

RLI-80

Non-Contact Radar Level Sensor

Data Sheet No. 262490 Rev. C



Contents

1. About This Document	3	5.6 MODBUS® Parameters	8
1.1 Function	3	6. Maintenance	10
1.2 Online Documentation	3	6.1 Basic Maintenance	10
1.3 Symbols Used	3	6.2 Basic Troubleshooting	10
2. Safety	3	6.3 Returns	11
2.1 Authorized Personnel	3	7. Connectivity	11
2.2 Appropriate Use	3	7.1 Bluetooth® Access Code	11
2.3 Incorrect Use	3	7.2 System Requirements	11
3. Product Description	3	7.3 Using the Mobile App	11
3.1 Specifications	4	7.4 Tank Adjustment	14
3.2 Part Number Nomenclature	4	7.5 Advanced Parameter Settings	14
3.3 Sensor Label	4	8. Dimensions	15
3.4 Operating Principle	4	9. Certificates & Approvals	16
3.5 Sensor Configuration	5	9.1 Radio Licenses	16
4. Mounting	5	9.2 Hazardous Location Approvals	17
4.1 General Instructions	5	9.3 EU Conformity	17
4.2 Bracket Mounting	5	10. Contact Information	17
4.3 Process Connection Mounting	5		
4.4 Process Extension Mounting	5		
4.5 Sensor Location	6		
4.6 Disconnecting the Sensor	6		
4.7 Operating Restrictions	7		
5. Electrical Connection	7		
5.1 Safely Connect	7		
5.2 Voltage Supply	7		
5.3 4-20mA Wiring	7		
5.4 MODBUS® Wiring Diagram	8		
5.5 Intrinsically-Safe Barriers	8		

1. About This Document

1.1 Function

This guide offers comprehensive details for the installation, connection, configuration, and troubleshooting of the RLI 80. Prior to installing and operating the sensor, we strongly recommend reading this manual and ensuring it is readily available for reference.

1.2 Online Documentation

<https://www.gemssensors.com/docs/default-source/resource-files/product-manual/rli-80-data-sheet.pdf>

1.3 Symbols Used



INFORMATION:

This symbol indicates helpful additional information and tips for successful work.



NOTE:

This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.



WARNING:

Non-observance of the information marked with this symbol may result in serious or fatal personal injury.



2. Safety

2.1 Authorized Personnel

All operations described in this document must be carried out by trained, and qualified personnel only. Personal protective equipment must always be worn when working with the RLI-80 sensor.

2.2 Appropriate Use

Gems RLI-80 is a non-contact continuous level sensor. Effective and reliable results from the sensor are only possible when used according to the specifications within this document. Individual applications must be reviewed by trained personnel to confirm the RLI-80 can be installed and used appropriately.

2.3 Incorrect Use

The sensor’s incorrect or inappropriate utilization can significantly elevate the potential for operational hazards, encompassing, but not limited to, vessel overflow, damage to property, environmental contamination, and impairment to both the sensor’s functionality and the integrity of the monitored medium. It is imperative to exercise the utmost care and precision in adhering to the prescribed operational guidelines.

3. Product Description

The RLI-80 Non-Contact Radar Level Sensor is a no-moving parts continuous level transmitter for reliable performance in challenging industrial tank level applications. RLI-80 Non-Contact Radar comes standard with 4–20 mA, MODBUS®, and Bluetooth® connectivity for configuration and setup.

The RLI-80 provides accurate level measurement in medias with a dielectric constant of 2 or greater. Constructed of chemically inert PVDF material and designed to withstand IP68 conditions, the RLI-80 withstands the harshest conditions. The 1.5” NPT or G1.5 mounting provides adaptability to be used in tanks as large as 49.2 ft (15 m). The RLI-80 is unaffected by changes in physical properties of the application such as pressure, temperature, or vapors.

- Measuring Range up to 49.2 ft (15 m)
- Accuracy: ±0.2 in (5 mm)
- Measurement is Independent of Temperature, Pressure and Moisture Variations
- Minimum Dielectric Constant (er) > 2
- 4–20 mA and MODBUS® Outputs
- Temperature Range: –40° F to +176° F (–40° C to +80° C)
- Pressure: Full Vacuum to 43 PSI (3 bar)
- IP68 Protection
- Approvals: Intrinsically-Safe, cULus, CE, ATEX/IECEX, FCC

Applications

- Water & Wastewater
- Food & Beverage Process Tanks
- Fuel Tank Farms
- Chlorination Systems
- Cooling Towers
- Water Purification

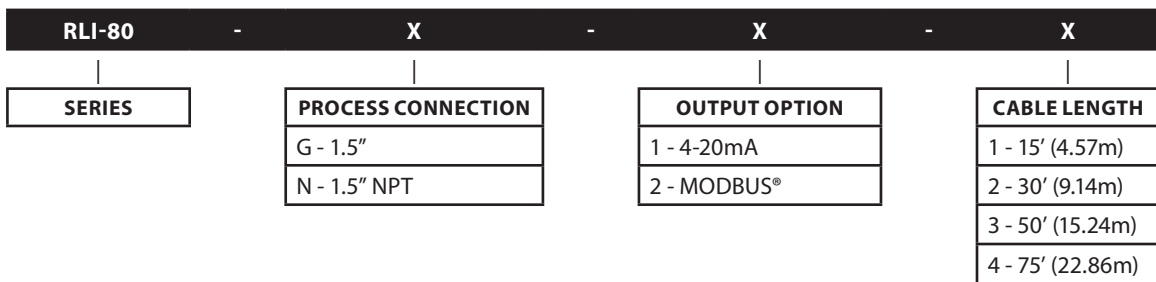
3.1 Specifications

MEDIA	Liquids
DIELECTRIC CONSTANT	Er > 2
MEASURING RANGE	49.21' (15 m)
FREQUENCY	80 GHz
OPERATING PRESSURE	Full VAC to ~43 PSI (3 bar)
OPERATING TEMPERATURE	-40° F to +176° F (-40° C to +80° C)
ACCURACY	± 0.2" (5 mm)
DEADBAND	9.84" (250 mm)
BEAM ANGLE	8°
MATERIALS (WETTED PARTS)	PVDF (Housing), FKM (Seal)
THREADED CONNECTION	1.5" NPT (Process Connection), G1.5 (Process Connection), 1 ¼"-12 (Bracket Mounting)
PROTECTION RATING	IP68
INPUT	24-36 VDC
OUTPUT	MODBUS® (4-Wire) or 4-20 mA (2-Wire)
COMMUNICATION INTERFACE	Configurations / Diagnostics via Bluetooth®, View Tank Obstacles & Signal Strength
INDICATION / ADJUSTMENT	Via App on Smartphone or Tablet & Bluetooth®
APPROVALS	cULus, CE, ATEX/IECEX, FCC
ELECTRICAL CONNECTION	15' (4.57 m), 30' (9.14 m), 50' (15.24m) or 5' (22.86m) TPE Jacketed Cable

Bluetooth® is a registered trademark of Bluetooth SIG, Inc. in Kirkland, WA.

MODBUS® is a registered trademark of Schneider Electric USA, Inc. in Palatine, IL.

3.2 Part Number Nomenclature



3.3 Sensor Label

The sensor label will have the general specifications of the sensor, including but not limited to the input voltage, the output, FCC, IC information, serial number (s/n), part number (p/n), material, and approval logos. The s/n is important as it is needed to connect the sensor to the Bluetooth® App

3.4 Operating Principle

Our sensor operates on radar technology, which involves sending short microwave signals towards the liquid being measured. Here's a step-by-step explanation of how it works:

- **Signal Emission:** The sensor emits microwave signals aimed at the surface of the liquid in the tank.
- **Signal Reflection:** When these microwave signals hit the liquid's surface, they bounce back towards the sensor.

- Time-of-Flight Principle: The sensor employs a concept called the “time-of-flight” principle. This means it measures the time it takes for the microwave signal to travel from the sensor to the liquid surface and back again.
- Distance Calculation: Knowing the speed at which microwaves travel, the sensor calculates the distance between itself and the liquid surface by dividing the total travel time by two. This division by two is because the signal had to make a round trip—down to the liquid surface and back up to the sensor.
- Liquid Level Determination: Most often, what we’re interested in is the level of the liquid, not the air above it. To find the liquid level, the sensor subtracts the height of the air (non-liquid space) from the total depth of the tank. This subtraction yields the precise liquid level


3.5 Sensor Configuration

RLI-80 comes standard with integrated Bluetooth® connectivity that allows for the application parameters (Sensor Height, Fill Height) to be adjusted via standard smartphone/tablets.

4. Mounting

4.1 General Instructions

The instrument is suitable for standard and extended ambient conditions. It can be used indoors as well as outdoors.



NOTE: FOR SAFETY REASONS, THE INSTRUMENT MUST ONLY BE OPERATED WITHIN THE SPECIFIED PROCESS CONDITIONS NOTED IN THIS DOCUMENT. REVIEW THE WETTED MATERIALS OF THE SENSOR TO ENSURE THAT ALL PARTS OF THE INSTRUMENT EXPOSED TO THE PROCESS ARE CHEMICALLY COMPATIBLE. ENSURE THE PROCESS PRESSURE AND PROCESS TEMPERATURE DO NOT EXCEED THE LISTED SPECIFICATIONS.

4.2 Bracket Mounting

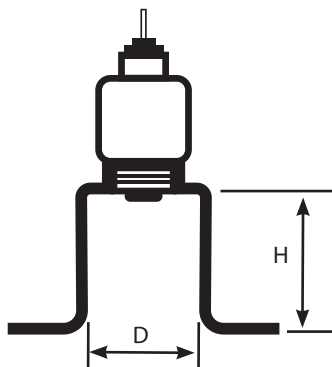
For open tanks you may mount the sensor using the bracket p/n 261977. The device is mounted to the bracket via the 1 ¼"-12 UNF threads at the top and the supplied jam nut. The bracket can be attached to the side of a wall or ceiling. Where possible keep the center of the sensor at least 8" away from the side of the tank wall.

4.3 Process Connection Mounting

For sealed tanks you can use the 1.5" NPT or G1.5 process connection. For sealed tanks make sure the sealant is compatible with the PVDF housing and that no sealant is placed on the sensor face. Where possible install sensor into a plastic female bung.

4.4 Process Extension Mounting

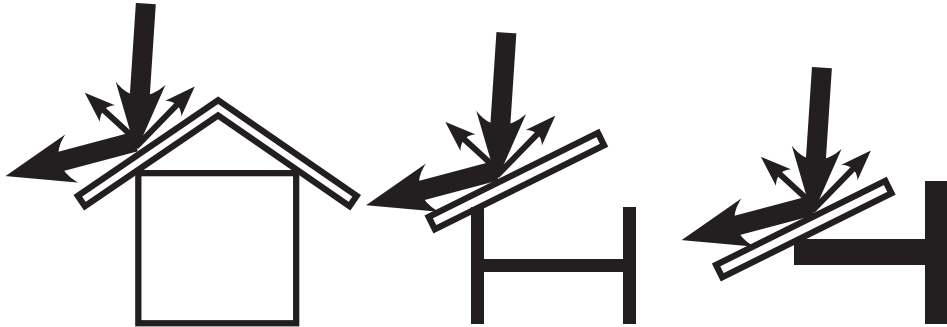
When mounting within an extended process connection, the tank end of the bung should be smooth and burr-free. The ends should also be rounded, if possible, to not get any false signals. Process extensions should also be used in medias with higher dielectric constants to ensure a stronger return signal. See the below recommended process extension diameters based on bung heights.



D BUNG DIAMETER	H BUNG HEIGHT DIAMETER
1.5" (40 mm)	≤ 5.9" (150 mm)
2" (50 mm)	≤ 7.9" (200 mm)
3" (80 mm)	≤ 11.8" (300 mm)
4" (100 mm)	≤ 15.8" (400 mm)
5" (150 mm)	≤ 23.6" (600 mm)

4.5 Sensor Location

Mount the radar sensor in a location where no other equipment or fixtures will encounter the radar beam. Obstructions within the tank or directly outside on plastic tanks (ladders, pipes) can cause false signal returns and disrupt the correct signal from the media. When possible, install the sensor at least 8" away from the tank wall. Large obstructions creating false echoes can also be weakened by installing metal baffles above them to direct the signal away from the radar sensor.



Install the sensor as perpendicular as possible to the media surface to obtain the most accurate measurement readings. The middle of the sensor face is the beginning of the measurement range.

4.6 Disconnecting the Sensor



WARNING: PRIOR TO DISMOUNTING, PLEASE BE AWARE OF ALL DANGEROUS PROCESS CONDITIONS NOT LIMITED TO PRESSURIZED TANK OR VESSEL, HIGH TEMPERATURES, CORROSIVE OR TOXIC MEDIA AND VAPORS. FOLLOW THE DIRECTIONS OF MOUNTING AND ELECTRICAL CONNECTION IN REVERSE ORDER.



NOTE: SENSOR DISCONNECTION AND UNINSTALLATION SHOULD ONLY BE PERFORMED BY TRAINED PERSONNEL FAMILIAR WITH THE SENSOR'S SPECIFICATIONS AND SAFETY REQUIREMENTS. IF YOU ENCOUNTER ANY DIFFICULTIES OR UNCERTAINTIES DURING THESE PROCEDURES, SEEK ASSISTANCE FROM QUALIFIED TECHNICIANS OR OUR TECHNICAL SUPPORT TEAM.

- **Safety First:** Prioritize safety by wearing appropriate personal protective equipment (PPE), including, but not limited to, gloves and eye protection.
- **Power Down:** Before attempting any disconnection, power down the sensor and any associated equipment to avoid electrical hazards.
- **Turn Off Power Source:** Ensure that the power source supplying the sensor is switched off and disconnected.
- **Unplug Cables:** Carefully disconnect any cables or connections linked to the sensor. Exercise caution to avoid damaging connectors or cables during this process.
- **Secure the Sensor:** If the sensor is mounted, make sure it is securely held in place to prevent accidental drops or movement during the disconnection.
- **Unfasten any Mounting Hardware:** If required, remove any fasteners or components securing the sensor to its mount. Exercise care to avoid damaging the sensor or any surrounding equipment.
- **Assess Accessibility:** Once the mounting hardware is loosened, assess whether any additional components or obstacles hinder the sensor's removal. If necessary, temporarily relocate or adjust surrounding equipment to facilitate the dismantling process.
- **Lift and Remove:** With the sensor now detached from its mount, lift it gently from the mounting location. Use caution to prevent any sudden movements or shocks during removal.
- **Inspect for Damage:** After removal, inspect the sensor for any visible damage or anomalies. Make note of any issues that may require maintenance or replacement before reinstalling.
- **Store Securely:** After removal, store the sensor in a clean, dry, and safe location. Ensure it is protected from potential damage during storage.

4.7 Operating Restrictions

For operation outside of closed metal vessels under the usage restriction complying with 15.256, this device must be installed and maintained to ensure a vertically downward orientation of the transmit antenna's main beam. This device may only operate at fixed locations and may not operate while being moved, or while inside a moving container. Hand-held applications are prohibited. The device and its antenna(s) must be installed to provide a separation distance of at least 20 cm from all persons.

Pour une utilisation en dehors de conteneurs métalliques fermés sous la restriction d'utilisation conformément à l'article 15.256, cet appareil doit être installé et entretenu de manière à assurer une orientation verticale vers le bas du faisceau principal de l'antenne d'émission. Cet appareil ne peut être utilisé qu'à des emplacements fixes et ne peut pas être utilisé pendant le transport ou à l'intérieur d'un conteneur en mouvement. Les applications portatives sont interdites. L'appareil et ses antennes doivent être installés de manière à fournir une distance de séparation d'au moins 20 cm par rapport à toutes les personnes.

5. Electrical Connection

5.1 Safely Connect

All electrical connections should be carried out by qualified personnel.



WARNING: ENSURE THAT ALL ELECTRICAL CONNECTIONS ARE CARRIED OUT EXCLUSIVELY BY PERSONNEL WHO ARE BOTH TRAINED AND AUTHORIZED BY THE PLANT OPERATOR.



WARNING: MAKE CONNECTIONS OR DISCONNECTIONS ONLY WHEN THE INSTRUMENT IS IN A DE-ENERGIZED STATE. THE POWER SUPPLY SPECIFICATIONS CAN BE FOUND IN THE "SPECIFICATIONS" SECTION.

5.2 Voltage Supply



NOTE: POWER THE INSTRUMENT USING AN ENERGY-LIMITED CIRCUIT WITH A MAXIMUM POWER RATING OF 100 W, FOLLOWING IEC 61010-1 STANDARDS. SUITABLE OPTIONS INCLUDE:

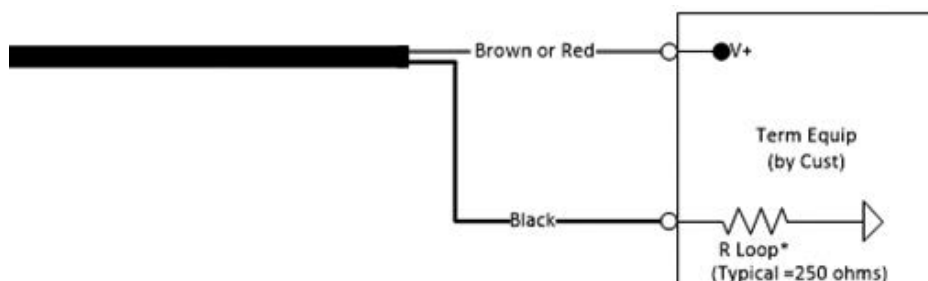
- CLASS 2 POWER SUPPLY UNIT (COMPLIANT WITH UL1310)
- SELV POWER SUPPLY UNIT (SAFETY EXTRA-LOW VOLTAGE) WITH EITHER INTERNAL OR EXTERNAL CURRENT LIMITATION.

Be mindful of the following factors that can affect the operating voltage:

- Reduced Power Supply Voltage: The power supply unit may provide a lower output voltage under nominal load conditions (e.g., with a sensor current of 20.5 mA or 22 mA in case of a fault signal).
- Impact of Other Instruments: Take into consideration the influence of additional instruments in the circuit.

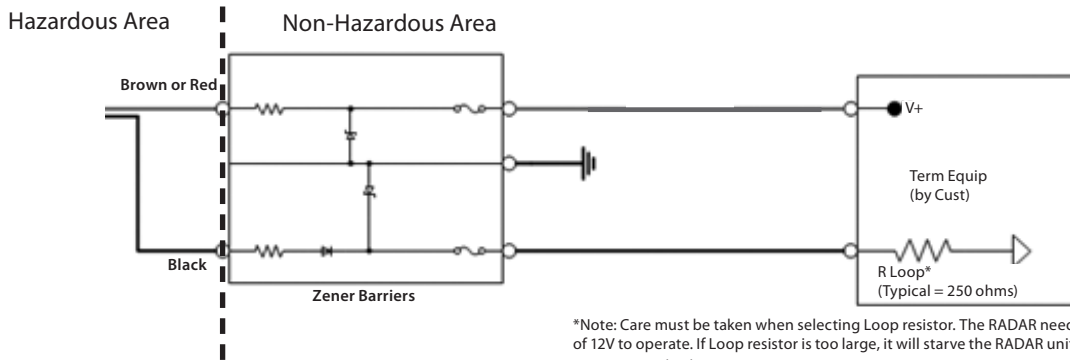
5.3 4-20mA Wiring

Non-Intrinsically-Safe



*Note: Care must be taken when selecting Loop resistor. The RADAR needs a minimum of 12V to operate. If Loop resistor is too large it will starve the RADAR unit and erroneous output may occur.

Intrinsically-Safe

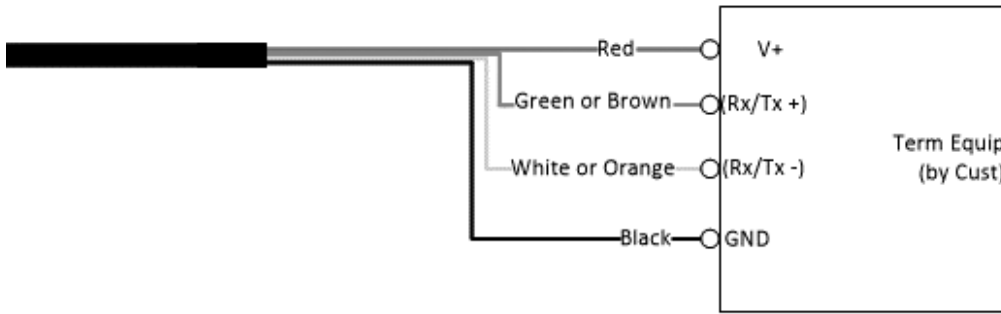


*Note: Care must be taken when selecting Loop resistor. The RADAR needs a minimum of 12V to operate. If Loop resistor is too large, it will starve the RADAR unit and erroneous output may occur.

$$R_{Loop} = R_{Supply\ Barrier} + R_{Return\ Barrier} + R_{Monitoring\ Equipment}$$

5.4 MODBUS® Wiring Diagram

Non-Intrinsically-Safe



*Note: RS-485 Half-duplex communication protocol.

Intrinsically-Safe configuration only available with 4-20mA output.

5.5 Intrinsically-Safe Barriers

When using the RLI-80 within a Hazardous Location, Intrinsically-Safe barriers are required. The following barriers are one example that may be used with the RLI-80. Pepperl+ Fuchs Type Z787 P/N 71816.

5.6 MODBUS® Parameters

This RLI-80 uses a RS-485 physical interface to support the MODBUS RTU interface. These are the TX/RX+ and the TX/RX - connections as shown in the wiring harness diagram. The serial interface uses 8 data bits with 1 stop bit. The Baud rate and Parity may be modified by the user using the BLE configuration Application as well as the RTU device ID and other user defined parameters.

This RLI-80 supports the following baud rate and parity options:

TABLE 1: RLI-80 MODBUS RTU BAUD RATES

BAUD
9600 (Default)
19200
38400
57600
115200
921600

TABLE 2: RLI-80 MODBUS RTU PARITY

BAUD
None
Odd
Even (Default)

Table 3 details the data available by the reading the Input registers.

TABLE 3: RLI-80 INPUT REGISTERS (04)

ADDRESS	REGISTER	DATE TYPE	COMMENTS
0	Update Counter	Uint16	Updated for each radar measurement.
1	Output Range (Meters)	Float (IEEE-754 Format)	Output Range Value Based on latest measurement or average of selected.
2			
3	Latest Range (Meters)	Float (IEEE-754 Format)	Latest Measurement Value (IEEE-754 Format) (Meters)
4			
ADDRESS	REGISTER	DATE TYPE	COMMENTS
5	Magnitude	Float (IEEE-754 Format)	Relative Signal Magnitude Value of latest measurement.
6			
7	Percent (Range = 0-100%)	Float (IEEE-754 Format)	Percent Full Value or Percent Empty Value (if selected).
8			
9	Up Time (0.1 Minutes)	Float (IEEE-754 Format)	Up time since power-up.
10			
11	Device Temperature (°C)	Int16	Measured Internal Temperature
12	Current Operational Mode	Uint16	01 - Operational (Default) 02 - Standby (Radar Operation Suspended) 03 - Continuous
13	Error Code	Uint16	Measurement Error Code (TBD) 0 = No Errors
14	Serial Number	Uint32	Device Serial Number
15			
16	Device Name	Char[8]	User-Assigned Device Name (8 character field padded with spaces)
17			
18			
19			
20	Radar Min Range (Meters)	Float (IEEE-754 Format)	Minimum Limit for Radar Processing (User-Defined)
21			
22	Radar Max Range (Meters)	Float (IEEE-754 Format)	Maximum Limit for Radar Processing (User-Defined)
23			
24	Tank Top Range (Meters)	Float (IEEE-754 Format)	Top of Tank Range Setpoint Used for % Calculations & 4-20 Output (User-Defined)
25			

26	Tank Bottom Range (Meters)	Float (IEEE-754 Format)	Bottom of Tank Range Setpoint Used for % Calculations & 4-20 Output (User-Defined)
27			
28	Tank Inversion Mode	Int16	0 = Normal, Bottom: 0% Top: 100% 1 = Inverted, Bottom: 100% Top: 0% (User-Defined)
29	Reserved		TBD
30	Reserved		TBD
31	Reserved		TBD

Table 4 details the available control functions.

TABLE 4: RLI-80 WRITE SINGLE REGISTERS (06)

ADDRESS	REGISTER	DATE TYPE	COMMENTS
0	Operational Mode	Uint16	0 - Normal Measurements at 3 sec. Rate 1 - Standby, Measurements Suspended 2 - Continuous Measurements at 0.5 sec. Rate (Requires 60 mA)
1	Reserved		TBD
2	Reserved		TBD

6. Maintenance

6.1 Basic Maintenance

6.1.1 Routine Maintenance:

Under typical operating conditions, IP68 radar sensors are designed to require minimal maintenance. Their robust construction is engineered to withstand harsh environments and resist dust and temporary immersion in water.

6.1.2 Monitoring for Buildup:

Certain applications may lead to the accumulation of debris or substances on the sensor face over time. Such buildup can potentially impact measurement accuracy. Regular visual inspections can help identify when cleaning is needed.

6.1.3 Cleaning Procedures:

When it becomes necessary to clean the sensor face, it is crucial to use appropriate cleaning methods and materials that align with the sensor’s IP68 rating. Here’s how to do it effectively:

- **Select Compatible Cleaning Media:** Choose cleaning media that are compatible with the sensor’s housing and seal materials. This ensures that the cleaning process does not harm or degrade any components.
- **Follow IP Rating Standards:** To maintain the IP68 rating, adhere to cleaning methods and procedures suitable for devices with this level of protection against dust and temporary immersion. Avoid using excessive water pressure or aggressive cleaning agents that may compromise the sealing integrity.

6.2 Basic Troubleshooting

4-20mA or MODBUS® signal missing	<ul style="list-style-type: none"> • Ensure electrical connection is tight and secure. • Ensure sensor is supplied with correct voltage supply. • Ensure the operating voltage is not too low and that the load resistance is not too high. See the wiring diagram.
---	--

Current signal less than 3.6 mA or greater than 22 mA (excluding MODBUS®)	<ul style="list-style-type: none"> • Ensure sensor is supplied with correct voltage supply.
Output measurement unchanged during filling	<ul style="list-style-type: none"> • Ensure the sensor face is projecting past the end of the threaded socket. • Remove any buildup on the sensor face. • Eliminate any large obstructions within close range that are causing false signals.
Output measurement increases toward 100% during emptying	<ul style="list-style-type: none"> • Remove any buildup on the sensor face.

6.3 Returns

Standard terms & conditions of sale apply. Refer to the document located online at <https://www.gemssensors.com/docs/default-source/resource-files/terms-conditions/gems-customer-terms>. All Return Authorization activity must go through the Gems quality services team. To initiate a Return Authorization please go to <https://ecatalog.gemssensors.com/support/ra>

7. Connectivity

7.1 Bluetooth® Access Code

The Bluetooth® access code is required to establish communication between the RLI-80 sensor and your smartphone/tablet. The access code is the serial number (s/n) which is found on the label of the sensor. The access code only needs to be entered once and is stored in the application.

7.2 System Requirements

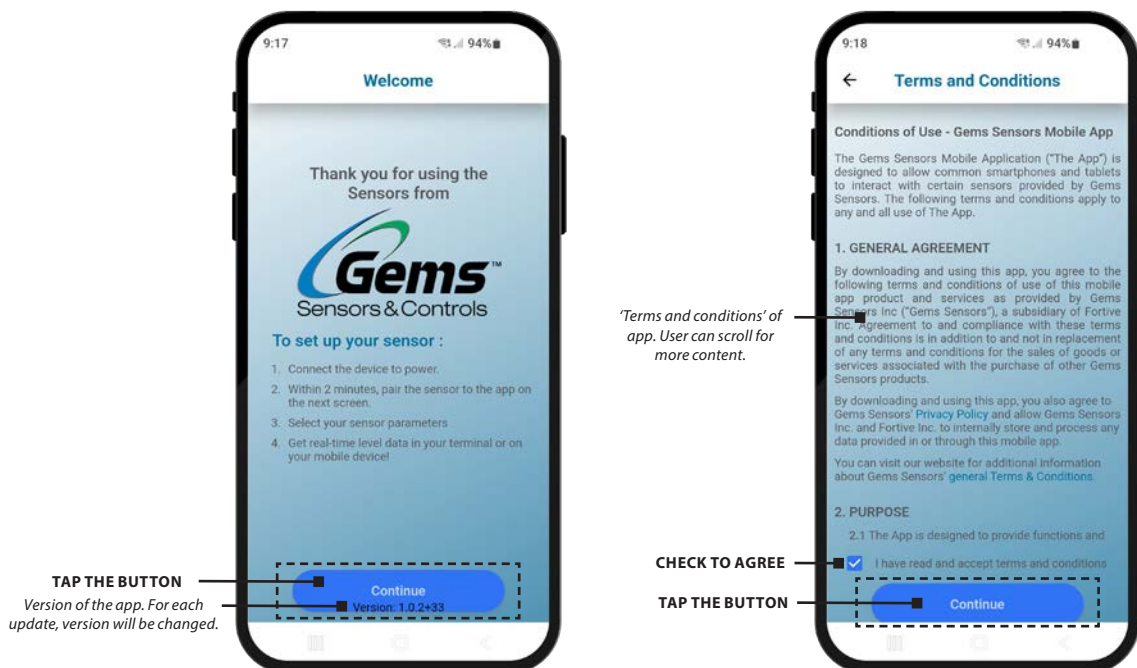
The smartphone/tablet should have the below operating systems to connect to the sensor correctly.

- - iOS 8 or newer
- - Android 5.1 or newer
- - Bluetooth® 4.0 LE or newer

7.3 Using the Mobile App

7.3.1 Welcome Screen & Terms and Conditions Screen

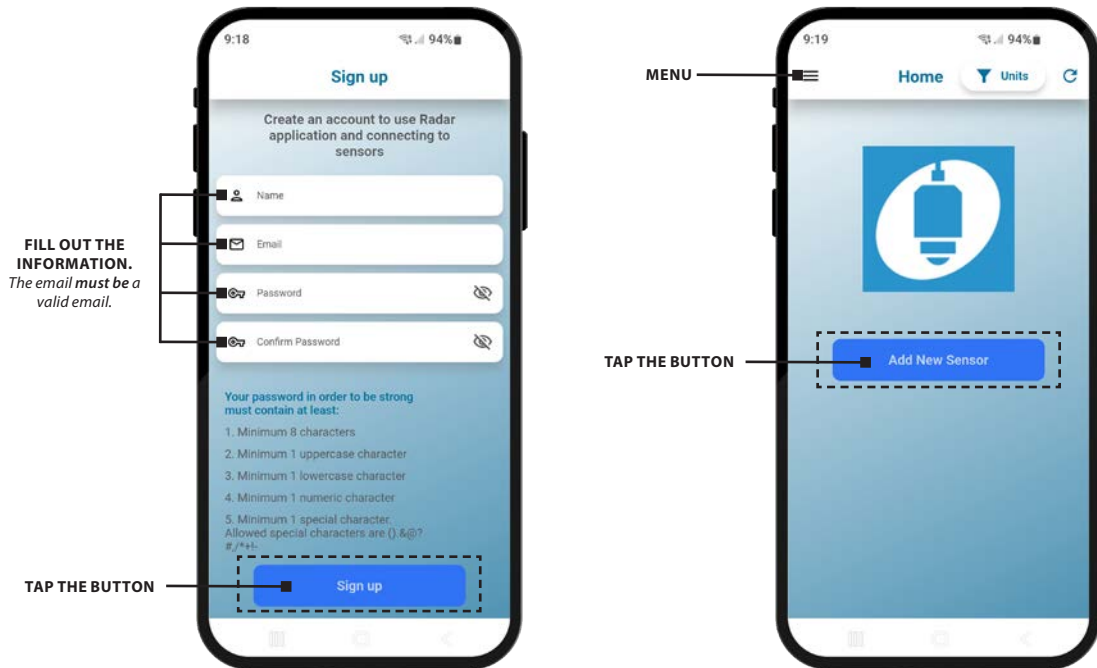
The welcome and on-boarding screen will be displayed to the user only once after the app is installed. The terms and conditions screen is also only displayed once after the app is installed. The user must read all of the terms and conditions of the app by scrolling down. It is required to accept the terms and conditions by selecting the checkbox in order to use the app.



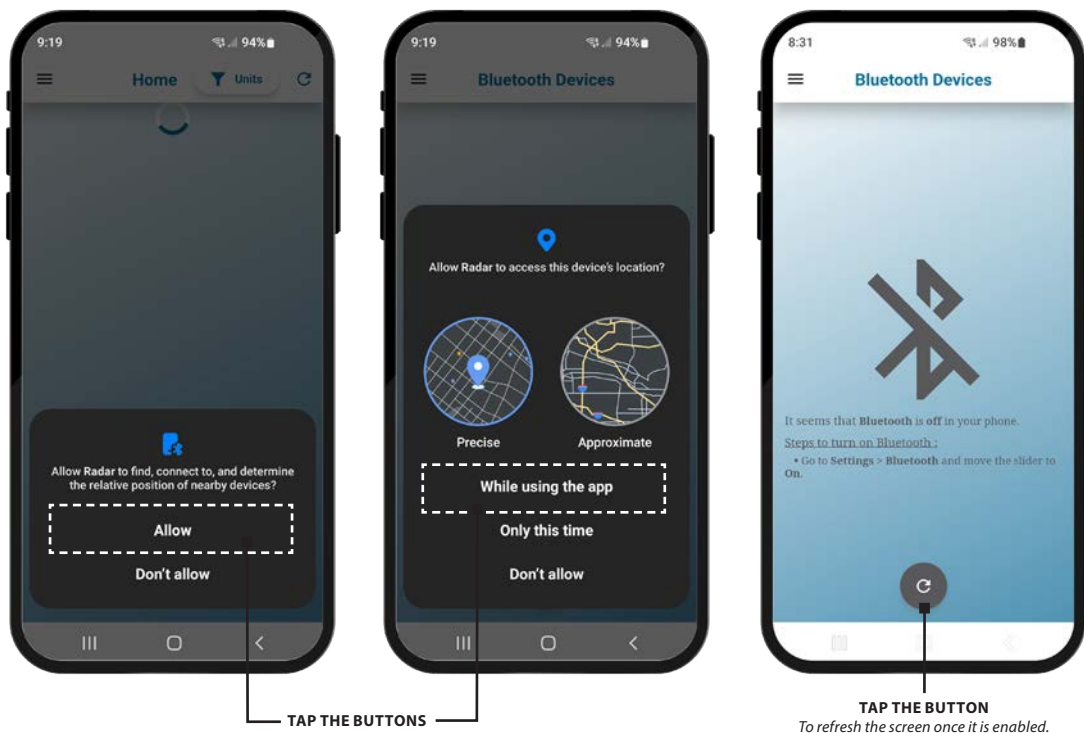
7.3.2 Sign-Up Screen & Home Screen

The sign-up screen is only displayed once after installation. The user must enter their name, a valid email address and password in order to register to use the app. After logging into the app, the user is redirected to the home screen. By default, no sensors are connected or paired with Bluetooth®.

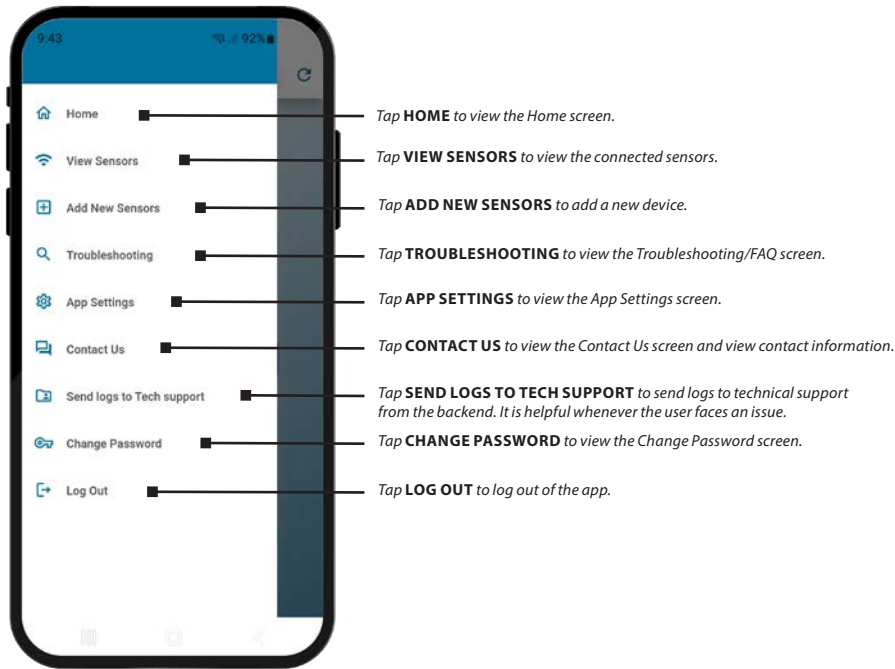
Open the Bluetooth® app and select the “Add New Sensor” option. The smartphone or tablet will search for any Bluetooth® devices in the area. Click on the radar sensor that you would like to set up. Connecting the sensor for the first time will require an authentication code, which is the serial number (s/n). The s/n is located on the sensor label. After the sensor is connected to the app the tank adjustment menu will be displayed.



7.3.3 Connection Permissions Screens

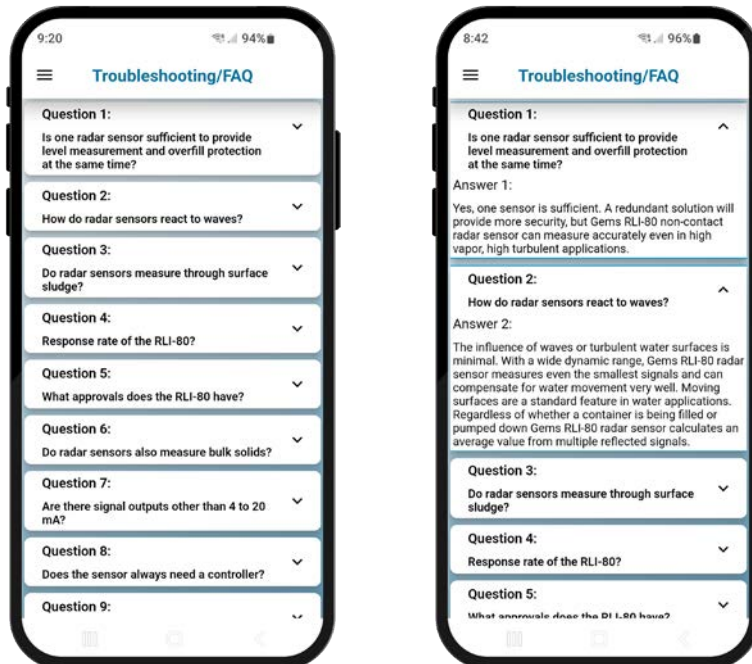


7.3.4 Menu Toolbar



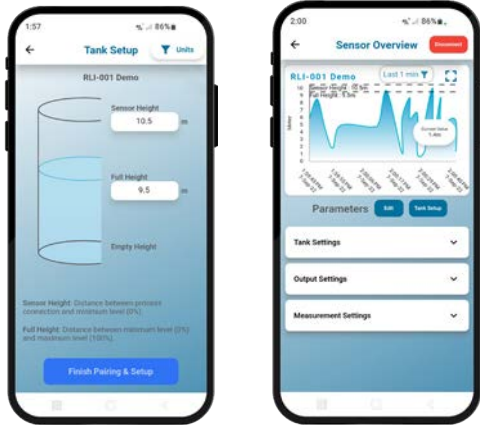
7.3.5 Troubleshooting Screen

The Troubleshooting screen displays answers to frequently asked questions.



7.4 Tank Adjustment

Enter the following parameters into the application to set your configuration.



SENSOR HEIGHT:

Distance between the process connection and the minimum level (empty height, 0%).

FULL HEIGHT:

Distance between minimum level (empty height, 0%) and maximum level (fill height, 100%).

LOOP FAIL-SAFE:

Select 4mA, 20mA, or 22mA as your loop fail-safe value. This is the output value that will be sent out if the radar signal is lost.

TANK NAME:

Enter the name of the tank the sensor is installed in. Tank name is limited to 8 characters.

After those parameters are entered, you may exit the setup menu and the configuration will be saved. Your tank parameters can be viewed below the measurement graph.

7.5 Advanced Parameter Settings

The following advanced parameters may be adjusted within the application but are not required.

7.5.1 Scan Start Range

Defines the starting range for radar level processing. Must be less than Scan End Range.

Range: 0.0 – 20.0 meters **Default:** 0.05 meters

7.5.2 Scan Edge Range

Defines the ending range for radar level processing. Must be greater than Scan Start Range.

Range: 0.0 - 20.0 meters **Default:** 3.1 meters

7.5.3 Tank Invert

Sets the output used for 4-20 mA and MODBUS® to report % Empty versus % Full.

Selections: On (% Empty) or Off (% Full) **Default:** Off (% Full)

7.5.4 Average Length

Sets the number of measurements used for range averaging for use in output reporting via 4-20mA or MODBUS®.

Range: 1-16 **Default:** 1 (none)

7.5.5 Sample Period

Sets the time between radar measurements in seconds.

Range: 2-60 seconds **Default:** 2 seconds

7.5.6 History Interval

Sets the number of measurements intervals between each update to the history archive.

Range: 1 (Every Measurement) – 32767 (History Updated Every 32767 Measurements) **Default:** 1

7.5.7 4-20 Error Selection

Sets the loop fail-safe output value that will be sent out if the radar signal is lost.

Selections: 4mA, 20mA, 22mA **Default:** 4mA

7.5.8 MODBUS® Enable

Enables/Disables the MODBUS® RTU interface over RS-485 connection.

Selections: Off, On-Normal (2s Sampling), On-Continuous (500ms Sampling) **Default:** On-Normal

7.5.9 MODBUS® RTU Address

Selects the slave address for communications to the RLI-80 device over MODBUS® RTU protocol.

Range: 1-254 **Default:** 1

7.5.10 MODBUS® Baud Rate Selection

Selects the serial baud rate used for communications to the RLI-80 device over MODBUS® RTU protocol.

Selections: 9600, 19200, 38400, 57600, 115200, 921600 **Default:** 9600

7.5.11 MODBUS® Parity Selection

Selects the serial parity bit used for communications to the RLI-80 device over MODBUS® RTU protocol.

Selections: None, Odd, Even **Default:** Even

7.5.12 BLE Name

Allows customization of the tank name the RLI-80 device is installed on. For example: the default name is "TANK1", so resulting name is "RLI-*nnn* TANK1" where "*nnn*" is the last 3 digits of the RLI-80 serial number.

Selection: Text Entry up to 8 Characters **Default:** TANK1 (Resulting Name: RLI-*nnn* TANK1)

7.5.13 4-20 mA Adjustments

Allows fine tuning of the 4-20mA output. Updates to these values should be done via a process that forces the device into a forced 0% (4mA) or 100% (20mA) mode.

4 mA Adjustment:

Allows fine tuning of the 4mA output level to adapt to different supply and load resistor configurations.

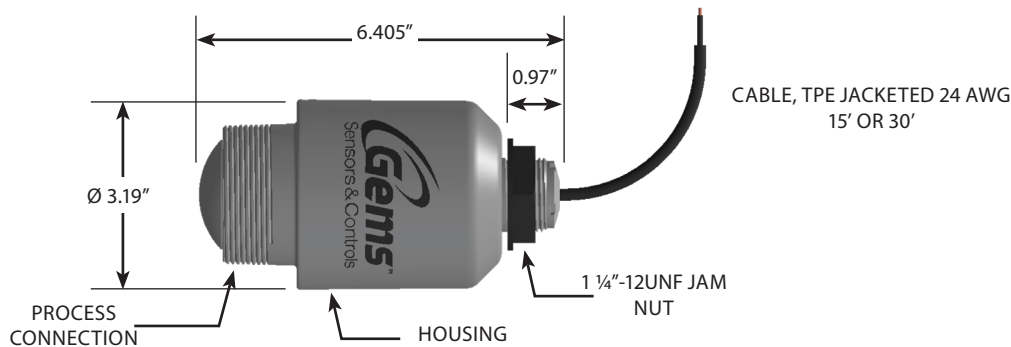
Range: -150 to +150 **Default:** 0

20 mA Adjustment:

Allows fine tuning of the 20mA output level to adapt to different supply and load resistor configurations.

Range: -150 to +150 **Default:** 0

8. Dimensions



9. Certificates & Approvals

9.1 Radio Licenses

1) FCC Interference Statement (Part 15.105 (b))

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 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.

2) FCC Part 15 Clause 15.21:

“Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment”

3) FCC Part 15.19(a) [interference compliance statement], unless the following statement is already provided on the device label:

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

4) ISED RSS-Gen Notice (in English and French):

“This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device. .”
- The installation of the LPR/TLPR device shall be done by trained installers, in strict compliance with the manufacturer’s instructions.
- The use of this device is on a “no-interference, no-protection” basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. However, devices found to interfere with primary licensing operations will be required to be removed at the user’s expense.
- This device shall be installed and operated in a completely enclosed container to prevent RF emissions, which can otherwise interfere with aeronautical navigation. Level Probing Radar Equipment RSS-211 6
- The installer/user of this device shall ensure that it is at least 10 km from the Dominion Astrophysical Radio Observatory (DRAO) near Penticton, British Columbia. The coordinates of the DRAO are latitude 49°19’15” N and longitude 119°37’12” W. For devices not meeting this 10 km separation (e.g., those in the Okanagan Valley, British Columbia,) the installer/user must coordinate with, and obtain the written concurrence of, the Director of the DRAO before the equipment can be installed or operated. The Director of the DRAO may be contacted at 250-497-2300 (tel.) or 250-497-2355 (fax). (Alternatively, the Manager, Regulatory Standards, Industry Canada, may be contacted.)

“L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes :

- L’appareil ne doit pas produire de brouillage;
- L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement. .”

- L'installation de l'appareil LPR/TLPR doit être effectuée par des installateurs formés, en stricte conformité avec les instructions du fabricant.
- L'utilisation de cet appareil se fait sur une base "sans interférence, sans protection". Cela signifie que l'utilisateur doit accepter les opérations de radar de haute puissance dans la même bande de fréquence qui peuvent interférer avec ou endommager cet appareil. Cependant, les appareils qui interfèrent avec les opérations de licence principales devront être retirés aux frais de l'utilisateur.
- Cet appareil doit être installé et utilisé dans un conteneur complètement fermé pour éviter les émissions RF, qui peuvent autrement interférer avec la navigation aérienne. Équipement radar de mesure de niveau RSS-211 6
- L'installateur/utilisateur de cet appareil doit s'assurer qu'il se trouve à au moins 10 km de l'Observatoire radio astrophysique Dominion (DRAO) près de Penticton, en Colombie-Britannique. Les coordonnées du DRAO sont la latitude 49°19'15" N et la longitude 119°37'12" O. Pour les appareils ne respectant pas cette séparation de 10 km (par exemple, ceux de la vallée de l'Okanagan, en Colombie-Britannique), l'installateur/utilisateur doit coordonner avec et obtenir l'accord écrit du directeur du DRAO avant l'installation ou l'utilisation de l'équipement. Le directeur du DRAO peut être contacté au 250-497-2300 (téléphone) ou au 250-497-2355 (fax). (Alternativement, le gestionnaire des normes réglementaires d'Industrie Canada peut être contacté.)

5) ISED Canada ICES-003 Compliance Label (CAN BE PROVIDED ON LABEL OR in MANUAL):

"CAN ICES-3 (B)/NMB-3(B)"

9.2 Hazardous Location Approvals

This device has the following Intrinsically-Safe approvals. UL/c-UL for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Zone 0, Group IIC, AEx/Ex ia IIC T4 Ga; and ATEX/IECEx/UKEx Zone 0, Group IIC, II 1G Ex ia IIC T4 Ga

9.3 EU Conformity

The device satisfies the legal requirements of the applicable EU directives. The CE marking confirms the conformity of the Radar sensor with these directives.

10. Contact Information

Toll Free: 1-855-877-9666 | Outside the US: 860-747-3000 | Email: cs@gemssensors.com

