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A success story

When TriOS Mess- und Datentechnik GmbH was first founded in 1998, it would have been hard to anticipate its future development. The R&D project funded by the BMBF (German Federal Ministry for Education and Research) under the name RAMSES laid the groundwork for a success story in optical measurement technology during the founding phase of TriOS GmbH. RAMSES was the first multispectral radiometer for light measurements available on the market for use in marine research.

With over a thousand devices deployed worldwide – the clear No. 1 in the world – the product name RAMSES is a synonym for compact, robust and reliable light measurements. The devices are routinely used to measure the light distribution in the water column as well as for the validation and calibration of modern environmental satellite data

(such as MERIS). The sensors have proven their reliability in many adverse environmental conditions, such as in the Antarctic, but also in unusual locations such as ocean racing yachts in the Volvo Ocean Race. Many holiday-makers in Norway are accompanied by the instrument – albeit unknowingly – on their journeys along the fjords on board cruise ships of the Hurtigruten line.

Today, the one-man company founded by Rüdiger Heuermann as a former university spin-off has become world leader in the field of optical immersion sensors. The TriOS product range rapidly expanded, and the original RAMSES radiometers were followed by submersible fluorometers (microFlu and enviroFlu) and Photometers (ProPS, VIPER, OSCAR). The business of TriOS Mess- und Datentechnik GmbH thus expanded far beyond the field of marine



technology to include water quality applications such as drinking water and wastewater monitoring as well as many industrial applications. But that's not all: TriOS is one of the leading companies in the field of oil-in-water monitoring and thus makes a significant contribution to the reduction of pollution from oil spills.

The company's needs for production facilities and qualified staff increased in line with the growth of its product range and the number of units produced. In July 2011, TriOS therefore moved into the newly built headquarters in Rastede, Germany. Here, the foundations were laid for a significant increase in the vertical range of manufacture through own CNC machining, modern PCB assembly and device manufacturing, thus integrating all quality-relevant processes in-house. Nearly all TriOS products therefore proudly bear the label of quality "Made in Germany". TriOS has continued its innovation drive. One of the latest TriOS sensors on the market is NICO – a UV Photometer for a precise

determination of nitrate in real time, also configurable via TriOS G2 interface.

What's more, new sensors for environmentally relevant parameters are being developed in several research projects in cooperation with universities and research institutions. Many of our customers are also partners in the development of new products.

At this point I would like to express my special thanks, also on behalf of all TriOS employees, to these partners without which TriOS could not exist as it does today.

Rüdiger Heuermann
Managing Director

TriOS G2 interface

The rapid change in the way we communicate and interact with technology is obvious to everyone, not only since the ubiquitous spread of smartphones. These developments are increasingly also exerting an influence on measurement technology. To meet these requirements, TriOS developed

the new, innovative G2 interface concept which, in addition to very flexible connections to process control systems, allows intuitive configuration and operation via operating system-independent web browser and data acquisition systems.



All G2 sensors are equipped with an internal memory that allows storing all data and events. The easiest way to establish a connection to the G2 sensors is the use of the G2 interface box (with or without WiFi module). The box is used for the connection, as well as the power supply and is universally suitable for all TriOS G2 sensors.

Three steps to the TriOS G2 interface

1. Connect



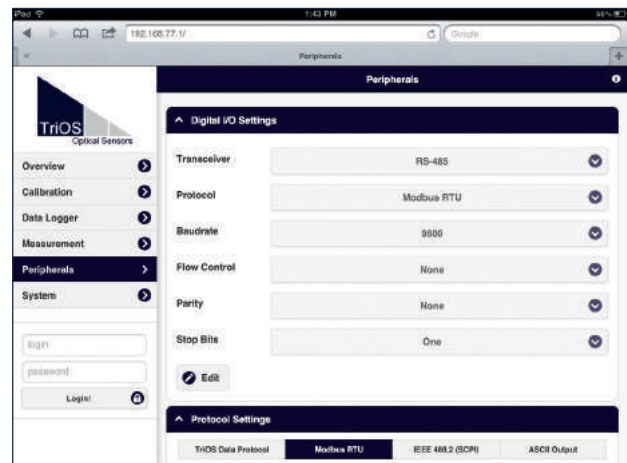
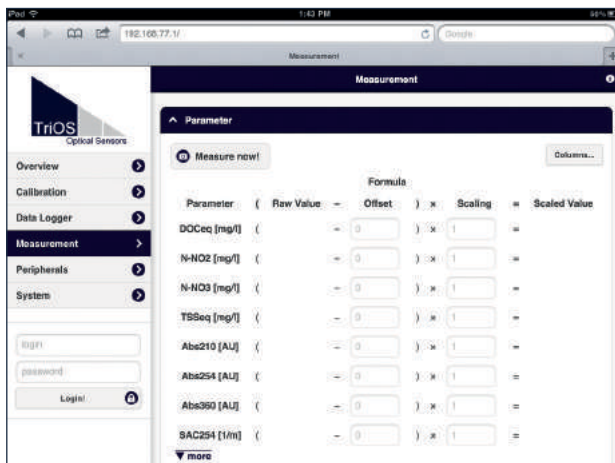
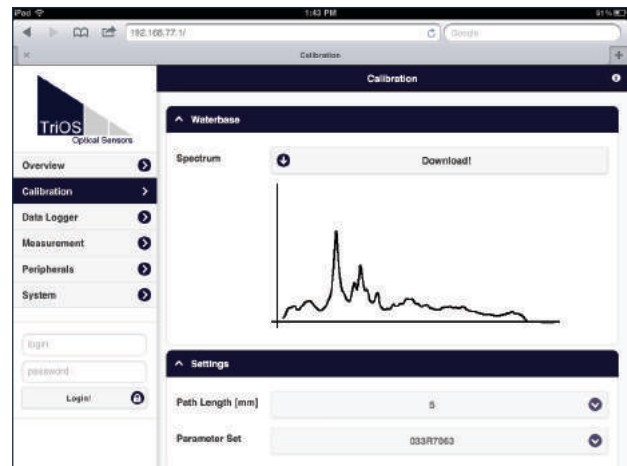
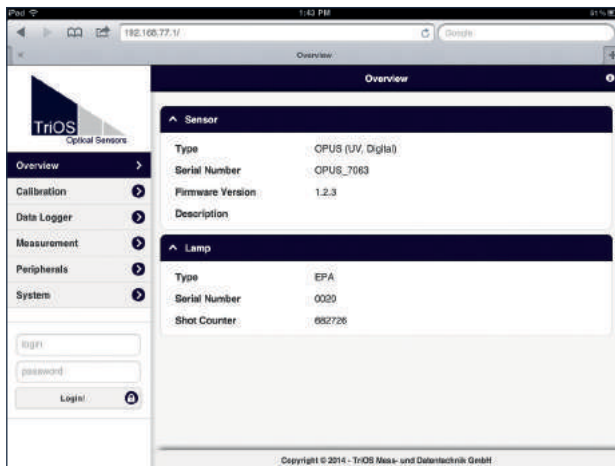
2. Open browser



3. Enter URL

<http://192.168.77.1/> or http://OPUS_7063

Done!





PHOTOMETERS

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 (CODeq, BODeq, DOCeq, TOCeq), 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.

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.

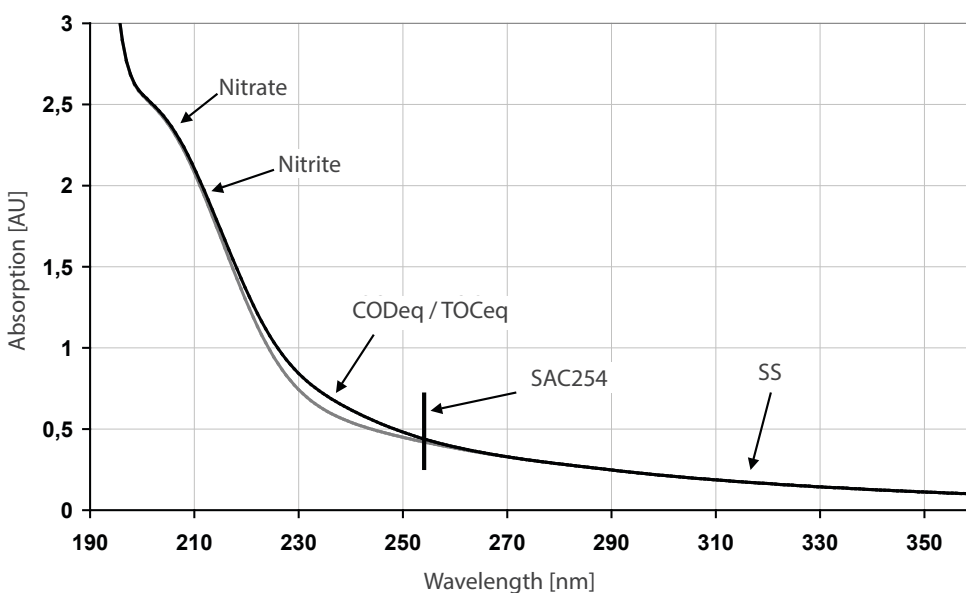
Benefits

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

Applications

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

Absorption spectrum with/without CODeq



Technical Specifications

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

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 ₃ -N | Spectral | mg/L | 0...100 | 0.3 | 0.5 | 0.05 | ± (5 % + 0.1) |
| | Nitrite NO ₂ -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 | |
| | DOCe _q | Spectral | mg/L | 0...1000 | 5 | 10 | 1 | |
| | TOCe _q | 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 ₂₅₄ | Single wavelength | 1/m | 0...2200 | 15 | 50 | 5 | |
| | COD-SACeq** | Single wavelength | mg/L | 0...3200 | 22 | 73 | 7.3 | |
| | BOD-SACeq** | Single wavelength | mg/L | 0...1050 | 7.2 | 24 | 2.4 | |
| 10 | Nitrate NO ₃ -N | Spectral | mg/L | 0...10 | 0.03 | 0.05 | 0.005 | ± (5 % + 0.01) |
| | Nitrite NO ₂ -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 | |
| | DOCe _q | Spectral | mg/L | 0...100 | 0.5 | 1 | 0.1 | |
| | TOCe _q | 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 ₂₅₄ | 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 COD standard solution correspond to 85 mg/L KHP)

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

1 mg/L NO₃-N correspond to 4.43 mg/L NO₃

1 mg/L NO₂-N correspond to 3.29 mg/L NO₂



OPUS G2 Interface

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

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



NICO

15SXXXXXX



TriOS's new low-cost nitrate meter

Based on the device platform concept of TriOS sensors like OPUS, LISA and VIPER, TriOS introduces NICO: a UV photometer for the determination of nitrate. The four detection channels enable a precise optical determination of nitrate by absorption, taking into account turbidity and organic substances that pose a problem for many products currently on the market.

An internal temperature correction additionally increases stability of the measured values.

Equipped with our G2 interface with web browser configuration, internal data logger, flexible protocols and data outputs, NICO includes features that are much more advanced than those of comparable devices available on the market.

The unified platform of all TriOS photometers also facilitates a standardized spare parts and consumables system. The cutting-edge G2 interface not only enables quick integration into third-party systems, but also the use of a wide range of accessories for our devices.

Benefits

- Proven UV-absorption method
- Without sampling and preparation of test samples
- Real-time sensor
- Without reagents
- Optical window with nano coating

Applications

- Sewage treatment plants
- Environmental monitoring
- Drinking water monitoring

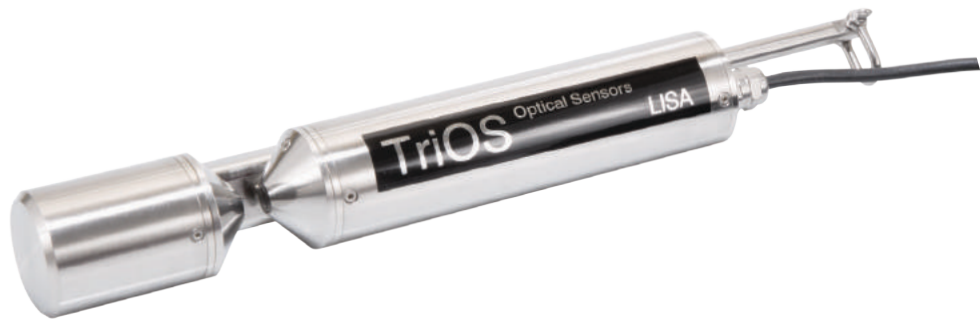


Technical Specifications

| | | |
|---|------------------|--|
| Measurement technology | light source | Xenon flash lamp |
| | detector | 4 photo diodes + filter |
| Measurement principle | | Attenuation |
| Optical path | | 0.3 mm, 1 mm, 2 mm, 5 mm, 10 mm, 50 mm |
| Parameter | | NO ₃ -N |
| Measuring range | | 0...100 mg/L |
| Measurement accuracy | | ± (5 % + 0.1) |
| Turbidity compensation | | Yes |
| Data logger | | ~ 2 GB |
| T100 response time | | 2 min |
| Measurement interval | | ≥ 1 min |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | ~ 470 mm x 48 mm (10 mm path) |
| Weight | stainless steel | ~ 3 kg |
| | titanium | ~ 2 kg |
| Interface | digital | Ethernet (TCP/IP) |
| | | RS-232 or RS-485 (Modbus RTU) |
| | analog | Ethernet (TCP/IP) |
| | | 4...20 mA |
| Power consumption | | ≤ 8 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU Analog Out (4...20 mA) |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...10 m/s |

LISA UV

14SXXXXX0



LISA – The state of the art SAC₂₅₄ sensor by TriOS

Long-lasting and energy-efficient UV-LED technology and a robust design are the core features of LISA UV. Like all TriOS sensors LISA uses the unique nanocoated windows combined with compressed air flushing to achieve long operating times without cleaning.

The TriOS G2 interface allows quick and easy integration of the sensor into existing process control systems or external data loggers. In addition to the integrated network interface, LISA UV is available with digital or analog output. The sensor

can easily be configured through any standard web browser on a PC, tablet or Smartphone.

The optical path length can be adapted to the application at any time by various lens sockets. An automatic turbidity compensation is carried out by a second measuring channel.

Through application-specific correlation LISA UV can be configured for direct output of BODeq, CODeq, TOCeq. A direct output of UVT₂₅₄ is also possible.

LISA – Cutting-edge measurement technology at low investment and operating costs.

Benefits

- Without sampling and preparation of test samples
- Real-time sensor
- Without reagents
- Optical window with nano coating
- UV-LED technology

Applications

- Sewage treatment plants
- Environmental monitoring
- Drinking water
- Monitoring of UV-disinfection systems

| Path (mm) | Parameter | Unit | Measurng Range* | Detection Limit | Determination limit* | Precision* |
|-----------|-----------|------|-----------------|-----------------|----------------------|------------|
| 1 | SAC254nm | 1/m | 5...1500 | 5 | 15 | 2.5 |
| | CODeq** | mg/L | 8...2200 | 8 | 22 | 4.0 |
| | BODeq** | mg/L | 2.5...700 | 2.5 | 7 | 1.3 |
| | TOCeq** | mg/L | 3...880 | 3 | 9 | 1.5 |
| | UVT | % | 3...98.8 | 98.8 | 96.6 | 0.6 |
| 10 | SAC254nm | 1/m | 0.5...150 | 0.5 | 1.5 | 0.25 |
| | CODeq** | mg/L | 0.8...220 | 0.8 | 2.2 | 0.4 |
| | BODeq** | mg/L | 0.25...70 | 0.25 | 0.7 | 0.13 |
| | TOCeq** | mg/L | 0.3...90 | 0.3 | 0.9 | 0.15 |
| | UVT | % | 3...98.8 | 98.8 | 96.6 | 0.6 |

* under laboratory conditions

** based on KHP (Note: 100 mg COD-standard-solution corresponds to 85 mg/l KHP)

Technical Specifications

| | | |
|---|------------------|---|
| Measurement technology | light source | 2 LED (254 nm, 530 nm) |
| | detector | Photo diode |
| Measurement principle | | Attenuation, transmission |
| Optical path | | 1 mm, 2 mm, 5 mm, 10 mm, 50 mm |
| Parameter | | SAC _{254'} , CODeq, BODeq, TOCeq, UVT, Turb530 |
| Measuring range | | See parameter list p. 14 |
| Measurement accuracy | | 0.2 % |
| Turbidity compensation | | at 530 nm |
| Data logger | | ~ 2 MB |
| T100 response time | | 4 s |
| Measurement interval | | ≥ 2 s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 300 mm x 48 mm (with 10 mm path) |
| Weight | stainless steel | ~ 2.3 kg (with 10 mm path) |
| | titanium | ~ 2.1 kg (with 10 mm path) |
| Interface | digital | Ethernet (TCP/IP) RS-232 or RS-485 (Modbus RTU) |
| | analog | Ethernet (TCP/IP) 4...20 mA |
| Power consumption | | ≤ 1 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU or: Analog Out (4...20 mA) |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...10 m/s |

VIPER G2

17SXXXXX0



VIPER measures hyperspectral attenuation and transmission coefficients in the wavelength range of 360 nm and 750 nm, enabling detailed determination of multiple parameters at the same time. The light source is provided by 5 selected, energy-saving LEDs that guarantee a long service life and stable measurement data. VIPER can be used in different media as it is available in multiple path lengths, both in stainless steel or titanium housing.

Benefits

- Without sampling and preparation of test samples
- Real time sensor
- Without reagents
- Optical window with nano coating
- LED technology

Typical applications for VIPER are water quality monitoring, color measurements of aqueous solutions or quality monitoring of drinking water. Like all TriOS sensors, VIPER is equipped with a nano-coated optical window that protects from fouling. Additional parameters can be installed by means of software if necessary at a later time.

Applications

- Drinking water monitoring
- Environmental monitoring
- Colorimetry
- Quality assurance
- Petrochemical industry
- Industrial applications
- Food industry



Technical Specifications

| | | |
|---|------------------|--|
| Measurement technology | light source | 5 LED |
| | detector | High-end miniature spectrometer, 256 channels 360 to 750 nm, 2.2 nm/pixel |
| Measurement principle | | Attenuation |
| Optical path | | 10 mm, 50 mm, 100 mm, 150 mm, 250 mm |
| Parameter | | SAC ₄₃₆ Pt-Co color scale (APHA/Hazen) (390 nm, 455 nm) Colouring based on DIN EN ISO 7887-C (410 nm, 436 nm, 525 nm, 620 nm) Cr-Co color scale (380 nm, 413 nm) |
| Measuring range | | 0.01...2.5 AU (absorption units) |
| Measurement accuracy | | < 0.2 % |
| Turbidity compensation | | Yes |
| Data logger | | ~ 2 GB |
| T100 response time | | 2 min |
| Measurement interval | | ≥ 1 min |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 495 mm x 48 mm (with 50 mm path) |
| Weight | stainless steel | ~ 2.4 kg (with 50 mm path) |
| | titanium | ~ 1.3 kg (with 50 mm path) |
| Interface | digital | Ethernet (TCP/IP) |
| | | RS-232 or RS-485 (Modbus RTU) |
| Power consumption | | ≤ 3 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...10 m/s |

Color measurement

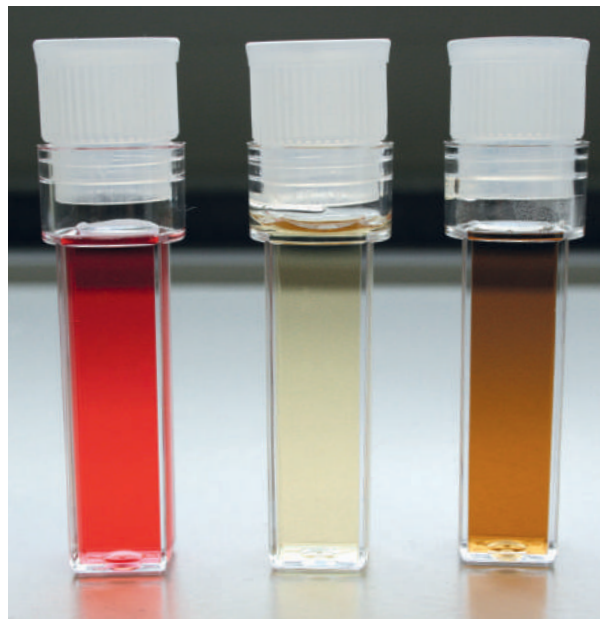
VIPER is an in-situ VIS photometer to determine the color of liquids. In addition to the hyperspectral recording of spectra (2.2 nm/pixel), various color indexes can be determined. This enables standardized, safe and objective measurements. Time-consuming and expensive sampling is eliminated through in-situ measurements. Additionally variations over a whole day can be recorded.

SAC_{436} (DIN EN ISO 7887-3 (2011))

Spectral absorption coefficients at 436 nm are designated SAC_{436} . It represents the light attenuation of an aqueous sample with a layer thickness of 1 m and a wavelength of 436 nm. The yellow to brown color ranges that occur in colored water have the highest light attenuation at 436 nm, which is why for example the coloring is determined according to drinking water regulations at this wavelength.

VIPER compensates any turbidity when determining the SAC_{436} .

Depending on the customer's request, SACs in the entire wavelength range (such as SAC_{525} , SAC_{620}) can be determined, or individual opacity adjustments can be made.

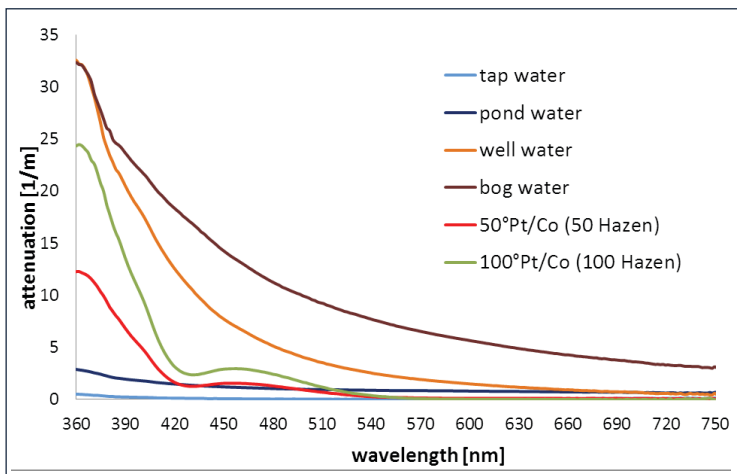
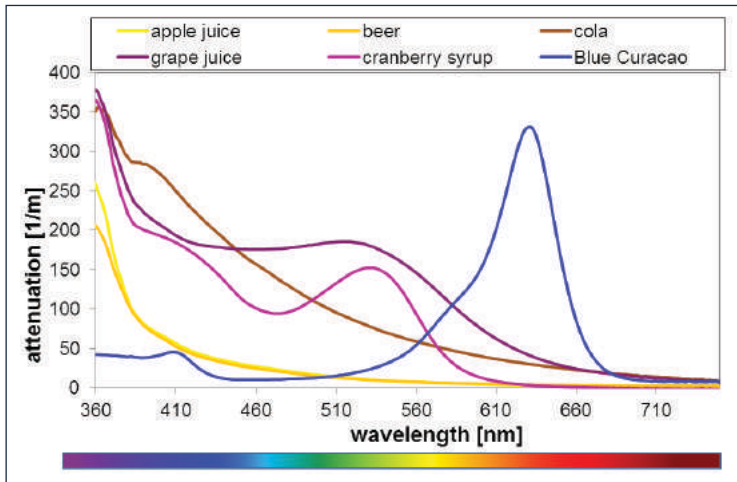


Pt-Co color scale (Hazen/APHA)

(DIN EN ISO 6271 (2005))

The Pt-Co scale number records the range from colorless (<1) to light yellow-orange (500). The color number is defined via a standard solution of hexachloroplatinate in acidic salt water and specified in mg/L Pt.

The Pt-Co color number is calculated from the turbidity-corrected attenuation at 455 nm or 390 nm.



Coloring

VIPER enables hyperspectral measurements of color of all liquids.

This also allows the differentiation of colors that are perceived similarly, but consist of different color mixes.

The diagram on the left shows examples from the beverage industry.

VIPER: Attenuation spectrum

Subsequent calculation of color numbers is also possible thanks to the storage of spectra. Several color numbers can be simultaneously calculated from a spectrum. In addition to the mentioned color numbers, the device can determine the Cr-Co color number (Russian grade) in accordance with GOST 3351-74, which is interesting for the Russian market. Please contact us for any special applications. We will be happy to help.



LISA color

5XSXXXXX0



Colorimetry – LISA enables reliable low-cost color measurements. LISA color uses two different LEDs for long-term stable measurements of SAC or colors at different wavelengths. The second channel is used for turbidity/background correction. The cutting-edge device platform, used in all other TriOS photometers, enables optical path lengths of 50, 100, 150 and 250 mm, so that almost any application can be easily implemented.

LISA color also enables applications in aggressive media (e.g. high chloride concentrations) thanks to the optional titanium housing.

Benefits

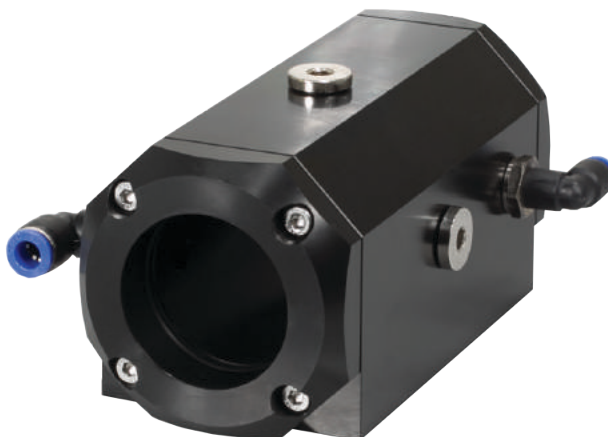
- Low investment
- Low maintenance (nano coating, air blast cleaning)
- Simple integrations into third-party systems
- Robust housing

Equipped with our G2 interface with web browser configuration, internal data logger, flexible protocols and data outputs, LISA color includes features that are much more advanced than those of comparable devices currently available on the market.

The cutting-edge G2 interface not only enables quick integration into third-party systems, but also the use of a wide range of accessories for our devices.

Applications

- Environmental monitoring
- Drinking water monitoring
- Industrial applications

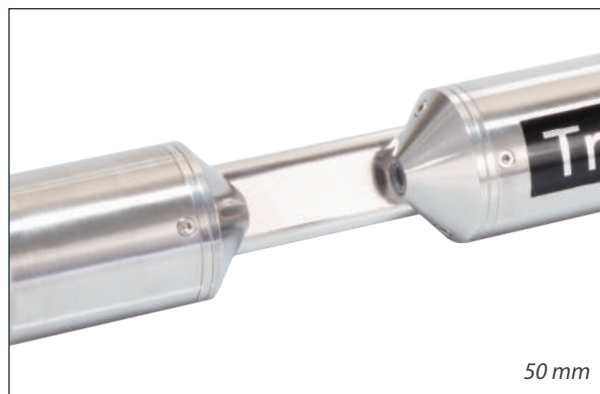


Technical Specifications

| | | |
|---|------------------|---|
| Measurement technology | light source | 2 LEDs |
| | detector | Photo diode |
| Measurement principle | | Attenuation, transmission |
| Optical path | | 50 mm, 100 mm, 150 mm, 250 mm |
| Parameter | | SAC ₄₃₆ |
| | | Colouring (based on DIN EN ISO 7887 (410 nm, 436 nm, 525 nm, 620 nm)) |
| | | Pt-Co color number (APHA/Hazen) (390 nm or 455 nm) |
| | | Cr-Co color number (390 nm or 413 nm) |
| Measuring range | | see parameter list (p. 22) |
| Measurement accuracy | | 0.5 % |
| Turbidity compensation | | Yes, 740 nm |
| Data logger | | ~ 2 MB |
| T100 response time | | 4 s |
| Measurement interval | | ≥ 2s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 340 mm x 48 mm (with 50 mm path) |
| Weight | stainless steel | ~ 2.4 kg (with 50 mm path) |
| | titanium | ~ 1.3 kg (with 50 mm path) |
| Interface | digital | Ethernet (TCP/IP) |
| | | RS-232 or RS-485 (Modbus RTU) |
| | analog | Ethernet (TCP/IP) |
| | | 4...20 mA |
| Power consumption | | ≤ 1 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU Analog Out (4...20 mA) |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...0 m/s |

Measuring range

| Parameter variations | According to the standard | Unit | Measuring range | |
|----------------------|----------------------------------|-----------------|-----------------|-----------|
| | | | 10 mm | 50 mm |
| SAC 436 nm | DIN EN ISO 7887:2012-04_method B | 1/m | 0.5...150 | 0.1...30 |
| SAC 525 nm | DIN EN ISO 7887:2012-04_method B | 1/m | 0.5...150 | 0.1...30 |
| SAC 620 nm | DIN EN ISO 7887:2012-04_method B | 1/m | 0.5...150 | 0.1...30 |
| True Color 410 nm | DIN EN ISO 7887:2012-04_method C | mg/L Pt | 10...2800 | 2...560 |
| Hazen 390 nm | DIN EN ISO 6271-2:2005-03 | mg/L Pt | 4...1100 | 0.8...220 |
| Hazen 455 nm | DIN EN ISO 6271-2:2005-03 | mg/L Pt | 20...5500 | 4...1100 |
| Cr-Co 380 nm | None | ° (color grade) | 5...1500 | 1...300 |
| Cr-Co 413 nm | GOST 3351:1974 | ° (color grade) | 20...5500 | 4...1100 |







FLUOROMETERS

enviroFlu

30SXXXXX0



PAH, oil-in-water using UV fluorescence

enviroFlu-HC is the new generation of immersion sensors for measurement of oil-in-water. The used measuring principle of UV fluorescence is much more sensitive than the conventionally used infrared scattering or absorption method. This allows to determine even the slightest traces of PAH's, for example in drinking water and cooling water condensates.

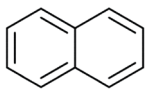
Benefits

- Without sampling and preparation of test samples
- Real time sensor
- Without reagents
- High sensitivity and selectivity
- Optical window with nano coating

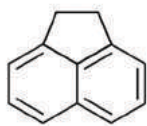
Application areas include the petrochemical industry, leakage detection in cooling and wastewater streams as well as environmental monitoring. The devices enable both stationary use in shafts, flows or piping, and mobile use through an optional hand-held measuring instrument. An innovative coating reduces fouling of the optical measuring window and minimizes the maintenance.

Applications

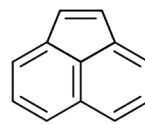
- Drinking water
- Wastewater
- Airports
- Cooling water
- Desalination plants
- Refineries
- Pipeline monitoring
- Bilge water monitoring
- Exhaust gas cleaning with approval for ship use according to IMO regulation MEPC.184(59)



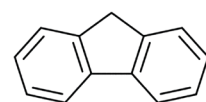
1. Naphthalene



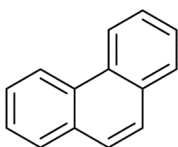
2. Acenaphthene



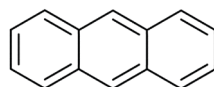
3. Acenaphthylene



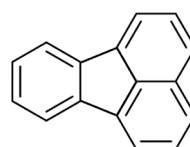
4. Fluorene



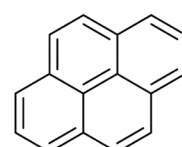
5. Phenanthrene



6. Anthracene



7. Fluoranthene



8. Pyrene

Technical Specifications

| | | |
|---|-------------------|--|
| Measurement technology | light source | Xenon flash lamp + filter (254 nm) |
| | detector | Photo diode + filter (360 nm) |
| Measurement principle | | Fluorescence |
| Parameter | | PAH, oil |
| Measuring range | enviroFlu-HC 500 | PAH: 0...50 ppb, 0...500 ppb Oil: 0...1.5 ppm, 0...15 ppm typical |
| | enviroFlu-HC 5000 | PAH: 0...500 ppb, 0...5000 ppb Oil: 0...15 ppm, 0...150 ppm typical |
| Measurement accuracy | | enviroFlu-HC 500 0.3 ppb enviroFlu-HC 5000 0.5 ppb |
| Turbidity compensation | | No |
| Data logger | | No |
| T100 response time | | ≤ 10 s |
| Measurement interval | | ≤ 5 s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 311 mm x 68 mm |
| Weight | stainless steel | ~ 2.7 kg |
| | titanium | ~ 1.9 kg |
| Interface | digital | RS-232 (TriOS) |
| | analog | 4...20 mA, 0...5 V |
| Power consumption | | ≤ 3.5 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Analog Out (0...5 VDC, 4...20 mA) |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | -5...+55 °C (0...+40 °C for specified accuracy) |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...10 m/s |

surFlu

36SXXXXXX



Oil spills and related oil pollution pose a potential risk for businesses that use oils or lubricants in their processes in any way. Alongside our world-leading enviroFlu-HC for the detection of very small amounts in water, we now offer surFlu for the detection of oil films on water.

State-of-the-art, stable UV LED technology for fluorescence excitation and multiple detection channels for reliable detection of smallest oil films on water enable universal application of the device. Multi-channel detection ensures reliable differentiation from biogenic films (which are caused e.g. by dead algae), foliage, humic substances, undulations, thus avoiding false alarms.

Benefits

- Without sampling and preparation of test samples
- Real time sensor
- Without reagents
- Non-contact measurement
- High sensitivity and selectivity
- Interference compensation through 4 LED channel technology

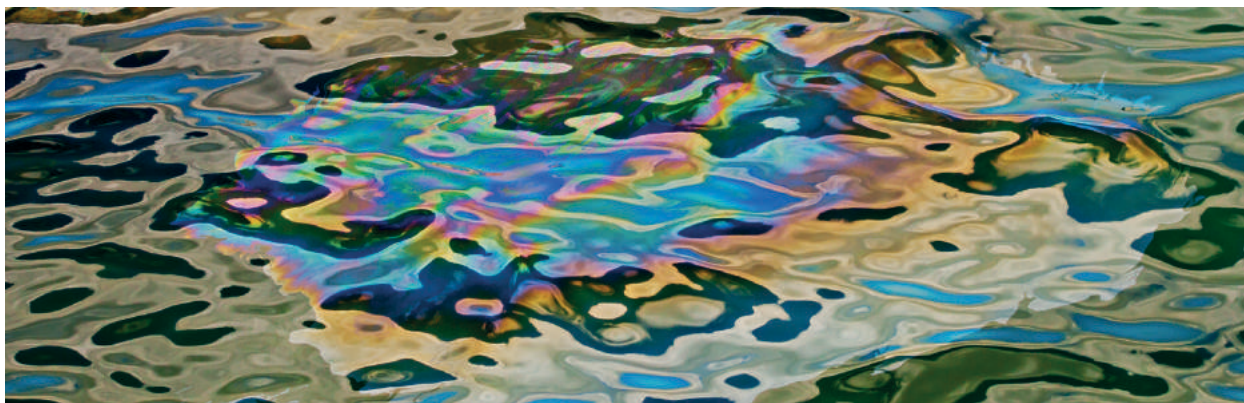
The special geometry of the optics allows large variance in the distance between sensor and water surface, so that even highly fluctuating water levels in basins, gullies, streams or rivers will have no impact on the measuring signal. The stability of measured values is boosted by an internal temperature correction.

Equipped with our innovative G2 interface with web browser configuration, internal data logger, flexible protocols and data outputs, surFlu boasts extensive features that go significantly beyond what's available on the market today.

The state-of-the-art G2 interface not only ensures quick integration into third-party systems, but also use of the wide range of accessories for our devices.

Applications

- Sewage inlets
- Seaports
- Surface waters
- Airports
- Cooling water
- Refineries



Technical Specifications

| | | |
|---|-----------------|--|
| Measurement technology | light source | LED (365 nm) |
| | detector | 4 photo diodes + filter |
| Measurement principle | | Fluorescence |
| Optical path | | 5 m ± 3 m above the water surface |
| Parameter | | Oil on water (PAH) |
| Measuring range | | Adjustable |
| Turbidity compensation | | Yes |
| Data logger | | ~ 10 MB |
| T100 response time | | 2 s |
| Measurement interval | | 1 s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 315 mm x 68 mm |
| Weight | stainless steel | ~ 2.7 kg |
| | titanium | ~ 1.9 kg |
| Interface | digital | Ethernet (TCP/IP) |
| | | RS-232 or RS-485 (Modbus RTU) |
| Power consumption | | ≤ 3 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month /typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure with fixed cable | | 3 bar |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |

matrixFlu UV

35S10XXXX



Our high-end matrixFlu UV fluorometer combines multiple excitation and detection wavelengths for fluorescence measurements in a single device with a highly compact design. The special optical arrangement of excitation and detection channels enables not only single values to be determined, but also a 3x4 matrix of wavelength combinations. This allows quasi synchronous in-situ detection of EEMs (Excitation Emission Matrices).

MatrixFlu UV is primarily designed for the detection of PAH's (polycyclic aromatic hydrocarbons), BTX (Benzene, Toluene, Xylene), CDOM (colored dissolved organic matter), and TRP (Tryptophan) concentration.

Benefits

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

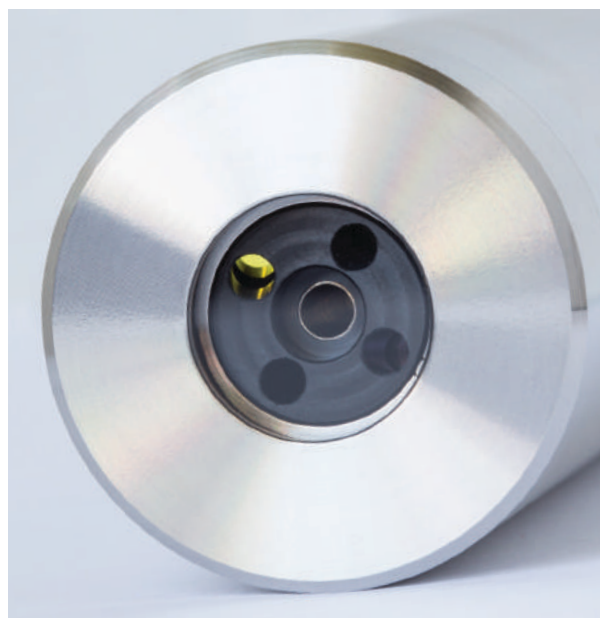
Applications

- Surface water
- Bathing lakes
- Drinking water production and treatment
- Raw water treatment
- Environmental monitoring

State-of-the-art, specially selected LEDs are used for fluorescence excitation. The stability of measured values is increased by an internal temperature correction.

Equipped with our innovative G2 interface with web browser configuration, internal data logger, flexible protocols and data outputs, matrixFlu UV offers extensive features that go significantly beyond what's available on the market today.

The state-of-the-art G2 interface not only ensures quick integration into third-party systems, but also use of the wide range of accessories for our devices.



Detail of design for 3x4 wavelengths



The development was part of the NEXOS project and was funded by the European Union.

| Ex | Em | | | |
|-----|----------|-----|--------|--------|
| | 289 | 360 | 460 | 540 |
| 254 | BTX | PAH | CDOM 1 | CDOM 4 |
| 280 | scat 280 | TRP | CDOM 2 | CDOM 5 |
| 320 | XX1 | XX2 | CDOM 3 | CDOM 6 |

Technical Specifications

| | | |
|---|------------------|---|
| Measurement technology | light source | LED (254 nm/280 nm/320 nm) |
| | detector | 4 photo diodes with filter |
| Measurement principle | | Fluorescence |
| Parameter | | PAH [$\mu\text{g/L}$] |
| | | BTX [$\mu\text{g/L}$] |
| | | CDOM [$\mu\text{g/L}$] |
| | | TRP [$\mu\text{g/L}$] |
| Measuring range | | 0...500 $\mu\text{g/L}$ PAH · 0...1000 $\mu\text{g/L}$ BTX · 0...200 $\mu\text{g/L}$ CDOM |
| Measurement accuracy | | 5 % |
| Turbidity compensation | | No |
| Data logger | | ~ 10 MB |
| T100 response time | | 12 s |
| Measurement interval | | 6 s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 155 mm x 36 mm |
| Weight | stainless steel | ~ 0.6 kg |
| | titanium | ~ 0,5 kg |
| Interface | digital | Ethernet (TCP/IP) RS-232 oder RS-485 (Modbus RTU, OGC PUCK) |
| | analog | - |
| Power consumption | | $\leq 1.8 \text{ W}$ |
| Power supply | | 12...24 VDC ($\pm 10 \%$) |
| Maintenance effort | | $\leq 0.5 \text{ h/month}$ (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU, OGC PUCK |
| Warranty | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...5m/s |

matrixFlu VIS

34S10XXXX



Our high-end matrixFlu VIS fluorometer combines multiple excitation and detection wavelengths for fluorescence measurements in a single device with a highly compact design. The special optical arrangement of excitation and detection channels enables not only single values to be determined, but also a 4x4 matrix of wavelength combinations. This allows quasi synchronous in-situ detection of EEMs (Excitation Emission Matrices).

MatrixFlu VIS is primarily designed for the on-line detection of algae (cyanobacteria, green algae, etc.) and is expanded by the detection of CDOM.

Benefits

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

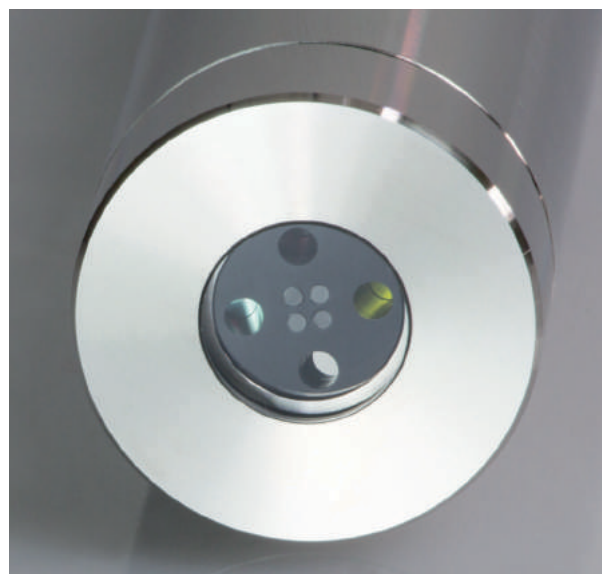
Applications

- Surface water
- Bathing lakes
- Drinking water production and treatment
- Raw water treatment
- Environmental monitoring

State-of-the-art, specially selected LEDs are used for fluorescence excitation. The stability of measured values is increased by an internal temperature correction.

Equipped with our innovative G2 interface with web browser configuration, internal data logger, flexible protocols and data outputs, matrixFlu offers extensive features that go significantly beyond what's available on the market today.

The state-of-the-art G2 interface not only ensures quick integration into third-party systems, but also use of the wide range of accessories for our devices.



Detail of design for 4x4 wavelengths



The development was part of the NEXOS project and was funded by the European Union

| Ex | Em | | | |
|-----|----------|--------|--------|-----|
| | 460 | 682 | 655 | 850 |
| 375 | CDOM 1 | CDOM 3 | CDOM 2 | XX3 |
| 470 | scat 460 | chl-a | XX2 | XX4 |
| 590 | XX1 | blue2 | blue1 | XX5 |

Technical Specifications

| | | |
|---|------------------|--|
| Measurement technology | light source | 4 LED (375 nm/470 nm/590 nm) |
| | detector | 4 photo diodes with filter |
| Measurement principle | | Fluorescence |
| Parameter | | Chlorophyll a [$\mu\text{g/L}$] |
| | | Phyocyanin [$\mu\text{g/L}$] |
| | | CDOM [$\mu\text{g/L}$] |
| Measuring range | | 0...200 $\mu\text{g/L}$ |
| Measurement accuracy | | 5 % |
| Turbidity compensation | | Yes |
| Data logger | | ~ 10 MB |
| T100 response time | | 12 s |
| Measurement interval | | 6 s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 155 mm x 36 mm |
| Weight | stainless steel | ~ 0.6 kg |
| | titanium | ~ 0.5 kg |
| Interface | digital | Ethernet (TCP/IP) RS-232 oder RS-485 (Modbus RTU, OGC PUCK) |
| | analog | - |
| Power consumption | | $\leq 1.8 \text{ W}$ |
| Power supply | | 12...24 VDC ($\pm 10 \%$) |
| Maintenance effort | | $\leq 0.5 \text{ h/month}$ (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Modbus RTU, OGC PUCK |
| Warranty | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with Subconn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...5 m/s |

nanoFlu

32SXXXXX0



Miniature fluorometer

nanoFlu fluorometers are low-priced, submersible miniaturized fluorometers for highly precise and selective measurement of CDOM (colored dissolved organic matter, yellow substances), chlorophyll A or phycocyanin in cyanobacteria. Long-term stability of measurements is ensured by the combination of low power consumption and innovative coating

of the optical window, as an energy efficient and environmentally friendly anti-fouling solution. The devices can be used in diverse applications for the monitoring of sea and river waters, as well as in drinking- and wastewater treatment systems. Internal reference signals of the high performance LEDs used for fluorescence excitation compensate aging effects and temperature influences.

Benefits

- High sensitivity
- Nano coating
- Fast data acquisition
- Electronic light compensation
- Compact size
- Low power consumption
- Low costs

Applications

- Surface waters
- Bathing lakes
- Drinking water production and treatment
- Raw water treatment
- Environmental monitoring

Parameter list

| Parameter | |
|-----------|--------------------------------------|
| | CDOM [$\mu\text{g/L}$] |
| | or chlorophyll a [$\mu\text{g/L}$] |
| | or cyanobacteria [$\mu\text{g/L}$] |
| | or rhodamine [$\mu\text{g/L}$] |
| | or tryptophan [$\mu\text{g/L}$] |

Technical Specifications

| | | |
|---|------------------|--|
| Measurement technology | light source | LED |
| | detector | Photo diodes |
| Measurement principle | | Fluorescence |
| Parameter | | See parameter list |
| Measuring range | | 0...200 µg/L |
| Measurement accuracy | | ± 3 % |
| Turbidity compensation | | No |
| Data logger | | ~ 10 MB |
| T100 response time | | < 2 s |
| Measurement interval | | < 1 s |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 186 mm x 36 mm |
| Weight | stainless steel | ~ 0.6 kg |
| | titanium | ~ 0.5 kg |
| Interface | digital | Ethernet (TCP/IP) RS-232 or RS-485 (Modbus RTU) |
| | analog | 4...20 mA or 0...5 V |
| Power consumption | | < 1 W |
| Power supply | | 12...24 VDC (± 10 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | Analog Out (4...20 mA) Modbus RTU |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| | with fixed cable | 3 bar |
| | in FlowCell | 1 bar, 2...4 L/min |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...10 m/s |



RADIOMETERS

RAMSES

40SXXX010



Spectral imaging radiometer to measure radiance or irradiance in UV, VIS and UV/VIS

RAMSES radiometers are spectral imaging radiometers to measure radiance, irradiance, or scalar irradiance in the UV, VIS and UV/VIS ranges. Thanks to their ultra small size and weight as well as very low power consumption, they are especially suitable for hand-held and autonomous applications. RAMSES radiometers combine precision hyperspectral light measurements with a maximum of flexibility. The modular system increases cost-effectiveness, while the many accessories and special solutions enable a wide range of applications such as installation on ships, handheld usage or autonomous measurements in remote places, like the Arctic or Antarctica.

Benefits

- Extremely low power consumption
- Environmentally robust
- World market leader

Applications

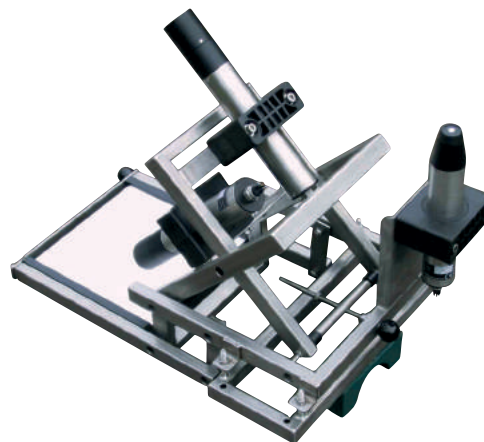
- Water quality
- Field measurements
- Satellite validation
- Biology
- Photosynthesis
- Color measurements
- Climate research



Frame 1



Frame 2



Frame 3

Technical Specifications

| | | |
|---|-----------------|--|
| Measurement technology | detector | High-end miniature spectrometer |
| | | 256 Channels |
| Measurement principle | | Radiance or irradiance |
| Parameter | | See parameter list p. 40 |
| Measuring range | | See parameter list p. 40 |
| Measurement accuracy | | See parameter list p. 40 |
| Data logger | | - |
| T100 response time | | ≤ 10 s (burst mode) |
| Measurement interval | | ≤ 8 s (burst mode) |
| Housing material | | Stainless steel (1.4571/1.4404) or titanium (3.7035) |
| Dimensions (L x Ø) | | 260 mm (ACC) / 245 mm (ASC) / 300 mm (ARC) x 48 mm |
| Weight | stainless steel | 0.9 kg |
| | titanium | 0.7 kg |
| Interface | digital | RS-232 (TriOS) |
| Power consumption | | ≤ 0.85 W |
| Power supply | | 8...12 VDC (± 3 %) |
| Maintenance effort | | ≤ 0.5 h/month (typical) |
| Calibration/maintenance interval | | 24 months |
| System compatibility | | RS-232 (TriOS protocol) |
| Guarantee | | 1 year (EU: 2 years) |
| INSTALLATION | | |
| Max. pressure | with SubConn | 30 bar |
| Protection type | | IP68 |
| Sample temperature | | +2...+40 °C |
| Ambient temperature | | +2...+40 °C |
| Storage temperature | | -20...+80 °C |
| Inflow velocity | | 0.1...10 m/s |

RADIOMETERS // RAMSES

RAMSES PARAMETER LIST

| | ACC | | | ARC | ASC |
|------------------------------|--|-----------|-----------|---|---|
| |  | | |  |  |
| | UV | UV/VIS | VIS | VIS | VIS |
| Wavelength range* [nm] | 280...500 | 280...720 | 320...950 | 320...950 | 320...950 |
| Detector* | 256 channel silicon photo diode array | | | | |
| Pixel dispersion* [nm/pixel] | 2.2 | 2.2 | 3.3 | 3.3 | 3.3 |
| Wavelength accuracy* | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 |
| Usable channels | 100 | 200 | 190 | 190 | 190 |

| | ACC-UV | ACC-VIS | ARC-VIS | ASC-VIS |
|------------------------------------|--|---|---|---|
| | UV A / UV B irradiance | VIS irradiance | VIS radiance | VIS scalar irradiance |
| Wavelength range* | 280...500 nm | | | |
| Typical saturation (IT: 4 ms)** | 20 W m ⁻² nm ⁻¹ (at 300 nm) | 10 W m ⁻² nm ⁻¹ (at 400 nm) | | 20 W m ⁻² nm ⁻¹ (at 400 nm) |
| | 17 W m ⁻² nm ⁻¹ (at 360 nm) | 8 W m ⁻² nm ⁻¹ (at 500 nm) | 1 W m ⁻² nm ⁻¹ sr ⁻¹ (at 500 nm) | 12 W m ⁻² nm ⁻¹ (at 500 nm) |
| | 18 W m ⁻² nm ⁻¹ (at 500 nm) | 14 W m ⁻² nm ⁻¹ (at 700 nm) | | 15 W m ⁻² nm ⁻¹ (at 700 nm) |
| Typical NEI (IT: 8 s)** | 0.85 μW m ⁻² nm ⁻¹ (at 300 nm) | 0.4 μW m ⁻² nm ⁻¹ (at 400 nm) | | 0.8 μW m ⁻² nm ⁻¹ (at 400 nm) |
| | 0.75 μW m ⁻² nm ⁻¹ (at 360 nm) | 0.4 μW m ⁻² nm ⁻¹ (at 500 nm) | 0.25 μW m ⁻² nm ⁻¹ sr ⁻¹ | 0.6 μW m ⁻² nm ⁻¹ (at 500 nm) |
| | 0.80 μW m ⁻² nm ⁻¹ (at 500 nm) | 0.6 μW m ⁻² nm ⁻¹ (at 700 nm) | | 0.8 μW m ⁻² nm ⁻¹ (at 700 nm) |
| Collector type | cosine response | | | |
| Accuracy | Better than 6-10 % *** | | | |
| Integration time | 4 ms..8 s | | | |

*) Specifications of Carl ZEISS AG, Germany

**) IT: integration time

***) Depends on wavelength range

Photometers

Fluorimeters

Radiometers

Nephelometry

eCHEM

Controller

Accessories

Systems





NEPHELOMETRY

Turbidity Immersion Sensor

90S631100 · 90S631130
90S731100 · 90S731130



The digital immersion sensor is used for optical turbidity measurement according to the 90 ° IR scattered light method in raw-, waste- and process waters up to 4000 NTU.

Benefits

- Reliable concentration measurements by optical methods
- Pulsed infrared scattered light procedure
- No mechanically moving parts
- Digital reading
- Preprocessing in the sensor increases measurement sensitivity

Applications

- Measurement of turbidity in drinking water, domestic water, circulating water

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|-----------------------------|
| Measurement principle | 90 ° scattered light method |
| Measuring method | Nephelometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 3 W |

INPUT PARAMETERS

| | |
|-------------------------------|--|
| Measuring ranges | 0...40, 0...400, 0...1000, (0...4000 opt.) NTU |
| Cable specification | black PUR (halogen free), shielded, M12 plug |
| Measurement wavelength | 880 nm |

OUTPUT SIZES

| | |
|-----------------------|--------------------|
| Accuracy | ± 2 % FS |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|---------------------------|--|
| Response time | 90 % of the value in 5 s |
| Accuracy | 98 % |
| Calibration method | On controller, through analytical multipoint determination |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|------------|
| Process temperature | 0...+60 °C |
| Process pressure | 4 bar |

STRUCTURAL DESIGN

| | |
|---------------------------|---|
| Dimensions (Ø x L) | 42 mm x 207 mm |
| Materials | Black PVC or stainless steel body, special glass optics, Viton® O-rings |
| Thread | 1" GAS |

Turbidity Clear Water

90S610100 · 90S610130



The digital bypass sensor is used for optical turbidity measurement according to the 90° IR scattered light method in pure water up to 100 NTU.

Benefits

- Reliable concentration measurements by optical methods
- Pulsed infrared scattered light procedure
- No mechanically moving parts
- Digital reading
- Sensor data preprocessing increases measurement sensitivity

Applications

- Measurement of turbidity in drinking water treatment plants with low turbidity values

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|----------------------------|
| Measurement principle | 90° scattered light method |
| Measuring method | Nephelometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 3 W |

INPUT PARAMETERS

| | |
|-------------------------------|--|
| Measuring ranges | 0...10/0...100 NTU |
| Cable specification | black PUR (halogen free), shielded, M12 plug |
| Measurement wavelength | 880 nm |

OUTPUT SIZES

| | |
|-----------------------|------------------------------|
| Output signal | RS-485, Modbus RTU |
| Accuracy | ± 1 % FS |
| Resolution | 0.01 NTU (full scale 10 NTU) |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|---------------------------|--|
| Response time | 90 % of the value in 5 seconds |
| Accuracy | 98 % |
| Calibration method | On controller, through analytical multipoint determination |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|------------|
| Process temperature | 0...+50 °C |
| Process pressure | 4 bar |

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 42 mm x 207 mm |
| Materials | Black PVC and stainless steel body, special glass optics, Viton® O-rings |
| Thread | 1" GAS |

Suspended Solids

91S131100



The eCHEM optical sensor for solid measurements is a process- and immersion sensor for measuring solid particle content. The measurement is based on multi-channel technology using the 90° scattered light method.

Applications

- Sludges from biological processes
- Paper mills
- Food processing
- Scrubber systems
- Sewage treatment plants: primary sludge, sludge, return sludge, digested sludge
- Outlets

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|----------------------------|
| Measurement principle | 90° scattered light method |
| Measuring method | Nephelometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 3 W |

INPUT PARAMETERS

| | |
|-------------------------------|--|
| Measuring ranges | 0...30 g/L |
| Cable specification | black PUR (halogen free), shielded, M12 plug |
| Measurement wavelength | 880 nm |

OUTPUT SIZES

| | |
|-----------------------|--------------------|
| Output signal | RS-485, Modbus RTU |
| Accuracy | ± 3 % FS |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|---------------------------|--|
| Response time | 90 % of the value in 5 seconds |
| Repeatability | 98 % |
| Calibration method | On controller, through analytical multipoint determination |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|------------|
| Process temperature | 0...+60 °C |
| Process pressure | 4 bar |

STRUCTURAL DESIGN

| | |
|---------------------------|---|
| Dimensions (Ø x L) | ~ 42 mm x 210 mm |
| Materials | Stainless steel 1.4401 housing, window with epoxy glue, Viton® O-ring |
| Thread | 1" GAS |





eCHEM

pH Sensor Digital

90S130100 · 90S130130



Robust digital pH sensor for operation on TriBox controllers and HS100 DIN G2 rail module. Digital communication ensures safe and trouble-free signal transmission from the sensor to the controller. The high-quality gel pH electrode has a hole diaphragm and is insensitive to dirt, making the sensor ideal for wastewater applications.

Benefits

- High-quality combination electrode with hole diaphragm and polymerised solid electrolyte
- Low maintenance
- Plug and play with TriBox controller

Applications

- Water and wastewater treatment
- Coagulation and flocculation
- Process monitoring and control
- Acid/base neutralization systems

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|---------------|
| Measurement principle | Digital |
| Measuring method | Potentiometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 2 W |

INPUT PARAMETERS

| | |
|----------------------------|--|
| Measured variables | pH and temperature (Pt100) |
| Measuring ranges | pH 0..14 |
| Cable specification | black PUR (halogen free), shielded, M12 plug |

OUTPUT SIZES

| | |
|---------------------------------|--------------------|
| Temperature compensation | Pt100 |
| Accuracy | 0.05 pH |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|----------------------|------------------------------|
| Response time | 95 % of the value in 10 sec. |
| Repeatability | 98 % |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|-----------------------------------|
| Process temperature | 0...+50 °C |
| Process pressure | 6.9 bar at 50 °C |
| Conductivity | Min. operating conductivity 50 µS |

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 29 mm x 299 mm |
| Materials | Ryton® and PVC body, Viton® O-rings, other materials: Teflon®, carbon, epoxy |
| Thread | 3/4" NPT |

pH Sensor Digital Differential

90S130200 · 90S130230



Robust digital differential pH sensor for operation on TriBox controllers and HS100 DIN G2 module. The closed design ensures separation of the pH electrode reference system from the medium to be measured, thus excluding electrode poisoning. A dirt-resistant salt bridge minimizes cleaning efforts and prevents dilution of electrolytes. The sensor therefore achieves an extremely long service life even in heavily contaminated media.

Benefits

- Measurement transmission via digital Modbus RTU protocol
- Longer electrode life thanks to differential measurements
- All calibrations can be performed via the digital interface
- No moving mechanical parts
- Plug and Play

Applications

- Difficult measurement of inlets for waste water treatment plants
- Process monitoring and control

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|---------------|
| Measurement principle | Differential |
| Measuring method | Potentiometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 2 W |

INPUT PARAMETERS

| | |
|----------------------------|--|
| Measured variables | pH and temperature (Pt100) |
| Measuring ranges | pH 0...14 |
| Cable specification | black PUR (halogen free), shielded, M12 plug |

OUTPUT SIZES

| | |
|---------------------------------|--------------------|
| Temperature compensation | Pt100 |
| Accuracy | 0.05 pH |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|----------------------|-----------------------------|
| Response time | 90 % of the value in 5 sec. |
| Repeatability | 98 % |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|-----------------------------------|
| Process temperature | -5...+50 °C |
| Process pressure | 6.9 bar at 50 °C |
| Conductivity | Min. operating conductivity 50 µS |

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 37.5 mm x 292.5 mm |
| Materials | Ryton® and PVC body, Viton® O-rings, other materials: Teflon®, carbon, epoxy |
| Thread | 1" NPT |

ORP Sensor Digital

90S330100 · 90S330130



Robust digital REDOX sensor for operation on TriBox controllers and HS100 DIN G2 rail module. Digital communication ensures safe and trouble-free signal transmission from the sensor to the controller. The high-quality REDOX electrode features a hole diaphragm and is impervious to dirt, making the sensor ideal for wastewater applications.

Benefits

- High-quality combination electrode with hole diaphragm and polymerized solid electrolyte
- Low maintenance
- Plug and play with TriBox controller

Applications

- Water and wastewater treatment
- Coagulation and flocculation
- Process monitoring and control
- Acid/base neutralization systems

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|---------------|
| Measurement principle | Digital |
| Measuring method | Potentiometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 2 W |

INPUT PARAMETERS

| | |
|----------------------------|--|
| Measured variables | REDOX and temperature |
| Measuring ranges | -1500 mV...+1500 mV |
| Cable specification | black PUR (halogen free), shielded, M12 plug |

OUTPUT SIZES

| | |
|---------------------------------|--------------------|
| Temperature compensation | Pt100 |
| Accuracy | ± 1 mV |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|----------------------|------------------------------|
| Response time | 95 % of the value in 10 sec. |
| Repeatability | 98 % |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|-----------------------------------|
| Process temperature | 0...+50 °C |
| Process pressure | 6.9 bar at 50 °C |
| Conductivity | Min. operating conductivity 50 µS |

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 29 mm x 299 mm |
| Materials | Ryton® and PVC body, Viton® O-rings, other materials: Teflon®, carbon, epoxy |
| Thread | 3/4" NPT |

ORP Sensor Digital Differential

90S330200 · 90S330230



Robust digital differential REDOX sensor for operation on TriBox controllers and HS100 DIN G2 module. The closed design ensures separation of the REDOX electrode reference system from the medium to be measured, thus excluding electrode poisoning. A dirt-resistant salt bridge minimizes cleaning efforts and prevents dilution of electrolytes. The sensor therefore achieves an extremely long service life even in heavily contaminated media.

Benefits

- Measurement transmission via digital Modbus RTU protocol
- Longer electrode life thanks to differential measurements
- All calibrations can be performed via the digital interface
- No moving mechanical parts
- Plug and Play

Applications

- Difficult measurement of inlets for waste water treatment plants
- Process monitoring and control

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|---------------|
| Measurement principle | Differential |
| Measuring method | Potentiometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 2 W |

INPUT PARAMETERS

| | |
|----------------------------|--|
| Measured variables | REDOX and temperature |
| Measuring ranges | -1500 mV...1500 mV |
| Cable specification | black PUR (halogen free), shielded, M12 plug |

OUTPUT SIZES

| | |
|---------------------------------|--------------------|
| Temperature compensation | Pt100 |
| Accuracy | ± 1 mV |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|----------------------|-----------------------------|
| Response time | 90 % of the value in 5 sec. |
| Repeatability | 98 % |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|-----------------------------------|
| Process temperature | -5...+50 °C |
| Process pressure | 6.9 bar at 50 °C |
| Conductivity | Min. operating conductivity 50 µS |

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 37.5 mm x 292.5 mm |
| Materials | Ryton® and PVC body, Viton® O-rings, other materials: Teflon®, carbon, epoxy |
| Thread | 1" NPT |

Conductivity Sensor

90S430100 · 90S430130



Digital sensor to measure conductive conductivity especially in pure media, for operation on TriBox controllers and HS100 DIN G2 rail module. The digital technology ensures secure and interference-free signal transmission from the sensor to the controller.

Benefits

- Reliable conductivity measurement with two conductive graphite electrodes and temperature compensation
- PVC sensor housing and graphite electrodes
- No mechanically moving parts
- Immediate installation and easy maintenance
- Modbus RTU digital communication protocol

Applications

- Measurement of conductivity in the outflow of wastewater treatment plants
- Measurement of conductivity in industrial and water circuits

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|---------------------------------------|
| Measurement principle | Conductive with 2 graphite electrodes |
| Measuring method | Conductometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 2 W |

INPUT PARAMETERS

| | |
|----------------------------|--|
| Measuring ranges | 0.00 to 20000 µS |
| Cable specification | black PUR (halogen free), shielded, M12 plug |

OUTPUT SIZES

| | |
|---------------------------------|--------------------|
| Temperature compensation | RS-485, Modbus RTU |
| Accuracy | ± 1 µS |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|----------------------|--|
| Response time | 90 % of the value in less than 60 sec. |
|----------------------|--|

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|--------------|
| Process temperature | -10...+45 °C |
| Process pressure | 10 bar |

STRUCTURAL DESIGN

| | |
|---------------------------|-------------------------------|
| Dimensions (Ø x L) | 33 mm x 220 mm |
| Materials | PVC body, graphite electrodes |
| Thread | 1" GAS BSP |

Dissolved Oxygen Sensor

90S531100 · 90S531130



Calibration-free measuring sensor for dissolved oxygen according to the luminance method. Digital value transmission to the controller. No interference by H₂S, reducing or oxidizing substances. Evaluation via display unit.

Benefits

- No electrolyte replacement necessary
- Reliable concentration measurement using an optical measuring method
- Interchangeable cap for luminophore replacement (membrane)
- No mechanically moving parts
- Immediate installation and easy maintenance
- Parameterization of salinity and barometric pressure to compensate for oxygen value

Applications

- Measurement of dissolved oxygen in surface water, aquacultures, sea water, as well as drinking- and wastewater systems

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|--|
| Measurement principle | Optical measurement using luminescence |
| Measuring method | Luminescence |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 2 W |

INPUT PARAMETERS

| | |
|----------------------------|--|
| Measuring ranges | 0.00...20.00 mg/L, 0...200 % |
| Cable specification | black PUR (halogen free), shielded, M12 plug |

OUTPUT SIZES

| | |
|---------------------------------|--------------------|
| Temperature compensation | Internal NTC |
| Data interface | RS-485, Modbus RTU |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 33 mm x 220 mm |
| Materials | 3/4 stainless steel body (PVC body optional), 3/4 special glass optics, 3/4 NBR and silicone O-rings |
| Thread | 3/4" BSP |

Free Chlorine

90S210001 · 90S210000



The chlorine measuring probe is an electrochemical sensor for measuring the concentration of chlorine in water. The measuring cell captures free chlorine from inorganic chlorine products (hypochlorite, chlorine gas, etc.). The measuring method has a reduced pH dependency, so that pH fluctuations only have a limited impact on the measurement signal. pH value increases only lead to an approximately 10% reduction of the measuring signal per pH unit.

Benefits

- Stable signals even with fluctuating pH values
- Abrasive particles are tolerated
- Surfactants are partially tolerated

Applications

- Swimming pools, drinking water, seawater

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|--|
| Measurement principle | Membrane-covered, potentiostatic amperometric 3-electrode system |
| Measuring method | Amperometry |

AUXILIARY POWER

| | |
|------------------------------|--------------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V (± 10 %) |

INPUT PARAMETERS

| | |
|---------------------------------|---|
| Measured variables | Free chlorine with reduced pH dependency |
| Measuring ranges | 0...2 mg/L, 0...20 mg/L |
| Cable specification | - |
| Temperature compensation | Automatic through integrated temperature sensor Pt100 |

OUTPUT SIZES

| | |
|-----------------------|---|
| Output signal | RS-485, Modbus RTU |
| Accuracy | Measuring range 2 mg/L: at 0.4 mg/L & 1.6 ppm < 1 % Measuring range 20 mg/L: at 4 mg/L < 1 % at 16 mg/L W37 < 3 % |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|-----------------------------|---|
| Response time | T90: approx. 2 min |
| Running-in period | Approx. 2 h at initial operation |
| Drift | Approx. -1 % per month |
| Cross influences | Combined chlorine increases measured value |
| Calibration method | Determination of chlorine with DPD-1 method |
| Maintenance interval | typically once per week |

PROCESS CONDITIONS

| | |
|----------------------------|--|
| Process temperature | 0...+45 °C (no ice crystals in the test water) |
| Process pressure | 3 bar, no pressure shocks or vibrations |
| Flow rate | Approx. 15...30 L/h in FLC-3, minimum flow dependence exists |
| pH range | pH 4... pH 9, reduced pH dependence |
| Conductivity | 10 µS/cm...50 mS/cm (sea water) |

STRUCTURAL DESIGN

| | |
|---------------------------|---|
| Dimensions (Ø x L) | 25 mm x 205 mm |
| Materials | Micro-porous hydrophilic membrane, UPVC, stainless steel 1.4571 |

Chlorine Dioxide

90S220000 · 90S020000



The application areas of this sensor extend to almost all water qualities. It is resistant to chemicals and detergents thanks to a special membrane system. The chlorine dioxide sensor is also resistant to chlorine. Ozone is measured with a 25 times higher sensitivity than chlorine dioxide. The measuring cell can be used in the pH range from pH >1 up to the limit of stability of chlorine dioxide in alkaline solutions. Precipitation, such as lime, can block the membrane!

Benefits

- Surfactants are partially tolerated
- Abrasive particles are tolerated
- Higher temperatures are possible

Applications

- All types of water treatment

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100
- Fittings: FlowCell

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|---|
| Measurement principle | Membrane-covered, amperometric 2-electrode system |
| Measuring method | Amperometry |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |

INPUT PARAMETERS

| | |
|---------------------------------|--|
| Measured variables | Chlorine Dioxide |
| Measuring ranges | 2 mg/L, 20 mg/L |
| Cable specification | - |
| Temperature compensation | Automatic through integrated temperature sensor, temperature changes <5 °C/h |

OUTPUT SIZES

| | |
|-----------------------|--|
| Output signal | RS-485, Modbus RTU |
| Accuracy | Measuring range 2 mg/L: at 0.4 mg/L & 1.6 mg/L < 1 % Measuring range 20 mg/L: at 1.5 mg/L < 0.1 % |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|-----------------------------|--|
| Response time | T90: approx. 1 min |
| Running-in period | Approx. 1 h at initial operation |
| Cross influences | Cl ₂ : does not interfere, O ₃ : is measured with 25 higher sensitivity than ClO ₂ |
| Calibration method | On Controller by means of analytical determination |
| Maintenance interval | Regular monitoring of the measurement signal at least once a week. |

AMBIENT CONDITIONS

| | |
|-----------------------------|---|
| Storage temperature | Sensor: Frost free, dry and without electrolyte |
| Compressive strength | 1.0 bar, no pressure shocks or vibrations |

PROCESS CONDITIONS

| | |
|----------------------------|---|
| Process temperature | +5...+50 °C |
| Process pressure | 1.0 bar, no pressure shocks or vibrations |
| pH range | pH 2...11 |

STRUCTURAL DESIGN

| | |
|---------------------------|-------------------------------|
| Dimensions (Ø x L) | 25 mm x 205 mm |
| Materials | PVC-U, stainless steel 1.4571 |

NH4-N ISE

90S801100 · 90S801130
90S901100 · 90S901130



The eCHEM ISE sensor enables ammonium measurements to be made directly in the process. Time consuming steps such as sampling and preparation are eliminated. To ensure stable measurements, the interference of potassium is simultaneously compensated.

Benefits

- Direct measurement of ammonium without sample preparation
- Potassium measurement compensates cross-sensitivity and ensures reliable measuring results
- Direct installation on the edge of the pool, no separate building necessary

Applications

- Wastewater treatment facilities
- Surface water
- Environmental monitoring

Accessories

- Cable: Extension cables of 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox Mini, HS100

Technical Specifications

OPERATION AND SYSTEM CONFIGURATION

| | |
|------------------------------|-----------------------------|
| Measurement principle | Via ion-selective membranes |
| Measuring method | Potentiometric / ISE |

AUXILIARY POWER

| | |
|------------------------------|----------------|
| Electrical connection | 8-pin M12 plug |
| Power supply | 12...24 V |
| Power consumption | 3 W |

INPUT PARAMETERS

| | |
|---------------------------------|--|
| Measuring ranges | NH ₄ ⁺ : 0...100 ppm, K ⁺ : 0...1000 ppm, T: 0...50 °C |
| Cable specification | black PUR (halogen free), shielded, M12 plug |
| Temperature compensation | Automatic through integrated Pt100 temperature sensor |

OUTPUT SIZES

| | |
|-----------------------|--------------------|
| Output signal | RS-485, Modbus RTU |
| Accuracy | ± 1 mg/L or ± 1 % |
| Data interface | RS-485, Modbus RTU |

PERFORMANCE CHARACTERISTICS

| | |
|--------------------------------------|---|
| Time between two measurements | 1 s |
| Response time | 90 % of the value in less than 60 seconds |
| Calibration method | On Controller by means of analytical determination |

AMBIENT CONDITIONS

| | |
|------------------------|------|
| Protection type | IP68 |
|------------------------|------|

PROCESS CONDITIONS

| | |
|----------------------------|------------|
| Process temperature | 0...+50 °C |
| Process pressure | Max. 1 bar |
| pH range | pH 4...10 |

STRUCTURAL DESIGN

| | |
|---------------------------|--|
| Dimensions (Ø x L) | 76 mm x 334 mm |
| Materials | Stainless steel case, black PVC protection electrodes hous- ing and cover, NBR O-rings |
| Thread | 1 "BSP |





CONTROLLER

TriBox3

10C000000

Digital 4-channel display and control unit with integrated solenoid valve for pneumatic control

TriBox3 is a measurement and control system for all TriOS sensors. The device provides 4 sensor channels with selectable RS-232 or RS-485 function. In addition to Modbus-RTU, various other protocols are available. A built-in valve allows compressed air cleaning of the sensors. In addition, the TriBox3 offers various Interfaces, such as a IEEE 802.3 Ethernet Interface, a IEEE 802.11 b/g/n Interface, a USB port and 6 analog outputs (4...20 mA). An integrated relay can be used to trigger alarms or



to control external devices. Low power consumption, a robust aluminium housing and multiple interfaces makes it suitable for all applications in the areas of environmental monitoring, drinking water and waste water treatment plants, and many other areas.

| 2016-04-15 14:16:50 9403 | | System Info | | Messautomatik aus | |
|---|---|---|--------|-------------------|----------|
| SAK254 LISA_305C 36.25 1/m 14:15:37 | CSBeq LISA_305C 52.93 mg/l 14:15:37 | BSBeq LISA_305C 17.40 mg/l 14:15:37 | Sensor | Anzeige | Optionen |
| TOCeq LISA_305C 21.17 mg/l 14:15:37 | TRANS254 LISA_305C 27.25 % 14:15:37 | TRANS530 LISA_305C 62.79 % 14:15:37 | Daten | Info | Power |

Benefits

- Open Modbus RTU communication
- For all digital TriOS sensors
- Low-cost alternative to analog measuring points
- Integrated data logger with Service logbook
- WiFi for communication via web browser
- USB interface
- TCP/IP interface
- Modbus RTU server

Technical Specifications

ENERGY SUPPLY

| | |
|--------------------------|--|
| Voltage supply | 85...265 VAC, 50...60 Hz, 12...24 VDC (± 5%) |
| Power consumption | typical: 6 W, max: 50 W |

SENSOR INTERFACES

| | |
|-------------------|---|
| Connection | 4 x M12 industrial connectors for TriOS sensors |
| Standard | RS-232, RS-485 |
| Protocol | Modbus-RTU, TriOS |

MODBUS RTU

| | |
|-------------------|----------------------------------|
| Server RTU | Yes (on each sensor connection) |
| Client RTU | Yes (on each sensor connection) |
| Parameter | Adjustable (default: 9600-8-N-1) |

MODBUS TCP

| | |
|-------------------|---------------------------|
| Server TCP | Yes |
| TCP port | Adjustable (default: 502) |

NETWORK/USB

| | |
|----------------------|----------------------------------|
| Standard | Ethernet, WiFi IEEE 802.11b/g/n |
| Connection | 1 x RJ-45, built-in WiFi antenna |
| Protocol | TCP/IP, Modbus TCP, VNC |
| Web Interface | No |
| USB | USB 2.0 (host), USB A socket |

ANALOG INTERFACES

| | |
|-----------------------------|---|
| Analog output | 6 analog outputs, configurable: 4...20 mA |
| Load | Max. 500 Ω |
| Connection terminals | 1.5 mm ² (AWG 16) |
| Error indicator | 0 mA |

SWITCH INPUT/OUTPUT

| | |
|--------------------------|--|
| Measuring trigger | Triggers for global measurement (galvanically separated), control voltage: 10 - 26 VDC Terminal: 1.5 mm ² (AWG 16) |
| Control voltage | No |

RELAY OUTPUTS

| | |
|---------------------------------|---|
| Electrical specification | 1 x relay switching contact (SPDT) (250 VAC, 2 A)/(30 VDC, 2 A) |
| Connection terminals | Max. 2.5 mm ² (AWG14) |

COMPRESSED AIR CLEANING

| | |
|--------------|------------|
| Valve | Integrated |
|--------------|------------|

DISPLAY

| | |
|----------------|---|
| Display | 7 inch capacitive touch screen (800 x 480 pixels) |
| LED | 5 x status LED |

DATA STORAGE

| | |
|-----------------------|--|
| Storage medium | Internal 2 GB microSD card, direct log-in per USB stick possible |
| Data export | Via USB 2.0 Host |

AMBIENT

| | |
|------------------------------|---------------------------|
| Operating temperature | 0...+40 °C |
| Storage temperature | -20...+70 °C |
| Relative air humidity | 0...95 % (non-condensing) |
| Protection type | IP65 |

MECHANICS

| | |
|-------------------|--|
| Dimensions | 280 x 170 x 94 mm |
| Weight | 3.7 kg |
| Materials | Housing: aluminium die-cast alloy, front panel: acrylic glass (PMMA) |

TriBox Mini

20C000000

2-channel digital controller

Digital 2-channel controller with 2 digital sensor inputs and 2 x 4...20 mA outputs. The digital 2-channel controller is compatible with all digital TriOS sensors. All measurement data and diagnostic data can be read out via a built-in web browser.



Benefits

- Open Modbus RTU communication
- For all digital TriOS sensors
- Low-cost alternative to analog measuring points
- Integrated data logger with service logbook
- WiFi for communication via web browser

Technical Specifications

ENERGY SUPPLY

| | |
|--------------------------|---------------------------------|
| Voltage supply | 85-265 VAC, 50-60 Hz, 10-15 VDC |
| Power consumption | typical: 2 W, max: 40 W |

SENSOR INTERFACES

| | |
|-------------------|---|
| Connection | 2 x M12 industrial connectors for TriOS sensors |
| Standard | RS-232, RS-485 |
| Protocol | Modbus-RTU, TriOS |

MODBUS RTU

| | |
|-------------------|----------------------------------|
| Server RTU | No |
| Client RTU | Yes (on each sensor connection) |
| Parameter | Adjustable (default: 9600-8-N-1) |

NETWORK/USB

| | |
|----------------------|-----------------------|
| Standard | WiFi IEEE 802.11b/g/n |
| Connection | Built-in WiFi antenna |
| Protocol | TCP/IP |
| Web Interface | Yes |
| USB | No |

ANALOG INTERFACES

| | |
|-----------------------------|--|
| Analog output | 2 x analog outputs, configurable 4...20 mA |
| Load | Max. 500 Ω |
| Connection terminals | 1.5 mm ² (AWG 16) |
| Error indicator | No |

SWITCH INPUT/OUTPUT

| | |
|--------------------------|---|
| Measuring trigger | No |
| Control voltage | 12 VDC (only for TriOS accessories), terminal: max. 2.5 mm ² (AWG14) |

RELAY OUTPUTS

| | |
|---------------------------------|---|
| Electrical specification | 1 x relay switching contact (SPDT)/250 VAC, 2 A/30 VDC, 2 A |
| Connection terminals | Max. 2.5 mm ² (AWG14) |

COMPRESSED AIR CLEANING

| | |
|--------------|--|
| Valve | Optional: external connection possible |
|--------------|--|

DISPLAY

| | |
|----------------|--|
| Display | 3.5 inch capacitive touch display (320x240 pixels) |
| LED | 5 x status LED |

DATA STORAGE

| | |
|-----------------------|--------------------------------|
| Storage medium | Internal 2 GB microSD card |
| Data export | Via WiFi (compressed tar file) |

AMBIENT

| | |
|------------------------------|---------------------------|
| Operating temperature | 0...+40 °C |
| Storage temperature | -20...+70 °C |
| Relative air humidity | 0...95 % (non-condensing) |
| Protection type | IP65 |

MECHANICS

| | |
|-------------------|--|
| Dimensions | 150 x 139 x 80 mm |
| Weight | 1.6 kg |
| Materials | Housing: Aluminium die-cast alloy Front panel: acrylic glass (PMMA) |

HS100

11C300000

G2 DIN rail interface module for all TriOS G2 sensors

G2 interface with WiFi for DIN rail mounting (45 mm wide) for all digital TriOS sensors with G2 interface; WiFi interface (on/off switchable), (RS-485) Modbus RTU and Modbus TCP/IP.

Input voltage: 24 VDC ($\pm 10\%$)

Benefits

- Open Modbus RTU communication
- For all digital TriOS sensors
- Low-cost alternative to analog measuring points
- WiFi for communication via web browser



Technical Specifications

ENERGY SUPPLY

| | |
|--------------------------|-----------------------|
| Voltage supply | 24 VDC ($\pm 10\%$) |
| Power consumption | typical: 2.5 W |

SENSOR INTERFACES

| | |
|--------------------------------|-----------------------------------|
| Connection | 1x M12 plug for TriOS G2 sensors. |
| Standard | RS-485 |
| Protocol | Modbus RTU |
| Analog interfaces | No |
| Switch input/output | No |
| Relay outputs | No |
| Compressed air cleaning | No |

MODBUS RTU

| | |
|-------------------|----------------------------------|
| Client RTU | Yes (connected to the sensor) |
| Parameter | Adjustable (default: 9600-8-N-1) |

MODBUS TCP

| | |
|-------------------|---------------------------|
| Server TCP | Yes |
| TCP port | Adjustable (default: 502) |

NETWORK/USB

| | |
|----------------------|--|
| Standard | Ethernet, WiFi IEEE 802.11b/g/n |
| Connection | 2 x RJ-45, external WiFi antenna (SMA) |
| Protocol | TCP/IP, Modbus TCP |
| Web Interface | Yes |
| USB | No |
| Data storage | No |

DISPLAY

| | |
|----------------|----------------|
| Display | No |
| LED | 4 x status LED |

AMBIENT

| | |
|------------------------------|---------------------------|
| Operating temperature | 0...+40 °C |
| Storage temperature | -20...+70 °C |
| Relative air humidity | 0...95 % (non-condensing) |
| Protection type | IP20 |

MECHANICS

| | |
|-------------------|--|
| Dimensions | 45 x 99 x 119 mm |
| Weight | 0.25 kg |
| Materials | Housing: polyamide (PA) Front panel: acrylic glass (PMMA) |



ACCESSORIES

G2-Interface Box

11C000000 · 11C100000



The G2 Interface Box is available in two versions: with and w/o WiFi. Using this box TriOS G2 sensors can be configured and controlled. This is enabled by the web interface of the G2 sensors, which can be accessed via a WiFi or LAN connection. The web interface can be viewed with any browser.

Technical Specifications

ENERGY SUPPLY

| | |
|--------------------------|--|
| Voltage supply | 24 VDC (± 10 %) |
| Power consumption | ≤ 1,5W plus sensor (WiFi version only) |

SENSOR INTERFACES

| | |
|------------------------------|--------------------------------------|
| Connection | 1x M12 plug for TriOS G2 sensors |
| Standard | IEEE 802.3 |
| Protocol | Web interface (with G2 sensors only) |
| Analog interfaces | No |
| Switch input / output | No |

NETWORK / USB

| | |
|----------------------|---|
| Standard | IEEE 802.3, IEEE 802.11 b/g/n (WiFi version only) |
| Connection | 1x RJ-45, external WiFi antenna (SMA) (WiFi version only) |
| Protocol | TCP/IP (with G2 sensors only) |
| Web Interface | No |
| USB | No |
| Data Storage | No |

ENVIRONMENT

| | |
|------------------------------|---------------------------|
| Operating Temperature | 0...+40 °C |
| Storage Temperature | -20...+70 °C |
| Relative air humidity | 0...95 % (non-condensing) |
| Protection type | IP20 |

MECHANICS

| | |
|---------------------------|---|
| Dimensions (W/H/D) | 60 mm x 35 mm x 126 mm / 60 mm x 35 mm x 162 mm |
|---------------------------|---|

Pocket Power G2

11C200000

Currently only available for **enviroFlu, microFlu, RAMSES**.
Soon also for **all G2 sensors**.



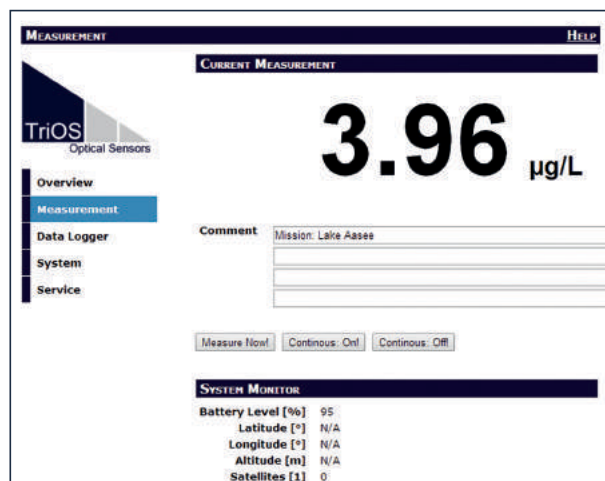
The mobile interface for TriOS sensors

Mobile monitoring of environmental parameters is gaining popularity. PocketPower is TriOS's new portable solution for controlling applications of the optical sensors through a mobile interface.

The PocketPower supplies the sensors with convenient rechargeable Li-poly batteries, and backs up the data on the internal SD card (2 GB).

A web browser interface for your TriOS sensors is available via WLAN, for easy control of your test by a laptop, tablet or smartphone.

- Easy use with smartphone or tablet
- Web browser interface
- High-end rechargeable batteries
- Automatic positioning via built-in GPS module



Features

| | |
|-----------------------|---|
| System | 32-bit microcontroller |
| Storage capacity | 2 GB |
| Sensor interface | RS-232 |
| Sensor connection | M12 socket |
| Transmission type | WLAN |
| Operating temperature | 0...+40 °C |
| Dimensions | 100 x 150 x 60 mm |
| Weight | 0.5 kg |
| Housing | Robust plastic housing (IP65) with shoulder strap |
| Extra | Internal GPS receiver |

AirShot

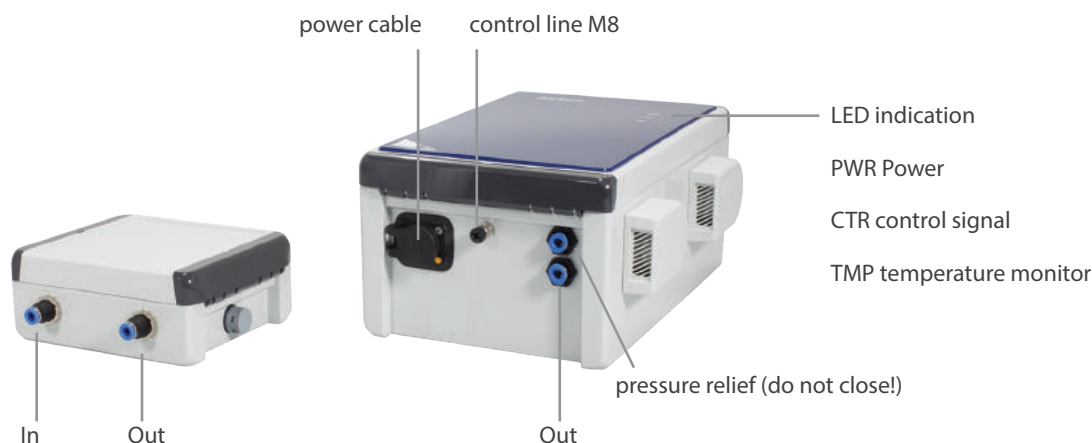
02A100005



The compact pressured air cleaning system AirShot works with pressured air pulses instead of a continuous air flow, thus reducing the required amount of air significantly and enabling a very compact design.

Furthermore the pressure pulses perform a more effective cleaning than continuous air flow systems, making the AirShot a valuable addition to every system.

AirShot can be used as an alternative to a standard compressor and can be operated with a TriBox. To prevent the AirShot from overheating it features a internal temperate monitor which indicates excessive heat with a LED.



The recommended settings are 6 s cleaning at an interval of 2 min (at 20 °C).

Technical Specifications

| | |
|--------------------------------|--|
| Size w/h/d | 190 x 260 x 125 mm and 125 x 150 x 65 mm |
| Weight | 3,9 kg |
| Max. Pressure | 6 bar |
| Connection | for 6 mm hoses (4 mm inner diameter) |
| Housing | Polycarbonate |
| Protection type | IP44 |
| Power cable length | 3 m |
| Control line | 5 m |
| Temperature Impulse Box | -5...+40 °C |
| Temperature Compressor | -20...+40 °C |
| max. activation time | 90 s in 30 min. (at 20 °C) |

Solenoid Valve for TriBox Mini

03A000000



The TriBox Mini supports operation of an external controllable pneumatic valve for the purpose of compressed air cleaning. All settings for the solenoid valve can be adjusted by the TriBox Mini menu ("Measurement & Cleaning" → subitem „Cleaning“).

The solenoid valve can easily be installed. It features four 5.3 mm installation holes.

Available configurations:

- interval cleaning
- duration of cleaning
- pause before measurement



Technical Specifications

| | |
|--------------------------------|--|
| Size | 110 x 97 x 55 mm |
| Weight | 0.6 kg |
| Max. Pressure | 6 bar |
| Connection | for 6 mm hoses (4 mm inner diameter) |
| Housing | die-cast aluminium alloy |
| Protection type | IP65 |
| Connection cable length | 1 m |
| Temperature Range | 0...+40 °C |

SolidCAL 20AXX000X



Solid secondary standard for TriOS enviroFlu-HC or microFlu fluorometer

The SolidCAL solid secondary standard enables fast function- and calibration checks of the TriOS fluorometers enviroFlu-HC (for PAH detection) or microFlu (for the detection of chl-A, CDOM, or phycocyanin). The easy handling of the standard ensures fast and accurate device verification directly at the site. A standard is available for each TriOS fluorometer – for enviroFlu-HC also in different concentrations. In addition to the standard, the SolidCAL kit includes cleaning accessories and a carrier.



FieldCAL

20A210003

Secondary standard for RAMSES radiometer

The FieldCAL secondary standard enables reliable calibration and function tests of RAMSES radiometers in the field. Thanks to the special design, radiance (ARC), as well as irradiance (ACC) sensors can be checked. An adapter tube used for radiance sensors is included in the set. Small dimensions and a sturdy transport box make FieldCAL a useful tool for light measurements in the field.



Benefits

- High stability
- Battery-powered
- Small size
- Ease of use
- For irradiance and radiance sensors

Technical Specifications

| | |
|-------------------------|---|
| Wavelength range | 430...730 nm 310...50 nm (with software extrapolation) |
| Light source | White LED with spherical diffuser |
| Stability | Type Better than 1 % after 1 minute |
| Battery | 4 x AA (not rechargeable) |
| Operating time | Typ. 50 hours per battery charge |
| Material | POM, seawater-resistant plastic |
| Dimensions (ØxL) | 50 mm x 140 mm 50/60 mm x 182 mm (mit ACC Adapter) |



FlowCell FC 48/10 USC

10A100012



FlowCell with integrated ultra sonic cleaning

In addition to the standard FlowCell, TriOS now also offers an ultra sonic FlowCell which combines the bypass-installation with direct cleaning.

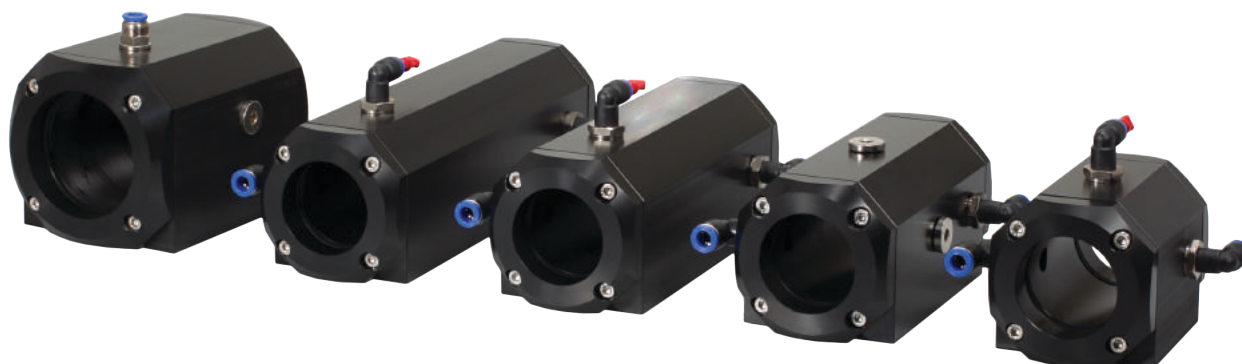
Fouling on the measurement windows can be prevented by

the use of ultrasound. The condition of the optical path can be monitored at any time through the inspection window and the lighting unit.

The FlowCell FC 48/10 USC is suitable for sensors with a maximum path length of 10 mm.

Durchflusszelle

10A10000X



FlowCell for eCHEM and NEPH Sensors

10A0X0000



Modular FlowCell system with easy assembly concept

This FlowCell was solely developed for our eCHEM and nephelometry product range and is based on a simple but clever system. By only one screw rotation, the side parts of the FlowCell can be released and expanded by further modules. For wall-mounting, only the black mounting element has to be fixed at the wall. After this, the FlowCell is simply put in front of it and can be secured with a fixing bolt.

The base module comprises one complete FlowCell Unit and can be expanded by expansion modules, consisting of a flow unit, an O-ring and the mounting element.

This concept allows complete freedom in the conception of an application by giving the ability to change and adjust the system at any time.



Base Module



Expansion Module



FlowCell for NEPH Turbidity Clear Water

10A050000

To minimize the reflections and ensure precise measurements, TriOS has developed a customized FlowCell for the Turbidity Clear Water probe from the nephelometry line.

The black housing endures a low level of light reflections and enhances data quality.



Water Quality Panel

11A10000X



Panels

11A10000X



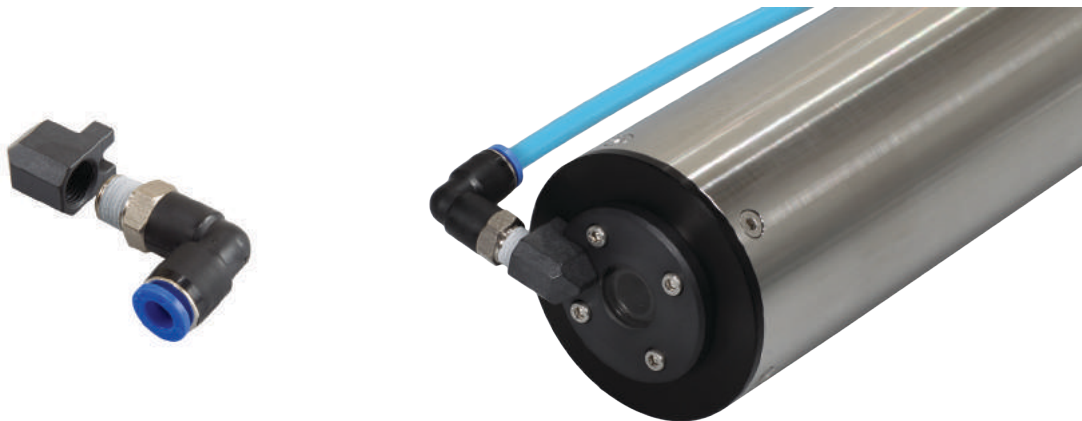
Float

05A000005



Air Clean Head for enviroFlu and microFlu

02A100003



Photometers

Fluorometers

Radiometers

Nephelometry

eCHEM

Controller

Accessories

Systems

Photometers

Fluorimeters

Radiometers

Nephelometry

eCHEM

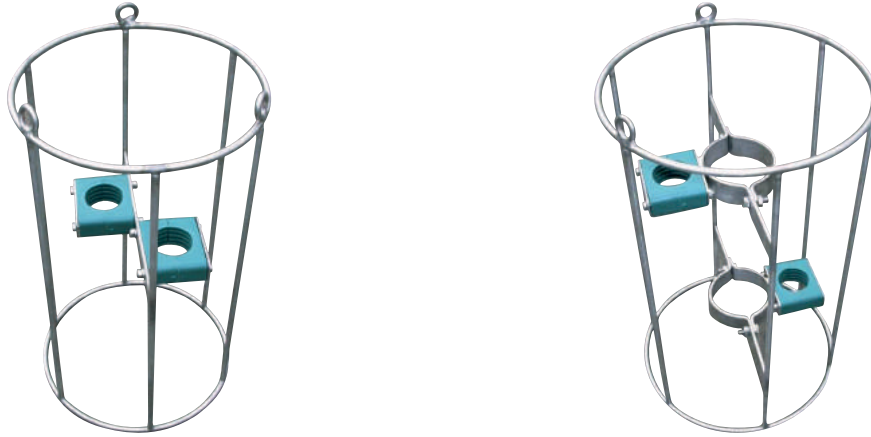
Controller

Accessories

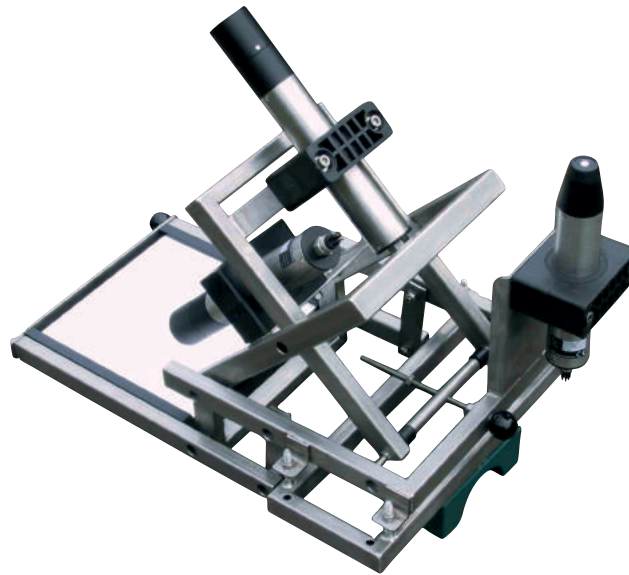
Systems

RAMSES Frames

05A000000 · 05A000001



05A000002



Clamp CL48 & CL68

01A100000X



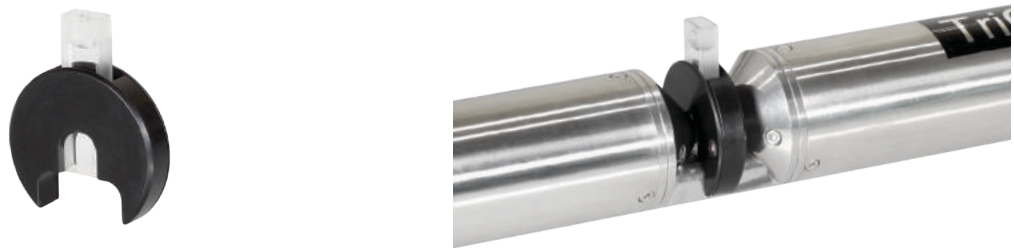
Protective Basket Cover for enviroFlu

00P100005



Cuvette Holder for 5mm quartz cuvettes on 10mm path*

10A200000



*For all photometers: OPUS, LISA, LISA color, VIPER, NICO

VALtub for validation of photometers*

10A30000X



*For all photometers: OPUS, LISA, LISA color, VIPER, NICO

Optic Cleaning Kit

05A000004



Cable

50A0XXXX0



Junction Box 5xM12

50A000001

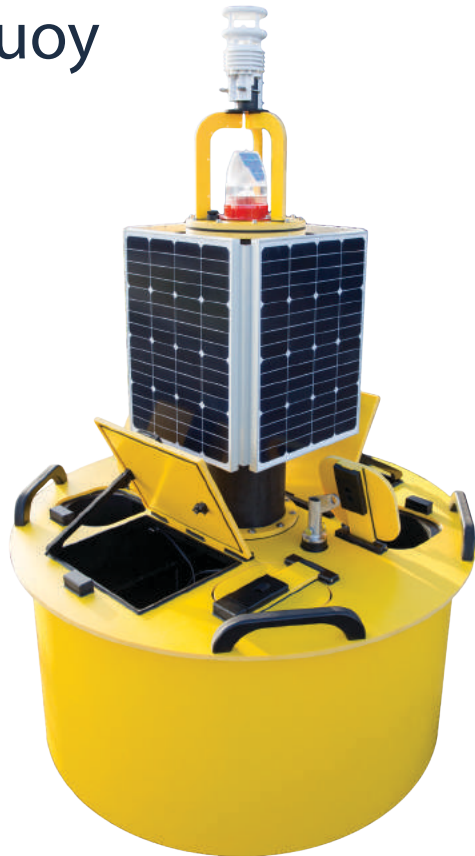






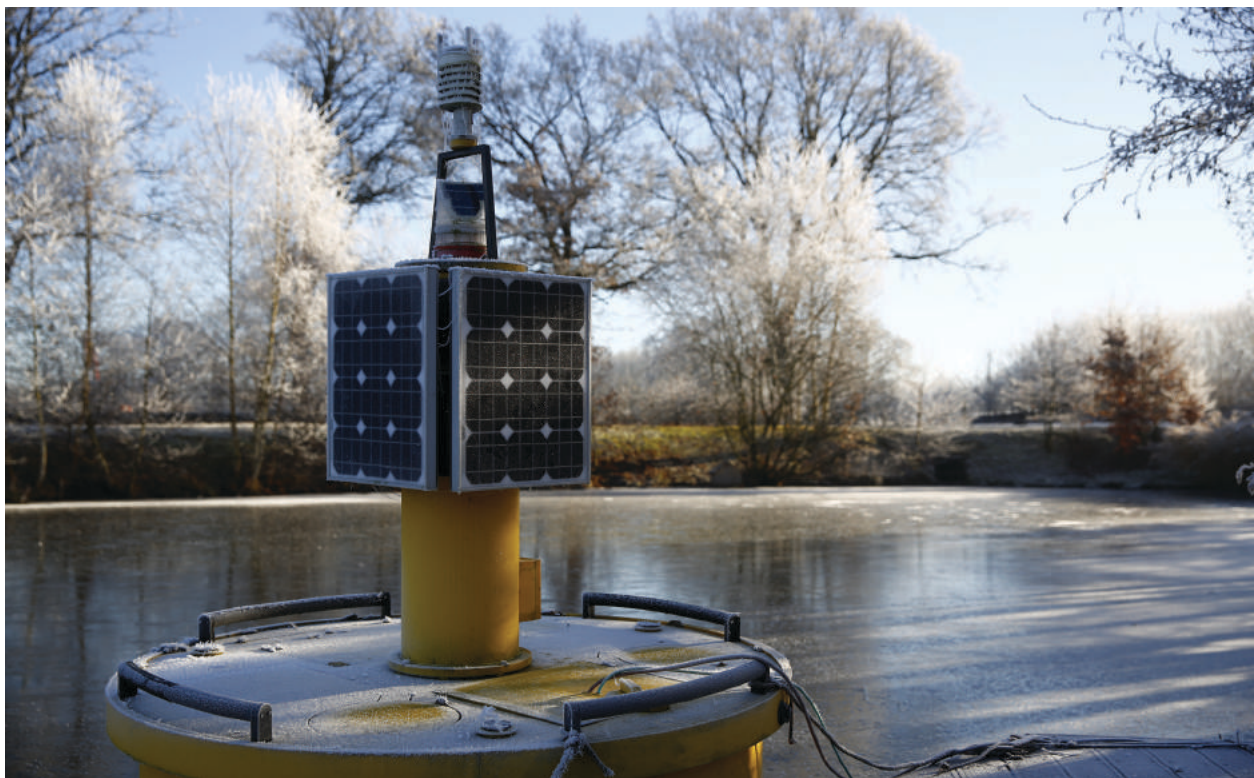
SYSTEMS

Buoy



Buoy-200 is a modern system of buoys for environmental monitoring of water quality in lakes, reservoirs, or rivers. Flexibility, robustness, easy access for maintenance and protection against vandalism were the main driving forces in

the development of Buoy-200. In addition to solar energy, the Buoy-200 can be equipped with a fuel cell (using a double cartridge) for operation in areas with low sunlight or in applications with higher power consumption. All sensors, batteries, control unit, cables, etc. are mounted protected inside the Buoy-200.



Demo Installation Box



Measuring system box for mobile, secure, autonomous monitoring on lakes or rivers, with frequently changing locations. Optionally equipped with e.g.

- controller
- heating
- compressor
- car battery
- charge controller for solar panel

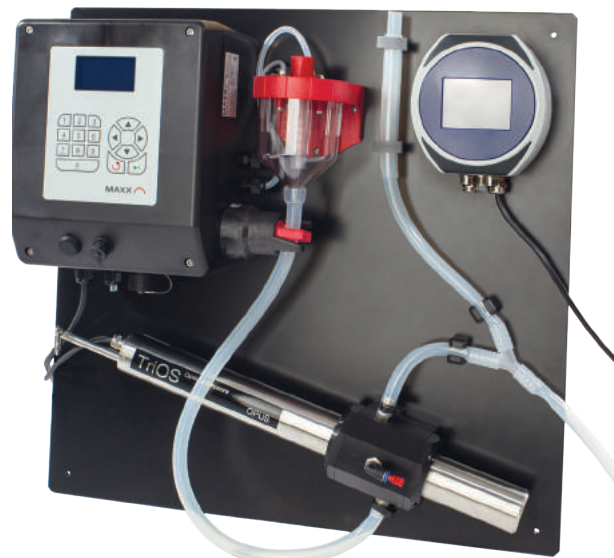


Online measurement with integrated wall-mounted sampler

For use in hard-to-reach measuring points TriOS has taken the proven stationary sampler with pressure-vacuum technology and combined it with optical, reagent-free sensors.

A clear display and numeric keypad allow programming in a very short time. The sampler offers time- and quantity-based sampling and is extremely low maintenance due to its simple design. It is weatherproof and can be mounted or fixed to a wall.

The pressure vacuum sampler operates according to ISO 5667 and thus meets the requirements for subsequent reproducible analysis with the integrated online sensor or analysis in the laboratory.





APPENDIX

Opus UV: measuring ranges depending on the path length*

| parameter | principle | unit | factor | path length [mm] | | | | | | | |
|---------------------------|--------------------|------|--------|------------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|
| | | | | 0.3 | 1 | 2 | 5 | 10 | 20 | 50 | |
| absorbance (AU) | spectral | AU** | - | 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 | 0.01...2.2 |
| absorbance (1/m) | spectral | 1/m | - | 50...7300 | 15...2200 | 7.5...1100 | 3...440 | 1.5...220 | 0.75...110 | 0.3...44 | 0.03...4.4 |
| 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 | 0.0006...0.2 |
| 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 | 0.0030...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 | 0.001...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 | 0.0033...10 |
| DOceq | spectral | mg/L | - | 17...3300 | 5.0...1000 | 2.5...500 | 1.0...200 | 0.5...100 | 0.25...50 | 0.1...20 | 0.01...20 |
| TOceq | spectral | mg/L | - | 17...3300 | 5.0...1000 | 2.5...500 | 1.0...200 | 0.5...100 | 0.25...50 | 0.1...20 | 0.01...20 |
| COdeq | spectral | mg/L | - | 100...7300*** | 30...2200*** | 15...1100*** | 6.0...440*** | 3.0...220*** | 1.5...110*** | 0.6...44*** | 0.06...44*** |
| BODEq | spectral | mg/L | - | 100...7300*** | 30...2200*** | 15...1100*** | 6.0...440*** | 3.0...220*** | 1.5...110*** | 0.6...44*** | 0.06...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 | 0.01...80 |
| SAC254 | single wavelengths | 1/m | - | 50...7300 | 15...2200 | 7.5...1100 | 3.0...440 | 1.5...220 | 0.75...110 | 0.3...44 | 0.03...44 |
| COD-SACeq**** | single wavelengths | mg/L | 1.46 | 75...10600 | 22...3200 | 11...1600 | 4.4...640 | 2.2...320 | 1.1...160 | 0.44...64 | 0.044...64 |
| BOD-SACeq**** | single wavelengths | 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 | 0.015...21 |
| TSSeq***** | single wavelengths | mg/L | 2.6 | 130...4300 | 40...1300 | 20...650 | 8.0...260 | 4...130 | 2.0...65 | 0.8...26 | 0.08...26 |

* under laboratory conditions

** absorbance unit

*** depending on the composition of the COD and BOD (sum parameter)

**** based on KHP (Note: 100 mg COD-standard-solution corresponds to 85 mg/L KHP)

***** based on SiO₂

Note:

1 mg/L N-NO₃ corresponds to 4.43 mg/L NO₃

1 mg/L N-NO₂ corresponds to 3.29 mg/L NO₂

VIPER: measuring ranges depending on the path length*

| parameter | according to | unit | factor | path length [mm] 10 | path length [mm] 50 | path length [mm] 100 | path length [mm] 150 | path length [mm] 250 |
|-----------------|-------------------------------|------------------|--------|---------------------|---------------------|----------------------|----------------------|----------------------|
| SAC 436 | DIN EN ISO 7887:2011_method B | 1/m | - | 1...250 | 0.2...50 | 0.1...25 | 0.06...17 | 0.04...10 |
| SAC 525 | DIN EN ISO 7887:2011_method B | 1/m | - | 1...250 | 0.2...50 | 0.1...25 | 0.06...17 | 0.04...10 |
| SAC 620 | DIN EN ISO 7887:2011_method B | 1/m | - | 1...250 | 0.2...50 | 0.1...25 | 0.06...17 | 0.04...10 |
| True Color 410 | DIN EN ISO 7887:2011_method C | mg/L Pt | 18.52 | 20...3750 | 4...750 | 2...375 | 1.2...250 | 0.8...150 |
| Pt-Co-Color 390 | DIN EN ISO 6271-2016:05 | mg/L Pt | 7.4 | 8...1500 | 1.6...300 | 0.8...150 | 0.4...100 | 0.2...60 |
| Pt-Co-Color 455 | DIN EN ISO 6271-2016:05 | mg/L Pt | 36.4 | 40...7500 | 8...1500 | 4...750 | 2.4...500 | 1.4...300 |
| Cr-Co-Color 380 | - | ° (color degree) | 9.7 | 10.0...2000 | 2...400 | 1...200 | 0.6...130 | 0.4...80 |
| Cr-Co-Color 413 | Gost 3351-74 | ° (color degree) | 34.1 | 40...7000 | 8...1400 | 4...700 | 2.6...450 | 1.6...275 |

* under laboratory conditions

LISA UV: measuring ranges depending on the path length*

| parameter | according to | unit | factor | path length [mm] 1 | path length [mm] 2 | path length [mm] 5 | path length [mm] 10 | path length [mm] 50 |
|------------------|-------------------------|--------|-----------------|--------------------|--------------------|--------------------|---------------------|---------------------|
| SAC 254 | DIN 38404-3: 2005-07 C3 | 1/m | - | 5...1500 | 2.5...750 | 1...300 | 0.5...150 | 0.1...30 |
| CODeq** | - | mg/L | 1.46 | 8...2200 | 4...1100 | 1.5...440 | 0.8...220 | 0.15...45 |
| BODeq** | - | mg/L | 0.48 | 2.5...700 | 1.25...350 | 0.5...140 | 0.25...70 | 0.05...15 |
| TOCeq** | - | mg/L | 0.584 | 3...880 | 1.5...440 | 0.6...175 | 0.3...90 | 0.06...20 |
| Turbidity 530 nm | - | FAU*** | 3.2054 / 0.0096 | 20...4000 | 10...1400 | 4...420 | 2...200 | 0.4...40 |

* under laboratory conditions

** based on KHP (Note: 100 mg COD-standard-solution corresponds to 85 mg/L KHP)

*** Formazin Attenuation Unit

LISA color: measuring ranges depending on the path length*

| parameter | according to | unit | factor | 10 | 50 | 100 | 150 | 250 |
|------------------|-------------------------------|------------------|---------------|-------------|------------|-----------|-----------|-----------|
| SAC 436 | DIN EN ISO 7887:2011_method B | 1/m | - | 0.5...150 | 0.1...30 | 0.05...15 | 0.03...10 | 0.02...6 |
| SAC 525 | DIN EN ISO 7887:2011_method B | 1/m | - | 0.5...150 | 0.1...30 | 0.05...15 | 0.03...10 | 0.02...6 |
| SAC 620 | DIN EN ISO 7887:2011_method B | 1/m | - | 0.5...150 | 0.1...30 | 0.05...15 | 0.03...10 | 0.02...6 |
| True Color 410 | DIN EN ISO 7887:2011_method C | mg/L Pt | 18.52 | 10.0...2800 | 2...560 | 1.0...280 | 0.6...185 | 0.4...110 |
| Pt-Co-Color 390 | DIN EN ISO 6271-2016:05 | mg/L Pt | 7.4 | 4.0...1100 | 0.8...220 | 0.4...110 | 0.3...75 | 0.2...45 |
| Pt-Co-Color 455 | DIN EN ISO 6271-2016:05 | mg/L Pt | 36.4 | 20...5500 | 4.0...1100 | 2.0...550 | 1.5...360 | 0.8...220 |
| Cr-Co-Color 380 | - | ° (color degree) | 9.7 | 5.0...1500 | 1.0...300 | 0.5...150 | 0.3...100 | 0.2...60 |
| Cr-Co-Color 413 | Gost 3351-74 | ° (color degree) | 34.1 | 20...5500 | 4.0...1100 | 2.0...550 | 1.5...360 | 0.8...220 |
| Turbidity 740 nm | - | FAU** | 6.0 / 0.01242 | 3...330 | 0.6...60 | 0.3...30 | 0.2...20 | 0.12...12 |

* under laboratory conditions

**Formazin Attenuation Unit

