MetRad1
Handheld Metal/Gamma Detection Unit

Operation Manual

BNC Berkeley Nucleonics

Test, Measurement and Nuclear Instrumentation since 1963

GENERAL

Thank you for purchasing the Model MetRad 1 - Handheld Metal / Gamma Detection unit. Before operating the unit, please read this manual thoroughly, and retain it for future reference.

The MetRad 1 is a handheld metal detector with added functionality to allow detection and location of radioactive sources in the subject baggage and personnel. During a single scan the MetRad 1 allows simultaneous detection of metals and radioactive substances, saving clearance time, reducing the number of instruments used at checkpoints improving overall security operations.

The MetRad 1 gamma sensor couples a large volume detection module with state-of-the-art electronics which results in excellent sensitivity to shielded or very low gamma radiation sources. The MetRad 1 is compliant with the ANSI N42.32 standard for personal radiation detectors (PRDs) used in homeland security.

The rugged instrument can be used by a wide range of inspectors. Some examples include customs and border protection officers, transportation security and police services, security guards in airports, building entries, secure public events and critical infrastructure. Performance is reliable in both indoor and outdoor settings, ensuring the same product can be used for inspection of people, vehicles, luggage, hand luggage, premises and open areas.

DELIVERY KIT

The MetRad 1 standard delivery kit is shown in table below:

Description	Qty
Handheld Metal / Gamma Detection Unit (Model MetRad 1)	1
Battery (Type 6F22), Non-Rechargeable	1
Operations Manual	1
Packaging	1

Optionally, the device may be supplied with a 9V Rechargeable 6F22 battery and an external 110/220V AC Charger.

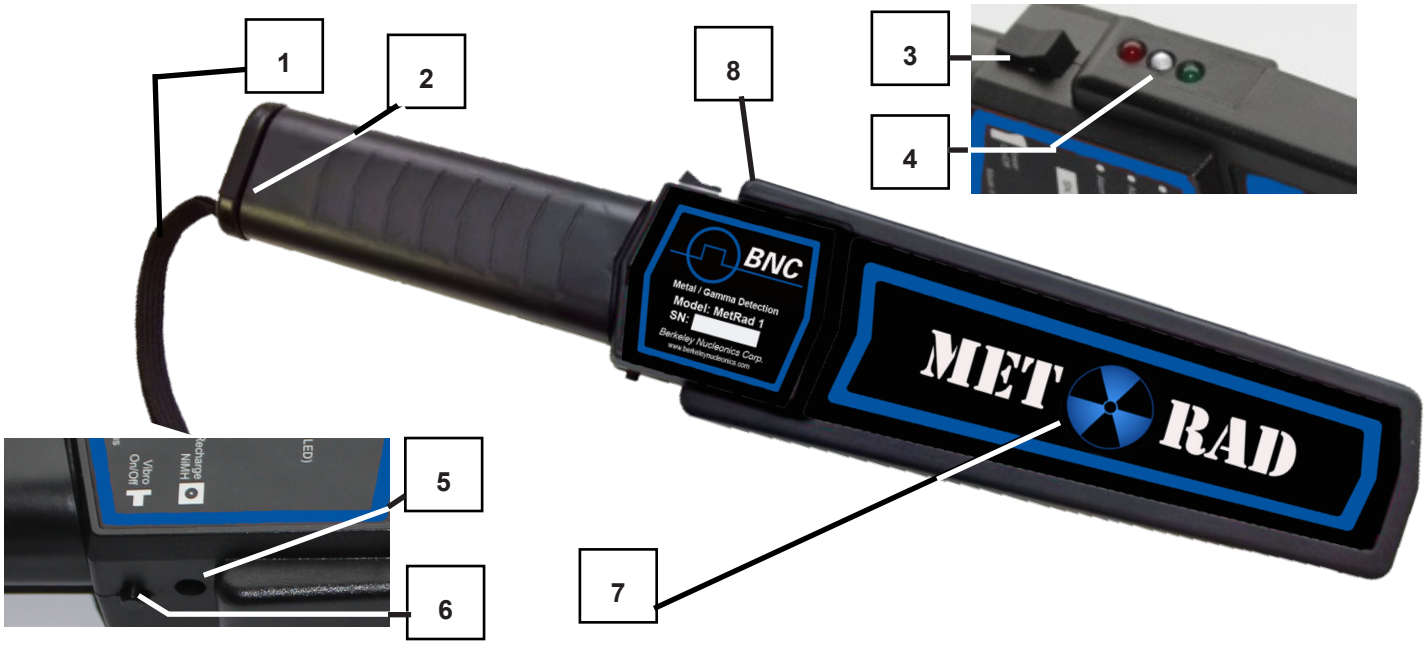
NOTE: Use caution when charging the batteries. Use only rechargeable batteries when connecting an external AC charger, as non-rechargeable batteries can explode and cause a fire.

SPECIFICATIONS

Three-Color LED Indicator	Green LED = ON / Active Blue LED = GAMMA ALARM Red LED = METAL ALARM
Gamma Detector	3 cc CsI(Tl) with SiPM
Gamma Energy Range	15 KeV to 3 MeV
Time to Alarm, Gamma	2 seconds
Preset Threshold	30 µR/h (0.30 µSv/h)
Metal Detector, Frequency	40 kHz
Minimal Metal Detection Distance (in the air)	Assault Knife: 150mm (±10mm) Handgun: 200mm (±10mm) Magnetic Plate 100mmX100mm: 200mm (±10mm) Led Container: 200 mm (±10mm)
Suggested Scanning Speed	0.1 M/Sec to 0.5 M/Sec
Ingress Protection	IP65
Battery	9V Type 6F22
Battery Lifetime (under normal operating conditions)	500 hours active use
Operating Temperatures	-20° C to +50° C
Humidity	Up to 95% at 30° C
Pressure	84 kPa to 106.7 kPa
Size	420 x 85 x 45 mm
Weight	400 grams (<1.0 lbs)

Note: For more detailed specifications, please contact manufacturer

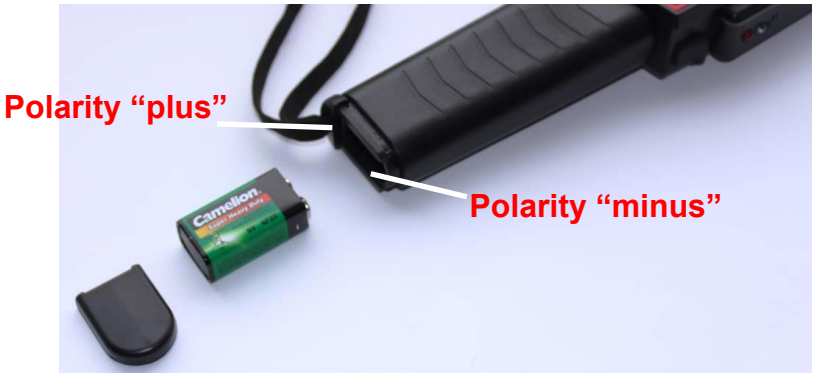
COMPONENETS



1 – Safety Strap
2 – Battery Compartment Cover
3 – On/Off Switch
4 – Light Alerts (Green / Yellow, Blue and Red)
5 – Battery Charger Port
6 – Silent Mode Button (Vibration Only)
7 – Center of Detector (Detection Area)
8 – Sensitivity Adjustment Button

BATTERY INSTALLATION

To install the battery, first open the battery compartment cover (2) by sliding it to the direction opposite to the safety strap location. Install the battery with correct polarity (the battery compartment is marked with positive (+) and negative (□) symbols), see the figure below:



Replace the battery compartment cover and make sure it sits tight.

CAUTION: When used with non-rechargeable batteries, do not connect the unit to the external AC charger. This can cause a fire or explosion.

TURNING THE UNIT ON/OFF

To operate the unit, turn it ON by setting the power switch (3) to the forward position. The green LED on the panel (4) will illuminate and stay on until device is turned off.

If the power LED does not turn green, or there is a continuous sound or vibration, the battery is depleted and needs to be replaced. Replace or recharge the battery and then try again.

OPERATING THE UNIT

Once the power is turned on, and the device is set to vibration or audio alarm using button (6), use the detection area (7) of the MetRad 1 to look for metal and/or radioactive objects.

Searching for Metal

Before starting the inspection procedure, it is recommended to test the detector first by sweeping it across a known metal object and checking detection with audio/vibration and visual alarms.

To search for metal objects move the MetRad 1 over the subject, with a smooth, even motion, about one inch from the surface. A continuous sound or vibration alarm will go off and the red LED will illuminate whenever metal is detected.

Note: The metal detection works only when the detector is in motion.

Searching for Radiation

The Radiation Detector of the MetRad 1 is always ON when the unit is ON. Unlike the detection of metal objects, motion is not required to activate the gamma detector. It will alarm on any gamma radioactive sources in the local vicinity. To search for radioactive sources, scan target baggage, people or areas as described in section above. When a gamma radiation source is detected (and the manufacturer's preset threshold is exceeded) the sound/vibration signal will alert the user. This audible alarm is different from the metal audible alarm. The gamma alarm will also trigger a BLUE LED to illuminate. The rate of alarm indication will increase as the unit approaches the radioactive source and decreases as the distance between the source and the detector increases. This aids localization of the source material.

Note: The manufacturer preset threshold is set to 30 30 μR/h (0.30 μSv/h).

If you locate a gamma source and want to increase the alarm threshold, press and hold the sensitivity adjustment button (8) while in the max alarm status. This will gradually increase preset threshold and continue until the alarm stops. After the adjustment, you can continue inspection procedure normally looking for even stronger radiation gamma sources. When you return the unit to normal background conditions, the detector will re-calibrate automatically and return to its initial threshold level.

Caution: In the event of a gamma alarm, be sure to follow standard procedures to limit exposure to personnel.

There are three main factors that impact gamma radiation detection and they should be emphasized during inspection procedures:

a) Distance: The shorter the distance from the source to the detector the higher the probability of detection, and the smaller the radioactive contamination levels that can be identified.

b) Speed: The slower the speed of movement of the detector across the inspected object the higher is probability of gamma detection.

c) Shielding. As sources are shielded, they become difficult to detector. The larger the shield is, the less the detection probability is. The most common shielding material for gamma radioactive sources is metal (for example, lead). It is likely that if your target has shielded radiation sources, you will experience a combined alarm (both metal and gamma).

MAINTANANCE AND TROUBLESHOOTING

Maintenance of the device is usually limited to replacing or charging the battery. If stored for long time, remove the battery from the detector to avoid leakage. In case of radioactive contamination of the unit's surface, clean it with a soft cloth and an ethyl alcohol or similar decontaminants solution.

WARRANTY

Berkeley Nucleonics Corporation warrants to the purchaser that the Product, including component parts, to be free from defects in material and workmanship, under normal use and service for a period of one year (the "Warranty Period") *provided, however*, that the foregoing warranties are expressly contingent (and shall otherwise be void) upon use of the Products in accordance with specifications and without misuse, abuse, or abnormal use, accident, damage, alteration, or modification thereto or improper or unauthorized repairs or improper maintenance. Specifications are subject to change without notice.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