INSTRUCTION MANUAL

HI6321

Advanced Conductivity Benchtop Meter

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.

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1. PRELIMINARY EXAMINATION

HI6321 is Hanna's® advanced benchtop conductivity meter with a large touch screen display and streamlined design. Each HI6321 is supplied with:

- HI7631233 EC and resistivity probe
- HI764060 electrode holder with following accessories:
  - base plate (with integrated pivot pin) and screw (requires installation)
  - cable holder clip, attached
  - electrode holder with adapter, attached
- EC calibration starter kit consisting of:
  - 1413 μS/cm standard solution (4 sachets)
  - 12880 μS/cm standard solution (2 sachets)
  - 5000 μS/cm standard solution (2 sachets)
- Electrode rinse solution (2 sachets)
- 24 VDC power adapter
- USB-C to USB-A cable
- Probe quality certificate
- Quick reference guide
- Instrument quality certificate

Note: Save all packing material until you are sure the instrument works correctly. Any damaged or defective item must be returned in its original packing material with the supplied accessories.
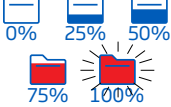
2. SAFETY MEASURES
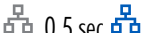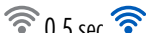
Handling & Usage Precautions

The unit, while not fragile, can be damaged by improper handling and usage.

- Transport the unit with all cables removed.
- Keep the unit on a stable and even surface, away from contact with liquid.
- Avoid excessive dirt and dust.
- Protect the unit from contact with food, oils, and chemicals.
- If the device becomes wet, gently wipe the exterior with a clean, dry cloth.
- Keep away from direct sunlight.
- Use in a safe place that is appropriate to application requirements.
- Use attachments and accessories specified in this manual only.
- Capacitive touchscreen and buttons — operate without applying pressure.
- Do not puncture the capacitive touchscreen or drop the unit.
- Do not use the device near heat sources.
- Do not place objects on top of the device.
- Do not insert objects into the ports, spaces around keys, other than the intended cable, USB drive.

3. USER INTERFACE – ICONS

Capacitive keys	Description
$<$	**Back** — return to a previous hierarchical menu level
$\bigcirc$	**Home** — access to measurement screen & configured profile
$\equiv$	**Menu** — access to Users, System Settings, Measurement Settings, Log Recall, Help

Main menu	Description
😊	Users — login & rights configuration
🔧	System Settings — system configuration, connectivity & printing items
⚙	Measurement Settings
▶	Log Recall — access logged measurement data
❓	Help — access support

Measurement	Description
⚙	Measurement Menu, accessed from measurement screen
	EC and resistivity probe
🔒	Autohold applied
EC / Res / TDS / Sal	Autohold, pending stable measurement
⚠ / ⚠	Warning on standby / active function

Logging	Description
● / ■ #00002 00:00:12	Start / Stop logging (current index and time since log start)
M / M #00012	Manual logging (current index)
D	Triggers log session, pending next stable measurement
A	Autohold logging in progress
🗨 / 🗨	Annotated text/Annotated text in use
0% 25% 50% 75% 100%	Available file storage capacity (at full capacity the icon is displayed blinking)

Log recall	Description
▤ / ▤	Table view — function active/not selected
⬛ / ⬛	Graph view — function active/not selected
ⓘ / ⓘ	Information view — function active/not selected

General	Description
🗗	Measurement profile
⏳	Background operation in progress
⏰	Active alarm set
Unstable Stable Autohold	Stability/Autohold indicator

Connectivity & Printing		Description
Ethernet	🖧	Connection established (tap for IP address)
	🖧 0.5 sec 🖧	Connection in progress
	🖧	Connection error
Wi-Fi	📶	Connection established (tap for IP address)
	📶 0.5 sec 📶	Connection in progress
	📶	Connection error
USB	▬	USB-A or USB-C flash drive plugged in
	▬	High-power consumption with the flash drive plugged in
PC	🖥	PC connection established through USB-C port
Printer	🖨	Printer connected — printing manual log option **enabled**
	🖨	Printer connected — printing manual log option **disabled**
	🖨!	Printer not recognized or no longer connected

4. GENERAL DESCRIPTION & INTENDED USE

HI6321 is an advanced benchtop meter with a capacitive display, comprised of a housing and an integrated conductivity measurement module. Compact and easy to operate, the meter is delivered with HI7631233 EC and resistivity probe.

HI7631233 is a platinum, four-ring probe with an integral temperature sensor that adjusts the measured conductivity to a reference temperature by applying compensation algorithms:

- **linear**: when the temperature coefficient of variation has the same value for all measurement temperatures
- **standard**: for high-purity water measurements (>1 MΩ•cm resistivity) and documented in ASTM Standard D5391-14
- **natural**: for natural ground, well, or surface water (water with similar composition) as per ISO7888 standard

The result is reliable electrolytic conductivity, resistivity, TDS (Total Dissolved Solids), or Salinity (expressed in percent, PSU, or ppt units).

TDS is a calculated value based on the conductivity of the solution (TDS $=$ factor $\times$ EC$_{25}$). A TDS factor is a conversion factor used to change an EC measurement to a ppm measurement.

Sal PSU: The practical salinity of seawater relates the ratio of electrical conductivity of a normal seawater sample at 15 °C and 1 atmosphere to a potassium chloride solution (KCl) with a mass of 32.4356 g/Kg water at the same temperature and pressure. Under these conditions the ratio is equal to 1 and S$=$35. The practical salinity scale may be applied to values 0 through 42.00 PSU at temperatures between 0 to 35 °C.

Sal ppt: measurements expressed in ppt are based on the Natural Seawater Scale that extends from 0.00 to 80.00 g/L and covers 10 to 31 °C temperature range. It determines the salinity based upon a conductivity ratio of sample to standard seawater at 15 °C and an approximate salinity value of 35 in seawater.

Sal %: in this scale 100 % salinity is equivalent to roughly 10 % solids.

This system responds to a complex range of measurement and monitoring requirements, providing accuracy, reproducibility, and reliability.

HI6321 is supplied with an electrode holder that has a flexible arm. The holder can be mounted quickly and provides secure support for electrodes while taking measurements in sample containers.

This benchtop meter supports:

- USB type A – support for USB stick, printer, keyboard
- USB type C – support for USB stick, PC connection

The user can select between five different views.

- Basic measurement configuration
- Simple GLP with calibration information
- Full GLP with probe status and calibration point details
- Live updated, interactive graph
- Tabulated data with date, time, and notes

Capacitive touch screen with multi-touch support

The benchtop unit has a 7-inch color display with resolution of 800$\times$480. The capacitive, multi-touch screen supports video playback and data plotting.

Main Features

Calibration & Measurement

- Measure
  - ▶ **Conductivity** — μS/cm or mS/cm
  - ▶ **Resistivity** — Ω•cm, kΩ•cm, MΩ•cm
  - ▶ **TDS** — ppm or ppt
  - ▶ **Salinity** — ppt, PSU, %
- Application-specific profiles for quick and direct measurement without the need to update the sensor and system settings
- Active log during measurement
- Measurement stability indicator (using the Stability Criteria setting)
- Reading modes: direct and direct / autohold
- Temperature source (Automatic or set manually)
- Audible and / or alarm messages for measurements outside threshold limits
- Galvanic isolation for conductivity measurement module
- Standard (up to)**four-point conductivity** calibration with standards for cell factor determination and $0 \, \mu$S/ cm for offset:
  - 84 μS/cm, 1413 μS/cm, 5.0 mS/cm,12.88 mS/cm for the 0.1/cm cell
  - 80.0 mS/cm, 111.8 mS/cm additional standards for the 1.0/cm cell
- Standard **single point salinity** calibration in 100 % salinity standard, with Salinity **scale** set to %
- Non-volatile memory saves data and settings

Logging

- Data log collection of at least 1 000 000 data points (with time and date stamp)
- Logging types: manual, automatic, autohold
- Sample ID for manual and Autohold data

Connectivity features & services

- Transfer logged data to a USB thumb drive
- Log files that include measurements and calibration data (as .CSV file)
- FTP and email for log export via Ethernet and Wi-Fi connection
- Download logs using the benchtop's embedded web server
- USB type A for USB stick, printer, keyboard
- USB type C for USB stick and PC connection

User-support feature

- Help section — brief overview of instrument's main functionalities and features

5. SPECIFICATIONS

5.1. INSTRUMENT

Conductivity	Range	0.000 to 9.999 μS/cm 10.00 to 99.99 μS/cm 100.0 to 999.9 μS/cm 1.000 to 9.999 mS/cm 10.00 to 99.99 mS/cm 100.0 to 1000.0 mS/cm
	Resolution	0.001 μS/cm 0.01 μS/cm 0.1 μS/cm 0.001 mS/cm 0.01 mS/cm 0.1 mS/cm
	Accuracy	$\pm$1 % of reading or $\pm$0.010 μS/cm, whichever is greater
	Cell constant	0.0500 to 200.0000 /cm
	Calibration type	Automatic Manual
	Calibration points	Single Multiple
	Calibration solutions	84.00 μS/cm 1.413 mS/cm 5.000 mS/cm 12.88 mS/cm 80.00 mS/cm 111.8 mS/cm
	Calibration reminder	Disabled Daily: 0 min. to 23 hours and 59 min. Periodic: 1 min. to 30 days, 23 hours and 59 min.
	Temperature compensation	Linear Natural Standard Disabled
	Reference temperature	Range 5.0 to 30.0 °C (41.0 to 86.0 °F) Resolution 0.1 °C / 0.1 °F
	Temperature coefficient	0.00 to 10.00 %/°C

Resistivity	Range	1.0 to 99.9 Ω•cm 100 to 999 Ω•cm 1.00 to 9.99 KΩ•cm 10.0 to 99.9 KΩ•cm 100 to 999 KΩ•cm 1.00 to 9.99 MΩ•cm 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm 1 Ω•cm 0.01 KΩ•cm 0.1 KΩ•cm 1 KΩ•cm 0.01 MΩ•cm 0.1 MΩ•cm
	Accuracy	±1 % of reading or ±1 Ω•cm, whichever is greater
Total Dissolved Solids (TDS)	Range	0.000 to 9.999 ppm 10.00 to 99.99 ppm 100.0 to 999.9 ppm 1.000 to 9.999 ppt 10.00 to 99.99 ppt 100.0 to 400.0 ppt actual TDS (with 1.00 factor)
	Resolution	0.001 ppm 0.01 ppm 0.1 ppm 0.001 ppt 0.01 ppt 0.1 ppt
	Accuracy	±1 % of reading or ±0.01 ppm, whichever is greater
Salinity	Range	0.00 to 42.00 PSU - Practical Scale 0.00 to 80.00 ppt - Natural Sea Water 0.0 to 400.0 % - Percent Scale
	Resolution	0.01 for Practical Scale / Natural Sea Water 0.1 % for Percent Scale
	Accuracy	±1 % of reading
	Calibration	1 point for percent scale, using 100 % salinity calibration solution

Temperature	Range	−20.0 to 120.0 °C / −4.0 to 248.0 °F / 253.2 to 393.2 K
	Resolution	0.1 °C / 0.1 °F / 0.1 K
	Accuracy	±0.2 °C / ±0.4 °F / ±0.2 K
	Calibration	Single point, adjustable
Reading	Modes	Direct Direct/Autohold
	Stability criteria	Accurate Medium Fast
Views	Basic	Conductivity, Resistivity, TDS, Salinity, Temperature measurement data Measurement profile (if enabled) Stability status
	Simple GLP	Basic view information Last calibration date and offset
	Full GLP Conductivity & Salinity	Simple GLP information and calibration point details Cell constant, reference and source temperature
	Graph (Plot)	Measurement versus time graph (panned or zoomed)
	Table	Measurements updated every second (displayed in table)
Logging	Type	Automatic, Manual, Autohold
	Number of records	50 000 maximum per file Stores at least 1 000 000 data points per user
	Automatic interval	1, 2, 5, 10, 30 seconds 1, 2, 5, 10, 15, 30, 60, 120, 150, 180 minutes
	Sample ID	Incremental mode or manual
	Export option	.CSV file format
Users		Up to 9 users and the default administrator account
Connectivity	USB-A	2 ports for keyboard and/or printer input or USB thumb drive
	USB-C	1 port for PC connectivity, USB-C type thumb drive and printer
	Wi-Fi & Ethernet	FTP Web server Log transfer and download Email
	RS232	Connecting peripherals
Power supply		DC adapter 100-240 VAC to 24 VDC 2 A
Environment		0-50 °C / 32 - 122 °F / 273 - 323 K Maximum 95% RH non-condensing
Dimensions		205×160×77 mm (8.0×6.2×3.0")
Weight		Approximately 1.2 kg (26.5 lbs.)

5.2. HI7631233 PROBE

Range	0 to 1000 mS/cm
Recommended operating temperature	−5 to 100 °C (23 to 212 °F)
Temperature sensor	Built-in
Cell constant	1 ± 15 %
Cell type	Four-ring, platinum on glass
Body	Polyetherimide (PEI)
Wetted parts	Sensor body PVDF O-ring NBR
Sensor diameter	Ø 12.0 mm
Connection	DIN
Cable length	1 m (3.3')

6. FUNCTIONAL & LCD DESCRIPTION

6.1. MAIN UNIT

Front View
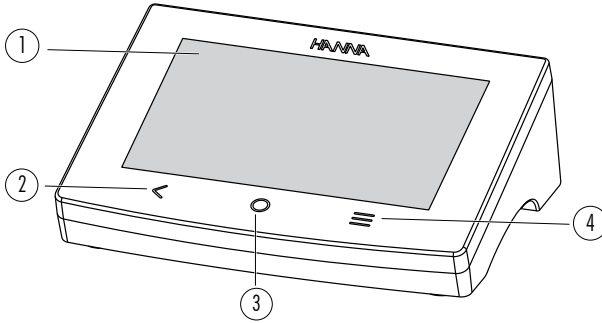
1. LCD display	3. **Home** key
2. **Back** key	4. **Menu** key

LCD Description
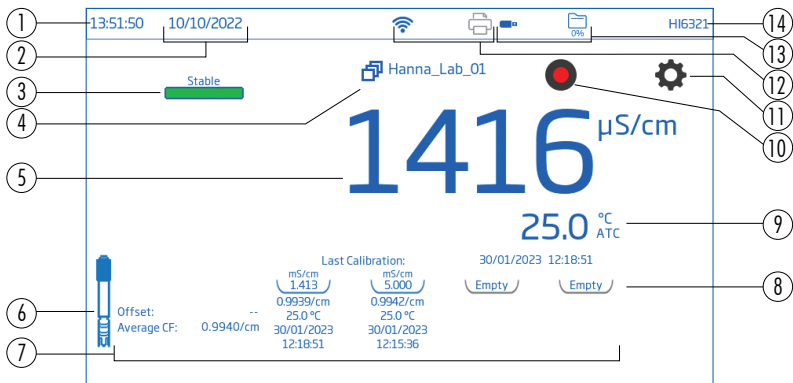
1. Current time	9. Temperature reading
2. Current date	and temperature compensation status
3. Stability statusr	10. Start logging icon
4. Measure profile	11. Measurement Menu icon
5. Parameter reading	12. Connectivity and Printer icons
6. Probe icon	13. USB connection status
7. Calibration information	and Logging space availability
8. Calibration standard trays	14. User name (default "Admin")

Status Area

| 10:07:11   03/03/2022 | 📶 | 🔋 | 🗀 0% | Admin |

Status area runs horizontally across the top of the LCD screen and is continuously displayed after powering the unit.
- Left corner — current time & date
- Middle — connectivity status
- Right corner — storage space availability & username

Direct Keys

Icon	Name	Function
<	Back	• returns the user to previous hierarchical menu level • exit or escape function
◯	Home	• access to measurement screen • exit or escape function
☰	Menu	• access to Users, System Settings, Measurement Settings, Log Recall, Help

Rear View
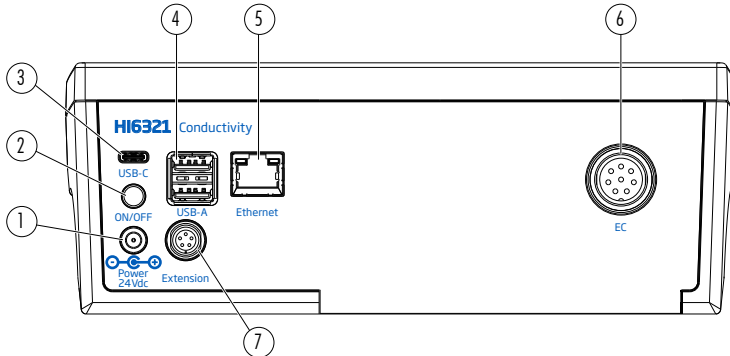
1. Input for power cable
2. Power button
3. Input for USB-C flash or PC cable
4. Input for USB-A flash (x2) or keyboard/printer
5. Ethernet port
6. Probe connection port
7. Peripherals port

6.2. PROBE

The HI7631233 four-ring conductivity probe provides stable measurements over a wide measure range and does not require frequent calibrations.

An integral temperature sensor measures temperature and adjusts the measured conductivity to a reference temperature by applying compensation standards.

1   Cable
2   Probe body
3   Probe holes
4   Probe sensor
5   Plastic bung (remove for measurement and calibration)
6   DIN Connector
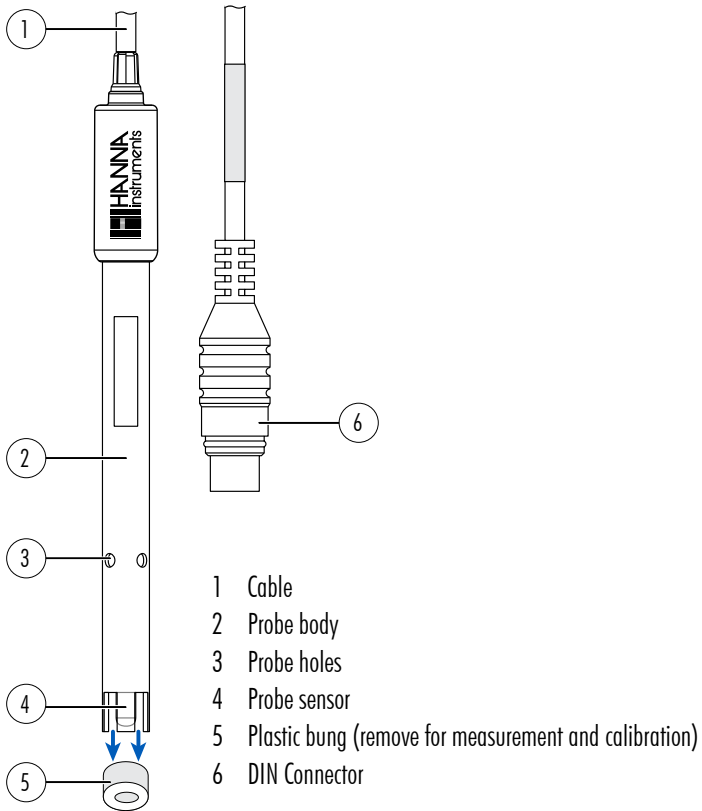
7. GETTING STARTED

7.1. INSTALLING THE HOLDER

Attaching the base plate

- Take the HI764060 holder from the box.
- Identify the metal base plate (4) with the integrated pivot pin (5) and the screw (2).
- The plate may be attached to either side of the meter, left (L) or right (R).
- Place the meter face down on a clean, dry surface.
- Align the hole on the base plate (3) over the rubber foot (6R or 6L). The pivot pin (5) should be facing downward.
- Use a screwdriver (1) to tighten the screw (2) and attach the base plate to the meter.
- Position the meter with the display facing up.
- Slide the holder (7) over the pivot pin (5). A "slide in" motion is required to lock the arm into position.
- For increased arm rigidity, tighten the metal knobs on both sides of the holder.
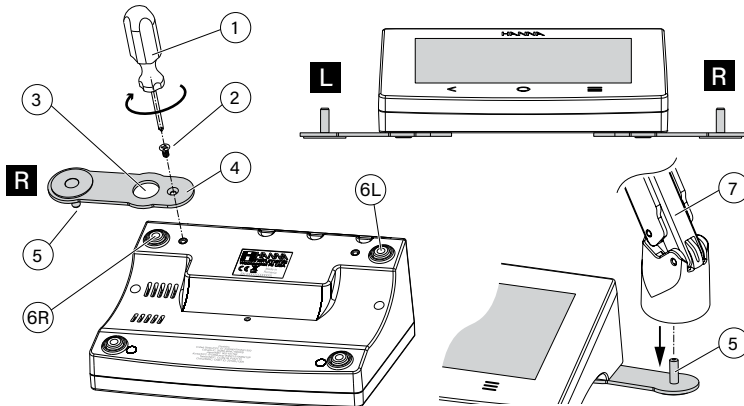
Cable holder clip

The holder is delivered with a cable clip (attached) that secures several cables whilst allowing them to move freely with the arm motion.

1. To open the latch, press the clip inward while pulling up the latch.
2. To close the latch, lower latch over cable and snap closed.
   The latch snaps in position and secures the cables inside.

Open clip   Close clip

press

pull

To reattach the clip onto the electrode arm:
1. Align the clip's dovetail over the slot.
2. Gently push down to slide in position.

Insert clip

Center-back positioning

Using the adapter

The arm holder is ended with a probe holder fitted with an adapter that has three different-sized apertures:
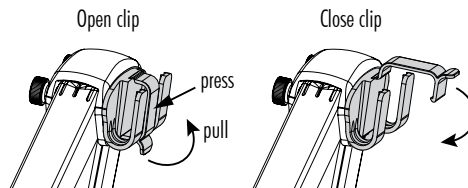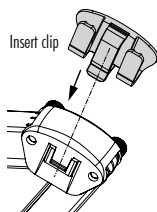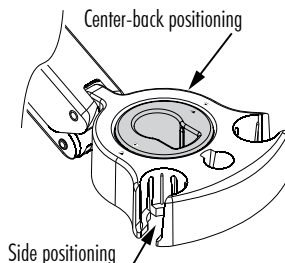
- center-front (reference temperature probe only)
- center-back (conductivity probe, with adapter only)
- left and right (conductivity probe, no adapter)

Side positioning

7.2. USING THE HOLDER

Use the holder for probe support and easy movement in and out of beakers and containers during calibration and sample measurement.

7.3. CONNECTING THE PROBE, KEYBOARD, PRINTER

Connecting the probe

The HI7631233 probe is connected to the benchtop through a DIN connector, which makes attaching and removing the probe an easy process. With the meter off:

- Connect the probe to the DIN connection port, on the back of the meter. Align the pins and key then push the plug into the socket.
- Place the probe into the holder and secure the cable in the cable holder clip.
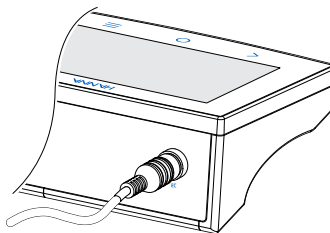
Note: Connector and plug must be connected firmly for the system to work correctly.

Connecting a USB-A keyboard

Connect a USB's keyboard plug into the USB-A input on the back of the unit. Once connected the keyboard is automatically detected.

Users can attach a keyboard to set up calibration password, sample ID, user ID, or company/lab name.

Connecting a printer

Hanna® aims to ensure meter compatibility with USB printers but can not ensure compatibility with all models. HI6321 can print directly to certain models of USB-dedicated printers with PCL printer language capability.

Printer components and requirements

- Printer, PCL driver compatible
- Cable
  - ▶ power cable
  - ▶ USB connector cable with two ends:
        type B connector (plugs into printer)
   type A connector (plugs into the USB port on the meter)

7.4. POWERING THE UNIT & SELECTING OPERATING LANGUAGE AND REGIONAL PREFERENCES

1. Connect the power adapter to the rear panel of the meter.
2. Connect the power plug into the 24 V power socket.
3. Press the black ON/OFF power button.
    At start up, the meter briefly displays the initialization screen.
4. The instrument launches into a Tutorial.
    Tap [Skip] to automatically enter measurement screen.
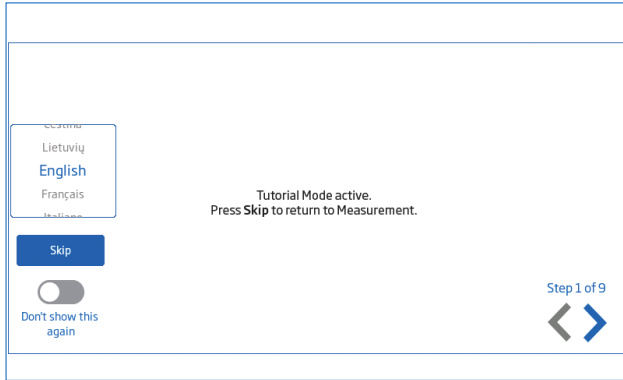
At first power on default language is English. A language window allows users to set operating language.
To configure regional preferences, from Tutorial screen:

- Tap ≡ (direct **Menu** key) twice to access System Menu screen.
- Tap ⊘ (System Settings icon) and select System tab.
    Users can change the date, time, and region settings, as well as language preferences.

7.5. BASIC OPERATIONS

General operating modes are setup, measurement, logging, and data sharing.

- Tap ≡ (direct **Menu** key) to access:
    - ☻ User settings
    - ⊘ System settings
    - ⚙ Measurement settings
    - ▶ Log recall files and file management
        User can view a single sample or an interval log session, see Logging section for detailed description.
    - ❓ Help for text and video support
- Tap ○ (direct **Home** key) to return to measurement.
- Tap ✿ (Measurement Menu icon) to access sensor-related functions.

8. SYSTEM MENU ITEMS

Tap ☰ (direct **Menu** key) to access System Menu screen. Users must have previously logged in.
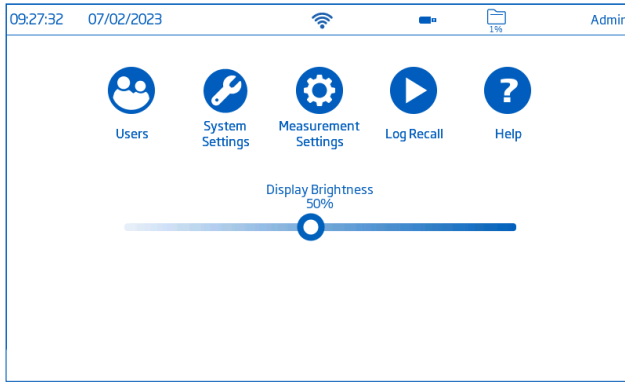
System Menu capacitive icons

Symbol	Name	Functionality
😊	Users	Login and rights configuration & instrument accessibility
🔧	System Settings	System configuration, connectivity, and printing items
⚙	Measurement Settings	Measurement configuration
▶	Log Recall	Access logged measurement data
❓	Help	Access video-supported outline of main instrument functionalities

Brightness control bar

  Drag the slider along the control bar to adjust brightness.
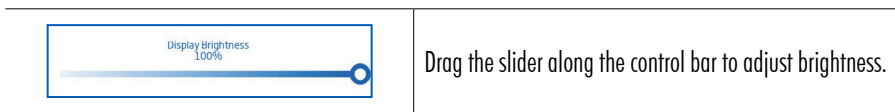
8.1. USERS

Users is the first item under the System Menu and enables multiple-users configuration, rights management, and account creation.
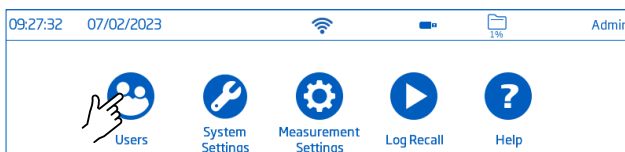
On first access, "Admin" is default user name and no password is required. Default options are updated from the Users menu.

Function	Administrator*	Standard User
Enable account creation	✓	–
Reset password	✓	–
Delete account	✓	–
Assign administrator rights	✓	–
View/Use Factory Settings reset	✓	–
Customize settings	✓	✓
Add FTP information	✓	✓
Change password	✓	✓
View and delete log files	✓	✓

*Settings and configurations made by users with administrator rights can only be modified by users with identical rights.

Log in & Create New Account

1. Power the instrument.
   Wait for the initialization process to complete.
2. Tap [Skip] to enter Measurement screen.

   Note: Tap ● (under [Skip]) to disable Tutorial.
3. Tap ≡ followed by 😊.
4. Tap **Edit Users** to enter Account Management.

18:18:41 11/11/2022	📶	🔋	📁 0%	HI6321
	User Settings			
Logout	Edit Users			
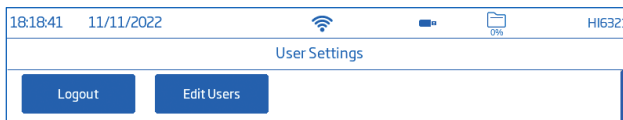
5. Tap ● to enable Account Creation and Logins. Tap ＜ to return.

🔋	📁 0%	HI6321
Enable Account Creation		🔘
Enable Logins		🔘
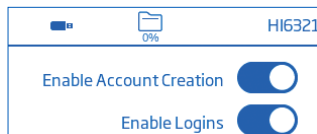
6. Tap **Logout** to enter Users screen.
   "Admin" account is automatically created (default).
7. Tap the **plus** symbol avatar.
8. Input user name and tap ⏎.

9. Enter password and tap ⏎. Reenter password to confirm.
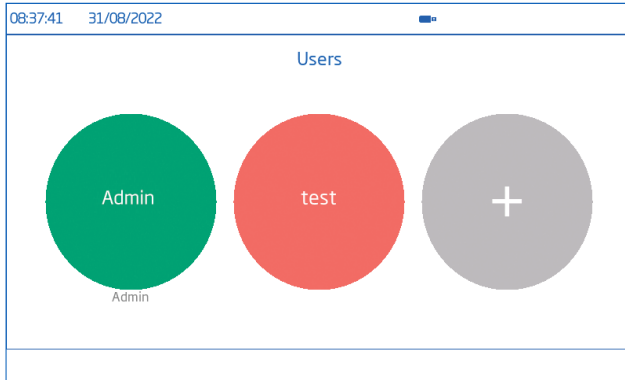
Log Out & Switch User

1. Tap 😊 followed by **Logout**.
2. Tap user's account avatar.
3. Input password.

Adding & Removing Users (users with administrator rights only)

1. Tap ☰ followed by 😊.
2. Tap **Edit Users** to enter Account Management screen and start editing.
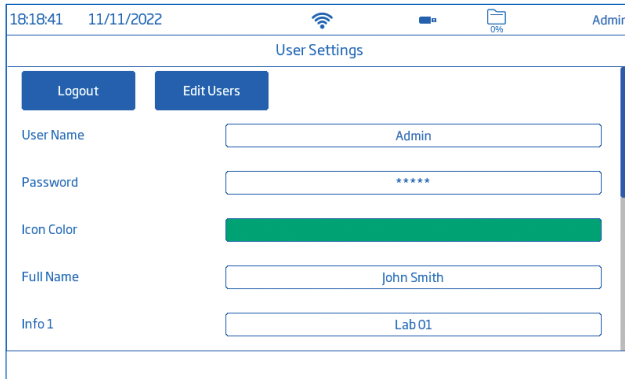
Configure user settings

Name, Password, assigned avatar color, Full Name, information fields, FTP-dedicated fields, Email Address

• To edit option, tap field and use the on-screen keypad to input information.
• Use the FTP dedicated fields and email address for file transfer of logged data.

Account Management

Users with administrator rights are able to:

- Enable Account Creation
- Enable Logins
  Each power up requires user selection before instrument enters measurement mode.
- Enable Admin i.e. assign administrator rights to a standard user
- Reset Password
  1. Select user name from users list.
  2. Tap **Reset Password**.
     The password is deleted and user can set a new password.
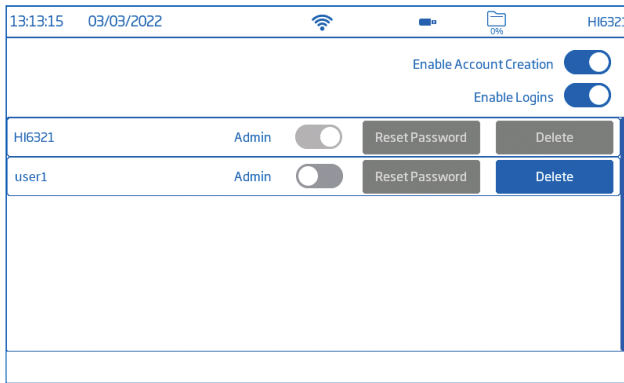
- Delete users
  1. Select user name and tap **Delete**. The instrument prompts for confirmation.
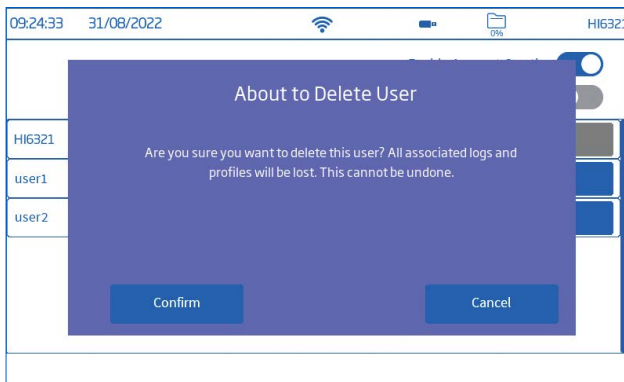
8.2. SYSTEM SETTINGS

System Settings is the second item under the System Menu.

Network, Connect & Print, System tabs permit users to navigate system settings and operations, configure network connection and architecture, connectivity and printing services, change system settings, and view meter information.
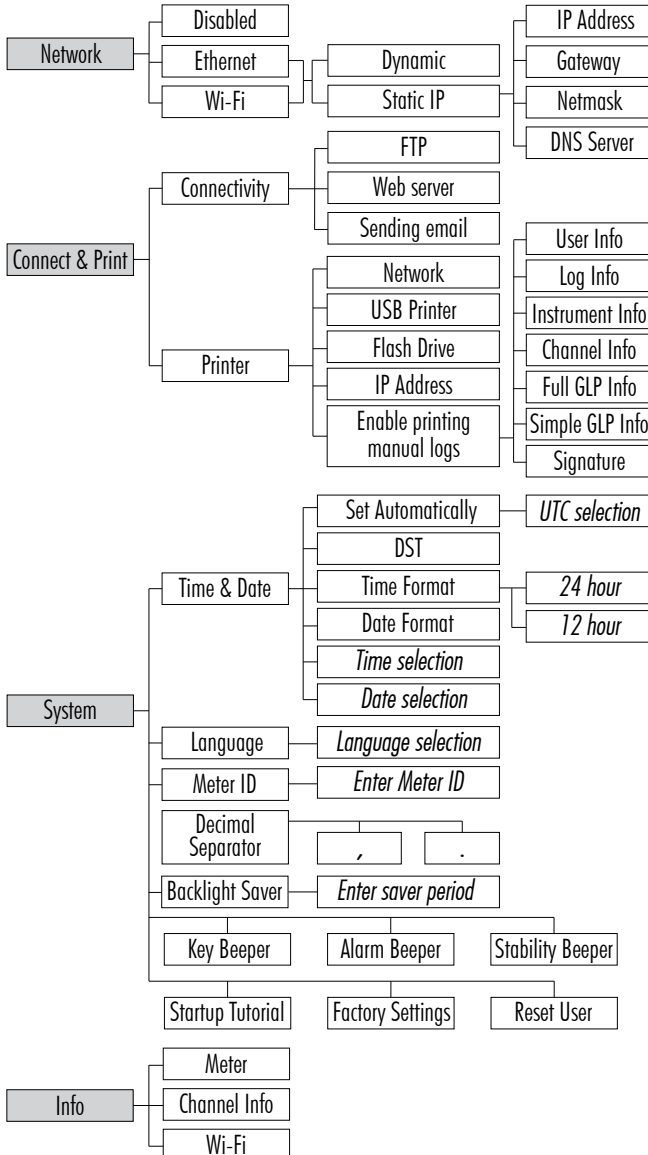
Network

Data sharing options: Ethernet, Wi-Fi, or Disabled

With connection established, IP assignment can be set as:
- Dynamic — IP Address, Gateway, Netmask, DNS Server are auto assigned
- Static — network details are entered manually

To input network information:
1. Tap **IP Address** field.
2. Input address and tap ⏎.

Wi-Fi connectivity
1. Tap **Wi-Fi**.
2. Select the IP address type (Dynamic or Static).
3. Tap **Press to select network**.
4. Scan options and select preferred network.
   Enter password if / when prompted.
5. Tap ⏎ to confirm.
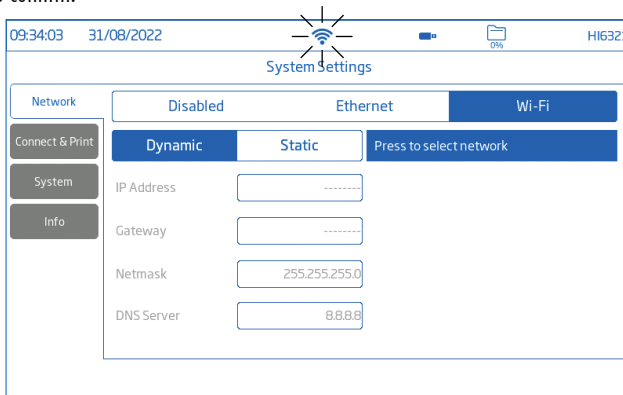
Note: *With connection established, tap ⛗ or ⌃ to check IP address or verify connection status.*

When attempting to connect, ⌃ icon is displayed ⌃ 5 sec. ⌃.

Connect & Print

Options: Connectivity, Printer

Connectivity

Tap ⬤ to enable (disable) following **connectivity** options:
- FTP access to meter: log file transfer to an FTP site and meter FTP server connection to client (log download)
- Meter web server: log file download to a web client
- Sending emails: log file transfer via email. A valid e-mail address is required for file sharing (see Users, Configure user settings).
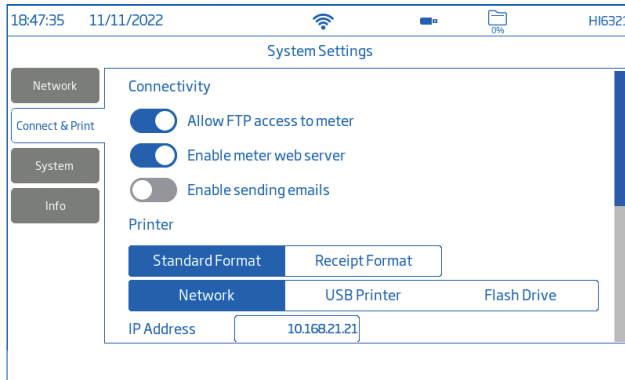
Printer

Supported printer types: Standard, Thermal

- Select **Standard Format** to print on an international (ISO) or North American (ANSI) paper size standard.
- Select **Receipt Format** to configure information to be printed on a receipt format.

Print document options: Network, USB Printer, Flash Drive

- Select **Network** to connect a printer in the same network. Tap to enter IP address.
- Select **USB Printer** to connect a printer via USB-A port.
- Select **Flash Drive** to export log files directly to USB Flash Drive.
- Tap **Enable printing manual logs** to send files to configured printer.
  Tap to enble for printing: User, Log, Instrument, and Channel information; Full GLP, Simple GLP, Signature.

Note: The connection to the printer (Flash drive) must be made prior to enabling the field selections.
Ensure internet connection established between printer and internet.
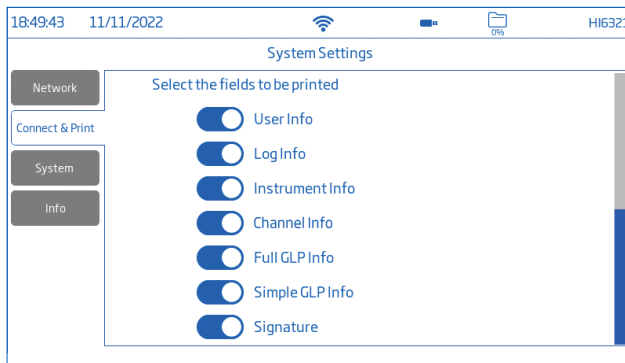
System

Options: Time, Date, Language, Meter ID, Decimal Separator, Backlight Saver, Beepers, Startup Tutorial, Factory Settings, Reset User

Note: Use the scroll bar to view or select from entire settings list.

Time & Date

Tap ⬤⚪ to enable (disable):

- **Set Automatically** (meter must be connected to the internet)
  - ▶ Direct selection from scrollable list of options
  - ▶ UTC options:
    from UTC 00:00 to UTC+14:00
    from UTC 00:00 to UTC -12:00

- **DST** (Daylight Savings Time) seasonal time change is used in some locations that advances clocks (typically by one hour) during warmer months.
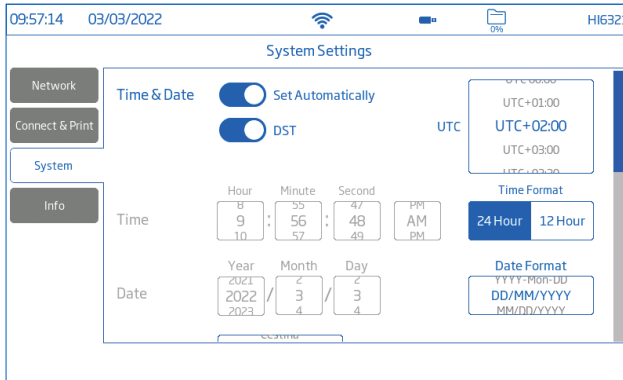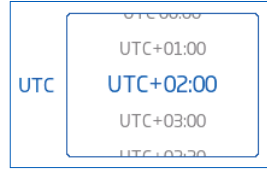
Time

- Hour, Minute, Second, time of day (AM or PM), time format (24 or 12 Hour)

Note: Set Automatically must be disabled

Date: Year, Month, Day, choice of display formats (DD-Mon-YYYY; YYYY-Mon-DD; DD/MM/YYYY; MM/DD/YYYY; YYY/MM/DD; YYYY-MM-DD; Mon DD, YYYY)

Note: Set Automatically must be disabled

Language: select from list of supported options to change meter's interface language

Meter ID
- Name the meter with a discrete name, location, or number.
- Tap ⏎ to save.

Note: option available to users with administrator rights only.
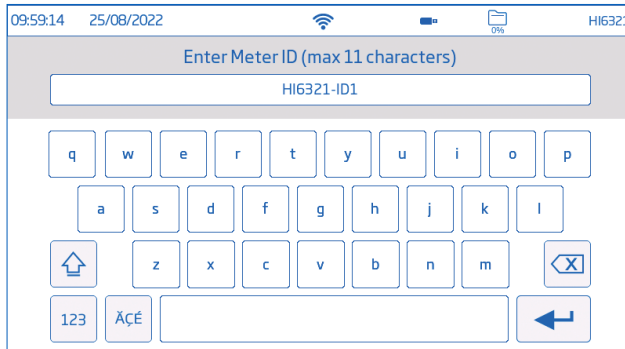
Tap 🔵 or corresponding tab to enable (disable) following settings:

Decimal Separator: comma or period depending on regional preference

Backlight Saver: enabled, 1 to 60 minutes (or disabled)

If the backlight turns off after the set period of time, tap screen to turn it back on.

Beeper: Key, Alarm, Stability

When enabled, an audible signal alerts users in the event of a wrong key press, an alarm condition, or the stability threshold being exceeded.

Startup Tutorial: if disabled (option enabled as default), the meter does not launch into Tutorial at power on.
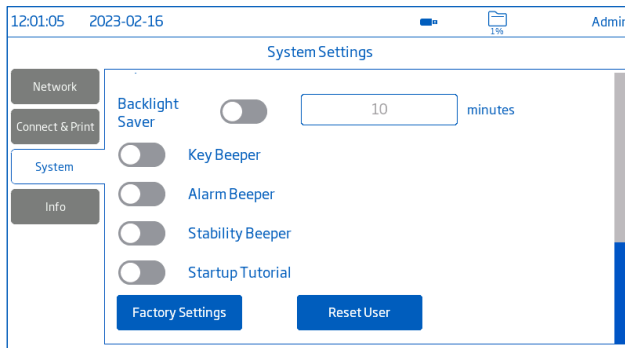
Factory Settings

Option restores system settings i.e. resolution for measured data, temperature unit, view mode, and alarm to original factory values. Restoring factory settings deletes all user information, logs, or configured measurement profiles. When option invoked, the instrument asks for confirmation.

Note: Option available to users with administrator rights only.
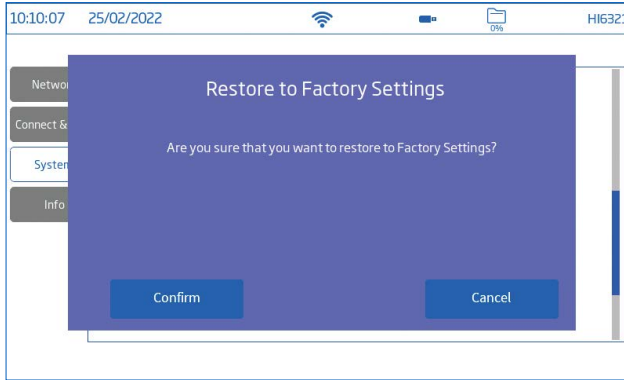
Reset User

Option restores default settings for this user. All data (including profiles and log files) specific to this user will be permanently deleted, except for the username and password.

When option invoked, the instrument asks for confirmation.

Info

Read-only item displays information on meter, channel serial number, and Wi-Fi firmware version.
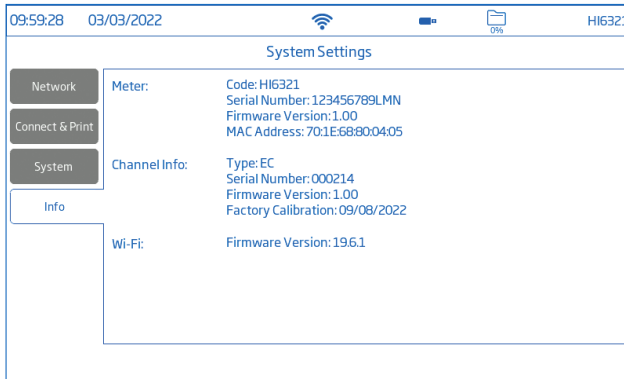
8.3. MEASUREMENT SETTINGS

Measurement Settings is the third item under the System Menu and allows setting calibration, reading, temperature, view, alarms, logging and measurement profile options.
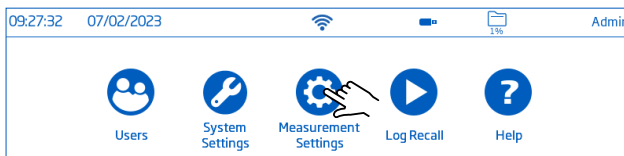
Measurement Setup Overview

Calibration, Reading, Temperature, View, Alarms, Logging, Profile tabs help user navigate through all measurement operations. The following table presents an overview of possible functions.

Calibration

	Conductivity	Resistivity	TDS	Salinity %	Salinity ppt, PSU
Last Calibration	Calibrate Clear	Based on conductivity or salinity calibration	Based on conductivity calibration	Calibrate Clear	Based on conductivity
Standard Entry Type	Automatic, Manual				
Calibration Reminder	Disabled Daily Periodic	–	–	Disabled Daily Periodic	–
Cell Constant	0.0500 to 200.0000	–	–	–	
Calibration Points	Single Point Multiple Points	–	–	–	

Reading

	Conductivity	Resistivity	TDS	Salinity
Unit Salinity Scale	μS/cm mS/cm AutoRanging	$\Omega \cdot$ cm k$\Omega \cdot$ cm m$\Omega \cdot$ cm AutoRanging	ppm ppt AutoRanging	ppt PSU %
TDS Factor	–	–	0.40 to 1.00	–
Stability Criteria	Accurate, Medium, Fast			
Reading Mode	Direct Direct/Autohold			
Probe Type	Probe code			

Temperature

	Conductivity	Resistivity	TDS	Salinity
Temperature Source	Automatic, Manual			
Temperature Unit	°C, °F, K			
Temperature Compensation	Linear, Natural, Standard, Disabled			
Manual	-20.0 °C to 120.0 °C			
Reference Temperature	5.0 °C to 30.0 °C (when temperature compensation option is not disabled)			
Temperature Coefficient	0.00 to 10.00 %/°C (with Linear temperature compensation option only)			
User Temperature Calibration	Calibrate Clear			

View

	Conductivity	Resistivity	TDS	Salinity	
				%	ppt, PSU
View Type	Basic Simple GLP Full GLP Graph Table	Basic Simple GLP Graph Table	Basic Simple GLP Graph Table	Basic Simple GLP Full GLP Graph Table	Basic Graph Table

Alarms

	Conductivity	Resistivity	TDS	Salinity
High / Low	0.000 to 1.100E+3 mS/cm	1.000 to 1100E+8 Ω•cm	0.000 to 4.000E+5 ppm	0.000 to 8.000E+1 ppt 0.00 to 42.00 PSU 0.0 to 400.0%
High / Low Temperature	-20.0 to 120.0 °C -4.0 to 248.0 °F 253.2 to 393.2 K			

Logging

	Conductivity	Resistivity	TDS	Salinity
Logging Type	Automatic Manual Autohold (Direct/Autohold mode only)			
Sampling Period (Automatic logging)	1, 2, 5, 10, 30 sec. 1, 2, 5, 10, 15, 30, 60,120, 150, 180 min.			
File Name	Create (Manual logging type only)			
Log Note	User input			
Log Info 1 through to 4	User input			
Sample ID	None Increment Manual			

Profiles

	Conductivity	Resistivity	TDS	Salinity
Profile Feature	Enable Disable			
Current Profile	Save As Save Delete			
Load Profile	Configured profiles			

8.4. LOG RECALL

Log Recall is the fourth item under the System's Menu and allows data selection, viewing, sharing, and deletion. Logged data is retrieved by the user that has logged the measurement.
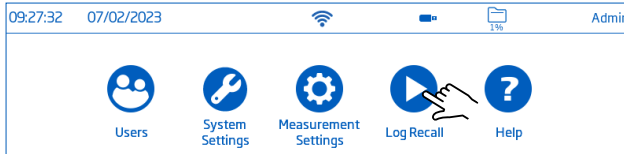
- Data is stored in parameter-specific .CSV files: conductivity, resistivity, TDS, salinity.
- Storage location is independent and organized in lots.
- A lot (file) can store 1 to 50 000 log records i.e. saved measurement data points.
- One user can store a minimum of 1 000 000 data points.

View

Data can be viewed, plotted (graph), or tabulated (complete with date, time, notes).
From the System Menu screen:

1. Tap ▶ (Log Recall). The instrument displays the Log Recall screen.
   Tap on corresponding table header element to order logged data by Name, Parameter, Start/Stop time stamp, #Samples.
   Tap the up arrow to reverse order.
2. Tap to select .CSV file.
3. Tap **View**.

   Note: Option available with .CSV file selected only.

4. Tap ⊞ or ⌁ icon to have logged data displayed in tabulated form or plotted.

Index	Date	Time	EC	Unit	EC abs	Unit	T[°C] ATC	Notes
1	10/11/2022	15:29:13	0.000	µS/cm	0	µS/cm	25.0	"H"
2	10/11/2022	15:29:14	0.000	µS/cm	0	µS/cm	25.0	"H"
3	10/11/2022	15:29:15	0.000	µS/cm	0	µS/cm	25.0	"H"
4	10/11/2022	15:29:16	0.000	µS/cm	0	µS/cm	25.0	"H"
5	10/11/2022	15:29:17	0.000	µS/cm	0	µS/cm	25.0	OK
6	10/11/2022	15:29:18	0.000	µS/cm	0	µS/cm	25.0	OK
7	10/11/2022	15:29:19	0.000	µS/cm	0	µS/cm	25.0	OK
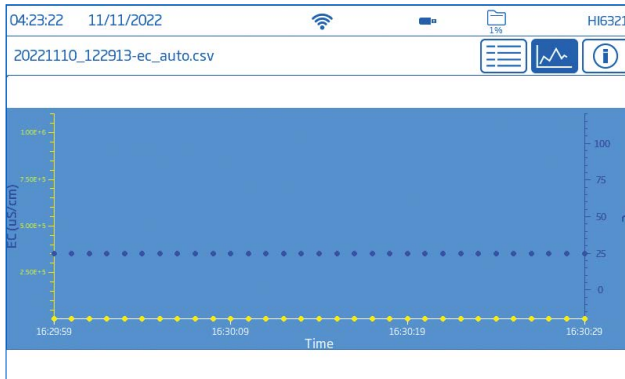
Tap ⓘ icon and scroll through USER, LOG, CHANNEL, INSTRUMENT, GLP DATA information.

LOG INFO
Log Note:
Log Info 1:
Log Info 2:
Log Info 3:
Log Info 4:
Log Type: Automatic
Number Of Samples: 000000007
Start Date and Time: 15:29:13 10/11/2020
Sampling Period: 1 seconds
Temperature Compensation: Linear
Reference Temperature: 25.0ºC
Linear Compensation Coefficient: ---

Select (Deselect) All

To export to a USB-A flash drive:
1. Tap ▶ (Log Recall) to access the log history.
2. Tap **Select All** button to select entire log history.
   With all files selected, tap **Delete** to empty the log or tap **Share** to transfer data.
3. Tap **Deselect All** to clear selection.

Delete

1. Tap ▶ (Log Recall) to access the log history.
2. Tap to select required .CSV file (one file) or tap **Select All**.
3. Tap **Delete**.
4. The instrument prompts for confirmation.
   Deleted files can not be recovered and Log Recall screen is displayed blank.

04:21:34	11/11/2022					HI6321
View	Select All	Deselect All	Log Recall		Delete	Share

Delete Selected Log Files?

Are you sure you want to delete the selected log files? This cannot be undone.

	amples
20221110_	7
20221110_	14
20221110_	11
20221110_	8
20221110_	10
20221110_	9

Confirm   Cancel

15:33:13 10/11/2022
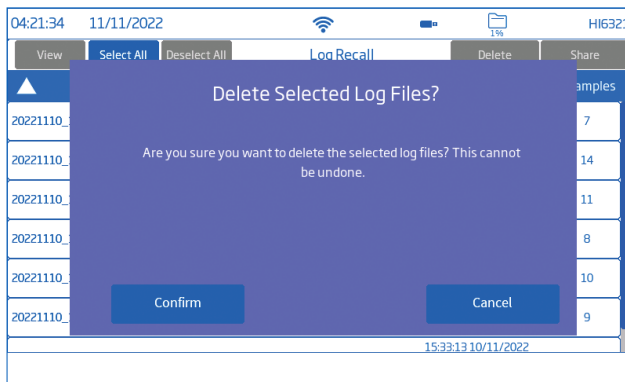
Share

Options: USB-A, FTP, Email, Print, Web server
USB-A and USB-C

Plug the USB flash drive into the USB port located on the back.
1. Tap ▶ (Log Recall) to access the log history.
2. Select file (files) for transfer or use **Select All** option.
3. Tap **Share**. Pop-up flyout is displayed.
4. Tap to select USB-A or USB-C.
   ⏳ is displayed during data transfer.
5. Transfer completion is confirmed and the instrument returns to Log Recall screen.

FTP

HI6321 can act as an FTP server (host) or client. Meter has to be connected to the internet and **Allow FTP access to meter** enabled. See System Settings section, Connect & Print tab.
- Use meter's IP address and password to connected and view logged files.
- Enter in the FTP dedicated fields own server information to export logged files to the FTP server.
- Configure FTP server info in the User menu (☺) to use the meter as an FTP client and upload files to an FTP server.

Connect via **FTP to meter server**:
1. On preferred FTP software, type the meter's IP address in the dedicated Host field.
2. Enter the username and password of the user currently logged in.
3. Connect to view the files logged on the meter.

Connect the **meter to an FTP server** and share logs:
1. In Users menu, type selected server's IP address, username, and password.
2. From System Menu, tap ▶ . Log Recall screen opens up.
3. Select file(s) for transfer.
4. Tap **Share**. Pop-up flyout is displayed.
5. Tap to select FTP. The files are being transferred in the root folder of the server.

FTP server installation and configuration
- PC running Windows10 or later
- Password protected Windows account
- FTP server must be allowed through the Windows Firewall

Installation
1. Navigate to **Start** › **Control Panel** › **Administrative tools** › **Server Manager**.
2. Go to **Roles** and expand **Web Server**.
3. Right click on **Web Server** and then click on **Add Role Services**.
4. Go to **Role Services** and check **FTP Server**.
5. Ensure **IIS Manager** (Internet Information Services) is checked under **Management Tools**.
6. Click **Next** followed by **Install**.
7. Wait for installation to complete.

Configuration (PC must be running Windows10 or later)
1. Navigate to **Start** › **Control Panel** › **Administrative tools** › **IIS Manager** (Internet Information Services).
2. Double click to expand the **IIS Manager** console.
3. Right click on **Sites**, on the Connection pane.
4. Click on **Add FTP Site**, to select. Type the FTP server name and the path to be used for file transfer
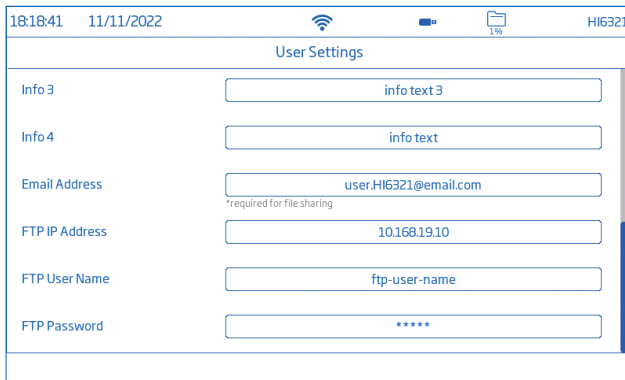   *Note: Select Make New Folder to create a designated folder to store FTP files.*

5. Click **Next**.
6. In the Binding and SSL Settings window keep all default settings but change the SSL option to **No SSL**.
7. Click **Next**.
8. When prompted to authenticate and authorize information, select **Basic and Specified** users.
9. Type local account name to gain access to the server.
10. Check both **Read** and **Write** options.
11. Click **Finish**.

Email

Meter has to be connected to the internet and **Enable sending emails** enabled (see System Settings, Connect & Print section).

Tap 😊 to access the Users menu and input email address.

18:18:41	11/11/2022	🛜	🔋 1%	📁	HI6321

User Settings

Info 3	info text 3
Info 4	info text
Email Address	user.HI6321@email.com *required for file sharing
FTP IP Address	10.168.19.10
FTP User Name	ftp-user-name
FTP Password	*****

1. From System Menu, tap ▶ to access Log Recall.
2. Select file(s) for transfer or use **Select All** option.
3. Tap **Share**. Pop-up flyout is displayed.
4. Select **Email**.
5. Transfer completion is confirmed and the instrument returns to Log Recall screen.

04:25:10	11/11/2022	🛜	🖨 🔋 1%	📁	HI6321

View	Select All	Deselect All	Log Recall	Delete	Share

▲ Name	Parameter	Start/Stop	Share To:
20221110_122913-ec_auto.csv	Conductivity	15:29:13 10/11 15:29:19 10/11	USB-A
20221110_122932-res_auto.csv	Resistivity	15:29:33 10/11 15:29:46 10/11	FTP
20221110_123021-tds_auto.csv	TDS	15:30:21 10/11 15:30:31 10/11	Email
20221110_123043-sal_auto.csv	Salinity	15:30:43 10/11 15:30:50 10/11/2022	Print
20221110_123106-ec__002.csv	Conductivity	15:31:06 10/11/2022 15:31:24 10/11/2022	Cancel 10
20221110_123157-ec_Lab02_003.csv	Conductivity	15:31:57 10/11/2022 15:32:11 10/11/2022	9
		15:33:13 10/11/2022	

Print
- Connect either a printer (Network or USB) or plug-in a USB Flash Drive (see System Settings, Connect & Print section).
- Tap **Print** and follow on-screen instructions.

Web server

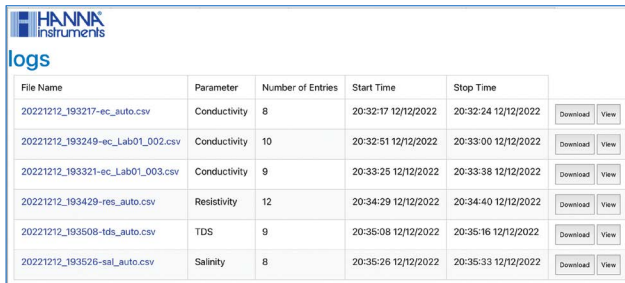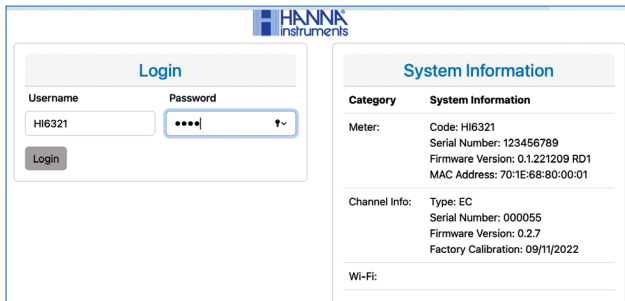Any browser can be used to access the web server and download log files. Meter has to be connected to the internet and **Enable meter web server** enabled (see System Settings, Connect & Print section).

Note: Both the meter and the device the browser is accessed from have to be connected at the same network.

1. Tap 🛜 for IP address and type address in the browser.

10:07:11 03/03/2022			🛜👆	🔋	📁 1%	HI6321
IP Address: 192.168.13.177						Close

2. Enter the username and password of current user to gain access to logs and tags. Click on file to download to the PC.

HANNA instruments

Login			System Information	
Username: HI6321	Password: •••• 👁		Category	System Information
Login			Meter:	Code: HI6321 Serial Number: 123456789 Firmware Version: 0.1.221209 RD1 MAC Address: 70:1E:68:80:00:01
			Channel Info:	Type: EC Serial Number: 000055 Firmware Version: 0.2.7 Factory Calibration: 09/11/2022
			Wi-Fi:	

HANNA instruments

logs

File Name	Parameter	Number of Entries	Start Time	Stop Time		
20221212_193217-ec_auto.csv	Conductivity	8	20:32:17 12/12/2022	20:32:24 12/12/2022	Download	View
20221212_193249-ec_Lab01_002.csv	Conductivity	10	20:32:51 12/12/2022	20:33:00 12/12/2022	Download	View
20221212_193321-ec_Lab01_003.csv	Conductivity	9	20:33:25 12/12/2022	20:33:38 12/12/2022	Download	View
20221212_193429-res_auto.csv	Resistivity	12	20:34:29 12/12/2022	20:34:40 12/12/2022	Download	View
20221212_193508-tds_auto.csv	TDS	9	20:35:08 12/12/2022	20:35:16 12/12/2022	Download	View
20221212_193526-sal_auto.csv	Salinity	8	20:35:26 12/12/2022	20:35:33 12/12/2022	Download	View

PC Connection

The logged data can be transferred from the meter to a PC.
- Use the USB-C cable to connect the meter to the PC.
- The meter will appear as a flash drive on the computer.
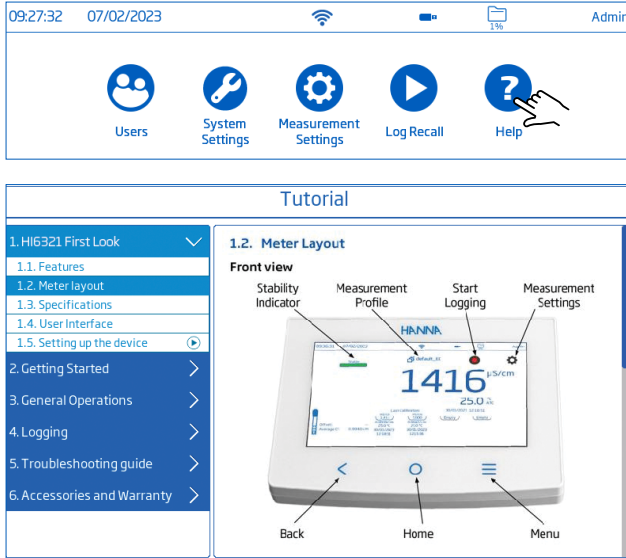- Save files to the PC. All logs will be listed as .CSV files.

The .CSV files may be opened with any text editor or spreadsheet application.

All features of the spreadsheet program can be used to analyze and graph the data.

8.5. HELP

Help is the fifth item under the System Menu.

• Tap ❓ to access support and navigate through an overview of system's main functionalities.

• Tap to play (stop) video-supported segments:
  ▶ 1.5. Setting up the device
  ▶ 3.1. Calibration
  ▶ 3.2. Reading measurements
• Tap ☰ once to increase video speed.
  ▶ The meter supports, with each tap, three playback speeds: normal (x1), medium (x2), and fast (x4).

9. MEASUREMENT & PROBE SETUP MENU

From the Measurement screen, tap ✿ to access system and measurement configuration tabs.
Alternatively, tap ≡ (**Menu** key) then ◉.
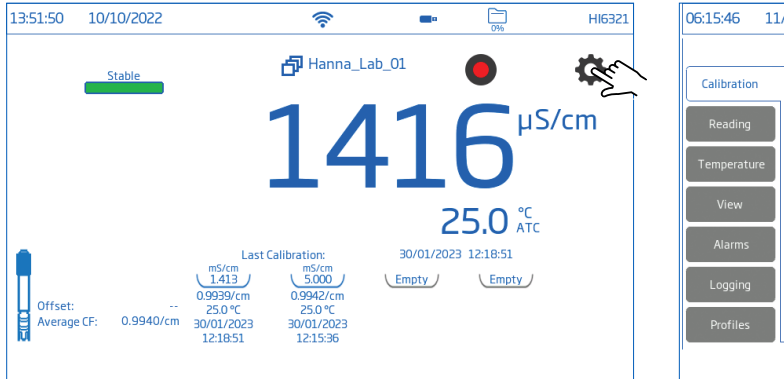
9.1. CALIBRATION

Options: Conductivity & Salinity
Last Calibration, Standard Entry Type, Calibration Reminder, Cell Constant, Calibration Points

Last Calibration (Conductivity and Salinity)**: Calibrate** or **Clear** a previous calibration

Standard Entry Type
- **Automatic**: meter selects the closest calibration standard value to that of the sample being measured
- **Manual**: user selects the calibration standard to be used for calibration

Calibration Reminder (Conductivity and Salinity)
- **Daily-**calibration interval (hours and minutes)
- **Periodic**-calibration interval (days, hours, minutes)

"Calibrate probe" message is displayed if calibration is not done within set interval.
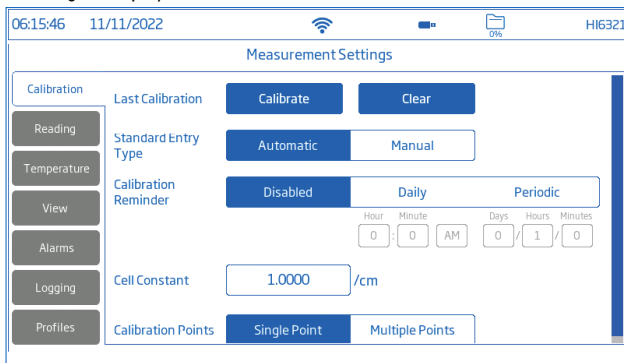
Cell Constant: allows users to adjust cell measurement to compensate for the measured properties.
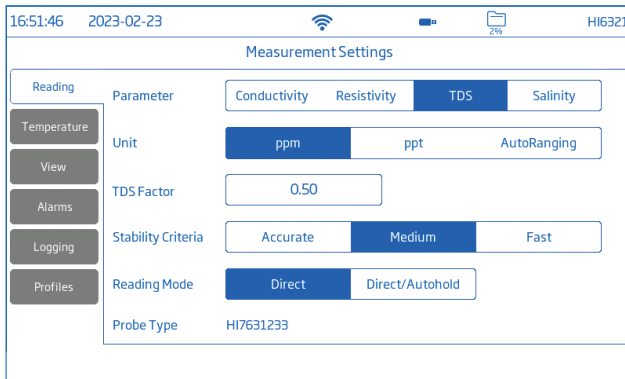- Tap dedicated field and enter value.
- Tap ⏎ to save.

Calibration Points: allows users to select a **Single Point** or **Multiple Points** calibration.
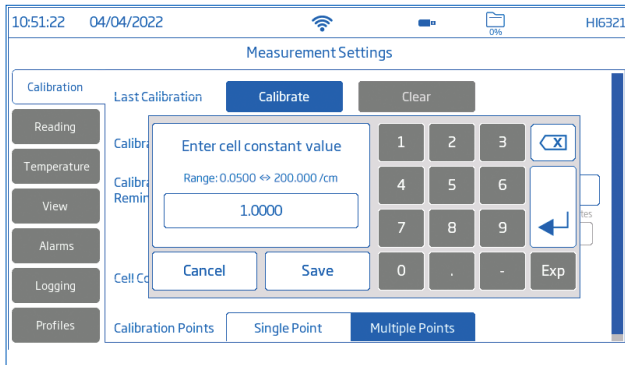
9.2. READING

Options: Parameter, Units/Salinity Scale, TDS Factor, Stability Criteria, Reading Mode, Probe Type

Parameter

Options: Conductivity, Resistivity, TDS, Salinity

Tap to select measurement configuration.

Units & Salinity Scale
- **Conductivity Options**: μS/cm, mS/cm, **AutoRanging** i.e meter automatically selects the unit to optimize the measurement.
- **Resistivity Options**: Ω•cm, kΩ•cm, MΩ•cm, **AutoRanging**
  Resistivity is calculated from conductivity measurement.

- **TDS Options**: **ppm**, **ppt**, **AutoRanging** i.e. meter automatically selects the unit to optimize the measurement.
- **Salinity scale**: **ppt** (Natural Sea Water 1966), **PSU** (Practical Scale 1978), **%**(Percent Scale)
  Salinity value is determined based on selected scale.

TDS Factor

TDS factor is a conversion factor used to change an EC measurement to a ppm measurement. TDS factor may be set between 0.40 to 1.00.

- Tap dedicated field and enter the value.
- Tap ↵ to save.
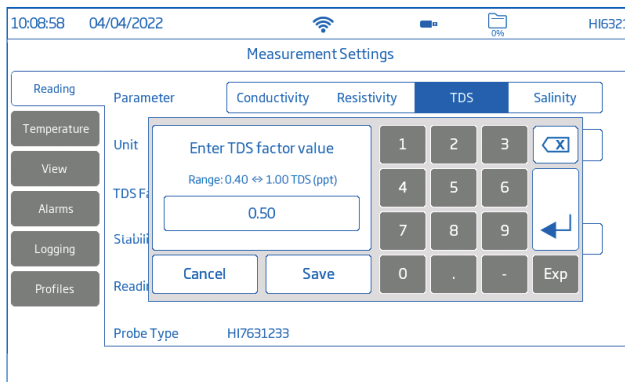
Stability Criteria

Options: Accurate, Medium, Fast

Allows users to set the stability criterion for selected parameter based upon the stability setting selected. While the measurement is changing, the stability indicator is shown partially (▬▭); when the criteria is reached the indicator is displayed as a full green bar (▬▬).

- **Accurate**: for applications where high accuracy is required
  Measurement is recognized as stable using more critical criteria evaluating measurement fluctuations.
- **Medium**: for applications where average accuracy is accepted
  Measurement is recognized as stable using less critical criteria evaluating measurement fluctuations. The measurement may still change after registering stable.
- **Fast**: for applications when stability-evaluation methods are not so critical

Reading Mode

Options: Direct, Direct/Autohold

- **Direct**: as measurement changes, measurement stability is continuously evaluated. Unstable (blinking) or Stable indicator are displayed above the progress bar.
- **Direct/Autohold**: 🔒 (lock icon) is displayed between the log and Measurement Menu icons.
  - ▶ Tap 🔒 to initiate a measurement.

▶ Configured parameter icon is displayed i.e. 🔵EC 🔵Res 🔵TDS 🔵Sal .
▶ ▬▬▬ Autohold is displayed blinking until the measurement is stable.
▶ When stable, the indicator stops blinking and measurement freezes at current value.
▶ Tap parameter icon to return to direct measurement.
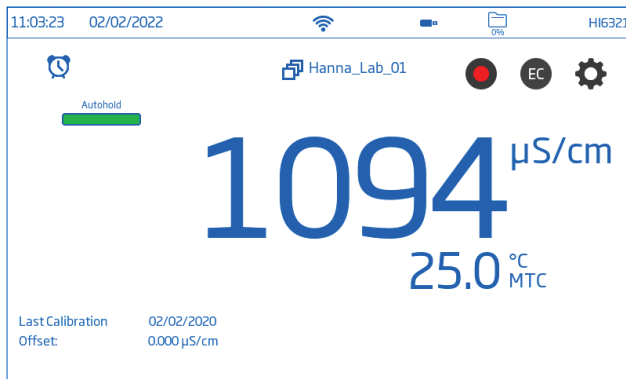
9.3. TEMPERATURE
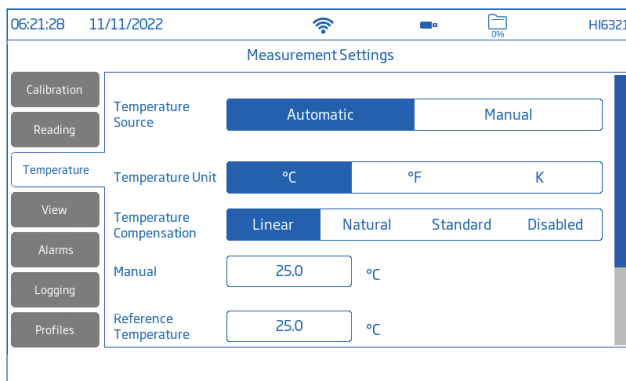
Options: Temperature Source, Temperature Unit, Temperature Compensation, Manual, Reference Temperature, Temperature Coefficient, User Temperature Calibration

Temperature Source: Automatic, Manual

Users can select between physical temperature input source (Automatic) and entering sample temperature value manually (Manual).

- **Automatic**: built-in temperature sensor adjusts the measured conductivity to a reference temperature. "ATC"is displayed indicating temperature compensation status.
- **Manual**: sample temperature is entered manually and displayed "MTC" indicates temperature compensation status.

Temperature Unit: Celsius, Fahrenheit, Kelvin degrees

Temperature Compensation (Scale): Linear, Natural, Standard
- **Linear**: used when it is assumed that the temperature coefficient of variation has the same value for all measurement temperatures.
- **Natural**: for natural ground, well, or surface water and covers 60 to 1000 μS/ cm (0 to 35 °C) range.
- **Standard**: used for resistivity measurements (high-purity water).

Manual

Manually input sample's temperature when Temperature Source is configured as Manual.
- Tap dedicated field and enter the value.
- Tap ⬅ to save.

Reference Temperature: 5.0 to 30.0 °C

Value used for temperature-compensated conductivity. All conductivity measurements will be referenced to the conductivity of a sample at this temperature.
- Tap dedicated field and enter the value.
- Tap ⬅ to save.

Temperature Coefficient: 0.00 to 10.00 %/°C (Linear Scale only)

Temperature coefficient is a function of the solution being measured. When the actual temperature coefficient of the sample is known:
- Tap dedicated field and enter the value.
- Tap ⬅ to save.

User Temperature Calibration: Calibrate or Clear

To perform a new calibration:
1. Tap **Calibrate**.
2. Place the probe and a reference thermometer into a stirred container of water.
   Allow reading to stabilize.
3. If the displayed value is different than the reference thermometer reading, tap **Calibrated Temperature** and use the on-screen keypad to enter the value.

Note: Users need a separate reference thermometer.

4. Tap **Save** to confirm and save the calibration data.
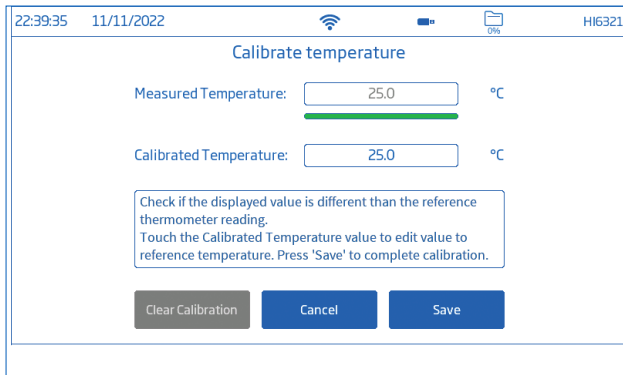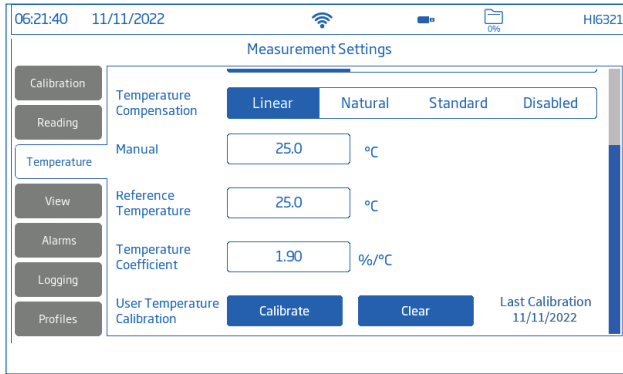
9.4. VIEW

Conductivity, Salinity %: Basic, Simple GLP, Full GLP, Graph, Table
Resistivity, TDS, Salinity ppt & PSU: Basic, Simple GLP, Graph, Table

• Select preferred display configuration from View Type window.
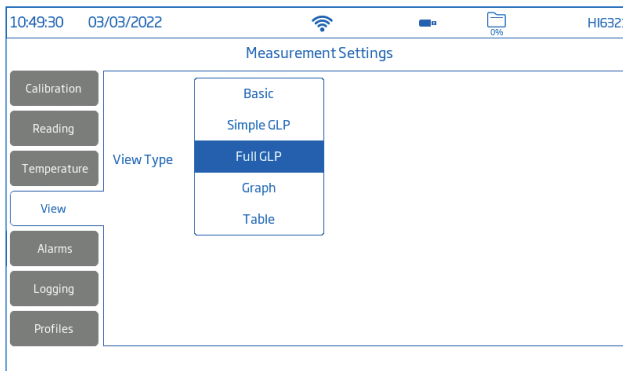
Basic

Screen displays the measured value, measurement unit, stability and temperature compensation status/source.
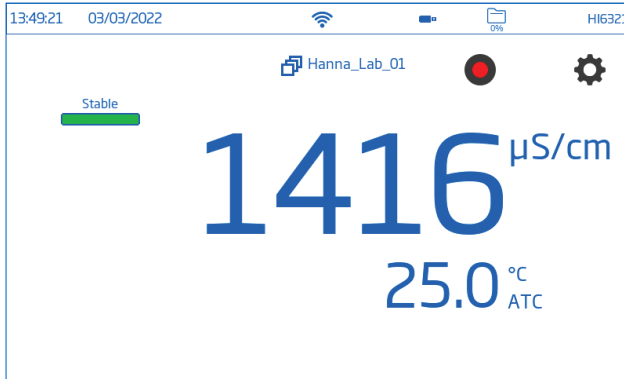
Simple GLP

Simple GLP screen displays last calibration date and time, offset value and cell constant (as well as data displayed in Basic screen).

Note: If no calibration was made, "Not Calibrated" is displayed.
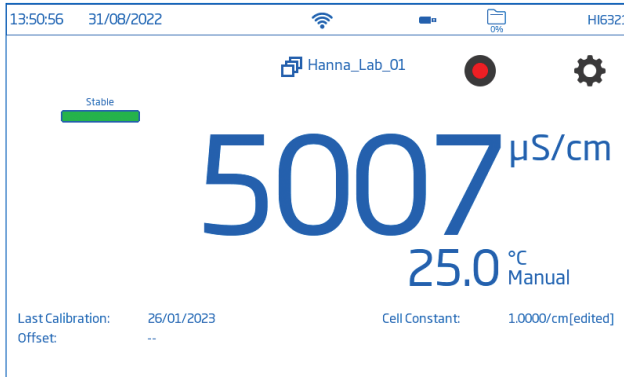
Full GLP

Full GLP screen displays probe symbol, calibration temperature, calibration information (as well as data displayed in Simple GLP screen).
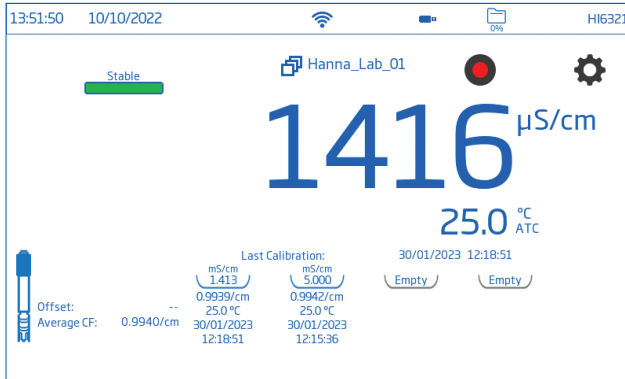
Graph

When Graph is selected the measured value is plotted as a graph.

To zoom in on a graph:

1. Select Time or parameter axis.
2. With axis selected, pinch (drag) on the display.

Table

When Table is selected, the measured values are displayed tabulated (complete with date, time, and notes made during logging). The newest data is displayed at the top of the table.

9.5. ALARMS

Options: High /Low configured parameter value, High/Low Temperature

Users can set the threshold limits for the measured parameters. When the measurement exceeds set high-threshold value or drops below set low-threshold value, the alarm is triggered and an alarm message is displayed.
If the Alarm Beeper is enabled (See: System Menu Items / System Settings / Alarm Beeper), an audible beep will be heard.

Note: High-parameter values cannot be lower than low-parameter ones.

To set an alarm limit:
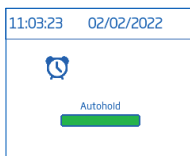
1. Tap 🔵 to enable low or high parameter threshold option.
2. Use the on-screen keypad to enter the value.
3. Tap **Enter** to confirm (**Cancel** to exit and return to measurement settings).

🕐 (alarm icon) is displayed on the measurement screen when an alarm is active.

9.6. LOGGING

Options: Logging Type, Sampling Period, File Name, Log Note, Log Info, Sample ID
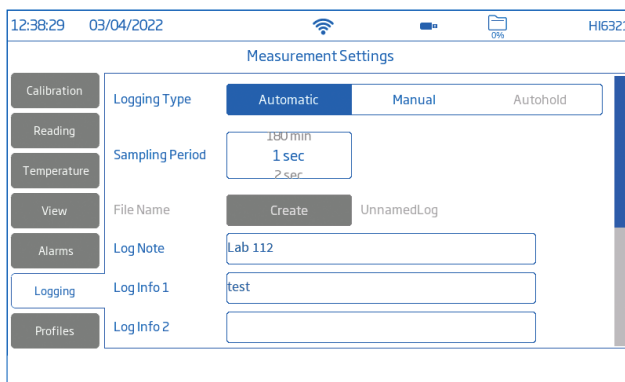
Logging Type

- **Automatic**: data is logged automatically at predefined time intervals (i.e. Sampling Period).
  - ▶ A file name is automatically generated, complete with year/month/day, and logging time.
  - ▶ Log files are identified by parameter:
    - EC: 20220329_085101-**ec**_auto
    - Resistivity: 20220309_095704-**res**_auto
    - Salinity: 20220331_101507-**sal**_auto
    - TDS: 20220331_101458-**tds**_auto
- **Manual**: data is logged every time 🔴 is tapped.
  - ▶ Tap **Create** to rename file as preferred e.g. 20220329_085101-ec_Test_001 or 20220329_085101-tds_002.
- **Autohold**: Direct/Autohold reading mode must be configured.

  Note: Manual and Autohold records are stored in the same log file, i.e. data logged on different days is stored in the same lot. Automatic records are stored separately.
  Data logged with Autohold option selected, is identified by the "H" in the Notes column.

Sampling Period

Option available only with **Automatic** logging type selected.
Time-interval options are selected from scrollable list.

File Name

Available only with **Manual** and **Autohold** logging type selected.

To create a file name, from Logging screen:

1. Tap **Create**.
2. Use the on-screen keypad to enter file name (maximum 13 characters).
3. Tap **Enter** to confirm.

Log Note & Log Info

Notes on measured data are saved together with logged data.

Sample ID

Manual and autohold samples can be labeled with a numerical ID (increments with each new sample logged), a text label, or a text label with numerical ID.

With **Increment** selected:

1. Tap **Sample ID Prefix**.
2. Use the on-screen keypad to enter a text prefix, of maximum 15 characters, to the sample name.
3. Tap ⏎ to confirm.
4. Select ID number from scrollable list.

9.7. PROFILES

Option: **Profile Feature**, **Current Profile** (configure), **Load Profile** (previously configured)

- Tap ⬤ to enable (disable) **Profile Feature** option.

Current Profile

A profile is a sensor setup complete with required measurement and temperature unit, display preference, and alarm threshold options. Once configured and saved the profile can be loaded for applications that require similar configurations.

To save a profile, having previously configured all other application-specific options, from the Measurement screen:

1. Tap ⚙.
2. Tap **Profiles** tab.
3. Tap **Save As** and use the keypad to enter profile name.
4. Tap ⏎ to confirm.
   Once saved, profile name is added to the Load Profile list.

Load Profile

To select a configured profile:

1. Tap to select from the **Load Profile** list.
2. Profile name is automatically entered in the **Current Profile** field.

3. Start measuring.

Note: Profile setting modifications are indicated by (*) in measurement screen.

10. CALIBRATION

10.1. CONDUCTIVITY CALIBRATION

HI6321 meter allows two types of calibration procedures:
- Standard up to four-point conductivity calibration with standards for cell factor determination:
  - ▶ 0 μS/cm for offset
  - ▶ 84 μS/cm, 1413 μS/cm, 5.0 mS/cm,12.88 mS/cm for the 0.1/cm cell
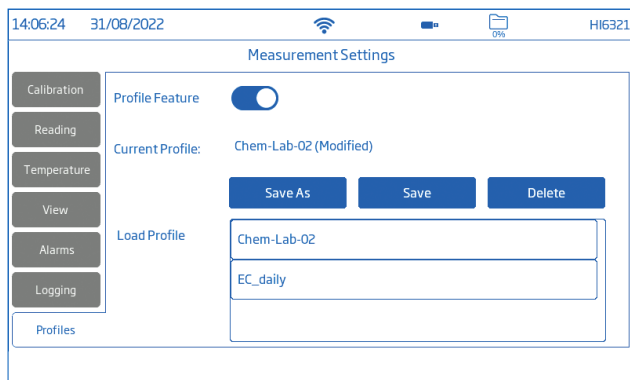 - ▶ 80.0 mS/cm, 111.8 mS/cm additional standards for the 1.0/cm cell
- Standard single point salinity calibration in 100% salinity standard, with the parameter reading set to Salinity and Salinity Scale set to %.

 Note: Conductivity parameter must be calibrated first.

Preparation
- Remove plastic bung prior to calibration.
- Clean the probe in distilled water, shake off water droplets, and allow to dry prior to calibration.
- Use a calibration standard with a value that is close to that of the sample.
- Inspect the probe for debris or blockages.
- Ensure the vent holes are completely submerged.
- Tap the probe to remove any air bubbles that may be trapped inside the sleeve.
- To minimize cross-contamination, when a two-point calibration is required, use two beakers: one for rinsing the probe and the other for calibration.
- For measurements across a temperature gradient (when water temperature is drastically different from the standards), allow the probe to reach thermal equilibrium before conducting calibrations or making measurements.

10.2. PROCEDURE

Automatic Calibration

With option selected, the HI6321 automatically selects the closest standard to the value being measured.
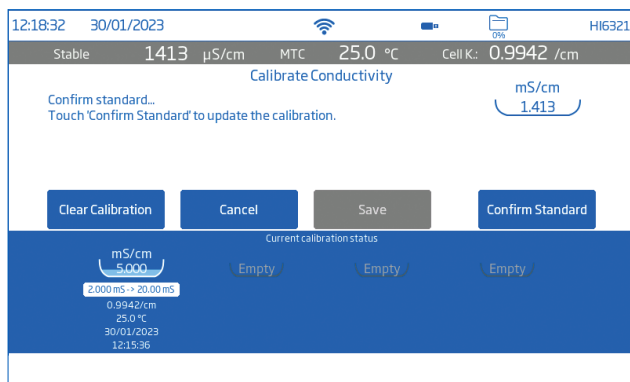
With the probe connected to the meter:

1. From Measurement screen, tap ✿ (Measurement Menu icon).
2. Tap **Temperature** tab.
3. Configure **Temperature Source**.
4. Tap **Calibration** tab.
5. Configure Standard Entry Type as **Automatic**.
6. Select number of calibration points.
7. Tap **Calibrate** to start the process.
8. Tap **Clear Calibration** to start a fresh calibration and clear all previously used standards.
   If using a new conductivity probe, it is recommended to clear all standards and start new.
9. Suspend the probe in the air. Allow for the reading to stabilize.
   The standard value is automatically recognized.
10. After the reading has stabilized, tap **Confirm Standard**. The calibration point is added to the tray.

   #### Single Point calibration
   Tap **Save** to have first calibration point accepted and saved. Meter returns to Channel Settings.

   #### Multiple Points calibration
   Use two beakers, one for rinse and one for measurement.
11. Raise and lower the probe in rinse beaker of standard. Discard rinse standard.
12. Immerse the sensor in standard. The standard value is automatically recognized.
13. Allow reading to stabilize then tap **Confirm Standard**.
14. Repeat steps 11 through to 13 with up to two more standards.
15. Tap **Save** to accept and save (in tray) the calibration point and return to calibration settings.
16. Tap ○ or ‹ to return to measurement.
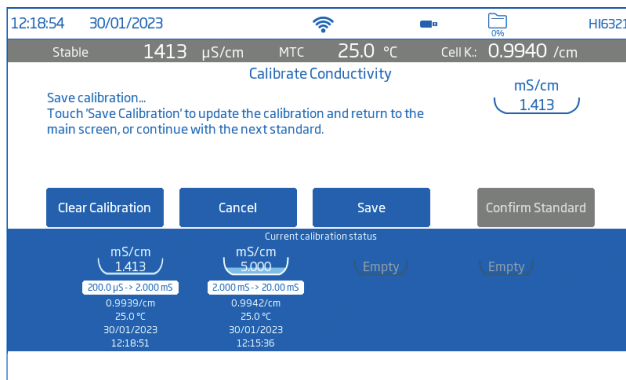
Manual Calibration

With option selected, users have to option to edit calibration point values.

1. Follow Automatic Calibration procedure up to step 9 **but** configure **Standard Entry Type** (Step 5) as **Manual**.
2. Suspend the probe in the air. Allow for the reading to stabilize.
3. Tap **Edit Standards**. Input value and tap **Save**.
4. After the reading has stabilized, tap **Confirm Standard.**
5. Raise and lower the probe in next rinse standard. Discard.
6. Immerse the sensor in calibration standard. Tap **Edit Standards**.
7. Input value and tap **Save**.
8. After the reading has stabilized, tap **Confirm Standard.**
9. Continue with up to two more standards.
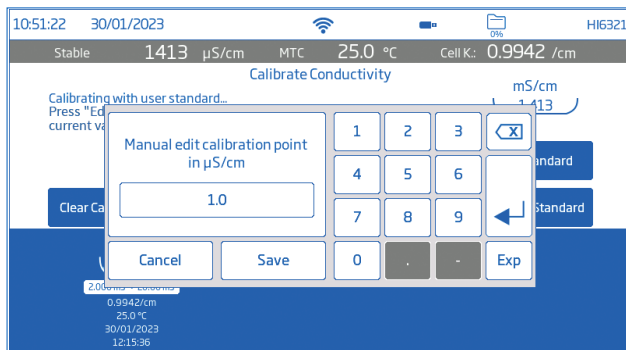
10.3. SALINITY CALIBRATION

Salinity calibration can be performed with the parameter reading set to Salinity and Salinity Scale set to %.

1. From Measurement screen, tap ⚙ (Measurement Menu icon).
2. Tap **Reading** tab.
3. Tap to configure reading Parameter to **Salinity.**

4. Set Salinity Scale to **%**.
5. Tap **Calibration** tab.
6. Tap **Calibrate** to start the process.
7. Tap **Clear Calibration** to start a fresh calibration. If using a new conductivity probe, it is recommended to clear and start new.
8. Raise and lower conductivity cell in rinse beaker of salinity standard then discard.
9. Immerse the sensor in salinity standard. Ensure the vent holes are completely submerged. The meter automatically recognizes the standard.
10. Allow the reading to stabilize then tap **Confirm Standard**.
    The standard is recognized and added to the tray.
11. Tap **Save** to have calibration accepted and saved, and return to calibration setting screen.
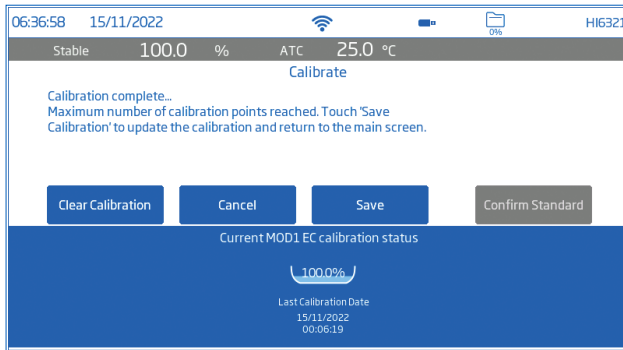
11. MEASUREMENT

Options: Direct, Direct/Autohold

- **Direct**: sample measurements are displayed continuously.
- **Direct/Autohold**: reading is displayed when measurement stability is reached. A measurement that has not reached equilibrium will not be used. After stability criteria is reached, the meter enters Direct/Autohold mode.

When to measure conductivity instead of resistivity

Resistivity is the reciprocal of conductivity and their scales emphasize different areas of the measurement range.

- Resistivity (set as Reading parameter) is commonly used in ultrapure water
- Conductivity (set as Reading parameter) is suitable for measuring larger amounts of contaminants.
  Users can subsequently change Reading parameter to Resistivity to measure in resistivity units ($M\Omega \bullet cm$).

Recommended temperature compensation setting for these type of measurements is **Standard** as it utilizes the correct compensation algorithm.

11.1. MEASUREMENT TIPS

1. Connect the probe to the meter. Only work with recently calibrated probes.
2. Use the HI764060 electrode holder for easy transfer in and out of containers during calibration and sample measurement.
3. Ensure plastic bung is removed prior to taking measurements.
   To limit sample contamination, pour 2 beakers of calibration standards. Use one beaker to rinse the sensor, and another one for measurement.
4. Ensure the vent holes are completely submerged.
5. Tap the probe to remove any air bubbles that may be trapped inside the sleeve.

   Note: Use the same size beaker and immersion depth for samples and calibration standards.

6. If measuring across a temperature gradient, allow the sensor to reach temperature equilibrium. If using manual temperature compensation, input the sample temperature.
7. Once the reading indicates Stable, record measurement data.

11.2. DIRECT READINGS

- From Measurement screen, tap ✿ (Measurement Menu).
- Tap **Reading** tab and select measured parameter.
- Tap **Direct** to select direct Reading Mode.
- Place the probe into the sample to be measured. Ensure the vent holes are completely submerged.
  Allow time for the reading to stabilize. (Unstable status is indicated on the screen until measurement is stabilized).
- The measured value is displayed on the LCD, together with GLP information and display preferences.
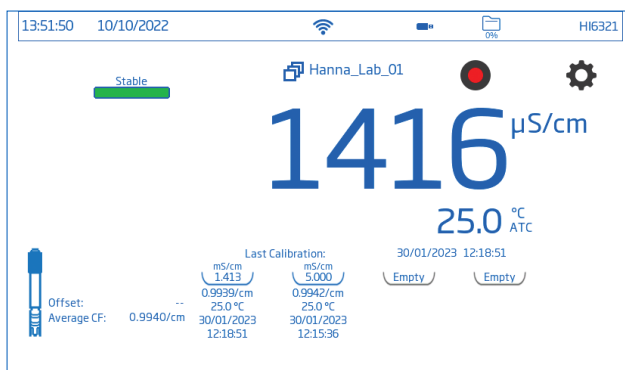

11.3. DIRECT / AUTOHOLD READINGS

- From Measurement screen, tap ✿ (Measurement Menu).
- Tap **Reading** tab and select measured parameter.
- Tap **Direct/Autohold** to select direct/autohold Reading Mode.
- Place the probe into the sample to be tested. Ensure the vent holes are completely submerged.

- Measured value is displayed on the LCD.
  Autohold is displayed blinking until configured stability criteria is reached.
  When measurement is stable, the measured value is kept on display and Autohold stops blinking.
- To return to direct Reading Mode, tap icon on display (EC / Res / TDS / Sal).
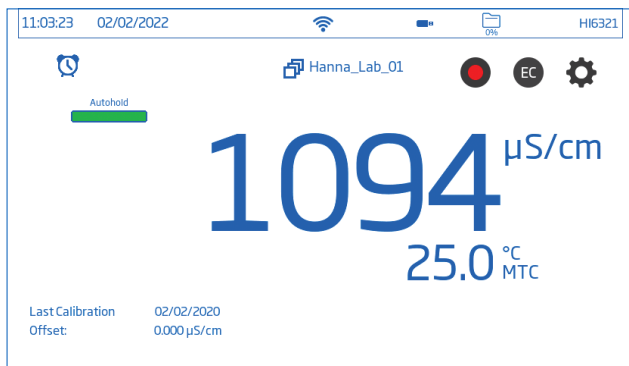
12. LOGGING

Tap 📂 to check available storage.
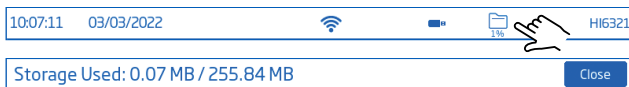
Three logging types are available: Automatic, Manual, and Autohold.
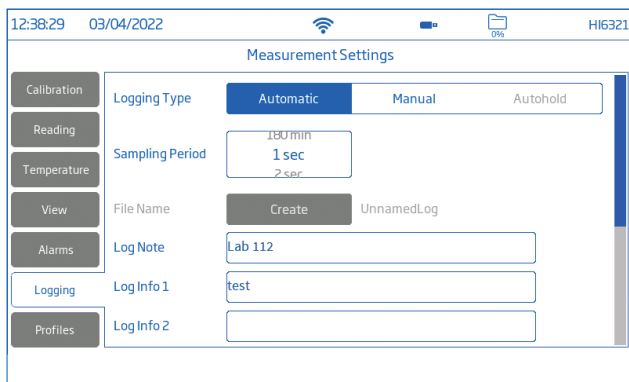
Automatic logging

- Readings are logged (🔴) at predefined period intervals.
  Sampling interval options range from 1 second to 180 minutes.
- Records are continuously added to it until the session stops.

- For each automatic logging session, a new lot is created.
- A complete set of GLP information including date, time, mode selection, temperature reading, and calibration information is stored with each log. User and log information e.g. company, address, sample details may also be included on the .CSV file.

Manual logging
- Readings are logged each time ⓜ is tapped.
- All manual readings are stored in a single log (i.e. records made on different days share the same log).

Autohold logging
- Readings are logged each time ⓐ is tapped and configured stability criteria is reached.
- All Autohold readings are stored in a single log (i.e. records made on different days are logged in the same lot).

    Note: Stability criteria can be set to Fast, Medium, or Accurate for all logging types.

12.1. AUTOMATIC LOGGING

1. From Measurement screen, tap ✿ (Measurement Menu).
2. Tap **Reading** tab and tap to select stability criteria (Accurate, Medium, or Fast).
3. Tap **Logging** tab and select **Automatic** logging type.
4. Scroll to select Sampling Period.
5. Tap ◯ (**Home** key) to reenter Measurement screen.
6. From Measurement screen, tap ⬤ symbol to start/stop logging.
7. During active logging, users can track and log notes.

    To add a new log note:
    - Tap 🗩 .
    - Use on-screen keypad to enter text.
    - Tap ⬅ to log entered note.

        Log Recall view, and .CSV log indicate the added log notes.

12.2. MANUAL LOGGING

1. From Measurement screen, tap ✿ (Measurement Menu).
2. Tap **Reading** tab then select stability criteria (Accurate, Medium, or Fast).

    Note: Manual logging doesn't use this criteria for logging. Setting this is only for the user to note the stability of the reading.

3. Tap **Logging** tab and select **Manual** logging type.
4. See option to create file name:
    - Tap **Create.**
    - Use on-screen keypad to enter file name.

- Tap ⏎ to save new name.
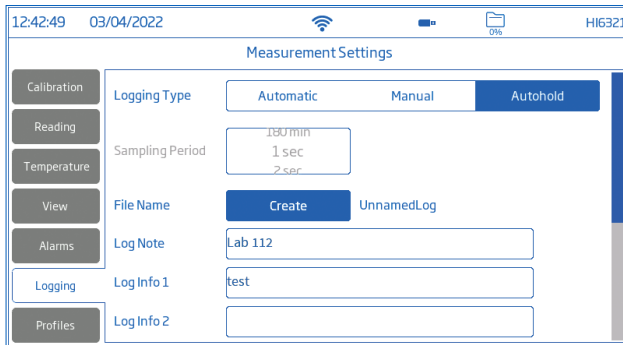
5. See option to define sample ID (name and prefix).
   - Tap **Sample ID Prefix** field to start editing.
   - Use the on-screen keypad to enter lot file name.
   - Tap ⏎ to save new name.
   - Scroll to select Prefix value.
6. Tap ◯ (**Home** key) to reenter Measurement screen.
7. From Measurement screen, tap Ⓜ (manual logging symbol) to log data.
   Data is logged every time symbol is tapped.
8. See option to track and log notes.
9. From Measurement screen, tap ⬤ symbol to start logging, and tap ⬤ symbol to stop logging.

12.3. AUTOHOLD LOGGING
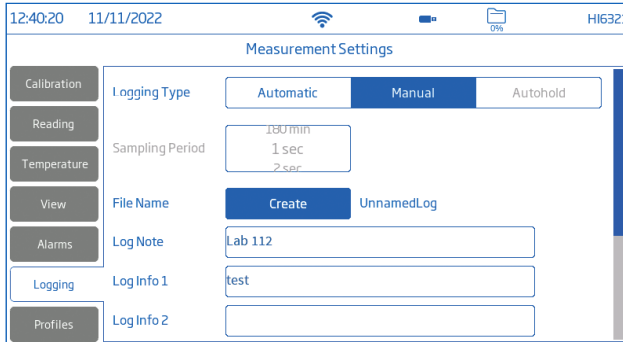
1. From Measurement screen, tap ✿ (Measurement Menu).
2. Tap **Reading** tab then select stability criteria (Accurate, Medium, or Fast).
   Note: Autohold logging uses this criteria for logging. Setting this will affect when data is recorded.
3. Tap to select **Direct/Autohold** reading mode.
4. Tap **Logging** tab and select **Autohold** logging type.

5. Create a file name or have a file previously set up.
6. Option to define sample ID (name and prefix)
    • Tap **Sample ID Prefix** field to start editing.
    • Use the on-screen keypad to enter lot file name.
    • Tap ⏎ to save new name.
    • Next, scroll to select Prefix value.
7. Tap ◯ (**Home** key) to reenter Measurement screen.
8. From Measurement screen, tap 🅓 (Direct logging symbol) to start logging.
   Active Autohold logging in progress is indicated by displayed 🅐 symbol.
   Progress bar, top left corner, indicates progress status.
9. Once configured stability criteria is checked, and conditions are met, data is logged.
   The instrument prompts measurement screen, displayed in configured view.

CSV file format naming convention

To help identify measurement-specific data, files within a data package have the measurement unit automatically included in the file name (e.g. when reading and logging in Conductivity Parameter, automatically logged files retain the "EC" ID in the file name).

Manual or Autohold logged files retain the distinction between different reading modes in the file name. Users have the option to input file name:

• EC › 20220329_085101-**ec**_auto
• Resistivity › 20220309_095704-**res**_auto
• Salinity › 20220331_101507-**sal**_auto
• TDS › 20220331_101458-**tds**_auto

13. MAINTENANCE

Probe Maintenance

Rinse the probe thoroughly as water residue may not be visible.

Cleaning

Dirty or improperly cleaned probes can result in erratic and inaccurate readings.
   • Clean off the external sheath with a soft cloth and surfactant solution.
   • Rinse the probe under a stream of running tap water to remove salt or minerals.
     Jet the tap water stream through the opening to dislodge any debris.
   • Only if strictly necessary, carefully remove the outer plastic sheath to disassemble the probe. Clean off with a warm water (surfactant) mixture and follow with a through rinsing with purified water.
     Allow pieces to dry and reassemble.
Calibrate the probe with the appropriate standard solution for the intended application.

Storage

   • Store the probe dry, after cleaning in distilled water.
   • Clean the probe and calibrate after long-term storage.

General Cleaning of HI6321

The following steps outline the process to ensure users keep the benchtop clean and disinfected while limiting the risk of damage from unsuitable cleaners.

- Disinfect the screen using commercially available non-ammonia glass or disinfectant cleaner.
- Apply a small amount of cleaner directly to a microfiber or lint-free disposable cloth.
  Make sure the cloth is damp and not wet.
- Wipe the glass touch screen clean with the cloth. Do not apply cleaner directly to the interface.

14. ERROR MESSAGES

The instrument shows clear warning messages (bottom of the screen) when erroneous conditions appear or when measured values are outside the expected range.

The information below provides an explanation of the errors and warnings, and recommended action to be taken.

Displayed Message	Explanation & Recommended Action
"Temperature under/over range"	Temperature outside specified range. Replace probe if necessary.
"Under/over compensation range"	During conductivity calibration, the temperature is under/over the conductivity calibration solution compensation limit.
"EC under/over range"	Outside range in the corresponding scale. Ensure the vent holes are completely submerged and the sample is within specified range.
"Broken electrode"	The meter fails to calibrate or gives faulty readings. Replace the probe.
"EC out of calibration range"	Displayed when the measured value is outside calibration range.
"Factory calibration expired"	Contact the Hanna technical support for the periodic factory calibration.

15. SOFTWARE UPDATE

To introduce new features and/or performance improvements Hanna Instruments® releases updated firmware versions. To check for new releases, scan the QR code or go to: https://software.hannainst.com.

Requirements
- USB-A drive (FAT32 format)
- Device must be turned off

Steps
1. Scroll down the software downloads page to find the **Instrument Firmware** list.
2. Connect the USB-A drive to PC.
3. Find the Firmware Version needed for download, then click DOWNLOAD NOW.
4. Wait for *.hiup file download to complete.
5. Plug the flash drive into the USB-A port and turn the meter on.

HI6321
Boot Rev: 1.1

To upgrade insert USB drive

HI6321
Boot Rev: 1.1

Searching for update package

6. Wait for update to complete (~1 hour). *Note: Do not turn off the meter or disconnect from power.*

HI6321
Boot Rev: 1.1

Do not turn off the meter. Update Progress: 24335/62061

16. ACCESSORIES

CONDUCTIVITY SOLUTIONS

HI7030M or HI7030L	12880 μS/cm standard solution, 250 or 500 mL
HI7031M or HI7031L	1413 μS/cm standard solution, 230 or 500 mL
HI7033M or HI7033L	84 μS/cm standard solution, 230 or 500 mL
HI7034M or HI7034L	80000 μS/cm standard solution, 250 or 500 mL
HI7035M or HI7035L	111800 μS/cm standard solution, 230 or 500 mL
HI7037M or HI7037L	100 % NaCl seawater salinity standard solution, 250 or 500 mL
HI7039M or HI7039L	5000 μS/cm standard solution, 250 or 500 mL

OTHER ACCESSORIES

HI740036P	100 mL beaker (10 pcs.)
HI764060	Electrode holder
HI900946	115 Vac to 24 Vdc power adapter, US plug
HI900947	230 Vac to 24 Vdc power adapter, European plug
HI920016	USB type A to C cable

CERTIFICATION

All Hanna® instruments conform to the **CE European Directives** and **UK standards.**

CE   UKCA   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.
Ensuring proper product disposal prevents potential negative consequences for the environment and human health. For more information, contact your city, your local household waste disposal service, or the place of purchase.

RECOMMENDATIONS FOR USERS

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

WARRANTY

HI6321 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. Electrodes and probes are warranted for a period of six months. 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 (see 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 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.

REGULATORY NOTICES FOR THE WI-FI MODULE

United States (FCC) FCC ID: 2ADHKATWINC1500.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada (ISED)   IC: 20266-WINC1500PB
                        HVIN: ATWINC1500-MR210PB
                        PMN: ATWINC1500-MR210PB

This device complies with Industry Canada's 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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établisse-ment d'une communication satisfaisante.

Japan (MIC) 005-101762

South Korea (KCC) R-CRM-mcp-WINC1510MR210P

Taiwan (NCC) CCAN18LP0321T2

注意！依據 低功率電波輻射性電機管理辦法 第十二條 經型式認證合格之低功率射頻電機, 非經許 可, 公司、商號或使用者均不得擅自變更頻率、加大功率或 變更原設計 之特性及功能。第十四條 低功率射頻電機之使用不得影響飛航安全及 干擾合法通信; 經發現有干擾現象時, 應立即停用, 並改善至無干擾時 方得繼續使用。前項合法通信, 指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用 電波輻射性 電機設備之干擾。

China (SRRC) CMIIT ID: 2018DJ1305

ANATEL 08497-18-08759

Note: FCC information is marked on the back of the device.