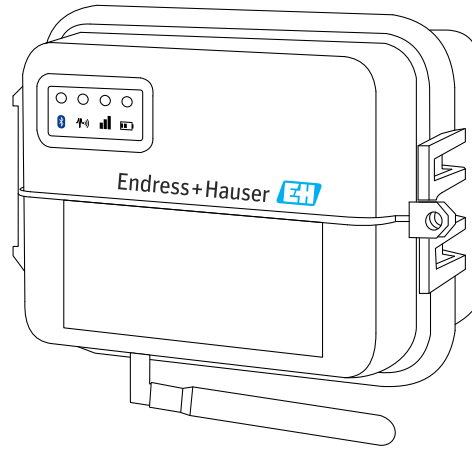
KA01320S/00/EN/03.20
71509964
2020-12-14



# Brief Operating Instructions
# **Connect Sensor FXA30, FXA30B**

Fieldgate
Low-power cellular sensor gateway for wireless drop-in networking to remotely monitor industrial environments and control systems




Endress+Hauser
People for Process Automation

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# 1 Document information

## 1.1 Document conventions

### 1.1.1 Safety symbols

**⚠ DANGER**

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

**⚠ WARNING**

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

**⚠ CAUTION**

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

**NOTICE**

This symbol contains information on procedures and other facts which do not result in personal injury.

### 1.1.2 Electrical symbols

| Symbol | Meaning | Symbol | Meaning |
|---|---|---|---|
| ⎓ | Direct current | ~ | Alternating current |
| ⎓ ~ | Direct current and alternating current | ⏚ | **Ground connection**<br>A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system. |

| Symbol | Meaning |
|---|---|
| ⏚ | **Protective Earth (PE)**<br>A terminal which must be connected to ground prior to establishing any other connections.<br>The ground terminals are situated inside and outside the device:<br>▪ Inner ground terminal: Connects the protectiv earth to the mains supply.<br>▪ Outer ground terminal: Connects the device to the plant grounding system. |

### 1.1.3 Communication specific symbols

| Symbol | Meaning |
|---|---|
|  | **LED**<br>Light emitting diode is off. |
|  | **LED**<br>Light emitting diode is on. |
|  | **LED**<br>Light emitting diode is flashing. |

### 1.1.4 Symbols for certain types of information

| Symbol | Meaning | Symbol | Meaning |
|---|---|---|---|
|  | **Permitted**<br>Procedures, processes or actions that are permitted. |  | **Preferred**<br>Procedures, processes or actions that are preferred. |
|  | **Forbidden**<br>Procedures, processes or actions that are forbidden. |  | **Tip**<br>Indicates additional information. |
|  | Reference to documentation |  | Reference to page |
|  | Reference to graphic | 1., 2., 3... | Series of steps |
|  | Result of a step |  | Visual inspection |

### 1.1.5 Symbols in graphics

| Symbol | Meaning | Symbol | Meaning |
|---|---|---|---|
| 1, 2, 3,... | Item numbers | 1., 2., 3... | Series of steps |
| A, B, C, ... | Views | A-A, B-B, C-C, ... | Sections |
|  | Hazardous area |  | Safe area (non-hazardous area) |

# 2 Terms and abbreviations

| Term/abbreviation | Explanation |
|---|---|
| BA | Document type "Operating Instructions" |
| KA | Document type "Brief Operating Instructions" |
| TI | Document type "Technical Information" |
| SD | Document type "Special Documentation" |
| XA | Document type "Safety Instructions" |
| FIS | Field Information Server<br>A web-based operating portal for managing the lifecycle & diagnostics of worldwide applied gateways in the Inventory Management System. |
| SupplyCare Hosting | Cloud-based inventory management platform for transparent information within the supply chain |
| APN | Access Point Name |
| CLI | Command Line Interface |
| DHCP | Dynamic Host Configuration Protocol |
| IMEI | International Mobile Equipment Identity |
| LED | Light Emitting Diode |
| TCP | Transmission Control Protocol |
| USB | Universal Serial Bus |
| URL | Uniform Resource Locator |

# 3 Registered trademarks

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**Firefox®**
Registered trademark of of the Mozilla Foundation

**Chrome™**
Registered trademark of Google Inc.

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# 4 Basic safety instructions

## 4.1 Installation considerations

Read all instructions before installing and powering the unit and keep these instructions in a safe place for future reference.

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 FXA30/FXA30B.

- 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 FXA30/FXA30B 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 Endress+Hauser; connecting non-approved accessories and batteries may damage the unit.
- Connect Sensor FXA30/FXA30B must be maintained by Endress+Hauser or a Endress+Hauser qualified technician only. Always use the designated battery, order number 71329969, from Endress+Hauser. 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 0.2 Nm.
- Allowable wire size for terminal blocks is 0.5 to 1.5 $mm^2$.

## 4.2 ATEX requirements

- Connect Sensor FXA30/FXA30B must be installed in an enclosure that provides a degree of protection not less than IP 54, in accordance with EN 60079-15.
- Connect Sensor FXA30/FXA30B should be used in an area of not more than pollution degree 2, as defined in EN 60664-1.

## 4.3 Warnings: Explosion hazards

Review the following explosion hazard warnings for the Connect Sensor FXA30/FXA30B.

The Connect Sensor FXA30/FXA30B unit contains internal batteries.

**⚠ WARNING**

**Connect Sensor FXA30/FXA30B 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.

## 4.4 Certifications

The following certifications apply to the Connect Sensor FXA30/FXA30B device.

### 4.4.1 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 200 mm (7.87 in).

### 4.4.2 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 unit 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.

### 4.4.3 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 |
| UL60950-1 | Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use | October 14, 2014 |

# 5 Incoming acceptance and product identification

## 5.1 Incoming acceptance

Check the following during incoming acceptance:
- Are the order codes on the delivery note and the product sticker identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?

If one of these conditions is not met, please contact your Endress+Hauser sales office.

## 5.2 Product identification

The following options are available for identifying the gateway:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note

## 5.3 Scope of delivery

- Connect Sensor FXA30/FXA30B
- Hard copy of Brief Operating Instructions
- Battery (depending on ordered option)

Please note the device accessories like antenna in the "Accessories" section of the Operating Instructions.

## 5.4 Manufacturer

DIGI INTERNATIONAL INC.

11001 Bren Road East

Minnetonka, MN 55343 USA

## 5.5 Vendor

Endress+Hauser SE+Co. KG

Hauptstrasse 1

79689 Maulburg

Germany

Phone: +49 7622 28-0

# 6 Product description

## 6.1 Function and system design

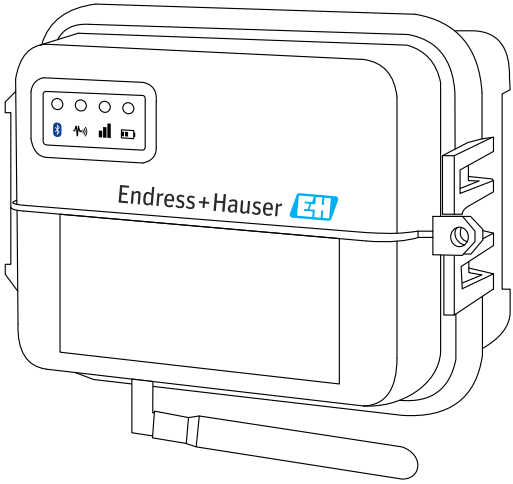
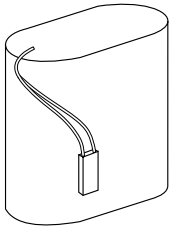
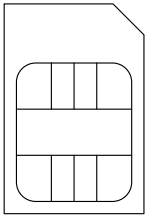
Connect Sensor FXA30/FXA30B is a low-power cellular sensor gateway for wireless drop-in networking to remotely monitor industrial environments and control systems, such as inventory level, flow, pressure as well as any other process variable. To power Connect Sensor FXA30/FXA30B, use either the internal battery or an external power source, such as solar panels, for setups with no power or limited power.
Connect Sensor FXA30/FXA30B includes an external input/output (I/O) interface inside a waterproof enclosure for connecting sensors. The sensors gather information (sensor readings) from their environment, and Connect Sensor FXA30/FXA30B reports that information to SupplyCare Hosting using a lowbandwidth cellular connection.

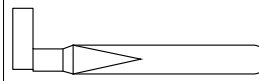
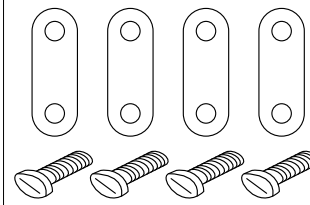
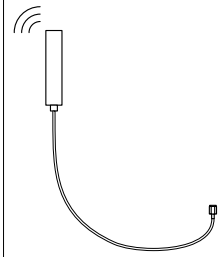
Make sure there is adequate cellular network coverage where you plan to install the gateway before purchasing cellular service.

## 6.2 Product design

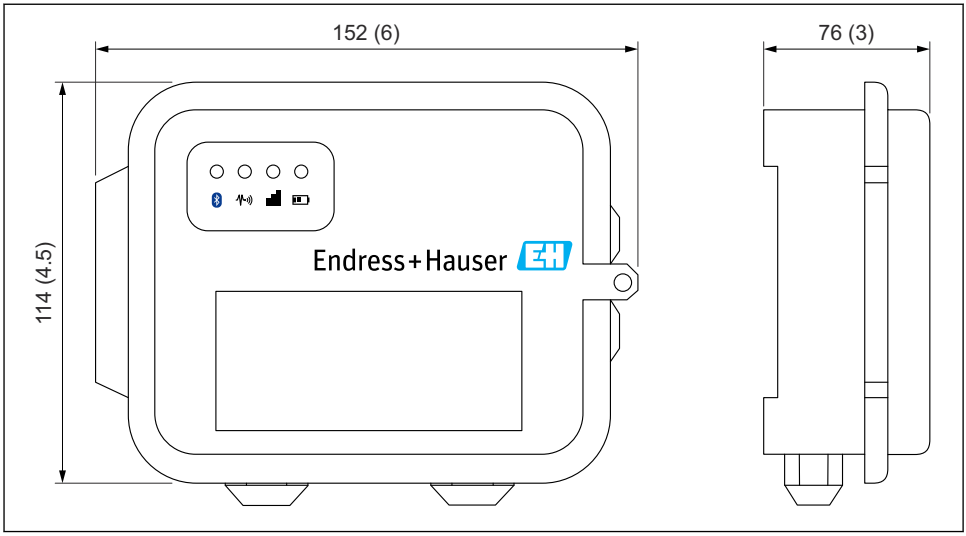
### 6.2.1 Components

These sections include a list of Connect Sensor FXA30/FXA30B components, and reference information about the Connect Sensor FXA30/FXA30B LEDs, ports, and buttons.

| Component | Description |
|---|---|
| Connect Sensor FXA30/FXA30B |   |
| Battery<br>Only included when explicitly ordered in bundle or as accessory.<br>Accessory order No. 71329969 |  |
| Activated SIM card<br>Included when a data communication contract is purchased with the Connect Sensor FXA30/FXA30B |  |

| Component | Description |
|---|---|
| Cellular antenna for LTE and GSM<br>(not part of the standard delivery)<br><br>Network and Frequencies<br>▪ GSM900; 890 to 960 MHz<br>▪ GSM1800; UMTS 1 710 to 2 170 MHz<br>▪ LTE2600; 2 500 to 2 690 MHz<br>▪ Nominal Impedance: 50 Ω<br>▪ VSWR: 2.5 : 1<br>▪ Polarization: Linear<br>▪ Vertical Radiation Pattern: Omni<br>▪ Power Rating: 3 W<br>▪ Gain: 0 to 2 dBi<br>▪ Weight: 47 g (1.66 oz)<br>▪ Dimensions:<br>  ▪ Height: 228 mm (9 in)<br>  ▪ Width: 25 mm (1 in)<br>▪ Operating Temperature:<br>  −30 to +70 °C (−22 to 158 °F)<br>▪ Connector: SMA (m)<br><br>Order No. 71329987 |  |
| Wall Mounting Kit<br>4 Mounting Feet 4 Mounting Screws<br>Order No. 71336975 |  |
| Fixed Antenna LTE, GSM ,UMTS<br>(not part of the standard delivery)<br>For indoor and outdoor use 3 meter cable length<br><br>Network and Frequencies<br>▪ LTE800; 790 to 862 MHz<br>▪ GSM900; 890 to 960 MHz<br>▪ GSM1800; UMTS 1 710 to 2 170 MHz<br>▪ LTE2600; 2 500 to 2 690 MHz<br>▪ Polarization: vertical<br>▪ Gain: ≈ 2 dBi<br>▪ VSWR: ≤ 1.9 : 1<br>▪ Return loss: > 10 dB<br>▪ Nominal Impedance: 50 Ω<br>▪ UV Resistance: Existsts (housing flares are possible)<br>▪ Cable: 3 m (9.84 ft); Low Loss<br>▪ Connector: SMA (m)<br><br>Order No. 71327395 |  |

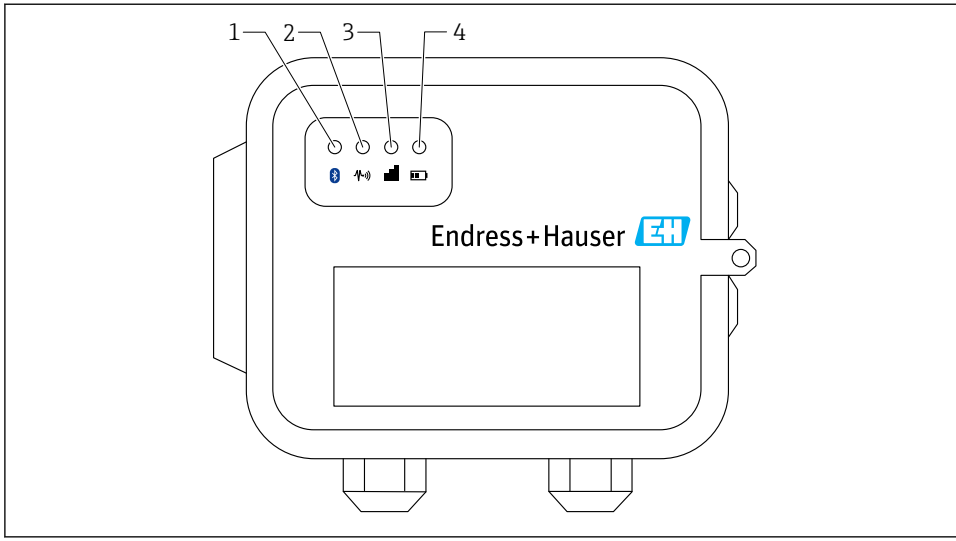
### 6.2.2 Dimensions




1 *Dimensions in mm (in)*

### 6.2.3 Display elements (device status indicator / LED)

Connect Sensor FXA30/FXA30B has four LED indicators to monitor Bluetooth connection, sensor activity, cellular connection, and battery life. If Connect Sensor FXA30/FXA30B is powered and all LEDs are off, it is in sleep mode.

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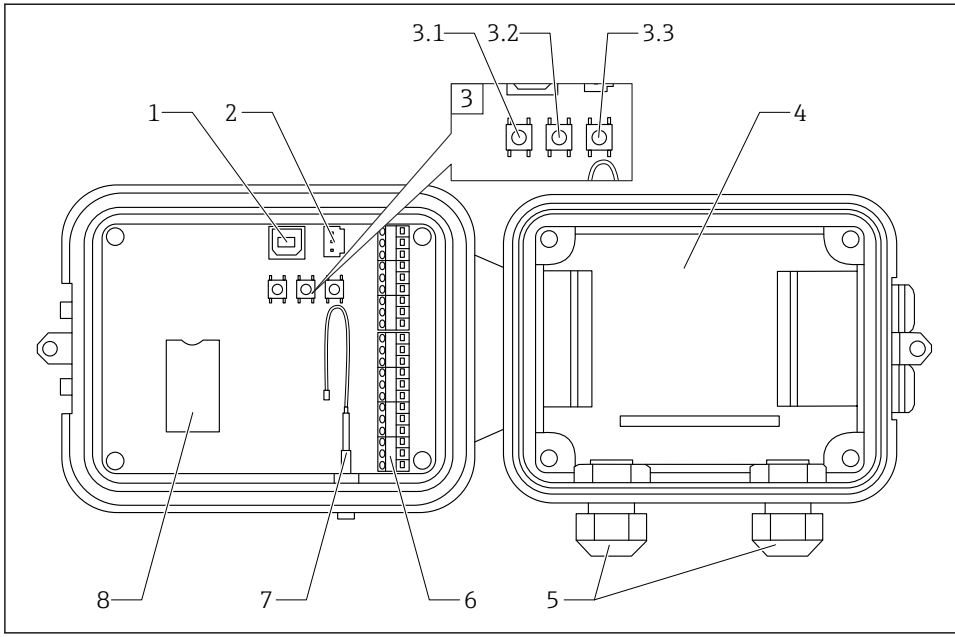
1 *Bluetooth*
2 *Sensor reading*
3 *Cellular*
4 *Battery*

| Item | LED | State | Description |
|---|---|---|---|
| 1 | Bluetooth | | Indicator light for Bluetooth communication<br>Yellow blinking: Bluetooth is on<br>The bluetooth module is thought for future use together with an App. |
| 2 | Sensor reading | | Indicator light for the sensor(s):<br>Green blinking: One or more sensors are reading the environment |
| 3 | Cellular | | Indicator light for the cellular network connection:<br>Solid purple: Connect Sensor FXA30/FXA30B is waking |
| | | | Indicator light for the cellular network connection:<br>Red blinking: Searching for the cellular network |
| | | | Indicator light for the cellular network connection:<br>Blue blinking: Connected to the cellular network and attempting to communicate with FIS |
| | | | Indicator light for the cellular network connection:<br>Solid light: Successfully sent data to FIS; |

| Item | LED | State | Description |
|---|---|---|---|
| | |  | turns off after a few seconds |
| 4 | Battery |  | Indicator light for battery function:<br>Solid purple: Connect Sensor is waking |

### 6.2.4 Ports and buttons

The following figure shows the controls for setting up and configuring Connect Sensor FXA30/FXA30B.

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*1 Console port*
*2 Battery port*
*3 Control buttons*
*3.1 Wake button*
*3.2 Factory button*
*3.3 Reset button*
*4 Battery tray*
*5 Cable glands*
*6 Input/Output (I/O) interface*
*7 Cellular antenna port*
*8 SIM Card tray*

| Item | Name | Description |
|---|---|---|
| 1 | Console port | Connects Connect Sensor FXA30/FXA30B 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 FXA30/FXA30B |
| 3.1 | Wake button | Wakes Connect Sensor FXA30/FXA30B |

| Item | Name | Description |
|---|---|---|
| 3.2 | Factory button | Removes all configuration changes and restores Connect Sensor FXA30/FXA30B 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. |
| 3.3 | 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. |
| 4 | Battery tray | Holds the battery in place |
| 5 | Cable glands | Thread sensor cables through these openings into Connect Sensor FXA30/FXA30B |
| 6 | Input/Output (I/O) interface | Wire analog or digital input and output sensors or power to this interface |
| 7 | Cellular antenna port | Connects an external cellular antenna to Connect Sensor FXA30/FXA30B |
| 8 | SIM Card tray | Connects the SIM card to Connect Sensor FXA30/FXA30B |

## 6.3 Product specifications

The following table provides a summary of general product specifications for Connect Sensor FXA30/FXA30B.

| Specifications | |
|---|---|
| **Management** | |
| Configuration and management | ▪ Endress+Hauser Field Information Server (FIS)<br>▪ Local USB to Serial CLI Protocol |
| Protocol | TCP |
| SIM Slots | 1, standard size |
| **Power** | |
| Battery | 7.2 V, 14 Ah, Lithium Thionyl Chloride, nonrechargeable, replaceable |
| Battery self discharge | <1%/year if stored at +30 °C (+86 °F) |
| External power requirement | 8 to 30 $V_{DC}$ at 1 A |
| Power draw, sleeping | 86.4 µW |
| Power draw, continuous monitoring | 400 mW |
| Power draw, peak transmit | 14.4 W |
| **Sensor protocol support** (FXA30B only) | |
| MODBUS | MODBUS RTU and ASCII, connect to up to 4 sensors |
| **Analog input** | |
| Input | 4 × analog input:<br>4 to 20 mA<br>4 × Modbus RS-485 (Connect Sensor FXA30B only) |

| Specifications | |
|---|---|
| Input current range | 4 to 22 mA (Current loop input) |
| **Digital input** | |
| Ports | 1 digital input or pulse counter input |
| Input Range | ▪ 0 to 0.6 $V_{DC}$ logic low;<br>▪ 2.2 to 30 $V_{DC}$ logic high |
| Max. input voltage | 30 $V_{DC}$ |
| Max. pulse count frequency | 2 kHz |
| **Output power** | |
| Ports | 5 |
| Output voltage options | 24 $V_{DC}$ |
| Max. current output | 200 mA per sensor |
| **Environmental** | |
| Environmental Operating temperature | –35 to +70 °C (–31 to 158 °F) |
| Storage temperature | –40 to +85 °C (–40 to 185 °F) |
| Relative humidity | 90% (Non-condensing after 90%) |
| Ingress Protection (IP) rating | IP66 |
| **Physical** | |
| Dimensions (L x W x H) | ▪ Lenght: 152 mm (6 in)<br>▪ Width: 114 mm (4.5 in)<br>▪ Height: 76 mm (3 in) |
| Weight | 0.57 kg (1.25 lb) |
| LEDs | ▪ Bluetooth<br>▪ Sensor reading<br>▪ Cellular<br>▪ Battery |
| Enclosure material | 10% fiberglass reinforced polycarbonate |
| Enclosure rating | NEMA Type 4, 4X, 6, and 6P<br>UL 94 V-0 |

## 6.4 Hardware enhancements

Aditional to the features of the Connect Sensor FXA30 the Connect Sensor FXA30B is equipped with the following functions:

Modbus protocol

## 6.5 Battery life

Connect Sensor FXA30/FXA30B uses sleep and wake modes to manage power use. The device wakes only for sensor readings and sending the scheduled readings to SupplyCare Hosting. It is in sleep mode at all other times to maintain low power consumption.

Extend battery life by scheduling less frequent sensor readings and communication uplinks. Scheduling more frequent sensor readings and communication uplinks may shorten the battery life.

## 6.6 Cell modem transmit (TX) output power

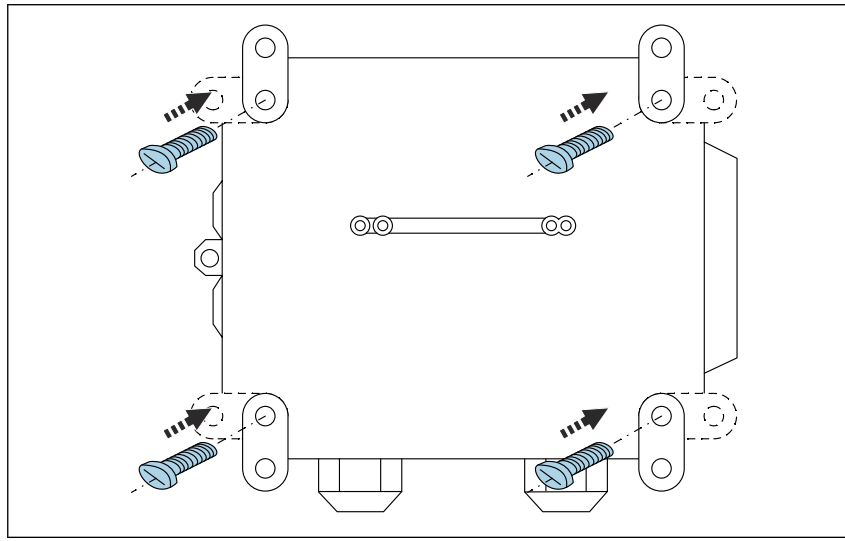
| Modem | Band | Power Class |
|---|---|---|
| HE910-D | GSM 850 / 900 | 4 (2 W) |
| | DCS 1800 / PCS 1900 | 1 (1 W) |
| | EDGE, 850/900 MHz | E2 (0.5 W) |
| | EDGE, 1800/1900 MHz | Class E2 (0.4 W) |
| | WCDMA FDD B1, B2, B4, B5, B8 | Class 3 (0.25 W) |
| LE910-NA1 | LTE All Bands (for North America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

# 7 Installation

## 7.1 Mounting

### Wall mounting

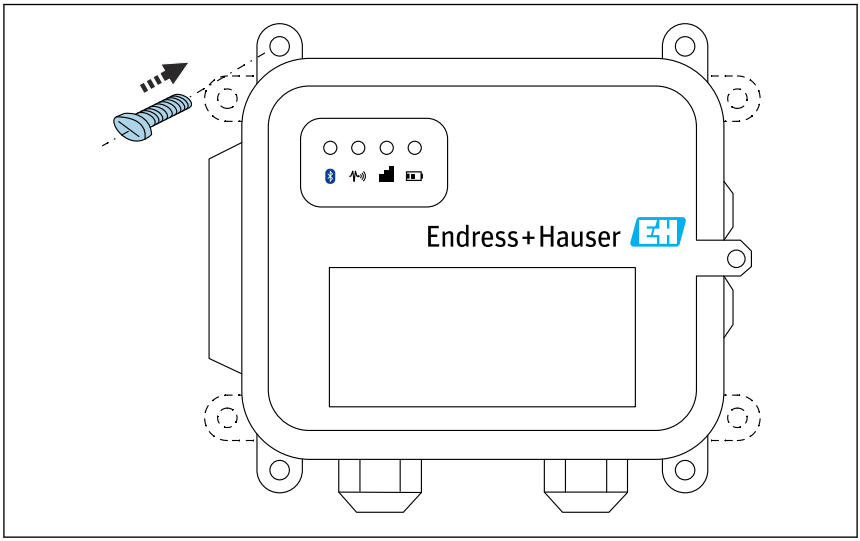
1. Use Mounting kit Connect Sensor FXA30/FXA30B and fix the 4 brackets with the supplied screws on backside of the housing.




*2 Backside*

The Mounting kit Connect Sensor FXA30/FXA30B can be ordered as accessory via Order code : 71336975

2. Only to be fastened at stable materials (e.g. metal, brick, concrete) using suitable fastening material (to be supplied by customer).




*3 Frontside*

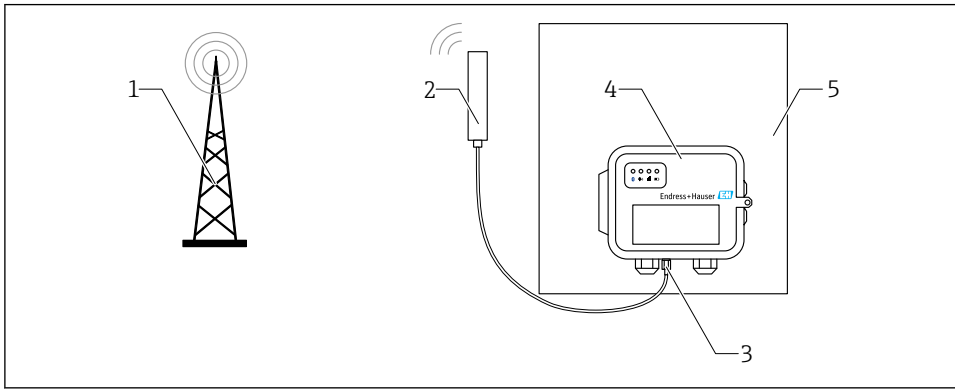
## 7.2 Antenna

Connect Sensor FXA30/FXA30B require an external antenna for wireless communication via UMTS (2G/3G) or LTE (North America).

If Connect Sensor FXA30/FXA30B is mounted inside a cabinet, the antenna must be mounted outside the cabinet.

Suitable antennas are available as an accessory.

In areas with weak UMTS (2G/3G) or LTE (North America) reception, it is advisable to first check the communication before securing the antenna permanently.

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4 *Connection: SMA connection*

1 *UMTS (2G/3G) or LTE network*
2 *Antenna for Connect Sensor FXA30/FXA30B*
3 *SMA connection*
4 *Connect Sensor FXA30/FXA30B*
5 *Control cabinet*

# 8 Assembling

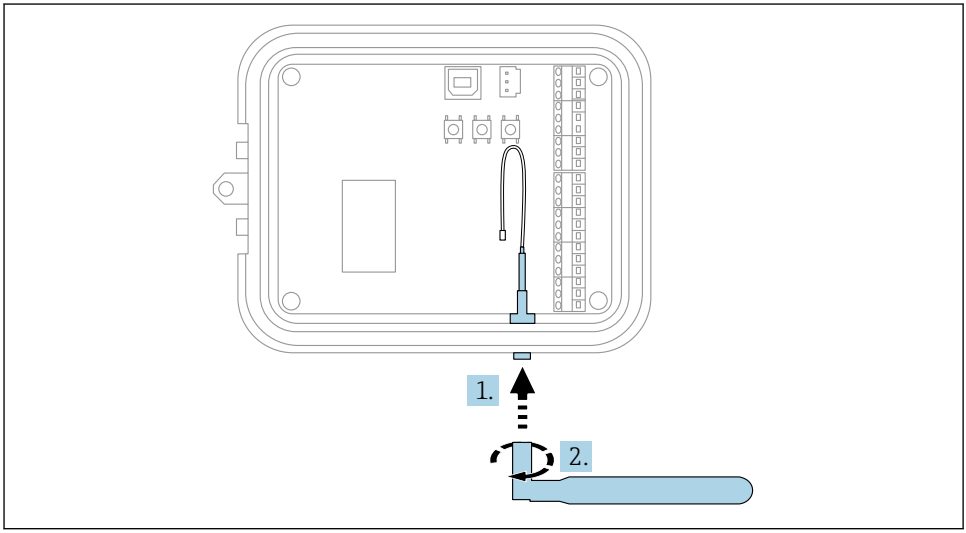
Before wiring sensors to the I/O interface, assemble Connect Sensor FXA30/FXA30B to make sure it works and check the cellular network coverage in the install area.

Make sure you have the following required equipment:
- Battery or Direct Current source
- Activated SIM card
- Cellular antenna

We recommend that you complete configuration, including verifying cellular and FIS connectivity, before wiring external sensors to Connect Sensor FXA30/FXA30B.

## 8.1 Connect the cellular antenna

You must use a passive (non-amplified) antenna with the Connect Sensor FXA30/FXA30B.

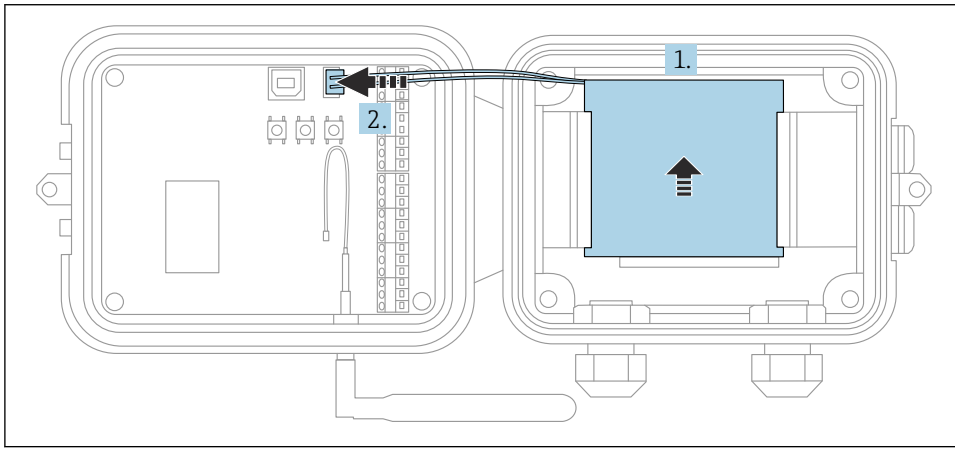



5 *Connect the cellular antenna*

1. Plug antenna to cellular antenna port
2. Tighten the antenna connection

## 8.2 Connect the battery

Open the Connect Sensor FXA30/FXA30B enclosure.

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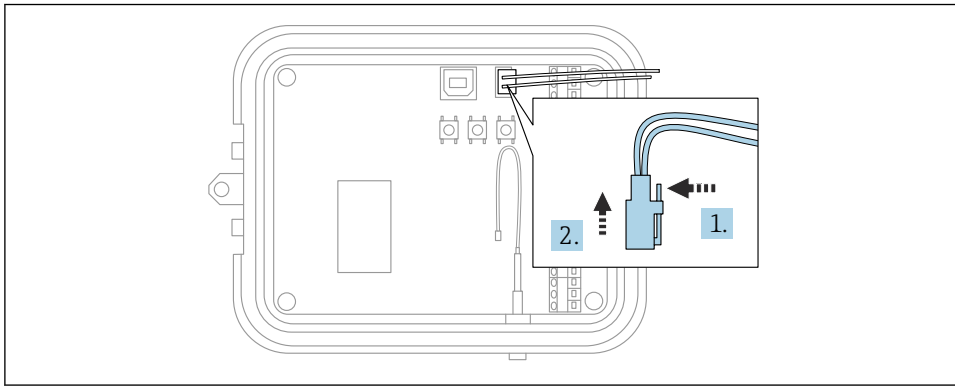
*6 Connect the battery*

1. Insert battery to battery tray
2. Connect battery to battery port

## 8.3 Disconnect the battery

Open the Connect Sensor FXA30/FXA30B enclosure.

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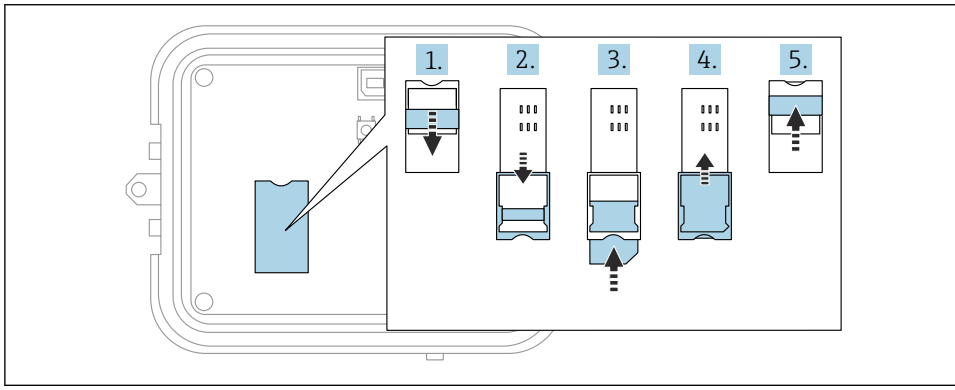
*7 Disconnect the battery*

1. Press secure pin back

2. Pull plug out of battery port

## 8.4 Insert SIM card

Open the Connect Sensor FXA30/FXA30B enclosure.




8 *Insert SIM card*

1. Unlock SIM Card tray
2. Swing open the SIM Card tray
3. Insert SIM Card (Standard SIM)
4. Clap SIM Card tray back
5. Lock SIM Card tray

# 9 Configure the cellular connection

If you purchased a Data communication contract with the Connect Sensor FXA30/FXA30B, then the cellular connection is already configured on your Connect Sensor FXA30/FXA30B and you can skip this section.

Connect Sensor FXA30/FXA30B is configured with a default APN that you need to change to register Connect Sensor FXA30/FXA30B on the cellular network for your cellular service provider. Use the command line interface (CLI) to initially configure the cellular connection.

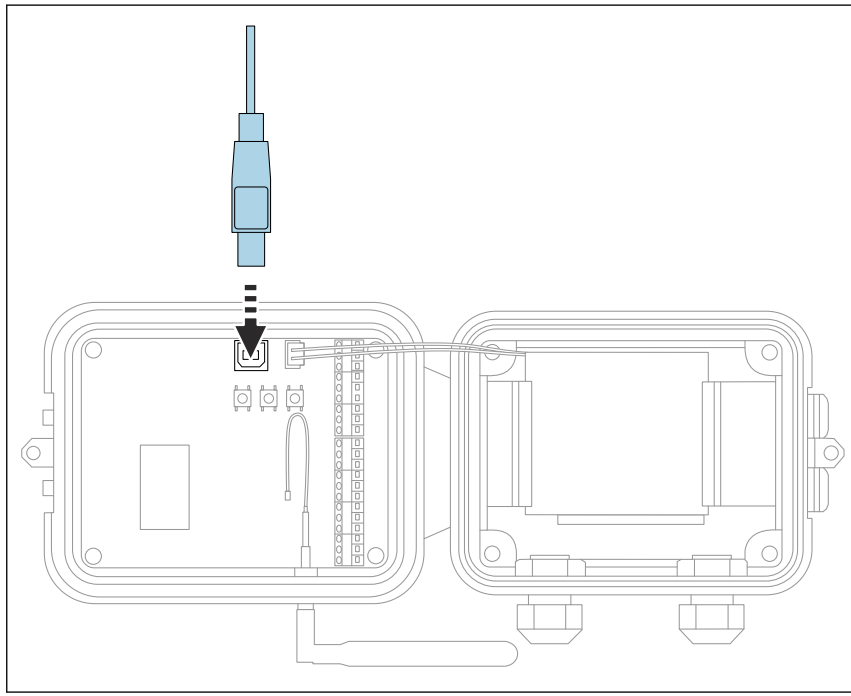
Before you begin, make sure you have the following required equipment and information:
- Computer running a terminal emulator program for example Microsoft Windows command line
- USB type A to B cable
- APN from your cellular service provider

## 9.1 Register on cellular network

To register Connect Sensor FXA30/FXA30B 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. You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Sensor FXA30/FXA30B to a computer using a USB cable. It is recommended the use of drivers available at http://www.ftdichip.com/Drivers/VCP.htm



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3. Open a terminal program on a computer (e.g.: Putty) and connect to Connect Sensor FXA30/FXA30B using the following configuration:
   - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor FXA30/FXA30B
     **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)
8. Type **activate** at the command prompt and press **Enter** to immediately make the change.
   ↳ Connect Sensor FXA30/FXA30B immediately wakes up to report the change to FIS. After the change completes, it goes to sleep again.

### 9.1.1 Check the cellular connection

Make sure the cellular network provides an adequate signal where you install Connect Sensor FXA30/FXA30B to maintain a consistent cellular connection.

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

To check the cellular network connection at the install location:

1. Press the Wake button.
2. Make sure the cellular LED blinks blue to show it is connected to the cellular network.
3. If Connect Sensor FXA30/FXA30B does not connect to the cellular network, see → 50

You can now complete I/O interface wiring.

**Data storage**
- Standard-Firmware:
  In case of problems with the uplink mobile connection, the Connect Sensor FXA30B can store the measured data of up to 63k data points.
- Continuous Monitoring Firmware:
  Connect Sensor FXA30B can store 5 minutes of measured data (resolution 1 second) before and after an alarm event.

# 10 Electrical connection

**WARNING**

**Hazardous electric voltage**

Risk of electric shock and injury from startle response.

- ▶ De-energize all power sources before connecting.
- ▶ Before commissioning the device, measure the supply voltage and compare it with the voltage specifications on the nameplate. Only connect the device if the supply voltage measured matches the specifications.

## 10.1 Power options

### 10.1.1 Power the Connect Sensor FXA30/FXA30B

While Connect Sensor FXA30/FXA30B has an internal battery for power, you can use an external power source, such as solar panels or other DC sources. For an external power source, use the external power input to power the Connect Sensor FXA30/FXA30B device.

- When Connect Sensor FXA30/FXA30B is connected to an external power source, the external power source becomes the primary power source and the internal battery becomes a backup power source.
  If the external power source is unable to power Connect Sensor FXA30/FXA30B (such as when it has an unacceptable voltage range), it automatically switches to the internal battery as the power source.
- The external power inputs accept a DC range of 8 to 30 $V_{DC}$

### 10.1.2 Power the sensors

The Connect Sensor FXA30/FXA30B can power sensors connected to the analog, digital, or serial power outputs. In order to configure the Connect Sensor FXA30/FXA30B power options the cloud interface on the Field Information Server is to be used.

If you have a Modbus-enabled device that must get power from theConnect Sensor FXA30B, the Modbus device must be wired to the serial power output.

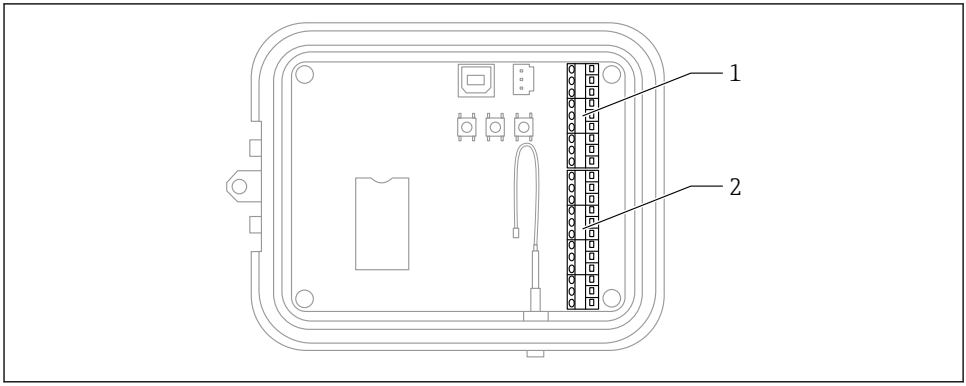
Note the following:

- The sensor power output voltage is 24 $V_{DC}$
- The maximum output current for each sensor power output connector is 200 mA

## 10.2 Terminal assignment

### 10.2.1 I/O interface pin assignments

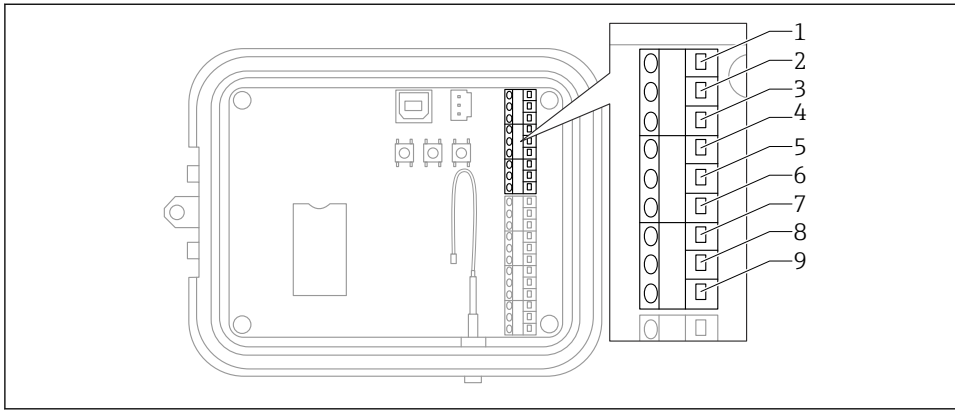
Connect Sensor FXA30/FXA30B has two I/O connectors, a 9-pin connector and a 12-pin connector.




9 *I/O interface pin assignments*

*1 9-pin connector*
*2 12-pin connector*

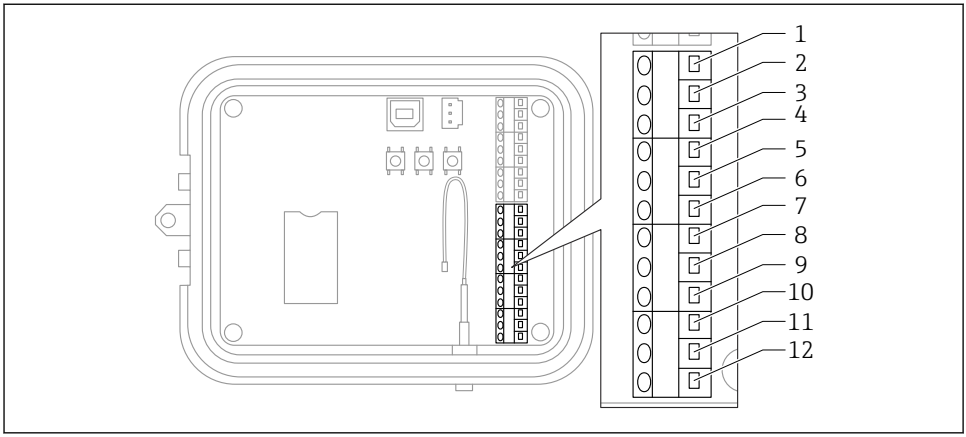
## 9-pin connector details




*10 9-pin connector details*

| Pin number | Assignment | Signal |
|---|---|---|
| 1 | SGnd | Serial interface ground |
| 2 | SRX/- | Serial interface Modbus - |
| 3 | STX/+ | Serial interface Modbus + |
| 4 | SPwr | Serial interface power output |
| 5 | EXT GND IN | External power supply, ground |
| 6 | EXT PWR IN | External power supply, positive input |
| 7 | DGnd | Digital interface, ground |
| 8 | DIO | Digital interface I/O |
| 9 | DPwr | Digital interface power output |

## 12-pin connector details




*11 12-pin connector details*

| Pin number | Assignment | Signal |
|---|---|---|
| 1 | A 4 GND | Analog interface 4, ground |
| 2 | A 4 IN | Analog interface 4, analog input |
| 3 | A 4 Pwr | Analog interface 4, power output+ |
| 4 | A 3 GND | Analog interface 3, ground |
| 5 | A 3 IN | Analog interface 3, analog input |
| 6 | A 3 Pwr | Analog interface 3, power output |
| 7 | A 2 GND | Analog interface 2, ground |
| 8 | A 2 IN | Analog interface 2, analog input |
| 9 | A 2 Pwr | Analog interface 2, power output |
| 10 | A 1 GND | Analog interface 1, ground |
| 11 | A 1 IN | Analog interface 1, analog input |
| 12 | A 1 Pwr | Analog interface 1, power output |

## 10.3 Wire sensors to the I/O interface

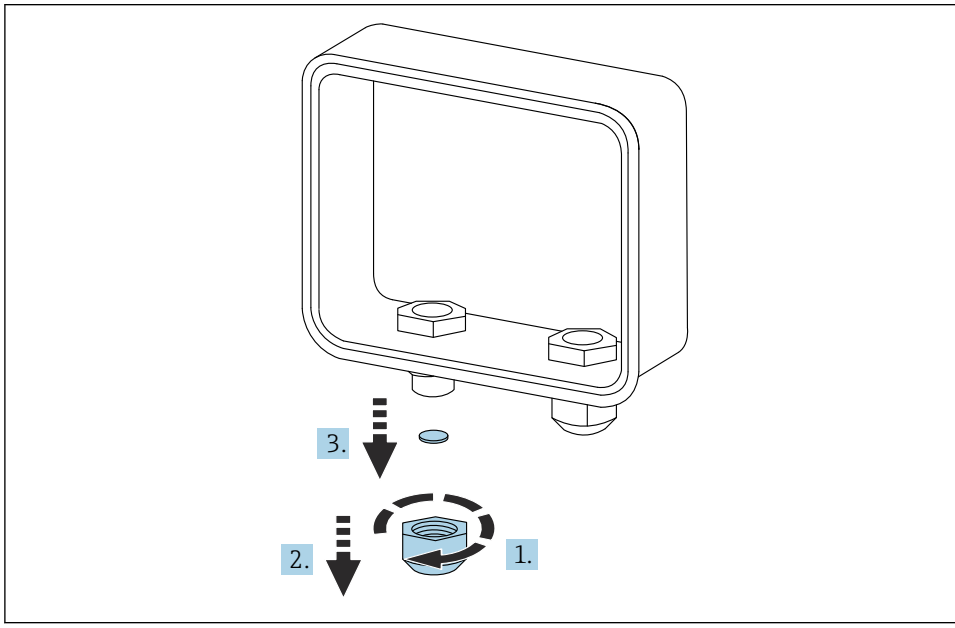
To wire sensors to the Connect Sensors FXA30/FXA30BI/O interface, you need the following equipment:
- Screwdriver, slot-headed 0.4 × 2.5 × 80 mm
- Wire size Ø 1.29 to 0.25 mm (16 to 30 AWG) for each pin connector

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

NOTICE

**Wiring Connect Sensors FXA30/FXA30B**
- ▶ Open Connect Sensors FXA30/FXA30B enclosure and disconnect all power sources.
- ▶ Make sure external power source is switched off.
- ▶ Disconnect the battery → 25.

### 10.3.1 Unscrew gland cap

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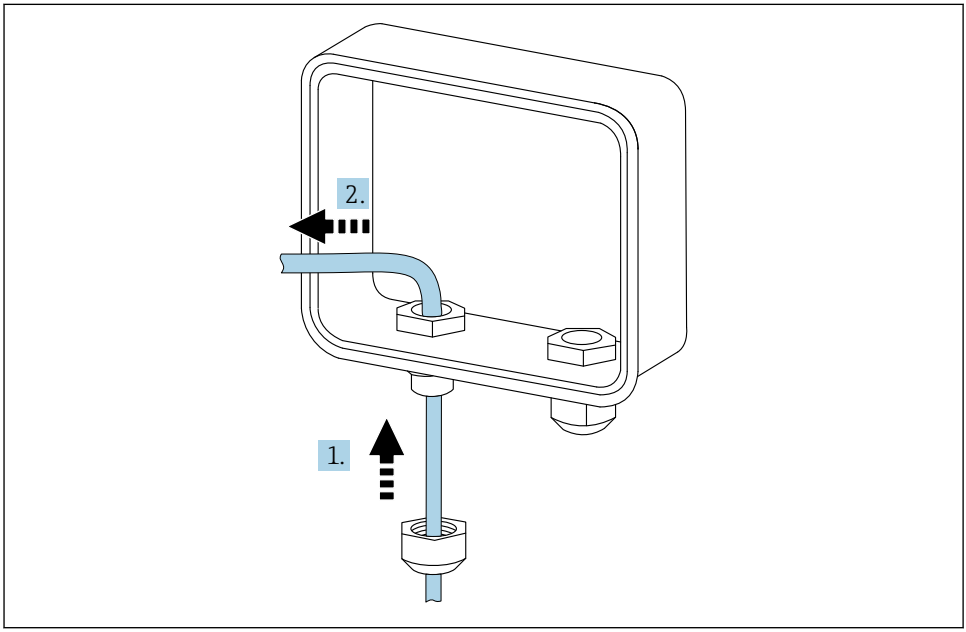
12 *Unscrew gland cap*

1. Unscrew gland cap
2. Pull gland cap down
3. Remove plastic seal

**NOTICE**

**Over tightening an unused cable gland cap,**
can force out the plastic hole cover, unsealing the cable gland
- ▶ Make sure the plastic hole cover stays in place to keep it sealed.

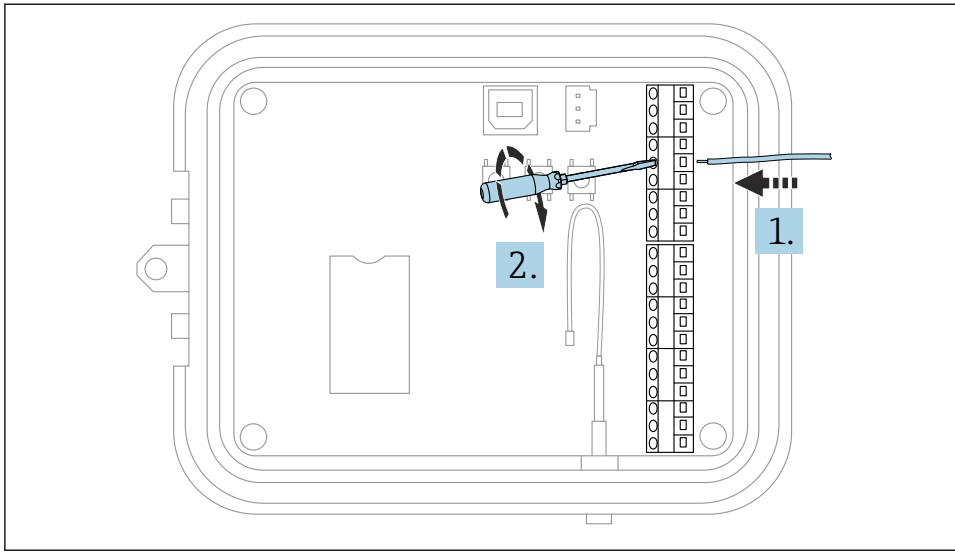
### 10.3.2 Insert sensor cable




*13 Insert sensor cable*

1. Run sensor cable through gland cap
2. Push sensor cable through cable gland

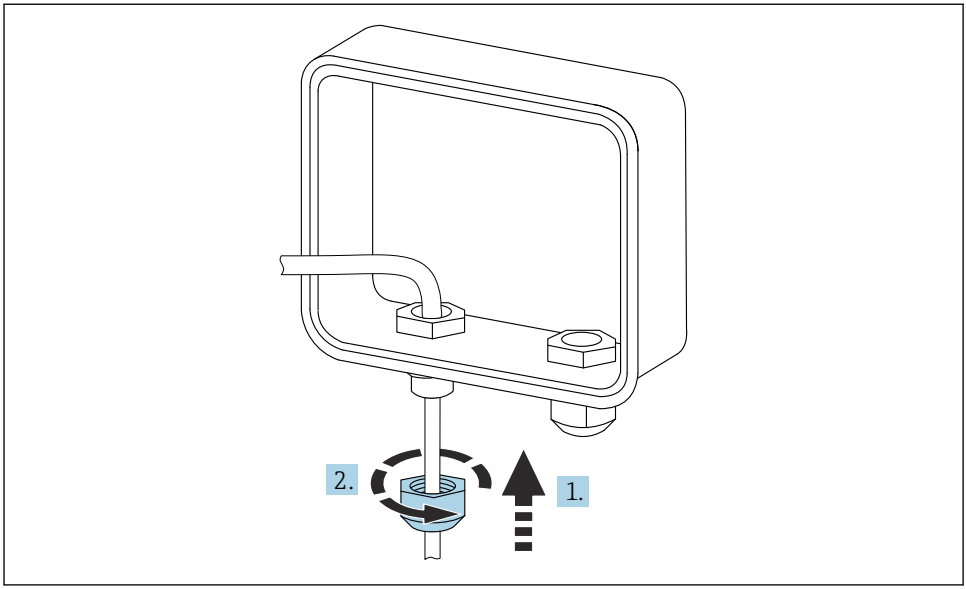
### 10.3.3 Connect wire




14 *Connect wire*

1. If necessary use screwdriver to loosen the I/O interface connector screw. Slide wire into terminal side of connector
2. Tighten screw to 0.2 Nm to secure wire to connector

### 10.3.4 Tighten gland cap




*15 Tighten gland cap*

1. Push gland cap to gland
2. Tighten cap to the cable gland to seal and secure the wire

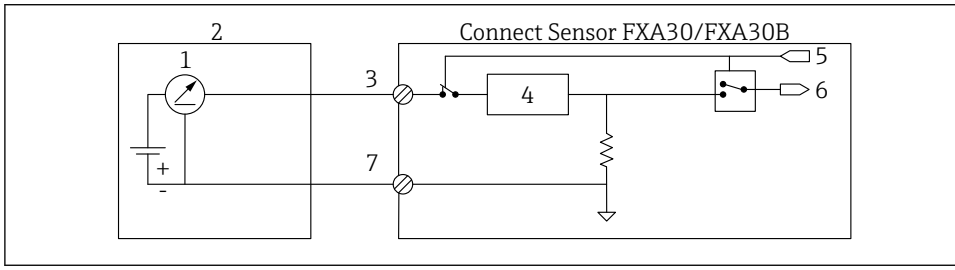
## 10.4 Analog input

The analog inputs have the following modes of operation, which are disabled by default.

### 10.4.1 Current loop

Connect Sensor FXA30/FXA30B can monitor a 4 to 20 mA current input. The following schematics show wiring options for 4 to 20 mA inputs.

#### Self-powered

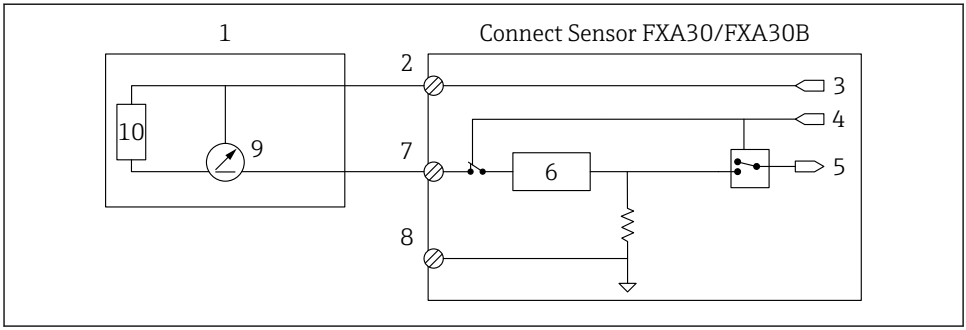



*16 This figure shows the schematic when the external sensor is self-powered or powered from a source other than Connect Sensor FXA30/FXA30B.*

*1 4 to 20 mA Output*
*2 External Sensor*
*3 Analog Input*
*4 Current Loop Protector*
*5 Analog Select Signal (Current Mode)*
*6 Analog Input*
*7 Analog Ground*

### 2-wire (loop-powered) sensors

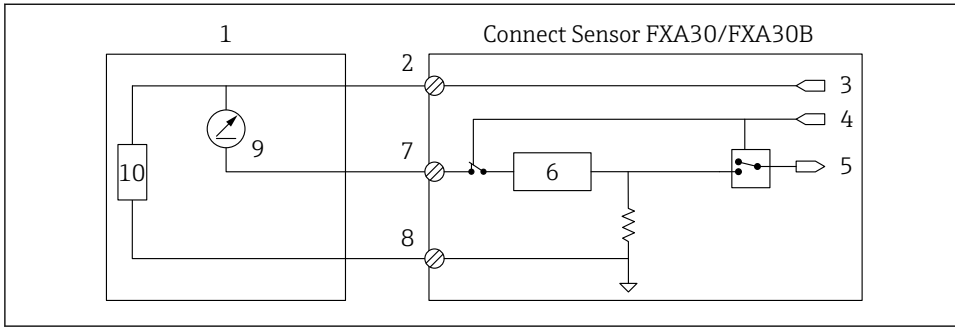
You can connect the Connect Sensor FXA30/FXA30B to a 4 to 20 mA 2-wire sensor, which is also known as a loop-powered sensor.




17 *This figure shows the schematic when using power from the Connect Sensor FXA30/FXA30B current loop to power a sensor.*

1 *External Sensor*
2 *Power*
3 *Sensor Power*
4 *Analog Select Signal (Current Mode)*
5 *Analog Input*
6 *Current Loop Protector*
7 *Analog Input*
8 *Analog Ground*
9 *4 to 20 mA Output*
10 *Sensor Circuitry*

### 3-wire sensors




18 *This figure shows the schematic when the analog power output from Connect Sensor FXA30/FXA30B is powering the sensor.*

1 *External Sensor*
2 *Power*
3 *Sensor Power*
4 *Analog Select Signal (Current Mode)*
5 *Analog Input*
6 *Current Loop Protector*
7 *Analog Input*
8 *Analog Ground*
9 *4 to 20 mA Output*
10 *Sensor Circuitry*

## 10.5 Digital Input

Connect Sensor FXA30/FXA30B has one digital input pin. You can configure the pin as a digital input or pulse counter, but not more than one input function simultaneously.

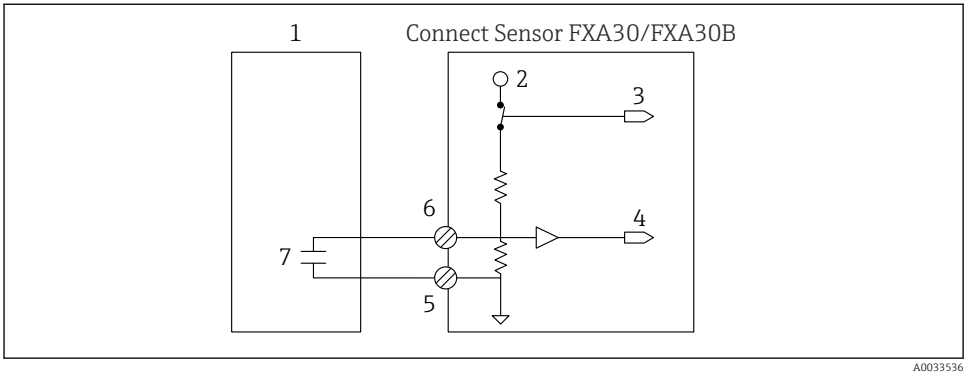
### 10.5.1 Digital input and pulse counter

When configuring the pin as a digital input, it allows the following modes of operation:

- Input mode:
  Connect Sensor FXA30/FXA30B gets the digital input value at scheduled sensor readings. You can configure Connect Sensor FXA30/FXA30B to wake from sleep mode when an input value changes (rising edge or falling edge wake).
- Pulse counter:
  When connected to a mechanical meter, Connect Sensor FXA30/FXA30B counts pulses during Connect Sensor FXA30/FXA30B sleep cycles and reports them to Connect Sensor FXA30/FXA30B during normal reporting intervals.

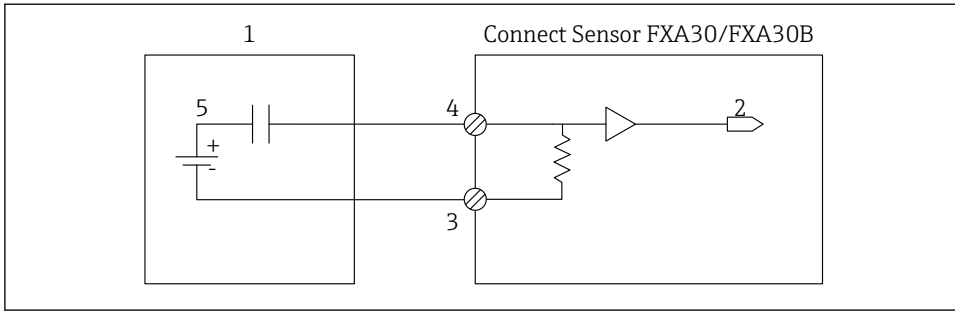
Each mode has a pull-up resistor that you can enable or disable. The pull-up indicates the digital input's state when there is no external voltage.

If you enable the pull-up resistor, it will constantly draw power. Depending on the current flow to the sensor, you may need to externally power the Connect Sensor FXA30/FXA30B.




19 *The figure shows a digital input with the pull-up resistor enabled where it is driving an external relay.*

1 *External Sensor*
2 *3.3 V*
3 *Pull-up Enable (On)*
4 *Digital Input*
5 *Digital Ground*
6 *Digital I/O*
7 *External Contact*



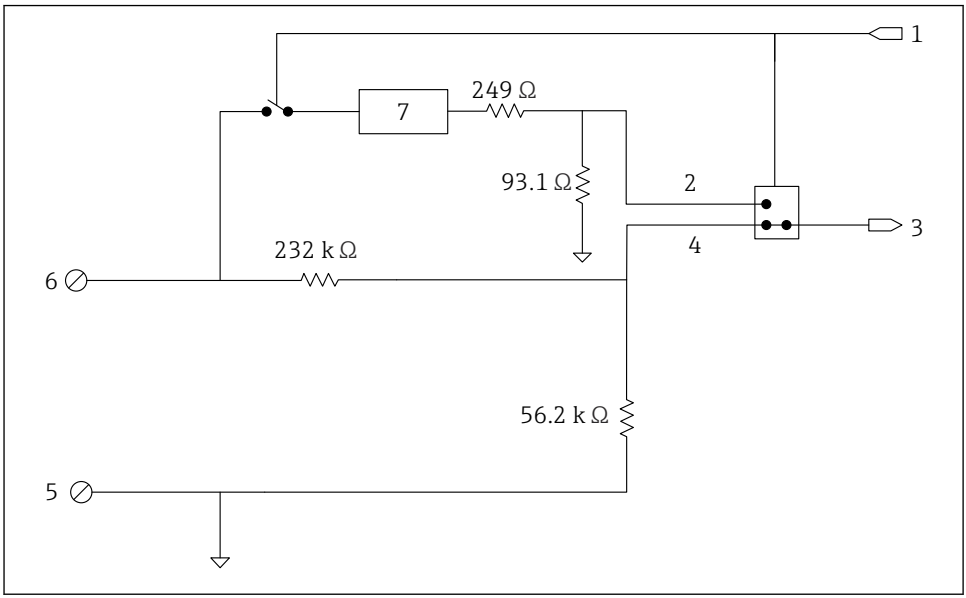

20 *The figure shows a digital input with the pull-up resistor disabled.*

1 *External Sensor*
2 *Digital Input*
3 *Digital Ground*
4 *Digital I/O*
5 *External Contact*

## 10.6 I/O schematics

The following sections show electrical wiring schematics for the Connect Sensor FXA30/FXA30B I/O connectors.

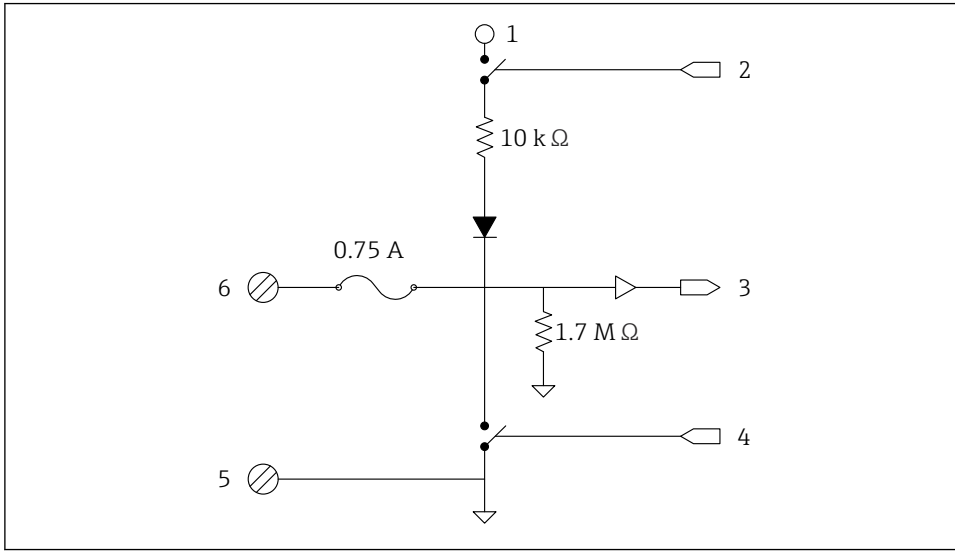
### 10.6.1 Analog input schematic




*21 The image is an overview of the analog input wiring diagrams.*

*1 Analog Select Signal*
*2 Current Loop Signal*
*3 Analog Input*
*4 Voltage Input Signal*
*5 Analog Ground*
*6 Analog input*
*7 Current Loop Protector*

### 10.6.2 Digital I/O schematic




22 *The image is an overview of the digital I/O wiring diagrams.*

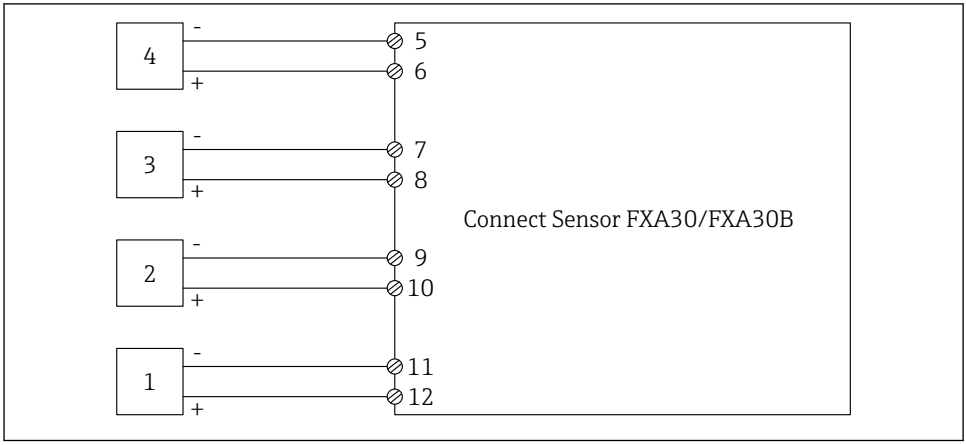
*1 Analog Select Signal*
*2 Current Loop Signal*
*3 Analog Input*
*4 Voltage Input Signal*
*5 Analog Ground*
*6 Analog input*
*7 Current Loop Protector*

## 10.7 Wiring Overview

The analog inputs have the following modes of operation, which are disabled by default.

### 10.7.1 Standard Firmware

Wiring Connect Sensor FXA30/FXA30B with Standard Firmware




*23 Standard Mode*

*1 External Sensor (1)*
*2 External Sensor (2)*
*3 External Sensor (3)*
*4 External Sensor (4)*
*5 A4IN (Analog Input 4)*
*6 A4Pwr (Sensor 4 Power)*
*7 A3IN (Analog Input 3)*
*8 A3Pwr (Sensor 3 Power)*
*9 A2IN (Analog Input 2)*
*10 A2Pwr (Sensor 2 Power)*
*11 A1IN (Analog Input 1)*
*12 A1Pwr (Sensor 1 Power)*

# 11 Commissioning into FIS

## 11.1 Introduction

Field Information Server (FIS) is a web-based operating portal for managing the lifecycle and diagnostics of worldwide applied gateways in the Inventory Management System.

## 11.2 Requirements for the personnel

The personnel for configuration, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Trained, qualified specialists: must have a relevant qualification (training) for this specific function and task
- Are authorized by the hosting service owner (Endress+Hauser)
- Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- Following instructions and basic conditions

Facility operating personnel is not supposed to have access to this system.

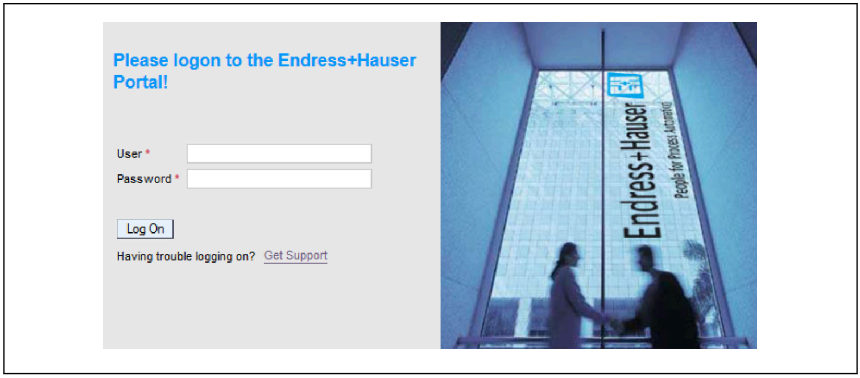
## 11.3 Starting the program

The use of following Web Browsers is recommended to avoid any drawback and ensure that all features are supported:
- Internet Explorer 11
- Firefox® > 38.0 or later
- Chrome™ browser > 36.0 or later

Please, notice that the number of visible functionalities inside the menus or elements inside a page, depends on user access rights.

1. Start your Web browser

2. Specify the URL for the Field Information Server. The URL is:
**https://portal.endress.com**
   ↳ The following page appears:

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3. Enter your **User** name (login name) and your **Password**
4. Click **Log On** to confirm your entries
5. The first time you log on, you are asked to change your password
   ↳


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6. Click to edit the password.
7. Enter your current password in the **Old password** field. Enter your new password in the **New password** and **Repeat** fields.
8. Click to save the new password.

If the password is not correct, you are asked to enter the password again. If you have forgotten or want to reset your password, use the **Get Support** link on the **Log in** page.

For details about Field Information Server (FIS) please refer to the online help via the menu “Help”. All FIS views and parameters are described.

# 12 Diagnostics and troubleshooting

This section provides troubleshooting information and resources for Connect Sensor FXA30/FXA30B. You need physical access to the device to perform the procedures in this section.

## 12.1 LEDs used for troubleshooting

Use the Connect Sensor FXA30/FXA30B 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 FXA30/FXA30B is powered and all LEDs are off, it is in sleep mode.

Details → 14

## 12.2 Device not responding

Try the following procedures when your Connect Sensor FXA30/FXA30B 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.

### 12.2.1 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

### 12.2.2 Reset the device

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

1. Open the Connect Sensor FXA30/FXA30B enclosure.
2. Press the **Reset** button to force a reset when the Connect Sensor FXA30/FXA30B device does not respond to any inputs.
   ↳ Pressing **Reset** cancels all operations and completes a power cycle, then Connect Sensor FXA30/FXA30B 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.

### 12.2.3 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 FXA30/FXA30B 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 FXA30/FXA30B to work with your sensors and environment.

## 12.3 Device not connected to the cellular network

When Connect Sensor FXA30/FXA30B 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 still cannot connect to the cellular network, get the network connection status from the device. Then please contact Endress+Hauser for support: www.addresses.endress.com

## 12.4 Basic cellular connection troubleshooting

The following basic troubleshooting steps resolve most cellular connection issues for a Connect Sensor FXA30/FXA30B. You need physical access to the device to complete the steps.

### 12.4.1 Verify SIM configuration

Verify the following for your device:

1. Make sure the SIM card is inserted correctly into the SIM tray; see → 27
2. Make sure you are using the correct APN and that the PIN, user name, and password are configured, if required; see → 28
3. Contact your cellular service provider to make sure your SIM card is activated and assigned to a contract.

### 12.4.2 Check cellular antenna

Make sure the cellular antenna is securely installed on the device and is not damaged.

### 12.4.3 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:

1. Move the device to an area with adequate cellular network coverage
2. Use a cabled antenna to move the antenna to get a better signal without moving the device

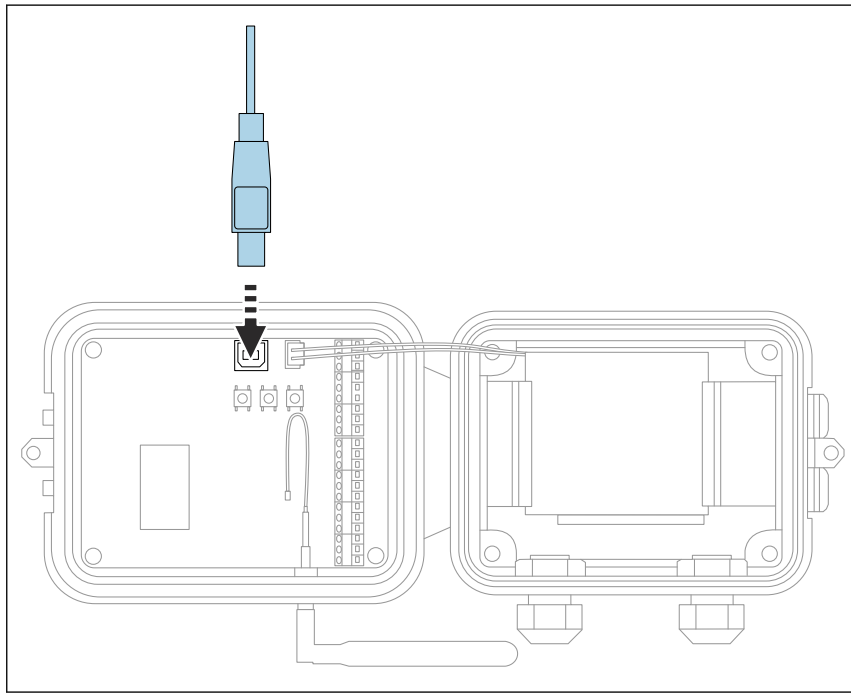
### 12.4.4 Check battery life

Older batteries may not have enough power to connect to the cellular network and you may need to replace the battery. If Connect Sensor FXA30/FXA30B has been deployed awhile, check the battery life:

Connect to your device using the CLI:

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. You may need to install device drivers or wait for your computer to automatically install them when connecting Connect Sensor FXA30/FXA30B to a computer using a USB cable. Digi recommends drivers available at http://www.ftdichip.com/Drivers/VCP.htm.



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3. Open a terminal program on a computer and connect to Connect Sensor FXA30/FXA30B using the following configuration:
   - **Connection port:** Connect to the COM port associated with the USB cable connected to Connect Sensor FXA30/FXA30B
     **Baud rate or bits per second:** 115200
     **Data:** 8 bit
     **Parity:** None
     **Stop:** 1 bit
     **Flow control:** None
4. Press the **Wake** button and wait 5-10 seconds after the cellular LED starts blinking.
5. Type **status** at the command prompt.
6. Find the **Battery Life** field to see how much battery life remains.
7. Replace the battery, if needed.

## 12.5 Device does not connect to Field Information Server (FIS)

If your Connect Sensor FXA30/FXA30B does not connect to Field Information Server (FIS)

1. Get the correct 15-digit device IMEI number on the Connect Sensor FXA30/FXA30B label.
2. Go to FIS and sign in with your user name and password.
3. Verify that the 15-digit device IMEI number on the Connect Sensor FXA30/FXA30B label is the same as the one in FIS.
4. Add your device to FIS if the numbers do not match.


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