

# OPUS

12SXXXXX0



OPUS is the new generation of spectral sensors for online measurement of nitrogen and carbon compounds. Through the analysis of a full spectrum, OPUS is able to deliver reliable readings for  $\text{NO}_3\text{-N}$ ,  $\text{NO}_2\text{-N}$ , organic ingredients ( $\text{COD}_{\text{eq}}$ ,  $\text{BOD}_{\text{eq}}$ ,  $\text{DOC}_{\text{eq}}$ ,  $\text{TOC}_{\text{eq}}$ ), and a number of other parameters.

OPUS features the new TriOS G2 interface, allowing fast and easy configuration of sensors by using a web browser.

## Benefits

- Without sampling and preparation of test samples
- Real-time sensor
- Without reagents
- Optical window with nano coating
- Pre-installed application calibration

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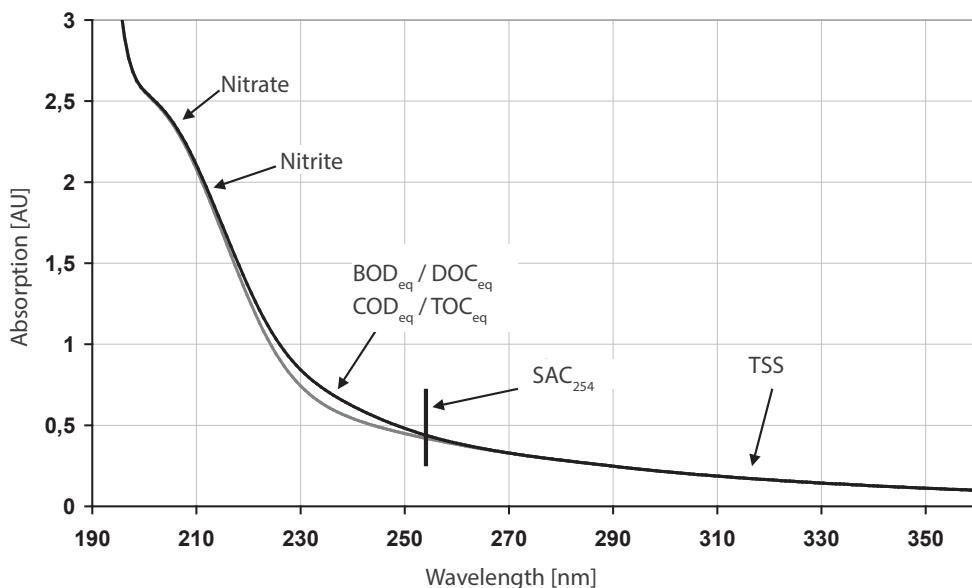
Integration into existing process control systems and external data loggers has never been easier.

With the optional battery pack, mobile applications are also feasible. WiFi connectivity allows laptops, tablets or smartphones to be easily used for control without any special application software or app installation.

## Applications

- Sewage treatment plants
- Environmental monitoring
- Drinking water monitoring
- Industrial applications

## Absorption spectrum with/without $\text{COD}_{\text{eq}}$



## Technical Specifications

|   |                  |   |  |
|---|------------------|---|--|
| <b>Measurement technology</b>           | light source     | Xenon flash lamp  |  |
|   | detector         | High-end miniature spectrometer                                   |  |
|   |                  | 256 Channels  |  |
|   |                  | 200 to 360 nm   |  |
| <b>Measurement principle</b>            |                  | 0.8 nm/pixel  |  |
| <b>Optical path</b>                     |                  | Attenuation, spectral analysis                                    |  |
| <b>Parameter</b>                        |                  | 0.3 mm, 1 mm, 2 mm, 5 mm, 10 mm, 50 mm                            |  |
| <b>Measuring range</b>                  |                  | See parameter list p. 10  |  |
| <b>Measurement accuracy</b>             |                  | See parameter list p. 10  |  |
| <b>Turbidity compensation</b>           |                  | See parameter list p. 10  |  |
| <b>Data logger</b>                      |                  | Yes   |  |
| <b>T100 response time</b>               |                  | ~ 2 GB  |  |
| <b>Measurement interval</b>             |                  | 2 min   |  |
| <b>Housing material</b>                 |                  | ≥ 1 min   |  |
| <b>Stainless steel</b>                  |                  | Stainless steel (1.4571/1.4404) or titanium (3.7035)              |  |
| <b>Dimensions (L x Ø)</b>               |                  | 470 mm x 48 mm (with 10 mm path) ~ 18.5" x 1.9" (with 10 mm path) |  |
| <b>Weight</b>                           | stainless steel  | ~ 3 kg (with 10 mm path) ~ 6.6 lbs (with 10 mm path)              |  |
|   | titanium         | ~ 2 kg (with 10 mm path) ~ 4.4 lbs (with 10 mm path)              |  |
| <b>Interface</b>                        | digital          | Ethernet (TCP/IP)   |  |
|   |                  | RS-232 or RS-485 (Modbus RTU)                                     |  |
| <b>Power consumption</b>                |                  | ≤ 8 W   |  |
| <b>Power supply</b>                     |                  | 12...24 VDC (± 10 %)  |  |
| <b>Maintenance effort</b>               |                  | ≤ 0.5 h/month (typical)   |  |
| <b>Calibration/maintenance interval</b> |                  | 24 months   |  |
| <b>System compatibility</b>             |                  | Modbus RTU  |  |
| <b>Warranty</b>                         |                  | 1 year (EU: 2 years) US: 2 years                                  |  |
| <b>INSTALLATION</b>                     |                  |   |  |
| <b>Max. pressure</b>                    | with SubConn     | 30 bar ~ 435 psig   |  |
|   | with fixed cable | 3 bar ~ 43.5 psig   |  |
|   | in FlowCell      | 1 bar, 2...4 L/min ~ 14.5 psig at 0.5 to 1.0 gpm                  |  |
| <b>Protection type</b>                  |                  | IP68 NEMA 6P  |  |
| <b>Sample temperature</b>               |                  | +2...+40 °C ~ +36 °F to +104 °F                                   |  |
| <b>Ambient temperature</b>              |                  | +2...+40 °C ~ +36 °F to +104 °F                                   |  |
| <b>Storage temperature</b>              |                  | -20...+80 °C ~ -4 °F to +176 °F                                   |  |
| <b>Inflow velocity</b>                  |                  | 0.1...10 m/s ~ 0.33 fps to 33 fps                                 |  |

# PHOTOMETERS // OPUS

Photometers

Fluorometers

Radiometers

Turbidity

eCHEM

Controller

Accessories

Systems

## Measuring Range

Single parameter under optimum laboratory conditions

| Path (mm) | Parameter                  | Measurement principle | Unit | Measuring range | Detection limit | Limit of determination | Precision | Accuracy*      |
|-----------|----------------------------|-----------------------|------|-----------------|-----------------|------------------------|-----------|----------------|
| 1         | Nitrate NO <sub>3</sub> -N | Spectral              | mg/L | 0...100         | 0.3             | 0.5                    | 0.05      | ± (5 % + 0.1)  |
|           | Nitrite NO <sub>2</sub> -N | Spectral              | mg/L | 0...150         | 0.5             | 1.2                    | 0.12      | ± (5 % + 0.1)  |
|           | CODEq                      | Spectral              | mg/L | 0...2200***     | 30              | 100                    | 10        |                |
|           | BODEq                      | Spectral              | mg/L | 0...2200***     | 30              | 100                    | 10        |                |
|           | DOCeQ                      | Spectral              | mg/L | 0...1000        | 5               | 10                     | 1         |                |
|           | TOCeq                      | Spectral              | mg/L | 0...1000        | 5               | 10                     | 1         |                |
|           | TSSeq                      | Spectral              | mg/L | 0...1500        | 60              | 200                    | 20        |                |
|           | KHP                        | Spectral              | mg/L | 0...4000        | 5               | 10                     | 1         | ± (5 % + 2)    |
|           | SAC <sub>254</sub>         | Single wavelength     | 1/m  | 0...2200        | 15              | 50                     | 5         |                |
|           | COD-SACeq**                | Single wavelength     | mg/L | 0...3200        | 22              | 73                     | 7.3       |                |
| 10        | BOD-SACeq**                | Single wavelength     | mg/L | 0...1050        | 7.2             | 24                     | 2.4       |                |
|           | Nitrate NO <sub>3</sub> -N | Spectral              | mg/L | 0...10          | 0.03            | 0.05                   | 0.005     | ± (5 % + 0.01) |
|           | Nitrite NO <sub>2</sub> -N | Spectral              | mg/L | 0...15          | 0.05            | 0.12                   | 0.012     | ± (5 % + 0.01) |
|           | CODEq                      | Spectral              | mg/L | 0...220***      | 3               | 10                     | 1         |                |
|           | BODEq                      | Spectral              | mg/L | 0...220***      | 3               | 10                     | 1         |                |
|           | DOCeQ                      | Spectral              | mg/L | 0...100         | 0.5             | 1                      | 0.1       |                |
|           | TOCeq                      | Spectral              | mg/L | 0...100         | 0.5             | 1                      | 0.1       |                |
|           | TSSeq                      | Spectral              | mg/L | 0...150         | 6               | 20                     | 2         |                |
|           | KHP                        | Spectral              | mg/L | 0...400         | 0.5             | 1                      | 0.1       | ± (5 % + 0.2)  |
|           | SAC <sub>254</sub>         | Single wavelength     | 1/m  | 0...220         | 1.5             | 5                      | 0.5       |                |
|           | COD-SACeq**                | Single wavelength     | mg/L | 0...320         | 2.2             | 7.3                    | 0.73      |                |
|           | BOD-SACeq**                | Single wavelength     | mg/L | 0...105         | 0.72            | 2.4                    | 0.24      |                |

\* Based on a standard calibration solution

\*\* Based on KHP (100 mg/L COD standard solution correspond to 85 mg/L KHP)

\*\*\* Depending on composition of COD and BOD (checksum parameter)

1 mg/L NO<sub>3</sub>-N correspond to 4.43 mg/L NO<sub>3</sub>

1 mg/L NO<sub>2</sub>-N correspond to 3.28 mg/L NO<sub>2</sub>



## OPUS G2 Interface

The easiest and fastest way of sensor integration and configuration in any process control system or data logger via web browser:

**MEASUREMENT**

**CURRENT MEASUREMENT**

- N-NO<sub>2</sub> [mg/l]: 757
- T85eO [mg/l]: 356
- System1 [a.u.]: 25.25
- CODeq [mg/l]: 757
- BODeq [mg/l]: 27.8437
- HA [mg/l]: 25.25
- F Error [1]: 255
- Integration Time [ms]: 255
- Cal Factor [1]: 757
- Flash Count [1]: 1
- Lamp Reference 1 [1]: 757
- Lamp Reference 2 [1]: 356
- Temperature Lamp [°C]: 27.8437
- Temperature Spectrometer [°C]: 25.25

**Spectrum**

**Comment:**

**MEASUREMENT SETTINGS**

- Automatic:  On  off
- Default Measurement: Absorption
- Run LSA:  Yes  No
- Interval [s]: 30
- Flash Count [1]: 1
- Flash Frequency: 177
- Averaging [1]: 1

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**CALIBRATION**

**WATERBASE**

**Spectrum**

**PATH SETTINGS**

Path Length [mm]: 10

**PERIPHERALS**

**DIGITAL I/O**

- Transceiver: RS-232
- Protocol: Modbus RTU
- Baudrate: 9600
- Flow Control: None
- Parity: None
- Stop Bits: One

**PROTOCOL SETTINGS**

Address: 1

Let OPUS automatically monitor your processes and react to unexpected events or incidents with the optional "policing" feature of OPUS.



For more information, please visit: [www.labunlimited.com/OPUS](http://www.labunlimited.com/OPUS)