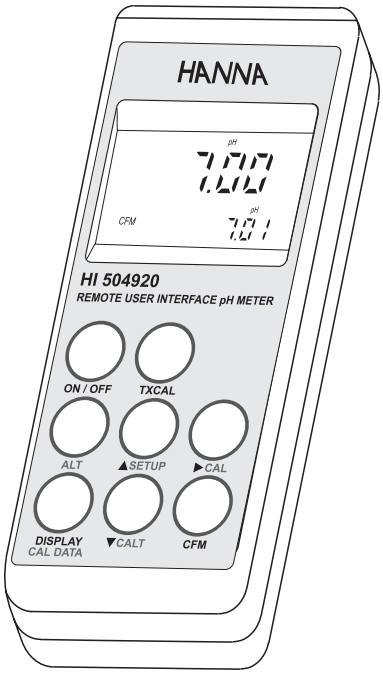
Instruction Manual

HI 504920

Remote User Interface pH 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 all the necessary information for correct use of the instrument.
If you need additional technical information, do not hesitate to e-mail us at **tech@hannainst.com**.
This instrument is in compliance with 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 damage, notify your Dealer.

Each meter is supplied complete with:

- **HI 62920** amplified pH electrode with built-in temperature sensor, DIN connector and 2 m cable
- Hanna HI 504910 interface cable (**HI 7920**)
- pH 4.01 buffer solution, 20 mL sachet
- pH 7.01 buffer solution, 20 mL sachet
- Instruction manual
- 1.5V AA size alkaline batteries (4 pcs)
- 12 Vdc power adapter
- Rugged carrying case.

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

GENERAL DESCRIPTION

HI 504920 is a complete portable pH/ORP/temperature meter, to be used mainly with Hanna **HI 504910** Digital Transmitter for two different applications: it can be a reference pH meter for calibrating the **HI 504910** Digital Transmitter, or it can be set as user interface for the **HI 504910** as well.

All pH measurements are automatically compensated for temperature (ATC). The instrument housing is made of rugged, lightweight material, making it truly portable.

Five memorized buffers (4.01, 6.86, 7.01, 9.18 and 10.01 pH) and wrong buffer recognition technology make calibration simple and error free. One or two-point calibration can be performed.

An user friendly interface provides clear messages regarding errors, functions and more.

An alarm time-out is available to alert the user if too much time has elapsed since the last pH calibration and that re-calibration may be required.

The meter provides a controlled access to calibration and GLP settings

through a password protection method.

The Battery Error Preventing System (BEPS) detects when the batteries level becomes weak.

When the batteries are getting low, a clear indication is displayed on LCD to warn the user of this condition. However, the meter continues to measure correctly even when the low battery indication is displayed. The meter automatically switches itself off when the batteries are too weak to support proper function.

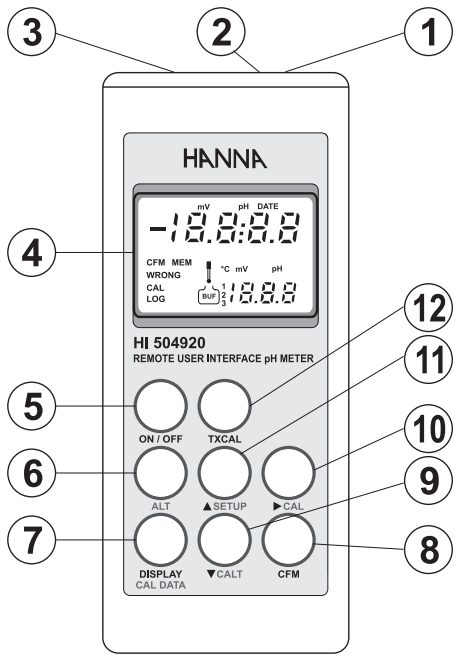
For long term field and lab applications, this meter can be connected to a 12 VDC adapter.

The meter allows the user to enter an ID code to uniquely identify the instrument.

Made of lightweight ABS material, the water-resistant rugged casing is built to last.

The meter is in compliance with IP67 standards: dust-tight, protected against the effects of temporary immersion in water and designed to provide laboratory results and accuracy under harsh industrial conditions.

FUNCTIONAL DESCRIPTION



1) Power adapter plug
2) Connector for the **HI 504910** interface cable (**HI 7920**)
3) Electrode Connector
4) Liquid Crystal Display (LCD)
5) **ON/OFF** key, to turn the meter on and off
6) **ALT** key, to alternate key function
7) **DISPLAY / CAL DATA** key, to select measurement ranges, to display time and date, and to view calibration data (with ALT)
8) **CFM** key, to confirm values
9) □ **CALT** key, to move down or calibrate temperature (with ALT)
10) □ **CAL** key, to move right or calibrate pH (with ALT)
11) □ **SETUP** key, to move up or enter setup mode (with ALT)
12) **TXCAL** key, to calibrate the **HI 504910** Digital Transmitter

SPECIFICATIONS

Range	pH	-4.00 to 19.99 pH
	mV	±600.0 mV ; ±2000 mV autoranging
	Temp.	-20 to 120 °C
Resolution	pH	0.01 pH
	mV	0.1 mV between ±400 mV 0.2 mV from +400 to +600 mV 0.2 mV from -400 to -600 mV 1 mV outside
	Temp.	0.1 °C from -10 to 120 °C / 1°C below -10°C
Accuracy (@20°C/68°F)	pH	±0.01 pH
	mV	±0.2 mV between ±400 mV ±0.4 mV from +400 to +600 mV ±0.4 mV from -400 to -600 mV ±2 mV outside
	Temp.	±0.4 °C from 0 to 70°C / ±1°C outside
Typical EMC Deviation	pH	±0.02 pH
	mV	±1 mV between ±600 mV ±2 mV outside
	Temp.	±0.4°C
pH Calibration		Automatic 1 or 2 points with 5 memorized buffers (4.01, 6.86, 7.01, 9.18 and 10.01 pH)
mV Calibration		Automatic 2 points at 0, 350 mV or 3 points at 0, 350 and 1900 mV
Temperature Compensation		Automatic from -20 to 120°C
pH Electrode		**HI 62920** Amplified, with built-in temperature sensor, matching pin, DIN connector and Titanium body (included)
ORP Electrode		Amplified ORP electrode with DIN connector (see accessories)
Input Impedance		10^{12} Ohm
Infrared optical interface towards HI 504910		through **HI 7920** interface cable
Power supply		4x1.5V AA (IEC LR6) batteries/300 hours typical life or 12 VDC adapter
Casing		IP 67
Environment		0 to 50°C / 100% RH
Dimensions		196 x 80 x 60 mm (7.7 x 3.1 x 2.4")
Weight		500 g (18 oz)

INITIAL PREPARATION

Each meter is supplied complete with batteries and 12 VDC adapter. To power the instrument with batteries, remove the back cover, unwrap the batteries and install them while paying attention to the polarity.

If using external power supply, connect the 12 VDC adapter to the power adapter plug.

To prepare the instrument for use, connect the pH or ORP electrode to the connector located on the top of the instrument.

To switch the meter on, press the ON/OFF key. The batteries charge status or "LINE" message (if external power adapter is connected) will be displayed on the LCD for a few seconds.

The meter is now ready to operate.

To maximize battery life, the meter is automatically switched off after 5 minutes of non-use (this feature can be disabled through setup code 20). To reactivate the instrument press the ON/OFF key.

Before proceeding with pH measurements follow the calibration procedure.

Note: When the use of an alternate function (SETUP, CAL, CAL DATA and CALT) is requested, press and hold the ALT key first and then the second desired key.

Note: To prevent damage to the electrode, remove it from the sample before turning the meter off.

When the meter is OFF, detach the electrode from the meter before immersing it in the storage solution.

CALIBRATION

pH CALIBRATION

For greatest accuracy, it is recommended to frequently calibrate the instrument. For a faster procedure, it is possible to calibrate at 1 point, but it is always a good practice to calibrate at 2 points.

For a two-point calibration two of the following pH buffers can be used: pH 4.01, pH 7.01 (or 6.86), pH 10.01 (or 9.18).

In the case of a two-point calibration in the acidic range (from 0 to 7 pH), use pH 7.01 (or 6.86) buffer as first solution and pH 4.01 buffer as second solution. If testing in the alkaline range (from 7 to 14 pH), use pH 10.01 (or 9.18) buffer as second solution.

Due to electrode conditioning time, the electrode must be kept immersed a few seconds to stabilize. The meter is equipped with a stability indicator and the user will be guided step by step with easy indications on the LCD during the calibration. This will make the calibration a simple and error-free procedure.

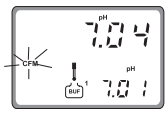
PROCEDURE

1. Rinse the electrode with a portion of the first calibration buffer or clean water. Dip the tip (4 cm/1½") of the electrode into a beaker containing the solution.
2. Press (ALT+) CAL when the meter displays pH measurement.

3. Enter the password (if different from "0000") with the arrow keys.
4. Press CFM to confirm the password or (ALT+) CAL to exit.
5. If password is correct, the meter displays "7.01pH" on the secondary LCD with the "BUF 1" and "CAL" indications. The primary LCD shows the uncalibrated pH reading.

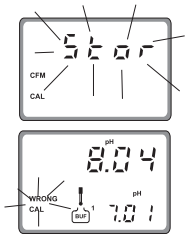
Note: The pH buffer value (displayed on the secondary LCD) varies with temperature. For example, at 20°C it shows 4.00 -7.03 - 10.06, at 25°C it shows 4.01-7.01-10.01.

6. Select the first buffer solution value with □ or □ if necessary.
7. When the "CFM" symbol blinks, the reading is stable and calibration can be confirmed.



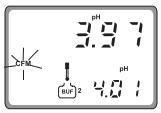
8. Press CFM to confirm the first buffer.

9. If everything is satisfactory the LCD will display "Stor" and then the expected value for the second buffer (two-point calibration). If a wrong solution or electrode has been used or if the buffer is polluted, "WRONG" will be displayed to alert the user.



10. If a single point calibration is required, press (ALT+) CAL to exit the calibration mode and maintain the previous slope calibration. The instrument then checks the electrode parameters and advises user of possible abnormalities by "old probe" and "dead probe" indications.

11. Press □ or □ to select the second buffer value. The meter will display the "BUF 2" indication.
12. Rinse the electrode with some of the second buffer solution or clean water.
13. Dip the tip (4 cm/1½") of the pH electrode into a beaker containing the second buffer.
14. When the "CFM" symbol blinks, press CFM to confirm the second calibration point.



15. The LCD will display "Stor". The instrument checks the electrode parameters and advises the user of possible abnormalities by "old probe" and "dead probe" indications (in these cases, repeat the calibration procedure with fresh buffers). If everything is satisfactory the meter is calibrated and it returns to normal operational mode.

Note: To abort the calibration procedure and leave the calibration data unchanged, press ALT and CAL before confirming the first point.

CALIBRATION ERROR MESSAGES

If the "old probe" or "dead probe" messages are displayed, or if the WRONG tag blinks during calibration, check the electrode by following the conditioning and maintenance procedures and repeat calibration. If calibration can not be successfully performed, the pH electrode might have to be replaced.

Note: See "GLP" section for more details about "old probe" and "dead probe" messages.

mV CALIBRATION

Contact your nearest Hanna Service Center for periodic mV calibration.

It is recommended to have the meter recalibrated for mV reading at least every two years.

TEMPERATURE CALIBRATION (for technical personnel only)

Contact your nearest Hanna Service Center for periodic temperature calibration.

It is recommended to have the meter recalibrated for temperature reading at least every two years.

Temperature calibration at your site should be performed only by skilled technical personnel as described in the following procedure (two-point calibration at 0.0 and 50.0°C):

1. Immerse the pH electrode with the built-in temperature sensor in a 0°C ice bath.
2. Press (ALT+) CALT to enter temperature calibration mode.
3. Enter the password.
4. The meter will display "0.0°C" on the secondary LCD with the "BUF 1" and "CAL" indications.
5. When the reading is stable the "CFM" tag starts blinking.
6. Press CFM to confirm. The secondary LCD will then display "50.0°C" with the "BUF 2" indication.
7. Immerse the pH electrode with the built-in temperature sensor in a 50°C bath.
8. When the reading is stable the "CFM" tag starts blinking.
9. Press CFM to confirm, save the new calibration data and return to normal mode.

Note: To abort the calibration procedure and leave the calibration data unchanged, press (ALT+) CALT at any time before the last step.

USE AS REFERENCE pH METER

HI 504910 QUICK pH CALIBRATION

HI 504910 can be calibrated frequently through **HI 504920** without interrupting the normal measurement.

This is accomplished through a single point pH calibration at the pH value of the solution monitored by **HI 504910**.

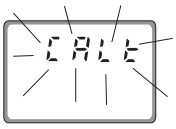
Perform the following steps:

1. Connect the supplied infrared optical interface cable (**HI 7290**) to the calibrator and to the **HI 504910** Digital Transmitter.

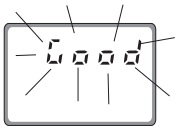
2. Immerse the pH electrode into the solution which **HI 504910** is measuring, as close as possible to the **HI 504910** pH probe. Wait a few seconds for the electrode to stabilize.

3. When the meter displays pH measurement, press TXCAL on the **HI 504920** calibrator.

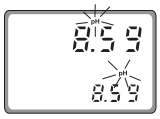
4. The LCD will display "CALt" for a couple of seconds to indicate that the calibration of the **HI 504910** transmitter is in progress.



5. If the calibration is completed correctly, the LCD will flash the "Good" message for a couple of seconds.



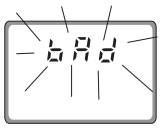
6. The primary LCD then shows the pH reading of the **HI 504910** transmitter, while the secondary one displays the pH reading of the reference meter. Both pH tags blink alternatively.



Note: The two values may differ a little if the solution under measurement is not stable. For an accurate calibration, it is recommended to perform the above procedure only when readings are stable.

7. To exit the calibration mode and return to normal measurement, press TXCAL.

Note: At point 5, if the probe offset is outside the allowed limits, if **HI 504910** is configured to measure ORP, or if some other error occurs, the LCD shows a blinking "bAd" message. To cancel this message and return to normal mode, press TXCAL. Then restart the calibration procedure from the beginning.



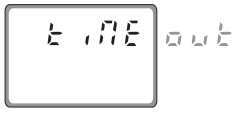
Note: Although it is recommended to perform the entire calibration procedure with the infrared optical interface cable connected between **HI 504920** and **HI 504910** (step 1), it can happen that the **HI 504910** must be located in a place difficult to reach when the **HI 504920** pH probe is immersed in the solution.

In this case, step 1 can be skipped. After step 4 the primary LCD will show the blinking "CALt" message and the secondary one a countdown starting from 120 seconds.

In this situation, the pH probe can be taken out of the solution and the interface cable must be connected to the **HI 504910** before the countdown reaches zero.

Calibration will then continue from step 5. At step 6 the pH tag of the secondary LCD does not blink, because the corresponding pH reading is the one taken with the **HI 504920** pH probe immersed when TXCAL was pressed.

If the interface cable is not connected before the end of the countdown, the LCD shows the "tiMEout" message and the calibration procedure is aborted.



Note: To perform a two-point calibration procedure with standard pH buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) through the **HI 504910** terminal mode, see the "Setup mode section", code 90.

Note: A probe life verification (as described in the "GLP" section) is performed on the **HI 504910** pH probe; the message "old probe" or "dead probe" could appear at the end of calibration.

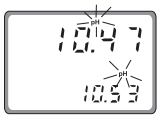
HI 504910 pH READING CHECK

The check of the **HI 504910** pH reading against the **HI 504920** pH reading is possible at any time.

Perform the following steps:

- Connect the infrared optical interface cable to **HI 504910**.
- Press (ALT+) TXCAL.

- The primary LCD shows the **HI 504910** pH reading and the secondary one displays the **HI 504920** pH reading. Both pH tags blink alternatively.



- Press (ALT+) TXCAL to return to normal mode.

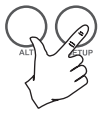
Note: In case of a communication error between **HI 504920** and **HI 504910**, the LCD shows the "rSEr" message. Check interface cable and connections.

Note: If the LCD shows "...", verify that **HI 504910** is configured to measure pH and not ORP.

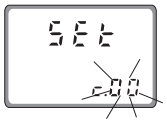
SETUP MODE

Setup can be used to view data regarding instrument status (e.g. battery charge) or to change the meter parameters (e.g. time).

- To enter this mode press (ALT+) SETUP while the meter is in measurement mode.



- The setup code "00" will blink on the secondary LCD and "SEt" will be displayed on the primary one.



- Select the code of the desired parameter using the ▲ or ▼ key.

- Press CFM to confirm the code.

Note: If (ALT+) SETUP are pressed before code confirmation, the meter returns to measurement mode.

- If the selected parameter is password protected, the lower LCD will display "PAS" and the password must be entered to proceed. Otherwise, the current parameter value will be displayed.

PASSWORD PROTECTION

Setting of time, date and calibration alarm time-out are password protected and the user will be asked to enter the password to change these parameters. After code confirmation the upper LCD will display "0000".

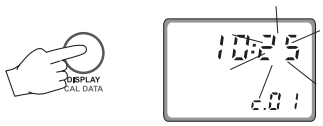
- If password is set to 0000 (factory setting), just press CFM to confirm.
- If password is set to a value different from 0000, enter the password with the up and down arrow keys and then press CFM to confirm.
- If the password is not correct, the meter displays the "WRONG" indication and asks for the password again.
- If the password is correct, the meter provides access to the parameter.

PARAMETER SETTINGS

- Once the parameter code (and password if needed) has been entered, the current value of the selected parameter will be displayed on the primary LCD and the parameter code on the secondary one. The parameter or a part of it will blink (e.g. only the hour blinks if time has been selected).

- Enter the new value using the arrow keys.

- If there is another part of the parameter to be set (e.g. minutes for the time), press DISPLAY to gain access and then enter the new value using the arrow keys.



- Press CFM to confirm the value.
- If the entered value is not acceptable, the "WRONG" indication will be displayed for a few seconds and then the meter will ask for a correct value.
- If the confirmed value is accepted, the meter will pass to the next parameter (asking for the password if it is protected).

Note: If (ALT+) SETUP are pressed before parameter value confirmation, the meter will not update the parameter and after escaping will ask for a new setup code.

The following table lists the setup codes along with the description of the specific setup items, their valid values and the factory settings (default):

Code	Valid values	Default
00 Instrument ID code	0000 to 9999	0000
01 Current time[1]	hh:mm	00:00
02 Current date[1]	dd.mm	01.01
03 Current year[1]	YYYY	1998
10 Calibration alarm time-out	01 to 99 days , OFF	OFF
20 Auto-Off/Power down time-out	ON, OFF	ON
21 Firmware version		
22 Battery level test		
90 HI 504910 terminal mode		
99 Password[2]	0000 to 9999	0000

[1] The meter automatically checks for entered time/date accuracy as follows:
0≤hh≤23; 0≤mm≤59; 01≤dd≤28/29/30/31; 1≤MM≤12; 1998≤YYYY≤2097.

[2] To change the password, the correct code must be entered first. If the password has been forgotten, the password protected features are no longer accessible; in this case contact your nearest Hanna Service Center.

Some of the setup parameters are explained below.

Code 00 - Setting the identification (ID) code

When using several identical meters it may be useful to uniquely identify them by assigning an ID code to each meter.

- Select code 00.
- Enter a 4-digit value using the arrow keys.
- Press CFM to confirm the value.

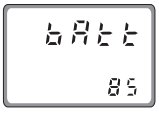
Code 20 - Auto-off

The auto-off time-out is factory set at 5 minutes.

- Select code 20 to disable/enable this feature.

Code 22 - Battery level test

- Select code 22.
- If the meter is connected to an external power adapter, the LCD displays "LINE" otherwise it shows "bAtt" on the primary display, and the remaining battery charge percentage on the secondary one (100 means fully charged battery and 0 indicates the minimum voltage that allows the meter to operate).



Note: The battery level test is also performed any time the meter is turned on.

Code 90 - HI 504910 terminal

- Select code 90.
- Press CFM to confirm the value.
- **HI 504920** enters a "terminal mode" during which it works as keyboard and LCD for **HI 504910**, allowing complete calibration, configuration and error check of **HI 504910** (see the **HI 504910** instruction manual for details).

Note: The "LOG" tag blinks while in **HI 504910** terminal mode.

- Press (ALT+) TXCAL to exit this mode and skip into measurement mode. **Put HI 504910 in normal measurement mode before exiting**.

Note: The LCD shows the "rSEr" message when a connection between **HI 504920** and **HI 504910** can not be established. In this case, check interface cable and connections.

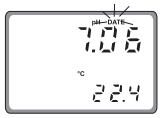
TAKING MEASUREMENTS

pH MEASUREMENTS

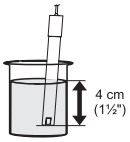
Connect the pH electrode with the built-in temperature sensor to the meter and press ON/OFF to power on the instrument.

If the electrode is not connected the LCD will display the "no probe" message and then dashes.

For greatest accuracy, it is recommended to set the Calibration alarm time-out to the value appropriate to your specific use and calibrate the meter as soon as the "DATE" warning symbol blinks on LCD (see GLP section).



To take pH measurements, remove the electrode protective cap and simply submerge the tip (4 cm/1½") of the electrode in the solution to be tested and stir gently. Allow for the reading to stabilize.



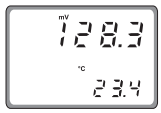
The temperature is displayed on the secondary LCD.

The pH reading is automatically temperature compensated (ATC).

If the reading is out of range, the meter displays "----". A blinking reading means that the electrode is "dead".

By continuously pressing the DISPLAY key the following information will be displayed on the primary LCD:

- mV reading (the mV scale is auto-ranging: when the reading is outside ±600 mV, the decimal point automatically disappears).



- Time
- Day / Month
- Year

Pressing DISPLAY again, the meter returns to pH reading.

Note: When date or time is displayed, it is possible to change them directly by pressing (ALT+) SETUP.

Note: If measurements are taken successively in different samples, it is recommended to rinse the electrode thoroughly with deionized water or, if not available, tap water first and then with some of the next sample to condition the electrode before immersing it in the sample.

ORP MEASUREMENTS

Connect the ORP electrode to the meter and press the ON/OFF key. The meter automatically sets the mV range.

If the electrode is not connected the LCD will display the "no probe" message and then dashes.

To take ORP measurements, remove the electrode protective cap and simply submerge the tip (4 cm/1½") of the electrode in the solution to be tested, stir gently and allow for the reading to stabilize.

Note: The ORP electrodes are not provided with the temperature sensor.

By continuously pressing the DISPLAY key the following information will be displayed on the primary LCD:

- Time
- Day / Month
- Year

Pressing DISPLAY again, the meter returns to mV reading.

Note: If measurements are taken successively in different samples, it is recommended to rinse the electrode thoroughly with deionized water or, if not available, tap water first and then with some of the next sample to condition the electrode before immersing it in the sample to be tested.

TEMPERATURE MEASUREMENTS

The temperature sensor is integrated in the pH electrode.

Immerse the pH electrode in the solution, wait a few minutes for the temperature to stabilize and press the ON/OFF key. The temperature will be displayed on the secondary LCD.

Note: If temperature measurement is out of range the LCD will display "- - -".

GOOD LABORATORY PRACTICE (GLP)

GLP is a set of functions that allows the storage or retrieval (when necessary) of data regarding the maintenance and status of the electrode. The meter can automatically analyze the data and advise the user with a clear message if a problem is found.

PROBE LIFE VERIFICATION

At the end of calibration, the meter checks if the electrode offset is within ±30 mV range and the slope between 53.5 and 62 mV/pH. If the values are not within these limits, the message "old probe" scrolls across the LCD. The electrode is still working, but it is necessary to perform a cleaning procedure (see "Electrode cleaning and maintenance" section) or replace it.

If the offset is outside the ±60 mV range or the slope is outside the 40 to 70 mV/pH interval, the "dead probe" message will scroll across the LCD; the reading will blink on the primary LCD to warn the user that it is not reliable.

ELECTRODE IDENTIFICATION

At start-up the meter checks if the electrode is connected. If not, the message "no probe" scrolls across the LCD and dashes ("----") are displayed in place of the reading.

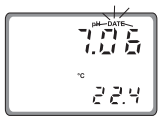
If the meter detects a "dead probe" situation, the reading will blink.

CALIBRATION ALARM TIME-OUT

The calibration alarm time-out is available only for pH calibration.

It is possible to set (through setup code 10) the number of days before the next required calibration procedure. User can set a value from 01 to 99 days. The default value is 07. Set the parameter to "OFF" to disable this feature.

When turned on, the meter checks if the time-out time has expired. If yes, the message "Cal date" scrolls across the LCD and the "DATE" tag blinks as a reminder.



LAST CALIBRATION DATA

Last calibration data are automatically stored after a successful calibration and they can be displayed by pressing the CAL DATA key.

To view the pH calibration data

- Press (ALT+) CAL DATA when the meter displays pH reading.

- The LCD will then display the last pH calibration date.
- Press DISPLAY to scan remaining data, in the following order:
  last calibration time;
  electrode offset value in mV ("OFF" appears on the secondary LCD);
  electrode slope in mV/pH ("SLP" appears on the secondary LCD);
  first calibration point buffer;
  second calibration point buffer (only if a 2-point calibration has been performed).
  If calibration was performed with an old or dead probe, the message "old probe" or "dead probe" will scroll on LCD.
- The meter then returns to normal mode. Press (ALT+) CAL DATA to escape before viewing all the data.

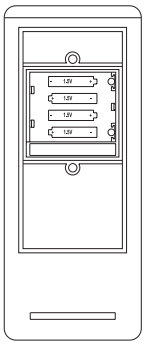
<u>To view the mV calibration data</u>

- Press (ALT+) CAL DATA when the meter displays mV reading.
- The LCD will then display the last mV calibration date.
- Press DISPLAY to scan remaining data, in the following order:
  last calibration time;
  first calibration point;
  second calibration point;
  third calibration point (only if a 3-point calibration has been performed).
- The meter then returns to normal mode. Press (ALT+) CAL DATA to escape before viewing all the data.

BATTERY REPLACEMENT

When the batteries are inserted and no power adapter is connected, the meter can recognize two different batteries charge levels.

1. **Weak batteries** - "bAt" indication is displayed on the secondary LCD alternating the temperature reading. The meter can still work for about 10 hours.
2. **Dead batteries** - meter shuts off and stops working to avoid erroneous readings.



Battery replacement must only take place in a non hazardous area using 1.5V alkaline AA type batteries.

In order to replace rundown batteries, simply remove the two screws of the rear cover and replace the four 1.5V AA batteries with new ones, while paying attention to the correct polarity.

A 12 VDC power adapter can also be used to power the unit (see accessories).

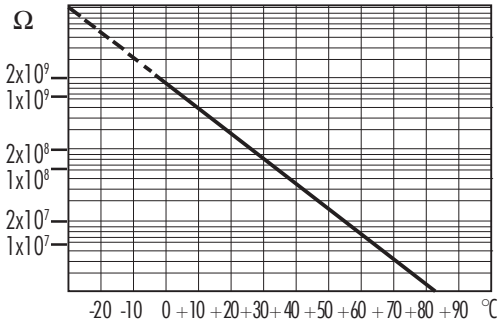
Note: The instrument uses the following configuration.

It is recommended to purchase the Hanna voltage adapters that use the proper polarity configuration.

However, **HI 504920** can be used also with other adapters. In this case, check the correct polarity of the adapter before connecting it to the meter.

TEMPERATURE-RESISTANCE CORRELATION FOR HANNA pH SENSITIVE GLASS

The resistance of glass electrodes partially depends on the temperature. The lower the temperature, the higher the resistance. It takes longer time for the reading to stabilize if the resistance is higher. In addition, the response time will suffer to a greater degree at temperatures below 10°C.



Since the resistance of the pH electrode is in the range of 200 Mohm, the current across the membrane is in the pico-Ampere range. Large currents can disturb the calibration of the electrode for many hours.

For these reasons **high humidity environments, short circuits and static discharges** are detrimental to a stable pH reading.

The pH electrode's life also depends on the temperature. If constantly used at high temperatures, the electrode life is drastically reduced.

Typical Electrode Life	
Ambient Temperature	1- 3 years
90 °C	Less than 4 months
120°C	Less than 1 month

High concentrations of sodium ions interfere with readings in alkaline solutions; the pH at which the interference starts to be significant depends upon the composition of the glass. This interference is the alkaline error and causes the pH to be underestimated. Hanna's glass formulations have the indicated characteristics.

Alkaline Error

Sodium Ion Correction for the Glass at 20-25°C		
Concentration	pH	Error
0.1 Mol L^{-1} Na^+	13.00	0.10
	13.50	0.14
	14.00	0.20
1.0 Mol L^{-1} Na^+	12.50	0.10
	13.00	0.18
	13.50	0.29
	14.00	0.40

ELECTRODE CONDITIONING AND MAINTENANCE

Note: To prevent damage to the electrode, remove the pH electrode from the sample before turning the meter off.

If the meter is OFF, detach the electrode from the meter before immersing the electrode in the storage solution.

PREPARATION

Remove the protective cap.

DO NOT BE ALARMED IF SALT DEPOSITS ARE PRESENT.

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

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

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

For refillable electrodes:

If the fill solution (electrolyte) is less than 1 cm (½") below the fill hole, add **HI 7082 3,5M KCl Electrolyte Solution** for double junction or **HI 7071 3,5M KCl+AgCl Electrolyte Solution** for single junction electrodes.

For a faster response unscrew the fill hole screw during measurements.

For AmpHel electrodes:

If the electrode does not respond to pH changes, the battery is run down and the electrode should be replaced.

MEASUREMENT

Rinse the electrode tip with distilled water.

Immerse the tip (4cm /1½") in the sample and stir gently for approximately 30 seconds.

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

STORAGE

To minimize clogging and ensure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry out.

Replace the solution in the protective cap with a few drops of **HI 70300 Storage Solution**. Follow the Preparation Procedure above before taking measurements.

Note: NEVER STORE THE ELECTRODE IN DISTILLED WATER OR DRY.

PERIODIC MAINTENANCE

Inspect the electrode and the cable. The cable used for connection to the meter must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry.
If any scratches or cracks are present, replace the electrode.
Rinse off any salt deposits with water.

For refillable electrodes:

Refill it with fresh electrolyte (**HI 7071** for single junction or **HI 7082** for double junction electrodes). Allow the electrode to stand upright for 1 hour.

Follow the Storage Procedure above.

CLEANING PROCEDURE

General Soak in Hanna **HI7061 General Cleaning Solution** for approximately 1 hour.

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

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

IMPORTANT: After performing any of the cleaning procedures rinse the electrode thoroughly with distilled water, drain and refill the reference chamber with fresh electrolyte, (not necessary for GEL filled electrodes) and soak the electrode in **HI 70300 Storage Solution** for at least 1 hour before taking measurements.

TROUBLESHOOTING

Evaluate your electrode performance based on the following possibilities:

- **Noise** (Readings fluctuate up and down) could be due to:
- **Clogged/Dirty Junction:** Refer to the Cleaning Procedure above.
- **Loss of shielding** due to low electrolyte level (in refillable electrodes only): refill with fresh **HI 7071** for single junction or **HI 7082** for double junction electrodes.

- **Dry Membrane/Junction:** Soak in **Storage Solution HI 70300** for at least 1 hour.
- **Drifting:** Soak the electrode tip in warm Hanna Solution **HI 7082** for 1 hour, then flush tip with distilled water. Refill with fresh **HI 7071** for single junction electrodes and **HI 7082** for double junction electrodes.
- **Low Slope:** Refer to the cleaning procedure above.
- **No Slope:** Check the electrode for cracks in glass stem or bulb and replace the electrode.
- **Slow Response/Excessive Drift:** Soak the tip in Hanna Solution **HI 7061** for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.

ACCESSORIES

pH CALIBRATION SOLUTIONS

HI 70004P	pH 4.01 buffer, 20 mL sachet (25 pcs)
HI 70007P	pH 7.01 buffer, 20 mL sachet (25 pcs)
HI 70010P	pH 10.01 buffer, 20 mL sachet (25 pcs)
HI 7004L	pH 4.01 buffer, 500 mL bottle
HI 7006L	pH 6.86 buffer, 500 mL bottle
HI 7007L	pH 7.01 buffer, 500 mL bottle
HI 7009L	pH 9.18 buffer, 500 mL bottle
HI 7010L	pH 10.01 buffer, 500 mL bottle

ELECTRODE STORAGE SOLUTION

HI 70300L	Storage solution, 500 mL bottle

ELECTRODE CLEANING SOLUTIONS

HI 70000P	Rinsing solution, 20 mL sachet (25 pcs)
HI 7061L	General cleaning solution, 500 mL bottle
HI 7073L	Protein cleaning solution, 500 mL bottle
HI 7074L	Inorganic cleaning solution, 500 mL bottle
HI 7077L	Oil & Fat cleaning solution, 500 mL bottle

REFILL ELECTROLYTE SOLUTIONS

HI 7071	3.5M KCl + AgCl Electrolyte, 50 mL (4 pcs)
HI 7072	1M KNO_3 Electrolyte, 50 mL (4 pcs)
HI 7082	3.5M KCl Electrolyte, for double junction electrodes, 50 mL (4 pcs)

ORP PRETREATMENT SOLUTIONS

HI 7091L Reducing Pretreatment solution, 500 mL bottle
HI 7092L Oxidizing Pretreatment solution, 500 mL bottle

ELECTRODES

HI 62920 pH electrode with built-in temperature sensor, matching pin, Titanium-body, DIN connector & 2m (6.6') cable
HI 32920 Combination ORP/Pt electrode, Titanium-body with DIN connector & 2m (6.6') cable
HI 3619D Combination ORP/Pt electrode, glass-body, single junction, with DIN connector & 1m (3.3') cable
HI 3620D Combination ORP/Pt electrode, plastic-body, single junction, gel-filled, with DIN connector & 1m (3.3') cable

OTHER ACCESSORIES

HI 7920 HI 504910 interface cable
HI 710005 115 Vac to 12 Vdc power adapter, US plug
HI 710006 230 Vac to 12 Vdc power adapter, European plug
HI 710031 Rugged carrying case
HI 76405 Electrode holder
HI 8427 pH and mV simulator
HI 931001 pH and mV simulator with LCD display

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CE DECLARATION OF CONFORMITY

HANNA instruments

CE

DECLARATION OF CONFORMITY

We

Hanna Instruments Italia Srl
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35030 Sarmeola di Rubano - PD
ITALY

herewith certify that the pH meter:

HI 504920

has 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 61000-4-2 Electrostatic Discharge
IEC 61000-4-3 RF Radiated
IEC 61000-4-4 Fast Transient

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

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A.Marsilio - Technical Director
On behalf of
Hanna Instruments S.r.l.

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

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

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

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

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

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

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