LabJackDasy 0.1 Alpha

A specially tailored open source DLL that allows DASYLab to control LabJack UD devices

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Installation Instructions

1. Download the latest UD driver release from http://labjack.com/support/windows-ud
2. Install the UD driver
3. Download the latest release from http://github.com/Samnsparky/LabJackDASY/downloads or http://labjack.com/support/ud/examples/dasylab.
4. Extract the enclosed LabJackDasy.dll to C:\Program Files\DASYLab 5.6 or equivalent.
5. Open C:\Program Files\DASYLab 5.6\DASYLAB.ini or equivalent and, under the section titled [Hardware], add the line: "LabJackDasy.dll=LabJack Driver"
6. Run DASYLab and go to Experiment > Select Driver
7. Attach your LabJack device and restart the program

What is LabJackDasy?

The LabJackDasy project allows users of DASYLab version 5 and up to communicate with LabJack UD family devices connected over USB or Ethernet.

License and Source Code

LabJack Corp. provides both DLLs and source code under the MIT license, the terms of which can be found in the the file "License.txt." Such a license should have been provided along with this document but can also be found with LabJackDasy's publicly available source code at its git repository. Lastly, while LabJack Corporation maintains LabJackDasy, this company has no association with Measurements Computing or DASYLab itself.

Getting Help

LabJackDasy is an open source project and we ask that bugs be filed at our git hib page. However, we also provide direct support by email at Support@labjack.com and public support at http://forums.labjack.com/.

Limitations and Known Bugs

Please keep in mind that this is an alpha release and is still under development.

- **An internal issue with DASYLab limits the precision of analog input values.** Please see the section titled "Precision of Analog Input Channels" below.
- **The "special" range is currently not supported for the U3**
- **The 0-5 V range is not currently supported on the UE9**
- **All devices must use 12-bit resolution**
- **Currently DASYLab requires that at least one input channel must be read from.** If you only wish to use digital or analog outputs, simply request a digital input channel but do not do anything with it. We are looking for a workaround in future releases.
- **DASYLab does not have timer / counter capability.** As per user request, this feature will be implemented as soon as possible.
- **DASYLab's GUI can become jittery when reading at high frequencies.**
- **DASYLab does not currently support raw I/O, SPI, I²C, or asynchronous communication**
- **DASYLab does not currently support LJ-TickDACs**

Precision of Analog Input/Output Channels

Due to an internal data conversion in DASYLab, values reported are approximately precise to 2 units (V) of the device's noise free resolution as reported in Appendix B of the LabJack User's Guide (U3, U6, UE9). Just to provide a general sense of how this operation will affect measurements, "real" values output by the UD driver directly and the same value as reported by DASYLab were compared for a set of 150 sample readings. The results are displayed in the following table:

| Device	Range	Average difference between UD and DASYLab reported values	Maximum difference observed between UD and DASYLab reported values
U3-LV	0-2.5 V	$1.00 * 10^{-4}$ V	$1.46 * 10^{-4}$ V
U3-HV	+/- 10 V	$3.02 * 10^{-4}$ V	$6.06 * 10^{-4}$ V
U6	+/- 10 V	$3.02 * 10^{-4}$ V	$6.06 * 10^{-4}$ V
	+/- 1 V	$3.16 * 10^{-5}$ V	$6.50 * 10^{-5}$ V
	+/- 100 mV	$2.98 * 10^{-6}$ V	$6.00\ 3.16 * 10^{-6}$ V
	+/- 10 mV	$3.70 * 10^{-7}$ V	$1.10 * 10^{-6}$ V
UE9	+/- 5 V	$1.02 * 10^{-4}$ V	$2.88 * 10^{-4}$ V
	0-2.5 V	$6.44 * 10^{-5}$ V	$1.38 * 10^{-4}$ V
	0-0.125 V	$3.66 * 10^{-5}$ V	$7.20 * 10^{-5}$ V
	0-0.625	$1.62 * 10^{-5}$ V	$3.4 * 10^{-5}$ V

The on-board DAC should have precision similar to the +/- 5 V range. However, specific testing is still underway.

This issue represents the most significant consideration when using DASYLab for analog inputs. These measurements are still preliminary and, while we believe that this bug will not hinder most common projects, please be aware of these precision changes while using LabJack devices with this software.
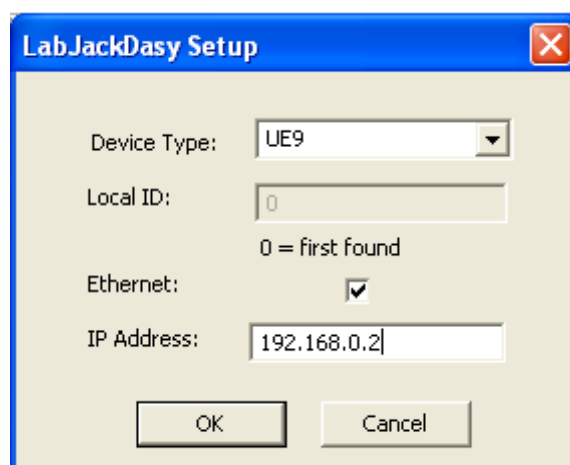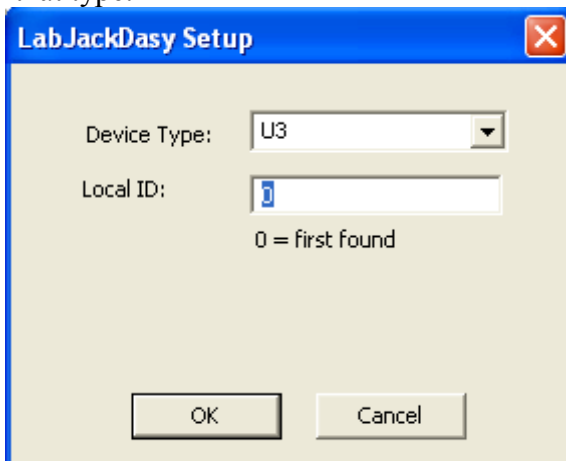
Open Device

The first found device of any type connected by USB is opened by default. To change the device in use by DASYLab

1. Open the Hardware Setup Dialog
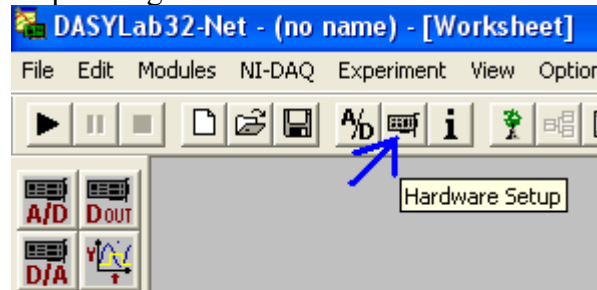
2. Select your device type and enter in the device's local ID or, if you are using an ethernet capable LabJack, the device's IP address. A local ID of zero will default to the first found LabJack of that type.

Configure Device

Each experiment defaults to a sampling rate of 10 Hz per channel with a "block size" of 4 scans, indicating that LabJackDasy will read each channel four times before giving those values to DASYLab. To change these settings, simply open the Experiment Setup dialog.
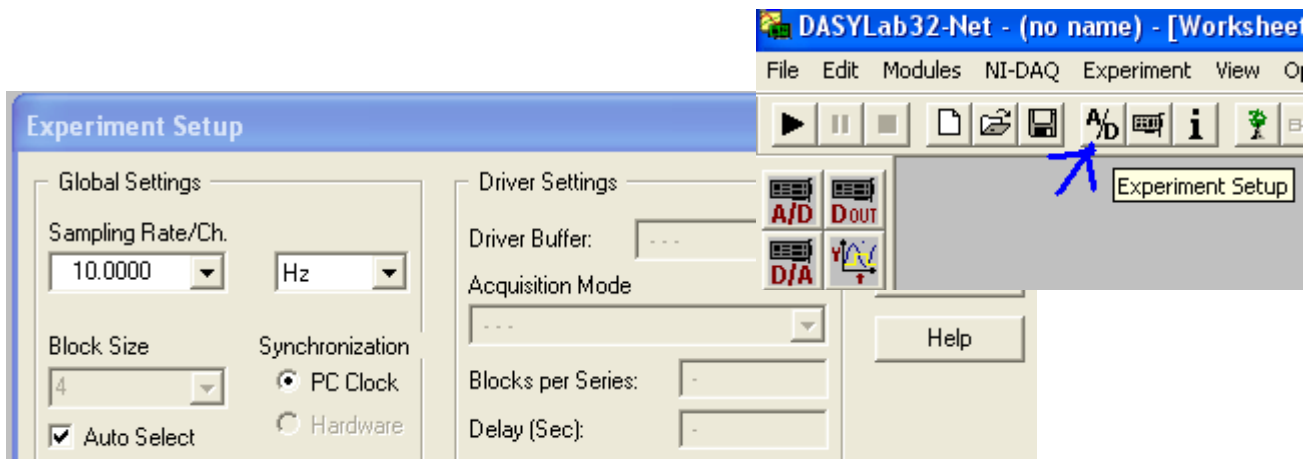
Note: The title (module name) displayed at the top of any module's icon can be changed by double clicking on that module.

Analog Inputs

Analog inputs in DASYLab are represented by the ADC input module ( ). Each module can hold 16 channels and, depending on your device type, you will be presented with a "Hardware Selection" dialog which will allow you to choose which to include. Please note that you may have multiple ADC modules per experiment.

Digital Inputs

Digital inputs in DASYLab can be used through the native digital input module ( ). DASYLab will still ask you which range of channels you would like to add but, because each FIO channel on a LabJack is only a single bit, each module can only hold an input one channel wide. However, like ADC modules, multiple digital input modules can be added.

Analog Outputs

LJ-TickDACs are not yet supported by LabJackDasy but on board DACs can be used through the native DAC output module ( ).

Digital Outputs

Digital outputs in DASYLab can be used through the native digital output module ( ). Like digital inputs, DASYLab will still ask you which range of channels you would like to add but, because each FIO channel on a LabJack is only a single bit, each module can only hold an output one channel wide. **Note: DASYLab currently requires at least one input (analog or digital) before you can add and use outputs.**

Stream Mode

The input frequency is given by the formula:

input frequency = sampling rate * (number of digital channels + number of analog channels)

where the sampling rate is set in the Hardware Setup dialog (see page 4). When this input frequency rises above 99 Hz, stream mode on the LabJack is automatically enabled. For more information on this feature, please consult the LabJack User's Guide (U3, U6, UE9).

Software Latency

DASYLab automatically attempts to artificially minimize its overhead while readings are gathered from the UD driver. However, in most setups, a low latency setting is appropriate. These latency settings are not controlled by LabJackDasy but can be manually set by the user by either lowering or raising the "block size" setting in the Experiment Setup dialog (see the section titled "Configure Device" on page 4). A higher block size corresponds with a larger latency.