

## SARA – SPECTROSCOPIC GAMMA DETECTOR

This self-contained spectroscopic in-situ gamma detector is designed to measure and analyze online and continuously the gamma spectra under environmental conditions. SARA is able to detect even minor changes of the composition of the nuclear spectra in the environment. This improves significantly the recognition of artificial isotopes, which is very important for the radiation early warning system, for example. It does not only support the fast detection of artificial radiation but it can also identify the nuclear isotopes. It is designed for outdoor use even in harsh environments and for continuous operation without any maintenance. Hermetically sealed detector unit guarantees optimal protection for the detector and the electronics against environmental conditions. The NaI(Tl), CeBr<sub>3</sub> or LaBr<sub>3</sub>(Ce)-based scintillation detector together with the MCA (multi-channel analyzer) provide high energy resolution under ambient temperature operation conditions. The integrated embedded Linux-PC enables online isotope identification and versatile data exchange through several interfaces. The standardized ANSI N42.42 protocol enables the use of many spectra evaluation software programs. An integrated web server facilitates data access using a web browser. SARA measures the total and nuclide specific gamma dose rate in units of the ambient dose equivalent rate H\*(10). For an extended gamma dose rate range an additional Geiger-Müller-detector (GM) or a high dose rate spectrometer can be integrated as option.

### FEATURES

- Fast detection of very low artificial radiation
- Online spectrum analysis
- In-situ isotope identification
- Standardized data protocol ANSI N42.42-2012 (XML-based)
- Embedded PC with LINUX provides ultimate flexibility
- Operation under harsh environmental conditions
- Absolute unattended operation
- Easy to maintain - neither consumables nor wear parts
- Rugged design (IP 68)
- Easy and quick set up
- Detector verification supported automatically with optional test set
- **Optimized glass fiber housing for low gamma energy**
- **Integrated LTE und GPS antenna**

### FUNCTIONS

- **Nonvolatile memory for 3 years of data or more**
- **Three user configurable aggregation intervals**
- Dose rate evaluation for each aggregation interval
- Nuclide specific evaluation: H\*(10), Bq/m<sup>2</sup> and Bq/m<sup>3</sup>
- Nuclide identification
- **Extended dose rate range with additional GM detector or high dose rate spectrometer\* as option**
- Freely configurable nuclide library
- Isotope based alarm management
- Integrated detector accuracy test
- Data access and parameter setting with web browser
- Characteristic limits of peak/nuclide analysis according ISO11929
- **Integrated WiFi for wireless service**

\*patent DE 10 2016 117 356



### ORDERING INFORMATION

SARA can be selected as follows (examples):

|  | LTE | GPS |
|--|-----|-----|
| SARA-1xx-L4  | X   |     |
| SARA-1xx-L4-G  | X   | X   |
| SARA-1xx-L   |     |     |
| SARA-1xx-Lx-xT comes with additional GM detector.              |     |     |
| SARA-1xx-Lx-xH with an additional high dose rate spectrometer. |     |     |

|  | Unit              | SARA-121  | SARA-122            | SARA-120            | SARA-101            | SARA-103            | SARA-111               | SARA-112               | SARA-110               |
|--|-------------------|---|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|------------------------|
| <b>Spectroscopic detector</b>  |                   |   |                     |                     |                     |                     |                        |                        |                        |
| <b>Material</b>  |                   | CeBr <sub>3</sub>   | CeBr <sub>3</sub>   | CeBr <sub>3</sub>   | NaI(Tl)             | NaI(Tl)             | LaBr <sub>3</sub> (Ce) | LaBr <sub>3</sub> (Ce) | LaBr <sub>3</sub> (Ce) |
| <b>Size</b>  | Inch              | 1.5x1.5   | 2.0x2.0             | 1.0x1.0             | 1.5x1.5             | 3.0x3.0             | 1.5x1.5                | 2.0x2.0                | 1.0x1.0                |
| <b>Dose rate range<sup>1</sup></b>   | μSv/h             | 0.001...1000  | 0.001...600         | 0.001...2000        | 0.001...400         | 0.001...100         | 0.001...1000           | 0.001...600            | 0.001...2000           |
| <b>Accuracy</b>  | %                 | +/-10   | +/-10               | +/-10               | +/-10               | +/-10               | +/-10                  | +/-10                  | +/-10                  |
| <b>Energy resolution<sup>1</sup></b>   | FWHM (guaranteed) | typ. 4.0 % (<4.5 %)   | typ. 4.0 % (<4.5 %) | typ. 4.0 % (<4.5 %) | typ. 6.5 % (<7.8 %) | typ. 6.6 % (<7.8 %) | typ. 2.8 % (<3.3 %)    | typ. 3.5 % (<3.9 %)    | typ. 3.5 % (<3.9 %)    |
| <b>Energy range</b>  | keV               | 30...3000   |                     |                     |                     |                     |                        |                        |                        |
| <b>Total efficiency<sup>1</sup></b>  | cpm / μSv/h       | 62500   | 119000              | 20400               | 61200               | 260000              | 62500                  | 112000                 | 20400                  |
| <b>Photopeak efficiency<sup>1</sup></b>  | cpm / μSv/h       | 11300   | 31000               | 3200                | 9900                | 70600               | 11300                  | 29200                  | 3200                   |
| <b>Intrinsic background</b>  | nSv/h             | <5  | <10                 | <5                  | <5                  | <5                  | 100                    | 130                    | 100                    |
| <b>MCA</b>   |                   |   |                     |                     |                     |                     |                        |                        |                        |
| <b>Number of channels</b>  |                   | 8192 (2048 used)  |                     |                     |                     |                     |                        |                        |                        |
| <b>ADC</b>   | Bit               | 14  |                     |                     |                     |                     |                        |                        |                        |
| <b>ADC Sampling Rate</b>   | MSPS              | 40  |                     |                     |                     |                     |                        |                        |                        |
| <b>Filtering</b>   |                   | Digital   |                     |                     |                     |                     |                        |                        |                        |
| <b>Option additional integrated Geiger Mueller tube (GM) model SARA-500-T or SARA-500-X</b>                  |                   |   |                     |                     |                     |                     |                        |                        |                        |
|  |                   | SARA-500-T  |                     |                     |                     | SARA-500-X          |                        |                        |                        |
| <b>Range</b>   | mSv/h             | 0.04...1000   |                     |                     |                     | 0.2...10000         |                        |                        |                        |
| <b>Accuracy</b>  | %                 | +/-15   |                     |                     |                     | +15/-15             |                        |                        |                        |
| <b>Sensitivity</b>   | cpm / μSv/h       | 7.15  |                     |                     |                     | 1.03                |                        |                        |                        |
| <b>Intrinsic background</b>  | nSv/h             | <270  |                     |                     |                     | --                  |                        |                        |                        |
| <b>Energy range</b>  | keV               | 50..1250  |                     |                     |                     | 70 .. 1300          |                        |                        |                        |
| <b>Option additional integrated high dose rate spectrometer model SARA-500-H (patent DE 10 2016 117 356)</b> |                   |   |                     |                     |                     |                     |                        |                        |                        |
| <b>Detector</b>  |                   | CeBr <sub>3</sub>   |                     |                     |                     |                     |                        |                        |                        |
| <b>Range</b>   | mSv/h             | 0.05...100  |                     |                     |                     |                     |                        |                        |                        |
| <b>Accuracy</b>  | %                 | +/-15%  |                     |                     |                     |                     |                        |                        |                        |
| <b>Energy resolution<sup>1</sup></b>   | FWHM              | Typ. 7%   |                     |                     |                     |                     |                        |                        |                        |
| <b>Energy range</b>  | keV               | 30 keV...3.0 MeV  |                     |                     |                     |                     |                        |                        |                        |
| <b>Total efficiency<sup>1</sup></b>  | cpm / μSv/h       | 1650  |                     |                     |                     |                     |                        |                        |                        |
| <b>Photopeak efficiency<sup>1</sup></b>  | cpm / μSv/h       | 125   |                     |                     |                     |                     |                        |                        |                        |
| <b>Environmental specification</b>   |                   |   |                     |                     |                     |                     |                        |                        |                        |
| <b>Operation temperature</b>   | °C                | -40...+60   |                     |                     |                     |                     |                        |                        |                        |
|  | °F                | -40...+140  |                     |                     |                     |                     |                        |                        |                        |
| <b>LTE transmission</b>  | °C                | -30...+60   |                     |                     |                     |                     |                        |                        |                        |
|  | °F                | -22...+140  |                     |                     |                     |                     |                        |                        |                        |
| <b>Protection class</b>  |                   | IP68  |                     |                     |                     |                     |                        |                        |                        |
| <b>Humidity</b>  | %                 | 0...100   |                     |                     |                     |                     |                        |                        |                        |
| <b>Electrical specification</b>  |                   |   |                     |                     |                     |                     |                        |                        |                        |
| <b>Power</b>   | W                 | 2.2 (average)   |                     |                     |                     |                     |                        |                        |                        |
| <b>Supply voltage</b>  | V                 | 7...30  |                     |                     |                     |                     |                        |                        |                        |
| <b>EMC-proofed</b>   |                   | EN55022:2006+A1:2007+A2:2010 Class B<br>EN55024:1998+A1:2001+A2:2003                                |                     |                     |                     |                     |                        |                        |                        |
| <b>Size and weight specification</b>   |                   |   |                     |                     |                     |                     |                        |                        |                        |
| <b>Diameter</b>  | mm (in)           | 94/134 (3.70/5.28)  |                     |                     |                     |                     |                        |                        |                        |
| <b>Height</b>  | mm (in)           | 502 (19.76)   |                     |                     |                     |                     |                        |                        |                        |
| <b>Weight</b>  | kg (lb)           | 1.95 (4.30)   | 2.26 (4.97)         | 3.90 (8.59)         | 1.89 (4.17)         | 3.40 (7.5)          | 1.95 (4.30)            | 2.25 (4.96)            | 1.80 (3.96)            |
| <b>Communication interfaces</b>  |                   | Ethernet 100 Mbit/s<br>RS232 (Service)<br>WiFi (for wireless service)<br>Optional: LTE (SARA-400-4) |                     |                     |                     |                     |                        |                        |                        |
| <b>Protocols</b>   |                   | HTTP, FTP, MODBUS, OpenVPN, SSH   |                     |                     |                     |                     |                        |                        |                        |
| <b>Optional extensions</b>   |                   | GPS (SARA-500-G)  |                     |                     |                     |                     |                        |                        |                        |
| <b>Optional Accessory</b>  |                   | Test Set (SARA-800-0100)  |                     |                     |                     |                     |                        |                        |                        |

<sup>1</sup> Cs-137

## RELATED PRODUCTS: SARA–SPECTROSCOPIC MONITORING STATION