

xylem

Peak effectiveness with EXO water quality monitoring

Smart solutions for
water quality & flow

May 20, 2026





Presentation outline



Environmental monitoring with EXO



Best practices and tips for success



Field application stories



Q&A

Environmental monitoring with EXO

EXO Sonde overview

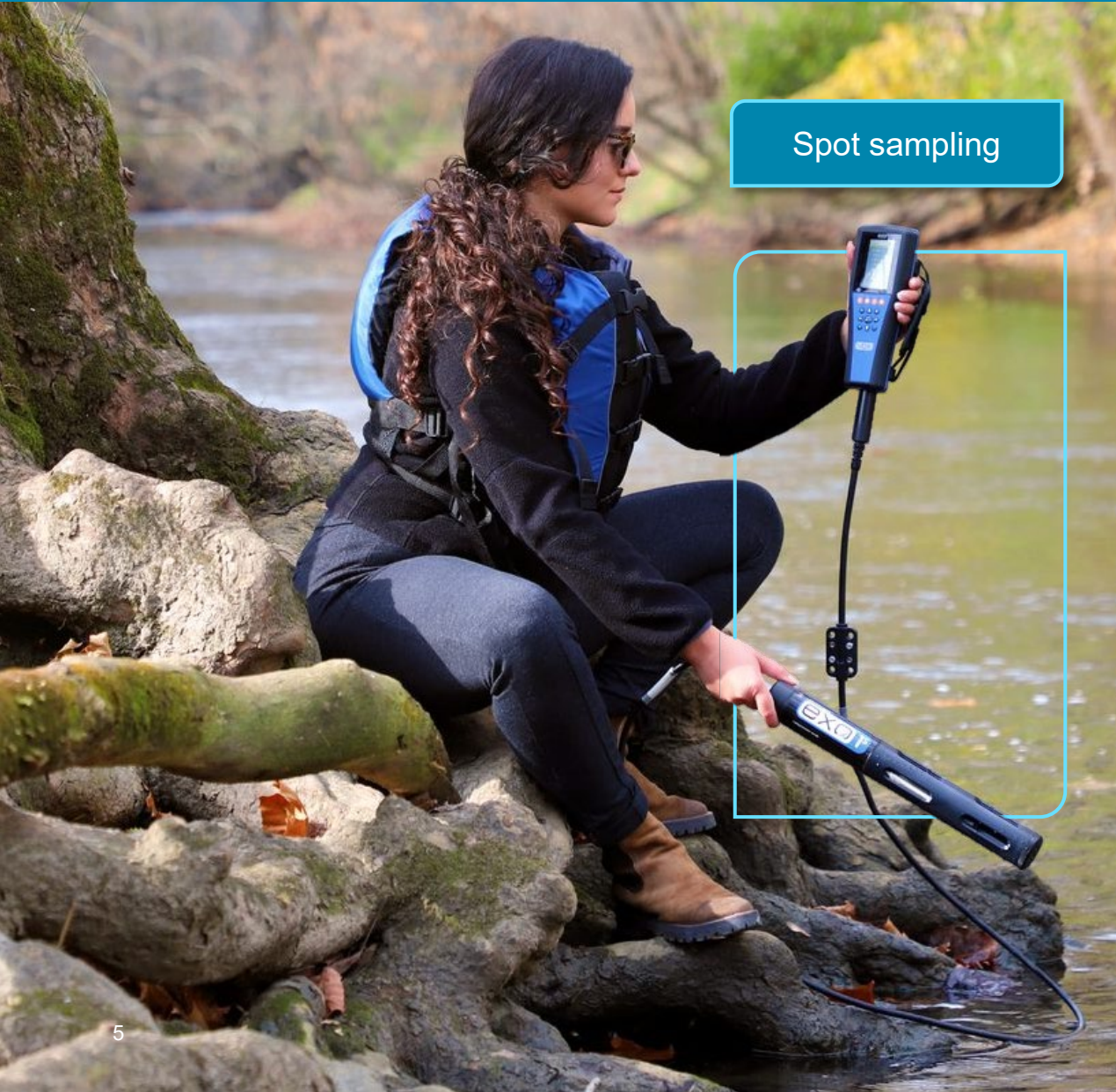
Smart solutions for
water quality & flow

Water quality monitoring

Tools and methods for data collection



Multiparameter water quality monitoring with EXO



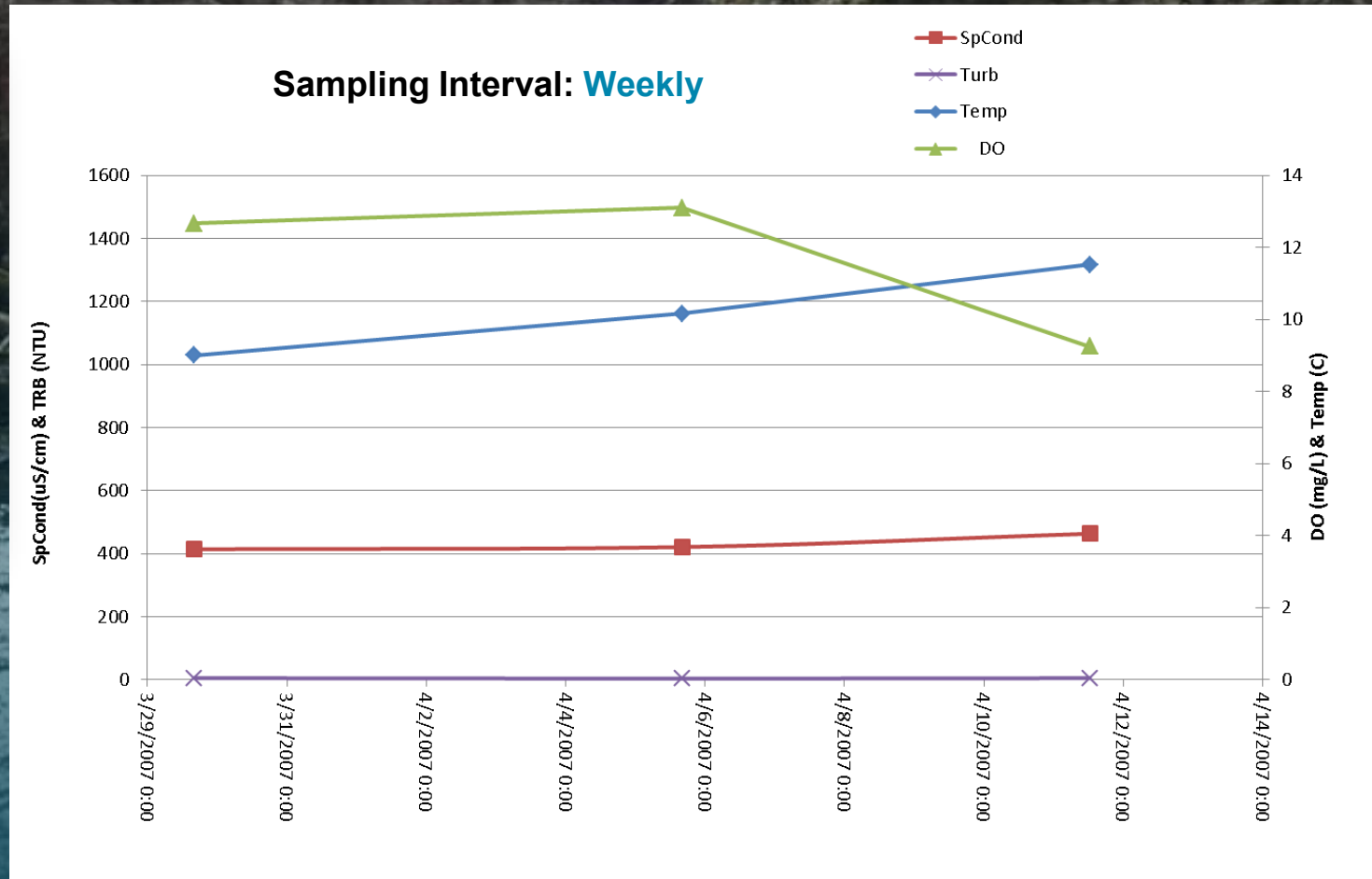
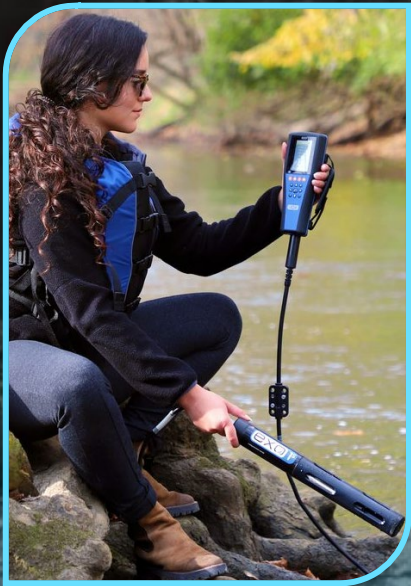
Spot sampling



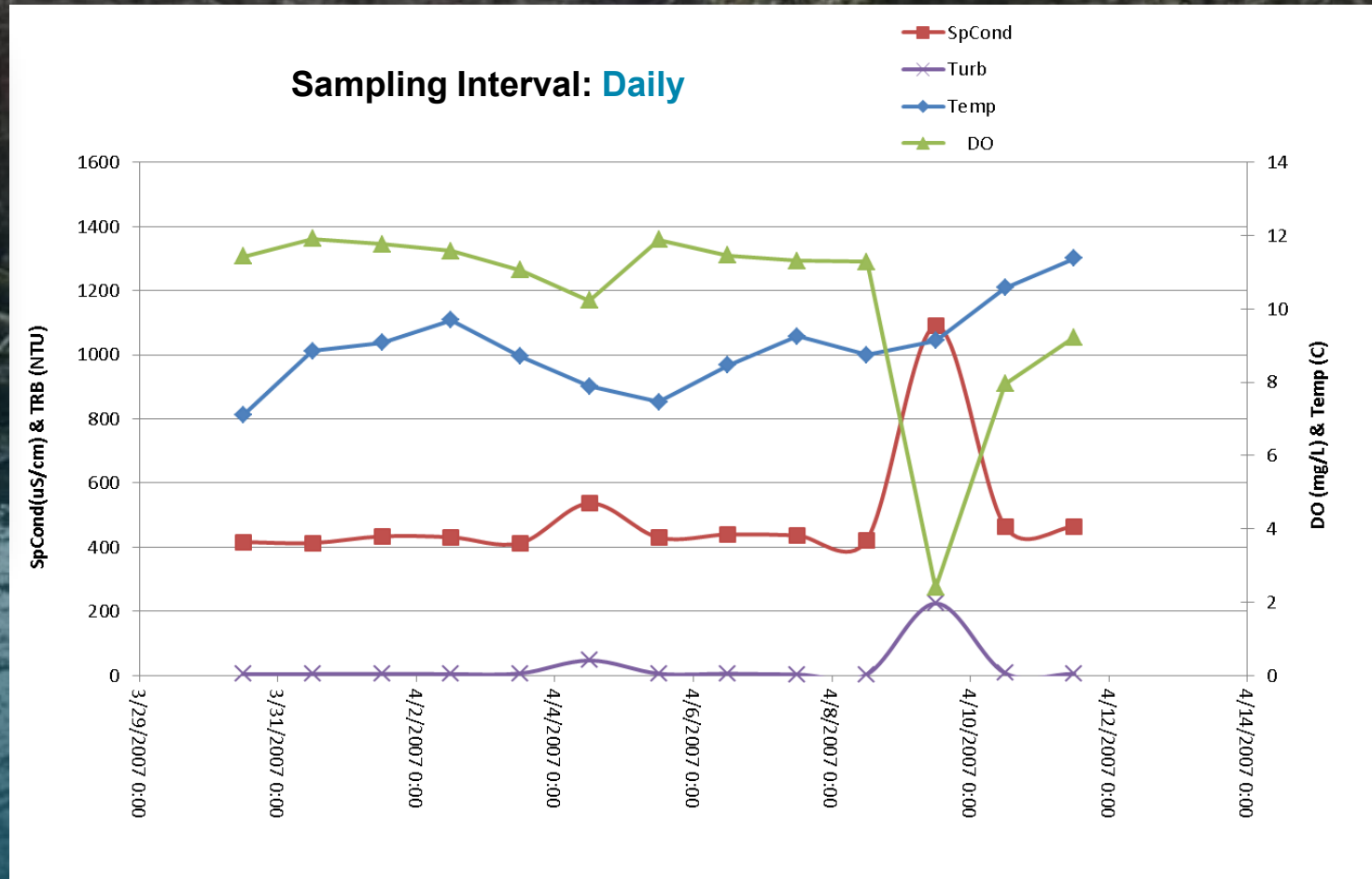
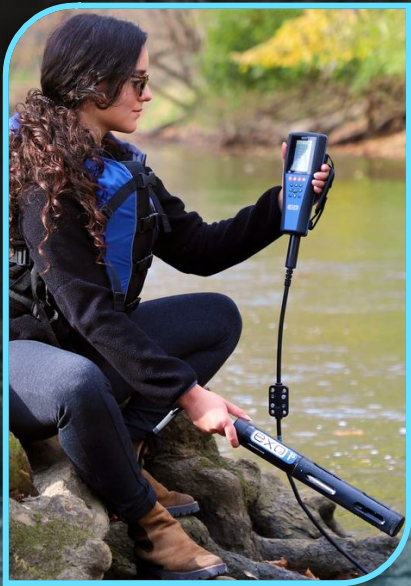
Continuous monitoring



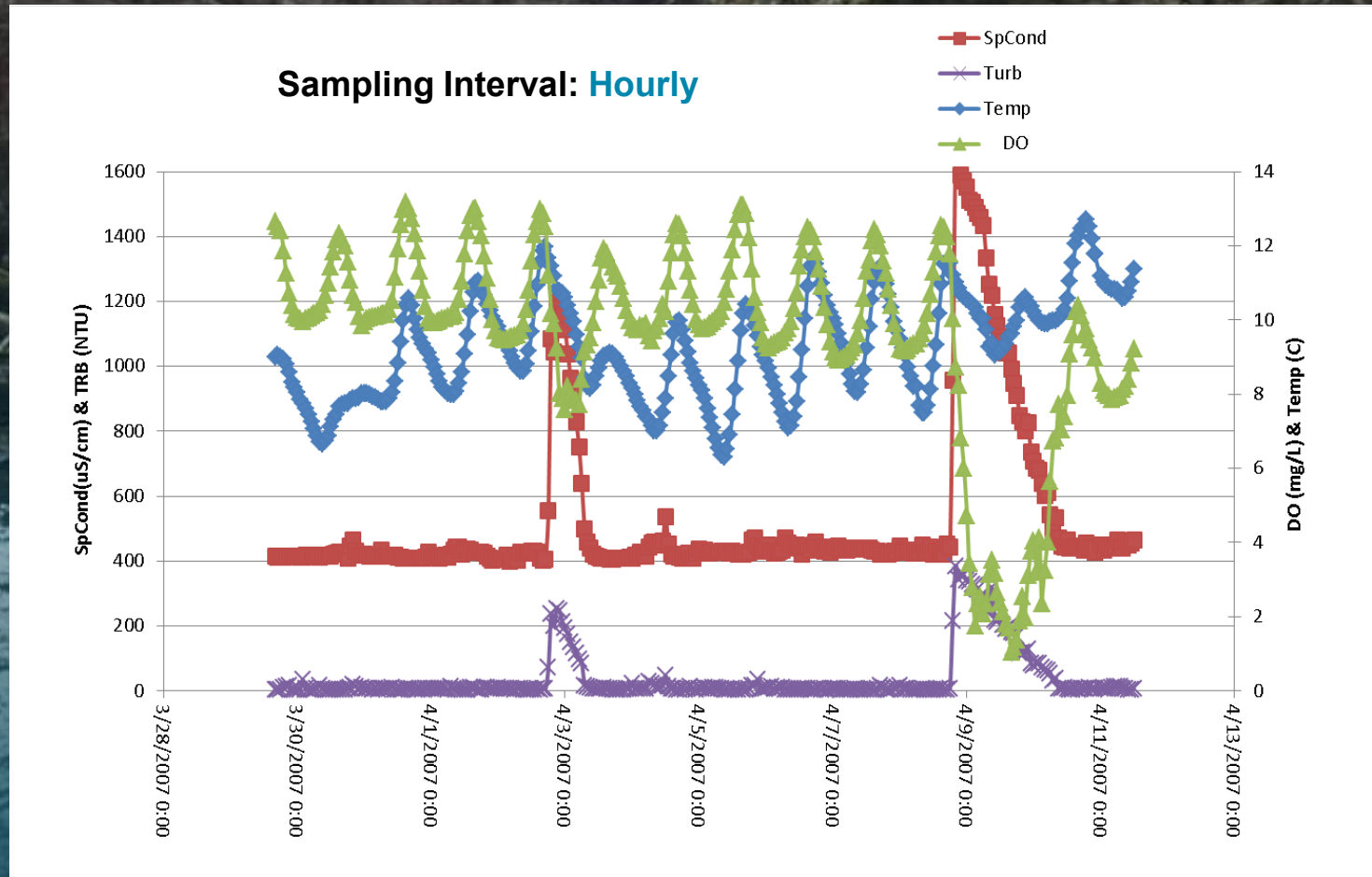
Spot sampling



Spot sampling



Continuous monitoring



EXO Sonde Platform

Three models



EXO1 & EXO1^S



- 4 universal sensor ports
- Optional depth sensor
- Less than 2-inch diameter



EXO2 & EXO2^S



- 7 universal sensor ports (including Central Wiper port)
- Optional depth sensor
- Auxiliary port



EXO3 & EXO3^S



- 5 universal sensor ports (including Central Wiper port)
- Optional depth sensor

EXO Multiparameter Sondes

The data is in the details

Unmatched reliability

Durable titanium components and rigorous testing ensure high accuracy in extreme environments

Powerful anti-fouling wiper

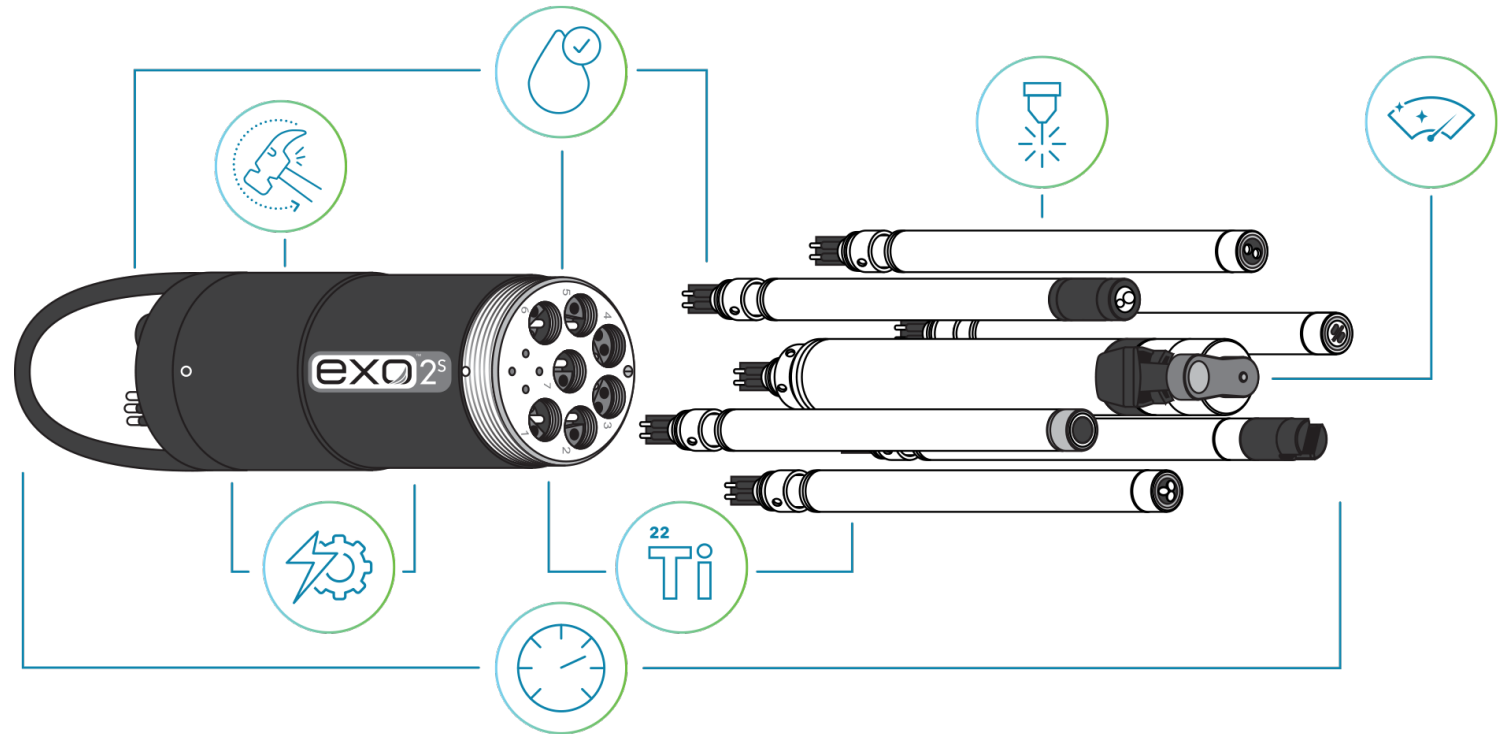
High torque sensor wiper with dense bristles enables long-term, uncompromised data collection

Intuitive operation

Simplify workflow with universal sensor ports, automatic sensor recognition, guided calibrations, and SmartQC™ for quality assurance

Seamless integration

Easily configure your system in minutes for remote real-time data access



- Wet-mate neoprene connectors on sonde, sensors, and cables
- Completely sealed, laser-welded titanium sensors and wiper
- Mechanically and electrically isolated sonde components
- Corrosion-resistant titanium sensors and bulkhead

3-year
warranty



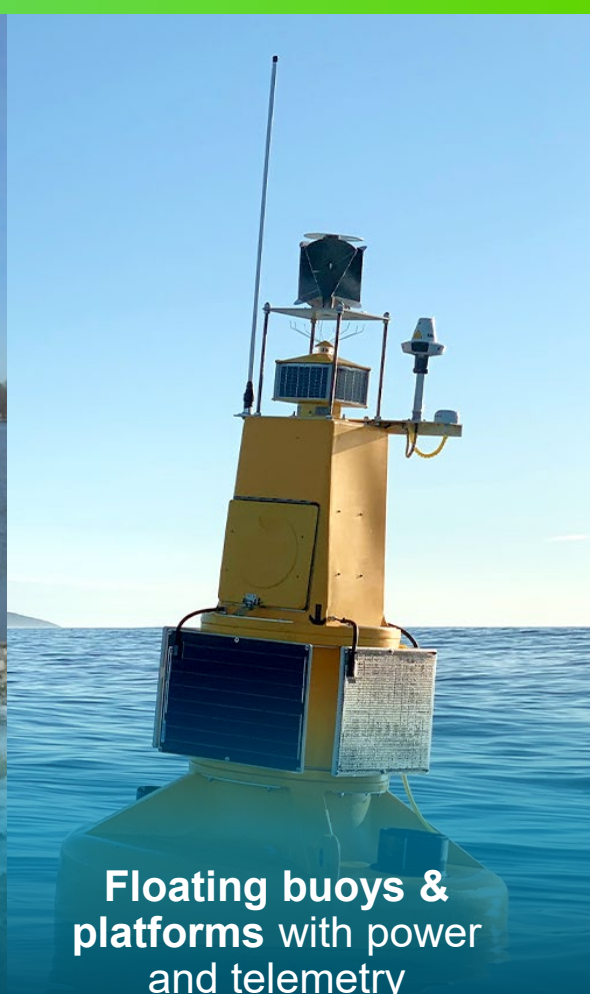
Discrete sampling
with the EXO Handheld
or Kor Mobile



Continuous monitoring
with internal logging



Land-based systems
with power and telemetry



Floating buoys & platforms
with power and telemetry



There are many ways to collect data with EXO!

From monitoring in remote locations to collecting high-quality data even when you can't be there

Best practices and tips for success

Review the not-so-basics

Smart solutions for
water quality & flow

Did you know...

EXO uses wet-mate connectors for reliability and durability!



EXO uses wet-mate connectors for reliability and durability!

What does wet-mate mean?



Connectors are resistant to moisture intrusion and corrosion



Pins are coated in neoprene rubber to provide seal



Connections can be made in the presence of water without causing electrical damage

Found on:

- Sonde cable ports
- Bulkhead ports
- Sensor connectors
- Cable connectors
- Handheld display
- KorLink Bluetooth adapter



EXO uses wet-mate connectors for reliability and durability!

Why?



Makes EXO less prone to damage in the field



Supports sensor and cable hot-swaps and sonde field maintenance



Compared to traditional connectors, wet-mates need a little more TLC!



EXO uses wet-mate connectors for reliability and durability!

They require maintenance!



Regular cleaning and lubrication, about quarterly



Clean off debris and old grease with lint-free wipe



Apply small dab of silicone grease with finger and rub in



Maintenance keeps the rubber from drying out. Cracks can allow water ingress and cause swelling.





Did you know...

Bulkhead ports are smart and universal!



Bulkhead ports are smart and universal!

Any sensor can be installed in any port



Automatic recognition by the sonde



Simplifies workflow



Depending on your payload, orientation can matter!



Bulkhead ports are smart and universal!

Orientation can matter!

- **Wiped C/T** is best placed **opposite the wiper guard** to reduce brush splay
- **NitraLED** must be in the **last port** (4 or 6) when used with the NitraLED wiper brush
- **Avoid** placing **optical sensors** directly **adjacent**, especially fDOM and Total Algae
- **Avoid** placing **optical sensors** directly **next to wiper guard** in case of misparking





Did you know...

Multi-sensor calibrations improve efficiency!

Multi-sensor calibrations improve efficiency!

Why?



Save time



Save your solutions,
reduce cost



Highest consistency
across sensors

How?



Smart Sensors store their own calibration,
so you can move them between sondes



Multi-sensor calibrations improve efficiency!

Make sure to...

- Include a Cond/Temp sensor for accuracy when performing batch calibrations of other sensors
- Use a clean calibration cup, sensor guard, wiper brush, and sensors
- Periodically check temperature with a NIST-traceable thermometer



Did you know?


Turbidity is the only sensor besides C/T with its own **internal thermistor!**


Multi-sensor calibrations improve efficiency!


In Kor:


- Select a sensor to calibrate


Select Parameter(s) to Calibrate

| Conductivity | |
|--|---|
|  Serial Number : 15F103709 Sensor Port : 1 | |
| PARAMETER TYPE | LAST CALIBRATION DATE |
| Sp Cond ($\mu\text{S}/\text{cm}$) | <Factory Calibrated> |
| | <input type="button" value="CALIBRATE"/> <input type="button" value="FACTORY RESET CALIBRATION"/> |

| Conductivity | |
|--|--|
|  Serial Number : 15E103519 Sensor Port : 2 | |

| Conductivity | |
|--|--|
|  Serial Number : 15F100340 Sensor Port : 3 | |

| Conductivity | |
|---|--|
|  Serial Number : 15E103521 Sensor Port : 4 | |


| Conductivity | |
|--|--|
|  Serial Number : 15E104320 Sensor Port : 5 | |

Multi-sensor calibrations improve efficiency!

In Kor:

- Select a sensor to calibrate
- Kor recognizes multiple sensors of the same type
- Once stable, click apply for each sensor (see sensor 1/#, SN)

Multiple sensor calibration

 You have multiple sensors with this parameter. Would you like to calibrate all of them?

Conductivity

Sp Cond ($\mu\text{S}/\text{cm}$)

Calibration Point 1 of up to 1
Sensor 15F103709 on Port 1
Sensor 1 of 7

| | |
|------------------------|---------------------------------|
| Standard Value | 1000.0 $\mu\text{S}/\text{cm}$ |
| Data Stability | Stable |
| Pre Calibration Value | 1051.8 $\mu\text{S}/\text{cm}$ |
| Post Calibration Value | Pending $\mu\text{S}/\text{cm}$ |
| Temp | 21.578 $^{\circ}\text{C}$ |

Sp Cond ($\mu\text{S}/\text{cm}$) vs. Time

Multi-sensor calibrations improve efficiency!

In Kor:

- Select a sensor to calibrate
- Kor recognizes multiple sensors of the same type
- Once stable, click apply for each sensor (see sensor 1/#, SN)
- Review calibration point for each sensor; redo, drop, or complete
- Continue with calibration point 2 if applicable

Wiped Conductivity
Sp Cond ($\mu\text{S}/\text{cm}$)

Calibration Point 1 Preview

15F103709 Port : 1 Standard Value : 1000.0 $\mu\text{S}/\text{cm}$ Pre : 1051.8 $\mu\text{S}/\text{cm}$ Post : 1000.0 $\mu\text{S}/\text{cm}$
 Accept Drop Redo

| | |
|------------------------|--------------------------------|
| Standard Value | 1000.0 $\mu\text{S}/\text{cm}$ |
| Data Stability | Stable |
| Pre Calibration Value | 1051.8 $\mu\text{S}/\text{cm}$ |
| Post Calibration Value | 1000.0 $\mu\text{S}/\text{cm}$ |
| Temp | 21.579 $^{\circ}\text{C}$ |

CALIBRATION TIPS

- You cannot calibrate temperature, but can check temperature readings with NIST thermometers prior to calibration
- YSI recommends always calibrating specific conductivity, which is temperature compensated to 25 $^{\circ}\text{C}$
 - This calibration will carry over to the salinity parameter
- Prior to calibration, ensure the CT probe is cleaned thoroughly, as bubbles, critters, and biofouling can dramatically effect calibrations
- Perform a 1-point calibration with a standard relevant to your application:
 - Freshwater – 1,000 $\mu\text{S}/\text{cm}$ (Part Number: 060007)

COMPLETION CALIBRATION



Did you know...

The order of your calibrations might affect your data?

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Why?

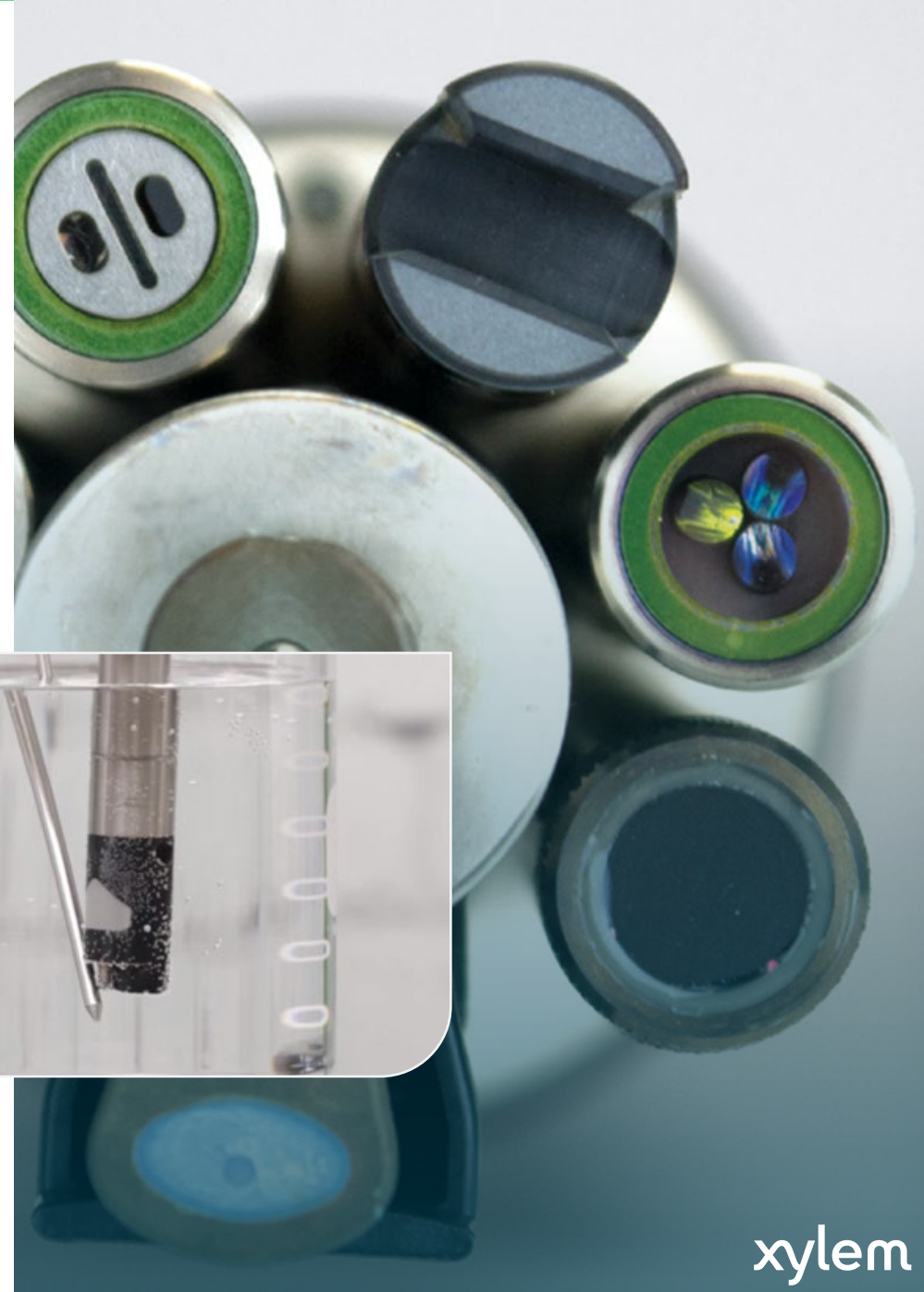
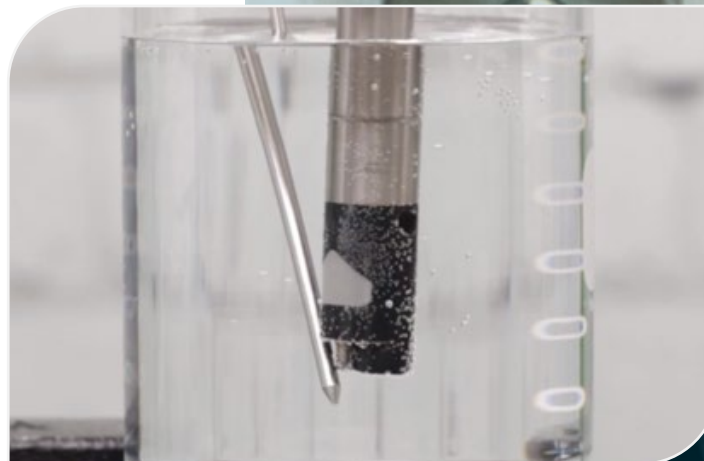


There is no one right order to follow, but...
Depends on your sensor payload



For example:

- Calibrate/Check Conductivity and Temperature first because other sensors reference C/T for compensation



The order of your calibrations might affect your data!

Why?



There is no one right order to follow, but...
Depends on your sensor payload



For example:

- Calibrate/Check Conductivity and Temperature first because other sensors reference C/T for compensation
- ISEs can be affected by conductivity solution, pH buffer, and Zobell's



The order of your calibrations might affect your data!

Why?



There is no one right order to follow, but...
Depends on your sensor payload



For example:

- Calibrate/Check Conductivity and Temperature first because other sensors reference C/T for compensation
- ISEs can be affected by conductivity solution, pH buffer, and Zobell's
- Turbidity must be calibrated before NitraLED for accurate turbidity correction of nitrate



The order of your calibrations might affect your data!



Check out EXO University for the full list of recommendations!

www.ysi.com/exou



Did you know...

You can customize your perfect anti-fouling kit!

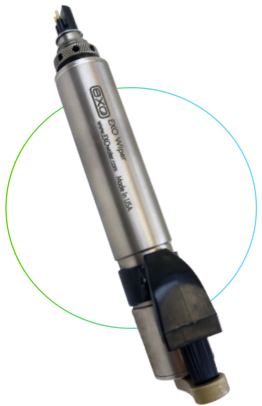


You can customize your perfect anti-fouling kit!

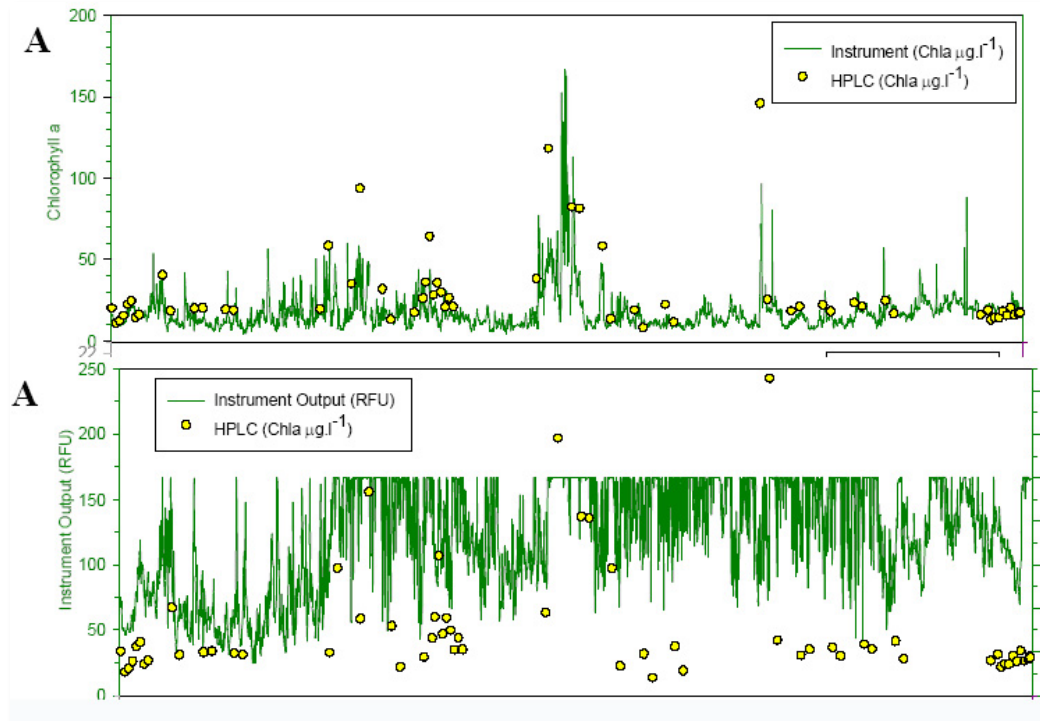
EXO Central Wiper



Keeps sensor tips free of debris, sediment, and biofouling for better data



No Wiper



You can customize your perfect anti-fouling kit!

You can restore your brush for extended use!

- Inspect bristles for splay
 - Clean and brush out debris under running water
 - Soak in hot water and dry with bristles tied to reform
- Inspect brush guard for cracks
- Send to factory annually for warranty maintenance on o-rings, seals, etc.



You can customize your perfect anti-fouling kit!

Consider other anti-fouling to maximize your deployments:

- Heat-shrink sleeves
- Copper tape and guards
- C-spray
- Flow cell

Other options

- UV lamps
- Air pump



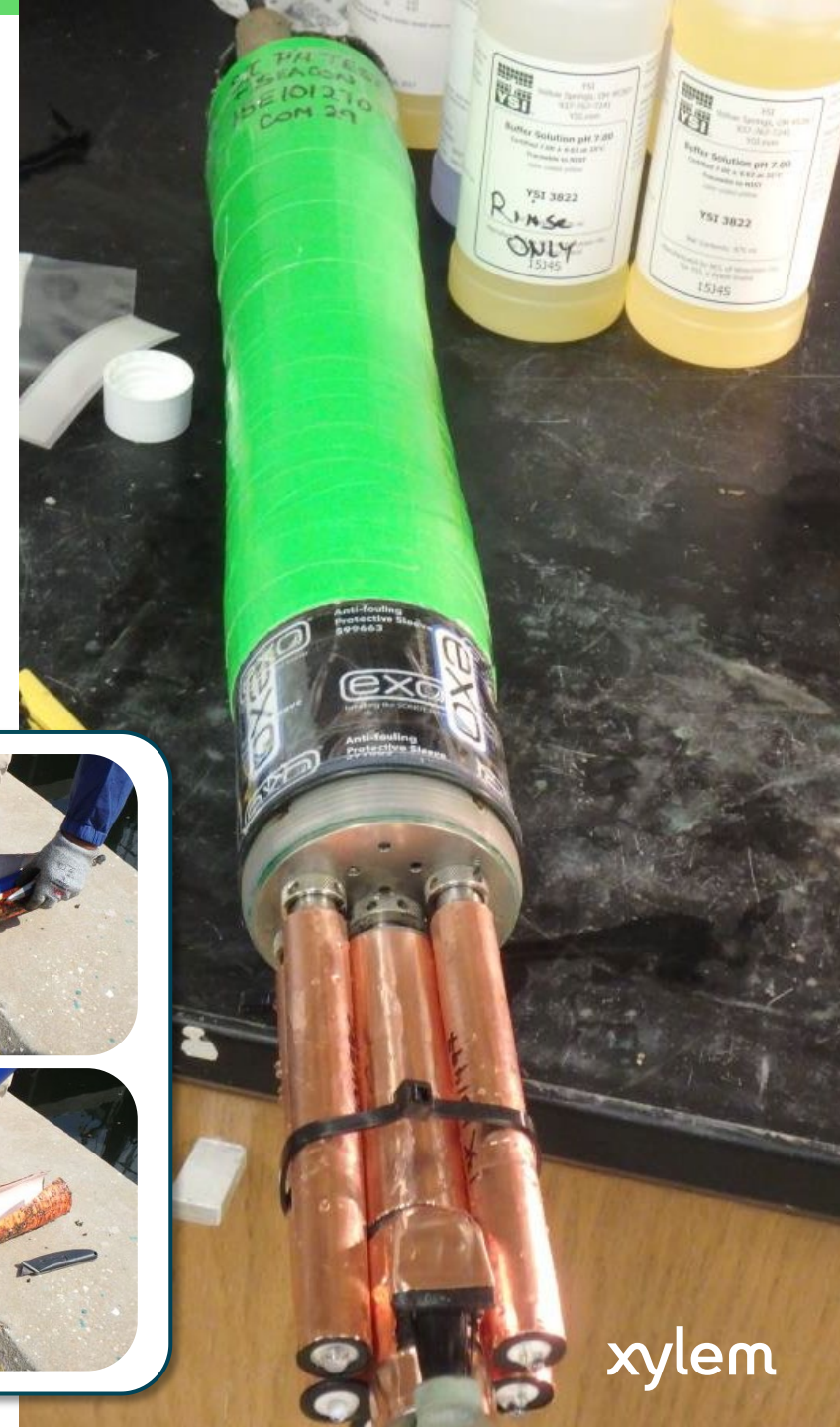
You can customize your perfect anti-fouling kit!

Consider other anti-fouling to maximize your deployments:

- Heat-shrink sleeves
- Copper tape and guards
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- Flow cell

Other options

- UV lamps
- Air pump





Did you know...

The Sensor Brace can improve wiped deployments!



Use the **Sensor Brace** for wiped deployments!

Why?



Improves sensor stability during wiping to reduce chances of pin corrosion due to “wobble”



Reduce fouling and buildup between sensors



Easy to install/uninstall



Direct replacement for the Zip-tie kit.
Better results and reusability!





Did you know...

Use Sample and Hold for deployments!

Use **Sample and Hold** for deployments!



Data sent to a connected data logger will match data stored in the sonde



Sonde memory acts as a backup of telemetered data

Deployment Template Configuration

Logging Mode: **Sample and Hold** (highlighted with a green box)

Additional Averaging Duration: 0 minute(s) 0 second(s)

Burst Mode Duration: 0 minute(s) 0 second(s)

Samples per Wipe: 1
A wipe will occur every 30.00 minutes

System-wide Averaging Mode: Default

Adaptive Logging:

Adaptive Logging Interval: 0 hour(s) 0 minute(s) 1 second(s) 0 ms

Adaptive Logging Duration: 0 hour(s) 0 minute(s) 0 second(s) 0 ms

Adaptive Logging 1 Mode: Off

Adaptive Logging 2 Mode: Off

Adaptive Logging 1 Parameter: Temp (°C)

Adaptive Logging 2 Parameter: Temp (°C)

Adaptive Logging 1 Threshold: 0 +/-

Adaptive Logging 2 Threshold: 0 +/-

Buttons: SAVE TEMPLATE, SAVE AND APPLY TEMPLATE TO SONDE, CANCEL



Did you know...

Adaptive logging can provide special event data!

Adaptive logging can provide special event data!



Increase sample interval during events



Set parameter-based thresholds

Adaptive Logging

Adaptive Logging Interval

0 5 0 0
hour(s) minute(s) second(s) ms

Adaptive Logging | Mode

Below

Adaptive Logging | Parameter

pH

Adaptive Logging | Threshold

5 + -



Did you know...

EXO-S is great for deployments!

EXO-S is great for deployments!



Ideal where external power is available



Lower cost option



Smaller footprint for tight locations or compact systems



EXO KorLink

Bluetooth adapter



For handheld monitoring and more using your mobile device



Enables communication with **Kor Mobile** on Android or iOS



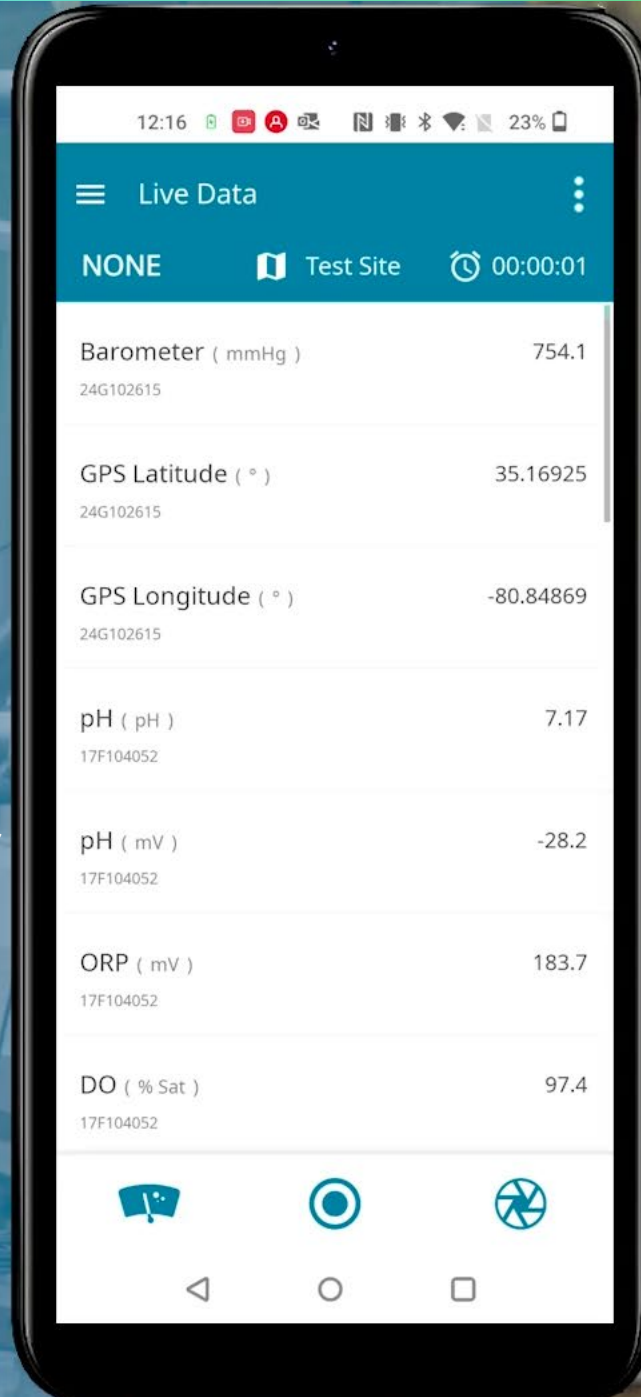
Onboard memory for data storage and transfer



Built-in GPS and barometer



Can power your sonde, including EXO-S



Field application stories

Real-world data collection with EXO

Smart solutions for
water quality & flow

UK Water Utilities – Section 82

EXO for CSO compliance



Xylem UK installs and maintains real-time monitoring stations for **25% and counting** of the country's regulated outflows.



Challenge

- The UK Environment Act (2023) calls for improving water stewardship across the UK with **new monitoring standards**
- Water utilities are required to monitor their wastewater treatment **outflows and CSOs**, and **downstream impact**
- Parameters of interest include dissolved oxygen, pH, turbidity, & **ammonia**
- **Real-time data** is a requirement

Solution

- Xylem coordinates **end-to-end solutions** for water utilities with no prior monitoring experience
- Upstream and downstream monitoring stations; **pumped kiosks** and **in-water sensors**
- **EXO2^S Sondes**, powered externally, sample once per hour or every 15 minutes during events
- Data is made public data within 1 hour using **HydroSphere** data platform with APIs



EXO Ammonium / Ammonia

UK Section 82 compliance



Measures Ammonium, calculates Ammonia

The majority of ammonia in rivers is in the form of **Ammonium**. Sensor measures ammonium and calculates ammonia based on pH & temperature.



Designed for fresh water

Best field accuracy at **< 2 mg/L NH₄⁺ -N**



Accurate beyond specs

Typical accuracy is **±0.5 mg/L NH₄⁺ -N**, within a range of 0 to 2 mg/L NH₄-N, over 4- to 6-week deployments; despite ±2 mg/L factory spec



Environment Agency-approved

Tested for many years by the Environment Agency National Water Quality Instrumentation Service (NWQIS) with **thousands of deployments**



Real-time indicator of CSOs

Ammonium data is displayed in **HydroSphere** in real-time and **correlates with known sewage overflow events**, making it a useful environmental indicator.

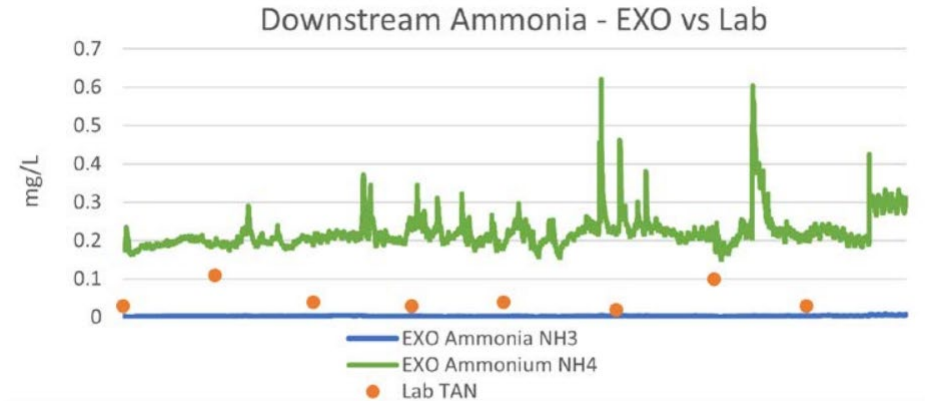


Figure 5. EXO ammonium and ammonia concentrations with lab-determined Total Ammonia Nitrogen (TAN) at the downstream site.

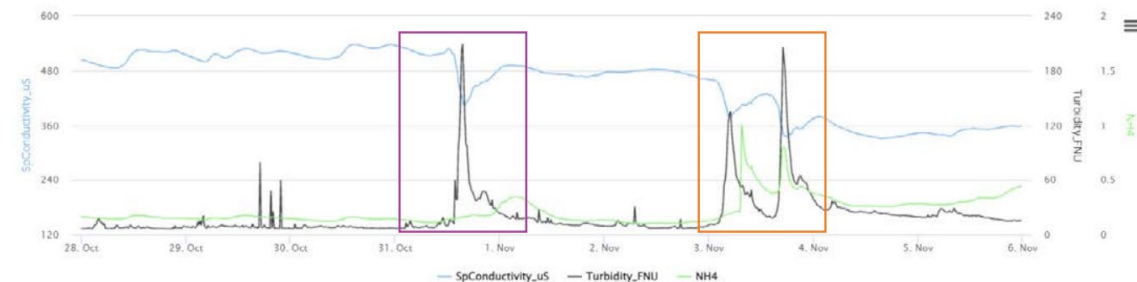


Figure 8. Downstream site live EXO sensor data excerpt from HydroSphere. Rain events during which a sewage overflow discharge demonstrated higher increases in ammonium.

Successful Ammonium ISE deployments

Tips from the field:

- Calibrate in a controlled lab environment every 4-6 weeks
 - Swap calibrated sensor for field sensor
- Condition the sensor membrane by soaking in standard (1 or 100 mg/L-NH₄⁺) overnight
- Replace module every 3-6 months, as needed
- Use wiper guard to protect membrane



Pennsylvania American Water

EXO integrated into drinking water systems



Xylem installed and maintained **42 monitoring systems in 2023.**

The effort was an extension of similar work with the West Virginia team, which first sought support for monitoring for railway spills in the state.



Challenge

- Implement **continuous monitoring systems** for drinking water facilities to prevent pollutants from entering the plant
- Pollutants of interest included **harmful algal blooms (HABs), refined fuels**, other WQ indicators.
- The data must **integrate with on-facility SCADA systems** for easy access, and equipment must be **on-site** to minimize risk.

Solution

- Xylem installed **42 monitoring systems in 33 drinking water facilities** across PA
- The initiative began in September 2023 and was completed by November – just two months
- Installations included a **pumped, flow-cell solution** that pulled source water into the plant
- **EXO** integrated with each facility's **SCADA for real-time data**



Bowling Green State University

EXO on Fondriest buoys for HAB monitoring



2 real-time buoy systems support HAB research effort on Lake Erie in 2017.

Continuous monitoring was funded by DOE HAB Research Initiative (HABRI) to study the lake's ecosystems and as a drinking water source.



Challenge

- Study nearshore toxic cyanobacteria, *Planktothrix*, in Sandusky Bay and the conditions that cause blooms
- Capture immediate effects of sudden weather events
- After the 2014 Lake Erie HAB crisis, instantaneous, continuous data on lake conditions became top priority for water managers

Solution

- Deployed 2 NexSens CB-450 Data Buoys with onboard power, telemetry, and MET sensors; at the mouth near a water intake and in the bay
- EXO2 Sondes collected water temperature, conductivity, pH, DO, turbidity, chlorophyll, phycocyanin
- Real-time data communicated to WQData LIVE and GLOS portals for data sharing to water managers and public; aids water treatment facility control
- Data reveals that *Planktothrix* thrives in cool water with high turbidity and low nitrogen, and provides other HAB insights



[Ref: Fondriest, Environmental Monitor | Data Buoys Study Turbid Water Environments In Lake Erie Basin, 2017](#)

Thank You

Questions?
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Smart solutions for
water quality & flow

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