



## pH METER - CONDUCTIVITY METER - THERMOMETER HD2156.1 AND HD2156.2

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 147 $\mu$ S, 1413 $\mu$ S, 12880 $\mu$ S or 111800 $\mu$ S/cm conductivity calibration solutions.

The HD2156.2 instrument is a **datalogger**. It memorizes 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 from the instrument connected to a PC 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 disabled.

**The instruments have IP67 protection degree.**

### INSTRUMENT TECHNICAL CHARACTERISTICS

#### 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
Storing temperature	-25...65°C
Working relative humidity	0...90%RH without condensation

**Protection degree IP67**

#### Power

Batteries	4 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	20 $\mu$ A
Mains	Output mains adapter 9Vdc / 250mA



*Security of memorized data* 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.
Storage interval	1s...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
Immediate print interval	1s...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	$\pm 0.001$ pH $\pm 1$ digit
Input impedance	$> 10^{12}\Omega$
Calibration error @25°C	Offset  $> 20$ mV Slope $> 63$ mV/pH or Slope $< 50$ mV/pH Sensitivity $> 106.5\%$ or Sensitivity $< 85\%$

#### Measurement of mV by Instrument

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

#### Measurement of conductivity by Instrument

Resolution with K cell=0.1	0.01 $\mu$ S/cm in range 0.00...19.99 $\mu$ S/cm
Measurement range (K cell=1)	
Resolution	0.0...199.9 $\mu$ S/cm / 0.1 $\mu$ S/cm 200...1999 $\mu$ S/cm / 1 $\mu$ S/cm 2.00...19.99mS/cm / 0.01mS/cm 20.0...199.9mS/cm / 0.1mS/cm
Accuracy (conductivity)	$\pm 0.5\%$ $\pm 1$ digit

#### Measurement of resistivity by Instrument

Measurement range / Resolution	4.0...199.9 $\Omega$ / 0.1 $\Omega$ 200...999 $\Omega$ / 1 $\Omega$ 1.00k...19.99k $\Omega$ / 0.01k $\Omega$ 20.0k...99.9k $\Omega$ / 0.1k $\Omega$ 100k...999k $\Omega$ / 1k $\Omega$ 1...10M $\Omega$ / 1M $\Omega$
Accuracy (resistivity)	$\pm 0.5\%$ $\pm 1$ digit

**Measurement of total dissolved solids (with coefficient  $\chi/TDS=0.5$ )**

Resolution with K cell=0.1    0.05mg/l in range 0.00...19.99mg/l  
 Measurement range  
 (K cell=1) / Resolution    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/l / 0.1 g/l  
 Accuracy (total dissolved solids)  $\pm 0.5\% \pm 1$ digit

**Measurement of salinity**

Measurement range / Resolution 0.000...1.999g/l / 1mg/l  
    2.00...19.99g/l / 10mg/l  
 Accuracy (total dissolved solids)  $\pm 0.5\% \pm 1$ digit

**Automatic/manual temperature compensation**

0...100°C with  $\alpha_T$  that can be selected from 0.00 to 4.00%/°C

**Reference temperature**

20°C or 25°C

**$\chi/TDS$  conversion factor**

0.4...0.8

**Cell constant K (cm<sup>-1</sup>)**

0.1, 0.7, 1.0 and 10.0

**Standard solutions automatically detected (@25°C)**

147  $\mu$ S/cm  
 1413  $\mu$ S/cm  
 12880  $\mu$ S/cm  
 111800  $\mu$ S/cm

**Measurement of temperature by Instrument**

Pt100 measurement range -50...+200°C  
 Pt1000 measurement range -50...+200°C  
 Resolution 0.1°C  
 Accuracy  $\pm 0.25$ °C  
 Drift after 1 year 0.1°C/year

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

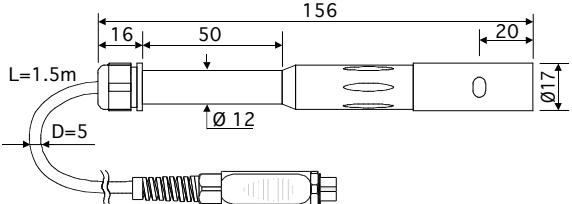
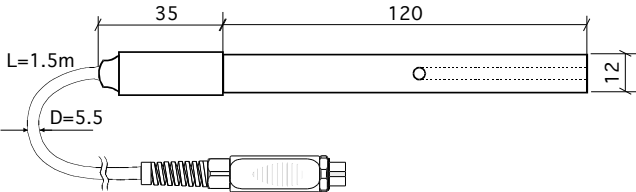
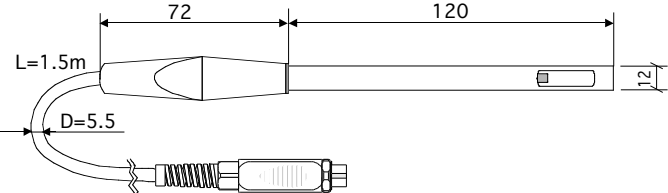
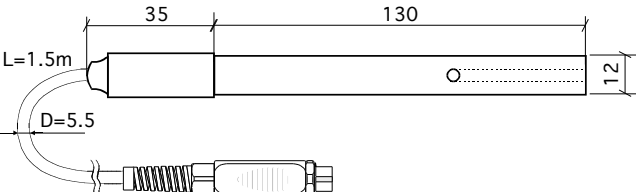
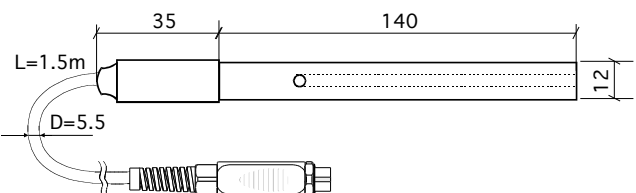
Model	Type	Working range	Accuracy
TP47.100	Pt100 4 wires	-50...+200°C	Class A
TP47.1000	Pt1000 2 wires	-50...+200°C	Class A
TP87.100	Pt100 4 wires	-50...+200°C	Class A
TP87.1000	Pt1000 2 wires	-50...+200°C	Class A

**Common characteristics**

Resolution 0.1°C  
 Temperature drift @20°C 0.005%/°C

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

**2 and 4 electrode conductivity probes**

ORDER CODE	MEASUREMENT RANGE	DIMENSIONS
SP06T	K=0.7 5 $\mu$ S...200mS/cm 0...90°C 4-electrode cell in Poca/Platinum	
SPT01G	K=0.1 0.1 $\mu$ S...500 $\mu$ S/cm 0...80°C 2-electrode cell in Glass/Platinum	
SPT1	K=1 10 $\mu$ S...10mS/cm 0...50°C 2-electrode cell in Epoxy/Graphite	
SPT1G	K=1 10 $\mu$ S...10mS/cm 0...80°C 2-electrode cell in Glass/Platinum	
SPT10G	K=10 500 $\mu$ S...200mS/cm 0...80°C 2-electrode cell in Glass/Platinum	

## ORDER CODES

**HD2156.1K:** The kit is composed of: instrument HD2156.1, **KP30 electrode**, **SP06T conductivity/temperature combined probe**, **TP87 temperature probe**, 4.01pH and 6.86pH buffer solutions, conductivity solution 12.880 $\mu$ S/cm HD8712, connection cable for serial output **HD2110CSNM**, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software.

**Other pH electrodes, conductivity and temperature probes must be ordered separately.**

**HD2156.2K:** The kit is composed of: instrument HD2156.2 **datalogger**, **KP30 electrode**, **SP06T conductivity/temperature combined probe**, **TP87 temperature probe**, 4.01pH and 6.86pH buffer solutions, conductivity solution 12.880 $\mu$ S/cm HD8712, connection cable for serial output **HD2101/USB**, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software.

**Other pH electrodes, conductivity and temperature probes must be ordered separately.**

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

**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 XP operating systems.

**AF209.60:** Stabilized power supply at 230Vac/9Vdc-300mA mains voltage.

**S'print-BT:** On request, portable, serial input, 24 column thermal printer, 58mm paper width.

## pH Electrodes

**KP20:** Combined pH electrode, gel-filled, with screw connector S7, body in Epoxy, Ag/AgCl sat. KCl.

**KP30:** Combined pH electrode, cable 1m, gel-filled, body in Epoxy, Ag/AgCl sat. KCl.

**KP60:** Combined pH electrode, 1 diaphragm, gel-filled, with screw connector S7, body in glass, Ag/AgCl sat. KCl.

**KP61:** Combined pH electrode, 3 diaphragms for milk, cream, etc. gel-filled, with screw connector S7, body in glass, Ag/AgCl sat. KCl.

**KP62:** Combined pH electrode, 1 diaphragm for pure water, paints, etc. gel-filled, with screw connector S7, body in glass, Ag/AgCl sat. KCl.

**KP70:** Combined pH electrode, micro diam. 6 x L=70mm, gel-filled, with screw connector S7, body in glass, Ag/AgCl sat. KCl.

**KP80:** Combined pointed pH electrode, gel-filled, with screw connector S7, body in glass, Ag/AgCl sat. KCl.

**CP:** Extension cable 1.5m with BNC connectors on one side and S7 on the other side for electrode with S7 connector.

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

**BNC:** Female BNC for electrode extension.

## ORP Electrodes

**KP90:** REDOX PLATINUM electrode, with screw connector S7, gel-filled, body in glass.

## pH Buffer solutions

**HD8642:** Buffer solution 4.01pH @25°C - 200cc.

**HD8672:** Buffer solution 6.86pH @25°C - 200cc.

**HD8692:** Buffer solution 9.18pH @25°C - 200cc.

## Redox Buffer solutions

**HDR220:** Redox buffer solution 220mV 0.5 l.

**HDR468:** Redox buffer solution 468mV 0.5 l.

## Conductivity probes

Please see the order codes reported in the probes' technical specifications.

## Standard conductivity calibration solutions

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

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

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

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

## Temperature probes

**TP47.100:** Direct 4 wire Pt100 sensor immersion probe. Probe's stem  $\varnothing$  3mm, length 230mm. 4 wire connection cable with connector, length 2 metres.

**TP47.1000:** Pt1000 sensor immersion probe. Probe's stem  $\varnothing$  3mm, length 230mm. 2 wire connection cable with connector, length 2 metres.

**TP87.100:** Pt100 sensor immersion probe. Probe's stem  $\varnothing$  3mm, length 70mm. Connection cable 4 wires with connector, length 1 metre.

**TP87.1000:** Pt1000 sensor immersion probe. Probe's stem  $\varnothing$  3mm, length 70mm. Connection cable 2 wires with connector, length 1 metre.

**TP47:** Only connector for probe connection: direct 4 wire Pt100, 2 wire Pt1000.

