INSTRUCTION MANUAL

HALO 2

HI9810452

Wireless pH Tester for Meat

with built-in specialized electrode

Foodcare

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.
Visit www.hannainst.com for more information about Hanna Instruments and our products.

TABLE OF CONTENTS

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc.

1. PRELIMINARY EXAMINATION

Remove the tester and accessories from packaging and examine them carefully. For further assistance, please contact your local Hanna Instruments office or email us at tech@hannainst.com.

Each HI9810452 is supplied with a starter kit consisting of:

- pH 4.01 buffer solution, 20 mL (2 sachets)
- pH 7.01 buffer solution, 20 mL (2 sachets)
- Electrode cleaning solution for Meat, Grease, and Fats, 20 mL (2 sachets)
- Electrode storage solution, 13 mL dropper bottle (1 pc.)
- Gelled bridge electrolyte, 13 mL dropper bottle (1 pc.)
- 3V Lithium battery – CR2032
- Quick reference guide with instrument quality certificate

Designated slot for the meat blade storage. FC097 blade is sold separately.

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

2. SPECIFICATIONS

pH	Range	0.00 to 12.00 pH
	Resolution	0.01 or 0.1 pH
	Accuracy	±0.05 pH
mV *	Range	pH/mV conversion
	Resolution	0.1 or 1 mV
Temperature	Range **	0.0 to 60.0 °C (32.0 to 140.0 °F)
	Resolution	0.1 °C; 0.1 °F
	Accuracy	±0.5 °C; ±0.9 °F
Calibration	Up to three points or four points * Automatic buffer recognition with Standard buffers Hanna (pH 1.68 *, 4.01, 7.01, 10.01) or NIST (pH 1.68 *, 4.01, 6.86, 9.18)	
Temperature compensation	Automatic (ATC) or Manual (MTC) *	
Electrode	Body material	Polyvinylidene Fluoride (PVDF)
	Glass	Low Temperature (LT)
	Junction	Open
	Reference cell	Double, Ag/AgCl
	Electrolyte	Gel (refillable)
	Tip / Shape	Conic, Ø 5 x 10 mm (Ø 0.19 x 0.39")
	Outer diameter	12 mm (0.47")
	Length	75 mm (2.95")
Battery type	3V Lithium – CR2032	
Battery life	Approximately 1000 hours (500 hours with Bluetooth enabled)	
Environment	0 to 50 °C (32 to 122 °F)	
Casing	IP65 ingress protection	
Dimensions	51 x 150 x 21 mm (2.0 x 5.9 x 0.8")	
Weight	45 g (1.6 oz.)	

* Available with Hanna Lab App

** Measuring outside the recommended operating temperature range may damage the gel electrolyte and void product warranty.

Note: *The tester can display measurements from –2.00 to 16.00 pH. Measurements outside of the pH range will flash. If this happens, assess the integrity of the tester and the type of measured sample.*

3. GENERAL DESCRIPTION & INTENDED USE

HI9810452 is a professional wireless pH tester, part of Hanna Instruments HALO2 family.

- The integrated Bluetooth module allows the tester to be connected to a compatible smart device with the Hanna Lab App.
- The tester has a compact, waterproof casing, and automatic pH calibration at up to three points (up to four points when used with the App).
- Automatically compensated temperature readings are displayed on a large LCD.
- Accurate and easy to use, the tester is ideal for pH measurement during meat processing.
- External threads ensure FC097 blade compatibility.

Operating Modes

The HI9810452 can be used as a stand-alone pH tester or connected to the Hanna Lab App.
The App turns a compatible smart device into a full-featured pH meter. Features include: electrode condition, GLP with time-stamp, live-readings, mV resolution, manual temperature compensation, stability criteria, calibration reminder, pH (mV) and temperature alarms, tester ID, and data sharing.

Electrode Features

The food grade **PVDF body material** is easy to clean and disinfect. Resistant to most chemicals (e.g. solvents, sodium hypochlorite), ultraviolet light, and fungal growth, the PVDF body has high-abrasion resistance and mechanical strength.

The **conical tip** allows for easy penetration into solids and semisolids.

The **PVDF outer junction sleeve** can be removed and cleaned. Once cleaned, a small amount of supplied gel electrolyte is added and the junction is refreshed, improving the measurement and extending the life of the tester.

The **double junction** design presents a silver-free electrolyte solution interacting with the sample, making the electrode less susceptible to clogging and guaranteeing a fast response and stable reading.

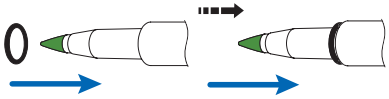
Built-in **temperature sensor** at the tip of the pH electrode allows for rapid determination of the sample temperature and a high-accuracy temperature reading.

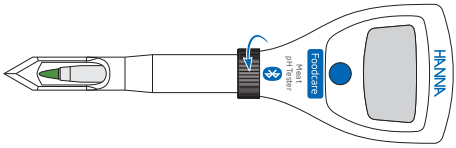
FC097 Stainless Steel Blade (purchased separately)

The tester has been specifically designed to be used with a 93 mm (3.66") stainless steel blade. The blade features a 25 mm (0.98") cutout opening allowing the electrode to come in contact with the sample. Made of high-grade steel, the tip is corrosion resistant and it protects the glass pH electrode from breakage and is razor sharp for piercing into meat.

Using the blade

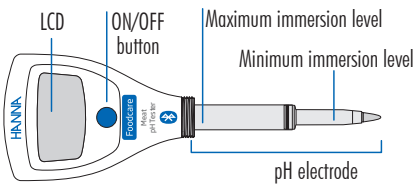
- Identify supplied o-ring and place on the electrode.
- Screw the blade collar ring until the threads are engaged.

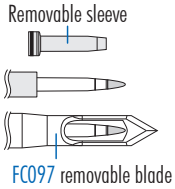


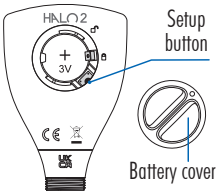


4. FUNCTIONAL DESCRIPTION & LCD DISPLAY

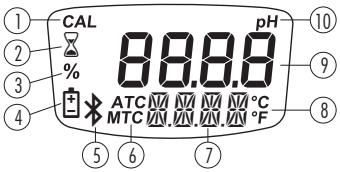
Front & Back view







LCD display



1 Calibration indicator
2 Stability indicator
3 Battery percentage indicator
4 Battery icon
5 Bluetooth icon
6 Temperature compensation
7 Second LCD line
8 Temperature unit
9 First LCD line
10 Measurement unit

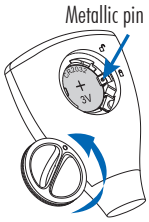
5. GENERAL OPERATIONS

Turning the Tester On & Off

- Turn the tester face down. Rotate the battery cover on the back of the tester counterclockwise and set it aside. Remove the battery insulation film.
- Press the ON/OFF button to turn the tester on (or off). Initialization screen displays all LCD segments, followed by the battery percentage. The tester enters measurement mode. Before the tester turns off, "OFF PWR" is displayed briefly.
- Press and hold the ON/OFF button to turn the tester off when connected to Bluetooth.

Battery Replacement

1. Turn off the tester. Turn the tester face down and rotate the battery cover counterclockwise.
2. Set the battery cover aside. Press the metallic pin to push old battery out.
3. Place the new battery with positive (+) sign facing out.
4. Reset the date and time in setup, or connect to the Hanna Lab App to update it automatically.
5. Align the mark on the cover with the open lock icon (🔓) on the case. Rotate the cover clockwise until the mark on the cover aligns with the closed lock icon (🔒).



***Note**: Only use specified battery type. Dispose of old battery in accordance with local regulations.*

6. SETUP

The Setup button is located inside the battery compartment. After Setup configuration, replace the cover.

Setup Menu Navigation

- Press the Setup button to enter Setup mode and navigate menu items.
- To exit Setup mode, press the Setup button after "SEt TIME" option is displayed.
- Press the ON/OFF button to configure menu item options.

Temperature Unit

Option: °C or °F
Press ON/OFF button to select desired temperature unit.

Auto-Off Interval

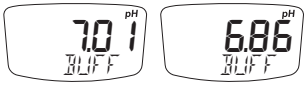
Option: 8, 60 min., or "----" (disabled)
Press ON/OFF button to select desired interval.
To save battery life, after the selected auto-off interval has elapsed, the tester will automatically turn off.

Calibration Points

Option: 2P or 3P
Press ON/OFF button to select between up to two- or up to three-point calibration.

Buffer Set

Option: 7.01 pH (Hanna) or 6.86 pH (NIST)
Press ON/OFF button to select the calibration buffer set (Hanna or NIST).



pH Resolution

Option: 0.01 pH or 0.1 pH
Press the ON/OFF button to select resolution.

Bluetooth Wireless Mode

Option: On, PAIr, or OFF
Press ON/OFF button to select Bluetooth option at start-up.

Bluetooth Pairing

Option: dEL PAIr
Press ON/OFF button to delete saved paired device.

Date & Time

Option: SEt TIME
Press ON/OFF button to set the date and time.
Option: YEAR, MO, DAY, HOUR, and MIN
Use the Setup button to select the option and press the ON/OFF button to change the selected option.

7. BLUETOOTH

With "PAIr BLU" or "On BLU" selected in Setup, the Bluetooth icon (ᛒ) will blink for up to 45 seconds, indicating the tester is in discoverable mode. Once connected, the icon will stop blinking. If not connected, the icon is not displayed.

- Select "On BLU", to enable Bluetooth without bonding.
- Select "PAIr BLU", to enable Bluetooth with bonding. A 6-digit bonding pin is displayed the first time the tester and smart device are paired. Once the devices are paired, the bonding pin is not required when reconnected.
- Select "OFF BLU", to disable Bluetooth.
- Select "dEL PAIR", to delete all paired devices. If PAIr BLU is enabled, a bonding pin will need to be re-entered.

8. HANNA LAB APPLICATION

- The Hanna Lab App is available on the App Store® and on Google Play.*
- Consult the Help section of the application for information on calibration, measurement, data logging, and sharing.
- When the tester is in discoverable mode, it will appear in the list of "Available Devices".
- Within the application, tap "Connect" to pair the tester with the device. All readings are transmitted directly to the application.

Tag a Measurement

Once connected to the application, the ON/OFF button can be pressed to tag the current reading.

- Press the ON/OFF button from measurement mode. The display shows "SEt TAG", followed by "- TAG".
- The reading on the application will flash green and the note icon (🗨) will be displayed. Tap the note icon (🗨) to add an annotation.

9. CALIBRATION

Preparation & Guidelines

1. Remove the electrode from the plastic storage cap. Save the cap for electrode storage.
2. Rinse off any storage solution or salts that may be on the body.
3. Verify there is solution inside the pH bulb by shaking the electrode down to restore continuity as the solution may have moved up the stem during shipping.
4. For best results, use a rinse beaker and a separate calibration beaker for each buffer. Discard rinsing buffers after use.

***Note**: Remove the blade prior to calibration and clean the electrode.*

App Store is a trademark of Apple, Inc.
Google Play and the Google Play logo are trademarks of Google LLC.

Procedure

For most applications it is recommended to start with pH 7.01 buffer (or pH 6.86).
To restore factory defaults, press and hold the ON/OFF button. "CAL CLR" is displayed.

Note: *It is recommended to calibrate the electrode with buffers at the temperature it will be used at.*

Stand-Alone Tester (Up to Three-Point Calibration)

1. Rinse the electrode tip with purified water and blot dry. Then rinse with the buffer being used for calibration.
2. Press and hold ON/OFF button until "CAL MODE" is displayed.
3. When "7.01 USE" or "6.86 USE" is displayed with "CAL" tag blinking, place the tip of the electrode in the correct buffer.

4. When the buffer has been recognized, "REC" is displayed.
   "WAIT" is displayed with the stability indicator (⧖) blinking until the reading is stable. Wait until the measurement is stored and the stability indicator disappears.

5. To save a one-point calibration and return to measurement mode, press the ON/OFF button.
   "CAL SAVE" is displayed briefly.

With 2P option selected

6. Place the tip of the electrode in the second buffer rinse beaker, then in the second calibration buffer. Wait until the measurement is stored and the stability indicator disappears.
7. After the second point has been stored, "CAL SAVE" is displayed briefly and the tester will return to measurement mode automatically.

With 3P option selected

6. Place the tip of the electrode in the second buffer rinse beaker, then in the second calibration buffer. Wait until the measurement is stored and the stability indicator disappears.
7. Place the tip of the electrode in the third buffer rinse beaker, then in the third calibration buffer. Wait until the measurement is stored and the stability indicator disappears.
8. After the third point has been stored, "CAL SAVE" is displayed briefly and the tester will return to measurement mode automatically.

With Hanna Lab App (Up to Four-Point Calibration)

Connect the tester to the Hanna Lab App and follow the calibration procedure.
See the App Help section for the calibration procedure.

10. CARE & MAINTENANCE

- Do not immerse the tester over the maximum immersion level.
- Fresh buffer should be used for each calibration. Once the sachets are opened the buffer value can change over time.
- For improved accuracy a two-point calibration is recommended.
- If the electrode is slow or sluggish, soak it in cleaning solution for 20 minutes. Rinse with water and hydrate the electrode in storage solution for a minimum of 30 minutes before calibrating.
- If measurements are taken successively, rinse the electrode thoroughly in distilled or deionized water to eliminate cross-contamination between measurements.
- When not in use, remove the blade, add a few drops of storage solution to the protective cap to keep the glass tip and the junction hydrated. If storage solution is not available, pH 4.01 or pH 7.01 buffer can be used.

Cleaning

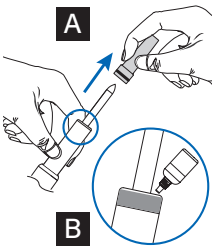
- Remove the blade and o-ring, and clean with soapy water.
- Rinse with deionized water. Keep the o-ring with the blade after cleaning.
- Remove electrode's outer junction sleeve and clean with purified water. Once cleaned a small amount of supplied gel electrolyte should be added to refresh the junction and improve the pH measurement.

***Note**: Never immerse the tester over the maximum immersion level.*

Refilling the Electrode

- To remove the electrode sleeve, carefully rotate and slide it off (A). Set aside.

  ***Note**: Handle the probe with care, the pH electrode stem is made of glass.*



- Rinse off any traces of electrolyte gel from sleeve. Soak the electrode tip in HI700601 General purpose cleaning solution (or HI700661, HI700663, HI700664) for 20 minutes. Rinse with distilled or deionized water.
- Refill the reference well with HI9071 Gelled bridge electrolyte (B).
- Replace the sleeve. Ensure the o-ring is fixed inside the electrode. Rinse off excess gel with distilled or deionized water.
- Shake the probe down gently to eliminate any trapped air bubbles.
- Soak the electrode in HI70300 Electrode storage solution for a minimum of 30 minutes before calibrating.

Storage

- To ensure a quick response, the glass tip and junction should be kept hydrated.
- When not in use, add a few drops of storage solution to the storage cap. If storage solution is not available, pH 4.01 or pH 7.01 buffer can be used.

***Note**: Do not store the electrode in distilled or deionized water.*

Stainless steel blade

- When not in use, keep the FC097 meat blade dry and clean (no grease or food particles) in the designated box slot, with protective cap on, to avoid contamination. Keep the o-ring with the blade.

11. WARNING & ERROR MESSAGES

	"---- WRNG" displayed during calibration.	Invalid buffer. Check the buffer value and use fresh buffer.
	Measured value displayed blinking.	Measured value is out of electrode range. Clean the electrode to improve condition.
	Battery icon (🔋) displayed blinking.	Battery is below 10 %, replace the battery.
	"BAtt DEAD" and tester turns off.	Depleted battery, replace the battery.

12. ACCESSORIES

Ordering Information	Product Description
pH Buffer Solution	
HI50016-02	pH 1.68 buffer solution, 20 mL sachet (25 pcs.)
HI70004P	pH 4.01 buffer solution, 20 mL sachet (25 pcs.)
HI70006P	pH 6.86 buffer solution, 20 mL sachet (25 pcs.)
HI70007P	pH 7.01 buffer solution, 20 mL sachet (25 pcs.)
HI70009P	pH 9.18 buffer solution, 20 mL sachet (25 pcs.)
HI70010P	pH 10.01 buffer solution, 20 mL sachet (25 pcs.)
HI77400P	pH 4.01 & 7.01 buffer solution, 20 mL sachet (10 pcs., 5 each)
HI770710P	pH 10.01 & 7.01 buffer solution, 20 mL sachet (10 pcs., 5 each)
Electrode Cleaning Solution	
HI700601P	Electrode cleaning solution for general use, 20 mL sachet (25 pcs.)
HI700630P	Meat, grease, and fats acid cleaning solution, 20 mL sachet (25 pcs.)
Electrode Storage Solution	
HI70300L	Electrode storage solution, 500 mL
HI70300M	Electrode storage solution, 230 mL
HI70300S	Electrode storage solution, 30 mL dropper
HI9072	Electrode storage solution, 13 mL dropper
Electrode Fill Solution	
HI9071	Gelled bridge electrolyte, 13 mL dropper
Other Accessories	
FC097	Stainless steel meat blade (93 mm / 3.66")

13. ABBREVIATIONS

ATC Automatic Temperature Compensation
GLP Good Laboratory Practice
MTC Manual Temperature Compensation
NIST National Institute of Standards and Technology

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 tester's performance. For your and the tester's safety do not use or store it in hazardous environments.

WARRANTY

HI9810452 is warranted for a period of one year 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 tester 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. This product interacts with raw meat. When shipping any product, make sure it is shipped back in compliance with shipping regulations, thoroughly cleaned to avoid contamination, and properly packaged for complete protection.

CERTIFICATION

All Hanna Instruments conform to the **CE European Directives** and **UK Standards**.

Disposal of Electrical and 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.

RoHS compliant

Regulatory Notices for stand-alone, Bluetooth, low-energy modules

All modules have identical operation. All references to US FCC Rules and Canadian RSS standards on device classification and operation, listed here under BMD-300 Module, apply to all models noted here. Remove the battery cover to check the installed module.

BMD-300 Module	
United States (FCC) FCC ID: 2AA9B04 This device complies with FCC Rules, Part 15, Subpart C "Intentional Radiators" and Subpart B, Chapter §15.105. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case, users are required to correct the interference at their own expense.	
Canada (ISED) IC: 12208A-04 This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.	
Australia / New Zealand (RCM) BMD-300 complies with the AS/NZS 4268:2017.	
Japan (MIC) R 210-106799	**South Korea (KCC)** R-CRM-Rgd-BMD-300
Brazil (ANATEL): Contains ANATEL approved module # 00820-21-05903.	**Mexico (IFETEL)**: Este equipo contiene el módulo con IFT #: NYCE/CT/0146/17/TS.

BMD-350 Module	
United States (FCC) FCC ID: 2AA9B05	**Canada (ISED)** IC: 12208A-05
Japan (MIC) R 210-108944	**Australia / New Zealand (RCM)** BMD-350 complies with the AS/NZS 4268:2017
Eurasia (EAC) EAC EAЭC N RU Д-US.HA27.B.00650/18	**Brazil (ANATEL)** Contains ANATEL approved module # 00857-21-05903
China (SRRC) CMIIT ID: 2018DJ7255	**Mexico (IFETEL)** Este equipo contiene el módulo con IFT #: RCPRIBM18-1491

ANNA-B112 Module	
United States (FCC) FCC ID: XPYANNAB1	**Canada (ISED)** IC: 8595A-ANNAB1
Taiwan (NCC) Contains Transmitter Module 內含發射器模組: CCAI18LP2200T2	**South Korea (KCC)** R-C-ULX-ANNA-B112
South Africa (ICASA) ICASA TA-2019/1203 Approved	**China (SRRC)** CMIIT ID: 2021DJ6698
Australia / New Zealand (ACMA) ANNA-B1 complies with AS/NZS 4268:2012 standard	
Japan (MIC) R 204-810005	The module complies with the Japanese Technical Regulation Conformity Certification of Specified Radio Equipment (ordinance of MPT N°. 37, 1981), Article 2, Paragraph 1, Item 19 "2.4 GHz band wide band low power data communication system".
ANATEL 03850-19-05903	**Brazil (ANATEL)** This equipment operates on a secondary basis and, consequently, must accept harmful interference, including from stations of the same kind, and may not cause harmful interference to systems operating on a primary basis.