

ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/AUV411-EN REV. C

UVITEC™ PROBE

UV254

ENGINEERED
TO OUTRUN



MEASUREMENT MADE EASY

Water quality monitoring solutions

Reliable measurement

- Dual-wavelength LED technology.
- Factory calibrated; 10-second sampling.

Easy to operate

- Real-time UV254 or inferred organics results in seconds.
- Submersible design, direct tank or open channel installation.

Easy to maintain

- Long-life UV LED, reduces replacements and costs.
- Titanium or SS 316 housing, with sapphire windows to withstand harsh environments.
- Continuous diagnostics alerts maintenance needs before failure.

Introduction to UV254 & UVT

UV254, or ultraviolet absorbance at 254 nanometers, measures the concentration of aromatic organic compounds in water, primarily humic and fulvic acids from natural organic matter. UVT (UV Transmittance) measures the percentage of UV light at 254 nm that passes through water, providing a complementary view of overall water clarity and quality.

UV-C light at 254 nm is the industry standard for germicidal disinfection because it effectively damages microbial DNA and RNA by forming thymine dimers that prevent replication. UV 254 nm is preferred over alternatives because it is non-thermal, non-toxic, leaves no chemical residue, and offers an optimal balance between effectiveness and cost-efficiency in the removal of bacteria, viruses, fungi, and spores.

When drinking water is disinfected with chlorine, it is important to monitor and understand the organic content of the source water. Dissolved organic carbon (DOC), for instance, can promote the formation of disinfection by-products (DBPs) such as trihalomethanes (THMs) and haloacetic acids (HAA5). UV254 can serve as a rapid surrogate measurement for DOC and can help predict the formation of potential DBPs.

UVT is essential for validating UV disinfection system effectiveness. Most systems require minimum 65 to 75 % UVT to ensure adequate pathogen inactivation and regulatory compliance.

For drinking water utilities, monitoring UV254 enables proactive optimization of coagulation and filtration processes to remove organic precursors before disinfection, while UVT monitoring ensures that treated water maintains the clarity needed for effective UV disinfection, preventing regulatory violations and protecting public health.

In wastewater reuse and industrial applications, UV254 provides real-time tracking of treatment efficiency and early detection of organic pollution events, while UVT validates that advanced treatment trains are producing water suitable for reuse or discharge. Unlike laboratory TOC analysis that can take hours or manual grab sampling for turbidity, both UV254 and UVT offer reagent-free optical measurement from a single sensor, making them essential tools for process control, compliance verification, and safeguarding water quality from source to tap.

UviTec UV254 probe

ABB's robust UV254 submersible probe provides affordable real-time measurement of organic matter in water or wastewater. The probe's rugged body is built to withstand harsh environments, with titanium or stainless steel options. Designed to meet the needs of many monitoring applications the AUV411 offers multiple path length selections for the desired measurement range.

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, ABB provides a total solution for all of your unique water quality needs.

Measurement principle

ABB's UviTec UV254 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 dual-wavelength LED, which pass through the water sample along a defined optical path length.

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

A = absorbance (Abs/cm)

c = concentration of organic compounds

ϵ = the molar absorptivity of the compounds

l = the measuring path length, in mm

The dual-wavelength LED technology measures the absorption at UV254, while also providing compensation for solids or interfering compounds at 850 nm. In addition to providing a UV254 result, the probe can also measure inferred organics, such as CODEquivalent (CODEq) or TOCeq.

Areas of application

Municipal Drinking Water UV254:

- Coagulation optimization & cost saving
- DBP control (as bias to problematic organics)
- Organic removal to prevent DBPs, TOC reduction in treated water
 - Typical monitoring point Pre-coagulation and/or Post coagulation

Specifications

Path length

0.5, 1, 2, 4, 10 mm

Parameter

UV254

Inferred parameters

BODeq, CODeq & TOCeq

Range

Depends on model selected.
Refer to Table 1 on page 5

Units

cm⁻¹, 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 UviTec 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

254 nm and 850 nm

Accuracy

+/- 1.0 % FS for UV254

Approvals

CE Mark

Light source

UV LED

Pressure rating

1.03 bar (15 psi)

Power consumption

20 mA @ 24 V (max.)

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 × 2.0 in)

Cable length

Integrated cable, 10 m (35 ft)

* 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) UV254 probe and 10 m (35 ft) of communication cable. Controller, mounting kit and cleaning system sold separately.

PROBE PATH LENGTHS AND RANGE

Path length	UV254 (cm ⁻¹)
0.5 mm	0 to 40
1 mm	0 to 20
2 mm	0 to 10
4 mm	0 to 5
10 mm	0 to 2

INFERRED ORGANICS VIA UV254, IN mg/L OR PPM

Path length	BODeq	CODeq	TOCeq	TSSest max.
0.5 mm	6 to 2,400	12 to 4,800	4 to 1,600	2,400
1 mm	3 to 1,200	6 to 2,400	2 to 800	1,200
2 mm	1.5 to 600	3 to 1,200	1 to 400	600
4 mm	0.75 to 300	1.5 to 600	0.5 to 200	300
10 mm	0.3 to 120	0.6 to 240	0.2 to 80	120

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

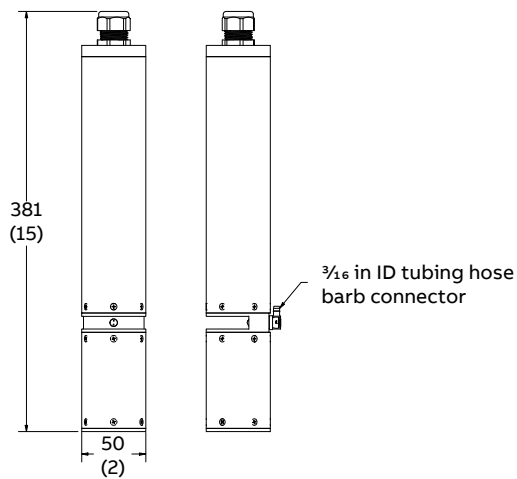
UVITEC ACCESSORIES

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

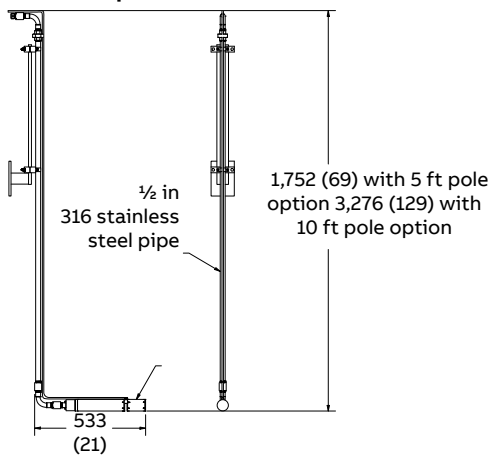


Figure 1 Pole mount

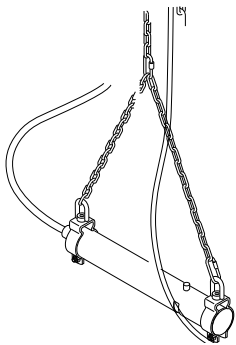


Figure 2 Chain mount

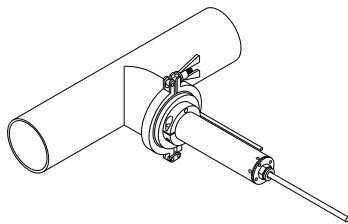


Figure 3 Tri-clamp

Ordering information

UviTec UV254 probe (ABB part number: 3KXA300411 V)		AUV411/	XX	XX	XXX	Options
Parameter						
UV254		MA				
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 (basic)	LC1
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Liquid AI – Annual subscriptions

Remote monitoring dashboard – Annual	LD4
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Trademarks

- Liquid AI is a registered 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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