

Operator Quick Guide

ORBISPHERE 410



Operating Information

About this Guide

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Instrument Controls

The instrument front panel provides these user interfaces:

- A touch screen acting as display, touch pad and keyboard. Contrast can be adjusted.
- A LED, showing when the instrument is on.
- A 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.

Measurement display shows one measurement slope.

Display can be configured to only show a single sensor measurement, or to show a parametrable graphic representation of the last measurements.

Touching some items on the display calls a related function.

Menu navigation

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

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 the 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.

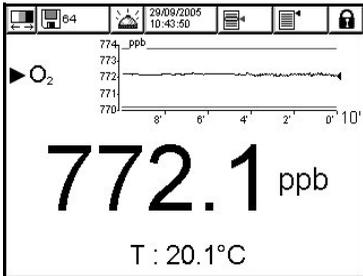
Operating Information (cont)

Identification and Authorization Level

Press the closed padlock icon (top right of the screen) 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.

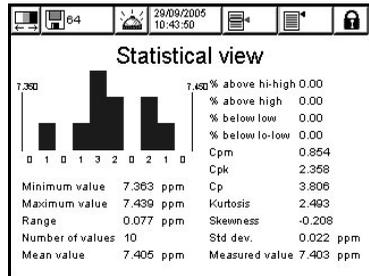
Views

The numeric view is the default view and shows 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 gas being measured and the channel configuration.

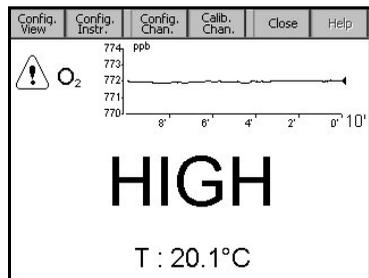
The statistical view offers statistical data that matches with Total Quality management tools. Statistics is a tool to better analyze how a process behaves.



Abnormal Conditions

Whenever an abnormal event is encountered, a sign is displayed on the upper left of the screen (see example below).

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

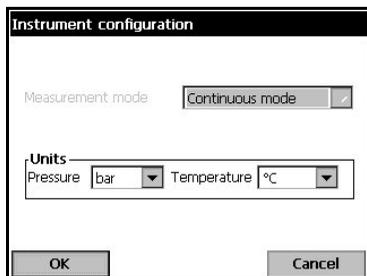
Instrument Configuration

Continuous Mode Description

The continuous mode is typically used for process measurement.

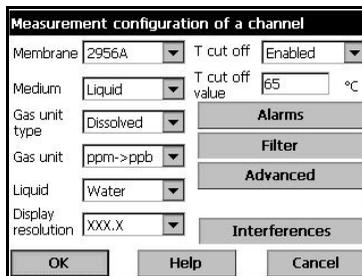
Continuous mode cycle:

- Measurements are taken every 2 seconds.
- Relays and analog outputs are regularly updated.
- Measurements are stored continuously in volatile and non-volatile memory.



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

Measurement Configuration



- Sensor's membrane number 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)
- Display resolution: Maximum resolution depends on gas, membrane and unit. A maximum of 5 digits can be displayed. Decimals can be limited to 0, 1, 2 or 3 decimals for easier reading.
- Thermal cutoff: To protect the sensor, the thermal cutoff function allows for setting a sample high temperature limit. If exceeded (during a Cleaning in Place cycle for example) the electrical signal to the sensor is cut off, the measurement session is suspended and the system displays a "HOT" alarm message. The system resumes when the temperature drops to 90% of the specified cutoff temperature.

Measurement (cont)

Measurement Alarms Configuration

The screenshot shows a dialog box titled "Measurement alarms configuration". It contains several input fields and checkboxes:

Low Low	400.0	ppb	<input type="checkbox"/> Disable
Low	450.0	ppb	<input type="checkbox"/> Disable
High	600.0	ppb	<input type="checkbox"/> Disable
High High	650.0	ppb	<input type="checkbox"/> Disable
Hysteresis	5	%	
Delay	15	s	

At the bottom, there are "OK" and "Cancel" buttons.

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 level. 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 Filter Configuration

The screenshot shows a dialog box titled "Measurement filter configuration". It contains several dropdown menus:

State	Enabled
Type	Median
Depth	5
Central depth	3

At the bottom, there are "OK" and "Cancel" buttons.

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)

Advanced Configuration

The screenshot shows a dialog box titled "Advanced configuration". It contains two checkboxes:

Enable ext. pressure sensor	<input type="checkbox"/>
Enable negative concentration	<input checked="" type="checkbox"/>

At the bottom, there are "OK" and "Cancel" buttons.

- Enable negative concentration: Check as appropriate

Measurement (cont)

Oxygen Interference Configuration

O2 interferences configuration

CO2 or H2S: All disabled

Chlorinity/Salinity: Salt enabled

Chlorinity/Salinity conc.: 19 g/l

OK Cancel

This option is available to take into account the influence of some components or gases in the sample during the measurements. By default all available interference corrections are disabled.

- Select CO₂, H₂S or all disabled
- Select Chlorinity, Salt or disabled. For chlorinity or salt, it is required to enter the actual concentration in sample.

Measured Data Storage

There is one measurement file which contains the data generated by the measurement cycle.

The current 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.

The measurement file can be managed as a rolling buffer. The maximum number of measurements is reached, the oldest measurement is discarded, except in "store once" mode where no storage is made once the buffer is full.

Measured data storage

Storage mode: Store once

RAM time: 10 s FLASH time: 72 h

Save in flash now Auto save in flash

Open data Start logging measurements

Purge data

Note: Actions will be carried out once the OK button is pressed (except for action "Open data").

OK Cancel

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)
- RAM (volatile memory) time: Delay in seconds between two recordings of measured data.
- FLASH (non-volatile memory) time: Delay in seconds between two data file transfers from volatile memory into non-volatile memory. Last data file erases previous one.

Buttons:

- 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

When any of the following parameters are modified, the measurement stored in the measurement file becomes inconsistent, and the measurement file is erased:

- The date or time
- The gas unit
- The temperature unit
- The pressure unit

Calibration

General

To calibrate the gas to measure (main gas), the user usually puts the sensor in the main gas without interfering gas.

Calibrations can only be performed once the instrument has been installed, configured and the channel has been set up. You must also ensure that you have the correct access rights to access the calibration menu.

Select Sensor calibration from the calibration menu. There are two types of gas sensor calibration available, depending on the gas being measured and the type of sensor in use:

- 1) In Air: The sensor is exposed to air at atmospheric pressure.
- 2) Direct value: This calibration exposes the sensor to a gas with a known partial pressure, or a liquid sample with a known gas concentration.

Electrochemical Gas Sensor Calibration

Calibration of the Measured Gas

Start calibration

Configuration

Calibration mode: In air **Modify**

State

Interferences: Disabled Sensor: OK

Measured values

Temp. 20.1 °C Barom. 0.965 bar

Current 0.80 µA

Start **Exit**

Before initiating a calibration process, the calibration parameters must be set by pressing on the **Modify** button. Last calibration parameters are memorized, so this step can be ignored if correct parameters are already set.

Modify Calibration Parameter

Calibration parameters

Calibration mode: In air

Medium: Gas

Gas unit type: Partial

Gas unit: mbar

Liquid: Water

Value: 200,000 mbar

Hold during calibration or verification:

OK **Cancel**

- Calibration mode: 2 types available, depending on the gas being measured and type of sensor being used:
 - **Direct value**
 - **In Air** (default)
- Medium: Select *liquid* or *gas* (direct calibration only)
- Concentration unit type: *Partial*, *fraction* or *dissolved* (dissolved is for calibration in a liquid only)
- Concentration unit: The list of available units depends on unit type selected above.
- Liquid: Select as appropriate, when liquid has been selected in *medium* (above).
- Enter the gas concentration according to value in the calibration media, when *direct value* is used
- Hold during calibration: On by default, this stops any output from the instrument during the calibration process to avoid sending invalid information to any connected device.
- Interference enabled: If selected, this takes into account the influence of interferences during calibration. By default the same interference as during measurement is selected.

Press OK to start calibration

Calibration (cont)

Calibration Results

The screenshot shows a software interface titled "Under calibration". It is divided into three main sections: "Results", "State", and "Measured values".

Results	
In air	35.50 % ideal current
Calibration possible	99.99 % last calibration
Warning, limits	0.02 % variation

State
Interferences: Disabled Sensor: Cal.

Measured values			
Temp.	20.1 °C	Barom.	0.965 bar
Current	8.03 µA	Ext. pres.	1.000 bar

At the bottom of the screen are three buttons: "Finish", "Hide", and "Cancel".

A calibration screen will be displayed showing current measurement data which is continually refreshed.

The value “% ideal current” is a percentage of the current against the ideal current for the membrane type selected. If this percentage is not within the accepted range, an error message is displayed and the calibration process fails. A warning message can be displayed when this value is close to boundaries, but calibration can be accepted.

The message is first displayed in the result box. The dialog box with the error message or the warning is displayed when the finish button is pressed.

The value “% last calibration” shows the ratio between current measurement and previous sensor calibration.

The value “% variation” indicates the variation during the last 3 measurements, which is the stability of the measurements. A variation as low as possible is wanted for a precise calibration

The display shows the actual calibration parameters, and the actual readings (temperature, barometer, current).

In case of calibration failure, consider replacing the membrane.

O₂ Sensor Calibration

The sensor is either in contact with:

- Air at atmospheric pressure (In Air)
- O₂ at known concentration (Direct value).
The gas can be dissolved or not.

In Air Calibration

This calibration procedure places the O₂ sensor in water-saturated air, to provide a known oxygen reference against which to calibrate.

Dry the sensor thoroughly, before placing the sensor storage cap under tap water. Shake off any excess water, but leave a few drops inside the cap. Verify that the screw-on protection cap is in place on the sensor head. *If you use a Dacron mesh inside the protection cap, make sure it is dry before attempting to calibrate.* Then, loosely place the storage cap back on the sensor, holding it in place by a few turns of its collar.

Set the calibration parameters accordingly and press calibrate.

Direct Calibration

This procedure calibrates the oxygen sensor against a liquid sample containing a known level of dissolved O₂ flowing through the sample line.

The instrument displays the sensitivity of the sensor as a percentage of the sensitivity determined when calibration was last performed.

Set the calibration parameters accordingly and press calibrate.

O₃ Sensor Calibration

The sensor is either in contact with:

- Air at atmospheric pressure (In Air)
- O₃ at known concentration (Direct Value).
The gas can be dissolved or not.

Procedure is the same as for the O₂ sensor. In the case of the "In air" calibration, the sensor measures O₂ during calibration. The O₃ coefficient is deduced taking into account how the sensor behaves in O₂. As a different voltage is used at the anode to measure O₂ and O₃, the O₃ measurement takes a long time to stabilize. To facilitate the follow up after an "O₃ in air" calibration, negative value can be displayed.

Calibration (cont)

Calibration Reports

Sensor calibration reports

Calibration report nb : 1

Sensor calibrated on this instrument

Date (yy.mm.dd-hh:mm): 06.01.09-15:03
Operator :
Operator ID :

Calibration coefficient : 57.70 µA/bar
Ratio with ideal membrane : 43.71 %
Ratio with last calibration : 51.47 %
Stability : 0.714 %

Previous **Next** **Exit**

Once a measured gas calibration is completed, a report is issued showing the log file of the last actions. The calibration report will contain the records for the last 10 calibrations. Each calibration record will contain parameters useful for traceability. For instance:

- the calibration coefficient
- all the measurements which influence the calibration (temperature, barometric pressure, current...)
- the date and time
- the user name and ID

Barometric Pressure Calibration

Barometric pressure calibration

Current barometric pressure: 0.965 bar

New barometric pressure: 0.965 bar

Validation **Cancel**

Upper box shows the barometric pressure measured by the instrument.

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

Once the calibration is done a calibration report is created.

Note :

The barometric sensor has been calibrated in factory.

Maintenance and Troubleshooting

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. Select enable and enter a delay in days. The display shows current instrument date and time, next calibration due date and time, and remaining days.

The next calibration date is updated when the sensor is calibrated.

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 current instrument date and time, next calibration due date and time, and remaining days.

The next service date is updated when the button **Service done** is pressed after a service.

The sensors attached to your instrument will require periodic servicing and maintenance. For

more information on this, please refer to the corresponding sensor maintenance manual.

Language

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.

Other Options

These include:

- **Time/Date** - Used to set the time, date and the display settings
- **Screen** - Used to set the screen contrast
- **Buzzer** - Used to set the alarm parameters (sound, volume, etc.)
- **Main board info** - Displays instrument model, ID and software version
- **Batteries** - This display gives the real time clock battery charge level and voltage

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.

Troubleshooting - List of Events

The possible events, along with the text message displayed on the instrument numeric view screen, the reason for the event and its criticality are listed in the following table.

An event is something which affects the measurement.

Maintenance and Troubleshooting (cont)

The following events are defined:

Type	Name	Description
Information 	Measure	Normal measurement mode.
	Filter enabled	The gas measurements are filtered.
	Sample measurement	The sample measurement is started.
	Meas. not ready	The measurement is not ready (e.g. at startup)
	Autotest in progress	The autotest is running.
	Autotest failed	The autotest has failed.
	Alarm snooze	The alarm snooze is ON.
Warning 	Calibration	Channel in calibration.
	Hold	The measurement is frozen.
	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	The calibration of the sensor is required.
	Service required	The sensor requires a service.
Alarm 	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.
	PROFIBUS-DP value not updated	The PROFIBUS-DP module has not received measurements from the instrument for 30 seconds.

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