



# InTemp® CX400 Series Temperature Logger Manual



InTemp CX400 series loggers measure temperature in indoor monitoring applications. Designed to meet World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) guidelines, this logger is ideal for clinical applications, such as vaccine storage and pharmaceutical manufacturing. This Bluetooth® Low Energy-enabled logger is designed for wireless communication with a mobile device. Using the InTemp app, you can easily configure the logger with one of four preset profiles designed for ambient storage, clinical refrigerator, freezer, or refrigerator monitoring or you can set up a custom profile for other applications. You can also quickly perform daily logger checks, download reports, and monitor tripped alarms. Or, you can use InTempConnect® to configure and download CX series loggers via the CX5000 Gateway. The InTempVerify™ app is also available to easily download loggers and automatically upload reports to InTempConnect. Use the built-in LCD screen on the logger to check the current temperature, daily maximum or minimum temperatures, logging status, battery use, and more. Once data is uploaded to InTempConnect, you can track logger configurations and automatically upload logger data to build custom reports for further analysis. The CX402 model uses a 2- or 4-meter probe and is available with a 5, 15, or 30 mL glycol bottle (bottle holder included). It also contains an internal sensor for ambient temperature monitoring. The CX403 model is available with an internal sensor only.

## InTemp CX400 Temperature Loggers

### Models:

- CX402-T205 & CX402-VFC205, 2 meter probe and 5 mL glycol bottle
- CX402-T215 & CX402-VFC215, 2 meter probe and 15 mL glycol bottle
- CX402-T230 & CX402-VFC230, 2 meter probe and 30 mL glycol bottle
- CX402-T405 & CX402-VFC405, 4 meter probe and 5 mL glycol bottle
- CX402-T415 & CX402-VFC415, 4 meter probe and 15 mL glycol bottle
- CX402-T430 & CX402-VFC430, 4 meter probe and 30 mL glycol bottle
- CX402-T2M, CX402-B2M, & CX402-VFC2M, 2 meter probe
- CX402-T4M, CX402-B4M, & CX402-VFC4M, 4 meter probe
- CX403

### Included Items:

- Double-sided tape (for models with glycol bottles)
- Two AAA 1.5 V alkaline batteries
- Battery door and screw
- NIST Certificate of Calibration

### Required Items:

- InTemp app
- Device with iOS or Android™

## Specifications

### External Temperature Probe

Range	-40° to 100°C (-40° to 212°F)
Accuracy	CX40x-Txxx and CX402-BxM: ±1.0°C from -40° to -15°C (±1.8°F from -40° to 5°F) ±0.5°C from -15° to 80°C (±0.9°F from 5° to 176°F) ±0.7°C from 80° to 100°C (±1.3°F from 176° to 212°F) CX40x-VFCxxx: ±1.0°C from -40° to -22°C (±1.8°F from -40° to -8°F) ±0.5°C from -22° to 50°C (±0.9°F from -8° to 122°F) ±1.0°C from 50° to 100°C (±1.8°F from 122° to 212°F)
Resolution	0.024°C at 25°C (0.04°F at 77°F)
Drift	<0.1°C (0.18°F) per year
NIST Calibration	CX40x-Txx and CX402-BxM: Single point NIST calibration, probe and logger body CX40x-VFCxxx: Single point NIST calibration, probe only CX403: Single point NIST calibration
Cable Length	2 or 4 meter (6.56 or 13.12 feet) flat ribbon cable
Probe Dimensions	Food-grade stainless steel probe with pointed tip, 53.34 mm (2.1 inches) long, 3.18 mm (0.125 inches) diameter



### Ambient Temperature Sensor

Range	-30° to 70°C (-22° to 158°F)
Accuracy	CX40x-Txxx and CX402-BxM: ±0.5°C from -15° to 70°C (±0.9°F from 5° to 158°F) ±1.0°C from -30° to -15°C (±1.8°F from -22° to 5°F) CX40x-VFCxxx: ±1.0°C from -30° to -22°C (±1.8°F from -22° to -8°F) ±0.5°C from -22° to 50°C (±0.9°F from -8° to 122°F) ±1.0°C from 50° to 70°C (±1.8°F from 122° to 158°F)
Resolution	0.024°C at 25°C (0.04°F at 77°F)
Drift	<0.1°C (0.18°F) per year

### Logger

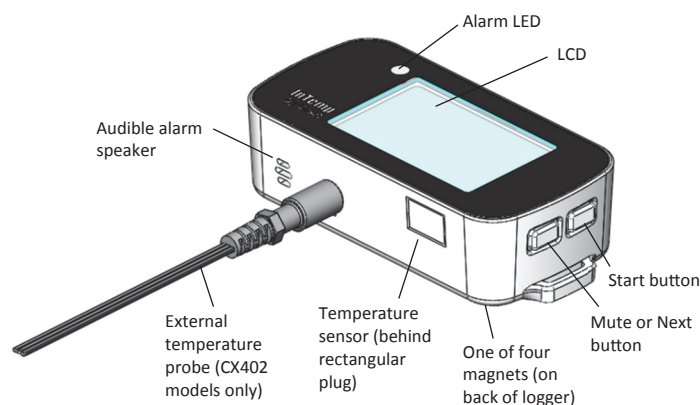
Radio Power	1 mW (0 dBm)
Transmission Range	Approximately 30.5 m (100 ft) line-of-sight
Wireless Data Standard	Bluetooth Low Energy (Bluetooth Smart)
Logger Operating Range	-30° to 70°C (-22° to 158°F), 0 to 95% RH (non-condensing)
Logging Rate	1 second to 18 hours

## Specifications (continued)

Time Accuracy	±1 minute per month at 25°C (77°F)
Battery Type	Two AAA 1.5 V alkaline or lithium batteries, user replaceable
Battery Life	1 year, typical with logging interval of 1 minute. Faster logging intervals, remaining connected with the InTemp app, excessive report generation, numerous audible alarms, and paging all impact battery life.
Memory	128 KB (84,650 measurements, maximum)
Full Memory Download Time	Approximately 60 seconds; may take longer the farther the device is from the logger
LCD	LCD is visible from 0° to 50°C (32° to 122°F); the LCD may react slowly or go blank in temperatures outside this range
Dimensions	9.4 x 4.5 x 2.59 cm (3.7 x 1.77 x 1.02 inches)
Weight	90.2 g (3.18 oz)
Environmental Rating	IP54
	The CE Marking identifies this product as complying with all relevant directives in the European Union (EU).
	See last page

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## Logger Components and Operation



**Start Button:** Press this button for 1 second to start the logger when it is configured to start “on button push.”

**Mute or Next Button:** Press this button for 1 second to mute a beeping alarm (see Logger Alarms). For CX402 loggers, press this button for 1 second to switch between the external probe and ambient internal sensor temperature readings.

**Magnets:** There are four magnets on the back of the logger (not shown in diagram) for mounting.

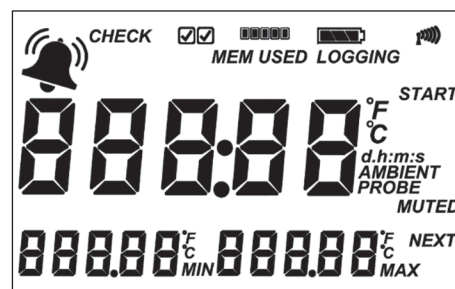
**Temperature Sensor:** This internal sensor measures ambient temperature.





**External Temperature Probe:** This is the probe that is plugged into the logger for measuring temperature (CX402 models only).














**Audible Alarm Speaker:** This is the speaker for the audible alarm that beeps when an alarm is tripped or the external probe is removed (if applicable).

**Alarm LED:** This LED blinks every 5 seconds when an alarm is tripped or the external probe is removed (if applicable). See Logger Alarms

**LCD:** This screen shows the latest temperature reading and other status information. The LCD screen refreshes at the same rate as the logging interval. The example shows all symbols illuminated on the LCD screen followed by a table with descriptions of each symbol.



LCD Symbol	Description
	An alarm has tripped because the temperature reading is outside the specified range
<b>CHECK</b> <input type="checkbox"/>	The logger has been configured to perform daily or twice daily checks (twice daily is shown in this example), but no checks have been performed yet.
<input checked="" type="checkbox"/>	The once daily or twice daily logger check (twice in this example) has been performed.
<b>MEM USED</b> 	This indicates how much memory has been used for the current configuration. In this example, approximately 40 percent of the memory has been used.
	This shows the approximate battery power remaining.
<b>LOGGING</b>	The logger is currently logging.
	The logger is currently connected to a phone or tablet via BlueTooth. The more bars there are, the stronger the signal.
<b>START</b>	The logger is waiting to be started. Press and hold the Start button for 3 seconds to start the logger.

LCD Symbol	Description
	This is an example of a temperature reading from an external probe.
	This is an example of a temperature reading from the internal sensor.
	This is an example of a minimum temperature, which is the lowest probe temperature reading from the day (CX402 models) or the lowest ambient temperature reading (CX403 model) within the current 24-hour period (midnight from one day to midnight the next day) if the logger was set to record logger checks (see Performing Logger Check). Otherwise the minimum and maximum readings represent the entire logging period and only reset when the logger is downloaded and restarted or stopped and reconfigured.
	This is an example of a maximum temperature, which is the highest probe temperature reading from the day (CX402 models) or the lowest ambient temperature reading (CX403 model) within the current 24-hour period (midnight from one day to midnight the next day) if the logger was set to record logger checks (see Performing Logger Check). Otherwise the minimum and maximum readings represent the entire logging period and only reset when the logger is downloaded and restarted or stopped and reconfigured.
	The external probe is not connected to the logger (if applicable).
	MUTE indicates an alarm is beeping. Turn off the beeping alarm by pressing the Mute button. The LCD then changes to MUTED.
	The audible alarm has been muted.
	The logger has been configured to start logging on a delay. The display will count down in days, hours, minutes, and seconds until logging begins. In this example, 5 minutes and 38 seconds remain until logging will begin.
	The profile settings are being loaded onto the logger.
	An error occurred while loading the profile settings onto the logger. Try reconfiguring the logger.
	The logger was paged from the InTemp app.
	The logger has been downloaded and stopped with the InTemp app or because the memory is full.
	The logger is being updated with new firmware.

Note: If the logger has stopped logging because the memory is full, the LCD screen will remain on with “STOP” displayed until the logger is downloaded to your mobile device. Once the logger has been downloaded, the LCD will turn off automatically after 2 hours. The LCD will turn back on the next time the logger connects with your device.

## Getting Started

InTempConnect is web-based software where you can monitor CX400 series logger configurations and view downloaded data online. Using the InTemp app, you can configure the logger

with your phone or tablet and then download reports, which are saved in the app and automatically uploaded to InTempConnect. The CX5000 Gateway is also available to automatically configure and download loggers and upload data to InTempConnect. Or, anyone can download a logger using the InTempVerify app if the loggers are enabled to be used with InTempVerify. See [www.intempconnect.com/help](http://www.intempconnect.com/help) for details on both the gateway and InTempVerify. If you do not need to access logged data via the cloud-based InTempConnect software, then you also have the option to use the logger with the InTemp app only

Follow these steps to begin using the loggers with InTempConnect and the InTemp app.

1. Administrators: Set up an InTempConnect account Follow all steps if you are a new administrator. If you already have an account and roles assigned, follow steps c and d.

If you are using the logger with the InTemp app only, skip to step 2.

- a. Go to [www.intempconnect.com](http://www.intempconnect.com) and follow the prompts to set up an administrator account. You’ll receive an email to activate the account.
- b. Log into [www.intempconnect.com](http://www.intempconnect.com) and add roles for the users you will be adding to the account. Click Settings and then Roles. Click Add Role, enter a description, select the privileges for the role and click Save.
- c. Click Settings and then Users to add users to your account. Click Add User and enter the email address and first and last name of the user. Select the roles for the user and click Save.
- d. New users will receive an email to activate their user accounts.

2. Set up the logger. Insert two AAA batteries in the logger, observing polarity. Insert the battery door in the back of the logger making sure it is flush with the rest of the logger case. Use the included screw and a Phillips-head screwdriver to screw the battery door into place.

Insert the external temperature probe (if applicable).

3. Download the InTemp app and log in.

- a. Download InTemp to a phone or tablet from the App Store® or Google Play™.
- b. Open the app and enable Bluetooth in the device settings if prompted.
- c. InTempConnect users: Log in with your InTempConnect user credentials. (Your device must be able to connect to the internet.) Make sure to check the box that says “I am an InTempConnect user” when signing in.

InTemp app only users: If you will not be using InTempConnect, create a user account and log in when prompted. DO NOT check the box that says “I am an InTempConnect user” when signing in.

4. Configure the logger

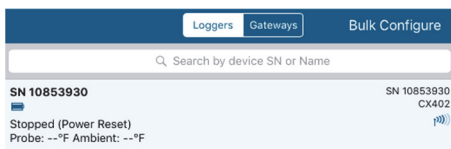
InTempConnect users: Configuring the logger requires privileges. The logger includes preset profiles. Administrators or those with the required privileges can

also set up custom profiles (including setting up daily logger checks) and trip information fields. This should be done before configuring the logger. If you plan to use the logger with the InTempVerify app, then you must create a logger profile with InTempVerify enabled. See [www.intempconnect.com/help](http://www.intempconnect.com/help) for details.

InTemp app only users: The logger includes preset profiles. To set up a custom profile, tap the Settings icon and tap CX400 Logger. Also, if you need to perform daily logger checks, tap Record CX400 Logger Checks under Settings and select Once Daily or Twice Daily. This should be done before configuring the logger.

See [www.intempconnect.com/help](http://www.intempconnect.com/help) for details on setting up custom profiles in both the app and InTempConnect and on setting up trip information.

- a. Tap the Devices icon in the app. Find the logger in the list and tap it to connect to it.



If you are having trouble connecting:

- Make sure the logger is within range of your mobile device. The range for successful wireless communication is approximately 30.5 m (100 ft) with full line-of-sight.
  - If your device can connect to the logger intermittently or loses its connection, move closer to the logger, within sight if possible.
  - Change the orientation of your phone or tablet to ensure the antenna in your device is pointed toward the logger. Obstacles between the antenna in the device and the logger may result in intermittent connections.
  - If the logger appears in the list, but you cannot connect to it, close the app, power down the mobile device, and then turn it back on. This forces the previous Bluetooth connection to close.
- b. Once connected, tap Configure. Swipe left and right to select a logger profile. Type a name or label for the logger. Tap Start to load the selected profile to the logger. InTempConnect users: If trip information fields were set up, you will be prompted to enter additional information. Tap Start in the upper right corner when done.
5. Deploy and start the logger. Deploy the logger to the location where you will be monitoring the temperature. Logging will begin based on the settings in the profile selected. If the logger was configured to perform daily checks, connect to the logger and tap Perform (Morning, Afternoon, or Daily) Check every day.

Once logging begins, the logger will display the current temperature reading and the minimum and maximum readings within the current 24-hour period (midnight from one day to midnight the next day) if the logger was set to record logger checks (see Performing Logger Checks). Otherwise the minimum and maximum readings represent the entire logging period and only reset when the logger is downloaded and

restarted or stopped and reconfigured (they will not reset if you download the logger and continue logging). These minimum and maximum values are also available in the logger reports (see Downloading the Logger).

For CX402 models, you can click Next to switch between external probe and ambient temperature readings. Minimum and maximum readings are only available for the external probe.

## Logger Alarms

There are two conditions that will trip an alarm:

- When the temperature reading by the external probe (if applicable) or the ambient temperature is outside the range specified in the logger configuration.
- When an external probe (if applicable) is disconnected during logging.

When a temperature alarm trips:

- The logger LED will blink every 5 seconds.
- The alarm icon will appear on the LCD and in the app.
- The logger will beep every 15 seconds (unless audible alarms are disabled in the logger profile).
- An Alarm Tripped event is logged.

When an external probe is removed:

- The logger LED will blink every 5 seconds.
- “ERROR” and “PROBE” will appear on the LCD and “ERROR” will appear in the app.
- An alarm icon will appear in the app.
- The logger will beep every 15 seconds.
- A Probe Disconnected event is logged.

To mute a beeping alarm, press the Mute button on the logger. Once muted, you cannot turn the beeping back on.

Download the logger to view details about a tripped alarm and to clear alarm indicators in the app and on the LCD (the probe must be reconnected for ERROR to clear on the LCD). For a temperature alarm, the tripped alarm will clear once the logger is downloaded and restarted.

## Passkey Protection

The logger is protected by an encrypted passkey automatically generated by the InTemp app for InTempConnect users and optionally available if you are using the InTemp app only. The passkey uses a proprietary encryption algorithm that changes with every connection.

### InTempConnect Users

Only InTempConnect users belonging to the same InTempConnect account can connect to a logger once it is configured. When an InTempConnect user first configures a logger, it is locked with an encrypted passkey that is automatically generated by the InTemp app. After the logger is configured, only active users associated with that account will be able to connect to it. If a user belongs to a different account, that user will not be able to connect to the logger with the InTemp app, which will display an invalid passkey message.

Administrators or users with the required privileges can also view the passkey from the device configuration page in InTempConnect and share them if needed. See [www.intempconnect.com/help](http://www.intempconnect.com/help) for more details. Note: This does not apply to InTempVerify. If the logger was configured with a logger profile in which InTempVerify was enabled, then anyone can download the logger with the InTempVerify app.

### InTemp App Only Users

If you are using the InTemp app only (not logging in as an InTempConnect user), you can create an encrypted passkey for the logger that will be required if another phone or tablet attempts to connect to it. This is recommended to ensure that a deployed logger is not mistakenly stopped or purposely altered by others.

To set a passkey:

1. Tap the Devices icon and connect to the logger.
2. Tap Set Logger Passkey.
3. Type a passkey up to 10 characters.
4. Tap Save.
5. Tap Disconnect.

Only the phone or tablet used to set the passkey can then connect to the logger without entering a passkey; all other mobile devices will be required to enter the passkey. For example, if you set the passkey for the logger with your tablet and then try to connect to the device later with your phone, you will be required to enter the passkey on the phone but not with your tablet. Similarly, if others attempt to connect to the logger with different devices, then they would also be required to enter the passkey. To reset a passkey, simultaneously press both the top and bottom button on the logger for 3 seconds, or connect to the logger, tap Set Logger Passkey, and select Reset to Factory Default.

## Downloading the Logger

You can download the logger to a phone or tablet and generate reports that include logged probe (if applicable) and ambient readings, events, user activity, alarm information, and more. Reports can be shared immediately upon download or accessed later in the InTemp app.

InTempConnect users: Privileges are required to download, preview, and share reports in the InTemp app. Report data is automatically uploaded to InTempConnect when you download the logger. Log in to InTempConnect to build custom reports (requires privileges). In addition, InTempConnect users can also download CX loggers automatically on a regular basis using the CX5000 Gateway. Or, if the logger was configured with a logger profile in which InTempVerify was enabled, then anyone can download the logger with the InTempVerify app. For details on the gateway and InTempVerify, see [www.intempconnect.com/help](http://www.intempconnect.com/help).

To download the logger with the InTemp app:

1. Tap the Devices icon and connect to the logger.
2. Tap Download.
3. Choose a download option:
  - Download & Continue. The logger will continue logging once the download is complete.

- Download & Restart. The logger will start a new data set using the same profile once the download is complete.
- Download & Stop. The logger will stop logging once the download is complete.

A report of the download is generated and is also uploaded to InTempConnect if you are logged into the InTemp app with your InTempConnect user credentials.

In the app, tap Settings to change the default report type and report sharing options. The report is also available in Secure PDF, XLSX, and VFC CSV (if enabled) formats for sharing at a later time. Tap the Reports icon to access previously downloaded reports. See [www.intempconnect.com/help](http://www.intempconnect.com/help) for details on working with reports in both the InTemp app and InTempConnect.

## Performing Logger Checks

If your monitoring application requires that you perform daily or twice daily checks of the logger, you can use the InTemp app to connect to the logger and perform a check.

To enable the perform check feature in the InTemp app (if you are not using InTempConnect):

1. Tap the Settings icon.
2. Under Record CX400 Logger Checks, select either Once Daily or Twice Daily. If you choose Twice Daily, a Perform Morning Check action will be listed in the Connected screen from 12:01 AM until 12:00 PM and then a Perform Afternoon Check action will be listed from 12:01 PM to 12:00 AM. If you choose Once Daily, an action will be listed in the Connected screen to Perform Daily Check.

To enable the perform check feature if you are using InTempConnect, an administrator or user with the required privileges must create a new profile for a CX400 logger and set the Daily Checks to Once Daily or Twice Daily. For details on managing profiles, see [www.intempconnect.com/help](http://www.intempconnect.com/help).

Note: Changes to the Record CX400 Logger Checks setting will take effect the next time the logger is configured. Also, when this setting is enabled, the minimum and maximum values displayed on the logger LCD represent the minimum and maximum readings within the current 24-hour periods and will reset every 24 hours. Otherwise, if this setting is not enabled, the minimum and maximum values represent the entire logging period and only reset when the logger is downloaded and restarted or stopped and reconfigured (they will not reset if you download the logger and continue logging).

To perform a check:

1. Tap the Devices icon and connect to the logger.
2. Tap Perform (Morning, Afternoon, or Daily) Check.

Once a check is completed, it is recorded as a logged user action along with the user email and the location, and is available for view in reports. The action is also listed as performed in the Connected screen and a checkmark will illuminate on the logger LCD.

You can also set up a notification to display on your phone or tablet to remind you to perform a check. Use the Reminders option under Settings in the InTemp app.

## Logger Events

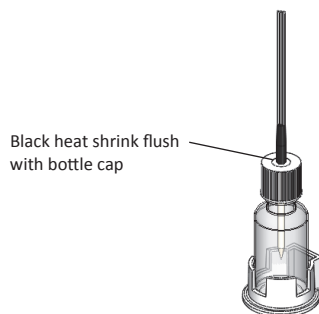
The logger records the following events to track logger operation and status. These events are listed in reports downloaded from the logger.

Event Name	Definition
Started	The logger started logging.
Stopped	The logger stopped logging.
Downloaded	The logger was downloaded.
Probe Disconnected/ Connected	The external probe was disconnected or connected during logging (CX402 model only).
Probe Alarm Tripped/Cleared	A probe temperature alarm has tripped or cleared because the reading was outside the alarm limits or back within range (CX402 model only).
Ambient Alarm Tripped/Cleared	An ambient temperature alarm has tripped because the reading was outside the alarm limits or has cleared (CX403 model only).
Performed/Missed Check	The user performed or missed the daily, morning, or afternoon logger check.
Safe Shutdown	The battery level dropped below 1.85 V; the logger performs a safe shutdown.

## Deploying the Logger

Follow these guidelines for deploying the logger:

- Use the four magnets on the back of the logger case to mount it to a magnetic surface.
- If using the CX402 logger for vaccine storage monitoring, the logger must remain outside of the refrigerator with the logger probe and glycol bottle placed inside the center of the refrigerator.
- If you remove the probe from the glycol bottle with a CX402 logger and then reinsert it, make sure you insert it through the center of the glycol bottle cap and push it down until the stainless steel probe is completely in the bottle. The black heat shrink on the probe cable should be flush with the top of the cap as shown in the example.



- For CX402 loggers, use the included double-sided tape to affix the bottle holder to a surface if desired.

## Protecting the Logger

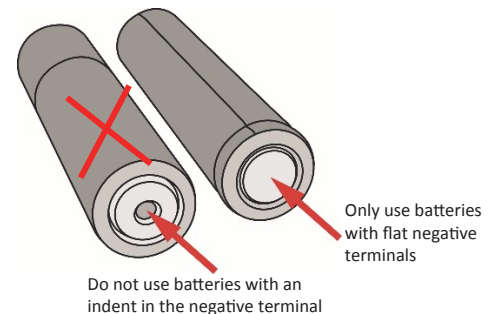
The logger is designed for indoor use and can be permanently damaged by corrosion if it gets wet. Protect it from condensation. If the logger gets wet, remove the battery immediately and dry the circuit board.

Note: Static electricity may cause the logger to stop logging. The logger has been tested to 8 KV, but avoid electrostatic discharge by grounding yourself to protect the logger. For more information, search for “static discharge” on onsetcomp.com.

## Battery Information

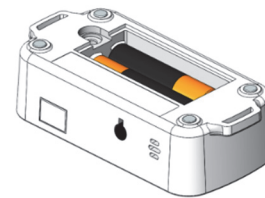
The logger requires two user-replaceable AAA 1.5 V alkaline or optional lithium batteries for operation at the extreme ends of the logger operating range. Expected battery life varies based on the ambient temperature where the logger is deployed, the frequency of connecting to the phone or tablet and downloading reports, the duration of audible alarms, and battery performance. New batteries typically last 1 year with logging intervals greater than 1 minute. Deployments in extremely cold or hot temperatures or a logging interval faster than 1 minute can impact battery life. Estimates are not guaranteed due to uncertainties in initial battery conditions and operating environment.

Note: Make sure the batteries installed have flat negative terminals. There should be no indent in the bottom of the batteries. Batteries with indents in the negative terminals may become loose and prevent proper operation.



To install or replace the batteries:

1. If the battery door is already installed on the back of the logger, use a Phillips-head screwdriver to remove it.



2. Remove any old batteries.
3. Insert two new batteries observing polarity.
4. Screw the battery door into place.

**⚠ WARNING:** Do not cut open, incinerate, heat above 85°C (185°F), or recharge the lithium batteries. The batteries may explode if the logger is exposed to extreme heat or conditions that could damage or destroy the battery case. Do not dispose of the logger or batteries in fire. Do not expose the contents of the batteries to water. Dispose of the batteries according to local regulations for lithium batteries.