


Data sheet bluSensor® Mini

Model - Humidity and Temperature Monitoring (BSP02AIR)



- Long-term stable sensors
- Integrated sensors
 - Humidity: +/- 2% rH
 - Temperature: +/- 0.2° C
- Additionally calculated values:
 - Dew point
 - Absolute humidity
 - Water vapor partial pressure
- No calibration necessary
- Data memory for 3 months (optionally extendable)
- Open interface for integration into external systems
- Robust housing with translucent RGB
- 2.4 GHz Wi-Fi
- Bluetooth Low Energy
- bluSensor® AIR App 

Product Summary

This temperature and humidity monitor is a digital wireless sensor designed with the latest IoT technology to easily log sensor values and trigger alarms when limits are exceeded. Whether you're on site or polling your values remotely, you'll always be up to date. It has a wide range of applications and is strictly designed to overcome conventional limits in terms of size, integration possibilities and price-performance ratio. The sensor covers a humidity measurement range of 0 to 99% RH and a temperature range of -35° to +75° C with a typical accuracy of +/-2% RF and +/- 0.2 °C. It is ideal for monitoring storage areas, refrigeration systems for industrial facilities such as control cabinets, or for monitoring indoor climate for mold problems. With the industry-proven quality and reliability of humidity and temperature sensors from a Swiss sensor manufacturer and the constant accuracy over a wide

measuring range, the bluSensor® temperature and humidity monitor offers the best price-performance ratio. A large data memory allows long-term recordings with individually configurable intervals from 1 to 30 minutes. The digital wireless sensor is a component of the latest bluSensor® technology and transmits its data wirelessly to smartphones or tablets. When developing the associated app, particular attention was paid to user-friendliness and ease of operation. In addition, it is compatible with the bluSensor® IoT sensor platform and can be connected online through the bluSensor® Gateway app. The bluSensor® allows integration into existing applications through its open interfaces. Good documentation and practical examples enable a labor-saving and rapid integration of the temperature and humidity monitor into any third-party systems.

Interval	Maximale Werte	Zeitraum
10 minutes	12.960	3 months
<i>for an extra charge:</i>	<i>individually adjustable</i>	
e.g. 1 minute	1.036.800	2 years


Advantages of bluSensor® technology

- Digitization made easy
- Best price - performance ratio
- Wide range of applications
- User-friendly operation
- Online tutorials and videos
- Integration into any external system

Data sheet bluSensor® Mini

Package - Humidity and Temperature Monitoring (BSP02AIR)



- Can be operated with user-friendly bluSensor® AIR app 
- Can also be used without app (device flashes in different colors when limit values are exceeded)
- Translucent housing for integrated, multi-color warning light (RGB)
- Power supply via USB (continuous operation)
- Use of long-term stable and calibrated sensors
- Dual radio (Bluetooth and WiFi)
- Reset button on the back for factory settings
- Dimension 48 x 48 x 14 mm

Model BSP02AIR	Functions
Bluetooth 4.2 (soon 5.0)	x
Wi-Fi 2.4 GHz (soon Wi-Fi MESH)	x
Integrated multicolor LED warning light	x
Power supply	USB 5V
Integrated Sensors	
Relative Humidity	x
Temperature	x
Dew Point	x
Absolute Humidity	x
Water vapor partial pressure	x
Data Memory on the Device	
2 Megabyte (MB)	Option

Temperature
Humidity

valid for:

Model - Humidity and Temperature Data Logger (BSP01AIR)

Model - Humidity and Temperature Monitoring (BSP02AIR)

Model - Hygiene monitor for commercial kitchens - Warning light (BSP03TEM)

Recommended storage conditions

Important !

Please store properly and do not let it condense !

The temperature should be in the range of 10°C - 50°C and 20% - 60% relative humidity. It is recommended to put the sensors into operation within 1 year from the date of delivery.

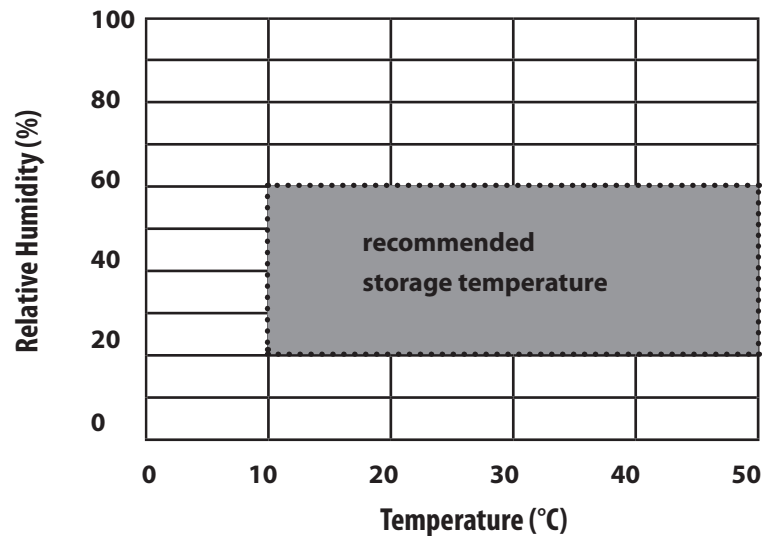


Figure Recommended humidity and temperature for sensor storage.

Recommended operating conditions

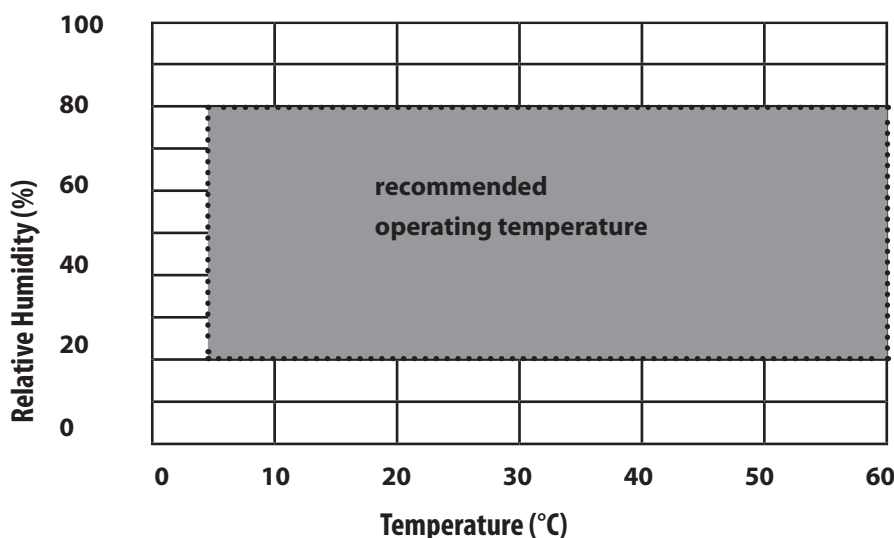
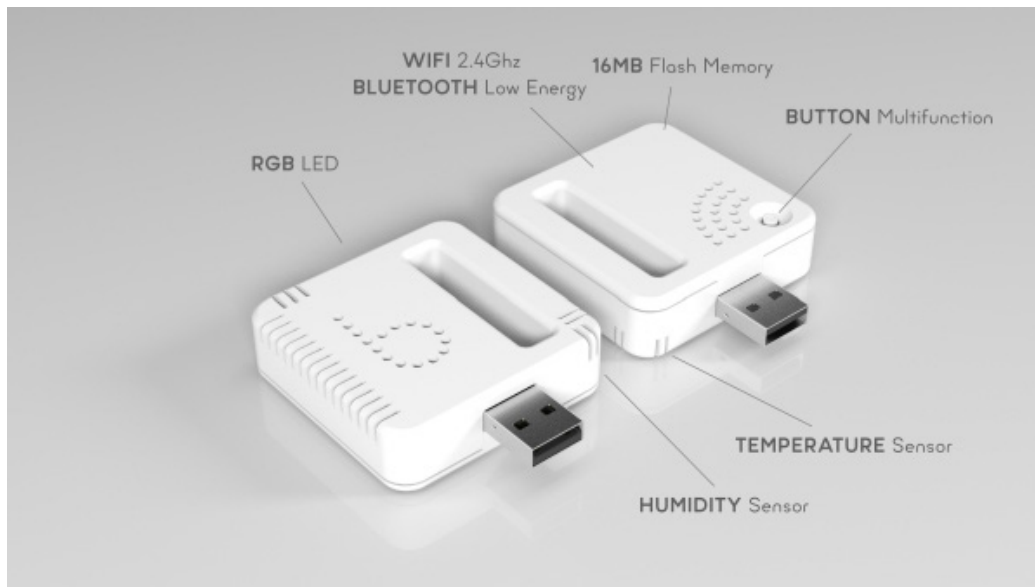


Figure Recommended humidity and temperature for sensor operation.

The sensor works best when operated within the recommended normal temperature and humidity range of 5 - 60 °C and 20 - 80 % RH, respectively. Prolonged exposure to conditions outside the normal range, especially high humidity, may cause a temporary shift in the RH signal (e.g. +3 % RH after 60 hours at >80 % RH). After returning to the normal temperature and humidity range, the sensor slowly returns to its calibration state by itself. Prolonged exposure to extreme conditions may accelerate aging.

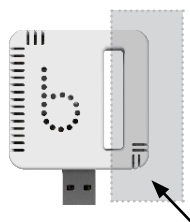
Temperature
Humidity

valid for:
Model - Humidity and Temperature Monitoring (BSP02AIR)



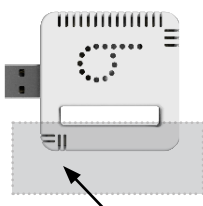
Optimal position

To achieve the most accurate measurement results, the environment in which the sensor is positioned must also be taken into consideration. Please note that in one room the air quality can differ. Next to the window is the freshest air, while in corners or niches it is much worse. Position the sensor where you spend the most time. Please also take into consideration that when you ventilate in places that are not easily accessible, the fresh air will be distributed later. If you use a low-quality power supply unit that heats up slightly during continuous operation, this can influence your measurement result. A heat cloud is created around the heat-radiating power supply unit, which leads to slightly increased temperature values.



Temperature sensor

The housing was specially designed to achieve the highest measurement accuracy. With regard to temperature, the sensor was positioned in its own area separated by chambers in order to be able to provide unbiased measurement results isolated from the rest of the electronics.

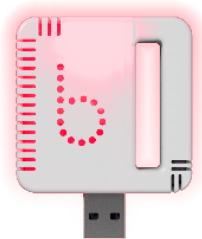


2 ideal positions

The most optimal position of the device is when the temperature sensor is at the bottom (**see figure on the left or top**) and when it is supplied with fresh air from all sides. USB goosenecks are also available in the accessories to position the sensor as desired and possibly remove it from radiating power plugs.

Temperature
Humidity

valid for:
Model - Humidity and Temperature Monitoring (BSP02AIR)


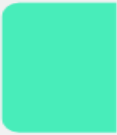


Warning light

You can define limit values for temperature and humidity. If these are exceeded or undershot, a warning light starts to flash. If no warning light is illuminated, either no limit values have been exceeded or no alarms have been activated on the device. The alarm is switched off at the factory and must be activated with the bluSensor® app.

Colour chart:

By means of the color you can recognize which limit value has been exceeded. The factory setting for the limit value definition is as follows:

	too wet or too warm preset limit value: > 75 % relative humidity or > 35°C temperature
	too cold or too dry: preset limit value < 10 °C temperature oder < 25% relative humidity

The preset limit values can be changed at any time in the bluSensor® app.

No warning light
= no limit value exceeded !
(or no alarms activated on the device)

Temperature
Humidity

valid for:

Model - Humidity and Temperature Data Logger (BSP01AIR)

Model - Humidity and Temperature Monitoring (BSP02AIR)

Model - Air Quality Sensor Smart Home (BSP02AIQ)

Model - Air quality - VOCs (volatile organic compounds) (BSP03AIX)

Model - Air quality - CO2 and VOCs (volatile organic compounds) (BSP03AIXC)

Model - Hygiene monitor for commercial kitchens - Warning light (BSP03TEM)

Value ranges, resolution and time response

Parameter	Value	Value range
Specified area	Temperature	-35°C to +75°C
	Humidity	0 % to 99 % rF
Resolution	Temperature	0,1°C
	Humidity	0,1% rF
Response time ³	Temperature	<5 to 30 seconds (τ 63%)
	Humidity ¹	8 seconds (τ 63%)
Sampling rate	Temperature	1 Hz
	Humidity	1 Hz

Table Value ranges and resolution for integrated sensors (temperature, humidity)

1 Time for reaching 63% of a humidity jump function, valid at 25°C and 1 m/s air flow. The humidity response time in the application depends on the sensor design.

2 Typical value for operation in normal humidity/temperature operating range. Max. value is < 0.5% rel. humidity per year. Value may be higher in environments with evaporated solvents, out-gassing tapes, adhesives, packaging materials, etc.

3 If, at a customer's request, a protective membran has also been integrated in the housing, the response time may be slower, since the penetration of air through the protective membran also requires a certain amount of time.

No recalibration necessary !

No calibration required for the temperature and humidity sensor

Each integrated temperature and humidity sensor has been individually tested and calibrated by our sensor supplier. For calibration, the supplier uses transfer standards that are subjected to a scheduled calibration procedure. The calibration of the reference, used to calibrate the transfer standards, is NIST traceable by an ISO/IEC 17025 accredited laboratory. The sensors are stable over time and do not require recalibration when properly used.

valid for:

Model - Humidity and Temperature Data Logger (BSP01AIR)

Model - Humidity and Temperature Monitoring (BSP02AIR)

Model - Air Quality Sensor Smart Home (BSP02AIQ)

Model - Proper ventilation in school classrooms - Warning light (traffic light)(BSP03AIX)

Model - CO2 monitor for ventilation systems - warning light (traffic light) (BSP03AIXC)

Model - Hygiene monitor for commercial kitchens - Warning light (BSP03TEM)

Temperature
Humidity

• **Gas measurement performance of the integrated sensor system:**

Temperature, Humidity

typ.: +/-0,2 °C für temperature und +/- 2% RH for humidity

typ.: < 0,02 °C derivation for temperature und 0,25% for humidity per year (log-term drift)

Integrated algorithm for the conversion of dew point, absolute humidity, water vapor partial pressure

The specifications listed apply to the individual components integrated by us and may deviate minimally in our finished housing variants.

Gas measurement performance of the integrated sensors (temperature, humidity)

We only integrate electronic components that meet our quality criteria. The temperature and humidity sensors we integrate are used by suppliers who perform their tests based on the JEDEC JESD47 qualification test method. The Moisture Sensitivity Level classification of the integrated air quality sensors is MSL1, according to IPC/JEDEC J-STD-020. Each integrated temperature, humidity sensor has been individually tested and calibrated by our supplier. For calibration, the supplier uses transfer standards that are subjected to a scheduled calibration procedure. The calibration of the reference, used to calibrate the transfer standards, is NIST traceable by an ISO/IEC 17025 accredited laboratory. The following section discusses the measurement accuracy of the integrated sensor system. The specifications listed apply to the individual components integrated by us.

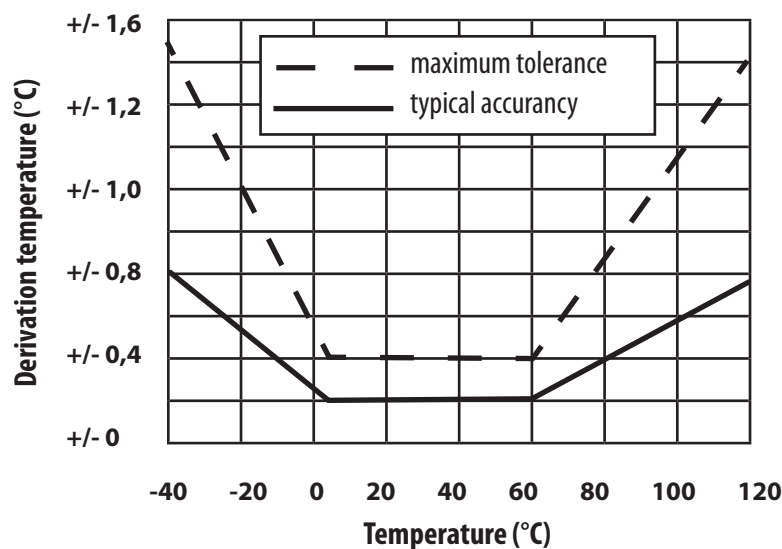


Figure Typical and maximum tolerance in the accuracy of an integrated temperature sensor.

Temperature
Humidity

valid for:

Model - Humidity and Temperature Data Logger (BSP01AIR)

Model - Humidity and Temperature Monitoring (BSP02AIR)

Model - Air Quality Sensor Smart Home (BSP02AIQ)

Model - Proper ventilation in school classrooms - Warning light (traffic light)(BSP03AIX)

Model - CO2 monitor for ventilation systems - warning light (traffic light) (BSP03AIXC)

Model - Hygiene monitor for commercial kitchens - Warning light (BSP03TEM)

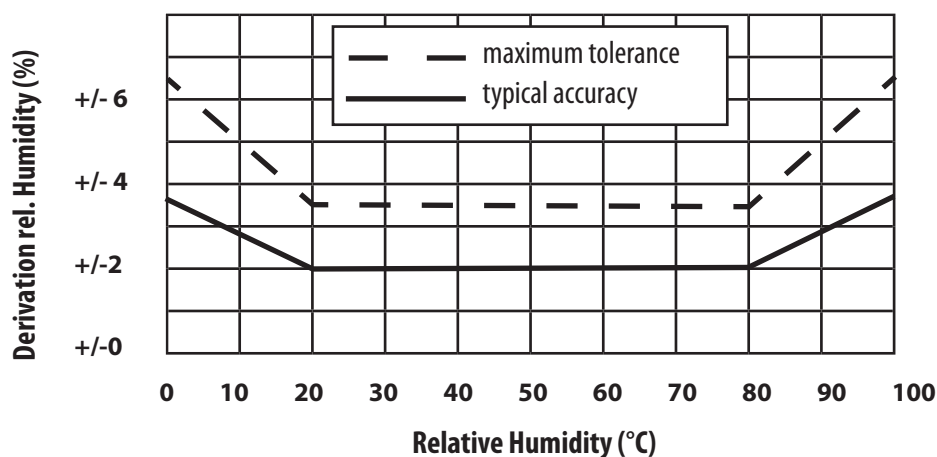


Figure Typical and maximum tolerance in accuracy of an integrated humidity sensor at 25°C.

Accuracy of humidity at different temperatures

The typical accuracy of humidity at 25°C is defined in the previous table. For other temperatures a typical accuracy was determined, which is shown in the following table. The figure refers to the integrated sensor technology and its specification.

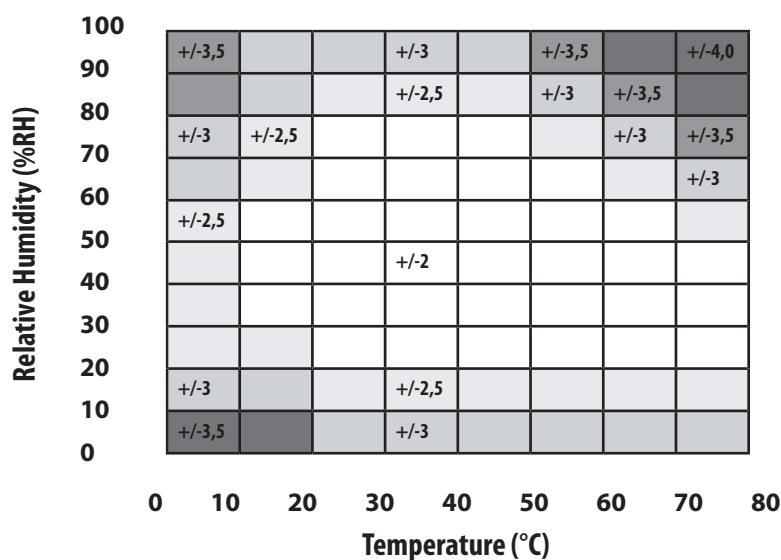


Figure Typical accuracy of relative humidity measurement of integrated sensor in %RH at temperatures from 0°C to 80°C.

Data sheet bluSensor® - all Models

General Information



Time specifications

For the use of the sensor you have to consider certain time factors. These can be found in the table below.

Parameter	Value
Switch-on time until ready for operation	10 seconds
Active Bluetooth connection	1 Hz (update rate)
Passive Bluetooth connection	10 seconds
Wi-Fi connection	10 minutes (default update rate)
Alarms (soon available)	1x immediately in the event of a limit being exceeded 1x as soon as normal range is reached again

Table Time specifications / general and for integrated sensor technology

Absolute minimum and maximum values

Loads exceeding the values shown in the table below may cause permanent damage to the device. These are load values for electrical components. The function of the device under these conditions cannot be guaranteed. Exposing the device to maximum values over a longer period of time may affect the reliability of your device.

Parameter	Wert
Supply voltage for models with battery	3 V
Supply voltage for models with USB	5 V
Supply voltage for models with power supply unit	12-24 V
Supply voltage for models with terminal strip	12-24 V
Temperature range storage	according to integrated sensor specifications
Temperature range operation	according to integrated sensor specifications
Humidity range	according to integrated sensor specifications

Table Absolute minimum and maximum values.

Data sheet bluSensor® - all Models

General Information

Handling instructions

Humidity, temperature and air quality sensors are highly accurate environmental sensors. Please follow the guidelines below carefully to ensure that you benefit from the excellent performance of the sensor.

Exposure to chemicals

The sensor must **not come into close contact with volatile chemicals** such as solvents or other organic compounds. In particular, high concentrations and long exposure must be avoided. Ketene, acetone, ethanol, isopropyl alcohol, toluene, etc. are known to cause moisture measurement drift - irreversible in most cases. Please note that such chemicals are integral components of epoxies, glues, adhesives, etc. and outgas during baking and curing. These chemicals are also added as plasticizers in plastics used for packaging materials and outgas for some time.

Acids and bases can irreversibly attack the sensor and must be avoided: HCl, H₂SO₄, HNO₃, NH₃ etc. Ozone in high concentration or H₂O₂ also have the same effect and should be avoided. Please note that the above examples are not a complete list of pollutants.

The sensor must **not come into contact with cleaning agents** or strong air blasts from an air gun (non-oil-free air). Exposure of the sensor to cleaning agents may cause drift of the measured value or complete failure of the sensor.

Ensure **good ventilation (fresh air supply)** to avoid high concentrations of volatile chemicals (solvents, e.g. ethanol, isopropanol, methanol, acetone, cleaning solutions, detergents...).

Important !
Protect your Sensor !

Use and installation

Do not apply mechanical force to any part of the sensor during mounting and operation. Prevent dust or particles from entering the sensor opening (sensor performance may be affected). For use in corrosive environments - such as condensation or corrosive gases - it may be necessary to protect the electronics of the sensor with a passivation. Please contact the support for this (support@blusensor.com). Such a passivation can be achieved by a conformal coating, by applying special agents to the sensor or by integrating a membrane in the housing.

Data sheet bluSensor® - all Models

General Information

Packing

We recommend storing the devices in metallic, antistatically shielded ESD bags. In particular, it is recommended not to reseal the ESD bags with adhesive or adhesive tapes after opening. Sensors must not be packed in outgassing plastics that could cause contamination of the sensor. In addition to antistatically shielded metal ESD bags, paper or cardboard-based packaging, thermoformed plastic trays (PE, PET, PP) can also be considered. Do not use polyethylene anti-static bags (light blue, pink or rose); be very careful with bubble wrap and foam. Pay attention to stickers that are inside the packaging. Sticker size should be kept to a minimum, and the sticky side must adhere completely to a surface. Note that many packaging materials may have additives (plasticizers) that can have an environmentally harmful effect on the sensor. As a general rule, if a material gives off a strong odor, do not use it. Even materials listed for recommended use may have additives. For high safety, device housings and shipping packages must be qualified.

Such a qualification test may involve exposing the device in the shipping package to a temperature $\geq 65^{\circ}\text{C}$ for at least 168 hours. (If shipping or storage conditions are expected to be harsh, the qualification test conditions must be adjusted for the packaging material.) The sensor reading must then show no changed deviation from a reference compared to the same measurements before exposure.

Do not use polyethylene antistatic bags (light blue, pink or rose colored). Do not use adhesive tapes in the packaging.

Ordering information

When ordering the air quality sensor, use the product names listed in the table. For current product information and distributors, visit www.blusensor.com.

bluSensor Mini		quantity	EAN-number
Model Beacon	(BSP01BE)		
Model Humidity and Temperature Data Logger	(BSP01AIR)		0742832891417
Model Humidity and Temperature Monitoring	(BSP02AIR)		0742832891431
Model Air Quality Sensor Smart Home	(BSP02AIQ)		0742832891424
Model Usage Counter	(BSP02COUNT)		
Model Motion	(BSP02MOTION)		
bluSensor Pro		quantity	EAN-number
Model Air quality - VOCs (volatile organic compounds)	(BSP03AIX)		0742832891448
Model Air quality - CO2 and VOCs (volatile organic compounds)	(BSP03AIXC)		0742832891455
Model Air quality - Particulate Matter Sensor	(BSP03PM)		0742832891462
Model Temperature Monitoring	(BSP03TEM)		
Model Relay control	(BSP03RELAY)		

Data sheet blusensor® - all Models

General Information

Revision History

Datum	Version	Seite	Änderungen
February 2021	1.0	-	-
May 2021	2.0	all	Particulate matter sensor
November 2021	3.0	all	VOC and CO2 sensor

Disclaimer and Copyright Notice:

The information in this document, including URL references, is subject to change without notice. All third party information contained in this document is provided without warranty of authenticity or accuracy. This document is not warranted to be merchantable, non-infringing, or fit for a particular purpose, nor is it otherwise warranted from any suggestion, specification, or sample. Any liability, including liability for infringement of proprietary rights, in connection with the use of information in this document is disclaimed. No license, express or implied, by estoppel or otherwise, is granted to any intellectual property rights. The Wi-Fi Alliance Member logo is a trademark of the Wi-Fi Alliance. The Bluetooth logo is a registered trademark of the Bluetooth SIG. The Apple logo is a registered trademark of Apple. The Google logo is a registered trademark of Google. All brand names, trademarks and registered trademarks mentioned in this document are the property of their respective owners and are hereby acknowledged.

Warning, personal injury

Do not use this product as a safety or emergency stop switch or in any other application where failure of the product could result in injury. Do not use this product for applications other than those for which it is intended and approved. Before installing, handling, using or servicing this product, please read the data sheet and application instructions. Failure to follow these instructions could result in death or serious injury.

If purchaser purchases or uses bluSensor® products for an unintended or unauthorized use, purchaser shall indemnify and hold harmless ALMENDO and its officers, employees, subsidiaries, affiliates and distributors from and against all claims, costs, damages and expenses, and reasonable attorneys' fees, arising directly or indirectly from any claim of personal injury or death in connection with such unintended or unauthorized use, even if ALMENDO is alleged to be negligent in the design or manufacture of the product.

ESD precautions

The device is sensitive to electrostatic discharge (ESD). To avoid ESD-induced damage and/or impairment, take the usual and legally prescribed ESD precautions when handling this product.

Warranty

ALMENDO warrants exclusively to the original purchaser of this product, for a period of 24 months (two years) from the date of delivery, that this product will be of the quality, materials and workmanship defined in ALMENDO's published specifications for the product. Within this period, if this product is found to be defective, ALMENDO will, at its option, repair and/or replace this product at no charge to the purchaser, provided that:

- the defects are reported and described in writing to ALMENDO within fourteen (14) days after their occurrence;
- such defects are found to be due to defects in design, materials or workmanship on the part of ALMENDO;
- the defective product is returned to ALMENDO at the Purchaser's expense;

The warranty period for any repaired or replaced product is limited to the unexpired portion of the original warranty period. This warranty does not apply to equipment that has not been installed and used within ALMENDO's recommended specifications for the intended and proper use of the

equipment. EXCEPT AS EXPRESSLY STATED HEREIN, ALMENDO MAKES NO WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT. ANY WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED AND DISCLAIMED. ALMENDO shall only be liable for defects in this product that occur under the operating conditions provided in the data sheet and when the product is used properly. ALMENDO expressly disclaims all warranties, express or implied, for any period during which the goods are not operated or stored in accordance with the technical specifications. ALMENDO assumes no liability arising out of the application or use of the products or circuits and expressly disclaims all liability, including without limitation for consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer application by the customer's technical experts. Recommended parameters can and will vary in different applications.

ALMENDO reserves the right, without further notice, to (i) change the product specifications and/or the information in this document, improve the reliability, features and design of this product.

Copyright© 2021 by ALMENDO
bluSensor® is a trademark of ALMENDO.
All rights reserved.

Headquarter:

Almendo Technologies GmbH
Wolfschwangweg 216
A-5084 Großmain bei Salzburg
AUSTRIA