TriOS
Optical Sensors

PRODUCT CATALOG
2018/2019

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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 NO_3-N, NO_2-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.

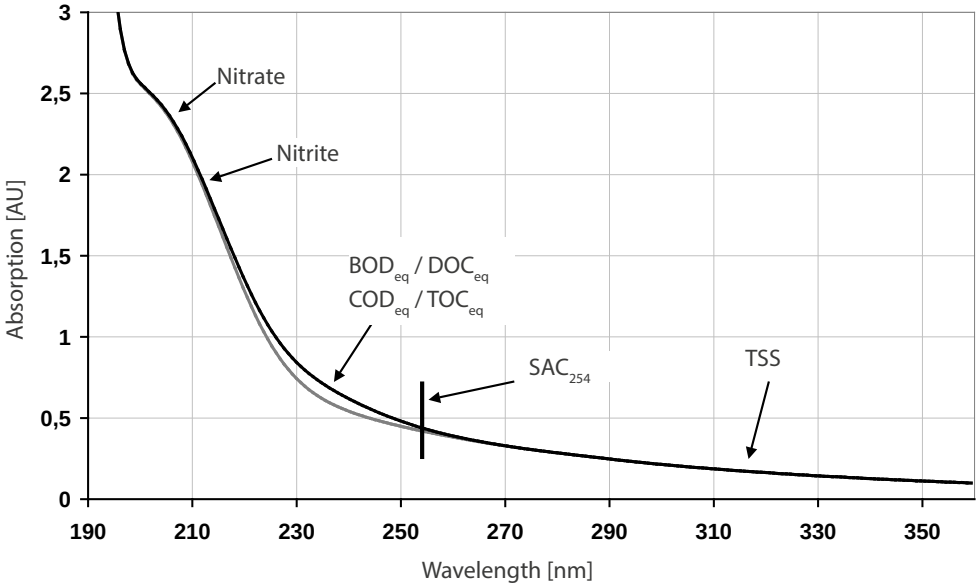
Benefits

- 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)	~ 18.5“ x 1.9“ (with 10 mm path)
Weight	stainless steel	~ 3 kg (with 10 mm path)	~ 6.6 lbs (with 10 mm path)
	titanium	~ 2 kg (with 10 mm path)	~ 4.4 lbs (with 10 mm path)
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	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig at 0.5 to 1.0 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

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	
	DOCeq	Spectral	mg/L	0...1000	5	10	1	
	TOCeq	Spectral	mg/L	0...1000	5	10	1	
	TSSeq	Spectral	mg/L	0...1500	60	200	20	
	KHP	Spectral	mg/L	0...4000	5	10	1	± (5 % + 2)
	SAC_{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	
	DOCeq	Spectral	mg/L	0...100	0.5	1	0.1	
	TOCeq	Spectral	mg/L	0...100	0.5	1	0.1	
	TSSeq	Spectral	mg/L	0...150	6	20	2	
	KHP	Spectral	mg/L	0...400	0.5	1	0.1	± (5 % + 0.2)
	SAC_{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	

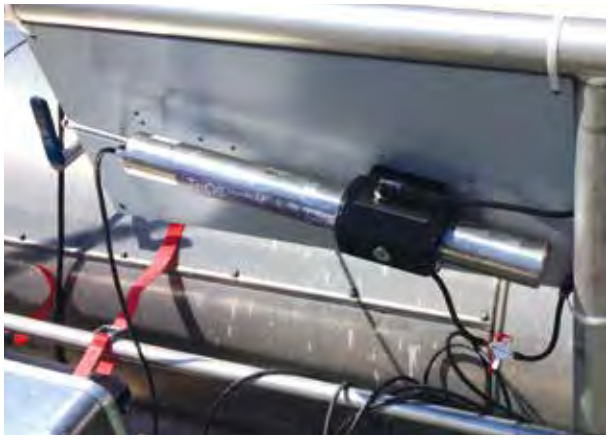
* Based on a standard calibration solution

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

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

1 mg/L NO_3-N correspond to 4.43 mg/L NO_3

1 mg/L NO_2-N correspond to 3.28 mg/L NO_2



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 low-cost 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 and internal data logger 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, which allows the use of a wide range of accessories for our devices. Furthermore the cutting-edge G2 interface enables quick integration into third-party systems.

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, NO_3, NO_x-N, NO_x (calibrated with NO_3 standard solution)	
Measuring range	1 mm path	0.5...60 mg/L NO_3-N	
	10 mm path	0.05...6 mg/L NO_3-N	
Measurement accuracy		± (5 % + 0.1)	
Turbidity compensation		Yes	
Data logger		~ 2 GB	
T100 response time		20 s	
Measurement interval		≥ 10 s	
Housing material		Stainless steel (1.4571/1.4404) or titanium (3.7035)	
Dimensions (L x Ø)		~ 470 mm x 48 mm (10 mm path)	~ 18.5“ x 1.9“ (with10 mm path)
Weight	stainless steel	~ 3 kg	~ 6.6 lbs
	titanium	~ 2 kg	~ 4.4 lbs
Interface	digital	Ethernet (TCP/IP)	
		RS-485 (Modbus RTU)	
Power consumption		≤ 7 W	
Power supply		12...24 VDC (± 10 %)	
Maintenance effort		≤ 0.5 h/month (typical)	
Calibration/maintenance interval		24 months	
System compatibility		Modbus RTU	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig at 0.5 to 1.0 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 to 33 fps

LISA UV

14SXXXXX0

LISA – The state of the art SAC_{254} 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 UVT_{254} 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	SAC_{254}	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	SAC_{254}	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)	~ 11.8" x 1.9" (with 10 mm path)
Weight	stainless steel	~ 2.7 kg (with 10 mm path)	~ 6 lbs (with 10 mm path)
	titanium	~ 1.9 kg (with 10 mm path)	~ 4.2 lbs (with 10 mm path)
Interface	digital version	Ethernet (TCP/IP)	
		RS-232 or RS-485 (Modbus RTU)	
	analog version	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)	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

VIPER

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 Warranty 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.

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.

Benefits

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

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)	~ 19.5″ x 1.9″ (with 50 mm path)
Weight	stainless steel	~ 2.4 kg (with 50 mm path)	~ 5.3 lbs (with 50 mm path)
	titanium	~ 1.3 kg (with 50 mm path)	~ 2.9 lbs (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	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1.0 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

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}.

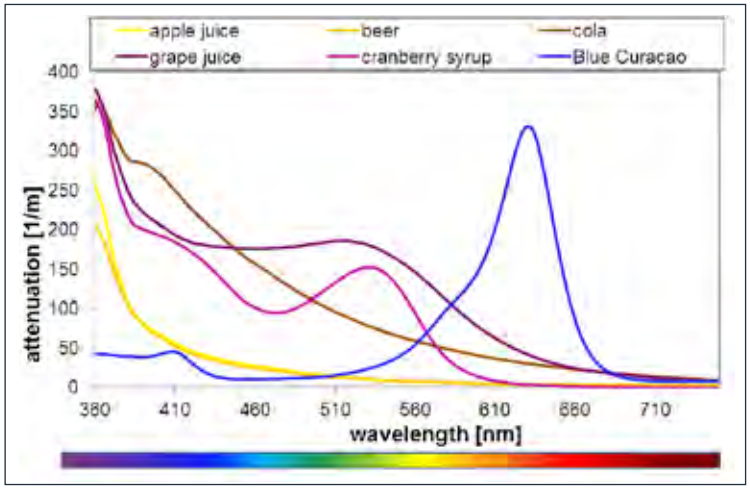
Depending on the customer's request, SACs in the entire wavelength range (such as SAC_{525}, SAC_{620}) can be determined, or individual opacity adjustments can be made.

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.

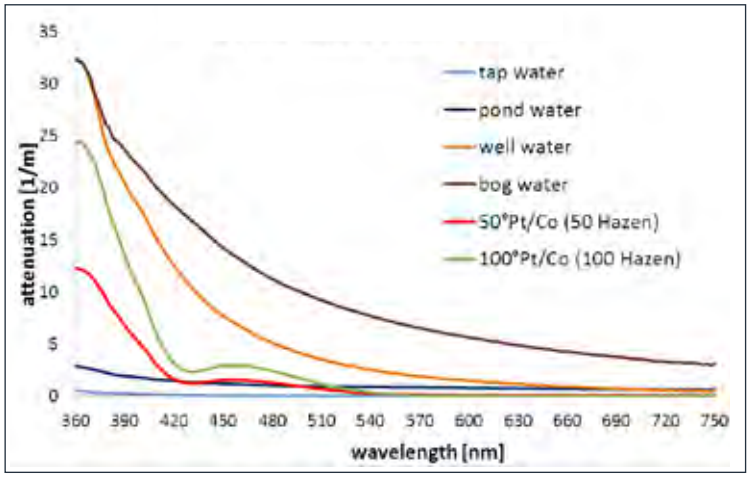


Coloring

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.

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 unified platform of all TriOS photometers also facilitates a standardized spare parts and consumables system, which allows the use of a wide range of accessories for our devices. Furthermore the cutting-edge G2 interface enables quick integration into third-party systems.

Benefits

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

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}	
		or Colouring (based on DIN EN ISO 7887 (410 nm, 436 nm, 525 nm or 620 nm))	
		or Pt-Co color number (APHA/Hazen) (390 nm or 455 nm)	
		or 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)	~ 13.4" x 1.9" (with 50 mm path)
Weight	stainless steel	~ 2.4 kg (with 50 mm path)	~ 5.3 lbs (with 50 mm path)
	titanium	~ 1.3 kg (with 50 mm path)	~ 2.9 lbs (with 50 mm path)
Interface	digital version	Ethernet (TCP/IP)	
		RS-232 or RS-485 (Modbus RTU)	
	analog version	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)	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1.0 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

Measuring range

Parameter variantions	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


150 mm

50 mm

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.

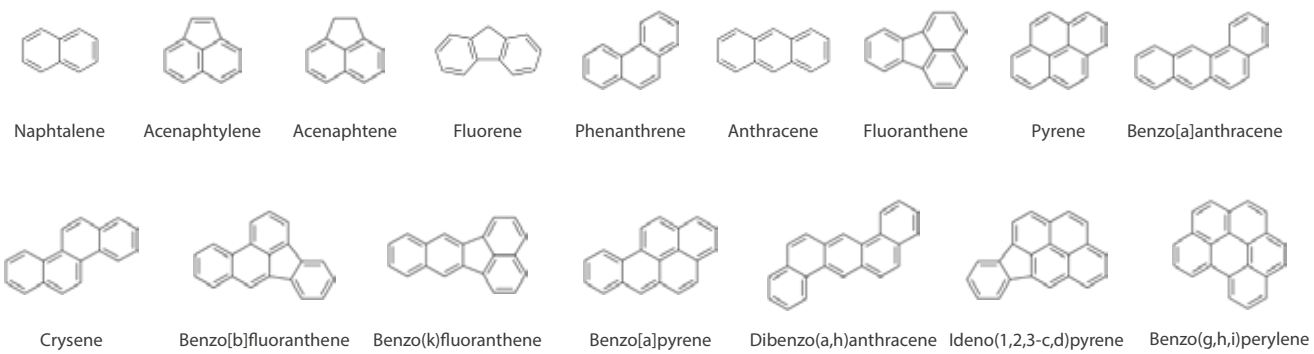
Application areas include the petrochemical industry, leakage detection in cooling and wastewater streams as well as environmental monitoring. The devices enable both stationary use in shafts, flows or piping, and mobile use through an optional hand-held measuring instrument. An innovative coating reduces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

Benefits

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

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)



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	~12.2″ x 2.6″
Weight	stainless steel	~ 2.7 kg	~ 6 lbs
	titanium	~ 1.9 kg	~ 4.2 lbs
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)	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		-5...+55 °C (0...+40 °C for specified accuracy)	~ +23 °F to +131 °F (~ 32 °F to 104 °F for specified accuracy)
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

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 online detection of algae (cyanobacteria, green algae, etc.) and is expanded by the detection of CDOM.

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 unified platform of all TriOS photometers also facilitates a standardized spare parts and consumables system, which allows the use of a wide range of accessories for our devices. Furthermore the cutting-edge G2 interface enables quick integration into third-party systems.

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

Detail of design for 4x4 wavelengths

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

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

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 [µg/L]	
		Phyocyanin [µg/L]	
		CDOM [µg/L]	
Measuring range		0...200 µg/L	0...200 ppb
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	~ 6.1˝ x 1.4˝
Weight	stainless steel	~ 0.6 kg	~ 1.3 lbs
	titanium	~ 0.5 kg	~ 1.1 lbs
Interface	digital	Ethernet (TCP/IP)	
		RS-232 oder RS-485 (Modbus RTU, OGC PUCK)	
Power consumption		≤ 1.8 W	
Power supply		12...24 VDC (± 10 %)	
Maintenance effort		≤ 0.5 h/month (typical)	
Calibration/maintenance interval		24 months	
System compatibility		Modbus RTU, OGC PUCK	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with Subconn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...5 m/s	~ 0.33 fps to 16.4 fps

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 [µg/L]
	or chlorophyll a [µg/L]
	or phycocyanin [µg/L]
	or rhodamine [µg/L]
	or fluorescein [µg/L]

Technical Specifications

Measurement technology	light source	LED	
	detector	Photo diodes	
Measurement principle		Fluorescence	
Parameter		See parameter list p. 30	
Measuring range		0...200 µg/L	0 to 200 ppb
Measurement accuracy		± 5 %	
Turbidity compensation		No	
Data logger		No	
T100 response time		6 s	
Measurement interval		3 s	
Housing material		Stainless steel (1.4571/1.4404) or titanium (3.7035)	
Dimensions (L x Ø)		171 mm x 36 mm	~ 6.7" x 1.4"
Weight	stainless steel	0.5 kg	~ 1.1 lbs
	titanium	0.4 kg	~ 0.9 lbs
Interface	digital	Ethernet (TCP/IP)	
		RS-232 or RS-485 (Modbus RTU)	
Power consumption	typical	< 1 W	
	with network	< 1.6 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)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1 gpm
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

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

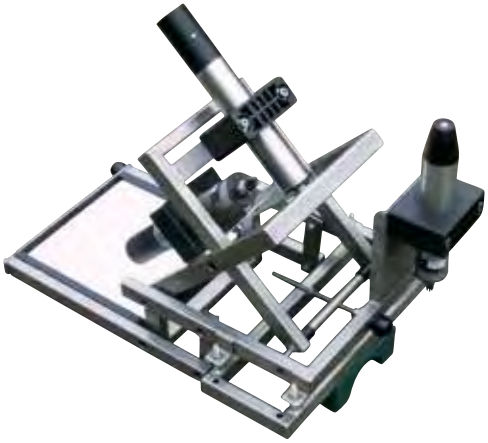
- Extremely low power consumption
- Environmentally robust
- World market leader

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. 36	
Measuring range		See parameter list p. 36	
Measurement accuracy		See parameter list p. 36	
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)		ACC 260 mm x 48 mm ASC 245 mm x 48 mm ARC 300 mm x 48 mm	ACC ~ 10.2″ x 1.9″ ASC ~ 9.6″ x 1.9″ ARC ~ 11.8″ x 1.9″
Weight	stainless steel	0.9 kg	~ 2 lbs
	titanium	0.7 kg	~ 1.5 lbs
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)	
Warranty		1 year (EU: 2 years)	US: 2 years

INSTALLATION

Max. pressure	with SubConn	30 bar	~ 435 psig
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature		+2...+40 °C	~ +36 °F to +104 °F
Storage temperature		-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity		0.1...10 m/s	~ 0.33 fps to 33 fps

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	320...950 nm		
Typical saturation (IT: 4 ms)**	20 W m^{-2} nm^{-1} (at 300 nm) 17 W m^{-2} nm^{-1} (at 360 nm) 18 W m^{-2} nm^{-1} (at 500 nm)	10 W m^{-2} nm^{-1} (at 400 nm) 8 W m^{-2} nm^{-1} (at 500 nm) 14 W m^{-2} nm^{-1} (at 700 nm)	1 W m^{-2} nm^{-1} sr^{-1} (at 500 nm)	20 W m^{-2} nm^{-1} (at 400 nm) 12 W m^{-2} nm^{-1} (at 500 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) 0.75 µW m^{-2} nm^{-1} (at 360 nm) 0.80 µW m^{-2} nm^{-1} (at 500 nm)	0.4 µW m^{-2} nm^{-1} (at 400 nm) 0.4 µW m^{-2} nm^{-1} (at 500 nm) 0.6 µW m^{-2} nm^{-1} (at 700 nm)	0.25 µW m^{-2} nm^{-1} sr^{-1}	0,8 µW m^{-2} nm^{-1} (at 400 nm) 0,6 µW m^{-2} nm^{-1} (at 500 nm) 0,8 µW m^{-2} nm^{-1} (at 700 nm)
Collector type	cosine response		FOV: 7° in air	Spherical, 2 Pi
Accuracy	Better than 6-10 % ***		Better than 6 % ***	Better than 5 % ***
Integration time	4 ms...8 s			

*) Specifications of Carl ZEISS AG, Germany **) IT: integration time ***) Depends on wavelength range

TURBIDITY

Turbidity Sensor TTurbXXX

81SX00000 · 81SX00010

The TTurb is a digital sensor for optical turbidity measurements according to the 90° IR scattered light method. Depending on the sensor it can be used in pure water up to 100 NTU as well as in raw-, waste- and process waters up to 4000 NTU. TTurb is available with a 10 m or a 2 m fixed cable.

TTurb100	0...100 NTU
TTurb400	0...400 NTU
TTurb1000	0...1000 NTU
TTurb4000	0...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
- 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

Measurement technology	Light source LED Detector photo diode	
Measurement principle	Nephelometry	
Parameter	Turbidity	
Measuring range	0...100, 0...400, 0...1000, (0...4000 opt.) NTU	
Measurement accuracy	± 2 % FS	
Measurement wavelength	860 nm, FWHM 30 nm	
T100 response time	6 s	
Measurement interval	3 s	
Housing material	PET / POM / NBR	
Dimensions (L x Ø)	170 x 36 mm	~ 6.7″ x 1.4″
Weight	0.3 kg	~ 0.7 lbs
Interface	Ethernet (TCP/IP) RS-485 (Modbus RTU)	
Power consumption	typically <0.9 W with network < 1.5 W	
Power supply	12...24 VDC (± 10 %)	
Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	24 months	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	3 bar	~ 43.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+40 °C	~ +32 °F... +104 °F
Ambient temperature	0...+40 °C	~ +32 °F... +104 °F
Storage temperature	0...+80 °C	~ +32 °F... +176 °F
Inflow velocity	0.1 m/s	~ 0.33 fps

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 measurement of attenuation.

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

Measurement technology	Optical meaurement by menas of attenuation	
Measurement principle	Absorption / attenuation	
Parameter	TSS	
Measuring range	0...30 g/L	
Measurement accuracy	± 3 % of FS	
Measurement wavelength	880 nm	
Response time	90 % of value in 5 sec	
Housing material	stainless steel 1.4401	
Dimensions (L x Ø)	210 x 42 mm	~ 8.3″ x 1.7″
Weight	1.64 kg (with 10 m cable)	~ 3.6 lbs (with 10 m cable)
Process connection	1″ GAS	
Interface	RS-485, Modbus RTU	
Power consumption	3 W	
Power supply	12...24 VDC (± 10 %)	

Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	24 months	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	4 bar	~ 58 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+60 °C	~ +32 °F... +140 °F
Ambient temperature	0...+60 °C	~ +32 °F... +140 °F

eCHEM

pH Sensor Digital TpH

80S100000 · 80S100010

Robust digital pH sensor for operation on TriBox controllers and HS100 DIN 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. TpH is available with a 10 m or a 2 m fixed cable.

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

Measurement technology	pH-electrode	
Measurement principle	Potentiometry	
Parameter	pH-value, temperature	
Measuring range	0...14 pH	
Measurement accuracy	± 0.05 pH	
Temperature compensation	Pt1000	
Response time	90 % of value in 5 sec	
T100 response time	10 s	
Measurement interval	5 s	
Housing material	PPS / PET / NBR	
Dimensions (L x Ø)	~ 180 x 27 mm	~ 7.1″ x 1.1″
Weight	~ 110 g	~ 0.2 lbs
Interface	RS-485, Modbus RTU	
Power consumption	0.2 W	
Power supply	12...24 VDC (± 10 %)	

Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	4 weeks	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	3 bar	~ 43.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+100 °C	~ +32 °F... +212 °F
Ambient temperature	0...+70 °C	~ +32 °F... +158 °F
Inflow velocity	0.,1 m/s	~ 0.33 fps

pH Sensor Digital Differential TpH-D

80S200000 · 80S200010

Robust digital differential pH sensor for operation on TriBox controllers and HS100 DIN rail 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. TpH-D is available with a 10 m or a 2 m fixed cable.

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 with TriBox controller

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

Measurement technology	pH electrode with additional reference-pH-electrode in pH7 buffer solution	
Measurement principle	Potentiometry	
Parameter	pH-value, temperature	
Measuring range	0...14 pH	
Measurement accuracy	± 0.03 pH	
Temperature compensation	Pt1000	
Response time	95 % of value in 5 sec	
T100 response time	10 s	
Measurement interval	5 s	
Housing material	PPS / PET / NBR	
Dimensions (L x Ø)	~ 225 x 32 mm	~ 8.9″ x 1.3″
Weight	180 g	~ 0.4 lbs
Interface	RS-485, Modbus RTU	
Power consumption	0.2 W	

Power supply	12...24 VDC (± 10 %)	
Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	4 weeks	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	3 bar	~ 43.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+95 °C	~ +32 °F... +203 °F
Ambient temperature	0...+70 °C	~ +32 °F... +158 °F
Inflow velocity	0.1 m/s	~ 0.33 fps

Redox Sensor Digital TORP

80S300000 · 80S300010

Robust digital REDOX sensor for operation on TriBox controllers and HS100 DIN 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. TORP is available with a 10 m or a 2 m fixed cable.

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

Measurement technology	ORP Redox electrode	
Measurement principle	Potentiometry	
Parameter	REDOX, temperatue	
Measuring range	-1000...+1000 mV	
Measurement accuracy	± 1 mV	
Temperature compensation	Pt1000	
Response time	95 % of value in 10 sec	
T100 response time	15 s	
Measurement interval	5 s	
Housing material	PPS / PET / NBR	
Dimensions (L x Ø)	~ 180 x 27 mm	~ 7.1″ x 1.1″
Weight	~ 110 g	~ 0.2 lbs
Interface	RS-485, Modbus RTU	
Power consumption	0.2 W	
Power supply	12...24 VDC (± 10 %)	

Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	4 weeks	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	3 bar	~ 43.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+100 °C	~ +32 °F... +212 °F
Ambient temperature	0...+70 °C	~ +32 °F... +158 °F
Inflow velocity	0.1 m/s	~ 0.33 fps

Conductivity Sensor TCon

80S400000 · 80S400010

Digital sensor to measure conductive conductivity especially in pure media, for operation on TriBox controllers and HS100 DIN rail module. The digital technology ensures secure and interference-free signal transmission from the sensor to the controller. TCon is available with a 10 m or a 2 m fixed cable.

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

Measurement technology	conductive with 2 graphite electrodes	
Measurement principle	Conductometry	
Parameter	Conductivity, temperature	
Measuring range	0...20000 µS	
Measurement accuracy	± 1 µS	
Temperature compensation	Pt1000	
Response time	95 % of value in 10 sec	
T100 response time	10 s	
Measurement interval	5 s	
Housing material	PPS / PET / NBR	
Dimensions (L x Ø)	180 x 27 mm	~ 7.1″ x 1.1″
Interface	RS-485, Modbus RTU	
Power consumption	0.2 W	
Power supply	12...24 VDC (± 10 %)	
Connector	8-pin M12-plug	

Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	4 weeks	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	3 bar	~ 43.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+70 °C	~ +32 °F... +158 °F
Ambient temperature	0...+70 °C	~ +32 °F... +158 °F
Inflow velocity	0.1 m/s	~ 0.33 fps

Dissolved Oxygen Sensor Digital

90S5311X0 · 90S5341X0

Calibration-free measuring sensor for dissolved oxygen according to the luminance method. Digital value transmission to the controller. No interference by H_2S, reducing or oxidizing substances. Evaluation via display unit. The dissolved oxygen sensor is available with a 10 m or a 2 m fixed cable.

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

Measurement technology	Optical measurement	
Measurement principle	Luminescence	
Parameter	Dissolved Oxygen	
Measuring range	0...20 mg/L	
Measurement accuracy	± 0.1 mg/L	
Temperature compensation	Via NTC	
Response time	90 % of value in < 60 sec	
Measurement interval	> 5 s	
Housing material	Stainless steel (316L) or titanium	
Dimensions (L x Ø)	146 x 25 mm	~ 5.7″ x 1″
Weight	VA: ~ 450 g Ti: ~ 300 g	VA: ~ 1 lbs Ti: ~ 0.7 lbs
Interface	RS-485, Modbus RTU	
Power consumption	1 W	
Power supply	12...24 VDC (± 10 %)	

Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	24 months	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	5 bar	~ 72.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+50 °C	~ +32 °F... +122 °F
Ambient temperature	0...+50 °C	~ +32 °F... +122 °F
Storage temperature	-10...+60 °C	~ +14 °F... +140 °F
Inflow velocity	no movement necessary	

Free Chlorine Sensor Digital

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. The Sensor has a plug and is not delivered with a fixed cable.

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

Measurement technology	membrane-covered, potentiostatic amperometric 3-electrode system	
Measurement principle	Amperometry	
Parameter	Free chlorine with reduced pH-dependency	
Measuring range	0...2 mg/L, 0...20 mg/L	
Measurement accuracy	Measurement range 2 mg/L: at 0.4 mg/L & 1.6 mg/L < 1 % Measurement range 20 mg/L: at 4 mg/L < 1 % at 16 mg/L W37< 3 %	
Temperature compensation	automatic through integrated temperature sensor Pt100	
Response time	T90: ~ 2 min	
Housing material	Micro-porous hydrophylic membrane, PVC-U, Stainless steel 1.4571	
Dimensions (L x Ø)	205 x 25 mm	~ 8″ x 1″
Weight	0.1 kg	~ 0.2 lbs
Interface	RS-485, Modbus RTU	

Power consumption	0.6 W	
Power supply	12...24 VDC (± 10 %)	
Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	Membrane cap change: every 24 months Electrolyte change: every 24 months	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	3 bar	~ 43.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	0...+45 °C	~ +32 °F... +113 °F
Ambient temperature	0...+55 °C	~ +32 °F... +131 °F
Storage temperature	+5...+35 °C	~ +41 °F... +95 °F

Chlorine Dioxide Sensor Digital

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! The Sensor has a plug and is not delivered with a fixed cable.

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

Measurement technology	Membrane-covered, amperometric 2-electrode system	
Measurement principle	Amperometry	
Parameter	Chlorine dioxide	
Measuring range	0...2 mg/L, 0...20 mg/L	
Measurement accuracy	Measurement range 2 mg/L: at 0.4 mg/L & 1.6 mg/L < 1% Measurement range 20 mg/L: at 1.5 mg/L < 0.1%	
Temperature compensation	Automatic through integrated temperature sensor Pt100	
Response time	T90: ~ 1 min	
Housing material	PVC-U, Stainless steel 1.4571	
Dimensions (L x Ø)	205 x 25 mm	~ 8.1″ x 1″
Weight	0.12 kg	~ 0.3 lbs
Interface	RS-485, Modbus RTU	
Power consumption	0.6 W	
Power supply	12...24 VDC (± 10 %)	

Connector	8-pin M12-plug	
Maintenance effort	≤ 0.5 h/month (typical)	
Calibration/maintenance interval	Membrane cap change: every 24 months; Electrolyte change: every 3 - 6 months	
System compatibility	Modbus RTU	
Warranty	1 Year (EU: 2 years) on electronics; All wearing parts are not included in the warranty	
Max. pressure	1 bar	~ 14.5 psig
Protection type	IP68	NEMA 6P
Sample temperature	+5...+50 °C	~ +41 °F... +122 °F
Ambient temperature	+5...+55 °C	~ +41 °F... +131°F
Storage temperature	+5...+35 °C	~ +41 °F... +95 °F

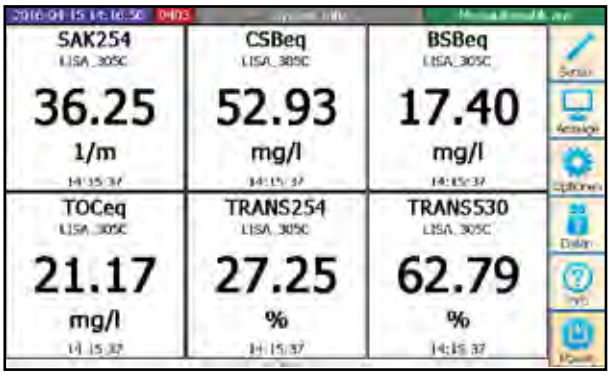
CONTROLLER

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.



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
- Also Available without WiFi

Technical Specifications

ENERGY SUPPLY	
Voltage supply	100...240 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 mm²	16 AWG
Error indicator	0 mA	
SWITCH INPUT/OUTPUT		
Measuring trigger	Triggers for global measurement (galvanically separated)	
	Control voltage: 10...26 VDC Terminal: 1.5 mm²	Control voltage: 10 - 26 VDC Terminal: 16 AWG
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 mm²	Max. 14 AWG
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 via USB stick possible	
Data export	Via USB 2.0 Host	
AMBIENT		
Operating temperature	0...+40 °C	~ +32 ˚F to +104 ˚F
Storage temperature	-20...+70 °C	~ -4 ˚F to +158 ˚F
Relative air humidity	0...95 % (non-condensing)	
Protection type	IP65	NEMA 4X
MECHANICS		
Dimensions	280 x 170 x 94 mm	~ 11″ x 6.7″ x 3.7″
Weight	3.7 kg	~ 8.2 lbs
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 with Modbus communication
- Low-cost alternative to analog measuring points
- Integrated data logger with service logbook
- WiFi for communication via web browser

TriBox mini NET

20C100000

The TriBox mini NET has an Ethernet Connection on the right port instead of a WiFi module.

Technical Specifications

ENERGY SUPPLY	
Voltage supply	100...240 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	**TB mini**	WiFi IEEE 802.11b/g/n	
	TB mini NET	Ethernet IEEE 802.3i	
Connection	**TB mini**	Built-in WiFi antenna	
	TB mini NET	Sensor interface COM2 (right)	
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 mm²	16 AWG
Error indicator	No	

SWITCH INPUT/OUTPUT

Measuring trigger	No	
Control voltage	12 VDC (only for TriOS accessories), terminal: max. 2.5 mm²	12 VDC (only for TriOS accessories), terminal: max. 14 AWG

RELAY OUTPUTS

Electrical specification	1 x relay switching contact (SPDT)/250 VAC, 2 A/30 VDC, 2 A	
Connection terminals	Max. 2.5 mm²	Max. 14 AWG

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	**TB mini**	Via WiFi (compressed tar file)
	TB mini NET	via Ethernet

AMBIENT

Operating temperature	0...+40 °C	~ +32 °F to +104 °F
Storage temperature	-20...+70 °C	~ -4 °F to +158 °F
Relative air humidity	0...95 % (non-condensing)	
Protection type	IP65	NEMA 4X

MECHANICS

Dimensions (H/W/D)	150 x 139 x 80 mm	~ 5.9" x 5.5" x 3.2"
Weight	1.6 kg	~ 3.5 lbs
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 (± 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 (± 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	~ +32 °F to +104 °F
Storage temperature	-20...+70 °C	~ -4 °F to +158 °F
Relative air humidity	0...95 % (non-condensing)	
Protection type	IP20	NEMA 1
MECHANICS		
Dimensions	45 x 99 x 119 mm	~ 1.8″ x 3.9″ x 4.7″
Weight	0.25 kg	~ 0.5 lbs
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	~ +32 °F to +104 °F
Storage Temperature	-20...+70 °C	~ -4 °F to +158 °F
Relative air humidity	0...95 % (non-condensing)	
Protection type	IP20	NEMA 1
MECHANICS		
Dimensions (W/H/D)	60 x 35 x 126 mm / 60 x 35 x 162 mm	~ 2.4″ x 1.3″ x 5″ / ~ 2.4″ x 1.3″ x 6.4″

FlowCell for TriOS Photometers and Fluorometers

10A10000X

FlowCell for Turbidity Sensors

10A050000

To minimize the reflections and ensure precise measurements, TriOS has developed a customized FlowCell for the sensors from the turbidity line.

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

This FlowCell is compatible with the white FlowCell for eCHEM sensors.

FlowCell FC 48/10 Ultrasonic

10A100012

FlowCell with integrated ultra sonic cleaning

In addition to the standard FlowCell, TriOS now also offers an ultrasonic 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 monitoring window and the lighting unit.

The FlowCell FC 48/10 USC is suitable for all TriOS photometers with a path length of up to 10 mm.

Technical Specifications

ENERGY SUPPLY		
Voltage supply	12...24 VDC (± 10%)	
Power consumption	≤ 15 W	
Control connection	Trigger input to initiate ultrasonic cleaning (galvanically isolated), Control voltage 5 – 24 VDC Connection via M5-connector (a suitable M5 connection cable with open end is included in the delivery)	
Power cable	M5-connector with optional DC power adapter cable and suitable 230V-power supply	
AMBIENT		
Operating temperature	+1...+40 °C	~ +33.8 °F to +104 °F
Storage temperature	-20...+70 °C	~ -4 °F to +158 °F
Protection type	IP64	NEMA 4
MECHANICS		
Dimensions W/H/D	115 x 136 x 90 mm	~ 4.5″ x 5.4″ x 3.5″
Weight	1 kg	~ 2.2 lbs
Materials	Housing: Polyoxymethylene (POM)	

FlowCell for eCHEM Sensors

10A0X0000

Modular FlowCell system with easy assembly concept

This FlowCell was solely developed for our eCHEM 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 FlowCell Base Unit and can be expanded by further base modules and closing side modules.

This concept allows complete freedom in the conception of an application by giving the ability to change and adjust the system at any time. This FlowCell system is compatible with the black Turbidity FlowCell.

Base Module

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 activation time settings are between 6 s cleaning at an interval of 2 min (at 20 °C) and 90 s in 30 min.

The standard setting is 15 s in 15 min.

Technical specifications

ENERGY SUPPLY		
Voltage supply	100...240 VAC, max. 4A	
INTERFACES		
Connection	for 6 mm hoses (4 mm inner diameter)	
Power Cable Length	3 m	~ 9´ 8˝
Control Line Length	5 m	~ 16´ 4˝
DISPLAY		
LED	3 x Status LED	
AMBIENT		
Temperature Range: Impulse Box	-5...+40 °C	~ +23 °F to +104 °F
Temperature Range: Compressor	-20...+35 °C	~ -4 °F to +95 °F
Protection type	IP44	NEMA 3
MECHANICS		
Size width/height/depth	Compressor: 190 x 260 x 125 mm Impulse Box: 125 x 150 x 65 mm	Compressor: ~ 7.5˝ x 10.2˝ x 4.9˝ Impulse Box: ~ 4.9˝ x 5.9˝ x 2.6˝
Weight	3.9 kg	~ 8.6 lbs
Housing	Polycarbonate	
SETTINGS		
Standard	15 s in 15 min	
Max. activation time	6 s in 2 min	
	90 s in 30 min (at 20 °C)	90 s in 30 min (at +68 °F)
Max. Pressure	7 bar	~ 101.5 psig

Solenoid Valve for TriBox Mini

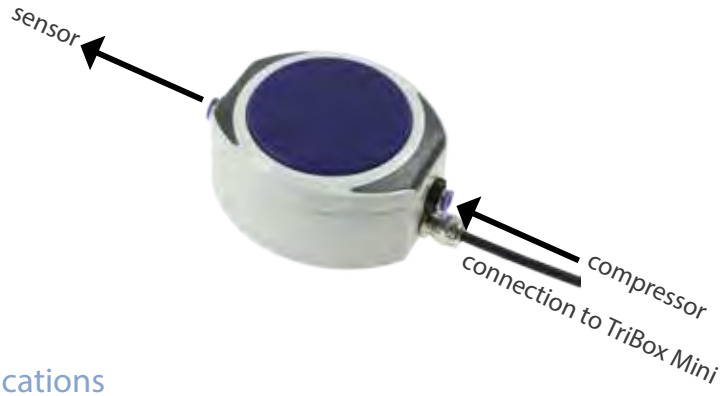
03A000000

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	~ 4.3″ x 3.8″ x 2.2″
Weight	0.6 kg	~ 1.3 lbs
Max. Pressure	6 bar	~ 87 psig
Connection	for 6 mm hoses (4 mm inner diameter)	
Housing	die-cast aluminium alloy	
Protection type	IP65	NEMA 4X
Connection cable length	1 m	~ 3´ 3″
Temperature Range	0...+40 °C	~ +32 °F to +104 °F

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), microFlu and nanoFlu (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	~ 2″ x 5.5″
	50/60 mm x 182 mm (with ACC Adapter)	~ 2″/2.4″ x 7.2″ (with ACC Adapter)

Wiper W55

02A10000X

Technical Specifications

ENERGY SUPPLY		
Power supply	12...24 VDC (± 10 %)	
Power consumption	about 2-6 W in operation; max. 30mW in standby	
INSTALLATION		
Path lengths	1 mm, 2 mm, 5 mm, 10 mm	
Max. pressure	3 bar	~ 43.51 PSIG
Protection type	IP68	NEMA 6P
Sample temperature	2...40 °C	~ +35.6 °F to +104 °F
Inflow velocity	up to 10 m/s	up to 32.8 fps
CONTROL		
Trigger input	+5 V...+24 VDC ±10%	
Power consumption of trigger input	2...15 mA	
Operating period (max.)	10 seconds	
AMBIENT		
Storage temperature	-10...+70 °C	~ +14 °F to +158 °F
MECHANICS		
Dimensions L x Ø	175 mm x 80 mm	~ 6.9" x 3.2"
Weight	< 1 kg	< 2.2 lbs
Materials	NBR, POM, Rubber, Titanium, V4A	
Warranty	1 Year (EU: 2 Years)	

Float

05A000005

The TriOS Float is the ideal solution for applications with fluctuating water levels. The scope of delivery includes sensor mountings in two sizes, so that TriOS Photometer with 48 mm diameter as well as the enviroFlu with 68 mm diameter can be attached. One device can be mounted at the float.

Additionally TriOS also offers mountings for small sensors such as nanoFlu (05A000006). In that case, up to three sensors can be attached to the float at the same time.

The Float remains floating at the water surface while the sensor is always submerged in the measured medium. For controlling of cleaning purposes the float can easily be taken out of the measured medium using the handle. Lateral attachments in form of stainless steel ropes prevent the float from drifting away.

Water Quality Panel

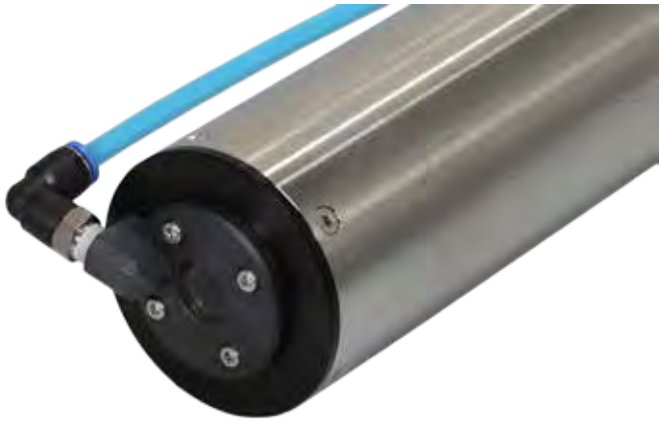
11A10000X

Panels

11A10000X

Air Clean Head for enviroFlu

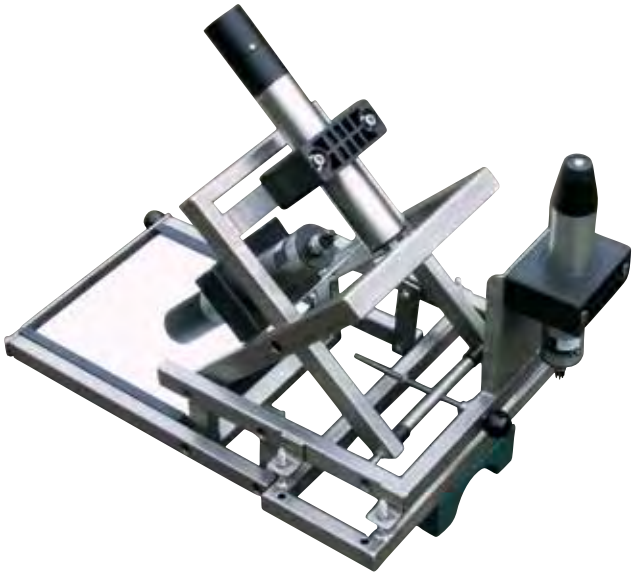
02A100003



RAMSES Frames

05A000000 · 05A000001

05A000002



Clamp CL48 & CL68

01A100000X

Protective Basket Cover for enviroFlu or Wiper W55

00P100005 · 00P100010

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

TriOS Buoy-175 is a modern state-of-the-art instrumentation platform for environmental monitoring of water quality in small lakes, reservoirs or rivers. Flexibility, robustness, easy servicing access and protection for vandalism have been the main driving forces during the development of Buoy-175.

A large technical compartment contains batteries, controller, cables, etc. It is connected inside the Buoy -175 to the easy accessible Sensor Sections. The Sensor Sections are 4 locked build –in Moon Pools in the buoy that protect the sensors and measuring instruments.

The system is supplied with a range of sensors that can specified by the customer. All buoys are fitted with solar panels and batteries. An airblast cleaning system used on many TriOS sensors, Navigation/warning lights and other markings together with telemetry options are available, selected to suit both the location and application requirements.

Each of the 4 sensor frames can hold up to four sensors and is completely adaptable to any applications needs.

Possible options:

- Data Controller
- Airblast system
- Topmarks (e.g. St. Andrews Cross)
- Marine lantern
- Weather station/Meteorological sensor package
- Telemetry
- Expandable battery pack from 2 to 8 cells

Features & Benefits

- Low operational costs
- Easy to deploy and service
- Expandable to allow new sensors
- Supports a variety of options

Technical Specifications

Hull structure	Welded UV stabilized polyethylene. Internally cross-braced with steel rods and connected to the stainless steel bushings in the mooring and lifting eyes. The hull is also filled with PUR foam to prevent water ingress in the event of hull damage.	
Tower	UV stabilized polyethylene	
Mooring	Single bridle	
Deployment	2 lifting eyes	
Finish	Colour pigment blended into polyethylene. No painting required	
Hull diameter	1620 mm	~ 63.8″
Total height *	2040 mm	~ 80.3″
Freeboard*	400 mm	~ 15.7″
Draft*	500 mm	~ 19.7″
Tower height	1040 mm	~ 41″
Focal height	1500 mm	~ 59.1″
Hull buoyancy	1400 kg	~ 55.1″
Reserve buoyancy *	780 kg	~ 30.7″
Full weight*	620 kg	~ 24.4″
Solar panels (Wp)	4 x 60 with MPPT charge controller	
Batteries12V (Ah)	120 – 480 (2 – 8 cells)	
Battery type	AGM lead-acid	

* without sensors and sensor frames, full battery pack and no other options

Sampler

11A100007

Event-Driven Sample Collection

The new TriOS sample collection system is a stationary sampler with integrated measurement technology in a stainless steel housing. It uses thermostatic control for automatic sample extraction according to the vacuum principle. Up to 12 sample containers can be used.

Technical Specifications

Housing	Double-walled stainless steel (material 1.4301/ SS304) / PS / PC (GF10) with 40 mm insulation. Housing separated in sample compartment and control compartment, each with lockable door. Upper door with plexiglass window. Protective top made of Styrosun which can be opened for connection and maintenance works.
Thermostatic control	Self-contained, controlled cooling / heating with 4 settings, no-frost. Independent of the programmable controller, Temperature in sample compartment: 4°C (adjustable from 0...9,9°C)
Sampling modes	Time-related, flow-dependent, event-related, manual sample extraction

Steuerung	Microprocessor control, Sleep-Mode (<5mA), power supply 8-16 V foil keyboard (with keys 0-9, ESC, ENT, cursor), graphical display (128*64 Pixel), back lit	
Data logger	3000 entries, non-volatile data memory; storage of sampling and malfunction data like sample extractions, bottle changes, messages, external signals	
Programming	12 freely programmable user programs, with function to link programs	
Program start options	• Immediately • Date/time • Weekday/time • By an external signal	
Program End/Stop options	End of sampling program • After 1 run • After X runs • Continuous operation • Date/time	
Pause mode	Interruption of program run at any time	
Overfilling protection	Adjustable from 1–999 samples/bottle	
Interval setting	1 min. to 99 h 59 min. in steps of 1 minute	
Pulse setting	1 to 9999 pulses/sample	
Manual sample extraction	Possible at any time without interrupting the current program run	
Program protection	Up to 5 years after voltage loss	
Interface	Mini-USB, RS 232	
Signal inputs	• 2x analog: 0/4-20 mA, • 8x digital (flow, event, 1 inputs can be programmed freely) • Impulse length 60ms, switching level 7-24 V, • Max. working resistance 500 Ohm, max. length of signal cable 30 m	
Signal outputs / status messages	• 8 digital outputs, 1x of them as collective malfunction message	
Sampling method	Vacuum system 1000 ml U-System, suction height up to 40m	
Single sample volume accuracy	Vacuum system: < 2,5 % or +/- 3 ml	
Dimensions (HxWxD)	1490 (2040 with open top) x 605 x 645 mm	~ 58.7″ (80.3″ with open top) x 23.8″ x 25.4″
Weight	~ 110 kg with composite container	~ 242.5 lbs
Wetted materials	PC, PVC, Silicone, PS, PE, EPDM	
Power supply	230 V / 115 V /AC	
Power requirement	Approx. 350VA (with cooling)	
Ambient temperature	-20 to 43 °C	~ -4 °F to 109.4 °F
Sample temperature	0 to 40 °C	~ 0 °F to 104 °F
Standards	CE, Sampling according to ISO 5667-10, EN16479	

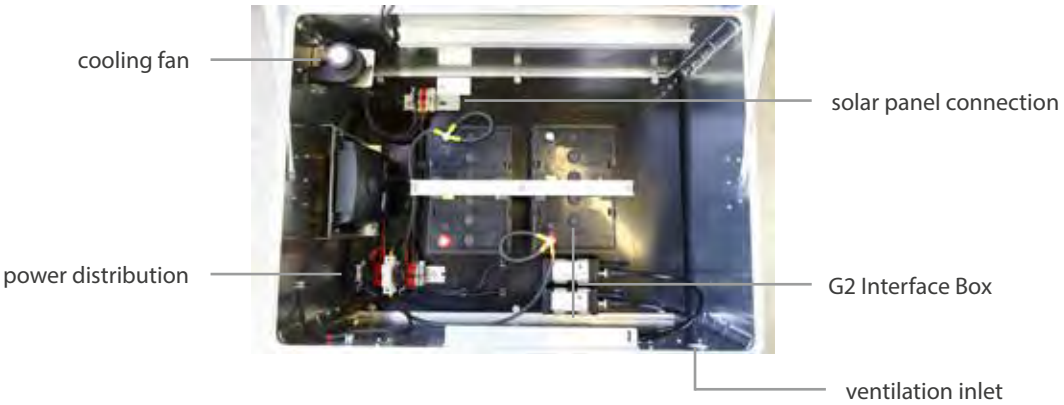
Solar Energy Box

02A100007

The Solar Energy Box is a stand-alone power supply for all TriOS G2 sensors. The box can power up to 2 sensors in the field.

Inside the Solar Energy Box you can access the data or configure the sensor with the web interface on the G2 sensors via the G2 Interface Box.

An internal temperature controlled fan prevents the box from overheating.



Technical specifications

Size w/h/d	840 mm x 480 mm x 600 mm	~ 33.1″ x 18.9″ x 23.6″
Weight	67 kg	~ 147.7 lbs
Output	12VDC max. 2A per connector	
Connection	2x M12 industrial connectors for TriOS sensors	
Internal connection	Ethernet Protocol TCP/IP	
Housing	Aluminum	
Protection type	IP44	NEMA 3
Operating Temperature	-20 °C...+40 °C	~ -4 °F to 104 °F
Batteries	12VDC, 1500 Wh	
Solar Panel	60W	
Terms of Transportation	contains Batteries, Wet, Non-spillable Class 8	

Online measurement with integrated wall-mounted sampler

For use at hard-to-reach measuring spots 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
absorbance (1/m)	spectral	1/m	-	50...7300	15...2200	7.5...1100	3...440	1.5...220	0.75...110	0.3...44
Nitrate N-NO_3	spectral	mg/L	-	1.0...330	0.3...100	0.15...50	0.06...20	0.03...10	0.015...5	0,006...2
Nitrate NO_3	spectral	mg/L	-	4.43...1460	1.33...440	0.67...220	0.27...88	0.13...44	0.067...22	0.030...9
Nitrite N-NO_2	spectral	mg/L	-	1.7...500	0.5...150	0.25...75	0.1...30	0.05...15	0.025...7.5	0.01...3
Nitrite NO_2	spectral	mg/L	-	5.6...1650	1.65...500	0.82...250	0.33...100	0.17...50	0.083...25	0.033...10
DOC_{eq}	spectral	mg/L	-	17...3300	5.0...1000	2.5...500	1.0...200	0.5...100	0.25...50	0.1...20
TOC_{eq}	spectral	mg/L	-	17...3300	5.0...1000	2.5...500	1.0...200	0.5...100	0.25...50	0.1...20
COD_{eq}	spectral	mg/L	-	100...7300***	30...2200***	15...1100***	6.0...440***	3.0...220***	1.5...110***	0.6...44***
BOD_{eq}	spectral	mg/L	-	100...7300***	30...2200***	15...1100***	6.0...440***	3.0...220***	1.5...110***	0.6...44***
KHP	spectral	mg/L	-	17...13300	5.0...4000	2.5...2000	1.0...800	0.5...400	0.25...200	0.1...80
SAC_{254}	single wavelengths	1/m	-	50...7300	15...2200	7.5...1100	3.0...440	1.5...220	0.75...110	0.3...44
COD-SAC_{eq}****	single wavelengths	mg/L	1.46	75...10600	22...3200	11...1600	4.4...640	2.2...320	1.1...160	0.44...64
BOD-SAC_{eq}*****	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
TSS_{eq}*****	single wavelengths	mg/L	2.6	130...4300	40...1300	20...650	8.0...260	4...130	2.0...65	0.8...26

* under laboratory conditions
** absorbance unit
*** depending on the composition of the COD and BOD (sum parameter)
**** based on KHP (Note: 100 mg/L COD-standard-solution corresponds to 85 mg/L KHP)
***** based on SiO_2

Note:
1 mg/L N-NO_3 corresponds to 4.43 mg/L NO_3
1 mg/L N-NO_2 corresponds to 3.28 mg/L NO_2

VIPER: measuring ranges depending on the path length*

parameter	according to	unit	factor	path length [mm]	path length [mm]	path length [mm]	path length [mm]	path length [mm]
				10	50	100	150	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*

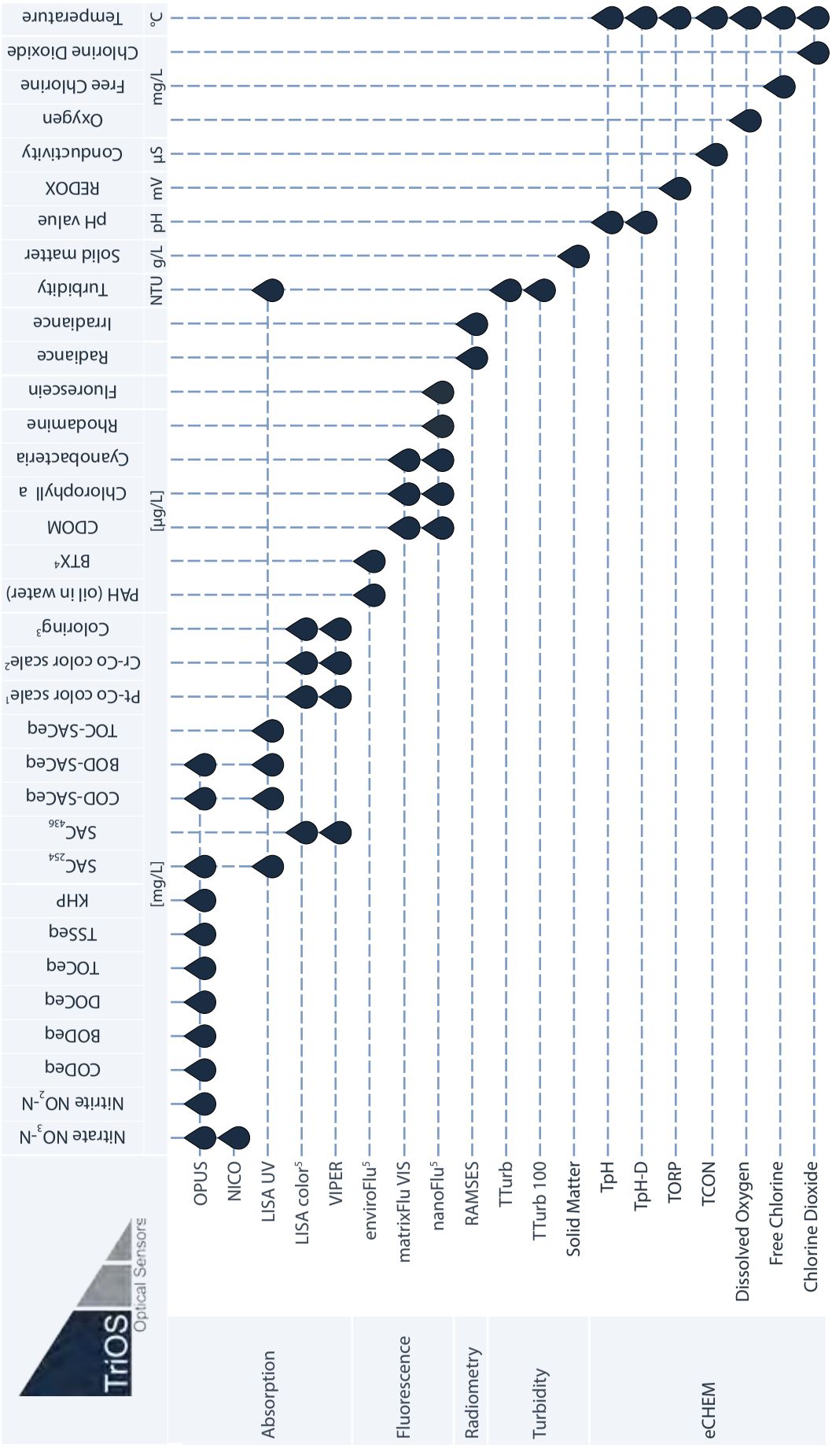
parameter	according to	unit	factor	path length [mm]	path length [mm]	path length [mm]	path length [mm]	path length [mm]
				1	2	5	10	50
SAC_{254}	DIN 38404-3: 2005-07 C3	1/m	-	5...1500	2.5...750	1...300	0.5...150	0.1...30
COD_{eq}**	-	mg/L	1.46	8...2200	4...1100	1.5...440	0.8...220	0.15...45
BOD_{eq}**	-	mg/L	0.48	2.5...700	1.25...350	0.5...140	0.25...70	0.05...15
TOC_{eq}**	-	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/L 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	path length [mm]	path length [mm]	path length [mm]	path length [mm]	path length [mm]
				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



[1] 390 nm, 455 nm (Apha/Hazen)
[2] 380 nm, 413 nm
[3] 410 nm, 436 nm, 525 nm, 620 nm
[4] mono-aromatic hydrocarbons
[5] depending on version