



Catalog Number HQ40d18

# **HQ Series Portable Meters**

USER MANUAL

September 2006, Edition 5



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# Section 1 General Information

## 1.1 Safety Information

Please read this entire manual before unpacking, setting up, or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

### 1.1.1 Use of Hazard Information

#### **DANGER**

*Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.*

#### **CAUTION**

*Indicates a potentially hazardous situation that may result in minor or moderate injury.*

***Important Note:** Information that requires special emphasis.*

***Note:** Information that supplements points in the main text.*

### 1.1.2 Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol, if noted on the instrument, will be included with a danger or caution statement in the manual.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	Electrical equipment and manufacturer supplied accessories marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. <b>Note:</b> For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.
	This symbol, if noted on the product, indicates the need for protective eye wear.

### 1.2 Product Overview

The HQ Series Portable Meters measure various parameters when used with IntelliCAL™ probes such as pH, conductivity, salinity, total dissolved solids (TDS), or dissolved oxygen (using Hach's patented luminescent dissolved oxygen probes, LDO®). The meter automatically recognizes the type of probe that is connected to the meter. IntelliCAL probes store the unique serial number, current calibration, and calibration history. When the default settings are used, an operator can take measurements right out of the box.

Data is easily managed by using the settings for operator ID, sample ID, and data storage. Supervisory control can be set by using the access function. Settings for measurement and calibration are stored as methods. The default method for each parameter follows suggested USEPA measurement techniques.

### 1.3 Meter Description

The HQ series meters are available in four models:

- **HQ11d**—pH/mV
- **HQ14d**—conductivity, salinity, total dissolved solids (TDS)
- **HQ30d**—pH, conductivity, salinity, total dissolved solids (TDS) or dissolved oxygen (LDO), 1 probe connector
- **HQ40d**—pH, conductivity, salinity, total dissolved solids (TDS), or dissolved oxygen (LDO), 2 probe connectors.

Other features:

- Auto probe recognition including serial number
- Methods containing parameter settings for regulatory control
- Supervisory access control
- Long sensor life, LDO
- No polarization time, LDO
- Internal data storage of 500 results
- Sample ID and Operator ID for data traceability
- Adjustable automatic shut-off for extended battery life
- Automatic correction for barometric pressure and temperature, LDO
- IP67 (waterproof to 1 meter for 30 minutes, excluding battery housing. Battery compartment submersible to 2 feet for 15 seconds)
- Connectivity to PC/printer/flash memory stick/keyboard
- Power from four alkaline or Nickel Metal Hydride (NiMH) AA batteries, or AC adapter

## Section 2 Specifications

Specifications are subject to change without notice.

<b>Meter Enclosure</b>	
Enclosure	Meter: IP67, waterproof to 1 meter for 30 minutes Battery Compartment: water resistant to 2 feet for 15 seconds
Power Requirements (internal)	AA Alkaline or Nickel Metal Hydride (NiMH) Batteries (4)
Power Requirements (external USB/DC power adaptor)	100–240 V, 50/60 Hz input; 4.5 to 7.5 V (7 VA) output (center contact +, outer shield -)
Storage Temperature	–20 to +60 °C (–4 to +140 °F)
Operating Temperature	0 to +60 °C (32 to 140 °F)
Operating Humidity	90% (non-condensing)
Weight	0.75 lb/11.6 oz/330 g 0.95 lb/15.2 oz/430 g (with four AA alkaline batteries installed)
<b>Inputs</b>	
5-pin Custom M-12 for probes	Meters accept IntelliCAL probes (HQ11d pH only; HQ14d conductivity only)
8-Pin Connector for USB and external AC power	The 8-pin connector enables USB and external AC power connectivity
<b>pH IntelliCAL Probes (standard and rugged)</b>	
pH Range	PHC301 (refillable): 0.0–14.0 pH
	PHC101 (gel filled): 2.0–14.0 pH
Sodium (Alkalinity) Error	–0.6 pH at pH 12.6 in 1 M NaOH
Temperature Range	0.0–80.0 °C
Temperature Accuracy	±0.3 °C
Warranty	PHC301 probe is covered by a one-year warranty PHC101 probe is covered by a six-month warranty
<b>LDO IntelliCAL Probes (standard and rugged)</b>	
Dissolved Oxygen Range	0.1–20.0 mg/L (ppm) 1–200% saturation
Dissolved Oxygen Accuracy	±0.1 mg/L for 0.1–8 mg/L ±0.2 mg/L for greater than 8.0 mg/L
% Saturation	1.0%
Temperature Range	0–50 °C
Temperature Resolution	0.1 °C
Temperature Accuracy	± 0.3 °C
Warranty	Probe is covered by a three-year warranty. Sensor cap is covered by a one-year warranty.
<b>Conductivity IntelliCAL Probe</b>	
Conductivity Range	0.01 µS/cm to 200.0 mS/cm
Conductivity Resolution	0.01–19.99 µS/cm: 0.01 µS/cm 20.0–199.9 µS/cm: 0.1 µS/cm 200.0–1999.0 µS/cm: 1.0 µS/cm 2.0–19.99 mS/cm: 0.01 mS/cm 20.0–200.0 mS/cm: 0.1 mS/cm
Conductivity Accuracy	±0.5% of Reading
TDS Range	0 to 50,000 mg/L as NaCl
TDS Accuracy	±0.5% of Reading

## Specifications

<b>Conductivity IntelliCAL Probe (continued)</b>	
TDS Resolution	0.0–199.9 mg/L: 0.1 mg/L 200.0–1999.0 mg/L: 1.0 mg/L 2.0–19.99 g/L: 0.01 g/L 20.0–50.0 g/L: 0.1 g/L
Salinity Range	0 to 42 ppt (‰)
Salinity Accuracy	±0.1 ppt
Salinity Resolution	0.01 ppt
Temperature Range	–10.0 to 110.0 °C
Temperature Accuracy	±0.3 °C
Warranty	Probe is covered by a one-year warranty.
<b>Outputs</b>	
USB	Peripheral and Host

# Section 3 Installation

## 3.1 Unpacking the Instrument

Remove the instrument and accessories from the shipping container and inspect each item for damage. Verify that all items listed on the packing slip are included. If any items are missing or damaged, contact the manufacturer or distributor (outside US).

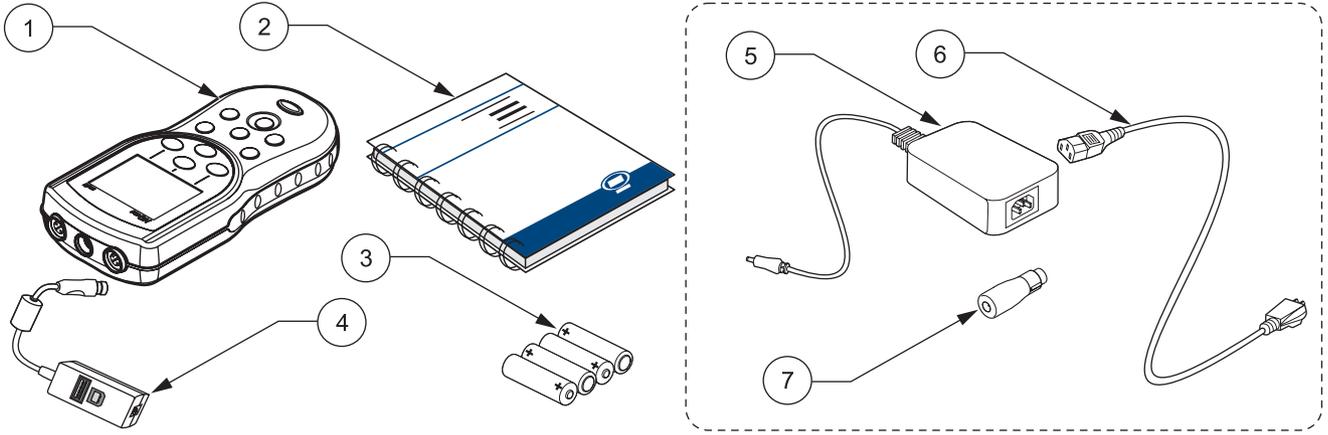


Figure 1 HQ11d, HQ14d, HQ30d Instrument Components

1	HQd Meter	5	AC-DC Power Supply (optional) <sup>1</sup>
2	User Manual (Cat. No. HQ40d18)	6	AC Power Cord (optional) <sup>1</sup>
3	AA Batteries (4) (Cat. No. 19380-04)	7	DC Power Adapter (optional) <sup>1</sup>
4	USB/DC Power Adapter (optional) (Cat. No. 58134-00)		

<sup>1</sup> Included in optional AC Power Adapter Kit (Cat. No. 58263-00 for 115 VAC or 58311-00 for 230 VAC).

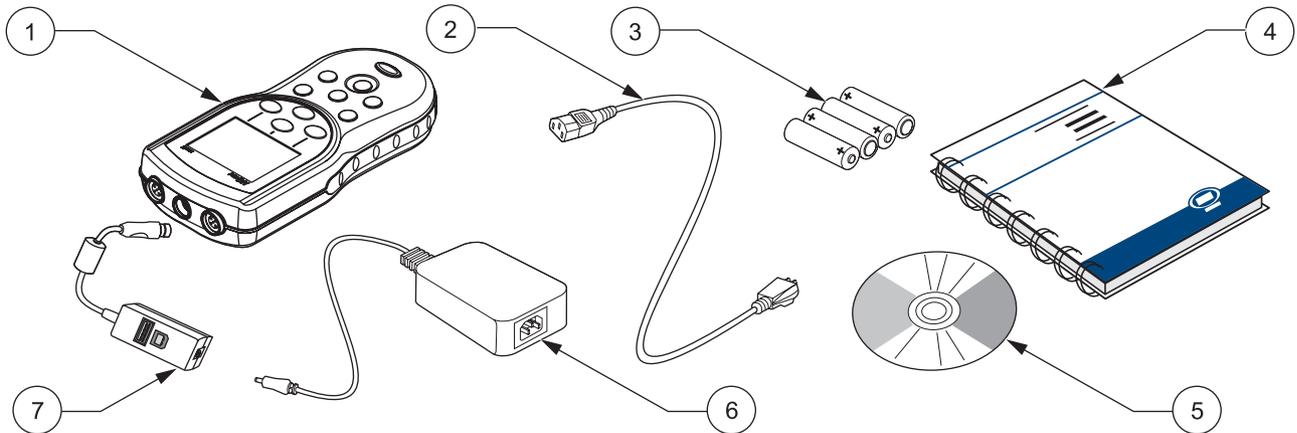


Figure 2 HQ40d Instrument Components

1	HQ40d Meter	5	PC Application Software (Cat. No. HQ40d45)
2	AC Power Cord (Cat. No. 18010-00 for 115 VAC; Cat. No. 46836-00 for 230 VAC)	6	AC-DC Power Supply (Cat. No. 58270-00)
3	AA Batteries (4) (Cat. No. 19380-04)	7	USB/DC Power Adapter (Cat. No. 58134-00)
4	User Manual (Cat. No. HQ40d18)		

### 3.2 AC Power and Batteries

**DANGER**

*Use only alkaline or nickel metal hydride type batteries in the meter. Other battery types might cause a fire or explosion.*

**DANGER**

*Make sure that the batteries are installed according to the polarity markings in the meter battery compartment. Failure to correctly install the batteries can result in damage to the meter, fire, or explosion.*

**DANGER**

*AC mains outlets in wet or potentially wet locations **MUST ALWAYS** be provided with a Ground Fault Circuit Interrupting (GFCI/GFI) circuit breaker. The AC-DC power adapter provided with this product is not sealed and must not be used on wet benches or in wet locations without GFCI protection.*

**CAUTION**

*Never mix battery types in the meter. Use four AA alkaline, or four AA nickel metal hydride batteries.*

**Important Note:** *The battery compartment of the meter and the USB/DC power adapter are not waterproof. Use care when operating these devices on a bench in wet environments. Water may infiltrate these devices and eventually cause performance or quality problems. Periodic inspection of the batteries and battery compartment is recommended, if the meter is used in wet environments: remove, clean, and dry the batteries, the interior of the battery compartment, and the battery contacts; then reinsert the batteries and close the compartment cover.*

The meter can be battery powered using four AA batteries (alkaline or nickel metal hydride) or by AC power. Connection to AC power requires additional components ([section 3.2.2 on page 14](#)).

#### 3.2.1 Battery Power

**Important Note:** *Rechargeable alkaline or nickel metal hydride batteries may also be used in the meter (do not mix battery types). Batteries are not charged in the meter.*

1. Pull the release tab on the battery cover and remove the cover as shown in [Figure 3](#).
2. Insert four AA batteries (alkaline or nickel metal hydride) following polarity markings inside the battery housing.
3. Replace the battery cover.

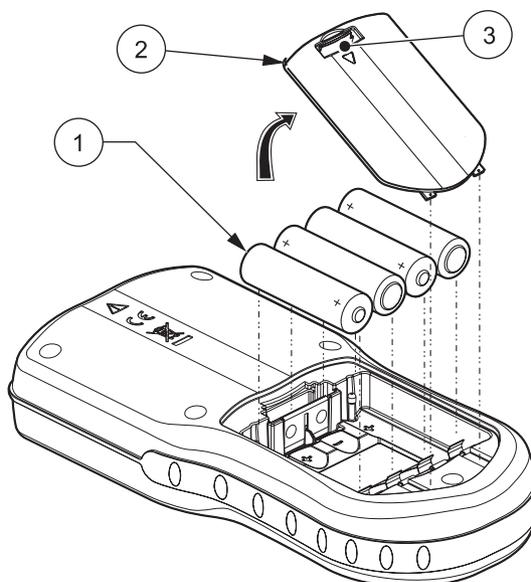


Figure 3 Battery Installation

1 AA Alkaline or Nickel Metal Hydride Battery (4) (Do not mix battery types.)	3 Release Tab
2 Battery Cover	



A battery icon appears in the top right corner of the display to indicate current battery status.

When batteries are installed, the meter will automatically shut off after five minutes of sitting idle (this is the default setting). This auto shut-off feature can be changed in the Display Options menu (see [section 9.7 on page 97](#)).

**Note:** When using nickel metal hydride (NiMH) batteries, the battery icon will not indicate a full charge after freshly charged batteries have been inserted (NiMH batteries are 1.2 V versus 1.5 V for alkaline batteries). Even though the icon does not indicate complete battery charge, if you use 2500 mAh NiMH batteries you will achieve 90% of instrument operation lifetime (before you need to recharge) versus new alkaline batteries.

**Note:** NiMH batteries self-discharge during storage. If you do not insert freshly charged NiMH batteries, operational lifetime will be reduced from this 90%.

**Note:** As batteries age, their output voltage decreases. Whenever battery voltage drops below 4-volts, the meter will shut itself down, to assure no loss of data. Insert fresh batteries and meter functionality will be restored.

### 3.2.2 AC Power

All meters can be powered by AC power using a power supply, adapter, and cord. The HQ40d meter ships with an AC-DC power supply, a USB/DC power adapter, and a power cord (see [Figure 6 on page 17](#)). The USB/DC power adaptor allows the meter to transfer data to a computer or flash memory stick ([section 3.5 on page 16](#)).

The HQ30d, HQ11d, and HQ14d meters can be powered by AC power using optional AC power adapter kits (Cat. No. 58263-00 for 115 VAC or 58311-00 for 230 VAC). Both kits include an AC-DC power supply, a DC power adapter, and a power cord. ([Figure 1 on page 11](#)).

### 3.3 Turning the Meter On and Off

***Note:** The meter can be operated in several different languages. When the meter is turned on for the first time, the user must select a language before any other meter functions can be accessed. Additionally, the operator is prompted to enter the correct time and date during initial use, and to verify correct time and date whenever the batteries are changed. See [section 4.3 on page 22](#).*

Press the power **ON/OFF** key to turn the meter on. If the meter does not turn on, be sure the batteries are installed properly or that the AC-DC power supply is connected properly to an electrical outlet.

Press the power **ON/OFF** key to turn the meter off. When batteries are used, the display backlight will turn off after 1 minute, and the meter will automatically turn off after 5 minutes (default settings). These features can be changed in the Meter Options>Display Options>Auto Shut Off/Backlight menus.

### 3.4 Probe Connection

**CAUTION**  
***BEFORE ATTACHING THE PROBE FOR THE FIRST TIME: Set the date and time in the meter before attaching the IntelliCAL probe for its first use. If the meter date and time are incorrect when the probe is installed, the probe will retain this incorrect time stamp for the remainder of its service life, even if the meter time and date have subsequently been corrected.***

The HQ11d, HQ14d, and the HQ30d support single connection and display of IntelliCAL™ probes (see [Figure 4](#)).

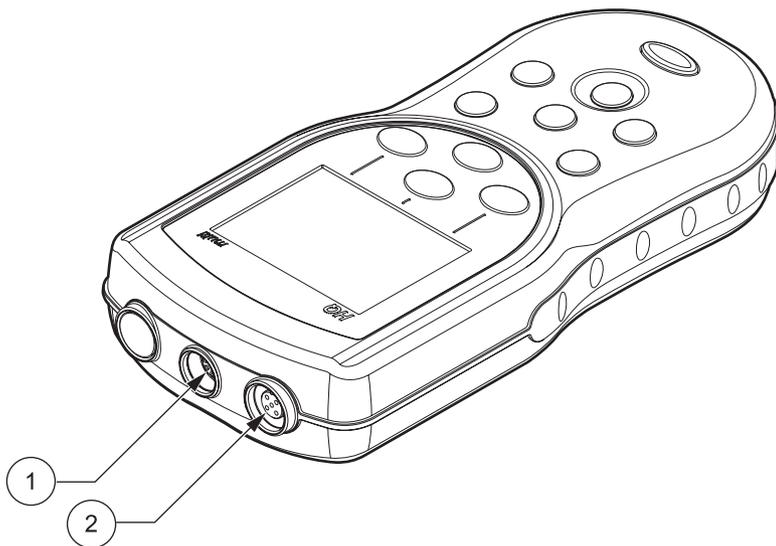


Figure 4 Connectors on HQ11d, HQ14d, HQ30d Meters

1 USB/DC Power Adapter Port (8-pin)	2 Probe Port (5-pin)
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The HQ40d supports dual connection and display of IntelliCAL™ probes (see [Figure 5](#)).

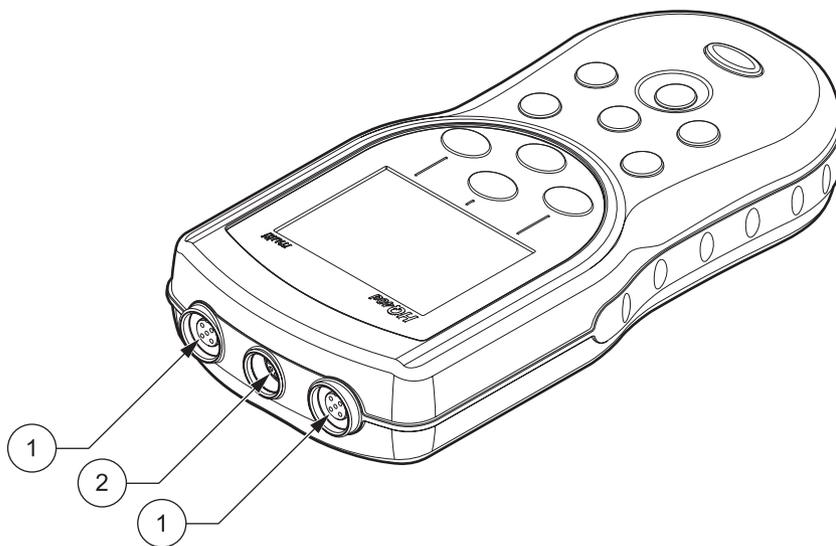
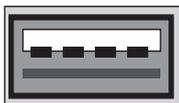


Figure 5 Connectors on HQ40d Meter

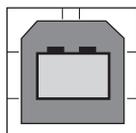
1 Probe Port (5-pin)	2 USB/DC Power Adapter Port (8-pin)
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### 3.5 Data Transfer

**Important Note:** The battery compartment of the meter and the USB/DC power adapter are not waterproof. Use care when operating these devices on a bench in wet environments. Water may infiltrate these devices and eventually cause performance or quality problems. Periodic inspection of the batteries and battery compartment is recommended, if the meter is used in wet environments: remove, clean, and dry the batteries, the interior of the battery compartment, and the battery contacts; then reinsert the batteries and close the compartment cover.



USB - Peripheral



USB - Host

Data can be transferred to a PC, printer, or flash memory stick by using the USB/DC power adapter. Refer to [Figure 6](#) for USB/DC power adapter connections.

The USB peripheral connector on the USB/DC power adapter is used for data transfer to a flash memory stick or printer. The flash stick can be connected to a PC for data transfer.

The USB host connector on the USB/DC power adapter is used for direct connection to a PC using a standard USB cable. The HQ40d Application Software must be installed onto a PC for direct communication with the meter. Start the Application Software to transfer data.

To conserve battery life, USB functionality is enabled only when the meter is initially turned on and remains connected to AC power.

To enable USB:

1. Turn the instrument off.
2. Connect the USB/DC power adapter to the instrument.
3. Plug the AC power cord into the AC-DC power supply. Connect the power output jack from the AC-DC power supply to the USB/DC power adapter.
4. Plug the AC power cord into an AC receptacle.
5. Turn on the instrument and plug in the desired USB device (refer to [Figure 6](#)).

See [section 5.3 on page 31](#) for more information on data transfer.

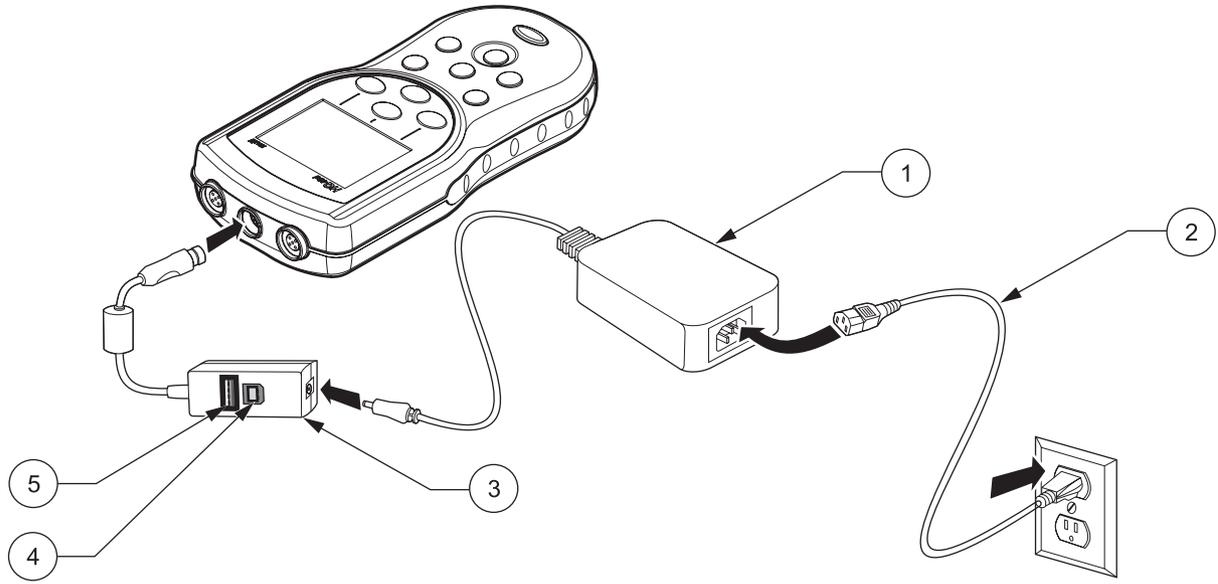


Figure 6 USB/DC Power Adapter Connections for Data Transfer

1	AC-DC Power Supply	4	Personal Computer Connection (USB Host)
2	AC Power Cord	5	Flash Memory Stick/Printer Connection (USB Peripheral)
3	USB/DC Power Adapter		



# Section 4 System Start Up

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## 4.1 Basic Start Up Overview

1. Install batteries, close the battery compartment door and power on the meter.
2. Select the language to display on the screen. Refer to [section 4.3 on page 22](#).
3. Set the date and time. Refer to [section 4.4 on page 22](#).
4. Set the Sample and Operator IDs. Refer to [section 5.1 on page 25](#).
5. Connect the probe to the meter.

When an IntelliCAL probe is connected to a HQ30d or HQ40d meter, the meter automatically recognizes the parameter and is ready for use. The HQ11d measures only pH/mV. The HQ14d measures only conductivity, salinity, and total dissolved solids (TDS).

6. Calibrate the probe.
  - pH Probe, [section 6.1 on page 47](#)
  - Conductivity Probe, [section 7.1 on page 63](#)
  - LDO Probe, [section 8.2 on page 79](#) or use factory-default setting
7. Take a measurement reading.
  - pH Probe, [section 6.2 on page 49](#)
  - Conductivity Probe, [section 7.2 on page 64](#)
  - LDO Probe, [section 8.1 on page 79](#)
8. Run Check Standards (pH and Conductivity only).
  - pH Probe, [section 6.3 on page 49](#)
  - Conductivity Probe, [section 7.3 on page 65](#)
9. Set the method.
  - pH Probe, [section 6.4 on page 51](#)
  - Conductivity Probe, [section 7.4 on page 66](#)
  - LDO Probe, [section 8.3 on page 81](#)
10. Modify Meter Options. Refer to [Section 9 on page 91](#).

## 4.2 Meter User Interface and Navigation

### 4.2.1 Keypad Description

Figure 7 shows the meter keypad and key descriptions common to all models.

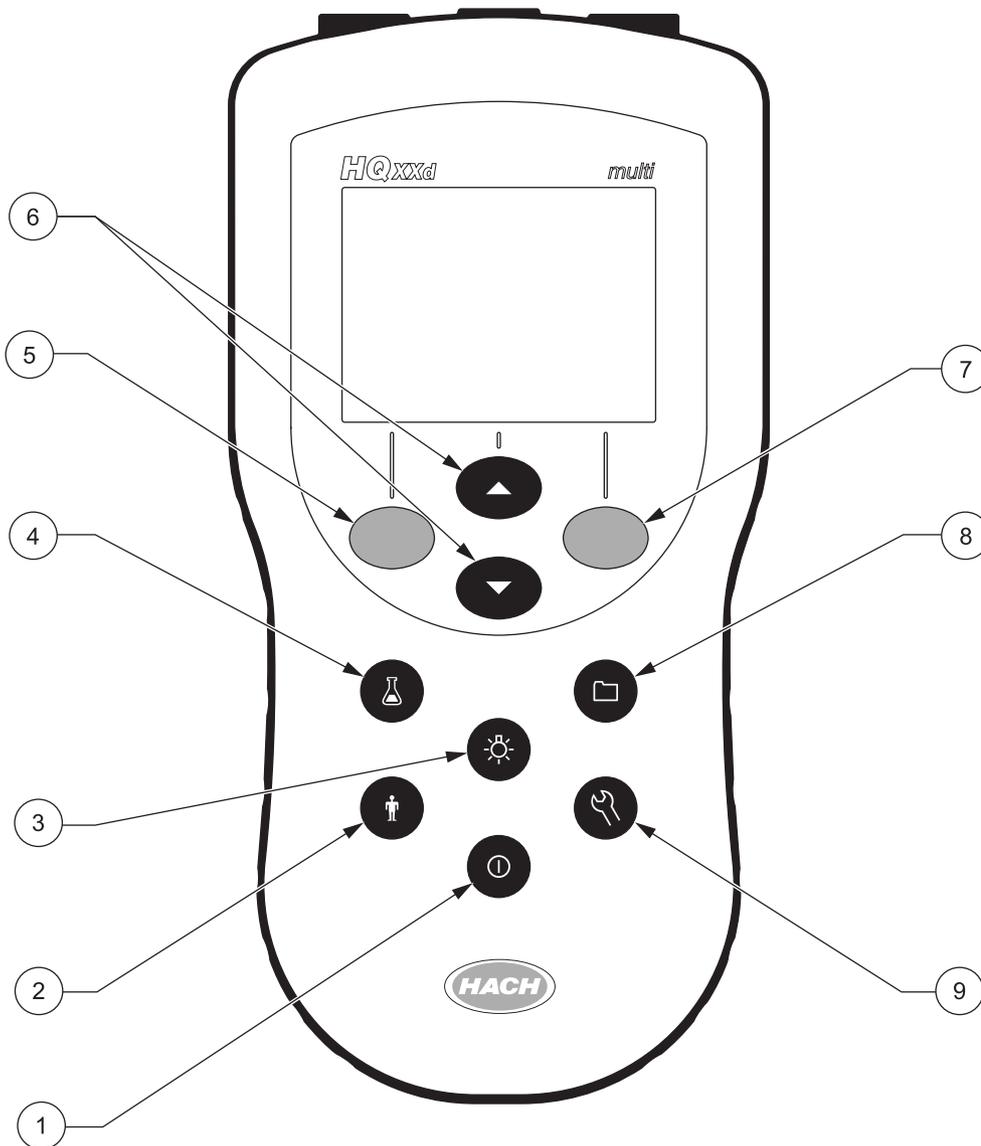


Figure 7 HQ Series Keypad Description

1	<b>POWER ON/OFF</b>	6	<b>UP and DOWN Softkeys:</b> function changes with software menus
2	<b>OPERATOR ID</b>	7	<b>GREEN/RIGHT Softkey:</b> function changes with software menu
3	<b>BACKLIGHT</b>	8	<b>DATA LOG</b>
4	<b>SAMPLE ID</b>	9	<b>METER OPTIONS AND PARAMETER METHODS</b>
5	<b>BLUE/LEFT Softkey:</b> function changes with software menu		

## 4.2.2 Display Description (Single and Dual)

### 4.2.2.1 Using Single Screen Mode

The meter displays the concentration, units, temperature, calibration status, operator ID, sample ID, date, and time as shown in [Figure 8](#).

The HQ40d meter can display two parameters simultaneously in the dual screen mode. See [section 4.2.2.2](#).

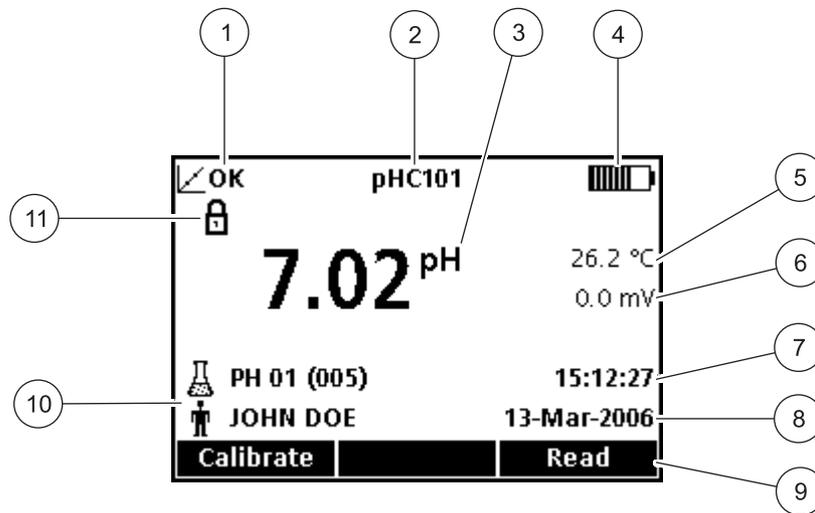
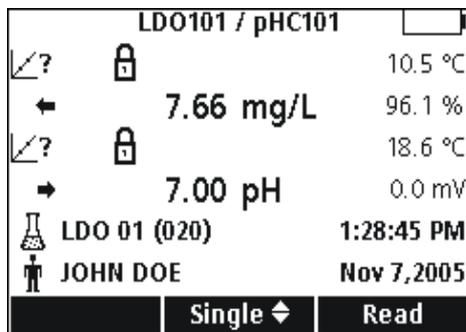


Figure 8 Single Screen Mode

1	Calibration Indicator	7	Time
2	IntelliCAL™ Probe Type	8	Date
3	Main Measurement Unit	9	Menu Driven Function Bar (Operated by <b>GREEN/RIGHT</b> key, <b>UP</b> and <b>DOWN</b> keys, and <b>BLUE/LEFT</b> key)
4	Battery Status	10	Sample and Operator Identification
5	Sample Temperature	11	Stability or Display Lock Indicator
6	Additional Units		

### 4.2.2.2 Using Dual Screen Mode (HQ40d only)

When two probes are connected to the HQ40d meter, the screen can show the reading from both probes simultaneously, or show just one probe.



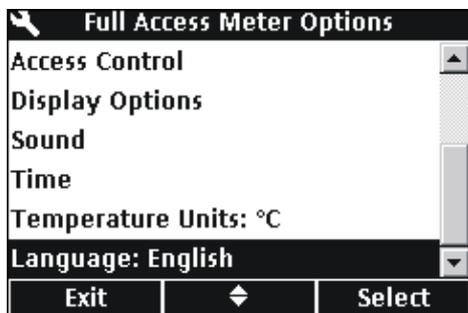
With two probes connected to the meter, use the **UP** and **DOWN** keys to change the screen mode to single or dual screen. In dual screen mode, the **UP** key will select the left probe for single view and the **DOWN** key will select the right probe.

### 4.3 Selecting the Language

The meter can be operated in several different languages. When the meter is turned on for the first time, the user must select a language before any other meter functions can be accessed.

To select or change the language:

1. Press the **METER OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Language**. Press the **GREEN/RIGHT** key under Select.
3. Use the **UP** and **DOWN** keys to select a language. Press the **GREEN/RIGHT** key under OK.



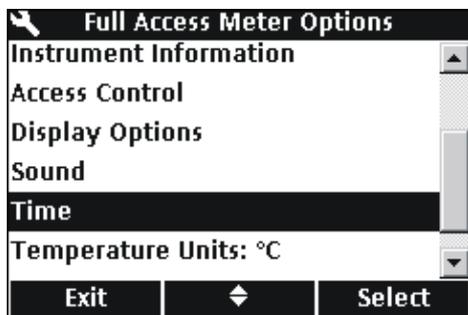
### 4.4 Setting the Date and Time

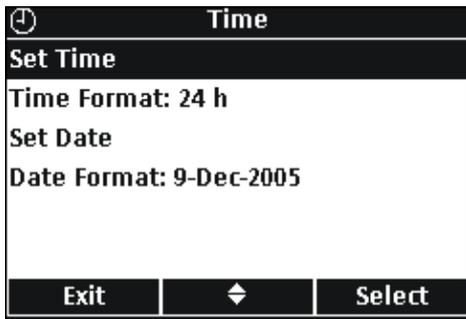
#### **CAUTION**

**BEFORE ATTACHING THE PROBE FOR THE FIRST TIME: Set the date and time in the meter before attaching the IntelliCAL probe for its first use. If the meter date and time are incorrect when the probe is installed, the probe will retain this incorrect time stamp for the remainder of its service life.**

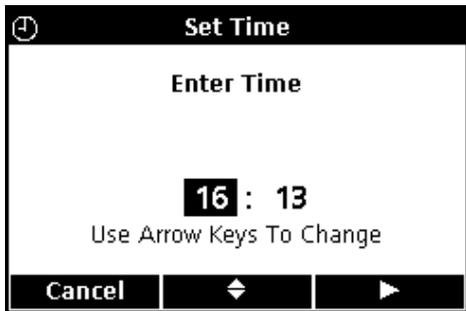
To change the time and date that is displayed on the meter:

1. Press the **METER OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Time**. Press the **GREEN/RIGHT** key under Select.





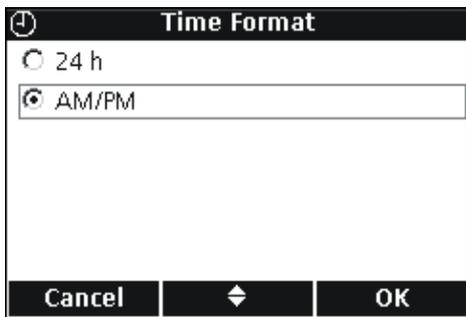
- By default, time entries use the 24-hour clock format. Use the **UP** and **DOWN** keys to highlight **Set Time**, **Time Format**, **Set Date**, or **Date Format**. Press the **GREEN/RIGHT** key under **Select**.



**SET TIME**

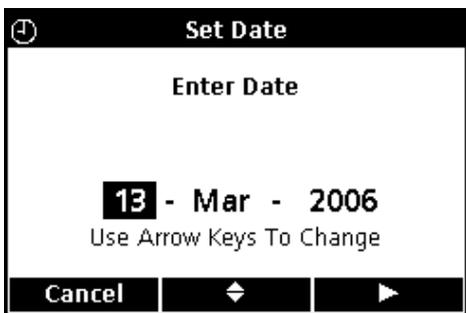
Use the **UP** and **DOWN** keys to change the time. Press the **GREEN/RIGHT** key to advance to the next space.

Press the **GREEN/RIGHT** key until **OK** replaces the right arrow in the function bar. Select **OK** to complete the entry. All time entry is in 24-hour format.



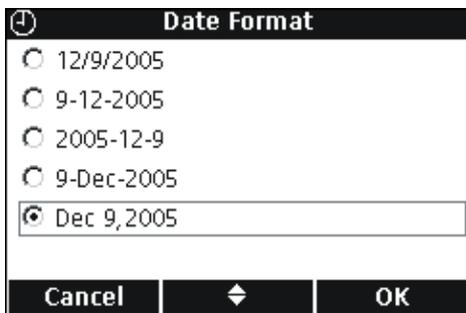
**TIME FORMAT**

Use the **UP** and **DOWN** keys to select an **AM/PM** (12-hour) or 24-hour time clock. Press the **GREEN/RIGHT** key under **OK**.



**SET DATE**

By default, date entries use the day-month-year format. Use the **UP** and **DOWN** keys to change the date. Press the **GREEN/RIGHT** key to advance to the next space. Press the **GREEN/RIGHT** key until **OK** replaces the right arrow in the function bar. Select **OK** to complete the entry.



**DATE FORMAT**

Use the **UP** and **DOWN** keys to select a date format. Press the **GREEN/RIGHT** key under **OK**.



## Section 5 Standard Operation

**Important Note:** Screen shot examples in this manual are included for illustrative purposes, and may not reflect actual results.

### 5.1 Setting the Sample and Operator Identification



Use the **SAMPLE ID** key to associate sample readings with a particular sample location. The Sample ID will be shown in the lower left corner of the display, and all stored data will include this ID. If no Sample ID is entered, the meter will display a generic "Sample ID".

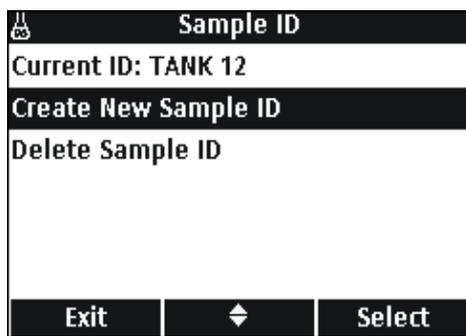


Use the **OPERATOR ID** key to associate sample readings with an individual. The Operator ID will be shown in the lower left corner of the display, and all stored data will include this ID. If no Operator ID is entered, the meter will display three dashes in the display.

#### 5.1.1 Sample ID

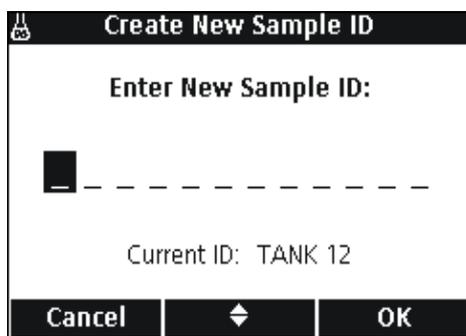
**Note:** Sample and Operator ID text can be entered using the optional keyboard.

##### 5.1.1.1 Creating a New Sample ID



To enter a new Sample ID:

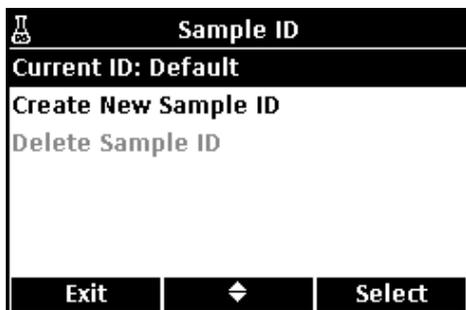
1. Press the **SAMPLE ID** key.
2. Use the **UP** and **DOWN** keys to highlight **Create New Sample ID**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to scroll through the letters and numbers. To accept a letter or number, press the **GREEN/RIGHT** key. The cursor will advance to the next space.
4. Repeat the previous step to add additional letters or numbers until the name is complete. To add a space, scroll to the blank space between A and 9 using the **UP** and **DOWN** keys and press the **GREEN/RIGHT** key. To replace a letter or number, press the **BLUE/LEFT** key and re-enter the letter or number.
5. Press the **GREEN/RIGHT** key until OK replaces the right arrow in the function bar. Select OK to complete the entry.

## Standard Operation

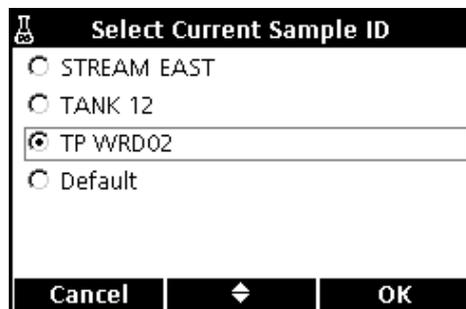
### 5.1.1.2 Selecting a Sample ID



The screenshot shows a menu titled "Sample ID" with a flask icon. The menu items are "Current ID: Default", "Create New Sample ID", and "Delete Sample ID". At the bottom, there are three buttons: "Exit", a double-headed arrow, and "Select".

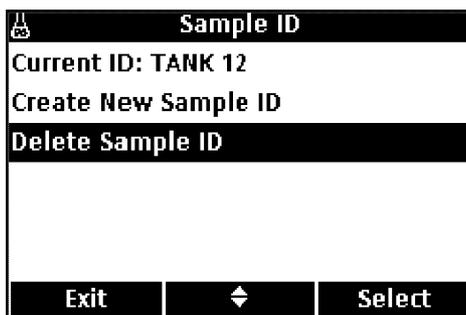
To select a different Sample ID:

1. Press the **SAMPLE ID** key.
2. Use the **UP** and **DOWN** keys to highlight **Current ID**. Press the **GREEN/RIGHT** key under **Select**.
3. Use the **UP** and **DOWN** keys to select the correct Sample ID. Press the **GREEN/RIGHT** key under **OK**.



The screenshot shows a menu titled "Select Current Sample ID" with a flask icon. The menu items are radio buttons for "STREAM EAST", "TANK 12", "TP WRD02", and "Default". The "TP WRD02" option is selected. At the bottom, there are three buttons: "Cancel", a double-headed arrow, and "OK".

### 5.1.1.3 Deleting a Sample ID

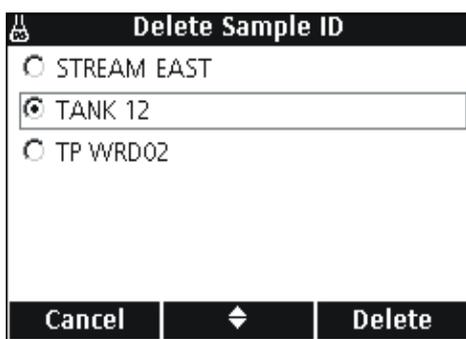


The screenshot shows a menu titled "Sample ID" with a flask icon. The menu items are "Current ID: TANK 12", "Create New Sample ID", and "Delete Sample ID". At the bottom, there are three buttons: "Exit", a double-headed arrow, and "Select".

To delete an existing Sample ID:

1. Press the **SAMPLE ID** key.
2. Use the **UP** and **DOWN** keys to highlight **Delete Sample ID**. Press the **GREEN/RIGHT** key under **Select**.

*Note: The default Sample ID cannot be deleted.*



The screenshot shows a menu titled "Delete Sample ID" with a flask icon. The menu items are radio buttons for "STREAM EAST", "TANK 12", and "TP WRD02". The "TANK 12" option is selected. At the bottom, there are three buttons: "Cancel", a double-headed arrow, and "Delete".

3. Use the **UP** and **DOWN** keys to select the Sample ID to be deleted. Press the **GREEN/RIGHT** key under **Delete**.

## 5.1.2 Operator ID

### 5.1.2.1 Creating a New Operator ID

The screenshot shows a menu titled "Operator ID" with a person icon. The current ID is "JOHN DOE". The menu options are "Create New Operator ID" (highlighted) and "Delete Operator ID". At the bottom, there are three buttons: "Exit", a double-headed arrow, and "Select".

The screenshot shows the "Create New Operator ID" screen. It prompts the user to "Enter New Operator ID:" with a text input field containing a cursor. Below the input field, it shows "Current ID: JOHN DOE". At the bottom, there are three buttons: "Cancel", a double-headed arrow, and "OK".

To create a new Operator ID:

1. Press the **OPERATOR ID** key.
2. Use the **UP** and **DOWN** keys to highlight **Create New Operator ID**. Press the **GREEN/RIGHT** key under Select.
3. Use the **UP** and **DOWN** keys to scroll through the letters and numbers. To accept a letter or number, press the **GREEN/RIGHT** key. The cursor will advance to the next space.
4. Repeat the previous step to add additional letters or numbers until the name is complete. To add a space, scroll to the blank space between A and 9 using the **UP** and **DOWN** keys and press the **GREEN/RIGHT** key. To replace a letter or number, press the **BLUE/LEFT** key and re-enter the letter or number.
5. Press the **GREEN/RIGHT** key until OK replaces the right arrow in the function bar. Press the **GREEN/RIGHT** key under OK.

### 5.1.2.2 Selecting an Operator ID

The screenshot shows a menu titled "Operator ID" with a person icon. The current ID is "Default". The menu options are "Create New Operator ID" and "Delete Operator ID". At the bottom, there are three buttons: "Exit", a double-headed arrow, and "Select".

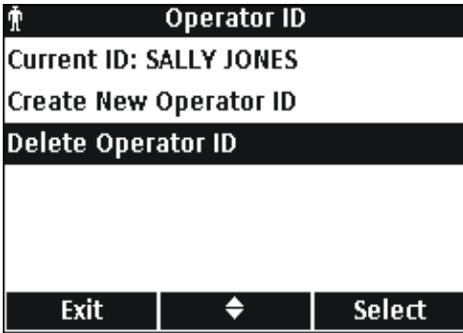
The screenshot shows the "Select Current Operator ID" screen. It displays a list of options: "JOHN DOE", "SALLY JONES" (which is selected and highlighted), and "Default". At the bottom, there are three buttons: "Cancel", a double-headed arrow, and "OK".

To select an existing Operator ID:

1. Press the **OPERATOR ID** key.
2. Use the **UP** and **DOWN** keys to highlight **Current ID**. Press the **GREEN/RIGHT** key under Select.
3. Use the **UP** and **DOWN** keys to select the Operator ID. Press the **GREEN/RIGHT** key under OK.

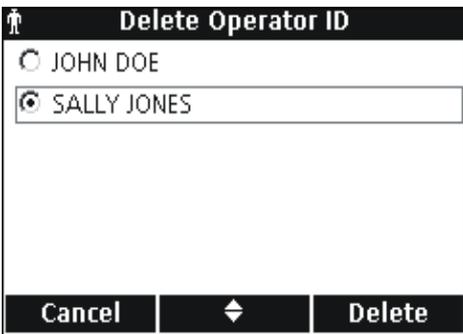
## Standard Operation

### 5.1.2.3 Deleting an Operator ID



To delete an existing Operator ID:

1. Press the **OPERATOR ID** key.  
*Note: The Default Operator ID cannot be deleted*
2. Use the **UP** and **DOWN** keys to highlight **Delete Operator ID**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to select the Operator ID to be deleted. Press the **GREEN/RIGHT** key under Delete.  
*Note: If the Current Operator ID is deleted, Default becomes the Current Operator ID.*

## 5.2 Using the Data Log

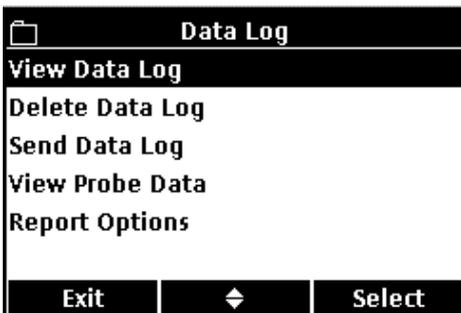
### 5.2.1 Storing Data



The HQ series portable meters can store up to 500 sample measurement, calibration, or check standard measurement results.

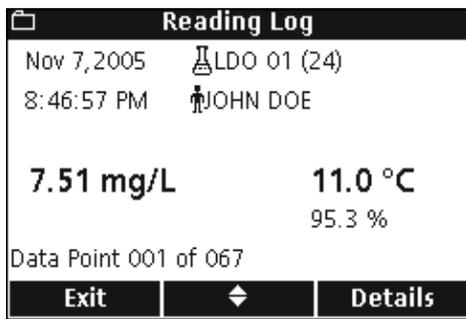
Data is stored automatically when Press to Read or Interval is selected for Measurement Mode in the Meter Options menu. When Continuous is selected, data will only be stored when the **GREEN/RIGHT** key under Store is pressed.

### 5.2.2 Viewing Stored Data



The data log records events chronologically, and displays the current number of data records (for example Data Record 250 of 500). The most recent data record is saved as 001 of 500. Perform the following to recall data:

1. Press the **DATA LOG** key.
2. Use the **UP** and **DOWN** keys to highlight **View Data Log**. Press the **GREEN/RIGHT** key under Select.
3. The display shows the most recent measurement, calibration, or check standard. Use the **UP** and **DOWN** keys to scroll through the stored data.

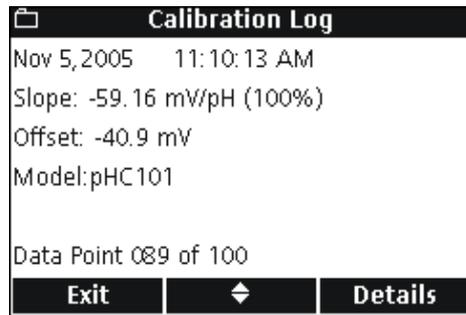


**READING LOG**

The measurement or Reading Log shows the most recent measurement value with associated time, date, operator and sample ID. A warning message appears if an error is associated with the measurement such as over limit or expired calibration.

The first screen displays information associated with the reading.

Press the **GREEN/RIGHT** key to access the calibration details for the reading. Press the **UP** and **DOWN** keys under Details. Scroll (if necessary) to the desired information associated with the reading.

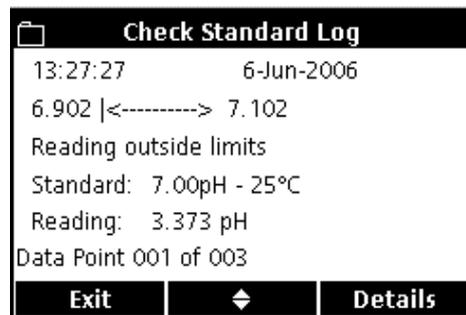


**CALIBRATION LOG**

The Calibration Log shows the most recent calibration data. Any error messages appear before other calibration data. If there are multiple error messages, they are listed in the Details screen.

The first screen displays information associated with the calibration.

Press the **GREEN/RIGHT** key to access the calibration details for the calibration. Press the **UP** and **DOWN** keys under Details. Scroll (if necessary) to the desired information associated with the reading.



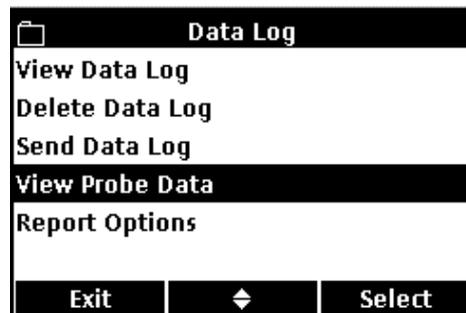
**CHECK STANDARD LOG**

The Check Standard Log (pH or conductivity only) shows the most recent check standard data with results.

The first screen displays the results of the check standard.

Press the **GREEN/RIGHT** key to access the calibration details for the reading. Press the **UP** and **DOWN** keys under Details. Scroll (if necessary) to the desired information associated with the reading.

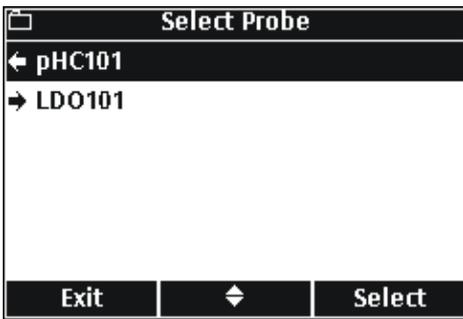
**5.2.3 Viewing Probe Data**



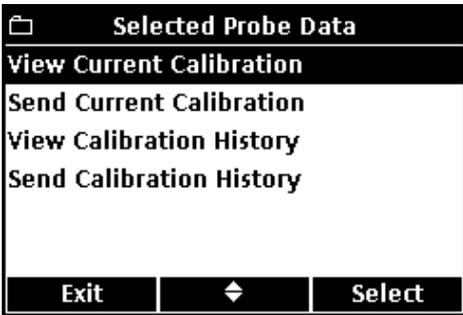
**Note:** A probe must be connected to the meter to use the View Probe Data function.

1. Press the **DATA LOG** key on the meter.
2. Use the **UP** and **DOWN** keys to highlight **View Probe Data**. Press the **GREEN/RIGHT** key under Select.

## Standard Operation



3. If only one probe is connected, proceed to Step 4. If two probes are connected (HQ40d only), the connected probes will be displayed. Use the **UP** and **DOWN** keys to highlight the probe. Press the **GREEN/RIGHT** key under Select.

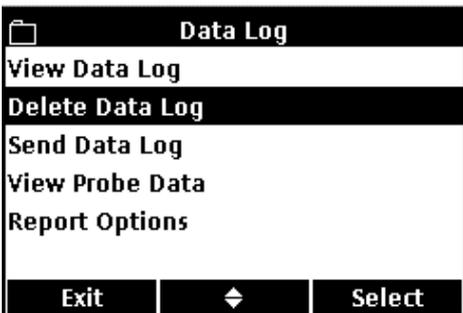


4. Use the **UP** and **DOWN** keys to highlight one of the selections for Probe Data. Press the **GREEN/RIGHT** key under Select.

### 5.2.4 Deleting Data

Data will be automatically deleted when the data log is full on a first in first out basis (oldest data deleted first).

Data can be deleted manually when Access Control is off, or when a valid password is entered.



1. Press the **DATA LOG** key.
2. Use the **UP** and **DOWN** keys to highlight **Delete Data Log**. Press the **GREEN/RIGHT** key under Select.



3. The display will show "Delete All Data?". Press the **GREEN/RIGHT** key under Select to delete all stored data.

## 5.3 Transferring Data

Data can be transferred to a printer, flash memory stick, or computer (PC) using the USB connection on the USB/DC power adapter. The meter must be powered on *after* connection to AC power for data transfer to occur.

**Note:** If the response time is slow when transferring data, reformat the flash memory stick or computer to use the file allocation table (FAT) format.

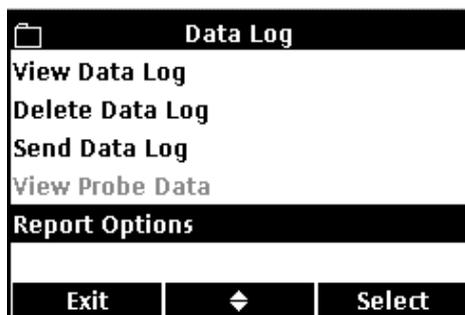
### 5.3.1 Transferring Data Options

Data that is sent to a printer can be configured to contain one, two, or three lines of information (Basic, Advanced, or Total Reports). Data that is transferred to a computer or flash memory stick can be configured to include or omit a column header row.

#### 5.3.1.1 Selecting Printed Report Types

The data log can be printed at three levels of detail: Basic Report, Advanced Report or Total Report as described in [section 5.4.2 on page 36](#).

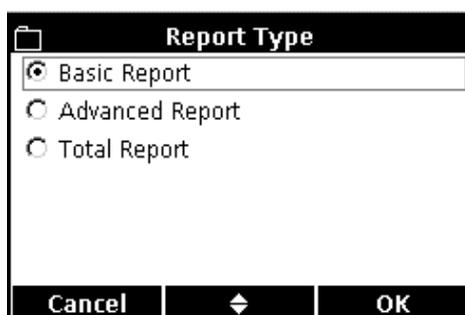
**Note:** The Report Type applies only to reports that are sent to a printer. Data that is transferred to the USB Flash memory Stick or PC will always receive the Total Report.



1. Press the **DATA LOG** key. Use the **UP** and **DOWN** keys to highlight **Report Options**. Press the **GREEN/RIGHT** key under Select.



2. Use the **UP** and **DOWN** keys to highlight **Report Type**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to select Basic Report, Advanced Report, or Total Report. Press the **GREEN/RIGHT** key under OK.

Printed reports will contain the level of detail that is selected.

### 5.3.1.2 Including Column Headers in Data Files

The HQd meters include a row of column headings whenever data is stored in the meter. This header contains descriptions of the data so that the downloaded data is easily recognizable ([section 5.6 on page 42](#)). The header information is sent to a USB flash memory stick and/or PC when the column headers option is on.

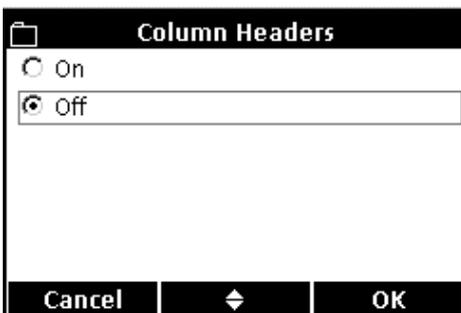
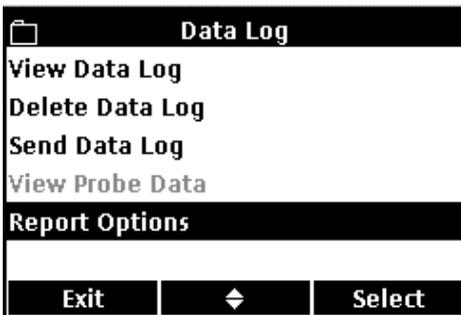
**Note:** *Column Headers applies only to data that is sent to a USB Flash memory Stick or PC.*

The column headers option is on by default and should be left on for most users. If an application or post-processing method is used that is incompatible with the headers, the column headers can be turned off.

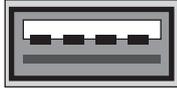
**Note:** *If the column headers option is changed from off to on, or if the language setting is changed, a column header row will appear in the data table at the point where the change took place.*

To turn column headers off or on:

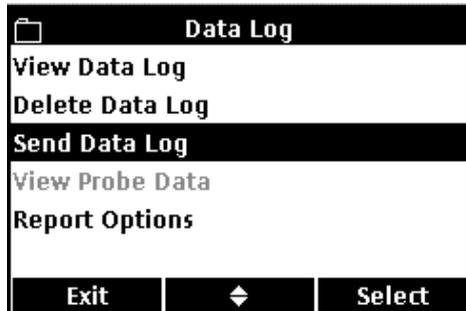
1. Press the **DATA LOG** key. Use the **UP** and **DOWN** keys to highlight **Report Options**. Press the **GREEN/RIGHT** key under **Select**.
2. Use the **UP** and **DOWN** keys to highlight **Column Headers**. Press the **GREEN/RIGHT** key under **Select**.
3. Use the **UP** and **DOWN** keys to select **On** or **Off**. Press the **GREEN/RIGHT** key under **OK**.



### 5.3.2 Sending Data to a Printer



USB - Peripheral



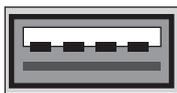
The HQd meters can connect to a compatible 72-column printer using a USB cable. Printed report formats are detailed in [section 5.4 on page 36](#).

To send data to a printer:

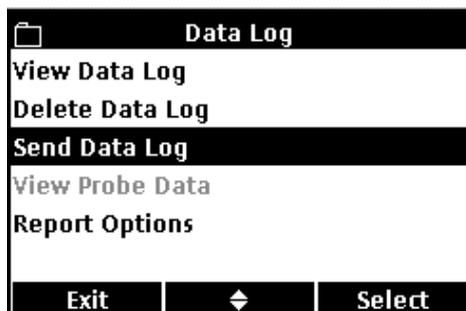
1. Turn off the meter. Connect the meter to an electrical outlet using the USB/DC power adapter and then turn on the meter.
2. Connect the printer cable to the peripheral USB connector on the USB/DC power adapter (for more information see [section 3.5 on page 16](#)).
3. Press the **DATA LOG** key on the meter.
4. Use the **UP** and **DOWN** keys to highlight **Send Data Log**. Press the **GREEN/RIGHT** key under Select.
5. The display will show "Sending Data" to indicate that the data is being sent to the printer. All measurement data, calibration data, and check standard results will be printed at the level of detail selected ([section 5.3.1.1 on page 31](#)).

**Important Note:** Never disconnect USB devices from the USB/DC power adapter or the USB/DC power adapter from the meter when the "Sending Data" screen is displayed, or the meter may lock up.

### 5.3.3 Sending Data to a Flash Memory Stick



USB - Peripheral



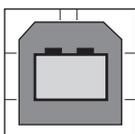
To send data to a flash memory stick:

1. Turn off the meter. Connect the meter to an electrical outlet using the USB/DC power adapter and then turn on the meter.
2. Connect the flash memory stick to the peripheral USB connector on the USB/DC power adapter (for more information see [section 3.5 on page 16](#)).
3. Press the **DATA LOG** key on the meter.
4. Use the **UP** and **DOWN** keys to highlight **Send Data Log**. Press the **GREEN/RIGHT** key under Select.



5. The display will show "Sending Data" to indicate that the data is being stored on the flash memory stick. All measurement data, calibration data, and check standard results will be stored on the memory stick in a text (.txt) file format.

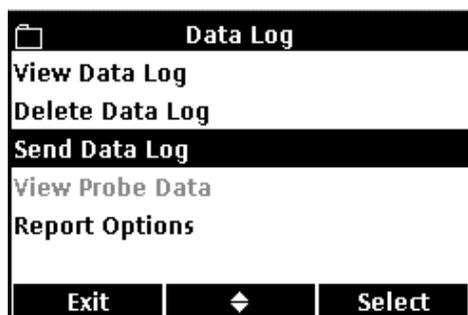
### 5.3.4 Sending Data to a Computer using the HQd PC Application Software



USB - Host

To send data directly to a computer:

1. Load the PC Application Software onto a PC.
2. Turn off the meter. Connect the meter to an electrical outlet using the USB/DC power adapter and then turn on the meter.
3. Connect a USB cable (Cat. No. 59240-00) to the host USB connector on the USB/DC power adapter and to the computer.
4. Open the PC Application software on the PC. Click on the green triangle shown in the menu bar to initiate a connection.
5. Press the **DATA LOG** key on the meter.
6. Use the **UP** and **DOWN** keys to highlight **Send Data Log**. Press the **GREEN/RIGHT** key under Select.

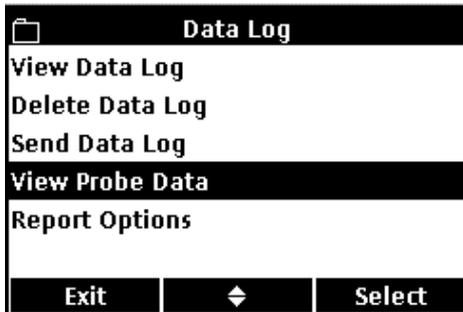


7. The meter will show "Sending Data". The data will appear in the PC Application Software window. The file is saved in Comma Separated Values (.csv) file format.

**Note:** The PC will receive the complete record. It is unaffected by whatever "Report Type" setting (Basic, Advanced, Total) is selected for printed reports.

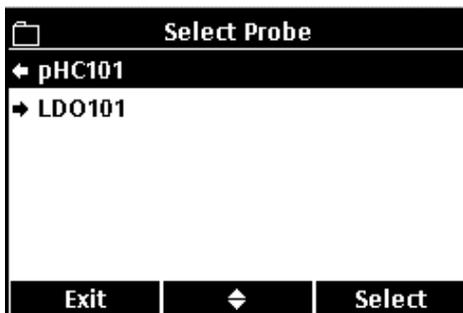
### 5.3.5 Sending Probe Calibration Data

Calibration data is included as part of the data log, but can also be specifically printed or downloaded from the stored information in the IntelliCAL probe. Printed calibration reports are detailed in [section 5.5 on page 40](#).

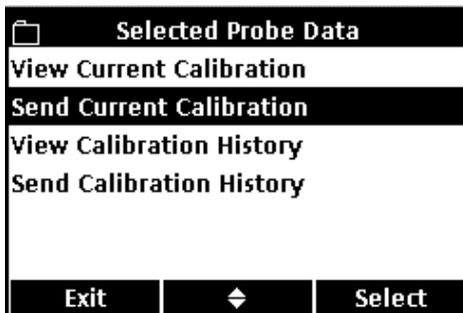


1. Press the **DATA LOG** key on the meter.
2. Use the **UP** and **DOWN** keys to highlight **View Probe Data**. Press the **GREEN/RIGHT** key under Select.

**Note:** A probe must be connected to the meter in order to use the View Probe Data function.

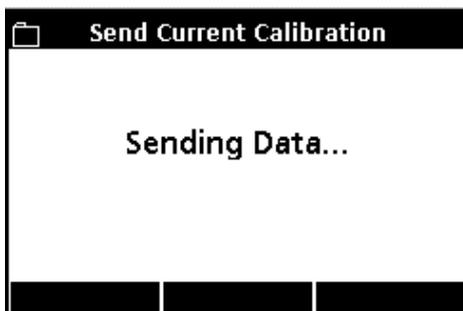


3. If only one probe is connected, proceed to Step 4. If two probes are connected (HQ40d meter only), both probes will be displayed. Use the **UP** and **DOWN** keys to highlight the desired probe. Press the **GREEN/RIGHT** key under Select.



4. Use the **UP** and **DOWN** keys to highlight **Send Current Calibration** or **Send Calibration History**.
  - **Send Current Calibration:** sends the most recent calibration information.
  - **Send Calibration History:** sends all calibration information that is stored in the probe.

Press the **GREEN/RIGHT** key under Select.



5. The display will show "Sending Data" to indicate that the data is being sent to a printer, USB flash memory stick or PC.

**Important Note:** Never disconnect USB devices from the USB/DC power adapter or the USB/DC power adapter from the meter when the "Sending Data" screen is displayed, or the meter may lock up.

## 5.4 Viewing Printed Data Log Reports

When the data log is sent to a printer (section 5.3.2 on page 33), the printed report contains all stored sample data, check standard data, and calibration information.

**Note:** All error messages will print at the end of each report option selected (Basic Report, Advanced Report, or Total Report).

### 5.4.1 Report Names

The first line of each report displays the report name, which is associated with the data log file. Figure 9 shows an example of the report name on a printed report.

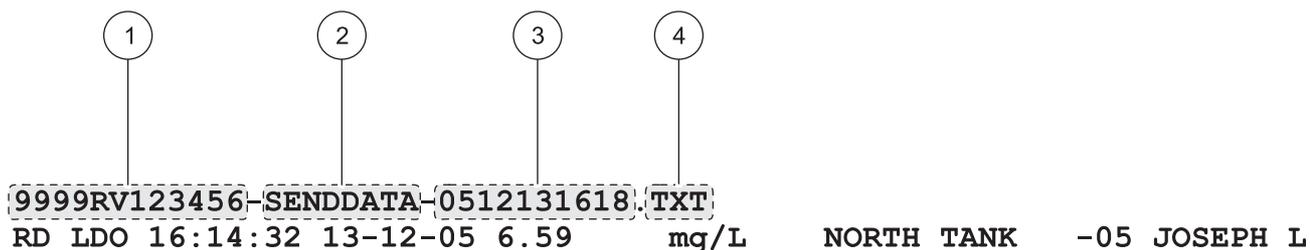


Figure 9 Report Name

1	Serial Number	3	Date and Time (24 h) (YYMMDDhhmm)
2	Report Label	4	File Type Extension

### 5.4.2 Sample Results

The amount of information that is printed for sample readings varies with the selected Report Type (Basic, Advanced, or Total).

#### 5.4.2.1 Basic Reports

A Basic Report contains a single line of information per sample reading. Figure 10 details the information available in this type of report.

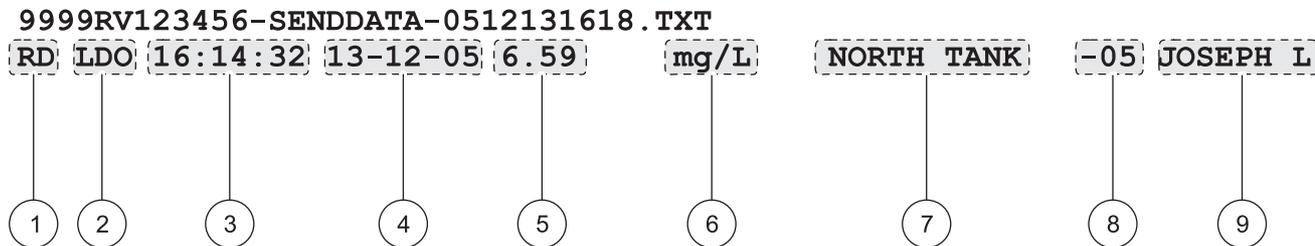


Figure 10 Sample Data on a Basic Report

1	Measurement Type (RD = Reading)	6	Reading Units
2	Parameter Type (pH, LDO, CD, etc.)	7	Sample ID: user-defined, displays "SAMPLE ID" if undefined
3	Time (hh:mm:ss in 24 h format)	8	Sample ID Counter
4	Date (DD-MM-YY or user-defined format)	9	Operator ID: user-defined, displays "- - -" if undefined
5	Reading Value		

### 5.4.2.2 Advanced Reports

An Advanced Report contains two lines of information per sample reading. The first line of information is the same as the information in a Basic Report. The second line includes additional information as shown in Figure 11.

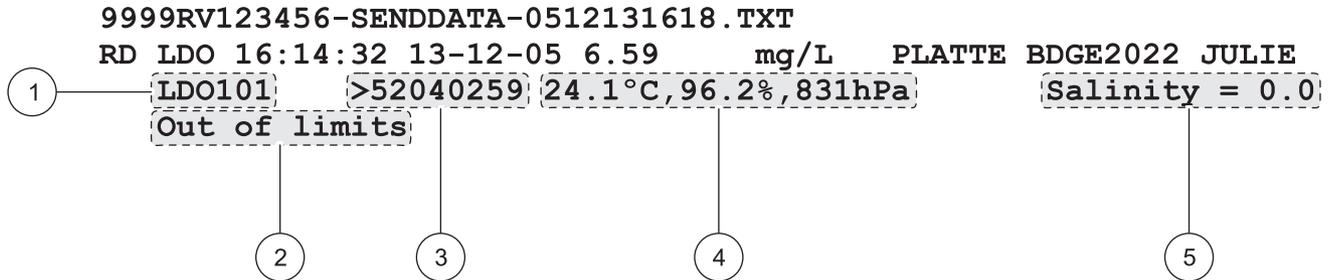


Figure 11 Sample Data on an Advanced Report

1	Probe Model Name
2	Error Message (if applicable)
3	Probe Serial Number: when using the HQ40d meter, the serial number will be prefaced by "<" or ">" to indicate which channel the probe was connected to during a dual reading.
4	Additional Units: displays all additional units associated with the reading. Contents vary depending on type of parameter being read.
5	Method Settings: displays highest-priority method setting associated with the reading. Contents vary depending on type of parameter being read and configuration of specific method.

### 5.4.2.3 Total Reports

A Total Report contains three lines of information per sample reading. The first two lines of information are the same as the information in an advanced report. The third line includes additional information as shown in Figure 12.

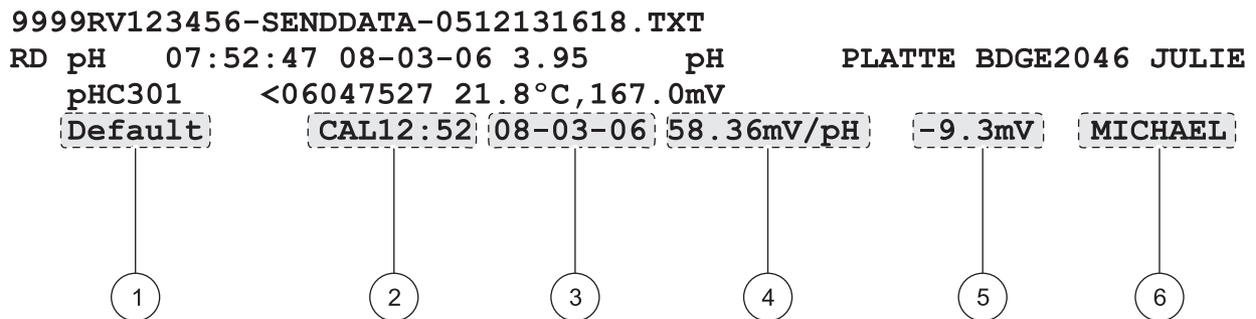


Figure 12 Sample Data on a Total Report

1	Method Name: user-defined Method Name used to take this reading
2	Calibration Time: time of last calibration, prefaced by "CAL" and displayed as hh:mm in 24 h format
3	Calibration Date: date of last calibration (DD-MM-YY or user-defined format)
4	Calibration Slope
5	Offset: contents vary depending on type of parameter being read and configuration of specific method. May be blank.
6	Calibration Operator ID: user-defined Operator ID of person who performed the last calibration. Displays "- - -" if undefined.

## Standard Operation

### 5.4.3 Calibration Results

Calibration data is included in the data log printout as two lines of information (Figure 13). The amount of information that is displayed for calibration data does not vary with the selected Report Option.

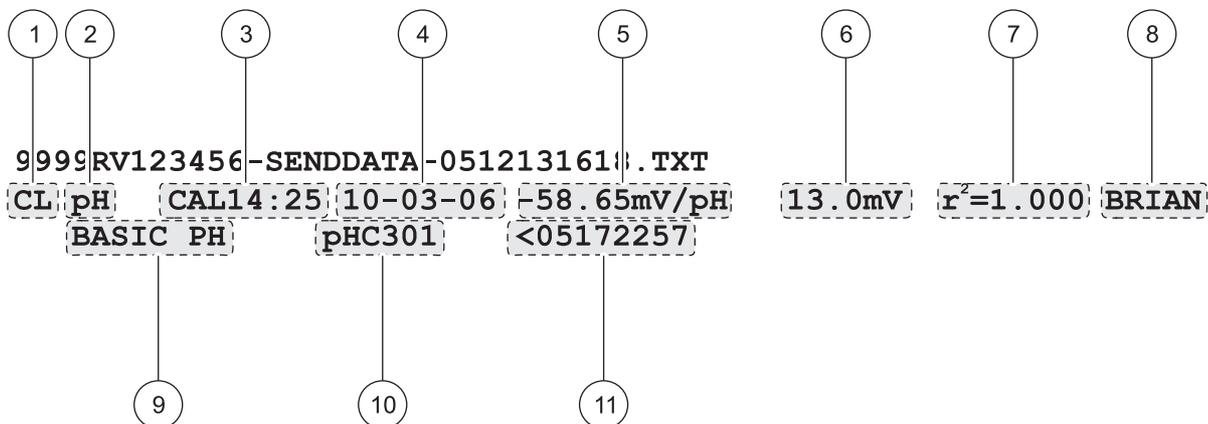


Figure 13 Calibration Data Report

1	Measurement Type (CL = Calibration)
2	Parameter Type (pH, LDO, CD, etc.)
3	Calibration Time: prefaced by "CAL" and displayed as hh:mm in 24 h format
4	Calibration Date (DD-MM-YY or user-defined format)
5	Calibration Slope
6	Offset: contents vary depending on type of parameter being read and configuration of specific method. May be blank.
7	r <sup>2</sup> : contents vary depending on type of parameter being read, configuration of specific method and number of calibration standards read. May be blank.
8	Calibration Operator ID: user-defined Operator ID of person who performed this calibration. Displays "-" if undefined.
9	Method Name: user-defined Method Name used to take this reading
10	Probe Model Name
11	Probe Serial Number: when using the HQ40d meter, the serial number will be prefaced by "<" or ">" to indicate which channel the probe was connected to during a dual reading

### 5.4.4 Check Standard Results

Check standard results are included in the data log printout as a single line of information (Figure 14). The amount of information that is displayed for check standard results does not vary with the selected Report Option.

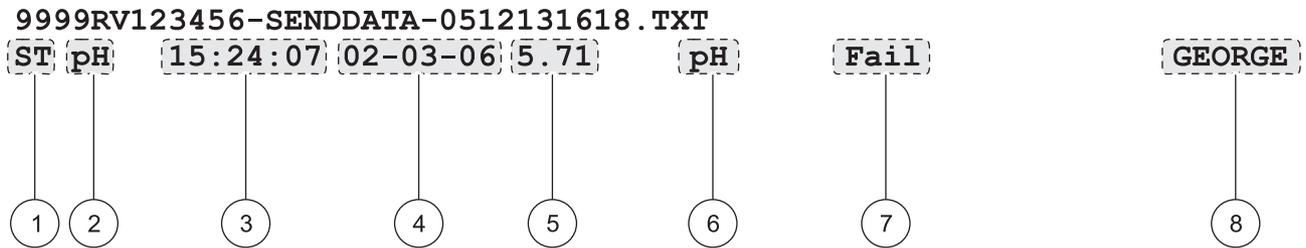


Figure 14 Check Standard Report

1	Measurement Type (ST = Check Standard)
2	Parameter Type (pH, LDO, CD, etc.)
3	Check Standard Time (hh:mm:ss in 24 h format)
4	Check Standard Date (DD-MM-YY or user-defined format)
5	Reading Value
6	Reading Units
7	Check Standard Pass/Fail: identifies whether Check Standard acceptance criteria has been met
8	Check Standard Operator ID: user-defined Operator ID of person who performed the check standard. Displays "- -" if undefined.

## 5.5 Viewing Printed Calibration Reports

A report can be printed for current calibration information or calibration history as described in [section 5.3.5 on page 35](#).

### 5.5.1 Current Calibration Reports

A Current Calibration Report contains two lines of information. [Figure 15](#) details the information available in this type of report.

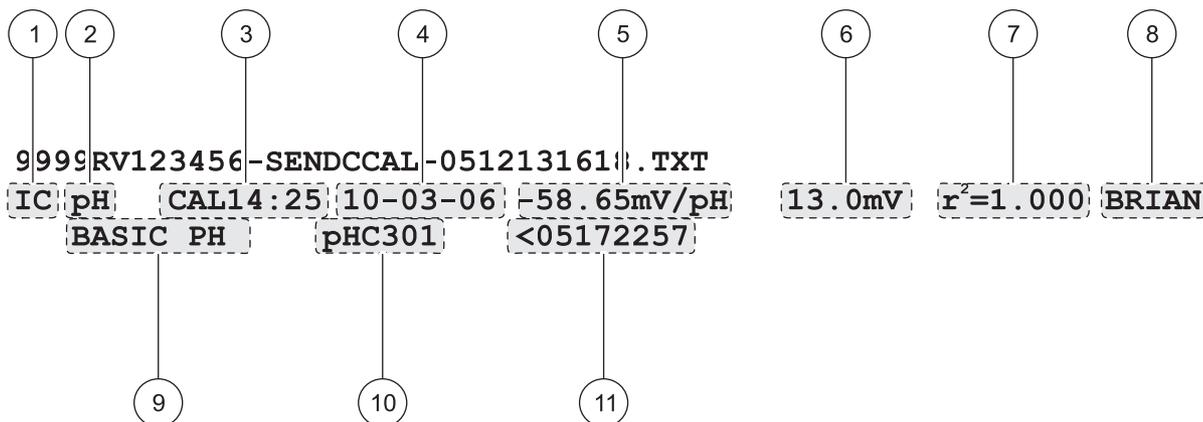


Figure 15 Current Calibration Report

1	Report Type (IC = Current Calibration)
2	Parameter Type (pH, LDO, CD, etc.)
3	Calibration Time: prefaced by "CAL" and displayed as hh:mm in 24 h format
4	Calibration Date (DD-MM-YY or user-defined format)
5	Calibration Slope
6	Offset: contents vary depending on type of parameter being read and configuration of specific method. May be blank.
7	r²: contents vary depending on type of parameter being read, configuration of specific method and number of calibration standards read. May be blank.
8	Calibration Operator ID: user-defined Operator ID of person who performed this calibration. Displays "-" if undefined.
9	Method Name: user-defined Method Name used to take this reading
10	Probe Model Name
11	Probe Serial Number: when using the HQ40d meter, the serial number will be prefaced by "<" or ">" to indicate which channel the probe was connected to during a dual reading.

### 5.5.2 Calibration History Reports

A Calibration History Report contains two lines of information per calibration. Figure 16 details the information available in this type of report.

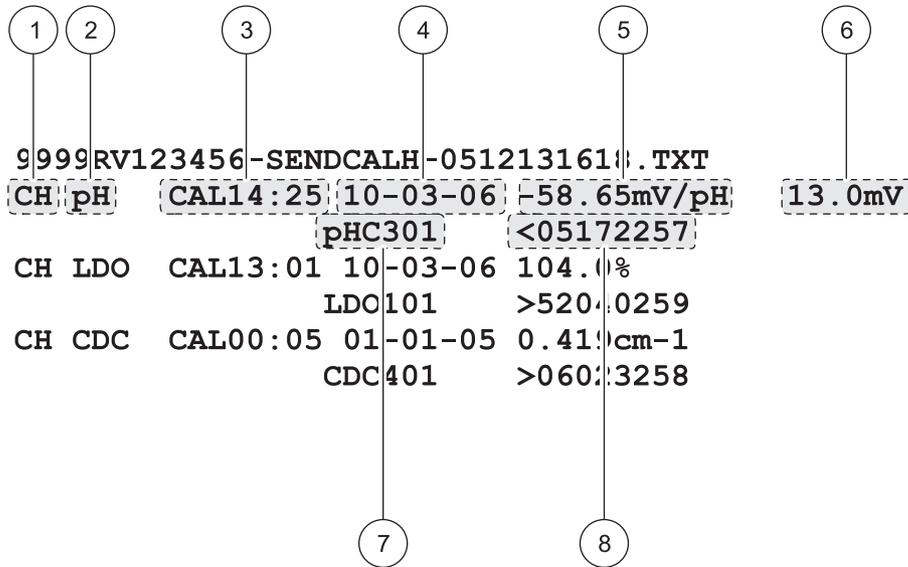


Figure 16 Calibration History Report

1	Report Type (CH = Calibration History)
2	Parameter Type (pH, LDO, CD, etc.)
3	Calibration Time: prefaced by "CAL" and displayed as hh:mm in 24 h format
4	Calibration Date (DD-MM-YY or user-defined format)
5	Calibration Slope
6	Offset: contents vary depending on type of parameter being read and configuration of specific method. May be blank.
7	Probe Model Name
8	Probe Serial Number: when using the HQ40d meter, the serial number will be prefaced by "<" or ">" to indicate which channel the probe was connected to during a dual reading.

## 5.6 Viewing Downloaded Data Files

Data sent to a flash memory stick will be found as a .txt file. Data sent to a computer will be found as a .csv file. The file name will have the following format:

"Serial Number-Data File Type-DateTime"

Table 1 details several examples of file names from a flash memory stick. The DateTime information contains the date in the "YYMMDD" format and Time in the 24-hour format.

**Table 1 Example File Names for Data Sent to a Flash Memory Stick**

Data File Type	Example File Name
Send Data Log	9999NN000000-SENDDATA-0603131624.TXT
Send Current Calibration	9999NN000000-SENDCCAL-0603131624.TXT
Send Calibration History	9999NN000000-SENDCALH -0603131624.TXT
Real Time Data	RTDATA.TXT

When opened, each line of the .txt file is a data record containing several fields separated by commas. If a field is not used or is not populated for a particular record, the field will be blank and only the comma (,) will appear in the file.

To view the data in columns, open the file using an application such as Microsoft® Excel® spreadsheet software. When viewed in a spreadsheet, each column will have a header row (column headers option must be on as detailed in [section 5.3.1.2 on page 32](#)).

The column header names with data examples are detailed in [Table 2](#). The displayed data will vary depending on the type of probe and the method of measurement that is used.

**Table 2 Data File Description**

Column No.	Column Header Name	Data Description and Example Values
1	Type	Type of data: RD = Reading CL = Calibration CK = Check Standard CH = Calibration History IC = Current Calibration
2	Parameter Type	Parameter: LDO, pH, or CD (conductivity)
3	Date	Date of reading: stored in user-defined Date Format
4	Time	Time of reading: stored in user-defined Time Format
5	Operator ID	Operator ID of the person who performed the reading or calibration. Will display "- - -" if default Operator ID is used.
6	Probe Model	Model number of the probe, for example pH101, CDC401, LDO101
7	Probe SN	Probe Serial Number On the HQ40d meter, the serial number is prefaced by "<" or ">" to indicate which port the probe was connected to during the reading.
8	Method Name	User-defined name of the method used for the reading.
9	Sample ID	User-defined Sample ID for the reading Will display "Sample ID" if the default Sample ID is used.
10	Primary Reading Value	Measured value Will display "-----" if out of range.

Table 2 Data File Description

Column No.	Column Header Name	Data Description and Example Values
11	Primary Reading Units	Measurement units defined for method, for example pH or mS/cm
12	Supp Reading 1	First Supplemental Reading if applicable, for example temperature.
13	Supp Units 1	Units for First Supplemental Reading, if applicable.
14	Supp Reading 2	Second Supplemental Reading, if applicable (example: "mV" for pH)
15	Supp Units 2	Units for Second Supplemental Reading, if applicable.
16	Supp Reading 3	Third Supplemental Reading, if applicable.
17	Supp Units 3	Units for Third Supplemental Reading, if applicable.
18	Reading Setting 1	Any settings that affect the reading, for example "NaCl/Non-Linear"
19	Reading Setting 2	
20	Reading Setting 3	
21	Reading Setting 4	
22	Reading Message 1	Any message (warning, information, etc.) that was displayed during the measurement, for example "Out of limits".
23	Reading Message 2	
24	Reading Message 3	
25	Reading Message 4	
26	Check Std Value	Value of the standard that was used to verify accuracy, for example: 7.00pH–25°C (pH, temp-compensated) 7.01pH (pH, custom)
27	Check Std Units	Check standard units, for example $\mu\text{S}/\text{cm}$ . Note: pH is not displayed here as it is included in the previous column.
28	Check Std Graph	Bar-graph showing the measurement in relation to the acceptance limits Example: "6.901 <----- -----> 7.101"
29	Check Std Status	Status of the check standard reading Example: "Reading within limits", "Reading outside limits"
30	Calibration Status	OK = current calibration is valid ? = calibration has expired
31	Cal Date	Date of Calibration Reading: stored in user-defined Date Format
32	Cal Time	Time of Calibration Reading: stored in user-defined Time Format
33	Cal Operator ID	The Operator ID specified when the probe was calibrated Will display "- -" if undefined.
34	Cal Slope Name	Slope (pH or LDO) or Cell Constant (conductivity)
35	Cal Slope	The slope value for the calibration
36	Cal Slope Aux	Used by pH to give the percent of nominal slope
37	Cal Slope Units	Units of the calibration slope Example: "mV/pH" for pH
38	Cal Offset	Calibration offset value
39	Cal Offset Units	Calibration offset units Example: "mV" for pH
40	Cal r2	Unitless calibration correlation coefficient
41	Cal Number of Std's	Number of standards used during calibration, for example 5. May be blank depending on Record Type, Parameter Type and Method Settings.
42	Cal Std 1	Known value of the first calibration standard
43	Cal Std 1 Units	Units of the first calibration standard
44	Cal Std 1 Primary Value	Measured value of the first calibration standard
45	Cal Std 1 Primary Units	Associated units for the calibration measurement
46	Cal Std 1 Supp Value	Value of supplemental measurement, for example temperature

## Standard Operation

**Table 2 Data File Description**

Column No.	Column Header Name	Data Description and Example Values
47	Cal Std 2	Value and units of the second calibration standard, if used.
48	Cal Std 2 Units	
49	Cal Std 2 Primary Value	
50	Cal Std 2 Primary Units	
51	Cal Std 2 Supp Value	
52	Cal Std 3	Value and units of the third calibration standard, if used.
53	Cal Std 3 Units	
54	Cal Std 3 Primary Value	
55	Cal Std 3 Primary Units	
56	Cal Std 3 Supp value	Value and units of the fourth calibration standard, if used.
57	Cal Std 4	
58	Cal Std 4 Units	
59	Cal Std 4 Primary Value	
60	Cal Std 4 Primary Units	
61	Cal Std 4 Supp Value	Value and units of the fifth calibration standard, if used.
62	Cal Std 5	
63	Cal Std 5 Units	
64	Cal Std 5 Primary Value	
65	Cal Std 5 Primary Units	Value and units of the sixth calibration standard, if used.
66	Cal Std 5 Supp Value	
67	Cal Std 6	
68	Cal Std 6 Units	
69	Cal Std 6 Primary Value	
70	Cal Std 6 Primary Units	Value and units of the seventh calibration standard, if used.
71	Cal Std 6 Supp Value	
72	Cal Std 7	
73	Cal Std 7 Units	
74	Cal Std 7 Primary Value	Value and units of the seventh calibration standard, if used.
75	Cal Std 7 Primary Units	
76	Cal Std 7 Supp Value	
77	Cal Std Supp Units	Units applicable to all secondary calibration readings. Example: "°C" or "°F" for temperature
78	Cal Message 1	Any messages about the calibration.
79	Cal Message 2	
80	Cal Message 3	
81	Cal Message 4	
82	Date/Time POSIX	Date and Time of Reading stored in POSIX format <sup>1</sup> Example: 1149234913
83	Cal Date/Time POSIX	Date and Time of Calibration stored in POSIX format <sup>1</sup> Example: 1111320348

<sup>1</sup> POSIX date format expresses the date and time as the number of seconds from 1/1/1970 and is provided for advanced post-processing applications.

## 5.7 Archiving and Exchanging User Methods

In addition to capturing real-time data and transferring data from the data log, user-created methods can be saved to a USB flash memory stick. These methods can then be archived to a PC or transferred to another HQd meter.

Whenever a flash memory stick is connected to a meter, a 'User' folder is created on the memory stick, and all user-created methods that are stored in the meter are archived to this folder.

When a memory stick is connected to a meter, any user-created methods on the meter will be downloaded to the memory stick. The 'User' folder will be recreated each time the memory stick is connected. If the 'User' folder does not exist, a new 'User' folder will be created. The meter will not upload any methods from the memory stick if the 'User' folder does not exist or is empty.

The method names will appear in the 'User' folder with a prefix by the parameter type and an underscore (e.g., LDO\_, Cond\_, pH\_), and a file extension of .NGM. Only the METHOD NAME appears in the method library in the meter.

If a method on a meter has the same name as a method on a memory stick, the method in the meter will be overwritten. For example, if a file on the USB flash memory stick has the name "LDO\_SOUR TEST.NGM", this file will overwrite an LDO method on another meter with the same displayed method name (SOUR TEST).

When a memory stick is connected to a PC, a user can delete or change the name of any method, or delete the entire 'User' folder on the memory stick. Method names that are changed must preserve the prefix (e.g. LDO\_) and the file extension (.NGM). The METHOD NAME is limited to 12 characters. Allowable characters in the METHOD NAME are A through Z, 0 through 9, and one or more spaces.

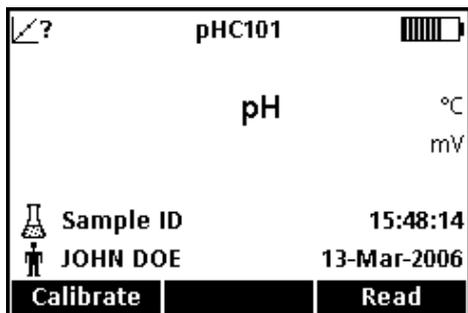


# Section 6 pH Operation and Methods

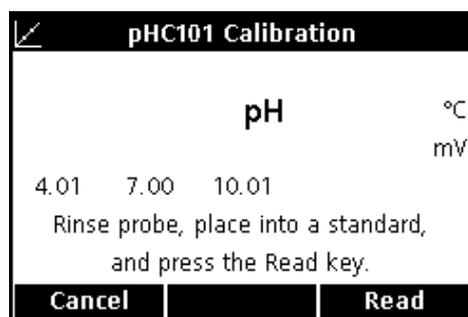
## 6.1 Calibrating the pH Probe

**Note:** Use pH buffer solutions to calibrate the pH IntelliCAL probe. The minimum number required and values of the pH buffer solutions are specified in the Calibration Options menu. A maximum of three buffers can be entered by using the "Color Coded" and DIN buffer sets. A maximum of five buffers can be entered by using the IUPAC buffer set.

**Note:** If using the HQ40d meter with two probes, the display must be in single display mode.

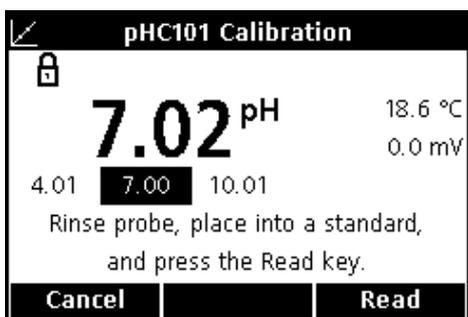


1. Press the **BLUE/LEFT** key under Calibrate.



2. The display will show the buffer values to be measured. These values are set in the Calibrations Options menu. Rinse the probe and place it in the first buffer solution. The probe automatically recognizes buffer values from a selected set, therefore entering the buffer values in a specific order is not required. However, it is recommended to begin with the lowest pH buffer for greatest accuracy.

3. Press the **GREEN/RIGHT** key under Read. The meter will automatically detect which buffer is being measured.

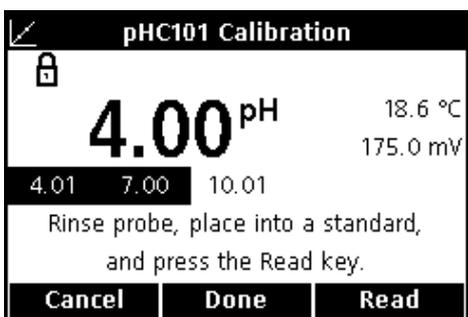


When the reading is stable, the display will highlight the buffer that has been read and display the temperature corrected pH value. Temperature correction is automatic: the displayed pH is the true pH value of the buffer at the measured temperature.

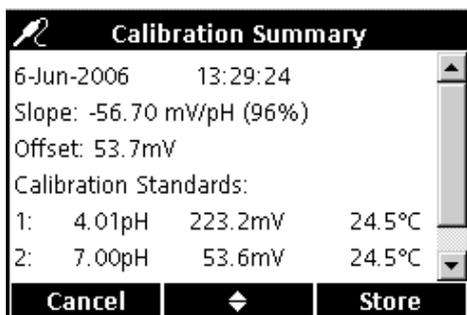
4. Rinse the probe and place it in the next buffer solution.

5. Press the **GREEN/RIGHT** key under Read.

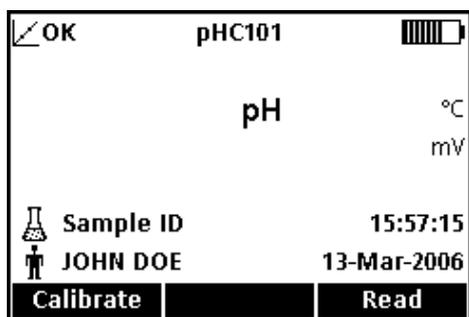
6. Repeat this procedure until the minimum number of calibration points specified in the pH Method have been acquired.



7. When the minimum number of buffer points are collected, Done appears above the **UP** key. Continue calibrating with the Method-specified calibration buffers (up to the maximum number specified in the pH Method), until all have been used, or press the **UP** key to review the Calibration Summary.



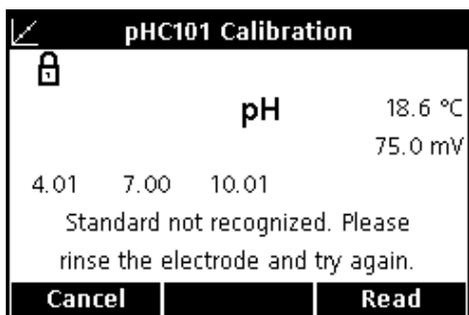
- The Calibration Summary will appear. Press the **GREEN/RIGHT** key under Store to accept the calibration and return to measurement mode. The calibration is recorded in the 500-result data log. The calibration information is also sent to a PC/printer/flash memory stick if connected.



- When the calibration is successful, the display will show OK in the upper left corner. The icon will appear as a question mark if the calibration information has expired or if a check standard has failed or been delayed.

## 6.1.1 Calibration Errors

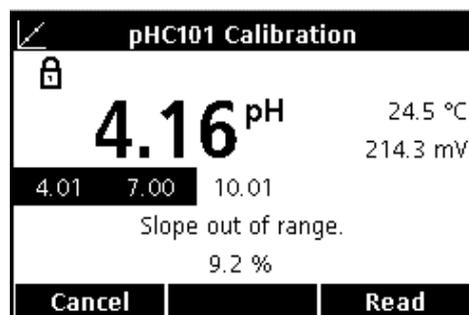
### 6.1.1.1 Standard Not Recognized



If the mV reading of the buffer does not fall within the limits set for auto detection, the display will show "Standard not recognized." If this happens, perform the following steps:

- Rinse the probe and place it in a fresh buffer solution.
- Press the **GREEN/RIGHT** key under Read. If the meter still does not recognize the buffer, be sure that the buffers used are the ones specified for the method. If so, refer to the IntelliCAL probe instruction sheet for cleaning and troubleshooting procedures.

### 6.1.1.2 Slope Error



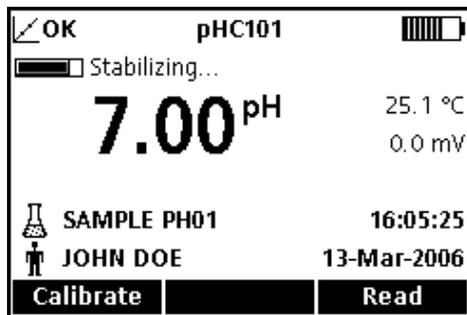
If the calibration slope does not meet the acceptance criteria, the display will show "Slope out of range". If this happens, perform the following steps:

- Obtain fresh buffer solutions. Rinse the probe and repeat the calibration.
- If the meter still gives a Slope error, be sure the buffers that are used are the ones specified for the method. If the error continues, there may be a problem with the probe.

## 6.2 Taking a pH Measurement

If complete traceability is required, set the Sample ID and Operator ID before taking a measurement.

**Note:** The default setting for Measurement Mode is “Press to Read”. If a different mode is required, change the Measurement Mode (see [section 9.5 on page 94](#)).



1. Place the pH probe into the sample.
2. Press the **GREEN/RIGHT** key under Read.
3. The display will show “Stabilizing...” and a progress bar will fill from 0 to 100% as the probe stabilizes in the sample. Stability is determined by using a fixed change in the signal/time equation. The lock icon will appear and the result will be automatically stored in the 500-result data log.
4. To take another measurement, repeat this procedure.

## 6.3 Running Check Standards

The Run Check Standards option for pH verifies reading accuracy by measuring a buffer solution of known pH value and comparing the measured to the theoretical value. The meter will indicate if the check standard passed or failed based on user-selected acceptance criteria ([section 6.5.4.4 on page 61](#)).

### 6.3.1 Automatic or Custom Check Standards

The pH value of a buffer solution will change when the temperature of the solution changes. Use one of the check standard buffers listed in the check standard options menu ([section 6.5.4.1 on page 59](#)) to best compensate for this temperature effect. When one of these buffers is selected, the solution can be at any temperature (within the temperature range), and the meter will automatically calculate the correct theoretical pH value of the standard at the measured temperature.

It is very important that the actual reading is compared to this correct theoretical value, or the check standard routine will not be valid. When a buffer is selected from the menu, the displayed pH value will include the reference temperature, for example pH 4.01 @ 25°C.

A custom check standard can be used ([section 6.5.4.2 on page 59](#)), but accuracy may be compromised. If a custom buffer is used as a check standard, no temperature compensation will be applied. The buffer must be measured at a known and constant temperature, and the pH value at that temperature must be entered into the meter. When a custom standard has been entered by the user, the displayed pH value will not include a temperature reference.

### 6.3.2 Measuring Check Standards

A check standard can be measured at any time by using the Meter Options menu or at specific intervals. Set the criteria for Check Standards from the Meter Options menu.

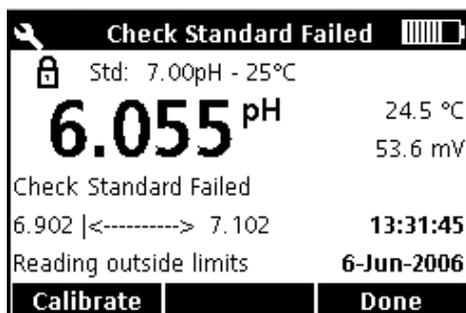
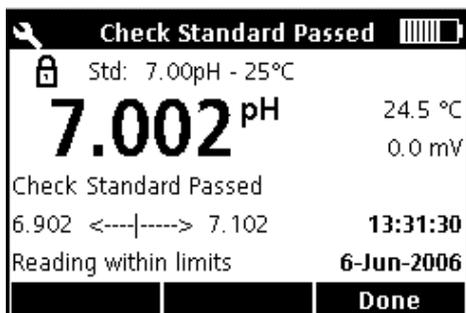
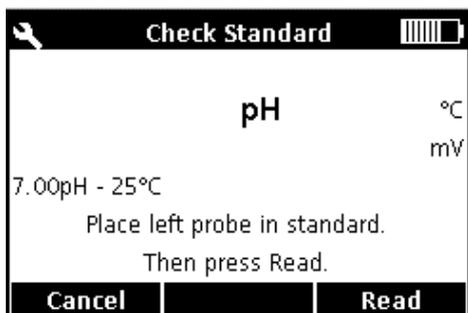
**Note:** Access Control must be off or a valid password entered before any of the check standard method options can be changed.

When the Check Standard reminder is ON, the meter will automatically display the Check Standard screen. The check standard can either be measured immediately, or be delayed and measured at a later time (this is a user-specified option, see Parameter Methods in [section 6.4 on page 51](#)).

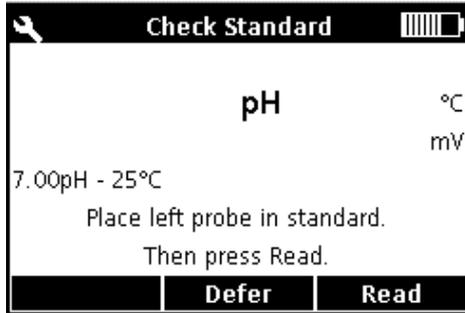
To measure the Check Standard:

1. Obtain the pH buffer solution specified for the check standard. The buffer solution to be used is shown in the display.
2. Place the probe in the buffer solution.
3. Press the **GREEN/RIGHT** key under Read.
4. The display shows the value of the check standard and either “Check Standard Passed” or “Check Standard Failed” appears. If “Check Standard Passed” appears, the success criteria has been met, and the measurement has been verified to be accurate. Press the **GREEN/RIGHT** key under Done to proceed with sample measurements.
5. If “Check Standard Failed” appears, the measurement is outside of the accepted limits.

If the acceptance criteria is set to “Cal Expires on Failure: Yes”, the instrument will display the **CALIBRATION ?** icon until it is re-calibrated. Press the **BLUE/LEFT** key under Calibrate and follow the steps for calibration.

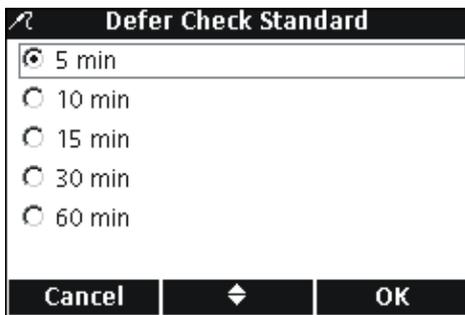


### 6.3.3 Deferring a Check Standard



A Check Standard Reminder can be deferred to a later time. This option is set in the Parameter Methods menu so that a supervisor can control this function. A password is required to change this setting. To defer the Check Standard measurement to a later time, use the Reading Check Standard screen.

1. Press the **UP** key under Defer.



2. Use the **UP** and **DOWN** keys to select when the next reminder will be displayed.

3. Press the **GREEN/RIGHT** key under OK. The Check Standard reminder will appear after the selected time has passed.

### 6.4 Setting the pH Method



The pH Method menu is available via the **METER OPTIONS/PARAMETER METHODS** key when Access Control is off, or when a valid password is entered. A pH probe must be connected to the meter to edit pH methods. Method selection is not restricted.

[Table 3](#) outlines the menu options for a pH Method. These options do not need to be changed if the default method is used. Modify Current Method submenus and default settings are described in [section 6.5 on page 52](#).

The HQ series meters contain a default method for pH with settings for measurement, calibration, check standards, and units. The default settings cannot be changed.

Use the Save Current Method As function to save the selected method with a new name. The meter settings for this new method can then be modified.

**Note:** To enter options that are different from the default settings, a new method must be created and then modified, as described in [section 6.5.1 on page 53](#).

Table 3 pH Methods Menu Summary

pH MAIN MENU	pH SUBMENU
Current Method	Set Current Method
Save Current Method As	New Method Name
Modify Current Method	Measurement Options
	Calibration Options
	Check Standards Options
	Units
Delete a Method	Delete a Method

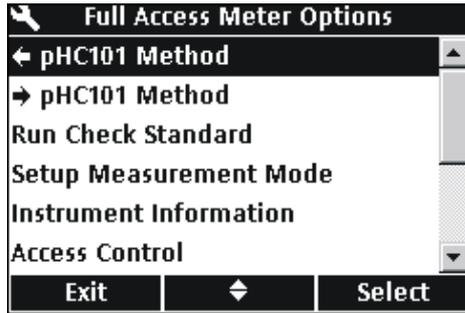
### 6.5 Modify Current Method Menu for pH Summary

pH METHOD OPTION	AVAILABLE SELECTIONS	DEFAULT SETTING
<b>Measurement Options</b>		
Resolution	0.1 Fast 0.01 Fast 0.01 Medium 0.01 Slow 0.001 Slow	0.01 Medium
Measurement Limits	Lower Limit: 0.00–14.00 pH Upper Limit 0.00–14.00 pH	Lower: 0.00 pH Upper: 14.00 pH
<b>Calibration Options</b>		
Buffer set	Color Coded 4.01, 7.00, 10.01 IUPAC 1.68, 4.01, 7.00, 10.01, 12.45 DIN 1.09, 4.65, 9.23	Color Coded 4, 7, 10
Set Calibration Reminder	Reminder: On or Off Repeat: 2 h, 4 h, 8 h, 2 d, 5 d, 7 d Expires: Immediately, Reminder +30 min, + 1 h, + 2 h, continue reading	Reminder: Off Repeat: 8h Expires: +30 min.
Minimum Cal Points	1, 2, or 3 Calibration Points	1 Calibration Point
Slope Limit	Slope Limit: 0 to ±10%	±5%
<b>Check Standards Options</b>		
Check Standard	0–14 pH	7 pH buffer
Check Standard Reminder	Reminder: On or Off Repeat: 2 h, 4h, 8h, 12 h, 24 h Allow Defer: Yes or No	Reminder: Off Repeat: 4h Defer: Yes
Acceptance Criteria	Acceptance Limits: 0.01–1.00 pH Calibration Expires On Failure: Yes or No	±0.05 pH No
Standard Value <sup>1</sup>	Enter a Value	7.00 pH
<b>Units</b>	pH or mV	pH

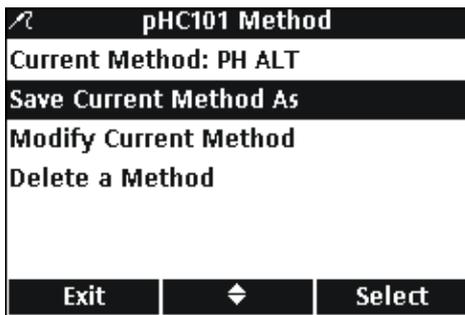
<sup>1</sup> For Custom Check Standard only

### 6.5.1 Modifying pH Methods

A new pH method can be entered when Access Control is off, or when a valid password is entered.

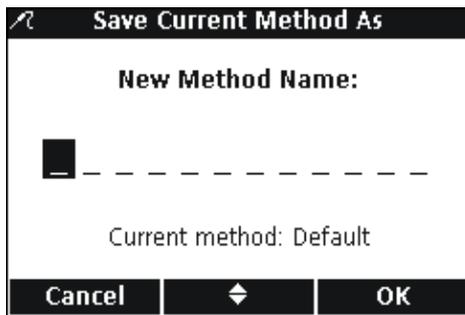


1. Press the **OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **pHC101 Method**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to highlight **Save Current Method As**. Press the **GREEN/RIGHT** key under Select.

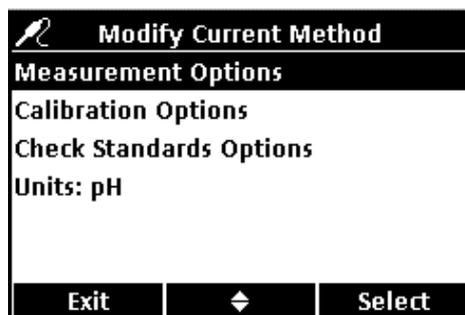
*Note: The default method cannot be modified or deleted, but can be saved with a new name (Save Current Method As) and then modified.*



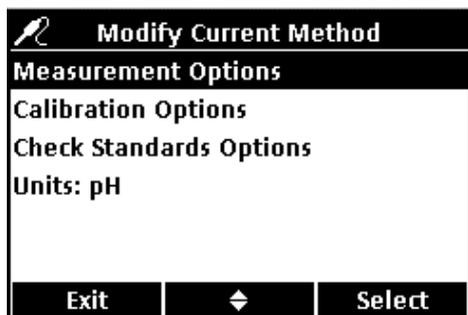
4. Use the **UP** and **DOWN** keys to scroll through the letters and numbers. To select a letter or number, press the **GREEN/RIGHT** key. The cursor will advance to the next space.
5. Repeat the previous step to add additional letters or numbers until the name is complete. To add a space, scroll to the blank space (between A and 9) using the **UP** and **DOWN** keys and press the **GREEN/RIGHT** key. To delete a letter or number, press the **BLUE/LEFT** key and re-enter the letter or number.
6. Press the **GREEN/RIGHT** key until OK replaces the Right arrow in the function bar. Press the **GREEN/RIGHT** key under OK. Alternately, use the accessory USB keyboard option.

### 6.5.2 Modifying the pH Measurement Options

Edit measurement options to change the displayed resolution or upper and lower pH limit.

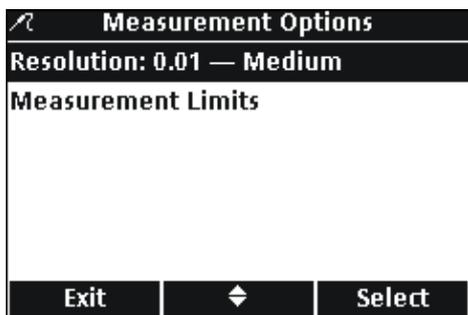


1. With **Measurement Options** highlighted in the Modify Current Method menu, press the **GREEN/RIGHT** key under Select.

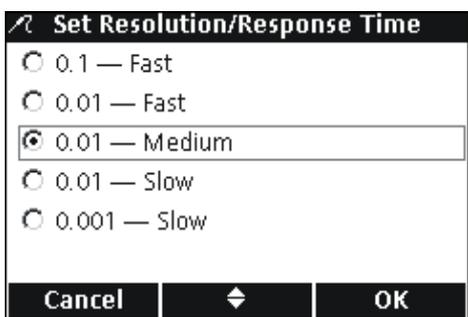


### To Edit the Resolution

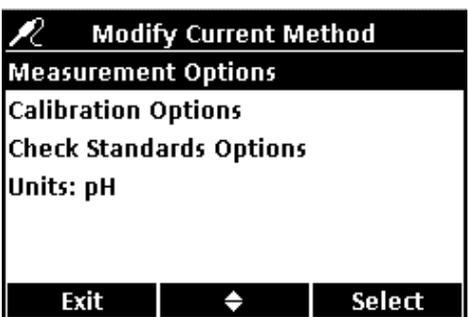
1. With **Measurement Options** highlighted in the Modify Current Method menu, press the **GREEN/RIGHT** key under Select.



2. With **Resolution** highlighted, press the **GREEN/RIGHT** key under Select.

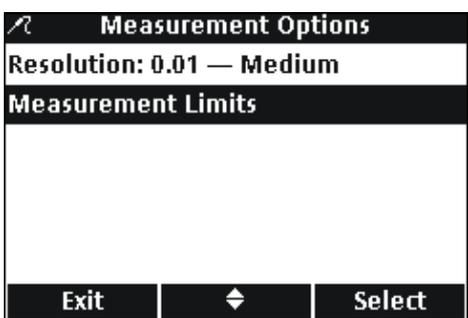


3. Use the **UP** and **DOWN** keys to select the desired resolution and speed of response. The most accurate readings are obtained at the “slow” response settings. Press the **GREEN/RIGHT** key under OK.

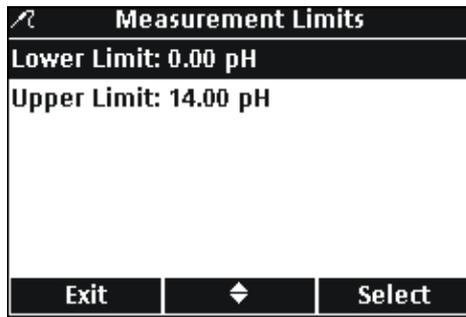


### To Edit the Upper and Lower pH Limits

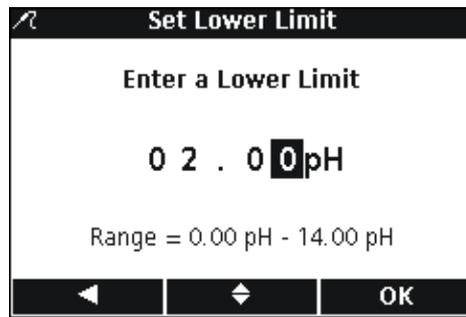
1. With **Measurement Options** highlighted in the Modify Current Method menu, press the **GREEN/RIGHT** key under Select.



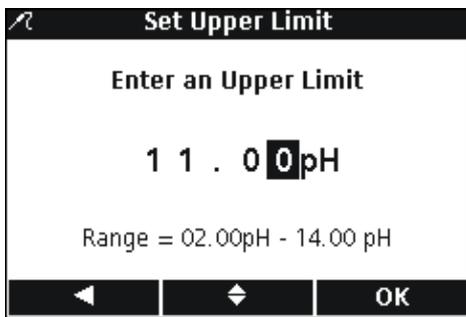
2. Use the **UP** and **DOWN** keys to select **Measurement Limits**. Press the **GREEN/RIGHT** key under Select.



- Use the **UP** and **DOWN** keys to select **Lower Limit** or **Upper Limit**. Press the **GREEN/RIGHT** key under Select.



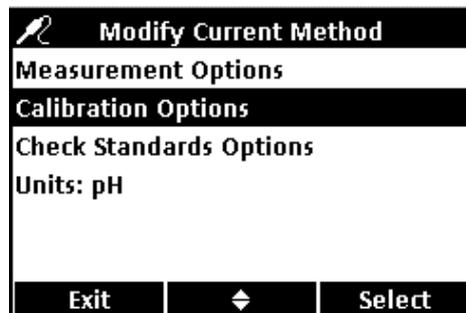
- Set Lower Limit:** Use the **UP** and **DOWN** keys to change the limit value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.



- Set Upper Limit:** Use the **UP** and **DOWN** keys to change the limit value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

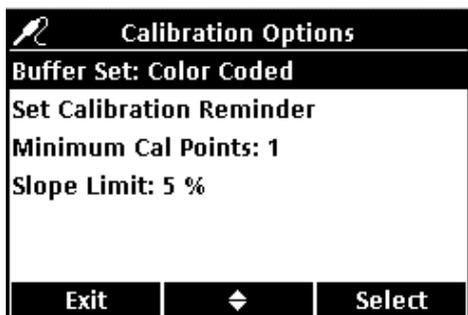
### 6.5.3 Modifying the pH Calibration Options

Edit calibration options to change the specified buffer sets for calibration, calibration reminders, minimum required number of calibration points, and slope acceptance criteria.



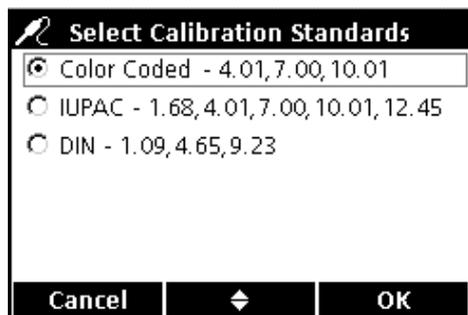
To modify the current calibration method options, use the **UP** and **DOWN** keys to highlight **Calibration Options** in the Modify Current Method menu. Press the **GREEN/RIGHT** key under Select.

The Calibrations Options menu will appear. Edit the buffer sets, calibration reminder, calibration points, and slope limits using the following steps.

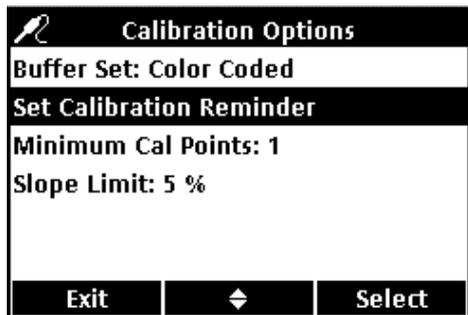


**Editing the Buffer Sets for Automatic Recognition.**

1. Use the **UP** and **DOWN** keys to highlight **Buffer Set**. Press the **GREEN/RIGHT** key under **Select**.

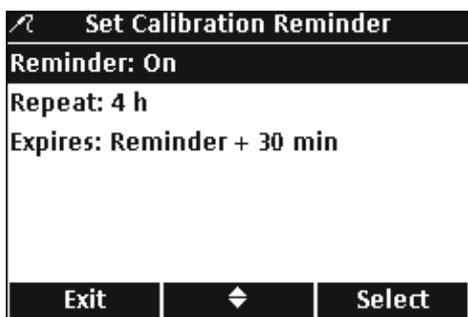


2. Use the **UP** and **DOWN** keys to select the desired buffer set for calibration. Press the **GREEN/RIGHT** key under **OK**. The meter will use these buffers for auto recognition.



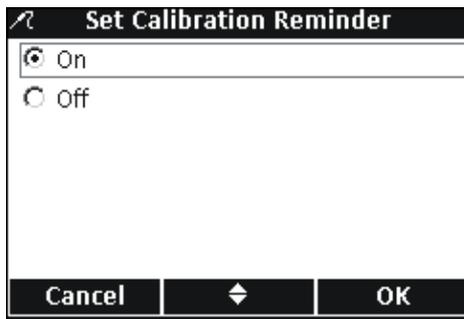
**Editing the Calibration Reminder**

1. Use the **UP** and **DOWN** keys to highlight **Set Calibration Reminder**. Press the **GREEN/RIGHT** key under **Select**.

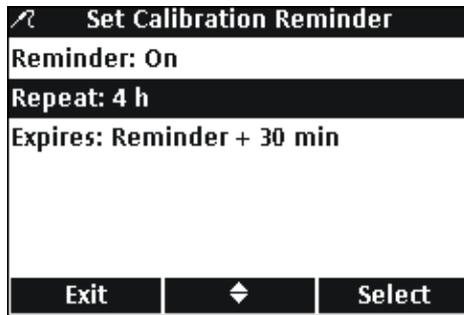


To turn Reminder On or Off:

2. Use the **UP** and **DOWN** keys to highlight **Reminder**. Press the **GREEN/RIGHT** key under **Select**.

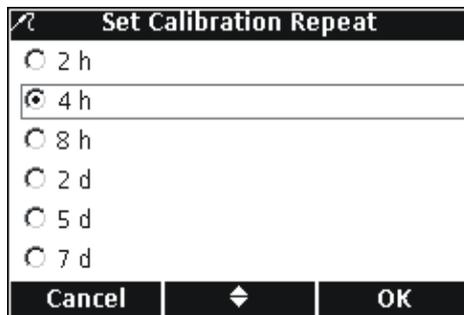


- Use the **UP** and **DOWN** keys to select **On** or **Off**. Press the **GREEN/RIGHT** key under **OK**.

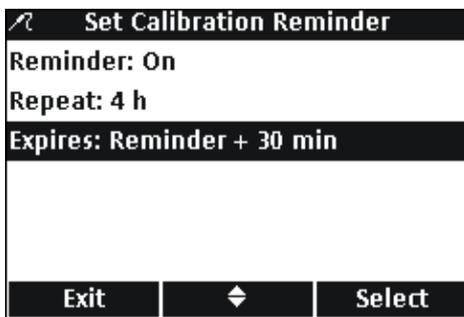


To set the Reminder frequency:

- Use the **UP** and **DOWN** keys to highlight **Repeat**. Press the **GREEN/RIGHT** key under **Select**.

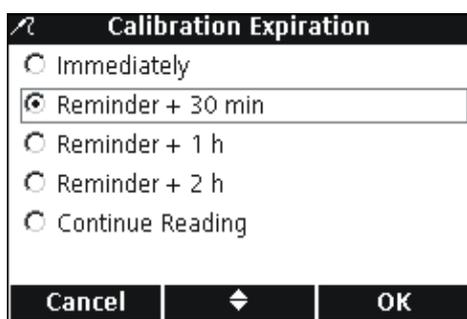


- Use the **UP** and **DOWN** keys to select the desired reminder frequency. Press the **GREEN/RIGHT** key under **OK**.



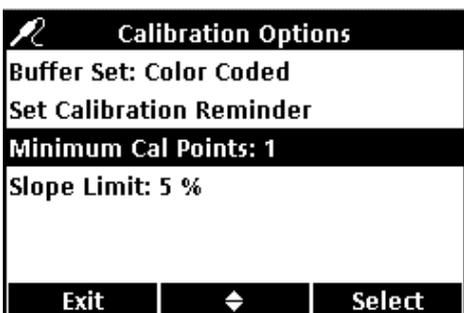
To edit the calibration expiration:

- Use the **UP** and **DOWN** keys to highlight **Expires**. Press the **GREEN/RIGHT** key under **Select**.



- Use the **UP** and **DOWN** keys to select how long after the reminder the calibration will expire. Press the **GREEN/RIGHT** key under OK.

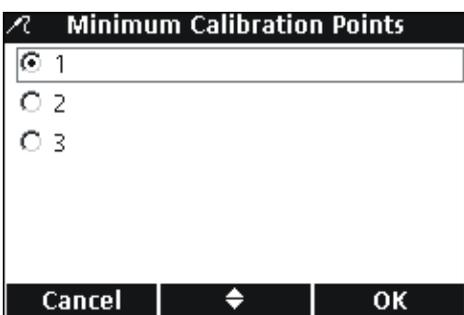
**Note:** The meter cannot be used for measuring samples after the calibration expires unless the Continue Reading setting is enabled.



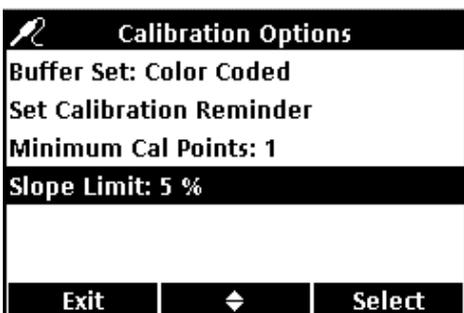
### Editing the Calibration Points

The meter can be set to require a minimum number of calibration points be entered before calibration can be completed. To set the minimum number of buffers that are required to complete calibration:

- Use the **UP** and **DOWN** keys to highlight **Minimum Cal Points**. Press the **GREEN/RIGHT** key under Select.



- Use the **UP** and **DOWN** keys to select the desired minimum number of calibration points. Press the **GREEN/RIGHT** key under OK.

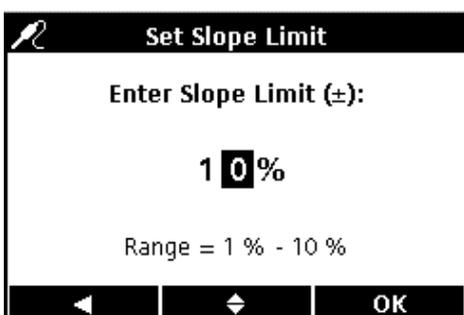


### Setting the Calibration Slope Limit

The meter can reject a calibration if the calibration slope falls outside of specified limits. Specify a narrower tolerance to achieve a more accurate calibration.

To change the acceptable slope tolerance for calibration:

- Use the **UP** and **DOWN** keys to highlight **Slope Limit**. Press the **GREEN/RIGHT** key under Select.
- Use the **UP** and **DOWN** keys to enter a value for the acceptable slope limit. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

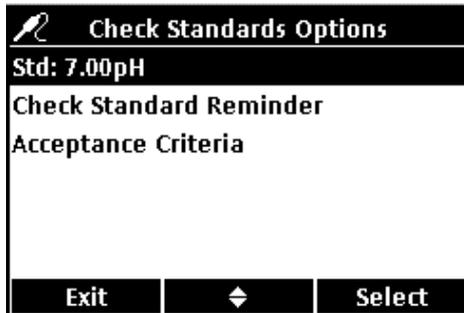


The meter will reject a calibration if the slope falls outside of the specified slope limit.

## 6.5.4 Modifying the pH Check Standard Options

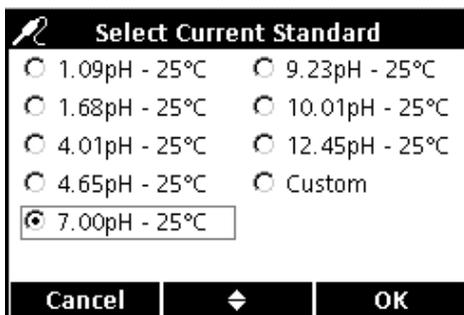
The buffer solution that is used for check standard measurements can be changed.

### 6.5.4.1 Selecting a Check Standard Buffer



From the Modify Current Method screen:

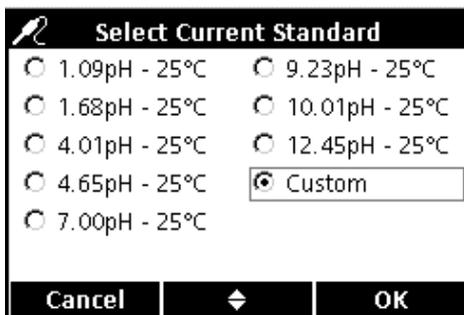
1. Use the **UP** and **DOWN** keys to highlight **Check Standard Options** (not pictured).
2. Use the **UP** and **DOWN** keys to highlight **Std:**. Press the **GREEN/RIGHT** key under Select to select the buffer to be used.



3. Use the **UP** and **DOWN** keys to select a temperature-compensated buffer. Press the **GREEN/RIGHT** key under OK.

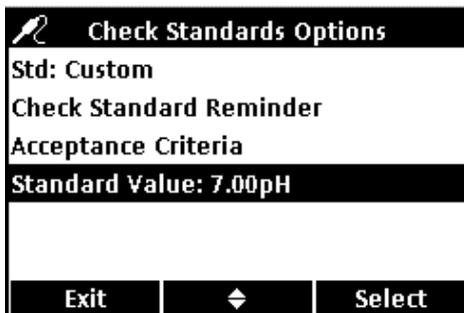
**Important Note:** selecting a temperature-compensated buffer is strongly recommended whenever check standards cannot be measured at known, consistent, and constant temperatures.

### 6.5.4.2 Using a Custom Check Standard

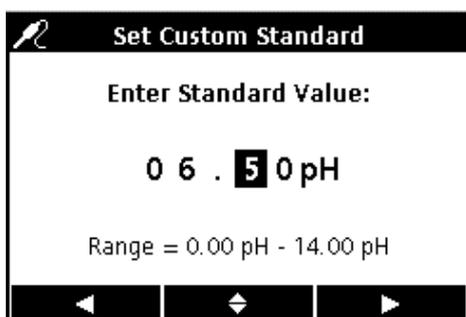


1. To use a custom standard, use the **UP** and **DOWN** keys to highlight **Custom**. Press the **GREEN/RIGHT** key under OK.

**Note:** If a custom standard is selected, the pH value is not corrected for temperature.

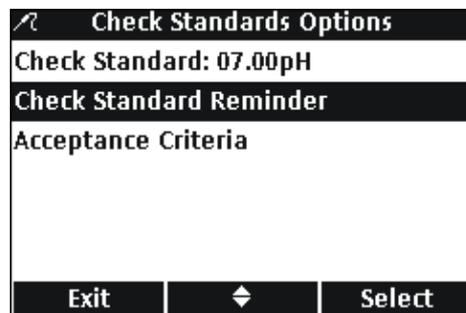


2. If Custom standard is selected in step 1, use the **UP** and **DOWN** keys to highlight **Standard Value**. Press the **GREEN/RIGHT** key under Select.



3. If a custom standard is chosen, use the **UP** and **DOWN** keys to enter a value to be used for the custom check standard. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

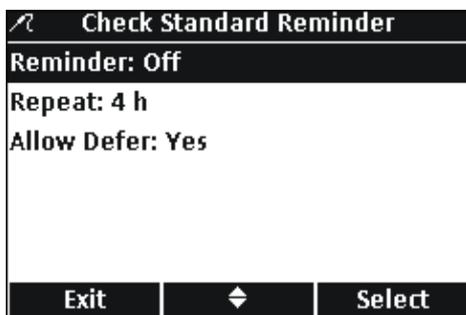
### 6.5.4.3 Editing the Check Standard Reminder Options



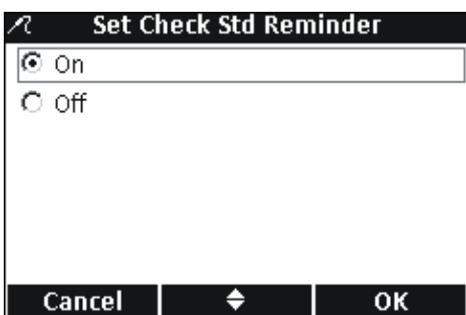
To turn the Check Standard reminder on or off, set the frequency of the check standard reminder, and edit the defer option refer to the following steps.

To edit Check Standard Reminder Options:

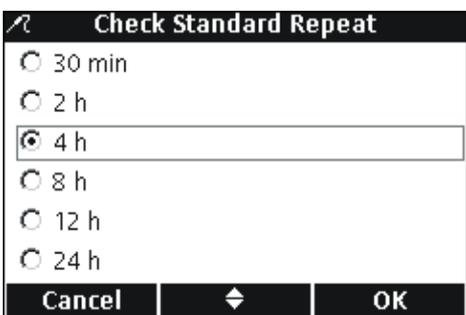
1. Use the **UP** and **DOWN** keys to highlight **Check Standard Reminder**. Press the **GREEN/RIGHT** key under Select.



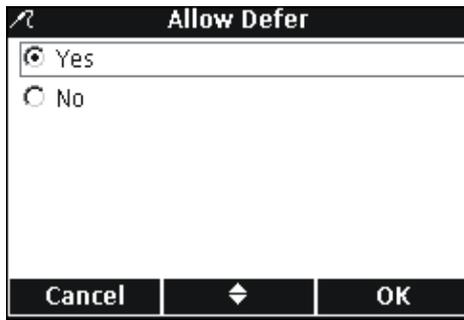
2. To turn the Check Standard on or off, use the **UP** and **DOWN** keys to highlight **Reminder**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to select **On** or **Off**. Press the **GREEN/RIGHT** key under OK.

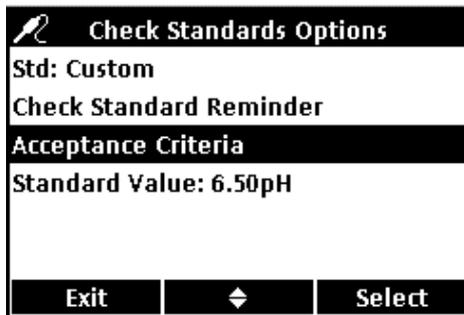


4. To set the Check Standard Reminder frequency, use the **UP** and **DOWN** keys to select **Repeat**. Press the **GREEN/RIGHT** key under Select.
5. Use the **UP** and **DOWN** keys to select the reminder frequency. Press the **GREEN/RIGHT** key under OK.

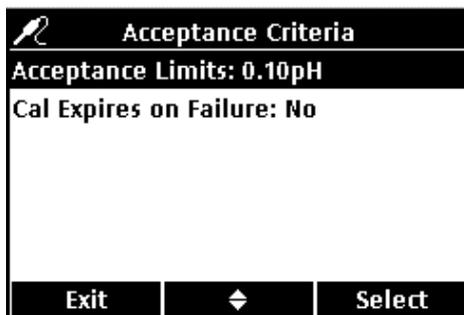


6. To edit the defer options, use the **UP** and **DOWN** keys to select **Allow Defer**. Press the **GREEN/RIGHT** key under Select.
7. Use the **UP** and **DOWN** keys to select **Yes** or **No**. Press the **GREEN/RIGHT** key under OK.

#### 6.5.4.4 Editing the Acceptance Criteria for Check Standards

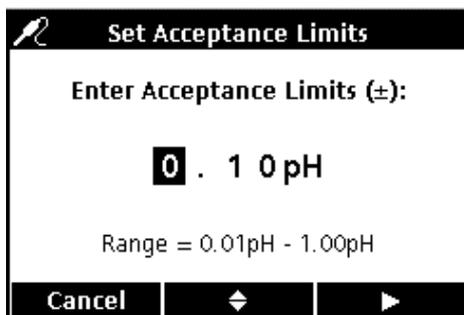


1. Use the **UP** and **DOWN** keys to highlight **Acceptance Criteria**. Press the **GREEN/RIGHT** key under Select.

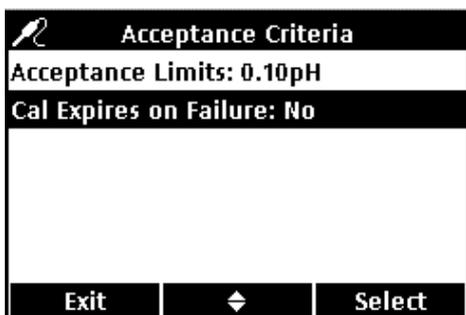


Refer to the following steps to edit the Check Standard acceptance criteria or edit whether a failed Check Standard requires re-calibration before continuing measurements.

1. Use the **UP** and **DOWN** keys to highlight **Acceptance Limits**. Press the **GREEN/RIGHT** key under Select.



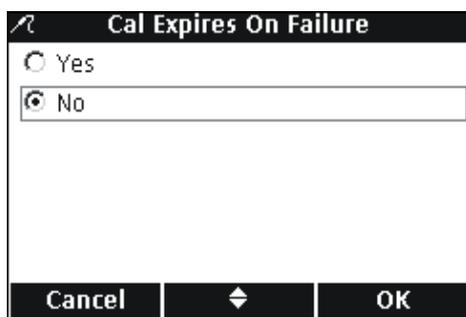
2. Use the **UP** and **DOWN** keys to enter a tolerance (as  $\pm$ pH) that the Check Standard must fall within. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.



**Acceptance Criteria**  
Acceptance Limits: 0.10pH  
Cal Expires on Failure: No

Exit    ◆    Select

3. Use the **UP** and **DOWN** keys to highlight **Cal Expires on Failure**. Press the **GREEN/RIGHT** key under Select.



**Cal Expires On Failure**  
 Yes  
 No

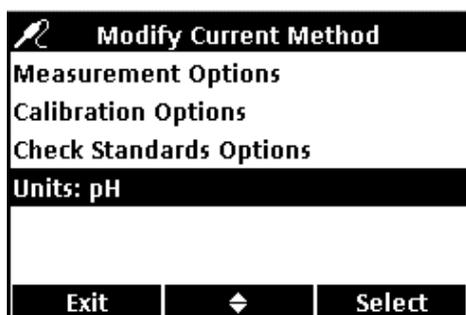
Cancel    ◆    OK

4. Use the **UP** and **DOWN** keys to select **Yes** or **No**. Press the **GREEN/RIGHT** key under OK.

When set to Yes, the meter must be calibrated when a Check Standard falls outside of the specified acceptance limits. No measurements can be taken until the meter is successfully re-calibrated.

When set to No, the meter will operate normally in the measurement mode.

### 6.5.5 Modifying the pH Measurement Units



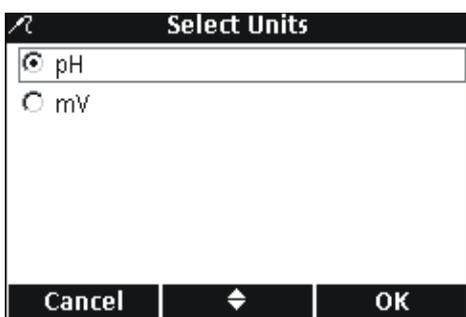
**Modify Current Method**  
Measurement Options  
Calibration Options  
Check Standards Options  
Units: pH

Exit    ◆    Select

The meter will display both pH and mV values in the measurement mode.

To change which unit is prominent:

1. Use the **UP** and **DOWN** keys to highlight **Units**. Press the **GREEN/RIGHT** key under Select.



**Select Units**  
 pH  
 mV

Cancel    ◆    OK

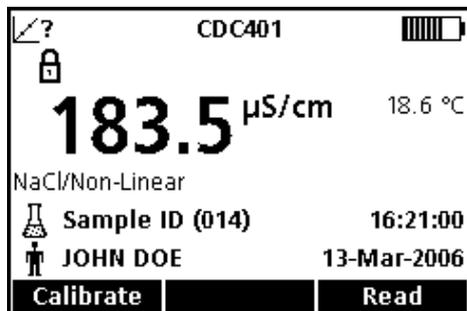
2. Use the **UP** and **DOWN** keys to select **pH** or **mV**. Press the **GREEN/RIGHT** key under OK.

## 7.1 Calibrating the Conductivity Probe

Calibrating a conductivity probe establishes the linear cell constant of the probe. Use a conductivity standard solution to calibrate the IntelliCAL conductivity probe. The conductivity standard can be specified in the Conductivity Options menu (see [section 7.4 on page 66](#)).

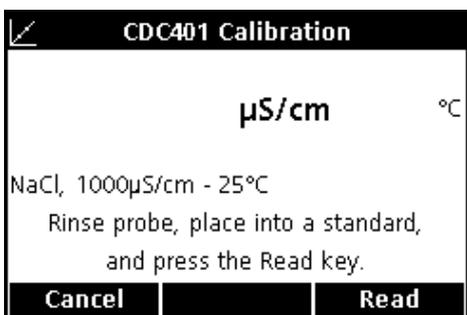
1. Press the **BLUE/LEFT** key under Calibrate.

**Note:** If using the HQ40d meter with two probes, the display must be in single screen mode.

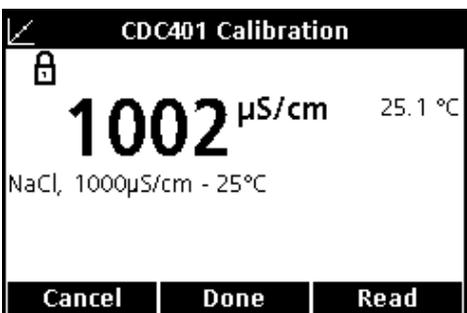


2. The display will show the required conductivity standard solution. Rinse the probe and place it in the standard solution.

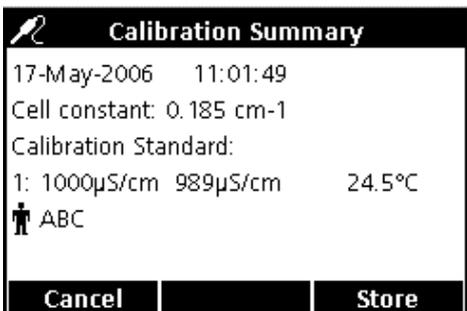
**Note:** All conductivity calibrations are performed using conductivity units ( $\mu\text{S}/\text{cm}$ ,  $\text{mS}/\text{cm}$ ) regardless of whether conductivity, resistivity, salinity, or total dissolved solids (TDS) is measured.



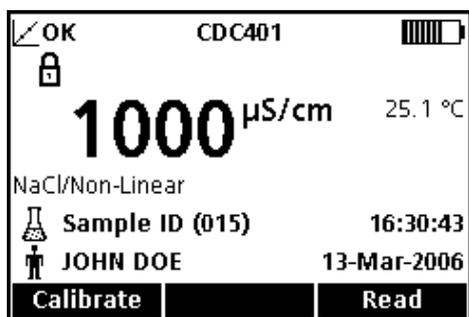
3. Press the **GREEN/RIGHT** key under Read. The meter will calculate the cell constant based on the selected calibration standard.



4. When the reading is stable, the display will show the temperature corrected value of the conductivity reading of the standard solution.
5. Press the **UP** key under Done.



6. The Calibration Summary will appear. Press the **GREEN/RIGHT** key under Store to accept the calibration and return to the measurement mode. The calibration is stored in the meter data log. If using the HQ40d meter, the calibration information is also sent to a PC/printer/flash memory stick if connected.

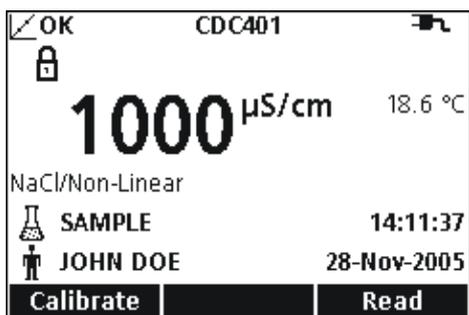


- When the calibration is successful, the display will show OK in the upper left corner. A question mark will be displayed if a calibration has expired or if a check standard has failed or been delayed.

## 7.2 Taking a Conductivity, Salinity, Resistivity, or TDS Measurement

If complete traceability is required, enter an Operator ID and Sample ID before measuring samples: be sure the Operator ID and Sample ID shown in the display are current. Press the **OPERATOR ID** and **SAMPLE ID** keys to update.

**Note:** The default setting for Measurement Mode is “Press to Read”. If a different mode is required, change the Measurement Mode (see [section 9.5 on page 94](#)).



- Place the conductivity probe into the sample.
- Press the **GREEN/RIGHT** key under Read.
- The display will show “Stabilizing...” and a progress bar will fill from 0 to 100% as the probe stabilizes in the sample. The lock icon will appear and the result will be stored automatically in the 500-result data log.
- This screen is an example of a conductivity measurement displayed in conductivity units. Repeat this procedure to take additional measurements. See [Figure 17 on page 64](#), [Figure 18](#) , and [Figure 19 on page 65](#).

**Note:** When an IntelliCAL conductivity probe is attached to the meter, the measurement results will be displayed in units of conductivity, salinity, resistivity, or total dissolved solids (TDS). To change the measurement units, save the default method under a new name, and select the unit of choice in the new method.

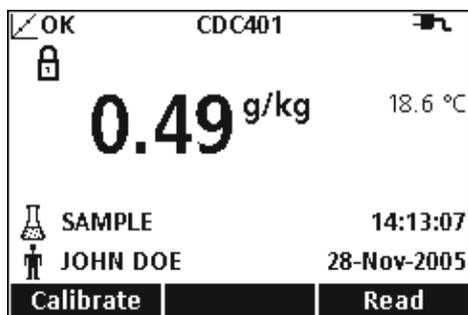


Figure 17 Example of Conductivity Measurement Displayed in Salinity Units

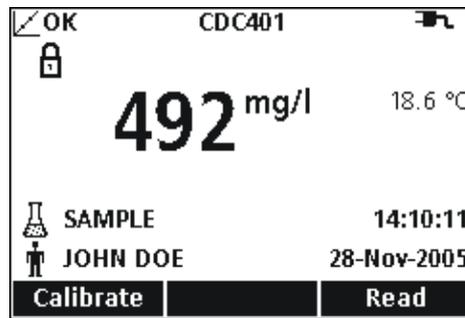


Figure 18 Example of Conductivity Measurement Displayed in TDS Units

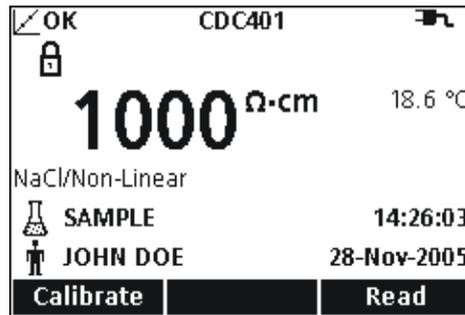


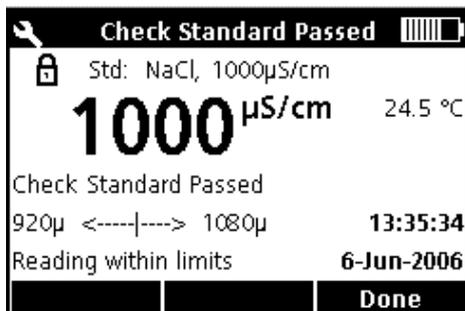
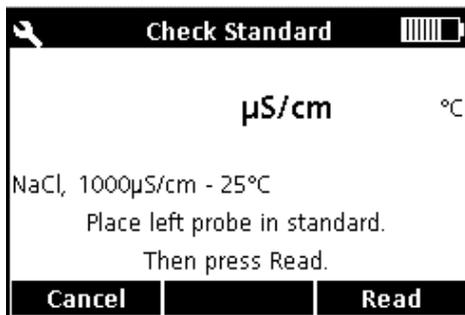
Figure 19 Example of Conductivity Measurement Displayed in Resistivity Units

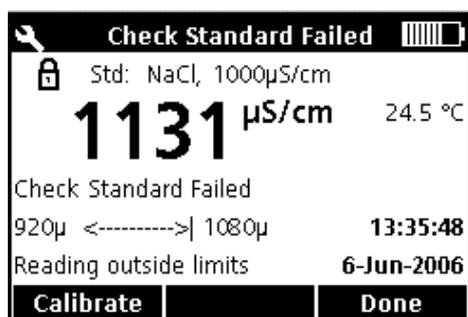
### 7.3 Running Check Standards Manually or Automatically

When the Check Standard reminder is on, the meter will automatically display the Check Standard screen. The check standard can either be measured immediately, or the measurement can be delayed until a later time.

To measure the Check Standard:

1. Obtain the conductivity standard solution specified for the check standard. The conductivity solution to be used is shown on the display.
2. Place the probe in the conductivity standard.
3. Press the **GREEN/RIGHT** key under Read.
4. The display will show the value of the check standard and either "Check Standard Passed" or "Check Standard Failed".
5. If "Check Standard Passed" is displayed, the reading is verified to be accurate. Press the **GREEN/RIGHT** key under Done to proceed with sample measurements.





6. If “Check Standard Failed” is displayed, the measurement is outside of the accepted limits.
7. If the acceptance criteria does not allow failed Check Standards, all results will be displayed with the **CALIBRATION ?** icon, and will be stored with a flag indicating a suspect calibration. Press the **BLUE/LEFT** key under Calibrate and follow the steps for calibration.

### 7.3.0.1 Deferring a Check Standard



A Check Standard Reminder can be deferred to a later time. This option is set within the Method to allow for supervisor control of this function. A password may be required to change this setting.

To defer the Check Standard measurement to a later time:

1. Press the **UP** key under Defer.
2. Use the **UP** and **DOWN** keys to select when the next reminder will be displayed.
3. Press the **GREEN/RIGHT** key under OK. The Check Standard reminder will re-appear after the selected time has passed.

## 7.4 Setting the Conductivity Method



The Conductivity Method menu is available via the **METER OPTIONS/PARAMETER METHODS** key when Access Control is off, or when a valid password is entered. A conductivity probe must be connected to the meter to change these options.

[Table 4](#) outlines the menu options for Conductivity Method. These options do not need to be changed if the default method is used. The Modify Current Method submenus and default settings are described in detail in [section 7.5 on page 67](#).

The HQ series meters contain a default method for conductivity with settings for measurement, calibration, check standards, and units. The default settings cannot be changed.

To enter options that are different from the default settings, a new method must be created and then modified.

**Table 4 Conductivity Parameter Method Menu Summary**

CONDUCTIVITY MAIN MENU	CONDUCTIVITY SUBMENU
Current Method	Set Current Method
Save Current Method As	New Method Name
Modify Current Method	Parameter
	Measurement Options
	Calibration Options
	Check Standards Options
Delete a Method	Delete a Method

## 7.5 Modify Current Method Menu for Conductivity Summary

CONDUCTIVITY OPTION	AVAILABLE SELECTIONS	DEFAULT SETTING
Parameter	Conductivity Salinity TDS Resistivity	Conductivity
<b>Measurement Options</b>		
Units	Conductivity: Auto range between $\mu\text{S/cm}$ and $\text{mS/cm}$ , fixed $\mu\text{S/cm}$ , or fixed $\text{mS/cm}$ Salinity: ppt, g/kg, <unitless> TDS: no options other than mg/L Resistivity: no options other than Ohm-cm	Auto range (conductivity) ppt (salinity)
Measurement Limits (conductivity, salinity, TDS, and resistivity respectively)	Lower Limit: 0.01 $\mu\text{S/cm}$ , 0 ppt, 0 mg/L, 5 Ohm-cm Upper Limit: 200,000 $\mu\text{S/cm}$ , 40 ppt, 50,000 mg/L, $5 \times 10^7$ Ohm-cm	Lower: 0.01 $\mu\text{S/cm}$ Upper: 200,000 $\mu\text{S/cm}$
Temperature Correction <sup>1</sup>	None Linear (conductivity 1.9%/C) Non-Linear/NaCl Natural Water	Parameter Based Defaults
Correction Factor <sup>1,2</sup>	Enter Factor (Available only for conductivity and resistivity with linear temperature correction)	1.90%/°C
Reference Temperature <sup>1,3</sup>	20 °C 25 °C	25 °C
<b>Calibration Options</b>		
Set Calibration Standard	1 D KCl, 111.3 mS/cm, 25 °C 0.1 D KCl, 12.85 mS/cm, 25 °C 0.01 D KCl, 1.41 mS/cm, 25 °C 0.1 M KCl, 12,880 $\mu\text{S/cm}$ , 25 °C 0.01 M KCl, 1413 $\mu\text{S/cm}$ , 25 °C 0.001 M KCl, 146.93 $\mu\text{S/cm}$ , 25 °C NaCl, 18 mS/cm, 25 °C NaCl, 1000 $\mu\text{S/cm}$ , 25 °C NaCl, 25 $\mu\text{S/cm}$ , 25 °C NaCl, 0.05%, 1015 $\mu\text{S/cm}$ , 25 °C Seawater Custom	NaCl, 1000 $\mu\text{S/cm}$ , 25 °C
Calibration Reminder	Reminder: On or Off Repeat: 30 min, 2 h, 4 h, 8 h, 2 d, 5 d, 7 d Expires: Immediately, Reminder +30 min, + 1 h, + 2 h, continue reading	Reminder: Off Repeat: 8h Expires: +30 min
Standard Value	(For custom calibration standard only)	User Selectable
Reference Temperature	(For custom calibration standard only)	User Selectable
Temperature Correction	(For custom calibration standard only)	User Selectable
<b>Check Standards Options</b>		
Check Standard Value	Enter value	1413 $\mu\text{S/cm}$
Check Standard Reminder	Reminder: On or Off Repeat: Off, 0.5 h, 2 h, 4h, 8h, 12 h, 24 h Allow Defer: Yes or No	Reminder: Off Repeat: 4h Defer: No

## 7.5 Modify Current Method Menu for Conductivity Summary (continued)

CONDUCTIVITY OPTION	AVAILABLE SELECTIONS	DEFAULT SETTING
Acceptance Criteria	Acceptance Limits: $\pm 1$ to $\pm 10\%$ Calibration Expires On Failure: Yes or No	$\pm 5\%$ Off
Standard Value	(For Custom Standard Only)	User Selectable
Reference Temperature	(For Custom Standard Only)	User Selectable
Temperature Correction	(For Custom Standard Only)	User Selectable

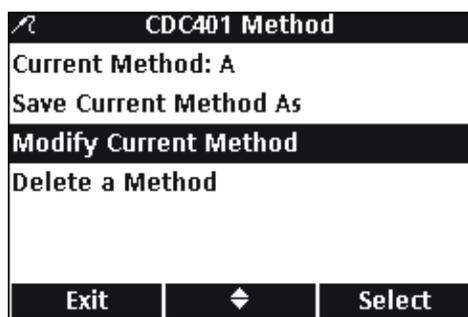
<sup>1</sup> Automatic temperature correction for salinity or TDS.

<sup>2</sup> Available for conductivity and resistivity with linear temperature correction only.

<sup>3</sup> Available for conductivity and resistivity with linear on non-linear/NaCl temperature correction only.

### 7.5.1 Modifying a Conductivity Method

A method for conductivity can be edited when Access Control is off, or when a valid password is entered.

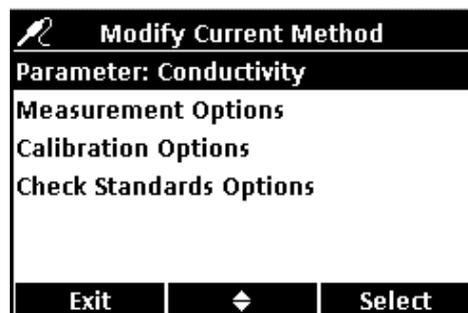


- From the **Conductivity Parameter Methods** menu, use the **UP** and **DOWN** keys to highlight **Modify Current Method**. Press the **GREEN/RIGHT** key under Select.

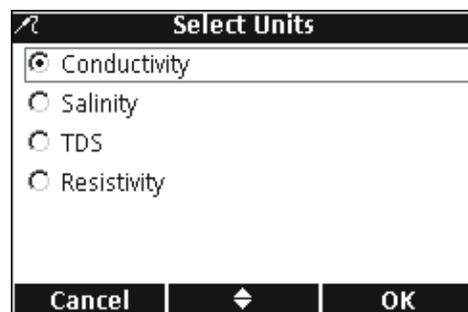
*Note:* The default method cannot be modified or deleted, but can be saved with a new name (Save Current Method As) and then modified.

### 7.5.2 Modifying the Conductivity Parameter

Change the parameter to measure Conductivity, TDS, Salinity, or Resistivity.



- With **Parameter** highlighted in the **Modify Current Method** menu, press the **GREEN/RIGHT** key under Select.



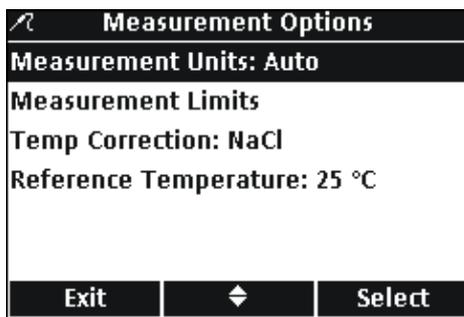
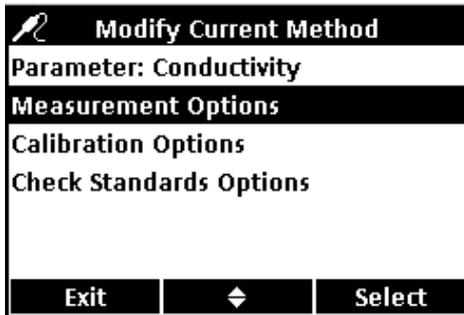
- Use the **UP** and **DOWN** keys to select the desired parameter. Press the **GREEN/RIGHT** key under OK.

### 7.5.3 Modifying the Conductivity Measurement Options

Use Measurement Options to change units for conductivity upper and lower measurement limits, or temperature correction for conductivity or resistivity.

1. Use the **UP** and **DOWN** keys to highlight **Measurement Options** in the Modify Current Method menu. Press the **GREEN/RIGHT** key under Select.

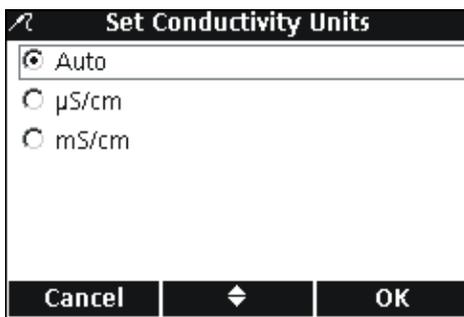
The available Measurement Options will vary depending on which parameter is selected.



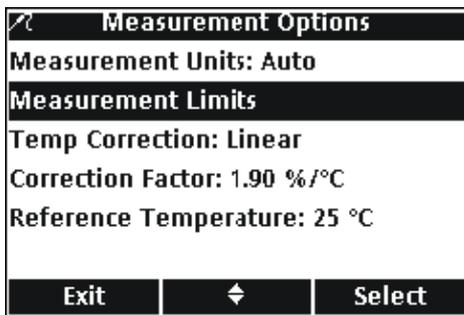
#### Changing Measurement Units

The units for conductivity can be fixed or “auto-scaling”. The units for Salinity can also be changed. To change the units for either parameter:

1. Use the **UP** and **DOWN** keys to highlight **Measurement Units**. Press the **GREEN/RIGHT** key under Select.



2. Use the **UP** and **DOWN** keys to select the desired units. Press the **GREEN/RIGHT** key under OK.

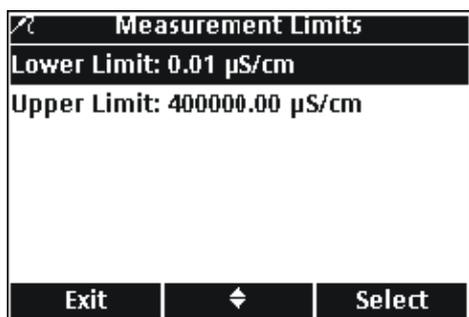


#### Changing Measurement Limits

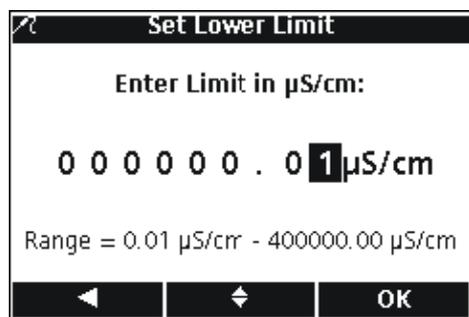
Upper and lower limits can be set for conductivity, salinity, TDS, and resistivity. To change limits:

1. Use the **UP** and **DOWN** keys to select **Measurement Limits**. Press the **GREEN/RIGHT** key under Select.

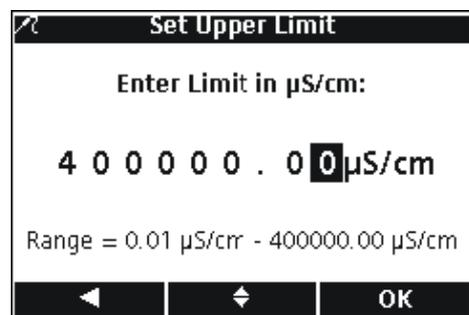
## Conductivity Operation and Methods



2. Use the **UP** and **DOWN** keys to select **Lower Limit** or **Upper Limit**. Press the **GREEN/RIGHT** key under **Select**.

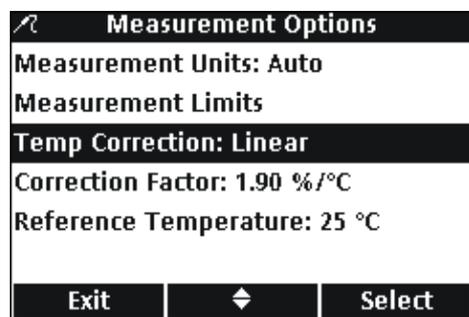


3. **Set Lower Limit:** Use the **UP** and **DOWN** keys to change the limit value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key until **OK** replaces the right arrow in the function bar. Select **OK** to complete the entry.



4. **Set Upper Limit:** Use the **UP** and **DOWN** keys to change the limit value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key until **OK** replaces the right arrow in the function bar. Select **OK** to complete the entry.

*Note: Upper and lower limits only use conductivity units.*

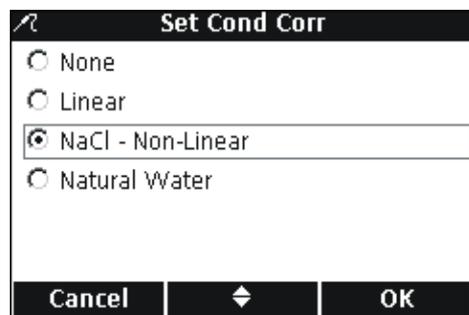


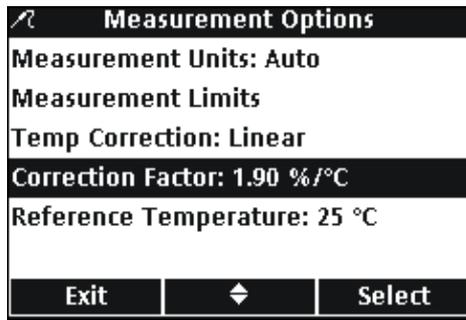
### Changing Temperature Correction

Temperature correction options are available for conductivity or resistivity.

To change the Temperature Correction Options:

1. Use the **UP** and **DOWN** keys to highlight **Temperature Correction**. Press the **GREEN/RIGHT** key under **Select**.
2. Use the **UP** and **DOWN** keys to select the temperature correction to be used. Press the **GREEN/RIGHT** key until **OK** replaces the right arrow in the function bar. Select **OK** to complete the entry.



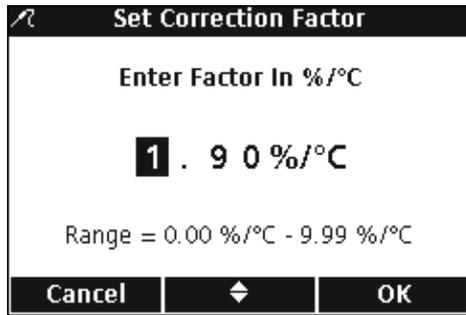


## Changing the Correction Factor

When the temperature correction is set to linear, the correction factor can be changed.

To change the Correction Factor:

1. Use the **UP** and **DOWN** keys to highlight **Correction Factor**. Press the **GREEN/RIGHT** key under Select.
2. Use the **UP** and **DOWN** keys to change the correction factor. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

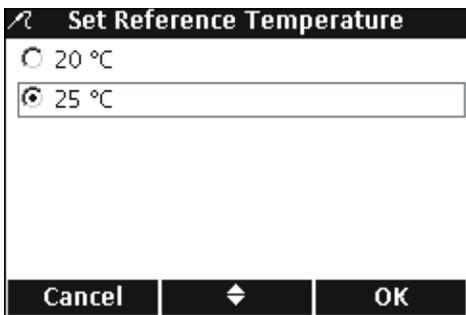
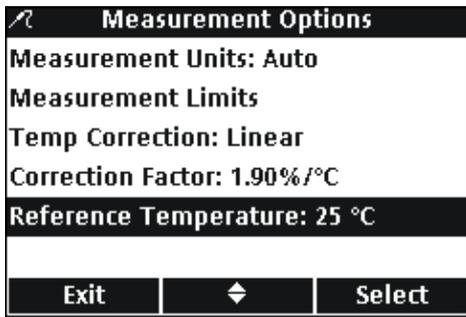


## Changing the Reference Temperature

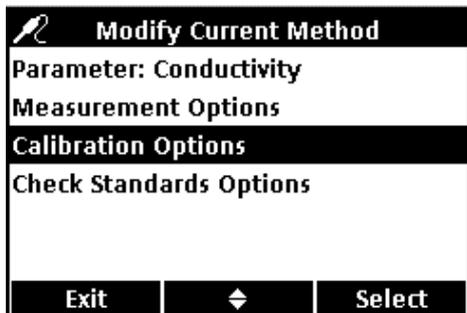
The reference temperature can be changed when the temperature correction is set to linear or NaCl/non-linear.

To change the Reference Temperature:

1. Use the **UP** and **DOWN** keys to highlight **Reference Temperature**. Press the **GREEN/RIGHT** key under Select.
2. Use the **UP** and **DOWN** keys to select the reference temperature to be used. Press the **GREEN/RIGHT** key until OK replaces the right arrow in the function bar. Select **OK** to complete the entry.

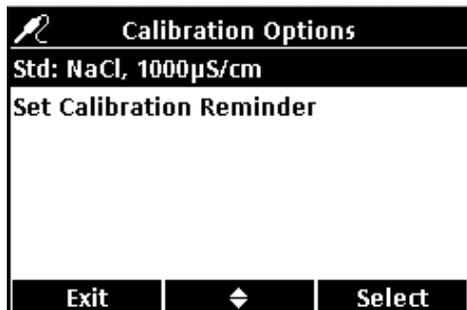


## 7.5.4 Modifying the Conductivity Calibration Options



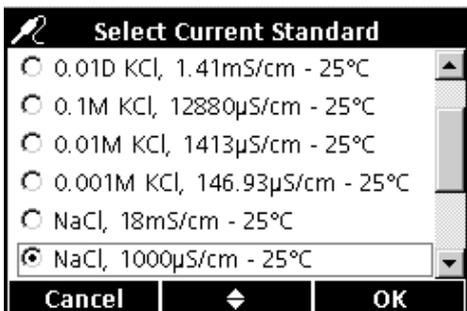
Calibration Options changes the specified conductivity standard for calibration and calibration reminders.

1. Use the **UP** and **DOWN** keys to highlight **Calibration Options**. Press the **GREEN/RIGHT** key under Select.

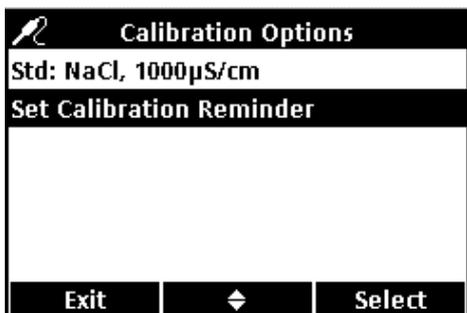


### Changing the Conductivity Standard

1. Use the **UP** and **DOWN** keys to highlight **Std**. Press the **GREEN/RIGHT** key under Select.

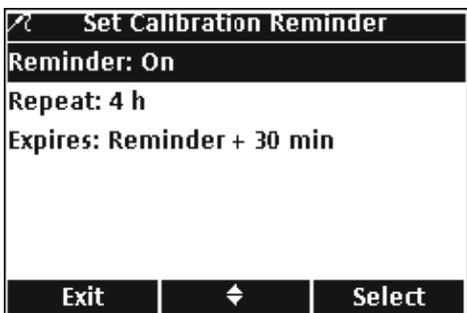


2. Use the **UP** and **DOWN** keys to select the calibration standard solution to be used. Press the **GREEN/RIGHT** key under OK.



### Editing the Calibration Reminder

1. Use the **UP** and **DOWN** keys to highlight **Set Calibration Reminder**. Press the **GREEN/RIGHT** key under Select.



2. To turn Reminder On or Off, use the **UP** and **DOWN** keys to highlight **Reminder**. Press the **GREEN/RIGHT** key under Select.

**Set Calibration Reminder**

On  
 Off

Cancel    ◆    OK

3. Use the **UP** and **DOWN** keys to select **On** or **Off**. Press the **GREEN/RIGHT** key under OK.

**Set Calibration Reminder**

Reminder: On  
Repeat: 4 h  
Expires: Reminder + 30 min

Exit    ◆    Select

4. To set the Calibration Reminder frequency, use the **UP** and **DOWN** keys to highlight **Repeat**. Press the **GREEN/RIGHT** key under Select.

**Set Calibration Repeat**

2 h  
 4 h  
 8 h  
 2 d  
 5 d  
 7 d

Cancel    ◆    OK

5. Use the **UP** and **DOWN** keys to select the desired reminder frequency. Press the **GREEN/RIGHT** key under OK.

**Set Calibration Reminder**

Reminder: On  
Repeat: 4 h  
Expires: Reminder + 30 min

Exit    ◆    Select

6. To edit when the Calibration Reminder expires, use the **UP** and **DOWN** keys to highlight **Expires**. Press the **GREEN/RIGHT** key under Select.

**Calibration Expiration**

Immediately  
 Reminder + 30 min  
 Reminder + 1 h  
 Reminder + 2 h  
 Continue Reading

Cancel    ◆    OK

7. Use the **UP** and **DOWN** keys to select how long after the reminder the calibration will expire. Press the **GREEN/RIGHT** key under OK.

Calibration Options		
Std: Custom		
Set Calibration Reminder		
Standard Value: 1000 $\mu\text{S}/\text{cm}$		
Reference Temperature: 25 $^{\circ}\text{C}$		
Temp Correction: 1.90 $\%/^{\circ}\text{C}$		
Exit	↕	Select

Set Custom Standard		
Enter Standard Value:		
0 0 1 0 0 0 $\mu\text{S}/\text{cm}$		
Range = 000001 $\mu\text{S}/\text{cm}$ - 199999 $\mu\text{S}/\text{cm}$		
←	↕	OK

Calibration Options		
Std: Custom		
Set Calibration Reminder		
Standard Value: 1000 $\mu\text{S}/\text{cm}$		
Reference Temperature: 25 $^{\circ}\text{C}$		
Temp Correction: 1.90 $\%/^{\circ}\text{C}$		
Exit	↕	Select

Set Standard Temperature		
Enter Standard Value in $^{\circ}\text{C}$		
2 5 $^{\circ}\text{C}$		
Range = 00 $^{\circ}\text{C}$ - 99 $^{\circ}\text{C}$		
Cancel	↕	▶

Calibration Options		
Std: Custom		
Set Calibration Reminder		
Standard Value: 1000 $\mu\text{S}/\text{cm}$		
Reference Temperature: 25 $^{\circ}\text{C}$		
Temp Correction: 1.90 $\%/^{\circ}\text{C}$		
Exit	↕	Select

### Editing the Custom Calibration Standard

When **Custom** is selected for the conductivity calibration standard, the concentration, reference temperature, and temperature correction can be set for the calibration standard.

#### STANDARD VALUE

To enter the conductivity Standard Value of the custom calibration solution:

1. Use the **UP** and **DOWN** keys to highlight **Standard Value**. Press the **GREEN/RIGHT** key under Select.
2. Use the **UP** and **DOWN** keys to change the value of conductivity standard for calibration. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

#### REFERENCE TEMPERATURE

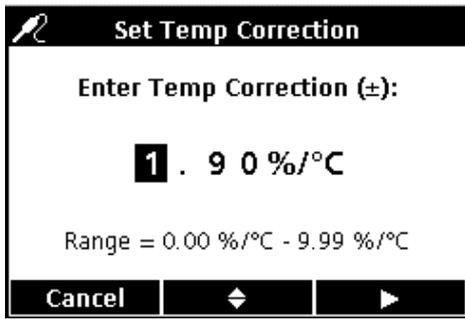
To enter the Reference Temperature for the custom calibration standard:

1. Use the **UP** and **DOWN** keys to highlight **Reference Temperature**. Press the **GREEN/RIGHT** key under Select.
2. Use the **UP** and **DOWN** keys to change the Reference Temperature for calibration. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

#### TEMPERATURE CORRECTION

To enter the Temperature Correction to be used with the custom calibration standard:

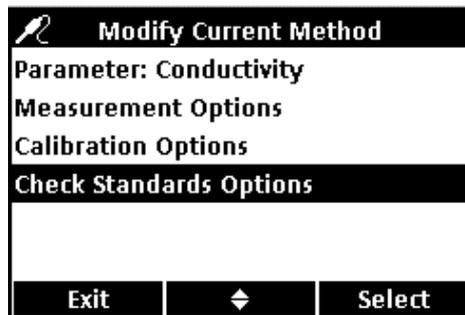
1. Use the **UP** and **DOWN** keys to highlight **Temp Correction** ( $\%/^{\circ}\text{C}$ ). Press the **GREEN/RIGHT** key under Select.



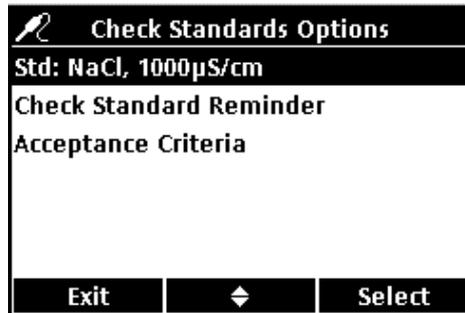
2. Use the **UP** and **DOWN** keys to change the Correction Factor. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

### 7.5.5 Modifying Conductivity Check Standard Options

Check Standard Options changes the standard solution used for the check standard, the reminder, and the acceptance criteria.

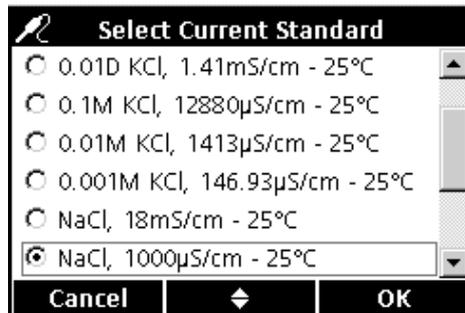


To edit the Check Standard Options, use the **UP** and **DOWN** keys to highlight **Check Standards Options**. Press the **GREEN/RIGHT** key under Select. The Check Standard menu appears with the following sections.



#### Editing the Check Standard Value

1. To edit the Check Standard value, use the **UP** and **DOWN** keys to highlight **Std:**. Press the **GREEN/RIGHT** key under Select.



2. Use the **UP** and **DOWN** keys to select the Check Standard Value to be used. Press the **GREEN/RIGHT** key under OK.

**Check Standards Options**  
Std: NaCl, 1000µS/cm  
**Check Standard Reminder**  
Acceptance Criteria  
Exit ◊ Select

**Check Standard Reminder**  
Reminder: On  
Repeat: 2 h  
Allow Defer: Yes  
Exit ◊ Select

**Set Check Std Reminder**  
 On  
 Off  
Cancel ◊ OK

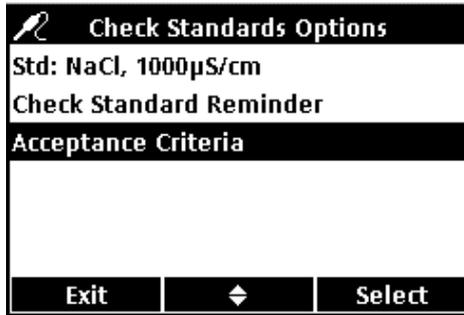
**Check Standard Repeat**  
 30 min  
 2 h  
 4 h  
 8 h  
 12 h  
 24 h  
Cancel ◊ OK

**Allow Defer**  
 Yes  
 No  
Cancel ◊ OK

### Editing the Check Standard Reminder

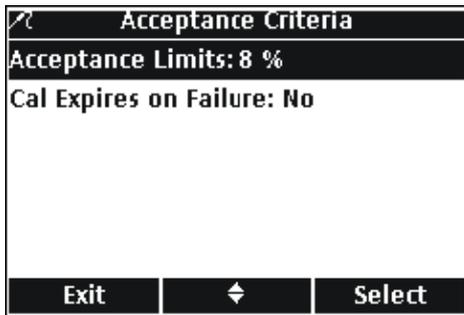
Refer to the following steps to turn the Check Standard Reminder on or off, to set the Check Standard repeat, and to defer the Check Standard.

1. Use the **UP** and **DOWN** keys to highlight **Check Standard Reminder**. Press the **GREEN/RIGHT** key under **Select**.
2. To turn Check Standard Reminder on or off, use the **UP** and **DOWN** keys to highlight **Reminder**. Press the **GREEN/RIGHT** key under **Select**.
3. Use the **UP** and **DOWN** keys to select **On** or **Off**. Press the **GREEN/RIGHT** key under **OK**.
4. To set the Check Standard Reminder repeat, use the **UP** and **DOWN** keys to highlight **Repeat**. Press the **GREEN/RIGHT** key under **Select**.
5. Use the **UP** and **DOWN** keys to select the desired reminder frequency. Press the **GREEN/RIGHT** key under **OK**.
6. To edit the Allow Defer option, use the **UP** and **DOWN** keys to highlight **Allow Defer**. Press the **GREEN/RIGHT** key under **Select**. The defer option allows the operator to continue with sample measurements instead of measuring a check standard when the reminder appears.
7. Use the **UP** and **DOWN** keys to select **Yes** or **No**. Press the **GREEN/RIGHT** key under **OK**.

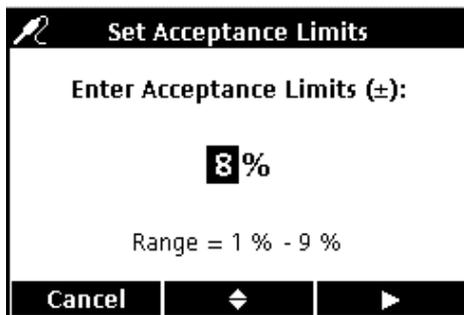


**Editing the Acceptance Criteria for Check Standards**

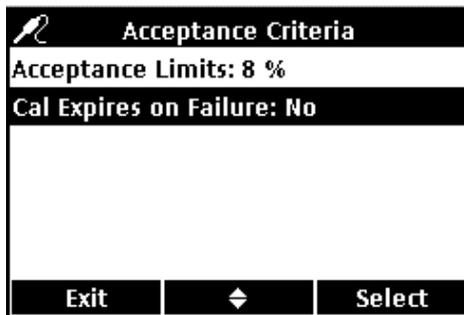
1. Use the **UP** and **DOWN** keys to highlight **Acceptance Criteria**. Press the **GREEN/RIGHT** key under Select.



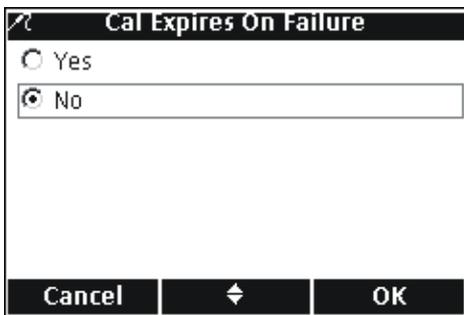
2. To edit Acceptance Limits, use the **UP** and **DOWN** keys to highlight **Acceptance Limits**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to enter a percent range that the Check Standard must fall within. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.



4. To edit the result of a failed Check Standard, use the **UP** and **DOWN** keys to highlight **Cal Expires on Failure**. Press the **GREEN/RIGHT** key under Select.



5. Use the **UP** and **DOWN** keys to select **Yes** or **No**. Press the **GREEN/RIGHT** key under OK.

When set to Yes, the meter must be re-calibrated when a Check Standard falls outside of the specified acceptance limits. If the meter is not re-calibrated, each result will be displayed with the **CALIBRATION ?** icon and stored with a flag indicating a questionable calibration.

When set to No, the meter will operate normally in the measurement mode.



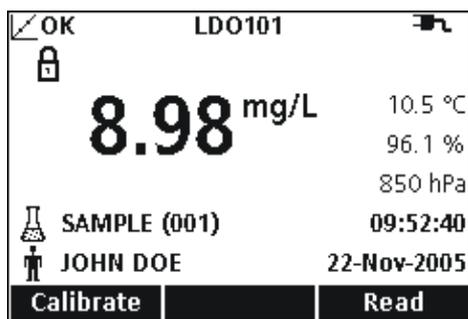
# Section 8 LDO Operation and Methods

## 8.1 Taking a Dissolved Oxygen Measurement

If complete traceability is required, enter a Sample ID and Operator ID before measuring.

**Note:** The default setting for Measurement Mode is "Press to Read". To change the mode, see Measurement Mode in [section 9.5 on page 94](#).

**Important Note:** A count down message appears on the screen thirty days before the sensor-cap expiration date of the LDO IntelliCAL probe. This message will be displayed until there are zero days remaining and the sensor cap must be replaced. All measurements taken after the sensor cap expiration date appear with the calibration ? icon at the top left corner of the screen.



1. Place the LDO probe into the sample.
2. Press the **GREEN/RIGHT** key under Read.
3. The display will show "Stabilizing..." and a progress bar will fill from 0 to 100% as the probe stabilizes in the sample. When the result has stabilized, the lock icon will appear and the result will be stored automatically in the data log.
4. To make another measurement, repeat this procedure.

The display will also show the temperature and pressure. If a salinity correction was entered, the correction will appear on the display.

## 8.2 Calibrating the LDO Probe

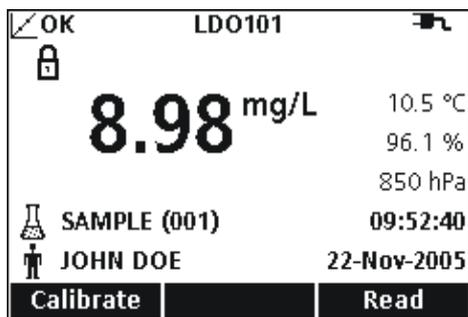
**Important Note:** Factory calibration is the default setting. Factory calibration coefficients are stored in the LDO IntelliCAL probe iButton®\*. Each lot of LDO sensor caps is factory calibrated. Performance will vary slightly as a function of usage history. For best performance, a one-time calibration initialization can be performed when a new sensor is installed. Additional calibrations can be performed at the operator's discretion but are not required. Manually calibrating the LDO probe will require creating and modifying a new method (see [section 8.4 on page 82](#)).

LDO calibration can be performed manually using one of two standards:

- Water-saturated air (recommended). For example, use a bottle with a narrow neck such as a BOD bottle (Cat. No. 621-00). Add a small amount (1-cm) of water to the bottle, stopper and shake vigorously for several minutes, then insert the probe.
- A water sample with a known dissolved oxygen concentration. The concentration must be determined by Winkler titration, or by calculation of a saturated-air water sample using existing pressure, temperature, and salinity conditions.

**Note:** Modify the LDO Method to use a water sample as a standard.

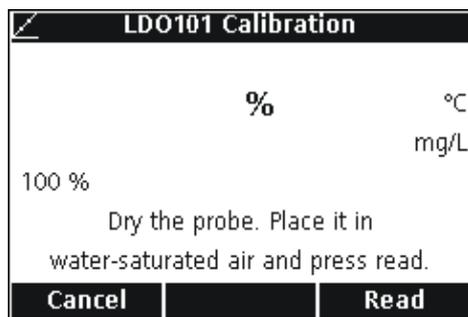
\* iButton is a registered trademark of Maxim Integrated Products, Inc.



To calibrate using water-saturated air:

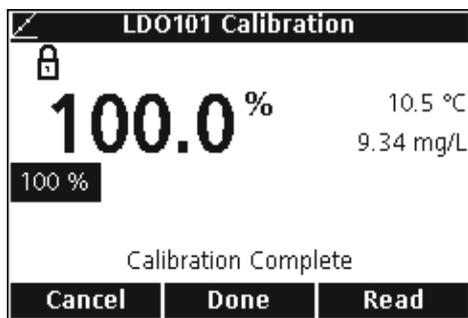
1. Press the **BLUE/LEFT** key under Calibrate.

*Note: If using the HQ40d meter with two probes, the display must be in single screen mode.*

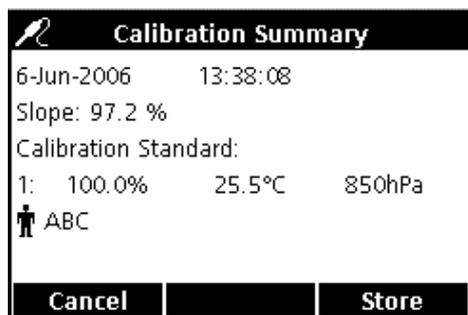


2. Dry the probe and place it in the calibration chamber.
3. Press the **GREEN/RIGHT** key under Read.

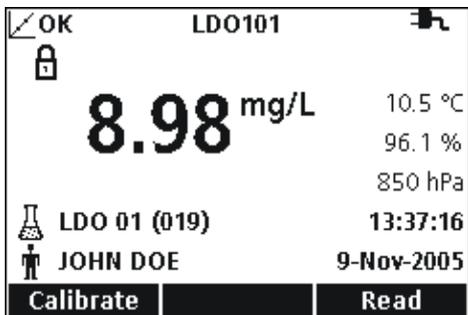
*Note: Be sure that no water is on the probe after placing it in the calibration chamber.*



4. When the reading is stable the standard value will be highlighted on the screen and the calibrated reading value will appear on the screen. Press the **UP** key under Done.

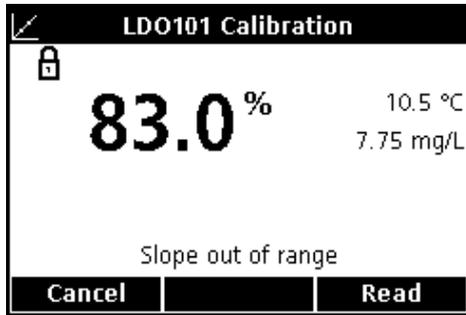


5. The Calibration Summary will appear. Press the **GREEN/RIGHT** key under Store to accept the calibration and return to the measurement mode. The calibration is recorded in the data log. If using the HQ40d meter, the calibration information is also sent to a PC/printer/flash memory stick if connected.



6. When the calibration is successful, the display will show OK in the upper left corner. A question mark will be displayed if the calibration has expired or if a check standard has failed or been delayed.

### 8.2.1 Calibration Error- Slope Out of Range



If the calibration slope does not meet the acceptance criteria, the display will show “Slope out of range”. If this happens, allow the probe to stand in the water-saturated air for several minutes to reach equilibrium and re-press the **GREEN/RIGHT** key under Read.

### 8.3 Setting LDO Methods



The LDO Method menu is available via the **METER OPTIONS/PARAMETER METHODS** key when Access Control is off, or when a valid password is entered. An LDO IntelliCAL probe must be connected to the meter to change these options.

[Table 5](#) outlines the software menu for LDO options. These options do not need to be changed if the default method is used. The Modify Current Method submenus and default settings are described in detail in [section 8.4 on page 82](#).

The HQ series meters contain a default method for LDO with settings for measurement, calibration, and units. The default settings cannot be changed. The default method must be saved and then modified. Use the **Save Current Method As** function to save the method as a new method that can be modified.

To enter options that are different from the default settings, a new method must be entered and then modified.

**Table 5 LDO Options Main Menu Summary**

LDO MAIN MENU	LDO SUBMENU
Current Method	Set Current Method
Save Current Method As	New Method Name
Modify Current Method	Measurement Options
	Select Units
	Calibration Standard
Delete a Method	Delete a Method

### 8.4 Modify Current Method Menu Summary

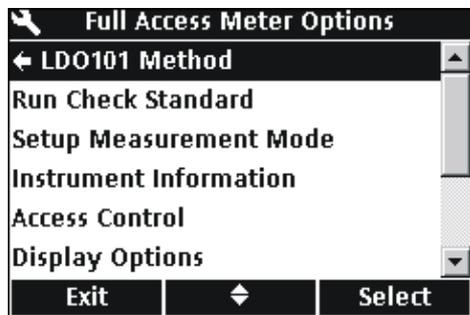
LDO METHOD OPTION	AVAILABLE SELECTIONS	DEFAULT SETTING
<b>Measurement Options</b>		
Resolution	0.1 Fast 0.01 Fast 0.01 Medium 0.01 Slow	0.01 Medium
Measurement Limits	Lower Limit: 0–20 mg/L Upper Limit: 0–20 mg/L	Lower: 0 mg/L Upper: 20 mg/L
Salinity Correction	0–70	0
Pressure Units	hPa mBar inHg mmHg	hPa
Averaging Interval	Off 30 s 60 s 90 s 3 min 5 min	Off
<b>Units</b>	mg/L %	mg/L
<b>Calibration<sup>1</sup></b>	User Factory	Factory
<b>Calibration Standard<sup>1</sup></b>	100% mg/L	100%
<b>Set Standard Value<sup>1</sup></b>	Enter Value	User-defined value

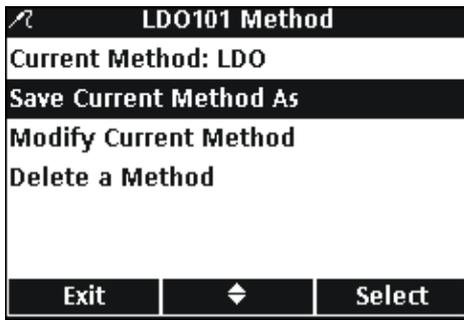
<sup>1</sup> For User Calibration Only

#### 8.4.1 Entering a New LDO Method

A new method for LDO can be entered when Access Control is off, or when a valid password is entered.

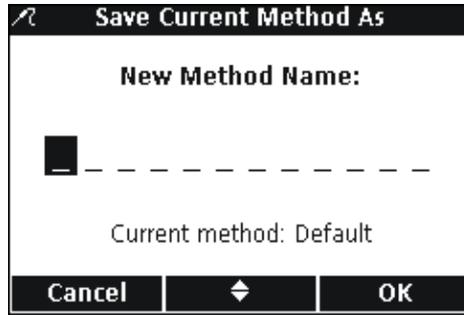
1. Press the **OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **LDO101 Method**. Press the **GREEN/RIGHT** key under Select.





- Use the **UP** and **DOWN** keys to highlight **Save Current Method As**. Press the **GREEN/RIGHT** key under Select.

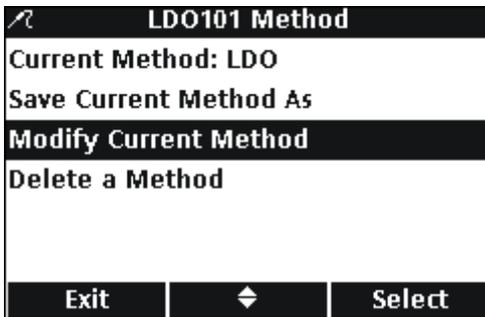
*Note: Modify Current Method and Delete a Method are not available until a new method is created.*



- Use the **UP** and **DOWN** keys to scroll through the letters and numbers. To select a letter or number, press the **GREEN/RIGHT** key. The cursor will advance to the next space.
- Repeat the previous step to add additional letters or numbers until the name is complete. To add a space, scroll to the blank space (between A and 9) using the **UP** and **DOWN** keys and press the **GREEN/RIGHT** key. To delete a letter or number, press the **BLUE/LEFT** key.
- Press the **GREEN/RIGHT** key until OK replaces the Right arrow in the function bar. Select **OK** to complete the entry.

### 8.4.2 Modifying an LDO Method

A method for LDO can be edited when Access Control is off, or when a valid password is entered.

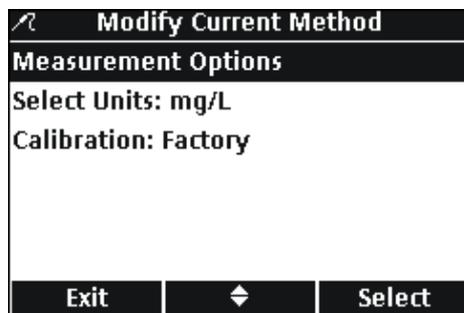


- From the LDO Method menu, use the **UP** and **DOWN** keys to highlight **Modify Current Method**. Press the **GREEN/RIGHT** key under Select.

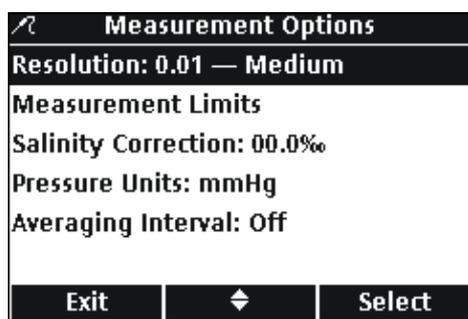
*Note: The default method cannot be modified or deleted, but can be saved with a new name (Save Current Method As) and then modified.*

### 8.4.3 Modifying LDO Measurement Options

Edit Measurement Options to change the displayed resolution, upper and lower limits, salinity correction, pressure units, or averaging interval.

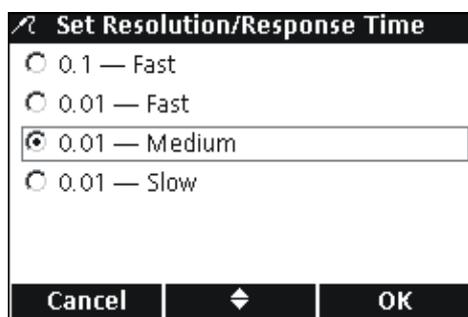


- With **Measurement Options** highlighted in the Modify Current Method menu, press the **GREEN/RIGHT** key under Select.

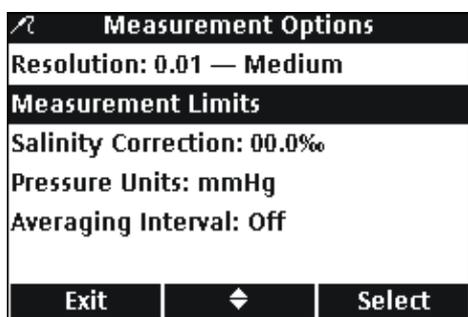


## Changing Resolution

1. With **Resolution** highlighted, press the **GREEN/RIGHT** key under Select.

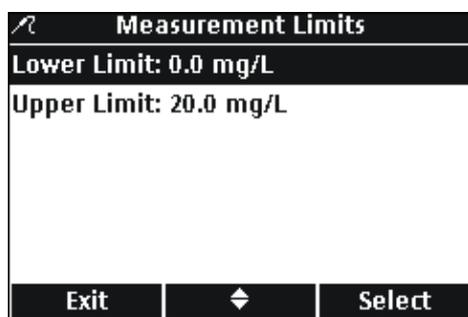


2. Use the **UP** and **DOWN** keys to select the desired resolution and speed of response. Press the **GREEN/RIGHT** key under OK.

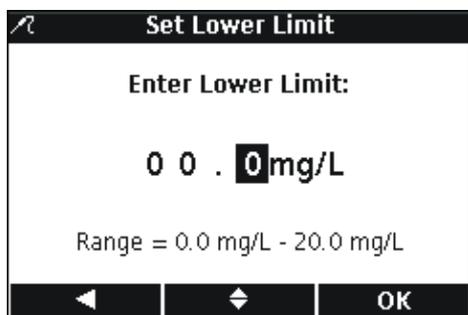


## Changing Measurement Limits

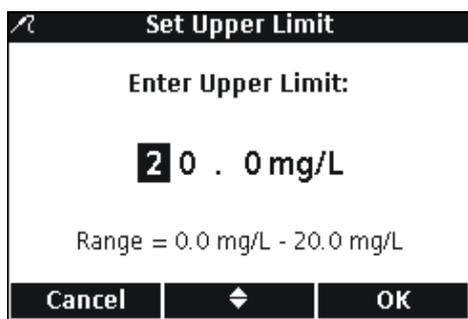
1. Use the **UP** and **DOWN** keys to select **Measurement Limits**. Press the **GREEN/RIGHT** key under Select.



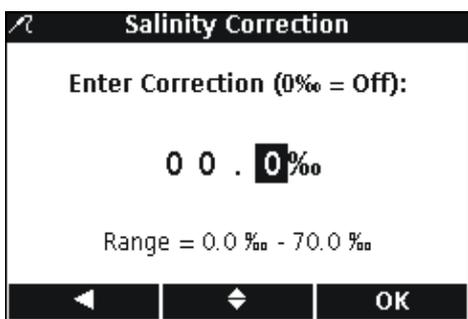
2. Use the **UP** and **DOWN** keys to select **Lower Limit** or **Upper Limit**. Press the **GREEN/RIGHT** key under Select.



3. **Lower Limit:** Use the **UP** and **DOWN** keys to change the limit value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.



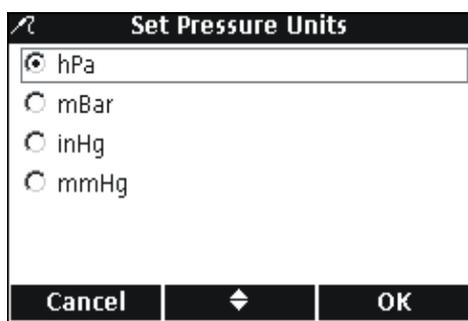
4. **Upper Limit:** Use the **UP** and **DOWN** keys to change the limit value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.



#### Changing Salinity Correction

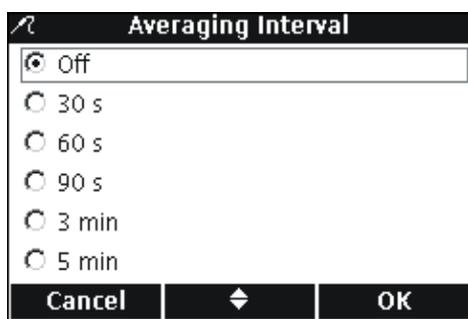
Correct dissolved oxygen values for high concentrations of dissolved salts by entering the sample salinity. Use a conductivity probe to measure the salinity.

1. Use the **UP** and **DOWN** keys to enter the sample salinity/salinity correction factor. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.



#### Changing Pressure Units

1. Use the **UP** and **DOWN** keys to select the desired pressure units. Press the **GREEN/RIGHT** key under OK.



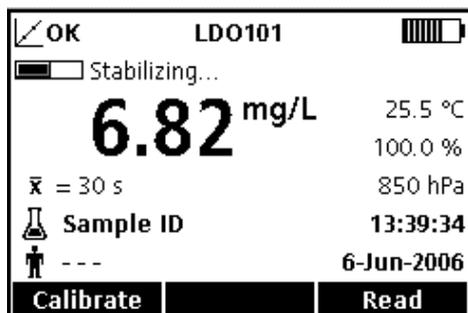
#### Changing the Averaging Interval

In samples containing a high amount of air bubbles such as aeration basins, results will appear unstable or noisy. Use the averaging function to improve stability.

To select the interval for averaging results:

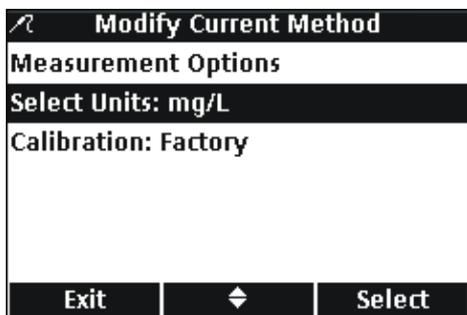
1. Use the **UP** and **DOWN** keys to select the desired Averaging Interval. Press the **GREEN/RIGHT** key under OK.

Displayed results will be averaged over the selected interval.



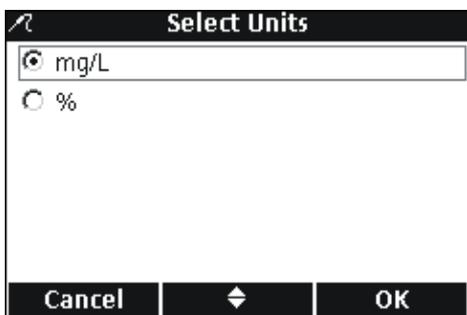
2. Whenever the average function is enabled, the averaging icon ( $\bar{x}$ ) will be displayed along with the averaging interval.

### 8.4.4 Modifying the LDO Measurement Units



The meter will display both mg/L DO and % saturation in the measurement mode. To change which unit is prominent:

1. Use the **UP** and **DOWN** keys to highlight **Select Units**. Press the **GREEN/RIGHT** key under Select.
2. Use the **UP** and **DOWN** keys to select the units. Press the **GREEN/RIGHT** key under OK.

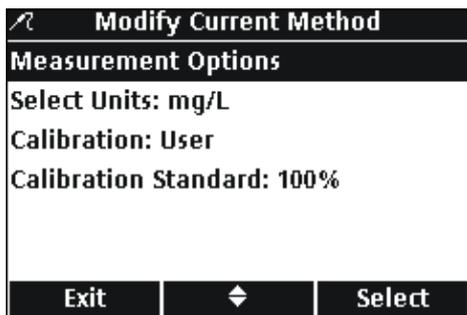


### 8.4.5 Modifying the LDO Calibration Standard

**Important Note:** Factory calibration is the default setting. Factory calibration coefficients are stored in the iButton.

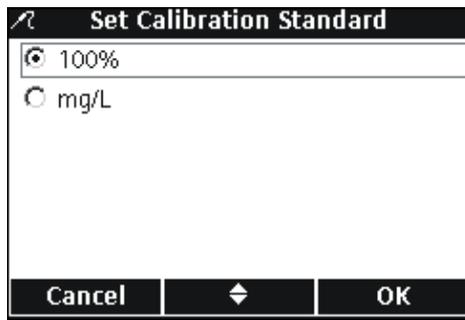
Each lot of LDO sensor caps is factory calibrated. Performance will vary slightly as a function of usage history. For best performance, a one-time calibration initialization can be performed when a new sensor is installed. Additional calibrations can be performed at the operator's discretion but are not required. See [section 8.2 on page 79](#) for calibration instructions.

#### 8.4.5.1 Selecting Water-Saturated Air as the Calibration Standard



To use water-saturated air as the calibration standard:

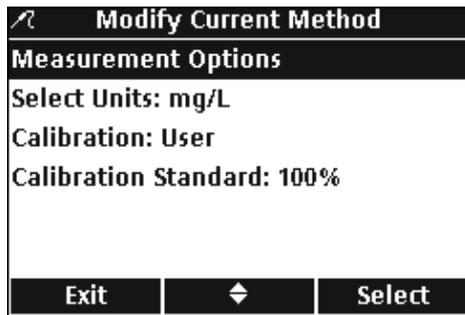
1. Use the **UP** and **DOWN** keys to highlight **Calibration Standard** in the Modify Current Method menu. Press the **GREEN/RIGHT** key under Select.



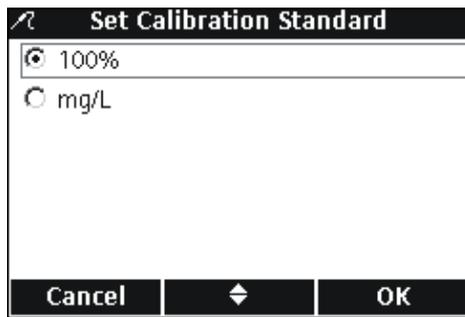
2. Use the **UP** and **DOWN** keys to select **100%**. Press the **GREEN/RIGHT** key under **OK**.

#### 8.4.5.2 Selecting a Water Sample as the Calibration Standard

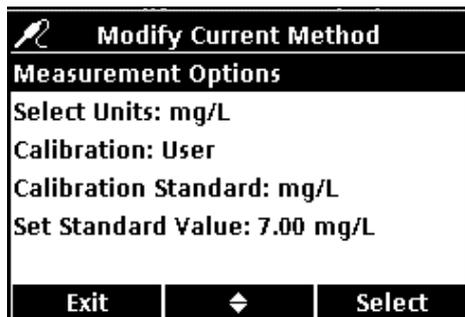
Water-saturated air is recommended for calibration of the HQ series meters, however a water sample with a known dissolved oxygen concentration can also be used. The dissolved oxygen concentration must be determined by Winkler titration, or by calculation of a saturated-air water sample using existing pressure, temperature, and salinity conditions.



1. Use the **UP** and **DOWN** keys to highlight **Calibration Standard** in the Modify Current Method menu. Press the **GREEN/RIGHT** key under **Select**.

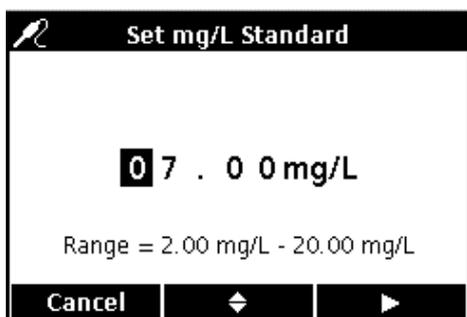


2. Use the **UP** and **DOWN** keys to select **mg/L**. Press the **GREEN/RIGHT** key under **OK**.



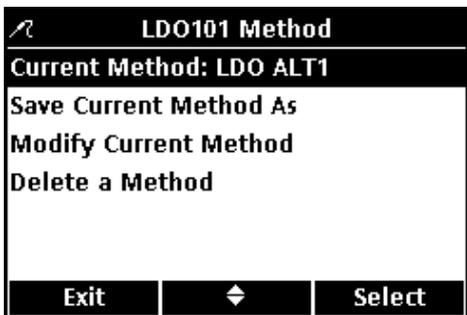
When using a water sample as the calibration standard, a default value of 7.00 mg/L is used. Change the standard value to the exact concentration determined for the sample as follows:

3. Use the **UP** and **DOWN** keys to select **Set Standard Value**. Press the **GREEN/RIGHT** key under **Select**.



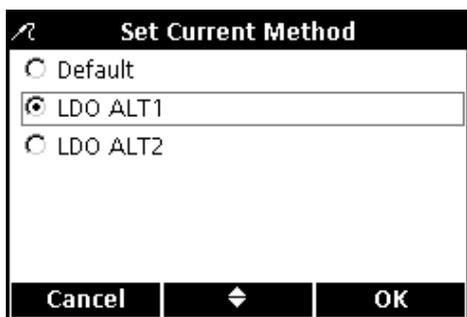
4. Use the **UP** and **DOWN** keys to change the standard value. Use the **BLUE/LEFT** key to move to the left. Use the **GREEN/RIGHT** key to move to the right. When the cursor is at the far right, press the **GREEN/RIGHT** key under OK.

### 8.4.6 Selecting a LDO Method



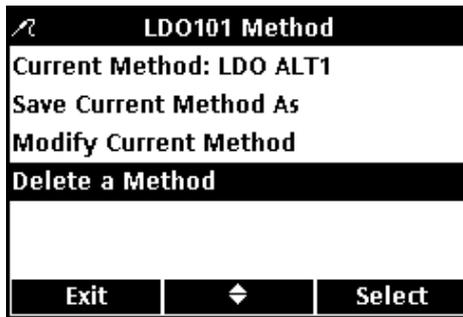
Select which method to use when additional methods have been entered in the LDO Options menu.

1. Use the **UP** and **DOWN** keys to highlight **Current Method**. Press the **GREEN/RIGHT** key under Select.



2. Use the **UP** and **DOWN** keys to select the desired method. Press the **GREEN/RIGHT** key under OK.

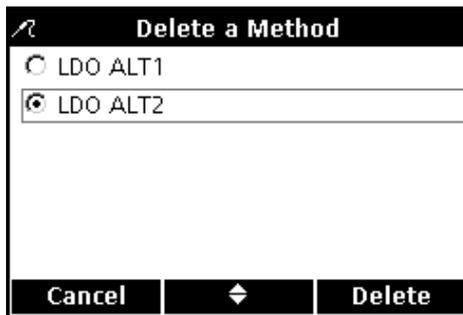
## 8.4.7 Deleting a Method



A screenshot of a terminal window titled "LDO101 Method". The menu options are: "Current Method: LDO ALT1", "Save Current Method As", "Modify Current Method", and "Delete a Method". The "Delete a Method" option is highlighted. At the bottom, there are three buttons: "Exit", a diamond-shaped cursor key, and "Select".

To delete an existing LDO method:

1. Use the **UP** and **DOWN** keys to highlight **Delete a Method**. Press the **GREEN/RIGHT** key under Select.
2. Use the **UP** and **DOWN** keys to select the desired method. Press the **GREEN/RIGHT** key under Delete. Once a method has been deleted, it cannot be recovered.



A screenshot of a terminal window titled "Delete a Method". It shows a list of methods: "LDO ALT1" and "LDO ALT2". The "LDO ALT2" option is selected with a radio button. At the bottom, there are three buttons: "Cancel", a diamond-shaped cursor key, and "Delete".



## Section 9 Advanced Operations



The various meter features that can be changed via the **OPTIONS** key is displayed in [section 9.1](#) and [section 9.2](#). The Parameter Method menu selection is a dynamic selection screen that can change depending on how many probes are attached to the meter. The Full Access Meter Options menu is displayed when Access Control is off, or when a valid password is entered. These options do not need to be changed if the default factory settings are used.

### 9.1 Meter Options Menu- Full Access

FULL ACCESS METER OPTIONS (Access Control Off or valid password entered)	
<b>RUN CHECK STANDARD</b>	Measure standard solution (available for pH and conductivity)
<b>SETUP MEASUREMENT MODE</b>	Press To Read
	Interval: Duration and Interval
	Continuous
<b>INSTRUMENT INFORMATION</b>	Probe Information
	Meter Information
<b>ACCESS CONTROL</b>	On or Off
	Set Access Password
<b>DISPLAY OPTIONS</b>	Contrast
	Auto-Shutoff
	Backlight
<b>SOUND</b>	Key Press
	Stability Alert
	Calibration Reminder
<b>TIME</b>	Set Time
	Time Format
	Set Date
	Date Format
<b>TEMPERATURE UNITS</b>	Set Temperature Units
<b>LANGUAGE</b>	Select Language

### 9.2 Operator Meter Options Menu

OPERATOR METER OPTIONS (Access Control On)	
<b>RUN CHECK STANDARD</b>	Measure standard solution (available for pH or conductivity)
<b>INSTRUMENT INFORMATION</b>	Probe Information
	Instrument Information
<b>ACCESS PASSWORD</b>	Enter Password
<b>DISPLAY OPTIONS</b>	Contrast
	Auto-Shutoff
	Backlight
<b>SOUND</b>	Key Press
	Stability Alert
	Calibration Reminder

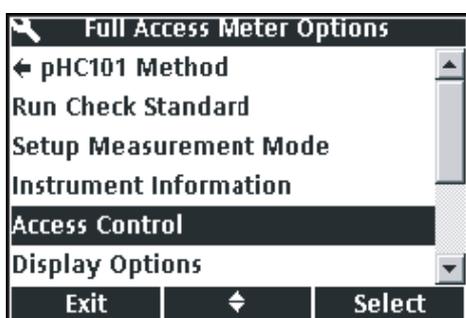
## 9.3 Using Access Control

Access Control is used to protect parameter methods and meter setup. When Access Control is on, options for Setup Measurement Mode, Access Control, Time, Temperature Units, and Language will be disabled in the Setup menu.

The Access Control option is available in the Meter Options>Full Access menu, which is available upon initial startup when Access Control is set to OFF, or when Access Control is set to ON and a valid password is entered.

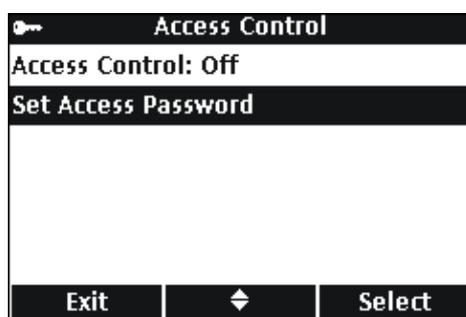
**Important Note:** Set the password before turning Access Control on. If a password is specified and Access Control is set to ON, make sure the password is stored in a safe place. If the password is forgotten, the operator will be locked out of the meter.

### 9.3.1 Turning Access Control On



To protect parameter methods and meter setup:

1. Press the **METER OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Access Control**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to highlight **Set Access Password**. Press the **GREEN/RIGHT** key under Select.



4. Use the **UP** and **DOWN** keys to scroll through the letters and numbers. To accept a letter or number, press the **GREEN/RIGHT** key. The cursor will advance to the next space.
5. Repeat the previous step to add additional letters or numbers until the password is complete. To add a space, scroll to the blank space between A and 9 using the **UP** and **DOWN** keys and press the **GREEN/RIGHT** key. To replace a letter or number, press the **BLUE/LEFT** key and re-enter the letter or number.
6. Press the **GREEN/RIGHT** key until OK replaces the right arrow in the function bar. Select OK to complete the entry.



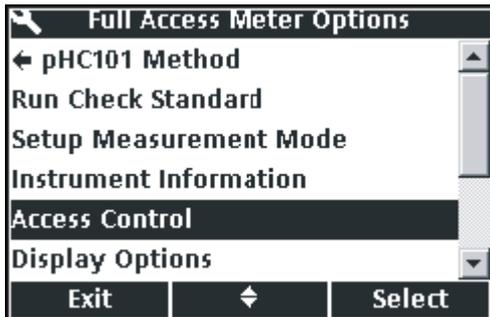
- Use the **UP** and **DOWN** keys to highlight **Access Control**. Press the **GREEN/RIGHT** key under **Select**.



- Use the **UP** and **DOWN** keys to select **ON**. Press the **GREEN/RIGHT** key under **Select**.

Access is now restricted. The Operator Meter Options menu will be displayed when the **OPTIONS** key is pressed.

### 9.3.2 Turning Access Control Off



To turn Access Control off:

- Press the **OPTIONS** key.
- Use the **UP** and **DOWN** keys to highlight **Access Control**. Press the **GREEN/RIGHT** key under **Select**. Select **Off** to turn Access Control off.

## 9.4 Running Check Standards

Run Check Standards verifies equipment accuracy by measuring a solution of known conductivity or pH. When the IntelliCAL probe is placed in the solution, the meter will indicate if the Check Standard passed or failed.

The meter can automatically display a reminder to measure a check standard at a specified interval with a specified acceptance criteria. These options are changed in the Parameter Method menu for each parameter.

## 9.5 Setting the Measurement Mode

Three measurement modes affect the way measurements are taken and data is stored:

### PRESS TO READ:

The **GREEN/RIGHT** key must be pressed for each sample measurement. Each result is stored in the Data Log automatically when the Set Stability Criteria are met. The result is also sent simultaneously to any device (PC/printer/flash memory stick) that is connected to the USB/DC power adaptor.

### INTERVAL:

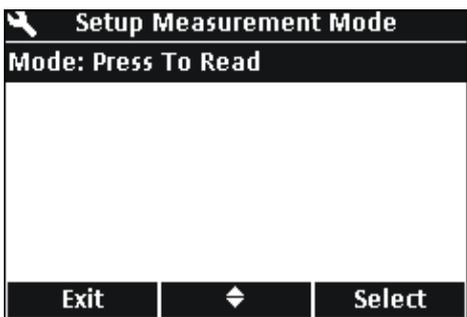
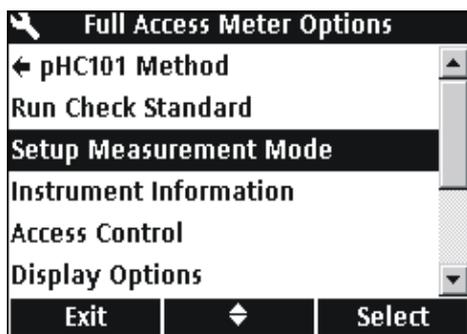
The meter measures the sample at a user defined interval for a user defined duration and stores the data in the Data Log automatically. The result is also sent simultaneously to any device (PC/printer/flash memory stick) that is connected to the USB/DC power adaptor.

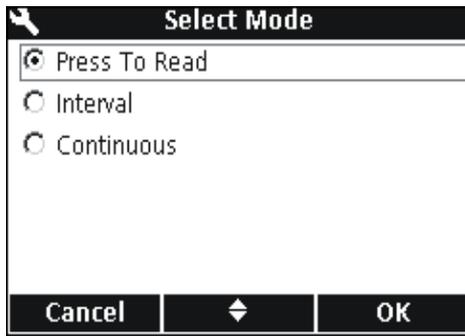
### CONTINUOUS:

The meter continuously measures the sample, and data can be stored manually in the Data Log. When stored, the data point is also sent simultaneously to any device (PC/printer/flash stick) that is connected to the USB/DC power adaptor.

To select a measurement mode:

1. Press the **OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Setup Measurement Mode**. Press the **GREEN/RIGHT** key under Select.
3. With **Mode** highlighted, press the **GREEN/RIGHT** key under Select.



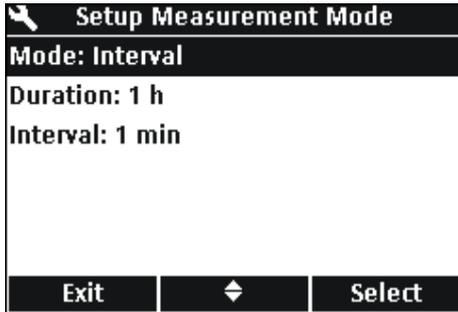


4. Use the **UP** and **DOWN** keys to select **Press to Read**, **Interval**, or **Continuous**. Press the **GREEN/RIGHT** key under OK.

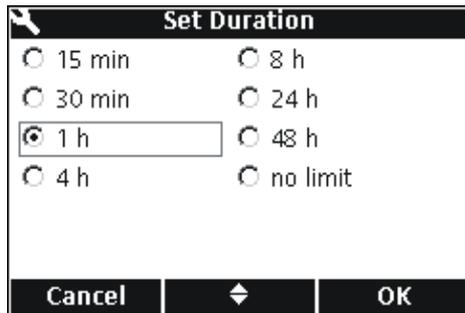
### 9.5.1 Setting Auto Measurement Intervals

When using the Interval Mode, it must be specified how often and for how long the measurements will be taken. Calibration Reminders, Auto Shut Off, and Check Standard Reminders do not interrupt interval measurements. However, a missed calibration will store readings as Cal? rather than as Cal OK. After interval measurements are completed, any missed reminders appear and Auto Shut Off is enabled.

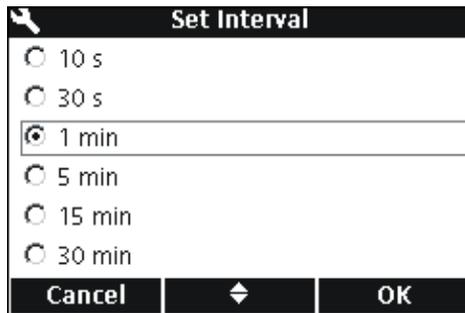
To specify the measurement interval and duration:



1. Select Interval as the Measurement Mode.
2. Use the **UP** and **DOWN** keys to select **Duration**. Press the **GREEN/RIGHT** key under Select to display the Set Duration screen.

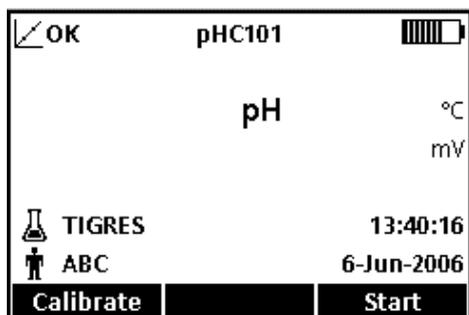


3. Use the **UP** and **DOWN** keys to select the duration or total time that measurements will be taken. Press the **GREEN/RIGHT** key under OK.



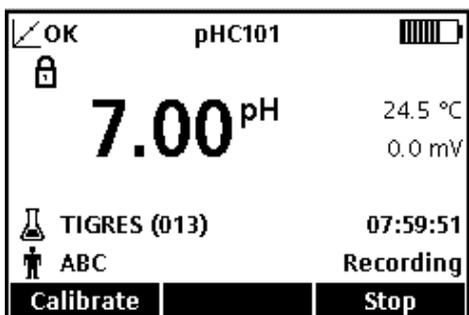
4. Use the **UP** and **DOWN** keys to select **Interval**. Press the **GREEN/RIGHT** key under Select to display the Set Interval screen.
5. Use the **UP** and **DOWN** keys to select how often measurements will be taken. Press the **GREEN/RIGHT** key under OK.

### 9.5.2 Starting Interval Measurements



From the Main Measurement screen, press the **GREEN/RIGHT** key under Start to begin interval measurements. The remaining duration for the measurement is displayed in the lower right corner of the screen. The Sample ID automatically advances by number for each reading.

The auto-shutoff feature is disabled during interval measurements. The meter goes into a standby state between readings to conserve power. Measurements are suspended when performing calibration, running check standards, or using the Meter Options menu. Measurements resume when returning to the reading mode.



Measurements stop when the selected interval duration has passed. The auto-shutoff feature becomes active. To repeat the interval measurement, press the **GREEN/RIGHT** key under Start.

### 9.5.3 Preventing Data Log Overflow in Interval Reading Mode

When measurements are taken at specified intervals, each result will be stored automatically in the Data Log. The meter can store up to 500 data records. If the number of accumulated results exceeds 500, data will be replaced on a first in first out basis (FIFO). Meters can be connected to a PC/printer/flash memory stick to prevent loss of data.

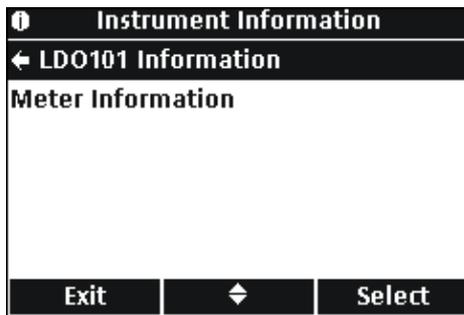
**Table 6 Suggested Combinations of Interval/Duration to Prevent Data Log Overflow**

Interval	Duration
10 seconds	1 hour
30 seconds	4 hours
1 minute	8 hours
5 minutes	24 hours

**Note:** Stop interval measurements before making any method or meter setup changes.

## 9.6 Viewing Instrument Information

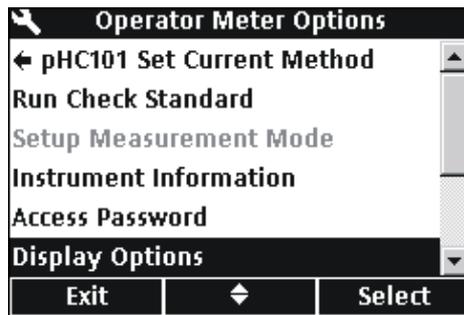
Use the Instrument Information menu to find the serial number, software version, and model number of the meter or IntelliCAL probes connected to the meter.



1. Press the **OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Instrument Information**. Press the **GREEN/RIGHT** key under Select.
3. Use the **UP** and **DOWN** keys to choose probe information or meter information. Press the **GREEN/RIGHT** key under Select.

## 9.7 Setting the Display Options

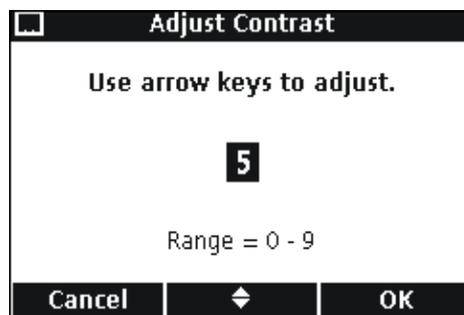
Use Display Options to change the display contrast, battery saving auto-shutoff options, and the backlight option.



1. Press the **METER OPTIONS** key. Use the **UP** and **DOWN** keys to highlight **Display Options**. Press the **GREEN/RIGHT** key under Select.

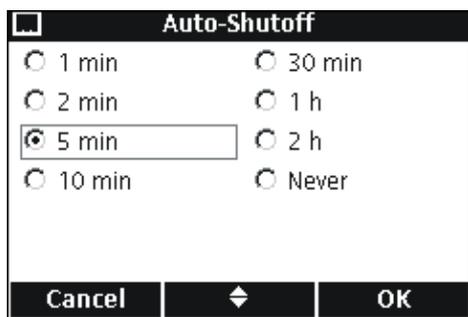


2. Use the **UP** and **DOWN** keys to choose **Contrast**, **Auto-Shutoff**, or **Backlight**. Press the **GREEN/RIGHT** key under Select.



### CONTRAST

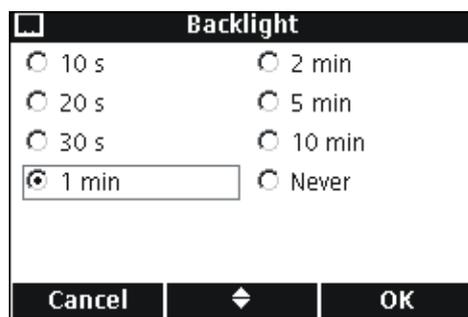
Use the **UP** and **DOWN** keys to adjust the contrast of the display. Zero is the lightest setting and 9 is the darkest setting. Press the **GREEN/RIGHT** key under OK to accept the setting.



### AUTO-SHUTOFF

Auto-shutoff maximizes battery life and is not active when the meter is connected to AC power or in Interval Reading Mode.

Use the **UP** and **DOWN** keys to select a time period after which the meter will shut off if no keys are pressed. Press the **GREEN/RIGHT** key under OK.



### BACKLIGHT

The display is illuminated when the **BACKLIGHT** key is pressed. To maximize battery life, set a time period after which the backlight will automatically turn off if no key is pressed.

Use the **UP** and **DOWN** keys to select a time period after which the backlight will shut off if no keys are pressed. Press the **GREEN/RIGHT** key under OK.

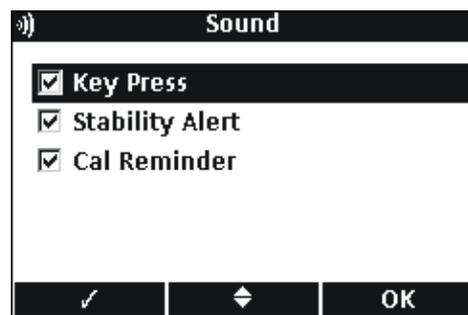
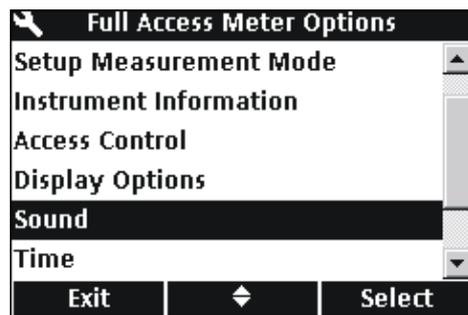
## 9.8 Setting the Sound Options

The meter can make an audible sound when a key is pressed, when stability is reached, or when the calibration reminder is due. The meter can also make an audible sound when it begins transferring data to a flash memory stick and again when the data transfer is complete.

To turn the sound on or off:

1. Press the **METER OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Sound**. Press the **GREEN/RIGHT** key under Select.
3. Use the **UP** and **DOWN** keys to highlight **Key Press**, **Stability Alert**, or **Cal Reminder**. Press the **BLUE/LEFT** key under the check mark. Multiple items can be selected.

**Note:** Select **Stability Alert** to turn on sound for data transfer to a flash memory stick.

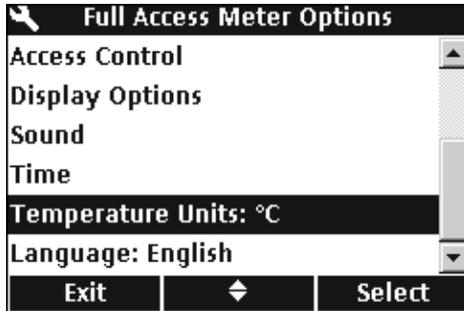


## 9.9 Setting the Date and Time

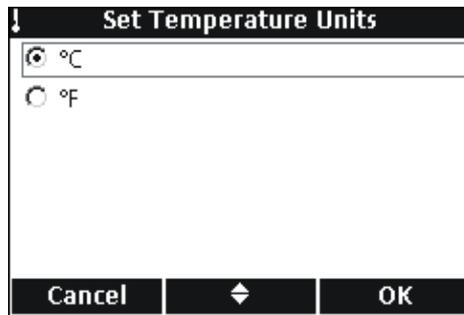
Refer to [section 4.4 on page 22](#) for more information.

## 9.10 Changing the Temperature Units

To select degrees Celsius or Fahrenheit:



1. Press the **METER OPTIONS** key.
2. Use the **UP** and **DOWN** keys to highlight **Temperature Units**. Press the **GREEN/RIGHT** key under Select.



3. Use the **UP** and **DOWN** keys to select Celsius or Fahrenheit. Press the **GREEN/RIGHT** key under OK.

## 9.11 Language

Refer to [section 4.3 on page 22](#) for more information.



# Section 10 Maintenance

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**DANGER**

**Only qualified personnel should conduct the tasks described in this section of the manual.**

## 10.1 General Meter Cleaning

The meter is designed to be maintenance-free. If the meter is dirty, wipe the surface with a damp cloth. Use a cotton-tipped applicator to clean or dry the connectors if they get wet.

## 10.2 General Probe Cleaning

For information about cleaning the probes, see the instruction sheet that comes with the IntelliCAL probe.

## 10.3 Battery Replacement

See [section 3.2 on page 12](#).

## 10.4 Updating Instrument Software

From time to time Hach Company may release updates to the meter software. A flash stick connected to the USB/DC power adapter can be used to update the instrument software or transfer data from the instrument.

**Note:** *The manufacturer will determine if an update to the software is necessary to make sure that the HQd Series correctly functions.*



# Section 11 Parts and Accessories

## 11.1 Parts

Description	Quantity	Catalog Number
LDO Probe, standard, with 1 m cable	1	LDO101-01
LDO Probe, standard, with 3 m cable	1	LDO101-03
LDO Probe, rugged, with 5 m cable	1	LDO101-05
LDO Probe, rugged, with 10 m cable	1	LDO101-10
LDO Probe, rugged, with 15 m cable	1	LDO101-15
LDO Probe, rugged, with 30 m cable	1	LDO101-30
pH Gel Probe, standard, with 1m cable	1	PHC101-01
pH Gel Probe, standard, with 3m cable	1	PHC101-03
pH Liquid Probe, standard, with 1m cable	1	PHC301-01
pH Liquid Probe, standard, with 3m cable	1	PHC301-03
pH Gel Probe, rugged, with 5m cable	1	PHC101-05
pH Gel Probe, rugged, with 10m cable	1	PHC101-10
pH Gel Probe, rugged, with 15m cable	1	PHC101-15
pH Gel Probe, rugged, with 30m cable	1	PHC101-30
Conductivity Probe, standard with 1m cable	1	CDC401-01
Conductivity Probe, standard with 3m cable	1	CDC401-03
Conductivity Probe, rugged with 5m cable	1	CDC401-05
Conductivity Probe, rugged with 10m cable	1	CDC401-10
Conductivity Probe, rugged with 15m cable	1	CDC401-15
Conductivity Probe, rugged with 30m cable	1	CDC401-30

## 11.2 Accessories

Description	Quantity	Catalog Number
Probe Depth Marker (Rugged Cable Markers)	5	58286-10
LDO Sensor Cap, Replacement (includes iButton, cap seal, and probe-tip o-ring)	1	58112-00
Glove Kit	1	58287-00
Field Kit	1	52258-00
Standard Probe Holder	1	58294-00
Rugged Shroud Kit	1	58259-00
Color Coded Probe Clips (five colors, two clips in each color)	1	58184-00
AC Power Adapter Kit, 115 VAC	1	58263-00
AC Power Adapter Kit, 230 VAC	1	58311-00
Batteries, Alkaline AA	4/pkg	19380-04
USB/DC Power Adapter	1	58134-00
USB Cable, 6 ft. (1.8 m), Type A Male, Type B Male	1	59240-00
Keyboard (QWERTY)	1	LZV582
BOD Bottle (300 mL)	1	621-00
BOD Stirrer/Funnel Accessory Kit (US)	1	58266-00
BOD Stirrer/Funnel Accessory Kit (EU)	1	58267-00
Software for direct connection to PC	1	HQ40d45

## 11.3 Consumables

Description	Quantity	Catalog Number
<b>IUPAC Series Certified pH Standards (Buffers)<sup>1</sup>:</b>		
pH 1.679 ± 0.010 @ 25 °C	500 mL	S11M001
pH 4.005 ± 0.010 @ 25 °C	500 mL	S11M002
pH 7.000 (Radiometer Analytical) ± 0.010 @ 25 °C	500 mL	S11M004
pH 10.012 ± 0.010 @ 25 °C	500 mL	S11M007
pH 12.45 ± 0.05 @ 25 °C	500 mL	S11M008
<b>Color-coded pH Standards (Buffers):</b>		
pH 4.01 ± 0.02 @ 25 °C	500 mL	22834-49
pH 7.00 ± 0.02 @ 25 °C	500 mL	22835-49
pH 10.01 ± 0.02 @ 25 °C	500 mL	22836-49
pH 4.01 ± 0.02 @ 25 °C	4 L	22834-56
pH 7.00 ± 0.02 @ 25 °C	4 L	22835-56
pH 10.01 ± 0.02 @ 25 °C	4 L	22836-56
pH 4.01 ± 0.02 @ 25 °C	20 L	22834-61
pH 7.00 ± 0.02 @ 25 °C	20 L	22835-61
pH 10.01 ± 0.02 @ 25 °C	20 L	22836-61
<b>Certified Conductivity Standards<sup>1</sup>:</b>		
KCl, 1 Demal, 111.3 mS/cm ± 0.5% @ 25 °C	500 mL	S51M001
KCl, 0.1 Demal, 12.85 mS/cm ± 0.35% @ 25 °C	500 mL	S51M002
KCl, 0.01 Demal, 1408 µS/cm ± 0.5% @ 25 °C	500 mL	S51M003
NaCl, 0.05%, 1015 µS/cm ± 0.5% @ 25 °C	500 mL	S51M004
<b>KCl Conductivity Standards:</b>		
0.1 Molar KCl, 12.88 mS/cm @ 25 °C	500 mL	C20C250
0.01 Molar KCl, 1413 µS/cm @ 25 °C	500 mL	C20C270
0.001 Molar KCl, 148 µS/cm @ 25 °C	500 mL	C20C280
<b>NaCl Conductivity Standards:</b>		
180 µS/cm @ 25 °C	100 mL	23075-42
1000 µS/cm @ 25 °C	100 mL	14400-42
18.00 mS/cm @ 25 °C	100 mL	23074-42
<b>BOD Consumables:</b>		
Nitrification Inhibitor (TCMP) - (200 tests)	35 g	2533-35
Nitrification inhibitor (TCMP) - (2500 tests)	500 g	2533-34
Nitrification Inhibitor (ATU)	50 g	28454-25
BOD Seed (50 tests)	50 capsules	24712-00
BOD Standard Solution, 300 mg/L GGA, 10-mL Voluette® Ampules	25/pkg	14865-10
Nutrient Buffer Pillow, 0.5 mL (for preparing 300 mL of dilution water)	50/pkg	14160-66
Nutrient Buffer Pillow, 3 mL (for preparing 3 L of dilution water)	50/pkg	14861-66
Nutrient Buffer Pillow, 4 mL (for preparing 4 L of dilution water)	50/pkg	24364-66
Nutrient Buffer Pillow, 6 mL (for preparing 6 L of dilution water)	50/pkg	14862-66
Nutrient Buffer Pillow, 19 mL (for preparing 19 L of dilution water)	25/pkg	14863-98
Buffer Solution, APHA, for BOD, pH 7.2, phosphate type	1 L	431-53
Calcium Chloride Solution, APHA	1 L	428-53

### 11.3 Consumables (continued)

Description	Quantity	Catalog Number
Magnesium Sulfate Solution, APHA	1 L	430-53
Ferric Chloride Solution, APHA	1 L	429-53
<b>Miscellaneous:</b>		
pH Filling Solution (for PHC301), 3M KCl, saturated with AgCl	30 mL	28417-00
pH Electrode Storage Solution	500 mL	27565-49

<sup>1</sup> Certified standards ship with certificates for traceability to Standard Reference Materials



## Section 12 How to Order

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### U.S.A. Customers

**By Telephone:**

6:30 a.m. to 5:00 p.m. MST  
Monday through Friday  
(800) 227-HACH (800-227-4224)

**By Fax:**

(970) 669-2932

**By Mail:**

Hach Company  
P.O. Box 389  
Loveland, Colorado 80539-0389 U.S.A.

**By E-mail:**

orders@hach.com

### Information Required

- Hach account number (if available)
- Your name and phone number
- Purchase order number
- Brief description or model number
- Billing address
- Shipping address
- Catalog number
- Quantity

### International Customers

Hach maintains a worldwide network of dealers and distributors. To locate the representative nearest you, send an e-mail to: intl@hach.com or contact:

**Hach Company World Headquarters;** Loveland, Colorado, U.S.A.  
Telephone: (970) 669-3050; Fax: (970) 669-2932

### Technical and Customer Service (U.S.A. only)

Hach Technical and Customer Service Department personnel are eager to answer questions about our products and their use. Specialists in analytical methods, they are happy to put their talents to work for you.

Call 1-800-227-4224 or e-mail techhelp@hach.com



## Section 13 Repair Service

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**Authorization must be obtained from Hach Company before sending any items for repair. Please contact the Hach Service Center serving your location.**

**In the United States:**

Hach Company  
Ames Service  
100 Dayton Avenue  
Ames, Iowa 50010  
(800) 227-4224 (U.S.A. only)  
FAX: (515) 232-3835

**In Canada:**

Hach Sales & Service Canada Ltd.  
1313 Border Street, Unit 34  
Winnipeg, Manitoba  
R3H 0X4  
(800) 665-7635 (Canada only)  
Telephone: (204) 632-5598  
FAX: (204) 694-5134  
E-mail: [canada@hach.com](mailto:canada@hach.com)

**In Latin America, the Caribbean, the Far East,  
Indian Subcontinent, Africa, Europe, or the Middle East:**

Hach Company World Headquarters,  
P.O. Box 389  
Loveland, Colorado, 80539-0389 U.S.A.  
Telephone: (970) 669-3050  
FAX: (970) 669-2932  
E-mail: [intl@hach.com](mailto:intl@hach.com)



## Section 14 Certification

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Hach Company certifies this instrument was tested thoroughly, inspected and found to meet its published specifications when it was shipped from the factory.

The HQ Series Portable Meters have been tested and are certified as indicated to the following instrumentation standards:

### Product Safety (power supply only)

115/230 VAC External Power Supply

Certified to CSA and Listed to UL safety standards (cULus mark), TUV-GS & CE marked per 73/23/EEC

### EMI Immunity

Instrument tested with the external Power Supply:

Per 89/336/EEC EMC: EN 61326:1998 (Electrical Equipment for measurement, control and laboratory use— EMC requirements) Supporting test records by Hach Company, certified compliance by Hach Company.

#### **Standards include:**

IEC 1000-4-2:1995 (EN 61000-4-2:1995) Electro-Static Discharge Immunity (Criteria B)

IEC 1000-4-3:1995 (EN 61000-4-3:1996) Radiated RF Electro-Magnetic Field Immunity (Criteria B)

IEC 1000-4-4:1995 (EN 61000-4-5:1995) Electrical Fast Transients/Burst (Criteria B)

IEC 1000-4-5:1995 (EN 61000-4-5:1995) Surge (Criteria B)

IEC 1000-4-6:1996 (EN 61000-4-6:1996) Conducted Disturbances Induced by RF Fields (Criteria A)

IEC 1000-4-11:1994 (EN 61000-4-11:1994) Voltage Dip/Short Interruptions (Criteria B)

Additional immunity Standard/s include:

ENV 50204:1996 Radiated Electro-Magnetic Field from Digital Telephones (Criteria B)

### Emissions

Instrument tested with the external Power Supply:

Per 89/336/EEC EMC: EN 61326:1998 (Electrical Equipment for measurement, control and laboratory use—EMC requirements) Class “B” emission limits all models except HQ40D Multi-Portable Meter with “2” LDO probes. The HQ40D when used with “2” LDO probes meets only Class “A” limits. Supporting test records by Hewlett Packard, Fort Collins, Colorado Hardware Test Center (A2LA # 0905-01) and certified compliance by Hach Company.

#### **Standards include:**

EN 61000-3-2 Harmonic Disturbances Caused by Electrical Equipment

EN 61000-3-3 Voltage Fluctuation (Flicker) Disturbances Caused by Electrical Equipment

## **Additional Emissions Standard/s include**

EN 55011 (CISPR 11), Class “B” emission limits all models except HQ40D Multi-Portable Meter with “2” LDO probes. The HQ40D when used with “2” LDO probes meets only Class “A” limits.

## **CANADIAN INTERFERENCE-CAUSING EQUIPMENT REGULATION**

IECS-003: Class “A” emission limits. Supporting test records by Hewlett Packard, Fort Collins, Colorado Hardware Test Center (A2LA # 0905-01) and certified compliance by Hach Company.

This Class “A” digital apparatus meets all requirements of the Canadian Interference- Causing Equipment Regulations.

Cet appareil numérique de la classe “A” respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## **FCC PART 15: Class emission A limits**

Supporting test records by Hewlett Packard, Fort Collins, Colorado Hardware Test Center (A2LA # 0905-01) and certified compliance by Hach Company.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class “A” digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense. The following techniques of reducing the interference problems are applied easily.

1. Disconnect the external power supply from the meter and/or remove one of the meter’s batteries to verify that meter is or is not the source of the interference.
2. Move the meter and it’s power supply away from the device receiving the interference.
3. Reposition the receiving antenna for the device receiving the interference.
4. Try combinations of the above.

## Section 15 Limited Warranty

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Hach Company warrants its products to the original purchaser against any defects that are due to faulty material or workmanship for a period of one year from date of shipment unless otherwise noted in the product manual.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing.

Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

### Limitations

This warranty does not cover:

- Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction
- Damage caused by misuse, neglect, accident or improper application or installation
- Damage caused by any repair or attempted repair not authorized by Hach Company
- Any product not used in accordance with the instructions furnished by Hach Company
- Freight charges to return merchandise to Hach Company
- Freight charges on expedited or express shipment of warranted parts or product
- Travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

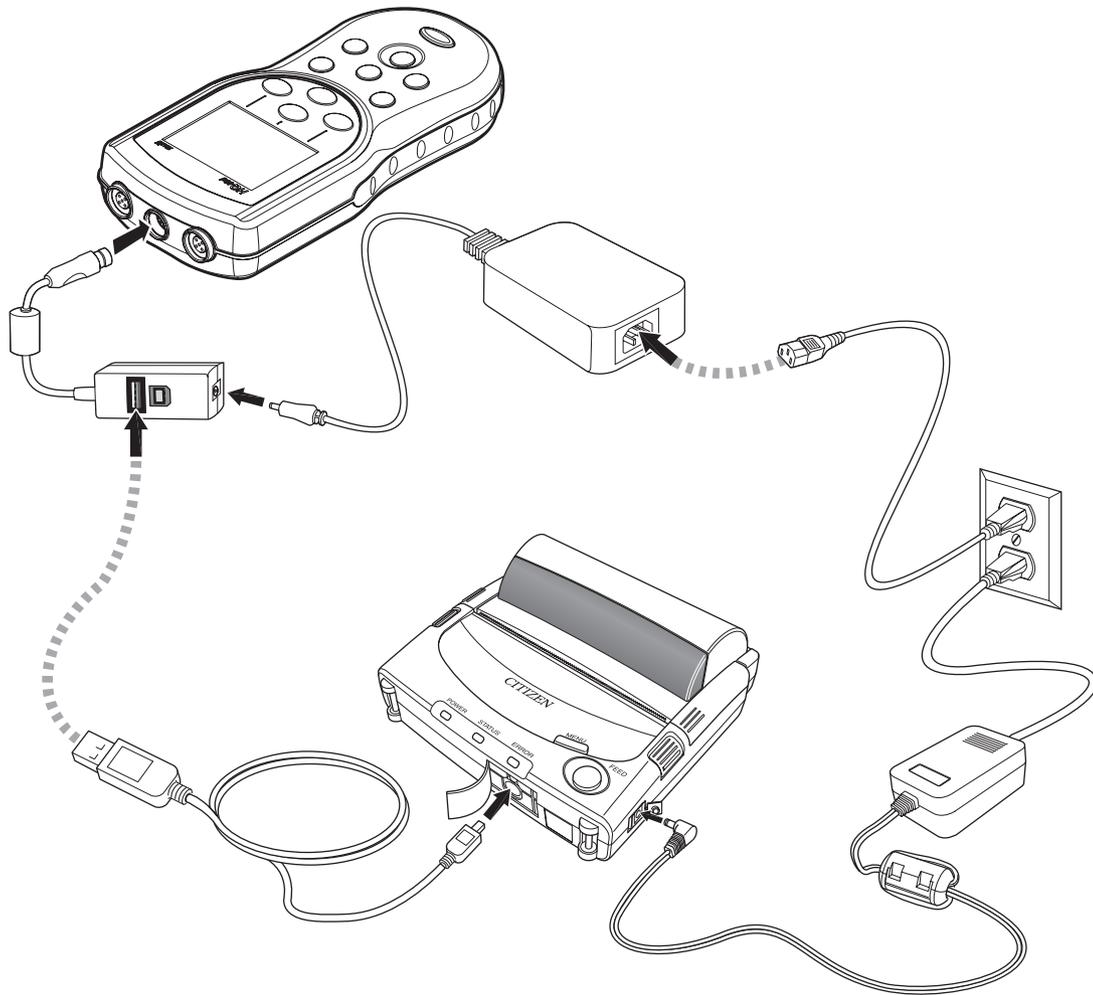
### Limitation of Remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.



# Appendix A Connecting the Citizen Handy Printer PD-24

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**WARNING**

*Refer to the manual provided with the printer for detailed safety information.*



<b>A</b>	
AC power supply .....	12
Access Control	
passwords .....	92
turning off .....	93
turning on .....	92
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