



Digi Connect[®] Sensor

User Guide

Revision history—90001491

| Revision | Date | Description |
|----------|--------------|---|
| A | May 2016 | Initial release. |
| B | October 2016 | <ul style="list-style-type: none">■ Added C1D2 certification information.■ Added wiring compliance information.■ Added wire guard information. |
| C | March 2017 | <ul style="list-style-type: none">■ Added HART protocol information.■ Added Modbus protocol information.■ Added continuous monitoring feature information.■ Added Oversampling feature information.■ Updated "Device Cloud" references to "Remote Manager".■ Removed information about the wire guard.■ Added ATEX certification information. |
| D | April 2017 | <ul style="list-style-type: none">■ Added registered trademark symbol to HART® protocol.■ Updated IP rating information for ConnectSensor and ATEX. |
| E | June 2017 | Modified regulatory and certification information as required by RED (Radio Equipment Directive). |
| F | July 2017 | Modified the SIM card installation instructions. |

Trademarks and copyright

Digi, Digi International, and the Digi logo are trademarks or registered trademarks in the United States and other countries worldwide. All other trademarks mentioned in this document are the property of their respective owners.

© 2017 Digi International Inc. All rights reserved.

Disclaimers

Information in this document is subject to change without notice and does not represent a commitment on the part of Digi International. Digi provides this document “as is,” without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Digi may make improvements and/or changes in this manual or in the product(s) and/or the program(s) described in this manual at any time.

Warranty

To view product warranty information, go to the following website:

www.digi.com/howtobuy/terms

Send comments

Documentation feedback: To provide feedback on this document, send your comments to techcomm@digicom.com.

Customer support

Digi Technical Support: Digi offers multiple technical support plans and service packages to help our customers get the most out of their Digi product. For information on Technical Support plans and pricing, contact us at +1 952.912.3444 or visit us at www.digicom.com/support.

Contents

About Digi Connect® Sensor

| | |
|---|----|
| Digi Device Cloud and Digi Remote Manager | 8 |
| Regulatory information and certifications | 9 |
| FCC certifications and regulatory information | 9 |
| Declaration of Conformity (DoC) | 9 |
| CE mark (Europe) | 9 |
| Maximum power and frequency bands | 10 |
| Battery life | 10 |
| Continuous Monitoring Feature | 11 |
| Connect Sensor product specifications | 11 |
| Cell modem transmit (TX) output power | 12 |
| Safety notices | 12 |
| Installation considerations | 13 |
| Warnings: Explosion hazards | 14 |
| RF exposure statement | 15 |
| UL/cUL conformity | 15 |
| Special conditions for safe use (ATEX) | 15 |
| ATEX marking | 16 |
| Connect Sensor hardware replacement | 18 |

Get started

| | |
|---|----|
| Learn about Connect Sensor product components | 19 |
| Verify product components | 19 |
| Connect Sensor LEDs | 21 |
| Connect Sensor ports and buttons | 23 |
| Set up a Connect Sensor | 24 |
| Assemble Connect Sensor | 25 |
| Configure the cellular connection | 27 |
| Check the cellular connection | 29 |
| Wire the I/O sensors | 29 |
| Add a device to Digi Remote Manager® | 29 |

Configure sensor and report settings

| | |
|--|----|
| Enable and configure analog inputs | 31 |
| Enable and configure analog power outputs | 33 |
| Enable and configure a digital input | 34 |
| Enable and configure a digital pulse counter | 35 |
| Enable and configure a digital output | 37 |

| | |
|---|----|
| Enable and configure a digital power output | 38 |
| Enable and configure HART® protocol and a HART® alarm | 39 |
| Enable and configure the Modbus protocol | 40 |
| Enable and configure a serial power output | 43 |
| Modbus station addresses and locations | 44 |
| Report settings | 45 |
| More about First Daily Report | 46 |
| Configure report settings | 46 |
| About analog and digital input options | 48 |
| Alarms | 48 |
| Hysteresis | 49 |
| Custom scaled sensor values | 50 |
| Oversampling | 53 |

View device and sensor data

| | |
|---|----|
| Use Remote Manager to view device and sensor data | 54 |
| About data streams | 54 |
| View device data streams | 55 |
| Use the mobile app to view sensor data | 56 |

Connect Sensor device settings

| | |
|---|----|
| Configure cellular options | 58 |
| Configure Remote Manager settings | 59 |
| Configure the battery life alarm | 60 |
| Configure internal temperature settings | 61 |
| Configure local interface settings | 62 |
| View device information | 63 |
| Use Remote Manager to view device information | 63 |
| Use the CLI to view device information | 63 |

Connect Sensor maintenance

| | |
|--|----|
| Firmware updates | 65 |
| Update the firmware using Remote Manager | 65 |
| Update firmware from Connect Sensor | 66 |
| Update the firmware using the CLI | 66 |
| Battery replacement | 68 |
| Safety information | 68 |
| Replace the battery | 68 |

Troubleshoot Connect Sensor

| | |
|--|----|
| Connect Sensor LEDs for troubleshooting | 70 |
| Device not responding | 71 |
| Check the battery | 71 |
| Reset the device | 71 |
| Restore factory defaults to the device | 72 |
| Device not connected to the cellular network | 72 |
| Basic cellular connection troubleshooting | 72 |
| Advanced cellular network troubleshooting | 73 |
| Device does not connect to Remote Manager | 74 |

| | |
|--|----|
| Device does not appear in the mobile app | 75 |
| Verify Bluetooth connectivity | 75 |
| Reset the device | 75 |

Remote Manager option definitions for Connect Sensor

| | |
|---|----|
| Analog Current Loop Input and Voltage Input option definitions | 78 |
| Analog Power, Digital Power, and Serial Output option definitions | 81 |
| Cellular option definitions | 82 |
| Device Cloud option definitions | 82 |
| Device (report) option definitions | 83 |
| Digital Input option definitions | 85 |
| Digital Output option definitions | 86 |
| Toggle digital output on alarm | 86 |
| Digital Pulse Counter option definitions | 88 |
| Global Alarm Settings option definitions | 89 |
| HART Protocol Settings option definitions | 89 |
| Internal Temperature option definitions | 90 |
| Local Interface Settings option definitions | 91 |
| Modbus Protocol Settings option definitions | 91 |

Data stream definitions

| | |
|---|-----|
| Group definitions for Connect Sensor data streams | 94 |
| Connect Sensor device-specific (ts1 and ui) data stream definitions | 95 |
| Analog input (ain and cl) data stream definitions | 96 |
| Analog (avout), digital (dvout1), and serial power output data stream definitions | 97 |
| Digital input (din1) data stream definitions | 98 |
| Digital output (dout1) data stream definitions | 99 |
| Digital pulse counter (pcnt1) data stream definitions | 100 |
| Temperature sensor (temp1) data stream definitions | 100 |
| HART (hart1) data stream definitions | 101 |
| Data streams for HART protocol | 104 |
| Modbus (modb1) data stream definitions | 105 |
| Data streams for Modbus protocol | 106 |

Using the CLI

| | |
|--|-----|
| Verify cellular network coverage using the CLI | 107 |
| Verify battery life using the CLI | 108 |

CLI commands

| | |
|--|-----|
| fwupdate | 111 |
| status | 111 |
| set | 112 |
| Analog input CLI commands | 113 |
| Digital input CLI commands | 116 |
| Digital output CLI commands | 118 |
| Digital pulse counter CLI commands | 119 |
| Analog and digital power output CLI commands | 121 |
| Cellular CLI commands | 122 |
| Remote Manager CLI commands | 124 |

| | |
|---|-----|
| Internal temperature CLI commands | 125 |
| HART CLI commands | 126 |
| Modbus CLI commands | 127 |

Firmware options

| | |
|---|-----|
| CSENSE Continuous Monitoring firmware | 128 |
| Enable CSENSE Continuous Monitoring | 129 |
| Enable continuous monitoring on digital input | 129 |
| Enable continuous monitoring on analog input | 130 |
| Configure the buffer time for continuous monitoring | 131 |

About Digi Connect® Sensor

Connect Sensor is a low-power cellular sensor gateway for wireless drop-in networking to remotely monitor industrial environments and control systems, such as pipeline flow, air pressure, and light levels. To power Connect Sensor, use either the internal battery or an external power source, such as solar panels, for setups with no power or limited power.

Connect Sensor includes an external input/output (I/O) interface inside a waterproof enclosure for connecting third-party sensors. The sensors gather information (sensor readings) from their environment, and Connect Sensor reports that information to Digi Remote Manager® using a low-bandwidth cellular connection. You can sign in to your Remote Manager account to view the reports or use the Digi Connect Wizard app on a mobile device and pair it with a nearby Connect Sensor to view real-time sensor and device data in the field.

Note Make sure there is adequate cellular network coverage where you plan to install the gateway before purchasing cellular service.

This guide shows you how to:

- Set up and maintain Connect Sensor
- Use Remote Manager to configure external sensors and data reports
- View sensor data and Connect Sensor system information

See the [Digi Connect Sensor I/O Wiring Guide](#) for details about wiring analog or digital I/O sensors and power to Connect Sensor.

Digi Device Cloud and Digi Remote Manager

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.

Regulatory information and certifications

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 Sensor concerning emissions, EMC, and safety. For more information, see 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 Sensor is certified for use in several European countries. For information, visit www.digi.com/resources/certifications.

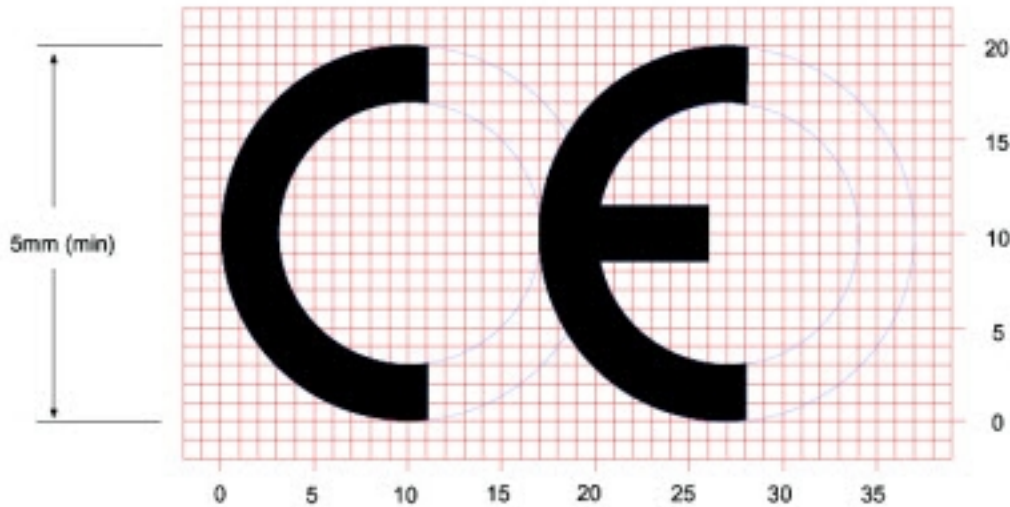
If the Connect Sensor is incorporated into a product, the manufacturer must ensure compliance of the final product with articles 3.1a and 3.1b of the RE Directive (Radio Equipment Directive). A Declaration of Conformity must be issued for each of these standards and kept on file as described in the RE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

Furthermore, the manufacturer must maintain a copy of the Connect Sensor 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.

Maximum power and frequency bands

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

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

Battery life

Connect Sensor uses sleep and wake modes to manage power use. The device wakes only for sensor readings and sending reports to Remote Manager. It is in sleep mode at all other times to maintain low power consumption.

The battery will last 2 to 3 years in these conditions:

- Adequate cellular network coverage where Connect Sensor is installed
- Connect Sensor sends reports to Remote Manager a maximum of two times a day
- Connect Sensor is not powering high-current sensors with long read delays

Extend battery life by scheduling less frequent sensor readings and reports. Scheduling more frequent sensor readings and reports may shorten the battery life to less than 2 years.

Continuous Monitoring Feature

For some customers, the scheduling paradigm of the standard Connect Sensor offering is inadequate. Digi offers an alternate firmware image that trades alarm reactivity for power consumption. The CSENSE Continuous Monitoring firmware image can be downloaded and installed on a Connect Sensor.

When using the continuous monitoring feature, Connect Sensor never sleeps. For best performance and ease of use it is recommended that you use an external power source rather than relying on the battery within Connect Sensor. If the battery is used, the battery life is significantly reduced. The Connect Sensor battery can be used as a short-term battery backup if the external power source fails.

For more information about the continuous monitoring feature, see [CSENSE Continuous Monitoring firmware](#).

Connect Sensor product specifications

The following table provides a summary of general product specifications for Connect Sensor.

| Specifications | |
|------------------------------|---|
| Management | |
| Configuration and management | Remote Manager/Local USB to Serial CLI Protocol |
| Protocol | TCP |
| Power | |
| Battery | 7.2V, 14 Ah, Lithium Thionyl Chloride, non-rechargeable, replaceable |
| Battery life | 2 to 3 years (when following guidelines in Battery life) |
| Battery self discharge | <1%/year if stored at +30 ° C |
| Battery use | -35°C ≤ Tamb ≤ 60°C ambient temperature range |
| External power requirement | 8 to 30VDC at 1A |
| Environmental | |
| Operating temperature | -35 ° C to +70 ° C |

| Specifications | |
|--------------------------------|---|
| Storage temperature | -40 ° C to +85 ° C |
| Relative humidity | 90% (Non-condensing after 90%) |
| Ingress Protection (IP) rating | IP66 Note IP66 is for Class I Division 2 hazardous locations and ordinary locations only. For more information on ATEX installation requirements, see ATEX requirements . |
| Physical | |
| Dimensions (L x W x H) | 15.2 cm x 11.4 cm x 7.6 cm (6.0 in x 4.5 in x 3 in) |
| Weight | 1.25 lbs |
| LEDs | Bluetooth®, Sensor reading, Cellular, Battery |
| Enclosure material | 10% fiberglass reinforced polycarbonate |
| Enclosure rating | NEMA Type 4, 4X, 6, and 6P UL 94 V-0 |

Cell modem transmit (TX) output power

| Modem | Band | Power Class |
|-----------|------------------------------|-----------------|
| HE910-D | GSM 850 / 900 | 4 (2W) |
| | DCS1800 / PCS 1900 | 1 (1W) |
| | EDGE, 850/900 MHz | E2 (0.5W) |
| | EDGE, 1800/1900 MHz | Class E2 (0.4W) |
| | WCDMA FDD B1, B2, B4, B5, B8 | Class 3 (0.25W) |
| LE910-NA1 | LTE All Bands | Class 3 (0.2W) |
| | WCDMA All Bands | Class 3 (0.25W) |
| LE910-SV1 | LTE All Bands | Class 3 (0.2W) |

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.

Note When installing in a C1D2 area, you must use C1D2 listed, IP66 rated conduit and conduit fittings to maintain applicable safety ratings on the Connect Sensor.

- 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).
- Connect Sensor 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 Sensor 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 batteries falling into a protected area.
- When inserting wires into the terminal block, we recommend tightening torque to 0.2N-m.
- Allowable wire size for terminal blocks is 0.5-1.5mm².

ATEX requirements

- Connect Sensor must be installed in an enclosure that provides a degree of protection not less than IP54, in accordance with EN 60079-15.
- Connect Sensor 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 Sensor device.

Note The Connect Sensor device contains internal batteries.



WARNING! Connect Sensor 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.



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 Sensor contient des batteries internes.



AVERTISSEMENT! L'unité Connect Sensor 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 |
|------------|---|------------------|
| 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 |

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 Sensor is intended for fixed installation, where the installation is intended to minimize the risk from electrostatic discharge.
- Provision shall be made to prevent the rated voltage being exceeded by the transient disturbances of more than 140% of the peak rated voltage.
- Connect Sensor must be installed in an enclosure that provides a degree of protection not less than IP54, in accordance with EN 60079-15.
- Connect Sensor 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 Sensor device is compliant to the ATEX Directive under Certification DEMKO 16 ATEX 1717X.

Applicability

Connect Sensor has been evaluated according to the following conditions. The ATEX evaluation and the special conditions in this section apply to part numbers 50001907-xx.



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



WARNING! The Connect Sensor unit should not be installed in locations with either pressurized or flammable materials. The battery should be replaced in unclassified areas only.



WARNING! Install Connect Sensor 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> II 3 G Ex nA IIC T6 Gc</p> | <p>ATEX symbol and classification:</p> <ul style="list-style-type: none"> ■  — 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. ■ II — 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. ■ 3 — 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. ■ G — This indicates that the Environment is based on International Electrotechnical Commission (IEC) 60079-0, Clause 29.4. ■ Ex — This indicates that the product has been evaluated for use in potentially explosive atmospheres. ■ nA — This indicates that the product provides ignition protection by using components that are non-sparking during normal operations. ■ IIC — The Group symbol where IIC is electrical equipment for places with an explosive gas atmosphere other than mines susceptible to firedamp. ■ T6 — This is the Temp Code, indicating a maximum surface temperature of 85° C. ■ Gc — 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). |

Connect Sensor hardware replacement

The Connect Sensor hardware can be replaced with Connect Sensor+ hardware, which provides additional external device monitoring features.

- [Enable and configure HART® protocol and a HART® alarm](#)
- [Enable and configure the Modbus protocol](#)

Get started

Use the following sections to get started with Connect Sensor.

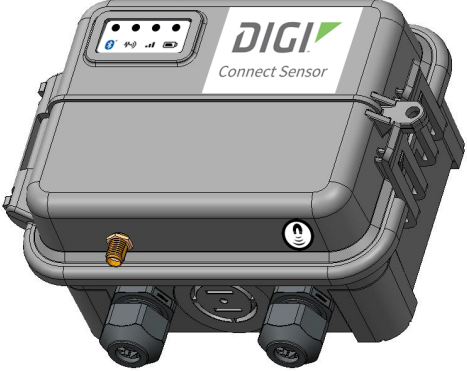
1. [Learn about Connect Sensor product components](#)
2. [Set up a Connect Sensor](#)
3. [Add a device to Digi Remote Manager®](#)
4. [Configure sensor and report settings](#)

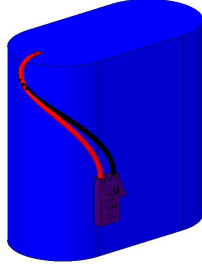
Learn about Connect Sensor product components

These sections include a list of Connect Sensor components, and reference information about the Connect Sensor LEDs, ports, and buttons.

Verify product components




Connect Sensor includes the following components:

| Component | Description |
|----------------|--|
| Connect Sensor |  |

| Component | Description |
|--|--|
| <p>Battery</p> <hr/> <p>Note The battery is included for all versions except for the -N versions.</p> <hr/> |  |

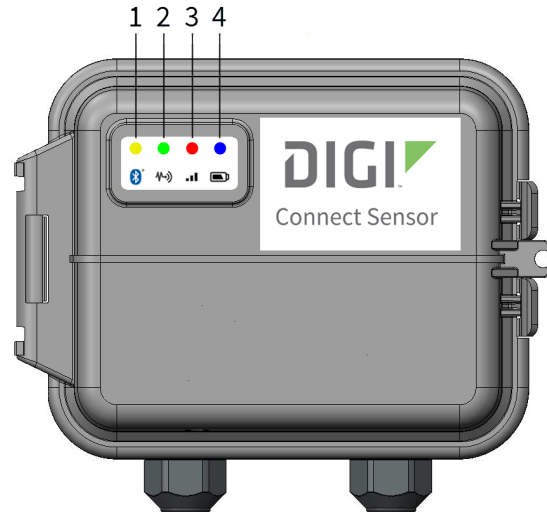
Optional Accessories

The following accessories are available through Digi International Inc.; for more information, visit <http://www.digi.com/products/cellular-solutions/cellular-gateways/digi-connect-sensor>:

| Component | Description |
|---|--|
| <p>Activated SIM card—when you purchase Digi Bundled Services</p> |  |
| <p>Cellular antenna</p> |  |
| <p>Magnet—for manually waking the device</p> |  |

Connect Sensor LEDs

Connect Sensor has four LED indicators to monitor Bluetooth connection, sensor activity, cellular connection, and battery life. If Connect Sensor is powered and all LEDs are off, it is in sleep mode.

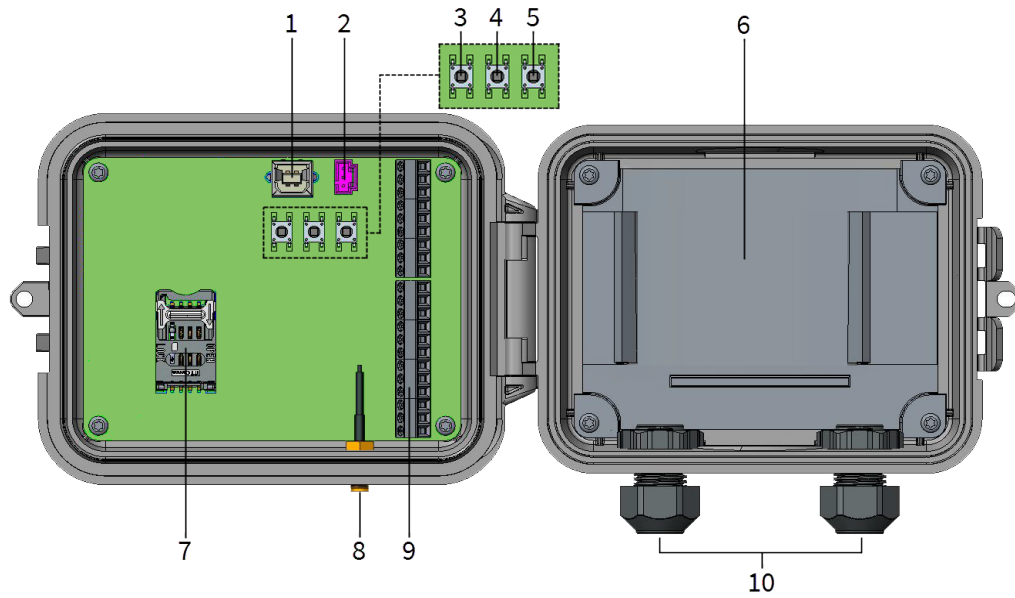


| Item | LED | Description |
|------|----------------|---|
| 1 | Bluetooth | Indicator light for Bluetooth communication: <ul style="list-style-type: none"> ■ Yellow blinking: Bluetooth is on and Connect Sensor is discoverable |
| 2 | Sensor reading | Indicator light for the sensor(s): <ul style="list-style-type: none"> ■ Green blinking: One or more sensors are reading the environment |
| 3 | Cellular | Indicator light for the cellular network connection: <ul style="list-style-type: none"> ■ Solid purple: Connect Sensor is waking ■ Red blinking: Searching for the cellular network ■ Blue: <ul style="list-style-type: none"> • Blinking: Connected to the cellular network and attempting to communicate with Remote Manager • Solid light: Successfully sent data to Remote Manager; turns off after a few seconds |

| Item | LED | Description |
|------|---------|---|
| 4 | Battery | <p>Indicator light for battery function:</p> <ul style="list-style-type: none">■ Solid purple: Connect Sensor is waking <p>The following patterns are based on the Global Alarm > Battery Life setting in Remote Manager:</p> <ul style="list-style-type: none">■ Red blinking: Indicates battery life is less than or equal to the Battery Life alarm■ Blue blinking: Indicates battery life is greater than the Battery Life alarm |

Connect Sensor ports and buttons

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



| Item | Name | Description |
|------|-----------------------|--|
| 1 | Console port | Connects Connect Sensor to a computer using a USB type A to B cable for access to the command line interface (CLI). |
| 2 | Battery port | Connects the battery wire to power Connect Sensor. |
| 3 | Wake button | Wakes Connect Sensor. |
| 4 | Factory button | Removes all configuration changes and restores Connect Sensor to its original factory default settings when you press and hold it for a 3 seconds. If you press this button, but do not hold it down, the device briefly wakes and returns to sleep mode—no settings are affected. |
| 5 | Reset button | Restarts the device when it is not responding to input (from the CLI or otherwise). Pressing this button does not remove previous configuration changes. |
| 6 | Battery tray | Holds the battery in place. |
| 7 | SIM Card tray | Connects the SIM card to Connect Sensor. |
| 8 | Cellular antenna port | Connects an external cellular antenna to Connect Sensor. |

| Item | Name | Description |
|------|------------------------------|--|
| 9 | Input/Output (I/O) interface | Wire analog or digital input and output sensors or power to this interface. For more information, see the Digi Connect Sensor I/O Wiring Guide . |
| 10 | Cable glands | Thread sensor cables through these openings into Connect Sensor. |

Set up a Connect Sensor

Complete all of the tasks in this section in order to set up a Connect Sensor.

1. [Assemble Connect Sensor](#)
2. [Configure the cellular connection](#)
3. [Check the cellular connection](#)
4. [Wire the I/O sensors](#)

Assemble Connect Sensor

Before wiring sensors to the I/O interface, assemble Connect Sensor to make sure it works and check the cellular network coverage in the install area.

Make sure you have the following required equipment:

- Battery
- Cellular antenna

Note You must use a passive (non-amplified) antenna with Connect Sensor.

- Activated SIM card

To assemble Connect Sensor:

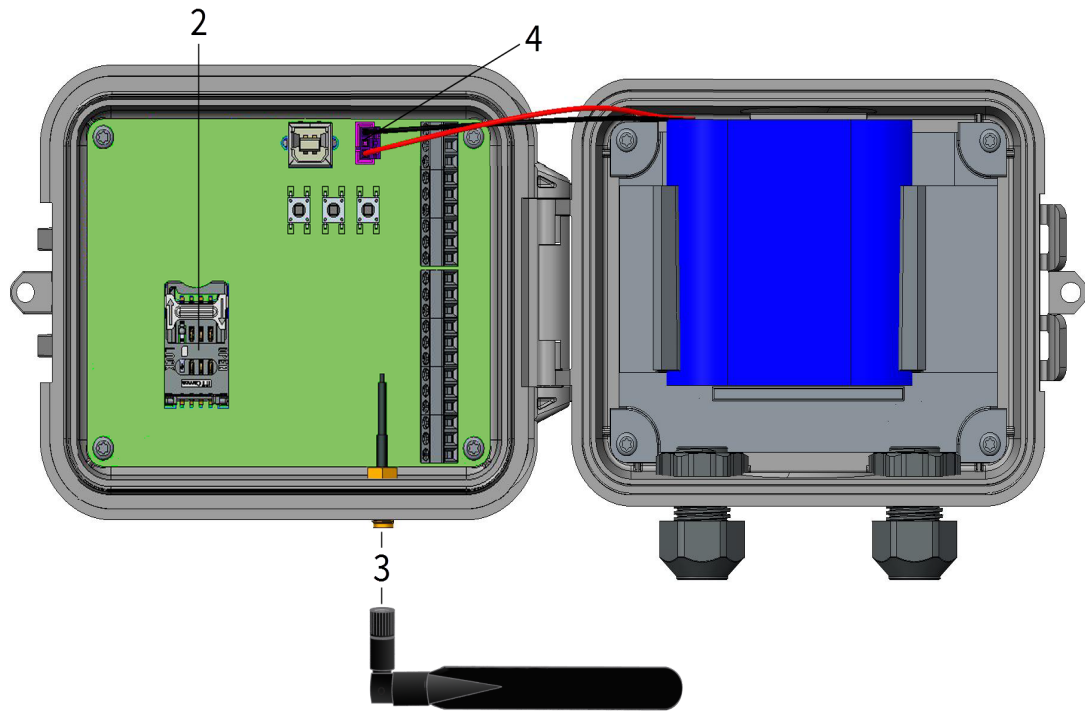
1. Open the Connect Sensor enclosure.
2. Insert the SIM card.
 - a. Unlock the SIM card tray by gently pushing the metal bar toward the bottom of the tray and pulling it open.
 - b. Insert the SIM card with the metal contacts face down and the flat edge inserted into the holder.
 - c. Press the SIM card tray onto the board.
 - d. Lock the SIM card tray by gently pushing the metal bar toward the top of the SIM card holder.



Note If you purchased Digi Bundled Services, the SIM card is already installed. If you have a cellular account with another provider, get an activated SIM card (standard size) from your cellular service provider.

3. Connect the cellular antenna.
4. Insert and connect the battery.

Note We recommend that you complete configuration, including verifying cellular and Remote Manager connectivity, before wiring external sensors to Connect Sensor.



Configure the cellular connection

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

Connect Sensor is configured with a default APN that you need to change to register Connect Sensor on the cellular network for your cellular service provider. Use the command line interface (CLI) to initially configure the cellular connection.

Before you begin, make sure you have the following required equipment and information:

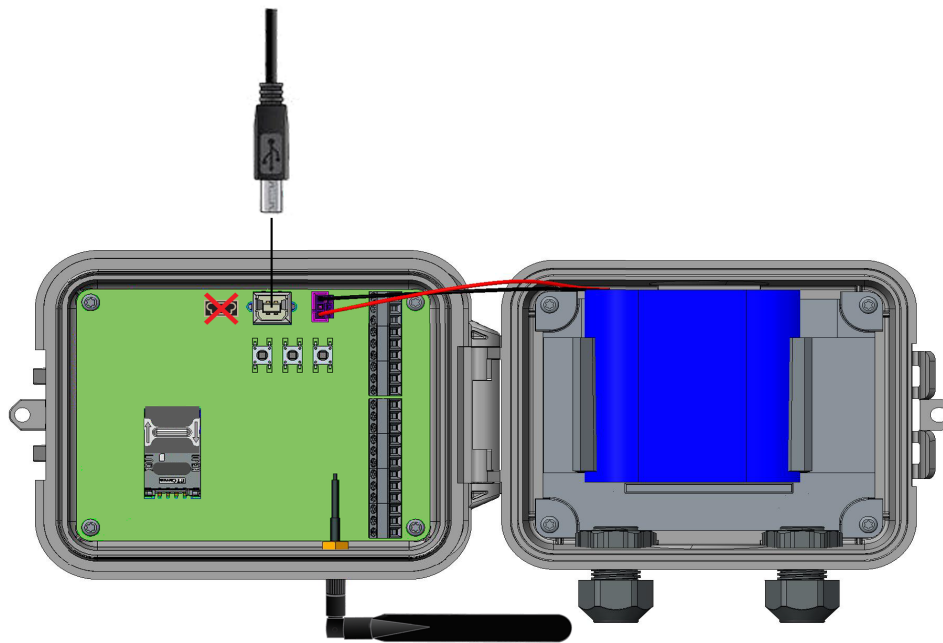
- Computer running a terminal emulator program
- USB type A to B cable
- APN from your cellular service provider

To register Connect Sensor on a cellular network:

1. Open the enclosure and make sure the battery is connected and the SIM card is installed.
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 Sensor to a computer using a USB cable. Digi recommends drivers available at <http://www.ftdichip.com/Drivers/VCP.htm>.



3. Open a terminal program on a computer and connect to Connect Sensor using the following configuration:

- **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor
 - **Baud rate or bits per second:** 115200
 - **Data:** 8 bit
 - **Parity:** None
 - **Stop:** 1 bit
 - **Flow control:** None
4. Press the **Wake** button.
 5. At the command prompt, type **set apn=thecellular.apn** where **thecellular.apn** is the string supplied by your cellular service provider.
 6. Press **Enter**. The terminal program displays the APN configuration setting's current value and the pending value.
 7. If required, set a user name, password, and PIN for the SIM card. At the command prompt, type the following and press **Enter** after each command:
 - **set usr=<username>**
Where *username* is the name of your cellular account.
 - **set pwd=<password>**
Where *password* is the password for your cellular account.
 - **set pin=<pin>**
Where *pin* is the PIN for your SIM card.For details about these commands, see [CLI commands](#).
 8. Type **activate** at the command prompt and press **Enter** to immediately make the change. Connect Sensor goes to sleep and immediately wakes up to report the change to Remote Manager. After the change completes, it goes to sleep again.
 9. (Optional) Verify the new settings:
 - a. Press the **Wake** button.
 - b. At the command prompt type **set commandname** where **commandname** is one of the settings you updated, such as **apn**.

After setting up and configuring Connect Sensor, use the following sections in this guide to configure additional settings and remotely manage Connect Sensor:

- [Check the cellular connection](#)
- [Configure sensor and report settings](#)
- [Connect Sensor device settings](#)
- [View device and sensor data](#)

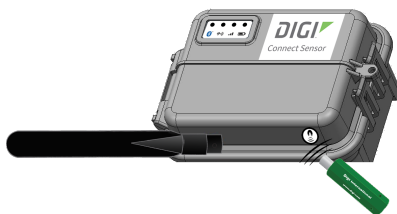
Check the cellular connection

Make sure the cellular network provides an adequate signal where you install Connect Sensor to maintain a consistent cellular connection.

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

To check the cellular network connection at the install location:

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



2. Make sure the cellular LED blinks blue to show it is connected to the cellular network.
3. If Connect Sensor does not connect to the cellular network, see [Device not connected to the cellular network](#).

You can now complete I/O interface wiring, see the [Digi Connect Sensor I/O Wiring Guide](#).

Wire the I/O sensors

You can wire the analog and digital input/output sensors or power using the I/O interface. For detailed information, see the [Digi Connect Sensor I/O Wiring Guide](#).

Note All external or field wiring must be in accordance with NFPA 70 Article 501.10(B).

After wiring sensors, use the following sections in this guide to configure additional settings and remotely manage Connect Sensor.

- [Configure sensor and report settings](#)
- [View device and sensor data](#)
- [Connect Sensor device settings](#)

Add a device to Digi Remote Manager®

To remotely manage Connect Sensor and get sensor data, you need to create a Remote Manager account and add your Connect Sensor 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, 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 and sign in with your user name and password.
2. Locate the 15-digit device IMEI number on the Connect Sensor label.
3. Click **Device Management > Devices**.
4. Click **Add Devices**. The Add Devices dialog appears.
You cannot use the **Discover** button to discover Connect Sensor 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" the Connect Sensor to force a connection with Remote Manager and update the data. For instructions, see [Update the firmware using the CLI](#) or [Update firmware from Connect Sensor](#).

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.

Configure sensor and report settings

At this point, you should have completed the following steps:

- [Configure the cellular connection](#)
- [Check the cellular connection](#)
- [Wire the I/O sensors](#)
- [Add a device to Digi Remote Manager®](#)

After completing those steps, follow the topics in this section to use Remote Manager to enable and configure sensor and report settings to monitor and manage the device and its sensors. Connect Sensor automatically detects the device version and provides support for its configuration within the available options in Remote Manager.

The configuration changes must be scheduled so that they are downloaded and applied to the Connect Sensor device the next time it connects to Remote Manager.

Use Remote Manager to control the following:

- Which sensors are enabled or disabled
- When Connect Sensor reads sensor values and reports them to Remote Manager
- Which sensor values trigger an alarm report
- What user-friendly name you want to use for the sensor
- How you want raw sensor values converted to custom scaled units

Enable and configure analog inputs

Connect Sensor has four analog inputs, each of which you can configure as either a 4-20 mA current loop or a voltage input. For details about the configuration options, see [Analog Current Loop Input and Voltage Input option definitions](#).

To set analog input options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Select the analog input for your sensor:
 - **Analog: 4-20mA Current Loop 1-4**
 - **Analog: Voltage Input 1-4**

Note Configure each analog input as either a current loop or a voltage input, not both. For example, if you enable Analog: 4-20mA Current Loop 1, make sure you disable Analog: Voltage Input 1.

6. Enable the input by selecting **On** for **Interface Enable**.
7. Select **On** for the alarms you want to enable and enter an appropriate value for each threshold that you enabled. For more information, see [Alarms](#).
8. Enter a value for **Hysteresis** to prevent multiple alarms when the sensor input value is near a high or low threshold. For more information, see [Hysteresis](#).
9. Enter a user-friendly name that describes the sensor in the **Sensor Description** field.
10. Enter the unit of measurement type, such as *inches*, that you are using for your application in the **Custom Scaled Sample Unit** field.
11. Enter the sensor manufacturer's values for y1 and y2 in the **Custom Scaled Sample Value** fields. For more information about the Custom Scaled fields, see [Custom scaled sensor values](#).
12. Enable the oversampling feature, if desired. For more information about this feature, see [Oversampling](#).
 - a. From the **Oversampling (ovs)** list box, select the option that describes the desired value for the sampled data: **Average**, **Minimum**, or **Maximum**.
 - b. In the **Oversampling Inter-sample Delay** field, specify the time interval between readings. The time is measured in milliseconds.
 - c. In the **Oversampling Number Samples** field, specify the number of data samples that must be taken.

13. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Enable and configure analog power outputs

Note Powering sensors reduces battery life.

Enable and configure the power output options when you use Connect Sensor to power the analog sensors.

Each of the four analog inputs also has four corresponding power outputs to power sensors. The analog power outputs work independently—each one powers only its corresponding analog input.

For example:

- Analog: Power Output 1 powers either Analog: 4-20mA Current Loop 1 or Analog: Voltage Input 1.
- Analog: Power Output 2 powers either Analog: 4-20mA Current Loop 2 or Analog: Voltage Input 2, and so on.

When Connect Sensor powers multiple sensors, it powers only one sensor at a time for each sensor reading. This also allows you to set different voltage ranges for each power output. For example, you can set **Analog: Power Output 1 to 3.3 V** and **Analog: Power Output 2 to 15 V**.

For details about the configuration options, see [Analog Power, Digital Power, and Serial Output option definitions](#).

To set analog power output options in in Remote Manager:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.

3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Analog: Power Output** and select the power output that corresponds to your analog input.
6. Enable the output by selecting **On** for **Power Output Enable**.
7. Select the appropriate voltage **Output Level** for your power output. Refer to the manufacturer specifications for the sensor.
8. Enter the appropriate **Read Delay** that your sensor needs to stabilize before reading the sensor input value. Refer to the manufacturer specifications for the sensor.

For example, a sensor may need 7 seconds to power on and stabilize before it can get an accurate reading.

Note A higher read delay keeps the device powered on longer, which reduces battery life.

9. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Enable and configure a digital input

Connect Sensor has one digital I/O pin. You can configure the pin as a digital input, pulse counter, or digital output, but not more than one I/O function simultaneously.

In addition to the standard alarm and user-friendly name settings, the digital input options include rising edge wake, falling edge wake, and a pull-up resistor.

For details about the configuration options, see [Digital Input option definitions](#).

To configure digital input options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Select **Digital: Input**.
6. Select **On** for **Interface Enable** and disable the interface for all other digital I/O settings:
 - **Digital: Output > Interface Enable: Off**
 - **Digital: Pulse Counter > Interface Enable: Off**
7. Select **On** for the alarms you want to enable.
8. Select **On** for **Rising Edge Wake** and **Falling Edge Wake** to enable them.
9. Select **On** for **Enable pullup** when your application requires it.
10. Enter a user-friendly name for the sensor in the **Sensor Description** field.
11. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Enable and configure a digital pulse counter

Connect Sensor has one digital I/O pin. You can configure the pin as a digital input, pulse counter, or digital output, but not more than one I/O function simultaneously.

When using a digital pulse counter, Connect Sensor continues to count pulses during sleep cycles and reports them to Remote Manager during normal reporting intervals.

For example, if Connect Sensor reports every hour, the sensor counts pulses during each hour Connect Sensor is in sleep mode. At the end of each hour, Connect Sensor wakes and reports the total pulse count for that hour to Remote Manager. The pulse counter resets to zero after each wake cycle and stores the values until the next reporting interval.

For details about the configuration options, see [Digital Pulse Counter option definitions](#).

To set digital pulse counter options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Digital: Pulse Counter**.
6. Select **On** for **Interface Enable** and disable the interface for all other digital I/O settings:
 - **Digital: Input > Interface Enable: Off**
 - **Digital: Output > Interface Enable: Off**
7. Select **On** for the alarms you want to enable and enter an appropriate value for each threshold that you enabled.
8. Enter a value for **Hysteresis** to prevent multiple alarms when the sensor input value is near a high or low threshold.
9. Select **On** for **Enable pullup** when your application requires it.
10. Enter a user-friendly name for the sensor in the **Sensor Description** field.
11. Enter the unit of measurement type, such as *inches*, that you are using for your application in the **Custom Scaled Sample Unit** field.
12. Enter the sensor manufacturer's values for y1 and y2 in the **Custom Scaled Sample Value** fields. For more information about the Custom Scaled fields, see [Custom scaled sensor values](#).
13. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Enable and configure a digital output

Connect Sensor has one digital I/O pin. You can configure the pin as a digital input, pulse counter, or digital output, but not more than one I/O function simultaneously. Use Remote Manager to control a digital output level and enable an internal pull-up resistor. For details about the configuration options, see [Digital Output option definitions](#).

To set digital output options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Select **Digital: Output**.
6. Select **On** for **Interface Enable** and disable the interface for all other digital I/O settings:
 - **Digital: Input > Interface Enable: Off**
 - **Digital: Pulse Counter > Interface Enable: Off**
7. Select the appropriate **Output Level** for your digital output. Refer to the manufacturer specifications for the sensor.
8. Select the appropriate **Toggle Output on** option If you want to toggle the digital output on a selected alarm. For more detailed information, see [Toggle digital output on alarm](#).
9. Select **On** for **Enable pullup** when your application requires it.
10. Enter a user-friendly name for the sensor in the **Sensor Description** field.
11. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:

- i. Select **One-Time**.
- ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Enable and configure a digital power output

Note Powering sensors reduces battery life.

Configure the digital power output options when you use Connect Sensor to power an external device. For details about the configuration options, see [Analog Power, Digital Power, and Serial Output option definitions](#).

To set digital power output options in Remote Manager:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Select **Digital: Power Output**.
6. Enable the output by selecting **On** for **Power Output Enable**.
7. Select the appropriate voltage **Output Level** for your power output. Refer to the manufacturer specifications for the sensor.
8. Enter the appropriate **Read Delay** that your sensor needs to stabilize before reading the sensor input value. Refer to the manufacturer specifications for the sensor.
For example, a sensor may need 7 seconds to power on and stabilize before it can get an accurate reading.

Note A higher read delay keeps the device powered on longer, which reduces battery life.

9. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:

- Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
- Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Enable and configure HART® protocol and a HART® alarm

The Highway Addressable Remote Transducer (HART) is a digital communications technology protocol for sending and receiving digital information across a 4-20 mA analog current loop that connects field instruments with distributed control systems.

Note The HART protocol is available only with Connect Sensor+.

The HART protocol allows Connect Sensor to collect remote diagnostic information from a HART-enabled sensor and alert a user remotely when the sensor has malfunctioned. You can enable the HART protocol only on an Analog 4-20mA Current Loop 1. When the HART protocol is enabled, diagnostic information is collected from the HART-enabled sensor at the scheduled time. Diagnostic information from the 4-20mA analog Loop 1 is also collected at the scheduled time.

You can also choose to enable the HART protocol alarm option. This ensures that when an error occurs with the HART-enabled sensor, error information is pushed to Remote Manager without waiting for the next scheduled push.

You can review diagnostic information from the HART-enabled sensor in the **Data Services** tab in Remote Manager. For more information about reviewing HART information in the data stream, see [HART \(hart1\) data stream definitions](#).

Note The FieldComm Group owns the HART specifications. For more information, see www.fieldcommgroup.org/technologies/hart.

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.

5. Expand the **Analog: 4-20mA Current Loop** node.
6. Click on the **Analog: 4-20mA Current Loop 1** option. The properties for the loop appear.
7. For the **Interface Enable (ena)** field, select the **On** option.
8. In the left pane, click the **HART Protocol Settings** option. The **HART Protocol Settings** page appears.
9. For the **Protocol Enable (ena)** field, select the **On** option.
10. Determine whether error information should be pushed immediately. For the **Device Status Alarm Mask (aem)** option:
 - Select the **On** option if error information should be pushed immediately.
 - Select the **Off** option if error information should be pushed with the next scheduled push.
11. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

12. If Connect Sensor is providing power to the HART-enabled device, you must enable the analog power output. For instructions, see [Enable and configure analog power outputs](#).
If the external sensor device has an alternate power source, you can skip this step.

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

Enable and configure the Modbus protocol

Modbus is an industrial automation protocol used for sending and receiving digital information across a single, external RS-485 serial bus.

Note The Modbus protocol is available only with Connect Sensor+ hardware.

The Modbus protocol allows Connect Sensor to collect remote diagnostic information from a Modbus-enabled sensor as well as alert a user remotely if the sensor malfunctions. You can configure Connect Sensor to collect remote diagnostic information from up to four Modbus-enabled sensors.

The Modbus protocol uses the serial pins on the I/O terminal block in Connect Sensor. The configuration settings specified in the **Modbus Protocol Settings** page in Remote Manager must exactly match the Modbus protocol settings on the external sensor device(s). The configuration includes a list of variables, which specify the locations on the Modbus device that the Connect Sensor should read to collect diagnostic information.

You can also choose to enable the Modbus protocol alarm option. This ensures that when an error occurs with the Modbus-enabled sensor, error information is pushed to Remote Manager without waiting for the next scheduled push.

You can review diagnostic information from the Modbus-enabled sensor in the **Data Services** tab in Remote Manager. For more information about reviewing Modbus information in the data stream, see [Modbus \(modb1\) data stream definitions](#).

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Modbus Protocol Settings**.
6. For the **Protocol Enable (ena)** field, select the **On** option.
7. Determine whether error information should be pushed immediately. For the **Device Status Alarm Mask (aem)** option:
 - Select the **On** option if error information should be pushed immediately.
 - Select the **Off** option if error information should be pushed with the next scheduled push.
8. The following settings must match the configuration of the external sensor device. Select the appropriate option from the list box.
 - **Serial framing mode (mode)**
 - **Serial baud rate (baud)**
 - **Serial data bits (dbt)**
 - **Serial stop bits (sbt)**
 - **Serial parity (par)**
9. For each Modbus sensor that you want to monitor, you can specify the station address and then include a list of variable addresses. The items in the list must be separated by a comma without spaces. The list is limited to 63 characters, which allows for 8 to 10 variables in a list. For more information about identifying Modbus stations and locations, see [Modbus station addresses and locations](#).
 - a. In the **Station1: Slave Address (saddr1)** field, select the station address.
 - b. In the **Station 1: Variable list (vars1)** field, enter the list of variable addresses.
 - c. Repeat this process for any additional stations. You can specify up to four stations.

Modbus Protocol Settings

Protocol Enable (ena): On Off
 Device Error Alarm Mask (aem): On Off
 Serial framing mode (mode): RTU ▼
 Serial baud rate (baud): 19200 ▼
 Serial data bits (dbt): 8 ▼
 Serial stop bits (sbt): 1 ▼
 Serial parity (par): even ▼

Station 1: Slave Address (saddr1): 1 ▲▼
 Station 1: Variable List (vars1): 10007,313003
 Station 2: Slave Address (saddr2): 2 ▲▼
 Station 2: Variable List (vars2): 17003F
 Station 3: Slave Address (saddr3): 0 ▲▼
 Station 3: Variable List (vars3):
 Station 4: Slave Address (saddr4): 0 ▲▼
 Station 4: Variable List (vars4):

▼

10. Apply the configuration changes:

- a. Select **Schedule** from the **Save** drop-down menu.
- b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

11. If Connect Sensor is providing power to the Modbus device, you must enable the serial power output. For instructions, see [Enable and configure a serial power output](#).

If the external sensor device has an alternate power source, you can skip this step.

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

Enable and configure a serial power output

This section describes how to configure serial power. Note that powering sensors reduces battery life; to reduce unnecessary battery consumption, only wake the device when needed.

Note The serial power output option is available only with Connect Sensor+, and is used only with a Modbus device.

If Connect Sensor is providing power to the Modbus device, you must enable the serial power output.

To set serial power output options in Remote Manager:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Select **Serial: Power Output**.
6. Enable the output by selecting **On** for **Power Output Enable**.
7. Select the appropriate voltage **Output Level** for your power output. Refer to the manufacturer specifications for the sensor.
8. Enter the appropriate **Read Delay** that your sensor needs to stabilize before reading the sensor input value. Refer to the manufacturer specifications for the sensor. For example, a sensor may need 7 seconds to power on and stabilize before it can get an accurate reading.

Note A higher read delay keeps the device powered on longer, which reduces battery life.

9. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Modbus station addresses and locations

In Modbus, a station address acts as a unique identifier for the external sensor device. A station address is assigned when the external sensor device is configured and installed. Multiple stations listen to the bus and can respond only to the commands that match their unique station address. Connect Sensor acts as a master to the slave station addresses. All Modbus devices connected to Connect Sensor must have the exact same serial configuration.

In the Connect Sensor configuration, you can specify a list of variable addresses for each station address. The variable addresses identify the values that should be pulled from each station device. If Connect Sensor is configured to read a variable that is unsupported by a Modbus station, no data sample is stored.

Finding the Modbus address

A Modbus variable address includes a combination of the reading category, the logical address of the information, and the interpretation method. Together these create a variable address that can be added to a variable list in the Connect Sensor configuration.

Step 1: Determine the reading category

The reading category is the single digit prefix of the variable address. Each variable type has a unique prefix.

| Modbus variable type | Number of bits | Prefix value |
|----------------------|----------------|--------------|
| Coil | 1 | 0 |
| Discrete input | 1 | 1 |
| Input register | 16 | 3 |
| Holding register | 16 | 4 |

Step 2: Determine the logical address

Many Modbus device specifications list variables using a 0-based physical address. Since Modbus uses a 1-based logical address, the logical address is calculated by adding one to the physical address. The logical address must have either four or five digits, padded on the left by zeroes if required.

For each configured station address, you can configure a corresponding variable list. The variable list is limited to 63 characters, which limits the number of variables to between 8 and 10.

A variable address can be either 5 or 6 decimal digits in length.

Five decimal digits:

| | |
|---------------|--|
| 00001 - 09999 | Coils: physical addresses 0 - 9998 |
| 10001 - 19999 | Discrete inputs: physical addresses 0 - 9998 |
| 30001 - 39999 | Input registers: physical addresses 0 - 9998 |
| 40001 - 49999 | Holding registers: physical addresses 0 - 9998 |

Six decimal digits:

| | |
|----------------|---|
| 00001 - 065536 | Coils: physical addresses 0 - 65535 |
| 10001 - 165536 | Discrete inputs: physical addresses 0 - 65535 |
| 30001 - 365536 | Input registers: physical addresses 0 - 65535 |
| 40001 - 465536 | Holding registers: physical addresses 0 - 65535 |

Step 3: Determine the interpretation method

Generally, a single-bit value is interpreted as either 0 or 1, and a 16-bit value is interpreted as an integer between 0 and 65535. These are the default interpretations for the four categories, and no extra specification is required.

Some Modbus devices, however, specify that a pair of consecutive 16-bit registers should be combined and the 32-bits be interpreted as an IEEE 754 floating point value instead. To indicate this, the Connect Sensor variable address requires a suffix of either 'f' or 'F':

If the 32-bit value can be represented as DCBA, where D represents the most significant byte of the value, and A represents the least significant byte of the value, two floating point encodings are supported as follows:

| | |
|---|--|
| f | IEEE 754 floating point value with bytes in the following order: B A D C |
| F | IEEE 754 floating point value with bytes in the following order: D C B A |

Examples

- If the device specification defines a simple holding register at physical address 4002, the prefix is 4, the logical address is 4003, and there is no interpretation suffix. The combined logical address is 44003.
- If the device specification defines a coil at physical address 17, the prefix is 0, the logical address is 0018 (zero padded), and there is no interpretation suffix. The combined logical address is 00018.
- If the device specification defines an input register at physical address 7002 that is 32-bit floating point value with bytes presented in D C B A order, the prefix is 3, the logical address is 7003, and the interpretation suffix is 'F'. The combined logical address is 37003F.

Report settings

Use the Device Settings options in Remote Manager to configure Connect Sensor reporting.

When configuring how much data to send and when to send it, use the following options:

- **Read Sensor Every:** How often the device reads sensors (when Connect Sensor is configured to read sensors more than once a day).
 - **Report Sensor Data Every:** How often sensor input values are sent to Remote Manager.
 - **Report Sensor Every N Days:** How often, in days, sensor input values are sent to Remote Manager.
- Important:** Use this setting only when sending reports less than once per day.
- **First Daily Report At HHMM:** When the new day begins and the first report is sent to Remote Manager. See [More about First Daily Report](#).
 - **Send Last:** Number of sensor values per sensor to include in a report sent to Remote Manager. The range is 0 to 65536. When 0 is entered, all buffered data is sent.
- For example, you have four sensors and set **Send Last** to **5**. With these settings, Connect Sensor sends up to 20 sensor values in one report, which includes up to five of the most recent sensor values for each of the four sensors. The actual number of sensor values included in a report depends on how often Connect Sensor wakes and sends a report. If you configure your Connect Sensor to send a report at every wake, then each report will have only one sensor value for each sensor.
- **Send Location Every** and **GPS Enable** are not supported.

Together, these options control how often Connect Sensor captures data, how often data is reported, and how much data is included when it is sent to Remote Manager.

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 sensor input values 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.

More about First Daily Report

Remote Manager's First Daily Report option helps maintain a consistent schedule. When you use this option, it resets scheduled reports to begin from this time each day and sends a report at that time. Use the First Daily Report option to ensure you get reports at the same time intervals that you want each day.

For example, if you configure the device to report every 5 hours and set the First Daily Report option to 60 (60 minutes after midnight UTC), the device reports at the following 5-hour intervals every day: 1:00, 6:00, 11:00, 16:00, and 21:00.

The default setting for First Daily Report is 60, which resets the schedule to 1:00 UTC every day. Setting First Daily Report to 0 resets the schedule to midnight UTC every day.

Configure report settings

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



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

To configure device options:

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

Device Settings

| | | | |
|--------------------------------------|---|--------|----------|
| Read Sensor Every (rdp): | <input type="text" value="720"/> | ▲ ▼ | minutes |
| ? Report Sensor Data Every (sdp): | <input type="text" value="1"/> | ▲ ▼ | reads |
| ? Report Sensor Every N Days (sdpd): | <input type="text" value="0"/> | ▲ ▼ | days |
| ? First Daily Report At HHMM (sst): | <input type="text" value="60"/> | ▲ ▼ | minutes |
| ? Send Last (sdc): | <input type="text" value="144"/> | ▲ ▼ | readings |
| ? Send Location Every (gin): | <input type="text" value="1"/> | ▲ ▼ | reports |
| ? GPS Enable (gps): | <input type="radio"/> On <input checked="" type="radio"/> Off | | |

Notes:

- **Send Location Every** and **GPS Enable** are not supported.
 - Reporting to Remote Manager more than twice a day reduces the battery life.
6. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

About analog and digital input options

Use Remote Manager to:

- Enable each of the analog and digital inputs and configure their options to get sensor data in Remote Manager. For more information, see [Enable and configure analog inputs](#) or [Enable and configure a digital input](#).
- **Alarms:** Configure alarms for each sensor to alert you when there are sudden changes in your industrial environment. For additional information, see [Alarms](#) and [Hysteresis](#).
- **Custom Scaling:** Use custom scaled sensor values to convert raw data into custom units that are meaningful to your application. For additional information, see [Custom scaled sensor values](#).
- **Oversampling:** Configure oversampling to increase the precision of a data sample collected at a scheduled reading by reading multiple samples. For additional information, see [Oversampling](#).

Alarms

Use alarms to send reports to Remote Manager when unusual changes occur in sensor values. Alarm reports are sent when a sensor reaches an alarm value during a sensor reading, even if it is between reporting intervals.

Connect Sensor sends alarm reports as follows:

- **High alarm:** Sends an alarm report when the input value is greater than the high threshold.
- **Low alarm:** Sends an alarm report when the input value is less than the low threshold.
- **Delta high alarm:** Sends an alarm report when the input value increases too much between two consecutive readings.
- **Delta low alarm:** Sends an alarm report when the input value decreases too much between two consecutive readings.
- **Rising edge:** Sends an alarm report when the device wakes on a digital input change from low voltage to high voltage.
- **Falling edge:** Sends an alarm report when the device wakes on a digital input change from high voltage to low voltage.

For example, with high alarms enabled and configured, Connect Sensor is configured to read sensor input values every hour and scheduled to send reports twice every day, at 8:00 and 20:00. An input value suddenly reaches its high threshold at 11:00. When Connect Sensor wakes at 11:00 to take a reading, it sends a high alarm report to Remote Manager.

Alarms are available for the following:

- Analog: 4-20mA Current Loop Input
- Analog: Voltage Input
- Digital: Input
- Digital: Pulse Counter

For Connect Sensor+, alarms are also available for the following:

- Hart protocol: [Enable and configure HART® protocol and a HART® alarm](#)
- Modbus protocol: [Enable and configure the Modbus protocol](#)

Hysteresis

Sensor values may sometimes fluctuate during an alarm condition, which causes Connect Sensor to send multiple alarm reports.

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 sensor input value fluctuations.

For example, a pressure sensor input value increases to the high threshold and the device sends a high alarm report. However, the pressure sensor input value continues to increase and decrease repeatedly between normal and high thresholds during this alarm condition. If you have not set a hysteresis range, the Connect Sensor device sends an alarm report every time the sensor input value reaches the high threshold.

The following are examples of how high and low hysteresis works with a voltage input:

- **High hysteresis:** If your high threshold is 10 volts and your hysteresis value is 2 volts, then your high alarm hysteresis is 8 volts. This means that the alarm turns on when the sensor input value reaches 10 volts and remains on if the sensor input value stays above 8 volts. No additional alarm reports are sent during this alarm condition. The alarm turns off when the sensor input value falls below 8 volts.
- **Low hysteresis:** If your low alarm threshold is 2 volts and the hysteresis value is 3 volts, then your low alarm hysteresis is 5 volts. This means that the alarm turns on when the sensor input value reaches 2 volts and remains on if the sensor input value stays below 5 volts. No additional alarm reports are sent during this alarm condition. The alarm turns off when the sensor input value rises above 5 volts.

Setting the hysteresis threshold to 0 (zero) causes Connect Sensor to send an alarm report every time the sensor input value exceeds a high or low alarm threshold.

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

Custom scaled sensor values

Connect Sensor reads raw sensor values in milliamps (mA), volts, and pulses. Use the Custom Scaled settings in Remote Manager to convert raw values for both analog inputs and the digital pulse counter into meaningful values for your environment, such as when converting 4-20 mA current to liters or pulses to amp hours.

Refer to the sensor's manufacturer specifications for details about conversion rates and calculations.

Analog input examples

In Remote Manager, both the current loop and voltage input settings use the following fields to convert current or volts into meaningful values for your environment.

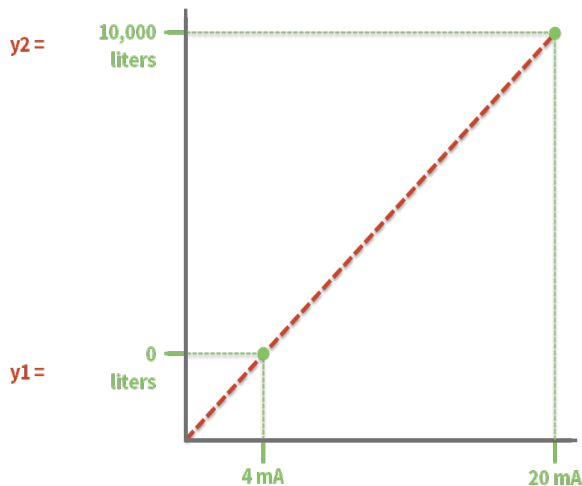
- **Custom Scaled Sample Unit:** Unit of measurement that you are converting to, such as liters, watts, miles per hour, degrees, and so on.
- **Custom Scaled Sample Value (y1):** Point 1 custom value associated as follows:
 - Current loop: 4 mA
 - Voltage: 0 V
- **Custom Scaled Sample Value (y2):** Point 2 custom value associated as follows:
 - Current loop: 20 mA
 - Voltage: 10 V

Use the manufacturer specifications for your sensor to calculate the **y1** and **y2** values.

4-20 mA current loop input example

This example demonstrates how to determine y1 and y2 in liters for a 4-20 mA current loop input. This graph is similar to what you find in sensor manufacturer's specifications.

Note When calculating values, there must be a linear relationship between y1 and y2. If the sensor's measurements are not linear, the calculated values will not be accurate.



The following image shows you enter this information in Remote Manager.

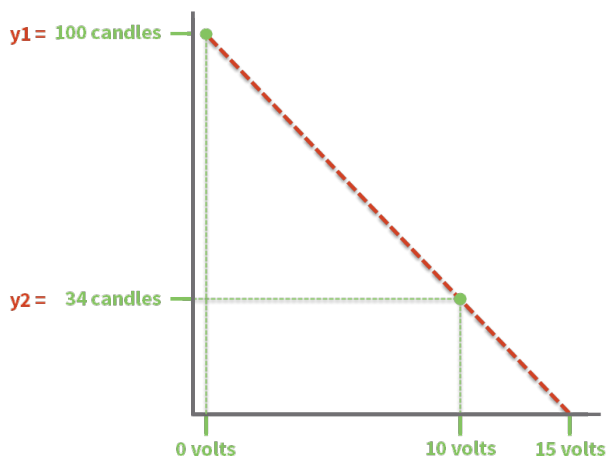
Analog: 4-20mA Current Loop 1

| | |
|-------------------------------------|---|
| Interface Enable (ena): | <input checked="" type="radio"/> On <input type="radio"/> Off |
| High Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? High Threshold (alh): | <input type="text" value="18"/> mA |
| Low Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Low Threshold (all): | <input type="text" value="4"/> mA |
| Delta Low Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Delta Low Threshold (adl): | <input type="text" value="16"/> mA |
| Delta High Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Delta High Threshold (adh): | <input type="text" value="16"/> mA |
| ? Hysteresis (ahy): | <input type="text" value="1"/> mA |
| ? Sensor description (dsc): | <input type="text" value="Water gauge"/> |
| ? Custom Scaled Sample Unit (unit): | <input type="text" value="Liters"/> |
| ? Custom Scaled Sample Value (y1): | <input type="text" value="0"/> |
| ? Custom Scaled Sample Value (y2): | <input type="text" value="10000"/> |

Voltage input example

This example demonstrates how to determine y1 and y2 in candles for a voltage input. This graph is similar to what you find in sensor manufacturer's specifications.

Note When calculating values, there must be a linear relationship between y1 and y2. If the sensor's measurements are not linear, the calculated values will not be accurate.



The following image shows you enter this information in Remote Manager.

Analog: Voltage Input 1

| | |
|-------------------------------------|---|
| Interface Enable (ena): | <input checked="" type="radio"/> On <input type="radio"/> Off |
| High Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? High Threshold (alh): | <input type="text" value="10"/> volts |
| Low Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Low Threshold (all): | <input type="text" value="0"/> volts |
| Delta Low Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Delta Low Threshold (adl): | <input type="text" value="10"/> volts |
| Delta High Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Delta High Threshold (adh): | <input type="text" value="10"/> volts |
| ? Hysteresis (ahy): | <input type="text" value="1"/> volts |
| ? Sensor description (dsc): | <input type="text" value="Light sensor"/> |
| ? Custom Scaled Sample Unit (unit): | <input type="text" value="Candles"/> |
| ? Custom Scaled Sample Value (y1): | <input type="text" value="100"/> |
| ? Custom Scaled Sample Value (y2): | <input type="text" value="34"/> |

Digital pulse counter example

Using pulse counting, Custom Scaling Factor, Custom Scaled Sample Unit, and a time range, the digital pulse counter provides the appropriate measurement for your environment. The following equation shows how pulses are converted:

- *Pulses between reporting intervals x Custom scaling factor (in Custom Scaled Sample Unit) = reported measurement*
- *Pulses between reporting intervals:* Number of pulses between reporting intervals, which is based on report settings in Remote Manager (see [Report settings](#)).
- *Custom scaling factor:* Refer to your sensor's manufacturer specifications for this value.
- *Custom scaled sample unit:* Unit of measurement for your application.
- *Reported measurement:* Reported value in the unit of measurement for your application.

For example, we want to measure rainfall in inches using a rain gauge with a digital pulse counter. The manufacturer specifications for our sensor state that 1 pulse equals 0.011 inches.

We configure Connect Sensor to send reports to Remote Manager every hour. Connect Sensor reads 100 pulses from 11:00 to 12:00.

$$100 \text{ (pulses) during one hour} \times 0.011 \text{ (inches)} = 1.1 \text{ inches}$$

The digital pulse counter device reports a rainfall amount of 1.1 inches between 11:00 and 12:00.

The following image shows how you would enter this example into the Digital: Pulse Counter settings in Remote Manager.

Digital: Pulse Counter

| | |
|-------------------------------------|---|
| Interface Enable (ena): | <input checked="" type="radio"/> On <input type="radio"/> Off |
| High Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? High Threshold (alh): | 500 |
| Low Alarm (aem): | <input type="radio"/> On <input checked="" type="radio"/> Off |
| ? Low Threshold (all): | 0 |
| ? Hysteresis (ahy): | 5 |
| ? Enable pullup (puen): | <input checked="" type="radio"/> On <input type="radio"/> Off |
| ? Sensor description (dsc): | Rain gauge |
| ? Custom Scaled Sample Unit (unit): | Inches |
| ? Custom Scaling Factor (scl): | 0.011 |

Oversampling

The oversampling feature enables you to increase the precision of a data sample collected at a scheduled reading by reading multiple samples. You can specify the number of samples that should be read and the time interval between each reading. You can also specify how the data samples should be manipulated to create the final data sample that is pushed: an average value of all of the samples, the minimum value, or the maximum.

Oversampling can be enabled on all four Analog 4-20mA Current Loop and on all four Analog Voltage inputs.

For example, oversampling is configured to discover the average value of 10 readings taken 70 milliseconds apart. Whenever Connect Sensor needs a value for that sensor, such as on a scheduled wake, it actually reads the sensor 10 times, 70 milliseconds apart, averages those results, and uses the averaged value as the sensor reading.

Note Reading a large number of data samples over a long interval reduces battery life.

View device and sensor data

You can use either Remote Manager or the Digi Connect Wizard mobile app to view device and sensor data.

- [Remote Manager](#): View the most recently reported information and historical details about device or sensor data in a table, graph, or raw data format.
- [Digi Connect Wizard Mobile app](#): View real-time device or sensor data in a table or graph format locally using a Bluetooth-enabled mobile device.

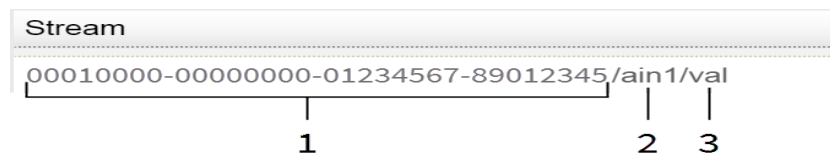
Use Remote Manager to view device and sensor data

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

About data streams

Data streams are individual, detailed device or sensor values that Connect Sensor reports to Remote Manager. For Connect Sensor, data streams include time-stamped information such as milliamps (mA), voltage, custom scaled units, internal temperature, alarms, thresholds, hysteresis, and more. Select a specific data stream to see its current value, as well as historical data.

The Connect Sensor data streams have a group and a corresponding short name. The following image and table provide details about the parts of a data stream.



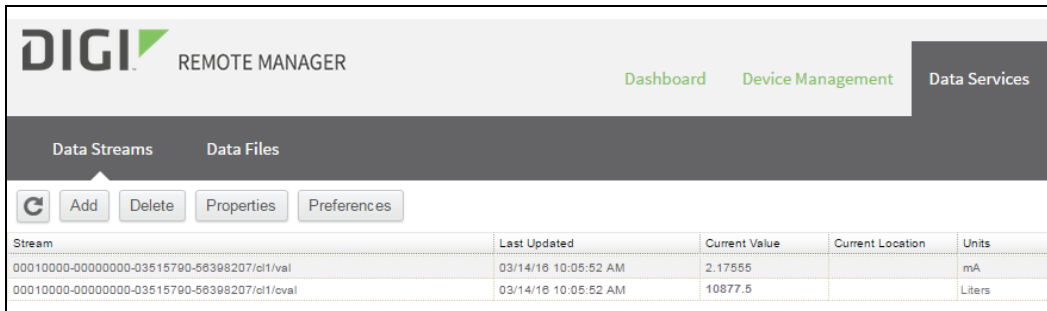
| Item | Name | Description |
|------|--------------------------|--|
| 1 | Connect Sensor device ID | Identifies the device. |
| 2 | Group | Identifies the device-specific function or sensor for the data stream. For example, <i>ain1</i> corresponds to the sensor for Analog: Voltage Input 1. |
| 3 | Short name | Identifies the specific data point. In this example, <i>val</i> is the raw analog voltage input value. |

Data streams for custom scaled values

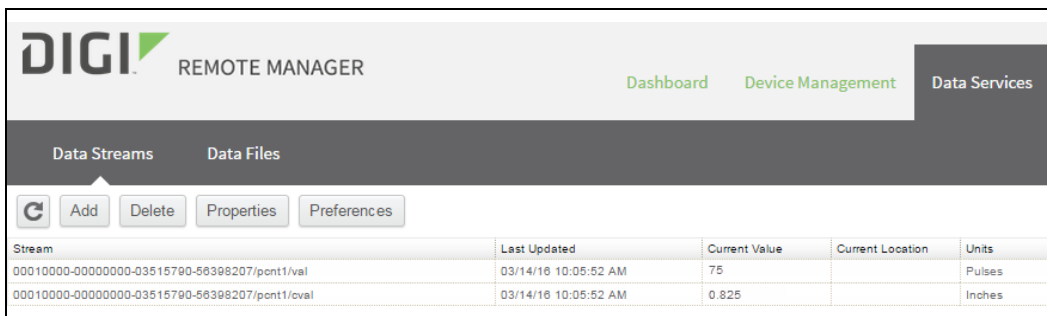
Remote Manager includes two data streams that report input values:

- **val**: Raw measurement in its original value, such as mA, voltage, or pulses.
- **cval**: Calculated measurement in its custom value, such as liters, watts, miles per hour, degrees, and so on. This appears in data streams only when you configure Custom Scaled Sample settings for analog inputs or Custom Scaling Factor for a digital pulse counter.

The following images show how these two data streams appear in Remote Manager:



| Stream | Last Updated | Current Value | Current Location | Units |
|--|----------------------|---------------|------------------|--------|
| 00010000-00000000-03515790-56398207/cl1/val | 03/14/16 10:05:52 AM | 2.17555 | | mA |
| 00010000-00000000-03515790-56398207/cl1/cval | 03/14/16 10:05:52 AM | 10877.5 | | Liters |



| Stream | Last Updated | Current Value | Current Location | Units |
|--|----------------------|---------------|------------------|--------|
| 00010000-00000000-03515790-56398207/pont1/val | 03/14/16 10:05:52 AM | 75 | | Pulses |
| 00010000-00000000-03515790-56398207/pont1/cval | 03/14/16 10:05:52 AM | 0.825 | | Inches |

Additional information

To learn more about:

- Data stream groups and group-specific short names for Connect Sensor, see [Data stream definitions](#).
- General information for Remote Manager data streams, see the [Data Streams](#) section in the [Device Cloud User Guide](#).

View device data streams

To view data for a Connect Sensor device:

1. Sign into [Remote Manager](#), and do one of the following:
 - 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.
2. Click a data stream to see its details.

3. 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 | | Data Files | | | | |
|---|-------------------------|-------------------------|------------------|---------|-----------|------|
| <div style="display: flex; justify-content: space-between; align-items: center;"> ⌂ Add Delete Properties Preferences </div> | | | | | | |
| Stream | Last Updated | Current Value | Current Location | Units | Data Type | Desc |
| 00010000-00000000-03599990-44209062/loc/i | 12/15/15 03:54:51 PM | 1 | | | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/val | 12/15/15 03:45:28 PM | 14.3671875 | | in | DOUBLE | |
| 00010000-00000000-03599990-44209062/loc/i/um | 12/15/15 03:54:51 PM | 0 | | | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/imp | 12/15/15 03:45:28 PM | 24.78027 | | cel | DOUBLE | |
| 00010000-00000000-03599990-44209062/loc/i/hty | 12/15/15 03:54:51 PM | 1 | | | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/ast | 12/15/15 03:54:51 PM | 900 | | min | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/ekd | 12/15/15 03:54:51 PM | | | | STRING | |
| 00010000-00000000-03599990-44209062/loc/i/er | 12/15/15 03:45:28 PM | 1 | | | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/redpd | 12/15/15 03:54:51 PM | 0 | | days | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/redp | 12/15/15 03:54:51 PM | 1 | | min | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/redc | 12/15/15 03:54:51 PM | 1 | | | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/redcs | 12/15/15 03:54:51 PM | 1 | | con | LONG | |
| 00010000-00000000-03599990-44209062/loc/i/tmp | | | | | | |
| Charts | Time | Updated | Location | Quality | Data | |
| Raw Data | 12/31/89 06:02:51.00 PM | 12/15/15 03:54:51.97 PM | | 0 | 24.78027 | |
| | 12/15/15 03:45:02.00 PM | 12/15/15 03:45:28.34 PM | | 0 | 24.78027 | |
| | 12/15/15 03:30:04.00 PM | 12/15/15 03:30:34.72 PM | | 0 | 24.78027 | |
| | 12/15/15 03:26:56.00 PM | 12/15/15 03:27:22.47 PM | | 0 | 24.78027 | |
| | 12/15/15 03:25:02.00 PM | 12/15/15 03:25:28.28 PM | | 0 | 24.29151 | |
| | 12/31/89 06:05:02.00 PM | 12/15/15 03:20:12.29 PM | | 0 | 24.29151 | |
| | 12/15/15 03:12:15.00 PM | 12/15/15 03:12:50.13 PM | | 0 | 24.29151 | |
| | 12/15/15 03:10:46.00 PM | 12/15/15 03:11:10.25 PM | | 0 | 24.29151 | |

Use the mobile app to view sensor data

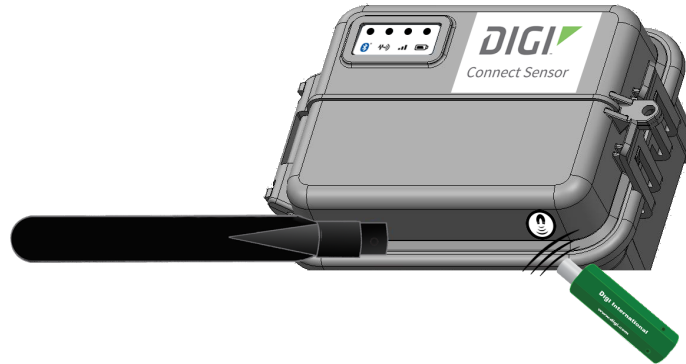
Connect Sensor connects to the Digi Connect Wizard mobile app using Bluetooth Smart (low energy). The Digi Connect Wizard mobile app allows you to view real-time sensor data on a nearby mobile device.

Note When using an Android device, make sure it is running Android 4.4.3 or later.

To install and run the app:

1. Download the Digi Connect Wizard app. 
2. Enable Bluetooth on your device and make sure it is near the Connect Sensor device.
3. Open the app.

4. Wake Connect Sensor by doing one of the following:
 - Open the enclosure and press the **Wake** button.
 - Swipe the magnet across the front of the Connect Sensor.



5. Tap **Read Sensors > Find Devices** to scan for devices.
6. Tap your Connect Sensor to list sensors on the device.
7. Tap a sensor name to see real-time data. Data points load at 5-second intervals.

Connect Sensor goes into sleep mode when you close the app. If you keep the app open, Connect Sensor remains awake and takes sensor readings. The device goes into sleep mode after 60 minutes. Keeping the app open for long periods of time can reduce battery life.

Connect Sensor device settings

You can view or change Connect Sensor settings using Remote Manager or the CLI.

Note The Connect Sensor battery can operate 2 to 3 years when you follow standard operating conditions. Changes to Remote Manager settings can affect battery life. For more information on standard operating conditions, see [Battery life](#).

For more information about Remote Manager, visit www.digi.com/products/cloud/digi-remote-manager.

Configure cellular options

You configured necessary cellular settings during the initial Connect Sensor 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 [Configure the cellular connection](#). 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 Sensor 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. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:

- i. Select **Immediate**.
- ii. Select the **Schedule Offline** check box.
- iii. Click **Schedule**.
- Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Configure Remote Manager settings

Remote Manager settings options for Connect Sensor 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 Sensor 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. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Configure the battery life alarm

Use the Global Alarm Settings option to set the battery life percentage that triggers Connect Sensor to send an alarm report to Remote Manager. For details about this option, see [Global Alarm Settings option definitions](#).

To configure global alarm options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Global Alarm Settings**.
6. Enter a battery life percentage.
7. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Configure internal temperature settings

The Connect Sensor internal temperature is included as a report in Remote Manager data streams. Configure internal temperature alarms so that Connect Sensor sends alarm reports for high temperatures, low temperatures, and unusual temperature changes. For details about these options, see [Internal Temperature option definitions](#).



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

To configure global alarm options:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Internal Temperature**.
6. Select **On** for **Interface Enable** to turn on this option.
7. Enter appropriate values for each option. Threshold and hysteresis values are in Celsius.
8. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

Configure local interface settings

Enable or disable the CLI or Bluetooth for Connect Sensor through the Local Interface Settings option. For details about these options, see [Local Interface Settings option definitions](#).

Note Digi recommends that you keep the local interface settings enabled.

To configure local interface settings:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices** tab.
3. Double-click the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Local Interface Settings**.
6. Enable or disable the options.
7. Enter a value for the Bluetooth device name.
8. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

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

View device information

You can view current information about the device, such as battery percentage, connection history, mobile and cellular connection details, UTC time, and firmware versions.

Use one of the following methods to view device information:

- **Remote Manager:** Device information is available in the System Information menu. For more information, see [Use Remote Manager to view device information](#)
- **CLI:** Connect to the device using the CLI to view device information. For more information, see [Use the CLI to view device information](#).

Use Remote Manager to view device information

The battery percentage, connection history, mobile and cellular connection details, UTC time, and firmware versions are available in the System Information menu in Remote Manager. This information is available from the last time Connect Sensor reported to Remote Manager.

To view system information:

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices**.
3. Double-click the Connect Sensor you want to review.
4. Click **System Information > UTC Time** to verify the time and date of the last report. The system information was current at that time and date.
5. Select a system detail in the **System Information** node to see additional information.
 - a. Click **System Information > Battery Percentage** to view the percentage of battery power remaining. If the remaining percentage is low, you should change the battery. For instructions, see [Battery replacement](#).
 - b. Click **System Information > Mobile Information** to view information about the Connect Sensor device and the firmware, such as the cellular signal strength.
 - c. Click **System Information > Version** to view the version of the firmware installed on the Connect Sensor.

Use the CLI to view device information

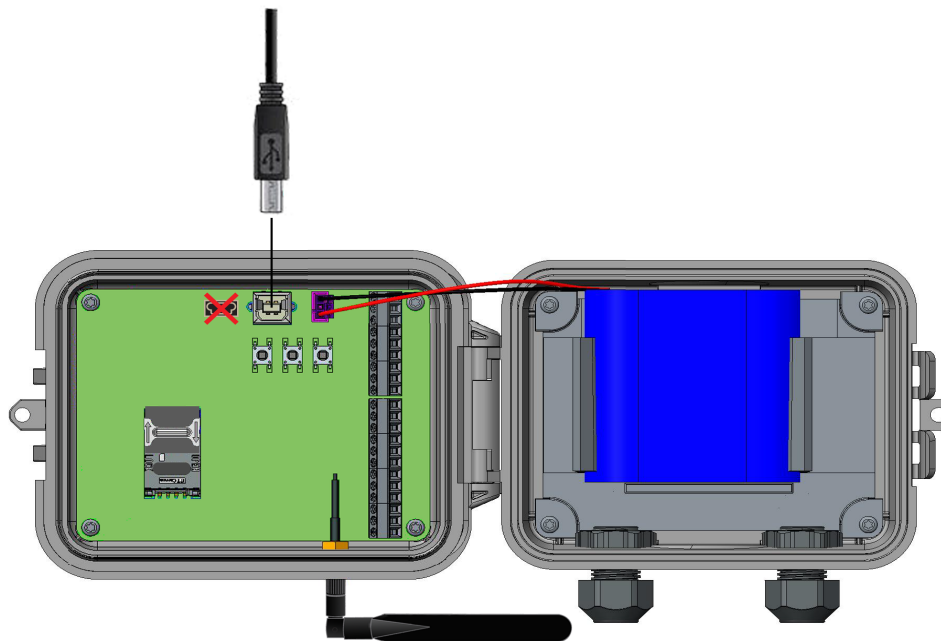
Use the CLI to view status information for your device.

1. Connect to your device using the CLI :
 - a. Open the enclosure and make sure the battery is connected and the SIM card is installed.
 - b. 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 Sensor to a computer using a USB cable. Digi

recommends drivers available at <http://www.ftdichip.com/Drivers/VCP.htm>.



- c. Open a terminal program on a computer and connect to Connect Sensor using the following configuration:
 - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor
 - **Baud rate or bits per second:** 115200
 - **Data:** 8 bit
 - **Parity:** None
 - **Stop:** 1 bit
 - **Flow control:** None
2. Press the **Wake** button and wait 5-10 seconds after the cellular LED starts blinking.
3. Type **status** at the command prompt to view additional information about the device; for details, see [CLI commands](#).

Connect Sensor maintenance

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 Sensor 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 Sensor firmware. Using this method, the firmware is updated the next time the device connects to Remote Manager.

1. Go to www.digi.com/support to download the Connect Sensor firmware file.
2. Sign in to Remote Manager at remotemanager.digi.com.
3. Click **Device Management > Devices** tab.
4. Right-click the Connect Sensor 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 Sensor in the list of devices.
 - b. Verify the firmware version in the **Firmware Level** column is correct for your device.

Update firmware from Connect Sensor

If you need to update the firmware before a scheduled push from Connect Sensor, you can physically wake Connect Sensor to force a connection between Connect Sensor and Remote Manager.

1. Schedule the firmware upgrade for the device in Remote Manager. For instructions, see [Update the firmware using Remote Manager](#).
2. When the upload is complete, go to the Connect Sensor device.
3. Use a magnet to wake the Connect Sensor. This forces a connection between Connect Sensor and Remote Manager.
4. The device wakes up, connect to Remote Manager, and the firmware upload occurs.

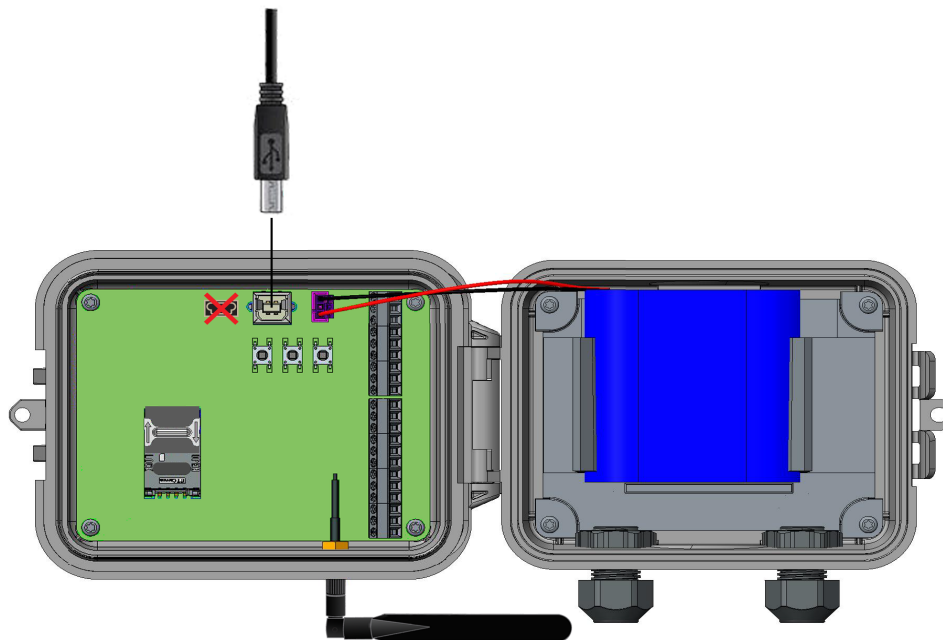
Update the firmware using the CLI

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

1. Download the Connect Sensor firmware file.
 - a. Go to the [Connect Sensor](#) 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.

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

4. You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Sensor to a computer using a USB cable. Digi recommends drivers available at <http://www.ftdichip.com/Drivers/VCP.htm>.



Open a terminal program on a computer and connect to Connect Sensor using the following configuration:

- **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor
 - **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](#).

Safety information

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

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



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

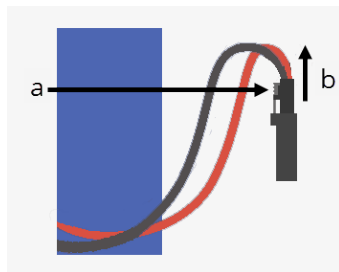
- To avoid the risk of the battery falling into a protected area, do not assemble the device in the installation area.
- Move the device to a non-hazardous and unclassified area before opening the enclosure and connecting the hardware.
- Always use the designated battery, model number 76000912, from Digi International Inc.
- Allow only a trained technician to replace the lithium thionyl chloride batteries used in Connect Sensor.
- 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.

Replace the battery

Make sure you follow the guidelines in [Safety information](#) when replacing the battery in a Connect Sensor device.

To replace the Connect Sensor battery:

1. Open the enclosure.
2. To 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.

Troubleshoot Connect Sensor

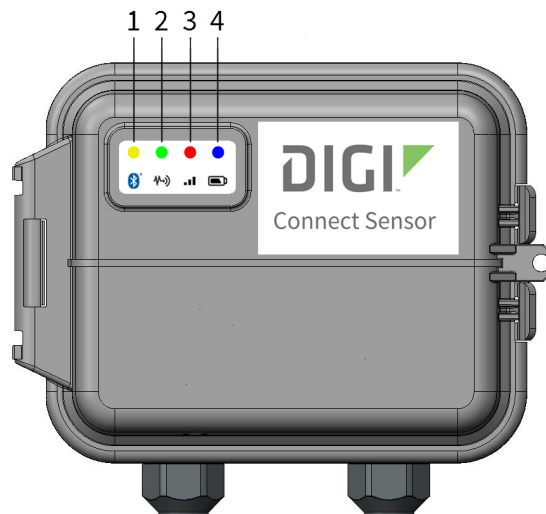
This section provides troubleshooting information and resources for a Connect Sensor device. You need physical access to the device to perform the procedures in this section.

Digi International provides the following additional online resources:

- Knowledge Base: www.digi.com/support/kbase
- Support forum: www.digi.com/support/forum
- Support request: www.digi.com/support

Connect Sensor LEDs for troubleshooting

Use the Connect Sensor four LEDs when troubleshooting the device. These LEDs have specific behaviors that provide information for Bluetooth connection, sensor activity, cellular connection, and battery life. If Connect Sensor is powered and all LEDs are off, it is in sleep mode.



| Item | LED | Description |
|------|----------------|---|
| 1 | Bluetooth | Indicator light for Bluetooth communication: <ul style="list-style-type: none"> ■ Yellow blinking: Bluetooth is on and Connect Sensor is discoverable |
| 2 | Sensor reading | Indicator light for the sensor(s): <ul style="list-style-type: none"> ■ Green blinking: One or more sensors are reading the environment |
| 3 | Cellular | Indicator light for the cellular network connection: <ul style="list-style-type: none"> ■ Solid purple: Connect Sensor is waking ■ Red blinking: Searching for the cellular network ■ Blue: <ul style="list-style-type: none"> • Blinking: Connected to the cellular network and attempting to communicate with Remote Manager • Solid light: Successfully sent data to Remote Manager; turns off after a few seconds |
| 4 | Battery | Indicator light for battery function: <ul style="list-style-type: none"> ■ Solid purple: Connect Sensor is waking The following patterns are based on the Global Alarm > Battery Life setting in Remote Manager: <ul style="list-style-type: none"> ■ Red blinking: Indicates battery life is less than or equal to the Battery Life alarm ■ Blue blinking: Indicates battery life is greater than the Battery Life alarm |

Device not responding

Try the following procedures when your Connect Sensor is not responding, such as when the LEDs do not light up after pressing the Wake button. You need physical access to the device to complete the steps.

Check the battery

The battery may be disconnected or no longer working. Try the following:

- Make sure the battery wires are firmly connected to the Battery port.
- Connect a different battery to the device, if you have an additional battery.

Reset the device

This procedure forces the device to restart and retain its configuration.

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

Restore factory defaults to the device

This procedure removes all configuration changes and returns the device to its factory default settings. Use this procedure when the device is still not responding after pressing the Reset button.

1. With the Connect Sensor enclosure open, press and hold the **Factory** button for at least 3 seconds until the LEDs flash purple. The device is reset to its factory defaults.
2. Reconfigure Connect Sensor to work with your sensors and environment.

Device not connected to the cellular network

When Connect Sensor cannot connect to the cellular network, use the following troubleshooting steps. You need physical access to the device to complete the steps.

- [Basic cellular connection troubleshooting](#): You can resolve most cellular connection issues using these steps.
- [Advanced cellular connection troubleshooting](#): If the device is still cannot connect to the cellular network, get the network connection status from the device and contact [Digi Technical Support](#).

Basic cellular connection troubleshooting

The following basic troubleshooting steps resolve most cellular connection issues for a Connect Sensor. You need physical access to the device to complete the steps.

Verify SIM configuration

1. Verify the following for your device:
 - a. Make sure the SIM card is inserted correctly into the SIM tray; see [Assemble Connect Sensor](#).
 - b. Make sure you are using the correct APN and that the PIN, user name, and password are configured, if required; see [Configure the cellular connection](#).
2. Contact your cellular service provider to make sure your SIM card is activated and assigned to a contract.

Check cellular antenna

- Make sure the cellular antenna is securely installed on the device and is not damaged.
- Verify that the antenna installed on the device matches the available network. For example, a 3G antenna may not work as expected when installed on an LTE-only device.

Verify cellular network coverage

Work with your cellular service provider to make sure there is adequate network coverage for the device installation area. If possible, do one of the following:

- Move the device to an area with adequate cellular network coverage
- Use a cabled antenna to move the antenna to get a better signal without moving the device.
- [Use Remote Manager to view device information](#)
- [Verify cellular network coverage using the CLI](#)

Check battery life

Older batteries may not have enough power to connect to the cellular network and you may need to replace the battery. If Connect Sensor has been deployed for some time, check the battery life. This can be done from Remote Manager or by using the CLI.

- [Use Remote Manager to view device information](#)
- [Verify battery life using the CLI](#)

Advanced cellular network troubleshooting

If the basic troubleshooting steps did not resolve the network connection issue, use the CLI to get the status of your device and contact [Digi Technical Support](#).

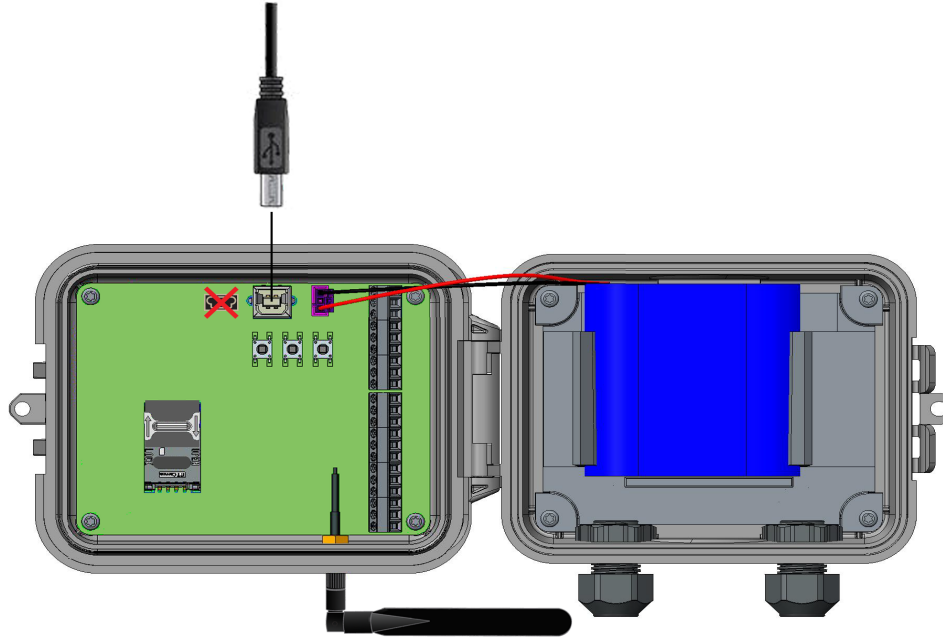
To get basic network connection status information from Connect Sensor:

1. Connect to your device using the CLI :
 - a. Open the enclosure and make sure the battery is connected and the SIM card is installed.
 - b. 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 Sensor to a computer using a USB cable. Digi

recommends drivers available at <http://www.ftdichip.com/Drivers/VCP.htm>.



- c. Open a terminal program on a computer and connect to Connect Sensor using the following configuration:
 - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor
 - **Baud rate or bits per second:** 115200
 - **Data:** 8 bit
 - **Parity:** None
 - **Stop:** 1 bit
 - **Flow control:** None
2. Press the **Wake** button and wait until 5-10 seconds after the cellular LED starts blinking.
3. Type **status** at the command prompt to view additional information about the device; for details, see [CLI commands](#).

Device does not connect to Remote Manager

The Connect Sensor may be connected to the cellular network but does not show a connection in Remote Manager. In this case, the cellular LED light blinks blue.

Follow this procedure if your Connect Sensor does not connect to Remote Manager.

1. Get the correct 15-digit device IMEI number on the Connect Sensor label.
2. Go to remotemanager.digi.com and sign in with your user name and password.

3. Verify that the 15-digit device IMEI number on the Connect Sensor label is the same as the **Device ID** in Remote Manager.
4. Add your device to Remote Manager if the numbers do not match:
 - a. Click **Device Management > Devices**.
 - b. Click **Add Devices**. The Add Devices dialog appears. You cannot use the Discover button to discover devices automatically because the devices are not available on the local network.
 - c. From the **Add Devices** drop-down menu, select **IMEI**, and enter the number.
 - d. Click **Add** to add the device.
 - e. Click **OK** to close the Add Devices dialog. The device appears in the Device Management list.
 - f. 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.

Device does not appear in the mobile app

Try the following if your Connect Sensor does not appear in the mobile app. You need physical access to the device to complete the steps.

Verify Bluetooth connectivity

Note the following:

- Bluetooth is on only when you manually wake Connect Sensor.
- Bluetooth is not on during report or read intervals.

First, verify the following Bluetooth settings.

1. Ensure that Bluetooth is enabled on your Connect Sensor:
 - a. Sign in to remotemanager.digi.com.
 - b. Click **Device Management > Devices** tab.
 - c. Right-click your Connect Sensor.
 - d. Click **Configuration > Local Interface Settings**.
 - e. Verify that **Bluetooth Enable** is **On**.
2. Verify that your mobile device supports Bluetooth Smart (low energy) and is within range of Connect Sensor.
3. Manually wake Connect Sensor.
4. Try the mobile app again; see [Use the mobile app to view sensor data](#).

Reset the device

If your Connect Sensor still does not appear in the mobile app after verifying Bluetooth settings, try resetting the device.

1. Open Connect Sensor enclosure.
2. Press and release the **Reset** button.
3. Try the mobile app again; see [Use the mobile app to view sensor data](#).

Remote Manager option definitions for Connect Sensor

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

Analog Current Loop Input and Voltage Input option definitions

The following table provides Remote Manager definitions for Connect Sensor Analog: 4-20mA Current Loop and Analog: Voltage Input options. For additional information about using these options, see [Enable and configure analog inputs](#).

| Option | Description | Range | Default |
|----------------------|---|--|--|
| Interface Enable | Enables or disables the analog input source. | On/Off | Off |
| High Alarm | Enables or disables high alarm reports for the analog input source. | On/Off | Off |
| High Threshold | Specifies the input value that generates a high alarm report when High Alarm is On . | <ul style="list-style-type: none"> ■ Current loop: 0.0-25.0 (mA) ■ Voltage: 0.0 - 30.0 (volts) | Current loop: 20.0 mA Voltage: 10.0 volts |
| Low Alarm | Enables or disables low alarm reports for the analog input source. | On/Off | Off |
| Low Threshold | Specifies the input value that generates a low alarm report when Low Alarm is On , in the following units: Current Loop inputs — mA Voltage inputs — volts | <ul style="list-style-type: none"> ■ Current loop: 0.0-25.0 (mA) ■ Voltage: 0.0 - 30.0 (volts) | Current loop: 4.0 mA Voltage: 0.0 volts |
| Delta Low Alarm | Enables or disables delta low alarm reports for the analog input source. | On/Off | Off |
| Delta Low Threshold | Specifies the input value that generates a delta low alarm report when Delta Low Alarm is On . | <ul style="list-style-type: none"> ■ Current loop: 0.0-25.0 (mA) ■ Voltage: 0.0 - 30.0 (volts) | Current loop: 16.0 mA Voltage: 10.0 volts |
| Delta High Alarm | Enables or disables delta high alarm reports for the analog input source. | On/Off | Off |
| Delta High Threshold | Specifies the input value that generates a delta high alarm report when Delta High Alarm is On . | <ul style="list-style-type: none"> ■ Current loop: 0.0-25.0 (mA) ■ Voltage: 0.0 - 30.0 (volts) | Current loop: 16.0 mA Voltage: 10.0 volts |

| Option | Description | Range | Default |
|---------------------------------------|---|--|--|
| Hysteresis | Specifies the input value to keep an alarm on or shut off an alarm during high and low alarm states. 0 — hysteresis is off 1 or more — hysteresis is on and managing alarms | <ul style="list-style-type: none"> ■ Current loop: 0.0-25.0 (mA) ■ Voltage: 0.0 - 30.0 (volts) | Current loop: 1.0 mA Voltage: 1.0 volts |
| Sensor description | Specifies description of the sensor for this input source. | Text | Empty |
| Custom Scaled Sample Unit | Specifies the unit of measurement this analog input is using for the custom scaled sensor values. | Text | Empty |
| Custom Scaled Sample Value (y1) | Specifies the first data point associated with the following raw value: Current Loop inputs — 4 mA Voltage inputs — 0 volts | Number | 0 |
| Custom Scaled Sample Value (y2) | Specifies the second data point associated with the following raw value: Current Loop inputs — 20 mA Voltage inputs — 10 volts | Number | 0 |
| Oversampling (ovs) | Enables or disables oversampling. The feature is enabled when you specify how the readings should be manipulated: <ul style="list-style-type: none"> ■ Average: An average of all of the readings taken. This is the recommended option. ■ Minimum: The minimum value of all of the readings taken. ■ Maximum: The maximum value of all of the readings taken. | Off Average Minimum Maximum | Off |
| Oversampling inter-sample Delay (ovi) | The time interval at which a sample is taken. | 0 - 5000 milliseconds | 50 |

| Option | Description | Range | Default |
|--|---|---------|---------|
| Oversampling Number Samples (ovn) | The number of samples that should be taken. | 2 - 100 | 10 |

Analog Power, Digital Power, and Serial Output option definitions

The following table provides Remote Manager definitions for Connect Sensor Analog: Power Output and Digital: Power Output options. For details about setting these options, see:

- [Enable and configure analog power outputs](#)
- [Enable and configure a digital power output](#)
- [Enable and configure a serial power output](#)

| Option | Description | Range | Default |
|---------------------|--|--|-----------|
| Power Output Enable | Enables or disables the power output source. | On/Off | Off |
| Output Level | Specifies the voltage level output for the analog power source. | <ul style="list-style-type: none"> ■ 3.3 volts ■ 5 volts ■ 15 volts ■ 24 volts | 3.3 volts |
| Read Delay | Specifies the time in seconds that the sensor voltage is enabled before Connect Sensor reads its value. This allows the sensor to stabilize to get an accurate reading. Note A higher read delay keeps the device powered on longer, which reduces battery life. | 0-120 seconds | 0 |

Cellular option definitions

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

| Option | Description | Value |
|-------------|--|--|
| Server Name | Specifies the URL that connects your device to Remote Manager. This setting is configured by default. Note Do not make changes to this setting without help from Digi Technical Support. | my.devicecloud.com |
| SSL Enable | Enables SSL encryption for data sent from Connect Sensor to Remote Manager. Note Enabling SSL encryption significantly increases cellular data usage. | On: Enabled Off: Disabled (default) |

| Option | Description | Value |
|-----------------|---|----------------------|
| NTP Server Name | <p>Network Time Protocol (NTP) server name that synchronizes Connect Sensor time with Coordinated Universal Time (UTC). This setting is configured by default.</p> <hr/> <p>Note Do not make changes to this setting without help from Digi Technical Support.</p> <hr/> | time.devicecloud.com |

Device (report) option definitions

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

| Option | Description | Range | Default |
|--------------------------|--|---|------------------------|
| Read Sensor Every | Specifies in number of minutes how often Connect Sensor wakes to read the enabled sensors. Use this option when the device is configured to read sensors more than once a day. | 5 minutes to 1440 minutes (24 hours) | 720 minutes (12 hours) |
| Report Sensor Data Every | Specifies in number of scheduled wake cycles when the device sends sensor data to Remote Manager. | 1 to 288 readings | 1 |
| Read Sensor Every N Days | Specifies in number of days how often sensor input values are sent to Remote Manager. Use this option when configuring Connect Sensor to report less than once per day. Set this option to 0 when Connect Sensor reports more than once per day. | <p>0 to 31 days</p> <hr/> <p>Note Digi recommends configuring Connect Sensor to report at least once per week.</p> <hr/> | 0 days |

| Option | Description | Range | Default |
|---------------------------------|---|---------------------|---------|
| First Daily Report At HHMM | Specifies the number of minutes after midnight UTC to use as the beginning of the new day (resets the schedule) and to send the first daily report. Examples: <ul style="list-style-type: none"> 0 minutes = midnight UTC 60 minutes = 1 hour after midnight UTC 360 minutes = 6 hours after midnight UTC | 0 to 1439 (minutes) | 60 |
| Send Last | Specifies how many sensor values are included in each report to Remote Manager. If set to 0, all buffered data is sent. Example: 5 = sends up to the five most recent sensor values for each sensor | 0 to 65536 readings | |
| Send Location Every | This option will be available in a future release of Connect Sensor. | N/A | N/A |
| GPS Enable | This option will be available in a future release of Connect Sensor. | N/A | N/A |
| Buffer Sensor Data Before Alarm | Defines the number of seconds of sampled data collected before an alarm occurred that should be saved and pushed after an alarm occurs. This field is available only if the CSENSE Continuous Monitoring firmware has been uploaded to the device. | 0 to 300 | 5 |
| Buffer Sensor Data After Alarm | Defines the number of seconds of sampled data collected after an alarm occurred that should be saved and pushed after an alarm occurs. This field is available only if the CSENSE Continuous Monitoring firmware has been uploaded to the device. | 0 to 300 | 10 |

Digital Input option definitions

The following table provides Remote Manager definitions for Connect Sensor Digital: Input options. For details about setting these options, see [Enable and configure a digital input](#).

| Option | Description | Range | Default |
|--------------------|---|--------|---------|
| Interface Enable | Enables or disables the digital input source. | On/Off | Off |
| High Alarm | Enables or disables high alarm reports for the digital input source. When enabled, sends an alarm report when the pin is high. | On/Off | Off |
| Low Alarm | Enables or disables low alarm reports for the digital input source. When enabled, sends an alarm report when the pin is low. | On/Off | Off |
| Delta Low Alarm | Enables or disables delta low alarm reports for the digital input source. When enabled, sends an alarm report for a falling transition. | On/Off | Off |
| Delta High Alarm | Enables or disables delta high alarm reports for the digital input source. When enabled, sends an alarm report for a rising transition. | On/Off | Off |
| Rising Edge Wake | Enables or disables the device to monitor a digital input during sleep mode. When enabled, wakes the device when the digital input changes from low voltage to high voltage (rising edge) and reports the value to Remote Manager with the other sensor and device data. | On/Off | Off |
| Falling Edge Wake | Enables or disables the device to monitor a digital input during sleep mode. When enabled, wakes the device when the digital input changes from high voltage to low voltage (falling edge) and reports the value to Remote Manager with the other sensor and device data. | On/Off | Off |
| Enable pullup | Enables or disables the internal pull-up resistor to drive a logic level voltage. For example, use this to drive a logic voltage across a mechanical switch to read the value (open or closed) of the mechanical switch. | On/Off | Off |
| Sensor description | Specifies description of the sensor for this input source. | Text | Empty |

Digital Output option definitions

The following table provides Remote Manager definitions for Connect Sensor Digital: Output options. For details about setting these options, see [Enable and configure a digital output](#).

| Option | Description | Range | Default |
|--------------------|--|---|------------|
| Interface Enable | Enables or disables the digital output source. | On/Off | Off |
| Output Level | Sets the open collector digital output as follows: <ul style="list-style-type: none"> ■ High output: If the internal pull-up is enabled, the line is pulled up to 3.3 volts. If the internal pull-up is not enabled and there is no external pull-up, the line is high impedance. ■ Low output: The output is shorted to ground. | Low output/ High output | Low output |
| Toggle Output on | Controls the level of the DOUT signal when an alarm condition occurs. A default DOUT state can be selected and then configured to toggle when a specified level alarm is detected on the specified analog input. The signal remains in the toggled state until the alarm condition is cleared, including any alarm level hysteresis. For more information, see Toggle digital output on alarm . | High or low alarm on one analog input, either voltage input or current loop | None |
| Enable pullup | Enables or disables the internal pull-up resistor to drive a logic level voltage. | On/Off | Off |
| Sensor description | Specifies description of the sensor for this output source. | Text | Empty |

Toggle digital output on alarm

You can use the **Toggle Output on** field in the **Digital Output** page to control the level of the DOUT signal when an alarm condition occurs. A default DOUT state can be selected and then configured to toggle when a specified level alarm is detected on the specified analog input. The signal remains in the toggled state until the alarm condition is cleared, including any alarm level hysteresis.

You can toggle the digital output in response to only one level alarm on one analog input (either a voltage input or a current loop).

For example, if the DOUT is ON during normal operation and an alarm occurs, the DOUT toggles to OFF. When the alarm condition is cleared, the DOUT toggles back to ON.

To configure this option:

- An alarm option must be selected from the **Toggle Output on** field in the **Digital Output** settings page. Options are available for low or high alarms on an analog input 1, 2, 3, or 4. Only one alarm can be selected. An analog input alarm can be enabled on either a voltage input or a current loop.
- Alarm conditions for the selected alarm type must be configured for the corresponding analog input.

Note Alarms are only evaluated as sensors are read, and the interval between readings can be significant, even with a device using Continuous Monitoring firmware. Note that a reading may be delayed if the device is communicating with the Digi Remote Manager. For this reason, this feature should not be used when safety is critical.

Digital Pulse Counter option definitions

The following table provides Remote Manager definitions for Connect Sensor Digital: Pulse Counter options. For additional information about using these options, see [Enable and configure a digital pulse counter](#).

| Option | Description | Range | Default |
|---------------------------|--|--------|---------|
| Interface Enable | Enables or disables the digital input source. | On/Off | Off |
| High Alarm | Enables or disables high alarm reports for the digital pulse counter. | On/Off | Off |
| High Threshold | Specifies the number of pulses that generates a high alarm report when High Alarm is On . | Number | 0 |
| Low Alarm | Enables or disables low alarm reports for the digital pulse counter source. | On/Off | Off |
| Low Threshold | Specifies the number of pulses that generates a low alarm report when Low Alarm is On . | Number | 0 |
| Hysteresis | Specifies when to keep an alarm on or shut off an alarm during high and low alarm states. 0 — hysteresis is off 1 or more — hysteresis is on and managing alarms | Number | 0 |
| Enable pullup | Enables or disables the internal pull-up resistor to drive a logic level voltage. | On/Off | Off |
| Sensor description | Specifies description of the sensor for the pulse counter. | Text | Empty |
| Custom Scaled Sample Unit | Specifies the unit of measurement the pulse counter uses for the custom scaled sensor values. | Text | Empty |
| Custom Scaling Factor | Specifies the number used to convert each pulse into the custom scaled sample unit. For example, if one pulse equals 0.011 inches, you would enter 0.011 in this field. | Number | 0 |

Global Alarm Settings option definitions

The following table provides Remote Manager global alarm options for Connect Sensor. For additional information about using these options, see [Configure the battery life alarm](#).

| Option | Description | Range | Default |
|--------------|--|-------|---------|
| Battery Life | Specifies the battery life percentage that generates a low battery alarm report. | 1-100 | 50 |

HART Protocol Settings option definitions

Note The HART protocol is available only with Connect Sensor+ hardware.

The following table provides Remote Manager definitions for Connect Sensor HART protocol options. For details about setting these options, see [Enable and configure HART® protocol and a HART® alarm](#).

| Option | Description | Range | Default |
|--------------------------|--|--------|---------|
| Protocol enable | Enables or disables the HART protocol. | On/Off | Off |
| Device Status Alarm Mask | Determines whether error information should be pushed immediately. | On/Off | Off |

Internal Temperature option definitions

The following table provides Remote Manager internal temperature monitoring options for Connect Sensor. For additional information about using these options, see [Configure internal temperature settings](#).



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

| Option | Description | Range | Default |
|------------------|--|-------------|---------|
| Interface Enable | Enables or disables the internal temperature sensor. | On/Off | Off |
| High Alarm | Enables or disables high alarm reports for the internal temperature value. | On/Off | Off |
| High Threshold | Specifies the internal temperature in degrees Celsius that generates a high alarm report when High Alarm is On . | -100 to 100 | 50.0 |
| Low Alarm | Enables or disables low alarm reports for the internal temperature value. | On/Off | Off |
| Low Threshold | Specifies the internal temperature in degrees Celsius that generates a low alarm report when Low Alarm is On . | -100 to 100 | 0 |
| Hysteresis | Specifies the degrees in Celsius to keep an alarm on or shut off an alarm during high and low alarm states. 0 — Hysteresis is off 1 or more — Hysteresis is on and managing alarms | 0 to 100 | 5.0 |

Local Interface Settings option definitions

The following table provides Remote Manager CLI and Bluetooth options for Connect Sensor. For additional information about using these options, see [Configure local interface settings](#).

| Option | Description | Range | Default |
|-----------------------|---|--------|---------|
| CLI Enable | Enables or disables the command line interface (CLI) for local changes to the device. | On/Off | On |
| Bluetooth Enable | Enables or disables the Bluetooth interface used to communicate with other devices. | On/Off | On |
| Bluetooth Device Name | Specifies the name of the Connect Sensor that appears in a list of available Bluetooth devices when pairing with a nearby device. | Text | Empty |

Modbus Protocol Settings option definitions

Note The Modbus protocol is available only with Connect Sensor+ hardware.

The following table provides Remote Manager definitions for Connect Sensor Modbus protocol options. For details about setting these options, see [Enable and configure the Modbus protocol](#).

| Option | Description | Range | Default |
|--------------------------|---|--------------|---------|
| Protocol enable | Enables or disables the Modbus protocol. | On/Off | Off |
| Device Status Alarm Mask | Determines whether error information should be pushed immediately when an alarm occurs. | On/Off | Off |
| Serial framing mode | The transmission mode. | RTU ASCII | RTU |

| Option | Description | Range | Default |
|--------------------------|--|--|---------|
| Serial baud bits | The baud rate. | 600 - 230400 (fixed values within this range) | 19200 |
| Serial data bits | The number of data bits that can be sent in a packet. | 7 8 | 8 |
| Serial stop bits | The bit that marks the end of a unit transition. | 1 2 | 1 |
| Serial parity | The check bit for detecting an error in transmission. | none odd even | none |
| Station 1: Slave Address | A station address configured for the sensor. When the value is set to 0, this station is skipped. | 0 - 247 | 0 |
| Station 1: Variable List | List of variable addresses on the specified station that you want to monitor. The items in the list must be separated by a comma without spaces. The list is limited to 63 characters, which allows for 8 to 10 variables in a list. | 63 characters | blank |
| Station 2: Slave Address | A station address configured for the sensor. When the value is set to 0, this station is skipped. | 0 - 247 | 0 |
| Station 2: Variable List | List of variable addresses on the specified station that you want to monitor. The items in the list must be separated by a comma without spaces. The list is limited to 63 characters, which allows for 8 to 10 variables in a list. | 63 characters | blank |
| Station 3: Slave Address | A station address configured for the sensor. When the value is set to 0, this station is skipped. | 0 - 247 | 0 |

| Option | Description | Range | Default |
|--------------------------|--|---------------|---------|
| Station 3: Variable List | List of variable addresses on the specified station that you want to monitor. The items in the list must be separated by a comma without spaces. The list is limited to 63 characters, which allows for 8 to 10 variables in a list. | 63 characters | blank |
| Station 4: Slave Address | A station address configured for the sensor. When the value is set to 0, this station is skipped. | 0 - 247 | 0 |
| Station 4: Variable List | List of variable addresses on the specified station that you want to monitor. The items in the list must be separated by a comma without spaces. The list is limited to 63 characters, which allows for 8 to 10 variables in a list. | 63 characters | blank |

Data stream definitions

The following sections provide Remote Manager data streams descriptions for Connect Sensor. For additional information about using data streams to analyze Connect Sensor data, see [Use Remote Manager to view device and sensor data](#).

Group definitions for Connect Sensor data streams

The following table provides data stream group definitions for Connect Sensor. For additional information about using data streams to analyze Connect Sensor data, see [About data streams](#).

| Group | Description |
|------------------------|--|
| ain | Data streams for analog voltage input sources 1 - 4, identified as follows: ain1 — Analog: Voltage Input 1 ain2 — Analog: Voltage Input 2 ain3 — Analog: Voltage Input 3 ain4 — Analog: Voltage Input 4 |
| avout | Data streams for analog power output sources 1 - 4, identified as follows: avout1 — Analog: Power Output 1 avout2 — Analog: Power Output 2 avout3 — Analog: Power Output 3 avout4 — Analog: Power Output 4 |
| cl | Data streams for analog current loop input sources 1 - 4, identified as follows: cl1 — Analog: 4-20mA Current Loop 1 cl2 — Analog: 4-20mA Current Loop 2 cl3 — Analog: 4-20mA Current Loop 3 cl4 — Analog: 4-20mA Current Loop 4 |
| din1 | Data stream for the Digital: Input source |
| dout1 | Data stream for the Digital: Output source |
| dvout1 | Data stream for the Digital: Power Output source |
| pcnt1 | Data stream for the Digital: Pulse Counter source |
| temp1 | Data stream for the Internal Temperature sensor |

| Group | Description |
|-------|--|
| ts1 | Data stream for the following Connect Sensor device-specific settings: Cellular Settings Device Cloud Settings Device Settings Global Alarm Settings System Information |
| ui | Data stream for Local Interface Settings options |

Connect Sensor device-specific (ts1 and ui) data stream definitions

The following table provides data streams definitions for the Connect Sensor device (ts1 and ui). For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|------------------------|---|
| abt | Alarm battery | Battery Life threshold setting; for example, 75 (percent). |
| apn | APN | Access point name for the cellular network your device uses. |
| bat | Battery level | Estimated percentage of battery life remaining. |
| bte | Bluetooth enable | Bluetooth module enabled or disabled: 0 — Bluetooth off 1 — Bluetooth on |
| btn | Bluetooth display name | Name of the Connect Sensor that appears in a list of available Bluetooth devices when pairing with a nearby device. For example, H2O gauge . |
| cli | CLI enable | Command line interface enabled or disabled for local device changes: 0 — CLI off 1 — CLI on |
| dwt | Device wake reason | Reason the device woke up: 2 — Normal reading or report 3 — Alarm reading or report 8 — Wakeup report |
| fwv | Firmware version | Firmware version on the device; for example, 2.0.1.19. |
| isn | Cloud server name | Server address that Connect Sensor uses to connect to Remote Manager. |
| nsn | NTP server name | NTP server address used to remotely synchronize time on the device. |

| Short name | Long name | Description |
|------------|-------------------------|---|
| rdp | Read period (minutes) | Number of minutes between wake cycles for sensor readings. |
| rsi | RSSI | Signal strength of the cellular connection. |
| sdc | Send count | Maximum number of readings sent during one report. |
| sdp | Send interval | Number of scheduled wake cycles for sensor readings between each report. |
| sdpd | Read period (days) | Number of days between readings. When using sdpd, the device follows the First Daily Report At HHMM (sst) setting. |
| ssl | TLS/SSL data encryption | TLS/SSL data encryption for the Connect Sensor connection to Remote Manager: 0 — TLS/SSL data encryption off 1 — TLS/SSL data encryption on |
| sst | Send start time | Number of minutes after midnight UTC that the new day begins and the first report of the day is sent. |

Analog input (ain and cl) data stream definitions

The following table provides data stream definitions for both the voltage analog input (ain) and the current loop analog input (cl) groups for Connect Sensor.

For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|-------------------|--|
| adh | Alarm delta high | Delta High threshold setting. ain (1- 4) — volts cl (1 - 4) — mA |
| adl | Alarm delta low | Delta Low threshold setting. ain (1- 4) — volts cl (1 - 4) — mA |
| 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) 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 15. |

| Short name | Long name | Description |
|------------|----------------------|---|
| ahy | Alarm hysteresis | Hysteresis setting. Examples: ain (1- 4) — 1.0 (volts) cl (1 - 4) — 1.0 (mA) |
| alh | Alarm high | High Threshold setting. Examples: ain (1- 4) — 8 (volts) cl (1 - 4) — 14 (mA) |
| all | Alarm low | Low Threshold setting. Examples: ain (1- 4) — 2 (volts) cl (1 - 4) — 6 (mA) |
| arm | Alarm reason mask | Alarms that are active during the report; the value in the data stream equals the sum of the active alarms: 1 — Alarm high active (alh) 2 — Alarm low active (all) 4 — Alarm delta low active (adl) 8 — Alarm delta high active (adh) For example, if the Alarm high and Alarm low are active during the report, the arm data stream value is 3. |
| cval | Custom value | Value calculated from the raw value (val) and custom scaled unit values for y1 and y2 (described in this table). |
| dsc | Description | Description of the sensor. |
| ena | Sensor enable | Sensor enabled or disabled: 0 — Sensor off 1 — Sensor on |
| unit | Custom unit string | Unit for the custom value (cval). |
| val | Raw value | Measured analog voltage or current loop input. |
| y1 | Custom unit, point 1 | Custom value associated with the following raw value: ain (1 - 4) — 0 volts cl (1 - 4) — 4 mA |
| y2 | Custom unit, point 2 | Custom value associated with the following raw value: ain (1 - 4) — 10 volts cl (1 - 4) — 20 mA |

Analog (avout), digital (dvout1), and serial power output data stream definitions

The following table provides data stream definitions for the analog power output (avout 1 - 4), digital power output (dvout1), and serial power output groups for Connect Sensor.

For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|-----------------------|---|
| ena | Voltage output status | Voltage output enabled or disabled: 0 – Output off 1 – Output on |
| out | Voltage output level | Level of voltage output: 0 – 3.3 volts 1 – 5 volts 2 – 15 volts 3 – 24 volts |
| rdl | Read delay | Time in seconds that the sensor voltage is enabled before Connect Sensor reads its value. This allows the sensor to stabilize to get an accurate reading. |

Digital input (din1) data stream definitions

The following table provides data stream definitions for the digital input (din1) group for Connect Sensor.

For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|-------------------|--|
| 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) 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 15. |
| arm | Alarm reason mask | Alarms that are active during the report; the value in the data stream equals the sum of the active alarms: 1 – Alarm high active (alh) 2 – Alarm low active (all) 4 – Alarm delta low active (adl) 8 – Alarm delta high active (adh) For example, if the Alarm high and Alarm low are active during the report, the arm data stream value is 3. |
| dsc | Description | Identifies the user-configured description of the sensor. |
| ena | Sensor enable | Sensor enabled or disabled: 0 – Sensor off 1 – Sensor on |

| Short name | Long name | Description |
|------------|------------------|--|
| puen | Pull-up enable | Pull-up resistor to 3.3 volts enabled or disabled: 0 – Pull-up disabled 1 – Pull-up enabled |
| wem | Wake enable mask | Wake enabled when the digital input signal changes; the value in the data stream equals the sum of the enabled values: 1 – Wake on a rising edge of the input 2 – Wake on a falling edge of the input For example, to wake on any edge, the wem data stream value is 3. |

Digital output (dout1) data stream definitions

The following table provides data stream definitions for the digital output (dout1) group for Connect Sensor.

For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|----------------------|---|
| dsc | Description | Identifies the user-configured description of the sensor. |
| ena | Sensor enable | Sensor enabled or disabled: 0 – Sensor off 1 – Sensor on |
| out | Digital output value | Digital output on or off: 0 – Digital output at low voltage 1 – Digital output at high voltage |
| puen | Pull-up enable | Pull-up resistor to 3.3 volts enabled or disabled: 0 – Pull-up disabled 1 – Pull-up enabled |
| tog | Toggle Output on | Toggle digital output on alarm: 0 – Disabled 1 – Analog 1 High Alarm 2 – Analog 1 Low Alarm 3 – Analog 2 High Alarm 4 – Analog 2 Low Alarm 5 – Analog 3 High Alarm 6 – Analog 3 Low Alarm 7 – Analog 4 High Alarm 8 – Analog 4 Low Alarm |

Digital pulse counter (pcnt1) data stream definitions

The following table provides data stream definitions for the digital pulse counter (pcnt1) group for Connect Sensor.

For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|-----------------------------|--|
| 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) For example, if you have the Alarm high and Alarm low enabled, the aem data stream value is 3. |
| ahy | Alarm hysteresis | Hysteresis setting; for example, 2 (pulses). |
| alh | Alarm high | High Threshold setting; for example, 4000 (pulses). |
| all | Alarm low | Low Threshold setting; for example 50 (pulses). |
| arm | Alarm reason mask | Alarms that are active during the report; the value in the data stream equals the sum of the active alarms: 1 — Alarm high active (alh) 2 — Alarm low active (all) For example, if the Alarm high and Alarm low are active during the report, the arm data stream value is 3. |
| cval | Custom value | Value calculated from the raw value (val). |
| dsc | Description | Identifies the user-configured description of the sensor. |
| ena | Sensor enable | Sensor enabled or disabled: 0 — Sensor off 1 — Sensor on |
| puen | Pull-up enable | Pull-up resistor to 3.3 volts enabled or disabled: 0 — Pull-up disabled 1 — Pull-up enabled |
| scl | Custom value scaling factor | Scaling factor used to calculate the custom value (cval) from the raw value (val). |
| unit | Custom unit string | Identifies the user-configured unit for the custom value (cval). |
| val | Raw value | Number of pulses since the last reading. |

Temperature sensor (temp1) data stream definitions

The following table provides data stream definitions for the temperature sensor (temp1) group for Connect Sensor.



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

For additional information about data streams, refer to the following:

- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description |
|------------|-------------------|--|
| 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) For example, if you have the Alarm high and Alarm low enabled, the aem data stream value is 3. |
| ahy | Alarm hysteresis | Hysteresis setting; for example, 2.0 (Celsius). |
| alh | Alarm high | High Threshold setting; for example, 50.0 (Celsius). |
| all | Alarm low | Low Threshold setting; for example -30.0 (Celsius). |
| arm | Alarm reason mask | Alarms that are active during the report; the value in the data stream equals the sum of the active alarms: 1 – Alarm high active (alh) 2 – Alarm low active (all) For example, if the Alarm high and Alarm low are active during the report, the arm data stream value is 3. |
| ena | Sensor enable | Sensor enabled or disabled: 0 – Sensor off 1 – Sensor on |
| val | Raw value | Measured temperature. |

HART (hart1) data stream definitions

The following table provides data stream definitions for the HART protocol.

Note The HART protocol is available only with Connect Sensor+ hardware.

For additional information about data streams, refer to the following:

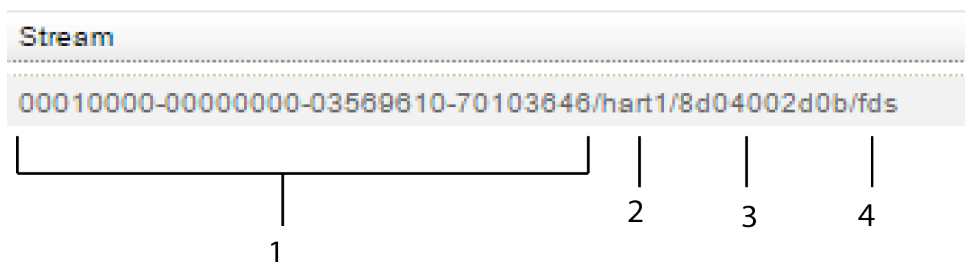
- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

| Short name | Long name | Description | | | | | | | | | | | | | | |
|------------|---|---|----------|-------------|------|----------------------|------|---------------------------|------|-------------------------|------|----------------------|------|-----------------------|------|---|
| ads | Additional status | An Additional Status message is collected if the field device status indicates that more status information is available. | | | | | | | | | | | | | | |
| aem | Alarm enable mask | HART alarm enabled or disabled: 0 — HART alarm disabled 64 — HART alarm enabled | | | | | | | | | | | | | | |
| coms | Communication status | <p>A Communication Status message is sent only when a protocol-level error is detected during a HART sensor read. The Communication Status value is a bit mask. Bits include:</p> <table border="1"> <thead> <tr> <th>Bit Mask</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x02</td> <td>Buffer overflow</td> </tr> <tr> <td>0x08</td> <td>Longitudinal parity error</td> </tr> <tr> <td>0x10</td> <td>Framing error</td> </tr> <tr> <td>0x20</td> <td>Overrun error</td> </tr> <tr> <td>0x40</td> <td>Vertical parity error</td> </tr> <tr> <td>0x80</td> <td>Always set, as it indicates a communication error</td> </tr> </tbody> </table> | Bit Mask | Description | 0x02 | Buffer overflow | 0x08 | Longitudinal parity error | 0x10 | Framing error | 0x20 | Overrun error | 0x40 | Vertical parity error | 0x80 | Always set, as it indicates a communication error |
| Bit Mask | Description | | | | | | | | | | | | | | | |
| 0x02 | Buffer overflow | | | | | | | | | | | | | | | |
| 0x08 | Longitudinal parity error | | | | | | | | | | | | | | | |
| 0x10 | Framing error | | | | | | | | | | | | | | | |
| 0x20 | Overrun error | | | | | | | | | | | | | | | |
| 0x40 | Vertical parity error | | | | | | | | | | | | | | | |
| 0x80 | Always set, as it indicates a communication error | | | | | | | | | | | | | | | |
| derr | Digi error | A Digi error is sent when Connect Sensor has a problem communicating with the sensor. | | | | | | | | | | | | | | |
| drev | Device revision level | The sensor device revision level. | | | | | | | | | | | | | | |
| eds | Extended device status | <p>An Extended Device Status message is collected if the HART device makes it available during command processing.</p> <p>The Extended Device Status value is a bit mask. Bits include:</p> <table border="1"> <thead> <tr> <th>Bit Mask</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x01</td> <td>Maintenance required</td> </tr> <tr> <td>0x02</td> <td>Device variable alert</td> </tr> <tr> <td>0x04</td> <td>Critical power failures</td> </tr> <tr> <td>0x10</td> <td>Out of specification</td> </tr> <tr> <td>0x20</td> <td>Function check</td> </tr> </tbody> </table> | Bit Mask | Description | 0x01 | Maintenance required | 0x02 | Device variable alert | 0x04 | Critical power failures | 0x10 | Out of specification | 0x20 | Function check | | |
| Bit Mask | Description | | | | | | | | | | | | | | | |
| 0x01 | Maintenance required | | | | | | | | | | | | | | | |
| 0x02 | Device variable alert | | | | | | | | | | | | | | | |
| 0x04 | Critical power failures | | | | | | | | | | | | | | | |
| 0x10 | Out of specification | | | | | | | | | | | | | | | |
| 0x20 | Function check | | | | | | | | | | | | | | | |
| ena | HART protocol enable | HART protocol enabled or disabled: 0 — HART protocol disabled 1 — HART protocol enabled | | | | | | | | | | | | | | |

| Short name | Long name | Description | | | | | | | | | | | | | | | | | | |
|------------|------------------------------------|--|----------|-------------|------|--------------------------------|------|------------------------------------|------|------------------------|------|--------------------|------|-----------------------|------|------------|------|-----------------------|------|--------------------|
| fds | Field device status | <p>A Field Device Status message is accumulated during every HART sensor read.</p> <p>The Field Device Status value is a bit mask. Bits include:</p> <table border="1"> <thead> <tr> <th>Bit Mask</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x01</td> <td>Primary variable out of limits</td> </tr> <tr> <td>0x02</td> <td>Non-primary variable out of limits</td> </tr> <tr> <td>0x04</td> <td>Loop current saturated</td> </tr> <tr> <td>0x08</td> <td>Loop current fixed</td> </tr> <tr> <td>0x10</td> <td>More status available</td> </tr> <tr> <td>0x20</td> <td>Cold start</td> </tr> <tr> <td>0x40</td> <td>Configuration changed</td> </tr> <tr> <td>0x80</td> <td>Device malfunction</td> </tr> </tbody> </table> | Bit Mask | Description | 0x01 | Primary variable out of limits | 0x02 | Non-primary variable out of limits | 0x04 | Loop current saturated | 0x08 | Loop current fixed | 0x10 | More status available | 0x20 | Cold start | 0x40 | Configuration changed | 0x80 | Device malfunction |
| Bit Mask | Description | | | | | | | | | | | | | | | | | | | |
| 0x01 | Primary variable out of limits | | | | | | | | | | | | | | | | | | | |
| 0x02 | Non-primary variable out of limits | | | | | | | | | | | | | | | | | | | |
| 0x04 | Loop current saturated | | | | | | | | | | | | | | | | | | | |
| 0x08 | Loop current fixed | | | | | | | | | | | | | | | | | | | |
| 0x10 | More status available | | | | | | | | | | | | | | | | | | | |
| 0x20 | Cold start | | | | | | | | | | | | | | | | | | | |
| 0x40 | Configuration changed | | | | | | | | | | | | | | | | | | | |
| 0x80 | Device malfunction | | | | | | | | | | | | | | | | | | | |
| hwrev | Hardware revision level | The sensor device hardware revision level. | | | | | | | | | | | | | | | | | | |
| rev | Revision number | HART major protocol revision number. | | | | | | | | | | | | | | | | | | |
| swrev | Software revision level | The sensor device software revision level. | | | | | | | | | | | | | | | | | | |
| type | Device type value | 16-bit expanded device type value read by the dynamic device discovery. | | | | | | | | | | | | | | | | | | |

| Short name | Long name | Description | | | | | | | | | | | | |
|------------------|---|--|------------------|-------------|--------|---|--------|--|--------|--|--------|---|--------|---|
| val | Dynamic variable | Supported elements with data are pushed to Remote Manager as they are read. The names of the dynamic variables are derived from the associated HART 7 specification names. <table border="1" data-bbox="732 447 1419 1167"> <thead> <tr> <th>Dynamic variable</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>lc/val</td> <td>Loop current as a floating point value in mA.</td> </tr> <tr> <td>pv/val</td> <td>Primary variable value as a floating point number. The units in the data point are derived from information returned by the HART device.</td> </tr> <tr> <td>sv/val</td> <td>Secondary variable value as a floating point number. The units in the data point are derived from information returned by the HART device.</td> </tr> <tr> <td>tv/val</td> <td>Tertiary variable value as a floating point number. The units in the data point are derived from information returned by the HART device.</td> </tr> <tr> <td>qv/val</td> <td>Quaternary variable value as a floating point number. The units in the data point are derived from information returned by the HART device.</td> </tr> </tbody> </table> | Dynamic variable | Description | lc/val | Loop current as a floating point value in mA. | pv/val | Primary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | sv/val | Secondary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | tv/val | Tertiary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | qv/val | Quaternary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. |
| Dynamic variable | Description | | | | | | | | | | | | | |
| lc/val | Loop current as a floating point value in mA. | | | | | | | | | | | | | |
| pv/val | Primary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | | | | | | | | | | | | | |
| sv/val | Secondary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | | | | | | | | | | | | | |
| tv/val | Tertiary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | | | | | | | | | | | | | |
| qv/val | Quaternary variable value as a floating point number. The units in the data point are derived from information returned by the HART device. | | | | | | | | | | | | | |

Data streams for HART protocol



| Item | Name | Description |
|------|--------------------------|---|
| 1 | Connect Sensor device ID | Identifies the device. |
| 2 | Group | Identifies the device-specific function or sensor for the data stream. For example, <i>hart1</i> corresponds to the sensor for a device with HART protocol on Analog 4-20mA Current Loop 1. |

| Item | Name | Description |
|------|---------------------|---|
| 3 | HART device address | Identifies the HART device address that is discovered during device detection. |
| 4 | Short name | Identifies the specific data point. In this example, <i>fds</i> is the Field Device Status. |

Modbus (modb1) data stream definitions

The following table provides data stream definitions for the Modbus protocol.

Note The Modbus protocol is available only with Connect Sensor+ hardware.

For additional information about data streams, refer to the following:

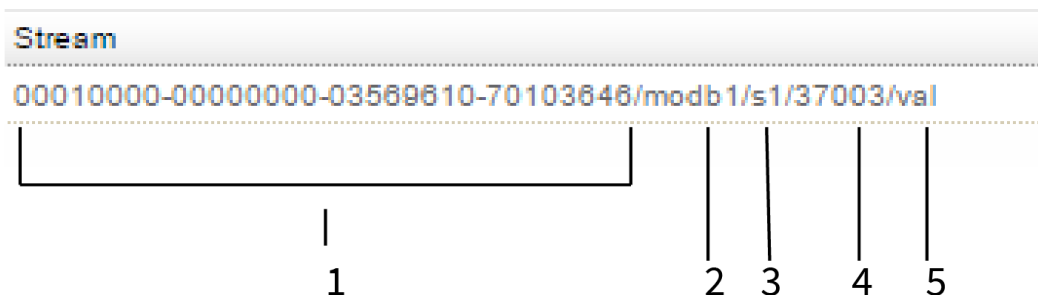
- Use data streams to analyze Connect Sensor data, see [About data streams](#).
- Data streams group definitions, see [Group definitions for Connect Sensor data streams](#).

Some data stream information pushed to Remote Manager includes the Modbus device address identified during device detection. For examples, see [About data streams](#).

| Short name | Long name | Description |
|------------|---------------------------------|--|
| aem | Alarm enable mask | Modbus alarm enabled or disabled: 0 — Modbus alarm disabled 1 — Modbus alarm enabled |
| baud | Baud rate | The baud rate. Value can be 600 - 230400. |
| dbt | Data bits | The number of data bits that can be sent in a packet: <ul style="list-style-type: none"> ■ 7 ■ 8 |
| ena | Modbus protocol enable | Modbus protocol enabled or disabled: 0 — Modbus protocol disabled 1 — Modbus protocol enabled |
| err | Error response status value | Error values: 1 - Illegal function 2 - Illegal data address 3 - Illegal data value 4 - Device failure 128 - Timeout |
| mode | Modbus serial transmission mode | Specifies the Modbus serial transmission mode: <ul style="list-style-type: none"> ■ rtu ■ ascii |

| Short name | Long name | Description |
|------------|------------------------------------|--|
| par | Parity | The check bit for detecting an error in transmission: <ul style="list-style-type: none"> ■ none ■ odd ■ even |
| saddr<1-4> | Modbus station addresses | The station address number that is configured for the Modbus sensor device. |
| sbt | Stop bit | The bit that marks the end of a unit transition. <ul style="list-style-type: none"> ■ 1 ■ 2 |
| val | Variable that returns a value | Coils and discrete inputs will be 0 or 1. Input and holding registers will be 16-bit unsigned integer values, or signed floating point values, depending on configuration. |
| vars<1-4> | Corresponding Modbus variable list | Comma-separated list of variable addresses. |

Data streams for Modbus protocol



| Item | Name | Description |
|------|--------------------------|---|
| 1 | Connect Sensor device ID | Identifies the device. |
| 2 | Group | Identifies the device-specific function or sensor for the data stream. For example, <i>modb1</i> corresponds to the sensor for a device with Modbus protocol enabled. |
| 3 | Modbus station address | Identifies the station address that is being monitored. |
| 4 | Modbus variable address | Identifies the variable address that is being monitored at the specified station address. |
| 5 | Short name | Identifies the specific data point. In this example, <i>val</i> is the value that is returned. |

Using the CLI

If you have physical access to Connect Sensor, you can use the CLI to perform firmware update and verify Connect Sensor status information.

The CLI commands that you can use are discussed in [CLI commands](#).

The sections below explain how to connect to the Connect Sensor and perform some standard functions.

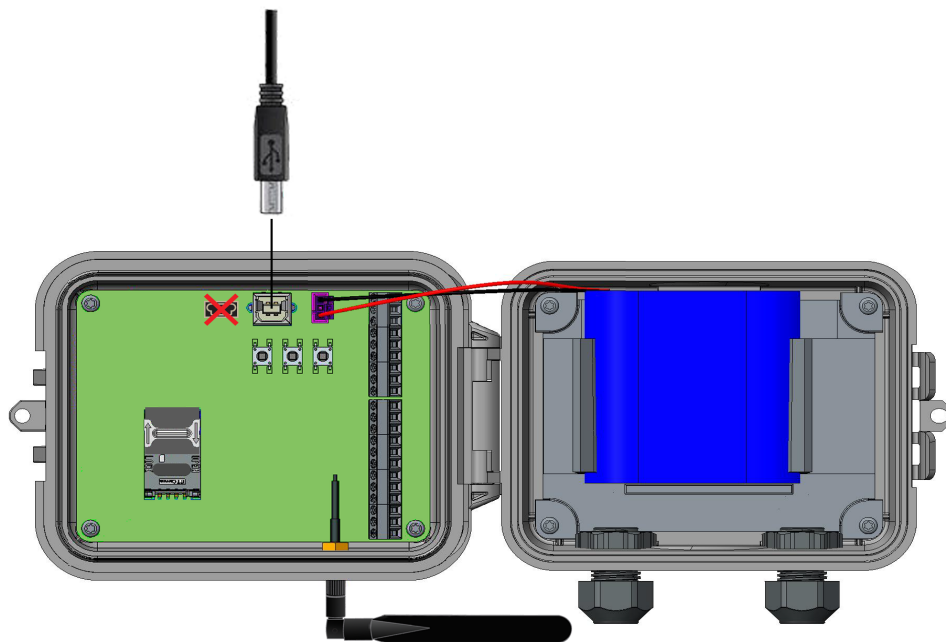
- [Update the firmware using the CLI](#)
- [Use the CLI to view device information](#)
- [Verify cellular network coverage using the CLI](#)
- [Verify battery life using the CLI](#)

Verify cellular network coverage using the CLI

If you have physical access to Connect Sensor, you can use the CLI to verify the cellular signal strength using CLI status command.

1. On your laptop, go to www.digi.com/support to download the Connect Sensor 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. You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Sensor to a computer using a USB cable. Digi recommends drivers available at <http://www.ftdichip.com/Drivers/VCP.htm>.

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



4. Press the **Wake** button. The command prompt appears in the terminal program window.
5. At the command prompt, type **status**.
6. Press **Enter**. The status information appears. Note that cellular network information is available only when the modem has connected to the cellular network. You may have to type **status** multiple times while the modem connects before the desired status information is available.
7. Verify the cellular signal strength in the **Signal strength** option. For more details about all of the options, see [status](#).

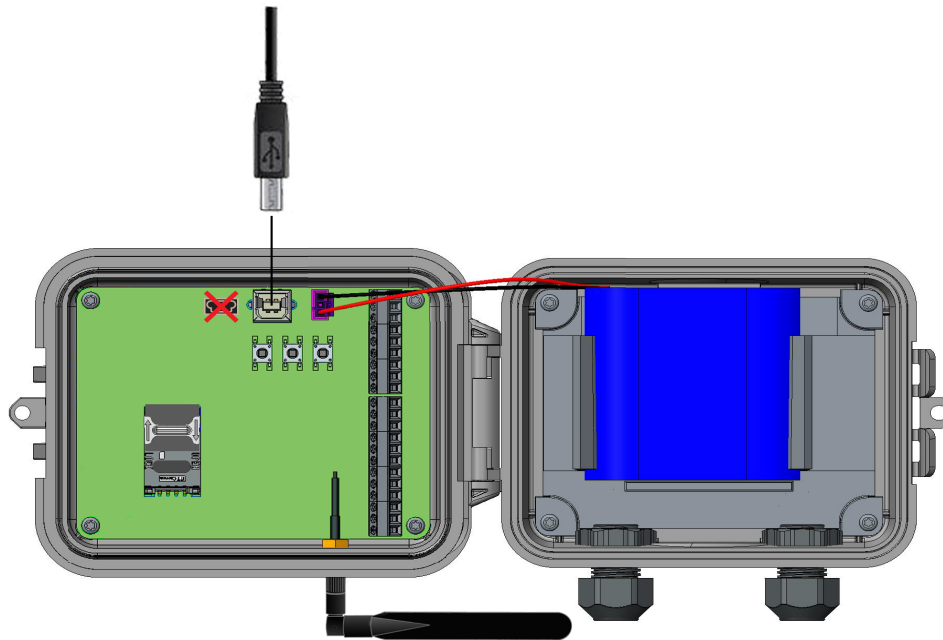
Verify battery life using the CLI

Older batteries may not have enough power to connect to the cellular network and you may need to replace the battery. If Connect Sensor has been deployed awhile, check the battery life. This can be done using the CLI.

1. Access the Connect Sensor. Open the enclosure and make sure the battery is connected.
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.

3. You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Sensor to a computer using a USB cable. Digi recommends drivers available at <http://www.ftdichip.com/Drivers/VCP.htm>.



4. Open a terminal program on a computer and connect to Connect Sensor using the following configuration:
 - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor
 - **Baud rate or bits per second:** 115200
 - **Data:** 8 bit
 - **Parity:** None
 - **Stop:** 1 bit
 - **Flow control:** None
5. Press the **Wake** button and wait 5-10 seconds after the cellular LED starts blinking.
6. Type **status** at the command prompt.
7. Find the **Battery Life** field to see how much battery life remains. For details, see [CLI commands](#).
8. If the remaining percentage is low, you should change the battery. For instructions, see [Battery replacement](#).

CLI commands

The following sections provide all of the available CLI commands for configuring Connect Sensor and viewing status information.

| | |
|----------------|-----|
| fwupdate | 111 |
| status | 111 |
| set | 112 |

fwupdate

Use

Type **fwupdate** at the command prompt to update the device firmware.

Options

Make sure the terminal program is able to transfer YMODEM files.

status

Use

Type **status** at the command prompt to display device information.

The status information represents a snapshot in time, and is updated each time you type the **status** command. The Connect Sensor device modem must be connected to the cellular network to be able to capture and display cellular information for the Connect Sensor. The modem is "awake" for a short amount of time and then automatically disconnects from the network.

You may have to type the **status** command a few times to make sure you have a complete set of device status information. This may take between 45 and 60 seconds, depending on how long it takes for the modem to connect. Before and after the modem is connected, only status information about the Connect Sensor hardware displays.

Connect Sensor device options

The following information about the Connect Sensor device hardware always displays.

| Option | Description |
|------------------|--|
| Device Type | Name and version of the device hardware |
| Device ID | ID number for the Connect Sensor device |
| Firmware Version | Version of the device's current firmware |
| UTC Time | Last reported date and time |
| Battery Life | Amount of battery life remaining. |

Connect Sensor modem and cellular connection options

The following information displays when the modem is connecting or has connected. These fields display depending on the status of the modem connection to the cellular network.

| Option | Description |
|-------------------------|---|
| Mobile support software | Version of the mobile software |
| Device type | Cellular network type the device connects to. |

| Option | Description |
|---------------------|---|
| Manufacturer | Cellular modem manufacturer. |
| Model | Cellular modem model number. |
| Modem revision | Modem firmware version. |
| Serial number | Modem serial number. |
| Provider | Cellular provider. |
| Phone number | Phone number registered to the activated SIM card. |
| SIM IMSI | Unique user identifier for the cellular network. |
| SIM ICCID | SIM serial number. |
| SIM PIN status | State of the SIM card. |
| Signal strength | Strength of the cellular signal. |
| Signal quality | Quality of the cellular signal. This measures signal interference. |
| Connection state | Cellular connection state. |
| Connection duration | Amount of time the cellular modem was connected during last wake cycle. |
| Disconnect reason | Cause of the cellular modem disconnection during last wake cycle. |
| Connections | Number of cellular connection attempts since power up. |
| Connection errors | Number of failed connections since power up. |
| User disconnects | Number of normal disconnections since power up. |
| Monitoring errors | Number of cellular modem errors since power up. |
| Device resets | Number of times cellular modem was reset to recover from errors since power up. |

set

Use

Type **set** and additional commands at the command prompt to configure device and sensor settings.

Options

See the commands in the following sections.

Analog input CLI commands

Use **set**, the sensor identifier, and the commands in the following table to configure sensor options with the CLI. For example, type **set ain1 ena=on** at the command prompt to enable the analog voltage input 1 interface.

Sensor identifiers:

- Analog voltage input 1: **ain1**
- Analog voltage input 2: **ain2**
- Analog voltage input 3: **ain3**
- Analog voltage input 4: **ain4**
- Analog 4-20 mA current loop 1: **cl1**
- Analog 4-20 mA current loop 2: **cl2**
- Analog 4-20 mA current loop 3: **cl3**
- Analog 4-20 mA current loop 4: **cl4**

Analog current loop and voltage input CLI commands:

| Option | CLI command | Description | Value options | Default |
|-----------------|-------------|--|---|---------|
| Input interface | ena | Enables or disables the analog input source. | <ul style="list-style-type: none"> ■ on ■ off | off |

| Option | CLI command | Description | Value options | Default |
|----------------------|-------------|--|---|---|
| Alarms | aem | Enables or disables alarm reports for the analog input sources. When enabled, sends an alarm report in one of the following conditions: <ul style="list-style-type: none"> High alarm Low alarm Delta high alarm Delta low alarm | <ul style="list-style-type: none"> hi lo dh dl Enable multiple alarms using a comma separated command without spaces (such as set ain1 aem=hi,lo,dh,dl) | Empty (all alarms disabled) |
| High threshold | alh | Specifies the input value that generates a high alarm report when the high alarm is enabled. | <ul style="list-style-type: none"> Current loop: 0.0-25.0 (mA) Voltage: 0.0 - 30.0 (volts) | <ul style="list-style-type: none"> Current loop: 20.0 Voltage: 10.0 |
| Low threshold | all | Specifies the input value that generates a low alarm report when the low alarm is enabled. | <ul style="list-style-type: none"> Current loop: 0.0-25.0 (mA) Voltage: 0.0 - 30.0 (volts) | <ul style="list-style-type: none"> Current loop: 4.0 Voltage: 0.0 |
| Delta low threshold | adl | Specifies the input value that generates a delta low alarm report when the delta low alarm is enabled. | <ul style="list-style-type: none"> Current loop: 0.0-25.0 (mA) Voltage: 0.0 - 30.0 (volts) | <ul style="list-style-type: none"> Current loop: 16.0 Voltage: 10.0 |
| Delta high threshold | adh | Specifies the input value that generates a delta high alarm report when the delta high alarm is enabled. | <ul style="list-style-type: none"> Current loop: 0.0-25.0 (mA) Voltage: 0.0 - 30.0 (volts) | <ul style="list-style-type: none"> Current loop: 16.0 Voltage: 10.0 |

| Option | CLI command | Description | Value options | Default |
|---------------------------------|-------------|--|--|---|
| Hysteresis | ahy | Specifies the input value to keep an alarm on or shut off an alarm during high and low alarm states. <ul style="list-style-type: none"> 0 — hysteresis is off 1 or more — hysteresis is on and managing alarms | <ul style="list-style-type: none"> Current loop: 0.0-25.0 (mA) Voltage: 0.0 - 30.0 (volts) | <ul style="list-style-type: none"> Current loop: 1.0 Voltage: 1.0 |
| Sensor description | dsc | Specifies description of the sensor for this input source. | Text | Empty |
| Custom scaled sample unit | unit | Specifies the unit of measurement this analog input is using for the custom scaled sensor values. | Text | Empty |
| Custom scaled sample value (y1) | y1 | Specifies the first data point associated with the following raw value: <ul style="list-style-type: none"> Current Loop inputs — 4 mA Voltage inputs — 0 volts | Number | 0 |
| Custom scaled sample value (y2) | y2 | Specifies the second data point associated with the following raw value: <ul style="list-style-type: none"> Current Loop inputs — 20 mA Voltage inputs — 10 volts | Number | 0 |

Digital input CLI commands

Use the commands in the following table with the **set** command and **din1** when configuring the digital input options with the CLI. For example, type **set din1 ena=on** to enable the digital input interface.

| Option | CLI command | Description | Value options | Default |
|-----------------|-------------|--|---|-----------------------------|
| Input interface | ena | Enables or disables the digital input source. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Alarms | aem | Enables or disables alarm reports for the digital input source. When enabled, sends an alarm report in one of the following conditions: <ul style="list-style-type: none"> ■ High alarm ■ Low alarm ■ Delta high alarm ■ Delta low alarm | <ul style="list-style-type: none"> ■ hi ■ lo ■ dh ■ dl ■ Enable multiple alarms using a comma separated command without spaces (such as set ain1 aem=hi,lo,dh,dl) | Empty (all alarms disabled) |

| Option | CLI command | Description | Value options | Default |
|------------------------------|-------------|--|---|----------------------------------|
| Rising and falling edge wake | wem | <p>Enables or disables the device to monitor a digital input during sleep mode as follows (they are either all On or all Off when using the CLI for configuration):</p> <ul style="list-style-type: none"> ■ Rising edge wake alarm: When enabled, wakes the device when the digital input changes from low voltage to high voltage (rising edge) and reports the value to Remote Manager with the other sensor and device data. ■ Falling edge wake alarm: When enabled, wakes the device when the digital input changes from high voltage to low voltage (falling edge) and reports the value to Remote Manager with the other sensor and device data. | <ul style="list-style-type: none"> ■ rise ■ fall ■ Enable both alarms using a comma separated command without spaces (such as set din1 wem=rise,fall) | Empty (all edge wake alarms off) |
| Enable pullup | puen | Enables or disables the internal pull-up resistor to drive a logic level voltage. For example, use this to drive a logic voltage across a mechanical switch to read the value (open or closed) of the mechanical switch. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Sensor description | dsc | Specifies description of the sensor for this input source. | Text | Empty |

Digital output CLI commands

Use the commands in the following table with the **set** command and **dout1** when configuring the digital output options with the CLI. For example, type **set dout1 ena=on** to enable the digital output interface.

| Option | CLI commands | Description | Value options | Default |
|--------------------|--------------|--|---|---------|
| Output interface | ena | Enables or disables the digital output source. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Output level | out | Sets the open collector digital output as follows: <ul style="list-style-type: none"> ■ Low output: The output is shorted to ground. ■ High output: If the internal pull-up is enabled, the line is pulled up to 3.3 volts. If the internal pull-up is not enabled and there is no external pull-up, the line is high impedance. | <ul style="list-style-type: none"> ■ low ■ high | low |
| Enable pullup | puen | Enables or disables the internal pull-up resistor to drive a logic level voltage. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Sensor description | dsc | Specifies description of the sensor for this output source. | Text | Empty |

Digital pulse counter CLI commands

Use the commands in the following table with the **set** command and **pcnt1** when configuring the digital pulse counter options with the CLI. For example, type **set pcnt1 ena=on** to configure the digital pulse counter interface.

| Option | CLI command | Description | Value options | Default |
|---------------------------------|-------------|---|--|-----------------------------|
| Digital pulse counter interface | ena | Enables or disables the digital input source. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Alarms | aem | Enables or disables alarm reports for the digital pulse counter source. When enabled, sends an alarm report in one of the following conditions: <ul style="list-style-type: none"> ■ High alarm ■ Low alarm | <ul style="list-style-type: none"> ■ hi ■ lo ■ Enable both alarms using a comma separated command without spaces (such as set pcnt1 aem=hi,lo) | Empty (all alarms disabled) |
| High threshold | alh | Specifies the high threshold in number of pulses that generates a high alarm report when high alarm is On . | Number | 0 |
| Low threshold | all | Specifies the low threshold in number of pulses that generates a low alarm report when low alarm is On . | Number | 0 |
| Hysteresis | ahy | Specifies when to keep an alarm on or shut off an alarm during high and low alarm states. <ul style="list-style-type: none"> ■ 0 — hysteresis is off ■ 1 or more — hysteresis is on and managing alarms | Number | 0 |

| Option | CLI command | Description | Value options | Default |
|---------------------------|-------------|--|---|---------|
| Enable pullup | puen | Enables or disables the internal pull-up resistor to drive a logic level voltage. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Sensor description | dsc | Specifies description of the sensor for the pulse counter. | Text | Empty |
| Custom scaled sample unit | unit | Specifies the unit of measurement the pulse counter uses for the custom scaled sensor values. | Text | Empty |
| Custom scaling factor | scl | Specifies the number used to convert each pulse into the custom scaled sample unit. For example, if one pulse equals 0.011 inches, you type 0.011 as the value. | Number | 0 |

Analog and digital power output CLI commands

Use the commands in the following table with the **set** command and the sensor power identifier when configuring the sensor options with the CLI. For example, type **set avout1 ena=on** to enable the analog power output 1 interface.

Sensor power identifiers:

- Analog power output 1: **avout1**
- Analog power output 2: **avout2**
- Analog power output 3: **avout3**
- Analog power output 4: **avout4**
- Digital power output: **dvout1**

| Option | CLI command | Description | Value options | Default |
|------------------------|-------------|---|--|---------|
| Power output interface | ena | Enables or disables the power output source. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Output level | out | Specifies the voltage level output for the analog power source. | <ul style="list-style-type: none"> ■ 3.3 ■ 5 ■ 15 ■ 24 | 3.3 |
| Read delay | rdl | <p>Specifies the time in seconds that the sensor voltage is enabled before Connect Sensor reads its value. This allows the sensor to stabilize to get an accurate reading.</p> <hr/> <p>Note A higher read delay keeps the device powered on longer, which reduces battery life.</p> <hr/> | 0-120 seconds | 0 |

Cellular CLI commands

Use the following commands with the **set** command when configuring the device with the CLI. All cellular configuration values are supplied by your cellular service provider.

| Option | CLI command | Description | Value options |
|-----------|-------------|---|---|
| APN | apn | Identifies the access point name that connects your device to the correct cellular network. | <ul style="list-style-type: none">■ If you purchased Digi Bundled Services, this value is preconfigured for you.■ If you purchased cellular service through a third party, contact your provider for this value. |
| User Name | user | Specifies the user name for your cellular network account. | <ul style="list-style-type: none">■ Use only when required by your cellular service provider.■ Length: Up to 63 characters■ Printable characters and spaces only (no quotation marks or backslashes)■ No value: disabled (no user name required) |

| Option | CLI command | Description | Value options |
|----------|-------------|---|--|
| Password | pwd | Specifies the password for your cellular network account. | <ul style="list-style-type: none">■ Use only when required by your cellular service provider.■ Length: Up to 63 characters■ Printable characters and spaces only (no quotation marks or backslashes)■ No value: disabled (no password required) |
| SIM PIN | pin | Specifies the PIN for your cellular network SIM card. | <ul style="list-style-type: none">■ Use only when required by your cellular service provider.■ Length: 4 to 8 numeric characters■ No value: disabled (no PIN required) |

Remote Manager CLI commands

Use the following commands with the **set** command when configuring the device with the CLI. All Remote Manager configuration values are preconfigured. supplied by your cellular service provider. Do not make changes to this setting without help from Digi Technical Support.

| Option | CLI command | Description | Values |
|-----------------|-------------|---|--|
| Server name | isn | Specifies the URL that connects your device to Remote Manager. This setting is configured by default. | my.devicecloud.com |
| SSL | ssl | Enables SSL encryption for data sent from Connect Sensor to Remote Manager. <hr/> Note Enabling SSL encryption significantly increases cellular data usage. <hr/> | <ul style="list-style-type: none">■ on■ off (default) |
| NTP server name | nsn | Network Time Protocol (NTP) server name that synchronizes Connect Sensor time with Coordinated Universal Time (UTC). This setting is configured by default. | time.devicecloud.com |

Internal temperature CLI commands

Use the following command with the **set** command when configuring the device with the CLI.



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

| Option | CLI commands | Description | Value options | Default |
|--------------------------------|--------------|---|---|----------------------|
| Internal temperature interface | ena | Enables or disables the internal temperature sensor. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Alarms | aem | Enables or disables alarm reports for the internal temperature. When enabled, sends an alarm report in one of the following conditions: <ul style="list-style-type: none"> ■ High alarm ■ Low alarm | <ul style="list-style-type: none"> ■ hi ■ lo ■ Enable multiple alarms using a comma separated command without spaces (such as set ain1 aem=hi,lo) | Empty (all disabled) |
| High threshold | alh | Specifies the internal temperature in degrees Celsius that generates a high alarm report when the high alarm is enabled. | -100 to 100 | 50.0 |
| Low threshold | all | Specifies the internal temperature in degrees Celsius that generates a low alarm report when the low alarm is enabled. | -100 to 100 | 0 |

| Option | CLI commands | Description | Value options | Default |
|------------|--------------|---|---------------|---------|
| Hysteresis | ahy | Specifies the degrees in Celsius to keep an alarm on or shut off an alarm during high and low alarm states. <ul style="list-style-type: none"> ■ 0 — Hysteresis is off ■ 1 or more — Hysteresis is on and managing alarms | 0 to 100 | 5.0 |

HART CLI commands

Use the commands in the following table with the **set** command and **hart1** when configuring the HART protocol options with the CLI. For example, type **set hart1 ena=on** to enable the HART protocol.

Note The HART protocol is available only with Connect Sensor+ hardware.

| Option | CLI command | Description | Value options | Default |
|----------------|-------------|--|---|---------|
| HART interface | ena | Enables or disables the HART protocol. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Alarms | aem | Enables the device to alarm status if the device status indicates an error. When enabled, all alarms force a push to Remote Manager. | <ul style="list-style-type: none"> ■ err ■ blank (no entry) | blank |

Modbus CLI commands

Use the commands in the following table with the **set** command and **modb1** when configuring the digital input options with the CLI. For example, type **set modb1 ena=on** to enable the Modbus protocol for the external sensor device.

Note The Modbus protocol is available only with Connect Sensor+ hardware.

| Option | CLI command | Description | Value options | Default |
|-----------------------------------|--------------|---|---|---------|
| Modbus protocol | ena | Enables or disables the Modbus protocol on a sensor. | <ul style="list-style-type: none"> ■ on ■ off | off |
| Serial protocol transmission mode | mode | Specifies the Modbus transmission mode. | <ul style="list-style-type: none"> ■ rtu ■ ascii | rtu |
| Station addresses | saddr<1 - 4> | Specify which station addresses will be queried by the Connect Sensor when the sensors are read. | The station address number that is configured for the Modbus sensor device. | 0 |
| Variable list | vars<1 - 4> | For each configured station address, you can configure a corresponding variable list. The variable list is limited to 63 characters, which limits the number of variables to between 8 and 10. For more information, see Modbus station addresses and locations . | Comma-separated list of variable addresses. | null |

Firmware options

This section includes information about the Connect Sensor firmware options that are available in addition to the standard firmware. These firmware options provide additional features. Note that these firmware options contain all of the features in the standard Connect Sensor firmware in addition to the features available in the firmware option you select.

If you want to use any of the optional features, you must upgrade from the standard Connect Sensor firmware to the firmware variant that includes those features. The firmware upgrade can happen only when Connect Sensor is awake and connected to Remote Manager. Any firmware upgrades, configuration changes, or commands that have been added to a schedule in Remote Manager are pushed to Connect Sensor at that time. If you need to upgrade the firmware before a scheduled push from Connect Sensor, you can physically wake the Connect Sensor device to force a connection between Connect Sensor and Remote Manager. For information on how to update the firmware, see [Firmware updates](#).

CSENSE Continuous Monitoring firmware

Note It is strongly recommended that an external power source for the Connect Sensor device is used with continuous monitoring.

For some customers, the scheduling paradigm of the standard Connect Sensor offering is inadequate. With continuous monitoring, Connect Sensor can constantly monitor sensors for an alarm by continually sampling sensor data. This enables Connect Sensor to find alarms faster, and to not miss any alarms that may have occurred between scheduled sensor readings.

The Connect Sensor device should be configured to specify a buffer time range for before and after an alarm occurs. When an alarm occurs, Connect Sensor continues to sample data until the time limit of the buffer is reached. When buffer time limit is reached, the sample data in the buffer for the time range specified, the alarm information, and any information from a scheduled reading stored in device's memory is pushed to Remote Manager.

In addition to continuous monitoring, scheduled sensor readings still occur, and that data is stored in the Connect Sensor memory.

- If a sensor alarm occurs, the data samples taken during the buffer time range plus any other diagnostic information stored in the device's memory is pushed when the buffer time range is reached.
- If an alarm doesn't occur between scheduled pushes, the information from a scheduled reading stored in the device's memory is pushed to Remote Manager as scheduled.

Continuous monitoring can occur simultaneously for up to five inputs: four analog and 1 digital.

- Analog 4-20mA Current Loop 1 or Analog Voltage Input 1
- Analog 4-20mA Current Loop 2 or Analog Voltage Input 2
- Analog 4-20mA Current Loop 3 or Analog Voltage Input 3
- Analog 4-20mA Current Loop 4 or Analog Voltage Input 4
- Digital Input

When using this feature, Connect Sensor never sleeps. For best performance and ease of use it is recommended that you use an external power source rather than relying on the battery within Connect Sensor. The Connect Sensor battery can be used as a battery backup if the external power source fails.

Enable CSENSE Continuous Monitoring

Follow these steps to enable and configure continuous monitoring.

1. Upgrade to the CSENSE Continuous Monitoring firmware. For upgrade information, see [Firmware updates](#).
2. Enable the continuous monitoring feature on an Analog 4-20mA Current Loop, Analog Voltage Input, or a Digital Input. For information, see [Enable continuous monitoring on analog input](#) or [Enable continuous monitoring on digital input](#).
3. Configure the buffer time range for all sensors using continuous monitoring to ensure the desired amount of data is stored when an alarm occurs. For information, see [Configure the buffer time for continuous monitoring](#).

Enable continuous monitoring on digital input

Note The Connect Sensor firmware must be upgraded before continuous monitoring can be enabled on the analog or digital input. For information, see [CSENSE Continuous Monitoring firmware](#).

1. Follow the standard process to configure a digital input. For instructions, see [Enable and configure a digital input](#).
2. The digital input must be enabled. Verify that the **Interface Enable (ena)** option is set to **On**.
3. Verify that the **Continuous Monitoring Enable (mon)** option is set to **On**.
4. Click **Save**.

5. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:
 - i. Select **One-Time**.
 - ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

6. Configure the buffer time for the sensor to ensure the desired amount of data is stored when an alarm occurs. For information, see [Configure the buffer time for continuous monitoring](#).

Enable continuous monitoring on analog input

Note The Connect Sensor firmware must be upgraded before continuous monitoring can be enabled on the analog or digital input. For information, see [CSENSE Continuous Monitoring firmware](#).

1. Follow the standard process to configure an Analog 4-20mA Current Loop or Analog Voltage Input. For instructions, see [Enable and configure analog inputs](#).
2. The analog input must be enabled. Verify that the **Interface Enable (ena)** option is set to **On**.
3. Verify that the **Continuous Monitoring Enable (mon)** option is set to **On**.
4. Click **Save**.
5. Apply the configuration changes:
 - a. Select **Schedule** from the **Save** drop-down menu.
 - b. Specify the schedule options:
 - Apply changes during the next wake cycle:
 - i. Select **Immediate**.
 - ii. Select the **Schedule Offline** check box.
 - iii. Click **Schedule**.
 - Apply changes on a specific date and time in the future:

- i. Select **One-Time**.
- ii. Choose a date and time from the drop-down menus.

Note The change is applied during the wake cycle after the date and time you specify.

- iii. Select the **Schedule Offline** check box.
- iv. Click **Schedule**.

Connect Sensor downloads and applies configuration changes the next time it connects to Remote Manager.

6. Configure the buffer time for the sensor to ensure the desired amount of data is stored when an alarm occurs. For information, see [Configure the buffer time for continuous monitoring](#).

Configure the buffer time for continuous monitoring

To ensure the desired amount of data is stored when an alarm occurs, you should configure the buffer time range for the sensor.

1. Sign in to [Remote Manager](#).
2. Click **Device Management > Devices**.
3. Double-click on the Connect Sensor device you want to configure.
4. Expand the **Configuration** menu.
5. Click **Device Settings**.
6. Configure the buffer time range for before and after the alarm event. The time is measured in seconds.
 - a. In the **Buffer Sensor Data Before Alarm** field, select the number of seconds of sample data that occurred before the alarm that should be saved and pushed.
 - b. In the **Buffer Sensor Data After Alarm** field, select the number of seconds of sample data that occurred after the alarm that should be saved and pushed.
7. Click **Save**.
8. From the **Save** drop-down list, select the **Schedule** option. The **Schedule Device Properties** dialog appears.
9. Select the following options:
 - **Immediate**: Upload files immediately.
 - **Schedule Offline**: Queue upload to occur the next time this device connects to Remote Manager.
10. Click **Schedule**.