

SOLINST TECHNICAL BULLETIN

Ensuring Proper Use and Maintenance of Leveloggers

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Knowing What to Expect

As with any groundwater or surface water monitoring project, you should determine the best instruments to use, and how to maintain those instruments, based on the monitoring environment specific to your application.

When using Leveloggers, this means selecting the appropriate pressure range, ensuring the monitoring temperatures are within the instruments specifications, making sure the wetted materials are compatible with your site's chemistry, and determining the proper deployment method.

A maintenance schedule and precautionary measures should be determined early on, especially if you suspect your monitoring environment to be harsh on the instrument sensors.

Selecting the Proper Levellogger

Leveloggers are available in a variety of pressure ranges, from M5 to M200, which can withstand submergence from 5 to 200 meters (15 to 600 feet), respectively. The Levellogger 5 can withstand 2 times overpressure, but outside the stated pressure range, accuracy is not guaranteed. Using outside the overpressure range can damage the sensor.

A temperature detector is used to accurately compensate for temperature changes, within the range of 0 to +50°C for the Levellogger 5. The Levellogger will record temperature in its thermal range of -20 to +80°C, but outside the compensation range, readings will be less accurate. Using beyond the thermal range can damage the unit.

Levellogger data sheets provide a list of wetted materials to help check for chemical compatibility with the monitored water. Before deploying your Levellogger, you can also check the chemical compatibility of your instrument's wetted materials, by obtaining a sample of the water you will be monitoring in, and measuring the chemicals of concern for your site.



Solinst has various documents to help determine the best deployment method for your Levellogger, including the Levellogger User Guide and Technical Bulletins found on the Solinst website.

Placing your Levellogger in that water for a closely monitored test period, although actual expected pressure and temperature conditions may not be emulated, will give you a good idea of how your Levellogger will react and perform in the chemical environment. This type of test can be done with any instrument, including pumps, water level meters, etc.

Scheduling Maintenance

If you are not sure how your Levelloggers are going to perform in, and/or react to your monitoring environment, it is recommended to schedule staged site inspections to physically check your units and their function periodically during the monitoring term.

If you do not check your site regularly, you will not know how the monitoring environment is affecting your instruments. The photos below show different types of biofouling that can occur. Biofouling, sediment accumulation, or corrosion on a pressure sensor or conductivity cell can compromise the accuracy of their measurements.



Photo Credit: Tom Shinsky, The Louis Berger Group

It is also recommended to take manual water level measurements each time you inspect your Levellogger. These manual water level measurements can be used to compare to Levellogger readings to ensure the Levellogger is performing as it should. If your readings appear to be inaccurate, it may be a sign that your Levellogger needs to be cleaned. All sensors experience some long-term drift from their original calibrated state, but not routinely performing maintenance checks and cleaning, can lead to accelerated sensor degradation.

Determining how frequent your site visits should be, is again based on your monitoring environment—specifically water quality. In good quality freshwater, such as a municipal production well, inspecting a Levellogger and taking manual measurements may just be done seasonally; actually cleaning the Levellogger may only be needed annually. While, in harsher environments, such as at contaminated sites, inspections and cleaning should be more frequent. **Your ongoing maintenance schedule will be based on your own experience and knowledge of the monitoring site, and based on the results of your staged site inspections.**

Continued overleaf...

Ensuring Proper Use and Maintenance of Leveloggers

Preventative Maintenance

If you are familiar with the conditions of your monitoring site, and know you are going to require extra corrosion-resistance, biofouling protection, or protection from ice accumulation, there are precautionary steps that can be taken.

Although the Levelogger 5 has a corrosion-resistant coating (inside and out) and a Hastelloy pressure sensor diaphragm, in extremely corrosive environments, you can further protect the Levelogger using a balloon filled with deionized water or tap water. As pressure changes, the fluid encasing the loggers will transmit the pressure differential to the logger's pressure transducer, without exposing it to corrosive conditions.

Solinst offers a Biofoul Screen that can be used to protect the Levelogger against biofouling. The Delrin copper-coiled screen naturally reduces biofouling. The Biofoul Screen simply slips onto the sensor end of the Levelogger where it is held in place with its compression fitting. It allows water to freely enter the pressure transducer inlets, and/or conductivity cell.



The Levelogger on the right was protected using a Biofoul Screen, while the Levelogger on the left was deployed unprotected and shows signs of biofouling on the sensor end.

To avoid icing, the easiest method is to lower the Levelogger to a point in the water column below the frost line or ice formation depth. In shallow streams, wetlands or ponds where icing/freezing may penetrate to the bottom, install the Levelogger in a vented stilling well imbedded into the bottom of the water body beyond the frost line. Alternatively, place the Levelogger inside rubber balloons filled with a non-toxic, non-corrosive anti-freeze solution or saltwater solution. The antifreeze solution will protect the Levelogger from ice expansion; yet transmit any pressure and temperature fluctuations.

Maintaining Leveloggers

Generally, cleaning your Levelogger consists of rinsing and using a mild, non-residual, non-abrasive, household cleaner with a very soft plastic bristled brush. Do not insert any object through the pressure transducer inlets at the sensor end of the Levelogger.

Some cases may require specific maintenance:

Hard Water

Hard water can result in the precipitation of calcium and magnesium deposits on the Levelogger body and pressure transducer. These deposits can be dissolved using a diluted solution ($\leq 10\%$) of acetic or phosphoric acid. Commercially available products designed for household use can also be used.

Suspended Solids

High suspended solid loads may block the pressure transducer inlets or clog the internal pressure cell. To minimize this, Leveloggers should be placed in areas with higher flow. Simply rinse the Levelogger inlets to remove any particles.

Bacteriological or Chemical Fouling

Sessile bacteria, other microorganisms, barnacles, mussels and algae can buildup on the Levelogger body, as well as the sensors. Chemical deposits can also be a result of electrical charge differential between the Levelogger and the monitored liquid. Both forms of fouling can be removed by soaking in a diluted ($\leq 10\%$) solution of sulfuric acid. Hard-to-remove deposits may require several hours of soaking.

LTC Conductivity Pins

LTC conductivity pins are platinum-coated; therefore, they should not be roughly cleaned or touched with any metal. They can be cleaned with a soft bristle brush, Q-Tip, or cloth. Almost any diluted ($\leq 10\%$) acid solution can be used. Soaking time should be monitored and kept to a minimum.

O-Ring Damage

There are o-rings on Levelogger optical ends and in the Levelogger caps, which are designed to prevent leaks. Depending on your application, you may be unscrewing the caps and/or direct read cables from the Levelogger optical end more frequently. This could result in damage to the o-rings. These o-rings should be inspected regularly and replaced as required (contact Solinst for replacements).

Storage Tips

Before storing Leveloggers for any extended period, they should be stopped from recording (using Levelogger Software), cleaned as described above, and stored with the cap on to protect the optical eye and to prevent unnecessary battery drainage.