Manual for the NIM Dual High Voltage Power Supply

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Abstract

This document gives detailed steps on how to properly use the power supply and how to properly read the data

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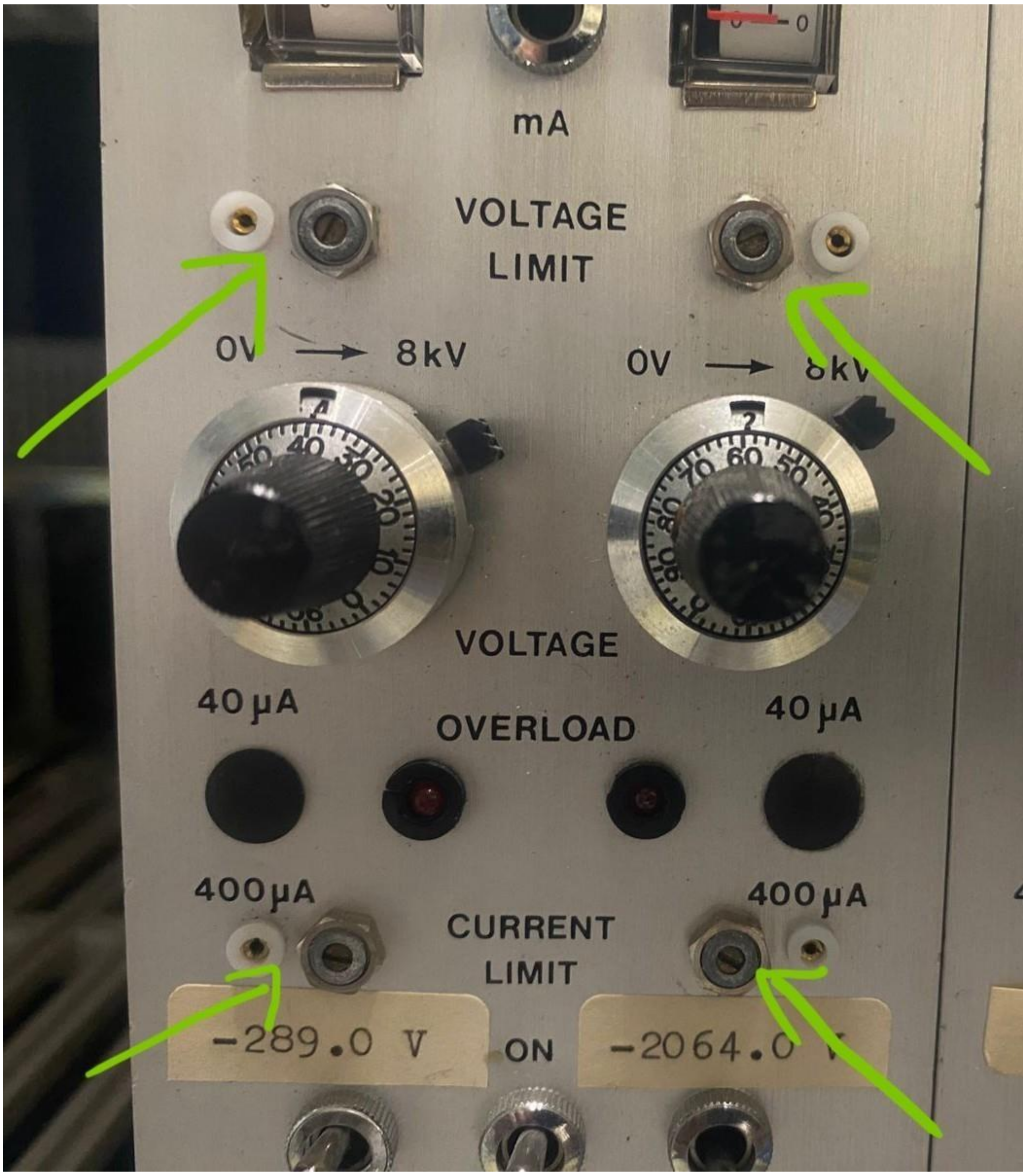
1.Preparation before operating

First step to using the power supply is to take a small flathead screwdriver and start rotating the four screws showed at the image below. This is done so that the power supply does not go to overload quickly.



2.Turning the device on

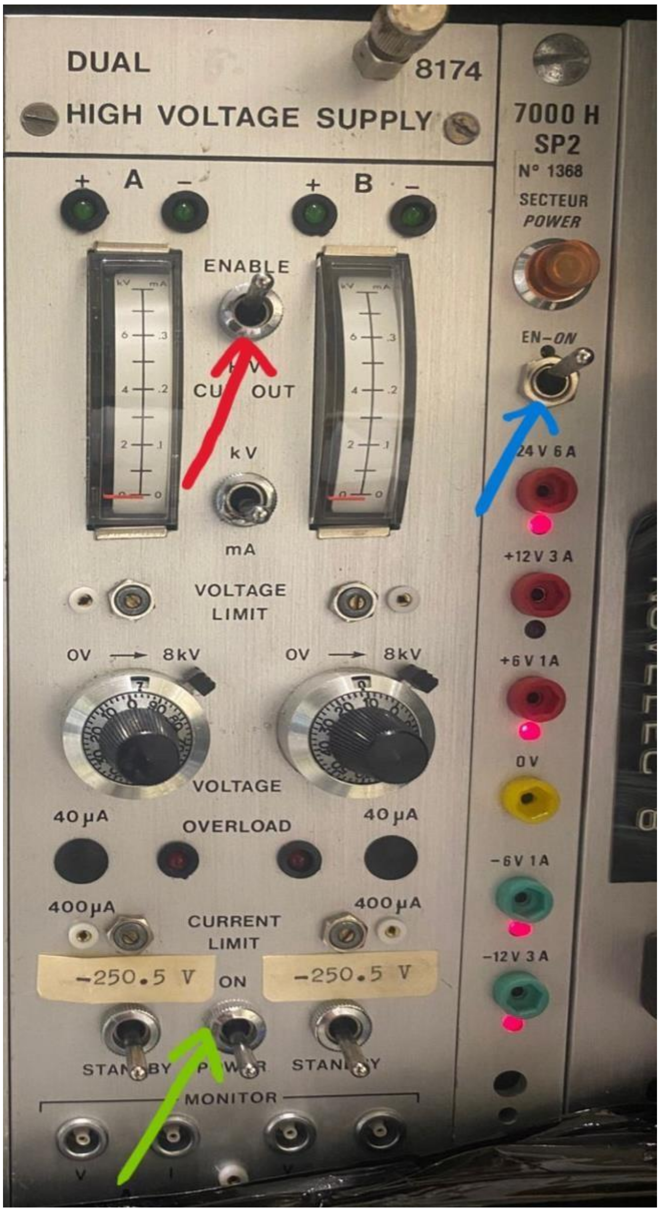
For the high voltage power supply to function it needs an ECL signal which is –0.9 V.

Down below is marked with a green arrow the place where this ECL signal should be input.

The left side is for channel A and the right side is for channel B

After we provide the ECL signal to the desired channel we follow the arrow sequence on the image below:

1. Blue Arrow
2. Red Arrow
3. Green Arrow



Now the power supply is ready to be used.

3.Operating the device

We have decided which channel we will be using when we connected the ECL signal to the back, so we can switch on the desired channel, or both if we need to use the 2 of them.

Down below is the image of which switches we need to use:

- Blue arrow is for channel A
- Red arrow is for channel B

Now we start rotating the dial of the respective channel we want to use to get a reading.

*****Caution*****

The voltage on the dial is not the actual output voltage (see page 9)

4.Reading and taking data

There is two ways in this power supply to read data. One is through the analog reader and the other one you can connect a multimeter. Let's see both ways below.

4.1. Analog Reading

When reading the analog, we have to be reasonable for the values that we take because we cannot know for sure what the exact value of the analog is, for example when the value is somewhere between 3 and 4 kV, we say approximately 3.5 kV.

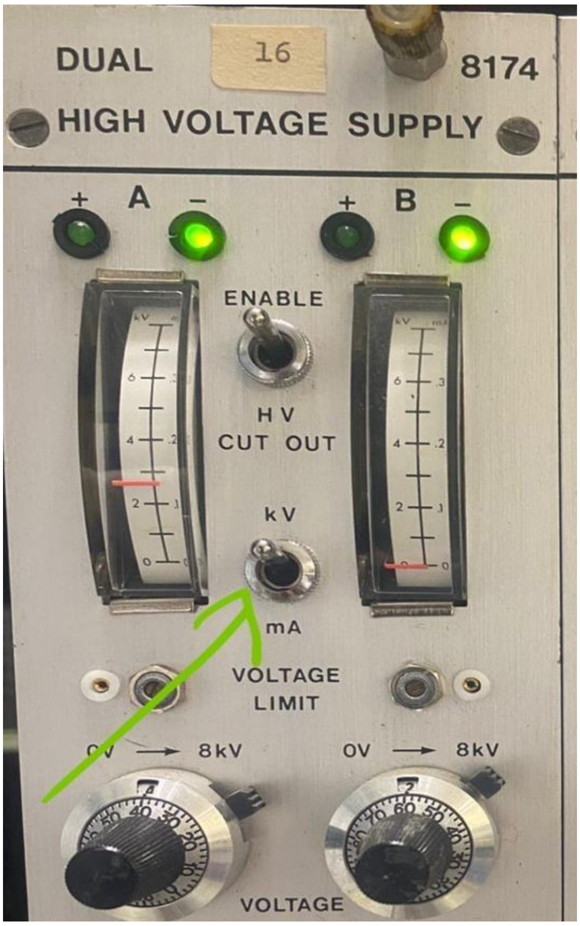
In the image below marked with green arrow see that there is a switch that you can use to switch the reading between Voltage and Current. If you see closely at the analog reader, you see that at the top there are some inscriptions. On the right side there is mA and on the left side there is kV. So here are the steps. To read:

Output current

Turn the switch down and read on the right side

Output voltage

Turn the switch up and read on the left



4.2. Multimeter Reading

When we want to take mor precise data we must use a multimeter. To do this we use the two points that are shown in the image below. The points where we put the multimeter are marked with a green arrow. To take the data we connect the ground and voltage terminals of the multimeter to a Lemo Cable and put it to one of the points. We put the multimeter to DC voltage and leave it there.

Caution

The data taking points only output voltage so you should be careful. Explanation at the output voltage section.

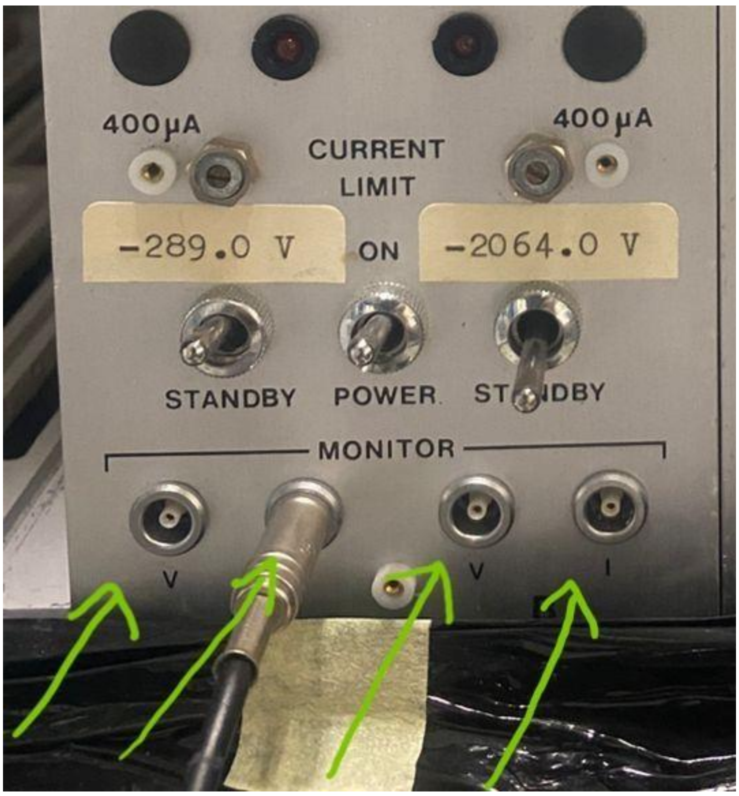
To measure:

Output Voltage

Read the value on the multimeter once it is not changing anymore. That value is a scaled down voltage of the real voltage. **(see page 8)**

Output Current

Here we don't have to put the multimeter on current mode since the point doesn't give the current, but it gives us a voltage that represents that current. To find out what is the actual value of the current, we need to find the conversion factor, which will be explained how to find it in a separate section. **(see page 9)**



5.Data taking preparation (if you don't know the data taking conversion factors)

Before we start taking any real data with the power supply, we first must find all the conversion factors so that we can do good data analysis when we take real data. To do this we put the device under a load, follow the preparation if the device is being used for the first time. After that we follow the next section for turning the device on. After the device is on and under load, we put the dial to zero and start taking data following the table below with 0.3 kV increments until the overload lamp turns on:

$V_{sp}(kV)$	$V_{an}(kV)$	$I_{an}(mA)$	$V_{mm}(V)$	$I_{mm}(V)$
0				
0.3				
…				

- V_{sp} - Set point voltage (the voltage we put in the dial)
- V_{an} - Voltage we read in the analog
- I_{an} - Current we read in the analog
- V_{mm} - Voltage we read in the multimeter
- I_{mm} - Voltage that represent current in the multimeter

Caution

a and b are not the same for all the sections so be careful when making calculations.

5.1. Voltage scale factor

To find the voltage scale factor we do a linear regression to find the equation $y = ax + b$ in our case:

$y = V_{an}$

$x = V_{mm}$

So, the equation is $V_{an} = aV_{mm} + b$ and the real voltage reading on the multimeter will be $V_{mmr} = aV_{mm} + b$ where:

V_{mmr} - The real multimeter voltage reading.

5.2. Real output voltage

To find the real output voltage we do a linear regression to find the equation $y = ax + b$

In our case:

$y = V_{mmr}$ or V_{an} (V_{mmr} would be more accurate)

$x = V_{sp}$

So, the final formula is: $V_{mm} = aV_{sp} + b$

To find out what V_{sp} we need to get our desired output voltage, we use: $V_{sp} = \frac{V_d - b}{a}$

Where V_d is the desired output voltage.

5.3. Current conversion factor

To find the current conversion factor we do a linear regression to find the equation

$y = ax + b$

In our case:

$y = I_{an}$
$x = I_{mm}$

So the equation we get is $I_{an} = aI_{mm} + b$ hence the real output current is $I = aI_{mm} + b$