

PRODUCT DATA SHEET

BAUER GAS MEASUREMENT SYSTEM B-DETECTION PLUS

DESCRIPTION

- Alarm and fault warnings when limits specified in EN 12021:2014 are exceeded¹
 - Direct connection to compressor control unit (B-CONTROL MICRO or B-CONTROL II) possible
 - Available as integrated version or stand-alone version
 - NEW: Measurement of intake air, ambient air as well as measurement directly from a breathing air cylinder
- ¹ Humidity and VOC measurement as option

B-DETECTION PLUS is designed as a permanently installed gas measurement system for online monitoring of CO₂, CO, O₂, absolute humidity and VOC's (volatile organic components as in vaporized oily substances) in compressed breathing air. If limits are exceeded, the control system shows a warning signal i.e. alarm on the display and thereafter automatically shuts down the system. Available in two versions: either B-DETECTION PLUS i (integrated into a MINI-VERTICUS, a VERTICUS or a PE-VE, not retrofittable), and or B-DETECTION PLUS s (standalone, suitable for all other BAUER compressors with control units and suitable for retrofitting to any other existing system). The measurements can be saved in the B-CONTROL MICRO data logger and thereafter simply transferred to a computer in Excel format by applying an SD card.

TECHNICAL DATA SENSOR MODULE

B-DETECTION PLUS	Integrated	Standalone
Medium	Air; nitrox (max. 40% O ₂) ¹	
Permissible operating pressure (inlet AIRBOX)	Max. 350 bar (higher pressures on request)	
Permissible charging rate (inlet AIRBOX)	Max. 850l/min (higher charging rates on request)	
Permissible operating temperature	+5°C ... +45°C	
Permissible storage temperature	-10°C ... +50°C	
Max. permissible impact stress	2 g	
Operating pressure (sensors)	Ambient air pressure (approx. 1013mbar)	
Maximum permissible ambient humidity	0 to 90% non-condensing	
Permissible operating environment	Non-explosive only	
Operating voltage / frequency	24 VDC	100 - 250 VAC, 50/60 Hz
Power consumption	Connection via compressor	Max. 50 W
Flow rate (compressed air flow)	0.5 ... 1.5 l/min	
Outputs	-	3 relay outputs
Serial connection	Modbus RS485 (internally used)	CAN-Bus, Profibus DB optional with gateway, Ethernet interface
Gas intake connector	6 mm	
Weight	2 kg	7.1 kg
Dimensions (H × W × D)	160 × 260 × 92 mm	462 × 354 × 184 mm
Protection class (DIN EN 60529)	-	IP64 (wall mounted)
1 No VOC measurement possible for Nitrox applications.		



Sensor Modules

The sensors of the B-DETECTION PLUS are arranged to provide optimal operating conditions for each sensor. To deliver optimum results, electrochemical sensors (CO and O₂) require gas with specific humidity, pressure and temperature characteristics. However, physical sensors (CO₂) require different conditions to provide continuously reproducible and reliable measurement values. The following sensor modules are supplied as standard in the B-DETECTION PLUS Gas Measurement System:

Oxygen (O ₂)	
Medium	Air; nitrox (max. 40 % O ₂)
Measurement cell type	Electrochemical
Measurement range	0 % ... 40 % O ₂
Accuracy of full scale (FS)	
At calibration temperature	± 1.0 %
At ± 10 ° C deviation from calibration temperature	± 1.0 %
Throughout temperature range 5 ° C to + 45 ° C	± 1.0 %
Warm-up time	60 s
Replacement interval	As required

Carbon monoxide (CO)	
Medium	Air; nitrox (max. 40 % O ₂) ¹
Measurement cell type	Electrochemical with 3 electrodes
Measurement range	0 ppm to 25 ppm (parts per million)
Accuracy of full scale (FS)	
At calibration temperature	± 1.0 %
At ± 10 ° C deviation from calibration temperature	± 2.0 %
Throughout temperature range 5 ° C to + 45 ° C	± 3.5 %
Warm-up time	60 s
Replacement interval	As required

¹ For Nitrox applications, the accuracy of the sensor may be impaired.

Carbon dioxide (CO ₂)	
Medium	Air; nitrox (max. 40 % O ₂)
Measurement cell type	Non-dispersive infrared sensor
Measurement range	0 ... 2000 ppm (parts per million)
Accuracy of full scale (FS)	
At calibration temperature	± 0.5 %
At ± 10 ° C deviation from calibration temperature	± 2.5 %
Throughout temperature range 5 ° C to + 45 ° C	± 4.0 %
Warm-up time	180 s
Replacement interval	Approx. 7 years

Sensor Modules Optional

To measure absolute humidity, a dew point sensor can be connected to the pressure reducer unit. The display is in mg / m³.

Dew point sensor	
Medium	Air; nitrox (max. 40 % O ₂)
Measurement range	-70...+60 °C (-94...+140 °F) / 10 ... 40000 ppm
Permissible storage temperature	-40°C to +60°C
Measurement accuracy at 20°C	± 2°C (±3.6 °F) / 1 ppm + 20% of displaced value
Response times 63 % [90 %] at +20°C gas temperature and 1 bar	-60 °C --> -20°C 5s [15s] -20°C --> -60°C 45s [10 min]
Flow rate (compressed air flow)	2.0 ... 5.5 l/min
Calibration interval	2 years
Housing	Stainless steel (AISI 316L)
IP rating of housing	IP66
Mechanical connection	ISO G1/2" or NPT 1/2
Weight	90 g

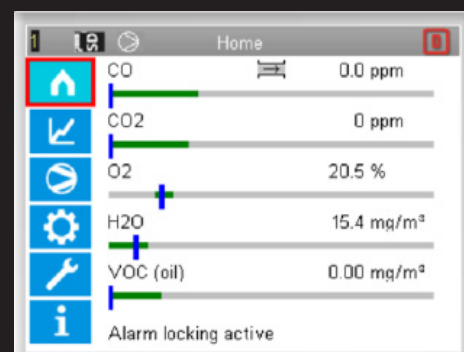
In addition, residual oil can optionally be measured as oil vapour¹:

Volatile organic compounds (VOC)	
Medium	Air
Measurement sensor type	Photoionization detector (PID)
Measurement range	0...1 ppm (parts per million; isobutene as calibration gas)
Detection limit	5 ppb (parts per billion; isobutene as calibration gas)
Storage temperature range	-20 ... +60°C
Relative humidity range	0...90 % non-condensing
Warm-up time	180 s
Sensor lamp life	6,000 operating hours

¹ DIN EN 12021:2014 defines limits for oil content. Reliable measurement of oil vapour content of the air. Sensor calibration based on isobutene. Oil mist limits as mentioned in DIN EN 12021:2014 are not measured.

B-Control Display

All measurement values are clearly shown in the display of the B-CONTROL MICRO + net Gas Measurement System (standalone version) or of the compressor control unit (integrated version) and can be logged from there. Limits can be adjusted as required using the respective control unit keypad. The CAN interface allows measurement results from the B-DETECTION PLUS s to be transmitted to a B-CONTROL II unit or B-CONTROL Micro +net compressor control unit (B-CONTROL I and B-CONTROL MICRO: additional relay contact is required for the alarm function). When limits are exceeded, the compressor then automatically shuts down and shows a warning message on the display.



Gas measurement values displayed by the B-CONTROL MICRO (+ net)

Monitoring

The values measured are monitored by the electronic system. As soon as a measurement value exceeds a predefined alert limit, the following event is triggered:

- Visual warning (message in display)

In addition, the following event is triggered by the integrated B-DETECTION PLUS i model and the standalone B-DETECTION PLUS s (if integrated into the compressor):

- The corresponding relay is activated, that means. the compressor shuts down or the automatic purging valve is opened (see also "Options")

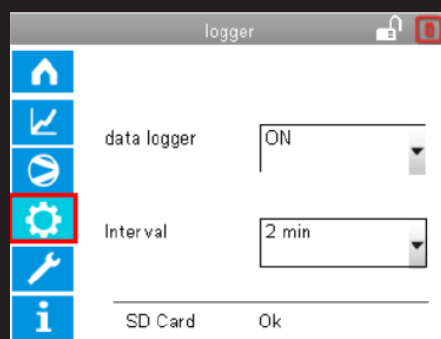
Alarm limit values can be set as required. Two alarm limits can be set per sensor. Default alarm limit values are set to comply with the DIN EN 12021:2014 standard.

If desired, the Own-Risk mode can be set, in which the alarms are deactivated in a password-protected manner to prevent the compressor from shutting down in emergencies.

Data Logger

The B-CONTROL's data logger function allows all measurement values within a definable interval to be logged and exported in Excel format using an SD card (B-CONTROL MICRO). A list of names can be saved in the SD card.

Shortcuts can be used to start and stop the logger.



Data logger display

Gas Sampling Unit

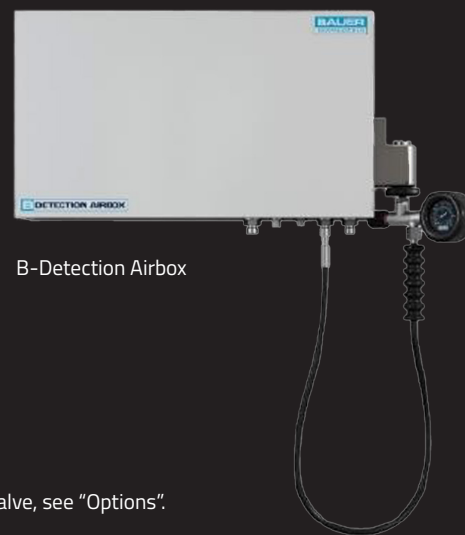
The pressure reducing unit enables the measurement system to be connected to (high-) pressure lines. An integrated solenoid valve prevents unnecessary sensor load and backflow from the pressure vessels during compressor idle time.

The pressure reducer is integrated in the B-DETECTION AIRBOX for the B-DETECTION PLUS s, while for the B-DETECTION PLUS i, the gas sampling unit is integrated into the compressor.

B-DETECTION AIRBOX	
Inlet pressure	Min. 7 bar
Weight	14 kg ¹
Dimensions (H×W×D) with connections	266 × 409 × 129 mm
Protection class	IP21 ²

¹ Weight details for the AIRBOX refer to the model with full range of functions incl. automatic purging valve, see "Options".

² As per DIN EN 60529, wall mounted



B-Detection Airbox

System Check

To ensure precise measurements as well as to lengthen the service life of the device, the following inspection intervals are recommended:

Inspection types	Inspection intervals
Visual check	Monthly (1 month)
Function check	Quarterly (3 months; calibration whenever required)
Sensor replacement	As required
Calibration of sensors	Dew point: every 2 years (sensor to be returned to BAUER as part of an exchange program) Other: when required
Inspection records	3 years

It furthermore is possible to execute a fully automatic sensor test after a pre-set test interval; note the "automatic test gas test" option for this.

For further maintenance-related information, please refer to the works operating instructions and the works maintenance plan. A testing gas kit for sensor checks is available separately from BAUER.

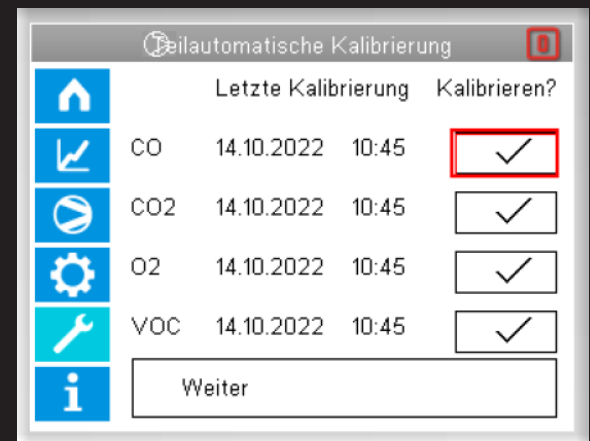
Calibration

The sensors can be semi-automatically calibrated. In this case, all sensors are calibrated together. The menu navigation provides simple step-by-step instructions. A selection of sensors can be made individually via the B-CONTROL. During calibration, the flow rate is monitored and a timer is started.

Furthermore, an expert calibration is also possible. A manual calibration of the sensors is possible in the corresponding software menu and is recommended every 12 months for the CO₂ and VOC sensor (PID). Same applies in case of CO and/or CO₂ sensor exchange only.

If a replacement assembly (PCB including CO and O₂ sensor) is applied, then the CO and O₂ sensors are already calibrated at BAUER KOMPRESSOREN in order to ensure the highest possible sensor accuracy.

Calibration gases are available separately from BAUER, too.



Calibration menu display

OPTIONS

Gas Humidification

To deliver optimum results, electrochemical sensors (CO and O₂) require gas with specific humidity, pressure and temperature characteristics. Incorrect or lack of gas preparation significantly reduce sensor service life. Where the B-DETECTION PLUS is in continuous operation for periods over one hour, BAUER therefore recommends humidifying the test gas flow to maximise sensor service life.

Compressor shutdown if limit values for one or more gases are exceeded

Compressor shutdown where defined limit values are exceeded may be effected by CAN BUS (for B-CONTROL MICRO +, B-CONTROL MICRO + net and B-CONTROL II) or a potential-free contact, depending on the control unit of the compressor system. Up to 3 compressors can be shut down.

Connection to other control systems (for B-DETECTION PLUS s)

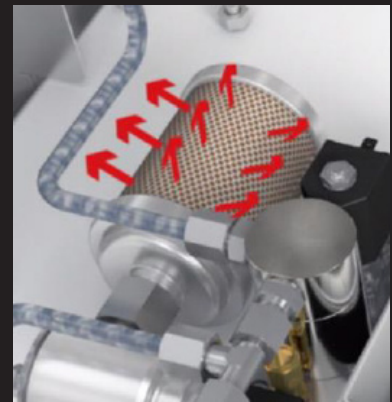
The following interfaces can optionally be used to connect the unit:

- CAN (L2)
- Profibus DP (add-on module)
- Profinet
- Modbus RTU
- Modbus TCP
- Fault message contact (potential-free)

Automatic Purging Valve

The automatic purging valve can be integrated into the B-DETECTION AIRBOX for standalone systems or built directly into the compressor system in the case of integrated systems. If limit values are exceeded during gas measurement at the time of computer start-up or operation, the B-DETECTION PLUS suppresses compressor shutdown and purges the compressed air for a specific time, releasing it into the environment via the soundproof purging valve. If the air values have not improved after the specific period, the compressor then shuts down.

This is particularly recommended for automatic system operation. It requires the B-DETECTION PLUS system to be connected to the compressor control unit.



Automatic purging valve

In normal cases, the concentration of CO₂ in the compressed breathing air in the filter housing is equal to the concentration in ambient air. However, this may deviate when filter cartridges are replaced (the molecular sieve adsorbs CO₂ from the air for a short period of time) and/or when the pressure in the filter housing drops. When pressure drops, the CO₂ content of the air in the filter housing rises. When the compressor is then restarted, the higher CO₂ concentration as collected in the filter housing is flushed out of the filter housing. To avoid these raised CO₂ levels in the compressed breathing air, it is strongly recommended to purge the compressor system for approx. 5 minutes before connecting and filling the breathing air cylinders, i.e. opening the purging valve to release compressed air. This purging procedure runs automatically in case the automatic purging valve option is selected.

Ambient Air Pump

An additional pump installed in the measurement system enables the gas composition of the intake air to be analysed. Where the CO₂ content in the ambient air permanently is 450 ppm or higher, the use of an AERO-GUARD CO₂ scrubber is strongly recommended.

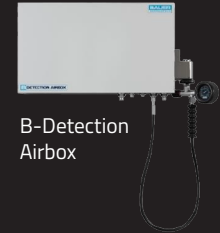
By means of an adapter for intake air measurement, the intake air conditions can be checked directly in the intake section (hose or pipe) of the compressor unit.



Ambient air pump

Cylinder Measurement

With the B-DETECTION PLUS s and i, it is possible to check breathing air cylinders that have already been filled. The cylinder adapter (filling hose) located on the AIRBOX remains pressurized at all times, resulting in a fast response time during measurement.



B-Detection Airbox

Connection to B-APP

The BAUER KOMPRESSOREN APP (B-APP) offers features such as product-specific news, videos and calculation tools on the subject of compressed (breathing) air.

In addition, the B-APP enables the remote control and monitoring of systems with the new BAUER control B-CONTROL MICRO +net. The connection to the compressor or the B-DETECTION can be made either directly via local WLAN or via B-CLOUD.

B-APP can be downloaded free of charge from the App Store (iOS) and via Google Play (Android).



Controlling the unit with the B-APP

B-LINK

WLAN Access Point/Client. For setting up a WLAN for communication B-CONTROL MICRO +Net with the B-APP (remote function) or B-CLOUD.

- Preconfigured as access point: Direct WLAN connection with a device (smartphone, tablet).
- Client: For connection to existing WLAN (home router, DSL router, company network). The configuration is performed by the customer.
- The WLAN module is installed at a suitable location in the compressor and connected ready for operation. Any necessary adjustment to the configuration are made by the customer.



B-LINK 4G

As aforementioned, however additionally equipped with mobile radio function (4G)

- Industrial 4G LTE Wi-Fi router for IoT applications
- Dimensions: 83 × 25 × 74 mm (without antennas)
- Incl. 10 m Ethernet cable for connection to the B-CONTROL MICRO +net
- Ready for mobile radio operation ex works. Configuration for WLAN to be executed by end user.

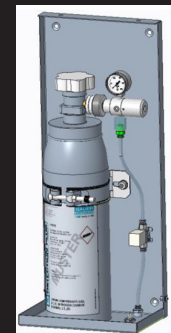


A suitable SIM card (4G/LTE) or a mobile phone contract must be organised by the customer and is not included in the scope of delivery. Depending on the local conditions, installation or mounting is carried out on site outside the compressor unit or B-DETECTION.

Automatic Bump Test with Cylinder

The automatic test gas test fully automatically checks the sensors according to the pre-set test interval. Furthermore, the remaining cylinder content and the correct flow rate are constantly monitored, too.

The default setting here is 1 test per week. At this interval, the cylinder content is sufficient for approx. 2 years.



RULES, STANDARDS AND GENERAL INFORMATION

- EU Pressure Equipment Directive (2014/68/EU)
- EU Low-Voltage Directive 2014/35/EU
- EU Electromagnetic Compatibility (EMV) 2014/30/EU
- Safety requirements for electrical measurement, control, and laboratory use EN 61010-1 July 2011

Applicable national standards and technical specifications, in particular

- T 021 Gas detection systems and equipment for toxic gases/vapours and oxygen - Use and operation

Documentation:	1 × operating manual and parts list with exploded view drawing
Model:	In line with the state of the art according to DIN, VDE, TÜV and Accident Prevention regulations
Testing:	In line with Bauer standard, as per DIN EN 10204 - 3.1

Otherwise the General Terms and Conditions of BAUER KOMPRESSOREN (AGB) in the version valid at the time of contract conclusion apply. These Terms & Conditions can be viewed and downloaded at the website www.bauer-kompressoren.com, or sent by BAUER on request.

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