HD 2256.2
BENCH-TOP pH AND CONDUCTIVITY METER

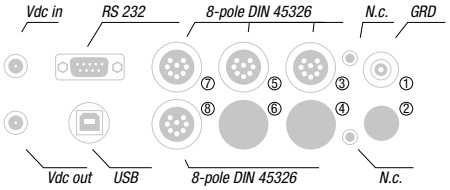
The **HD2256.2** is a bench top instrument for electrochemical measures: **pH**, **conductivity** and **temperature**. It is fitted with a large backlighted LCD display.
The **HD2256.2** measures **pH**, **mV**, **redox potential** (ORP) with pH, redox electrodes or electrodes with separate reference. **Conductivity and resistivity** in liquids, **total dissolevd solids** (TDS) and **salinity** with combined 4-ring and 2-ring conductivity/temperature probes. The conductivity probes can have a direct input or with SICRAM module. The inputs are separate.
Al models are fitted with input for the measurement of t**emperature** with Pt100 or Pt1000 immersion, penetration or contact probes. The temperature probes are equipped with an automatic recognition module and factory calibration data are stored inside.

- The pH electrode calibration can be carried out on one or five points and the calibration sequence can be chosen from a list of 13 buffers Temperature compensation can be automatic or manual.
- The conductivity probe calibration can be performed automatically with automatically detected conductivity calibration solutions: 147µS/cm, 1413µS/cm, 12880µS/cm or 111800µS/cm or manually with calibration solutions having different values.
- Conductivity, dissolved oxygen and temperature probes fitted with SICRAM module can store factory and calibration data inside.

The data can be transferred from the instrument connected to a PC via the multi-standard RS232C serial port and USB 2.0. The storing parameters can be configured using the menu.
The RS232C serial port can be used to transfer the acquired measurements to a 24 column portable printer in real time (HD40.1 or HD40.2).
The instruments equipped with **HD22BT** (Bluetooth) option can transfer data without any connection to a PC or printer fitted with Bluetooth input or through Bluetooth/RS232C converter.
The software DeltaLog11 allows instrument management and configuration, and data processing on PC.
The instruments have IP66 protection degree.

Technical characteristics HD2256.2
pH - mV - χ - Ω - TDS - NaCl - °C - °F

Instrument	
Dimensions (Length x Width x Height)	265x185x70mm
Weight	490g
Materials	ABS, rubber
Display	Back lighted, matrix point display. 240x64 points, visible area: 128x35mm
Operating conditions	
Working temperature	-5 … 50°C
Storage temperature	-25 … 65°C
Working relative humidity	0 … 90% R.H. without condensate
Protection degree	**IP66**
Power	
	Mains adapter (cod. SWD10) 12Vdc/1A
Auxiliary socket	For supplying of electrode holder with built-in stirrer HD22.2
Security of memorized data	
	Unlimited
Time	
Date and hour	Real time schedule with backup battery 3.6V - ½AA
Accuracy	1min/month max drift
Measured values storing	
Quantity	2000 screens
Storage interval	1s … 999s



Calibration storage

Quantity	Last 8 calibrations of each physical quantity

RS232C serial interface

Type	RS232C electrically isolated
Baud rate	Can be set from 1200 to 115200 baud
Data bit	8
Parity	None
Stop bit	1
Flow Control	Xon/Xoff
Length of serial cable	Max 15m

USB Interface

Type	1.1 - 2.0 electrically isolated
Bluetooth Interface	optional

Connections

Input for temperature probes with SICRAM modules⑤	8-pole male DIN45326 connector
pH/mV input ①	BNC female
Input for SICRAM module pH/ temperature ③	8-pole male DIN45326 connector
2/ 4- electrode direct conductivity input ⑧	8-pole male DIN45326 connector
Input conductivity electrodes with SICRAM module⑦	8-pole male DIN45326 connector
Serial interface	DB9 connector (9- pole male)
USB interface	USB connector type B
Bluetooth	Optional
Mains adapter	2-pole connector (Ø5.5mm-2.1mm). Positive at centre
Outlet for power supply of electrode holder with built-in magnetic stirrer	2-pole connector (Ø5.5mm-2.1mm). Positive at centre (output 12Vdc/200mA max).

pH measurement by instrument

Measuring range	-9.999…+19.999pH
Resolution	0.01 o 0.001pH selectable from menu
Accuracy	±0.001pH ±1digit
Input impedance	$>10^{12}\Omega$
Calibration error @25°C	|Offset| > 20mV Slope > 63mV/pH o Slope < 50mV/pH Sensitivity > 106.5% or Sensitivity < 85%
Calibration points	Up to 5 points with 13 automatically detected buffer solutions
Standard solutions automatically detected (@25°C)	1.679pH - 2.000pH - 4.000pH - 4.008pH 4.010pH - 6.860pH - 6.865pH - 7.000pH 7.413pH - 7.648pH - 9.180pH - 9.210pH 10.010pH

mV measurement by instrument

Measuring range	-1999.9…+1999.9mV
Resolution	0.1mV
Accuracy	±0.1mV ±1digit
Drift after 1 year	0.5mV/year

Conductivity measurement by instrument

		Resolution
Measuring range (Kcell=0.01) / Res.	0.000…1.999µS/cm	0.001µS/cm
Measuring range (Kcell=0.1) / Res.	0.00…19.99µS/cm	0.01µS/cm
Measuring range (K cell=1) / Res.	0.0…199.9µS/cm	0.1µS/cm
	200…1999µS/cm	1µS/cm
	2.00…19.99mS/cm	0.01mS/cm
	20.0…199.9mS/cm	0.1mS/cm
Measuring range (Kcell=10) / Ris.	200…1999mS/cm	1mS/cm
Accuracy (conductivity)	±0.5% ±1digit	

Measurement of resistivity by instrument

		Resolution
Measuring range (Kcell=0.01)	Up to 1GΩ·cm	(*)
Measuring range (Kcell=0.1)	Up to 100MΩ·cm	(*)
Measuring range (K cell=1)	5.0…199.9Ω·cm	0.1Ω·cm
	200…999Ω·cm	1Ω·cm
	1.00k…19.99kΩ·cm	0.01kΩ·cm
	20.0k…99.9kΩ·cm	0.1kΩ·cm
	100k…999kΩ·cm	1kΩ·cm
	1…10MΩ·cm	1MΩ·cm
Measuring range (Kcell=10)	0.5…5.0Ω·cm	0.1Ω·cm
Accuracy (resistivity)	±0.5% ±1digit	

Measurement of total dissolved solids (with coefficient χ/TDS=0.5)

Measuring range (Kcell=0.01)	0.00…1.999mg/l	0.005mg/l
Measuring range (Kcell=0.1)	0.00…19.99mg/l	0.05mg/l
Measuring range (K cell=1)	0.0…199.9 mg/l	0.5 mg/l
	200…1999 mg/l	1 mg/l
	2.00…19.99 g/l	0.01 g/l
	20.0…199.9 g/	0.1 g/l
Measuring range (Kcell=10)	100…999 g/l	1 g/l
Accuracy (total dissolved solids)	±0.5% ±1digit	

Measurement of salinity by instrument

Measuring range	0.000…1.999g/l	1mg/l
	2.00…19.99g/l	10mg/l
	20.0…199.9 g/l	0.1 g/l
Accuracy (salinity)	±0.5% ±1digit	

Automatic/manual temperature compensation

	0...100°C with α_T = 0.00…4.00%/°C
Reference temperature	0…50°C
Conversion factor χ/TDS	0.4…0.8
Cell constant K (cm^{-1}) already set on instrument	0.01 - 0.1 - 0.5 - 0.7 - 1.0 - 10.0
Cell constants K(cm^{-1}) that can be set by user	0.01…20.00

Standard solutions automatically detected (@25°C)

147µS/cm
1413µS/cm
12880µS/cm
111800µS/cm

Measurement of temperature by instrument

Pt100 measuring range	-50…+150°C
Pt1000 measuring range	-50…+150°C
Resolution	0.1°C
Accuracy ±0.1°C ±1digit	
Drift after 1 year	0.1°C/year

(*) The resistivity measurement is obtained from the reciprocal of conductivity measurement. Close to the bottom of the scale, the indication of resistivity appears like reported in the table below:

K cell = 0.01 cm^{-1}		**K cell = 0.1 cm^{-1}**	
Conductivity (µS/cm)	Resistivity (MΩ·cm)	Conductivity (µS/cm)	Resistivity(MΩ·cm)
0.001 µS/cm	1000 MΩ·cm	0.01 µS/cm	100 MΩ·cm
0.002 µS/cm	500 MΩ·cm	0.02 µS/cm	50 MΩ·cm
0.003 µS/cm	333 MΩ·cm	0.03 µS/cm	33 MΩ·cm
0.004 µS/cm	250 MΩ·cm	0.04 µS/cm	25 MΩ·cm
…	…	…	…

ORDERING CODES

HD2256.2: The kit is composed of: instrument HD2256.2 for the measurement of pH - redox - conductivity - resistivity - TDS - salinity - temperature, **datalogger**, stabilized power supply at mains voltage 100-240Vac/12Vdc-1A., instructions manual and software DeltaLog11.

pH/mV electrodes, conductivity probes, dissolved oxygen probes, temperature probes, standard reference solutions for different measurement types, connection cables for pH electrodes with S7 connector, cables for data download to PC or printer have to be ordered separately.

ACCESSORIES

9CPRS232: Connection cable SubD female 9- pole for serial output RS232C.
CP22: USB 2.0 connection cable - connector typo A - connector type B.
DeltaLog11: Software for download and management of the data on PC using Windows 98 to Vista operating systems.
SWD10: Stabilized power supply at 230Vac/9Vdc-300mA mains voltage.
HD40.1: Portable, serial input, 24 column thermal printer, 57mm paper width.
HD40.2: 24-column portable thermal printer, **Bluetooth and serial interface**, 57mm paper width, four NiMH 1.2V rechargeable batteries, SWD10 power supply, instruction manual, 5 thermal paper rolls. Requires the module HD22BT (**optional**) or the cable HD 2110 CSNM (**optional**).
HD22.2: Laboratory electrode holder composed of basis plate with incorporated magnetic stirrer, staff and replaceable electrode holder. Height max. 380mm. Powerd by bench-top meters of the series HD22… with cable HD22.2.1 (**optional**) or supplier SWD10 (**optional**).
HD22.3: Laboratory electrode holder with metal basis plate. Flexible electrode holder for free positioning. For Ø 12mm probes.
HD22BT: Bluetooth module for wireless data transmission from instrument to PC. **The fitting of the module into the instrument is made exclusively by Delta Ohm, at the time of placing the order.**
TP47: Module for the connection of Pt100 4-wire and Pt1000 2-wire probes.

pH electrodes without SICRAM module *(Inputs ① and ②)*

KP20: Combined pH electrode for general use, gel filled with screw connector S7 body in Epoxy.
KP30: Combined pH electrode for general use, cable 1 m, gel filled, body in Epoxy.
KP50: Combined pH electrode with Teflon collar diaphragm, for emulsions, deionised water, S7 screw connector, gel filled, body in glass.
KP 61: Combined pH electrode, 3 diaphragms for milk, cream, etc. Liquid reference filling, with screw connector S7, body in glass.
KP 62: Combined pH electrode, 1 diaphragm for pure water, paints, etc. gel-filled, with screw connector S7, body in glass.
KP 63: Combined pH electrode for general use, varnish, cable 1 m, electrolyte KCl 3M body in glass.
KP 64: Combined pH electrode for water, varnish, emulsions, etc., electrolyte KCl 3M with screw connector S7, body in glass.
KP 70: Combined pH micro electrode diam. 4.5 x L=25 mm. Gel filled, with screw connector, body in glass.
KP 80: Combined pointed pH electrode, gel filled, with screw connector S7, body in glass.
KP100: Flat membrane gel combined pH electrode with S7 screw connector, glass body, for skin, leather, paper.
CP: Extension cable 1.5m with BNC connectors on one side and S7 on the other side for electrode with S7 connector.
CP5: Extension cable 5m with BNC connectors on one side and S7 on the other side for electrode with S7 connector.
CE: S7 screw connector for pH electrode.
BNC: Female BNC for electrode extension.

pH electrodes with SICRAM module *(Input③)*

KP63TS: Combined pH/temperature electrode with SICRAM module, body in Epoxy, Ag/AgCl sat KCl.

SICRAM Module with BNC input for pH electrodes *(Input ③)*

KP47: SICRAM module for pH electrode with BNC standard connector.
Electrode characteristics at page 401

ORP Electrodes *(Inputs ① and ②)*

KP90: Redox Platinum electrode, with screw connector S7, electrolyte KCl 3M, body in glass.
KP91: Redox Platinum electrode with 1m cable, GEL filled, body in glass.

χ

mV

pH buffer solutions

HD8642: Buffer solution 4.01pH - 200cc.
HD8672: Buffer solution 6.86pH - 200cc.
HD8692: Buffer solution 9.18pH - 200cc.

Redox buffer solutions

HDR220: Redox buffer solution 220mV 0,5 l.
HDR468: Redox buffer solution 468mV 0,5 l.

Electrolyte solutions

KCL 3M: 50cc ready for use solution for electrode refilling.

Cleaning and maintenance

HD62PT: Diaphragm cleaning (tiourea in HCl) - 500ml.
HD62PP: Protein cleaning (pepsin in HCl) - 500ml.
HD62RF: Regeneration (fluorhydric acid) - 100ml.
HD62SC: Solution for electrode preservation - 500ml.

Conductivity probes and combined conductivity and temperature probes without SICRAM module *(Input ⑦)*

SP06T: Combined conductivity and temperature 4-electrode cell in Platinum, body in Pocan. Cell constant K = 0.7. Measurement range 5µS/cm …200mS/cm, 0…90°C.
SPT401.001: Combined conductivity and temperature 2- electrode cell in stainless steel AISI 316. Cell constant K = 0.01. Measurement range 0.04µS/cm …20µS/cm, 0…120°C. Measurement in closed-cell.
SPT01G: Combined conductivity and temperature 2-electrode Platinum-wire cell, body in glass. Cell constant K = 0.1. Measurement range 0.1µS/cm …500µS/cm, 0…80°C.
SPT1G: Combined conductivity and temperature 2-electrode Platinum-wire cell, body in glass. Cell constant K = 1. Measurement range 10µS/cm …10mS/cm, 0…80°C.
SPT10G: Combined conductivity and temperature 2-electrode Platinum-wire cell, body in glass. Cell constant K = 10. Measurement range 500µS/cm …200mS/cm, 0…80°C.

Combined conductivity / temperature probes with SICRAM module *(Input ⑧)*

SPT1GS: Combined conductivity /temperature 2-electrode Platinum- wire cell, body in glass with SICRAM module. Cell constant K = 1. Measuring range 10µS/cm …10mS/cm, 0…80°C.
Electrode characteristics at page 402

Standard conductivity calibration solutions

HD8747: Standard calibration solution 0.001mol/l equal to 147µS/cm @25°C - 200cc.
HD8714: Standard calibration solution 0.01mol/l equal to 1413µS/cm @25°C - 200cc.
HD8712: Standard calibration solution 0.1mol/l equal to 12880µS/cm @25°C - 200cc.
HD87111: Standard calibration solution 1mol/l equal to 111800µS/cm @25°C - 200cc.

Temperature probes comlpete with SICRAM module *(Input ⑤)*

TP87: PT100 sensor immersion probe. Stem Ø 3 mm, length 70 mm. Cable length 1 m.
TP472I.0: Pt100 sensor immersion probe. Stem Ø 3 mm, length 230 mm. Cable length 2 m.
TP473P.0: Pt100 sensor penetration probe. Stem Ø 4mm, length 150 mm. Cable length 2 m.
TP474C.0: Pt100 sensor contact probe. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable length 2 m.
TP475A.0: Air probe, sensor Pt100. Stem Ø 4mm, length 230mm. Cable length 2 m.
TP472I.5: Immersion probe, sensor Pt100. Stem Ø 6mm, length 500 mm. Cable length 2 m.
TP472I.10: Immersion probe, sensor Pt100. Stem Ø 6mm, length 1,000mm. Cable length 2 m.

Temperature probes complete with TP47 module *(input⑤)*

TP47.100: Direct 4 wires Pt100 sensor immersion probe. Probe's stem Ø 3mm, length 230mm. Connection cable 4 wires with connector, length 2 m.
TP47.1000: Pt1000 sensor immersion probe. Probe's stem Ø 3mm, length 230mm. Connection cable 2 wires with connector, length 2 m.
TP87.100: Pt100 sensor immersion probe. Probe's stem Ø 3mm, length 70mm. 4 wire connection cable with connector, length 1 m.
TP87.1000: Pt1000 sensor immersion probe. Probe's stem Ø 3mm, length 70mm. 2-wire connection cable with connector, length 1 m.

Accessories

TP47: Module for the connection of Pt100 4-wire and Pt1000 2-wire probes.