

**INFORMATION**

LABORATORY ANALYSIS

PORTABLE DIGITAL ELECTROCHEMISTRY



# Digital Electrochemistry

Confidence in pH, oxygen, conductivity, redox



UNITED FOR WATER QUALITY



Flexible + reliable: INTELLICAL electrodes measure correctly with every HQD, because they take their calibration with them—Mix + Match!

Simple + accurate: the same connection for all electrodes, for all parameters

Reliable + clear: HQD meters communicate clearly in all languages



### When was your last calibration?

You measure pH frequently—perhaps several times daily. You are aware that the pH says a lot about the quality of a sample, and the processes for which you are responsible. Especially in the treatment of wastewater and drinking water, conductivity and oxygen play a key role in many applications. Whether in the field or in the laboratory, you have to be able to rely on the readings of electrochemical parameters—at all times.

### Have confidence in your pH, conductivity and oxygen readings!

**High Quality Digital—HQD** means complete, coordinated, stable meters with practical accessories and intelligent electrodes. What makes HQD special is the newly developed INTELLICAL electrodes, which store all relevant characteristic parameters in digital form. In practice, this means they measure pH, conductivity and oxygen correctly—more reliable, flexible and simple than ever before.

Optimised for practical use: meters, electrodes, buffer solutions



Digital INTELLICAL electrodes are recognised automatically

→ **Outstanding reliability and simple handling**

Digital INTELLICAL electrodes and meters are geared to each other and are interchangeable (Mix + Match principle)

→ **Flexible and efficient—ideal for use with varying applications**

The calibration data is stored in the INTELLICAL electrodes, and the control intervals can be programmed to enable application—specific status checks

→ **Correct results in the shortest time possible**

Stable, ready-to-use INTELLICAL oxygen sensor with luminescence (LDO) technology

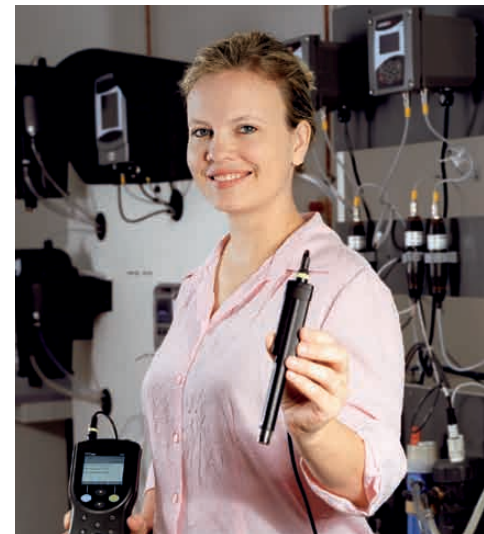
→ **Reliable O<sub>2</sub> results—without calibration or replacing the electrolyte**

All INTELLICAL electrodes with integrated temperature sensor

→ **Time-saving automatic temperature compensation**

More than 50 years of experience in developing and making electrodes and instruments for use in the field and in the laboratory

→ **Competent support through innovative technology and comprehensive applications know-how**



"Our customers need reliable results in the shortest time possible. So we asked ourselves how unnecessary, time-consuming, calibration could be avoided. Our development team came up with an innovative answer in the form of digital electrodes, which save their own calibration data. They are calibrated once, in the central laboratory. They can be used in totally different locations without having to repeat the calibration each time they are used with a different meter. Genuine Mix + Match!"

Melissa Aquino,  
product manager, Düsseldorf



# Digital electrochemistry: have confidence

Fully documented: individual names for samples and users

GLP data management: save all settings for each measurement



**You prefer plain language? HQD too!**

HQD communicates clearly—this was a priority for HACH LANGE. Clear, legible text on the illuminated display. The intuitive menu structure is easily user friendly and ensures smooth, error-free handling. From one-touch measurements to the programming of complex tasks, you will appreciate the plain language of HQD!

Optimised readings: visual and acoustic notification of stable readings

**Calibration? HQD reminds you!**

Reliable pH readings are now very simple. You set the interval between calibrations to suit your own situation. HQD reminds you when recalibration is due. Furthermore, you can also define the calibration quality by entering requirements with regard to the slope.

Intuitive operation: from one-touch measurement to complex programming



Ingeniously simple: data transfer with a USB stick

Practical: colour coding of electrode and plug, e.g. purple for conductivity

Up to date: HQ 40D multi communicates with the printer, keyboard and PC through a USB port



Large illuminated graphic display. Results and operating instructions in plain English

→ **Immediately understandable and easy to read, even in difficult light conditions**

One-touch measurement and user programming through intuitively understandable menus

→ **Optimal handling for every user**

Automatic measurement with the progress of the stabilisation of the reading shown on the display. User-defined measurement interval (data logger)

→ **Reliable, error-free measurement in all conditions**

Freely selectable calibration interval, slope tolerances and standard control solution

→ **Reliable readings at all times**

USB, PC, printer and keyboard connections, with all read and write functions

→ **Complete GLP-compliant communication and documentation, also via LIMS**

All the necessary information about each reading is automatically saved

→ **Full GLP data management**

Password-protected programmes and settings

→ **Accidental changes to settings are excluded; outstanding operational reliability**



"Have you ever felt confused by mysterious symbols and baffling abbreviations? We have too! So we decided that HQD would combine technical excellence with a clearly understandable user interface. With so many languages this was no simple matter, but it was worth the effort. Our customers can carry out measurements immediately with HQD, without first having to search through the manual."

Johannes Berssen,  
software developer, Berlin

# You always know what to do with HQD





**Our pH and conductivity electrodes have already passed their baptism of fire!**

INTELLICAL electrodes are the proud result of more than 50 years of glass blowing craftsmanship. In cold drinking water, heavily polluted wastewater or low-ion process water—you benefit from their minimum response times, maximum calibration stability and long service life. Naturally, this also applies to the outdoor electrodes made of stainless steel, which remain intact even under the most trying conditions. Cables of up to 30 m in length enable digital data transmission from previously inaccessible measurement locations, e.g. lakes, boreholes and bridges—even for pH.



pH gel electrode, rugged design, with 5, 10, 15, 30 m cable



4-pin conductivity electrode, laboratory version, with 1 or 3 m cable



HQ 40D multifunctional meter—waterproof (IP 67), with continuous protective grip made of nonslip rubber

Batteries for more than 2000 pH readings—with power-economy mode, safe from data losses

Rugged field kit cases

Outdoor electrode in rugged, waterproof (IP 67) design, impact protection can be removed for cleaning purposes

Digital INTELLICAL electrodes with maximum calibration stability, service life and minimum response times

→ **Reliable, high-precision, high-accuracy readings**

pH and conductivity electrodes in various designs for use in the laboratory and in the field

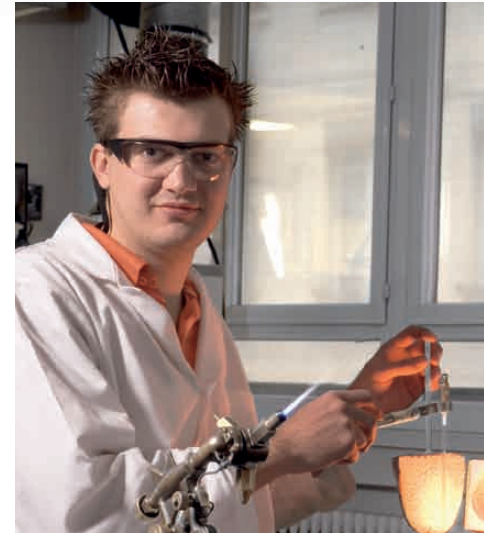
→ **Versatile electrodes for all applications, e.g. wastewater, drinking water, process water**

HQD meters, rugged and waterproof (IP 67), mains and battery operated, power-economy mode, large memory for 500 readings

→ **Ideal for portable use**

Rugged outdoor electrodes with cables up to 30 m long—without interferences thanks to digital technology

→ **Reliable results from inaccessible measurement locations and over long distances—even for pH**



Digital INTELLICAL electrodes for pH and conductivity



pH liquid electrode, laboratory version, with 1 or 3 m cable



pH gel electrode, laboratory version, with 1 or 3 m cable



4-pin conductivity electrode, rugged design, with 5, 10, 15, 30 m cable

Cable lengths up to 30 m—even for pH

"High-precision glass electrodes—no instrument can match the products of our genuine craftsmanship! We can look back on more than 50 years of glass blowing with justified pride—we make electrodes for pH, conductivity, ion-selective electrodes, etc. for every possible application. To do this we make use of our original glass recipes—and steady hands, without which we couldn't do anything! Traceable quality is our top priority, because this is a must for customers today."

Sébastien Lazzaro,  
glassblower, Lyon

# pH and conductivity— suitable for all types of water

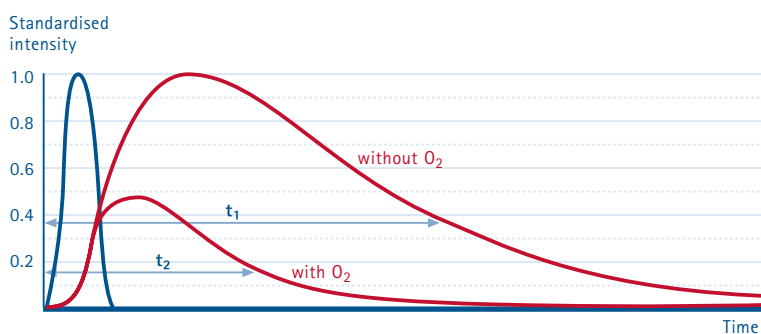
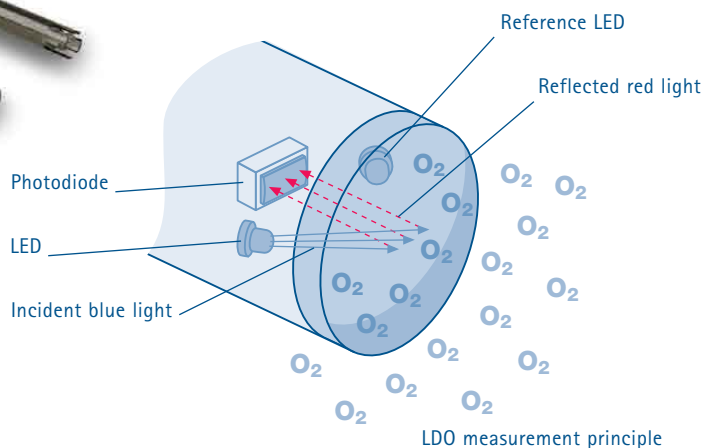


**Why calibrate, when you could be taking readings?**

Forget it—calibrating O<sub>2</sub> electrodes is history! Today there is LDO—the dissolved oxygen sensor without drift, without electrolyte, without membrane clogging. The new measurement principle (**LDO** stands for **L**uminescent **D**issolved **O**xygen) has revolutionised oxygen measurement. Instead of frequent calibration and electrolyte replacement, you simply change the sensor cap once each year. Using LDO saves time and money—from the very first day, in every application.

Shock-resistant in the field: The protective covering prevents damage to the HQ30D flexi and electrodes

Extremely flexible with Mix + Match. The HQ30D flexi also carries out measurements with INTELICAL pH and conductivity electrodes



— Incident light — Emitted light The more O<sub>2</sub> the sample contains, the shorter the period of luminescence



Drift-free LDO sensor

→ **No calibration, no polarisation**

Luminescence-based LDO technology

→ **No replacement of electrolyte, no interference by deposits or H<sub>2</sub>S**

INTELLICAL LDO technology with an automatic reminder to change the sensor cap each year

→ **Error-free results with minimum effort**

Flow-free sensor without O<sub>2</sub> consumption

→ **Precise and accurate measurements at high and low O<sub>2</sub> concentrations**



LDO sensor, laboratory version,  
with 1 or 3 m cable



LDO sensor, rugged design,  
with 5, 10, 15, 30 m cable



Memory chip  
with sensor cap  
calibration data

Each LDO sensor cap is supplied ready  
to use, including a memory chip.  
You are alerted automatically when  
the annual replacement is due



"As service engineers, we are as enthusiastic as our customers about the LDO method of measuring oxygen! It is not always easy to do something different, but where differences to the expected results have occurred, LDO has always been found to be correct. It really is true that the advantages of LDO make it absolutely superior! Since it was launched, LDO has proved itself everywhere where oxygen is measured. In the process version LDO is just as successful—our customers in the sewage treatment sector are achieving big savings in their energy costs!"

Wim Vandebroek,  
field service engineer, Mechelen

# LDO measurement is simpler than ever before

# Technical Data



	HQ 11D	HQ 14D	HQ 30D FLEXI	HQ 40D MULTI
Electrode connectors	1 (pH)	1 (Conductivity)	1 (pH, Cond., O <sub>2</sub> )	2 (pH, Cond., O <sub>2</sub> , ISE)
<b>Dissolved oxygen (LDO)</b>			•	•
Range			0.00–20.0 mg/l; 0–200%	
Resolution			0.01 or 0.1 mg/l; 0.1% saturation	
Accuracy			±1% of the measuring range	
Air pressure compensation			Automatic	Automatic
<b>pH</b>	•		•	•
Range	0–14		0–14	0–14
Resolution (selectable)	0.1/0.01/0.001		0.1/0.01/0.001	0.1/0.01/0.001
Accuracy	±0.002		±0.002	±0.002
Temp. compensation	Automatic		Automatic	Automatic
<b>ORP</b>	•		•	•
Range	±1500 mV		±1500 mV	±1500 mV
Resolution	0.1		0.1	0.1
Accuracy	±0.1 mV		±0.1 mV	±0.1 mV
<b>Ion concentration (ISE)</b>				•
Range				Depends on the ISE electrode
Resolution (selectable)				Max. 5 places; 0.1/0.01/0.001
Accuracy				±0.1 mV
<b>Temperature</b>	•	•	•	•
Range	-10 to +110 °C	-10 to +110 °C	-10 to +110 °C	-10 to +110 °C
Resolution	0.1 °C	0.1 °C	0.1 °C	0.1 °C
Accuracy	±0.3 °C	±0.3 °C	±0.3 °C	±0.3 °C
<b>Conductivity</b>		•	•	•
Range		0.01 µS/cm–200 mS/cm		0.01 µS/cm–400 mS/cm
Resolution		Max. 5 places, 2 decimal places, if possible		
Accuracy		±0.5 % (1 µS/cm–200 mS/cm)		±0.5% (1µS/cm–400 mS/cm)
Temperature compensation		Non-linear (natural water in conformity with DIN 38404 and EN ISO 7888), non-linear (NaCl), linear coefficient [numeric value] % / °C, no compensation		

	HQ 11D	HQ 14D	HQ 30D FLEXI	HQ 40D MULTI
<b>Resistivity</b>		•	•	•
Range		2.5 Ω cm–49 MΩ cm	2.5 Ω cm–49 MΩ cm	2.5 Ω cm–49 MΩ cm
Resolution		Max. 5 figures	Max. 5 figures	Max. 5 figures
Accuracy		±0.5%	±0.5%	±0.5%
<b>TDS</b>		•	•	•
Range		0.0–50.0 mg/l	0.0–50.0 mg/l	0.0–50.0 mg/l
Resolution		Max. 3 figures	Max. 3 figures	Max. 3 figures
Accuracy		±0.5 in the measuring range		
<b>Salinity</b>		•	•	•
Range		0–42 (g/kg, ‰, no unit)		
Resolution		Up to 0.01 ppt	Up to 0.01 ppt	Up to 0.01 ppt
Accuracy		±0.1 mg/l at < 8 mg/l	±0.1 mg/l at < 8 mg/l	±0.1 mg/l at < 8 mg/l
Autoread	•	•	•	•
Autocal Automatic buffer recognition	pH: s. HQ30/40D		pH: IUPAC 1.679; 4.005; 7.000; 10.012 DIN 1.09; 4.65; 9.23 Colour coded 4, 7, 10	
		Conductivity: Demal (1 D; 0.1 D; 0.01 D) Molar (0.1 M; 0.01 M; 0.001 M) NaCl (0.05%; 25 µS/cm; 1000 µS/cm; 18 mS/cm) User defined; standard sea water		
Calibration points With calibration and check standard reminder	Max. 4 points	1 point	pH max. 4 points Conductivity 1 point O <sub>2</sub> 1 point	pH max. 4 points Conductivity 1 point O <sub>2</sub> 1 point ISE max. 5 points
Sensor status indicator	•	•	•	•
Interfaces				Waterproof USB port for printer, PC, keyboard and USB stick
Password protection	•	•	•	•
Data management	Basic, detailed, total (GLP)			
Data memory	500 readings; data can be saved manually or automatically			
Sample_ID and operator_ID	Alphanumeric, max. 12 characters; 12 sample names and 20 user names Automatic logging of sample numbers (0–999)			
Measurement mode	Manual, interval, continuous; analytical methods editable			
Display	Backlit graphic display; 240 × 160 pixel; automatic switch-off in economy mode. With date and time display. Simultaneous display of two parameters (HQ40D).			
Power supply	115 V / 250 V (power unit optional)			115 V / 250 V
Battery operation	4 AA batteries or rechargeable batteries (battery charger is needed)			
Protection class	IP67 for instrument, outdoor electrodes and connections			
Dimensions, weight	95 × 197 × 36 mm (H × W × L), 323 g (without batteries)			

Subject to change without notice

HACH LANGE – [www.hach-lange.com](http://www.hach-lange.com)



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## Accessories

Product	Description	Art. No.
Outdoor Kit	Shockproof plastic cover for outdoor use; with hand strap and neck strap	5828700
Electrode holder	Shockproof holder for the standard electrode, with cable management for up to 3 metres of cable; can be plugged into the plastic cover	5829400
Case	For standard electrodes; practical plastic case, shockproof, lightweight; contains the outdoor kit, two electrode holders for standard electrodes and 5 sample bottles (120 ml)	5825800
Case	For outdoor electrodes; practical plastic case, shockproof, lightweight; contains the outdoor kit and 5 sample bottles (120 ml)	5835700
Cable marker	For marking the submersion depth; (5/pk)	5828610
Electrode marker	Coloured markers for identifying the different electrodes; 5 colours, 2 markers per colour	5819400
USB adapter	For connecting a USB stick, printer, keyboard or PC (HQ 40D only)	5813400
USB stick	For saving data and transferring data between the HQ 40D and the PC; 128 MB capacity	LZV568
Keyboard	With USB connector	LZV582
LDO sensor cap	Contains one sensor cap, memory chip with calibration data, and sealing rings	5181200
Power unit	For mains operation	5826300

## Electrodes / Sensors

All INTELLICAL standard electrodes/sensors are watertight to depth of 3 metres for 24 hours, including temperature sensor.  
 All INTELLICAL outdoor electrodes/sensors are watertight to depth of 30 metres for 24 hours, including temperature sensor, steel housing, with reinforced cable.

Product	Description	Cable length	Art. No.	Cable length	Art. No.
<b>pH</b>					
	INTELLICAL pH standard electrode, liquid electrolyte	1 m	PHC301-01	3 m	PHC301-03
	INTELLICAL pH standard electrode, gel electrolyte, maintenance-free	1 m	PHC101-01	3 m	PHC101-03
	INTELLICAL pH rugged outdoor electrode, gel electrolyte, maintenance-free	5 m	PHC101-05	10 m	PHC101-10
		15 m	PHC101-15	30 m	PHC101-30
<b>Conductivity</b>					
	INTELLICAL conductivity standard electrode, 4-pin graphite	1 m	CDC401-01	3 m	CDC401-03
	INTELLICAL conductivity rugged outdoor electrode, 4-pin graphite	5 m	CDC401-05	10 m	CDC401-10
		15 m	CDC401-15	30 m	CDC401-30
<b>LDO (Dissolved Oxygen)</b>					
	INTELLICAL LDO standard sensor	1 m	LDO101-01	3 m	LDO101-03
	INTELLICAL LDO rugged outdoor sensor	5 m	LDO101-05	10 m	LDO101-10
		15 m	LDO101-15	30 m	LDO101-30

With our expanding product offerings, more helpful accessories and special sensors will be available soon.  
 Please contact your local HACH LANGE office.

# pH Buffer- and Conductivity standard solutions

PH BUFFER SOLUTIONS			
Product	Description	Quantity	Art. No.
<b>Certified pH standard solutions. IUPAC range</b> Supplied in airtight sealed can; guaranteed shelf life; with COFRAC certificate; traceable to standard reference materials tolerance $\pm 0.010$ pH (25 °C)			
pH 1.679		500 ml	S11M001
pH 4.005		500 ml	S11M002
pH 7.000		500 ml	S11M004
pH 10.012		500 ml	S11M007
<b>Quality buffer solutions</b> Ready-to-use buffer solutions in bottles; with and without colour coding *			
pH 4.01	Red	500 ml	2283449
pH 7.00	Yellow	500 ml	2283549
pH 10.01	Blue	500 ml	2283649
pH 4.01	No colour code	500 ml	1222349
pH 7.00	No colour code	500 ml	1222249
pH 10.00	No colour code	500 ml	1222149
pH 1.09	Technical buffer solution (DIN 19267)	500 ml	S11M009
pH 4.65	Technical buffer solution (DIN 19267)	500 ml	S11M010
pH 9.23	Technical buffer solution (DIN 19267)	500 ml	S11M011
<b>pH buffer powder pillows</b> Individually sealed reagent powder pillows. each of which can be used to prepare 50 ml solution; with and without colour coding *			
pH 4.01	Red	50/pk	2226966
		250/pk	2226964
pH 7.00	Yellow	50/pk	2227066
		250/pk	2227064
pH 10.00	Blue	50/pk	2227166
		250/pk	2227164
<b>SINGLET buffer solutions</b> Buffer solutions in individually sealed airtight pouches; colour coded; 25 ml/pouch *			
pH 7.00 and pH 10.01	Yellow + Blue	2 × 10/pk	2769820
pH 4.01 and pH 7.00	Red + Yellow	2 × 10/pk	2769920
pH 4.01	Red	20/pk	2770020
pH 7.00	Yellow	20/pk	2770120
pH 10.01	Blue	20/pk	2770220

CONDUCTIVITY STANDARD SOLUTIONS			
Product	Description	Quantity	Art. No.
<b>Certified conductivity standard solutions</b> Supplied in airtight sealed can; guaranteed shelf life; with certificate; traceable to standard reference materials			
KCl 1 D	111.3 mS/cm $\pm 0.5\%$	500 ml	S51M001
KCl 0.1 D	12.85 mS/cm $\pm 0.35\%$	500 ml	S51M002
KCl 0.01 D	1408 $\mu$ S/cm $\pm 0.5\%$	500 ml	S51M003
NaCl 0.05%	1015 $\mu$ S/cm $\pm 0.5\%$	500 ml	S51M004
<b>NaCl solutions</b>			
85.47 mg/l as NaCl	180 $\pm 10$ $\mu$ S/cm	100 ml	2307542
491 mg/l as NaCl	1,000 $\pm 10$ $\mu$ S/cm	100 ml	1440042
1,000 mg/l as NaCl	1,990 $\pm 20$ $\mu$ S/cm	100 ml	210542
10,246 mg/l as NaCl	18,000 $\pm 50$ $\mu$ S/cm	100 ml	2307442
<b>Molar KCl solutions</b>			
KS 910 KCl 0.1 M	12.88 mS/cm	500 ml	C20C250
KS 920 KCl 0.01 M	1.413 mS/cm	500 ml	C20C270
KS 930 KCl 0.001 M	146.9 $\mu$ S/cm	500 ml	C20C280
<b>Other</b>			
Electrode rinse solution		20/pk	2770320
Electrode rinse solution		500 ml	2756549

\* All buffer solutions are traceable to standard reference materials produced by NIST; tolerance  $\pm 0.02$  pH (25 °C).



# The best combination for everybody

Select the article number for your individual HQD starter set.



**HQ XX D .99. XXX XXX**

Meter	
40	HQ 40D multi 2-channel instrument for pH, cond., ISE and O <sub>2</sub>
30	HQ 30D flexi 1-channel instrument for pH, cond. and O <sub>2</sub>
14	HQ 14D 1-channel instrument for conductivity
11	HQ 11D 1-channel instrument for pH

Electrode/Sensor 1	
000	No electrode
101	PHC 101 standard, pH, gel, 1 m
103	PHC 101 standard, pH, gel, 3 m
105	PHC 101 outdoor, pH, 5 m
110	PHC 101 outdoor, pH, 10 m
115	PHC 101 outdoor, pH, 15 m
130	PHC 101 outdoor, pH, 30 m
151	PHC 301 standard, pH, liquid electrolyte, 1 m
153	PHC 301 standard, pH, liquid electrolyte, 3 m
201	CDC 401 standard, conductivity, 1 m
203	CDC 401 standard, conductivity, 3 m
205	CDC 401 outdoor, conductivity, 5 m
210	CDC 401 outdoor, conductivity, 10 m
215	CDC 401 outdoor, conductivity, 15 m
230	CDC 401 outdoor, conductivity, 30 m
301	LDO 101 standard, O <sub>2</sub> , 1 m
303	LDO 101 standard, O <sub>2</sub> , 3 m
305	LDO 101 outdoor, O <sub>2</sub> , 5 m
310	LDO 101 outdoor, O <sub>2</sub> , 10 m
315	LDO 101 outdoor, O <sub>2</sub> , 15 m
330	LDO 101 outdoor, O <sub>2</sub> , 30 m

Electrode/Sensor 2	
000	No electrode (always for HQ 11D and HQ 14D)
101	PHC 101 standard, pH, gel, 1 m
103	PHC 101 standard, pH, gel, 3 m
105	PHC 101 outdoor, pH, 5 m
110	PHC 101 outdoor, pH, 10 m
115	PHC 101 outdoor, pH, 15 m
130	PHC 101 outdoor, pH, 30 m
151	PHC 301 standard, pH, liquid electrolyte, 1 m
153	PHC 301 standard, pH, liquid electrolyte, 3 m
201	CDC 401 standard, conductivity, 1 m
203	CDC 401 standard, conductivity, 3 m
205	CDC 401 outdoor, conductivity, 5 m
210	CDC 401 outdoor, conductivity, 10 m
215	CDC 401 outdoor, conductivity, 15 m
230	CDC 401 outdoor, conductivity, 30 m
301	LDO 101 standard, O <sub>2</sub> , 1 m
303	LDO 101 standard, O <sub>2</sub> , 3 m
305	LDO 101 outdoor, O <sub>2</sub> , 5 m
310	LDO 101 outdoor, O <sub>2</sub> , 10 m
315	LDO 101 outdoor, O <sub>2</sub> , 15 m
330	LDO 101 outdoor, O <sub>2</sub> , 30 m

Example: HQ30D + pH electrode, gel, 1 m cable + LDO sensor, 1 m cable = HQ 30D.99.101301

Every set is equipped with buffer/standard solutions. Every HQ30D and HQ40D set contains a case and an outdoor kit.



## Do you want?

Reliable results for pH, conductivity, O<sub>2</sub>—  
at all times, wherever you are

## The solution

Digital electrochemistry with HQD meters and  
INTELLICAL electrodes



- The Mix + Match of electrodes and meters ensures reliability and flexibility
- Calibration data is securely stored in the electrode— for correct values at all times
- Plain language and easy operating stand for intuitive handling
- Versatile electrodes and practically proven accessories ensure reliable operation
- The LDO method of oxygen measurement gives enormous handling benefits
- The HQD technology and INTELLICAL electrodes are backed up by more than 50 years of production experience



The fast way to the right result:  
arrive on site



Connect the electrodes



Read.  
HQD: analysis without waiting.