



Breathing Air Monitoring

Professional solutions for mobile and stationary respiratory air monitoring.



Compressors | Purification | Storage | Filling Panels | Nitrox/Trimix

High performance and economic high pressure solutions
Made in Germany

Why is it important to monitor the quality of respiratory air?

As a matter of principle, operators are required to fill respiratory air in line with EN 12021. Most operators are aware of this obligation and make sure they take the appropriate measures for implementation. However, it is possible that hazardous substances end up in the respiratory air – despite adhering to all the regulations. Poor quality intake air, saturated filter cartridges or defective equipment may have consequences which endanger health or which are even life-threatening. Performing checks once or twice a year does not provide comprehensive protection. To be on the safe side, permanent monitoring is indispensable.

Potential hazards due to impurities in the respiratory air

Humidity (H₂O)

Today, all air compressors are supplied with appropriate filter systems as a matter of principle. These remove the water from the air and condition the compressed air. If the filter is replaced too late, water may enter the respiratory air bottles. These may then corrode from the inside. If the corrosion is severe, the bottles may burst. Furthermore, regulators may freeze in cold environments.

Carbon monoxide (CO)

Carbon monoxide is a dangerous toxic gas. Nearby combustion engines or heating systems may contaminate the intake air. If this air is then compressed, it becomes life-threatening very quickly. CO absorbed by the lungs impairs the blood's ability to transport oxygen. This may result in a loss of consciousness and subsequently death. This is always possible, especially when used on board a boat and insufficient attention is paid to the wind direction.

Carbon dioxide (CO₂)

The ever-increasing concentration of carbon dioxide is a problem which now concerns the whole world. In January 2020, the concentration of CO₂ in the atmosphere reached its current highest level of 415.79 ppm. Carbon dioxide results in clouding of perception, right through to loss of consciousness. It is currently an underestimated hazard, since all the molecular sieves on the market store more or less CO₂ and then, depending on the pressure, release it again – sometimes at extremely high concentrations far exceeding 3000 ppm.

Oil residues (VOC)

Here the intake location plays an important role. If, for example, the intake is directly inside workshops, garages or workstations, it is possible that oil vapours or other gases and vaporous substances may also be compressed. Sources of exterior air can also be hazardous; for example, in the case of plant metabolism, rotting and decomposition processes. Inhaled oils or other pollutants can penetrate unchecked as far as the pulmonary alveoli. The consequence may be inflammatory reactions (such as a lung infection). Other symptoms include dizziness, headaches and coughing.

Oxygen (O₂)

The oxygen content of the air is normally (21 ±1)%. Experience has shown that this is not problematic during compression. However, depending on the intake location, there is a possibility of an altered oxygen content. If the concentration is too low, symptoms of hypoxia may occur. There is a risk of clouding of consciousness, loss of consciousness, respiratory distress (right through to suffocation) and muscle weakness. Furthermore, an excessive oxygen content can have toxic effects under pressure.

Limit values as per DIN EN 12021:2014-07

Component	Limit value at 1013 mbar and 20 °C
Humidity (H ₂ O)	25 mg/m ³
Carbon monoxide (CO)	5 ppm
Carbon dioxide (CO ₂)	500 ppm
Oil residues (VOC)	0.5 mg/m ³
Oxygen (O ₂)	21 ± 1 Vol.-%

What solutions do L&W offer?

As a manufacturer, we believe that a merely „good“ quality level is insufficient. We are conscious of our responsibility to prioritise the quality of compressed air over all else. This is also why we always proceed in an exemplary way when manufacturing our respiratory equipment.

The standard DIN EN 12021:2014-07 (Respiratory equipment - Compressed gases for breathing apparatus) provides information on how the term „quality“ is defined. We offer different measurement equipment for the various sectors, allowing you to ensure your own equipment is safe by enabling you to constantly check and monitor the limit values. Turn to page 10 to find out more about the measurement technology we use.

The L&W Puracon series: an overview

Puracon	Humidity	CO	CO ₂	O ₂	VOC	Pressure
Mobil M200	5 – 99 mg/m ³	-	-	-	-	150 - 250 bar
Mobil M300	5 – 99 mg/m ³	-	-	-	-	250 - 350 bar
Mobil BA	5 – 120 mg/m ³	0 - 30 ppm	0 - 3000 ppm	0 - 25 %	0.05 - 0.5 mg/m ³	max. 350 bar
Stationary ECO	5 – 99 mg/m ³	-	-	-	-	150 - 350 bar
Stationary PRO	5 – 50 mg/m ³	-	-	-	-	150 - 350 bar
Stationary CO/CO ₂	5 – 120 mg/m ³	0 - 30 ppm	0 - 3000 ppm	-	-	max. 350 bar
Premium	5 – 120 mg/m ³	0 - 30 ppm	0 - 3000 ppm	0 - 30 %	0.05 - 0.5 mg/m ³	max. 350 bar



Puracon Breathing Air Monitoring

Puracon Mobil M200 / M300

The usage of a Puracon monitoring system is the most reliable and economic method of breathing air monitoring. L&W Puracon systems can be ordered as an option for a new compressor unit or can also be easily integrated into an existing filling stations.

Puracon Mobil M200 / M300 is used for humidity monitoring during filling procedures or to check the equipment before diving. The humidity value can be controlled during the entire filling procedure. Exceeding of the limits will be indicated by a red LED. The Puracon Mobil M200 / M300 can be connected directly between cylinder and filling hose (no installation work on the compressor required).

Pressure Ranges: M200: 150 to 250bar / M300: 250 to 350bar

Specifications

- » Auto shut down (battery saving mode)
- » Pressure compensation
- » Higher accuracy by new temperature compensation
- » Applicable without installation work on the compressor
- » Storage of max. humidity value
- » Alarm LED - freely adjustable limit
- » Humidity checks of filled tanks possible



Technical Data

Technical Data	M 200	M 300
Operating pressure	150 to 250 bar	250 to 350 bar
Power supply	2 x AAA LR03 alk. battery	2 x AAA LR03 alk. battery
Connector	DIN 200 (G5/8)	DIN 300 (G5/8)
Protection rating	IP64	IP64
Operating temperature	+5°C to +45°C	+5°C to +45°C
Dimensions	60 x 90 x 40 mm	60 x 90 x 40 mm

Monitoring Range	M 200	M 300
Humidity	0 - 99 mg/m ³	0 - 99 mg/m ³
Pressure	150 - 250 bar	250 - 350 bar

Puracon Breathing Air Monitoring

Puracon Mobil BA

The new Puracon Mobil BA is the professional solution for mobile monitoring of air quality according to the European standard EN 12021-2014. The system determines the moisture, CO, CO₂, O₂ and VOC* content in the compressed air within a few minutes.

Display and sensor system have been combined to a very compact and handy device, which replaces the conventional and laborious test method of using test tubes.

The system is connected between the filling connection and the bottle to be filled, the determined values are displayed clearly in the illuminated display. Air quality checks of already filled bottles can be carried out by using the high pressure throttle valve.

The Aerator unit of the Puracon Mobil BA enables the measuring of CO, CO₂ and O₂ concentration in the ambient air.

Specifications

- » High quality aluminum housing
- » Digital LCD display incl. warning LED (red / green)
- » Pressure / temperature compensation
- » Pressure reducer including throttle valve
- » Adapter DIN 200 / DIN 300
- » Filling connector DIN 200 / DIN 300
- » High pressure throttle valve
- » Assembly tools
- » Power cable (length 1.2 m) with 230V plug
- » Calibration unit consisting of:
 - Aerator unit incl. activated carbon filter
 - Pressure regulator with control valve including teflon hose



Technical Data

Technical Data	Puracon Mobil BA
Medium	Breathing air
Power supply	100 - 240 V
Connector	DIN 200 / DIN 300 (5/8")
Protection class	IP 50
Operating temperature	+5°C to +35°C
Dimensions	175 x 120 x 55 mm
Weight	1.3 kg

Monitoring Range	
Humidity	5 – 120 mg/m ³
CO	0 - 30 ppm
CO ₂	0 - 3000 ppm
O ₂	0 - 25 %
Oil	0.05 - 0.5 mg/m ³
Pressure	max. 350 bar

* VOC = (volatile organic compounds) Sensor for oil vapors and other air pollution such as Hydrogen H, Hydrosulfide H₂S, Ammonium NH₄, Ethanol C₂H₆O, Toluene C₇H₈.

Puracon Breathing Air Monitoring

Puracon Stationary ECO

The usage of a Puracon monitoring system is the most reliable and economic method of breathing air monitoring. L&W Puracon systems can be ordered as an option for a new compressor unit or can also be easily integrated into an existing filling stations.

Puracon Stationary ECO is a cost-efficient solution for humidity monitoring during the filling procedure.

The Puracon Stationary ECO can be connected directly to the high-pressure line after the humidity filter. The humidity value can be observed during the entire filling procedure. Exceeding of the limits will be indicated by a red LED.

Specifications

- » Adjustable measuring speed
- » Auto shut down (battery saving mode)
- » Pressure compensation
- » Higher accuracy by new temperature compensation
- » Storage of max. humidity value
- » Alarm LED - freely adjustable limit



Technical Data

Technical Data	Puracon Stationary ECO
Operating pressure	150 to 350 bar - adjustable pressure range
Power supply	2 x AAA LR03 alk. battery
Connector	G1/4 thread
Protection rating	IP64
Operating temperature	+5°C to +45°C
Dimensions	60 x 90 x 40 mm

Monitoring Range	
Humidity	0 - 99 mg/m ³
Pressure	150 - 350 bar

Puracon Breathing Air Monitoring

Puracon Stationary PRO

Puracon Stationary PRO is the professional solution for humidity monitoring during the filling procedure. The PRO version provides separated sensor and display unit. The sensor is connected directly to the high-pressure line after the humidity filter and is linked to the display unit via a data cable.

Specifications

- » Aluminum sensor housing with G $\frac{1}{4}$ " inlet and outlet
- » Display unit (Ø 96 x 37 mm) for wall mounting with sensor cable (length: 2 m)
- » Power supply cable (length: 1.7 m) with CE plug 100 - 230 V ~ 50/60Hz
- » Digital LCD display with humidity display in mg/m³ and error warnings
- » Higher accuracy by new temperature and pressure compensation
- » 2 monitoring LEDs, adjustable limits
- » 2 output signals (24V)
- » Sensor cables with 5, 10, 15 or 30 m available for surcharge
- » Approved up to 350 bar

Available versions

- » 420 bar sensor (stainless steel)
- » 12 V DC
- » 24 V DC
- » Ex with ATEX certification



Technical Data

Technical Data	Puracon Stationary PRO
Operating pressure	150 - 350 bar / optional 420 bar
Power supply	100 - 240 V / optional 12V or 24VDC
Connector	Sensor: G1/4 thread
Protection rating	IP64
Operating temperature	+5°C to +45°C

Monitoring Range	
Humidity	5 – 50 mg/m ³
Pressure	150 - 350 bar

Puracon Breathing Air Monitoring

Puracon Stationary PRO CO/CO₂

The new Puracon Stationary PRO CO/CO₂ is the professional solution for continuous monitoring of humidity + CO + CO₂ during the filling process of breathing air.

The stationary system is used to monitor all the required values of the breathing air quality in accordance with EN 12021 and provides a new security in the field of breathing air monitoring.

The Puracon Stationary PRO CO/CO₂ is connected to the high pressure line after the breathing air filter and can also easily retrofitted at already existing breathing air compressors.

The determined values are clearly shown in the illuminated LCD display and if at least one limit value in the breathing air is exceeded the red alarm LED lights up brightly and the compressor can be switched off automatically with the installed shut down relay. This guarantees legal compliant filling of breathing.

Specifications

- » Switch box for wall mounting
- » Large LCD display unit Ø = 96 mm
- » Power cord (length 1.2 m) with CE plug 230 V AC
- » Digital LCD display in ppm%, mg / m³ and bar
- » Pressure / Temperature compensation
- » Red Alarm LED
- » Green Operation LED
- » Pressure reducer including throttle valve
- » Gas flow regulator
- » Max. pressure: 350 bar (Optional 420 bar)
- » Including humidification line
- » Shut down relay

Options

- » Additional remote display incl. cable
- » 420 bar Version



Technical Data

Technical Data	Stationary PRO CO/CO ₂
Operating pressure	350 bar (Optional 420 bar)
Power supply	100 - 240 V
Connector	Inlet: 8L / Outlet: 8L
Protection rating	IP 54
Operating temperature	+5°C to +45°C
Dimensions	300 x 400 x 155 mm

Monitoring Range	
Humidity	5 – 120 mg/m ³
CO	0 - 30 ppm
CO ₂	0 - 3000 ppm
Pressure	max. 350 bar

Puracon Breathing Air Monitoring

Puracon Premium

The further development of the Puracon Premium offers professional monitoring of the breathing air quality during filling operations.

In accordance with EN 12021, all relevant components of the compressed breathing air such as humidity, CO, CO₂, O₂ and VOC are monitored for the safety of the system operator. The measured values can be called up worldwide on Windows-based devices and allow recording of 32,000 data units per second, minute, hour or day in real time. Location-independent remote maintenance, adjustments, as well as the graphical representation of all intake and compressed gas readings are continuously available. The data will be saved on the unit, can be downloaded via USB and other storage media or can be sent directly via email. The sensor circuit board can be easily calibrated by exchanging.

Specifications

- » Wall-mount control box
- » Mini-PC with display and storage of all relevant data
- » Display of the measured values in ppm, %, mg/m³, bar and °C
- » Pressure / temperature compensation
- » Green operation LED / red alarm LED
- » Pressure reducer including throttle valve
- » Signal output for compressor shutdown
- » Flushing function to eject non-standard air during compressor start-up
- » Integrated ventilation unit
- » Languages: German / English / French / Italian / Spanish / Chinese / Dutch

Functions

- » Remote maintenance / settings by L&W after approval
- » Remote access via Bluetooth, WIFI or with external software
- » Graphic representation of the gas readings (storage of 32,000 data units, display update per sec, min, h or d freely selectable)
- » Data backups via USB or as email
- » Display of filling time [min]
- » Pressure and temperature displays
- » Display of certificates, instructions and approvals
- » Streaming of the display on e.g. TV devices (up to 50")
- » Additional Puracon software for displaying the data optionally available



Technical Data

Technical Data	Premium
Operating pressure	350 bar (Optional 420 bar)
Power supply	100 - 240 V
Connector	Inlet: 8L / Outlet: 8L
Protection class	IP 54
Operating temperature	+5°C to +45°C
Dimensions	400 x 500 x 200 mm

Monitoring Range Sensor	
Humidity	5 – 120 mg/m ³
CO	0 - 30 ppm
CO ₂	0 - 3000 ppm
O ₂	0 - 30 %
Oil	0.05 - 0.5 mg/m ³
Pressure	max. 350 bar

* VOC = (volatile organic compounds) Sensor for oil vapors and other air pollution such as Hydrogen H, Hydrosulfide H₂S, Ammonium NH₄, Ethanol C₂H₆O, Toluene C₇H₈.

What technology does L&W use for measuring?

All our measuring systems work with pressure and temperature compensation.

The following measurement methods are used, depending on the component to be analysed:

Humidity (H₂O)

Capacitive humidity sensors are used for humidity monitoring. This occurs in the high-pressure range. In contrast to humidity measurement at ambient pressure – where pre-drying over long periods is sometimes necessary – high-pressure measurement offers several advantages. The number of water molecules to be measured is significantly higher, enabling values to be determined very rapidly. Furthermore, long periods of pre-drying are not necessary, and the sensor is ready to use very quickly. Unlike cheaper systems, with L&W, the actual humidity value after the filter is measured. As required by EN 12021, the measured value is displayed as an absolute humidity in mg/m³.

Carbon monoxide (CO)

Carbon monoxide is measured with a chemical sensor. This uses the CO to generate a small current. Due to the chemical reaction, the sensor is depleted very slowly. The operating life is approx. 3 to 5 years.

Carbon dioxide (CO₂)

L&W uses an IR (infra-red) sensor here. This sensor has no materials which decompose or which are depleted during measurements. The advantage of this system is its long operating life of up to 10 years.

Oil residues (VOC)

These are measured using VOC metal-oxide sensors. Although not directly required to do so by the standard, this sensor also detects many other air pollutants and triggers an alarm immediately. Unlike other manufacturers who use PID sensors with measurement ranges from 0 to 100 ppm, L&W is able to measure far below 1 ppm. EN 12021 speaks of a maximum oil concentration of 0.5 mg/m³ or less than 1 ppm. We are therefore close to the required limit value and measure with high sensitivities (1:10,000,000). This kind of measurement range detects the tiniest changes immediately and works more accurately and faster.

Other advantages are operating life and the service costs. PID sensors use UV lamps which must be replaced after approx. 8000 hours (less than one year if switched on permanently), resulting in high running costs. If these sensors are switched off to reduce costs, they need a long time to reactivate – which means rapid measurements are no longer possible.

Oxygen (O₂)

This is measured with a chemical sensor. The sensor uses the oxygen to generate a voltage. Here the sensor is depleted due to the internal chemical reaction. According to the manufacturer however, an operating life of up to 3 years can be expected. Depending on the location it is used in (in very dry air) realistically this is, however, between 1.5 to 2 years.

Pressure

The pressure sensor used is a pre-calibrated pressure sensor with a stainless steel measuring cell.

Temperature

Here too, a pre-calibrated sensor is used to display the temperature value in a digital format.

Calibration

Displaying reliable data is fundamental for every piece of monitoring equipment. Depending on the application and location, there is a variety of alternatives to choose from for calibrating the monitoring systems. The sensor circuit boards must be calibrated by L&W after two years at the latest.

Test gas

L&W offers you the opportunity to purchase your own calibration unit, including the test gas. This enables you to perform extra tests on the system multiple times a year. The test gas comprises a special mixture. However, it is not a substitute for the required manufacturer calibration.

CAUTION: Only use original L&W test gas! Standard test gases may damage the Puracon sensors.

Calibration by L&W

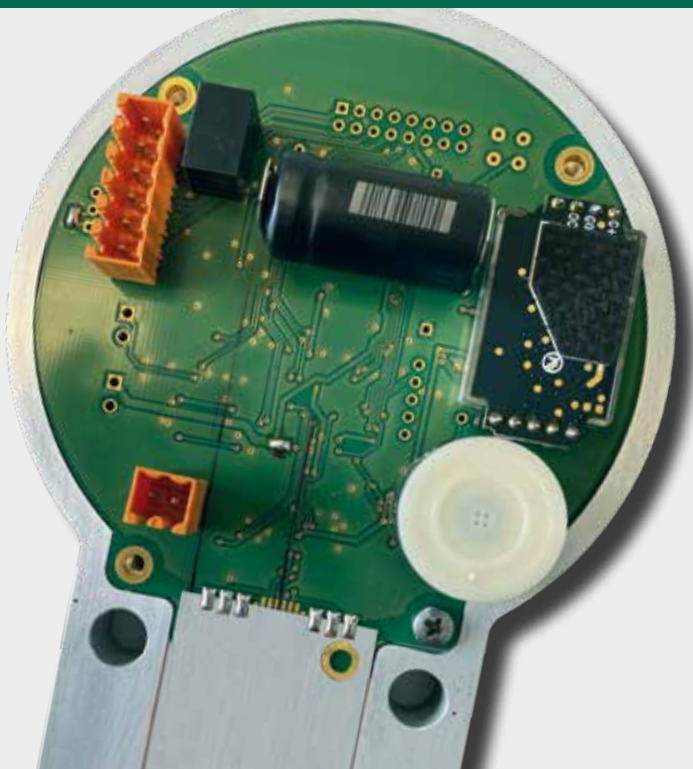
For full factory calibration, the sensor circuit boards must be sent to us – after 2 years at the latest. Here it is only necessary to unscrew 4 screws and unplug the connectors. The circuit board is then serviced in the factory: the electronics are inspected and calibrated and the circuit board is sent back again. When shipping, it is important to provide sufficient packaging to ensure the sensors are well-protected.

Replacing the sensor circuit boards

Many operators do not have the option of deactivating their systems for calibration and waiting for the sensors to be returned. With this in mind, there is the option to exchange the sensor circuit boards. Once they have been delivered, the customer must perform the exchange. The old circuit boards are then returned to L&W.

This method replaces the required manufacturer calibration. In addition, L&W provides a warranty period of one year on ALL sensors.

Our sensors



The advantages

- » High-quality sensors
- » Pressure-compensated sensors
- » Temperature-compensated sensors
- » Real-time reaction (no determination of average value)
- » Measurement ranges close to EN 12021
- » Long calibration intervals
- » Rapid replacement of the sensor circuit board



L&W - World Wide

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Current product range as pdf



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