GM Counter

Introduction

This handheld Geiger Counter detects alpha, beta and gamma radiation particles. It is a flexible device specially developed for schools and other educational institutions. It uses the built-in GM tube with the protective cap on for gamma radiation measurements (counting) and when the cap is removed it conducts measurement (counting) of alpha- or beta radiation.

The Geiger counter uses a single rechargeable (non-replaceable battery) 3,7V battery.

Overview

- 5 fixed counting periods (Time = 1, 10, 60, 100 or 300 seconds) - plus manual start and stop

- Optional Repeat Mode – repeat measurements without interruption. The main display shows every completed measurement result, while the current count is displayed in an auxiliary display

- GM tube voltage can be adjusted between 400 and 700 V, while still reading the counts.

- GM Sound gives a click from a loudspeaker for each pulse recorded.

- Ready Beep signals end of measurement period - especially handy in repeat mode

- Datastreaming to and control from a PC. (Use the USB C => USB cable)

- Recharging the battery (use the USB C => USB cable – charging from PC or with mobile charger)

Quick Guide

Power On: Press ⏻ to turn on and off. Right after the counter is switched on it is ready for single measurements with a measurement time of 10 s.

Navigation: Find the parameter you want to set using the buttons ▲ and ▼. The parameter is marked with a flashing arrow in the display: *Time, Repeat, GM Voltage, GM Sound, Ready Beep*.

Setting: Press ✓ to select the current parameter. Then set the parameter with ▲ and ▼.

Accept: Press ✓ to accept the new value.

Measurement: Start a measurement by pressing ▶. This also resets the display.
The measurement stops when the selected time expires. If an infinite period is chosen – or if you just want to stop prematurely – press ▶ again to stop.

Time

Set the counting period by using the buttons ▲ and ▼, until the arrow next to *Time* flashes.

Press ✓ and set the time with ▲ and ▼. An arrow at the top of the display shows the time to be selected when pressing ✓.

Pressing ▲ when at 300 s or ▼ when at 1 s, the arrow disappears - this means manual start/stop.

The current counting period is **not** changed before the final ✓ press. Any ongoing counting continues in the background.

If possible, an ongoing measurement will continue after pressing ✓ until the **new** period expires. This will fail when you choose a time that has already expired. If the measurement in this way is invalid, the display will be reset.

When a measurement with fixed time is under way, the horizontal bar next to *Time* will show the amount of time that has elapsed. The bar stays at its maximum after the measurement completes. In repeat mode, however, the bar is reset immediately as the next measurement begins.

Until a valid measurement is available, a small hourglass is shown on the display. This applies when a single measurement is started, and during the first measurement period in repeat mode.

G-M voltage

The voltage to the GM tube is set by using the buttons ▲ and ▼, until the arrow next to *GM Voltage* flashes. Press ✓ and set the voltage with ▲ and ▼

The voltage changes immediately – not at the final ✓ press.

The voltage is shown in the main display and can be adjusted in the range from 300 to 700 V.

When counting simultaneously with adjusting the voltage, the counts are displayed in the auxiliary display. This is handy if you want to measure the GM tube characteristics. Set the counter to single measurements to read the results easier.

There is a certain, short reaction time when the voltage increases – and one a little longer when the voltage is lowered. If you wish to systematically study the effect of changing voltage, it is most practical to start at a low voltage and increase it in small steps.

Cancel

You can exit navigation mode by "travelling too far": Press ▲ when *Time* is selected – or press ▼ when *Ready Beep* is selected. Pressing ✓ twice gives the same result - you choose to set a parameter, and accept the old, unchanged value. If you have changed a parameter, there is no "escape button". However, apart from the GM-voltage, everything can be reset by turning off and on again. The GM voltage should be set at 500 V when using Frederiksen GM tubes.

Battery Saver Function

The unit turns off automatically after an hour - but only if it is inactive.

Communication with a computer

This communication requires the USB C cable.

Operation mode

Default mode is to stream data automatically. If you use Microsoft Excel with the *Datastreamer* plugin, live data can be presented in a spreadsheet - download it form our web site (search for 513620).

Datastreamer

Automatic streaming sends data as text with 9600 bits per second. These values are separated by commas by default:

current count, latest finished result, count period, repeat (0/1), progress , voltage

"Progress" means: Percentage of the count period selected. - Or (for indefinite count period): Elapsed time in seconds.

Communication protocol

Commands to the unit consist of one letter, possibly followed by a number. The possible responses from the device depend on the command.

B: Streaming control

When used alone, this command returns current status. Used with a parameter 0-8, the mod is changed as described:

'B0': Stop streaming
'B1': Send streaming data when ready
'B2': Send streaming data now
'B3': Send now, repeat when ready (B2+B1)
'B4': Send data every 50 ms
'B5': Use comma between values
'B6': Use semicolon between values
'B7': Use space between values
'B8': Use tabulator between values

(B4 + B5 is standard behaviour. B0 corresponds to pressing *Start/stop* while turning on.

C: Read Company Information

Returns the string
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D: Read register values

Returns the current values of secondary and primary data registers

E: Send results or not

When used alone, it returns status. When used with parameter 0-1, the status will change according to the following:

'e0' → counts not automatically sent
'e1' → counts sent automatically when each count period has finished

F: Counting time

When used alone, it returns the actual counting time in seconds. When used with parameter 0-5, counting period is changed according to the parameter:

'f0' → Infinitely
'f1' → 1s
'f2' → 10s
'f3' → 60s
'f4' → 100s
'f5' → 300s

Other counting periods are invalid. Display icons are updated accordingly.

J: GM voltage

When used alone, it returns the current GM voltage in volts. When used with parameter 400-700, the GM voltage is modified according to the parameter. Example:

'j520' → GM voltage set to 520V

O: Single / Repeat Mode

When used alone, it returns status. When used with parameter 0-1, mode is changed accordingly:

'o0' → Single
'o1' → Repeat

S: Start / Stop counting.

When used alone, it returns the status. 0 means stopped. When used with parameter 0-1, counting is started or stopped:

's0' → Stop counting. (No function if counting is stopped)

's1' → Start counting. (No function if counting is in progress)

U: Speaker on / off

Used alone, the command returns the current speaker status. Used with a parameter, the speaker will be connected or disconnected according to this table:

'U0'→ GM sound off   -
Ready Beep off
'U1'→ GM sound on   -
Ready Beep off
'U2'→ GM sound off- Ready Beep on
'U3'→ GM sound on   -
Ready Beep on

V: Version number returned

'GM   counter.   Firmware   version xxxxxxxx'

W: Read finished counts

Reads a register that holds a copy of the primary register. The value is copied each time a count period expires. The register is erased when it is read. If the register is empty when this command is received, a value of "-1" is returned.

To ensure that all values are transferred to the PC, this register should be read on intervals not longer than the counting time.