Aqua TROLL 500/600 Sensor Summary

Sensor Summary

Sensors	Expected Lifetime*	Recommended Calibration Frequency	Pressure Rating - PSI	Usable Depth		Operational Temperature Range
pH/ORP	2 years or greater**	10 to 12 weeks**	350	200	650	- 5 to 50° C
RDO	2 years or greater	12 months**	350	200	650	- 5 to 50° C
Conductivity	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
Temperature	2 years or greater	NA	350	200	650	- 5 to 50° C
Turbidity	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
Pressure	2 years or greater	User calibration only if needed	12.8 42.7 108 285	9 30 76 200	30 100 250 650	- 5 to 50° C
Barometric Pressure	2 years or greater	User calibration only if needed	NA	NA	NA	- 5 to 50° C
Ammonium	6 to 12 months**	Monthly**	30	25	70	0 to 40° C
Chloride	1 year or greater**	Monthly**	350	200	650	0 to 50° C
Nitrate	6 to 12 months**	Monthly**	30	25	70	0 to 40° C
Chlorophyll a	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
BGA-PC	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
BGA-PE	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
Rhodamine	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
Fluorescein	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
FDOM	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C
Crude Oil	2 years or greater	User calibration only if needed	350	200	650	- 5 to 50° C

* Expected lifetime includes total shelf life and deployment lifetime.
** Lifetime and calibration frequency depend on site and storage conditions.

Solutions

Solution	Shelf Life - Unopened	Shelf Life - Opened
Quick Cal	4 months. Store in a cool, dark place. Shake before use.	7 to 21 days (±10 mV, ±0.05 pH, ±50 µS/cm)
ZoBell's	9 months. Store in a cool, dark place.	3 to 6 months
Low Conductivity (147 µS/cm)	12 months	Hours (±1 µS/cm, check before use)
Other Conductivity	12 months	3 to 6 months
pH Calibration Buffers	24 months	3 to 6 months
Sensor Reference Filling Solution	24 months	12 months
pH Storage Solution	24 months	12 months
Sodium Sulfite	12 months	3 to 6 months
Turbidity	12 months	12 months from expiration date
Deionized Water	24 months	Hours, check before use for calibration
Ammonium	12 months	3 to 6 months
Chloride	12 months	3 to 6 months
Nitrate	12 months	3 to 6 months

Potential Interferents

pH
Sodium salts

Dissolved Oxygen
Temperature, atmospheric pressure, salinity, chlorinity

Ammonium
Cesium, Potassium, Thallium, pH, Silver, Lithium, Sodium

Nitrate
Perchlorate, Iodide, Chlorate, Cyanide, Bromide, Nitrite, Hydrogen Sulfide (bisulfite), Hydrogen Carbonate
(bicarbonate), Carbonate, Chloride, Dihydrogen Phosphate, Hydrogen Phosphate, Phosphate, Acetate, Fluoride, Sulfate

Conductivity
Temperature

ORP
Ions that are stronger reducing agents than hydrogen or platinum, e.g., chromium, vanadium, titanium, etc.

Chloride
Hydroxide, Ammonia, Thiosulfate, Bromide, Sulfide, Iodide, Cyanide

BGA-PC, BGA-PE, Chlorophyll a, Rhodamine WT
Turbidity

RDO Cap Chemical Incompatibility

The following chemicals will damage the RDO sensing element.

- Alcohols > 5%
- Hydrogen peroxide > 3%
- Sodium hypochlorite (commercial bleach) > 3%
- Gaseous sulfur dioxide
- Gaseous chlorine
- Do not use in organic solvents (e.g., acetone, chloroform, methylene chloride, etc.), which may destroy the sensing element

Conductivity/Temperature Sensor

Soaking the Conductivity/Temperature sensor in vinegar for longer than one hour can cause serious damage.

Ammonium, Chloride, and Nitrate Interferent Concentrations

Ammonium

The table below lists concentrations of possible interfering ions that cause 10% error at various levels (in ppm) of NH_4^+.

Ion	100 ppm NH_4^+	10 ppm NH_4^+	1 ppm NH_4^+
Celsium (Cs^+)	100	10	1
Potassium (K^+)	270	27	2.7
Thallium (Tl^+)	3100	310	31
pH (H^+)	pH 1.6	pH 2.6	pH 3.6
Silver (Ag^+)	270,000	27,000	2,700
Lithium (Li^+)	35,000	3,500	350
Sodium (Na^+)	11,100	1,100	110

Chloride

The table below lists concentrations of possible interfering ions that cause 10% error at various levels (in ppm) of Cl^-.

Ion	100 ppm Cl^-	10 ppm Cl^-	1 ppm Cl^-
Hydroxide (OH^-)	3,840	384	38.4
Ammonia (NH_3)	6	0.6	0.06
Thiosulfate ($S_2O_3^{2-}$)	3	0.3	0.03
Bromide (Br^-)	0.68	0.068	6.8 x 10-3
Sulfide (S^{2-})	9 x 10-5	9 x 10-6	9 x 10-7
Iodide (I^-)	1.8 x 10-4	1.8 x 10-5	1.8 x 10-6
Cyanide (CN^-)	1.5 x 10-5	1.5 x 10-6	1.5 x 10-7

Nitrate

The table below lists concentrations of possible interfering ions that cause 10% error at various levels (in ppm) of $N0_3^-$.

Ion	100 ppm NO_3^-	10 ppm NO_3^-	1 ppm NO_3^-
Perchlorate (ClO_4^-)	7 x 10-2	7 x 10-3	7 x 10-4
Iodide (I^-)	4	0.4	0.04
Chlorate (ClO_3^-)	30	3	0.3
Cyanide (CN^-)	20	2	0.2
Bromide (Br^-)	400	40	4
Nitrite (NO_2^-)	230	23	2
Hydrogen Sulfide (HS^-)	230	23	2

Bicarbonate (HCO_3^-)	440	440	44
Carbonate (CO_3^{2-})	8,600	860	86
Chloride (Cl^-)	7,600	760	76
Dihydrogen Phosphate ($H_2PO_4^-$)	34,640	3,464	346
Hydrogen Phosphate (HPO_4^{2-})	34,300	3,430	343
Phosphate (PO_4^{3-})	33,900	3,390	339
Acetate (OAc^-)	104,200	10,420	1,042
Fluoride (F^-)	81,400	8,140	814
Sulfate (SO_4^{2-})	685,700	68,570	6,857

Barometric Pressure Sensor Specifications

Accuracy	±1.0 mbar
Range	300 to 1,100 mbar
Resolution	0.1 mbar
Sensor Type	Fixed
Response Time	T63<1s, T90<1s, T95<1s
Units of Measure	psi, kPa, bar, mbar, mmHg, inHg
Methodology	Silicon strain gauge

Conductivity Sensor Specifications

Accuracy	±0.5% of reading plus 1 µS/cm from 0 to 100,000 µS/cm;±1.0% of reading from 100,000 to 200,000 µS/cm; ±2% of reading from 200,000 to 350,000 µS/cm
Range	0 to 350,000 µS/cm
Resolution	0.1 µS/cm
Sensor Type	Removeable
Response Time	T63<1s, T90<3s, T95<5s
Units of Measure	Actual conductivity: µS/cm, mS/cm Specific conductivity: µS/cm, mS/cm Salinity: PSU Total dissolved solids: ppt, ppm Resistivity: Ohms-cm Density: g/cm3
Methodology	Std. Methods 2510, EPA 120.1

*Accuracy at calibration points. For greatest accuracy over instrument life, keep the conductivity cell submersed in water for 24-48 hours prior to calibration and deployment.

Total Dissolved Solids

TDS is derived from conductivity and temperature.

Range	0 to 350 ppt
Resolution	0.1 ppt
Units of Measure	ppt, ppm

Salinity

TDS is derived from conductivity and temperature.

Range	0 to 350 PSU
Resolution	0.1 PSU
Units of Measure	PSU, ppt
Methodology	Std. Methods 2520A

Dissolved Oxygen RDO Sensor Specifications

Accuracy	±0.1 mg/L from 0 to 8 mg/L ±2% of reading from 20 to 50 mg/L
Range	0 to 20 mg/L 20 to 60 mg/L
Resolution	0.01 mg/L
Sensor Type	Removable with replaceable RDO-X Cap
Response Time	RDO-X Cap: T63<15s, T90<45s, T95<60s Fast Cap: T63<3s, T90<30s, T95<45s
Units of Measure	mg/L, % saturation, ppm
Methodology	EPA-approved In-Situ Methods (under the Alternate Test Procedure process): 1002-8-2009, 1003-8-2009, 1004-8-2009

Level, Depth, Pressure Sensor Specifications

Accuracy	Typical ±0.1% full scale (FS)
Range	Non-vented or Vented 9.0 m (30 ft) - Burst: 27 m (90 ft) 30 m (100 ft) - Burst: 40 m (130 ft) 76 m (250 ft) - Burst: 107 m (350 ft) 200 m (650 ft) - Burst: 229 m (750 ft)
Resolution	±0.01% FS or better
Sensor Type	Fixed
Response Time	T63<1s, T90<1s, T95<1s

Units of Measure	Pressure: psi, kPa, bar, mbar, mmHg, inHg, cmH2O, inH2O Level: mm, cm, m, in, ft, cmH2O, inH2O
Methodology	Piezoresistive; ceramic

*Typical performance across full temperature and pressure calibrated range. Typical is defined as all values within 1 standard deviation.

ORP Sensor Specifications

Accuracy	±5.0 mV @ 25° C
Range	±1,400 mV
Resolution	0.1 mV
Sensor Type	Replaceable pH/ORP combo sensor
Response Time**	T63<3s, T90<15s, T95<30s
Units of Measure	mV
Methodology	Std. Methods 2580

*Accuracy from standard at 25° C.
**At thermal equilibrium immediately following calibration, measuring from air to +400 mV

pH Sensor Specifications

Accuracy	±0.1 pH units or better
Range	0 to 14 pH units
Resolution	0.01 pH unit
Sensor Type	Replaceable pH/ORP combo sensor
Response Time**	T63<1s, T90<2s, T95<3s
Units of Measure	pH units
Methodology	Std. Methods 4500-H+, EPA 150.2

*At thermal equilibrium.

Temperature Sensor Specifications

Accuracy	±0.1° C
Range	-5 to 50° C (23 to 122° F)
Resolution	0.01° C
Sensor Type	Replaceable
Response Time**	T63<2s, T90<15s, T95<30s

Units of Measure	° C, ° F
Methodology	EPA 170.1

Sensor only, when transferring from air to ambient water temperature. Typical system response time with all sensors and restrictor installed: T63<30s; T90<3.5m; T95,7.5m

Turbidity Sensor Specifications

Accuracy	±2% of reading or ±0.5 NTU or FNU, whichever is greater
Range	0 to 4,000 NTU
Resolution	0.01 NTU (0 to 1,000 NTU) 0.1 NTU (1,000 to 4,000 NTU)
Sensor Type	Replaceable
Response Time**	T63<1s, T90<1s, T95<1s
Units of Measure	NTU, FNU
Methodology	ISO 7027

Total Suspended Solids

TSS is derived from turbidity.

Range	0 to 1,500 mg/L
Resolution	0.1 mg/L
Units of Measure	ppt, mg/L

User-defined reference.

Ammonium Sensor Specifications

Accuracy	±10% or ± 2 mg/L, whichever is greater
Max Depth	25 m, 30 PSI
Range	0-10,000 mg/L as N
Resolution	0.01 mg/L
Sensor Type	Removable
Response Time*	T90 < 10sec, T95 < 30sec
Units of Measure	mg/L, ppm, mV
Methodology	Std. Methods 4500-NH_3D, EPA 350.3

*Between calibration points.

Ammonia (Unionized Ammonia and Total Ammonia)

Ammonia is derived from ammonium, pH and salinity. pH sensor and conductivity/temperature sensor required.

Range	0 to 10,000 mg/L
Resolution	0.01 mg/L
Units of Measure	mg/L, ppm

Chloride Sensor Specifications

Accuracy	±10% or ±2 mg/L, w.i.g.*
Range	0-190,000 mg/L - CL-
Resolution	0.01 mg/L
Sensor Type	Removable
Response Time*	T90 < 10sec, T95 < 30sec
Units of Measure	mg/L, ppm, mV
Methodology	Std. Methods 4500-Cl-D

* Between calibration points.

Nitrate Sensor Specifications

Accuracy	±10% or ±2 mg/L, w.i.g.*
Max Depth	25 m, 30 PSI
Range	0-50,000 mg/L as N
Resolution	0.01 mg/L
Sensor Type	Removable
Response Time*	T90 < 10sec, T95 < 30sec
Units of Measure	mg/L, ppm, mV
Methodology	Std. Methods 4500-NO3D

* Between calibration points.

Chlorophyll a Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of 0-1000 µg/L Chl a in MeOH
Max Depth	200 m

Range	0-100 RFU 0-1000 µg/L Chl a in MeoH
Resolution	.001 RFU .01 µg/L Chl a
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s
Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength (nominal)	430 nm
Detection Wavelength	675 nm to 750 nm

BGA-PC Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of PC standards from 0-1000 µg/L PC
Max Depth	200 m
Range	0-100 RFU 0-1000 µg/L PC
Resolution	.001 RFU .01 µg/L PC
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s
Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength (nominal)	590 nm
Detection Wavelength	640 nm to 690 nm

BGA-PE Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of PE standards from 0-1000 µg/L PE
Max Depth	200 m
Range	0-100 RFU 0-1000 µg/L PE
Resolution	.001 RFU .01 µg/L PE
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s

Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength	498 nm
Detection Wavelength	575 nm to 625 nm

Rhodamine WT Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of RWT (Rhodamine Water Tracer) standards from 0-1000 µg/L
Max Depth	200 m
Range	0-100 RFU 0-1000 µg/L
Resolution	.001 RFU .01 µg/
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s
Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength (nominal)	530 nm
Detection Wavelength	580 nm to 660 nm

Fluorescein WT Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of FWT (Fluorescein Water Tracer) standards from 0-500 µg/L
Max Depth	200 m
Range	0-100 RFU 0-500 µg/L
Resolution	.001 RFU .005 µg/L
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s
Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength (nominal)	462 nm
Detection Wavelength	525 nm to 570 nm

FDOM Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of Quinine Sulfate from 0-3000 µg/L
Max Depth	200 m
Range	0-100 RFU 0-3000 µg/L
Resolution	.001 RFU .03 µg/L
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s
Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength (nominal)	375 nm
Detection Wavelength	455 nm to 530 nm

Crude Oil Sensor Specifications

Linearity	R2 > 0.999 for serial dilutions of PTSA from 0-3000 µg/L
Max Depth	200 m
Range	0-100 RFU 0-3000 µg/L
Resolution	.001 RFU .03 µg/L
Sensor Type	Removable
Response Time*	T63<1s, T90<1s, T95<1s
Units of Measure	Concentration: µg/L Fluorescence: RFU
Excitation Wavelength (nominal)	365 nm
Detection Wavelength	430 nm to 505 nm

Warranty	2 year - Sonde, RDO and sensor cap, temperature/conductivity, temperature only, turbidity (excluding pH/ORP) 1 year - pH/ORP, chloride ISE, accessories 90 Days - Nitrate and Ammonium ISE sensors Other: see warranty policy (www.in-situ.com/warranty)
Notes	Specifications are subject to change without notice. Android is a trademark of Google, Inc. Bluetooth is a trademark of Bluetooth SIG, Inc. Delrin and Tefzel are trademarks of E.I. du Pont de Nemours & Co. Santoprene is a trademark of ExxonMobile. Inconel is a trademark of Special Metals Corporation. Viton is a registered trademark of DuPont Performance Elastomers L.L.C.