

Soil Sensor (Teros-12)

Measures volumetric water content (VWC), electrical conductivity (EC), and temperature of soil. This device, belonging to the PRO sensor series, includes Aranet Sub-GHz ISM band radio which wirelessly transmits sensor measurements to the Aranet PRO base station.



Product numbers

| Product number | Radio band | To be used in |
|----------------|------------|---|
| TDSPHE02 | EU868 | European Union |
| TDSPHEU2 | US920 | United States of America, Canada, South America, Australia, New Zealand |
| TDSPHEU2 | AS923 | BRN, KHM, HKG, IDN, LAO, TWN, THA, VNM, MYS, SGP |
| TDSPHEJ2 | JP923 | Japan |
| Not available | KR923 | South Korea |

Sensor performance

General notes

- 95 % of the sensors perform within the specified accuracy limits at the time of purchase, assuming they are in an equilibrium state.

Volumetric water content

| | |
|------------|---------|
| Range | 0–100 % |
| Resolution | 0.1 % |
| Accuracy | ±3 % |

- The VWC range is dependent on the media the sensor is calibrated to. A custom calibration will accommodate the necessary ranges for most substrates.
- Given accuracy figure is typical for mineral soils that have solution electrical conductivity of <8 dS/m. The VWC accuracy is dependent on the media the sensor is calibrated to. A custom calibration can improve the accuracy up to 1 % of VWC reading.

Apparent dielectric permittivity

| | | |
|------------|----------------------|------------------------|
| Range | 1–80 | |
| Resolution | 0.01 | |
| Accuracy | ±1 % (in range 1–40) | ±15 % (in range 40–80) |

Bulk electrical conductivity

| | | |
|------------|-----------------|--|
| Range | 0–20 dS/m | |
| Resolution | 0.001 dS/m | |
| Accuracy | ±8 % of reading | |

Temperature

| | | |
|------------|-----------|------------|
| Range | -40–60 °C | -40–140 °F |
| Resolution | 0.1 °C | 0.1 °F |
| Accuracy | ±0.5 °C | ±1.0 °F |

- Temperature measurement may not be accurate if sensor is not fully immersed in the medium of interest, due to longer time required to reach thermal equilibrium.

General specifications

| | | |
|-----------------------------|--------------------------|------------|
| Ingress protection rating | IP68 | |
| Operating temperature range | -40–60 °C | -40–140 °F |
| Weight (incl. battery) | 320 g | 11.3 oz |
| Power supply | 1 pc AA battery | |
| Packaging includes | 1 pc AA alkaline battery | |

Aranet radio parameters

| | | |
|----------------------------|-------------------|--------|
| Line of sight range | 3 km | 1.9 mi |
| Transmitter power | 14 dBm | 25 mW |
| Data transmission interval | 1, 2, 5 or 10 min | |
| Data protection | XXTEA encryption | |

- Specifically for JP923 radio band, reduced transmitter power of 13 dBm (20 mW) is used.

Aranet radio bands and channels

| Radio band | Channel 1 | Channel 2 | Channel 3 | Channel 4 |
|------------|---------------------|---------------------|---------------------|---------------------|
| EU868 | 868.1 MHz | 868.3 MHz | 868.5 MHz | — |
| US920 | 917.3 and 922.9 MHz | 917.5 and 923.1 MHz | 917.7 and 923.3 MHz | 917.9 and 923.5 MHz |
| AS923 | 923.1 MHz | 923.3 MHz | — | — |
| JP923 | 923.0 MHz | 923.4 MHz | — | — |
| KR923 | 923.1 MHz | 923.3 MHz | — | — |

- This table outlines the radio channels utilized by Aranet Sub-GHz radio technology for transmitting sensor data to the base station, complying with the legislation in various regions. To determine availability of this product in your region and the corresponding channels used, refer to the *Product numbers* table at the beginning of this document.

Battery lifetime

| Measurement interval | Alkaline battery lifetime | Lithium battery lifetime |
|----------------------|---------------------------|--------------------------|
| 1 min | 0.9 years | 1.2 years |
| 2 min | 1.7 years | 2.3 years |
| 5 min | 3.9 years | 5.3 years |
| 10 min | 6.6 years | 9.5 years |

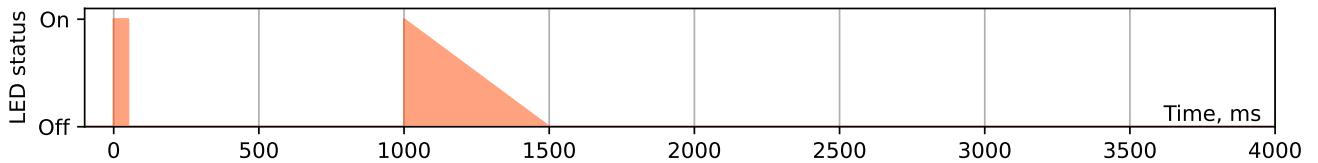
- Battery lifetime data has been obtained by mathematical extrapolation and is provided for descriptive purposes only and is not intended to make or imply any guarantee or warranty.
- Battery lifetime tests and calculations performed assuming device is at 20 °C (68 °F) and using *Fujitsu Premium LR6G07* (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).

Pairing process description

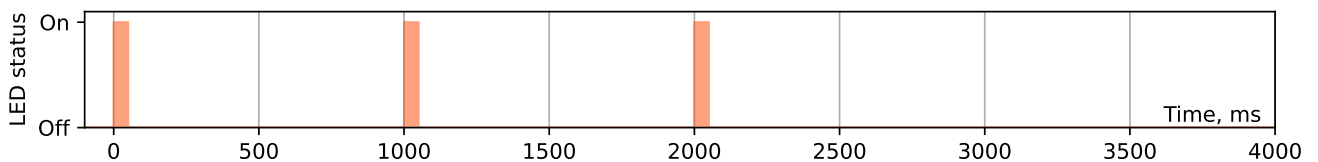
As part of the Aranet PRO product series, this device enables wireless sensor reading transmission to the Aranet PRO and PRO Plus base station. Here's how to pair the sensor with the base station:

- **Preparing for pairing:** Place the sensor within 20 m (60 ft) of the base station during pairing. Once paired, it can communicate over a much greater distance (up to 3 km / 1.9 mi line of sight).
- **Power off the sensor:** If the sensor comes with a battery-disconnect pull tab, leave it in place for now. For battery-powered sensors that are already on, open the casing and remove the battery for at least 20 seconds. If the sensor uses a power supply, unplug it. For newer hardware versions, locate the PAIRING button on the sensor PCB which can be used to initiate pairing without the removal of battery.
- **Start the pairing process:** Access the SENSORS menu in the base station Web GUI. Set the measurement interval and select PAIR SENSOR to start the pairing process.

- **Power on the sensor:** Within 2 minutes, pull the battery tab, reinsert the battery, connect the power supply, or press the PAIRING button to initiate pairing.
- **Confirm successful pairing:** A successful pairing is indicated by the sensor appearing in the Web GUI and a specific LED blink sequence on the sensor PCB (one to three short blinks followed by a longer fade-out blink of the LED):



- **Troubleshooting:** If pairing fails, the sensor won't appear in the Web GUI, and the LED blink sequence will consist only of three short blinks. In this case, repeat the process closer to the base station.



- **Final setup:** After successful pairing, customize parameters like name and tags in the Web GUI. Close the sensor casing and install it in the desired location.

Compliance information

CE Conformité Européenne

FC Federal Communications Commission (USA)

IC Innovation, Science and Economic Development Canada