

# EC Sensor

This kit uses electrical conductivity (EC) sensor to help you maintain optimal water quality for healthy plant growth. The sensors measure nutrient levels to ensure the best possible water conditions for your horticulture needs. 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
TDSEC001	EU868	European Union
TDSEC0U1	US920	United States of America, Canada, South America, Australia, New Zealand
TDSEC0U1	AS923	BRN, KHM, HKG, IDN, LAO, TWN, THA, VNM, MYS, SGP
Not available	JP923	Japan
Not available	KR923	South Korea

- This product is a kit consisting of several separate devices. It combines Aranet devices with carefully selected solutions from other companies to provide a single, unified solution. Please consult the *Kit contains* table for a detailed list of included devices.

## Kit contains

Product number	Manufacturer	Product name	Amount
TDSCT2*2	Aranet	4–20 mA Transmitter with 24 VDC PSU	1
SZ3384.1	B&C Electronics	Electrical conductivity probe	1
C3436	B&C Electronics	Electrical conductivity 4–20 mA module	1

- Aranet product number designations include the symbol “\*” to signify multiple product numbers, which, depending on the region of use, have either 0, U or J in place of the asterisk. Refer to the relevant product datasheets for more information.

## Warning information

- This device requires installation by a certified electrician. Installation involves handling bare wire leads that may carry hazardous voltages.

- Before installation, disconnect power from the main power supply to prevent the risk of electric shock. Additionally, ensure the power supply is disconnected before removing the lid or servicing any internal components, such as replacing the transmitter battery.

## Measurement 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.
- This sensor is designed for precise measurements in liquids and is unsuitable for soil, substrates, or porous media, which lack consistent ionic conductivity for reliable operation.

### Electrical conductivity

Range	0–20 mS/cm	
Resolution	0.01 mS/cm	
Accuracy	±1.5 %	
Reference temperature	20 °C	68 °F
Temperature sensor	PT100	

- The default reference temperature is 20 °C (68 °F) but can be configured to 25 °C (77 °F). This setting standardizes conductivity measurements by compensating for temperature variations using data from the integrated temperature sensor, ensuring consistent and accurate results. Note that the reference temperature is configurable only in degrees Celsius. See details in section *Setting EC sensor reference temperature*.
- Without sensitivity calibration, the sensor's accuracy is equivalent to its tolerance of ±10 %. Sensitivity calibration improves this accuracy, bringing it in line with the specifications of the standard buffer solution manufacturer—typically ±1.5 % near the buffer solution's stated value (e.g., 5 mS/cm). Note that accuracy may vary outside this range. For optimal performance, calibrate the sensor using a standard buffer solution that closely matches the expected operational values. For more details, refer to section *Calibration of EC sensor*.

## Specifications of kit components

### Electrical conductivity probe

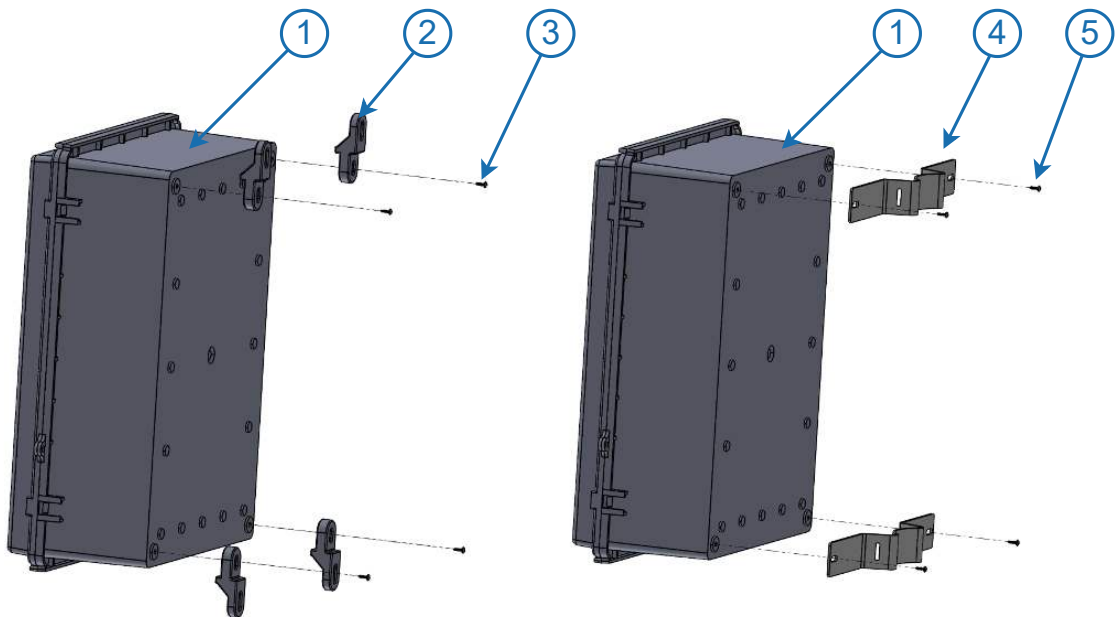
Body	Epoxy	
Operating temperature	-5–80 °C	23–176 °F
Maximum operating pressure	10 bar at 20 °C	145 psi at 68 °F
Probe length	110 mm	4.3 in
Probe diameter	∅12 mm	∅0.47 in
Cable length	5 m	16.4 ft

## Enclosure

Ingress protection rating	IP67	
Operating temperature range	0–50 °C	32–122 °F
Dimensions	350×250×100 mm	13.8×9.8×3.9 in
Weight	2.7 kg	5.95 lbs
Enclosure material	Polycarbonate	
Power cable length	3 m	9.8 ft
Input voltage	85–265 VAC	
Frequency range	47–63 Hz	
Maximum power consumption	25 W	
Packaging includes	AA alkaline battery, wall mount, pole mount	

## Installing and using the EC Sensor

- **Install enclosure.** Mount the enclosure box (1) in place using either four plastic (ABS) wall mounts (2) secured with the longer screws (3), or two stainless steel pole mounts (4) secured with the shorter screws (5). Once the enclosure is mounted, connect the sensor's power supply cable to the mains power supply.



- **Pair the Aranet transmitters.** For more details on pairing process consult Aranet product TDSCT2×2 data sheet. After pairing 4–20 mA transmitter with 24 VDC PSU included in this kit, configure the conversion from analog 4–20 mA to electrical conductivity values. Open the sensor settings menu in the Aranet base station's web interface, update its name, and enable the conversion feature. Select the appropriate units, ensuring mS/cm is used for conductivity and define the minimum and maximum measurement values as detailed below.

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Current value	Conversion value of EC
4 mA	0 mS/cm
20 mA	20 mS/cm

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- **Calibrate the sensor.** Follow the calibration instructions described in section *Calibration of EC sensor*.
- **Set the EC reference temperature.** If desired EC sensor reference temperature differs from the reference temperature used for calibration adjust it as described in *Setting EC sensor reference temperature*.
- **Install EC probe.** After completing the calibration, install the sensor probe as the final step. See section *Probe installation instructions* for detailed instructions.

## Calibration of EC sensor

### General notes

- Each sensor undergoes zero calibration at the factory to ensure baseline accuracy. However, to enhance initial precision and account for the natural degradation of measurement accuracy over time, regular sensitivity calibration is necessary.
- For measurements in the scale of 0–20 mS/cm, only sensitivity calibration using a standard buffer solution (e.g., 5.0 mS/cm) is required to ensure accurate readings. Zero calibration, which sets the baseline to 0  $\mu$ S/cm in air, is not mandatory for this range but may be performed if higher accuracy at very low conductivity levels is needed.
- If the sensor probe wires are touched, disconnected, or reconnected for any reason, a new sensitivity calibration must be performed to ensure precise results.

### Prepare for the calibration

- (1) If installed, remove the probe from the measurement location. Thoroughly clean the probe by rinsing it with deionized water to remove any residue.
- (2) Choose a standard KCl solution with a known conductivity (e.g., 1.41 mS/cm, 5.00 mS/cm, or 12.88 mS/cm) or use another solution with a defined conductivity value.
- (3) Open the enclosure of the *EC Sensor* and locate the *Electrical conductivity 4–20 mA module* made by B&C Electronics with the product number and labeling C3436.
- (4) Change the reference temperature to the value defined by the standard solution if needed, typically 25 °C, as explained in section *Setting EC sensor reference temperature*.

### Calibrate the sensor

- (5) Immerse the probe in the standard EC solution and allow the probe to stabilize at the measurement temperature before proceeding.
- (6) On the C3436 module, press and hold the **UP (SENS)** button for more than 3 seconds. The messages **Sens typ** and **KCl std** will alternate on the display.

- (7) Use the **UP/DOWN** buttons to select the desired calibration type and press **ENT** to confirm the selection. Aranet recommends using **KCI STD** which is used to calibrate using standard buffer solutions.
- (8) The display will show the measured value in mS. Use the **UP/DOWN** buttons to adjust the value to match that of the standard solution being used. Press **ENT** to confirm the entered value.

### Address potential issues

- (9) If the new value is accepted, the display will briefly show the message **UPDATE**. However, if the new value exceeds the limits of acceptability listed in the instrument's technical specifications, the error **Sens Err** will appear.
- (10) If the measured value differs significantly from the expected value, consider the following: The actual value of the solution may differ from its nominal value (e.g., the solution is contaminated or degraded); The conductivity cell may not be functioning correctly; The **cell K** configuration may be incorrect. Consult the manufacturers technical documentation to address these advanced cases.

### Recommended calibration frequency and maintenance

- It is recommended to calibrate the sensor every 6 months. However, the interval may vary depending on environmental conditions and the required accuracy level.
- It is recommended to clean the EC sensor probe every 6 months by rinsing with deionized water and using an EC-safe cleaning solution if needed. Re-calibrate after cleaning, adjusting frequency based on usage and environment.

### Probe installation instructions

To achieve accurate and consistent EC sensor measurements, proper physical installation is essential. Although specific requirements may vary depending on the intended application, following these general guidelines will help ensure reliable sensor performance and high-quality readings:

- EC probe should be immersed in the sample water to a depth of at least 20 mm (0.8 in).
- A continuous sample flow is recommended to prevent stagnant water.
- The flow velocity should be controlled to avoid cavitation.
- The sample in contact with the probe must be representative of the solution to be measured.
- The liquid should be free of air bubbles, circulate continuously, and completely fill the tube surrounding the probe.
- Ensure that sediment deposits or foreign materials do not accumulate near the probe.
- Verify that the probe's temperature and pressure limitations are not exceeded.

### Setting EC sensor reference temperature

The reference temperature standardizes conductivity measurements by compensating for temperature variations using data from the integrated temperature sensor. This ensures consistent and comparable results across different temperature ranges. The displayed EC value is automatically recalculated to represent what it would be at the reference temperature. The default reference temperature is set to 20 °C (68 °F) but can be configured to 25 °C (77 °F) based

on user preferences. Note that the reference temperature is configurable only in Celsius. It is important to select the reference temperature that aligns with the desired result interpretation. To change the reference temperature on EC sensor controller C3436 follow these steps:

- Open the Aranet EC & pH Sensor enclosure and find C3436 controller.
- Press **MODE** two times from start display to get the message **Set-up**.
- Press **ENT** to scroll through the setup functions until **Temp. Ref** is visible.
- Press **UP/DOWN** to change the reference temperature from **20 °C** to **25 °C** or vice versa.
- Press **ENT** to confirm the changes; the message **UPDATE** will appear.
- Press **MODE** 4 times to exit from the procedure and return to start display.

Consult the manufacturer's technical documentation for more advanced C3436 configuration details.

## Compliance information

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**CE** Conformité Européenne

**FC** Federal Communications Commission (USA)

**IC** Innovation, Science and Economic Development Canada

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