

Ion-selective measurement



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Applications and meters overview

Ion-selective measurement is an electrochemical process in which the concentration of a multitude of dissolved ions in liquids can be quantitatively determined with suitable electrodes.

- ✓ yes
- yes
- ✓ recommended
- ✓ recommended for some applications
- not recommended

	Digital		Analogue		Analogue	
	Benchtop ISE meters		Portable ISE meters			
	inoLab® IDS		inoLab®		ProfiLine	
	Multi 9630	Multi 9620	pH/ION 7320	Multi 3320	pH/Cond 3320	pH/ION 3310
2 parameters simultaneously*	✓	✓	✓	✓	✓	
3 parameters simultaneously	✓					
ISE direct measurement	●	●	●	●	●	●
Incremental methods	●	●	●			
Additional parameters	●	●	●	●	●	●
Routine measurements	✓	✓	✓	✓	✓	✓
Routine measurements with documentation	✓	✓	✓	✓	✓	✓
AQA with documentation	✓	✓	✓	✓	✓	✓
R&D High resolution and precision	✓	✓	✓	✓	✓	✓
Control measurements	✓	✓	✓	✓	✓	✓
LIMS connection	✓	✓	✓	✓	✓	✓
Quality assurance	✓	✓	✓	✓	✓	✓
Education	✓	✓	✓	✓	✓	✓
Service	–	–	–	✓	✓	✓
Laboratory measurements	✓	✓	✓	✓	✓	✓
Field measurements	–	–	–	✓	✓	✓
PC connection	✓	✓	✓	✓	✓	✓
Memory	✓	✓	✓	✓	✓	✓
USB interface	✓	✓	✓	✓	✓	✓
Analogue/Digital adapter necessary	✓	✓				
Graphic display			✓	✓	✓	✓
Color graphic display	✓	✓				
	Compatible sensors					
	Analogue electrodes					
Combined ISE	82	✓	✓	✓	✓	✓
Half cells	83	✓	✓	✓		✓
	Multi 9630	Multi 9620	pH/ION 7320	Multi 3320	pH/Cond 3320	pH/ION 3310
	see page	40	40	56	49	50
						80

Benchtop meters for ion-selective measurement

Ion-selective measurement can be performed in two general ways:

Simple, direct potentiometric determination via a linear or non-linear calibration curve, or determination via the so-called increment methods.

All state-of-the-art WTW laboratory meters with ISE function have both functionalities.

inoLab® IDS - digital



inoLab® Multi 9630 IDS: Measure three parameters simultaneously

The digital inoLab® multi parameter meter for IDS sensors for parallel measurement of the same or different parameters. Requires the ADA 94pH/IDS DIN or ADA 94pH/IDS BNC for the ISE measurement.

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inoLab® Multi 9630 IDS

inoLab® Multi 9620 IDS: Measure two parameters simultaneously

Similar to inoLab® Multi 9630 IDS, but up to two sensors can be connected. Requires the ADA 94pH/IDS DIN or ADA 94pH/IDS BNC for the ISE measurement.

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inoLab® Multi 9620 IDS

inoLab® - analogue



inoLab® pH/ION 7320P

inoLab
innovations that make sense



Technical specifications: inoLab® analogue benchtop ion selective meters

inoLab® pH/ION 7320	
Measurement ranges/resolution	pH -2.000 ... +20.000 pH units
	mV -1200 ... +1200 mV -2500 ... +2500 mV
	Temperature -5 ... +105 °C/0,1 °C
Concentration	0.000 ... 9.999
	(mg/l, µmol/l, 10.00 ... 99.99
	mg/kg, ppm, %) 100.0 ... 999.9
	1000 ... 999999
Special functions	Known addition (single), known subtraction, sample addition, sample subtraction, blank value correction
Accuracy (±1 digit)	pH ±0.005 pH units -±0.01 pH units
	mV ±0.3 mV, ±1 mV
	Temperature ±0.1 K
Calibration MultiCal® calibration automatic:	AutoCal 2-/3-/4-/5 point
	AutoCal-Tec 2-/3-/4-/5 point
	ConCal® 2-/3-/4-/5 point
	ISECal 2 bis 7 points

inoLab® pH/ION 7320: Concentration determination with two measurement channels



inoLab® pH/ION 7320P

- ⦿ **Two channel meter for simultaneous measurements of pH, ion concentration or ORP**
- ⦿ **Data output via USB interface for rapid data transfer in *.csv format or via an optionally built-in printer**
- ⦿ **CMC function for measuring range monitoring with pH**

The inoLab® pH / ION 7320 is a specialized pH and ionic concentration meter that can measure pH or concentration on each of its two channels simultaneously.

Reliable measurements

- Repeatable measurement results due to active automatic AutoRead function with detection of stable measuring values
- The CMC function for pH visualises the optimal measuring range for correct measurement
- Graphic display with plain text menus for convenient and safe operation
- Input of the electrode serial number for the GLP/AQA compliant documentation
- Transmission of all data in *.csv format via USB interface to PC, formatted transfer to Excel (MultiLab® Importer, included in the delivery or as a download)
- Output directly in the meter via optional built-in printer

Flexible and high performance:

- 1 to 5 point calibration with pH
- 2 to 7 point calibration with ion measurement, also non-linear
- Blank value correction, incremental methods: Known addition, known subtraction, sample addition, sample subtraction
- Concentration specification in different units
- Selectable AutoRead criterion
- DIN or BNC version
- Backlit graphic display with CMC display

Order information: inoLab® analogue benchtop Ion-selective meters

Model	Description	Order no.
inoLab® pH/ION 7320	Precise and convenient pH/mV/ISE 2 channel benchtop meter	1GA330
inoLab® pH/ION 7320P	Precise and convenient pH/mV/ISE 2 channel benchtop meter with built-in printer	1GA330P
inoLab® pH/ION 7320 BNC	Precise and convenient pH/mV/ISE 2 channel benchtop meter with BNC connectors	1GA340

Portable meters for ion-selective measurement



ProfiLine Multi 3320: The environment specialist

In addition to pH, ORP potential, conductivity and dissolved oxygen (electrochemical), the Multi 3320 also measures ion concentration with combined electrodes.



ProfiLine Multi 3320

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ProfiLine pH/Cond 3320: Perfect in process

The most important parameters pH/mV and conductivity are complemented by the possibility for ISE measurement with combined ISE electrodes.



ProfiLine pH/Cond 3320

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Specifications

ProfiLine		pH/ION 3310
pH measurement		-2.0 ... +20.0 ± 0.1 pH
		pH -2.00 ... +20.00 ± 0.01 pH
		-2.000 ... +19,999 ± 0,005 pH
		mV ± 1200.0 mV ± 0.3 mV
		± (2500 ± 1) mV
ISE measurement	Concentration	0.000 ... 9.999
	(mg/l, µmol/l, mg/kg, ppm, %)	10.00 ... 99.99
		100.0 ... 999.9
		1000 ... 999999
Temperature		-5.0 ... 105.0 °C ± 0.1 °C
CMC		Yes
Calibration		1-, 2-, 3-, 4-, 5-point WTW technical buffers, DIN, NIST as well as further 22 buffer sets
	ISECal	2 to 7 point

ProfiLine pH/ION 3310: pH-, mV- and concentration measurement from a single source



ProfiLine pH/ION 3310

- **pH and ISE measurement**
- **2 to 7 point calibration, also non-linear**
- **Convenient menu control**

The pH/ION 3310 is a portable meter for outdoor use for combined pH and ISE measurements. All applications are covered with 1 to 5 point calibration for pH as well as a 2 to 7 point calibration for the direct potentiometric determination with ISE's, including the non-linear range.

Reliable measurements

- Repeatable measurement results with the automatic AutoRead function for detecting stable measurement values
- The CMC function for pH visualises the optimal measuring range and supports correct measuring
- Graphic display with plain text menus for convenient and safe operation
GLP/AQA compliant documentation
- Transmission of all data in *.csv format via USB interface to PC; if desired, formatted transfer to Excel (MultiLab® Importer, included in the delivery or as download)

Flexible and high performance:

- 1 to 5 point calibration for pH
- 2 to 7 point calibration for ion measurements, including the non-linear range
- Concentration readings in different units
- Backlit graphics display

Order information: Portable analogue ISE meters

Model	Description	Order no.
pH/ION 3310	Professional pH/mV/ISE meter, IP 67 waterproof	2GA310





Application table

Ion type	Application
Ammonium (NH ₄ ⁺)	Wastewater
Bromide (Br ⁻)	Wine, plants
Calcium (Ca ²⁺)	Milk products
Chloride (Cl ⁻)	Drinking water, diet foods, mineral water
Copper (Cu ²⁺)	Galvanic baths
Fluoride (F ⁻)	Toothpaste, drinking water, cement
Nitrate (NO ₃ ⁻) [®]	Baby food, fertiliser, wastewater
Potassium (K ⁺) [®]	Wine, fertiliser
Silver (Ag ⁺) [®]	Galvanic baths
Sodium (Na ⁺) [®]	Boiler feed water, diet foods, wine
Sulphide (S ²⁻) [®]	Proteins, sediments

Ion-selective electrodes

Ion-selective and gas-sensitive electrodes are used for measuring the dissolved concentration of specific ions or gases in water. Similar to the pH electrode, the membrane interacts with the dissolved ions and delivers a concentration-dependent voltage signal that is converted to the corresponding measurement result.

Combined ISE and GSE electrodes

-  **Space-saving through integrated reference electrode**
-  **11 different types available - broad selection of applications including ammonium measurement**
-  **Slim and space-saving design with 12 mm shaft diameter**
-  **Series 800 with 1 m fixed cable and DIN or BNC plug**

Technical specifications and order information: inoLab® analogue Ion-selective electrodes

Combined ISE and GSE electrodes



	NH 500/2	Ca 800	Ag/S 800	Cl 800	CN 800
Determinable ions	Ammonium	Calcium, Magnesium	Silver, Sulphide	Chloride	Cyanide
Membrane	–	L	S	S	S
Contains reference electrode	Yes	Yes	Yes	Yes	Yes
Measuring range	0.02 to 900 mg/l, With 3 exchange heads and 50 ml electrolyte solution	0.02 ... 40000 mg/l 5 x 10 ⁻⁷ ... 1 mol/l	0.01 ... 108000 mg/l 10 ⁻⁷ ... 1 mol/l 0.003 ... 32000 mg/l 10 ⁻⁷ ... 1 mol/l	2 ... 35000 mg/l 5 x 10 ⁻⁵ ... 1 mol/l	0.2 ... 260 mg/l 8 x 10 ⁻⁶ ... 10 ⁻² mol/l
Bridge electrolyte		ELY/BR/503	ELY/BR/503	ELY/BR/503	ELY/BR/503
Ionic strength-adjusting solution	MZ/NH3/CN	ISA/Ca	ISA/FK (Ag) or according to the operating instructions for sulphide measurement	ISA/FK	
Standard solutions (conc. 10 g/l)	ES/NH ₄	ES/Ca	Standard solutions must be prepared freshly ^③	ES/Cl	MZ/NH3/CN Standard solutions must be prepared freshly
pH range	4-12	2.5-11	2-12	2-12	0-14
Order No. DIN variant	106395 (S7 plug head)	106655	106651	106661	106663
Order No. BNC variant		106654	106650	106660	106662
Order no. Exchange head		106656			

① S = Solid electrode, L = Matrix electrode, G = Glass electrodes

② Titration

③ Preparation according to operating manual

④ Recipes for additionally required solutions are specified in the application report and operating manuals.

Combined ISE and GSE electrodes

ISE half cell



Cu 800	K 800	Br 800	F 800	NO 800	
Copper, Nickel®	Potassium®	Bromide	Fluoride, Aluminium, Phosphate®, Lithium®	Nitrate	Sodium
S	L	S	S	L	G
Yes	Yes	Yes	Yes	Yes	requires reference electrode R 503/D
0.0006 ... 6400 mg/l 10 ⁻⁸ ... 10 ⁻¹ mol/l	0.04 ... 39000 mg/l 10 ⁻⁶ ... 1 mol/l	0.4 ... 79000 mg/l 5 x 10 ⁻⁶ ... 1 mol/l	0.02 ... sat. mg/l 10 ⁻⁶ ... sat. mol/l	0.4 ... 62000 mg/l,	0.05 ... 23000 mg/l
ELY/BR/503	ELY/BR/503/K	ELY/BR/503	ELY/BR/503	ELY/BR/503/N	ELY/BR/503
ISA/FK	ISA/K	ISA/FK	TISAB	TISAB/NO ₃	ISA/Na
ES/Cu	ES/K	ES/Br	ES/F	ES/NO ₃	ES/Na
2-6	2-12	1-12	5-7	2.5-11	>10
106665	106671	106653	106667	106675	106375 (S7 plug head)
106664	106670	106652	106666	106674	
	106672			106676	