Instruction Manual

HI 9828

Multiparameter

HANNA® instruments

w w w . h a n n a i n s t . c o m

Dear Customer,

Thank you for choosing a Hanna Instruments product.
Please read this instruction manual carefully before using the instrument. It will provide you with the necessary information for correct use of the 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** or see the back cover for our worldwide contact list.
This instrument is in compliance with the CE directives.

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Chapter 1 - INTRODUCTION

1.1 PRELIMINARY EXAMINATION

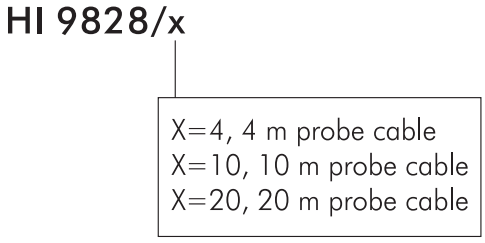
Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify your Dealer or the nearest Hanna Customer Service Center immediately.

HI9828 is supplied complete with:
- Multisensor probe (pH/ORP, Conductivity, D.O.)
- **HI9828-25** quick calibration standard solution, 500 mL
- Calibration beaker
- Probe maintenance kit
- 4 rechargeable C size, Ni-MH batteries
- Power adaptor and cable
- Cigarette lighter cable
- 5 i-Button© with holder
- **HI7698281** USB interface cable
- **HI92000** Windows® compatible software
- Instruction manual
- Rugged carrying case

NOTE Save all packing materials until you are sure that the instrument functions correctly. Any damaged or defective items must be returned in their original packing materials together with the supplied accessories.

1.2 MODEL IDENTIFICATION

Based on probe cable length, 3 different models are available according to the following scheme:



Windows® is a registered Trademark of "Microsoft Co."

1.3 GENERAL DESCRIPTION

HI 9828 is a multiparameter system that benefits from years of experience of Hanna Instruments as a manufacturer of analytical instruments. Waterproof, resistant and easy to use, it is the ideal solution for field measurements of lakes, rivers and sea. Thanks to the microprocessor based multisensor probe, it is possible to measure all the parameters necessary to evaluate the water quality, as dissolved oxygen saturation percentage, conductivity, seawater specific gravity and other parameters that ensure life in water as pH and temperature. It is also possible to use the same probe with different meters without the need to recalibrate the system.

Up to 12 parameters can be enabled and seen on the large graphic display with backlight. All readings can be memorized and associated to a precise sampling area thanks to the i-Button© system and the remarks that the operator can insert before or during measurements. The same data can be plotted on the meter and also downloaded to a PC by means of USB connector and **HI92000** Windows® compatible application for successive elaborations.

The setting menu can be protected by password to avoid not authorized modifications and the help function is always available to explain the selected function, operation or message.

The main features of **HI9828** series include:

- Measurement of dissolved oxygen, pH, ORP, conductivity and related parameters, temperature, atmospheric pressure and seawater specific gravity
- Field replaceable sensor modules for DO, EC and pH/ORP
- 5 interface languages: English, Spanish, French, Portuguese, Italian
- Graphical display with backlight
- GLP features
- i-Button© system to remark the sampling area
- Up to 60,000 samples stored in 100 different lots
- Four C size Ni-MH rechargeable batteries
- Batteries recharged from mains power supply and from cigarette lighter
- Password protection

1.4 POWER SUPPLY

HI9828 runs with 4 rechargeable C size, Ni-MH batteries.

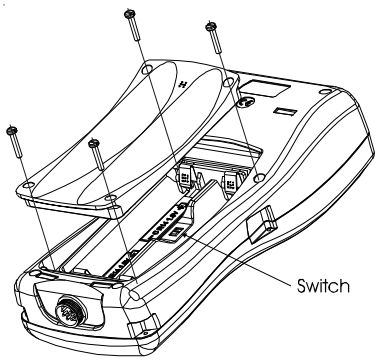
On the display the battery symbol visualizes the remaining battery charge. When this symbol starts blinking, it is necessary to recharge or replace them with new ones. When the batteries are completely rundown the meter automatically shuts off to avoid wrong readings.

1.4.1 Batteries installation

Battery replacement must only take place in a nonhazardous area.

Remove the 4 screws on the rear cover of the instrument and insert the batteries while paying attention to the correct polarity.

Move the switch down toward the probe connector if using rechargeable batteries. Move the switch up for alkaline batteries.



Alkaline batteries can explode or leak when attempting to recharge them with the switch set to down position.

1.4.2 Recharging batteries

HI9828 is supplied with two cables for recharging batteries: HI710045 and HI710046.

Mains power supply

In order to recharge batteries from the mains power supply, use HI710045 combined with the 12 Vdc adapter.

- With the meter OFF, disconnect the probe.
- Connect HI710045 to the meter and to the power adapter; connect the adapter to the mains power supply.
- The message “Battery charging in progress” appears and then the battery symbol.
- A complete batteries recharging will last about 14 hours.

Cigarette lighter supply

To recharge **HI9828** from a vehicle cigarette lighter supply, use **HI710046**.

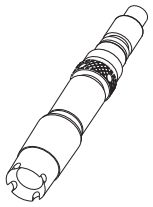
- Simply connect the cable to the meter and to the car's cigarette lighter.
- The message "Battery charging in progress" appears on the display, followed by the battery symbol.
- A complete batteries recharging will last about 14 hours.

NOTE Batteries can also be recharged with the meter ON; if the auto-off feature is enabled, the meter turns off automatically after the set time.

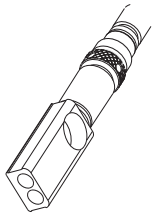
1.5 PROBE DESCRIPTION & INSTALLATION

HI9828 is supplied with the multisensor probe for dissolved oxygen, temperature, conductivity, pH and redox measurements.

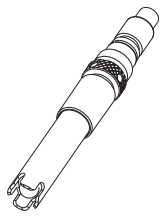
1.5.1 Sensors description



The galvanic D.O. sensor allows to have stable readings in a few seconds. The thin permeable membrane isolates the sensor elements from the testing solution, but allows oxygen to enter. Oxygen that passes through the membrane causes a current flow, from which the oxygen concentration is determined. Before installing the probe, it is necessary to activate the D.O. sensor; see paragraph 1.5.3 for details.



The conductivity sensor uses the 4-ring technology that allows stable and linear readings without any interference in the whole range.



The pH/ORP sensor features a glass membrane for pH readings and a Pt sensor for redox measurements.
To avoid clogging problems and ensure a fast response, the pH bulb must be kept moist at any time. Store the electrode with few drops of **HI70300** storage solution in the protective cap.

The EC sensor also works as matching pin and must be always mounted to have correct pH readings.

For correct redox measurements, the surface of the electrode must be clean and smooth, and a pretreatment procedure should be performed to ensure quick responses.

Since the Pt/PtO system depends on the pH, the pretreatment of the electrode may be determined by the pH and the redox potential values of the solution to be measured.
As a general rule, if the ORP (mV) reading corresponding to the solution pH value is higher than the values in the table below, an oxidizing pretreatment is necessary; otherwise perform a reducing pretreatment.

pH	mV	pH	mV	pH	mV	pH	mV	pH	mV	pH	mV
0	990	1	920	2	860	3	800	4	740	5	680
6	640	7	580	8	520	9	460	10	400	11	340
12	280	13	220	14	160						

For reducing pretreatment: immerse the electrode for a few minutes in HI 7091L.

For oxidizing pretreatment: immerse the electrode for a few minutes in HI 7092L.

1.5.2 Specifications of sensors

	HI769828-0	HI769828-1	HI769828-2	HI769828-3
Sensor Type	pH	pH/ORP	DO	EC
Measure Type	pH; mV (pH)	pH; mV (pH); mV	DO% sat; DO conc.	EC; TDS; resistivity; salinity
Measure Range	0.00 to 14.00 ±600.0 mV (pH)	0.00 to 14.00 ±600.0 mV (pH) ±2000.0 mV	0.0 to 500.0 % 0.00 to 50.00 mg/L	0.000-200.000 mS/cm 0-400000 mg/L 0 to 1.0000 MΩ/cm 0.00 to 70.00 PSU
Color Code	Red	Red	White	Blue
Materials	Tip: glass (pH) Junction: cloth Body: PEI Electrolyte: gel Reference: double	Tip: glass (pH); Pt (ORP) Junction: cloth Body: PEI Electrolyte: gel Reference: double	Cat/An: Ag/Zn Membrane: PTFE Body: PVC	Stainless steel AISI 316 Body: PVC
Maintenance Solution	HI 70300 (storage)	HI 70300 (storage)	HI 7042S (refilling)	-
Dimensions	100 x 14 Ø mm	100 x 14 Ø mm	101 x 16.5 Ø mm	111 x 14 Ø mm

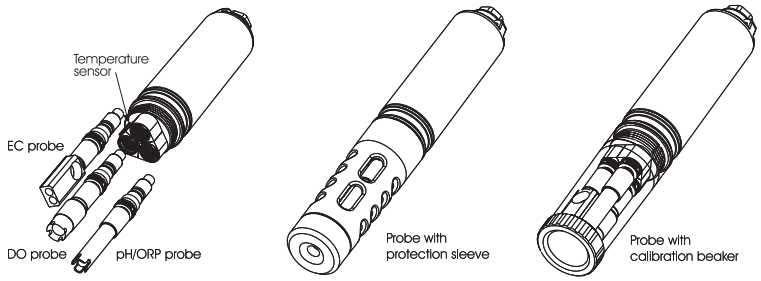
1.5.3 D.O. sensor activation

The D.O. probe is shipped dry. To hydrate the probe and prepare it for use proceed as follows:

- Remove the black & red plastic cap. This cap is used for shipping purposes only and can be thrown away.
- Insert the supplied O-ring in the membrane.
- Rinse the supplied membrane with electrolyte while shaking it gently. Refill with clean electrolyte. Gently tap the membrane over a surface to ensure that no air bubbles remain trapped. To avoid damaging the membrane, do not touch it with your fingers.
- With the sensor facing down screw the cap clockwise to the end of the threads. Some electrolyte will overflow.

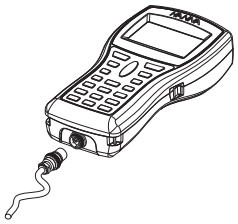
1.5.4 Installation

The multisensor probe can support 3 different electrodes, DO, EC, pH/ORP. To make easier the installation, the 3 sensors have 3 proper color codes.



For correct sensor installation, proceed as follow:

- Grease the O-ring gaskets.
- Insert the sensor while paying attention to the correct alignment with the corresponding colored connector; fix the sensor by screwing the locking nut with the supplied tool.
- When all sensors are mounted, screw the protection sleeve for taking measurements or the transparent beaker for calibration.
- With the meter off, connect the probe to the DIN socket on the bottom of the meter by aligning the pins and pushing in the plug. Tighten the nut to ensure a good connection.



1.6 SPECIFICATIONS

TEMPERATURE	
Range	-5.00 to 55.00 °C; 23.00 to 131.00 °F; 268.15 to 328.15 K
Resolution	0.01 °C; 0.01 °F; 0.01 K
Accuracy	± 0.15 °C; ± 0.27 °F; ±0.15 K
Calibration	Automatic at 1 custom point

pH	
Range	0.00 to 14.00 pH; ± 600.0 mV
Resolution	0.01 pH; 0.1 mV
Accuracy	± 0.02 pH; ± 0.5 mV
Calibration	Automatic 1, 2 or 3 points with 5 memorized standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or 1 custom buffer

ORP	
Range	± 2000.0 mV
Resolution	0.1 mV
Accuracy	± 1.0 mV
Calibration	Automatic at 1 custom point

DISSOLVED OXYGEN	
Range	0.0 to 500.0 % 0.00 to 50.00 mg/L
Resolution	0.1 % 0.01 mg/L
Accuracy	0.0 to 300.0 %: ± 1.5 % of reading or ± 1.0% whichever is greater; 300.0 to 500.0 %: ± 3% of reading 0.00 to 30.00 mg/L: ± 1.5 % of reading or 0.10 mg/L whichever is greater; 30.00 mg/L to 50.00 mg/L: ± 3% of reading
Calibration	Automatic 1 or 2 points at 0, 100 % or 1 custom point

CONDUCTIVITY

Range	0.000 to 200.000 mS/cm (actual EC up to 400 mS/cm)
Resolution	
Manual	1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm
Automatic	1 µS/cm from 0 to 9999 µS/cm 0.01 mS/cm from 10.00 to 99.99 mS/cm 0.1 mS/cm from 100.0 to 400.0 mS/cm
Automatic mS/cm	0.001 mS/cm from 0.000 to 9.999 mS/cm 0.01 mS/cm from 10.00 to 99.99 mS/cm 0.1 mS/cm from 100.0 to 400.0 mS/cm
Accuracy	±1 % of reading or ±1 µS/cm whichever is greater
Calibration	Automatic at 1 point with 6 memorized standards (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point

RESISTIVITY

Range *(depending on measurement setup)*	0 to 999999 Ω·cm; 0 to 1000.0 kΩ·cm; 0 to 1.0000 MΩ·cm
Resolution	Depending on resistivity reading
Calibration	Based on conductivity or salinity calibration

TDS

Range	0 to 400000 mg/L or ppm; (the maximum value depends on the TDS factor)
Resolution	
Manual	1 mg/L (ppm); 0.001 g/L (ppt); 0.01 g/L (ppt); 0.1 g/L (ppt); 1 g/L (ppt)
Automatic	1 mg/L (ppm) from 0 to 9999 mg/L (ppm) 0.01 g/L (ppt) from 10.00 to 99.99 g/L (ppt) 0.1 g/L (ppt) from 100.0 to 400.0 g/L (ppt)
Automatic g/L (ppt)	0.001 g/L (ppt) from 0.000 to 9.999 g/L (ppt) 0.01 g/L (ppt) from 10.00 to 99.99 g/L (ppt) 0.1 g/L (ppt) from 100.0 to 400.0 g/L (ppt)
Accuracy	±1 % of reading or ±1 mg/L (ppm) whichever is greater
Calibration	Based on conductivity or salinity calibration

SALINITY	
Range	0.00 to 70.00 PSU (extended Practical Salinity Scale)
Resolution	0.01 PSU
Accuracy	±2% of reading or ±0.01 PSU whichever is greater
Calibration	1 custom point

SEAWATER SPECIFIC GRAVITY	
Range	0.0 to 50.0 σ_t, σ_0, σ_{15}
Resolution	0.1 σ_t, σ_0, σ_{15}
Accuracy	± 1σ_t, σ_0, σ_{15}
Calibration	Based on conductivity or salinity calibration

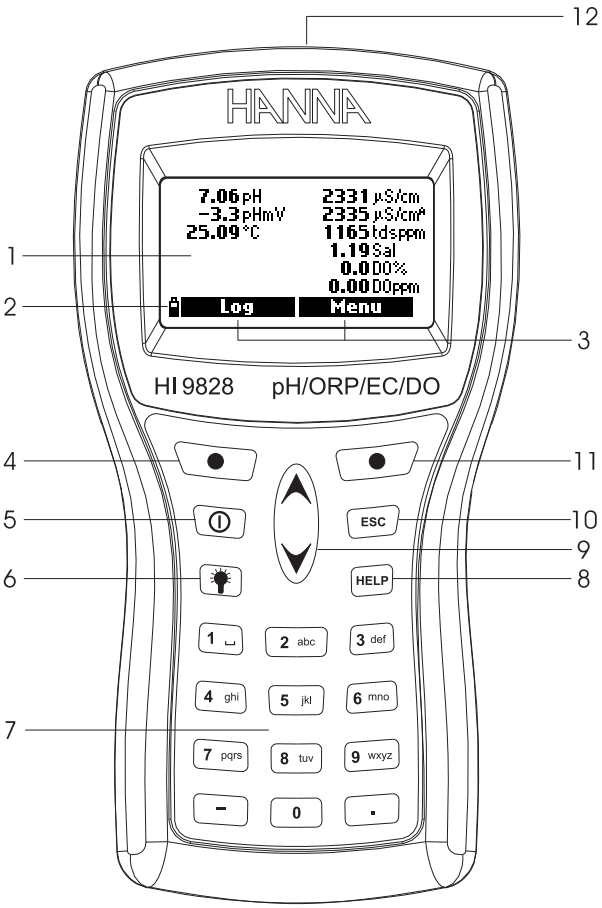
ATMOSPHERIC PRESSURE	
Range	450 to 850 mmHg; 17.72 to 33.46 inHg; 600.0 to 1133.2 mbar; 8.702 to 16.436 psi; 0.5921 to 1.1184 atm; 60.00 to 113.32 kPa
Resolution	0.1 mmHg; 0.01 inHg; 0.1 mbar 0.001 psi; 0.0001 atm; 0.01 kPa
Accuracy	± 3 mmHg within ± 15 °C from the temperature during calibration
Calibration	Automatic at 1 custom point

GENERAL CHARACTERISTICS

Temperature Compensation	automatic from -5 to 55 °C (23 to 131 °F)
Logging Memory	Up to 60,000 samples with 13 measurements each*
Logging Interval	From 1 second to 3 hours
PC Interface	USB (with HI 92000 software)
Waterproof Protection	Meter IP67, Probe IP68
Environment	0 to 50 °C (32 to 122 °F); RH 100 %
Power Supply	4 x 1.5 V alkaline C cells (approximately 150 hours of continuous use, without backlight) or 4 x 1.2 V rechargeable C cells (approximately 70 hours of continuous use, without backlight)
Dimensions	
Meter	221 x 115 x 55 mm (8.7 x 4.5 x 2.2″)
Probe	L = 270 (10.6″), dia = 46 mm (1.8″)
Weight	
Meter	750 g (26.5 oz.)
Probe	750 g (26.5 oz.)

* Without remarks. When using remarks the maximum number of samples decreases but in practical cases it will never be less than 50,000.

1.7 DISPLAY & KEYBOARD DESCRIPTION



1. Display
2. Battery level indicator
3. Softkey functions
4. Left softkey: function defined on display
5. On/Off key: to turn on and off the meter
6. Backlight: to activate the backlight
7. Alphanumeric keyboard: to insert alphanumeric codes
8. HELP key: to have information about the shown screen
9. Arrow keys: to scroll between options
10. ESC key: to go back to the previous screen
11. Right softkey: function defined on display
12. Tag reader

1.8 HELP FUNCTION

HI9828 is provided with the HELP function, useful to have short information regarding the displayed screen. Simply press the HELP key and an information window will appear.

For longer messages press the arrow keys to scroll.

To escape from the help window press again the HELP key or ESC.

Chapter 2 - MEASUREMENT MODE

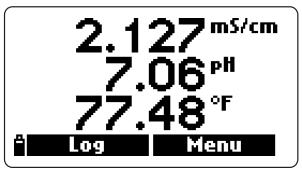
HI9828 can read at the same time different parameters from the same probe. As described in the previous section, up to 3 sensors can be mounted on the probe.

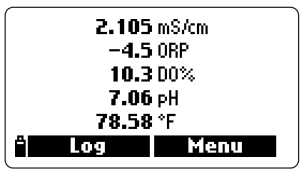
2.1 PROCEDURE

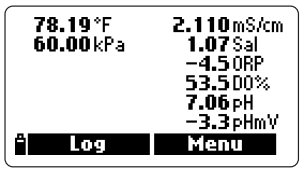
- Connect the probe to the meter and carefully fix the protection sleeve to the probe.
- Immerse the probe into the sample while paying attention to avoid stones.
- Turn the meter on by pressing the On/Off key. The display will show "HANNA HI9828", the firmware version and then enters the measurement mode.
- The meter displays the readings for all the enabled parameters. See Chapter 3 for details.
- Press LOG to store the readings or MENU to enter in the main menu. See Chapter 5 for details.

NOTE If the meter does not find the probe, the message "Probe disconnected!" appears. In this case only "Menu" softkey is available and only the functions that not require any reading are active.

It is possible to enable up to 12 measurements at the same time. Based on the number of enabled parameters, the display graphical resolution changes: the lower the number of parameters, the bigger the size of the digits.







A small "A" letter added to µS/cm or mS/cm units, refers to actual conductivity value, i.e. the conductivity reading with no temperature compensation.

When a measurement is out of range, the nearest full scale value will slowly and continuously blink.

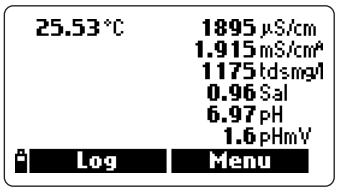
By pressing the lamp key, the backlight turns on and off. After one minute with no key pressed, the backlight turns off automatically.

Chapter 3 - SETUP MODE

A few parameters have to be set before taking any measurements. In the main menu two setup items are available: "Measurement" and "System".

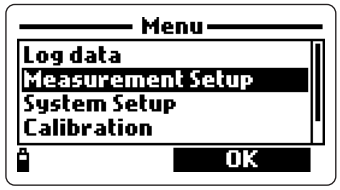
The measurement setup allows to set the displayed readings and their units, while the system setup is used to set the system parameters, as the interface language, date and time, LCD contrast, acoustical signals, etc.

3.1 MEASUREMENT SETUP



• Switch the meter on by pressing On/Off.

After the initialization has been completed, the meter enters the measurement mode. The active softkeys are LOG and MENU.

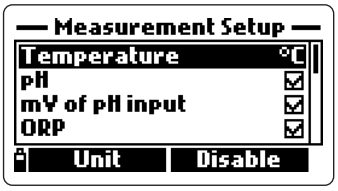


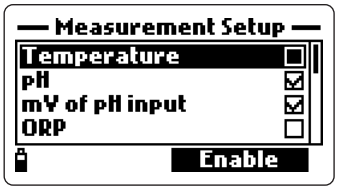
• Press MENU, select "Measurement Setup" using the arrow keys, then press OK.

• The display shows the complete list of measurable parameters.

• To select a parameter, scroll with the arrow keys.

It is possible to enable or disable each parameter. A checked box or the measure unit means that the parameter is enabled. Press the right softkey to enable or disable the parameter.





For some parameters it is also possible to select the measure unit and the resolution by pressing the UNIT or RESOLUTION softkey.

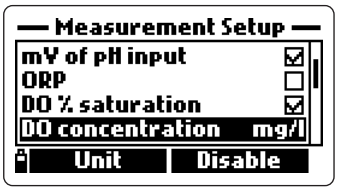
NOTE If the password is enabled, the meter will ask to insert it prior to change the first parameter.

Temperature

The user can select the measure unit: K, °F or °C.

pH, mV of pH Input, ORP, D.O. % Saturation, Salinity

These parameters can only be enabled or disabled; the measure unit and the resolution are fixed.

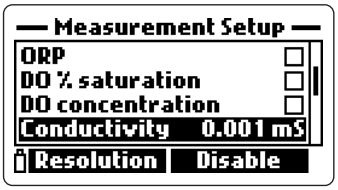


D.O. concentration

It is possible to select ppm or mg/L measure unit.

Conductivity and Actual Conductivity

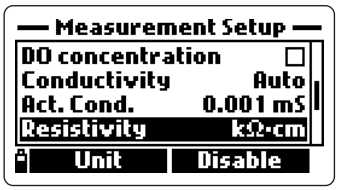
It is possible to select among the following options: Auto (autoranging both μS/cm and mS/cm ranges), 1 μS/cm, 0.001 mS/cm, 0.01 mS/cm, 0.1 mS/cm, 1 mS/cm, Auto mS (autoranging for mS/cm ranges).



NOTE The actual conductivity is the conductivity reading with no temperature compensation.

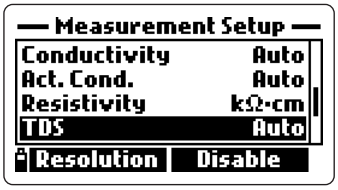
Resistivity

It is possible to select Ω·cm, kΩ·cm or MΩ·cm.



TDS

It is possible to select among the following options: Auto (autoranging both ppm (mg/L) and ppt (g/L) ranges), 1 ppm (mg/L), 0.001 ppt (g/L), 0.01 ppt (g/L), 0.1 ppt (g/L), 1 ppt (g/l), Auto ppt (g/L) (autoranging for ppt (g/L) ranges).



NOTE For setting ppm or mg/L, see paragraph 3.2 “System Setup”.

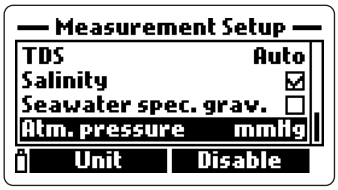
Seawater specific gravity

This value is a widely used parameter for seawater; it is similar to density measurement and it is an expression of salt content in water. It depends on water pressure, temperature and salinity.

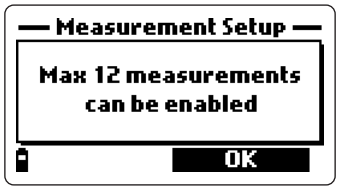
In the seawater specific gravity menu it is possible to select the reference temperature: σ_t, σ_0 and σ_{15} (i.e. current temperature, t=0°C and t=15°C).

Atmospheric pressure

It is possible to select among the following measure units: atm, kPA, mmHg, inHg, mbar, psi.



NOTE A maximum of 12 measurements can be displayed simultaneously. A warning message appears if trying to enable more than 12 measurements.



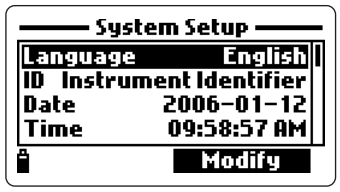
3.2 SYSTEM SETUP

- From measurement mode, press MENU, select "System Setup" using the arrow keys and then press OK.
- To select a parameter, scroll with the arrow keys to highlight it and then press MODIFY.

NOTE If the password is enabled, the meter will ask to insert it prior to change the first parameter.

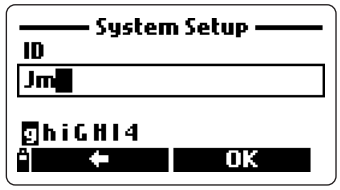
Language

The display language can be selected among the following available options: English, Spanish, French, Portuguese and Italian. The language selection can be modified by pressing the MODIFY softkey.



ID

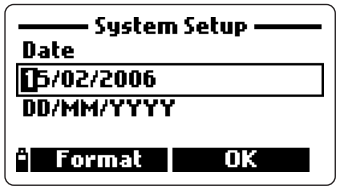
The meter can be labelled with an identification code: press MODIFY and a text box will be displayed. Use the keyboard to insert the desired alphanumeric code and then press OK. A maximum of 25 characters can be used.



Date

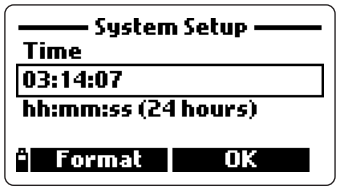
Select the desired date format by pressing repeatedly FORMAT. The available formats are: DD/MM/YYYY, YYYY-MM-DD and MM/DD/YYYY.

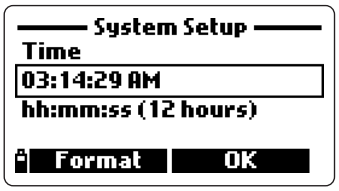
Use the keyboard to insert the date and then press OK.



Time

Select the desired time format by pressing repeatedly FORMAT. The available formats are: hh:mm:ss (24 hours) and hh:mm:ss (12 hours).



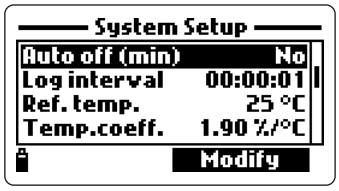


Use the keyboard to insert the time and then press OK.

To choose AM or PM, press A or P on the keyboard after inserting the time.

Auto off

The meter shuts off automatically if no keys are pressed for the set time. By pressing the MODIFY softkey it is possible to select the desired option for this feature: NO (disabled), 5, 10, 15, 20, 30 or 60 minutes.

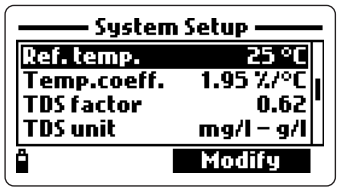


Log interval

Set the logging time interval from 1 second to 3 hours.

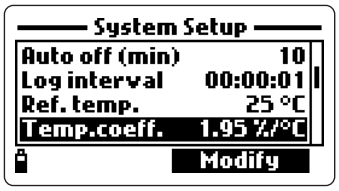
Reference temperature

For conductivity readings, a reference temperature for the displayed value has to be set. The available options are 20°C and 25°C. Press the MODIFY softkey to select the desired option.



Temperature coefficient

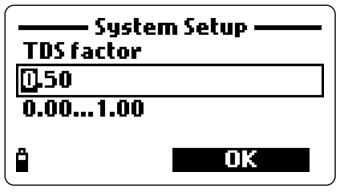
The temperature coefficient can be set from 0.00%/°C (no temperature compensation) to 6.00%/°C. Press MODIFY and then use the keyboard to insert the desired value. The left arrow softkey allows to shift the cursor. To confirm the value press OK.



TDS factor

The conversion factor can be set from 0.00 to 1.00. Usually for strong ionic solutions the factor is 0.5 and for weak ionic solutions, as nutritive solutions, is 0.7.

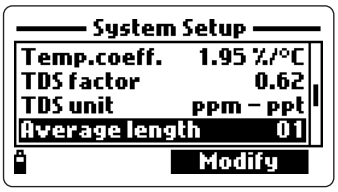
To set this parameter, press MODIFY, insert the value and then confirm by pressing OK.



TDS unit

TDS readings can be displayed in ppm-ppt or mg/L-g/L unit. Press MODIFY to select the desired option.

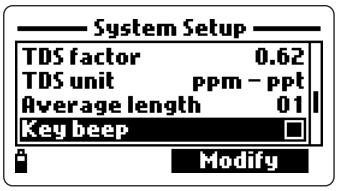
Average length



In order to obtain an average and more representative measurement with unstable samples, set a reading repetition number for the displayed parameters.

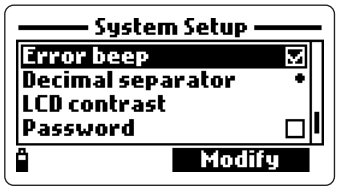
To select the desired average length, press MODIFY. The value can be set from 1 to 30.

Key beep



If enabled, the meter emits an acoustical signal every time a key is pressed.

Error beep

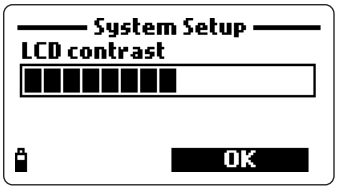


If enabled, the meter emits an acoustical signal every time a wrong key is pressed, or when some particular errors occur.

Decimal separator

It is possible to select the type of decimal separator: dot or comma; press MODIFY to select the desired symbol.

LCD contrast



For setting the LCD contrast, select the corresponding setup item and press MODIFY. An horizontal bar will be displayed. Use the arrow keys to modify the contrast and then press OK.

Password

To enable the password proceed as follows:

- Press MODIFY to select the password setup item.
- Insert the desired password in the text box and press OK.

NOTE While typing, the characters are masked with "*" (star) symbol.

- The meter will ask to confirm. Type again the same password and then press OK to confirm.

- The meter returns to the "System Setup" menu and the checkbox near the password entry is signed.

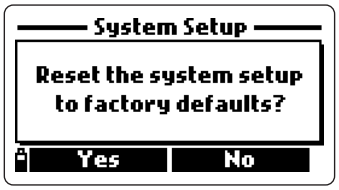
To disable the password proceed as follows:

- Press MODIFY to select the password setup item.
- Insert the password and then press DISABLE. "NO" will appear in the text box.
- Press OK to confirm.

Restore factory settings

It is possible to reset the "System Setup" and "Measurement Setup" parameters to their default values.

- Select the "Restore factory settings" item and press OK.
- The meter will ask to confirm: press YES to confirm or NO to escape.



NOTE To quit the system setup mode at any time, press ESC. For all setup items, if the selection is not confirmed, the previous setting will be kept.

3.3 TABLE OF MEASUREMENT AND SETUP ITEMS

Measurement Setup

Item	*Description*	*Default value*	*Valid Values*
Temperature	Temperature unit	°C	K; °C; °F; ☐
pH	pH measure	☑	☑; ☐
mV of pH input	mV of pH readings	☑	☑; ☐
ORP	Redox measure	☑	☑; ☐
D.O. % saturation	Dissolved oxygen measure	☑	☑; ☐
D.O. concentration	Dissolved oxygen measure	ppm	ppm; mg/L; ☐
Conductivity	Electrical conductivity measure	Auto	☐; Auto; 1 µS; 0.001 mS; 0.01 mS; 0.1 mS; 1 mS; Auto mS
Actual conductivity	No temperature compensated conductivity measure	Auto	☐; Auto; 1 µS; 0.001 mS; 0.01 mS; 0.1 mS; 1 mS; Auto mS
Resistivity	Resistivity measure	MΩ·cm	Ω·cm; kΩ·cm; Ω·cm
TDS	Total dissolved solids measure	Auto	☐; Auto; 1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt; 1 ppt; Auto ppt
Salinity	Salinity measure	☑	☑; ☐
Seawater specific gravity	Specific gravity measure	σ_t	☐; σ_t; σ_0; σ_{15}
Atmospheric pressure	Atm. pressure measure	☐	☐; mmHg; inHg; mbar; psi; atm; kPa

System Setup

Item	*Description*	*Default value*	*Valid values*
Language	Interface language	English	English; Español; Français; Português; Italiano
ID	Meter identification code	-	Max 25 characters
Date	Update calendar	YYYY-MM-DD	YYYY-MM-DD; MM/DD/YYYY; DD/MM/YYYY
Time	Update clock	hh:mm:ss (24 hours)	hh:mm:ss (12 hours); hh:mm:ss (24 hours)
Auto-off (min)	Auto shut-off after a period of non use	5 min	NO; 5; 10; 15; 20; 30; 60 min
Log interval	Period between 2 subsequent automatic records	00:00:01	00:00:01 to 03:00:00

Ref. temperature	Reference temperature for conductivity measurements	25°C	20°C; 25°C
Temp. coefficient	Temperature coefficient for conductivity measurements	1.90%/°C	0.00 to 6.00%/°C
TDS factor	Conversion factor from conductivity to TDS readings	0.50	0.00 to 1.00
TDS unit	Measure unit for TDS	ppm-ppt	ppm-ppt; mg/L-g/L
Average length	Number of readings for average value calculation	01	1 to 30
Key beep	Acoustic signal for key pressed	☑	☑ ; ☐
Error beep	Acoustic signal for wrong key pressed	☑	☑ ; ☐
Decimal separator	Symbol used for decimal separator of displayed numbers	.	. ; ,
LCD contrast	Contrast for the LCD	8	0 to 15
Password	Password insertion	-	Max 25 characters

Chapter 4 - CALIBRATION MODE

HI9828 allows to perform six different types of calibration, one for each parameter and also a quick single-point calibration for some parameters.

The calibration data are stored in the non volatile probe memory, so that the same probe can be used with different meters without needing recalibration.

- To perform a calibration, select "Calibration" in the main menu with the arrow keys and then press OK.

NOTE If the password is enabled and the latest function displayed was not a password protected feature, the meter will ask to insert the password.

- Select the calibration type with the arrow keys and then press OK.

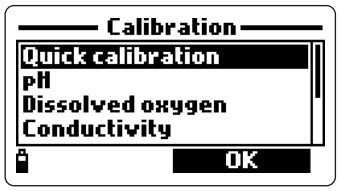
The available options are:

Quick calibration (single point procedure to calibrate the D.O. saturation, pH and conductivity ranges), pH, D.O., conductivity, atmospheric pressure, ORP and temperature.

4.1 QUICK CALIBRATION

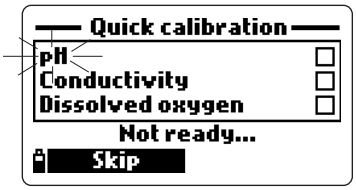
The quick calibration feature allows a fast and easy calibration of the multiparameter probe on the field, using only one solution (HI9828-25).

- Fill the calibration beaker with the HI9828-25 calibration solution.
- Screw the calibration beaker on the probe body. Some solution will overflow.
- Wait a few minutes to stabilize.

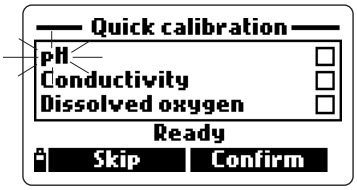


- In "Calibration" menu, select the "Quick calibration" option and press OK.

- A 3-item (pH, Conductivity and Dissolved Oxygen) screen appears, "pH" starts blinking and the "Not ready" message is shown on the lower part of the window.



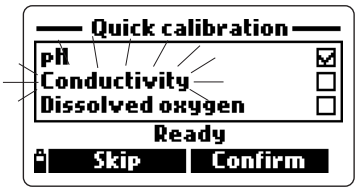
- When the measure is stable, "Ready" is shown. Press CONFIRM to store the value.
- The messages "Storing data on probe, please wait..." and "Updating GLP data, please wait ..." appear.



NOTE If pH calibration is not required, the meter allows to skip to the EC quick calibration, by pressing the SKIP soft key.

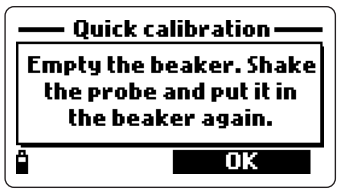
If the pH sensor is missing the message "pH sensor not installed! Skip to conductivity calibration" appears.

- After the pH calibration is completed, the "Conductivity" option will blink.
- When the measure is stable, "Ready" appears. Press CONFIRM to store the value.
- The messages "Storing data on probe, please wait..." and "Updating GLP data, please wait ..." appear.



NOTE If EC calibration is not required, skip to the DO quick calibration, by pressing the SKIP soft key.

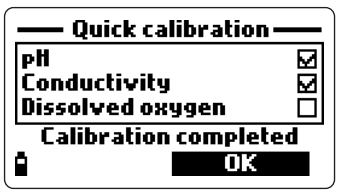
- The message "Empty the beaker. Shake the probe and put it in the beaker again" appears.
- Unscrew the calibration beaker and remove the solution.



- To dry the probe shake it as you would do with a clinical thermometer. Pay attention that no drops are present on the DO sensor.

NOTE To avoid sensor damages, do not use paper to dry the probe.

- Screw back the calibration beaker on the probe body.
- Wait for reading to stabilize and then press OK to close the displayed message.
- When the measurement is stable, the message "Ready" appears. Press CONFIRM to store the value.
- The messages "Storing data on probe, please wait..." and "Updating GLP data, please wait..." appear.
- The 3-calibration-item screen appears again and the check box corresponding to the calibrated parameters will be marked.
- Press OK to return to the calibration menu.

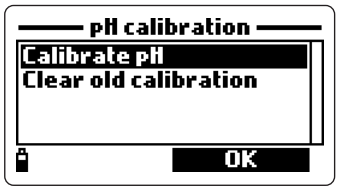


NOTE To quit any quick calibration procedure, press ESC at any time.

4.2 pH CALIBRATION

Calibrate the meter often, especially if high accuracy is required.

Selecting pH calibration the display shows two options: “Calibrate pH” and “Clear old calibration”.



If “Calibrate pH” is selected, it is possible to perform a new calibration at 1, 2 or 3 points with standard buffers (pH 4.01, 6.86 or 7.01, 9.18 or 10.01) or a single calibration with custom buffer.

If “Clear old calibration” is selected, all calibration data will be deleted and the default data restored.

NOTES Old calibration data have to deleted every time the pH electrode is replaced and after a cleaning procedure.

When a 3-point calibration is performed, all the old data are overwritten, while with a 1 or 2-point calibration procedure the meter will use the previous data stored with the last 3-point calibration for the missing points.

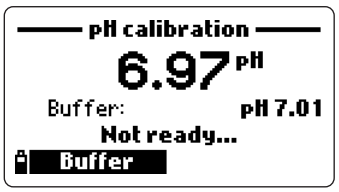
4.2.1 Preparation

Pour small quantities of selected buffer solutions into clean beakers. If possible, use plastic beaker to minimize EMC interferences. To minimize cross contamination, use two beakers for each buffer solution: the first one for rinsing the electrode and the second one for calibration.

4.2.2 Procedure

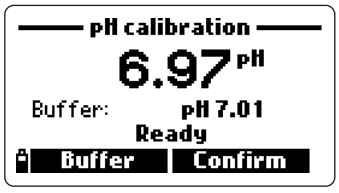
The current measured value is shown on the primary display and the buffer value is displayed in the secondary one.

Press the BUFFER softkey to change the buffer value or insert a custom buffer.



<u>1, 2 or 3-point calibration</u>

- Immerse the probe into the selected buffer and stir gently. The current pH value, the buffer value and “Not ready” are displayed.
- When the reading is stable and close to the selected buffer value, the display shows “Ready”.

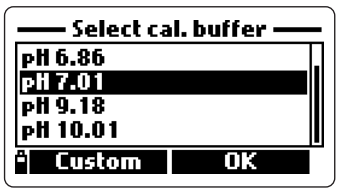


- Press CONFIRM to accept the value or BUFFER to select another buffer using the arrow keys.
- After the first calibration point is confirmed, immerse the probe in the second buffer solution and stir gently.
- When the reading is stable and close to the selected buffer, the display shows the message “Ready”.
- Press CONFIRM to accept the value or BUFFER to change the buffer.
- After the second calibration point is confirmed, proceed by immersing the probe in the third buffer solution, stirring gently and waiting for stable reading.
- When the calibration is completed, the display shows the following messages: “Storing data on probe, please wait...”, “Updating GLP data, please wait ...” and “Calibration completed”.
- Press OK to return to the calibration menu.
- To return to the main menu, press ESC repeatedly.

NOTE The user can terminate the pH calibration mode at any time, by pressing the ESC key.

Custom buffer calibration

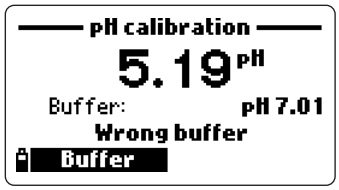
HI 9828 allows a single point procedure to calibrate with a custom buffer value.

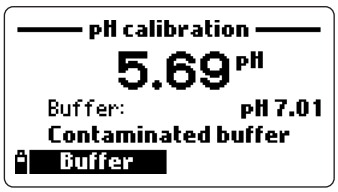


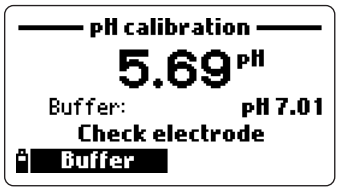
- Select this option by pressing BUFFER and then CUSTOM keys while the meter is waiting for stable reading.
- The display shows a window with a text box for inserting the desired custom value. The valid range for custom buffer is 0.00 to 14.00 pH.

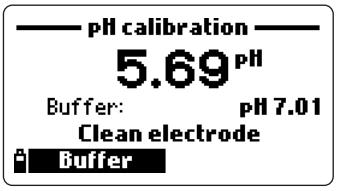
4.2.3 Error list

If the meter does not accept a pH calibration point, a short message is displayed to indicate the possible error source. See for example the following screens:









These are the available messages:

- "Input out of scale": the pH value is out of scale.
- "Wrong buffer": this message means that the difference between the pH reading and the selected buffer is too big. Check if the proper calibration buffer has been selected.
- "Invalid temperature": this message means that the buffer temperature is outside the allowed range.
- "Wrong & Contaminated buffer / Check electrode": this message means that the buffer is contaminated or the electrode is broken or very dirty.
- "Wrong & Check electrode / Clean electrode": this message means that the electrode is broken or very dirty.
- "Wrong & Clear old calibration": this message indicates an erroneous slope condition. This message appears if the slope between current and previous calibration points exceeds the slope window (80% to 110%). Press the CLEAR sofkey to clear the old data and continue the calibration procedure, or press ESC to quit the pH calibration mode.

4.3 DISSOLVED OXYGEN CALIBRATION

If D.O.% saturation range is calibrated, D.O. concentration range will also be calibrated, and vice-versa.

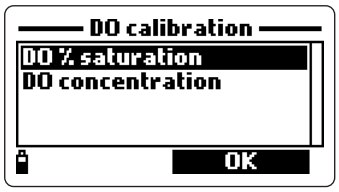
The D.O.% saturation value is referred to the D.O. concentration in air (100%). For this reason it is recommended to calibrate the probe near the area where the measurements will be taken.

Also note that the D.O. concentration values are based on D.O.% saturation, temperature, salinity and atmospheric pressure. It is recommended to use a standard solution or a reference D.O. meter to compare readings during calibration.

The calibration of D.O.% saturation range can be performed at 1 or 2 standard points (0% and 100%), or at a single custom point (50 to 500%).

The calibration of D.O. concentration range can be performed at a single custom point (4 to 50 mg/L).

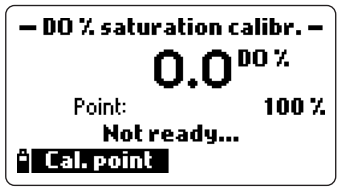
4.3.1 Procedure



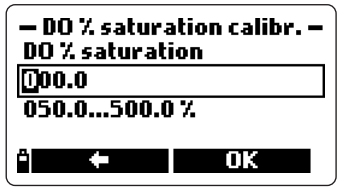
Choose the D.O. calibration mode in the main calibration menu, then select the calibration type using the arrow keys and confirm by pressing OK.

<u>D.O. % saturation</u>

This calibration starts by default with 100 %.



- Fill the calibration beaker with approximately 4 mm (5/32″) of distilled water and screw it on the probe.
- The message NOT READY is displayed until a stable reading is reached.
- To change the standard calibration point, press the CAL. POINT softkey and select the desired standard point.
- To insert a different calibration value, press CAL. POINT and then CUSTOM. Insert the desired value using the keyboard.



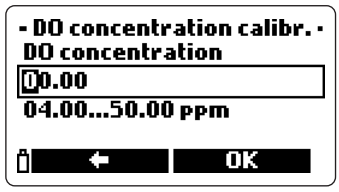
- When the reading is stable, READY and CONFIRM appear. Press CONFIRM to store the calibration point.
- After the first calibration point is confirmed, put the probe in a zero oxygen standard solution and wait for stable reading.

• Press CONFIRM to store the calibration point.
• The following messages will appear: “Storing data on probe, please wait...”, “Updating GLP data, please wait ...” and “Calibration completed”.
• Press OK to return to the calibration menu.
• To return to the main menu, press ESC repeatedly.

NOTE The user can perform a single point calibration with standard values.
To abort the calibration press ESC after the first point is accepted.
If the D.O. input is not within the acceptable range, the message “INVALID INPUT” is displayed.

D.O. concentration

A solution with known D.O. concentration is needed to calibrate the D.O. concentration range.

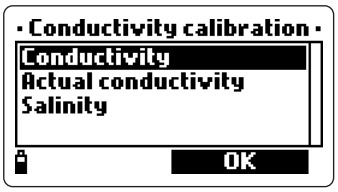


• From D.O. calibration menu, select DO concentration and insert the known value and press OK.
• When the reading is stable, press CONFIRM to accept the value.
• When the messages “Storing data on probe, please wait...”, “Updating GLP data, please wait ...” and “Calibration completed” appear, the calibration is completed. To return to the main calibration menu, press OK
• To return to the main menu, press ESC repeatedly.

4.4 CONDUCTIVITY CALIBRATION

For a correct conductivity calibration the probe sleeve must be always inserted.

The conductivity calibration menu includes 3 different type of calibration: Conductivity, Actual conductivity and Salinity.



The “Conductivity” option allows a single point calibration with a standard solution selectable by the user. This calibration is temperature compensated.

The “Actual conductivity” option allows a single point calibration with a custom conductivity solution of known actual value (not temperature compensated).

The “Salinity” option allows calibration with a standard salinity solution.

The 3 options are related, so that one of this calibration procedure also calibrate the two remaining ranges.

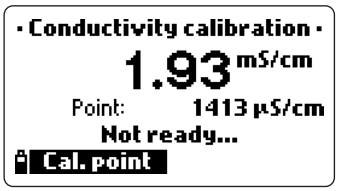
NOTE For correct EC readings it is recommnded to calibrate using a standard solution with a conductivity value close to the sample being measured.

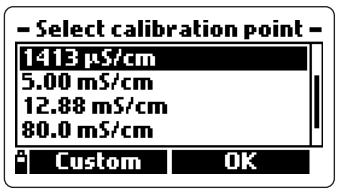
4.4.1 Procedure

After choosing the conductivity calibration mode in the main calibration menu, select the type of calibration with the arrow keys and then press OK.

Conductivity

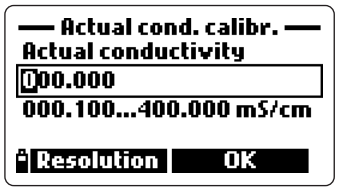
- Select the "Conductivity" option and press OK to confirm.





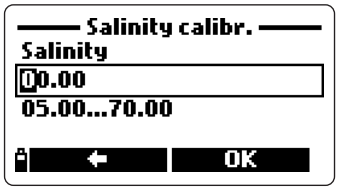
- Fill a beaker with a standard conductivity solution (see "Accessories" section for choosing the proper HANNA solution).
- Immerse the probe in the solution and wait for the stable reading. The probe sleeve must be inserted.
- The primary display shows the actual reading and the secondary one the standard value.
- To change the standard value, press CAL. POINT. The available values of standard solutions are displayed: 0 µS/cm, 84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm and 111.8 mS/cm.
- Press CUSTOM to insert a custom value (compensated conductivity value). Choose "Resolution" to select the desired resolution.
- When the reading is stable, press CONFIRM to store the value.
- After confirmation, the following messages are displayed: "Storing data on probe, please wait...", "Updating GLP data, please wait...", "Calibration complete".
- Press OK to return to the main calibration menu.
- To return to the main menu, press ESC repeatedly.

Actual Conductivity



- Select the "Actual conductivity" option and press OK to confirm.
- Insert the custom value and set its resolution.
- Immerse the probe in the conductivity solution and wait for stable reading. The probe sleeve must be inserted.
- When the reading is stable, press CONFIRM to store the value.
- After confirmation, the following messages are displayed: "Storing data on probe, please wait...", "Updating GLP data, please wait...", "Calibration complete".
- Press OK to return to the main calibration menu.
- To return to the main menu, press ESC repeatedly.

Salinity

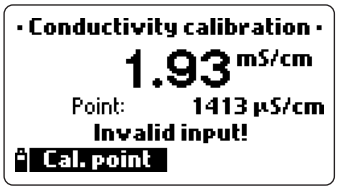


- Select the "Salinity" option and press OK.
- Insert the salinity value of the custom calibration solution.
- Immerse the probe in the solution and wait for stable reading. The probe sleeve must be inserted.
- When the reading is stable, press CONFIRM to store the value.
- After confirmation, the following messages are displayed: "Storing data on probe, please wait...", "Updating GLP data, please wait...", "Calibration complete".
- Press OK to return to the main calibration menu.
- To return to the main menu, press ESC repeatedly.

NOTES These calibration procedures set the slope value. To calibrate the offset, repeat the procedure setting the calibration point at 0 μS/cm.

If the temperature input is not within the acceptable range (0 to 50°C), the message "Invalid temperature" is displayed.

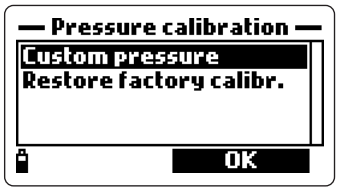
If the conductivity input is not within the acceptable range, the message "Invalid input" is displayed.

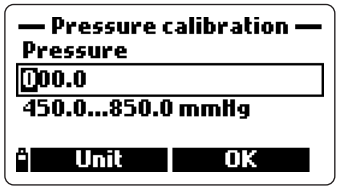


4.5 ATMOSPHERIC PRESSURE

For this calibration procedure a reference barometer is needed. A maximum difference of 40 mbar between current reading and calibration point is allowed during calibration.

4.5.1 Procedure

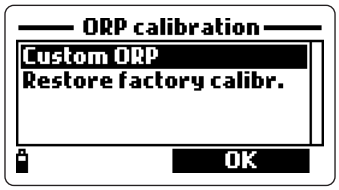


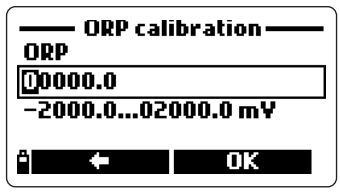


Choose the "Atmospheric pressure" calibration mode in the calibration menu, then select the calibration type using the arrow keys and confirm the selection by pressing OK.

- To perform a pressure calibration at a custom point, select the "Custom pressure" option.
- Select the measure unit with the UNIT key and insert the pressure value with the keyboard.
- Press OK and wait for the measure stability.
- When the reading is stable, press CONFIRM to store the value.
- After confirmation, the following messages are displayed: "Storing data on probe, please wait...", "Updating GLP data, please wait...", "Calibration complete".
- Press OK to return to the main calibration menu.
- To return to the main menu, press ESC repeatedly.
- To restore the factory calibration, select the corresponding option in the "Pressure calibration" menu and then press OK.

4.6 ORP CALIBRATION





It is possible to calibrate at one custom point or restore the factory calibration.

4.6.1 Procedure

- Select the "Custom ORP" option and press OK.
- Fill a beaker with a ORP solution (see "Accessories" section for choosing the proper HANNA solution).
- Using the keyboard, insert the solution value and then press OK to confirm.

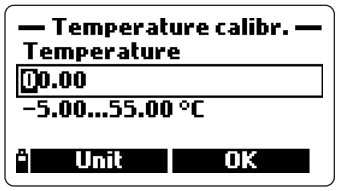
- When the reading is stable, press CONFIRM to store the calibration point.
- After confirmation, the following messages are displayed: “Storing data on probe, please wait...”, “Updating GLP data, please wait...”, “Calibration complete”.
- Press OK to return to the main calibration menu.
- To return to the main menu, press ESC repeatedly.
- To restore the factory calibration data, select the corresponding option in the “ORP calibration” menu and then press OK.

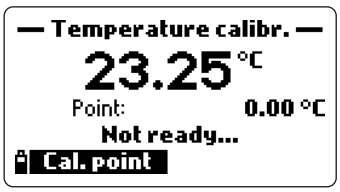
4.7 TEMPERATURE CALIBRATION

The meter is factory calibrated for temperature readings. If necessary, temperature calibration may be performed as explained below.

4.7.1 Procedure

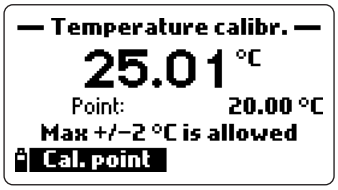
- Select “Temperature” in the main calibration menu and press OK to enter the temperature calibration mode.
- Insert the probe in the thermoregulated bath.
- Select the measure unit (°C, °F or K) and insert the bath temperature value (read by a reference thermometer).
- When the reading in stable, READY and CONFIRM appear on the display.
- Press CONFIRM to store the calibration point.
- After confirmation, the following messages are displayed: “Storing data on probe, please wait...”, “Updating GLP data, please wait...”, “Calibration complete”.





- Press OK to return to the main calibration menu.
- To return to the main menu, press ESC repeatedly.

NOTE The meter allows a maximum difference of ±2°C between the current reading and the set value. If this condition is not satisfied, the display will show the message “Max +/-2°C is allowed”.

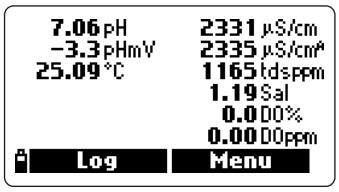


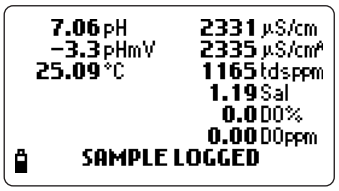
Chapter 5 - LOGGING MODE

HI9828 can store up to 60,000 samples in 100 different lots. The value 60,000 is reached if no remarks are used. When using remarks, the maximum number of stored measurements decreases, but in practical cases it will never be less than 50,000.

5.1 LOGGING

- From measurement mode press LOG to store the enabled readings. The default setting suggests the last used lot to store the sample. Each sample can be associated to a tag by simply touching the tag with the tag reader.
- The meter asks the location for storing the readings. Press OK to accept the proposed lot.
- The "SAMPLE LOGGED" message is shown, then the meter returns to the measurement mode.



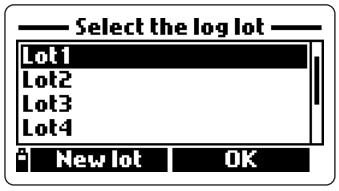


5.1.1 Logging options

- To insert additional information for the logged value or to select the continuous logging mode, press OPTIONS.

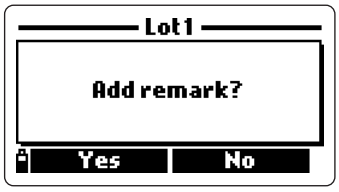
- The following softkeys will appear: "One sample" and "Continuous". Select the desired option.

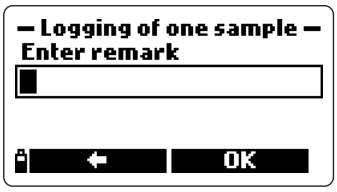
- To choose the reading storing location, select an existing lot using the arrow keys and press OK to confirm. To create a new lot press the NEW LOT softkey and insert the desired code in the displayed text box using the keyboard. Press OK to confirm. If the name already ex-



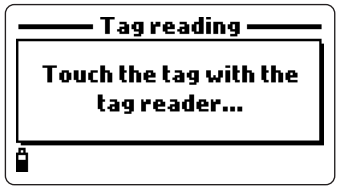
ists, a waring message advises the user: “The file already exists! Insert a different file name”. Press OK to insert a different file name.

- The “Add remark? Yes or No” window will then appear. If YES is pressed and a remark list already exists, it is possible to select the desired note or press NEW to insert a new remark in a text box appears.





- The “Tag reading” option allows to associate the logged or to be logged samples to a tag. The message “Touch the tag with the tag reader” is displayed. Press SKIP if no tags are available or to skip this option.
- If the tag is touched, the associated ID will be displayed. If no ID is associated to the tag, the serial number is shown.



- Press TAG ID to insert an id. code for the used tag and then press OK (or simply press OK if not interested in a tag ID).

NOTES A logging list with relative remarks can be created before taking any measurements and logging. See below paragraph “Log data setup”.

To abort the logging procedure at any time, press the ESC softkey repeatedly.

In case of continuous logging, the data collection will start after the last option is confirmed. In case of one sample logging, the data is stored after LOG is pressed.

5.2 LOG DATA SETUP

To set lots, insert remarks, review logged or plotted data and to delete lots, from the main menu select LOG DATA using the arrow keys. Press OK to confirm the selection.

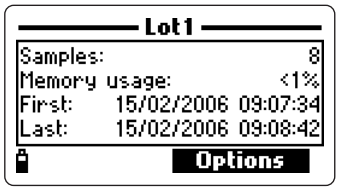
A list of available functions appears.

5.2.1 Lots

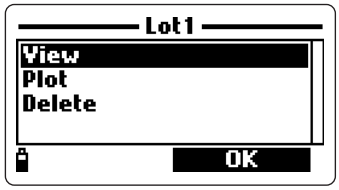
This option allows to insert a new lot, to view logged measurements, to plot data or to delete lots.

- Scroll with the arrow keys to select the desired lot and then press OK.
- To create a new lot press the NEW LOT softkey and insert the identification name with the keyboard. Press OK to confirm.

NOTE In the upper line of the window, the display shows the percentage of memory still available for inserting new data, for example "Data lots (free: 100%)".

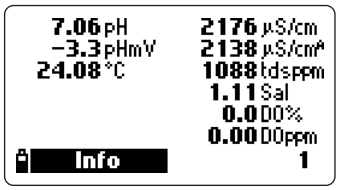


- After OK is pressed, the meter displays all the data related to the selected lot: number of samples, memory space used, time and date of the first and the last reading.
- If OPTIONS is pressed, a 3-option menu appears: VIEW to visualize the readings stored in the selected lot; PLOT to visualize the corresponding graph; DELETE to delete the selected lot.



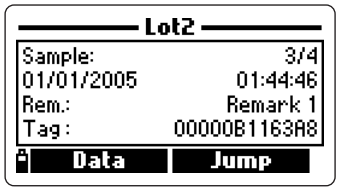
NOTE The first line of the 3-option window indicates the lot name.

View

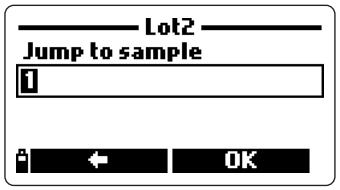


- Press VIEW and the sample details will be displayed. Use the arrow keys to change the sample number in the selected lot. The sample number is shown on the down right corner of the display.

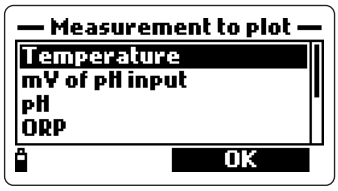
NOTE Details are available only for the currently enabled parameters (see section 3.1 "Measurement setup").



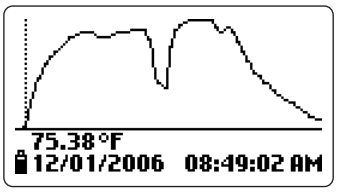
- Press INFO to see the sample number, time and date, remarks and tag ID or serial number (if available).
- Press DATA to return to the previous screen or JUMP to select another sample in the same lot. If JUMP is pressed a text box appears to insert the desired sample number.
- Press ESC to return to the 3-option menu.



Plot

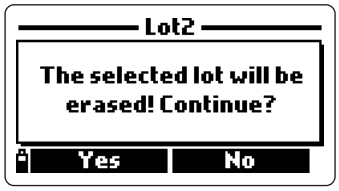


- Press PLOT and the list of the available parameters for the selected lot will appear.
- Use the arrow keys to scroll and select the desired parameter. Press OK to view the graph.
- Use the arrow keys to move the cursor in the graph and highlight a sample. The sample data are displayed below the graph.
- Press ESC to return to the parameter list.
- Press ESC again to return to the 3-option menu.



NOTE The number of lot samples that can be plotted is limited by the display resolution. To view a complete graph download data to PC.

Delete



- Press DELETE and the meter will display the message "The selected lot will be erased! Continue?". Press YES to delete or NO to return to the previous screen.
- To return to the LOG DATA menu, press ESC repeatedly.

5.2.2 Delete all lots

- If the "Delete all data" option is selected, the display shows the message "All stored log data will be erased! Continue?". Press YES to delete or NO to return to the previous screen.

5.2.3 Remarks

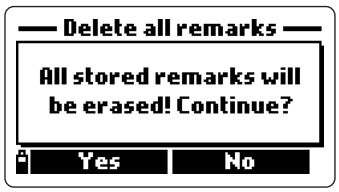
A remark can be associated to each sample.

- To add a remark, use the arrow keys to scroll and highlight the REMARKS option. Press OK to confirm the selection.
- The display shows the list of memorized remarks.
- Press NEW to insert a new remark. A text box appears to insert the desired information.
- Press DELETE to cancel an existing remark.

NOTE During logging each reading can be associated to a remark either selected from a previously created remarks list or new. See paragraph 5.1.1 "Logging options".

5.2.4 Delete all remarks

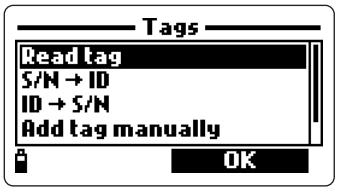
- To delete all the inserted remarks, use the arrow keys to select the entry and press OK. The display will shows the message "All stored remarks will be erased! Continue?". Press YES to delete or NO to return to the previous screen.



5.2.5 Tags

Read tag

- Select READ TAG to view and modify the information associated to a tag, or to insert a tag ID if the tag has never been memorized in the meter. The display shows the message "Touch the tag with the tag reader". Touch the tag with the tag reader located on the top of the meter (#12 at page 18).
- When the tag is detected the meter displays the information regarding the tag serial number and the tag ID (if available).

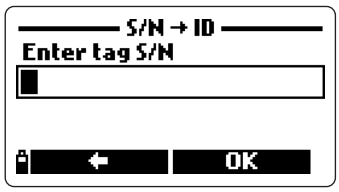


- Press the TAG ID softkey (available only if the tag has never been identify) to insert the current tag ID.
- Press MODIFY to change the tag information or OK to close the window.

S/N → ID

This option allows to view the ID code associated to a tag serial number.

- Select S/N→ID and press OK.
- Insert the serial number using the keyboard and then press OK.
- The tag information window will appear. Press OK to return to the previous screen or MODIFY to modify the tag ID.

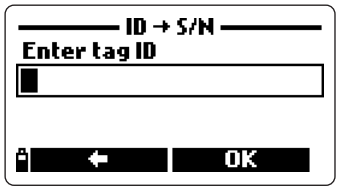


- If the typed S/N is not stored in memory, the warning message "This tag S/N is not stored in memory" advises the user.

ID → S/N

This option allows to view the tag serial number related to an ID.

- Select ID→S/N and press OK.
- Insert the identification code using the keyboard and then press OK.
- The tag information window will appear. Press OK to return to the previous screen or MODIFY to modify the tag ID.



NOTE If the inserted ID is not present in the memory, a warning message advises the user.

Add tag manually

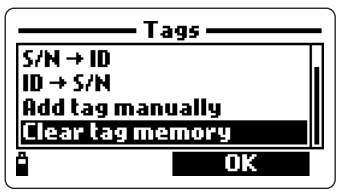
An ID code can be associated to a tag even if the tag is not physically available.

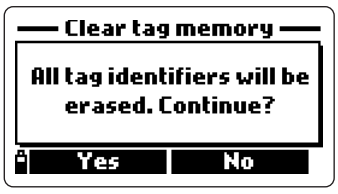
- Select the proper option and press OK.
- Insert the tag serial number using the keyboard and then press OK.
- Insert an ID code for the added tag and then press OK.
- The meter will now display all information just entered.

Clear tag memory

The tag memory can be completely cleared.

- Select the "Clear tag memory" option and press OK.
- The display will show the message "All tag identifiers will be erased. Continue?".





- Press YES to confirm tag erasing or NO to return to the previous screen.
- To return to measurement mode, press ESC repeatedly.

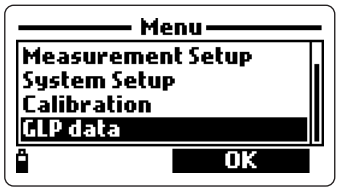
Chapter 6 - GLP

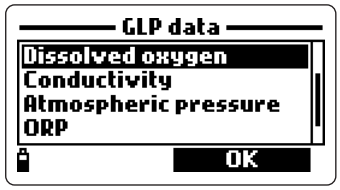
GLP (Good Laboratory Practice) is a set of functions that allows to store or recall data regarding the probe calibration. This feature also allows to associate a reading to "certified data" (standard solutions, reference meters, etc.) put in the meter through the calibration procedure.

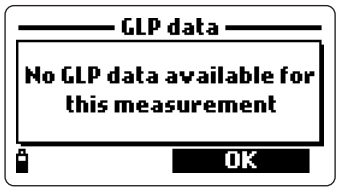
To visualize GLP data, from measurement mode press the MENU softkey and scroll using the down arrow key to highlight the "GLP data" option.

Press OK: the complete list of available parameters appears. Select the desired option using the arrow keys and press OK to view the relative information.

NOTE When there are no available calibration data for the selected parameter, the display shows the message "No GLP data available for this measurement". Press OK to return to the previous screen.



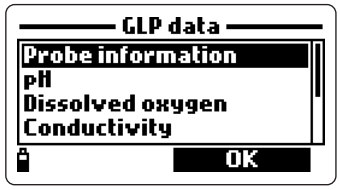


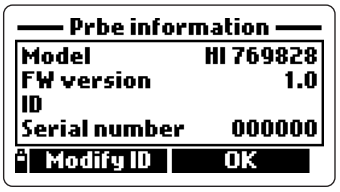


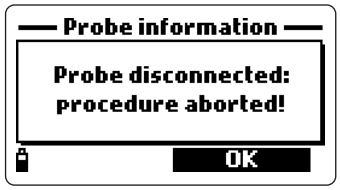
6.1 PROBE INFORMATION

- To view the probe information, select the "Probe information" option and press OK.
- The following information appear: model, firmware version, ID and serial number.
- Press OK to return to the previous screen or MODIFY ID to change the identification code.
- When MODIFY ID is pressed, a text box appears to insert the code. Press OK to confirm or ESC to escape without saving the changes.
- The messages "Storing data on probe, please wait..." and "Data successfully stored on probe" appear.
- Press OK to return to the "Probe information" screen.

NOTES If no probe is connected a warning message appears.

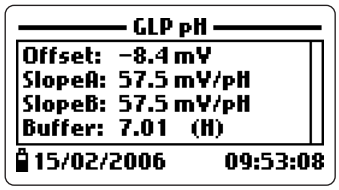






6.2 pH

- From the GLP data main menu, select the pH option and press OK.
- All the information about the last pH calibration appears: offset, acidic slope, basic slope, used buffers, time and date of procedure.
- Use the arrow keys to scroll the last 5 calibration data sets stored.



- Press ESC to return to the GLP data main menu.

NOTE The C label near the buffer value indicates a custom point, while the H means HANNA standard value.

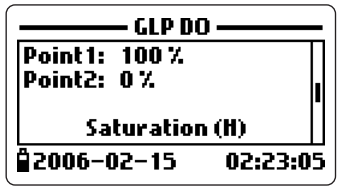
If a quick calibration was performed, the buffer values are replaced with "Quick calibration".

If the calibration was cleared, the values for offset and slope are the default values and the message "Old calibrations cleared" appears.

If no pH calibration has been performed, a warning message advise the user. Press OK to return to the previous screen.

6.3 DISSOLVED OXYGEN

- From GLP data main menu select the Dissolved Oxygen option and press OK.
- All the information about the last D.O. calibration appears: calibrated points, % saturation or concentration, time and date.



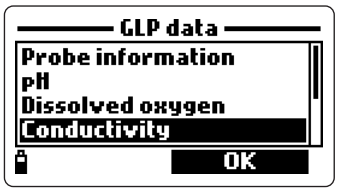
- Use the arrow keys to scroll the last 5 memorized calibrations.
- GLP calibration data for D.O. include 3 options: 2-point percentage D.O. calibration, single point percentage D.O. calibration and concentration D.O. calibration.

NOTE The C label near the calibration point indicates a custom point, while the H means HANNA standard value.

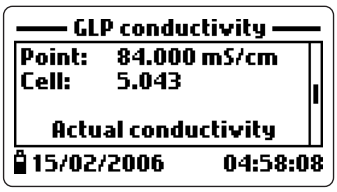
When the D.O. percentage saturation is calibrated, also the D.O. concentration range is calibrated, and vice-versa.

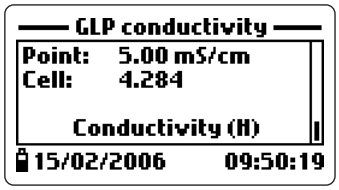
If no D.O. calibration has been performed, a warning message advise the user. Press OK to return to the previous screen.

6.4 CONDUCTIVITY



- From GLP data main menu select the "Conductivity" option and press OK. This menu allows to view data for conductivity, actual conductivity and salinity calibrations.
- All the information about the last conductivity calibration appears: calibrated point, cell constant value, calibration type (conductivity, actual conductivity or salinity), time and date.





- Use the arrow keys to scroll the last 5 memorized calibrations.
- For conductivity calibration GLP data the following screens are available: conductivity, actual conductivity, salinity.

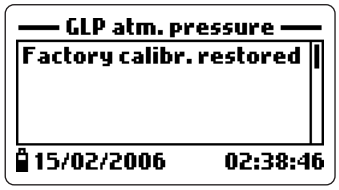
NOTE The C letter near the conductivity calibration indicates a custom point, while the H means HANNA standard value.

If no conductivity calibration has been performed, a warning message advise the user. Press OK to return to the previous screen.

If the selected calibration is a factory calibration, the meter shows the message "Factory calibration".

6.5 ATMOSPHERIC PRESSURE

- From GLP data menu select the "Atmospheric pressure" option and press OK.
- All the information about the last atmospheric pressure calibration appears: custom calibration point, time and date.
- In case of restoring factory calibration data, the display will show the warning message "Factory calibr. restored".
- Use the arrow keys to scroll the last 5 memorized calibrations.

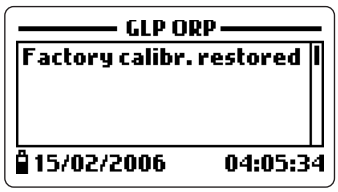


NOTE If no atmospheric pressure calibration has been performed, a warning message advise the user. Press OK to return to the previous screen.

If the selected calibration is a factory calibration, the meter shows the message "Factory calibration".

6.6 ORP

- From GLP data main menu select the “ORP” option and press OK.
- All the information about the last ORP calibration appears: calibrated point, time and date
- In case of restoring factory calibration data, the display will show the warning message “Factory calibr. restored”.
- Use the arrow keys to scroll the last 5 memorized calibrations.

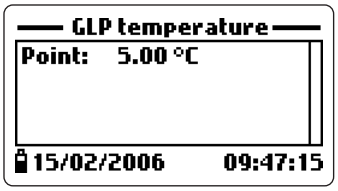


NOTE If no ORP calibration has been performed, a warning message advise the user. Press OK to return to the previous screen.

If the selected calibration is a factory calibration, the meter shows the message “Factory calibration”.

6.7 TEMPERATURE

- From GLP data main menu select the “Temperature” option and press OK.
- All the information about the last temperature calibration appears: calibrated point, time and date.
- Use the arrow keys to scroll the last 5 memorized calibrations.



NOTE If no temperature calibration has been performed, a warning message advise the user. Press OK to return to the previous screen.

If the selected calibration is a factory calibration, the meter shows the message “Factory calibration”.

Chapter 7 - PC CONNECTION MODE

The logged data can be transferred to PC using the HI92000 Windows® compatible application software.

HI92000 allows to use the powerful capabilities of most spread sheet programs (e.g. Excel©, Lotus 1-2-3©). Simply open the file downloaded by HI92000 from the selected spread sheet program and you can do any elaboration available with the software (e.g. graphics, statistic analysis). HI92000 offers a variety of features and is provided with an on-line-help to support the user throughout any situation.

7.1 SOFTWARE INSTALLATION

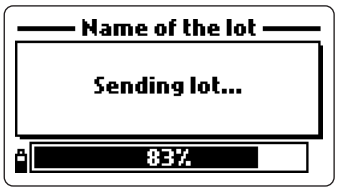
- Insert the installation CD into the PC.
- The software menu window should start automatically (if it does not, go to the main CD folder and double-click "histart.exe"). Click "Install software" and follow the instructions.

7.2 PC CONNECTION

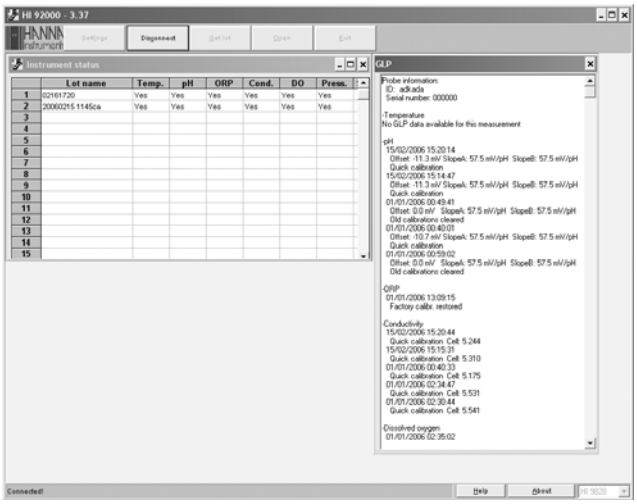
- With the meter OFF, disconnect the probe.
- Connect the HI 7698281 USB adapter to the meter and to the USB port on PC.
- Turn the meter ON and the message "PC connection" appears.

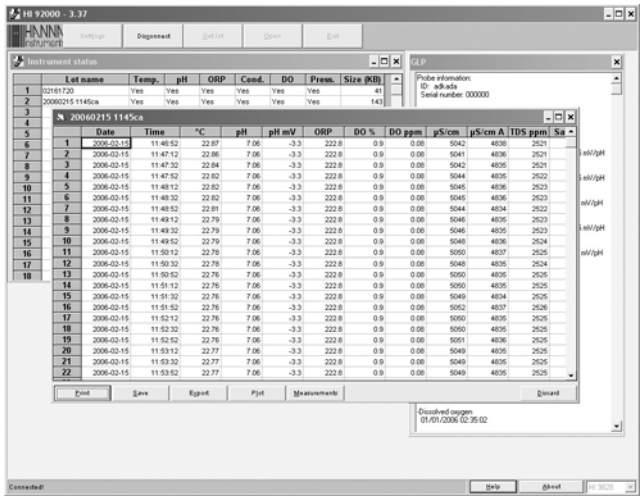
- Run the HI92000 application software, select the number of the used COM port within the "Settings" window and then press CONNECT.
- HI92000 downloads the logged data. The PC monitor shows the GLP data and the logged lot (see figure on next page). To download and view all samples of a certain lot, select the desired lot and press the "Acquire lot" option.

- During download, the meter displays a visual representation of the transferred data percentage.



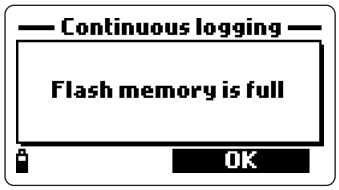
NOTE To verify the PC COM port number used for connecting the meter, with the cable connected, press START in the Windows® task bar. In the main menu select "Settings" and then "Control panel", "System", "Hardware", "Device Manager" and "Ports". This last menu shows the number of the used COM port near the USB serial port.


HI 92000 - 3.37
Settings
Disconnect
Get Int
Open
Exit
Instrument status
Lot name
Temp.
pH
ORP
Cond.
DO
Press.
02161720
20060215 1145ca
GLP
Probe information:
ID: adkada
Serial number: 000000
Temperature
No GLP data available for this measurement
pH
15/02/2006 15:20:14
Offset: -11.3 mV SlopeA: 57.5 mV/pH SlopeB: 57.5 mV/pH
Quick calibration
15/02/2006 15:14:47
Offset: -11.3 mV SlopeA: 57.5 mV/pH SlopeB: 57.5 mV/pH
Quick calibration
01/01/2006 00:49:41
Offset: 0.0 mV SlopeA: 57.5 mV/pH SlopeB: 57.5 mV/pH
Old calibrations cleared
01/01/2006 00:40:01
Offset: -10.7 mV SlopeA: 57.5 mV/pH SlopeB: 57.5 mV/pH
Quick calibration
01/01/2006 00:59:02
Offset: 0.0 mV SlopeA: 57.5 mV/pH SlopeB: 57.5 mV/pH
Old calibrations cleared
ORP
01/01/2006 13:09:15
Factory calbr. restored
Conductivity
15/02/2006 15:20:44
Quick calibration Cell: 5.244
15/02/2006 15:15:31
Quick calibration Cell: 5.310
01/01/2006 00:40:33
Quick calibration Cell: 5.175
01/01/2006 02:34:47
Quick calibration Cell: 5.531
01/01/2006 02:30:44
Quick calibration Cell: 5.541
Dissolved oxygen
01/01/2006 02:35:02
Connected!
Help
About
HI 9828

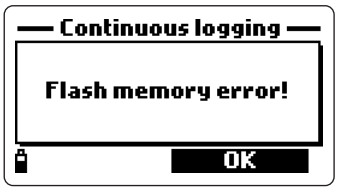

HI 92000 - 3.37
Settings
Disconnect
Get Int
Open
Exit
Instrument status
Lot name
Temp.
pH
ORP
Cond.
DO
Press.
Size (KB)
02161720
20060215 1145ca
GLP
Probe information:
ID: adkada
Serial number: 000000
20060215 1145ca
Date
Time
°C
pH
pH mV
ORP
DO %
DO ppm
pS/cm
pS/cm A
TDS ppm
Sa
Print
Save
Export
Plot
Measurements
Discard
Dissolved oxygen
01/01/2006 02:35:02
Connected!
Help
About
HI 9828

Chapter 8 - ERROR MESSAGES

HI9828 displays a series of messages if probe or meter errors are generated. Here below are described the error messages with their meaning and indication to solve the problem. For quick information the help menu is always available on the meter by pressing the "Help" button.



- "Continuous logging - Flash memory is full". This message means that the memory is full and no reading can be logged. Press OK and delete one or more lots.



- "Flash memory error!". This message indicates an error in the meter internal memory. Press OK, download the data and delete all lots. If the problem persists, contact the HANNA service center.

- "Probe communication error!". This message means that there is a communication problem between probe and meter. Check if the cable is correctly connected, turn the meter off, disconnect the probe and connect it again. If the problem persists, contact the HANNA service center.

- "Probe critical error: EEPROM corruption!". This message means that the probe EEPROM data are corrupted. Turn the meter off, disconnect the probe and connect it again. If the problem persists, contact the HANNA service center.

- "Probe critical error: ADC blocked!". This message means that the probe internal A/D converter does not respond or is blocked. Turn the meter off, disconnect the probe and connect it again. If the problem persists, contact the HANNA service center.

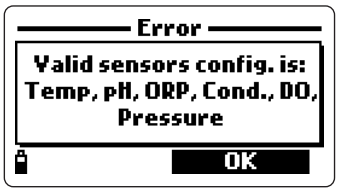
- "Probe critical error: I2C bus fault!". This message indicates an internal transmission not acknowledged or a bus fault for more than a certain number of unsuccessful transmission attempts. Turn the meter off, disconnect the probe and connect it again. If the problem persists, contact the HANNA service center.

- "Probe critical error". This message means that a probe generic error occurs. Turn the meter off, disconnect the probe and connect it again. If the problem persists, contact the HANNA service center.

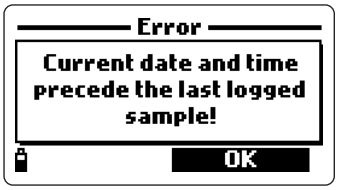
- "None of the enabled measurements is available". This message appears in measurement mode if none of the selected parameters is available because the corresponding sensors are not mounted on the probe. Turn the meter off, install the required sensor and proceed with measurements.

- "Please disconnect probe from meter before installing or removing any sensor!". This message appears if the operator removes or mounts a sensor with the meter on and the probe connected. To avoid sensor or probe damages, please turn the meter off before any operation on the probe.

- "Error - Valid sensors config. is Temp, pH, ORP, Cond., DO, Pressure" or similar messages. This kind of error occurs when the user tries to record new samples with different sensor configuration in an existing lot. All logged samples in the same lot must have the same sensor configuration. Press OK and change logging lot.



- "Error - Current date and time precede the last logged sample!". This error occurs when the user tries to record new data in an existing lot, but the current time and date of the meter precede the time and date of last logged data for the selected lot. Press OK, set a correct value for time and date or log in a different lot.



- "I2C bus error!". This message appears when a the internal transmission is not recognized or after a certain number of unsuccessful transmission attempts. Turn the meter off and on again. If the problem persists, contact the HANNA service center.

APPENDIX A - PROBE MAINTENANCE

HI9828 is supplied complete with a probe maintenance kit that includes **HI7042S** (electrolyte solution for D.O. sensor), 5 membranes and O-rings for D.O. sensor, a small brush for cleaning EC and D.O. sensors, 5 O-rings for sensor connectors and a syringe with grease to lubricate these O-rings.

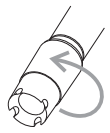
General maintenance

After use rinse the probe with tap water and dry it. The pH electrode bulb must be kept moist. Dry the D.O. and EC sensors.

Maintenance of D.O. sensor

For a top performance probe, it is recommended to replace the membrane every 2 months and the electrolyte once a month.

Proceed as follows:



- Unscrew the membrane by turning it counterclockwise.
- Rinse the supplied spare membrane with some electrolyte while shaking it gently. Refill with clean electrolyte.
- Gently tap the membrane over a surface to ensure that no air bubbles remain trapped.
- With the sensor facing down, completely screw the cap clockwise. Some electrolyte will overflow.

If any deposit scales the sensors, gently brush the sensor surface with the supplied brush, while paying attention to not damage the plastic body.

Maintenance of pH probe

- Remove the electrode protective cap. Do not be alarmed if any salt deposits are present. This is normal with pH electrodes and they will disappear when rinsed with water.
- Shake down the electrode as you would do with a clinical thermometer to eliminate any air bubbles inside the glass bulb.
- If the bulb and/or junction are dry, soak the electrode in **HI70300** storage solution for at least one hour.
- To minimize clogging and ensure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry.
- Replace solution in the protective cap with a few drops of **HI70300** storage solution. Tap water may also be used for a very short period (couple of days).

NEVER USE DISTILLED OR DEIONIZED WATER TO STORE THE pH ELECTRODE.

- Inspect the electrode for scratches or cracks. If any is present, replace the electrode.
- Cleaning procedure: clean frequently the probe by soaking it for 1 minute in **HI70670** or **HI70671** cleaning solution. After cleaning soak the electrode in **HI70300** storage solution before taking measurements.

Maintenance of EC probe

- After every series of measurements, rinse the probe with tap water.
- If a more thorough cleaning is required, clean the probe with the supplied brush or a nonabrasive detergent.

NOTES

- After a cleaning procedure, always recalibrate the instrument.
- Grease the O-rings before installing back the sensors.

APPENDIX B - ACCESSORIES

HI 9828 ACCESSORIES

HI 769828/4	Multiparameter probe body with 4 m cable
HI 769828/10	Multiparameter probe body with 10 m cable
HI 769828/20	Multiparameter probe body with 20 m cable
HI 769828-0	pH sensor, double junction, non refillable
HI 769828-1	pH/ORP sensor
HI 769828-2	DO sensor
HI 769828-3	EC sensor
HI 9828-25	Quick calibration solution, 500 mL bottle
HI 9828-27	Quick calibration solution, 1 G bottle
HI 7698281	USB interface cable
HI 92000	Windows® compatible application software
HI 920005	i-Button© with holder (5 pcs)
HI 7698282	Probe maintenance kit
HI 7698283	Calibration beaker
HI 7698284	Flow cell
HI 710045	Power supply cable
HI 710046	Cigarette lighter cable
HI 710005	115 Vac/12 Vdc, US plug adapter
HI 710006	230 Vac/12 Vdc, European plug adapter
HI 710012	230 Vac/12 Vdc, UK plug adapter
HI 710013	230 Vac/12 Vdc, South African plug adapter
HI 710014	230 Vac/12 Vdc, Australian plug adapter

pH BUFFER SOLUTIONS

HI 5004	pH 4.01 buffer solution, 500 mL bottle
HI 5046	pH 4.63 buffer solution, 500 mL bottle
HI 5005	pH 5.00 buffer solution, 500 mL bottle
HI 5006	pH 6.00 buffer solution, 500 mL bottle
HI 5068	pH 6.86 buffer solution, 500 mL bottle
HI 5007	pH 7.01 buffer solution, 500 mL bottle
HI 5074	pH 7.41 buffer solution, 500 mL bottle

HI 5008	pH 8.00 buffer solution, 500 mL bottle
HI 5009	pH 9.00 buffer solution, 500 mL bottle
HI 5091	pH 9.18 buffer solution, 500 mL bottle
HI 5010	pH 10.01 buffer solution, 500 mL bottle

ORP TEST & PRETREATMENT SOLUTIONS

HI 7020L	ORP test solution, 200/275 mV @20°C, 500 mL
HI 7021L	ORP test solution, 240 mV @20°C, 500 mL bottle
HI 7022L	ORP test solution, 470 mV @20°C, 500 mL bottle
HI 7091L	Reducing pretreatment solution, 500 mL bottle
HI 7092L	Oxidizing pretreatment solution, 500 mL bottle

ACCESSORIES FOR D.O. MEASUREMENTS

HI 7040L	Zero oxygen solution, 500 mL bottle
HI 7042S	Electrolyte solution for D.O. sensor, 30 mL bottle
HI 76409A/P	D.O. membrane, 5 pcs

CONDUCTIVITY STANDARD SOLUTIONS

HI 7030L	12880 µS/cm standard solution, 500 mL bottle
HI 7031L	1413 µS/cm standard solution, 500 mL bottle
HI 7033L	84 µS/cm standard solution, 500 mL bottle
HI 7034L	80000 µS/cm standard solution, 500 mL bottle
HI 7035L	111800 µS/cm standard solution, 500 mL bottle
HI 7039L	5000 µS/cm standard solution, 500 mL bottle

PROBE CLEANING & MAINTENANCE SOLUTIONS

HI 70670L	Cleaning solution for salt deposits, 500 mL bottle
HI 70671L	Cleaning and disinfection solution for algae, fungi and bacteria, 500 mL bottle
HI 70300	Electrode storage solution, 500 mL

APPENDIX C - WARRANTY

All Hanna Instruments **meters are guaranteed for two years (sensors, electrodes and probes for six months)** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions.

This warranty is limited to repair or replacement free of charge. Damage due to accident, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure.

If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Customer Service department and then send it with shipping costs prepaid.

When shipping any instrument, make sure it is properly packaged for complete protection.

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used. Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment, requiring the operator to take all necessary steps to correct interferences. The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all time. To maintain the EMC performance of equipment, the recommended cables noted in the user's manual must be used. Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance. To avoid electrical shock, do not use these instruments when voltage at the measurement surface exceed 24 Vac or 60 Vdc. To avoid damage or burns, do not perform any measurement in microwave ovens.

USER NOTES

SALES AND TECHNICAL SERVICE CONTACTS

Australia:
Tel. (03) 9769.0666 • Fax (03) 9769.0699

China:
Tel. (10) 88570068 • Fax (10) 88570060

Egypt:
Tel. & Fax (02) 2758.683

Germany:
Tel. (07851) 9129-0 • Fax (07851) 9129-99

Greece:
Tel. (210) 823.5192 • Fax (210) 884.0210

Indonesia:
Tel. (21) 4584.2941 • Fax (21) 4584.2942

Japan:
Tel. (03) 3258.9565 • Fax (03) 3258.9567

Korea:
Tel. (02) 2278.5147 • Fax (02) 2264.1729

Malaysia:
Tel. (603) 5638.9940 • Fax (603) 5638.9829

Singapore:
Tel. 6296.7118 • Fax 6291.6906

South Africa:
Tel. (011) 615.6076 • Fax (011) 615.8582

Taiwan:
Tel. 886.2.2739.3014 • Fax 886.2.2739.2983

Thailand:
Tel. 66-2619-0708 • Fax 66-2619-0061

United Kingdom:
Tel. (01525) 850.855 • Fax (01525) 853.668

USA:
Tel. (401) 765.7500 • Fax (401) 765.7575

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