

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-2014-10-14.exe](#)
Size: 49.99 MB
Upload date: 2014-10-14 11:45

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. First set the parameters as desired, then click apply. Once changes are applied, the Digit can be removed from USB, and will immediately begin logging.



Log 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. Requires Apply.

- 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. Requires Apply.

Log Items

- Log Temperature
- Log Light
- Log Humidity

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. Requires Apply. View the current alarm status with the rectangular boxes Green = No alarms triggered, Red = User Alarms Triggered. The alarms cannot trigger unless they are first armed. Also, alarms cannot be armed or triggered while the Digit is connected to the PC. See the Alarm Configuration section for further details.

Alarm Item

- Temperature
- Light
- Humidity
- None

Configure Alarm

| | |
|--|--------------------------|
| User Alarm Status | LED Behavior |
| Alarms Armed <input checked="" type="checkbox"/> | [Green ON] - None |
| <input checked="" type="checkbox"/> High Threshold | [Red ON] - User Alarm |
| <input checked="" type="checkbox"/> Low Threshold | [Green Blink] - Warnings |
| | [Red Blink] - Failures |

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

Battery Install Date 

Battery Life (estimation based on install date)



0% 20% 40% 60% 80% 100%

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

Device Type: Digit-TLH

Serial Number: 220010126

FW Version: 1.1725

Device Name: Boiler Room Digit

System Information: The system information area contains system-level issues, such as battery power failure. For instance, if the battery was temporarily removed during logging, and the Digit could not recover, the Power Failed rectangular box would appear red, indicating that logging has stopped. System Warnings typically mean that there was a disturbance, but the Digit was able to recover. Some additional information is available if you click on the System Information button.

| | |
|---------------------------------------|---------------------------------------|
| System Failures | System Warnings |
| <input type="checkbox"/> Power Failed | <input type="checkbox"/> Brown-Out |
| | <input type="checkbox"/> Reset/Sync |
| | <input type="checkbox"/> ESD Detected |
| | <input type="checkbox"/> Low Battery |

System Information

Synchronize: To synchronize the real-time clock of the Digit with a computer, click the Synchronize button. It is recommended to synchronize prior to Erase or Apply. 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 RTCC synchronization before daylight savings rollover will show a 3600 second difference after the rollover.

Real-Time Clock

Differs from PC by 2 sec

Erase & Apply: To erase a data set, click Erase. On erase, a new logging session will begin with the same settings as the previous logging session. If you want to begin a logging session with different settings, then change the settings throughout Otero and click Apply. Since the Digit can only store a single logging session, you must erase the existing data set before new settings can be applied.



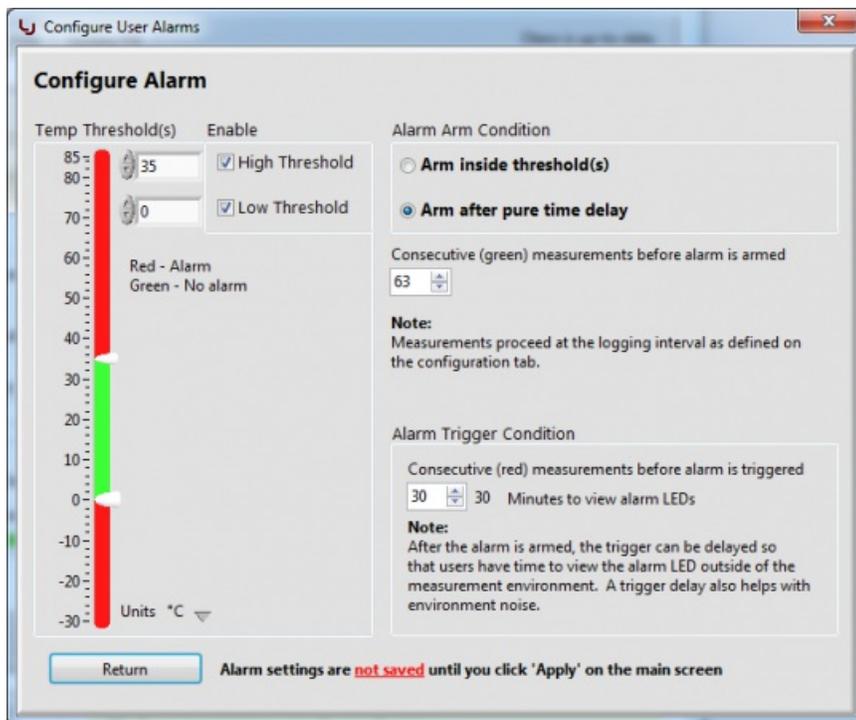
Reset Alarms: This feature can be ignored if firmware is greater or equal to 1.1725. On older firmware the Digit hardware did not automatically reset user alarms and system flags when a new data logging session started, so users would select the Reset Alarms checkbox prior to clicking 'Apply'. With the latest firmware, users may ignore this check box.



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. Alarms cannot be armed or triggered while the Digit is connected to the PC.



Note: System-level warnings and failures take precedence over user-defined threshold alarms, so if any LEDs are blinking on USB connect, it's a good idea to open software and see what happened.

High Threshold: The upper threshold, or trip-point for a user-defined alarm to be triggered. In a refrigerator, set a high threshold of 37°F, and disable the low threshold. Then you can periodically check the alarm to verify contents have not spoiled. No need to download data or have a computer around!

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.

Temp Threshold(s)

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.

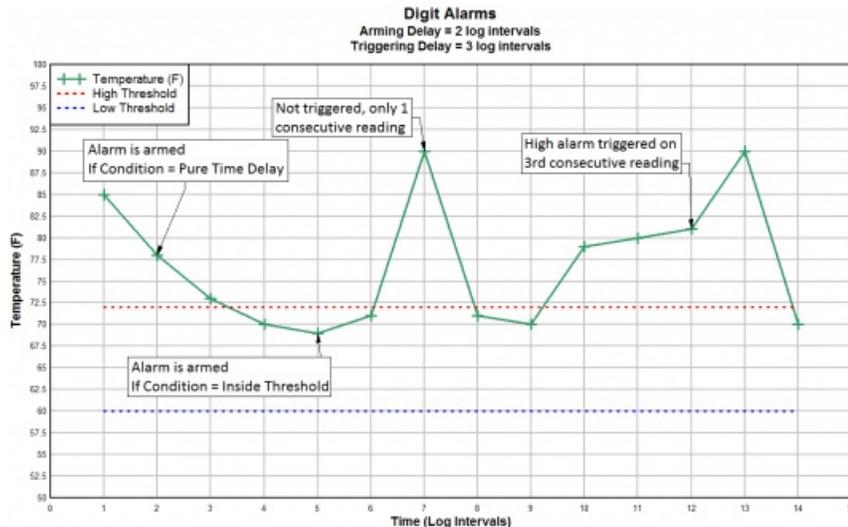
Alarm Trigger Condition

Consecutive (red) measurements before alarm is triggered

20 20 Minutes to view alarm LEDs

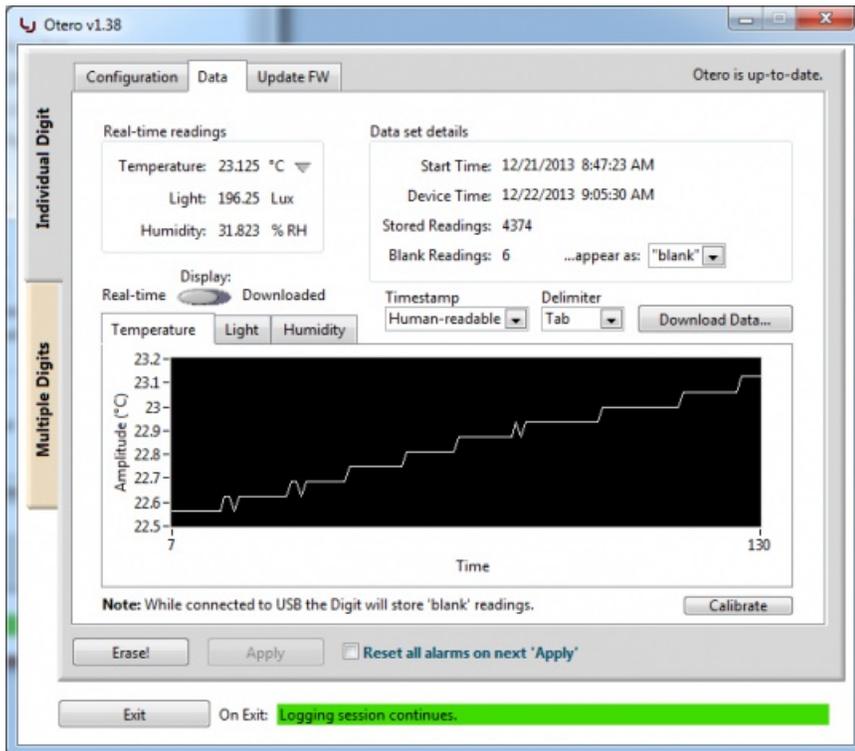
Note:
After the alarm is armed, the trigger can be delayed so that users have time to view the alarm LED outside of the measurement environment. A trigger delay also helps with environment noise.

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



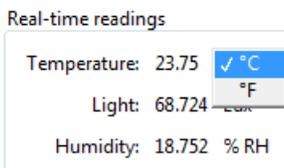
Data

The data tab is where data is downloaded and reviewed. Real-time readings can also be seen, but real-time readings are not stored to memory, because they are influenced by processor heat (generated by USB activity). Instead, the Digit stores blank readings while it's connected to the PC, which can be thought of as placeholders to keep an accurate timestamp for subsequent readings.



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

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



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

Device Time: The current time stored in the real-time clock of the Digit-TL. When users erase or apply, firmware stores the device time as the start time. For this reason, synchronizing the Digit after erasing data or after applying new settings will have no effect on the current data set's timestamp; always synchronize before Erase or Apply.

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.

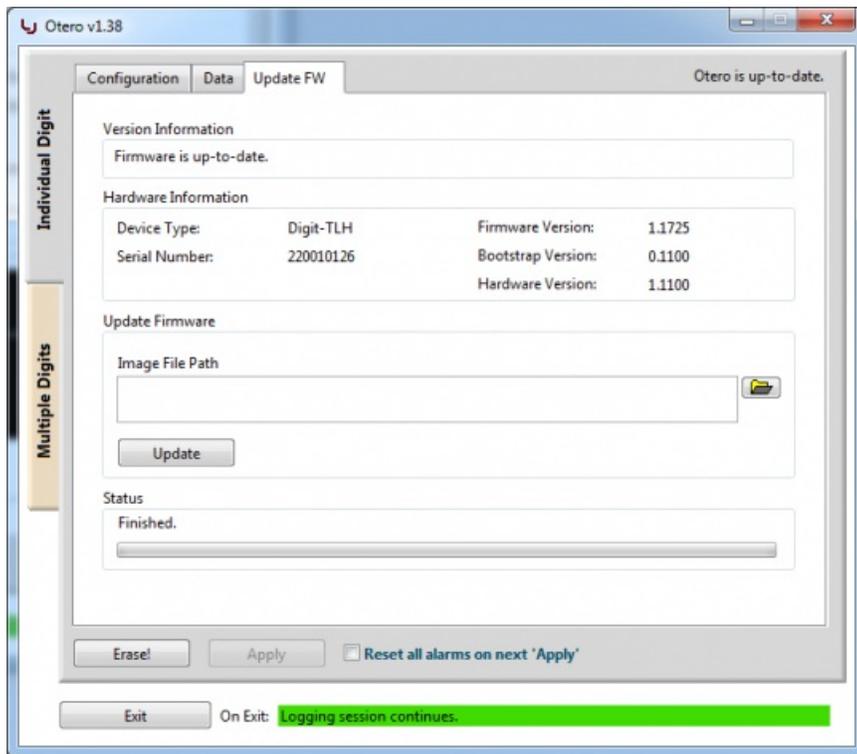
Delimiter: The delimiter in the exported .csv file. Choose Tab, Comma, or Semicolon. The delimiter is set to comma by default, so international customers should change it to tab or semicolon separated.

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.

Note: To change the scale on downloaded data: Un-check the Autoscale checkbox, then highlight the text using the cursor, and

manually type in a new number. After you enter a new number, click anywhere on the program screen for the new scale to take effect. This is useful if you want to "zoom in" on a specific event in the data set.

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:

[Otero v1.43](#)

[Otero v1.48](#)

Otero - Multiple Digits (Advanced)

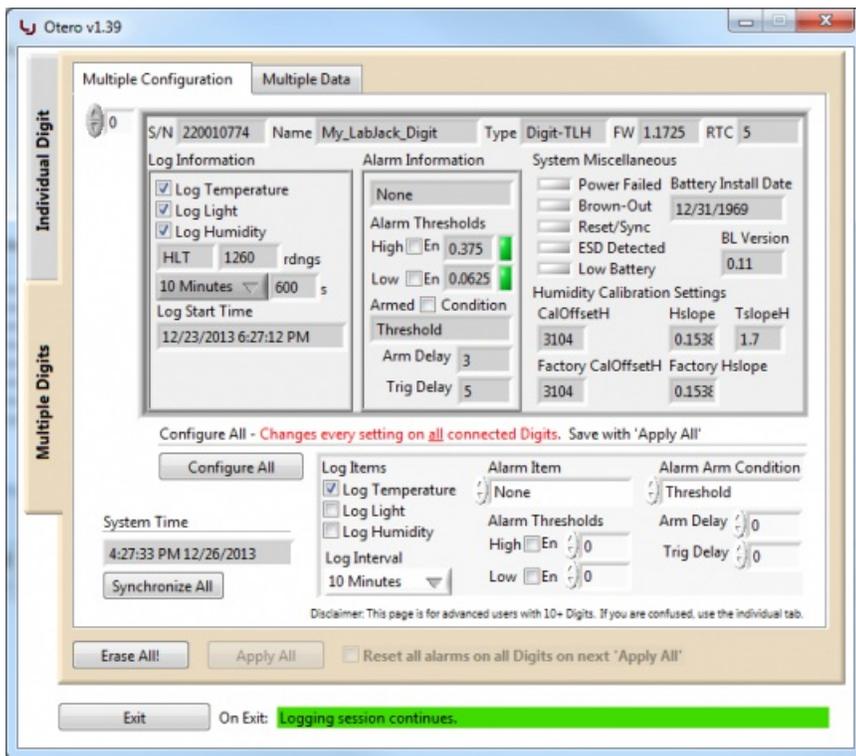
Summary

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.



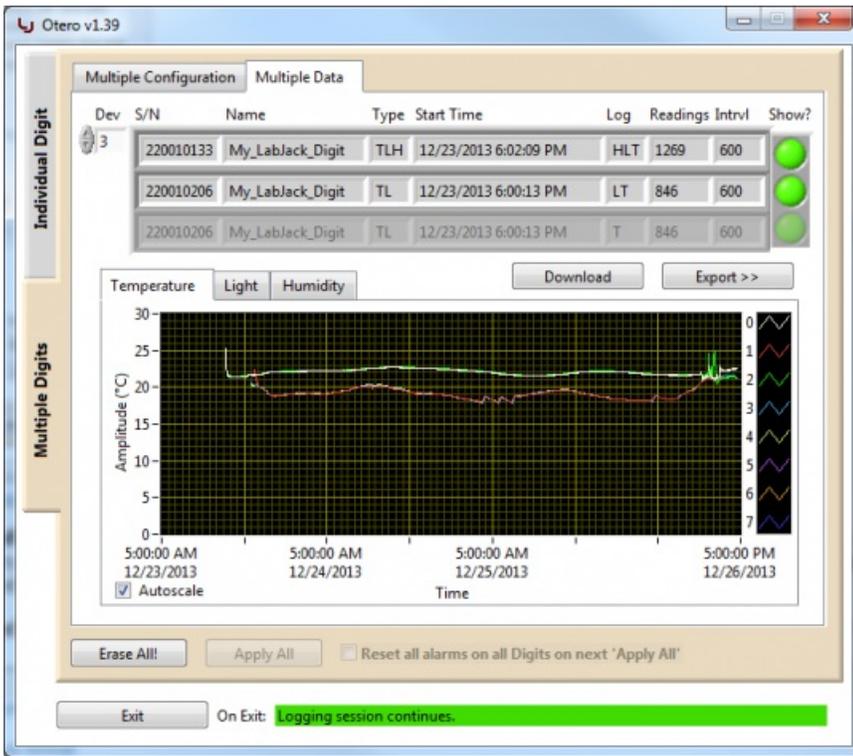
Configure All: Transfers the settings in the smaller box on the right to all connected Digits. This is convenient for people who want every Digit in the field to behave the exact same way. The Configure All button will send new settings, but settings changes are not saved until 'Apply All' is selected.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

Synchronize All: Synchronize all devices with system time. It is recommended to synchronize prior to Erase All or Apply All.

Erase All & Apply All: To erase all data sets, click Erase All. On erase, a new logging session will begin with the same settings as the previous logging session. To begin a logging session with different settings, change the settings next to Configure All, click Configure All, then click Apply All.

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.



Disable autoscale to zoom in on a desired region. The mouse wheel does not work to zoom, instead, highlight the time and type in a new value, then click with the mouse somewhere on screen to accept the new value.

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 'Multiple Data Export' tab. The dialog is divided into two main sections: 'Data Format Options' and 'Filename Format Options'.
 In the 'Data Format Options' section:
 - 'Timestamp' is set to 'Human-readable'.
 - 'Delimiter' is set to 'Tab'.
 - 'Temperature Units' is set to '°C'.
 - 'Blank readings appear as:' is set to '"blank"'.
 - A tip: 'Use 1E-6 to make programmatic parsing easy.'
 In the 'Filename Format Options' section:
 - 'Prefix' is empty, with a placeholder '"Prefix_Filename.csv"'.
 - A tip: 'Use a prefix to differentiate between experiments.'
 - 'Filename' options include:
 - 'name_date' (selected): '"BoilerRoomDigit_2013-09-18.csv"' (radio button selected)
 - 'SN_date': '"220010133_2013-09-18.csv"' (radio button unselected)
 - 'date_number': '"2013-09-18_0.csv", "2013-09-18_1.csv", ...' (radio button unselected)
 - 'data_number': '"data_0.csv", "data_1.csv", ...' (radio button unselected)
 - 'Export directory' is empty, with a button to 'Select Cur Dir to select a directory'.
 - A note: 'Must define a valid export directory'.
 At the bottom are 'Cancel' and 'Export All' buttons.

Timestamp: See related section.

Delimiter: See related section.

Temperature Units: Degrees Celsius by default, optionally change exported temperatures to 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 Synchronize (All)
2. Click Erase (All)
3. 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 Synchronize (All)
4. Click Erase (All)
5. Click Apply (All)
6. Exit

...check-in on logging.

1. Select Data (Multiple Data) tab
2. Download
3. View and/or Export
4. Exit

...end a logging session.

1. Select Data (Multiple Data) tab
2. Download
3. View and/or Export
4. Exit

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

1. Select Data (Multiple Data) tab
2. Download
3. View and/or Export
4. Erase (All)
5. Disable logging of temperature, light, humidity.
6. (Click Configure All)
7. Apply (All)
8. Exit

Multiple Digits

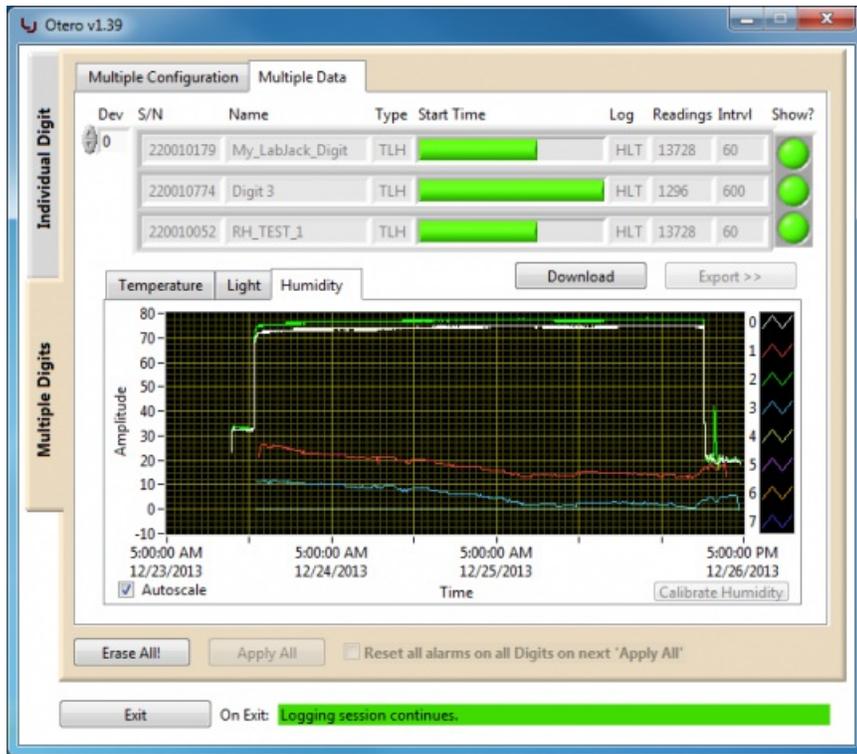
Otero - Calibrate Humidity (Advanced)

Summary

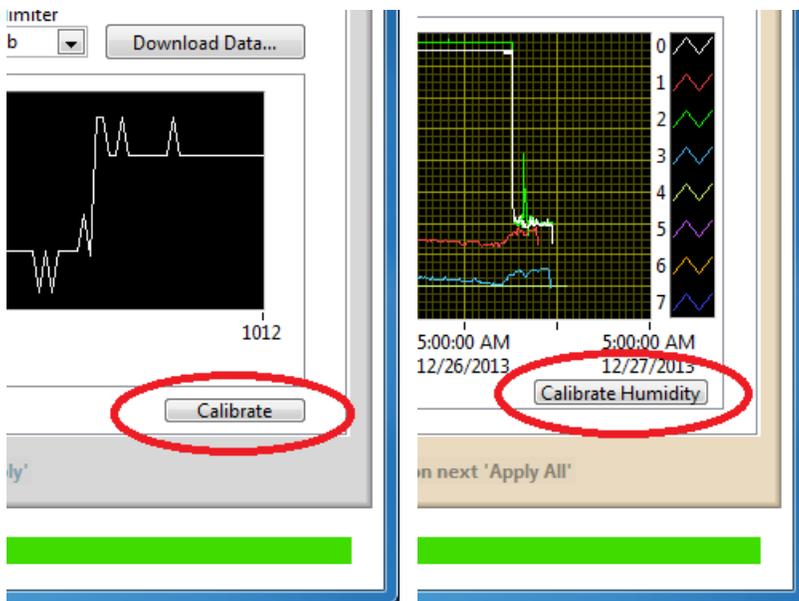
It is possible to calibrate humidity to achieve higher accuracy. It is necessary to first leave the Digit in a chamber of known humidity

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.

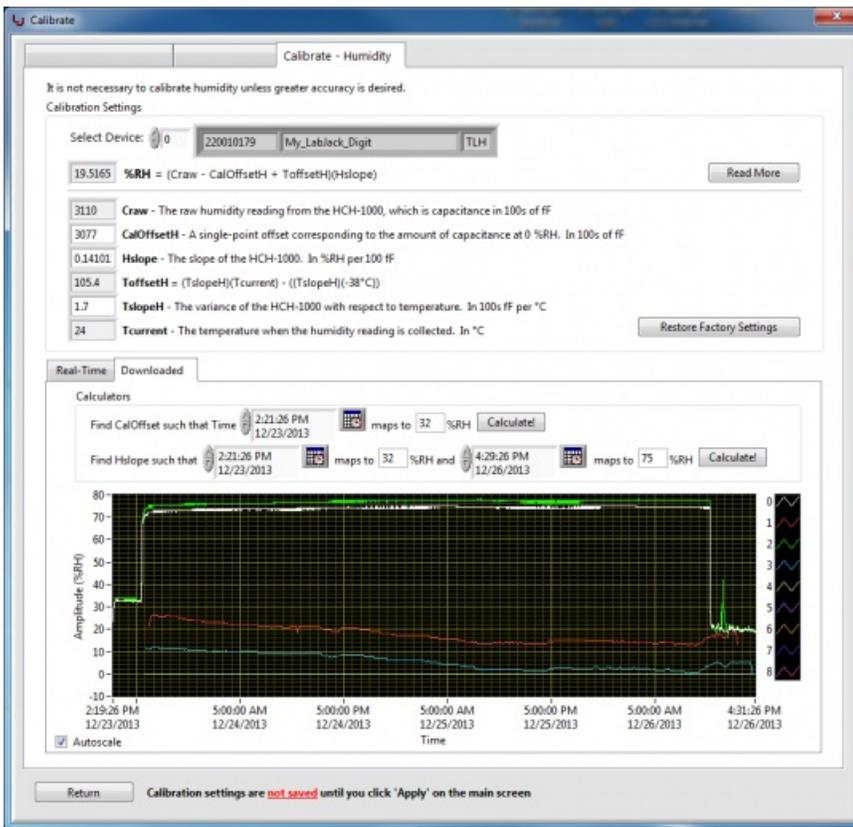
After removing the Digit-TLH(s) from the humidity calibration chamber(s), plug them in and download the data. The calibration section in software is accessible after valid humidity data is downloaded.



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, then export the data(uses new calibration) by clicking Download Data... or Export, and save the calibration settings by clicking Erase first then clicking Apply. **Be sure that you click Apply!** The calibration adjustments will be lost if changes are not applied.

Calibrate Humidity

Otero Changelog

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.