

Lab and Field Instrumentation

2008|2009



QUALITY PRODUCTS FOR:

pH · ORP · ISE · Dissolved Oxygen · Conductivity ·
Multiparameter · BOD/Respiration · Photometry · Turbidity

WTW, a Nova Analytics company



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Publisher



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General description of Meters

inoLab® Laboratory Meter – innovative and progressive

The new inoLab® series: more powerful, more innovative with a modern design. Designed for reliable and precise laboratory measurements, with different function levels to meet all requirements for measuring safely, reliably and with the great amount of ease of use and flexibility.

inoLab® 750

inoLab
Innovations that make sense

- Two galvanically isolated pH inputs
- Four routines for special conductivity functions
- Menu navigation with backlit graphic display



Precise

With its outstanding technical features, the inoLab® 750 proves the best option for the high-demand laboratory. It offers easy operation for routine measurements, however its real capability is displayed with difficult measuring scenarios. A multitude of measuring combinations can easily be selected

with a clearly structured menu. The instrument features password-protected operator levels, multi-level menu functions and complies with requirements of the pharmaceutical industry (CFR 21 Part 11, Pure water acc. to pharmacopoeia etc.).

inoLab® 720
inoLab
innovations that make sense

- Large, bright display
- Easy-to-clean surface
- Simple Operation

Simple and reliable measurements. Ideal for measuring pH and ORP, oxygen, conductivity and temperature. Instrument suitable for routine measurements at a great price.

Simple

The inoLab® function keys are designed for easy navigation. Automatic calibration and AutoRead functions ensure stable and reproducible results. The multifunction display for pH, oxygen, conductivity and temperature is large and easy to read.

Flexible

Choose between battery or AC power for maximum flexibility. Recharge the battery by simply connecting the instrument to AC power.


inoLab® 730
inoLab
innovations that make sense

- Data transmission via bidirectional interface or optional built-in printer
- GLP/AQA
- Datalogger and memory for 800 entries

No matter whether pH, ORP, ISE, dissolved oxygen, conductivity, TDS or salinity, this is the perfect system for all standard measurements. Document measured values according to AQA, GLP guidelines via use of printer.

Safe

The built-in printer (optional) incorporates high-quality thermal paper and is guaranteed not to fade for 10 years. Incorporates functions such as a real-time clock, a serial number and a calibration protocol with sensor characteristics to provide GLP-support. In addition to the bidirectional RS 232 interface the datalogger has memory for 800 data sets.

Comfortable

Incorporates a modern and well designed display for pH, oxygen, conductivity and temperature readings. The tactile keypad is easy to clean and well-suited for biological laboratories.

inoLab® 740
inoLab
innovations that make sense

- Control via PC or terminal
- Comprehensive data acquisition
- Measurement functions for demanding laboratory analysis

Computer Compatible

inoLab® 740 can be connected directly to a PC. The inoLab® 740 comes complete with our MultiLab® pilot software package transforming any computer into a meter. Configuration, calibration, measurement: all functions are controlled by means of pull-down menus on a clearly arranged user interface, similar to data base and export to PC standard formats. All measured data are available as tables and graphics, both online or offline.

Intelligent

The active multifunction box contains all measuring functions, numerous extension possibilities, connections, plug contacts and an electrically isolated interface for control via PC or terminal. The measuring procedure on the inoLab® 740 is initiated by pressing either the Run/Enter or AutoRead key. The built-in electronics process all incoming measuring signals immediately and make them available for communication with other peripheral devices.



ProfiLine – Portable Meters

Indestructible and waterproof, reliable and safe:

Both the housing and the technical specifications of ProfiLine 197i portable instruments are top class – suitable for rough field operation as well as for use in laboratories.

These portable field meters are characterized by their extreme robustness and shock-resistance. These instruments are hose-proof (IP 66) and submersible (IP 67). Special probes with cable lengths of up to 330 ft (100 m) are available for extreme depth measurements.

Incorporates a new built-in, environmentally-friendly NiMH rechargeable battery which allows for 600 hrs of operation time away from AC power, a carrying strap, a carrying handle as well as the built-in electrode storage sleeve which make the ProfiLine 197i a real asset for either field or laboratory applications.

ProfiLine 197i has excellent technical specifications, data transmission by means of the MultiLab® pilot software and can be ordered with or without probes.

Whether measuring pH, dissolved oxygen, conductivity or multiple parameters: there is a suitable ProfiLine available for every measuring task.

ProfiLine 197i

- Robust, waterproof
- Precise, versatile
- For measurements at depths down to 100 m

e.g. Measurement of D.O. depth profiles

Oxygen depth armature **TA 197 Oxi** with built-in temperature sensor, up to 100 m cable with waterproof plug (IP 67), pressure-resistant steel armoring and a screw-off protective hood, fits into 2" boreholes.

Use with battery-powered stirrer **BR 325** for depth measurement.



Handheld Meters

The 315i, 330i and 340i series of handheld meters provide reliable measurements under difficult conditions both in the Lab and in the field. Lightweight and compact, the Series 3xxi meters are impact-resistant, hose-proof to IP 66 and meet the requirements for IP 67.

Model 315i

- For routine measurements
- Simple operation
- Reliable, Accurate

Simple

Simple operation means that measuring errors are avoided. All the function keys of the 315i can be operated even when wearing gloves; automatic calibration and AutoRead functions ensure stable and reproducible results. The multi-functional display for pH, oxygen, conductivity and temperature is easy to read.



Model 330i

- Routine and standard measurements
- Wide Range of Sensors Available
- Datalogger

Proven

The 330i, which is designed for field use and has proven its reliability, has a datalogger for 800 data records, multi-functional display, manual data input feature and 3000 hours of continuous operation.



Model 340i

- GLP compliant
- Bidirectional interface RS 232
- Remote Control

Full of Features

In addition to all of the advanced features of all 3xxi series units, the model 340i can operate either with line or battery power. The model 340i also has a bidirectional interface for output to a PC or printer.

Multi 350i

- Simultaneous measurement of 3 parameters + temperature
- Back-lit graphic display
- Menu-driven

Flexible and robust. Compact precision without compromises. For simultaneous measurement of up to 4 parameters. Graphics display with user-friendly menu navigation as well as the highest level of accuracy and resolution make this instrument top class.

**Exclusively for the Multi 350i –
the new multiparameter Probes from WTW:**

ConOx:

combined conductivity and oxygen sensor for laboratory and field applications

MPP 350:

outdoor multiparameter probe for pH, oxygen and conductivity



More on page 56.



The System

The key word is MobiLab

Our professional case can be used as a mobile laboratory. It contains a work platform with measuring beakers, a plug-in stand, all the necessary calibration and cleaning solutions as well as waterproof instructions – simply Ready to go.



VARIO® – Simple Measurements

Simple Measurements at your Fingertip!

You notice it straight away: VARIO® has no keys! Instead it has an innovative touch screen: all functions can easily be called up and set – with one hand. A light fingertip touch on the display is enough – and the VARIO® switches on itself.

Placing the electrode in solution starts the measurement automatically. Even very small volumes can be measured with the optimized electrode.

The VARIO® also functions as a laboratory clock, with stopwatch and timer.

Simply clever...



VARIO®



- Touch screen
- Up to 1000 h continuous operation
- Laboratory clock with timer function

Handheld Instrument with added Value!

Due to their ruggedness and ergonomic design, the VARIO® instruments are particularly suited for service applications. Therefore, VARIO® is supplied with a comfortable carrying case assuring a trouble-free storage of the sensors.

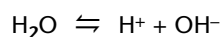




pH Meters

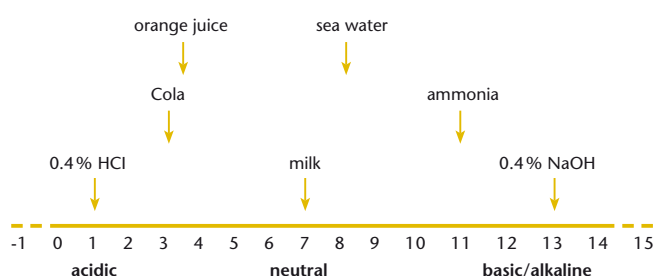
pH Value

The water molecule has the property of dissociating into two ionic components in aqueous solutions.



The H^+ ion is termed hydrogen ion or proton, the OH^- ion hydroxide ion.

The pH value describes the activity of hydrogen ions in aqueous solutions on a scale of -1 to 15. Based on this scale, liquids are characterized as being acidic, alkaline or neutral: a solution which is neither acidic or alkaline is neutral. This corresponds to a value of 7 on the scale. Acidity indicates a higher activity of hydrogen ions and a pH value lower than 7. Alkaline solutions are characterized by a lower hydrogen ion activity or higher hydroxide ion activity, respectively and a pH value above 7. The graph below uses examples to illustrate the pH scale.



The pH scale is logarithmic. A difference of one pH unit represents a tenfold, or ten times increase or reduction of hydrogen ion activity in the solution. This explains how a solution's aggressiveness increases with the distance from the neutral point.

The pH value can be measured using electrochemical measuring systems, litmus paper, indicators and colorimeters. Of these methods, electrochemical sensors provide the most accurate results.

The pH electrode is an electrochemical sensor which consists of a measuring electrode and a reference electrode. The measuring electrode is made of special glass which, due to its surface properties, is particularly sensitive to hydrogen ions. It is filled with a buffer solution which has a pH value of 7. When placing the pH electrode into a test solution, the change in voltage is measured by the electrode by comparing the measured voltage to the stable reference electrode. This change is recorded by the meter and converted into the pH value displayed.

Application range pH-measurement

● recommended by WTW ○ conditionally applicable – not recommended

Application range	inoLab®						Profiline pH 197i	VARIO® pH	Handheld meters			
	pH 720	pH 730	pH/ION 735	pH 740	pH/ION 740	pH/ION/Cond 750			pH 315i	pH 330i	pH 340i	pH/ION 340i
Routine measurement	●	○	○	○	○	○	○	●	●	●	○	○
Routine measurement with documentation	–	●	●	●	●	●	●	–	–	–	●	●
AQA with documentation	–	●	●	●	●	●	●	–	–	–	●	●
R&D high resolution and precision	–	●	●	●	●	●	●	–	–	●	●	●
Control measurements	–	●	●	●	●	●	●	●	–	●	●	●
LIMS connection	–	●	●	●	●	●	●	–	–	–	○	○
Quality assurance	–	●	●	●	●	●	●	–	–	●	●	●
Training	●	●	●	●	○	○	○	●	●	●	○	○
Service	–	–	–	–	–	–	●	●	●	●	●	●
Laboratory measurements	●	●	●	●	●	●	●	●	–	–	○	○
Field measurements	–	–	–	–	–	–	●	–	●	●	●	●
Depth measurements	–	–	–	–	–	–	●	–	–	–	–	–
External control/ PC connection/ PC control	–	●	●	●	●	●	●	–	–	–	●	●
pH/ION function	–	–	●	●	●	●	–	–	–	–	–	●
Ion-specific measurement programs	–	–	●	–	●	●	–	–	–	–	–	–
see page	12	12	24	13	25	52	14	16	15	15	15	27

For pH measurement with multi-parameter instruments see page 48



Laboratory pH Meters

Along with weighing and temperature measurements, pH is the most measured parameter in the laboratory. With inoLab® WTW offers a family of laboratory instruments which meet all measurement requirements from routine measurements to research applications.

inoLab® pH 720

inoLab
innovations that make sense

- Routine meter for precise measurement values (0.001 pH)
- Large display
- Easy-to-clean membrane keypad

simple and reliable

Easy to use routine laboratory pH/mV meter with large multifunctional display for pH and temperature, automatic temperature compensation, MultiCal® calibration system; for battery or line power operation.



inoLab® pH 730

inoLab
innovations that make sense

- Supports all GLP needs
- Built-in printer (optional)
- Datalogger with memory for 800 data sets

compact and precise

Precision pH/mV meter with large multifunctional display for pH and temperature, automatic temperature compensation, MultiCal® calibration system, built-in measurement storage with GLP-conforming documentation and digital interface. Shown with optional built-in printer.



inoLab® pH 740

inoLab
innovations that make sense

- Computer-controlled precision meter
- EMC-stabilized
- Upgradeable firmware/software

additional features

- 5-point calibration
- Selectable buffers
- Real-Time Graphic Display
- Built-in digital recorder
- Connection for bar-code reader or PC keyboard
- User Selectable Languages
- Multi-Level GLP Functions
(password-protected operator levels)
- Free-of-charge downloads for MultiLab® pilot
or terminal

flexible and powerful

High-performance pH/mV/ION meter with graphic display and digital recorder function for pH, temperature and ion-selective measurement, automatic temperature compensation, high resolution (0.001 pH), MultiCal® calibration system, built-in measurement storage with GLP-conform documentation and digital interface. PC keyboard interface for connecting an external keyboard or a barcode reader. Includes software for direct control by PC. Built-in printer option available.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	pH 720	pH 730	pH 740
Range/Resolution	pH -2.000 ... +19.999 pH -2.00 ... +19.99 pH mV -999.9 ... +999.9 mV; -1,999 ... +1,999 mV Temp. -5.0 ... +105.0 °C (23 ... 221 °C)		-2.000 ... +20.000 pH -2.00 ... +20.00 pH -999.9 ... +999.9 mV; -2,000 ... +2,000 mV -5.0 °C ... +105.0 °C (23 ... 221 °C)
Accuracy (±1 digit)	pH ±0.005 pH ±0.01 pH mV ±0.3 mV, ±1 mV Temp. ±0.1 K	±0.005 pH ±0.01 pH ±0.3 mV, ±1 mV ±0.1 K	±0.004 pH ±0.01 pH ±0.2 mV, ±1 mV ±0.1 K
Calibration	MultiCal® automatic calibration: AutoCal 2-/3-point AutoCal-Tec 2-/3-point ConCal® 1-/2-point ISECal –	MultiCal® automatic calibration: 2-/3-point 2-/3-point 1-/2-point –	MultiCal® automatic calibration: 2-/3-/4-/5-point 2-/3-/4-/5-point 1-/2-point 2- and 3-point

Ordering Information

inoLab® Laboratory pH Meter SETs		□ Order No.	▲ Order No.
inoLab® pH 720	Simple and reliable pH meter, including SenTix® 42/41, without passive multifunction box and accessories	1A10-2117	1A10-1112
inoLab® pH 730	Compact precision pH meter with serial interface, including SenTix® 82/81, passive multifunction box and accessories	1A20-2119	1A20-1114
inoLab® pH 740P	The intelligent pH measuring station, additionally equipped with built-in printer, incl. terminal, SenTix® 82/81 and accessories	1A31-2119	1A31-1114
Passive multifunction box	(not included in pH 720 Set)	109 810	109 810

IP 43

CE

cETLUS

3 Year
Warranty

□ with BNC plug, ▲ with DIN plug

Other SETs or electrodes in SET see brochure "Product Details"

Portable pH Meters

All WTW meters in the ProfiLine pH 197i series are both waterproof (IP 66) and submersible (IP 67). In addition, these units are able to float providing a high degree of comfort when used in field applications. With GLP memory functions, real-time clock, a display corresponding to the recorder output, 800 data records memory capacity, a carry handle, strap standard, the ProfiLine197i supplied with integrated powerful NiMH rechargeable batteries is a complete pH measuring system. When used with the TA 197 pH Depth Armature, the ProfiLine 197i with its built-in preamplifier, is accurate to a depth of 330 ft (100 m).

ProfiLine pH 197i

- Robust, shockproof
- Fully waterproof
- Standard pH measurement and pH measurement down to depths of 330 ft (100 m)



Depth armature TA 197 pH

Technical Data

Model	ProfiLine pH 197i	
Range/ Resolution	pH	-2.00 ... +19.99 pH,
	mV	-199.9 ... +199.9 mV; -1999... +1999 mV
	Temp.	-5.0 ... +105.0 °C (23 ... 221 °F)
Accuracy (±1 digit)	pH	±0.01 pH,
	mV	±0.5 at +15 °C ... +35 °C (59 ... 95 °F), ±1 at +15 °C ... +35 °C (59 ... 95 °F)
	Temp.	±0.1 K
Calibration	MultiCal® automatic calibration: 1,2,3-point calibration, AutoCal, AutoCal-Tec and ConCal®	

Ordering Information

Portable pH Meter – with wide-range power supply 100-240 VAC (50/60 Hz) included		Order No.
ProfiLine pH 197i	Robust, waterproof, submersible pH/mV meter	3A30-110



Depth armatures for measurements down to depths of 330 ft (100 m)
see brochure "Product Details"

Handheld pH Meters

WTW handheld pH meters are optimized for use on-site and field use, but can also be used in the laboratory. In particular the pH 340i, with its optional line power supply and serial interface, is suitable for applications in which precise measurements are required both in the laboratory and the field.

WTW handheld pH meters are available in three versions:

pH 315i:

Robust and waterproof battery-operated pH/mV meter. Measuring errors are avoided by the silicone keypad with only 5 keys and a simplified calibration method with automatic buffer recognition and display for standard buffers. AutoRead ensures stable and reproducible results.

pH 330i:

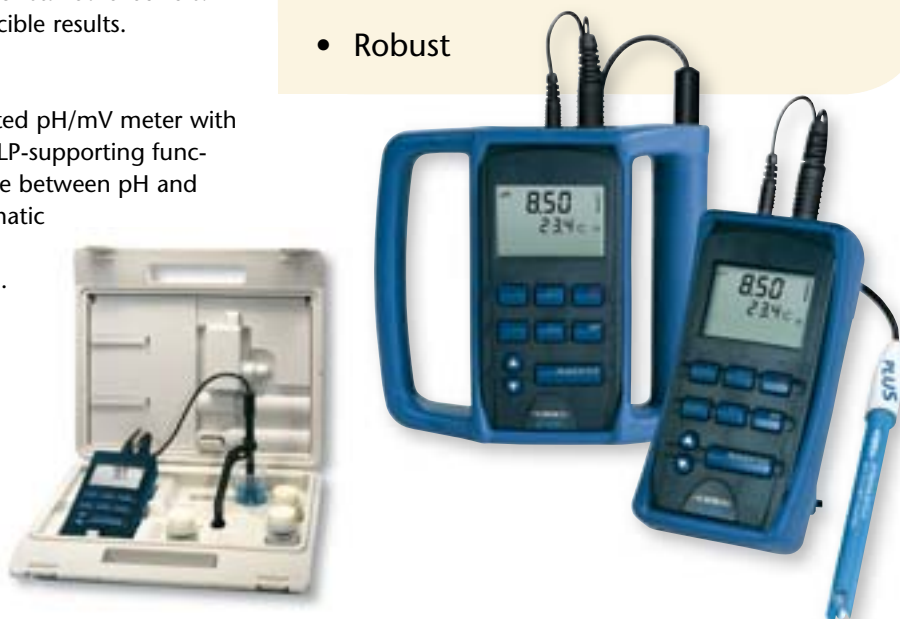
Robust and waterproof battery-operated pH/mV meter with built-in datalogger, real-time clock, GLP-supporting functions, display for calibration switchable between pH and mV. Configured with MultiCal® automatic calibration for buffer recognition, and automatic temperature compensation.

pH 340i:

Features of pH 330i, with additional analog and digital RS 232 output.

pH 315i, pH 330i, pH 340i

- Waterproof (IP 67)
- Large silicone keys
- Robust



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	pH 315i	pH 330i and pH 340i
Range/ Resolution	pH -2.00 ... +16.00 pH mV -1999 ... +1999 mV Temp. -5.0 ... +105.0 °C (23 ... 221 °F)	-2.000 ... +19.999 pH; -2.00 ... +19.99 pH -999.9 ... +999.9 mV; -1999 ... +1999 mV -5.0 ... +105.0 °C (23 ... 221 °F)
Accuracy (±1 digit)	pH ±0.01 pH mV ±0.3 mV at +15 °C ... +35 °C (59 ... 95 °F) Temp. ±0.1 K	±0.005 pH at +15 °C ... +35 °C (59 ... 95 °F) ±0.3 mV at +15 °C ... +35 °C (59 ... 95 °F) ±0.1 K
Calibration	Simplified 1, 2 or 3-point calibration with automatic buffer recognition AutoCal automatic 3-point calibration with DIN buffers	MultiCal® automatic calibration: AutoCal automatic 1-, 2- or 3-point calibration with DIN buffers AutoCal-Tec automatic 1-, 2- or 3-point calibration with WTW technical buffers ConCal® conventional 2-point calibration with any buffers

Ordering Information

Handheld pH Meter SETs	Order No.
pH 315i Robust and waterproof handheld pH meter, for battery operation, in mobile case set with SenTix® 41	2A10-1012
pH 330i Robust and waterproof handheld pH meter with datalogger, for battery operation, in mobile case set with SenTix® 41	2A20-1012
pH 340i Robust and waterproof handheld pH meter with datalogger and serial interface, in mobile case set with SenTix® 41	2A30-1012
Universal wide-range power supply 100 V - 240 V, 50-60 Hz; for 340i series	902 867



Other electrodes in SET see brochure "Product Details"

VARIO®

You notice it immediately: apart from its ergonomic form the new VARIO® has no keys, but has an innovative touch screen instead. In this way all functions can be called up and set – a simple touch is enough.

VARIO® pH

VARIO

- Compatible with most electrode types
- One-hand operation
- Twistable display

Measuring in no time at all

Just a fingertip touch on the display – and VARIO® is ready for use. Immersion in the solution starts the measurement automatically. The stable measurement can be read from the large display together with the temperature and can also be “frozen”. The memory has space for up to 50 measured values for later evaluation.



If the VARIO® is not being used for pH measurements then it can be used as a laboratory clock or timer.



Light, handy, robust – it finds a place in every laboratory coat without dripping or leaving nasty stains, as it can be stored without KCl.

Technical Data

Model	VARIO® pH
pH range	-2.00 ... 16.00
pH accuracy	±0.01 pH
Temperature	-5.0 ... 100.0°C (23 ... 212 °F)
Automatic buffer recognition	TEC/NIST
Calibration points	3 (MultiCal®)

Ordering Information

VARIO®		Order No.
VARIO® Set	VARIO® in the mobile case set, incl. short electrode with built-in temperature sensor and technical buffer 4 and 7	2V00-001V



Other electrodes see brochure “Product Details”



The VARIO® can operate continuously for 1500 hours on one easily replaceable AA (1.5 V) battery.

VARIO® comes standard with an intelligent glass electrode that is protected by a plastic casing. The conical protective cap does not require KCl which prevents the electrode from dripping and protects it from drying out.

The VARIO® can do even more.

The adapter contained in the VARIO® Set makes the instrument compatible with commercially available precision electrodes. The VARIO® measures as accurately and reliably as a handheld instrument.

You can twist and turn as much as you want, the VARIO® is an essential aid whenever speed is required in the laboratory or in production.



pH Electrodes and Accessories



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

SenTix® PLUS Electrodes

Model	SenTix® 20 103 630	SenTix® 21 103 631	SenTix® 21-3 103 632	SenTix® 22 103 633	SenTix® 41 103 635	SenTix® 41-3 103 636	SenTix® 42 103 637	SenTix® 51 103 651	SenTix® 52 103 652	SenTix® 60 103 639	SenTix® 61 103 640	SenTix® 62 103 641	SenTix® 81 103 642	SenTix® 82 103 643	SenTix® 91 103 695	SenTix® 92 103 696
Measuring range pH	0 ... 14 pH				0 ... 14 pH			0 ... 14 pH		0 ... 14 pH			0 ... 14 pH		0 ... 14 pH	
Operating range °C (°F)	0 ... 80 °C (32...176 °F)				0 ... 80 °C (32...176 °F)			0 ... 80 °C (32...176 °F)		0 ... 100 °C (32...212 °F)			0 ... 100 °C (32...212 °F)		0 ... 100 °C (32...212 °F)	
Reference electrolyte	Gel				Gel			KCl 3 mol/l, Ag ⁺ -free		KCl 3 mol/l, Ag ⁺ -free			KCl 3 mol/l, Ag ⁺ -free		KCl 3 mol/l, Ag ⁺ -free	
Membrane shape	Cylindrical				Cylindrical			Cylindrical		Conical			Conical		Spherical	
Membrane resistance at 25 °C (77 °F)	<1 GΩ				<1 GΩ			<1 GΩ		<600 MΩ			<600 MΩ		<600 MΩ	
Diaphragm	Fiber				Ceramics			Platinum		Platinum			Platinum		Platinum	
Shaft material	Noryl				Noryl			Topas®		Glass			Glass		Glass	
Shaft length (±2 mm)	120 mm				120 mm			120 mm		120 mm			120 mm		170 mm	
Shaft Ø (±0,5 mm)	12 mm				12 mm			12 mm		12 mm			12 mm		12 mm	
Temperature Sensor	–				built-in NTC (30 KΩ)			built-in NTC (30 KΩ)		–			built-in NTC (30 KΩ)		built-in NTC (30 KΩ)	
Connection	①	②	②	②	②	②	②	②	②	①	②	②	②	②	②	②
Electrode cable	③	④	⑤	④	④	⑤	④	④	④	③	④	④	④	④	④	④
Electrode plug	⑥/⑦	⑥	⑥	⑦	⑥+⑧	⑥+⑧	⑦+⑧	⑥+⑧	⑦+⑧	⑥/⑦	⑥	⑦	⑥+⑧	⑦+⑧	⑥+⑧	⑦+⑧



SenTix® PLUS Electrodes

Model	SenTix® L 103 655	SenTix® Mic-D 103 660 Mic-B 103 661		SenTix® HWS 103 662	SenTix® RJS 103 663	SenTix® pH 103 667	SenTix® R 103 668	SenTix® B 103 669
Measuring range pH	0 ... 14 pH	0 ... 14 pH		0 ... 14 pH	2 ... 13 pH	0 ... 14 pH	–	–
Operating range °C (°F)	10 ... 100 °C (50 ... 212 °F)	-5 ... 100 °C (23 ... 212 °F)		-5 ... 100 °C (23 ... 212 °F)	0 ... 80 °C (32...176 °F)	0 ... 80 °C (32...176 °F)	-5 ... 100 °C (23 ... 212 °F)	-5 ... 100 °C (23 ... 212 °F)
Reference electrolyte	KCl 3 mol/l	KCl 3 mol/l		KCl 3 mol/l	Referid®	–	KCl 3 mol/l	Double electrolyte system
Membrane shape	Spherical	Cylindrical		Spherical	Calotte	Spherical	–	–
Membrane resistance at 25 °C (77 °F)	< 600 MΩ	< 1 GΩ		< 600 MΩ	< 600 MΩ	< 600 MΩ	–	–
Diaphragm	Platinum	Platinum		Cut	Split ring	–	Platinum	Cut
Shaft material	Glass	Glass		Glass	Glass	Glass	Glass	Glass
Shaft length (±0.08 in./±2 mm)	16.73 in. (425 mm)	3.78 in. (96 mm) (from upper edge of ground)		6.69 in. (170 mm)	4.72 in. (120 mm)	4.72 in. (120 mm)	4.72 in. (120 mm) (from upper edge of ground)	4.06 in. (103 mm)
Shaft Ø *	0.47 in. (12 mm)	0.12 in. (3 mm)		0.47 in. (12 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)
Temperature Sensor	built-in NTC (30 KΩ)	–		built-in NTC (30 KΩ)	built-in NTC (30 KΩ)	–	–	–
Connection	⑨	⑥, ⑦		⑨	⑨	③	⑩	⑩

①: Plug head, ②: Fixed cable, ③: AS/DIN, AS/DIN-3 or AS/BNC, ④: Cable length 3 ft (1 m), ⑤: Cable length 9 ft (3 m), ⑥: DIN plug, ⑦: BNC plug, ⑧: Banana plug, ⑨ AS S/D1 or AS S/D3 or AS S/B1 or AS S/B3, ⑩ AS S/R
* (±0.02 in./±0.5 mm)



SenTix® PLUS Special Electrodes

Model Order No.	SenTix® H 103 644	SenTix® HW 103 650	SenTix® SP 103 645	SenTix® Sur 103 646	SenTix® Mic 103 647	SenTix® V 103 690	SenTix® FET-D 103 700	.../-B 103 702
Measuring range pH	0 ... 14 pH	0 ... 14 pH	2 ... 13 pH	2 ... 13 pH	0 ... 14 pH	0 ... 14 pH	0 ... 14 pH	
Operating range °C	0 ... 80 °C (32 ... 176 °F)	0 ... 60 °C (32 ... 140 °F)	0 ... 80 °C (32 ... 176 °F)	0 ... 50 °C (32 ... 122 °F)	0 ... 100 °C (32 ... 212 °F)	0 ... 80 °C (32 ... 176 °F)	0 ... 60 °C (32 ... 140 °F)	
Reference electrolyt	KCl 3 mol/l, Ag ⁺ -frei	KCl 3 mol/l, Ag ⁺ -frei	Referid®	Referid®	KCl 3 mol/l, Ag ⁺ -frei	Gel	KCl 3,3 mol/l, Ag ⁺ -frei	
Membrane shape	Cylindrical	Cylindrical	Spear	Flat	Cylindrical	Flat	ISFET	
Membrane resistance at 25 °C (77 °F)	< 2 GΩ	< 800 MΩ	< 400 MΩ	< 1 GΩ	< 700 MΩ	< 500 MΩ	—	
Diaphragm	Cut	Cut	Hole	Split ring	Ceramic	Fiber	fritted polyethylene	
Shaft material	Glass	Glass	Noryl	Glass	Glass	Noryl	ABS	
Shaft length (±0.08 in./±2 mm)	6.69 in. (170 mm)	6.69 in. (170 mm)	2.56/0.98 in. (65/25 mm)	4.72 in. (120 mm)	1.57/3.15 in. (40/80 mm)	1.22/0.79 in. (31/20 mm)	3.39 in. (86 mm)	
Shaft Ø (±0.02 in./±0.5 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)	0.59/0.02 in. (15/5 mm)	0.47 in. (12 mm)	0.47/0.02 in. (12/5 mm)	0.67/0.75 in. (17/19 mm)	0.67 ... 0.51 in. (17 ... 13 mm)	
Connection	Plug head	Plug head	Plug head	Plug head	Plug head	—	DIN	BNC
Electrode cable*	AS/DIN, AS/DIN-3, or AS/BNC					—	fixed cable (39.37 in./1 m)	
Electrode plug	Din plug or BNC, as selected					—	—	
Temperature sensor	—	—	—	—	—	NTC (30 KΩ)	NTC (30 KΩ)	

* not included

Calibration and Maintenance Supplies

All WTW Technical buffers are certified accurate and are NIST/DIN traceable

(see page 117, Services).

Buffer bottles from WTW

- Easy to dispense
- Easy to use
- Reliable calibration

Applicable buffers

	PL 4/7/9 DIN/NIST	APL 4/7/9 STAPL 4/7/9 DIN/NIST	TEP 4/7 Trace	TEP 10 Trace	TEP 10-	TPL 4/7 Trace	TPL 10 Trace	TPL 10
inoLab® 7xx/197i/Multi 350i	●	●	●	●	—	●	●	—
VARIO® pH	●	●	●	●	—	●	●	—
pH 315i, 330i, 340i, pH/ION 340i	●	●	●	●	—	●	●	—
pH/Cond 340i, pH/Oxi 340i, Multi 340i	●**	●**	●	●	—	●	●	—
inoLab® Level 1, 2, 3/pH 197	●	●	●	—	●	●	—	●
pH 330, 340, pH/ION 340	●	●	●	—	●	●	—	●
MultiLine P3/P4	—	—	●	—	●	●	—	●

Ordering informations for calibration and maintenance supplies see brochure "Product Details".

** not Multi 340i

Applications for SenTix® PLUS Electrodes

	● recommended by WTW ○ conditionally applicable – not recommended													
	SenTix® V	SenTix® 20 21-..., 22	SenTix® 41, 1-3, 42, RJS	SenTix® 51, 52	SenTix® 60, 61 62	SenTix® 81, 82	SenTix® 91, 92, L	SenTix® H	SenTix® HW, HWS	SenTix® Sp	SenTix® Sur	SenTix® Mic, MIC-D, MIC-B	SenTix® FET	SenTix® ORP, PtR, Ag, Au
Acids				○	●	●	●	○	○					ORP, PtR*
Ammonia				○	○	○	○	●						
Aquarium water	●	●	●	●	○	○	○							ORP, PtR*
Beer				●	●	●	●	○						
Beverages				●	●	●	●	○	○				○	
Bleach solution				○	○	○	○	●						
Boiler feedwater					○	○	○		●					
Bread										●			●	
Cheese										●			●	
Coffee extract				○	●	●	●	○	●				●	
Condensate									●					
Cosmetics	○							○	●				●	
Demineralized water									●					
Developer			RJS*		○	○	○	●	○					
Dispersion colors	○		RJS*					○	●					
Distilled water									●					
Drinking water	○	○	○	●	●	●	●	○	○					
Electroplating baths	○		RJS*	●	●	●	●	○	○					
Electroplating wastewater	●	●	●	○	○	○	○	○	○					○
Extracts				○	○	○	○	○	●					
Fixing baths			RJS*	○	○	○	○	●	●					ORP, PtR*
Fruit										●			●	
Fruit juice	○			●	●	●	●	○	○				○	
Groundwater		○	○	○	○	○	○		○					PtR*
Household cleansers	○	○	○	○	●	●	●	●	○					
Juice	○			●	●	●	●	○	○				○	
Leather	○										●			
Lemonade				●	●	●	●	○	○				○	
Lyes								●						
Margarine										●			●	
Meat										●			●	
Milk								○	●				○	
Mineral water	○	○	○	●	●	●	●	○	○				○	
Non-aqueous liquids				○	○	○	○		○					
Oil/water emulsions			RJS*					○	●					
Paint, water-soluble	○		RJS*					○	●				●	
Paper	○										●			
Paper extract				○	●	●	●							
Protein-containing liquids					●	●	●	○	●			MIC-D/-B*		
Rainwater				○	○	○	○		●					
Saliva	●										●	○	●	
Salt solutions	○	○	○	○	●	●	●	○	○					
Sausage										●			●	
Seawater				○	○	○	○	●	●					
Shampoo	○								●				●	
Skin	○										●			
Soil extract	●	●	●	●	○	○	○	○						
Solids (penetration)										●			○	
Solids (surface)	○										●			
Sulfide-containing liquids			RJS*					○	●					PtR*
Surface water	○	○	○	●	●	●	●	○	○					
Suspensions			RJS*					●	●					
Swimming pool water	●	●	●	●	○	○	○							
Tapwater	○	○	○	●	●	●	●	○	○					
Tris buffer solutions							●		●					
Vegetable juice	○	○	○	●	●	●	●	○	○				○	
Vegetables										●			●	
Wastewater	○	●	●	○	○	○	○							PtR*
Wine				●	●	●	●							
Yogurt	○	○	○	○	●	●	●			●			●	
	SenTix® V	SenTix® 20 21-..., 22	SenTix® 41, 1-3, 42, RJS	SenTix® 51, 52	SenTix® 60, 61 62	SenTix® 81, 82	SenTix® 91, 92, L	SenTix® H	SenTix® HW, HWS	SenTix® Sp	SenTix® Sur	SenTix® Mic, MIC-D, MIC-B	SenTix® FET	SenTix® ORP, PtR, Ag, Au

** for ORP Measurement see page 20



ORP measurements

Reduction and oxidation are two central chemical terms that describe the ability of chemical agents to accept (reduction) or donate electrons (oxidation). In aqueous solutions, the ORP (Oxidation-Reduction Potential) voltage can be measured using a standard hydrogen electrode as reference. The reducing or oxidizing properties of a solution first are a matter of the reactants. By using an ORP electrode this change in potentials would be recorded as a positive or negative voltage.

ORP measurements monitor chemical reactions such as checking the denitrification of wastewater and disinfectant effect of detergents or the strength of plating baths.

Measurement of ORP voltage is carried out with ORP combination electrodes. Similar to pH electrodes, these consist of a measuring electrode and a reference electrode. A metal electrode (normally a precious metal like gold, silver or platinum) is used in ORP combination electrodes in place of a glass membrane for carrying out the measuring function. The tendency for the chemical agents to accept or donate electrons determines the potential of the metal and thus the electrical potential of the combination electrode. ORP combination electrodes in use today contain a silver/silver chloride reference electrode, i.e. the indicated potential refers to this potential. Conversion to the standard hydrogen electrode system (UH) and that of the silver/silver chloride reference electrode is easily possible.

$$U_H = U_{Meas} + U_{Ref}$$

SenTix® ORP reference electrode potential against the standard hydrogen electrode

Temperature in °F (°C)	Potential in mV
32 (0)	+ 224
41 (5)	+ 221
50 (10)	+ 217
59 (15)	+ 214
68 (20)	+ 210
77 (25)	+ 207
86 (30)	+ 203
95 (35)	+ 200
104 (40)	+ 196
113 (45)	+ 192
122 (50)	+ 188
131 (55)	+ 184
140 (60)	+ 180
149 (65)	+ 176
158 (70)	+ 172



ORP measurements can be carried out with all WTW pH/mV meters.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers


Sentix® PLUS Electrodes

Model	Sentix® ORP 103 648	Sentix® Ag 103 664	Sentix® Au 103 665	Sentix® PtR 103 666
Working range °C (°F)	0 ... 100 °C (32 ... 212 °F)	-5 ... 100 °C (23 ... 212 °F)	-5 ... 100 °C (23 ... 212 °F)	-5 ... 100 °C (23 ... 212 °F)
Reference electrolyte	KCl 3 mol/l	ELY/ORP/Ag	KCl 3 mol/l	Gel
Sensor	Platinum	Silver	Gold	Platinum
Sensor shape	Round 0.16 in. (4 mm)	Cylindrical cap	Cylindrical cap	Round 0.24 in. (6 mm)
Diaphragm	Ceramic	Ceramic	Ceramic	Split ring
Shaft material	Glass	Glass	Glass	Glass
Shaft length (±0.08 in./±2 mm)	4.72 in. (120 mm)	4.72 in. (120 mm)	4.72 in. (120 mm)	4.72 in. (120 mm)
Shaft Ø (±0.02 in./±0.5 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)	0.47 in. (12 mm)
Temperature Sensor	–	–	–	–
Connection	AS DIN/AS DIN-3, AS BNC			

Ordering Informations for accessories

Testing and maintenance supplies for ORP measurements		Order No.
SORT/RH	Reagents for regenerating ORP electrodes consisting of activation powder (10 g) and chlorine powder (30 g)	109 730
RH 28	ORP buffer solution 1 bottle of 250 ml: pH 7, UH = 427 mV	109 740
ELY/ORP/AG	Electrolyte with 2 mol/l KNO ₃ +0.001 mol/l KCl for combined ORP electrode with silver electrode	109 735

ORP measurements can be carried out with all WTW pH/mV meters.



Ion-Selective Measurements

Ion-selective measurement is a method for determining the concentration of dissolved ions. Potassium ions, sodium ions, fluoride or chloride are examples of such cations and anions which are directly measured in solutions. Indirect methods such as – titration allow the determination of aluminum, nickel ions, or sulfate.

Measurement with ISE's, like the measurement of pH, is a potentiometric method. ISE's are in two configurations:

1. separate ion-selective electrode and reference electrode
2. combined ion-selective electrode with built-in reference electrode

The ion-selective membrane of the electrode consists of a sparingly soluble salt of the ion to be measured (solid state electrodes), a PVC-membrane, modified by an ion exchanger or ion carrier (matrix electrodes), glass (glass electrode) or a gas-permeable plastic (gas-sensitive electrodes).

The activity of the ions to be measured determines the electrode current. With increasing activity of the anions the voltage turns more negative, with increasing activity of cations, more positive. A pH/ionmeter uses the electrode signal to calculate the concentration of the sample.

The wide range of possible applications includes, for example, the measurement of fluoride concentration according to DIN 38 405. Chloride content determination in concrete samples or nitrate concentration determination in fruit juices are further examples of the ways in which

ion-selective measurement technology can be applied. An introduction to ion-selective measurement technology as well as application reports are available on our CD-ROM entitled "Principles of measurement technology".

Determination of	Application
Lead (Pb^{2+})	Soil samples
Bromide (Br^-)	Wine, plants
Cadmium (Cd^{2+})	Soil samples
Calcium (Ca^{2+})	Dairy products
Chloride (Cl^-)	Drinking water, foodstuffs
Cyanide (CN^-)	Electroplating baths
Fluoride (F^-)	Toothpaste, cement
Iodide (I^-)	Salt water
Potassium (K^+)	Wine, fertilizer
Copper (Cu^{2+})	Electroplating baths
Sodium (Na^+)	Wine, boiler feed water
Nitrate (NO_3^-)	Baby food, fertilizer, wastewater
Silver (Ag^+)	Electroplating baths
Sulfide (S^{2-})	Proteins, sediments

Ion-Selective Electrodes

WTW offers a complete range of ion selective electrodes and measuring instruments; you can choose between two types: Half cells of the 500 series which require a reference electrode from the R 503 type (an exception is the gas sensitive NH 500/2 which has a built-in reference electrode), or the combination electrodes from the 800 series.

These combination electrodes with built-in reference are excellent in handling and additionally offer the possibility to measure in small volumina. More over this they have an outstanding price performance ratio.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Applications for Ion-selective and Gas-sensitive Electrodes

Electrode type	Membrane ^②	Determinable ions	ISE Type 500 (Half cell, reference electrode necessary)	Reference electrode	combined ISE Type 800 (built-in refe- rence electro- de)	Measuring range	Bridge electrolyte	Ionic strength adjuste- ment solu- tion	Stand- ard solution (conc. 10 g/l)	pH range
Ammonia (NH ₄ ⁺)		Ammonia	NH 500/2	—	—	0,02...900 mg/l 10 ⁻⁶ ...5 x 10 ⁻² mol/l	—	MZ/NH ₃ /CN	ES/NH ₄	4-12
Lead (Pb ²⁺)	S	Lead	Pb 500	For all ion selective electrodes from the 500 series:	Pb 800	0,2...20000 mg/l 10 ⁻⁶ ...10 ⁻¹ mol/l	ELY/BR/503	ISA/FK	ES/Pb	4-7
Bromide (Br ⁻)	S	Bromide	Br 500		Br 800	0,4...79000 mg/l 5 x 10 ⁻⁶ ...1 mol/l	ELY/BR/503	ISA/FK	ES/Br	1-12
Cadmium (Cd ²⁺)	S	Cadmium	Cd 500		Cd 800	0,01...11000 mg/l 10 ⁻⁷ ...10 ⁻¹ mol/l	ELY/BR/503	ISA/FK	—	2-8
Calcium (Ca ²⁺)	L	Calcium, Magnesium ^③	Ca 500 ^①		Ca 800 ^①	0,02...40000 mg/l 5 x 10 ⁻⁷ ...1 mol/l	ELY/BR/503	ISA/Ca	ES/Ca	2,5-11
Chloride (Cl ⁻)	S	Chloride	Cl 500		Cl 800	2...35000 mg/l 5 x 10 ⁻⁵ ...1 mol/l	ELY/BR/503	ISA/FK	ES/Cl	2-12
Cyanide (CN ⁻) ^⑤	S	Cyanide	CN 500	R 503/P (2 mm pin plug) or R 503 D (4 mm banana plug)	CN 800	0,2...260 mg/l 8 x 10 ⁻⁶ ...10 ⁻² mol/l	ELY/BR/503	MZ/NH ₃ /CN	—	0-14
Fluoride (F ⁻)	S	Fluoride, Aluminum Phosphate ^③ , Lithium ^③	F 500		F 800	0,02...sat. mg/l 10 ⁻⁶ ...sat. mol/l	ELY/BR/503	TISAB	ES/F	5-7
Iodide (I ⁻)	S	Iodide, Thiosulfate Mercury	I 500		I 800	0,006...127000 mg/l 10 x 10 ⁻⁸ ...1 mol/l	ELY/BR/503	ISA/FK	ES/I	0-14
Potassium (K ⁺) ^⑤	L	Potassium	K 500 ^①	For all ion selective electrodes from the 500 series:	K 800 ^①	0,04...39000 mg/l 10 ⁻⁶ ...1 mol/l	ELY/ BR/503/K	ISA/K	ES/K	2-12
Copper (Cu ²⁺)	S	Copper, Nickel ^③	Cu 500		Cu 800	0,0006...6400 mg/l 10 ⁻⁸ ...10 ⁻¹ mol/l	ELY/BR/503	ISA/FK	ES/Cu	2-6
Sodium (Na ⁺) ^⑤	G	Sodium	DX 223 NA			0,05...23000 mg/l 2 x 10 ⁻⁶ ...1 mol/l	—	ISA/Na	ES/Na	>10
Nitrate (NO ₃ ⁻) ^⑤	L	Nitrate	NO 500 ^①		NO 800 ^①	0,4...62000 mg/l 7 x 10 ⁻⁶ ...1 mol/l	ELY/ BR/503/N	TISAB/NO ₃	ES/NO ₃	2,5-11
Silver (Ag ⁺) ^⑤	S	Silver	Ag/S 500		Ag/S 800	0,01...108000 mg/l 10 ⁻⁷ ...1 mol/l	ELY/BR/503	ISA/FK	—	2-12
Sulfide (S ²⁻) ^⑤	S	Sulfide	Ag/S 500		Ag/S 800	0,003...32000 mg/l 10 ⁻⁷ ...1 mol/l	ELY/BR/503	④	—	2-12

① Exchange measuring head

② S = solid state electrode, L = matrix electrode, G = glass electrode

③ Titration

④ Use according to operating instructions

⑤ Formulations for additionally required solutions are given in the application steps and operating instructions

Ordering Information for ISE electrodes and accessories see brochure "Product Details".

Application Range Ion-Selective Measurements

● recommended by WTW

○ suitable

Application Range	inoLab®				Handheld meters
	pH/ION 735	pH/ION 740	pH 740, pH/Cond 740, Multi 740	pH/ION/Cond 750	pH/ION 340i, Multi 350i
Occasional, simple ISE measurement	○	○	●	○	●
Routine and standard measurement	●	●	○	●	○
Advanced methods and procedures	●	●	–	●	–
<i>see page</i>	24	25	13, 50	25, 52	27, 55

Laboratory Ionmeters

inoLab® pH/ION 735

inoLab
Innovations that make sense

- Incremental Methods
- Advanced Incremental Methods
- Menu-driven user interface

pH, mV and Concentration Measurements with a single Instrument

Whether routine measurements or demanding analysis: the pH/ION 735 is the ideal precision instrument for all uses. A graphical user interface makes high-resolution pH and ion measurement easy and comfortable. 5-point calibration for pH and up to 7 calibration points for ion measurements guarantees a high-precision measurement by calculating non-linear calibration curves. The Model pH/ION 735 has user defined method capability as well as preprogrammed incremental techniques.

For those who need to document their results: a datalogger with storage for 4,500 entries, bi-directional RS 232 interface, real-time clock, and GLP-supporting calibration protocols, as well as date, time and selectable sample identification number identify all data sets.

This instrument is also available with a built-in printer.



inoLab® pH/ION 740

inoLab
innovations that make sense

- Advanced incremental methods
- Free software downloads
- Comprehensive documentation options

flexible and powerful

High-performance pH/mV/ion meter with graphic display and digital recorder function for pH, temperature and ion-selective measurement, automatic temperature compensation, high resolution (0.001 pH), MultiCal® calibration system, built-in measurement storage with GLP-conform documentation and digital interface. PC keyboard interface for connecting an external keyboard or barcode reader, and software for direct control by PC is included. With a built-in printer option available.

inoLab® pH/ION/Cond 750

inoLab
innovations that make sense

- Two galvanically isolated pH/mV/ISE inputs
- Menu-operated with back-lit graphic display
- One pH and one ISE calibration record per each input

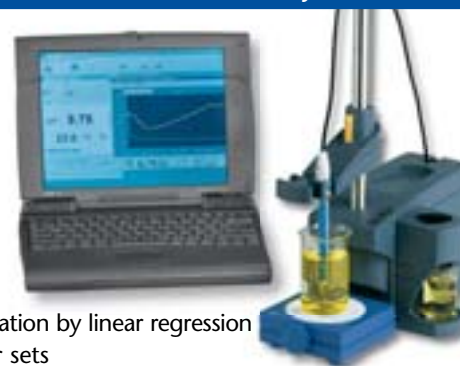
Premium class from WTW:

Two galvanically isolated inputs allow independent measurements of pH-value, ORP or ion concentration. For accurate measurements along the characteristic curve of the electrode it is possible to carry out calibrations with up to seven standard solutions. The calculation of the calibration curve by using a modified Nikolski algorithm also takes the non-linear parts of the curve in to account. The following methods are used to evaluate the ionic concentration:

- Known addition/known subtraction
- Sample addition/sample subtraction
- Double known addition
- Blank value correction
- Known addition with blank value correction
- Reference measurement

Features

- 5-point pH calibration by linear regression
- Selectable buffer sets
- Graphic evaluation possible
- Built-in digital recorder
- Connection for barcode reader or PC keyboard
- User Selectable Languages
- Multi-Level GLP Functions (password-protected operator levels)
- Free-of-charge downloads for MultiLab® pilot or terminal
- Four to seven point ISE calibration with a modified nikolski algorithm
- Known addition, double-known addition and known subtraction
- Sample addition/subtraction
- Blank value addition



A further highlight of this instrument is the possibility of conductivity measurement. Not only can specific resistance, salinity, and TDS be determined but also sample specific temperature coefficients. A wide range of additional functions like data administration, PC-operation by MultiLab® pilot, GLP-compliant calibration and data recording allow an easy integration into modern laboratory environment.

For further details see page 52.

Technical Data inoLab® pH/ION 735 and 740

Model	pH/ION 735	pH/ION 740
Range/ Resolution	pH -2.000 ... +20.000 pH mV -999.9 ... +999.9 mV -2000 ... +2000 mV Temperature 23.0 ... 221 °F (-5 ... +105 °C/0.1 °C) Conc.. 0.000 ... 10.000 mg/l 0.00 ... 100.00 mg/l 0.0 ... 1000.0 mg/l 0 ... 2000 mg/l	-2.000 ... +20.000 pH -999.9 ... +999.9 mV -2000 ... +2000 mV 23.0 ... 221 °F (-5 ... +105 °C/0.1 °C) Measuring range 1 (Resolution): 0,000 ... 9,999 (0,001) mg/l Measuring range 2: 0,00 ... 99,9 (0,01) mg/l Measuring range 3: 0,0 ... 999,9 (0,1) mg/l Measuring range 4: 0 ... 1999 mg/l
Accuracy (±1 digit)	±0.004 pH ±0.01 pH ±0.2 mV, ±1 mV ±0.1 K	±0,004 pH ±0,01 pH ±0,2 mV, ±1 mV ±0,1 K
Calibration	MultiCal® automatic calibration: AutoCal 2-/3-/4-/5-point AutoCal-Tec 2-/3-/4-/5-point ConCal® 1-/2-point ISECal 2- to 7-point Special functions: Known addition (single) Known subtraction Sample addition Sample subtraction Blank value addition Blank value correction	MultiCal® automatic calibration: 2-/3-/4-/5-point 2-/3-/4-/5-point 1-/2-point 2- to 7-point Special functions: Known addition (single and double) Known subtraction Sample addition Sample subtraction Blank value addition Blank value correction

Technical Data inoLab® pH/ION/Cond 750

Model	pH/ION/Cond 750
Range/ Resolution	pH -2 ... 20.000 pH -2.00 ... 20.00 pH mV -999.9 ... +999.9 mV -2000 ... +2000 mV Conc. (mg/l) 0.000 ... 10.000 0.00 ... 100.00 0.0 ... 1000.0 0 ... 2000 Temperature: 23 ... 221 °F (-5 ... +105 °C)
Accuracy (±1 digit)	pH ±0.004 pH ±0.01 pH mV ±0.2 mV, ±1 mV
Temperature compensation	Automatic ±0.2 mV, ±1 mV 23.0 ... 221 °F (-5 ... +105 °C) 23.0 ... 212 °F (-5.0 ... 100 °C) Manuell -4 ... 266 °F (-20 ... +130 °C) NTC 30 KOhm: ±0.1 Pt 1000 ±0.1 K
Calibration	MultiCal® automatic calibration: AutoCal 2-/3-/4-/5-point AutoCal-Tec 2-/3-/4-/5-point ConCal® 1-/2-point ISECal 2- to 7-point Special functions: Known addition (single and double) Known subtraction Sample addition Sample subtraction Blank value addition, Blank value correction

Ordering Information

inoLab® Laboratory Ionmeters – with wide-range power supply 100-240 VAC (50/60 Hz) included		□ Order No.	▲ Order No.
pH/ION 735P	inoLab® pH/ION 735P with built-in printer for GLP-conform documentation	1G21-210	1G21-110
pH/ION 740P	inoLab® pH/ION 740P with built-in printer for GLP-conform documentation; extended measuring and storage options	1G31-210	1G31-110
pH/ION/Cond 750	Flexible and powerful precision bench-top pH/mV/Ion/conductivity-meter with two inputs, single instrument	1K30-210	1K30-110



□ with BNC plug
▲ with DIN plug

Handheld Ionmeter

pH/ION 340i

- Handy, waterproof
- Up to 1500 hours continuous operation
- GLP

pH, mV and Concentration Measurements in one Hand

The pH/mV and ionmeter pH/ION 340i offers the highest degree of flexibility possible. For pH measurements the instrument can be calibrated manually or automatically and offers simultaneous display of pH and temperature. For measurements with ion-selective electrodes the pH/ION 340i offers concentration display in mg/l. Direct display in mV to ± 999.9 mV in 0.1 mV steps; and to ± 1999 mV in 1 mV steps.

Of course, even in these higher ranges the concentration is calculated from a mV resolution of 0.1 mV. Calibration is carried out with up to three standards (selected from 16 standards in the range of 0.01 to 1000 mg/l).

Operating on either line power or rechargeable battery for up to 1500 hours with "LoBat" warning means that the instrument can be used in the Lab or in the field.



Lightweight and compact, these impact meters are IP 66 (hose proof) and IP 67 (submersible).

The built-in datalogger for up to 500 measurements together with GLP calibration protocol offers a comprehensive documentation of the results. With analog or digital data transfer (RS 232), automatic recognition of stable measurements (AutoRead), electrode evaluation and calibration interval monitoring functions ensure reproducible and comprehensible measurements.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	pH/ION 340i	
Range/ Resolution	pH	-2.000 ... +19.999 pH
	mV	-999.9 ... +999.9 mV
Temperature Conc.		-1999 ... +1999 mV
		-5 ... +105 °C/0.1 °C
Accuracy (± 1 digit)		0.01 ... 1999 mg/l
		± 0.005 pH
Calibration		± 0.01 pH
		± 0.3 mV, ± 1 mV
AutoCal		± 0.1 K
AutoCal-Tec		MultiCal® automatic calibration:
		2-point
ConCal®		2-point
		1-/2-point
ISECal		2-/3-point

Ordering Information

Handheld Ionmeter		Order No.
pH/ION 340i	Robust and waterproof handheld ionmeter with datalogger and serial interface	2G30-100
Universal wide-range power supply	100 V - 240 V, 50-60 Hz; for 340i series	902 867





Dissolved Oxygen Measurement

Dissolved Oxygen

Some oxygen is dissolved in practically every liquid. For example, at a temperature of 68 °F (20 °C) and an atmospheric pressure of 1013 mbar saturated water contains about 9 mg/l oxygen. Ethanol can contain up to 40 mg/l whereas glycerol only has about 2 mg/l.

Each liquid takes up oxygen until the partial pressure of oxygen in the liquid is in equilibrium with the air or gas phase in contact with it. The actual oxygen concentration depends on a number of factors, such as temperature, air pressure, oxygen consumption by microorganisms in a biodegradation process or oxygen production by algae, etc.

The oxygen concentration is important for the:

- **Living conditions for fish and microorganisms in waters**
- **Degradation processes in wastewater treatment**
- **Corrosion processes in pipelines**
- **Shelf life of beverages, etc.**

The determination of the oxygen concentration was formerly carried out by the WINKLER titration method. Today electrochemical measurement is a recognized method in numerous standard procedures.

In its simplest form an oxygen sensor contains a working electrode and a counterelectrode. Both electrodes are located in an electrolyte system which is separated from the sample by a gas-permeable membrane. The working electrode reduces the oxygen molecules to hydroxide ions. In this electrochemical reaction a current flows from the counterelectrode to the working electrode. The more oxygen present in the sample, the larger the current signal. The oxygen meter calculates the oxygen concentration in the sample from this signal.

Application range Oxygen Meters

● recommended by WTW ○ conditionally applicable – not recommended

Application Range	inoLab®			Profiline Oxi 197i	Handheld Meters		
	Oxi 730	Oxi 740	BSB/ BOD 740		Oxi 315i	Oxi 330i	Oxi 340i
Routine measurement	–	–	–	–	●	●	–
Routine measurement with documentation	●	●	●	●	–	–	●
AQA with documentation	●	●	●	●	–	–	●
R&D high precision	●	●	●	●	–	●	●
Control measurements	●	●	●	●	○	●	●
LIMS connection	●	●	●	●	–	–	○
Quality assurance	●	●	●	●	–	●	●
Training	●	●	●	○	●	●	○
Service	–	–	–	●	●	●	●
Laboratory measurements	●	●	●	●	–	–	○
Field measurements	–	–	–	●	●	●	●
Depth measurements	–	–	–	●	–	–	–
External control/ PC connection/ PC control	● ● –	● ● ●	● ● ●	● ● –	– – –	– – –	● ● –
BOD measurements with self-stirring sensor	●	●	●	●	–	–	–
BOD measurements with assessment program	–	–	●	–	–	–	–
<i>see page</i>	30	31	62	32	33	34	34

For oxygen measurement with multi-parameter instruments see page 48

Application Range Sensors

Application Range	ConOx	DurOx®	CellOx® 325	StirrOx® G	TA 197 Oxi
BOD measurements	–	–	○	●	–
Fish farming	●	●	○	–	–
Surface waters	●	○	●	–	–
Ground water	○	–	○	–	●
Control measurements	●	●	●	○	–
Depth measurements	–	–	–	–	●
Laboratory measurements	○	–	●	○	–
Pharmaceutics	○	○	●	–	–
Biotechnology (non-autoclavable)	○	○	●	–	–
Wastewater treatment plant: aeration basin	○	●	○	–	–
<i>applicable instruments:</i>	<i>Multi 350i</i>	<i>Oxi 3xxi, Multi 350i</i>	<i>all</i>	<i>inoLab®, 197i</i>	<i>197i</i>



Laboratory Oxygen Meters

Oxygen is one of the most frequently measured parameters in the laboratory. It plays a large role in the degradation of substances and the growth of microorganisms, both in environmental technology and in biotechnology.

The inoLab® Oxi 740 instrument is particularly suitable for monitoring such processes. For routine measurements the inoLab® Oxi 730 is equipped with all the necessary functions which are required for documentation according to GLP.

inoLab® Oxi 730

inoLab
Innovations that make sense

- GLP documentation
- Comprehensive datalogging (800 data sets)
- Interface for self-stirring oxygen sensor StirrOx® G

compact and communicative

Standard laboratory oxygen meter with large multifunctional display for routine use in the laboratory. Automated functions such as air pressure correction, temperature compensation and OxiCal® rapid calibration make work easier. Datalogger, analog and digital output RS 232 as well as the optional built-in printer guarantee QA-conform documentation.

Features

- Simplified operator convenience
- Easy-to-clean touch-sensitive keypad
- Optional built-in printer

The StirrOx® G can be operated by the inoLab® Oxi 730 for BOD₅ determination according to DIN EN 1899-1 resp. DIN EN 1899-2 with manual start/stop functions.



inoLab® Oxi 740

inoLab
innovations that make sense

- Precision instrument
- Firmware/Softwareupdate
- External control (MultiLab® pilot)

Features

- Built-in digital recorder
- Graphic evaluation possible
- Connection of bar-code reader or PC keyboard
- Automatic memory function if bar-code reader is used
- User Selectable Languages
- Multi-Level GLP Functions (password-protected operator levels)
- Limit input with acoustic alarm
- Free-of-charge software downloads for MultiLab® pilot or terminal

inoLab® Oxi 740 with Terminal or PC Software:
flexible and powerful

High-performance oxygen meter with graphic display and digital recorder function for oxygen measurement in the laboratory. Automated functions such as air pressure correction, temperature compensation by the IMT method and OxiCal® rapid calibration make work easier. The built-in measurement store, the digital output RS 232 and the optional built-in printer (paper width 4.4" resp. 112 mm) guarantee QA-conform documentation.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	Oxi 730	Oxi 740
Range/Resolution	O ₂ Conc. 0.00 ... 19.99 mg/l. 0.0 ... 90.0 mg/l* O ₂ saturation 0.0 ... 199.9%. 0 ... 600%* O ₂ part. pressure 0.0 ... 199.9 mbar. 0 ... 1250 mbar Temperature 23 ... 122 °F (-5.0 ... +50.0 °C)	O ₂ Conc. 0.00 ... 20.00 mg/l. 0.0 ... 90.0 mg/l* O ₂ saturation 0.0 ... 200.0%. 0 ... 600%* O ₂ part. pressure 0.0 ... 200.0 mbar. 0 ... 1250 mbar Temperature 23 ... 122 °F (-5.0 ... +50.0 °C)
Accuracy (±1 digit)	O ₂ Conc. ±0.5% of value O ₂ saturation ±0.5% of value Temperature ±0.1 K	
Temperature compensation	32 ... 122 °F (0 ... +50 °C) automatic via IMT compensation	
Salinity correction	Automatic from 0.0 ... 70.0 adjustable via display	
Calibration	OxiCal® rapid calibration in OxiCal®-SL	

Ordering Information

inoLab® Laboratory Oxygen Meter SETs – with wide-range power supply 100-240 VAC (50/60 Hz) included		Order No.
inoLab® Oxi 730P	With built-in printer, including CellOx® 325, passive multifunction box and accessories	1B21-0111
inoLab® Oxi 740	Including terminal, PC software, CellOx® 325 and accessories	1B30-0111

IP 43

CE

cETLUS

3 Year
Warranty

* = depends on oxygen sensor and medium

Portable Oxygen Meters

The WTW oxygen meter **ProfiLine Oxi 197i** supplied with integrated powerful NiMH rechargeable batteries is both hose-proof (IP 66) and submersible (IP 67). This easy to use meter conforms to GLP and has an 800 data point datalogger and accurate recorder output.

ProfiLine Oxi 197i

- High-precision, indestructible, waterproof
- Recorder output corresponding to display
- Depths measurement down to 330 ft (100 m)

TA 197 Oxi

Oxygen depth armature **TA 197 Oxi** with built-in temperature sensor, up to 100 m cable with waterproof plug (IP 67), pressure-resistant steel armoring with screw-off protective hood, fits into small bore-holes (2" dia.).

External control via PC with MultiLab® pilot. They are equipped with a carrying/support handle and carrying strap as standard. The Oxi 197i is suitable for depth measurements down to 330 ft (100 m) in combination with the TA 197 Oxi depth armature.



BR 325

Battery-powered stirrer **BR 325** for profile and depth measurements.



Technical Data

Model	ProfiLine Oxi 197i	
Range/ Resolution	O ₂ Conc.	0.00 ... 19.99 mg/l (19.9 mg/l*), 0.0 ... 90.0 mg/l (90 mg/l*)
	O ₂ saturation	0.0 ... 199.9% (199%*), 0 ... 600%
Accuracy (±1 digit)	O ₂ Conc.	±0.5% of value
	O ₂ saturation	±0.5% of value
	Temperature	±0.1 K
Air pressure compen.	Automatic with built-in pressure sensor (500 ... 1100 hPa)	
Temperature compen.	<2% at 32 ... 104 °F (0 ... +40 °C)	
Salinity correction	Automatic from 0.0 ... 70.0, adjustable via display	
Calibration	OxiCal® rapid calibration in OxiCal®-SL or OxiCal®-D	

Ordering Information

Portable Oxygen Meters		Order No.
ProfiLine Oxi 197i	Robust, waterproof, submersible oxygen meter	3B30-010



* depends on oxygen sensor and medium
Depth armatures for measurements down to depths of 330 ft (100 m)
 see brochure "Product Details"

Handheld Oxygen Meters

WTW handheld oxygen meters are available in three versions: Oxi 315i, Oxi 330i, Oxi 340i.

They are suitable for checking both oxygen values in the field and for laboratory measurements. In combination with galvanic oxygen sensors DurOx® 325 or Cellox® 325 (no polarization time required) the measuring system is ready for immediate use anywhere.

Oxi 315i

- Robust, shockproof, waterproof
- Keypad with large, easy-to-operate silicone keys
- Extremely Long Battery Life

Simple, robust handheld meter with simplified keypad, without memory function and with no manual input facilities; in combination with DurOx® 325 with its protective hood it is particularly suitable for measurements in the fish-farming sector.



D.O. measurement with Oxi 315i and DurOx® incl. protection cap in fish farming



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Oxi 330i, 340i

- Robust, shockproof, waterproof
- Keypad with large, easy-to-operate silicone keys
- Extremely long battery life

Oxi 330i

Proven robust battery-operated handheld meter with manual input functions, built-in datalogger (800 data records), GLP-supporting functions, automatic temperature and air pressure compensation and salinity correction ...

Oxi 340i

As Oxi 330i, but with additional analog and digital RS 232 output and optional line adaptor. External control via MultiLab® pilot software.



Oxi 340i with field armoring
FM 325 (optional)

Oxi 330i with protective
armoring
SM 325 (optional)



complete as SET

Technical Data

Model	Oxi 315i	Oxi 330i	Oxi 340i
Range/ Resolution	O ₂ Conc.	0.00 ... 19.99 mg/l (19.9 mg/l*), 0.0 ... 90.0 mg/l (90 mg/l*)	
	O ₂ saturation	0.0 ... 199.9% (199%*), 0 ... 600%	
	O ₂ part. pressure	0.0 ... 199.9 mbar (199 mbar*), 0 ... 1250 mbar	
	Temperature	-5.0 ... +50.0 °C	
Accuracy (±1 digit)	O ₂ Conc.	±0.5% of value	±0.5% of value
	O ₂ saturation	±0.5% of value	±0.5% of value
	O ₂ part. pressure	–	±0.5% of value
	Temperature	±0.1 K	±0.1 K
Temperature compensation	2% at 32 ... 104 (0 ... +40 °C)		
Air pressure compensation	Automatic with built-in pressure sensor (500 ... 1100 hPa)		
Salinity correction	0 or 30 solid SAL	Automatic from 0.0 ... 70.0, adjustable via display	
Calibration	OxiCal® rapid calibration in OxiCal®-SL or OxiCal®-D		

Ordering Information

Handheld Oxygen Meter SETs		Order No.
Oxi 315i	Handheld oxygen meter, including DurOx® 325-3, professional case and accessories	2B10-0017
Oxi 330i	Handheld oxygen meter, including CellOx® 325, professional case and accessories	2B20-0011
Oxi 340i	Handheld oxygen meter, including CellOx® 325, professional case and accessories	2B30-0011
Universal wide-range power supply	100 V - 240 V 50-60 Hz; for 340i series	902 867



Other sensors in SET see brochure "Product Details"
* if DurOx® oxygen sensor is used

Oxygen Sensors

- Galvanic sensors: immediately ready for measurement
- Equipped with protective hood for rough conditions
- Simple air calibration using calibration vessel

DurOx® 325

only for handheld and field meters
Oxi 3xxi/Oxi 197i and Multi 350i

Membrane covered galvanic oxygen sensor

- Temperature compensation
- Long working life – up to 6 months with one electrolyte filling
- Low approach flow
- Waterproof sensor (IP 68 – 2 bar)
- Incl. calibration vessel OxiCal®-D
- With protective hood SK-D as standard



CellOx® 325

Membrane covered galvanic oxygen sensor

- Temperature compensation
- Up to 6 months usage of membrane
- High signal resolution
- Rapid response
- Waterproof sensor (IP 68 – 2 bar)
- Incl. calibration vessel OxiCal®-SL
- Membrane leakage monitoring



StirrOx® G

for inoLab® Oxi 730, inoLab® Oxi 740
and ProfiLine Oxi 197i

Self-stirring oxygen sensor – simultaneous stirring and measurement

- Single-handed operation for rapid series measurements
- Constant approach flow for high reproducibility
- Extremely low self-consumption of oxygen – only 0.008 µg h⁻¹ (mg/l)⁻¹
- Incl. calibration vessel OxiCal®-ST
- Temperature compensation
- Membrane leakage monitoring



Accessories

Various calibration and storage vessels are available for oxygen sensors.

see brochure "Product Details".

Ordering Information

Oxygen sensors (The sensor prices include the corresponding accessory case with spare parts and maintenance supplies)		Order No.
StirrOx® G	Self-stirring oxygen sensor for oxygen determination in Karlsruhe bottles and Winkler bottles, with OxiCal®-ST calibration and storage vessel	201 425
CellOx® 325	Galvanic oxygen sensor with OxiCal®-SL calibration and storage vessel, waterproof plug, cable length 1.5 m	201 533
DurOx® 325-3	Galvanic oxygen sensor with OxiCal®-D calibration vessel, water proof plug, cable length 3 m	201 570

Calibration and storage vessels and other sensors and accessories
see brochure "Product Details".



Conductivity Measurements

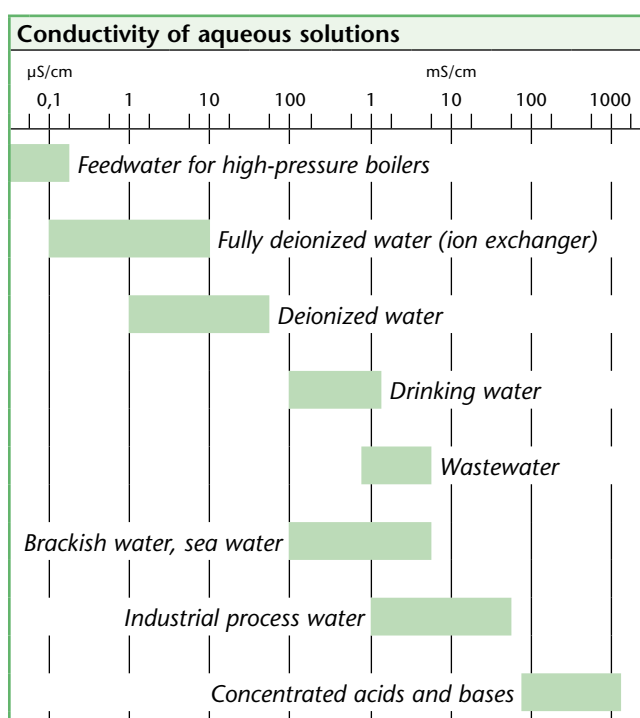
Conductivity Meters – The Electrolytical Conductivity

Conductivity is a parameter used to measure the ionic concentration and activity of a solution. The more salt, acid or alkali in a solution, the greater its conductivity. The unit of conductivity is S/m, often also S/cm.

The scale for aqueous solutions begins with pure water at a conductivity of $0.05 \mu\text{S/cm}$ ($77^\circ\text{F}/25^\circ\text{C}$). Naturally occurring waters such as drinking water or surface water have a conductivity in the range $100 - 1000 \mu\text{S/cm}$. At the upper end of the chart some acids and alkalines can be found.

Conductivity measurements are used for applications such as in the production of ultrapure water or determining the salinity of sea water.

Conductivity is measured by making a measurement of the electrical resistance. The simplest kind of measuring cell used consists of two similar electrodes. An alternating voltage applied to one of the electrodes causes the ions in the solution to migrate towards the electrodes. The more ions in the solution, the greater the current which flows between the electrodes. The instrument measures the current and uses Ohm's law to calculate first the conductance of the solution and then – by taken the cell data into account – the conductivity.



Application Range Conductivity Measurements

● recommended by WTW ○ conditionally applicable – not recommended

Application Range	inoLab®				Profiline Cond 197i	VARIO® C _{ond}	Handheld meters		
	Cond 720	Cond 730	Cond 740	pH/ION/ Cond 750			Cond 315i	Cond 330i	Cond 340i
Routine measurement	●	–	–	–	–	●	●	●	–
Routine measurement with documentation	–	●	●	●	●	–	–	–	●
AQA with documentation	–	●	●	●	●	–	–	–	●
R&D high precision	–	●	●	●	●	–	–	●	●
Control measurements	–	●	●	●	●	●	–	●	●
LIMS connection	–	●	●	●	●	–	–	–	○
Quality assurance	–	●	●	●	●	–	–	●	●
Training	●	●	●	●	○	●	●	●	○
Service	–	–	–	–	●	●	●	●	●
Laboratory measurements	●	●	●	●	●	●	–	–	○
Field measurements	–	–	–	–	●	–	●	●	●
Depth measurements	–	–	–	–	●	–	–	–	–
External control/ PC connection/ PC control	–	●	●	●	●	–	–	–	●
Salinity/TDS measurement	●	●	●	●	●	●	only SAL	●	●
Specific resistance	●	●	●	●	–	–	●	●	●
Suitable for Pharmacopoeia	●	●	●	●	●	–	–	●	●
Measurement of ultrapure water	●	●	●	●	●	●	●	●	●
Trace conductivity	●	●	●	●	●	–	–	●	●
<i>see page</i>	38	38	39	52	40	43	41	42	42

For conductivity measurements with multi-parameter instruments see page 48

Application Range Sensors	TetraCon® 325	TetraCon® 325/S	LR 325/01	LR 325/001	TetraCon® DU/T	TA 197 LF
Ultrapure water (Pharmacopoeia)	–	–	●	●	–	–
Chemical water	○	–	–	–	●	–
Ground water	●	–	●	–	–	●
Surface water	●	–	–	–	–	–
Depth measurements (barrages)	○	–	–	–	–	●
Laboratory measurements	●	–	●	●	–	–
Food industry (juices)	●	–	–	–	○	–
Swimming pools	●	–	–	–	○	–
Pharmaceutics	●	–	●	○	○	–
Cosmetics/Detergents	○	●	–	–	–	–
Semi-conductor industry	–	–	●	●	–	–
Paint/Varnish (water-soluble)	●	○	–	–	–	–
Electroplating	●	–	–	–	–	–
<i>applicable instruments:</i>	<i>all/except VARIO®</i>	<i>all/except VARIO® /315i</i>	<i>all/except VARIO®</i>	<i>all/except VARIO® /315i</i>	<i>all/except VARIO® /315i</i>	<i>Cond 197i</i>



Laboratory Conductivity Meters

Conductivity is an important parameter that is often used for monitoring water quality. In the laboratory sector this parameter has also increased in importance since the introduction of pharmacopoeia standards for pharmaceutical water. WTW inoLab® Cond laboratory instruments meet all the requirements for measurements according to this standard.

inoLab® Cond 720

inoLab
Innovations that make sense

- Application specific displays
- Touch-sensitive keypad with pressure point and tactile response
- Battery or line power operation

Simple and reliable

Routine laboratory conductivity meter with large multi-functional display, parallel temperature display and automatic temperature compensation. 68 °F or 77 °F (20 °C or 25 °C) can be set as reference temperature. Both TDS and salinity measurements are possible as well as conductivity and temperature. The ability to set different cell constants means that other special conductivity cells can be connected as well as the TetraCon® 325 4-electrode conductivity cell and LR 325/01 ultrapure water conductivity cell.



inoLab® Cond 730

inoLab
Innovations that make sense

- Simplified operator convenience
- GLP documentation via PC or optional built-in printer
- Meets all the requirements acc. to pharmacopoeia

Compact and precise

Standard laboratory conductivity meter with large multifunctional display, parallel temperature display and automatic temperature compensation. The datalogging capability and the real-time clock allows for all GLP functions. Data output can take place via the optional built-in printer on thermal paper accepted for use for official documents or via the built-in RS 232 digital interface via a PC or external printer.

68 °F or 77 °F (20 °C or 25 °C) can be set as reference temperature. Both TDS and salinity measurements are possible as



well as conductivity and temperature. The ability to set different cell constants means that other special conductivity cells can be connected as well as the TetraCon® 325 4-electrode conductivity cell and LR 325/01 ultrapure water conductivity cell.

inoLab® Cond 740

inoLab
innovations that make sense

- Meets all the requirements acc. to pharmacopoeia
- TDS and salinity measurement
- External control with MultiLab® pilot via PC



with Terminal or PC software: flexible and powerful

High-performance laboratory conductivity meter with graphic display and digital recorder function, parallel display of temperature and automatic temperature compensation. A built-in datalogger and a real-time clock allows for all QA conforming functions. The optional built-in printer allows data printout on thermal paper accepted for use in official documents. 68 °F or 77 °F (20 °C or 25 °C) can be set as reference temperature. Both TDS and salinity measurements are possible as well as conductivity and temperature. The ability to set different cell constants means that other special conductivity cells can be connected as well as the TetraCon® 325 4-electrode conductivity cell and LR 325/01 ultrapure water conductivity cell.

A PC keyboard interface allows an external keyboard or a barcode reader to be connected.

additional features

- Built-in digital recorder
- Real-Time Graphic Display
- User Selectable Languages
- Multi-Level GLP Functions (password-protected operator levels)
- Limit input with acoustic alarm
- Meets all the requirements acc. to pharmacopoeia
- Free-of-charge software downloads for MultiLab® pilot or terminal

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	Cond 720 and Cond 730	Cond 740
Range/Resolution	Conductivity 0.0 µS/cm ... 500 mS/cm in 5 measuring ranges or AutoRange additionally for K = 0.1 cm ⁻¹ : 0.00 µS/cm ... 19.99 µS/cm K = 0.01 cm ⁻¹ : 0.000 µS/cm ... 1.999 µS/cm Temperature 23 ... 211.82 °F (-5.0 ... +99.9 °C) Salinity 0.0 ... 70.0 TDS 0 ... 1999 mg/l Resistivity 0.000 ... 1999 MΩcm	0.0 µS/cm ... 2000 mS/cm in 5 measuring ranges or AutoRange additionally for K = 0.1 cm ⁻¹ : 0.00 µS/cm ... 20.00 µS/cm K = 0.01 cm ⁻¹ : 0.000 µS/cm ... 2.000 µS/cm 23 ... 221 °F (-5.0 ... +105.0 °C) 0.0 ... 70.0 0 ... 2000 mg/l 0.000 ... 2000 MΩcm
Accuracy (±1 digit)	Conductivity ± 0.5% of value Temperature ± 0.1 K	
Reference temperature	68 ... 77 °F (20 °C or 25 °C) selectable	
Cell constants	0.475 cm ⁻¹ , 0.1 cm ⁻¹ and 0.01 cm ⁻¹ fixed; freely selectable 0.25 ... 2.5 cm ⁻¹ and 0.09 ... 0.11 cm ⁻¹	0.475 cm ⁻¹ , 0.1 cm ⁻¹ and 0.01 cm ⁻¹ fixed; freely selectable 0.25 ... 2.5 cm ⁻¹
Temperature compensation	Automatic or switched off	
Temperature coefficient	• Non-linear function for natural water to EN 27 888 • Linear compensation from 0.001 ... 2.999%/K • No compensation	
Calibration	With 0.01 mol KCl	

Ordering Information

inoLab® Laboratory Conductivity Meter SETs – with wide-range power supply 100-240 VAC (50/60 Hz) included		Order No.
inoLab® Cond 720	Simple and reliable conductivity meter, including TetraCon® 325 and accessories	1C10-0111
inoLab® Cond 730	Compact precision conductivity meter, including TetraCon® 325, passive multifunction box and accessories	1C20-0111
inoLab® Cond 740P	The intelligent conductivity measuring station with additional built-in printer, TetraCon® 325 and accessories	1C31-0111
Passive multifunction box	(not included in Cond 720 Set)	109 810



Portable Conductivity Meters

The WTW conductivity meter ProfiLine Cond 197i supplied with integrated powerful NiMH rechargeable batteries is both hoseproof (IP 66) and submersible (IP 67). Along with an 800 data file datalogger, a real time clock and recorder output, the ProfiLine Cond 197i conforms to all GLP requirements.

ProfiLine Cond 197i

- Highly precise, indestructible, waterproof
- Large, silicone keys for field use
- Large, easy to read display
- Measurement down to depths of 330 ft (100 m)

They are equipped with a carrying/support handle and carrying strap as standard.

The Cond 197i is suitable for depth measurements down to 330 ft (100 m) in combination with the TA 197 LF depth armature.



TA 197 LF

Conductivity depth armature TA 197 LF with built-in temperature sensor, up to 100 m cable with waterproof plug (IP 67), pressure-resistant steel armoring (material VA 1.4571) with screw-off protective hood, pressure-resistant to max. 10 bar, fits into small boreholes (2" dia.).

Technical Data

Model	ProfiLine Cond 197i	
Range/ Resolution	Conductivity	0.0 µS/cm ... 500 mS/cm in 5 measuring ranges or AutoRange,, 0.00 ... 19.99 µS/cm for K=0.1 cm ⁻¹ , 0.000 ... 1.999 µS/cm for K=0.01 cm ⁻¹
	Temp.	23 ... 221 °F (-5.0 °C ... +105.0 °C)
	Salinity	0.0 ... 70.0
	TDS	0 ... 1999 mg/l
Accuracy (±1 digit)	Conductivity	±0.5% of value
	Temp.	± 0.1 K
Reference temperature	68 ... 77 °F (20 °C or 25 °C), selectable	
Cell constants	Calibratable 0.450...0.500 and 0.800...1.200 cm ⁻¹ , fixed: 0.01 cm ⁻¹ freely adjustable 0.25 ... 2.5 cm ⁻¹ and 0.09 ... 0.11 cm ⁻¹	
Temperature compensation	Automatic, can be switched off	
Temperature coefficient	• Non-linear function for natural waters to EN 27 888 coefficient and ultrapure water function • Linear compensation from 0.01 ... 2.99%/K • No compensation	

Ordering Information

Portable Conductivity Meter – with wide-range power supply 100-240 VAC (50/60 Hz) included		Order No.
ProfiLine Cond 197i	Robust, waterproof, submersible conductivity meter	3C30-010



Depth armatures down to 330 ft (100 m) see brochure "Product Details"

Handheld Conductivity Meters

WTW handheld conductivity meters are available in three versions: **Cond 315i**, **Cond 330i**, **Cond 340i**.

Useable anywhere, WTW handheld instruments are robust, easy to operate and provide assured accurate readings. From the monitoring of on-line process systems to field studies, WTW's handheld Conductivity meters meet all your measurement needs.

Cond 315i

- Robust, shockproof, waterproof
- Up to 1500 hours of continuous operation
- 4-electrode principle allows a wide range of applications

The simple conductivity meter for meeting higher demands. With only 5 keys for error-free measurement with parallel temperature measurement, automatic temperature compensation, 4-electrode measuring technology.



Complete as SET



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Cond 330i, 340i

- Robust, shockproof, waterproof
- Up to 1500 hours of continuous operation
- 4-electrode principle allows a wide range of applications

Cond 330i

Robust and waterproof handheld conductivity meter for battery operation; with parallel temperature display, integrated datalogger, GLP supporting functions, automatic and manual temperature compensation with linear temperature function and non-linear function for ultrapure water and natural waters according to EN 27 888. The temperature compensation can be switched off; either 68 °F or 77 °F (20 °C or 25 °C) can be selected as the reference temperature.

Cond 340i

As Cond 330i, but with additional analog and digital RS 232 output and an optional power supply is available.



Cond 340i in field armoring
FM 325 (optional)

Cond 330i in protective armoring
SM 325 (optional)

Technical Data

Model	Cond 315i	Cond 330i and Cond 340i
Range/ Resolution	Conductivity 0.0 µS/cm ... 500 mS/cm in 5 measuring ranges or AutoRange 0.00 µS/cm ... 19.99 µS/cm (for K=0.1 cm ⁻¹) Temp. -5.0 °C ... +105.0 °C Salinity 0.0 ... 70.0 TDS 0.000 ... 1999 MΩcm Resistivity	Conductivity 0.0 µS/cm ... 500 mS/cm in 5 measuring ranges or AutoRange 0.00 µS/cm ... 19.99 µS/cm (for K=0.1 cm ⁻¹) 0.000 µS/cm ... 1.999 µS/cm (for K=0.01 cm ⁻¹) -5.0 °C ... +105.0 °C 0.0 ... 70.0 0 ... 1999 mg/l
Accuracy (±1 digit)	Conductivity ±0.5% of value Temp. ±0.1 K	
Reference temp.	68 ... 77 °F (20 °C or 25 °C), selectable	
Cell constant	Fixed 0.475 cm ⁻¹ , 0.1 cm ⁻¹	0.475 cm ⁻¹ , 0.1 cm ⁻¹ and 0.01 cm ⁻¹ fixed and 0.25 ... 2.5 cm ⁻¹ and 0.09 ... 0.11 cm ⁻¹ adjustable
Temperature comp.	Automatic, can be switched off	
Temperature coefficient	• Non-linear function for natural waters (nLF) to EN 27 888 and ultrapure water function • No compensation	• Non-linear function for natural waters (nLF) to EN 27 888 and ultrapure water function • Linear compensation from 0.01 ... 2.99 %/K • No compensation

Ordering Information

Handheld Conductivity Meter SETs		Order No.
Cond 315i	Robust and waterproof battery-operated handheld conductivity meter, including TetraCon® 325, professional case and accessories	2C10-0011
Cond 330i	Robust and waterproof battery-operated handheld conductivity meter with datalogger, including TetraCon® 325, professional case and accessories	2C20-0011
Cond 340i	Robust and waterproof battery-operated handheld conductivity meter with datalogger and serial interface, including TetraCon® 325, professional case and accessories	2C30-0011
Universal wide-range power supply	100 V - 240 V, 50-60 Hz; for 340i series	902 867



Other measuring cells in SET see brochure "Product Details"

VARIO® C_{ond}

VARIO

- Touch screen
- Large operating range
- Plug-in cells – no cables

Simple measurement at your fingertips – now also available for conductivity measurement!

VARIO® C_{ond} has a lot to offer – at an excellent price. This economical designed meter is ideal for use in process control monitoring or anywhere a small, accurate meter is needed. The VARIO® is small, light, handy, waterproof and has a robust firm-grip rubber armoring.

Miniature precision

The globally renowned measurement cell TetraCon® 325 was specially shortened and modified for the VARIO® C_{ond}. With extra ultrapure water cell and flow vessel the VARIO® C_{ond} is uniquely suited for ultrapure water analysis.

Increased precision through the omission of cable connectors – the VARIO® C_{ond} is an appropriate solution for servicing and maintaining water treatment equipment. No matter whether using it for pure water measurement in semi-conductor industry or in cell culture laboratories, the pure water conductivity cell with flow-through vessel always allows a rapid and easy control measurement.



Long-lasting power.

VARIO® C_{ond} offers up to 500 hours of continuous operation – with just one standard battery. The low power technology shuts down the device after 10 minutes in standby. Changing the battery is easy and quick.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	VARIO® C _{ond}
Range/Resolution	[μS/cm] 0.00 ... 19.99 (when using module LR01 V) 0.0 ... 199.9 0 ... 1999
	[mS/cm] 0.00 ... 19.99 0.0 ... 199.9 0 ... 1999
Resistivity [k*cm]	0.000 ... 1.999 0.00 ... 19.99 0.0 ... 199.9 0 ... 1999
Resistivity [M*cm]	0.000 ... 1.999 0.0 ... 199.9 0 ... 1999
SAL	0.0 ... 70.0 according IOT
TDS [mg/l]	0 ... 1999
T [°F/°C]	41 ... 221/5.0 ... +105.0

Ordering Information

VARIO® C _{ond}	Order No.
VARIO® C _{ond} Set	VARIO® C _{ond} in the mobile case set, incl. 4-electrode cell and KCl solution 0.01 mol/l 2X00-001A
VARIO® C _{ond} Set	VARIO® C _{ond} in the mobile case set, incl. ultrapure water cell and flow-through vessel 2X00-001B



Other accessories see brochure "Product Details"

Conductivity Cells

For more than 50 years WTW has been one of the leading manufacturers worldwide of precision conductivity meters and cells. The TetraCon® 4-electrode system is the result of our commitment to quality and sets a new standard for professional conductivity measurements.

TetraCon®

In comparison with conventional measuring cells with 2 electrodes, the TetraCon® conductivity cell offers numerous technical advantages:

- Highest degree of precision and linearity by optimized cell geometry
- Extremely large measuring range with just one cell
- Long-term cell constant stability with high-quality abrasion-resistant graphite electrodes
- With built-in temperature sensor as standard
- Smallest immersion depth possible
- No measuring errors even with very dirty electrode – contact resistance on the electrode surface is automatically compensated
- No measuring errors from cable influences
- No measuring errors from primary or secondary polarization effects
- No measuring errors due to contact with side walls or base of measuring vessels
- Robust, unbreakable epoxy body

Selection Guide

Measuring cell	VARIO® C _{ond}	Cond 315i	LF 315	LF 318	LF 320/323/325	LF 330/340A	Cond 330i/340i	inoLab® Cond, pH/Cond, Multi	LF 537	LF 538	LF 539	LF 3000	MultiLab® 540	MultiLab® P4/P5	MultiLine® P4, Multi 340i, Multi 197i	MultiLine® P3 pH/ LF, pH/Cond 340i	Multi 350i	LF 197	LF 597	Cond 197i
LTA 1			②	②	②	②	②	②	●	●	②					②	②			②
LTA 10									●	●	●	●	②				②			
LR 01/T									●		●	●		●						
KLE 1/T									●		●	●		●						
KLE 315			●																	
TetraCon® 96									●		●	●		●						
TetraCon® 96-1,5									●		●	●		●						
TetraCon® 325, TetraCon® 325/C		●		●	●	●	●	●		●			●		●	●	●	●	●	●
TA 197 LF																		●		●
TetraCon® 325/Pt													●							
TetraCon® DU/T					⑤	⑤	⑤	⑤	④	⑤	④	④	⑤	④			⑤	⑤	⑤	⑤
TetraCon® DU/TH					⑤	⑤	⑤	⑤	④	⑤	④	④	⑤	④			⑤	⑤	⑤	⑤
LR 325/01		●			●	●	●	●		●			●				●	●	●	●
LR 325/001						●	●	●					●				●	●	●	●
TetraCon® 325/S						●	●	●		●			●				●	●	●	●
ConOx																	●			
TetraCon® V	●																			
LR01 V	●																			

Adapter (possible conversion with cell constants) is required:

- ② Adapter cable K/LTA together with temperature sensor TFK 325 or TFK 150
- ④ Connection cable KKDU
- ⑤ Connection cable KKDU 325



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Conductivity Cells

Application	Standard		Special	Ultrapure Water		Trace	Flow-through
	TetraCon® 325	TetraCon® V	TetraCon® 325/S	LR 325/01	LR 01 V	LR 325/001	TetraCon® DU/T
Order No.	301 960	301 990	301 962	301 961	301 992	301 962	301 252**
Electrode material	Graphite		Graphite	V4A steel		V4A steel	Graphite
Flow-thru vessel	–		–	–		V4A steel	–
Shaft material	Epoxy		Epoxy	V4A steel		V4A steel	Epoxy
Shaft length	4.72 in (120 mm)		4.72 in (120 mm)	4.72 in (120 mm)		4.72 in (120 mm)	6.10 in (155 mm)
Cell constant	K = 0.475 cm ⁻¹		K = 0.491 cm ⁻¹	K = 0.1 cm ⁻¹		K = 0.01 cm ⁻¹	K = 0.778 cm ⁻¹
Diameter	0.60 in (15.3 mm)		0.60 in (15.3 mm)	0.47 in (12 mm)		0.79 in (20 mm)	–
Cable length	4.9 ft (1.5 m)		4.9 ft (1.5 m)	4.9 ft (1.5 m)		4.9 ft (1.5 m)	3.3 ft (1 m) (only with KKDU 325)
Measuring range	1 µS/cm ... 2 S/cm*		1 µS/cm ... 2 S/cm*	0,001 µS/cm ... 200 µS/cm		0,0001 µS/cm ... 30 µS/cm	1 µS/cm ... 2 S/cm*
Temperature range	32 ... 212 °F (0 ... 100 °C)		32 ... 212 °F (0 ... 100 °C)	32 ... 212 °F (0 ... 100 °C)		32 ... 212 °F (0 ... 100 °C)	32 ... 140 °F (0 ... 60 °C)
Filling volume	–		–	17 ml (without sensor)		ca. 10 ml (without sensor)	7 ml
Min./max. immersion depth	36/120 mm	40 mm	40/120 mm	30/120 mm	40 mm	40/120 mm	–

For additional special measuring cells or other cable lengths see brochure "Product Details"

* Measuring range depends on particular instrument,

** Adapter cable KKDU 325 (order no. 301 963), length 3.3 ft (1 m), is necessary for the connection

Ultrapure water measuring acc. to pharmacopoeia

Calibration and testing agents

Kit for ultrapure water acc. to pharmacopoeia

This kit contains LR 325/01 Ultrapure water cell, D01/T flow-through vessel made of glass (USP-KIT 1) or stainless steel (USP-KIT 2), NIST traceable 5 μ S standard with accuracy $\pm 2\%$ and 6R/SET/LabTesting set



Ultrapure water cell LR 325/01 with glass flow-through vessel



Calibration standard 100 μ S/cm

Shelf life 2 years,
NIST traceable with accuracy $\pm 3\%$

Calibration standard 5 μ S/cm

Shelf life 1 year,
NIST traceable with accuracy $\pm 2\%$



Conductivity measuring kit ultrapure water measuring acc. to pharmacopoeia, with stainless steel flow-through vessel for pharmaceutical water.

Ordering Information Calibration and Testing Agents

Kit for measuring the conductivity according to pharmacopoeia		Order No.
USP Kit 1	Kit for measuring conductivity according to pharmacopoeia, consisting of LR 325/01 Ultrapure water cell, D01/T Glass flow-through vessel, NIST traceable 5 μ S standard with accuracy $\pm 2\%$ and 6R/SET/LabTesting set	300 569
USP Kit 2	As USP Kit 1, but flow-through vessel made of stainless steel instead of D01/T	300 568
Calibration agents		Order No.
KS 100 μ S	Calibration standard 100 μ S/cm, shelf life 2 years, NIST traceable with accuracy $\pm 3\%$ (300 ml)	300 578
KS 5 μ S	Calibration standard 5 μ S/cm, shelf life 1 year, NIST traceable with accuracy $\pm 2\%$ (300 ml)	300 580
E/SET	Calibration set (6 x 50 ml bottles calibration and control standard, KCl 0.01 mol/l)	300 572

Flow-through vessels



Trace conductivity cell LR 325/001
with stainless steel flow-through vessel



Glass flow-through vessel D01/T
with ultrapure water cell LR 01 V

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Ordering Information Flow-through Vessels

for LTA 1, LTA, LTA 01 and TFK 530		Order No.
D 530	Flow-through vessel of transparent PVC, suitable for conductivity cells and temperature sensors, I.D. 44 mm, V*=97 ml	108 060
for TetraCon® 325		Order No.
D 201	Flow-through vessel of transparent PVC, I.D. 18 mm, V*=13 ml	203 730
for TetraCon® 96, LTA 100 and KLE 1		Order No.
D 1/T	Flow-through vessel, glass I.D. 24 mm, V*=36 ml	302 730
for LR 01/T and LTA 01		Order No.
D 01/T	Flow-through vessel, glass I.D. 18 mm, V*=17 ml	302 750

V* = filling volume without sensor



Multi-Parameter Measurements

pH, Oxygen and Conductivity Measurements

Multi-parameter Instruments

With simultaneous function for pH, ORP, Dissolved Oxygen, Conductivity, Salinity and Temperature, these small and compact meters are complete laboratories themselves. WTW multiparameter instruments solve the problem of multiple electrode interference by utilizing our advanced sensor technology. It is now possible to measure oxygen, conductivity and pH simultaneously in the same sample vessel or field location.

Long battery life or optional line adaptors allows WTW's Multi-parameter instruments to be used either in the laboratory or in the field. The datalogging function insures accurate

reporting. Our standard automatic documentation storage, user defined calibration procedures and GLP functions provide comprehensive quality assurance.



Application Range Multiparameter Measurements

Application range	inoLab®						Handheld meters			
	pH/Cond 720	Multi 720	pH/Cond 740	Multi 740	pH/ION/Cond 750	Profiline Multi 197i	pH/Cond 340i	pH/Oxi 340i	Multi 340i	Multi 350i
Routine measurement	●	●	○	○	○	-	○	○	-	○
Routine measurement with documentation	-	-	●	●	●	●	●	●	●	●
AQS with documentation	-	-	●	●	●	●	●	●	●	●
R&D high resolution and precision	-	-	●	●	●	-	-	-	-	●
Control measurements	●	●	●	●	●	●	●	●	●	●
LIMS connection	-	-	●	●	●	●	○	○	○	●
Quality assurance	●	●	●	●	●	●	●	●	●	●
Training	●	●	○	○	○	○	●	●	○	○
Service	-	-	-	-	-	●	●	●	●	●
Laboratory measurements	●	●	●	●	●	●	○	○	○	●
Field measurements	-	-	-	-	-	●	●	●	●	●
Depth measurements	-	-	-	-	-	●	-	-	-	up to 330 ft (100 m)
External control/PC connection/PC control	-/-/-	-/-/-	●/●/●	●/●/●	●/●/●	●/●/-	●/●/-	●/●/-	●/●/-	●/●/-
BOD measurements with self-stirring sensor	-	-	-	●	-	-	-	-	-	-
BOD measurements with assessment program	-	-	-	-	-	-	-	-	-	-
pH/ION function	-	-	●	●	●	-	-	-	-	●
Ion-specific measurement programs	-	-	-	-	●	-	-	-	-	-
Salinity/TDS measurement	●/●	●/●	●/●	●/●	●/●	●/-	●/-	-/-	●/-	●/●
Specific resistance	●	●	●	●	●	-	-	-	-	●
Suitable for Pharmacopoeia	●	●	●	●	●	-	-	-	-	●
Measurement of ultrapure water	●	●	●	●	●	-	-	-	-	●
Trace conductivity	●	●	●	●	●	-	-	-	-	●
see page	50	50	50	50	52	54	58	58	58	55

Application range sensors

Application range sensors	TetraCon® 325	LR 325/01	LR 325/001	DurOx®	CellOx® 325	ConOx	MPP	TA 197 pH	TA 197 LF	TA 197 Oxi
Ultrapure Water (Pharmacopoeia)	-	●	●	-	-	-	-	-	-	-
Chemical water	○	-	-	○	○	○	○	-	-	-
Ground water	●	●	-	○	-	○	●	-	-	-
Surface water	●	-	-	●	-	●	●	-	-	-
Depth measurements (barrages)	up to 66 ft (20 m)	-	-	-	up to 66 ft (20 m)	up to 66 ft (20 m)	up to 330 ft (100 m)	up to 330 ft (100 m)	up to 330 ft (100 m)	up to 330 ft (100 m)
Laboratory measurements	●	●	●	○	●	●	-	-	-	-
BOD measurements	-	-	-	-	●	-	-	-	-	-
Fish farming	-	-	-	●	○	●	●	-	-	-
Swimming pools	●	-	-	●	●	●	○	-	-	-
Food industry (juices)	●	-	-	-	○	○	-	-	-	-
Pharmaceutics	●	●	○	○	●	●	-	-	-	-
Cosmetics/Detergents	○	-	-	-	-	-	-	-	-	-
Semi-conductor industry	-	●	●	-	○	○	-	-	-	-
Process technology	○	-	-	○	○	-	-	-	-	-
Biotechnology (non-autoclavable)	-	-	-	●	●	●	-	-	-	-
Wastewater treatment plant: aeration basin	-	-	-	●	○	○	●	-	-	-
Wastewater treatment plant: inflow	●	-	-	●	○	○	●	-	-	-
applicable instruments:	all with Cond. Meas.	350i inoLab® pH/Cond 7xx inoLab® Multi 7xx		350i	all with D.O. Meas.	350i	350i	Multi 197i	Multi 197i	Multi 197i

Laboratory Multi-Parameter Instruments

With the growing number of measurements required by today's modern laboratory, instruments need to be able to perform multiple functions. The inoLab® multi-parameter instruments provide the most necessary features and functions at an outstanding price.

inoLab® 720

inoLab
innovations that make sense

- Compact
- Versatile
- Easy-to-use



inoLab® pH/Cond 720 and inoLab® Multi 720

The routine instrument **inoLab® pH/Cond 720** is a favorably-priced model for initial processing of pH / conductivity measurements. The **inoLab® Multi 720** allows the measurement of pH and ORP, oxygen, conductivity and salinity as well as the temperature. Their large multifunction display means that they are suitable for standard measurements where GLP-documentation is not required.

additional features:

- Easy-to-clean touch-sensitive keypad
- Simplified operator convenience
- Bench and wall-mounted models
- Mains-independent
- Country-specific units
- Application-oriented displays

inoLab® 740

inoLab
innovations that make sense

- Multifunctional
- Precise
- Communicative



inoLab® pH/Cond 740 and inoLab® Multi 740

As high-end instruments the **inoLab® pH/Cond 740** and the **inoLab® Multi 740** have a resolution of 0.001 pH units. They also have all the functions necessary for making ion selective measurements. With the **inoLab® Multi 740** oxygen is measured as %, mg/l or mbar. The **pH/Cond 740** and the **inoLab® Multi 740** can be used to measure the salinity and TDS (Total Dissolved Solids) as well as conductivity and specific resistance.

The optional built-in printer as well as the graphic display with operator guidance increase the measuring comfort and allow QA-conform documentation.

additional features:

- 5-point calibration by linear regression
- Freely selectable buffer sets
- Graphic evaluation possible
- Built-in digital plotter
- Connection for bar-code reader or PC keyboard
- User Selectable Languages
- Limit input with acoustic alarm
- Multi-Level GLP Functions (password-protected operator levels)
- Free-of-charge downloads for MultiLab® pilot or terminal

Technical Data inoLab® 720

Model	pH/Cond 720, Multi 720	Multi 720	pH/Cond 720, Multi 720
	pH measurement	Oxygen measurement	Conductivity measurement
Range/ Resolution	pH: -2.00 ... +16.00 pH mV: -199.9 ... +199.9 mV -1999 ... +1999 mV Temp.: 23 ... 221 °F (-5.0 ... +105.0 °C)	O ₂ concentration: 0.00 ... 19.99 mg/l 0.0 ... 90 mg/l* O ₂ saturation: 0.0 ... 199.9% 0 ... 600%* O ₂ partial press.: 0.0 ... 199.9 mbar 0 ... 1250 mbar Temp.: 32 ... 122 °F (0.0 ... 50.0 °C)	0.0 µS/cm ... 500 mS/cm in 5 ranges or AutoRange, in addition at: K = 0.01 cm ⁻¹ 0.000 ... 1.999 µS/cm K = 0.1 cm ⁻¹ 0.00 ... 19.99 µS/cm Temperature: 23 ... 221 °F (-5.0 ... +105.0 °C) Salinity: 0.0 ... 70.0 TDS: 0 ... 1999 mg/l Spec. resistivity: 0.000 ... 1999 MΩcm
Accuracy (±1 digit)	pH: ±0.01 pH mV: ±0.3 mV, ±1 mV	±0.5% of value	±0.5% of value
Temperature compensation	Automatic 23 ... 221 °F (-5 ... +105.0 °C) with TFK 325 or built-in temperature sensor manual -4 ... 266 °F (-20 °C ... +130 °C)	Automatic via IMT compensation from 32 ... 104 °F (0 ... 40 °C)	Linear and non-linear function for ultrapure water and natural water to EN 27 888, can be switched off
Calibration	MultiCal® 2-point ConCal® 1-/2-point	With OxiCal®-SL	Calibration with 0.01 mol KCl

Technical Data inoLab® 740

Model	pH/Cond 740, Multi 740	Multi 740	pH/Cond 740, Multi 740
	pH measurement	Oxygen measurement	Conductivity measurement
Range/ Resolution	pH: -2.000 ... +20.000 pH -2.00 ... +20.00 pH mV: -999.9 ... +999.9 mV -2000 ... +2000 mV ISE: Conc.: 0.01 ... 2000 mg/l Temp.: 23 ... 221 °F (-5.0 ... +105.0 °C)	O ₂ concentration: 0.00 ... 20.00 mg/l 0.0 ... 90 mg/l* O ₂ saturation: 0.0 ... 200.0% 0 ... 600%* O ₂ partial press.: 0.0 ... 200.0 mbar 0 ... 1250 mbar Temp.: 32 ... 122 °F (0.0 ... 50.0 °C)	0.0 µS/cm... 2000 mS/cm in 5 ranges or AutoRange, in addition at: K = 0.01 cm ⁻¹ 0.000 ... 2.000 µS/cm K = 0.1 cm ⁻¹ 0.00 ... 20.00 µS/cm
Accuracy (±1 digit)	pH: ±0.004 pH ±0.01 pH mV: ±0.2 mV, ±1 mV	±0.5% of value	±0.5% of value
Temperature compensation	Automatic 23 ... 221 °F (-5 ... +105.0 °C) with TFK 325 or built-in temperature sensor manual -4 ... 266 °F (-20 °C ... +130 °C)	Automatic via IMT compensation from 32 ... 104 °F (0 ... 40 °C)	Linear and non-linear function for ultrapure water and natural water to EN 27 888, can be switched off
Calibration	MultiCal® 2-, 3- and 5-point ISECal 2- and 3-point ConCal® 1-/2-point	With OxiCal®-SL	Calibration with 0.01 mol KCl

Ordering Information

inoLab® Multi-Parameter SETs – with wide-range power supply 100-240 VAC (50/60 Hz) included		Order No.
inoLab® Multi 720	Simple and reliable multi-parameter meter for routine work, including SenTix® 41, CellOx® 325, TetraCon® 325 and accessories	1F10-111211
inoLab® Multi 740	Flexible and powerful – the intelligent pH, oxygen and conductivity measuring station consisting of multifunction box and universal terminal, with PC software/connection cable, SenTix® 81, CellOx® 325, TetraCon® 325 and accessories	1F30-111411
Passive multifunction box	(not included in Multi 720 Set)	109 810



Other multi-parameter SETs see brochure "Product Details"

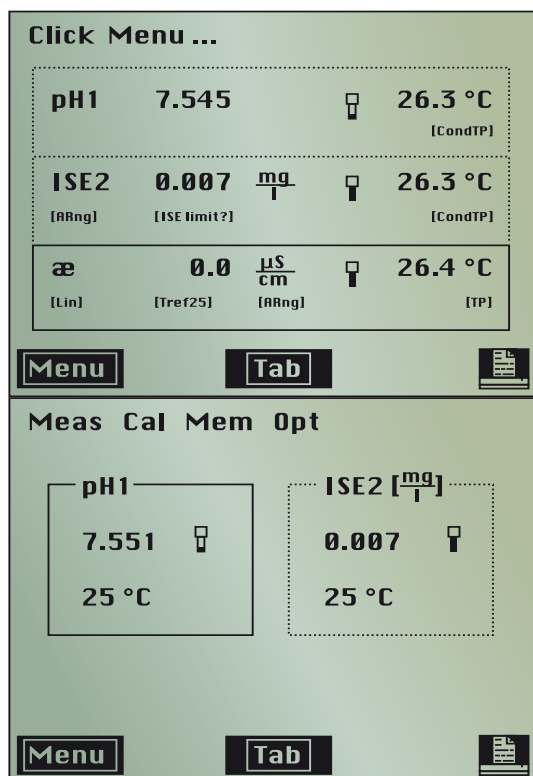
* depends on oxygen sensor and medium

inoLab® pH/ION/Cond 750 inoLab Innovations that make sense

- 2 galvanically isolated pH inputs
- Multiple conductivity functions
- Menu-driven with backlit graphics display

The Ultimate Measurement Technology by WTW:

This ultimate multiparameter meter with its two galvanically separated pH inputs allows independent and simultaneous measurements of pH, ORP or ion concentrations. Calibrations with up to 7 standard solutions can be carried out to achieve precise measurements across the entire characteristic curve of an ISE electrode. The wide range of calibration procedures allows for even the non-linear portion of the calibration curve to be accurately defined.



Display with menus

In addition to direct potentiometric methods the following advanced methods are also included:

- Known addition/subtraction
- Addition/subtraction of samples
- Double known addition
- Blank correction
- Known addition with blank correction
- Reference measurement

In addition to pH and Ion capability, and with features such as the ability to measure salinity, TDS, specific conductance, resistance and temperature coefficients, this versatile meter can perform all required conductivity measurements. Temperature coefficients are pre-programmed for NaOH, HCl, KCl, and NaCl. More over that individual (non-) linear coefficients can be fed into the instrument. Additional features include the measurement of sample concentrations by conductivity; two dimensional temperature concentration field to determine accurate reference conductivities. Comprehensive additional functions such as measurement data management, PC-connection via MultiLab® pilot, GLP-conform calibration and measurement data acquisition and a bidirectional RS 232 interface permit seamless integration into modern laboratory routines.



Technical Data inoLab® pH/ION/Cond 750

	pH/ION measurement	Conductivity measurement
Range/Resolution	pH: -2 ... 20.000 pH -2.00 ... 20.00 pH mV: -999.9 ... +999.9 mV -2000 ... +2000 mV Conc.: 0.01 mg/l ... 200 g/l Temperature: -5.0 ... +105.0 °C	0.0 µS/cm ... 2000 mS/cm in 5 ranges or AutoRange, additional: 0.00 µS/cm ... 20.00 µS/cm (K=0.1 cm⁻¹) 0.000 µS/cm ... 2.000 µS/cm (K=0.01 cm⁻¹) Temp.: -5.0 °C ... +105.0 °C Salinity: 0.0 ... 70.0 TDS: 0 ... 2000 mg/l Spec. resistivity: 0.00 ... 2000 MOhm
Accuracy (±1 digit)	pH: ± 0.004 pH. ± 0.01 pH mV: ± 0.2 mV. ± 1 mV	Conductivity: ± 0.5% of value
Temperature compensation	Automatic 23 ... 221 °F (-5 ... +105.0 °C) Manual -4 ... 266 °F (-20 ... +130 °C) NTC30 KOhm: ±0.1 K Pt 1000: ±0.1 K	23 ... 212 °F (-5.0 ... 100 °C) - Linear and non-linear functions for ultrapure water and natural waters to EN 27 888 - Lineare compensation from 0.01% ... 3.00%/K - Compensation can be switched off Special functions: non-linear temperature coefficients, pre-programmed coefficients, concentration determination, non-linear reference conductivity
Salinity correcture	—	68 °F/77 °F (20 °C/25 °C) selectable
Calibration	—	Fixed 0.01 cm⁻¹. Freely selectable 0.090 ... 0.110 cm⁻¹ 0.250 ... 25.000 cm⁻¹ Calibrable 0.450 ... 0.500 cm⁻¹

Ordering Information

inoLab® Multi-Parameter SETs – with wide-range power supply 100-240 VAC (50/60 Hz) included		□ Order No.	▲ Order No.
inoLab® pH/ION/Cond 750	Flexible and powerful – the intelligent pH, ION and conductivity measuring station consisting of multifunction box, with PC software/connection cable, SenTix® 81/82, TetraCon® 325 and accessories	1K30-211901	1K30-111401
Passive multifunction box	(not included in Multi 720 Set)		109 810



□ with BNC plug, ▲ with DIN plug

Other multi-parameter SETs see brochure "Product Details"

Portable Multi-Parameter Instruments

The WTW ProfiLine Multi 197i supplied with integrated powerful NiMH rechargeable batteries is both hose-proof (IP 66) and submersible (IP 67). With its recorder output, real-time clock and 500 data file datalogger standard, these rugged meters conform to all GLP requirements. It allows the simultaneous connection of pH, conductivity and oxygen sensors. The parameter to be measured is set in the display via the "M" function key and can then be measured or stored. They are equipped with a carrying/support handle and carrying strap as standard.

ProfiLine Multi 197i

- Robust, shockproof
- Waterproof, submersible
- The multi-talent for depth measurements



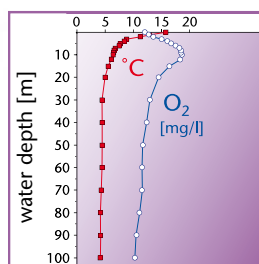
The Multi 197i has a built-in preamplifier and is therefore suitable in combination with the WTW depth armatures for single-parameter operation at depths down to 330 ft (100 m).

Up to three depth armatures can be simultaneously connected using the adapter ADA/TA 197 pH.

Measurement at Depth Profiles

Oxygen, pH and Conductivity:

Depth armatures with integrated temperature measurement sensors, up to 330 ft (100 m) of cable with a waterproof plug (IP 67), VA 1.4571 steel armoring and screw-on protective hood, pressure resistant to max. 10 bar, suitable for small boreholes (2" diameter).



f.l.t.r.: oxygen depth armature TA 197 Oxi and battery-powered stirrer BR 325, pH depth armature TA 197 pH, 4-electrode depth measuring cell TA 197 LF

Technical Data ProfiLine Multi 197i

Model	pH measurement	Oxygen measurement	Conductivity measurement
Range/ Resolution	pH: -2.00 ... +19.99 mV: -1999 ... +1999	O ₂ concentration: 0.00 ... 19.99 mg/l 0.0 ... 90.0 mg/l O ₂ saturation: 0.00 ... 19.99% 0.0 ... 600%*	1 µS/cm ... 500 mS/cm in 4 ranges Salinity: 0.0 ... 70.0
Accuracy (±1 digit)	pH: ± 0.01 pH, mV: ± 1 mV	±0.5% of value	±1% of value
Temperature compensation	Automatic 23 ... 221 °F (-5 ... +105.0 °C) Manual -4 ... 266 °F (-20 ... +130 °C)	Automatic via IMT Compensation from 32 ... 104 °F (0 ... 40 °C)	Non-linear function for ultrapure and natural waters to EN 27 888
Reference temp.	—	—	68/77 °F (20/25 °C) selectable
Calibration	1-2 point calibration with technical buffers	Automatic calibration	Automatic calibration

Ordering Information

Portable Multi-Parameter Instrument	Order No.
ProfiLine Multi 197i Robust, waterproof, submersible multi-parameter instrument	3F30-110



* depends on oxygen sensor and medium
Sensors, depth armatures and accessories see brochure "Product Details"

Handheld Multi-Parameter Instruments

Multi 350i

- Multi-functional, High degree of Accuracy
- Flexible
- All parameters simultaneously displayed

Multi 350i – compact Precision without Compromises

pH, mV, ISE, Oxygen, Conductivity: The new Multi 350i can measure all of these parameters. If desired, pH, oxygen, conductivity and temperature can be measured simultaneously: In the Laboratory using the **combined conductivity/oxygen sensor ConOx**, in the field with the multi-parameter probe **MPP 350**. All current WTW pH, combination ISE's, oxygen and conductivity sensors can be additionally connected.

High resolution, high precision, simple, menu-driven operation. Even in poor lighting conditions the backlit graphics display provides clearly readable values. A datalogger, memory for 1,800 data sets and a real-time clock support GLP requirements.

Includes built-in NiMH rechargeable battery for up to 1,000 hours of continuous measurements and appropriate line adaptor.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

ConOx

- Slender
- Handy
- Conductivity, dissolved oxygen and temperature at the same time



Conductivity and Oxygen Measurement with fully automatic Salinity Correction.

A slender and handy sensor for three parameters: conductivity, dissolved oxygen and temperature. The oxygen module can be easily removed and works according to the time-proven galvanic principle. Immediately ready for use, little maintenance required, for all water analysis applications in laboratories and in the field. Including OxiCal® CX calibration vessel.

The conductivity sensor features the time-proven 4-electrode system. If desired it can also be used without the oxygen module. Precise, easy to clean, capable of accurate measurements even when used in normally electrode fouling samples. Available with cable lengths 4.9 ft, 9.8 ft, 19.7 ft, 32.8 ft, 49.2 ft, 65.6 ft (1.5 m, 3 m, 6 m, 10 m, 15 m, 20 m).

MPP 350

- pH, conductivity, dissolved oxygen and temperature at the same time
- For all areas of application in surface waters and 2 inch boreholes
- Depth measurement up to 330 ft (100 m)



An all-new Multi-Parameter Probe as the perfect Probe for use with Multi 350i:

With a diameter of only 1.6 in (41.5 mm) and a length of 11.42 in (29 cm), this probe is usable in a wide range of applications. Wherever simultaneous measurement of pH, dissolved oxygen and conductivity is required, this probe is the ideal supplement to the Multi 350i.

Suitable for measurements in lakes, rivers, seawater and brackish water, in boreholes

down to a maximum depth of 330 ft. (100 m), as well in groundwater and spring water. The special pH sensor SensoLyt® MPP-A (please order separately) for measurements in water provides reproducible measurement values, even at low conductivity levels.

For cable lengths greater than 20 ft. (6 m) a battery operated stirrer is included. The conductivity measuring cell with proven 4-pole-measurement technology has a measuring range of 1 μ S/cm to 2 S/cm. The MPP 350 is available with 8 different cable lengths up to 330 ft (100 m). Accessories include specialized calibration vessels. Two field sets are available including case, Multi 350i meter, accessories and MPP either with 20 ft. (6 m) or 81 ft. (25 m) cable length.

Technical Data Multi 350i

	pH measurement	Oxygen measurement	Conductivity measurement
Range/ Resolution	pH: -2...20.000 -2.00...20.00 mV: -999.9 ... +999.9 -2000 ... +2000 Conc.: 0.01 ... 2000 mg/l Temp.: -5.0 °C ... 105.0 °C	O ₂ Conc.: 0.00 ... 20.00 mg/l (19.9 mg/l*) 0.0 ... 90.0 mg/l (90 mg/l*) O ₂ saturation: 0.00 ... 200.0% (200%*) O ₂ part. pressure: 0.0 ... 200.0 mbar (200 mbar*) 0.0 ... 1250 mbar Temp.: 0.0 °C ... 50.0 °C	0.0 µS/cm ... 2000 mS/cm in 5 ranges in AutoRange mode additional: 0.00 µS/cm ... 20.00 µS/cm (K=0.1 cm ⁻¹) 0.000 µS/cm ... 2.000 µS/cm (K=0.01 cm ⁻¹) Temp.: -5.0 °C ... +105.0 °C Salinity: 0.0 ... 70.0 TDS: 0 ... 2000 mg/l Spec. resistivity: 0.00 ... 2000 MOhm
Accuracy (±1 digit)	pH: ± 0.004 pH. ± 0.01 pH mV: ± 0.2 mV. ± 1 mV	O ₂ Conc.: ±0.5% of value O ₂ saturation: ±0.5% of value O ₂ part. pressure: ±0.5% of value	LF: ±0.5% of value
Temperature compensation	Automatic 23 ... 221 °F (-5 ... +105.0 °C) Manual -4 ... 266 °F (-20 ... +130 °C) NTC 30 kOhm: ± 0.1 K Pt 1000: ± 0.1 K	32 ... 122 °F (0 °C ... 50 °C) (on ambient temperature 41 ... 86 °F/5...30 °C) <2% at 32 ... 104 °F (0 ... +40 °C) Temperature: ±0.1 K	23 ... 212 °F (-5.0 ... 100 °C) • Linear and non-linear function for ultrapure and natural waters to EN 27 888 • Linear comp. from 0.01% ... 3.00%/K • Compensation can be switched off NTC 30 kOhm: ± 0.1 K Pt 1000: ± 0.1 K
Air pressure compensation	—	Automatic with built-in pressure sensor (500 ... 1100 hPa)	—
Salinity correcture	—	Automatic or manual	—
Ref. temperature	—	—	68 °F/77 °F (20 °C/25 °C) selectable
Cell constants	—	—	Fixed 0.01 cm ⁻¹ , Freely selectable 0.090 ... 0.110 cm ⁻¹ , 0.250 ... 25.000 cm ⁻¹ , Calibrable 0.450 ... 0.500 cm ⁻¹ , 0.800 ... 1.200 cm ⁻¹

Technical Data ConOx

Electrode material	Graphite
Shaft material	Epoxy/POM
Shaft length	145 mm
Cell constant	K=0.475 cm ⁻¹
Diameter	0.60 in. (15.3 mm)
Range	1 µS/cm ... 2 S/cm
Temperature range	32 ... 122 °F (0...50 °C)
Oxygen sensor	Galvanic sensor
Working time	6 months with 1 electrolyte filling, zero current free

Technical Data MPP 350

Range	pH: 4 ... 12 O ₂ : 0 ... 600% Cond.: 1 µS/cm ... 2 S/cm Temp.: 0 ... 50 °C
Dimensions	Diameter 41.5 mm, Length approx. 290 to 410 mm (depends on special accessories)
Weight	approx. 700 g
Materials	POM, Stainless steel 1.4571 (additional weight), PVC (Cable)

Ordering Information

Handheld Multi-Parameter SET		Order No.
Multi 350i SET	Robust and waterproof pocket multi-parameter instrument with data logger and serial interface, including SenTix® 41-3 and ConOx-3, NiMH batteries and battery charger, PC communication package, professional case and accessories	2F40-114B0E
ConOx-3	Combined conductivity-oxygen-probe with 9.8 ft (3 m) cable and accessories	401 010
MPP 350-3	pH/oxygen/conductivity sensor without pH electrode, with 9.8 ft (3 m) cable and accessories	401 100
SensoLyt® MPP-A	Armored pH electrode for MPP 350	401 152
SensoLyt® MPP-A Pt	Armored ORP electrode for MPP 350	401 153
A 325/S	Stainless steel armoring for ConOx and CelloX®	903 831
SK 325	Protective hood suitable for A 325/S	201 580

Multi 350i:



* also valid for DurOx®

Multi 340i

- Waterproof
- Robust
- GLP conform

The rugged, versatile Multimeter

The hose-proof (IP 66) instrument with battery or optional line adaptor also meets the requirements of IP 67 and is optimally suited for use in the field, in laboratories or at production sites.

Simultaneous connection of a pH/ORP electrode and an oxygen sensor or conductivity cell allows up to three parameters (including temperature) to be measured at the same time.

additional features include:

- Handy
- Up to 2500 hours continuous operation
- Easy to use
- Complete in set



Multi 340i SET

- Multi-parameter instrument Multi 340i
- Professional case with built-in measuring set-up, two STH 320 stands, two beakers, SM 325 protective armoring and carrying strap with two cases
- Line adaptor power supply, calibration and maintenance supplies, operating instructions

pH/Oxi 340i, pH/Cond 340i

- Waterproof
- Robust
- GLP conform

Multi-Parameter Instruments pH/Oxi 340i and pH/Cond 340i

WTW handheld multi-parameter instruments stand for precise multi-parameter measuring technology. The pH/Oxi 340i for the determination of pH, oxygen and temperature and the pH/Cond 340i for the determination of pH, conductivity and temperature are favorably-priced alternatives to the single parameter instruments for applications which require the measurement of several parameters. The instruments are hose-proof and also meet the requirements of IP 67. They are extremely robust and optimally suited for use in the field, in laboratories or at production sites.

additional features include:

- Handy
- Up to 2500 hours continuous operation
- Easy to use
- Complete in set



pH/Oxi 340i SET

Kit includes:

Professional case with sample beakers included, pH/Oxi 340i, pH electrode and oxygen sensor as chosen, STH 320 stand and calibration and maintenance supplies

pH/Cond 340i SET

Kit includes:

Professional case with sample beakers included, pH/Cond 340i, pH electrode and conductivity cell as chosen, STH 320 stand and calibration and maintenance supplies

Protective armoring

for safe on-site use

- ① **SM 325** Shock-absorbing, rubber protective armoring with support handle and sensor cable management
- ② **TG/ML** Sleeve set, suitable for SM 325 protective armoring, consisting of 2 sensor sleeves, holding device and additional carrying strap for field use. Can also be used for storing the sensor
- ③ **FM/ML** Field armoring, specially designed for rough use on-site and in industry, extremely robust and shock-resistant thanks to protective armoring with 2 sensor sleeves, carrying handle and additional carrying strap with holding device, sensor cable management and folding support for laboratory measurements



Technical Data			
Model	pH/Oxi 340i, pH/Cond 340i, Multi 340i	pH/Oxi 340i, Multi 340i	pH/Cond 340i, Multi 340i
	pH measurement	Oxygen measurement	Conductivity measurement
Range/ Resolution	pH: -2.00 ... +19.99 mV: -1999 ...+1999	O ₂ concentration: 0.00 ... 19.99 mg/l 0.0 ... 90.0 mg/l O ₂ saturation: 0.00 ... 19.99% 0.0 ... 600%*	1 µS/cm ... 500 mS/cm in 4 ranges Salinity: 0.0 ... 70.0
Accuracy (±1 digit)	pH: ± 0.01 pH mV: ± 1 mV	±0.5% of value	±1% of value
Temperature compensation	Automatic 23 ... 221 °F (-5 ... +105.0 °C) Manual -4 ... 266 °F (-20 ... +130 °C)	Automatic via IMT Compensation from 32 ... 104 °F (0 ... 40 °C)	Non-linear function for ultrapure and natural waters to EN 27 888
Reference temp.	—	—	68/77 °F (20/25 °C) selectable
Calibration	1-2 point calibration with technical buffers	Automatic calibration	Automatic calibration
Ordering Information			
Handheld Multi-Parameter Instrument SETs			Order No.
pH/Oxi 340i	Robust and waterproof handheld multi-parameter instrument with datalogger and serial interface for battery operation, including SenTix® 41-3, Cellox® 325-3, professional case and accessories		2D30-101B20
pH/Cond 340i	Robust and waterproof handheld multi-parameter instrument with datalogger and serial interface for battery operation, including SenTix® 41-3, TetraCon® 325-3, professional case and accessories		2E30-101B02
Multi 340i	Robust and waterproof handheld multi-parameter instrument with datalogger and serial interface for battery operation, including SenTix® 41-3, Cellox® 325-3, TetraCon® 325-3, professional case and accessories		2F30-104B22
Universal wide-range power supply	100 V - 240 V, 50-60 Hz; for 340i series		902 867
IP 66 IP 67 CE cETLus 3 Year Warranty Other electrode/sensors in SET see brochure “Product Details” * depending on sensor and /or sample			



BOD measurements/Respiration

Biological Oxygen Demand

BOD measurement according to EN 1899-1 and EN 1899-2 and for self-checks

Biological Oxygen Demand (BOD) is an important parameter in water resource management. BOD is a parameter used to measure the quality of water and treatment results in wastewater. In addition, BOD analysis potential is used in the planning and design wastewater treatment facilities.

In routine use BOD determination is used to check the wastewater in the inflow and discharge of wastewater treatment plants. Depending on the measurement site and type of wastewater the BOD value can lie between a few mg/l and several thousand mg/l. Several methods are available for carrying out the measurement.

WTW offers various measuring systems for these methods.

In “dilution BOD” the oxygen content of a sample is measured with an oxygen sensor before and after an incubation period of 5 days. The difference between the measurements is the BOD₅ value; this is the official EPA method.

In “BOD self-checks” with the respirometer the reduction in oxygen causes a definite pressure difference which can be measured by a pressure sensor. This method is very easy to carry out and is a practical method.

Also both methods are very different, the measurements correlate for discharge analysis in municipal wastewater treatment facilities. Both methods requires the samples to be kept at 68 °F (20 °C) for 5 days. WTW offers a wide range of temperature controlled incubators.

Depletion/Respiration

In the course of growing environmental consciousness, microbiological degradability tests have become increasingly important. These can be, for example, soil surveys from waste sites or environmental impact surveys for new chemical substances. The necessary respiration measurements for anaerobic or aerobic degradation can be easily carried out using the OxiTop®-C systems with excellent analysis. WTW offers a wide range of application specific packages with appropriate sample vessels.



inoLab® BSB/BOD 740 with StirrOx® G



Oxi 197i



OxiTop® IS 12



OxiTop® Control



Biogas determination



Soil respiration

"Dilution BOD"

according to EN 1899-1/EN 1899-2; official EPA method	see page
with inoLab® BSB/BOD 740	with easy-to-use analysis program, with PC control. 62
with ProfiLine Oxi 197i	Recommended electrode: self-stirring oxygen sensor StirrOx® G 63

"BOD self-check measurement"

worldwide approved method according to the self-check regulations	see page
OxiTop®	Simple routine measurement, mercury-free pressure measurement 66
OxiTop® Control	Routine, standard and special measurement, with automatic sample management 67

Depletion/Respiration

Special measurements	see page
OxiTop® Control OC 110	Respiration 68/72
	Biogas determination
	Soil respiration
	Biodegradability

Accessories/Incubators

	see page
Upgrading and general Accessories	70
Incubators/Thermostat Cabinets	76

Dilution BOD

according to DIN EN 1899-1 and DIN EN 1899-2; official EPA method

inoLab® BSB/BOD 740 inoLab innovations that make sense

- Simple sample management
- Automatic BOD calculation
- EPA approved

flexible and powerful

This laboratory oxygen meter has been specially developed for BOD_n measurements. BOD measurements are determined by regulation EN 1899-1 and is **EPA approved**. You can store up to 7 of your own routines for frequently occurring dilution ratios. A maximum of 30 measuring samples each with 18 dilutions allow the management of up to 540 diluted samples. The inoLab® BSB/BOD 740 can also be used as a conventional high-end oxygen meter (For technical data such as inoLab® Oxi 740 refer to page 33). Additional memory and editing options are available when operated using the MultiLab® pilot. The entire measurement and sample management can thus be easily handled via PC.

In combination with StirrOx® G with its automatic start/stop function the inoLab® BSB/BOD 740 is the ideal measuring system for routine oxygen measurement in the BOD₅ determination according to DIN EN 1899-1 and DIN EN 1899-2.

Special features:

- BOD/depletion
- Determination of the biochemical oxygen demand according to DIN EN 1899-1
- Determination of oxygen depletion according to DIN 38 414 P6
- Up to 5 samples for dilution water
- Up to 30 measuring samples
- Up to 18 dilutions per measuring sample
- Up to 7 routines can be stored
- Adjustable incubation time, 5 ... 30 days

Additional features when using the MultiLab® pilot:

- Management of an arbitrary number of samples
- Max. of 32 dilutions per measuring sample
- Max. of 32 dilution waters (blank solutions)
- Adjustable incubation period, 1 to 32 days
- Allocation of names for dilution waters, samples, diluted samples and routines (max. of 255 characters per name)
- Warning indication for BOD values that are too high or too low
- Calculations by mouse click
- Automatic protocols



ProfiLine Oxi 197i

- EPA approved method
- Accurate
- Battery and line power operation

Laboratory oxygen meter ProfiLine Oxi 197i with self-stirring oxygen sensor StirrOx® G.



StirrOx® G

Self-stirring oxygen sensor – simultaneous stirring and measurement

- Single-handed operation for series measurements
- Constant flow for high reproducibility
- Immediately ready for measuring – no polarization period required
- Extremely low self-consumption of oxygen – only 0.008 µg h⁻¹ (mg/l)⁻¹
- Zero-current free – no zero point calibration necessary
- With calibration and storage vessel OxiCal®-ST as standard
- Membrane life – Up to 6 months
- Temperature compensation with 2 built-in sensors
- Membrane leakage monitoring – damaged membranes are indicated



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Ordering Information

BOD measurement		Order No.
inoLab® BSB/BOD 740P	High-end oxygen/BOD meter including terminal with built-in printer, active multifunction box, with self-stirring oxygen sensor StirrOx® G, wide range power pack and accessories	1H31-0114
ProfiLine Oxi 197i	ProfiLine oxygen meter, extremely robust, hose-water proof (IP 66), RS 232 digital output, operation from mains supply or rechargeable batteries, with wide-range power supply with connection for self-stirring oxygen sensor StirrOx® G and Cellox® 325	1B30-0111
StirrOx® G	Self-stirring oxygen sensor for oxygen determination in Karlsruhe bottles, with OxiCal®-ST calibration and storage vessel and accessory case with spare parts and maintenance supplies	201 425

inoLab® BSB/BOD 740:

IP 43

CE

cETLUS

3 Year
Warranty

ProfiLine Oxi 197i:

IP 66
IP 67

CE

cETLUS

3 Year
Warranty

For technical data such as inoLab® Oxi 740 refer to page 31

Technical Data ProfiLine Oxi 197i see page 32

BOD self-check measurement

Respiration/Biogas Determination with OxiTop® and OxiTop® Control

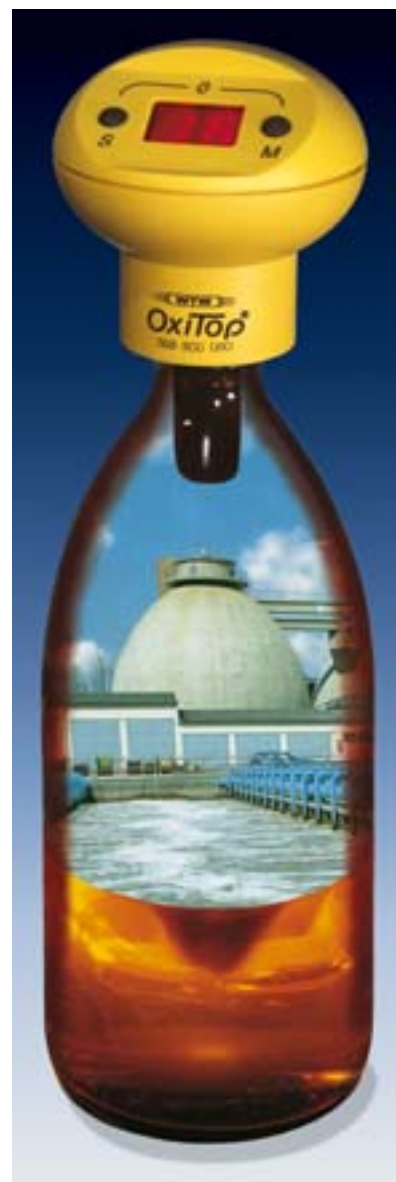
OxiTop® & OxiTop® Control

- Undiluted samples
- AutoTemp function for delayed start of cold samples
- Non-volatile memory of measured values

Mercury-free measurement

Biochemical oxygen demand BOD determination is still one of the most important parameters in water resource management. It can be used to evaluate the impact of biodegradable substances in waters and waster water. With its OxiTop® systems, WTW offers a unique, modular and mercury-free instrument system. It is not only suitable for BOD determination, but also for measuring biodegradability and depletion.

The advantages of **OxiTop®** and **OxiTop® Control**: simple operation, improved controllability and non-toxicity, and measuring ranges of up to 400 000 mg/l BOD (with OxiTop® Control OC 110). As the measured pressure is automatically converted the values can be directly read as mg/l BOD.



Application range

	OxiTop®	OxiTop® Control OC 100	OxiTop® Control OC 110
Application	BOD routine	BOD routine, BOD standard	BOD routine, standard and BOD special, Respiration/Dilution, Soil respiration, Biodegradability, Biogas determination
BOD range	0 – 4.000 mg/l	0 – 4.000 mg/l	0 – 400,000 mg/l
Measured value memory	5 days	0.5 h – 99 days	0.5 h – 99 days
Pressure mode	—	—	Pressure p 500 – 1.350 hPa
Sample volume	Fixed	Fixed	Definable

OxiTop® Complete Sets for 6 or 12 Measuring Vessels

The complete packages have been assembled so that they contain everything necessary to carry out the measurements. The make up of each package depends on the application and varies by number of vessels, controllers and utensils for sample preparation.

Special stirring platforms were developed in order to maintain a constant temperature and guarantee optimum oxygen distribution in the sample. These stirrer platforms have space for either 6 or 12 standard bottles or 6 large vessels for special applications.

Applicable systems

- **BOD**
OxiTop® IS 6 / IS 12
OxiTop® Control 6/12
- **Soil respiration**
OxiTop® Control B6M / B6
- **OECD / aerobic applications**
OxiTop® Control A6 / A12
OxiTop® Control S6 / S12
- **Biogas determination**
OxiTop® Control AN 6 / AN 12
- **Microbial applications**
OxiTop® Control AN 6 / AN 12
OxiTop® Control A6 / A12

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Composition of complete packages



	OxiTop®	OxiTop® Control				
Accessories	IS 6/ IS 12	6 / 12	B6 / B6M / B6M 2.5	A6 /A12	S6 / S12	AN6 / AN12
Vessel with measuring head	Amber bottle, 510 ml with rubber sleeve	Amber bottle, 510 ml with rubber sleeve	Duran bottle 500 ml / 1,0 l vessel / 2,5 l vessel; with adapter	1000 ml vessel / 250 ml vessel with adapter	Amber bottle, 510 ml with rubber sleeve	1000 ml vessel / 250 ml vessel
Number	6 / 12	6 / 12	6 / 6 / 6	6 / 12	6 / 12	6 / 12
Measuring heads	OxiTop®	OxiTop®-C	OxiTop®-C	OxiTop®-C	OxiTop®-C	OxiTop®-C
Stirrer	IS 6/IS 12	IS 6/IS 12	—	IS 6-Var/IS 12	IS 6/IS 12	IS 6-Var/IS 12
Controller	—	OC 100	OC 110	OC 110	OC 110	OC 110
Software + Cable	—	—	●	●	●	●
CO ₂ absorbent	●	●	●	●	●	●
Nitrification inhibitor	●	●	—	●	●	●
Overflow measuring flask	164/432 ml	164/432 ml	—	—	—	—
Stirrer bars	6/12	6/12	—	6/12	6/12	6/12
Stirrer bar remover	●	●	—	●	●	●
Blocks of chart paper	●	●	—	—	—	—
see page	66	67	73	74	74	75

BOD self-check measurement

OxiTop® IS 6, IS 12

- High-precision
- 5-day automatic storage of measured values
- Mobile
- Extendable



OxiTop® IS 12

Complete packages for 6 or 12 simultaneous measurements

Measurement using OxiTop® is based on pressure measurement in a closed system: microorganisms in the sample consume the oxygen and form CO₂. This is absorbed by NaOH, creating a vacuum which can be read directly as a measured value in mg/l BOD.

The used sample volume regulates the amount of oxygen available for a complete BOD. Measurement ranges of up to 4,000 mg/l can be measured using different volumes.

The OxiTop® heads (green and yellow for differentiation of inflow/outflow) have an AutoTemp function: if the sample

temperature is too cold, the start of measurement is automatically delayed (by at least 1 hour) until a constant temperature has been reached.

Apart from the automatic storage of 5 measured values (1 value per day), further measured values can be read at all times during or after the period of 5 days, which permits the tracking of check values or measurements over longer periods.

Technical Data OxiTop®-C Measuring Head

Measuring principle	Manometric with pressure sensor
Measurement of	BODn
Pressure range	500 - 1350 hPa
Accuracy	±1% of value ±1 hPa
Resolution	1 hPa (corresponds to 0.7% of BODn measuring range)
Power supply	lithium batteries (280 mAh), 2 x CR2430
Ambient temperature	Storage: -13 ... 149 °F (-25 ... +65 °C) Operation: 41 ... 122 °F (+5 ... +50 °C)
Dimensions	H: 2.8 in (70 mm), Ø 2.8 in (70 mm)

Ordering Information

OxiTop® complete packages		Order No.
OxiTop® IS 6	Complete package, ready for use, for 6 simultaneous measurements, with IS 6 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 6 OxiTop® measuring systems, including accessories	208 210
OxiTop® IS 12-6	Complete package, ready for use, for 6 simultaneous measurements (extendable to 12 simultaneous measurements), with IS 12 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 6 OxiTop® measuring systems, including accessories	208 212
OxiTop® IS 12	Complete package, ready for use, for 12 simultaneous measurements, with IS 12 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 12 OxiTop® measuring systems, including accessories	208 211



Note: versions for 120 VAC/60 Hz see brochure "Product Details"

BOD self-check measurement – for a larger number of samples

with simple sample management

OxiTop® Control 6, Control 12

- Controller-driven
- Simultaneous measurement of up to 100 samples
- Statistical evaluation
- Automatic sample ID
- Worldwide approved method

Complete package for 6 or 12 simultaneous measurements



OxiTop® Control is the logical further development of the successful OxiTop® system using software-controlled functions and infrared interface to communicate with a handy controller, the OC 100. This system enables the simultaneous and grouped start, management, storage and tracking

of 100 measuring heads via the controller and tracked on a large display with graphic evaluation. Data can be transferred to the PC for evaluation and documentation via the **AK-540/B** cable (order no. 902 842) and the communication program **Achat OC** (order no. 208 990).

Controller OC 110 in combination with the OxiTop® Control S6 / S12 is ideal for users with other applications apart from BOD (see page 74).



OxiTop® Control 12

Check sampling progress!

The data can be called up at any time, even during sampling, thus enabling checking of the samples for errors. The display of the progress curve allows immediate detection of irregularities and interferences, such as a BOD value set too high for the volume used or undesired nitrification. Corrections can thus be made at an early stage.



Controller OC 100/OC 110

common features

- Simultaneous sample management with option of grouping up to 100 OxiTop®-C measuring heads.
- Data call-up of one parallel sample with statistical evaluation and as individual data.
- Automatic calculation and graphical display of BOD value.
- Data transfer even through glass doors.
- Protocol and documentation of data via Achat OC communication program in combination with a PC
- GLP and AQS with inspection intervals for calibration with the OxiTop® PM calibration tablets
(see page 70: Accessories)



OxiTop® OC 100

OxiTop®-C Measuring Head

- Instead of the display and keys, the OxiTop®-C measuring head has an infrared interface with which it communicates with Controller OC 100 or OC 110. By "pointing" the controller at an OxiTop®-C measuring head it can be identified and started, data can be called up or deleted and sampling progress can be displayed.
- Each measuring head has its own identification number; this means that manual identification of samples is no longer necessary, even for parallel samples. In addition, statistical evaluations can be easily performed for parallel samples.
- The OxiTop®-C measuring heads have an AutoTemp function for delaying the start of samples which are too cold by up to 4 hours. This mode can be deactivated for BOD standard.
- The measuring heads can store up to 360 data sets. Data are automatically stored in the corresponding interval according to the interval period set (0.5 h to 99 days).
- The built-in pressure sensor can register differences in pressure ranging from 500 to 1,350 hPa.



Application range/Technical Data OxiTop® Control

	OxiTop® Control OC 100	OxiTop® Control OC 110
BOD routine	Individual samples up to 4,000 mg/l	Individual samples up to 4,000 mg/l
BOD standard	Parallel samples with statistical evaluation up to 4,000 mg/l	Parallel samples with statistical evaluation up to 4,000 mg/l
BOD special	—	Freely definable volumes, 0.5 h – 99 days, up to 400,000 mg/l BOD
Soil respiration	—	freely definable volume determination
OECD / Aerobic applications	—	freely definable volume determination
Biogas determination	—	Pressure p 500 - 1350 hPa 10 intermediate values
Data sets per measurement	180 ... 360 (depending on duration)	
Measurement period	0.5 h ... 99 days	
Power supply	3 mignon (AA); alkaline 1.5 V	
Interface	IR (infrared); RS 232 for communication with PC	
Ambient temperature	Storage: -13 °F ... 149 °F (-25 °C ... +65 °C), Operations: 41 °F ... 104 °F (+5 °C ... +40 °C)	
Dimensions	1.7 x 3.9 x 7.9 in (45 x 100 x 200 mm) (H x W x D)	
Weight	Approx. 390 g	

Technical Data OxiTop®-C Measuring Head

Measuring principle	Manometric with pressure sensor
Measurement of	BOD _n
Pressure range	500 - 1350 hPa
Accuracy	±1% of value ±1 hPa
Resolution	1 hPa (corresponds to 0.7% of BOD _n measuring range)
Power supply	lithium batteries (280 mAh), 2 x CR2430
Ambient temperature	Storage: -13 ... 149 °F (-25 ... +65 °C) Operation: 41 ... 122 °F (+5 ... +50 °C)
Dimensions	H: 2.8 in (70 mm), Ø 2.8 in (70 mm)

Ordering Information

OxiTop® Control		Order No.
OxiTop® Control 6	Complete package, ready for use, for 6 simultaneous measurements, with Controller OC 100 and IS 6 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 6 OxiTop®-C measuring systems, including 6 sample bottles, 6 rubber sleeves, 6 stirrer bars and other accessories	208 201
OxiTop® Control 12	Complete package, ready for use, for 12 simultaneous measurements, with Controller OC 100 and IS 12 Inductive Stirring System, for mains operation 230 V / 50/60 Hz and 12 OxiTop®-C measuring systems, including 12 sample bottles, 12 rubber sleeves, 12 stirrer bars and other accessories	208 204
OxiTop® Control S6/S12	Complete package with Controller OC110 and software	see page 74

OxiTop® Control:


1 Year
Warranty

Controller OC 100 & OC 110, OxiTop®-C Measuring Head:


1 Year
Warranty

For applications also refer to p. 72 – 75 Respiration/Depletion measurement

Note: versions for 120 VAC/60 Hz see brochure "Product Details"

System Extensions and general Accessories

OxiTop® Measuring Heads & SETs

... for Retrofitting

In order to meet the growing demand and the extension of potential applications, OxiTop® and OxiTop®-C systems are also available as individual items in different combinations, such as:

- Individual measuring heads OxiTop®/OxiTop®-C
- A set of two OxiTop® heads (yellow and green).
- Upgrade sets for a further 6 positions with 6 heads each and flasks, sleeves and stirring bars, as well as the stirring platform.



Stirrers

... for BOD measurement

Stirrers IS 6 and IS 12 have been specially developed for BOD measurement with the OxiTop® system. Software-controlled speed regulation prevents the magnetic stirrer bar from getting caught or wobbling.

The speed is selected so that an optimal gas exchange with the sample takes place. The stirrer is maintenance-free and non-wearing as it contains no moving parts.

The IS 6-Var model has been specially developed for use with large measuring vessels and has space for 6 measuring vessels. Its outer dimensions are identical to those of the IS 12.

Stirrer IS 6 and IS 12



IS 6-Var

Testing Aids for the OxiTop® system for Quality Control

Two testing aids are available for monitoring measurement and checking system leakage, which can be called up during a corresponding time interval using the AQA function in the controller.

OxiTop® PM

These calibration tablets simulate a complete BOD and perform quantitative monitoring of measurement (approx. 308 mg/l, batch-dependent) as well as checks for leakage over the entire period.

OxiTop® PT

This testing aid performs a "quick" check for under-pressure and leakage. The OxiTop® contains the pressure table required for the individual place of installation. OxiTop®-C automatically includes these values.

General Accessories

Storage racks

For safe storage of OxiTop® measuring systems and OxiTop®-C measuring heads, for 6 measuring heads each.

Marking rings

For identification of BOD bottles for OxiTop® instruments.

Overflow measuring flasks

... in different standard sizes for OxiTop®

Apart from the supplied 164 ml and 432 ml overflow measuring flasks contained in the standard scope of supply, the following sizes are also available: 22.7 ml, 43.5 ml, 97 ml, 250 ml, 365 ml.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data Stirrers

Model	IS 6	IS 12	IS 6-Var
No. of stirring positions	6	12	6
Stirrer speed	Program-controlled 180 ... 450 min ⁻¹		
Ambient temperature	Lagerung: -25 °C ... +65 °C Betrieb: +5 °C ... +40 °C		
Dimensions (H x W x D in mm)	67 x 265 x 181	67 x 350 x 266	67 x 265 x 181

Please refer to the brochure "Product Details" for a precise listing of all available components.
Ordering Information for accessories and spare parts

Depletion/Respiration with OxiTop® Control OC 110

The investigation and monitoring of biological cleaning treatment processes are becoming more and more important with respect to the environmental requirements such as wastewater treatment, soil remediation and waste treatment.

Biological tests are often in the foreground as well as the usual physical-chemical measuring methods. In order to determine the biodegradability of foodstuffs, pollutants, harmful substances or waste substances and the microbial activity so-called respiration (depletion) measurements are often carried out. In these measurements the respiration of the organisms is determined under defined conditions as the oxygen uptake or release of carbon dioxide.

Measurements are carried out via closed systems using the OxiTop®-C in combination with the OC 110 controller. Depending on the field of use, specially adapted measuring vessels, which are all equipped with the necessary connection thread and some of which are autoclavable, come into operation. For this task there are various complete packages available which come equipped with all required utensils.

For the incubation of larger measuring vessels, WTW offers the TS 1006-i thermostat cabinet as well as the IS 6-VAR stirrer platform, which has been specially designed for vessels with large base diameter.



Depletion/Respiration		
	Applications and Procedures	Measuring
Soil respiration	Soil analysis/ biodegradability of pollutants: laboratory method according to DIN 19 737	Aerobic using CO ₂ absorption, quantitative CO ₂ determination possible
Biodegradability	Determination according to OECD 301 F / DIN EN 29 408 / ISO 9408	Aerobic using CO ₂ absorption
Biogas determination	Determination of anaerobic degradation processes	Anaerobic, determination of CO ₂ + Methane
Microbiology	Growth and stress investigations: determination of the respiration rate	Aerobic, warning pressure possible

Determination of soil respiration

Laboratory method for determining the microbial soil respiration according to DIN 19 737.

OxiTop® Control B6/BM6

- Simple and precise
- Cost-efficient
- Optimum measuring vessels for subsequent quantitative determination of CO₂

Soil respiration measurements are used for forecasting, surveying and checking remediation work, for biodegradability measurements of substances (pesticides, fungicides, fertilizers, etc.) as well as for carrying out toxicity tests.

This determination is possible with the OxiTop® Control System and special, practically-tested measuring vessels in a very accurate, simple and favorably-priced way.

The expenditure for personnel and apparatus is considerably reduced when compared with conventional methods.

Soil respiration measurements can be carried out in 2 different types of vessel.

For actively respiring soils with strong CO₂ development the MG 1.0 measuring vessel is recommended: its large opening (approx. 3.9 in / 100 mm dia.) means that it can be easily used with large-volume CO₂ absorber vessels for afterwards quantitative CO₂ determination.



Example of application using PF/45... sample vessels



Example of application using MG/... measuring vessels

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Ordering Information

OxiTop® Control	Complete soil respiration package	Order No.
OxiTop® Control BM6	Package for soil respiration (aerobic) with 6 MG 1.0 measuring vessels, 1000 ml, with stopper adapters for OxiTop®-C	208 232
OxiTop® Control B6	Package for soil respiration (aerobic) with 6 PF 45/500 sample vessels, 500 ml, Duran and 6 OxiTop® AD/SK adapters, autoclavable	208 230

Determination of biodegradability

Laboratory procedures for determination of biodegradability according to DIN EN 29 408 / ISO 9408 / OECD 301 F

OxiTop® Control A6/A12

OxiTop® Control S6/S12



The determination of the biodegradability should be checked before “new” chemicals are used for the first time, not only for environmental reasons but also to minimize disposal charges.

The sample and a blank are stirred at a constant temperature for 28 days in closed bottles.

The CO₂ produced is removed from the gas space by means of an absorber so that the resulting negative pressure is a measure of the biodegradability.

The continuous recording of the values in the OxiTop®-C means that the required documentation can be guaranteed in an optimal manner.

The measuring bottles and adapters can be autoclaved at 249.8 °F (121 °C).

Ordering Information

Model	Complete OECD packages	Order No.
OxiTop® Control A6	Package for aerobic applications with 6 x 1000 ml measuring units	208 220
OxiTop® Control A12	Package for aerobic applications with 12 x 250 ml measuring units	208 222
OxiTop® Control S6	Package for aerobic applications with 6 x 510 ml measuring units	208 196
OxiTop® Control S12	Package for aerobic applications with 12 x 510 ml measuring units	208 198

Note: versions for 115 VAC/50/60 Hz see brochure “Product Details”

Biogas determination

Determination of anaerobic degradation processes: biogas determination

OxiTop® Control AN6/AN12

Anaerobic degradation processes take place in the absence of oxygen. In order to be able to fill the gas space above the sample with inert gas the measuring bottle has a septum sealed nozzle. When anaerobic degradation has taken place the dissolved CO₂ can be driven off and then removed from the gas space by means of a CO₂ absorber. The resulting pressure difference is proportional to the CO₂ concentration, the remaining overpressure is proportional to the methane concentration.

The degradation process can be comfortably followed in the "pressure" operating mode.



Determination of the Respiration Rate

Microbiological growth and stress investigations: determination of the respiration rate (aerobic/anaerobic measuring operation)

OxiTop® Control AN6/AN12

OxiTop® Control A6/A12

The use of special measuring bottles with a septum sealed nozzle allows the interference-free addition of substrates and solutions.

Pressure alterations could indicate a reduction in oxygen concentration, for example, which could make the addition of oxygen or air necessary (possibly other gases as well).

It is possible to set a "warning pressure" or a pressure limit so that the operator can carry out manipulations on the system.



The momentary pressure can be stored so that the manipulation is fully documented. The recording of measured values (max. 10 values) permits long-term measurement.

Ordering Information

Model	Complete packages for microbiology	Order No.
OxiTop® Control AN6	Package for aerobic or anaerobic applications with 6 x 1000 ml measuring units	208 225
OxiTop® Control AN12	Package for aerobic or anaerobic applications with 12 x 250 ml measuring units	208 227
Model	Complete packages for aerobic measurements	Order No.
OxiTop® Control A6	Package for aerobic applications with 6 x 1000 ml measuring units	208 220
OxiTop® Control A12	Package for aerobic applications with 12 x 250 ml measuring units	208 222

Note: versions for 115 VAC/50/60 Hz see brochure "Product Details"

Incubators

OxiTop® Box

- Compact
- Precise
- Uniform temperature distribution

**Thermostat box with forced air circulation
for 68 °F (tolerance 67.1 - 68.9 °F / 20 ±0.5 °C)**

OxiTop® Box is a benchtop model with hinged clear-view cover which can accommodate a maximum of either 12 OxiTop® simultaneous measurements or 20 Karlsruhe bottles.

The chamber is equipped with a connection for an IS 6 or IS 12 stirrer.

A special compartment is provided for thermostating 6 methylene blue samples.

The box is made of non-corrosive materials and the compressor is CFC-free.

A cross-flow fan ensures uniform temperature distribution.

The box has an automatic defrosting system with condensate evaporation.



*Example of an application:
OxiTop® Box with OxiTop® Control 12*

Technical Data

Model	OxiTop® Box
Temperature control	68 °F (tolerance 67.1 - 68.9 °F) (20 °C ±0.5 °C)
Ambient temperature	Storage: -13 ... +122 °F (25 °C ... +50 °C) Operation: +50 ... 89.6 °F (+10 °C ... +32 °C)
Power consumption	200 W
Dimensions (H x W x D)	14.76 x 16.73 x 23.62 in (375 x 425 x 600 mm)
Weight	Approx. 30 kg

Ordering Information

BOD thermostat boxes		Order No.
OxiTop® Box	BOD OxiTop® Box, thermostat box with temperature-controlled forced ventilation for 230 V 50 Hz mains supply	208 432



Note: versions for 115 V / 60 Hz see brochure "Product Details"

Thermostat Cabinets

- Versatile
- Powerful
- Inexpensive

To incubate samples at a constant, desired temperature during the reaction period, a thermostat cabinet is necessary. WTW offers thermostat cabinets in various sizes with a variably adjustable temperature range of 50 °F - 104 °F (10 °C - 40 °C) and a power supply of 230 V/50 Hz. Temperature accuracy lies at ± 1 °C deviation from the set temperature.

As the samples must be additionally stirred the thermostat cabinets are fitted with internal sockets to provide the stirrers with electricity. 2 – 4 shelves are available, according to the thermostat cabinet size, thus enabling simultaneous thermostating of up to 48 standard BOD samples, or equipping with 4 IS 12 or IS 6-Var stirrer platforms.

The largest model TS 1006-i is especially suited for special applications, as the compartment height between the 4 shelves leaves enough space for 1.5 l vessels or flasks with side nozzles.

The sizes TS 606/2-i a TS 606/4-i are available with transparent insulating glass doors and especially suited for use in combination with the OxiTop® Control system, as data



can be called up through the closed glass door. This has the advantage that temperature fluctuations caused by opening the door can be avoided.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	TS 606/2-i	TS 606/3-i	TS 606/4-i	TS 1006-i
Shelves	2	3	4	4 widely spaced
Number of samples	2 x 12 BOD Standard	3 x 12 BOD Standard	4 x 12 BOD Standard	4 x 12 BOD Standard 4 x 6 special vessels
Glass door	Optional	—	Optional	—
Temp. control range	50 °F ... 104 °F (+10 °C ... +40 °C) ± 1 K; Adjustment interval: 1 °C			
Ambient temperature	Operation: 50 °F ... 89.6 °F (+10 °C ... +32 °C) (Climate class SN); Storage: -13 °F ... 149 °F (-25 °C ... +65 °C)			
Gross contents	180 l	260 l	360 l	500 l
Dimensions (H x B x D in mm)	outside 850 x 602 x 600 inside 734 x 513 x 433	1215 x 602 x 600 1047 x 513 x 433	1589 x 602 x 600 1418 x 513 x 433	1515 x 755 x 715 1338 x 646 x 516
Weight	37 kg	45 kg	50 kg	72 kg

Ordering Information

BOD thermostat cabinets – only available for 230 V/50 Hz			Order No.
TS 606/2-i	Thermostat cabinet for 2 BOD OxiTop® systems		208 380
TS 606/3-i	Thermostat cabinet for 3 BOD OxiTop® systems		208 382
TS 606/4-i	Thermostat cabinet for 4 BOD OxiTop® systems		208 383
TS 1006-i	Thermostat cabinet for 4 BOD OxiTop® systems		208 385


1 Year
Warranty

Other thermostat cabinet see brochure "Product Details"

Photometry

Straightforward measuring!

Depending on your application, WTW offers the appropriate photometer and the appropriate test sets. Photometers and tests are perfectly matched to each other. The methods for all test sets are stored in the photometers.

Cuvette tests without barcode

Powder tests

Small but nice – the powder tests for field use

p. 94



pHotoFlex®

... precision for all-purpose use

pHotoFlex®

p. 88



Cases / Sets

The mobile lab for field use

p. 90



LabStation

The small lab solution: pHotoFlex® plus LabStation

p. 90



photoLab®

... utmost precision for lab use

photoLab®

p. 86



Thermoreactors

The convenient and
safe way to digestions

p. 92

Reagents/
accessories

p. 94 / 103



Systematic and spectral analysis – Routine measurement and photometric testing

Photometric identification can be split into two groups.

The **routine measurement** of measurement parameters – also known as systematic analytics – enables to display the measuring values of each parameter promptly thanks to the stored methods for test kits. The reagent of the test kit is transformed by the substance to a measurable colour. The coloration is caused by the absorption of certain light particles (wavelengths) of the white light. The wavelength is measured at the highest absorption.

Such routine measurements are standard tasks for controlling wastewater, drinking water or environmental monitoring.

Photometer and optimized test kits for various measuring areas complete a perfectly harmonizing system. The programmes of each test kits called methods, may not be identical with each photometer model through optical and light related differences.

Spectral analytics is especially dedicated for studies of (unknown) substances, development of own methods and for optimizing testing systems: For i.e. determining the absorption maximum and therefore the suitable wavelength for test systems, spectra are run over a wider wavelength range. Insofar the highest and most suitable absorption is identified. Additionally testings such as enzyme kinetics or multi-wavelength measurements can also be processed.



Portable and Accurate: The pHotoFlex®, photoLab® and spectroFlex series

In order to choose the appropriate instrument, the following should be considered:

Mobile measuring	Measuring in laboratory environment
With pHotoFlex® and pHotoFlex® Turb For fast and accurate measurements in the field consider these features: • low power consumption • robust • mobile • precise These requirements are met by a special optical system working with a combination of LED and filters. The robustness of the portable pHotoFlex® instruments is due to the low warming and to the longer lifespan of the LEDs utilized. With two cuvette sizes, these photometers allow for all common tests and offer a wide measuring range. The optional LabStation allows the user to conveniently download results collected in the field to a computer back at the lab.	With photoLab® S6/S12 and photoLab® 6100/6600 Highest demands are considered to be the basis for research, routine measurements and "calculation charges". Therefore, the instruments have to offer: • AQS/IOK • accurate measuring • wide measuring ranges • comfort features, e.g. test and cuvette recognition A complex optical system and a short warm up time guarantee constant measuring conditions. The constant power supply allows the use of bar-codes. The optical system and rectangular cuvettes up to 50 mm allow wide measuring ranges reaching up to trace elements analysis. The largely constant temperature in the lab allows extensive presettings for the methods, thereby providing a higher user comfort. Additionally, using photoLab 6100 and 6600 the following tasks can be accomplished: • Measurements from 190 – 100 nm • AQA extended for matrix check and larger user groups • Scans (spectra), kinetics and multi-wavelength measurements • Data transfer via USB and USB hub into larger user communities

What are the common features of all series?

- Proven quality, adapted to the respective use
- Highest accuracy corresponding to the used optical system
- A large selection of cuvettes and outstanding instrument features for a simple use of the cuvettes.

Application Photometers						
Application range	Portable Photometers		Laboratory Photometers			
	pHotoFlex®	pHotoFlex® Turb	photoLab® S6	photoLab® S12	photoLab® 6100	photoLab® 6600
Application areas	Environmental monitoring, water treatment, beverage industry, wine industry, process control, multi-parameter applications for photometry, pH and turbidity.		Routine measurements in wastewater and drinking water, optional field use	Routine measurements in wastewater and drinking water, comprehensive laboratory testes, optional field use	Spectral and special analysis in industry, education and science and analysis of routine measurements with standard parameters in waste water and drinking water as well as environmental analysis.	
Wavelengths	6 wavelengths: 436, 517, 557, 594, 610, 690 nm	6 wavelengths: 436, 517, 557, 594, 610, 690, 860 nm	6 wavelengths: 340, 445, 525, 550, 605, 690 nm	12 wavelengths: 340, 410, 445, 500, 525, 550, 565, 605, 620, 665, 690, 820 nm	320 nm – 1100 nm (VIS), freely definable	190 nm – 1100 nm (UV-VIS), freely definable
Optical system	LED with filters		Filter/Reference beam	Filter/Reference beam	Monochromator/Single Beam + AutoCheck	
Special functions	pH measurement	pH measurement, Turbidity (IR)	—	Kinetics	Spectra, kinetics, multi wave length measurements, graphical evaluation of data, environmental parameters with routine and special tasks with AQA support, PC-Software for easy data management, input and transfer	
	optional: LabStation for easy operation and laboratory evaluation with software and barcode reader support					
User-defined methods	100		No	50	100, 20 profiles	
Cuvettes	Round: 16 mm (height: 91 – 104 mm), 28 mm		Round 16 mm	Round / rectangular 10, 20, 50 mm	Round and rectangular 10, 20, 50 mm	

The photoLab® series – Immediate and high precision measuring!

The photoLab® filter photometers offer laboratory precision in combination with highest comfort and fastest measuring speed. This becomes especially valuable in routine operation:

Open the lid, insert the cuvette, read the measuring value without delay!

photoLab® Serie

- AQA/IQC, multistage
- Automatic cuvette identification
- Barcode recognition for all cuvette types

Speed and accuracy originate from the used filter technology with reference beam technique. Combined with barcoded round and rectangular cuvette tests utmost efficient and cost-saving measuring is made possible for all demands. The given wavelengths by high-precision filters do not require any mechanics and therefore make this measuring instrument practically a maintenance free unit.

- Auto Check for highest stability and precision
- Automatic cuvette recognition for all used cuvette types
- Automatic test recognition through integrated barcode reader
- Automatic measuring start
- Automatic Quality Assurance AQA
- Broad selection of programmed test kits



photoLab® S6

The filter photometer with 6 wavelengths for all common routine determinations with the round reaction cuvettes for wastewater and drinking water analysis.

The instrument is therefore easy and straight-forward for:

- sporadic, single measurements
- using reaction cuvettes for fast measuring results
- standard measurements with easy storage

photoLab® S12

Filter photometer with 12 wavelengths for an extensive routine operation in service laboratories and for education. Besides the barcoded reaction test kits, there is also a considerable number of reasonable reagent test kits available for rectangular cuvettes. Uniquely, the barcode support also comes with the test kits for 10 mm, 20 mm and 50 mm rectangular cuvettes. Especially within the drinking water analysis even trace concentrations are covered.

The instrument is therefore highly efficient and cost-saving for:

- routine determinations with a large number of samples
- measuring of smallest concentrations
- special tasks with user-defined methods

The additional characteristic for own routine and kinetics measurements make this instrument suitable for servicing business units and education.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data photoLab®		
Model	photoLab® S6 and S6-A	photoLab® S12 and S12-A
Type	Filter Photometer	Filter Photometer
Photodiode array for	6 wavelengths	12 wavelengths
Wavelengths, nm	340, 445, 525, 550, 605, 690	340, 410, 445, 500, 525, 550, 565, 605, 620, 665, 690, 820
User-defined methods	–	50
Auto-zero adjustment	Yes	Yes
AutoSelect-function	Yes	Yes
Cuvette recognition	Yes	Yes
Cuvette type	Round	Round, 10 mm, 20 mm and 50 mm
Data storage and time	500 data sets with date and time	1000 data sets with date and time
Essential functions	Concentration, absorption and transmission measurement, AQA/IQC, RS 232 interface	Concentration, absorption and transmission measurement, AQA/IQC, Kinetics, RS 232 interface
Operation with rechargeable batteries (optional)	1 working day, total discharge protection, maintenance charging during mains operation	1 working day, total discharge protection, maintenance charging during mains operation
Test marks	CE, UL, CUL	CE, UL, CUL
Warranty	2 years	2 years

Ordering Information

Model	Order No.
photoLab® S6	Mains operated version, 230 V European standard plug 250 013
photoLab® S6-A	Version with rechargeable batteries, 230 V European standard plug 250 022
photoLab® S12	Mains operated version, 230 V European standard plug 250 024
photoLab® S12-A	Version with rechargeable batteries, 230 V European standard plug 250 026



Note: versions for other mains supplies/countries on request

pHotoFlex®: The Portable Photometers

The pHotoFlex® series offers most robust optics, combining precision with low power consumption achieved through optical filters together with the LEDs. The instruments are equipped with 6 wavelengths. Additionally, the pH measuring and the optional turbidity measuring (IR range) are integrated! This makes these instruments the perfect partner for all measurements on site: in a wastewater plant for wastewater and reference measurements, in drinking water analysis at a well-head or in a cistern and finally for monitoring water bodies generally. They are handy, low current and offer many extra features at the same time:

pHotoFlex® Series

- Precise
 - Versatile
 - Robust
- The smart adapter solution for operating different cuvette types: Flip the adapter: ø 28 mm and 16 mm from 92 up to 104 mm
 - Backlit display with automatic switch-off
 - User guidance via display for easy operation without handbook reading
 - Large selection of test sets for all requirements
 - Integrated pH measurement with automatic temperature compensation
 - Turbidity measurement with infrared light source according to DIN 27027/ISO 7027
 - 100 program storage places for user-defined routine measurements

The menu navigation leads all the way through the measuring tasks also allowing to select 10 of the most frequently used test sets out of a favorite list and when necessary all other test sets can also be traced. In order to further enhance on-site work, there is a field case with integrated "laboratory tray" (see p. 90).

Ideal: with the LabStation and LSdata measurements and data evaluation can also be processed in the laboratory (see p. 90).



The constant ambient conditions supply a permanent power supply for comfortable operation via barcode and without repeated zeroing. Barcodes are included in the analysis regulations.

pHotoFlex® – portable photometer with pH

The portable photometer pHotoFlex® demonstrates its capability with complex tasks in environmental and process monitoring at changing locations.

pHotoFlex®

- More than 150 methods available
- Integrated pH measurement
- Color measurements



with pH sensor SenTix® 41

pH function

The integrated pH function allows measurements of pH 0 ... 16 with automatic buffer recognition (TEC/NIST). Temperature compensation is automatic within the permitted range of 23 ... 212 °F (– 5 ... 100 °C). WTW's MultiCal®-routine allows the automatic calibration with up to 3 calibration points. WTW offers a large selection of pH

sensors as an optional accessory: For field use, the maintenance-free SenTix® 41 is recommended, whereas for precision measurements in the laboratory, the SenTix® 81 glass electrode should be used. The electrodes are described in detail in the pH measuring chapter (from p. 17 onward).

pHotoFlex® Turb – Total Capability

The pHotoFlex® Turb is analogous to the pHotoFlex®, but has additionally an infrared (IR) light source for nephelometric turbidity measurement (90°), according to the requirements of DIN 27027/ISO 7027.

The calibration with the supplied AMCO® standards can be documented and output via RS232 like the measured data.

The AMCO standards enable highest precision also for the sensitive area of drinking water.

pHotoFlex® Turb

additionally:

- Turbidity measurement according to DIN 27027/ ISO 7027
- 0-1100 NTU/FNU
- Calibration kit (0.02-10-1000 NTU)



Field case set

- The “in-field laboratory”
- Integrated tray
- Convenient

pHotoFlex® series in a convenient field case!

A small lab for in-field use. The integrated tray with placings for the instrument, cuvettes, measuring beaker and a stand for the pH electrode is particularly practical.

Complete sets with:

- pH electrode SenTix® 41 for all pHotoFlex® models
- 1 variable pipette with 5 ml volume for all pHotoFlex® models
- Calibration standards for pHotoFlex® Turb and Turb 430 IR/T
- Many useful accessories: empty cuvettes, buffer solutions with pH 4.01 and 7.00, PC cable AK Labor 540 B, stand for the pH electrode, cleaning tissues, screwdriver for battery change
- Space for other accessories



LabStation plus LSdata

The smart way of data management!

The LabStation upgrades the portable pHotoFlex® and Turb 430 models (see p. 110) to make it a small laboratory solution. With the new software package LSdata the measured data can be processed on a PC conveniently and according to GLP standards. The software is included in the delivery of the LabStation:

- Data export from the instrument to the PC according to GLP and with password protection
- Subsequent processing in Excel format, e.g. for clear documentation of individual sampling points
- Generation, administration and matching between instrument and PC of user-defined methods via dialogue window
- Calculation of calibration curve for user-defined methods



The LabStation also serves as charging station for the rechargeable battery set included in the delivery package. Alternatively a rechargeable battery set for pHotoFlex® and Turb 430 models is available separately.

A useful note for field work:

For taking along all necessary utensils, such as test kits and spray bottle with distilled water as well as a disposal container you can also pick a tool box from any from any building centre to perfectly suit your needs.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data

Model	pHotoFlex®	pHotoFlex® Turb
Light source	LED	LED
Wavelengths nm	436, 517, 557, 594, 610, 690	436, 517, 557, 594, 610, 690 + 860
User-defined methods	100	100
Methods/Software update	Via Internet	Via Internet
Data storage	1000 data sets	1000 data sets
pH	0-16	0-16
Turbidity	—	0-1100 NTU/FNU
Accuracy	Photometry pH pH / Turbidity	< 2nm wavelength accuracy, 0.005 abs. reproducibility ±0.01 pH —
Auto-zero adjustment/calibration:	Photometry pH / Turbidity	With start of new method, with LabStation once a day 3 point
Interface	RS 232, USB via adapter (optional)	RS 232, USB via adapter (optional)
Measuring parameters	Photometry, pH	Photometry, pH, Turbidity
Battery	Type AA batteries 4x1.5 V, for approx. 3000 measurements	Type AA batteries 4x1.5 V, for approx. 3000 measurements
Rechargeable battery	Optional: rechargeable battery or LabStation	Optional: rechargeable battery or LabStation
Test marks	cETLus	cETLus
Warranty	2 years	2 years

Ordering Information

pHotoFlex®	Order No.
pHotoFlex®	Portable photometer with pH 251 100
pHotoFlex® Turb	Portable photometer with pH and turbidity 251 110
pHotoFlex®/SET	Portable universal LED filter photometer in a field case with tray to hold instrument and accessories 251 200
pHotoFlex® Turb/SET	Portable universal LED filter photometer with integrated turbidity measurement and pH functions in a field case with tray to hold instrument, calibration standard kit and accessories 251 210
FC pHotoFlex®/Turb 430	Field case with tray to hold instrument, for all pHotoFlex® and Turb 430 models 251 304
LS Flex/430	LabStation for all pHotoFlex® and Turb 430 models with LSdata software, rechargeable battery and universal mains adapter 251 301
RB Flex/430	Rechargeable battery for all pHotoFlex® models and Turb 430 IR/T with universal plug 251 300



Thermoreactors

Thermoreactors for COD and all other thermal Digestion Processes

Thermoreactors are required for the determination of COD, total nitrogen or total phosphorus. They ensure a complete digestion of the sample, as they maintain the necessary high reaction temperature throughout the whole of the defined period. For sample digestion three crack sets are available: crack set 10 (model 14687, 100 digestions) and crack set 10-C (model 14688, 25 cuvettes) for heavy metal, as well as crack set 20 for total nitrogen (model 14963, 90 determinations).

In each of the thermoreactors from WTW the most important temperatures and digestion times are stored in 7, easily selectable digestion programs. In addition to these 7 fixed standard programs, CR 3200 and CR 4200 thermoreactors allow you to store 8 of your own user-defined programs. Suitable for 16 mm cuvettes.

Thermoreactors

- Programs for routine tests
- Rapid digestion for COD
- Quality assurance with separate sensor



CR 2200



CR 3200



CR 4200

Fast digestion for CSB

New programs for COD

For the COD digestion, the user can now select among 3 programs: 289.4 °F (148°C), 302 °F (150°C, according to US EPA) for 120 minutes and, at the request of many customers, a rapid digestion for 20 minutes at 298.4 °F (148 °C). This timespan has proven to be sufficient for many purposes in practice.

All reactors have timer functions. All reactors display when the reaction temperature is reached.

Safety Precautions

All WTW thermoreactors optimize the heat transmission between the heating block and cuvettes as well as their superior safety. Apart from the built-in safety hood, which prevents chemicals from being splashed about should a cuvette break and the contact protection for the heating block surface.

CR 2200

is ideal for anyone who needs to perform routine water analysis tests with small sample amounts, as 7 programs are available for digestion of 12 sample cuvettes at 212, 248 and 298.4 °F (100, 120, 148 and 150 °C).

CR 3200

In addition, you can program the CR 3200 to carry out 8 of your individual digestions at freely selectable temperatures up to 338 °F (170 °C).

CR 4200

is the right choice for anyone who needs to perform multiple tests simultaneously, such as COD (298.4 °F/148 °C) and total-N (248 °F/120 °C), as the two thermoblocks for 12 cuvettes each can be controlled separately. It also has memory for 8 of your own user-defined programs with free temperature selection up to 338 °F (170 °C).

Temperature sensor TFK CR

Quality Assurance:

Quality assurance is constantly increasing in importance, even in the operational analysis sector. The CR 3200 and CR 4200 thermoreactors are both equipped with the external temperature sensor TFK CR (Order No. 250 100) as a testing aid. This temperature sensor can be plugged into the interface in place of a cuvette and the set and actual temperatures can be outputted either to a printer or a PC. This means that the function can not only be monitored, but also documented.

Application Areas and Technical Data Thermoreactors

Application Areas	CR 2200	CR 3200	CR 4200
Routine measurements	●	●	●
Wastewater	●	●	●
Specialized tasks in wastewater	–	●	●
Specialized tasks in wastewater and in laboratories	–	●	●
Number of samples, max.	1 x 12	2 x 12, same program	2 x 12, different programs
7 pre-stored programs	212 °F (100 °C) 60 min, 248 °F (120 °C) with 30 min, 60 min, 120 min, 298.4 °F (148 °C) 120 min, 20 min 302 °F (150 °C) 120 min	212 °F (100 °C) 60 min, 248 °F (120 °C) with 30 min, 60 min, 120 min, 298.4 °F (148 °C) 120 min, 20 min 302 °F (150 °C) 120 min	212 °F (100 °C) 60 min, 248 °F (120 °C) with 30 min, 60 min, 120 min, 298.4 °F (148 °C) 120 min, 20 min 302 °F (150 °C) 120 min
Own programs	–	8 freely selectable 77-338 °F (25-170 °C)	8 freely selectable 77-338 °F (25-170 °C)
Control accuracy	±1 °C ±1 digit		
Safety class	I to DIN VDE 0700 part 1/11.90		
Instrument safety	EN 61010, UL 3101, CAN/CSA C22.2-1010; EN 61010-2-010, IEC-CAN/CSA C22.2-1010.2.010		
Dimensions	W: 10.08 in (256 mm); H: 7.28 in (185 mm), open: 11.42 in (290 mm); D: 12.4 in (315 mm)		

Ordering Information

Model	Order No.
CR 2200	Reactor (230 VAC with Europlug) for COD and other thermal digestions. For up to 12 reaction cuvettes. (Regional power supply available on demand) 1P21-1
CR 3200	Reactor (230 VAC with Europlug) for COD and other thermal digestions. For up to 2x12 reaction cuvettes. (Regional power supply available on demand) 1P22-1
CR 4200	Reactor (230 VAC with Europlug) for COD and other thermal digestions. For up to 2x12 reaction cuvettes in two separately controllable heating blocks. (Regional power supply available on demand) 1P23-1



Reagents from A – Z

The right Test for every Application

A wide choice of tests is available for routine analysis in different applications. Depending on the optical system and the wavelength employed, photometer and test set make up a matched system with different specific advantages.

For use with portable photometers, test sets should first of all be straightforward. The low consumption LED optics allow the use of easy-to-use and cost-effective test sets, e.g. powder tests. In the laboratory, instruments with bar code and utmost optical sensitivity suggest the use of high-precision tests with bar code reader, certificate and quality assurance support.

WTW continues to expand our reagent offering. Not only are new tests developed, but the usability of tests with different instruments is continuously expanded. Due to the different photometer optics, one and the same test may yield different measuring ranges in different instruments. LED photometers usually have smaller measuring ranges for the same test.

Reagents for routine tasks

- Convenient and cost effective
- Precise
- Assured quality by AQA/IQC



Taking measurements correctly

Every concentration determination is accurate only within the linear absorption range. At the limits of the measuring range you have to expect deviations within the given toler-

ance. Therefore it may be well worth to repeat the measurement using a test set with a better suited measuring range.

Test Types Overview

Identification:	● = reaction cuvette test	■ = reagent test	TP = powder test	TC = cuvette test
Type	Cuvette test	Reagents test	Powder test	
Certificate	With certificate (●) for optimum precision Without certificate (TC) for very good precision	With certificate (■) for optimum precision	Without certificate (TP), precise	
Test identification	Bar code (●) and/or method selection	Bar code (●) and/or method selection	Method selection, bar code optional (external)	
Advantages:	Reaction cuvette with bar code or method selection, 16 mm: Sample adding, inserting, measuring and reading at minimum work, QA support for assured results	Large measuring range, using 10, 20 and 50 mm rectangular cuvettes for determination also of trace concentrations. QA support for assured results	Compact, straight forward procedure few paraphernalia	
Application area:	Laboratory, infrequent work or very large sample throughput	Laboratory, low concentrations, cost-effective routine work with large sample throughput	Mobile measurements, screening and monitoring tasks	

Reagents							CC	SW	photoLab®				pHotoFlex®	photoLab6000*	
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter	ml	Order No.	No. of tests	S6			S12	Spektral					
Acid Capacity up to pH 4.3															
● 01762/1	0.20 - 8.00 mmol/l Ks 4.3 10 - 400 mg/l CaCO ₃	16 16	5 (0.2, 1.0)	252 059	90	–	–	●	●	●	●				
Aluminium Al															
● 00594	0.02 - 0.50 mg/l Al	16	6	252 068	25	–	✓	–	●	●	–	–	–		
■ 14825	0.020 - 1.20 mg/l Al	10, 20, 50, 28	5	250 425	300	✓	✓	–	●	●	●	●	●		
TP Al-1 TP	0.00 - 0.25 mg/l	28	20	251 400	100	–	–	–	–	–	●	–	–		
Ammonia NH ₃ (subject to pH value)															
● 14544	0.5 - 16.0 mg/l NH ₄ -N 0.7 - 20.6 mg/l NH ₄	16	0.5	250 329	25	–	–	–	–	–	●	–	–		
■ 14752/1	0.02 - 1.50 mg/l NH ₄ -N 0.03 - 1.93 mg/l NH ₄	16, 28	5	250 426	500	–	–	–	–	–	●	–	–		
■ 14752/2	0.02 - 1.50 mg/l NH ₄ -N 0.03 - 1.93 mg/l NH ₄	16, 28	5	252 081	250	–	–	–	–	–	●	–	–		
Ammonium NH ₄															
● 14739	0.010 - 2.000 mg/l NH ₄ -N 0.01 - 2.60 mg/l NH ₄ ⁺	16	5	250 495	25	✓	–	●	●	●	–	–	●		
● A6/25	0.20 - 8.00 mg/l NH ₄ -N 0.26 - 10.3 mg/l NH ₄ ⁺	16	1	252 072	25	✓	✓	●	●	●	●	●	●		
● 14544	0.5 - 16.0 mg/l NH ₄ -N 0.6 - 20.6 mg/l NH ₄ ⁺	16	0.5	250 329	25	✓	✓	●	●	●	●	●	●		
● 14559	4.0 - 80.0 mg/l NH ₄ -N 5.2 - 103.0 mg/l NH ₄ ⁺	16	0.1	250 424	25	✓	✓	●	●	●	–	–	●		
■ 14752/1	0.010 - 3.00 mg/l NH ₄ -N 0.013 - 3.86 mg/l NH ₄ ⁺	10, 20, 50, 16, 28	5	250 426	500	✓	✓	–	●	●	●	●	●		
■ 14752/2	0.010 - 3.00 mg/l NH ₄ -N 0.013 - 3.86 mg/l NH ₄ ⁺	10, 20, 50, 16, 28	5	252 081	250	✓	✓	–	●	●	●	●	●		
■ 00683	2.0 - 150 mg/l NH ₄ -N 2.6 - 193 mg/l NH ₄ ⁺	10	0.1, 0.2	252 027	100	✓	✓	–	●	●	–	–	●		
TP NH ₄ -1 TP	0.00 - 0.50 mg/l NH ₄ -N 0.00 - 0.64 mg/l NH ₄ ⁺	28	10	251 408	200	–	–	–	–	–	●	–	–		
TC NH ₄ -2 TC (LR)	0.00 - 2.50 mg/l NH ₄ -N 0.00 - 3.20 mg/l NH ₄ ⁺	16	2	251 997	50	–	–	–	–	–	●	–	–		
TC NH ₄ -3 TC (HR)	0 - 50 mg/l NH ₄ -N 0 - 64 mg/l NH ₄ ⁺	16	0.1	251 998	50	–	–	–	–	–	●	–	–		
Antimony:															
Please ask for application leaflets															
AOX															
● 00675	0.05 - 2.50 mg/l AOX	16		252 023	25	–	–	●	●	●	–	–	–		
Arsenic															
■ 01747	0.001 - 0.100 mg/l As	10, 20	350	252 063	30	–	–	–	●	●	●	–	–		
also AS absorption tube required:				252 066											
Ascorbic acid:															
Please ask for application leaflets															
BOD Biochemical oxygen demand O ₂															
● 00687	0.5 - 3000 mg/l BOD	16	–	252 028	50	–	✓	●	●	●	–	–	–		
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50															

Reagents									photoLab®					photoLab6000*
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter	ml	Order No.	No. of tests	CC	SW	S6	S12	Spektral	pHotoFlex®			
Boron B														
■ 14839	0.050 - 0.800 mg/l B	10, 20	5	250 427	60	–	–	–	●	●	–			
● 00826	0.05 - 2.00 mg/l B	16	4	252 041	25	–	✓	–	●	●	–			
Bromine Br ₂														
■ 00605	0.020 - 10 mg/l Br ₂	10, 20, 50	10	252 014	200	–	–	–	●	●	–	●		
Cadmium Cd														
● 14834	0.025 - 1.000 mg/l Cd	16	5	250 314	25	✓	–	●	●	●	●	●		
■ 01745	0.002- 0.500 mg/l Cd	10, 20, 50	10	252 051	55	–	–	●	●	●	–	●		
Calcium Ca														
■ 14815	5 - 160 mg/l Ca	10, 20, 16, 28	0.1	250 428	100	–	✓	–	●	●	●			
● 00858	10 - 250 mg/l Ca	16	1	252 047	25	–	–	●	●	●	–			
Chlorine Cl ₂ (f = free, t = total)														
● 00595	0.03 - 6.00 Cl ₂ , f	16	5	250 419	200	–	–	●	●	●	●	●		
● 00597	0.03 - 6.00 Cl ₂ , f+t	16	5	250 420	200	–	–	●	●	●	●	●		
■ 00598/1	0.010 - 6.00 Cl ₂ , f	10, 20, 50	10	252 010	1200	–	–	–	●	●	–	●		
■ 00598/2	0.010 - 6.00 Cl ₂ , f	10, 20, 50	10	252 011	200	–	–	–	●	●	–	●		
■ 00599	0.010 - 6.00 Cl ₂ , f+t	10, 20, 50	10	252 012	200	–	–	–	●	●	–	●		
■ 00602/1	0.010 - 6.00 Cl ₂ , t	10, 20, 50	10	252 013	200	–	–	–	●	●	–	●		
■ 00602/2	0.010 - 6.00 Cl ₂ , t	10, 20, 50	10	252 055	1200	–	–	–	●	●	–	●		
TP Cl-1 TP	0.00 - 2.00 mg/l Cl ₂ , f	28	10	251 401	100	–	–	–	–	–	●	–		
TP Cl-2 TP	0.00 - 5.00 mg/l Cl ₂ , f	28	25	251 402	100	–	–	–	–	–	●	–		
TP Cl-3 TP	0.00 - 2.00 mg/l Cl ₂ , t	28	25	251 414	100	–	–	–	–	–	●	–		
Chlorine Liquid test kit (free and total chlorine) Cl ₂														
● / ■	0.010 - 6.00 Cl ₂	16, 50	10			–	–	●	●	●	–			
	00086 Chlorine reagent Cl2-1			252 077	200									
	00087 Chlorine reagent Cl2-2			252 078	400									
	00088 Chlorine reagent Cl2-3			252 079	600									
	00089 Accessories Cl2 (round cells etc.)			252 080	25									
Chloride Cl														
● 14730	5 - 125 mg/l Cl	16	1	250 353	25	✓	✓	●	●	●	●	●		
■ 14897/1	2.5 - 250 mg/l Cl	10, 16	1, 5	250 491	100	✓	✓	–	●	●	●	●		
■ 14897/2	2.5 - 250 mg/l Cl	10, 16	1, 5	252 082	175	✓	✓	–	●	●	●	●		
Chlorine dioxide ClO ₂														
■ 00608	0.020 - 10.00 mg/l ClO ₂	10, 20, 50, 16, 28	10	252 017	150	–	–	–	●	●	●	●		
Chromate (chromium VI and total chromium) Cr														
● 14552	0.05 - 2.00 mg/l Cr	16	10	250 341	25	–	✓	●	●	●	●	●		
■ 14758	0.01 - 3.00 mg/l Cr	10, 20, 50	5	250 433	250	–	✓	–	●	●	–	●		
Chromium plating bath CrO ₃ :														
See reagent-free tests														
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50														

Reagents									photoLab®					photoLab6000*
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter	ml	Order No.	No. of tests	CC	SW	S6	S12	Spektral	pHotoFlex®			
COD Chemical oxygen demand O₂														
● 14560	4.0 - 40.0 mg/l COD (148 °C, 2 h)	16	3	250 303	25	✓	-	●	●	●	-	●		
● C3/25	10 - 150 mg/l COD (148 °C, 2 h)	16	3	252 070	25	✓	-	●	●	●	●	●		
● 14895	15 - 300 mg/l COD (148 °C, 2 h)	16	2	250 359	25	✓	-	●	●	●	-	●		
● 14690	50 - 500 mg/l COD (148 °C, 2 h)	16	2	250 304	25	✓	-	●	●	●	-	●		
● C4/25	25 - 1500 mg/l COD (148 °C, 2 h)	16	3	252 071	25	✓	-	●	●	●	●	●		
● 14691	300 - 3500 mg/l COD (148 °C, 2 h)	16	2	250 351	25	✓	-	●	●	●	-	●		
● 14555	500 - 10000 mg/l COD (148 °C, 2 h)	16	1	250 309	25	✓	-	●	●	●	-	●		
TC COD1 TC (LR)	0 - 150 mg/l COD (148 °C, 2 h)	16	2	251 990	25	-	-	-	-	-	●	-		
TC COD2 TC (MR)	0 - 1500 mg/l COD (148 °C, 2 h)	16	2	251 991	25	-	-	-	-	-	●	-		
TC COD3 TC (HR)	0 - 15000 mg/l COD (148 °C, 2 h)	16	0,2	251 992	25	-	-	-	-	-	●	-		
COD Chemical oxygen demand (HG free) O₂														
● 09772	10 - 150 mg/l COD (148 °C, 2h)	16	2	250 301	25	✓	-	●	●	●	●			
● 09773	100 - 1500 mg/l COD (148 °C, 2h)	16	2	250 306	25	✓	-	●	●	●	●			
Copper Cu														
● 14553	0.05 - 8.00 mg/l Cu	16	5	250 408	25	-	✓	●	●	●	●	●		
■ 14767	0.02 - 6.00 mg/l Cu	10, 20, 50, 16, 28	10	250 441	250	-	✓	-	●	●	●			
TP Cu-1 TP	0.00 - 5.00 mg/l Cu	28	10	251 403	100	-	-	-	-	-	●	-		
Copper plating bath Cu:														
See reagent-free tests														
Cyanide (free and easy liberatable cyanide) CN														
● 14561	0.010 - 0.500 mg/l CN	16	5	250 344	25	-	-	●	●	●	●	●		
■ 09701	0.002 - 0.500 mg/l CN	10, 20, 50	5, 10	250 492	100	-	-	-	●	●	-	●		
Detergents:														
see Surfactants: anionic, cationic, nonionic														
Fluoride F														
● 14557	0.10 - 1.50 mg/l F	16	5	250 365	25	-	✓	-	●	●	●	●		
■ 14598/1	0.10 - 20.0 mg/l F	10	5 or 0.5	252 048	100	-	-	-	●	●	-	●		
■ 14598/2	0.10 - 20.0 mg/l F	10	5 or 0.5	252 083	250	-	-	-	●	●	-	●		
Formaldehyde HCHO														
● 14500	0.10 - 8.00 mg/l HCHO	16	2	250 406	25	-	-	●	●	●	-			
■ 14678	0.02 - 8.00 mg/l HCHO	10, 20, 50	3	250 331	100	-	-	-	●	●	-			
Gold Au														
■ 14821	0.5 - 12.0 mg/l Au	10, 16	2	250 436	80	✓	✓	-	●	●	●			
Halogens (total):														
see Cl ₂ , Br ₂ , I ₂ , ClO ₂ , O ₃														
Hazen:														
See reagent-free tests: Coloration														
Heavy metals:														
see lead, cadmium, chromium														
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50														

Reagents									photoLab®					pHotoFlex®	photoLab6000*
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter	ml	Order No.	No. of tests	S6			S12	Spektral					
Hydrazine N ₂ H ₄															
■ 09711	0.005 - 2.00 mg/l N ₂ H ₄	10, 20, 50	5	250 493	100	–	–	–	●	●	–				
Hydrogen peroxide H ₂ O ₂															
● 14731	2.0 - 20.0 mg/l H ₂ O ₂	16	10	250 402	25	–	✓	–	●	●	–				
■ 18789	0.015 - 6.00 mg/l H ₂ O ₂	10, 20	8	252 067	100	–	–	–	●	●	–				
Iodine I ₂															
■ 00606	0.050 - 10.00 mg/l I ₂	10, 20, 50	10	252 015	200	–	–	–	●	●	–	●			
Iodine number:															
See reagent-free tests: Coloration															
Iron Fe															
● 14549	0.05 - 4.00 mg/l Fe	16	5	250 349	25	✓	✓	●	●	●	●	●	●		
● 14896	1.0 - 50.0 mg/l Fe	16	1	250 361	25	–	–	●	●	●	–				
■ 14761/1	0.005 - 5.00 mg/l Fe	10, 20, 50, 16, 28	5	250 435	1000	✓	✓	–	●	●	●	●	●		
■ 14761/2	0.005 - 5.00 mg/l Fe	10, 20, 50, 16, 28	5	250 439	250	✓	✓	–	●	●	●	●	●		
■ 00796	0.010 - 5.00 mg/l Fe	10, 20, 50	8	252 042	150	✓	✓	–	●	●	–	●			
TP Fe-1 TP	0.00 - 1.80 mg/l Fe	16, 28	10	251 404	100	–	–	–	–	–	●	–			
TP Fe-2 TP	0.00 - 3.00 mg/l Fe	16, 28	10	251 405	100	–	–	–	–	–	●	–			
Lead Pb															
● 14833	0.10 - 5.00 mg/l Pb	16	5	250 313	25	✓	–	●	●	●	–	●			
■ 09717	0.010 - 5.00 mg/l Pb	10, 50, 16, 28	8	252 034	50	✓	–	–	●	●	●	●			
Magnesium Mg															
● 00815	5.0 - 75.0 mg/l Mg	16	1	252 043	25	–	✓	●	●	●	●				
Manganese Mn															
■ 01739	0.005 – 2.000 mg/l Mn	10, 20, 50	8	252 056	250	–	–	–	●	●			●		
■ 14770/1	0.01 - 10.0 mg/l Mn	10, 20, 50, 16, 28	5	250 442	500	✓	✓	–	●	●	●	●			
■ 14770/2	0.01 - 10.0 mg/l Mn	10, 20, 50, 16, 28	5	252 084	250	✓	✓	–	●	●	●	●			
● 00816	0.10 - 5.00 mg/l Mn	16	7	252 035	25	✓	–	●	●	●	●	●			
TP Mn-1 TP	0.0 - 20.0 mg/l Mn	16, 28	10	251 406	100	–	–	–	–	–	●	–			
Molybdenum Mo															
● 00860	0.02 - 1.00 mg/l Mo	16	10	252 040	25	–	–	–	●	●	–				
TP Mo-1 TP	0.0 - 35.0 mg/l Mo	16, 28	10	251 407	100	–	–	–	–	–	●	–			
Monochloramine															
■ 01632	0.05 – 10.0 mg/l Cl ₂	10, 20, 50		252 057	150	–	–	–	●	●	–				
Nickel Ni															
● 14554	0.10 - 6.00 mg/l Ni	16	5	250 409	25	✓	–	●	●	●	–	●			
■ 14785	0.02 - 5.00 mg/l Ni	10, 20, 50	5	250 443	250	✓	–	–	●	●	–		●		
Nickel plating bath:															
See reagent-free tests															
Nitrogen (total):															
see Total Nitrogen N _{Total}															
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50															

Reagents							CC	SW	photoLab®				pHotoFlex®	photoLab6000*	
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter	ml	Order No.	No. of tests	S6			S12	Spektral					
Nitrate NO ₃															
● 14556	0.10 - 3.00 mg/l NO ₃ -N 0.44 - 13.30 mg/l NO ₃	16	2	250 411	25	✓	✓	–	●	●	●	●	●	●	
● N2/25	0.5 - 25.0 mg/l NO ₃ -N 2.2 - 110.7 mg/l NO ₃	16	1	252 073	25	✓	–	–	●	●	●	–	–	●	
● 14542	0.5 - 18.0 mg/l NO ₃ -N 2.2 - 79.7 mg/l NO ₃	16	1.5	250 410	25	✓	–	–	●	●	●	●	●	●	
● 14764	1.0 - 50.0 mg/l NO ₃ -N 4 - 221 mg/l NO ₃	16	0.5	250 347	25	✓	–	–	●	●	●	–	–	●	
● 00614	23 - 225 mg/l NO ₃ -N 102 - 996 mg/l NO ₃	16	0.1	252 019	25	–	–	–	●	●	●	–	–	–	
■ 14942	0.2 - 17.0 mg/l NO ₃ -N 0.9 - 75.3 mg/l NO ₃	10, 20, 50, 16	1	250 422	50	✓	✓	–	–	●	●	●	–	–	
■ 14773	0.2 - 20.0 mg/l NO ₃ -N 0.9 - 88.5 mg/l NO ₃	10, 20	1.5, 3	250 444	100	✓	–	–	–	●	●	–	–	●	
■ 09713/1	0.1 - 25.0 mg/l NO ₃ -N 0.45 - 110.7 mg/l NO ₃	10, 20, 50	0.5	250 421	90	✓	–	–	–	●	●	–	–	●	
■ 09713/2	0.1 - 25.0 mg/l NO ₃ -N 0.45 - 110.7 mg/l NO ₃	10, 20, 50	0.5	252 085	250	✓	–	–	–	●	●	–	–	●	
TC NO3-1 TC	0 - 30.0 mg/l NO ₃ -N 0.0 -133.0 mg/l NO ₃	16	2	251 993	50	–	–	–	–	–	–	●	–	–	
Nitrite NO ₂															
● N5/25	0.010 - 0.700 mg/l NO ₂ -N 0.03 - 2.30 mg/l NO ₂	16	5	252 074	25	–	✓	–	–	●	●	●	●	●	
■ 14776/1	0.005 - 1.000 mg/l NO ₂ -N 0.016 - 3.29 mg/l NO ₂	10, 20, 50, 16, 28	5	250 445	1000	–	✓	–	–	–	●	●	●	●	
■ 14776/2	0.005 - 1.000 mg/l NO ₂ -N 0.016 - 3.29 mg/l NO ₂	10, 20, 50, 16, 28	5	250 440	335	–	✓	–	–	–	●	●	●	●	
■ 00609	1.0 - 90.0 mg/l NO ₂ -N 3.3 - 295.2 mg/l NO ₂	16	8	252 069	25	–	–	–	–	●	●	●	–	–	
TP NO ₂ -1 TP	0.00 - 0.33 mg/l NO ₂ -N 0.00 - 1.08 mg/l NO ₂	16, 28	10	251 409	100	–	–	–	–	–	–	●	–	–	
TC NO ₂ -2 TC	0.03 - 0.60 mg/l NO ₂ -N (LR) 0.10 - 2.00 mg/l NO ₂ (LR) 0.30 - 3.00 mg/l NO ₂ -N (HR) 0.99 - 9.90 mg/l NO ₂	16 16	2 0,5	251 994	48	–	–	–	–	–	–	●	–	–	
Organic Acids (volatile)															
● 01763	50 - 3000 mg/l	16		252 060	100	–	–	–	–	●	●	●	–	–	
Oxygen O ₂															
● 14694	0.5 - 12.0 mg/l O ₂	16	–	250 403	25	–	–	–	–	●	●	●	–	–	
Ozone O ₃															
■ 00607/1	0.010 - 4.00 mg/l O ₃	10, 20, 50, 16, 28	10	252 016	200	–	–	–	–	●	●	●	●	●	
■ 00607/2	0.010 - 4.00 mg/l O ₃	10, 20, 50, 16, 28	10	252 054	1200	–	–	–	–	●	●	●	●	●	
■ 14732	replaced by ClO ₂ 00608 and ozone 00607														
pH															
● 01744	pH 6.4 – 8.6	16	10	252 050	280	–	✓	–	–	●	●	●	–	–	
Phenol C ₆ H ₅ OH															
■ 00856	0.002 – 0.100 mg/l C ₆ H ₅ OH 0.025 – 5.000 mg/l C ₆ H ₅ OH	20 10, 20, 50	200 10	252 058	50 250	–	✓	–	–	–	●	●	–	–	
● 14551	0.10 - 2.50 mg/l C ₆ H ₅ OH	16	10	250 412	25	–	✓	–	–	–	●	●	–	–	
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50															

Reagents									photoLab®				pHotoFlex®	photoLab6000*
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter	ml	Order No.	No. of tests	CC	SW	S6	S12	Spektral	pHotoFlex®	photoLab6000*		
Phosphate PO ₄														
● P6/25	0.05 – 5.00 mg/l PO ₄ -P 0.05 – 5.0 mg/l P _{Total} 0.2 - 15.3 mg/l PO ₄	16	5	252 075	25	✓	✓	●	●	●	●	●		
● 14543	0.05 - 5.00 mg/l PO ₄ -P 0.05 - 5.00 mg/l P _{Total} 0.2 - 15.3 mg/l PO ₄	16	5	250 324	25	✓	✓	●	●	●	●	●		
● P7/25	0.5 - 25.0 mg/l PO ₄ -P 0.5 - 25.0 mg/l P _{Total} 1.5 - 76.7 mg/l PO ₄	16	1	252 076	25	✓	✓	●	●	●	●	●		
● 14546	0.5 - 25.0 mg/l PO ₄ -P 1.5 - 76.7 mg/l PO ₄	16	5	250 413	25	✓	✓	●	●	●	●			
● 14729	Will be replaced in Q1/2008 by P7/25													
● 00616	3.0 - 100.0 mg/l PO ₄ -P 10.0 - 307.0 mg/l PO ₄	16, 28	0.2	252 021	25	-	✓	●	●	●	●	●		
■ 14848/1	0.01 - 5.00 mg/l PO ₄ -P 0.03 - 15.3 mg/l PO ₄	10, 20, 50, 16, 28	5	250 446	420	✓	✓	-	●	●	●	●		
■ 14848/2	0.01 - 5.00 mg/l PO ₄ -P 0.03 - 15.3 mg/l PO ₄	10, 20, 50, 16, 28	5	252 086	220	✓	✓	-	●	●	●	●		
■ 14842	0.5 - 30.0 mg/l PO ₄ -P 1.5 - 92.0 mg/l PO ₄	10, 20	5	250 447	400	-	✓	-	●	●	-			
■ 00798	1.0 - 100.0 mg/l PO ₄ -P 3.0 - 307.0 mg/l PO ₄	10, 16	8	252 045	100	-	✓	-	●	●	●	●		
TP PO ₄ -1 TP	0.00 - 0.80 mg/l PO ₄ -P 0.00 - 2.45 mg/l PO ₄	28	10	251 410	100	-	-	-	-	-	●	-		
TC PO ₄ -2 TC	0.00 - 1.60 mg/l PO ₄ -P 0.00 - 4.91 mg/l PO ₄	16	5	251 989	50	-	-	-	-	-	●	-		
TC PO ₄ -3 TC	0.00 - 1.10 mg/l PO ₄ -P 0.00 - 1.10 mg/l P _{Total} (digestion) 0.00 - 3.37 mg/l PO ₄	16	5	251 988	50	-	-	-	-	-	●	-		
Phosphate (total): see Phosphate PO ₄														
Potassium K														
● 14562	5.0 - 50.0 mg/l K	16	2	250 407	25	-	✓	●	●	●	●	●		
● 00615	30 - 300 mg/l K	16	0.5	252 020	25	-	✓	●	●	●	●			
SAC See reagent-free tests														
Silicate/Silicic acid Si														
■ 14794	0.005 - 5.00 mg/l Si 0,11 - 10,70 mg/l SiO ₂	10, 20, 50, 16, 28	5	250 438	300	-	✓	-	●	●	●	●		
■ 00857	0.5 - 500 mg/l Si	10, 16, 28	4/0.5	252 046	100	-	-	-	●	●	●	●		
TP Si-1 TP (LR)	0.00 - 0.75 mg/l Si 0.00 - 1.60 SiO ₂	16, 28	10	251 411	100	-	-	-	-	-	●	-		
TP Si-2 TP (HR)	0.0 - 46.7 mg/l Si 0.0 - 100.0 mg/l SiO ₂	16, 28	10	251 412	100	-	-	-	-	-	●	-		
Silver Ag														
■ 14831	0.25 - 3.00 mg/l Ag (total-Ag: 100 °C or 120 °C, 1 h) Digestion reagents are contained in the test set	10, 20	10	250 448	100	-	-	-	●	●	-			
Sodium Na														
● 00885	10 - 300 mg/l Na	16	0.5	252 044	25	-	-	●	●	●	●			
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50														

Reagents							CC	SW	photoLab®				pHotoFlex®	photoLab6000*	
Model	Measuring Range (Specification max.)	Cuvette (mm) ¹⁾ depending on meter		ml	Order No.	No. of tests			S6	S12	Spektral				
Sulfate SO ₄															
● 14548	5 - 250 mg/l SO ₄	16	5	250 414	25	✓	✓	●	●	●	●	●	●		
● 00617	50 - 500 mg/l SO ₄	16	2	252 022	25	✓	✓	●	●	●	–	–	●		
● 14564	100 - 1000 mg/l SO ₄	16	1	250 415	25	✓	✓	●	●	●	–	–	●		
■ 14791	25 - 300 mg/l SO ₄	10, 20	2.5	250 449	200	✓	–	●	●	●	–	–	–		
TP SO ₄ -1 TP	0 - 70 mg/l SO ₄	16, 28	10	251 413	100	–	–	–	–	–	–	●	–		
Sulfide/Hydrogensulfide S															
● 14779	0.02 - 1.50 mg/l S	10, 20, 50	5	250 450	220	–	–	–	●	●	–	–	–		
Sulfite SO ₃															
● 14394	1.0 - 20.0 mg/l SO ₃	16	3	250 416	25	–	–	–	●	●	–	–	–		
■ 01746	1.0 - 60.0 mg/l SO ₃	10	2	252 053	150	–	–	–	●	●	–	–	–		
Surfactants															
a-Ten (anionic) ●	14697	0.05 - 2.00 mg/l a-Ten	16	250 333	25	–	–	–	●	●	–	–	●		
c-Ten (cationic) ●	01764	0.05 - 1.50 mg/l CTAB	16	252 062	25	–	–	–	●	●	–	–	●		
n-Ten (nonionic) ●	01787	0.10 - 7.50 mg/l Triton X-100	16	252 061	25	–	–	–	●	●	–	–	●		
Tin Sn															
● 14622	0.10 - 2.50 mg/l Sn	16	5	250 401	25	–	✓	–	●	●	–	–	–		
TOC Total organic carbon															
● 14878	5.0 - 80.0 mg/l TOC	16	3	252 036	25	–	–	●	●	●	–	–	●		
● 14879	50 - 800 mg/l TOC	16	3	252 037	25	–	–	●	●	●	–	–	●		
Total Nitrogen N _{Total}															
● 14537	0.5 - 15.0 mg/l N _{Total} (120 °C, 1 h)	16	10	250 358	25	✓	–	●	●	●	●	●	●		
● 14763	10 - 150 mg/l N _{Total} (120 °C, 1 h)	16	1	250 494	25	✓	–	●	●	●	–	–	●		
● 00613	0.5 - 15.0 mg/l N _{Total} (120 °C, 1 h)	16	10	252 018	25	✓	–	●	●	●	–	–	●		
TC N _{tot} 1 TC (LR)	0 - 25.0 mg/l N _{Total} (120°C, 30 min.)	16	2; 2	251 995	50	–	–	–	–	–	●	–	–		
TC N _{tot} 2 TC (HR)	5 - 150 mg/l N _{Total} (120°C, 30 min.)	16	0.5; 2	251 996	50	–	–	–	–	–	●	–	–		
Total phosphate: see Phosphate PO ₄															
Water hardness, RH Residual hardness															
● 14683	0.075 - 0.750 °d 0.50 - 5.00 mg/l Ca	16	4	250 404	25	–	–	●	●	●	–	–	–		
Water hardness, total hardness															
● 00961	0.7 - 30.1 °d, 5 - 215 mg/l Ca	16	1	252 039	25	–	–	●	●	●	●	●	●		
Zinc Zn															
● 00861	0.025 - 1.000 mg/l Zn	16	2	252 049	25	–	–	●	●	●	●	–	–		
● 14566	0.20 - 5.00 mg/l Zn	16	0.5	250 417	25	✓	–	●	●	●	●	●	●		
■ 14832	0.05 - 2.50 mg/l Zn	10	5	250 451	90	–	–	–	●	●	–	–	–		
Necessary reagent:	06146	zinc reagent 6		250 452	180	–	–	–	–	–	–	–	–		
● = Reaction cuvettes tests; TC = Cuvette Test; CC = CombiCheck test; ml = Sample volume (photoLab®); 1) Ø 16, 28 ■ = Reagent tests; TP = Powder Pillows; SW = Sea Water; * = is constantly being completed □ 10,20,50															

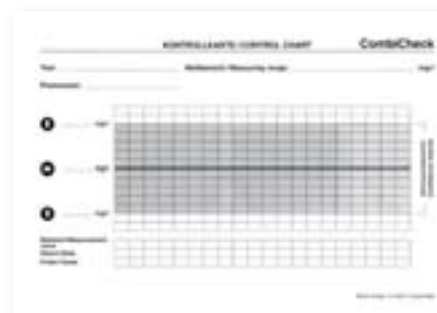
CombiCheck

CombiCheck solutions are ready-to-use multi-parameter standards. Each package contains a standard solution and an addition solution. Both solutions can be used directly **without dilution** for quality assurance.

- The standard solution is used to check the accuracy of the results for the complete system: procedure - analytical method - reagents - photometer.
- The addition solution is used to check sample-dependent influences by measuring the recovery rate and to determine the most suitable sample preparation method.

The maximum number of determinations which can be made with a **CombiCheck** standard solution depends on the test set used. With the addition solution 280 determinations are always possible.

Read also all test kit instructions!



Storage: 35.6 ... 46.4 °F (+2 ... +8 °C)

CombiCheck			
Parameter	Concentration	Suitable for test set model	Max. no. of determinations
14676 CombiCheck 10			250 482
Ammonium	4.00 mg/l NH ₄ -N	A5/25	90
		A6/25	90
		14558	90
Chloride	25.0 mg/l Cl	14730	90
COD	80 mg/l CSB	C1/25	45
		C3/25	30
		14540	30
Nitrate	2.5 mg/l NO ₃ -N	14556	45
		14773	60
Phosphate	0.80 mg/l PO ₄ -P	P4/25	22
		P6/25	18
		14543	18
		14848	9
Sulfate	100 mg/l SO ₄	14548	18
		14791	40
		00617	48
14675 CombiCheck 20			250 483
Ammonium	12.0 mg/l NH ₄ -N	14544	180
Chloride	60 mg/l Cl	14730	90
COD	750 mg/l CSB	C2/25	45
		C4/25	30
		14541	30
Nitrate	9.0 mg/l NO ₃ -N	N1/25	180
		N2/25	90
		14542	60
		14563	90
		14773	60
		14942	60
		09713	180
Phosphate	8.0 mg/l PO ₄ -P	P5/25	180
		P7/25	90
		14729	90
Sulfate	500 mg/l SO ₄	14564	90

CombiCheck			
Parameter	Concentration	Suitable for test set model	Max. no. of determinations
14677 CombiCheck 30			250 484
Cadmium	0.500 mg/l Cd	14834	19
Copper	2.00 mg/l Cu	14553	19
		14767	19
Iron	1.00 mg/l Fe	14549	19
		14761	9
		00796	12
Manganese	1.00 mg/l Mn	14770	9
		00816	13
14692 CombiCheck 40			250 485
Aluminium	0.75 mg/l Al	14825	19
Nickel	2.00 mg/l Ni	14554	19
		14785	19
Lead	2.00 mg/l Pb	14833	19
		09717	11
Zinc	2.00 mg/l Zn	14566	190
14695 CombiCheck 50			250 486
Ammonium	1.00 mg/l NH ₄ -N	14739	19
		14752	19
Nitrogen	5.0 mg/l N _{ges}	14537	9
		00613	9
COD	20.0 mg/l CSB	14560	32
14696 CombiCheck 60			250 487
COD	250 mg/l CSB	14690	48
		14895	48
Chloride	125 mg/l Cl	14897	96
14689 CombiCheck 70			250 488
Ammonium	50.0 mg/l NH ₄ -N	14559	950
		00683	480
COD	5,000 mg/l CSB	14555	95
Nitrogen	50.0 mg/l N _{Total}	14763	95
14738 CombiCheck 80			250 489
COD	1,500 mg/l CSB	14691	48
Nitrate	25.0 mg/l NO ₃ -N	14764	190
Phosphate	15.0 mg/l PO ₄ -P	14729	95
		P7/25	95

Accessories

Standard Solutions

Standard solutions which limited stability, to be freshly prepared at regular intervals:

- Free chlorine
- Bound chlorine
- Formaldehyde
- Hydrazine
- Hydrogen peroxide
- Hydrogen sulfide
- Phenol
- Silicon
- Sulfide
- Sulfite
- Anionic surfactants

Standard Solutions

Parameter	Conc. in mg/l	Amount in ml	Model	Order No.
Aluminium	1000	500	19770	250 460
Ammonium	1000	500	19812	250 461
AOX	20	85 (8-16 Checks)	00680	252 026
Lead	1000	500	19776	250 462
Boron	1000	500	19500	250 463
BOD	210	10 bottles for 10 x 1l	00718	252 030
Cadmium	1000	500	19777	250 464
Calcium	1000	500	19778	250 465
Chloride	1000	500	19897	250 466
Chromium	1000	500	19779	250 467
Chromate	1000	500	19780	250 468
COD 160	100	30	KCSB 100	250 356
COD 1500	400	30	KCSB 400	250 357
Iron	1000	500	19781	250 469
Fluoride	1000	500	19814	250 470
Potassium	1000	500	70230	252 471
Silicic acid (Silicon)	1000	500	70236	252 472
Copper	1000	500	19786	250 473
Manganese	1000	500	19789	250 474
Nickel	1000	500	19792	250 475
Nitrate	1000	500	19811	250 476
Nitrite	1000	500	19899	250 477
Phosphate	1000	500	19898	250 478
Silver	1000	500	19797	250 479
Sulfate	1000	500	19813	250 480
TOC	1000	100	09017	250 499
Zinc	1000	500	19806	250 481

PhotoCheck

AQA/IQC: Comprehensive testing aid for optics and measurement linearity!

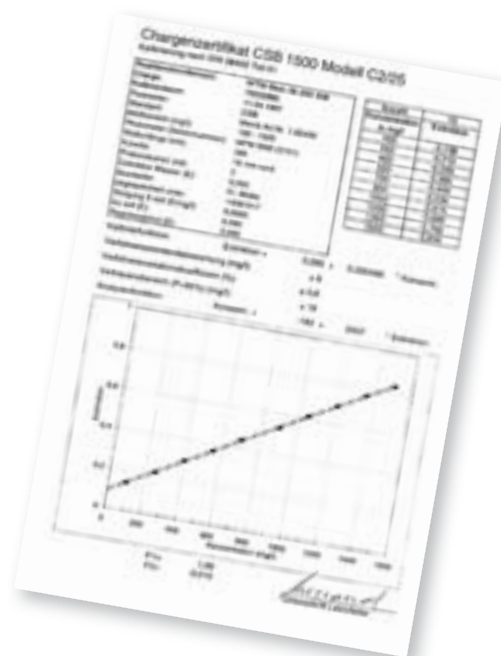
The stable colored solutions are used for checking the filter and the wavelength settings 445 nm/446 nm, 520 nm/525 nm as well as 690 nm. The correctness of the wavelength setting and the linearity of the extinction measurement are checked with 4 solutions per wavelength. The control is fast and comfortable, via a simple, menu-guided function. The traceability of this testing aid to international standards is guaranteed by checking the solutions in a reference photometer monitored with primary standards (NIST standards). These values are documented accordingly.

PipeCheck

Testing aid for the right pipetting volume!

The appropriate test solution is diluted with distilled water using the pipette to be checked and the extinction of the dilute solution is compared with that of a reference solution. Pipettes with a variation in volume of more than $\pm 2.5\%$ must be regarded as being faulty.

General Information



- The current **analytical procedure** is included in each package.
- Certificates for test sets ■ and ● can be found on the WTW homepage www.WTW.com.
- **Storage:** if no other information is provided then the test set can be stored at **59 to 77 °F (+15 to +25 °C)**.
- WTW recommends regularly checking reagents and photometers, e.g. with **PhotoCheck** and **CombiCheck**.
- Reaction cuvette tests are marked with ● and have only **one** measuring range. The cuvette information is "round", i.e. the outer diameter of the test cuvette is 16 mm. Reaction cuvette tests are pre-prepared rapid tests, with only one measuring range.
- Reagent tests are marked with ■. The measuring range information applies to the total useable measuring range for this method without sample dilution and normally involves changing a (rectangular) cuvette.
- The designation **TC** and **TP** stands for new test sets without charge certificate, that are suited for pHotoFlex®. **TC** are reaction cuvette tests in 0.63 in (16 mm) cuvettes, **TP** are powder tests and are used in 0.63 in and 1.1 in (16 mm and 28 mm) cuvettes according to their measuring range. Measured in round cuvettes with 28 or 16 mm external diameter.
- All reagent tests require, e.g. reaction vessels or RK 14/25 empty cuvettes and rectangular cuvettes
- Round cuvettes are not suitable for repeated use and are not to be used with reagent tests.
- In some tests a second citation form is given for the measuring ranges, e.g. nitrate as nitrate (NO_3) and as nitrate nitrogen ($\text{NO}_3\text{-N}$). Other possible units and citation forms which can be set are contained in the operating instruction for the instrument.
- Tests which require a **digestion** (e.g. COD) are marked with the **digestion** temperature and time (e.g. 298.4 °F/148 °C, 2 h). Thermoreactors from WTW are equipped with appropriate programs. Crack tests are available for digestion of heavy metal and total nitrogen (*see brochure "Product Details"*).

The specifications for DIN/ISO/EN/US EPA are mentioned in the brochure "Product Details".

Reagent-free Tests

% transmittance

0 – 100 % T, 10, 20, 50 mm cuvette (self-absorption).

FAU turbidity

(EN ISO 7027) Determination of turbidity

Turbidity is caused in liquids by the presence of undissolved substances. For undissolved finely dispersed substances the turbidity can be measured by measuring the reduction in the intensity of a beam of light when passed through the liquid, or by measuring the intensity of the scattered radiation. According to EN ISO 7027, all instruments may be used which satisfy the following requirements: Incoming radiation at 860 nm.

The results are given in FAU units (Formazin Attenuation Units) when the radiation passing through is measured.

Extinction

According to the Lambert-Beer law, the extinction $E = \epsilon(\lambda) \cdot c \cdot d$ is proportional to the concentration of substances contained in the water. The proportionality constant $\epsilon(\lambda)$ depends on the wavelength. These constants, and other data required for the determination of the solids in the water are stored in modern photometers as method data. The basic quantity measured is and remains the extinction.

Coloration

(EN ISO 7887: 1994)

If a layer of several meters of pure water is observed in transmitted light it appears to have a weakly blue coloration. This coloration can alter in the presence of contaminants to form a wide range of colorations. Natural waters are usually colored yellow-brown by contamination with iron or clay particles or humic matter.

(A green coloration can be produced by algae.) The "true" color of water is determined after filtration through a 0.45 µm filter.

Normally most yellow-brown colored waters and the outflows of municipal sewage treatment plants can be measured at 436 nm. The outflows of industrial wastewater treatment plants show no sharp and distinctive extinction maxima. For the investigation of such water it is obligatory to measure at 436 nm (mercury line); the two other measuring wavelengths 525 nm and 620 nm can, depending on the filter used, vary slightly from these wavelengths. For discontinuous measurements the standard permits the use of filter photometers with a spectral bandwidth of < 20 nm for measurements at 436 nm, 525 nm and 620 nm. Thus, for example, instruments with 445 nm and 520 nm interference filters with a bandwidth of 10 nm are also suitable. For comparability with the standard, however, a spectrophotometer is required. The results are presented in m^{-1} together with the measuring wavelength, spectral band-

width, water temperature and pH.

In some publications the result is given in DFZ (translucent coloration number); which is identical with the m^{-1} result. (DIN ISO 6271: 19988)

Clear liquids, determination of the color number with the platinum-cobalt scale (Hazen color number, APHA color number). Spectrophotometers are mentioned as being suitable for measuring the stock solutions at 430 nm, 455 nm, 480 nm and 510 nm. According to the standard the measurement itself is carried out with a color comparator which allows a visual comparison.

Chrome-plating bath

Reagent-free measurement of the self-coloration of an electroplating bath. 5 ml of the sample are pipetted into a 100 ml volumetric flask, filled up to the mark with distilled water and well mixed. 4 ml of the diluted sample are pipetted into a 100 ml volumetric flask, filled up to the mark with distilled water and well mixed. 5 ml of the 1:500 dilution are placed in a screw-cap glass and 5 ml 40% sulfuric acid are added. The glass is sealed and the contents well mixed. The solution is filled into a rectangular cuvette for the measurement.

Nickel-plating bath

Reagent-free measurement of the self-coloration of an electroplating bath. 5 ml of the sample are pipetted into a round cuvette and 5 ml 40% sulfuric acid are added. The cuvette is sealed and the contents mixed. The solution is filled into a rectangular cuvette for the measurement.

Copper-plating bath

Reagent-free measurement of the self-coloration of an electroplating bath. 25 ml of the sample are pipetted into a 100 ml volumetric flask, filled up to the mark with distilled water and well mixed. 5 ml of the diluted sample are placed in a screw-cap glass and 5 ml 40% sulfuric acid are added. The glass is sealed and the contents well mixed. The solution is filled into a rectangular cuvette for the measurement.

SAC – Spectral Absorption Coefficient

The spectral absorption coefficient generally known as SAC (unit:1/m) and measured photometrically being the sum of dissolved organic water components. In the drinking water area the SAC is commonly measured at a wavelength of 436 nm, within the wastewater industry at 254 nm. A separation has to be made between clear and turb samples. It has to be considered that the determination as a sum parameter can be applied only usefully when assuming that the composition of the water content is not subject to extreme variations. SAC methods are available as part of the photoLab 6000 series.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers



Turbidity Measurements

Quality Control using Turbidity Measurements

Turbidity measurements are of extreme importance in quality monitoring in water, wastewater, beverage production, electroplating and petrochemical applications.

Light passing through liquid which contains undissolved solids, such as algae, mud, microbes and other insoluble particles, is both absorbed and scattered. Turbidity increases with the amount of undissolved solids present in the sample. However, the shape, size and composition of the particles also influence the degree of turbidity. Turbidity has been determined by simply measuring light passing through the sample. Measuring the **scattered light at an angle of 90°** has proved to be a more accurate method particularly at lower measuring ranges. Instruments that use this method are also referred to as **nephelometers**.

Turbidity Measurements

- High precision AMCO®-standards
- AQA functions
- US EPA

Turbidity or nephelometers instruments differ by the light source they utilize. Infrared units (IR-LED) with a wavelength of 860 nm are required for methods: ISO 7027/ DIN EN 27027 (EN ISO 7027). Standard methods specifies the use of units that use white light by a tungsten wide-band lamp for water and wastewater analysis.

Which light source – infrared (IR) or white light (tungsten)?

An infrared light source minimizes or even eliminates the influence of coloration in a solution, because there is practically no absorption at a wavelength of 860 nm. The detection sensitivity for small particles, on the other hand, is somewhat lower at this wavelength because of the generally lower light scattering of small particles.

White light has a higher sensitivity for small particles, however the inherent coloration of the solution has a stronger disturbing effect in this case.

The IR measurement is required by DIN ISO, the white light measuring by US EPA.

Nephelometric or transmittance measuring?

The nephelometric measuring with 90° scattered light is advantageous for the lower turbidity range. In contrast, the transmittance method is better suited for medium to high turbidities, where there are stronger light scattering and shadowing effects among the larger-sized particles. In this case, the diminution of light intensity gives a more accurate result than a 90° scattered light metering. Laboratory instruments for higher turbidity ranges therefore offer significantly more measuring options. Ratio procedures evaluate different angles. There are no standard methods defining these procedures, but industry specific procedures.

Typical turbidity values for various liquids

Liquid	NTU
Deionized water	0.02
Drinking water	0.02 ... 0.5
Spring water	0.05 ... 10
Wastewater (untreated)	70 ... 2000
White water (paper industry)	60 ... 800

Please note:

As floating and moving particles are measured in turbidity, slight measurement deviations are possible. In order to achieve results which are as representative as possible, attention should be paid to the following:

- samples should be measured immediately, as particle otherwise settle.
- constant lamp operating temperature.
- condensation on samples should be avoided.
- the position of the standards should be marked to exclude the influence of glass inhomogeneities.

The Right Instrument for the right Use!

4 models to choose from:

2 portable models, each with either IR or tungsten light source, and 2 laboratory meters with IR or Tungsten light source:

Application areas for turbidity measuring

	Turb 355 T/IR	Turb 430 T/IR	Turb 550/Turb 550 IR	Turb 555/Turb 555
Applications	Portable use for waste water, surface water and ground water applications	Portable use for all water testing applications incl. drinking water, wine industry, process control Laboratory use: optional for all applications up to 1100 NTU/FNU with LabStation	Routine meter for laboratories; drinking water	Routine meter for precision measurements
Light source	Tungsten lamp/IR LED	Tungsten lamp/IR LED	Tungsten lamp/IR LED	Tungsten lamp/IR LED
Measuring range	0-1100 NTU/FNU	0-1100 NTU/FNU	0-1000 NTU/FNU	0-10000 NTU/FNU/FAU
Calibration	Automatic 1-3 point	Automatic 3 point	Automatic 1-3 point	Automatic 1-5 point
Special features	Portable field meter	Portable field meter Calibration interval Calibration documentation Storage for measure values Optional: LabStation	AQA Flow-through measurement (unpressurized)	AQA complete with password protection, ratio method for the reduction of interferences; transmission, flow-through measurement (unpressurized/ up to 4 bar)



Portable Turbidity Meters

Turb 550 / Turb 550 IR

- Measuring range 0.01 ... 1 000 NTU with autoranging
- Automatic 1-3 point calibration
- Flow-through measurement



THE professional turbidity meter – Up to 1000 NTU

Laboratory turbidity meters for nephelometric measurements with automatic 1-3-point calibration and calibration interval monitoring. Measuring range selection from 0.01 ... 1 000 NTU is carried out automatically and for comparative measurements the current and previous values can be shown on the 2-line display.

Standard equipment includes instrument with built-in short operating instructions, 3 empty cuvettes and 3 standards (0.02 – 10.0 – 1 000 NTU, AMCO® standards with approval for drinking water as primary standards according to US EPA and according to EN ISO 7027).

An unpressurized flow-through adapter is available for continuous measurements.

Turb 555 / Turb 555 IR

- Measuring range 0.0001 to 10 000 NTU with AutoRange function
- Automatic 1 ... 5 point calibration
- Values displayed in
 - NTU
 - EBC
 - FNU, FAU (Turb 555 IR)
 - Nephelos (Turb 550)
- Flow-through measurement



The ADVANCED professional meter – Measuring range up to 10 000 NTU

High-precision laboratory turbidity meter with a wide measuring range of 0.0001 to 10 000 NTU (automatic measuring range switching) for all turbidity measuring applications from ultrapure and drinking water measurements, through quality assurance in soft drinks and wastewater treatment. The measuring system with its 4 detectors allows not only nephelometric (90° scatter) measurements and transmittance

measurements, but also ratio measurements in which the influences of stray light and sample color are reduced. Comprehensive AQA functions such as monitoring the calibration interval or password protection for calibration and setup access fulfil quality assurance requirements for measured values and are all also included in the documentation of the measurements.

Continuous flow-through measurements are possible up to a pressure of 4 bar with FLOW-THRU-TURB vessel.



Flow-through vessel Flow-Turb

The scope of delivery includes the 4 AMCO® standards for calibration up to 4000 NTU. For applications up to 10 000 NTU a further standard is available. Due to the precise manufacturing accuracy and long-time stability the AMCO® standards show advantages in comparison to Formazin.

Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Technical Data				
	Turb 550	Turb 550 IR	Turb 555	Turb 555 IR
Measuring principles	Nephelometric	Nephelometric	Nephelometric ratio method transmission	Nephelometric ratio method transmission
Light source	Tungsten lamp	IR-LED	Tungsten lamp	IR-LED
Measuring range	NTU 0 ... 1000 FNU – EBC – Nephelos – FAU –	0 ... 1000 0 ... 1000 – – –	0 ... 10000 – 0 ... 2450 0 ... 67000 –	0 ... 10000 0 ... 10000 0 ... 2450 – 0 ... 10000
Resolution	0.01 NTU from 0.00 ... 9.99 0.1 NTU from 10.0 ... 99.9 1 NTU from 100 ... 1000		0.0001 NTU from 0.0001 ... 9.9999 NTU 0.001 NTU from 10.000 ... 99.999 NTU 0.01 NTU from 100.00 ... 999.99 NTU 0.1 NTU from 1000.0 ... 9999.9 NTU	
Accuracy	±2% of value or ±0.01 NTU		0 ... 1000 NTU: ±2% of value or ±0.01 NTU 1000 ... 4000 NTU: ±5% of value 4000 ... 10000 NTU: ±10% of value	
Reproducibility	±1% of value or ±0.01 NTU			
Calibration	Automatic 1...3 point calibration		Automatic 1...5 point calibration	
Response time	< 3 seconds		< 6 seconds	
Cuvettes	1.1 x 2.76 in (28 x 70 mm) round cuvette, 25 ml sample volume			
AQA functions	Calibration interval monitoring Calibration protocol		Calibration interval monitoring Calibration protocol Password-protected access to calibration and configuration time-controlled data transmission	
Operating temp.	50 ... 104 °F (+10 ... +40 °C)		32 ... 122 °F (0 ... +50 °C)	
Power supply	Plug-in power supply 100 - 240 VAC ±10% / 47 - 63 Hz			

Ordering Information

Model		Order No.
Turb 550	Laboratory turbidity meter with universal power supply 90 ... 250 V, 3 calibration standards 0.02 – 10.0 – 1000 NTU, 2 empty cuvettes	600 100
Turb 550 IR	Laboratory turbidity meter for measurements according to DIN EN 27 027, ISO 7027 (EN ISO 7027) universal power supply 90 ... 250 V, 3 calibration standards 0.02 – 10.0 – 1000 NTU, 2 empty cuvettes	600 110
Turb 555	High-end laboratory turbidity meter according to US EPA with universal power supply 90 ... 250 V, 4 calibration standards 0.02 – 10.0 – 100 – 1750 NTU, 3 empty cuvettes	600 200
Turb 555 IR	High-end laboratory turbidity meter according to DIN/ISO (EN ISO 7027) with universal power supply 90 ... 250 V, 4 calibration standards 0.02 – 10.0 – 100 – 1750 NTU, 3 empty cuvettes	600 210



Flow-through vessels, calibration standards and other accessories see brochure "Product Details"

Portable Turbidity Meters

Turb 430 IR / Turb 430 T

- Scattered light characteristics according to Pharmacopoeia 5.0
- Multifunctional LabStation
- GLP/AQA conform documentation

Lab accuracy & comfort in portable field instrument

With the turbidimeters **Turb 430 T** and **Turb 430 IR**, the user has the choice to perform nephelometric measurements at 90° scattered light according to the application and standard required.

The **Turb 430 IR** meets the DIN 27027/ISO7027 requirements, the **Turb 430 T** those of US EPA 180.1. The measuring range is from 0 to 1100 NTU/FNU and is identified automatically. Accurate measurements in the lower range, e.g. in drinking water are no problem!



Menu driven calibration with up to 3 points and all measurement function are easy for even the most inexperienced operator to perform accurate and precise measurements. The calibration is via an AMCO® standards set (0.02-10-1000 NTU). Up to 1000 data sets with ID nos. can be stored and subsequently output via the LabStation in combination with the powerful LSdata software.



NEW:
*A turbidity measuring
lab for in the field – the
new Turb 430IR/T sets*

The quality of the measurement results is supported by adjustable calibration intervals with documentation.

The Turb 430 is not only a field measuring instrument (especially with the practical field case), but also a “small lab instrument” for applications up to 1100 NTU/FNU and with optimum data management.

Optional: Field case and rechargeable battery set (The brochure “Product Details” p. 73).

Turb 355 T / Turb 355 IR

- 0 – 1100 NTU/FNU
- Easy operation
- Handy



Small portable turbidimeter for control purposes

Battery-operated portable turbidity meter with Tungsten lamp according to US EPA or infrared LED (860 nm) for nephelometric measurements according to ISO 7027/DIN/EN 27 027 (EN ISO 7027): Handy, lightweight and easy to operate.

The Turb 355 T / IR comes in a handy carrying case. All necessary accessories (calibration standards 0,02 – 10,0 and 1000 NTU, empty cuvettes and batteries) are included. The instrument is powered by 4 AAA batteries.

Technical Data		
	Turb 430 IR / Turb 430 T	Turb 355 T / 355 IR
Measuring principles	Nephelometric (90° scatter)	Nephelometric (90° scatter)
Light source	IR-LED/Tungsten lamp	Tungsten lamp/IR-LED
Measuring range	NTU 0 ... 1100 / 0-1100 FNU 0 ... 1100	0 ... 1100 0 ... 1100
Resolution	0.01 from 0.00 ... 9.99 0.1 from 10 ... 99.90 1 from 100 ... 1100	0.01NTU from 1 ... 9.99 0.1 NTU from 10.0 ... 99.9 1 NTU from 100 ... 1000
Accuracy	0.01 NTU or ± 2 % of the measured value	± 2 % of the measured value or ± 0.1 NTU last decimal place in range 1 ... 500 NTU ± 3 % of the measured value in range 500 ... 1100 NTU
Reproducibility	<0.5% of the measured value or 0.01 NTU/FNU	± 1 % of the measured value or ± 0.05 NTU/FNU
Calibration	Automatic 3 point calibration	Automatic 1...3 point calibration
Response time	Approx. 3 seconds (IR) / approx. 7 seconds (T)	14 seconds
Cuvettes	1.10x2.36 in. (28x60 mm), 20 ml sample volume	0.98x1.77 in (25x45 mm), 15 ml sample volume
Interface	RS 232, USB via adapter	
Special functions	Calibration protocol Yes Storage of measured value 1000 RS 232 Yes Date/Time Yes Data evaluation Yes Rechargeable battery Optional	— — — — — —
Operating temp.	32 ... 122 °F (0 ... +50 °C)	32 ... 122 °F (0 ... +50 °C)
Power supply	4 x AA batteries for approx 3,000 measurements	4 micro (AAA) alkaline manganese batteries suitable for more than 1,500 measurements

Ordering Information

Model		Order No.
Turb 355 IR	Portable turbidity meter according to ISO 7027 / DIN EN 27 027 (EN ISO 7027) in professional case with 4 micro (AAA) alkaline manganese batteries, 3 calibration standards 0.02 – 10.0 – 1000 NTU and 2 empty cuvettes	600 311
Turb 355 T	same as Turb 355 IR, but with tungsten lamp according to US EPA	600 312
Turb 430 IR	Portable turbidity measuring instrument for nephelometric measurements (90°) according to DIN EN 27027, incl. calibration kit (0.02 - 10 - 1000), 2 empty cuvettes, cleaning tissues, batteries (4 x AA), suited for drinking water. (Optional LabStation or rechargeable battery pack, see brochure "Product Details" p. 73)	600 320
Turb 430 T	Portable turbidimeter for nephelometric measurement (90°, tungsten) acc. US EPA 180.1, incl. calibration standard kit (0.02-10-1000 NTU) and accessories: 2 empty cuvettes (28 mm), cleaning tissues, batteries (4 x AA); suitable for drinking water. Optional: LabStation or rech.batt. pack or as set (see brochure "Product Details" p. 73)	600 325

Turb 430 IR / Turb 430 T:



Turb 355 T / Turb 355 IR:



LabStation, case and battery set as well as accessories, please refer to pages 90/91 or the brochure "Product Details".



Colony Counter

One and two and three...

The most time-consuming part of carrying out a microbial count is the actual counting process on Petri dishes. Colony counters facilitate this task and as a result are essential in every bacteriological laboratory. Their particular advantages are the easy, rapid and reliable counting of bacterial colonies with very sample handling.

BZG 30

- Intelligent counting technology
- Operator Comfort
- Safe
- Flexible

The **colony counter BZG 30** is easy to use, and allows fatigue-free and safe work thanks to its problem-free counting mechanism: The surface on which the Petri dish is placed is pressure-sensitive; marking the colonies on the Petri dish with the marker pen activates the counter. The pressure sensitivity is adjustable for optimal adaptation to the operator.



Intelligent counting technology

The colony counter **BZG 30** has an acoustic check signal and automatically compensates for the weights of different Petri dishes; the pressure sensor system also provides uniform sensitivity over the whole of the working field. Zero-voltage protection guards against power interruptions.

The ring-shaped lamp provides uniform working field illumination; the magnifier offers distortion-free optics and can be individually positioned on its extremely flexible arm.

Versatile work is guaranteed by selectable direct or indirect illumination. Direct illumination is particularly suitable for nutrient agars with a dark background; indirect illumination for lighter agars. Colony counter **BZG 30** has an additional counter input for counter marker KS 30 and is supplied with an interchangeable Wolffhügel grid.



Technical Data

Counter	LED display (0 ... 999) with reset to 0
Standard magnifier	1.7-fold surface magnification, 100 mm dia.
Illumination	20 W ring lamp
Power supply	230 V $\pm$ 15%, 50 ... 60 Hz or 115 V $\pm$ 15%, 50 ... 60 Hz, as selected
Power consumption	21 W
Dimensions	300 x 325 x 90 mm (B x D x H) with magnifier arm
Weight	5.6 kg
Test certificate	CE
Warranty	1 year

Ordering Information

Colony Counter		Order No.
BZG 30	Colony counter with magnifier (1.7-fold, 100 mm dia.) complete with plug-in flexible arm, switchable background (light - dark) and Wolffhügel grid; for Petri dishes 70 mm and 100 mm dia. 230 V / 50 ... 60 Hz	803 314
BZG 30	Ditto, but for 115 V / 50/60 Hz	803 315
BZG/LUP 8	Surcharge for colony counter with special magnifier (2.3-fold magnification, 60 mm dia.) and plug-in flexible arm (replaces 1.7-fold magnifier)	803 319


1 Year
Warranty

WTW software – simple and comfortable

MultiLab® pilot

- Digital on-line recorder
- Export function for Word, Excel, Access and other programs
- Free-of-charge download from the internet
- **Minimum system requirements:**
Hardware: IBM-compatible PC with 486DX processor, 8 MB RAM, 20 MB free memory, VGA/SVGA graphics board, CD-ROM drive, one free interface (RS 232) for each connected instrument
Software: ab Windows 95

The free-of-charge software package for all laboratory, handheld and field instruments, can be downloaded from the internet

“MultiLab® pilot” controls the measurement and carries out data transfer and storage. The data can be shown online as a table or graph or off-line transferred to a printer. The inoLab® 740 and 750 can be controlled active.

Well laid out

All display modules are arranged as independent windows which can be moved about as required. Each window has its own menu bar with which settings for the measurement can be made quickly and conveniently. Additional graphic symbols, on-line help texts and a large measurement display round out the picture.

ACHAT OC

- **Min. software requirements:**
Windows 3.1 update options on request.
- **Necessary accessories:**
Connection cable AK 540/B.

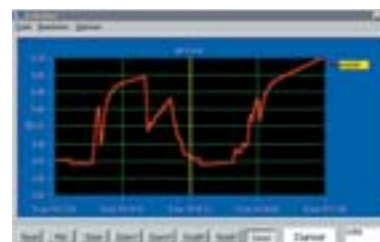


MultiLab® pilot can also be used to comfortable data transfer with the inoLab® 730, handheld meters MultiLine P3, P4 and 340/340i and other instruments.

Graphic

A comfortable digital recorder is used as a graphic support for data monitoring in real-time mode.

Apart from zoom and scrolling functions, individual values can be displayed or limiting values laid down via the cursor.



Communication program for BOD Measurement with OxiTop® Control

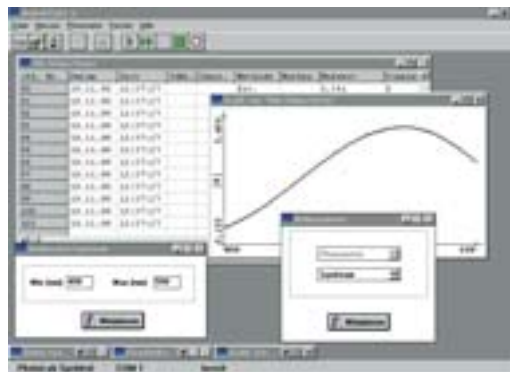
Stored measuring data can be transferred simple and comfortable from the OxiTop® Control system to a PC with the communication program ACHAT OC. These transferred data can be processed by PC or the Controller OC 100/OC 110.

Multi/ACHAT II

- dBASE format
- Sorting according to measurement parameter
- Windows program with context-sensitive menus and help programs

PC-Software Multi/ACHAT II: PC Communication with WTW Photometers photoLab®

WTW offers the Multi/ACHAT II PC software program so that stored measuring data can be transferred simply and comfortably from the instrument to a PC for documentation and statistical evaluation.



Parameter

pH

ORP

ISE

Oxygen
(D.O.)

Conductivity

Multi-
parameter

BOD/
Respiration

Photometers

Turbidity

Colony
Counter

Software/
Printers

Interface cables for connecting a PC or an external printer (P3001)

b = bidirectional			f = can be remote controlled			u = unidirectional		
Instrument	Model	Suitable accessories	Instrument	Model	Suitable accessories	Instrument	Model	Suitable accessories
Cond 197i	b	4,5	Oxi 197	u	4,5			
Cond 340i	b	4,5	Oxi 325	u	4,5			
inoLab® 730	b	4,5	Oxi 340	b	4,5			
inoLab® 735	b	4,5	Oxi 340i	b	4,5			
inoLab® 740	f	6,7,8,9	Oxi 538	u	4,5			
inoLab® 750	f	7,8,9	Oxi 597	u	4,5			
inoLab® Level 2	b	4,5	pH 197i	b	4,5			
inoLab® Level 3	f	6,7,8,9	pH 197	u	4,5			
LF 197	u	4,5	pH 325	u	4,5			
LF 325	u	4,5	pH 340	b	4,5			
LF 340	b	4,5	pH 340i	b	4,5			
LF 538	u	4,5	pH 340/ION	b	4,5			
LF 597	u	4,5	pH 538	u	4,5			
Multi 197i	b	4,5	pH/Cond 340i	b	4,5			
MultiLine® P3 pH/LF	b	4,5	pH/ION 340i	b	4,5			
MultiLine® P3 pH/Oxi	b	4,5	pH/Oxi 340i	b	4,5			
MultiLine® P4	b	4,5	photoLab® Series	b	2			
Multi 340i	b	4,5	pHotoFlex® Series	u	3			
Multi 350i	b	4,5	spectroFlex Series	b	SK/TC, ADA 12V			
Oxi 197i	b	4,5						

Ordering Information

MultiLab® pilot		Order No.
KOM pilot	Communications package, consisting of 1 x MultiLab® pilot and 1 AK 340/B	902 915
AK M-PC	Adapter cable for connecting a PC to the multifunction box, incl. MultiLab® pilot	902 901
AK T-PC	Interface cable for connecting the inoLab® 740/Level 3 terminal to the PC	902 902
ADA USB/Ser	Adapter USB serial interface RS 232 (9-pin socket)	902 880
Multi/ACHAT II		Order No.
Multi/ACHAT II	Software for PC under Windows, German and English	902 750
KOM Labor	Communications package, consisting of: 1 x Multi/ACHAT II and 1 AK Labor	902 754
AK Labor	Interface cable for connecting instrument to a PC via the RS 232 interface including 9/25-pin adapter and operating instructions	902 758
ACHAT OC		Order No.
ACHAT OC	PC communication program for Controller OxiTop® OC 100 or OC 110 for further processing of measuring data	208 990
AK 540/B	Interface cable for connecting instrument to a PC via the RS 232 interface including 9/25-pin adapter and operating instructions	902 842

Additional accessories see brochure "Product Details"
PC Communication with pHotoFlex® photometers: LSdata see page 90

WTW Printers

WTW instruments with a serial interface can be connected directly to a PC (see software section) and can therefore use the PC printer for their printouts.

For protocol purposes a printer can also be connected directly.

For instruments with a serial interface WTW offers suitable printers and cables. As the transmission rate (baud rate) of most instruments is permanently fixed it may be necessary to set the printer to the suitable transmission rate.



P 3001



LQ 300+

Technical Data			
Model	P 3001	inoLab® printer	LQ 300+
Printing methode	Thermal printer		24-pin matrix printer
Printing line	40 characters/line	–	80 characters at 10 cpi
Paper width	112 mm		182 mm ... 216 mm (single sheet, autom. feed)
Type of paper	Thermal printer paper, normal quality: legible approx. 5 years high quality: legible at least 10 years		Normal paper 52.3 g/m²... 90 g/m²
Size (W x D x H)	170 x 170 x 66 mm	–	366 x 275 x 141 mm
Weight	Approx. 1 kg	–	Approx. 4.3 kg
Power supply	230 V AC, 50 Hz rechargeable battery	–	220 V AC ... 240 V AC, 50 Hz ... 60 Hz
Ambient temperature			
Operation	0 °C ... 40 °C		+5 °C ... 35 °C
Storage	-20 °C ... 55 °C		-20 °C ... 55 °C
Tested safety to			EN 60 950
Interface(s)	RS 232 (serial) Centronics (parallel)	–	RS 232 (serial) Centronics (parallel)
Ordering Information			
Printer P 3001			Order No.
P 3001	Thermal matrix printer, mains and rechargeable battery operation. Paper width 112 mm, preset baud rate: 4800; preset characters/line: 40		250 045
AK 325/S	Interface cable to connect instrument to P 3001		902 837
AK 540/S	Interface cable to connect instrument to P 3001		902 843
Printer LQ 300+			Order No.
LQ 300+	Matrix printer, mains operation on 230 VAC. Standard paper (A4 or endless)		250 046
AK/LQ 300	Interface cable to connect instrument to LQ 300+ (only photoLab® series, not inoLab®, not 3xx(i) series)		250 746
Further connection cable and accessories see brochure “Product Details”			



Customer Service/Certificates

We are active...

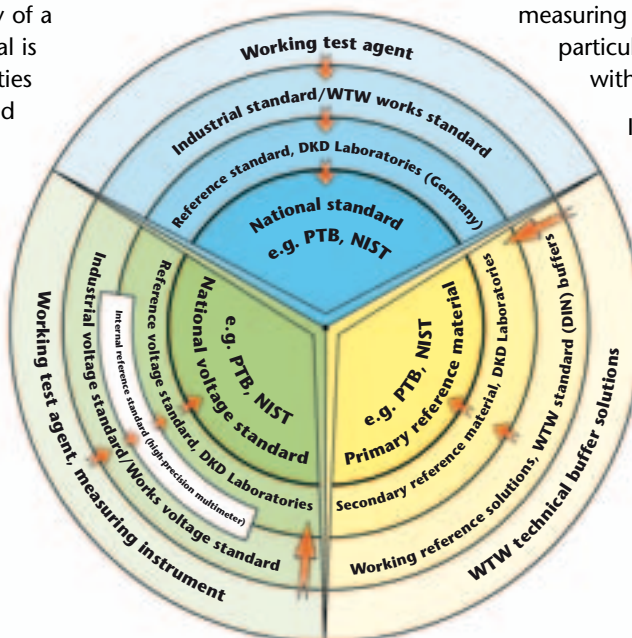
in solving your quality assurance problems

Every measurement carries a potential error. This applies in particular to the calibration of instruments. In order to quantify this error the variation of the measured value from a national or international standard is given. In a transferred sense this is the "standard meter" of the quantity involved.

In chemical analysis reference materials are used. These substances are measured in appropriate metrological facilities. The uncertainty of a measurement for such a material is documented. Examples of facilities which can provide such qualified evidence are the National Institute of Standards (NIST, Gaithersburg, USA) and the Physikalisch-Technische Bundesanstalt (PTB, D-Braunschweig).

In further steps secondary, tertiary, etc. reference materials are prepared from the primary reference materials by comparative measurements. The uncertainty of each of these steps compared to the "standard meter" can be given;

this takes into account the measuring agents and methods used. It is important that the calibration of a measuring system can be traced back to the particular standard in an unbroken chain with defined uncertainty.



In practice working reference buffer solutions are used; these are obtained by comparing them with primary or secondary material. WTW pH buffers meet these requirements. The individual uncertainty of the pH of a particular buffer solution is documented by a certificate.



What we can offer you

Calibration of measuring systems for determination of conductivity, pH, and dissolved oxygen in aqueous media

No certification to DIN ISO 9000 without test agent monitoring

The perfect functioning of the test agent used is a constant requirement for the correctness and comparability of measured values. This is why it belongs to the basic rules of **quality assurance** and **Good Laboratory Practice** that the accuracy of each test agent is monitored at regular intervals after a defined period of use by carrying out a calibration. This task is faced by a continually increasing number of companies and laboratories who are trying to achieve or have already achieved certification of their QA system according to the DIN ISO 9000 series of standards.



Why you should make use of the manufacturer's technical competence

Proper calibration requires specially qualified personnel with particular knowledge of the individual instrument and the presence of suitable calibration facilities. This is why it is usually more efficient and economical to allow test agent monitoring to be carried out by an external calibration laboratory or directly by the manufacturer.

WTW is available as a competent partner and can provide this service for all WTW measuring systems for the determination of conductivity, pH, and dissolved oxygen.

We have been certified to ISO 9001 since 1993 and are completely familiar with the requirements of the standard. Our calibration facilities are linked to national standards. Calibration agents for which no national standards exist are prepared in accordance with recognized national and international standard methods.

We carry out a works calibration and provide you with a calibration certificate.

If required we can also carry out test agent monitoring for our photometers and BOD measuring instruments. Please ask for our advice.

WTW offers different types of certificate

1. Certificate of Compliance

General certificate (without mentioning the serial number) which certifies that the product complies with the technical data given in the operating instructions. The certificate is not signed and is free of charge.

2. Manufacturer's Test Certificate

Individual certificate (mentioning the serial number) which states that the product has been tested and complies with the information given about accuracy on the certificate. Contains a passage about the regular calibration of the test agents used by us and their traceability to national and international standards. Can be produced by the customer as evidence for ISO 900 purposes.

Certificate for brand-new products:

These Certificates are added to all instruments. The certificate is not signed and is free of charge.

CE Declaration of Conformity

Certifies that the product complies with the valid EC directives.

Certificates according to FDA regulations

Validation of instruments according to FDA regulations like IQOQPQ on request.

Manufacturer's certificate for calibration solutions

When ordering or within 3 months after purchasing we can supply a manufacturer's certificate for the pH buffer solutions and conductivity calibration solutions offered in our range of products; this certifies their controlled manufacture on the basis of national and international standards.

Calibration certificates available for a fee

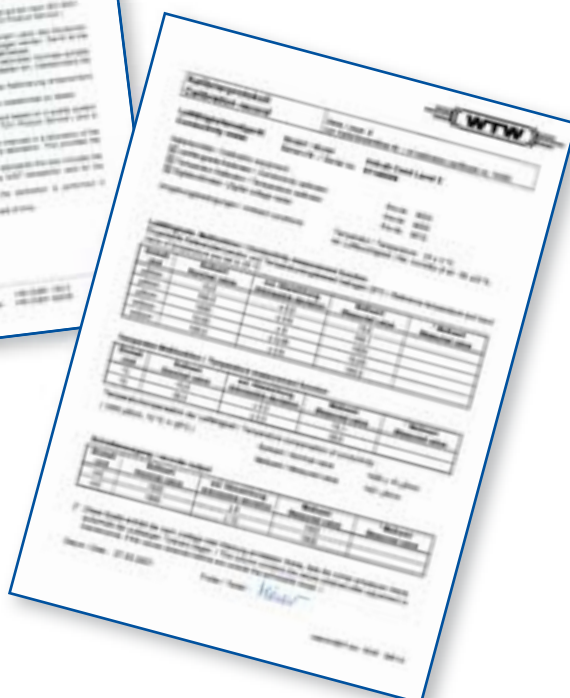
Calibration certificate for an instrument

The measuring functions of the instrument are calibrated independently of the signal generator by using electrical standards.

Calibration certificate for a signal generator

For pH electrodes and conductivity cells the calibration is made by using calibration solutions. For oxygen sensors the slope is calibrated by using air saturated with water vapor and the zero current by using a zero solution or in pure nitrogen.

With pH electrodes and oxygen sensors a gradual alteration to the technical data occurs (aging). This is why they have to be calibrated by the operator at regular intervals; the procedure is described in the instruction manuals of the corresponding instrument.



Certificate for used products:

Provided at the customer's request in association with a repair contract. Test data are listed in a protocol. The certificate is signed by our QM officer and will be invoiced.

Analog

Monitors
EcoLine/QuadroLine®
and sensors

- High accuracy and enhanced EMC performance using integrated pre-amplifier
- Integrated lightning protection
- EcoLine 170: Monitors for field installation
- QuadroLine® 296: Monitors for panel mounting 96 x 96 mm

D.O.
pH
Cond
Turb

NH_4

NO_3

NO_2

Analyzer-Systeme

TresCon®/
TresCon® Uno

TresCon®: Multi-parameter-analyzer for up to three parameters
Self-calibrating systems: easy to use – easy to extend
Also available as a compact single parameter unit

Digital

Multiparameter System

IQ SENSOR NET

System 182 (XT) and 2020 XT

TSS

NH₄

NO₃

COD

TOC

DOC

SAK

BOD

P_{Total}

PO₄

- One system for all parameters
- High accuracy and enhanced EMC performance using – integrated pre-amplifier & digital processing
- Integrated lightning protection
- Sensor can be pre-calibrated in Lab
- Universal sensor connection – Standard for all digital sensors
- Easily expandable using 2-wire technology
- 0/4 ... 20 mA
RS 232, RS 485, PROFIBUS-DP, Modbus RTU



Are you interested?

Please order the new
WTW On-line Catalog

Company highlights	
1945	Company founded by Dr. Karl E. Slevogt
1948	Renamed to Wissenschaftlich-Technische-Werkstätten (WTW)
1954	Introduction of first WTW pH meter
1965	Introduction of first WTW oxygen meter
1976	Bavarian State Award for the Combibox compact multi-parameter system
1982	Introduction of the first zero-current-free (stable zero point) oxygen sensor for field measurements in the world
1983	Start of WTW's on-line measuring technology program
1986	First company to offer a 3-electrode oxygen sensor (TriOxmatic®) with automatic calibration on air (OxiCal®)
1987	First company to offer a 4-electrode conductivity sensor (TetraCon®) for portable water analysis
1993	First manufacturer of D.O., pH and conductivity measuring systems to be certified to ISO 9001
1995	• Introduction of the mercury-free OxiTop® system for manometric BOD determination • First company to offer monitors with built-in lightning protection
1997	New photoLab® laboratory photometers combine precision with outstanding ease of use
1998	• Introduction of the PurCon® sample preparation system as a replacement for conventional filtration systems • First WTW spectrophotometer
1999	"Innovations that make sense": the new laboratory instruments of the inoLab® family with their 3 function levels set new standards for the analytical measurement of pH, oxygen, conductivity and temperature as well as for ISE and multi-parameter measurements
2000	Introduction of TresCon® – the modular analytical system for the continuous measurement of ammonium, nitrite, nitrate, phosphate
2001	• IQ SENSOR NET – the multi-parameter measuring system offers unlimited possibilities for on-line measurements • The new VisoTurb® and ViSolid® turbidity and solid sensors with their revolutionary ultrasonic keeping clean system give "low-maintenance" a completely new meaning

About us

There are not many companies around that can look back on 60 successful years. WTW is such a company, and one of the secrets of its enduring success is undoubtedly the permanent strive for top performance in the development and production of water analysis instruments. We are driven by our goal to offer complete solutions to make our customers work easier.



Sean Donnelly,
CEO WTW GmbH

"To make good things even better" is one of the most difficult tasks one could imagine, but we believe there are always opportunities for improvement. This remains an important part of the WTW strategy and in 2008 we are pleased to be able to offer our customers new and innovative products.

Laboratory & Field Instrumentation

Offering the world's most complete line of pH/ORP, D.O./BOD/Respirometry and Conductivity Instruments, Turbidity Meters, Photometers with reagents, WTW systems range from rugged waterproof, hand-held, and portable field meters to an integrated line of laboratory instruments, supplies and accessories that include the inoLab™ systems and a wide range of technically advanced Multi-parameter instruments that represent the state-of-the-art in measurement systems.

For example, the Multi 350i handheld instrument offers pH, conductivity, D.O. and temperature measuring in one handheld, waterproof instrument featuring a compact multi-parameter sensor.

WTW offers high-quality technology for optical systems with the new photoLab 6000 series (spectrophotometers for VIS and UV/VIS range).

On-line Instrumentation

The IQ family has experienced growth: The terminal/controller MIQ/TC 2020 XT is the new extremely high-performance core of each IQ SENSOR NET system 2020. The integrated USB interface facilitates a considerably faster data exchange using a USB memory stick or connecting directly to an external system. The dual-processor function being integrated with

every MIQ/TC 2020 XT increases the system stability and therefore also the availability of the entire system. The new 182 XT-4 system is the economic solution for up to 4 sensors, perfectly suitable for central measuring points, e.g. locations with multiple parameters being measured.

The IQ SENSOR NET system is therefore the most flexible, digital based system providing from 1 up to 20 measuring points suited for conventional instrumentation with analog outputs as well as for field bus instrumentation. The innovative digital sensors in this system represent the state of the art in process measuring systems. For the measuring and control of wastewater the world's most complete line of pH/ORP, D.O., Conductivity, Nitrogen, Carbon, Phosphate and unique self cleaning Turbidity instrumentation as well as comprehensive accessories are available.

The dependability, reliability, and versatility of WTW field proven Ammonia, Phosphate, Nitrite and Nitrate Analyzers, probes, and pH, ORP, D.O., and Conductivity systems and meters have established WTW products as industry standards world-wide.



WTW has built a solid reputation in its more than 60 years history by providing "best in class" products with unparalleled customer and technical support.

WTW strives to deliver solutions to our customers measuring problems. Our Customer Care Centers are dedicated to ensuring each customer's individual success. WTW's extensive applications library coupled with knowledgeable applications specialist provides for rapid resolution to technical challenges.

With support facilities around the globe, the WTW manufacturing center, located just south of Munich, Germany, delivers quality technical instrumentation with continuous support. We are proud to present our product offering to you and look forward to serving your needs.

„Made in Germany“



Company highlights

2002	AmmoLyt® 700 IQ enables reliable On-line "in-situ" measurement of Ammonium PurCon® IS: Sample Preparation – directly without pump
2003	NitraLyt® 700 IQ is a perfect supplementary nutrient parameter (Nitrate) for On-line "in-situ" measurement
2004	- Multi-parameter handheld meter Multi 350i represents state-of the art in field applications NitraVis®, CarboVis® and NiCaVis® – spectral "in-situ" On-line sensors for combined Nitrate, Carbon and TSS measurement providing new solutions for waste water control
2005	- Portable photometers and turbidity meters for universal applications: pHotoFlex®/pHotoFlex® Turb Turb 430 IR IQ SENSOR NET System 182 compact 2 channel transmitter as a supplement to the IQ SENSOR NET family ECDO DO-Sensors Best for DO online measurement
2006	VARiON® ammonium and nitrate multisensor with automatic compensation of interference ions
2007	- The new optical D.O. sensor FDO® 700 IQ completes the WTW portfolio for on-line D.O. measuring - The new spectrophotometers of the spectroFlex series combine systematic and spectral analysis with well proven quality assurance AQA.
2008	The IQ SENSOR NET system keep on developing: - New terminal/controller T 2020 XT with USB and dual-processor function System 184 XT-4: perfect for up to 4 sensors IQ-LabLink joins on-line measuring with laboratory calibration



Contact Addresses

Looking for your local contact?

Here you can find your "local WTW":

contact addresses, representatives, distributors... Click!



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Germany

from:

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Company

Department

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Country

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Information Request

Please send me the following information



*Catalog Laboratory and Field Instrumentation
2008/2009*



pcs.



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*CD-ROM
Principles of Measuring Technique*



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Date

Signature

Notes:

General information

1. Special versions of instruments on request.
2. Accessories and spare parts for older models – please make separate inquiry.
3. In order to avoid our customers having to pay a surcharge for small-volume purchases, we supply our consumables in practical minimum ordering quantities.

Technical alterations

The technical description corresponds to the current products. Alterations because of technical improvements are possible.

Illustrations

We draw your attention to the fact that the illustrations are intended to clarify certain points. There may therefore be discrepancies between the illustrations and the written text.

Liability

We accept no responsibility for printing errors, writing errors or mistakes in the translation.

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