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DO-060.16E

## PORTABLES DISSOLVED OXYGEN - TEMPERATURE METERS

### HD2109.1 HD2109.2 Dissolved oxygen - Temperature meters



The **HD2109.1** and **HD2109.2** are portable instruments with a large LCD display. They measure the concentration (in mg/l) of dissolved Oxygen in liquids, the saturation index (in %) and the temperature using SICRAM combined probes of polarographic type with two or three electrodes and integrated temperature sensor. Temperature only is measured by Pt100-SICRAM or direct 4 wire-immersion, penetration or contact probes. Thanks to an internal pressure sensor, the instruments automatically compensate for barometric pressure. The instrument anticipates automatic compensation of the Oxygen probe membrane permeability and of the salinity of the liquid being examined. The dissolved Oxygen probe's quick calibration function guarantees timely correctness of the performed measurements. The dissolved Oxygen and temperature probes are fitted with an automatic detection module, with the factory calibration settings already being memorized inside. The HD2109.2 is a **datalogger**. It memorizes up to 18,000 dissolved Oxygen concentration, saturation index measurements, barometric pressure and temperature samples which 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 HD2109.1 and HD2109.2 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 relative measurement REL, the Auto-HOLD function, and the automatic turning off which can also be disabled.

**The instruments have IP67 protection degree.**

#### ORDER CODES

**HD2109.1K:** The kit is composed of: instrument HD2109.1, calibrator DO9709/20, connection cable for serial output **HD2110CSNM**, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **The dissolved Oxygen and temperature probes must be ordered separately.**

**HD2109.2K:** The kit is composed of: instrument HD2109.2 **datalogger**, calibrator DO9709/20, connection cable for serial output **HD2101/USB**, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **The dissolved oxygen and temperature probes must be ordered separately.**



#### TECHNICAL CHARACTERISTICS

##### Instrument

Dimensions	(Length x Width x Height) 185x90x40mm
Weight	470g (complete with batteries)
Materials	ABS, rubber
Display	2x4 1/2 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

##### Power

Batteries	4 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed	with instrument off 20µA
<b>With dissolved oxygen probe</b>	40µA
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 **HD2109.2**

Type	2000 pages containing 9 samples each
Quantity	18,000 samples
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)

## ORDER CODES

**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 HD2109.1K).

**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.

**DO9700:** zero solution.

**DO9701:** electrolyte solution.

### Combined dissolved Oxygen/temperature probes

**DO9709 SS:** The kit includes: combined probe for measurement of O<sub>2</sub> and temperature with replaceable membrane, three membranes, 50ml of zero solution, 50ml of electrolyte solution. Cable length 2m. 12mm x 120mm.

**DO9709 SS.5:** The kit includes: combined probe for measurement of O<sub>2</sub> and temperature, replaceable membrane, Ø 12mm x Ø 12mm. Cable length 5m, three membranes, 50ml of zero solution, 50ml of electrolyte solution.

**DO9709 SS.10:** The kit includes: combined probe for measurement of O<sub>2</sub> and temperature, replaceable membrane, Ø 12mm x Ø 12mm. Cable length 10m, three membranes, 50ml of zero solution, 50ml of electrolyte solution.

### Temperature probes complete with SICRAM module

**TP87:** Pt100 sensor immersion probe. Stem Ø 3 mm, length 70 mm. Cable length 1 metre.

**TP472I:** Pt100 sensor immersion probe. Stem Ø 3 mm, length 300 mm. Cable length 2 metres.

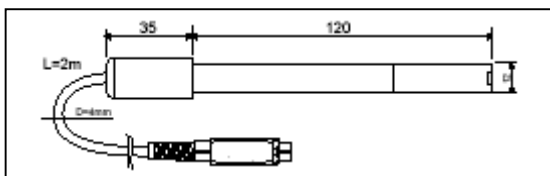
**TP472I.0:** Pt100 sensor immersion probe. Stem Ø 3 mm, length 230 mm. Cable length 2 metres.

**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.

**TP472I.5:** Pt100 sensor immersion probe. Stem Ø 6mm, length 500 mm. Cable length 2 metres.

**TP472I.10:** Pt100 sensor immersion probe. Stem Ø 6mm, length 1000mm. Cable length 2 metres.



### USB interface - model HD2109.2

Type 1.1 - 2.0 electrically isolated

### Connections

Input for Oxygen and temperature probes

8-pole male DIN45326 connector

Serial and USB interface 8-pole MiniDin connector

Mains adapter 2-pole connector (positive at centre)

### Measurement of the concentration of dissolved Oxygen

Measurement range 0.00...90.00mg/l

Resolution 0.01mg/l

Accuracy (60...110%, 1013mbar, 20...25°C)

±0.03mg/l±1digit

### Measurement of the saturation index of dissolved Oxygen

Measurement range 0.0...600.0%

Resolution 0.1%

Accuracy ±0.3% ±1digit

### Measurement of barometric pressure

Measurement range 0.0...1100.0mbar

Resolution 0.1mbar

Accuracy ±2mbar±1digit between 18 and 25°C

±(2mbar+0.1mbar/°C) in the remaining range

### Setting the salinity

Measurement range 0.0...70.0mg/l

Resolution 0.1mg/l

### Temperature measurement with the sensor inside the dissolved Oxygen probe

Measurement range 0...+45°C

Resolution 0.1°C

Accuracy ±0.25°C

Drift after 1 year 0.1°C/year

### Temperature measurement by Instrument with Pt100 probe

Pt100 measurement range -200...+650°C

Resolution 0.1°C

Accuracy ±0.25°C

Drift after 1 year 0.1°C/year

## DATOS TÉCNICOS DE LAS SONDAS

### Sondas de temperatura sensor Pt100 con módulo sicram

Model	Type	Range	Accuracy
TP87	Immersion	-50 to 200 °C	±0,25 °C (-50 to 200 °C)
TP472I.0	Immersion	-50 to 400 °C	±0,25 °C (-150 to 350 °C) ±0,4 °C (350 to 400 °C)
TP473P.0	Penetration	-50 to 400 °C	±0,25 °C (-150 to 350 °C) ±0,4 °C (350 to 400 °C)
TP474C.0	Contact	-50 to 400 °C	±0,25 °C (-150 to 350 °C) ±0,4 °C (350 to 400 °C)
TP475A.0	Air	-50 to 400 °C	±0,25 °C (-150 to 350 °C) ±0,4 °C (350 to 400 °C)
TP472I.5	Immersion	-50 to 400 °C	±0,25 °C (-150 to 350 °C) ±0,4 °C (350 to 400 °C)
TP472I.10	Immersion	-50 to 400 °C	±0,25 °C (-150 to 350 °C) ±0,4 °C (350 to 400 °C)

Common characteristics Resolution 0.1°C

Temperature drift @20°C 0.003%/°C

### Direct 4 wire Pt100 probes

Model	Type	Range	Accuracy
TP47.100	4 wire Pt 100	-50 to 400 °C	Class A

Common characteristics Resolution 0.1°C

Temperature drift @20°C 0.003%/°C

### Oxygen probe – dimensions and characteristics

Model	DO9709 SS
Type	Polarographic probe, Silver anode, Platinum cathode
Application range	
Oxygen concentration	0,00 a 60 mg / l
Functioning temperature	0 a 45 °C
Accuracy instrument + probe	1% full scale
Membrane	Replaceable

## DO9709 Dissolved oxygen - Data-logger



### ORDER CODES

**DO 9709:** Diplomatic carrying case, instrument DO 9709, manual, 9V alkaline battery, temperature probe TP 870, connecting cable CP RS 232C and software DELTALOG-1, calibrator DO 9709/20, electrolyte solution for O<sub>2</sub> DO 9701 and zero solution DO 9700.

**The probe for measuring dissolved Oxygen must be ordered separately. Probes and connecting cables**

**DO 9709SS:** Combined probe for measuring dissolved Oxygen and temperature with possibility of changing the membrane. 3 membranes. Cable length 2 metres.

**DO9709 SS.5:** The kit includes: combined probe for measurement of O<sub>2</sub> and temperature, replaceable membrane, Ø 12mm x Ø 12mm. Cable length 5m, three membranes.

**DO9709 SS.10:** The kit includes: combined probe for measurement of O<sub>2</sub> and temperature, replaceable membrane, Ø 12mm x Ø 12mm. Cable length 10m, three membranes.

**TP 870:** Immersion temperature probe, diam. 3x230 mm., measuring range -50...+400°C.

**TP 870P:** Penetration temperature probe, diam. 4x150 mm., measuring range -50...+400°C.

**TP 870C:** Contact temperature probe, diam. 5x230 mm., measuring range -50...+400°C.

**TP 870A:** Air temperature probe, diam. 4x230 mm., measuring range -50...+250°C

**CP RS 232C:** Connecting cable from SUB D female 9-pole to SUB D female 9-pole, for serial output RS 232C..

**The temperature probes must be ordered separately. The instrument may be fitted with all probes in the TP 870... series or with any type of Pt100 probe by other manufacturers as long as they have 4 wires and comply with the diagram.**

The **DO 9709** Dissolved Oxygen - Data Logger allows the measurement of the concentration (expressed in mg/l) of dissolved oxygen in liquids and of the saturation index (expressed in %), using a combined measurement of a polarographic type with two or three electrodes, and a temperature sensor inside the probe. Normally the instrument measures the partial pressure of the oxygen in the water, measuring the current generated by the polarographic probe. The temperature sensor, contained in the oxygen probe, and the atmospheric pressure sensor housed inside the instrument allow calculation of the saturation index and of the oxygen concentration in the liquid being examined. The instrument contemplates automatic compensation of the membrane permeability, used in the oxygen probe, and of the salinity of the liquid being examined. Temperature probes with a 4-wire Pt100 sensor may be connected to the instruments, or active probes of series TP 870, for taking temperature measurements in the range from -50 to +200°C: The fast calibration function of the dissolved oxygen probe guarantees lasting correctness of the measurements taken. The instrument's Data Logger function enables it to store up to 30,000 readings. The sampling period is variable from 1 second to 12 hours. The data acquired may later be transferred to a Personal Computer or a printer by means of the opto-insulated serial line RS 232C. For each value stored the date and time of acquisition is indicated; each acquisition block is ended with a report which provides the maximum, minimum and mean values. With the Serial Output function it is possible to obtain the instantaneous values measured by the instrument at the output of the serial line RS 232C, in order to send them to a printer or a computer. Other functions such as HOLD (which blocks the display), REL (for taking relative measurements) and RECORD (for storing the maximum, minimum and mean values) further enrich the instrument's performance. Thanks to its versatility and to its storage capacity, the instrument is particularly suitable for monitoring activities, for example in fish breeding establishments, purification plants, for the environmental control of waters and finally for laboratory measurements: in the medical, biochemical, microbiological field and in the food industry.

### TECHNICAL CHARACTERISTICS

Display:	double LCD 3 1/2 digit, figure height 12.5 mm. and symbols.
Instrument conversion frequency:	2 per second.
Instrument working	temperature: -5...+50°C, 0...90% R.H., no condensation.
Storage temperature:	-20...+60°C.
Power supply:	9V battery, lifetime with a good alkaline battery 100 hours (about 1 year with the instrument switched off).
Connectors:	input A and B, DIN 41524 female 8-pole circular connector, serial gate SUB D male 9-pole.
Instrument case:	ABS.
Dimensions:	instrument alone 210x72x40 mm., kit 370x295x85 mm.
Weight:	instrument alone 350 gr., kit 1600 gr.

#### Measuring the concentration of dissolved Oxygen (input A)

Measuring range:	0.00 to 90.0 mg/l
Resolution:	0.01 mg/l in the range 0.00 to 19.99 mg/l 0.1 mg/l in the range 20.0 to 90.0 mg/l automatic change of scale
Accuracy of instrument alone:	±0.03 mg/l in condition 60 to 110%, 1013 mbar, 20 to 25°C
Temperature probe measuring range:	0 to 45°C

#### Measuring the saturation index of dissolved Oxygen (input A)

Measuring range:	0.0 to 600.0 %
Resolution:	0.1% in the range 0.00 to 199.9% 1% in the range 200 to 600% automatic change of scale
Accuracy of instrument alone:	±0.3% between 0 and 199.9% ±2% between 200 and 600%
Temperature probe measuring range:	0 to 45°C





#### Temperature measurement with the sensor inside the Oxygen probe (input A)

Measuring range:	0 to 45°C
Resolution:	0.1°C
Accuracy of instrument alone:	0.2°C in the range 18 to 25°C 0.2°C + 0.01°C/°C in the range -5 to 18°C and 25 to 45°C
Accuracy with NTC sensor:	0.4°C in the range 18 to 25°C 0.4°C + 0.015°C/°C in the range -5 to 18°C and 25 to 45°C

#### Measurement of atmospheric pressure

Measuring range:	600 to 1100 mbar
Resolution:	1 mbar
Accuracy of instrument alone:	±2 mbar in the range 18 to 25°C ±2 mbar + 0.1 mbar in the range -5 to 18°C and 25 to 45°C

#### Setting water salinity

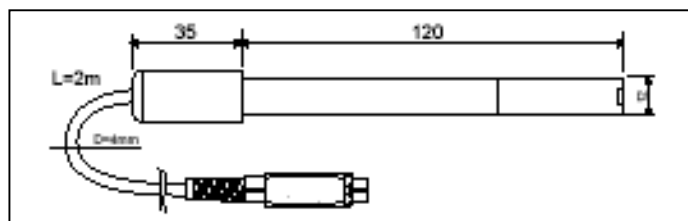
Setting range:	0.0 to 70.0 g/l Resolution: 0.1 g/l
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#### Temperature measurement (input B)

Temperature probe: Pt100 platinum probe (100 ohm at 0°C).  
Input for temperature probes of the series TP 870, TP 870A, TP 870/C, TP 870/P (Pt100 sensor with amplification and linearization circuit) or Pt100 4-wire probes with direct input.  
Instrument temperature measuring range: -50...+200°C. \*  
Resolution: 0.1°C in the range -50.0...+199.9°C.

#### Oxygen probe – dimensions and characteristics

Model	DO9709 SS
Type	Polarographic probe, Silver anode, Platinum cathode
Application range	
Oxygen concentration	0,00 a 60 mg / l
Functioning temperature	0 a 45 °C
Accuracy instrument + probe	1% full scale
Membrane	Replaceable



INSTRUMENT ACCURACY IN TEMPERATURE MEASUREMENTS				
Type of probe	Measuring Range	Resolution	Accuracy with instrument temperature from 18 to 25°C	Accuracy with instrument temperature from -10 to 18 and from 25 to 50°C
Instrument alone:	-50 to 200 °C	0,1 °C	0,2 °C	0,2 °C ± 0,01 °C/ °C
Instrument with TP 870:	-50 to 200 °C	0,1 °C	0,4 °C	0,4 °C ± 0,015 °C/ °C
Instrument with Pt100 class A:	-50 to 200 °C	0,1 °C	0,4 °C	0,4 °C ± 0,01 °C/ °C