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User Manual EE820

CO_2 Sensor for Demanding Applications



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1 General Information

This user manual serves for ensuring proper handling and optimal functioning of the device. The user manual shall be read before commissioning the equipment and it shall be provided to all staff involved in transport, installation, operation, maintenance and repair. E+E Elektronik Ges.m.b.H. does not accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. It may contain technical inaccuracies and typographical errors. The contents will be revised on a regular basis and changes will be implemented in subsequent versions. The described product(s) and the contents of this document may be changed or improved at any time without prior notice.

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PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/ee820.

1.1 Explanation of Warning Notices and Symbols

Safety precautions

Precautionary statements warn of hazards in handling the device and provide information on their prevention. The safety instruction labeling is classified by hazard severity and is divided into the following groups:

DANGER

Danger indicates hazards for persons. If the safety instruction marked in this way is not followed, the hazard will verly likely result in severe injury or death.

WARNING

Warning indicates hazards for persons. If the safety instruction marked in this way is not followed, there is a risk of injury or death.

CAUTION

Caution indicates hazards for persons. If the safety instruction marked in this way is not followed, minor or moderate injuries may occur.

NOTICE

Notice signals danger to objects or data. If the notice is not observed, damage to property or data may occur.

Informational notes

Informational notes provide important information which stands out due to its relevance.

INFO

The information symbol indicates tips on handling the device or provides additional information on it. The information is useful for reaching optimal performance of the device.

The title field can deviate from “INFO” depending on the context. For instance, it may also read “PLEASE NOTE”.

1.2 Safety Instructions

1.2.1. General Safety Instructions

NOTICE

Improper handling of the device may result in its damage.

- The EE820 enclosure, the sensing probe and the sensing module shall not be exposed to unnecessary mechanical or thermal stress.
- Use the EE820 only as intended and observe all technical specifications.

1.2.2. Intended Use

The EE820 is a CO_2 sensor for harsh and demanding applications, such as hatchers, incubators, life stock barns or greenhouses. The sensor is designed for indoors and outdoors application in non-explosive environment with atmospheric pressure and under all non-condensing humidity conditions.

⚠ WARNING

Non-compliance with the product documentation may cause safety risks for people and the entire measurement installation.

The manufacturer cannot be held responsible for damages as a result of incorrect handling, installation, and maintenance of the device.

- Do not use EE820 in explosive atmosphere or for measurement of aggressive gases.
- The sensor shall not be exposed to extreme mechanical or thermal stress.
- For use in polluted, dirty environment is essential to close tightly the sensor cover as well as the cable gland or conduit adapter in order to avoid pollution ingress into the enclosure.
- This device is not appropriate for safety, emergency stop or other critical applications where device malfunction or failure could cause injury to human beings.
- The device may not be manipulated with tools other than specifically described in this manual.

NOTICE

Failing to follow the instructions in this user manual may lead to measurement inaccuracy and device failures.

- The EE820 may only be operated under the conditions described in this user manual and within the specification included in chapter 8 Technical Data.
- Unauthorized product modification leads to loss of all warranty claims. Modification may be accomplished only with an explicit permission of E+E Elektronik Ges.m.b.H.!

1.2.3. Mounting, Start-up and Operation

The EE820 has been produced under state of the art manufacturing conditions, has been thoroughly tested and has left the factory after fulfilling all safety criteria. The manufacturer has taken all precautions to ensure safe operation of the device. The user must ensure that the device is set up and installed in a way that does not impair its safe use. The user is responsible for observing all applicable local and international safety guidelines for safe installation and operation of the device. This user manual contains information and warnings that must be observed by the user in order to ensure safe operation.

PLEASE NOTE

The manufacturer or his authorized agent can be only be held liable in case of willful or gross negligence. In any case, the scope of liability is limited to the corresponding amount of the order issued to the manufacturer. The manufacturer assumes no liability for damages incurred due to failure to comply with the applicable regulations, operating instructions or the specified operating conditions. Consequential damages are excluded from the liability.

⚠ WARNING

Non-compliance with the product documentation may cause accidents, personal injury or property damage.

- Mounting, installation, commissioning, start-up, operation and maintenance of the device may be performed by qualified staff only. Such staff must be authorized by the operator of the facility to carry out the mentioned activities.
- The qualified staff must have read and understood this user manual and must follow the instructions contained within.
- All process and electrical connections shall be thoroughly checked by authorized staff before putting the device into operation.
- Do not install or start-up a device supposed to be faulty. Make sure that such devices are not accidentally used by marking them clearly as faulty.
- A faulty device shall be removed from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer.

1.3 Environmental Aspects

PLEASE NOTE

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with all relevant environmental protection requirements. Please observe local regulations for the disposal of the device.



For disposal, the individual components of the device must be separated according to local recycling regulations. The electronics shall be disposed of correctly as electronics waste.

2 Scope of Supply

- EE820 - CO_2 Sensor for Demanding Applications according to ordering guide
- Mounting set (screws and rowl plugs / screw anchors)
- Cable gland (only for EE820-HVxxxAxE1 with cable gland)
- M12x1 cable connector for self assembly (for option AC2 only)
- Test report according to DIN EN 10204-2.2

3 Product Description

3.1 General

The EE820 CO2 sensor is optimized for use in demanding applications, such as hatchers, incubators, life stock barns or greenhouses.

The sensor is designed for indoors and outdoors application in non-explosive environment with atmospheric pressure and under all non-condensing humidity conditions.

The sensor enclosure is IP54 protected with a special filter for installation in even harsh environment.

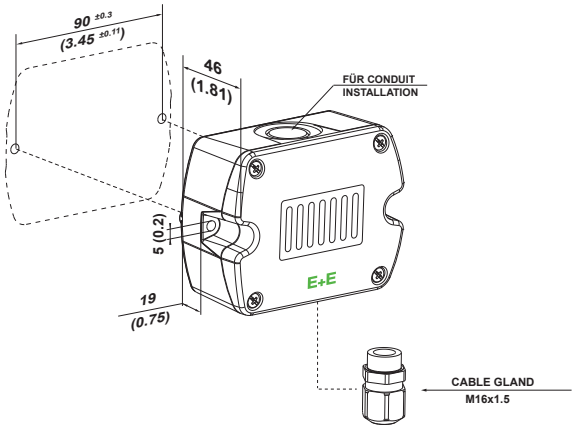
Power supply and output are possible via cable gland or M12 connector (see chapter 4.2 Electrical Connection for details).

For a setup deviating from default, the EE820 can be configured manually . Please refer to chapter 5 Setup and Configuration for details.

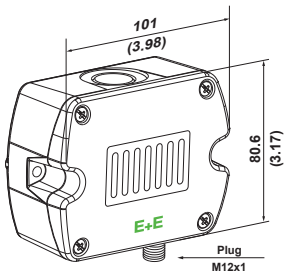
3.2 Dimensions

Values in mm / inch

Enclosure
M16x1.5 cable gland



Enclosure
M12 plug, 4 poles



4 Mounting and Installation

4.1 General

For types with cable gland, use a matching wrench for mounting the cable gland (in the scope of supply) onto the EE820 enclosure.

When using EE820 with conduit connection use a flat screwdriver to knock open the blind at the top of the enclosure, carefully. Take good care to avoid damaging the electronics inside the enclosure. The conduit adapter is not included in the scope of supply. The M16x1.5 opening for the cable gland shall be tightly closed using the blind plug included in the scope of supply (see also chapter 3.2 Dimensions).

For best measurement results, the EE820
- must be installed in an environment where the medium to be measured flows sufficiently around the sensor.
- shall not be placed near influencing objects such as heating radiators or fan heaters.

4.2 Electrical Connection

EE820 is available with a cable gland or M12 connection (depending on the order code) and features screw terminals for connecting the power supply and the outputs. The cables are fed into the enclosure through the M16 cable gland.

NOTICE

It is important to make sure that the cable glands are closed tightly for the power supply and outputs cable. This is necessary for assuring the IP rating of the enclosure according to EE820 specification, as well as for stress relief at the screw terminals on the EE820 board.

⚠ WARNING

Incorrect installation, wiring or power supply may cause overheating and therefore personal injuries or damage to property.

It is essential that the cables are not under voltage during installation. No voltage must be applied when the product is connected or disconnected. For correct cabling of the device, always observe the presented wiring diagram for the product version used.

The manufacturer cannot be held responsible for personal injuries or damage to property as a result of incorrect handling, installation, wiring, power supply and maintenance of the device.

4.2.1. EE820 with Cable Gland

Use a matching wrench to install the cable gland (in the scope of supply) onto the EE820 enclosure.

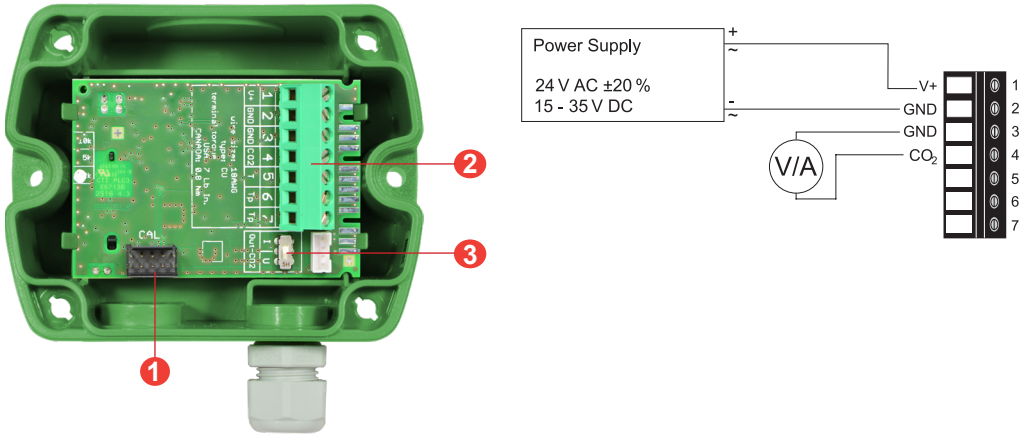


Fig. 1 EE820 - E1 with M16x1.5 cable gland

NOTICE

For failure-free operation and performance according to the specifications, the supply GND and the measurement GND must be wired separately.

4.2.2. EE820 with M12 Plug

The EE820 with M12 does not require any wiring inside the device. The external mounting holes allow the device to be mounted without opening the front cover. The mating M12x1 cable plug for self assembly is included in the scope of supply.

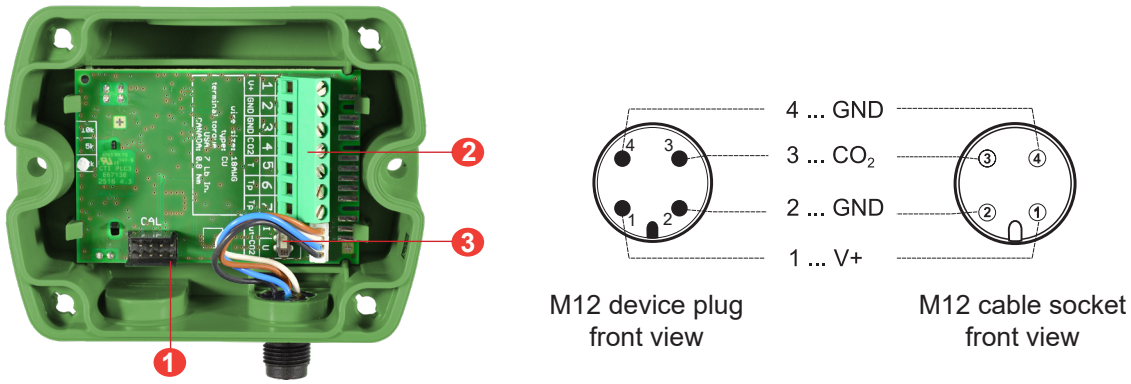


Fig. 2 EE820 with M12 plug, 4 poles

NOTICE

For failure-free operation and performance according to the specifications, the supply GND and the measurement GND must be wired separately.

No.	Function
1	Configuration connector (USB configuration adapter)
2	Screw terminals for power supply and outputs
3	Output signal (I / U) selection

Tab. 1 Parts of the EE820 electronics board types

4.2.3. EE820 with conduit connection

EE820 with conduit connection use a flat screwdriver to knock open the blind, carefully, in order to avoid damaging the electronics inside the enclosure. The conduit adapter is not included in the scope of supply. The M16x1.5 opening for the cable gland shall be tightly closed using the blind plug included in the scope of supply.

5 Setup and Configuration

The EE820 is ready to use and does not require any configuration by the user. The factory setup of EE820 corresponds to the type number ordered. For ordering guide please see data sheet at www.epluse.com/ee820.

If needed, the user can change the factory setup by using the Product Configuration Software PCS10 (available for free download at www.epluse.com/pcs10) and the optional USB-C configuration stick (HA011070). One can change CO_2 output signal, scaling of the outputs and perform CO_2 adjustment / calibration.

5.1 Product Configuration

5.1.1. Changing the Analogue Output Signal with DIP Switch

The output signal can be changed from voltage to current or vice versa.

Set the output signal selection switch to I for current 4 - 20 mA output or to U for voltage 0 - 10 V output. The original CO_2 output range does not change and the calibration data remains valid.

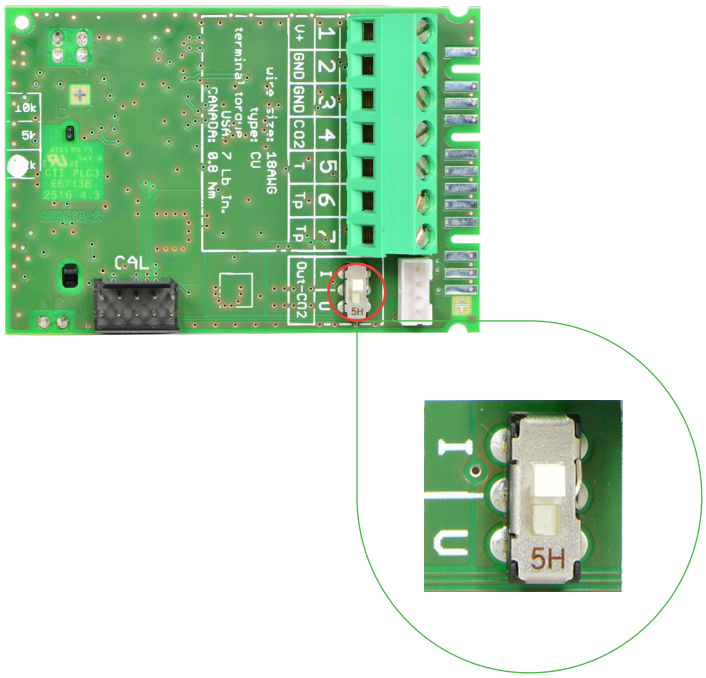


Fig. 3 DIP switch for output signal selection

Example

Factory setup:
Voltage output (U), output scale: 0 - 10 V = 0...5 000 ppm

User setup (after setting the output signal selection switch to I):
Current output (I), output scale: 4 - 20 mA = 0...5 000 ppm

5.1.2. EE820 Configuration using HA011070

NOTICE

The USB-C configuration stick HA011070 galvanically isolates the USB interface of the PC from the supply voltage of the EE820. When using the USB-C configuration stick the EE820 needs external supply.

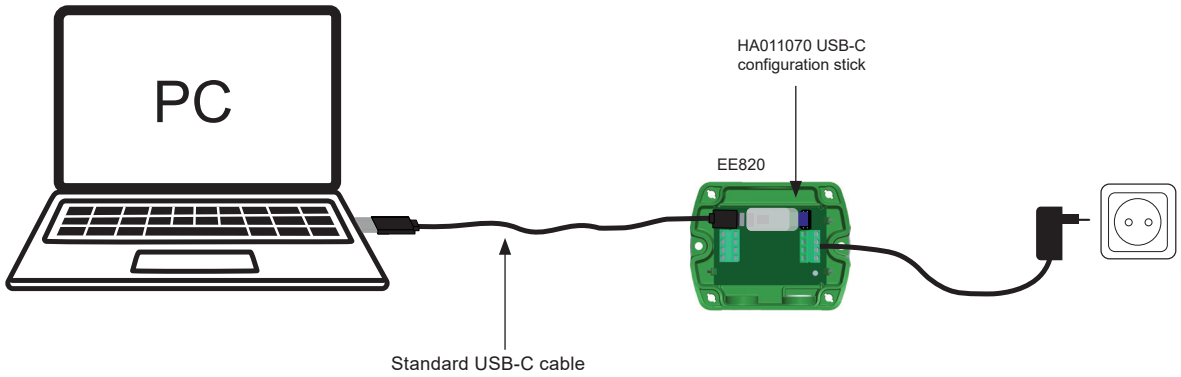


Fig. 4 EE820 configuration using the HA011070 USB-C configuration stick

5.1.3. EE820 Configuration using legacy USB configuration adapter HA011066

(not intended for new designs)

The scaling of the output can be changed by using the USB Configuration Adapter (HA011066) and PCS10.

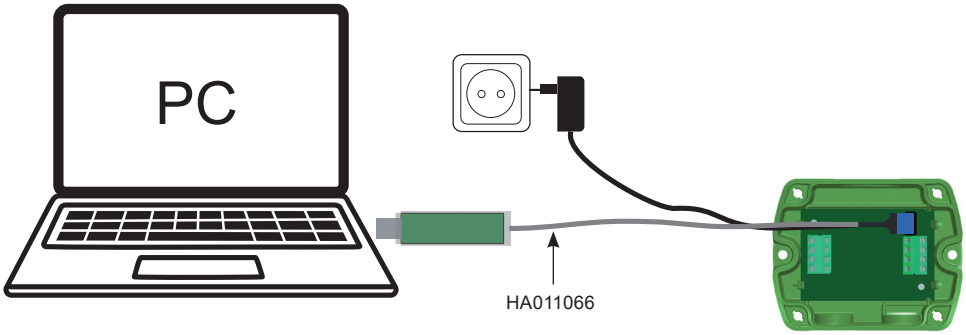


Fig. 5 EE820 connected to a PC running PCS10

NOTICE

The EE820 may not be connected to any additional power supply when using the USB configuration adapter HA011066.

5.2 PCS10 Product Configuration Software

To use the software for changes in settings, please proceed as follows:

1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on the PC.
2. Connect the EE820 to the PC using the Modbus configuration adapter.
3. Start the PCS10 software.
4. Follow the instructions on the PCS10 opening page for scanning the ports and identifying the connected device
5. Click on the desired setup mode from the main PCS10 menu on the left. Follow the online instructions of the PCS10 which are displayed when clicking the “Tutorial” button.
6. Changes are uploaded to the sensor by pressing the “Sync” button.

Example

The initial scaling of the output is 4 - 20 mA = 0...5 000 ppm.
The output scale after the change can be 4 - 20 mA = 400...4 000 ppm.

PLEASE NOTE

- After changing the factory setup (output signal and / or output scale) the original type number on the EE820 identification label loses its validity; it does not match any longer the device setup.
- The return to factory setup function of PCS10 restores the original adjustment / calibration of the device, but does not affect the user setup for output signal and output scale.

6 Maintenance and Service

6.1 Calibration and Adjustment

6.1.1. Definitions

Calibration: The specimen is compared with a reference and its deviation from the reference is documented.

Adjustment: The specimen is brought in line with the reference.

6.1.2. CO_2 Calibration and Adjustment

Depending on the application and the requirements of certain industries, there might arise the need for periodical CO_2, calibration or adjustment.

6.1.3. Calibration and Adjustment at E+E Elektronik

Calibration and / or adjustment can be performed in the E+E Elektronik calibration laboratory. For information on the E+E capabilities in ISO or accredited calibration please see www.epluse cal.com.

6.1.4. Calibration and Adjustment by the User

Perform offset and 1- or 2-point adjustment via the PCS10 Product Configuration Software (see below).

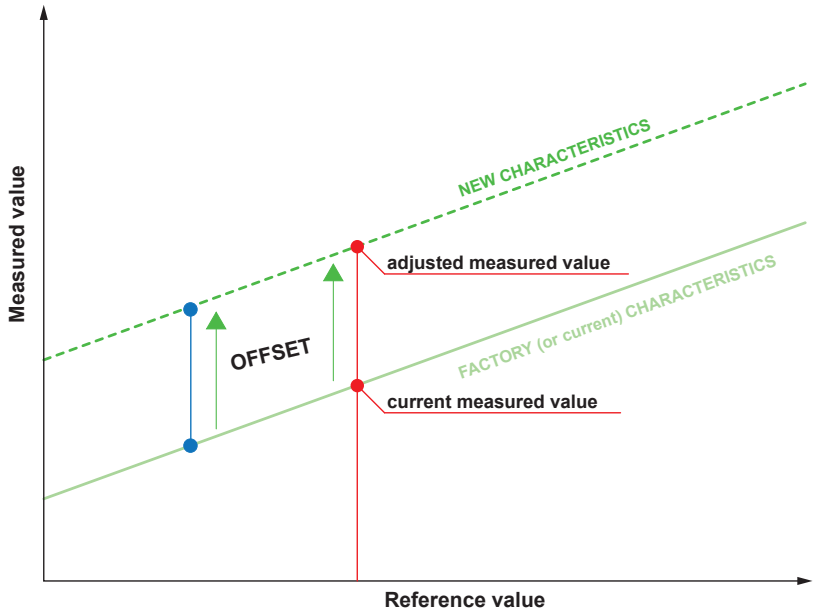


Fig. 6 Offset adjustment

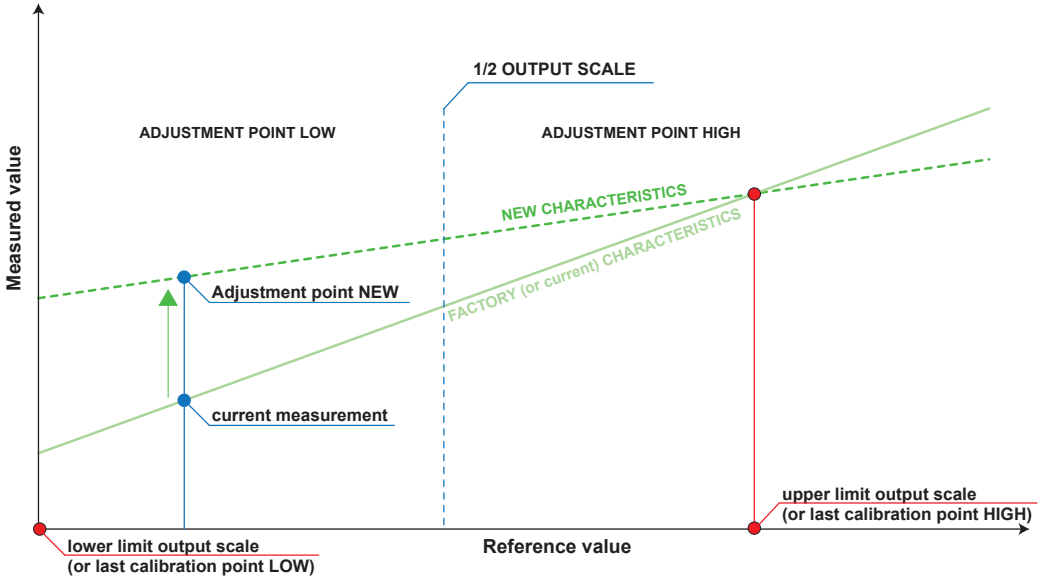


Fig. 7 1- or 2-point adjustment

6.2 Cover Replacement

The electronics of EE820 are very well protected by the enclosure and the filter on the front cover. Thus, it is resistive even to dirty and dusty environment,

In a polluted environment, the filter on the EE820 front cover might get clogged in a long run. Longer response time indicates a clogged filter. In this case the entire front cover shall be replaced by an original new one (see chapter 6.5 Spare Parts).

NOTICE

Always switch off the EE820 before exchanging the cover

6.3 Cleaning

In case of dirt deposits on the exterior of the device, this can be cleaned by weeping it gently with a soft, light wet cloth. The enclosure must be closed during the cleaning. Do not use solvent-based cleaning agents; these might affect the enclosure and the labels. Do not attempt to clean the filter on the front cover, as it would only lead to its faster clogging.

Protection caps for M12 connector are available to preserve the contacts of plug / in case of temporary removing of probe (see chapter 7 Accessories).

NOTICE

Do not attempt in any way to clean the inside of the device.

6.4 Repairs

Repairs may be carried out by the manufacturer only. The attempt of unauthorized repair excludes any warranty claims.

6.5 Spare Parts

Description	Code
EE820-COVER Cover complete with filter and mounting screw	**HA011303**

7 Accessories

Description	Code
USB-C configuration stick	**HA011070**
E+E Product Configuration Software (Free download: www.epluse.com/pcs10)	**PCS10**
Connection cable M12x1 socket - flying leads **1.5 m (3.3ft)** **5 m (16.4 ft)** **10 m (32.8 ft)**	 **HA010819** **HA010820** **HA010821**
Protective cap for M12 socket	**HA010781**
Protective cap for M12 plug	**HA010782**
Power supply adapter	**V03**

For further information please refer to the Accessories datasheet.

8 Technical Data

Measurands

CO_2

Measurement principle	Dual wavelength non-dispersive infrared technology (NDIR)
Measuring range	0...2 000 / 5 000 / 10 000 ppm
Accuracy @ 25 °C (77 °F) and 1 013 mbar (14.7 psi) **0...2 000 ppm** **0...5 000 ppm** **0...10 000 ppm**	 < ±(50 ppm + 2 % of measured value) < ±(50 ppm + 3 % of measured value) < ±(100 ppm + 5 % of measured value)
Temperature dependency in the range of -20...45 °C (-4...113 °F)	±(1 + CO_2 concentration [ppm] / 1 000) ppm/°C ± 0.556 * (1+ CO_2 concentration [ppm] / 1 000) ppm/°F
Response time t_{63}, typ.	300 s
Sampling interval, approx.	15 s

Outputs

Analogue

CO_2 **0...2 000 / 0...5 000 / 0...10 000 ppm**	0 - 10 V 4 - 20 mA	-1mA < I_L < 1 mA R_L ≤ 500 Ω	I_L = load current R_L = load resistance

General

Power supply class III USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	24 V AC ±20 % 15 - 35 V DC
Current consumption, typ.	15 mA + output current
Peak current, max. @ analogue output	350 mA for 0.3 s
Warm-up time[1)]	< 5 min
Electrical connection	Screw terminals max. 2.5 mm^2 or M12 plug
Working conditions	-20...+60 °C (-4...+140 °F) 0...100 %RH, non-condensing
Storage conditions	-20...+60 °C (-4...+140 °F) 0...95 %RH, non-condensing
Enclosure **Material** **Protection rating**	 Polycarbonate (PC), UL94 V-0 approved IP54
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial environment FCC Part15 Class B ICES-003 Class B
Conformity	CE UKCA
Configuration and adjustment	PCS10 Product Configuration Software (free download) and configuration adapter

1) For performance according to specification.

9 Conformity

9.1 Declarations of Conformity

E+E Elektronik Ges.m.b.H. hereby declares that the product complies with the respective regulations listed below:

CE European directives and standards.

and

UKCA UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee820 for the Declarations of Conformity.

9.2 Electromagnetic Compatibility

EMC for industrial environment.
Our sensors are group 1 devices and correspond to class B.

9.3 FCC Part 15 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which thereceiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

9.4 ICES-003 Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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