Instruction Manual

HI 98143
pH & EC Transmitter with Isolated Output

HI 98143-01	**0 to 14 pH = 0 to 1 Vdc** **0 to 10 mS = 0 to 1 Vdc**
HI 98143-04	**0 to 14 pH = 0 to 4 Vdc** **0 to 10 mS = 0 to 4 Vdc**
HI 98143-20	**0 to 14 pH = 4 to 20 mA** **0 to 10 mS = 4 to 20 mA**
HI 98143-22	**0 to 14 pH = 4 to 20 mA** **0 to 10 mS = 4 to 20 mA**

HANNA® instruments
www.hannainst.com

WARRANTY

These instruments are warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. **Electrodes and 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 shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

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

Dear Customer,

Thank you for choosing a Hanna product.

This manual will provide you with the necessary information for the correct operation of the meter. Please read it carefully before using the meter.

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.

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully. If any damage has occurred during shipment, immediately notify your Dealer or the nearest Hanna Customer Service Center.

Each instrument is supplied complete with instructions.

Note: Conserve all packing material until the instrument has been observed to function correctly. Any defective item must be returned in its original packing.

GENERAL DESCRIPTION

HI 98143 is a panel mounted pH and EC transmitter specially designed to accept signals directly from a pH electrode and conductivity probe at the same time.

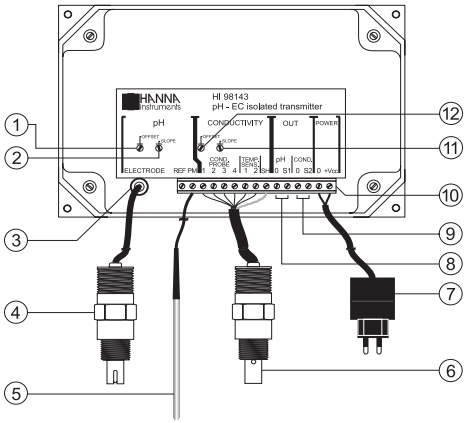
Direct connections of the probes to the transmitter assures a positive electrical connection with no signal loss.

Four models are available, transmitting at 0-1 V, 0-4 V or 4-20 mA signal. The output signals are prooprtional to the input signals, but independent of changes in load or cable capacitance.

Conductivity readings are compensated for temperature changes. These transmitters can be connected to any pH or conductivity controller, recorder, computer or any data monitoring device that accepts 0 to 1 V, 0 to 4 V or 4 to 20 mA input.

The **HI 98143-22** model has been specifically designed to be used with the **HI 8000** fertigation controllers.

FUNCTIONAL DESCRIPTION



1. pH offset calibration trimmer
2. pH slope calibration trimmer
3. BNC connector for pH electrode
4. pH electrode (not included)
5. Potential matching pin (not included)
6. Conductivity probe (not included)
7. 12-24 Vdc power adapter (not included)
8. pH output terminals
9. EC output terminals
10. Power supply terminals
11. EC slope calibration trimmer
12. EC offset calibration trimmer

ACCESSORIES

HI 1001	"flow-thru", double junction pH electrode with BNC connector and 3 m (10')
HI 1283	Stainless steel grounding probe with 2 m (6.6') cable
HI 3001	"flow-thru", 4 platinum ring EC probe with built-in temperature sensor & 3 m (10') cable
HI 7004L	pH 4.01 buffer solution, 500 mL bottle
HI 7007L	pH 7.01 buffer solution, 500 mL bottle
HI 7039L	5.00 mS/cm calibration solution, 500 mL bottle
HI 70300L	Electrode storage solution, 500 mL bottle
HI 7061L	Electrode cleaning solution, 500 mL bottle
HI 710005	115 Vac to 12 Vdc power adapter
HI 710006	230 Vac to 12 Vdc power adapter

SPECIFICATIONS

Range	
pH	0 to 14 pH
EC	0 to 10 mS/cm
Accuracy(@ 25°C/77°F)	
pH	±0.5% f.s.
EC	±2% f.s.
Typical EMC Deviation	
pH	±2% f.s.
EC	±2% f.s
Isolated Output (pH and EC)	
HI 98143-01	0-1 V
HI 98143-04	0-4 V
HI 98143-20	4-20 mA (passive)
HI 98143-22	4-20 mA (active)
Calibration	Manual, 2 point, through trimmers
pH	offset and slope trimmers
EC	0 and 5 mS/cm trimmers
Temperature Compensation (EC only)	Automatic from 0 to 60°C with ß=2%/°C
pH Electrode	**HI 1001** pH electrode (suggested) and **HI 1283** matching pin (not included)
EC Probe	**HI 3001**(not included) with cell constant 2.1
Casing	IP54
Power Supply	12-24 Vdc
Environment	0 to 50°C (32 to 122°F); RH max 95%
Dimensions	160 x 105 x 31mm (6.3 x 4.1 x 1.2")
Weight	280 g (9.9 oz.)

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used. Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment. The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb all the time. The metal band at the end of the EC probe is sensitive to electrostatic discharges. Avoid touching this metal band all the time. 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 this instrument when voltages at the measurement surface exceed 24 Vac or 60 Vdc. To avoid damages or burns, do not perform any measurement in microwave ovens.

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CONNECTIONS

pH ELECTRODE CONNECTION

- Connect the pH electrode to the BNC connector (#3) and the Matching pin to the PM terminal.

EC PROBE CONNECTION

- Probe wires are colour coded for an easy installation:

Terminal	Probe Wire Color
EC probe #1	Green
EC probe #2	White
EC probe #3	Red
EC probe #4	Blue
Temperature sensor #1	Brown
Temperature sensor #2	Grey
Shield	Yellow-green

POWER CONNECTION

- Connect a 2-wire cable to the 12-24 Vdc power source, while paying careful attention to its polarity.

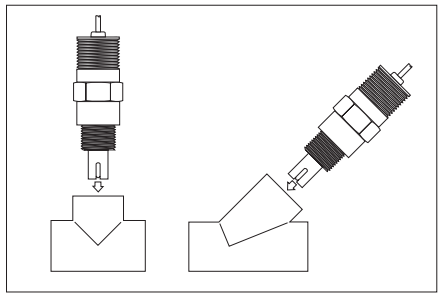
OUTPUT CONNECTION

- Connect a 2-wire cable from the pH output terminals (#8) to the pH receiver, and another 2-wire cable from the EC output terminals to the EC receiver, while paying attention to the polarity. Outputs vary proportionally to the measured pH and EC values in the range of 0-1 V (for **HI 98143-01**), 0-4 V (for **HI 98143-04**) or 4-20 mA (for **HI 98143-20** and **HI 98143-22**).

OPERATIONAL GUIDE

- HI 98143 may be wall-mounted at any convenient location close to the measurement site. To minimize thermal drifts due to extreme temperature fluctuations, it is recommended to protect transmitter inside a casing.
- Connect probes, power supply and receiving devices to the **HI 98143** as explained in the previous section.
- Remove the protective cap from the pH electrode and immerse it at least 4 cm into the sample.
- If the matching pin is used, dip it together with the pH electrode; if it is not used, connect the matching pin terminal to the reference with a jumper wire.

- Immerse the EC probe in the sample.
- For continuous flow-thru measurements, the probes can be easily installed in any standard ½" pipe tee. Use Teflon® tape between the probe and the pipe to ensure a leak free joint. Take care not to overtighten it, as excessive pressures can cause probe damage.



Note: To prevent any damage, disconnect the pH electrode before turning the meter off.

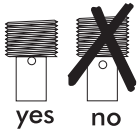
PROBE MAINTENANCE

pH ELECTRODE MAINTENANCE

- Do not be alarmed if white crystals appear around the electrode protective cap. This is normal with pH electrodes and they dissolve when rinsed with water.
- When not in use, rinse the electrode with tap water and store it with a few drops of storage (**HI 70300**) or pH 7 (**HI 7007**) solution in the protective cap.
  NEVER USE DISTILLED OR DEIONIZED WATER FOR STORAGE PURPOSES.
- If the electrode has been left dry, soak the tip in a storage (**HI 70300**) or pH 7 (**HI 7007**) solution for at least one hour to reactivate it.
- To minimize clogging and provide longer life for the pH electrode, it is recommended to clean it monthly. Immerse the tip of the electrode in **HI 7061** for one hour and then rinse it with tap water.

EC PROBE MAINTENANCE

- When calibration can no longer be achieved, remove conductivity probe from the system for maintenance.
- Rinse the probe with tap water. If a more thorough cleaning is desired, remove the plastic protective sleeve and clean the platinum sensors with a non-abrasive cloth soaked in **HI 7061** cleaning solution. Reinsert the sleeve, while paying attention that the sleeve hole touches the threaded edge.



CALIBRATION

For better accuracy, frequent calibration of the instrument is recommended. Calibration should also be performed whenever the pH electrode is replaced, after testing aggressive chemicals or at least once a month.

pH CALIBRATION

Pour small quantities of pH 7.0 (**HI 7007**) and pH 4.0 (**HI 7004**) or pH 10.0 (**HI 7010**) solutions into two clean beakers. Use pH 4.0 solution as second calibration buffer if you are measuring acidic samples, while pH 10.0 solution is recommended for alkaline solutions.

- Connect a multimeter to the pH output terminals and set it to voltage (**HI 98143-01** and **HI 98143-04**) or current (**HI 98143-20** and **HI 98143-22**) readings.
- Turn the transmitter on. Rinse and immerse pH electrode and matching pin (if used) in pH 7.0 buffer. Stir gently and wait for the reading to stabilize.
- Adjust the pH offset calibration trimmer with a small screwdriver until the multimeter displays:
  500 mV for **HI 98143-01**
  2.00 V for **HI 98143-04**
  12.00 mA for **HI 98143-20** and **HI 98143-22**.

- Rinse and immerse pH electrode and matching pin (if used) in pH 4.0 (or pH 10.0) buffer and stir gently.
- Wait a couple of minutes and then adjust the pH slope trimmer until the multimeter shows the value of the second buffer:

model	pH 4 buffer	pH 10 buffer
HI 98143-01	286 mV	714 mV
HI 98143-04	1.14 V	2.86 V
HI 98143-20	8.57 mA	15.43 mA
HI 98143-22	8.57 mA	15.43 mA

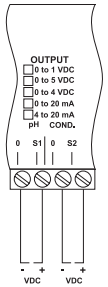
The pH calibration is now complete.

EC CALIBRATION

- Connect a multimeter to the EC output terminals and set it to voltage (**HI 98143-01** and **HI 98143-04**) or current (**HI 98143-20** and **HI 98143-22**) readings.
- Turn the transmitter on.
- Leave the **HI 3001** EC probe in air (dry probe), and adjust the EC offset calibration trimmer with the calibration screwdriver until the multimeter displays:
  0 mV for **HI 98143-01** and **HI 98143-04**
  4.00 mA for **HI 98143-20** and **HI 98143-22**.
- Pour a small quantity of 5.00 mS/cm (**HI 7039**) calibration solution in a plastic beaker and immerse completely the tip of the EC probe into the solution.
- Tap the probe repeatedly on the bottom of the beaker and stir it to ensure that no air bubbles are trapped inside the sleeve. In the case of in-line applications, to better simulate the installation ambient, the probe tip should be close to the beaker bottom edge.
- Allow the reading to stabilize and adjust the EC slope calibration trimmer to read on the multimeter:
  500 mV for **HI 98143-01**
  2.00 V for **HI 98143-04**
  12.00 mA for **HI 98143-20** and **HI 98143-22**.

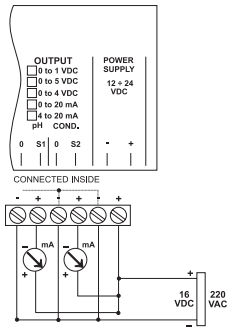
The EC calibration is now complete.

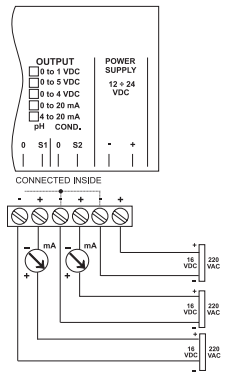
OUTPUT

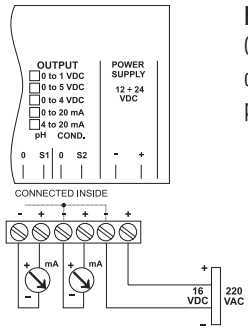


HI 98143-01 and HI 98143-04:
The input is isolated from output and power supply. The outputs aren't isolated from power supply.

HI 98143-20:
The output must be feed by an external power supply, which can be the same used for the meter. Carefully follow the first connection diagram.
If an additional power supply is used to feed the inputs, follow the second connection schema. Note that the negative sockets are connected with the negative power supply.







HI 98143-22:
Carefully follow this connection diagram for active current output calibration.