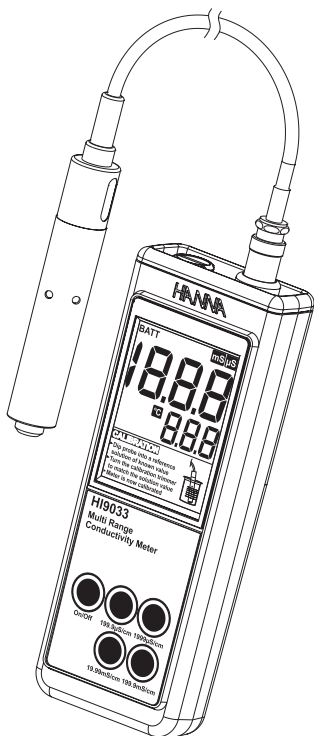


Instruction Manual

HI9033 • HI9034

Waterproof Multi-Range EC and TDS Meters for Field Applications



 **HANNA**[®]
instruments

www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna Instruments product.

Please read this instruction manual carefully before using these instruments.

This manual will provide you with the necessary information for correct use of these instruments, as well as a precise idea of their versatility.

If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our worldwide contact list at www.hannainst.com.

The instruments are in compliance with **CE** 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, please contact your local Hanna Instruments Office.

Each meter is supplied complete with:

- **HI76302W** conductivity probe with 1 m (3.3') cable
- Calibration screwdriver
- Battery (3 x 1.5V AAA)
- Rugged carrying case
- Instruction manual
- Quality Certificate

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

GENERAL DESCRIPTION

HI9033 and **HI9034** multi-range conductivity and TDS meters, have been designed for extended use in wet, humid, dusty and muddy conditions. These meters utilize the latest in four-ring potentiometric technology which has been proven to provide higher accuracy than the common amperometric method.

HI9033 can measure conductivity in four ranges. This allows the user to analyze samples from deionized water to brine without having to switch or recalibrate the probe.

HI9034 measures total dissolved solids (TDS) in three ranges to offer the highest accuracy when performing measurements in diverse applications such as HVAC, waste water treatment and reverse osmosis. All three ranges can be activated at the touch of a button without having to change the probe.

Both meters perform measurements with ATC (automatic temperature compensation) which adjusts for the effects of temperature.

These portable instruments also feature BEPS (Battery Error Prevention System) technology that alerts the user when low batteries could affect the readings.

FUNCTIONAL DESCRIPTION & SPECIFICATIONS OF HI9033

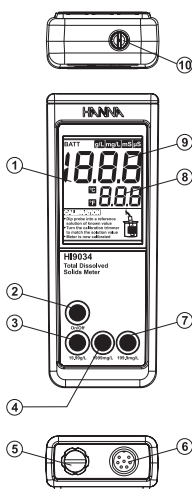
- 1) Liquid Crystal Display
- 2) 199.9 $\mu\text{S}/\text{cm}$ Range selection key
- 3) ON/OFF key
- 4) 19.99 mS/cm Range selection key
- 5) Battery compartment cap
- 6) Probe connector
- 7) 199.9 mS/cm Range selection key
- 8) 1999 $\mu\text{S}/\text{cm}$ Range selection key
- 9) Secondary LCD line
- 10) Primary LCD line
- 11) Slope calibration trimmer



Range	0.0 to 199.9 $\mu\text{S}/\text{cm}$ / 0 to 1999 $\mu\text{S}/\text{cm}$
	0.00 to 19.99 mS/cm / 0.0 to 199.9 mS/cm
	0.0 to 60.0 $^{\circ}\text{C}$
Resolution	0.1 $\mu\text{S}/\text{cm}$ / 1 $\mu\text{S}/\text{cm}$
	0.01 mS/cm / 0.1 mS/cm
	0.1 $^{\circ}\text{C}$
Accuracy (@20 $^{\circ}\text{C}/68$ $^{\circ}\text{F}$)	$\pm 1\%$ F.S. (excluding probe error)
	± 0.4 $^{\circ}\text{C}$
Calibration	Manual, 1 point, through trimmer
Temperature Compensation	Automatic, 10 to 50 $^{\circ}\text{C}$ (50 to 122 $^{\circ}\text{F}$) with $\beta = 2\%/^{\circ}\text{C}$
Probe	HI76302W with 1 m (3.3") cable (included)
Battery Type/ Life	3 x 1.5V AAA
	APPROX. 400 hours of continuous use
Environment	0 to 50 $^{\circ}\text{C}$ (32 to 122 $^{\circ}\text{F}$); RH max 100%
Dimensions	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
Weight	300 g (10.6 oz.)

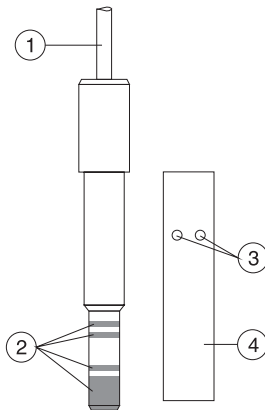
FUNCTIONAL DESCRIPTION & SPECIFICATIONS OF HI9034

- 1) Liquid Crystal Display
- 2) ON/OFF key
- 3) 19.99 g/L Range selection key
- 4) 1999 mg/L Range selection key
- 5) Battery compartment cap
- 6) Probe connector
- 7) 199.9 mg/L Range selection key
- 8) Secondary LCD line
- 9) Primary LCD line
- 10) Slope calibration trimmer



Range	0.0 to 199.9 mg/L / 0 to 1999 mg/L
	0.00 to 19.99 g/L
	0.0 to 60.0 °C
Resolution	0.1 mg/L / 1 mg/L / 0.01 g/L
	0.1 °C
Accuracy (@20 °C/68 °F)	± 1% F.S. (excluding probe error)
	± 0.4 °C
Calibration	Manual, 1 point, through trimmer
Temperature Compensation	Automatic, 10 to 50 °C (50 to 122 °F) with $\beta = 2\%/^{\circ}\text{C}$
Probe	HI76302W with 1 m (3.3") cable (included)
Battery Type/ Life	3 x 1.5V AAA
	APPROX. 400 hours of continuous use
Environment	0 to 50 °C (32 to 122 °F); RH max 100%
Dimensions	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
Weight	300 g (10.6 oz.)

FUNCTIONAL DESCRIPTION OF HI76302W CONDUCTIVITY PROBE



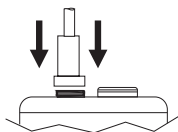
- 1) Watertight screened cable (1 m / 3.3')
- 2) 4 stainless steel rings
- 3) Air-release holes
- 4) PVC protective sleeve

OPERATIONAL GUIDE

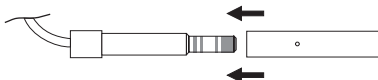
INITIAL PREPARATION

Each meter is supplied complete with a 3x1.5V batteries. Remove the back cover, unwrap the battery and install it while paying attention to its polarity (see "Battery Replacement" section).

Connect the probe to the meter securely by aligning the pins with the socket, pushing the plug in and tightening the threaded ring.



Make sure that the sleeve is properly inserted on the probe, with the holes towards the top of the probe (i.e. the end nearest to the cable). Make sure that the meter has been calibrated before taking any measurements (see "Calibration" section for details).



If probe is not connected, the LCD will displays "---" on both LCD lines.

TAKING MEASUREMENTS

To take measurement, place the probe into the solution to be tested while making sure that the holes are completely submerged. Tap and stir the probe to remove any air bubbles trapped inside the PVC sleeve.



Turn the instrument on by pressing the ON/OFF key, and then select the desired range by pressing the corresponding key.

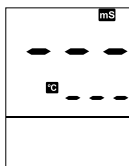


The instrument will display all used tags for few seconds followed by the battery capacity.



If the probe is not connected the instrument will display dash lines.

If the LCD displays range limit blinking, the meter is out of range and the solution measured exceeds the selected range. In this case, the next (higher) range should be selected.



TEMPERATURE EFFECT

HI76302W conductivity probe features a built-in temperature sensor that allows automatic compensation of the reading for any temperature differences.



Wait for a few minutes for the temperature sensor to reach the thermal equilibrium with the test solution before taking measurements. If the temperature of conductivity probe and solution is drastically different, a longer time should be allowed.

AFTER MEASUREMENTS

When all measurements are completed, turn the meter OFF and clean the probe (see "Probe Maintenance" section for details).

Note: Probe body and sleeve are made of PVC, and are susceptible to damage due to temperatures exceeding 60 °C (140 °F). If the probe is exposed to high temperature, the bond between the rings and the probe body may become impaired and the probe will not function properly. In this case, the probe will need to be replaced.

CALIBRATION

For best results, choose a calibration solution with a conductivity or TDS value as close as possible to the sample to be measured.

For example, for measurements in the 2 to 20 mS/cm range, use the **HI7030** (12.88 mS/cm) conductivity calibration solution.

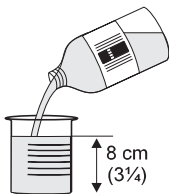
For accurate calibration, use two beakers for each solution: the first one for rinsing the probe and the second one for calibration.

If possible, use plastic beakers to minimize any EMC interference.

For a complete list of Hanna Instruments calibration solutions see the "Accessories" section.

PROCEDURE FOR HI9033

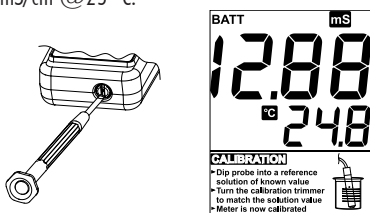
- Fill a beaker with 8 cm (3¼") of conductivity calibration solution (if possible fill two beakers, one for rinsing the probe and one for calibration).
- Connect the probe to the meter securely by aligning the pins with the socket, pushing the plug in and tightening the threaded ring.
- Immerse the probe into the beaker, while paying attention that the holes on the PVC sleeve are completely submerged.
- Turn the instrument on by pressing the ON/OFF key and select the appropriate range (e.g. 19.99 mS/cm).



- Tap the probe repeatedly on the bottom of the beaker and stir it to ensure that no air bubbles remain trapped inside the sleeve.
- If the probe temperature is close to the solution temperature, the display will stabilize quickly and show the temperature compensated conductivity measurement.

However, the ATC circuitry needs a few minutes for temperature compensation if the temperature difference is about 5 °C (9 °F).

- When the reading is stable, adjust the calibration trimmer to read the solution conductivity value @25 °C.
For example if using HI7030, turn the trimmer to read 12.88 mS/cm @25 °C.



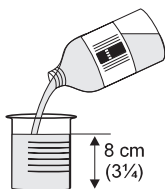
The calibration is now complete and the instrument is ready for use. All subsequent measurements will be compensated to 25 °C (77 °F).

Note: Calibration can also be standardized to have readings compensated to 20 °C (68 °F), by simply adjusting the trimmer to the calibration solution value at 20 °C (68 °F). For example, for HI7030 adjust the trimmer to read 11.67 mS/cm (see "Conductivity vs. Temperature" section).

If the instrument cannot be calibrated, refer to the "Probe Maintenance" section.

PROCEDURE FOR HI9034

- Fill a beaker with 8 cm (3¼") of TDS calibration solution (if possible fill two beakers, one for rinsing the probe and one for calibration).
- Connect the probe to the meter securely by aligning the pins with the socket, pushing the plug in and tightening the threaded ring.
- Immerse the probe into the beaker, while paying attention that the holes on the PVC sleeve are completely submerged.
- Turn the instrument on by pressing the ON/OFF key and select the appropriate range (e.g. 1999 mg/L).

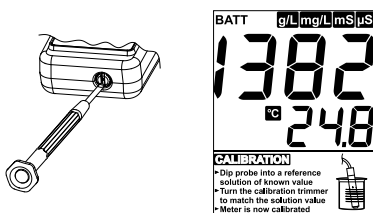


- Tap the probe repeatedly on the bottom of the beaker and stir it to ensure that no air bubbles remain trapped inside the sleeve.
- If the probe temperature is close to the solution temperature, the display will stabilize quickly and show the temperature compensated conductivity measurement.

However, the ATC circuitry needs a few minutes for temperature compensation if the temperature difference is about 5 °C (9 °F).

- When the reading is stable, adjust the calibration trimmer to read the solution conductivity value @25 °C.

For example if using **HI7032**, turn the trimmer until the display shows 1382 mg/L @25 °C.



The calibration is now complete and the instrument is ready for use. All subsequent measurements will be compensated to 25 °C (77 °F).

Note: Calibration can also be standardized to have readings compensated to 20 °C (68 °F), by simply adjusting the trimmer to the calibration solution value at 20 °C (68 °F). For example, for HI7032 adjust the trimmer to read 1251 mg/L (see "TDS vs. Temperature" section).

If the instrument cannot be calibrated, refer to the "Probe Maintenance" section.

CONDUCTIVITY VS. TEMPERATURE

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

The conductivity increases with increasing temperature. In fact, 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 degree Celsius ($\%/^{\circ}\text{C}$).

$^{\circ}\text{C}$	$^{\circ}\text{F}$	HI7030 ($\mu\text{S}/\text{cm}$)	HI7031 ($\mu\text{S}/\text{cm}$)	HI7033 ($\mu\text{S}/\text{cm}$)	HI7034 ($\mu\text{S}/\text{cm}$)	HI7035 ($\mu\text{S}/\text{cm}$)	HI7039 ($\mu\text{S}/\text{cm}$)
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	113300	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

TDS VS. TEMPERATURE

The TDS value in aqueous solutions is directly proportional to conductivity. The ratio between the two parameters depends on the solution and it is usually set to a factor of 0.5 (corresponding to a solution of CaCO_3). This means that $1 \mu\text{S}/\text{cm}$ is equal to 0.5 mg/L (ppm) of TDS.

°C	°F	HI7032 mg/L (ppm)	HI7036 g/L (ppt)
0	32	758	6.82
5	41	876	7.88
10	50	999	8.99
15	59	1122	10.10
16	60.8	1148	10.33
17	62.6	1173	10.56
18	64.4	1200	10.78
19	66.2	1224	11.01
20	68	1251	11.24
21	69.8	1277	11.47
22	71.6	1303	11.71
23	73.4	1329	11.94
24	75.2	1358	12.18
25	77	1382	12.41
26	78.8	1408	12.65
27	80.6	1438	12.89
28	82.4	1461	13.13
29	84.2	1476	13.37
30	86	1515	13.61
31	87.8	1541	13.85

PROBE MAINTENANCE

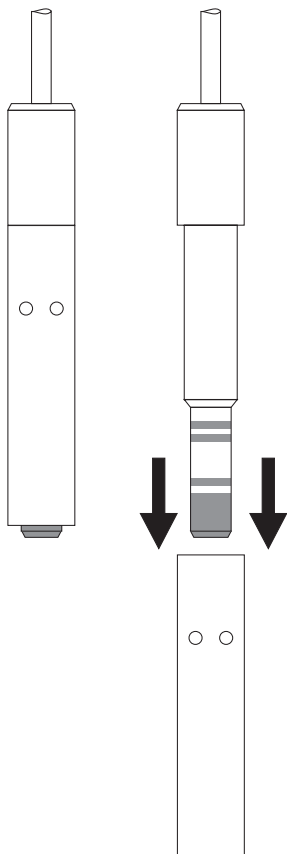
After every series of measurements, rinse the probe with tap water.

If a more thorough cleaning is required, remove the PVC sleeve and clean the probe with a cloth or a nonabrasive detergent.

When reinserting the sleeve onto the probe, be sure that the sleeve is in the right direction with the four holes towards the cable end.

After cleaning the probe, always 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, the rings might become loose or detached, resulting in a serious impairment of probe functioning. In such cases, probe needs to be replaced.



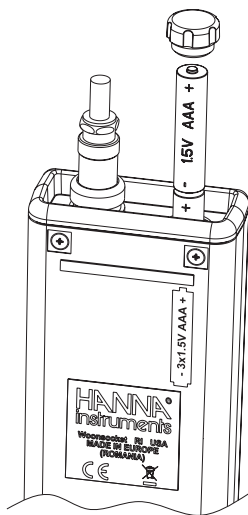
BATTERY REPLACEMENT

When the battery level is low, "BATT" log is displayed blinking on the LCD to advise the user that approx. 1 hour of working time is left.

It is recommended to change the batteries as soon as the battery indicator blinks (lower frequency).

To replace the batteries, follow the next steps:

- Turn OFF the instrument.
- Open the battery compartment cap (located on the top of the instrument).
- Remove old batteries.
- Insert three new 1.5V AAA batteries in the battery compartment, following the instructions on the rear of the instrument.
- Reattach the battery compartment cap.



The instrument is provided with the BEPS (Battery Error Prevention System) feature, which automatically turns the instrument off when the batteries level is too low to ensure reliable readings. At start up the display will show "0 bAtt" message for a few seconds, then the instrument automatically turns off.

ACCESSORIES

CONDUCTIVITY & TDS CALIBRATION SOLUTIONS

HI7030M	12880 $\mu\text{S}/\text{cm}$ solution, 230 mL bottle
HI7030L	12880 $\mu\text{S}/\text{cm}$ solution, 500 mL bottle
HI8030L	12880 $\mu\text{S}/\text{cm}$ solution, 500 mL FDA bottle
HI7031M	1413 $\mu\text{S}/\text{cm}$ solution, 230 mL bottle
HI7031L	1413 $\mu\text{S}/\text{cm}$ solution, 500 mL bottle
HI8031L	1413 $\mu\text{S}/\text{cm}$ solution, 500 mL FDA bottle
HI7033M	84 $\mu\text{S}/\text{cm}$ solution, 230 mL bottle
HI7033L	84 $\mu\text{S}/\text{cm}$ solution, 500 mL bottle
HI8033L	84 $\mu\text{S}/\text{cm}$ solution, 500 mL FDA bottle
HI7034M	80000 $\mu\text{S}/\text{cm}$ solution, 230 mL bottle
HI7034L	80000 $\mu\text{S}/\text{cm}$ solution, 500 mL bottle
HI8034L	80000 $\mu\text{S}/\text{cm}$ solution, 500 mL FDA bottle
HI7035M	111800 $\mu\text{S}/\text{cm}$ solution, 230 mL bottle
HI7035L	111800 $\mu\text{S}/\text{cm}$ solution, 500 mL bottle
HI8035L	111800 $\mu\text{S}/\text{cm}$ solution, 500 mL FDA bottle
HI7039M	5000 $\mu\text{S}/\text{cm}$ solution, 230 mL bottle
HI7039L	5000 $\mu\text{S}/\text{cm}$ solution, 500 mL bottle
HI8039L	5000 $\mu\text{S}/\text{cm}$ solution, 500 mL FDA bottle
HI7032M	1382 ppm (mg/L) solution, 230 mL bottle
HI7032L	1382 ppm (mg/L) solution, 500 mL bottle
HI7036M	12.41 ppt (g/L) solution, 230 mL bottle
HI7036L	12.41 ppt (g/L) solution, 500 mL bottle

OTHER ACCESSORIES

HI76302W	4-ring conductivity probe with built in temperature sensor and 1 m (3.3') cable
HI98501	ChecktempC electronic thermometer (-50.0 to 150 °C)
HI710005	115 Vac / 12 Vdc power adapter, US plug
HI710006	230 Vac / 12 Vdc power adapter, European plug
HI721317	Rugged carrying case
HI731326	Calibration screwdriver (20 pcs)

RECOMMENDATIONS FOR USERS

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used. Any variation introduced by the user to the supplied equipment may degrade the meters' performance. For yours and the meter's safety do not use or store the meter in hazardous environments.

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.

Electrodes and 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 your local Hanna Instruments Office.

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.

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



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