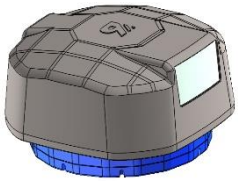


920 Radar Pulse Wave BLE Sensor Safety Manual [9415-x0001]

Device name:

920 Pulse Wave Radar sensor [9415-x0001]

Manufacturer:

Rochester Sensors, LLC

1025 S Belt Line Road Suite 100; Coppell, TX 75019

United States of America

Table of contents

Introduction

This document outlines the Ex safety requirements of the 920 PulseWave Radar BLE sensor.

1. Safety requirements

Prior to installation and use, it is necessary to read and understand this instruction manual with additional attention to Ex marking, special conditions of use and technical parameters.
The device can be connected only to equipment with proper, fitted intrinsically safe parameters. It is strongly recommended to carry out any service manipulations without presence of explosion atmosphere or outside of explosion endangered zone.

2. Description

920 Pulse Wave Radar sensor [9415-x0001] is an intrinsically safe telemetry device designed for measuring liquid level in a tank. The device is mounted on the top of the tank with the use of a special glued or threaded adapter. As a sensor of fluid level radar chip is used. Information related to the measured level is presented on an LCD and can be read via 2,4 GHz radio interface. The device is powered by two non-replaceable lithium primary cells or from an external cable connection. All components are located on one printed board inside of a plastic enclosure. The version with primary cells has no external connectors. The second version has a permanently connected cable with two circuits – power supply and for 0…5V analog signal output.

3. Name, versions and device marking

3.1 Type identification and versions

Product: **920 Pulse Wave Radar sensor [9415-x0001]**

Versions:

9415-B0001-00 – battery version (no external connections)
9415-C0001-xx – cable version (power supply and voltage output)
xx means cable length in feet

3.2 Ex marking

920 Pulse Wave Radar sensor [9415-x0001] 920 Radar Safety Document is designed for work in areas endangered by explosion in Zone 0. Possible use and level of protection is coded in Ex marking:

II 1G **Ex ia IIA T3 Ga**

I.S. Class I, Div. 1, Groups D, T3
Class I, Zone 0, AEx ia IIA T3

Marking according to ATEX Directive requirements:

 - specific marking of explosion protection,

Equipment group:	**II** - equipment intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dust mixtures,
Equipment category:	**1** – very high level of protection,
Explosive atmosphere type:	**G** - mixtures of air and gases, vapours or mists.

Ex marking according to IEC 60079-0:2017

	Ex – symbol which indicates that the electrical equipment corresponds to one of more types of protection which are subject of the specific standards
Equipment protection type:	**ia** – intrinsic safety, level of protection "ia",
Group II subdivision:	**IIA** – a typical gas is propane,
Temperature class:	**T3** – maximum surface temperature is 200°C,
Equipment protection level (EPL):	**Ga** – very high protection level.

Ex marking according to US and Canada HazLoc regulations

Equipment protection type:	**I.S.** – intrinsic safety,
	AEx ia – intrinsic safety, level of protection "ia",
Hazard class:	**Class I** – Gas or vapour explosive atmosphere
Area classification:	**Div 1**, **Zone 0** – Explosive atmosphere presents continuously
Gas group:	**Groups D**, **IIA** – a typical gas is propane,
Temperature class:	**T3** – maximum surface temperature is 200°C,

CE xxxx	"**CE**" / "**UKCA**" marks that indicate conformity with the applicable requirements for products sold within European Union / United Kingdom
UKCA xxxx	**xxxx** means number of Notified/Approved Body certifying Quality Management System
OBAC 23ATEX0282X	**OBAC** – notified body issued Ex certificate (ATEX and IECEx)

SGS 23UKEX0205X **SGS** – approved body issued Ex certificate (UKEX)

IECEx OBAC 23.0008X

SGSNA/24/CA/00001X **SGSNA** – NRTL listed body issued US and Canada HazLoc certificate

23ATEX0282X/23UKEX0205X/23.0008X – reference number of ATEX EU-Type Examination … / UKEX UK Type Examination… / IECEx equipment scheme … certificates

SGSNA/24/CA/00001X – reference number of US and Canada HazLoc Listing certificate

X – symbol after certificate reference indicates specific conditions of use. They are listed in clause 6 of this document and shall to be fulfilled for safety of use

4 Basic technical data and entity parameters

Followed table includes mostly parameters related to Ex safety.

Ambient temperature	-40°C…+85°C
Enclosure degree of protection	*Not less than IP20 (Ex)**
Power supply 9415-B0001-00	Primary cells 3,6V
Power supply 9415-C0001-xx	External via cable, Un=5V
Radio frequency range	2,4 GHz band
Radio power	≤4 mW
Dimensions (maximum)	104x95x70 mm
Maximum allowable cable capacity	60pF/ft; total C ≤ 3nF
Maximum allowable cable inductivity	0,2uH/ft; total L≤10uH

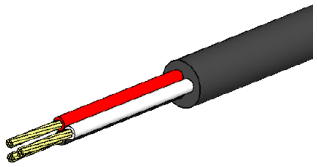
** - IP20 is verified as minimum for Ex certification only. Final IP degree of protection will be shown here after examination according to IEC60529 standard.*

Intrinsically safe parameters for cable version 9415-C0001-xx

Maximum input voltage	Ui = 6.6 V
Maximum input current	Ii = 0.45 A
Maximum input power	Pi = 0.7 W
Maximum internal capacitance	Ci = Cc + 430µF
Maximum internal inductance	Li = Lc

Where Cc, Lc mean internal capacitance and inductance o cable. Only cables with parameters not higher than 60pF/ft and 0,2uH/ft can be used. Total cable C and L shall be not higher than 3nF and 10uH.

Mentioned above values Ii, Pi, Ci, Li refer to whole connection (sum of power supply and data) for example $I_{ps} + I_{data} \leq$ Ii=0,45 A.



Wires colours:

RED – power supply

WHITE – data – 0…5V interface

BLACK – ground

The device can be connected only to other Ex certified device with intrinsically safe parameters:

Uo≤Ui; Io≤Ii, Po≤Pi, Co≥Ci, Lo≥Li

White wire is active, 0...5V output interface. In case of use this data output following intrinsically safe parameters shall to be respected (pair white-black wires):

Maximum output voltage	Uo=5,88V
Maximum output current	Io=0,131A
Maximum output power	Po=0,193W
Maximum external capacitance	Co=1000uF-Cc
Maximum external inductance	Lo=150uH-Lc

Where Cc, Lc mean internal capacitance and inductance o cable. Only cables with parameters not higher than 60pF/ft and 0,2uH/ft

can be used. Total cable C and L shall be not higher than 3nF and 10uH.

5. Legal acts (directives, standards)

The device 920 Pulse Wave Radar sensor [9415-x0001] is designed to work in explosive atmospheres according to:

- DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (ATEX Directive) and United Kingdom Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations UKSI 2016:1107 (as amended by UKSI 2019:696).

And harmonised/designated standards:

1) EN IEC 60079-0:2018
   Explosive atmospheres - Part 0: Equipment - General requirements
2) EN 60079-11:2012
   Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

- IECEx scheme according to standards:

1) IEC 60079-0:2017; Ed. 7
   Explosive atmospheres - Part 0: Equipment - General requirements
2) IEC 60079-11:2023; Ed.7
   Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

- The North American HazLoc standards:

1) UL 60079-0, Edition 7, CAN/CSA C22.2 No. 60079-0: 19
   Explosive atmospheres - Part 0: Equipment - General requirements

2) UL 60079-11, Edition 6, CAN/CSA C22.2 No. 60079-11: 14
Explosive Atmospheres - Part 11: Equipment Protection by Intrinsic Safety

3) UL 913, Edition 8
Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations

6. Warnings and special conditions of use

WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD -
- SEE INSTRUCTIONS

AVERTISSEMENT - DANGER POTENTIAL DE CHARGES ELECTROSTATIQUES - VOIR INSTRUCTIONS

In order to guarantee explosion proof safety and conformity with legal acts listed in Clause 5, listed below requirements shall be absolutely fulfilled:

- Ambient temperature range is -40°C≤Tamb≤+85°C,
- Repair or service including replacement of components is not permitted,
- Live maintenance is not permitted,
- Under certain extreme circumstance, the plastic enclosure may store an ignition-capable level of electrostatic charge. The device shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge. Do not rub. The equipment shall only be cleaned with a damp cloth,
- White wire in 9415-C0001 version is active, 0...5V output interface. In case of use this data output following intrinsically safe parameters shall to be respected: Uo=5,88V; Io=0,131A; Po=0,193W; Lo=150uH-Lc; Co=1000uF-Cc, where Lc, Cc are total inductance and capacitance of connected cable.

The device shall be installed according to Control drawings presented in Clause 9.

7. Safety instructions

Special conditions of use always need to be fulfilled.

7.1 Putting into service

920 Pulse Wave Radar sensor [9415-x0001] is delivered with connected batteries.

Start-up of the device requires only proper use of user interface. Activities related to starting up of the device do not have influence on Ex safety.

7.2 Installation/deinstallation

During installation/deinstallation it is necessary to protect device against gathering electrostatic charge on the device surface. The device is designed for fixed mounting.

7.3 Use

After installing, use of the device does not require any activity related with Ex safety.

7.4 Maintenance

As The device does not require any maintenance work.

ATTENTION !
Special conditions of use listed in Clause 6 always shall be fulfilled.

7.5 Adjustment

920 Pulse Wave Radar sensor [9415-x0001] does not require an adjustment.

8. Package content

Final package for customer includes:

1. The device with approved marking.

2. Paper instruction containing approved "minimum content" (without Control Drawings) with QR code linking with Control Drawings important for installation and other not safety related part of instruction.

3. Cartoon box when QR code will be repeated.

Control drawings are presented in Clause 9 of this document.

9. Control drawings

9.1 9415-B0001 (battery version) installation

HAZARDOUS AREA
any zone (0, 1, 2) containing T3 (or T2 or T1) classified gas

9415-B0001-00
Radar Sensor
I.S. Class I, Div. 1, Group D, T3
Class I, Zone 0, AEx ia IIA T3

WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD - SEE INSTRUCTIONS
AVERTISSEMENT - DANGER POTENTIAL DE CHARGES ELECTROSTATIQUES - VOIR INSTRUCTIONS

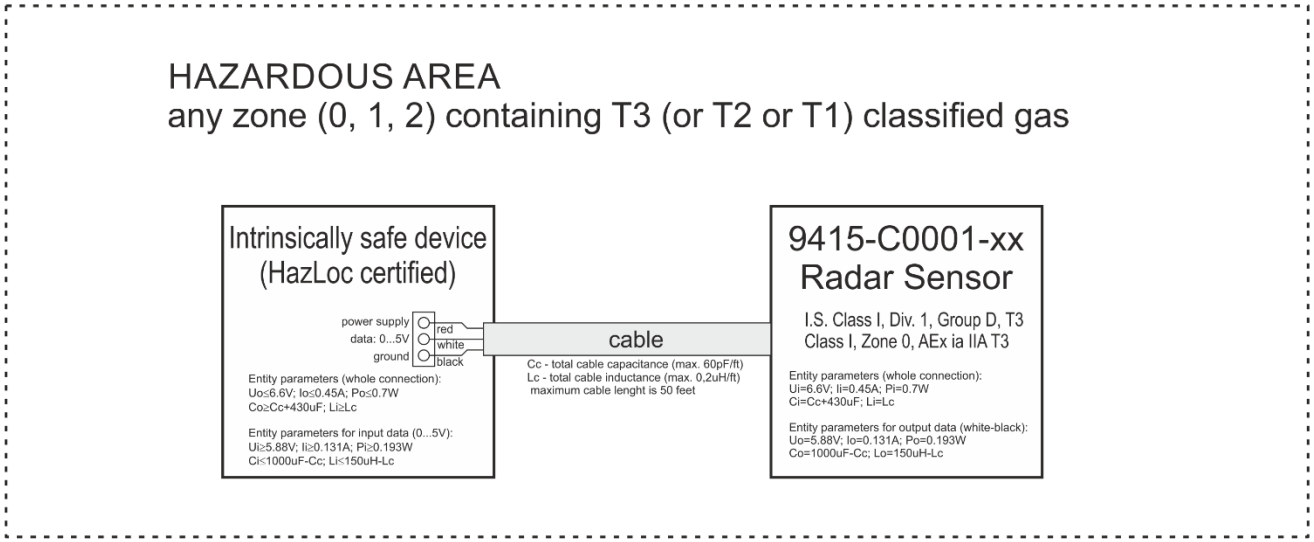
The Radar Sensor models:
9415-B0001-00 - battery version (no external connections)
9415-C0001-**xx** - cable version (power supply and voltage output);
xx means cable length in feet

Manufacturer:
Rochester Sensors, LLC
1025 S Belt Line Road Suite 100; Coppell, TX 75019
United States of America

Installation notes:

1. Ambient temperature range is -40°C≤Tamb≤+85°C
2. Under certain extreme circumstance, the plastic enclosure may store an ignition-capable level of electrostatic charge. The device shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge. Do not rub. The equipment shall only be cleaned with a damp cloth.
3. Repair or service including replacement of components is not permitted.
4. Live maintenance is not permitted.
5. Installation must be in accordance with the Canadian Electrical code for installation in Canada
4. Installation must be in accordance with National Electrical Code for installation in the U.S.
6. The device:
   rated Zone 0 can also be accepted in Zone 1 and 2,
   rated Division 1 can also be accepted for Division 2.

Description: Control drawing for 9415-B0001		
Part: 1/1	Revision: 1.0	Date: 2/Nov/2023



WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD - SEE INSTRUCTIONS
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4. Live maintenance is not permitted.
5. Installation must be in accordance with the Canadian Electrical code for installation in Canada.
6. Installation must be in accordance with National Electrical Code for installation in the U.S.
7. General requirements for entity parameters:
   Ui≥Uo; Ii≥Io; Pi≥Po; Ci+Ccable≤Co; Li+Lcable≤Lo.
8. Corectness of parameters and markings of connected apparatus shal be evaluated prior to installation by skilled person
9. The device can be connected only to other intrinsically safe device or to associated apparatus or Ex safety barrier under conditions of matching entity parameters and HazLoc markings
10. Any apparatus connected to the 9415-C0001-xx Radar Sensor must be certified to the applicable requirements for Hazardous Locations.
11. The device:
    rated Zone 0 can also be accepted in Zone 1 and 2,
    rated Division 1 can also be accepted for Division 2.

The Radar Sensor models:
9415-B0001-00 - battery version (no external connections)
9415-C0001-**xx** - cable version (power supply and voltage output);
xx means cable length in feet

Manufacturer:
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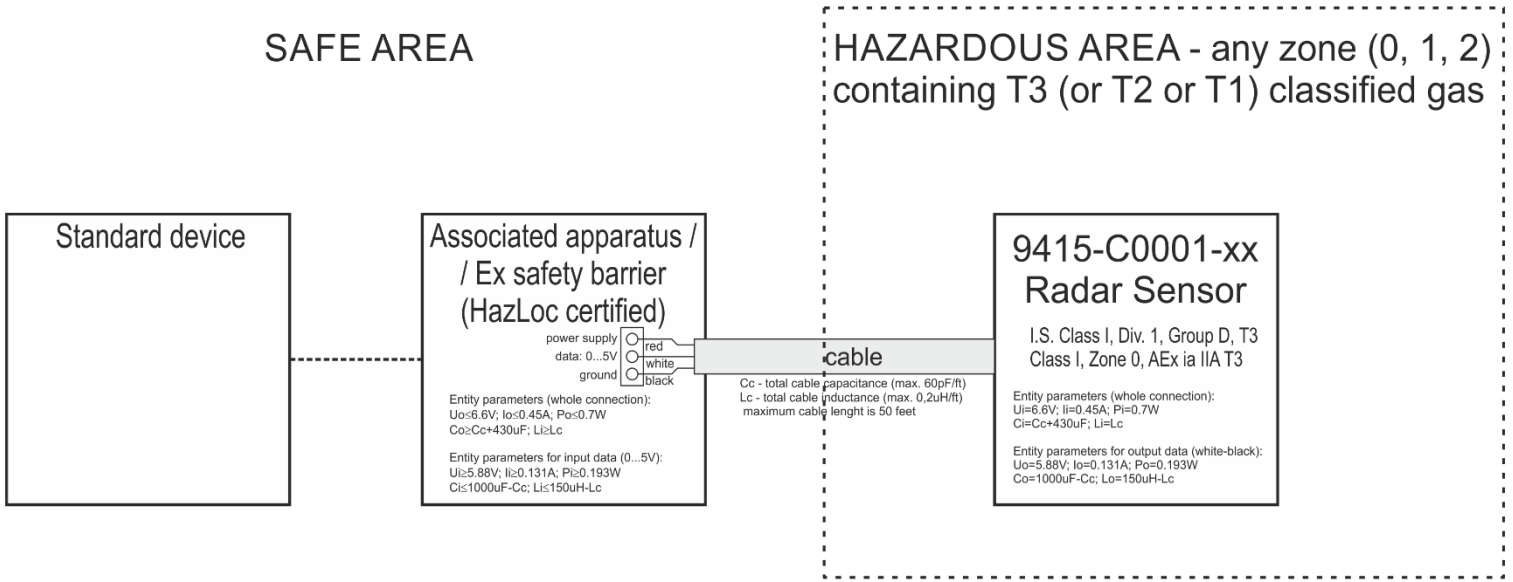
1025 S Belt Line Road Suite 100; Coppell, TX 75019
United States of America

Description: Control drawing for 9415-C0001		
Part: 1/2	Revision: 1.0	Date: 2/Nov/2023



WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD - SEE INSTRUCTIONS
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United States of America

Description: Control drawing for 9415-C0001		
Part: 2/2	Revision: 1.0	Date: 2/Nov/2023