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## Dual AC voltage source – DualDAC 3

**Two-channel audio frequency ultra-stable arbitrary wave generator**



**Operation manual v0.1**

## ***Description and introduction :***

See separate specifications document.

## ***How to get started:***

- 1) Connect your DualDAC 3 (DD3) unit to external 18V dc voltage supply using 2-pole 5.08mm terminal block delivered with the unit. Customer should make own twisted-pair cable using wire sized between 12-24 AWG (1 – 2.5 mm<sup>2</sup>). The current consumption is about 1A. Use e.g. 1.5A current limit in your power supply. Make sure that the power switch at the rear panel unit is in OFF position. Check that the polarity is as depicted in rear panel.



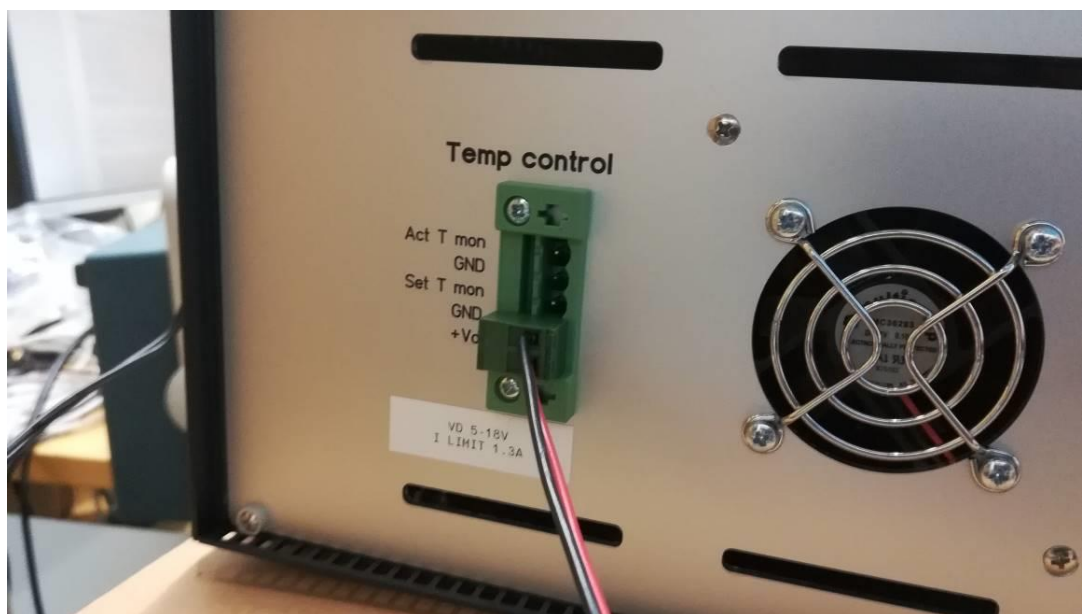
- a. Place your unit on a table and prepare an oscilloscope next to your unit. Connect GPIB cord to controller unit. We recommend using National Instruments' GPIB-USB-HS adapter.



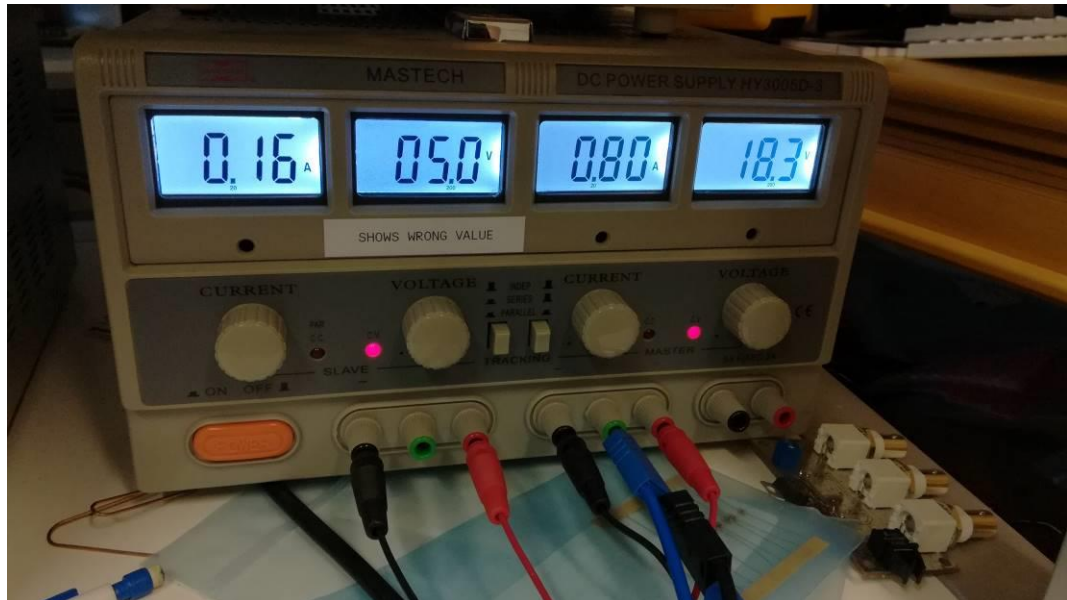
- b. Power up the optical-to-TTL converter a.k.a. fibre receiver using the ac/dc wall adapter (12V / 0.5A) delivered with the unit. Green led should indicate operation. Connect optical fibre between fibre receiver and sync out connector of controller unit.



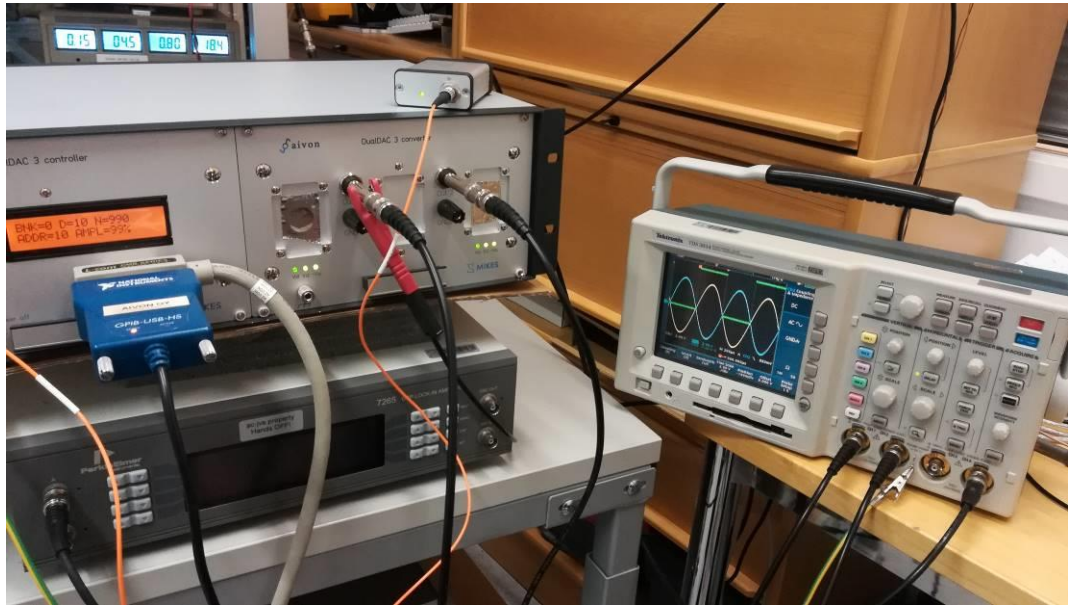
- c. Temperature control is based on PTC2.5K-CH controller by Wavelength Electronics Inc. Please see full details from manufacturer's datasheet. Connect twisted pair cable (provided by user) from temperature control rear panel connector (5-pole 5.08mm terminal block, wire size 12 – 24 AWG) to unipolar power supply +5V. Only two poles are needed while the remaining three can be used to monitor actual and nominal setpoint. (If fact, you can also use a 2-pole terminal block as in figure below.) Set possible current limiter to 1.5A. To achieve temperatures deviating significantly from factory set point of about 37C the user should increase the supply voltage up to maximum of +30V. Before doing this, please consult PTC2.5K-CH datasheet.



- d. Connect possible external optical 10 MHz source. **Always make sure that power is turned off when replacing this connector. If the clock signal is discontinued, the firmware in the controller unit can get damaged and the unit has to be reprogrammed by Aivon.**
- 2) Turn on the DD3 power switch in rear panel and make sure that the current consumption is about 1A without fan. Turn on fan if needed.



- 3) Temperature controller supply: in standard laboratory environment the current should start with preset limiting current value (about 1.3A) because the controller tries to reach the factory set point of 37C. Within few minutes the current should saturate to less than 0.3A as the unit reaches its set point and the DD3 electronics dissipation provides most of the heating power. The user can check the temperature set point by measuring voltage at rear panel connector. Factory set point is 0.6V corresponding to 37C. The actual temperature of the internal temperature sensor can be measured from rear panel connector. Contact Aivon to get a table of voltage-to-temperature dependency.
- 4) Connect a BNC cable between optical-to-TTL converter and oscilloscope and make sure that there is a 5V square wave with frequency of about 1 kHz. You can use this signal to trigger later your output waveforms in oscilloscope. This sync signal can be used as reference in lock-in amplifier measurements.

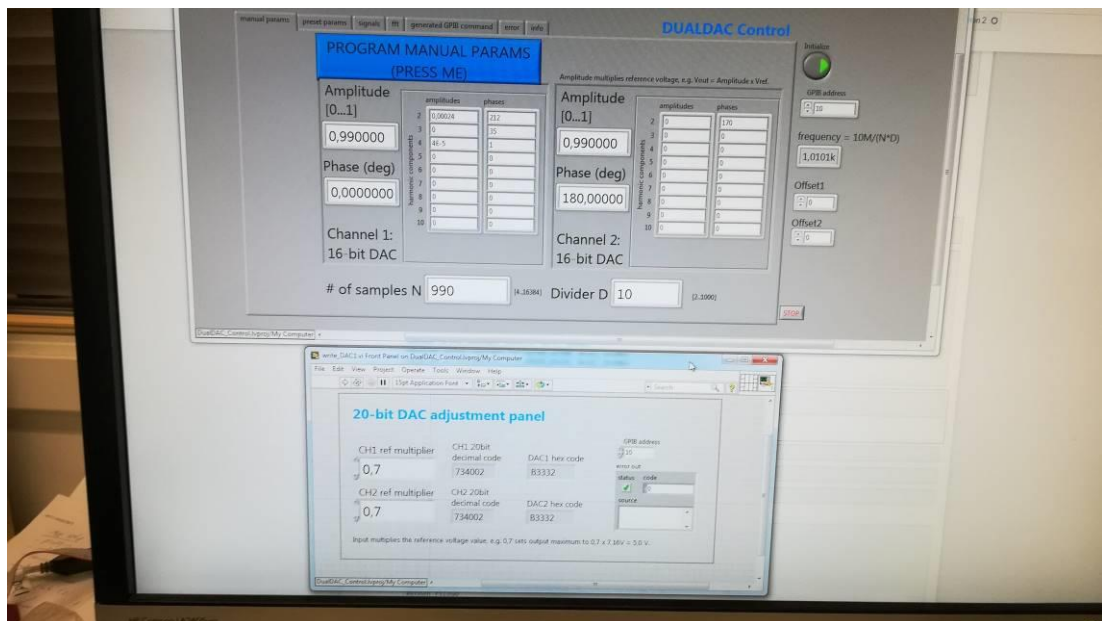


- a. Ask for a free DD2015 software package from Aivon and unzip it to your computer. Using LabView open the DD2015\_Control.lvproj LabView project. Open files DualDAC\_Control.vi and write\_DAC1.vi and check that the GPIB addresses are 10.

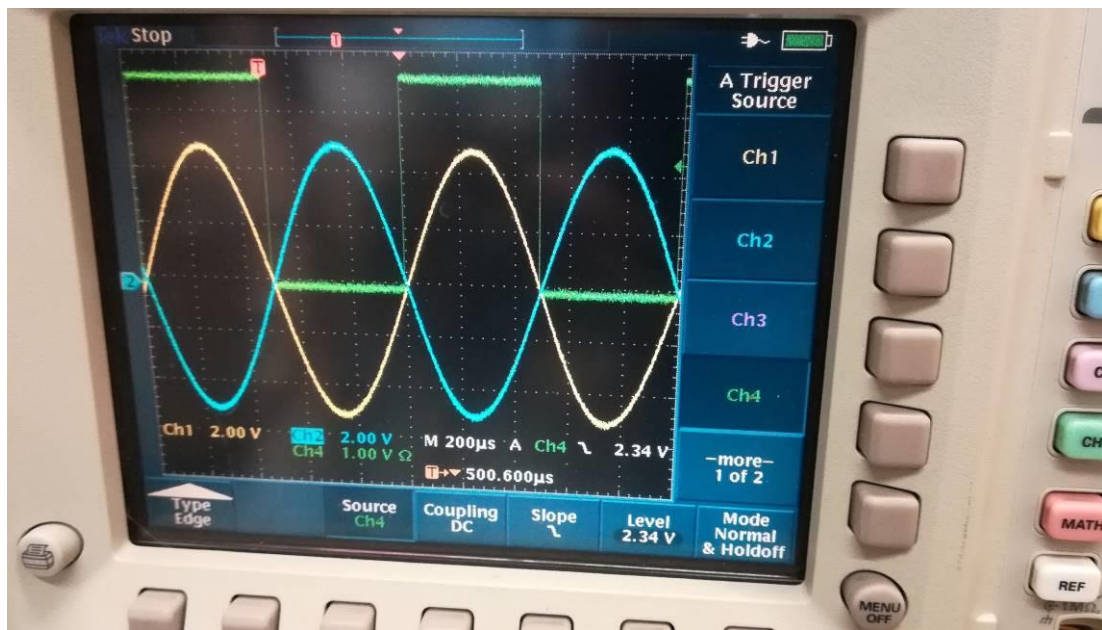
### Operation:

Sine waveforms for both output channels are created in two-step procedure:

- 1) Specify the maximum amplitudes using program “write\_DAC1.vi”, which controls the 20-bit DACs in converter unit.
- 2) Specify the waveform amplitudes, phases, offsets and common frequency using program “DualDAC\_Control.vi”, which controls the 16-bit DACs in converter unit.



3) Observe the waveforms using oscilloscope.



4) More details can be found in separate software manual for DualDAC.

### ***Opening the enclosures:***

The user may need to open the enclosure if

- internal Zener has to be replaced by external reference
- setpoint of the temperature control has to be changed
- the user wants to access the clock in/out connectors at the rear panel of the converter unit. A separate delay generator can be connected to clock out/in in order to fine-tune the phases of the two output waveforms

The opening procedure is as follows:



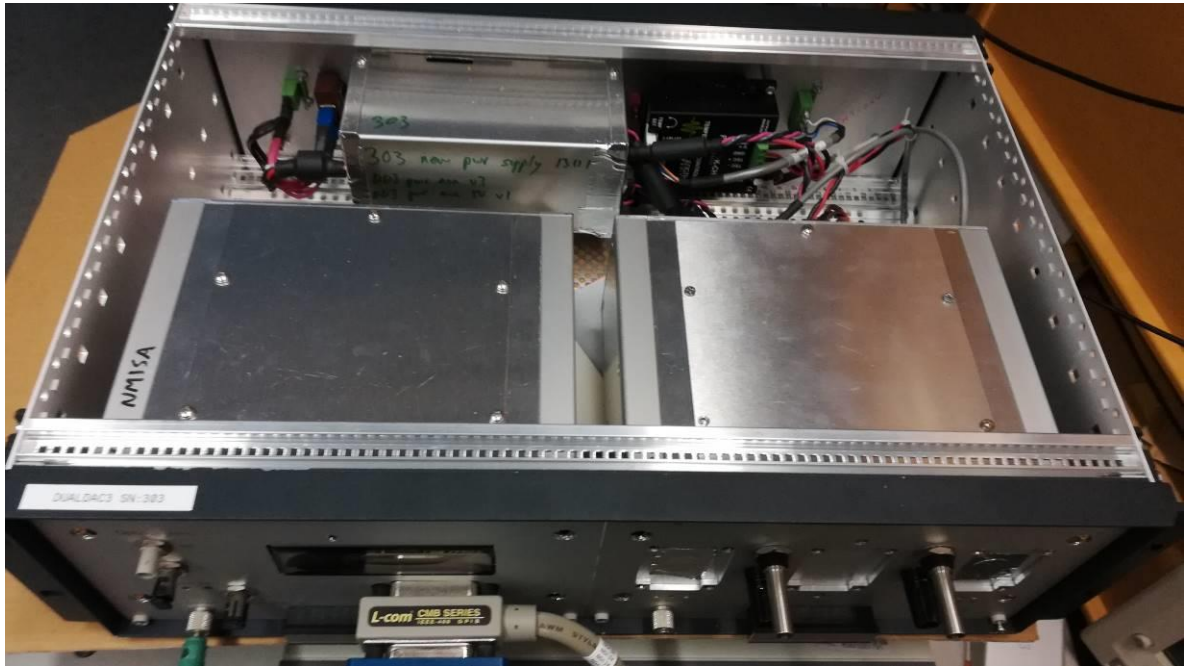
1)

Turn off all power supplies and detach the side panels using a flat screwdriver



2)

Detach the top panel using a flat screwdriver. There are suitable spots at both ends of the side part of the top panel as shown in the image.



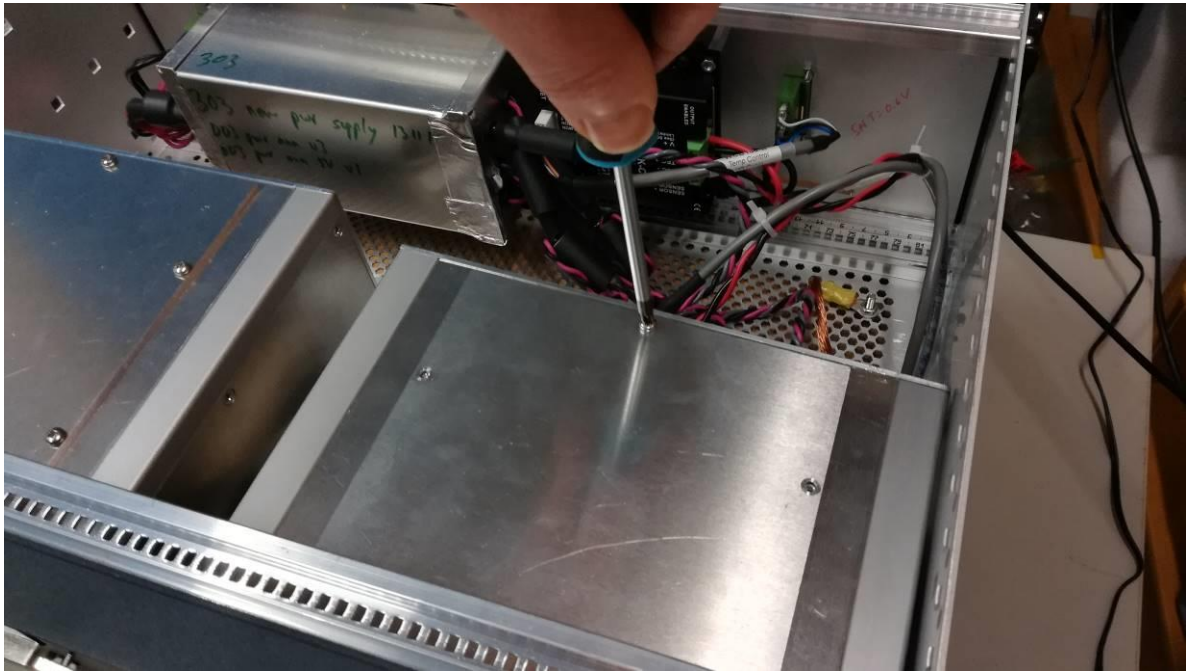
3)

DualDAC 3 unit with top cover removed. Power supply unit with dc/dc converters is located inside the rear panel in own enclosure.



4)

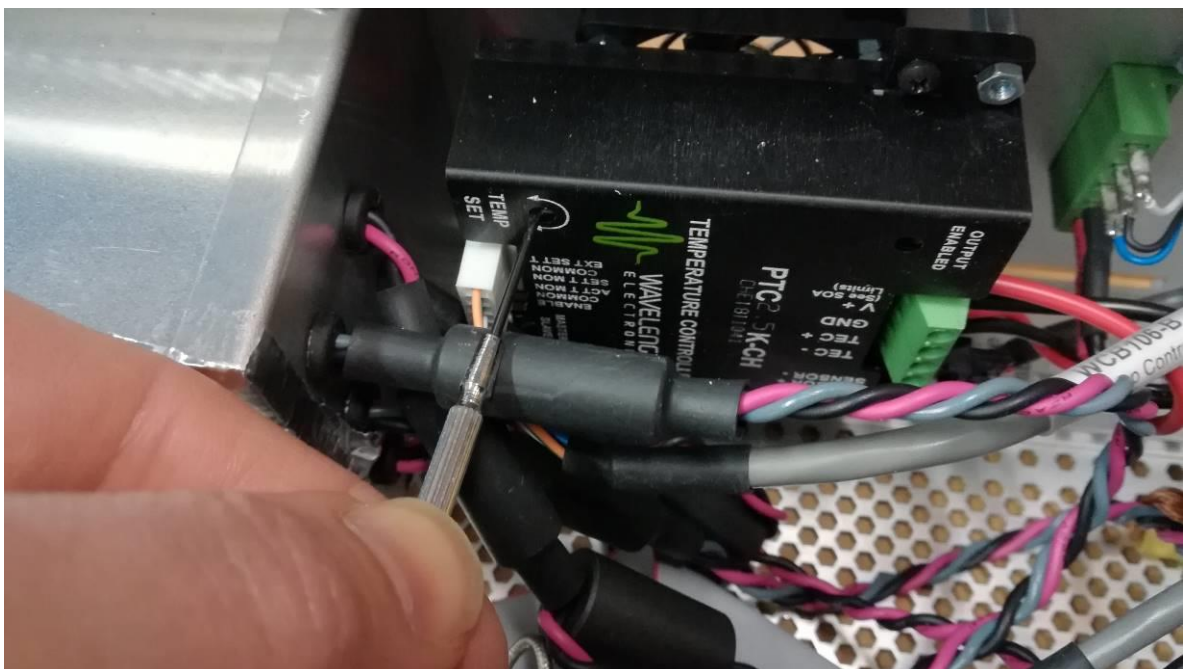
If converter unit or its maintenance lid needs to be removed, undo the four screws at the front corners of the unit.



5)

Slide the converter unit few centimeters outside the frame to remove one hidden maintenance lid screw. Remove also the other five screws to remove the cover completely.

- 6) **Adjusting the setpoint of the temperature control.** Connect a multimeter between GND and “set T mon” test point at the rear panel connector. Turn on the temperature controller power. The multimeter should read 0.6V. Locate the temperature setpoint trimmer at the controller inside the rear panel.

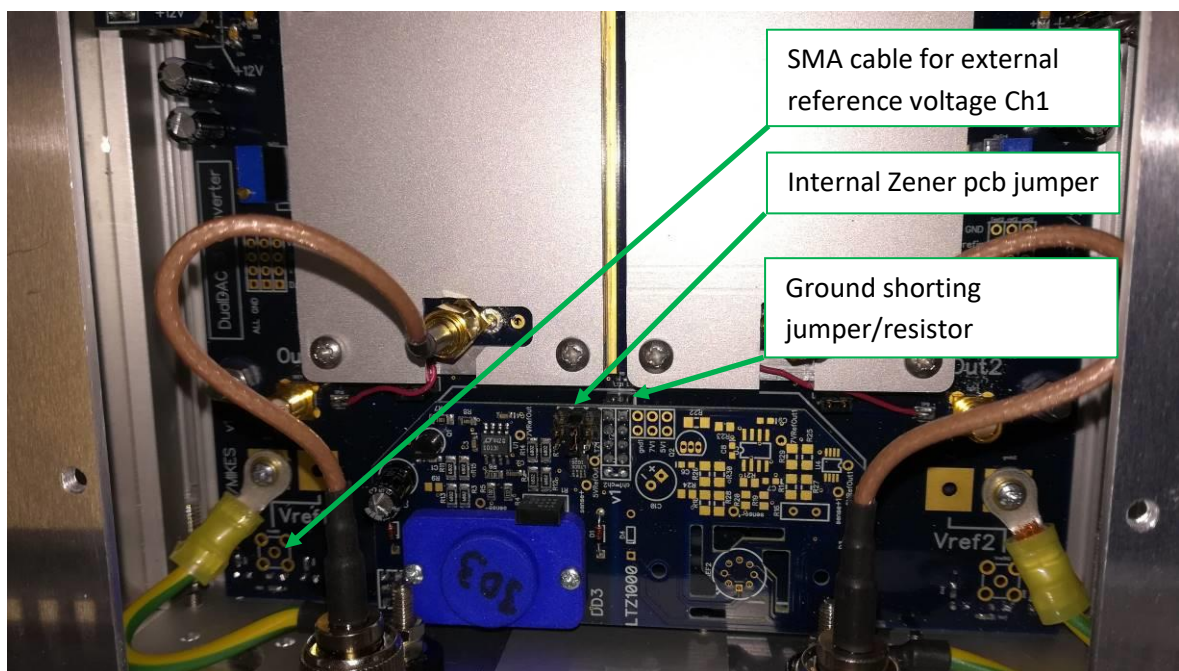


Turn the trimmer and monitor multimeter reading until the desired setpoint is achieved. To obtain more space you can open the rear panel collar screws (6 pcs) and pull the rear panel further away from the main unit.

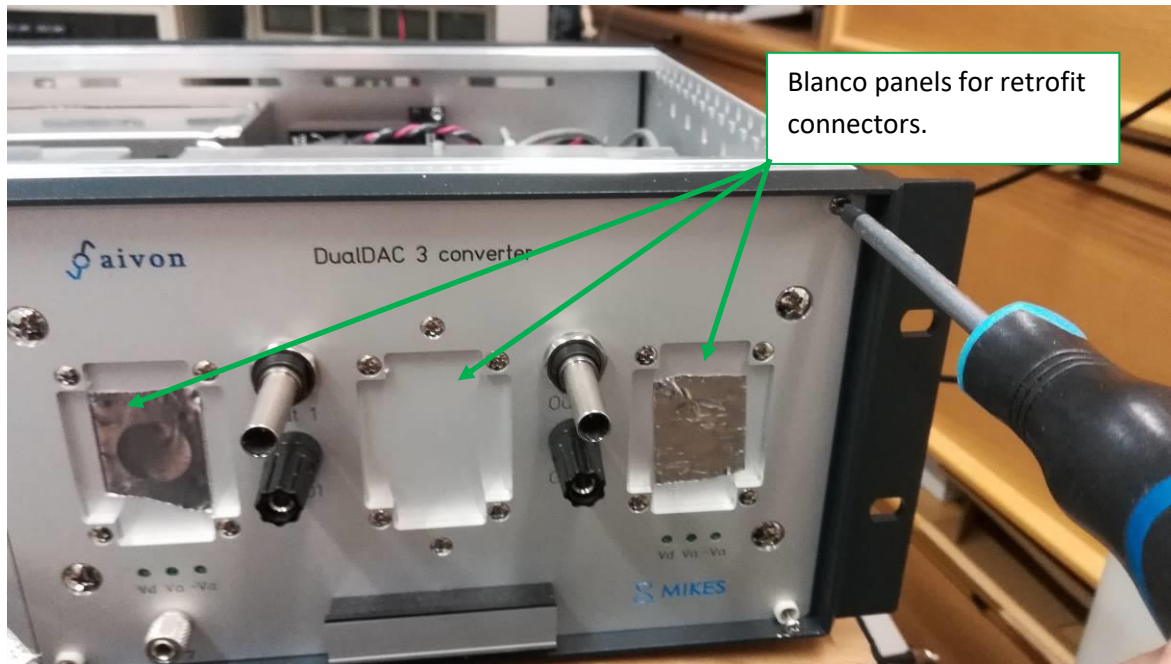
## 7) Changing the internal reference to external reference.

Open the maintenance lid of the converter unit by removing six screws. Remove screws and the lid and slide the unit back inside the frame.

Remove a jumper in the internal Zener printed circuit board and connect your external reference to SMA connector. Please ask Aivon to place SMA connector before shipment if you intend to use external reference. Both channels have own SMA's for external reference. Even if the jumper is removed, Output grounds are still shorted by a jumper or zero-ohm resistor. Undo the jumper or remove the resistor to disconnect grounds.

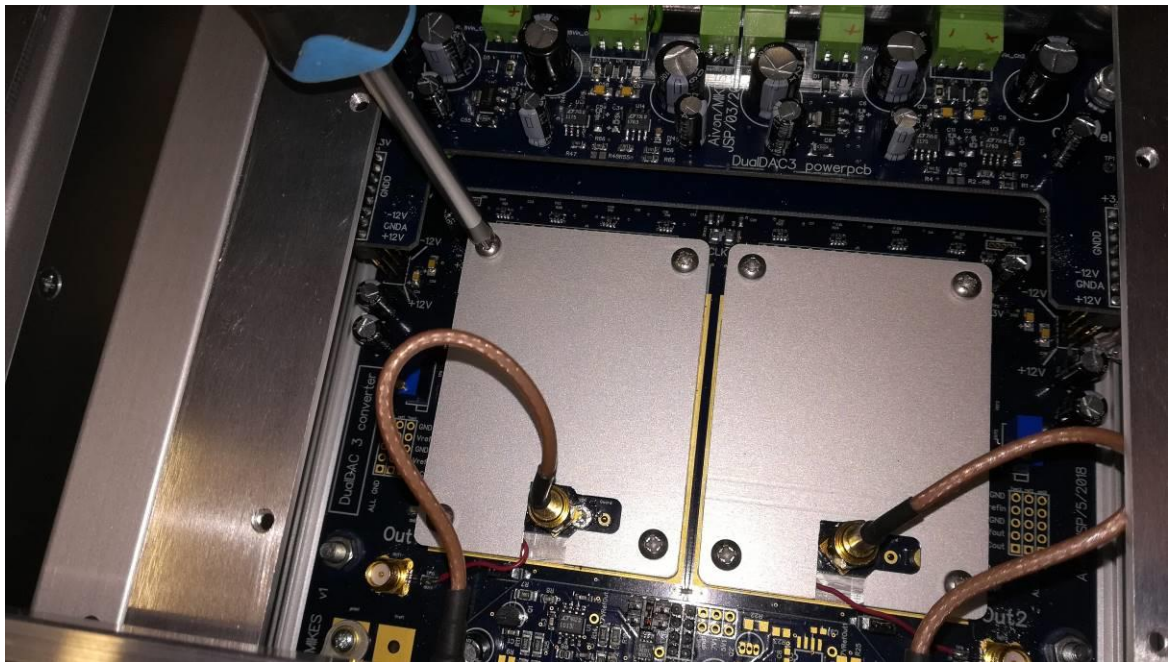


The cable for external reference can be fed through blanco panels available in front panel. This panel can be used for retrofit connectors by the user.

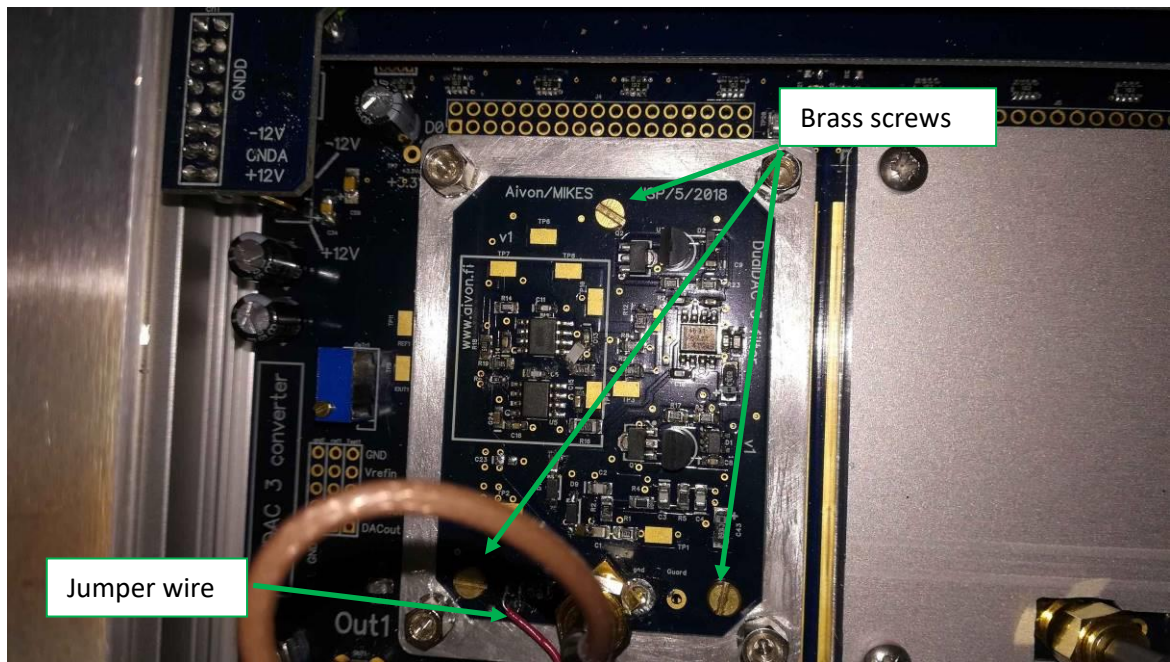


#### 8) Changing the filter/buffer unit.

Filter/buffer units are located at the center of the main converter board. The filter covers are removed by opening four screws.



The filter pcb is removed by opening three brass screws holding the pcb. Possibly a jumper wire has to be removed by soldering prior to removal.



#### 9) Changing the delay in clock lines.

The clock lines form short SMA loops outside the rear panel of converter unit. User can disconnect these loops to connect suitable delay generator to fine-tune the phases.

