

Introduction

The instrument series **HD2205.2**, **HD2206.2**, **HD2256.2**, **HD2259.2**, and **HD22569.2** is made up of bench top instruments for electrochemical measures: **pH**, **conductivity**, **dissolved oxygen**, and **temperature**. They are fitted with a large backlighted LCD display.

The **HD2205.2** is equipped with two BNC inputs for the measurement of **pH**, **mV**, **redox potential** (ORP) with pH or redox electrodes, or electrodes with separate reference, and one input for combined pH/temperature probes fitted with SICRAM module.

The **HD2206.2** measures **conductivity**, **resistivity** in liquids, **total dissolved 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.

The **HD2256.2** measures **pH**, **mV**, **redox potential** (ORP) with pH, redox electrodes or electrodes with separate reference; **Conductivity and resistivity** in liquids, **total dissolved 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.

The **HD2259.2** measures **pH**, **mV**, **redox potential** (ORP) with pH, redox electrodes or electrodes with separate reference; the **concentration of dissolved oxygen** in liquids (in mg/l), and **saturation index** (in %), using SICRAM combined probes of polarographic type with two or three electrodes and integrated temperature sensor.

The **HD22569.2** measures **pH**, **mV**, **redox potential** (ORP) with pH, redox electrodes or electrodes with separate reference; **conductivity**, **resistivity** in liquids, **total dissolved solids** (TDS) and **salinity** with combined 4-ring and 2-ring conductivity/temperature probes with direct input or SICRAM module; **concentration of dissolved oxygen** in liquids (in mg/l) and **saturation index** (in %), using SICRAM combined probes of polarographic type with two or three electrodes and integrated temperature sensor.

All models are fitted with input for the measurement of **temperature** with Pt100 or Pt1000 immersion, penetration or contact probes. The probes are equipped with an automatic detection module, with the factory calibration settings already being memorized 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.

- 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.
- The dissolved Oxygen probe's quick calibration function guarantees timely correctness of the performed measurements.
- Conductivity, dissolved oxygen and temperature probes fitted with SICRAM module can store factory and calibration data inside.

The instruments of the series HD22... are **datalogger**, they memorize up to 2,000 samples of data:

- pH, mV and temperature: HD2205.2
- conductivity or resistivity or TDS or salinity and temperature: HD2206.2
- pH or mV, conductivity or resistivity or TDS or salinity and temperature: HD2256.2,
- pH or mV, concentration of dissolved oxygen or saturation index and saturation index and temperature: HD2259.2,
- pH or mV, conductivity or resistivity or TDS or salinity, concentration of dissolved oxygen and temperature: HD22569.2.

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 (S'print-BT).

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 of the instruments series HD22...

Common technical data

- ▶ **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
Storing 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 E 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
USB Interface	optional

- ▶ **EMC standard regulations**

Security	EN61000-4-2, EN61010-1 level 3
Electrostatic discharge	EN61000-4-2 level 3
Electric fast transients	EN61000-4-4 level 3, EN61000-4-5 level 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B

HD2206.2

Technical characteristics HD2206.2 χ - Ω - TDS - NaCl - °C - °F measurement

Measured values

χ - Ω - TDS - NaCl - °C - °F

Connections

Input for temperature probes with SICRAM module ©

8-pole male DIN45326 connector

2/4 ring direct conductivity input

8-pole male DIN45326 connector

Conductivity probe with SICRAM module input ⑦

8-pole male DIN45326 connector

Serial interface ⑧

DB9 connector (9-pole male)

USB interface

USB connector type B

Bluetooth

Optional

Mains adapter

2-pole (Ø5.5mm-2.1mm).
Positive at centre

Socket 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).

Measurement of conductivity by instrument

Measuring range (Kcell=0.01) / Res.

0.000...1.999 μ S/cm / 0.001 μ S/cm

Measuring range (Kcell=0.1) / Res.

0.00...19.99 μ S/cm / 0.01 μ S/cm

Measuring range (K cell=1) / Res.

0.0...199.9 μ S/cm / 0.1 μ S/cm

200...1999 μ S/cm / 1 μ S/cm

2.00...19.99mS/cm / 0.01mS/cm

20.0...199.9mS/cm / 0.1mS/cm

Measuring range (Kcell=10) / Res.

200...1999mS/cm / 1mS/cm

Accuracy (conductivity)

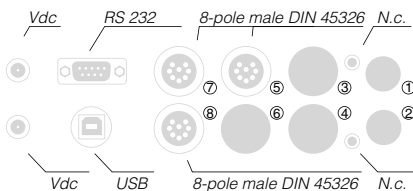
$\pm 0.5\%$ ± 1 digit



χ

TDS





► **Measurement of resistivity by instrument**

Measuring range (Kcell=0.01) / Res.	Up to 1GΩ·cm / (*)
Measuring range (Kcell=0.1) / Res.	Up to 100MΩ·cm / (*)
Measuring range (K cell=1) / Res.	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) / Res.	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) / Res.	0.00...1.999mg/l / 0.005mg/l
Measuring range (Kcell=0.1) / Res.	0.00...19.99mg/l / 0.05mg/l
Measuring range (K cell=1) / Res.	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
Measurement range (Kcell=10) / Res.	100...999 g/l / 1 g/l
Accuracy (total dissolved solids)	±0.5% ±1digit

► **Measurement of salinity**

Measuring range / Resolution	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**

Reference temperature	0...100°C with $\alpha_T = 0.00...4.00\%/^{\circ}\text{C}$
χ /TDS conversion factor	0...50°C
Cell constants K (cm ⁻¹) already set on the instrument	0.4...0.8
Cell constants K (cm ⁻¹) that can be set by user	0.01 - 0.1 - 0.5 - 0.7 - 1.0 - 10.0 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
...

► Combined 2-ring or 4-ring conductivity probes without SICRAM module for HD2206.2, HD2256.2 and HD22569.2 ⑦

ORDERING CODE	MEASUREMENT RANGE AND USE	DIMENSIONS
SP06T	<p>K=0.7 5μS/cm ...200mS/cm 0...90°C 4-electrode cell in Pocan/Platinum Probe material Pocan General use No heavy tasks</p>	
SPT401.001	<p>K=0.01 0.04μS/cm ...20μS/cm 0...120°C 2-electrode cell in AISI 316 Ultrapure water Measurement in closed-cell</p>	
SPT01G	<p>K=0.1 0.1μS/cm ...500μS/cm 0...80°C 2-electrode cell in Platinum-wire Probe material glass Pure water</p>	
SPT1G	<p>K=1 10μS/cm ...10mS/cm 0...80°C 2-electrode cell in Platinum wire Probe material glass General heavy tasks, average conductivity</p>	
SPT10G	<p>K=10 500μS/cm ...200mS/cm 0...80°C 2-electrode cell in Platinum wire Probe material glass General heavy tasks, high conductivity</p>	

Conductivity probes with SICRAM module

ORDERING CODE	MEASUREMENT RANGE AND USE	DIMENSIONS
SPT1GS	<p>K=1 10μS/cm ...10mS/cm 0...80°C 2-electrode cell Glass/Platinum</p>	

► Temperature probes

Temperature probes with Pt100 sensor, complete with SICRAM module ⑤

Modell	Type	Application range	Accuracy
TP87	Immersion	-50°C...+200°C	±0.25°C (-50°C...+200°C)
TP472I.0	Immersion	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P.0	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C.0	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP475A.0	Air	-50°C...+250°C	±0.3°C (-50°C...+250°C)
TP472I.5	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP472I.10	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)

Temperature drift @20°C 0.003%/°C

► Pt100 4 - wire probes and Pt1000 2-wire probes complete with TP47 module ⑤

Modell	Type	Application range	Accuracy
TP47.100	Pt100 a 4 fili	-50...+200°C	Class A
TP47.1000	Pt1000 a 2 fili	-50...+200°C	Class A
TP87.100	Pt100 a 4 fili	-50...+200°C	Class A
TP87.1000	Pt1000 a 2 fili	-50...+200°C	Class A

Temperature drift @20°C 0.005%/°C

TP47: Module for the connection of Pt100 4-wire and Pt1000 2-wire probes to instrument series HD34..., without amplifying electronics and linearization.

► **Ordering codes for instrument series HD22...**

HD2206.2K: The kit is composed of: instrument HD2206.2 for the measurement of 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.

► **Common accessories for instruments series HD22...**

9CPRS232: Connection cable SubD female 9- pole for serial output RS232C.

CP22: USB 2.0 connection cable - connector type A - connector type B.

DeltaLog11: Software for download and management of the data on PC using Windows 98 to XP operating systems.

SWD10: Stabilized power supply at 230Vac/9Vdc-300mA mains voltage.

S'print-BT: Portable, serial input, 24 column thermal printer, 58mm paper width.

HD2110CSP: Connection cable for instruments series HD34...to printer S'print-BT

HD22.2: Laboratory electrode holder composed of basis plate with incorporated magnetic stirrer, staff and replaceable electrode holder. Height max. 380mm.

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 to instrument series HD22..., without amplifying electronics and linearization.

► **Accessories for instruments HD2206.2, HD2256.2 and HD22569.2 with input for conductivity measurement**

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

SP06T: Combined conductivity and temperature 4-electrode cell in Platinum, body in Pocan. Cell constant $K = 0.7$. Measurement range $5\mu\text{S}/\text{cm} \dots 200\text{mS}/\text{cm}$, $0\dots 90^\circ\text{C}$.

SPT401.001: Combined conductivity and temperature 2- electrode cell in stainless steel AISI 316. Cell constant $K = 0.01$. Measurement range $0.04\mu\text{S}/\text{cm} \dots 20\mu\text{S}/\text{cm}$, $0\dots 120^\circ\text{C}$. Measurement in closed-cell.

SPT01G: Combined conductivity and temperature 2-electrode Platinum-wire cell, body in glass. Cell constant $K = 0.1$. Measurement range $0.1\mu\text{S}/\text{cm} \dots 500\mu\text{S}/\text{cm}$, $0\dots 80^\circ\text{C}$.

SPT1G: Combined conductivity and temperature 2-electrode Platinum-wire cell, body in glass. Cell constant $K = 1$. Measurement range $10\mu\text{S}/\text{cm} \dots 10\text{mS}/\text{cm}$, $0\dots 80^\circ\text{C}$.

SPT10G: Combined conductivity and temperature 2-electrode Platinum-wire cell, body in glass. Cell constant $K = 10$. Measurement range $500\mu\text{S}/\text{cm} \dots 200\text{mS}/\text{cm}$, $0\dots 80^\circ\text{C}$.

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

SPT1GS: Combined conductivity /temperature 2-electrode Platinum- wire cell, body in glass with SICRAM module. Cell constant $K = 1$. Measuring range $10\mu\text{S}/\text{cm} \dots 10\text{mS}/\text{cm}$, $0\dots 80^\circ\text{C}$.

► **Standard conductivity calibration solutions**

HD8747: Standard calibration solution 0.001mol/l equal to $147\mu\text{S}/\text{cm}$ @ $25^\circ\text{C} - 200\text{cc}$.

HD8714: Standard calibration solution 0.01mol/l equal to $1413\mu\text{S}/\text{cm}$ @ $25^\circ\text{C} - 200\text{cc}$.

HD8712: Standard calibration solution 0.1mol/l equal to $12880\mu\text{S}/\text{cm}$ @ $25^\circ\text{C} - 200\text{cc}$.

HD87111: Standard calibration solution 1mol/l equal to $111800\mu\text{S}/\text{cm}$ @ $25^\circ\text{C} - 200\text{cc}$.



HD22.3



► **Accessories for instruments HD22... with Temperature input**

- **Temperature probes complete with SICRAM module (Input ⑤)**
 - TP87:** Pt100 sensor immersion probe. Stem Ø 3 mm, length 70 mm. Cable length 1 metre.
 - TP4721.0:** Pt100 sensor immersion probe. Stem Ø 3 mm, length 230 mm. Cable length 2 metres.
 - TP473P.0:** Pt100 sensor penetration probe. Stem Ø 4mm, length 150 mm. Cable length 2 metres.
 - TP474C.0:** Pt100 sensor contact probe. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable length 2 metres.
 - TP475A.0:** Air probe, sensor Pt100. Stem Ø 4mm, length 230mm. Cable length 2 metres.
 - TP4721.5:** Immersion probe, sensor Pt100. Stem Ø 6mm, length 500 mm. Cable length 2 metres.
 - TP4721.10:** Immersion probe, sensor Pt100. Stem Ø 6mm, length 1,000mm. Cable length 2 metres.
- **Temperature probes complete with TP47 module (input ⑤)**
 - TP47.100:** Direct 4 wires Pt100 sensor immersion probe. Probe's stem Ø 3mm, length 230mm. Connection cable 4 wires with connector, length 2 metres.
 - TP47.1000:** Pt1000 sensor immersion probe. Probe's stem Ø 3mm, length 230mm. Connection cable 2 wires with connector, length 2 metres.
 - TP87.100:** Pt100 sensor immersion probe. Probe's stem Ø 3mm, length 70mm. 4 wire connection cable with connector, length 1 metre.
 - TP87.1000:** Pt1000 sensor immersion probe. Probe's stem Ø 3mm, length 70mm. 2-wire connection cable with connector, length 1 metre.
- **Common Accessories for instruments of the series HD22...**
 - TP47:** Module for the connection of Pt100 4-wire and Pt1000 2-wire probes to instrument series HD22..., without amplifying electronics and linearization.



HD22.2



S'print-BT

