

InTemp®

CX 4-Channel Analog CX460 Data Logger User Guide



InTemp CX460 Data Logger

Models:

- 4-Channel Analog (CX460)

Included Items:

- Two AAA 1.5 V alkaline batteries (installed)

Required Items:

- InTemp app
- Mobile device with Bluetooth and iOS, iPadOS®, or Android™,

The InTemp CX 4-Channel Analog (CX460) data logger measures and transmits data wirelessly to a mobile device using Bluetooth® Low Energy (BLE) technology. The CX460 has four analog inputs and supports a wide variety of external sensors (sold separately), including self-describing temperature, split-core AC current transformer, 4-20 mA input, and DC voltage input sensors. The self-describing sensors are designed with integrated strain relief for a secure connection to the loggers and are automatically detected by the InTemp® app for easy setup. Using the app, you can configure the loggers, read out and view data, and export the data for further analysis. The loggers can calculate minimum, maximum, average, and standard deviation statistics and can also be configured to trip audible or visual alarms at thresholds you specify. This compact logger also has a built-in LCD screen to display current sensor readings, logging status, battery use, memory consumption, and more.

Specifications

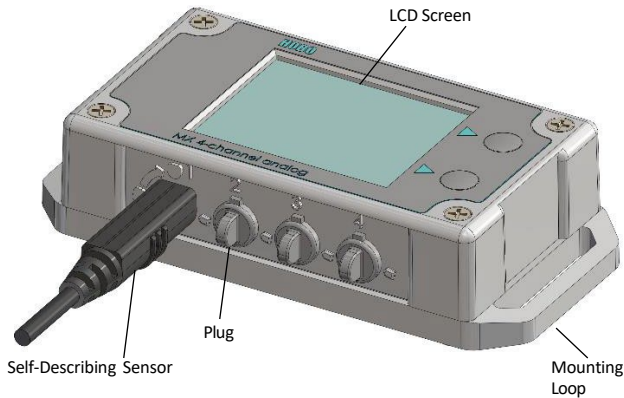
Logger

Operating Range	-20° to 70°C (-4° to 158°F)
Radio Power	1 mW (0 dBm)
Transmission Range	Approximately 30.5 m (100 ft) line-of-sight
Wireless Data Standard	Bluetooth Low Energy
Logging Interval	1 second to 18 hours
Start Modes	Start now, on interval, on button push, after elapsed time, or date & time
Time Accuracy	±1 minute per month at 25°C (77°F)
Battery Type	Two AAA 1.5 V alkaline batteries, user replaceable
Battery Life	1 year, typical with logging interval of 1 minute and Bluetooth Always On enabled; 2 years, typical with logging interval of 1 minute and Bluetooth Always On disabled; and temperatures between 0° and 50°C (32° and 122°F). Faster logging intervals and statistics sampling intervals, burst logging, remaining connected with the app, excessive downloads, and paging may impact battery life.
Memory	4 MB (1.9 million measurements, maximum)
Full Memory Download Time	Approximately 4 to 15 minutes depending on the mobile device; may take longer the further 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
Size	11.28 x 5.41 x 2.92 cm (4.44 x 2.13 x 1.15 in.)
Weight	123 g (4.34 oz)
Environmental Rating	IP54



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Logger Components and Operation



Analog Sensor Port: Use this 2.5 mm jack to connect a self-describing sensor or other analog sensor. The CX460 has four ports.

Top Button: Press this button for 3 seconds to start logging (if the logger is configured with the Start On Button Push option). This requires configuring the logger in the app with a logger profile that has Start on Button Push selected for the start mode (see [Configure the Logger](#)).

You can also press the top button for 1 second to wake up the logger, bring the logger to the top of the list in the app, cycle through each channel on the LCD, and silence a beeping alarm (see [Logger Alarms](#)).

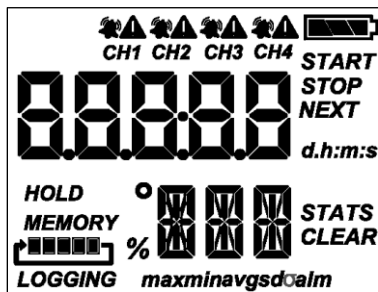
Bottom Button: You can press this button for 1 second to wake up the logger or silence a beeping alarm. Press both the top and bottom buttons simultaneously for 10 seconds to reset a logger password.

Self-Describing Sensor: This is a type of external sensor available for CX460 loggers. Turn the sensor plug one-quarter clockwise when inserting it into an analog sensor port to secure it in place. This sensor also features automatic detection by the logger (see [Working with External Sensors](#)).

Plug: Use this Santoprene® (TPE) plug to fill an empty analog sensor port.

Mounting Loops: Use the two mounting loops (only one visible in the diagrams) to mount the logger (see [Mounting the Logger](#)).

LCD Screen: This logger is equipped with an LCD screen that displays details about the current status. This example shows all symbols illuminated on the LCD screen followed by definitions of each symbol.



LCD Symbol	Description
START	The logger is waiting to be started or restarted. Press and hold the top button for 3 seconds to start the logger; the logger also displays HOLD during this time.
HOLD	The logger displays HOLD when you press the top button for 3 seconds to start the logger, or while pressing the bottom button for 3 seconds to clear an alarm.
NEXT	The logger displays NEXT when it is logging more than one. Press the top button to cycle through each channel to view sensor measurements.
	The battery indicator shows the approximate battery power remaining.
MEMORY 	The logger is set to Stop When Memory Fills. The memory bar indicates the approximate amount of storage space remaining in the logger. When the logger first starts logging data, all five segments are empty.
LOGGING	The logger is currently logging.
	The bell icon indicates a sensor alarm has tripped. Press the top button to view the channel with the alarm icon.
	This indicates a problem with an external sensor. See Working with External Sensors for more details.
75429 °F	This is an example of a sensor reading, with the latest reading displayed above the unit type for that sensor. To switch between US and SI units, change the units in the Settings area of the app (reconfigure the logger to have your unit's changes take effect). Note: If the sensor value exceeds five digits, the scientific notation E3 is appended to the value on the LCD to signify that the displayed digits are multiplied by 1,000
05:38 m:s	The logger has been configured to start logging on a particular date/time. The display counts down in days, hours, minutes, and seconds until logging begins. In this example, 5 minutes and 38 seconds remain until logging begins.
LoRd	The configuration settings are being loaded onto the logger from the app.
Stop	The logger was stopped by the app or because the memory is full.

Notes:

- The LCD screen refreshes at the same rate as the logging interval.
- When the logger has stopped logging, the LCD screen remains on and displays *STOP* until you download data from the logger to your mobile device. Once you have downloaded data from the logger, the LCD turns off automatically after 1 hour. The LCD turns back on the next time you press the top or bottom button to wake up the logger.
- The LCD screen flashes *HELLO* when you page the logger from the app (see [Downloading the InTemp App and Log In](#)).
- The LCD screen flashes *BOOT* when a firmware upgrade is underway.
- The LCD screen flashes *CHIRP OFF* when you clear an audible alarm.

Button Functionality Quick Reference

Button	Press for 1 second to:	Press and hold for 3 seconds to:	Press and hold for 10 seconds to:
Top button	• Cycle through each channel to view the latest sensor readings • Wake up the logger • Bring the logger to the top of the list in the app • Silence a beeping alarm	Start logging (depending on settings chosen in the logger profile)	NA
Bottom button	• Wake up the logger • Silence a beeping alarm	Clear an alarm for the channel currently displayed	NA
Both buttons	NA	NA	Reset a passkey

Getting Started

InTempConnect is web-based software that allows you to monitor CX460 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.

Follow these steps to begin using the CX460 with InTempConnect and the InTemp app.

- 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.
 - Go to www.intempconnect.com and follow the prompts to set up an administrator account. You'll receive an email to activate the account.
 - Log into www.intempconnect.com and add roles for the users you will be adding to the account. Click System Setup and then Roles. Click Add Role, enter a description, select the privileges for the role and click Save.

- Click System Setup 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.
- New users will receive an email to activate their user accounts.

- Set up the logger.** Insert two AAA batteries into the logger, observing polarity. Insert the battery door into 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.

Connect the self-describing sensors (See [Working with External Sensors](#)).

- Download the InTemp app and log in.**

- Download InTemp from the App Store® or Google Play™ to a phone or tablet.
- Open the app and enable Bluetooth in the device settings if prompted.
- InTempConnect users:** Log in with your InTempConnect account email and password from the InTempConnect User screen.

- 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. See www.intempconnect.com/help for details.

See www.intempconnect.com/help for details on setting up custom profiles in both the app and InTempConnect and on setting up trip information.

- 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.
- 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.

- Deploy and start the logger.** Deploy the logger to the location where you will be monitoring the temperature.

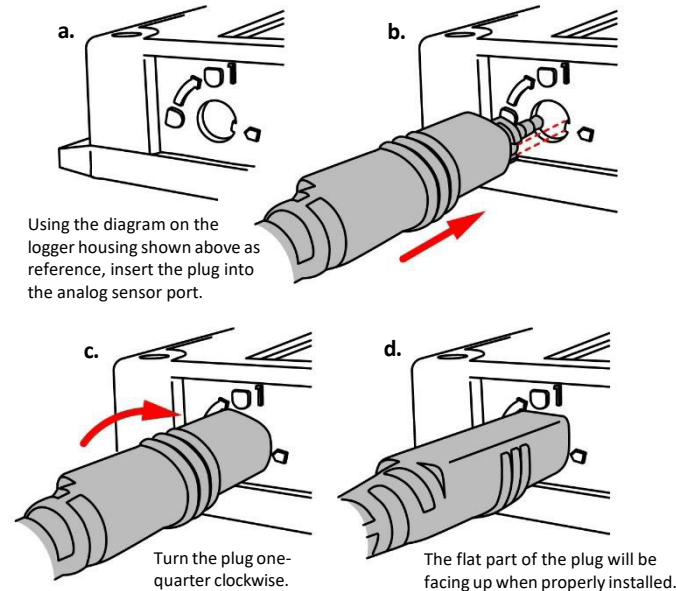
Logging will begin based on the settings in the profile selected. Once logging begins, the logger will display current readings.

Working with External Sensors

The CX460 has four analog sensor ports that can accept self-describing and other external sensors. Refer to www.onsetcomp.com for a current list of supported sensors.

To connect an external sensor:

1. Make sure the logger is stopped.
2. For self-describing sensors, insert the plug into an analog sensor port as shown.



3. For other external sensors, insert the sensor into an analog sensor port and make sure it is firmly seated.
4. If you need to connect a sensor to the sensor cable, complete any wiring before logging begins. Refer to the sensor or cable manual for more information on connecting the sensor and wiring, if applicable.

Notes:

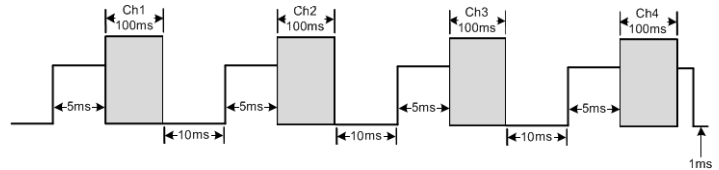
- If you disconnect a sensor or if it is not fully inserted into the analog sensor port while the logger is logging, a warning icon appears on the LCD and the logger beeps once. Use the top button on the logger to view the channel with the warning, which also displays dashes instead of a valid current reading. Erroneous readings are displayed in the app and logged depending on the logging interval while the sensor is disconnected (e.g., if a sensor is disconnected for 5 minutes and the logging interval is set to 1 minute, there are 5 erroneous data points while the sensor was disconnected). When the sensor is reconnected, the warning icon clears, the correct value replaces the dashes for the channel on the LCD, and the correct readings are logged.
- Do not swap out sensors or move sensors to empty ports while the logger is logging. Stop the logger before making any physical changes to the sensors.
- If a warning icon appears for a self-describing sensor and you have checked that the correct sensor is properly installed, the sensor might be faulty. Contact Onset Technical Support.

- The 4-20mA input cable (SD-MA-420 or CABLE-4-20mA) measures current from 0 to 20.1 mA. Do not expose it to current above 20 mA or to negative current. Do not cut off the end of the gray cable where it connects to the blue and yellow wires as it contains the precision resistor required for current measurement.
- If you are using the SD-VOLT-2.5 or CABLE-2.5-STEREO voltage input cable, the input line must not be exposed to signals below 0 V or above 2.5 V. The voltage input cable connections are as follows:

Wire	Connection
Red	Switched 2.5 V output
White	Voltage input
Black	Ground

- The external input channels have a switched 2.5 V output. This signal can be used to power a sensor directly or to trigger an external circuit. External sensors should draw no more than 4 mA total when powered.

The switched 2.5 V output turns on about 5 ms before the external channels are measured as shown in the following diagram for an MX1105 logger. The shaded area shows the 100 ms period for each enabled channel during which the logger samples the input signals.



When using multiple voltage and/or current inputs, the (-) from the current source(s) and the 0 V line from the voltage source(s) are tied together at the logger. If these lines are at different voltage potentials, this may cause inaccurate readings or even damage your logger.

WARNING: Analog channel input cannot exceed 2.5 V DC. For sensor outputs up to 24 V DC, use the appropriate voltage adapter cable (SD-VOLT-xx or CABLE-ADAPX).

Logger Alarms

There are three conditions that can 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 profile.
- When an external probe (if applicable) is disconnected during logging.
- When the logger battery drops to 15% or the equivalent of one bar on the LCD battery icon.

You can enable or disable alarms and set temperature alarm thresholds in logger profiles that you create in either InTempConnect or in the app.

When a temperature alarm trips:

- The logger LED blinks every 5 seconds.
- The alarm icon appears on the LCD and in the app.
- The logger beeps once 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 blinks every 5 seconds.
- **ERROR** and **PROBE** appear on the LCD and **ERROR** appears in the app.
- An alarm icon appears in the app.
- The logger beeps once every 15 seconds.
- A Probe Disconnected event is logged.

When a low battery alarm trips:

- The battery icon on the LCD flashes.
- The logger quickly beeps three times every 15 seconds.
- A Low Battery event is logged.

To mute a beeping alarm, press the Mute button on the logger. Once muted, you cannot turn the beeping back on. Note that if a temperature and/or probe alarm is occurring at the same time as a low battery alarm, pressing the mute button will silence all alarms.

Download the logger to view details about a tripped alarm and to clear temperature 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. Replace the batteries in the logger to clear a battery alarm. **Note:** Download the logger before replacing the batteries to ensure no data is lost.

Passkey Protection

The logger is protected by an encrypted passkey automatically generated by the InTemp app for InTempConnect users. 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 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.

Downloading Data from the Logger

You can download data from 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).

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 continues logging once the download is complete.
 - Download & Restart. The logger starts a new data set using the same profile once the download is complete.
 - Download & Stop. The logger stops logging once the download is complete.

To download multiple loggers with the InTemp app:

1. Tap Devices, then Bulk Download.
2. The screen changes to Bulk Download mode. This changes the way the screen behaves when you tap on a logger tile. Tap on a tile to select it for bulk download. You can select up to 20 loggers. Text at the bottom of the page updates to indicate how many loggers are selected.
3. Tap Download X Loggers to begin the download.
 - Download & Continue. The loggers continue logging once the download is complete.
 - Download & Restart. The logger starts a new configuration using the same profile once the download is complete. You will be prompted to enter trip information again (if applicable). Note that if the logger profile is set up to start with a button push, you must push the button on the logger for logging to restart.
 - Download & Stop. The logger stops logging once the download is complete. The downloads begin and run one after another. The screen displays the download queue.
4. Click Cancel to cancel the downloads and return to the Devices screen, not in Bulk Download mode.
5. The screen displays Done when all the loggers are downloaded.

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. If you are using the bulk download feature, one report per logger is generated.

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 later. Tap the Reports icon to access previously downloaded reports. See www.intempconnect.com/help for details on working with reports in both the InTemp app and InTempConnect.

Mounting the Logger

Use the four magnets on the back of the logger to mount it to a magnetic surface or insert the desired ties/connectors through the mounting loops to attach it to other surfaces. Insert a Santoprene plug into any empty analog sensor ports if necessary.

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.

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. Battery life is 1 year, typical with a logging interval of 1 minute, but may be extended to 2 years when the logger is configured with Bluetooth Always On disabled. Expected battery life varies based on the ambient temperature where the logger is deployed, the logging or sampling interval, frequency of offloading and connection to the mobile device, number of channels that are active, audible alarms duration, and battery performance. Deployments in extremely cold or hot temperatures, a logging interval faster than 1 minute, or a sampling interval faster than 15 seconds can impact battery life. Estimates are not guaranteed due to

uncertainties in initial battery conditions and operating environment.

To replace the batteries:

1. Use a Phillips-head screwdriver to unscrew the four screws on the front of the logger.
2. Carefully separate the top and bottom of the logger enclosure.
3. Remove any old batteries and insert new batteries observing polarity.
4. Make sure the rubber seal on the bottom part of the logger enclosure is clean and free of any debris.
5. Carefully reassemble the logger enclosure and screw in the four screws.

⚠ WARNING: Do not cut open, incinerate, heat above 85°C (185°F), or recharge lithium batteries. The batteries may explode if the logger is exposed to extreme heat or conditions that could damage or destroy the battery cases. 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.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada Statements

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Avis de conformité pour l'Industrie Canada

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

To comply with FCC and Industry Canada RF radiation exposure limits for general population, the logger must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.