

Opus

SPECTROMETER



Absorption spectrum analysis

OPUS is a high-end miniature spectrometer for online measurements of nitrogen and carbon compounds. By the analysis of a complete spectrum the sensor is able to provide reliable measurements of the concentrations of NO₃-N and NO₂-N as well as the organic parameters such as COD_{eq}, BOD_{eq}, DOC_{eq} and TOC_{eq}.

The spectral absorption analysis from 200 to 360 nm is refined by a calibration adapted to your application. 6 types of calibrations are proposed :

- Wastewater treatment plant inlet
- Wastewater treatment plant outlet
- Anammox process
- River water
- Sea water
- Drinking water

The instrument can be calibrated for the measurement of one parameter or several simultaneously.

Integration solutions

OPUS has the new G2 interface that allows quick access to sensor data and configurations using a web browser on computer, tablet and smartphone.

The probe can be installed directly in the field, even with highly contaminated water, or in measuring cell (panel and measuring station).

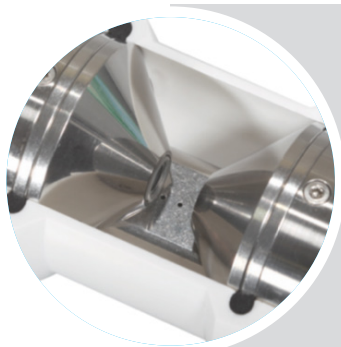
The sensor has many accessories to optimize its integration into the processes, automate its cleaning and facilitate the use of measurement data. Measurement campaigns and mobile apps are also available with the optional battery.

Applications

- Processing control of wastewater treatment
- Resource Water Monitoring
- Drinking water control
- Industrial applications

Advantages

- Accuracy and reliability by measurement of attenuation and full spectrum analysis of UV absorption 200 - 360 nm
- In situ and continuous measurements
- Optical windows with nano treatment against deposits
- Pre-installed application calibrations
- Automatic turbidity compensation

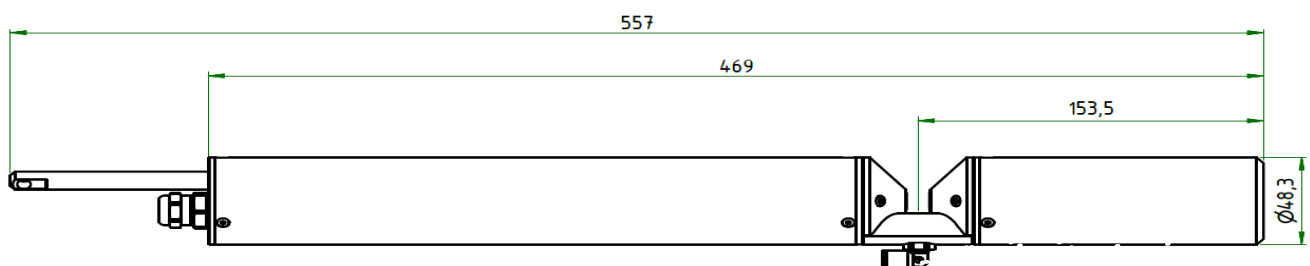


The xenon flash lamp emits a broad spectrum light directed into a beam of parallel wavelengths toward the optical path to pass through the sample. Compounds in water absorb light at specific wavelengths. The light received is then diffracted and measured by a 256 channel photodiode. The probe measures the attenuation of light to define the absorption spectrum of the medium from 200 to 360 nm.

On the basis of a large number of absorption spectra records related to the application, the sensor performs a combination between the absorption spectrum obtained and the nearest water profile to refine the concentration calculations (LSA calculation rules).

Technical specifications

Measurement technology	Light source	Xenon flash lamp
	Detector	High quality miniature spectrometer 256 channels 200 to 360 nm 0,8 nm/pixel
Principle of measurement		Attenuation measurement and absorption spectrom analysis
Optical path		0,3 mm, 1 mm, 2mm, 5 mm, 10 mm, 50 mm
Parameters		see list of parameters p.3
Measurement ranges		see list of parameters p.3
Measurement accuracy		see list of parameters p.3
Turbidity compensation		Automatic
Internal memory		2 GB
T100 response time		2 min
Measurement interval		> 1 min
Probe Body Materials		Stainless steel (1.4571 / 1.4404) or titanium (3.7035)
Dimensions (L x d)		470 mm x 45 mm (with optical path 10 mm)
Weight		3 kg stainless steel - 2 kg titanium
Interface	Digital	Ethernet (TCP/IP) RS-232 or RS-485 (Modbus RTU)
	Power Supply	12 ... 24 VCC (+/- 10%)
Consumption		< 8 W
Maintenance		<0.5 h / month (standard use)
Calibration interval		24 months
Warranty		24 months in the European Union
Maximum pressure	Connector SubConn	30 bars
	Connector fixe	3 bars
	FlowCell	1 bar, 2 ... 4 L / min
Protection		IP 68
Temperature of the medium / sample		+ 2 ... + 40 °C
Ambient temperature		+ 2 ... + 40 °C
Storage temperature		- 20 ... + 80 °C
Inflow velocity		0,1 ... 10 m/s



Measuring ranges

Single parameter under optimum laboratory conditions

Optical path (Mm)	Parameters	Principle of measurement	Unit.	Measurement range	Detection limit	Limit of determination	Min. resolution	Accuracy
1	NO ₃ -N	Spectral	mg/L	0...100	0,3	0,5	0,05	+/- (5%+0,1)
	NO ₂ -N	Spectral	mg/L	0...150	0,5	1,2	0,12	+/- (5%+0,1)
	COD _{eq}	Spectral	mg/L	0...2200*	30	100	10	
	BOD _{eq}	Spectral	mg/L	0...2200*	30	100	10	
	DOC _{eq}	Spectral	mg/L	0...1000	5	10	1	
	TOC _{eq}	Spectral	mg/L	0...1000	5	10	1	
	TSS _{eq}	Spectral	mg/L	0...1500	60	200	20	
	KHP	Spectral	mg/L	0...4000	5	10	1	+/- (5%+2)
	SAC ₂₅₄	1 single wavelenth	1/m	0...2200	15	50	0,5	
	COD-SAC _{eq}	1 single wavelenth	mg/L	0...3200	22	73	7,3	
	BOD-SAC _{eq}	1 single wavelenth	mg/L	0...1500	7,2	24	2,4	

10	NO ₃ -N	Spectral	mg/L	0...10	0,03	0,05	0,005	+/- (5%+0,01)
	NO ₂ -N	Spectral	mg/L	0...15	0,05	0,12	0,012	+/- (5%+0,01)
	COD _{eq}	Spectral	mg/L	0...220*	3	10	1	
	BOD _{eq}	Spectral	mg/L	0...220*	3	10	1	
	DOC _{eq}	Spectral	mg/L	0...100	0,5	1	0,1	
	TOC _{eq}	Spectral	mg/L	0...100	0,5	1	0,1	
	TSS _{eq}	Spectral	mg/L	0...150	6	20	2	
	KHP	Spectral	mg/L	0...400	0,5	1	0,1	+/- (5%+0,2)
	SAC ₂₅₄	1 single wavelenth	1/m	0...220	1,5	5	0,5	
	COD-SAC _{eq}	1 single wavelenth	mg/L	0...320	2,2	7,3	0,73	
	BOD-SAC _{eq}	1 single wavelenth	mg/L	0...150	0,72	2,4	0,24	

Parameter	Principle	Unit	Factor	Optical path (mm)						
				0,3	1	2	5	10	20	50
Absorbance	spectral	UA	-	0,01...2,2	0,01...2,2	0,01...2,2	0,01...2,2	0,01...2,2	0,01...2,2	0,01...2,2
Absorbance	spectral	1/m	-	50...7300	15...2200	7,5...1100	3...440	1,5...220	0,75...110	0,3...44
Nitrate N-NO ₃	spectral	mg/l	-	1,0...330	0,3...100	0,15...50	0,06...20	0,03...10	0,015...5	0,006...2
Nitrate NO ₃	spectral	mg/l	-	4,43...1460	1,33...440	0,67...220	0,27...88	0,13...44	0,067...22	0,030...9
Nitrite N-NO ₂	spectral	mg/l	-	1,7...500	0,5...150	0,25...75	0,1...30	0,05...15	0,025...7,5	0,01...3
Nitrite NO ₂	spectral	mg/l	-	5,6...1650	1,65...500	0,82...250	0,33...100	0,17...50	0,083...25	0,033...10
DOC _{eq}	spectral	mg/l	-	17...3300	5,0...1000	2,5...500	1,0...200	0,5...100	0,25...50	0,1...20
TOC _{eq}	spectral	mg/l	-	17...3300	5,0...1000	2,5...500	1,0...200	0,5...100	0,25...50	0,1...20
COD _{eq}	spectral	mg/l	-	100...7300*	30...2200*	15...1100*	6,0...440*	3,0...220*	1,5...110*	0,6...44*
BOD _{eq}	spectral	mg/l	-	100...7300*	30...2200*	15...1100*	6,0...440*	3,0...220*	1,5...110*	0,6...44*
KHP	spectral	mg/l	-	17...13300	5,0...4000	2,5...2000	1,0...800	0,5...400	0,25...200	0,1...80
SAC ₂₅₄	254nm	1/m	-	50...7300	15...2200	7,5...1100	3,0...440	1,5...220	0,75...110	0,3...44
COD-SAC _{eq}	Spec wavele.	mg/l	1,46	75...10600	22...3200	11...1600	4,4...640	2,2...320	1,1...160	0,44...64
BOD-SAC _{eq}	Spec wavele.	mg/l	0,48	24...3500	7,2...1050	3,6...525	1,44...210	0,72...105	0,36...52,5	0,15...21
TSS _{eq}	Spec wavele.	mg/l	2,6	130...4300	40...1300	20...650	8,0...260	4,0...130	2,0...65	0,8...26