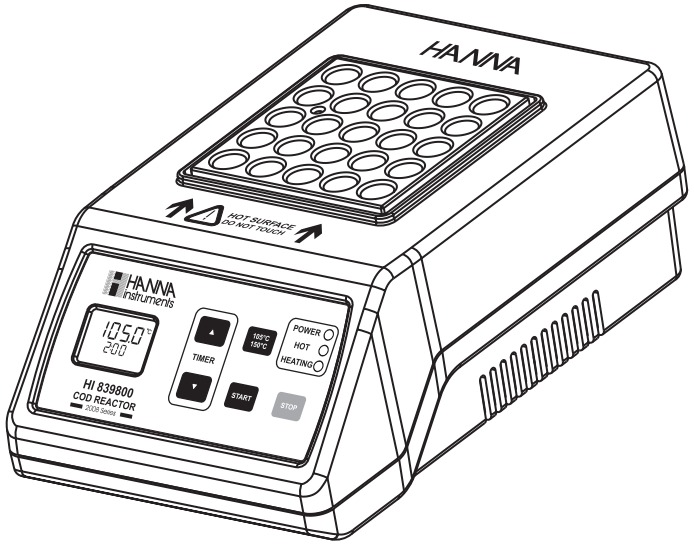
Instruction Manual

HI 839800 COD REACTOR and Test Tube Heater 2008 Series



HANNA® instruments
www.hannainst.com

CE
This Instrument is in
Compliance with the CE Directives

Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. 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.

This instrument is in compliance with CE directives.

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GENERAL DESCRIPTION

The **HI 839800** thermo-reactor is constructed of durable materials with a vial capacity to perform up to 25 digestions simultaneously.

The reactor is equipped with 2 predefined temperature programs (dedicated temperature settings for COD and total phosphorous reactions at 150°C, and also 105°C for total nitrogen digestion).

In addition, **HI 839800** features LED indicators for visual indication of power on (POWER), heating in progress (HEATING) and hot surface warning (HOT).

The heater block temperature can be verified by placing a thermometer in the temperature well in the block.

A 3-hour timer is incorporated for applications where timed digestions are required. When this feature is enabled, a beep will be heard and the heating element will turn off at the end of the selected time period.

The reactor contains a thermal fuse that prevents overheating, by turning off the heating element.

The temperature is continuously displayed on the LCD even when there is no active temperature program running.

Two models are available:

- **HI 839800-01** runs with 115 Vac power supply
- **HI 839800-02** runs with 230 Vac power supply

PRELIMINARY EXAMINATION

Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occurred during shipment, please notify your Dealer.

Each **HI 839800** Test Tube Heater is supplied complete with:

- Power Cable
- Instruction Manual

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

ABBREVIATIONS

°C: degree Celsius

COD: Chemical Oxygen Demand

HEALTH & SAFETY

Before unpacking, setting up or using this reactor it is important to carefully read this manual. Pay particular attention to all warnings, cautions and notes. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure the safe use of this reactor, it must not be installed or used in any manner other than that specified in this manual.

⚠ **Reactor Operation:** The Reactor incubates glass vials containing hazardous chemicals at high temperature. Read the Material Safety Data Sheet (MSDS) before handling reagent vials.

Handling Reagent Vials: Handle the vials very carefully and wear protective clothing. After use, dispose of the reagent vials according to local regulations.

Safety Equipment: When operating with Reactor use protective clothing, including goggles or face mask, and gloves.

Use of the optional safety shield is highly recommended.

Reagent Spills: Wipe up spilled reagents immediately. If reagent contacts skin, rinse the affected area thoroughly with water. Avoid breathing released vapors. Read the Material Safety Data Sheet (MSDS) for each reagent for complete chemical information.

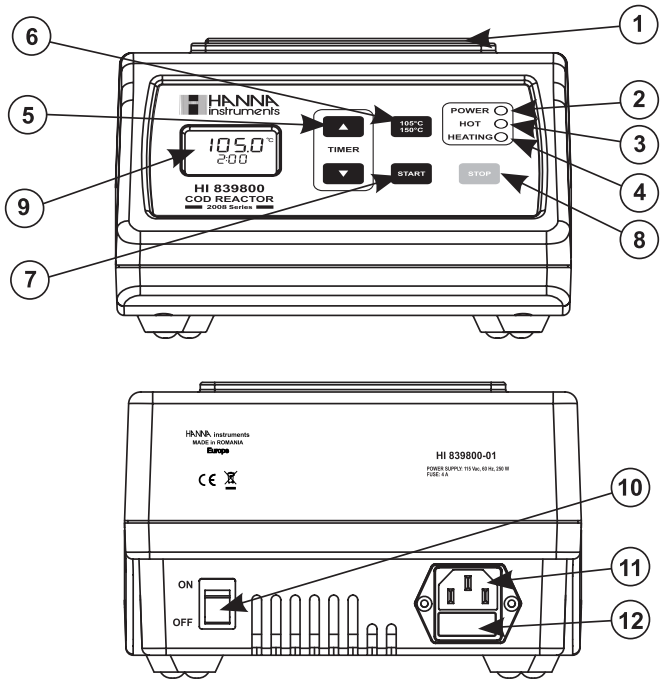
Fire Hazard: Avoid the presence of flammable liquids or paper near the operating Reactor. A fire hazard could be created.

SPECIFICATIONS

Temperature of Reaction	105 °C or 150°C (221 °F or 302 °F)
Temperature Stability	±0.5°C
Temperature Range	-10°C to 160°C
Accuracy	±2°C (@ 25°C)
Capacity	25 vials (dia 16x100 mm), 1 receptacle for a stainless steel reference thermometer
Warm-up Time	10 - 15 minutes, depending on selected temperature
Operating Mode	timed (0 to 180 minutes) or infinity mode
Environment	5 to 50°C (41 to 122 °F)
Power Supply	**HI 839800-01** 115 Vac; 60 Hz; 250 W
(fuse protected)	**HI 839800-02** 230 Vac; 50 Hz; 250 W
Dimensions	190 x 300 x 95 mm (7.5 x 11.8 x 3.7")
Weight	approx. 4.8 kg (10.6 lb.)

FUNCTIONAL DESCRIPTION

REACTOR DESCRIPTION



1) Heater block: can hold up to 25 vials.
2) POWER LED indicator: lights (green) when the power switch on the back of the reactor is set in the ON position.
3) HOT surface indicator: flashes (red) if the block temperature is above 50°C.
4) HEATING LED indicator: lights (yellow) only when the heater is ON. When the indicator cycles ON and OFF, the heater is maintaining a stable temperature.
5) ▲, ▼: keys are used to adjust the timer values when setting reaction time.
6) **105°C/150°C**: key is used to select the temperature program, 105°C or 150°C (221°F or 302°F).
7) **START**: key is used to start the selected temperature program or to start the timer after placing the vials into the heater block.
8) **STOP**: key is used to stop the heating process or to stop the timer.
9) Liquid Crystal Display (**LCD**)
10) Power switch: turns the reactor ON and OFF. When the power switch is set in the ON position the power indicator will light.
11) Power supply: 115 or 230 Vac, depending on model.
12) Fuse holder: the fuse is placed on the rear of the case for easy maintenance.

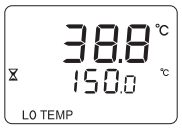
OPERATING MODES

• **Idle mode**: the default mode. While in this mode the meter measures and displays the heater block temperature, **an IDLE** message, the target temperature and the reaction time.

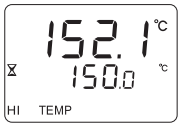
• **Heating mode**: activated by the **START** key. First, the reactor will heat to the desired temperature. When the temperature is reached and it is stable, a beep signals the user that the vials can be inserted into the heater block. Pressing the **START** key initiates the countdown timer. A beep tone is heard also at the end of the heating cycle, the heater is off and the block starts cooling. The heating mode will be stopped anytime if the **STOP** key is pressed.

ERRORS AND WARNINGS

The instrument shows messages when special conditions occur.



Temperature Low: Appears during the heating mode if the measured temperature is lower than the set point. Wait for warm-up period.



Temperature high: Appears during the heating mode if the heater block temperature is over the set point. Wait for cooling period.

Heating system malfunctions: Appears when the heating mode is ON for more than 5 minutes and the temperature has not increased.

Hot surface: Appears when the heating block temperature is over 50 °C.

STARTUP

Prepare the reactor as follows:

- Place the reactor on a flat table. Do not place the instrument under direct sun light.
- Connect the reactor to a power outlet with ground. Verify the correct voltage and frequency are used. See the label on the instrument.
- Turn the reactor ON using the power switch located on the rear panel. Wait until unit displays the heater block temperature.

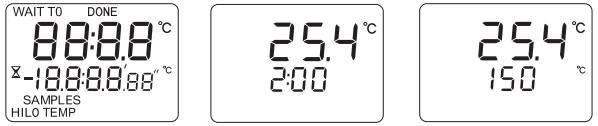
TEMPERATURE SELECTION

The reactor has 2 predefined temperature profiles:

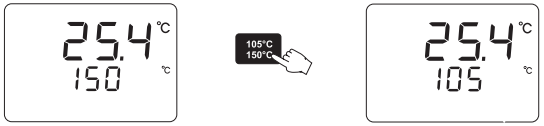
- 105 °C (221 °F)
- 150 °C (302 °F)

To choose from the available profiles:

- At start up, the display briefly illuminates all message segments then displays the heater block temperature. The current settings are displayed (reaction time and temperature) on the second line.

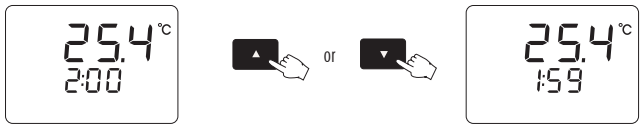


- Press the **105°C/150°C** key to select the temperature program 105°C or 150°C.

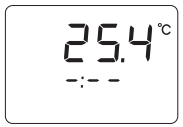


TIMER SELECTION

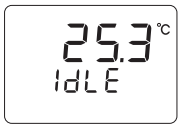
- Press the ▲, or ▼ key to increase or decrease the reaction time.



- An infinite mode for time may also be set if the reaction time is adjusted in the way described above, until the display shows the "-:--" message.

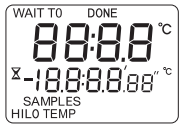


- If the selected temperature program is not started within 10 seconds, the temperature screen will be displayed.

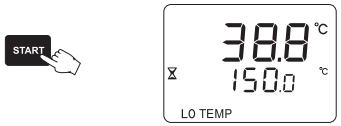


DIGESTION PROCEDURE

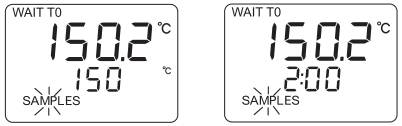
- Turn the reactor on using the power switch located on the rear panel. The green POWER LED will be illuminated.
- The display briefly illuminates all message segments and then displays the heater block temperature.



- Select the temperature according to the specific digestion procedure.
- Press the **START** button to start the heating mode. The yellow HEATING LED will illuminate.
- The display will show the current temperature of the heating block and the set temperature.



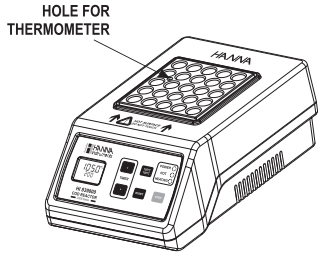
- When the heating block is above 50°C the red HOT LED will flash.
- The heater block warms for approximately 10-15 minutes, depending on the selected temperature. During this period the heating indicator will remain ON continuously until block temperature is within 10°C of target temperature. The heater and the heating indicator will cycle OFF and ON, in order to maintain the desired temperature.
- When the desired temperature is reached and has stabilized, a beep will signal that vials may be placed in the reactor. At this time the vials can be inserted into the block and the timed digestion can be started. Press START to start the timer.



The instrument displays the current temperature, and alternately on the second row, the set point value, and the reaction time.

Notes:

- Use of the optional safety shield is strongly recommended to protect the operator from splattering reagents in case a vial should break.
- Do not place the reactor near a heating or cooling source. Temperature stability could be affected.
- In order to allow the heat transmission from the block to the liquid inside the tubes, the temperature of the metallic block is a few degrees higher than the set value.



- During operation, the block temperature will be slightly different for an empty block or one full of vials. If cold tubes are placed in the block, the temperature will decrease several degrees and a few minutes will be required to recover as the tubes warm.
- An external stainless steel probe thermometer can be used to check the block temperature, by placing it into the appropriate receptacle.
- After inserting vials, press **START** to start the timer.

- The heating indicator will cycle ON and OFF maintaining the constant temperature.
- After the time has elapsed, the message DONE is displayed. The heating element will turn OFF, and the samples are ready to be removed from the reactor.

- To begin another digestion, press **START**. To modify the temperature program use the **105°C/150°C** key. To change the timer value, use ▲ and ▼ keys.

MAINTENANCE

The reactor should be kept clean and any reagent spills should be wiped up immediately.

Do not touch the heater block unless you are certain it has cooled.

If some reagent accidentally spills into the heater block, disconnect power and allow the reactor to cool; then remove all tubes and clean the block.

Should overheating occur, the reactor automatically shuts down, and all LED indicators turn off. Contact your dealer or your nearest Hanna Service Center for maintenance.

FUSE REPLACEMENT

Replace fuse only with fuse of specified type and current rating.

- Turn the reactor off and disconnect the power supply.
- Unscrew the fuse holder by rotating it counterclockwise.
- Replace the fuse with one 4A fuse for -01 or one 2A fuse for -02 model.
- Replace the fuse holder before turning the reactor on.

ACCESSORIES

HI 151-00 Electronic thermometer (°C)

HI 151-01 Electronic thermometer (°F)

HI 740216 Test tube cooling rack (25 tube capacity)

HI 740217 Laboratory bench safety shield

WARRANTY

HI 839800 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

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 your dealer. 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.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

Recommendations for Users

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

Operation of these instruments may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all necessary steps to correct interferences.

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

To avoid damages or burns, do not put the instrument in microwave oven. Do not use or store the instrument in hazardous environments.

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

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