DRAGONFLY-N MANUAL

MODELS DN-1200B, DN-1500S/M/C, DN-2000S/M/C

1. INTRODUCTION

Thank you for choosing the Dragonfly-N for your particle detection needs.

This unit is fully USB powered and generates a high positive voltage for interfacing with various types of neutron detectors.

Please fully read this manual before operating your Dragonfly-N.

IMPORTANT SAFETY PRECAUTIONS

DANGER! Hazardous voltages are present during operation. Failure to follow these precautions or misuse may result in injury or death.

The product chassis must always be earth grounded.
Do not touch connections unless the equipment is completely off and all capacitances are discharged.
Allow five minutes for discharge of internal capacitance of the product.
Do not ground yourself or work under wet or damp conditions.

2. OPERATING PARAMETERS

	Model		
Parameter	DN-1200	DN-1500	DN-2000
Input Voltage	+5V (±5%)		
Input Current (max)	500mA		
Output Voltage (max)	1200V	1500V	2000V
Output Current (max)	1000µA	1000µA	700µA
Output Impedance	22 MΩ		
Count Rate	0 to 10k counts/second (linear response)		
Operating Temperature	10-30°C		
Operating Humidity	0%-90% RH, non-condensing		
Background Suppression	Less than 1 count/sec		
Detector Compatibility	BF_3 Proportional Tube, ^3He Proportional Tube, PMT		

Table 1: General Operating Parameters.

3. MECHANICAL DIMENSIONS

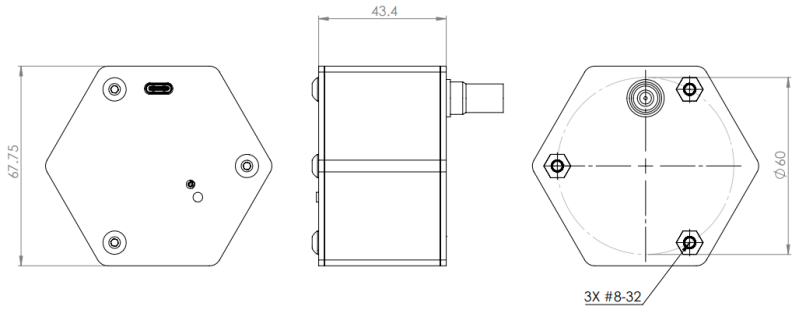

Figure 1: Mechanical Drawing (Connector May Vary)

4. SCA ADJUST

4.1. Introduction

4.1.1. The SCA (single-channel analyzer) potentiometer should be adjusted each time a new type of detector is used.

4.2. Required equipment:

4.2.1. Signal Generator or Pulser (Ortec 419 Preferred)

4.2.2. Charge Terminator (Charge Terminator for Ortec 419 preferred)

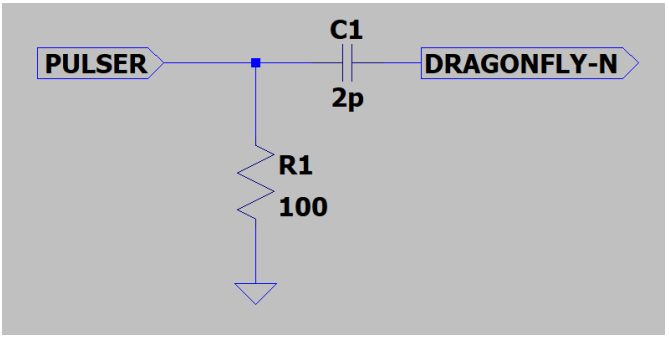

Figure 2: General schematic of charge terminator.

4.2.3. Small flathead screwdriver

4.3. Procedure

4.3.1. Set the pulse to negative-going, exponential decay

4.3.1.1. Time constant of 200us or greater, 1ms preferred

4.3.1.2. Amplitude: as required to achieve 0.05 pC per pulse. See table 2.

Capacitance of Charge Terminator	Pulser Amplitude
1 pF	50 mV
2 pF (Ortec 419)	25 mV
4 pF	12.5 mV

Table 2: Pulser Amplitude vs Charge Terminator Capacitance

4.3.2. Set the frequency to AC line frequency. The resulting counts will depend on your local line frequency. Counts are reported every 100 ms, therefore the measured counts will be the line frequency divided by 10.

Line Frequency	Resulting Counts / 0.1s
50 Hz	5
60 Hz	6

Table 3: Resulting Counts vs Line Frequency

4.3.3. Turn potentiometer all the way counter-clockwise.

4.3.4. Turn potentiometer clockwise until the counts listed in Table 2 are reliably achieved. Stop turning the potentiometer.

5. POLE ZERO (P/Z) ADJUST

5.1. There is a P/Z potentiometer located underneath the lid for baseline restoration. This is factory-set and should not be changed.

6. USING THE SOFTWARE

Figure 3: Sample image of Dragonfly-Neutron software. Your software may look different, depending on the version.

6.1. Install the included software.
- 6.1.1. Unzip the folder on the USB Drive.
- 6.1.2. Run the Installer.

6.2. Plug in the Dragonfly-N to your computer.

Note: Only use a high-quality, shielded, power- and data-capable USB cable such as Assmann A-USB31C-20A-200.

Note: The USB-C connector on this product is NOT reversible. Simply flip it180deg if you are unable to connect.

- 6.2.1. The USB-A port on your computer must be a root hub capable of supplying up to 500mA of current.

6.3. Open the software and connect to the Dragonfly-N.
- a. Connect by selecting the Dragonfly-N port and then clicking "Connect", both in the top-left corner.

7. USING THE DRAGONFLY-N

7.1. Attach your detector to the output of the Dragonfly-N.
- 7.1.1. Connect your Dragonfly-N directly to your detector, using a male-male adapter as required. The use of a cable is not recommended.
- 7.1.2. IMPORTANT: Detector must be connected before turning on high-voltage.

7.2. Slowly raise voltage as required for your detector. The red "HV" LED on the Dragonfly-N should illuminate.
- **a. WARNING: High-voltage is present within the unit and at the output connector. Do not disassemble or touch the output connector.**

b. IMPORTANT: Always raise and lower voltages slowly to avoid damaging your detector. Never exceed the rated voltage of your detector. Never remove the detector while high-voltage is applied.
c. You will see the CURRENT monitor increase. This is normal. A very high or very rapid increase in current can indicate a faulty detector.

7.3. Once the required voltage is reached, your Dragonfly is ready to detect neutrons!

7.3.1. Note: You may need to thermalize high-energy neutrons before they may be detected. This is true for a proportional tube, which can only detect thermal neutrons. Moderation may be achieved with a hydrogen-rich material, such as plastic or wax.

7.3.2. Detectors are sensitive instruments. For best results, strain-relieve your USB cable and do not move the cable while taking measurements.

7.4. Once finished, slowly lower the voltage, wait for current to reach zero, and unplug the Dragonfly-N.

For technical support, please contact us at: info@nucleonpower.com