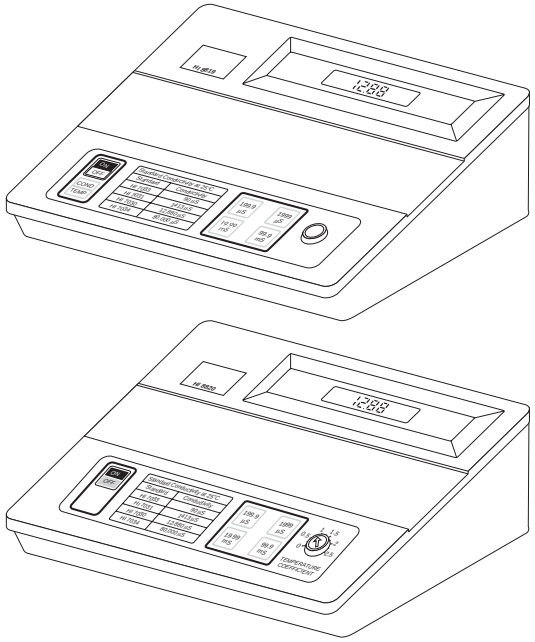
Instruction Manual

HI 8819 - HI 8820
Bench Conductivity Meters



HANNA instruments

http://www.hannainst.com

CE

These Instruments are in Compliance with the CE Directives

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 CSA, UL and CE (EN 50081-1 and EN 50082-1) directives.

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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 meter comes supplied with a conductivity probe (**HI7685** for HI8819 or **HI7687** for HI8820), a voltage adapter, a dust cover and an instruction manual.

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

HI8819 and **HI8820** are digital bench-top multirange conductivity meters designed for simplicity of use in measuring electrical conductivity in liquids. Four ranges of conductivity measurements are provided to cover every application from deionized water to brine. The conductivity probe does not require changing or re-calibration when switching from one range to another.

The probe is made of glass with 4 platinum rings that are corrosion resistant. It is also suitable for measuring conductivity of liquids in small sample sizes, and comes with a 1 m (3.3') cable.

The temperature effect can be compensated through a knob on the front panel of **HI8819**.

With **HI8820**, the 4-ring probe has a built-in temperature sensor that automatically compensates for temperature changes in the liquid tested. The temperature coefficient can be adjusted from 0 to 2.5%.

KEYBOARD & REAR PANEL

KEYBOARD:

ON/OFF To switch the instrument ON or OFF

COND/TEMP To select the display of conductivity readings or temperature settings for compensation (for HI8819 only)

199.9 µS To select the range 0.0 to 199.9µS/cm

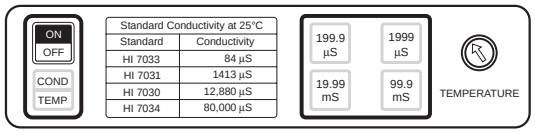
1999 µS To select the range 0 to 1999µS/cm

19.99 mS To select the range 0.00 to 19.99 mS/cm

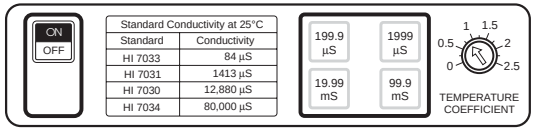
99.9 mS To select the range 0.0 to 99.9mS/cm

TEMPERATURE Knob: To manually set to the temperature compensation of the reading (for HI8819 only)

TEMPERATURE COEFFICIENT knob: To set the temperature coefficient from 0% to 2.5% per °C (for HI8820 only).



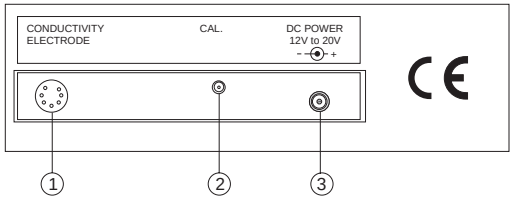
Keyboard of HI 8819



Keyboard of HI 8820

REAR PANEL:

1) **Probe Connection**
   Connect the conductivity probe to the DIN socket.
2) **Calibration Trimmer**
3) **DC Power Socket**



Power connection

Plug the 12VDC adapter (**HI710005** or **HI710006**) into the DC socket.

Note: Make sure the main line is protected by a fuse.

SPECIFICATIONS

	HI8819
Range	0.0 to 199.9 µS/cm 0 to 1999 µS/cm 0.00 to 19.99 mS/cm 0.0 to 99.9 mS/cm
Resolution	0.1 µS/cm; 1 µS/cm 0.01 mS/cm; 0.1 mS/cm
Accuracy	±1% Full Scale excluding probe error
Typical EMC Deviation	±1% Full Scale
Calibration	Manual single point through trimmer
Temperature Compensation	Manual from 0 to 50°C (32to 122°F) with ß at 2%/°C
Probe	**HI 7685 platinum 4-ring conductivity probe** with 1 m (3.3') cable **(included)**
Power Supply	12VDC through HI710005 or HI710006 (included)
Environment	0 to 50°C (32 to 122°F); 95% RH
Dimensions	230x 170x 70mm (9.1 x 6.7 x 2.7")
Weight	1 Kg (2.2 lbs)

	HI8820
Range	0.0 to 199.9 µS/cm 0 to 1999 µS/cm 0.00 to 19.99 mS/cm 0.0 to 99.9 mS/cm
Resolution	0.1 µS/cm; 1 µS/cm 0.01 mS/cm; 0.1 mS/cm
Accuracy	±1% Full Scale excluding probe error
Typical EMC Deviation	±2% Full Scale
Calibration	Manual single point through trimmer
Temperature Compensation	Automatic from 0 to 50°C (32to 122°F) with a variable ß from 0 to 2.5%/°C
Probe	**HI 7687 platinum 4-ring conductivity probe** with 1 m (3.3') cable **(included)**
Power Supply	12VDC through HI710005 or HI710006 (included)
Environment	0 to 50°C (32 to 122°F); 95% RH
Dimensions	230x 170x 70mm (9.1 x 6.7 x 2.7")
Weight	1 Kg (2.2 lbs)

CONDUCTIVITY MEASUREMENTS

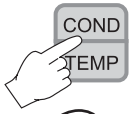
Make sure that the instrument has been calibrated before taking conductivity measurements (see page 8 for calibration procedure).

Connect the probe to the back of the meter and switch the instrument on by pressing the ON/OFF key. If possible, to minimize any EMC interferences, use plastic beakers for the solutions.

FOR HI8819:

- Immerse the probe in the solution submerging the holes of the sleeve (0.5 cm below). Tap the probe lightly on the bottom of the recipient to remove any air bubbles which may have being trapped inside the sleeve.

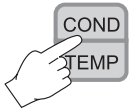
- Take the temperature of the solution with a CHECKTEMP or a glass thermometer.
- Press the COND/TEMP key to select temperature mode.



- Adjust the TEMPERATURE knob until the LC displays the temperature of the solution.

TEMPERATURE

- Press the COND/TEMP key to select the conductivity measurement range.



- If the display shows only a "1", there is an over-range condition. Select the next higher range.

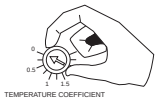
- The conductivity reading displayed has been manually compensated for temperature variations.

- After the measurement is completed, the instrument should be switched off by pressing the ON/OFF key and the probe should be cleaned (see page 15 for cleaning procedure).

FOR HI8820:

- Immerse the probe in the solution submerging the holes of the sleeve (0.5 cm below). Tap the probe lightly on the bottom of the recipient to remove any air bubbles which may have being trapped inside the sleeve.
- If the display shows only a "1", there is an over-range condition. Select the next higher range.

- Adjust the "TEMPERATURE COEFFICIENT" knob to the value of the solution. See page 15 for the procedure to select the correct coefficient value.



- Before taking any measurement allow a few minutes for the reading to stabilize. As soon as the thermal equilibrium is reached (3 or 4 minutes) the reading stops drifting.
- The conductivity reading displayed has been automatically compensated for temperature variations (after 2 or 3 minutes).
- After the measurement is completed, the instrument should be switched off by pressing the ON/OFF key and the probe should be cleaned (see page 15 for cleaning procedure).

CALIBRATION

INITIAL PREPARATION

If you are measuring in the mS ranges, calibrate the meter using HI7030 (or HI8030) conductivity solution (12.88 mS @ 25°C) or HI7034 (or HI8034) conductivity solution (80 mS @ 25°C). Choose a solution with a conductivity value close to the solution to be measured. For the µS ranges, use HI7031 (or HI8031) conductivity solution (1413 µS @25°C) when calibrating in the range from 0 to 1999 µS or HI7033 (or HI8033) conductivity solution (84 µS @ 25°C) when calibrating in the range from 0 to 199.9 µS.

Rinse the probe thoroughly in distilled water. This is to minimize contamination of the calibration solution and secure higher accuracy.

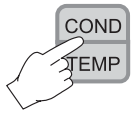
When possible, use plastic beakers to minimize any EMC interferences.

PROCEDURE FOR HI8819:

- Pour a small quantity of the conductivity solution into a plastic beaker e.g. HI7030 or HI8030 (12.88 mS/cm @ 25°C).

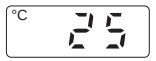
- Immerse the conductivity probe in the solution submerging the holes of the sleeve (0.5cm below). Make sure that no air bubbles are trapped inside the glass sleeve. Wait for 2 or 3 minutes for the thermal equilibrium.
- Use a CHECKTEMP or a glass thermometer with resolution of 1° for measuring the temperature of the solution (e.g. 18°C).

- Switch the instrument on by pressing the ON/OFF key.



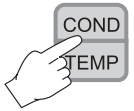
- Press COND/TEMP key to display temperature settings.

- Adjust the TEMPERATURE knob to display "25°C" if you are using 25°C (77°F) as reference temperature.

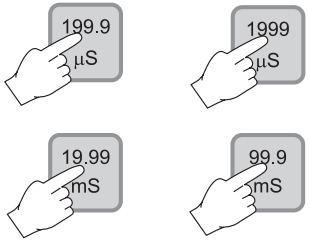


TEMPERATURE

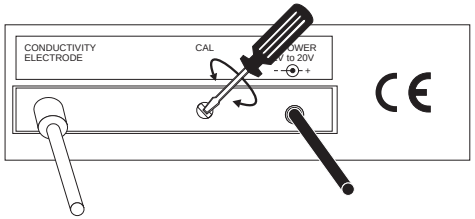
- Press the COND/TEMP key to display conductivity readings and select the appropriate conductivity range



  e.g. "19.99 mS" for HI7030/HI8030,
  "99.9 mS" for HI7034/HI8034,
  "1999µS" for HI7031/HI8031,
  "199.9 µS" for HI7033/HI8033.

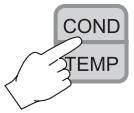


- Using a small screwdriver adjust the trimmer on the rear panel until the display shows the conductivity reading at the temperature of the solution noted earlier (see the conductivity vs. temperature chart on page 13) e.g. "11.19 mS".



Calibration is now completed and the instrument is ready for use.

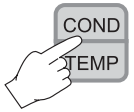
TO CHECK THE CALIBRATION



- Press the COND/TEMP key to display the temperature.
- Adjust the TEMPERATURE knob to display the temperature of the calibration solution, i.e. the temperature noted with the CHECKTEMP or glass thermometer.

TEMPERATURE

- Press the COND/TEMP key to display conductivity.



- The display should read the conductivity of the calibrating solution at the reference temperature.

  E.g. using HI7030/HI8030 with a solution at 18°C, the reading will be "12.88 mS".

PROCEDURE FOR HI8820:

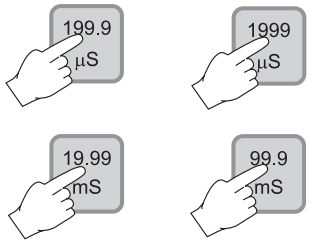
- Pour a small quantity of the conductivity solution into a plastic beaker.

- Immerse the conductivity probe in the solution submerging the holes of the sleeve (0.5 cm below). Make sure that no air bubbles are trapped inside the glass sleeve. Wait for 2 or 3 minutes for thermal equilibrium.

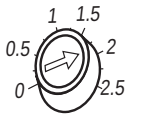
- Switch the instrument on by pressing the ON/OFF key.

- Select the appropriate conductivity range

  e.g. "19.99 mS" for HI7030/HI8030,
  "99.9 mS" for HI7034/HI8034,
  "1999μS" for HI7031/HI8031,
  "199.9 μS" for HI7033/HI8033.

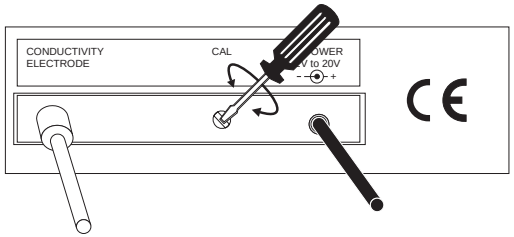


- Set the temperature coefficient knob to 2%°C.



TEMPERATURE COEFFICIENT

- Using a small screwdriver adjust the trimmer on the rear panel until the display shows the conductivity reading at 25°C (77°F),
  e.g.: "12.88 mS" for HI7030/HI8030,
  "80.00 mS" for HI7034/HI8034,
  "1413 μS" for HI7031/HI8031,
  "84 μS" for HI7033/HI8033.



If you are using a different reference temperature, refer to the conductivity vs temperature charts on page 12 for the appropriate conductivity reading at the reference temperature.

E.g. If you prefer to standardize the temperature to 20°C (68°F) rather than 25°C (77°F), using HI7030/HI8030, adjust the trimmer to read "11.67 mS" i.e.11670 μS (as indicated on the chart on page 12). All subsequent measurements will be compensated to 20° (68°F).

The calibration is now complete.

Note: The instrument should be calibrated weekly or every time the probe has been changed.

CONDUCTIVITY VERSUS TEMPERATURE CHART

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.

°C	°F	HI 7030 HI 8030 (µS/cm)	HI 7031 HI 8031 (µS/cm)	HI 7033 HI 8033 (µS/cm)	HI 7034 HI 8034 (µS/cm)	HI 7035 HI 8035 (µS/cm)	HI 7039 HI 8039 (µS/cm)
0	32	7150	776	64	48300	65400	2760
5	41	8220	896	65	53500	74100	3180
10	50	9330	1020	67	59600	83200	3615
15	59	10480	1147	68	65400	92500	4063
16	60.8	10720	1173	70	67200	94400	4155
17	62.6	10950	1199	71	68500	96300	4245
18	64.4	11190	1225	73	69800	98200	4337
19	66.2	11430	1251	74	71300	100200	4429
20	68	11670	1278	76	72400	102100	4523
21	69.8	11910	1305	78	74000	104000	4617
22	71.6	12150	1332	79	75200	105900	4711
23	73.4	12390	1359	81	76500	107900	4805
24	75.2	12640	1386	82	78300	109800	4902
25	77	12880	1413	84	80000	111800	5000
26	78.8	13130	1440	86	81300	113800	5096
27	80.6	13370	1467	87	83000	115700	5190
28	82.4	13620	1494	89	84900	117700	5286
29	84.2	13870	1521	90	86300	119700	5383
30	86	14120	1548	92	88200	121800	5479
31	87.8	14370	1575	94	90000	123900	5575

E.g.: If you are calibrating HI8819 using HI7030/HI8030 (12880 mS/cm @ 25°C) as buffer solution and the solution temperature is 18°C, set the temperature reference to 25°C and turn the trimmer to display "11.19 mS".

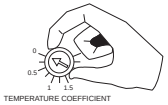
TEMPERATURE COMPENSATION

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/°C. Acids, alkalis and concentrated salt solutions have lower values, typically 1.5%/°C. Since a small difference in temperature causes a large change in conductivity readings particularly at high and low temperatures, the readings are usually normalized at 25°C.

The **HI8819** manually compensates for temperature differences with a fixed ß at 2%.

The **HI8820** automatically compensates for temperature differences with a built-in NTC sensor circuitry. A knob is also provided to adjust the temperature coefficient manually from 0% (without compensation) to 2.5% per degree Celsius.

DETERMINATION OF THE TEMPERATURE COEFFICIENT OF A SOLUTION (for HI8820 only)



Follow the procedure described below:

1) Immerse the probe into a sample of the solution and adjust the knob to 0% (i.e. no compensation).
2) Condition the sample and probe at 25°C and note the conductivity reading C25.
3) Condition the sample and probe to a temperature t°C which is approximately 5°C to 10°C different from 25°C and note the conductivity reading Ct.
4) The temperature coefficient ß of the solution is calculated with the formula:

$$ß = 100 \times \frac{(Ct - C25)}{(t - 25) \times C25}$$

The above procedure is suitable for determining the temperature coefficient in the laboratory where the temperature of the solution can be determined and controlled. If this is not possible e.g. during on-site measurements, the following procedure should be used:

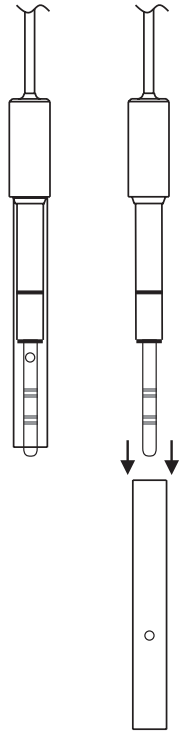
a) Immerse the probe into the test solution and turn the temperature coefficient knob to 0% (no compensation).
b) Allow the conductivity reading to stabilize (the reading should not change by more than ±0.2 mS within 1 minute) and record the value, C.
c) Repeat the procedure with the temperature of the solution changed by more than 10°C. Wait for the conductivity reading to stabilize.
d) Adjust the temperature coefficient knob until the display reads the value C as recorded earlier (point b).
e) The value indicated by the knob is the temperature coefficient of the solution.

PROBE MAINTENANCE

Rinse the probe with tap water after every series of measurements. If a more thorough cleaning is required, remove the glass sleeve and clean the probe with a cloth or a nonabrasive detergent.

After cleaning the probe, re-calibrate the instrument.

The four ring platinum probe body and sleeve are in glass. For this reason great care while handling the probe must be taken.



ACCESSORIES

CONDUCTIVITY BUFFER SOLUTIONS:

HI 7030L	12880 µS/cm (µmho/cm), 460mL
HI 7030M	12880 µS/cm (µmho/cm), 230mL
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 7034L	80000 µS/cm (µmho/cm), 460mL
HI 7034M	80000 µS/cm (µmho/cm), 230mL
HI 7035L	111800 µS/cm (µmho/cm), 460mL
HI 7035M	111800 µS/cm (µmho/cm), 230mL
HI 7039L	5000 µS/cm (µmho/cm), 460mL
HI 7039M	5000 µS/cm (µmho/cm), 230mL

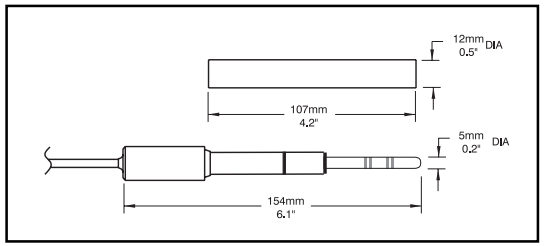
CONDUCTIVITY BUFFER SOLUTIONS IN FDA APPROVED BOTTLES:

HI 8030L	12880 µS/cm (µmho/cm), 460 mL
HI 8031L	1413 µS/cm (µmho/cm), 460 mL
HI 8033L	84 µS/cm (µmho/cm), 460 mL
HI 8034L	80000 µS/cm (µmho/cm), 460 mL
HI 8035L	111800 µS/cm (µmho/cm), 460 mL
HI 8039L	5000 µS/cm (µmho/cm), 460 mL

CONDUCTIVITY PROBES:

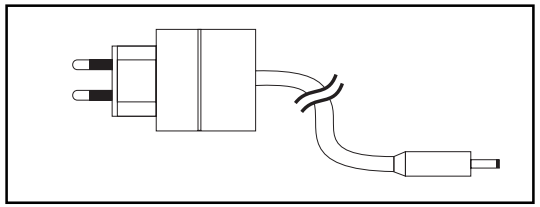
HI 7685 This probe for **HI8819** uses the 4-ring method measure conductivity. The probe cable is 1m (3.3') long.

HI 7687 This probe for **HI 8820** uses the 4-ring method and has a built-in temperature sensor for ATC. The probe screened cable is 1m (3.3') long.



OTHER ACCESSORIES:

CHECKTEMPC	Electronic thermometer (range: -50.0 to 150.0°C)
HI710005	Voltage adapter from 115VAC to 12VDC
HI710006	Voltage adapter from 230VAC to 12VDC



HI 731326	Small screwdrivers, length 90 mm, for calibration purposes (20 pcs)
HI 76405	Electrode holder
MANBNCONR2	Instruction Manual

WARRANTY

All Hanna Instruments **meters are guaranteed 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 guaranteed for a period of six months.** This warranty is limited to repair or replacement free of charge.

Damage 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 bench conductivity meters:

HI 8819 HI 8820

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
EN 61010-1	User Safety Requirement

Date of Issue: 22-6-1998

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 these instruments in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences.

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

During calibration of instruments, ESD wrist straps should be worn to avoid possible damage to the sensor by electrostatic discharge.

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

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

Use plastic beakers to minimize any EMC interferences.

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

PRINTED IN PORTUGAL

MANBNCONR2 01/99

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