

USB-5100 Series

Multi-Channel Data Loggers



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Features

- Stand-alone, remote multi-channel data loggers
- USB-5104 is a high-accuracy, four-channel thermocouple data logger that records temperature in indoor environments
 - Supports up to four J, K, T, E, R, S, B, or N type thermocouple sensors (sold separately).
 - Records ambient temperature with 12-bit internal temperature thermistor
 - Supports software-selectable burst logging, enabling the logger to record data at a different intervals based on user-specified conditions
- Built-in LCD screen displays readings, logging status, battery use, and memory consumption between readouts
- Software-selectable logger alarm indicates high or low readings
- Logger control buttons for manual control of logging, display options, and event generations
- Powered by two AAA batteries (included)
- Includes mini-USB cable
- Includes built-in magnets and accessory kit for logger mounting

Software

- Easy-to-use USB-5100 Series Data Logger software available as a free download
- Configure, launch and perform data read out of data loggers
- Displays logger status and current readings
- Plots, filters, and exports logger data (convert to .csv, .txt, or Microsoft® Excel® format)
- Create and save custom graphs to a project file
- Calculate minimum, maximum, average, and standard deviation statistics
- Supported Operating Systems:
 - Windows® 8/7/Vista® /XP, 32-bit or 64-bit (required Java™ Runtime Environment available for installation with software)
 - Mac® OS X version 10.6.x or later (32-bit or 64-bit)



USB-5100 Series data loggers offer low-cost, stand-alone collection from multiple data channels.

Overview

The USB-5104 is the first product in the USB-5100 Series of multi-channel data loggers. The logger can log data from up to four thermocouple (TC) sensors, and includes an internal 10K thermistor to record ambient temperature.

The USB-5104 has 4 MB of memory that can store up to 1.9 million measurements.

Users can easily configure logger sampling intervals (one second to over 18 hours), high/low temperatures alarms using the USB-5100 Series Data Logger software, which is available as a download.

Burst logging can also be configured through software, allowing the logger to vary sampling intervals based on changing temperature condition.

The built-in LCD screen displays temperature, logging status, battery use, and memory consumption in between readouts.

The USB-5104 is powered by two AAA batteries (standard included; rechargeable supported).

TC and Temperature Input

The USB-5104 provides up to four high-accuracy TC input channels that support J, K, T, E, R, S, B, or N type TC sensors. Each channel can be individually-configured based on the connected TC type.

The logger also includes an internal 10K thermistor to record ambient temperature and to provide cold-junction compensation of the TC output.

Device Buttons

The USB-5104 provides two software-configurable buttons on the device for users to manually control logging and data display.

Start/Stop button: Depending on the software configuration, users can:

- press this button for three seconds to start/resume logging, or to stop logging.
- press this button for one second to record an internal event or to turn on the LCD screen



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
General & Software Information

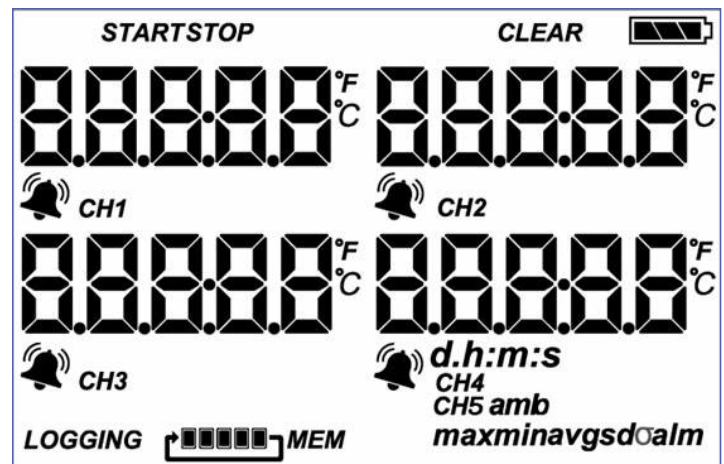
Alarm/Stats button: Depending on the software configuration, users can:

- press the button to clear a tripped alarm
- press the button to switch between statistics, alarm readings, the current sensor reading, and the internal temperature reading

LCD Screen

USB-5100 data loggers include a LCD screen that displays the following information:

- **START:** The device is waiting to be launched by pressing the Start/Stop button.
- **STOP:** The device is currently logging; stop logging by the pressing Start/Stop button.
- **LOGGING:** The device is currently logging.
- : A sensor reading is above or below the high or low alarm that you configured.
- **CLEAR:** An alarm waiting to be cleared by pressing the Alarm/Stats button for three seconds.
- : Battery indicator displays the approximate battery power remaining.
- : Temperature reading – the displayed temperature units are configured in software.
- **CH1:** The channel number associated with the TC reading (channel 1 in this example). Up to four channels are displayed at one time.
- : The logger is configured to start logging at a set date/time. The display counts down in days, hours, minutes, and seconds until logging begins.
-  MEM: The logger is configured to stop logging when memory fills. The memory bar indicates the approximate space remaining in the logger to record data.
-  MEM: The logger is configured to never stop logging (wrapping). The logger records data indefinitely, with newest data overwriting the oldest data.
- **max**
min
avg
sd: These symbols indicate the maximum, minimum, average, and standard deviation values most recently calculated by the logger.
- **alm:** The sensor reading that tripped the alarm.
- **Load:** The launch settings are being loaded onto the logger from software.
- **Err:** An error occurred while loading the launch configurations onto the logger from software.
- **Stop:** The logger has been stopped by software or because the memory is full.



The LCD screen on USB-5100 Series data loggers displays information on readings, alarms, statistics, memory, and battery power.

USB-5100 Series Software

Logging Interval

The USB-5100 Series software provides both preset and custom logging intervals that range from 1 second to over 18 hours (18 hours, 12 minutes, and 15 seconds maximum) depending on your data collection needs. The logger stores the data and users can upload it to a computer through USB when collection is complete.

Logging Modes and Filters

The following logging modes can be configured using the USB-5100 Series software:

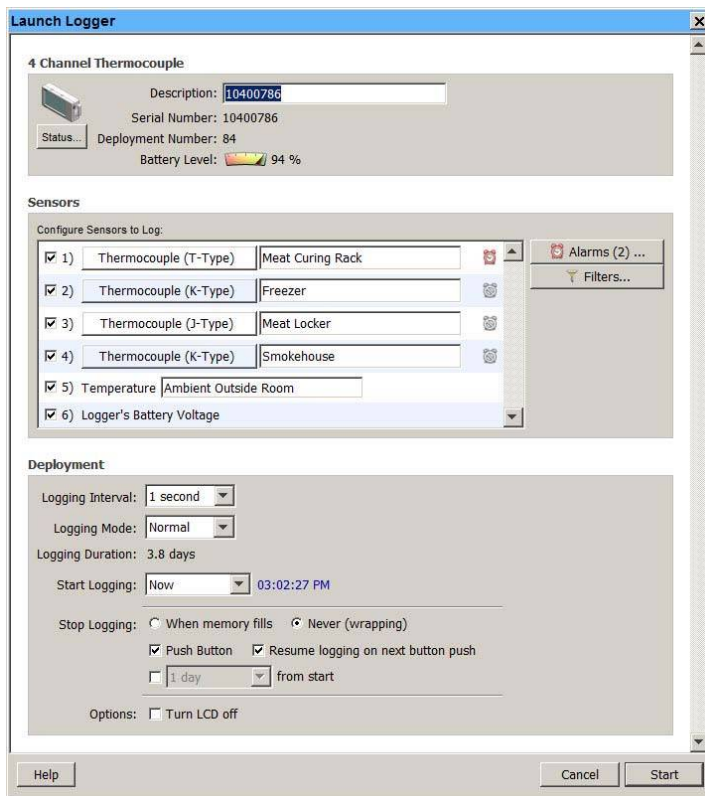
- **Normal:** Configures the logger to collect data at the selected logging interval.
- **Burst Logging:** Configures the logger to use a different logging interval when specific conditions are met. Burst logging is not available for the internal temperature channel.
- **Statistics:** Configures the logger to calculate maximum, minimum, average, and standard deviation during logging for all enabled sensors except battery voltage. Statistics logging is not available for the internal temperature channel.

Statistics are calculated for each logging session, and can be displayed on the LCD screen.

You can also create custom statistics, called a *filtered* series, by selecting a configured channel, selecting a filter (maximum, minimum, or average), and selecting how often to calculate the filter for the channel. A filtered series is calculated when you read out and plot the logger data, and are not displayed on the LCD screen.

USB-5100 Series

Software Information



The USB-5100 Series software provides options for configuring logger alarms and filters, and logging intervals, modes, and start and stop conditions.

Start Logging Modes

The following start logging modes can be configured using the USB-5100 Series software:

- **Now:** Logging begins by clicking **Start** in the **Launch Logger** software window.
- **At Interval:** Logging begins at an exact interval (for example 9:00:00 rather than 8:47:00 when you choose a one-hour logging interval). The exact start time depends on the selected logging interval you choose.
- **On Date/Time:** Logging begins at a selected date and time, up to approximately six months from the present. The LCD screen counts down to the start date/time and then logging begins.
- **Push Button:** Logging starts when the Start/Stop button on the logger pressed for three seconds. The LCD screen on the logger displays **START** until the button is pressed.

Stop Logging Modes

The following stop logging modes can be configured using the USB-5100 Series software:

- **When memory fills:** The logger stops recording data once the memory is full.
- **Never (wrapping):** The logger records data continuously until either the logger battery runs out or the Start/Stop button on the logger pressed for three seconds. When the logger memory is full, the newest data overwrites the oldest data.
- **Push button:** The logger stops recording data when the Start/Stop button on the logger is pressed for three seconds. The LCD screen on the logger displays **STOP** when this option has been selected.
- **Resume logging on next button push:** Resume a stopped logger by pressing the Start/Stop button for three seconds (only available when **Push button** is selected as a **Stop Logging** option).
- **Specific stop date:** Select the date that the logger stops recording data. Choose either a preset time or set your own custom date and time.

Alarms

USB-5100 Series loggers provide high alarm and low alarm options that can be set through software. Alarm conditions and readings are indicated on the LCD screen (see [LCD Screen on page 2](#)).

Alarms can be set based on the number of readings outside the alarm range – for example, trip an alarm one five readings are above/below the configured alarm value. Alarms conditions can be **cumulative** – five readings out-of-sequence trip an alarm – or **consecutive** – five readings in a row trip an alarm.

Alarms are not supported when Burst Logging is selected. Additional options are available for maintaining alarms and clearing alarms based on the following conditions:

Reading Out and Plotting Data

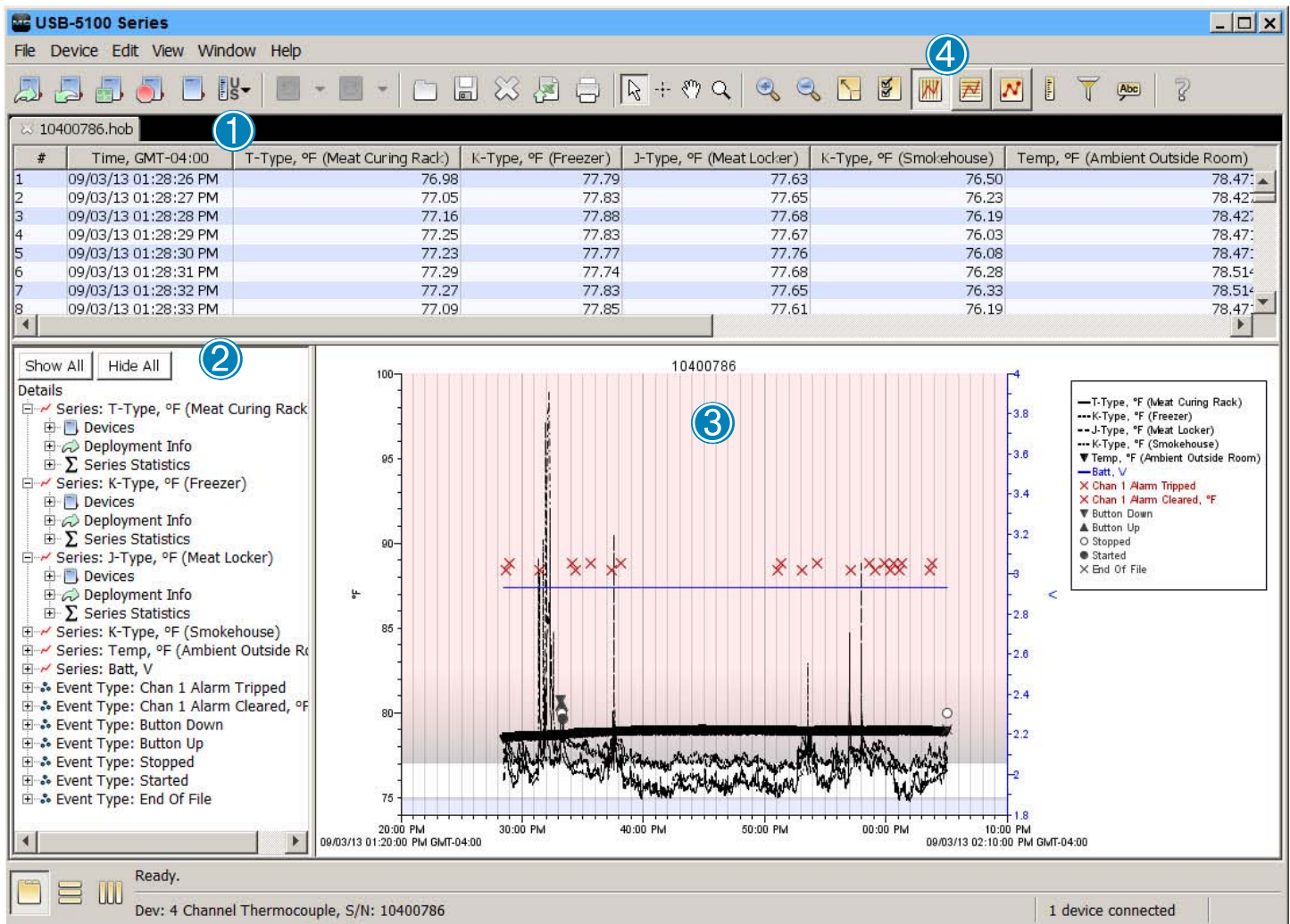
After configuring a logger and logging data, users can stop the logger, save the data to file, and plot the data.

The USB-5100 Series software interface provides the following visual components when plotting logged data:

Points Table – Chronologically lists data points (values) and logged events displayed in the plot. The Points Table is linked to the graph – only the data for the series and events on the plot are listed in the Points Table.

USB-5100 Series

Software Information



The USB-5100 Series software interface includes the ① Points Table, which chronologically lists data points and logged events; the ② Details Pane, which shows information for each series and event displayed in the plot; and the ③ Plot, which displays the data series and events in a graph. Operations can be performed on the Plot or individual series using the ④ Actions Buttons.

Details Pane – Shows information for each series and event displayed in the plot including, such as device information (model and serial numbers), deployment information, (launch description, start time, logging interval), and series statistics (total number of sensor samples and events, time of the first and last sample, and the maximum, minimum, average, and standard deviation for each plotted sensor series).

Plot – The plot displays the data series and events in a graph, and includes a time axis (x-axis), value axis (y-axis), and legend for each series

Toolbar Actions Buttons – The toolbar includes **actions buttons that** enable users perform the following operations on the plot or on a specific series:

- zoom in/out
- show/hide gridlines, data point markers legend, title, and border
- convert units
- create a filtered series
- add graph labels
- several other graph/plot options
- show graph at full scale

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Software Information & Specifications

Exporting Data

The data plotted and displayed in the Points Table can be exported to a .csv, .txt, or Microsoft Excel (.xls) file. Information in the Details Pane can be exported to a .txt file.

Saving to a Project File

Logged data along with any customized display and analysis settings can be saved to a custom project file.

When a project file is re-opened, the plot displays as it did when you saved the file, and contains all of the same data

Specifications

All specifications are subject to change without notice.
Typical for 25 °C unless otherwise specified.

USB-5104

Thermocouple Accuracy			
Type	Range	Accuracy	Resolution
J	-210 °C to 760 °C (-346 °C to 1,400 °F)	±0.6 °C (±1.08 °F) ± TC probe accuracy	0.03 °C (0.06 °F)
K	-260 °C to 1,370 °C (-436 °C to 2,498 °F)	±0.7 °C (±1.26 °F) ± TC probe accuracy	0.04 °C (0.07 °F)
T	-260 °C to 400 °C (-436 °C to 752 °F)	±0.6 °C (±1.08 °F) ± TC probe accuracy	0.02 °C (0.03 °F)
E	-260 °C to 950 °C (-436 °F to 1,742 °F)	±0.6 °C (±1.08 °F) ± TC probe accuracy	0.03 °C (0.05 °F)
R	-50 °C to 1,550 °C (-58 °F to 2,822 °F)	±2.2 °C (±3.96 °F) ± TC probe accuracy	0.08 °C (0.15 °F)
S	-50 °C to 1,720 °C (-58 °F to 3,128 °F)	±2.2 °C (±3.96 °F) ± TC probe accuracy	0.08 °C (0.15 °F)
B	550 °C to 1,820 °C (1,022 °F to 3,308 °F)	±2.5 °C (±4.5 °F) ± TC probe accuracy	0.1 °C (0.18 °F)
N	-260 °C to 1,300 °C (-436 °F to 2,372 °F)	±1.0 °C (±1.8 °F) ± TC probe accuracy	0.06 °C (0.11 °F)

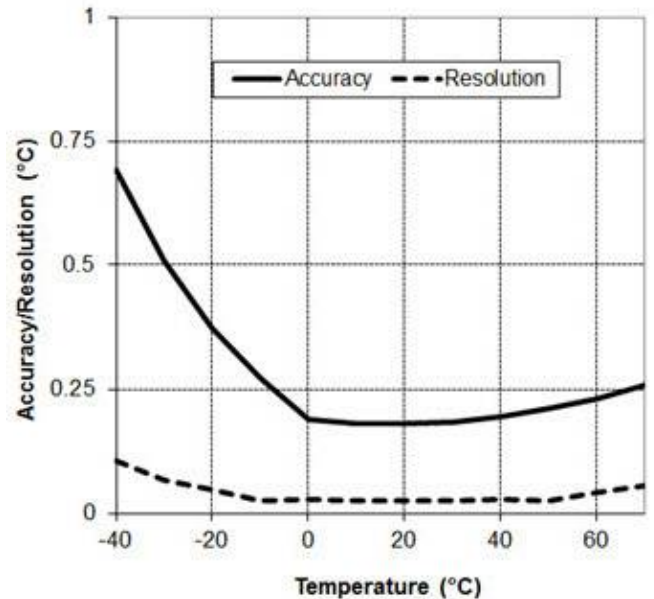
Environmental

Internal 10k Thermistor (Temperature)

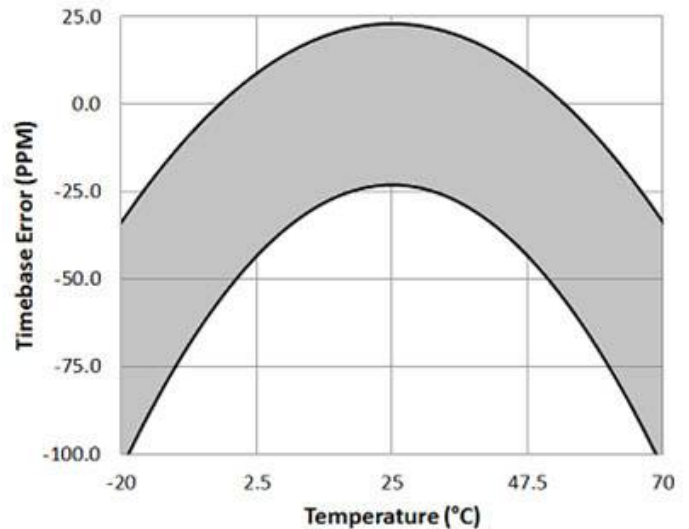
Range: -20° to 70°C (-4° to 158°F)
Accuracy: ±0.21 °C from 0 °C to 50 °C (±0.38 °F from 32 °F to 122 °F)
 (see Plot A)
Resolution: 0.024 °C at 25 °C (0.04 °F at 77 °F) (see Plot A)
Drift: <0.1 °C (0.18 °F) per year

Logger

Operating Range
Logging: -20 °C to 70°C (-4 °F to 158°F); 0 to 95% RH (non-condensing)
Launch/Readout: 0 °C to 50 °C (32 °F to 122 °F) per USB specification
Logging Rate: 1 s to 18 h, 12 min, 15 s
Logging Modes: Normal, burst, or statistics
Memory Modes: Wrap when full or stop when full
Start Modes: Immediate, push button, date & time, or next interval
Stop Modes: When memory full, push button, or date & time
Restart Mode: Push button
Time Accuracy: ±1 min per month at 25 °C (77 °F) (see Plot B)



Plot A: Internal Temperature Accuracy & Resolution



Plot B: Time Accuracy

Battery Life: 1 year, typ with logging rate of 1 min and sampling interval of 15 s or greater
Battery Type: Two AAA batteries or non-rechargeable lithium batteries
Memory: 4 MB (1.9 million measurements, max)
Download Type: USB 2.0 interface
Full Memory Download Time: Approximately 1.5 min
LCD: LCD is visible from 0 °C to 50 °C (32 °F to 122 °F); the LCD may react slowly or go blank in temperatures outside this range
Size (L × W × H): 10.8 × 5.41 × 2.54 cm (4.25 × 2.13 × 1 in.)
Weight: 107.5 g (3.79 oz)
Environmental Rating: IP50

USB-5100 Series

Ordering

Ordering Information

Part No.	Description
USB-5104	Battery-powered four-channel thermocouple data logger; includes mini-USB cable, Command™ strip, double-sided tape, hook & loop strap, and two AAA 1.5 V alkaline batteries

Software

Part No.	Description
USB-5100 Series software	Software for USB-5100 Series Data Loggers on Windows and Mac platforms.