

9415-x0001-xx Radar Sensor

User Manual

Manufacturer:

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United States of America

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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

9415-x0001-xx Radar Sensor 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*

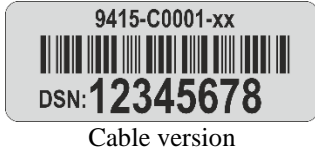
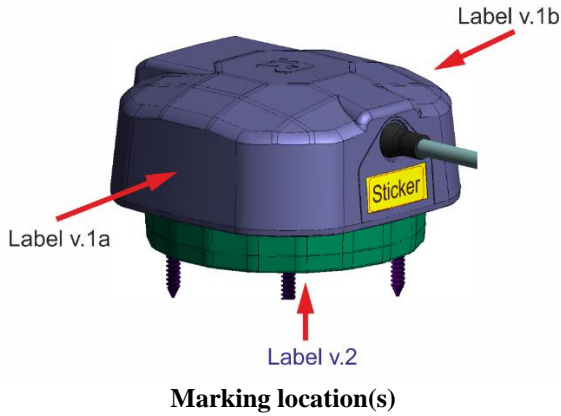
Product: **9415-x0001-xx Radar Sensor**

Versions:

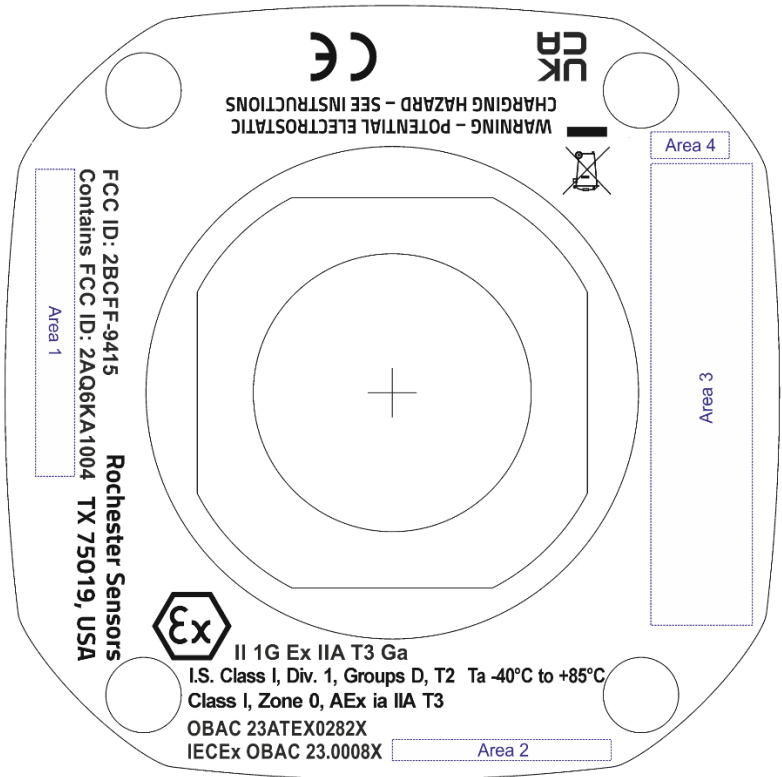
9415-B0001-00 – battery version (no external connections)

9415-C0001-xx – cable version (power supply and voltage output)
xx means cable length in feet

3.2 Product marking

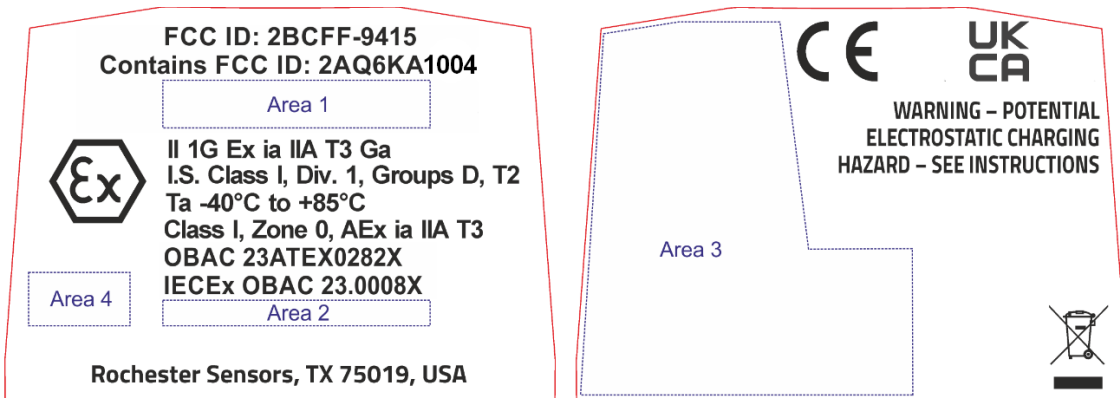


Stickers



- Area 1 - IC marking
- Area 2 - UKEX certificate number
- Area 3 - US/CA HazLoc listing marking
- Area 4 - IP code marking

Marking, version 2



- Area 1 - IC marking
- Area 2 - UKEX certificate number
- Area 3 - US/CA HazLoc listing marking
- Area 4 - IP code marking

Marking, version 1

4 Basic technical data and entity parameters

Followed table includes mostly parameters related to Ex safety.

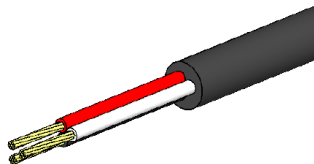
Ambient temperature range	-40°C...+85°C
Power supply 9415-B0001-00	Embedded, non-replaceable 3,6V batteries
Power supply 9415-C0001-xx	External via cable, Un=5VDC
Dimensions (maximum)	104x95x70 mm
2,4GHz radio interface	
Frequency range	2400 – 2483.5 MHz
Radio power	≤1 dBm
Antenna	Integral, PCB antenna
Pulsed Coherent Radar	
Frequency range	57 – 64 GHz
EIRP	10 dBm
Antenna	Integral, Antenna in Package (AiP)
Analog output (9415-C0001-xx)	
Type of output, range	DC voltage 0-5V proportional to the level being
Cable length	Up to 50 feet

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} ≤ 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:

$$U_o \leq U_i; I_o \leq I_i, P_o \leq P_i, C_o \geq C_i, L_o \geq L_i$$

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	$U_o=5,88V$
Maximum output current	$I_o=0,131A$
Maximum output power	$P_o=0,193W$
Maximum external capacitance	$C_o=1000\mu F-C_c$
Maximum external inductance	$L_o=150\mu H-L_c$

where C_c , L_c 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 Special conditions of use

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 $-40^{\circ}C \leq T_{amb} \leq +85^{\circ}C$,
- 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: $U_o=5,88V$; $I_o=0,131A$; $P_o=0,193W$; $L_o=150\mu H-L_c$; $C_o=1000\mu F-C_c$, where L_c , C_c are total inductance and capacitance of connected cable.

6 FCC PART 15 COMPLIANCE

6.1 *Modification statement*

Rochester Sensors, LLC has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

6.2 *Interference statement*

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

6.3 *Wireless notice*

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device needs to be installed and used on distance greater than 20 cm from human body.

6.4 *FCC Class B digital device notice*

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 instructions, 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.

7 IC LICENSE COMPLIANCE

7.1 Interference statement [EN]

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

7.2 Interference statement [FR]

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

7.3 Wireless notice [EN]

This equipment complies with the ICESRF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of the human body.

7.4 Wireless notice [FR]

Cet équipement est conforme aux limites d'exposition aux radiations ICES définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 cm entre le radiateur et une partie de votre corps.

8 RED COMPLIANCE

Product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU (RED). To confirm this, it bears the marking:



8.1 Radio-frequency exposure

The device complies with RF specifications when the device used at 20cm from your body.

Frequency bands	Maximum output power
BLE (2402-2480)	0.77dBm (EIRP)