Instruction Manual

HI 98360

Autoranging & Logging Portable Waterproof Microprocessor EC/TDS/NaCl/°C Meter

HANNA instruments

www.hannainst.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 the necessary information for 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 or turn to the back cover for our worldwide contact list.

This instrument is in compliance with $C\boldsymbol{\epsilon}$ directives.

WARRANTY

HI 98360 is guaranteed for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. Electrodes and probes are guaranteed for six months. This warranty is limited to repair or replacement free of charge.

Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact the dealer from whom you purchased the instruments. If under warranty, report the model number, date of purchase, serial number and the nature of the problem. 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 Technical Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packed 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 damage, notify your dealer or the nearest Hanna Customer Service Center.

Each instrument is supplied with:

- **HI 76309/1.5** Conductivity/TDS probe with 1.5 m cable
- 1.5V, AA size Alkaline Batteries (4 pcs)
- Instruction Manual
- 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

HI 98360 is a waterproof portable logging microprocessor-based Conductivity/TDS/NaCl/Temperature meter.

The autoranging feature of the EC and TDS ranges automatically sets the meter to the scale with the highest possible resolution.

The Auto Endpoint feature automatically freezes the display when a stable reading is reached.

The measurements are automatically (ATC) or manually (MTC) compensated for temperature. The temperature coefficient value is user selectable. It is possible to disable the temperature compensation and measure the uncompensated conductivity.

The Battery Error Prevention System (BEPS) turns the meter off when the batteries level is too low to ensure reliable readings.

The meter can store data in memory at the user's request for later retrieval.

HI 98360 also allows data transfer to computer through the RS232 port.
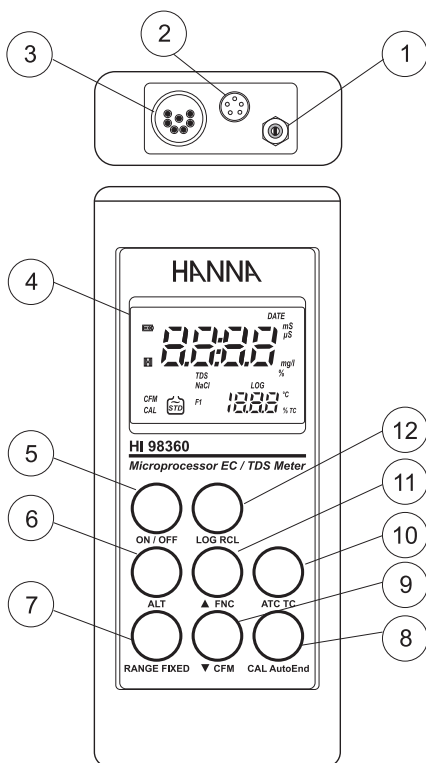
1) Power adapter socket.
2) RS232 serial communication connector.
3) DIN electrode connector.
4) Liquid Crystal Display (LCD).
5) **ON/OFF** key, to turn the meter on and off.
6) **ALT** key, to enable alternate key function.
7) **RANGE FIXED** key, to select measurement range or (with ALT) to freeze the current range on the LCD.
8) **CAL AutoEnd** key, to enter calibration mode or (with ALT) to enter Auto Endpoint mode.
9) **▼CFM** key, to move down or (with ALT) confirm values.
10) **ATC TC** key, to select temperature compensation mode or (with ALT) to view the temperature coefficient value.
11) **▲FNC** key, to move up or (with ALT) enter setup mode.
12) **LOG RCL** key, to store or (with ALT) recall measurements.

SPECIFICATIONS	
RANGE	0.00 to 29.99 μS/cm 30.0 to 299.9 μS/cm 300 to 2999 μS/cm 3.00 to 29.99 mS/cm 30.0 to 200.0 mS/cm up to 500.0 mS/cm uncompensated[*] conductivity
	0.00 to 14.99 ppm 15.0 to 149.9 ppm 150 to 1499 ppm 1.50 to 14.99 g/l 15.0 to 100.0 g/l up to 400.0 g/l uncompensated[*] TDS (with 0.80 factor)
	0.0 to 400.0% NaCl
	−9.9 to 120.0 ºC
RESOLUTION	0.01 μS/cm 0.1 μS/cm 1 μS/cm 0.01 mS/cm 0.1 mS/cm
	0.01 ppm 0.1 ppm 1 ppm 0.01 g/l 0.1 g/l
	0.1% NaCl
	0.1 ºC
ACCURACY @ 20 ºC / 68 ºF	±0.5% of reading
	±0.5% of reading
	±0.5% of reading
	±0.4 ºC
EC Calibration	1 point with 6 buffers available: 84.0, 1413 μS/cm 5.00, 12.88, 80.0, 111.8 mS/cm

[*] Uncompensated conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.

NaCl Calibration	1 point with HI 7037 buffer (optional)
Temperature compensation	Manual or Automatic from −9.9 to 120.0 ºC (can be disabled to measure uncompensated conductivity)
Temperature coefficient	0.00 to 6.00 %/ºC (for EC and TDS only); default value is 1.90 %/ºC
Reference temperature	20 ºC or 25 ºC
TDS factor	0.40 to 0.80 (default value is 0.50)
Probe	HI 76309/1.5 EC probe (included)
Auto-off	After 5 minutes (can be disabled)
Power supply	4 x 1.5 AA alkaline batteries (included) - approx. 200 hours of use or 12 VDC adapter
Dimensions	196 x 80 x 60 mm (7.7 x 3.1 x 2.4")
Weight	500 g (18 oz)
Environment	0 − 50 ºC (32 − 122 ºF) max RH 100%
Warranty	2 years

CONNECTIONS
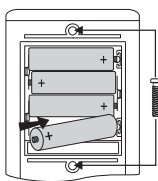
Remove the back cover, unwrap the batteries and install them while paying attention to the polarity. Replace the back cover.

Alternatively, connect the voltage adapter to the power adapter socket.
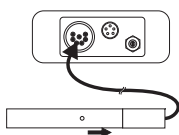
Connect the EC/TDS probe to the 7-pin connector located on the top of the instrument. Tighten the threaded ring.

Make sure the probe sleeve is properly inserted, as shown in the nearby figure.

SETUP

Setup is used to view or change the instrument parameters.

To enter setup press ALT+FNC when the meter is in measurement mode.

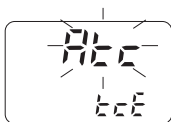"Set" is displayed on the upper LCD. The lower LCD displays the blinking code of the current setup item.

Select the desired setup item using the ▲ or ▼ key.

Press ALT+CFM to confirm.

Note: If ALT+FNC are pressed before item confirmation, the meter will escape and return to measurement mode.

Once the desired setup item has been selected, its current value blinks (if it is a changeable parameter).

To change the value use the ▲ or ▼ key.

Press ALT+CFM to confirm.

Note: Press ALT+FNC before confirmation to escape without changing the previously set value.

The following table lists the setup items, their valid range of values and the factory settings (default):

Item	Description	Valid values	Default
tc	Temp. compensation coeff.	0.00 to 6.00 %/°C	1.90
tcE	Temp. compensation mode	Atc, Mtc, notc	Atc
rEF	Reference Temperature	20 or 25°C	25°C
tdS	TDS factor	0.40 to 0.80	0.50
CEL	Cell constant (K)	0.500 to 1.700	1.000
Aof	Auto-Off enable	On, OFF	On
YEA	Year	1999 to 2098	1999
dAT	Date	dd:mm	01:01
hou	Hour	hh:mm	00:00
uEr	Firmware release		
Chr	Battery level test		

Notes:

- Once enabled, the Auto Off time is fixed at 5 minutes.
- When the battery level test is selected (Chr), LCD will display the remaining percentage of battery charge. 100% means fully charged battery and 0% corresponds to the minimum battery level that allows the meter to operate.

  The battery charge level calculation is based on a typical alkaline battery discharge curve.

  If the meter is connected to an external power adapter and "Chr" is selected, the LCD will display "LINE".
- At startup, the main LCD shows briefly the reference temperature, while the secondary LCD shows "rEF".

TAKING MEASUREMENTS

Press the ON/OFF key to turn the meter on.

At startup the display will show the reference temperature value with "rEF" indication for a few seconds.

Immerse the probe into the solution to be tested. The sleeve holes must be completely submerged. Tap the probe repeatedly to remove any air bubbles that may be trapped inside the sleeve.

If needed, press the RANGE key repeatedly until the desired range (EC, TDS, NaCl) is selected on the LCD.
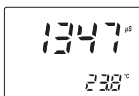
Allow for the reading to stabilize. The upper LCD displays the measure in the selected range while the temperature is displayed on the lower LCD.

Notes:

- If the meter displays "----", the reading is out of range.
- If the reading is not stable, the stability indicator "∼" blinks.
- Make sure the meter is calibrated before taking measurements.
- If measurements are taken successively in different samples, to have accurate readings it is recommended to rinse the probe thoroughly with deionized water before immersion in the samples.
- To maximize battery life, the meter is automatically switched off after 5 minutes of non-use. To reactivate the instrument press the ON/OFF key. This feature can be disabled by entering the setup mode and selecting the "AoF" item (see SETUP section for details).
- TDS reading is obtained multiplying the EC reading by the TDS factor, which has a default value of 0.50. It is possible to change the TDS factor in the 0.40 to 0.80 range by entering the setup mode and selecting the "tdS" item (see SETUP section). Always set the reference temperature to 25°C when measuring TDS.
- When the use of an alternate function (RCL, FNC, CFM, FIXED, TC and AutoEnd) is requested, press and hold the ALT key first and then the second key.

AUTORANGING

The EC and TDS scales are autoranging. The meter automatically sets the scale with the highest possible resolution.

By pressing ALT+FIXED, the autoranging feature is disabled and the current range is frozen on the LCD. "F1" symbol blinks on the LCD.

To restore the autoranging option press ALT+FIXED again.

Note: Autoranging is automatically restored if the RANGE key is pressed, if the setup or calibration modes are entered and if the meter is turned off and back on again.
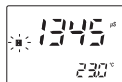
AUTO ENDPOINT MODE

The Auto Endpoint feature allows the user to freeze the display, when a stable reading is reached (EC/TDS/NaCl and temperature range).
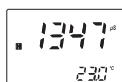
To enter the Auto Endpoint mode, press ALT+AutoEnd keys.

The LCD will show the current reading together with a blinking "H" tag.

When measurement becomes stable, the "H" symbol stops blinking and the measured value is frozen on the display.

To exit this mode and return to normal operations, press again ALT+AutoEnd.

Note: While in Auto Endpoint mode, current measurement (both stable and unstable) can be stored in the meter memory by pressing the LOG key.

Note: While in Auto Endpoint mode, calibration mode can not be entered and it is not allowed to change the temperature compensation and the range options.

TEMPERATURE COMPENSATION

Three options of compensating temperature are available:

Automatic (Atc): The probe has a built-in temperature sensor; the value of the temperature is used to automatically compensate the EC/TDS reading. This is the default option.

Manual (Mtc): The temperature value, shown on the lower LCD, can be manually set by the user with the up and down arrow keys. The "°C" symbol blinks when this option is active.

No Compensation (notc): The temperature reading shown on the lower LCD is not taken into account. The reading displayed on the upper LCD is the actual EC or TDS value. The "%TC" symbol blinks when this option is active.

To select the desired option press the ATC key until the option is briefly displayed on the LCD.

If temperature compensation is active, measurements are compensated using a default temperature coefficient of 1.90 %/°C.

It is possible to select a different temperature coefficient (TC) in the 0.00 to 6.00 %/°C range by entering the setup mode and selecting the "tc" item (see SETUP section for details).

The current temperature coefficient can be quickly viewed pressing ALT+TC. The value is briefly displayed on the lower LCD.

Note: If the temperature reading is out of $-9.9 - 120.0$ °C interval, and ATC or MTC option is selected, the temperature limit range value will be displayed together with the "°C" tag blinking.

Temperature compensation is performed by means of the following formula:

Compensated conductivity $=$ Measured conductivity/$[1+\alpha(T-T_{ref})/100]$ where T is the measured temperature and T_{ref} is the reference temperature (20 or 25°C).

Note that if a solution has a temperature coefficient α with $T_{ref}=25°C$, when changing the reference temperature to 20°C, the temperature coefficient must be manually adjusted by the user according to the following formula: $\beta=\alpha/(1-\alpha/20)$

For example, $\beta=2.10\%/°C$ when $\alpha=1.90\%/°C$.

Note that: $\alpha=\beta/(1+\beta/20)$

<u>Always set reference temperature to 25°C when measuring TDS.</u>

EC/TDS CALIBRATION

EC calibration is a single point procedure. Selectable calibration points are: 0.0, 84.0 μS/cm, 1413 μS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm,111.8 mS/cm.

To enter EC calibration select the EC range and press the CAL key.

Note: TDS reading is automatically derived from the EC reading and no specific calibration for TDS is needed. Pressing CAL while TDS range is selected has no effect.

Rinse the probe with some of the calibration solution or deionized water. Immerse the probe into the solution. The sleeve holes must be completely submerged. Tap the probe repeatedly to remove any air bubbles that may be trapped inside the sleeve.

For zero calibration, just leave the dry probe in air.
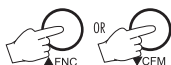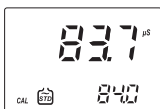
The indications "STD" and "CAL" are displayed. The upper LCD shows the uncalibrated EC reading. The lower LCD shows the buffer value. The stability indicator "$\sim$" blinks.

Select the desired value with the ▲ and ▼ keys, if necessary.

When the "$\sim$" symbol stops blinking, the reading is stable. The "CFM" indication starts blinking on the LCD asking for confirmation. Press ALT+CFM to confirm the calibration. If everything is satisfactory, the meter displays the "Stor Good" message and returns to measurement mode.

Notes:

- If the uncalibrated reading is too far from the expected value or the temperature value is out of 0 – 60°C range, calibration is not recognized. The "CFM" indication does not appear; the "$\sim$" and "STD" symbols blink to signal wrong or contaminated calibration solution. If the temperature value is out of 0 – 60°C range, the "°C" tag will also be displayed blinking on the LCD.
- For best results choose a calibration value close to the sample to test.
- In order to minimize the EMC interferences, use plastic beakers.
- The meter uses 1.90%/°C compensation factor during calibration. If the setup item "tc" has been set to a different value, when exiting the calibration mode the value displayed on the upper LCD could be different from the nominal buffer value.
- It is possible to set the cell constant value directly without following the calibration procedure. To set the cell constant enter the setup mode and select "CEL" (see SETUP for details).

NaCl CALIBRATION

Calibration is 1-point at 100.0% NaCl. Use the **HI7037** calibration solution (sea water solution) as a 100% NaCl standard solution.

- To enter NaCl calibration select the NaCl range and press CAL.
- Rinse the probe with some of the calibration solution or deionized water. Immerse the probe into **HI 7037** solution. The sleeve holes must be completely submerged. Tap the probe repeatedly to remove any air bubbles that may be trapped inside the sleeve.
- The indications "STD" and "CAL" are displayed. The upper LCD shows the uncalibrated NaCl reading in percentage. The lower LCD shows "100".
- When the " $\sim$ " symbol stops blinking, the reading is stable. The "CFM" indication starts blinking on the LCD asking for confirmation.
- Press ALT+CFM to confirm the calibration.
- If everything is satisfactory, the meter displays the "Stor Good" message and returns to measurement mode.

Note: If the uncalibrated reading is too far from the expected value, the calibration is not recognized. The "CFM" indication does not appear; the " $\sim$ " and "STD" symbols blink to signal wrong or contaminated calibration solution.

TEMPERATURE CALIBRATION
(for technical personnel only)

The calibration is a 2-point procedure at 0.0 and 50.0°C.

- Immerse the probe in a 0°C temperature bath.
- To enter temperature calibration mode, press and hold LOG+CAL, then turn the meter on.
- The lower LCD displays "0.0°C"; "STD" and "CAL" tags appear.
- When the reading is stable, "CFM" symbol starts to blink.
- Press ALT+CFM to confirm. The lower LCD displays 50.0°C.
- Immerse the probe in a 50°C temperature bath.
- When the reading is stable, "CFM" symbol starts to blink.
- Press ALT+CFM to confirm and return to normal operation.

TEMPERATURE ADJUSTMENT

The temperature reading can be manually fine-tuned by following this procedure:

To enter the temperature calibration mode, press and hold LOG+CAL, then turn the meter on.

Press CAL to enter the temperature adjustment mode. The upper and lower LCD will display the current temperature reading.

Adjust the temperature reading on the upper LCD using the arrow keys. The maximum adjustment is ±1°C around current reading.

Press ALT+CFM to confirm. The meter returns to measurement mode and displays the new temperature.

**Note:** Press LOG+CAL to escape without any changes.

To store the current reading in memory press the LOG key while in measurement mode. The LCD will display "Stor" along with the "LOG" indication and the sample number for a few seconds.

By pressing the LOG key a complete set of information is memorized: date, time, EC/TDS/NaCl and temperature readings.

Up to 250 samples can be stored into memory.

When the memory is full and the LOG key is pressed, the sample will not be stored and the LCD will display "FULL". In this case it is necessary to delete some data from memory to proceed.
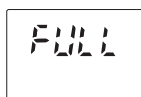

TO VIEW LOGGED DATA

To retrieve the memorized information press ALT + RCL.

The meter displays the date (upper LCD) and the number (lower LCD) of the last logged sample. The "ZERO" indication will be displayed if no samples are stored in memory.
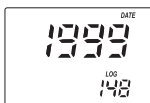
• Select the desired sample number with the arrow keys. Pressing the ▲ key while the last sample is displayed causes the meter to go to the first sample.
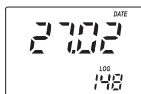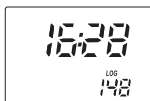

• Press RANGE to view remaining data of the selected sample. After the date information, the remaining data will be displayed in the following order:
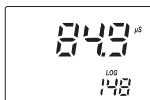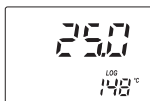
– Year

```
1999   DATE
        LOG
        148
```

– Time

```
16:28
        LOG
        148
```

– EC, TDS, NaCL reading;
 "----" means reading out of range or
 no probe was connected.

```
849   µS
        LOG
        148
```

– Temperature reading;
   "----" means reading out of range.

```
25.0
        LOG
        148 °C
```

- It is always possible to skip to another sample using the up and down arrow keys. For example, if the reading of a sample is displayed, pressing the up arrow key will cause the meter to display the reading of the next sample.

- It is possible to return to normal operational mode at any time by pressing ALT+RCL.

TO DELETE LOGGED DATA

It is possible to delete a single sample or all the memory at one time.
To delete a single sample:

- Enter the viewing logged data mode and select the desired sample number.

- Press ALT+AutoEnd. The "CFM" indication starts blinking asking for confirmation.

- Press the ALT+CFM to confirm deletion.

Note: Press ALT+AutoEnd to escape without data deletion.

When viewing through the logged data, the "NULL" message will be displayed when selecting a deleted sample.

To delete all logged data:

- Enter the viewing logged data mode.
- Press ALT+TC. The "CFM" indication will start blinking asking for confirmation.

- Press ALT and CFM to confirm deletion.

Note: Press ALT+TC to escape without data deletion.

Note: If no samples are stored in memory and a deletion is attempted, the meter will show the message "Zero" and then returns to normal operational mode.

DATA TRANSFER TO PC

Connect the meter to a PC through the RS232C output (the connector is located on the top of the meter). Use HI 920011 (5 to 9-pin) connection cable.
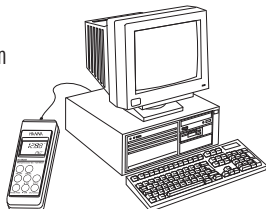
SPECIFICATIONS

Isolated 8-bit data transmission

Baud Rate: 2400
Start bit: 1
Stop bit: 1
Parity bit: none

SENDING COMMANDS FROM PC

It is possible to remotely control the instrument with any terminal programs. Connect the meter to the PC through the HI 920011 cable, start the terminal program and set the communication options as follows: 8, N, 1, no flow control.

To send a command to the meter, follow the next scheme:

$$<command> <CR>$$

The computer sends the command expressed as a 3-character sequence and a CR character.

Note: All the terminal programs that support the ANSI escape sequence, represent the CR character with the string ' ^ M'.

The available commands are the following:

MOD - to request the firmware code of the meter.

RPA - to request the setup parameters setting.

LTB - to request the number of logged samples.

LOD - to request the logged data.

    The meter answers with the following order:

    status byte

    date (ddmmyy)

    time (hhmm)

    measurement (binary)

    temperature reading (binary)

    At the end of the logged data the checksum (2 complement) is sent.

Note: The meter will send $<CAN>$ if a corrupted or unknown command is received.

BATTERY REPLACEMENT

When the batteries are inserted and no power adapter is connected, the meter can recognize the following battery charge levels:

- **Low battery** - the battery symbol is displayed on the LCD. Backlight is automatically disabled and it is not possible to enable it until new batteries are inserted or an external power adapter is used. When the battery symbol appears, batteries have typically 10% of their life left and the meter is still measuring properly.
- **Very weak battery** - The meter shuts off to avoid erroneous operations.

Note: If the meter is not powered for several minutes (e.g. in dead battery condition), the current date and time are lost.

Battery replacement must only take place in a non-hazardous area using 1.5V alkaline AA type batteries.
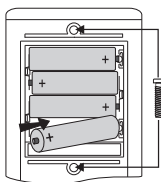
In order to replace run down batteries, simply remove the two screws on the rear cover of the instrument and replace the four 1.5V AA batteries with new ones, paying attention to the correct polarity.

New batteries allow approx. 200 hours of continuous use (with 2700 mA/h batteries).

A 12VDC power adapter can also be used. It is recommended to use the Hanna voltage adapters that use the proper polarity configuration.

However, other adapters can be used. In this case, check the polarity of your adapter before connecting it to the meter.

PROBE MAINTENANCE

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

Make sure to reinsert the sleeve onto the probe properly and in the right direction.

After cleaning the probe, recalibrate the instrument.

CONDUCTIVITY VS. 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.

The following table lists the temperature dependence of HANNA EC calibration buffers.

°C	°F	HI7030 HI8030 (μS/cm)	HI7031 HI8031 (μS/cm)	HI7033 HI8033 (μS/cm)	HI7034 HI8034 (μS/cm)	HI7035 HI8035 (μS/cm)	HI7039 HI8039 (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

ACCESSORIES

CONDUCTIVITY CALIBRATION SOLUTIONS

HI 70030P	12880 μS/cm solution, 20 mL sachet (25 pcs.)
HI 7030L	12880 μS/cm solution, 500 mL bottle
HI 7030M	12880 μS/cm solution, 230 mL bottle
HI 70031P	1413 μS/cm solution, 20 mL sachet (25 pcs.)
HI 7031L	1413 μS/cm solution, 500 mL bottle
HI 7031M	1413 μS/cm solution, 230 mL bottle
HI 70033P	84 μS/cm solution, 20 mL sachet (25 pcs.)
HI 7033L	84 μS/cm solution, 500 mL bottle
HI 7033M	84 μS/cm solution, 230 mL bottle
HI 7034L	80000 μS/cm solution, 500 mL bottle
HI 7034M	80000 μS/cm solution, 230 mL bottle
HI 7035L	111800 μS/cm solution, 500 mL bottle
HI 7035M	111800 μS/cm solution, 230 mL bottle
HI 70039P	5000 μS/cm solution, 20 mL sachet (25 pcs.)
HI 7039L	5000 μS/cm solution, 500 mL bottle
HI 7039M	5000 μS/cm solution, 230 mL bottle
HI 7037L	100% NaCl sea water standard solution, 500 mL bottle

PROBE CLEANING SOLUTIONS

HI 7061M	General Cleaning Solution, 230 mL bottle
HI 7061L	General Cleaning Solution, 500 bottle

OTHER ACCESSORIES

HI 76309/1.5	stainless steel 4-ring conductivity/TDS probe with temperature sensor and 1.5 m cable.
HI 710005	12VDC voltage adapter (US plug)
HI 710006	12VDC voltage adapter (European plug)
HI 710012	12VDC voltage adapter (UK plug)
HI 710013	12VDC voltage adapter (S. Africa plug)
HI 710014	12VDC voltage adapter (Australian plug)
HI 740027	1.5V AA batteries (4 pcs)
HI 740036	100 mL plastic beaker (6 pcs)
HI 740034	Cap for 100 mL beakers (6 pcs)
HI 76405	Electrode holder
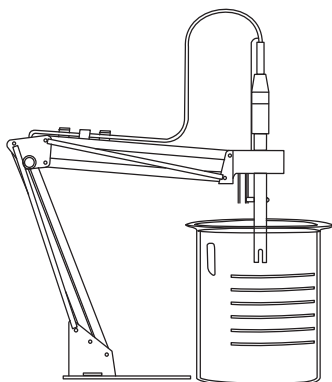
RECOMMENDATIONS FOR USERS

Before using this product, make sure that it is entirely suitable for the environment in which it is used.

Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment, requiring the operator to follow all necessary steps to correct interferences.

The metal bands of the probe are sensitive to electrostatic discharges. Avoid touching these metal bands at all times.

To maintain the EMC performance of this equipment the recommended cables must be used.

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

To avoid electrical shock, do not use this instrument 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.