pH Sensor

This kit uses pH sensor to help you maintain optimal water quality for healthy plant growth. The sensor monitors acidity/alkalinity 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
TDSPH001	EU868	European Union
TDSPH0U1	US920	United States of America, Canada, South America, Australia, New Zealand
TDSPH0U1	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
SZ165	B&C Electronics	Glass pH probe	1
PH3436	B&C Electronics	pH 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.

pH level

Range	0–14	
Resolution	0.01	
Operating temperature	20 °C	68 °F

- The pH sensor must be calibrated near the operating pH range using standard buffer solutions, especially during initial setup or after significant environmental changes. See details in section *Calibration of pH sensor*.

- The default measurement temperature is set to 20°C (68°F), but if the operating temperature differs, calibration and manual configuration of the correct temperature in the controller are required for reliable results. See details in section *Setting pH sensor operating temperature*.

- The pH sensor's accuracy relies on regular calibration to account for tolerances of ±15% for zero offset (approx. pH of 2) and ±3% for sensitivity slope. Using buffer solutions close to the expected pH range enhances measurement reliability.

Specifications of kit components

Glass pH probe

Body	Glass	
Operating temperature	0–60 °C	32–140 °F
Maximum operating pressure	6 bar at 25 °C	87 psi at 77 °F
Probe length	110 mm	4.3 in
Probe diameter	$\varnothing$12 mm	$\varnothing$0.47 in
Cable length	9 m	29.5 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	2.5 kg	5.5 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	

Available accessories

Product number	Description	Packaging
TDAPHB01	Buffer solution pH 4.01, 250 ml	To be ordered separately
TDAPHB02	Buffer solution pH 7.00, 250 ml	To be ordered separately
TDAPHB03	Buffer solution pH 9.21, 250 ml	To be ordered separately

- Aranet offers pH buffer solutions at pH of 4.01, 7.00, and 9.21 for accurate sensor calibration. The pH 7.00 buffer solution (zero point) is required for every calibration. To ensure proper accuracy, clients should also use a second buffer solution with pH 4.01 for acidic ranges or pH 9.21 for alkaline ranges based on their operating conditions.

Installing and using the pH Sensor

- **Install enclosure.** Mount the enclosure box in place using four plastic (ABS) wall mounts or two stainless steel pole mounts and connect it 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 pH 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 pH is used for pH level and define the minimum and maximum measurement values as detailed below.

Current value	Conversion value of pH
4 mA	0 pH
20 mA	14 pH

- **Calibrate the sensor.** Follow the calibration instructions described in section *Calibration of pH sensor*.

- **Install pH probe.** After completing the calibration, install the sensor probe as the final step. See section *Probe installation instructions* for detailed instructions.

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Calibration of pH sensor

General notes

- Aranet pH sensors are not factory-calibrated and require both zero and sensitivity calibration before use. Calibration should be performed using buffer solutions that match the expected measurement range (e.g., pH 4.01, 7.00, or 9.21). The instrument automatically recognizes buffer solutions using the stored pH/°C table, but operators should verify the displayed value and adjust it if necessary to match the actual buffer value.

- For the most accurate results, we recommend using Aranet buffer solutions, specifically designed to work seamlessly with our sensors. Proper calibration ensures precise measurements and optimal sensor performance.

- If the sensor probe wires are touched, disconnected, or reconnected for any reason, a new calibration must be performed to ensure precise results.

Prepare for calibration

(1) Ensure the glass membrane was kept moist during storage. If dry, soak the electrode in a buffer solution or tap water (not distilled water) for at least three hours.

(2) If the membrane is moist, remove the protective cap or take the sensor out of sample, rinse with clean water, and gently dab dry with soft paper — do not rub to avoid charging.

(3) Open the enclosure of the *pH Sensor* and locate the *pH 4–20 mA module* made by B&C Electronics with the product number and labeling `PH3436`.

(4) The default operating temperature is set to 20 °C (68 °F). If the expected sample temperature differs, adjust the operating temperature as described in section *Setting pH sensor operating temperature*. Ensure that the calibration solution is at the same temperature.

Perform zero calibration

(5) Immerse the probe in the pH 7.00 solution (`TDAPHB02`) solution and allow the probe to stabilize at the measurement temperature before proceeding.

(6) On the `PH3436` module, press and hold the **MODE (ZERO)** button for more than 3 seconds. The message **Zero Cal** will alternate with the actual pH value on the display.

(7) 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.

(8) Take the sensor out of solution, rinse with clean water, and gently dab dry with soft paper — do not rub to avoid charging.

Perform sensitivity calibration

(9) Immerse the probe in in a pH 4.01 (`TDAPHB01`) or pH 9.21 (`TDAPHB03`) solution to perform the second point calibration and allow the probe to stabilize at the measurement temperature before proceeding.

(10) On the `PH3436` module, press and hold the **UP (SENS)** button for more than 3 seconds. The message **Sense Cal** will alternate with the actual pH value on the display.

(11) 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.

(12) Take the sensor out of solution, rinse with clean water, and gently dab dry with soft paper — do not rub to avoid charging. Place it back in the measurement sample.

Address potential issues

(13) 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.

(14) 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 electrode probe may be malfunctioning, or there could be issues with the cable connections. Consult the manufacturers technical documentation to address these advanced cases.

Recommended calibration frequency and maintenance

- Initially, compare the sensor readings to a standard buffer solution every month to monitor accuracy. If the error remains within the acceptable range, you can extend the calibration interval to every 3 months. However, if deviations exceed acceptable limits, calibrate more frequently. The optimal interval depends on environmental conditions and required accuracy.

- Electrodes may be affected by residue from various substances, which can drastically affect response time. If mechanically intact, they can often be restored to normal performance by following methods mentioned bellow. Clean the sensor whenever you notice residue buildup.

- **To remove inorganic deposits and scaling**, immerse the sensitive electrode tip in a 0.2 mol/L hydrochloric acid solution (approx. 7 ml or 0.24 oz of concentrated HCl (37%) in 1000 ml or 33.8 oz of water) for 30 seconds to 3 minutes. After treatment, thoroughly rinse the electrode with deionized water for 30 to 60 seconds to remove any residual acid.

- **To remove organic deposits, fouling, oil, or grease film**, immerse the sensitive electrode tip in a 0.2 mol/L sodium hydroxide solution (approx. 80 g or 2.8 oz of pure NaOH pellets in 1000 ml or 33.8 oz of water) for 30 seconds to 3 minutes. Afterward, rinse the electrode with deionized water for 30–60 seconds. Follow this by repeating the hydrochloric acid cleaning step and finish with another 30–60 seconds rinse in deionized water.

- When not in use, store the pH electrode in a 3% NaCl solution. Do not use deionized or distilled water. Electrodes should not be stored for periods longer than 6 months.

Probe installation instructions

To achieve accurate and consistent pH 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:

- pH 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 pH sensor operating temperature

Aranet pH sensor does not include an integrated temperature sensor, so the operating temperature must be set manually to ensure accurate measurements. The default operating temperature is set to 20 °C (68 °F), but if the actual sample temperature differs significantly, this value must be updated in the controller. Accurate temperature settings are crucial for reliable pH readings, as significant deviations from the correct temperature can affect measurement accuracy. To manually set the operating temperature value on PH3436 controller follow these steps:

- Open the *pH Sensor* enclosure and find PH3436 controller.

- Press **MODE** two times from start display to get the message **Set-up**.

- Press **ENT** to scroll trough the setup functions until **T man** is visible.

- Press **UP/DOWN** to change the operating temperature from default **20 °C (68 °F)** to the actual sample temperature.

- Press **ENT** to confirm the changes; the message **UPDATE** will appear.

- Press **MODE** to exit from the procedure and return to start display.

Consult the manufacturer's technical documentation for more advanced PH3436 configuration details.

Compliance information

CE   Conformité Européenne

FC   Federal Communications Commission (USA)

IC   Innovation, Science and Economic Development Canada