Grüezi YouTubers. Here is the guy with the Swiss accent. With a new episode around sensors and microcontrollers.

In video #146 I used a DPS5005 power supply to test my electronic load, in video #148 I introduced a new kind of cheap devices, where the value of the “dull” hardware is increased by adding a Serial connection and a PC software, and in video #151 I had a nice box in my mailbag. Somewhere in-between, I got this new device: A DPS5005 with Serial and Bluetooth connections.

Today I want to show you this new device, and also a possible setup to automate your lab.

We will

* Assemble a nice-looking bench power supply consisting of a DPS5005, a case, and a 48-volt power supply
* Then, we will test a few of the electrical properties of the DPS5005
* And we will have a look at the PC software which comes with it
* And finally, together with the remotely controlled electronic load, we will build a simple “Source Measure Unit”

The normal DPS 5005 was a very small switching power supply with nice features:

* Up to 50 volts and 5 Amperes
* Constant voltage and constant current modes
* Nice user interface with dial and a display with lots of information
* Additional features like programmable voltages and currents. These features are not self- explanatory, and with a few buttons and a dial, not easy to use

But there is hope with the new version of this power supply. It adds a small connector and two little boards. One for USB, and one for a Bluetooth connection to the PC. And in addition, we get a decent PC software. This is the same concept as the electronic load, where they also added a Serial connection and a Software to enhance its value. The price difference between a normal DPS5005 and one with a Serial connection is only 5$. If you add Bluetooth, it is 8 dollars.

Because I purchased also a nice case, my young lab companion will first assemble the parts and build a nice Power Supply. The case comes with a 5-volt fan, which is connected with a small board to the input connectors. Unfortunately, it not temperature controlled. So, it runs always and its sound is quite annoying. I am not sure if it is necessary for the DPS5005 as this device is quite efficient and therefore does not dissipate too much energy. This is, why we implemented a plug for the fan. Like that, we easily can cut if off for our tests.

Next, we had to connect the power switch. It switches the DPS5005 completely off. The external power supply, however, still keeps running (and also its fan). So, it might be a good idea to insert a 220-volt switch before this device.

Then, he had to drill an 8mm hole into the back plate to make sure, the PC connection cable can exit the case.

At the end, he assembled the whole case, including the banana plugs in the front panel.

The maximal input voltage of the DPS5005 is rated as 55 volts, and the input voltage should be at least 1.1 times the maximum output voltage. The manual also says “please leave a room to use, or else, it will be burnt”. I am not completely sure, what it means, but decided to stay below 53 volts. I only bought a 48-volt power supply, but these devices, fortunately, have a small adjustment trimmer. And with turning this trimmer, I easily get the 53 volts…

Now, everything is ready and can be tested. First, we do a temperature test with the maximal 5 Amperes. Without the fan switched on, the temperature of the heat sink increases to more than 100 degrees. It does not matter if we select 5 or 40 volts at the output, the temperature is similar. If we connect the fan and wait for a few minutes, the temperature is reduced to around 70 degrees.

So, as written in the manual, you have to use a fan if you want to use the device at its maximum power for more than a few minutes.

Next is efficiency. The device dissipates about 10 watts at 5 amperes, also similar at 5 and 40 volts output voltage. This explains also, why we had about the same temperature during our tests before.

The Ampere meter reads 4.987 and the electronic load 5.001A, a difference of 0.3%. Please keep in mind, that in this setup, the volt meter does not show exact results, because I do not use the four-wire method showed in video #146.

At zero amperes, the volt meters should show the same values: The difference is 0.02V or 0.4% which is in spec. All-in-all, very good.

Another very important topic is ground references. Especially, if you connect your bench devices to your valuable PC. So, let's test where the different grounds are connected. We have three different grounds:

* The input
* The output
* Serial connection

There are no connections between the three grounds, especially not between the power supply and the USB connector, which is very good. If we look at the Serial connection board, we see the reason. It has two optocouplers aboard which protect our PC.

Let’s now connect the device to the PC and fire up the Software. First, we have to connect it to the right COM port. Then, we already see the input voltage. Next, we can remotely control our power supply, with either a mouse operated dial or by keying in the exact values.

I connect a 5-ohm 10-watt resistor to the power supply and instruct it to step the voltage up from 0 to 10 volts. The current is limited to the maximum of 5A. Now, we can start the scan and go to the diagram. We see the voltage and the current going up, as expected. Unfortunately, we cannot export the measured values. This would be a nice addition to do some analysis later on.

We can do the same thing with a constant current. I connect a 50-watt LED to the power supply and because it is not cooled, only go up to 0.8A. We start and see, that the LED needs around 30 volts to start. And at 27.6 watts, the voltage is around 34.5 volt. Nice curve.

One question posed by some subscribers was the ripple. I connected a 5-ohm 10-watt resistor and at 7 volts, I measured the following values: peak-to-peak 480 mV, RMS 22.63 mv. My linear Voltcraft looks like that. The peat-to-peak is much lower, but the RMS is only about half with the same load. So, for delicate circuits, you might need some additional filtering with the DPS5005

But this is only the start. If we remember the electronic load of video #148, we could now start to do some combined measurements. As you might know, I am currently working on Solar Chargers. One of these chargers we are testing is this one. It has an input for the solar panel and an output for the battery. Let’s assume, we want to find out, how this device behaves. To do so, we use our new power supply to simulate the solar panel. And we connect a half charged Li-Po battery to the battery pins. Now we have two different connections to monitor: The input and the output. The input can be monitored as before, with our power supply. And our electronic load can monitor the output. Like that, we can characterize the behavior of the device and we see, that it only starts to charge the battery at an input voltage of around 5.5 volts. This is the so-called MPPT point. When I got the device, it did not work until I did this test across the whole input voltage range. I found out, that the MPPT point was at 12 volts, which was too high for my 6-volt panels. So, I had to change a resistor on the board and now, it seems to work as intended.

Devices which can do these combined supply and measurements are called “Source Measure Units” and are very expensive. Now, our setup, of course, does not have specifications like 100 volts nor 100 Nano volts. But it is useful for 50 volts at the input and 20 volts at the output and 5 amperes at the input as well as 4 amperes at the output. And it has some graphical capabilities.

Of course, there is still a lot of room for improvement in the software. The most important one is the graphical display of the DPS5005 software. Here, you have to change the scale every time, and the time base of the output voltage and output current are not automatically the same.

Other things could be added. For example, it would be neat if the values of the voltage scan would be automatically transferred to the graphics axes. Because usually, you want exactly these values entered.

As already said, I missed the export functionality for data like in the electronic load. This would be nice, especially in conjunction with the load. Like that, we easily could measure the efficiency of devices by comparing the input with the output power in Excel. And if both devices would export the actual PC time with the measured values, we even could automatically match the input- and output values. But maybe this is asking too much for a free software.

The supplier documented the interface openly. For the moment in Chinese, but with Google translate and a little time, it should be possible to translate it into English. And there is an open source software available for the DPS5005. However, I am not sure if this is necessary anymore if we can use the PC to control it.

The last “goodie” is the Bluetooth module. It can replace the Serial connector and you have a wireless connected power supply. A real IoT device.

Summarized:

* We got a nice looking and small bench power supply
* The fan of the DPS5005 is annoying because it never switches off and it is placed on the desktop close to my ears. Most of the time, it would not be necessary because the device is quite efficient. The 48-volt power supply is also quite noisy because its fan also runs all the time. I placed it below the table behind my drawer
* The electrical properties of the DPS5005 are ok. It delivers nearly 50 volts and 5 A, and the ripple is also ok
* The volt- and ampere meters show exact values and are inside their specifications
* The PC software is helpful, especially the automation part. There is still room for improvement, and I am sure, we will get new versions over time
* The graphic display should be enhanced, and a data export function to Excel should be added
* Together with the remotely controlled electronic load, we were able to build a simple “Source Measure Unit” and checked one of our Solar charger modules
* And, a “beasty” DPS 5020 50 volts 20 Amperes version is available for pre-order on Banggood

I hope, this video was useful or at least interesting for you. Bye!

<https://www.mediafire.com/folder/3iogirsx1s0vp/DPS_communication_upper_computer>