

Instruction Manual

HI 8033

HI 933000

Portable Multi-Range

Conductivity Meters

 **HANNA**[®]
instruments
www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna Product.

Please read this instruction manual carefully before using the instrument. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

These instruments are in compliance with the **CE** directives.

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. 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.

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PRELIMINARY EXAMINATION

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

Each meter is supplied with:

- Conductivity probe with 1 m (3.3') cable
- Calibration screwdriver (HI 933000 only)
- 9V battery and instruction manual

Note: Save all packing materials until you are sure that the instrument functions correctly. Any damaged or defective item must be returned in its original packing materials together with the supplied accessories.

GENERAL DESCRIPTION

HI 8033 and HI 933000 are some of the most complete and versatile portable conductivity meters ever manufactured.

Designed with utmost precision and simplicity, these meters provide for up to 3 or 4 measurement ranges.

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.

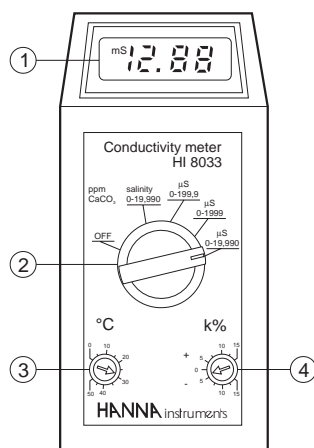
HI 8033 compensates for temperature manually, while HI 933000, with a built-in temperature sensor and circuitry, automatically compensates for temperature changes.

The temperature coefficient is fixed at 2%.

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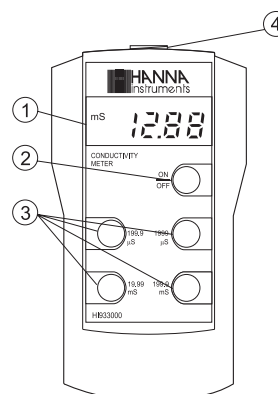
FUNCTIONAL DESCRIPTION & SPECIFICATIONS OF HI 8033



- 1) Liquid Crystal Display
- 2) Rotary switch
- 3) Knob for manual temperature compensation
- 4) Calibration knob

Range	0.0 to 199.9 ; 0 to 1999 $\mu\text{S}/\text{cm}$ 0.00 to 19.99 mS/cm 0 to 19990 ppm
Resolution	0.1 ; 1 $\mu\text{S}/\text{cm}$ / 0.01 mS/cm / 10 ppm
Accuracy (@20°C/68°F)	$\pm 1\%$ FS (excluding probe error)
Typical EMC Deviation	$\pm 2\%$ FS
Calibration	Manual, 1 point
Temperature Compensation	Manual, 0 to 50°C (32 to 122°F) with $\beta = 2\%/^{\circ}\text{C}$
Probe (included)	HI 76301W with 1 m (3.3') cable
Environment	0 to 50°C (32 to 122°F); RH max 95%
Battery Type	1 x 9 V alkaline
Battery Life	Approx. 100 hours of continuous use
Dimensions	185 x 82 x 47 mm (7.3 x 3.2 x 1.9")
Weight	270 g (9.5 oz.)

FUNCTIONAL DESCRIPTION & SPECIFICATIONS OF HI 933000

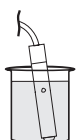


- 1) Liquid Crystal Display
- 2) ON/OFF key
- 3) Measurement range selection keys
- 4) Probe connector

Range	0.0 to 199.9 / 0 to 1999 $\mu\text{S}/\text{cm}$ 0.00 to 19.99 / 0.0 to 199.9 mS/cm
Resolution	0.1 / 1 $\mu\text{S}/\text{cm}$; 0.01 / 0.1 mS/cm
Accuracy (@ 20°C / 68°F)	$\pm 1\%$ FS (excluding probe error)
Typical EMC Deviation	$\pm 2\%$ FS
Calibration	Manual, 1 point through trimmer
Temperature Compensation	Automatic, 10 to 40°C (50 to 104°F) with $\beta = 2\%/^{\circ}\text{C}$
Probe (included)	HI 76302W with 1 m (3.3') cable
Environment	0 to 50°C (32 to 122°F); RH max 95%
Battery Type	1 x 9 V alkaline
Battery Life	Approx. 100 hours of continuous use
Dimensions	143 x 80 x 38 mm (5.6 x 3.2 x 1.5")
Weight	360 g (13 oz.)

OPERATIONAL GUIDE

- Each meter is supplied complete with a 9V battery. Slide off the battery compartment cover on the back of the meter and install the battery while paying attention to its polarity (see "Battery Replacement" section for details).
- Connect the probe to the meter by aligning the pins with the socket and pushing the plug in. With **HI 933000**, tighten the threaded ring.
- Make sure that the meter has been calibrated before taking any measurements (see "Calibration" section for details).
- Immerse the conductivity probe into the sample, making sure that the holes on the shaft are completely submerged. If possible, use plastic beakers to minimize any EMC interference.



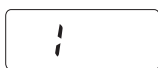
- Tap the probe lightly on the bottom of the beaker to remove any air bubbles which may be trapped inside the sleeve.
- Turn the instrument on by pressing the ON/OFF key or by setting the rotary switch (**HI 8033**) to the desired measurement range.
- **For HI 8033:**

Measure the solution temperature with a *ChecktempC* or another accurate thermometer, and set the temperature knob to the measured value (e.g. 20°C).



- Select the appropriate measurement range.

Note: If the display shows only a "1", the meter is out of range. Select the next (higher) range.



- **For HI 933000:**

Before taking any measurement, wait a couple of minutes for the temperature sensor to reach thermal equilibrium with the sample. When the temperature of the sample is lower than 20°C or higher than 30°C, allow more time for the thermal equilibrium to be achieved.

- After measurements, switch the instrument off and clean the probe (see "Probe Maintenance" section for details).

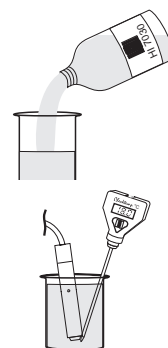
CALIBRATION

The instrument should be re-calibrated at least once a month, or after probe or battery replacement.

For more accurate results, it is recommended to use a calibration solution with a conductivity value close to the range to be measured. See the "Accessories" section for a wide selection of conductivity solutions.

PROCEDURE FOR HI 8033

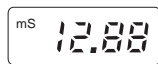
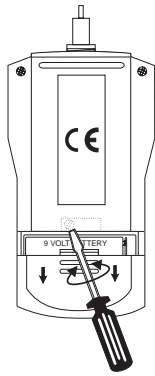
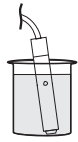
- Pour the conductivity calibration solution (e.g. **HI 7030**) into a beaker while making sure that the holes on the probe are completely submerged. If possible, use plastic beakers to minimize any EMC interference.
- Immerse the conductivity probe and the *ChecktempC* in the solution.
- Wait a couple of minutes for the thermal equilibrium to be reached.
- Tap the probe on the bottom, then shake it while rotating to make sure no air bubbles remain trapped in the sleeve.
- Measure the temperature of the calibration solution with the *ChecktempC*, and adjust the °C knob accordingly.
- Turn the rotary knob to select the 19990 $\mu\text{S}/\text{cm}$ range.
- Turn the k% calibration knob until the display shows the conductivity reading at 25°C (see "Conductivity vs. temperature chart"), e.g. 12880 $\mu\text{S}/\text{cm}$ (= 12.88 mS/cm), and all subsequent measurements will be compensated to 25°C (77°F).
- If you prefer to standardize the temperature compensation to 20°C (68°F), adjust the trimmer to read "11.67 mS" (see "Conductivity vs. temperature chart"). All subsequent measurements will be compensated to 20°C.
- The calibration is now complete and the meter is ready for use.



PROCEDURE FOR HI 933000

- Pour the conductivity calibration solution (e.g. **HI 7030**) into a beaker while making sure that the holes on the probe are completely submerged. If possible, use plastic beakers to minimize any EMC interference.

- Immerse the conductivity probe in the solution and wait a couple of minutes for thermal equilibrium to be reached.
- Tap the probe on the bottom, then shake it while rotating to make sure no air bubbles remain trapped in the sleeve.
- Switch the instrument on by pressing ON/OFF, and select the 19.99 mS/cm range by pressing the corresponding range key.
- With the supplied screwdriver, adjust the calibration trimmer in the battery compartment until the display shows "12.88 mS", i.e. the solution conductivity value at 25°C. All subsequent measurements will be compensated to 25°C (77°F).



- If you prefer to standardize the temperature compensation to 20°C (68°F), adjust the trimmer to read "11.67 mS" (see "Conductivity vs. temperature chart"), and all subsequent measurements will be compensated to 20°C.
- The calibration is now complete and the meter is ready for use.

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.

For manual temperature compensation, refer to the following chart:

°C	°F	HI 7030 HI 8030 ($\mu\text{S}/\text{cm}$)	HI 7031 HI 8031 ($\mu\text{S}/\text{cm}$)	HI 7033 HI 8033 ($\mu\text{S}/\text{cm}$)	HI 7034 HI 8034 ($\mu\text{S}/\text{cm}$)	HI 7035 HI 8035 ($\mu\text{S}/\text{cm}$)	HI 7039 HI 8039 ($\mu\text{S}/\text{cm}$)
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

For instance, the conductivity values of the calibration solutions at 25°C are 12880 $\mu\text{S}/\text{cm}$, 1413 $\mu\text{S}/\text{cm}$ or 5000 $\mu\text{S}/\text{cm}$ when using HI 7030, HI 7031 or HI 7039, respectively.

At 20°C, the values are 11670 $\mu\text{S}/\text{cm}$, 1278 $\mu\text{S}/\text{cm}$ or 4523 $\mu\text{S}/\text{cm}$, respectively.

With the solutions at 30°C, the values are 14120 $\mu\text{S}/\text{cm}$, 1548 $\mu\text{S}/\text{cm}$ or 5479 $\mu\text{S}/\text{cm}$, respectively.

PROBE MAINTENANCE

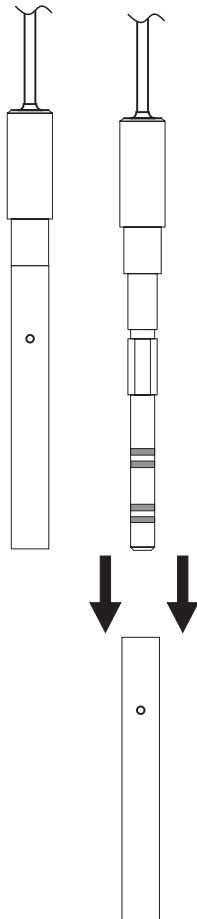
After every series of measurements, rinse the probe with tap water.

If a more thorough cleaning is required, remove the PVC sleeve and clean the probe with a cloth or a non-abrasive detergent. When reinserting the sleeve onto the probe, be sure that the sleeve is in the right direction with the holes towards the cable end.

After cleaning the probe, re-calibrate the instrument.

The probe body is made of PVC. For this reason it must never come into close contact with a heat source.

If the probe is exposed to high temperatures (above 50°C/122°F), the rings might become loose or detached, resulting in a serious impairment of the probe. In such cases, the probe has to be replaced.



BATTERY REPLACEMENT

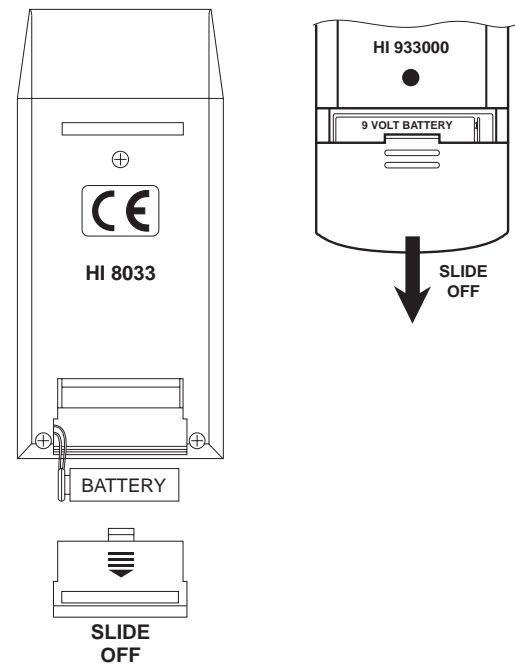
When the battery becomes weak, a "V" will be displayed to warn the user that only a few hours of working life are left.

A low battery can result in unreliable measurements. It is recommended to replace it immediately.

Battery replacement must only take place in a non-hazardous area, and using an alkaline 9V battery.

Slide off the battery compartment cover (see figure below) and replace the 9V battery with a new one.

Make sure the battery contacts are tight and secure before replacing the cover.



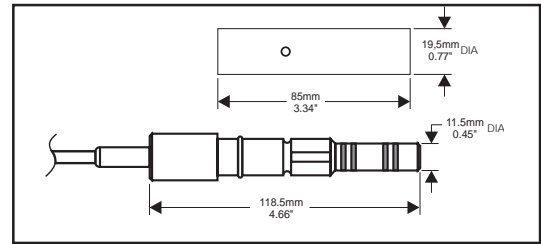
ACCESSORIES

CALIBRATION SOLUTIONS

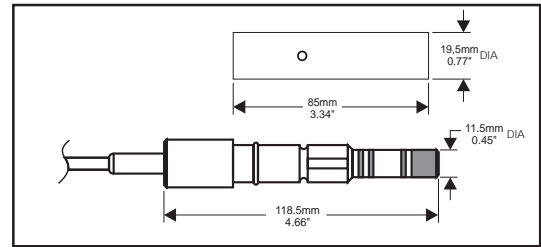
HI 7030L	12880 $\mu\text{S}/\text{cm}$, 500 mL bottle
HI 7030M	12880 $\mu\text{S}/\text{cm}$, 230 mL bottle
HI 7031L	1413 $\mu\text{S}/\text{cm}$, 500 mL bottle
HI 7031M	1413 $\mu\text{S}/\text{cm}$, 230 mL bottle
HI 7033L	84 $\mu\text{S}/\text{cm}$, 500 mL bottle
HI 7033M	84 $\mu\text{S}/\text{cm}$, 230 mL bottle
HI 7034L	80000 $\mu\text{S}/\text{cm}$, 500 mL bottle
HI 7034M	80000 $\mu\text{S}/\text{cm}$, 230 mL bottle
HI 7035L	111800 $\mu\text{S}/\text{cm}$, 500 mL bottle
HI 7035M	111800 $\mu\text{S}/\text{cm}$, 230 mL bottle
HI 7039L	5000 $\mu\text{S}/\text{cm}$, 500 mL bottle
HI 7039M	5000 $\mu\text{S}/\text{cm}$, 230 mL bottle
HI 7032L	1382 ppm (mg/L), 500 mL bottle
HI 7032M	1382 ppm (mg/L), 230 mL bottle
HI 7036L	12.41 ppt (g/L), 500 mL bottle
HI 7036M	12.41 ppt (g/L), 230 mL bottle
HI 8030L	12880 $\mu\text{S}/\text{cm}$, 500 mL FDA bottle
HI 8031L	1413 $\mu\text{S}/\text{cm}$, 500 mL FDA bottle
HI 8033L	84 $\mu\text{S}/\text{cm}$, 500 mL FDA bottle
HI 8034L	80000 $\mu\text{S}/\text{cm}$, 500 mL FDA bottle
HI 8035L	111800 $\mu\text{S}/\text{cm}$, 500 mL FDA bottle
HI 8039L	5000 $\mu\text{S}/\text{cm}$, 500 mL FDA bottle

CONDUCTIVITY PROBES

HI 76301W 4-ring conductivity probe with 1 m (3.3') cable



HI 76302W 4-ring conductivity probe with built-in temperature sensor and 1 m (3.3') cable



OTHER ACCESSORIES

ChecktempC	Electronic thermometer (range: -50.0 to 150.0°C)
HI 710001	Soft carrying case
HI 710007	Blue shockproof rubber boot for HI 933000
HI 710008	Orange shockproof rubber boot for HI 933000
HI 710009	Blue shockproof rubber boot for HI 8033
HI 710010	Orange shockproof rubber boot for HI 8033
HI 731326	Calibration screwdriver (20 pcs)

CE DECLARATION OF CONFORMITY



DECLARATION OF CONFORMITY

We

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

herewith certify that the conductivity meters

HI 8033 and HI 933000

have been tested and found to be in compliance with EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC according to the following applicable normatives:

EN 50082-1: Electromagnetic Compatibility - Generic Immunity Standard
IEC 801-2 Electrostatic Discharge
IEC 801-3 RF Radiated

EN 50081-1: Electromagnetic Compatibility - Generic Emission Standard
EN 55022 Radiated, Class B

EN61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use

Date of Issue: 15-10-1998

P. Cesa - Technical Director
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 interference to radio and TV equipment, requiring the operator to take all necessary steps to correct interferences.

The metal rings of the probe are sensitive to electrostatic discharges. Avoid touching these rings at all times. During calibration of the instruments, ESD wrist straps should be worn to avoid possible damage to the probe by electrostatic discharge. Use plastic beakers to minimize any EMC interferences.

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 24 Vac or 60 Vdc.

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

SALES AND TECHNICAL SERVICE CONTACTS

Australia:

Tel. (03) 9769.0666 • Fax (03) 9769.0699

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Tel. (10) 88570068 • Fax (10) 88570060

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MANCOND3

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