BIOMEDX BEV Set

For multi-parameter fluid/colloid suspension measurement.

Instructions

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BIOMEDX

BEV Set
(Bio-Electronique Vincent)

Multi-Parameter Fluid Measurement Tools

Measuring:

pH, ORP, Conductivity.

The Biomedx BEV set is composed of 3 simple electronic measurement tools with probes for easily measuring the electrical parameters of liquid (water based) mediums. BEV is the acronym for Bio-Electronique Vincent. It was the hydrologist Professor Louis Claude Vincent who immersed himself into the concepts of identifying the “perfect” parameters for water within an environment

In the 1950’s and 60’s Vincent published data showing why in certain areas of France there was a higher incidence of degenerative diseases like cardio vascular disease and cancer then there were in other areas. The reasons appeared to boil down to the fact that the electrical properties of the water in the ill health districts were skewed away from the ideal electrical properties that support health. Differences in chlorination practices, anionic and cationic mineral ratios and filtration all affect the measurable electrical characteristics of water. There is a healthy range, and the range above and below that which is not conducive for ideal health.

The Biomedx BEV set can be a cornerstone for measuring the parameters of the terrain of the soil on the farm, the qualities of the pond, the river, or the well behind the house, or even the internal fluid environment of the body.

OVERVIEW

The BEV set is composed of 3 separate meters, pH, ORP and Conductivity. The pH and ORP meters are placed into a base holding unit. The electrodes are then plugged into the proper meter, the pH/ORP leads are labeled as such.

Depending on how your lab table is set up, you might run your electrode lead wires to the back to keep them clear of the work area.

Combination pH & ORP probe.

Installing Batteries

Batteries are preinstalled on the pH and ORP meters. Here is the battery compartment on a meter.

Batteries are usually not preinstalled in the conductivity meter so you will need to do that.

The conductivity meter can be pushed out of its rubber boot.

Battery compartment is in the back. (4 alkaline AAA batteries.)

The jack end of the conductivity probe is plugged into the top of the conductivity meter.

The probe shown here has a small rubber squeeze bulb attached vs. the larger silicon bulb as shown in the top picture.

You will note another probe also comes with the meter. This is a k=1.0 electrode for large sample water testing, we do not use it for the BEV work.

QUICK REFERENCE QUIDE TO METER USE & CALIBRATION

In the back pocket of this binder you will find the manufacturers instruction sets for the BEV set meters/testers. What follows is a quick reference and notes particular to our work.

Note that the mfg instructions are for multiple model number units. The pH and ORP testers we use have the same model number 10BNC, the Conductivity tester is CON 6.

pH METER

Plug your pH electrode wire into the BNC connector at the bottom of the unit. (For more info on the pH/ORP probes see that section in the manual.)

When setting up your pH meter, as it would be for any pH meter, there are various settings that must be made. Of important note is that when any probe is plugged into the meter, the meter will give a reading but that reading may be in error as all electrodes have varying voltage outputs. So any time an electrode and meter come together, the meter must be calibrated to the electrode.

A pH electrode is calibrated to a pH meter using known calibration standards or pH buffer solutions. Standard pH calibration buffer standards are 4.01, 7.00 and 10.01. For our purposes we calibrate at 4.01 and 7.00. This is called dual point calibration.

Within the meter itself are calibration standards based on USA or NIST standards. We will use USA standards.

NOTE: Your meter has 3 buttons, ON/OFF CAL HOLD/ENT

Pressing one or a combination of these will put you into different modes of the meter.

For Calibration the First Time, Select Your Buffer Standard

You will need to select USA calibration standards.

With the unit off, while pressing down the HOLD/ENT button, turn on your tester by pressing the ON/OFF button.

Your display will flash either **USA** or **nSt** - press CAL to toggle between them. You want USA, press HOLD/ENT to confirm the selection.

Set your Room Temperature on the Meter

While in measurement mode, press HOLD/ENT to bring the meter to “HOLD” mode.

Press CAL button keeping it held down continuously to switch to °C or °F mode,

Release the CAL button to confirm your mode selection and the display will go to the manual temperature calibration mode with the upper display flashing. The upper display shows the adjustable temperature value and the lower display show the last set temperature offset.

Press the HOLD/ENT button to set the upper display to your room temperature.

Once the setting is reached, release the HOLD/ENT button. The new value is automatically confirmed and returns to the measurement mode if no button is pressed after 5 seconds.

(Technically the temperature setting should be your sample temperature but with a small sample size this will equilibrate to your probe and sample container temp fairly quickly which is likely your room temp. If you are putting your probe into a fresh cup of urine on the other hand, this may be warmer than your room temp but it will not amount to that large of a pH shift to matter much. If desired, you could use a slightly increased temp setting above your room temp to “split the difference” so to speak, but again the pH shift due to temp will be minor.)

pH Calibration

Calibration should be done regularly, first thing in the morning is a good habit.

We will assume your USA standards are selected.

We will calibrate at two points, 4.01pH and 7.00pH.

Press ON/OFF to turn the unit on.

Take your electrode out of its storage container (or from wherever it is located), rinse (with distilled water), blot dry, and place the electrode into a test tube that has a bit of 7.00 calibration buffer. (Remember that the calibration buffer fluid must reach up to the reference junction of the probe to have an accurate reading.)

Press CAL to enter calibration mode. The CAL indicator will be shown on the meter window. The top number displayed will show the reading based on the last calibration while the lower part of the display will indicate the pH standard of the buffer to which you are calibrating.

Press HOLD/ENT to confirm you want your electrode to calibrate to the selected 7.00pH buffer.

Once this is done the upper number will read 7.00pH and the lower part of the display will be toggling between the next buffer solutions for the next calibration point.

Take the electrode out of the 7.00pH buffer, rinse and blot dry and place the electrode into a test tube with 4.01pH buffer. The bottom of the display will shift to 4.01, let the probe stabilize for a bit and press HOLD/ENT to lock in the 4.01 calibration point.

Press CAL to exit to measurement mode.

You are done calibrating the probe to the meter.

pH Measurement

Once calibrated you are ready to make a measurement. Turn unit on. Place the electrode into your sample, read the pH value when stable. Turn unit off after measure. If no button is pressed in 8.5 minutes, the unit will turn off automatically to conserve battery.

HOLD function

Press HOLD/ENT button to freeze the measurement value, a “HOLD” indicator will show on the display, press HOLD/ENT again to release the freeze.

Changing Batteries

There is a battery indicator on the display. 3 bars indicate the battery is full. 2 bars indicate 50% of the battery is left. 1 bar indicates 25%.

Blinking battery indicator notes need to replace batteries.

Open battery compartment lid (screws off).

Remove old batteries and replace with fresh ones.

Note polarity.

ORP METER

Plug your ORP electrode into the BNC connector at the bottom of the unit. (For more info on the pH/ORP probes see that section in the manual.)

If you plug any ORP probe into an ORP meter and test any sample, the meter without calibration will always give you a 'default' value which is essentially the raw mV reading the meter is reading directly from the electrode. When setting up your ORP meter, as it would be for any ORP meter, you should calibrate the voltage output of your ORP probe to the meter with a known calibration standard. We use a 200mV calibration standard.

Calibration

Take your electrode out of its storage container (or from wherever it is located), rinse (with distilled water), blot dry, and place the electrode into a test tube that has a bit of 200mV calibration standard. (Remember that the calibration fluid must reach up to the reference junction of the probe to have an accurate reading.)

Press CAL to enter calibration mode. The screen will switch to a dual display with the upper display flashing the relative mV value to be calibrated and the lower display showing the default measurement value of the sample. The **CAL** indicator will also be shown on the screen replacing **MEAS** to indicate that the tester is in calibration mode.

Immediately press and hold the HOLD/ENT button to scroll the reading to match your 200mV calibration solution. Release the button when value is reached and wait 5 seconds for automatic COnfirmation. The primary display will stop flashing and the secondary display will automatically show **CO** before the screen returns to the single display measurement mode. The **mV** symbol on the display will now change to **R.mV** indicating that the value displayed is a relative mV value of the default non-calibrated measure.

Making a Measurement

Basic: Turn unit on. Dip electrode into sample to be tested, stir once and allow sample to stabilize for 2 to 5 minutes. Note the ORP value. You can press HOLD/ENT button to freeze the reading if desired. (Pressing HOLD/ENT again releases the freeze.) Turn tester off after measurement. If no button is pressed in 8.5 minutes the unit will turn itself off to conserve battery.

Note: According to some chemists and electrode engineers biological samples due to their active nature should be consistently stirred when measuring and it could take many minutes for a reading to stabilize. A procedure to come to some consistency when measuring urine and saliva for example has been ascertained by Biomedx as follows; always stabilize your electrode in 200mV calibration solution for a few minutes before making a measurement. When your electrode is placed in the sample (if urine stir once and if saliva in a microtainer push the electrode up and down once before letting the electrode sit) set a timer for 2 minutes and make your reading (whatever it is) at the two minute mark. This ORP value at the 2 minute mark will be entered into your software to calculate your rH2 value. Remember that our electrode is a combo probe that also is measuring pH so when you have a pH value which will be given at the same time you are getting your ORP value, that number will be entered as well.

Changing Batteries

There is a battery indicator on the display. 3 bars indicate the battery is full. 2 bars indicate 50% of the battery is left. 1 bar indicates 25%.

Blinking battery indicator notes need to replace batteries.

Open battery compartment lid (screws off).

Remove old batteries and replace with fresh ones.

Note polarity.

Self Diagnostic Message

Or / **Ur** Electrode is not in contact with sample or electrode is failing.

Er.O mV calibration error while attempting to calibrate tester to a value which is out of range.

Reset to Factory Default

You can reset the ORP calibration to the factory default by using the user reset function.

Switch off the tester. While pressing the CAL button, press and release the ON/OFF button to enter 'User Reset' selection menu. The screen will display **rSt** on the bottom of the display with a flashing **nO** selection. Press CAL to toggle between **nO** and **YES** selection. **nO** deactivates the reset selection and **YES** activates the reset back to the factory default. Press HOLD/ENT to confirm the selection.

CONDUCTIVITY METER

Meter display:

The meter has a large custom LCD that consists of 4-digit segments and operation 'annunciators' or display areas for **uS/mS** (microsiemens/millisiemens) and **°C** (temperature). You can also see displayed **HO** when the HOLD function is activated and **LO** for a low battery condition.

Buttons:

There are 6 keys on the keypad and some buttons have several functions depending on its mode of operation.

ON/OFF

Turns unit on and off, when unit is switched on it goes directly to measurement mode.

CAL

Enters calibration mode for conductivity and temperature.

HOLD/ENTER

Pressing HOLD freezes the measured reading, pressing again releases freeze. Pressing this button as 'ENTER' also confirms values in calibration mode and selections in SETUP mode.

/ and **\/**

Up and down arrow buttons. In calibration mode, press these to move through calibration values.

In Setup Mode: Press to scroll through the setup sub-group programs.

Press /\ the up arrow button during conductivity measurement mode to activate manual ranging function with each key press moving conductivity up to a higher range. Note that for our purposes in BEV testing we will always be using the auto ranging feature of the meter.

MODE

Selects measurement mode for conductivity and temperature.

When pressed together with ON/OFF it will take you into the SETUP mode. This allows setting meter preferences such as electrode cell constant, normalization temp and temp coefficient factor, automatic or manual calibration, single or multi-point calibration, and to reset meter to factory default.

Preparing Your Unit for Operation

If your conductivity meter was purchased as part of a Biomedx BEV Set package, it is possible that the batteries have already been installed and the initial meter setup has been done prior to it being shipped out. This means that in addition to the batteries being installed, the proper cell constant of our small sample electrode - K=10 - has been entered , the default temperature of 25 °C has been set, automatic ranging has been selected and manual calibration selected. Oftentimes this is not the case and you MUST set the unit up for proper operation.

Batteries: Remove the unit from its rubber boot by pushing it out from the bottom edges of its boot. (See picture on bottom right of page 5.) Flip unit over to access battery compartment. Uses 4 AAA alkaline batteries. When replacing batteries make sure unit is powered OFF before replacing. Note proper polarity of batteries when inserting.

When battery power gets low during operation, you will see the **LO** indicator on the display screen in the upper left corner of the display.

Connecting electrode: Plug the male BNC connector of your electrode wire to the BNC female connector on top of the meter. (Push connector down and turn clockwise to lock it in place. Do the opposite to disconnect.)

Power On: When switching the unit ON, it will go through a series of displays showing the various setup parameters.

1st screen shows **Con 6** (the meters name).

2nd screen shows **C.1.0** or perhaps **C.10.0** which is the Biomedx conductivity electrode cell constant, k. (Different cell constants can be input if required with different probes. The mfg supplies a k=1 probe with the Con 6 unit but it requires a large sample size and we do not use that for our BEV work.)

3rd screen shows **t 25.0 °C** which is the normalization temperature. We typically leave this value as is.

4th screen shows **t 2.1%** which is the temp coefficient. This is also left as is.

5th screen will light up all LCD segments for 2 seconds and then change into…

6th screen measurement mode.

Switching Between Conductivity and Temp Measurement Mode

At the top of the unit you can plug in a temperature sensor (next to the BNC conductivity jack) to measure temperature or for automatic temp reference for conductivity when making a conductivity measurement. To switch between measuring conductivity or temperature, simply press the MODE key. The display will show either **uS** or **mS** for conductivity or **°C** for temperature mode.

IMPORTANT—Preparing Your Unit for Calibration

Before starting calibration you must make sure your unit has the correct settings for the Biomedx k=10 conductivity electrode cell constant and manual calibration with a single point calibration.

Setting cell constant:

With the meter switched off, press ON and MODE simultaneously holding both keys for 2 seconds. Release the ON button first before releasing the MODE button.

StUP will appear momentarily and **CELC** will appear next on the display. (Pressing the up and down arrow buttons will cycle you through the setup menu CELC, ACAL, t.Co, t.ne, S.P.CA, UrSt.) We want CELC (for cell constant) so...

Press ENTER. Use the arrow buttons to select 10.0 for the Biomedx electrode. (If using another electrode you would select the proper cell constant for that probe.) Press ENTER. Note that sometimes the unit will display –10.0, that is okay, select that.

Press the arrow buttons to move to the next menu item you want to alter or press CAL to exit to measurement mode. But if this is the first time using the meter, you will want to continue and set the following as well.

Setting Automatic Calibration OFF:

We want to manually calibrate our probe to 7.00mS so need to turn ACAL - automatic calibration - off. If you were still in the above setup menu after setting the cell constant, push the arrow buttons until ACAL is displayed. (If starting from a switched off unit, press ON and MODE at same time for 2 seconds to enter setup mode and use arrow buttons to go to ACAL.)

Press ENTER when ACAL is displayed and use arrow buttons to select NO. Press ENTER to accept the NO selection and this will return you to the menu to select another setup item with the arrow buttons or press CAL to exit to measurement mode.

Single Point Calibration:

S.P.CA This refers to calibrating at one conductivity point. If you were still in the above setup menu after setting CELC or ACAL , push the arrow buttons until S.P.CA is displayed. (If starting from a switched off unit, press ON and MODE at same time for 2 seconds to enter setup mode and use arrow buttons to go to S.P.CA .)

Press ENTER when S.P.CA is displayed and use the arrow buttons to select YES. Press ENTER to accept the YES selection and this will return you to the menu to select another setup item with the arrow buttons or press CAL to exit to measurement mode.

We leave t.nr at 25.0 °C and t.Co at 2.1%.

If you want to return to the factory default values select YES for UrST.

Calibration

If necessary press MODE to select the conductivity mode.

> Note: your conductivity electrode has platinum coated electrodes and these need to have been wet (stored in distilled water) for approximately 1/2 to one hour prior to calibration for the electrode to give stable measurements moving forward from that point. You could calibrate a dry electrode to your calibration standard and then make an immediate measurement but note that once the electrode is wet for a while that calibration will no longer be valid and you would need to calibrate again once the electrode stabilized.

Remove your electrode from its distilled water in its storage test tube and squirt out and/or shake off any excess water and dry the external probe.

Pour off a small amount of some 7.00mS conductivity standard into a small medicine cup.

Suck up some of the 7.00mS calibration fluid into the electrode making sure the fluid goes past the upper electrode (connecting both the bottom and top electrode with the fluid) and then squirt this out into a paper towel as waste. Do this again. On the third or fourth time at sucking up some calibration fluid - making sure the fluid is connecting the two internal electrodes of the probe - let the reading stabilize and press CAL. **CA** will appear on the display for 1.5 seconds and a value will appear flashing.

Wait for the value to stabilize and press the up or down arrow buttons to adjust the value to 7.00mS which is your calibration standard.

Press ENTER. The **CO** indicator will appear for 1.5 seconds and the calibration is successfully performed. The meter will return to measurement mode.

Troubleshooting

See page 35 of the meter manual that is in the box with your meter or in the back pocket of this binder which is where you should keep it for future reference.

Error Codes

See page 36 of the meter manual.