Operator Quick Guide

ORBISPHERE 3650 ATEX

HACH ULTRA™

EXCELLENCE IN PROCESS ANALYTICS

Operating Information

About this Guide

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Before Taking Measurements

IMPORTANT: Before taking any measurements, please ensure that the conditions of use correspond to the certification of the instrument and the installation was performed as described in the Operator's Manual.

Instrument Controls

The front panel of the instrument has a three-digit liquid crystal display (LCD).

The LCD includes a right-side marker to distinguish between gas concentration and temperature display. This marker also indicates the measurement display units (ppm, ppb, or %) depending on the instrument model.

To the LCD's right is a label showing the measurement units configured at the factory for your application.

In addition to the controls indicated on the front panel, there is also a pressure relief valve switch on top of the instrument to enable atmospheric pressure equilibrium for sensor calibration, or for measurements in gaseous samples in % units.

The button in the bottom right corner backlights the LCD for approximately three minutes. The other push-button controls are:

- **POWER** turns instrument power on or off. The instrument starts in measurement mode
- **MEAS** places the instrument in measurement mode
- **CAL** calibrates the analyzer against a reference sample. This button can be locked out from the WinLog97 PC program
- **STO** stores a measurement value into memory
- The ⇧ ⇩ keys toggle between gas concentration and temperature measurement displays in measurement mode, increases or decreases the storage number during storage or memory view, or sets a calibration value during calibration
- **POWER** + **CAL** sensor calibration
- **POWER** + **STO** starts automatic data acquisition.
- **POWER** + ⇧ starts memory storage view

Startup

To start the instrument, press the keyboard **POWER** switch. When you turn power on, the instrument displays its model number briefly, and then starts in measurement mode.

The instrument can be operated independently, making measurements as a portable analyzer. You may store these measurement values for later analysis via the WinLog97 program (on your personal computer) or the memory view mode (on the instrument).

Measurement
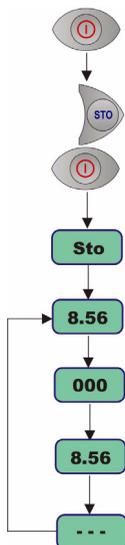
Taking Measurements

Connect the top-mounted inlet to accept your sample, typically this is accomplished by connection to a sampling valve. The sample flow can be regulated by the knurled stainless steel knob on top of the flow chamber.

The LCD includes a right-side marker to distinguish between gas concentration measurements and temperature. To switch between gas measurement and temperature measurement, press the ⇧ ⇩ buttons. To backlight the LCD for approximately three minutes, press the **Backlight** button.

The analyzer will store up to 500 gas measurement values, labeled by numbers 0 through 499, along with the current date and time of each measurement. You have the choice of acquiring this information manually or automatically, as described below.

Automatic Data Acquisition

Before starting automatic measurement storage, first select the sampling rate desired using the Sampling Rate menu of the WinLog97 program.


Switch the instrument **OFF** (by pressing the **POWER** key). Then hold down the **STO** button while switching the instrument back **ON**. The LCD displays the message `Sto` for about one second.

Gas concentration measurements are displayed for about two minutes. After two minutes the instrument displays the sample number (starting at `000`), then the gas concentration measurement value followed by `[---]` to indicate the measurement is being stored.

This storage sequence repeats automatically, at the rate specified.

To end automatic storage, switch the instrument **OFF** (by pressing the **POWER** key) while it is in normal measurement mode. Switching **ON** again without holding down the **STO** button returns the instrument to measurement mode.

Manual Data Acquisition
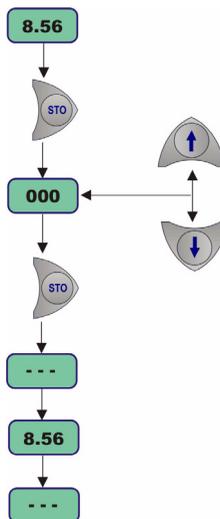
For the first measurement you wish to store, press the **STO** button once to display a sample number. The default sample number is `000` (for first time access), or the last used memory position where data was stored, incremented by a value of 1.

You can increase or decrease this number by pressing the ⇧ ⇩ buttons within three seconds.

Press **STO** a second time, within five seconds of the first. The instrument then displays the gas concentration measurement value for about three seconds, followed by a clearing message as the value is stored.

Repeat the above steps to store additional measurements.

Measurement (cont)

Viewing Stored Measurements
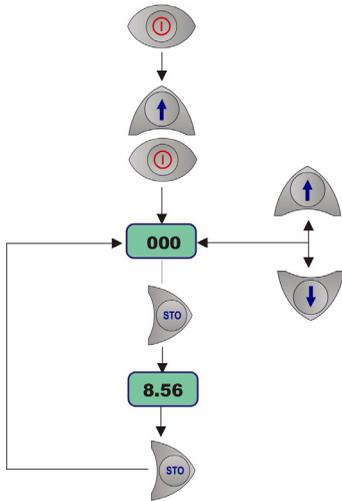
Switch the instrument **OFF** (by pressing the **POWER** key). Hold down the ⇧ button while switching the instrument back **ON**. The LCD displays a sample location number.

Scroll through the numbered sample locations of all the stored values using the ⇧ ⇩ buttons.

To view the actual gas concentration measurement value at a particular sample number, press the **STO** button. The LCD now displays the stored value for that sample number.

Press **STO** a second time to return to the next numbered location display, to continue scrolling or view another stored value.

To return to the measurement mode, switch the instrument **OFF** and then back **ON** again without holding down any additional buttons.

Downloading Data

If you have made measurements and stored them in the instrument, you should be ready to bring them into the WinLog97 program for viewing, copying, saving and printing. To download stored data from the instrument to the PC, choose the **DownLoad** data command from the **Logger** menu.

The window displays the stored measurements from the instrument showing the sample number, gas concentration, a date and time stamp, and a sample description.

Sample Description

For help in identifying the locations of various sampling points that are stored by the analyzer, you may choose the **Sampling Point Description** command from the **Logger** menu.

The measurement values to be placed in positions 0 through 499 can be described however you wish. Double-click on a particular position (or click **Modify**), then type a description in the box.

Copy Data

To copy the results to the Windows Clipboard, so that the data can be pasted into a spreadsheet, word processor or other Windows program that accepts tabular text information, choose the **Clipboard** command from the **Export** menu.

Save Data

To save this list of measurements as a text file, capable of being recalled by the WinLog97 program or imported as a file into other Windows programs, choose the **Save As** command from the **File** menu and enter the device and file name.

Print Data

To place this list of measurements into a tabular format and send it to the printer, choose the **Print** command from the **File** menu.

Clear Data

To **clear** all the values stored in the instrument, choose the **Clear Data** command from the **Logger** menu. Since this action will clear the storage memory of the instrument, a warning appears which you must confirm. Choose **Clear** to start the memory clear operation.

Measurement (cont)

Monitor Measurements in Real-Time

You may wish to analyze a particular sampling point via the WinLog97 program's **Monitoring** menu. To use this Monitoring chart, the instrument must be connected to your PC.
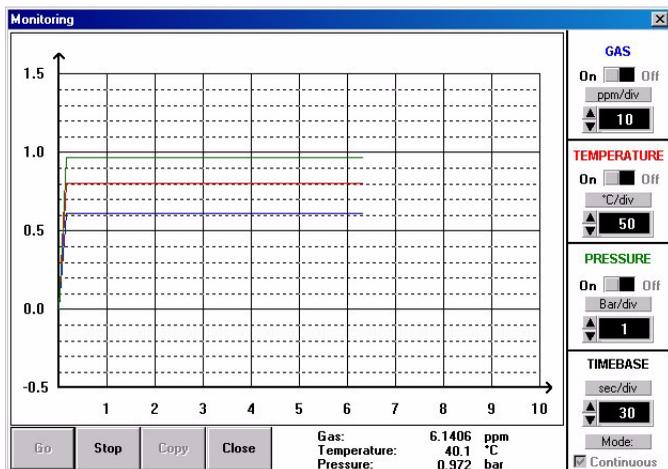
Choose **Monitoring** from the WinLog97 menu to bring up a chart display.

The chart shows the gas concentration (in blue), temperature (in red), and pressure (in green) as the sample is being measured by the instrument. The chart is updated directly from instrument measurements, at a rate determined by the time scale set in the **TIMEBASE** box at the lower right corner of the chart.

Click the **TIMEBASE** up/down pointers to change the time scale of the divisions of the chart. Each division mark along the baseline (1, 2, ...10) can be made to represent from 30 seconds to 2½ hours, providing from 5 minutes to 25 hours of continuously displayed samples (as illustrated in the table).

Timebase	Updating Rate	Max. Samples
30 Seconds/Division	5 Secs/Sample	60
1 Minute/Division	5 Secs/Sample	120
10 Minutes/Division	5 Secs/Sample	1,200
30 Minutes/Division	9 Secs/Sample	2,000
1 Hour/Division	18 Secs/Sample	2,000
2.5 Hours/Division	45 Secs/Sample	2,000

Click on the **Continuous** box to enable or disable continuous charting. When this box is checked, the chart scrolls continuously after reaching the **10** division, and the oldest samples are lost off the left of the chart.

When **Continuous** is not checked, the chart stops displaying new results after reaching the **10** division, and all subsequent measurements are lost.

Click the up/down pointers for each measurement variable (**GAS**, **TEMPERATURE** and **PRESSURE**) to change the scaling of that value on the chart. The display of each measurement variable may be turned on or off by choosing the appropriate **On** or **Off** switch.

A running display of latest sample **Gas**, **Temperature** and **Pressure** is also shown in the bottom-right corner of the chart.

Use the buttons at the bottom of the chart to control real-time monitoring. Choose **Go** to clear the chart and start real-time monitoring, **Stop** to stop monitoring and **Copy** to copy the data from the chart as text information to the Windows Clipboard. This information can be pasted from the clipboard into any Windows application, such as a spreadsheet or word processor.

Choose **Close** to close the Monitoring window.

Instrument Configuration

The following commands are all available from the **Configuration** menu in the WinLog97 software installed on your PC.

The instrument must be connected to your PC in order to change its configuration.

INSTRUMENT - PC CONNECTION

The **Serial port** menu lets you choose one of four serial communication ports. Usually, **COM1** is used to connect to a mouse, so try **COM2** first.
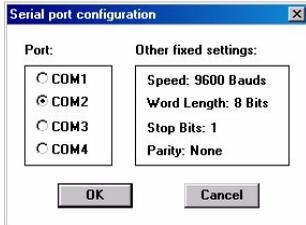

SETTING SAMPLING INTERVALS

The analyzer can perform as a standalone data acquisition device, automatically recording gas measurements with the date and time, and storing up to 500 of these values.
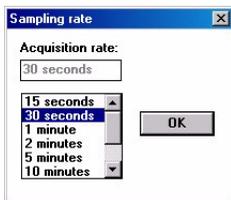
Choosing **Sampling Rate** lets you select time intervals (acquisition rate) for this storage capability.
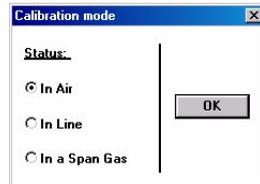
MEMBRANE SELECTION

You may find it necessary to use a different type of membrane for different applications.
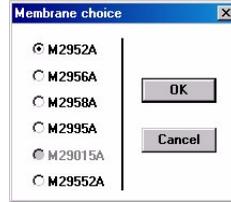
To re-configure the analyzer, choose **Membrane** to bring up the box which reveals the membrane models available.
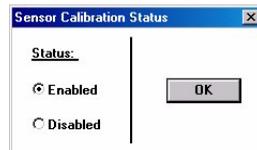
CALIBRATION MODE

Use the **Calibration mode** command to select how the sensor is to be calibrated.

Choose **In Air** to allow calibration of the sensor in air, **In Line** to calibrate the sensor directly in the sampling line, or **In a Span Gas** to calibrate in a source of gas of known concentration.

CALIBRATION KEY STATUS

You can use the **Calibration Key Status** menu to prevent an accidental sensor re-calibration from the instrument keyboard.


Enable or **Disable** the instrument front panel **CAL** button. Disabling the button will prevent accidental sensor re-calibration.

# Instrument Configuration (cont)

CALIBRATION RANGE CHECKING

When calibration is performed for **In Air** and **In a Span Gas** calibration modes, the sensor measurement current is compared to an ideal current for the selected membrane to determine whether or not to complete the calibration. You can use the **Calibration Range Checking** menu to enable or disable sensor calibration range checking in the instrument.
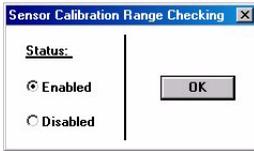
Choose **Disabled** to calibrate without checking the value of the measurement current, within a range of 0% to 999% of the ideal current. When set to **Enabled**, at calibration the measurement current should be between 25% and 175% of the ideal current; if the value is outside of these limits, the calibration fails and `Err` is displayed on the instrument LCD.
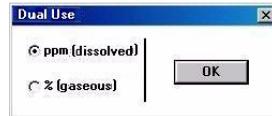
SPAN GAS

When calibrating the sensor in a span gas, use the **Span Gas** menu to enter the span gas concentration (as a %age) when using a span gas as a calibration medium.
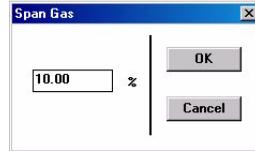
## DUAL USE (MODEL 3650Ex/113 ONLY)

Use the **Dual Use** menu to change the measurement phase (either dissolved or gaseous) for the model 3650Ex/113 dual-use analyzer.

Choose **ppm (dissolved)** to set the instrument for dissolved measurement in liquids, or **% (gaseous)** to set the instrument to gas phase measurement.

INSTRUMENT CONFIGURATION REVIEW

To review if the instrument is set up as expected, choose the **Configuration view** command.
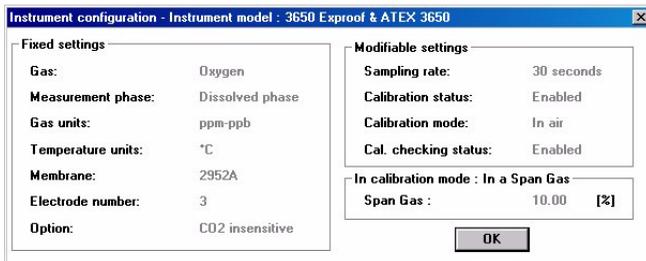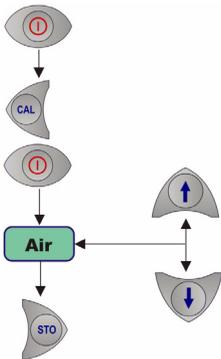
Calibration

BAROMETRIC PRESSURE SENSOR

The instrument internal barometric pressure sensor is calibrated at the factory, and normally requires no further attention. However, you may wish to calibrate it against your own instrumentation, or simply check the instrument for accuracy.

Select **Troubleshooting**, **Pressure Calibration** from the WinLog97 program, and enter the current atmospheric pressure, in mbars, in the calibration pressure entry box.

GAS SENSOR

The sensor can be calibrated either in air or directly in line in a liquid sample. Additionally, oxygen sensors can be calibrated using a span gas.

To perform a calibration, you must first choose which method you wish to use. The mode of calibration may be selected using the WinLog97 program. Alternatively, you can select the mode of calibration using the instrument front panel buttons.

Switch the instrument power **OFF**. Switch the instrument on by holding down the **CAL** button, and then pressing the **POWER** button at the same time. The instrument display will show either `Air` for in air calibration, `LI` for in line calibration, or `SPA` for span gas calibration

Use the ⇧ ⇩ buttons to change the mode to your choice and press the **STO** button to set the selected mode.

In a Span Gas Calibration

The span gas calibration procedure may be used if you have a source of gas with a known concentration of O_2 (in% units). To perform this type of calibration, the instrument must be set for calibration **In a Span Gas**. The Windows WinLog97 program must also be used in this procedure.
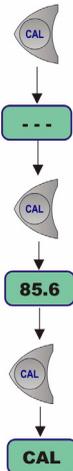
Switch on the instrument, if necessary, and wait a minute or so for the displayed measurement to settle. Then expose the sensor to a span gas sample with a known oxygen concentration. Enter the percentage of oxygen in the span gas using the WinLog97 program.

Press the **CAL** button. Remember, this button may have been locked out to prevent an accidental reset.

A brief clearing `[---]` message appears. Press **CAL** again within a 3 second period. The percentage of the measured current to the ideal one is displayed.

When the reading is stable, press **CAL** again.

If the new calibration current is within 25% to 175% of the ideal current, the instrument displays `CAL` and returns to the measurement mode. Calibration is now complete, the sensor is calibrated, and you can proceed with your measurements.

If the new calibration current is not within this range, the instrument displays `Err` and returns to measurement mode. The system will not calibrate, and it is likely that a sensor service will be required.

In Line Calibration

The in line calibration procedure can be used to calibrate the sensor directly in line, against a liquid sample with a known dissolved oxygen concentration.

To perform this type of calibration, the instrument must be set for calibration **In line**. Switch on the instrument, if necessary, and wait a minute or so for the displayed measurement to settle.

Expose the sensor to a liquid sample with a known gas concentration.
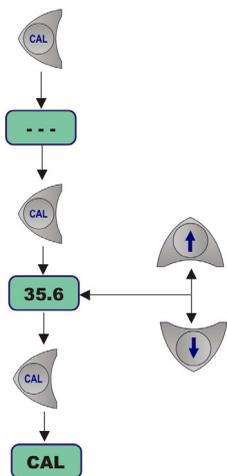
Press the **CAL** button. Remember, this button may have been locked out to prevent an accidental reset.

A brief clearing `[---]` message appears. Press **CAL** again within a 3 second period. A measurement will flash on the LCD, showing the oxygen concentration of the calibration sample.

Assuming you know the gas content to be a certain value, you can adjust the displayed value with the ⇧ ⇩ keys.

When the reading is adjusted to the known concentration, press **CAL** again. The instrument displays `CAL` and returns to the measurement mode.

In Air Calibration (oxygen sensors only)

The oxygen sensor can be accurately calibrated in air. To perform this type of calibration, the instrument must be set for calibration **In air**.

You can perform this procedure with the sensor connected to the instrument, but without the flow chamber mounted.

The membrane must be dry, and prior to calibrating it may be necessary to remove the screw-on protection cap and its optional grill to make sure that the components are not damp.

Switch on the instrument, if necessary, and wait a minute or so for the displayed measurement to settle.
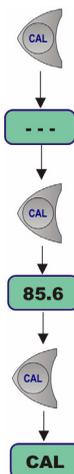
The process is then exactly the same as for calibration in a span gas, detailed previously.

Troubleshooting

You may wish to use the **Troubleshooting** menu to make sure that the instrument is configured correctly for your application, and is in good working order.

The instrument must be connected to your PC to perform these tests.

SERIAL LINK TEST

Normally, the instrument will inform you of a disconnected RS-232 (serial) link when appropriate. However, you can confirm a good connection using the **Serial Link Test** option, and echoing a test message via the instrument.
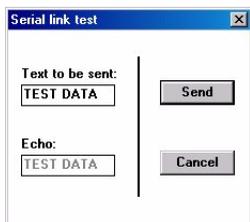
Enter text characters in the **Text to be sent** box, then click **Send**. If the serial link is operating correctly, the exact same text will be displayed back from the instrument in the **Echo** box.

KEYBOARD TEST

The **Keyboard Test** option will reveal whether all the instrument buttons are functioning correctly.
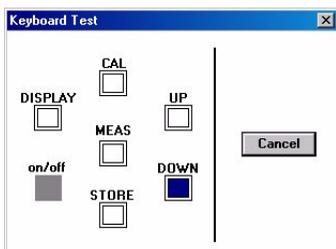
Press any one of the instrument's buttons (*except* the **on/off** button) for a full second or more. The appropriate square on-screen should darken.

DISPLAY TEST

Choosing the **Display Test** option lets you perform a one-way communication between computer and instrument.

Type a number in the **Number** box (you may also select one of three units positions for the LCD's rightmost indicator bar as well). Then choose **Send**. The number and indicator bar placement should appear on your instrument LCD.

CLOCK SETTINGS

Choose the **Clock settings** option to set the date and time in the instrument.
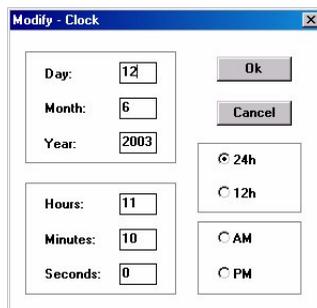
ANALOG VOLTAGES VIEW

The **Analog Voltage View** option gives a real-time look at voltages used by the system to transmit information about sensor current, temperature and pressure. This is useful when trying to identify an instrument problem with an Orbisphere service representative either on-site or over the phone.
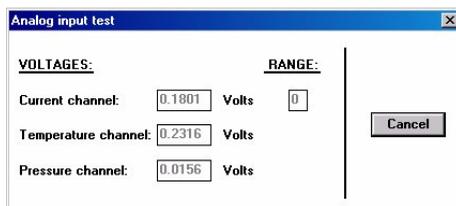
The voltage limits for normal operation are:

- Current channel: -1.5 V to +1.5 V
- Temperature channel: +10 mV to +4 V
- Pressure channel: -100 mV to +100 mV

MEASUREMENTS VIEW

The **Measurements View** option confirms, on your PC monitor, what your instrument should be displaying on the LCD for gas concentration and sample temperature.

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