TriOS
Optical Sensors

PRODUCT CATALOG
2022

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A success story.

When TriOS Mess- und Datentechnik GmbH was founded in 1998, the further development path was not foreseeable. With the R&D project funded under the project name RAMSES by the BMBF (Federal Ministry of Education and Research), the foundation stone for a success story in optical measurement technology was laid during the founding phase of TriOS GmbH. RAMSES was the first spectral-resolution light measurement instrument available on the market for use in marine research.

Today, the product name „RAMSES“ is synonymous with compact, robust and reliable light measurements, with over a thousand instruments in use worldwide - the clear No. 1 in the world. The instruments are routinely used to measure light distribution in the water column as well as for validation and calibration of advanced environmental satellite data (e.g. MERIS). The sensors have proven their reliability in many adverse environmental conditions, such as in Antarctica, but also in unusual locations such as offshore racing yachts in the Volvo Ocean Race. Many Norwegian vacationers accompany the devices, even if certainly not consciously perceived, on their journey along the fjords on the ships of the Hurtigruten.

Today, the former university spin-off, which has been managed by Rüdiger Heuermann alone since 2000, has become a leading company in the field of optical immersion sensors.

In addition to the original RAMSES radiometers, the TriOS product range has expanded visibly. Innovative measuring instruments for algae detection, for the measurement of smallest amounts of oil in water, the reagent-free determination of nutrients and organic substances followed, whereby the business field of TriOS Mess- und Datentechnik GmbH has expanded far beyond the field of marine technology into water quality, drinking water and wastewater monitoring and many industrial applications. Among other things, TriOS is one of the leading companies in the field of oil-in-water monitoring and thus makes a significant contribution to reducing environmental pollution caused by oil discharges.

With the expansion of the product range and the

increase in the number of units produced, the need for production space and qualified employees grew. Thus, the move to the newly built company headquarters in Rastede took place in July 2011. This laid the foundation for significantly increasing the vertical range of manufacture by means of in-house CNC machining, modern PCB assembly and device production, and thus having all quality-relevant processes in-house. In 2019, the company premises were also expanded with additional warehouse and production buildings to meet the enormous market demand. Equipped with state-of-the-art technology, this has also allowed development to grow and deepen in-house. Almost all TriOS products thus rightly bear the status „Made in Germany“. TriOS has remained true to its drive for innovation. One of the latest TriOS products on the market is the EGC Water Analyzer - a measuring cabinet for determining various parameters in wash water from exhaust gas scrubbers on ships. It can be equipped with three types of sensors: the enviroFlu for PAH, the TTurb for turbidity and the TpH-D for pH. In addition, the flow rate, temperature as well as the turbidity-corrected PAH value can be determined.

In addition, novel sensors for environmentally relevant parameters are currently being developed in several research projects in cooperation with universities and research institutes. Many of our customers are also partners in the development of new products.

My special thanks, also on behalf of all TriOS employees, go to these partners, without whom TriOS would not exist in its current form.

Rüdiger Heuermann
Managing Director

The TriOS G2 Interface

The rapid change in the way we communicate and interact with technology has been evident not only since the ubiquitous spread of smartphones. This development is also having more and more influence on measurement technology. To meet these requirements, TriOS has developed the innovative G2 interface concept which, in addition to a very flexible connection to process control systems and data acquisition systems, also enables intuitive configuration and operation using operating system-independent web browsers.

All G2 sensors are equipped with an internal memory. This enables the storage of all measurement data and events. The easiest way to establish a connection to the G2 sensors is to use the G2 interface box (with or without WiFi module). The box is used for establishing the connection as well as for the power supply and can be used universally for all TriOS G2 sensors.

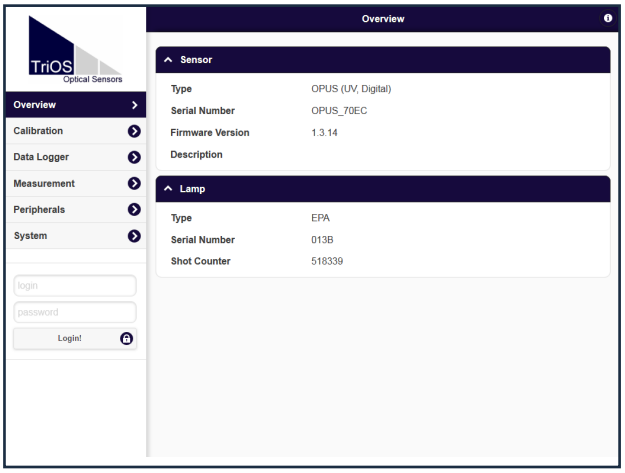
Three steps into the TriOS G2 interface

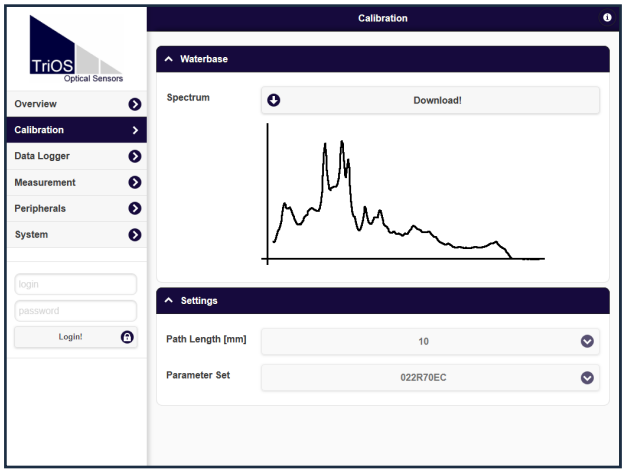
1. Connect

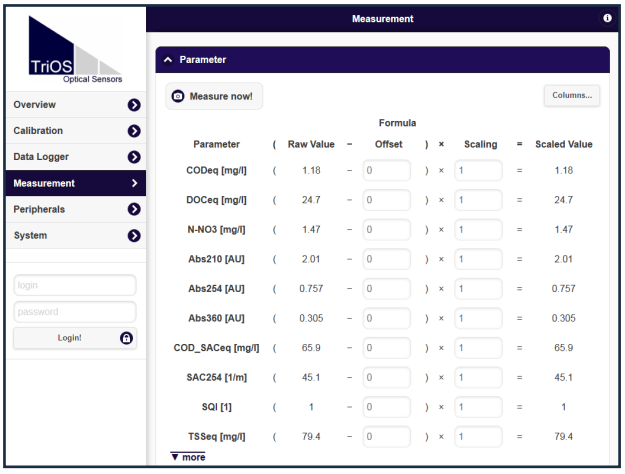
2. Open browser

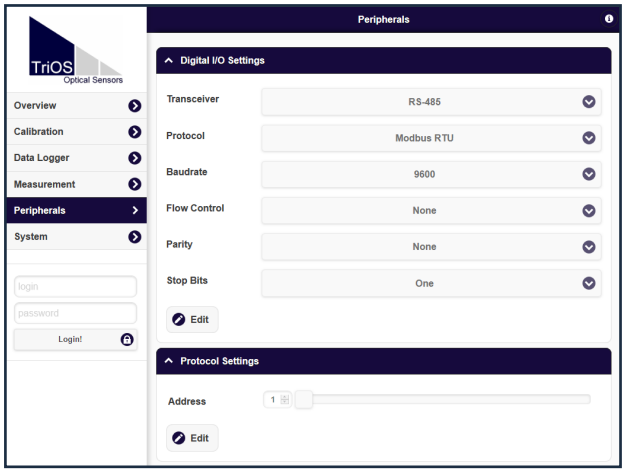
3. Enter URL http://192.168.77.1/ or http://OPUS_7063

Ready!









PHOTOMETER

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 (COD_{eq}, BOD_{eq}, DOC_{eq}, TOC_{eq}), and a number of other parameters.

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

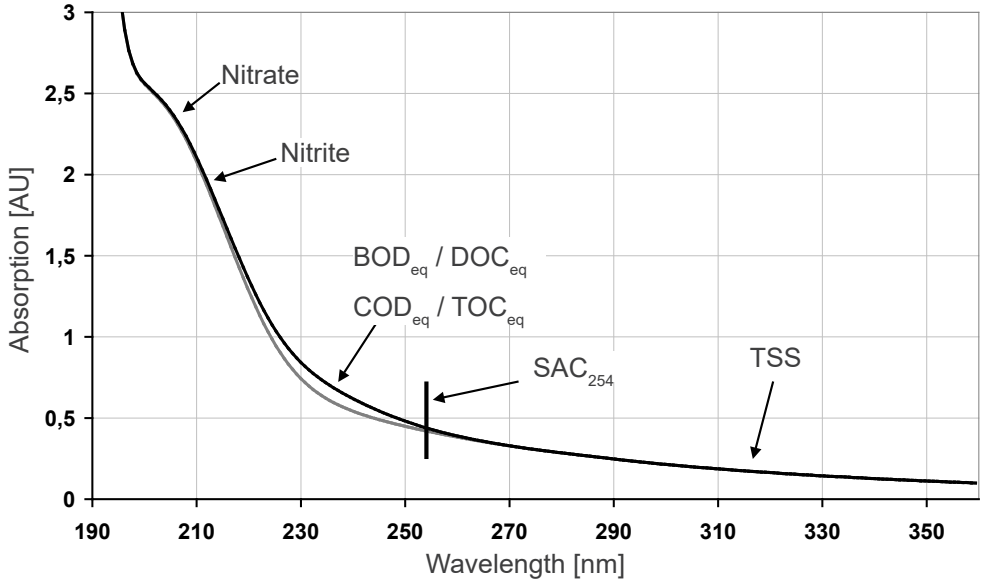
Benefits

- 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), titanium (3.7035), Deep Sea Version: titanium (3.7035)	
Dimensions (L x Ø)		~ 470 mm x 48 mm (10 mm path) Deep Sea Version: ~ 511 x 59 mm	~ 18.5“ x 1.9“ (with10 mm path) Deep Sea Version: ~ 20.1“ x 2.3“
Weight	stainless steel	~ 3 kg (with 10 mm path)	~ 6.6 lbs (with 10 mm path)
	titanium	~ 2 kg Deep Sea Version: ~ 4 kg	~ 4.4 lbs Deep Sea Version: ~ 8.8 lbs
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
Max. pressure	with SubConn	30 bar Deep Sea Version: 600 bar	~ 435 psig Deep Sea Version: ~ 8702.26 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	Precisi-on	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)
	COD_{eq}	Spectral	mg/L	0...2200***	30	100	10	
	BOD_{eq}	Spectral	mg/L	0...2200***	30	100	10	
	DOC_{eq}	Spectral	mg/L	0...1000	5	10	1	
	TOC_{eq}	Spectral	mg/L	0...1000	5	10	1	
	TSS_{eq}	Spectral	mg/L	0...1500	60	200	20	
	KHP	Spectral	mg/L	0...4000	5	10	1	± (5 % + 2)
	SAC_{254}	Single wavelength	1/m	0...2200	15	50	5	
	COD-SAC_{eq}**	Single wavelength	mg/L	0...3200	22	73	7.3	
	BOD-SAC_{eq}**	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)
	COD_{eq}	Spectral	mg/L	0...220***	3	10	1	
	BOD_{eq}	Spectral	mg/L	0...220***	3	10	1	
	DOC_{eq}	Spectral	mg/L	0...100	0.5	1	0.1	
	TOC_{eq}	Spectral	mg/L	0...100	0.5	1	0.1	
	TSS_{eq}	Spectral	mg/L	0...150	6	20	2	
	KHP	Spectral	mg/L	0...400	0.5	1	0.1	± (5 % + 0.2)
	SAC_{254}	Single wavelength	1/m	0...220	1.5	5	0.5	
	COD-SAC_{eq}**	Single wavelength	mg/L	0...320	2.2	7.3	0.73	
	BOD-SAC_{eq}**	Single wavelength	mg/L	0...105	0.72	2.4	0.24	

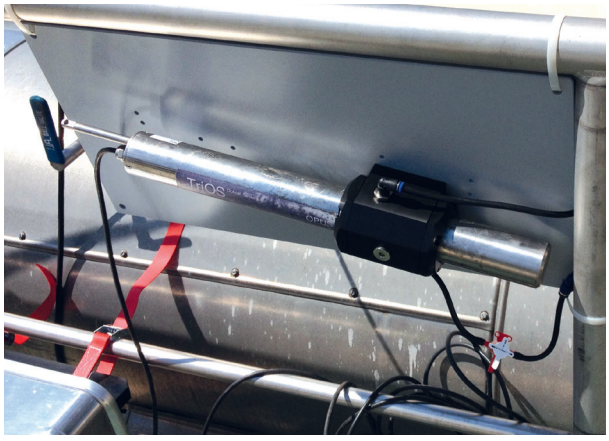
* Based on a standard calibration solution

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

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

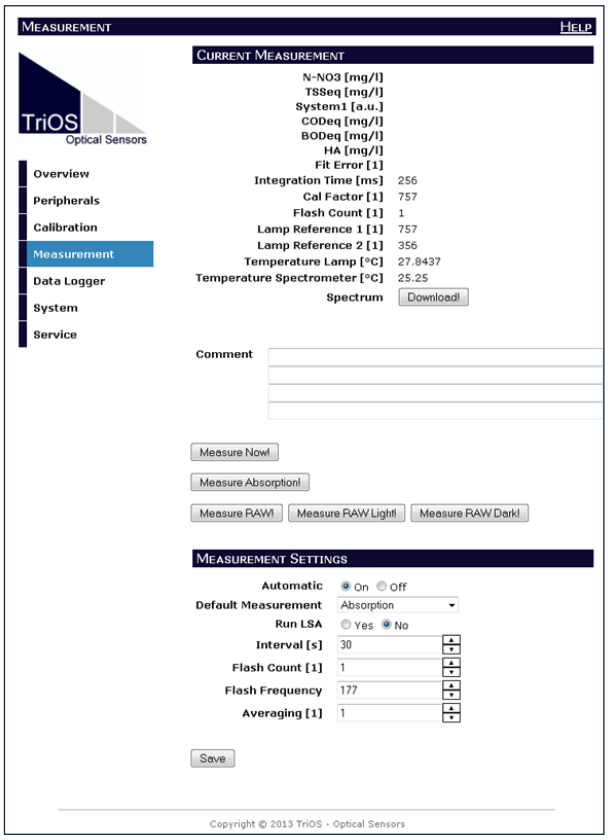
1 mg/L NO_3-N correspond to 4.43 mg/L NO_3

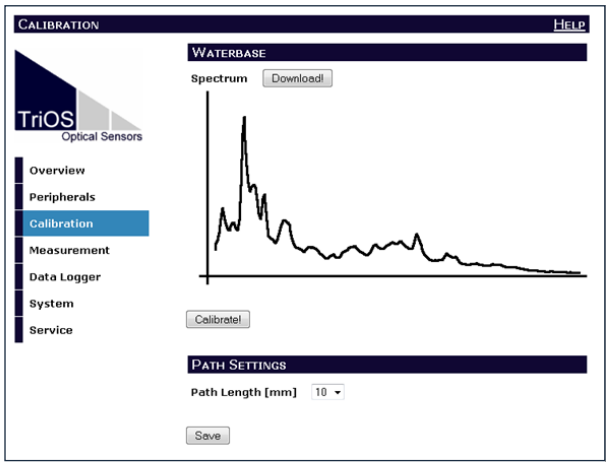
1 mg/L NO_2-N correspond to 3.28 mg/L NO_2

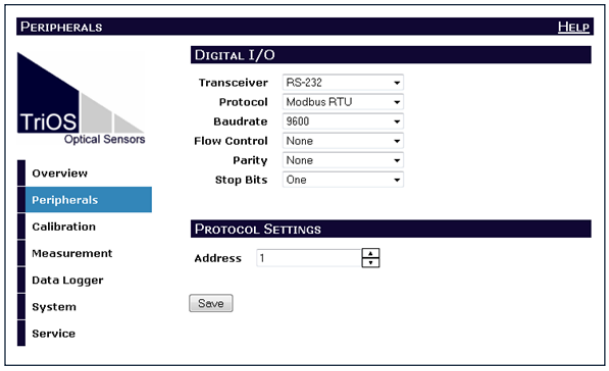


OPUS G2 Interface

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.

OPUS aero

12SXXXXXX

OPUS aero is the new generation of spectral sensors for online measurement of nitrate and nitrite in wastewater aeration tank. By analyzing a complete spectrum, OPUS aero is able to provide reliable readings for either NO_3-N only or NO_3-N and NO_2-N, depending on the calibration.

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.

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

- Wastewater aeriation tank

Path (mm)	Nitrate N-NO_3	Nitrite N-NO_2
0,3	2.4...120	4.4..220
1	0.7...36	1.3...67
2	0.35...18	0.65...33.5

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	
Parameter		Nitrate NO_3-N or Nitrate NO_3-N+Nitrite NO_2-N	
Measuring range		See parameter list	
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)	
Dimensions (L x Ø)		~ 470 mm x 48 mm	~ 18.5“ x 1.9“
Weight	stainless steel	~ 3 kg	~ 6.6 lbs
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)	USA: 2 years
Max. pressure	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

NICO

15SXXXXXX

The Low-Cost Nitrate Meter from TriOS

Based on the innovative instrument platform concept of TriOS, on which OPUS, LISA and VIPER, among others, are based, NICO is a cost-effective UV photometer for nitrate determination. The three detection channels provide precise optical nitrate determination by absorption, taking into account turbidity and organics, which are a problem with many products currently on the market.

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

Equipped with our innovative G2 interface with web browser configuration and internal data logger, NICO has features that are significantly above the currently available devices on the market, in combination with an attractive price.

The uniform instrument platform of all TriOS photometers also stands for a uniform spare parts and consumables system, which enables the use of the wide range of accessories available for our instruments. The modern G2 interface also offers fast 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	
Parameters		NO_3-N, NO_3, NO_x-N, NO_x (calibrated with NO_3 standard solution)	
Measurement 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 mg/L NO_3-N) with 10 mm path ± (5 % + 1 mg/L NO_3-N) with 1 mm path	
Turbidity compensation		Yes	
Data Logger		~ 2 GB	
Reaction time T100		20 s	
Measurement interval		≥ 10 s	
Housing material		Stainless steel (1.4571/1.4404), 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 %)	
Required supervision		Typically ≤ 0.5 h/month	
Calibration / maintenance interval		24 months	
System compatibility		Modbus RTU	
Warranty		1 year (EU: 2 years)	US: 2 years
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

NICO plus

16AXX10X0

The new all-rounder from TriOS - Now with a new turbidity compensation*

As a new all-rounder, NICO plus not only offers the parameters NO_3-N, NO_3, NO_x-N and NO_x previously known from NICO, but has now been expanded to include numerous parameters. These include UVT_{254}, UVT_{254n}, SAK_{254}, CSB_{eq}, BSB_{eq}, TOC_{eq}, DOC_{eq}, turbidity and TSS_{eq}.

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

Equipped with our innovative G2 interface with web browser configuration and internal data logger, NICO plus has features that are significantly above the currently available devices on the market, in combination with an attractive price.

The instrument platform of all TriOS photometers stands for uniform spare parts and consumables and universal use of the wide range of accessories.

Parameter	Measuring range (at 10 mm)	Detection limit
NO_3	0.22... 22 ppm	0.22 ppm
NO_3-N	0.05...5 ppm	0.05 ppm
NO_x	0.22... 22 ppm	0.22 ppm
NO_x-N	0.05...5 ppm	0.05 ppm
UVT_{254}	25...96.6 %	96.6 %
UVT_{254n}	25...96.6 % (referred to 10 mm cuvettes)	96.6 % (referred to 10 mm cuvettes)
SAC_{254**}	1.5...60 1/m	1.5 1/m
COD_{eq}	2.2…90 ppm	2.2 ppm
BOD_{eq}	0.7…30 ppm	0.7 ppm
TOC_{eq}	1…35 ppm	1 ppm
DOC_{eq}	1…35 ppm	1 ppm
Turb	5…200 FAU***	5 FAU***
TSS_{eq}	5…180 ppm	5 ppm

* Turbidity measurement according to DIN EN ISO 7027
** based on the procedure DIN 38404 - C3
*** FAU: Formazine Attenuation Unit

Technische Spezifikationen

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, 20 mm, 50 mm	
Parameters		See parameter list	
Measurement range		See parameter list	
Measurement accuracy		± (5 % + 2-fold detection limit)	
Turbidity compensation		Yes	
Data Logger		~ 2 GB	
Reaction time T100		20 s	
Measurement interval		≥ 10 s	
Housing material		Stainless steel (1.4571/1.4404)	
Dimensions (L x Ø)		~ 470 x 48 mm (with 10 mm path)	~ 18.5“ x 1.9“ (with10 mm path)
Weight	VA	~ 3 kg	~ 6.6 lbs
Interface	digital	Ethernet (TCP/IP)	
		RS-485 (Modbus RTU)	
Power consumption		≤ 7 W	
Power supply		12 – 24 VDC (± 10 %)	
Required supervision		Typically ≤ 0.5 h/month	
Calibration/maintenance interval		24 months	
System compatibility		Modbus RTU	
Warranty		1 year (EU & USA: 2 years)	USA: 2 years
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 innovative SAC_{254} sensor by TriOS

Long-lasting and energy-efficient UV-LED technology and a robust design are the outstanding 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 innovative TriOS G2 interface allows quick and easy integration of the sensor into existing process control systems or external data logger. 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 adapters. An automatic turbidity compensation is carried out via a second measuring channel.

Through application-specific correlation LISA UV can be configured for direct output of BOD_{eq}, COD_{eq}, TOC_{eq} and UVT.

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
- LED technology

Applications

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

Path length	Parameter	Measuring range	Detection limit
1 mm	SAC_{254nm}*	0-1500 /m	5 /m
	COD_{eq}	0-2200 mg/L	8 mg/L
	BOD_{eq}	0-700 mg/L	2.5 mg/L
	TOC_{eq}	0-880 mg/L	3 mg/L
	UVT	3-100 %	98.8 %
10 mm	SAC_{254nm}*	0-150 /m	0.5 /m
	COD_{eq}	0-220 mg/L	0.8 mg/L
	BOD_{eq}	0-70 mg/L	0.25 mg/L
	TOC_{eq}	0-90 mg/L	0.3 mg/L
	UVT	3-100 %	98.8 %

* following the DIN 38404 - C3 procedure

Technical Specifications

Measurement technology	light source	2 LED (254 nm, 530 nm)	
	detector	Photo diode + filter	
Measurement principle		Attenuation, Transmission	
Optical path		1 mm, 2 mm, 5 mm, 10 mm, 50 mm	
Parameter		SAK_{254}, CSB_{eq}, BSB_{eq}, TOC_{eq}, UVT	
Measuring range		See parameter list	
Measurement accuracy		0.2 % FS (Full Scale)	
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 (bei 10 mm Pfad)	~ 11.8” x 1.9” (with 10 mm path)
Weight	stainless steel	~ 2.3 kg (with 10 mm path)	~ 5.1 lbs (with 10 mm path)
	titanium	~ 2.1 kg (with 10 mm path)	~ 4.6 lbs (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)	
Warranty		1 Jahr (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

VIPER

17SXXXXX0

VIPER measures spectrally resolved attenuation in the wavelength range between 360 nm and 720 nm and thus allows the detailed determination of several parameters at the same time. 5 selected and energy-saving LEDs serve as the light source, ensuring stable measurement data and a long service life. VIPER can be used in a wide variety of media, as it is available in several path lengths and in both stainless steel and titanium. Applications for VIPER include water monitoring, colour measurement of aqueous solutions or quality monitoring of drinking water. Like every TriOS sensor, VIPER is equipped with nano-coated optical windows to prevent dirt build-up. Additional parameters can be installed later using software, if necessary. VIPER is equipped with the new TriOS G2 interface, allowing easy and fast sensor configuration via a web browser. Integration into existing process control systems and external data loggers has never been easier.

NEW! The TriOS compressed air flushing is now also available for the paths 100 mm, 150 mm and 250 mm!

Advantages

- without sampling and sample preparation
- without delay
- without reagents
- optical windows with nanocoating
- LED technology

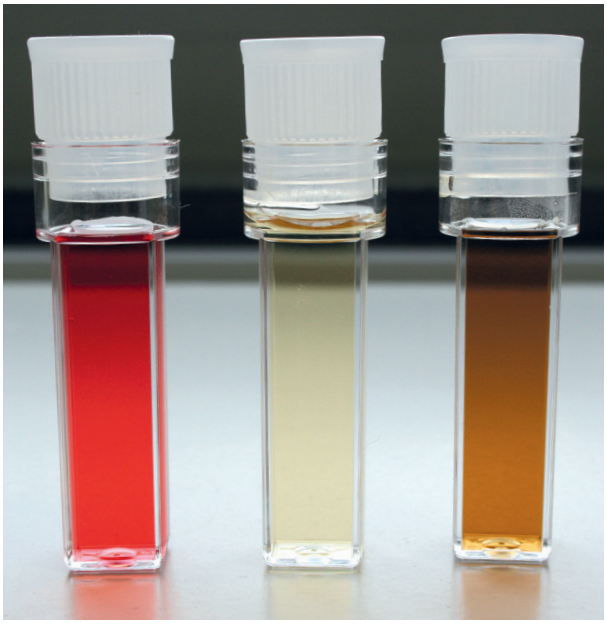
Applications

- Drinking water monitoring
- Environmental monitoring
- Colour measurement
- Quality assurance
- Petrochemistry
- Industry
- 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
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

Colour Measurement



VIPER is an in-situ VIS spectrophotometer to determine the colour of liquids. In addition to the hyperspectral recording of spectra (2.2 nm/pixel), various colour numbers can be determined. This enables standardized, safe and objective measurements. Time-consuming and expensive sampling is eliminated by in-situ measurements. What's more, variations over a whole day can be recorded.

SAC_{436} (DIN EN ISO 7887: 2012-04)

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 colour ranges that occur in coloured water have the highest light attenuation at 436 nm, which is why for example the colouring is determined according to drinking water regulations at this wavelength.

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

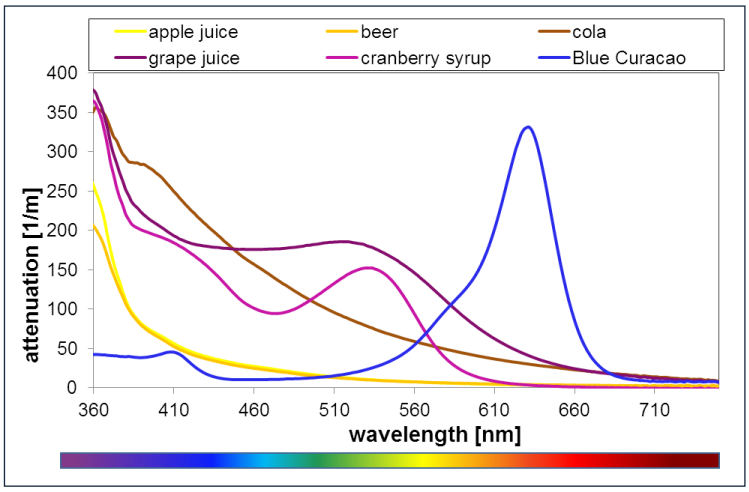
Depending on the customer's request, SACs in the entire wavelength range (such as SAC_{525}, SAC_{620}) can be determined, or individual opacity adjustments can be made.

Pt-Co colour scale (Hazen/APHA)

(DIN EN ISO 6271:2016-05)

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

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

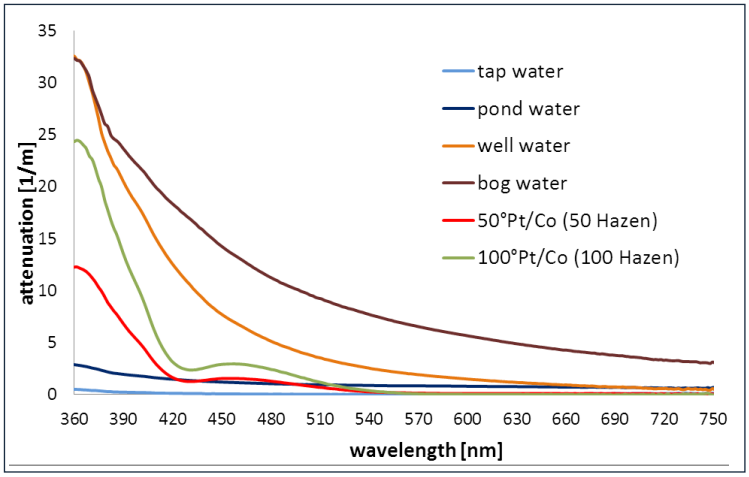


Colouring

VIPER enables hyperspectral measurements of the colour of each liquid.

This also allows the differentiation of colours that are perceived immediately, but consist of different colour mixes.

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



VIPER: Attenuation spectrum

Subsequent calculation of colour numbers is also possible thanks to the storage of spectra. VIPER therefore enables several colour numbers to be simultaneously calculated from a spectrum. In addition to the above colour numbers, the device can determine the Cr-Co colour 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 colour measurements. The LISA color uses two different LEDs for long-term stable measurement of the SAC or color 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.

With the optional titanium housing, the LISA color can also be used for applications in aggressive media (e.g. high chloride concentrations).

Equipped with our innovative G2 interface with a web browser configuration, internal data logger, flexible protocols and data outputs, the LISA color possesses equipment attributes that are significantly greater than the devices currently available on the market

The unified platform of all TriOS photometers also facilitates a standardized spare parts and consumables system, which means the broad range of our device accessories can be implemented. The cutting-edge G2 interface also enables quick integration into third-party systems.

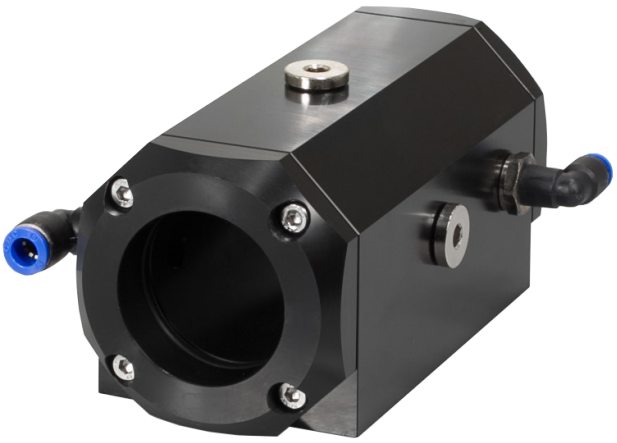
NEW! The TriOS pressure cleaning is now available for the path lengths 100 mm, 150 mm and 250 mm!

Benefits

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

Applications

- Environmental monitoring
- Drinking water monitoring
- Industrial applications

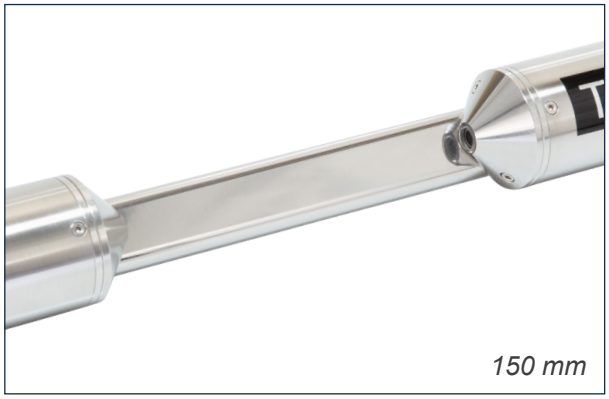


Technical Specifications

Measurement technology	Light source	2 LEDs	
	Detector	Photodiode	
Measurement principle		Attenuation, transmission	
Optical path		50 mm, 100 mm, 150 mm, 250 mm	
Parameters		$SAC_{436,}$ $SAC_{525,}$ SAC_{620}	
		Color (based on DIN EN ISO 7887 (410 nm, 436nm, 525 nm, 620 nm)	
		Pt-Co color number (APHA/Hazen) (390 nm or 455 nm)	
		Cr-Co color number (380 nm or 413 nm)	
Measurement range		See parameter list p.26	
Measurement accuracy		0.5 %	
Turbidity compensation		yes, 740 nm	
Data logger		~ 2 MB	
Reaction time T100		4 s	
Measurement interval		≥ 2 s	
Housing material		Stainless steel (1.4571/1.4404) or titanium (3.7035)	
Dimensions (L x Ø)		340 mm x 48 mm (for 50-mm path)	~ 13.4” x 1.9” (for 50-mm path)
Weight	stainless steel	~ 2.4 kg (for 50-mm path)	~ 5.3 lbs (for 50-mm path)
	titanium	~ 1.3 kg (for 50-mm path)	~ 2.9 lbs (for 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 %)	
Required supervision		typically ≤ 0,5 hours per month	
Calibration/maintenance interval		24 months	
System compatibility		Modbus RTU	
		Analog out (4...20 mA)	
Warranty		1 year (EU & US: 2 years)	
Max. pressure	with Subconn	30 bars	~ 435 psig
	with fixed cable	3 bars	~ 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

Measurement range

Parameters	Unit	Measurement range			
		50 mm	100 mm	150 mm	250 mm
SAC 436 nm	1/m	0.1...30	0.05...15	0.03...10	0.02...6
SAC 525 nm	1/m	0.1...30	0.05...15	0.03...10	0.02...6
SAC 620 nm	1/m	0.1...30	0.05...15	0.03...10	0.02...6
True color 410 nm	mg/L Pt	2...560	1...280	0.6...185	0.4...110
Hazen 390 nm	mg/L Pt	0.8...220	0.4...110	0.3...75	0.2...45
Hazen 455 nm	mg/L Pt	4...1100	2...550	1.5...360	0.8...220
Cr-Co 380 nm	° (degree of color)	1...300	0.5...150	0.3...100	0.2...60
Cr-Co 413 nm	° (degree of color)	4...1100	2...550	1.5...360	0.8...220



150 mm

50 mm

FLUOROMETER

enviroFlu

30SXXXXX0

PAH, oil-in-water by means of UV fluorescence

enviroFlu-HC is a new generation of immersion probes for measuring oil-in-water. The measuring principle of UV fluorescence used is far more sensitive than the conventionally used infrared scattering or absorption methods. This makes it possible to determine even the smallest traces of PAHs, e.g. in drinking water, but also in cooling water condensates. The field of application ranges from petrochemistry, leakage detection in cooling and waste water streams to environmental monitoring. The devices can be used stationary in manholes, in the flow or in pipelines, as well as portable, using an optional hand-held measuring device. A new type of coating reduces soiling of the optical measuring windows and thus reduces the required maintenance to a minimum.

Advantages

- without sampling and sample preparation
- without delay
- without reagents
- high sensitivity and selectivity
- optical windows with nanocoating

NEW! enviroFlu HC MB incl. Modbus interface!

Areas of application

- Drinking water
- Waste water
- Airports
- Cooling water
- Desalination plants
- Refineries
- Pipeline monitoring
- Bilge water monitoring
- Flue gas scrubbing with ship approval according to MEPC.259(68)

	Interface	Data protocol	Variants	Measuring range
enviroFlu HC	Digital: RS-232 Analog: 4...20 mA / 0...5 VDC	TriOS Data protocol	HC 500	0...500 ppb
			HC 5000	0...5000 ppb
enviroFlu HC MB	Digital: RS-485	Modbus RTU	HC MB 500	0...500 ppb
			HC MB 5000	0...5000 ppb
enviroFlu BT	Digital: RS-232 Analog: 4...20 mA / 0...5 VDC	TriOS Data protocol	BT	0...10 000 ppb

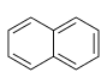
Technical specifications

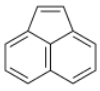
Measurement technology	Light source	Xenon flash lamp + filter (254 nm)
	Detector	Photodiode + filter (360 nm)
Measurement principle		Fluorescence
Parameters		PAH, oil
Measure-ment range	enviroFlu HC (MB) 500	PAH: 0...50 ppb, 0...500 ppb, Oil: 0...1.5 ppm, 0...15 ppm typ.
	enviroFlu HC (MB) 5000	PAH: 0...500 ppb, 0...5000 ppb Oil: 0...15 ppm, 0...150 ppm typ.
	enviroFlu BT	0...1000 ppb, 0...10 000 ppb
Detection limit		enviroFlu HC (MB) 500 0.3 ppb enviroFlu HC (MB) 5000 0.5 ppb
Measurement accuracy		± 5 % FS*
Reproducibility		≤ 0.5 % FS*
Turbidity compensation		No (only possible via TTurb on the TriBox3)
Data logger		no
Reaction time T100		≤ 10 s
Measurement interval		≥ 5 s
Interface	enviroFlu HC	Digital: RS-232 (TriOS Protocol) Analog: 4...20 mA, 0...5 V
	enviroFlu HC MB	Digital: RS-485 (Modbus RTU) Analog: nicht vorhanden
	enviroFlu BT	Digital: RS-232 (TriOS Protocol) Analog: 4...20 mA, 0...5 V
Power consumption		≤ 3.5 W
Power supply		12...24 VDC (± 10 %)
Required supervision		Typically ≤ 0.5 h/month
Calibration/maintenance interval		24 months, the manufacturer calibration can be increased to 4-5 years when used with associated DryCAL-Set
System compatibility		analog out (0...5 VDC, 4...20 mA)
Warranty		1 year (EU: 2 years) / US: 2 years
Material	Housing	Stainless steel (1.4571/1.4404) or titanium (3.7035) DeepSea version: titanium (3.7035)
	Measuring head	black POM with synthetic quartz glass DeepSea version: Cover titanium, pressure ring POM Acid-resistant version: PPS
Dimensions (L x Ø)		311 mm x 68 mm / ~12.2″ x 2.6″ DeepSea version: 314 x 78 mm / Deep sea version: ~ 12.4″ x 3.1″
Weight	stainless steel	~ 2.7 kg / ~ 6 lbs
	titanium	~ 1.9 kg / ~ 4.2 lbs DeepSea version: ~ 3.9 kg / DeepSea version: ~ 8.6 lbs

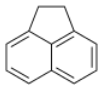
Max. pressure	with SubConn	30 bars	~ 435 psig
	with fixed cable	3 bar	~ 43.5 psig
	in FlowCell	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1 gpm
	Deepsea version	600 bar	~ 8702.2 psig
Protection type		IP68	NEMA 6P

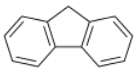
Sample temperature	+2...+40 °C	~ +36 °F to +104 °F
Ambient temperature	-5...+55 °C (2...+40 °C for specified accuracy)	~ +23 °F to +131 °F (~ 32 °F to 104 °F for specified accuracy)
Storage temperature	-20...+80 °C	~ -4 °F to +176 °F
Inflow velocity	0.1...10 m/s	~ 0.33 fps to 33 fps
Max. immersion depth	300 m with SubConn 8-pin underwater connector	~ 984 ft with SubConn 8-pin underwater connector
	30 m with fixed cable	~ 98.4 ft with fixed cable
	optional: 6000 m Deepsea version	optional: ~ 19685.04 ft Deepsea version

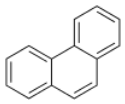
* FS: Full Scale ≙ Measurement Range

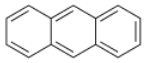

Naphtalene

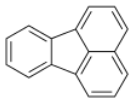

Acenaphtylene

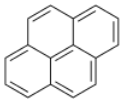

Acenaphtene

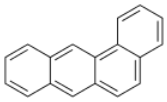

Fluorene

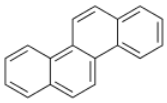

Phenanthrene

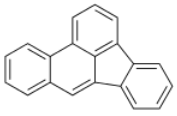

Anthracene

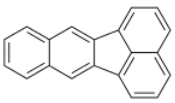

Fluoranthene

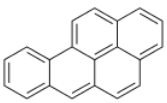

Pyrene

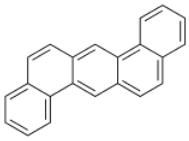

Benzo[a]anthracene

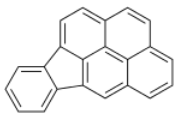

Crysene


Benzo[b]fluoranthene


Benzo(k)fluoranthene


Benzo[a]pyrene


Dibenzo(a,h)anthracene


Ideno(1,2,3-c,d)pyrene


Benzo(g,h,i)perylene

nanoFlu

32SXXXXX0

Miniature fluorometer

nanoFlu fluorometers are low-priced, submersible miniaturized fluorometers for the highly precise, selective measurement of cdom (coloured dissolved organic matter, yellow substances), chlorophyll a, phycocyanin in cyanobacteria, rhodamine or fluorescein. 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 antifouling 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 ageing effects and temperature influences.

The nanoFlu 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.

Benefits

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

Applications

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

Accessories

- FlowCell
- SolidCAL

Parameter list

Parameters	cdom [µg/L] with 0...200 µg/L
	or chlorophyll a [µg/L] with 0...200 µg/L or 0...500 µg/L
	or phycocyanin [µg/L] with 0...200 µg/L or 0...500 µg/L
	or rhodamine [µg/L] with 0...200 µg/L
	or fluorescein [µg/L] with 0...200 µg/L

Technical Specifications

Measurement technology	Light source	LED
	Detector	Photodiode
Measurement principle		Fluorescence
Parameters		See parameter list
Measurement range		0...200 µg/L or 0...500 µg/L
Measurement accuracy		± 5 %
Turbidity compensation		no
Data logger		no
Reaction time T100		6 s
Measurement interval		3 s
Housing material		Stainless steel (1.4571/1.4404) or titanium (3.7035) or POM
Dimensions (L x Ø)		171 mm x 36 mm
Weight	stainless steel	0.5 kg
	titanium	0.4 kg
	POM	0.27 kg
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 %)
Required supervision		typically ≤ 0,5 hours per month
Calibration/maintenance interval		24 months
System compatibility		Modbus RTU
Warranty		1 year (EU & US: 2 years)

INSTALLATION

Max. pressure	with SubConn	30 bars
	with fixed cable	3 bars
	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		max. 10 m/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 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

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

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

Technical Specifications

Measurement technology	light source	3 LED (375 nm/470 nm/590 nm)	
	detector	4 photo diodes with filter	
Measurement principle		Fluorescence	
Parameter		Chlorophyll a [µg/L]	
		Phycocyanin [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
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

microFlu V2

37SX0XX1X

microFlu V2 fluorometers are submersible miniature fluorometers for highly precise and selective measurement of tryptophan, cdom, blue-green algae or chlorophyll. The combination of low power consumption and innovative coating of the measurement windows as an energy and environmentally neutral antifouling solution ensures long-term stability of the measurements. The instruments can be used in a wide range of applications for monitoring seawater, river water, drinking water and wastewater. Internal reference measurements of the high-power LED used for fluorescence excitation compensate for aging effects and temperature influences. microFlu V2 is equipped with a RS-485 interface, which enables allows easy and fast sensor configuration via Modbus. Integration into existing process control systems and external data loggers has never been easier.

Advantages

- without sampling and sample preparation
- without delay
- without reagents
- high sensitivity and selectivity
- optical windows with nanocoating
- electronic daylight compensation
- handy size

Applications

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

Sensor Version	Parameter	Ex / Em	Measuring range	Detection limit
chl	Chlorophyll	470 nm / 685 nm	0 – 200 ppb	0.05 ppb
chl	Chlorophyll	470 nm / 685 nm	0 – 500 ppb	1 ppb
blue	Cyanobacteria	620 nm / 655 nm	0 – 200 ppb	0.5 ppb
blue	Cyanobacteria	620 nm / 655 nm	0 – 500 ppb	2 ppb
cdom	cdom (coloured dissolved organic mater)	375 nm / 460 nm	0 – 500 ppb	0.25 ppb
TRP	Tryptophan	275 nm / 360 nm	0 – 500 ppb	3 ppb

Technical specifications

Measurement technology	Light source	LED + Filter	
	Detector	Photodiode + Filter	
Measurement principle		Fluorescence	
Parameters		Chlorophyll a [µg/L] Phycocyanin [µg/L] cdom [µg/L] Tryptophan [µg/L]	
Measurement range		See parameter list	
Detection limits		See parameter list	
Measurement accuracy		+/- (5 % + Detection limit)	
Turbidity compensation		No	
Data logger		No	
Reaction time T90		6 s (default)	
Smallest measuring interval		3 s (default)	
Interface	digital	RS-485, Modbus RTU	
	analog	4...20 mA (default)	
		0 – 5 V	
		0 – 10 V	
Power consumption	typical	max. 0.6 W	
	with activated analog interface	max. 1.1 W	
	Power-Down	max. 70 mW	
Power supply		12 – 24 VDC (± 10 %)	
Required supervision		≤ 0.5 h/month typical	
Calibration/ maintenance interval		24 months	
Warranty		1 year (EU & USA 2 years)	
Housing material		Stainless steel (1.4571/1.4404) or titanium (3.7035)	
Dimensions (L x Ø)		~ 162 mm x 48 mm	~ 6.4“ x 1.9“
Weight	VA	~ 650 g	~ 1.4 lbs
	TI	~ 510 g	~ 1.1 lbs
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

microFlu V2 HC

37S80XX13

microFlu V2 HC is a new immersion probe for measuring oil in water. The measuring principle of UV fluorescence used is many times more sensitive and specific than the conventionally used infrared scattering or absorption methods. This makes it possible to determine even the smallest traces of PAHs, e.g. in drinking water, but also in cooling water condensates. The field of application ranges from petrochemistry, leakage detection in cooling and waste water streams to environmental monitoring. The instruments can be used stationary in manholes or in flow-through, as well as in pipelines. A nano-coating reduces the contamination of the optical measuring windows and thus reduces the required maintenance to a minimum.

microFlu V2 HC is equipped with an RS-485 interface that allows easy and fast sensor configuration via Modbus and also has an analog interface. Integration with existing process control systems and external data loggers has never been easier.

Advantages

- without sampling and sample preparation
- without delay
- without reagents
- high sensitivity and selectivity
- optical windows with nano-coating

Applications

- Surface waters
- Drinking water
- Waste water
- Airports
- Cooling water
- Desalination plants
- Refineries / Gas stations
- Seepage ditch (road run-off water)
- Pipeline monitoring
- Bilge water monitoring

Technical specifications

Measurement technology	Light source	LED 255 nm
	Detector	Photodiode + Filter (360 nm)
Measurement principle		Fluorescence
Parameters		PAH, Oil

Measurement range		PAH: 0...5000 ppb
		Oil: 0...150 ppm typ.
Detection limits		PAH: 5 ppb
		Oil: 0.15 ppm typ.
Measurement accuracy		±10 % FS
Turbidity compensation		No
Data logger		No
Reaction time T90		6 s
Smallest measuring interval		3 s
Interface	digital	RS-485, Modbus RTU
	analog	4...20 mA (default)
		0 – 5 V
		0 – 10 V
Power consumption	typical	max. 0.6 W
	with activated analog interface	max. 1.1 W
	Power-Down	max. 70 mW
Power supply		12 – 24 VDC (± 10 %)
Required supervision		≤ 0.5 h/month typical
Calibration/maintenance interval		24 months
Warranty		1 year (EU & USA 2 years)
Housing material		1 year (EU & USA 2 years)
Dimensions (L x Ø)		ca. 162 mm x 48 mm ~ 6.4“ x 1.9“
Weight	VA	~ 650 g ~ 1.4 lbs
	TI	~ 510 g ~ 1.1 lbs
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

RADIOMETER

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

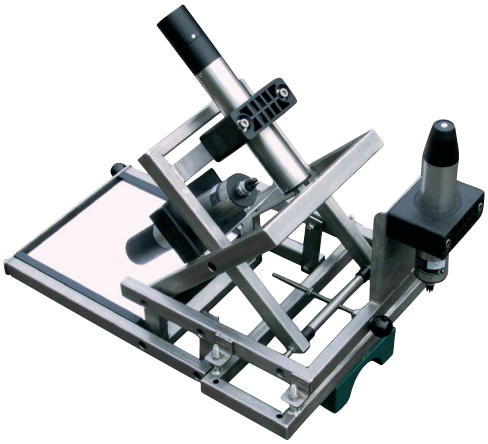
- Extremely low power consumption
- Environmentally robust
- World market leader

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.46	
Measuring range		See parameter list p.46	
Measurement accuracy		See parameter list p.46	
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), POM	
Dimensions without IP Module, without SubConn Connector (L x Ø)		ACC 260 mm x 48 mm ARC 300 mm x 48 mm ASC 245 mm x 48 mm	ACC ~ 10.2” x 1.9” ARC ~ 11.8” x 1.9” ASC ~ 9.6” x 1.9”
Dimensions with IP Modul, without connector		ACC 284 mm x 48.5 mm ARC 322 mm x 48.5 mm	ACC ~ 11.2” x 1.9” ARC ~ 12.7” x 1.9”
Weight	Titanium	1.25 kg	~ 2.8 lbs
Interface digital		RS-232	
Data logger		-	
Power consumption		≤ 0.85 W	
Power supply		8...12 VDC (± 3 %)	
Maintenance effort		≤ 0,5 h/month (typically)	
Calibration-/Maintenance Interval		24 months	
System compatibility		RS-232 (TriOS Protocol)	
Warranty		1 Year (EU & USA : 2 Years)	
Max. pressure	with SubConn	30 bar	~435 psig
	DeepSea version	100 bar	~1450 psig
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36…+104 °F
Ambient temperature		+2...+40 °C	~ +36…+104 °F
Storage temperature		-20...+80 °C	~ -4…+176 °F
Inflow velocity		0...10 m/s	~ 0…33 fps

	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

RAMSES Parameter List

	ACC-UV UV A / UV B irradiance	ACC-VIS VIS irradiance	ARC-VIS VIS radiance	ASC-VIS VIS scalar irradiance
Wavelength range*	280...500 nm	320...950 nm		
Type 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)
Type 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	Kosinus		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 **) Integration time ***) Depends on wavelength range ****) Noise-equivalent irradiance

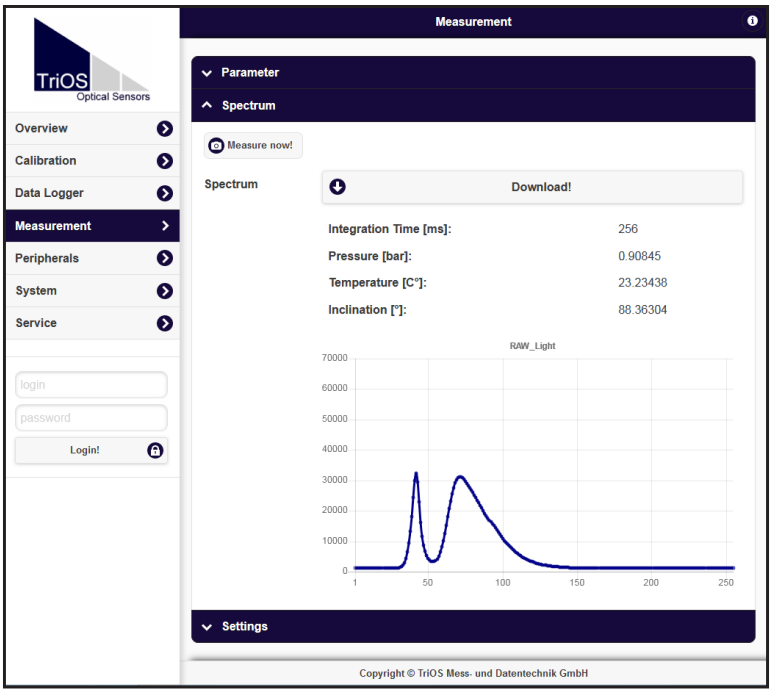
RAMSES G2

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 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.

By implementing the G2 extension module, the RAMSES radiometry series now also features the innovative G2 Interface and can now easily be configured by using a web-browser. The internal data logger with 2 GB storage and the comparably low power consumption provides the opportunity for a self-sufficient measurement operation without a separate controller. The addition of the Modbus RTU protocol to the interface simplifies the integration into existing PLCs and external data loggers. Additional to radiance and irradiance, the parameters inclination, pressure and temperature can be retrieved.



Benefits

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

Applications

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

Technical Specifications

Measurement technology	Detector	High-end miniature spectrometer	
		256 Channels	
Measurement Principle		Radiance or irradiance	
Parameter		See parameter list	
Measuring range		See parameter list	
Measurement accuracy		See parameter list	
T100 response time		≤ 24 s (burst mode)	
Measurement interval		≤ 12 s (burst mode)	
Housing material		Stainless Steel (1.4571 / 1.4404) or Titanium (3.7035), POM	
Dimensions with IP Modul, without connector		ACC 284 mm x 48.5 mm ARC 322 mm x 48.5 mm	ACC ~ 11.2” x 1.9” ARC ~ 12.7” x 1.9”
Weight	Titanium	1.25 kg	~ 2.8 lbs
Interface digital		RS-485; Ethernet (TCP/IP)	
Data logger		~ 2 GB	
Power consumption		typically 1 W	
Power supply		9…24 VDC (± 10%)	
Maintenance effort		≤ 0,5 h/month (typically)	
Calibration-/Maintenance Interval		24 months	
System compatibility		RS-485 (Modbus RTU)	
Warranty		1 Year (EU & USA : 2 Years)	
Max. pressure	with SubConn	30 bar	~435 psig
	DeepSea version	100 bar	~1450 psig
Protection type		IP68	NEMA 6P
Sample temperature		+2...+40 °C	~ +36…+104 °F
Ambient temperature		+2...+40 °C	~ +36…+104 °F
Storage temperature		-20...+80 °C	~ -4…+176 °F
Inflow velocity		0...10 m/s	~ 0…33 fps

	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 UV A / UV B irradiance	ACC-VIS VIS irradiance	ARC-VIS VIS radiance	ASC-VIS VIS scalar irradiance
Wavelength range*	280...500 nm	320...950 nm		
Type 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)
Type 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	Kosinus		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 **) Integration time ***) Depends on wavelength range ****) Noise-equivalent irradiance

eCHEM

pH Sensor Digital TpH

80S1000X0

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

Measurement technology		pH electrode
Measurement principle		Potentiometry
Parameter		pH value, temperature
measuring range	pH	0...14 pH
	Temperature	0...+65 °C
resolution	pH	0.01 pH
	Temperature	0.1 °C
precision	pH	± 0,06 pH
	Temperature	± 0.5 °C
Intrinsic error	pH1	± 0.05 pH
	pH7	± 0.05 pH
	pH13	± 0.35 pH
Linearity measurement error		± 0.1 pH

The sensor complies with DIN EN 60746-2:2003-09 and the electrodes with BS 2586:1979.

Repeatability	pH1	± 0.1 pH
	pH7	± 0.05 pH
	pH13	± 0.1 pH
Output signal fluctuation	pH7	± 0.025 pH
	pH4	± 0.05 pH
Warm-up time		< 5 min
Drift	Short-term drift 24 h	≤ 0.03 pH
	Long-term drift 1 week	≤ 0.05 pH
10% time and 90% time	T10 ascending	< 2 s
	T10 falling	< 2 s
	T90 ascending	≤ 5 s
	T90 falling	≤ 5 s
Temperature compensation		Pt1000
Measurement interval		2 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 %)	
Connection	8-pin M12 plug	
Sensor cable	2 m and 10 m	

Required supervision	Typically ≤ 0.5 h/month	
Calibration / maintenance interval	Typically 4 weeks	
System compatibility	Modbus RTU	
Warranty	1 year (EU & US: 2 years) on electronics; wearing parts are excluded from the warranty	

Max. pressure	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	~ +23 °F to +131 °F
Storage temperature	0...+80 °C	~ +32 °F to +176 °F
Inflow velocity	0...3 m/second	~ 0...10 fps

pH Sensor Digital Differential TpH-D

80S2000X0

Robust, digital differential pH probe for operation with TriBox controllers and HS100 top-hat rail module. The reference system of the pH electrode is separated from the measuring medium due to the closed design. This rules out electrode poisoning. A salt bridge that is insensitive to dirt reduces the amount of cleaning required and prevents dilution of the electrolyte. As a result, the probe achieves a particularly long service life even in heavily contaminated media.TpH-D is available with a cable length of 10 m or 2 m.

Advantages

- Communication of measurements via digital
- Modbus RTU protocol
- the differential measurement method enables a longer lifetime of the electrodes
- all calibrations can be performed via the digital interface
- no moving mechanical parts
- plug and play with TriBox controller

Applications

- difficult measurement of inlets to waste water treatment plants
- Process monitoring and control

Accessories

- Cable: Extension cable 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox mini, HS100
- Fittings: Flow cell

Technical specifications

Measurement technology		pH electrode with additional reference pH electrode in pH7 buffer solution
Measurement principle		Potentiometry
Parameters		pH value, temperature
Measuring range	pH	0...14 pH
	Temperature	0...+65 °C
Resolution	pH	0.01 pH
	Temperature	0.1 °C
Accuracy	pH	± 0,06 pH
	Temperature	± 0.5 °C
Intrinsic error	pH1	± 0.05 pH
	pH7	± 0.05 pH
	pH13	± 0.35 pH

The sensor complies with DIN EN 60746-2:2003-09 and the electrodes with BS 2586:1979.

Linearity measurement error		± 0.1 pH
Repeatability	pH1	± 0.1 pH
	pH7	± 0.05 pH
	pH13	± 0.1 pH
Output signal fluctuation	pH7	± 0.025 pH
	pH4	± 0.05 pH
Warm-up time		< 5 min
Drift	Short-term drift 24 h	< 0.03 pH
	Long-term drift 1 week	< 0.05 pH
10% time and 90% time	T10 ascending	< 2 s
	T10 falling	< 2 s
	T90 ascending	≤ 5 s
	T90 falling	≤ 5 s
Temperature compensation		Pt1000
Measurement interval		2 s

Housing material		PPS / PET / NBR / PVDF / ceramic junction / Viton O-ring / titanium ground electrode / pH glass
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 %)
Connection	8-pin M12 plug
Sensor cable	2 m and 10 m

Required supervision	Typically ≤ 0.5 h/month
Calibration / maintenance interval	Typically 4 weeks
System compatibility	Modbus RTU
Warranty	1 year (EU&US: 2 years) on electronics; wearing parts are excluded from the warranty

Max. pressure	with fixed cable	3 bar	~ 43.5 psig
	in flow cell	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	~ +23 °F to +131 °F
Storage temperature	+5...+15 °C	~ +41 °F to +59 °F
Inflow velocity	0...3 m/second	~ 0...10 fps

Turbidity Sensor TTurb

81SXX00XX

The TTurb is a digital sensor for optical turbidity measurement using the 90° IR scattered light method. Depending on the sensor design it can be used in pure water up to 100 FNU as well as in raw water, waste water and process water up to 1000 FNU. TTurb is available with different cable lengths (10 m or 2 m) as well as in different versions.

As an immersion sensor, the TTurb can be used directly in the measuring medium, but is also available in the FlowCell-optimized version directly with a flow cell for bypass applications. In addition, it is possible to obtain the TTurb directly in a set with the dry-standard TTurbCAL. This standard is always directly adapted to each individual instrument and thus enables precise function tests directly on site, without any reagents.

TTurb100	0...100 FNU
TTurb400	0...400 FNU
TTurb1000	0...1000 FNU

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
- Measurement of turbidity in open waters

Accessories

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

Technical Specifications

Measurement technology		LED light source Photodiode detector	
Measurement principle		Nephelometry	
Parameters		Turbidity as FNU; mg/L; NTU; TSSeq	
Measuring range		0...100, 0...400, 0...1000 FNU	
Measurement accuracy		± (5 % + 0.5)	
Detection limit		0.5 FNU for TTurb 100 2 FNU for TTurb 400 2 FNU for TTurb 1000	
Measurement wavelength		860 nm, FWHM 30 nm	
Reaction time T100		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 %)	
Connection		8-pin M12 plug	
Required supervision		≤ 0.5 h/month typically	
Calibration/ maintenance interval		24 months	
System compatibility		Modbus RTU	
Warranty		1 year (EU&US: 2 years) on electronics; wearing parts are excluded from the warranty	
Max. pressure	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		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		maximum 0.1 m/second	maximum ~ 0.33 fps

The sensor meets requirements of DIN EN ISO 7027-1:2016-11.

Conductivity Sensor

90S4301X0

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

Measurement technology	Conductivity	
Measurement principle	Conductivity with two graphite electrodes	
Parameters	Conductivity	
Measurement range	0.00 µS… 20000 µS	
Measurement accuracy	±0.5 µS at 20 µS ± 5 µS at 200 µS ± 50 µS at 2000 µS ± 500 µS at 20000 µS	
Response time	T90 < 60s	
Temperature compensation	Via NTC	
Housing material	PVC housing, graphite electrodes	
Dimensions (L x Ø)	220 mm x 33 mm	~ 8.7“ x 1.3“
Interface	RS-485 Modbus RTU	
Power supply	12…24 VDC	
Connection	8-pin M12 connector, cable length 2 m or 10 m	
Maintenance interval	2 years	
System compatibility	Modbus RTU	
Warranty	1 year (EU & US: 2 years) on electronics; wear parts are excluded from the warranty	
Process pressure	10 bar	~ 145 psig
Calibration method	One-point calibration with standard measuring solution	
Process temperature	0…50°C	~ +32 °F to +122 °F

Conductivity Inductive

90S4401X0

The inductive conductivity sensor has 2 toroidal coils which are housed in a plastic casing and therefore do not come into contact with the surrounding solution. For this reason, it is physically impossible for the sensor surface to become soiled, coated or contaminated.

Since the inductive conductivity sensor does not determine the conductivity via electrodes, but via electrical fields, no polarization effects occur. Thus the sensor provides more accurate measurement results, especially for measurement media with high conductivities.

The sensor housing is made of Noryl, which is extremely resistant to chemicals.

Benefits

- No contamination, coating or pollution of the sensor surface
- No polarization effects
- Low maintenance requirement

Technical specifications

Measurement technology		Change of inductance
Measurement principle		Change of inductance with two toroidal coils
Parameter		Conductivity
Measuring range		0.5 mS/cm – 2000 mS/cm
Measurement accuracy		± (2% + 20 µS/cm)
Drift		0.1 % / Year
Turbidity compensation		No
Temperature compensation		Via NTC
Data Logger		No
Response time		T90, depending on equilibrium
Measurement interval		10 seconds
Material	Housing	Noryl
Dimensions (L x Ø)		119 mm x 52 mm
Weight		0.1 kg
Interface		RS-485 Modbus RTU (Baud rate = 9600)
Power consumption		< 75 mW
Power supply		7 – 40 VDC
Connection		8-pin M12 connector
Maintenance effort		≤ 0.5 h/month typical
Maintenance interval		24 Months
Calibration method		Two-point calibration in air and with standard measuring solution during initial installation, followed by validation
System compatibility		Modbus RTU
Warranty		1 year, EU & USA: 2 years
Max. pressure	With fixed cable	10 bar
Protection type		IP68
Temperature	Sample	-10 °C ... +70 °C (max. 85 °C)
	Ambient	-10 °C ... +70 °C (max. 85 °C)
	Storage	-20 °C ... +80 °C
Inflow velocity		Max. 3 m/s, Steady and constant flow

Digital Dissolved Oxygen Sensor

90S53X1X0

The oxygen sensor uses luminescence-based optical measurement technology and measures reliably and precisely. The low maintenance and small amount of consumable materials needed by the sensor provide immediate returns on investment. Only the membrane cap must be replaced every two years. The sensor can also be used in applications with a very weak water flow. The oxygen sensor is available with a 10-meter or a 2-meter cable.

Benefits

- Low operation costs thanks to low maintenance (no electrolyte replacement)
- Larger calibration interval thanks to low deviations
- No polarisation voltage necessary
- High degree of measurement accuracy, even at low concentrations
- Fast response time
- No minimum inflow (no oxygen consumption)

Applications

- Measurement of dissolved oxygen in surface water, aquaculture, seawater and drinking water and wastewater plants

Accessories

- Cable: Extension cable 0.3 m, 2 m, 10 m, 25 m
- Controller: TriBox3, TriBox mini, HS100
- Fittings: FlowCell

Technical Specifications

Measurement principle		Luminescence	
Parameters		Dissolved oxygen	
Measurement range		0...20 mg/L 0...20 ppm 0...200 %	
Measurement accuracy		± 0.1 mg/L ± 0.1 ppm ± 1 %	
Resolution		0.01	
Reaction time		90% of the value in less than 60 seconds	
Measurement interval		> 5 s	
Inflow velocity		No movement necessary	
Temperature compensation		Via NTC (compensation active for temperatures below 0 °C)	
Measurement range (temperature)		0...+50 °C	
Resolution (temperature)		0.01 °C	
Accuracy (temperature)		0.5 °C	
Membrane cap		No cross-sensitivity with: pH 1...14 ; CO_2, H_2S, SO_2 Cross-sensitivity with organic solvents such as acetone, toluene, chloroform dichloromethane (methylene chloride) or chlorine gas	
Material		Standard version with passivated stainless steel (316L) housing, cap and screws; For seawater applications with titanium housing, cap and screws Cable: polyurethane casing; Cable grommet: polyamide Patch with active substance (black) - membrane: silicon for optical insulation	
Dimensions (L x Ø)		146 mm x 25 mm	~ 5.7″ x 1″
Weight	stainless steel	~ 450 g	~ 1 lbs
	titanium	~ 300 g	~ 0.7 lbs
Interface		RS-485 (Modbus RTU)	
Power consumption		1 W	
Power supply		12 V (± 10 %)	
Sensor cable		2 m and 10 m	~ 6.6 ft and ~ 32.8 ft
Calibration/maintenance interval		2 years	
Warranty		1 year (EU & US: 2 years) on electronics; wear parts are excluded from the warranty	
Max. pressure		5 bar	~ 72.5 psig
Protection type		IP 68	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

Free Chlorine Sensor Digital

90S21000X

The chlorine sensor from the eCHEM sensors product range is an electrochemical sensor for measuring the chlorine concentration in water. This sensor detects free chlorine from inorganic chlorine products (chlorine gas, hypochlorite, 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

Measurement technology	Membrane-covered, amperometric potentiostatic 3-electrode system	
Measurement principle	Amperometry	
Parameters	Free chlorine with reduced pH dependency	
Measurement range	0...2 mg/L, 0...20 mg/L	
Accuracy	Measuring range 2 mg/L: at 0.4 mg/L & 1.6 mg/L < 1% Measuring range 20 mg/L: at 4 mg/L < 1% at 16 mg/L< 3 %	
Response time	T90: approx. 2 min	
Running-in period	Approx. 2 h prior to initial operation	
Drift	approx. -1 % per month	
Temperature compensation	Automatic through integrated temperature sensor; Temperature jumps must be avoided	
Housing material	Micro-porous hydrophilic membrane, UPVC, stainless steel 1.4571	
Dimensions (L x Ø)	Approx. 205 mm x approx. 25 mm	~ 8.1” x 1”
Interface	RS-485, Modbus RTU	
Power supply	9...30 VDC	
Connection	8-pin M12 plug	
Maintenance interval	typically once per week	
System compatibility	Modbus RTU	
Warranty	1 year (EU & US: 2 years) on electronics; wear parts are excluded from the warranty	
Process pressure	1 bar, no pressure shocks or vibrations, with retaining ring	~ 14.5 psig
Calibration method	Determination of chlorine with DPD-1 method	
Process temperature	0...+45 °C (no ice crystals in the test water)	~ +32 °F... +113 °F
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)	
Cross influences	Combined chlorine increases measured value	

Chlorine Dioxide Sensor Digital

90SX20000

The chlorine dioxide sensor from the eCHEM sensors product range is an electrochemical sensor for measuring the chlorine dioxide concentration in water. The range of application of the sensor covers almost all water qualities and treatments (e.g. bottle washing machine, CIP system, rinser). It can also be used in seawater. Thanks to a special membrane system, the sensor is particularly resistant to chemicals and surfactants.

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	
Parameters	Chlorine Dioxide	
Measurement range	0...2 mg/L, 0...20 mg/L	
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 %	
Response time	T90: approx. 1 min	
Running-in period	Approx. 2 h prior to initial operation	
Drift	Approx. -1 % per month	
Temperature compensation	Automatic through integrated temperature sensor; Temperature jumps must be avoided	
Housing material	Micro-porous hydrophilic membrane, UPVC, stainless steel 1.4571	
Dimensions (L x Ø)	Approx. 205 mm x approx. 25 mm	~ 8.1” x 1”
Interface	RS-485, Modbus RTU	
Power supply	9...30 VDC, max. 56 mA	
Connection	8-pin M12 plug	
Maintenance interval	typically once a week measuring signal check, membrane cap change & electrolyte change depending on application	
System compatibility	Modbus RTU	
Warranty	1 year (EU & US: 2 years) on electronics; wear parts are excluded from the warranty	
Process pressure	1 bar, no pressure shocks or vibrations, operation with retaining ring	~ 14.5 psig
Calibration method	Determination of chlorine with DPD-1 method	
Process temperature	0...+50 °C (no ice crystals in the test water)	~ +32 °F...+122 °F
Flow rate	Approx. 15...30 L/h in FLC-3, minimum flow dependence exists	
pH range	pH 1...pH 12, reduced pH dependence	
Conductivity	10 µS/cm...50 mS/cm (sea water)	
Cross influences	Cl2 does not interfere; O3: factor 25	

Total Chlorine Sensor

90SX30000

The chlorine sensor from the eCHEM sensor product range is an electrochemical sensor for measuring the chlorine concentration in water. The sensor measures the concentration of total chlorine in a sample created by adding inorganic chlorine products (e.g. chlorine gas, sodium hypochlorite solution, calicium hypochlorite solution). The measuring method has a reduced pH dependency, so that pH value fluctuations only have a minor influence on the measuring signal. By regularly replacing the electrolyte and the membrane cap, the sensor performance can be guaranteed and ensured over a longer period of time.

Advantages

- Stable signals even with variable pH values
- Surfactants are partially tolerated

Applications

- Swimming pools, drinking water, seawater, brine water (15% NaCl)

Accessories

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

Technical specifications

Measurement technology	Membrane-covered, amperometric potentiostatic 3-electrode system
Measuring principle	Amperometry
Parameter	Total chlorine (free chlorine + combined chlorine) with reduced pH dependence
Measurement range	0...2 mg/L; 0...20 mg/L
Accuracy*	Measuring range 2 mg/L: <2% at 0.4 mg/L and 1.6 mg/L Measuring range 20 mg/L: <1% at 4 mg/L and <3% at 16 mg/L
Application	Swimming pools, drinking water, seawater, brine water (15% NaCl), Surfactants are partially tolerated
Suitable chlorinating agents	Inorganic chlorine compounds: NaOCl (=chlorine bleach), Ca(OCl)2, chlorine gas, electrolytically produced chlorine

Resolution		Measuring range 2 mg/L: 0.001 mg/L Measuring range 20 mg/L: 0.01 mg/L
Response time		T90: approx. 3 minutes (brine water approx. 5 minutes)
Running-in time		Approx. 2 hours for initial start-up
Slope drift		approx. -1 % per month
Temperature compensation		Automatically, through an integrated temperature sensor, temperature jumps are to be avoided
pH range		pH 4 - pH 12, with reduced pH dependence
Conductivity		10 µS/cm - 200 µS/cm (brine water)
Zero point determination		Not necessary
Slope calibration		On the unit by analytical chlorine determination, DPD-4 method (DPD-1 + DPD-3)
Cross-sensitivities		ClO2: factor 1; O3: factor 1.3; Corrosion inhibitors and water hardness stabilisers can cause measurement errors.
Absence of the disinfectant		Max. 24 hours
Material		Microporous hydrophilic membrane, PVC-U, PEEK, stainless steel (1.4571)
Dimensions (L x Ø)		approx. 205 mm x 25 mm
Weight		1.1 kg
Interface		RS-485, Modbus RTU
Power supply / electronics**		9 - 30 VDC, approx. 56 - 20 mA
Connection		8-pin M12 connector
Maintenance effort		Weekly control of the measuring signal recommended Depending on the water quality, the membrane cap and the electrolyte should be replaced once a year
System compatibility		Modbus RTU
Warranty		1 year (EU & USA: 2 years) on electronics; Wear parts are excluded from the warranty
Max. Pressure		3 bar, no pressure surges and/or vibrations, with circlip
Inflow velocity		approx.15 - 30 l/h in FlowCell
Temperature	Transport	+5...+50 °C (sensor, electrolyte, membrane cap)
	Sample	0...+45 °C (there must be no ice crystals in the measuring water)
	Ambient	0…+55 °C
Storage	Sensor	can be stored dry and without electrolyte for an unlimited period at +5...+40 °C
	Electrolyte	in original container in the dark at +5...+ 35 °C one year (after production, please note expiry date)
	Membrane cap	Can be stored in original packaging for an unlimited period at +4...+40°C (used caps cannot be stored).

* After calibration at repeat conditions (25 °C, pH 7.2 in drinking water) from full scale value

** Electronics is completely electrically isolated; digital internal measured value processing

CONTROLLER

TriBox3

10C000000

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

TriBox3 is a measurement and control system for all TriOS sensors. The unit offers 4 sensor channels with selectable RS-232 or RS-485 interface. In addition to Modbus-RTU, various other protocols are available. A built-in valve allows the use of a compressed air purge for the sensors. In addition, the TriBox3 offers various interfaces, including an IEEE 802.3 Ethernet interface, an IEEE 802.11 b/g/n interface, a USB connection and 6 analogue outputs (4...20 mA). An integrated relay can be used to trigger alarms or control external devices. Low power consumption, a robust aluminium housing and a range of interfaces make the TriBox3 ideal for all applications in environmental monitoring, drinking water, waste water treatment plants and many other areas.

Advantages

- open Modbus RTU communication
- for all digital TriOS sensors
- cost-effective alternative to analogue measuring points
- integrated data logger with service logbook
- WiFi for communication
- USB interface
- TCP/IP interface
- Modbus RTU server
- also available without WiFi

Technical specifications

POWER SUPPLY	
Voltage supply	100...240 VAC, 50...60 Hz, 12...24 VDC (± 5%)
Power consumption	Type: 6 W, max: 50 W
Protection class	1
Overvoltage category	II
SENSOR INTERFACES	
Connection	4 M12 industrial connectors for TriOS sensors
Standard	RS-232, RS-485
Protocol	Modbus-RTU, TriOS
MODBUS RTU	
Server RTU	yes (on each sensor connector)
Client RTU	yes (on each sensor connector)
Parameters	Adjustable (default: 9600-8-N-1)
MODBUS TCP	
Server TCP	yes
TCP port	Adjustable (default: 502)

NETWORK/USB		
Standard	Ethernet, WiFi based on IEEE 802.11b/g/n	
Connection	1 RJ-45 integrated WiFi antenna (for TriBox3 with WiFi)	
Protocol	TCP/IP, Modbus TCP, VNC	
Web interface	no	
USB	USB 2.0 (Host), USB-A socket	
ANALOG INTERFACES		
Analog Output	6 analogue outputs, configurable: 4...20 mA	
Load	max. 500 Ω	
Connection terminals	1.5 mm²	16 AWG
Error indicator	0 mA	
SWITCH INPUT/OUTPUT		
Measurement trigger	Trigger for global measurement (galvanically isolated), Control voltage: 12...24 VDC (± 5%) Connection terminal: 1.5 mm² (AWG 16)	Control voltage: 12...24 VDC (± 5%) Connection terminal: AWG 16
Control voltage	no	
RELAY OUTPUTS		
Electrical specification	1 x relay changeover contact (SPDT) / 250 VAC, 2 A / 30 VDC, 2 A	
Connection terminals	max. 2.5 mm²	max. 14 AWG
COMPRESSED AIR CLEANING		
Valve	integrated, max. air pressure: 5 bar	
DISPLAY		
Display	7” capacitive touch-display (800x480 pixels)	
LED	5 status LEDs	
DATA STORAGE		
Storage medium	internal 2 GB microSD card, direct logging to USB stick possible.	
Data Export	via USB 2.0 Host	
ENVIRONMENT		
Operating temperature	-10...+50 (with pre-installed mains power cable +5...+40 °C)	~ +14 ˚F to +122 ˚F (with pre-installed mains power cable +41...+104 ˚F)
Storage temperature	-20...+70 °C	~ -4 ˚F to +158 ˚F
Relative air humidity	0...95 % (not condensing)	
Protection type	IP65	NEMA 4X
Pollution level	2	
MECHANICAL SYSTEM		
Dimensions (width x height x depth)	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

Digital 2-channel controller

Digital 2-channel controller with 2 digital sensor inputs and two 4...20 mA outputs. The digital 2-channel controller is compatible with all digital TriOS sensors. All of the measured values and diagnostics data that are saved can be selected using an integrated web browser.

Benefits

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

TriBox mini NET

20C100000

Instead of WiFi, the TriBox mini NET has an Ethernet connection via the right port.

Technical Specifications

Voltage supply	100...240 VAC, 50...60 Hz, 10...15 VDC
Power consumption	Typ: 2 W, max.: 40 W
Connection	2 M12 industrial connectors for TriOS sensors
Standard	RS-232, RS-485
Protocol	Modbus RTU, TriOS
Server RTU	no
Client RTU	yes (on each sensor connector)
Parameters	Adjustable (default: 9600-8-N-1)

Standard	**TB mini**	WiFi based on IEEE 802.11b/g/n	
	TB mini NET	Ethernet based on IEEE 802.3i	
Connection	**TB mini**	Built-in WiFi antenna	
	TB mini NET	COM2 sensor interface (right) with M12→RJ45 cable	
Protocol		TCP/IP	
Web interface		yes	
USB		no	
Analog output		2 analog outputs, configurable 4...20 mA	
Load		max. 500 Ω	
Connection terminals		1.5 mm²	16 AWG
Error indicator		no	
Measurement 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
Electrical specification		1 relay changeover contact (SPDT) / 250 VAC, 2 A / 30 VDC, 2 A	
Connection terminals		max. 2.5 mm²	max. AWG 14
Valve		Optional: external connection possible	
Display		3.5 inch capacitive touch display (320x240 pixels)	
LED		5 status LEDs	
Storage medium		Internal 2 GB microSD card	
Data export	**TB mini**	Via WiFi (compressed tar file)	
	TB mini NET	via Ethernet (compressed tar file)	
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 (the network cable has a lower protection class)	NEMA 4X (the network cable has a lower protection class)
Dimensions (width x height x depth)		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)	

DRY STANDARDS

SolidCAL

20AXX000X

Solid secondary standard for TriOS fluorometers

The SolidCAL solid secondary standard enables fast function and calibration checks of the TriOS enviroFlu-HC fluorometer for PAH detection and the nanoFlu fluorometer for the detection of chl-a, cdom or phycocyanin. The simple use of the standard ensures fast, accurate device verification, even on 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 a cleaning fluid and carrier.

FieldCAL

20A210003

Secondary standard for RAMSES radiometers

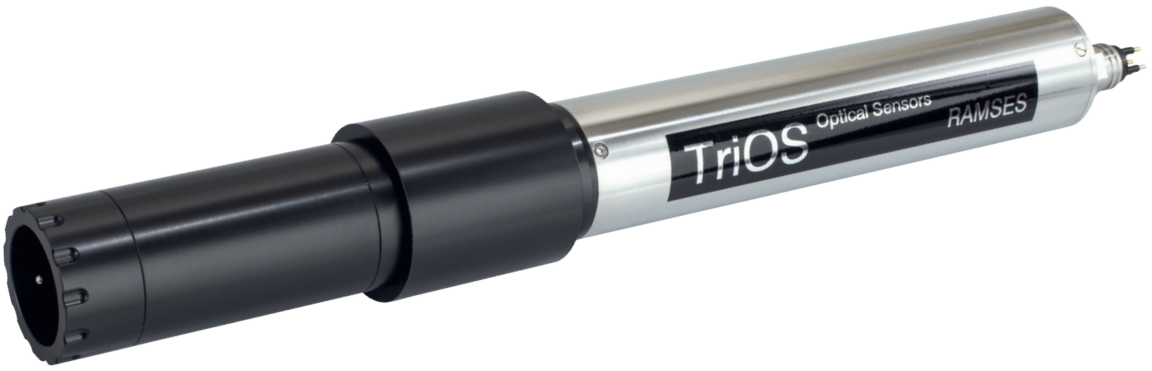
The FieldCAL secondary standard enables reliable calibration and function tests of RAMSES radiometers in the field. Thanks to the special design, radiance (ARC), as well as irradiance (ACC) sensors can be checked. An adapter used for radiance sensors is included in the set. Small dimensions and a sturdy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

Benefits

- High stability
- Battery-powered
- Small size
- Easy to use
- For irradiance and radiance sensors

Technical Specifications

Wavelength range	430...730 nm	
Light source	White LED with spherical diffuser	
Stability	Type Better than 1% after 1 minute	
Battery	4 AA (not rechargeable)	
Operating time	Type 50 hours per battery charge	
Material	POM, seawater-resistant plastic	
Dimensions (ØxL)	50 mm x 140 mm 50/60 mm x 182 mm (with ACC Adapter)	~ 2" x 5.5" ~ 2/2.4" x 7.2" (with ACC Adapter)



DryCAL

20A100008

DryCAL enables high-precision validation of the corresponding enviroFlu sensor. Every DryCAL corresponds precisely to a certain sensor and is calibrated to its specific properties, which significantly increases the precision of the calibration.

The DryCAL is sold as a set with two dry calibration standards.

TTurbCAL

20A100007

The TTurbCAL is a solid matter standard, which provides an FNU value for reagent-free calibration of TriOS TTurb sensors. The standard is very easy to use and makes device calibration on site much easier.

ACCESSORIES

G2 InterfaceBox

11CX00000

The G2 InterfaceBox is available in variants with and without WiFi. G2 sensors from TriOS Mess- und Datentechnik GmbH can be configured and controlled via the interface box. 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 accessed with any browser.

Technical Specifications

Voltage supply	24 VDC (± 10 %)	
Power consumption	≤ 1.5 W plus sensor (only the WiFi variant)	
Connection	1 M12-plug for TriOS G2 sensors	
Standard	IEEE 802.3	
Protocol	Web interface (only with G2 sensors)	
Analog interfaces	no	
Switch input/output	no	
Standard	IEEE 802.3, IEEE 802.11 b/g/n (only the WiFi variant)	
Connection	1 RJ-45 external WiFi antenna (SMA) (only the WiFi variant)	
Protocol	TCP/IP (only with G2 sensors)	
Web interface	no	
USB	no	
Data storage	no	
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
Dimensions (width x height x depth)	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″

TTrig

12C100000

TTrig is a measurement interval switch for the TriOS G2 sensors OPUS and NICO. Due to its low standby power (<1 mW), it is ideally suited for operation with a battery as power supply. It is designed to minimize energy consumption between measurements.

The TTrig features an additional connection for commissioning and controlling a wiper (W55).

Remote or self-sufficient measuring stations can thus be operated maintenance-free for several months.

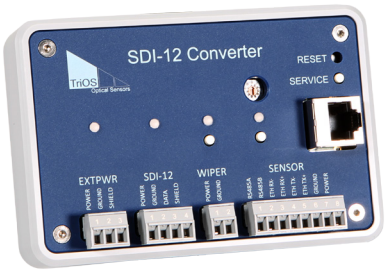
An RJ-45 Ethernet interface provides access to the sensor's G2 web interface for downloading the measurement data from the data logger with a notebook.

Technical Specifications

POWER SUPPLY	
Voltage supply	12...24 VDC, max. 4A
Power in standby	<1mW
SENSOR INTERFACES	
Connection	M12 for TriOS G2 sensors; 1x RJ-45
Standard	RS-485
Protocol	Modbus RTU
Analog interfaces	No
OTHER INTERFACES	
Connection	1x M8 connector for wiper W55 Trigger output
ENVIRONMENT	
Operating temperature	0...+40 °C
Storage temperature	-10...+70 °C
Relative air humidity	0...95 % (non-condensing)
Protection type	IP64
MECHANICAL SYSTEM	
Dimensions (width x height x depth)	140 x 80 x 60 mm
Weight	0.5 kg

SDI-12 Converter

11C100001



The SDI-12 converter translates the Modbus protocol used by TriOS sensors into SDI-12 and thus serves as an interface between the sensors and the SDI-12 interface of the peripherals.

The SDI-12 converter translates the Modbus protocol used by TriOS sensors into SDI-12 and thus serves as an interface between the sensors and the SDI-12 interface of the peripherals. Due to its low standby power (< 20 mW) it is perfectly suited for operation with a battery as power supply. Four status LEDs inform the user continuously about the current operation mode and power supply. Both, measurements with G2 sensors and wiper cleaning cycles can be controlled via the converter. The implemented Ethernet interface allows data export and sensor configuration via the web interface.

With three manual buttons Sensor Scan, Wiper Cleaning and Service Mode can be activated. The position of the rotary encoder determines the sensor address via which the sensor is addressed.

Technical Specifications

External power supply	Power supply	12…24 VDC (± 10 %)	
	Connection terminal	1.5 mm² (AWG 16)	
SDI-12 Interface	Power supply	10…24 VDC (± 10 %)	
	Power consumption in standby	< 20 mW	
	Protocol	SDI-12	
Wiper Interface	Connection terminal	1.5 mm² (AWG 16)	
	Standard	W55 Wiper	
Sensor Interface	Connection terminal	1.5 mm² (AWG 16)	
	Standard	RS485	
	Protocol	Modbus RTU	
Network*	Standard	Ethernet	
	Connection	RJ45	
Operating temperature		-10…+40 °C	~ 14 ˚F to +104 °F
Storage temperature		-10…+70 °C	~ 14 ˚F to 158 ˚F
Relative air humidity		0…95 % (non-condensing)	
Protection type		IP30	NEMA 1
LED		4x RGB Status LED	
Housing material		PVC, Perspex	
Dimensions (L x W x H)		120 x 80 x 45mm	~ 4.7” x 3.2” x 1.8”
Weight		250 g	~ 0.6 lbs
System compatibility		SDI-12	
Warranty		1 Year (EU & US: 2 Years)	

* Only available if the connected sensor has an Ethernet interface.

FC68 FlowCell for enviroFlu

10A100003

The FlowCell FC68 is used for bypass installation of the enviroFlu. The measurement medium is directed through the cell, making measurement without a reagent on land possible.

FC48 FlowCell for TriOS Photometers

10A10000X

The FlowCell FC48 is used for bypass installations of the TriOS Photometer with a diameter of 48 mm. Different path lengths are available.

Ultrasonic FlowCell

10A10001X

FlowCell with integrated ultrasound cleaning

In addition to the conventional FlowCell, TriOS now offers an ultrasonic FlowCell, which combines the bypass installation with direct cleaning.

Ultrasonic sound sprevents deposits forming on the measurement windows of the sensor. The built-in viewing window and the illumination unit allow the state of the optical path be monitored at any time.

The FlowCell is suitable for a photometer with a 10 mm path as the FC 48/10 USC and for a photometer with 100 mm path as the FC 48/100 USC.

Technical Specifications

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 socket (a suitable M5 connection cable with open ends is included in the delivery)	
Power cable	M5 socket with optional coaxial connector power adapter cable and matching 230 V power adapter	
Max. internal pressure	1 bar, 2...4 L/min	~ 14.5 psig, 0.5 to 1gpm
Operating temperature	+1...+40 °C	~ 34 ˚F to +104 ˚F
Storage temperature	-20...+70 °C	~ -4 ˚F to +158 ˚F
Protection type	IP64	NEMA3
Dimensions (width x height x depth)	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 simple installation concept

The specially developed FlowCell for the eCHEM series is based on a simple, clever system. The side and base pieces of the FlowCell can be detached easily with only one turn and new modules can be added. The sensor-specific adapter pieces can also be replaced easily. Only the black attachment element is needed to attach it to the wall. The FlowCell can then simply be placed in front and attached with a bolt.

The system is designed to be modular, which means that every extension can be ordered individually and customized according to the application. This gives you complete freedom in the design of your application and you can adapt the system in just a few simple steps. The eCHEM FlowCell system is compatible with the FlowCell for turbidity.

FlowCell for nanoFlu

10A090000

FlowCell for Turbidity Sensors

10A050000

A specialized FlowCell was developed for the sensors of the turbidity series to minimise reflections. This design maximises the precision of the measurements. This FlowCell is compatible with the FlowCell for eCHEM sensors and the nanoFlu FlowCell.

Sedimenter

02A100011

The sedimenter is a flow-through device for use in turbid water. The sample is passed through the sedimenter without pre-filtering. The sensor can also be installed in the sedimenter equipped with a wiper.

Suitable for OPUS, NICO, enviroFlu & microFlu. Version for LISA, LISA color and VIPER on request.

Technical specifications

Measuring device	Suitable for OPUS, NICO, enviroFlu & microFlu with and without wiper. Version for LISA, LISA color and VIPER on request.
Pressure range	Unpressurised, open drain
Material	PVC
Dimensions	Installation plate for wall mounting: 800 mm x 495 mm
Weight	Sediment incl, wall plate only: 14.7 kg

Wiper W55 V2

02A100008 • 02A100X18

The TriOS Wiper W55 V2 provides an additional cleaning option for all TriOS photometers with path lengths from 1 mm up to 10 mm. The wiper housing can be mounted on the sensor in just a few steps and provides reliable cleaning of the measurement windows. The new magnetic axis lock allows quick and easy wiper blade replacement, without any tools.

The new version of the wiper now features blockage detection and removal, and a service mode that increases the life of the wiper through regular use. The accessory can also be used in seawater up to a depth of 10m.

Technical Specifications

Path lengths	1 mm, 2 mm, 5 mm, 10 mm
Control port	4-pin M8-plug A suitable M8 connection cable with open end is included in the scope of delivery.
Trigger input	5 – 24 VDC (±10%)
Power consumption trigger input	2...15 mA
Operating time (max.)	3 Seconds
Dimensions L x Ø	175 mm x 80 mm
Weight	0.52 kg
Material	NBR, POM, TPE (PP, EPDM), Titanium, V4A
Power supply	12 – 24 VDC (± 10 %)
Power consumption	approx. 2 – 6 W in operation; max. 0.75 W in standby
Maintenance effort	≤ 0.5 h/month typical
Maintenance interval	depending on application
Warranty	1 year (EU & USA : 2 years)
Max. Pressure	1 bar
Protection Type	IP68
Inflow velocity	up to 10 m/s
Operating temperature	+2...+40 °C
Storage temperature	-10 °C...+70 °C

AirShot2

02A100010

The compact pressured air cleaning system AirShot2 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 AirShot2 a valuable addition to every system.

AirShot2 can be used as an alternative to a standard compressor and can be operated with a TriBox3.

The cleaning process of the AirShot2 requires only 10 seconds. It can be triggered at a minimum interval of 5 minutes.

Technical specifications

ENERGY SUPPLY		
Voltage supply	**230 V Version**	230 VAC, max. 200 W, 0.86 A
	110 V Version	110 VAC, max. 200 W, 1.8 A
INTERFACES		
Connection		for 6 mm hoses (4 mm inner diameter)
Power cable length		3 m
Control line length		5 m
Trigger Input		12...24 VDC, M8 4-Pin
Wiper Output		M8 4-Pin
DISPLAY		
LED		3 x Status LED
AMBIENT		
Temperature Impulse Box		-5...+40 °C
Temperature Compressor		-10...+40 °C
Protection type		IP44
MECHANICS		
Size w/h/d		190 x 260 x 125 mm and 90 x Ø46 mm
Weight		4.4 kg
Housing		Polycarbonate
SETTINGS		
Standard		10 s every 5 min
Max. Pressure		7 bar

Solenoid Valve V2 for TriBox mini

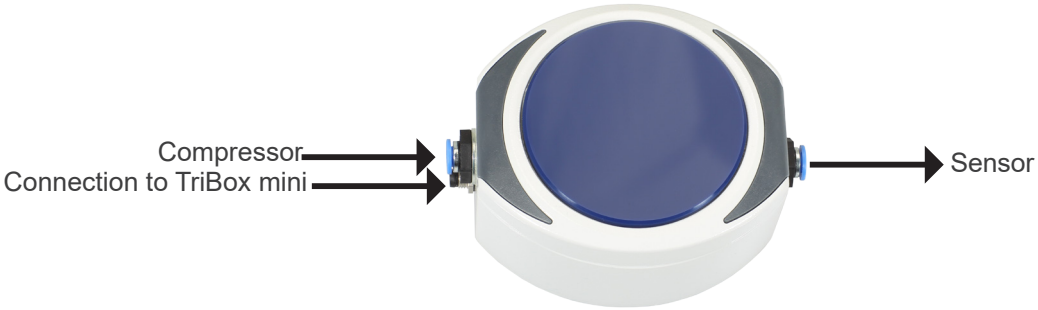
03A000003

The TriBox mini supports operation of an external, controllable valve for the purposes of water or compressed-air cleaning. All Solenoid Valve V2 settings can be configured via the TriBox mini menu ("Measurement & Cleaning", sub-item "Cleaning").

The Solenoid Valve V2 can be installed very easily. It has four 5.3 mm holes for installation.

Available configurations:

- Interval cleaning
- Duration of cleaning
- Pause before measurement

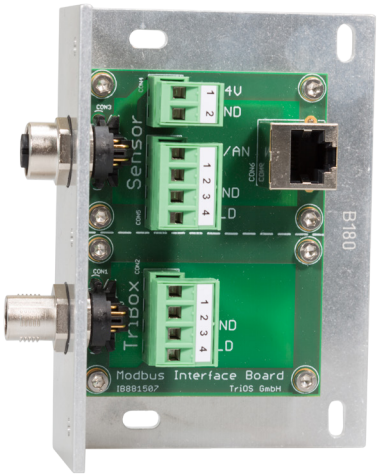


Technical Specifications

Dimensions	110 x 97 x 55 mm	~ 4.3" x 3.8" x 2.2"
Weight	~ 0.6 kg	~ 1.3 lbs
Max. pressure	5 bar	~ 72.5 psig
Voltage supply	12 VDC	
Power consumption	3 W	
Connection	for 6 mm hoses (4 mm inner diameter)	for ~0.23" hoses (~0.16" inner diameter)
Housing	Die-cast aluminium alloy	
Protection type	IP65	NEMA 4X
Cables	1.5 m connector cable with M8 plug	~ 4.9 ft connector cable with M8 plug
Temperature	2...+40 °C	~ 35.6 ˚F to +104 ˚F

Modbus Interface Board

07A000000



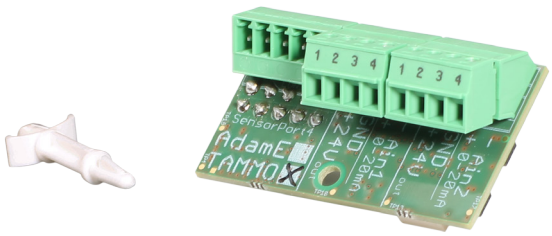
The Modbus interface controls the sensor interfaces of the TriBox3, TriBox Mini or the TriOS G2 sensors with connectors, providing simple, flexible connection options. The TriBox is connected via a standard M12 extension cable. TriOS G2 sensors with M12 connectors can be connected directly. To operate the sensors, a power supply must be connected to the interface, which is connected directly to the sensor. Additional mounting holes in the aluminium L profile make installation easy.

Technical Specifications

Voltage supply	12…24 VDC (+/- 10%), only required for operation with sensors 2 pin PCB plug connector	
G2 sensor connector	1 M12 built-in socket	
G2 sensor serial tap	4 pin PCB plug connector	
G2 sensor network tap	1 RJ-45 socket, standard: IEEE 802.3i (10BaseT)	
TriBox connection	1 M12 built-in plug, connection via standard M12 extension	
TriBox serial tap	4 pin PCB plug connector	
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	IP10	NEMA 1
Dimensions (width x height x depth)	110 x 40 x 95 mm	~ 4.3″ x 1.6″ x 3.7″
Weight	180 g	~ 0.4 lbs
Material	Aluminium	

TAMMO

07A000001



TAMMO is an expansion module for TriBox3, which converts analog signals to RS-485 Modbus RTU protocol. The analog to Modbus module provides a total of two current inputs, where both the parameter and the unit for two parameters can be set.

The TriBox3 must have at least software version V1.5.4 installed. For older versions, a software upgrade must be performed first.

Technical Specifications

POWER SUPPLY	
Power supply	12 V / 24 V (done by TriBox3)
Power consumption	< 100 mW
SENSOR INTERFACES	
Connection terminal	1.5 qmm (AWG 16)
Standard	RS-485
Protocol	Modbus RTU
ANALOG INTERFACES	
Analog input	2x current input: 4-20 mA (default setting in TriBox3) 0-20 mA (configurable at TriBox3)
Measurement accuracy	± 0,2 % of Full Scale Range
Measurement rate	~ 60 SPS
Connection terminal	1.5 qmm (AWG 16)
AMBIENT	
Operating temperature	-10...+50 °C
Storage temperature	-20...+70 °C
Relative air humidity	0...95 % (non-condensing)
Protection type	IP00
MECHANICS	
Dimensions L/W/H	59x32x28 mm
Weight	14 g
System compatibility	TriBox3, as of software V1.5.4
Warranty	1 year (EU & USA: 2 years)

Float

05A000005

The TriOS float is the ideal solution for use in fluctuating water levels. The float comes with two sizes of sensor brackets so that both the TriOS photometer with its 48 mm diameter and the enviroFlu with its 68 mm diameter can be attached. One sensor at a time can be attached to the float.

TriOS also offers sensor brackets for small sensors, such as the nanoFlu (05A000006). With this, several sensors can be attached to one float.

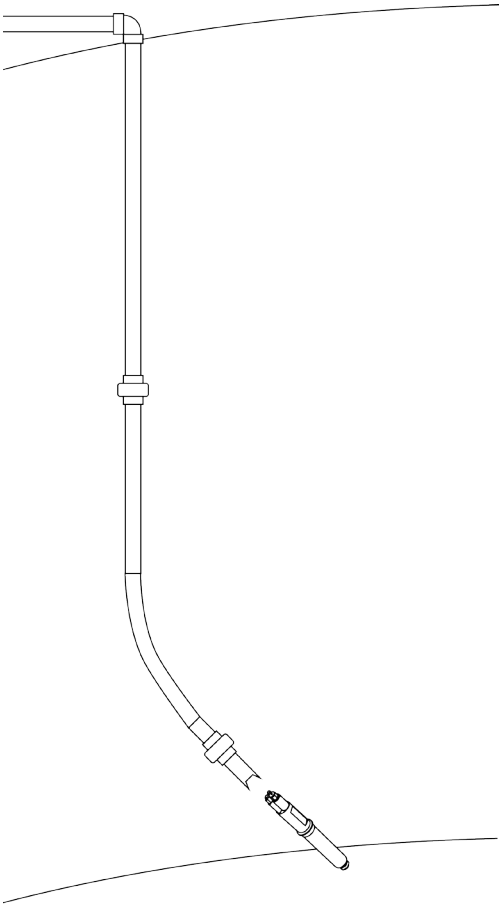
The float stays on the surface of the water with the sensor always in the medium. The float can easily be removed from the medium by its handle to do a check or clean it. Side attachments of stainless steel cables prevent the float from being carried away.

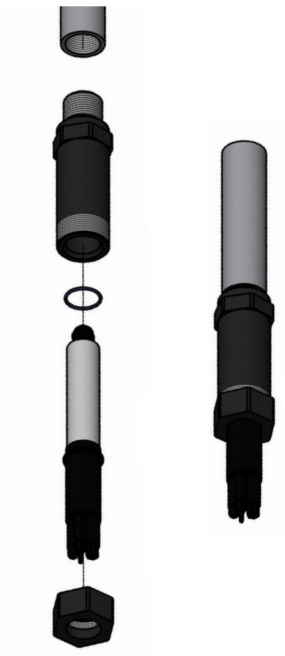
Pipe Adapter

06A0000XX

For installation in existing pipe systems, such as pool edge fixtures, TriOS offers adapter pieces with G1 or NPT1 thread for the following sensors:

- TpH
- TpH-D
- TTurb
- Conductivity
- Oxygen





Telescopic Rod

12A000000

The new TriOS telescopic rod provides a solid and reliable mounting method for the TriOS dissolved oxygen sensor. The sensor is permanently mounted in the head section of the telescopic rod and can be immersed in the medium by extending the telescopic tubes to a distance of 6.8m. The rod can be held by hand or attached to a railing or similar with the supplied double clamp. Due to the material mix of carbon and fiberglass, the rod is grippy and light at the same time.

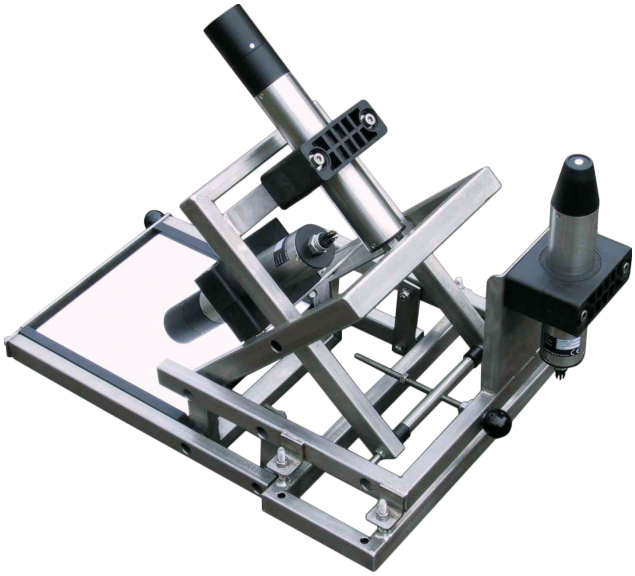
Technical specifications

Dimensions LxW	6800 mm x 90 mm
Weight	2.32 kg
Material	Telescopic rod: carbon fiberglass mix, bracket: aluminum

RAMSES Frames

05A000000

05A000002



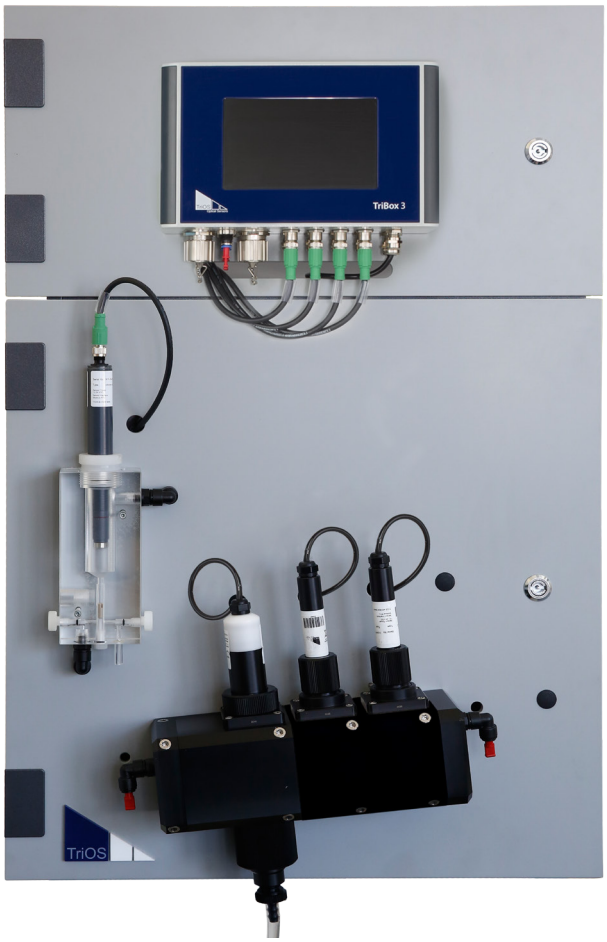
Hydraulic Clamps CL48 & CL68

01A100000X

Water Qualitäty Panel

11A10000X

The modern TriOS bypass panel makes it possible to cleanly and precisely monitor water quality on site. The sensor is passed through the FlowCells and thus analysed for various parameters. The panel can be ordered in different designs and sensor assemblies.



11A100002	Water quality panel with pH, conductivity, turbidity, chlorine, TriBox mini
11A100003	Water quality panel with pH, conductivity, turbidity, chlorine, TriBox 3
11A100004	Water quality panel with pH, conductivity, turbidity, TriBox mini

pH Buffer Set

80P000002

pH Buffer Solution

TriOS provides the necessary certified buffer solution with pH4 and pH 7 to calibrate TriOS TpH-D sensors. No transfer of fluids necessary, as the containers fit directly into the calibration process.

Quick and easy calibration of all EGC Quality Analyzer sensors directly at the site. No dangerous fluids, no expertise needed! Let the wizard of the TriBox guide you through every step of the process.

Panels

11A10000X

Flange DN50 / DN80 / DN100

Flange solution for pipeline installation, according to DIN11851.

Compressed Air Cleaning Head for enviroFlu

02A100003

Protective cage for enviroFlu or W55 wiper

00P100005 . 00P100010

Cuvette holder

for 5 mm quartz glass cuvette with 10 mm path*

10A200000

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

VALtub for photometer validation*

10A30000X

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

Optics Cleaning Set

05A000004

Cable

50A0XXXX0

5-input M12 Sensor Connector Box

50A000001

SYSTEMS

EGC Water Analyzer

11A10001X

The EGC Water Analyzer is TriOS‘ latest development in the monitoring of various wastewater-parameters. It can be equipped with three sensors: enviroFlu for identification of polycyclic aromatic hydrocarbons (PAH), TTurb for turbidity measurements and TpH-D for the determination of the pH value.

Inside the measurement cabinet is a TriBox3 to which all sensors are connected. The Ethernet interface and the analogue outputs are directly connected to the transparent connector box.

Certified by DNV and ABS!

Equipped with the enviroFlu, TTurb and TpH-D in the appropriate configuration, a TriBox3 (from software version 1.4.22) and wire rope dampers, the analyzer has a ship approval according to IMO regulations MEPC.259(68).

Technical Specifications

POWER SUPPLY			
Voltage supply		100 … 240 VAC, 50 … 60 Hz	
Power consumption		Max. 50 W	
INTERFACES			
digital		Ethernet	
analogue		6 outputs: 4…20 mA	
Load		max. 500 Ω	
Protocol		Modbus TCP/IP	
Parameters		PAH (MEPC.259(68)) pH (BS EN 60746-2:2003) Turbidity (DIN EN ISO 7027:2016) Temperature (of TpH-D) Flow (internal) PAH turbidity corrected	
MECHANICAL SYSTEM			
Size (width x height x depth)		600 x 800 x 337 mm	~ 23.6“ x 31.5“ x 13.3“
Weight		43 kg (without sensors) 45.5 kg (with sensors)	~ 95 lbs (without sensors) ~ 100 lbs (with sensors)
ENVIRONMENT			
Sample temperature		+2°C…+40°C	~ +36 °F to +104 °F
Ambient temperature		0°C…+45°C	~ +32 °F to +113 °F
Storage temperature		-20°C…+80°C	~ -4 °F to +176 °F
Relative air humidity		0...95% (non-condensing)	
pH value		> pH4	
Protection type		IP56	NEMA 4
INLET			
Max. pressure	Inlet pressure	1 to 25 bar maximum	~ 14.5 psig to 363 psig maximum
	Internal	max. 3 bar	~ 43.5 psig
Flow volume		2...5 L/min	
Internal volume		Approx. 1 L	

MEAS100

11A100007

Automatic sampling with the **M**onitoring **E**vent **A**utomatic **S**ampler

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) with 40 mm insulation. Housing separated into sample compartment and control compartment, each with lockable door. Upper door with Plexiglas window. Protective cover made of Styrosun that can be propped open for connection and maintenance work	
Thermostatic control	Independent, regulated cooling / heating with four settings, no-frost Sample compartment temperature:	
	4 °C (adjustable from 0...9.9 °C)	~ +39.2 °F (adjustable from 32...49.8 °F)

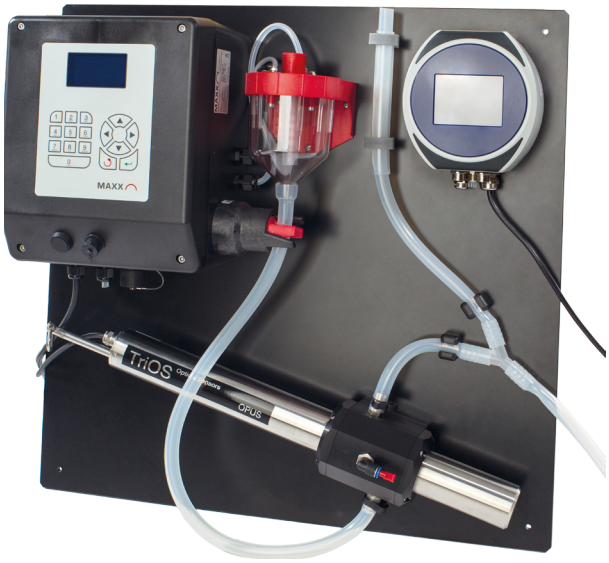
Sampling modes	Time-dependent, volume-dependent, event controlled, manual	
Control	Microprocessor control, sleep mode (<5 mA), 8-16 V power supply, foil keypad, with key field (0-9, ESC, ENT, cursor keys) graphical display (128x64 pixels), background illumination	
Data storage	3000 entries, non-volatile data memory; sampling and malfunction report data, including sample extractions, bottle changes, reports, external signals	
Programming	Twelve (12) freely programmable application programs with program links	
Program start options	• Immediately • Date / time • Day of week / time • With external signal	
Programme end / stop options	• 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 / bottles	
Intervals 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 loss of power supply	
Interface	Mini-USB, RS-232	
Signal inputs	• 2 analog: 0/4...20 mA • 8 digital (volume, event, 1 freely programmable) • Pulse length at least 60 ms; switch level 7...24 V • Max. working resistance: 500 Ohm; max. length of signal cable: 30 m / 98.4 ft	
Signal output / status messages	8 digital; 1 of them being the collective malfunction message	
Metering system	Vacuum system 1000 ml U system, suction height up to 40 m / 131.2 ft	
Single sample volume accuracy	Vacuum system: < 2.5 % or +/- 3 ml	
Dimensions (height x width x depth)	1490 (2040 with open cover) x 605 x 645 mm	~ 58.7" (80.3" with open cover) x 23.8" x 25.4"
Weight	~ 110 kg with composite container	~ 242.5 lbs with composite container
Materials with medium contact	PC, PVC, silicone, PS, PE, EPDM	
Auxiliary power / Power supply	230 V / 115 V /AC	
Power consumption	approx. 350 VA (with cooling)	
Ambient	-20...+43 °C	~ -4 °F to +109.4 °F
Sample temperature	0...+40 °C	~ +32 °F to +104 °F
Standards	CE; sampling according to ISO 5667-10, EN16479	

Online measurement with integrated wall-mounted sampler

For use in hard-to-reach measuring points, for example, 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.



ANNEX

Opus UV: measurement ranges depending on the path length*

Parameters	Measurement 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 $N\text{-}NO_3$	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 $N\text{-}NO_2$	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
$COD\text{-}SAC_{eq}$****	Single wavelengths	mg/L	1.46	75...10600	22...3200	11...1600	4.4...640	2.2...320	1.1...160	0.44...64
$BOD\text{-}SAC_{eq}$*****	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 wavelength	mg/L	2.6	130...4300	40...1300	20...650	8.0...260	4...130	2.0...65	0.8...26

* under laboratory conditions
** unit of absorption level
*** depends on the composition of the COD or BOD (sum parameters)
**** based on KHP (note: 100 mg COD standard solution is equivalent to 85 mg/L KHP)
***** based on SiO_2

Note:
1 mg/L $N\text{-}NO_3$ is equivalent to 4.43 mg/L NO_3
1 mg/L $N\text{-}NO_2$ is equivalent to 3.28 mg/L NO_2

VIPER: measurement ranges depending on the path length*

Parameters	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: 2012-04	1/m	-	1...250	0.2...50	0.1...25	0.06...17	0.04...10
SAC_{525}	DIN EN ISO 7887: 2012-04	1/m	-	1...250	0.2...50	0.1...25	0.06...17	0.04...10
SAC_{620}	DIN EN ISO 7887: 2012-04	1/m	-	1...250	0.2...50	0.1...25	0.06...17	0.04...10
True colour 410	DIN EN ISO 7887: 2012-04	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	-	° (degree of colour)	9.7	10.0...2000	2...400	1...200	0.6...130	0.4...80
Cr-Co colour 413	Gost 3351-74	° (degree of colour)	34.1	40...7000	8...1400	4...700	2.6...450	1.6...275

* under laboratory conditions

LISA UV: measurement ranges depending on the path length*

Parameters	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 COD standard solution is equivalent to 85 mg/L KHP)
***Formazine attenuation unit

LISA color: measurement ranges depending on the path length*

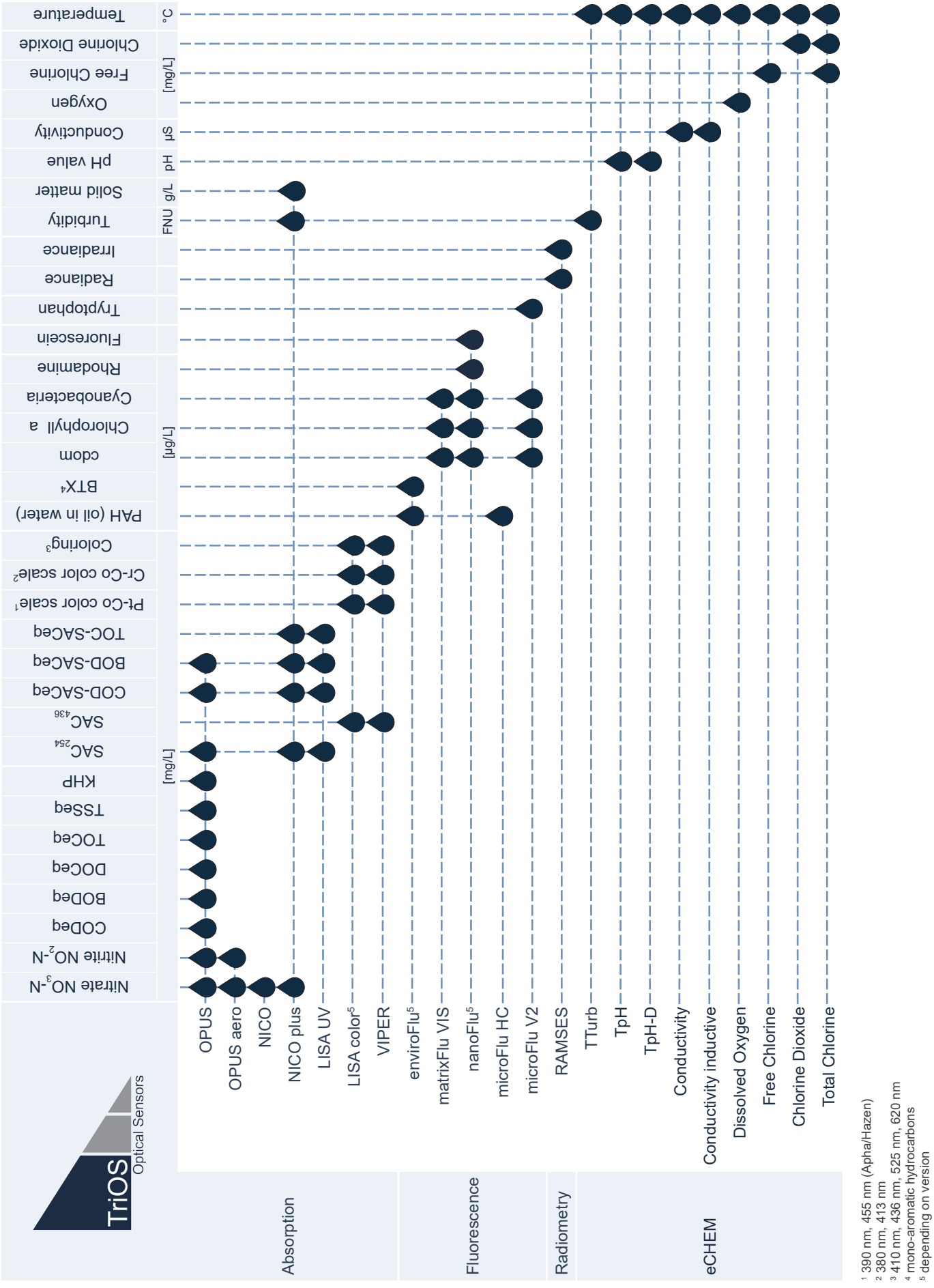
Parameters	according to	Unit	Factor	Path length (mm)	Path length (mm)	Path length (mm)	Path length (mm)	Path length (mm)
				10	50	100	150	250
SAC_{436}	DIN EN ISO 7887: 2012-04	1/m	-	0.5...150	0.1...30	0.05...15	0.03...10	0.02...6
SAC_{525}	DIN EN ISO 7887: 2012-04	1/m	-	0.5...150	0.1...30	0.05...15	0.03...10	0.02...6
SAC_{620}	DIN EN ISO 7887: 2012-04	1/m	-	0.5...150	0.1...30	0.05...15	0.03...10	0.02...6
True color 410	DIN EN ISO 7887: 2012-04	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	-	° (degree of colour)	9.7	5.0...1500	1.0...300	0.5...150	0.3...100	0.2...60
Cr-Co color 413	Gost 3351-74	° (degree of colour)	34.1	20...5500	4.0...1100	2.0...550	1.5...360	0.8...220

* under laboratory conditions
**Formazine attenuation unit

NICO: Measurement ranges depending on the path length*

Parameters	Unit	Factor	Path length (mm)	Path length (mm)	Path length (mm)	Path length (mm)	Path length (mm)	Path length (mm)	Path length (mm)
			0,3	1	2	5	10	20	50
Nitrate NO3-N	[mg/L]	-	0…200	0…60	0…30	0…12	0…6	0…3	0…1.2
Nitrate NO3	[mg/L]	-	0…886	0…266	0…133	0…53	0…26.6	0…13	0…5

* under laboratory conditions



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

		TriOS Protocol	Modbus able	SDI-12 Converter compatible (Device Driver available)
Absorption	OPUS	✗	✓	✓
	OPUS aero	✗	✓	✓
	NICO	✗	✓	✓
	NICO plus	✗	✓	✓
	LISA UV	✗	✓	✓
	LISA color[5]	✗	✓	✓
	VIPER	✗	✓	✓
Fluorescence	enviroFlu	✓	✗	✗
	enviroFlu HC MB	✗	✓	✓
	matrixFlu VIS	✗	✓	✓
	nanoFlu	✗	✓	✓
	microFlu HC	✗	✓	✓
	microFlu V2	✗	✓	✓
Radiometry	RAMSES	✓	✗	✗
	RAMSES G2	✗	✓	✓
Turbidity	TTurb	✗	✓	✓
eCHEM	TpH	✗	✓	✓
	TpH-D	✗	✓	✓
	Conductivity	✗	✓	✗
	Conductivity Induktive	✗	✓	✗
	Dissolved Oxygen	✗	✓	✗
	Free Chlorine	✗	✓	✗
	Chlorine Dioxide	✗	✓	✗
	Total Chlorine	✗	✓	✗

NOTES