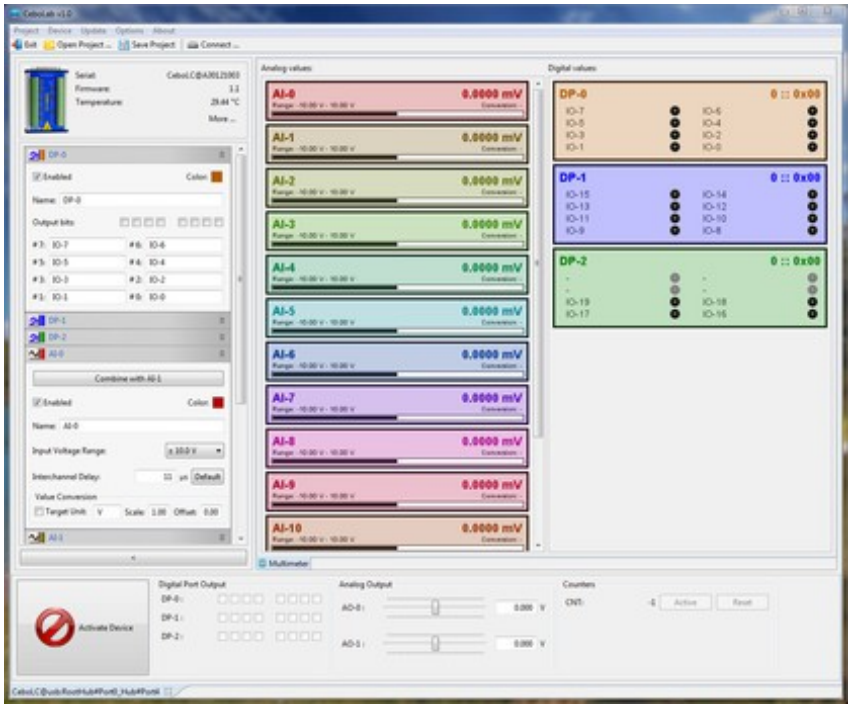
CeboLab

CeboLab is the application that lets you work with any CeboMsr compatible device without programming it directly. It offers many of the features that can be done using our API in form of a GUI application.

One of the major functions of CeboLab is to patch the firmware. This process is described at chapter “firmware update”.

For better understanding, the screenshot below shows how you can monitor all inputs of a CEBO LC device.



Features

General

- Update firmware.
- Handle multiple devices.
- Soft-disconnect device (Device is set to power up state until return to connected state).
- Watch device data (Serial number, temperature, firmware version).

Analog inputs

- Watch active voltage.
- Transform voltage to a different range using scale and offset.
- Select gain range and define interchannel delay.
- Define individual colors and labels used in the whole application.

Analog outputs

- Set active voltage.
- Digital I/O's - grouped in Ports:
- Set direction.
- Watch state (if input).
- Define state (if output).
- Define individual colors and labels used in the whole application.

Counter:

- Watch active value.
- Reset to zero.
- Enable or disable counter.

Application Example

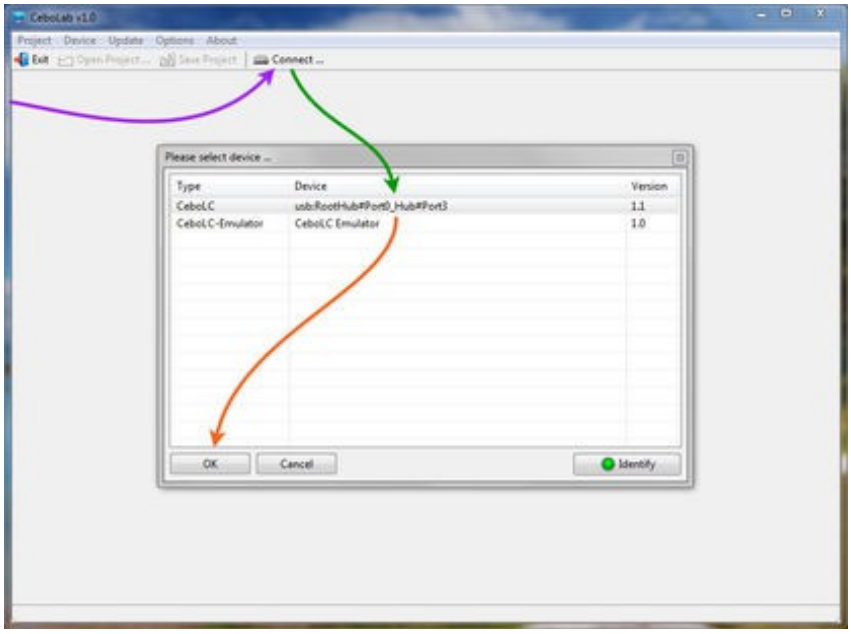
This example will show you how to reach the following goals with CeboLab:

- Monitor AI-0 and AI-1
- Combine AI-2 and AI-3 to differential and monitor it
- Monitor IO-0 - IO-3 and use IO-4 - IO-7 as output
- Set AO-0 to 3.5 V
- Set colors and names for AI-* and DP-*
-

The requirements are a complete installation and a connected device. Don't connect any peripherals to the device, at least yet.

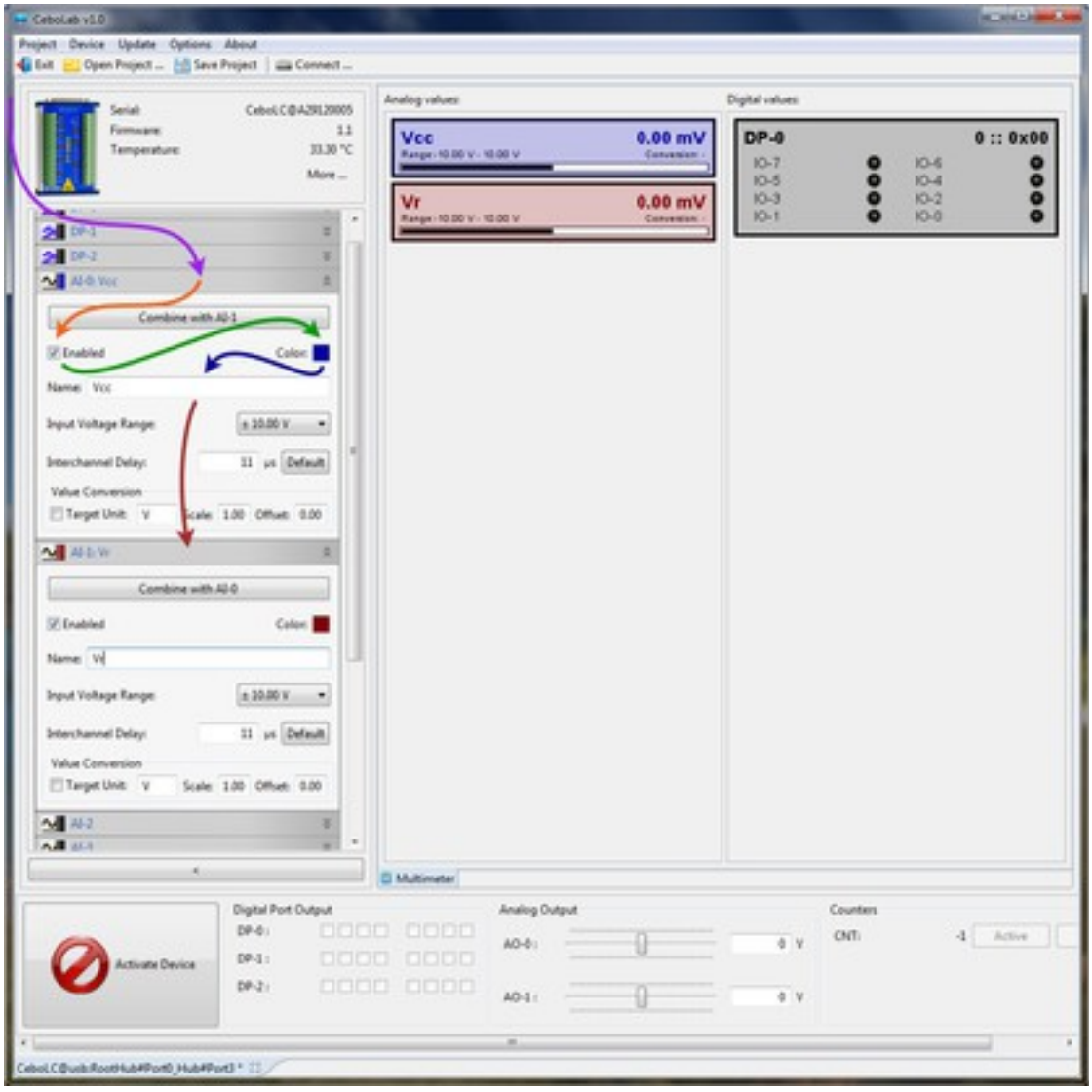
Connect to the device

Start **CeboLab**. Click on the **Connect ...** button, select your device and click **OK**.



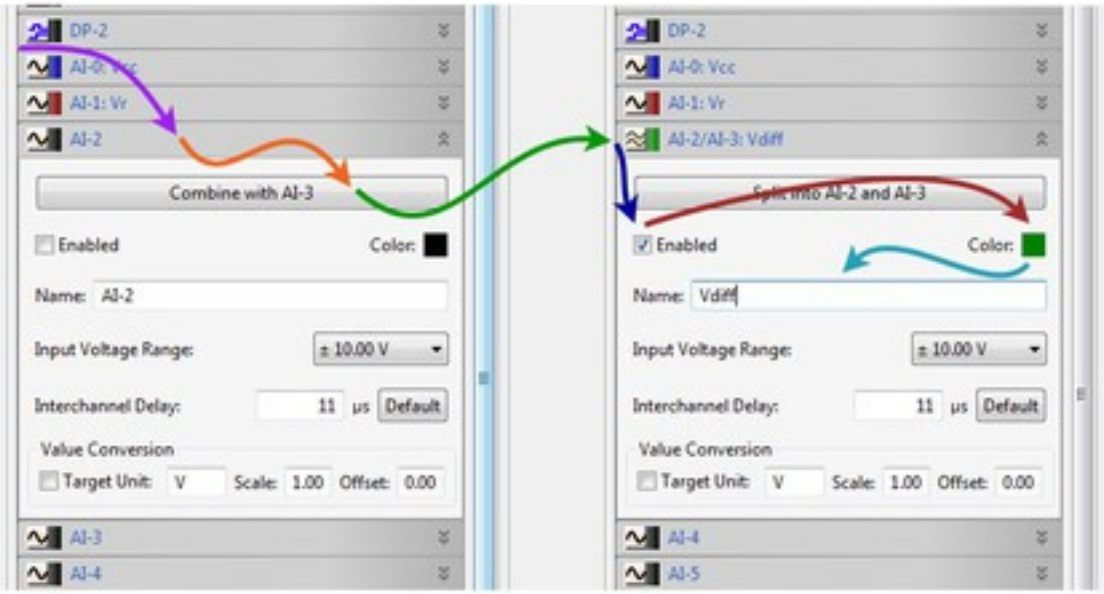
Monitor AI-0 and AI-1

Open the configuration panel for AI-0. Check that **Enabled** is active (should be for AI-0). Select a **Color** for this input. Give the input a name, e.g. **what** you measure. Repeat these steps for AI-1. See that colors and names are used in the display right of the configuration.



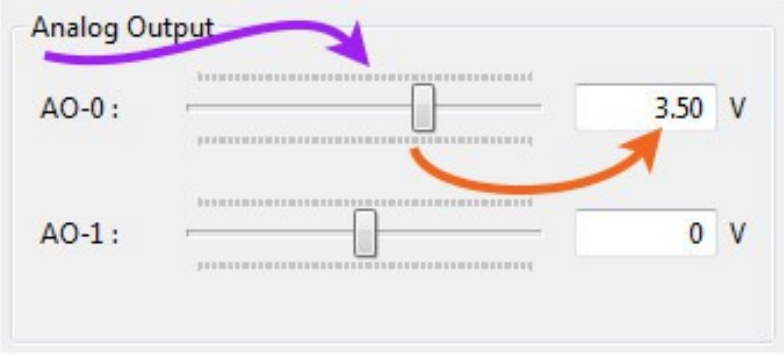
Combine AI-2 and AI-3 to differential and monitor it

Open configuration panel for AI-2 and click on **Combine with AI-3**. This will remove AI-2 and AI-3 from the configuration list and create a new panel, **AI-2/AI-3**. Click on **Enabled**, set a **Color** and give it a **Name**.



Set AO-0 to 3.5 V

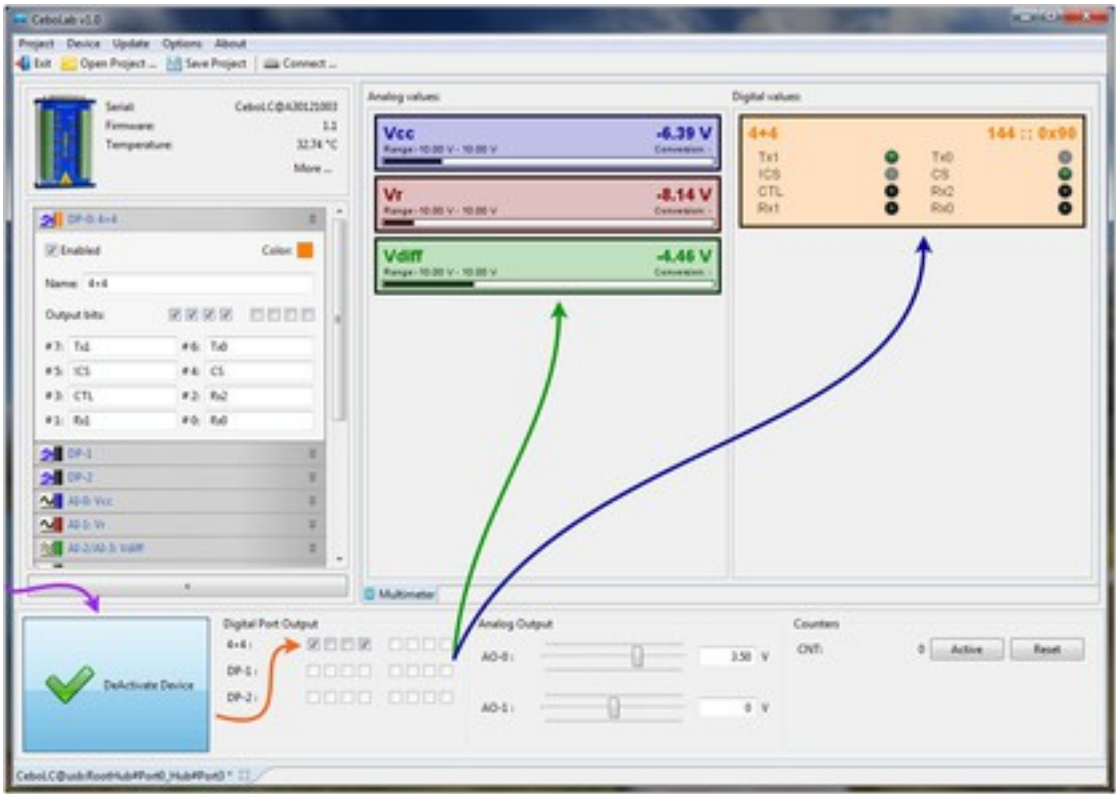
Either move the slider to 3.5 V or enter 3.5 in the input field. Confirm the value by pressing the **Enter** key. Be sure to use a dot **'.'** as decimal point.



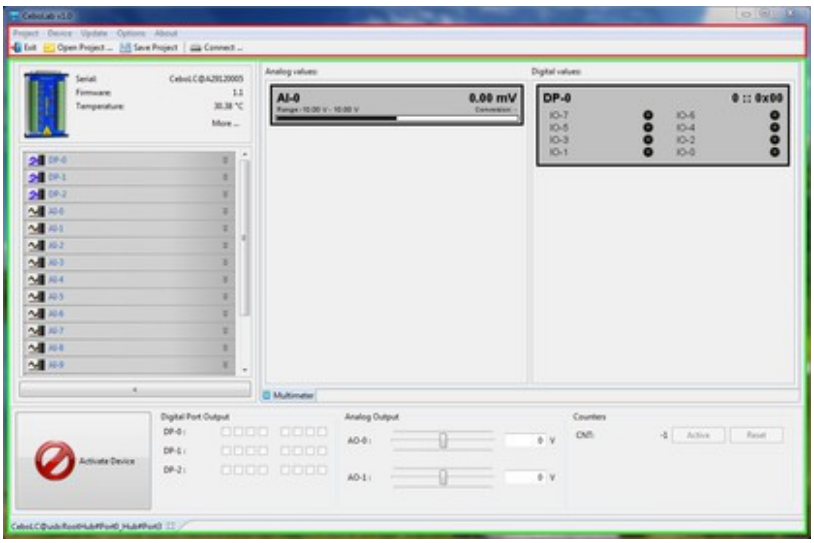
Activate the setup

The final and most important part is to Activate the device by clicking on the large button in the bottom left. Data is than actively communicated with the device. You can change settings like above in active state too !

Modify the output I/O's by setting the checkboxes in the Digital Port Output panel and watch the values in both multimeter panes.



Overview



The main view of CeboLab is split into two parts. The upper part, highlighted in red, is always visible. It is not directly bound to a specific device, but some functionality (e.g. Project) works with the active device.
The lower part, highlighted in green, is a large tab-area. Every connected device has its own tab. One device can only have one tab, no device can use more than one. Switching between the tabs does not change any behavior or state, it only sets the selected device into visual focus. Closing a tab drops the connection to the respective device and lets you open the device in a new tab or outside of CeboLab.

Project management

The project menu entry offers the usual application specific options:

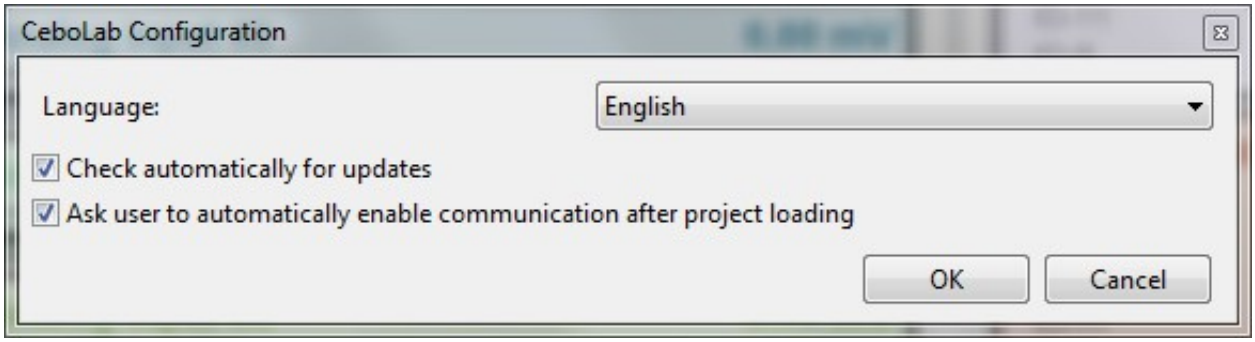
- Load
- Save
- Save as …

... of a project. A project means the settings on a specific tab. If you change any option: names, colors, input range, I/O direction … Projects can be used to store all these

settings.
After you've connected to a device, open your previously stored project and all settings are restored. You will be requested if you want activate the device after loading. Take a look chapter “activate button” to understand why this is necessary.

Configuration

The configuration dialog of CeboLab can be accessed selecting the **Options / Configure CeboLab …** menu items.



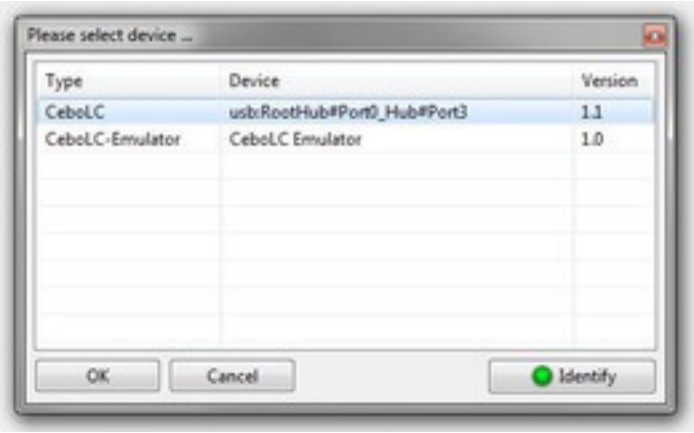
Language
Select the supported language that best serves you. New languages may be available in newer versions of CeboLab. After a new language has been selected, you have to restart CeboLab.

Check automatically for updates
If selected, CeboLab checks every time it is started for a new update. If one is available, you're forwarded to out website.

Ask user to automatically enable communication after project loading
If this option is enabled, you'll see a message box when loading a project. It will ask if you want automatically connect the device if loading is completed. If this option is disabled, the device must be connected manually. Read more about this topic in chapter “activate button”.

Connect to a device

Before you can do anything with a device, you have to create a connection with it. Select either **Device/Connect …** from the menu or click on **Connect …** in the tool bar. This will open the device browser. The contents of the list depend on the count of devices connected to the host.



Every entry contains three pieces of information:

- Type: The type of the device.
- Device: The identifier, build from the location it is connected to, unique.
- Version: The Firmware version.

If you've connected more than one device, use the **Identify** button to pulse the identify LED on the device. Select OK or double click on one of the devices to close the selection dialog and open the device.

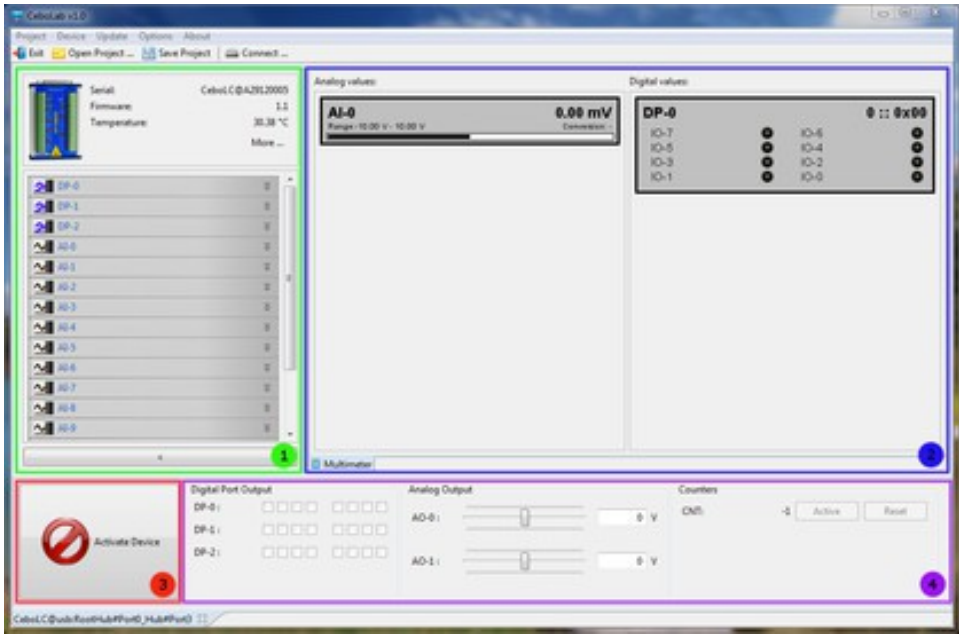
There could be different reasons why a device is not listed here:

- The driver is not installed.
- The device is already opened on a different tab.
- The device is opened in a different application.

The Emulator devices are always listed here. They are intended to users who want take a look at CeboLab, but don't have a device. An emulator device tries to act like a real device, which is possible only with limitations.

Device tab

Each device tab is responsible for exactly one device. A tab is opened when connecting a device and can be closed by clicking on the cross in the tab title. Each device that is opened in one tab is not available when connect to a new device or outside of CeboLab. The image below shows the different areas. These areas are outlined in the following sections.

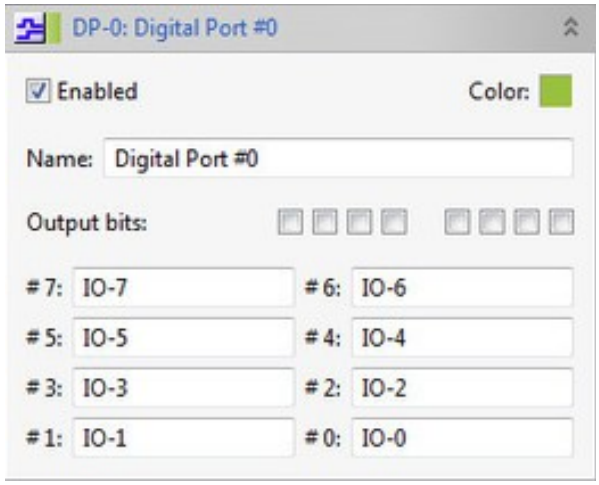


1. Information and configuration: This area shows all device relevant information in the upper part. The configuration of the individual peripherals can be found below.
2. Device data tabs: These tabs are used to display measured data in various ways. More tabs will be added in future versions.
3. Activate Button: If this button is deactivated, no communication with the device is done.
4. Peripheral control: Device components that have direct output options can be controlled here.

Information and configuration

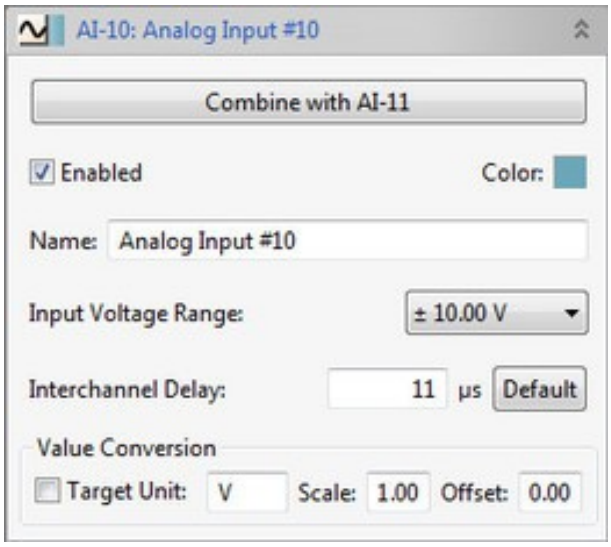
This section describes the top left area on a device tab.
The top part shows important information about the device that it represents. Clicking on the **More ...** button opens a dialog that shows additional information.
The area below holds the configuration to all device peripherals (those who have configuration options).
The header of each entry starts with an icon that represents the type of the peripheral. This icon has a colored area, which shows the color you can set for each individual peripheral. The title text contains the name of the peripheral and, if you've modified the name by yourself (which is explained later), the name you gave it. On the example screenshot, DP-0 has a greenish color and the user specified name "Digital Port #0".
Clicking on a header will open or close the configuration section of the respective peripheral. The options here are described in the subsequent topics. These options vary depending on the peripheral type.
The headers are dynamic. If you e.g. combine two single ended inputs into a differential input, both single ended inputs are removed and the differential entry is added. This can be reversed by splitting the differential input back to both single ended inputs.
The whole area can by minimized by clicking on the button at the bottom of the area. A small arrow button will than replace the area. clicking on it will show the area again.

Digital Ports



The **Enabled** checkbox is a global enable, so this ports state is displayed in CeboLab. By default, the first port is enabled after device connection. To display the state of the other ports, open their configuration and selected **Enabled**.
Right of **Enabled** is the **Color** setting. The default color is black. Click in the nearby rectangle to choose the color to use for this port in the whole UI. In the screenshot below, this is the green rectangle. The icon in the header will show the selected color as well.
The text area below let you choose an individual **Name** for this port. The **Name** entered here is used in the whole UI.
Below the **Name** field, the **Output** checkboxes can be found. Each I/O of the port has its own checkbox. The I/O's are listed from right to left. A selected checkbox means, the I/O is set to output, input otherwise.
The remaining text fields below let you name each individual I/O. Like the name of the whole port, the I/O names are use everywhere in the UI.

Analog Inputs



The button at the top of the configuration is used to combine single ended inputs into one differential, or split the differential input back into single ended. Options of the individual single ended inputs and the differential input are **not** shared (e.g. name, color, input range).
The **Enabled** checkbox let you choose if the individual analog input is visible in the UI. By default, the first single ended input is

enabled, while the others are disabled.
The color that is used for this input in the whole UI can be changed by clicking on the colored rectangle right of the label **Color**. The color is shown besides the icon in the header as well.
Below these settings, a **Name** for the input can be specified. This **Name** is used everywhere in the UI.
What follows is the **Input Voltage Range**. This range can be modified by selection a different entry in the combo box right of it. This setting affects the following setting as well. Different **Input Voltage Ranges** may have different **Interchannel Delay**'s. Selecting a new range modifies the value in the text field below to the default **Interchannel Delay**. You can set the value to default as well, if you click on the **Default** button, next to the input field.
The subsequent settings work together. If the **Target Unit** checkbox is selected, the analog input's measured value is scaled according the the following settings. It is first scaled using the value in the text box near **Scale** and the **Offset** value is added to the result. The sum is than decorated using the text in the input field near **Target Unit**. This feature can easily be used to actively transform an input voltage to a new value space.

Device data tabs

These tabs occupy the largest space inside the UI, as they are the most important part. The current release contains the Multimeter tab only, but other tabs are already in planning. Only one tab can be active at a specific time.

Multimeter

The multimeter tab shows the voltages of all enabled analog inputs, as well as the level of the I/O's of each enabled digital port. The display is split, while the left part shows analog inputs, and the right part digital ports. The colors and names used for display are the one you can set in the config of analog inputs and digital ports. Here's a screenshot:

The analog display is very self-explanatory. Left is the name of the input and on the right, the active voltage is displayed. The **Range** on the left shows the active input range. If value conversion is used, the range is fixed as well. In this case, the active conversion is shown next to **Conversion**. The bar at the bottom of each input shows the position of the current value inside the current range.

The digital port output shows the user defined name on its top left as well. The right top region displays the digital value of the ports I/O's in decimal as well as hexadecimal.

The LED's in the lower part display the state of each individual I/O encoded as follows:

- black: I/O is input, low level
- green: I/O is input, high level
- grey: I/O is output, low level (or not available)
- dark green: I/O is output, high level

Activate Button

The activate button is a very important element of CeboLab. Its primary intention is to prevent damage to periphery connected to CEBO devices.
As an example: A stored project contains the information that IO-0 is set as output and its state is high. After some time you connect IO-0 to a different periphery and configure it as input. If you now accidentally load the older project, IO-0 is set to output and driven to high level, this may damage the periphery that is connected to this I/O now.
The procedure is now as follows: After a fresh connect to a device or after loading a project (*), the device is in deactivated state, no communication is done. You can freely adjust all device peripheral settings. If you than click on this button, the connection is established, outputs are configured and set.

So please remember: If this button is deactivated, nothing will really be done with the device.

*Loading a project will ask you if you wan't auto connect after loading. In this case, you don't have to click on this button explicitly.

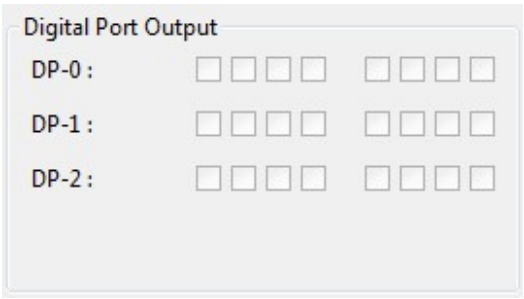
If the button looks like this, no communication is done, the device is is power-up state.

If the button looks like this, the device is used, every setting is directly transferred to the device and active.

Peripheral control

This area contains elements to control various device peripherals.

Digital Port Output



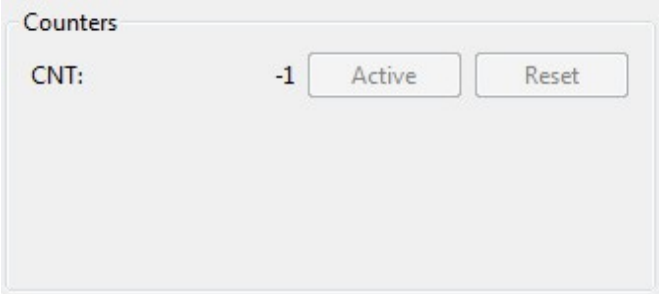
This panel offers a checkbox for each digital I/O. Activate one of the the boxes, sets the respective I/O to high, while a deselected checkbox means that the I/O is low.
This all depends on the I/O direction. If the I/O is set to input, its checkbox in this panel is deactivated. You have to set the I/O as output, before defining its state. This can be done in its configuration panel, take a look chapter “digital ports”.
The device must be activated as well !

Analog Output

The output voltage for each of the devices analog outputs can be set here. Either move the slider to the required level or if you need to set an exact value, write the voltage value directly to the input text boxes. The value is than set when pressing enter or the input field looses its focus.
If an invalid value is entered, the input fields get a red background, correct the values in this case. Use a dot **'.'** as decimal point everywhere in CeboLab.
Important: Don't forget to activate the device.

Counters

The counters section display the values of all counters a device supports. In deactivated state, the counter value is shown as '-1'. The **Active** toggle button next to the value must be enabled if the the counter should count events. Clicking the **Reset** button sets the counter back to zero.



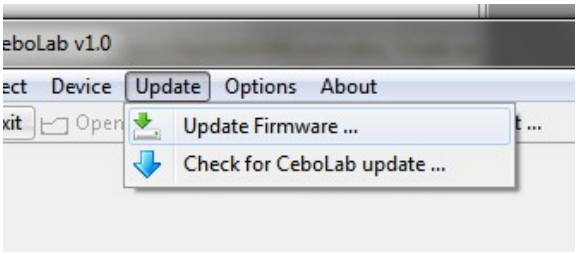
Firmware Update

You can update the firmware using CeboLab very easily. The latest version can be found in the downloads area.

Regarding the version compatibility: The major number of the API must be greater or equal to the major number of the firmware. If the major number of the firmware is higher than the major number of the firmware, you have to use a newer API. If the major number of the API is greater than the major number of firmware, some API functions may not be available.

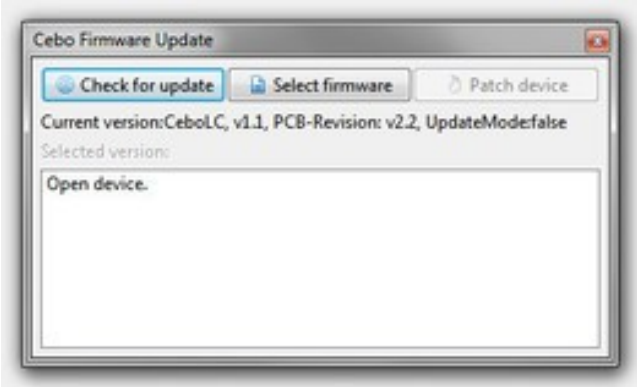
To start the update process, plug the device to your computer as usual. Open CeboLab. Check if the device isn't used by CeboLab or in any different application, it can't be accessed otherwise.

Select **Update Firmware …** from the menu as shown on the right.



What follows is the device selector on the left. It lists all candidates for an update. Select the device to update and continue by clicking **OK**. If you have connected more than one device, use the **Identify** button. Clicking on this button turns off the identify LED for 500 ms.

The following dialog lets you choose the previously downloaded file by clicking **Select firmware**. If the file doesn't match your device, you'll get an error message. Otherwise, the button **Patch device** will be enabled. Click it to complete the patch. The patching process itself is very short and you should get a success message box if no error occurs. The device will reconnect itself twice during this process, this is necessary.



If something fails, please try it again. The device will stay in update mode, until the new firmware is downloaded successfully.

You can use the device after patching it directly without reboot or restarting CeboLab.

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Revision history

v1.0		Initial release.
v1.1	April, 28 2014	Layout, Header, Footer modified

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