Preliminary Examination

Remove the meter from the packing material and examine it carefully. If you require any further information, please contact Hanna Instruments technical support team at: tech@hannainst.com.
Each HI96748 is delivered in a cardboard box and is supplied with:
• Sample cuvettes and caps (2 pcs.)
• 9V battery
• Quality certificate
• Instruction manual

Note: Ensure that the meter functions correctly and save all packing material. Items that need to be returned must be returned in their original packing material with the supplied accessories.

General Description & Intended Use

HI96748 portable photometer is designed for the measurement of low range manganese. It features a combination of a special tungsten lamp, a narrow band interference filter and silicon photodetector to ensure accurate photometric readings. The Hanna exclusive CAL Check™ feature utilizes NIST traceable standards to verify meter validation and calibration.

Specifications

Range	0 to 300 μg/L
Resolution	1 μg/L
Accuracy @25 °C (77 °F)	±10 μg/L ±3% of reading
Light source	Tungsten lamp
Light detector	Silicon Photocell with narrow band interference filter @575 nm
Method	Adaptation of the PAN method. The reaction between manganese and reagents causes an orange tint in the sample.
Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
Battery type	9V (1 pc.)
Auto shut off	After 10 min. of non-use in measurement mode; after 1 hour of non-use in calibration mode; with reminder of last reading
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")
Weight	320 g (11.3 oz.)

Functional & Keypad Description
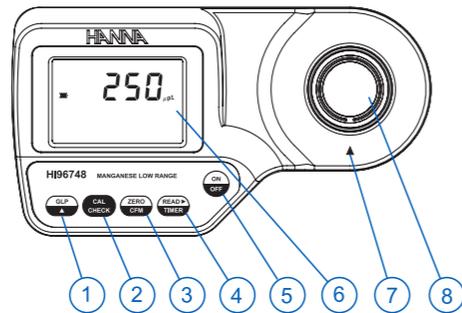
1. **GLP ▲** Press to enter GLP mode. In calibration mode, press to edit the date and time.
2. **CAL CHECK** Press to perform meter validation or press and hold for three seconds to enter calibration mode.
3. **ZERO CFM** Press to zero the meter prior to measurement, to confirm edited values or to restore factory calibration.
4. **READ▶ TIMER** Press to take a measurement, or press and hold for three seconds to start the countdown prior to measurement. In GLP mode, press to view the next screen.
5. **ON OFF** Press to turn the meter ON and OFF.
6. Liquid Crystal Display (LCD)
7. Cuvette alignment indicator
8. Cuvette holder

LCD Description
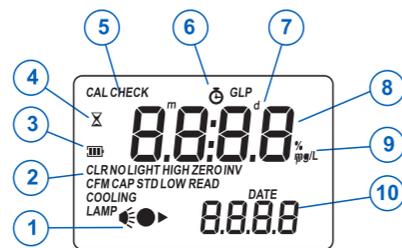
1. Lamp, cuvette and detector group icons
2. Error messages and warnings
3. Battery status indicator
4. Stability indicator
5. Status messages
6. Built-in timer
7. The month, day and date icons (appear when a date is displayed)
8. Primary LCD, measurement line
9. Measurement units
10. Secondary LCD line

Validation & Calibration Procedures

Warning: Use Hanna Instruments CAL Check™ Standard Solutions to validate or calibrate the meter.
For accurate validation and calibration results, please perform tests at room temperature (18 to 25 °C / 64.5 to 77.0 °F).

Validation

1. Press **ON/OFF** key to turn the meter on.
2. A short beep alert and the four-dash lines displayed on the LCD indicate that the meter is ready.

3. Insert the CAL Check™ Standard Cuvette A into the holder and ensure that the notch on the cap is positioned securely in the groove.


4. Press **ZERO/CFM** key and the lamp, cuvette and detector group icons will appear on the display, depending on the measurement phase. The display will show "-0.0-" when the meter is zeroed and ready for validation.
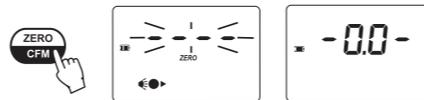
5. Remove the cuvette.
6. Insert the CAL Check™ Standard HI96748.1B into the cuvette holder. Ensure that the notch on the cap is positioned securely in the groove.

7. Press **CAL CHECK** key and the lamp, cuvette and detector group icons together with "CAL CHECK" message will appear on the display, depending on the measurement phase.
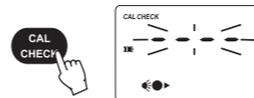
8. When the CAL Check measurement is complete, the display will show the value obtained during the measurement.

The reading should be within specifications as reported on the CAL Check™ Standard Certificate. If the value is found out of specifications, check that the cuvettes are free of fingerprints, oil or dirt and repeat validation. If results are still found to be out of specifications, recalibrate the instrument.

Calibration

Note: It is possible to interrupt the calibration procedure at any time by pressing CAL CHECK or ON/OFF keys.

1. Press **ON/OFF** key to turn the meter on.
2. A short beep alert and the four displayed dash lines indicate that the meter is ready.
3. Press and hold **CAL CHECK** key for three seconds to enter calibration mode. The "CAL" message will be displayed during calibration. The "ZERO" message blinking indicates that the meter is ready for zeroing.

4. Insert the CAL Check™ Standard Cuvette A into the cuvette holder and ensure that the notch on the cap is positioned securely in the groove.


5. Press **ZERO/CFM** key and the lamp, cuvette and detector group icons will appear on the display, depending on the measurement phase. The display will show "-0.0-" when the meter is zeroed and ready for validation. The "READ" message blinking indicates that the meter is ready for reading the calibration standard.
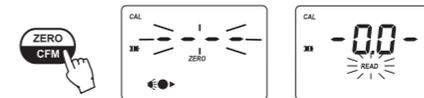
6. Remove the cuvette.
7. Insert the CAL Check™ Standard HI96748.1B into the cuvette holder. Ensure that the notch on the cap is positioned securely in the groove.

8. Press **READ▶/TIMER** key and the lamp, cuvette and detector group icons will appear on the display, depending on the measurement phase. The display will show for three seconds the Cal Check™ standard value.
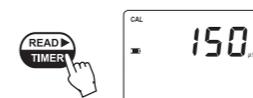

Note: If the display shows "STD HIGH" or "STD LOW", verify that both CAL Check™ Standard Cuvettes, A and B are free from fingerprints or dirt and that they have been inserted correctly.

9. The date of last calibration (e.g.: "01.08.2019") or "01.01.2019", if the factory calibration was selected, appears on the display. In both cases the year number is blinking, indicating that is available for editing.

10. Use **GLP/▲** key to change the year/month/day information, which the display shows blinking. Keep the **GLP/▲** key pressed for the value to be increased automatically. Press **ZERO/CFM** key or **READ▶/TIMER** key to confirm the value.
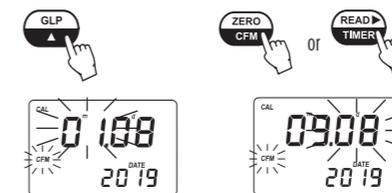
Note: It is possible to change the editing from day to year and month by pressing READ▶/TIMER key.

11. Press **ZERO/CFM** key to save the calibration date. The instrument displays "Stor" for one second and the calibration is saved.

12. The four-dash lines displayed on the LCD indicate that the instrument has automatically returned to measurement mode.

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 yours and the meter's safety do not use (or store) it in hazardous environments.

Certification

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

CE
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, the place of purchase or go to www.hannainst.com.

Warranty

IST96748 04/19

Measurement Procedure

1. Press the **ON/OFF** key to turn the meter on.

   Note: For best result perform your tests between 20-24 °C (68-75.2 °F).

2. A short beep alert together with four-dash lines displayed on the main LCD indicate that the meter is ready. The "**ZERO**" message displayed blinking indicates that the meter is ready for zeroing.
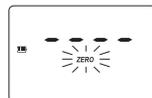
3. Fill one cuvette with 10 mL of deionized water and a second cuvette with 10 mL of sample.

4. Add one packet of HI93748A-0 Ascorbic acid to each cuvette, replace the plastic stopper and the cap. Shake gently until the Ascorbic acid dissolves.
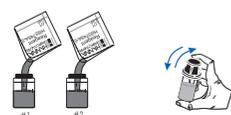
5. Add 0.2 mL of the HI93748B-0 Alkaline-cyanide reagent solution to each cuvette, replace the plastic stopper and the cap. Invert gently to mix for about 30 seconds.
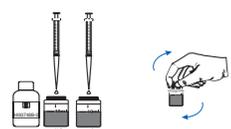
6. Add 1 mL of the HI93748C-0 0.1% PAN indicator solution to each cuvette, replace the caps and shake gently.
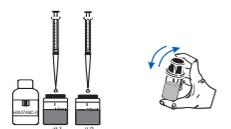
7. Insert the cuvette with the reacted deionized water (blank) into the holder and ensure that the notch on the cap is positioned securely in the groove.

8. Press and hold **READ▶/TIMER** for three seconds. The display will show the countdown prior to zeroing the blank. Alternatively, wait for 2 minutes and then press **ZERO/CFM** and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase. After a few seconds the display will show "**-0.0-**". The meter is now zeroed and ready for measurement. Remove the cuvette.
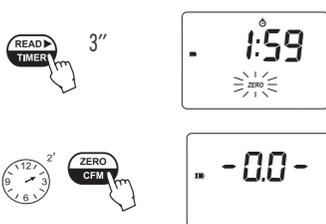
9. Insert the second cuvette with the reacted sample into the holder and ensure that the notch on the cap is positioned securely in the groove. Press **READ▶/TIMER**. The lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.
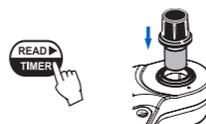
10. At the end of measurement, the instrument directly displays concentration in μg/L of manganese on the LCD.

Note: A temperature above 30 °C may cause turbidity. In this case, before zeroing and taking readings, add 2-3 drops of Dispersing agent (HI93703-51) to each cuvette and swirl until complete dissolution of turbidity.

Interferences

Interference may be caused by: Aluminum above 20 mg/L; Cadmium above 10 mg/L; Calcium above 200 mg/L as $CaCO_3$; Cobalt above 20 mg/L; Copper above 50 mg/L; Iron above 10 mg/L; Lead above 0.5 mg/L; Magnesium above 100 mg/L as $CaCO_3$; Nickel above 40 mg/L; Zinc above 15 mg/L.

Error & Warning Messages

Zero Reading

Light high: There is too much light to perform a measurement. Please check the preparation of the zero cuvette.

Light low: There is not enough light to perform a measurement. Please check the preparation of the zero cuvette.
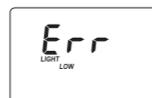
No light: The instrument cannot adjust the light level. Please check that the sample does not contain any debris.
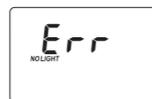
Sample Reading

Inverted cuvettes: The sample and the zero cuvette are inverted.

Zero: A zero reading was not taken. Follow the instructions of the measurement procedure for zeroing the meter.
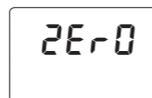
Under range: A blinking "**0**" indicates that the sample absorbs less light than the zero reference. Check the procedure and make sure you use the same cuvette for reference (zero) and measurement.
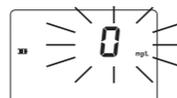
Over range: A flashing value of the maximum concentration indicates an over range condition. The concentration of the sample is beyond the programmed range: dilute the sample and re-run the test.

During Calibration

Standard low: The standard reading is less than expected.

Standard high: The standard reading is higher than expected.
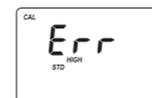
Other Errors & Warnings

Cap error: Message is displayed when external light enters in the analysis cell. Ensure that the cuvette cap is in place.

Cooling lamp: The instrument waits for the lamp to cool down.
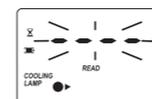
Low battery: Battery indicator is displayed empty. The battery must be replaced soon.
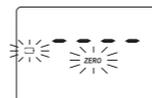
Dead battery: This indicates that the battery is dead and must be replaced. Change the battery and restart the meter.

GLP

In GLP mode, the last calibration date can be verified and the factory calibration can be restored.

Last Calibration Date

1. Press **GLP/▲** to enter GLP mode. The calibration month and day will appear on the main display and the year on the secondary display.
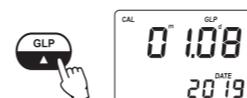
2. If no calibration was performed, the factory calibration message, "**F.CAL**" will appear on the main display and the instrument returns to measurement mode after three seconds.
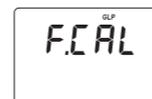
Restoring Factory Calibration

1. Press **GLP/▲** to enter GLP mode.

2. Press **READ▶/TIMER** to enter restore factory calibration screen. The instrument asks for confirmation to delete user calibration.

3. Press **ZERO/CFM** to restore the factory calibration (or press **GLP/▲** again to exit without restoring factory calibration). The meter briefly displays "**donE**" message to indicate that factory calibration has been restored and then returns to measurement mode.

Battery Management

To save the battery, the instrument shuts down after 10 minutes of non-use in measurement mode and after 1 hour of non-use in calibration mode.
If a valid measurement value was displayed before auto shut off, the value will then be displayed when the instrument is switched on. The blinking "**ZERO**" means that a new zero has to be performed.

One fresh battery lasts about 750 measurements, depending on the light level. The remaining battery capacity is evaluated at startup and after each measurement.

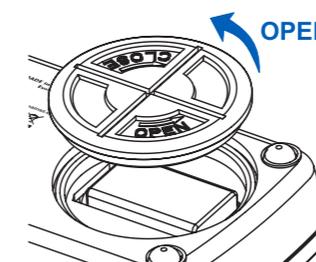The instrument displays a three-levels battery indicator:
- 3 lines indicate 100 % capacity
- 2 lines indicate 66 % capacity
- 1 line indicate 33 % capacity

Battery indicator is displayed blinking if the capacity is under 10 %.
If the battery is empty, the meter displays "**dEAd bAtt**" message and turns off.

To change the battery:
1. Press the ON/OFF key to turn the instrument off.
2. Turn the instrument upside down and turn the battery cover located on the back of the meter counterclockwise to unlock.
3. Remove the cover and replace the battery.
4. Insert back the battery cover and turn it clockwise to close.

OPEN

Accessories

Reagent Sets

HI93748-01	Reagents for 50 tests
HI93748-03	Reagents for 150 tests
HI93703-51	Dispersing agent

**Other Accessories**

HI96748.1-11	CAL Check™ Standard Cuvettes (1 set)
HI740029P	9V battery (10 pcs.)
HI731318	Cloth for wiping cuvettes (4 pcs.)
HI731331	Glass cuvettes (4 pcs.)
HI731335	Caps for cuvettes (4 pcs.)
HI93703-50	Cuvette cleaning solution (230 mL)

HI96748

Manganese Low Range Portable Photometer

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instruments