# Radiation Sensor HOME

Wireless, portable device for measuring levels of ionizing radiation ($\gamma$, $\beta$). This sensor, belonging to the HOME sensor series, is intended to be used together with the *Aranet Home* mobile application for extended data browsing capabilities.

## Product numbers

| | |
|---|---|
| Globally | TDSNUCH1 |

## Sensor performance

### Sensor element description

| | |
|---|---|
| Detector type | PIN diode |
| Detected types of radiation | $\gamma$, $\beta$, x-rays |
| Accuracy in calibrated energy range | ±20 % |
| Calibrated photon energy range | 200–1500 keV |
| Full photon energy range | 80–1500 keV |

- The specified accuracy applies to $\gamma$ radiation measurements in the 200–1500 keV photon energy range. Device is calibrated using a Cs-137 radiation source.
- As a result, the device is not calibrated to provide precise measurements for $\beta$ radiation and x-rays in the 80–200 keV photon energy range. However, the device can still detect these types of radiation and will indicate their presence.
- Listed data corresponds to both dose rate and total dose measurements described below. Total dose measurements are derived from dose rate measurements via numerical integration within the sensor firmware.

### Ambient equivalent dose rate of ionizing radiation

| | | |
|---|---|---|
| Measurement range | 0–1000 µSv/h | 0–100 mrem/h |
| Resolution (0-10 µSv/h) | 0.01 µSv/h | 0.001 mrem/h |
| Resolution (10-1000 µSv/h) | 3 significant digits | |
| Measurment intervals | 1, 2, 5 or 10 min | |


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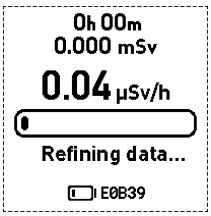
- The device operates on a default measurement interval of 5 min, adjustable via the *Aranet Home* mobile application during configuration. However, if the device detects radiation levels surpassing the ambient threshold (a level customizable through the mobile application), it automatically overrides these intervals. In such cases, the measurement interval is temporarily shortened to 1 min.
- Upon initial power-up, the device may briefly display dose rate measurements with lower accuracy due to limited measurement history and the sporadic nature of radiation quanta detection. To indicate this, the device will show the dose rate measurement along with a progress bar, illustrating the improvement in measurement quality over time. The progress bar will disappear once the measurement accuracy reaches an appropriate level.




- For dose rate measurements, the device utilizes a dynamic averaging algorithm that adjusts the averaging window in the range 1–60 min based on radiation intensity. When dose rates are low, the averaging window expands to enhance accuracy in detecting background radiation. Conversely, for higher dose rates, the window contracts to swiftly respond to sudden radiation increases and promptly alert the user.

### Ambient equivalent total dose of ionizing radiation

| | | |
|---|---|---|
| Measurement range | 0–1000 mSv | 0–100 rem |
| Dose accumulation time limit | 2 years | |
| Resolution (0-10 mSv) | 0.001 mSv | 0.0001 rem |
| Resolution (10-1000 mSv) | 3 significant digits | |

- Upon reaching the dose accumulation time limit, the device will still update the total dose reading but will cease to increase the accumulation time. We recommend resetting the total dose reading either by using the button located on the back of the device or via the *Aranet Home* mobile application before this limit is reached.

## General specifications

| | | |
|---|---|---|
| Ingress protection rating | IP20 | |
| Operating temperature range | 0–50 °C | 32–122 °F |
| Operating relative humidity range | 0–85 % | |
| Dimensions | 71×71×24 mm | 2.80×2.80×0.94 in |
| Weight (incl. batteries) | 107 g | 3.8 oz |
| Enclosure material | Polycarbonate | |
| Power supply | 2 pcs AA batteries | |
| Packaging includes | 2 pcs AA alkaline batteries, configuration pin | |

## Bluetooth transmit power

| | |
|---|---|
| Normal range (Default) | -12 dBm |
| Extended range | 4 dBm |

- Bluetooth transmitter power can be adjusted through the settings in the *Aranet Home* mobile application. Enable the extended range feature only if the sensor experiences poor connectivity with the mobile application during typical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use, such as in large rooms or through walls. Note that enabling this feature will reduce the expected battery lifetime listed below.

- Radiation Sensor HOME is compatible with smart devices conforming to Bluetooth specification 4.1 and up.

## Battery lifetime

| | Alkaline batteries | | Lithium batteries | |
|---|---|---|---|---|
| Measurement interval | Bluetooth Off | Bluetooth On | Bluetooth Off | Bluetooth On |
| 1 min | 1.7 years | 1.5 years | 2.2 years | 2.0 years |
| 2 min | 2.6 years | 2.1 years | 3.5 years | 2.8 years |
| 5 min | 4.0 years | 2.9 years | 5.5 years | 3.8 years |
| 10 min | 4.8 years | 3.2 years | 6.7 years | 4.4 years |

- Data provided for a device with an active Bluetooth connection considers it being paired with the *Aranet Home* mobile application and engaging in regular data transfer with the mobile phone or tablet.
- Battery lifetime data has been obtained by mathematical extrapolation and is provided for descriptive purposes only and is not intended to make or imply any guarantee or warranty.
- Battery lifetime tests and calculations performed assuming device is at 20 °C (68 °F) and using *Fujitsu Premium LR6G07* (alkaline) and *Energizer Ultimate Lithium L91* (lithium) AA batteries as reference.
- The operating temperature range may vary based on the battery type used. Generally, the range for alkaline batteries is between -20–50 °C (-4–122 °F), whereas for lithium batteries, it is -40–60 °C (-40–140 °F).
- Listed lifetime data does not take into account the out-of-turn measurements that are made due to abnormally high radiation levels (see notes in section *Sensor performance*).

## Measurement data memory specifications

| Measurement interval | Historic data availability |
|---|---|
| 1 min | 6 days |
| 2 min | 12 days |
| 5 min | 30 days |
| 10 min | 60 days |

- The device provides access to historical data through the *Aranet Home* mobile application. For users seeking high-resolution measurement data consistently, shorter measurement interval is recommended, as frequent interval changes can impact historical data resolution.
- When transitioning to a longer measurement interval (e.g., from 1 min to 10 min), the firmware computes average values from subsets to represent the longer sampling (for instance, a 10 min average derived from ten 1 min samples).


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- Likewise, when shifting to a shorter interval (e.g., from 10 min to 1 min), the memory stores additional samples mirroring the longer interval's data (such as ten 1 min samples with identical values as the original 10 min sample).
- The provided information applies to a device with the latest firmware installed. We strongly advise upgrading the firmware using the *Aranet Home* mobile application as soon as an update becomes available.

## Important notes

- Do not leave the device in direct sunlight! Exposure to intense sunlight can adversely affect the performance and longevity of the e-ink display, potentially leading to issues like reduced contrast, diminished readability, or even permanent damage to the display pixels or electronic components. Moreover, sun exposure can also adversely impact accuracy of sensor readings.
- Do not remove the sticker on the back of the device as it protects the sensor element from debris and mechanical damage.
- While the device is not calibrated to provide precise quantitative measurements of x-ray intensity, it exhibits a noticeable response to x-ray sources, such as those found in airport security baggage scanners. When exposed to x-ray sources, both the device screen and the *Aranet Home* mobile application will indicate an increase in measured radiation levels. It is important to note that this response does not indicate a faulty or damaged device.

## Compliance information

| | |
|---|---|
| CE | Conformité Européenne |
| FC | Federal Communications Commission (USA) |
| IC | Innovation, Science and Economic Development Canada |


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