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User Manual EE8915

CO_2 Sensor for Railway Applications



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Content

1 General Information ... 3
1.1 Explanation of Warning Notices and Symbols ... 3
1.2 Safety Instructions ... 4
1.2.1 General Safety Instructions ... 4
1.2.2 Intended Use ... 4
1.2.3 Mounting, Start-up and Operation ... 4
1.3 Environmental Aspects ... 5
2 Scope of Supply ... 5
3 Product Description ... 5
3.1 General ... 5
3.2 Dimensions ... 6
3.3 Electrical Connection ... 7
4 Mounting and Installation ... 8
4.1 General ... 8
4.2 Wall Mount ... 8
4.3 Duct mount ... 8
5 Setup and Configuration ... 9
5.1 EE-PCS Product Configuration Software ... 10
6 Maintenance and Service ... 10
6.1 Error Indication on the Analogue Output ... 10
6.1.1 Status and Error Indication via LEDs ... 10
6.2 Cleaning ... 11
6.3 Repairs ... 11
7 Accessories ... 11
8 Technical Data ... 11
9 Conformity ... 13
9.1 Declarations of Conformity ... 13
9.2 Electromagnetic Compatibility ... 13
9.3 FCC Part 15 Compliance Statement ... 13
9.4 ICES-003 Compliance Statement ... 13

1 General Information

This user manual is intended to ensure 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. accepts no liability for any warranty or liability claims arising from this publication or improper handling of the product(s) described.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. The document 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 product(s) described 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/ee8915.

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.

Informative notes

Informative notes provide important information that is characterised by its relevance.

INFO

The information symbol indicates tips on handling the device or provides additional information on it. This information is useful to achieve optimum performance of the device.

The title field may 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 EE8915 enclosure, the sensing probe and the sensing module shall not be exposed to unnecessary mechanical stress.
- Use the EE8915 only as intended and observe all technical specifications.

1.2.2 Intended Use

Due to the compliance with tough railway standards, the EE8915 CO_2 sensor is suitable for demanding conditions in all process and climate applications. It is available for wall or duct mounting.

⚠ 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 EE8915 in explosive atmosphere or for measurement in aggressive gases.
- 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

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

- The EE8915 may only be operated under the conditions described in this user manual and within the specification included in chapter 8 Technical Data.
- Any unauthorised product modifications will invalidate all warranty claims. Modifications may only be carried out with the express authorisation of E+E Elektronik Ges.m.b.H.!

1.2.3 Mounting, Start-up and Operation

The EE8915 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 device shall be set up and installed in a way that does not impair its safe use. All applicable local and international safety guidelines for safe installation and operation of the device have to be observed. This user manual contains information and warnings that must be observed in order to ensure safe operation.

ⓘ PLEASE NOTE

The manufacturer or his authorised agent can 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 damage caused by non-compliance with the applicable regulations, operating instructions or the specified operating conditions. Any consequential damage is excluded from liability.

⚠ WARNING

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

- Mounting, installation, commissioning, start-up, operation and maintenance of the device may only be carried out by qualified staff. Such staff must be authorised 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. The manufacturer accepts no responsibility for non-compliance with instructions, recommendations and warnings.
- All process and electrical connections must be thoroughly checked by authorised staff before commissioning the device.
- Do not install or start-up a device suspected to be faulty. Mark it clearly as faulty and remove it from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer. A faulty device may only be investigated and possibly repaired by qualified, trained and authorised staff. If the fault cannot be fixed, the device shall be removed from the process.

1.3 Environmental Aspects

PLEASE NOTE

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with 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

- EE8915 CO_2 Sensor for Railway Applications
- Test report according to DIN EN10204-2.2
- Quick guide
- Rubber gasket (only for duct mount)

3 Product Description

3.1 General

The EE8915 reliably measures CO_2 concentration in harsh environment and fulfils the relevant railway standards.

Due to the compliance with tough railway standards, the EE8915 stands for excellent performance even under challenging conditions in any process and climate control application.

The sensor incorporates the E+E dual wavelength non-dispersive infrared (NDIR) CO_2 sensor, which compensates ageing effects, is highly insensitive to pollution and offers outstanding long-term stability. A multiple point CO_2 and T factory adjustment procedure leads to excellent CO_2 measurement accuracy over the entire T working range -40...+60 °C (-40…+140 °F).

The EE8915 is available for wall and duct mounting. The design enables the combination of short response time and high protection class. The CO_2 measured data is available as voltage and current output signals.

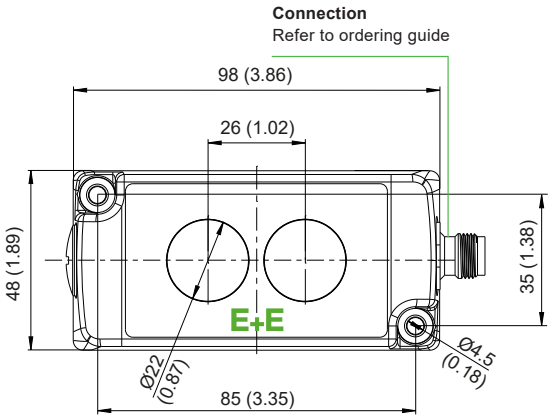
For a non-standard setup, the EE8915 can be configured manually using the free EE-PCS product configuration software and a USB connection.

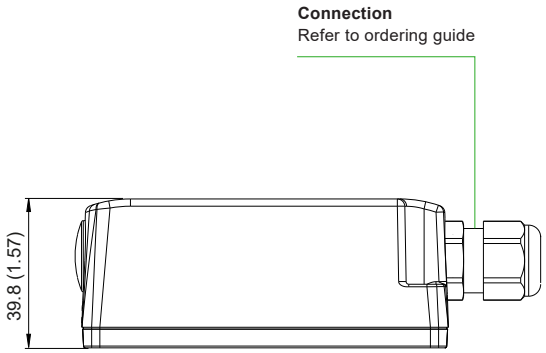
3.2 Dimensions

Values in mm (inch)

Wall mount

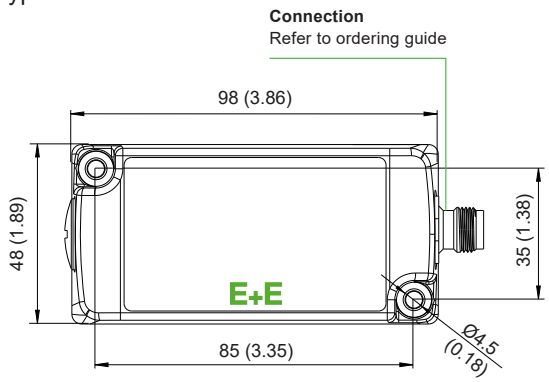
Type T1

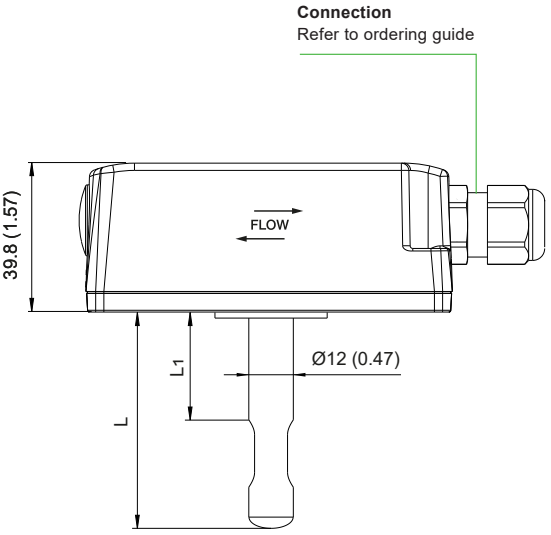




Duct mount

Type T2

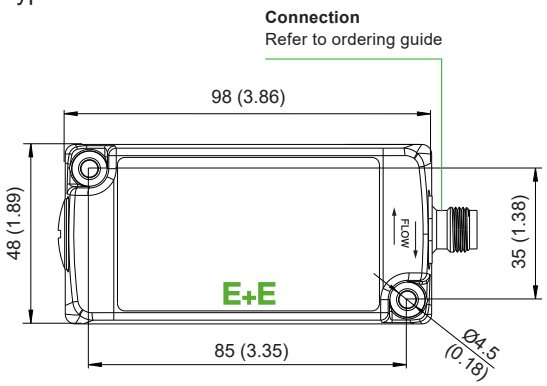


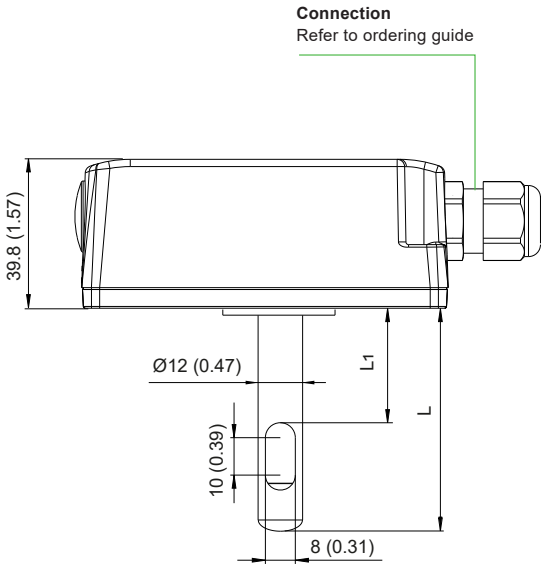


L in mm (inch)	L_1 in mm (inch)
207.7 (8.18)	178.7 (7.04)
57.7 (2.27)	28.7 (1.30)

Duct mount with 90° rotated probe

Type T27





L in mm (inch)	L_1 in mm (inch)
207.7 (8.18)	178.7 (7.04)
57.7 (2.27)	28.7 (1.30)

3.3 Electrical Connection

⚠ WARNING

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

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.

The EE8915 can be connected either with a fix installed cable or an M12 connector (refering to the ordering guide).

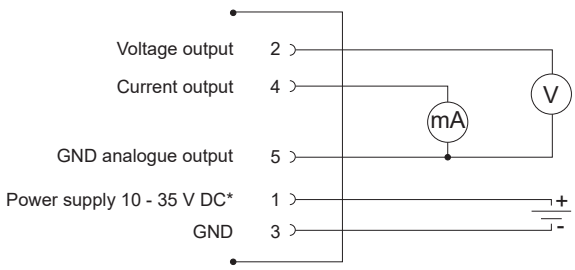
Fix Installed Cable

Pin	Function
1	10 - 35 V DC supply
2	GND supply
3	GND analogue output
4	Current output
5	Voltage output

M12 Connector



Plug for supply and analogue output



*The supply circuit must be fused with ≤ 8A

NOTICE

For failure-free operation and performance according to the specs, the GND supply and the GND analogue output must be wired separately.

Analogue outputs factory settings according to the ordering guide
(refer to datasheet at www.epluse.com/ee8915):

Order code	Voltage output	Current output
GA7	0 - 10 V	4 - 20 mA
GA11	0 - 5 V	0 - 20 mA

4 Mounting and Installation

4.1 General

For mounting, the cable gland (in the scope of supply) on the EE8915 enclosure use a matching wrench.

4.2 Wall Mount

Choose a location which minimises the dust deposits on the filter.

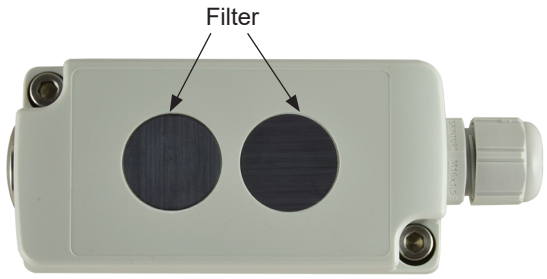


Fig. 1 Filter position

4.3 Duct mount

When correctly installed, a small amount of air flows through the divided probe into the EE8915 enclosure, where the CO_2 sensing cell is located, and back into the duct.

Type T2

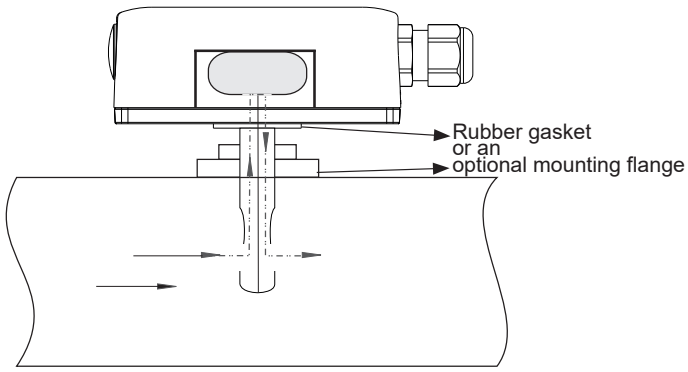


Fig. 2 Positioning in the pipeline

PLEASE NOTE

For accurate measurement and response time according to the specification.

- Minimum air speed in the duct shall be 1 m/s (196 ft/m).
- The air flow shall be perpendicular to the opening holes on the head of probe.

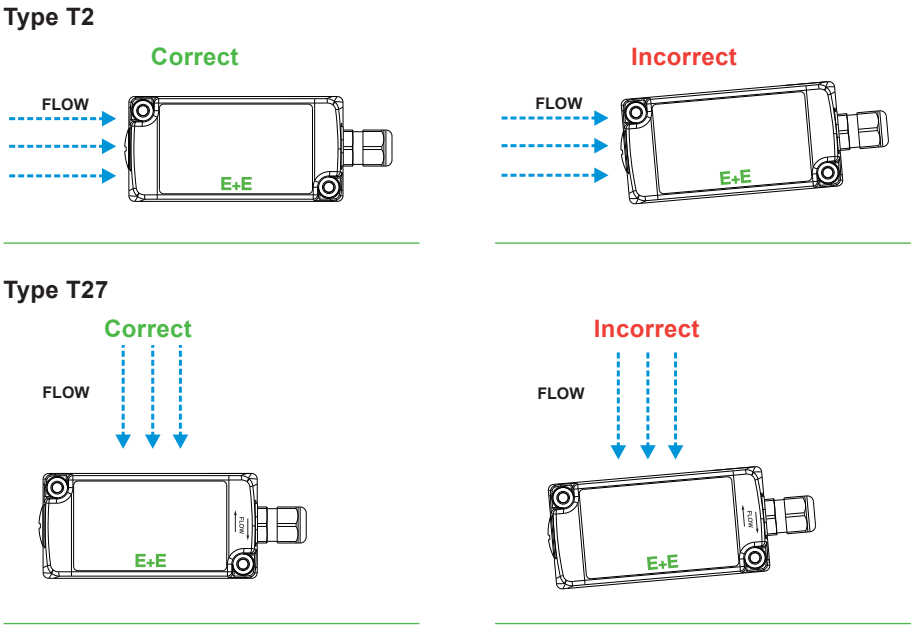


Fig. 3 Mounting position

5 Setup and Configuration

The EE8915 is ready to use and does not require any configuration by the user. The factory setup of the EE8915 corresponds to the specified order code. Please refer to the datasheet at www.epluse.com/ee8915. If needed, the user can change the factory setup with the help of the free EE-PCS Product Configuration Software and the USB service interface.

The CO_2 output signal and the scaling of the outputs can be changed and a CO_2 adjustment can be performed.

It is possible to enable or disable the pressure compensation (factory setting: enabled) and the Namur error indication (factory setting: disabled).

The USB port (type Micro USB) is located behind the access cover.



Fig. 4 Location of the USB port

During setup or adjustment via USB service interface, the EE8915 requires external power supply.



Fig. 5 EE8915 connected to a PC running EE-PCS

5.1 EE-PCS Product Configuration Software

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

1. Download the EE-PCS Product Configuration Software from www.epluse.com/configurator and install it on the PC.
2. Connect the E+E device to the PC using the USB configuration adapter.
3. Start the EE-PCS software.
4. Follow the instructions on the EE-PCS opening page for scanning the ports and identifying the connected device.
5. Click on the desired setup or adjustment mode from the main EE-PCS menu on the left and follow the online instructions of the EE-PCS.

6 Maintenance and Service

6.1 Error Indication on the Analogue Output

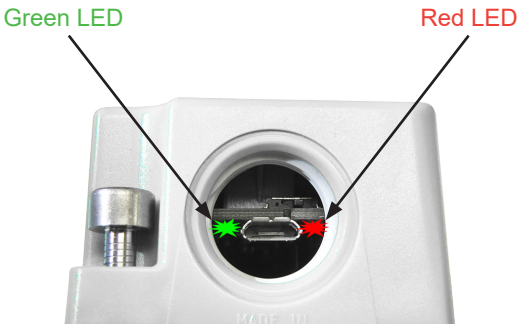
The EE8915 features an error indication on the analogue output according to NAMUR recommendations (factory setting: disabled).

The feature can be enabled with the EE-PCS Product Configuration Software, refer to Chapter 5.1 EE-PCS Product Configuration Software.

Output signal	NAMUR signal level
0 - 5 V	5.5 V
0 - 10 V	11 V
0 - 20 mA	21 mA
4 - 20 mA	21 mA

6.1.1 Status and Error Indication via LEDs

Status LEDs are located close to the USB service interface, under the access cover.



LED		Description
Green	**flashing**	Normal operation
Red	**off**	Normal operation
	permanently lit	Failure. Contact E+E after sales service.
	flashes	Failure. Also indicated on the analogue output (NAMUR indication enabled). The failure might be temporary, caused for instance by overheating. If the flashing persists, contact E+E after sales service.

Tab. 1 Explanation of the LED colours

6.2 Cleaning

Longer response time of the wall mount EE8915 is caused by duct deposits on the filter. Clean the filter by sweeping it gently with a soft, dry cloth.

6.3 Repairs

PLEASE NOTE

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

7 Accessories

For further information please refer to the Accessories datasheet.

Description	Code
Plastic mounting flange, Ø12 mm (0.47"), RAL7035	**HA010202**
Connector, M12x1 socket, 5 poles, for self assembly	**HA010708**
Sensor connection cable, shielded, 5 poles, M12x1 socket ←→ wire ferrules	
1.5 m (4.9 ft)	**HA010819**
5 m (16.4 ft)	**HA010820**
10 m (32.8 ft)	**HA010821**
Protection cap for M12 socket	**HA010781**
Protection cap for M12 plug	**HA010782**

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	< ±(50 ppm +2 % of measured value) mv = measured value
0...5 000 ppm	< ±(50 ppm +3 % of measured value)
0...10 000 ppm	< ±(100 ppm +5 % of measured value)
Temperature dependency in the range of -20...45 °C (-4...+113 °F)	±(1 + mv / 1 000) ppm/°C ±0.556*(1 + mv / 1 000) ppm/°F
Residual pressure dependency[1] in the range of -20...45 °C (-4...+113 °F), related to 1 013 mbar	0.014 % of mv/mbar 0.965 % of mv / psi
Response time t_{63}, typ. **Duct mount**	<110 s at 3 m/s (590 ft/min) air speed
Wall mount	<160 s
Sampling intervall	Approx. 15 s

1) Pressure dependence of a sensor without pressure correction: 0.14 % mv/mbar.

Outputs

Analogue

CO_2[1)]	0 - 5 V or 0 - 10 V and 0 - 20 mA or 4 - 20 mA	-1 mA < I_L < 1 mA R_L ≤ 500 Ω	I_L = load current R_L = load resistor

1) Voltage and current output signals are simultaneously available.

General

Power supply class III USA & Canada: Class 2 supply necessary, max. voltage 30 V DC		10 - 35 V DC 24 V DC nominal voltage Un according to EN 50155
Current consumption, typ. @ 24 V DC/AC	**Average** **Peak**	10 mA + output current 105 mA for 0.3 s
Minimum air speed in the duct		1 m/s (196 ft/min)
Electrical connection		Connector M12x1 or cable with flying leads, max. 2 m (6.56 ft)
Working and storage conditions		-40...+60 °C (-40...+140 °F) 0...95 %RH, non-condensing
Enclosure **Material** **Protection rating**		 Polycarbonate, UL94 V-0 approved IP65 / NEMA 4X
Electromagnetic compatibility		Railway standard: EN 50121-3-2:2016 EN 50121-1:2017 EN 61326-1 EN 61326-2-3 Industrial environment FCC Part15 Class B ICES-003 Class B
Conformity		CE UKCA
Configuration and adjustment	**Software** **Interface**	EE-PCS Product Configuration Software (free download: www.epluse.com/configurator) USB, micro B

Compliance with Railway Standards

- EN 50155:2021 Electronic equipment used on rolling stock
- EN 50121-1:2017 Electromagnetic compatibility - general
- EN 50121-3-2:2016 Electromagnetic compatibility - rolling stock
- EN 61373:2010 Rolling stock equipment - shock and vibration tests
- EN 50125-1 Environmental conditions for equipment - rolling stuck on - board equipment
- EN 45545-2 Fire protection on railway vehicles
- EN 50306 Railway rolling stock cables having special fire performance

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/ee8915 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 the receiver 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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