

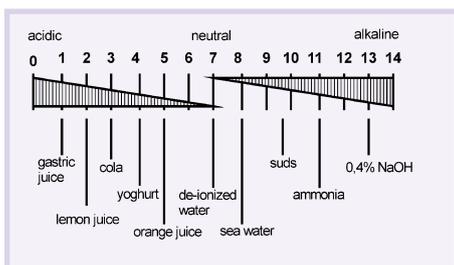
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Water analysis



The pH Value



The pH value is a logarithmic measure for the concentration of the H ions in a hydrous solution and indicates, by a numerical value, whether the solution has an acid, neutral or alkaline reaction.

The pH scale ranges from pH0 to pH14, pH7 is neutral.

The further the pH value deviates from 7, the more aggressive the sample is. The acidic or alkaline effect will increase by the factor 10 per pH unit.

The illustration on the left shows some examples for pH values of typical substances

The Redox Potential

The level of the Redox potential (measured in mV) indicates the strength of an oxidising or reducing reaction of a measuring solution. A negative voltage value means that the solution has reducing properties compared to a standard hydrogen electrode. A positive value indicates that

the solution has an oxidising effect.

As the extermination of microorganisms (disinfection) is directly related to the strength of the oxidation (e.g. of chlorine) the Redox potential is successfully being used for monitoring disinfection processes, e.g. in swimming baths. However,

redox measurements are also performed for controlling the denitrification of waste waters (redox break point determination) at the detoxification in galvanic plants and for monitoring multiple chemical processes (e.g. cyanide oxidation or chromate reduction).

ALMEMO® pH and Redox Measurement

By using reference solutions the calibration of pH and redox probes can be started with the push of a button. As the adjustment is stored in the ALMEMO® connector, the probe can also be used with other

devices. If ALMEMO® devices with several input sockets are used, it is even possible to connect more probes with individual adjustments. The calculation of the pH value is based on the electrode steepness

at 25°C. If the temperature of the measuring medium largely deviates from the reference temperature, it is possible for all ALMEMO® devices to perform a temperature compensation.

The Electrical Conductivity

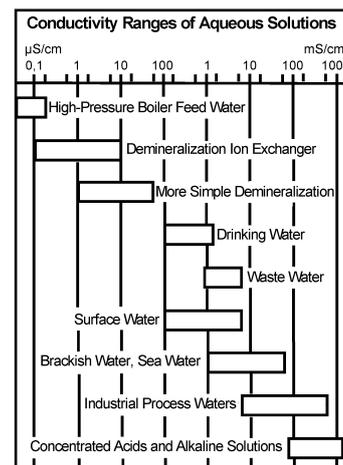
The conductivity (unit S/m = Siemens/meter) is a measure for the ion concentration in a measuring solution.

It is proportional to the salt, acid or base content in the measuring solution. High-purity waters have a conductivity of approx. $0.05\mu\text{S}/\text{cm}$ (at 25°C), natural waters approx. 100 to $1000\mu\text{S}/\text{m}$, some bases (e.g. potassium hydroxide solutions) up

to slightly more than $1000\text{mS}/\text{cm}$.

The diagram shows further examples of hydrous solutions relevant for measurements.

In practice, the conductivity measurement is used for monitoring plants, for producing of high-purity waters or for determining the salinity of sea water.



Solute Oxygen

Oxygen is not only a component of the air but it is also contained dissolved in water and, practically, in every liquid. For example, water contains approximately 9mg/l oxygen in saturated compound at a temperature of 20°C and an atmospheric pressure of 1019mbar.

Every liquid accepts as much oxygen until the oxygen partial vapour pressure in the liquid is in a balance with the 'contacting' air or gas phase. The saturation state

(air-saturated water) is reached when the partial pressure of the physically dissolved oxygen in the liquid equals the partial pressure of the oxygen in the air.

The current oxygen concentration increases with atmospheric pressures and with decreasing temperatures. Relevant for metrology are processes, such as the oxygen consumption involved with microbiological decomposition processes or an oxygen production, e.g. due to the growth

of algae.

The oxygen concentration is very important for animals and organisms living in water and for the biological treatment of municipal and industrial waste water. Additionally, corrosion processes in lines and keeping the quality of beverages depend on the solute oxygen in the liquid.

This is only possible with ALMEMO® Devices

Through the complete electrical isolation of the measuring inputs it is possible to use only one single ALMEMO® device to simultaneously measure various chemical

variables, and use several probes in one sampling vessel without having any mutual influences of the probes! Through pre-programmed ALMEMO® connectors

it is possible to connect any environmental sensor technology.

ALMEMO® system with data logger and comprehensive sensor equipment

Order no.

For exploring abandoned polluted areas and their environments or for performing groundwater quality tests

ALMEMO® data logger including sensor equipment and accessories

- ALMEMO® 2690-8 with 5 measuring inputs, including PC data cable
- Temperature sensor -70 to $+400^\circ\text{C}$
- pH electrode 1 to 12 pH including connecting cable and buffer solutions pH 4/7/10
- Redox electrode including connecting cable and buffer solution 220 mV and KCl solution
- Conductivity probe 0.01 to 20.00 mS/cm including reference solution 2.77 mS/cm
- Probe for measuring solute oxygen 0 to 40 mg/l or 0 to 260 % saturation including filling solution
- Adjustment set for the oxygen probe, saturation and zero point adjustment

MA26908AKSU

FPA30L0250 + OFS0008

FY96PHEK + ZA9610AKY4W
+ ZB98PHPL4 + ZB98PHPL7
+ ZB98PHPL10 + ZB98PHNL

FY96RXEK + ZA9610AKY5W
+ ZB98RXPL2

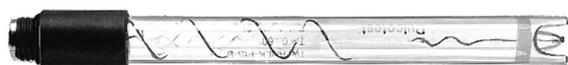
FYA641LFP1 + ZB96LFRL

FYA64002

ZB9640AS

Water analysis

pH One-Bar Measuring Chain FY96PHEK



Applications:

manual measurements e.g. swimming pools, drinking water ...

Technical Data

pH range:	1 ... 12	Reference:	Ag / AgCl (3mol KCl / gel)
Operating range	0 ... 13pH / 0 ... 60°C	Shaft length:	125 ±3mm
Operating pressure:	unpressurised	Shaft diameter:	12mm (polycarbon)
Conductivity:	> 150 µS / cm	Electrode head:	plug head SN6
Diaphragm type:	glass fiber		

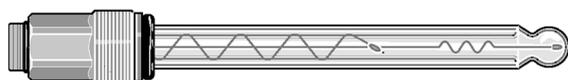
Type

pH-one-bar measuring chain pH 1 ... 12, 0 ... 60°C for unpressurised operating

Order no.

FY96PHEK

pH One-Bar Measuring Chain FY96PHER



Applications:

Waste water, drinking water, industrial water, chemical industry, paper industry, food industry ...
(not media contained for chlorine and fluoride, for not frequent temperature fluctuations).

Technical Data

pH range:	1 ... 12	Shaft diameter:	12mm (glass)
Operating range	0 ... 13pH / 0 ... 80°C	screw connection	thread PG13.5
max. pressure:	6 bar	Shaft length:	120 ±3mm
Conductivity:	> 50 µS / cm	Electrode head:	plug head SN6
Diaphragm type:	PTFE ring diaphragm		
Reference:	Ag mit AgCl stock (3mol KCl / polymer)		

Type

pH-one-bar measuring chain pH 1 ... 12; 0 ... 80°C

Order no.

FY96PHER

pH One-Bar Measuring Chain FY96PHEN



Applications:

manual measurements in the laboratory.

Technical Data

pH range:	0 ... 12	KCl-elektrolyt refillable	
Operating range	0 ... 13pH / 0 ... 80°C	Shaft length:	160 ±3mm
Operating pressure:	unpressurised	Shaft diameter:	12mm (material: glass)
Conductivity:	> 150 mS / cm,	Electrode head:	plug head SN6
Diaphragm type:	ceramik diaphragm		
Reference:	Ag / AgCl stock (3mol KCl / liquid)		

Type

pH-one-bar measuring chain pH 0 ... 12, 0 ... 80°C for unpressurised operating

Order no.

FY96PHEN

pH Insertion Electrode FY96PHEE



Applications:

pH-measurements in semi-solid or pasty media,
e.g. foods like meat, cheese ...

Technical Data

pH range:	1 ... 12	KCl-elektrolyt refillable	
Operating range	0 ... 13pH / 0 ... 60°C	Shaft length:	120 ±3mm (glass)
Operating pressure:	unpressurised	Penetrating tip	approx. 45 mm, Ø 6 to 8 mm
Diaphragm type:	3 ceramic diaphragms	Electrode head:	plug head SN6
Reference:	Ag / AgCl (3mol KCl / liquid)		

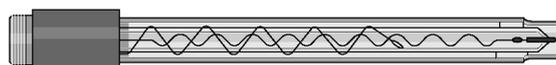
Type

pH-insertion electrode pH 1 ... 12, 0 ... 60°C for unpressurised operating

Order no.

FY96PHEE

Redox-One-Bar Measuring Chain FY96RXEK



Applications:

manual measurements e.g. swimming pools, drinking water ...

Technical Data

Operating temperature	0 ... 60°C	Metal electrode :	platinum
Operating pressure:	unpressurised	Shaft length:	125 ±3mm
Conductivity:	> 150 µS / cm	Shaft diameter:	12 mm (material: plastic)
Diaphragm type:	glass fiber	Electrode head:	plug head SN6

Type

Redox-one-bar measuring chain 0 ... 60°C for unpressurised operating

Order no.

FY96RXEK

Accessories for pH-One-Bar Meas. Chains and Redox-One-Bar Meas. Chain

pH-One-Bar Measuring Chains	Order no.	Redox-One-Bar Measuring Chain	Order no.
ALMEMO® transducer cable* for pH probes,		ALMEMO® transducer cable* for redox probes,	
1.2 m	ZA9610AKY4W	1.2 m	ZA9610AKY5W
5 m	ZA9610AKY4WL05	5 m	ZA9610AKY5WL05
ALMEMO® transducer cable* for pH and redox probes,		ALMEMO® transducer cable* for pH and redox probes,	
1.2 m	ZA9610AKY6W	1.2 m	ZA9610AKY6W
5 m	ZA9610AKY6WL05	5 m	ZA9610AKY6WL05
Buffer solution pH 4.0 50 ml	ZB98PHPL4	Redox buffer solution 220 mV	ZB98RXPL2
Buffer solution pH 7.0 50 ml	ZB98PHPL7	KCl solution, 3-molar	
Buffer solution pH 10.0 50 ml	ZB98PHPL10	for refilling and storage, 50ml	ZB98PHNL
KCl solution, 3-molar, 50ml for refilling and storage	ZB98PHNL		

* Cable with spray-coated ALMEMO®connector

Water analysis

ALMEMO® connecting cable for pH and redox probes



Transducer cable with various electrodes

Applications:

Transducer cables are available for all popular electrodes with a coaxial connector. To avoid the measuring signal being corrupted by the measuring instrument itself an extremely high-impedance amplifier is integrated in the ALMEMO® connector on the connecting cable. It is also possible, by means of impedance conversion and differential measurement, to measure several electrodes with different potentials, -free from interference and using only one ALMEMO® device.

Technical Data

Transducer	High-impedance measuring amplifier (>500 Gohm), integrated in the ALMEMO® connector	Electrode terminal	For plug-on head S7/SN6 or SMEK (see variants)
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Type

ALMEMO® connecting cable with transducer (ALMEMO® connector, spray-coated)
For probes with plug-on head S7/SN6 (coaxial connector, screw-fit):

Programming for pH probe

Cable length 1.2 meters

Cable length 5 meters

Programming for redox probes

Cable length 1.2 meters

Cable length 5 meters

Programming for pH or redox probe (1 probe connectable at a time)

Cable length 1.2 meters

Cable length 5 meters

Order no.

ZA9610AKY4W
ZA9610AKY4WL05

ZA9610AKY5W
ZA9610AKY5WL05

ZA9610AKY6W
ZA9610AKY6WL05



Type

ALMEMO® connecting cable with transducer
For probes with SMEK plug-on head

Cable length 2 meters

Programming for pH probe with integrated temperature sensor NTC (30 kohm at 25 °C), linearization saved in ALMEMO® connector (only for current V6 ALMEMO® devices)

Programming for pH probe

Programming for redox probe

Order no.

ZA9640AKY8
ZA9610AKY8
ZA9610AKY9

NTC temperature sensor for automatic temperature compensation when measuring pH



Connector programming designation *T for ALMEMO® 2490 and 2590-2/-3S/-4S and (with effect from 07/2006) for ALMEMO® 2690/ 2890/ 5690/ 8590/ 8690

Type

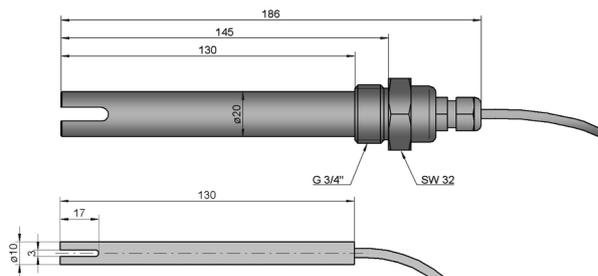
Stainless-steel sheathed sensor (see page 07.06) Diameter 3.0 mm, length 250 mm, Hexagonal cable sleeve with 1.5 meters PVC cable and ALMEMO® connector

Safety hose made from PTFE (for aggressive media) Hermetically sealed on one side, inside diameter 3.0 mm, outside diameter 4.0 mm, length 700 mm

Order no.

FNA30L0250T
ZT9000TS7

Conductivity Probe FYA641LFP1 / LFL1



Applications:

Concentrated waste water, aggressive waters, general aqueous and partly aqueous solutions, beer, emulsions, electroplating, waters, concentrated acidic and alkaline solutions, corrosive acids and alkaline solutions, lacquers and paints, substances containing protein, soaps, detergents, suspensions, titrations in organic substances, environmental analysis.

Technical Data

Measuring range:	0.01 to 20mS/cm LFL1 up to 10mS/cm	Minimum insertion depth:	30mm
Temperature sensor:	NTC, type N (10k at 25°C)	Shaft material:	PVC - C
Temperature compensation:	0 to +70°C, automatic	Shaft length/shaft diameter:	LFP1: 130mm/20mm LFL1: 130mm/10mm
Compensation coefficient:	1.9 linear	Fitting length / thread	only LFP1 145 mm / G $\frac{3}{4}$ "
Cell constant:	approx. 1cm ⁻¹	Maximum pressure	LFP1: 16 bar at 25 °C LFL1: not suitable for use under pressure
Electrode material:	special coal	Cable length:	1.5m
Accuracy:		Power supply:	8 to 12V through meas. instr.
0.01 to 5mS/cm:	± 1% of meas. val. ± 0.05mS	Current consumption:	approx ca. 3 mA
5 to 20mS/cm:	± 2% of meas. val. ± 0.05mS		
Nominal temperature:	25°C ± 3°C		
Operating temperature:	-5 to 70°C		

Accessories

Reference solution 2.77mS/cm at 25°C 0.02mol KCl, 250ml

Order no.

ZB96LFRL

Type (including manufacturer's test certificate)

Active conductivity probe with automatic temperature compensation, Built-in probe, G 3/4" thread, suitable for use under pressure up to 20mS/cm

Laboratory probe, not suitable for use under pressure up to 10mS/cm

Factory calibration KY90xx conductivity for measuring chain (sensor + device) (see chapter Calibration certificates)

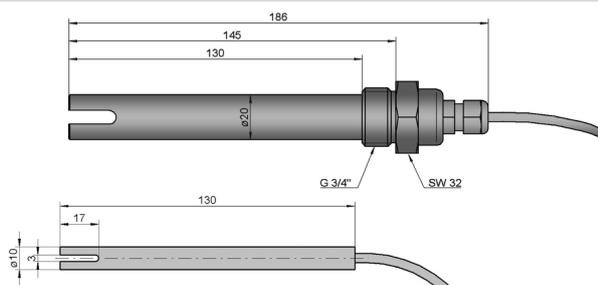
Order no.

FYA641LFP1

FYA641LFL1

Water analysis

Conductivity Probe FYA641LFP2 / LFL2



Applications:

Low-salt waste water, general aqueous and partly aqueous solutions, fish tanks, emulsions, desalting/ion exchanger, beverages, waters, cold/boiler feed water, lacquers and paints, milk, samples with low ionic strength, substances containing protein, purest water, soaps, detergents, suspensions, drinking water, environmental analysis.

Technical Data

Measuring range:	1 to 200 μ S/cm	Shaft material:	PVC - C
Temperature sensor:	NTC, type N (10k at 25°C)	Shaft length/Shaft diameter:	LFP2: 130mm/20mm LFL2: 130mm/10mm
Temperature compensation:	0 to +70°C, automatic	Fitting length / thread	only LFP2 145 mm / G $\frac{3}{4}$ ''
Compensation coefficient:	1.9 linear	Maximum pressure	LFP2: 16 bar at 25 °C LFL2: not suitable for use under pressure
Cell constant:	approx. 1cm ⁻¹	Cable length:	1.5m
Electrode material:	special coal	Power supply:	8 to 12V through meas. instr.
Accuracy:	\pm 2% of meas. val. \pm 0.5 μ S	Current consumption:	approx. 3 mA
Nominal temperature:	25°C \pm 3°C		
Operating temperature:	-5 to 70°C		
Minimum insertion depth:	30mm		

Zubehör

Reference solution 147 μ S/cm at 25°C 0.001mol KCl, 250ml	Order no. ZB96LFRL2
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Type (including manufacturer's test certificate)

Active conductivity probe 0 ... 200 μ S/cm with automatic temperature compensation,

Built-in probe, G $\frac{3}{4}$ '' thread, suitable for use under pressure

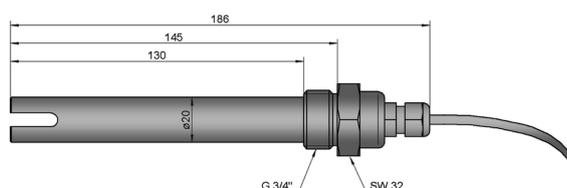
Laboratory probe, not suitable for use under pressure

Factory calibration KY90xx conductivity for measuring chain (sensor + device) (see chapter Calibration certificates)

Order no.

FYA641LFP2
FYA641LFL2

Conductivity Probe FYA641LFP3



Applications:

Concentrated waste water, aggressive waters, general aqueous and partly aqueous solutions, beer, emulsions, electroplating, waters, concentrated acid and alkaline solutions, corrosive acids and alkaline solutions, lacquers and paints, substances containing protein, soaps, detergents, suspensions, titrations in organic substances, environmental analysis.

Technical Data

Measuring range:	0 to 200 mS/cm	Shaft material:	PVC - C
Temperature sensor:	NTC, type N (10k at 25°C)	Shaft length:	145mm
Cell constant:	approx. 1cm ⁻¹	Shaft diameter:	20mm
Electrode:	4 electrodes, special coal	Fitting length / thread	130 mm / G $\frac{3}{4}$ ''
Accuracy:	1 mS/cm \pm 1.5% of meas. val.	Maximum pressure	16 bar at 25 °C
Nominal temperature:	25°C \pm 3°C	Cable length:	1.5m
Operating temperature:	0 to 70°C	Power supply:	8 to 12V through meas. instr.
Minimum insertion depth:	30mm	Current consumption:	approx. 15 mA

Accessories

Reference solution 111.8mS/cm at 25°C 1mol KCl, 250ml	Order no. ZB96LFRL3
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Type (including manufacturer's test certificate)

Conductivity probe 0 ... 200mS/cm without temp. compensation

Factory calibration KY90xx conductivity for measuring chain (sensor + device) (see chapter Calibration certificates)

Order no.

FYA641LFP3

Oxygen Sensor FYA64002



Applications:

Determination of the conditions of life for fish and microorganisms in waters and fish tanks, biological treatment of municipal and industrial waste water, storage of organic liquids, examinations of drinking water, control of corrosion processes in heating system lines, examination of quality-keeping of beverages.

Technical Data

Measuring ranges:		Temperature sensor:	NTC type N (10k at 25°C)
Temperature range:	-5.0 ... 50°C	Accuracy of temp. measurement (at nominal conditions):	-20 ... 0°C: ±0.4°C, 0 ... 70°C: ±0.1°C
O2 saturation:	0 ... 260% saturation	Nominal conditions:	25°C ±3°C/1013mbar
O2 concentration:	0.0 ... 40mg/l (5 ... 40°C)	Shaft material:	PVC, black
Measuring principle:	Clark	Membrane cap:	replaceable (spare)
Working electrode:	Pt cathode	Shaft length/shaft diameter:	145mm/12mm
Reference electrode:	Ag/AgCl counter electrode	Connecting cable:	1.5m long with spray-coated ALMEMO® connector
Membrane:	PTFE	Polarisation voltage:	650mV
Response time (t ₉₀ %):	approx. 10–15s	Service life	
Zero current at 0% saturation:	< 5nA	(with one electrolyte filling):	several months
Meas. current at 100% saturation:	approx. 700nA	Total service life (durability):	several years
Accuracy, oxygen measurement:	< ± 1% of measured value		
Velocity in blower stream:	approx. 10cm/s		
Storage temperature:	-10 ... 50°C		
Insertion depth:	40mm		
Filling volume (electrolyte):	0.6ml		

Accessories

Order no.

Adjustment set consisting of:

25g sodium sulphite in 20ml PE bottle for preparation of the null solution, vessel for adjustment of the saturation level	ZB 9640 AS
25g sodium sulphite in 20ml PE bottle	ZB 9640 NS
20ml filling solution in PE bottle for O ₂ probe	ZB 9640 NL
Spare membrane cap with protection (2 pieces)	ZB9640EM

Type

Order no.

Oxygen sensor for O₂ measurements in liquids incl. connecting cable 1.5m long with spray-coated ALMEMO® connector

FYA64002

