ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/AUV402-EN REV. C

UVITEC™ PROBE

BOD/COD



MEASUREMENT MADE EASY

Water quality monitoring solutions

Reliable measurement

- Multi-wavelength LED technology providing superior measurement performance.
- Factory calibrated for immediate deployment, with optional field adjustment.
- Multi-dimensional organic detection responds to immediate process changes, providing enhanced process insight and control.

Easy to operate

- Real-time, reagentless BOD/COD measurements in 10 seconds compared to 5 days with traditional lab testing.
- Submersible design installs directly in open channels or tanks, no sample extraction required.
- Liquid AI® data platform compatible with remote monitoring and calibration for critical applications.

Easy to maintain

- Long-life UV LED light source eliminates frequent lamp replacements and reduces consumable costs.
- Titanium (Grade 2) or stainless steel (SS 316) construction withstands harsh wastewater environments; sapphire optical windows resist scratching and fouling.
- Probe Clean System provides compressed air or pressurized water cleaning to maintain optical window clarity in high-solids applications.
- Continuous diagnostics provide early warning of maintenance needs before failures occur, minimizing unplanned downtime.

BOD and COD: Essential water quality parameters

Biochemical Oxygen Demand (BOD) measures the amount of dissolved oxygen consumed by microorganisms while breaking down biodegradable organic matter in water. BOD indicates what the biodegradable organic pollution is (sewerage, food waste, plant matter, etc.), how well the biological treatment process is working, and the oxygen depletion potential when discharged into the environment.

Chemical Oxygen Demand (COD) measures the total oxygen required to chemically oxidize all organic compounds. COD captures both biodegradable organics (sewage, food waste, what BOD measures) and non-biodegradable organics (industrial chemicals, plastics, pesticides). COD is always higher than BOD because it includes more types of pollution.

These parameters are critical for regulatory compliance (effluent discharge limits), environmental protection (preventing oxygen depletion in rivers and lakes that kills aquatic life), process control (optimizing aeration and chemical dosing), and operational cost management. High BOD/COD levels indicate organic pollution from sewage, industrial waste, or agricultural runoff, making continuous monitoring essential for municipal wastewater treatment plants, industrial facilities, and water reuse applications.

Traditional laboratory methods are slow, expensive, and prevent real-time control. Standard BOD_5 testing requires a 5-day incubation period with ±15 to 20 % measurement error due to biological variability, sample handling, and analyst technique. COD testing uses hazardous chemical digestion (strong acids and dichromate) that takes two to three hours with ±5 to 10 % error, generates toxic waste requiring disposal, and poses safety risks to operators. Both methods are labor-intensive, require frequent sampling, and deliver results too late for proactive process adjustments.

UviTec BOD/COD probe

ABB's UviTec BOD/COD system revolutionizes organic monitoring by delivering lab-quality results in 10 seconds instead of days. Using our unique multi-wavelength UV LED technology, the system provides continuous, reagent-free measurements with confidence and no hazardous chemicals or waste. Real-time data enables immediate process control, reducing chemical usage, and preventing permit violations through 24/7 compliance monitoring. The rugged submersible probe installs directly in process streams with minimal maintenance, eliminating daily lab testing, reducing operator workload, and transforming wastewater management from reactive to predictive and autonomous.

Controllers and accessories

Our innovative modular product platform ensures our clients gain the real-time water quality monitoring system that meets their specific demands and budget. With multiple controller and accessory options available such as automatic compressed air cleaning systems that lower maintenance while improving system performance, UviTec provides a total solution for all of your unique water quality needs.

Liquid AI Calibration Health

Liquid AI Calibration Health is an active monitoring service designed to ensure water quality systems produce reliable and accurate data. Unlike traditional global calibrations that lose effectiveness as water conditions change, through Calibration Health new contaminants and composition shifts that could impact calibration performance are incorporated into the calibration to continuously improve performance, maintaining confidence in results, even in complex environments. Available as a one-time or ongoing service, it transforms UviTec monitoring systems into intelligent solutions that become smarter the longer they operate, delivering the highest level of confidence and trust in water quality measurements.

Measurement principle

ABB's UviTec BOD/COD submersible probe utilizes advanced UV-VIS absorption spectroscopy to deliver real-time organic matter measurements in various water and wastewater applications. The probe employs a unique multi-wavelength LED technology that emits light across multiple UV/Vis wavelengths, which pass through the water sample along a defined optical path length. Organic compounds, absorb UV light while the transmitted light intensity is measured by photo-detectors.

The system applies the Lambert-Beer Law: $A = \varepsilon \times c \times l$, where:

- A = absorbance (Abs/cm)
- c = concentration of organic compounds
- ε = the molar absorptivity of the compounds
- l = the measuring path length, in mm

Multi-wavelength LED technology measures both the concentration and composition of organic matter, enabling detection of changes in water and wastewater characteristics that single-wavelength sensors cannot identify. This reagent-free optical approach delivers lab-quality BOD/COD results in just 10 seconds.

Areas of application

Municipal wastewater

Early warning systems | BOD/COD
Location: Primary effluent (post grit removal, primary effluent weir)
- Optimize coagulation dosing
- Detect slug events & industrial discharge

Effluent monitoring | BOD/COD
Location: Effluent weir, prior to discharge
- Ensure regulatory compliance
- Verify BOD/COD removal & process efficiency

Industrial wastewater

Dairy wastewater – Influent | BOD/COD
Location: Lift station, pre/post EQ tanks, pre-DAF
- Detect & prevent product loss
- CIP control & pre-DAF polymer dosing
- Surcharge management

Dairy wastewater – Effluent | BOD/COD
Location: Post-DAF, flume
- Feedback treatment optimization
- Surcharge management

Pulp & Paper wastewater

Pulp & Paper – Influent | BOD/COD
Location: Primary effluent weir
- Detect slug events (soap, liquor)
- Nutrient dosing & aeration control

Pulp & Paper – Effluent | COD
Location: Final effluent, post-secondary clarifier
- Non-reportable regulation compliance (BOD equivalent)

Specifications

Path length
0.5, 1, 2, 4, 10 mm

Parameters*
BODeq, CODeq, TSSest

Range
Dependent on model selected.
Refer to "Probe models and range" on page 6

Units
mg/L, ppm

Sampling time
10 seconds

Calibration
Factory calibrated. Field adjustment of calibration is possible.

Cleaning
Automatic compressed air or pressurized water cleaning with optional Probe Clean System

Self-diagnostics
Detection and diagnosis of internal system fault

Alarms
Continuous detection of leaks, lamp output, humidity, temperature and electrical fault

Humidity control
Humidity sensor with desiccant pack

Wavelengths
Multiple wavelengths

Light source
UV LED

Electrical
Power consumption (max.)
20 mA @ 24 volts

Process pressure rating
1.03 bar (15 psi)

Process operating temperature**
0 to 45 °C (32 to 113 °F)

Housing material
Titanium (Grade 2) or stainless steel (SS 316)

Wetted materials
Titanium housing
Titanium, epoxy, sapphire, SS 316, Viton™
Stainless steel housing
Epoxy, sapphire, SS 316, Viton

Weight***
Titanium
1.5 kg (3.31 lb)
Stainless steel
2.5 kg (5.25 lb)

Ingress protection type
IPX8

Dimensions (H × Ø)
381 × 51 mm (15 × 2 in)

Approvals
CE Mark

* Results can not typically be used for compliance, only as an indicator value of organic loading for process control support. BODeq is an equivalent measurement for BOD5. CODeq is an equivalent measurement for COD. TSSest is an estimate measurement for TSS.

** Operating (water) temperature absolute maximum 55 °C (131 °F). Instrument performance reduced when operating outside recommended operating range. Contact ABB to verify application.

*** Weight does not include cable. Cable weight: 0.70 kg (1.55 lb).

Probe models and range

Includes titanium (-X) or stainless steel (-S) BOD/COD probe and 10.6 m (35 ft) of communication cable. Controller, mounting kit and cleaning system sold separately.

Measurement ranges are estimations based on previous field data, and may vary based on plant-specific details. Full measurement range may be greater than the ranges stated in the table below, although accuracy may be significantly reduced outside these stated ranges.

Contact ABB for your application-specific demands.

MUNICIPAL WASTEWATER

Path length	BOD (mg/L)	COD (mg/L)	Max TSSest (mg/L)*
0.5 mm	0 to 6,000	0 to 14,000	0 to 40,000
1 mm	0 to 3,000	0 to 7,000	0 to 20,000
2 mm	0 to 1,500	0 to 3,500	0 to 10,000
4 mm	0 to 750	0 to 1,750	0 to 5,000
10 mm	0 to 300	0 to 700	0 to 2,000

DAIRY

Path length	BOD (mg/L)	COD (mg/L)	Max TSSest (mg/L)*
0.5 mm	0 to 20,000	0 to 50,000	0 to 40,000
1 mm	0 to 10,000	0 to 25,000	0 to 20,000
2 mm	0 to 5,000	0 to 12,500	0 to 10,000
4 mm	0 to 2,500	0 to 6,250	0 to 5,000
10 mm	0 to 1,000	0 to 2,500	0 to 2,000

PULP & PAPER

Path length	BOD (mg/L)	COD (mg/L)	Max TSSest (mg/L)*
0.5 mm	0 to 1,400	0 to 4,000	0 to 40,000
1 mm	0 to 700	0 to 2,000	0 to 20,000
2 mm	0 to 350	0 to 1,000	0 to 10,000
4 mm	0 to 175	0 to 500	0 to 5,000
10 mm	0 to 70	0 to 200	0 to 2,000

* Stated ranges are approximate, dependent on site and application. Contact ABB to confirm model selection.
TSS measurement range is approximate and dependent upon site-specific conditions. TSS levels exceeding what is published in these tables will decrease ranges for corresponding organics measurements. For a more accurate TSS output, a dedicated TSS or Turbidity sensor should be installed as part of the system.

Controllers

Controllers include proprietary inputs for UviTec sensors and accessories.

UVITEC CONTROLLERS

Part number	Name	Description
3KXA300301 V	UviTec Controller	Wall-mounted controller with 4-line × 20-character backlit LCD display. Includes Modbus RTU (RS485), 1 channel of 4 to 20 mA out and digital I/O module
3KXA300302 V	UviTec Controller Pro	Wall-mounted controller with 307 mm (12.1 in) color LCD touch panel PC interface (PC external on door model). Includes Modbus TCP

Accessories

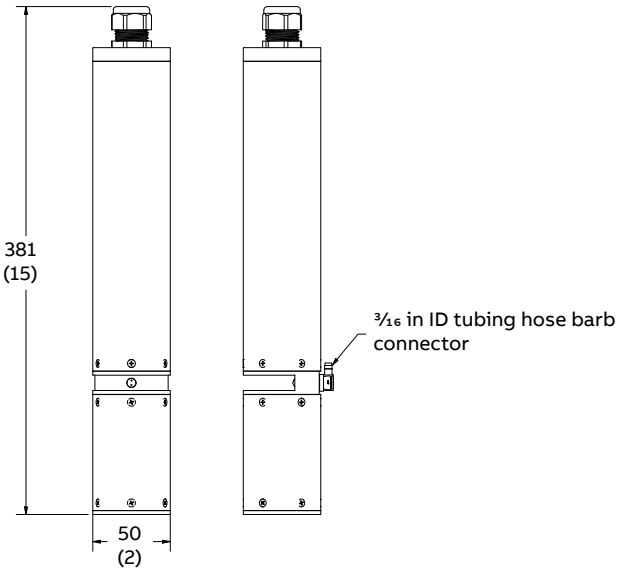
AUV402 PROBE ACCESSORIES

Part number	Name	Description
3KXA300000U0029	UviTec Probe Clean System	Cleaning valve module requires on-site compressed air or pressured water for automatic probe cleaning
3KXA300000U0030	UviTec Compressed Air System	Compressor for air cleaning when compressed air not available on-site
3KXA300000U0031	Probe mounting kit I	Probe mounting kit includes wall mount and two mounting brackets. No pole included.
3KXA300000U0032	Probe mounting kit II	Probe mounting kit includes wall mount and two mounting brackets. 1.5 m (5 ft) pole included.
3KXA300000U0033	Probe mounting kit III	Probe mounting kit includes wall mount and two mounting brackets. 3 m (10 ft) pole included.
3KXA300000U0034	Tri-clamp	Stainless steel clamp for mounting probe in line with process pipe.
3KXA300000U0035	Chain mount	Stainless steel chain for mounting probe in open channel

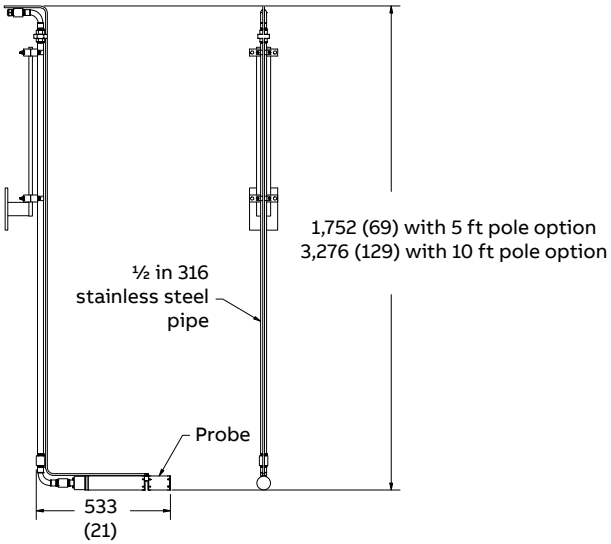
Dimensions

The probe is a submersible instrument installed directly in-situ using a pole mounting kit, chain mount, or tri-clamp. Dimensions shown in mm (in).

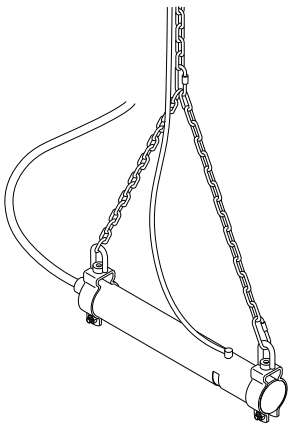
Probe dimensions



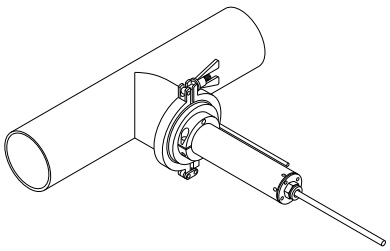
Probe mount options



01 Pole mount



02 Chain mount



03 Tri-clamp

Ordering information

UviTec BOD/COD Probe (ABB part number: 3KXA300402 V)	AUV402/	XX	XX	XXX	Options
Parameter					
BOD/COD		BA			
Probe material					
Stainless steel			S2		
Titanium			X2		
Path length					
0.5 mm				005	
1 mm				010	
2 mm				020	
4 mm				040	
10 mm				100	

Optional ordering codes
Add 1 or more of the following codes after the standard ordering information to select any additional options if required:

Cleaning system (multiple sel)	
Probe Clean System	PCS
Compressed Air System	PUC
Probe mounting	
Pole mount kit I – No pole included	MK1
Pole mount kit II – 5 ft pole included	MK2
Pole mount kit III – 10 ft pole included	MK3
Tri-clamp	MT1
Chain mount	MC1
Documentation language	
English	M5
German	M1
Italian	M2
Spanish	M3
French	M4
Liquid AI – Calibration service	
Calibration health – One time (standard)	LC2
Calibration health – One time (advanced)	LC3
Liquid AI – Annual subscriptions	
Remote monitoring dashboard - Annual	LD4

Trademarks

- Liquid Ai is a trademark of ABB Limited.
- Modbus is a registered trademark of Schneider Electric USA, Inc.
- UviTec is a trademark of ABB Limited.
- Viton is a trademark of The Chemours Company FC, LLC.

Additional information
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ABB Measurement & Analytics

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