

# EXO

ADVANCED WATER QUALITY MONITORING PLATFORM



a xylem brand

# Breaking the sonde barrier.

EXO represents the intersection of the Environment and Observation and a new generation of monitoring technology.



# Features You'll Find Only with YSI:



## SmartQC

**Smart QC**  
Automatically checks for faults and errors to ensure successful deployments



**Auto-recognition**  
and set-up of all sensors with background data routing



**Cable-free Operation**  
through the use of wireless communications



**Biofouling Protection**  
with copper-alloy components and anti-fouling wipers



**Assisted Calibration**  
Graphical KOR software speeds the calibration process while reducing reagent consumption



**Titanium Sensors**  
with sapphire glass and wet-mateable connectors

A smart, field-ready water monitoring platform. EXO offers a wide range of capabilities to those dedicated to monitoring natural aquatic environments such as oceans, estuaries, rivers, lakes, and ground water.

Inside the EXO platform you'll find innovations resulting in greater ruggedness, increased accuracy and improved ease-of-use in the collection and transmission of water quality data—cost-effective now and adaptable for the future.

Like you, our engineers and scientists have spent years in the field, deploying and using the products we make. That passion for producing the most advanced and reliable monitoring equipment is how we break the sonde barrier.

# Water quality monitoring that's field-ready

EXO's welded titanium sensors and high-impact body is built for high pressure and depths to 820 feet (250 meters)



# Surface Water & Ground Water Monitoring

## Capturing accurate data in freshwater environments is easy with EXO.

EXO is ready to go with:

- Wireless communication to reduce the number of field cables
- Onboard diagnostics to mitigate set-up and configuration errors
- Improved power management and enhanced anti-fouling components to extend deployment times

Calibrates multiple sensors simultaneously, typically in 15 minutes; no cables required



### Quick and Easy Calibration

Complete calibration in less than 15 minutes using EXO's suite of smart sensors and intuitive KOR interface software. Sondes can now be turned around and redeployed in the timespan of a typical sample interval.

### Go Wireless

Set up, calibrate, and deploy your instrument without a single cable. No more trips to the field and discovering you don't have the right cables. The wireless handheld and sonde are the perfect pair.

### Reduce Biofouling

There's no escaping biofouling in underwater measurements. To keep it from interfering with data, EXO uses copper-alloy parts and anti-fouling wipers to prolong deployments and improve data accuracy.

### Smart Controls for Quality Data

Guided calibration and sensor feedback make EXO an extremely reliable water monitoring platform. Guided prompts and internal calibration logs not only speed up the calibration, but reduce the opportunity for errors.

### Smart Probes. Smart Ports.

Never worry a bad probe will compromise your data. Active port monitoring automatically detects sensors and, if damage to a sensor occurs, can shut down that port to prevent damage to the sonde or other sensors.

### Smart Sonde

Onboard monitoring systems automatically scan for configuration errors, monitor memory status, and verify sensor operation. Numerous onboard tests ensure successful deployments.

[www.EXOwater.com](http://www.EXOwater.com)

# Expandable design that's network-ready

With a highly efficient power management platform, robust construction, and a chemistry-free anti-fouling system, EXO allows accurate data collection for up to 90 days between service intervals.



# Estuary & Ocean Monitoring: High-quality multisensor suite in small and durable package

In harsh conditions, EXO is a practical alternative to traditional CTDs with:

- The ability to integrate seamlessly with marine monitoring systems
- Quick and easy re-configuration and calibration
- Large suite of high-performance sensors, which eliminates individual cables and connectors

Combine traditional CTD sensing with additional sensors in a compact device which readily integrates with remote monitoring platforms



## Compact and Accurate

The EXO platform offers a completely new approach—highly accurate, quick-response sensors in a small, easy-to-deploy and easy-to-maintain package. Gone are large and complicated sensor arrangements requiring complex integration.

## Smart Probes

All EXO sensors have onboard memory and processing, allowing users to easily calibrate and configure sensors at one location and distribute to various field sites.

## Measurable Sensor Performance

A new metrology system specifically for EXO offers improved accuracy of conductivity and temperature sensors to better address oceanographic challenges.

## Monitor without Interruption

EXO's patented reinforced structure, welded Titanium tubes, improved power management, and stable sensor performance allow you to gather data for long periods of time and with fewer interruptions, even in the toughest conditions.

## Smart Ports

Wet-mateable connectors allow for swaps in wet conditions, while the smart ports shut down any excessive current draws to prevent damage.

## Self-Routing Sensors

Automatic routing enables a string of sondes to pass messages to individual probes. Anytime the configuration changes, the system automatically recognizes it. A "kick" allows any device to send alerts back up the chain.

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# Enhance Data Collection with these EXO Components

## EXO Handheld

The EXO handheld provides an extremely durable, portable, weather-proof interface to the EXO sondes. The handheld uses a mobile version of the KOR interface software.

Additional standard features:

- GPS
- Temperature-compensated barometer
- Backlit alphanumeric keypad
- Wet-mate wireless connector
- Bluetooth communication
- Color LED screen
- 2 GB of storage
- Rechargeable battery capable



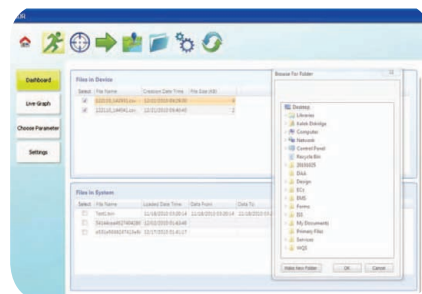
## Anti-fouling Accessories

Extend deployment times and keep sensors clear of biofouling with:

- Anti-fouling wiper (EXO2)
- Copper-alloy sensor guards
- Copper mesh screen for conductivity-temperature sensor
- Copper tape

## KOR Interface Software

The KOR Software offers users the capability to easily manage, visualize, and organize large amounts of field data. KOR also provides an interface to the EXO products for fast calibration, configuration, QA/QC or data collection.



- New calibration processes for long-term monitoring
- Graphical user interface for quick data analysis
- Multiple languages

## Multiple Data Output Options

Sonde output is readable by YSI handheld instruments, interface software, and data telemetry modules. In addition to the cable (standard), these communication interfaces are also available:

**DCP Signal Output Adapter:** Wires into the end of the YSI field cable via flying leads and converts signal to RS-232 or SDI-12 for datalogger applications.



*DCP Signal Output Adapter*

**USB Adapter:**

Allows connections between an EXO sonde and a PC.



*USB Adapter*

**Bluetooth Wireless Technology:**

Enables communication between a sonde and a user in the lab and pre-deployment in the field.





# Sondes: EXO1 EXO2

Removable Bail

6-Pin Cable Connector

High-impact Xenoy Housing

Pressure Transducer Opening

Red LED Indicator - Status

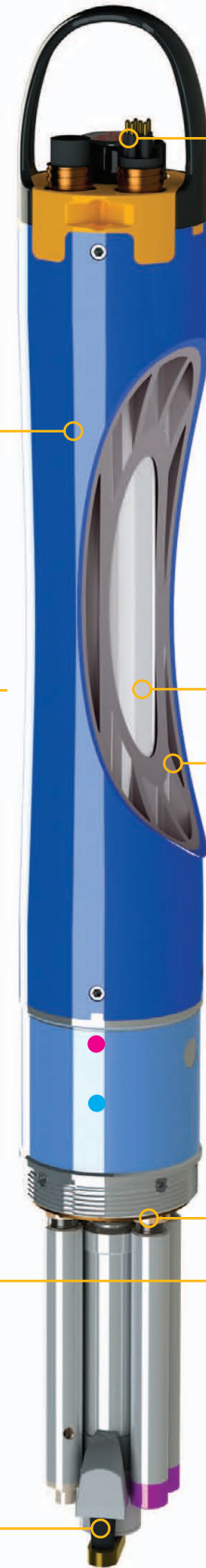
Blue LED Indicator - Bluetooth

On/Off Magnetic Switch for Power and Bluetooth

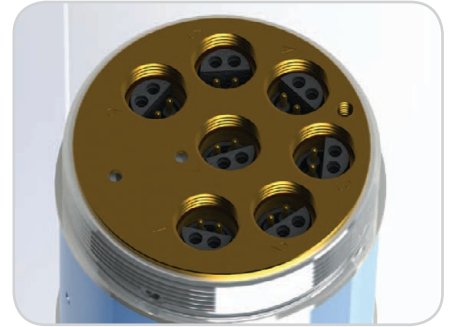
4-Pin Wet-Mateable Connectors

Port Plug

Anti-fouling Wiper



Cable connector, battery valve, and expansion port for an additional sensor



EXO2 sonde contains 6 universal sensor ports plus a central port for an anti-fouling wiper

Battery Compartment

Cutaway: Reinforced internal structure



Anti-fouling wiper keeps sensors clear of biofouling and lengthens deployment times by 25%

Welded Titanium Housing



EXO1 sonde contains 4 universal sensor ports

## Instrument Specifications\*

|   |   |                              |
|---|---|------------------------------|
| <b>EXO1 Sonde</b>                           |   |                              |
| Ports                                       | 4 sensor ports<br>Peripheral port: 1 power communication port   |                              |
| Size  | Diameter: 4.70 cm (1.85 in)<br>Length: 64.77 cm (25.50 in)  |                              |
| Weight                                      | 1.42 kg (3.15 lbs) with 4 probes, guard and batteries installed   |                              |
| <b>EXO2 Sonde</b>                           |   |                              |
| Ports                                       | 7 sensor ports (6 ports available when central wiper used)<br>Peripheral ports: 1 power communication port; 1 auxiliary expansion port  |                              |
| Size  | Diameter: 7.62 cm (3.00 in)<br>Length: 71.10 cm (28.00 in)  |                              |
| Weight                                      | 3.60 kg (7.90 lbs) with 5 probes, guard and batteries installed   |                              |
| <b>Sondes</b>                               |   |                              |
| Operating Temperature                       | -5 to 50°C  |                              |
| Storage Temperature                         | -20 to 80°C (except 0 to 60°C for pH and pH/ORP sensors)  |                              |
| Depth Rating                                | 0 to 250 m (0 to 820 ft)  |                              |
| Communications                              | Computer Interface: Bluetooth wireless technology, RS-485, USB<br>Output Options: USB with signal output adapter (SOA); RS-232 & SDI-12 with DCP-SOA                                |                              |
| Sample Rate                                 | Up to 4 Hz  |                              |
| Battery Life                                | 90 days**   |                              |
| Data Memory                                 | 512 MB total memory; >1,000,000 logged readings   |                              |
| <b>Sensors</b>                              |   | <b>Calculated Parameters</b> |
| Ammonium                                    | ORP   | Salinity                     |
| Chloride                                    | pH  | Specific Conductance         |
| Conductivity                                | Temperature   | Total Dissolved Solids       |
| Depth                                       | Total Algae (Chlorophyll + BGA-PC or PE)  | Total Suspended Solids       |
| Dissolved Oxygen                            | Turbidity   |                              |
| Fluorescent Dissolved Organic Matter (fDOM) | Vented Level  |                              |
| Nitrate                                     |   |                              |
| <b>EXO Handheld</b>                         |   |                              |
| Size  | Width: 12.00 cm (4.72 in)<br>Height: 25.00 cm (9.84 in)   |                              |
| Weight                                      | 0.71 kg (1.56 lbs) without batteries  |                              |
| Operating System                            | Windows CE 5.0  |                              |
| Operating Temperature                       | -10 to 50°C   |                              |
| Storage Temperature                         | -20 to 80°C   |                              |
| IP Rating                                   | IP-67   |                              |
| Data Memory                                 | 2 GB total memory; >2,000,000 data sets   |                              |
| <b>Accessories</b>                          |   |                              |
| Cables (vented and non-vented)              | Flow cells  | Sonde/sensor guard           |
| Carrying case                               | KOR software  | Calibration cup              |
| DCP Signal Output Adapter                   | USB Signal Output Adapter   | Anti-fouling components      |
| <b>Warranty</b>                             |   |                              |
| 3 months                                    | Replaceable reagent modules for ammonium, chloride, and nitrate   |                              |
| 1 Year                                      | Optical DO membranes and replaceable reagent modules for pH and pH/ORP  |                              |
| 2 Years                                     | Cables; sonde bulkheads; handheld; conductivity, temperature, depth, and optical sensors; electronics base for pH, pH/ORP, ammonium, chloride, and nitrate sensors; and accessories |                              |

\* Specifications indicate typical performance and are subject to change. Please check EXOwater.com for up-to-date information.

\*\* Typically 90 days at 20°C at 15-minute logging interval; temperature/conductivity, pH/ORP, DO, and turbidity sensors installed on EXO1; or temperature/conductivity, pH/ORP, DO, total algae, and turbidity sensors installed with central wiper that rotates once per logging interval on EXO2. Battery life is heavily dependent on sensor configuration.

EXO Bluetooth modules comply with Part 15C of FCC Rules and have FCC, CE Mark and C-tick approval. Bluetooth-type approvals and regulations can be country specific. Check local laws and regulations to insure that the use of wireless products purchased from Xylem are in full compliance.

## Sensor Specifications\*

| Sensor   | Range  | Accuracy*   | Response               | Resolution   |
|--|--|---|------------------------|--|
| Ammonium <sup>11</sup><br>(ammonia with pH sensor)                                     | 0 to 200 mg/L <sup>1</sup>   | ±10% of reading or 2 mg/L-N, w.i.g.   | -                      | 0.01 mg/L  |
| Barometer  | 375 to 825 mmHg  | ±1.5 mmHg from 0 to 50°C  | -                      | 0.1 mmHg   |
| Blue-green Algae<br>Phycocyanin (PC)<br>(part of Total Algae sensor)                   | 0 to 100 RFU;<br>0 to 100 µg/L PC  | Linearity: R <sup>2</sup> > 0.999 for serial dilution of Rhodamine WT solution from 0 to 100 µg/mL PC equivalents | T63<2 sec              | 0.01 RFU; 0.01 µg/L PC                               |
| Blue-green Algae<br>Phycocyanin (PE)<br>(part of Total Algae sensor)                   | 0 to 100 RFU;<br>0 to 280 µg/L PE  | Linearity: R <sup>2</sup> > 0.999 for serial dilution of Rhodamine WT solution from 0 to 280 µg/mL PE equivalents | T63<2 sec              | 0.01 RFU; 0.01 µg/L PE                               |
| Chloride <sup>11</sup>   | 0 to 1000 mg/L-Cl <sup>2</sup>   | ±15% of reading or 5 mg/L-Cl, w.i.g.  | -                      | 0.01 mg/L  |
| Chlorophyll<br>(part of Total Algae sensor)  | 0 to 400 µg/L Chl;<br>0 to 100 RFU                                       | Linearity: R <sup>2</sup> > 0.999 for serial dilution of Rhodamine WT solution from 0 to 400 µg/L Chl equivalents | T63<2 sec              | 0.01 µg/L Chl; 0.01 RFU                              |
| Conductivity <sup>3</sup>  | 0 to 200 mS/cm   | 0 to 100: ±0.5% of reading or 0.001 mS/cm, w.i.g.; 100 to 200: ±1% of reading                                     | T63<2 sec              | 0.0001 to 0.01 mS/cm (range dependent)               |
| Depth <sup>4</sup><br>(non-vented)   | 0 to 10 m (0 to 33 ft)   | ±0.04% FS (±0.004 m or ±0.013 ft)   | T63<2 sec              | 0.001 m (0.001 ft)<br>(auto-ranging)                 |
|  | 0 to 100 m (0 to 328 ft)   | ±0.04% FS (±0.04 m or ±0.13 ft)   |                        |  |
|  | 0 to 250 m (0 to 820 ft)   | ±0.04% FS (±0.10 m or ±0.33 ft)   |                        |  |
| Vented Level   | 0 to 10 m (0 to 33 ft)   | ±0.03% FS (±0.003 m or ±0.010 ft)   |                        |  |
| Dissolved Oxygen<br>Optical  | 0 to 500%<br>air saturation  | 0 to 200%: ±1% of reading or 1% saturation, w.i.g.; 200 to 500%: ±5% of reading <sup>5</sup>                      | T63<5 sec <sup>6</sup> | 0.1% air saturation                                  |
|  | 0 to 50 mg/L   | 0 to 20 mg/L: ±0.1 mg/L or 1% of reading, w.i.g.; 20 to 50 mg/L: ±5% of reading <sup>5</sup>                      |                        | 0.01 mg/L  |
| fDOM   | 0 to 300 ppb Quinine Sulfate equivalents (QSE)                           | Linearity: R <sup>2</sup> > 0.999 for serial dilution of 300 ppb QS solution<br>Detection Limit: 0.07 ppb QSE     | T63<2 sec              | 0.01 ppb QSE   |
| Nitrate <sup>11</sup>  | 0 to 200 mg/L-N <sup>1</sup>   | ±10% of reading or 2 mg/L-N, w.i.g.   | -                      | 0.01 mg/L  |
| ORP  | -999 to 999 mV   | ±20 mV in Redox standard solutions  | T63<5 sec <sup>7</sup> | 0.1 mV   |
| pH   | 0 to 14 units  | ±0.1 pH units within ±10°C of calibration temp; ±0.2 pH units for entire temp range <sup>8</sup>                  | T63<3 sec <sup>9</sup> | 0.01 units   |
| Salinity (Calculated from Conductivity and Temperature)                                | 0 to 70 ppt  | ±1.0% of reading or 0.1 ppt, w.i.g.   | T63<2 sec              | 0.01 ppt   |
| Specific Conductance (Calculated from Cond. and Temp.)                                 | 0 to 200 mS/cm   | ±0.5% of reading or .001 mS/cm, w.i.g.  | -                      | 0.001, 0.01, 0.1 mS/cm (auto-scaling)                |
| Temperature  | -5 to 50°C   | -5 to 35°C: ±0.01°C <sup>10</sup><br>35 to 50°C: ±0.05°C <sup>10</sup>  | T63<1 sec              | 0.001 °C   |
| Total Dissolved Solids (TDS)<br>(Calculated from Conductivity and Temperature)         | 0 to 100,000 g/L<br>Cal constant range<br>0.30 to 1.00<br>(0.64 default) | Not Specified   | -                      | variable   |
| Total Suspended Solids (TSS)<br>(Calculated from Turbidity and user reference samples) | 0 to 1500 mg/L   | Not Specified   | T63<2 sec              | variable   |
| Turbidity <sup>11</sup>  | 0 to 4000 FNU  | 0 to 999 FNU: 0.3 FNU or ±2% of reading, w.i.g.; 1000 to 4000 FNU: ±5% of reading <sup>12</sup>                   | T63<2 sec              | 0 to 999 FNU: 0.01 FNU;<br>1000 to 4000 FNU: 0.1 FNU |

All sensors have a depth rating to 250 m (820 ft), except shallow and medium depth sensors and ISEs. EXO sensors are not backward compatible with 6-Series sondes.

\* Specifications indicate typical performance and are subject to change. Please check EXOwater.com for up-to-date information. Accuracy specification is attained immediately following calibration under controlled and stable environmental conditions. Performance in the natural environment may vary from quoted specification.

<sup>1</sup> 0-30°C    <sup>2</sup> 0-40°C    w.i.g. = whichever is greater

<sup>3</sup> Outputs of specific conductance (conductivity corrected to 25°C) and total dissolved solids are also provided. The values are automatically calculated from conductivity according to algorithms found in *Standard Methods for the Examination of Water and Wastewater* (Ed. 1989).

<sup>4</sup> Accuracy specifications apply to conductivity levels of 0 to 100,000 µS/cm.

<sup>5</sup> Relative to calibration gases

<sup>6</sup> When transferred from air-saturated water to stirred deaerated water

<sup>7</sup> When transferred from water-saturated air to Zobell solution

<sup>8</sup> Within the environmental pH range of pH 4 to pH 10

<sup>9</sup> On transfer from water-saturated air to rapidly stirred air-saturated water at a specific conductance of 800 µS/cm at 20°C; T63<5 seconds on transfer from water-saturated air to slowly-stirred air-saturated water.

<sup>10</sup> Temperature accuracy traceable to NIST standards

<sup>11</sup> Calibration: 1-, 2-, or 3-point, user-selectable

<sup>12</sup> Specification is defined in AMCO-AEPA Standards

# What can Xylem do for you?

Xylem (XYL) is a leading global water technology provider, enabling customers to transport, treat, test and efficiently use water in public utility, residential and commercial building services, industrial and agricultural settings. The company does business in more than 150 countries through a number of market-leading product brands, and its 12,500 people bring broad applications expertise with a strong focus on finding local solutions to the world's most challenging water and wastewater problems. Xylem was named to the Dow Jones Sustainability World Index for advancing sustainable business practices and solutions worldwide.

[www.xylem.com](http://www.xylem.com)



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