Safety-Guard™

Advancing Technology
for a Safer World

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

Introduction

World events of late have increased the need for better security at borders, airports, seaports and other critical infrastructure to guard against illicit trafficking of nuclear related materials. The willingness of terrorists to sacrifice their own lives to achieve their evil causes creates a new dimension in safeguarding our respective areas of the world.

Because radiation knows no boundaries, these unconventional threats require unconventional responses to protect our population from the potentially terrible consequences. The world populace, which entrusted their governments with the security of nuclear materials in the past, are now demanding a strong defense to detect any clandestine attempts to incite panic, contaminate property or cause injury and death among its civilian populations.

Those assigned with designing border and other protective systems in pursuit of 100% detectability and capture are faced with a daunting task on several fronts. Key factors in the design and selection of such systems include operator-friendliness, reliability, durability, high sensitivity and unquestionable security against tampering to name a few.

Comprehending the complex nuclear physics involved in detecting the large variety of radioactive materials against unknown and limitless shielding configurations and vehicle geometries at varying speeds and background conditions can be overwhelming to those not endowed with this type of background and understanding. The challenge in detecting these materials cloaked behind devious intentions ultimately requires highly intelligent and highly sensitive systems to assure reliable and consistent results.

Experience that Counts

Thermo Fisher Scientific is dedicated to providing optimum solutions to best suit each specific border or protective boundary to maximize protection under these most difficult of circumstances. They not only understand the complexity of the situation, but also have the experience with over 1800 such systems in use throughout the world.

Our company has a long history of safeguarding governments and private industry alike for well over 5 decades. Our leadership position has been justifiably earned through the dedicated efforts of our staff of scientists, engineers and quality-oriented manufacturing personnel who have strived to provide systems offering the highest degree of safety and reliability possible.

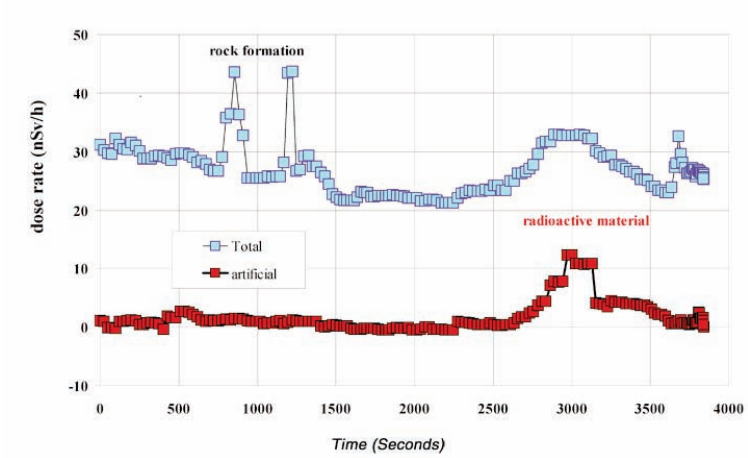
The Right Technology- NBR

Detecting nuclear materials in these difficult conditions requires more than just dedication and hard work; it also requires the right technology. Thermo Fisher Scientific invented its industry leading and well-renown Natural Background Reduction (NBR) technology to address the complex scenarios facing control point applications. This latest version of NBR reflects the use of better detector materials, improved electronics and enhanced algorithms.

The NBR technology utilizes an ingenious methodology to differentiate between nuclides of concern and any naturally occurring radioactive materials (NORM) against fluctuating background conditions, which otherwise cause interference and loss of sensitivity. The NBR technology enhances throughput of the system by allowing NORM induced activity such as those commonly found in building materials and household goods to pass through without compromising the systems ability to catch materials of concern. Equally important, it does so without added complexity and cost which might burden the system. When compared to more sophisticated and costly spectral-based systems, the NBR technology accomplishes the necessary task in real time with minimum cost and expertise required to support operations.

When sorting out a real source from naturally induced interferences, the NBR technology leads to less confusion within the system . Its true benefit is the lower alarm threshold achievable while simultaneously not jeopardizing the false positives. Simply put, NBR results in enhanced sensitivity and fewer innocent alarms. This translates into greater throughput with fewer interruptions and costly delays.

Thermo Fisher Scientific's NBR technology is a very successful counting technique that has proven itself in many parts of the world where enhanced sensitivity, lowered innocent alarms and ability to ignore background fluctuations due to natural occurring circumstances are vitally important.



The graph above depicts two simultaneous signals, both from an identical gamma-sensitive detector. The upper (blue) line represents the normal "gross" count channel as produced from a normal system using standard counting technologies. The lower (red) signal is generated by the NBR technology driven channel which ignores natural background influences.

As can clearly be seen, the upper gross counting channel is easily fooled by the high count rates exhibited by common rock material. The lower NBR channel on the other hand remains undisturbed by these naturally occurring disturbances while still clearly and more sharply detecting "artificial" or man-made radioactive materials sources intended to induce an alarm.

NBR = Increased sensitivity with fewer false alarms

Configurable Approach

The Safety Guard System series offer the latest intelligent radiological detection systems configured to optimize site-specific criteria in the most cost-efficient manner possible. With this forward-thinking approach, each system can be configured to support the sensitivity level, data handling and appropriate alarm response that perfectly matches the specific needs and budget of each site. Thermo Fisher Scientific believes this configured approach helps simplify selection of the right system to meet the mission profile, and ultimately results in a superior system with streamlined implementation and startup.

Detector Selection

Selecting the best system for the intended application begins with identifying the right detector and physical arrangement to meet the application.

All the detectors offered in the SGS series utilize high quality materials and components packaged to support the rigors of the environment into which they are placed:

- Stainless steel cabinets with aluminum doors that do not rust and provide for better detection performance.
- Lead lined cabinets provide for better detection performance and significantly reduce support frame construction costs.
- High quality stainless steel "Banner" proximity sensors with shrouds that work reliably in the most demanding environment
- Easy to access cabinets with lockable half-turn three-point latch (does not have dozens of clamps to unscrew)

Two types of detector sensors are offered, one for gamma and another for neutrons. These sensors may be purchased either independently or in combination with each other.

The gamma sensitive detectors are large area 5 cm (2") thick plastic scintillators using premium material which offer high efficiency to gamma energies beginning at 5 keV. These detector designs provide a highly uniform response across the detector face and employ 3 mm (0.125") of lead shielding to reduce background. The neutron detectors are high-efficiency ^{3}He pressurized tubes.

Sensitivity of the system is a function of area coverage, the more area the greater the overall visibility to any potential radioactive source emanating from the objects being measured. Two detector sizes are offered, the Model 400G and 1500G. The model numbers represent the overall volume of the plastic material utilized in these designs. The Model 400GN and 1500GN include the neutron detectors which are integral to the detector housing.

Multiple detectors may be combined to increase vertical coverage, horizontally to enhance the speed at which vehicles pass by or additionally cover the top or bottom of objects being scanned. Detectors are configured to meet your specific needs: up to 4 Gamma or up to 8 Neutron detectors.

The Model SGS-400 conveyor radiation monitors are specially configured to mount to conveyor systems conveying packages or articles in a cost-effective manner. A programmable controller monitors all detector data, generates alarms and stores data for later analysis.

Thermo Fisher Scientific specialists will be glad to help you configure a detector arrangement best suited to meet your detection criteria.

SGSII-4500E2 offers multiple lane with overhead coverage

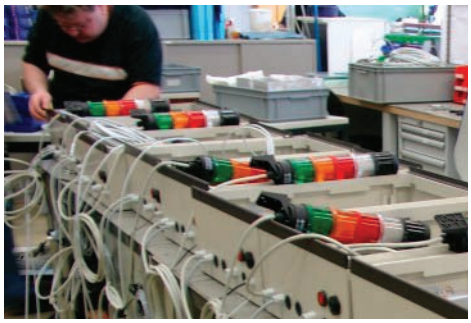
Gamma Detector Specifications (per detector)

	400G	1500G
Volume:	416 in^3	1440 in^3
Sensitivity:	500 cps/uR/h	1500 cps/uR/h
Detector Plastic Size:	66 H x 20 W x 5 D cm (26" H x 8" W x 2" D)	122 H x 38 W x 5 D cm (48" H x 15" W x 2" D)
Detector Enclosure Size:	76 H x 51 W x 24 D cm (30" H x 20" W x 9" D)	183 H x 46 W x 31 D cm (72" H x 18" W x 12" D)
Weight:	45 kg (100 lbs.)	154 kg (340 lbs.)

Neutron Detector Specifications

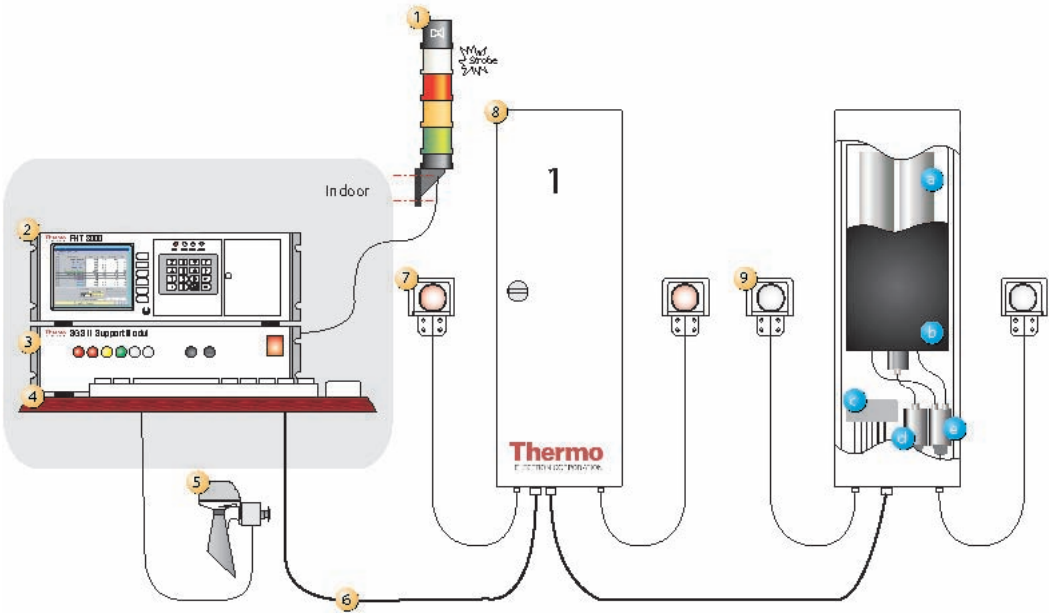
Gas Filling:	^{3}He, 3 atm
Sensitivity (per detector):	approx. 150 cps/n/sec/cm^2

SGSI-400G, designed to mount to conveyor systems



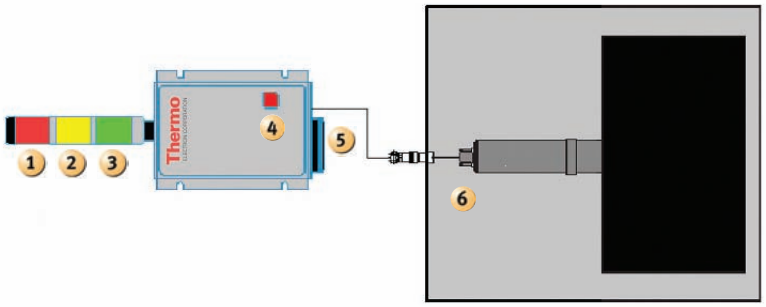
SGSII-6000GN2, four 1500 detectors for increased vertical height coverage

SGSII-3000GN System Diagram (Neutron Detection included in GN)



1. Alarm Tower indicates Normal Operation, Radiation Detected and a Strobe for Speed Alarm
2. Advanced SGS Series II Controller
3. SGSII Alarm Status Panel
4. Keyboard and Mouse
5. Large Horn and Push Button to mute horn in case of alarm
6. RS485 Data cable including sensor signals
7. Object Sensor: Receiver
8. SGS 1500GN Detector
9. Object Sensor: Transmitter
   - a. ^{3}He Neutron Detectors
   - b. Large volume plastic scintillator gamma ray detector
   - c. Terminals
   - d. Intelligent Pre-Amplifier FHT 671
   - e. Intelligent Pre-Amplifier FHT 641

SGSI-400G Diagram (Neutron Detection optional)



1. High level alarm
2. Alert
3. Power
4. Alarm reset
5. Audible alarms
6. Detector assembly

Support Services

Thermo Support Plans

You have chosen the best radiation measurement and protection equipment on the market, now it is time to protect it.

Thermo Fisher Scientific is committed to providing you with the Trained and Certified Service and Support that you expect. We offer a wide variety of Field Service Plans and e-Service Support Plans to meet your requirements. Performance agreements range from regular Planned Maintenance Plans to Premium total system coverage. Please review your options and choose the solution that is right for you.

Field Service

Field Service is available across the world. Please refer to the Field Service Product Bulletin for more information. Consider a Field Service Plan for even greater service features; including 3 business day on-site arrival guarantee, no per incidence charge, and relocation service. Also evaluate an e-Support Agreement for advanced remote monitoring.

Field Service Plans

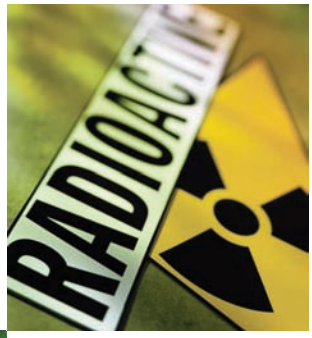
Field Service Plans are designed for the customer who requires on-site service and/or where Depot Service is not available. Thermo provides on-site service from one of its Service Centers. In the US pricing is structured in 4 Service Zones. Your Zone is determined by the distance to the nearest radiation product service center that services your equipment. Refer to the Field Service Plan Bulletin for more information.

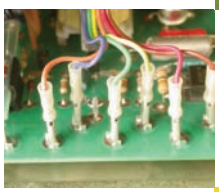
e-Support Plans

One of our most popular service offerings is Thermo's e-support, which offers a wide range of monitoring options. E-support refers to the ability to provide direct radiation instrument support to an installed radiation system by means of remote communications over ordinary voice telephone lines, wireless communication or the internet. Instant, daily, or monthly notification options are available, helping you verify the entire system is up and operating correctly.

ASAP

The Automated Service Alert Program is a popular service offered by Thermo. ASAP allows our trained staff to contact your system on a contracted period of your choosing. Once connected, our ASAP program performs a complete diagnostics check to verify the entire system is up and operating correctly. All data is reviewed by our dedicated staff, in the event of non-compliance an alert certificate is e-mailed, faxed, or mailed to the designated administrator.





About Thermo Fisher Scientific

Thermo Fisher Scientific offers a complete line of high-sensitivity instrumentation designed for national and international safeguard organizations, defense and law enforcement agencies to detect illicit radioactive materials and monitor areas for radioactivity: Portal monitors; hand-held radiation detectors; mobile radiation detection systems to provide unobtrusive surveillance, detection and spectroscopic isotope identification; ViewPoint™ Enterprise, a monitoring software platform integrating data from sensors to provide real-time date. More information and product descriptions of our radiation instrumentation line can be found at www.thermo.com/rmp.

USA:
27 Forge Parkway
Franklin, MA
USA
(505) 274 4212
(505) 428 3535 fax

UK:
Bath Road
Beenham, Reading RG7 5PR
England
+44 (0) 118 971 2121
+44 (0) 118 971 2835 fax

Europe / Middle East / Africa / Asia:
Frauenauracher Strasse 96
D 91056 Erlangen
Germany
+49 (0) 9131 909-0
+49 (0) 9131 909-205 fax

www.thermo.com/rmp