Digital Electrochemistry

WATER WASTEWATER

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You measure pH, conductivity or oxygen regularly, perhaps several times daily. In the fields of wastewater and drinking water treatment and in quality assurance, the pH of a sample says a lot about its quality – and therefore about the processes for which you are responsible. Conductivity and oxygen also play a key role in many applications. Whether in the field or in the laboratory, you must be able to rely on the readings of electrochemical parameters at all times.

For more than 50 years, HACH LANGE GmbH has made instruments and electrodes to measure pH, conductivity, oxygen and ISE for all conceivable applications. It therefore successfully combines tradition and innovation. With the HQD series, HACH LANGE GmbH is now offering new portable meters and sensors for electrochemical parameters. **H**igh **Q**uality **D**igital (HQD) means comprehensive and coordinated rugged meters with practical accessories, buffer solutions and intelligent electrodes. What makes HQD unique are the newly developed INTELLICAL electrodes, which store all relevant parameters and transmit them in digital form to the meter. They are unaffected by external interference and can be used with cables up to 30 m long – even for pH! Once the electrode has been calibrated, it can be connected to different meters without having to be recalibrated. The meter recognises the electrodes as soon as they are connected and is immediately ready for use.

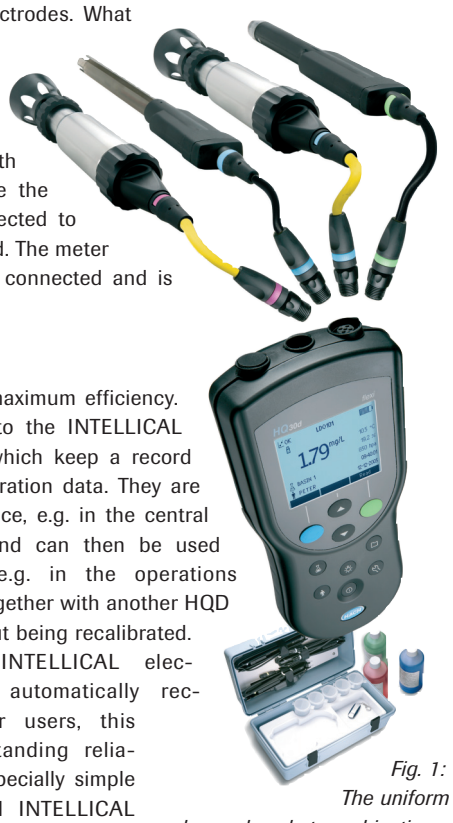

Fig. 1: The uniform plug and socket combination enables all INTELLICAL electrodes to be connected to any measurement channel of the HQD meter.

New digital electrodes

The HQD series provides reliable results with maximum efficiency. Unnecessary calibrations are avoided thanks to the INTELLICAL electrodes, which keep a record of their calibration data. They are calibrated once, e.g. in the central laboratory, and can then be used elsewhere, e.g. in the operations laboratory together with another HQD meter, without being recalibrated.

Digital INTELLICAL electrodes are automatically recognised. For users, this means outstanding reliability and especially simple handling. All INTELLICAL electrodes have the same plug, irrespective of whether they measure pH, conductivity or oxygen, and are geared to each other and interchangeable. Digital electrodes ensure maximum calibration stability, minimum response times and a long service life.

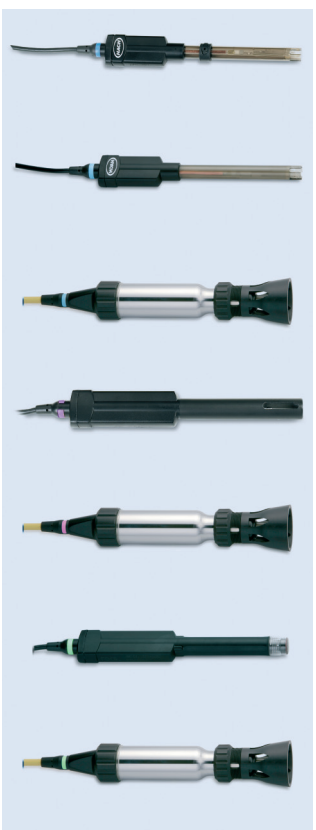

Fig. 2: A selection of electrodes from the extensive INTELLICAL range for pH, conductivity, oxygen and ISE, for laboratory and outdoor applications.

pH, conductivity and oxygen INTELLICAL electrodes provide traceable, highly precise, accurate readings in the field and in the laboratory. INTELLICAL electrodes are available as standard laboratory models and as rugged versions for outdoor applications.

Stainless steel outdoor electrodes protect against external influences such as strong magnetic fields in the vicinity of pump and stirrer motors. They are used at locations that are difficult to access and over long distances (with cable lengths up to 30 m long) – even for pH.

New meters

Have you ever been frustrated by confusing symbols and baffling abbreviations? The new HQD meters communicates in the user's language and displays the results and operating instructions in understandable text. Settings and programmes can be entered quickly and intuitively, without referring to the manual.

All HQD meters are rugged, have a protection rating IP67 and are therefore waterproof and dustproof. They can be mains or battery operated. The power-economy mode is ideal for portable users, and extends battery life. The large illuminated graphic display is immediately understandable and easy to read, even in difficult light conditions.
The HQD series offers three different measurement modes:

- Automatic (AUTOREAD)
- Continuous
- Interval (user-defined)

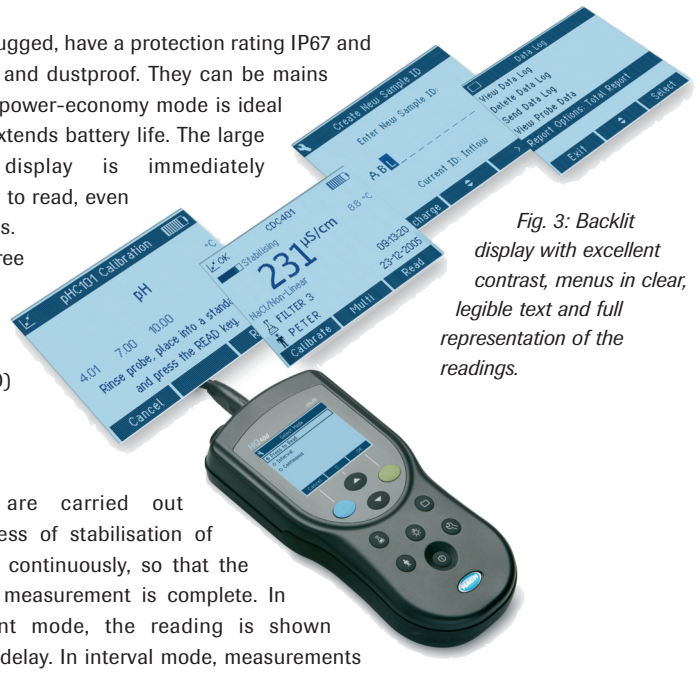

Fig. 3: Backlit display with excellent contrast, menus in clear, legible text and full representation of the readings.

When measurements are carried out automatically, the progress of stabilisation of the reading is displayed continuously, so that the user can see when the measurement is complete. In continuous measurement mode, the reading is shown immediately without any delay. In interval mode, measurements are carried out at user-defined intervals and the HQD functions as a data logger, with a large storage capacity for up to 500 readings. All the relevant data is recorded together with each reading, e.g. date, time, calibration data, user name, etc., thus ensuring that data management conformis with GLP (Good Laboratory Practice).

Fig. 4: Complete HQD field kit

Fig. 5: HQ series of meters for pH; for conductivity; for O_2, pH, conductivity (1 channel); for O_2, pH, conductivity (2 channels).

All HQD meters can accommodate a maximum of 20 user names and 12 sample names containing up to 12 characters. An external keyboard can be connected to the USB interface to simplify the input of such data. The USB interface, with read and write functions, provides up-to-date communication options for PC, printer and data storage devices.

The HQD data can be stored on a USB memory stick. Alternatively, they can also be transmitted directly to a PC with the help of the new HQ-Connect software. The data is in text form and is compatible with Windows™ programmes, e.g. EXCEL™. Complete documentation can therefore be generated in compliance with GLP, also via LIMS.

To ensure operational security and prevent accidental changes to settings, HQD has an optional password protection feature.

Innovation in oxygen metering

Have you ever felt frustrated that a conventional oxygen electrode first has to be polarised and then calibrated?

Two years ago, HACH LANGE GmbH launched its newly developed innovative technique for measuring oxygen: Luminescent Dissolved Oxygen (LDO). This proven technology has now been integrated into the HDQ series and improved further still. With this technique, the electrodes are immediately ready for use without any prior polarisation and calibration. No sample stirring is necessary, and the new physical detection method consumes none of the sample's oxygen content. This is especially significant when very low concentrations have to be measured.

Other properties of the LDO electrode include:

- Annual sensor change, with automatic reminder
- Drift-free
- Maintenance-free
- Membrane-free
- No electrolyte
- No interference from deposits or hydrogen sulphide (H_2S)

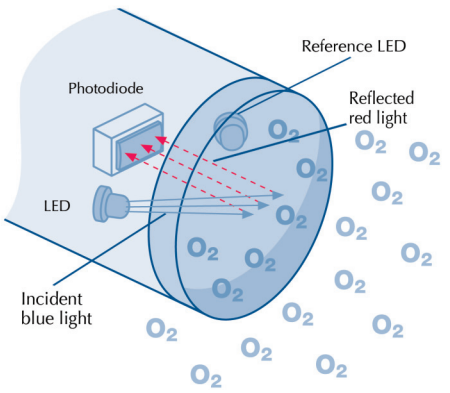

Fig. 6: Measurement principle of LDO oxygen electrode

Reliable and traceable

An automatic calibration function and the use of a control standard ensure reliable and traceable readings. The user sets the calibration interval (hours or days) individually and is automatically reminded when the calibration is due. The quality of the calibration can be adjusted by specifying the upper and lower limits of the slope.

When large numbers of samples have to be handled, and for quality control purposes, it is advisable to measure a control standard between calibrations. HQD has a "Check Standard" function for this purpose. This is defined by the user, who is then automatically prompted to measure a standard solution. If the result is not within the permissible limits of the standard, an error message is displayed and a new calibration is recommended.

Fig. 7: Colour-coded pH buffer solutions for routine applications

Standard solutions are essential for calibration and quality control. HACH LANGE offers a wide selection of pH buffer solutions and conductivity standards. The certified IUPAC pH buffer solutions and IUPAC conductivity standards, which satisfy the highest quality requirements, are recommended. They are completely traceable and offer excellent accuracy and reproducibility. The standards are supplied in special packaging with protective gas and have a shelf life of 2 years. Molar conductivity standards and ISO-compliant colour-coded pH buffer solutions are available for routine daily measurements.

Table. 1: HQD meters and their key characteristics

	HQ11D	HQ14D	HQ30D	HQ40D
Measurement channels	1	1	1	2
Oxygen			•	•
pH	•		•	•
Conductivity		•	•	•
Redox potential	•		•	•
ISE				•
Temperature	•	•	•	•
Resistivity		•	•	•
TDS		•	•	•
Salinity		•	•	•
Air pressure (oxygen measurement)			•	•
AUTOREAD	•	•	•	•
AUTOCAL	•	•	•	•
USB interface	•	•	•	•
Protection rating IP67	•	•	•	•
Data memory for 500 readings	•	•	•	•
Sample name	•	•	•	•
Operator name	•	•	•	•
Battery and mains operation	•	•	•	•

pH/Redox Electrodes – Now Even Better

Customers can now measure the pH value and redox potential (ORP) using the cost-effective sensors in the JUMO BlackLine series of electrodes from **JUMO GmbH & Co. KG** (Germany) These electrodes – tried and tested for many years – have recently been made even better.

So far, only high-quality process electrodes have been manufactured using the well-proven JUMO solid electrolyte and annular-gap diaphragm. The resulting benefits are a longer electrode life and, at the same time, a reduced danger of electrolyte poisoning due to the ingress of foreign matter and electrode poisons.

The open annular-gap diaphragm provides the link between the medium and reference system. A rugged reference system in cartridge style has replaced the wire conduction system used up to now. The application of a cartridge-style reference system ensures that the electrolyte supplies a stable reference signal, with the result that stable measurements are transmitted for a longer period during the entire measurement process. These sensors are therefore ideally suited to the use in aquariums (also seawater aquariums), in greenhouse technology, and for determining the pH and/or redox potential in surface water (rainwater, pond water).

Thanks to our 30 years of experience in electrode manufacture, the user can be sure that what he purchases are not cheap products but fully matured sensors with an excellent price-performance ratio.

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New Line of Water Quality Instruments

In-Situ Inc. (USA) announces the release of the Aqua TROLL® 200, a 18.3 mm diameter water quality instrument designed for monitoring and logging conductivity, level/pressure and temperature in the harshest environments. Building on the successful Level TROLL platform, the Aqua TROLL 200 features open communications that are SCADA and telemetry ready. Standard output includes Modbus/RS485, SDI-12 and 4-20mA. The Aqua TROLL 200 is engineered to combat fouling and conserve power, allowing it to be deployed for extended periods of time. Constructed of corrosion-resistant titanium, the Aqua TROLL 200 withstands demanding marine, ground and surface water applications. In addition, the Aqua TROLL 200 operates on 8-36 VDC external power or internal batteries that are guaranteed for 5 years when logging every 15 minutes. Standard logging modes include linear, fast linear, linear averaging and event with a 1/sec logging rate and 4MB memory for storage of up to 200,000 data points. Included Win-Situ® software simplifies data management by providing easy set-up, downloading, data analysis and export tools. The Aqua TROLL 200 is available in absolute and gauged models up to 500 psi or 1153 feet (351 m). Optional accessories include the field durable RuggedReader® handheld computer, titanium back shell hanger and RuggedCableTM with convenient Twist-Lock connectors. Typical applications for the Aqua TROLL 200 include tidal influence studies, saltwater intrusion monitoring, and aquifer storage and recovery (ASR) projects.

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