

# *Operator Quick Guide*

## ORBISPHERE G1100 SENSOR AND 410 INSTRUMENT



# Operating Information

## About this Guide

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## Instrument Controls

The instrument front panel provides these user interfaces:

- Touch screen acting as display, touch pad and keyboard. Contrast can be adjusted.
- LED, showing when the instrument is on.
- Buzzer sounds each time the screen is touched, and when an event alarm is set. Sound level and type can be adjusted.

## Touch Screen

The user interface on the front panel is a 320x240 pixels display with touch-screen. To make navigation user friendly, the interface software is Windows CE based, providing easy selection through menus.

All the measurement, configuration, calibration and "standard service" routines can be called by pressing buttons and menu bars on screen.

The display can be configured to only show a sensor measurement, or to show the measurement with a parameterized graphic representation of the last measurements.

## Menu navigation

<b>View</b>	MAIN	<b>Up</b>
<b>Measurement</b>		<b>Main</b>
<b>Calibration</b>		<b>Close</b>
<b>Inputs / Outputs</b>		<b>Help</b>
<b>Communication</b>		
<b>Security</b>		
<b>Products</b>		
<b>Global configuration</b>		
<b>Services</b>		

Pressing the "menu" button in the header bar calls the main menu. The display is made of three columns:

- Left column is the menus, or submenus (greyed out options are not available)
- Center column shows a tree view of actual position inside menu structure
- Right column has the following generic controls
  - **Up** - Return to a previous menu
  - **Main** - Jump directly to main menu
  - **Close** - Close the menu and return to the measurement view display
  - **Help** - Help topics relating to the current menu

## Virtual Keyboard

When a text box (alphanumeric field) has to be edited and is pressed, a virtual keyboard appears on screen. It can be used as a PC keyboard (pressing CAP give access to special keys).

56	56	L							
Input Panel									
Esc	Home	←	→	End	CAP	Shift	Del	←	
a	b	c	d	e	f	7	8	9	
g	h	i	j	k	l	4	5	6	
m	n	o	p	q	r	1	2	3	
s	t	u	v	w	x	0	.	-	
y	z	Space				Enter			

Once values have been entered, press the **Enter** key to confirm and exit the virtual keyboard.

# Operating Information (cont)

## Identification and Authorization Level

**Identification**

ID: 1007


Password: \*\*\*\*

Status: Identification successful

Name: Armstrong

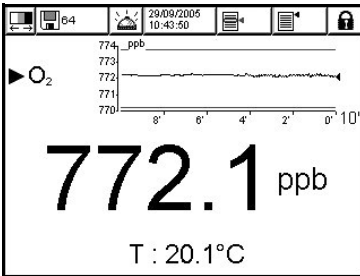
Level: 4 (0->Lowest / 4->Highest)

Buttons: OK, Change Password, Cancel

Press the closed padlock icon  to open the identification window. The user identification and password must be entered to access functionalities authorized by the security level of the given user.

## Views

The numeric view is the default view and shows the numeric measurement value identified for the gas measurement channel, a graphic showing measurement value evolution during the set time frame, and sample temperature.



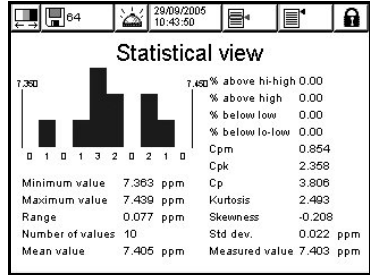
The diagnostic window contains useful information for troubleshooting purposes. The amount of information displayed depends on the channel configuration.

**Diagnostic View**

Gas concentration	9979.6 ppb
Temperature	24.4 °C
Barometric pressure	0.984 bar
Partial pressure	221.02 mbar
Partial pressure stdev	0.596 mbar
Fluorescence phi	25.728 °
PhiO(T)	44.312 °
Fluorescence amplitude	0.826 V
Reference amplitude	1.983 V
Flow rate	N/A
Event mask	0

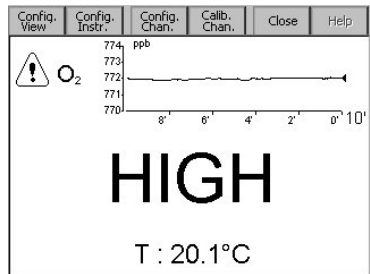
The statistical view offers statistical data that matches with Total Quality management tools. Statistics is a tool to better analyze how a process behaves.

The statistics are calculated from the data in the measurement file. The values are updated each time a new value is added to this file.



## Abnormal Conditions

Whenever an abnormal event is encountered, a sign is displayed on the upper left of the screen. Pressing on the sign calls a window giving further details about the actual situation.



There are three levels of abnormal conditions:



**Alarm** - There is a severe problem causing the channel to be out of action, and the system alarm relay to be enabled



**Warning** - Events less critical than a system alarm (e.g. measurement alarm)



**Information** - For information only, no action is required

# Measurement

## Continuous Mode Description

The continuous mode is typically used for process measurement, and follows this cycle:

- Every 5 sec. measurements are refreshed on the display
- Regularly updates the outputs (relay and analog outputs)
- Continuously stores measurements in memory (volatile and non volatile memory)

- Display resolution: Maximum resolution depends on unit. A maximum of 5 digits can be displayed. Can be limited to 0, 1, 2 or 3 decimals for easier reading.
- Thermal cutoff: This option is for information purposes only. It is possible to set a sample high temperature limit, which if exceeded causes the system to display a "HOT" alarm message. It is recommended, however, to disable this function.

## Instrument Configuration

- Measurement mode is locked on **Continuous** for on line processes
- Selection of units for barometric pressure and temperature

## Measurement Configuration

- Sensor's spot selection
- Medium: Liquid or Gas Phase
- Gas unit type: Partial, Fraction, Dissolved
- Gas unit: The list of available units depends on unit type selected above
- Liquid: When medium is liquid, select water or a liquid with a different solubility (if available)

## Measurement Alarms Configuration

Set the thresholds for the low/high concentration levels, according to the application. Each alarm type can be individually enabled or disabled without losing its settings. These events can activate the relays and can be displayed.

- Low-low: 2nd stage for too low concentration
- Low: 1st stage for too low concentration
- High: 1st stage for too high concentration
- High-high: 2nd stage for too high concentration
- Hysteresis in % of above set values. The hysteresis is used to prevent relay "flickering" when the measurement is just at the alarm levels. Set this to a minimum, but enough to eliminate flickering
- Delay in seconds before alarms go on whenever concentration values are above "High alarms" or below "Low alarms". Set this to a minimum, but enough to avoid alarms for non representative peaks beyond the set level.

## Measurement (cont)

### Measurement Filter Configuration

The screenshot shows a dialog box titled "Measurement filter configuration". It contains four settings, each with a dropdown menu:

- State: Enabled
- Type: Median
- Depth: 5
- Central depth: 3

At the bottom of the dialog are two buttons: "OK" and "Cancel".

The filters are aimed at "flattening" the measurement curve in situations where the process shows atypical peak values that could otherwise hamper the interpretation of measurement readings. The filter is applied on the last set of measurements each time a measurement is taken.

- Mean: Mathematical average of the last set (depth) of measurement values.
- Median filter: Allows for eliminating atypical peak measurement values, and averages the remaining ones. The calculation sorts the last measurements set (depth) by values, then deletes the highest and lowest values, and averages the remaining values (central depth)

### Measured Data Storage

The screenshot shows a dialog box titled "Measured data storage". It contains the following settings and options:

- Storage mode: Store once (dropdown)
- RAM time: 10 s
- FLASH time: 72 h
- Save in flash now: Button
- Auto save in flash:
- Open data: Button
- Purge data: Button
- Start logging measurements: Button

A "Note" section at the bottom states: "Actions will be carried out once the OK button is pressed (except for action 'Open data')." At the very bottom are "OK" and "Cancel" buttons.

There is one measurement file which contains the data generated by the measurement cycle. The measurement file is updated in volatile memory, and regularly copied in non-volatile memory (file back-up). At start up, the measurement file in volatile memory is updated with the file from the non-volatile memory.

Adjust the parameters for recording and storing measured data.

Storage mode selection:

- No storage
- Store once: When volatile memory is full (1,000 positions), measurement recording stops
- Rolling buffer: When volatile memory is full, the latest measurement set replaces the oldest (first-in, first-out basis)

Other options:

- RAM time (volatile memory): Delay in seconds between two recordings of measured data.
- FLASH time (non-volatile memory): Delay in seconds between two data file transfers from volatile memory into non-volatile memory. Last data file erases previous one.
- Save in flash now: Press this button to store measurement data in flash (non-volatile memory) immediately. After pressing this button, press OK to initiate the process. A warning screen appears informing you that the operation can take up to 30 seconds. Press Yes to continue with the process, or No to abort.
- Auto save in flash: Check this box to save measurements in flash (non-volatile memory) automatically. Measurements are saved at regular time intervals as defined in the FLASH time box.
- Open data: Opens a table containing the measured value stored in the volatile memory
- Purge data: Clear all data in the volatile and non-volatile memories
- Start logging measurement: In store once mode, starts and stops the measurement recording session. Measurement recording is stopped when buffer is full

# Calibration

## General

Hach Ultra recommends the sensor be calibrated once a month for applications of less than 50ppb, or once every three months for applications greater than 50ppb.

The temperature sensor is factory calibrated and can only be changed by a Hach Ultra representative.

## Sensor Calibration

The sensor can be calibrated either automatically at pre-defined intervals, or manually on an ad hoc basis. There are two calibration modes available - zero or high-level adjustment. The zero calibration method is the best calibration method to guarantee the sensor specifications. However, for higher level concentrations (such as 1% oxygen which corresponds to about 400 ppb dissolved O<sub>2</sub>) a high-level adjustment can be performed.

## Initial Sensor Calibration

After the instrument and sensor have been installed and configured, an initial calibration of the sensor must be performed. Before starting the calibration, wait at least 10 minutes with sample flowing through the system to ensure temperature equilibrium.

Select the **Configuration** option from the main sensor calibration menu to check the calibration parameters.

Calibration parameters

Auto-calibration  
 Enable Configure Hold during calibration or verification

Manual-calibration  
 Auto-End Configure

Zero calibration bottle  
 Enable  
Remaining volume 26 L

New bottle  
34 L Apply

OK Stop parameters Cancel

Ensure the parameters are set up to their default values as illustrated:

- Auto-calibration: Off by default.
- Manual-calibration Auto-End: On by default.
- Hold during calibration or verification: On by default.

- Zero calibration bottle: On by default.
- New bottle: 34 liters by default. If using a different size bottle then update this parameter to reflect the size of the bottle and press **Apply**.

Exit from the configuration screen by pressing on **OK**. Then select **Calibration** from the main sensor calibration menu and perform a manual zero calibration as described on the next page.

After a successful calibration, return to the configuration option and enable auto-calibration. Select the **Auto-calibration Configure** option and set the number of days between calibration to 30. This will ensure an automatic monthly calibration cycle.

## Automatic Calibration

A regular automatic calibration is the recommended option so ensure that this has been set up and that the parameters are correct.

When the calibration starts, the sample flow into the flow chamber is cut off automatically by the solenoid valve. Gas from the attached nitrogen gas bottle then flows through the flow chamber until measurements match the criteria set in **Stop parameters** or the time-out period of 10 minutes has elapsed.

Once the automatic calibration process is invoked, the message "Auto cal." will flash alternately with the measurement on the numeric view screen for the duration of the calibration.

When the stability criteria is reached, the calibration parameters are updated. Normal sample measurement then resumes.

If the stability criteria is not reached within a 10 minute period, the process is aborted. After the delay defined in **Stop parameters**, a second calibration is then attempted. If this second calibration also fails, then an Auto. Cal error event is activated. Normal sample measurement then resumes but the calibration parameters unchanged.

## Manual Calibration

Manual calibrations can be made at any time, even if the auto-calibration parameter is enabled.

## Calibration (cont)

### Calibration Configuration

This option can be invoked directly from the main calibration menu by selecting the **Configuration** option, or by pressing the **Modify** button in either the zero or high level calibration screens. The process sets all the parameters used for sensor calibration.

The parameters have been described in the **Initial Sensor Calibration** section on the previous page.

If the **Stop parameters** button is pressed on the main configuration screen, you can view or change the existing values, or restore the default values. It is highly recommended to leave these parameters at their default values and not change them.

These values apply to automatic calibrations and to manual calibrations with the **Auto-End** parameter set.

### Configure Automatic Calibration

This option sets the parameters for the sensor to be zero calibrated at a regular interval. The sensor should be installed in the specially designed flow chamber with a gas bottle of pure nitrogen attached.

Sensor auto-calibration timer

Zero Calibration mode

Next calibration date 26 Nov 2006 10:07:37

Nb of days to next calibration 29

Nb of days between calibrations 30

OK Cancel

The calibration mode is set to zero calibration and cannot be changed. Details of the next calibration date are displayed. If the next calibration date is overdue, the word **Missed** is displayed.

Enter the number of days between calibrations.

### Configure Manual Calibration

This option sets the parameters required for manual sensor calibration.

Sensor manual calibration parameters

Calibration mode High level calibration

High level calibration

Cal. sample In line sample

Medium Liquid Gas unit type Dissolved

Gas unit ppb Liquid Water

Reference value 1.5 ppb

OK Cancel

- Calibration mode: 2 types available:
  - Zero calibration
  - High level calibration

If zero calibration is selected, no other parameters are required to be set. However, the following parameters must be set if high level calibration has been selected.

- Calibration sample: Set to **in line sample, gas bottle or factory parameters**. If factory parameters is selected, the Ksv value is displayed. This value should only need to be changed when replacing the sensor spot. The Ksv value of the new spot can be found on the 33021 kit box.

These additional parameters are required if in line sample or gas bottle has been selected as the calibration sample.

- Medium: This is automatically set to **liquid** if in line sample has been selected as the calibration sample, or **gas** if gas bottle has been selected.
- Gas unit type: Either **partial** or **dissolved** are available for an in line sample. If gas bottle was selected this is set to **fraction**.
- Gas unit: The list of available units depends on unit type selected above.
- Liquid: This defaults to **water**.
- Reference value: Enter the reference value for calibration

Press **OK** to return to the main calibration screen.

## Calibration (cont)

### Zero Calibration

The screenshot shows the 'Start calibration' screen. Under 'Configuration', 'Cal. mode' is set to 'Zero calibration' with a 'Modify' button. The 'State' section shows 'Sensor : OK'. Under 'Measured values', 'Temp.' is 24.8 °C and 'Fluor. phase' is 26.579 °. At the bottom are 'Start' and 'Exit' buttons.

With this method, the sensor should be exposed to pure N<sub>2</sub> gas using the specially designed flow chamber. Provided the sensor is attached to the flow chamber, this calibration method can be automated.

Press **Start** to start the calibration.

The screenshot shows the 'Under calibration, Cal. Time: 01:04' screen. Under 'Results', 'Zero calibration' and 'Signal within range' are 'NO', while 'Stability reached' is 'NO'. A box shows '37.01 % last calibration'. The 'State' section shows 'Sensor : Cal.'. Under 'Measured values', 'Temp.' is 24.9 °C, 'Fluor. phase' is 26.660 °, 'Pp O2 Std deviation' is 196.29 mbar, and another 'Fluor. phase' is 9.374 mbar. At the bottom are 'Finish', 'Hide', and 'Cancel' buttons.

A screen is displayed showing the measured values and length of time the sensor has been under calibration. These values are continually refreshed.

The value **% last calibration** displayed in the top box is an informational message showing the difference between the current and previous sensor calibrations.

The **Signal within range** and **Stability reached** boxes in the top right corner indicate whether the calibration is within acceptable limits. When both boxes indicate **YES**, press **Finish** to accept the new calibration. A confirmation screen then asks to accept and store the new parameters.

If one or both boxes show **NO**, you can still perform a calibration but it is not recommended, and the calibration should be aborted by pressing the **Cancel** button.

In the case of a calibration failure, attempt a second calibration after about 5 minutes. If the second attempt also fails, then refer to your Hach Ultra representative for advice.

If the Auto-End parameter is set, then the calibration will be deemed successful when the parameters defined in **Stop parameters** are met. You will then be asked to confirm the calibration.

If you have not accepted or cancelled the calibration after an elapsed time of 10 minutes then the process will time-out, and the warning message illustrated left will be displayed.

### High-Level Adjustment

The screenshot shows the 'Start calibration' screen for high-level adjustment. Under 'Configuration', 'Cal. mode' is 'High level calibration' with a 'Modify' button. 'Cal. sample' is 'In line sample'. 'Liquid' is 'Water' with a 'Value' of '600.000 ppm'. The 'State' section shows 'Sensor : OK'. Under 'Measured values', 'Temp.' is 23.2 °C, 'Barom.' is 9.959 bar, and 'Fluor. phase' is 27.378 °. At the bottom are 'Start' and 'Exit' buttons.

This calibration exposes the sensor to a gas or a liquid sample with a known gas concentration. You also have the option to reset the sensor's calibration parameters to factory settings (from drop-down list for **Cal. sample**).

The screen example illustrated is for calibrating using a liquid sample. The screen for calibration using a gas bottle differs only slightly.

Press **Start** to start the calibration. The process is then the same as for the zero calibration described previously.



## Calibration (cont)

### Sensor Verification

Verification	
<b>Configuration</b>	
Cal. mode	High level calibration <input type="button" value="Modify"/>
Cal. sample	In line sample
Liquid	Water Value 1.5 ppb
<b>State</b>	
Sensor :	OK
<b>Measured values</b>	
Temp.	25.2 °C Barom. 0.960 bar
Fluor. phase	25.772 °
<input type="button" value="Start"/> <input type="button" value="Exit"/>	

Similar to the calibration procedure, but for verification of the actual calibration values. The result of the measurements made during the verification is not stored and the actual calibration data is not modified.

### Barometric Pressure Calibration

Barometric pressure calibration	
Current barometric pressure	0.965 bar
New barometric pressure	0.965 bar
<input type="button" value="Validation"/> <input type="button" value="Cancel"/>	

The barometric sensor has been factory calibrated but should be periodically verified with a precision certified barometer. This is only necessary if measuring in gas phase with fraction units (% , ppm).

The upper box shows the barometric pressure as measured by the instrument.

Using a precision certified barometer, measure the barometric pressure in the location where the measuring instrument is used. Compare the values, if values are the same press **cancel**, otherwise enter the new barometric value in the lower box and **validate** the new setting.

Once the calibration is completed a calibration report is generated.

### Calibration Reports

Once a calibration is completed (for a gas or pressure sensor) successfully, the calibration report is updated with the new details. The calibration report contains data for the last 10 calibrations. The example illustrated below is for a gas sensor calibration.

Sensor calibration reports	
Calibration report nb : 1	
Date (yy.mm.dd-hh:mm): 06.04.13 - 19:42	
Calibration mode : Manual zero calibration	
Operator :	
Operator ID :	
Phi0(Tcal) :	44.226 °
Tcal :	25.10 °C
Ksv(25°C) :	0.0067 mbar-1
Stability :	0.005 %
<input type="button" value="Previous"/> <input type="button" value="Next"/> <input type="button" value="Exit"/>	

Each calibration record will contain parameters useful for traceability. For instance, it will contain:

- the date and time
- the calibration mode (zero or high level)
- the calibration type (manual or automatic)
- the operator name and ID
- all the measurements which influence the calibration

## Sensor Maintenance

The sensor spot needs to be replaced once a year. The procedure is very simple and takes no more than a few minutes.

In addition, if you are using a model 33079-x particle filter, it is advisable to replace the filter cartridge (model 33080) at the same time.

Before starting check the Ksv factor of the new spot (value found on kit 33021 box). If this is different to the Ksv value displayed in the factory parameter in the **Configure Manual Calibration - Factory Parameters** screen, update it to the new value.

### Equipment Required

- Pair of tweezers and Maintenance tool - both supplied. Also available from kit no. 33022.
- Replacement sensor spot and O-ring - available from kit no. 33021



### Sensor Spot Removal

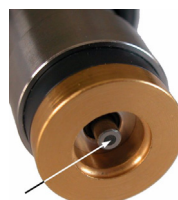
- 1) Using the tweezers, gently prise away the O-ring that secures the sensor spot.



- 2) Insert the narrow end of the maintenance tool over the sensor spot and gently squeeze to get a secure grip. Remove the old spot.
- 3) The old sensor spot and O-ring can be discarded.



Once the sensor spot is removed do not touch the inside of the sensor as this could scratch and damage the exposed sensitive measuring head (indicated with arrow).



## Sensor Maintenance (cont)

### Sensor Spot Replacement

- 1) Take the new sensor spot and place into the end of the sensor using the maintenance tool.



- 2) Using your fingers, put the new securing O-ring in place and push into position.



- 3) To ensure the O-ring is properly in place, take the maintenance tool and put the large end on top of the O-ring on the sensor. Push down firmly and twist left and right a few times until the O-ring is flush with the top of the sensor.



# Maintenance and Diagnostics

## Instrument Maintenance

Any instrument maintenance should be carried out by a qualified Hach Ultra Service Technician. Please contact your local representative should you feel any maintenance or instrument adjustments are required.

## Services

A number of maintenance and diagnostic options are available from the **Services** menu.

## Sensor Diagnostics - Calibration Timer

**Sensor diagnostic - Calibration timer**

**Date**  
Current date 03 May 2005 14:11:24  
Next calibration date 01 Aug 2005 11:32:57

**Calibration status**  
State Disable **Enable**  
Nb of days to next calibration 99  
Nb of days between calibrations 90

OK Cancel

The instrument can automatically remind the user when the next sensor calibration is due. This option is useful if you perform manual calibrations. However, if you have selected to automatically calibrate your instrument, this option should be disabled.

- To enable the timer, select enable and enter a delay in days.
- The display shows the current instrument date and time, next calibration due date and time, and the remaining days.

The next calibration date is updated when the sensor is calibrated. The event "Cal. required" is generated when the delay has elapsed.

## Sensor Diagnostics - Service Timer

**Sensor diagnostic - Service timer**

**Date**  
Current date 03 May 2005 14:12:35  
Next service date 23 Oct 2005 09:39:15

**Service status**  
State Disable **Enable**  
Nb of days to next service 172  
Nb of days between services 180

OK Service done Cancel

The instrument can automatically remind the user when the next sensor service is due.

- Select enable and enter a delay in days. This should be validated by a level 3 user.

The display shows the current instrument date and time, the next sensor service due date and time, and the remaining days.

The next service date is updated when the button "Service done" is pressed after a service. The event "Service required" is generated when the delay has elapsed.

## Language Selection

**Choose a language**

English  
 French  
 German  
 Italian  
 Spanish

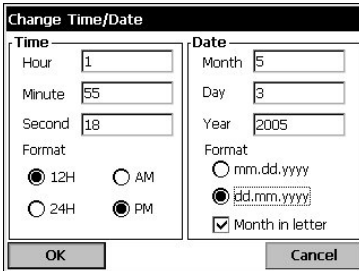
OK Cancel

Check the language as required and restart the instrument to apply the change. The instrument will restart in the language selected.

Check the language as required and restart the instrument to apply the change. The instrument will restart in the selected language.

## Maintenance and Diagnostics (cont)

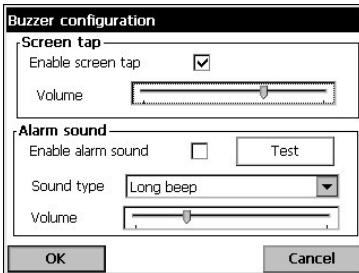
### Clock



The 'Change Time/Date' screen is divided into two columns: 'Time' and 'Date'. The 'Time' column has input boxes for Hour (1), Minute (55), and Second (18). Below these are radio buttons for Format: 12H (selected), 24H, AM, and PM. The 'Date' column has input boxes for Month (5), Day (3), and Year (2005). Below these are radio buttons for Format: mm.dd.yyyy and dd.mm.yyyy (selected), and a checked box for 'Month in letter'. At the bottom are 'OK' and 'Cancel' buttons.

Type in each appropriate box the actual time and date, and select the display format for them.

### Buzzer



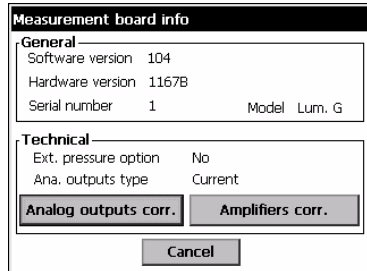
The 'Buzzer configuration' screen has two main sections. The 'Screen tap' section has a checked 'Enable screen tap' checkbox and a volume slider. The 'Alarm sound' section has an unchecked 'Enable alarm sound' checkbox, a 'Test' button, a 'Sound type' dropdown menu set to 'Long beep', and a volume slider. At the bottom are 'OK' and 'Cancel' buttons.

Adjust the sounds available on the instrument:  
When "screen tap" is enabled, a click sound is heard each time the screen is touched. The volume is adjustable.

The instrument alarm sound can be enabled or disabled to suit the application. The sound type and volume can also be adjusted.

Press the test button to test the adjustments made. Press again to stop.

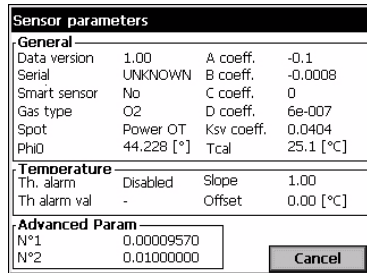
### Measurement Board



The 'Measurement board info' screen is divided into 'General' and 'Technical' sections. The 'General' section shows: Software version 104, Hardware version 1167B, Serial number 1, and Model Lum. G. The 'Technical' section shows: Ext. pressure option No, and Ana. outputs type Current. At the bottom are two buttons: 'Analog outputs corr.' and 'Amplifiers corr.', and a 'Cancel' button.

For reference, this display gives information on the measurement board hardware and software.

### Sensor Parameters



The 'Sensor parameters' screen is divided into 'General', 'Temperature', and 'Advanced Param' sections. The 'General' section shows: Data version 1.00, Serial UNKNOWN, Smart sensor No, Gas type O2, Spot Power OT, PhiD 44.228 [°], A coeff. -0.1, B coeff. -0.0008, C coeff. 0, D coeff. 6e-007, Ksv coeff. 0.0404, and Tcal 25.1 [°C]. The 'Temperature' section shows: Th. alarm Disabled, Th alarm val -, Slope 1.00, and Offset 0.00 [°C]. The 'Advanced Param' section shows: N#1 0.00009570 and N#2 0.01000000. At the bottom is a 'Cancel' button.

For reference this display gives information on the sensor model and type, last calibration, settings and behavior.

### Other Options




These include:

- **Screen** - Used to set the screen contrast
- **Main Board Info** - Displays instrument model, ID and software version
- **Batteries** - On all instruments this display gives the real time clock battery charge level and voltage. On portable instrument there is a battery level indicator for the main batteries.

## Events and Alarms

### Troubleshooting - List of Events

The possible events, the reason for the event and its criticality are listed in the following table.

Type	Name	Description
<b>Information</b> 	Measure	Normal measurement mode.
	Filter enabled	The gas measurements are filtered.
	Sample measurement	The sample measurement is started.
	Sample measurement aborted by user	The sample measurement has been stopped manually.
	Sample measurement aborted by time-out	The sample measurement has been stopped as the maximum time to measure a sample has been exceeded.
	Sample measurement aborted by sensor error	The sample measurement has been stopped due to an error in the measurement.
<b>Warning</b> 	Alarm snooze	The alarm snooze is ON.
	Calibration	Channel in calibration
	Alarm low low	The gas concentration is below the Alarm LowLow limit.
	Alarm low	The gas concentration is below the Alarm Low limit.
	Alarm high	The gas concentration is above the Alarm High limit.
	Alarm high high	The gas concentration is above the Alarm HighHigh limit.
	Calibration required	A calibration of the sensor is required.
	Service required	The sensor requires a service.
	Channel on hold	Channel on hold during calibration
	Low level zero calibration gas	The level of zero calibration gas is very low
	Auto calibration required	An automatic sensor calibration is due
	Auto calibration in progress	An automatic sensor calibration is in progress
Auto calibration failed	The automatic sensor calibration has failed	
<b>Alarm</b> 	Channel disabled	The channel has been disabled.
	Channel out	The measurement board has been disconnected (or does not answer).
	Sensor out	The sensor has been disconnected.
	Thermal cut off	The temperature is above the thermal cut off.
	PROFIBUS-DP	The PROFIBUS-DP module has not received measurements from the instrument for 30 seconds.



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