# Data•Xchange
# User Manual


**Version 1.01**
**24 June 2015**

## Revision History

| Revision | Date | Description | Author |
|---|---|---|---|
| Version 1.0 | 13-03-2015 | Finalized | JZ |
| Version 1.01 | 24-06-2015 | Updated wireless adaptor instructions | ABT |

# Table of Contents

## General Description

AML Oceanographic's wireless communication device, Data•Xchange, is an expansion available for X•Series profilers. Designed to improve the efficiency of data collection, it transfers data from AML loggers directly to the operator's computer without a cable, and records the location of each cast automatically.

Data•Xchange functions by replacing the standard red shorting pin of the X•Series data loggers. In the pin's place, it operates the logger in real time and keeps the data on its own internal storage. The GPS receiver locates the instrument before every cast, and appends that information to the data file.

Communications with Data•Xchange occur automatically over a WiFi connection through SeaCast. This allows data stored on the device to be transferred at up to 300 kilobytes per second, more than 40 times faster than a cabled RS-232 connection. In addition, the profiler operates without interference from Data•Xchange, retaining all settings and capabilities from before the installation of the device.

Data•Xchange is equipped with a single 8-pin connector for installation onto Base•X, Minos•X, or Plus•X instruments. It is typically used in vertical profiling, where its wireless connection allows for data retrieval between casts while using its power-saving features to reduce the need to disconnect and reconnect the shorting plug and data cable.


## Where Do I Start?

This user manual provides a complete overview of the use and storage of your Data•Xchange. The Table of Contents above provides an overview of topics covered in this manual.

# Shipping & Receiving

## Receiving an Instrument

When receiving an instrument, perform the following steps to ensure the instrument 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 instrument inside.
- The shipping package should include all of the following items
    - Data•Xchange
    - USB memory stick with manuals and documentation
    - USB wireless adaptor
- Inspect for damage
    - Check the connector sockets for corrosion, dirt, and salt deposits.
    - Check the pressure case for dents and scrapes.
    - Check for nicks and cuts on the cable.
- Attach Data•Xchange to an instrument and connect wirelessly using SeaCast. Perform a test cast and retrieve the data.

## Returning an Instrument 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.

# Using the Device

## Pressure Ratings

Data•Xchange is rated for a depth of 1000m. Pressure ratings are also given for Xchange™ sensors and the instrument used. **Deployments should never exceed the lowest of these three pressure ratings.** For example, a 500m instrument equipped with a 6000 dBar (0-6000m) P•Xchange™ sensor and a 1000m Data•Xchange is limited to deployments of 500m depth or less. Similarly, a 6000m instrument equipped with a 1500 dBar (0-1500m) P•Xchange™ sensor and a 1000m Data•Xchange is limited to deployments of 1000m depth or less.

It is desirable to optimize the accuracy of pressure measurements by using a P•Xchange™ sensor with a pressure rating near the depth of the deployment.

> Caution: Do not exceed the specified pressure ratings of the P•Xchange™ sensor, Turbidity•Xchange™ sensor, or the instrument or device housing. Turbidity•Xchange™ sensors are limited to deployments of 300m or less, regardless of the pressure rating of the instrument on which they are installed. Overpressure can result in damage to the sensors and the instrument.

## Pre-Deployment Procedures

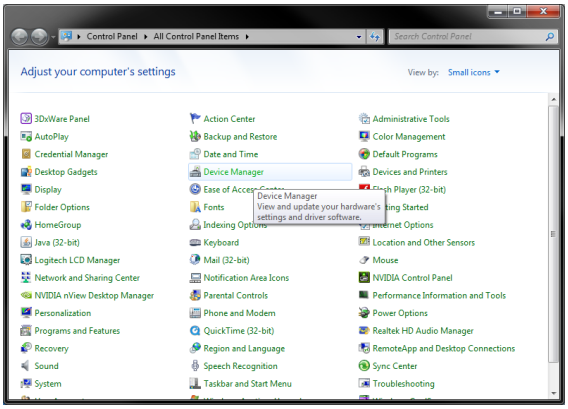
- Upon Receipt
  - Use the Shipping and Receiving instructions to verify the condition of the instrument.
  - Verify that all sensor calibrations are valid for the duration of the deployment. If not, swap the Xchange™ sensors for sensors with valid calibrations or send them to a service centre for recalibration.
  - Lightly lubricate the underwater connectors with 3M silicone spray or equivalent.
- Before leaving the jetty
  - If applicable, verify the P•Xchange™ pressure range is correct for the deployment.
  - Connect the instrument to a computer using the data cable.
  - Ensure the shackle adaptor is properly attached, as per Installing the Shackle Adaptor.

## USB Wireless Adaptor

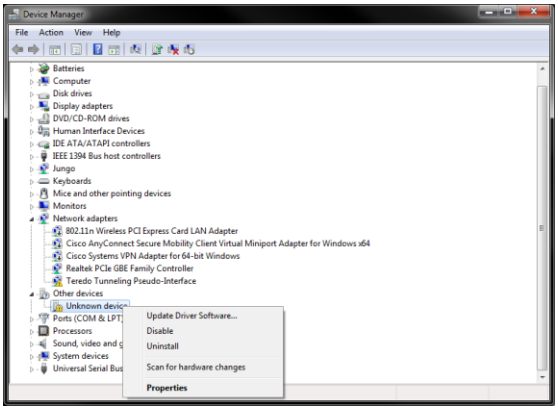
Since a wireless connection is required to connect to Data•Xchange, a wireless adaptor is included with every device for the user's convenience. If a computer – such as a laptop – already has an adaptor installed, it can connect to Data•Xchange without disrupting its existing network.

### Installation

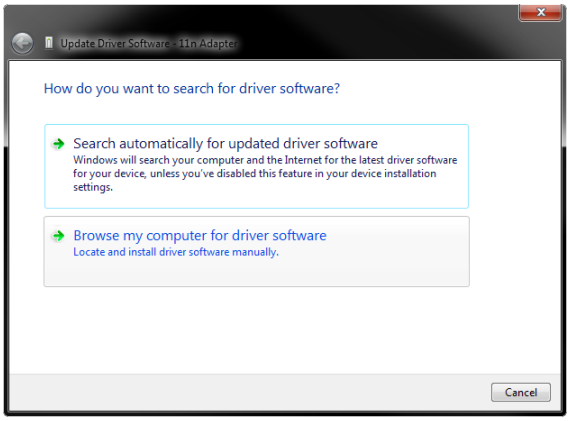
The drivers for the wireless adaptor are included with every installation of SeaCast 4 and on the AML USB stick. The following instructions explain how to install them on a computer running Windows 7.



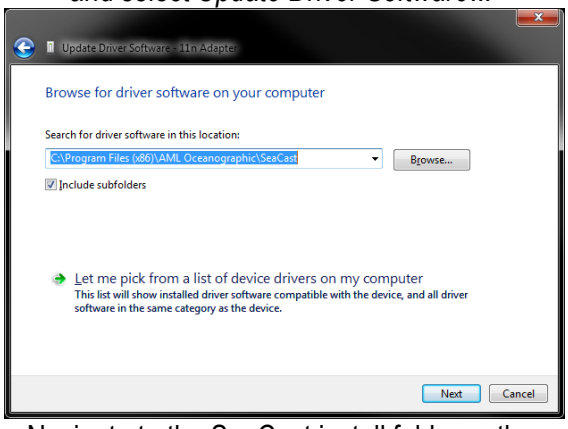

Control Panel > Device Manager




Right-click *Unknown device* in *Other devices* and select *Update Driver Software*...




Browse your computer.




Navigate to the SeaCast install folder or the AML USB stick. Ensure *Include subfolders* is ticked.

Select *Next* and the utility will find and install the driver.

## Attaching to the Instrument

### Installing the Shackle Adaptor

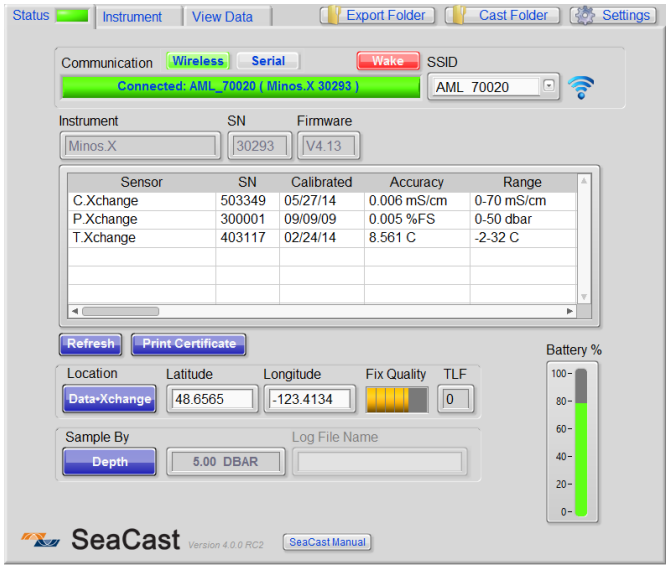
Data•Xchange can be equipped with a shackle extender to physically support the device while attached. These extend the existing shackle and include mounting points for an accommodating holster. The device is then secured in place and protected from bending and mild impact.


### Activating the Device

Insert the Data•Xchange plug firmly into the 8-pin connector bulkhead on the top of the instrument and thread on the locking sleeve. The LEDs on both Data•Xchange and the instrument will light up, indicating that the instrument is ready to log.

## Data•Xchange and SeaCast

SeaCast is the free data management software provided by AML Oceanographic for use with its products. For more information on using SeaCast to configure your Data•Xchange, update the firmware, and automatically retrieve and export files, see the SeaCast user manual.



## Device Status and Power Saving Modes

Data•Xchange is equipped with an amber LED under its endcap. This indicates the power and connection status of the device and combined with the subordinate X•Series instrument's LED, the status of the system as a whole. The device has three connection states, as displayed in the following table:

| State | Pattern |
|---|---|
| GPS lock | ☼• • • • • • • |
| No GPS lock | ☼•☼• • • • • |
| Establishing communications | ☼•☼•☼• • • |

When first plugged in, Data•Xchange will establish communications and begin to find a GPS fix. To show this, the patterns will alternate until the instrument responds, at which point only the lock or no lock pattern will display.

In addition, there are three optional power-saving modes:

| Mode Name | *Default | Effect and Recovery | Indicator |
|---|---|---|---|
| WiFi Sleep | Enabled 1 second after loss of WiFi connectivity | Turns off device's wireless network when the instrument is in water for more than the specified number of seconds after losing WiFi connection to SeaCast. The device begins to broadcast again once air is detected. | None, but instrument LED will blink to show logging activity. |
| Sleep | Enabled after 3 minutes of inactivity | Turns off the instrument after the specified number of minutes of inactivity while connected wirelessly. To restore function, send a wakeup command over the network, sever the wireless connection, or power cycle the device. | Instrument LED shuts off. Data•Xchange LED remains blinking. |
| Shutdown | Disabled | Shuts down everything possible after the set time has elapsed without input. To recover, reconnect the device. | All LEDs turn off. |

*Default settings can be changed with SeaCast, or directly through the terminal as explained in the Appendix.

Caution: Even in shutdown mode, Data•Xchange draws a small amount of current. Always unplug the device before storage.

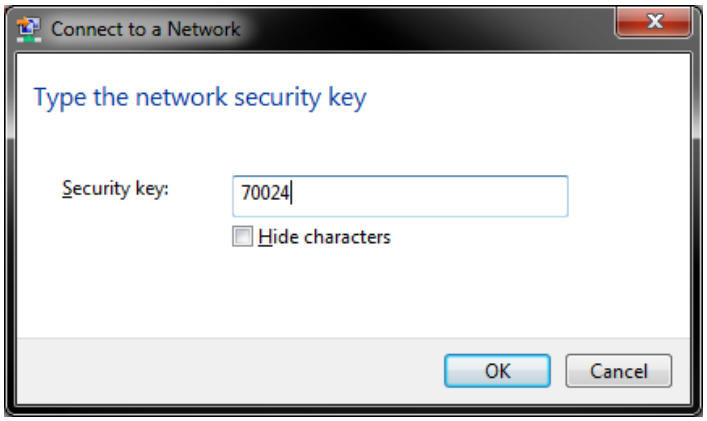
## Data•Xchange Log Files

Data•Xchange reads the live output of its X•Series instrument as it records. Saved in individual SeaCast (.csv) cast files onto the onboard memory, this data is accessible over wireless, and is downloaded by SeaCast when the device is synchronized.

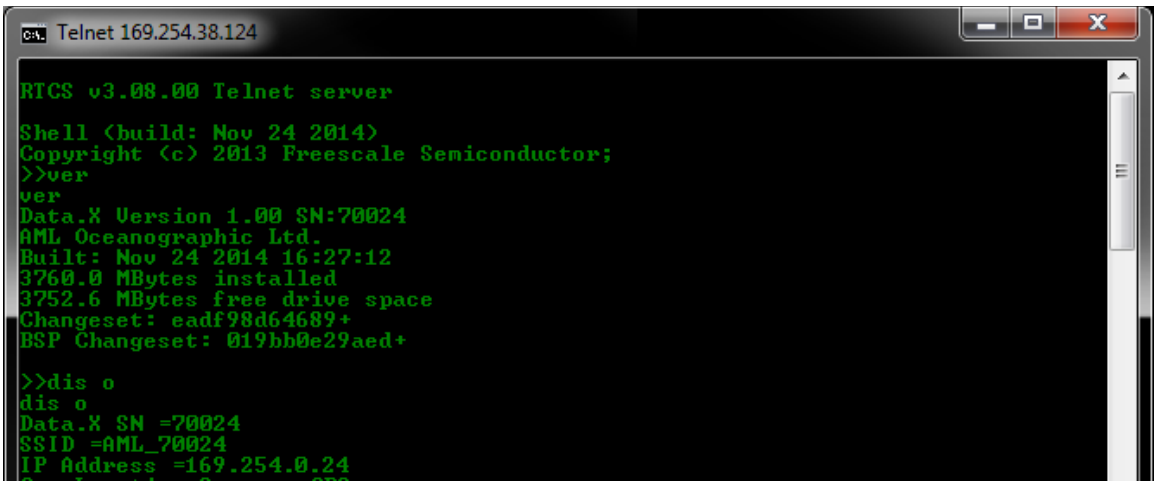
The instrument will also log when there is space in its memory. This data is accessible through the cabled serial connection as explained in the instrument's user manual. When the instrument is full it will stop storing data, but Data•Xchange will continue to record without interruption.

## Manual Connection

It is possible to connect to Data•Xchange and its attached instrument manually. To gain access to the device, connect to the ad-hoc network with the SSID matching the serial number of the unit. The password is the serial number.


The Data•Xchange console can be operated by any Telnet client at this point, and the file system can be accessed with FTP. The IP address of the device can be found with its serial number as explained in the appendix or obtained through SeaCast by entering the *DISPLAY OPTIONS* command into the Advanced Instrument Control panel on the *Instrument* tab. For more information on available terminal commands, see the Appendix.


## Post-Deployment Procedures

- When the instrument and device are retrieved they should be rinsed with fresh water.
- Dry the area around the connectors with a clean cloth or compressed air prior to disconnecting the plugs or cables. Remove Data•Xchange.
- Dry the instrument and device and stow them securely.

# Maintaining the Device

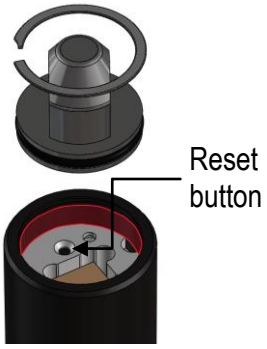
## Periodic Maintenance

Periodic preventative maintenance will prolong the life of the device. The following steps are recommended:

- If the device is dirty or oily, allow it to soak in warm, soapy water before cleaning with a rag or soft brush. When finished, rinse with fresh water to remove any residual soap or dirt.
- Before each use:
  - Check the connector sockets for corrosion, dirt, and salt deposits
  - Check the pressure case for dents and scrapes
  - Check for nicks and cuts on the cable.
- After each use:
  - Clean and rinse the device using fresh water.
  - Dry the device completely, and store it in a cool, dry place.
- Monthly:
  - Lightly lubricate the connector contacts with 3M silicone spray or equivalent. Avoid the use of grease. It can create internal pressure and push past the connector seals on the pins.

## Resetting to Factory Firmware

As a safety measure, the device is supplied with the ability to reset its firmware to the original factory state. The following steps describe the process.




1. Ensure Data•Xchange is clean and dry; do not open while wet.
2. In a clean environment, remove the retaining ring and gently pull the endcap free of the pressure casing. Set both safely aside.
3. While using a thin tool to depress the reset button, plug the device into a charged instrument. The light will flash quickly for a few seconds as the firmware reloads, then stop for a moment. The button may now be released.
4. The device will now start up normally. Connect to it over wireless and confirm functionality.
5. To ensure the integrity of the casing is maintained for 1000m deployments, inspect the sealing surface on the pressure housing and o-rings on the endcap for debris or damage. These areas are indicated in the accompanying picture. Replace the o-ring if it is damaged. If the o-ring is dry, apply a thin layer of silicone grease. If debris has scratched or gouged the sealing surface or the o-ring grooves, sealing may be compromised.
6. Place the endcap back in position and secure it with the retaining ring.

# Support

## Troubleshooting

The following guide is for issues related to Data•Xchange. If the X•Series instrument fails to communicate or generates noisy or incorrect data, refer to its specific user manual.

**Device fails to connect over wireless:**

- Is the device powered?
    - Is the connector fully seated?
    - Is the attached X•Series instrument charged?
    - The amber endcap light will blink when powered, using the patterns on the label.
- Is your computer connected to the ad-hoc network the device generates?
    - See which wireless networks are available to your computer. If using SeaCast, a network called "Data•Xchange" will appear. If not, the SSID with the device's serial number included indicates that it is broadcasting.

**Connection is spotty, or device wakes up from sleep mode without prompting:**

- Is there a powerful wireless transmitter or microwave emitter nearby?
    - Interference from such sources can cause a momentary loss of connection that can cause also Data•Xchange to awaken.
    - It may be necessary to relocate either the Data•Xchange or the source of interference if the problem persists.
    - In some cases, it is possible to solve this problem by changing the wireless channel of either the Data•Xchange or the source of interference. The command to set device channel is explained in the appendix.

**Device fails to acquire a GPS lock, or takes longer than expected:**

- Is the device oriented vertically?
- Is there a significant obstruction around the device?
- Is it cloudy, overcast, or raining, especially on the horizon?
    - Weather conditions have a significant effect on GPS fix acquisition time.

**Device is nonresponsive:**

- Was the wireless network disrupted during a firmware version upload?
- Reset the firmware as described in Resetting to Factory Firmware earlier in this manual.

## 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

# Appendices

## IP Address

The IP address of each Data•Xchange is auto-generated in the ad-hoc range based on its serial number. The first two blocks will always be 169.254, while the second two will be the last four digits of the serial number expressed in base-256 notation, as shown below.

| Serial Number | IP Address |
|---|---|
| 70033 | 169.254.0.33 |
| 70256 | 169.254.1.0 |
| 70510 | 169.254.1.254 |

## Command Addressing

Commands sent to Data•Xchange are executed by the device. To access the instrument that the device is installed on, use the `---` command to enter Instrument Mode. Once this is done, the instrument can be addressed as though it were connected serially. For a list of commands specific to the instrument in use, refer to its particular manual. To return to Data•Xchange, enter `+++`. This resets the instrument, so it will be inaccessible for the next few seconds as it reboots.

## Command Listing

For a complete command listing, input *HELP* when communicating by terminal. Some common commands have been provided below.

### General Commands

| Command | Description |
|---|---|
| VERSION | Displays device firmware version, device serial number, and available memory. |
| DISPLAY OPTIONS | Displays configuration settings, including GPS, power-saving, and wireless information. |
| IDENTIFY | Flashes the Data•Xchange LED. |
| HELP | Displays the main command listing. |
| ? | Displays the internal file system commands. |
| DISPLAY and SET CHANNEL | Allows the user to set the WiFi channel used by Data•Xchange. After a new channel has been set, all computers must be disconnected and Data•Xchange restarted for the change to take effect. Default channel is 10. |
| REBOOT | Reboots the device. |
| DISPLAY and SET IWIA | Toggles In-Water Instrument Access |
| --- | Enter Instrument Mode. |
| +++ | (While in Instrument Mode) Return to Data•Xchange. Resets the instrument. |

### Power Saving

| Command | Description |
|---|---|
| SLEEP | Puts the instrument to sleep. |
| WAKEUP | Wakes the attached instrument. |
| DISPLAY and SET SLEEP | Usage: set sleep [<yes/no/val>]<br><yes/no> = Enable/Disable Sleep Timeout<br><val> = Sleep Timeout Value (min) |
| DISPLAY and SET SHUTDOWN | Usage: set sleep [<yes/no/val>]<br><yes/no> = Enable/Disable Shutdown Timeout |

| | |
|---|---|
| | <val> = Shutdown Timeout Value (min) |
| DISPLAY and SET WIFISLEEP | Usage: set sleep [<yes/no/val>]<br><yes/no> = Enable/Disable WiFi Sleep Timeout<br><val> = WiFi Sleep Timeout Value (sec) |
| DISPLAY and SET BATTSHDN | Controls shutdown the threshold at which the device shuts itself and the instrument down. |
| DISPLAY VOLTAGE | Displays the instrument battery voltage as measured by Data•Xchange. |

## Technical Specifications

### Electrical

- 2.4 GHz WiFi communications integrated module and antenna
- GPS receiver and antenna
- Data Storage: 4 GB

### Power

- External Power Supply: 6-14 VDC (Supplied from attached instrument)
- Power draw at 7.2 VDC
  - Active: 125 mA
  - Active, with WiFi sleep enabled: 110 mA
  - Sleep mode: 115 mA
  - Shutdown: 5 mA

### Pressure Case

- Environmental Limits
  - Storage: -40°C to 80°C
  - Usage: -20°C to 45°C

| Housing | | | | | | |
|---|---|---|---|---|---|---|
| Status | Type | Depth Rating | Diameter | Length | Weight (in water) | Weight (in air) |
| Standard | Delrin | 1000 m | 33mm (1.3") | Body: 158mm (6.2")<br>Total: 300mm (12") | 0.05 Kg (0.11 lbs) | 0.19 kg (0.41 lbs) |

| Connector | | | | | |
|---|---|---|---|---|---|
| Type | Status | Pins | Sex | Material | Manufacturer |
| Micro | On Cable | 8 | Male | Polyurethane | Subconn |

**Sampling Capabilities**

- As per instrument attached

**Included Items**

- Data•Xchange device
- USB wireless network adaptor
- USB memory stick with manuals and documentation

**Software**

- SeaCast 4

# Ordering Codes

## Device

| | |
|---|---|
| DTX-MC8M-WG-10 | Data•Xchange Wireless Device, Micro 8 |

## Shackle Extenders

| | |
|---|---|
| CSE-0022 | Base•X Shackle Extender |
| CSE-0023 | Minos•X Shackle Extender |
| CSE-0024 | Plus•X Shackle Extender |

## Warranty

AML Oceanographic warrants the device 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 are found to be defective. The warranty applies only to the original purchaser of the instruments. 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 any other than authorized personnel.

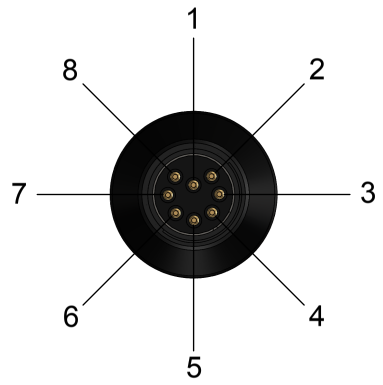
This warranty is the only warranty given by AML. No warranties implied by law, including but not limited to the implied warranties of merchantability and fitness for a particular purpose shall apply. In no event will AML be liable for any direct, indirect, consequential, or incidental damages resulting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

## Regulatory Information

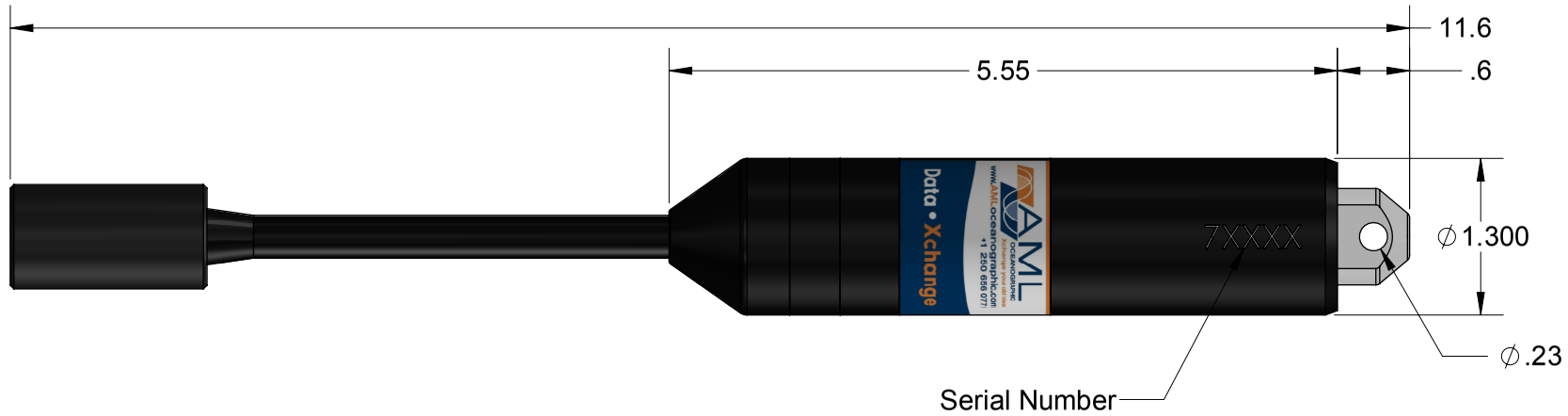
The Qualcomm Atheros AR4100 WiFi adaptor used in Data•Xchange is a certified radio module under the following regulatory bodies:

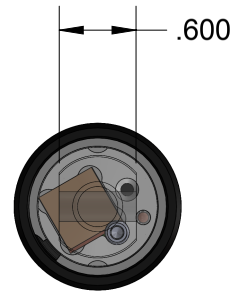
| | | |
|---|---|---|
| 1. | FCC Part 15.247 Intentional Radiator Certification | FCCID: PPD-AR410 |
| 2. | Industry Canada RSS-210 | IC ID: 4104A-AR4100 |
| 3. | R&TTE CE Marking | DoC: AR4100 Europe DoC 2011-6-21.pd |
| 4. | Japan Certificates | 003GZA110921, July 7, 2011<br>003WWA110920, July 7, 2011 |

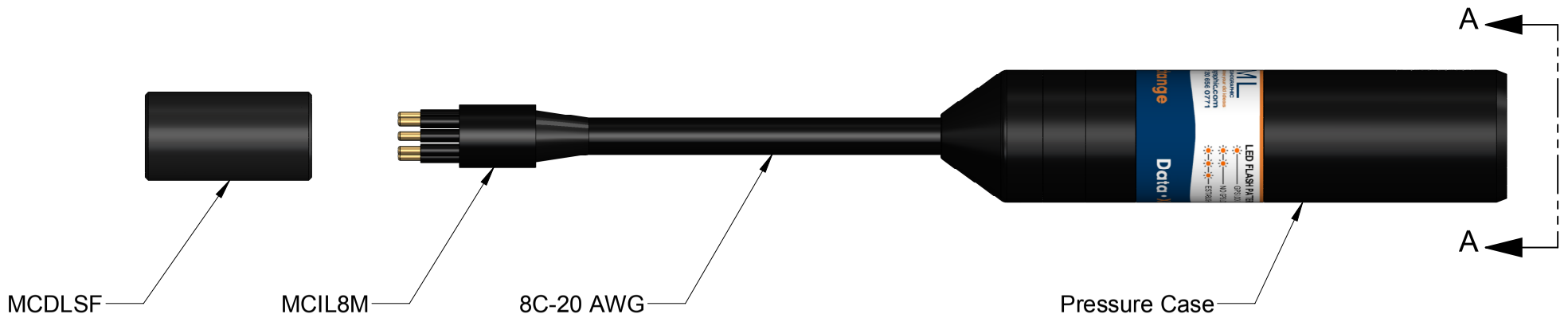
# Technical Overview Drawings

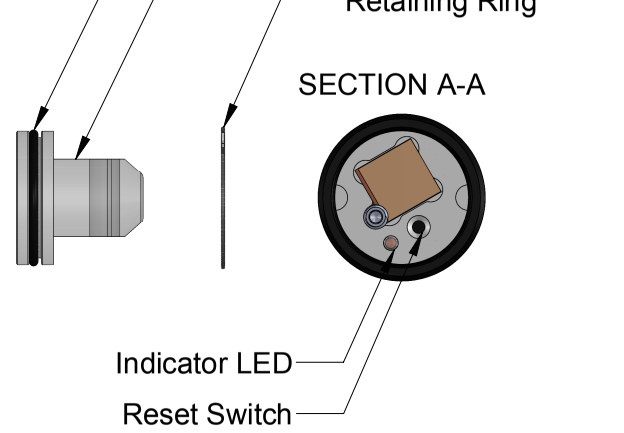



| Pin | Assignment |
|---|---|
| 1 | N/C |
| 2 | Rx |
| 3 | Tx |
| 4 | GND |
| 5 | N/C |
| 6 | PWR |
| 7 | LPWR |
| 8 | COMM |




AML OCEANOGRAPHIC
Xchange your old ideas
2071 Malaview Ave., Sidney B.C. Canada, V8L 5X6 Ph: (250) 656 0771 Fax: (250) 655 3655

THIS DRAWING CONFORMS TO ASME Y14.5-2009

*DIMENSIONS AND TOLERANCES:*
UNITS: INCHES [MM]
ANGLES: ± 1°
FRACTIONS: ± 1/32
HOLE SIZES: ± 0.005(0.13)
0.00: ± 0.015(0.38)
0.000: ± 0.005(0.13)

*UNLESS OTHERWISE SPECIFIED:*
ORIGINAL SCALE:2:3
HOLE DEPTHS GIVEN FOR FULL DIAMETER.
SURFACE FINISH: 63

*TITLE:*
# DATA•XCHANGE — CUSTOMER OVERVIEW DRAWING

| DRAWN | DATE | DRAWING NO.: | REV | AML NO. |
|---|---|---|---|---|
| ABT | 04FEB2015 | WIFI-GA-03956 | | SUB-G0757 |
| REVIEWED | DATE | MATERIAL: VARIOUS | | |
| | SIZE B | SLD FILE NO.: DTX-MC8M-WG-10 | | SHEET NO. Sheet 1 of 1 |

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |