



**HD 2156.1 E HD 2156.2**  
**pH METER - CONDUCTIVITY METER - THERMOMETER**

The **HD2156.1** and **HD2156.2** are portable instruments with a large LCD display. They measure pH, mV, redox potential (ORP), conductivity, liquid resistivity, total dissolved solids (TDS) and salinity using combined 4-ring and 2-ring conductivity/temperature probes. Temperature only is measured by Pt100 or Pt1000 immersion, penetration or contact probes.

The pH electrode calibration, as well as manual, can be carried out on one, two or three points and the calibration sequence can be chosen from a list of 13 buffers. The probe calibration can be performed automatically in one or more of the 147µS, 1413µS, 12880µS or 111800µS/cm conductivity calibration solutions.

The HD2156.2 instrument is a **datalogger**. It stores up to 20,000 sets of three measurements composed of pH or mV, conductivity or resistivity or TDS or salinity and temperature: these data can be transferred to a PC from the instrument connected via the multi-standard RS232C serial port and USB 2.0. The storing interval, printing, and baud rate can be configured using the menu.

The HD2156.1 and HD2156.2 models are fitted with an RS232C serial port and can transfer the acquired measurements to a PC or to a portable printer in real time.

The *Max*, *Min* and *Avg* function calculates the maximum, minimum or average values. Other functions include: the Auto-HOLD function and the automatic turning off which can also be excluded.

**The instruments have IP67 protection degree.**

**INSTRUMENT TECHNICAL CHARACTERISTICS**

**Measured quantities:** pH, mV,  $\chi$ ,  $\Omega$ , TDS, Nacl, °C, °F

*Instrument*

Dimensions (Length x Width x Height)	185x90x40mm
Weight	470g (complete with batteries)
Materials	ABS, rubber
Display	2x4½ digits plus symbols Visible area: 52x42mm

*Operating conditions*

Working temperature	-5...50°C
Storage temperature	-25...65°C
Working relative humidity	0...90%RH without condensation
<b>Protection degree</b>	<b>IP67</b>

*Power*

Batteries	4 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	20µA
Mains (SWD10)	Output mains adapter 12Vdc / 1A
<i>Security of memorized data</i>	Unlimited, independent of battery charge conditions

*Time*

Date and time	Schedule in real time
Accuracy	1min/month max error

*Measured values storage - model HD2156.2*

Type	2000 pages containing 10 samples each
Quantity	20,000 sets of three measurements composed of pH or mV, $\chi$ or $\Omega$ or TDS or salinity and temperature.
Selectable storage interval	1s, 5s, 10s, 15s, 30s, 60s (1min), 120s (2min), 300s (5min), 600s (10min), 900s (15min), 1200s (20min), 1800s (30min) and 3600s (1hour)

*Serial interface RS232C*

Type	RS232C electrically isolated
Baud rate	Can be set from 1200 to 38400 baud
Data bit	8
Parity	None
Stop bit	1
Flow Control	Xon/Xoff
Serial cable length	Max 15m
Selectable print interval	1s, 5s, 10s, 15s, 30s, 60s (1min), 120s (2min), 300s (5min), 600s (10min), 900s (15min), 1200s (20min), 1800s (30min) and 3600s (1hour)

*USB interface - model HD2156.2*

Type	1.1 - 2.0 electrically isolated
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*Connections*

pH/mV input	Female BNC connector
Conductivity input	8-pole male DIN45326 connector
Serial interface and USB	8-pole MiniDin connector
Mains adapter	2-pole connector (positive at centre)

*Measurement of pH by Instrument*

Measurement range	-2.000...+19.999pH
Resolution	0.01 or 0.001pH selectable from menu
Accuracy	±0.001pH ±1digit
Input impedance	>10 <sup>12</sup> Ω
Calibration error @25°C	Offset > 20mV Slope > 63mV/pH or Slope < 50mV/pH Sensitivity > 106.5% or Sensitivity < 85%

*Measurement of mV by Instrument*

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

<b>Measurement of conductivity</b>		<b>Resolution</b>	<b>Measurement of salinity</b>		<b>Resolution</b>																								
Measuring range	0.00...19.99µS/cm	0.01µS/cm	Measurement range	0.000...1.999g/l	1mg/l																								
Kcell=0.1				2.00...19.99g/l	10mg/l																								
Measuring range	0.0...199.9µS/cm	0.1µS/cm		20.0...199.9g/l	0.1g/l																								
Kcell=1	200...1999µS/cm	1µS/cm	<b>Accuracy (salinity)</b>	±0.5%1 digit																									
	2.00...19.99mS/cm	0.01mS/cm																											
	20.0...199.9mS/cm	0.1mS/cm	<b>Temperature compensation</b>																										
Measuring range	200...1999mS/cm	1mS/cm	<i>automatic/manual</i>	0...100°C with αT selectable from 0.00 to 4.00%/°C																									
Kcell=10																													
<b>Accuracy (conductivity)</b>	±0.5%1 digit		<b>Reference temperature</b>	20°C or 25°C																									
			<b>λ / TDS Conversion factor</b>	0.4...0.8																									
			<b>Cell constant K (cm-1)</b>	0.1, 0.7, 1.0 and 10.0																									
<b>Measurement of resistivity</b>		<b>Resolution</b>	<b>Standard solutions automatically detected @25°C</b>																										
Measuring range	till 100MΩ·cm/(*)			147µS/cm																									
Kcell=0.1		0.1Ω·cm		1413µS/cm																									
Measuring range	5.0...199.9Ω·cm	1Ω·cm		12880µS/cm																									
Kcell=1	200...999Ω·cm	0.01kΩ·cm		111800µS/cm																									
	1.00k...19.99kΩ·cm	0.1kΩ·cm																											
	20.0k...99.9kΩ·cm	1kΩ·cm	<b>Measurement of temperature</b>																										
	100k...999kΩ·cm	1MΩ·cm	Pt100 measuring range	-50...+200°C																									
	1...10MΩ·cm	0.1Ω·cm	Pt1000 measuring range	-50...+200°C																									
Measuring range	0.5...5.0Ω·cm		<b>Resolution</b>	0.1°C																									
Kcell=10			<b>Accuracy</b>	±0.25°C																									
<b>Accuracy (resistivity)</b>	±0.5%±1 digit		<b>Drift after 1 year</b>	0.1°C/anno																									
			<b>Preset cell constant values:</b>	K=0,01 - K=0,1 - K=1, K=10																									
<b>Measurement of total dissolved solids (with coefficient λ/TDS=0.5)</b>			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:																										
Measuring range	0.00...19.99mg/l	0.05mg/l	<table border="1"> <thead> <tr> <th colspan="2">K cell = 0.01 cm<sup>-1</sup></th> <th colspan="2">K cell = 0.1 cm<sup>-1</sup></th> </tr> <tr> <th>Conductivity (µS/cm)</th> <th>Resistivity (MΩ·cm)</th> <th>Conductivity (µS/cm)</th> <th>Resistivity (MΩ·cm)</th> </tr> </thead> <tbody> <tr> <td>0.001 µS/cm</td> <td>1000 MΩ·cm</td> <td>0.01 µS/cm</td> <td>100 MΩ·cm</td> </tr> <tr> <td>0.002 µS/cm</td> <td>500 MΩ·cm</td> <td>0.02 µS/cm</td> <td>50 MΩ·cm</td> </tr> <tr> <td>0.003 µS/cm</td> <td>333 MΩ·cm</td> <td>0.03 µS/cm</td> <td>33 MΩ·cm</td> </tr> <tr> <td>0.004 µS/cm</td> <td>250 MΩ·cm</td> <td>0.04 µS/cm</td> <td>25 MΩ·cm</td> </tr> </tbody> </table>			K cell = 0.01 cm <sup>-1</sup>		K cell = 0.1 cm <sup>-1</sup>		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
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Measuring range	100...999g/l	1g/l																											
Kcell=10																													
<b>Accuracy (conductivity)</b>	±0.5%1 digit																												

### TECHNICAL DATA OF PROBES AND MODULES EQUIPPED WITH INSTRUMENT

#### 2 and 4 electrode conductivity probes

ORDER CODE	MEASUREMENT RANGE	DIMENSIONS
<b>SP06T</b>	K=0.7 5µS...200mS/cm 0...90°C 4-electrode cell in Pocan/Platinum	
<b>SPT 400.001</b> not suitable for HD 2306.0	K=0.01 0,05...19,9µS/cm 2-electrode cell AlSi 316 - Teflon	
<b>SPT01G</b>	K=0.1 0.1µS...500µS/cm 0...80°C 2-electrode cell in Glass/Platinum	
<b>SPT1G</b>	K=1 10µS...10mS/cm 0...80°C 2-electrode cell in Glass/Platinum	
<b>SPT10G</b>	K=10 500µS...200mS/cm 0...80°C 2-electrode cell in Glass/Platinum	

### Temperature probes with 4 wire Pt100 and 2 wire Pt1000 connector sensor

Model	Type	Working range	Accuracy
TP47.100	Pt100 4 wires	-50...+200°C	Class A
TP47.1000	Pt1000 2 wires	-50...+200°C	Class A
TP87.100	Pt100 4 wires	-50...+200°C	Class A
TP87.1000	Pt1000 2 wires	-50...+200°C	Class A

Temperature drift @20°C 0.005%/°C

### ORDER CODES

**HD2156.1:** The kit is composed of: instrument HD2156.1, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software.

**HD2156.2:** The kit is composed of: instrument HD2156.2 **datalogger**, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software.

**pH/mV probes, conductivity probes, temperature probes, standard calibration solutions for various types of measurements, connection cables for pH electrodes with S7 connector, cables for data transfer to PC or printer have to be ordered separately.**

**HD2110CSNM:** 8-pole connection cable MiniDin - Sub D 9-pole female for RS232C.

**C.206:** Serial connection cable with USB connector for PC and 8-pole MiniDin male connector for the instrument

**HD2101/USB:** Connection cable USB 2.0 connector type A - 8-pole MiniDin (not suitable for HD2156.1K).

**DeltaLog9:** Software for download and management of the data on PC using Windows 98 to Vista operating systems.

**SWD10:** Stabilized power supply 100-240 Vac/12Vdc-1A mains voltage

**HD40.1:** 24-column portable thermal printer, serial interface, 57mm paper width, four NiMH 1.2V rechargeable batteries, SWD10 power supply, instruction manual, 5 thermal paper rolls.

**RCT:** The kit includes 4 thermal paper rolls 57mm wide and 32mm in diameter.

**BAT-40:** Spare battery pack for HD40.1 printer with built-in temperature sensor.

**HD22.2:** Laboratory electrode holder composed of base plate with built-in magnetic stirrer, shaft and replaceable electrode holder. Suitable diameter 12mm. Powered by bench-top meters of the series HD22...with cable HD22.2.1 (**optional**) or power supplier SWD10 (**optional**).

**HD22.3:** Laboratory electrode holder composed of base plate. Flexible arm for free positioning. Suitable for electrodes with diameter 12mm.

### pH Electrodes

**KP 20:** Gel pH filled combined electrode for general use, with S7 screw connector, EPOXY body.

**KP 30:** Gel pH combined electrode for general use, 1m cable with BNC, EPOXY body.

**KP 50:** Gel pH combined electrode, porous Teflon ring junction, suitable for emulsions, demineralised water, with S7 screw connector, glass body.

**KP 61:** 3 diaphragm liquid filled pH combined electrode for wine, milk, cream, etc., S7 screw connector, liquid reference filling, glass body.

**KP 62:** 1 diaphragm gel pH combined electrode for pure water, varnishes, gel filled, S7 screw connector, glass body.

**KP 63:** 1 liquid filled pH combined electrode for general use, varnishes, 1m cable with BNC, glass body.

**KP 64:** Liquid filled pH combined electrode, Teflon ring diaphragm, for wine, varnishes, emulsions, S7 screw connector, glass body.

**KP 70:** Pointed gel combined pH microelectrode diam. 6 x L=70 mm., with S7 screw connector, EPOXY body, glass tip, open junction.

**KP 80:** Pointed gel pH combined electrode, with S7 screw connector, glass body, for cream, milk, viscous material, open junction.

**KP100:** Flat membrane gel combined pH electrode with S7 screw connector, glass body, for skin, leather, paper.

### Characteristics and dimensions of the probes at page 401

**CP:** 1.5m extension cable with BNC/S7 connector for electrode without cable, thread S7.

**CP:** 1.5m extension cable with BNC/S7 connector for electrode without cable, thread S7.

**CP 5:** 5m extension cable with BNC/S7 connector for electrode without cable, thread S7.

**CP 10:** 10m extension cable with BNC/S7 connector for electrode without cable, thread S7.

**CP 15:** 15m extension cable with BNC/S7 connector for electrode without cable, thread S7.

**CE:** S7 screw connector for pH electrode.

**BNC:** female BNC for extension cable

### ORP Electrodes

**KP 90:** REDOX PLATINUM liquid filled electrode with S7 screw connector, glass body.

**KP 91:** Gel REDOX PLATINUM electrode, 1m cable with BNC, EPOXY body

**Characteristics and dimensions of the probes at page 402**

### 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

**KCL3M** Ready to use solution for electrode refilling – 100 cc

### Cleaning and maintenance

**HD62PT:** Diaphragm cleaning (tiourea in HCl) - 500ml.

**HD62PP:** Protein cleaning (pepsin in HCl) - 500ml.

**HD62RF:** Regeneration (fl uorhydric acid) - 100ml.

**HD62SC:** Solution for electrode preservation - 200ml.

### Conductivity probes

See order codes reported in the table at page 358.

### Standard conductivity calibration solutions

**HD8747:** Standard calibration solution 0.001 mol/l equal to 147µS/cm @25°C, 200cc.

**HD8714:** Standard calibration solution 0.01 mol/l equal to 1413µS/cm @25°C, 200cc.

**HD8712:** Standard calibration solution 0.1 mol/l equal to 12880µS/cm @25°C, 200cc.

**HD87111:** Standard calibration solution 1 mol/l equal to 111800µS/cm @25°C, 200cc.

### Temperature probes complete with SICRAM module

**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 without SICRAM module

**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.

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

