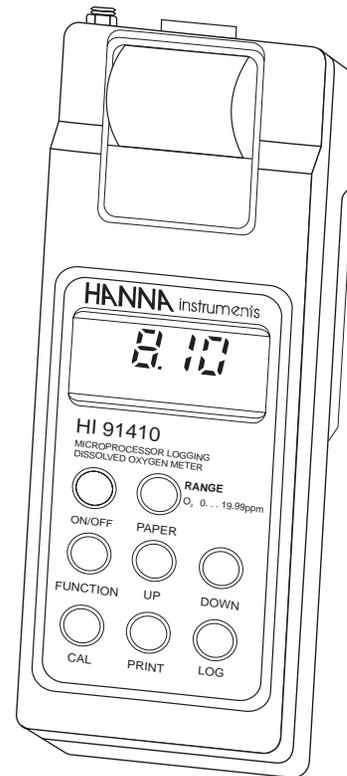


Instruction Manual

HI 9141 - HI 91410

Portable Printing and Logging Dissolved Oxygen Meters



PRINTED IN ITALY

MANDOPRNR1
02/96



<http://www.hannacan.com>

These Instruments are in Compliance with the CE Directives



<http://www.hannacan.com>



Dear Customer,

Thank you for choosing a Hanna Instruments Product.

Please read this instruction manual carefully before using the instrument.

This manual will provide you with all the necessary information for the correct use of the instrument, as well as a precise idea of its versatility in a wide range of applications.

These instruments are in compliance with CE directives EN 50081-1 and 50082-1.

TABLE OF CONTENTS

Preliminary Examination	1
General Description	1
Functional Description Probe	3
Functional Description HI 9141	4
Functional Description HI 91410	5
Specifications	6
Initial Preparation	7
Calibration	9
Taking Measurements	11
Setting Date, Time, Printing Interval	13
Printing / Recording with HI 9141	17
Printing / Logging with HI 91410	19
Altitude Compensation	23
Salinity Compensation	24
Temperature Compensation	24
Probe & Membrane Maintenance	25
Data Transfer to PC	27
Fault Functions	29
Memory Organization (HI 91410 only)	30
Printer Maintenance	31
Battery Replacement	33
Accessories	35
Warranty	36
CE Declaration of Conformity	37

 **HANNA** *ISO 9000 Certified*
instruments *Company since 1992*

CE DECLARATION OF CONFORMITY

 **HANNA**
instruments

CE

DECLARATION OF CONFORMITY

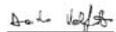
We
Hanna Instruments Srl
V.le delle industrie 12
35010 Ronchi di Villafranca (PD)
ITALY

herewith certify that the dissolved oxygen meters
HI 9141 HI 91410

have been tested and found to be in compliance with the following regulations:

IEC 801-2	Electrostatic Discharge
IEC 801-3	RF Radiated
IEC 801-4	Fast Transient
EN 55022	Radiated, Class B

Date of Issue: 28-11-1995


D. Volpato - Engineering Manager
On behalf of
Hanna Instruments S.r.l.

Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used.

Operation of this instrument in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance.

To avoid electrical shock, do not use these instruments when voltages at the measurement surface exceed 24VAC or 60VDC.

To avoid damages or burns, do not perform any measurement in microwave ovens.

In particular cases the meters could turn off. In such cases, the meters can be turned on by pressing the ON/OFF key.

WARRANTY

All Hanna Instruments **meters are warranted for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to the instructions. The **probes are warranted for a period of six months**.

This warranty is limited to repair or replacement free of charge.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charge for repair or replacement.

If the instrument is to be returned to Hanna Instruments, obtain a Return Goods Authorization from the Customer Service Department first and then send it with shipment cost prepaid.

When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

All rights are reserved. Reproduction in whole or in part is prohibited without the written consent of the copyright owner.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it to make sure that no damage has occurred during shipping. If there is any damage, notify your Dealer.

Each Printing D.O. meter is supplied complete with:

- 1.5V AA size batteries (4 pieces)
- DO Probe with 4 m/13' cable (**HI 76407/4**)
- Membrane cap, 2 pieces (**HI 76407A**)
- Electrolyte solution, 30 ml (**HI 7041S**)
- Paper rolls, 5 pieces
- Rugged Carrying case

Note: Save all packing material until you are sure that the instrument functions correctly. All defective items must be returned in the original packing with the supplied accessories.

GENERAL DESCRIPTION

The **HI 9141** and **HI 91410** are portable, microprocessor-based, printing (and logging HI 91410 only) meters for Dissolved Oxygen measurements.

Housed in a rugged and lightweight case, with an easy-to-read LCD, they are the first portable D.O. meters in their category to incorporate a printer. The printer uses plain, non-fading paper.

They are capable of storing up to 8,000 readings. These readings can be printed and/or transferred to a computer system for elaboration or permanent storage (HI 91410 only). An optional **HI 9200** infrared transmitter can be used to interface the **HI 91410** to a computer for data transfer.

Dissolved oxygen and temperature measurements can be performed with lab-grade preci-

sion in the field (wastewater treatment, fish-farming, water analysis, etc.) as well as in the laboratory without compromising accuracy.

Dissolved oxygen is indicated in ppm (parts per million).

Temperature is compensated for by the meter's ATC circuitry. Salinity compensation in water allows direct determination of dissolved oxygen in saline waters and the altitude compensation readjusts for the altitude variance.

The dissolved oxygen probe has a membrane covering the polarographic sensors and a built-in thermistor for temperature measurements and compensation. This permeable Teflon® membrane isolates the sensor elements from the testing solution, but allows oxygen to enter. When a voltage is applied across the sensor, oxygen that has passed through the membrane reacts causing a current flow.

ACCESSORIES

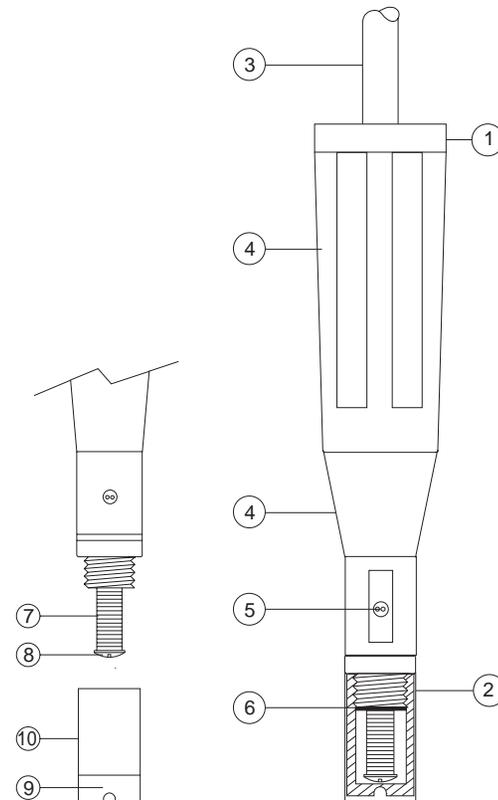
HI 7041S	Refilling Electrolyte Solution, 30 ml
HI 710005	115 VAC to 12 VDC power adapter
HI 710006	230 VAC to 12 VDC power adapter
HI 710034	Plain paper spare roll (10 pcs)
HI 710035	Spare ink cartridge (1 pc)
HI 721308	1.5V AA alkaline battery (10 pcs)
HI 76407/10	Spare probe with 10 meters (33') cable
HI 76407/20	Spare probe with 20 meters (66') cable
HI 76407A/P	5 spare membranes
HI 9200	Infrared Transmitter
HI 92000/16	Windows® 3.11 compatible software for data transfer to PC
HI 92000/32	Windows® 95 compatible software for data transfer to PC
MANDOPRNR1	Instruction manual

It is recommendable to purchase Hanna Instruments **HI 710005** and **HI710006** voltage adapters that use the proper polarity configuration.

HI9141 and **HI 91410** can also be used with other adapters. In this case, remember to check the correct polarity of your adapter before connecting it to the meter.

WARNING: In **HI91410**, if the external power supply and batteries are disconnected, all stored data will be erased. Always apply external power supply to the instrument when changing low batteries to prevent data from being lost.

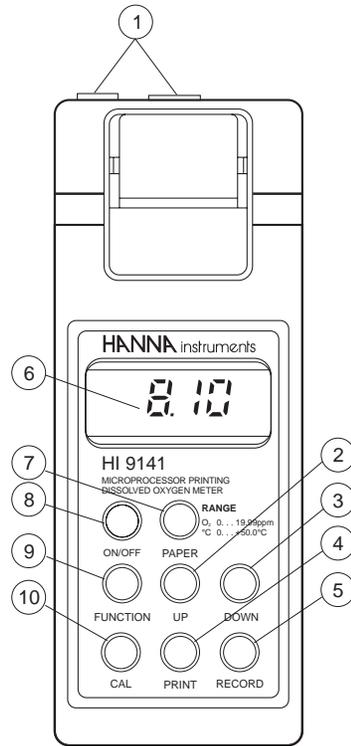
FUNCTIONAL DESCRIPTION PROBE



1. D.O. Probe
2. Protective Cap
3. Watertight Shielded Cable
4. Polypropylene Probe Body
5. Temperature Sensor
6. O-Ring Seal
7. Silver Chloride Anode
8. Platinum Cathode (sensor)
9. Oxygen Permeable Teflon® Membrane
10. Membrane Cap

Teflon® is registered Trademark of "du Pont de Nemours & Co."

FUNCTIONAL DESCRIPTION HI9141



1. Probe connector and socket for adapter
2. **UP** key, to set date, time, printing interval, values for altitude and salinity compensation
3. **DOWN** key, to set date, time, printing interval, values for altitude and salinity compensation
4. **PRINT** key, to obtain a printout
5. **RECORD** key, to enter the recording mode
6. Liquid Crystal Display
7. **PAPER** key, to move the paper up
8. **ON/OFF** key, to turn the meter on or off
9. **FUNCTION** key, to select the D.O. or temperature mode and for compensation selection
10. **CAL** key, to enter or exit calibration mode.

BATTERY REPLACEMENT

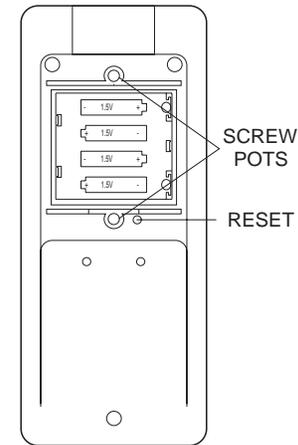
If "LO BAT" appears on the display, it indicates that the batteries are running down.



If it blinks during printing, it means that 200 printouts can be made before the batteries are exhausted. When there is only sufficient power for 100 printouts, the "LO BAT" sign is displayed continuously on the LCD.

Battery replacement must only take place in a non hazardous area using the battery types specified in this instruction manual (see page 35).

In order to replace run down batteries, simply remove the two screws on the rear cover of the instrument and replace the four 1.5V AA batteries with new ones, paying attention to the correct polarity.

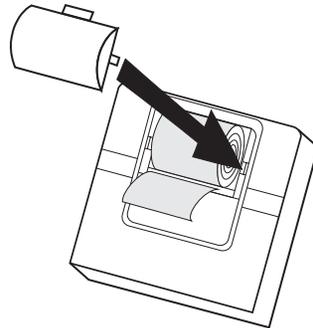


A 12VDC power source can also be used to power the unit (see the Accessories section page 35).

Note: The instrument uses the following configuration.

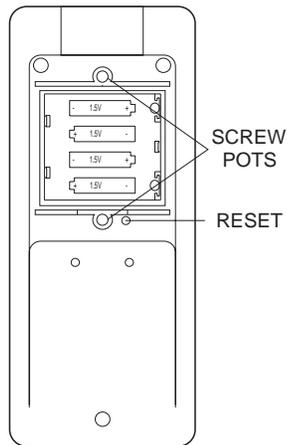


Allow approximately 5 cm (2") to exit from the printer and replace the paper cover.



TO RESET THE PRINTER

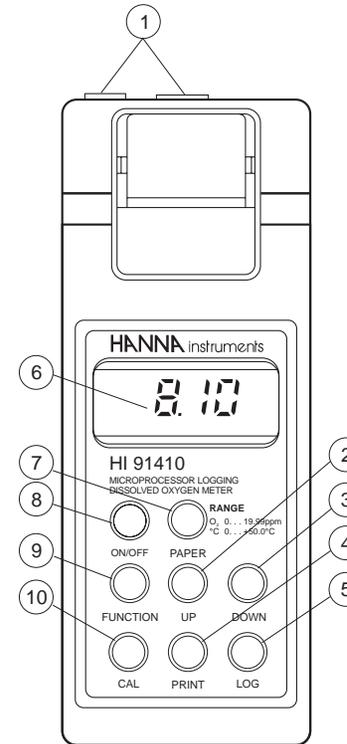
Take the battery cover off by removing the screws. Using a pencil press the black button. This will reset the printing mechanism.



Before replacing the battery cover investigate the cause of the printer jam (e.g. the paper caught under the cover preventing the printer from advancing paper feed).

Replace the battery cover and secure the screws.

FUNCTIONAL DESCRIPTION HI91410



1. Probe connector and socket for adapter
2. **UP** key, to set date, time, printing interval, values for altitude and salinity compensation
3. **DOWN** key, to set date, time, printing interval, values for altitude and salinity compensation
4. **PRINT** key, to obtain a printout
5. **LOG** key, to enter or exit the logging mode
6. Liquid Crystal Display
7. **PAPER** key, to move the paper up
8. **ON/OFF** key, to turn the meter on or off
9. **FUNCTION** key, to select the D.O. or temperature mode and for compensation selection
10. **CAL** key, to enter or exit calibration mode.

SPECIFICATIONS HI9141 & HI91410

Range	DO Temp.	0.00 to 19.99 ppm 0.0 to 50.0°C
Resolution	DO Temp.	0.01 ppm 0.1°C
Accuracy	DO Temp.	1.5% of full scale ±0.5 °C
Typical EMC Deviation	DO Temp.	±0.6 ppm ±3°C
Calibration		Automatic in saturated air at 100%
Temperature Compensation		Automatic from 0 to 30°C (32 to 86°F)
Altitude Compensation	Resolution	0 to 1,900 m (6,230') 100 m (328')
Salinity Compensation	Resolution	0 to 40 g/l 1 g/l
Power Supply		4 x 1.5V AA batteries, approx. 70 hours of life; Auto shut-off after 4 hours. Power socket for 12VDC adapter
Printer		Low-power impact type belt, 14 characters per line using 38mm plain paper
Printing/Logging Interval		1, 2, 5, 10, 15, 30, 60, 120, 180 minutes
Environment		0 to 50°C; 95% RH
Dimensions		220 x 82 x 66 mm (8.7 x 3.2 x 2.6")
Shipping Weight		1.7 kg (3.8 lb.)
Response Time		The response time is about 20 seconds for a 95% reading at a constant temperature of 25°C. The response time for low oxygen readings or at low temperature is approxi- mately 40 seconds. Allow more time to obtain more ac- curate readings.

PRINTER MAINTENANCE

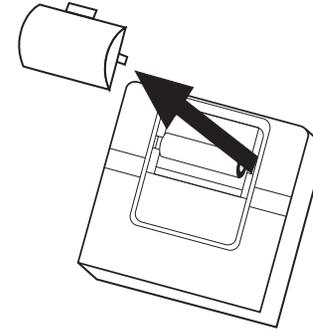
TO CHANGE THE INK CARTRIDGE

When printouts become faint, it might be necessary to change the ink cartridge. Contact your Hanna authorized center.

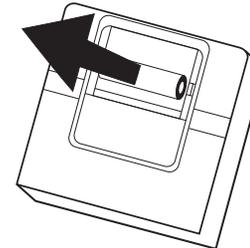
TO INSERT THE PAPER ROLL

The **HI 9141** and **HI91410** use plain paper rolls 38 mm large. To insert a new roll is very easy.

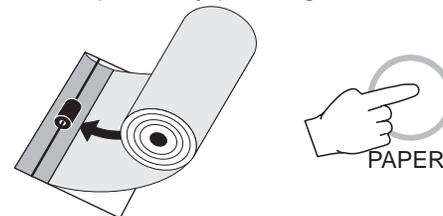
Open the paper cover pulling gently on the tab.



Take the carton cylinder out.



Insert the paper edge in the printer slot and feed the printer by pressing the PAPER key.



MEMORY ORGANIZATION (HI91410 ONLY)

Capacity: 8,000 data samples, divided into 16 pages.

Data capacity per page:
500 data samples.

Each time a new logging period starts, it automatically starts from a new page.

If "LOGGING" is still on, and the available page is "0" the meter will overwrite the first LOT DATA in the existing meter memory. During logging the meter automatically returns to the oldest page in the memory and if it contains data, it will overwrite it. In this case the first log will not correspond to the oldest set of data.

It is recommended to periodically "clean" the memory. Save the data with a PC if you need to keep a record and then disconnect the batteries for about 1 minute. If you do this, remember to re-set the date, time, altitude and salinity.

WARNING

Data are stored into memory until batteries are removed.

If replacement of the batteries is needed and data are not to be lost, plug the external power supply in and proceed with batteries replacement as described on page 33. Only once the batteries have been replaced it is possible to unplug the power supply without losing the stored data.

INITIAL PREPARATION

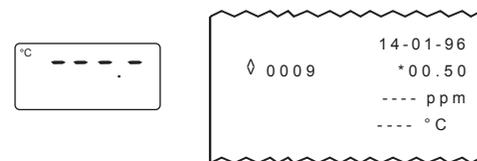
Each meter is supplied complete with batteries. Remove the back cover, unwrap the batteries and install them while paying attention to the polarity (see also page 33).

To prepare the instrument for use, connect the D.O. probe to the meter securely by aligning the pins with the socket located on the top of the meter, pushing the plug in and tightening the threaded ring. Follow the "Initial Probe Preparation" procedure explained on page 8.

To switch the meter on, press the ON/OFF key and "Cond" appears on the display to inform that the probe is in the auto-conditioning (polarization) mode. Once the "Cond" disappears, the instrument can be calibrated (see page 9).



If the probe is disconnected, the meter will display "°C ---.-" and print "---- ppm" and "----°C" to alert the user.



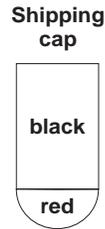
This also indicates the possibility of a broken probe cable.

To maximize battery life, the display is automatically switched off after 4 hours of non-use. However, the meter will continue to monitor dissolved oxygen and temperature (if in the recording/logging mode).

INITIAL PROBE PREPARATION

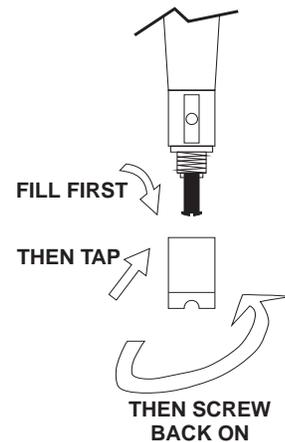
All probes shipped from Hanna Instruments are dry. To hydrate the probe and prepare it for use, connect it to the meter and proceed as follows.

1. Remove the red and black plastic cap. This cap is for shipping purposes and can be thrown away.
2. Wet the sensor by soaking the bottom 2½ cm (1") of the probe in electrolyte (**HI 7041S**) for 5 minutes.



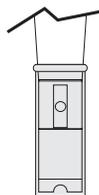
3. Rinse the membrane cap (**HI 76407A** supplied in the kit with the meter) with electrolyte solution while shaking it gently. Refill with clean electrolyte solution.

4. Gently tap the sides of the membrane cap with your finger tip to ensure that no air bubbles remain trapped. To avoid damaging the membrane, do not tap the membrane directly on the bottom.



5. Make sure that the rubber O-ring sits properly inside the membrane cap.
6. With the sensor facing down, slowly screw the cap clockwise. Some electrolyte will overflow.

When not in use, place the protective cap supplied in the kit with the meter.



FAULT FUNCTIONS

HI9141 and **HI91410** are factory programmed to automatically diagnose a fault. This is displayed with error codes on the LCD.

Error codes:

PEr 0, PEr 1, PEr 2 = Short circuit on the system, the meter should be returned for repair (see Warranty section).

PEr 3 = Printer mechanism fault - repair needed (see Warranty section).

PEr 4 = Printer clutch jammed - reset the printer (see page 32).

PEr 9 = Printer jammed - reset the printer (see page 32).

Data transmission from the instrument to the PC is now much easier with new **HI 92000** Windows® compatible application software offered by Hanna Instruments.

HI 92000 allows you to use the powerful means of the most spread sheet programs (e.g. Excel®, Lotus 1-2-3®). Simply run your favorite spread sheet and open the file downloaded by **HI 92000**. It is possible to make any elaboration available with your software (e.g. graphics, statistical analysis).

User friendly, **HI 92000** offers a variety of features and has an on line help to support you throughout any situation.

To install **HI 92000** you need a 3.5" drive and a few minutes to follow the instructions conveniently printed on the disk label.

CALIBRATION

PROBE POLARIZATION

The probe is under polarization with a fixed voltage of approximately 800 mV.

Probe polarization is essential for stable measurements with the same recurring degree of accuracy.

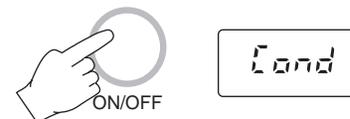
With the probe properly polarized, oxygen is continually "consumed" when it passes through the sensitive diaphragm and dissolves in the electrolyte solution contained in the probe.

If polarization is interrupted, the electrolyte solution continues to be enriched with oxygen until it reaches an equilibrium with the surrounding solution.

Whenever measurements are taken with a non-polarized probe, the oxygen level revealed is both that of the tested solution as well as that present in the electrolyte solution. This reading is incorrect.

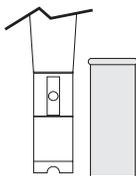
The calibration of this instrument is very simple and is recommended every time the meter is turned on.

- Make sure the probe is ready for measurements (see page 8), i.e. the membrane cap is filled with electrolyte and the probe is connected to the meter and properly polarized.
- Switch the meter on by pressing the ON/OFF key and "Cond" appears on the display to inform that the probe is in auto-conditioning (polarization) mode.



- Once the "Cond" disappears, the instrument can be calibrated.

- For an accurate calibration, it is recommended to wait for 5 or 10 minutes to ensure precise conditioning of the probe.
- Remove the protective cap.



- Press the CAL key. "CAL" appears on the primary display to indicate that the instrument is in calibration mode.



- The instrument will automatically standardize itself to the actual saturation value and after approximately 1 minute will show the value in ppm corresponding to the maximum oxygen level soluble in water at that particular temperature and at the conditions of altitude and salinity previously set. Once the value in ppm is displayed, the calibration is completed.



- Press the FUNCTION key and make sure F1 and F2 are set to the appropriate altitude and salinity values (see pages 23-24).



Notes: • The instrument must also be calibrated whenever the probe, the membrane or the electrolyte solution are changed.

- If you want to exit the calibration mode during the calibration, press the CAL key again.



DATA TRANSFER TO PC

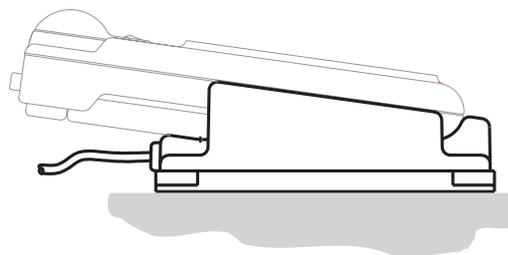
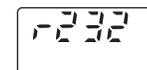
HI91410 contains infrared emitting circuitry.

Press the FUNCTION key until "F2" is displayed on the secondary LCD.



Place your data-logger on the **HI9200** Infrared Transmitter (ensuring that the two infrared LEDs are placed on top of each other) and the memory can then be downloaded to your PC through the **HI9200's** RS232 port.

During the data transfer the instrument displays the message "r 232".



Using the **HI9200** Infrared Transmitter, all recorded data can be fed to your Personal Computer for easy reproduction, storage or elaboration without the interference of cables or cords between the meter and the transmitter.

will damage the membrane.

- Make sure that the rubber O-ring sits properly inside the membrane cap.
- With the sensor facing down, slowly screw the membrane cap clockwise. Some electrolyte will overflow.

The Platinum cathode (#8 in the Functional Description at page 3) should always be bright and untarnished. If it is tarnished or stained, which could be due to contact with certain gases or extended use with a loose or damaged membrane, the cathode should be cleaned. You can use a clean lint-free cardboard or cloth. Rub the cathode very gently side to side 4-5 times. This will be enough to polish and remove any stains without damaging the platinum tip. Afterwards, rinse the probe with deionized or distilled water and install a new membrane cap using fresh electrolyte and follow the steps above. Re-calibrate the instrument.

Important: in order to have accurate and stable measurements, it is important that the surface of the membrane is in perfect condition. This semipermeable membrane isolates the sensor elements from the environment but allows oxygen to enter. If any dirt is observed on the membrane, rinse carefully with distilled or deionized water. If any imperfections still exist, or any damage is evident (such as wrinkles or tears-holes), the membrane should be replaced.

Make sure that the O-Ring sits properly in the membrane cap.

TAKING MEASUREMENTS

Make sure the meter has been calibrated (see page 9) and the protective cap has been removed. Immerse the tip of the probe in the sample to be tested.



Make sure the temperature sensor is also immersed.

Allow approximately one minute for the meter to stabilize and read the mg/l (ppm) value of dissolved oxygen on the display.

For accurate dissolved oxygen measurements a water movement of 0.3 m/sec is required at a minimum. This is to ensure that the oxygen-depleted membrane surface is constantly replenished. A moving stream will provide adequate circulation.

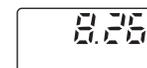
During field measurements, this condition may be met by manually agitating the probe. Accurate readings are not possible while the liquid is at rest.

During laboratory measurements, the use of a magnetic stirrer to ensure a certain velocity in the fluid is recommended. In this way, errors due to the diffusion of the oxygen present in the air in the solution are reduced to a minimum.

At all times, the time necessary for thermal equilibrium to occur between the probe and the measurement sample must be allowed (a few minutes if the temperature difference is only several degrees).

ppm READINGS

The ppm readings allow the user to read the concentration of the dissolved oxygen



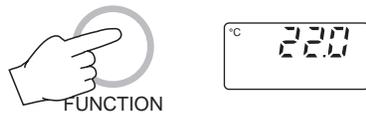
directly on the display expressed in ppm (mg/l).

If the sample contains significant salinity concentration or if you are performing the measurements at an altitude different from sea level, the readout values must be corrected, taking into account the lower degree of oxygen solubility in such occasions as explained on pages 23-24.

Remember to set the altitude and/or the salinity before taking ppm measurements. The meter will automatically compensate for these factors.

TEMPERATURE READINGS

The probe has a built-in temperature sensor. Press the FUNCTION key to display the measured temperature.



Allow the probe to reach the thermal equilibrium before taking any measurement. Thermal equilibrium can take several minutes to be reached. The greater the difference between the temperature at which the probe was stored and the temperature of the sample, the longer the time will be.

If "°C ---.-" is displayed, it indicates that the D.O. probe is not properly connected. This also indicates the possibility of a broken probe cable.



PROBE AND MEMBRANE MAINTENANCE

The oxygen probe body is made of reinforced plastic for maximum durability.

A thermistor temperature sensor provides temperature measurements of the sample tested. It is always recommended that the protective cap be kept on the probe when the probe is not in use to provide protection against damage and dirt.

To replace the membrane or refill with electrolyte, proceed as follows:

- Remove the protective cap by gently twisting and pulling it off the body of the probe (see fig. 1).

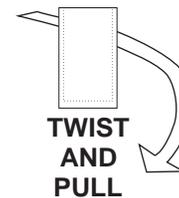


fig. 1

- Unscrew the membrane cap by turning it counterclockwise (see fig.2).

- Wet the sensor by soaking the bottom 2½ cm (1") of the probe in electrolyte (**HI 7041S**) for 5 minutes.

- Rinse the new membrane cap (**HI 76407A**) supplied with the meter with electrolyte solution while shaking it gently. Refill with clean electrolyte solution.

- Gently tap the sides of the membrane cap with your finger tip to ensure that no air bubbles remain trapped. Do not directly tap the bottom with your finger as this

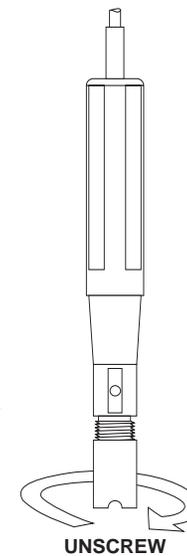


fig. 2

SALINITY COMPENSATION

Press the FUNCTION key until "F2" will be displayed.



Use the UP and DOWN keys to set the salinity between 0 and 40 g/l.



Salinity affects D.O. concentration decreasing its value. Below is the table showing the maximum solubility of oxygen at various temperature and salinity.

°C	Salinity (g/l) at Sea Level					°F
	0 g/l	10 g/l	20 g/l	30 g/l	35 g/l	
10	11.3	10.6	9.9	9.3	9.0	50.0
12	10.8	10.1	9.5	8.9	8.6	53.6
14	10.3	9.7	9.1	8.6	8.3	57.2
16	9.9	9.3	8.7	8.2	8.0	60.8
18	9.5	8.9	8.4	7.9	7.6	64.4
20	9.1	8.5	8.0	7.6	7.4	68.0
22	8.7	8.2	7.8	7.3	7.1	71.6
24	8.4	7.9	7.5	7.1	6.9	75.2
26	8.1	7.6	7.2	6.8	6.6	78.8
28	7.8	7.4	7.0	6.6	6.4	82.4

TEMPERATURE COMPENSATION

The D.O. probe has a built-in sensor for temperature so that the D.O. readings are automatically compensated for temperature effects.

SETTING DATE, TIME AND PRINTING INTERVAL

Turn the instrument on by pressing the ON/OFF key and wait for the "Cond" symbol to disappear.



Press the FUNCTION key twice and the display will show "F1" on the secondary display.



Press the CAL key and the display will show the date setting.



Press the CAL key again and the year will start blinking on the secondary LCD.



Use the UP or the DOWN keys to select the year.



When the correct year is selected, press the CAL key once. The month will start blinking.



Select the month by using the UP or the DOWN keys.



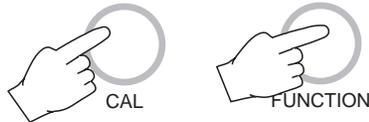
Press the CAL key, the day will start blinking.



Use the UP or the DOWN keys to select the correct day.



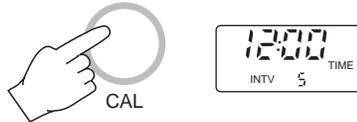
Press the CAL key to confirm the selected date and press the FUNCTION key to leave the date setting mode.



Press the FUNCTION key again to display "F2" on the secondary display.



Press the CAL key and the display will show the time and the printing interval setting.

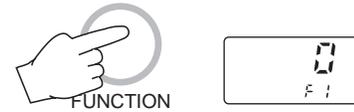


Press the CAL key again and the printing interval will start blinking.



ALTITUDE COMPENSATION

Press the FUNCTION key twice and "F1" will be displayed.



Use the UP and the DOWN keys to set the altitude between 1 and 1900 m, in steps of 100 m (1 meter = 3.28 feet).



Altitude affects D.O. concentration decreasing its value. The following table reports the maximum oxygen solubility at various temperatures and altitudes.

°C	Altitude, Meters above Sea Level							°F
	0 m	300 m	600 m	900 m	1200 m	1500 m	1800 m	
0	14.6	14.1	13.6	13.2	12.7	12.3	11.8	32.0
2	13.8	13.3	12.9	12.4	12.0	11.6	11.2	35.6
4	13.1	12.7	12.2	11.9	11.4	11.0	10.6	39.2
6	12.4	12.0	11.6	11.2	10.8	10.4	10.1	42.8
8	11.8	11.4	11.0	10.6	10.3	9.9	9.6	46.4
10	11.3	10.9	10.5	10.2	9.8	9.5	9.2	50.0
12	10.8	10.4	10.1	9.7	9.4	9.1	8.8	53.6
14	10.3	9.9	9.6	9.3	9.0	8.7	8.3	57.2
16	9.9	9.7	9.2	8.9	8.6	8.3	8.0	60.8
18	9.5	9.2	8.7	8.6	8.3	8.0	7.7	64.4
20	9.1	8.8	8.5	8.2	7.9	7.7	7.4	68.0
22	8.7	8.4	8.1	7.8	7.7	7.3	7.1	71.6
24	8.4	8.1	7.8	7.5	7.3	7.1	6.8	75.2
26	8.1	7.8	7.5	7.3	7.0	6.8	6.6	78.8
28	7.8	7.5	7.3	7.0	6.8	6.6	6.3	82.4
30	7.5	7.2	7.0	6.8	6.5	6.3	6.1	86.0
32	7.3	7.1	6.8	6.6	6.4	6.1	5.9	89.6
34	7.1	6.9	6.6	6.4	6.2	6.0	5.8	93.2
36	6.8	6.6	6.3	6.1	5.9	5.7	5.5	96.8
38	6.6	6.4	6.2	5.9	5.7	5.6	5.4	100.4
40	6.4	6.2	6.0	5.8	5.6	5.4	5.2	104.4

It is always possible to switch from the logging with printing function to the logging function. Press the CAL key and the "LOG" symbol will start to blink to indicate that the data are now stored only into memory.



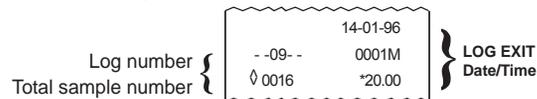
Notes:

- It is recommended to use the external power supply (**HI710005** or **HI710006**) during logging with printing mode, especially when many printouts are required.
- Before proceeding with logging with printing, make sure there is enough paper for your measurements. When the paper is finished the meter will not advise the operator and the printouts could be lost. If this happens, data will continue to be stored into memory.
- It is possible to insert a new paper roll during logging session (see page 31).
- Once in the logging mode, the interval cannot be changed. Exit the logging mode first (pressing the LOG key) before setting the new interval.
- If the PRINT key is pressed while in logging mode, a printout is produced without affecting the running sample number.



TO STOP LOGGING

Press the LOG key, this will generate a log exit status printout.



Any interval can be selected from 1, 2, 5, 10, 15, 30, 60, 120 or 180 minutes by using the UP and the DOWN keys.



Set the desired interval by pressing the CAL key once and the hour will start blinking.



To select the hour, press the UP or the DOWN keys (24 hour clock).



Press the CAL key once, the minutes will start blinking.



Use the UP or the DOWN keys to select the minutes.



Press the CAL key to confirm the selected time and printing interval.



Press the FUNCTION key to leave the time setting mode.



Press the FUNCTION key again to display D.O. readings.



Your time, date and printing interval are now set and stored in the memory even when the display is switched off.

TO VIEW DATE / TIME / TEMPERATURE

To view the temperature press the FUNCTION key.



To view the date first, press the FUNCTION key to display "F1" and then the CAL key.



To view the time first, press the FUNCTION key until the display shows "F2" and then the CAL key. This also displays the selected printing interval.



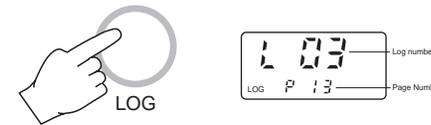
Press the FUNCTION key until the display returns to the D.O. readings.



LOGGING MODE WITH PRINTING

This function is suggested when an immediate report of the measurement is required in addition to the recording of the data into memory.

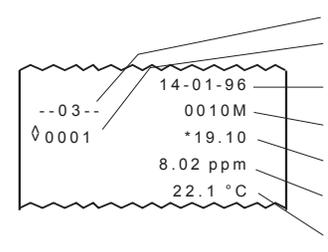
Press the LOG key to enter the logging mode. The log number and page number will appear for a few seconds on the display to indicate the correct operational mode.



The printer will print a complete set of data and the "LOG" symbol will appear on the secondary display.

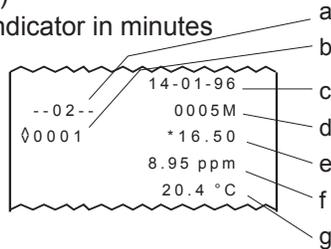
Each printout provides the following information:

- a - A running log number
- b - Running sample number (in that particular log)
- c - Date (DD-MM-YY)
- d - Printing interval indicator in minutes
- e - Time (HH-MM)
- f - D.O. value in ppm.
- g - Temperature value in °C.



The printout provides the following information:

- a- A running log number
- b- Running sample number (in that particular log)
- c- Date (DD-MM-YY)
- d- Printing interval indicator in minutes
- e- Time (HH-MM)
- f- D.O. value in ppm.
- g- Temperature value in °C.



To continue logging without printing, press now the CAL key and the "LOG" symbol on display will start to blink and no printout will be generated.



If you wish to restart printing press the CAL key again.

Notes:

- Once in the logging mode, the interval cannot be changed. Exit the logging mode first (pressing the LOG key) before setting the new interval.
- If the PRINT key is pressed while in logging mode, a printout is produced without affecting the running sample number.



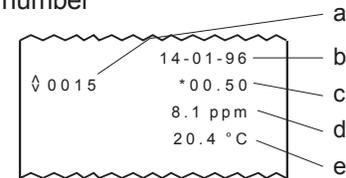
PRINTING / RECORDING WITH HI 9141

To print the measured values press the PRINT key.



The printout provides the following information:

- a- Running sample number
- b- Date (DD-MM-YY)
- c- Time (HH-MM)
- d- D.O. value in ppm.
- e- Temperature value in °C.



RECORDING MODE (PROGRAMMED PRINTOUTS)

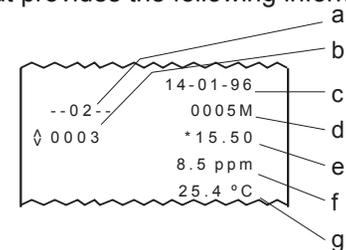
Press the RECORD key to enter the recording mode. The log number and the interval time will appear for a few seconds on the display to indicate the correct operational mode.



The meter will print the measurement taken in that moment, and will print at the interval selected thereafter until the RECORD key is pressed.



Each printout provides the following information:



- a- A running log number
- b- A running sample number (in that particular log)

- c - Date (DD-MM-YY)
- d - Printing interval indicator in minutes
- e - Time (HH.MM)
- f - D.O. value in ppm
- g - Temperature value in °C.

When the meter is in recording mode "LOG" is displayed on the bottom left corner of the LCD with the temperature value on the primary display.



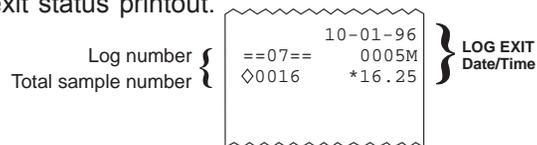
Notes:

- It is recommended to use the external power supply (**HI710005** or **HI710006**) during recording mode, especially when many printouts are required.
- Before proceeding with recording, make sure there is enough paper for your measurements. When the paper is finished the meter will not advise the operator and the printouts could be lost.
- It is possible to insert a new paper roll during recording session (see page 31).
- If the PRINT key is pressed while still in recording mode, a printout is produced without affecting the running sample number.
- Once in recording mode, the printing interval cannot be changed. Exit the recording mode first (pressing the RECORD key) before setting the new interval (see page 13).



TO STOP RECORDING

In order to quit the recording mode, press the RECORD key. This will generate a recording exit status printout.



PRINTING / LOGGING WITH HI 91410

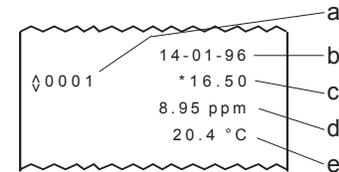
To print the measured values shown on display, press the PRINT key.



This function can be activated in normal operation mode as well as during logging (see below).

When in measurement mode, the printout provides the following information:

- a - Running sample number
- b - Date (DD-MM-YY)
- c - Time (HH-MM)
- d - D.O. value in ppm.
- e - Temperature value in °C.

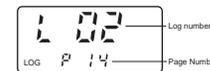


LOGGING MODE

This function is suggested when remote measurements have to be taken automatically without the necessity of an operator and for a long period of time. In this mode data will be stored directly into memory.

Set the appropriate logging interval (see page 13).

Press the LOG key to enter the logging mode. The log number and page number will appear for a few seconds on the display to indicate the correct operational mode.



The printer will print a complete set of data and the "LOG" symbol will appear on the bottom left corner of the LCD.