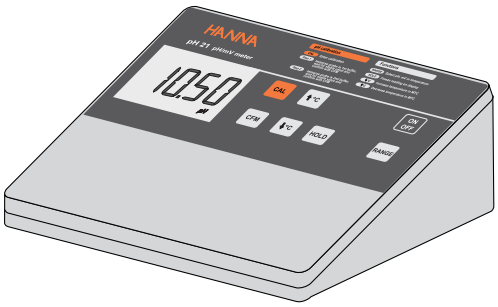
Instruction Manual

pH20 • pH21

Basic pH meters



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 the correct use of the instrument, as well as a precise idea of its versatility in a wide range of applications.
If you need additional technical information, do not hesitate to e-mail us at **tech@hannainst.com**
These instruments are in compliance with the CE directives.

WARRANTY

All Hanna Instruments **meters are warranted for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. **The electrodes and the probes are warranted for 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 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 1110B** pH electrode with BNC connector and 1 m cable
- 12 Vdc adapter
- instruction manual

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

pH 20 and **pH 21** are basic pH meters designed for simplicity of use in all applications where rapid daily controls are required.

These meters are also suitable for educational field, where students begin to approach pH measurements.

Both models measure pH in the 0 to 14 range, with 0.01 resolution.

In addition, **pH 21** can also measure ORP (mV) by using a proper ORP electrode (optional).

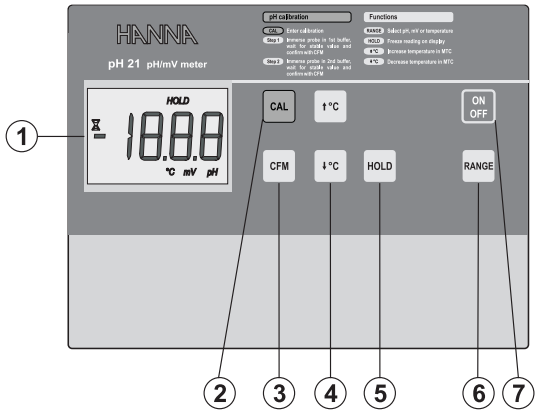
The pH calibration procedure is automatic and can be performed at 1 or 2 points.

Readings can be manually (MTC) or automatically (ATC) compensated for temperature variations.

The automatic temperature compensation is performed if using the optional **HI 7662** temperature probe, while for manual compensation the user can set the temperature value through the arrow keys.

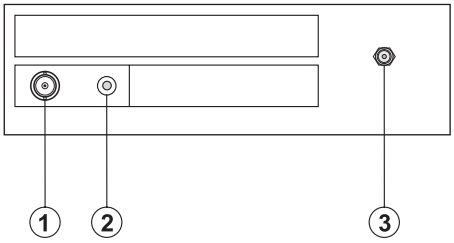
The meters are also provided with the Hold function, which allows to freeze reading on the LCD by simply pressing the HOLD button.

FUNCTIONAL DESCRIPTION



1. Liquid Crystal Display
2. **CAL** key, to enter and exit the calibration mode
3. **CFM** key, to confirm calibration values
4. **↑°C** and **↓°C** keys, to manually set temperature value for compensation
5. **HOLD** key, to freeze reading on display
6. **RANGE** key, to select measurement range
7. **ON/OFF** key, to turn the meter on and off

REAR PANEL

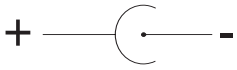


1. BNC connector for pH or ORP (**pH 21** only) electrode.
2. Temperature probe socket for use with the **HI 7662**.
3. Power supply input. Plug the 12 Vdc adapter into the DC socket, then into the mains.

Notes:

- Make sure the mains line is protected by a fuse.
- If the instrument needs to be unplugged, press the ON/OFF key before disconnecting it from the mains.

Note: These instruments use the following configuration.



It is recommended to use the Hanna **HI 710005** or **HI 710006** voltage adapters (supplied with the meter) which are provided with the proper polarity configuration.

The meters can also be powered with other adapters. In this case, remember to check the correct polarity of the adapter before connecting it to the meter.

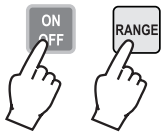
SPECIFICATIONS

Range	**pH**	0.00 to 14.00
	ORP	±1999 mV (**pH 21** only)
	°C	0.0 to 100.0
Resolution	**pH**	0.01
	ORP	1 mV (**pH 21** only)
	°C	0.1
Accuracy	**pH**	±0.02
(@20°C/68°F)	**ORP**	±2 mV (**pH 21** only)
	°C	±1
pH Calibration		Automatic, 1 or 2 point
Temperature Compensation		Automatic (with temperature probe) or manual (adjustable with arrow keys)
pH Electrode		**HI 1110B** combination pH electrode with BNC and 1 m cable (**included**)
Temperature probe		**HI 7662** (**optional**)
Power supply		12 Vdc adapter (**included**)
Environment		0 to 50°C (32 to 122°F) RH max 95% non-condensing
Dimensions		230 x 170 x 75 mm (9.1x6.7x 3")
Weight		500 g (1.1 lb.)

OPERATIONAL GUIDE

TAKING pH MEASUREMENTS

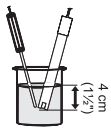
- Make sure that the instrument has been calibrated for pH before taking measurements (see "pH Calibration" section for details).
- Connect the supplied **HI 1110B** pH electrode to the BNC connector on the rear panel (see page 4).
- If automatic temperature compensation is required, connect the **HI 7662** temperature probe (optional) to the proper socket on the rear panel (see page 4).
- Connect the 12VDC power adapter to the instrument (see page 4) and then to the mains.
- Press the ON/OFF key to turn the meter on.
- Press the RANGE key to select the pH mode, if necessary.



- Remove the electrode protective cap, then immerse the pH electrode and the temperature probe in the sample to be tested.

Note: If the pH electrode is dry, immerse it in **HI 70300** storage solution for at least one hour to reactivate it.

Note: The pH electrode should be submerged approximately 4 cm (1½") into the solution and the temperature probe (if used) should be located as close as possible to the electrode.



Note: With refillable electrodes, to obtain a faster response unscrew the refill hole cap during measurements.

- Shake briefly and wait a few seconds for the reading to stabilize, i.e. when the hourglass symbol stops blinking. The LCD will show the pH value automatically compensated for temperature variations.

- After measurements, turn the meter off by pressing the ON/OFF key, disconnect the power adapter from the mains and the pH electrode from the instrument.
- Store the electrode with a few drops of **HI 70300** solution in the protective cap.

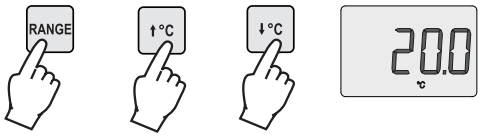
  NEVER USE DISTILLED OR DEIONIZED WATER FOR STORING PURPOSES.

Note: If measurements are taken in different samples successively, it is recommended to clean the electrode thoroughly to avoid cross-contamination. After cleaning, rinse the electrode with water and then with some of the solution to be tested.

MANUAL TEMPERATURE COMPENSATION

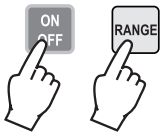
- When the temperature probe is not connected, the default temperature value is 25°C.
- To temperature compensate the pH reading, measure the temperature of the solution with a ***CheckTempC*** or another accurate thermometer. E.g. 20°C.

- Press the RANGE key to enter the °C mode and adjust the displayed value by using the arrow keys.



TAKING ORP MEASUREMENTS (for pH21 only)

- **The meter is factory calibrated for ORP (mV) range. Please contact the nearest Hanna Service Center for recalibration, if needed.**
- Connect an ORP electrode (optional, see "Accessories" section) to the BNC connector on the rear panel (see page 4).
- Connect the 12VDC power adapter to the instrument (see page 4) and then to the mains.
- Press the ON/OFF key to turn the meter on.
- Press the RANGE key to select the ORP (mV) mode.



- Remove the electrode protective cap, then immerse the ORP electrode in the sample to be tested.

Note: The electrode should be submerged approximately 4 cm (1½") into the solution.

Note: With refillable electrodes, to obtain a faster response unscrew the refill hole cap during measurements.

- Shake briefly and wait a few seconds for the reading to stabilize, i.e. when the hourglass symbol stops blinking. The LCD will show the ORP (mV) value.

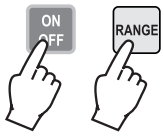
- After measurements, turn the meter off by pressing the ON/OFF key, disconnect the power adapter from the mains and the electrode from the instrument.

Note: To perform correct ORP measurements, the surface of the ORP electrode must be clean and smooth.

Note: When not in use, the tip of the electrode should be kept moist and safe from any mechanical stress which might cause damage to the glass/platinum junction.

TAKING TEMPERATURE MEASUREMENTS

- **The meter is factory calibrated for temperature range. Please contact the nearest Hanna Service Center for recalibration, if needed.**
- Connect the **HI 7662** temperature probe (optional) to the proper connector on the rear panel (see page 4).
- Connect the 12VDC power adapter to the instrument (see page 4) and then to the mains.
- Press the ON/OFF key to turn the meter on.
- Press the RANGE key to select the temperature (°C) mode.

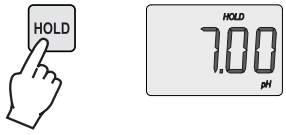


- Immerse the probe in the sample to be tested.
- Shake briefly and wait a few seconds for the reading to stabilize, i.e. when the hourglass symbol stops blinking. The LCD will show the temperature (°C) value.

- After measurements, turn the meter off by pressing the ON/OFF key, disconnect the power adapter from the mains and the probe from the instrument.

HOLD FUNCTION

- To freeze a reading on display, from measurement mode press and hold the HOLD key. The "HOLD" tag will light up.



- The meter returns to normal mode when the HOLD key is released.

Note: The RANGE key is not working while in HOLD mode.

pH CALIBRATION

For better accuracy the instruments should be calibrated frequently, and however:

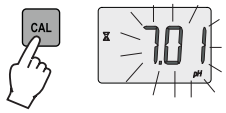
1. After electrode replacement.
2. After testing aggressive chemicals.
3. At least once a month.
4. When extreme accuracy is required.

- Turn the instrument on after connecting the pH electrode and the temperature probe.
- Immerse the temperature probe together with the electrode into pH 7.01 buffer solution or manually set the temperature (see the note here below).

Note: The pH electrode should be submerged approximately 4 cm (1½") into the solution and the temperature probe should be located as close as possible to the electrode.

Note: If the temperature probe is not used, measure the buffer value with a thermometer, enter the °C mode by pressing the RANGE key and adjust the displayed value by using the arrow keys.

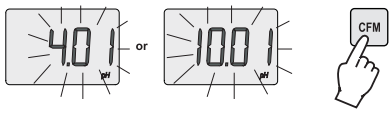
- Press the RANGE key to display pH readings.
- Press the CAL key to enter the calibration mode: the display flashes "pH 7.01" and the hourglass symbol lights up.



- Wait till the hourglass symbol on the LCD turns off and the "pH" tag stops blinking, then press CFM to confirm the first calibration point (offset). "pH 4.01" will flash on the LCD.

- If a single point calibration at pH 7.01 is desired, press the CAL key to exit, otherwise proceed with the second point.
- Rinse and immerse both pH electrode and temperature probe (if used) in pH 4.01 or pH 10.01 buffer solution. The meter automatically recognizes the buffer and displays the correct value.

- Wait till the hourglass symbol on the LCD turns off and the "pH" tag stops blinking, then press CFM to confirm the second calibration point (slope).



- The meter automatically returns to normal measurement mode.

Note: To abort a calibration procedure and save previous calibration data, press the CAL key while the "pH" tag is still blinking.

Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used.

Operation of these instruments in residential area could cause unacceptable 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 times.

During operation, ESD wrist straps should be worn to avoid possible damage to the electrode by electrostatic discharges.

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 60VDC.

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

ELECTRODE CONDITIONING & MAINTENANCE

PREPARATION

Remove the electrode 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 have formed 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 refill solution (electrolyte) is more than 2½ cm (1") below the fill hole, add the appropriate Electrolyte Solution.

MEASUREMENT

Rinse the electrode tip with distilled water, immerse it (4 cm / 1½") 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 the solution to be tested, before taking any measurements.

STORAGE

To minimize clogging and ensure a quick response time, the glass bulb and the junction should always be kept moist.

When not in use, store it with a few drops of **HI 70300** storage solution or **HI 7007** pH 7.01 buffer in the protective cap.

NEVER STORE THE ELECTRODE IN DISTILLED OR DEIONIZED WATER.

PERIODIC MAINTENANCE

Inspect electrode and cable. The cable used for the 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. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.

Connectors must be perfectly clean and dry.

Refill the electrode with fresh electrolyte (see the electrode's specifications to select the correct refilling solution). Allow the electrode to stand upright for 1 hour. Follow the Storage Procedure.

CLEANING PROCEDURE

General : Soak in **HI 7061** General Cleaning Solution for about 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 : Soak in **HI 7077** Oil & Fat Cleaning Solution for 1 minute.

IMPORTANT: After performing any of the cleaning procedures, rinse the electrode thoroughly with distilled water and soak it in **HI70300** Storage Solution for at least 1 hour before taking measurements.

TROUBLESHOOTING

Evaluate the electrode performance based on the following.

- **Noise** (Readings fluctuate up and down) could be due to:
  - **Clogged/Dirty Junction:** refer to the Cleaning Procedure.
  - **Loss of shielding** due to low electrolyte level: refill with proper solution.
- **Dry Membrane/Junction:** soak in **HI70300** Storage Solution for at least 1 hour.
- **Drifting:** soak the electrode tip in warm **HI7082** Solution for one hour and rinse the tip with distilled water (refill with fresh electrolyte if necessary).
- **Low Slope:** refer to the Cleaning Procedure.
- **No Slope:**
  - Check the electrode for cracks in glass stem or bulb (replace the electrode if cracks are found).
  - Make sure cable and connections are not damaged nor lying in a pool of water or solution.
- **Slow Response/Excessive Drift:** soak the tip in **HI7061** Solution for 30 min, rinse thoroughly in distilled water and then follow the Cleaning Procedure.
- **For ORP Electrodes:** polish the metal tip with a lightly abrasive paper while paying attention not to scratch the surface, then wash it thoroughly with water.

Note: For field applications, it is always recommended to keep a conditioned spare electrode handy. When anomalies can not be resolved with a simple maintenance, change the electrode and recalibrate the meter.

ACCESSORIES

pH CALIBRATION SOLUTIONS

HI 70004P	pH 4.01 buffer solution, 20 mL sachet, 25 pcs
HI 7004M	pH 4.01 buffer solution, 230 mL bottle
HI 7004L	pH 4.01 buffer solution, 500 mL bottle
HI 8004L	pH 4.01 buffer solution, 500 mL FDA bottle
HI 70007P	pH 7.01 buffer solution, 20 mL sachet, 25 pcs
HI 7007M	pH 7.01 buffer solution, 230 mL bottle
HI 7007L	pH 7.01 buffer solution, 500 mL bottle
HI 8007L	pH 7.01 buffer solution, 500 mL FDA bottle
HI 70010P	pH 10.01 buffer solution, 20 mL sachet, 25 pcs
HI 7010M	pH 10.01 buffer solution, 230 mL bottle
HI 7010L	pH 10.01 buffer solution, 500 mL bottle
HI 8010L	pH 10.01 buffer solution, 500 mL FDA bottle

STORAGE & CLEANING SOLUTIONS

HI 70300M	Storage solution, 230 mL bottle
HI 80300M	Storage solution, 230 mL FDA bottle
HI 70300L	Storage solution, 500 mL bottle
HI 80300L	Storage solution, 500 mL FDA bottle
HI 70000P	Electrode rinsing solution, 20 mL sachet, 25 pcs
HI 7061M	General cleaning solution, 230 mL bottle
HI 8061M	General cleaning solution, 230 mL FDA bottle
HI 7061L	General cleaning solution, 500 mL bottle
HI 8061L	General cleaning solution, 500 mL FDA bottle
HI 7073M	Protein cleaning solution, 230 mL bottle
HI 8073M	Protein cleaning solution, 230 mL FDA bottle
HI 7073L	Protein cleaning solution, 500 mL bottle
HI 8073L	Protein cleaning solution, 230 mL FDA bottle
HI 7074M	Inorganic cleaning solution, 230 mL bottle
HI 7074L	Inorganic cleaning solution, 500 mL bottle
HI 7077M	Oil & Fat cleaning solution, 230 mL bottle
HI 8077M	Oil & Fat cleaning solution, 230 mL FDA bottle
HI 7077L	Oil & Fat cleaning solution, 500 mL bottle
HI 8077L	Oil & Fat cleaning solution, 500 mL FDA bottle

REFILLING ELECTROLYTE SOLUTIONS

HI 7071	3.5M KCl + AgCl electrolyte, 4 x 30 mL, for single junction electrodes
HI 8071	3.5M KCl + AgCl electrolyte, 4 x 30 mL, for single junction electrodes (FDA approved bottle)
HI 7072	1M KNO_3 electrolyte, 4 x 30 mL

HI 8072 1M KNO_3 electrolyte, 4 x 30 mL (FDA approved bottle)
HI 7082 3.5M KCl electrolyte, 4 x 30 mL, for double junction electrodes
HI 8082 3.5M KCl electrolyte, 4 x 30 mL, for double junction electrodes (FDA approved bottle)

ORP SOLUTIONS

HI 7091M Reducing pretreatment solution, 230 mL bottle
HI 7091L Reducing pretreatment solution, 500 mL bottle
HI 7092M Oxidizing pretreatment solution, 230 mL bottle
HI 7092L Oxidizing pretreatment solution, 500 mL bottle
HI 7020M Test solution, 200-275 mV, 230 mL bottle
HI 7020L Test solution, 200-275 mV, 500 mL bottle
HI 7021M Test solution, 240 mV, 230 mL bottle
HI 7021L Test solution, 240 mV, 500 mL bottle
HI 7022M Test solution, 470 mV, 230 mL bottle
HI 7022L Test solution, 470 mV, 500 mL bottle

pH ELECTRODES

All electrode part numbers ending with B are supplied with BNC connector and 1 m (3.3') cable.

HI 1043B Glass body, double junction, refillable, combination. Use: strong acid/alkali.
HI 1048B Glass body, annular open junction, refillable, combination. Use: wine processing.
HI 1053B Glass body, triple ceramic junction, conic shape, refillable, combination. Use: emulsions.
HI 1083B Glass body, micro, Viscolene, non-refillable, combination. Use: biotechnology, micro titration.
HI 1110B Glass body, single junction, gel-filled, combination. Use: general purpose.
HI 1131B Glass body, single junction, refillable, combination. Use: general purpose.
HI 1230B Plastic body, double junction, gel-filled, combination. Use: general, field.
HI 1330B Glass body, semimicro, single junction, refillable, combination. Use: laboratory, vials.
HI 1331B Glass body, semimicro, single junction, refillable, combination. Use: flasks.
HI 1332B Plastic body, double junction, refillable, combination. Use: general purpose.
HI 1413B Glass body, single junction, flat tip, Viscolene, non-refillable, combination. Use: surface measurement.
HI 2031B Glass body, semimicro, conic tip, refillable, combination. Use: semisolid products.
FC 100B PVDF body, double junction, refillable, combination. Use: general purpose for food industry.
FC 200B PVDF body, open junction, conic shape, Viscolene, non-refillable, combination. Use: meat, cheese.
FC 210B Glass body, double junction, conic shape, Viscolene, non-refillable, combination. Use: milk, yogurt.
FC 220B Glass body, triple ceramic junction, refillable, combination. Use: food processing.

ORP ELECTRODES

All electrode part numbers ending with B are supplied with BNC connector and 1 m (3.3') cable.

HI 3131B Glass body, refillable, combination, platinum sensor. Use: titration.
HI 3230B Plastic body, gel-filled, combination, platinum sensor. Use: general purpose.
HI 4430B Plastic body, gel-filled, combination gold sensor. Use: general purpose.

For a complete list of available pH and ORP electrodes, consult the Hanna General Catalog or visit **www.hannainst.com**

OTHER ACCESSORIES

ChecktempC Pocket-size thermometer (range -50.0 to 150.0°C)
HI 710005 115 Vac/12 Vdc power adapter, US plug
HI 710006 230 Vac/12 Vdc power adapter, European plug
HI 76405 Electrode holder
HI 7662 Temperature probe with 1 m (3.3') cable
HI 8427 pH/ORP electrode simulator with 1 m (3.3') coaxial cable and BNC connector
HI 931001 pH/ORP electrode simulator with LCD, 1 m (3.3') coaxial cable and BNC connector

SALES AND TECHNICAL SERVICE CONTACTS

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

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

Egypt:
Tel. & Fax (02) 2758.683

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Tel. (07851) 9129-0 • Fax (07851) 9129-99

Greece:
Tel. (210) 823.5192 • Fax (210) 884.0210

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South Africa:
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Taiwan:
Tel. 886.2.2739.3014 • Fax 886.2.2739.2983

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