# T•Xchange™

# User Manual

| Revision | Date of Revision | Changes | Name |
|---|---|---|---|
| Version 1.0 | 06 Dec 2012 | Added Revisions Table. Changed DIS T CAL to DIS TEMP CAL. Updated blanking plug image. Updated Website information. | Erika Ladouceur |
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# General Description of the Sensor

The AML Oceanographic's T•Xchange™ sensor is the industry's only field swappable temperature sensor.

The T•Xchange™ sensors store all pertinent sensor manufacturing and calibration data within the sensor. This allows the sensor to be swapped between any T•Xchange™ enabled instruments without having to manually update the calibration coefficients. Calibration sheets can be printed on demand by any instrument connected to the SeaCast software. Re-calibrations only require the sensor, not the instrument, to be shipped to the service centre. T•Xchange™ sensors are engraved at the factory with a unique serial number and the temperature range of the sensor as shown in the image below.



Serial Number

Temperature Range

T•Xchange™ Engraving
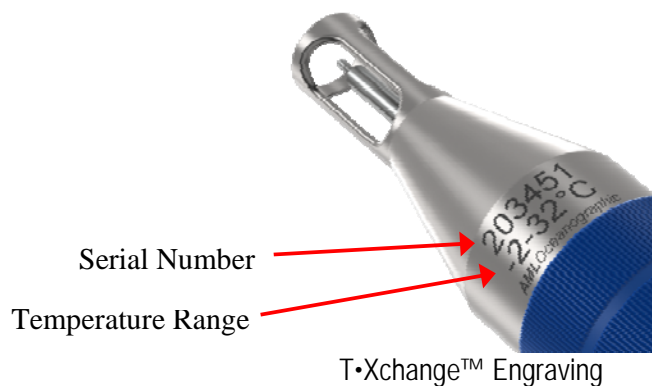
# Which Manual do I Start With?

AML Oceanographic's sensors and instruments may be shipped with several manuals:

- An instrument manual (I.e. SV Plus v2, Minos SVP) which provides an overview on how to use and maintain the instrument;
- A software manual (I.e. SeaCast) which provides instructions on how to use the software to configure the instrument and review instrument data; and
- An Xchange™ manual (for instruments equipped with Xchange™ sensors) which provides an overview on how to install and maintain Xchange™ sensors.

If you are configuring an instrument for field use or lab test, we recommend that you begin with the SeaCast manual. If you are focussed on instrument maintenance, we recommend that you begin with the instrument manual. If you are wishing to swap a T•Xchange™ sensor, we recommend that you read this manual.

# Shipping and Receiving

## *Receiving the Sensor*

When the sensor is received at a new location it is prudent to perform the following steps to ensure the sensor has not been damaged in transit:

- Check the shipping container for signs of damage
- Check for damage on the sensor itself
    - o Check the sensor for dents or dirt.
    - o Check the connector for corrosion or dirt
- Connect the sensor to an instrument. Connect the instrument to a computer using the data cable. Launch SeaCast, AML Oceanographic's application software. Verify that the instrument tab in SeaCast is displaying accurate T•Xchange™ sensor information. The T•Xchange™ sensor serial number and last calibration date should be displayed.
- On the View Data page select Monitor and allow the instrument to sample some data, as shown below. This will confirm the sensor is working.
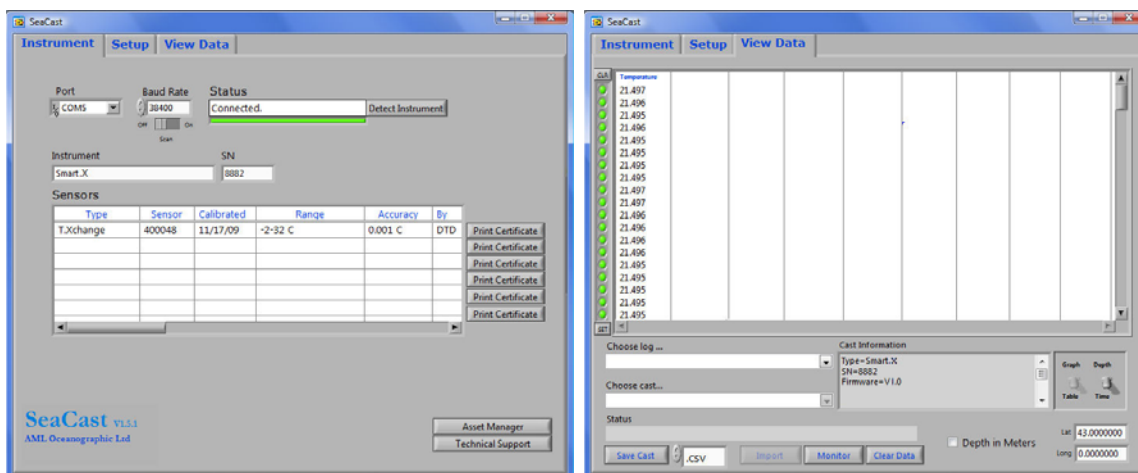


## *Shipping the Sensor*

- If shipping for repair or recalibration, obtain an RMA number from the service centre. Please refer to page 10 for contact details.
- Pack the instrument in its original shipping box to prevent damage during shipping.

# Using the T•Xchange™

This section of the manual discusses how to attach and disconnect the T•Xchange™ sensor. This section also identifies pre-deployment and post-deployment procedures, as well as periodic maintenance requirements.

## *Pressure Ratings*

The T•Xchange™ sensor is rated to operate to a maximum depth of 6000 m. However the instrument the T•Xchange™ sensor is used on will likely be depth limited by both its' pressure case and pressure sensor. **Deployments should never exceed the shallower of these pressure limitations.**

## *Attaching the T•Xchange™ Sensor*

- Select a T•Xchange™ temperature range that is compatible with your deployment.
- Ensure that the instrument socket is clean and dry
- Check the sensor's o-ring for cleanliness (see below, Inspecting & Replacing O-Rings)
- Align the sensor to the sensor mount
- Place the sensor into the mount
- Rotate the sensor until it drops down into the mount enough to allow the blue locking sleeve threads to engage the mount threads
- Screw down the blue locking sleeve until it stops. The bottom of the sleeve should be within 1 mm of the instrument end cap



## *Removing the T•Xchange™ Sensor*

- If the sensor has been used in salt water rinse the sensor in fresh water.
- Dry the sensor before removal to protect the connector.
- Unscrew the blue locking sleeve.
- Lift the sensor out of the mount.
- Ensure that the instrument socket is dry and clean, using compressed air if necessary.
- Immediately insert the blanking plug in the T•Xchange™ socket on the end-cap OR insert a replacement T•Xchange™ sensor



T•Xchange™, P•Xchange™ & Turbidity•Xchange™ Blanking plug

## *Pre-Deployment Procedures*

- 4 to 6 weeks ahead
  - o Ensure that the installed T·Xchange™ sensor has the correct temperature range for the deployment. If necessary, swap with another calibrated T·Xchange™ sensor with the correct range.
  - o Use the receiving checklist to verify the sensor is in good working order.
  - o Verify the calibration is valid for the duration of the deployment. Have the sensor re-calibrated if required or swap with another calibrated T·Xchange™ sensor.
- Before leaving the jetty
  - o Ensure the T·Xchange™ sensor is properly mounted on the instrument. The blue locking sleeve should be fully threaded onto the sensor mount of the instrument.
  - o Test the instrument to ensure the T·Xchange™ sensor is functioning properly.

## *Post-Deployment Procedures*

- Ensure the sensor is clean and dry before storage

## *Periodic Maintenance*

Periodic maintenance will prolong the life of the sensor. The following is recommended:

- If the sensor is dirty or oily, leave the sensor on the instrument. Prepare some warm soapy water and allow the instrument to soak before cleaning with a rag or soft brush. Rinse with fresh water.
- Before each deployment
  - o Check the sensor is properly seated on the instrument
  - o Check the sensor for cleanliness or damage
- After each deployment
  - o Clean and rinse the sensor using fresh water
- Before installing on an instrument
  - o Check the sensor for cleanliness or damage
  - o Check the o-ring under the blue locking sleeve of the sensor for cleanliness and silicon grease
- Removing from an instrument
  - o Ensure the sensor is clean and dry before removing
  - o Install a new sensor or blanking plug into the instrument to protect the contacts of the sensor mount
  - o Safely store the sensor
- Yearly
  - o Send the sensor to a service centre for diagnostics and re-calibration
- Long term storage preparation
  - o Ensure the instrument has been thoroughly cleaned and dried.
  - o Remove all Xchange sensors from the instrument and dry the connectors.
  - o Lubricate the instrument and Xchange sensor connector contacts with a silicone spray.
  - o Lubricate the retainer rings and o-rings with silicone grease.
  - o Install connector and sensor blanking plugs in the instrument.

## *Inspecting & Replacing the O-ring*

It is crucial to keep the T•Xchange™ 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 the o-rings 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 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.
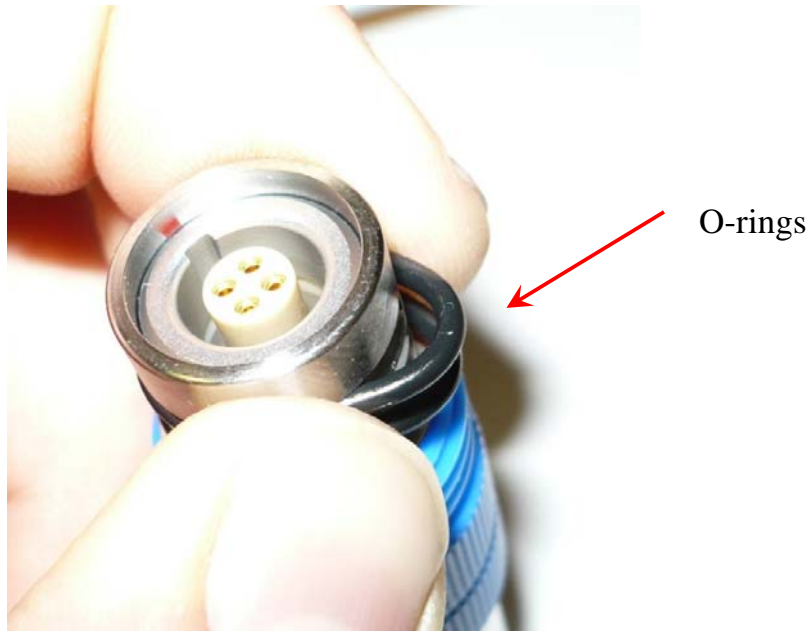


O-rings

O-ring Removal

# T•Xchange™ Commands

When using AML Oceanographic's SeaCast application software, knowledge of the instrument command set is not usually necessary.  However, the operator can issue text commands to the instrument as well as to specific sensors on an instrument.  This can be done from SeaCast or any terminal emulation program such as HyperTerminal.

There is additional functionality on T•Xchange™ equipped instruments with respect to the command set.  To use these commands, the user must first establish direct communication with the T•Xchange™ sensor.

## *Talking to the T•Xchange™ Sensor*

There are two ways to accomplish direct communication with the T•Xchange™ sensor.  They are:

1. On a Micro T instrument with the T•Xchange™ option, the T•Xchange™ commands can be given directly to the instrument.  Simply type the commands into the terminal emulation program.
2. On a Smart.X, Minos.X or Plus.X instrument, the "TALK" command is used to direct communications to the T•Xchange™ sensor.  Use the following procedure to accomplish this:

   ### Entering Talk Mode
   o  Establish communications with the instrument
   o  Send a "DETECT" command to the instrument.  The instrument will return a list of sensors detected on each slot of the instrument. Note the slot number for the T•Xchange™ sensor.
   o  Send a "TALK 2" command to the instrument.  Replace the 2 with the appropriate slot number if required.  This command directs subsequent communications directly to the sensor board.

   ### Exiting Talk Mode
   o  To exit talk mode, simultaneously press the CTRL and C keys

## *Specific Commands of Interest*

- DIS OPTIONS — Displays the current settings for the T•Xchange™
- DIS TEMP CAL — Displays the calibration sheet for the sensor
- SET TEMP FORMAT 23 Sets the T format to 2 digits ahead of the decimal place and 3 digits after the decimal place
- SET TEMP FORMAT 22 Sets the T format to 2 digits ahead of the decimal place and 2 digits after the decimal place

- SET TEMP FORMAT 21 Sets the T format to 2 digits ahead of the decimal place and 1 digits after the decimal place
- SET TEMP FORMAT 20 Sets the T format to 2 digits with no decimal

# Customer Support

## *Troubleshooting*

Instrument fails to detect the sensor
- Is the sensor properly mounted on the instrument?
    - Is the sensor fully screwed down?
    - Check the connector on both the sensor and the instrument for corrosion or damaged contacts.
    - Cycle the instrument power.
- Call the nearest service center for support

Temperature sensor is noisy
- Check the connector on both the sensor and the instrument for corrosion or damaged contacts
- Is the instrument subject to vibrations?
- Are there temperature eddies in the water being tested?
- 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.

## *AML Oceanographic Contact Info*

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

My AML Oceanographic:

**My AML Oceanographic** is AML's on-line 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. The functionality within **My AML Oceanographic** is expected to evolve quickly. Upon launch, **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

Mailing and Shipping Address:
AML Oceanographic Ltd.
2071 Malaview Ave.
Sidney, BC, Canada
V8L 5X6

# Technical Specifications

## *Sensors*

| Temperature Sensors | | | | | |
|---|---|---|---|---|---|
| Type | Range | Accuracy | Precision | Resolution | Response Time |
| T.Xchange | -2 to 32 C | ±0.005 C | ±0.003 C | 0.001 C | 100 ms |
| T.Xchange | -2 to 45 C | ±0.008 C | ±0.003 C | 0.001 C | 100 ms |

## *Mechanical Materials*

| Housing | | | | |
|---|---|---|---|---|
| Status | Type | Depth Rating | Diameter | Length |
| Standard | Titanium | 6000m | 22.9mm (0.9″) | 89.6 mm (3.53″) |

## *Sampling Capabilities*

- Samples up to 25 times per second