

LabJack

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Otero - Windows Only

Summary

The software for the Digit logging device is called Otero. It is a simple program designed to make using a LabJack Digit straightforward and convenient. The essential parts of the program can be understood on the [quickstart](#) page, so this document serves as a more detailed review of program functionality.

1. Download/install the LabJack Windows software and driver bundle.

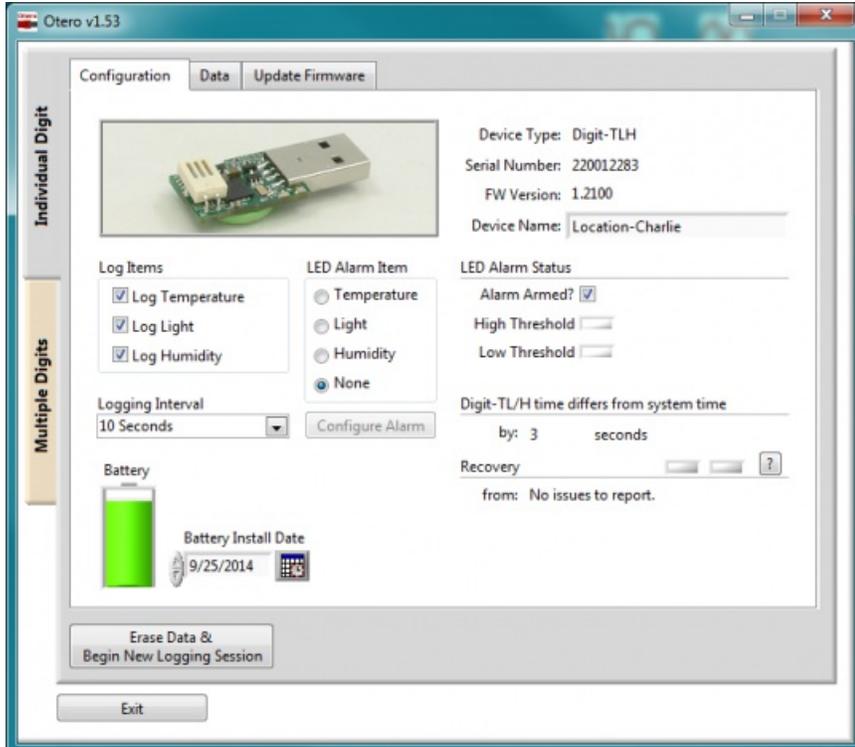
LabJack Windows Driver and Software Installation Package

Name: [LabJack-2015-01-28.exe](#)
Size: 71.04 MB
Upload date: 2015-01-28 18:15

2. Open the program called Otero from the start menu. Or open the program directly under C:\Program Files\LabJack\Applications\Otero.exe

Configuration

The configuration tab of the program is where most of the important decisions are made. To begin a new logging session, click "Erase Data & Begin New Logging Session". The Digit will immediately begin logging at the defined logging interval.



Logging Interval: The rate at which data is collected. If the environment is changing rapidly, you may choose to take a reading every 10 seconds. Or, if the environment is more stable, a log interval of 10 minutes may be all that is necessary to capture a good data set. Changes do not take effect until the user starts a new logging session.

- 10 Seconds
- 30 Seconds
- ✓ 1 Minute
- 10 Minutes
- 30 Minutes
- 1 Hour
- 6 Hours

Log Items: The kind of data to store in memory. If only temperature information is needed, disable the light reading. Or, to conserve battery life during storage disable all log items. Changes do not take effect until the user starts a new logging session.

Log Items

- Log Temperature
- Log Light
- Log Humidity

LED Alarm Item: Which kind of data will trigger a user-defined alarm. Choose the item, such as light or temperature, then configure the alarm with a desired threshold. Alarms are not audible, when triggered, they will simply make the red LED light up on the next connection to a powered USB receptacle. View the current alarm status with the rectangular boxes green = no alarms triggered, red = alarms triggered, white = alarms disabled. The alarms cannot trigger unless they are first armed. Alarms are automatically reset when a new logging session starts. See the LED Alarm Configuration section for further details.

LED Alarm Item	LED Alarm Status
<input type="radio"/> Temperature	Alarm Armed? <input checked="" type="checkbox"/>
<input type="radio"/> Light	High Threshold <input type="text"/>
<input type="radio"/> Humidity	Low Threshold <input type="text"/>
<input checked="" type="radio"/> None	

Battery Install Date: When the battery is replaced, change the install date to update the battery life estimator.



Device Name: To change the device name, select the text and enter a new name.

Device Name:

Recovery Flags: If there are system-level issues, such as battery power failure, the device will record a recovery flag. For instance, if the battery was temporarily removed during logging, the Power Failed recovery flag would be set, indicating that logging was interrupted. System Recovery flags typically mean that there was a disturbance, but the Digit was able to recover. Some additional information is available if you click on the "?" button.

Recovery

from: No issues to report.

Digit-TL/H Real-Time-Clock: Software will automatically synchronize the RTC with the host computer at the start of a new logging session. Also note that the Digit does not account for daylight savings or other timezone related differences, it simply stores a current time. This means that RTC synchronization before daylight savings rollover will show a 3600 second difference after the rollover.

Digit-TL/H time differs from system time

by: 3 seconds

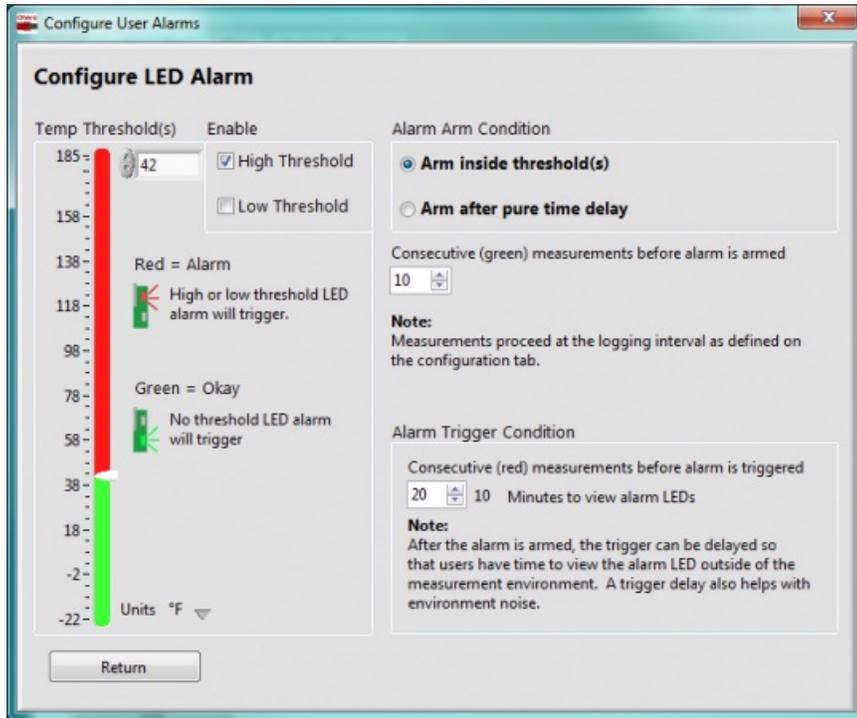
Erase Data & Begin New Logging Session: Erases past data, synchronizes the RTC with the host computer, clears alarms, and begins a new logging session. The Digit can only store a single logging session, so once memory is full (262,144 readings), it is necessary to begin a new logging session. Users may begin a new logging session at any time, but doing so will erase any previously recorded data.

Erase Data &
Begin New Logging Session

LED Alarm Configuration

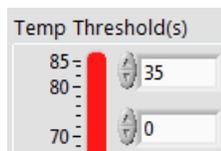
The alarm configuration screen is for changing parameters related to LED indicators. When the Digit is connected to a powered USB port, it will immediately illuminate an LED indicating alarm status. If any alarms have been triggered, the red LED will illuminate, if no alarms have been triggered, the green LED will illuminate. Once configured, these alarms make it possible to quickly verify threshold conditions have not been exceeded, no need to download data or have a computer around!

It is easiest to think of the alarms like a security system, first it becomes armed by a defined condition, then once armed it can be triggered by a defined condition. Once triggered, the red LED will illuminate instead of the green one.



High Threshold: The upper threshold, or trip-point for a user-defined alarm to be triggered. For instance, set a high threshold of 37°F, and disable the low threshold for refrigerator monitoring. Once the Digit is configured, and stored inside the refrigerator, you can periodically check the LED alarm to verify that the contents of the refrigerator have not spoiled.

Low Threshold: The lower threshold, or trip-point for a user-defined alarm to be triggered. For instance, set the low threshold to 32°F, and the RED led will illuminate on next USB connect if the Digit experienced below-freezing temperatures.



Enable High Threshold: The high threshold will be used for alarm triggering.

High Threshold

Enable Low Threshold: The low threshold will be used for alarm triggering.

Low Threshold

Alarm Arming: How the alarm is armed; that is, inside threshold region or after a set amount of time. See example below.

Alarm Arm Condition

Arm inside threshold(s)

Arm after pure time delay

Consecutive (red or green) measurements before alarm is armed

10 10 Minutes

Note:
Measurements proceed at the logging interval as defined on the configuration tab.

Alarm Arm Condition

Arm inside threshold(s)

Arm after pure time delay

Consecutive (green) measurements before alarm is armed

10

Note:
Measurements proceed at the logging interval as defined on the configuration tab.

Alarm Arming Delay: Within threshold = How many in-bounds readings required to arm the alarm. Pure time delay = The number of log intervals to wait before arming the alarm.

Alarm Triggering: How many consecutive readings (above/below) threshold required to trigger the alarm. The alarm will not trigger unless it is armed, and the defined number of consecutive alarm readings have occurred. See example.

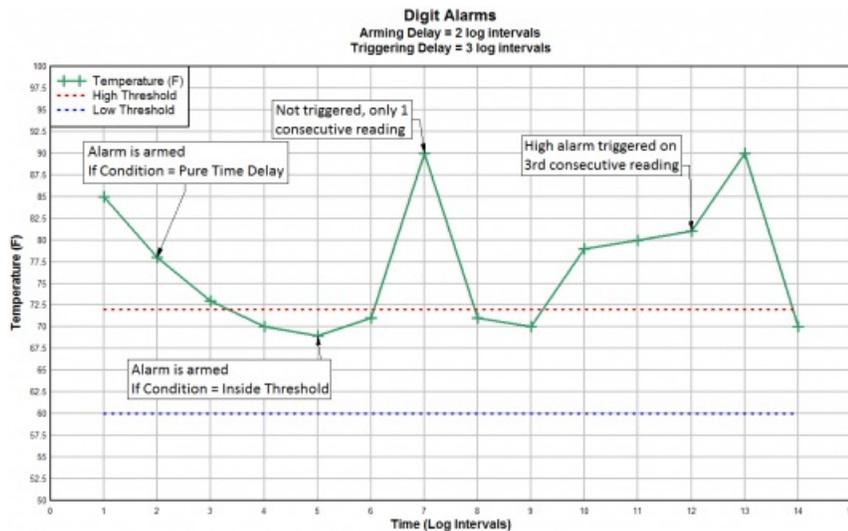
Alarm Trigger Condition

Consecutive (red) measurements before alarm is triggered

20 20 Minutes to view alarm LEDs

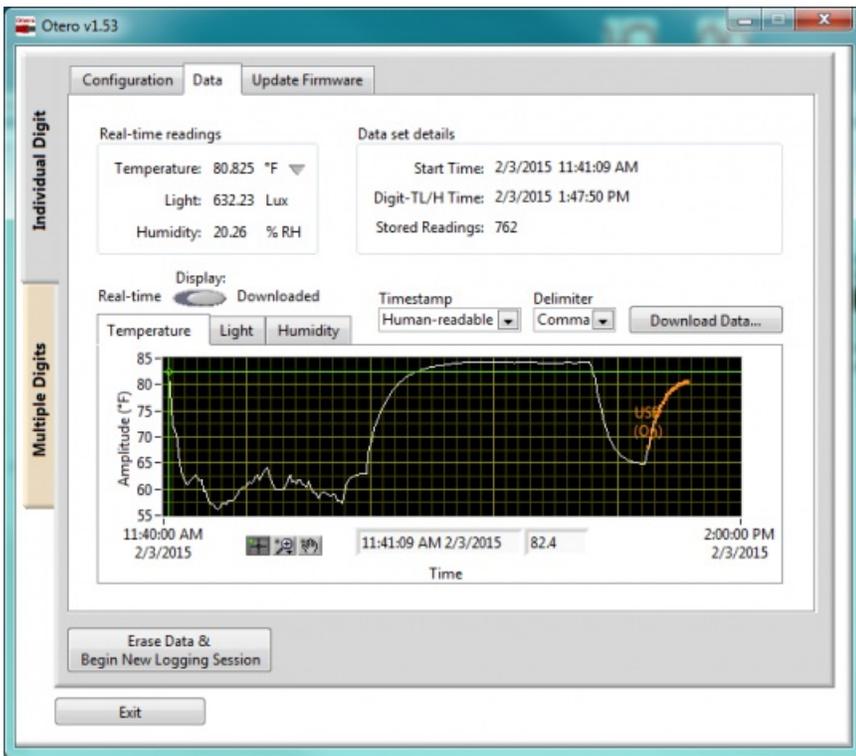
Note:
After the alarm is armed, the trigger can be delayed so that users have time to view the alarm LED outside of the measurement environment. A trigger delay also helps with environment noise.

Example: Arming delay is set to 2, and triggering delay is set to 3.



Data

The Data tab is where data is downloaded and reviewed. Temperature readings collected while USB was connected are indicated in orange.

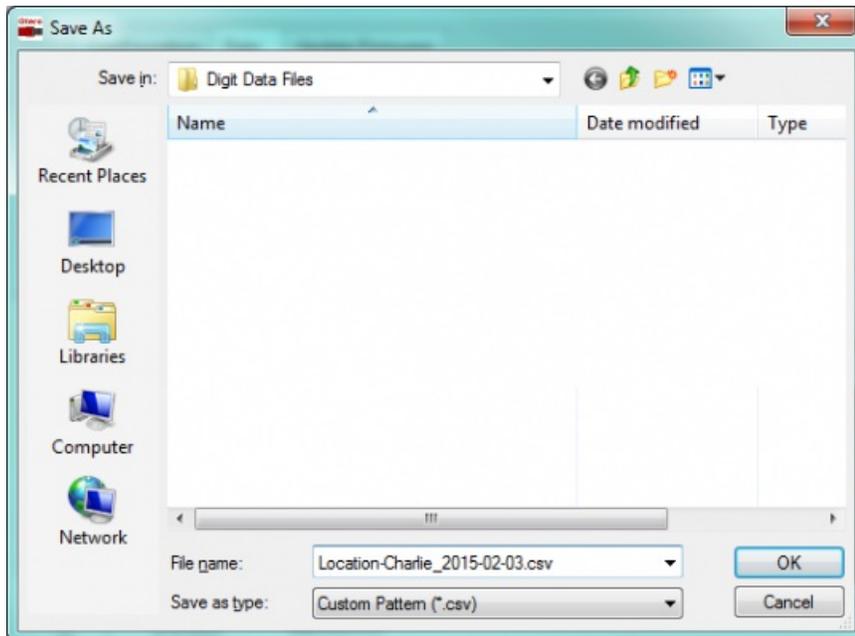


This tab contains real-time data, and download options.

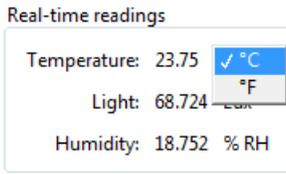
Download Data: Click "Download Data..." to download data.



A file dialog will appear. Create and save the data file by clicking "OK". Click "Cancel" to skip saving the file.



Temperature Units: Change the temperature units with the adjacent downward grey arrow. Changing the units here will also change the units of downloaded/exported data.



Start Time: The date/time when logging was started. Start time is the timestamp for data.

Digit-TL/H Time: The current time stored in the real-time clock of the Digit-TL/H.

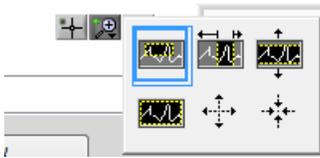
Display: Toggle display between real-time readings, and downloaded data by switching this control.

Timestamp: The format of the timestamp in exported data files. Human-Readable is in the format [YYYY-mm-dd HH:MM:SS], Seconds ->1970 is the number of seconds that have elapsed since January 1, 1970, also known as the Unix timestamp. Both will export the data file with both timestamp formats included.

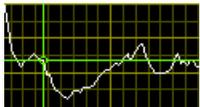
Delimiter: The delimiter in the exported .csv file. Choose Tab, Comma, or Semicolon. The delimiter is set to comma by default. If the system decimal separator is comma, the program will change the default delimiter to tab(introduced in v1.49 of Otero to aid international users).

Blank Readings: The format for blank data space in exported data files. The program will convert blank memory (0d65536) to a more friendly number, such as 0.00, "blank" as a string, or 0.000001. "blank" is the default setting because it is most intuitive when looking through data manually. It is recommended to select 0.000001 for programmatic parsing, since no valid data will ever be that number.

Zoom Tools: Zoom in, zoom out, or selectively highlight and view data by using the zoom tools. It is also possible to highlight the date text using the cursor, and manually type in a new date. After you enter a new number, click anywhere on the program screen for the new scale to take effect.

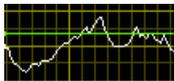


Cursor Indicator: Move the cursor around to see the time and value of each data point.

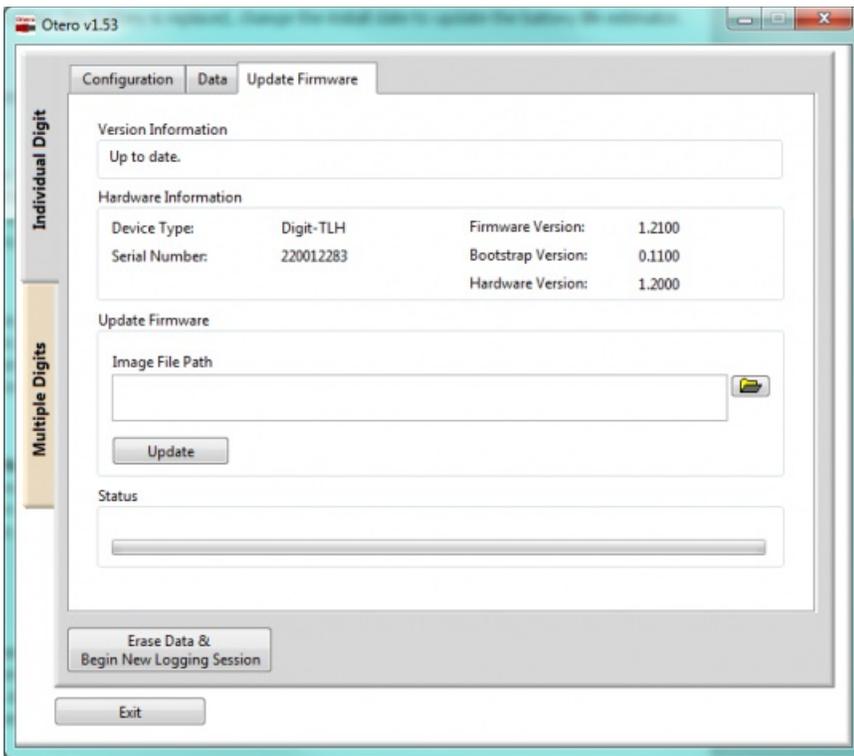


AM
15    11:41:09 AM 2/3/2015 82.4

Hand Move: Move the whole screen around with the hand tool.



Update Firmware



The update firmware tab contains all the necessary items to update your firmware. Download the latest firmware file from the [firmware page](#), then use this portion of the program to update to the downloaded file. The update process takes only a few moments, but bear in mind that upgrading **will erase your stored data**. It is advised that you first download your data, then update the firmware.

Otero

File attachment:

 [Old Otero Users Manual \(<v1.50\)](#)

Otero - Multiple Digits (Advanced)

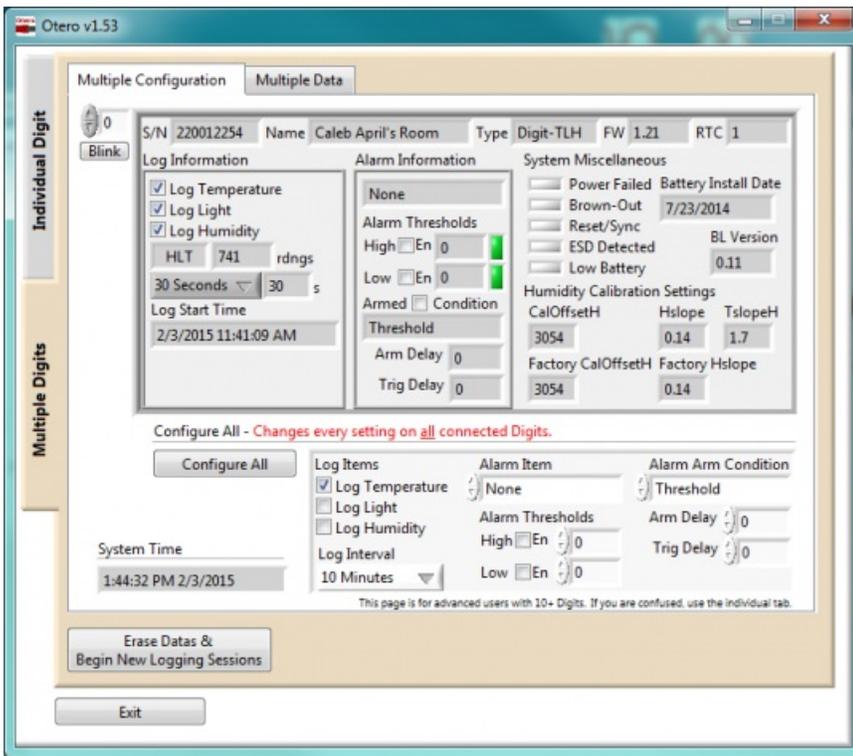
Summary

The Multiple Digits tab of Otero is for advanced users with ten or more Digits. It is designed so that hundreds of Digits can be simultaneously configured and initialized. Also, for large experiments, all the data can be downloaded at a single time. A few items are not available on the Multiple Digits tab, such as device name, and battery install date, since those items are not used frequently. Note that each Digit will need an active USB port - we use a few [Satechi 12 Port USB hubs](#).

This section also provides the ability to calibrate humidity on a large number of Digit-TLHs.

Multiple Configuration

The multiple configuration tab of the program shows the current configuration for any connected Digit. Scroll through all the connected Digits with the up and down arrow buttons top left. Note that nothing can be changed in this section, it is made for viewing only. Individual parameters for each device must be changed using the Individual Digits half of Otero. To configure every setting on ALL connected Digits at the same time, regardless of pre-existing settings, use the Configure All section.



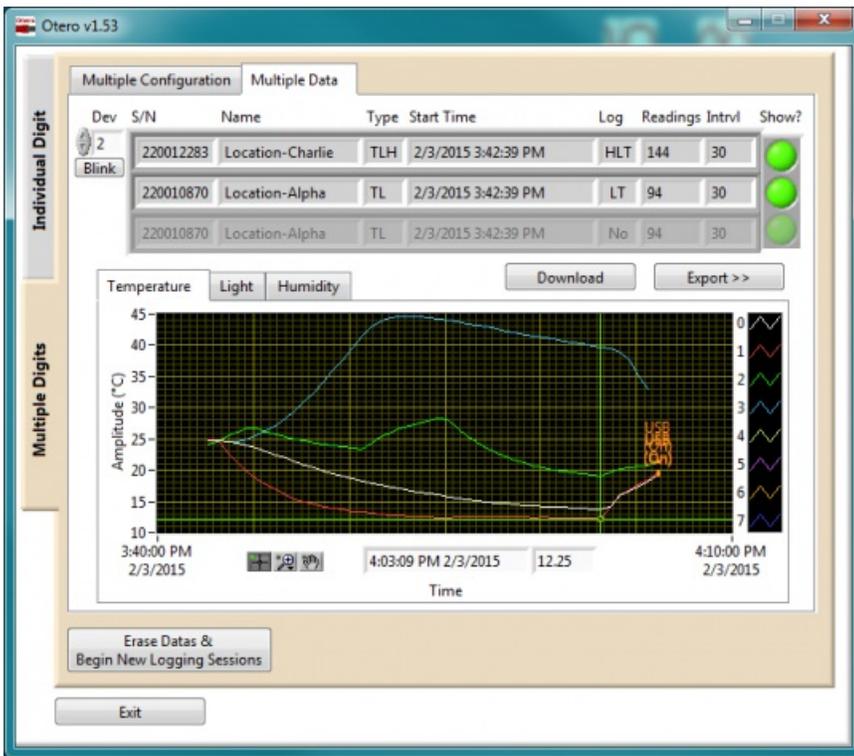
Configure All: Transfers the settings in the smaller box on the right to all connected Digits. This is convenient for people who want every Digit in the field to behave the exact same way. The Configure All button will send new settings, but settings changes are not saved until 'Apply All' is selected. For details on individual settings, see the related section.

Erase Datas & Begin New Logging Sessions: Erases all data on all connected Digit-TL/Hs and begins a new logging session. To begin a logging session with different settings, change the settings next to Configure All, click Configure All, then click Erase Datas & Begin New Logging Sessions.

Blink: Click Blink to blink the green LED of the currently selected Digit. This is useful to identify which physical Digit-TL/H contributed what data.

Multiple Data

The Multiple Data tab of the program shows downloaded data for all connected Digits. Scroll through connected devices using the up and down arrow buttons top left. Show or hide data on the graph with the corresponding circular green button.



The mouse wheel does not work to zoom, instead use the zoom tools, or highlight the time and type in a new value. Use the cursor to identify individual data points.

Export

Select how to format exported files using the Multiple Data Export popup. This page is has a lot of overlap with the explanations from earlier in this document, with some additions to make file management easier.

The screenshot shows the 'File Export All.vi' dialog box. It has a title bar with a close button. The main content is divided into two columns: 'Data Format Options' and 'Filename Format Options'.

Data Format Options:

- Timestamp: Human-readable (dropdown)
- Delimiter: Tab (dropdown)
- Temperature Units: °C (dropdown)
- Blank readings appear as: "blank" (dropdown)
- Tip: Use 1E-6 to make programmatic parsing easy.

Filename Format Options:

- Prefix: (text input) "Prefix_Filename.csv"
- Tip: Use a prefix to differentiate between experiments.
- Filename:
 - name_date: "BoilerRoomDigit_2013-09-18.csv"
 - SN_date: "220010133_2013-09-18.csv"
 - date_number: "2013-09-18_0.csv", "2013-09-18_1.csv", ...
 - data_number: "data_0.csv", "data_1.csv", ...

Export directory:

- Use Select Cur Dir to select a directory (button)
- Must define a valid export directory (text input)

Buttons: Cancel, Export All

Timestamp: See related section.

Delimiter: See related section.

Temperature Units: Optionally change exported temperatures to Celsius or Fahrenheit.

Blank Readings: See related section.

Prefix: Differentiate between experiments, or different download events by adding a prefix. The prefix will be added to every file, before the filename, separated with an underscore.

Filename: Use the device name, serial number, date, or the index to differentiate between individual devices. The device name is used by default, since most users will name the Digit, and physically label it with that name.

Common Process Walk-through

Individual Digit (Multiple Digits) - Text inside parenthesis below applies to the 'Multiple Digits' section of the program.

To:

...begin a new logging session. This will preserve all existing settings (each Digit can have unique log interval, log items, alarm conditions)

1. Click Erase Data(s) & Begin New Logging Session(s)
2. Exit

...begin a new logging session with new settings. This will erase existing settings, in favor of new settings (each Digit will have the same log interval, log items, alarm conditions)

1. Change settings (in rectangular box bottom right)
2. (Click Configure All)
3. Click Erase Data(s) & Begin New Logging Session(s)
4. Exit

...check-in on logging.

1. Select Data (Multiple Data) tab
2. Download (Download + Export)
3. Exit

...end a logging session.

1. Select Data (Multiple Data) tab
2. Download (Download + Export)
3. Exit

...end a logging session, and put Digits into most power-efficient mode.

1. Select Data (Multiple Data) tab
2. Download (Download + Export)
3. Disable logging of temperature, light, humidity.
4. (Click Configure All)
5. Click Erase Data(s) & Begin New Logging Session(s)
6. Exit

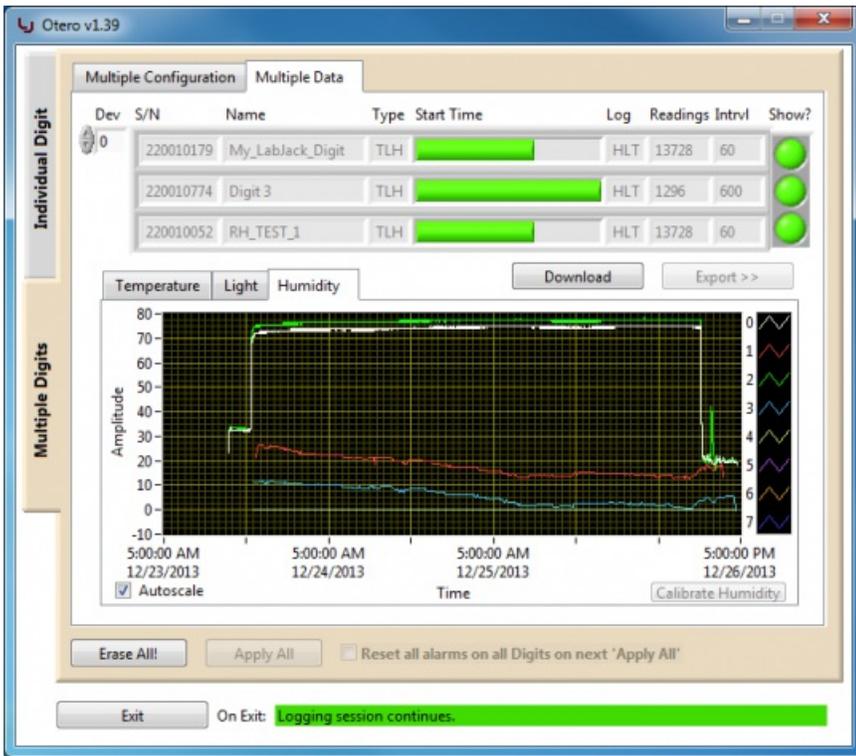
Multiple Digits

Otero - Calibrate Humidity (Advanced)

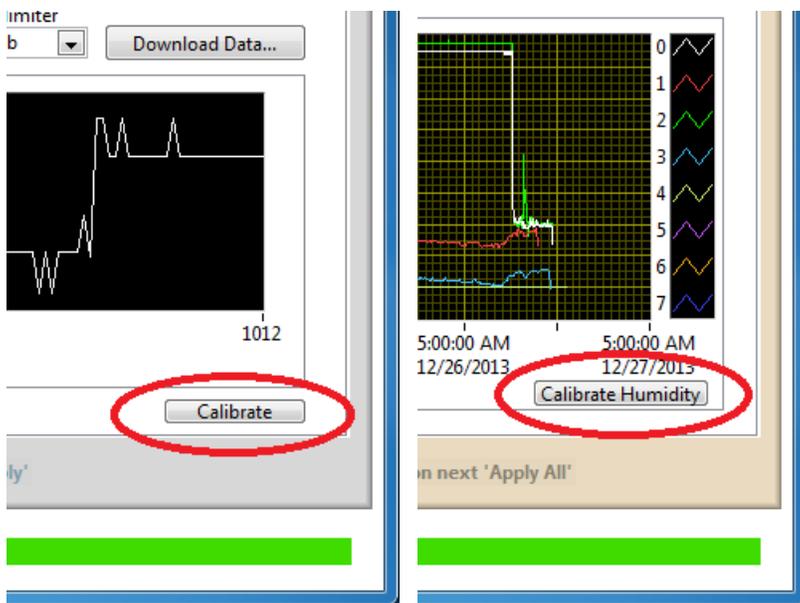
Summary

It is possible to calibrate humidity to achieve higher accuracy. It is necessary to first leave the Digit in a chamber of known humidity for a few hours prior to calibration in software. There are multiple methods to calibrate hygrometers, please use online resources to find the a suitable method for your application.

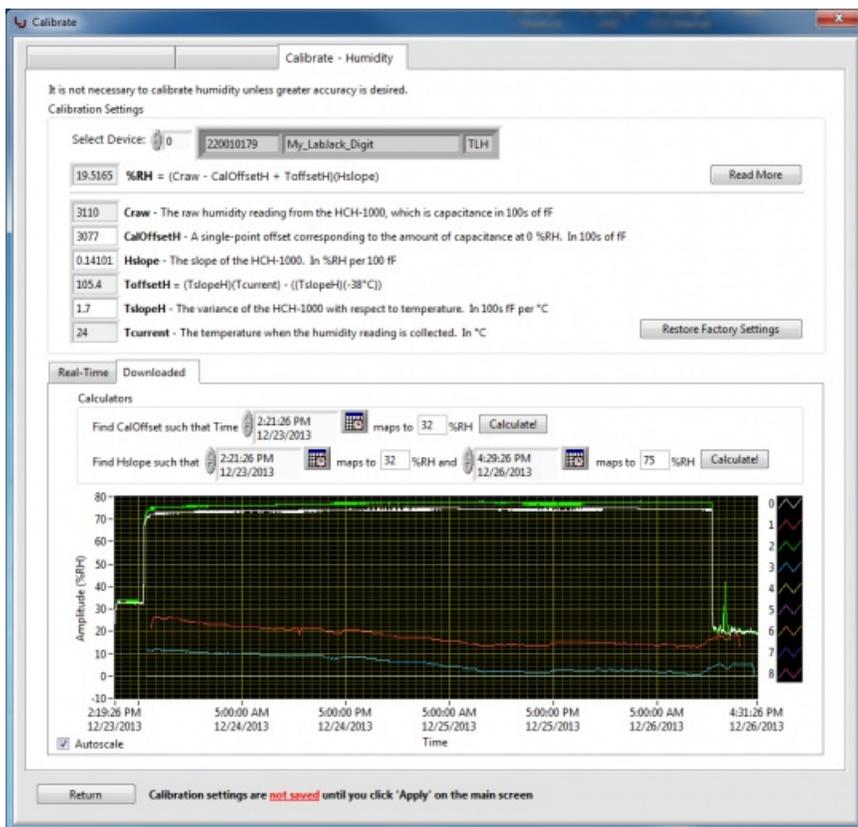
After removing the Digit-TLH(s) from the humidity calibration chamber(s), plug them in and download the data. The calibration section in software is accessible after valid humidity data is downloaded.



After download is complete, open the calibration pane.



This is the calibration section of Otero. There are no parameters to calibrate Temperature or Light, so the calibration option will only appear if one or more Digit-TLH are connected to the computer.



The raw humidity value (Craw) is a measure of capacitance in hundreds of fempto Farads. To convert humidity from fempto Farads into a %RH, use the following equation.

$$\%RH = (Craw - CalOffsetH + ToffsetH)(Hslope)$$

Read More: Opens a window with a few details about each parameter.

Restore Factory Settings: Restores the factory calibration offset, slope, and temperature dependence of the Digit-TLH.

Change any parameter on-the-fly to see the impact on downloaded data, or use the calculators to make it easy.

Calculate CalOffset: Enter a time into the time input box that corresponds with a known humidity value in the data set, then enter what the humidity value at that time should be, then click Calculate!. This requires time spent in 1 chamber of known humidity. The calibration offset will be automatically adjusted, and %RH will be the desired value.

Calculate Hslope: Enter two points into the time/value input boxes, then click Calculate! to automatically generate a new slope value. This requires time spent in 2 chambers of different known humidity. Note that after changing the slope, the CalOffset will need to be re-calculated: Just press Calculate again.

After the data looks correct, click Return, changes are auto-saved.*

*Starting with firmware v1.21, changes are auto-saved. In previous versions of firmware, users had to click 'Apply' to save changes.

Calibrate Humidity

Otero Changelog

1.53

Renamed the Erase & Restart Logging button to be more descriptive. Button text now reads "Erase Data & Begin New Logging Session". Also added a prompt that will appear if users attempt to exit the program with unsaved changes to Log Items or Log Interval. Added help button that opens online documentation. Small UI tweaks.

1.52

Small bug fix. Starting with v1.50, when switching from the 'Multiple Digits' tab and the 'Individual Digits' tab, downloaded data on the 'Individual Digits' Data tab would appear on the graph with twice the original amplitude, this is fixed in 1.52.

1.51

New graph navigation tools to make it easier to zoom-in, zoom-out, and locate individual data points on the graph. Autoscale check box removed, but it's possible to autoscale by clicking the magnifying glass icon, and selecting the bottom-left option. It's also possible to autoscale by switching between the different data tabs.

1.50

Simplified buttons, remembers temperature units. New version compatible with Digit-TL/TLH firmware v1.21. Improved visual appearance of the battery indicator, and recovery flags. Software will now remember previous selection of °C or °F, as well as the download directory and other software options. Starting with firmware v1.21, settings changes are auto-saved by firmware, so the 'Apply' button is removed. To make changes to Log Interval or Log Items, users must restart the logging session by clicking 'Erase Data & Begin New Logging Session'. The synchronize button has been removed. Device time is now automatically synchronized with the computer by clicking the "Erase Data & Begin New Logging Session" button. Downloaded .csv files now include a column representing "During USB" readings, which 0(false) = on battery power, 1(true) = USB active. Starting with firmware v1.21, the Digit-TL/TLH continuously logs data, regardless of USB presence. Users can still parse out temperature data collected during active USB connection by using the "During USB" flags in downloaded data.

1.49

The delimiter in downloaded files now defaults to comma only if comma is not the default decimal separator for the system. Prior to this default change, international customers would have to manually change to Tab separated before downloading data files. Also made it more apparent that it's possible to modify the device name. Also fixed an issue which prevented proper closing of the program if you were on the data tab. Also made the version checking less obtrusive (removed popup message). Pressing the <Enter> key no longer causes the program to jump to a different tab. Program makes it more obvious when the battery is dead/low, and logging has stopped.

1.48

Added "blink" buttons on the multiple configuration, multiple data, and humidity calibration screens to help users identify which physical hardware contributed which data. This is particularly useful for when dozens of Digit-(TL/TLH)s are connected to the USB host, and only a single unit has suspicious or interesting data. Previously there was no way of knowing exactly which physical hardware contributed what data when multiple were connected because the serial numbers of Digit-(TL/TLH)s are not shown on a sticker. Instead, users had to either use process of elimination and disconnect Digits from USB then re-launch the program, or they had to label the units.

1.47

Fixed a bug where the program could report Error #0 if the remote server containing version information was not fully available. The error in previous versions would often manifest as a "CD post value" error of some kind.

1.44

Changed the default delimiter on downloaded data from tab separated to comma separated. International customers should select tab or semicolon prior to download.

1.43

Reduced timeout of online version checking from (~3s) to 500mS to improve offline program usage experience.

1.42

Fixed a bug which allowed for an Return character in the Device Name. If there is a Return character in the device name, the download .csv dialog will not appear, so exporting to .csv appears non-functional. In Otero v1.42 it is not possible to insert a Return character in the device name. New program icon.

1.41

A few minor tweaks to the humidity calibration factory default slope, and expanded allowed slope input range to be more suitable for HW v1.20 Digit-TLHs. Basically just a few minor tweaks to Digit-TLH calibration to make it better for HW v1.20. New program icon.

1.40

Temperature units of downloaded data now correctly displayed as F or C, depending on selection. Changed error checking to make it possible to use the program without an internet connection(only a problem since v1.38). Due to humidity calibration changes in v1.41+, [Otero v1.40](#) is the recommended version for hardware v.1.11 Digit-TLH users. Digit-TL unaffected and fully compatible with newest versions.

1.39

Fixed a bug where exported temperature data was not exported in degrees F when F was selected (on the 'data' tab, 'Real-time readings' section), this bug was only present since v1.37. Note that the temperature of downloaded data is still displayed in Celcius on the downloaded data graph, regardless of selection (should be fixed in a future release).

1.38

Added check for Otero version, and firmware version against an online database to verify up-to-date. Some minor text changes in information dialog windows. Text changes to graph(s) y-axis. Humidity readings now coerced to range (-10% to 110%) program-wide. Numerous bug fixes related to v1.37. Now includes all support files, so the .exe can be copied and pasted anywhere.

1.37

Added multiple Digit support. New features make it easier to manage hundreds of Digits at the same time. Features include:

- Mass configure - Configure 100s of Digits to have the same settings.
- Mass download/view/export - Export Digit data instantly to 100s of files using several naming options
- Mass calibrate humidity - Store 100s of Digits in a reference chamber, and calibrate all of them in a few simple steps!
- Mass RTC synchronization, user alarm resets etc

File export now uses ISO 8601 date, and H:i:s time (YYYY-MM-DD HH:MM:SS). Graphs now show timestamp on X axis instead of generic 'reading #'. Removed need for ProgressBar.vi in the support folder. Added the ability to change the battery install date (if users install a new battery themselves). Small UI tweaks and re-arranging. Added indicator near the Exit button which describes what happens to the current logging session on Exit.

1.36

Fixed a small bug with T, L, H where light readings were not downloaded correctly at low temperatures. Updated the way that errors are displayed. Added error 2499 to OteroConstants.json

1.34

Changed screen sizes slightly, updated configuration tab to contain system alarms & warning flags, instead of just alarms. Added sync button instead of using message prompt. Now uses configuration file called OteroConstants.json in ...labjack/applications/support folder.
