

DSN 102

Dual SPAD Power Supply

User's Manual



Version 1.10

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1. Introduction

The dual SPAD power supply DSN 102 is an accessory for the SPCM-AQR(H) detectors of Perkin Elmer, the PDM detector modules of Micro Photon Devices (MPD), the COUNT modules from Laser Components and the τ -SPAD from PicoQuant. It controls and monitors the operation of the detectors. The DSN 102 can control two SPAD modules at the same time, displaying the count rate of one selected module. As recommended for most SPADs, precautions should be taken to avoid any excessive light level that will damage the SPAD module. In regular laboratory use, it is virtually impossible to ensure sufficient precautions manually. Therefore the DSN 102 is equipped with an automatic protection circuitry. The DSN 102 shuts down the supply voltage to the SPAD module safely when critical exposure levels to light are reached. In such a case, the DSN 102 gives an acoustic warning. For further diagnostics and detector adjustments, there is also a BNC output for an oscilloscope or other monitoring device. The voltage at this output is proportional to the log count rate. In addition, an acoustic count rate monitor output, e.g. for use with speakers or earphones, is provided.

The DSN 102 in its OEM version is an installation module (3 U, 160 mm depth) designated to fit into a 19 inch subrack. The stand-alone version is supplied in a small table-top rack, equipped with the appropriate AC power supply.



Attention: The DSN 102 helps to protect SPAD modules, but there is no guaranteed absolute safety. Additional protection from excess light levels should be provided through appropriate design of the optical setup.

2. Controls

Fig. 1 shows the front panel of the DSN 102. The Lemo sockets (4) and (5) provide the power supply for the SPAD modules with the appropriate current rise time during power-up. The display (3) indicates both the operation status as well as the count rate of a selected SPAD module. The count rate is displayed as a floating-point number with a two-digit mantissa and a one-digit exponent. The SMA sockets *TTL-IN* (6) and *TTL-OUT* (7) as well as *TTL-IN* (8) and *TTL-OUT* (9) are shunt-connected. They act as both signal input for counting as well as signal carry-through. With the switch (10) the input impedance is selectable between 50 Ohms and 1 MOhm. To control the dynamic behaviour of the count rate one can monitor the voltage on the BNC output (11). For this purpose, it is useful to connect, e.g. an oscilloscope with

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high input impedance. Note: the BNC output is designed for alignment purposes, i.e. the internal transformation from count rate to voltage is by no means exact. A 3.5 mm earphone socket (12) further allows the count rate to be monitored by means of a headphone. The frequency of the tone is a measure of the count rate.

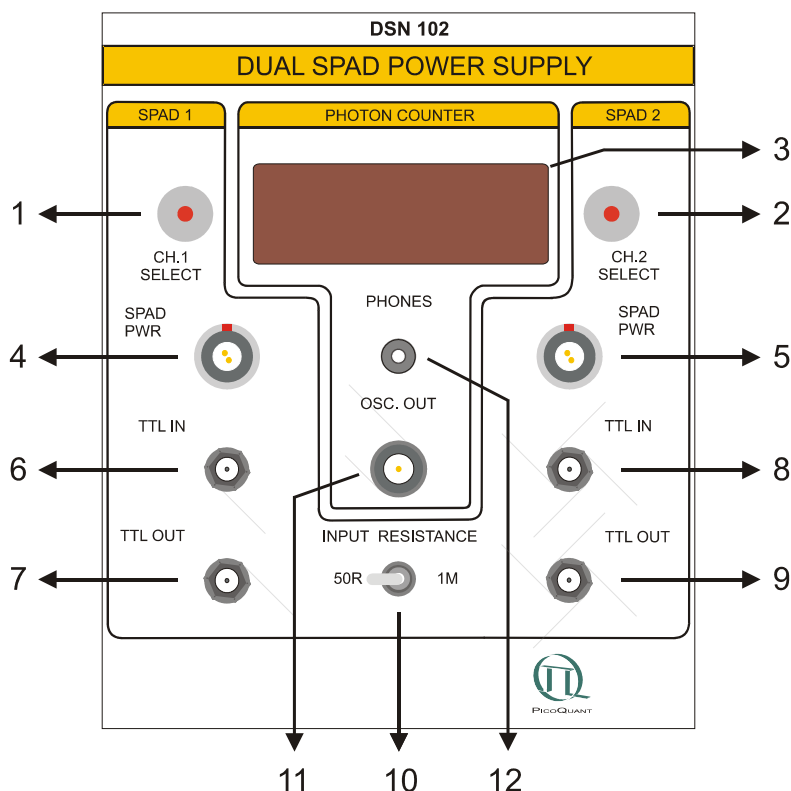


Figure 1

3. Operation

If the DSN 102 OEM version is used, a DC power must be supplied externally. Fig. 3b in section 5.3 shows the rear plug of the OEM module. Connect pins 2 at columns *a* and *C* to Ground and pins 12 at columns *a* and *C* to +5 V. Use an appropriate power supply. See section 5, Technical Data for more details about the external power supply.

3.1 Startup

The DSN 102 is delivered either as a complete stand-alone device with line cable or as a OEM module. In either case, before you switch on the external power you must connect the SPAD modules.

Connect the power for SPAD module #1 with the power socket (4) and the TTL output signal of the SPAD to the SMA socket (6). NOTE: the timing outputs of the PDM modules and the τ -SPAD will not work with the DSN 102. Do the same connections with SPAD module #2 at the right-hand side (power socket (5) and signal SMA socket (8)).

Choose the input impedance of the signal input with the termination switch (10). If the signal is fed through this device to enter, e.g. TCSPC electronics with an appropriate termination of 50 Ohms, choose 1 MOhm for the DSN 102 signal inputs. Otherwise, if there is no termination in the subsequent signal chain, choose 50 Ohms termination.



Attention: Connecting the signal output with two shunting 50 Ohms terminations may damage the attached SPAD module.

After switching on the line power, or respectively, applying the bus voltage on the rear connector of the OEM version, a message "OFF" appears on the display. Additionally the last digit shows the shut down limit in Mcps (see section 3.2). The power at the SPAD modules remains off.

Pressing *CH1 SELECT* powers on SPAD module #1 and the digital display immediately shows the relevant signal intensity in counts per second (cps). The LED of the button lights up. Now pressing *CH2 SELECT* powers on SPAD module #2 and displays the intensity measured by this detector. The LED of *CH1 SELECT* button changes to blinking, indicating that the relevant detector is still ON, but its signal rate is not displayed. *CH2 SELECT* shines continuously indicating the ON state and that the display belongs to detector #2. Generally, pressing a blinking button makes it shine continuously and switches the display to the appropriate detector, while pressing a continuously shining button switches OFF the relevant detector.

3.2 Automatic and Manual Shut-Down

The built-in logic protects the SPAD modules by shutting down the supply voltage when the signal count rate exceeds a certain level. The shut down limit is factory set. It is visible in the last digit of the display after switching on the line power. Shutting down a SPAD module will be acknowledged with a warning beep. In case of shutting down the SPAD module, for which the count rate was last displayed, a message "ERR" appears on the display. The affected detector must then be powered up again manually.



Attention: Shutting down the SPAD modules must be done manually by pressing the appropriate button *CH1 SELECT* or *CH2 SELECT*. Never switch off running SPAD modules with the power line switch of the DSN 102.

4. Application Examples

4.1 Multichannel Photon Counting

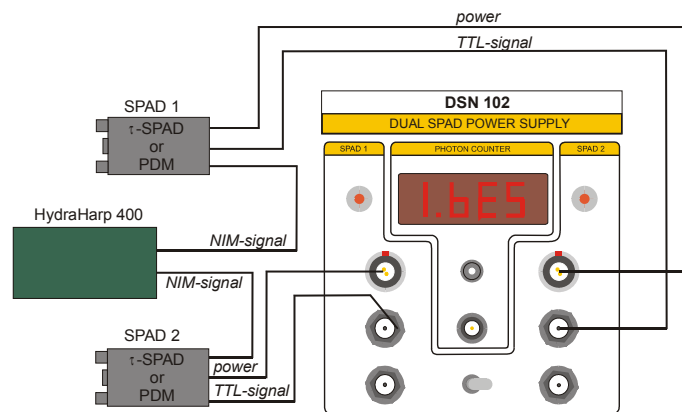


Figure 2a

4.2 Adjustment of SPADs

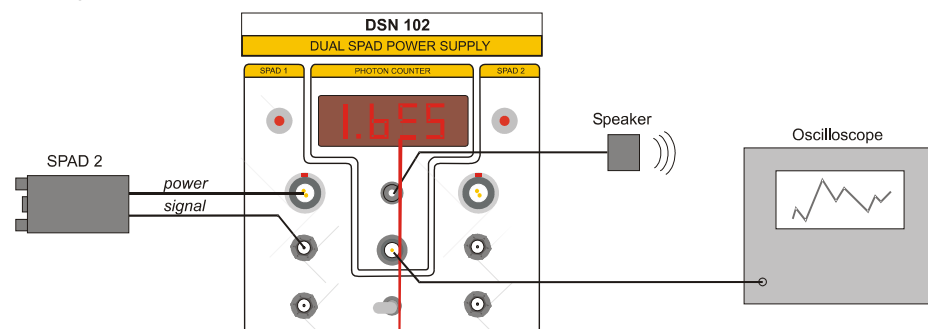


Figure 2b

5. Technical Data – DSN 102

5.1 Specifications – DSN 102 OEM Module

Power Consumption:

+13.5 V DC stabilized $\pm 5\%$ max. 2.0 A

Module Dimensions:

Subrack module 3 U / 21 HP

Operating Environment:

Operating temperature 0 to 50°C

5.2 Specifications – DSN 102 Stand-alone version

Frame:

Half size 1 slot (4 HP) for power supply module
 1 slot (21 HP) for DSN 102 module

Power Supply:

Line voltage 110 - 240 VAC, 50/60 Hz
 Power consumption max. 35 Watts

Dimensions:

Half size mainframe: 237 x 310 x 133 mm (w x d x h)

DSN 102 Module:
Counter

Display floating point, 2 mantissa, 1 exponent

Trigger level typ. +1.2 V

Connector type SMA (female)

Shut down count rate

High level factory set (2 ... 8 Mcps)

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SPAD Power Supply

Current max. 1.5 A per Channel
 Voltage SPCM-AQR(H) $+5\text{ V} \pm 5\%$
 Voltage PDM..... $+12\text{V} \pm 10\%$
 Voltage COUNT / τ -SPAD..... $+12\text{V} \pm 10\%$
 Connector type LEMO: EGG.2B.305.CLL
 Appropriate male connector.....LEMO: FGG.2B.305.CLL
 <http://www.lemo.de>

Oscilloscope Output

Output voltage max. 2 V
 Connector type BNC (female)

Acoustic Output

Connector type Earphone Jack 3.5 mm
 Impedance $>120\text{ Ohms}$

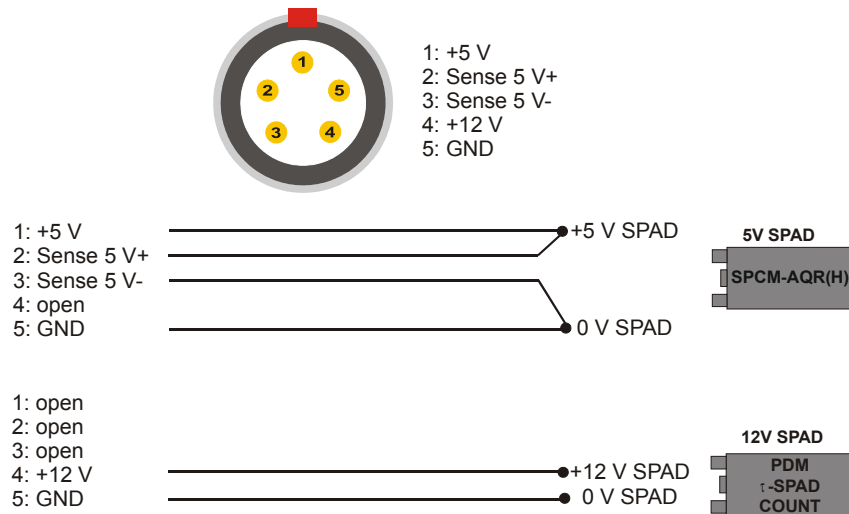
5.3 Power Supply - Front and Rear Connector

Figure 3a
 Front Connector – SPAD Power Cable
 Stand-alone and OEM version

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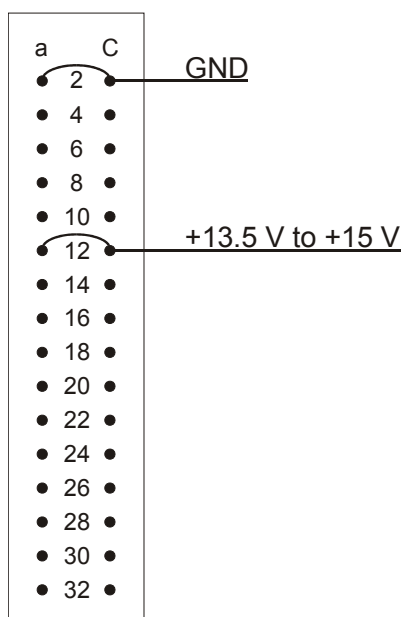


Figure 3b
Rear Connector -
OEM version

6. Support

The DSN 102 system has gone through thorough testing at PicoQuant. It is stable and reliable. Nevertheless we will continually make improvements and in-corporate these into upcoming versions.

In any case, we would like to offer you our complete support. Please do not hesitate to contact PicoQuant if you would like assistance with your system.

If you observe any errors e-mail a detailed description of the problem and relevant circumstances, to info@picoquant.com. Your feedback will help us to improve the product and documentation.

Of course we also appreciate good news: If you have obtained exciting results with one of our systems, we would like to know!

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Retraction of Old Devices

Waste electrical products must not be disposed of with household waste. This equipment should be taken to your local recycling center for safe treatment.

WEEE-Reg.-No. DE 96457402



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