



HI839150

## Hanna Instruments COD Reactor for Chemical Oxygen Demand and user-specific analysis

Dear Customer,

Thank you for choosing a Hanna Instruments® product.  
Please read this instruction manual carefully before using this instrument as it provides 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](mailto:tech@hannainst.com).  
Visit [www.hannainst.com](http://www.hannainst.com) for more information about Hanna Instruments and our products.

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## 1. PRELIMINARY EXAMINATION

Remove the instrument and accessories from the packaging and examine it carefully. For further assistance, please contact your local Hanna Instruments® office or email us at [tech@hannainst.com](mailto:tech@hannainst.com).

Each HI839150 is supplied with:

- HI740217 Laboratory safety shield
- Power cable
- Quick reference guide with instructions for manual download and instrument quality certificate

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

### Reactor models

HI839150-01 115 Vac, USA plug

HI839150-02 230 Vac, European plug

## 2. SAFETY MEASURES



**HOT SURFACE  
DO NOT TOUCH**

Touching the reactor block surfaces and vials while hot can cause serious burns.

Pay attention to all danger and caution statements. Failure to do so could result in injury to the operator or damage to the equipment. Do not use the reactor in any manner other than that which is specified in this manual.

|                         |                                                                                                                                                                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Safety equipment</b> | <ul style="list-style-type: none"> <li>• Use care and wear suitable eye protection and clothing when operating the reactor.</li> <li>• Use of supplied safety shield is strongly recommended.</li> </ul>                                                           |
| <b>Reagent spills</b>   | <ul style="list-style-type: none"> <li>• If a reagent spill occurs, wipe up immediately and rinse with plenty of water.</li> <li>• If reagent contacts skin, rinse the affected area thoroughly with water.</li> <li>• Avoid breathing released vapors.</li> </ul> |
| <b>Waste disposal</b>   | <ul style="list-style-type: none"> <li>• Contact a licensed waste disposal provider for proper disposal of reagent vials and reacted samples.</li> </ul>                                                                                                           |
| <b>Fire hazard</b>      | <ul style="list-style-type: none"> <li>• Keep flammable liquids away from the operating reactor.</li> </ul>                                                                                                                                                        |

## 3. GENERAL DESCRIPTION

The HI839150 is a robust 25 vial capacity thermo-reactor for COD determination of industrial wastewater.

The reactor has two stored digestion temperature programs that support analysis methods at:

- 150 °C (all COD methods, Iron Total, Phosphorus Acid Hydrolyzable, Phosphorus Total methods)
- 105 °C (Chromium and Nitrogen Total methods)

### Main Features

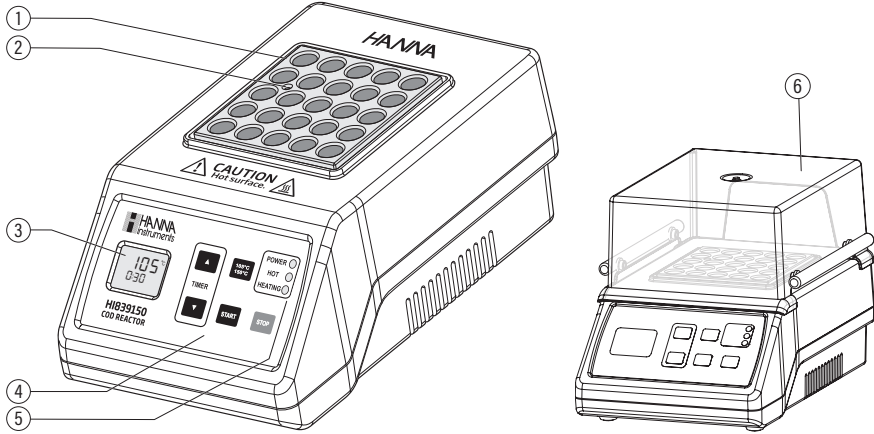
- Up to 180 minutes built-in countdown timer
- Indicator light for POWER (on), HOT (surface), HEATING (in progress)
- Reactor block temperature continuously evaluated and displayed
- Reference temperature probe well

4. SPECIFICATIONS

|                               |                                                                                  |
|-------------------------------|----------------------------------------------------------------------------------|
| Temperature range             | 20.0 to 160.0 °C (68 to 320 °F)                                                  |
| Accuracy                      | ± 2 °C                                                                           |
| Temperature stability         | ± 0.5 °C                                                                         |
| Capacity                      | 25 vials; Ø 16 mm × 100 mm (Ø 0.63" × 3.94")<br>Reference temperature probe well |
| Warm-up time                  | 10 to 15 minutes, depending on selected temperature                              |
| Digestion time                | 1 to 180 minutes                                                                 |
| Environment                   | 5 to 50 °C (41 to 122 °F)                                                        |
| Power supply (fuse protected) | 115 Vac (HI839150-01)<br>230 Vac (HI839150-02)                                   |
| Dimensions                    | 190 × 300 × 95 mm (7.5 × 11.8 × 3.7")                                            |
| Weight                        | Approximately 4.8 kg (10.6 lb.)                                                  |

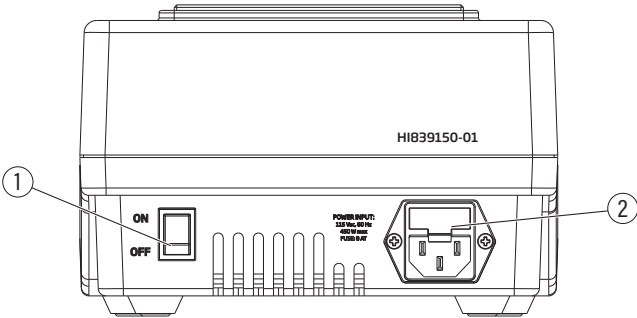
5. FUNCTIONAL DESCRIPTION

Front & Top View



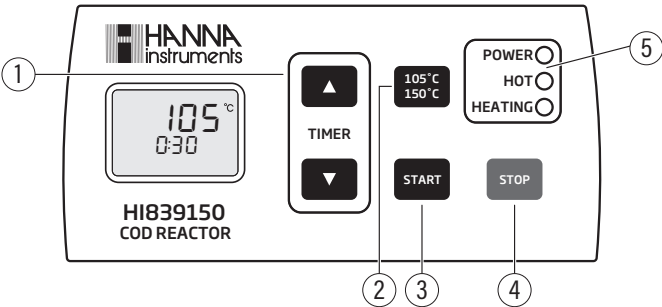
|   |                                  |                                                                                    |
|---|----------------------------------|------------------------------------------------------------------------------------|
| 1 | Reactor block                    | Up to 25 vial capacity                                                             |
| 2 | Reference temperature probe well | Holds reference temperature probe                                                  |
| 3 | LCD display                      | Displays temperature, timer, and status messages                                   |
| 4 | Keypad                           | Select program, start/stop heating                                                 |
| 5 | Reactor block status light       | Green (power on)<br>Red (hot surface)<br>Yellow (heating in progress)              |
| 6 | Laboratory safety shield         | Recommended during vial digestion procedure to maintain a safe working environment |

Rear View



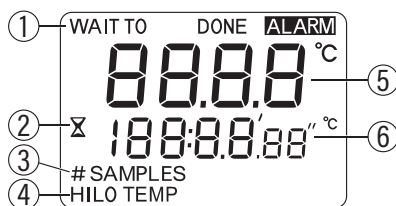
|   |                                  |                                                |
|---|----------------------------------|------------------------------------------------|
| 1 | ON/OFF switch                    | Press to turn the reactor on (off)             |
| 2 | AC power socket with fuse holder | 115 Vac (HI839150-01)<br>230 Vac (HI839150-02) |

Keypad



|   |                     |                                                                                                                                            |
|---|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |                     | <ul style="list-style-type: none"><li>Digestion time configuration</li></ul>                                                               |
| 2 |                     | <ul style="list-style-type: none"><li>105 °C or 150 °C digestion temperature program selection</li><li>Timer value configuration</li></ul> |
| 3 |                     | <ul style="list-style-type: none"><li>Start program</li><li>Start digestion</li></ul>                                                      |
| 4 |                     | <ul style="list-style-type: none"><li>Stop digestion</li><li>Exit edit mode</li></ul>                                                      |
| 5 | BLOCK STATUS LIGHTS |                                                                                                                                            |
|   | POWER (green)       | reactor is turned on                                                                                                                       |
|   | HOT (red)           | reactor block temperature above 50 °C (122 °F)                                                                                             |
|   | HEATING (yellow)    | continuously on, heating in progress<br>displayed blinking, block maintains a stable temperature                                           |

## LCD Display



|   |                                     |                                                                  |
|---|-------------------------------------|------------------------------------------------------------------|
| 1 | WAIT TO<br>SAMPLES<br>DONE<br>ALARM | Status tags                                                      |
| 2 | X                                   | Stability indicator                                              |
| 3 | #                                   | Program editing mode                                             |
| 4 | HI / LO TEMP                        | Temperature above (HI) below (LO) selected program's temperature |
| 5 | First LCD line                      | Measured temperature                                             |
| 6 | Second LCD line                     | Set temperature or reaction time                                 |

## 6. GENERAL OPERATIONS

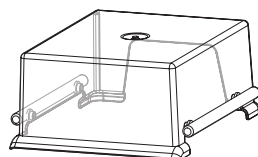
## Guidelines &amp; Safety Precautions

- Do not place the reactor near a heat source. Avoid the presence of flammable liquids near the operating reactor.
- Do not cover the ventilation slits on the side.
- Disconnect from power if an accidental spill occurs.
- Handling chemical samples, standards, and reagents can be dangerous. Review the Safety Data Sheets and become familiar with all safety procedures before handling any chemicals.
- Reactor block heats up a few degrees higher than selected temperature as it accounts for localized heat transfer to vials.
- Reactor block temperature drops as vials are inserted into the reactor. Allow time for block temperature to reach required digestion temperature.

## 6.1. INSTALLING THE LABORATORY SAFETY SHIELD

HI839150 is supplied with a laboratory safety shield with weighted handles that maintains proper safety position throughout digestion procedure.

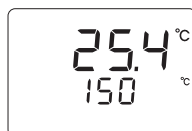
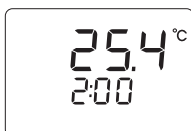
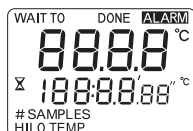
Use of safety shield is strongly recommended to maintain a safe working environment.



## 6.2. STARTUP

1. Place the reactor on a level and stable surface.
2. Connect to power. Check back of the instrument for correct voltage and frequency.
3. Switch the instrument on. POWER LED turns on.

All LCD segments are briefly displayed followed by initialization screen. First LCD line displays block temperature and second LCD line displays the current reaction time and program temperature, alternately.



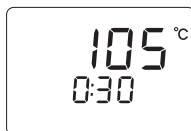
## 6.3. DIGESTION TEMPERATURE PROGRAM SELECTION & TIMER CONFIGURATION

105 °C (221 °F) and 150 °C (302 °F) temperature programs are delivered with the reactor.

1. Use the key to select program.
2. Long press key to enter timer value edit mode.  
Timer value starts blinking.
3. Use the keys to adjust value and the key to confirm.

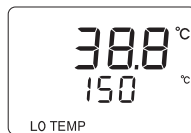


4. With program selected, press and the reactor block starts to warm up.



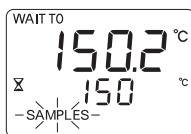
## 6.4. SAMPLE DIGESTION PROCEDURE

1. Press the key. The **HEATING** LED lights up (yellow).  
"rUn Strt" message is displayed followed by the reactor block's current temperature and selected program temperature.

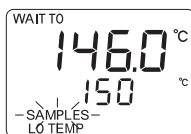


- When the reactor block temperature exceeds 50 °C, the **HOT** LED (red) starts blinking.
- During warm up (10 to 15 minutes), the **HEATING** LED stays on (yellow) for as long as the block temperature is within 10 °C of target temperature.

- An acoustic signal (3 short beeps) alerts users that the block temperature has reached configured (selected) temperature profile and the reactor is ready for vials to be inserted.  
“WAIT TO SAMPLES” (“SAMPLES” blinking) is displayed.



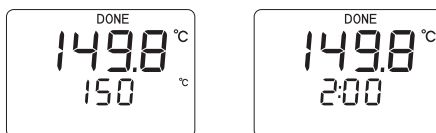
2. Insert the vials into the reactor. Block temperature may decrease.



3. Press the **START** key to start timed digestion. An acoustic signal (1 short beep) alerts users that operation is in progress. The block reactor heats up to configured temperature.  
Countdown timer is automatically started.



The end of the digestion time is signalled by an acoustic signal (5 short beeps) and “DONE” message is displayed. The heating is turned off and the block begins to cool off.



**Note:** To end digestion before the timer countdown finishes, press the **STOP** key.

## 7. WARNINGS & ERRORS

The instrument displays warning messages when erroneous conditions appear and when values are outside the expected range. The information below provides an explanation of the errors and warnings, and recommended action to be taken.



“LO TEMP” is displayed during warm-up process when the reactor block temperature is lower than set program temperature profile.

- Wait for warm-up to finish.



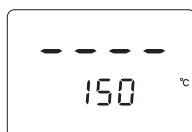
"HI TEMP" is displayed if the reactor block temperature is above the set program temperature profile.

- Wait for the reactor block to cool down.



ALARM tag and "HEAT FAILED" message are displayed if the reactor block fails to heat up 5 minutes after pressing the  key. A long acoustic signal alerts users of the issue.

- Contact Hanna Instruments® technical support.



Broken temperature probe (sensor).

- Contact Hanna Instruments technical support.

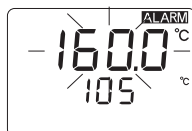
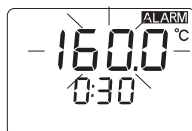
HOT 

HOT LED is displayed blinking when the reactor block temperature exceeds 50 °C. Do not touch the heating block.



Temperature is under/over range.

- Wait for warm-up to finish or wait for the reactor block to cool down.
- ALARM tag and an acoustic signal indicates the over range condition.



## 8. MAINTENANCE

### Cleaning

1. Switch off the reactor and disconnect from power. Allow the reactor block to cool off.
2. Remove vials and wipe the instrument with a soft, damp cloth.  
Water should not reach inside the reactor block.

### Replacing a spent fuse

Replace only with fuse of the specified type and current ratings.

1. Switch the reactor off and disconnect from power.
2. Turn the fuse holder counterclockwise until it disengages.
3. Retain the cap which holds the fuse, and replace the fuse in the cap with a new, appropriately rated fuse i.e. use "8 AT" for [HI839150-01](#) and "5 AT" for [HI839150-02](#) model.
4. Replace the fuse holder and rotate it clockwise.

## 9. HANNA INSTRUMENTS METHODS THAT REQUIRE DIGESTION

### COD METHODS – HI801, HI83399, HI83314, HI97106

| Parameter                 | Method                                                                                                                                                                                                                                           | Reagent set<br>(vial identification)                | Range                                   | Accuracy                                                                                                                                       | Temperature/<br>Digestion time |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| COD LR<br>EPA             | Adaptation of the US EPA 410.4<br>Approved Method for the<br>COD Determination on Surface<br>Waters and Wastewaters                                                                                                                              | <a href="#">HI93754A-25</a><br>(COD A, red label)   | 0 to 150 mg/L<br>(as O <sub>2</sub> )   | ± 5 mg/L or<br>± 4 % of reading<br>(whichever is<br>greater)                                                                                   | 150 °C / 120 minutes           |
| COD LR<br>Mercury<br>Free | <a href="#">HI83314</a> , <a href="#">HI83399</a> , <a href="#">HI97106</a><br>Adaptation of the US EPA 410.4 Approved<br>Method for the COD Determination on<br>Surface Waters and Wastewaters<br><a href="#">HI801</a> Dichromate Mercury Free | <a href="#">HI93754D-25</a><br>(COD D, red label)   |                                         |                                                                                                                                                |                                |
| COD LR<br>ISO             | <a href="#">HI83314</a> , <a href="#">HI83399</a> , <a href="#">HI97106</a><br>Adaptation of the US EPA 410.4 Approved<br>Method for the COD Determination on<br>Surface Waters and Wastewaters<br><a href="#">HI801</a> Dichromate ISO          | <a href="#">HI93754F-25</a><br>(COD F, red label)   |                                         |                                                                                                                                                |                                |
| COD MR<br>EPA             | Adaptation of the US EPA<br>410.4 Approved Method for the<br>COD Determination on Surface<br>Waters and Wastewaters                                                                                                                              | <a href="#">HI93754B-25</a><br>(COD B, white label) | 0 to 1500 mg/L<br>(as O <sub>2</sub> )  | <a href="#">HI83314</a><br><a href="#">HI83399</a><br><a href="#">HI97106</a><br>± 15 mg/L or<br>± 4 % of reading<br>(whichever is<br>greater) |                                |
| COD MR<br>Mercury<br>Free | <a href="#">HI83314</a> , <a href="#">HI83399</a> , <a href="#">HI97106</a><br>Adaptation of the US EPA 410.4 Approved<br>Method for the COD Determination on<br>Surface Waters and Wastewaters<br><a href="#">HI801</a> Dichromate Mercury Free | <a href="#">HI93754E-25</a><br>(COD E, white label) |                                         |                                                                                                                                                |                                |
| COD MR<br>ISO             | <a href="#">HI83314</a> , <a href="#">HI83399</a> , <a href="#">HI97106</a><br>Adaptation of the US EPA 410.4 Approved<br>Method for the COD Determination on<br>Surface Waters and Wastewaters<br><a href="#">HI801</a> Dichromate ISO          | <a href="#">HI93754G-25</a><br>(COD G, white label) | 0 to 1000 mg/L<br>(as O <sub>2</sub> )  | <a href="#">HI801</a><br>± 15 mg/L or<br>± 3 % of reading<br>(whichever is<br>greater)                                                         |                                |
| COD HR<br>EPA             | Adaptation of the US EPA<br>410.4 Approved Method for the<br>COD Determination on Surface<br>Waters and Wastewaters                                                                                                                              | <a href="#">HI93754C-25</a><br>(COD C, green label) | 0 to 15000 mg/L<br>(as O <sub>2</sub> ) | ± 150 mg/L or<br>± 2 % of reading<br>(whichever is<br>greater)                                                                                 |                                |
| COD UHR                   | Adaptation of the US EPA<br>410.4 Approved Method for the<br>COD Determination on Surface<br>Waters and Wastewaters                                                                                                                              | <a href="#">HI93754J-25</a><br>(COD J, blue label)  | 0.0 to 60.0 g/L<br>(as O <sub>2</sub> ) | ± 0.5 g/L<br>± 3 % of reading                                                                                                                  |                                |

## OTHER METHODS – HI801, HI83399, HI83314

| Parameter                           | Method                                                                                                                                                        | Reagent set<br>(vial identification) | Range                                                                                         | Accuracy                                                                                                                                                        | Temperature /<br>Digestion time |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Chromium,<br>(VI)/Total             | Adaptation of the Standard Methods of the Examination of Water and Wastewater, 22 <sup>nd</sup> Edition, 3500-Cr, Diphenylcarbazide Method                    | HI96781-25<br>(Cr, red label)        | 0 to 1000 µg/L<br>(as Cr)                                                                     | ± 10 µg/L<br>± 3 % of reading                                                                                                                                   | 105 °C /<br>60 minutes          |
| Iron, Total                         | Adaptation of Standard Methods for the Examination of Water and Wastewater, 23 <sup>rd</sup> Edition, 3500-Fe B, Phenanthroline Method                        | HI96778-25<br>(IRON, red label)      | 0.00 to 7.00 mg/L<br>(as Fe)                                                                  | ± 0.20 mg/L or<br>± 3 % of reading<br>(whichever is greater)                                                                                                    | 150 °C /<br>30 minutes          |
| Nitrogen,<br>Total LR               | Chromotropic Acid Method                                                                                                                                      | HI93767A-50<br>(N LR, green label)   | 0.0 to 25.0 mg/L<br>(as N)                                                                    | ± 1.0 mg/L or<br>± 5 % of reading<br>(whichever is greater)                                                                                                     | 105 °C /<br>30 minutes          |
| Nitrogen,<br>Total HR               | Chromotropic Acid Method                                                                                                                                      | HI93767B-50<br>(N HR, red label)     | 0 to 150 mg/L<br>(as N)                                                                       | ± 3 mg/L or<br>± 4 % of reading<br>(whichever is greater)                                                                                                       |                                 |
| Phosphorus,<br>Acid<br>Hydrolyzable | Adaptation of the EPA Method 365.2 and Standard Methods for the Examination of Water and Wastewater, 20 <sup>th</sup> Edition, 4500-P E, Ascorbic Acid Method | HI93758B-50<br>(P AH, white label)   | 0.00 to 1.60 mg/L<br>(as P)                                                                   | ± 0.05 mg/L or<br>± 5 % of reading<br>(whichever is greater)                                                                                                    | 150 °C /<br>30 minutes          |
| Phosphorus,<br>Total LR             | Adaptation of the EPA Method 365.2 & Standard Methods for the Examination of Water and Wastewater, 20 <sup>th</sup> Edition, 4500-P E, Ascorbic Acid Method   | HI93758C-50<br>(P TLR, red label)    | HI83314<br>HI83399<br>0.00 to 1.15 mg/L<br>(as P)<br><br>HI801<br>0.00 to 1.60 mg/L<br>(as P) | HI83314<br>HI83399<br>± 0.05 mg/L or<br>± 6 % of reading<br>(whichever is greater)<br><br>HI801<br>± 0.05 mg/L or<br>± 5 % of reading<br>(whichever is greater) |                                 |
| Phosphorus,<br>Total HR             | Adaptation of Standard Methods for the Examination of Water and Wastewater, 20 <sup>th</sup> Edition, 4500-P C, Vanadomolybdo phosphoric Acid Method          | HI93763B-50<br>(P THR, green label)  | 0.0 to 32.6 mg/L<br>(as P)                                                                    | ± 0.5 mg/L or<br>± 5 % of reading<br>(whichever is greater)                                                                                                     |                                 |

## HI83746 METHOD

| Parameter                         | Method         | Reagent    | Range             | Accuracy                               | Temperature / Digestion time |
|-----------------------------------|----------------|------------|-------------------|----------------------------------------|------------------------------|
| Reducing Sugars for Wine Analysis | Fehling Method | HI83746-20 | 0.00 to 50.00 g/L | $\pm 0.50$ g/L<br>$\pm 5$ % of reading | 105 °C / 7 min.              |

## 10. ADDITIONAL EQUIPMENT &amp; ACCESSORIES

| Ordering Information | Product Description                                                  |
|----------------------|----------------------------------------------------------------------|
| HI740216             | Test tube cooling rack                                               |
| HI740217             | Laboratory bench safety shield                                       |
| HI801                | iris <sup>®</sup> Spectrophotometer                                  |
| HI83224              | COD meter and multiparameter photometer                              |
| HI83314              | Multiparameter photometer with COD for wastewater                    |
| HI83399              | Photometer with COD for water & wastewater                           |
| HI83746              | Photometer for the determination of concentration of reducing sugars |
| HI97106              | COD portable photometer                                              |
| HI83746-20           | Reducing sugar analysis reagents set                                 |
| HI93703-59           | Charcoal for decoloration of red wine                                |
| HI93754X-25*         | COD reagent vial sets of different ranges                            |
| HI93758B-50          | Phosphorus, Acid Hydrolyzable reagent set                            |
| HI93758C-50          | Phosphorus, Total LR reagent set                                     |
| HI93763B-50          | Phosphorus, Total HR reagent set                                     |
| HI93767A-50          | Nitrogen, Total LR reagent set                                       |
| HI93767B-50          | Nitrogen, Total HR reagent set                                       |
| HI96778-25           | Iron, Total reagent set                                              |
| HI96781-25           | Chromium, (VI)/Total reagent set                                     |

\* Go to [www.hannainst.com](http://www.hannainst.com) for reagent vial sets ordering codes.

## CERTIFICATION

All Hanna<sup>®</sup> instruments conform to the CE European Directives and UK Standards.



RoHS  
compliant



**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.

**Disposal of waste batteries.** This product contains batteries, do not dispose of them with other household waste. Hand them over to the appropriate collection point for recycling.

Ensuring proper product and battery 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 the meter's performance. For your and the meter's safety do not use or store the meter in hazardous environments.

## WARRANTY

The **HI839150** is warranted for two years 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<sup>®</sup> office. If under warranty, report the model number, date of purchase, serial number (engraved on the bottom of the meter), 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 meter 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 meter, make sure it is properly packed for complete protection.