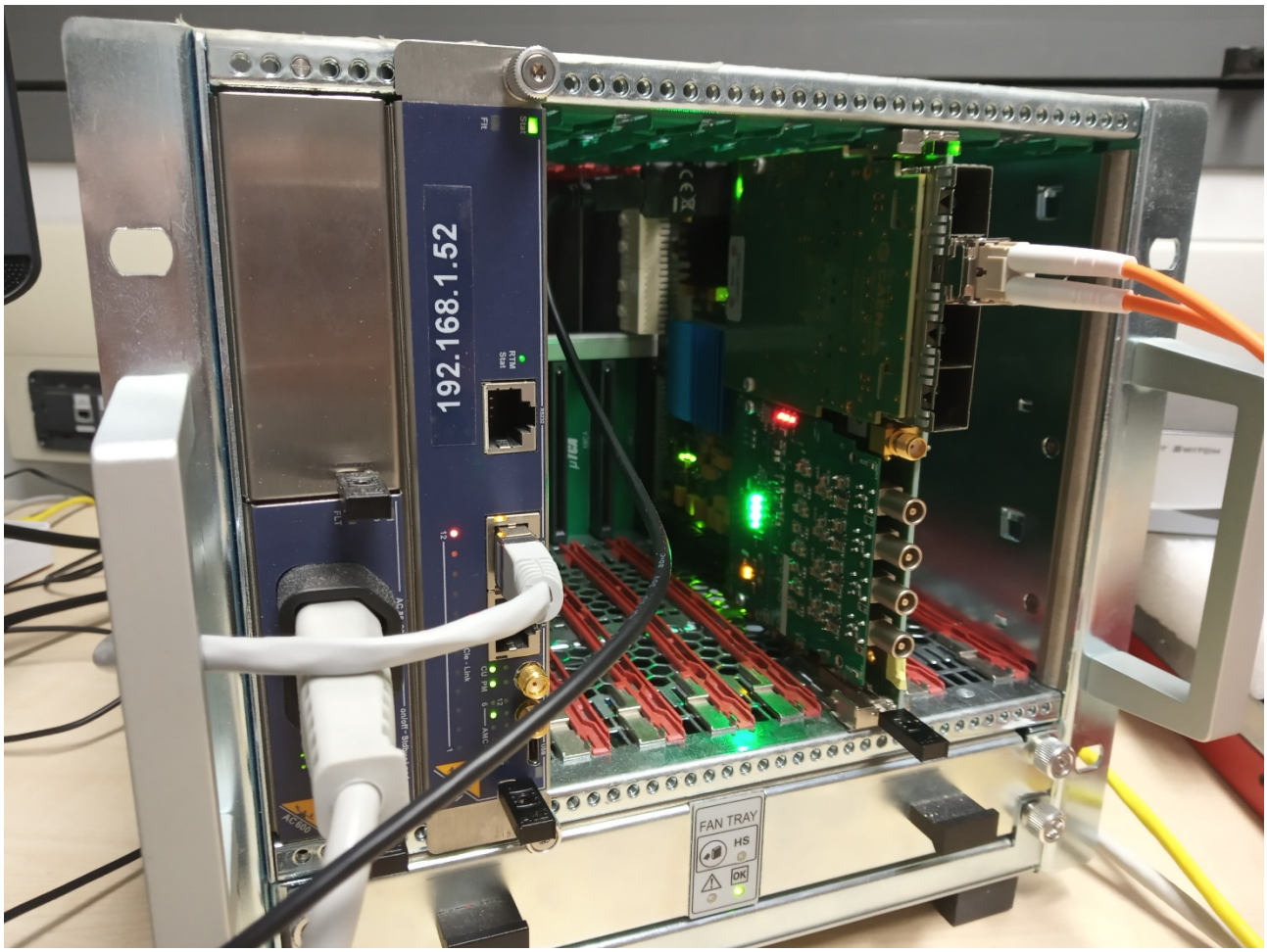
Quick Installation Guide

MTCA.4

Hardware Setup:

Mount the DAMC-FMC25 as shown in the picture.



Use only the second SFP connector from the TOP as shown in figure.

Connect the other end of the optical cable to the SFP1 input of the first FAST-PS.

To build up the daisy-chain, connect the SFP2 output (of the first FAST-PS) to the SFP1 input of the second FAST-PS, and so on.

DAMC-FMC25 Firmware:

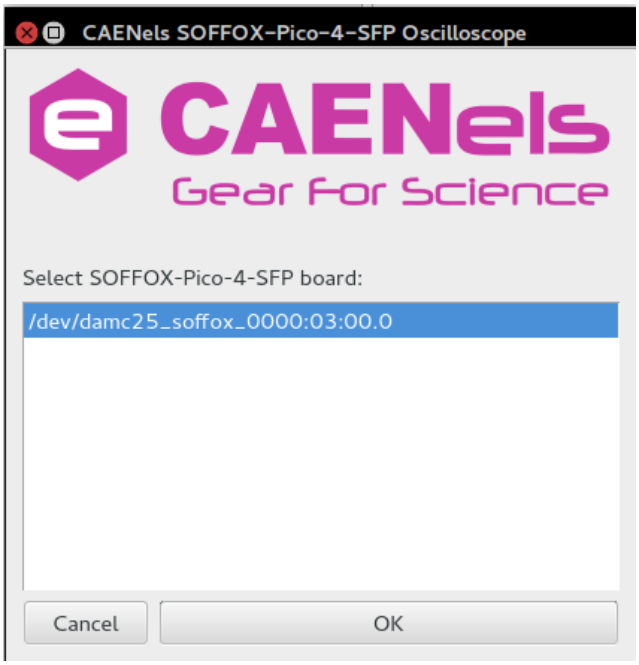
Install the firmware on the DAMC-FMC25 following the instructions in the README.md.
Power-cycle the DAMC-FMC25 at the end of the procedure.

DAMC-FMC25 Driver:

Follow the instructions in the README.md. Install and load the driver.

Software (Oscilloscope):

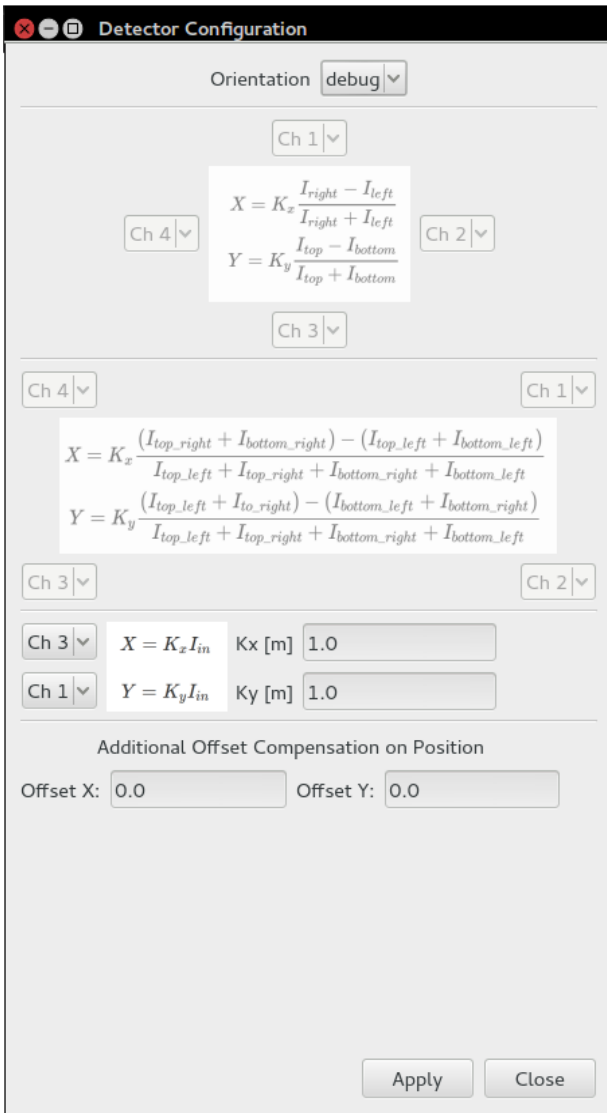
Follow the instructions in the README.md.
The Oscilloscope is a PyQt5 application.
When you run the application you should see this:



Select the card and press OK.
If the driver works correctly you should see the current readings, as follows:

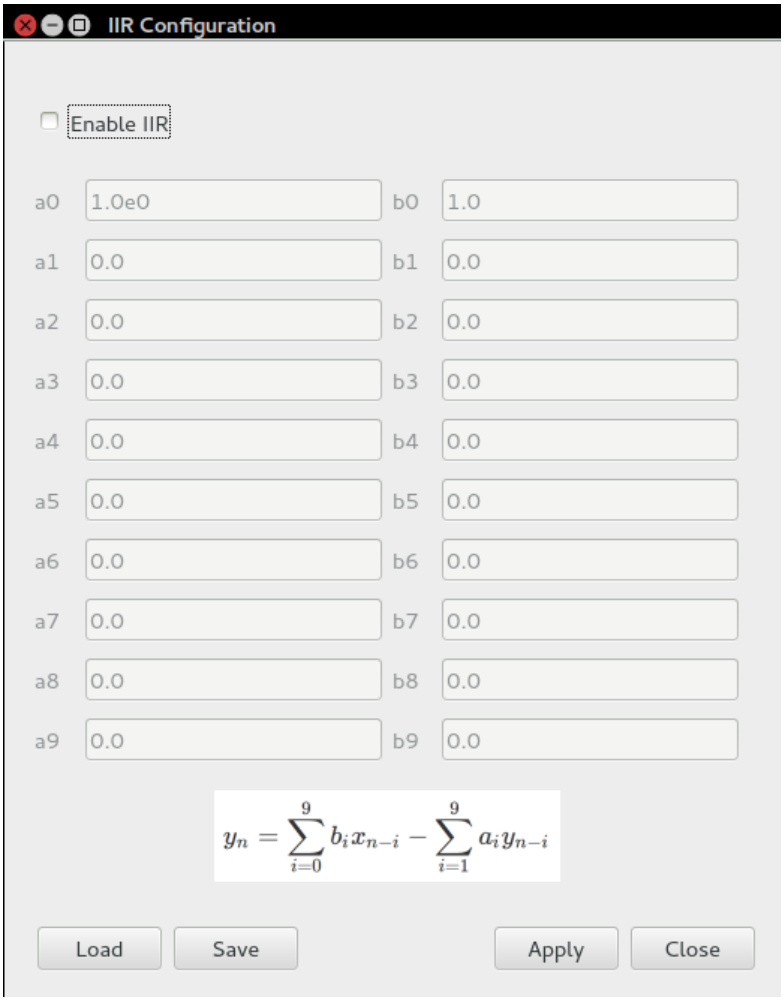
As you can see from the picture the Oscilloscope is showing 7 outputs: the 4 channel readings (Ch 1, Ch 2, Ch 3 and Ch 4), the X and Y positions (Pos X and Pos Y) calculated from the 4 channels and the output of the IIR filter applied only on the Y position (IIR(Pos Y)). The IIR(Pos Y) is the IIR output before the multiplication by the power supply scaling vector.

Detector Configuration:



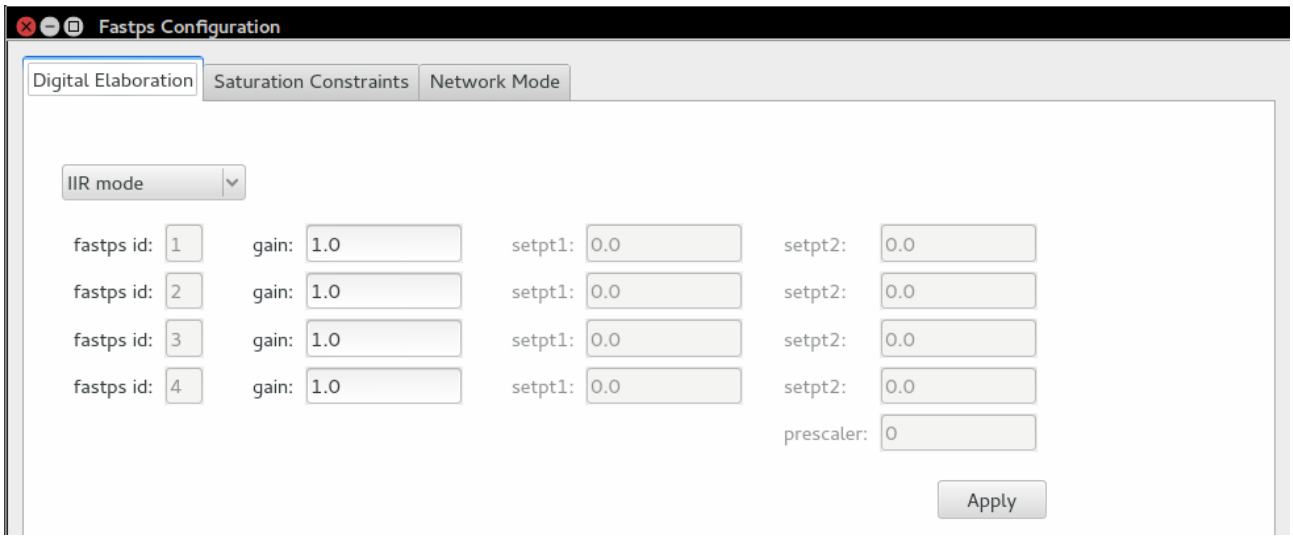
From the *Detector Configuration* tab it is possible to select the type of detector connected to the picoammeter. It is also possible, for debug purposes, to select the debug orientation. In this case X and Y positions are just a replication of the selected input channel current (Ch 3 and Ch 1 in the picture), multiplied by a configurable constant gain (Kx and Ky). This operation mode is useful to debug the IIR filter, for example by applying a known signal at the selected channel input and monitoring the IIR output.
Additionally it's possible to add a constant offset to X and/or Y positions.

IIR Configuration:



From the *IIR Configuration* tab it is possible to enable the IIR filter and set the coefficients. It is also possible to import the coefficients from a text file (an example can be found in /iir_filter/lowpass_100Hz.txt) and export the coefficients into a text file.

FAST-PS Configuration – Digital Elaboration:

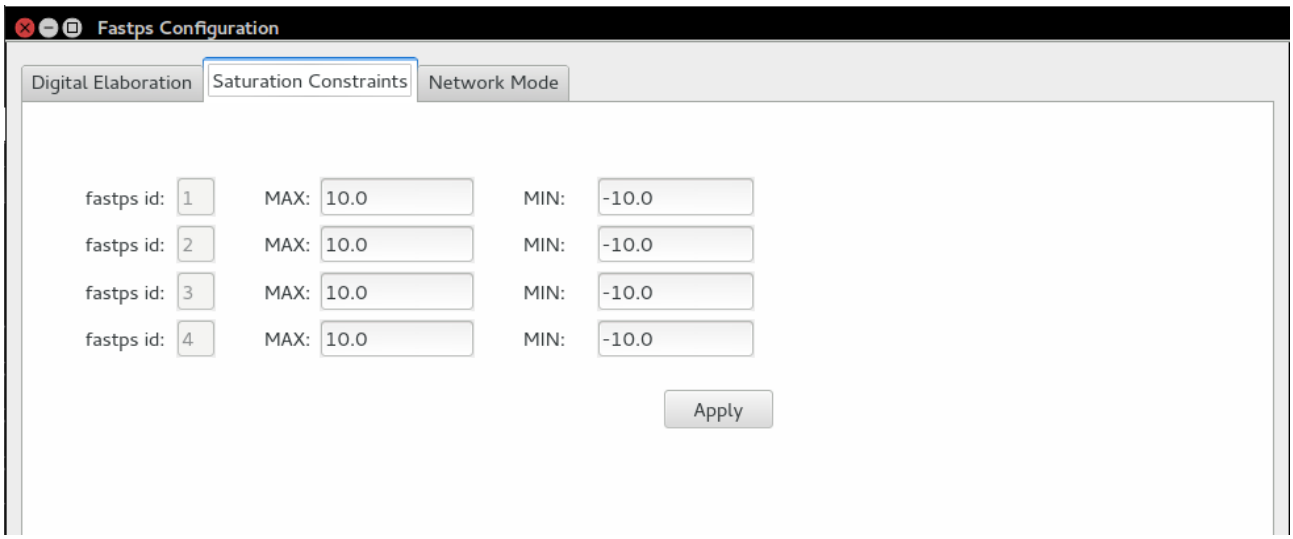


From the *Fastps Configuration – Digital Elaboration* tab it is possible select 3 different operation modes:

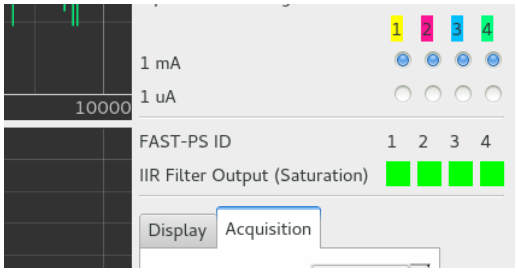
1) **IIR mode**: Default configuration. In this operation mode the IIR output is multiplied by 4 different gains resulting in 4 setpoints. Each setpoint has an associated FAST-PS identification value (*FAST-PS id* in the picture). The 4 setpoints and their associated FAST-PS ids are encapsulated in the UDP packet and sent through the SFP transceiver. The gains are configurable. Each FAST-PS unit filters the UDP packets and recognizes a setpoint as valid only if the identification value matches the FAST-PS ID of the correspondent unit (the FAST-PS ID is configurable by using the *Web Interface*[1] on each FAST-PS unit). In this operation mode the IIR filter works at 100 KHz, meaning that one UDP packet (i.e. 4 setpoints) are sent every 10 us.
2) **Constant Voltage**: in this operation mode it is possible to apply a configurable constant voltage value to the FAST-PS units (*setpt1* in the picture). In this case the setpoints are sent every 0.5 s. This operation is for debug purposes.
3) **Square Wave**: in this operation mode it is possible to send a square wave to the FAST-PS units, by changing *setpt1* and *setpt2*. The frequency of the square wave is adjustable with the *prescaler* (f=125MHz/*prescaler*), the duty cycle is 50% fixed. This operation is for debug purposes.

1 Since FAST-PS firmware version 1.5.15 the Visual-PS has been replace by the so called *Web Interface*. The FAST-PS are controlled and configured by typing the correspondent FAST-PS IP address on a browser (default is 192.168.0.10)

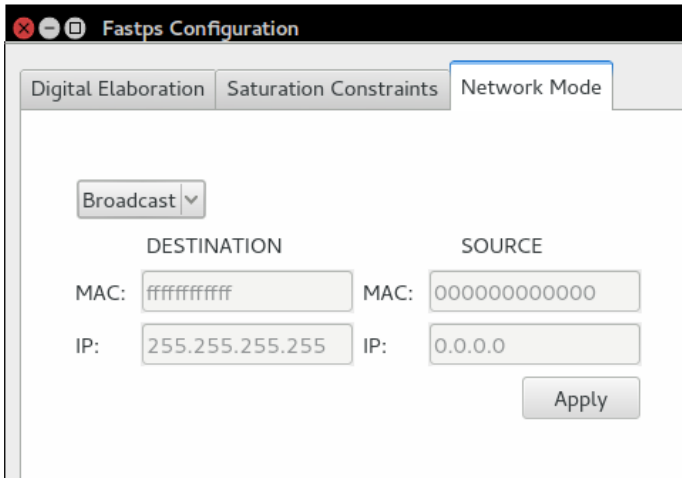
FAST-PS Configuration – Digital Elaboration:



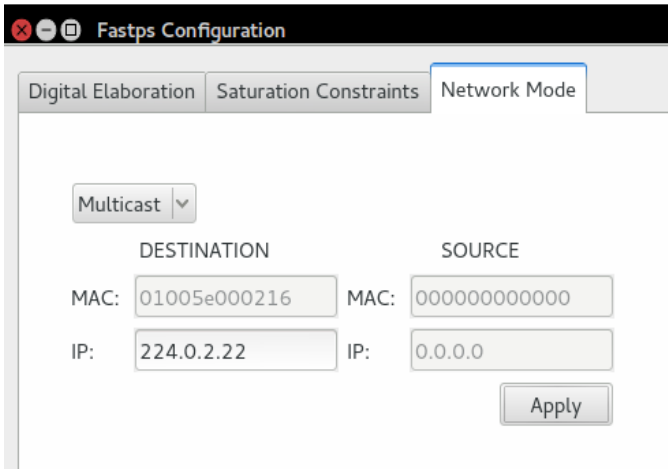
From the *Fastps Configuration – Saturation Constraints* tab it is possible to set the saturation limits. These maximum/minimum output limitation are applied to the FAST-PS setpoints (after the multiplication of the IIR output by the power supply scaling vector). Default values are +10/-10. Measurements units are not indicated because they depends on the FAST-PS output configuration, current or voltage. The GREEN square icons on the main window will become RED when the saturation limits are exceeded.

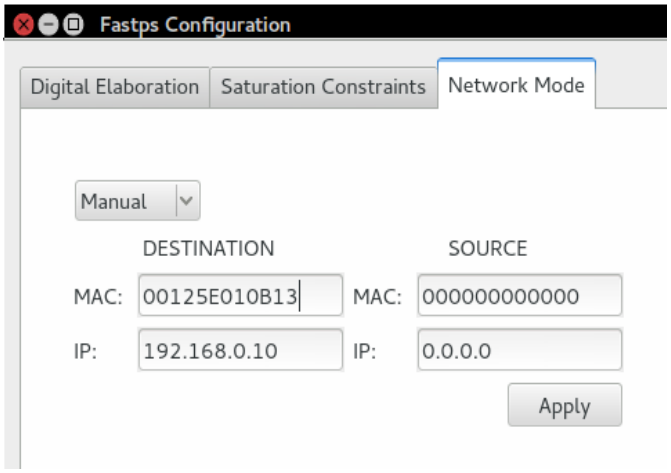


FAST-PS Configuration – Network Mode:



The *Fastps Configuration - Network Mode* tab is used to configure MAC and IP addresses that are part of the UDP IPv4 packet containing the setpoints that are sent to the power supplies.
Available configuration are Broadcast, Multicast and Manual. When Broadcast is selected all the addresses are pre-configured. When Multicast is selected the Multicast IP address has to be indicated. For our FAST-PS we use "224.0.2.22" as multicast ip address. When manual configuration is selected, the user can play with all the parameters.
If you connect everything using an Ethernet Switch equipped with SFP transceivers, it is important to setup also the MAC source and IP source.



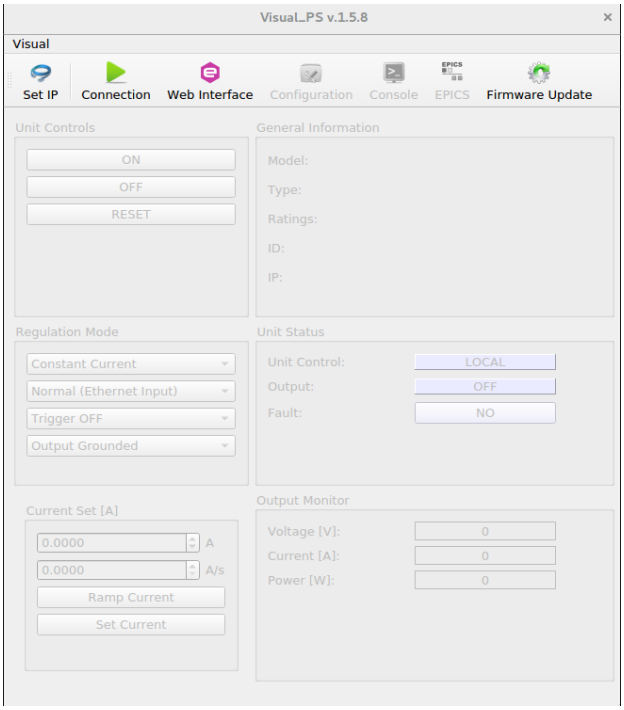


POWER SUPPLIES

FAST-PS Firmware:

Connect the FAST-PS unit with an Ethernet cable to a PC and install the last firmware version (>= 1.5.22) on the FAST-PS.
If your FAST-PS has a firmware version < 1.5.15 you need the Visual-PS to update the firmware. Instead, from firmware versions >= 1.5.15 we suggest to use the *Web interface*, since the Visual-PS will no longer be updated in the future releases.
The last firmware can be found at: http://support.caenels.com/caenels/repos/apps/
or directly here:
http://support.caenels.com/caenels/repos/apps/common/com.CAENels.PowerSupply.firmware.standard_stable/1.5.23Firmware_PS.7z

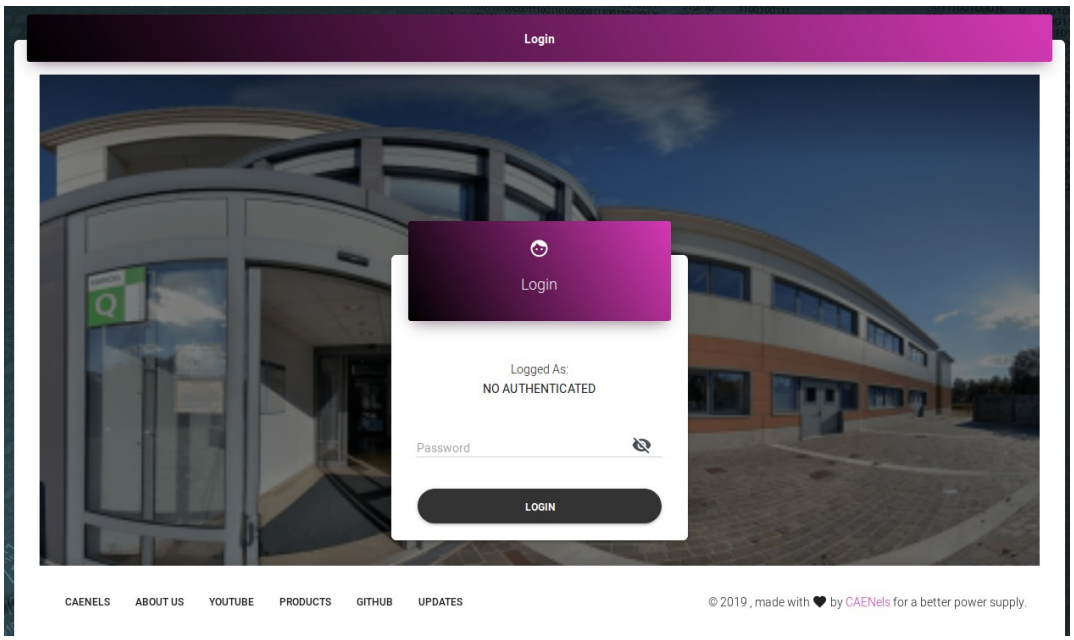
1) Update by Visual-PS:



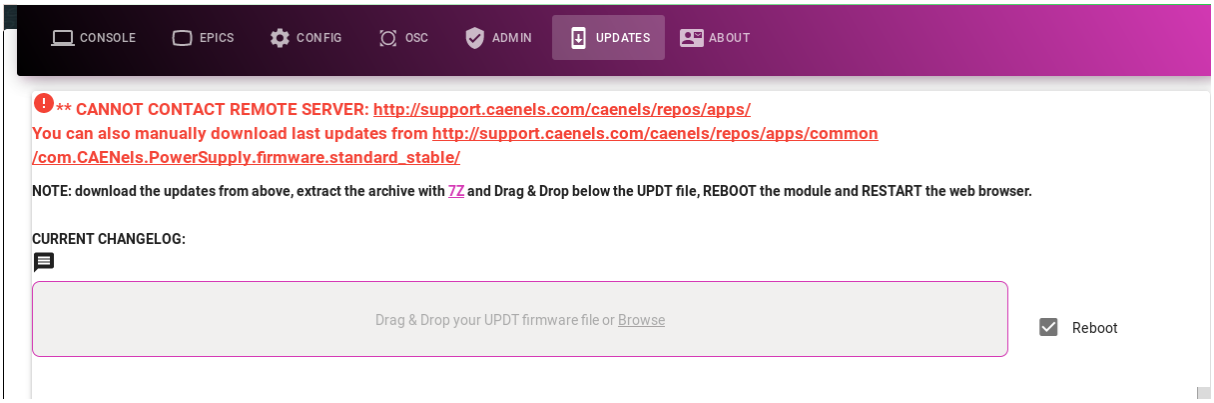
Click on the “Firmware Update” icon to and select the “.updt” file.

2) Update by Web Interface:

Open a browser on “http://192.168.0.10”. You will be prompted to insert a password. 2 users ara available password “user” (basic operation) and password “ps-admin” (advanced operation). This operation can be performed with both users.



After the login go to the “Updates” tab and follow the instructions to update the unit. The Update will be performed automatically followed by the reboot of the unit. **Important**: restart the web browser after the reboot.

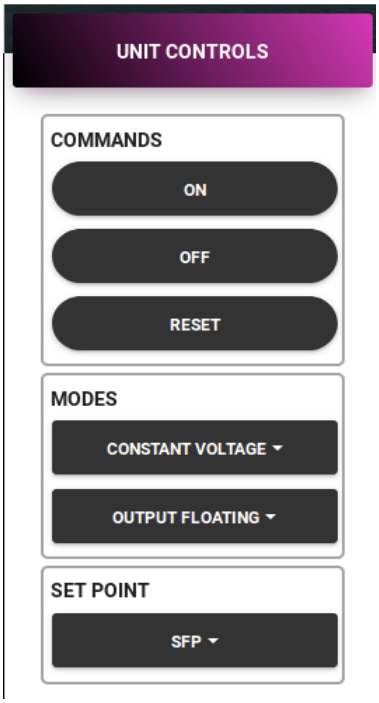


Communication check:

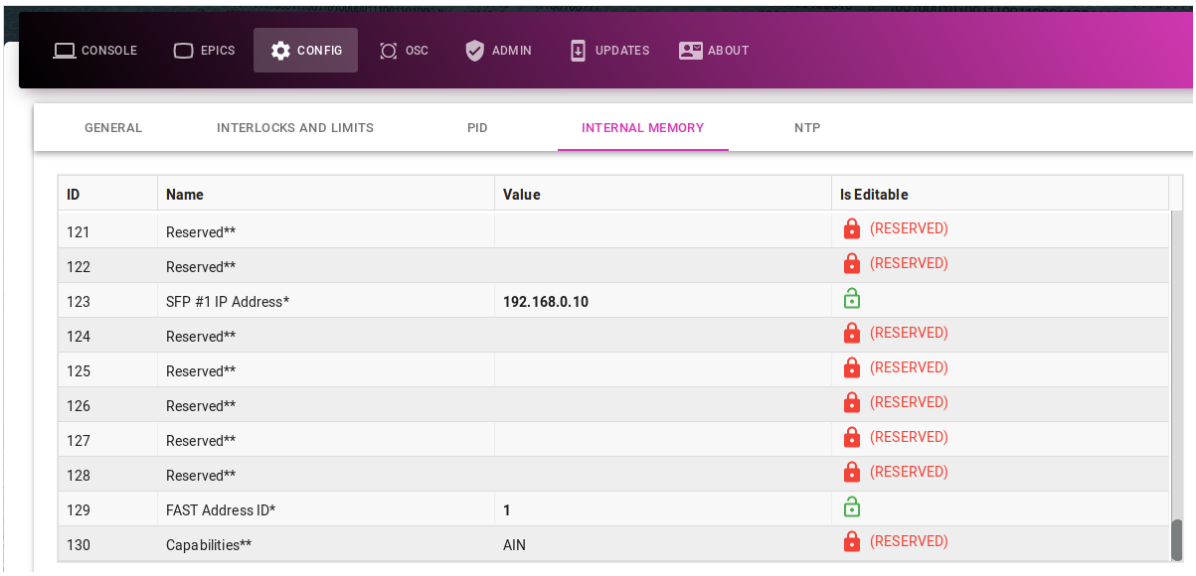
To check if the communication between the DAMC-FMC25 and the FAST-PS we will use the “OSC” (oscilloscope feature) available on the Web Interface, with the FAST-PS in “OFF”

Access as “ps-admin” on the Web Interface:

1) On the main page set “SETPOINT” to “SFP” ,
2) set “MODES” to “Constant Voltage” if you want to interpret the SPF setpoint as voltage in [V] or instead “Constant Current” to interpret the SFP setpoint as current in [A]
3) **Be sure NOT to switch ON the power supply**



4) Set the FAST-PS ID to “1” (from the Web interface → tab “Config” → “Internal Memory”)

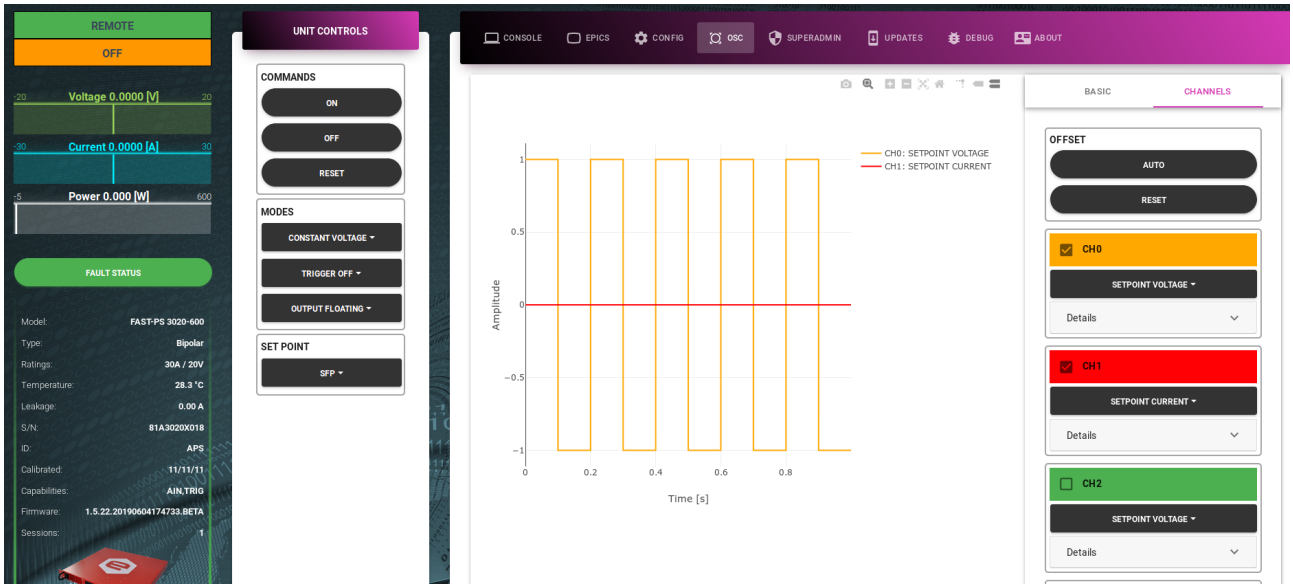


On the Soffox Oscilloscope:

1) Set the “Detector Configuration” to “Debug”
2) Set the “Network Mode” to Broadcast,

3) Check the “Saturation Constraints”
4) Set the “FAST-PS Configuration – Digital Elaboration” to “Square Wave”.
5) Set the “setpt1” (correspondent to the FAST-PS with ID “1”) to -1 and “setpt2” to 1, with a prescaler of 12500000.

At this point open the Web Interface Oscilloscope (“OSC”), and check the quantities “SETPOINT VOLTAGE” (or “SETPOINT CURRENT”)



At this point, the user can play around with all the Soffox Oscilloscope configurations and check the FAST-PS “SETPOINT” output on the oscilloscope **without switching ON the power supply.**

Useful Information:

1) Be aware that DAMC-FMC25 is continuously sending UDP packets once the SFP connection is established, independently of the Soffox Oscilloscope.
2) The power supplies in the Daisy-chain must have FAST-PS ID 1, 2, 3 and 4. These FATS-PS address are hard-coded in the UDP packet in the current implementation.
3) To reset the IIR filter if it goes in saturation, disable and enable the IIR filter.