PCE Americas Inc.
711 Commerce Way
Suite 8
Jupiter
FL-33458
USA
From outside US: +1
Tel: (561) 320-9162
Fax: (561) 320-9176
info@pce-americas.com

PCE Instruments UK Ltd.
Unit 11
Southpoint Business Park
Ensign way
Hampshire / Southampton
United Kingdom, SO31 4RF
From outside UK: +44
Tel: (0) 2380 98703 0
Fax: (0) 2380 98703 9
info@industrial-needs.com

www.pce-instruments.com/english
www.pce-instruments.com

Manual
Geiger Counter
PCE-RAM 10

Please read this manual before switching the unit on.
Important safety information insi

Contents

1. Introduction

Thank you for buying and using our Handheld Multi-function Digital Radiation Detector, which is designed strictly following the new standard. This product is made of highly-sensitive Geigai counter sensor and the latest CMOS integrated circuit technology. The product has functions as data logger, Bluetooth communication data transmission, and powerful software for data evaluation. It can detect α,β,γ,and X ray; it also can detect radiation pulse times. This meter can be widely used in field of Pharmaceutical Factory, laboratory, power station, stone pit, emergency rescue station, metal plant, Oil field and the oil pipeline equipment, environmental protection, police departments and etc. Mainly detect as below;

- Groundwater, radium pollution
- Radioactivity of underground drill pipe and equipment
- Radon radiation cesium pollution of the surround environment
- Radioactivity of construction materials.
- Radioactivity of porcelain, tableware and glass.
- Local radiation leak and nuclear radiation pollution
- The landfill and dump with risk of nuclear radiation
- Radioactive material detection of decoration material for houses and office buildings.
- Harmful radiation of personal property and valuable jewelry
- X-ray Intensity in Medical and Industrial usage

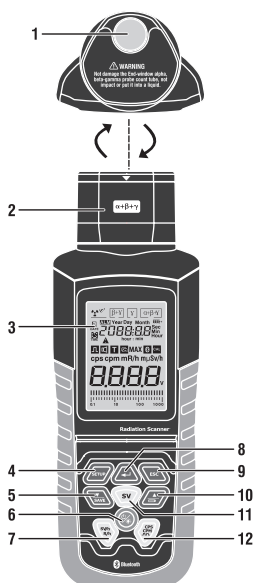
2. Features

- Using imported Geiger counter sensor
- Select button for different ray measurement
- High-difinition LCD display with back-light, measuring dynamic, ray category, reading, real-time time, battery indication, measurement symbols and simulating diagram indication.
- Adjustable indication of average time
- Accumulation of radiation detection value and conversion between different measurement unit

- Alarm, real-time time and Bluetooth data transmission functions
- Pulse counting function
- Automatic selection of measurement range
- Mini impact-resistant design, easy to carry
- Meet ergonomic principle, comfortable hand-feel
- Bluetooth communication data transmission function and powerful software for data evaluation.
- Large internal memory capacity that can directly store 4000 group of data inside, transfer to PC, and no need manual record.

3. Panel description

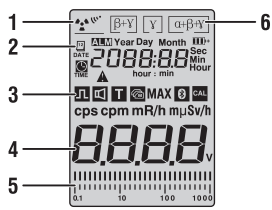
1-Sensor window of testing rays (G.M Geiger counter tube)
2-γ, β+γ, α+ γ+ β, ray measurement two-way(left and right) rotation selector switch
3-Large LCD display with backlight
4-SETUP Button (setting date, time, alarm value, beep volumn switch, measurement time of mean value, Bluetooth switch)
5-Data storage record key and parameter setting down buttons
6-Power switch and back light button
7-SV/h and R/h unit measuring switch button
8-Enter and confirm button
9-ESC exit button (in any setting or measuring conditions, press this button can return to Setup state)
10-Power consumption measurement of batter and parameter setting up key



11-SV unit accumulating count key and timing measuring key
12-CPS,CPM, pulse counting measurement unit switch button

4. LCaD display symbol description

1-Boot nuclear radiation ray measuring dynamic icon indication
2-Real-time date, time indication
3-Measuring function indication
4-Measurement reading and unit indication
5-Simulating bar of measurement reading indication
6-Measuring ray type instruction



5. Specifications

Ray types	α、β、γ and X ray,
Measuring Range (Auto-selection)	Radiation dose rate：0.001μSv/h - 1000μSv/h Pulse dose rate：0-4000cpm, 0-4000cps Accumulated radiation dose value： 0.001μSv - 9999Sv Accumulated Pulse dose rate：0- 9999
Sensitivity	Under the environment of cobalt-60 rays that at 1μSv/h, there are 108times of pulse or 1000 cpm/mR/hr. α–ray – from 4.0 Megavolt β–ray – from 0.2 Megavolt γ–ray – from 0.02 Megavolt X–ray –from 0.02 Megavolt
Accuracy	＜10%(less than 500μSv/h) <20%(less than 600μSv/h);

Selection of rays	Combination selection of α, β, γ, X rays
Sensor	Halogen compensating detector （G.M Geiger counter tube ）
Output port	Wireless Bluetooth Transmission（Space transmission distance is10m ）
Average time	Manual or automatic adjustable between 2 to 12 seconds
Display	Large 4bit digital LCD display with bar graph indications as below: Radiation dose rate, pulse dose rate、Accumulated radiation dose rate, Accumulated pulse dose rate, time, date, alarm value, Max radiation dose rate, type of rays, dynamic measuring icon, battery indication etc.
Alarm Function	Free to set the value of beep alarm，DEFAULT setup is 5μSv/hr
Normal radiation value of natural environment	Less than 0 - 0.2 uSv / h
Internal Memory	Auto-save 4000 groups of datas，record one group of date per second with detailed info as date, time, reading and unit
Bluetooth Transmission	Transmit one group of date every second with date, time, value and unitindicated.
Software	Real time data transmission, analysis, and recording
Working Temp	0°C- 50°C
Weight	206 g
Dimension	200mm x 70mm x 45mm
Power supply	3.6V High-energy li- battery
Quality certificate	European CE, US FCC-15
Warranty	One year for the main engine

Note:

Sievert (mark is Sv , unit:1Sv=100 rem)

rem (roentgen equivalent man)

μSv/h (unit of ray radiation dose rate)

1SV=100Rem

1 rem=1cSv=10mSv

1uR/h=10uSv/h

1mR/h =10mSv/h

CPS : pulse times per second (In the pulse rate model, pulsehas constantly been measured by counter tube and translated into pulse rate)

CPM : pulse counts per minute(In the pulse rate model, pulse has constantly been measured by counter tube and translated into pulse rate

International Safe Icon

⚠ It show that operation must comply with the requirements of the specification

☢ Nuclear radiation icon, it warns that people must be careful and operate as instructions when getting close to the radiation source.

6. Operation instruction

6-1. α,β,γ,ray selection switch

The multi-function digital nuclear radiation scanner adopts high precision Geiger counter tube, reliably measures not only γ rays, but α, β, and X rays as well.By the ray select rotation switch, we can select the measuring rays by choice

1. Switch to the middle for detecting the γ ray .
2. Switch to the left for detecting γ + β ray.
3. Switch to the right for detecting α+ γ+ β ray.
4. Switch at any position, it can detect X rays. When switch

to the middle, α, β rays will be blocked unless the scanner is very close to the radiation source.

Attention: Be careful when rotating the switch to avoid damage to the sensor.

Under normal conditions, the meter can detect the current radiation value quickly and accurately when the sensor window of rays aim at radiation source.

6-2. Power source and back light switch button. 

Note: The stored data will still be saved after turn it off, but the stored data will be lost if it is turned off Inappropriate.

1. Press the switch button for 2 seconds, it will beep shortly, and activate the LCD display; Press again the switch button for 2 seconds to shut down the LCD display.
2. After turn it on, and press the switch button, the LCD back light will be activated, press again, the back light will be shut off. To save energy, the backlight will be automatically shut off 1 minutes after be activated.

6-3. Sv/h and Rem/h button for current radiation dose rate

1. Press the button and into standard mode, it displays the current measurement value (μSv/h).

The measurement results could be read in data mode, and bar graph as well. The bar graph on the lower corner of display will change as the reading fluctuating and is distributed in scales as 0.1,1,10,100.

Note: If the reading is too low, the bar graph will be show in a line.

2. Sv/h and Rem/h unit conversion

Press the button for conversion, which is based on the formula: 10μSv/h=1mRem/h

6.4-Sv Dose accumulation SV

The digital nuclear radiation scanner could also do the measurement, recording the accumulated radiation dose at specific time. The initial unit is μSv, and it will automatically convert to mSv or Sv as the measured dose rate getting higher.

6-5. Button for Dose Rate accumulation

1. Press "SV"button, and enter into the regular infinite dose rate accumulation calculation mode with dose rate icon (μSv) on the display. Press the button again, and enter into timing measurement mode (default value is 60 minutes). Press the button once again to stop the timing measurement mode with a beep warning, and it displays the current accumulated measurement value; Press the button one more time, it will return to regular infinite dose rate accumulation calculation mode.
2. Under the timing measurement mode, press this button for 2 seconds for setting the measuring time, then it displays dose icon (μSv) and time unit icon "min". Now, the display will indicate 3 numbers as 060 as default value, which means 60 minutes, and the maximum is 999 minutes.

The first digit(the hundreds) will be in flashing state for setting directly.

press Enter button once to set tens digit ;

press Enter button the second time to set single digit ;

press ESC ESC button and return to the previous state;

press Enter button for the 3rd time to confirm the time setup and shows the current setting value;

press Enter button for the 4th time into dose accumulative working state, and the icon "TIME" on the top left corner starts flashing.

press SAVE down button or up button to adjust the display value.

Once the measurement time is set, there will be a short beep sound as remind at the end of the measurement. It displays dose accumulative value at that time, and the TIME icon shows and stops flashing. If it is not coming to the timing time yet, press "SV" button into non-timing accumulation state or recording state. if long press this button, you will re-enter into the timing setup mode .

Two methods for stopping the measurement:

Under non-timing condition, short press "SV" button for the 2nd time, stops the accumulate measurement, and into timing measurement; during the process of the timing measurement, short-pressing this button will stop accumulative measurement state.

Choosing other operation mode to zero the measurement results.

6-6. Pulse counting

The multi-function digital nuclear radiation scanner can be also used as an ordinary Gaiger counter. under the setting, it only records received pulse and calculate pulse, it will not be switched to Sv (Dose equivalent unit, 1Sv=100Rem) . The meter shows the received accumulative value of the pulse on LCD.

6-7. Pulse counting measuring button 

1. Pulse Rate Value Indication (CPS/CPM)

In radiation ray pulse rate testing mode, radiation ray pulse is constantly measured by counter tube and then transfer into pulse rate.

Press "CPS/CPM" button once and then press the button again into pulse rate unit switch between CPS and CPM.

CPS : pulse number per second

CPM : pulse number per minute

2. Press "CPS/CPM"key for the 3rd time into pulse counting mode, and it will display the pulse icon. Press the"CPS/CPM" button again (the 4th time) to end pulse counting. There will be a beep sound as a remind of entering into timing pulse counting mode, and shows

the pulse and timing flashing icon on display; press this button again to stop pulse counting; pressing once again will return to CPS pulse counting function.

3. Long press "CPS/CPM" button for two seconds or under "pulse" measurement mode, and will enter into measuring time setup mode, and the screen shows "pulse" and "time" icon. At this time, the display shows three digits, default value is 060, means 60 minutes, max to 999 minutes, and the first digit(the hundreds) is in blinking state, and this value can be set directly.

press  enter key for the first time to set tens digit

press  enter key for the second time to set single digit;

press  ESC button and return to the previous state;

press  enter button the third time to confirm and complete time input and show the current setting value;

press  enter button for the fourth time, enter into timing dose accumulative working state, and the icon "time" on the top left corner starts blashing;

press  down key or  up key to adjust the display value.

If measurement time is set, there will be a short beep sound at end of the measurement.

By then, it will display the measured accumulative value at that time. Meanwhile, the TIME icon will be shown and stops flashing.

Two methods for stopping the measurement:

Under not-timing condition, short press "CPS/CPM" pulse button for the 4th time, end of the accumulative measurement, and into timing measurement; during the timing measurement, short press this button to stop the accumulative measuring state.

Choosing other operation mode, then measuring results disappear.

6-8. Menu setup

Press "setup" button into menu setting interface: Date, time, alarm, pulse volumn , average time set(T), Bluetooth wireless data transmission(BT); 1 minute after press the button and left it untouched, it will automatically return to "μSv/h" measurement mode.

Date format: year, month, day
Time format: hour, minute, second
Alarm threshold: 1-999μSv/h, default value 205μSv/h
Pulse sound: ON/OFF
Time setting for average radiation measurement: the setup can change the processing reaction time of the meter against radiation source with setup range from 8s to 120s. With the increasing of radiation dose rate, it will automatically and proportionally reduce the average time according to the current setting average time. When the setting time is 8s and the radiation strength is more than 5μSv/h, the fastest response time can reach is 2s. Factory default time is 30s.
Bluetooth data transmission: "ON" and "OFF".

6-9. Date Setup

1. Press "setup" button once, select "DATE" icon by pressing "UP" or "DOWN" buttons, and the icon will be in flashing state. Press ENTER button to confirm your choice, and press ENTER button again for setup of "year", "month", and "day". For example, when "year" icon is flashing, press "UP" or "DOWN" button to adjust the value, then press "enter" to confirm.
2. Press "ENTER" button and set "month", when "month" icon is flashing, press "UP" or DOWN" to adjust the value, then confirm the setup by pressing ENTER.
3. Press ENTER for the 3rd time to set "day", the method is the same as above.
4. After finishing setting, press SETUP and return to main menu, select the next setup or press "ESC" to exit.

6-10. Time Setup

Press "setup" button once, select "TIME" icon through "UP" or "DOWN". Same method of DATE setup as above(hour, minute, second).

6-11. Alarm Threshold Value Setup (default value is 205uSv/h)

1. Press "SETUP" button once, then select "ALM" (BL) icon through "UP" or "DOWN" button. Then, the "ALM" icon will flash, press ENTER button to confirm your option, and press ENTER button once again to set the single digit, ten digit and hundred digit. The related digit will flash, and can be adjusted by pressing "UP" or "DOWN" button. After completing the setting, press "SETUP" and return to main menu.
2. When the measurement value is more than your set value, there will be continuous beep sound.

6-12. Pulse sound ON&OFF Setup

1. Press "setup" button once, and select icon by pressing "UP" and "DOWN" button. The icon will be flashing, and press ENTER button to confirm your option. it will display "OFF" and "ON" and in flashing sate, and then select pulse sound ON or OFF state via "UP " and "DOWN" button, and press ENTER to confirm your choice. After the setting, press SETUP to return to main menu, select next menu or press "ESC" button to exit.
2. When radiation ray has been detected, there will be a "tick" sound. And the stronger the radiation signal is, the faster the response frequency will be.

6-13. Setup of average time of radiation measurement (default value is 30s)

1. Press "setup" button once, select "T" icon by "UP" or "DOWN" button, and "T" icon will be flashing. Press ENTER to confirm your option, press ENTER button again to adjust the time, single, tens, and hundreds that flashing, by "UP" or "DOWN" button.
2.After the setting, press SETUP button to return to the main menu, select the next menu or press "ESC" button to exit.

6-14. Data storage (SAVE)

1. Press " SAVE" button once, and it will automatically save the current measuring dose rate value. Record mode is to record a measuring value every other minute, with max record memory of 4000 group of data (including real-time date, time, measurement value and measurement unit). When the record memory is full, the meter will automatically refresh the first recorded groups of data, and circulating record the data again.
2. Press "SAVE' button again and will exit data storage mode.

6-15. Bluetooth data transmission (BT)

1.Press "SETUP" button once, select "Bluetooth" (BL) icon by "UP" or "DOWN" button, and icon will be flashing. Press ENTER button to confirm your option, and it will shows OFF and ON on the display. By pressing "UP" or "DOWN" button again to select "on" or "off" of the Bluetooth. After complete the setting, press "ESC" to exit, and it will show BL icon on the display.

2.If not press the "SAVE" button during the transmission, the Bluetooth measuring data is real-time measurement.

3. If press "SAVE" button, it will automatically record the measurement data during the transmission.

**** For the connection with PC, pls. refer to the software operation instruction.

7.Battery Voltage Detection function

1. The multi-function digital nuclear radiation scanner uses supper-powerful Lithium battery.
Press "UP or BATTERY DETECTION" button, it will display the internal battery voltage, normal voltage is 2.7V to 3.7V.
2. Press "ESC" button to exit battery voltage detection function.
3. If the power supply is too low (less than 2.7V), the battery icon will indicate accordingly by flashing and reducing. By then, replacing the same battery is suggested.

Note: when battery is seriously exhausted, the meter will automatically power-off and the stored data will be lost.