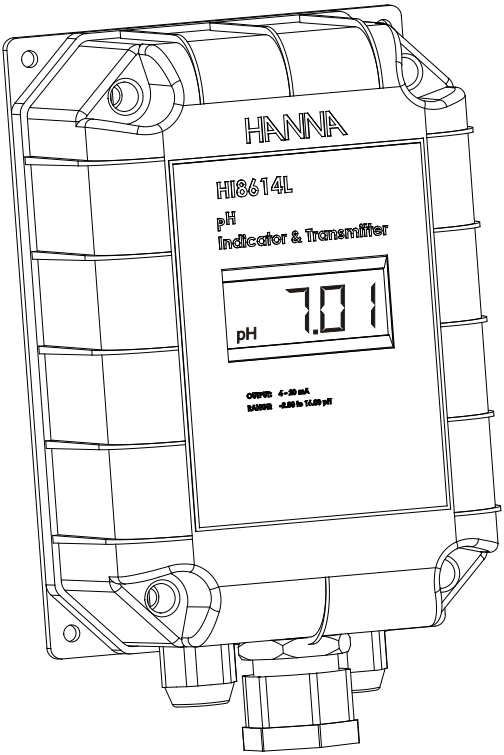
Instruction Manual

HI8614 • HI8614L
HI8615 • HI8615L

pH and ORP Transmitters



HANNA® instruments

www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna Instruments product.

Please read this instruction manual carefully before using these instruments.

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

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

WARRANTY

HI8614, **HI8614L**, **HI8615** and **HI8615L** 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 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 your local Hanna Instruments Office. 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 noticeable damage, please contact your local Hanna Instruments Office.

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

GENERAL DESCRIPTION

HI8614 / HI8614L (pH) and **HI8615 / HI8615L** (ORP) are 2-wire water-resistant transmitters specially designed for long distance measurement of pH or ORP in industrial applications.

HI8614 and **HI8615** are models without LCD, and the **HI8614L** and **HI8615L** are models with LCD.

The LCD allows easy verification and monitoring of measured values, and provides easier calibration and maintainance.

The pH or ORP signal is transmitted in a 2-wire current loop in the range of 4 to 20 mA.

HI8614 and **HI8614L**, can be connected to the Hanna Instruments process instruments **HI8510**, **HI8710**, **HI8711** or to any recorder, computer or data monitor that accepts 4 to 20 mA input.

HI8615 and **HI8615L**, can be connected to the Hanna Instruments process instruments **HI8512**, **HI8720** or to any recorder, computer or data monitor that accepts 4 to 20 mA input.

The transmitters use a universal BNC socket for quick and secure connection to any electrode with a BNC connector.

For **HI8614** family models the temperature compensation is performed by the transmitter's ATC circuitry if the temperature probe (**HI76608**, optional) is attached. If ATC is not required, it is possible to substitute the temperature probe with a fixed resistor.

The input is isolated from the current loop to eliminate problems related to ground loop, low insulation cables, multiple electrode connections, and a common mode voltage of up to 100 V ensures true differential readings.

The terminal board of the transmitter provides for connection of power supply, pH or ORP electrodes and temperature probe (for **HI8614** family models only).

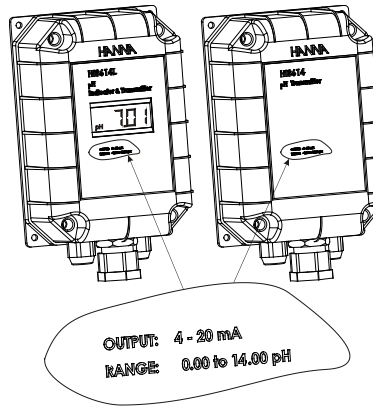
The unit is enclosed in a protective casing conforming to IP65 standards.

Ordering codes:

Code	Range	LCD
HI8614	0.00 to 14.00 pH	NO
HI8614L	0.00 to 14.00 pH	YES
HI8615	±1000 mV	NO
HI8615L	±1000 mV	YES

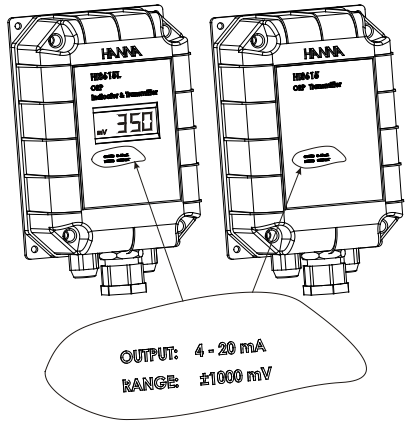
SPECIFICATIONS OF HI8614 & HI8614L

Range	4 to 20 mA/ 0.00 to 14.00 pH
Resolution	0.01 mA/ 0.01 pH
Accuracy (@25 °C/77 °F)	±0.02 mA/ ±0.02 pH
Calibration	Offset: ±2.2 mA/ ±2 pH Slope: ±0.5 mA/ 86 to 116 %
Temperature Compensation	Fixed or automatic from 0 to 100 °C (32 to 212 °F) with **HI76608** probe
Input Impedance	10^{12} Ohm
Output	4-20 mA (isolated)
Installation Category	II
Protection	IP65
Environment	0 to 50 °C (32 to 122 °F) RH max 95% non-condensing
Power Supply	HI8614: 18 to 30 Vdc HI8614L: 20 to 36 Vdc
Load	Max 500 Ohm
Dimensions	165 x 110 x 71 mm (6.5 x 4.3 x 2.8)
Weight	1 kg (2.2 lb.)



SPECIFICATIONS OF HI8615 & HI8615L

Range	4 to 20 mA/ ±1000 mV
Resolution	0.01 mA/ 1 mV
Accuracy (@25 °C/77 °F)	±0.02 mA/ ±5 mV
Calibration	Offset: ±0.8 mA/ ±100 mV Slope: ±0.8 mA/ 90 to 110 %
Input Impedance	10^{12} Ohm
Output	4-20 mA (isolated)
Installation Category	II
Protection	IP65
Environment	0 to 50 °C (32 to 122 °F) RH max 95% non-condensing
Power Supply	HI8615: 18 to 30 Vdc HI8615L: 20 to 36 Vdc
Load	Max 500 Ohm
Dimensions	165 x 110 x 71 mm (6.5 x 4.3 x 2.8)
Weight	1 kg (2.2 lb.)

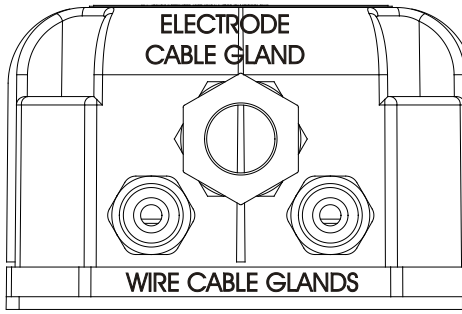


TERMINAL BOARD CONNECTIONS

Unscrew the 4 screws and remove the top cover.

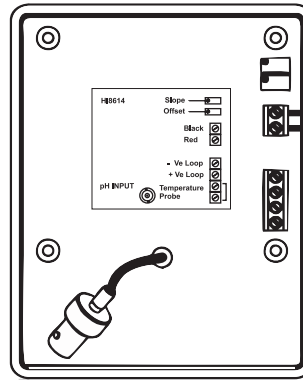
There are three cable glands on the transmitter cover. The large cable gland with the split in the rubber is for the electrode.

Connect the positive supply to the strip terminal "+VE LOOP" and the negative supply to the terminal "-VE LOOP" of the transmitter terminal block.



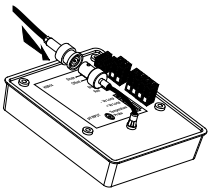
Black and Red contacts (**HI8614L** and **HI8615L** only).

- Red - LCD board V_+ (factory connected to the LCD)
- Black - LCD board V_- (factory connected to the LCD)

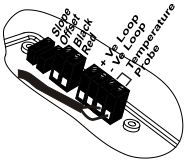


The wire between the transmitter and the recorder/indicator/controller should be a PVC insulated two wire with a wire diameter of at least 0.7 mm. This wire is fed through one of the smaller cable glands. The maximum distance between the power supply and the amplifier is 300 m (1000'). It is not necessary to use shielded cable. The transmitter is protected against inversion of supply voltage.

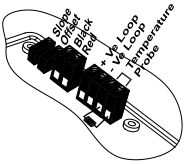
Electrode connection: connect the BNC of the cable to the BNC socket on the transmitter.



For HI8614 family only: for **automatic temperature compensation**, connect the 2 terminals of the temperature probe (**HI76608**, optional) to "TEMP. PROBE" terminals.



If automatic temperature compensation is not required, short the "TEMP. PROBE"terminals with a resistance according to the external temperature:

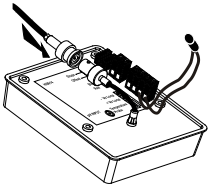


Temperature (°C)	Resistance (Ohms)
0	1634
10	1774
20	1922
30	2078
40	2242
50	2412
60	2590

A 2 kohm resistor is factory mounted for 25 °C temperature compensation.

pH CALIBRATION WITH AUTOMATIC TEMPERATURE COMPENSATION (HI8614 family)

INITIAL PREPARATION

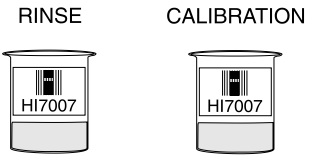


- Connect the pH electrode to the BNC socket.
- Connect the temperature probe to the transmitter.

Pour small quantities of pH7.01 and pH4.01 solution into two clean beakers.

For accurate calibration use two beakers for each buffer solution, the first one for rinsing the electrode, the second one for calibration. In this way contamination of the buffers is minimized.

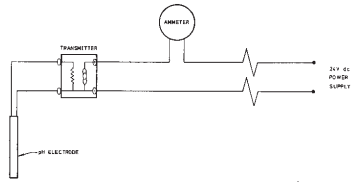
To get accurate readings, use pH7.01 and pH4.01 if you are going to measure acid samples or pH7.01 and pH10.01 for alkaline measurements.



Note: With **HI8614L** the instruments display can be used during calibration without the need to connect the ammeter and the reading is directly expressed in pH units.

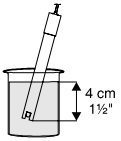
PROCEDURE

- Disconnect the +ve supply cable from "+VE LOOP" terminal and connect a 20 mA f.s. ammeter between the +ve cable and "+VE LOOP" terminal.



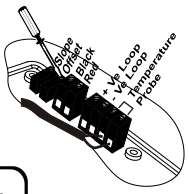
- Remove the protective cap from the electrode, rinse it with some pH7.01 solution or immerse it in the pH7 rinse solution, then immerse the pH electrode and temperature probe into pH7.01 calibration buffer solution; shake briefly and wait for the reading to stabilize.

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



- Adjust the offset trimmer until the ammeter reads 12 mA or the display shows "7.01" if the temperature of the buffer is at 25 °C.

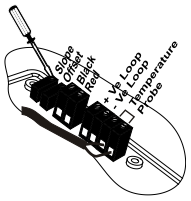
For other buffer temperatures, refer to page 12 for the appropriate mA / pH reading.



- Rinse the electrode with tap water or distilled water and a small amount of pH4.01 or 10.01 buffer solution or immerse it in the pH4 rinse solution (2nd calibration point). Dip the electrode and the temperature probe into pH4.01 (or 10.01) calibration buffer solution, shake briefly and wait for a few minutes for reading to stabilize.

- Adjust the slope trimmer until the ammeter reads 8.58 mA for **HI8614** and **HI8614L** or the display shows "4.01" at 25 °C. For other buffer temperatures, refer to page 12 for the appropriate mA / pH reading.

  If you are using pH10.01 buffer solution adjust the slope trimmer until the ammeter read 15.43 mA at 25 °C (77 °F) or the value indicated at page 12.



FOR H8614L ONLY

The Display Module is factory calibrated, so that the LCD display results are referred to the 4-20 mA loop current (e.g. LCD displays 0.00 pH when the loop current is 4.00 mA and displays 14.00 pH when the current is 20.00 mA).

Under normal application, adjustment on this module may not be necessary.

If routine check is required, the following procedures shall be performed.

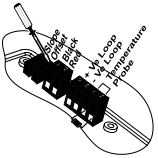
- Follow the procedure at page 10 to perform calibration on the transmitter module (using a ammeter).
- Simulate a 4.00 mA loop current for the transmitter (i.e. 0.00 pH as Electrode input) and check for display reading.
- Simulate a 20.00 mA loop current for the transmitter (i.e. 14.00 pH as Electrode input) and check for display reading.

Note: When **HI8614** or **HI8614L** instruments are used in conjunction with the new Hanna indicator **HI8510** or controllers **HI8710** and **HI8711**, the calibration can also be performed on the indicator/controller. In this case slight calibration adjustment can be made on the indicator/controller even if the whole system calibration is advised, always starting from the transmitter.

pH CALIBRATION WITH FIXED TEMPERATURE COMPENSATION (HI8614 family)

- Take the temperature of the buffer solutions using a Checktemp or a thermometer with a resolution of at least 1 °C.

- Connect the appropriate resistor to the "TEMP. PROBE" terminals (see page 8) depending on the temperature of the calibration solution.



- Follow the procedure as outlined in the calibration with automatic temperature compensation and use the thermometer reading to adjust the trimmer until the ammeter reads the value according to the following table.

HI8614, HI8614L

Temperature		pH4.01 Buffer		pH7.01 Buffer		pH10.01 Buffer	
°C	°F	pH	mA	pH	mA	pH	mA
0	32	4.01	9.34	7.13	12.12	10.32	14.95
5	41	4.00	9.33	7.10	12.09	10.24	14.88
10	50	4.00	9.33	7.07	12.06	10.18	14.83
15	59	4.00	9.33	7.04	12.04	10.12	14.77
20	68	4.00	9.33	7.03	12.03	10.06	14.72
25	77	4.01	9.34	7.01	12.01	10.01	14.68
30	86	4.02	9.35	7.00	12.00	9.96	14.63
35	95	4.03	9.36	6.99	11.99	9.92	14.60
40	104	4.04	9.37	6.98	11.98	9.88	14.56
45	113	4.05	9.38	6.98	11.98	9.85	14.53
50	122	4.06	9.39	6.98	11.98	9.82	14.51
55	131	4.07	9.40	6.98	11.98	9.79	14.48
60	140	4.09	9.41	6.98	11.98	9.77	14.46

ORP CALIBRATION (HI8615 family)

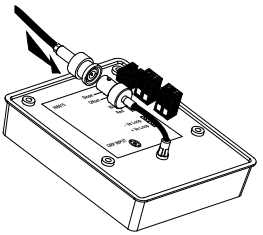
INITIAL PREPARATION

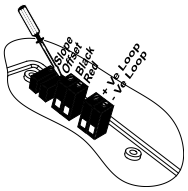
Disconnect the +ve supply cable from the "+VE LOOP" terminal and connect a 20 mA f.s. ammeter between the +ve cable and the "+VE LOOP" terminal. With **HI8615L** the instrument display can be used during calibration without the need to connect the ammeter. In this case the values are directly expressed in mV units.

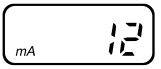
Pour a small quantity of **HI7021** ORP solution into a beaker.

PROCEDURE

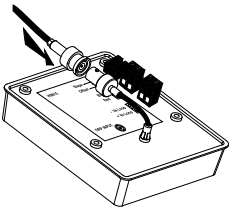
- Connect the shorting BNC connector to the ORP transmitter.
- Adjust the OFFSET ADJUSTMENT trimmer on the module for a display of 12 mA on the ammeter or 0 mV on the instrument display (**HI8615L** only). This sets the zero point for the transmitter.



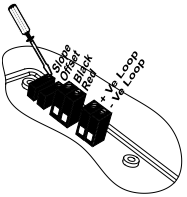




- Connect the ORP electrode to the transmitter and immerse the tip of the electrode into a beaker of **HI7021** ORP solution, and check that the ammeter reading lies between 13.8 and 14.1 mA for **HI8615** or the instrument reading is between 240 ±20 mV at 25°C (**HI8615L**).



- If the reading lies outside this range, adjust the slope adjustment trimmer on the transmitter for a reading just within this range.



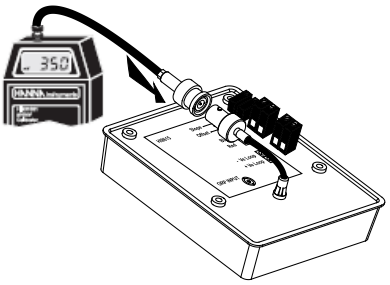
The unit is now calibrated.

A complete calibration of the transmitter module is advised periodically.

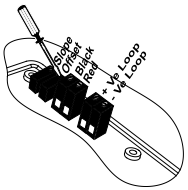
This calibration procedure requires the **HI8427** or the **HI931001** pH and ORP simulator to simulate the ORP electrode.

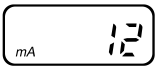
HI8427 or **HI931001** produce a known signal into the system so that the faults of the system can be isolated.

- Connect the ORP transmitter to the simulator.

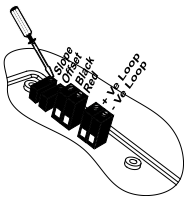


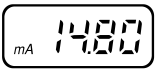
- Set the simulator to 0 mV and adjust the offset trimmer to read 12 mA on the ammeter or 0 mV on the **HI8615L** display.



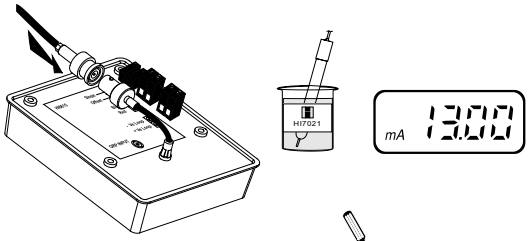


- Set the simulator to 350 mV and adjust the slope trimmer to read 14.8 mA for **HI8615** on the ammeter or 350 mV on the **HI8615L** display.

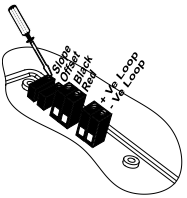




- Connect the ORP electrode to the module and immerse the tip of the electrode into the beaker of **HI7021** ORP solution and check that the ammeter reading lies between 13.8 and 14.1 mA for **HI8615**, or the instrument reading is between 240 ±20 mV at 25 °C (**HI8615L** only).



- Only if the reading lies outside this range, adjust the slope adjustment trimmer on the transmitter to reflect a reading within this range.



FOR H8615L ONLY

The **HI8615L** are factory calibrated, and the displayed values are referenced to the 4-20 mA loop current. Under normal application, adjustment on this module may not be necessary. If routine check is required, the following procedures shall be performed.

- Follow the above procedure for **HI8615** (see page 13).
- Simulate a 12.00 mA loop current for the transmitter (i.e. 0 mV at Electrode input) and check display reading.
- Simulate a 20.00 mA loop current for the transmitter (e.g. +1000 mV for **HI8615L** at Electrode input) and check display reading.

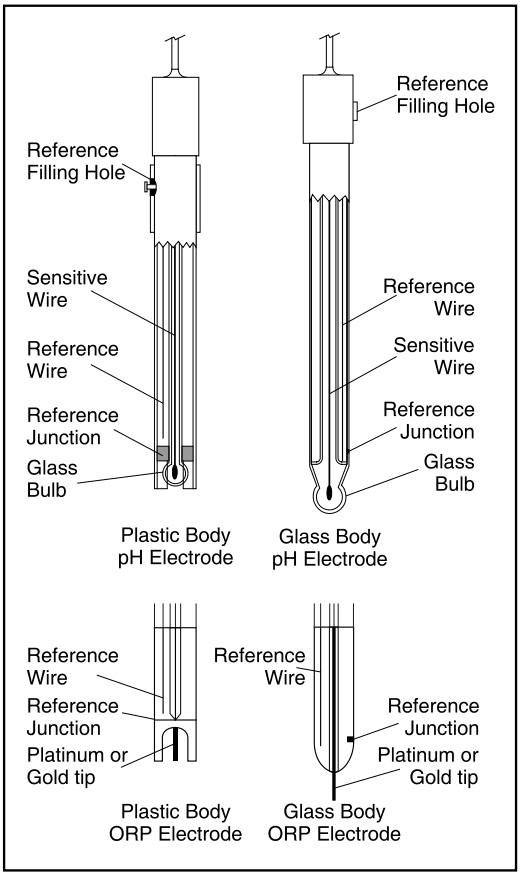
Please note:

HI8615 or **HI8615L**

-1000 mV	=	4 mA
0 mV	=	12 mA
1000 mV	=	20 mA
350 mV	=	14.8 mA
200 mV	=	13.6 mA
275 mV	=	14.2 mA
1 mV	=	12.008 mA

Note: When the **HI8615** and **HI8615L** are used in conjunction with the Hanna new **HI8512** indicator or **HI8720** controller, the calibration can also be performed on the indicator/controller. In this case slight adjustment can be made on the indicator/controller even if the whole system calibration is advised, always starting from the transmitter.

ELECTRODE CONDITIONING & MAINTENANCE



PREPARATION PROCEDURE

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 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 **HI70300** storage solution for at least one hour.

For refillable electrodes

If the fill solution (electrolyte) is more than 1 cm (½") below the fill hole, add **HI7082 3.5M KCl** electrolyte solution for double junction or **HI7071 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 (4 cm / 1½") in the sample and stir gently for approx. 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 assuring 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 **HI70300** storage solution or, in its absence, filling solution (**HI7071** for single junction or **HI7082** for double junction electrodes). 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 on the electrode body, replace the electrode. Rinse off any salt deposits with water.

For refillable electrodes

Refill it with fresh electrolyte (**HI7071** for single junction or **HI7082** for double junction electrodes). Allow the electrode to stand upright for 1 hour.

Follow the Storage Procedure above.

CLEANING PROCEDURE

- General — Soak in Hanna Instruments **HI7061** general cleaning solution for approximately 1 hour.

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

- Protein — Soak in Hanna Instruments **HI7073** protein cleaning solution for 15 minutes.
- Inorganic — Soak in Hanna Instruments **HI7074** inorganic cleaning solution for 15 minutes.
- Oil/grease — Rinse with Hanna Instruments **HI7077** Oil & 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.

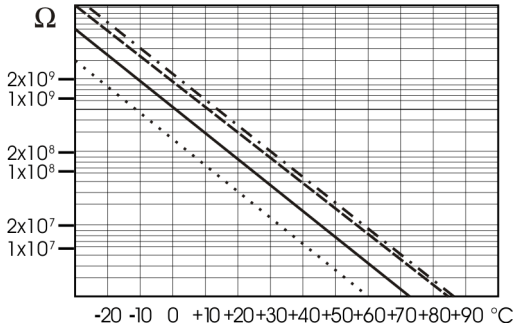
TROUBLESHOOTING

Evaluate your electrode performance based on the following.

- **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): **HI7071** for single junction or **HI7082** for double junction electrodes.
- **Dry Membrane/Junction:** soak in **HI70300** storage solution for at least one hour.
- **Drifting:** soak the electrode tip in warm Hanna Instruments solution **HI7082** for one hour and rinse the tip with distilled water. Refill with fresh **HI7071** for single junction electrodes and **HI7082** 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 Instruments **HI7061** cleaning solution for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.

TEMPERATURE CORRELATION FOR pH SENSITIVE GLASS

The resistance of glass electrodes partially depends on the temperature. The lower the temperature, the higher the resistance. It takes more 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 25 °C (77 °F).



Since the resistance of the pH electrode is in the range of 50-200 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 for 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

Alkaline Error

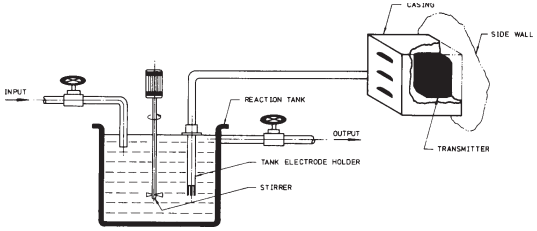
High concentrations of sodium ions interfere with readings in alkaline solutions. The pH at which the interference starts to be significant depends upon the composition of the glass. This interference is called alkaline error and causes the pH to be underestimated. Hanna Instruments' glass formulations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

Sodium Ion Correction for the Glass at 20-25 °C (68-77°F)		
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

INSTALLATION PROCEDURE AND EXAMPLES

The **HI8614** family and **HI8615** family transmitters may be wall mounted in any convenient location near the measurement point. To minimize thermal drift due to extreme temperature fluctuations during the measurement process, particularly if the measurement is conducted outdoors, it is best to protect the transmitter in an enclosed casing.

General Installation Procedure

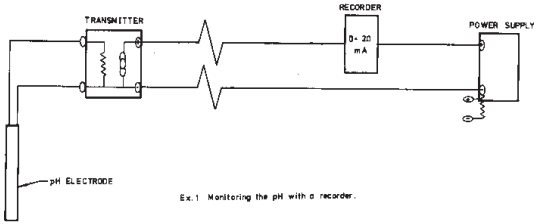


For most industrial application involving long term monitoring and control, it is also recommended to use tank electrode holders (**HI6050** or **HI6051**) to protect the pH electrode and the temperature probe from contamination by the test solution.

Note: **HI8614**, **HI8614L** will be used with the new instruments **HI8510**, **HI8710** and **HI8711**

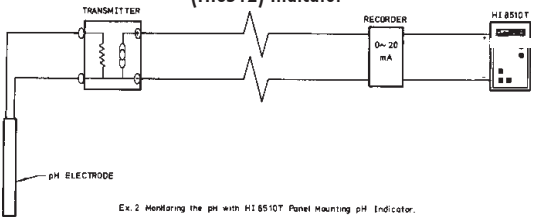
HI8615, **HI8615L** will be used with the new instruments **HI8512** and **HI8720**

Controlling the pH / ORP with a recorder



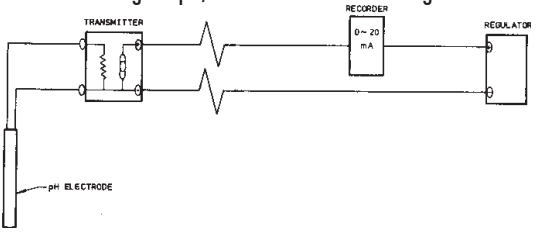
Ex.1 Monitoring the pH with a recorder.

Monitoring the pH/ORP with Panel Mounting pH (HI8510)/ORP (HI8512) Indicator

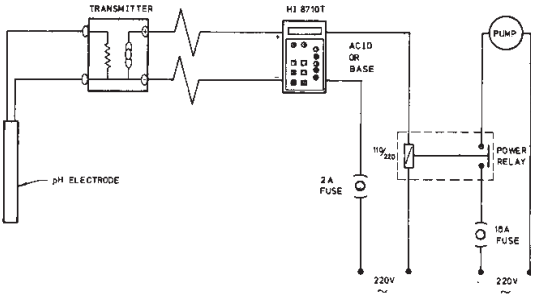


Ex. 2 Monitoring the pH with HI 8510T Panel Mounting pH Indicator.

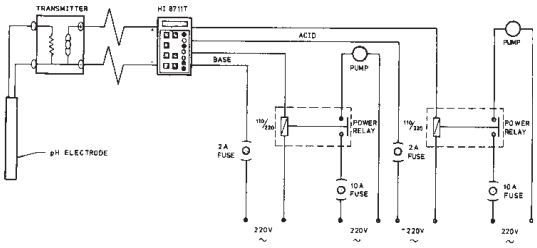
Controlling the pH/ORP with an Industrial Regulator



Monitoring and Controlling the pH/ORP with Panel Mounting Indicator/Regulator and Dosage Control of either Acid or Base



Monitoring and Controlling the pH with (HI8711) Panel Mounting Indicator/Regulator with Independent Dosage Control for Acid and Base



ACCESSORIES

pH CALIBRATION SOLUTIONS

HI7004M	pH4.01 buffer solution, 230 mL
HI7004L	pH4.01 buffer solution, 500 mL
HI7006M	pH6.86 buffer solution, 230 mL
HI7006L	pH6.86 buffer solution, 500 mL
HI7007M	pH7.01 buffer solution, 230 mL
HI7007L	pH7.01 buffer solution, 500 mL
HI7009M	pH9.18 buffer solution, 230 mL
HI7009L	pH9.18 buffer solution, 500 mL
HI7010M	pH10.01 buffer solution, 230mL
HI7010L	pH10.01 buffer solution, 500 mL

ORP SOLUTIONS

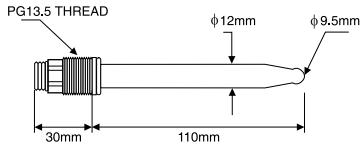
HI7021M	Test solution 240 mV, 230 mL bottle
HI7021L	Test solution 240 mV, 500 mL bottle
HI7091M	Reducing pretreatment solution, 230 mL
HI7091L	Reducing pretreatment solution, 500 mL
HI7092M	Oxidizing pretreatment solution, 230 mL
HI7092L	Oxidizing pretreatment solution, 500 mL

ELECTRODE MAINTENANCE SOLUTIONS

HI70300M	Storage solution, 230 mL
HI70300L	Storage solution, 500 mL
HI7061M	General cleaning solution, 230 mL
HI7061L	General cleaning solution, 500 mL
HI7073M	Protein cleaning solution, 230mL
HI7073L	Protein cleaning solution, 500mL
HI7074M	Inorganic cleaning solution, 230mL
HI7074L	Inorganic cleaning solution,500mL
HI7077M	Oil & Fat cleaning solution, 230 mL
HI7077L	Oil & Fat cleaning solution,500 mL
HI7071	3.5M KCl + AgCl electrolyte solution, 4 x 50mL bottle, for single junction electrodes
HI7072	1M KNO_3 electrolyte solution, 4 x 50 mL bottle
HI7082	3.5M KCl electrolyte solution, 4 x 50 mL bottle, for double junction electrodes

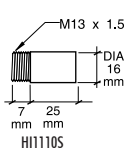
pH ELECTRODES

HI1090T Screwcap PG13.5 connector, double junction, glass body

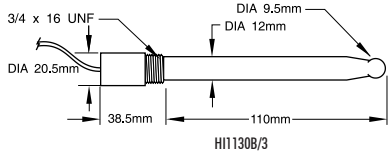


HI1110S Screw connector, single junction, glass body

HI1130B/3 BNC connector, 3 m (9.9') cable, single junction, glass body

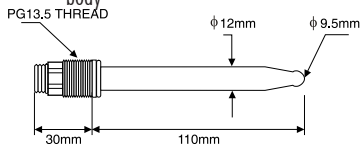


HI1110S



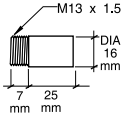
HI1130B/3

HI1110T Screwcap PG13.5 connector, double junction, glass body

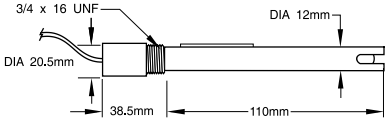


HI1114S Screw connector, double junction plastic body

HI1134B/3 BNC connector, 3 m (9.9') cable, double junction plastic body



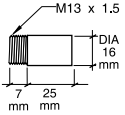
HI1114S



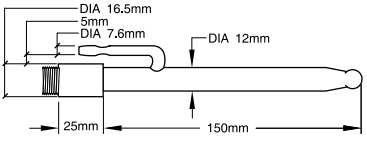
HI1134B/3

HI1115S Screw connector, single junction, glass body

HI 1135B/3 BNC connector, 3 m (9.9') cable, single junction, glass body

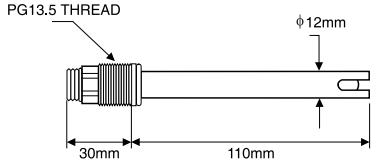


HI1115S

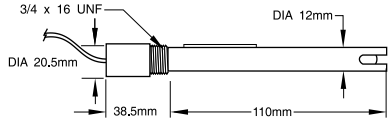


HI1135B/3

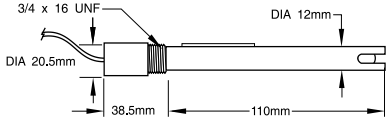
HI1210T Screwcap PG13.5 connector, double junction, plastic body



HI1910B BNC connector, 1 m (3.3') cable, double junction, plastic body, built-in amplifier

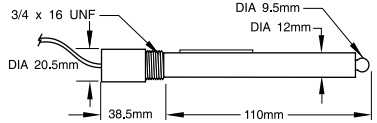


HI1911B BNC connector, 1 m (3.3') cable, double junction, plastic body, built-in amplifier

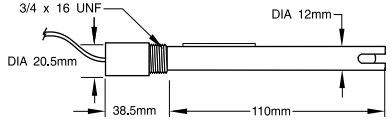


HI1912B BNC connector, 1 m (3.3') cable, double junction, plastic body, built-in amplifier

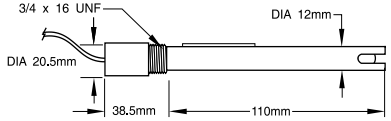
HI1912B/5 BNC connector, 5 m (16.5') cable, double junction, plastic body, built-in amplifier



HI2114B/5 BNC connector, 5 m (16.5') cable, double junction, plastic body

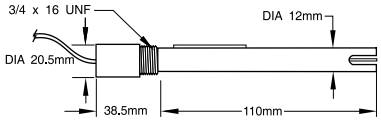


HI2910B/5 BNC connector, 5 m (16.5') cable, double junction, plastic body, built-in amplifier



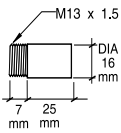
ORP ELECTRODES

HI2930B/5 BNC connector, 5 m (16.5') cable, Pt, plastic body, built-in amplifier

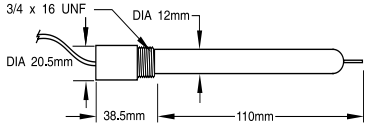


HI3110S Screw-type connector, Pt, glass body

HI3130B/3 BNC connector, 3 m (9.9') cable, Pt, glass body

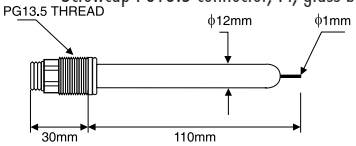


HI3110S



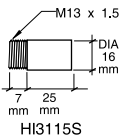
HI3130B/3

HI3110T Screwcap PG13.5 connector, Pt, glass body

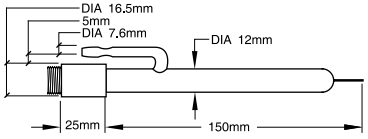


HI3115S Screw-type connector, side-arm, Pt, glass body

HI3135B/3 BNC connector, 3 m (9.9') cable, side-arm, Pt, glass body

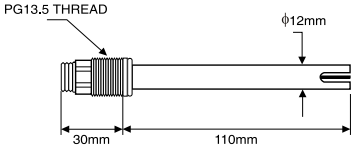


HI3115S



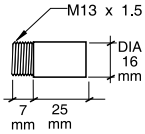
HI3135B/3

HI3210T Screwcap PG13.5 connector, Pt, plastic body

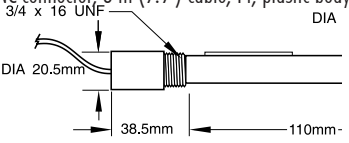


HI3410S Screw connector, Pt, plastic body

HI3430B/3 BNC connector, 3 m (9.9') cable, Pt, plastic body

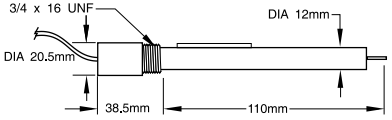


HI3410S



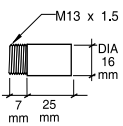
HI3430B/3

HI3932B/5 BNC connector, 5 m (16.5') cable, Pt, plastic body, built-in amplifier

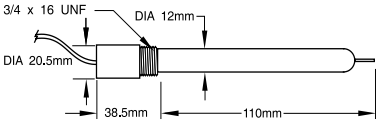


HI4110S Screw-type connector, Au, glass body

HI4130B/3 BNC connector, 3 m (9.9') cable, Au, glass body

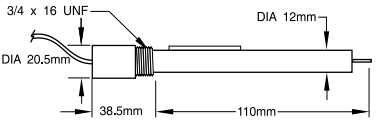


HI4110S

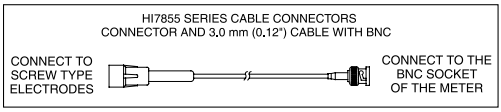


HI4130B/3

HI4932B/5 BNC connector, 5 m (16.5') cable, Au, plastic body, built-in amplifier



EXTENSION CABLES FOR SCREW-TYPE ELECTRODES ONLY (SCREW TO BNC CONNECTOR)



HI7855/1	Extension cable 1 m (3.3') long
HI7855/3	Extension cable 3 m (9.9') long
HI7855/5	Extension cable 5 m (16.5') long
HI7855/10	Extension cable 10 m (33') long
HI7855/15	Extension cable 15 m (49.5') long

OTHER ACCESSORIES

BL PUMPS	Dosing pumps with flow rate from 1.5 to 20 lph
HI98501	Pocket-size, thermometer with penetration probe and 0.1 °C resolution (range -50.0 to 150.0 °C)
HI6050 & HI6051	Submersible electrode holders
HI6054 & HI6057	Electrode holders for in-line applications
HI7871 & HI7873	Level controllers
HI8427	pH / ORP electrode simulator
HI931001	pH / ORP electrode simulator with LCD

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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 areas could cause unacceptable interferences to radio and TV equipment, requiring the operator to follow all necessary steps to correct interferences.

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

To avoid electrical shock, do not use these instruments 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.

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

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