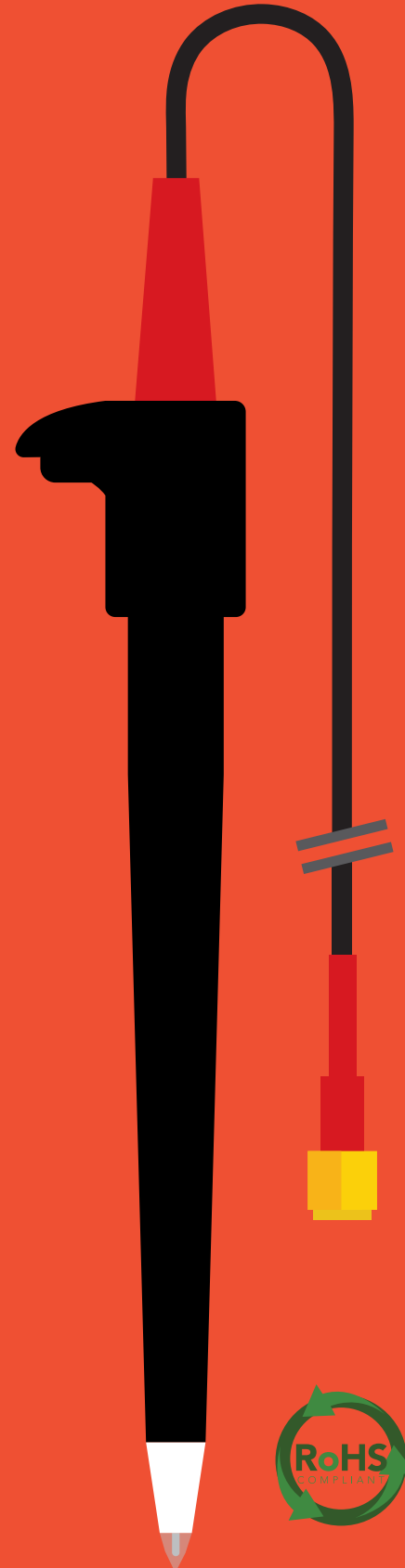


Gen 2

# Spear Tip pH Probe

Double junction silver / silver chloride

Reads	pH
Range	0 – 14
Resolution	+/- 0.001
Accuracy	+/- 0.002
Response time	95% in 1s
Temperature range °C	-5 – 110 °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 Years +



# 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.



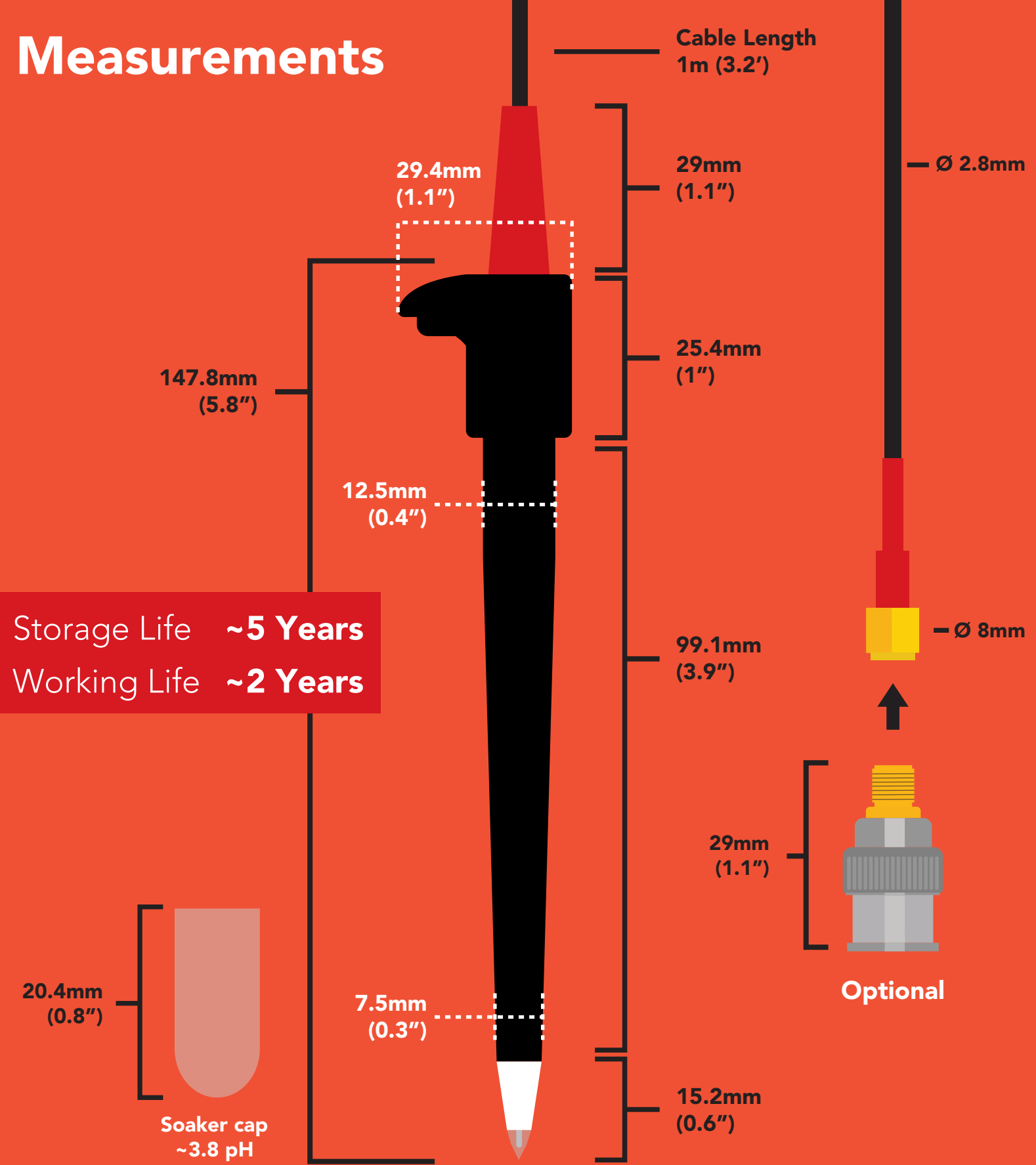
Dried KCl residue  
from pH storage  
solution

## 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.**

# Measurements

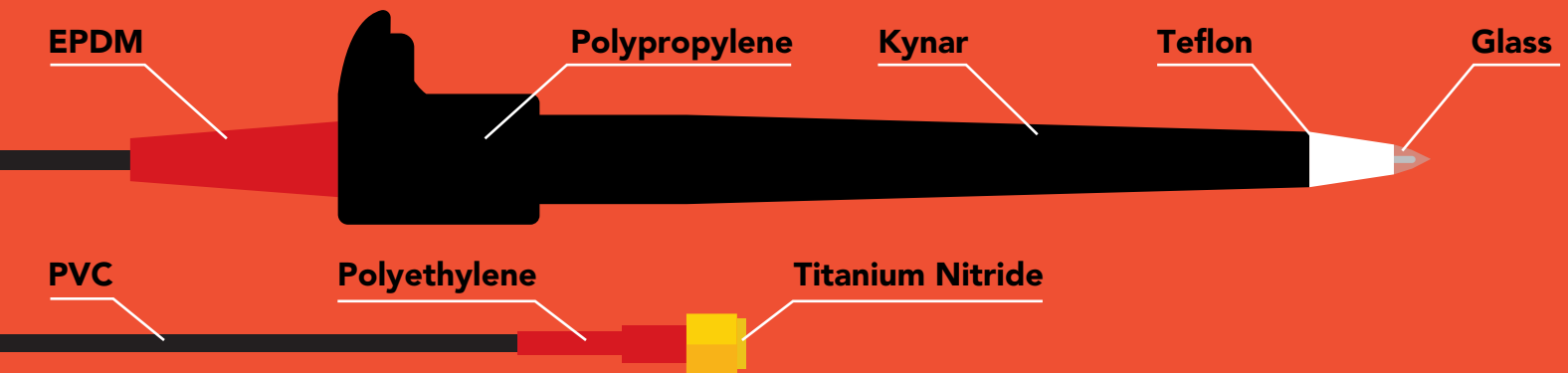


# Specifications

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	12.5mm x 147.8mm (0.5" x 5.8")
SMA connector	Male
Sterilization	Chemical only
Food Safe	Yes

DO NOT FREEZE

# Materials



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

# Typical applications

- Sturdy design with spear tip for food and soil applications
- High pH solutions (up to 14 pH)
- Hydroponics / aquaponics
- Beer, wine and other liquor

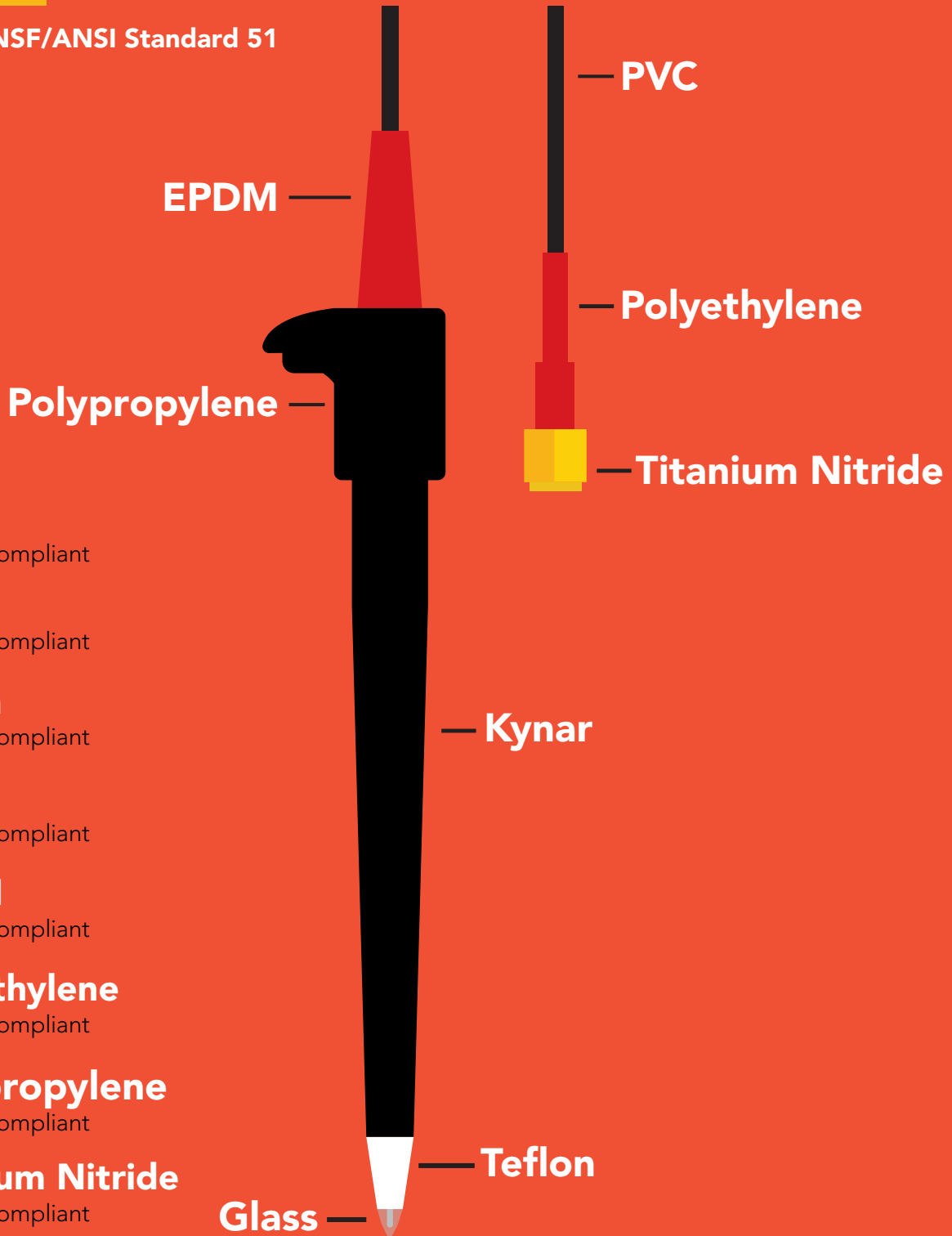
# NSF/ANSI 51 Compliant

## Food Safe

Atlas Scientific LLC, hereby certifies that,

**Spear Tip pH Probe**  
**Part # ENV-45-pH**

Complies with NSF/ANSI Standard 51



✓ **PVC**  
NSF-51 Compliant

✓ **Glass**  
NSF-51 Compliant

✓ **Teflon**  
NSF-51 Compliant

✓ **Kynar**  
NSF-51 Compliant

✓ **EPDM**  
NSF-51 Compliant

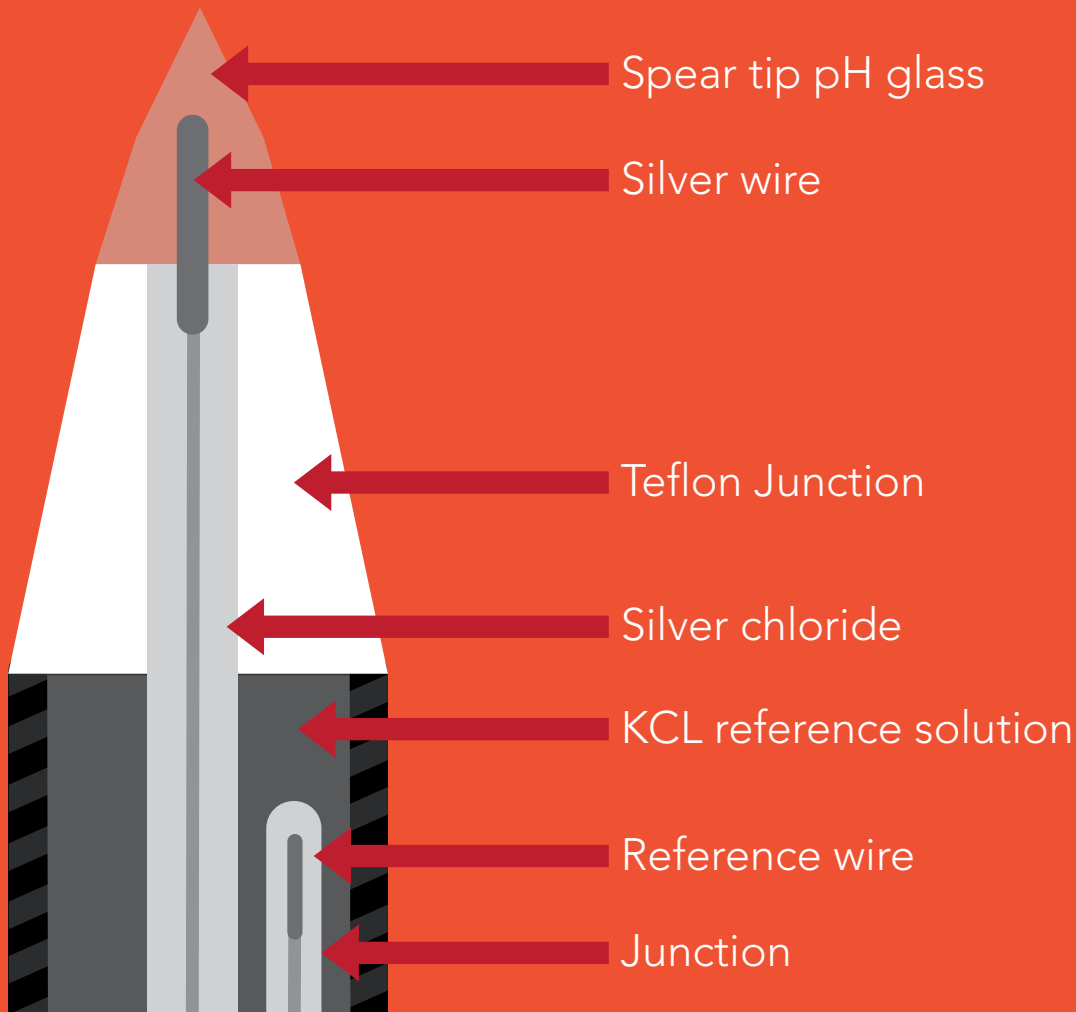
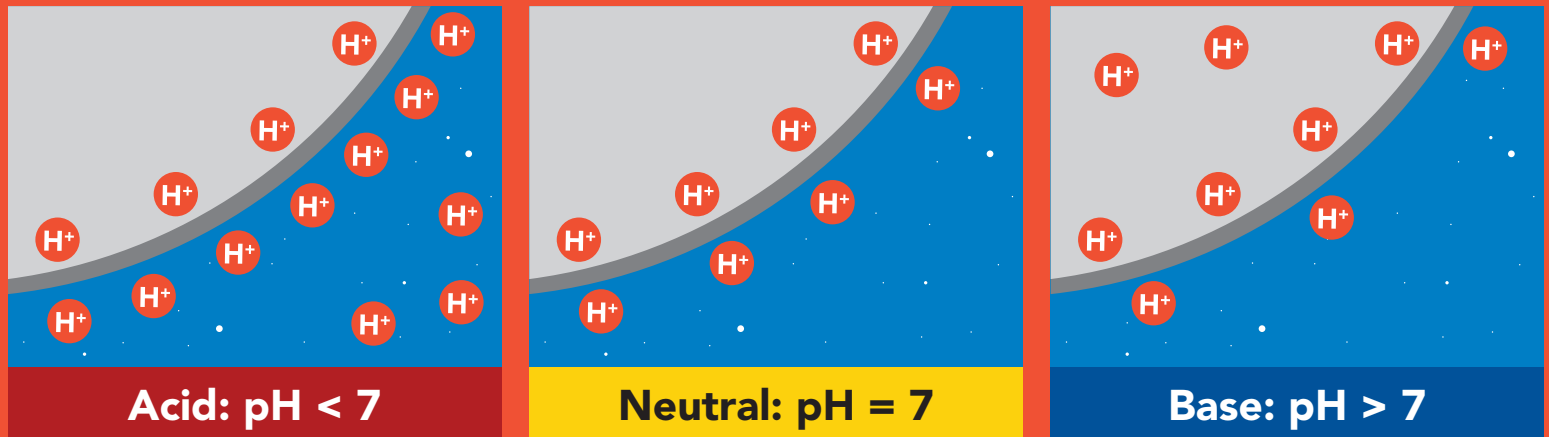
✓ **Polyethylene**  
NSF-51 Compliant

✓ **Polypropylene**  
NSF-51 Compliant

✓ **Titanium Nitride**  
NSF-51 Compliant

# Operating principle

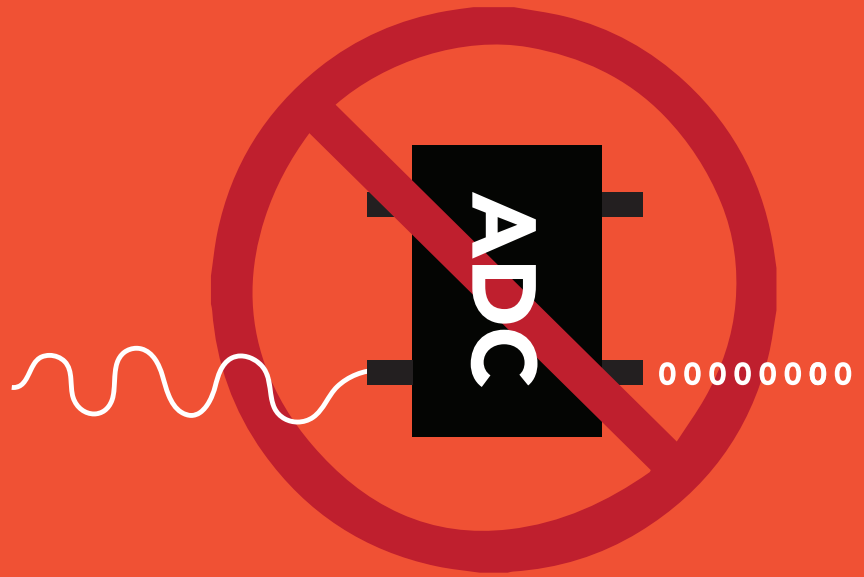
A pH (**potential of Hydrogen**) probe measures the hydrogen ion activity in a liquid. At the tip of a pH probe is a glass membrane. This glass membrane permits hydrogen ions from the liquid being measured to diffuse into the outer layer of the glass, while larger ions remain in the solution. The difference 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:

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

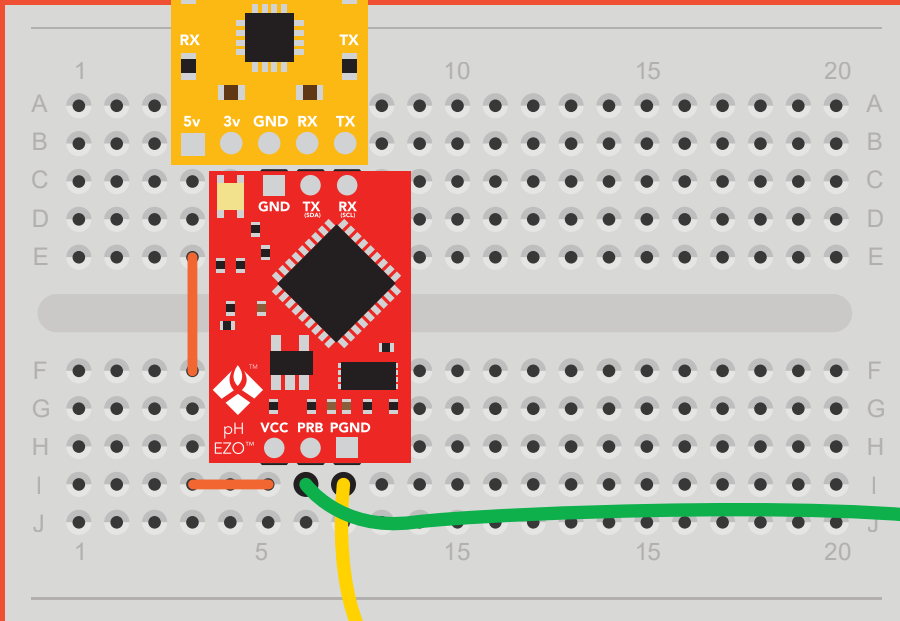
Where **R** is the ideal gas constant.

**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.

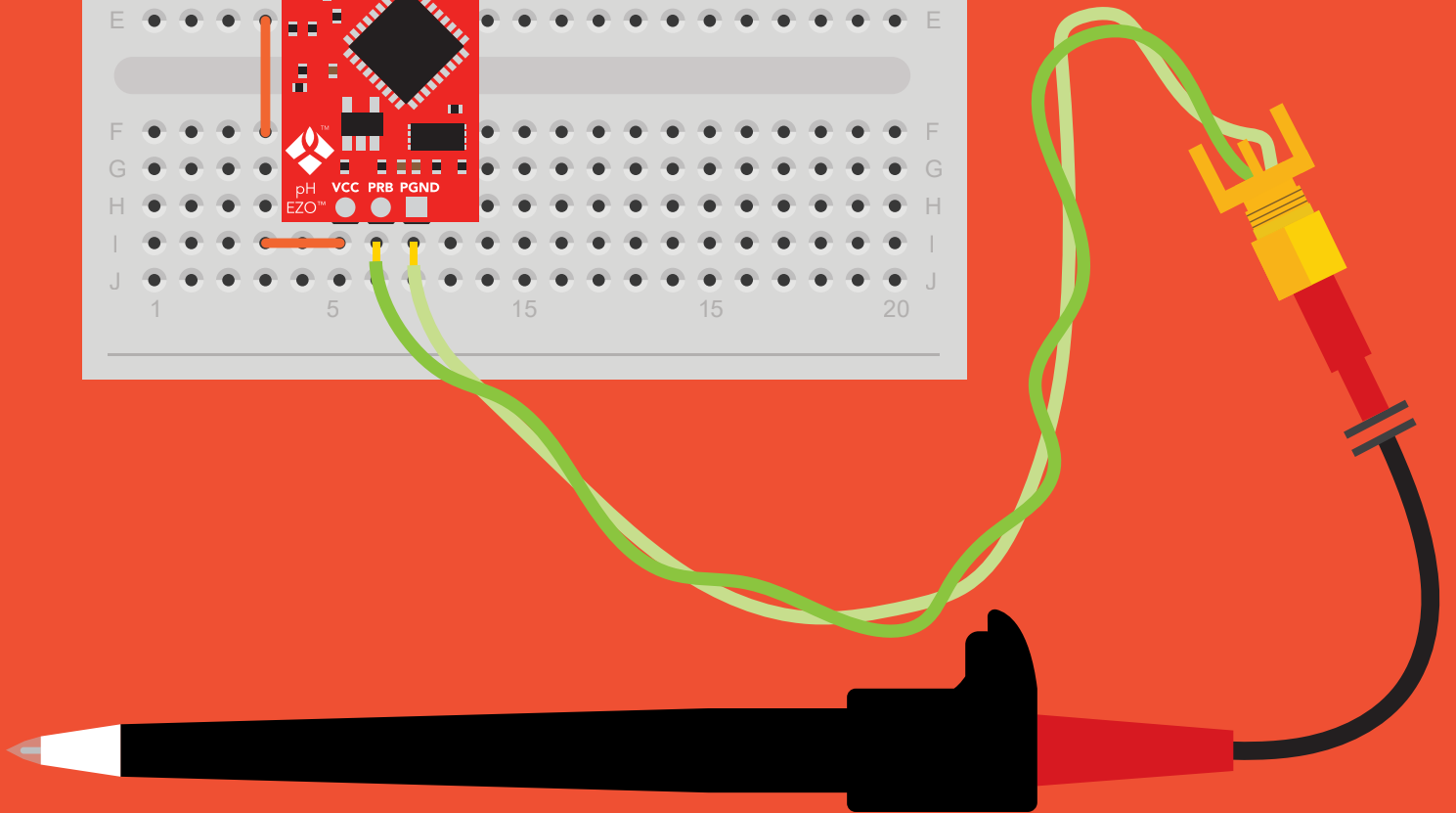
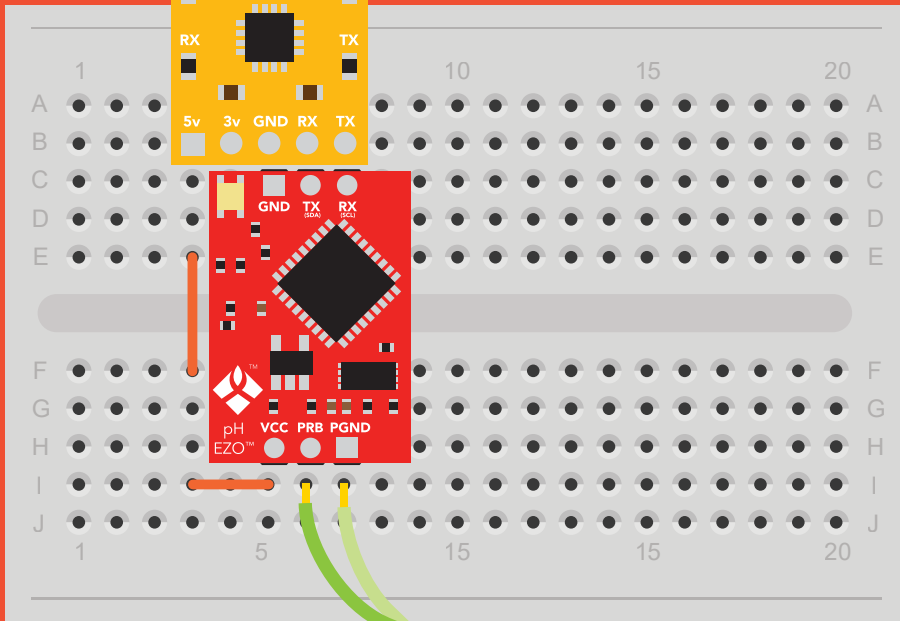
**NEVER** EXTEND THE CABLE  
WITH CHEAP JUMPER WIRES!



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



**DO NOT MAKE YOUR OWN  
UNSHIELDED CABLES!**



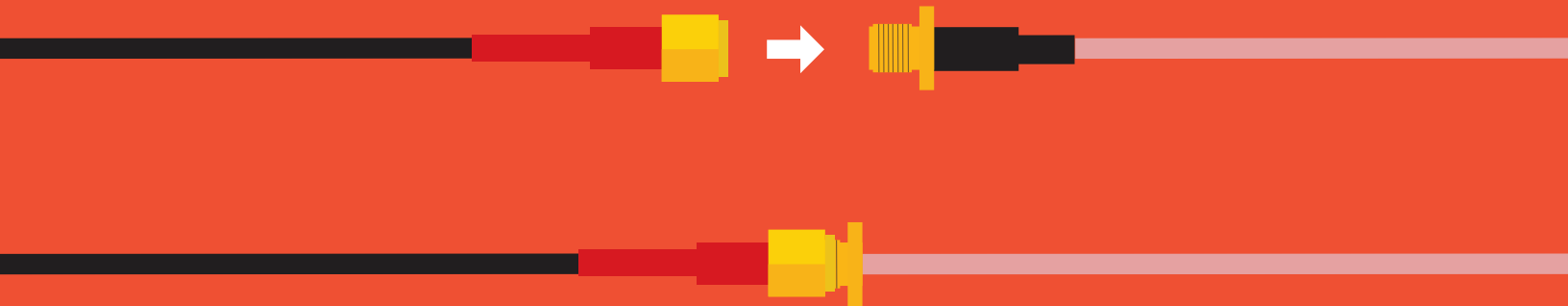
**ONLY USE SHIELDED CABLES.**

# Extending the probe cable length

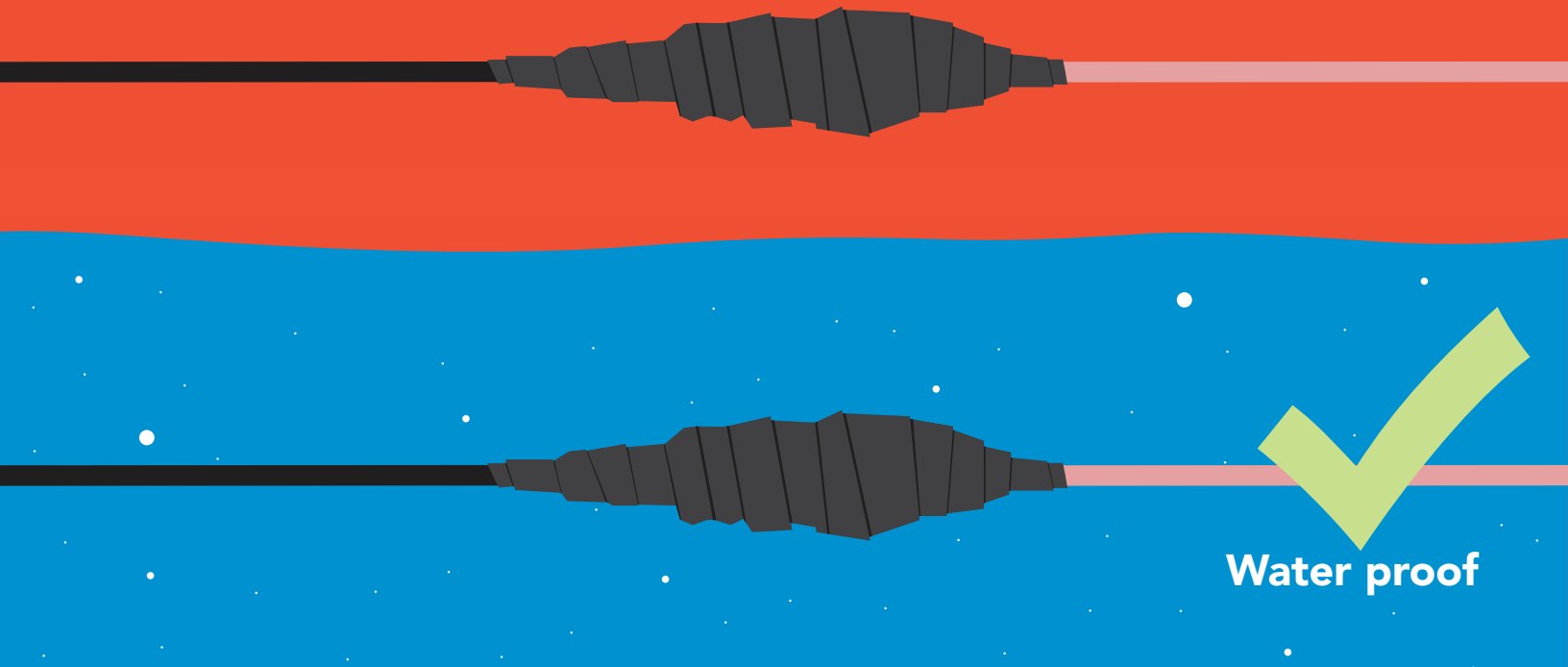
You can extend the cable to greater than 100 meters with no loss of signal. Atlas Scientific has tested up to 300 meters without a problem, however you run the risk of turning your pH probe into an antennae, picking up noise along the length of your cable.

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.

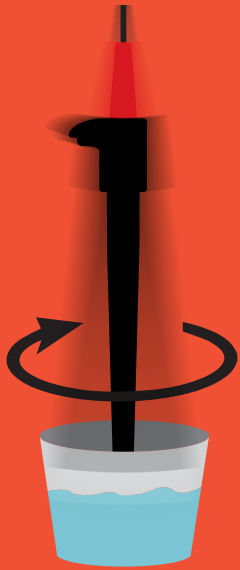


If you need to water proof a SMA connection, we highly recommend using a product like **Coax-Seal** to safely cover and prevent any water damage that may occur.



# Improve response time

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.



Response time

# 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**.

