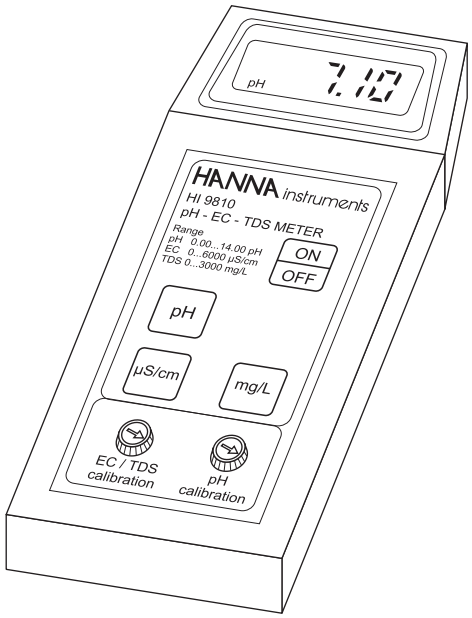
Instruction Manual

HI 9810
Portable
pH/EC/TDS Meter



HANNA instruments

http://www.hannainst.com

CE

This Instrument is in Compliance with the CE Directives

Dear Customer,

Thank you for choosing a Hanna product.

Please read this instruction manual carefully before using the meter. This manual will provide you with the necessary information for a correct use of the instrument, as well as a precise idea of its versatility. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

These instruments are in compliance with CE directives EN 50081-1, EN 50082-1 and EN61010-1.

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

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipment. If noticeable damage is found, notify your Dealer.

Each meter is supplied with:

- *HI 1285 combination, amplified, double-junction, gel pH electrode with incorporated EC/TDS probe and built-in temperature sensor and 1m (3.3') cable*
- *HI70007 pH 7.01 sachet (1 pc)*
- *HI70031, 1413 µS/cm sachet (1 pc)*
- *HI70032, 1382 ppm sachet (1 pc)*
- *Instruction Manual*
- *9 V battery.*

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

GENERAL DESCRIPTION

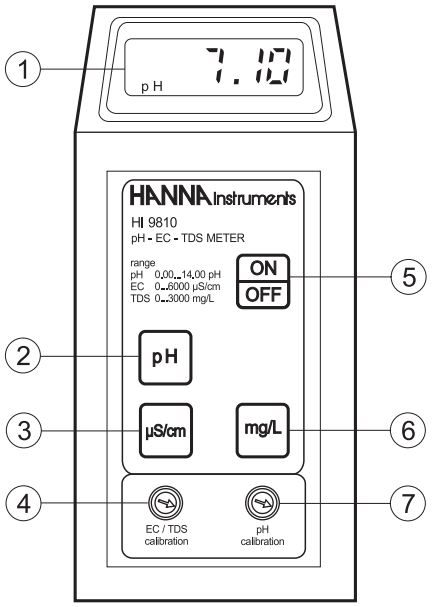
HI 9810 *is the most complete and versatile portable pH/EC/TDS meters ever manufactured. Designed with utmost precision and simplicity, this meter provides 3 kinds of measurements. The pH, EC and TDS ranges are easily selected using a membrane keyboard on the front panel.*

The conductivity of a solution depends on the temperature and for this reason measurements are carried out with reference to a standard temperature of 25°C. If the solution measured has a different temperature than 25°C, compensation must be performed.

HI 9810 *automatically compensates for temperature changes with a built-in temperature sensor and circuitry. The temperature coefficient is fixed at 2%/°C.*

HI 9810 *is designed for simplicity of use in taking pH, µS/cm and mg/L measurements.*

FUNCTIONAL DESCRIPTION



1) *LCD display*
2) *pH range selection key*
3) *µS/cm (EC) range selection key*
4) *EC/TDS calibration knob*
5) *ON/OFF key*
6) *mg/L (TDS) selection key*
7) *pH offset calibration knob.*

SPECIFICATIONS

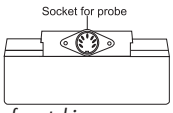
		HI 9810
Range	pH	*0.00 to 14.00*
	mg/L	*0 to 3000*
	µS/cm	*0 to 6000*
Resolution	pH	*0.10*
	mg/L	*10*
	µS/cm	*10*
Accuracy	pH	*±0.20*
(@20°C/68°F)	mg/L	*±2% f.s.*
	µS/cm	*±2% f.s.*
Conversion Factor		*1µS/cm = 0.5 mg/L*
Typical EMC	pH	*±0.10*
Deviation	mg/L	*±2% f.s.*
	µS/cm	*±2% f.s.*
pH Calibration		*Manual 1 point through offset trimmer*
Offset Calibration		*±1.5 pH*
EC/TDS Calibration		*Manual 1 point through slope trimmer*
EC/TDS Temperature Compensation		*Automatic from 0 to 50□C (32 to 122□F) with a β of 2%/□C*
Electrode		**HI 1285** *combination pH/EC/TDS electrode with temperature sensor and 1 m (3.3') cable* (**included**)
Battery Type		*9 Volt 150 hours of continuous use*
Environment		*0 to 50□C (32 to 122□F); max 95% RH non-condensing*
Dimensions		*185 x 82 x 45 mm (7.3 x 3.2 x 1.8")*
Weight		*520 g (1.1 lb.)*

OPERATIONAL GUIDE

INITIAL PREPARATION

Each meter is supplied complete with a 9V battery. Slide off the battery compartment cover on the back of the meter (see page 16), install the battery while paying attention to its polarity.

Connect the probe to the DIN socket on the top of the meter by aligning the pins with the socket and pushing in the plug.



Always remove the electrode protective cap before taking any measurements.

Make sure the meter has been calibrated before taking any measurements (see pages 8 and 9 for calibration procedures).

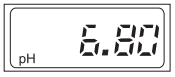
Turn the meter on by pressing the ON/OFF key.

TAKING PH MEASUREMENTS

If the electrode has been left dry, soak the tip in a pH 7 or pH 4 buffer solution for a few minutes to reactivate it.

- *To take a pH measurement simply submerge the tip (4cm/1½") of the combination pH/EC/TDS electrode into the sample to be tested.*

- *Select the pH mode .*



- *Shake the electrode briefly while submerged and allow a couple of minutes for the electrode to adjust and stabilize. The display will show the pH value.*

- *If measurements are taken in different samples successively, it is recommended to rinse (clean) the electrode thoroughly to eliminate cross-contamination. After cleaning, it is recommended to rinse the electrode with some of the sample to be measured.*

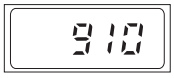
TAKING EC/TDS MEASUREMENTS

- *Immerse the tip of the electrode (4cm/1½") into the sample to be tested. If possible, use plastic beakers or containers to minimize any EMC interference.*
- *Tap the electrode lightly on the bottom of the beaker to remove any air bubbles which may be trapped inside the tip.*
- *Select the appropriate measurement range (EC or TDS).*

- *Wait for 1-2 minutes for the temperature sensor to attain thermal equilibrium. The display will then show the measurement automatically temperature compensated for temperature with the appropriate indication among the following:*

µS symbol indicates the meter is in µS/cm, EC mode

- No symbol indicates the meter is in TDS mode.



Note: *If the case of an erroneous reading, the "E" indication will appear on the right of the display.*

AFTER MEASUREMENTS

After measurements have been completed, the instrument should be switched off and the probe cleaned and covered with the protective cap.

pH CALIBRATION

For greatest accuracy, frequent calibration of the instrument is recommended. The instrument should be recalibrated for pH:

a) Whenever the electrode is replaced.
b) At least once a month.
c) After testing aggressive chemicals.
d) Where extreme accuracy is required.

PREPARATION

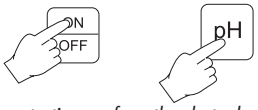
Pour small quantities of pH 7.01 (HI 7007 or HI 8007) or pH 4.01 (HI 7004 or HI 8004) or pH 10.01 (HI 7010 or HI 8010) solution into a clean beaker.

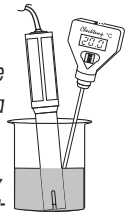
To obtain accurate readings, use pH 7.01 (HI 7007 or HI 8007) if you are going to measure neutral or close to neutral samples, pH 4.01 (HI 7004 or HI 8004) if you are going to measure acidic samples or pH 10.01 (HI 7010 or HI 8010) for alkaline measurements.

If you need to calibrate **HI 9810** *to NBS standards, use pH 6.86 (HI 7006 or HI 8006) instead of pH 7.01 and pH 9.18 (HI 7009 or HI 8009) instead of pH 10.01.*

PROCEDURE

· *Switch the meter on after connecting the electrode and press* **pH** *to display pH measurement.*





• *Remove the protective cap from the electrode, rinse and immerse it in the buffer and stir gently. Wait a couple of minutes for the reading to stabilize.*

· *If the buffer solution is not at ambient temperature, take its temperature with a ChecktempC (or an accurate thermometer), e.g. 10.0°C.*

Note: *the electrode should be submerged approximately 4 cm (1½") into the solution. The ChecktempC should be located close to the electrode.*

· *Adjust the pH calibration knob until the LCD shows the pH value at the above temperature (see the pH versus temperature chart on page 10).*

· *The pH calibration is now complete.*

EC/TDS CALIBRATION

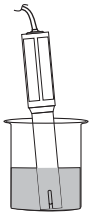
Accessories needed:

· *Use* **HI 7039** *or* **HI 8039**, *5,000 µS/cm EC solution or* **HI 7032**, *1382 ppm TDS solution.*

Note: the conversion between EC and TDS is made by a built-in circuit, hence it is requested to calibrate the meter only in EC or TDS range. The other range is thus automatically calibrated.

PROCEDURE

· *Pour approximately 4 cm (1½") of a conductivity calibration solution (e.g. HI 7039/HI 8039) into a beaker. If possible, use plastic beakers to minimize any EMC interference.*

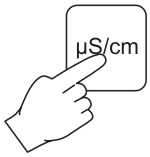


· *Immerse the combined electrode in the solution.*

· *Wait for a couple of minutes for thermal equilibrium to be reached.*

· *Tap the combined electrode on the bottom, then shake it lightly while rotating to make sure no air bubbles remain trapped inside the probe.*

· *Select the appropriate range, e.g. µS/cm.*



· *Turn the EC/TDS calibration knob until the display shows the EC or TDS reading at 25°C*

pH VALUES AT VARIOUS TEMPERATURES

For temperature compensation during calibration, please refer to the following chart.

TEMP		pH VALUES				
°C	°F	4.01	6.86	7.01	9.18	10.01
0	32	4.01	6.98	7.13	9.46	10.32
5	41	4.00	6.95	7.10	9.39	10.24
10	50	4.00	6.92	7.07	9.33	10.18
15	59	4.00	6.90	7.04	9.27	10.12
20	68	4.00	6.88	7.03	9.22	10.06
25	77	4.01	6.86	7.01	9.18	10.01
30	86	4.02	6.85	7.00	9.14	9.96
35	95	4.03	6.84	6.99	9.10	9.92
40	104	4.04	6.84	6.98	9.07	9.88
45	113	4.05	6.83	6.98	9.04	9.85
50	122	4.06	6.83	6.98	9.01	9.82
55	131	4.07	6.84	6.98	8.99	9.79
60	140	4.09	6.84	6.98	8.97	9.77
65	149	4.11	6.85	6.99	8.95	9.76
70	158	4.12	6.85	6.99	8.93	9.75

For instance, if the buffer temperature is 25□C, the display should show pH 4.00 or 7.00 or 10.00.

If the buffer temperature is 10□C, the display should show pH 4.00 or 7.10 or 10.20.

If the buffer temperature is 50□C, the display should show pH 4.10 or 7.00 or 9.80.

TEMPERATURE COMPENSATION

The conductivity of an aqueous solution is the measure of its ability to carry an electrical current by means of ionic motion.

The conductivity invariably increases with increasing temperature.

It is affected by the type and number of ions in the solution and by the viscosity of the solution itself. Both parameters are temperature dependent. The dependency of conductivity on temperature is expressed as a relative change per degree Celsius at a particular temperature, commonly as percent per □C.

For common ionic solution, this value is about 2%/□C. Acids, alkalis and concentrated salt solutions have somewhat lower value, typically 1.5%/□C.

Since a small difference in temperature causes a large change in conductivity, it is necessary to compensate for conductivity readings at high and low temperature. The readings are usually normalized at 25□C.

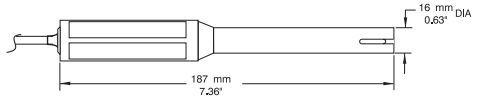
HI 9810 automatically compensates for temperature differences with a built-in temperature sensor circuitry. With this compensation, the display shows the readings at 25□C (77□F).

EC/TDS CONVERSION FACTOR

The TDS value in aqueous solutions is directly proportional to conductivity. The ratio between the two parameters depends on the solution.

HI 9810 *has a fixed conversion factor set to 0.5. This means that 1 µS/cm is equal to 0.5 mg/L of TDS.*

ELECTRODE CONDITIONING AND MAINTENANCE



HI 1285 *is a combined pH/EC/TDS electrode with built-in temperature sensor for EC/TDS automatic temperature compensation. The probe screened cable is 1 m (3.3") long.*

PREPARATION

Remove the protective cap.

DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT.

This is normal with pH electrodes and they will disappear when rinsed with water.

During transport tiny bubbles of air may have formed inside the glass bulb. The pH electrode cannot function properly under these conditions. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer.

If the bulb and/or junction are dry, soak the electrode in HI 70300 Storage Solution *for at least one hour.*

TEST MEASUREMENT

Rinse the electrode tip with tap water.

Immerse the tip (bottom 4 cm / 1½") in the sample and stir gently for approx. 30 seconds. Light tapping of the electrode on the bottom of the beaker is sometimes necessary to eliminate air bubble trapped in the electrode tip that could affect the EC/TDS reading.

For a faster response of the pH reading and to avoid cross contamination of the samples, rinse the electrode tip with the solution to be tested, before taking your measurements.

STORAGE

When not in use, replace the protective cap.

PERIODIC MAINTENANCE

Inspect the electrode and the cable. The cable used for the connection to the meter must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb.

Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.

CLEANING PROCEDURE

General	*Soak in Hanna* HI 7061 *General Cleaning Solution for approximately ½ hour.*

Removal of films, dirt or deposits on the membrane/junction:

Protein	*Soak in Hanna* HI 7073 *Protein Cleaning Solution for 15 minutes.*
Inorganic	*Soak in Hanna* HI 7074 *Inorganic Cleaning Solution for 15 minutes.*
Oil/grease	*Rinse with Hanna* HI 7077 *Oil and Fat Cleaning Solution.*

IMPORTANT: *After performing any of the cleaning procedures rinse the electrode thoroughly with tap water and soak the electrode in* HI 70300 *Storage Solution for at least 1 hour before taking a measurement.*

TROUBLESHOOTING

Evaluate your electrode performance on pH measurements based on the following.

- Noise *(Readings fluctuate up and down) could be due to:*
  - Clogged/Dirty Junction: *Refer to the Cleaning Procedure above.*
- Dry Membrane/Junction: *Soak in Storage Solution* HI 70300 *for at least 1 hour.*
- Drifting: *Soak the electrode tip in warm Hanna Solution* HI 7082 *for one hour and rinse tip with distilled water (refill with fresh* HI 7071 *for single junction electrodes and* HI 7082 *for double junction electrodes if necessary).*
- Low Slope: *Refer to the cleaning procedure above.*
- No Slope:
  - *Check the electrode for cracks in glass stem or bulb (replace the electrode if cracks are found).*
  - *Make sure cable and connections are not damaged nor lying in a pool of water or solution.*
- Slow Response/Excessive Drift: *Soak the tip in Hanna Solution* HI 7061 *for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.*

Note: *for field applications, it is always recommended to keep a spare electrode handy. When anomalies are not resolved with simple maintenance, change the electrode (and recalibrate the meter) to see if the problem is alleviated.*

ACCESSORIES

pH CALIBRATION SOLUTIONS

HI 70004P *pH 4.01 Buffer Sachets, 25 x 20 mL*
HI 7004M *pH 4.01 Buffer Solution, 230 mL*
HI 7004L *pH 4.01 Buffer Solution, 460 mL*
HI 7006M *pH 6.86 Buffer Solution, 230 mL*
HI 7006L *pH 6.86 Buffer Solution, 460 mL*
HI 70007P *pH 7.01 Buffer Sachets, 25 x 20 mL*
HI 7007M *pH 7.01 Buffer Solution, 230 mL*
HI 7007L *pH 7.01 Buffer Solution, 460 mL*
HI 7009M *pH 9.18 Buffer Solution, 230 mL*
HI 7009L *pH 9.18 Buffer Solution, 460 mL*
HI 70010P *pH 10.01 Buffer Sachets, 25 x 20 mL*
HI 7010M *pH 10.01 Buffer Solution, 230 mL*
HI 7010L *pH 10.01 Buffer Solution, 460 mL*

pH CALIBRATION SOLUTIONS IN FDA APPROVED BOTTLE

HI 8004L *pH 4.01 Buffer Solution, 460 mL*
HI 8006L *pH 6.86 Buffer Solution, 460 mL*
HI 8007L *pH 7.01 Buffer Solution, 460 mL*
HI 8009L *pH 9.18 Buffer Solution, 460 mL*
HI 8010L *pH 10.01 Buffer Solution, 460 mL*

CONDUCTIVITY & TDS BUFFER SOLUTIONS

HI 7031L *1413 µS/cm (µmho/cm), 460mL*
HI 7031M *1413 µS/cm (µmho/cm), 230mL*
HI 7033L *84 µS/cm (µmho/cm), 460 mL*
HI 7033M *84 µS/cm (µmho/cm), 230 mL*
HI 7032L *1382 ppm (mg/L), 460 mL*
HI 7032M *1382 ppm (mg/L), , 230 mL*
HI 7039L *5,000 µS/cm (µmho/cm), 460mL*
HI 7039M *5,000 µS/cm (µmho/cm), 230mL*

CONDUCTIVITY BUFFER SOLUTIONS IN FDA APPROVED BOTTLES

HI 8031L *1413 µS/cm (µmho/cm), 460 mL*
HI 8033L *84 µS/cm (µmho/cm), 460 mL*
HI 8039L *5,000 µS/cm (µmho/cm), 460mL*

ELECTRODE STORAGE SOLUTIONS

HI 70300M *Storage Solution, 230 mL*
HI 70300L *Storage Solution, 460 mL*

ELECTRODE STORAGE SOLUTIONS IN FDA APPROVED BOTTLE

HI 80300M *Storage Solution, 230 mL*
HI 80300L *Storage Solution, 460 mL*

ELECTRODE CLEANING SOLUTIONS

HI 70000P *Electrode Rinsing Sachets, 25 x 20 mL*
HI 7061M *General Cleaning Solution, 230 mL*
HI 7061L *General Cleaning Solution, 460 mL*
HI 7073M *Protein Cleaning Solution, 230 mL*
HI 7073L *Protein Cleaning Solution, 460 mL*
HI 7074M *Inorganic Cleaning Solution, 230 mL*
HI 7074L *Inorganic Cleaning Solution, 460 mL*
HI 7077M *Oil & Fat Cleaning Solution, 230 mL*
HI 7077L *Oil & Fat Cleaning Solution, 460 mL*

ELECTRODE CLEANING SOLUTIONS IN FDA APPROVED BOTTLE

HI 8061M *General Cleaning Solution, 230 mL*
HI 8061L *General Cleaning Solution, 460 mL*
HI 8073M *Protein Cleaning Solution, 230 mL*
HI 8073L *Protein Cleaning Solution, 230 mL*
HI 8077M *Oil & Fat Cleaning Solution, 230 mL*
HI 8077L *Oil & Fat Cleaning Solution, 460 mL*

OTHER ACCESSORIES

CHECKTEMPC *Electronic thermometer (range: -50.0 to 150.0□C)*
HI 710001 *Soft carrying case*
HI 710009 *Shockproof, blue rubberboot*
HI 710010 *Shockproof, orange rubberboot*
HI 710031 *Rugged carrying case*

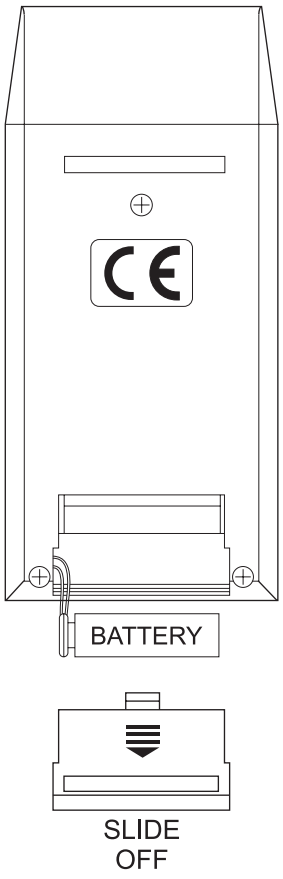
BATTERY REPLACEMENT

All meters are powered by a 9V battery that is located on the rear of the instrument.

When the battery becomes weak reaching a certain threshold, the istrument automatically switches off.

Replacement must only take place in a nonhazardous area using an alkaline 9V battery.

To access the battery, remove the battery cover by applying pressure in the direction indicated. Replace the old battery with a new one while paying attention to its polarity.



OTHER PRODUCTS FROM HANNA

- *CALIBRATION AND MAINTENANCE SOLUTIONS*
- *CHEMICAL TEST KITS*
- *CHLORINE METERS*
- *CONDUCTIVITY/TDS METERS*
- *DISSOLVED OXYGEN METERS*
- *HYGROMETERS*
- *ION SPECIFIC METERS (Colorimeters)*
- *MAGNETIC STIRRERS*
- *Na/NaCl METERS*
- *pH/ORP/Na ELECTRODES*
- *PROBES (DO, µS/cm, RH, T, TDS)*
- *PUMPS*
- *REAGENTS*
- *SOFTWARE*
- *THERMOMETERS*
- *TITRATORS*
- *TRANSMITTERS*
- *TURBIDITY METERS*
- *Wide Range of Accessories*

Most Hanna meters are available in the following formats:

- *BENCH-TOP METERS*
- *POCKET-SIZED METERS*
- *PORTABLE METERS*
- *PRINTING/LOGGING METERS*
- *PROCESS METERS (Panel and Wall-mounted)*
- *WATERPROOF METERS*
- *METERS FOR FOOD INDUSTRY*

For additional information, contact your dealer or the nearest Hanna Customer Service Center. You can also e-mail us at: tech@hannainst.com.

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 instructions.* **The electrodes and 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 charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Customer Service department and then send it with shipping costs 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.

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

CE DECLARATION OF CONFORMITY

HANNA instruments

CE

DECLARATION OF CONFORMITY

We

Hanna Instruments Italia Srl
via E.Fermi, 10
35030 Sarmeola di Rubano - PD
ITALY

herewith certify that the pH/EC/TDS meter:

HI 9810

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

IEC 801-2	Electrostatic Discharge
IEC 801-3	RF Radiated
EN 55022	Radiated, Class B
EN 61010-1	User Safety Requirement

Date of Issue: 07-06-1999

D.Volpato - Engineering Manager
On behalf of
Hanna Instruments Italia 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 these instruments in residential areas could cause unacceptable interferences to radio and TV equipment.

The metal band at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this metal band all the times.

The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all times.

During operation, ESD wrist straps should be worn to avoid possible damage to the electrode by electrostatic discharges.

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.

HANNA LITERATURE

Hanna publishes a wide range of catalogs and handbooks for an equally wide range of applications.
The reference literature currently covers areas such as:

- *Water Treatment*
- *Process*
- *Swimming Pools*
- *Agriculture*
- *Food*
- *Laboratory*
- *Thermometry*

and many others. New reference material is constantly being added to the library.

For these and other catalogs, handbooks and leaflets, contact your dealer or the Hanna Customer Service nearest to you. To find the Hanna Office in your vicinity, check our home page at www.hannainst.com.

MAN9810R2
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