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Instruction Manual

HI 9210N

Portable Waterproof pH Meter



Dear Customer,
 Thank you for choosing a Hanna Product.
 Please read this instruction manual carefully before using the instrument.
 If you require further technical information, do not hesitate to e-mail us at tech@hannainst.com.
 This instrument is in compliance with the **CE** directives.

WARRANTY

All Hanna Instruments **meters are guaranteed for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. **Electrodes and probes are guaranteed for a period of six months.** This warranty is limited to repair or replacement free of charge.

Damage due to accident, misuse, tampering or lack of prescribed maintenance are not covered. If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Customer Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

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PRELIMINARY EXAMINATION

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

The instrument is supplied complete with:

- **HI 1217D** pH electrode with built-in temperature sensor, DIN connector and 1 m (3.3') cable
- Batteries, 4 x 1.5V AA
- Instruction manual

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

GENERAL DESCRIPTION

The **HI 9210N** heavy-duty pH meter is designed to provide laboratory results and accuracy under the harshest of industrial conditions.

The supplied **HI 1217D** rugged pH electrode, incorporates a temperature sensor to provide both pH and temperature measurements with one probe. The electrode signal is also preamplified and strengthened to give you better protection against noise and electromagnetic interference, a common phenomenon in industrial applications.

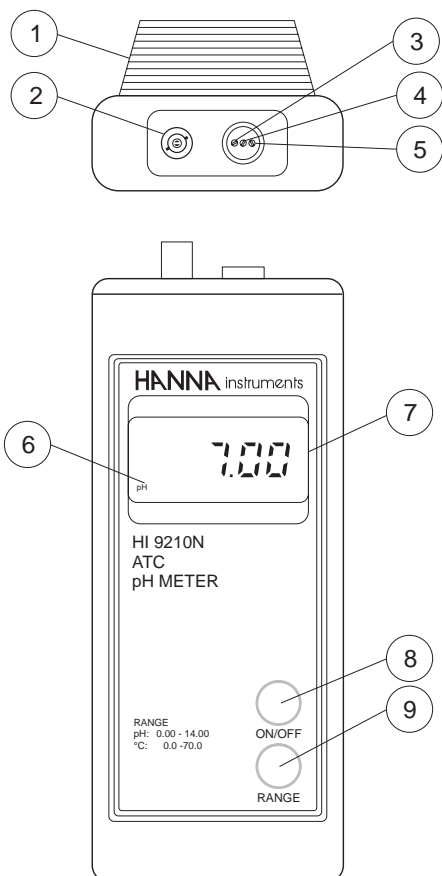
Calibration is manual to assure that the unit can be calibrated at any pH buffer value. The trimmers for calibration are placed behind a protective cover, that also keeps the meter watertight and prevents the calibration from being tampered with.

A low voltage indicator appears on the screen to alert the user that there is only a few hours of battery life left. Afterwards, the BEPS (Battery Error Prevention System) will stop any false readings by shutting the meter off.

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FUNCTIONAL DESCRIPTION



- 1) Battery cover
- 2) DIN connector for electrode
- 3) Offset calibration trimmer
- 4) Slope calibration trimmer
- 5) Temperature calibration trimmer
- 6) Mode indicator
- 7) Liquid Crystal Display
- 8) **ON/OFF** key, to turn the meter on or off
- 9) **RANGE** key, to visualize the temperature

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SPECIFICATIONS

| | |
|--------------------------|--|
| Range | 0.00 to 14.00 pH / 0.0 to 70.0°C |
| Resolution | 0.01 pH / 0.1°C |
| Accuracy (@20°C/68°F) | ±0.02 pH / ±0.5°C |
| pH Calibration | Manual, 2 point, through offset & slope trimmers Offset: ±1 pH / Slope: 85 to 105% |
| Temperature Compensation | Automatic, 0 to 70°C |
| Electrode | HI 1217D, with built-in temperature sensor and amplifier, DIN connector and 1 m (3.3') cable (included) |
| Battery Type | 4 x 1.5V AA |
| Battery Life | Approx. 2000 hours of continuous use |
| Environment | 0 to 50°C (32 to 122°F); RH max 100% |
| Dimensions | 196 x 80 x 60 mm (7.7x3.1x2.4") |
| Weight | 500 g (1.1 lb.) |

OPERATIONAL GUIDE

- The meter is supplied complete with batteries. Remove the back cover and install the batteries, while paying attention to their polarity.
- For better accuracy, make sure that the instrument is calibrated (see "Calibration" section for details).
- Connect the **HI 1217D** electrode to the DIN connector on the top of the instrument and press the ON/OFF key.
- To take a pH measurement, remove the electrode protective cap and simply submerge the tip (4cm/1½") of the electrode into the sample.
- If necessary, press the RANGE key until the display changes to the pH mode, and allow for the electrode to adjust and stabilize.
- Since the pH electrode also features a built-in temperature sensor, pH measurements are automatically adjusted for the temperature effect.
- To take temperature measurements, press the RANGE key to enter temperature mode, dip the supplied electrode (with built-in temperature sensor) in the sample and allow for the reading to stabilize.
- After use, switch the instrument off, rinse the electrode with clean water and store it with a few drops of storage (**HI 70300**) or pH 7 buffer solution in the protective cap.

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CALIBRATION

For best accuracy, it is recommended to calibrate the instrument frequently. In addition a pH calibration should be performed:

- Whenever the pH electrode or the batteries are replaced
- At least once a month
- After testing aggressive chemicals
- When extreme accuracy is required

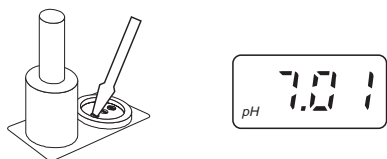
PREPARATION

Pour small quantities of pH 7.01 and pH 4.01 (or pH 10.01) solution into two clean beakers. For an accurate calibration, use two beakers for each buffer solution, the first one for rinsing the electrode and the second one for calibration.

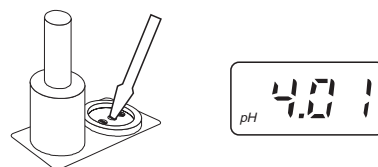
For accurate readings, use pH 7.01 & pH 4.01 buffers if you are going to measure acidic solutions, or pH 7.01 & pH 10.01 for alkaline samples.

PROCEDURE

- Remove the protective cap from the electrode, rinse it with some pH 7.01 solution, then dip it (at least 4 cm/1½") in pH 7.01 buffer. Stir briefly and wait for the reading to stabilize.
- To access the calibration trimmers, unscrew the protective cap on the top of the meter, near the electrode connector.
- Adjust the OFFSET trimmer until the LCD shows the buffer pH value at the current temperature (see "pH values at various temperatures" table). Press RANGE to read the buffer temperature.



- Rinse the electrode and dip it into pH 4.01 (or pH 10.01) buffer. Stir gently and wait for the display to stabilize.
- Adjust the SLOPE trimmer until the LCD displays the buffer pH value at the measured temperature.



- pH calibration is now complete. Replace the trimmer cover and tighten it to ensure a proper seal against water and humidity ingress.

Note: The meter also allows the user to calibrate the offset point of the temperature sensor. For this purpose, immerse the HI 1217D electrode in a solution together with a high precision reference thermometer. Then turn the temperature calibration trimmer (#5 at page 4) until the meter displays the temperature of the solution.

pH VALUES AT VARIOUS TEMPERATURES

Temperature has an effect on pH. The calibration buffer solutions are affected by temperature changes to a lesser degree than normal solutions. For pH calibration, please refer to the following chart.

| TEMP | | pH VALUES | | | | |
|------|-----|-----------|------|------|------|-------|
| °C | °F | 4.01 | 6.86 | 7.01 | 9.18 | 10.01 |
| 0 | 32 | 4.01 | 6.98 | 7.13 | 9.46 | 10.32 |
| 5 | 41 | 4.00 | 6.95 | 7.10 | 9.39 | 10.24 |
| 10 | 50 | 4.00 | 6.92 | 7.07 | 9.33 | 10.18 |
| 15 | 59 | 4.00 | 6.90 | 7.04 | 9.27 | 10.12 |
| 20 | 68 | 4.00 | 6.88 | 7.03 | 9.22 | 10.06 |
| 25 | 77 | 4.01 | 6.86 | 7.01 | 9.18 | 10.01 |
| 30 | 86 | 4.02 | 6.85 | 7.00 | 9.14 | 9.96 |
| 35 | 95 | 4.03 | 6.84 | 6.99 | 9.10 | 9.92 |
| 40 | 104 | 4.04 | 6.84 | 6.98 | 9.07 | 9.88 |
| 45 | 113 | 4.05 | 6.83 | 6.98 | 9.04 | 9.85 |
| 50 | 122 | 4.06 | 6.83 | 6.98 | 9.01 | 9.82 |
| 55 | 131 | 4.07 | 6.84 | 6.98 | 8.99 | 9.79 |
| 60 | 140 | 4.09 | 6.84 | 6.98 | 8.97 | 9.77 |
| 65 | 149 | 4.11 | 6.85 | 6.99 | 8.95 | 9.76 |
| 70 | 158 | 4.12 | 6.85 | 6.99 | 8.93 | 9.75 |

For instance, if the buffer temperature is 25°C, the display should show pH 4.01, 7.01 or 10.01 at pH 4, 7 or 10 buffers, respectively.

At 20°C, the display should show pH 4.00, 7.03 or 10.06.

The meter reading at 50°C will then be pH 4.06, 6.98 or 9.82.

ELECTRODE MAINTENANCE

PREPARATION

Remove the protective cap.

DO NOT BE ALARMED IF ANY 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 affecting proper functioning of the electrode. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer. If the bulb and/or junction is dry, soak the electrode in HI 70300 storage solution for at least one hour.

MEASUREMENT

Rinse the electrode tip with distilled water. Immerse the tip (at least 4 cm) in the sample and stir gently for a few 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 assure 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 OR DEIONIZED WATER.

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.

CLEANING PROCEDURE

General Soak in HI 7061 general cleaning solution for approx. 30 minutes.

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

- *Protein* Soak in HI 7073 protein cleaning solution for 15 minutes.
- *Inorganic* Soak in HI 7074 inorganic cleaning solution for 15 minutes.
- *Oil/grease* Rinse with HI 7077 oil & fat cleaning solution.

IMPORTANT: After performing any of the cleaning procedures, rinse the electrode thoroughly with distilled water and soak it in **HI 70300** storage solution for at least 1 hour before taking measurements.

TROUBLESHOOTING

Evaluate your electrode performance based on the following.

- **Noise** (Readings fluctuate up and down) could be due to **clogged/dirty junction**: Refer to the Cleaning Procedure above.
- **Dry membrane/junction**: Soak in **HI 70300** storage solution for at least one hour.
- **Drifting**: Soak the electrode tip in warm (approx. 50-60°C) **HI 7082** solution for one hour and rinse the tip with distilled water.
- **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 **HI 7061** solution for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.

BATTERY REPLACEMENT

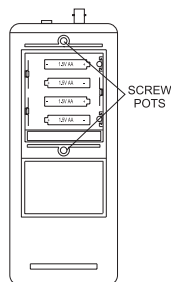
If the batteries become weak, the meter will display a "V" on the LCD to warn the user that only a few hours of working life are left.



HI 9210N is also supplied with BEPS (Battery Error Prevention System), that automatically shuts the meter off when the battery level is too low to ensure reliable readings.

Battery replacement must only take place in a non hazardous area and using the battery types specified in this instruction manual.

To replace the batteries, remove the rear cover of the instrument and replace all four 1.5V AA batteries with new ones, while paying attention to the correct polarity. Replace the cover and tighten the screws.



The meter is reset every time the batteries are removed. In case of any functional problems, the meter can be reset by removing and reinstalling the batteries.

ACCESSORIES

| | |
|------------------|---|
| HI 1217D | Amplified, gel filled pH electrode with built-in temperature sensor, DIN connector and 1 m (3.3') cable |
| HI 70004P | pH 4.01 buffer solution, 20 mL sachet, 25 pcs |
| HI 70007P | pH 7.01 buffer solution, 20 mL sachet, 25 pcs |
| HI 70010P | pH 10.01 buffer solution, 20 mL sachet, 25 pcs |
| HI 7004L | pH 4.01 buffer solution, 500 mL bottle |
| HI 7006L | pH 6.86 buffer solution, 500 mL bottle |
| HI 7007L | pH 7.01 buffer solution, 500 mL bottle |
| HI 7009L | pH 9.18 buffer solution, 500 mL bottle |
| HI 7010L | pH 10.01 buffer solution, 500 mL bottle |
| HI 8004L | pH 4.01 buffer solution, 500 mL FDA bottle |
| HI 8006L | pH 6.86 buffer solution, 500 mL FDA bottle |
| HI 8007L | pH 7.01 buffer solution, 500 mL FDA bottle |
| HI 8009L | pH 9.18 buffer solution, 500 mL FDA bottle |
| HI 8010L | pH 10.01 buffer solution, 500 mL FDA bottle |
| HI 70300L | Storage solution, 500 mL bottle |
| HI 70000P | Electrode rinse 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 |
| HI 80300L | Storage solution, 500 mL FDA bottle |
| HI 8061L | General cleaning solution, 500 mL FDA bottle |
| HI 8073L | Protein cleaning solution, 500 mL FDA bottle |
| HI 8077L | Oil & Fat cleaning solution, 500 mL FDA bottle |
| HI 721317 | Rugged carrying case |
| HI 76405 | Electrode holder |

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