AtlasScientific™
Environmental Robotics

V 4.8

Revised 7/22

Gen 2

Lab Grade pH Probe

Double junction silver / silver chloride
with EXR Glass

Reads	**pH**
Range	**0 – 14**
Resolution	**+/- 0.001**
Accuracy	**+/– 0.002**
Response time	**95% in 1s**
Temperature range °C	**-5 – 99 °C**
Max pressure	**100 PSI**
Max depth	**70m (230 ft)**
Connector	**Male SMA / Male BNC (Optional)**
Cable length	**1 meter**
Internal temperature sensor	**No**
Time before recalibration	**~1 Year**
Life expectancy	**~2.5 Years +**

RoHS COMPLIANT

1980's — Today

Despite appearances THE KCl CREEP is really quite harmless.

The white crystals you may find on your electrode are formed by potassium chloride (KCl) from the electrode filling solution. Rinse the KCl from the electrode with distilled water and proceed as usual.

Decades later...

KCl continues to behave the same way.

If you encounter the "KCl CREEP" rinse off your probe with water, and carry on. ***Your probe is not damaged.***

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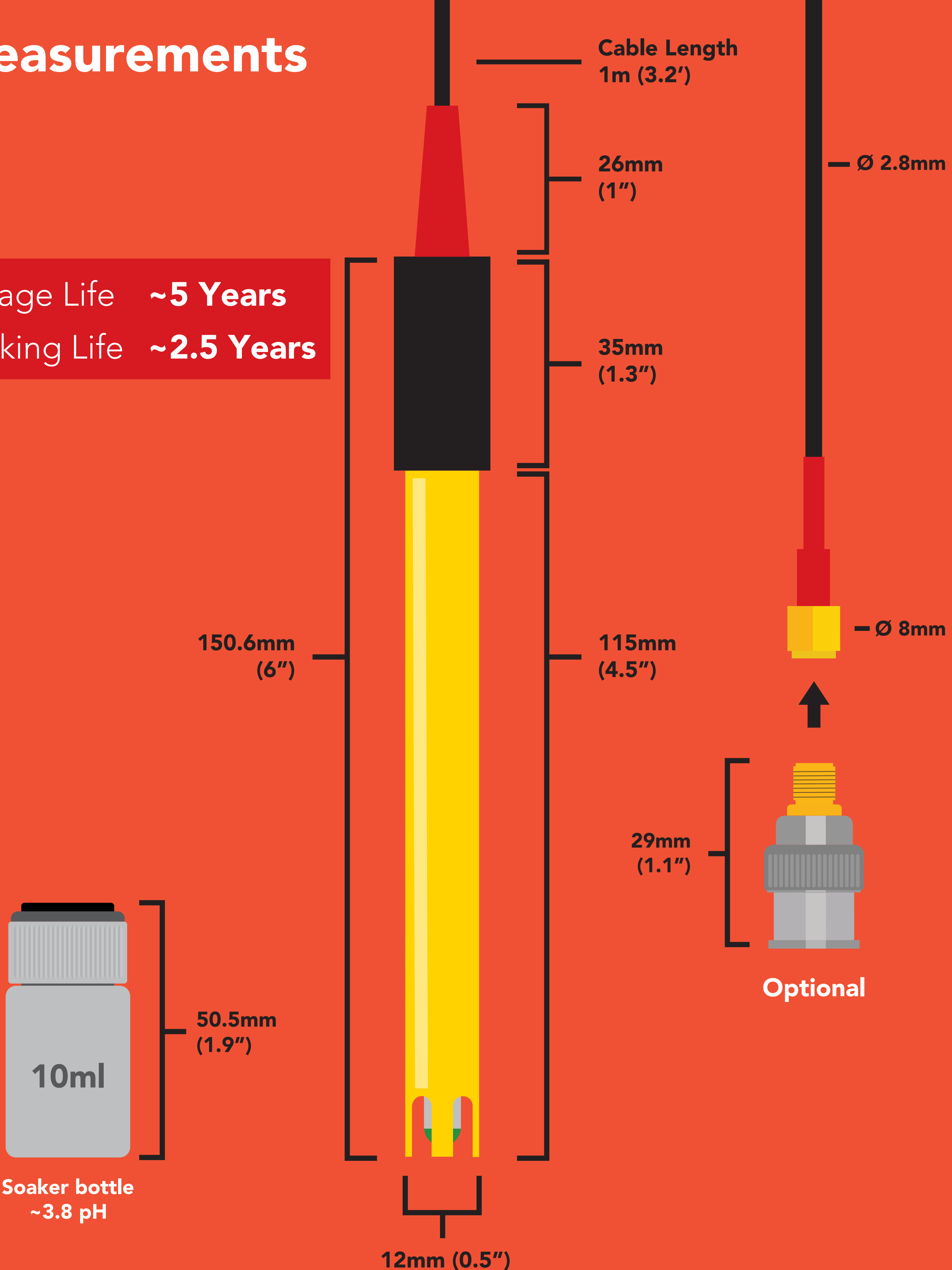
Measurements

Storage Life **~5 Years**

Working Life **~2.5 Years**



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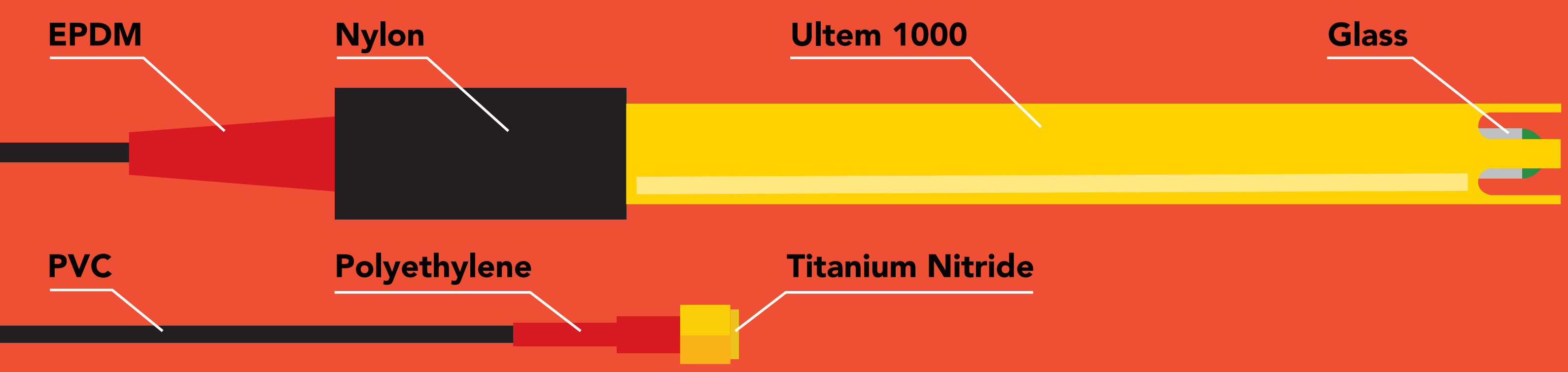
Specifications

Reference electrode	**Silver / silver chloride**
Double junction	**Yes**
Max depth	**70m (230 ft)**
Cable length	**1 meter**
Weight	**49 grams**
Speed of response	**95% in 1 second**
Isopotential point	**pH 7.00 (0 mV)**
Dimensions	**12mm x 150.6mm (0.5" x 6")**
SMA connector	**Male**
Sterilization	**Chemical only**
Food Safe	**Yes**

Materials



This pH probe can be *fully submerged* in fresh or salt water, up to the SMA connector *indefinitely*.

Typical applications

- Standard lab use
- Field use
- Soil
- High pH solutions (up to 14 pH)
- Samples containing heavy metals
- Hydroponics / aquaponics
- Beer, wine, alcohol, and food production

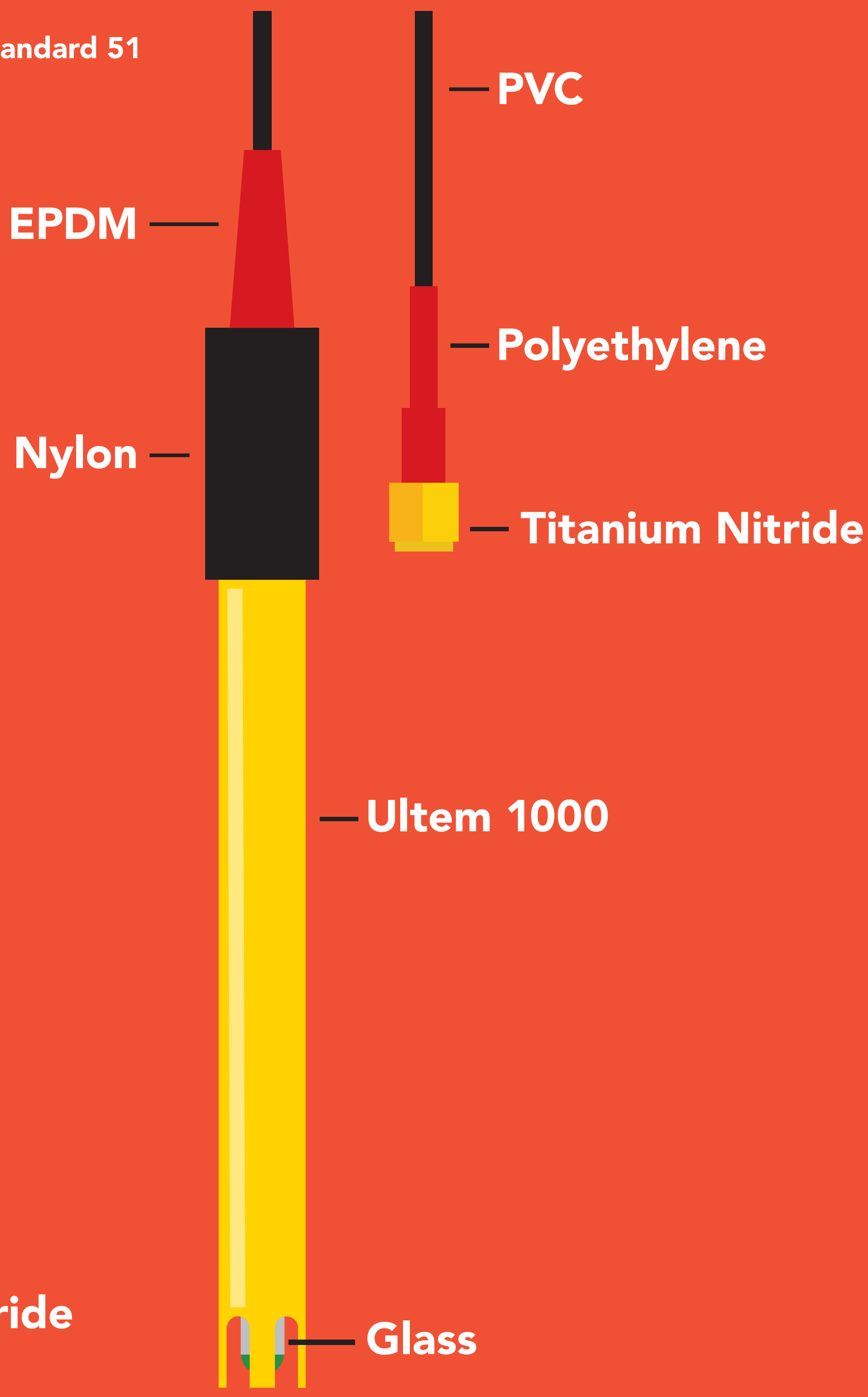
NSF/ANSI 51 Compliant

Food Safe

Atlas Scientific LLC, hereby certifies that,

Lab Grade pH Probe
Part # ENV-40-pH

Complies with NSF/ANSI Standard 51



✓ **PVC**
NSF-51 Compliant

✓ **Glass**
NSF-51 Compliant

✓ **Nylon**
NSF-51 Compliant

✓ **EPDM**
NSF-51 Compliant

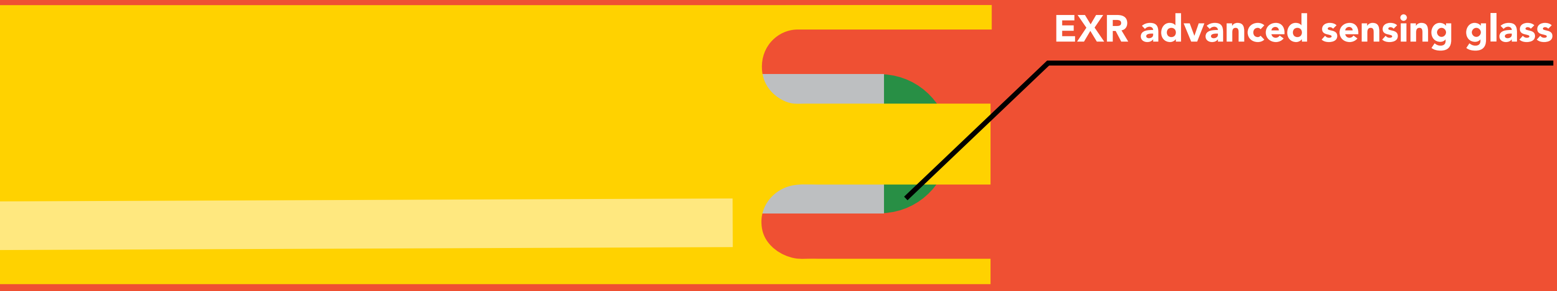
✓ **Ultem 1000**
NSF-51 Compliant

✓ **Polyethylene**
NSF-51 Compliant

✓ **Titanium Nitride**
NSF-51 Compliant

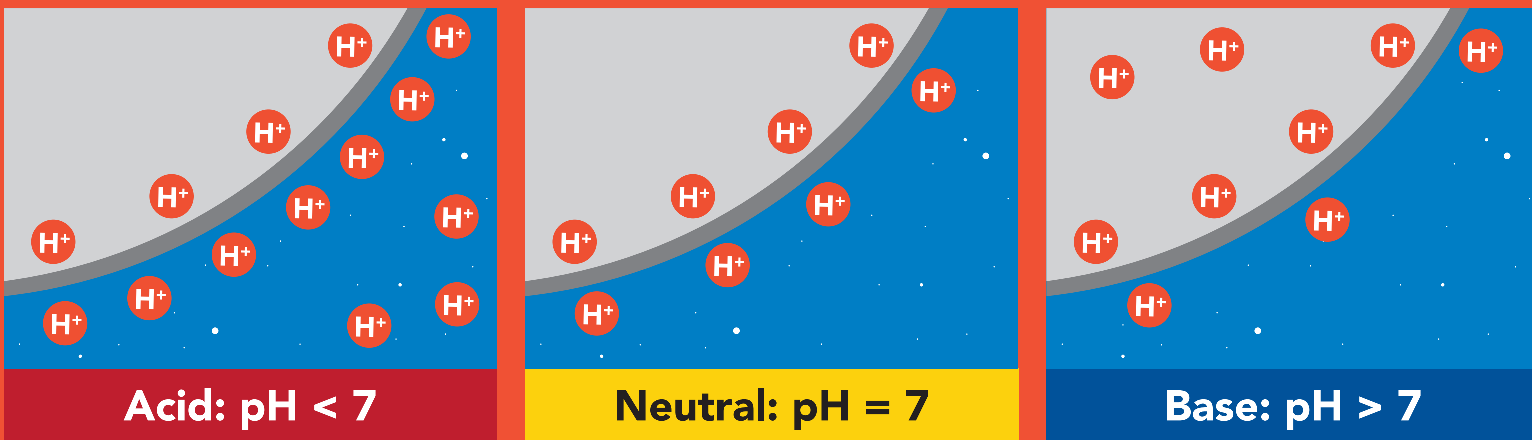
EXR advanced sensing glass

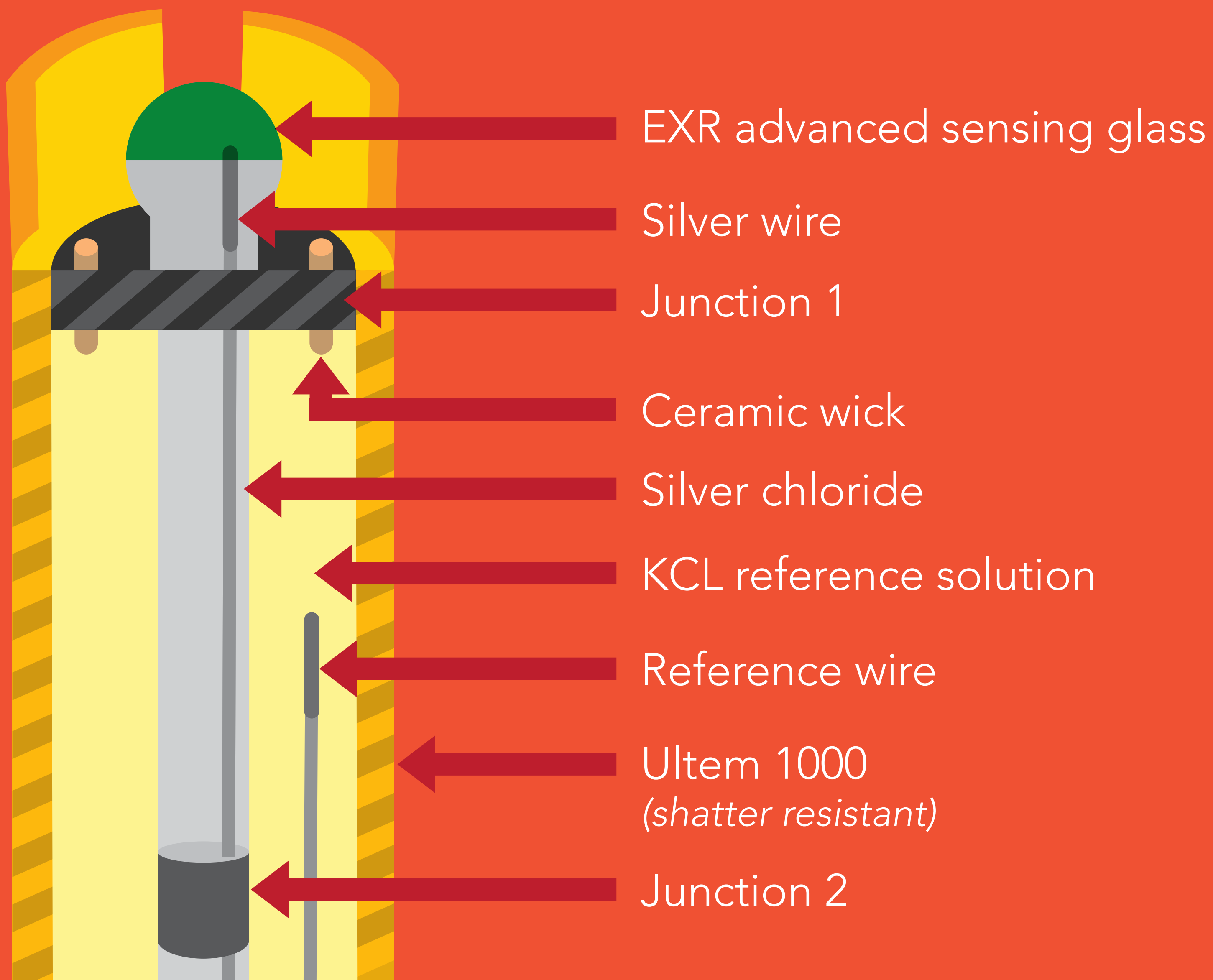
Our newest lab grade pH probes have EXR advanced sensing glass; located at the very tip of the glass bulb. The EXR advanced sensing glass has been specially formulated; allowing for faster reactions and more accurate readings in low ionic solutions.



Operating principle

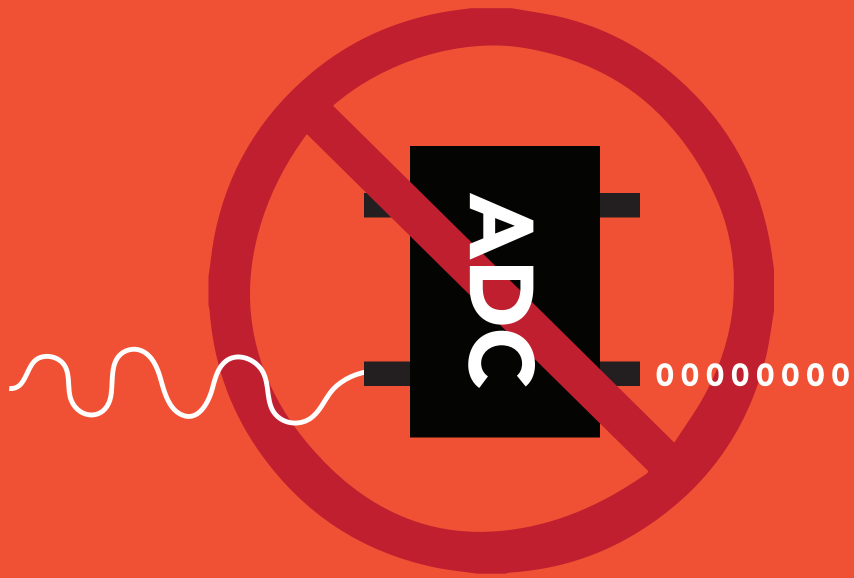
A pH ***(potential of Hydrogen)*** probe measures the hydrogen ion activity in a liquid. At the tip of a pH probe is a glass membrane. This glass membrane permits hydrogen ions from the liquid being measured to defuse into the outer layer of the glass, while larger ions remain in the solution. The difference in the concentration of hydrogen ions (outside the probe vs. inside the probe) creates a VERY small current. This current is proportional to the concentration of hydrogen ions in the liquid being measured.





A pH electrode is a passive device that detects a current generated from hydrogen ion activity. This current *(which can be positive or negative)* is *very weak and cannot be detected with a multimeter, or an analog to digital converter.* This weak electrical signal can easily be disrupted and care should be taken to only use proper connectors and cables.

Result will ***always*** read zero.



Result will ***always*** read zero.

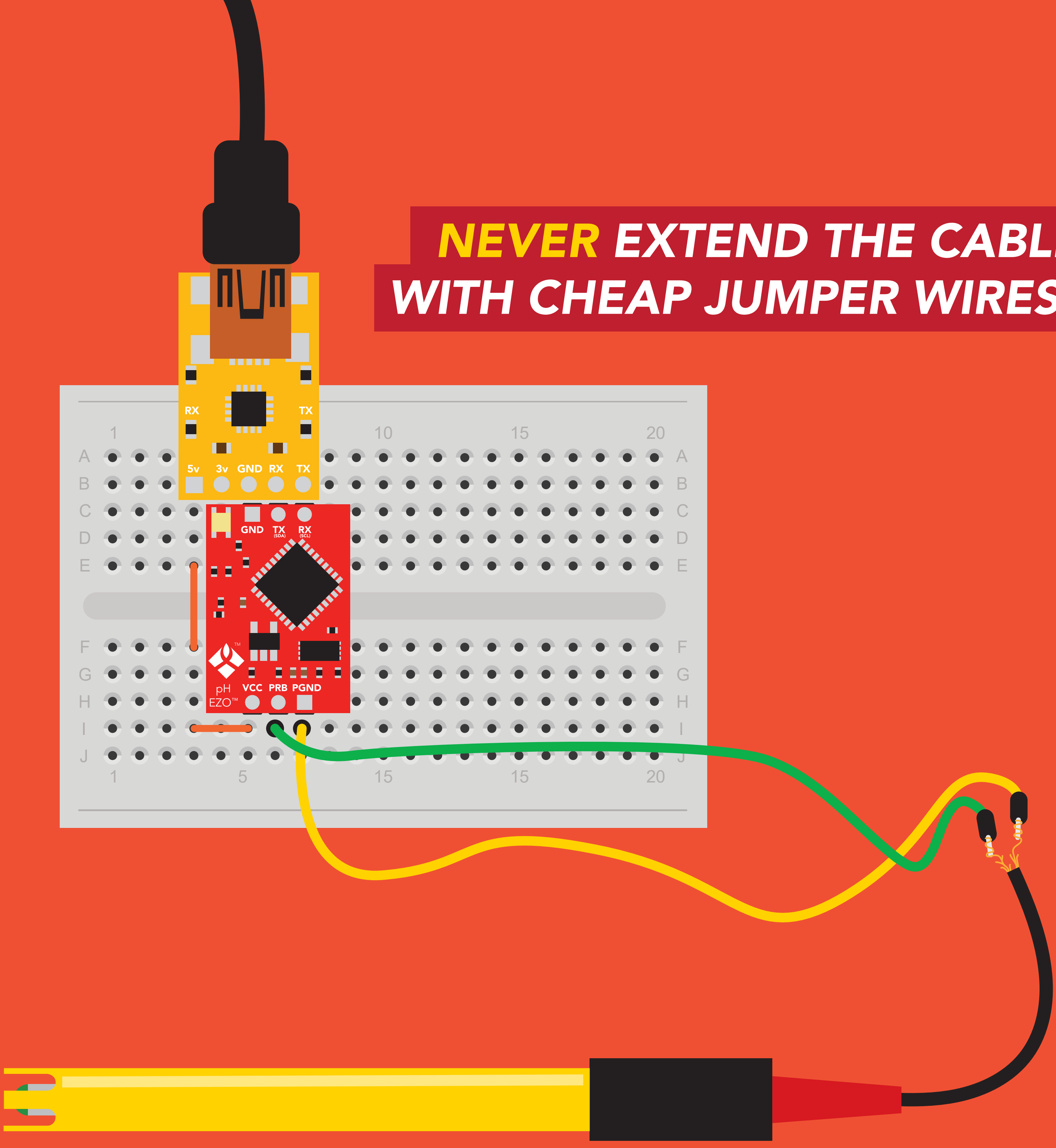
The current that is generated from the hydrogen ion activity is the reciprocal of that activity and can be predicted using this equation:

$$E = E^0 + \frac{RT}{F}\ln(\alpha_{H+}) = E^0 - \frac{2.303RT}{F}pH$$

Where **R** is the ideal gas constant.
T is the temperature in Kelvin.
F is the Faraday constant.

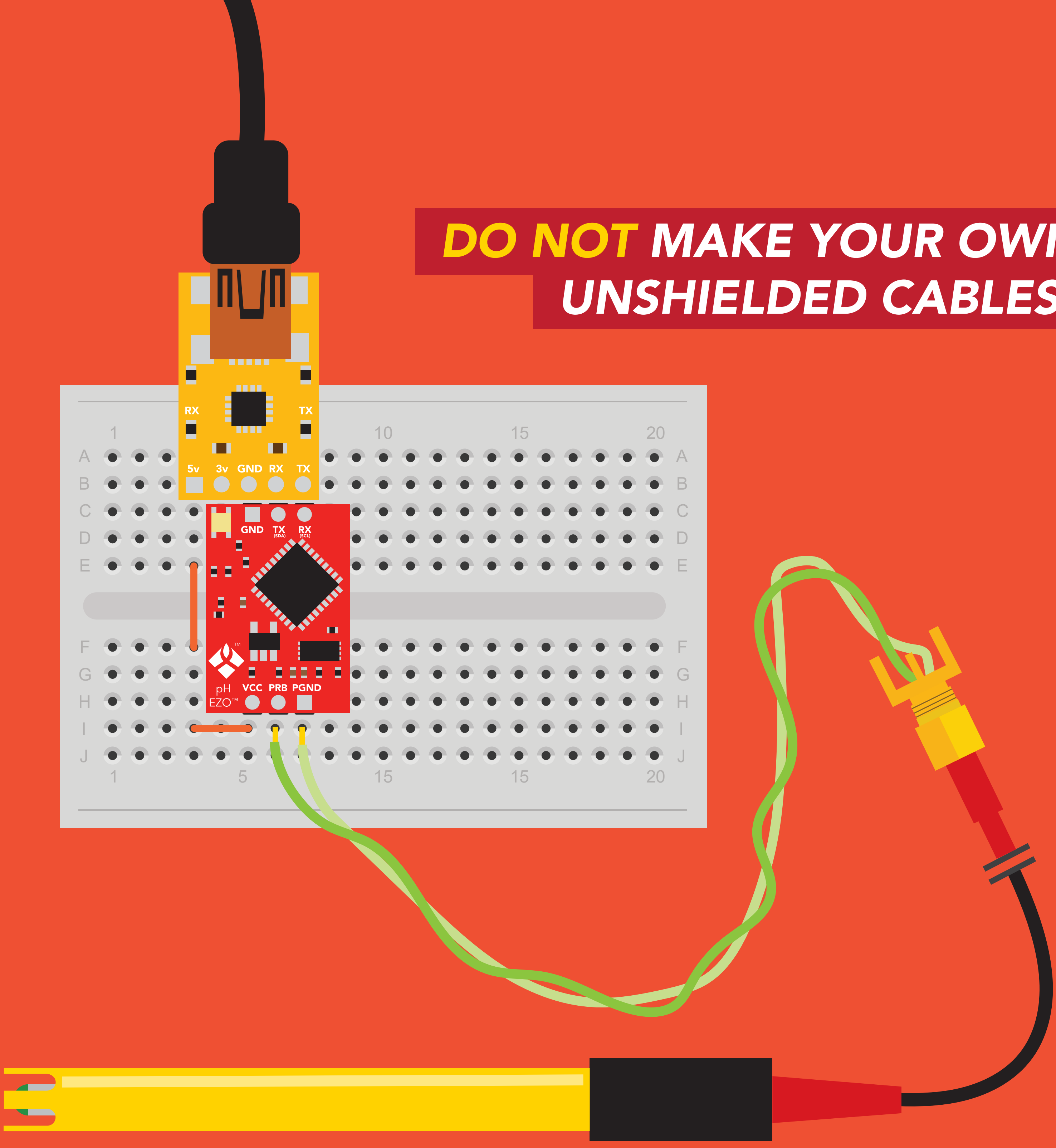
Because a pH probe is a passive device it can pick up voltages that are transmitted through the solution being measured. This will result in incorrect readings and will slowly damage the pH probe over time. In this instance, proper isolation is required.

***NEVER* EXTEND THE CABLE WITH CHEAP JUMPER WIRES!**



DO NOT CUT THE PROBE CABLE WITHOUT REFERRING TO *THIS DOCUMENT!*

DO NOT MAKE YOUR OWN UNSHIELDED CABLES!



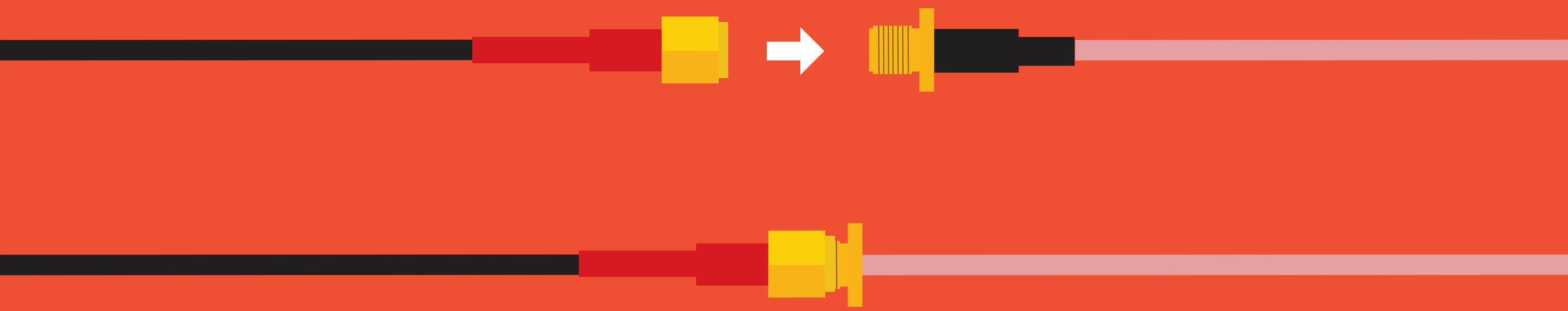
ONLY USE SHIELDED CABLES.

Extending the probe cable length

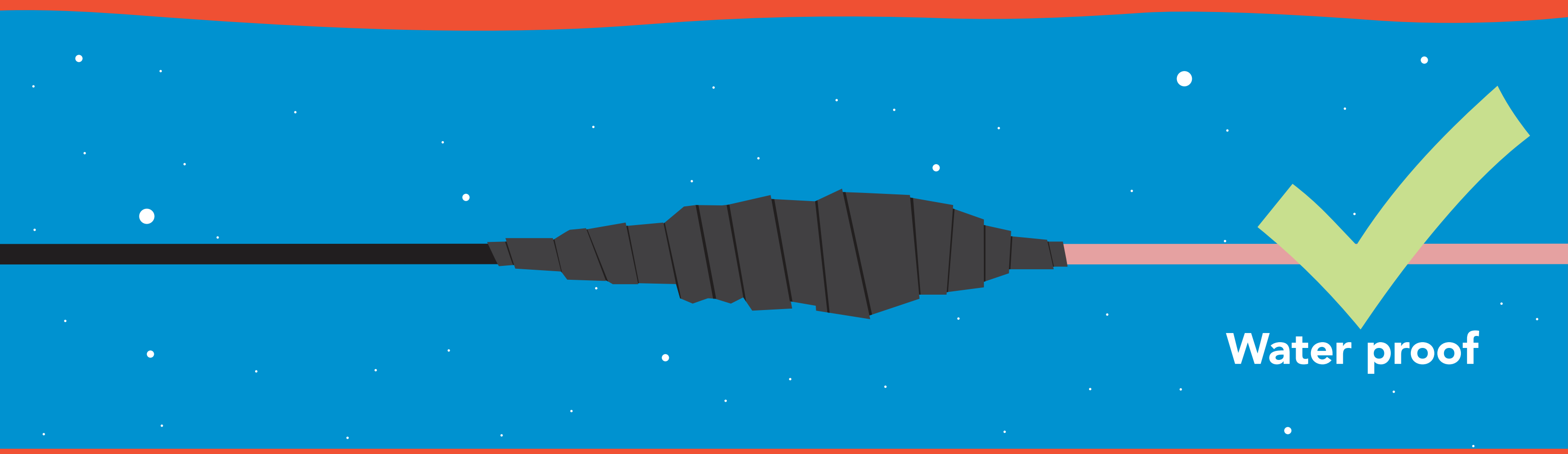
You can extend the cable to greater than 100 meters with no loss of signal. Atlas Scientific has tested up to 300 meters without a problem, however you run the risk of turning your pH probe into an antennae, picking up noise along the length of your cable.

If you want to extend your cable, we recommend that you use proper isolation, such as the ***Basic EZO™ Inline Voltage Isolator***, or ***Tentacle Shield***. Be sure to calibrate your probe with the extended cable.

Extending a probe cable can be easily done with our ***SMA Extension Cables***. Simply connect the SMA end of the probe to the Extension cable, and you are all set.



If you need to water proof a SMA connection, we highly recommend using a product like ***Coax-Seal*** to safely cover and prevent any water damage that may occur.



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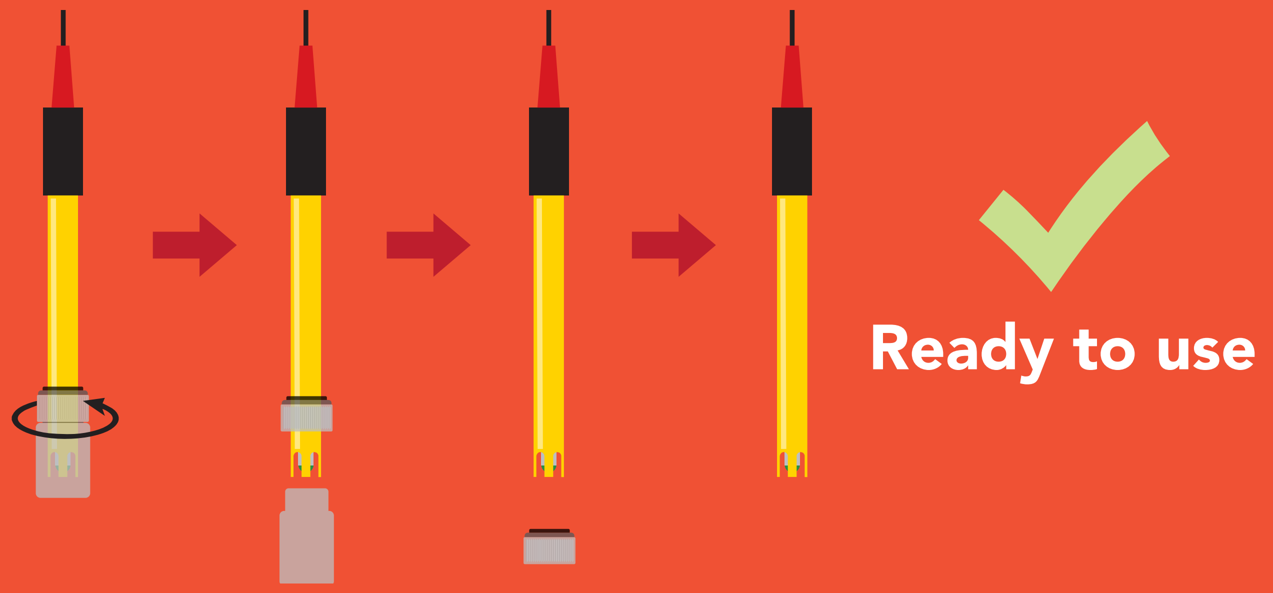
Helpful operating tips

pH probes must stay wet and cannot be allowed to dry out, this is why every pH probe is shipped in a plastic soaker bottle containing pH probe storage solution. The probe should remain in the bottle until it is used. If the probe is used infrequently, the bottle and its solution should be saved and the probe stored inside.

1 To remove the soaker bottle from the probe, hold the soaker bottle by the cap and turn the bottle until it separates from the cap; Then slide the cap off.



2 During shipment the air bubble in the probes stem may move into the bulb area. If bubbles are seen in the bulb area, hold the probe by its top cap and shake downward as done with a clinical thermometer.

3 Vigorously stir the probe in the sample, calibration solution, or rinse solution. This action will bring solution to the probes surface quicker and improve the speed of response.

Probe cleaning

Coating of the pH bulb can lead to erroneous readings including shortened span (slope). The type of coating will determine the cleaning technique. Soft coatings can be removed by vigorous stirring or by the use of a squirt bottle. Organic chemical, or hard coatings, should be chemically removed using a light bleach solution. If cleaning does not restore performance, reconditioning may be tried. ***Do not use a brush or abrasive materials on the pH probe.***

How often do you need to recalibrate a pH probe?

Because every use case is different, there is no set schedule for recalibration.

If you are using your probe in a fish tank, a hydroponic system or any environment that has generally weak levels of acids and bases you will only need to recalibrate your probe once per year for the first two years. After that every ~six months.

If you are using the pH probe in batch chemical manufacturing, industrial process, or in a solution that is known to have strong acids and bases, then calibration should be done monthly or in extreme cases after each batch.

Probe reconditioning

When reconditioning your pH probe is required due to aging, we recommend you use the ***Atlas Scientific pH probe reconditioning kit.***