Digital Dialysate Meter™

Operation Manual

MYRON L® COMPANY

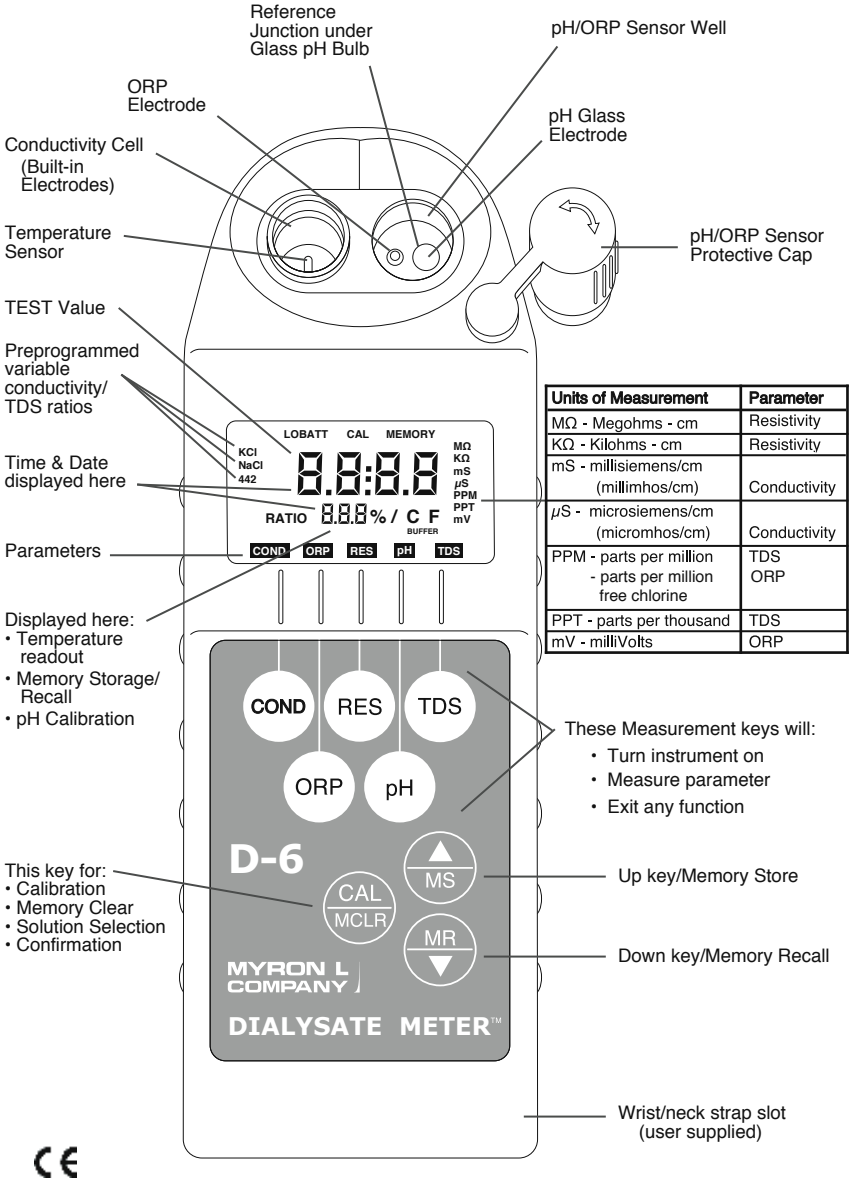
Water Quality Instrumentation

Accuracy • Reliability • Simplicity

18 February 16

PLEASE NOTE:
Because of our commitment to product improvement, the substance and style of this manual may change. When changes are made, the updated manual is posted for download in PDF format from the Myron L Website: **www.myronl.com**

Instrument Illustration



Units of Measurement	Parameter
MΩ - Megohms - cm	Resistivity
KΩ - Kilohms - cm	Resistivity
mS - millisiemens/cm (millimhos/cm)	Conductivity
µS - microsiemens/cm (micromhos/cm)	Conductivity
PPM - parts per million - parts per million free chlorine	TDS ORP
PPT - parts per thousand	TDS
mV - milliVolts	ORP

MODEL D-6 Shown

For detailed explanations see Table of Contents

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TABLE OF CONTENTS

I. GENERAL WARNINGS AND CAUTIONS

For your own safety and the safety of your patients follow these important safety instructions as well as other safety instructions noted throughout this operation manual.

WARNING: statements alert the user that serious adverse reactions for the patient are associated with related use or misuse.

CAUTION: statements alert the user that the related use or misuse of the device could cause it to be damaged or malfunction.

WARNING: Read this entire operation manual before using a Digital Dialysate Meter™.

WARNING: When using a Digital Dialysate Meter™ to check the conductivity or pH of dialysate, **ALWAYS** perform a calibration check of the instrument for those measurement functions at the beginning and end of each work day or more often if required by your clinic's internal procedures.

- See Calibration, pg. 16, for instructions.

WARNING: When using a D-6 to verify the complete removal of residual oxidizing germicides, such as chlorine, ORP mV reading should be as low as possible. Generally, an ORP reading of < 275 mV is a good indicator that there is very little residual oxidizer remaining. However, it is recommended that a target reading matching or close to the ORP value measured at the output of your RO system be sought.

WARNING: Because pH measurements require temperature compensation, **ALWAYS** fill both the pH sensor well and conductivity cell with sample.

- The Digital Dialysate Meter's™ temperature sensor is located in the conductivity cell.

WARNING: When measuring with a Digital Dialysate Meter™, **DO NOT** press the CAL key unless instructed to by a procedure in this manual.

- This will activate the Digital Dialysate Meter's™ calibration mode (the word CAL will appear at the top of the display) and could inadvertently change the calibration of the instrument and alter the accuracy of measurements.
- If you do accidentally activate CAL mode:
  - **DO NOT** press either the UP, DOWN or CAL keys.
- Re-press the desired parameter function key to return the instrument to measurement mode.

WARNING: The pH/ORP sensor well must **ALWAYS** be kept wet with a pH sensor storage solution when not in use.

- Allowing the sensor to dry out will damage or ruin it.
- **NEVER** use distilled water or tap water as a substitute for pH sensor storage solution.

WARNING: **DO NOT** use a Digital Dialysate Meter™ in place of the primary sensor controls and/or monitors of the hemodialysis system.

- If measurements taken with a Digital Dialysate Meter™ differ significantly from those reported by the hemodialysis system:
  - **DO NOT** continue with dialysis treatment.
  - **IMMEDIATELY** investigate the cause of the variation.

WARNING: Perform calibrations and calibration checks with standard reference solutions.

- Myron L® Company reference solutions are highly recommended and are the same solutions used in the manufacture and factory calibration of your Digital Dialysate Meter™.

WARNING: When calibrating the conductivity/resistivity or TDS functions of a Digital Dialysate Meter™, press and release the CAL key.

- **DO NOT** press and hold the CAL key. This may inadvertently change the conductivity/resistivity/TDS solution type and alter the performance of the instrument.

CAUTION: **NEVER** store or operate a Digital Dialysate Meter™ outside of its operating/storage temperature limits (see General Specifications, pg. 6).

- **DO NOT** put solutions below 0°C/32°F or in excess of 71°C/160°F in the sensor area.

CAUTION: If “LOBATT” flashes, replace the 9V alkaline battery. Follow the instructions in the Digital Dialysate Meter™ Operation Manual precisely.

CAUTION: Federal law restricts this device to sale by or on the order of a physician.

II. INTRODUCTION

Thank you for selecting the Dialysate Meter™, one of the Myron L® Company's latest in an increasing line of instruments utilizing microprocessor-based circuitry and SMT manufacturing processes. This circuitry makes the instrument accurate, reliable and very easy to use.

The Dialysate Meter incorporates several high performance features including ORP mV to ppm free chlorine conversion, optional wireless communication, a clock with time and date, memory of up to 100 locations with time and date stamp, the ability of the user to adjust the timeout "Auto OFF", and enhanced performance. See Features and Specifications on pages 6 & 7.

The most exciting feature is data logging with the ability to download the memory or stored test data with its corresponding time and date using an optional wireless com port accessory package. Software included with this accessory package allows the user to create spreadsheets and graphs with ease, and quickly and accurately manipulate data. Please Note: Although the Myron L® Company has performed extensive testing, we cannot guarantee compatibility of all applications and formats. We suggest testing your application and format for compatibility before relying on it.

Special note: Conductivity, Resistivity, and TDS require mathematical correction to 25°C values. On the left of the Dialysate Meter's liquid crystal display is shown an indicator of the salt solution characteristic used to model temperature compensation of conductivity and its TDS conversion. The indicator may be KCl, NaCl or 442™. Selection affects the temperature correction of Conductivity, and thus the calculation of TDS from compensated conductivity. The selection can affect the reported conductivity of hot or cold solutions and will change the reported TDS of a solution.

In hemodialysis facilities, using NaCl for Conductivity and Resistivity and 442 (Natural Water characteristic) for TDS will meet water testing requirements most of the time. This assumes that Conductivity will be used to determine concentration of dialysate solutions and that Resistivity will be used to determine the purity of DI water given both dialysate and DI product water most closely match the NaCl standard. This also assumes that TDS will be used to check reverse osmosis feed and product water, which most closely match the Natural Water characteristic. This is how your instrument, as shipped from the factory, is set to operate. However, the compensation and conversion solution type can be changed to another programmed solution characteristic when appropriate.

III. FEATURES and SPECIFICATIONS

A. Features

- Download capability with optional wireless communication package
- ORP mV to ppm free chlorine conversion (D-6)
- 4 digit LCD displays full 9999 μS/ppm
- Accuracy of ±1% of reading in a handheld instrument ±.1% at calibration point
- All electrodes are internal for maximum protection
- 4 electrode sensor technology
- Waterproof to 1 meter/3 feet
- Autoranging conductivity/TDS/resistivity
- Prompts for easy pH calibration (D-6)
- Factory calibrations stored in microprocessor
- 3 conductivity/TDS solution conversions preprogrammed into microprocessor
- Real Time Clock with Time and Date
- Data Logging with TIME and DATE in memory
- Memory stores 100 readings
- User adjustable timeout “Auto OFF”

B. General Specifications

Display	4 Digit LCD
Dimensions (LxWxH)	196 x 68 x 64 mm/ 7.7 x 2.7 x 2.5 in.
Weight	352 g/12.4 oz.
Case Material	VALOX®*
Cond/Res/TDS Cell Material	VALOX®*
Cond/TDS Electrodes (4)	316 Stainless Steel
Cond/Res/TDS Cell Capacity	5 ml/0.2 oz.
pH/ORP Sensor Well Capacity	1,2 ml/0.04 oz. (D-6)
Power	9V Alkaline Battery
Battery Life	>100 Hours/5000 Readings
Operating/Storage Temperature	0-55°C/32-132°F
Protection Ratings	IP67/NEMA 6 (waterproof to 1 meter/3 feet)
Chemical Resistance	Resistant to hydrocarbons, dilute acids and bases, detergents, and aqueous salt solutions
Water Resistance	IP67/NEMA 6 (waterproof to 1 meter/3 feet)
CE EMI/EMC Ratings (Conformité Européenne)	EN61326-1: 2006 + Annex A: 2008 (hand-held devices) CISPR 11: 2003 IEC 61000-4-2: 2001 and, IEC 61000-4-3: 2002
Flammability	PCB: UL94, V.0; Case: HB/1.47 or better

* ® Sabic Innovative Plastics

Additional information is available on our website at:
www.myronl.com

C. Specification Chart

	pH (D-6)	ORP (D-6) Free Chlorine	Conductivity	TDS	Resistivity	Temperature
Ranges	0-14 pH	±999 mV 0.2 - 9.9 ppm	0-9999 µS/cm 10-200 mS/cm in 5 autoranges	0-9999 ppm 10-200 ppt in 5 autoranges	10KΩ - 30MΩ	0-71 °C 32 - 160 °F
Resolution	±.01 pH	±1 mV 0.1 ppm	0.01 (<100 µS) 0.1 (<1000 µS) 1.0 (<10 mS) 0.01 (<100 mS) 0.1 (<200 mS)	0.01 (<100 ppm) 0.1 (<1000 ppm) 1.0 (<10 ppt) 0.01 (<100 ppt) 0.1 (<200 ppt)	0.01 (<100 KΩ) 0.1 (<1000 KΩ) 0.1 (>1 MΩ)	0.1 °C/F
Accuracy	±.01 pH*	±1 mV ± 2.5% of reading ppm**	±1% of reading	±1% of reading	±1% of reading	±0.1 °C
Auto Temperature Compensation	0-71 °C 32-160 °F		0-71 °C 32 - 160 °F	0-71 °C 32 - 160 °F	0-71 °C 32 - 160 °F	
Adjustable Temperature Compensation			0 - 9.99%/ °C	0 - 9.99%/ °C	0 - 9.99%/ °C	
Cond/TDS Ratios Preprogrammed			KCl, NaCl, 442™			

***EM Susceptibility:** When Measuring 10.0 pH Reference Solution
±0.2 pH in the presence of RF fields ≥ 3 V/m.
±0.37 pH in the presence of RF fields at 300 MHz (±30MHz)

**mV to ppm conversion accuracy assumes solution pH of 5-9 and Temperature of 20-30ºC in water sanitized by chlorine only

D. Warranty/Service

The Myron L Dialysate Meter, excluding the pH/ORP sensor, has a Two (2) Year Limited Warranty. The pH/ORP sensor has a Six (6) Month Limited Warranty for materials and workmanship. If an instrument fails to operate properly, see Troubleshooting Chart, pg. 37-38. The battery and pH/ORP sensor are user-replaceable. For other service, return the instrument prepaid to the Myron L® Company.

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If, in the opinion of the factory, failure was due to materials or workmanship, repair or replacement will be made without charge. A reasonable service charge will be made for diagnosis or repairs due to normal wear, abuse or tampering. This warranty is limited to the repair or replacement of the Dialysate Meter only. The Myron L® Company assumes no other responsibility or liability.

E. Dialysate Meter Models

DIALYSATE METER MODELS	**D-4**	**D-6**
PARAMETERS	Conductivity/TDS Resistivity/Temp.	Conductivity/TDS/pH Resistivity/ORP Free Chlorine/Temp.

MADE IN USA

IV. INITIAL CALIBRATION and FACTORY SETTINGS

CAUTION: The factory settings are not intended to replace calibration with reference solution/buffers.

Factory settings do not take into account the current condition of the actual sensor installed in your instrument or any environmental conditions that might exist in your facility.

- **DO NOT** use a Digital Dialysate Meter™ to check the pH or conductivity of dialysate using factory calibration settings.
- **ALWAYS** perform an initial calibration of a Digital Dialysate Meter™ with reference solutions/buffers prior to putting it into use for the first time.

The following table lists initial calibration procedures and their location in this manual.

PARAMETER	PROCEDURE	REFERENCE SOLUTION
General instructions (see Calibration, pg. 16)		
Conductivity	Gain	14.00 mS NaCl[1] (see Conductivity or TDS Calibration, pg. 19)
Resistivity	Electronically calibrated with Conductivity Gain	
TDS	Gain	442™[1] (see Conductivity or TDS Calibration, pg. 19)
		3000 PPM[1] (see Conductivity or TDS Calibration, pg. 19)
pH	Zero Point	7.0 pH (see pH Zero Calibration (D-6), pg. 20)
	Gain – Acid	4.0 pH (see pH Gain Calibration (D-6), pg. 21)
	Gain – Base	10.0 pH (see pH Gain Calibration (D-6), pg. 21)
ORP	Electronically calibrated with pH Zero Point	
Temperature	Does not require calibration	

[1]Make sure the correct solution type is selected and that it matches the type of reference solution being used (see Solution Selection, pg. 15)

Avoid letting solvents come into contact with the instrument's sensors, case or window areas. Shock damage from a fall may cause the instrument to fail.

WARNING: You **MUST** verify the function and calibration of any Dialysate Meter that has been dropped by performing calibration checks (see Checking pH/ORP Sensor Performance, pg. 34) of all measurement functions prior to putting it back into use.

V. RULES of OPERATION

A. Operation

Using the instrument is simple:

- Individual Cond/Res/TDS or multiple parameter readings may be obtained by filling the cond. cell or the entire sensor area.
- Rinse the pH/ORP sensor well (D-6) and/or conductivity cell with test solution 3 times and refill. Temperature and/or measurement extremes will require additional rinses for maximum accuracy.
- Press the desired measurement key to start measurement. Pressing the key again restarts the 15 second auto “off” timer.
- Note the value displayed or press the MS key to store the reading (ref. Memory Storage, pg. 25). It’s that simple!

B. Characteristics of the Keys

- Though your Dialysate Meter has a variety of sophisticated options, it is designed to provide quick, easy, accurate measurements by simply pressing one key.
- All functions are performed one key at a time.
- There is no “off” key. After 15 seconds of inactivity the instrument turns itself off (60 seconds in CAL mode). User adjustable up to 75 seconds.
- Rarely is it necessary to press and *hold* a key (as in Procedure to Select a Solution, pg. 15; or Conductivity or TDS Calibration, pg. 19).

C. Operation of the Keys (See Instrument Illustration on pg. i)

1. Measurement Keys in General

Any of the 5 measurement keys in the upper part of the keypad turns on the instrument in the mode selected. The mode is shown at the bottom of the display, and the measurement units appear at the right. Pressing a measurement key does this even if you are in a calibration sequence and also serves to cancel a change (ref. Leaving Calibration, pg. 18).

2. COND, RES and TDS Keys

These 3 keys are used with solution in the Conductivity Cell.
Precautions:

- While filling cell cup ensure no air bubbles cling on the cell wall.
- If the proper solution is not selected (KCl, NaCl or 442), refer to Why Solution Selection is Available, pg. 15 and Procedure to Select a Solution, pg. 15.

a. COND Key

Solution to be tested is introduced into the conductivity cell and a press of 

displays conductivity with units on the right. On the left is shown the solution type selected for conductivity.

CAUTION: When using a Digital Dialysate Meter™ to check the conductivity of dialysate, the solution type **MUST** be set to the NaCl conversion factor.

- If the proper solution type is not selected (the NaCl icon is not displayed), see Procedure to Select a Solution, pg. 15.

b. RES Key

A press of (RES) displays resistivity with units on the right. On the left is shown solution type selected for resistivity (ref. Solution Selection, pg. 15). The range of display of resistivity is limited to between 10 kilohms (KΩ) and 30 megohms (MΩ). A solution outside that range will only show [- - - -] in the display.

c. TDS Key

A press of (TDS) displays Total Dissolved Solids with units on the right. This is a display of the concentration of material calculated from compensated conductivity using the characteristics of a known material. On the left is shown solution type selected for TDS (ref. Solution Selection, pg. 15).

3. pH and ORP Keys (D-6)

WARNING: When using a Digital Dialysate Meter™ to test the pH of dialysate, **ALWAYS** perform a calibration check of the pH sensor at the beginning and end of each work day or more often if required by your clinic's internal procedures.

- See Checking pH/ORP Sensor Performance, pg. 34, for instructions.

Measurements are made on solution held in the pH/ORP sensor well. The protective cap is removed and the pH/ORP sensor well and conductivity cell are filled and rinsed with the sample enough times to completely replace the storage solution.

WARNING: Because pH measurements require temperature compensation, **ALWAYS** fill both the pH sensor well and conductivity cell with sample.

- The Digital Dialysate Meter's™ temperature sensor is located in the conductivity cell.

After use, the pH/ORP sensor well must be refilled with Myron L Storage Solution, and the protective cap reinstalled securely (ref. Maintenance of the pH/ORP Sensor, pg. 12 and Cleaning Sensors, 3. pH/ORP, pg. 35).

a. pH Key (D-6)

A press of (pH) displays pH readings. No units are displayed on the right.

b. ORP Key (D-6)

A press of (ORP) displays Oxidation-Reduction Potential/REDOX reading in millivolts (DEFAULT) or ppm depending on units selected; "mV" or "PPM" is displayed.

4. CAL/MCLR Key

CAUTION: Unintentionally pressing the CAL/MCLR key while making measurements could inadvertently change the calibration of the instrument by activating either:

- The calibration mode (the "CAL" icon will appear on the instrument's display), or
- The solution selection menu (the word "SEL" will appear on the instrument's display).
- If you do accidentally activate either of these features:
  - **DO NOT** press either the UP or DOWN keys.
  - **IMMEDIATELY** Repress the desired parameter function key to return the instrument to measurement mode.

A press of 

allows you to enter the calibration mode while measuring conductivity, TDS or pH. Once in "CAL" mode, a press of this key accepts the new value. If no more calibration options follow, the instrument returns to measuring (ref. Leaving Calibration, pg. 18).

If 

is held down for about 3 seconds, "CAL" mode is not entered, but "SEL" appears to allow Solution Selection (ref. pg. 15) with the Up or Down keys. As in calibration, the CAL key is now an accept key.

While reviewing stored records, the MCLR side of the key is active to allow clearing records (ref. Clearing a Record/Memory Clear, pg. 26).

5. UP or DOWN Keys

While measuring in any parameter, the 

or 

keys activate the Memory Store and Memory Recall functions.

While in "CAL" mode, the keys step or scroll the displayed value up or down. A single press steps the display and holding either key scrolls the value rapidly.

While in Memory Recall, the keys scroll the display up and down through the stack of records (ref. Memory Recall, pg. 25).

VI. AFTER USING the Dialysate Meter

A. Maintenance of the Conductivity Cell

Rinse out the conductivity cell with clean water. Do not scrub the cell. For oily films, squirt in a foaming non-abrasive cleaner and rinse (ref. Cleaning Sensors, pg. 34). Even if a very active chemical discolors the electrodes, this does not affect the accuracy; ***leave it alone***.

B. Maintenance of the pH/ORP Sensor

The sensor well must be kept wet with a solution. Before replacing the rubber cap, rinse and fill the sensor well with Myron L pH Sensor Storage Solution. If unavailable, you can use an almost saturated KCl solution, a saturated solution of table salt and tap water or pH 4 buffer (ref. pH and ORP Practices to Maintain Calibration, pg. 24). **NEVER USE DISTILLED WATER**.

VII. SPECIFIC RECOMMENDED MEASURING PROCEDURES

If the proper solution is not selected (KCl, NaCl, or 442), see Solution Selection, pg. 15.

CAUTION:

- For Cond/Res/TDS measurements:
  - The pH/ORP sensor well cap **MUST** be sealed.
  - Any crystals or other residue around the cap **MUST** be rinsed away to prevent contamination of the conductivity sample.
  - The conductivity cell **MUST** be rinsed and filled at least 3 times with sample before each measurement is taken.
- For pH/ORP measurements:
  - Both the pH/ORP sensor well and the conductivity cell **MUST** be rinsed and filled at least 3 times with sample before each measurement is taken.
- After sampling high concentration solutions or temperature extremes, more rinsing may be required.

A. Measuring Conductivity & Total Dissolved Solids (TDS)

WARNING: When using a Digital Dialysate Meter™ to check the conductivity of dialysate, the solution conversion factor **MUST** be set to the NaCl conversion factor.

- If the proper solution conversion factor is not selected, see Procedure to Select a Solution, pg. 15, for instructions on setting it.

1. Rinse cell cup 3 times with sample to be measured. (This conditions the temperature compensation network and prepares the cell.)
2. Refill cell cup with sample.
3. Press (COND) or (TDS).
4. Take reading. A display of [- - - -] indicates an overrange condition.

B. Measuring Resistivity

Resistivity is for low conductivity solutions. In a cell cup the value may drift from trace contaminants or absorption from atmospheric gasses, so measuring a flowing sample is required.

1. Ensure pH protective cap is secure to avoid contamination.
2. Hold instrument at 30° angle (cup sloping downward).
3. Let sample flow continuously into conductivity cell with no aeration.
4. Press (RES) key; use best reading.

NOTE: If reading is lower than 10 kilohms display will be dashes: [- - - -]. Use Conductivity instead.

C. Measuring pH (D-6)

WARNING: When using a Digital Dialysate Meter™ to test the pH of dialysate, **ALWAYS** perform a calibration check of the pH sensor at the beginning and end of each work day or more often if required by your clinic's internal procedures (see pH Calibration, pg. 20).

1. Remove protective cap by grasping its sides and pulling up.
2. Rinse pH/ORP sensor well and conductivity cell 3 times with sample to be measured. Shake out each sample to remove any residual liquid.
3. Refill pH/ORP sensor well and conductivity cell with sample.
4. Press (pH).
5. Note value displayed.
6. **IMPORTANT:** After use, fill pH/ORP sensor well with Myron L pH Sensor Storage Solution and replace protective cap. If Myron L pH Sensor Storage Solution is unavailable, you can use a strong KCl solution (preferred), a saturated solution of NaCl table salt and tap water (next best alternative), or a pH 4 buffer (least desirable alternative). **NEVER** use distilled water or plain tap water as this will quickly deplete the sensor (ref. Cleaning Sensors, 3. pH/ORP, pg. 35). *Do not allow pH/ORP sensor to dry out.*

D. Measuring ORP (D-6)

1. Remove protective cap by grasping its sides and pulling up.
2. Rinse pH/ORP sensor well and conductivity cell 3 times with sample to be measured. Shake out each sample to remove any residual liquid.
3. Refill both the pH/ORP sensor well and the conductivity cell with sample.

4. Press (ORP).

5. Take reading.

*NOTE: When ppm free chlorine units are selected (ref. VIII. ORP UNIT SELECTION), annunciators alert you when the concentration is outside the specified measurement range. "**Or**" (over range) will display when the concentration is over the range limit (> 9.9 ppm). "**Ur**" (under range) will display when the concentration is below the range limit (< 0.2 ppm).*

WARNING: When using a D-6 to verify the complete removal of residual oxidizing germicides, such as chlorine, ORP mV reading should be as low as possible. Generally, an ORP reading of < 275 mV is a good indicator that there is very little residual oxidizer remaining. However, it is recommended that a target reading matching or close to the ORP value measured at the output of your RO system be sought.

6. **IMPORTANT:** After use, fill pH/ORP sensor well with Myron L pH Sensor Storage Solution and replace protective cap. If Myron L pH Sensor Storage Solution is unavailable, you can use a strong KCl solution (preferred), a saturated solution of NaCl table salt and tap water (next best alternative), or a pH 4 buffer (least desirable alternative). **NEVER** use distilled water or plain tap water as this will quickly deplete the sensor (ref. Cleaning Sensors, 3. pH/ORP, pg. 35). *Do not allow pH/ORP sensor to dry out.*

VIII. ORP UNIT SELECTION (D-6) mV OR PPM FREE CHLORINE

1. Press (ORP).

2. Press and hold (CAL/MCLR) for approximately 3 seconds. The current preference for ORP units of measure is displayed. Factory setting for this preference is mV (see Figure 1).

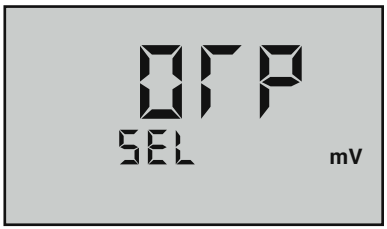

Figure 1

4. Press the (▲ MS) or (MR ▼) keys to toggle between mV and ppm free chlorine measurement format. The setting chosen is displayed. (ppm shown as example in Figure 2).

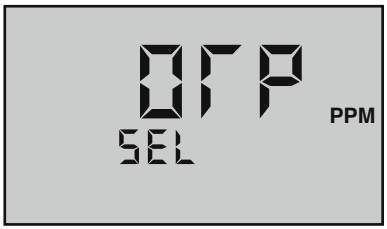

Figure 2

5. Press any parameter key to exit ORP unit preference selection or let the unit time out. ORP unit preference will be saved.

*NOTE: Free chlorine as determined by the D-6 Dialysate Meter is a measurement of the concentrations of Cl_2, HOCl, and OCl^- in solution. The D-6 Dialysate Meter does **NOT** measure chloramines present in solution.*

IX. SOLUTION SELECTION

A. Why Solution Selection is Available

Conductivity, resistivity, and TDS require temperature correction to 25°C values. Selection determines the temperature correction of conductivity and calculation of TDS from compensated conductivity.

B. The 3 Solution Types

On the left side of the display is the salt solution characteristic used to model temperature compensation of conductivity and its TDS conversion. In hemodialysis facilities, using NaCl for Conductivity and Resistivity and 442 (Natural Water characteristic) for TDS will meet water testing requirements most of the time.

This assumes that Conductivity will be used to determine concentration of dialysate solutions and that Resistivity will be used to determine the purity of DI water given both dialysate and DI product water most closely match the NaCl standard. This also assumes that TDS will be used to check reverse osmosis feed and product water, which most closely match the Natural Water characteristic.

This is how your instrument, as shipped from the factory, is set to operate. However, the compensation and conversion solution type can be changed to another programmed solution characteristic, when necessary.

C. Calibration of Each Solution Type

A Digital Dialysate Meter™ stores and uses separate calibration values for each of the three solution types.

If you're using a Digital Dialysate Meter™ for **BOTH** dialysate measurements **AND** product water quality measurements, **ALWAYS** calibrate the conductivity, resistivity and TDS functions of your Digital Dialysate Meter™ **FOR EACH TYPE**.

- Calibrating a function for one solution type **DOES NOT** affect the calibration of the same function for other solution types.
- For example, calibrating a measurement function, such as conductivity, for NaCl **DOES NOT** calibrate conductivity for KCl or 442™.

D. Procedure to Select a Solution

WARNING: When using a Digital Dialysate Meter™ to check the conductivity of dialysate, the solution type **MUST** be set to use the

NaCl conversion factor.

- **DO NOT** change the calibration solution type unless specifically directed to do so by a member of the technical staff of your facility.

NOTE: Check display to see if solution displayed (KCl, NaCl or 442) is already the type desired. If not:

1. Press (COND), (RES) or (TDS) to select the parameter whose solution type you wish to change.
2. Press and hold (CAL/MCLR) key for 3 seconds to make "SEL" appear (see Figure 3). For demonstration purposes, all 3 solution types are shown simultaneously.

Figure 3

3. Use the (▲ MS) or (MR ▼) key to select type of solution desired
   The selected solution type will be displayed: KCl, NaCl or 442.
4. Press (CAL/MCLR) to accept new solution type.

X. CALIBRATION

A. Proper Handling of Reference Solutions

ALWAYS perform calibrations and calibration checks with standard reference solutions that are NIST traceable.

- Myron L® Company reference solutions are highly recommended and are the same solutions used in the manufacture and factory calibration of your Digital Dialysate Meter™.

To ensure standard solution and calibration/verification accuracy

- Store solutions in a cool, dark place.
  - Preferred storage temperature is 25°C/77°F, the ideal calibration temperature.
- Keep solutions tightly capped to avoid evaporation.
- When using a solution, pour it directly from the bottle.
  - If using a syringe or pipette, pour the solution into another container and fill the syringe or pipette from there.
  - **DO NOT** use the pipette or syringe to draw solution directly from the bottle.
- Use the solution immediately after dispensing to prevent changes in concentration due to evaporation.
- Recap the bottle immediately after dispensing.
  - Keep the bottle capped when not in use.

continued on next page ...

- **DO NOT** return used samples to the storage bottle.
  - This includes any solution poured into secondary containers for use with syringes and pipettes.
- **DO NOT** use any solution that is past its expiration date.

B. Calibration Intervals

There is no simple answer as to how often you should calibrate an instrument. Myron L Digital Dialysate Meters™ are designed to not require frequent recalibration. The most common sources of error were eliminated in the design, and there are no mechanical adjustments. Still, to ensure specified accuracy, any instrument must be checked against chemical standards occasionally.

NOTE: If you are using the Dialysate Meter to check dialysate concentrations, you should check the calibration of the pH and Conductivity functions at the beginning and end of each work day or more often if required by your clinic's internal procedures. Then recalibrate if indicated by the table on page 18.

On the average, we expect calibration need only be checked monthly for the Conductivity, RES, or TDS functions. The pH (D-6) function should be checked daily to ensure the pH/ORP sensor is not broken or damaged. Measuring some solutions will require more frequent intervals (ref. Suggested Calibration Intervals, pg. 23).

C. Rules for Calibration of the Dialysate Meter

1. Calibration Steps

a. Starting Calibration

Calibration is begun by pressing 

while measuring Conductivity, TDS or pH. Measuring continues, but the "CAL" icon is on, indicating calibration is now changeable.

The reading is changed with the 

and 

keys to match the known value. The calibration for each of the 3 solution types may be performed in either conductivity or TDS mode.

Depending on what is being calibrated, there may be 1, 2 or 3 steps to the calibration procedures.

Unless otherwise instructed by your clinic's internal procedures, use the following table to determine when calibration is indicated for specific functions.

Function	Solution	Recalibrate if Dialysate Meter Reports Below	Recalibrate if Dialysate Meter Reports Above
Conductivity (NaCl)	14.00 mS	13.86 mS	14.14 mS
Conductivity (KCl)	7000 μS	6930 μS	7070 μS
TDS	442™ Solution (3000 PPM)	3030 ppm	2970 ppm
pH	7.0 Buffer	6.96 pH	7.04 pH
	4.0 Buffer	3.96 pH	4.04 pH
	10.0 Buffer	9.96 pH	10.04 pH

Once in "CAL" mode, the CAL/MCLR key becomes an accept key. At each point, pressing CAL/MCLR accepts the new calibration value and steps you to the next adjustment (or out of "CAL" mode if there are no more steps).

To bypass a calibration step, simply press CAL/MCLR to accept the present value as is.

b. Leaving Calibration

Calibration is complete when the "CAL" icon goes out. Pressing any measurement key cancels changes not yet accepted and exits calibration mode.

Leaving pH after the 2nd buffer results in the same gain being entered in place of the 3rd buffer.

2. Calibration Limits

There are calibration limits. A nominal "FAC" value is an ideal value stored by the factory. Attempts to calibrate too far, up or down, from there will cause the displayed value to be replaced with "FAC". If you accept it (press the CAL key), you will have the original default factory calibration for this measurement. The need to calibrate out so far that "FAC" appears indicates a procedural problem, incorrect standard solution, a very dirty cell cup or an aging pH/ORP sensor (ref. Troubleshooting Chart, pg. 37-38).

WARNING:

- Factory settings do not take into account the current condition of the sensor installed in your instrument.
- If you are unable to adjust the calibration value without causing the "FAC" icon to appear, your conductivity or pH/ORP sensor is damaged and must be replaced.

C. Calibration Procedures

1. Conductivity or TDS Calibration

a. Rinse conductivity cell three times with proper standard, KCl, NaCl, or 442 (ref. Cond/TDS Standard Solutions, pg. 39).

b. Refill conductivity cell with same standard. NaCl-14.00 is the example used here.

c. Press COND or TDS.

Then press CAL/MCLR.

The "CAL" icon will appear on the display (see Figure 4).

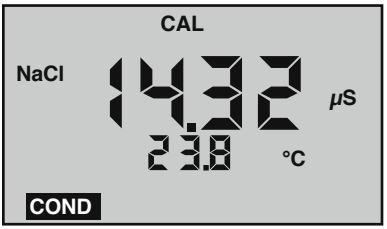

Figure 4

d. Press ▲ MS or MR ▼ to step the displayed value toward the standard's value (the value 14.32 in Figure 4 would be stepped down to 14.00) or hold a key down to scroll rapidly through the reading.

e. Press CAL/MCLR once to confirm new value and end the calibration sequence for this particular solution type. If another solution type is also to be measured, change solution type now and repeat this procedure.

2. Resistivity Calibration

Resistivity is the reciprocal of Conductivity. Resistivity is calibrated only if conductivity is calibrated for the same solution type.

3. Reloading Factory Calibration (Cond or TDS)

If calibration is suspect or known to be incorrect, and no standard solution is available, the calibration value can be replaced with the original factory value for that solution. This "FAC" value is the same for all Dialysate Meters, and returns you to a known state without solution in the cell. The "FAC" internal electronics calibration (which bypasses the electrodes and cell) is not intended to replace calibration with conductivity standard solutions. If another solution type requires resetting, change solution type and repeat this procedure.

CAUTION: **DO NOT** reset the calibration values or any range of your Digital Dialysate Meter™ to factory settings unless specifically directed to by a member of the technical staff of your facility.

Factory settings are not a substitute for calibration with reference solutions.

- **ALWAYS** perform dialysate checks with an instrument that has been calibrated with reference buffers/solutions.

a. Press COND or TDS.

b. Press CAL/MCLR.

c. Press ▲/MS key until “FAC” appears and release.

d. Press CAL/MCLR to accept the factory calibration setting.

4. pH Calibration (D-6)

ALWAYS calibrate a Digital Dialysate Meter™ pH function at Zero Point with a pH 7.0 buffer solution **BEFORE** performing either the Acid or Base gain calibration.

- The Acid/Base gain calibrations may be done in either order.

Read Proper Handling of Reference Solutions, pg. 16, before attempting pH calibration.

Calibrating the pH function of a Digital Dialysate Meter™ is a three-step process. Zero Point calibration is always done first. Steps 2 and 3 can be performed in either order.

STEP 1: Zero Point Calibration (7.0 pH buffer)

STEP 2: Gain Calibration – Acid (4.0 pH buffer)

STEP 3: Gain Calibration – Base (10.0 pH buffer)

a. pH Zero Calibration (D-6)

1. Rinse pH/ORP sensor well and conductivity cell 3 times with 7 buffer solution.

2. Refill both sensor wells with 7 buffer solution.

3. Press pH to verify the pH calibration. If the display shows 7.00, skip the pH Zero Calibration and proceed to section b. pH Gain Calibration, pg. 21.

4. Press CAL/MCLR to enter calibration mode. The “CAL”, “BUFFER” and “7” annunciators will appear (see Figure 5). Displayed value will be the uncalibrated sensor.

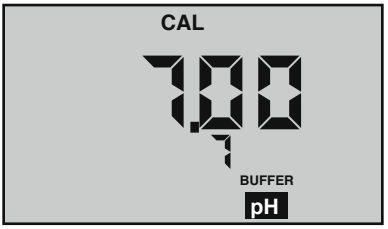

Figure 5

NOTES: If a wrong buffer is added (outside of 6-8 pH), "7" and "BUFFER" will flash, and the Dialysate Meter will not adjust.

The uncalibrated pH value displayed in step 4 will assist in determining the accuracy of the pH sensor. If the pH reading is above 8 with pH 7 buffer solution, the sensor well needs additional rinsing or the pH sensor is defective and needs to be replaced.

5. Press ▲ MS or MR ▼ until the display reads 7.00.

NOTE: Attempted calibration of >1 pH unit from factory calibration will cause "FAC" to appear. This indicates the need for sensor replacement (ref. Troubleshooting pg. 37-38) or fresh buffer solution.

WARNING: The "FAC" internal electronic calibration is not intended to replace calibration with pH buffers. It assumes an ideal pH sensor.

You may press CAL MCLR to accept the preset factory value, or *you may reduce your variation from factory setting by pressing* ▲ MS *or* MR ▼.

6. Press CAL MCLR to accept the new value. The pH Zero Calibration is now complete. Continue with pH Gain Calibration. **DO NOT** press any measurement keys as this will exit calibration.

b. pH Gain Calibration (D-6)

Important: Always calibrate or verify your Dialysate Meter with a pH 7 buffer solution before adjusting the gain with acid or base buffers, i.e., 4 and/or 10, etc. Either acid or base solution can be used for the 2nd point "Gain" calibration and then the opposite for the 3rd point. The display will verify that a buffer is in the sensor well by displaying either "Acd" or "bAS".

1. The pH calibration mode is initiated by either completion of the pH Zero Calibration, or verifying 7 buffer and pressing the CAL MCLR key twice while in pH measurement mode.
2. At this point the "CAL", "BUFFER" and "Acd" or "bAS" annunciators will be displayed (see Figures 6 and 7).

NOTE: If the "Acd" and "bAS" indicators are blinking, the unit is indicating an error and needs either an acid or base solution present in the sensor well.

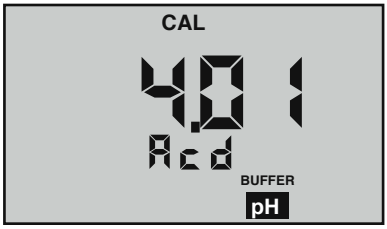

Figure 6

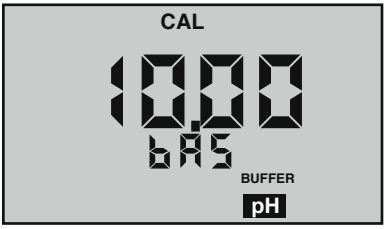

Figure 7

3. Rinse pH/ORP sensor well and conductivity cell 3 times with acid or base buffer solution.

4. Refill pH/ORP sensor well and conductivity cell again with same buffer solution.

5. Press ▲ MS or MR ▼ until display agrees with buffer value.

6. Press CAL MCLR to accept 2nd point of calibration. Now the display indicates the next type of buffer to be used.

Single point Gain Calibration is complete. Continue for the 3rd point of Calibration (2nd Gain).

DO NOT press any measurement keys as this will exit calibration. Exiting causes the value accepted for the buffer to be used for both acid and base measurements.

To continue with 3rd point calibration, use basic buffer if acidic buffer was used in the 2nd point, or vice-versa. Again, match the display to the known buffer value as in step 2 and continue with the following steps:

7. Repeat steps 3 through 6 using opposite buffer solution.

8. Press CAL MCLR to accept 3rd point of calibration, which completes the Calibration procedure. Fill pH/ORP sensor well and conductivity cell with Myron L Storage Solution and replace protective cap.

6. ORP Calibration (D-6)

ORP electrodes rarely give false readings without problems in the reference electrode. For this reason, and because calibration solutions for ORP are highly reactive and potentially hazardous, your Dialysate Meter has an electronic ORP calibration. This causes the zero point on the reference electrode to be set whenever pH 7 calibration is done.

7. Temperature Calibration

Temperature calibration is not necessary. The Dialysate Meter temperature sensing circuit uses a high quality sensor that does not require calibration.

XI. CALIBRATION INTERVALS

The Dialysate Meter is designed to not require frequent recalibration. The most common sources of error were eliminated in the design, and there are no mechanical adjustments. Still, to ensure specified accuracy, any instrument must be checked against chemical standards occasionally.

A. Suggested Calibration Intervals

PRIMARY USAGE	FUNCTION	TYPE OF CHECK	RECOMMENDED FREQUENCY
Checking Dialysate	Conductivity	Check against standard conductivity solutions	At the beginning and end of each workday
		Check cell cup cleanliness	At the beginning and end of each workday
	pH	Check against standard buffer solutions	At the beginning and end of each workday
		Check sensor well cleanliness	At the beginning and end of each workday
	Temperature	No calibration required	—————
Checking Water Quality	Conductivity	Check against standard conductivity solutions	Monthly
		Check cell cup cleanliness	Monthly
	Resistivity	No specific check required — calibration based on Conductivity calibration	—————
	TDS	Check against standard solution	Monthly
	pH	Check against standard buffer solutions	Every 2 weeks
		Check sensor well cleanliness	Every 2 weeks
	ORP	Automatically calibrated during pH calibration	—————
	Temperature	No calibration required	—————

B. Calibration Tracking Records for General Use (Not Dialysate)

To minimize your calibration effort, keep records. If adjustments you are making are minimal for your application, you can check less often. Changes in conductivity calibration should be recorded in percent. Changes in pH calibration (D-6) are best recorded in pH units.

Calibration is purposely limited in the Dialysate Meter to ±10% for the conductivity cell, as any change beyond that indicates damage, not drift. Likewise, calibration changes are limited to ±1 pH unit, as any change beyond that indicates the end of the sensor's lifetime and replacement is recommended.

WARNING: For Dialysate measurements, it is critical that you verify that the pH sensor is working at the beginning and end of each workday or more often if required by your clinic's internal procedures.

C. Conductivity, RES, TDS Practices to Maintain Calibration

Note: Very active chemicals may discolor the conductivity electrodes (though this is not likely in clinical use).

- *This does not affect the accuracy of conductivity measurements.*

1. Clean oily films or organic material from the cell electrodes by pouring isopropyl alcohol or squirting a foaming non-abrasive cleaner into the cell and rinsing (see Cleaning Sensors, pg. 34).
   - **DO NOT** scrub inside the cell.

2. Calibrate with solutions close to the measurements you make. Readings are compensated for temperature based on solution type. If you choose a solution type that does not closely match the characteristics of the solution you are trying to measure, your records of calibration changes will reflect temperature changes more than changes in the instrument's accuracy. For example, if you choose to measure tap water solute concentration in KCl mode, but you calibrate with 442 because it is handy, the further away from 25ºC the tap water sample is, the more error there will be in the temperature-compensated reading. *Note: Dialysate conductivity measurements **MUST** be set to NaCl.*

3. Rinse out the cell with pure water after taking measurements.
   - Allowing slow dissolving crystals to form in the cell contaminates future samples.

4. For maximum accuracy, keep the pH sensor cap on tight so that no fluid in the pH sensor well washes into the conductivity cell.

D. pH and ORP Practices to Maintain Calibration (D-6)

1. **ALWAYS** keep the sensor wet with Myron L pH Sensor Storage Solution when not in use. If the pH/ORP sensor is allowed to dry out, its accuracy will be significantly compromised.

2. Rinse and fill pH/ORP sensor well with pH Sensor Storage Solution immediately after each use.
   - **NEVER** use distilled water or tap water as a substitute for pH Sensor Storage Solution. This will deplete the sensor quickly, significantly decreasing its lifespan.
   - If pH Sensor Storage Solution is unavailable, use:
     - An almost saturated KCl solution (preferred)
     - A saturated solution of NaCl (table salt) and tap water (next best alternative)
     - pH 4 buffer (least desirable alternative).
   - Replace with Myron L pH Sensor Storage Solution as soon as possible.
   - Make sure the pH/ORP sensor cap is reinstalled securely over the pH/ORP sensor well.

ORP calibration solutions are caustic, and ±5% is considered very accurate. By using the pH zero setting (0 mV = 7 pH) for ORP and precision electronics for detection, the D-6 delivers better accuracy without calibration than a simpler instrument could using calibration solutions.

XII. MEMORY

This feature allows up to 100 readings with their temperatures to be stored simultaneously for later recall. At the same time, the TIME and DATE are also recorded. Memory download to a computer requires the bluDock™ accessory package. Order MODEL # BLUDOCK.

A. Memory Storage

1. While displaying a measurement, press ▲ MS to record the displayed value.

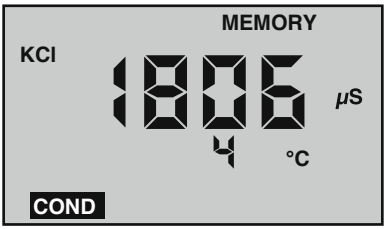

Figure 8

2. "MEMORY" will appear and the temperature display will be momentarily replaced by a number (1-100) showing the position of the record. Figure 8 shows a reading of 1806 µS stored in memory record #4.

B. Memory Recall

1. Press any measurement key.

2. Press MR ▼, "MEMORY" will appear, and the display will show the last record stored.

3. Press ▲/MS or MR/▼ to scroll to the record location desired (the temperature display alternates between temperature recorded and location number).

4. Press CAL/MCLR to display time and date stamp.

5. Press any measurement key to leave memory recall or allow to automatically turn off.

C. Clearing a Record/Memory Clear

After recalling a certain record location, press and hold CAL/MCLR to clear that memory. This space will be the place for the next memory record, unless you scroll to another empty position before ending the recall sequence. The next measurement stored will go into the next highest available memory location.

Example: You have locations 1-7 filled and wish to clear the conductivity reading stored in record location "3" and replace it with a pH reading.

1. Press MR/▼ and scroll to location "3".
2. Press and HOLD CAL/MCLR to clear old record "3".
3. Fill pH/ORP sensor well with sample.
4. Press pH to measure sample and press ▲/MS to store reading in location "3".
5. The next memory stored will go into location "8".
6. To clear all records: After pressing MR/▼, scroll down. "CLr ALL" will be displayed (see Figure 9).
7. Press CAL/MCLR. All records will be cleared.

XIII. TIME and DATE

The Time and Date may easily be changed.

A. Setting TIME

Time is always displayed in 24 hour time.

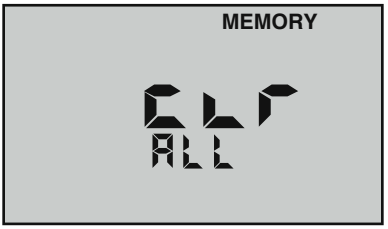

Figure 9

Example shown in Figure 10; 16:05 equals 4:05 PM.

1. Press COND.

2. Press MR ▼ until the time is displayed, scrolling through stored readings, "PC OFF", and "CLr ALL" to time, i.e.,"16:05".

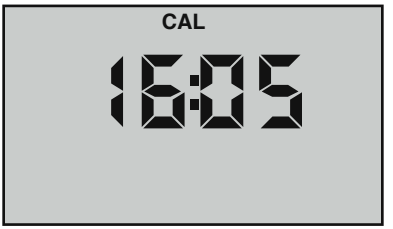

Figure 10

3. Press CAL MCLR to initiate. "CAL" will be displayed along with the time (see Figure 10).

4. Press ▲ MS or MR ▼ to change the time.

5. Press CAL MCLR to accept the change to the new time.

B. Setting DATE

Example shown in Figure 11 is in US format, i.e., mo/dy/yr. NOTE: The default format is US. Date format may be changed (ref. Date Format "US and International (Int)", pg. 28).

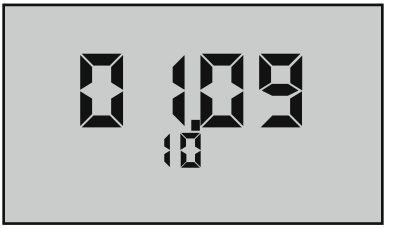

Figure 11

1. Press COND.

2. Press MR ▼ repeatedly until the date is displayed, scrolling through stored readings, "PC OFF", "CLr ALL", and time to date, i.e., "01.09/10" (January 9, 2010).

3. Press CAL MCLR to initiate. "CAL" will be displayed along with the year, "Yr" (see Figure 12).

4. Press ▲ MS or MR ▼ to change the year.

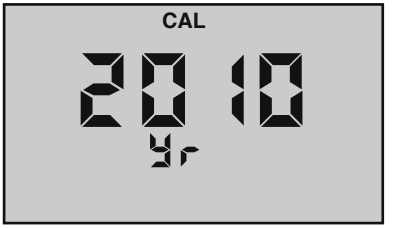

Figure 12

5. Press CAL MCLR to accept the change to the new year.

6. Press ▲ MS or MR ▼ to change the month.

7. Press CAL MCLR to accept the change to the new month (see Figure 13).

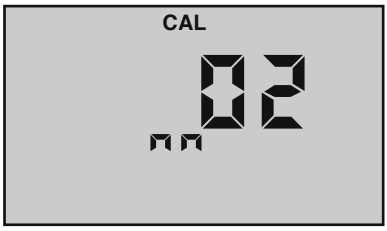

Figure 13

8. Press the ▲ MS or MR ▼ to change the day.

9. Press CAL MCLR to accept the change to the new day (see Figure 14).

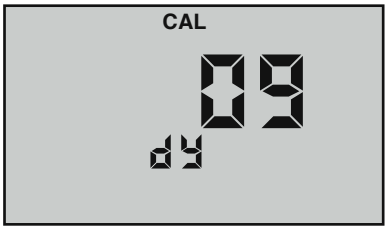

Figure 14

C. DATE FORMAT "US & International (Int)"

1. Press COND.

2. Press MR ▼ repeatedly until the format is displayed, scrolling through stored readings, "PC OFF", "CLr ALL", time, and date to date format.

3. Press CAL MCLR to change. Display will now indicate other format (see Figures 15 & 16).

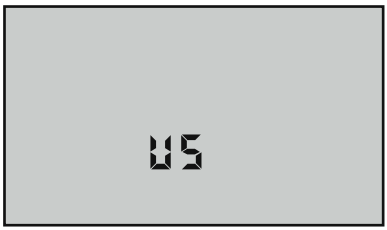

Figure 15

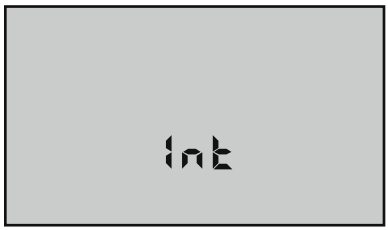

Figure 16

4. Press any measurement key or allow to automatically turn off.

XIV. TEMPERATURE FORMAT "Centigrade & Fahrenheit"

1. Press COND.

2. Press MR ▼ to display the stored memory records.

3. Press (MR ▼) repeatedly until you pass the “US” or “Int” date format location. The display will show a “C” or “F” (see Figures 17 and 18).

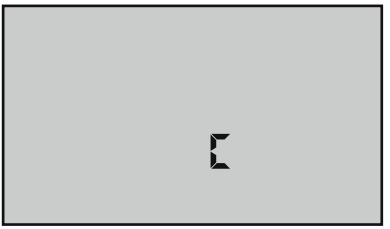

Figure 17

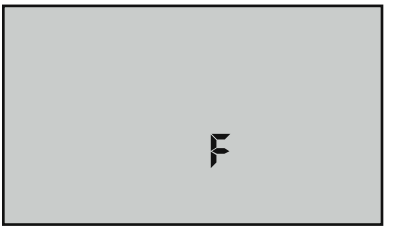

Figure 18

4. Press (CAL / MCLR) to switch units.

5. Press (COND) to accept unit preference for all temperature readings.

NOTE: *Tempco will still be shown in %/°C.*

XV. TOTAL RETURN to FACTORY SETTINGS “FAC SEL”

There may come a time when it would be desirable to quickly reset all the recorded calibration values in the instrument back to the factory settings. This might be to ensure all calibrations are set to a known value, or to give the instrument to someone else free of adjustments or recorded data for a particular application.
NOTE: All stored data will be lost.

CAUTION: After restoring its factory settings, **ALWAYS** recalibrate a Digital Dialysate Meter™ with reference buffers/solution before putting back into use.

1. Press (COND).

2. Press (MR ▼) to display the stored memory records.

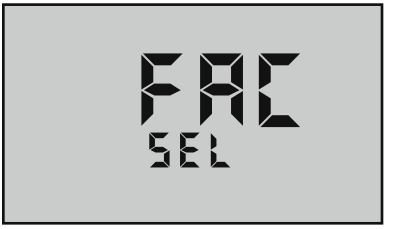

Figure 19

3. Press (MR ▼) repeatedly until you pass the “CLr ALL” and the “C”/“F” locations. The display will show “FAC SEL” (see Figure 19).

4. Press (CAL / MCLR) to accept the resetting. Display will return to Cond.

XVI. CELL CHECK

The cell check verifies the cleanliness of the conductivity/TDS/resistivity sensor. In normal use the cell may become dirty or coated and require cleaning. If the display is showing ".00" when the cell cup is dry, the sensor is probably clean. However, when testing high purity water in resistivity (RES) mode improved accuracy may be desired. No matter what a manufacturer claims, a sensor can and will become contaminated or coated and will therefore require cleaning. A true 4-wire sensor, as in the Dialysate Meter, helps to mitigate contamination, but NO SENSOR IS 100% IMMUNE.

1. Press (COND).
2. Press (MR ▼) to display the stored memory records.
3. Press (MR ▼) repeatedly until you pass the "FAC SEL" location. The display will show "CELL ch" (see Figure 20).
4. Press (CAL MCLR) to test. If cell is clean, "Good" will momentarily be displayed. (See Figure 21.) If cell is dirty, "CELL cLn" will be displayed (see Figure 22). (Ref. Cleaning Sensors, pg. 34.)

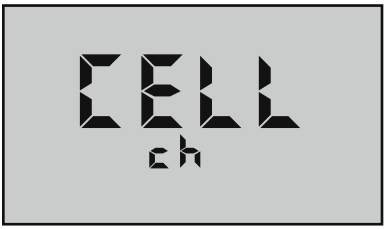

Figure 20

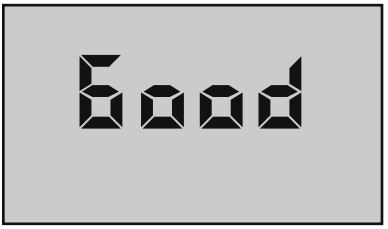

Figure 21

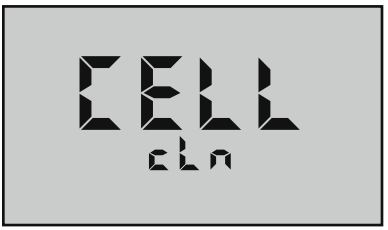

Figure 22

XVII. AUTO OFF

Auto off allows the user to adjust the time the instrument is ON (up to 75 seconds) after each press of a key. Default time is 15 seconds in measurement mode and 60 seconds in "CAL" (calibration) mode.

1. Press (COND).
2. Press (MR ▼) to display the stored memory records.

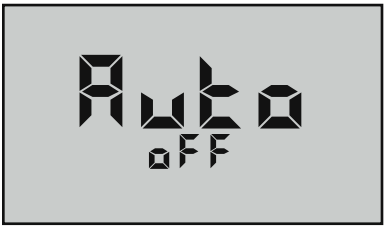

Figure 23

3. Press (MR ▼) repeatedly until you pass the “CELL ch” location. The display will show “Auto oFF” (see Figure 23).

4. Press (CAL / MCLR) to initiate. “CAL” will be displayed along with “15 SEC” (see Figure 24).

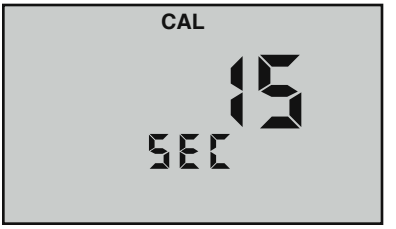

Figure 24

5. Press (▲ MS) or (MR ▼) to change the time (see Figure 25). Maximum time is shown.

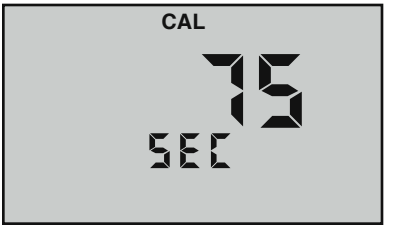

Figure 25

6. Press (CAL / MCLR) to accept the change (new time).

XVIII. “PC On” Mode

“PC On” mode enables data transfer to a personal computer when the wireless communication option is installed. (See page 40, G.) If this option is not installed, you can still put the unit in “PC On” mode, but the unit cannot transfer data. For complete data transfer instructions, read the operation manual included in the wireless communication accessory package.

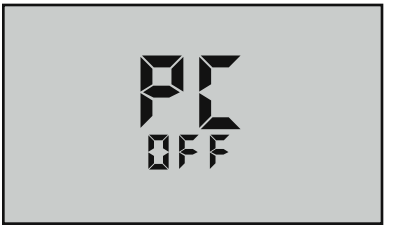

Figure 26

A. Enabling “PC On” Mode

1. Press any parameter button to turn the instrument on.

2. Press and HOLD (MR ▼) key until the menu “**PC OFF**” appears (see Figure 26).

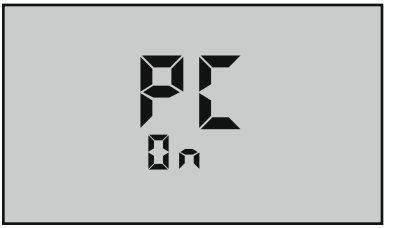

Figure 27

5. Press (CAL / MCLR) key. “**PC On**” will be displayed (see Figure 27).

NOTE: “**PC Ini**” may momentarily be displayed while initializing (see Figure 28).

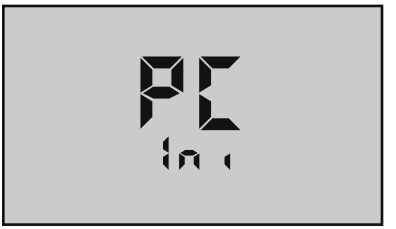

Figure 28

WARNING: Digital Dialysate Meter measurement data transferred to a personal computer using the wireless communication option is for record-keeping purposes only and is not intended for use in making treatment or diagnostic decisions.

XIX. CARE and MAINTENANCE

Dialysate Meters should be rinsed with clean water after use. Solvents should be avoided. Shock damage from a fall may cause instrument failure.

A. Temperature Extremes

- **NEVER** store or operate the Dialysate Meter outside of the temperature limits listed in General Specifications, pg. 6. This can damage the instrument and will void the warranty
- **DO NOT** leave a Digital Dialysate Meter™ in a vehicle or storage shed on a hot day. This can easily subject the instrument to conditions over 55°C/132°F.
- **DO NOT** put solutions below 0°C/32°F or in excess of 71°C/160°F in the sensor area. This may damage the sensor.
- **DO NOT** allow the pH/ORP sensor to freeze. This will damage the sensor.
- **DO NOT** leave a Digital Dialysate Meter™ in a vehicle or storage shed on a very cold day. This can easily subject the instrument to conditions below 0°C/32°F.
- **NEVER** use a Digital Dialysate Meter™ that has been stored or operated outside of its operating/storage temperature limits until it has been thoroughly checked by the maintenance staff of your facility to verify its operation and calibration.

B. Battery Replacement

If "LOBATT" flashes, replace the 9V alkaline battery. This icon warns that the battery level is significantly depleted and that the instrument is about to turn itself off before the charge level reaches a point low enough to affect measurements (see Figure 29).

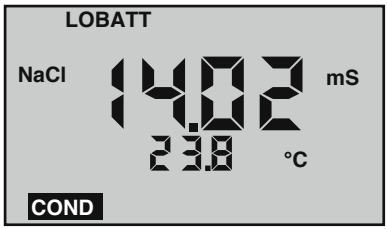

Figure 29

All calibration values are stored in non-volatile memory and are not affected by battery charge level.

PLEASE NOTE: ALWAYS replace the battery in a clean dry workspace away from water or other contaminants that can damage the instrument's circuitry.

WARNING: The case gasket **MUST** be flat and inserted all the way into the groove on the top case with **NO** kinks or twists.

- An improperly seated case gasket will allow moisture to leak into case that will damage the instrument.

Check the four screws.

- Each screw **MUST** have a small black O-ring around its shaft just under the head.
- Take care not to lose or damage the O-rings.

Dry Instrument THOROUGHLY. Remove the four (4) bottom screws. Open instrument carefully. Carefully detach battery from circuit board. Replace with 9 volt alkaline battery. Replace bottom, ensuring the sealing gasket is installed in the groove of the top half of case.

Tighten each screw until snug in the order shown in Figure 30. Then tighten each screw another ½ turn in the order shown in Figure 30.

NOTE: Though all calibration settings are protected even during power loss or battery replacement, loss of time and date may occur if battery is removed for longer than 3 minutes (180 seconds).

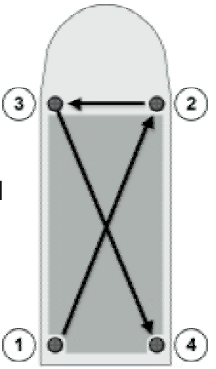

Figure 30

C. Preserving pH/ORP Sensor Function (D-6)

It is important to read and follow the instructions found in pH and ORP Practices to Maintain Calibration, pg. 24. In addition to these precautions:

- **DO NOT** leave high pH (alkaline) solutions in contact with the sensor for long periods of time. This will damage it.
- Samples containing chlorine, sulfur, or ammonia can poison the sensor.
    - If it is necessary to measure the pH of any such solutions, thoroughly rinse the pH/ORP sensor well and conductivity cell with clean water immediately after taking the measurement.
- **DO NOT** use a Digital Dialysate Meter™ to measure samples containing substances that reduce silver, such as cyanide.
    - These substances will damage the pH/ORP sensor.

D. pH/ORP Sensor Replacement (D-6)

WARNING: Only authorized members of your facility's maintenance staff should attempt pH/ORP sensor replacement. Complete installation instructions are provided with each replacement sensor.

WARNING: After replacing the pH/ORP sensor of your D-6 Dialysate Meter and **PRIOR** to putting it into use, **ALWAYS** perform a complete calibration of the following measurement functions with reference solutions/buffers:

- pH

- Conductivity
- TDS

Order model RPR. When ordering, be sure to include the model and serial number of your instrument to ensure receipt of the proper type.

E. Cleaning Sensors

1. Conductivity/TDS/Resistivity

The conductivity cell cup should be kept as clean as possible. Flushing with clean water following use will prevent buildup on electrodes. However, if very dirty samples — particularly scaling types — are allowed to dry in the cell cup, a film will form. This film reduces accuracy. Whenever a Conductivity Cell Cleanliness Check (Cell Check, pg. 30) indicates that the conductivity sensor requires cleaning ("CELL cLn"), use isopropyl alcohol or a foaming non-abrasive household cleaner. Rinse out the cleaner, and your Dialysate Meter is again ready for accurate measurements.

2. Checking pH/ORP Sensor Performance (D-6)

A Digital Dialysate Meter™ pH sensor measures the electrochemical potential between a 3.5 molar KCl solution inside the sensor and the solution being tested (outside of the sensor).
Over time, as the pH sensor operates, the KCl solution is gradually depleted. The rate at which this depletion occurs is very slow but is accelerated if the sensor is not cared for properly.

To check the age-related drift of your instrument's pH sensor junction:

1. Remove the protective cap from the pH/ORP sensor by grasping its sides and pulling up.
2. Rinse both the pH sensor well and the conductivity cell cup with 7.0 pH buffer solution at least 3 times.
3. Fill both the pH/ORP sensor well and the conductivity cell cup with 7.0 pH buffer solution.
4. Press (pH).
5. Press (CAL / MCLR).
   - Three icons will appear in the display: "CAL", "7" and "BUFFER".
6. **DO NOT** adjust the reading by pressing (▲ MS) or (MR ▼).

Assuming the pH buffer is good, this value represents the offset of the sensor.

- If the pH reading is above 8.0 pH or below 6.0 pH with 7.0 pH buffer solution, both the "7" and "BUFFER" icons will flash.
  - This indicates that the pH/ORP sensor needs to be replaced.

- If the pH reading is between 8.0 pH and 6.0 pH, calibrating the sensor (see pH Calibration, pg. 20) will correct the offset.

7. Press (pH) to return the instrument to measurement mode without changing the calibration of the instrument.

3. pH/ORP

CAUTION: **ONLY** authorized members of your facility's maintenance staff should attempt the following procedures.

The unique pH/ORP sensor in your Dialysate Meter is a nonrefillable combination type that features a porous liquid junction. *It should not be allowed to dry out.* However, if this occurs, the sensor may sometimes be rejuvenated by first cleaning the sensor well with isopropyl alcohol or a liquid spray cleaner, such as Windex™ or Fantastic™, and rinsing well. Do not scrub or wipe the pH/ORP sensor.

Then use one of the following methods:

1. Pour a HOT salt solution ~60°C/140°F — preferably potassium chloride (KCl) solution (Myron L pH/ORP Sensor Storage Solution) but HOT tap water with table salt (NaCl) will work fine — in the pH/ORP sensor well and allow to cool. Retest.

or

2. Pour DI water in the pH/ORP sensor well and allow to stand for no more than 4 hours (longer can deplete the reference solution and damage the glass bulb). Retest.

If neither method is successful, the sensor must be replaced.

Drifting can be caused by a film on the pH sensor bulb and/or reference (see Figure 31). Use isopropyl alcohol or spray a liquid cleaner such as Windex™ or Fantastic™ into the sensor well to clean it. The sensor bulb is very thin and delicate. Do not scrub or wipe the pH/ORP sensor.

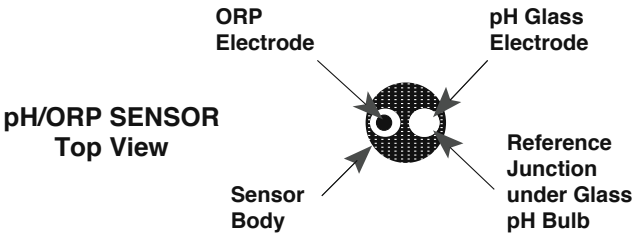

Figure 31

Leaving high pH (alkaline) solutions in contact with the pH sensor for long periods of time is harmful and will cause damage. Rinse such liquids from the pH/ORP sensor well and refill it with Myron L pH Sensor Storage Solution to extend the useful life of the sensor. If unavailable, you can use a saturated KCl solution, pH 4 buffer, or a saturated solution of table salt and tap water, but this should be replaced with storage solution as soon as possible.

Samples containing chlorine, sulfur, or ammonia can poison any pH electrode. If it is necessary to measure the pH of any such sample, thoroughly rinse the pH/ORP sensor well and conductivity cell with clean water immediately after taking the measurement. Any sample element that reduces silver, such as cyanide, will attack the reference electrode.

NOTE: The instrument's pH/ORP sensor has no field replaceable parts. Should the pH/ORP sensor require replacing, ref. pH/ORP Sensor Replacement (D-6), pg. 33.

XX. TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE
Meter won't turn ON	• Battery weak.
Inaccurate pH readings (D-6)	• pH calibration needed.
	• Contamination from residual pH buffers or samples in sensor well. • Calibration with expired pH buffers.
No response to pH changes (D-6)	• pH/ORP sensor bulb is cracked. • Electromechanical short inside the sensor body.
pH Zero Point calibration will not adjust down to pH 7.0 (D-6)	• pH/ORP sensor's internal KCl solution is depleted or contaminated.
pH readings drift or respond slowly to changes in buffers/samples (D-6) or "FAC" is displayed repeatedly	• Temporary condition due to the pH/ORP sensor's memory of solution in left in the sensor well for long periods. • Bulb dirty or dried out. • Reference junction clogged or coated.
Unstable Conductivity or TDS reading	• Dirty electrodes.
Unstable Resistivity readings	• Dirty electrodes. • Contamination of sample due to exposure to air resulting in samples with resistivity >1MΩ.
Unable to calibrate Conductivity or TDS	• Film or deposits on electrodes.
Resistivity readings much lower than expected	• Contamination from previous sample or from pH sensor well.
	• Test Sample is contaminated by Carbon dioxide absorbed from the air (commonly caused by using a standing sample).

CORRECTIVE ACTION
• Check battery connections or replace battery. (See Battery Replacement, pg. 32.)
• Recalibrate pH function. (See pH Calibration (D-6), pg. 20.)
• Thoroughly rinse sensor well. • Recalibrate using fresh buffers. (See pH Calibration (D-6), pg. 20.)
• Replace pH/ORP Sensor. (See pH/ORP Sensor Replacement (D-6), pg. 33.)
• Clean and rejuvenate sensor. (See pH/ORP, pg. 35.) • Recalibrate. (See pH Calibration (D-6), pg. 20.) • If no improvement, replace pH/ORP sensor. (See pH/ORP Sensor Replacement (D-6), pg. 33.)
• Clean and rejuvenate sensor. (See pH/ORP, pg. 35.) • Recalibrate. (See pH Calibration (D-6), pg. 20.) • If no improvement, replace pH/ORP sensor. (See pH/ORP Sensor Replacement (D-6), pg. 33.)
• Clean cell cup and electrodes. (See Cleaning Sensors, pg. 34.) • Minimize test sample exposure to air by using a flowing sample. Let sample flow continuously into conductivity cell with no aeration.
• Clean cell cup and electrodes. (See Cleaning Sensors, pg. 34.) • Minimize test sample exposure to air by taking a flowing sample. Let sample flow continuously into conductivity cell with no aeration.
• Clean cell cup and electrodes. (See Cleaning Sensors, pg. 34.)
• Rinse cell cup more thoroughly before measurement. • Ensure pH cap is snugly in place.
• Minimize test sample exposure to air by taking a flowing sample. Let sample flow continuously into conductivity cell with no aeration.

XXI. ACCESSORIES

A. Conductivity/TDS Standard Solutions

Your Dialysate Meter has been factory calibrated with the appropriate Myron L® Company NIST traceable KCl, NaCl, and our own 442™ standard solutions. Most Myron L conductivity standard solution bottles show three values referenced at 25°C: Conductivity in microsiemens/micromhos and the ppm/TDS equivalents based on our 442 Natural Water™ and NaCl standards. All standards are within ±1.0% of reference solutions. *Available in 2 oz., quarts/liters, and gallon/~3.8 liter bottles.*

1. Potassium Chloride (KCl)

The concentrations of these reference solutions are calculated from data in the International Critical Tables, Vol. 6. The 7000 μS is the recommended standard. *Order KCL-7000*

2. 442 Natural Water™

442 Natural Water Standard Solutions are based on the following salt proportions: 40% sodium sulfate, 40% sodium bicarbonate, and 20% sodium chloride, which represent the three predominant components (anions) in freshwater. This salt ratio has conductivity characteristics approximating fresh natural waters and was developed by the Myron L® Company over four decades ago. It is used around the world for measuring both conductivity and TDS in drinking water, ground water, lakes, streams, etc. 3000 ppm is the recommended standard. *Order 442-3000*

3. Sodium Chloride (NaCl)

NaCl solution most closely models the conductivity characteristics of dialysate in hemodialysis applications. Most Myron L standard solution labels show the ppm NaCl equivalent to the conductivity and to ppm 442 values. The 14.0 mS is the recommended standard. *Order NACL-14.0*

B. pH Buffer Solutions

pH buffers are available in pH values of 4, 7 and 10. Myron L® Company buffer solutions are traceable to NIST certified pH references and are color-coded for instant identification. They are also mold inhibited and accurate to within ±0.01 pH units @ 25°C. Order 4, 7 or 10 Buffer.
Available in 2 oz., quarts/liters, and gallon/~3.8 liter bottles.

C. pH Sensor Storage Solution

Myron L pH Sensor Storage Solution prolongs the life of the pH sensor.
Available in 2 oz., quarts/liters, and gallon/~3.8 liter bottles.

D. Soft Protective Carry Cases

Padded Nylon carrying case features a belt clip for hands-free mobility.

Two colors to choose from:
Blue - Model #: UCC
Desert Tan - Model #: UCCDT

E. Hard Protective Carry Cases

Large case with 2 oz. bottles of calibration standard solutions (NACL-14.0, 442-3000, 4, 7, & 10 pH buffers and pH Sensor Storage Solution). *Model #: PKD*

Small case (no calibration standard solutions), *Model #: UPP*

F. Replacement pH/ORP Sensor (D-6)

pH/ORP sensor is gel-filled and features a unique porous liquid junction. It is user-replaceable and comes with easy-to-follow instructions. *Model #: RPR*

G. bluDock™ Bluetooth® Wireless Communication Package

Package includes Dialysate Meter hardware modification that allows the unit to communicate wirelessly with a personal computer configured for wireless device communication. Package also includes U2CI software application that will operate on Windows XP, Vista and 7*, and Macintosh OSX** based computer systems and Bluetooth USB adapter (dongle) for computers that do not have Bluetooth capability. *Model #: BLUDOCK*

Dongle ordered separately, Model #: BDDO

NOTE: Bluetooth® is a registered trademark of Bluetooth SIG. The bluDock Bluetooth module is a registered Bluetooth device.

XXII. SOFTWARE VERSION

Contact the Myron L® Company to see if a software upgrade is available.

1. Press (COND) key.
2. Press (MR ▼) key until three numbers are displayed as shown in Figure 32.
3. Press (COND) key; instrument will time out in approximately 15 seconds.

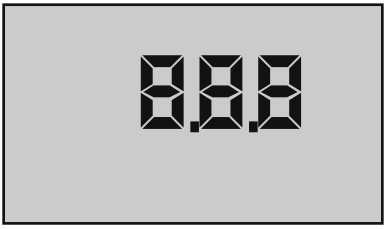

Figure 32

* Windows 2000, 2007, XP & Vista are registered trademarks of Microsoft Corporation.
** Macintosh OS9.2 & OSX are registered trademarks of Apple Computer Inc.

XXIII. MYRON L TECHNICAL SUPPORT

If you require assistance with any aspect of the operation and maintenance of this product, please contact the Myron L® Company Monday through Friday, from 7 a.m. to 3:30 p.m. Pacific Time. Our technical support staff can be reached quickly by phone at **+1-760-438-2021**. Alternatively, you can contact us by e-mail: **techquestions@myronl.com**

XXIV. ADDENDUM

XXV. NOTES

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