



## TROLL® 9500 Multiparameter Instrument



The powerful, portable TROLL 9500 Water Quality Instrument is designed for groundwater and surface water monitoring. The unit houses up to nine water quality sensors, internal power, and optional data logger.

### Lower Total Cost of Ownership

- Instrument saves time and money by offering long-lasting internal power, automated low-flow sampling, and telemetry accessibility.
- Field-proven sensors and antifouling system reduce maintenance and site visits.
- Intuitive Win-Situ® 4 Software and Flow-Sense Software improve efficiency by simplifying data collection and management.

### Reliable, Accurate Operation

- Instrument operates in fresh, waste, and marine waters.
- Instrument offers proven performance. Rigorous third-party testing shows that the TROLL 9500 delivers consistent results.
- Sensors are factory calibrated with NIST®-traceable standards (where applicable).

### Outstanding Customer Service

- Free, 24/7 technical support
- Seven-day service for maintenance and calibration (U.S.A. only)

### Logging Models

- **LTS:** LTS stands for “Level, Temperature, and one additional Sensor,” such as conductivity, dissolved oxygen (DO), or pH.
- **Professional:** This unit offers the highest value for most applications. Instrument allows for several sensors, including conductivity/salinity, DO, ORP, pH, temperature, or depth.
- **Professional XP:** The most capable TROLL 9500 offers features available on the Professional and supports XP or “Extended Parameter” sensors—turbidity, ammonium, chloride, or nitrate.

### Non-Logging Models

- **Profiler:** Ideal for sampling or vertical profiling, this unit is similar to the Professional, but does not include memory or logging capabilities. Data can be logged to a RuggedReader® Handheld PC or laptop.
- **Profiler XP:** This unit offers the same features as the Profiler with the option to use XP sensors.

## Applications

- Coastal deployments—estuaries and wetlands
- Environmental monitoring and spot checking
- Low-flow groundwater sampling
- Remediation and mine water monitoring
- Stormwater management
- Vertical profiling

# TROLL® 9500 Water Quality Sensors

## Customizable for Your Application



Choose from several field-ready sensors. The selected sensor set will determine the diameter of the TROLL 9500—sub-2 inch or sub-4 inch.

- **Barometric pressure:** Use this sensor to compensate water level and DO values.
- **Conductivity:** Characterize water quality in actual conductivity, specific conductivity, salinity, TDS, or specific gravity.
- **DO:** Choose from the optical Rugged Dissolved Oxygen (RDO®) Sensor or Clark cell.
- **Level/Pressure:** Choose from non-vented and vented sensors that are available for several ranges.
- **Nutrients:** Choose from ion-selective electrodes for ammonium, chloride, or nitrate.
- **pH or pH/ORP:** Extend field use with these durable sensors. The re-buildable pH sensor outlasts traditional sensors.
- **Temperature:** Compensate conductivity, DO, pH, and nutrient data with this fast, accurate sensor.
- **Turbidity or Turbidity/Level:** Comply with ISO standards. The turbidity sensor uses ISO 7027 method. Optional wiper is available for high-fouling sites or for lengthy deployments.



## Optical RDO Sensor

Breakthrough RDO technology surpasses Clark cell performance by eliminating hydration effects, membranes, electrolyte solution, and stirring.

- **Rugged performance:** Wiper-free design excels in demanding environments. Abrasion-resistant foil withstands fouling, high sediment loads, and rapid flow rates. No photobleaching effects.
- **Automatic setup:** RDO Cap with pre-loaded calibration coefficients simplifies setup and eliminates programming errors.
- **Accurate results:** Operates with low drift over long-term deployments. Excels in hypoxic conditions. Responds quickly and maintains stable response.
- **Long-lasting calibration:** Deploys for several months if sensor fouling is minimal and if the foil is not damaged or removed.
- **Minimal interferences:** Sensor is unaffected by sulfides, sulfates, hydrogen sulfide, carbon dioxide, ammonia, pH, or chloride.
- **Fast response:** Ideal for vertical profiling and dynamically changing conditions.



## TROLL 9500 Accessories



### TROLL® Shield Antifouling System

The TROLL Shield Guard slows biofouling on TROLL 9500 sensors. The guard extends instrument deployments in coastal environments and at high-fouling sites by up to six weeks.

### DO Field Bubbler Kit

For accurate results, use the DO Bubbler Kit for air-saturated water calibrations. The kit reduces time spent on calibration setup.

### Calibration Solutions

From easy-to-use Quick Cal Solution to NIST®-traceable standards, In-Situ supplies calibration solutions required to get accurate results. Call for details or visit [www.in-situ.com](http://www.in-situ.com).

### RuggedCable® Systems, Reels, & Well Accessories

RuggedCable Systems endure harsh environments and last for years. Titanium twist-lock connectors and Kellems® grip are included. Vented or non-vented cable is available in either Tefzel® or polyurethane. Order customized lengths up to 1,219 m (4,000 ft). Steel or plastic reels make deployment of long cables manageable. Ask us about well-docking accessories.



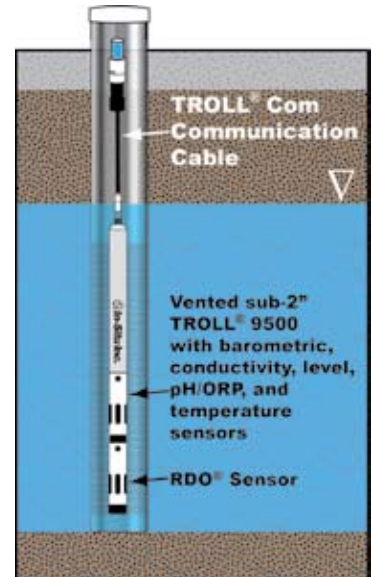
# Real-Time Monitoring for Remediation



## Conduct ISCO, ISCR, Biosparging, Air Sparging & More

The TROLL® 9500 Instrument supports real-time measurement of performance indicators, which allows for a dynamic work strategy per the EPA Triad Approach to site remediation. You can adapt to changing conditions as new data becomes available. This allows you to complete projects more quickly and at a lower cost than when using traditional approaches. With the TROLL 9500, you can:

- Deploy a sub-2 inch instrument and monitor DO with the RDO® Sensor, conductivity, pH/ORP, temperature, and barometric pressure. With the S2XP Restrictor, you can also log water level.
- Deploy in harsh conditions. The corrosion-resistant housing is suitable for many remediation applications.
- Reduce grab sampling and labor costs while improving safety when working with treatment chemicals.
- Improve performance monitoring and reduce maintenance and calibration time with durable sensors.
- Connect to the TROLL® Link Telemetry System for remote access and external power.



## TROLL 9500 Low-Flow Sampling System

You can use the TROLL 9500 System with Flow-Sense Software to conduct low-flow purging and sampling. You will collect representative samples, minimize contaminant volatilization, and reduce hazardous waste disposal. To improve efficiency in the field, the system:

- Automates collection of well and pumping information
- Monitors and records stabilization of key water quality parameters
- Automatically generates defensible calibration and sample reports that conform to federal and regional regulations
- Eliminates transcription time and errors

### Automated Test Setup

Flow-Sense Software retains all project information—well data, pump performance specifics, tubing details, pumping rate, stabilized drawdown, and parameter stabilization criteria. You can quickly access site information at subsequent sampling events without reentering data.

Win-Situ® Sync Software automatically copies well records and data between a computer and a RuggedReader® Handheld PC.

### Automated Data Collection

Stabilization criteria are set for each monitored parameter. Data collection intervals are defined by time or pumped volumes. During sampling, software calculates and displays variance and targets for each parameter. Data is logged at pre-determined intervals and stabilization is achieved when readings meet variation criteria. In addition, you can view data numerically or graphically.



### Automated Test Report Generation

After stabilization, stored data can be exported into Excel®. Flow-Sense Software automatically generates full calibration and sample reports that conform to federal and regional regulations. To save time, simply reuse templates at subsequent sampling events.

# TROLL<sup>®</sup> 9500 Multiparameter Instrument

General <b>TROLL 9500 Water Quality Instrument</b>					
Operating temp.	-5 to 50° C (23 to 122° F)				
Storage temp.	-40 to 65° C (-40 to 140° F)				
Dimensions & weight	4.7 cm (1.85 in) OD x 55.25 cm (21.75 in). With twist-lock hanger: 56.52 cm (22.25 in). Restrictor: 8.9 cm (3.5 in) OD x 21 cm (8.25 in) long; 1.9 kg (4.2 lbs)				
Wetted materials	PVC, 316L stainless steel, titanium, Acetal, Viton <sup>®</sup> , nylon. Cable: Tefzel <sup>®</sup> or polyurethane				
Water tightness rating	IP68 with all sensors and cable attached. Battery compartment: IP67 without the battery cover or cable attached				
Output options	RS485/RS232; SDI-12 (optional with SDI-12 adapter); ASCII streaming mode or binary command				
Power	External: 9-16 VDC (optional). Internal: 2 user-replaceable D batteries (use either alkaline or matched pair of lithium). Use only Saft LSH-20 3.6V lithium D cells. Use of any other battery will void the warranty.				
Logging					
Data logging	16 programmable tests (defined, scheduled to run, or stored). Logging modes: Linear, Linear Average, Event				
Memory	4 MB (222,000 data records <sup>1</sup> )				
Standard Sensors	Accuracy	Range	Depth Rating	Response Time	Methodology
Barometric pressure	±0.3% FS	16.5 psia	Meets highest rating	< 30 sec per 30 m (100 ft) of cable	Silicon strain gauge
Level, Depth, Pressure	±0.1% FS or better Sensor accuracy: -5 to 50° C	15, 30, 100, or 300 psi	<i>Non-vented</i> 30 psia: 10.90 m (35.76 ft) 100 psia: 60.11 m (197.2 ft) 300 psia: 200.7 m (658.6 ft) <i>Vented</i> 15 psig: 10.55 m (34.61 ft) 30 psig: 21.10 m (69.21 ft) 100 psig: 70.32 m (230.7 ft) 300 psig: 211.0 m (692.1 ft)	Instantaneous in thermal equilibrium	Silicon strain gauge (non-vented or vented)
Conductivity	Low: ±0.5% or 2 µS/cm High: ±0.5% + 2 µS/cm	Low: 5 to 20,000 µS/cm High <sup>2</sup> : 150 to 112,000 µS/cm	Low: Meets highest rating High: Meets highest rating	Low: Instantaneous High: Instantaneous	Std. Methods 2510, EPA 120.1 Std. Methods 2510, EPA 120.1
Dissolved oxygen RDO <sup>®</sup> Sensor <sup>3,4</sup>	±0.1 mg/L ±0.2 mg/L ±10% of reading	0 to 8 mg/L 8 to 20 mg/L 20 to 50 mg/L	150 psi from 0 to 50° C 300 psi @ 25° C	T90: < 45 sec. T95: < 60 sec. T90: < 45 sec. T95: < 60 sec. T90: < 45 sec. T95: < 60 sec.	EPA-approved In-Situ Methods 1002-8-2009, 1003-8-2009, 1004-8-2009
Clark cell	±0.2 mg/L	0 to 20 mg/L; 0 to 200% saturation	246 m (807 ft)	1-mil membrane: 1-2 min @ 25° C 2-mil membrane: 90 sec to 3 min	Std. Methods 4500-0 G, EPA 360.1
pH (single) <sup>5</sup> or pH/ORP (combo) <sup>5</sup>	pH: ±0.1 pH unit ORP: ±5.0 mV	pH: 0 to 12 pH units ORP: ±1400 mV	pH: 211 m (692 ft) pH/ORP: 211 m (692 ft)	pH: < 15 sec, pH 7 to pH 4 ORP: < 15 sec	pH: Std. Methods 4500-H <sup>+</sup> , EPA 150.2 ORP: Std. Methods 2580
Temperature	±0.1° C	-5 to 50° C (23 to 122° F)	Meets highest rating	< 30 sec	EPA 170.1
Extended Parameter (XP) Sensors					
Ammonium (NH <sub>4</sub> <sup>+</sup> )	±10%	0.14 to 14,000 ppm N	14 m (46 ft)	T98: < 60 sec, 1.4 to 14 ppm N	Std. Methods 4500-NH <sub>3</sub> D, EPA 350.3
Chloride (Cl <sup>-</sup> )	±15%	0.35 to 35,500 ppm Cl	70 m (231 ft)	T98: < 60 sec, 3.54 to 35.45 ppm Cl	Std. Methods 4500-Cl <sup>-</sup> D
Nitrate (NO <sub>3</sub> <sup>-</sup> )	±10%	0.14 to 14,000 ppm N	14 m (46 ft)	T98: < 60 sec, 1.4 to 14 ppm N	Std. Methods 4500-NO <sub>3</sub> D
Turbidity	±5% or 2 NTU/FNU	0 to 2,000 NTU/FNU	105 m (346 ft)	Instantaneous (5 sec for first reading)	ISO 7027
Warranty	TROLL 9500 and all sensors (excluding RDO & ISE sensors) come with a 1-year warranty. RDO Sensor: 3-year warranty. ISE sensors: 90-day warranty. RuggedCable <sup>®</sup> System: 2-year warranty.				
Notes	<sup>1</sup> A single data record includes time stamp, temperature, RDO, pH, and conductivity logged in Linear or Linear Average mode. <sup>2</sup> Full operating range: 70 to 200,000 µS/cm. <sup>3</sup> Full operating range: 0 to 50 mg/L. <sup>4</sup> Known interferences: Alcohols >5%; hydrogen peroxide >3%; sodium hypochlorite (commercial bleach) >3%; gaseous sulfur dioxide; gaseous chlorine; organic solvents (e.g., acetone, chloroform, methylene chloride, etc.), which may swell the sensing element (foil matrix) and destroy it. <sup>5</sup> pH sensor and pH/ORP sensor temperature range: 0 to 50° C.				

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