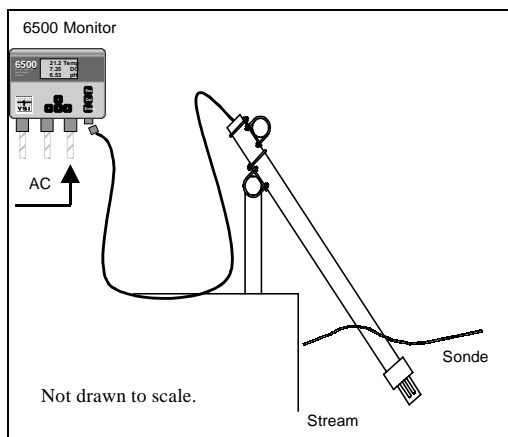


FIELD OPERATION GUIDE

YSI 6500 Environmental Process Monitor

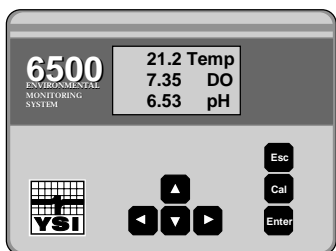
The YSI 6500 monitor combined with the YSI 6-series multi parameter sondes is intended for use in water quality monitoring applications. The sondes are able to measure up to 15 different parameters. The sensors are all located in the submersible sonde that also contains signal circuitry and communications circuitry that transmit sensor readings via SDI-12 protocol to the 6500.

Typical 6500 monitoring system configuration



For installing the monitor more than 25' and up to 250' from the sonde, use an optional YSI breakout box and patch cable with user-supplied wire. For using the monitor with more than one sonde, use the YSI # 6508 Junction Box. See Appendix D of the 6500 Operations Manual for installation details.

Monitor user interface



In Run mode view parameter readings from the LC display. Press **Esc** and **Enter** simultaneously to enter *Main* menu for setup. Press **Cal** to enter calibration menus for field calibrations. Use the arrow keys to scroll through readings or menu choices.

Visually check display for one or more of the multi parameter sensor readings. Record for hard copy reporting.

Configure set points for up to four relays resident in the 6500 to activate alarms or automatic phone dialer.

Output sensor readings using up to eight 4-20 mA current loop channels for integration with plant SCADA system or recorder.

INITIAL SETUP

Once the 6500 Environmental Process Monitoring system is installed and properly powered, use the 7 keys on the 6500 to set up your system. The 6500 powers up to Run mode (readings displayed). If necessary, adjust contrast by pressing and holding the **Cal** key while using the up/down arrow keys. To begin setup press **Esc** and **Enter** keys simultaneously for one second to view the *Main* menu display. To move backward one level in the menu press **Esc**.

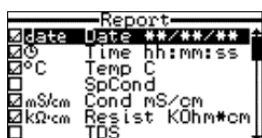
Both the Sensor and Report menus deal with the sonde configuration. Highlight *Sensor*, then press **Enter** to enable or disable the sensors installed on your sonde. In a similar manner enter the *Report* menu and select or deselect the parameters and units of measurement that you prefer.



Note from the display that temperature, conductivity, dissolved oxygen and pH sensors are enabled. Additional choices are shown.



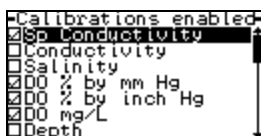
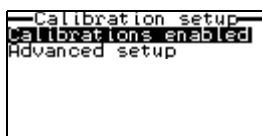
Each parameter has a submenu that is used to select the parameter units or to disable the parameter entirely. Highlight the desired parameter and press **Enter** to access the parameter submenu. Change to the desired units using the up/down arrow keys and make your choice by pressing **Enter**.



In order to calibrate sensors from the 6500 Monitor you must enable the appropriate sensors and units using the Calibrations enabled menu. Highlight *Calibration setup* from *Main* menu, then *Calibrations enabled*, then press **Enter**.

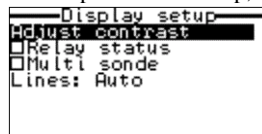
Again, highlight then press **Enter** to choose the parameters you would like displayed when calibrating from the 6500 keyboard. Note that some choices shown are not available with the sonde. Note also that temperature need not be calibrated. To program *Advanced setup*, see Section 2, *Sondes*, of the *Sonde* manual.

To complete initial setup, highlight *Display*, then press **Enter**. This menu allows you to activate a status bar for relays, adjust contrast, configure the display for multiple sondes, and set the number of lines for the *Run mode* display. The choice *Auto* allows you to display all selected parameters on one screen.



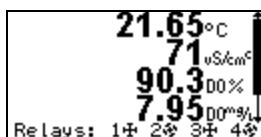
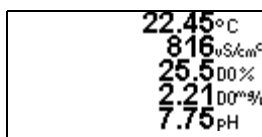
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In the example on the left all parameters are displayed on one screen. In the example on the right, the relay status indicators show that relays 2 and 4 are active and that additional parameters appear off the screen as indicated by the "scroll bar" on the right side. Use up/down arrow keys to observe the parameter(s) not in view.

In the example on the left all parameters are displayed on one screen. In the example on the right, the relay status indicators show that relays 2 and 4 are active and that additional parameters appear off the screen as indicated by the "scroll bar" on the right side. Use up/down arrow keys to observe the parameter(s) not in view.

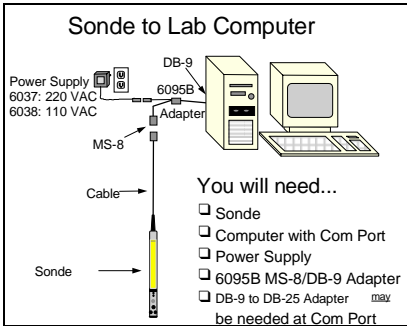


YSI Incorporated

CALIBRATION OPTIONS

There are several approaches to calibrating the sonde sensors for use with the 6500 Monitor. Options 1-3 all depend on an installation where convenient disconnection and removal of the sonde is desirable. See Section 4 of the 6500 Operations Manual for detailed calibration instructions. Options 2 and 4 are described in this guide.

1. Remove the sonde from the deployment site and

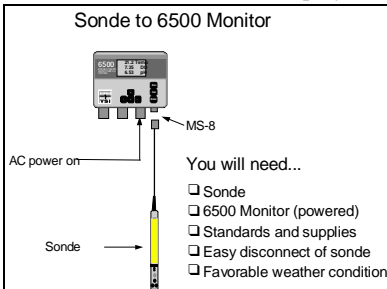


take it into a laboratory environment. Use EcoWatch software to communicate with the sonde calibration software.

Perform routine maintenance and calibration in the lab using this approach. See

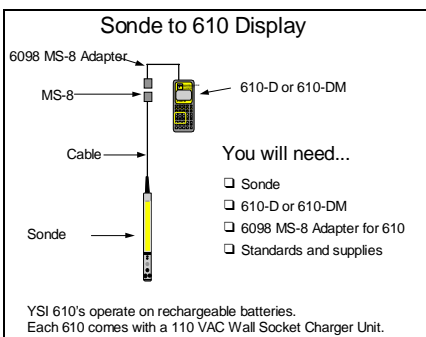
the 6-Series Sonde Operation Manual, Section 2, for more information.

2. Perform calibration at the deployment site. If the 6500



monitor resides near the sonde, use the 6500 calibration software to calibrate the sonde. You will need to transport a few calibration standards and supplies to the site. Unfavorable weather may make this approach difficult at times.

3. Perform calibration with a YSI 610 display/logger. The



610 acting as a terminal device can communicate directly with the sonde. This approach may be used at the deployment site since the 610 is battery powered. Alternatively, the sonde may be taken into a laboratory

environment and used with the 610 in a more hospitable environment when weather is a factor.

4. Perform an *in situ* calibration using the 6500 calibration software. You need not disconnect the sonde from the 6500. There is a significant advantage if the sonde and 6500 reside closely together at the deployment site.

To perform this type of calibration you will need reliable portable meters to make measurements as near to the sonde as possible. Compare the readings and adjust the 6500 to read the same as the portable meter. There are some disadvantages to this approach which include the inability to do a close-up visual inspection of the sonde, and the limitation that these types of calibrations are “one-point”, so that slope is not able to be adjusted.

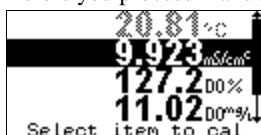
FIELD CALIBRATION

Below are instructions for calibrating the sonde sensors using the 6500 monitor. If the monitor is mounted outside and the air temperature is below freezing, take care not to expose the sensors for prolonged periods during calibration. Below is a list of supplies you will need to take to the deployment site. Also, you need to know the local barometric pressure for DO calibration.

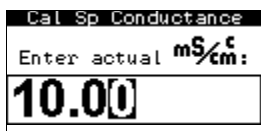
- ✓ Bucket of clean water to rinse sonde body between cals.
- ✓ Small brush for cleaning the conductivity cell ports.
- ✓ Calibration/storage vessels provided with the sonde.
- ✓ Standards for pH (pH 7 and one other buffer for 2-point cal).
- ✓ Conductivity standard (KCl, usually 10 mS/cm at 25°C).
- ✓ Latex gloves, towels, pre-rinse solutions, and lab notebook.

Conductivity Calibration

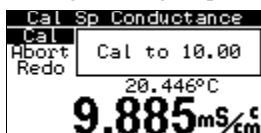
Before you proceed make sure that you have a clean, dry sonde and about 320mls of standard in the calibration cup. It is critical that the conductivity vent hole be completely submersed and that the reading is stable before confirming the calibration value.



With the sonde submersed in standard as described above, press **Enter** to display the *Specific conductance* screen. Using all 4 arrow keys

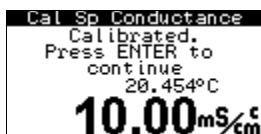


(left/right for digit, up/down to change value), enter the appropriate cal value, then press **Enter**.



A live display of specific conductance appears. With the highlight on *Cal*, press **Enter** to confirm the calibration.

A message will appear confirming the calibration and displaying the new value (e.g., 10.00 mS/cm).



If you choose to abort or redo calibration for any reason, highlight the appropriate choice above, press **Enter** and continue.

Remove the sonde from the standard. Rinse with water, shake excess water from sonde body and dry. Continue to the next standard by pressing **Esc** to return to the *Calibration menu*.

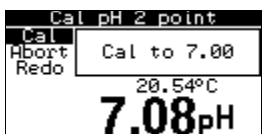
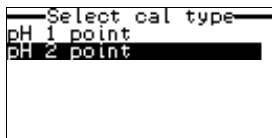
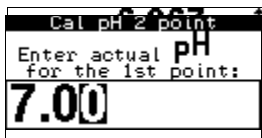
pH Calibration

Before you proceed make sure that you have a clean, dry sonde and about 200mls of standard in the calibration cup. Pre-rinse in used standard if possible. It is critical that the pH and temperature probes be completely submersed and that the reading is stable before confirming the calibration value.

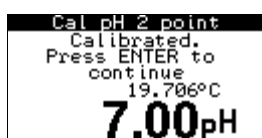
If performing a 2 or 3-point calibration, always start with pH 7. The more commonly used 2-point calibration is described below.

From the Calibration menu highlight pH then press **Enter**. Highlight the 2-point option as shown in the screen below, then press **Enter** to view the first cal point, pH 7 in this example.

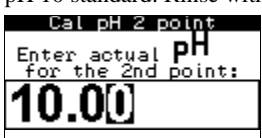
With the sonde submersed in standard as described above, press **Enter** to display the pH screen. Using all four arrow keys (left/right for digit, up/down for value), enter the appropriate cal value, then press **Enter**.



A live display of pH appears. With the highlight on **Cal**, press **Enter** to confirm the calibration. A message will appear confirming the calibration and displaying the new value (e.g., 7.00). If you choose to abort or redo calibration for any reason, highlight the appropriate choice above.

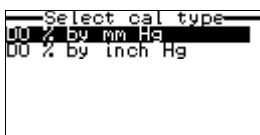
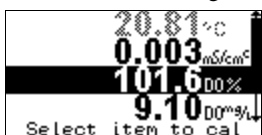


Remove the sonde from the pH 7 standard. Rinse with water; shake excess water from sonde body. Continue to the next standard (e.g., pH 10), pre-rinsing in used standard if possible. Proceed through the menu screens as shown above. Once the second point is calibrated, press **Esc** to return to the *Calibration menu*. Remove the sonde from the pH 10 standard. Rinse with water, shake excess water from sonde body and proceed to DO calibration.



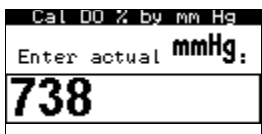
DO% Saturation Calibration

Place the sonde into the calibration cup with about 3mm (1/8") of water or a wet sponge at the bottom. Wait at least 10 minutes for probe acclimation before proceeding. From the Calibration display highlight the DO% reading and press **Enter** to display the choice for barometric reading.

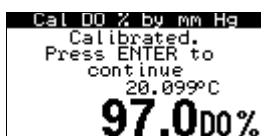
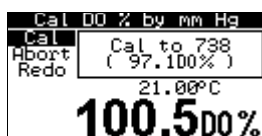


Choose the units for barometric pressure (e.g., mm Hg) and press **Enter**.

Next enter the current barometric pressure (uncorrected). If actual pressure is not known, use altitude to estimate the pressure. See Table 2 in Appendix F of the manual. Note that the cal to 738 mm Hg will result in a 97.1 DO% saturation for water-saturated air. Press **Enter** to proceed or choose *Abort* or *Redo* as before.



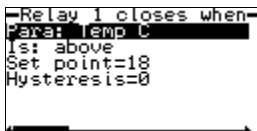
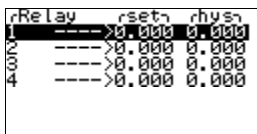
When the reading is stable for 30 seconds, press **Enter** to set calibration. Use **Esc** to return to previous menu screens.



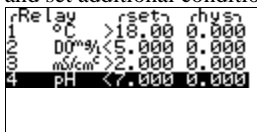
SET AND CHECK RELAYS AND 4-20 CURRENT LOOPS



set, hys menu shown to the left.



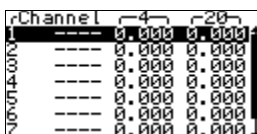
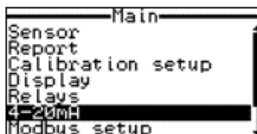
and set additional conditions



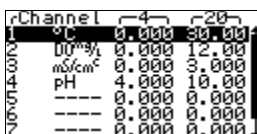
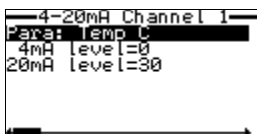
Relays and press **Enter**. As



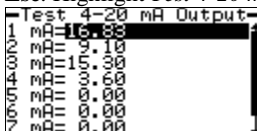
properly transmitted to the alarm or dialing device.



screen for that channel. See



To test 4-20 mA current loop outputs return to the 4-20 menu using **Esc**. Highlight *Test 4-20 mA* and press **Enter**. The values for each



channel represent what the sonde sensors are reading based on the configuration range that was assigned. Alternatively, press **Enter** and then use the arrow keys to enter a known mA value, e.g., 12 mA. This should equal 15°C based on the range assigned. Check your SCADA or recorder for accurate conversion.

There are 4 relays resident in the 6500 for which parameter limits may be set. From *Main* menu highlight *Relays* and press **Enter**. Choose *Configure Relays* in the next screen to display the *Relay*, set, hys menu shown to the left. For each of the 4 relays press **Enter** to activate the next display which allows you to assign parameter, condition and set point. Note, hysteresis (*hys*) or “dead band” allows you to manage relay “chatter” at the set point.

For each relay press **Enter** to activate the setup screen. For example, Relay 1 is set to close if the temperature rises above 18 °C. Use the left and right arrow keys to move to other relays and set additional conditions for additional parameters. The display to the left shows all 4 relays set for 4 different parameters.

To test relays press **Esc** to view the previous screen, then highlight *Test* and press **Enter**, the relay energizes (you may hear the click) and the relay icon begins spinning. In addition to this local relay test, you should also confirm that the relay signal is properly transmitted to the alarm or dialing device.

There are eight 4-20 mA current loop channels resident in the 6500 to which parameters may be assigned. From *Main* menu highlight *4-20mA* and press **Enter**. Choose *Configure 4-20mA* in the next screen to display the 4-20 channels.

Next highlight a particular channel and press **Enter**, to view the setup screen for that channel. See the example for Channel 1 shown to the left. Choose the parameter by highlighting *Para*, and then use the arrow keys and Enter key to assign the parameter. In a similar manner set the 4 and 20 mA levels for the low and high temperatures.

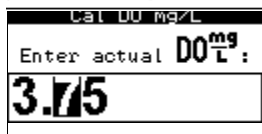
Use the left/right arrow keys to assign additional channels. Press **Esc** to view a list of all 4-20 channels. See the display to the left.

IN SITU CALIBRATION

As described on page 3, you may perform a one-point calibration of each of the parameters (except temperature). By this method leave the sonde deployed and use a portable meter to perform a spot

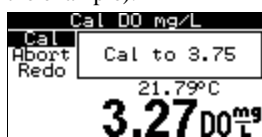


measurement that is representative of the sample stream, then adjust the 6500 display to read the same value. In the example below, DO mg/L is described.



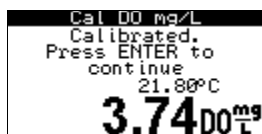
From *Main* menu, highlights *Calibration setup* then press **Enter** to access the assigned parameters. Highlight *DO mg/L* and press **Enter** to view the screen shown to the left. Use

the arrow keys to enter the reading from the portable meter (3.75 in the example).



With *Cal* highlighted, press **Enter** when the live reading (3.27 in the example) is stable. Note that the calibration is confirmed and a new value appears as the live reading (3.74 in the example). Press **Esc** to return to previous menus, including Run mode.

Press **Esc** to return to previous menus, including Run mode.



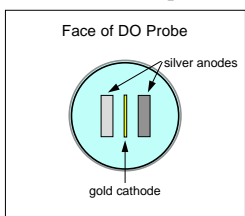
In a similar manner you can calibrate other parameters by this method. See the 6500 Operations Manual for more

information.

ROUTINE MAINTENANCE

To insure the best performance from the deployed sonde, periodically remove it from the sample stream for visual inspection. Do this weekly until you are comfortable with a longer interval.

A frequent problem can be algae build-up on the sonde guard or mounting hardware. If significant, the readings at the sensors may not be representative of the sample stream. In most cases simple agitation of the sonde and mounting boom will release the algal debris and eliminate problems.



On a monthly basis you should remove the sonde to change the DO membrane and electrolyte solution. At this time, also inspect the electrodes for fouling or deposits. One or both silver anodes will eventually show deposits and these must

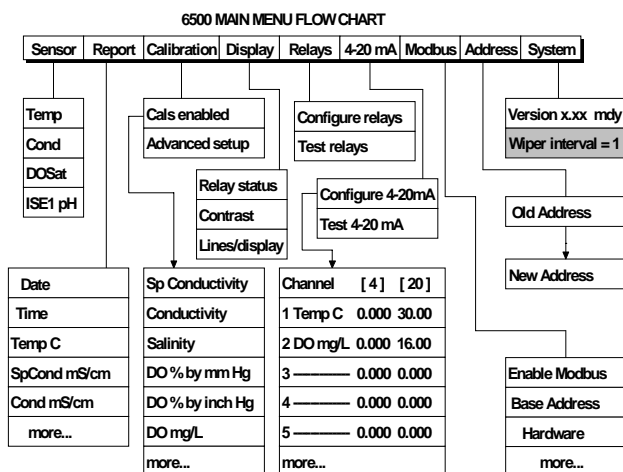
be resurfaced by gentle sanding followed by membrane replacement and recalibration (see Section 2, Sondes in the Sonde Operations manual).

In addition to DO probe and membrane inspection, inspect the conductivity probe ports and, if necessary, use the brush provided to clean the ports. Also inspect the pH glass electrode and reference electrode. Gently wipe these clean if needed.

Important: Anytime you clean, resurface, re-membrane, or change a sensor, recalibrate it using the detailed instructions provided in the manual.

For detailed information about use and care of your 6500 Environmental Process Monitor refer to Section 5 in the 6500 Operations Manual.

MENU FLOW DIAGRAM



BASIC TROUBLESHOOTING

This section is designed to help identify and solve a few basic problems that may occur in your 6500 system. See the Troubleshooting section in the Sondes manual for additional information.

Display is completely blank. (1) Check contrast adjustment. Press and hold **Cal** while pressing the up or down arrow key to adjust. (2) No AC power to 6500 unit. Check switches, breaker box, ground fault protection devices and surge protection devices. If protection device failure, determine cause before repowering.

Display reads 'No sonde on line'. (1) Check MS-8 sonde connector to 6500 connector and insure proper connection. The connector should be screwed on tight. (2) If a breakout box or other junction box is employed, check for good connections. (3) Attempt reset by turning AC power off, then back on. (4) Sonde baud rate or Autosleep functions may be improperly set.

Display reads 'Out of range'. This indicates that the sensor output during calibration does not conform to normal values. (1) Verify that you are using the correct cal standard solution and that it is not contaminated. (2) Verify that you have entered the correct cal value. (3) Check to insure that all sensors are fully submersed in cal solution. (4) Check for fouled sensors.

Display reads 'High DO charge'. Indicates a malfunction of the DO sensor, usually deposits on the electrode surface. (1) Repeat calibration procedure to verify the problem. (2) If message is a warning and you override, performance of the sensor measurement may be compromised. See the Sondes Operation Manual for more information.



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