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Retrofit for MicroCATs with Integral Pumps (37-IMP, 37-SMP, 37-SIP)

Equipment Affected

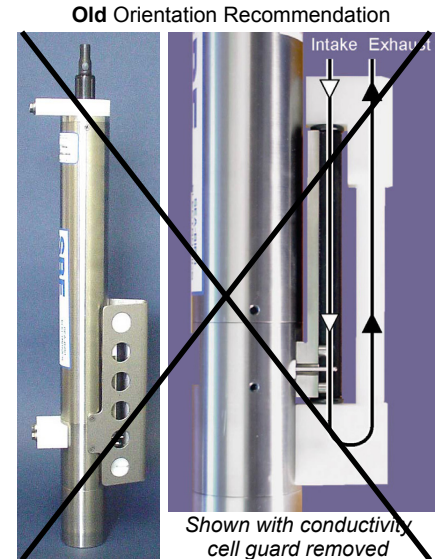
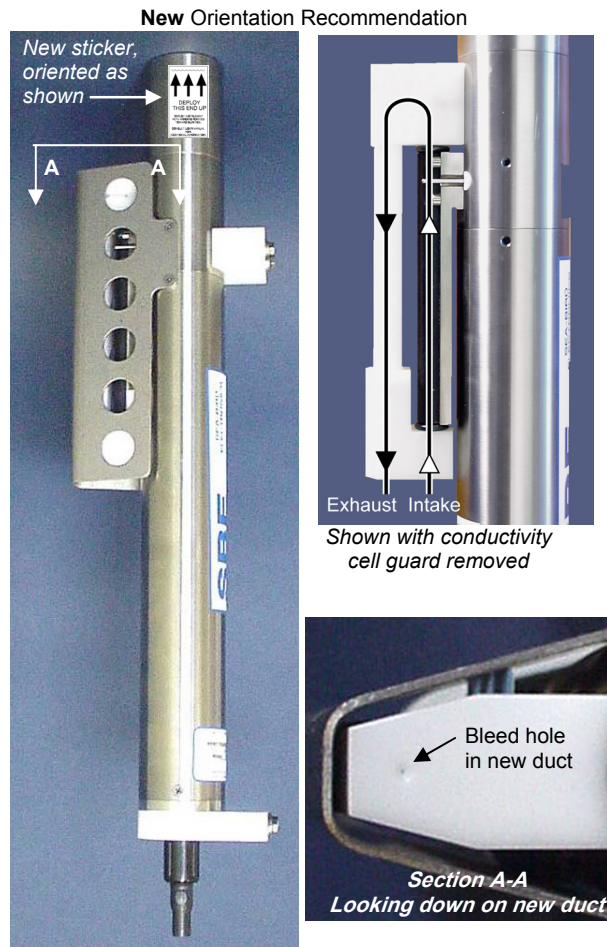
All 37-IMP, 37-SMP, 37-SIP MicroCATs shipped before mid-December, 2006.
 Note: This does **not** apply to MicroCATs without an integral pump (SBE 37-IM, 37-SM, 37-SI).

Description of Problem

When deployed near the sea bottom or in very turbid waters, pumped MicroCATs oriented with the intake/exhaust plumbing in an **upright** U-shape can become clogged with sediment. This results in poor flushing, causing poor quality data.

Reversing the orientation by putting the intake/exhaust plumbing pointing downward will prevent sediment from accumulating, but will cause air to be trapped in the pump impeller housing, thus preventing the pump from priming quickly at depths above approximately 30 meters. Trapped air could result in poor data until the air eventually dissolves and allows the pump to prime and normal flushing to begin.

Solution



Sea-Bird now recommends that the MicroCAT be oriented for deployment with its intake / exhaust in an **inverted** U-shape, with the intake/exhaust plumbing pointing downward. A minor design modification has been implemented to allow trapped air to escape.

Sea-Bird is providing a replacement duct with a small air bleed hole. The bleed hole allows any air in the plumbing to escape. Retrofit is easy and simply requires:

- Replacing the old duct with a new one having the air bleed hole.
- Removing the old orientation sticker and applying the new one, with the MicroCAT oriented as shown here, and the arrows on the sticker pointing up.

Corrective Action by Sea-Bird

- MicroCATs shipped before mid-December 2006:
 - Sea-Bird will install the new duct with air bleed hole and new orientation sticker (at no charge) the next time the instrument is returned to Sea-Bird for calibration or repairs.
 - Alternatively, you can request that Sea-Bird send you the retrofit kit (at no charge), *PN 50420 Pumped MicroCAT Duct with Air Bleed Hole Retrofit Kit*, if you want to do the retrofit yourself before you are able to send the MicroCAT in for calibration or other repairs. Replace the duct and the orientation sticker.
- MicroCATs shipped in mid-December 2006 and later: The new duct with air bleed hole and orientation sticker are already installed.

Background Information and Detailed Deployment Recommendations

Background Information

The integral pump runs for 1/2 second each time the MicroCAT takes a sample. This pumping scheme, combined with the plumbing's U-shape, provide the following advantages over a non-pumped system:

- Improved conductivity response – The pump flushes the previously sampled water from the conductivity cell and brings a new water sample quickly into the cell.
- Reduced biological fouling – Water does not freely flow through the conductivity cell between samples, allowing the build-up of the anti-foulant in the water held in the plumbing, and minimizing fouling.

We recognize from discussions with some customers that the original recommendations for MicroCAT orientation allow the MicroCAT to trap too much sediment. This problem occurs mostly in shallow coastal waters, near-bottom moorings, or offshore plumes of large rivers.

Deploying in an **inverted** U-shape to reduce the ingestion of materials presents a different challenge – how to eliminate air from the system, so that the pump will prime and operate. In considering the effect of air on the pump, it can be instructive to look at the amount of air in the water column:

- **Case 1:** The top ~2 meters of the water column may contain a continuous supply of bubbles injected into the system by breaking waves. In this area, the ability to continuously eliminate air from the system, throughout the deployment, is of prime concern.
- **Case 2:** The next ~30 meters of the water column is not typically affected by bubbles from breaking waves. In this region, it could take a few days to weeks after deployment for the air to clear out of the system in an inverted U-shape. However, once the air is bled, no more air would be injected into the plumbing.
- **Case 3:** Below ~30 meters, it could take only a few hours to a day for the air to clear out of the system in an inverted U-shape. As in Case 2, once the air is bled, no more air would be injected into the plumbing.

To allow use of the MicroCAT in the **inverted** U-shape, Sea-Bird has designed a new duct with a small air bleed hole, to provide a way for the air to exit the plumbing. However, because the bleed hole also provides a little more ventilation of the system, this ventilation will cause a slight decrease in the concentration of anti-foulant in the water held in the plumbing between samples. In our judgment, and the experience of customers, the risk of poor data due to sediment accumulation is usually greater than the risk of slightly reduced effectiveness of the anti-foulant, or is at least a reasonable trade-off.

Recommendations for Deployment

- **Most deployments** – Using the new duct with air bleed hole, deploy the MicroCAT on a mooring cable or structure with the plumbing in an **inverted** U-shape, allowing air to exit the plumbing through the bleed hole.

- **Deployments where severe bio-fouling is the main concern and sediment is not an issue** –

Case A: You need accurate data immediately upon deployment -

Do not retrofit your existing MicroCAT (alternatively, plug the bleed hole in a MicroCAT that has been retrofitted). Deploy the MicroCAT with the plumbing in an **upright** U-shape, providing maximum bio-foul protection but leaving the MicroCAT vulnerable to ingestion of sediment.

Case B: You can skip some initial data, allowing time for trapped air to dissolve into the water and the pump to prime properly – Do not retrofit your existing MicroCAT (alternatively, plug the bleed hole in a MicroCAT that has been retrofitted). Deploy the MicroCAT with the plumbing in an **inverted** U-shape, providing maximum bio-foul protection as well as protection from the ingestion of sediment. This deployment method will provide good data within a day if the deployment is deeper than ~30 meters. Eliminate scans associated with the initial deployment by evaluating the conductivity data; minimal changes in conductivity are an indication that the pump flow is not correct because air in the plumbing has prevented the pump from priming.

- **Deployments where air bubbles are the main concern and sediment is not an issue** - Do not retrofit your existing MicroCAT (alternatively, plug the bleed hole in a MicroCAT that has been retrofitted). Deploy the MicroCAT with the plumbing in an **upright** U-shape. This orientation provides better bleeding of air from the plumbing than can be achieved with the small bleed hole, but leaves the MicroCAT vulnerable to ingestion of sediment.

Cleaning the Air Bleed Hole before each Deployment

The air bleed hole is 0.5 mm (0.02 inch) diameter. Clean the air bleed hole before each new deployment, using a 0.4 mm diameter wire, 13 mm long (0.016 inch diameter wire, 0.5 inches long) (you can use #26 AWG wire). Clean the hole and blow through it to ensure it is open and can vent trapped air upon deployment.