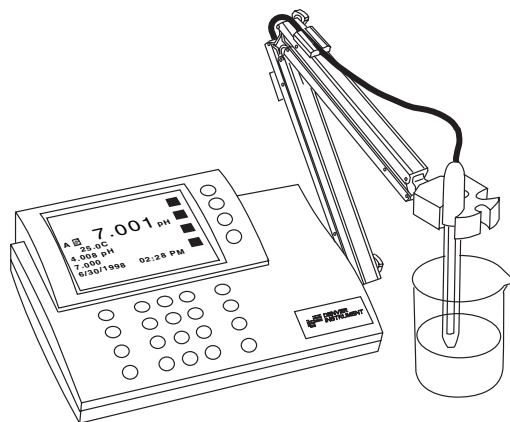


# 200 Series Meters

## Operation Manual

Model 215  
pH/mV meter

Model 225  
pH/mV/ion meter



# Disclaimer

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- The meter requires an electrode to take measurements. The system can only be as accurate as the two components. For assistance in selecting electrode, please contact Denver Instrument.
- Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.
- Use of this product in a manner not specified by the manufacturer may impair any safety protection provided by the equipment.
- You have purchased a quality precision meter that requires handling with care. Read entire contents of this Operation Manual prior to operating your new Denver Instrument meter.

# Warnings and Safety Information

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- Read the entire Operations Manual prior to attempting to operate your meter.
- Make sure the voltage rating printed on the AC adapter is identical to your local line voltage.
- Do not use this meter in a hazardous location.
- The only way to turn the power completely off is by disconnecting the AC adapter from the meter.
- Protect the AC adapter from contact with liquids.
- This product intended for indoor use.
- Product contains lithium battery. Dispose of in accordance with local regulations and ordinances



### WARNING!

This unit has no user serviceable parts! Do not open the meter housing, as this will void the manufacturer's warranty.

# Specifications

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Modes	pH	mV	Temperature	ion
Range	-2.000 to 20.000	± 2000.0	-5.0 to 105.0°C	1.00E-9 to 9.99E9
Resolution	0.001/0.01/0.1	0.1/1	0.1	1, 2, or 3 significant figures
Accuracy	± 0.002	±0.1	±0.3	± 0.17%n (n = ion charge)
Temperature Compensation	Automatic & Manual: -5 to 105°C			
Slope Control	Automatic, 90 to 105% Manual, 80 to 110%		Automatic or manual, 10% - 120%	
Standardization	Up to 5 pH buffers manually or auto-recognize buffers from sets or custom buffer set. 1 relative mV offset.		Up to 7 ion standards	
Power Requirements	120V AC, 60Hz 15V DC, 800 mA Center pin negative			
Dimensions (L x W x H)	10.4" x 8.0" x 4.5"			
Storing Temperature	-10 to 40°C (14 - 104°F), humidity up to 100% RH, non-condensing			
Operating Temperature	15 to 40°C (59 - 104°F), humidity less than 90% to RH, non-condensing			

# **Introduction**

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This Denver Instrument electrochemistry meter is a powerful, versatile and accurate instrument. It features easy menu-based operation with easy to understand prompts and electrode/standard error checking.

The 200 Series meters feature many advanced options, such as programmable stability criteria, standardization delay times, multi-channel operation, alarms, data logging of 620 data points and a superb RS-232 serial interface for controlling the meter and obtaining data.

## **Getting Started**

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### **Unpacking your meter**

Carefully remove your meter from the packing material. The electrode support arm, power adapter and electrode(s) (if purchased as a kit) are not attached to the meter during shipping.

Be sure that you have received each of the following items with your meter:

- Meter
- Brief Operations Manual
- Warranty Registration Card
- Electrode support arm
- Power adapter

Next follow the instructions for installing your meter.

Remember to return your completed warranty card within ten days and retain a record of all purchase information. Also take a moment to record the model and serial number of your meter for future reference.

# Installation Instructions

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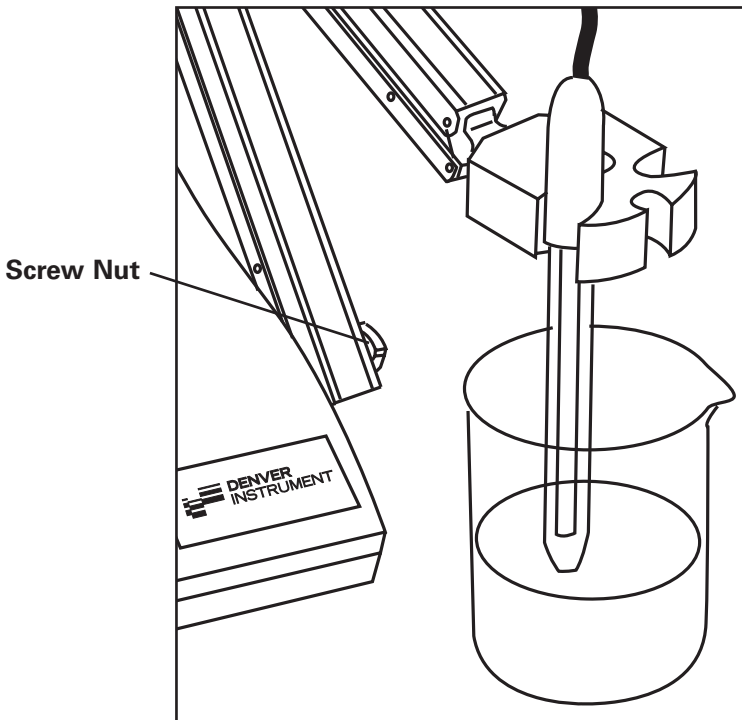
This manual provides a quick overview of common uses of this meter. Contact Denver Instrument for a more detailed instruction manual.

When choosing a location to set up your new meter, observe the following conditions to optimize ease and speed of use:

- Set up the meter on a stable, rigid and level surface.
- Room temperatures above 40°C (104°F) or below 15°C (50°F) could affect the meter operation and accuracy.
- Protect the meter from aggressive chemical vapors.
- Avoid exposing the meter to excessive moisture for extended periods.
- Line voltage to the meter should be reasonably constant and free from fluctuations.

## Electrode Support Arm Assembly

Loosen the screw nut on the bottom of the electrode. Place the electrode support arm on the bracket which is attached to the meter. Tighten the screw nut.



## Connecting Electrodes



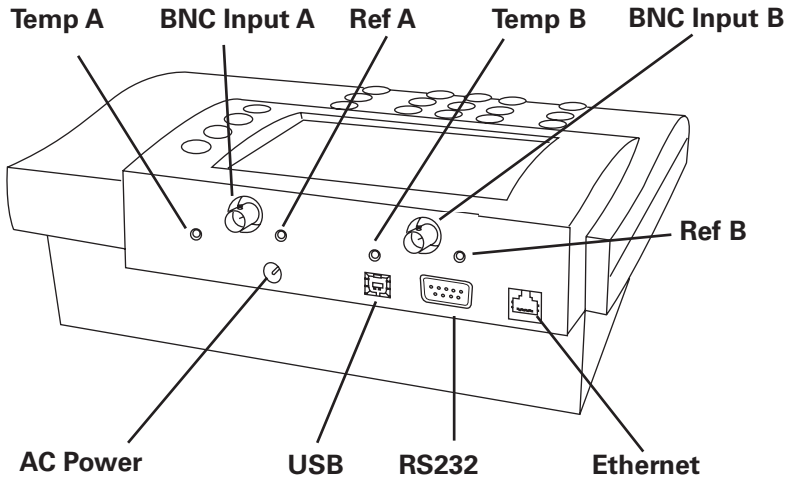
Not all inputs are available on all models.

pH, ORP or ISE electrodes (with BNC connector):

- Connect the electrode to the BNC input to channel A or B located at the rear of the meter. Push in and rotate the electrode's BNC connector until it locks in place (To disconnect, twist the BNC connector in the opposite direction and pull).
- Connect the ATC connector to the temp. A or temp. B.

Electrode Pair Using a Reference Electrode (with Reference Pin Plug):

- Connect the indicating electrode to the BNC input (push in and rotate the electrode's BNC connector until it locks in place).
- Connect the reference electrode to the reference input by pushing the electrode's tip pin plug into the input.



## Connecting the Meter to AC Power

Simply plug the AC adapter in to the rear of the meter and plug into an appropriate AC outlet. The meter will turn on automatically. There is no on/off switch, for best results, the meter should be left plugged in at all times.

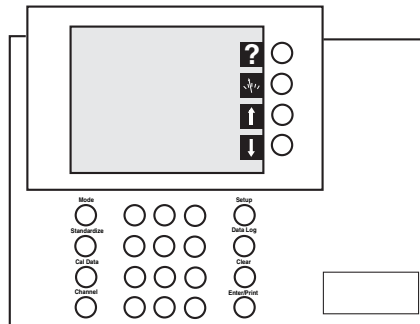
# Operation

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## Keypad

The meter uses seven keys to access the menus and for operation:

- **MODE**- Selects the mode (pH, mV or ion).
- **STANDARDIZE**- Use to enter pH buffers, relative mV offset or ion standards. Also accesses option menu to change other settings which affect the selected mode.
- **CAL DATA**- Displays and graphs buffers with time and date stamp and electrode calibration data.
- **CHANNEL**- Turn the Channel on or off.
- **SETUP**- The Setup menu is used to set various general meter settings, such as date and time, display contrast, keypress beep and serial port.
- **DATA LOG**- Use to set datalogging and view the stored data log.
- **CLEAR**- Exits from the current menu and returns to the previous menu, cancels the current operation or clears a number entry.
- **ENTER/PRINT**- Accepts numeric values, menu selections or pending operations. In the main measure screen, acts as a Print key, sending all current measurements to a printer or computer through the serial port and stores the measurements in the data log.



The numeric keypad is used to select a numbered item in the menu. It also allows for entering numbers in numeric fields.

Softkeys provide additional operations. Softkeys change their function as needed and each Softkey has an icon to indicate their current function.

- ? Help softkey** - provides information on current selection.
- ☀ Measurement softkey** - Returns to measurement screen from any menu.
- ↑ Up or Down Arrows** - In a menu, move the highlighted line up or down.
- ← Back Arrow** - Backspace during field entry.

## Display

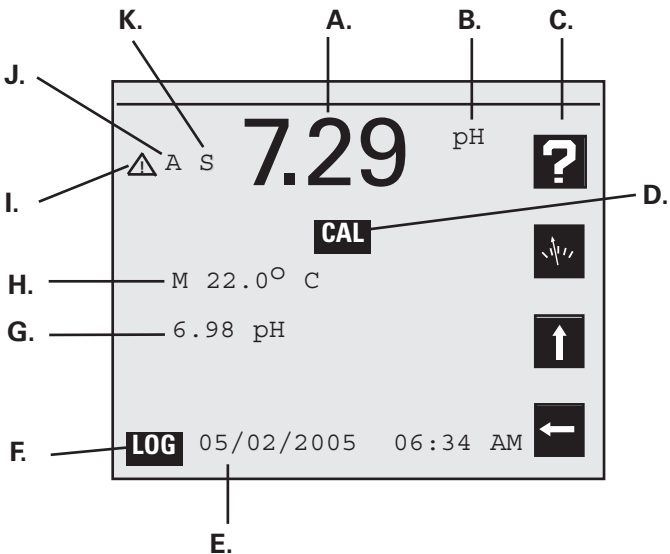
The display is a backlit quarter-VGA screen. A screen saver will come on after a period of non-use (the default is 45 minutes, set this time in the Setup menu); pressing any key will activate the measurement screen and backlight.



Not all of the following will display at the same time.

- A. Current measurement.
- B. Units.
- C. Softkey icons.
- D. Calibration due reminder.
- E. Date and time.
- F. Data Log active.
- G. Stored buffers/standards.
- H. Temperature ("M" when a manually entered temperature is being used).
- I. Alarm that data is outside the set alarm limits.
- J. Channel.
- K. Stability icon.

Dashes indicate a measurement is not available. This usually means the reading is out of range, or strict calibration has been set and the calibration expired.



# pH Mode

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## pH Standardization

Most customers can take advantage of our automatic standardization procedure (below) for general pH standardization.

1. Connect the pH electrode to the BNC connector (channel A or B) and, if desired, ATC connector to the temperature connector.
2. Press the **CHANNEL** key and turn the selected channel "ON".
3. Press the **MODE** key and select "1- pH".
4. Press **STANDARDIZE** and "3- Clear buffers to clear buffers". If all previously entered buffers will be re-entered, it is not necessary to clear buffers since the meter will replace the previous values. Press **CLEAR** or measurement softkey to return to the measurement screen.
5. Immerse the electrode in a buffer, stir (preferably with a stirbar) and wait for a steady reading.
6. Press the **STANDARDIZE** key, "1- Auto-enter a buffer". Review the checklist to be sure all steps have been followed and then press **ENTER**. The meter will check the electrode and buffers. If the slope is outside of 90 - 105%, an error message will be given.
7. The meter will then display the current measurement, temperature and standards stored in memory. Begin measuring or repeat steps 5 and 6 to enter up to five buffers.
8. Press **CAL DATA** to review and graph the electrode calibration data.

### Hints to achieve better accuracy:

- Allow time for the electrode to stabilize before beginning the standardization.
- Standardize using at least two buffers, bracketing the expected pH of your samples.
- Standardize at least daily for the most accurate readings.
- Open the fill hole on the electrode.
- Stir all buffers and samples.
- Rinse the electrode with DI water between samples and buffers.
- Always use fresh buffers.

### pH Mode Standardize Menu

In pH mode, press **STANDARDIZE** and the pH Mode Standardize Menu appears:

- 1). Auto-enter a buffer- use to standardize with a buffer from the selected buffer set which is auto recognized by the meter, or update an existing buffer. When the buffers are auto-entered the standardization is made compensating for temperature.

- 2). Manual buffer entry- use to enter a buffer value by manually entering the pH of the buffer. Since all buffers change pH with temperature, when manually entering buffers, the exact pH of the buffer at the current temperature must be entered (check the buffer label).
- 3). Clear buffers- use to clear all buffers entered for the current channel (pH mode). If all entered buffers are being re-entered, it is usually not necessary to clear buffers before re-entering them.
- 4). Options Menu- A menu of additional specific pH mode settings (see next section).
- 5). Cal reminder menu- use to set a timer reminding you to recalibrate. The CAL! icon will appear on the main screen and an exclamation mark will appear beside the buffers for which time has expired. If strict calibration is set, when a calibration has expired the CAL! icon appears, and "- -" is displayed in place of the measurement. No measurements can be obtained until a calibration is performed.



When strict calibration is set, the calibration reminders for all channels are turned ON, and can't be turned off from the Cal Reminder Menu.

- 6). Select buffer set- There are six auto-recognition buffer sets and the option to configure and use a custom buffer. Which ever set is selected, the meter will autorecognize a buffer from that set.

#### Auto-recognition Buffer Sets:

- 1) 1.68, 3.56, 4.01, 6.86, 7.42, 9.18, 10.01, 12.46 @ 25°C (NIST buffers)
- 2) 4, 7, 10 @ 25°C (set to match Reagecon Buffers)
- 3) 2, 4, 7, 10, 12 @ 25°C (set to match Fisher Buffers - Default)
- 4) 2, 4, 7, 10, 12 @ 20°C
- 5) 1, 3, 6, 8, 10, 13 @ 20°C
- 6) 1.09, 3.06, 4.65, 6.79, 9.23, 12.75 @ 25°C (DIN buffers)
- 7) Select custom buffer set

To create a custom buffer set, select #7 for custom buffers. Custom buffers can have any numeric pH value, or can be selected from the built-in temperature corrected buffers. Using the built-in buffers allow temperature correction of the pH values of the buffers, offering more accuracy.

## pH Mode Options Menu

In pH mode, press **STANDARDIZE** and #4 - pH Option Menu appears:

- 1). Select resolution- use to set pH readings to 0.1, 0.01, or 0.001 pH units.
- 2). Select stability criteria- use to set stability criteria to slow, medium or fast to match the electrode's speed of response and the variability of the signal allowed for the stability icon to be displayed.
- 3). Select signal averaging- use to set filtering of the electrode signal to very slow (10 readings), slow (8), medium (6), fast (4) or very fast (2). Slower settings give more stable readings, although may require longer times to reach stability
- 4). Set standardization delay- use to set a reading delay time for the meter to wait before accepting an electrode signal during standardization. Programming a standardization delay helps slow responding electrodes reach equilibrium before the electrode signal is accepted.
- 5). Set pH slope- use to set a known electrode slope used by the meter with a zero- or single-point standardization. The normal default slope is 59.16 mV/pH at 25°C. The meter allows between 80 and 120% efficiency to be entered.



Note:

When two or more standards are entered, the meter uses the actual determined slope(s).

- 6). Standardize menu- returns to the pH mode Standardization Menu.
- 7). Manual temperature menu- use to set a temperature to be used in the absence of an ATC probe or to manually override the ATC.
- 8). Data alarm menu- use to set pH limits. If the limits are exceeded an alarm indication is displayed  $\Delta$  and recorded with any data points placed in the data log.
- 9). Set isopotential point- use to set an isopotential point for use in high accuracy electrode measurements.
- 0). Select temperature probe type- Choose from auto-detect, 10 kOhm (use with Denver temperature and pH/temperature probes), 30 kOhms and Pt1000.

# mV Mode

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Millivolt measurements are used to measure ORP (oxidation-reduction potential) or redox potential, to check performance of pH or Ion Selective Electrodes, and for redox titrations.

## mV Standardization Menu

- 1.) Auto-enter mV offset- use to set the relative mV offset equal to the current mV reading. The current mV becomes 0.0 relative mV.
- 2.) Set mV offset- use to manually enter a mV offset.
- 3.) Clear mV offset- use to clear any offset that has been entered, returning the meter to absolute mV mode.
- 4.) Options menu- a menu of additional settings specific to the mV mode (see below).

## mV Mode Options Menu

In pH mode, press **STANDARDIZE** and #4 - mV Option Menu appears:

- 1.) Select resolution- use to set mV readings to 1 or 0.1 millivolt resolution.
- 2.) Select stability criteria- use to select stability criteria for slow, medium or fast response to match the electrode's speed of response and the variability of the signal allowed for the stability icon to be displayed.
- 3.) Select signal averaging- use to set the meter to average readings that are very slow (10 readings), slow (8), medium (6), fast (4) or very fast (2). Slower settings give more stable readings, although may require longer times to reach stability.
- 4.) Set standardization delay- use to set a length of time for the meter to wait before entering a relative mV standardization.
- 5.) Set mV offset- use to manually enter a mV offset (same as in the mV Standardize menu).
- 6.) Standardization menu- returns to the mV Standardization Menu.
- 7.) Select temperature probe type- Choose from auto-detect, 10 kOhm (use with Denver temperature and pH/temperature probes), 30 kOhms and Pt1000.

# Ion Mode

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## Ion Standardization and Measuring

1. Connect the ion electrode to the BNC connector (channel A or B) and, if desired, ATC connector to the temperature connector.
2. Press the **CHANNEL** key and turn the selected channel "ON".
3. Press the **MODE** key and select "3 - Ion"



Note:

The meter displays "---", indicating no valid measurement, until at least one ion standard has been entered.

4. Press **STANDARDIZE** and "3- Clear standards" to clear standards. If all previously entered standards will be re-entered, it is not necessary to clear standards since the meter will replace the previous values. If re-entering only some standards or changing the electrode all the old standards should be cleared. Press **CLEAR** or measurement softkey to return to the measurement screen.
5. Prepare a standard, and add the appropriate Ionic Strength Adjuster (ISA) solution to the standard (typically 1 mL of ISA for every 50 mL of standard).
6. Immerse the electrode in the solution, stir (preferably with a stir bar) continuously and wait for a stable reading. It is not uncommon for an ISE to take several minutes to stabilize.
7. Press **STANDARDIZE** and select "1 - Enter a standard" to add a standard. If this is the first standard being entered, select the ion name and units. Review the checklist to be sure all steps have been followed and then press **ENTER**. Enter the value of the standard.
8. The meter waits for the standardization delay time to pass (see next section) and then waits for a stable signal. It then checks the electrode and standard. If the slope is outside of 10 - 120% an error message will be given.
9. The meter will then display the current measurement, temperature (if ATC is connected) and standards stored in memory. Begin measuring or repeat steps 5 -7 to enter up to seven standards.
10. Press **CAL DATA** to review and graph the electrode calibration data.

## Hints to achieve better accuracy:

- Add Ionic Strength Adjuster to each standard and sample (typically 1 mL of ISA for every 50 mL of standard or sample). Check the pH of samples for those ISE with specific pH ranges and adjust the pH as needed.
- Standardize at least daily for the most accurate results.
- Always use fresh standards.
- Standardize using at least two standards, bracketing the expected range of your samples.
- Standardize from low to high concentrations.
- Use standards and samples near the same temperature.
- Allow time for the electrode to stabilize before beginning the standardization. ISE electrodes can take several minutes to reach stability.
- Open the fill hole on the electrode.

## Ion Mode Standardize Menu

In ion mode, press **STANDARDIZE** and the Ion Mode Standardize Menu appears:

- 1). Enter a standard - use to add a new standard or update (reenter) an existing standard. Follow the prompts. With the first standard you select the ion name and units.
- 2). Set ion slope - use to manually enter a slope for the selected ion electrode. Used with a one-point ion calibration. Useful if the ISE has a known, stable slope, so that measurements can be made after entering a single ion standard.



**Note:** When two or more standards are entered, the meter uses the actual determined slope(s).

- 3). Clear standards - use to clear standards for the electrode standardization selected. If all standards are being re-entered, it is usually not necessary to clear before re-entering them.
- 4). Options menu- use to set various additional parameters to the ion mode (see next section).
- 5). Cal reminder menu - use to set a timer reminding you to recalibrate. The CAL! icon will appear on the main screen and an exclamation mark will appear beside the buffers for which time has expired. If strict calibration is set (see Meter Setup Menu), when a calibration has expired the CAL! icon appears, and "- - -" is displayed in place of the measurement. No measurements can be obtained until a calibration is performed.

## Ion Mode Options Menu

In ion mode, press **STANDARDIZE** and #4 Ion Option Menu appears

- 1). Select resolution - use to set the readings to 1, 2, or 3 significant digits.
  - 2). Select stability criteria - use to set the stability criteria to slow, medium or fast to match the electrode's speed and stability of response and the variability of the signal allowed for the stability icon to be displayed.
  - 3). Select signal averaging - use to set filtering of the electrode signal to very slow (10 readings), slow (8), medium (6), fast (4) or very fast (2). Slower settings give more stable readings, although may require longer times to reach stability.
  - 4). Set standardization delay - use to set a time for the meter to wait before accepting an electrode signal during standardization. Delays of one minute for fast ISE's and five to ten minutes for slow ISE's are appropriate.
  - 5). Set ion slope - use to enter a known ion electrode slope for one-point standardization.
  - 6). Standardize menu - returns to the ion standardize menu.
  - 7). Manual temperature menu- use to set a manual temperature in the absence of an ATC probe or when manually overriding the ATC.
  - 8). Data alarm menu - use to enter ion limits to be entered. If the limits are exceeded an alarm indication ( $\Delta$ ) is displayed and recorded with any data points placed in the data log.
  - 9). Set isopotential point - use to enter an isopotential point (refer to long manual for more information on isopotential points)
  - 10). Enable incremental - use to turn on the known or sample addition methods (refer to long manual for more information on these methods). These methods are useful for small sample sizes, samples with concentrations outside of the specified ISE working range or samples with known interferences.
- +/-). Select temperature probe type: Choose from auto-detect, 10 kOhm (use with Denver temperature probes), 30 kOhms and Pt1000.

# Meter Setup

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Press **SETUP** to access the Meter Setup menu:

- 1). Time and date menu- Use to set the time format (HH:MM AM/PM or HH:MM:SS), set the time, set the date format (MM/DD/YY, DD-MM-YY or YYYY.MM.DD), and set the date.
- 2). Select temperature units- use to select temperature measurement and display in degrees Celsius, degrees Fahrenheit or Kelvin.
- 3). Select contrast: use to select the display contrast, making the displayed characters lighter or darker. Select setting "5" for typical conditions.
- 4). Language- choose from English, French, German and Spanish.
- 5). Setup serial port: use to configure the serial baud rate, data bits, parity and start bits. This must match the settings of the printer or computer being used with the meter.
- 6). Keypress beep on/off- use to turn on or off a "beep" upon each key press as an audible signal that a key has been pressed.
- 7). Select display background: use to set the display to black characters on a white background or white characters on a black background.
- 8). Show meter information- use to show the meter model, software version and serial number.
- 9). Enable measure lock- use to enable the measure lock where a stable measurement is locked (frozen) for later review. Stability criteria should be set to SLOW for all channels and modes in use. When this feature is turned on a lock icon will appear on a soft key. Press the softkey to release the "lock" and the meter will automatically lock on the next stable reading.
- 0). Enable strict calibration- use to set strict calibration where no measurements are displayed if the calibration reminder has expired.
- "+"). Set screen saver timeout- use to set a time for the screensaver to activate.
- "."). Restore factory defaults- use to reset all settings to factory defaults. On occasion it may be useful to completely reset the meter, for example, if other users have changed a setting.



Note:

A factory reset also clears all electrode standardizations.


# Data Logging

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The meter will store up to 620 data points in an internal data log. Press **PRINT** when in the main measure screen to store the current result with channel, stability, temperature, result, units, sample label, sample number, date and time in the data log. Print also outputs this data through the RS232 serial port. All channels displayed are printed and data logged.

Press **DATA LOG** and the Data Log menu will appear.

- 1). View data log: Shows the stored data, one screen at a time. Press the arrow soft keys to page up and down through the stored data. Press **CLEAR** or **ENTER** to return to the menu.
- 2). Data logging on/off: Turns the data logging on or off for all displayed channels.

 **Note:** For interval data logging, data points are only stored when this feature is "on" and when the main measurement screen is displayed.

- 3). Set logging interval- Allows you to enter the time interval for automatic data logging.
- 4). Clear data log- Clears all stored data points from memory.
- 5). Set sample number- Allows a number to be assigned to the first sample. This number will increase for each consecutive sample logged.
- 6). Set sample label- A custom user-entered name can be entered. This label will be printed and be stored with all data. To enter a label, repeatedly press a number key to select the desired character, then press **ENTER**. Repeat for all characters, then scroll up or down to "save and edit" and press **ENTER**.
- 7). Print data log- Use to send all data points in the data log to the RS232 serial port.

 **Note:** Removing power from the meter will lose the stored data in the data log.

# RS232 Interface

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This meter has a bidirectional RS232 port which enables communication with other serial devices such as a printer or computer. In order to communicate with another device the baud rate, parity, data bits and stop bits must be the same on both instruments. See "Meter Setup" section to set serial settings.

## Pinout

Your 200 Series Meter requires the use of a communications cable available from Denver Instrument.

## Bidirectional Commands

The Denver Instrument Series 200 meters have a bi-directional RS-232 serial port, which can be used to send commands to the meter and output data from the meter. Please see the complete manual for details.

# Troubleshooting

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## Testing the Meter - BNC connector

To test the meter for correct operation with a pH, ORP or Ion Selective electrode, short the BNC input connector

1. Place the BNC Shorting Cap that was supplied with the meter on the BNC connector.
2. Select mV mode by pressing **MODE** and selecting "2) mV". Verify meter is in absolute mV mode (display shows "mV", not "rel mV"). If the meter is reading rel mV, press **STANDARDIZE** and "2) Clear mV offset".
3. If the meter reads  $0 \pm 0.1 \text{ mV}^*$ , and is stable, the meter is measuring correctly.



Meter accuracy is  $\pm 0.1 \text{ mV}$  at calibration temperature, not including long term drift and a temperature error. The long term drift will not exceed  $0.1 \text{ mV}$  per month.

## Testing the pH Electrode

1. Make sure the electrode is properly attached to Channel A.
2. If an ATC (temperature) probe is attached make sure the temperature reading is within range.
3. Press **MODE** and select "2) mV". Verify that the meter is in absolute mV mode (display shows "mV", not "rel mV". If the meter is reading rel mV, press **STANDARDIZE** and "2) Clear mV offset".
4. To test the pH electrode, place it in a fresh pH 7 buffer. Stir the electrode until the reading is relatively stable. Note the mV reading.
5. Rinse the electrode in DI water and repeat for either a pH 4 or pH 10 buffer.
6. If the electrode potential is within the limits shown, it is measuring correctly.

pH 7	$0 \pm 30 \text{ mV}$
pH 4	159 to 186 mV higher than pH 7 reading
pH 10	159 to 186 mV lower than pH 7 reading

# Menu Tree

---

Mode	pH mV Ion		
<b>Standardize (in pH mode)</b>	Auto-enter a buffer		
	Manual buffer entry		
	Clear buffers		
	Option menu		
	Cal reminder menu	On/Off	
		Interval	
	Select buffer set	1.68, 3.56, 4.01, 6.86, 7.42, 9.18, 10.01, 12.46@25°C 4, 7, 10 @25°C 2, 4, 7, 10, 12@25°C (Default) 2, 4, 7, 10, 12@20°C 1, 3, 6, 8, 10, 13@20°C 1.09, 3.06, 4.65, 6.79, 9.23, 12.75 @25°C Custom buffer set	
	<b>Options (in pH mode)</b>	Select resolution	0.1 0.01 0.001
		Select stability criteria	Slow Medium Fast
		Select signal averaging	Very slow Slow Medium Fast Very Fast
Set standardization delay		min:sec	
Set pH slope		mV/pH	
Standardize menu			
Manual temperature menu		On/Off	
Data alarm menu		Manual temp. On/Off Upper limit Lower limit	
Set isopotential point			
Select temperature probe		Auto-detect 10 kOhms (Default) 30 kOhms Pt 1000	
<b>Standardize (in mV mode)</b>	Auto-enter mV offset		
	Set mV offset		
	Clear mV offset		
	Options menu		
<b>Options (in mV mode)</b>	Select resolution	1 0.1	
	Select stability criteria	Slow Medium Fast	
	Select signal averaging	Very slow Slow Medium Fast Very Fast	

	Set standardization delay	min:sec
	Set mV offset	
	Standardize menu	
	Select temperature probe	Auto-detect 10 kOhms (Default) 30 kOhms Pt 1000
<b>Standardize (in ion mode)</b>	Enter a standard	
	Set ion slope	mV/decade
	Clear standards	
	Options menu	
	Cal Reminder menu	On/off Days, hr:min
<b>Options Menu (in ion mode)</b>	Select resolution	1 sig fig 2 sig fig 3 sig fig
	Select stability criteria	Slow Medium Fast
	Select signal averaging	Very slow Slow Medium Fast Very Fast
	Set standardization delay	min:sec
	Set ion slope	mV/decade
	Standardize menu	
	Manual temperature menu	On/off Manual temp.
	Data alarm menu	On/off Upper limit Lower limit
	Set isopotential point	mV
	Enable incremental modes	Yes/no
	Select temperature probe	Auto-detect 10 kOhm (Default) 30 kOhm Pt 1000

<b>Setup</b>	Time and date menu	Set time	
		Set date	
		Time format	hr:min:sec
			hr:min AM/PM
		Date format	mm/dd/yyyy
			dd-mm-yyyy
			yyyy.mm.dd
	Select temperature units	Celsius	
		Fahrenheit	
		Kelvin	
	Select contrast	1 to 9	
	Language	English	
		French	
		German	
		Spanish	
Setup serial port	Baud rate	300	
		1200	
		2400	
		4800	
		9600	
		19200	
		38400	
		115200	
	Serial port	8, N, 1	
		7, E, 1	
		7, O, 1	
Keypress beep on/off	On		
	Off		
Select display background	White		
	Black		
Show meter information			
Enable measure lock	Yes		
	No		
Enable strict calibration	Yes		
	No		
Set screen saver timeout			
Restore factory defaults			

<b>Data Log</b>	View date log	
	Turn logging on/off	
	Set logging interval	hr:min:sec
	Clear data log	
	Set sample number	
	Set sample label	
	Print data log	

# Cleaning and Maintenance

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## Repairs

Repair work must be performed by qualified factory-trained personnel only.

This unit contains no user serviceable parts. All replacement parts should be obtained from the manufacturer. Contact Denver Instrument for further information.

## Cleaning

- Disconnect the meter AC adapter from power source prior to cleaning.
- Make sure that no liquids enter the meter housing.
- Do not use aggressive cleaning agents such as cleansers.
- The exterior surfaces of this product may be cleaned with a damp cloth or with mild detergent.



### **WARNING!**

If there are any indications that safe operations of the meter is no longer warranted, turn off power and disconnect from AC power source immediately.

## Safety Inspection

Safe operation of the meter is no longer assured if there is visible damage to the AC adapter or cord, the AC adapter no longer functions properly or the AC adapter has been stored for a long period under unfavorable conditions.

# Accessories

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A complete line of electrodes are available from Denver Instrument. Please contact your dealer or Denver Instrument for more information.

- Replacement pH/ATC probe 300729.1
- RS-232C Interface Cable 601439.1
- Printer Kit includes interface cable and 1 roll of printer paper. 902579.1
- Printer Paper (1 roll/pkg) 901044.1
- Collect XL Software - Connect the 200 Series Meter to your PC for direct input of real-time into spreadsheets 902242.1
- Collect SL software - Simple data collection software YSW04-0001

# Warranty Instructions

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1. Please return the prepaid, pre-addressed Purchase Registration Card to Denver Instrument promptly upon your purchase of the Denver Instrument product. The return of the card is not a condition precedent to warranty coverage.
2. If you have any questions about a Denver Instrument product, please contact the nearest Denver Instrument office as listed on back cover.
3. If it becomes necessary to return your Denver Instrument product for service, you must obtain a "Return Authorization Number". Please pack the product securely in its original approved packing carton or an other suitable container. Include your Return Authorization Number on the shipping label. Shipping charges must be fully prepaid.



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