HI7640-18 Series

Galvanic Dissolved Oxygen Industrial Smart Probe

dedicated to **HI510** Process Controller

INSTRUCTION MANUAL

HANNA instruments

Dear Customer,

Thank you for choosing a Hanna Instruments product.
Please read this instruction manual carefully before using this instrument.
This manual will provide you with the necessary information for correct use of this instrument, as well as a precise idea of its versatility.
If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our contact list at www.hannainst.com.

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1. PRELIMINARY EXAMINATION

Remove the probe from the packing and examine it carefully.
Each galvanic dissolved oxygen probe is supplied with:

- HI7042S Refilling electrolyte solution, 30 mL
- HI76409A/P Replacement membrane (5 pcs.)
- Refilling pipette
- Replacement screw and o-ring for electrolyte refilling
- Protective cap
- Probe quality certificate and Instruction manual

Note: *Save all packing material until you are sure that the probe works correctly. Any damaged or defective item must be returned in its original packing material with the supplied accessories.*

2. SAFETY MEASURES

General Safety & Installation Recommendations

- Electrical connection, installation, operation, and maintenance must be carried out by specialized personnel only.
  The specialized personnel must read, understand, and adhere to the instructions in this manual.
- Before connecting the probe to the process controller, disconnect the controller from the power line.
- User serviceable connections are all accessible inside controller's enclosure.
- Before powering the controller, verify the probe wiring has been done following the detailed instructions in this manual.

3. GENERAL DESCRIPTION

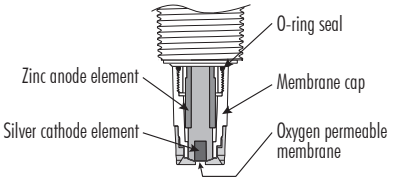
The HI7640-18 is a galvanic-style oxygen probe series designed for use with the Hanna Instruments HI510 Universal Process Controller.

The probe is suited for continuous measurement of oxygen dissolved in water.

An integral temperature sensor measures water temperature and adjusts the probe signal over the specified temperature range. The result is reliable dissolved oxygen (DO) concentration or percent saturated measurements.

Suitable for control applications in municipal and industrial wastewater treatment, the probe can be installed directly in-line, immersed in a tank, or in a flow cell installation.

The galvanic probe functions in the same manner as a battery. The sensing elements consist of silver cathode and zinc anode, with a pretensioned HDPE membrane isolating the cell from the liquid being measured.



The refillable electrolyte reservoir holds ample electrolyte to support the reaction. Oxygen diffuses through the membrane and is reduced on the surface of the cathode. This reaction generates a signal proportional to the oxygen concentration.

Note on manual: Refer to the HI510 controller manual for Probe Setup options regarding measurement, calibration, and control settings.

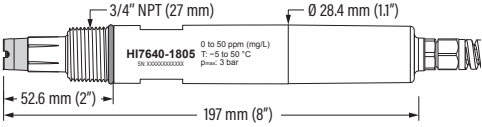
4. MAIN FEATURES

- Galvanic probe with digital processing
- Simple membrane-cap replacement using pretensioned HDPE membranes
- Large electrolyte reservoir provides longer service life
- Rugged, chemically-resistant PVDF (Kynar®) body
- ¾" NPT external thread for mounting
- 3 bar maximum pressure
- Built-in temperature sensor for measurement and DO compensation
- Digital probe stores model, firmware, serial number, and calibration information

5. SPECIFICATIONS

Range	0.0 to 600.0 % saturation 0.00 to 50.00 mg/L (ppm) concentration
Accuracy	±2 % of reading ±1 digit
Temperature	–5.0 to 50.0 °C (23.0 to 122.0 °F)
Temperature accuracy	± 0.5 °C / 1.0 °F
Temperature compensation	–5.0 to 50.0 °C (23.0 to 122.0 °F)
Body	PVDF
Sensor type	Galvanic cell • Cathode: Silver (Ag) • Anode: Zinc (Zn)
Water movement	0.01 to 0.03 m/second
Maximum pressure	3 bar
Threaded connection	¾" NPT external thread for insertion mounting
Wetted parts	Sensor body Membrane cap Membrane material (HDPE) O-ring
Cable length	5 m (16'5")

Dimensions

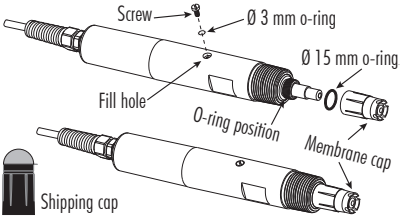


Probe Configuration

HI7640 – 1 8 z z	
1	Galvanic sensor
8	**Smart probe**, with RS485 connection
zz	00, 05, 10, 15, 25, 50 attached cable length (meters) The HI7640-1800 is supplied without cable. See Accessories section for extension cable ordering codes.

6. PREPARING FOR USE

Galvanic dissolved oxygen probes from Hanna Instruments are shipped dry. Remove the red and black shipping cap before use.
The membrane and the probe need to be filled with HI7042S Galvanic dissolved oxygen electrolyte solution prior first use and after membrane replacement.
Electrolyte must be replaced periodically, approximately once every 6 to 8 months.
The membrane cap should be replaced at the same time that the probe is refilled with electrolyte.



1. Unscrew and remove fill hole screw and o-ring located on side of probe body (see figure). Set aside.
2. Open the membrane package and take one Ø 15 mm sealing o-ring and one membrane cap.
3. Slide o-ring over anode and up onto cap threads, flushed against body. See figure for correct o-ring position.
4. Rinse the new membrane cap with some electrolyte and discard.
5. Fill the membrane cap with electrolyte.
6. Tap the cap to release any trapped air bubbles. Allow them to rise to the surface.
7. Refill cap to the top.
8. Holding the sensor at a slight angle with the fill hole aligned upright, slowly insert the sensing tip into the membrane cap so excess electrolyte and any remaining trapped air escapes through the fill hole.
9. Screw the membrane cap onto sensor body.
10. Use supplied pipette to fill the probe reservoir with electrolyte solution. The sensor holds approximately 8 mL of electrolyte.
11. Replace the Ø 3 mm o-ring and screw into the fill hole and tighten the screw.

7. INSTALLATION

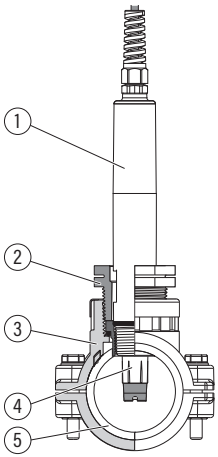
General considerations

- Probes are easily installed using the ¾" NPT external thread on the probe.
- Do not install the probe in an upside-down position.
- Hand tighten the probe in position. Then, depending on the process, tighten one or two turns with a wrench to secure in place.
- The membrane should stay wetted at all times as the probe consumes oxygen.
- Regardless of installation type (tube, tank, or flow cell) ensure an adequate water movement of 0.01 to 0.03 m/second past the sensor using a recirculating pump or a tank mixer.
- If placing the probe into a stream or fast flowing waters it is best to place it perpendicular to the flow and not facing into the flow.
- Provisions must be made for the removal of the probe from the process. Consider probe accessibility for maintenance.
- Make sure the membrane is protected from any blunt objects and is kept clean, to allow free exchange of oxygen.

Possible installation schemes with the relevant mounting accessories

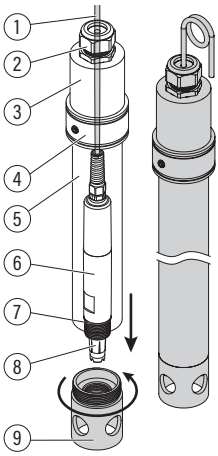
Note: *Due to the flexible nature of this product, accessories necessary to match desired configuration must be purchased separately, such as the accessories mentioned in this manual.*

In-line mounting with probe saddle



1 Probe
2 Probe fitting kit
3 Saddle
4 Membrane cap
5 Pipe

Tank immersion with electrode holder



1 Probe cable
2 Cable locking system
3 Pipe cap
4 Adjuster
5 PVC pipe
6 Probe body
7 O-ring, Ø 22.2 mm (0.87")
8 Membrane cap
9 Protective end cap

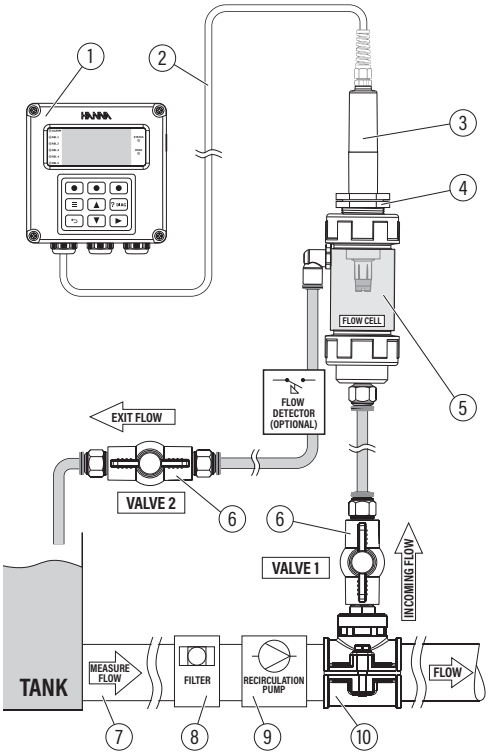
When installing the probe into the immersion electrode holder:

1. Screw the probe into the holder's threaded end cap (9)
2. Run the probe's extension cable through the pipe cap opening (3)
3. Screw the subassembly onto the PCV pipe (5)
4. Tighten the cable locking system (2) to secure the cabling

When removing the probe from tank (fish tank, water-treatment tank) or saddle and installing in a flow cell, users must consider that water characteristics change, as well as pressure or temperature, giving different dissolved oxygen readings when taking measurements.

Flow-cell installation

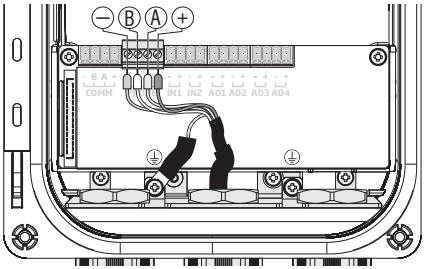
- Ensure no strong flow velocity past the membrane to maintain membrane integrity and prevent unstable readings. Placing the probe in a weir is recommended in extremely turbulent aeration basin installations.
- Position the probe so that it does not trap air bubbles at the membrane cap.
- Adjust the flow rate to around 150 L/hour (40 gal./hour) in order to provide the DO sensor with the required water movement of 0.01 to 0.03 m/second.
- Deposits of foreign material should not accumulate within the membrane area.



1	Process controller	6	Valves to control flow-cell flow
2	Wiring cable	7	Measure flow
3	DO probe	8	Filter
4	Flow-cell adapter	9	Recirculation pump
5	Flow cell	10	Saddle for pipe, 1¼" thread

8. WIRING THE PROBE TO THE CONTROLLER

1. Run the probe cable through the conduit opening.
2. Connect the probe leads to the removable terminal connector marked PROBE. Follow the lead markings (+) positive / (–) negative, to ensure correct wiring position for output leads.
3. Carefully put the wired terminal connector into place on the board.
4. Position the excess cable through the cable gland, before tightening the nut.
5. Remove the ground screw and hardware located below the PROBE connector and attach ground lead (⏚).



Probe Cabling Color Code

Marking	Color	Functionality
–	GREEN	0V
B	WHITE	RS485 D –
A	YELLOW	RS485 D+
+	BROWN	5V
⏚	GREEN / YELLOW	PROTECTIVE GROUND CONNECTION

9. CALIBRATION

HI510 Controller allows two types of DO calibration procedures:

- Standard calibration — a two-point calibration with standards
- Process calibration — available only if the probe has been calibrated in standards previously

Standard Calibration

Preparation

A two point calibration with standards verifies the probe is working correctly and establishes a slope.

- Verify the probe is filled with electrolyte and is connected to the controller.
- Verify the controller's barometric pressure reading with a reference meter. The pressure value can be adjusted from the controller's Technical Menu.
- Set the Salinity value if probe will be exposed to ocean or brackish waters.
- Set controller to desired measurement unit. Go to Probe Setting in Channel Setup. Choose between DO_Sat (% saturation) or DO_Conc (Concentration).

Procedure

A two point calibration uses air and zero oxygen solution to calibrate.

1. Press MENU direct key (☰) then **CAL** virtual key. The controller recognizes the currently selected measuring unit.
2. Suspend the probe into the water-saturated air and wait for the probe to reach thermal equilibrium.
3. Press **CFM** when displayed followed by **Next.**
4. Submerge the probe into HI7040 Zero oxygen solution and stir gently for 2-3 minutes. Wait for the temperature and probe values to become stable. The meter will automatically recognize the 0% (ppm) standard.
5. Press **CFM** to confirm the second calibration point and save the calibration.

Process Calibration

A process calibration is a single point calibration performed with the probe installed in the process. This type of calibration allows the user to adjust the measured DO value so that it matches the value determined with the hand-held meter. Prior to performing a process calibration, a hand-held meter and probe must be used to determine the DO value of the process.

Preparation

- Determine the process DO value, using a calibrated portable meter and probe.
- The process controller and the probe should have previously been calibrated with two standards (so a probe slope has been determined).

Procedure

1. Press MENU direct key (☰) then **CAL** virtual key.
2. Press **Process** when it is displayed.
3. Adjust the process value in agreement with the predetermined value using the directional keys (▲▼). Press **CFM** to confirm and save the calibration.

10. MAINTENANCE

DO Probe & Cap Membrane Cleaning

- Inspect, clean, and calibrate the probe at regular intervals. Alternatively, follow Standard Operating Procedures (SOP) guidelines.
- Rinse the probe, with cap assembled, with clean water. Blot the probe with a soft cloth or tissue. Handle the probe and membrane carefully to avoid damage.

- Mechanical cleaning of the membrane with abrasives is not recommended.
- Clean the exterior of the probe by wiping with a aqueous-soapy mixture and gently rubbing persistent spots off. Rinse with clean water.
- Replace the cap and electrolyte if coating persists or membrane damage is evident.

Membrane Cap & Electrolyte Replacement

The membrane cap and electrolyte are designed to provide trouble-free operation for up to eight weeks. Replacements are required when:

- The membrane cap is physically damaged
- Probe response is slower than usual, especially after many months of use
- DO probe calibration or readings exhibit greater than normal drift, especially after many months of use
- The membrane cap remains fouled after cleaning procedures were implemented.

Procedure

1. Remove probe from installation.
2. Unscrew and remove electrolyte screw located on the side of the probe body.
3. While holding the probe assembly vertical, unscrew the membrane cap assembly from the probe body. Discard the old membrane cap assembly. To remove old electrolyte, shake probe down.
4. Flush the probe body and electrolyte reservoir with tap water. Dry assembly with a lint-free cloth or tissue.
5. Inspect O-rings for nicks or wear. Discard and replace damaged ones.
6. If tarnished or stained, gently clean the cathode with a lint-free cloth.
7. Follow section 6 of this manual for filling instructions.

Long Term Storage

Discard any electrolyte solution from the reservoir and flush probe body and reservoir with water. Store the probe with the protective cap on.

11. ACCESSORIES

Ordering Information	Product Description
DO Solutions	
HI7040L	Zero oxygen solution set, 500 mL + 12 g
HI7042S	Refilling electrolyte solution, 30 mL
Other Accessories	
HI60501	PVC immersion electrode holder
HI60501-0	O-rings for **HI60501** electrode holder
HI605011	PVC mounting flange for **HI60501** electrode holder
HI60503	PVDF immersion electrode holder
HI60542	In-line electrode holder, direct pipe installation
HI740155P	Electrode refilling capillary pipette (20 pcs.)
HI76510-05	Probe extension cable, 5 m (16'5") long
HI76510-10	Probe extension cable, 10 m (32'9") long
HI76510-15	Probe extension cable, 15 m (49'2") long
HI76510-25	Probe extension cable, 25 m (82') long
HI76510-50	Probe extension cable, 50 m (164') long
BL120-400	Flow-cell probe adapter kit
BL120-401	Flow-cell valve
BL120-402	Flow-cell tubing,10 m (32'8") long
BL120-410	Flow cell
BL120-450	Flow-cell kit for Ø 50 mm (2") pipe
BL120-463	Flow-cell kit for Ø 63 mm (2.5") pipe
BL120-475	Flow-cell kit for Ø 75 mm (3") pipe
BL120-500	Probe fitting kit
BL120-550	Probe saddle for Ø 50 mm (2") pipe, 1¼" thread
BL120-563	Probe saddle for Ø 63 mm (2.5") pipe, 1¼" thread
BL120-575	Probe saddle for Ø 75 mm (3") pipe, 1¼" thread

For additional accessories information contact your local sales office.

CERTIFICATION

All Hanna Instruments conform to the **CE European Directives.**

Disposal of Electrical & Electronic Equipment. The product should not be treated as household waste. Instead, hand it over to the appropriate collection point for the recycling of electrical and electronic equipment, which will conserve natural resources. Ensuring proper product disposal prevents potential negative consequences for the environment and human health.
For more information, contact your city, your local household waste disposal service, or the place of purchase.

RECOMMENDATIONS FOR USERS

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used. Any variation introduced by the user to the supplied equipment may degrade its performance.
Do not use or store the product in hazardous environments.

WARRANTY

The probes are warranted for six months against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. 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 (RGA) 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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