

Cobalt X1 / X2

OCEAView

User guide for firmware version 2.10



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- 2014/35/EU Low Voltage Directive
- 2011/65/EU Restriction of Hazardous Substances Directive



상호명: (주)테솔

기자재명칭(모델명): Cobalt X Data Logger

제조사: DICKSON

인증번호: R-R-TES-CobaltX

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1 Introduction

Congratulations and thank you for choosing Cobalt X, a powerful and flexible wireless data logger created by Dickson.



Starting with firmware v2.9, Cobalt X data loggers can connect to the DicksonOne Cloud monitoring solution.

For more details, please check the appropriate DicksonOne Cloud documentation.

This User Guide presents an overview of Cobalt X, along with practical instructions to get your data logger(s) up and running quickly as part of the OCEAView monitoring solution. This document focuses primarily on the data logger's physical and hardware aspects.

Detailed configuration instructions and software settings are provided in related documentation, notably:

- OCEAView, a complete Cloud and On-premises sensor monitoring solution by Dickson
- Dickson LoRaWAN-enabled gateway
- Dickson OCEABridge Bluetooth-enabled gateway

1.1 About this User Guide

1.1.1 Terminology

Here are some terms and references that are used regularly throughout this User Guide.

Alarm	An alarm occurs when the system observes a sensor reading that is outside programmed range limits, such as a temperature reading that is too high or too low (also referred to as an excursion). When an alarm occurs, the system can notify users by sending an alert.
Alert	The OCEAView solution alerts users when an alarm occurs. Alert notifications can be sent to users via e-mail, voice message, or SMS/text. The system can also trigger Dickson alert devices.
Bluetooth®	Short-range wireless communication protocol, generally used in point-to-point connections (i.e. between a

smartphone and a data logger). Wireless range with Bluetooth Smart reaches up to about 100 feet (~30 meters).

Data logger	Refers to Cobalt X data logger device.
Dry Contact input	Binary state detection, also known as "open/closed" detection.
Equipment	Refers to the equipment or space (such as a refrigerator, freezer, incubator, cold room, etc.) for which you wish to monitor one or more physical parameters.
LoRaWAN®	Very-long-range wireless communication protocol offering line-of-sight range up to nearly 10 miles (about 15 km).
OCEAlert™	International Internet-based platform that delivers alerts to cellular phones via SMS/text messages and voice calls. The OCEAView platform includes e-mail alerts by default.
OCEAView™	Web platform monitoring solution that allows you to configure, manage, and monitor your Cobalt X data loggers.
Smart-Sensor™	Dickson technology that simplifies sensor management, notably by storing calibration and sensor information to provide plug-and-play operation.

1.2 OCEAView / Cobalt X solution overview

Cobalt X data loggers monitor temperature, humidity, and other physical parameters that may be critical in life science, pharmaceutical, and agri-food sectors. Combined with the OCEAView web application, Cobalt X data loggers provide a flexible solution for monitoring parameters simultaneously on several pieces of equipment in your lab or storage facilities. Cobalt X1 supports two active data logging sessions; Cobalt X2 supports up to four active data logging sessions. The two products are otherwise identical.

1.2.1 LoRaWAN vs Bluetooth wireless topologies

The OCEAView / Cobalt X solution implements both Bluetooth and LoRaWAN wireless technologies, offering a nearly identical usage model in both cases.

- **LoRaWAN** is a long-range wireless technology (with range up to about 10 mi./15 km) whose architecture is based on a “star” topology in which wireless data loggers connect to a gateway communicating bi-directionally with a server that collects and analyzes information collected by sensors (either on the Cloud or on-site). LoRaWAN’s long range connectivity greatly simplifies installations on geographically large sites, where a single gateway is often sufficient to cover entire complexes and campuses.

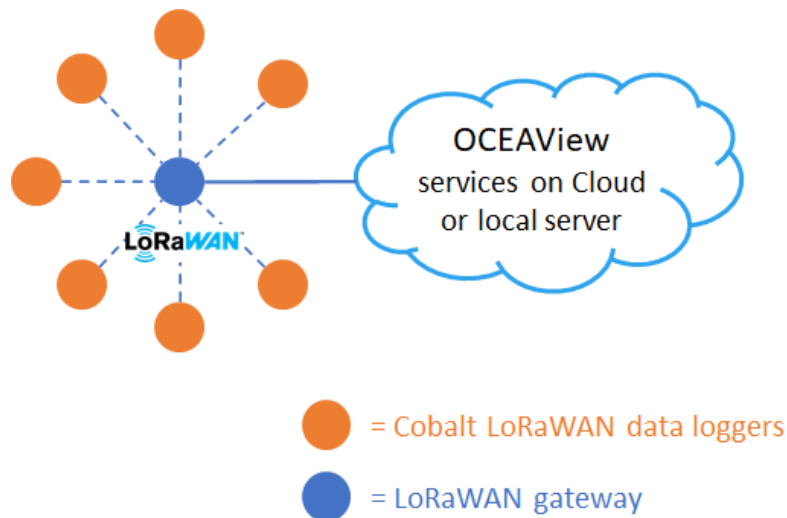


Figure 1 – Data loggers in LoRaWAN mode communicate with a LoRaWAN gateway connected to the OCEAView web platform

- **Bluetooth** is a shorter-range wireless technology (with range up to about 100 feet/30 m) commonly found in mobile and low-energy devices. Bluetooth architecture is generally based on a “point-to-point” connection between two devices directly. However, the OCEABridge Bluetooth Gateway simulates a star network topology by collecting data contained in Bluetooth advertising frames emitted by Cobalt X data loggers and sending

the data to the server automatically. This solution notably enables sensor read times as low as 5 seconds (in specific cases) and cost-effective coverage in areas with a low number of sensors.

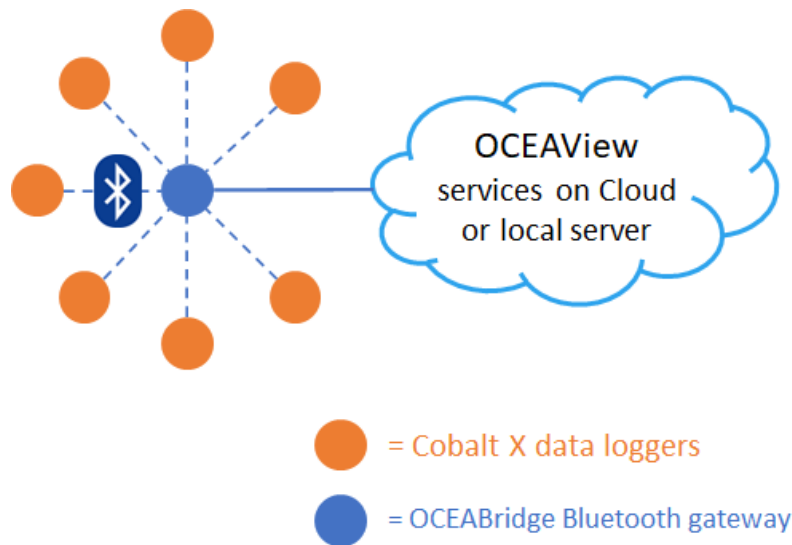


Figure 2 – Data logger in Bluetooth mode with OCEABridge gateway



The usage model described in the OCEAView User Guide is identical for both LoRaWAN and Bluetooth operation.

1.2.2 Cobalt X data logger features

Monitoring

- Multi-parameter sensor monitoring, with support for a variety of Dickson Smart-Sensors, digital and Pt100 sensors, and Dickson Atlas and Emerald Bluetooth-enabled wireless sensors
- Automatic recognition of connected sensors
- Configurable high/low alarm and warning limits, delays, alerts, reading and transmission intervals
- **New in firmware version 2.10:** pause alarms and warnings from 30 minutes to 72 hours, before or after excursion occurs
- Calibration parameters embedded directly in Smart-Sensors for ease-of-use and standard exchange for periodic calibration, with parameters taken into account automatically
- Unlimited data storage on OCEAView web platform
- Internal data logger memory for up 4,000 readings per sensor channel (8,000 total on Cobalt X1; 16,000 total on Cobalt X2)
Note: memory capacity for the dry contact sensor channel is 1,800 readings
- Immediate alarm transmission
- ISO 17025 (COFRAC) calibration, Dickson certified laboratory calibration, or NIST traceable calibration

Wireless connectivity

- LoRaWAN long-range, low-power wireless connectivity
 - Automatic wireless connection to LoRaWAN enabled gateway
- Bluetooth Low Energy for shorter range wireless connectivity
 - Automatic data collection by OCEABridge Bluetooth enabled gateway

Data logger highlights

- 2.4-inch color resistive LCD touch screen (usable with gloves)
- Runs on two LS17500 batteries or optional 5V USB adapter
- Integrated alarm buzzer
- Translucent outer ring lights up to provide visual alert
- Dry contact sensor cable input (available as of firmware version 2.6.x)

1.2.3 Information flow

The diagram below summarizes the information flow between Cobalt X data loggers and the OCEAView platform.

Remember, Cobalt X data loggers can be used with either LoRaWAN or Bluetooth wireless connectivity. Your choice of technologies depends on your specific needs and site requirements.

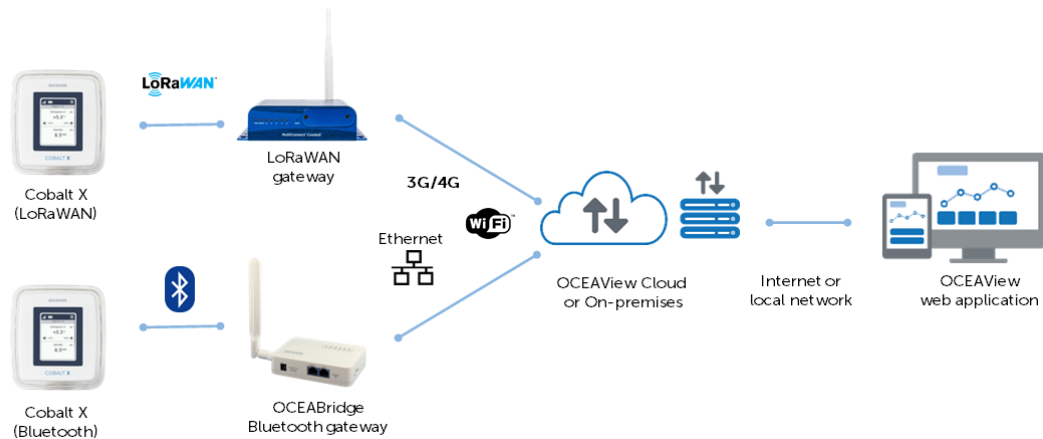


Figure 3 – Data loggers communicate with the web platform via a LoRaWAN or Bluetooth gateway within wireless range

1.2.4 LoRaWAN operation overview

Step	Process	Comments
1	Place your Cobalt X data logger as required to monitor your equipment.	For best wireless performance, follow recommendations when physically placing your data logger, as described in <i>section 4 - Placing your Cobalt X data logger, p. 38</i> .
2	<p>Plug in wired sensors (recognized automatically) and/or pair Bluetooth sensors.</p> <p>Use the data logger's touch screen to connect wirelessly to your LoRaWAN gateway.</p>	
3	<p>Login to the OCEAView web application</p> <p>Set up your data logger and configure data logging settings, such as upper and lower limit alarm and/or warning values. Push the configuration to your Cobalt X data logger. The data logger is updated, and data logging begins.</p>	The OCEAView application enables you to control every aspect of your system, including user authentication, alarm settings, data logging, data analysis, reports, and more.
4	The data logger data logger collects data from its sensors and transfers the information wirelessly to the LoRaWAN network.	Installed at your site, your LoRaWAN gateway transmits locally collected sensor data via the Internet to the web platform or your server as programmed.
5	Uploaded data logging details are accessible in the OCEAView web application and recorded in an audit trail.	You may use personal computers with web browser to access readings and alarms.

1.2.5 Bluetooth-only operation overview



The steps described here require the presence of a properly configured OCEABridge Bluetooth enabled gateway to communicate with OCEAView on the Cloud.

Step	Process	Comments
1	Place your Cobalt X data logger as appropriate to monitor your equipment.	Remember that Bluetooth connectivity is limited to about 30 meters. Keep the data logger in an area that is as unobstructed as possible.
2	<p>Use the data logger's touch screen to deactivate LoRaWAN connectivity (Menu → Advanced → [PIN code] → OK → LoRaWAN → On/Off → Off → Save)</p> <p>Plug in wired sensors (recognized automatically) and/or pair Bluetooth sensors.</p>	Bluetooth remains active when you deactivate LoRaWAN functionality.
3	<p>Login to OCEAView web application</p> <p>Set up your data logger and configure data logging settings, such as upper and lower limit values. Push the configuration to your Cobalt X data logger. The data logger is updated, and data logging begins.</p>	The OCEAView application enables you to control every aspect of your system, including user authentication, alarm settings, data logging, data analysis, reports, and more.
4	The data logger data logger collects data from its sensors and continually transmits Bluetooth advertising frames containing information, which is collected and forwarded to the web platform by the OCEABridge gateway.	A Bluetooth gateway installed at your site transmits locally collected sensor data via the Internet to the web platform.
5	Uploaded data logging details are accessible in the OCEAView web application and recorded in an audit trail.	

1.3 Hardware overview

1.3.1 Front view

The front of the Cobalt X data logger is comprised of a touch screen LCD and a translucent LED status ring around the casing. The touch screen shows data collected by the sensor(s) and gives you access to the setup menus. The status/alarm LED provides visual indications of the data logger status. For LED color indications, see section 8.1 – *LED status indications*, p. 119.

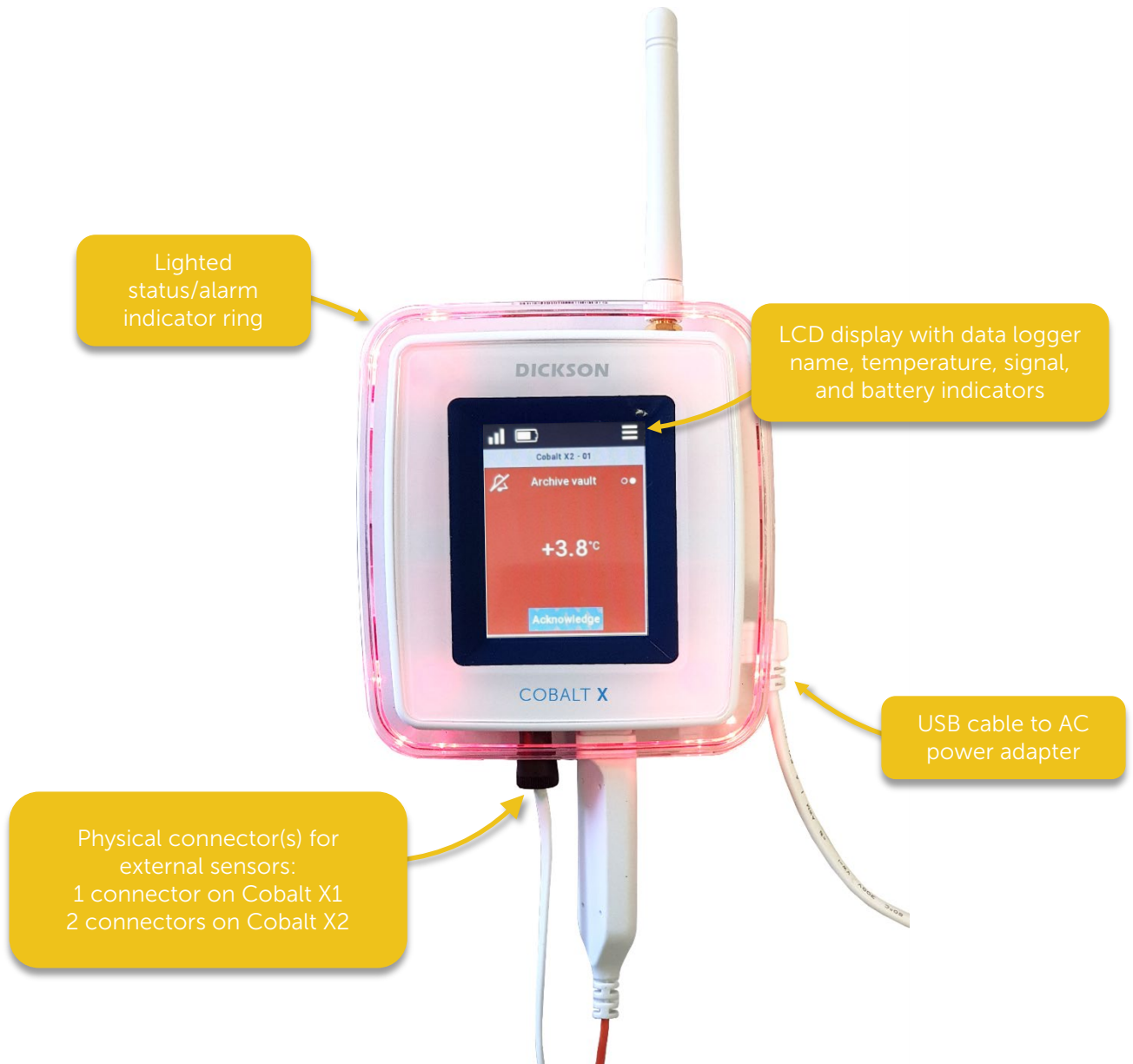


Figure 4 – Cobalt X2 data logger with two external sensors

1.3.2 Rear view

The battery compartment is located on the back of the data logger. The rear of the data logger has a slot to attach the data logger to the plastic holder using a small padlock (optional). See Chapter 4 – *Placing your Cobalt X data logger*, p. 38, for mounting information.

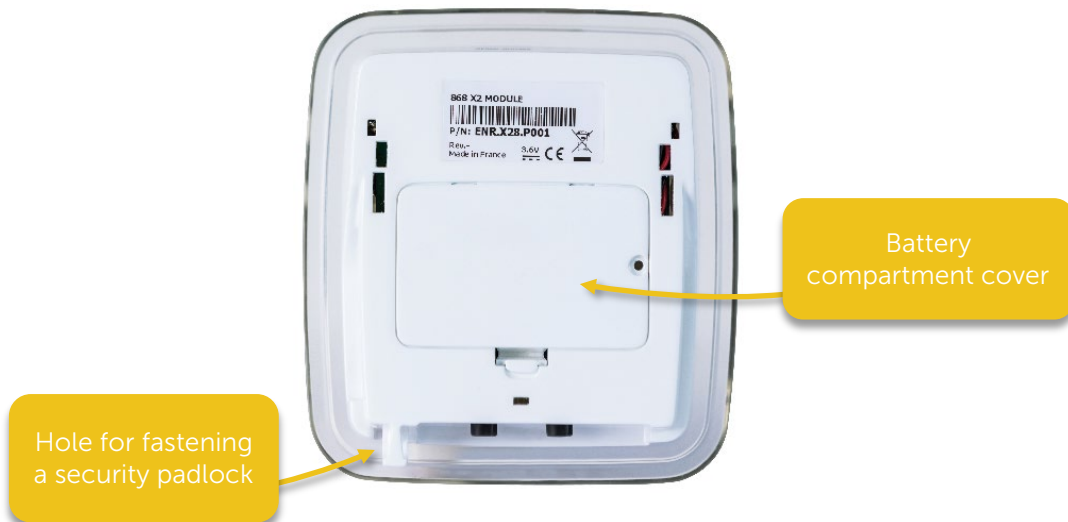


Figure 5 – Rear view of the Cobalt X data logger

1.3.3 Side view

The right side of the Cobalt X data logger features a USB port to power your data logger using the 5V micro-USB adapter (optional).

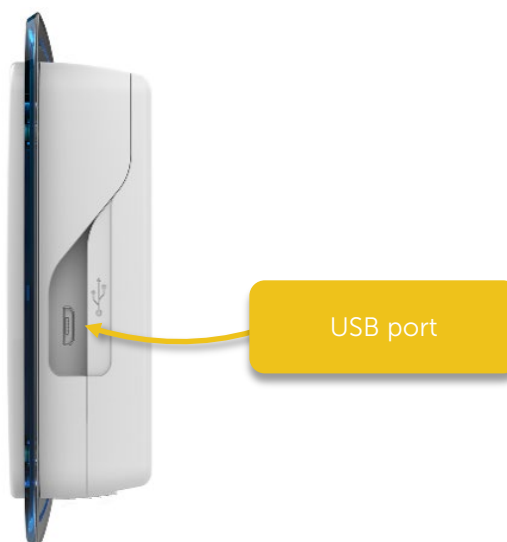


Figure 6 – Side view of the Cobalt X data logger

1.3.4 Bottom view

Cobalt X data loggers support a combination of wired or wireless sensors:

- Up to four simultaneous sensor channels on Cobalt X2
- Up to two simultaneous sensor channels with Cobalt X1

Plugs for connecting wired sensors are located at the bottom of the unit (two physical connectors on the X2 model and one physical connector on the X1 model). These plugs support both single and multiple sensor probes.

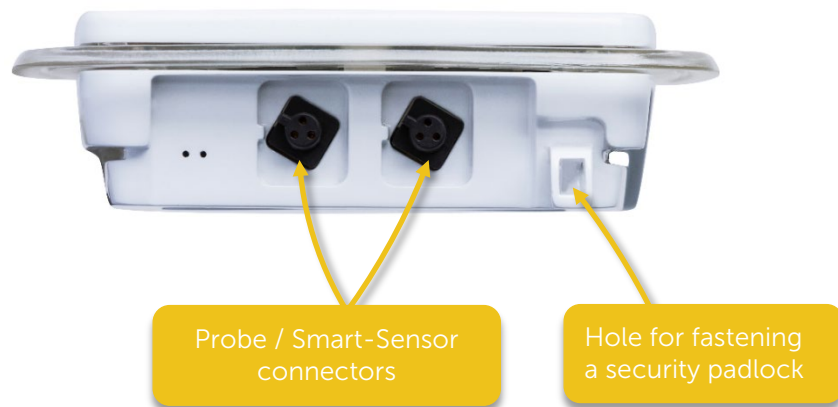


Figure 7 – Bottom view of Cobalt X2 (with two connectors)

1.3.5 Compatible sensor types

Cobalt X data loggers support a range of Dickson external digital temperature sensors, Smart-Sensors, and Bluetooth wireless sensors:

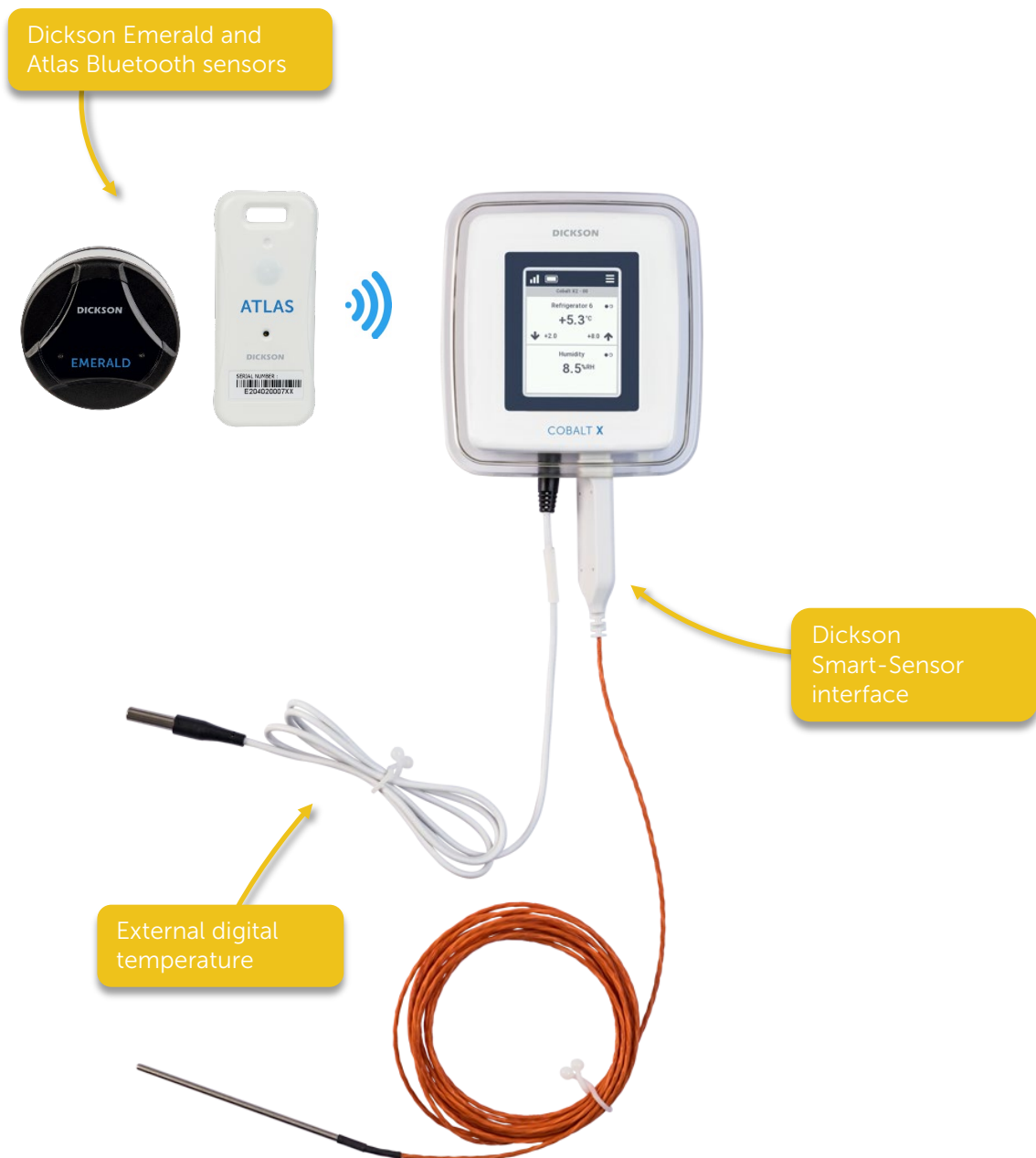


Figure 8 – Cobalt X data logger with Dickson wired and wireless sensors.

Please check with your authorized Cobalt X representative for the latest information on available sensors.

1.4 Package contents

- 1 Cobalt X1 or Cobalt X2 wireless data logger with antenna
- Two 3.6V LS17500 batteries (with screw for battery cover)
- Mounting kit
 - Plastic mounting cradle with screw holes
 - Adhesive-backed magnet (already attached)
 - Plastic ties and adhesive hooks for arranging cables
- Flat sensor extension cable with Binder connector – 1 cable with Cobalt X1 or 2 cables with Cobalt X2 (1.5 m / about 5 feet)
- Safety instructions

Optional

- 5V AC/DC adapter with micro-USB cable
- 1 calibration certificate per sensor (if purchased with calibration option)
- Round cable / flat ribbon cable for external digital temperature sensor

2 Technical specifications

2.1 Characteristics

2.1.1 General

- Color LCD display: 2.4"
- Touch screen: Resistive
- Number of sensor channels (simultaneous data logging sessions):
X1: 2 channels, X2: 4 channels
- Number of sensors (wired and/or wireless):
X1: One physical plug (supports 1 single, dual, or triple sensor) and up to four Bluetooth wireless sensors. For a triple sensor connected to a Cobalt 1 data logger, only two sensors can be used simultaneously.
X2: Two physical plugs (supports 2 single, dual, or triple sensors) and up to four Bluetooth wireless sensors
***NOTE:** It is important to distinguish between the number of sensors assigned to a given data logger, and the number of simultaneous data logging sessions you can have. For example, you could physically plug two triple-sensors AND pair up to four wireless sensors on an X2 data logger. In that case, the data logger has ten total available sensors, but you can only use four of them at a time for data logging.*
- Audible alarms: buzzer
- Power Supply: batteries or micro-USB (5V)
Please note that the AC power adapter (5V DC/1.2A) is provided separately. Batteries must be replaced by qualified technicians only.

2.1.2 Wireless technologies

- LoRaWAN® wireless connectivity for data transmission
- Bluetooth Low Energy (BLE, also referred to as Bluetooth Smart) technology for use with Bluetooth-enabled wireless sensors and OCEABridge Bluetooth gateway

2.1.3 Monitoring

- Read interval:
Bluetooth operation: 5 seconds minimum on Cobalt X1 or 15 seconds minimum on Cobalt X2, up to 12 hours maximum.
LoRaWAN operation: 1 minute to 12 hours (depending on the transfer interval configured in OCEAView)
- Data storage:
 - Unlimited on OCEAView web platform
 - 4,000 readings per sensor channel stored in internal data logger memory
Note: internal memory capacity for the dry contact sensor channel is 1,800 readings
- 1, 2, or 4 sensor tiles displayed simultaneously
- Color LED indicator for alarm status or Bluetooth communication

2.1.4 Operating and storage conditions

- Indoor use only in non-harsh environments (IP30 standard; optional IP67 external case for protection against shocks, vibrations, cleaning operations)
- Maximum mounting height under 2 meters (about 6.5 feet) from the floor
- Data logger operating range:
Standard data logger: 0 °C to +50 °C (+32 °F to +122 °F); 0 to 90% RH (non-condensing); with optional IP67 casing: -10 °C to +50 °C (+14 °F to +122 °F); 0 to 99.9% RH (non-condensing)
- Data logger storage conditions: -10 °C to +60 °C (+14 °F to +140 °F); 0 to 90% RH (non-condensing); optimal storage around 25 °C (77 °F)
- Pollution degree: 2 (normally only non-conductive pollution is supported; temporary conductivity caused by condensation is to be expected)

2.1.5 Casing and dimensions

- Product protection: designed for indoor use only
- Casing: ABS plastic
- Weight with batteries: 180 g (6.4 oz.)
- Dimensions: 100.8 x 110.8 x 296 mm (4 x 4.4 x 1.1 in.)

2.2 Dimensions

2.2.1 Data logger (in mm)

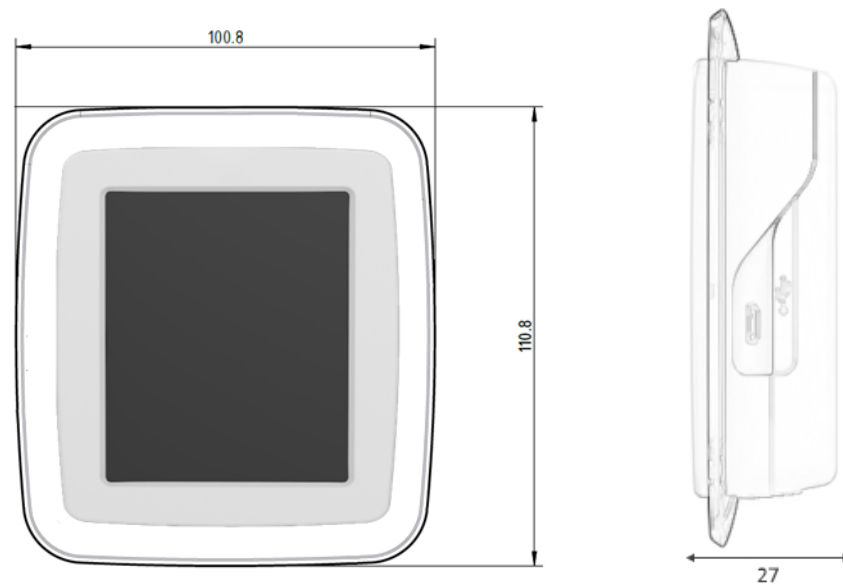


Figure 9 – Cobalt X data logger dimensions

2.2.2 Mounting kit (in mm)

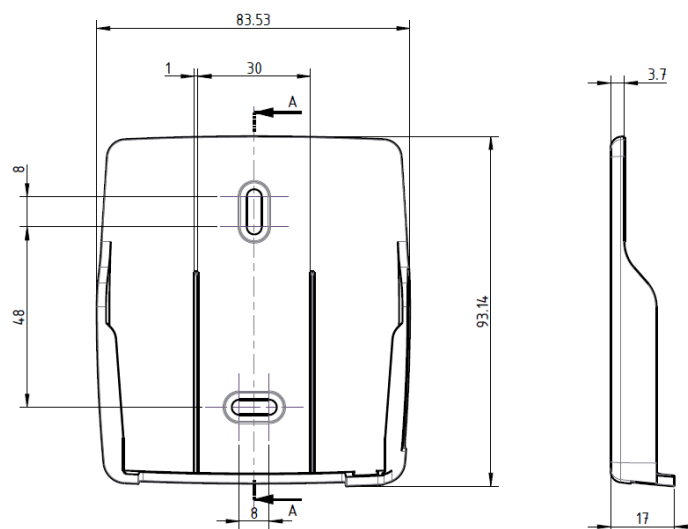


Figure 10 – Cobalt X mounting kit details

2.3 Power options

The Cobalt X data logger can be powered by two replaceable internal batteries (3.6 V) located on the back, or by AC power using the optional 5 Volt DC adapter.

2.3.1 Battery specifications

- 2 x SAFT LS17500 batteries: Lithium thionyl chloride, A-size bobbin cell
- Nominal voltage: 3.6 V
- Nominal capacity: 3600 mAh
- User-replaceable: Yes
- Battery life up to 2 years depending on usage.

See *section 9 – Maintaining your Cobalt X data logger, p. 128* for battery replacement instructions.

2.3.2 AC adapter (optional – provided separately)

- Input: 100 – 240 VACS (auto-switching)
- Output: 5VDC – 1.2A
- Cable: Micro USB



Use appropriate AC power supply in compliance with regulatory requirements and safety practices.



If plugged into AC power, your Cobalt X data logger will switch automatically to battery operation in the event of a power outage.

If that happens, an alert is sent immediately to the appropriate contact or alert device as configured the OCEAView web platform.

3 Getting started

3.1 Prerequisites

- An operational gateway:
 - For **LoRaWAN** operation: Dickson LoRaWAN gateway installed and setup to connect to the OCEAView web platform
 - For **Bluetooth** operation: OCEABridge Bluetooth gateway installed and setup for web platform connectivity
- 110 – 240 V AC power source and/or batteries installed in data logger
- Desktop or laptop computer with a supported web browser application (see OCEAView web application user documentation for details)
- Access to the OCEAView Cloud or On-premises platform
- OCEAView web account with at least one configured user

3.2 Attaching the antenna

The Cobalt X data logger requires an antenna to connect properly to your LoRaWAN network. The antenna is provided in the package with your data logger.

Attach the antenna to the data logger as shown here:

1. Place the antenna on the metal connector on the Cobalt X data logger.



Figure 11 – Place antenna on connector

2. Turn the ring clockwise and hand-tighten to attach the antenna firmly.



Figure 12 – Turn ring to secure the antenna to the data logger

3.3 Using the mounting cradle

The Cobalt X data logger includes a mounting cradle with a pre-attached magnet for adhering to metal surfaces. It is imperative to thoroughly clean the mounting surface before placing the data logger cradle.

The cradle may also be mounted with screws.

3.3.1 Using the magnet

1. Clean and dry the surface on which you will be mounting the data logger.



2. Place the mount on the cleaned metal surface, then slide the data logger down into position until it sits firmly in the cradle.



3.3.2 Mounting the cradle with screws



Please make sure any screws and anchors you use are compliant with local regulatory requirements and safety practices.

1. Insert the screws through the holes in the mounting cradle on the desired surface.
2. Hand-tighten the screws firmly (overtightening the screws may break the cradle).



3. Slide the data logger down into position until it sits firmly in the cradle.



To prevent removal, you may attach the data logger to the holder using a small padlock (not included):



3.4 Activating your Cobalt X data logger

To activate your Cobalt X data logger and enable it to communicate with the web platform, follow these steps:

1. Locate the Lithium batteries provided in the product box.
2. Insert the provided batteries in the battery compartment, making sure to respect polarity (+/-) as indicated on the printed image inside the compartment):



Figure 13 – Respect battery polarity indications inside battery cavity

3. Put the battery cover in place.

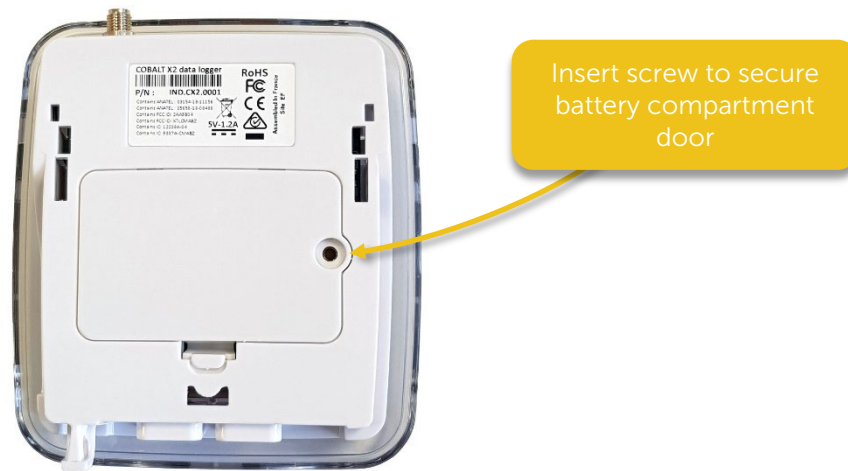


Figure 14 – Install the battery cover

4. Insert the provided screw to hold the battery cover in place, being careful not to over-tighten it.
5. Wait during the boot sequence.

To power your data logger using the AC adapter:

1. Plug the AC adapter into an electrical power outlet.
2. Insert the adapter's cable into the USB port located on the side of the Cobalt X data logger, keeping the 3.6V batteries installed as back-up.



Do not remove batteries from your data logger even when using the AC adapter. The batteries serve as a backup, with the power supply switching automatically to the batteries in case a power failure occurs. You may change the batteries without losing any data as long as the AC adapter remains plugged in. *You may also change batteries one after the other to maintain power during the process.*



Using the AC adapter to provide power to the Cobalt X enables the data logger to use "full power" mode for wireless connectivity, instead of the "low power consumption" mode used to optimize battery usage. This means that communication – such as updating data logging parameters on the data logger from the server – may be faster when using AC power.

3.5 LoRaWAN network selection

This section assumes that your LoRaWAN-enabled gateway is up and running and within wireless range of the Cobalt X data logger you are trying to connect.

After powering up the Cobalt X data logger:

1. Select the server platform you want to use:

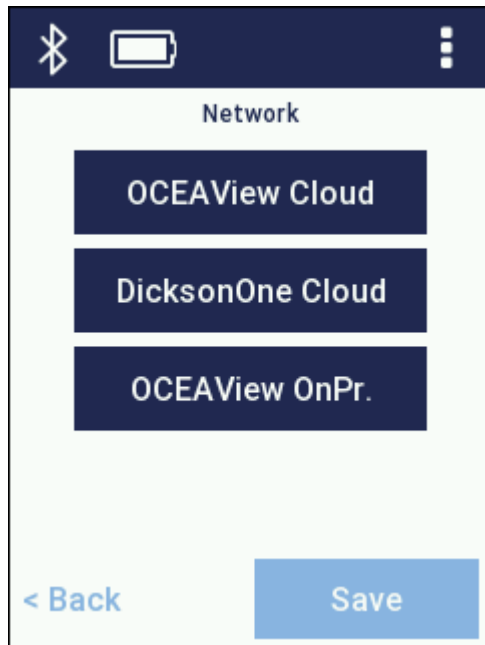


Figure 15 – Select the appropriate monitoring solution platform

The options available here are:

OCEAView Cloud	Public Cloud solution
DicksonOne Cloud	Public Cloud solution
OCEAView On-prem	On-premises solution (requires you to enter a customer key)



As of firmware v2.9, Cobalt X data loggers can connect to the DicksonOne Cloud monitoring solution. For details, please check the appropriate DicksonOne Cloud documentation.

Select the option that corresponds to your situation.

2. Tap on **Save** to continue.

3. The Cobalt X ready screen is displayed as shown below, pending configuration via the monitoring application. This screen is displayed whenever data logging is not running on the data logger.

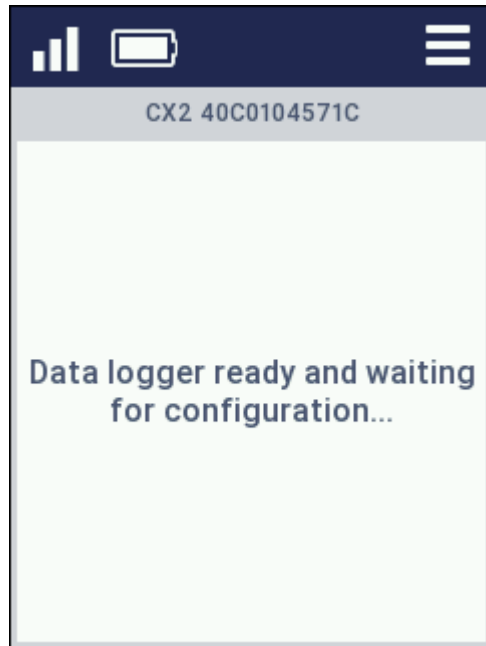


Figure 16 – Cobalt X ready screen

4 Placing your Cobalt X data logger

4.1 Optimizing wireless performance

4.1.1 General recommendations

For optimal performance, follow these recommendations when physically placing your Cobalt X data logger:

- Do not place the data logger within 40 cm (16 in.) of another data logger.
- Make sure the data logger is not placed on an electrical conduit or cable tray (such as those used for computer network cables).
- Keep about 20 cm (8 in.) of clear space around the data logger. For example, a data logger that is “stuck” between two refrigerators may not communicate effectively.

Make sure all cables, if any, are rigidly attached and that sensors are properly inserted in the appropriate space being monitored.

4.1.2 LoRaWAN

A typical LoRaWAN wireless installation involves one or more Cobalt X data loggers and a LoRaWAN-enabled gateway. Your gateway must be up and running and within wireless range of the Cobalt X data loggers you are trying to connect.

If necessary, see the Dickson LoRaWAN Gateway User Guide for requirements and details on the gateway component.

Long-range wireless connectivity enables Cobalt X data loggers to be placed nearly anywhere in your building or site. If you are using a Dickson LoRaWAN gateway and the signal is not strong enough, a second LoRaWAN-enabled gateway may be required. Please contact your authorized representative for support if you are having issues with connectivity.

- For best results, place the data logger so that it faces the general direction of the gateway (i.e. antenna vertical and not laying down on a table).

4.1.3 Bluetooth Low Energy (BLE, Bluetooth Smart)

As Bluetooth wireless technology is used to provide “short-range” connectivity (up to about 50 meters line-of-sight), the most important consideration is to keep the unit as clear as possible from surrounding obstruction.

5 Using external sensors

Cobalt X data loggers may be used with a variety of different sensor types. This document only describes the hardware aspects related to those sensors. For configuration details, please see the OCEAView web application user guide.

5.1 Dickson Pt100 Smart-Sensors

The image below shows a Cobalt X data logger with an external Pt100 sensor, connected via the specially designed Dickson Smart-Sensor interface.



Figure 17 – Cobalt X wireless data logger with a Pt100 Smart-Sensor

5.1.1 Connecting Smart-Sensors

The Cobalt X data logger and all types of external Smart-Sensors are independent from each other regarding calibration. Calibrated external Smart-Sensors store their own calibration parameters internally and can thus be plugged into any Cobalt X data logger.

Cobalt X data loggers support a specially designed Smart-Sensor technology that offers several key advantages with respect to conventional solutions:

- Calibration correction parameters are stored directly in the Smart-Sensor, which means all sensor readings are adjusted for maximum accuracy.
- You benefit from simple plug and play functionality with no special configuration or manual update required.
- Data loggers and sensors are independent: any supported sensor can be used with any Cobalt X data logger. This simplifies repairs, swap/exchange operations, and calibration procedures.



You may swap a sensor while data logging is running if, and only if, you replace the first sensor with an identical type of sensor. The data logging session simply continues uninterrupted (unless you swap sensors at the exact moment the sensor is read, in which case you will see a "Sensor fail" error for a condition that is strictly temporary, as data logging will resume as expected. More details on this are provided in *Appendix 2 - Troubleshooting on page 132*).

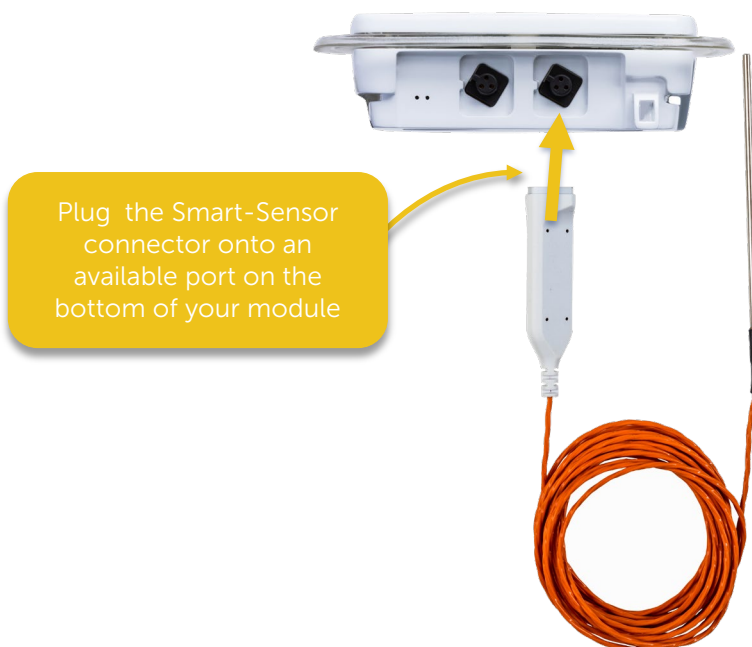


Figure 18 – Connecting an external Pt100 sensor



This feature offers an easy way to handle sensors at calibration time (depending on your standard operating procedure) without leaving your equipment unattended. Simply have an identical calibrated sensor on-hand and swap it with the one that needs calibration (replace with the same type of sensor: Pt100 with Pt100, or digital sensor with digital sensor).

5.1.2 Placing Smart-Sensors

Given the extreme temperature ranges typically handled by Pt100 sensors, please be sure to use the Pt100 compatible mounting system provided with your freezer, oven, nitrogen tank, or other equipment.

Cobalt X wireless data loggers support different Pt100 temperature sensors, each one designed for a different application and temperature range. Placement of your Pt100 sensor(s) depends on the equipment you intend to monitor. Non-exhaustive guidelines are provided in the following sections.



In all cases described in this section, the plastic connector joining the data logger and the sensor must be in the same temperature space as the data logger, not the sensor.



When routing any sensor cable, avoid direct cable contact with, or close proximity to, any high voltage wiring. Cabling must not be near any high voltage components or other electrical motors, equipment, or other potential electromagnetic sources. Avoid running the sensor cable parallel to high voltage wiring or coiling the cable in a manner that could be perturbed by electromagnetic interference.

Your equipment may be different than that described here. Contact the equipment manufacturer for instructions regarding proper sensor placement.

5.1.2.1 Pt100 for ultra-low-temperature freezers

When installing a Pt100 sensor in an ultra-low-temperature (ULT) freezer, it is easier to proceed with a thawed freezer.

When possible, route the sensor through the same access port used by the unit control sensor or an accessory port, such as that shown below in *Figure 19*.

When routing the Pt100 sensor through the same port used by the control sensor, we recommend installing the sensor only after the freezer has reached a thawed state.

To negate the possibility of condensation dripping onto electronic components, avoid routing the cable in close proximity to any electrical enclosures.

Mount the Pt100 sensor as close to the unit control sensor as possible. When possible, we recommend mounting the sensor within 5 cm (2 inches) of the control sensor.

When mounting the Pt100 sensor, avoid placing it in direct contact with the freezer wall. This will ensure the sensor is mounted to permit measurement of air temperature only.



We do not recommend installing the sensor through the door gasket on a ULT freezer. This leads to excessive ice build-up and possible door damage as well as longer compressor run times that may result in other mechanical problems.

The Pt100 (orange cable) that supports temperatures from -200°C to + 50°C may be placed inside the freezer. Make sure you attach the sensor using the provided cable-ties and then reseal any openings you may have unsealed to insert the sensor using Pergamum sealant.

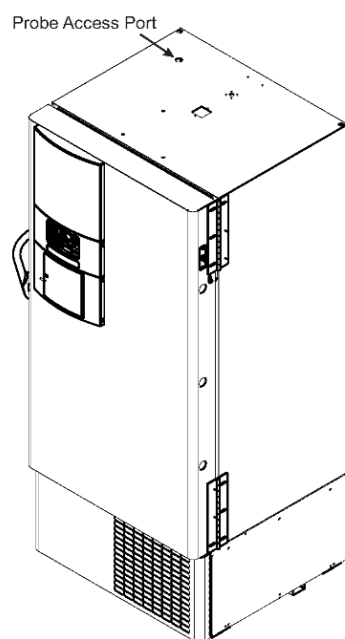


Figure 19 – Sample Pt100 access port for ULT freezer

5.1.2.2 Pt100 for liquid nitrogen and cryogenic tanks

Pt100 sensors for LN2/cryogenic tanks must be mounted, when applicable, in close proximity to the unit display sensor.

To avoid temperature measurement disparities, Dickson recommends mounting the sensor at the same height as the display sensor.

As an example, some freezers have an access panel on the back of the unit in which you may route the sensor cable up the back wall. Place the cable under the tank gasket utilizing the notch at the 12 o'clock position. We recommend the installation of Pergamum sealant where the cable passes through the notch.

Depending on whether storing in a vapor or liquid phase, place the sensor at a depth suitable for proper temperature monitoring.



Figure 20 – Pt100 (-200°C to +50°C) for nitrogen/cryogenic tank

5.2 Digital temperature sensors

Standard external digital sensors from Dickson do not connect to data loggers via the Smart-Sensor interface, which means calibration parameters must be configured manually in the OCEAView web application.



Figure 21 – Cobalt X data logger with external digital sensor

Depending on the design of the space to be monitored, you may be able to pass the sensor through an access port or opening. We recommend that you use the access port or opening if one is available.

1. When installation permits routing the sensor cabling through an access port or opening, connect the male end of the sensor firmly into the female end of the Cobalt X data logger.
2. When installation requires passage through the door gasket seal, connect the male end of the sensor into the female end of the flat cable by joining the connectors (without unscrewing them). Then, connect the other end of the flat cable into the end of the Cobalt wireless data logger.

5.2.1 Connecting a digital sensor

Simply connect the sensor cable to the data logger by plugging it in to one of the available connectors directly, as shown here:



Figure 22 – Cobalt X data logger with external digital sensor

5.2.2 Placing the sensor

1. If you have a Cobalt X data logger with one or more external sensors, the best solution is to use your equipment's access port or specific opening to insert the sensor(s). Otherwise, run the temperature sensor into the enclosure via the door joint, taking care to place the flat cable flush with the joint.



Installation through the door gasket on freezers may cause ice build-up inside the freezer and/or on the freezer door. This may result in damage to the freezer door if not properly maintained. When used with incubators, a flat cable may cause condensation, which could potentially increase the risk of contamination.

2. Clean the surface for the sensor using alcohol to remove any grease or dirt.
3. Attach one of the plastic cable holders to the sensor, remove the protective strip from the adhesive, and place the holder on the clean spot inside the enclosure.
4. Place the sensor / flat ribbon cable connector on the inside of the chamber in the same manner, as shown here:



Figure 23 – Sensor inside refrigerator chamber (external sensors only)

5. Your mounting kit includes a plastic holder that can be mounted using the provided magnet or screws. Choose the method that is most appropriate for your situation and place the Cobalt X data logger as described in *section 4 – Placing your Cobalt X data logger, p. 38*. For example:



Figure 24 – Cobalt X data logger mounted on the refrigerator door

6. Attach or coil the excess cable neatly.

5.3 Temperature/humidity Smart-Sensors

The Cobalt X wireless humidity/temperature sensor monitors both relative humidity levels and temperature. This option is generally used in various types of storage, medical and traceability applications.

This sensor connects via the Dickson Smart-Sensor connector, and therefore already contains calibration parameters if the sensor was calibrated by OCEAOSFT.



Figure 25 – Cobalt X data logger with dual temperature-humidity sensor

5.3.1 Placing the sensor

Mount the Cobalt X data logger in the desired location using the provided holder. Choose the attachment method that works best for your situation and place the Cobalt X data logger as described in *section 4 – Placing your Cobalt X data logger*, p. 38. Use the provided plastic cable holders to attach or coil the excess cable neatly.



When routing the cable for the Cobalt X sensor, avoid direct contact with or close proximity placement of the sensor cabling with any high voltage wiring. Cabling should be placed with no less than a minimum of 5 cm (2 inches) distance from high voltage components. Also, avoid running the sensor cable in parallel with high voltage wiring.

Contact the manufacturer of your equipment for instructions regarding proper placement of the sensor.

5.4 Triple CO₂ - Temperature - Humidity Smart-Sensor

5.4.1 Overview

The Dickson CO₂, temperature, and humidity Smart-Sensor is a triple-function device with three sensors. This Smart-Sensor unit is designed to be placed upright inside an incubator and connected via the provided ribbon cable to a Cobalt X data logger placed outside the incubator.



Do not place the Cobalt X data logger inside the incubator.

Remove the CO₂-Temperature-Humidity sensor from inside the incubator if you decontaminate the incubator (which produces a heat level not supported by the sensor unit).

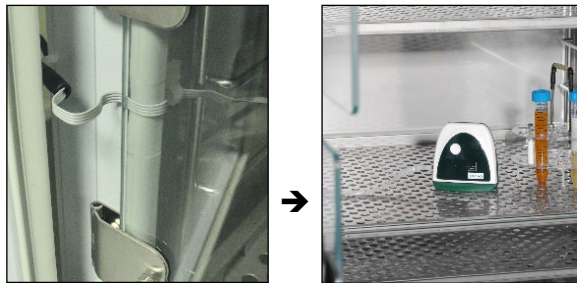


Figure 16 – Ribbon cable connecting to sensor unit inside incubator

The complete kit is shown here (Cobalt X sold separately):

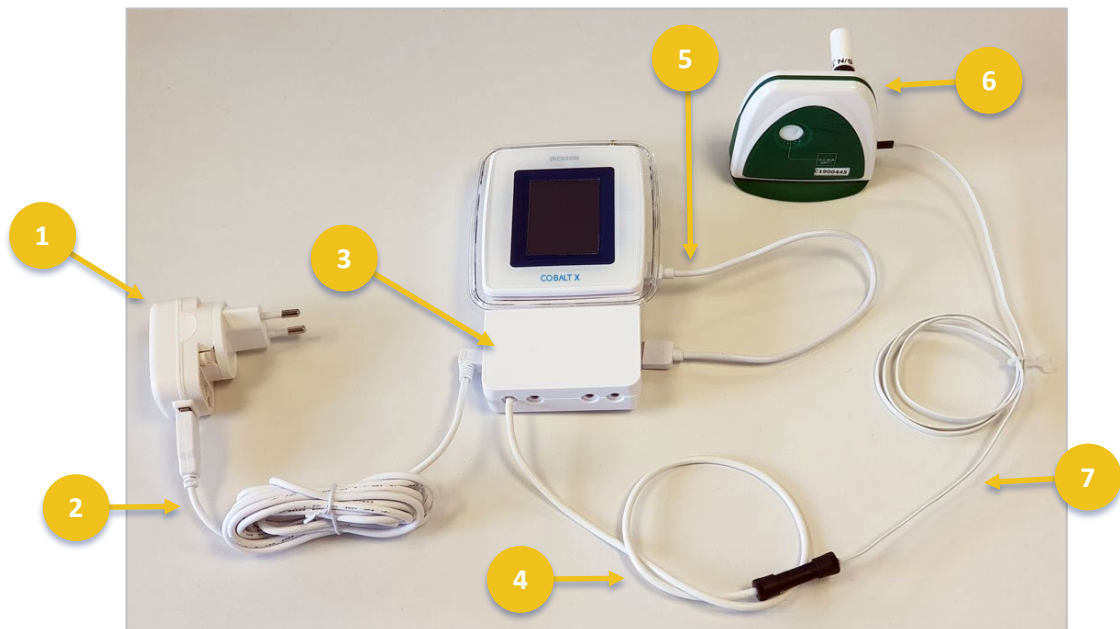


Figure 26 – Complete CO₂-Temp-Humidity sensor assembly

The various components in the above image are as follows:

Description	
1	AC adapter, provided with several international plugs
2	USB charging cable, plugged into AC adapter on left-hand side of Smart-Sensor extension
3	Smart-Sensor extension, connected to the bottom of the Cobalt X data logger
4	Smart-Sensor extension connector cable
5	USB charging cable from Smart-Sensor extension providing power to Cobalt X data logger
6	Triple CO ₂ -Temperature-Humidity sensor
7	4-wire flat ribbon cable to connect sensor with Smart-Sensor extension

The CO₂ sensor is contained inside the casing, with the dual temperature and humidity sensor attached to the back, as shown here:



Figure 27 – Sensor locations on unit

5.4.2 Key specifications

- Measured ranges:
CO₂: 0 to 9% CO₂
Temperature: 0°C to +50°C (+32° to +122°F)
Humidity: 0 to 99.9% RH non-condensing
Dimensions (sensor unit): 8 x 7.7 x 4.6 cm (3.1 x 3.0 x 1.8 in.)
- Flat cable length: 85 cm (33.36 in.)
- Smart-Sensor extension cable 50 cm (19.7 in.)
- IP44 protection, plastic casing (ABS, Polycarbonate) with PTFE filter, 0 to 90% RH non-condensing for indoor use

Please feel free to contact your Dickson representative for details regarding sensor accuracy, drift, and calibration.

5.4.3 Placing the sensor and Cobalt X data logger

Follow these instructions to assemble and place your triple sensor unit.

1. Place the sensor unit upright inside the chamber to be monitored, taking care to place the flat ribbon cable flush with the door joint (note: your cable may be different than that shown here).



Figure 28 – Ribbon cable lays flat beneath door joint

Using external sensors

2. Make sure that the sensor unit stays in an upright position:



Figure 29 – Sensor unit inside incubator

3. Clip the Smart-Sensor extension firmly onto the bottom of the Cobalt X data logger.



Figure 30 – Slide the Smart-Sensor extension onto the Cobalt X data logger

4. Plug one end of the longer USB charging cable into the AC adapter and the other end into the left-hand side of the Smart-Sensor extension (**1**), then plug the adapter into a wall socket with power.

Plug the shorter USB charging cable into the Smart-Sensor extension and the Cobalt X data logger (**2**) – this cable provides power to the Cobalt X data logger.

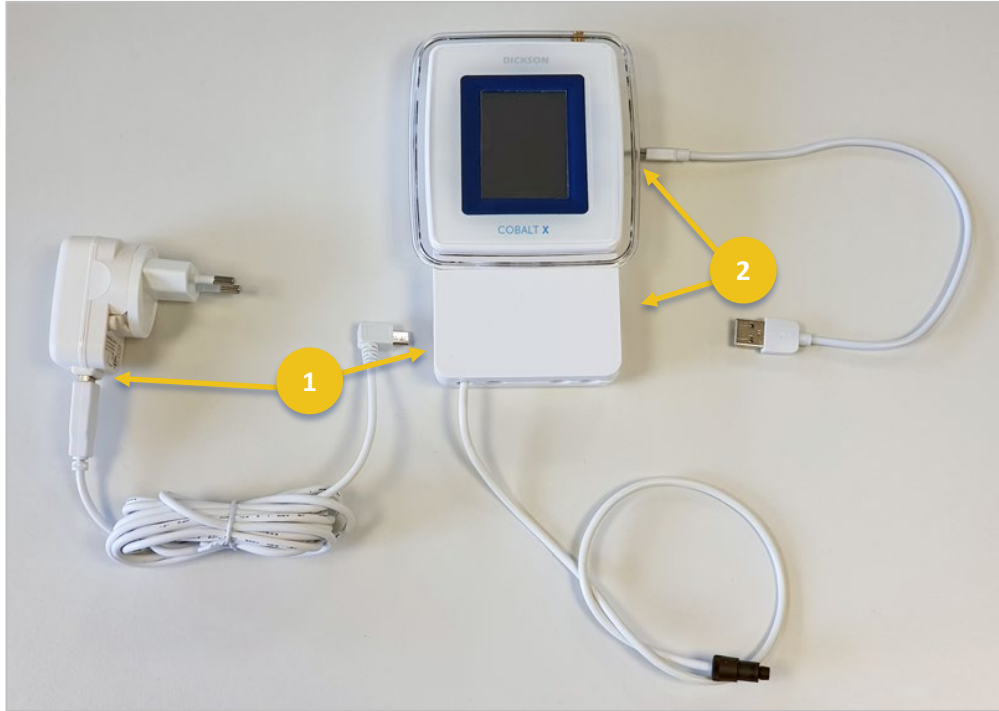


Figure 31 – Power connections for triple sensor unit

5. Connect the Smart-Sensor extension cable to the sensor ribbon cable:

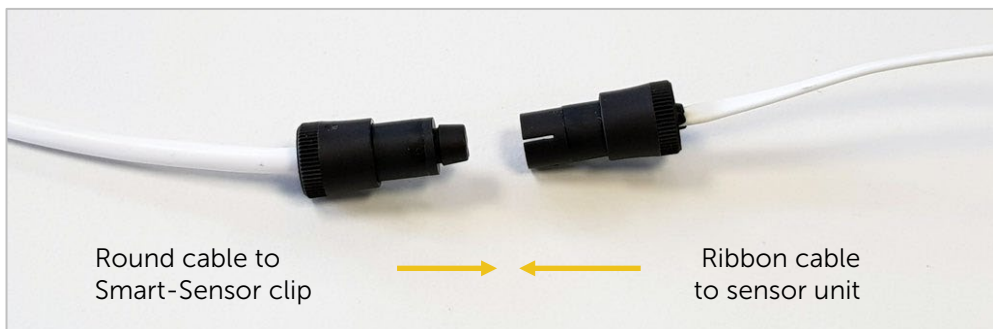


Figure 32 – Join the sensor cables together

6. Connect the temperature-humidity sensor unit to the back of the casing.

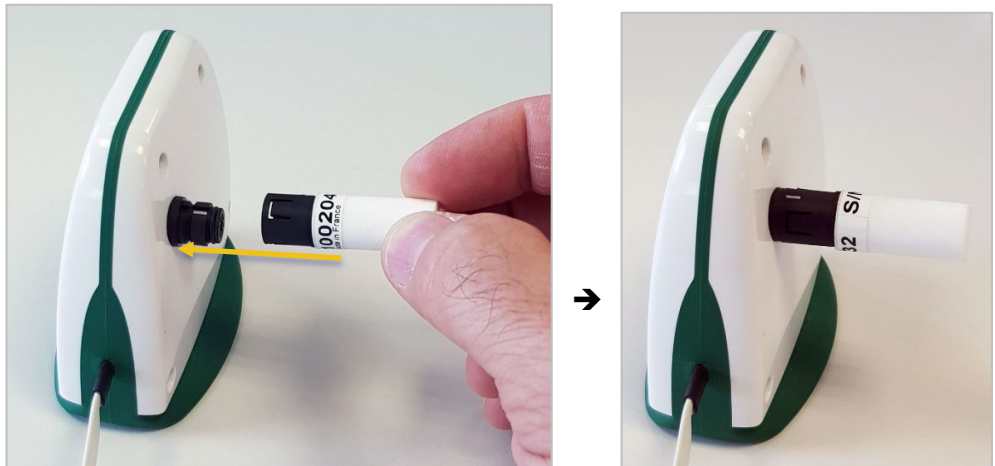


Figure 33 – Place the temperature/humidity sensor on the back of the unit

7. The fully assembled kit looks like this:



Figure 34 – Fully connected triple sensor assembly

8. Mount your Cobalt X data logger outside the incubator as described in *chapter 4 – Placing your Cobalt X data logger, p. 38*, and use the provided cable holders to attach or coil the excess cable neatly.



When routing sensor cables, avoid direct contact with or close proximity of sensor cabling with any high voltage wiring. Cabling should be placed with no less than a minimum of 5 cm (2 inches) distance from high voltage components. Also, avoid running the sensor cable in parallel with high voltage wiring. Feel free to contact your Dickson representative for instructions regarding proper sensor and cable placement.

5.5 Differential pressure Smart-Sensor

5.5.1 Overview

The differential pressure Smart-Sensor extension clips on to the bottom of your Cobalt X data logger, enabling you to compare the difference in pressure between two physically separated spaces. With a tube placed on one of the connectors, the sensor detects the difference in atmospheric pressure between where the Cobalt X is located and one or more other spaces. This is described in more detail in the following sections. Three options are available for this Smart-Sensor:


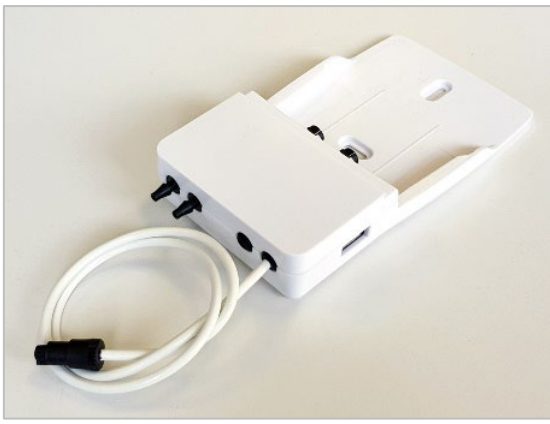

<p>Single differential pressure sensor (for Cobalt X1)</p>	
<p>Single differential pressure sensor with 50 cm Smart-Sensor extension cable (for Cobalt X2)</p>	
<p>Dual differential pressure sensors (for Cobalt X2)</p>	

Figure 35 – Three differential pressure sensor models



Note: the USB port serves as a pass-through for the current provided by optional AC adapter (plugged in to left-hand side).

5.5.2 Note regarding model with Smart-Sensor connection

The extension with a Smart-Sensor extension cable (for Cobalt X2) accommodates both the tube for measuring differential pressure and other compatible Dickson Smart-Sensors. The 50 cm cable extends the second connector from the Cobalt X2.

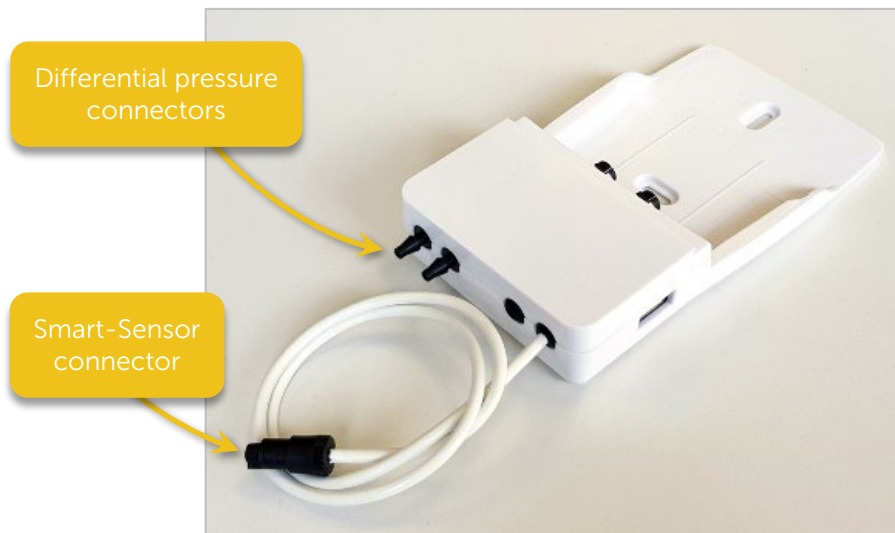


Figure 36 – Designed for differential pressure and another Smart-Sensor

5.5.3 Key specifications



The Differential Pressure Smart-Sensor draws power from the Cobalt X data logger and does not require an additional power supply battery. We nonetheless recommend using the optional AC adapter whenever possible to preserve battery power.

- Pressure measurable from -500 Pa to +500 Pa
-5 to +5 cm (-2.0 to +2.0 inches H₂O)
- Provided Tygon® hose L: 50 cm, Ø: 4 mm (4-5 mm straight adapter and “T” adapter)
- Full compatibility in air, Nitrogen (limited in O₂)
- Allowable overpressure: 1 bar (1,000 hPa, 4 inches H₂O)
- ABS plastic casing
- Smart-Sensor cable extension: 50 cm (only model with Smart-Sensor cable)

The Differential Pressure Smart-Sensor can be integrated with tubing provided by an existing system. Tube length and diameter have a direct effect on pressure readings. Please feel free to contact your Dickson representative for details regarding sensor accuracy, drift, calibration, and hose length.

5.5.4 Usage

The Differential Pressure Smart-Sensor is often used for monitoring in two different types of laboratory scenarios. In many laboratories, ambient air pressure is used to control the direction of particle flow. The differential pressure data logger is placed outside the cleanroom so that people know it is safe to enter, as shown in these two examples:

1. **High pressure cleanrooms**, such as vaccine and organ transplant laboratories in which the ambient pressure is higher than the neighboring room, hallway, or airlock in order to help keep particles from entering the cleanroom.

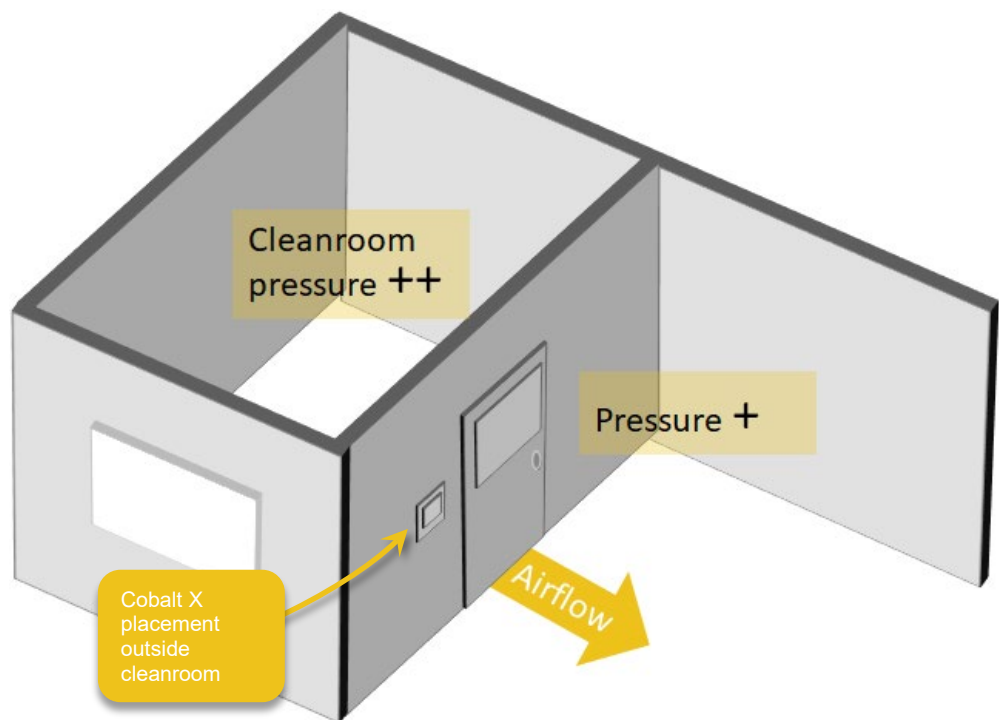


Figure 37 – High pressure cleanroom keeps particles from flowing in

2. **Low pressure cleanrooms**, such as virology laboratories in which the ambient pressure is lower than the neighboring room, hallway, or airlock in order to help keep particles from exiting the cleanroom.

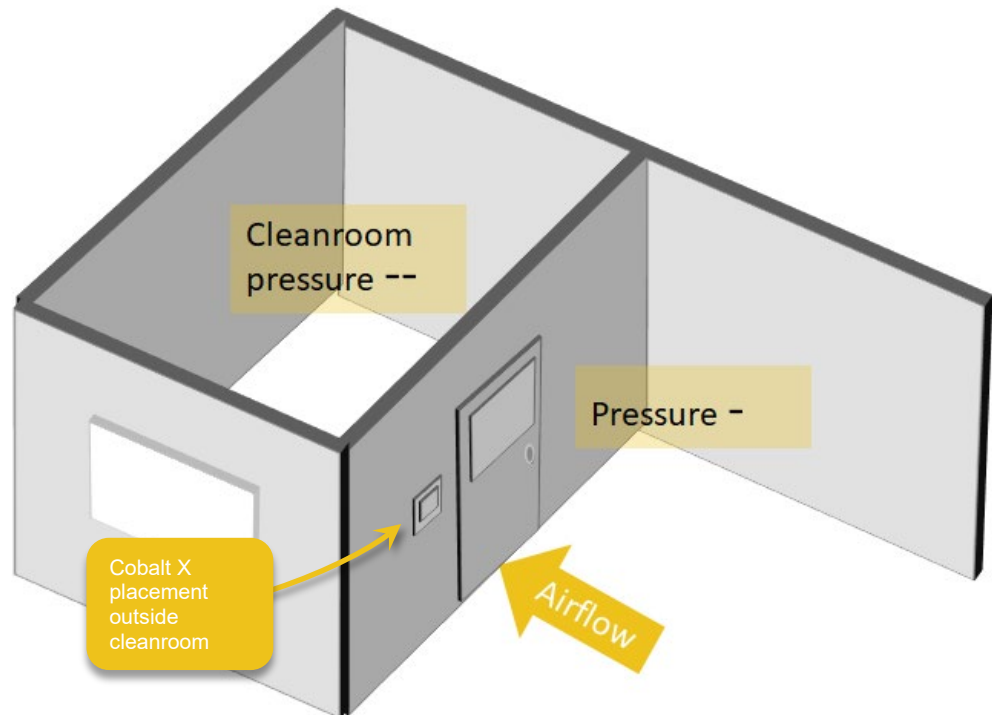


Figure 38 – Low pressure cleanroom keeps particles from flowing out

Using external sensors

You may cascade pressure control with an airlock before entering the cleanroom. Placed outside the airlock, the dual sensor data logger could be used in this case.

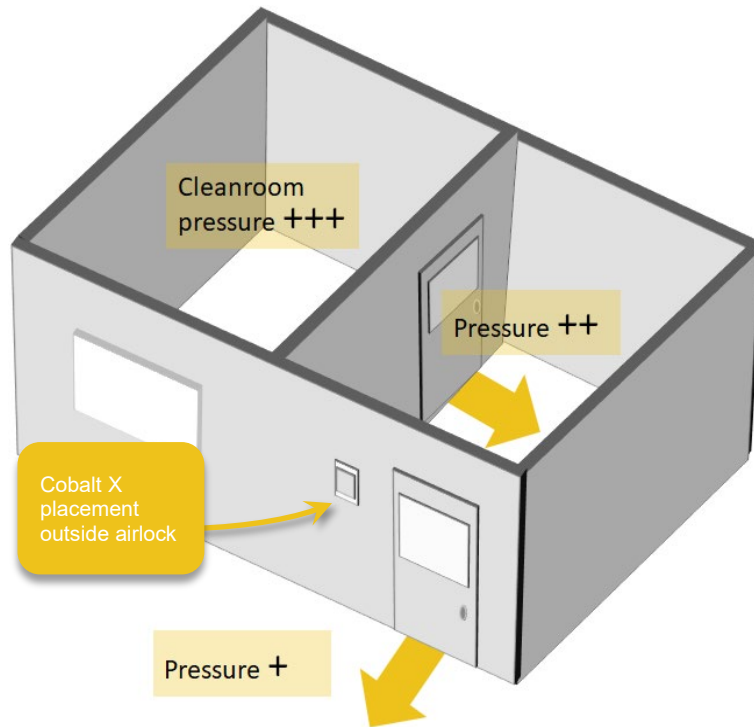


Figure 39 – High pressure cleanroom with an airlock

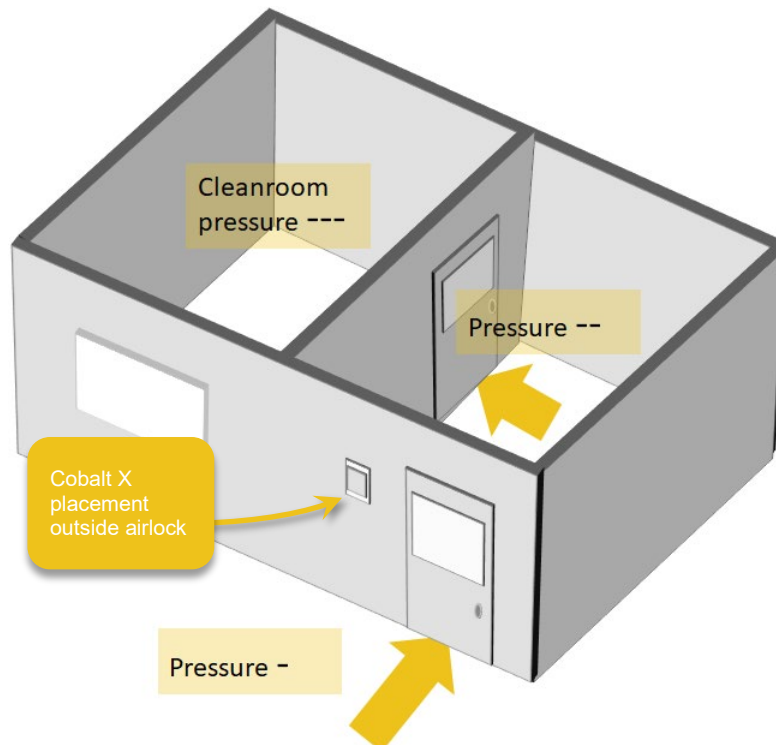


Figure 40 – Low pressure cleanroom with an airlock

5.5.5 Tube placement



The photos in this section show the model with a single sensor, but operation with the dual sensor model is identical.

With the Differential Pressure Smart-Sensor:

- Air flowing in through the **Low (-)** opening produces a negative value on the display
- Air flowing in through the **High (+)** opening produces a positive value on the display

A common way to use this sensor is therefore to plug the tube onto the **High (+)** connector and, under normal conditions, obtain positive values when monitoring high-pressure cleanrooms, and negative values when monitoring low-pressure cleanrooms.

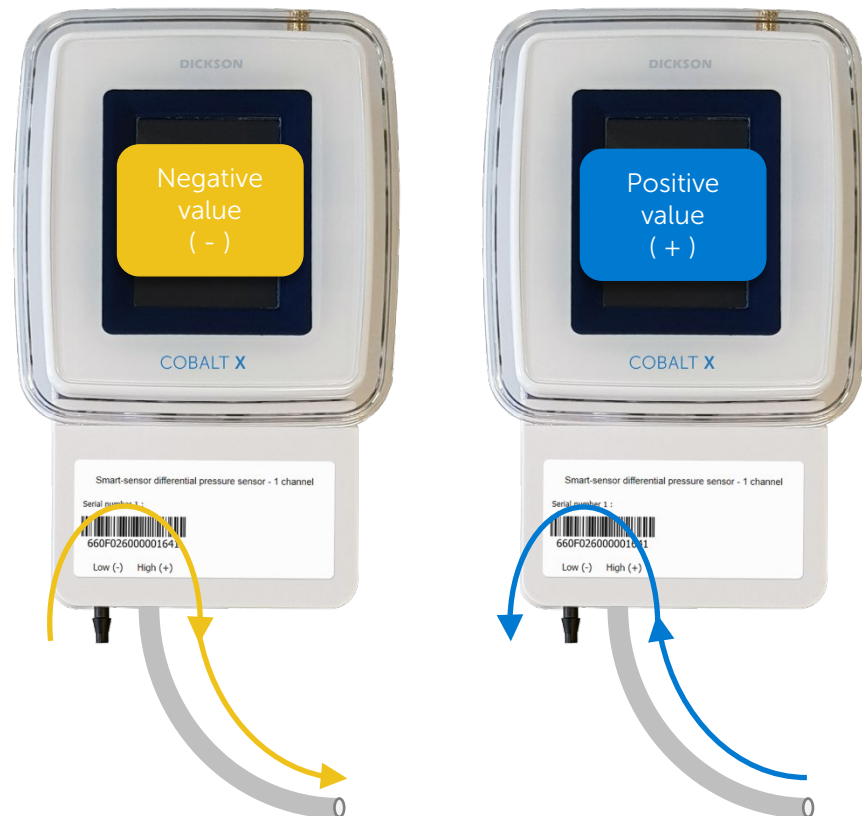


Figure 41 – Place tube on **High (+)** connector for positive values when monitoring a high-pressure cleanroom and negative values when monitoring a low-pressure cleanroom



One of the input pairs must always be left open. The dual sensor model is configured identically to the single sensor model described here.

The complete kit is shown here (Cobalt X sold separately):



Figure 42 – Complete differential pressure sensor assembly

The various components in the above image are as follows:

Description	
1	4 to 5 mm straight adapter; 4 to 5 mm "T" adapter
2	Clear Tygon® hose (diameter: 4 mm; length 50 cm) which can be connected to an existing pressure monitoring system. Note: air flow through the sensor creates a dependence on the tube length. Please contact us if you need assistance with this issue.
3	Smart-Sensor extension, connected to the bottom of the data logger

5.5.6 Placement and assembly

1. Place the Cobalt differential pressure data logger in the appropriate location for your needs. Connect one end of the tube in the room to be monitored and connect the other end to the appropriate (+ or -) connector on the data logger.
2. Mount the Cobalt data logger as described earlier in *section 4 – Placing your Cobalt X data logger, p. 38*.
3. Clip the Smart-Sensor extension firmly onto the bottom of the Cobalt X data logger.

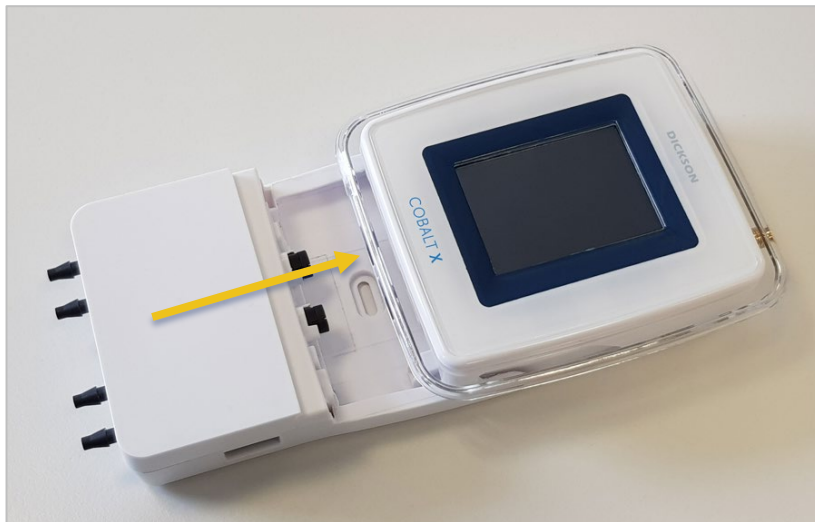




Figure 43 – Slide the Smart-Sensor extension onto the Cobalt X data logger

4. Place the Tygon tubing firmly onto the appropriate connector, generally **High (+)**, as described in *section 5.5.3 – Key specifications, p. 59*.
5. Mount your Cobalt X data logger outside the cleanroom or airlock as appropriate.

5.6 Dry contact input sensor

5.6.1 Overview

The dry contact input sensor on the Cobalt X data logger (in firmware version 2.6.x and higher) can be used to monitor many types of standard industry equipment that either provides a dry contact output connection or a simple pair of wires to form a continuous low-current electrical loop.

Typical applications include monitoring door opening-closing, uninterruptable power supplies, air conditioning units, and ultra-low-temperature freezers.



Figure 44 – Cobalt X with dry contact input cable

The data logger can be configured to detect either a “normally closed” or “normally open” state to correspond with the device or equipment to be monitored.

5.6.2 Key specifications

- 2-wire cable with 2.5 mm jack
- Cable lengths: 6.6 ft (2 m), 11.5 ft (3.5 m), or 16.4 ft (5 m)

Note: memory capacity for the dry contact sensor channel is 1,800 events (state-change with date & time stamp)

5.6.3 Plugging the connector cable into your data logger

Start by connecting the dry contact connector cable into the input jack on your Cobalt X data logger.

1. Insert the jack into the hole on the bottom left-hand side of the data logger.



Figure 45 – Insert jack into dry contact input plug

2. Make sure the jack is firmly in place before continuing.



Figure 46 – Cable inserted into input jack on data logger

5.6.4 Activating dry contact functionality

By default, the dry contact input sensor is not enabled on your data logger. Follow these steps to activate it:

1. Tap on **Menu** (☰) → **Sensors** → **Dry contact**
2. Enter your PIN code and tap **OK**.
3. Tap on **Configure**:

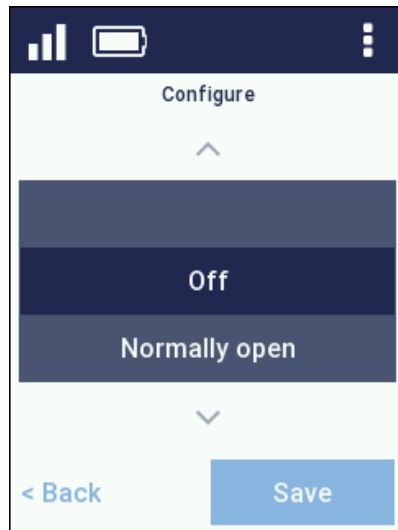


Figure 47 – Dry contact settings

4. Tap on the up/down arrows (⬆ or ⬇) to select **Normally open** or **Normally closed**.
Select Normally open or closed as described below in *section 5.6.7 – Wiring and common use cases, p. 72*.
5. Tap on **Save** to confirm your choice.

5.6.5 Testing current status of dry contact loop

After activating the dry contact input, you may check its current status as follows:

1. Tap on **Menu** (☰) → **Sensors** → **Dry contact**
2. Enter your PIN code and tap **OK**.

Tap on **Current status**. If the two wires are not touching each other (or are connected to an open loop), this status is displayed:

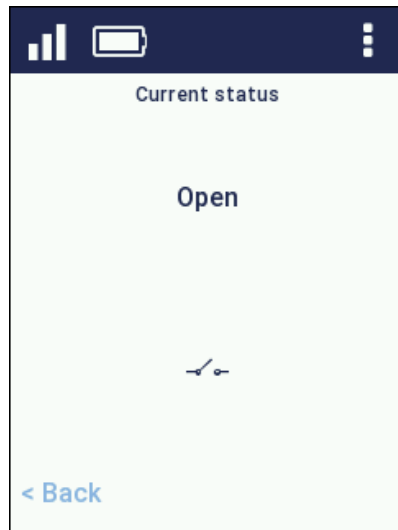


Figure 48 – Dry contact loop is open

If the two wires are touching each other (or are connected to a closed loop), this status is displayed:

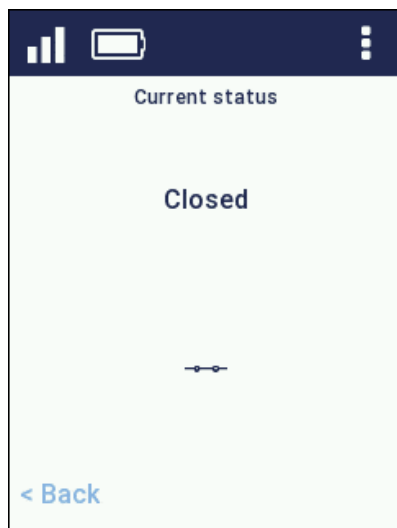


Figure 49 – Dry contact loop is closed

3. Tap on **Back** to exit this function.

5.6.6 Showing sensors

You may confirm sensor configuration with respect to “Normally closed” or “Normally open”, typically after connecting the sensor to the output terminal or wires on the monitored device.

1. Tap on **Menu** (☰) → **Sensors** → **Show sensors**
2. If the loop is currently in its normal state, the sensor information screen shows “Normal”.

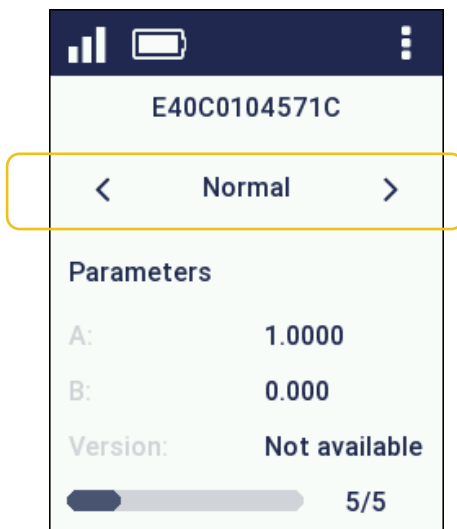


Figure 50 – Dry contact loop showing Normal status

3. If the loop is not currently in its normal state, the sensor information screen shows “Triggered”.

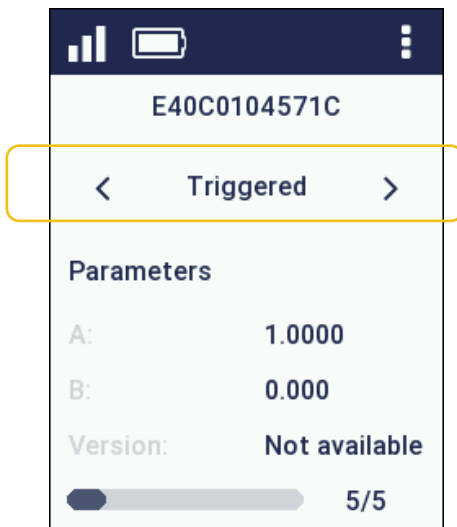


Figure 51 – Dry contact loop showing triggered dry contact (not normal state)

5.6.7 Wiring and common use cases

Connect the 2-wire cable from the Cobalt X data logger to the appropriate output or wiring on the device for which you are monitoring open/closed status.



The data logger implements a “dry loop”, that is, you must not inject any current or apply any voltage source to the dry contact wires.

The minimum state change detection time is about one second.

5.6.7.1 “Normally open” vs. “Normally closed”

It is important to establish whether your connected device or equipment is configured as “normally closed” or “normally open”.

Normally closed

Status is considered normal if the loop is detected as “closed”



Figure 52 – Electrical representation of closed loop

Normally open

Status is considered normal if the loop is detected as “open”

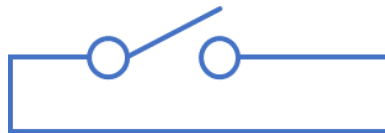


Figure 53 – Electrical representation of open loop



The Cobalt X data logger maintains a low charge on the current loop to detect when the loop is open or closed. For a device that is “normally open”, a status change is detected if the loop closes. You may configure an alert to be sent in that case.

However, if the connecting cable or circuit is physically cut in a “normally open” configuration, the loop remains open and is considered to still be in the “normally open” state and no alert is sent.

Industry applications are generally configured as “normally closed” for this reason.

5.6.7.2 Remote alarm contacts on an ultra-low-temperature freezer

The dry contact input sensor is commonly used to monitor laboratory equipment, such as ultra-low-temperature freezers with a specific remote alarm contact output terminal. The contacts, which are triggered in the event of various alarm conditions, are typically located on the back of the equipment.

The diagrams below show the two configuration options for this type of situation:


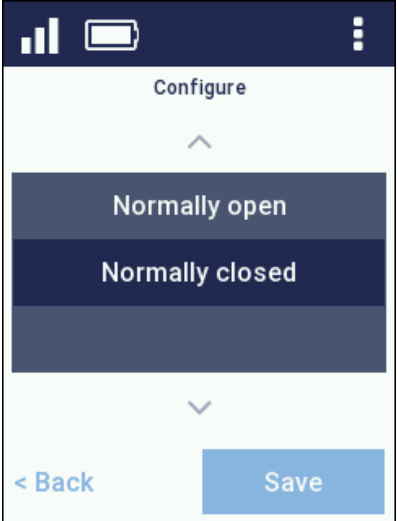
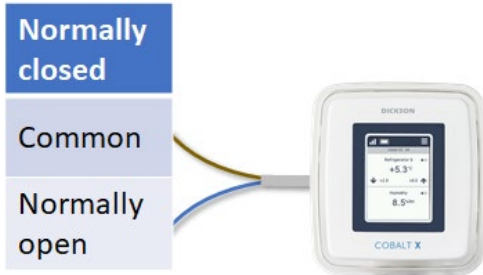
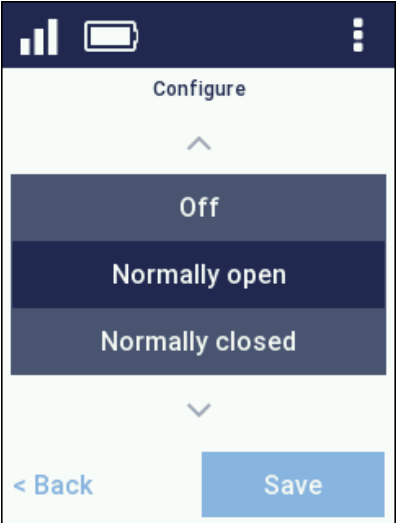
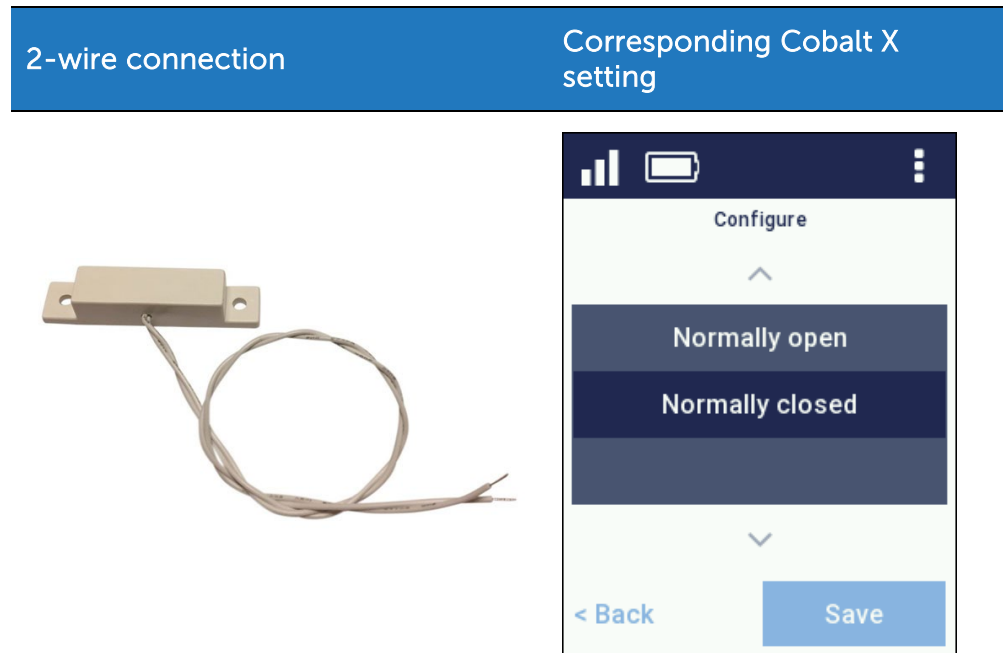
Terminal connection options		Corresponding Cobalt X setting:
		
		

Figure 54 – Wiring and configuration from a dry contact output terminal

It does not matter which color wire you connect to the terminal plugs.

5.6.7.3 Wired door contact

The dry contact input sensor is well suited for monitoring door contact devices. In this case, "Normally closed" is the most common setting (that is, the door is considered to be closed under normal circumstances).



It does not matter which color sensor input wire you connect to the data logger's two wires.



It is important to note that you may not change the configuration from "Normally closed" to "Normally open", or vice versa, while data logging is running. You must first stop data logging in OCEAView.

5.7 4-20 mA and 0-10 V loop sensors

5.7.1 Description

Dickson 4-20 mA current loop and 0-10 V current Smart-Sensors can be connected to industry-standard devices that generate appropriate output signal. The signal can be measured to provide status information for a variety of applications, including wind monitors, particle counters, ultra-low-temperature (ULT) freezers, and temperature, gas, VOC, and relative humidity devices, and more. Read values are converted into useful information by the OCEAView web application, then displayed both in the web application and on the Cobalt X data logger display.



Figure 55 – 4-20 mA / 0-10 V Smart-Sensor

Sensor wiring:

Black	Common ground
Red	0-10 V input
White	4-20 mA input

Connect the wires according to the type of device you want to monitor.



The maximum voltage on the 4-20 mA input wire is 2 V. Exceeding that value will damage your sensor. Do not connect all three wires at the same time.

5.8 Remote wireless sensors



Dickson Atlas and Emerald Bluetooth data loggers must have firmware version 2.3.0 or higher to function as wireless sensors with Cobalt X data loggers.

Cobalt X data loggers are equipped with Bluetooth Low Energy connectivity to use Dickson Atlas or Emerald data loggers as remote wireless sensors. This enables you to monitor and manage equipment in hard-to-access locations or where wired sensors are impractical. Wireless sensors connected to a Cobalt X data logger offer the same functionality in the OCEAView web application as wired sensors, totally transparently to users.

You can use any combination of wired or wireless sensors with your Cobalt X data logger, with up to two active wireless sensors on Cobalt X1, or up to four on Cobalt X2.

For the Cobalt X data logger to discover your nearby Atlas or Emerald wireless sensor, you must first activate Bluetooth on the sensor as described below. The Cobalt X data logger cannot detect a wireless sensor if it is disabled or in standby mode.

5.8.1 Activating an Emerald data logger

1. Place the “strong” side of the magnet in the circular recess on the back of the Emerald data logger and leave it there until the Cobalt X data logger detects it. The non-adhesive side of the magnet is noticeably stronger than the other.

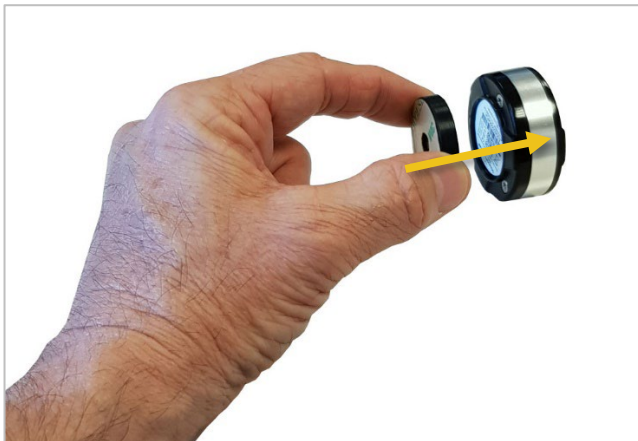


Figure 56 – Place the magnet on the Emerald data logger to activate Bluetooth

2. Bluetooth connectivity is enabled and the LED blinks blue. Once Cobalt X discovers the data logger, you may remove the magnet.

When within wireless range, the wireless sensor appears in the sensor pairing screen of the Cobalt X data logger. You may connect to it at any time as described in section 7.2.3.1. *Pairing a Bluetooth wireless sensor, p. 98.*

5.8.2 Activating an Atlas data logger

1. Press and hold the button on the Atlas data logger until the Cobalt X data logger discovers it.

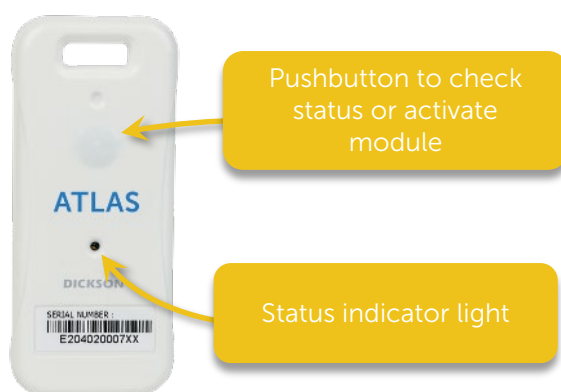


Figure 57 – Press and hold the button to activate Bluetooth

2. Bluetooth connectivity is enabled and the LED blinks blue. Once Cobalt X detects the data logger, you may release the button.

When within wireless range, the wireless sensor appears in the sensor pairing screen of the Cobalt X data logger. You may connect to it at any time as described in section 7.2.3.1 – *Pairing a Bluetooth wireless sensor, p. 98.*

6 Cobalt X user interface

The Cobalt X data logger offers a highly visible color LCD screen and a simple menu system. Using the data logger’s touch screen, you can navigate easily through data logging pages and menu settings, even while wearing most types of protective gloves.




Depending on your data logger’s firmware version, the screen color on your display may differ from that shown in this user guide.

6.1 Using the touchscreen



The Cobalt X touchscreen responds to a light touch from your finger. Do not use excessive force or sharp objects when pressing the touch screen or you may damage your data logger.

Action	Description	Gesture
Tap to activate	Briefly touch the Cobalt X screen surface with your fingertip to select a menu item, navigate, press a button, or enter your PIN code using the on-screen keypad.	

6.2 Entering your PIN code

Some actions on your Cobalt X data logger require the user to enter a PIN code to continue. Only users authorized to use a PIN code are allowed to enter into the Advanced menu or acknowledge alarms directly on the data logger screen.



If the data logger has never been used with OCEAView, the default PIN code is 000000 (six zeros).

The PIN code is contained in the user's profile on the OCEAView web application, where the Application Manager has an option to activate or deactivate PIN code use. In OCEAView, the user chooses 4 digits of the PIN code and the system adds 2 digits to create a unique 6-digit PIN code.

Enter the PIN code when prompted by the data logger display, then tap on **OK** to continue:

Password		
1	2	3
4	5	6
7	8	9
0	Back	

Figure 58 – PIN code keypad

6.3 Sensor display and control

Cobalt X allows you to connect a variety of different sensors that can be configured to meet your needs. With the X1 data logger, you may monitor up to two physical parameters simultaneously (2 sensor channels); with the X2 data logger, you may monitor up to four physical parameters simultaneously (4 sensor channels).

The data logger display features distinct areas to simultaneously display the latest temperature readings, minimum and maximum values, and alarm status as appropriate.

The bar at the top of the screen shows status icons and useful reference information, as explained in the following sections.



Figure 59 – Cobalt X with active two data logging sessions

6.3.1 Status bar

The **Status** bar across the top of Cobalt X screen includes the menu icon, wireless status, and battery level. The status bar remains visible on all screens, except when the data logger is in screen saver mode. It is slightly different in LoRaWAN and Bluetooth modes.

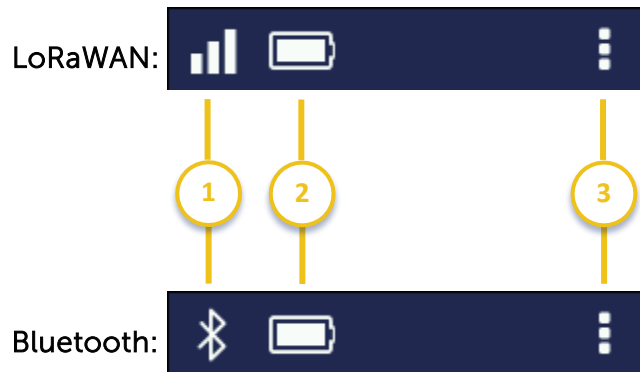


Figure 60 – Cobalt X status bar

The icons in the menu bar are as follows:

1		LoRaWAN network status: Indicates wireless network status with signal strength bars (3 bars for best signal, 1 bar if signal is weak).
		A warning triangle is displayed if the data logger is disconnected from the wireless network.
2		Indicates that the data logger is in Bluetooth-only mode. That is, LoRaWAN connectivity is turned off.
		Battery level indicator displays how much power the Cobalt X battery has.
3		Opens the menu. The icon changes to three vertical dots when sub-menus are open (⋮)

6.3.2 Data logging

The Cobalt X data logger shows the currently programmed data logging cycle(s). Data is shown on a single screen or splits into distinct areas when two or more configurations are defined.

Single data logging session (one sensor)

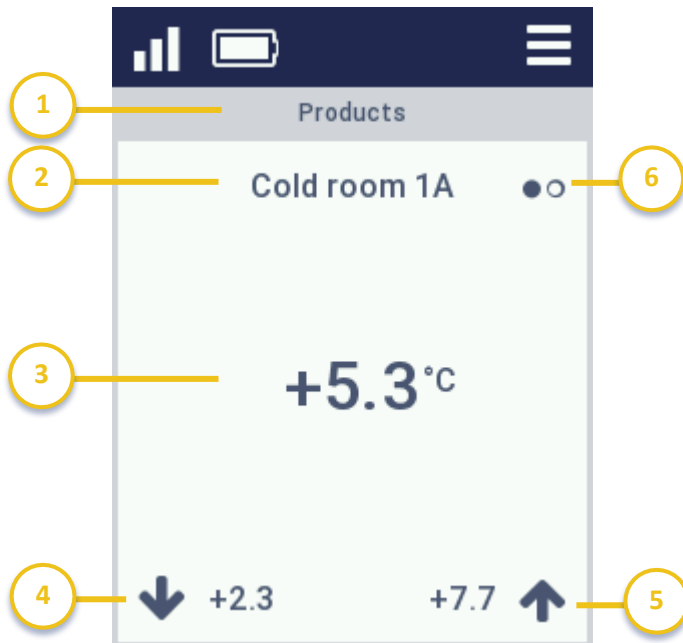


Figure 61 – One active data logging session

The Cobalt X display always shows the most important information about the sensor:

1. Sensor name
2. Equipment name
3. Latest reading
4. Programmed low limit (if applicable)
5. Programmed high limit (if applicable)
6. Indicates the physical plug on which the sensor is connected (left or right position on Cobalt X2 models)

Multiple data logging sessions

The display can show details for up to four sensors at the same time on the main screen. To adjust the display:

1. Select **Menu** → **Settings** → **Items per page**:



Figure 62 – Setting the number of displayed data logging sessions

2. Tap on **1**, **2**, or **4** to adjust the number of displayed sensors.
3. Tap on **Save** to apply the setting, or **Back** to return to the previous screen.
4. The screens below show multiple data logging sessions:

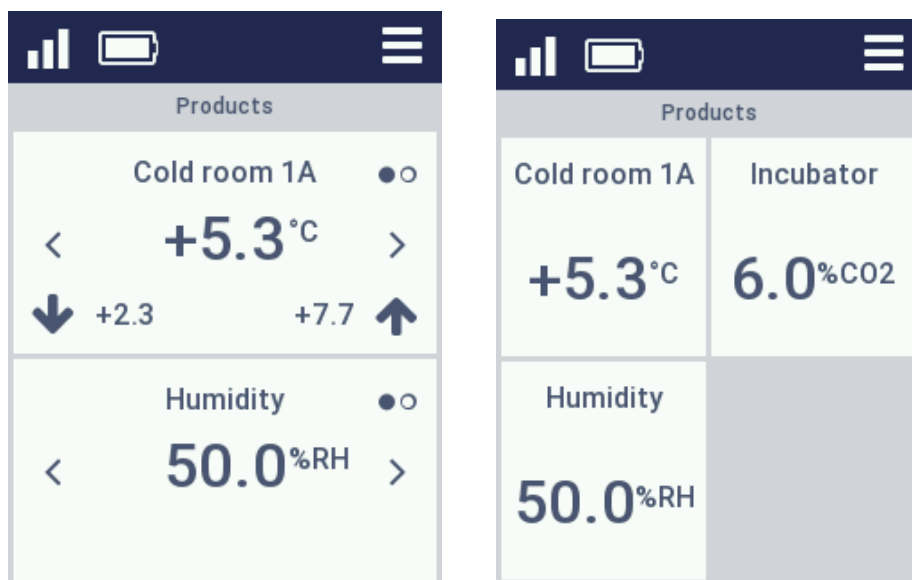



Figure 63 – Main display showing simultaneous data logging sessions

More than two data logging sessions (three or four sensors)

If you set the display to show two sensors, and more than two sensors are currently activated for data logging (on a Cobalt X2 data logger), right and left arrows  are present on the screen so you can access the other sensors:

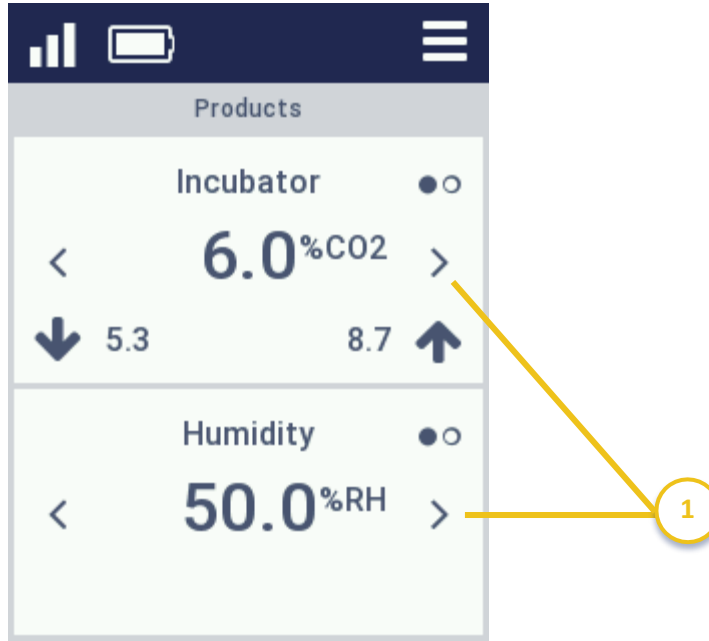


Figure 64 – Screen with more than two active data logging sessions

Press these arrows to switch to the next data logging screen (on Cobalt X2, which supports up to four simultaneous data logging sessions).

Wireless sensor indicator

As mentioned earlier, Cobalt X supports wired and wireless sensors. Wired sensors are plugged directly into the data logger; wireless sensors communicate via Bluetooth and are “paired” with the data logger (pairing process described in *section 7.2.3 – Using remote sensors, p. 98*).



Figure 65 – Display showing one of the sensors as a remote (wireless) sensor

The remote sensor is indicated by the icon  on the right-hand side of the screen.



If any of the data logger’s data logging sessions are in an alarm state, the Cobalt X screen background color turns red for both high and low limit alarms, as described in *section 8 – Alarms and warnings, p. 117*.

6.3.3 On-demand reading

Data on the Cobalt X screen is refreshed periodically. As a result, the temperature in the monitored environment may be different than the reading currently displayed on the unit itself.

You may check the current reading at any time without affecting stored information.

To perform an on-demand read

1. Tap on the current sensor value on the screen.
2. The background turns blue and the current sensor reading is displayed.

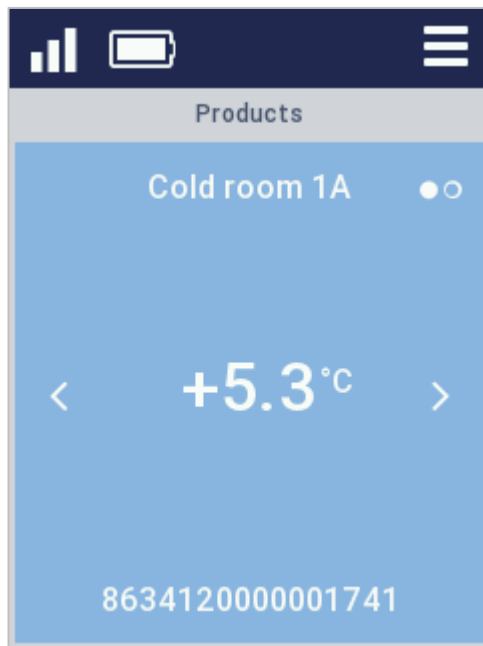


Figure 66 – Screen during on demand-reading (background turns blue temporarily)



On-demand reading is for your information only and not stored in the database. Only readings taken at the programmed interval are stored.

6.4 Screen backlight

When the Cobalt X is on battery power, the backlight is managed to preserve battery life. The backlight turns off after 30 seconds of inactivity following the last user action.

When the display is turned off, simply touch the Cobalt X screen to turn it back on. By default, the screen backlight remains on when the data logger is plugged in using the AC power adapter (USB).



If the screen does not turn on when you touch it, it is possible that the batteries are low, but the data logger is still functioning properly. In that case, the best action is to plug in the AC adapter and replace the batteries.

6.5 Screen saver

The Cobalt X data logger also features a screen saver that is enabled when using AC power (via the USB charger) and there are no alarms in progress.

After 30 seconds of inactivity, the Cobalt X screen goes dark and the screen saver shows the sensor name and the last temperature reading. This information scrolls around the Cobalt X screen until you wake up the data logger by tapping on the screen.

If the data logger is connected to several sensors, the text switches to the next sensor every 10 seconds. Tap the screen to wake up your Cobalt X data logger.

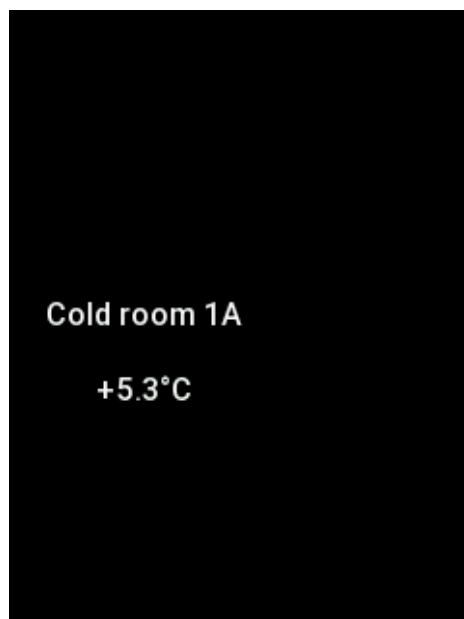


Figure 67 – Cobalt X display with active screen saver

7 Configuration menus

The Cobalt X data logger includes configuration menus for interacting with the data logger and setting specific parameters.

Tap on the menu bars to open configuration menus.

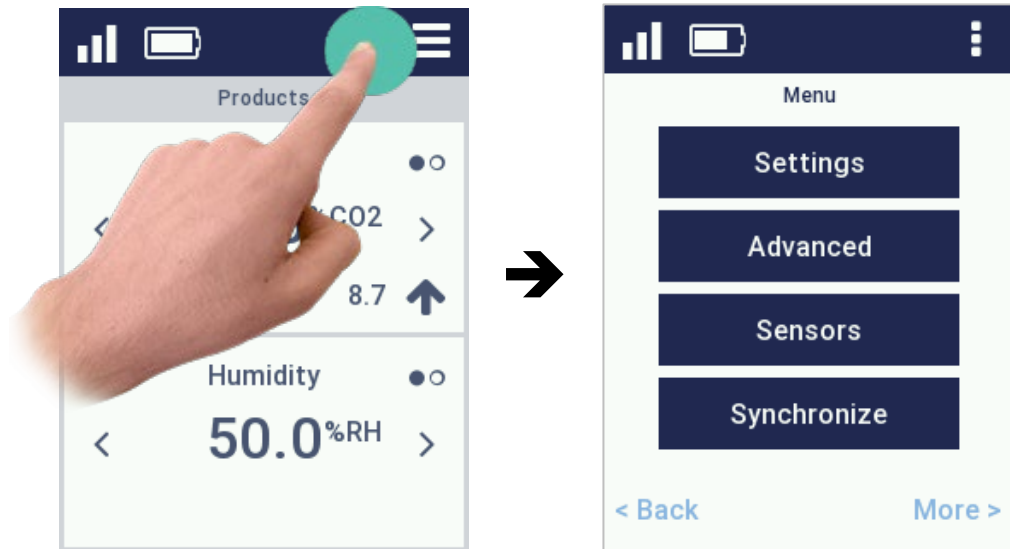


Figure 68 – Accessing Cobalt X configuration menus

Configuration menus

The following diagrams shows the menu structure according to whether the data logger is being used with LoRaWAN or Bluetooth wireless communication. Features are described in the following sections:

Menu structure for LoRaWAN use



Figure 69 – Menu structure when using LoRaWAN wireless operation

Menu structure for Bluetooth use

The structure is the same as for LoRaWAN operation, but some options are grayed out in the interface and not available in Bluetooth mode.



Figure 70 – Menu structure when using Bluetooth wireless operation

7.1 Settings

Tap on **Menu** (☰) → **Settings** for the following options:

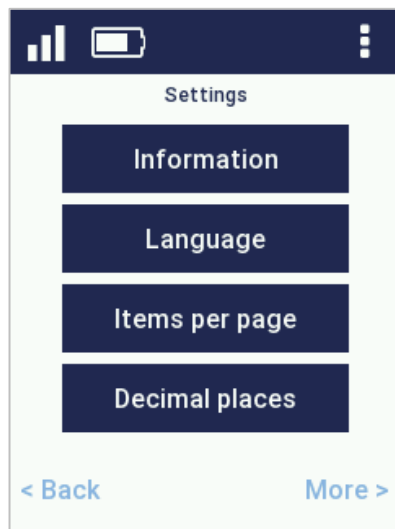


Figure 71 – Options in the Settings menu

7.1.1 Setting Cobalt X language

The **Language** option allows you to change the display language of your Cobalt X.

To change the language:

1. Tap on **Menu** (☰) → **Settings** → **Language**

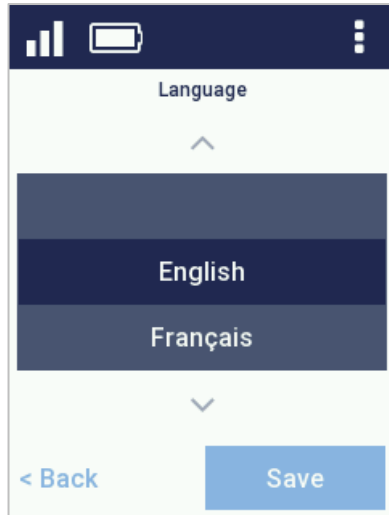


Figure 72 – Choosing the display language

2. Tap on the up/down arrows (⬆ or ⬇) to select the display language.
3. Tap on **Save** to confirm the selected language and return to the previous menu.
4. Tap on the menu icon (☰) to return to the home screen.

7.1.2 Changing the temperature unit

Temperature readings can be displayed in degrees Celsius (°C) or Fahrenheit (°F). To change the temperature unit shown on your Cobalt X data logger:

1. Tap on **Menu** (☰) → **Settings** → **More** → **Units**
2. Tap on the up/down arrows (▲ or ▼) to select the desired unit.

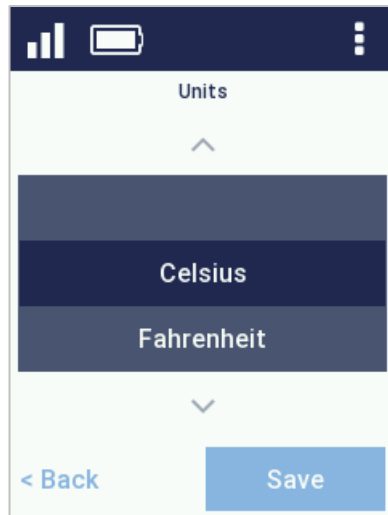


Figure 73 – Choosing temperature unit (C or F)

3. Tap on **Save** to confirm the selected unit and return to the previous menu.
4. Tap on the menu icon (☰) to return to the home screen.

7.1.3 Decimal places

You may choose to display sensor readings on the home screen with either one or two decimal places, as shown here:

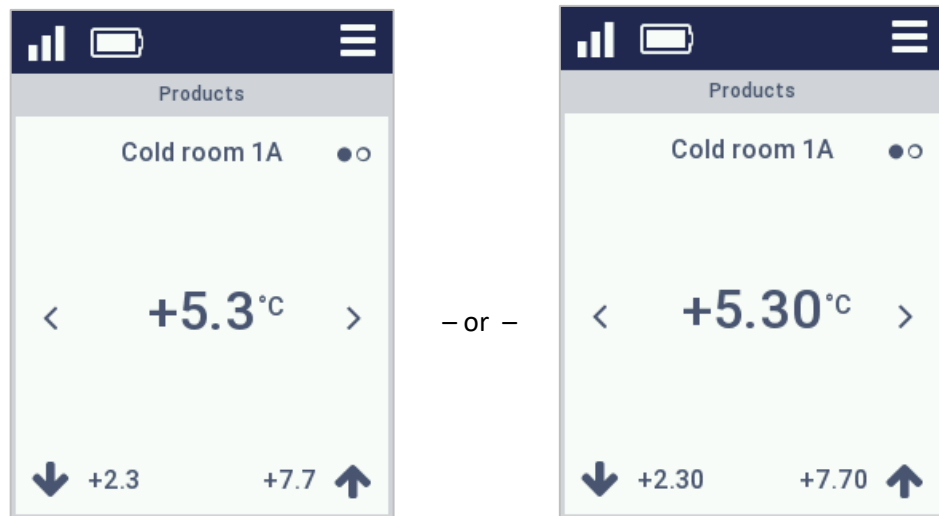


Figure 74 – Values displayed with one or two decimal points

1. Tap on **Menu** (☰) → **Settings** → **Decimal places**

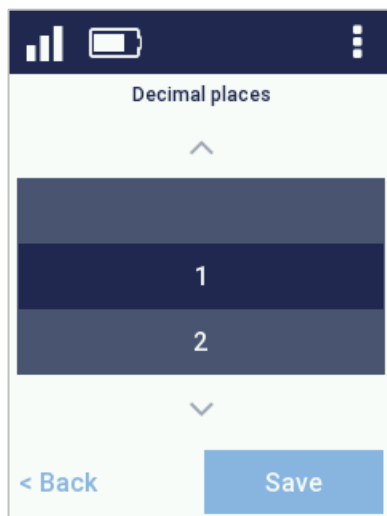


Figure 75 – Choosing one or two decimal points to display values

2. Tap on the up/down arrows (▲ or ▼) to select the desired number of decimal places.
3. Tap on **Save** to confirm the selected value and return to the previous menu.
4. Tap on the menu icon (☰) to return to the home screen.

7.1.4 Information

System information such as the firmware version, LoRaWAN wireless frequency, and remaining battery capacity can be found in the **Information** screen. This information is mostly useful in case you need technical support and are asked to provide specific details.

1. Tap on **Menu** (☰) → **Settings** → **Information**
2. Tap on **Back** or **More** button to return to the menu.



Figure 76 – Accessing detailed data logger information

3. Tap on the menu icon (☰) to return to the home screen.

7.2 Sensor management

7.2.1 Showing sensors

When several sensors are connected to your Cobalt X data logger, you may display the readings and parameters of each sensor using the **Show sensors** feature. The display shows each sensor for about ten seconds before cycling on to the next.

Tap on **Menu** (☰) → **Sensors** → **Show sensors**



Figure 77 – Sensor information

The following sensor information is displayed on the screen:

1. Sensor serial number
2. Latest reading
3. Physical position of the sensor on your data logger (left or right connector on Cobalt X2 only)
4. Sensor calibration parameters
5. Progress bar shows how long the screen will be shown before displaying the next sensor
6. Counter shows total number of sensors and which sensor is currently displayed.

The screen returns to the **Sensors** menu once the display has cycled through all sensors. You may interrupt the process at any time by tapping on the **Menu** icon (☰).

7.2.2 Updating sensors on OCEAView

When you physically plug a sensor into the connector on the Cobalt X data logger, the unit automatically recognizes the sensor and sensor type. That information is then transmitted to the OCEAView web application. If a sensor is not present or not up to date in the web application, you may use the **Refresh sensor** option to force it to detect the new sensor and update the configuration.

To update sensors in OCEAView:

1. Tap on **Menu** (☰) → **Sensors** → **Refresh sensors**
2. Wait while the system updates data in OCEAView.
3. When the process is complete, a confirmation message is shown on the screen:

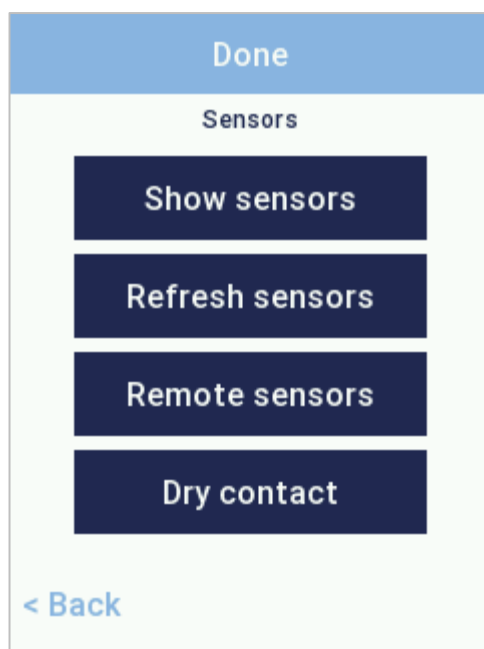


Figure 78 – Confirmation that sensors are updated on the web application.

4. Tap on **OK** → **Menu** (☰) to return to the home screen.

7.2.3 Using remote sensors

7.2.3.1 Pairing a Bluetooth wireless sensor

The Cobalt X data logger supports both wired and wireless sensors. As mentioned previously, wired sensors are detected and configured automatically by the data logger as soon as they are physically plugged into the unit.

Pairing the Cobalt X data logger with a Dickson wireless sensor is simple and guided through the touch screen.



This section covers supported Dickson Bluetooth-enabled data loggers (firmware version 2.3.0 or higher; please check with your authorized representative if you need more information).

To pair your wireless sensor

1. Tap on **Menu** (☰) → **Sensors** → **Remote sensors**
2. Enter your PIN code as configured in the OCEAView web application (described in *section 6.2 – Entering your PIN code, p. 79*) and tap **OK**.
3. Tap on **Pair remote sensors**
4. The Cobalt X data logger searches for compatible sensors within wireless range. If no sensors are found, this message is displayed:

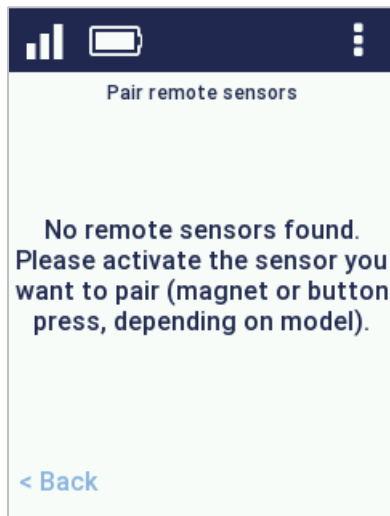


Figure 79 – Message pending Bluetooth sensor discovery

Only “activated” sensors can be discovered. If your wireless sensor does not appear in the list or if you do not know how to activate it, refer to the instructions in *section 5.8 – Remote wireless sensors, p. 76*.

5. When discovered, your sensor is displayed on the screen.

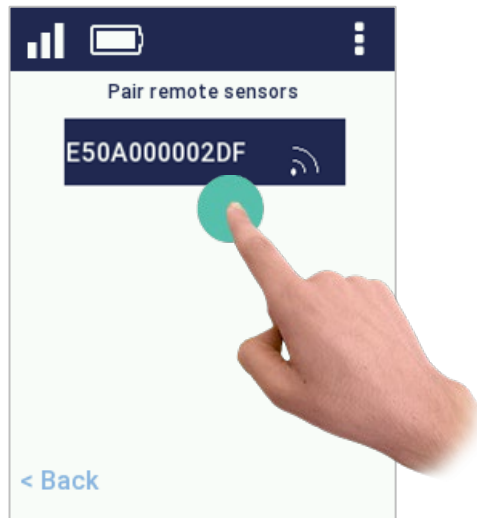


Figure 80 – Tap to pair the wireless sensor

Note: Sensors with data logging currently activated or already connected to another Cobalt X data logger cannot be paired.

6. Tap on the sensor and confirm the connection by tapping on **OK**.
7. Wait until pairing is complete, which may take a few seconds. Once pairing is successful, tap on **OK**. The wireless sensor is now paired with your data logger and shown just like any other sensors connected to the data logger (☰ → **Sensors** → **Show sensors**).

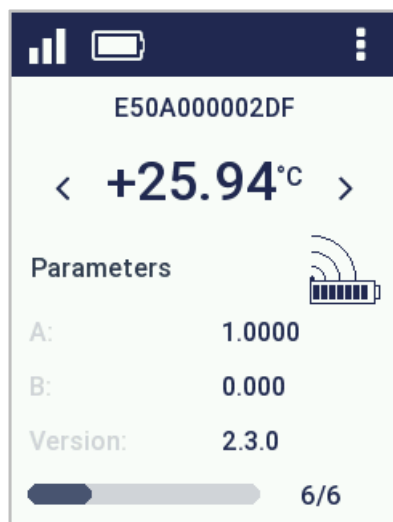


Figure 81 – Wireless sensor indicated by battery counter and wireless icon

8. Repeat the above steps if you want to pair additional Bluetooth data loggers.
9. Tap on the menu icon (☰) to return to the home screen.



Once in paired with a Cobalt X data logger in “remote” mode, the wireless sensor is no longer visible as a data logger itself in the OCEAView Mobile application and will not be detected by the OCEABridge Bluetooth gateway. Sensor configuration will now be controlled exclusively by your OCEAView web application.

Unpairing an Atlas or Emerald wireless sensor from the remote sensor list or removing the sensor battery disables the Bluetooth connection with the Cobalt X data logger and switches the sensor back to “standard” mode for use with OCEAView Mobile or OCEABridge.

Note: Version 2 of the OCEABridge gateway supports Atlas and Emerald only; version 3 supports Cobalt X data loggers only.

If a problem occurs during the pairing procedure, check the instructions in *chapter 11 – Appendix 2 - Troubleshooting, p. 132* before attempting to pair again.

7.2.3.2 Unpairing a Dickson wireless sensor

To unpair your Dickson wireless sensor:

1. Tap on the menu icon (☰) → **Sensors** → **Remote sensors**
2. Enter your PIN code and tap **OK**.
3. Tap on **Unpair remote sensors**
4. Choose the sensor you want to unpair and press **OK** confirm unpairing:

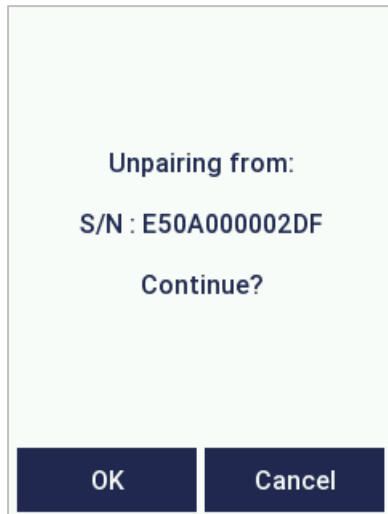


Figure 82 – Unpairing a wireless sensor

5. Wait until the unpairing process is complete, which may take a few seconds, then tap on **OK**. The wireless sensor is removed from the list and automatically switches back to "standard" mode.

7.2.3.3 Resetting a remote sensor's battery counter

To reset the Emerald wireless sensor's battery counter (only after removing or replacing batteries), use the **Reset battery** option on your Cobalt X data logger.



Only perform this action if you really install new batteries in your Emerald wireless data logger.

You may not reset the battery in Atlas products, as the battery is not replaceable.

To reset the wireless sensor's battery counter:

1. Tap on the menu icon (☰) → **Sensors** → **Remote sensors**
2. Enter your PIN code and tap **OK**.
3. Tap on **Reset battery**
4. Sensors that are currently paired with the Cobalt X data logger are displayed. Tap to select the serial number of the sensor whose battery you have changed and wish to reset:

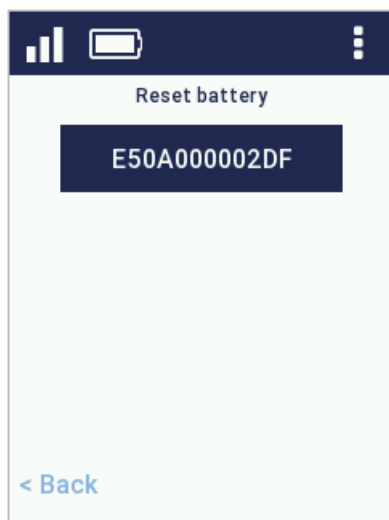


Figure 83 – Resetting a wireless sensor's battery counter

5. Tap on **OK** to confirm that you want to reset the battery counter.
6. Tap again on **OK** to return to the **Remote sensors** menu when done.



The above instructions only affect the battery contained in Emerald wireless sensors, not the Cobalt X unit itself.

7.2.3.4 Checking Bluetooth wireless signal strength

You may check Bluetooth wireless signal strength between your Cobalt X data logger and paired remote sensors to make sure that connectivity is strong and reliable between the devices.

1. Tap on the menu icon (☰) → **Sensors** → **Remote sensors**
2. Enter your PIN code and tap **OK**.
3. Tap on **Next** → **BLE performance**

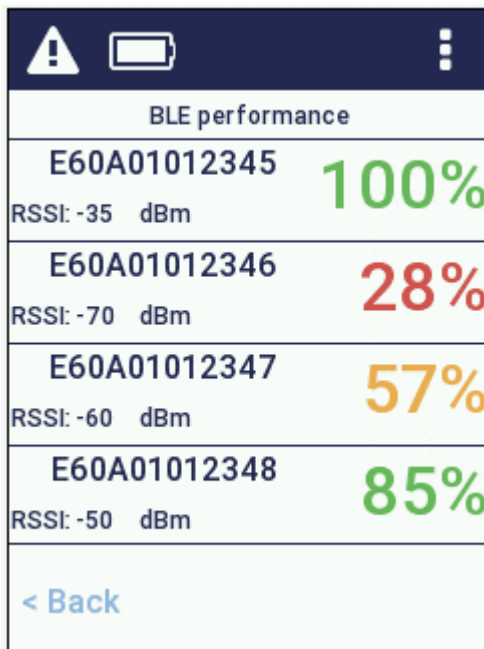


Figure 84 – BLE performance test with four connected remote sensors

The color coding corresponds to signal quality

Values	Color
Above 65%	Green
From 30% to 64%	Orange
Below 30%	Red

The signal strength should be at least 65% to ensure optimal connectivity.

7.2.4 Swapping sensors

Wired sensors

With your Cobalt X data logger, you may directly swap wired sensors that are **physically connected** to your data logger, such as for recalibration or to replace damaged cables. Wired sensors may be replaced on-the-fly whether data logging is running or not. All you have to do is make sure that you replace the sensor with an identical type of sensor. The process is completely transparent and guarantees continuity while avoiding down-time or interruptions.

Wireless sensors

With wireless sensors connected via Bluetooth, you must use the data logger interface to swap wireless sensors. To do this, the following conditions must be met:

- The wireless sensor you want to replace must currently be configured in an active data logging session.
- The new wireless sensor must also be paired with the Cobalt X data logger.
- The two wireless sensors must be of the same type (for example, both must be Atlas data loggers or Emerald data loggers).



The purpose of the **Swap sensor** feature is to replace a Bluetooth wireless sensor while it is currently being used for data logging.

To swap sensors:

1. Tap on the menu icon (☰) → **Sensors** → **Remote sensors**
2. Enter your PIN code and tap **OK**.
3. Tap on **Swap sensor**
4. Tap to select the sensor to replace and tap **OK** to confirm:

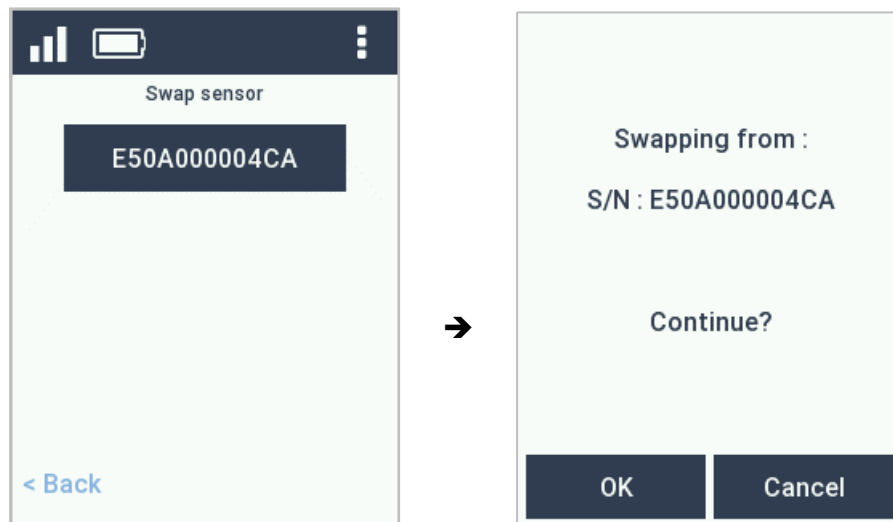


Figure 85 – Choose the current wireless sensor you want to replace

5. Tap to highlight the sensor to use (which must already be paired with your Cobalt X data logger) and tap on **OK** to confirm.

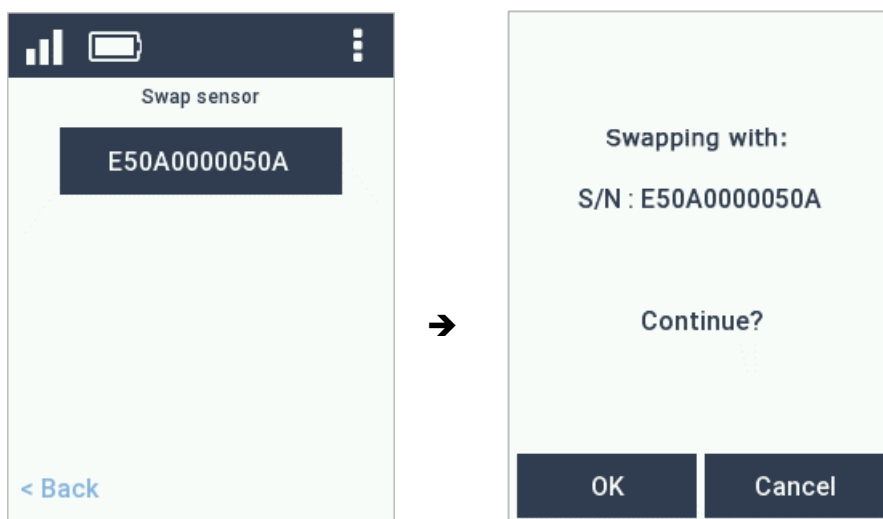


Figure 86 – Choose the new wireless sensor

6. A confirmation message is shown when the process is complete.

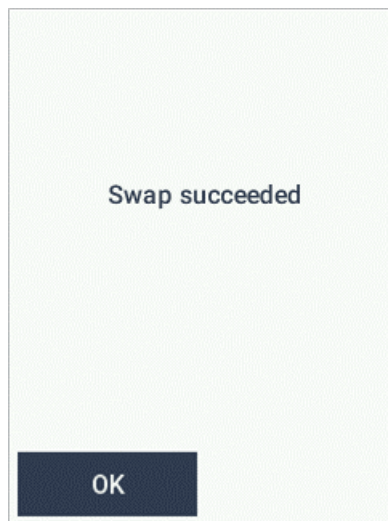


Figure 87 – Confirmation message that the swap process is complete

7. Tap on **OK** → menu icon (☰) to return to the home screen.



You may unpair the first sensor if you do not expect to use it again on the same Cobalt X data logger. If data logging is not currently running, you may simply unpair the previous sensor and pair the new one.

7.3 Advanced menu

The Cobalt X data logger includes an **Advanced** menu that you can use for troubleshooting and to confirm that your data logger is working properly.

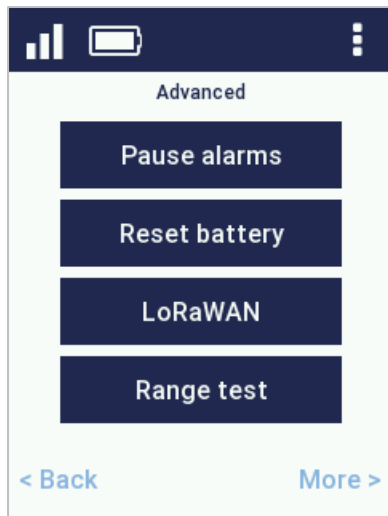


Figure 88 – Features in the Advanced menu

To limit access to the Cobalt X parameters and prevent unwanted changes, the **Advanced** menu is protected by your personal access code as configured in the OCEAView web application and is recommended for qualified personnel only.

1. Select **Menu** (☰) → **Advanced**
2. Enter your PIN code and tap on **OK** to continue. If you forgot your PIN code, you can look in your user profile in OCEAView or contact your system administrator for assistance.



Features in the **Advanced** menu should only be used when needed and by qualified technicians.

7.3.1 Calibrating the Cobalt X screen

If your Cobalt X data logger screen does not respond accurately to your touch, the touch screen may require calibration to position touch point coordinates correctly.

Proceed as follows to calibrate screen alignment:

1. Tap on **Menu** (☰) → **Advanced**
2. Enter your PIN code and tap **OK**.
3. Tap on **More** → **Calibrate screen** and follow the instructions on the screen. Starting in the upper-left corner, press and hold your finger on the screen – or use a pencil eraser to hug the edges more easily. Still pressing the screen, slide around the edges to all four corners of the screen, as shown on the image below:

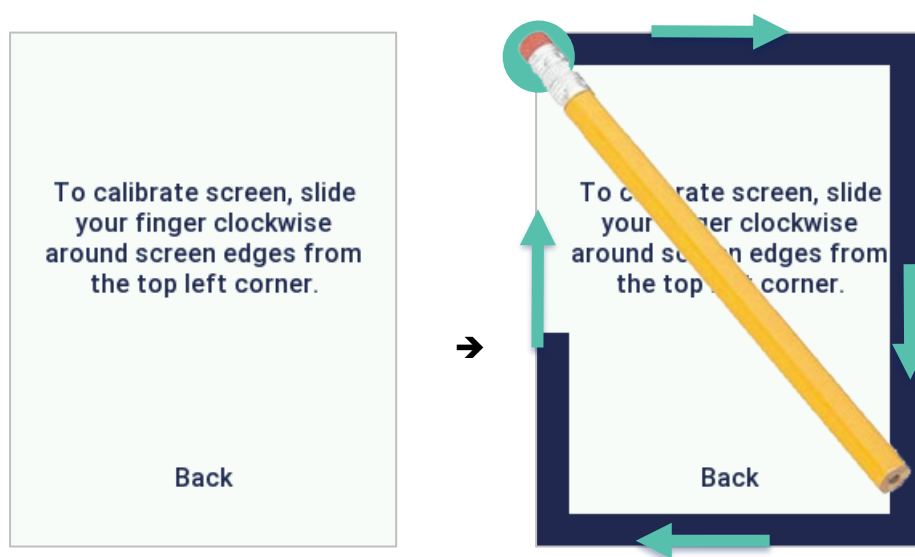


Figure 89 – Slide your finger or an eraser around the screen for best accuracy

After you pass through each calibration point sequentially, the screen returns to the **Advanced** menu.

7.3.2 Resetting the Cobalt X data logger battery counter

It is imperative to replace Cobalt X data logger batteries when the battery indicator is down to one bar, before data logging becomes unreliable. To install new batteries, see section 9.1 *Replacing batteries*, p. 128.

After replacing batteries, you must reset the battery counter so that your data logger displays the correct battery status.



This function should only be used if you replace your data logger's batteries with reliably new batteries.

To reset the battery counter:

1. Tap on **Menu** (☰) → **Advanced**
2. Enter your PIN code and tap **OK**.
3. Tap on **Reset battery** → **OK** to continue
4. Tap on **OK** → **Menu** (☰) to return to the home screen
5. The battery icon in the status bar should indicate a full battery:



Figure 90 – Battery counter showing 100% charge

7.3.3 LoRaWAN network setup

LoRaWAN wireless technology offers the flexibility to deploy your monitoring solution with different types of access architecture. Your network selection must reflect the license or subscription you choose for your system.

To configure your data logger:

1. Tap on **Menu** (☰) → **Advanced**
2. Enter your PIN code and tap **LoRaWAN** → **Network**

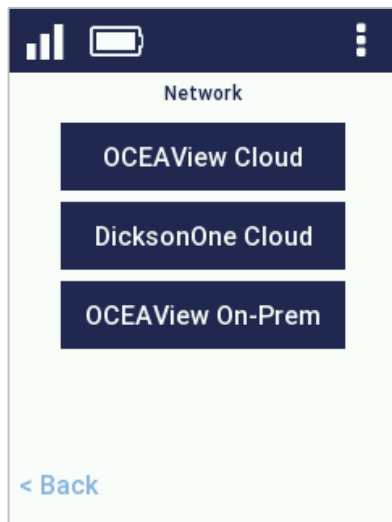


Figure 91 – LoRaWAN network options

3. Tap to select the desired installation type:

OCEAView Cloud	Public Cloud solution
DicksonOne Cloud	Public Cloud solution
OCEAView On-prem	On-premises solution (requires you to enter a customer key)



As of firmware v2.9, Cobalt X data loggers can connect to the DicksonOne Cloud monitoring solution. For details, please check the appropriate DicksonOne Cloud documentation.

4. Tap on **Save** to continue.

7.3.4 LoRaWAN wireless range test

You may use the range test feature in the **Advanced** menu to ensure that your Cobalt X data loggers are within wireless range of the configured LoRaWAN network (i.e. your LoRaWAN gateway). This feature is useful for system installers, as it can help you prepare your environment before deploying Cobalt X data loggers.

Confirming signal quality also allows you to identify optimal locations for your data loggers within the wireless coverage area.



This section assumes that your LoRaWAN-enabled gateway is installed, configured, and running properly. This test also performs an end-to-end test of the Cobalt X solution and verifies the connection to the server.

To test your LoRaWAN wireless coverage

1. Tap on **Menu** (☰) → **Advanced**
2. Enter your PIN code and tap **OK** → **Range test**
3. On the screen that appears, tap on **Test**.
4. The system performs a series of wireless communications test (notably using a technique known as “spreading factor modulation”) to determine wireless signal quality. If reception is strong, the result is indicated in green; if it is not strong enough, the result is indicated in red.

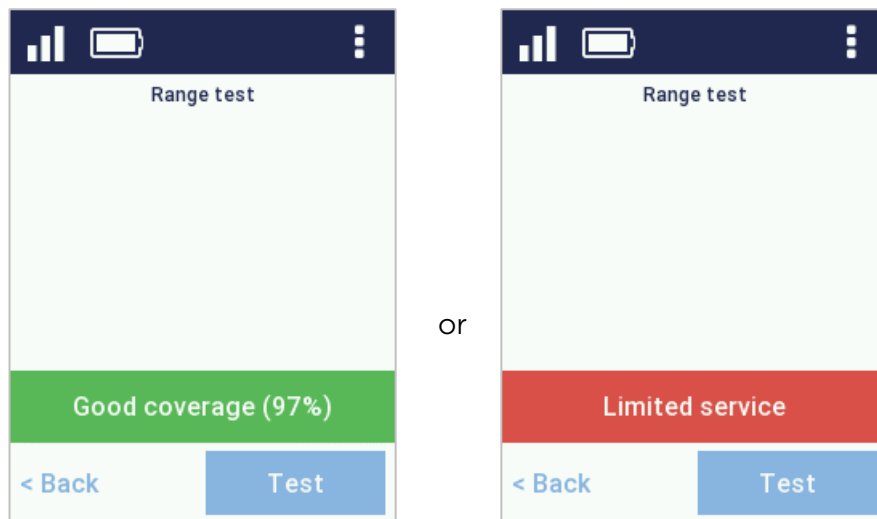



Figure 92 – LoRaWAN wireless coverage test

We recommend not setting up your data loggers if signal level is weak. Poor signal quality can result in inadequate coverage and cause system performance or reliability problems.



The wireless signal may be affected by excessive obstruction, RF/radio interference, or harsh environmental conditions. Make sure the data logger in question is placed optimally long-term operation.

Please contact support services if you are having difficulties connecting to the LoRaWAN network.

5. Tap on the menu icon () when you are done with this test.

7.3.5 LoRaWAN radio performance

You may check to see how well your data logger's wireless radio is performing. Based on results, you may choose to adjust placement or positioning of the data logger.

1. Tap on **Menu** (☰) → **Advanced**
2. Enter your PIN code and tap **OK** → **More** → **Radio performance** → **Test**



Radio performance		
	GW	Dev
RSSI	-100	0
SNR	-2	0

< Back Test

Figure 93 – LoRaWAN radio performance test

In this screen:

RSSI	Received Signal Strength Indicator: [Min: -140 / Max: -20] This is for information only. Generally speaking, the higher the value the better.
SNR	Signal-to-Noise ratio: [Min: -20 / Max: +20] A positive SNR value indicates a strong transmission. The transmission is less strong as the number descends. Generally speaking, SNR values down to -10 are acceptable.
GW	Gateway (gateway): Indicates the values received by the gateway from the data logger.
Dev	Data logger: Indicates the values received by the data logger from the gateway.

7.4 Quick server connection test

Without using the **Advanced** menu, you may perform a simple **Test** command to make sure that your Cobalt X data logger is able to communicate with the server. This function sends a request to the server and waits for a response to determine whether the server is reachable.

To test LoRaWAN communication:

1. Tap on the menu icon (☰) → **More**

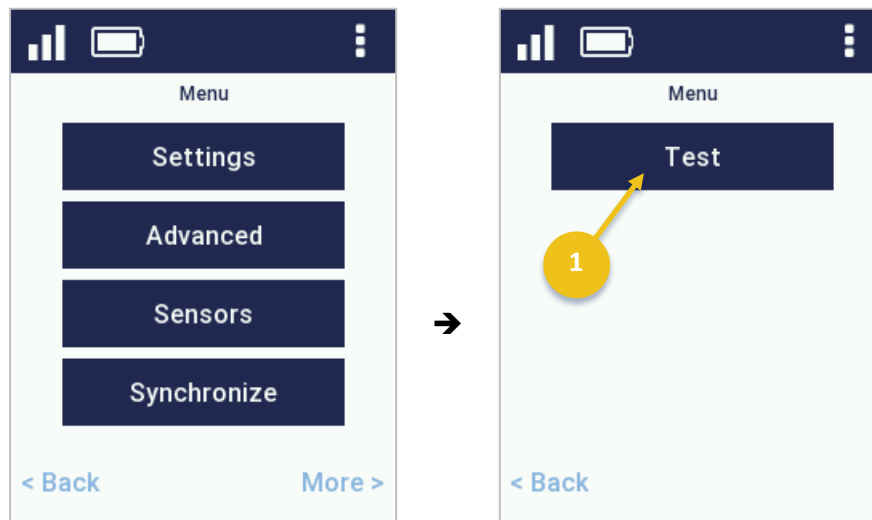


Figure 94 – Quick server connection test

2. Tap on **Test** (1)
3. Wait while the system tries to reach the server.
4. Results are displayed in the header bar:

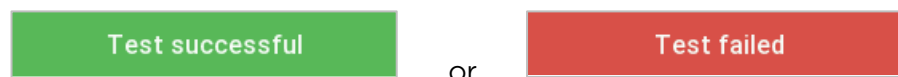


Figure 95 – Server connection test results

The only possible results are **Test successful** or **Test failed**. If the test fails, it generally means that the outside network cannot be reached from either your Cobalt X data logger or your local LoRaWAN gateway. If you are using a local gateway, make sure that it has a working Internet connection and check your installation. Contact technical support if you are unable to resolve the problem on your own.



Tap on the menu icon (☰) or **Back** to return to the home screen.

7.5 Data synchronization

The OCEAView monitoring solution enables you to force synchronization of your Cobalt X data logger with the server. This may be useful to speed up certain operations, notably:

- When adding a new sensor to a Cobalt X data logger: if you use the **Synchronize** function, the new sensor is updated on the server right away, otherwise the update occurs at the next programmed data transfer.
- If you make data logging configuration changes on the server, using the **Synchronize** function on the data logger causes those changes to be taken into account right away.
- You can also use this option to send the latest data logging information on-demand, without waiting for the transfer interval (this refreshes the information for the web application display but does not affect data logging graphs and records).

To synchronize your data logger data:

1. Tap on the menu icon () → **Synchronize**
2. If the data logger's network connection is up and running (which you can test as described in the previous section), information is updated bidirectionally.
3. Tap on the menu icon () to return to the home screen.



When using the Synchronize feature, please wait about one minute between presses. Due to the nature of LoRaWAN communications, it may take a moment for information to be updated completely.

7.6 Using your data logger in Bluetooth-only mode

The Cobalt X data logger may be used in “Bluetooth-only” mode, that is, without any LoRaWAN functionality. In that case, the data logger behaves exactly as it does with LoRaWAN connectivity, but data transmission is handled via Bluetooth wireless “advertising frames” containing data, which can then be collected by a OCEABridge Bluetooth gateway and forwarded to the OCEAView web platform.

This operating mode is described in more detail in *section 1.2.1 – LoRaWAN vs Bluetooth wireless topologies, p. 15*.

To deactivate LoRaWAN and use your data logger in Bluetooth-only mode:

1. Make sure that data logging is not currently running using LoRa connectivity, then tap on the menu icon (☰) → **Advanced**
2. Enter your PIN code → tap **OK** → **LoRaWAN** → **On/Off**
3. Tap on the up/down arrows (⤴ or ⤵) or tap **Off** for Bluetooth use. You may reactivate LoRaWAN by selecting **On**.
4. Tap on **Save** to apply the change or on **Back** or the menu icon (☰) to cancel.
5. If you turn off LoRaWAN, Bluetooth is the only active wireless communication, as indicated in the upper left-hand corner of the screen.

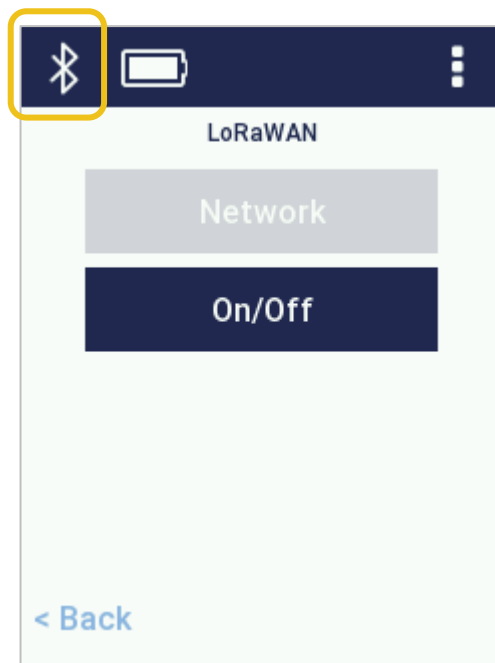


Figure 96 – Bluetooth icon in status bar

8 Alarms and warnings

One of the Cobalt X data logger's most important features is its ability to detect alarm conditions and work in tandem with the OCEAView server platform to notify designated users when problems occur.

An alarm condition can be one of the following:

- An **excursion**, where the read sensor value is outside the programmed target range. Excursions may be set up in OCEAView to be treated either as warnings (which do not require acknowledgment) or alarms (which require acknowledgment).

For dry contact sensors, which detect a binary "open" or "closed" state, the alarm condition arises when the sensor is in the opposite of its "normal" state.

- A **technical alarm**, generated directly by the Cobalt X data logger:
 - Low battery (when the battery reaches 10% of its full charge)
 - Unexpected stop (if the data logger stops functioning for some reason, such as when the battery is removed)
 - Sensor failure (if the data logger was unable to read the sensor)
 - Invalid sensor type (if an incompatible or unknown sensor type was plugged in)

Two other technical alarms concerning data loggers are visible in OCEAView but are not generated by the data logger. "Communication lost" and "Power lost" are generated by the server, according to your data logger configuration. Please see the OCEAView User Guide for more information.



Regardless of the programmed data transfer interval, alarms generated by the data logger are always transmitted spontaneously to the server as soon as they are detected.

When an alarm or warning occurs, the translucent outer ring on the Cobalt X casing flashes for as long as the data logger remains in excursion. The light stops flashing if, at the next programmed sensor read, the alarm condition has ended.

Two colors are used for alarms:

- **Red** for limit alarms and technical alarms, which require acknowledgment either on the data logger or in OCEAView.
- **Orange** for warnings, which are recorded in the audit trail like alarms but do not require acknowledgement.



Figure 97 – Data logger with alarm (left) and warning (right)

In either case, the color reverts to normal and the light stops flashing when the sensor value returns to its normal range, or when the technical alarm is resolved.



Alarms and warnings both trigger alerts (user notification or alarm device) if programmed in OCEAView. The only difference is that warnings do not need to be acknowledged by entering a PIN code.

8.1 LED status indications

The color ring on the Cobalt X casing indicates data logger status and offers simple patterns based on status, as described below:

General (● = short flash)	
Data logger is booting	● ● ●
Bluetooth connected	● ● ● ● (every 6 seconds)
Bluetooth listening	● (every 10 seconds for 1 minute)

Data logging status (● fixed for 1 second)	
Alarm in progress	●
Warning in progress	●



When the Cobalt X data logger is running on batteries, the outer ring will continue flashing in case of an alarm, even if the data logger screen has gone dark. In that case, tap to wake up the screen and handle the alarm.

8.2 Managing alarms

When the Cobalt X data logger is running on external power (using the optional AC adapter), the buzzer is activated to notify users in case of event on the data logger itself or at any point during data logging, such as when the temperature or humidity is above or below programmed limits.



To preserve data logger battery life, the buzzer is not activated when the data logger is running on batteries.

8.2.1 Snoozing an alarm

If an alarm condition is encountered and the buzzer is activated, the Cobalt X display shows an alarm icon (bell) in the upper left-hand corner of the screen:

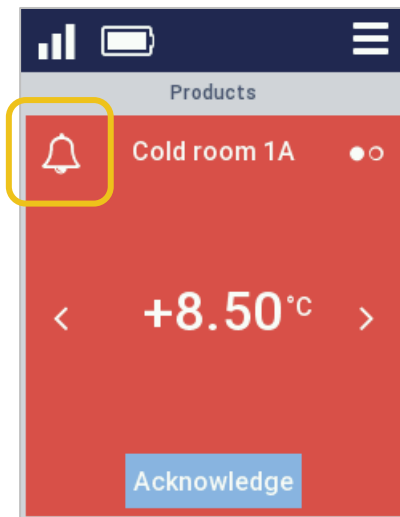


Figure 98 – Bell icon indicating that alarm sound is active

In some cases, or certain known situations, you may want to mute alarms temporarily.

To snooze an alarm:


1. Tap once on the alarm icon ().
2. A “mute” symbol appears in the left-hand corner of the screen:



Figure 99 – Bell icon indicating that alarm sound is active

3. The alarm sound is silenced for one hour and the LED stops blinking. After that time, if alarm condition is still present, the alarm sound automatically plays again and the LED blinking resumes.
4. Even if an audio alarm is cleared, a visual alarm remains on the Cobalt X screen as long as the alarm condition is still present.



The OCEAView web application provides access to measurements and alarms recorded by data loggers.

8.2.2 Acknowledging an alarm

When an alarm is in progress, the Cobalt X data logger remains in an alarm state as long as the alarm conditions are present.

If data logging was programmed with a delay to trigger an alarm only after a specified period of time, a stopwatch icon is displayed on the data logging screen (as described in the next section) and the alarm is activated when the limit is reached.

It is important for you to acknowledge data logger alarms and take care of any problems so that further alarms do not continue to occur. The problem may persist even if you have acknowledged the alarm on the Cobalt X display or in OCEAView.

Acknowledging alarms requires specific permissions, assigned in the OCEAView web application. Only authorized users with appropriate rights and access codes can acknowledge alarms.



The web application interface is updated when you acknowledge an alarm on the data logger screen and its status will be indicated as "Ongoing" until the problem is resolved, then "Ended"

If you acknowledge the alarm in the web application, the data logger will still show the alarm as long as the alarm condition persists.

To acknowledge alarms:

1. Tap the **Acknowledge** button 1.

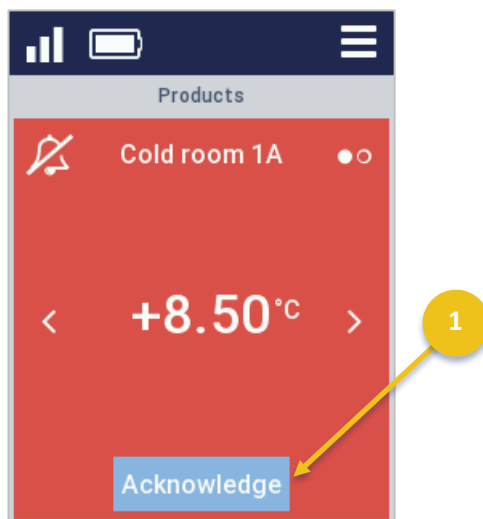


Figure 100 – Tap on Acknowledge button to clear alarm

2. Enter your PIN code as assigned in the OCEAView web application and tap **OK**.

3. Tap on the up/down arrows ( or ) to select a reason for the acknowledgement:

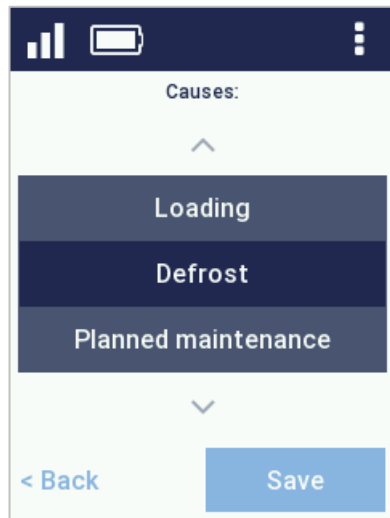



Figure 101 – Choose a reason for acknowledging the alarm

4. Once the alarm is acknowledged, the alarm icon is no longer shown on the Cobalt X data logger screen. The alarm status is also updated in the OCEAView web application.

8.2.3 Alarm delay indicator

When setting up data logging, you may program a delay before the alarm is triggered.

For example, you could set a 5-minute delay for the data logger to wait 5 minutes before triggering an alarm in case the temperature rises above, or drops below, the programmed limit.

In that case, if a reading on your Cobalt X data logger exceeds a programmed limit value, a stopwatch  is displayed in the upper left-hand corner to indicate that the data logger is in a “pre-alarm” state.

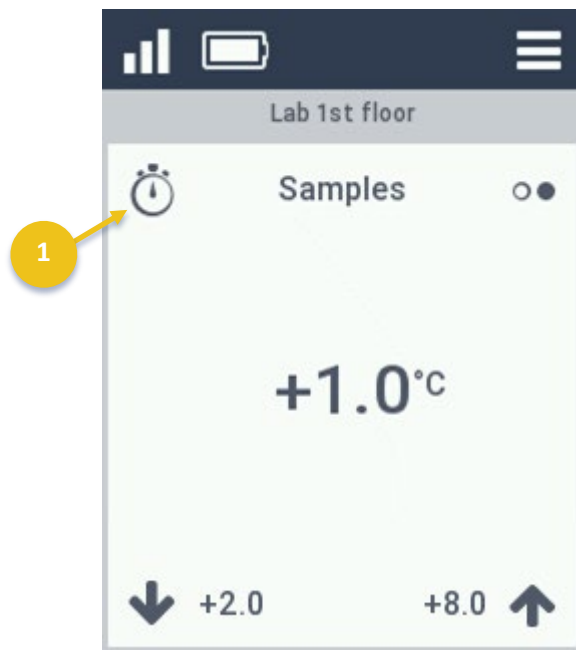


Figure 102 – Pre-alarm indicator on data logger display



The presence of the stopwatch icon indicates that the data logger has encountered an alarm condition but that the end of time delay has not yet reached.

8.2.4 Pausing alarms

Cobalt X allows you to pause alarms for a period ranging from 30 minutes to 72 hours. This feature is typically used to avoid generating alert notifications when an alarm or warning occurs due to a planned action such as preventive maintenance or an equipment move.

For example, if you plan to defrost a freezer, you could simply pause alarms for 24 hours rather than having to acknowledge the alarms the would inevitably occur during the operation. You may resume regular alarm management at any time.

To pause alarms:

1. Tap on the menu icon (☰) → **Advanced** → enter your PIN code → **Pause alarms**
2. Select the sensor for which you would like to pause alarms and warnings, then press **OK**.
3. Select the duration, from 30 minutes to 72 hours, then press **Save**

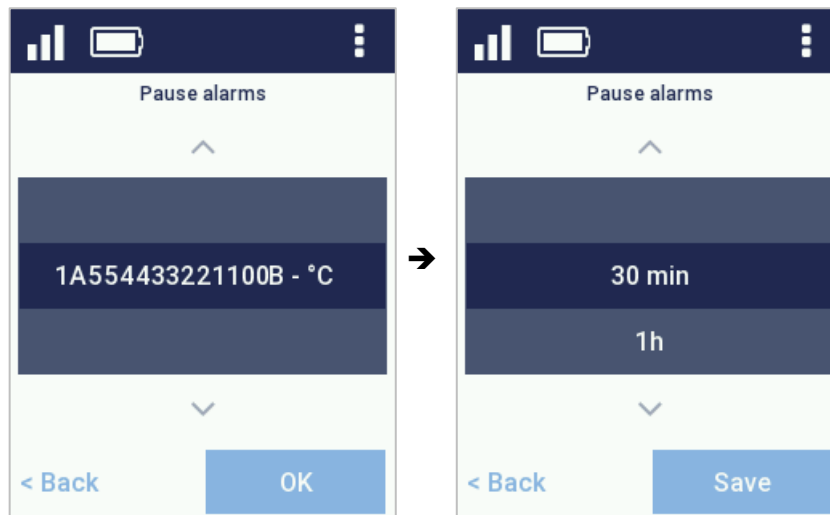


Figure 103 – Using the Pause alarms feature

4. Press **OK** to confirm or **Cancel** to return to the previous screen without applying a pause.
5. You may repeat this operation for other currently active sensors on the data logger.
6. Tap on **Back** or the menu icon (☰) to return to the home screen.

While alarms and warnings are paused, the data logger will continue to take sensor readings and send them to the server.

The following types of alarms/warnings are not generated during the pause:



- Limit alarms
- Dry contact alarms
- "Invalid sensor" alarms
- "Sensor fail" alarms

Specific alarms related to the data logger device itself will still be sent to the server:

- Low battery
 - Power loss (Cobalt X disconnected from AC power)
 - Communication lost
-

To resume alarms/warnings:

1. When your data logger is set to show one or two items per page, the main screen indicates clearly when alarms are paused:

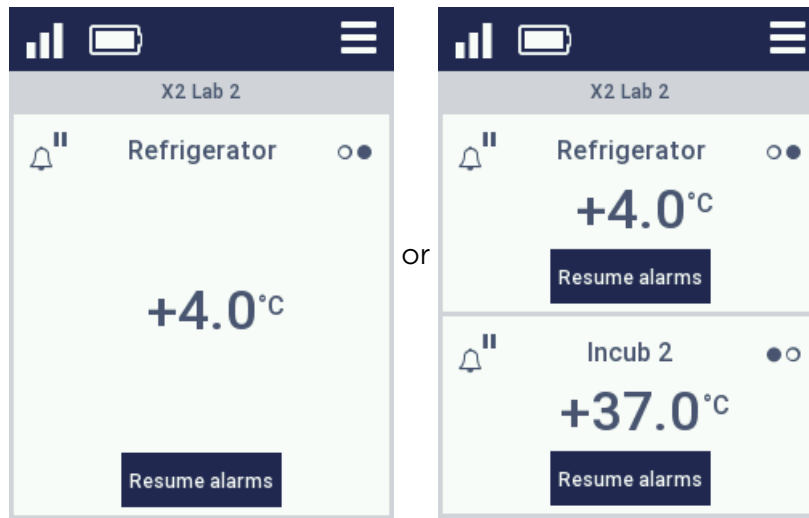


Figure 104 – Resuming alarm/warning functionality

The **Resume alarms** button is not displayed if your data logger is set to show four items per page, as shown here:



Figure 105 – Screen set up to display four items per page

2. To resume regular alarm/warning behavior, simply press **Resume alarms** and enter your PIN code if the button is displayed. Otherwise, if your screen is set to show four items per page and you want to resume alarm/warning functionality, you must go into **Settings → Items per page** and select one or two items per page, then press **Resume alarms**.

9 Maintaining your Cobalt X data logger

9.1 Replacing batteries

The Cobalt X data logger runs on batteries and/or AC power (via an adapter plugged into the USB port). Batteries are not installed prior to delivery.



If data logging is currently running, we recommend that you not take any risks by removing both batteries at the same time. A single battery is sufficient to maintain power during the change.

We recommend plugging the Cobalt X data logger into AC (USB) power, such as a power bank, when changing batteries to avoid any risk of data loss.

To replace batteries:

1. Remove the data logger from its mounting bracket if necessary. If possible, keep the data logger plugged into the AC (USB) power source.



Figure 106 – Optional: plug in USB power to avoid losing data

2. Use a manual screwdriver to remove the screw from the battery cover on the back of the data logger by turning the screw counterclockwise ①, then push the plastic tab ② open and remove the battery cover.

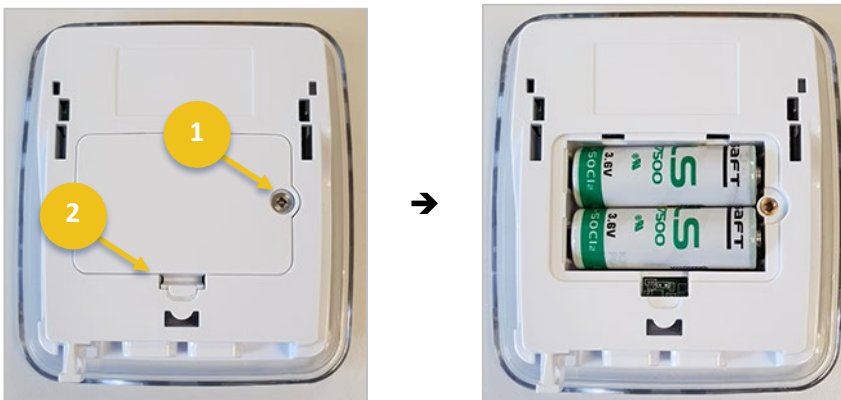


Figure 107 – Remove battery cover

3. A single battery will ensure continued operation so you can replace the other battery without interrupting data logging:
 - Remove one used battery from the data logger and replace it with a new one, making sure to respect battery polarity (see image printed inside battery slot).
 - With the first new battery firmly in place, remove and replace the second used battery.



Figure 108 – Replace one battery after the other (and/or keep AC power on)



If you remove both batteries simultaneously, the data logger will shut down and data logging currently in progress will be stopped (readings in memory are not lost).

4. Clip the battery compartment cover back onto the unit and replace the screw, being careful not to over-tighten it.
5. Wait during the boot sequence.



After replacing batteries, the battery counter must be reset to recognize the new battery status. See *section 7.3.2 – Resetting the Cobalt X data logger battery counter, p. 109.*

9.2 Cleaning instructions

You may occasionally need to clean your Cobalt X data loggers depending on conditions at your site.

Here are some recommendations and guidelines for cleaning your data loggers:

1. Clean the data logger using a soft cloth lightly moistened with water, a detergent or isopropanol alcohol.
2. Do not use any aggressive cleaning agents or scratching cleansers that might damage your data logger.
3. Do not submerge the data logger in any liquid, as the casing is not waterproof.

10 Appendix 1 – Cobalt X battery life

Cobalt X data logger battery life varies depending upon many factors:

1. **Ambient temperature:** battery capacity is diminished when subject to very cold or extreme heat conditions.
2. **Wireless communication:** LoRaWAN and Bluetooth wireless communication consume battery power. Therefore, battery life depends on factors such as the connection frequency and signal quality.
3. **Screen backlight:** the backlight is activated each time you press the Cobalt X screen but also when the data logger enters into an alarm condition. Extended use of the screen backlight reduces battery life considerably when the data logger is running on battery power.
4. **Alarm indicator (LED):** when the system triggers an alarm, the outer ring around the Cobalt X casing flashes as long as your data logger remains in an alarm condition. Prolonged use of the LED consumes power and reduces the data logger's battery life.
5. **Remote sensors (wireless):** When using Cobalt X with remote sensors, Bluetooth® communication consumes battery power. The more remote sensors used, the higher the battery consumption on the Cobalt X data logger.



These considerations do not apply when using Cobalt X on AC (USB) power.

10.1 Estimated battery life

The estimated Cobalt X operating lifetime on batteries is about 2 years, based on:

- Starting with new batteries
- A Cobalt X data logger equipped with 1 digital sensor and 1 Pt100 sensor
- 1 reading every 10 minutes
- LoRaWAN wireless transmission every 20 minutes
- 1 touchscreen press per day

11 Appendix 2 - Troubleshooting

If you are having difficulties with your configuration, have a look at these frequently asked questions before contacting technical support.

I swapped a sensor and received a Sensor Fail error. But then everything seemed OK. What happened?

Most likely, you performed the swap as the sensor was being read by the data logger. This generates an alarm concerning that precise moment. If the new sensor is working correctly, that problem can be considered as being very temporary and you can simply acknowledge the alarm to close it.

The Cobalt X data logger screen is black. When I tap the screen, nothing is displayed and there does not seem to be any reaction. What should I do?

Is your data logger running on battery only?

If so, the batteries might be low, and the screen is turned off because the data logger is in power saving mode. Try plugging in the AC (USB) power supply. If the screen comes back on, then simply install fresh batteries (i.e. one after the other) and/or leave it plugged in.



Remember to use the "Reset battery" function when you install fresh batteries, but never use that function unless you actually change the batteries!

Are the batteries inserted correctly?

First, check to make sure the batteries are installed and inserted in the right direction (+/- according to the image in the battery slot). Try testing the unit with batteries that are known to be of the correct size and voltage (non-rechargeable, 3.6V Lithium, 3600 mA). Contact technical support if the batteries are OK and still nothing is displayed on the screen.

The Cobalt X data logger is properly connected to the web platform. Why don't I get any temperature readings?

The Cobalt X wireless protocol is based on LoRaWAN technology. The data logger connects wirelessly to your LoRaWAN-enabled gateway and transfers data periodically, but not at every reading. If you modify data logging settings in OCEAView, the values on the Cobalt X screen will be updated when the next

transfer interval occurs. Wait for the next transfer interval to get your data updated.

This could also be due to a loose cable or improperly connected temperature sensor. Check the cable between the Cobalt X data logger and the sensor. Unplug the sensor and plug it back in. Make sure there are no exposed wires. Try a different sensor.

In Bluetooth mode using an OCEABridge gateway, my Cobalt X does not upload data to my OCEAView application. What should I do?

Check to make sure your OCEABridge gateway and Cobalt X are correctly registered for the same company in OCEAView.

The wireless sensor I wish to pair does not appear on the Cobalt X data logger screen. What should I do?

To make a wireless sensor visible to your Cobalt X data logger, make sure Bluetooth is enabled on the sensor as described in *section 5.8 – Remote wireless sensors, p. 76*, then follow the instructions in *section 7.2.3.1 Pairing a Bluetooth wireless sensor, p. 98* to proceed.

I cannot pair a wireless sensor that was previously discovered by my Cobalt X data logger. What should I do?

During pairing, the wireless sensor may enter “remote” mode but cannot be detected by your Cobalt X data logger. This can happen in case of a radio communication failure or when a factory reset is performed.

To pair the wireless sensor with your Cobalt X, follow these instructions:

1. Remove the battery from the Smart-Tracker data logger (to deactivate “remote” mode)
2. Wait for the Cobalt X data logger to automatically pair the sensor.

My wireless sensor’s calibration parameters are incorrect in the OCEAView web application. What should I do?

During pairing, the Cobalt X data logger downloads calibration parameters from the remote sensor. If wireless communication fails during the pairing process, the calibration parameters may be invalid in the web application. To fix this issue, use the **Settings ➔ Sensors ➔ Refresh sensors** function on the Cobalt X data logger to update sensor calibration parameters.

The unit or temperature range for my sensor is not displayed correctly in the OCEAView web application. What should I do?

Under rare conditions, it may happen that the sensor's physical parameter (unit) or temperature does not appear properly in the OCEAView web application. If that occurs, resynchronize the information by unplugging the sensor from the Cobalt X data logger and pressing **Settings → Refresh Sensors**. Then plug the sensor back into the data logger and press on **Settings → Refresh Sensors** again to push updated information to the web application.

Can external sensors be submerged in glycol?

Yes, for all metal-tipped sensors, but not the dual temperature/humidity sensor (with the white Teflon/PTFE casing). To "absorb" sudden variations in temperature, such as those caused by opening and closing the chamber door, you may submerge the metal part of the sensor in glycol or glycerol. This limits inconsequential temperature variations recorded by the sensor. Check your laboratory's Quality guide for recommendations and make sure to use a volume of glycol that corresponds to the volume of product(s) you are monitoring. To achieve the same results, you may also delay the transmission of alarms via the software and leave the sensors exposed.

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