



Idronaut pH Sensor on AML Secondary Mount User Manual



**Version 1.02
7 April 2017**

Revision History

Revision	Date	Description	Author
1.0	11 December 2015	Document Created	ABT
1.01	19 May 2016	Updates	JZ & ABT
1.02	7 April 2017	Added regulatory information section	ABT

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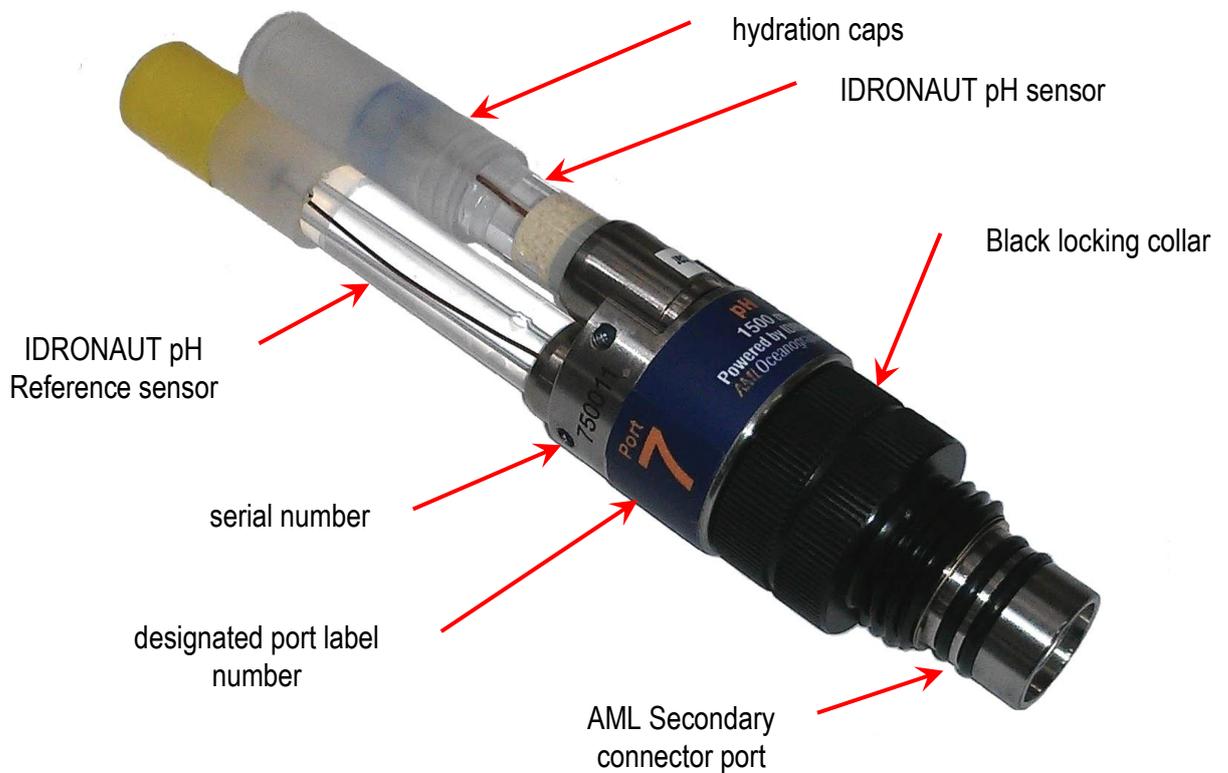
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General Description

The Idronaut pH sensor is an electrode sensor used for determining the pH level of salt or fresh water. This version mounts onto a dedicated secondary port on the sensor endcap of some AML instruments. It is powered through the instrument and the output signal is included in the standard AML data stream.

The sensor is equipped with an AML Oceanographic black Secondary connector. The black locking collar indicates the sensor outputs an analog voltage and must be used on a dedicated port on the instrument that converts it to a digital voltage. To retain its calibration, it must remain with the original instrument and used on the port identified on its label.

The sensor is rated to a depth of 1500m.



Shipping and Receiving

Receiving a Sensor

When receiving a new sensor, perform the following steps to ensure the sensor will be ready for deployment when required:

- Inspect the shipping container, looking for signs of damage. Damage to the shipping container could indicate damage to the sensor inside.
- Inspect for damage. The pH sensor contains delicate components.
 - Check the sensor for cracks or bends
 - Check the connector for corrosion, dirt, and salt deposits

Returning a Sensor to the Factory

- If shipping for repair or recalibration, obtain an RMA number from the service centre.
- Pack the instrument in its original shipping box to prevent damage during shipping.

An RMA number can be requested using the contact options given in the Support section of this manual.

Calibrating the pH Sensor

To calibrate your Idronaut pH sensor, perform the following tasks.

1. Connect the sensor to its designated port on the instrument. Connect to the instrument and engage the *MONITOR* command to view real-time data.
2. Prepare the pH buffer solutions. AML recommends using three pH buffer solutions of pH4, pH7, and pH10. Oakton instruments (www.4oakton.com) sells a 500mL buffer kit, shown below (Oakton part number: 05942-10).



Oakton pH 4.01, 7.00, and 10.01 Buffer Solution - PN: 05942-10

Rinse a clean cup large enough to fit both pH probes with distilled water. Fill to a height sufficient to immerse the electrodes with pH4 buffer solution. In the same manner, prepare a cup of pH7 and pH10 buffer solution.

3. Remove the plastic translucent hydrating caps from both the pH sensor and the pH-Reference sensor probe. Retain the hydrating solution, and place the caps in a safe, clean location.



Hydrating Caps on
(when not in use)



Hydrating Caps removed
(when in use)

4. Use a jig or fixture to suspend the Idronaut pH sensor vertically with both probes submerged in the pH4 solution. Ensure that the probes do not contact the bottom or sides of the cup. Record the voltage output of the sensor's signal wire.

5. Remove the sensor from the solution and rinse it with distilled water. Discard the buffer solution. **Note: Do not re-use the buffer solution.**
6. Repeat steps 4 and 5 using the pH7 and pH10 solutions.
7. Plot the data points recorded for each pH buffer solution used. The points should yield a linear relationship for signal voltage vs pH. Use this equation to develop a pH reading scale based on the voltage signal. If a linear data set does not develop, the buffer solution has spoiled, the sensor needs etching, or a sensor probe needs to be replaced. Try repeating the calibration. If similar results persist, see “Etching the pH Sensor Probe” under “Maintaining the Sensor.”

Using the Sensor

Pressure Ratings

The Idronaut pH sensor (SEN-PH-XAN-15) is rated for 1500m deployments. However, the instrument the sensor is used on may have a different depth rating. **Any deployment should never exceed the lower of these two pressure ratings.**

Caution: Do not exceed the specified pressure ratings of the Idronaut pH sensor or the instrument housing. Overpressure can result in damage to the sensor and the instrument.

Prior to deployment

Prior to deployment, ensure:

- The hydrating caps are off of the pH and pH-reference probes.
- The instrument has been properly calibrated (see “Calibrating the pH Sensor”).
- The instrument is connected properly.

Post deployment

After deployment, ensure:

- The sensors are rinsed with distilled water.
- The probes are hydrated with their respective solution (refer to “Maintaining the Sensor” section)
- The Idronaut pH sensor is stored in a secure location to protect the delicate sensor probes.

Maintaining the Sensor

pH Sensor Probe

The glass membrane of the pH sensor must be kept hydrated at all times. If the sensor is stored dry for an extended period (more than half a day), the sensor's performance may deteriorate. The electrode sensitivity diminishes, the response time increases, and signals tend to drift during measurements and calibrations. During all periods of inactivity, always place the translucent plastic cap filled with pH7 solution on the pH sensor. For a short time only (i.e. half a day), the sensor head can alternatively be immersed in distilled water to prevent dehydration.

pH Reference Sensor Probe

During all periods of inactivity, the reference sensor must be kept hydrated with the Idronaut Reference Sensor Storage Solution or, if not available, with NaCl saturated solution, using the plastic hydrating cap. Fill the cap to about one-third with the solution. The cap should be squeezed in order to allow an easy insertion.

If the sensor has been exposed to air without its protective cap, or the cap is empty of solution, the solid electrolyte of the sensor may contract, forming internal air bubbles, in particular by the junction hole. Should this occur:

1. Fill the cavity with the Idronaut Reference Sensor Storage Solution.
2. Take a small syringe, i.e. 1.5 ml, and aspirate a small amount of the Idronaut Reference Sensor Storage Solution (supplied with the probe).
3. Place the probe on a table in a horizontal position taking care that it does not rotate. Carefully insert the needle of the syringe in the junction hole of the reference sensor without bending the needle to avoid breaking the glass sensor.
4. Gently press the syringe plunger to inject some drops of solution inside to eliminate the air bubbles. If the cavity is too big and the electrolyte added easily leaks, or the cavity appears contaminated by foreign material, the replacement of the reference sensor may be required.

If the sensor is left immersed in the measuring environment for an indefinite period, there will be a slow progressive loss of the NaCl saturated solution from the solid electrolyte. In such working conditions, the reference sensor needs to be replaced within 6 months to a 1 year.

Etching the pH Sensor Probe

Note the following prior to etching the pH sensor probe:

- a) Etching the sensor is to only be performed if poor linearity of data is repeatedly observed. Most pH buffer solutions will generally last no longer than one year after opening the bottles, as the ambient CO₂ and pollutants can deteriorate them. In case of doubt or bad results, use fresh pH7 and pH4 buffer solutions as, in many cases, pH data problems are due to bad pH solutions.

- b) Do not use etching solution to store the electrode as this will permanently damage its pH glass membrane. The electrodes should always be stored either in distilled water or in the pH7 buffer solution
- c) The treatment of the pH sensor probe with etching solution cannot be performed indefinitely. After performing this step a few times, the treatment ceases to have any positive effect and the sensor should be replaced with a new one.
- d) Do not use the etching solution with the reference sensor. Permanent damage to the reference electrode will result.
- e) When not in use, the pH sensor probe must be fitted with the protective cap filled with either pH7 buffer or distilled water. (Alternatively, a salt solution - normally 3M NaCl - can be used).



WARNING: Use gloves in order to avoid any direct skin contact with the pH sensor etching solution since the solution contains hydrofluoric acid and ammonium fluoride and is highly corrosive

To etch the pH sensor probe, perform the following steps:

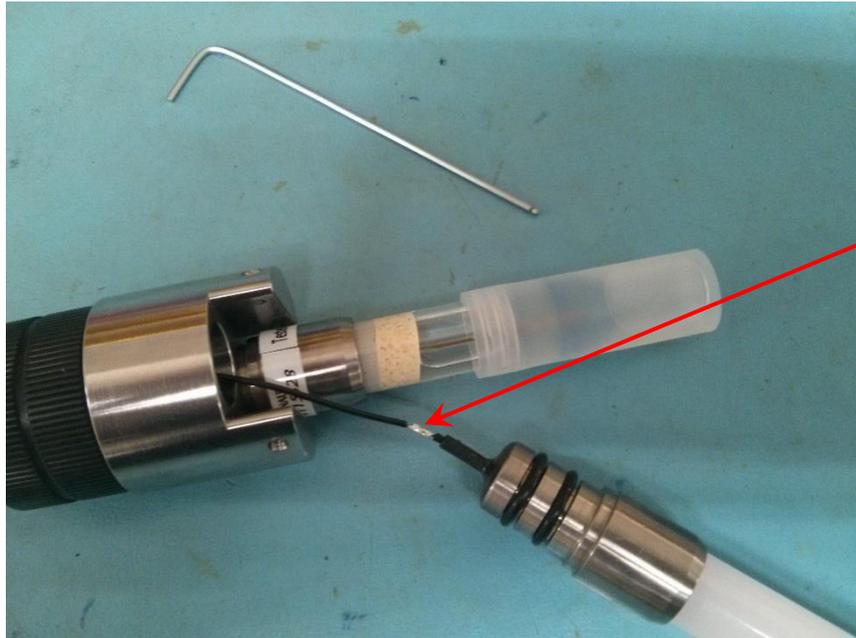
1. Half-fill the transparent cap with the pH Sensor Etching_Solution available from Idronaut.
2. Place the cap on the pH sensor, gently squeezing the sides to limit the inclusion of air bubbles during insertion. Ensure the etching solution covers the full round end of the sensor. After no more than one minute, remove the cap and carefully rinse both the pH sensor and cap with plenty of water. The electrode should be left in distilled water overnight before use.

Replacing a Probe

In order to replace either of the sensor probes, partial disassembly is required. Prior to disassembly, ensure that both probes are sealed in the correct solutions with their hydrating caps.

To replace a probe:

1. Loosen the set screws holding the sensor probes in place.
2. Remove the probe by gently pulling on its metal housing.
3. Remove the heat shrink and de-solder the probe from the sensor.
4. Trim the wire on the replacement probe to the length shown below.
5. Solder the new probe onto the sensor and insulate the solder joint with heat shrink.
6. Inspect the probe's O-rings for debris and apply silicone grease (see "Inspecting and Replacing the O-rings").
7. Insert the probe into the sensor by pushing it back into place by its metal housing.
8. Tighten the set screws to secure the probes.



SOLDER JOINT
WITH HEAT
SHRINK REMOVED

Inspecting and Replacing the O-rings

It is crucial to keep the sensor's O-rings clean and greased. Any fibres or dirt on or around the O-rings and grooves will allow water into the connector and damage both the sensor and the sensor mount. To gain access to the O-rings, perform the following steps:

- Remove the sensor from the instrument
- The O-rings should be slick with grease. If they are dry, apply silicone grease.
- Inspect the O-rings for dirt. Clean and reapply grease, if necessary
- Inspect the O-rings for nicks and cracks. If any are found, the O-rings must be replaced. Use 2-015-N70D Buna Nitrile O-rings. Apply silicone grease to the new O-rings before replacing.

Caution: Do not use a sharp instrument to remove the O-rings. If the O-ring grooves are scratched, the O-rings will not provide a waterproof seal. The O-rings can be removed easily with bare hands as shown below.



O-rings

O-ring Removal

Support

Troubleshooting

Instrument fails to detect the sensor:

- Is the sensor properly mounted on the instrument?
- Check the connector on both the sensor and the instrument for corrosion or damaged contacts.
- Cycle the instrument power.

Sensor data is noisy:

- Check the connector on both the sensor and the instrument for corrosion or damaged contacts.
- Is there a nearby source of electromagnetic interference? Examples are arcing brushes on electric motors, radio transmitters, switching power supplies, and faulty cathode ray tube monitors.
- Check the power supply to the sensor for noise. Ideally, the power supply should have less than 30mV of noise.

Contact AML Oceanographic

Service

To request an RMA or technical support

Email: service@AMLOceanographic.com

Phone: 1-250-656-0771

Phone: 1-800-663-8721 (NA)

Fax: 1-250-655-3655

Sales

For all general sales inquiries

Email: sales@AMLOceanographic.com

Phone: 1-250-656-0771

Phone: 1-800-663-8721 (NA)

Fax: 1-250-655-3655

Website

<http://www.AMLOceanographic.com>

Customer Portal

My AML Oceanographic is AML's online data centre. This secure area within our website is designed to offer one easy location for interested individuals and organizations - distributors, customers, prospects, and other members of our community - to manage their interactions with AML. *My AML Oceanographic* will allow you to:

- View and manage your assets (instruments and sensors)
- Consult instrument diagnostic summaries
- View and download calibration and conformity certificates
- View and manage your technical support cases
- Consult and download sales estimates, sales orders, and invoice copies
- View account balances and generate account statements
- Assess inventory availability at AML

To access the Customer Portal, please navigate to the *Support* button - located on the top right of the AML Oceanographic home page - select *Customer Centre* from the options on the drop down menu and follow the instructions provided.

Mailing and Shipping Address

AML Oceanographic

2071 Malaview Ave.

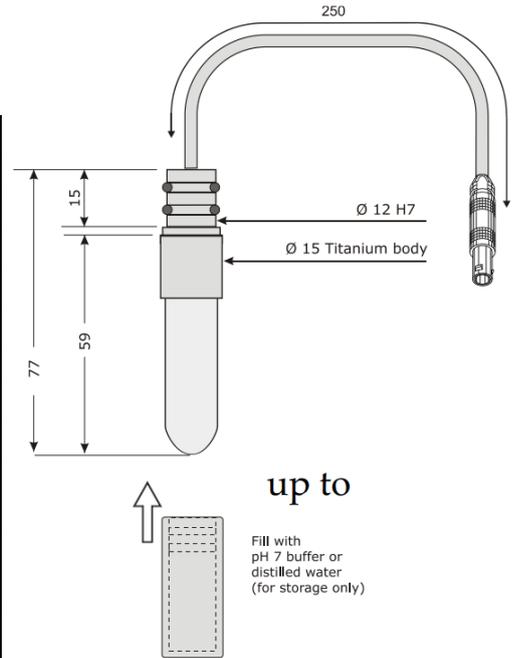
Sidney, BC, Canada

V8L 5X6

Technical Specifications

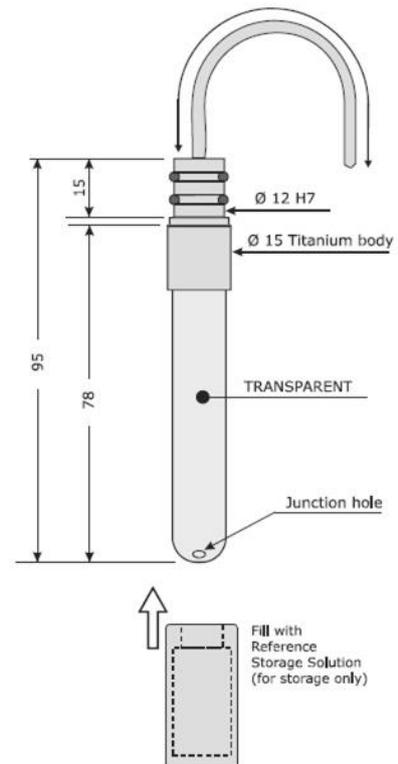
pH Sensor

Type	Blue glass membrane [100 Mohm @20°C]
Body Housing	Titanium
Measurement Range	0 to 14 [pH]
Accuracy	0.01 [pH]
Resolution	0.001[pH]
Drift	0.05 [pH/month]
Response time	3 [s]
Depth Rating	1500 [m]
Compensation	Thermal compensation
Life	Up to 2 [years] intensive use Up to 4 [years] weekly use
Calibration Frequency	Monthly
Maintenance	-Store with pH7 buffer Solution -Etching



pH-Reference Sensor

Type	Ag/AgCl filled with solid gel
Body Housing	Titanium
Life	Up to 1 [year] intensive use Up to 2 [years] weekly use
Maintenance	Store with Reference Sensor Storage Solution



Ordering Code

SEN-PH-XAN-15	PH Sensor & Reference, Idronaut, 1500m
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Regulatory Information

This product is compliant within the requirements of CE standards.



Warranty

AML warrants the instrument for a period of TWO YEARS from the date of delivery. AML will repair or replace, at its option and at no charge, components which prove to be defective. The warranty applies only to the original purchaser of the instruments and only to instruments and sensors manufactured by AML Oceanographic. The warranty of third party sensors will apply as per the specific vendor's warranty policy. The warranty does not apply if the instrument has been damaged, by accident or misuse, and is void if repairs or modifications are made by other than authorized personnel.

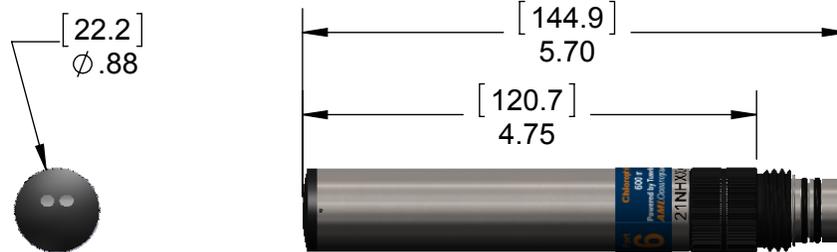
This warranty is the only warranty for new product given by AML. No warranties implied by law, including but not limited to the implied warranties of merchantability and fitness for a particular purpose shall apply. In no event will AML be liable for any direct, indirect, consequential or incidental damages resulting from any defects or failure of performance of any instrument supplied by AML.

DISCLAIMER

AML reserves the right to make any changes in design or specifications at any time without incurring any obligation to modify previously delivered instruments. Manuals are produced for information and reference purposes and are subject to change without notice.

Technical Overview Drawing

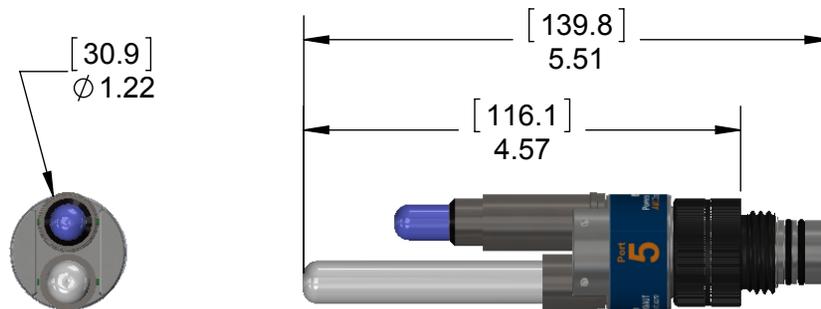
TURNER CYCLOPS-7



NOTES:

1. WEIGHT = 90g (0.20lbs)
2. CHLOROPHYLL AND PORT 5 LABELS SHOWN

IDRONAUT PH



NOTES:

1. WEIGHT = 130g (0.29lbs)
2. PORT 5 LABEL SHOWN

REV	DESCRIPTION	BY	DATE

NOTE: DIMENSIONS ARE IN INCHES [MM]

 <p>2071 MALAVIEW AVE. W., SIDNEY, B.C. CANADA V8L 5X6 PH:(250) 656 0771 FAX: (250) 655 3655 www.AMLoceanographic.com</p>	<p><i>TITLE</i></p> <p>SECONDARY OEM MECHANICAL OVERVIEW</p>	
	<p><i>SYSTEM</i></p> <p>SENSORS</p>	<p><i>AML PART NO.</i></p> <p>VARIOUS</p>
	<p><i>DATE</i></p> <p>09NOV2015</p>	<p><i>SLDRW NO.</i></p> <p>SNS-GA-04094</p>