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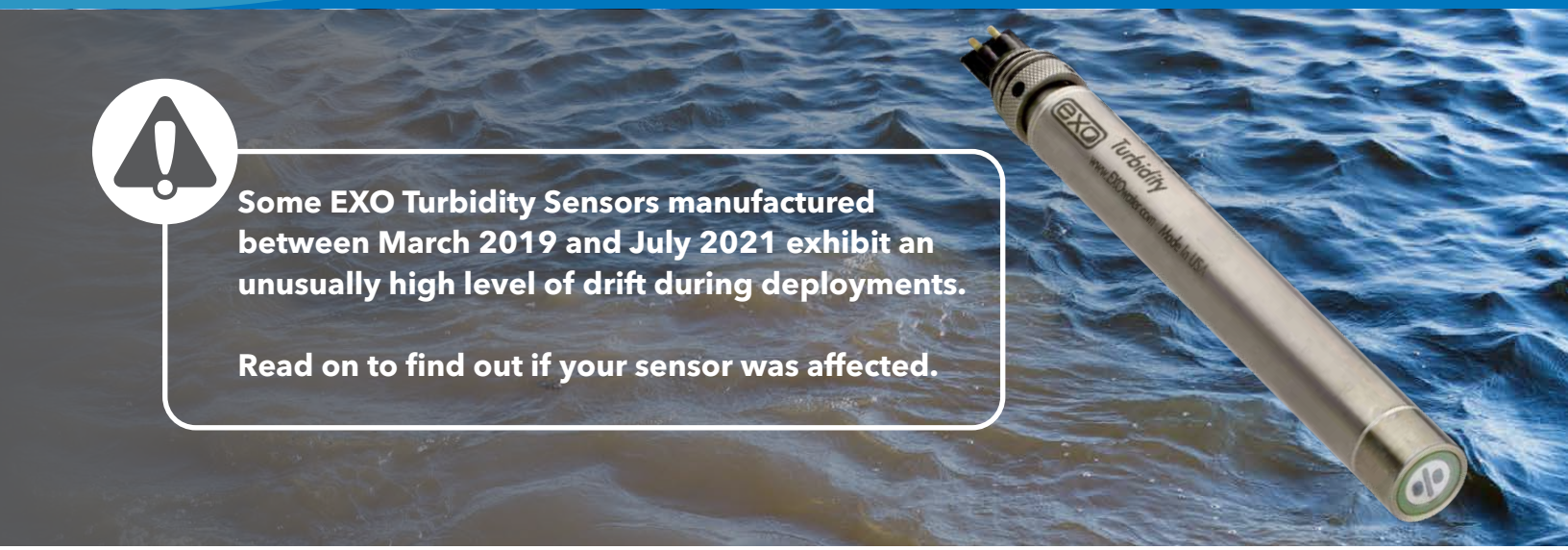
Environmental Solutions

Technical Note
XA00215-01

Qualifying EXO Turbidity Sensors for LED Drift



Some EXO Turbidity Sensors manufactured between March 2019 and July 2021 exhibit an unusually high level of drift during deployments.

Read on to find out if your sensor was affected.

INTRODUCTION

EXO Turbidity Sensor

All EXO Turbidity Sensors are susceptible to some degree of drift. This is to be expected, and this is why periodic user calibration and post-deployment calibration checks are necessary to ensure data quality. It was recently discovered that some of the EXO Turbidity Sensors manufactured **between March 2019 and July 2021** were built with LED's that exhibit an unusually high level of drift during deployments. In these affected sensors, the LED can experience continual drift over several months, or even years depending on sampling frequency, before fully stabilizing. This could eventually lead to a Yellow QC score being shown after each calibration.

It is important to note that **not all sensors built within this period are affected**. The intent of this document is to provide guidance for determining if your EXO Turbidity Sensor is experiencing irregular LED drift. If you find an affected sensor, YSI will need to verify the failure and ask that you return the sensor for warranty replacement.

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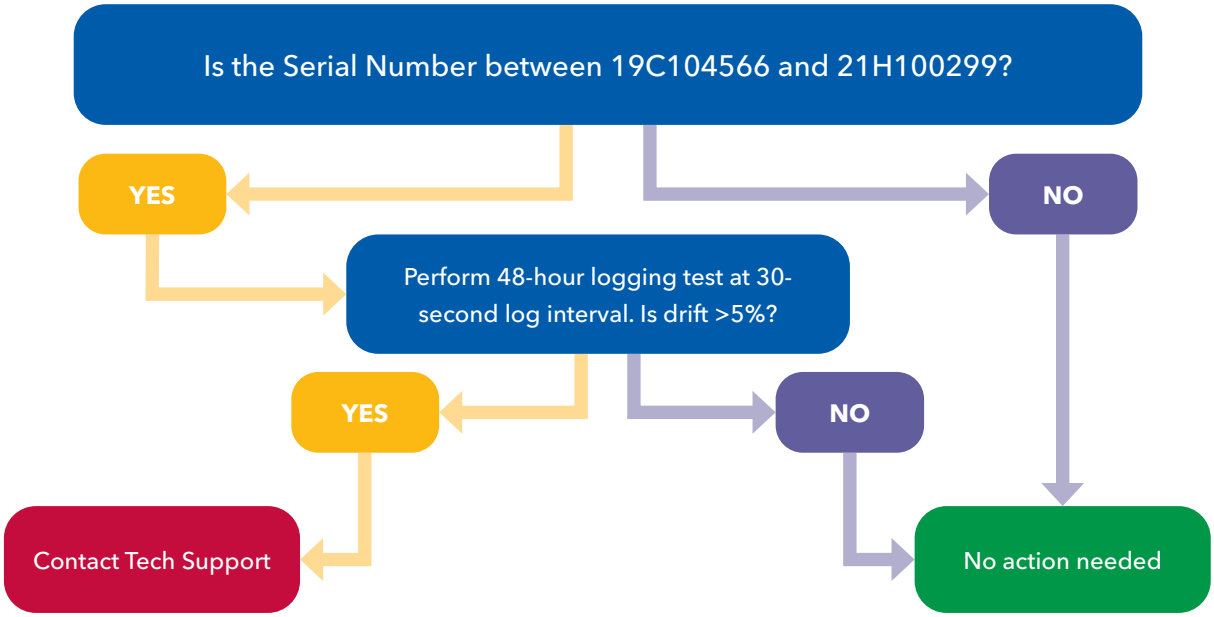
IS YOUR SENSOR AFFECTED?

Sensors at risk of being affected fall into the serial number range between **19C104566** and **21H100299**. If the sensor serial number is outside of this range, no further action is needed because the sensor does not contain one of the potentially affected LED's.

If the sensor is within the range, we must determine if it is experiencing irregular drift. Remember, *not all sensors within this range are affected*. A 48-hour rapid logging test is necessary to evaluate sensor performance. This flow chart will provide guidance for determining if your sensor is affected by irregular LED drift:



RAPID LOGGING TEST

This test will have you set up your EXO Sonde to log at a 30-second interval for at least 48 hours.

During this time, the sensor must be submerged in a 124 FNU YSI Standard Solution and sealed with the EXO Calibration/Storage Cup. This standard solution remains stable over the course of the deployment test as long as the cup is sealed. This will allow you to observe any drift that may be present from the LED.

After 48 hours have passed, the deployment may be stopped. The logged data can then be downloaded and viewed. The first and last recorded values are critical for determining if the LED is exhibiting irregular drift.

We'll calculate the percentage drift between the first logged value and the value after 48 hours. The values themselves are less important than the percentage change between them. Drift of ±5% may indicate that the sensor is affected.

WHAT YOU NEED

- EXO Sonde with probe guard
- EXO Turbidity Sensor
- EXO Calibration/Storage Cup
- YSI 124 FNU Turbidity Standard Solution

  NOTE: If you do not have the YSI 124 FNU Standard Solution, contact your local YSI Sales Representative to obtain a bottle at no charge.
- Batteries (2 D-cell for EXO1 & EXO3 or 4 D-cell for EXO2)
- Connection to Kor Software or the EXO Handheld

Before you begin, make sure all components are clean, including the sensor, probe guard, and calibration cup. Also be sure to install new batteries in the EXO Sonde.

1

Install the EXO Turbidity Sensor on an EXO1, EXO2, or EXO3 Sonde. No other sensors are required for the test. You may install a Central Wiper on an EXO2 or EXO3 Sonde to remove bubbles before logging. Make sure the probe guard is also installed.

NOTE: Test one turbidity sensor per one EXO Sonde; do NOT load up the bulkhead with multiple turbidity sensors.

Prepare the EXO Sonde by installing the Turbidity Sensor as well as the probe guard.

2

Immerse the sensor in the EXO Calibration Cup with **YSI 124 FNU Turbidity Calibration Standard**. It is necessary to use YSI's polymer-based standard for logging due to its stable properties. Formazin standard settles over time and should not be used for this test. Make sure the sensor tip is fully submerged.

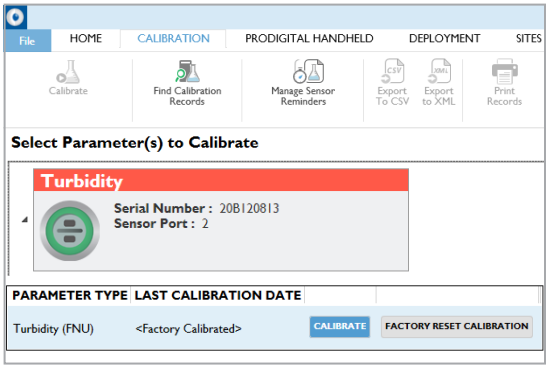
It is extremely important that the turbidity lens is clear of any air bubbles. If there are bubbles, gently shake or move the sensor to dislodge. If a wiper is installed, you can initiate wiping to clear any bubbles from the *Live Data* screen in Kor Software or the EXO Handheld.

NOTE: Tighten the locking collar to **seal the EXO Calibration Cup around the probe guard to prevent evaporation**. Evaporation can result in a 3.9% increase in turbidity concentration after 48 hours.

EXO Sonde in Calibration Cup

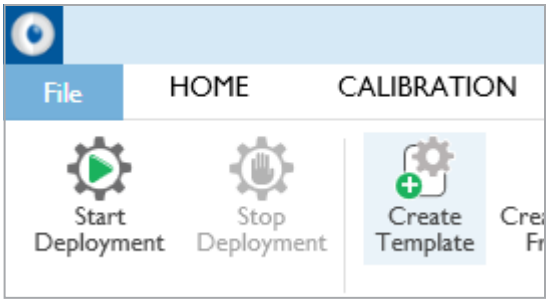
3

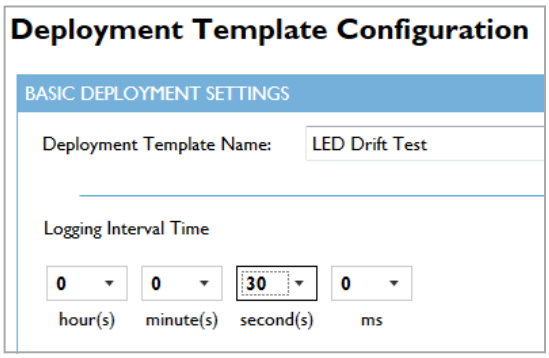
Using Kor Software or an EXO Handheld, navigate to the *Calibration* Menu and **Restore Factory Default Cal for turbidity**.



Select the button for Factory Reset Calibration

4 Navigate to the *Deployment* Menu and Create a New Deployment Template. Set up a test deployment with a **30-second logging interval**. Save and apply the template to the sonde.

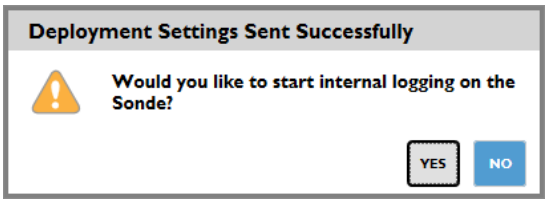




Create a new deployment template with a 30-second log interval

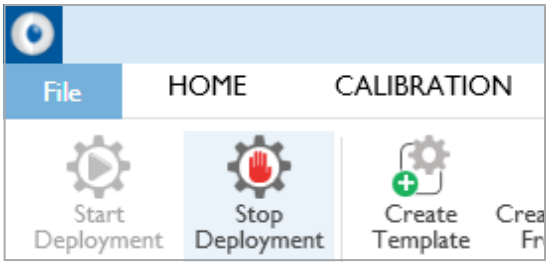
5 Start the deployment; **keep the sonde logging in the YSI 124 FNU Calibration Standard for at least 48 hours**.

NOTE: After the deployment has started, the sonde may be disconnected from the PC or handheld as long as it has new batteries installed.



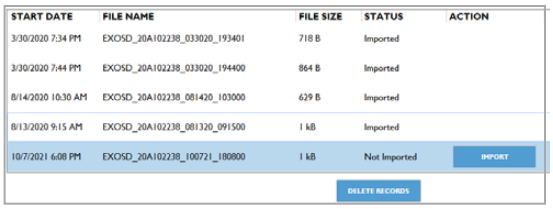
Start internal logging for at least 48 hours

6 Stop the deployment no sooner than 48 hours after logging started. The sensor should still be in the standard solution at this point.



Stop deployment

7 Once the deployment has been stopped, navigate to the *Instrument and Sensors* Menu and select the EXO Sonde. Download the latest log file [.bin file].

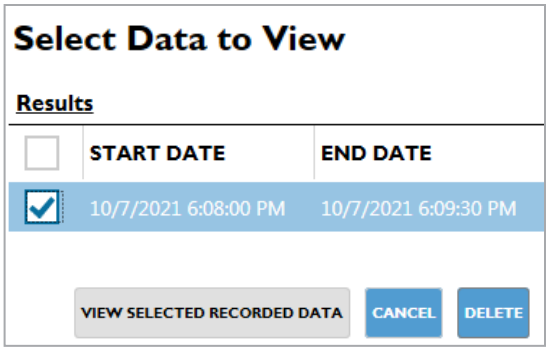


Import latest file

8

Navigate to the *Recorded Data* Menu and select the file you just downloaded (it should be the most recent log file) to view the data.

There will be a lot of data sets in this file, but the critical piece of information is the percent change between the first logged value and the value after 48 hours.



View latest data file

9

At this point, you can contact YSI Technical Support to help determine if the drift rate is irregular.

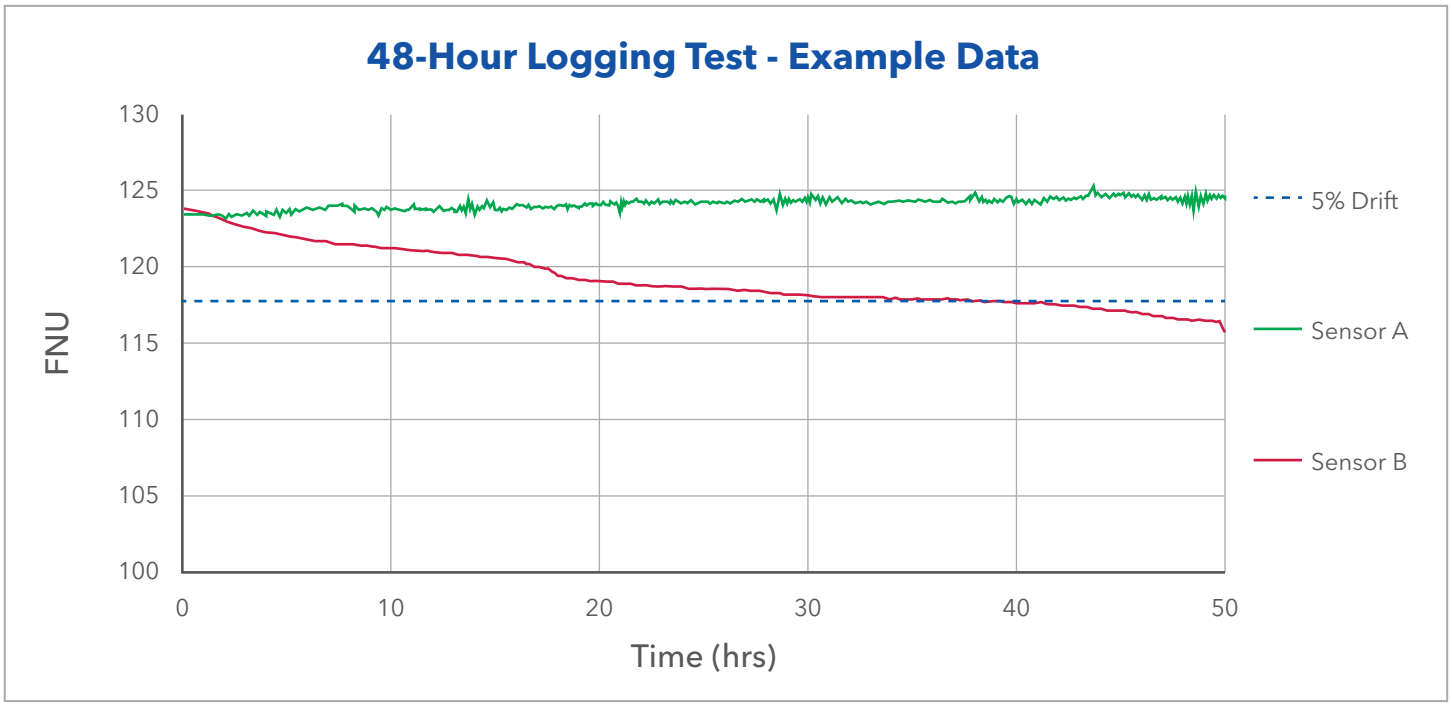
If you would like to assess the data yourself, you can calculate the drift percentage by dividing the logged value after 48 hours by the first logged value and subtracting one (1).

%Drift = (T48 / T1) - 1

T48 = Turbidity value at the 48-hour mark

T1 = First turbidity value

If the drift is greater than or equal to ±5% then the sensor may be affected and you should contact YSI Tech Support.



Data from a relatively stable sensor (A) compared to a sensor exhibiting irregular drift (B).

Returning Affected Sensors for Replacement

Before you go through the effort of shipping us the affected sensor(s), please contact YSI Technical Support [**800-765-4974** or **info@ysi.com**] to initiate the return for replacement.

If you performed the Rapid Logging Test, our Tech Support Representative will ask that you share the log file [.bin file] with the test data so that they can review and confirm the issue.

Once confirmed, you will be provided with a unique return authorization code to fast-track the replacement of affected sensor(s).

Turbidity sensors, ranging from **19C104566** and **21H100299**, returned to the Repair Center will not be charged an evaluation fee. Once irregular drift is verified, the sensor will be replaced under warranty.

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