

# GS-NEUTRON

Low cost neutron detector with excellent gamma rejection. This detector uses the Russian corona tubes CHM-12. The new GS-Neutron-015 has a very stable circuit with a completely steady baseline and strong neutron pulse. The detector is completely blind to gamma radiation and is not easily affected by EMF as many other detectors are.

The preamplifier circuit has an adjustable lower limit threshold (LLD) and hysteresis setting to allow for fine tuning of noisy signals.

The detector comes supplied with one 9V battery, which will power the detector for approximately 50-60 hours.

This detector is best powered by a GS-1100-PRO as it requires only 450 - 500V, as voltage drift is not an issue one could also use a slightly modified GS-1100A (send us a query if you want to do this mod).



## Connectivity

The output from this detector is an AC coupled line level signal and works best through the Line-In port on a PC, so we recommend an external sound card be used if the computer only has a Mic port.

## CHM-12 Tube Specifications

1	Corona discharge Voltage, MIN.....	450 V
2	Recommended working voltage MAX.....	500 V
3	Relative efficiency (nvth).....	15% (may vary from tube to tube)
4	Background counts.....	12 cph.
5	Working temperature range .....	-50 to +100 C°
6	Tube working life, not less than.....	1500 h.
7	Weight.....	200 gr. (tube only)
8	Dimensions.....	length 215mm diameter 8.5 mm

## Preamp and Build

1	Moderator .....	Black HDPE
2	Moderator diameter .....	90 mm
3	Preamplifier power (battery).....	9V
4	HV Connector .....	SHV
5	Signal connector .....	BNC
6	Output pulse .....	2.2V - 10 $\mu$ s
7	Overall dimensions .....	H 320 mm x 90 mm Ø

## Important Notes

These detectors are built from old tube stock and the efficiency may vary from tube to tube, we shall do our best to test that the tubes are working, but we do not offer a calibration guarantee at this time.

# GS-NEUTRON-150

## Operating Instructions

Simple setup instructions for the GS-Neutron, follow these steps.

### Battery Check

The GS-Neutron 9V battery is located in the base and will power the detector preamplifier continuously for about three days. The battery should be replaced when the voltage falls below 6V. Check battery voltage with a multimeter before use.

### Connections

Connect a low ripple source of 450-475 Volt DC to the BNC connector, positive to pin. Connect the signal output directly to the PCsound card line in port with the 3.5 mm mono audio jack cable.

### PC Audio Settings

Open the PC Audio control panel and set the default input to Line In, then set the input volume to around 50-60%

### Pulse Recorder and Analyser (PRA)

Run PRA software, then open the Data Acquisition and Control panel. Check the following settings:

- Left Channel Height Threshold = 10 for positive pulse, -10 if negative pulse.
- Use Shape Tolerance = Unticked
- Channel Selection = Left All
- Use Advanced Filter = Unticked

Note, if you are using PRA for gamma spectrometry, the main difference when counting neutrons is a higher pulse height thresholds and no pulse shape filtering. The objective is to set the pulse height threshold high enough not to get double counts.

**Important: Threshold must be set to a negative number if your PC inverts the pulse**

### Run Background Test

Now turn on the detector switch so the red LED (dim glow to conserve power) and start PRA Data Acquisition. You should see around 8-12 pulses per hour.

Confirm that you have the threshold set correctly by viewing the pulse in the Audio Input window.

If you are seeing double counts caused by ringing before the pulse, then rise the pulse height threshold.

Record your mean background count, in case you need to consider this for your experimental data.

Best of luck catching a few neutrons..!