

Water.
The resource of
the future.



**SMART SENSORS AND ANALYTICAL
SOLUTIONS FOR WATER QUALITY
AND PROCESS CONTROL**





We believe that
protecting water means
protecting the future.

Water: The Element of the Future. Our Responsibility Today.

Water is one of the most critical resources of our time. As global demand continues to rise and the effects of climate change intensify, the availability and quality of water are under increasing pressure. At Senseca, we recognize the strategic importance of water and are committed to protecting this essential resource through advanced sensor technology and intelligent monitoring solutions.

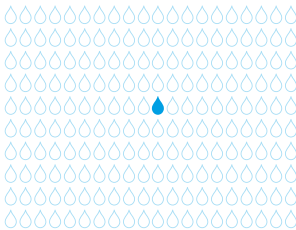
While 2/3 of the earth's surface is covered with water, only 0.5% of this water is accessible and suitable for human use. Meanwhile, global water demand is projected to increase by more than 50% in the first half of the 21st century, while climate change continues to disrupt natural water cycles. In developing countries, millions of cubic meters of water are lost due to leaks and inefficiencies. However, smart water monitoring and automation can reduce water consumption in industrial processes by up to 30% or even more.

Water exists in many forms and serves numerous purposes, ranging from **groundwater and surface water** to **municipal and industrial wastewater**, to **drinking water** through to process and product related water. Each of these types requires precise and reliable assessment to ensure **safety, efficiency and sustainability**.

Senseca provides the technology to facilitate this, offering both permanently installed, stationary systems and flexible, portable measuring devices that can adapt to various environments and needs.

Our solutions enable instant and accurate water quality analysis, supporting industries and communities in making informed decisions. With the ability to measure key parameters such as pH, redox, conductivity and dissolved oxygen, we help to ensure that water meets the required standards for its intended use, whether that be for environmental protection, industrial processes or public health.

For Senseca, investing in water analytics is a strategic commitment to safeguarding life and health, not just a business decision. Our sensor technologies promote the efficient use of resources, improve process control and facilitate the automation of water-related operations. By providing deeper insight into water quality and usage, we empower our customers to act with greater responsibility and foresight.



**Only 0.5% of the Earth's
water is accessible and
suitable for human use**





One element. Infinite solution.

Water's versatility is unmatched, playing a vital role in agriculture, industry and urban life.

Smart technologies and reliable sensors are behind every application, helping to monitor, manage and maximize the use of this essential resource.

Industrial plants

- Deionized water
- Cooling circuits (open/closed)
- Lubrication processes
- Boiler feed water
- Washing water
- Galvanic processes

Municipal sector

- Pools and public baths
- Landfill leachate
- Drinking water
- Wastewater treatment & monitoring
- Water monitoring
- Ecological state monitoring

Food production

- Fish farming
- Fish tanks
- Conventional agriculture
- Smart Greenhouse
- Hydroponics

Maritime

- Bilge water
- Ballast tank water
- Seawater desalination



Precision in Process Purity in Output.

Clean, usable water doesn't happen by accident. It's the result of a smart combination of technologies working together. Filtration systems, whether using **micro-**, **nano-** and **ultrafiltration** or **reverse osmosis**, help remove even the tiniest particles. **Ion exchangers** and **distillation units** refine water quality, while **biological treatment systems** such as **bioreactors** and **fermenters** break down contaminants using natural processes.

Oxidation and **disinfection methods** eliminate harmful substances to ensure the water is both safe and compliant, and **neutralization systems** control pH levels. **Centrifuges** efficiently separate solids from liquids, and **gas scrubbers** clean exhaust air to protect the environment.

All of these processes become even more effective thanks to **smart sensors**, which work quietly in the background to ensure everything operates efficiently. They **continuously collect data** to help control systems in real time, **make measurements visible and traceable**, and ensure that **critical limits are always monitored**. Sensors provide the insight and reliability needed to manage complex water treatment systems with confidence.

In addition to analytical sensors, our portfolio includes a wide range of process sensors for the **measurement of level, flow, temperature** and **pressure**, which are essential for ensuring that every process step runs within the correct operating parameters.

We also offer a comprehensive selection of products for **environmental monitoring**, covering aspects such as **solar radiation, humidity, visibility**, and **precipitation**.

Senseca's portable analytical measuring systems can be combined with **sensors for pressure, air quality, photoradiometry, soil moisture**, and **gas analysis**.



Water Analysis. Basics.

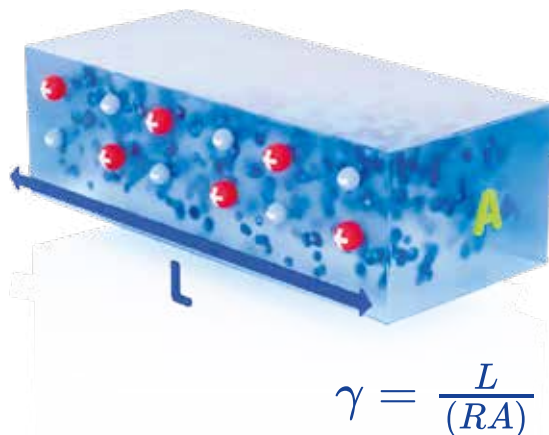
Conductivity Measurement.

Every conductivity measuring device from our numerous product families has high-quality measuring technology that satisfies the highest precision requirements.



Since the conductivity is a measurement for the ions dissolved in the water, it is also an indirect **measurement for concentration or salt content**.

For precise measurement of salt content in sea water or process fluids, derived variables such as salinity (g salt/kg water) or TDS (mg/l total dissolved solids)



Basics

- The conductivity describes the capability of a material to conduct electrical current
- In liquids, this is an indicator for the contained dissolved ions
- Normally used units: mS/cm and μ S/cm
- Electrical resistance is measured at the contact surfaces of measuring cells
- The device calculates the conductivity with the geometry of the measuring cells and the corresponding cell constant
- In the process, the conductivity is temperature-dependent
- All devices offer convenient temperature compensation options, such as nLF or linear
- The measuring cells have precise integrated temperature sensors

Examples for conductivities

LIQUID	CONDUCTIVITY
Boiler Feed Water	Up to 0.2 μ S/cm
Ion Exchanger	Up to 1.0 μ S/cm
Rain Water	10 .. 100 μ S/cm
Drinking Water	100 .. 2000 μ S/cm
Sea Water	10 .. 50 mS/cm
Industrial Process water	Up to 500 mS/cm
Concentrated Acids and Bases	Up to 1000 mS/cm

Water Analysis. Basics.

pH Measurement.



Definition of the pH value

- > The pH value describes the acidic or alkaline (basic) character of an aqueous solution.
- > A low pH value indicates a **higher concentration of H⁺ ions** (hydronium ions)
- > A high pH value indicates a **low H⁺ ion concentration**

What is an acid or a base?

- > Definition of an **acid**: an acid can split a hydronium ion H⁺.
- > Definition of a **base**: a base can split a hydroxide ion OH⁻.
- > In neutral liquid (pH = 7), H⁺ and OH⁻ **balance out** (neither acidic nor basic).

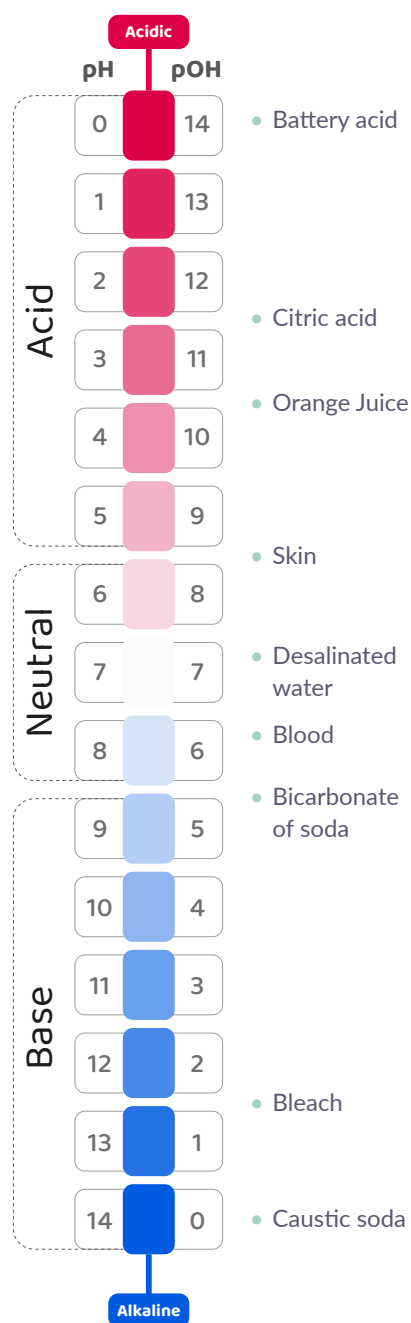
Definition of the pH scale

- > The pH value is the negative logarithm of hydronium activity (simplified: concentration).

$$\text{pH} = -\log_{10} a(\text{H}^+)$$

- > The ion product of hydronium ions and hydroxide ions is constant in aqueous solutions at 25 °C. activity (simplified: concentration).

$$a(\text{H}^+) \cdot a(\text{OH}^-) = 10^{-14} \quad \text{or} \quad \text{pH} + \text{pOH} = 14$$



Water Analysis. Basics.

Principle of a pH electrode.

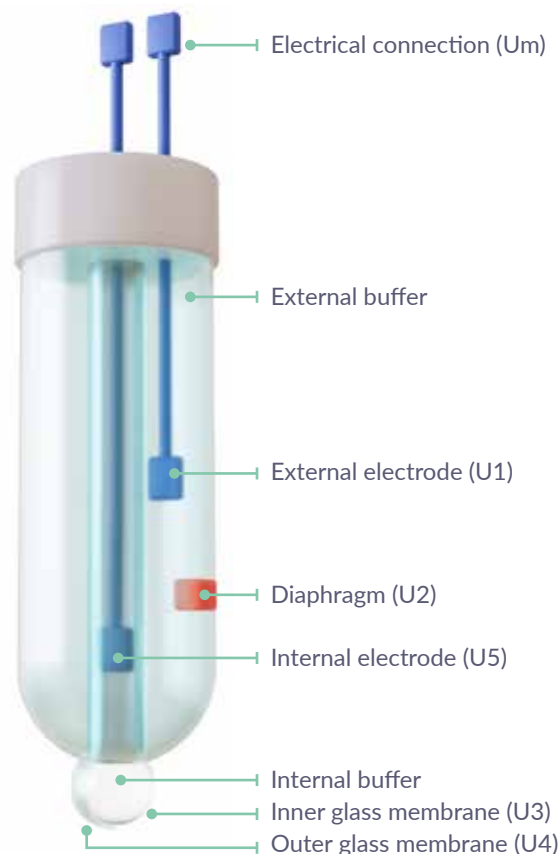
A so-called single-rod measuring chain is normally used as the pH electrode. It measures a voltage in aqueous solutions and is sometimes also used in foods such as cheese and meat.



Regular calibration and maintenance

Regular adjustment (calibration) is required for **precise measurements**. Depending on the accuracy requirement and application, calibration intervals range from 1 time per day to 1 time per year.

For this purpose, we offer you the right calibration liquids and cleaning solutions.



Basics

- > The voltage is **proportional** to the pH value
- > $U_m = U_1 + U_2 + U_3 + U_4 + U_5$
= (pH value – zero point) x gradient

Due to the fact that pH signals are very weak (high-ohm), it must be ensured, in particular, with the pH value that long cables and soiling of the plug connections are avoided. **The minimum conductivity should be available for stable measurements.**

The voltage output is **pH 7 : 0 V** and is almost linear with a gradient ideally of – 59.2 mV/pH (in practice, – 50 .. 59.2 mV/pH).

The temperature for the pH measurement

The temperature is important for various functions. Our devices offer **convenient compensation functions** – so they can measure safely and conveniently in practice:

- > The voltage output of the pH electrode is temperature dependent
- > The pH value of liquids is temperature-dependent
- > Buffer solutions depend slightly on the temperature during calibration

Water Analysis. Basics.

Oxygen measurement.

Dissolved oxygen in water

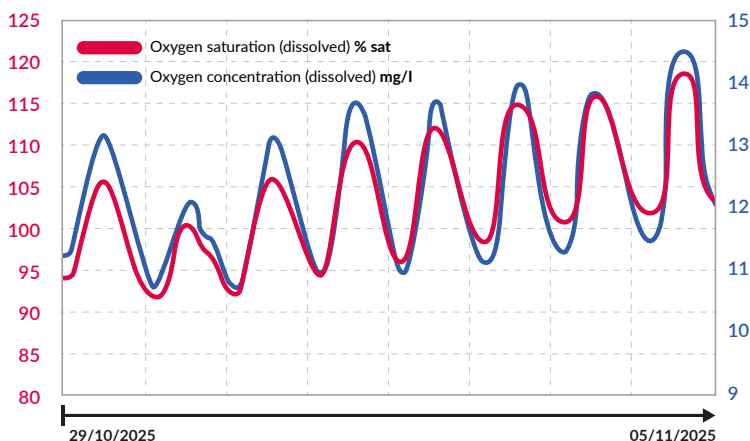
Dissolved oxygen is the basis for many life forms in water: fish, crustaceans and micro-organisms are all dependent on an adequate oxygen content of the water.

Measurement of the oxygen, therefore, is **beneficial for professional aquaculture** and for **monitoring of surface water, sewage treatment plants and well water**.

Oxygen is absorbed at the boundary between the water surface and the atmosphere. It is also produced by the metabolism of healthy water plants and algae with adequate light radiation (photosynthesis).

Animals and other life forms and decaying processes and the degradation of nutrients are oxygen-consuming. Water can assume different amounts of oxygen – cold water significantly more than warm water, fresh water significantly more than salt water.

➤ *Example: oxygen concentration/ saturation over 8 days of Sun in a flowing body of water.*



The measured variables saturation and concentration

Two measured variables offer a good illustration of the oxygen conditions in water:

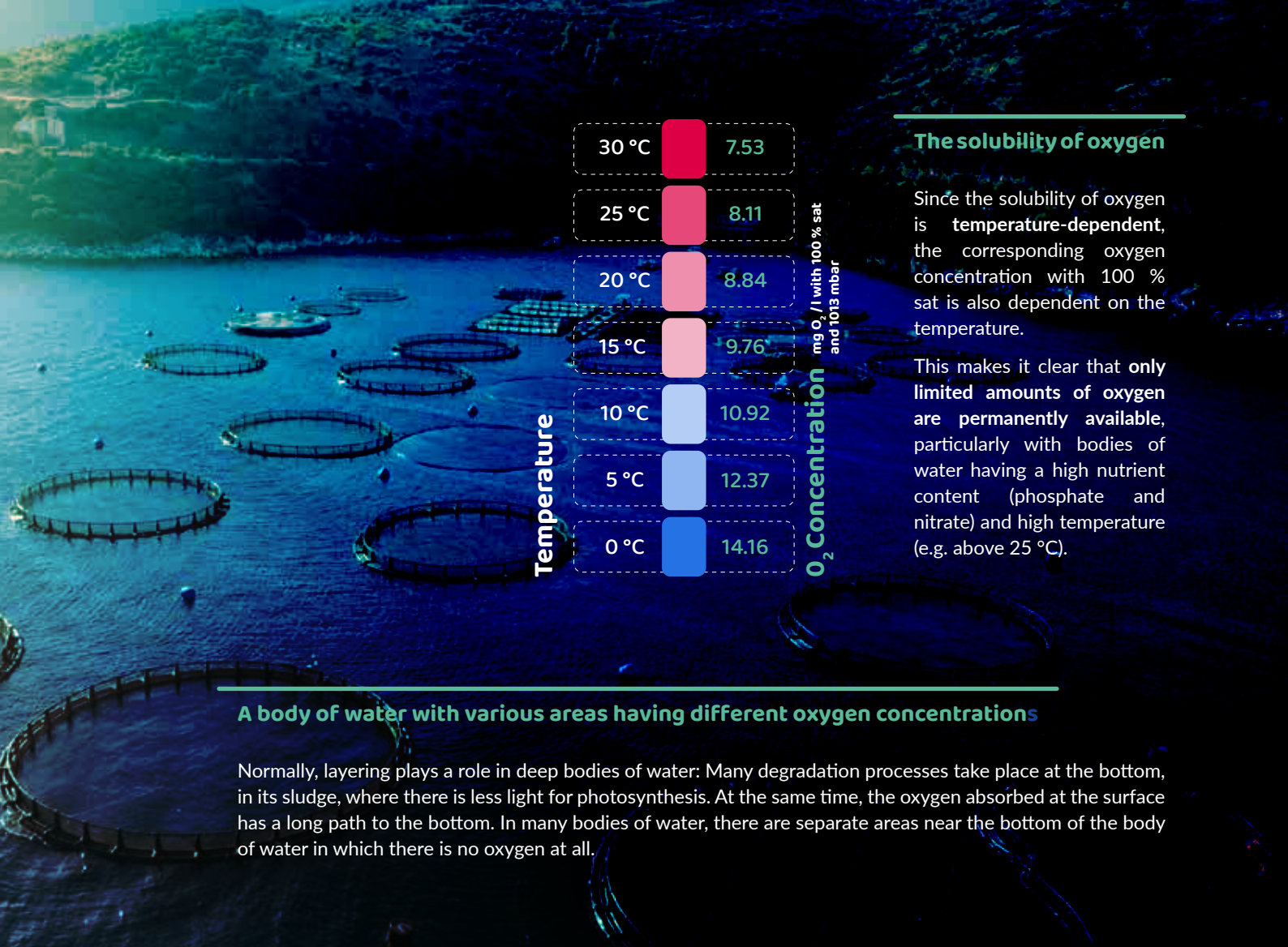
➤ Oxygen saturation

Oxygen dissolves in moving water from air oxygen on the water surface. Since the oxygen content of the air is nearly constant (~ 20.9 vol. %), the maximum natural saturation value is defined as 100 % sat. A value of 20 % sat indicates: 4/5 of the theoretically dissolvable oxygen has already been consumed and the oxygen level is low.

➤ Oxygen concentration

The oxygen concentration describes the absolute amount of dissolved oxygen in milligrammes of oxygen per litre of water (sometimes specified as ppm, 1 mg/l = 1 ppm).





Temperature	30 °C	7.53
	25 °C	8.11
	20 °C	8.84
	15 °C	9.76
	10 °C	10.92
	5 °C	12.37
	0 °C	14.16

mg O₂ / l with 100 % sat and 1013 mbar

O₂ Concentration

The solubility of oxygen

Since the solubility of oxygen is **temperature-dependent**, the corresponding oxygen concentration with 100 % sat is also dependent on the temperature.

This makes it clear that **only limited amounts of oxygen are permanently available**, particularly with bodies of water having a high nutrient content (phosphate and nitrate) and high temperature (e.g. above 25 °C).

A body of water with various areas having different oxygen concentrations

Normally, layering plays a role in deep bodies of water: Many degradation processes take place at the bottom, in its sludge, where there is less light for photosynthesis. At the same time, the oxygen absorbed at the surface has a long path to the bottom. In many bodies of water, there are separate areas near the bottom of the body of water in which there is no oxygen at all.

Additional applications

Oxygen is not always positive: oxygen can have a corrosive effect in pipeline systems and should be avoided (well water / drinking water). The same applies for boiler feed water or heat exchangers.

Oxygen measurement and sensors

Oxygen measurement with our handheld measuring devices is carried with 2 different systems:

> Galvanic sensors: Economic equipment within ECO-line

In these sensors, oxygen is consumed at the diaphragm on the front side in order to generate an electrical current which is proportional to the dissolved oxygen in the water.

For exact measurement, a small flow on the diaphragm is mandatory, e.g. with the raising and lowering of the sensor in the water during the measurement. With regular maintenance, the affordable sensors can be operated for > 1 year, while the diaphragm and electrolyte are exchangeable

Long cables are also available for depth measurements directly on site for both sensor types. As a result, elaborate sampling on site and falsification due to temporally delayed evaluations is avoided according to the in situ measurement.

> Ultra low maintenance optical sensors within the PRO-line

The non consuming optical principle is perfect for reliable and easy measuring: Water comes in contact to the membrane, depending on oxygen content the reaction to a light impulse is measured. Advantages are clear:

- non consuming: No minimum flow is necessary
- no electro-chemistry: Adjustment keeps constant over months.
- long life set up: No membrane change over >>1 year, nor fluids to be changed.



Digital at the measuring point. Decide with confidence.

The IX analysis transmitters series digitize the process values directly at the measuring point. This reduces the interference on the measurement - caused by corrosion, electromagnetic influences or potential shifts, for example - to a minimum.

Signals can thus be transmitted to the evaluation unit without scaling. Our transmitters are equipped with a **Modbus RTU interface** or alternatively **IO-Link** and **4...20mA** standard signal output. The Modbus version can be integrated directly into an existing fieldbus or operated with the MULTICON sensor controller as a multi-channel solution with central operation.

Using **SENSware** configuration software, the sensors can be conveniently parameterized, adjusted or calibrated. For transmitters with IO-Link, this is done via an IO-Link master. In addition to main and secondary process values, the sensors also provide **identification** and **diagnostic data**, making them ideal for **IIOT4.0 applications**.



+ Advantages

- Reliable signals for increased process quality
- Multiple process data eliminates the need for an additional measuring point (temperature)
- Sensor data for IIOT4.0 applications such as predictive maintenance for increased system availability
- Particularly easy system integration due to IO-Link
- Standardized sensor cables reduce installation effort
- Fast and repeatable commissioning thanks to PC configuration

*PHIX only

Compact and reliable
Digital values from the
measuring point

PHIX | CONDIX



+ Technical features

- Available for pH, redox (PHIX) or conductive conductivity measurement (CONDIX)
- Modbus RTU (RS485) or IO-Link/4...20mA versions
- Integrated data logger for operating hours and process operating times (temperature and pH value) as well as the results of past calibrations*
- Guided 1- / 2-point calibration or manual input of zero point/slope*
- SENSware configurable

At home. In harsh environments.

UNICON is characterized by its individual and robust housing design. The transmitter can withstand mechanical or environmental stresses such as corrosive vapors.

The convenient, backlit LCD combined with intuitive menu navigation enables fast commissioning, operation and calibration/adjustment. The error messages in plain text also shorten the troubleshooting process.

Equipped with a standard signal output for the main process value and 2 switching outputs for limit values or alarms, the basic version already offers a **good range of functions**.

UNICON can also be equipped with an **additional output** for the secondary measured value and measuring range changeover (second scaled main measured value), which can be switched via a digital input.

The series is powered via the current loop (2-wire) and requires no additional power supply.



Robust and simple
Field transmitter with LCD
text display

UNICON



⊕ Advantages

- Robust housing design for long service life
- Quick commissioning, operation and troubleshooting and good readability thanks to LCD text display
- Main and secondary measured value as well as measured value switching for fewer measuring points

⚙ Technical features

- Available for pH, redox (UNICON-PH) or conductive conductivity measurement (UNICON-LF)
- 1 (2)x 4...20mA, 2-wire
- 2 potential-free contacts for limit values or alarms
- Automatic temperature compensation
- Guided 1- / 2-point calibration or manual input of zero point/slope*

*UNICON-pH only

Efficient measurement. Full transparency.

The transmitters in 80x82mm format are designed for the economical fulfillment of simple measuring tasks. Measured values are displayed and operated via the integrated 4-digit LC display.

Both the main and secondary measured values can be displayed. Like the power supply, the measured value is output via a 4...20mA standard signal.

Error and system messages are shown on the display via an error code.



Compact and economic
Field transmitter with LC
display

GLMU | GPHU | GRMU



+ Advantages

- Pre-calibrated sets of sensor and measuring cell*
- Cost-effective solution for one measurand
- Fast commissioning

⚙ Technical features

- Available for pH (GPHU), redox (GRMU) or conductive conductivity measurement (GLMU)
- 1 x 4...20mA, 2-wire
- Guided 1- / 2-point calibration



*GLMU only

Easy to read inside. Clear outside.

Our panel and field meters with 7-segment display are characterized by a long service life and reliable signal processing. Below the main display there is an additional display that shows switching statuses or parameter designations and thus offers convenient operation. The measuring point can be individually labeled via a text and unit field on the front of the device.

The built-in measuring devices have 2 module slots on which up to 4 output signals can be specified. There is a choice of 2-fold digital output (transistor or relay), 1 active or 2 passive standard signal outputs.

Combined with the choice of AC or DC power supply, the device series can be configured for a wide range of applications.



Visibility and Flexibility

Panel and field meters with 7-segment display

**LF9648 | pH9648 |
LF1010**



⊕ Advantages

- Process value and limit values visible from afar
- Can be customized to application requirements
- Simple operation thanks to additional display

⚙ Technical features

- Available for pH, redox (pH9648) or conductive conductivity measurement (LF9648, LF1010)
- 7-segment and additional display
- up to 2x4...20mA
- Up to 4 digital outputs (relay or transistor)
- Power supply AC (24,115,230V) or DC (24V)
- Automatic temperature compensation
- guided 1- / 2-point calibration or manual input of zero point/slope*

*pH9648 only

Simple connection. Convenient operation.

MULTICON is designed for the convenient evaluation and operation of up to 6 digital sensors and their integration into modern field bus systems.

Its housing is designed for both panel mounting and field installation.

The TFT color display shows all main and secondary measured values of the connected sensors as an overview or sensor-specific information. The identification and diagnostic data as well as your parameters and calibration procedures are made accessible via the MULTICON.

Process values, identification and diagnostic data are output via the Profinet fieldbus and can be easily read into the controller via the device description (GSDML).

MULTICON and the connected sensors can be centrally configured both via the HMI and via the SENSware configuration tool.

To secure the system function, the device has 3 user groups that enable access to the device in stages.



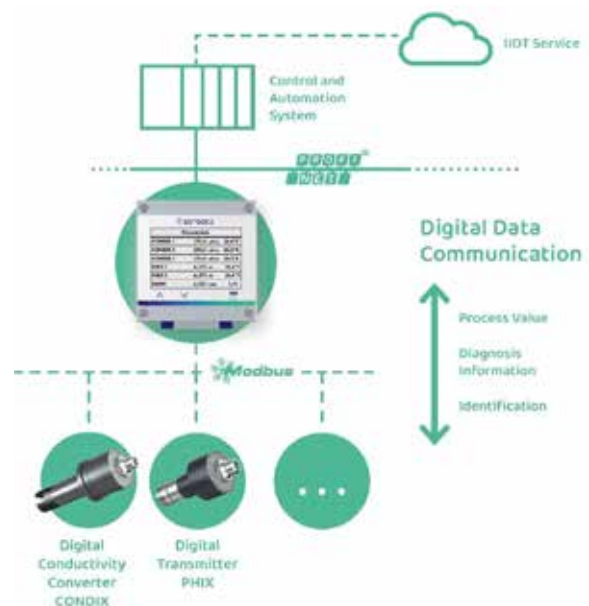
+ Advantages

- Robust housing for panel- and field mounting in one design
- Fast commissioning, operation and troubleshooting and good readability thanks to TFT graphic display
- Central display, operation and commissioning of up to 6 measuring points
- Customizable measuring point designations
- Particularly easy system integration due to Profinet
- Fast and repeatable commissioning thanks to PC configuration

Efficiency at all levels

Multi-channel system in universal design

MULTICON



Technical features

- 24V DC supply voltage
- Suitable for panel mounting and field installation
- Up to 6 digital sensors in any configuration (one input can alternatively be used for flow sensors)
- Ethernet interface with Profinet IO protocol
- USB-C configuration interface
- SENSware configurable

Adapt to your requirements.

Sensors for a wide range of applications.

Our pH combination electrodes and conductivity measuring cells are a comprehensive solution for demanding process environments. They cover a wide measuring range and are designed for durability, so they can deliver reliable measurement data even under the toughest conditions.

Various sensor materials and process connections enable seamless integration into your system.

Conductivity measuring cells, pH and redox electrodes can be tailored precisely to your application with individual specifications, as required in food production, water treatment, the semiconductor, pharmaceutical, or chemical industries, for example.



⊕ Advantages

- Minimal maintenance and downtime thanks to durable sensors.
- Precisely fitting sensors for processes involving contaminated media, extreme conductivity, high or low temperatures, or special pressure requirements for reliable measurement results.



Durable and reliable

pH/redox and conductivity sensors

pH101 | pH111 | pH211
LF4213 | LF4623
LF2603 | LF2453



⚙ Technical features

- pH and redox combination electrodes with application-optimized designs for measuring and reference system.
- 2- and 4-pole measuring cells made of stainless steel or graphite cover the range from ultrapure water to industrial/drinking water to lake or landfill leachate.
- Available process connections include G(R)½, ¾, 1, 1 ¼, clamp connection (DIN 11851) or PVC-U standard fitting.
- Versions for pipe or tank installation as well as interchangeable sensors for open systems such as basins or channels
- FDA-compliant and drinking water-compliant sensors available

A new generation of handheld devices. Designed for professionals, built for every environment.

The brand new PRO line series is a fully redesigned class of professional-grade handheld devices within the Senseca Portable portfolio.

Building on the success of the previous GMH 3000/5000 and HD21/23 models, it adds key features such as a graphical display, a USB-C data logger and a multilingual user interface. These features offer significant benefits to end users worldwide.

The extensive range of features includes an optional data logger, statistics, a USB interface, protection against unauthorised reconfiguration and a programmable favourites key.

The robust design is ideal for use in harsh environments and outdoors. Thanks to the magnet and stand-up bracket, it is also ideal for indoor use and maintenance.

Graphical water analyzers. Multifunctional by design.

The PRO line single-parameter variants focus on one main measurement, such as:

- pH: PRO 510/515
 - GE 135 comfortable pH & Temperature
- Dissolved oxygen: PRO D05.2/.3
 - DX 530 field O₂
 - DX 532 harsh field / larger depth O₂
 - DX 535 laboratory O₂ / Ø 12mm

⊕ Advantages

- Waterproof: IP67
- Impact-proof IK06; drop-protected
- Backlit graphical display for day and night visibility
- Comfortable user interface in five languages
- Nearly maintenance-free optical O₂ sensors for the easiest and most reliable way to monitor oxygen concentration

PRO Line: The innovative professional measuring tool for gaining in-depth insights.

PRO Single parameter



⚙ Technical features

- The PRO xx5 variants feature a data logger that can support up to one million recordings.
- Five different display views, such as: Life chart, multi-parameter and statistics.
- USB-C connector for interface connection or external power supply
- Comfortable adjustment and calibration menu.
- Long battery life with 4 AA alkaline batteries.



Portable multiparameter. Water analyzing systems.

The innovative digital sensor interface of the PRO multiparameter devices enhances the tried-and-tested single-parameter profile class, offering a new class of measurement experience.

Several measurement parameters can be combined in one central display. The SENSECA DX sensor family offers the unique market-leading ability to combine standard water analysis units, such as pH, oxygen and conductivity, with other important parameters, including light/photometry, soil moisture and air quality. The family is constantly growing and ready to explore new application worlds!

Alongside the 3-channel PRO D05 multiparameter device, hybrid versions such as the PRO 595 can be used with inexpensive standard BNC pH electrodes.



PRO line Multiparameter:
Connecting application
worlds to a single point of
truth.

**PRO Multi parameter,
pressure and
DX-Sensors**



⊕ Advantages

- All PRO line advantages
- A fully digital DX sensor portfolio: Ultimate accuracy and convenience.
- Hybrid combination of pH and DX sensors: Still cost-effective!
- Introducing nearly maintenance-free optical O₂ sensors: the easiest and most reliable way to monitor oxygen concentration.
- Market-unique possibility of combining with other sensors, such as air quality, light, pressure and many more

⚙ Technical features

- Up to 3 DX sensor inputs
- PRO 595 pH input via standard BNC connector besides 2 DX inputs
- Comfortable adjustment/calibration menu
- Rechargeable as easy as a smartphone with USB-C

Built to last. Engineered for what matters.

The ECO line is a special concept. It combines high-value, industrial-grade technology with a solid, simplified construction.

It is the easiest way to access reliable electrochemical water analysis. It can be used by heavy users daily or by occasional users who need a reliable instrument exactly when it's needed. The ECO line serves both.

The single parameter instruments focus on pure measurement values, making them safe for occasional users without in-depth knowledge to use as well.

Three parameters are covered by corresponding variants:

- pH: ECO 510
- pH & temperature: ECO511
- Conductivity: ECO521 | ECO522 | ECO523
- Dissolved oxygen: ECO 531



Compact and economic
Easy-to-use water analysis
meters for everybody

ECO line



⊕ Advantages

- Ergonomic and compact design for one-handed operation
- Large backlit display for premium visibility day and night
- Robust and waterproof according to IP65/67 standards
- High-quality, affordable sensors help you to keep costs and work under control
- Professional measuring technology for an entry-level price

⚙ Technical features

- Long battery life of up to 3000 hours with standard AA batteries.
- pH input via standard BNC.
- Conductivity variants with ultra-long-life measuring cells.
- Three-line display with 180° orientation flip function on key press

Enhance your water analysis. With accessories that fit.

Consumables and references for convenient maintenance and maximum reliability of measurement results.



pH buffers

Both stationary systems and portable measuring devices for pH need pH buffers for regular recalibration. Senseca offers a range of technical buffers, to suit your specific practical needs:

> GPH-TAB

Capsules: long storable!



> GPH-DOS

Dosing bottles: practical dosing chamber, 250 ml.



> GPH-BAG

Sachets: one way, easy to transport, boxes of 20 pcs a 25ml.



Storage and Maintenance

Reliable measurements start with proper care. Our storage and cleaning solutions keep your electrodes accurate and long-lasting



> KCL3M

Electrolyte: storage and refill solution – a must to have!



> GRL100

Cleaning agent: for cleaning and degreasing of electrodes.

For conductivity systems

Accuracy depends on the right reference. Our conductivity calibration solutions cover everything from pure water to seawater.

- > **GKL 100:** flexible standard as a reference e.g. for drinking water applications
- > **GKL 101:** specialist for pure water referencing
- > **GKL 102:** sea water reference



Industrial Applications

GERMANY

+49 2191 9672-0
info@senseca.com

Senseca Germany GmbH
Tenter Weg 2
42897 Remscheid

ITALY

+39 0331 53 59 20
info.milan@senseca.com

Senseca Italy S.r.l.
Via Rovereto 9/11
20014 S. Ilario di Nerviano (MI)

Portable Measurement

GERMANY

+49 9402 9383-0
info@senseca.com

Senseca Germany GmbH
Hans-Sachs-Straße 26
93128 Regensburg

Environmental Monitoring

ITALY

+39 049 897 7150
sales.padua@senseca.com

Senseca Italy S.r.l.
Via Marconi 5
35030 Selvazzano Dentro (PD)