

Instruction Sheet

Care and Maintenance of Aqua TROLL[®] and Level TROLL[®]

Instruments

User Maintenance

Overview

It is important for users to perform scheduled maintenance on their instruments to sustain the accuracy and longevity of the probes and cables. The frequency of this maintenance depends on the characteristics of the deployment site, including humidity levels and the degree of fouling.

Users should be aware of the conditions at their deployment sites and develop appropriate maintenance schedules to replace desiccant, clean the instruments, and send in the instruments for factory calibration. Users should check instruments often during the first portion of the deployment to determine the frequency of maintenance. General maintenance should be performed as often as possible. Factory maintenance and calibration should be performed every 12 to 18 months.

Preventing Condensation

Desiccant

Desiccant protects cables, connections, and internal components from condensation, which can cause irreparable damage and loss of data. Indicating desiccant changes from blue to pink as it becomes saturated with moisture.



Desiccant stages (from left)

New, nearly expired (replace now), expired

It is **extremely important** to use a properly-sized desiccant for your deployment and to **change desiccant often**. Desiccant should be changed before the entire volume has turned pink, and you should use enough desiccant to effectively keep your equipment dry until your next scheduled maintenance. Desiccant longevity is dependent on site conditions and can vary from one site to the next.

Desiccant Pack Options

Small Desiccant

The Small Desiccant is a disposable cap that ships with In-Situ products. The small desiccant is meant to protect the instrument and cable **only during shipping and should not be used for deployments**.



Large and Extra Large Desiccant

The Large and Extra-Large Desiccant are used to protect equipment deployed in the field. The Large Desiccant is best suited for low-humidity environments or deployments where maintenance occurs regularly. The Extra-Large Desiccant is designed for high-humidity environments or deployments where maintenance occurs infrequently. Extra-Large Desiccants provide six times the drying capability of the Large Desiccant. When the desiccant expires, both can be refilled with fresh desiccant and re-used (see Desiccant Refill Kit below). The Large Desiccant is available with an ABS or a titanium twist-lock connector, while the Extra Large Desiccant uses a titanium connector only.



Description	Part Number
Large Desiccant, Titanium	0051810
Large Desiccant, ABS	0053550
Extra Large Desiccant	0090420

Outboard Desiccant

The Outboard Desiccant is a replaceable desiccant pack designed to attach to the vent tube of a stripped-and-tinned cable.



Description	Part Number
Outboard Desiccant	0051380

Desiccant Refill Kit

The Desiccant Refill Kit supplies desiccant for the Large Desiccant, Extra Large Desiccant, and the Outboard Desiccant. It also contains replacement glass wool.

Description	Part Number
Desiccant Refill Kit	0029140

Installing Desiccant with Twist-Lock Connectors

1. Remove the protective dust cap from the bottom of the desiccant pack, if applicable.

2. Remove expiring desiccant (if present) from the cable by grasping the textured section of the cable connector in one hand and the desiccant in the other. Twist in opposite directions to unlock the desiccant from the cable.
3. Attach the new desiccant pack to the twist-lock connector on the cable.

Using the Desiccant Refill Kit

1. Remove the black nylon vent cap from the top of the desiccant.
2. Pour out and discard the used desiccant. Check the glass wool in the bottom of the container and replace if necessary.


 The glass wool prevents the desiccant beads from falling out the cable end of the desiccant pack. If the wool glass does this effectively, there is no need to replace it when refilling the desiccant.

3. Fill the container with fresh desiccant. Replace the vent cap. Reattach to cable if removed.

Desiccant Guidelines and Precautions

- The soft red dust caps protect connectors and shield new desiccant from moisture prior to use. **Do not remove the dust caps until you deploy the system.** During installation, remove caps to allow air to reach the cable vent.
- Do not inhale the silica dust when pouring desiccant from one container to another.
- Indicating desiccant is blue when dry. It gradually turns pink as it becomes saturated.



*Desiccant stages (from left)
New, nearly expired (replace now), expired*

- Replace desiccant before the entire volume has turned pink.
- Desiccant absorbs moisture from the top down. The black cap indicates the top.



Remember, replace desiccant before it expires in order to prevent damage to the internal components of your instrument.

Cleaning and Storage

Cleaning the Instrument

Clean the instrument body with water and a soft brush or plastic scouring pad, or soak overnight in a mild acidic solution, such as household vinegar. **NEVER** submerge the connector portion of the instrument when it is not connected to a cable.

If the ports near the pressure sensor are clogged with silt or mud, try the following procedures.

- Agitate the instrument vigorously in a bucket of clean water.
- Apply a gentle rinse of water from a wash bottle.
- In severe cases, remove the nose cone and clean out the holes with a soft brush or pipe cleaner.

Do not attempt to remove material from the instrument by tapping the instrument against a surface. To avoid damage to the pressure sensor diaphragm, do not insert any object into the sensor opening or attempt to dig out dirt or other materials. **You void the instrument's warranty by inserting anything into the sensor opening.** If contamination cannot be removed using the recommendations above, please contact In-Situ for cleaning.



A TROLL pressure sensor with the nose cone removed. Do not insert **ANY** object into the sensor opening. Doing so voids the warranty.

Conductivity Cell

Fouling from mineral and biological sources can alter the Aqua TROLL conductivity sensor's response.

- Always begin and finish cleaning procedures by rinsing under running water to remove any loose material.
- After cleaning, always check the calibration before redeployment. Calibrate the instrument if necessary.

Acceptable cleaning processes for the Aqua TROLL are listed below.

Process 1: Light scrubbing with a soft swab and mild soap such as a dilute solution of dish detergent. Be careful not to damage the plastic material of the conductivity cell. Instruments are shipped with polyurethane foam swabs for this purpose. You can also use a thin cotton pipe cleaner and clean the cell with a gentle back-and-forth “flossing” motion.

Process 2: Light scrubbing with a foam swab and an aggressive soap such as Alconox[®] detergent can be used for stubborn deposits.

Process 3: Dilute (10:1) acetic acid, or consumer-packaged white vinegar, can be used to pre-soften calcium deposits. Follow this with Process 1 or Process 2, depending on the degree of residual contamination. The instrument can soak for any length of time in dilute acetic acid. If this does not completely remove the material, try Process 4.

Process 4: Dilute phosphoric acid (< 27%), or the consumer product Lime-A-Way[®] can be topically applied with a soft swab to remove iron or calcium deposits that remain after using Process 3. Do not soak for more than 10 minutes. Rinse well with clean water.

IMPORTANT: If contamination cannot be removed using these recommendations, contact In-Situ Inc. for cleaning.

Twist-Lock Connectors

Keep the pins on all connectors free of dirt and moisture by using the soft protective dust caps when cable is not attached.

Storage

Store the instrument in a clean, dry place. Place the protective red dust cap on the cable end or store with cable attached to protect the connector pins and O-ring.

For vented cables, ensure the desiccant used is the appropriate size and change it when needed. Store the instrument where it will not roll off a bench onto a hard surface or sustain other mechanical shock. Protect the instrument from temperature extremes using the following guidelines:

- Level TROLL Instruments—store within the temperature range -40° C to +80° C (-40° F to +176° F)
- Aqua TROLL Instruments—store within the temperature range -40° C to +65° C (-40° F to +149° F)

Power Options

Internal Power—Batteries

Internal batteries are not user-replaceable. The approximate percentage of the power remaining in an internal battery is displayed on the Home Screen when an instrument is connected to Win-Situ Software.

External Power—External Battery Packs

External battery packs can significantly increase the life of an instrument, either for long-term deployments or to preserve an aging instrument.

TROLL Battery Pack

The sealed, submersible TROLL Battery Pack supplements internal battery power when an instrument is used for fast, frequent sampling or during long-term deployments. When this power source is connected, the instrument will use the external battery source first and switch to the internal batteries when external battery power is depleted. Total battery life depends on the sampling speed.



Description	Part Number
TROLL Battery Pack	0051450

TROLL Replaceable Battery Pack

The TROLL Replaceable Battery Pack supplements internal battery power when a Level TROLL or Aqua TROLL 100 or 200 Instrument is used for frequent, fast

sampling or during long-term deployments. When this power source is connected, the TROLL instrument will use the external battery source first and switch to the internal batteries when external battery power is depleted. Battery life depends on sampling rate. This battery pack allows for 1.5 V UM-3 or size AA batteries (8) that are replaced by the user.

✓ The TROLL Replaceable Battery Pack is not submersible.



Description	Part Number
TROLL Replaceable Battery Pack	0090000

Estimated Battery Lifetime

TROLL Battery Pack	Aqua TROLL 100/200	Level TROLL Family
15 minute logging rate*	4.1 years	1.1 years
1 hour logging rate*	4.4 years	1.1 years

*Logging with all sensors. Actual battery lifetime varies based on site conditions.

TROLL Replaceable Battery Pack	Aqua TROLL 100/200	Level TROLL Family
15 minute logging rate*	5.75 years	1.6 years
1 hour logging rate*	7 years	1.7 years

*Logging with all sensors. Actual battery lifetime varies based on site conditions.

Antifouling Products

TROLL Shield Nose Cone

The copper TROLL Shield Nose Cone is designed to reduce macro- and micro-fouling of the pressure sensor on Level TROLL and Aqua TROLL Instruments. Reduced fouling on the sensor improves measurement accuracy and extends the length of deployments.

For optimum performance, the TROLL Shield Nose Cone should be replaced every 12 months or sooner if site conditions are extremely harsh.



Description	Part Number
TROLL Shield Nose Cone	0081480

TROLL Shield Guard

The antifouling TROLL Shield Guard is designed to reduce the fouling of the conductivity cell on Aqua TROLL 100 and 200 Instruments. Reduced fouling on the sensor improves accuracy and extends the length of instrument deployments.

For optimum performance, the TROLL Shield Guard should be replaced every 6 months.



Description	Part Number
TROLL Shield Guard	0085190

O-ring Inspection and Replacement

Examine O-rings for wear, dryness, discoloration, stretching, cracks, nicks, and brittleness. Replace O-rings when any of these conditions are present. Replacing O-rings on an annual basis, regardless of

their condition, is the best way to protect against moisture damage.

Perform the following steps to replace an O-ring.

1. Remove and discard the damaged O-ring.
2. Use a clean, dry, soft cloth to clean the O-ring groove to remove dirt or residue.
3. Lubricate the new O-ring using high-vacuum grease.
 - a. Wash your hands thoroughly.
 - b. Apply a small amount of grease to the pad of your index finger, and rub your index finger and thumb together to spread the grease evenly.
 - c. Inspect the new O-ring and remove any debris stuck to it.
 - d. Rub your fingers around the O-ring until there is a thin layer of grease on the entire O-ring.
4. Install the O-ring in the groove and remove any excess lubricant with a clean cloth.

Do not allow water or lubricant to enter the connector.

Factory Calibration Services

In-House Factory Calibration

Factory calibration of In-Situ instruments should be performed every 12 to 18 months, or at any point when the data appears to drift significantly. Factory calibration includes a thorough cleaning, all operational checks, necessary firmware upgrades, O-ring replacement, and full range calibrations of the pressure sensor, temperature sensor, and conductivity sensor (when applicable).

Return Materials Authorization (RMA) Form

To obtain a factory calibration, fill out and return the online Return Materials Authorization (RMA) form located at www.in-situ.com/.

Guidelines for Cleaning Returned Equipment

Please help us protect the health and safety of our employees by cleaning and decontaminating equipment that has been subjected to any potential biological or health hazards, and labeling such equipment. Unfortunately, we cannot service your equipment without such notification. Please complete and sign the form in your Operator's Manual (or a similar statement

certifying that the equipment has been cleaned and decontaminated) and send it with each returned instrument.

- We recommend a cleaning solution, such as Alconox[®], which is a glassware cleaning product available from In-Situ (part number 0029810) or laboratory supply houses.
- Clean all cabling. Remove all foreign matter.
- Clean cable connector(s) with a clean, dry cloth. Do not submerge cable connectors.
- Clean the probe body—including the nose cone, cable head, and protective caps. Remove all foreign matter.

If an instrument is returned to our Service Center for calibration or repair without a statement that it has been cleaned and decontaminated, or in the opinion of our Service Representatives presents a potential health or biological hazard, we reserve the right to withhold service until proper certification has been obtained.

Warranty Conditions

Warranty Information

Visit www.in-situ.com/warranty for the most current product warranty information.

Warranty Void Conditions

Your In-Situ instrument has been designed to withstand harsh field conditions. However, as with any electronic instrument, it can be permanently damaged if subject to the following conditions.

- Used outside of operating specifications
- Handled or cleaned improperly
- Maintained incorrectly, including improper use and replacement of desiccant

Neglecting any instructions or warnings in your Operator's Manual or related In-Situ documentation may cause damage to your instrument, your warranty to become void, or both. Please follow all instructions and warnings to avoid damage to your product.



The presence of the Waste Electrical and Electronic Equipment (WEEE) marking on the product indicates that the device is not to be disposed via the municipal waste collection system of any member state of the European Union.

For products under the requirement of WEEE directive, please contact your distributor or local In-Situ office for the proper decontamination information and take back program, which will facilitate the proper collection, treatment, recovery, recycling, and safe disposal of the device