



# Digi Connect<sup>®</sup> Tank

v2

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User Guide

## Revision history—90001469

Revision	Date	Description
G	July 2017	<ul style="list-style-type: none"><li>■ Updated graphics and text with information about correctly aligning the cover and base when assembling the device.</li><li>■ Updated the product specifications temperature range.</li></ul>
H	August 2017	Added battery safety information.
J	May 2018	<ul style="list-style-type: none"><li>■ Updated insert SIM card instructions.</li><li>■ Added note to Connect Tank range specifications.</li></ul>
K	October 2018	Updated range specifications: <a href="#">Cellular specifications</a> and <a href="#">General product specifications</a> .
L	December 2020	Updated ATEX requirements.

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## Digi Connect® Tank v2 User Guide

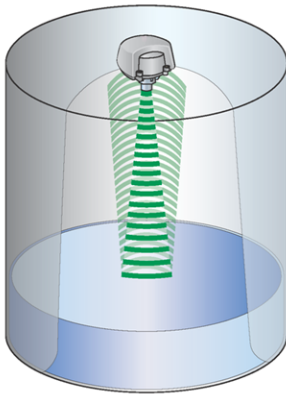
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Digi Connect Tank v2 allows you to remotely monitor the liquid level in a single tank. The Connect Tank device operates wirelessly by running on a long-life battery and communicating through the cellular network.

**Note** Do not use Connect Tank to measure levels of non-liquid tanks. The Connect Tank device uses ultrasonic sensing, which requires a uniform surface to take accurate measurements. Solid material does not provide a uniform surface.

---

Using its ultrasonic sensor, the Connect Tank device transmits a narrow ultrasonic sound beam to the surface of the liquid and reflects back to the sensor, as shown in the following figure. The device measures the amount of time it takes for the ultrasonic sound beam to travel down to the surface of the liquid and reflect back to the sensor. The device then converts the amount of time into a measurement showing how far the liquid is from the top of the tank in inches and reports that information to your Digi Remote Manager account.



## Get started

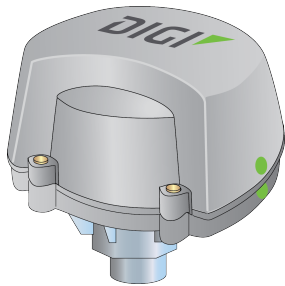
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Before installing the Connect Tank device in a tank, make sure you review the information in this section and complete all of the tasks.

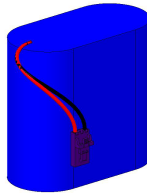
### Verify product components

Make sure you have the necessary parts in the box.

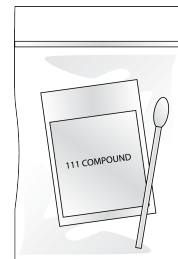
Connect Tank includes the following components:



Connect Tank



Battery

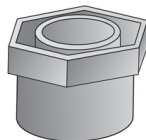


Gasket lubricant

The following accessories are available through Digi International Inc. For more information, see the [Digi Connect Tank product support page](#).



Activated SIM card  
(when you purchase Digi  
Bundled Services)



NPT adapter  
(for some tank configurations)



Magnet  
(for manually waking the device)

### Assemble the device

Before you begin, make sure you have the following required equipment to assemble the Connect Tank device:

- One 9/64-inch or 3.5 mm hex key
- Activated SIM card: See [Activate a SIM card](#)





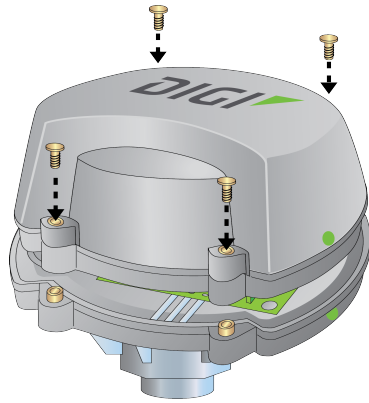
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**CAUTION!** This product contains a lithium metal battery. Prior to installation, the battery should be inspected for any signs of damage. If the battery appears to be damaged or is dropped during the installation, do not use the battery and dispose of it properly. See [Battery inspection](#) for more information.

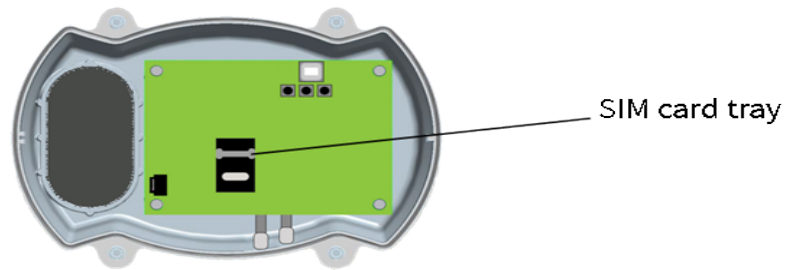
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To assemble the device:

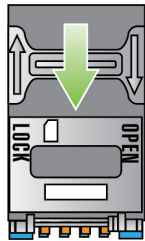
1. Use a 9/64-inch or 3.5 mm hex key to loosen the four retaining screws and open the Connect Tank enclosure cover.



2. Insert the activated SIM card.
  - a. Orient Connect Tank to match the picture below.



- b. Unlock the SIM card tray by gently pushing the metal bar toward the bottom of the tray.

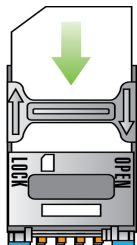


- c. Open the SIM card tray by pulling the tray up from the top or right side of the tray.

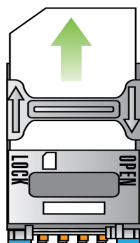


**CAUTION!** Do not pull the SIM card tray up from the left side or use a tool to open the tray. These actions may damage the SIM detect switch, which is beneath the left side of the tray.

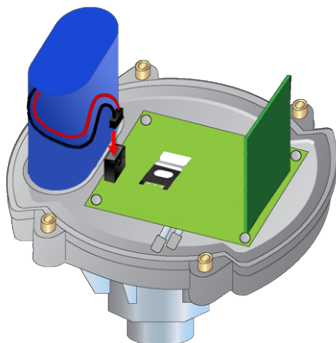
- d. Insert the SIM card into the SIM card tray, with the metal contacts face-down and the flat edge inserted into the holder.



- e. Press the SIM card tray onto the board.
  - f. Lock the SIM card tray by gently pushing the metal bar toward the top of the SIM card holder.



3. Place the battery in the battery holder. Make sure that the wiring attached to the top of the battery is NOT placed in the battery holder, as shown below.
4. Connect the wiring to the battery port on the circuit board.

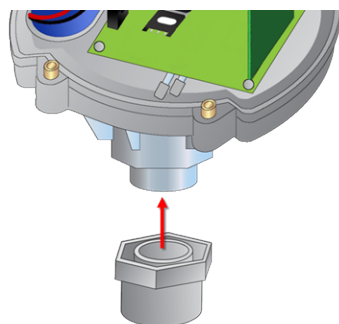


5. (Optional) If your tank has a 2-inch NPT threaded opening, you can attach a 1-inch to 2-inch adapter to the bottom of the device.

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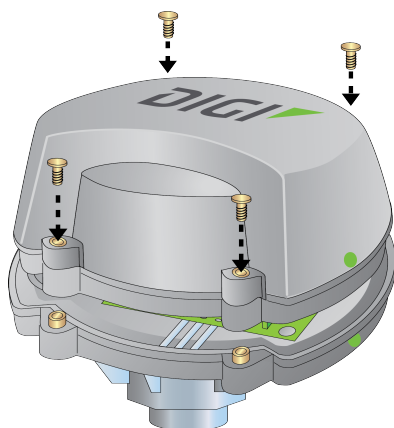
**Note** If you are using a 2-inch NPT adapter, you should only use the adapter available through Digi International (part number 76000910). This adapter has been modified specifically to not cause reflections of the ultrasonic signal. Standard 2-inch NPT adapters will interfere with the ultrasonic signal and cause incorrect tank level readings.

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6. If this is the first time you are assembling the device, complete initial configuration using the CLI. For more information, see [Initial Connect Tank configuration](#). If initial configuration has been completed, you can skip this step.

7. Reassemble the device.
  - a. Place the enclosure cover onto the base. To ensure that a gap does not appear between the cover and the base:
    - The green dots on the cover and the base must both be on the same side of the device, as shown below.
    - Make sure that the battery holder in the cover aligns with the battery holder in the base.



- b. Verify that an adequate seal is present between the cover and the base.
- c. Tighten the screws



**CAUTION!** Cover screws are required as part of the safety rating. When tightening the cover screws, use a screw torque of 0.79 to 1.92 newton meters (7 to 17 inch pounds).

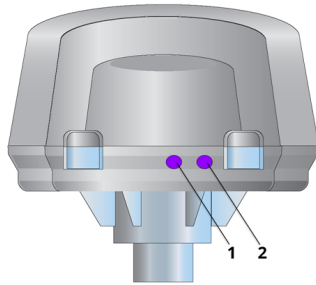
## Activate a SIM card

You can activate a SIM card from your cellular provider or from Digi.

1. Your SIM card provider needs the following information:
  - **Connect Tank IMEI number:** The IMEI number is on the label on the Connect Tank device and on the box the device was shipped in.
  - **SIM card number:** The SIM number is printed on the SIM card.
2. Call your SIM card provider to activate the SIM card.

## LED indicators

The Connect Tank device has two LED indicators to monitor the battery function, and the cellular network connection, and GPS locating.



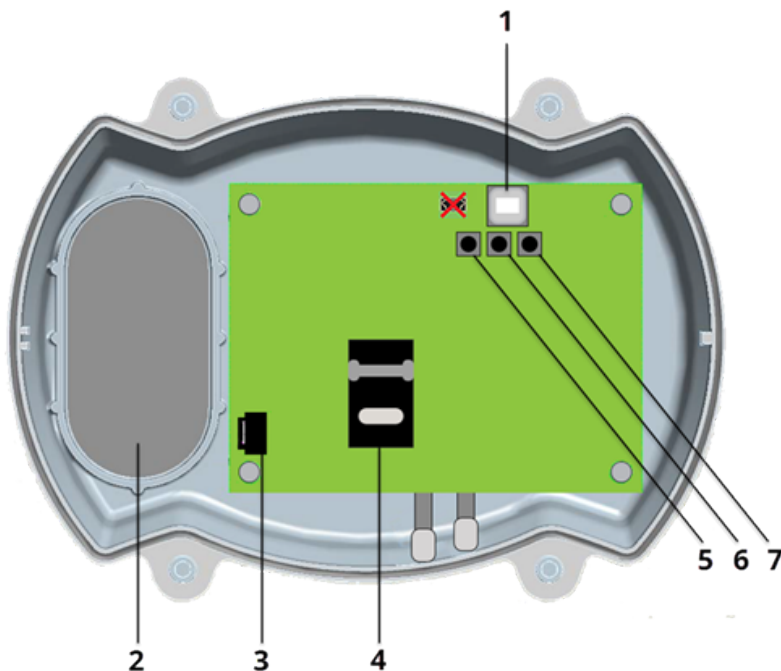
The following table describes LED functions.

**Note** A solid light for an extended period of time may indicate the device needs service. For assistance, contact [Digi Technical Support](#).

Item	Name	Description
1	Cellular and GPS LED	Indicator light for the cellular network connection: <ul style="list-style-type: none"> <li>■ Purple: The device is awake.</li> <li>■ Red:                             <ul style="list-style-type: none"> <li>• Slowly blinking: Performing GPS location; the LED slowly blinks red for an extended period of time during the first time the device performs GPS location.</li> <li>• Quickly blinking: Searching for the cellular network.</li> </ul> </li> <li>■ Blue:                             <ul style="list-style-type: none"> <li>• Blinking: Connected to the cellular network and attempting to communicate with Remote Manager.</li> <li>• Solid light: Successfully sent data to Remote Manager; turns off after a few seconds.</li> </ul> </li> </ul>
2	Battery LED	Indicator light for battery function: <ul style="list-style-type: none"> <li>■ Purple: The device is awake.</li> <li>■ Red blinking: Indicates the battery life is less than or equal to the Battery Life threshold alarm.</li> <li>■ Blue blinking: Indicates the battery life is greater than the Battery Life threshold alarm.</li> </ul> For more information about the Battery Life threshold, see <a href="#">Battery life</a> .

## Device controls

The following figure shows the controls for setting up and configuring the Connect Tank device.



Item	Name	Description
1	USB type B port	Connects the device to a computer using a standard USB type A to B cable; used to access the command line interface (CLI).  <b>Note</b> Do not use the mini USB port, which is covered by a red X in the graphic.
2	Battery holder	Compartment for the battery.
3	Battery port	Port where the battery connects to the device.
4	SIM card tray	Holds the SIM card.
5	Wake button	<ul style="list-style-type: none"> <li>■ Wakes up the device.</li> <li>■ Skips the GPS location process during device configuration.</li> </ul>
6	Factory button	<ul style="list-style-type: none"> <li>■ Press and hold this button for a few seconds to remove all configuration changes and restore the device to its original state.</li> <li>■ If you accidentally press this button, but do not hold it down, the device wakes and immediately returns to sleep mode.</li> </ul>
7	Reset button	Press this button to restart the device when it is not responding to inputs (from the CLI or otherwise), such as when one or both lights remain on for an extended period of time.

## Technical specifications

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### Cellular specifications

The following table summarizes the wireless WAN specifications for Connect Tank v2.

Specification	Details
Carriers	AT&T, International GSM Carriers
Frequency band	North American Version: Dual Band UMTS/HSPA+ (850/1900 MHZ) International Version: Dual Band UMTS/HSPA+ (900/2100 MHZ) Dual-Band GSM (900/1800 MHZ)
Data rate	HSDPA Cat. 10 / HSUPA Cat.6 data rates: <ul style="list-style-type: none"><li>■ DL: up to a maximum of 14.4 Mbps</li><li>■ UL: up to a maximum of 5.76 Mbps</li></ul> EDGE class 12 data rates: <ul style="list-style-type: none"><li>■ DL: up to a maximum of 237 kbps</li><li>■ UL: up to a maximum of 237 kbps</li></ul> GPRS class 12 data rates <ul style="list-style-type: none"><li>■ DL: up to a maximum of 85.6 kbps</li><li>■ UL: up to a maximum of 85.6 kbps</li></ul>
Antenna	Built-in
SIM slot	1

### Sensor specifications

The following table provides a summary of the Connect Tank v2 sensor specifications.

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**Note** Range figure estimates are based on free-air terrain with limited sources of interference. Actual range will vary based on transmitting power, orientation of transmitter and receiver, height of transmitting antenna, height of receiving antenna, weather conditions, interference sources in the area, and terrain between receiver and transmitter, including indoor and outdoor structures such as walls, trees, buildings, hills, and mountains.

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Sensor	Short range	Mid range
Model	Massa M-300/150	Massa M-300/95
Type	Ultrasonic, built-in temperature/sound speed compensation	
Range	Range when temperature is -20° C to +60° C: <ul style="list-style-type: none"> <li>■ 4 inches (100 mm) to</li> <li>■ 7 feet (2.1 meters)</li> </ul> Range when temperature is -30° C to -20° C: <ul style="list-style-type: none"> <li>■ 4 inches (100 mm) to</li> <li>■ 5 feet (1.5 meters)</li> </ul>	Range when temperature is -20° C to +60° C: <ul style="list-style-type: none"> <li>■ 1 foot (0.3meters) to</li> <li>■ 13 feet (4 meters)</li> </ul> Range when temperature is -30° C to -20° C: <ul style="list-style-type: none"> <li>■ 1 foot (0.3meters) to</li> <li>■ 12 feet (3.7 meters)</li> </ul>

## General product specifications

The following table provides a summary of the Connect Tank v2 general product specifications.

GPS/Glonass	
Channels	56
Tracking sensitivity	GPS: up to -161 dBm Glonass: up to -158 dBm
Horizontal accuracy	GPS: up to 2.5m Glonass: up to 4m
Antenna	Built-in
Management	
Configuration & management	Device Cloud/Local USB to Serial CLI Protocol
Protocol	TCP
Power	
Battery	7.2V, 14.5 Ah, Lithium Thionyl Chloride, non-rechargeable, replaceable
Battery life	Approximately 2 years (@ 2 reads/transmits per day)
Environmental	
Operating temperature	-30° C to +60° C (see range limitations in <a href="#">Sensor specifications</a> )
Storage temperature	-40° C to +85° C
Relative humidity	90% (non-condensing after 90%)
Battery discharge	up to 1%/year if stored at +30° C



GPS/Glonass	
<b>Physical</b>	
Dimensions (L x W x H)	7.0 in x 5.15 in x 6.0 in (17.8 cm x 12.9 cm x 15 cm)
Weight	1.25 lbs
LEDs	Battery, Network
Enclosure material	Valox (note: Massa sensor is PVC/PPA)
Enclosure rating	NEMA 4X
Mounting	1" NPT

## Hardware

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### Maximum power and frequency bands

This section contains the maximum power and frequency bands for Connect Tank.

Maximum power	Associated frequencies
2 W	Cellular 850 and 900 MHz bands
1 W	Cellular 1800 and 1900 MHz bands

### Safety notices

Digi products are designed to the highest standards of safety and international standards compliance for the markets in which they are sold. However, cellular-based products contain radio devices that require specific consideration. Make sure you read and understand all of the safety notices, warnings, and cautions for this product. Digi International assumes no liability for failure to comply with these precautions.

## Installation considerations

- Read all instructions before installing and powering the device and keep these instructions in a safe place for future reference. See [Nonincendive Field Wiring Diagram](#) for additional ATEX wiring safety guidelines.
- USB (P2) (J1) and SIM (P6) connectors are intended for maintenance use within a Division 2 classified area. These connectors can only be used if the power is disconnected or the area is known to be free of ignitable concentrations of flammable gases or vapors.  
All external or field wiring must be in accordance with NFPA 70 Article 501.10(B).
- v2 is intended for fixed installations only.
- Push button switches are not for normal operational or maintenance use in hazardous locations.
- If the device shows any signs of damage or malfunction when connecting the battery, remove the battery connection immediately and contact your supplier for repair or replacement.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Use only the accessories and battery provided by the manufacturer; connecting non-approved accessories and batteries may damage the device.
- Do not attempt to repair the product. Any attempt to service or repair the device by the user will void the product warranty.
- Connect Tank must be maintained by Digi or a Digi qualified technician only. Always use the designated battery, model number 76000912, from Digi. You must remove the unit from the installation or unclassified hazard location before opening the enclosure due to the risk of screws or batteries falling into the storage tank.
- When inserting wires into the terminal block, we recommend tightening torque to 0.2N-m.
- Allowable wire size for terminal blocks is 0.5-1.5mm<sup>2</sup>.

### ATEX requirements

- Connect Tank should be used in an area of not more than pollution degree 2, as defined in EN 60664-1.

## Warnings: Explosion hazards

Review the following explosion hazard warnings for the Connect Tank device.

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**Note** The Connect Tank device contains internal batteries.

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**WARNING!** Connect Tank is suitable for use in UL/cUL Class I, Division 2, Groups A, B, C, and D hazardous locations or non-hazardous locations only. Substitution of any component may impair suitability for Class I, Division 2.

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**WARNING - EXPLOSION HAZARD:** BATTERIES MUST ONLY BE CHANGED IN AN AREA FREE OF ignitable CONCENTRATIONS.



**WARNING - EXPLOSION HAZARD:** DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS FREE OF ignitable CONCENTRATIONS.



**WARNING!** Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

**Remarque** L'unité Connect Tank contient des batteries internes.



**AVERTISSEMENT!** L'unité Connect Tank est adaptée pour utilisation seulement dans des endroits non dangereux ou des endroits dangereux UL/cUL de classe I, division 2, groupes B, C et D. Le remplacement de tout composant risquerait de compromettre la convenance à la classe I, division 2.



**AVERTISSEMENT - RISQUE D'EXPLOSION:** LES BATTERIES DOIVENT ÊTRE REMPLACÉES DANS UN ENDROIT EXEMPT DE CONCENTRATIONS INFLAMMABLES.



**AVERTISSEMENT - RISQUE D'EXPLOSION:** NE DÉCONNECTEZ PAS LORSQUE LE CIRCUIT EST SOUS TENSION OU À MOINS QUE LA ZONE SOIT LIBRE DE TOUTE CONCENTRATION INFLAMMABLE.



**AVERTISSEMENT!** Les décharges électrostatiques peuvent endommager le matériel et nuire aux circuits électriques. Les dommages des décharges électrostatiques surviennent lorsque les composants électroniques sont mal manipulés et peuvent entraîner une défaillance complète ou intermittente.

## RF exposure statement

In order to comply with RF exposure limits established in the ANSI C95.1 standards, ensure users maintain a distance from the product of no less than 20 cm (approximately 7.8 inches).

## UL/cUL conformity

Conformity to UL / cUL standards in the United States and Canada is in accordance with the following:

Standard	Title	Issue date
ANSI/ISA 12.12.01, 2012	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations	2012
CAN/CSA C22.2 No. 213-M1987	Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations	1987
UL2054	UL Standard for Safety for Household and Commercial Batteries	October 29, 2004
UN 38.3	Recommendations on the Transport of Dangerous Goods Manual of Tests and Criteria	2009
UL 60950-1	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use	October 14, 2014

### **Essential health and safety requirements**

Connect Tank complies with the essential health and safety requirements provided by the following standards:

Standard	Title	Issue date
EN 60079-0:2012/A11:2013	Explosive Atmospheres - Part 0: Equipment - General Requirements	2013
EN 60079-15:2010	Explosive Apparatus for Explosive Gas Atmospheres - Part 15: Construction, Test and Marking of Type Protection "n" Electrical Apparatus	2010/05/01

### **Special conditions for safe use (ATEX)**

- Digi complies with the ATEX Directive to ensure a safe working environment when working with equipment in potentially explosive atmospheres.
- Connect Tank is intended for fixed installation, where the installation is intended to minimize the risk from electrostatic discharge.
- Connect Tank should be used in an area of not more than pollution degree 2, as defined in EN 60664-1.

Digi complies with the ATEX Directive to ensure a safe working environment when working with equipment in potentially explosive atmospheres. The Connect Tank device is compliant to the ATEX Directive under Certification DEMKO 14 ATEX 1416X.

### **Applicability**

Connect Tank has been evaluated according to the following conditions. The ATEX evaluation and the special conditions in this section apply to part numbers 50001884-xx.



**WARNING!** Connect Tank is suitable for use in ATEX Zone 2, Group IIC hazardous locations or non-hazardous locations only.



**WARNING!** The Connect Tank unit should not be installed in process tanks containing either pressurized or flammable materials. The battery should be replaced in unclassified areas only.



**WARNING!** Connect Tank is intended for fixed installation, where the installation is intended to minimize the risk from electrostatic discharge. Follow all installation safety guidelines in this section to minimize the risk from electrostatic discharge.



**WARNING!** Install Connect Tank in an area that does not have more than pollution degree 2 as defined in EN/ IEC 60664-1.




**WARNING!** To avoid potentially dangerous electrostatic discharges, control all likely ignition sources, minimize the harmful effects of any accidental fire or explosion by using explosion relief and suppression systems. All zoned areas containing potentially explosive atmospheres should be clearly marked using ATEX Ex hazardous area warning signs.





**WARNING!** Potential electrostatic charging hazard. To avoid building up an electrostatic charge when cleaning the enclosure of this device, you must use a damp cloth moistened only with water. Do not use flammable cleaning agents.

## ATEX marking

The device must include the markings described in the following table.

Mark	Description
	ATEX logo

Mark	Description
<p> <b>II 3 G Ex nA IIC T6 Gc</b></p>	<p>ATEX symbol and classification:</p> <ul style="list-style-type: none"> <li>■  — The ATEX symbol. This symbol indicates certification for use in an explosive atmosphere. The symbols that follow it provide the details of that certified use.</li> <li>■ <b>II</b> — This indicates Group II (Clause 4.2). The equipment is intended for use in places with an explosive gas atmosphere other than mines susceptible to firedamp.</li> <li>■ <b>3</b> — This indicates Equipment category 3. Category 3 comprises products designed to be capable of keeping within its operational parameters, stated by the manufacturer, and based upon a normal level of protection for its intended use, considering areas in which explosive atmospheres caused by mixtures of air and gases, vapors, mists or air/dust mixtures are unlikely to occur and if they do occur, do so infrequently and for a short period of time only.</li> <li>■ <b>G</b> — This indicates that the Environment is based on International Electrotechnical Commission (IEC) 60079-0, Clause 29.4.</li> <li>■ <b>Ex</b> — This indicates that the product has been evaluated for use in potentially explosive atmospheres.</li> <li>■ <b>nA</b> — This indicates that the product provides ignition protection by using components that are non-sparking during normal operations.</li> <li>■ <b>IIC</b> — The Group symbol where IIC is electrical equipment for places with an explosive gas atmosphere other than mines susceptible to firedamp.</li> <li>■ <b>T6</b> — This is the Temp Code, indicating a maximum surface temperature of 85° C.</li> <li>■ <b>Gc</b> — This indicates the Equipment Protection Level. Gc means equipment for explosive gas atmospheres, having an “enhanced” level of protection, which is not a source of ignition in normal operation and which may have some additional protection to ensure that it remains inactive as an ignition source in the case of regular expected occurrences (for example, failure of a lamp).</li> </ul>

## Safety information

The following safety information provides guidelines when assembling the Connect Tank device. For additional safety guidelines, see [Safety notices](#).

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**CAUTION!** The device is sensitive to electrostatic discharge (ESD).



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The Connect Tank device must be maintained only by Digi or a Digi qualified technician. Before assembling the device, note the following:

- To avoid the risk of the screws or battery falling into the storage tank, do not assemble the device in the installation area.
- Move the device to a non-hazardous and unclassified area before opening the enclosure and connecting the hardware.
- Always use the designated battery, model number 76000912, from Digi International Inc.
- Allow only a trained technician to replace the lithium thionyl chloride batteries used in Connect Tank.
- Prior to installation, the battery should be inspected for any signs of damage. If the battery appears to be damaged or is dropped during the installation, do not use the battery and dispose of it properly. See [Battery inspection](#) for more information.
- You may be required to have a licensed electrician install or perform maintenance on this equipment. Always follow applicable local, state, and federal codes and guidelines.

## Remote Manager reporting

The Connect Tank device sends its tank liquid level data to your Remote Manager account. You can configure when the device reads the liquid level and how often it reports that data. You can also set device alarms to report when a tank is nearly full, nearly empty, or the tank level drastically changes.

### Scheduled reports

By default, the Connect Tank device checks and reports the liquid level in a tank twice a day. However, you can change the frequency that it sends reports to accommodate your tank environment.

For example, you might want the device to check the tank liquid level twice a day, but send that data to Remote Manager only once a day.

### Alarms

You can configure the Connect Tank device to send an alarm separately from scheduled reports to communicate liquid level and device information, including:

- Low and high thresholds
- Delta low and delta high thresholds
- Hysteresis



- Sensor error
- Battery life

---

**Note** Sending more than two reports a day to Remote Manager reduces the battery life.

---

For more information, see [Configure alarms](#).

## Cellular and GPS communication

The Connect Tank device has an internal cellular antenna and an optional GPS antenna for communications. There are no external antennas required to operate the device. Before installing the device, make sure your cellular service provider has enough network coverage where your tanks are located. For more information about using the device to check network coverage, see [Check network coverage](#).



---

**CAUTION!** Unauthorized antenna modifications and attachments invalidate the device type specifications and may violate local RF emission regulations.

---

## Battery inspection



---

**CAUTION!** This product contains a lithium metal battery. Prior to installation, the battery should be inspected for any signs of damage. If the battery appears to be damaged or is dropped during installation, do not use the battery and dispose of it properly.

---

Please contact Digi Technical Support at 952-912-3444 or [Tech.support@digi.com](mailto:Tech.support@digi.com) to order a replacement battery.

The MSDS (Material Safety Data Sheet) for the battery can be found at [www.digi.com/documentation/ConnectTank](http://www.digi.com/documentation/ConnectTank).

The Connect Tank enclosure top and bottom have green alignment dots to ensure the top is placed correctly on the product. These alignment dots should align on top of each other when installed correctly. If the top of the product is reversed 180 degrees, the product will be susceptible to water ingress and the battery will be subject to additional shock and vibration during handling, potentially damaging the battery. For more information about aligning the dots and correctly assembling the Connect Tank, see [Assemble the device](#).

## Battery life

The Connect Tank device uses sleep and wake modes to manage power use. By default, the device wakes only to check the liquid level in a tank and send reports. It is in sleep mode at all other times, which reduces power consumption to the lowest possible levels.

The Connect Tank battery can operate for up to two years when you maintain these conditions:

- The device has adequate network coverage in the area.
- The device sends a report two times a day (or less).

The battery LED on the front of the device indicates battery life; for details, see [LED indicators](#).

## Initial Connect Tank configuration

---

Before installing Connect Tank in the field, complete the initial configuration steps to register it with a cellular network. When configuring Connect Tank, the device must be awake.

The following sections describe how to wake Connect Tank and register it with a cellular network using the command line interface (CLI).

After initial configuration using the CLI, you can use Remote Manager to configure additional settings and remotely manage the Connect Tank device; see [Manage Connect Tank with Remote Manager](#).

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Wake the device .....	27
Connect to the device using the CLI .....	27
Register Connect Tank on a cellular network .....	29
CLI commands .....	30

## About waking the device

You can wake the Connect Tank device by pressing the Wake button or swiping the optional magnet across the front of the device. When you press the Wake button or activate the magnetic switch, the following occurs:

- The device sends a report to Remote Manager with the following information:
  - Sensor connection status
  - Measured distance reading
  - Measured temperature reading
  - GPS location (optional, based on configuration)
  - Battery life (the current battery percentage remaining)
  - Device settings
  - Cellular network signal strength
- Battery and network status LEDs glow indicating their respective functions. For more information, see [LED indicators](#).

## Wake the device

You can wake the Connect Tank device as follows:

- If the Connect Tank enclosure is open, press the Wake button.
- If the Connect Tank enclosure is closed, swipe the magnet across the magnet icon on the outside of the device.

---

**Note** This feature was not included in the ATEX evaluation. For more information, see [Special conditions for safe use \(ATEX\)](#).

---

The LEDs blink indicating the device is on. For more information about LED behavior, see [LED indicators](#).

After the device wakes and sends a report to Remote Manager, it enters sleep mode. The device remains in sleep mode until the next scheduled or manual wake cycle.

## Connect to the device using the CLI

Perform the following initial configuration steps using a terminal program and CLI commands.

Before you begin, make sure you have the following required equipment for this step:

- Computer running a terminal program.
- USB type A to B cable.

To connect to the device using a terminal program:

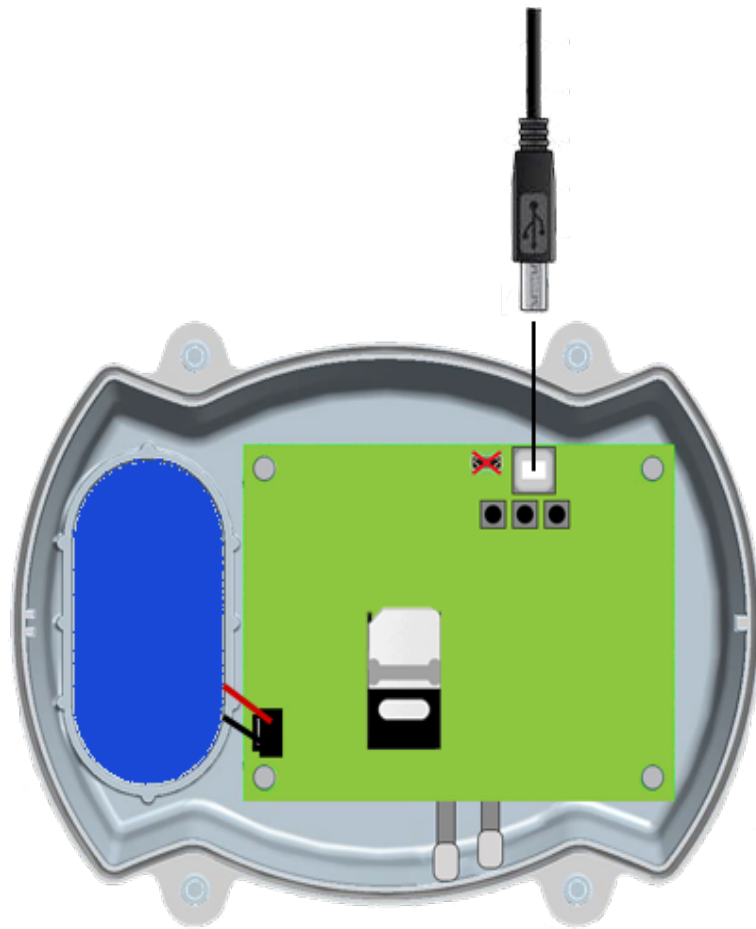
1. Open the enclosure and make sure the battery is connected and the SIM card is installed. For information, see [Assemble the device](#).
2. Connect a USB type A to B cable from your computer to the USB type B port.

---

**Note** Do not use the mini USB port, which is covered by a red X in the graphic below.

---

You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Tank to a computer using a USB cable. Digi recommends drivers available at [www.ftdichip.com/Drivers/VCP.htm](http://www.ftdichip.com/Drivers/VCP.htm).



3. Open a terminal program on a computer and connect to Connect Tank using the following configuration:
  - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Tank
  - **Baud rate or bits per second:** 115200
  - **Data:** 8 bit
  - **Parity:** None
  - **Stop:** 1 bit
  - **Flow control:** None

4. Press the Wake button.
  - The command prompt appears in the terminal program window and the device attempts to connect to the cellular network and obtain GPS location.
  - The cellular and GPS LED slowly blinks red for an extended period while the device performs GPS location for the first time.

---

**Note** To skip the GPS location process, press the Wake button again.

---

5. In the terminal program, type **status** at the command prompt and press **Enter** to see device information, such as firmware version, battery life, serial number, and connection state.
6. In the terminal program, type **set** to view configuration information for the device, including access point name (APN), user name, password, PIN, and ISN.
7. To change any of the configuration information:
  - a. Type set **[configuration option]=[value]** at the command prompt and press **Enter**. The **[configuration option]** is the device setting you want to change and **[value]** is the new option setting.  
For device configuration options, see [CLI commands](#).
  - b. [Optional] Type **set** again before the device goes to sleep to view the current and pending values.  
The device goes to sleep and immediately wakes up to make the change. After the device completes the change it goes to sleep again.
  - c. Press the Wake button and type **set** at the command prompt to verify the change is correct.

## Register Connect Tank on a cellular network

The Connect Tank device is configured with a default APN that you might need to change to register the device on the cellular network for your cellular account provider. Contact your cellular service provider to get the correct APN before completing the following steps.

---

**Note** If you purchased Digi Bundled Services, the cellular connection is already configured on your Connect Tank and you can skip this section.

---

To register the device on a cellular network:

1. Make sure the battery is connected and the SIM is installed, the device is connected to a computer, and the terminal program is configured to communicate with the device. For instructions, see [Connect to the device using the CLI](#).
2. Open the terminal program and connect to the Connect Tank device. For instructions, see [Connect to the device using the CLI](#).

3. Press the Wake button.
  - The command prompt appears in the terminal program window and the device attempts to connect to the cellular network and obtain GPS location.
  - The cellular and GPS LED slowly blinks red for an extended period while the device performs GPS location for the first time.

---

**Note** To skip the GPS location process, press the Wake button again.

---

4. At the command prompt, type set **apn=thecellular.apn** where **thecellular.apn** is the string supplied by your cellular service provider.
5. Press **Enter**.
  - The terminal program displays the APN configuration setting's current value and the pending value.
  - The device goes to sleep and immediately wakes up to make the change. After the device completes the change it goes to sleep again.
6. Press the Wake button and type set at the command prompt to verify your change was made and that it is correct.
7. Use other commands in the CLI to see additional information about the device, such as firmware version, battery life, cellular network strength, and more. See [CLI commands](#).

## CLI commands

The following table provides all of the available CLI commands for configuring the device and viewing status information.

Command	Use	Options
fwupdate	Update the firmware with a firmware image	Make sure the terminal program is able to transfer YMODEM files.

Command	Use	Options
status	Display device information	<p>View the following:</p> <ul style="list-style-type: none"> <li>■ Device Type: Name and version of the device hardware.</li> <li>■ Device ID: ID number for the Connect Tank device.</li> <li>■ Firmware Version: Version of the device's current firmware.</li> <li>■ UTC Time: Last reported date and time.</li> <li>■ Battery Life: Amount of battery life remaining.</li> <li>■ Sensor: Status of the sensor.</li> <li>■ Mobile support software: Version of the mobile software.</li> <li>■ Device type: Cellular network type the device connects to.</li> <li>■ Manufacturer: Cellular modem manufacturer.</li> <li>■ Model: Cellular modem model number.</li> <li>■ Modem revision: Modem firmware version.</li> <li>■ Serial number: Modem serial number.</li> <li>■ Phone number: Phone number registered to the activated SIM card.</li> <li>■ SIM IMSI: Unique user identifier for the cellular network.</li> <li>■ SIM ICCID: SIM serial number.</li> <li>■ SIM PIN status: State of the SIM card.</li> <li>■ Connection state: Cellular connection state.</li> <li>■ Connection duration: Amount of time the cellular modem was connected during last wake cycle.</li> <li>■ Disconnect reason: Cause of the cellular modem disconnection during last wake cycle.</li> <li>■ Connections: Number of cellular connection attempts since power up.</li> <li>■ Connection errors: Number of failed connections since power up.</li> <li>■ User disconnects: Number of normal disconnections since power up.</li> <li>■ Monitoring errors: Number of cellular modem errors since power up.</li> <li>■ Device resets: Number of times cellular modem was reset to recover from errors since power up.</li> </ul>

Command	Use	Options
set	Manage device configuration	<p>Use the following commands to change settings:</p> <ul style="list-style-type: none"> <li>■ apn: Access point name for the cellular network (supplied by your cellular service provider). Settings: <ul style="list-style-type: none"> <li>• Minimum length: 1 character</li> <li>• Maximum length: 63 characters</li> <li>• Alpha-numeric characters, hyphen, period</li> <li>• Cannot be disabled</li> </ul> </li> </ul> <hr/> <p><b>Note</b> If you purchased Digi Bundled Services, the cellular connection is already configured on your Connect Tank.</p> <hr/> <ul style="list-style-type: none"> <li>• Minimum length: 1 character</li> <li>• Maximum length: 63 characters</li> <li>• Alpha-numeric characters, hyphen, period</li> <li>• Cannot be disabled</li> </ul> <ul style="list-style-type: none"> <li>■ isn: URL to connect to Remote Manager; this is configured by default and should only be changed when directed by a Digi representative. Settings: <ul style="list-style-type: none"> <li>• IPv4 address, such as 10.20.30.40 or an FQDN, such as devicecloud.digi.com</li> <li>• Minimum length: 1 character</li> <li>• Maximum length: 63 characters</li> <li>• Alphanumeric characters, hyphen, period</li> <li>• Cannot be disabled</li> </ul> </li> <li>■ pin: PIN for your SIM card, if required (supplied by your cellular service provider). Settings: <ul style="list-style-type: none"> <li>• Minimum length: 4 characters</li> <li>• Maximum length: 8 characters</li> <li>• Numeric only</li> <li>• No value: disabled (no PIN required)</li> </ul> </li> <li>■ pwd: Password for your cellular account, if required (supplied by your cellular service provider). Settings: <ul style="list-style-type: none"> <li>• Minimum length: 1 character</li> <li>• Maximum length: 63 characters</li> <li>• Printable characters and spaces only (no quotation marks or backslashes)</li> <li>• No value: disabled (no user name required)</li> </ul> </li> <li>■ usr: User name for your cellular account, if required (supplied by your cellular service provider). Settings:</li> </ul>



Command	Use	Options
		<ul style="list-style-type: none"><li>• Minimum length: 1 character</li><li>• Maximum length: 63 characters</li><li>• Printable characters and spaces only (no quotation marks or backslashes)</li><li>• No value: disabled (no user name required)</li></ul>

## Install Connect Tank

---

You must install the device correctly to ensure the ultrasonic sound beam reflects back to the sensor. If the device is not installed correctly, it might cause false echoes, inaccurate measurements, or no measurements.

---

**Note** Do not use the device to measure levels of non-liquid tanks. The device uses ultrasonic sensing, which requires a uniform surface to take accurate measurements. Solid material does not provide a uniform surface.

---

Use the information in the following sections to install the Connect Tank device correctly and to troubleshoot inaccurate liquid level issues.

Before you begin .....	35
Install the device on a tank .....	35
Check network coverage .....	36

## Before you begin

Do the following before installing the Connect Tank device:

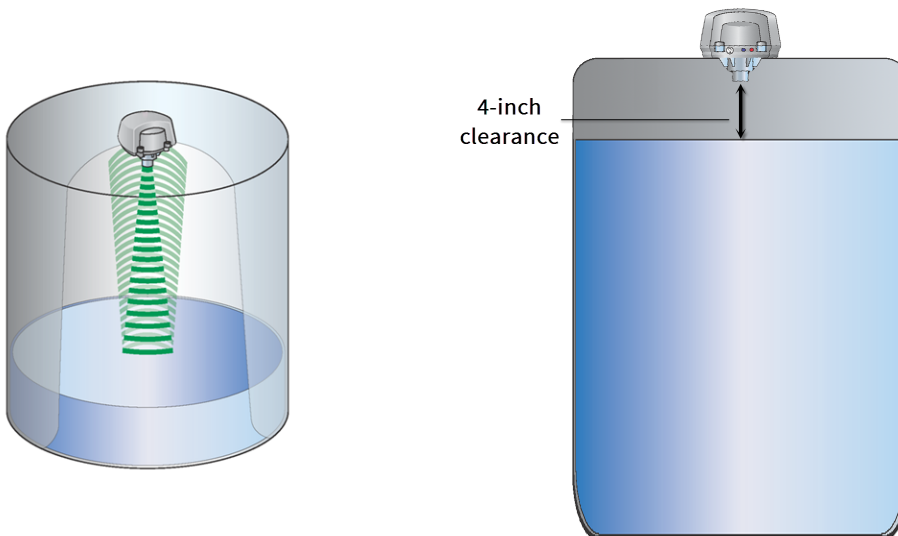
- Follow all of the [safety and certification guidelines and requirements](#) for the Connect Tank device.
- [Assemble the device](#) and complete initial configuration using the CLI.
- Make sure you have the necessary tools and equipment for your tank type and mounting option, such as NPT adapters.
- Review the installation information in this section to avoid incorrectly installing the device. Incorrect installation results in inaccurate or missed liquid level measurements.

## Install the device on a tank

Consider the following when installing the Connect Tank device:

- The sensor must be level (perpendicular to the liquid surface) to allow the ultrasonic sound beam to travel straight down.
- Make sure there is a minimum of 7 inches between the Connect Tank sensor and the maximum liquid level.
- Mounting the device vertically ensures proper orientation. If the device is not mounted vertically, it may send incorrect readings.
- Make sure the ultrasonic sound beam's transmission path does not have any obstructions.
- Position the device as close as possible to the center of the tank's diameter.

For troubleshooting installation, see [Troubleshooting](#).



## Check network coverage

The Connect Tank device has an internal antenna for cellular and an optional antenna for GPS communications. There are no external antennas required to operate the device.



**CAUTION!** Unauthorized antenna modifications and attachments invalidate the device type specifications and may violate local RF emission regulations.

---

To check network coverage:

1. Place the device in the area where it will be installed.
2. Wake the device.
3. Make sure the cellular LED blinks blue to show it is connected to the network and that there is an adequate network signal in the area.

If the device does not connect to the cellular network, see [Device not connected to the cellular network](#).

---

**Note** Proper network coverage helps reduce power consumption, leading to improved battery life.

---

## Manage Connect Tank with Remote Manager

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Digi Remote Manager is a cloud-based device management platform that allows you to connect any device to any application, anywhere. Remote Manager gives you the tools you need to manage many devices quickly and effectively, as well as insight into the health and current state of your entire device network.

The following sections describe how to use Remote Manager to remotely monitor and control all of your Connect Tank devices from any web browser.

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Alarm reports and options .....	39
Configure device (report) settings .....	43
Configure cellular options .....	45
Configure Remote Manager settings .....	45
Remote Manager option definitions for Connect Tank .....	46

## About using Remote Manager with Connect Tank

After registering the Connect Tank device on a cellular network, use Remote Manager to remotely change device configuration, review device information, set up device reporting, and review data about liquid levels.

Remote Manager allows you to change Connect Tank device settings, update firmware, and schedule the following tasks during wake cycles:

- Monitor the tank liquid level
- Report data to Remote Manager
- Check for and make scheduled configuration changes
- Check liquid level alarms
- Check battery life

For more information about Remote Manager, see <http://www.digi.com/products/cloud/digi-remote-manager>.

---

**Note** The Connect Tank battery can operate for up to 2 years when you follow standard operating conditions. Changes made to Remote Manager settings can affect battery life. For more information on standard operating conditions, see [Battery life](#).

---

## Before you begin

Before using Remote Manager to manage the Connect Tank device, do the following:

- Get the Connect Tank IMEI:
  - If you have physical access to the device, locate the 15-digit device IMEI number on the Connect Tank label.
  - If you need to remotely access the device, [connect to the device using the CLI](#).
- Create a Remote Manager account. To complete this step, see the [Remote Manager login page](#).

---

**Note** For initial device test and development, you can use a free Developer Edition Remote Manager account. When you are ready to deploy Connect Tank devices in the field, you need a Premiere account to access all Connect Tank features in Remote Manager.

---

## Add a device to Digi Remote Manager

To remotely manage Connect Tank and get sensor data, you need to create a Remote Manager account and add your Connect Tank device to your account.

---

**Note** To serve our customers most effectively, Digi International Inc. is consolidating its cloud services, Digi Device Cloud and Digi Remote Manager®, under the Remote Manager name. This phased process does not affect device functionality or the functionality of the web services and other features. However, you will find instances of both Device Cloud and Digi Remote Manager in some documentation, firmware, and user interfaces.

---

**Note** If you purchased Digi Bundled Services, the following steps were completed for you. You can skip this section.

---

To add a device to Remote Manager:

1. Sign in to your Remote Manager account:
  - If you need to create an account, go to Remote Manager at [remotemanager.digi.com](https://remotemanager.digi.com), click **Sign up**, and complete the form to create your account.
  - If you already have an account, go to Remote Manager at [remotemanager.digi.com](https://remotemanager.digi.com) and sign in with your user name and password.
2. Locate the 15-digit device IMEI number on the Connect Tank label.
3. Click **Device Management > Devices**.
4. Click **Add Devices**. The **Add Devices** dialog appears.  
You cannot use the **Discover** button to discover Connect Tank devices automatically because the devices are not available on the local network.
5. From the **Add Devices** drop-down menu, select **IMEI**, and enter the number.
6. Click **Add** to add the device.
7. Click **OK** to close the **Add Devices** dialog. The device appears in the Device Management list.

---

**Note** If the device does not display in the Device Management list, you can wake Connect Tank to force a connection with Remote Manager and update the data. For instructions, see [Update the firmware using the CLI](#).

---

8. Click **Refresh** if the device data does not appear on its own after a short period of time.  
Device data appears after the first time it communicates with Remote Manager.

## Alarm reports and options

You can configure the Alarm Settings options in the Remote Manager to have the Connect Tank device send reports indicating when liquid level measurements do not meet normal conditions for your tank environment. The alarms appear as reports in Remote Manager

### Configure alarms

This section explains how to configure the Alarm Settings in Remote Manager. For details about Alarm Settings options for the Connect Tank device, see [Alarm options](#).

1. Sign into [Remote Manager](#).
2. Click **Device Management > Devices**.
3. Double-click the Connect Tank device you want to configure.
4. Click **Configuration > Alarm Settings**.
5. Determine the alarms that you want to receive.
  - a. Select **On** for each alarm you want to receive.
    - [High and low thresholds](#)
    - [Hysteresis](#)
    - [Sensor error and battery life](#)
  - b. Enter an appropriate value for each alarm option.

6. Apply the configuration changes:
  - a. Click **Save > Schedule**. The **Save Device Properties** dialog appears.
  - b. Select a scheduling option. See [Schedule options](#).
  - c. Click **Schedule**. Connect Tank downloads and applies configuration changes the next time it connects to Remote Manager.

---

**Note** The **Recurring** option does not work with the Connect Tank device.

---

## High and low thresholds

Use these settings to define if the liquid level in the tank is too high, too low, or changes too quickly between two consecutive readings.

For example, the device is configured to take measurements every hour and send reports twice every day at 8:00 and 20:00. If a device senses that the liquid level reached a high or low alarm threshold at 11:00, it immediately sends a report to Remote Manager with that information.

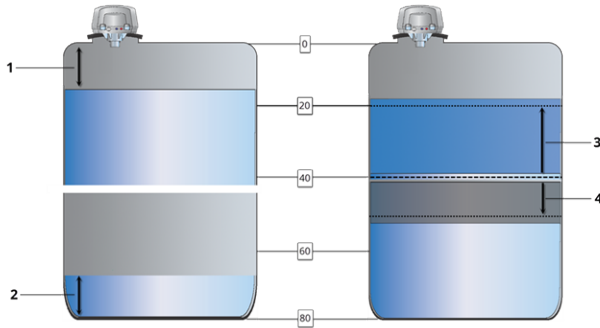
When configuring alarms, make sure you use correct measurements. The Connect Tank sensor measures the distance in inches from the top of the sensor to the top of the liquid in the tank. A smaller distance (such as 10 inches) is near the top of the tank; a larger distance (such as 70 inches) is near the bottom of the tank.

---

**Note** Actual measurements depend on your tank size.

---





	Threshold	Description
1	<b>High</b>	Sends an alarm report when the measurement indicates the liquid level is near the top of the tank. For example, the high threshold value might be 15 inches.
2	<b>Low</b>	Sends an alarm report when the measurement indicates the liquid level is near the bottom of the tank. For example, the low threshold might be 75 inches.
3	<b>Delta high</b>	Sends an alarm report when the liquid level increases too much between two consecutive readings. For example, the delta high threshold value might be 20 inches because liquid levels should not increase more than 20 inches between two consecutive readings.
4	<b>Delta low</b>	Sends an alarm report when the liquid level decreases too much between two consecutive readings. For example, the delta low threshold value might be 10 inches because liquid levels should not decrease more than 10 inches between two consecutive readings.

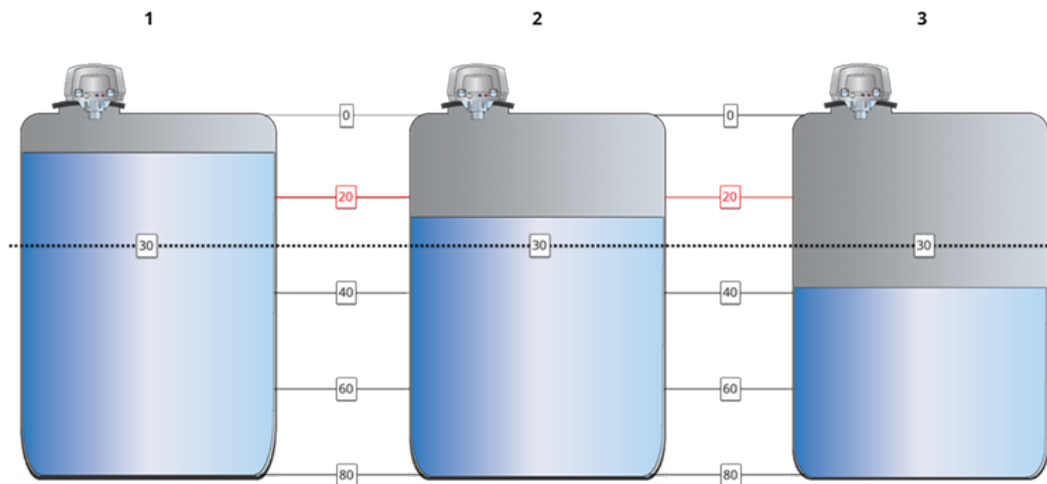
## Hysteresis

The liquid levels in your tanks may sometimes fluctuate during an alarm condition, which causes repeated alarm reports.

For example, in a Connect Tank the liquid level increased to the high alarm threshold and the device sent a high alarm report. Note that during this alarm condition, the liquid level may continue to increase and decrease repeatedly between normal and high thresholds. In this situation, if you do not set a hysteresis range, the Connect Tank device sends an alarm report every time the device measures the liquid level at the high threshold.

Hysteresis works with the high and low alarm thresholds to tell the device when to keep an alarm on without sending additional alarm reports, or when to shut off an alarm. Use this to avoid repeated alarms during common liquid level fluctuations.

For example, if your high alarm threshold is 20 inches and your hysteresis value is 10 inches, then your high alarm hysteresis is 30 inches. The following figure shows how a high alarm and hysteresis work in a tank.



	Alarm state	Description
1	On	The device measures that the water increased above the high threshold. The device sends an alarm report to Remote Manager.
2	On	The device measures that the water decreased below the high threshold, but it is still above the hysteresis so the alarm remains on. If the water increases again above the high threshold, no additional alarm reports are sent.
3	Off	The water decreased below the hysteresis so the alarm turns off. If the water increases again above the high threshold, the alarm turns on and the device sends another alarm report.

For a low alarm hysteresis, if your low alarm threshold is 70 inches and the hysteresis value is 10 inches, then your low alarm hysteresis is 60 inches. The alarm is on and stays on when the liquid level decreases below the low threshold and remains below the hysteresis. The alarm turns off when the water increases above the 60-inch hysteresis.

Setting the hysteresis threshold to 0 (zero) causes Connect Tank to send an alarm report every time the liquid level reaches a high or low alarm threshold.

**Note** Setting the hysteresis threshold to 0 (zero) may cause excessive data usage and reduce battery life.

### Sensor error and battery life

Connect Tank includes alarm reports for the sensor and battery.

- **Sensor error:** Connect Tank reports an error to Remote Manager when it detects an issue with the device's sensor.
- **Battery life:** Connect Tank reports the battery life percentage when it falls below the percentage that you configure for this option.

## Configure device (report) settings

Use the Device Settings options in Remote Manager to configure Connect Tank reporting. Together, these options control how often Connect Tank captures tank data, how often data is reported, and how much data is included when it is sent to Remote Manager.

For details about the configuration options, see [Device \(report\) settings option definitions](#).



**CAUTION!** If Connect Tank sends reports less than 15 minutes apart, it may result in an internal temperature that is above the ambient temperature.

**Note** Reporting to Remote Manager more than twice a day reduces the battery life.

For example, the following settings cause the device to read the tank's liquid level every half hour, report that information twice a day, and send only the last four readings:

- **Read Sensor Every:** 30 minutes
- **Report Sensor Data Every:** 24 reads
- **Send Last:** 4 readings

If the sensor value reaches an alarm threshold, that data is sent as an alarm report during the next device wake cycle regardless of device settings.

To configure device options:

1. Sign into [Remote Manager](#).
2. Click **Device Management > Devices**.
3. Double-click the Connect Tank you want to configure.
4. Click **Configuration > Device Settings**.
5. Enter appropriate values for each option.

Device Settings

Read Sensor Every (rdp):	720	▲▼	minutes
Report Sensor Data Every (sdp):	1	▲▼	reads
Report Sensor Every N Days (sdpd):	0	▲▼	days
First Daily Report At HHMM (sst):	60	▲▼	minutes
Send Last (sdc):	1	▲▼	readings
Send Location Every (gin):	1	▲▼	reports
Tank Upload Method (tum):	TCP/IP only ▼		
GPS Enable (gps):	<input type="radio"/> On <input checked="" type="radio"/> Off		
Waveform Collection:	<input type="radio"/> On <input checked="" type="radio"/> Off		
Tank Volume Unit (unit):	<input style="width: 100%;" type="text"/>		
Tank Total Height (tht):	0	▲▼	inches
Tank Sensor Offset (off):	0	▲▼	inches
Tank Total Volume (vol):	0	▲▼	

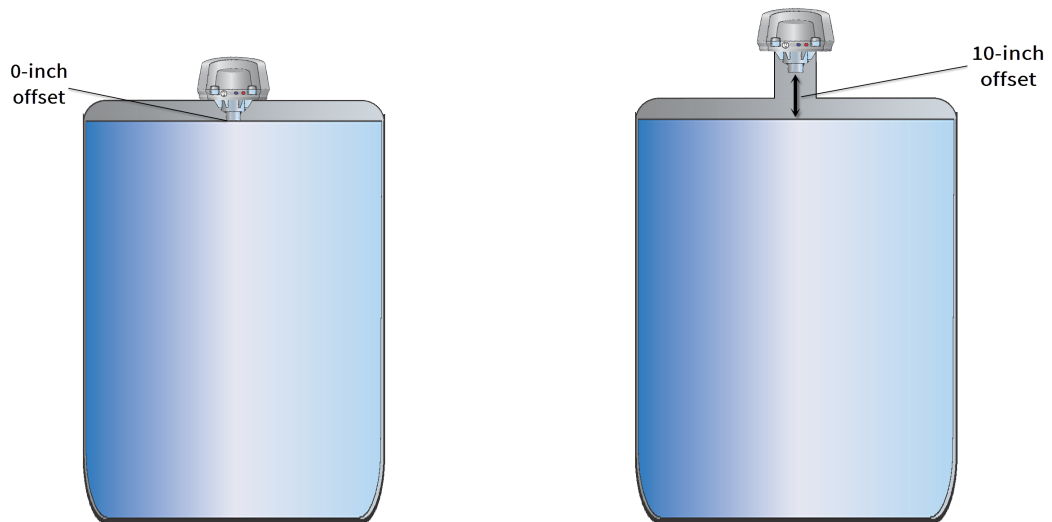
6. Apply the configuration changes:

- a. Click **Save > Schedule**. The **Save Device Properties** dialog appears.
- b. Select a scheduling option. See [Schedule options](#).
- c. Click **Schedule**. Connect Tank downloads and applies configuration changes the next time it connects to Remote Manager.

## Custom scaled values for tank data

Connect Tank reports sensor data in inches. You can use the following Device Settings in Remote Manager to convert inches into a custom value that makes sense for your tank configuration, such as gallons or liters:

- **Tank Volume Unit:** Unit of measurement that you are converting to, such as gallons or liters.
- **Tank Total Height:** Total tank height in inches.
- **Tank Sensor Offset:** Distance from the Connect Tank sensor to the top of the liquid in a full tank. The following images provide offset examples.



- **Tank Total Volume:** Total volume of the tank in the defined unit, such as gallons (unit defined in Tank Volume Unit).

For example, you want the Connect Tank to report sensor values in gallons. The tank holds a maximum of 5000 gallons and has a height of 8.1 feet (rounded to 97 inches). The Connect Tank is mounted on a standpipe, so there is a 10-inch clearance between the Connect Tank sensor and the top of the liquid when the tank is full. You should enter the tank information in Remote Manager as shown in the following figure:

Tank Volume Unit (unit):	gallons
Tank Total Height (tth):	97 inches
Tank Sensor Offset (off):	10 inches
Tank Total Volume (vol):	5,000

The result of the custom value calculations is reported in the **cval** data stream. For more information, see [Data streams reference information](#).

## Configure cellular options

You configured necessary cellular settings during the initial Connect Tank setup. Use these options to review the cellular configuration. Make changes to these settings only when instructed by your cellular service provider and when you have physical access to the device. For details about these options, see [Cellular option definitions](#).



**CAUTION!** If you make changes to cellular settings that result in a disconnected device, you must use the CLI to reconnect it to the cellular network; see [Register Connect Tank on a cellular network](#). Using the CLI requires physical access to the device.

To configure cellular options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Tank device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Cellular Settings**.
6. Enter an appropriate value for each cellular option.
7. Apply the configuration changes:
  - a. Click **Save > Schedule**. The **Save Device Properties** dialog appears.
  - b. Select a scheduling option. See [Schedule options](#).
  - c. Click **Schedule**. Connect Tank downloads and applies configuration changes the next time it connects to Remote Manager.

## Configure Remote Manager settings

Remote Manager settings options for Connect Tank are configured by default and require updates only when instructed by Digi Technical Support. For details about these options, see [Device Cloud option definitions](#).

To configure Remote Manager options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Tank device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Device Cloud Settings**.
6. Enter appropriate values for each option.
7. Apply the configuration changes:
  - a. Click **Save > Schedule**. The **Save Device Properties** dialog appears.
  - b. Select a scheduling option. See [Schedule options](#).
  - c. Click **Schedule**. Connect Tank downloads and applies configuration changes the next time it connects to Remote Manager.

## Remote Manager option definitions for Connect Tank

The following tables provide definitions for Remote Manager user interface options and data streams for Connect Tank devices.

### Alarm options

The following table provides Remote Manager alarm setting options for Connect Tank. For additional information about using these options, see [Configure alarms](#).

Option	Description	Range	Default
High Alarm	Enables or disables High Alarm reports for liquid levels above the High Threshold value.	On/Off	Off
High Threshold	Specifies the liquid level measurement in inches that generates a High Alarm report when High Alarm is <b>On</b> .	0.0-511.0	0
Low Alarm	Enables or disables Low Alarm reports for liquid levels below the Low Threshold value.	On/Off	Off
Low Threshold	Specifies the liquid level measurement in inches that generates a Low Alarm report when Low Alarm is <b>On</b> .	0.0-511.0	511
Delta Low Alarm	Enables or disables Delta Low Alarm reports when the liquid level decreases more than the Delta Low Threshold value for two consecutive readings.	On/Off	Off
Delta Low Threshold	Specifies the liquid level measurement in inches that generates a Delta Low Alarm report when Delta Low Alarm is <b>On</b> .	0.0-511.0	511
Delta High Alarm	Enables or disables Delta High Alarm reports when the liquid level increases more than the Delta High Threshold value for two consecutive readings.	On/Off	Off
Delta High Threshold	Specifies the liquid level measurement in inches that generates a Delta High Alarm report when Delta High Alarm is <b>On</b> .	0.0-511.0	511
Hysteresis	Specifies the measurement in inches to keep an alarm on or shut off an alarm during high and low alarm states. <b>0</b> — hysteresis is off <b>1</b> or more — hysteresis is on and managing alarms	0.0-511.0	0
Sensor error	Enables or disables the sensor error alarm that reports when the device cannot get a valid reading from the sensor.	On/Off	Off
Battery Life	Specifies the battery life percentage that generates a low battery alarm report.	1-100	75

### Cellular option definitions

The following table provides Remote Manager cellular setting options for Connect Tank. For additional information about using these options, see [Configure cellular options](#).

Option	Description
APN	Identifies the access point name that connects your device to the correct cellular network.
User Name	Specifies the user name for your cellular network account. Use only when required by your cellular service provider.
Password	Specifies the password for your cellular network account. Use only when required by your cellular service provider.
SIM PIN	Specifies the PIN for your cellular network SIM card. Use only when required by your cellular service provider.

### Device Cloud option definitions

The following table provides Remote Manager server name settings for Connect Tank. For additional information about using these options, see [Configure Remote Manager settings](#).

Option	Description	Value
Server Name	<p>Specifies the URL that connects your device to Remote Manager. This setting is configured by default.</p> <hr/> <p><b>Note</b> Do not make changes to this setting without help from Digi Technical Support.</p>	my.devicecloud.com
NTP Server Name	<p>Network Time Protocol (NTP) server name that synchronizes Connect Tank time with Coordinated Universal Time (UTC). This setting is configured by default.</p> <hr/> <p><b>Note</b> Do not make changes to this setting without help from Digi Technical Support.</p>	time.devicecloud.com

### Device (report) settings option definitions

The following table provides Remote Manager device (report) setting options for Connect Tank. For details about setting these options, see [Configure device \(report\) settings](#).

Option	Description	Range	Default
Read Sensor Every	How often the device sensor reads the liquid level in a tank. The time is measured in minutes.	5 minutes to 1440 minutes (24 hours)	720 minutes (12 hours)

Option	Description	Range	Default
Report Sensor Data Every	How often the device wakes and sends sensor data to Remote Manager.	1 to 96 readings; setting this to more than 96 results in lost data	1
Report Sensor Every N Days	How often the device sensor reads the liquid level in a tank. The frequency is measured in days.	0 days to 1439 days	0 days
First Daily Report At HHMM	Specifies the time that is used to reset the device's schedule to the beginning of a new day and send the first daily report. The time is noted as the number of minutes after midnight UTC. Examples: <ul style="list-style-type: none"> <li>■ 0 minutes = midnight UTC</li> <li>■ 60 minutes = 1 hour after midnight UTC</li> <li>■ 360 minutes = 6 hours after midnight UTC</li> </ul>	0 to 1439 (minutes)	0
Send Last	How many sensor values are included in each report to Remote Manager. If set to 0, all buffered data is sent.	0 to 50 readings	144
Send Location Every	Specifies in number of reports how often the device sends its GPS location to Remote Manager. Example: <ul style="list-style-type: none"> <li>■ 10 = sends the GPS location once every 10 reports</li> <li>■ If 2 reports are sent per day, then the GPS location is sent once every 5 days.</li> </ul>	1 to 96 reports	1



Option	Description	Range	Default
Tank Upload Method	Specifies which mode of communication to use when sending data to Remote Manager.	<ul style="list-style-type: none"> <li>■ TCP/IP only</li> <li>■ SMS only</li> <li>■ TCP/IP with SMS fallback</li> <li>■ SMS with TCP/IP fallback</li> </ul>	TCP/IP only
GPS Enable	Enables or disables GPS location.	Off/On	Off
Waveform collection	<p>Enables or disables waveform data collection when each report is sent. Use for debugging.</p> <p><b>Note</b> Enabling this option increases your cellular data usage and should be used only for debugging purposes.</p>	Off/On	Off

## Use Remote Manager to view device and sensor data streams

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The Connect Tank device and sensor data appear as data streams in Remote Manager.

### About data streams

Data streams are detailed, time-based information about a tank that the Connect Tank device sends to Remote Manager. For Connect Tank, data streams include detailed information such as distance, temperature, alarms, thresholds, hysteresis, and more.

You can select a specific data stream to see its current value, as well as historical data. The Connect Tank settings in Remote Manager have a corresponding three-letter short name, as shown in the following image. The short names are useful when using data streams to analyze sensor data.

Stream
00010000-00000000-03599990-42977439/management/connections
00010000-00000000-03599990-42977439/ts /ser
00010000-00000000-03599990-42977439/ts /gin
00010000-00000000-03599990-42977439/ts /tmp
00010000-00000000-03599990-42977439/ts /sdp
00010000-00000000-03599990-42977439/ts /all
00010000-00000000-03599990-42977439/ts /dwt
00010000-00000000-03599990-42977439/ts /val
00010000-00000000-03599990-42977439/ts /gps
00010000-00000000-03599990-42977439/ts /sdc
00010000-00000000-03599990-42977439/ts /fwv
00010000-00000000-03599990-42977439/ts /abt
00010000-00000000-03599990-42977439/ts /rdp
00010000-00000000-03599990-42977439/ts /alh
00010000-00000000-03599990-42977439/ts /sdpd

To learn more about:

- Connect Tank data streams and their details, see [Data streams reference information](#).
- General information for Remote Manager data streams, see the [Remote Manager documentation](#).

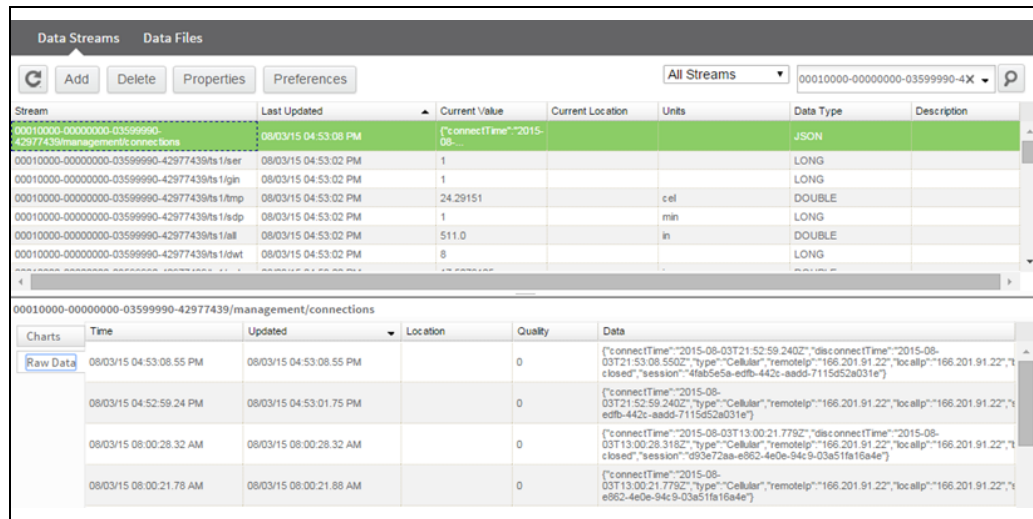
## View device data streams

To view data for a Connect Tank device:

1. Sign into [Remote Manager](#).
2. Access the Data Streams view:
  - Click **Device Management**, double-click your device, and click **View Device Streams**.
  - Click **Data Services** and enter the 15-digit device IMEI in the search field.

The Data Streams view appears showing all reported data for the selected device.

3. Click a data stream to display the details for the stream.
4. To view historical information for a data stream, click one of the following options in the bottom half of the window:
  - Click **Charts** to view the data as a graph.
  - Click **Raw Data** to view the data in a table (see the following image).



## Data streams reference information

The following table provides Remote Manager data streams descriptions for Connect Tank. For additional information about data streams, see [About data streams](#).

Short name	Long name	Description
abt	Alarm battery	Battery Life threshold setting; for example, 75 (percent).

Short name	Long name	Description
adh	Alarm delta high	Delta High threshold setting; for example, 10 (inches).
adl	Alarm delta low	Delta Low threshold setting; for example, 10 (inches).
aem	Alarm enable mask	Alarms that are enabled during the report; the value in the data stream equals the sum of the enabled alarms: 1 — Alarm high enabled (alh) 2 — Alarm low enabled (all) 4 — Alarm delta low enabled (adl) 8 — Alarm delta high enabled (adh) 64 — Alarm on sensor error For example, if you have the Alarm high and Alarm low enabled, the aem data stream value is 3. If you have all alarms enabled, the aem data stream value is 79.
ahy	Alarm hysteresis	Hysteresis setting; for example, 1.0 (inch).
alh	Alarm high	High Threshold setting; for example, 5 (inches).
all	Alarm low	Low Threshold setting; for example, 500 (inches).
alt	Altitude	Altitude location of the device in meters.
apn	APN	Access point name for the cellular network your device uses.
arm	Alarm reason mask	Alarms that are active during the report; the value in the data stream equals the sum of the enabled alarms: 1 — Alarm high (alh) 2 — Alarm low (all) 4 — Alarm delta low (adl) 8 — Alarm delta high (adh) 64 — Alarm on sensor error For example, if you have the Alarm high and Alarm low enabled, the aem data stream value is 3. If you have all alarms enabled, the aem data stream value is 79.
bat	Battery level	Estimated percentage of battery life remaining.
cval	Custom value	Value calculated from the raw value (val) using the following device settings: Tank Volume Unit (unit) Tank Total Height (tht) Tank Sensor Offset (off) Tank Total Volume (vol)
dwt	Device wake reason	Reason the device woke up: 2 — normal reading or report 3 — alarm reading or report 8 — wakeup report

Short name	Long name	Description
fix	GPS fix type	GPS location (fix) information: 0 — no fix 1 — valid fix 2 — invalid fix
fwv	Firmware version	Firmware version on the device; for example, 2.0.1.19.
gin	GPS interval	GPS information sent to Remote Manager every x-number of reports. The range is 1-96 reports. For example, GPS information is sent every 7 reports.
gps	GPS feature	GPS enabled or disabled on the device: 0 — GPS off 1 — GPS on
isn	Cloud server name	URL or server address you use to connect to Remote Manager.
lat	Latitude	Geographic latitude location of the device.
lon	Longitude	Geographic longitude location of the device.
off	Tank sensor offset	Distance from the Connect Tank sensor to the top of the liquid in a full tank.
phn	SMS phone number	Phone number associated with your device's SIM card.
rdp	Read period (minutes)	Number of minutes between readings.
rsi	RSSI	Signal strength of the cellular network.
scs	Sensor connected status	Device sensor connection state: 0 — sensor not connected to the device 1 — sensor connected to the device
sdc	Send count	Maximum number of readings that are sent during one report.
sdp	Send interval	Number of readings between each data transmission.
sdpd	Read period (days)	Number of days between readings. When sdpd is used, the device follows the First Daily Report At HHMM (sst) setting.
ser	Sensor error	Sensor error state: 0 — sensor error 1 — no error
sst	Send start time	Number of minutes after midnight UTC that the new day begins and the first report of the day is sent.

Short name	Long name	Description
sty	Sensor type	Type of sensor on your device. 1 — M300/150 (short range) 2 — M300/95 (mid range)
tht	Tank height total	Total tank height in inches.
tmp	Temperature	Temperature in the tank, measured in degrees Celsius.
tum	Tank upload method	Method the device uses to send data to Remote Manager. <b>Note</b> The only method supported in this version of Connect Tank is TCP/IP.
unit	Tank volume unit	Unit of measurement that you are converting to, such as gallons or liters.
val	Distance	Distance in inches the device sensor is from the surface of the liquid.
vol	Total tank volume	Total volume of the tank in the defined unit, such as gallons (unit defined in Tank Volume Unit).

## Connect Tank maintenance

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Use the following information when you need to update or downgrade the firmware or replace the battery.

### Firmware updates

You can use either the CLI or Remote Manager to update the Connect Tank device firmware, reload the current firmware, install optional firmware, or downgrade to a previous version of the firmware.

#### Update the firmware using Remote Manager

Use Remote Manager to remotely update Connect Tank firmware. Using this method, the firmware is updated the next time the device connects to Remote Manager.

1. Go to [www.digi.com/support](http://www.digi.com/support) to download the Connect Tank v2 firmware file.
2. Sign in to [Remote Manager](#).
3. Click **Device Management > Devices** tab.
4. Right-click the Connect Tank device you want to configure and click **Firmware > Update Firmware**.
5. Click the gear button and do the following:
  - a. Select **One-time**.
  - b. Set up the schedule.
  - c. Select **Schedule Offline**.
  - d. Click outside the Schedule Options pop-up window to return to the Update Firmware window.
6. Click **Browse** and find the file.
7. Click **Update Firmware**. The firmware is updated the next time the device connects to Remote Manager.
8. Refresh your browser to get updated information.
9. Verify the firmware version in Remote Manager:
  - a. Click **Device Management** and find your Connect Tank in the list of devices.
  - b. Verify the firmware version in the **Firmware Level** column is correct for your device.

## Update the firmware using the CLI

If you have physical access to Connect Tank, you can use the CLI to update the firmware.

1. Download the Connect Tankv2 firmware file.
  - a. Go to the [Connect Tank](#) product support page.
  - b. From the **Product Support** tab, click **Firmware**.
  - c. Download and install the firmware file.
2. Open the enclosure and make sure the battery is connected and the SIM card is installed.
3. Connect a USB type A to B cable from your computer to the USB type B port.

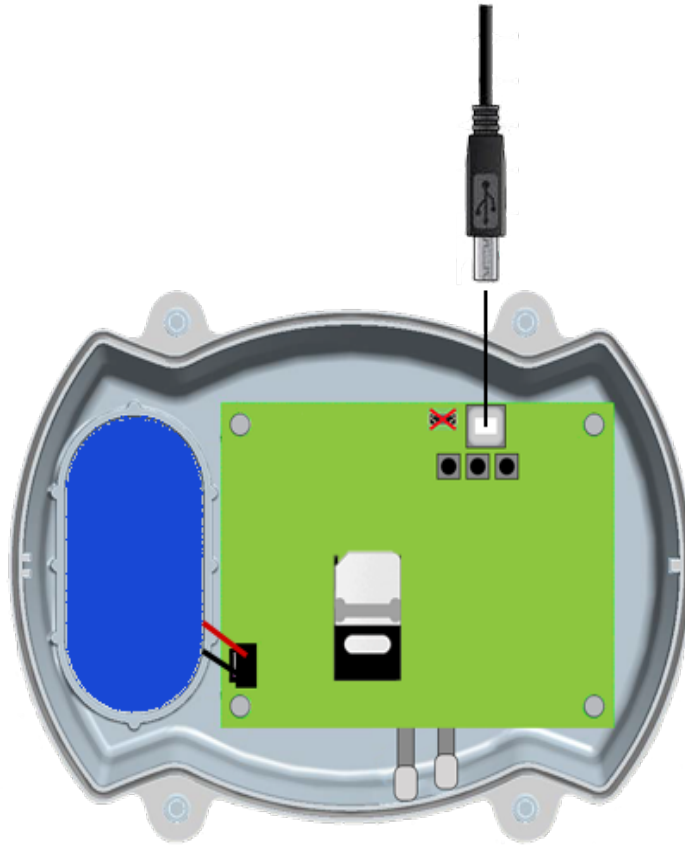
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**Note** Do not use the mini USB port, which is covered by a red X in the graphic below.

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You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Tank to a computer using a USB cable. Digi recommends drivers available at [www.ftdichip.com/Drivers/VCP.htm](http://www.ftdichip.com/Drivers/VCP.htm).



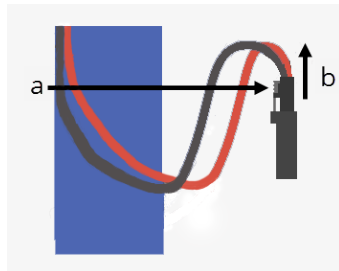
4. Open a terminal program on a computer and connect to Connect Tank using the following configuration:
  - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Tank
  - **Baud rate or bits per second:** 115200
  - **Data:** 8 bit
  - **Parity:** None
  - **Stop:** 1 bit
  - **Flow control:** None

5. Press the Wake button. The command prompt appears in the terminal program window.
6. In the terminal program:
  - a. Type **fwupdate** at the command prompt and select the YMODEM protocol to **send** the firmware file to the device. Refer to your terminal program documentation for how to use the YMODEM protocol.
  - b. Press **Enter**. The device remains awake to load and install the firmware update. After the device completes the change, it sends its updated status information to Remote Manager.
7. Press the Wake button and type **status** at the command prompt to verify the firmware version.

## Battery replacement

Before replacing the battery, review the [safety information](#) and make sure you have the necessary tools and equipment. For more information about battery life, see [Battery life](#).

1. Unscrew the four cover screws and open the enclosure cover.
2. Disconnect the battery.
  - a. Press in the tab at the top of the battery wire connector.
  - b. Pull up on the connector.

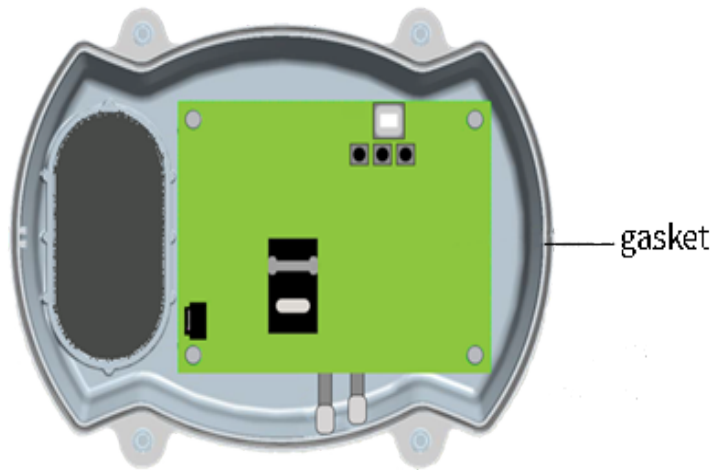


3. Remove the existing battery.
4. Place the new battery in the battery holder and connect the wiring to the battery port. Make sure the battery and its wiring are properly placed.
5. Press the Wake button and wait for the battery LED to slowly blink blue five times and then remain off.

## 6. Reassemble the device.

It is recommended that you apply lubricant to the gasket when you change the battery.

- a. Retrieve the gasket lubricant kit that was provided with the [Connect Tank components](#).
- b. Open the lubricant pouch and use the swab to apply the lubricant onto the gasket.

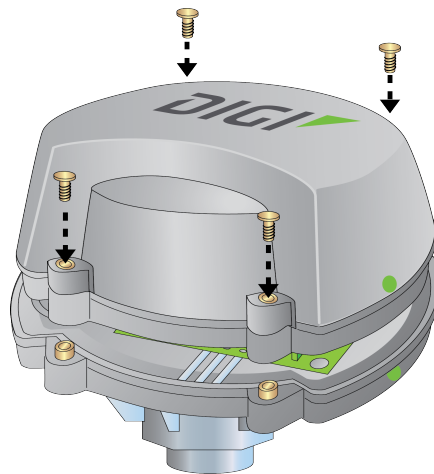


- c. Place the enclosure cover onto the base. The green dots on the cover and the base must both be on the same side of the device, as show below.

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**Note** Make sure that the battery holder in the cover aligns with the battery holder in the base. This ensures that a gap does not appear between the cover and the base.

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- d. Verify that an adequate seal is present between the cover and the base.
- e. Tighten the screws.



**CAUTION!** Cover screws are required as part of the safety rating. When tightening the cover screws, use a screw torque of 0.79 to 1.92 newton meters (7 to 17 inch pounds).

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## Troubleshooting

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This section provides troubleshooting information and resources for a Connect Tank device. You need physical access to the device to perform the procedures in this section.

Digi International provides the following additional online resources:

- Knowledge Base: [www.digi.com/support/kbase](http://www.digi.com/support/kbase)
- Support forum: [www.digi.com/support/forum](http://www.digi.com/support/forum)
- Support request: [www.digi.com/support](http://www.digi.com/support)

### Device not responding

If the Connect Tank is not responding, you can try the following methods to reset the device.

#### Reset the device

You can force a soft reset of the device.

1. Press the **Reset** button to force a soft reset when the Connect Tank device does not respond to any inputs.  
Pressing the **Reset** button cancels all operations and completes a power cycle, then it enters sleep mode. The device retains the last successful changes you made to its configuration.
2. **Wake** the device and wait for the proper LED light sequence to indicate it is functioning.

#### Restore factory defaults to the device

If pressing the **Reset** button does not fix the issue, then press and hold the **Factory** button until both lights flash purple to reset the device.

### Device not connected to the cellular network

Network activation on a Connect Tank device can fail due to the following:

- APN is incorrect
- SIM card is not activated on the cellular network or assigned to a contract
- Device is placed in an area with no network coverage

Try the following to resolve this issue:

1. Make sure you have the correct APN:
  - a. Contact your cellular service provider to get the correct APN.
  - b. Use the CLI to make changes to the APN and check cellular network coverage. See [Register Connect Tank on a cellular network](#).
2. Work with your cellular service provider to make sure there is adequate network coverage for the device installation area. If possible, move the device to an area with enough cellular network coverage.
3. Contact your cellular service provider to make sure your SIM card is activated and assigned to a contract.

## Troubleshooting Connect Tank reports and alarms

Use the following information to troubleshoot errors for reports and alarms.

### Empty tank reports

Use the following information when the Connect Tank device incorrectly reports that a tank is empty.

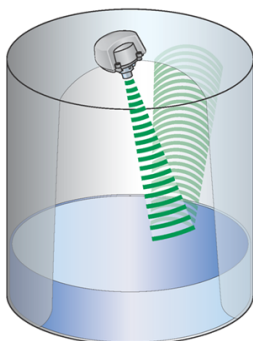
#### Issue

A report or alarm shows the tank is empty when it contains liquid.

#### Fix

Check the angle of the sensor. If the ultrasonic sound beam's transmission path is not perpendicular to the surface of the liquid, its reflection does not return to the sensor.

You might also need to use a self-aligning bulkhead fitting for an angled tank installation.



### No reports in Remote Manager

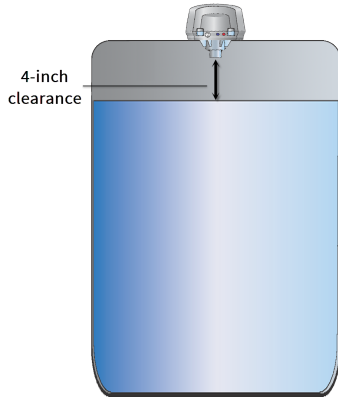
#### Issue

No reports are appearing in Remote Manager for regularly scheduled readings and report cycles.

When the liquid level is less than 4 inches from the sensor on the short-range model and less than 12 inches from the sensor on the mid-range model, Connect Tank is unable to take a reading. When this happens, Connect Tank reports an error (see [ser](#)), but does not report a value (see [val](#)).

#### Fix

Make sure there is a minimum of 7 inches between the Connect Tank sensor and the maximum liquid level.



## High liquid reports

Use the following information when a Connect Tank device incorrectly reports that the tank liquid level reached the high alarm threshold.

### Issue

A report or alarm shows the tank liquid level is too high when the liquid is at a normal level.

If the ultrasonic sound beam's transmission path is blocked, its reflection returns to the sensor in less time than it should, which can lead to a high-liquid level report or alarm. This is also called a false echo.

### Fix

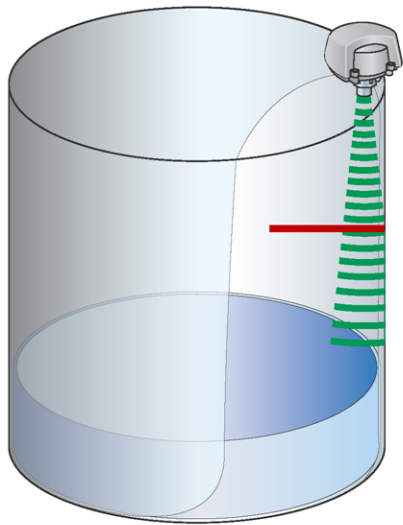
Make sure there are no obstructions in the ultrasonic sound beam's transmission path.

## Examples

### Obstructions

- The device is installed too close to the side of the tank causing the side of the tank to interrupt the transmission path.
- The transmission path is obstructed by recessed or protruding tank seams, or structures mounted inside the tank (such as a ladder).

**Fix:** Make sure the device is installed as close as possible to the center of the tank's diameter to avoid any obstructions between the sensor and the surface of the liquid.

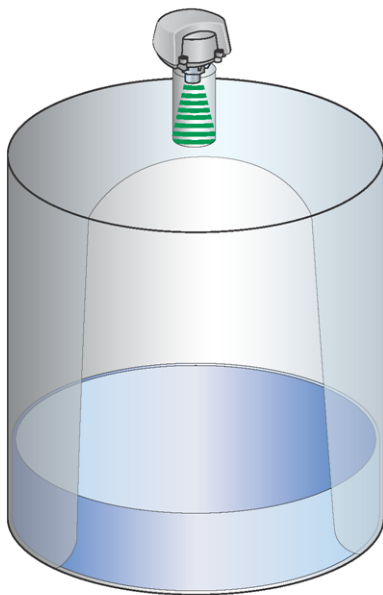


**Narrow standpipe**

The device is installed on a standpipe that is too narrow, which stops the ultrasonic sound beam from reaching beyond the sides of the standpipe.

**Fixes:**

- Use a standpipe that is wide enough or short enough for the ultrasonic sound beam to clear it.
- Use a Digi-provided custom adapter that is designed to reduce reflections from standpipes. Contact Digi for more information.
- Reduce the sensor’s sensitivity setting; work with the sensor manufacturer directly to adjust the sensitivity setting.





## Alarms while filling the tank

Use the following information for troubleshooting if the Connect Tank device sends alarm reports when you are adding liquid to a tank.

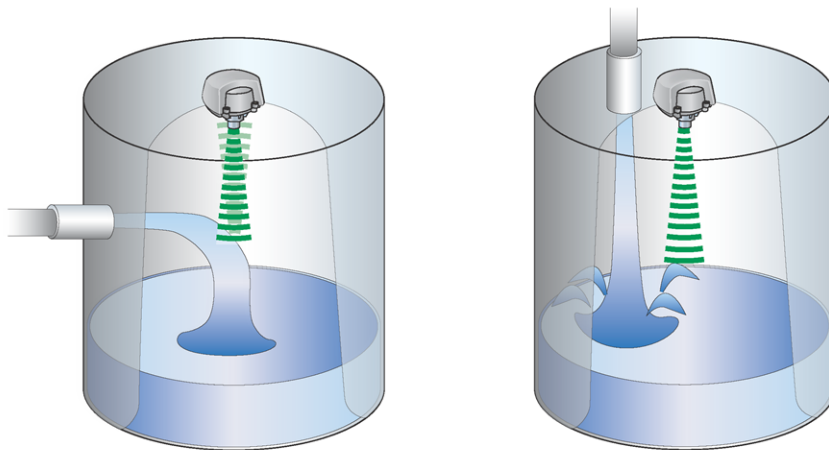
### Issue

A report or alarm shows the tank liquid level is high or empty while the tank is filling.

This happens when the liquid entering the tank either intersects with the ultrasonic sound beam or agitates the surface of the liquid enough to affect the sound beam's transmission path. The liquid either disperses the sound beam so it does not reflect to the sensor or it creates a false echo that reports a high-liquid level. The following figures show both of these scenarios.

### Fix

When this happens, either disregard measurements taken during this time or move the device to a location on the tank where the ultrasonic sound beam is not affected by incoming liquid. Wait a suitable amount of time after filling to let the liquid settle before taking measurements.



## Metal tank issues

Note the following when using the Connect Tank device on metal tanks.

### Issue

Metal tanks sometimes have vibrations that travel through the metal and reflect to the sensor causing occasional bad readings.

### Fix

Install a rubber gasket between the Connect Tank enclosure and the tank's metal surface to prevent the vibrations from affecting Connect Tank.

## Regulatory information

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### FCC certifications and regulatory information

#### ***Radio frequency interface (RFI) (FCC 15.105)***

This device has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 Subpart B, of the FCC rules. These limits are designed to provide reasonable protection against frequency energy, and if not installed and used in accordance with the instruction 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, you are encouraged to attempt to correct the interference with one or more of the following measures:

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

#### ***Labeling requirements (FCC 15.19)***

This device complies with Part 15 of 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.

If the FCC ID is not visible when the device is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module FCC ID.

#### ***Modifications (FCC 15.21)***

Changes or modifications to this equipment not expressly approved by Digi may void the user's authority to operate this equipment.

### Declaration of Conformity (DoC)

Digi has issued Declarations of Conformity for the Connect Tank concerning emissions, EMC, and safety. For more information, see [www.digi.com/resources/certifications](http://www.digi.com/resources/certifications).

#### **Important note**

Digi customers assume full responsibility for learning and meeting the required guidelines for each country in their distribution market. Refer to the radio regulatory agency in the desired countries of operation for more information.

## CE mark (Europe)

The Connect Tank is certified for use in several European countries. For information, visit [www.digi.com/resources/certifications](http://www.digi.com/resources/certifications).

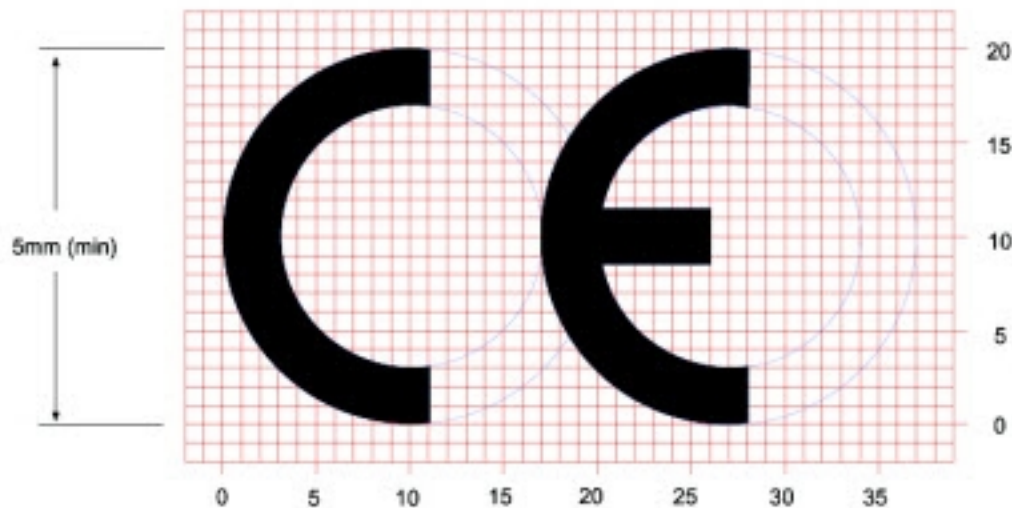
If the Connect Tank is incorporated into a product, the manufacturer must ensure compliance of the final product with articles 3.1a and 3.1b of the RE Directive (Radio Equipment Directive). A Declaration of Conformity must be issued for each of these standards and kept on file as described in the RE Directive (Radio Equipment Directive).

Furthermore, the manufacturer must maintain a copy of the Connect Tank user manual documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

### OEM labeling requirements

The CE marking must be affixed to a visible location on the OEM product.

### CE labeling requirements



The CE mark shall consist of the initials “CE” taking the following form:

- If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
- The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.