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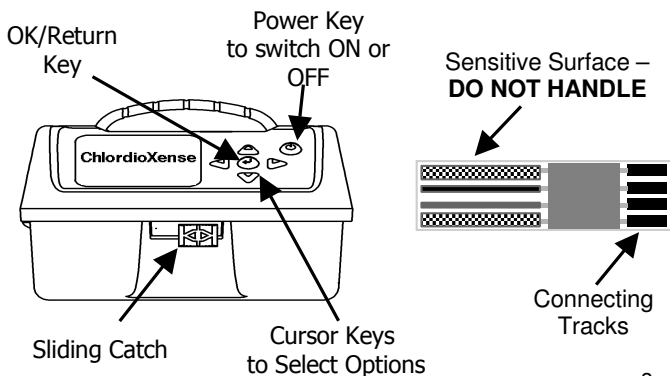
INTRODUCTION

The Palintest ChlordioXense is a precision instrument used with unique pre-calibrated disposable sensors*. It offers a simple, rapid, reagent-free method of analysing water for chlorine dioxide, removing almost all sources of technique dependence.

The instrument is lightweight and portable for field or laboratory use. It is extremely simple to use, with a large, clear, backlit results display. In 'Analysis' mode, all settings are locked, and the display prompts guide the user through the test. Once linked to a PC through the USB interface, a stored log of up to 500 tests may be accessed, and the instrument option settings may be edited.

* patent applied for

Diagram of Instrument and Sensor



Use of Sensor

The sensor is designed for single use only. The surface of the sensor is highly sensitive. It should be handled by the edges or through the foil packaging only.

Kit Contents

ChlordioXense Instrument
Chlordiox Preparation Pack
Sensor Pack (x100 Sensors)
Instructions
Sample Bottle
Sensor Carrying Box
Contact Drying Sticks

INSTRUMENT OPERATION

The ChlordioXense has three operating modes, the ANALYSIS mode, the SET-UP mode and the TEST mode.

The instrument automatically engages SET-UP mode when connected to a PC, and ANALYSIS mode when battery powered and not connected to a PC.

To access the TEST mode, see the calibration check standards instructions.

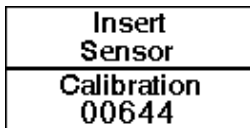
ANALYSIS Mode – for Testing Water Samples

Start-Up

- 1 Press and hold the power button (⏻) until the title screen is displayed.



- 2 When the instrument passes all internal functional checks on start up, the screen displays the current batch code and prompts the user to insert a sensor.



If start up fails, an error message is displayed.

- 3 Ensure the calibration code shown on screen matches with the number on the foil of the batch of sensors in use.

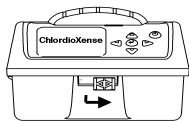
(See Entry of New Calibration Code - Page 9).

Performing a Test (Analysis Mode)

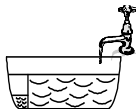
NB: The Chlordiox Preparation Reagent is a reagent specifically designed to work with the Chlordioxense instrument in water samples where copper or chlorine are likely to be found.

In samples where these two interferants are definitely not present, then the procedure described overleaf can be performed without performing Steps 3 and 4.

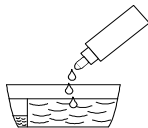
- 1 Slide the front catch to the right, and open the instrument case fully.



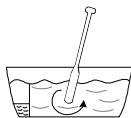
- 2 Remove the sample container. Rinse and then fill to the stepped line with the water sample.



- 3 Add five drops of Chlordiox Preparation Reagent to the centre of the sample vessel.

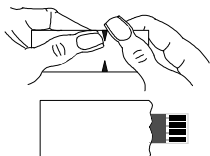


- 4 Briefly stir the solution gently with the rod provided.

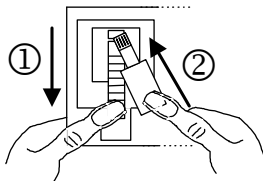


- 5 Replace the filled sample container in the instrument.

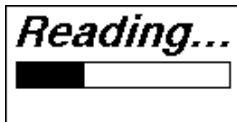
- 6 Tear open the foil along the pre-cut marks, in the manner shown. Holding the sensor through the foil pack, expose the connecting tracks.



- 7 Press the blue lever to open the jaws of the sensor connector. Insert the exposed end of the sensor, connecting tracks uppermost, into the slot, and release the lever. The jaws will close to hold the sensor in place. Slide the foil pouch off to expose the sensor.



- 8 **Gently** close the instrument lid to immerse the sensor in the sample. The test starts automatically. The display indicates progress of the test. ***Do not disturb the instrument during the test.***



- 9 The chlorine dioxide result will be displayed. Press the down arrow to scroll through Chlorine Dioxide, Temperature, Date and Time and Sample Number. All results are automatically stored to the instrument log.

0.21 mg/l ClO ₂	
← Read	Temp ▼

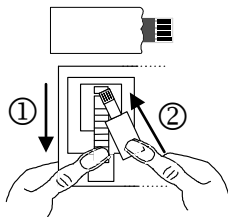
- 10 After completion of the test, open the instrument and press the blue lever to remove the used sensor. Empty and rinse the sample container. ***Do not leave water within the instrument on completion of the test.***
- 11 Press (←) key to carry out a new test or new calibration.
If no key is pressed for five minutes, the instrument automatically switches off to save power.
- 12 To recall the last reading to the screen, press the (←) key from the 'Insert Sensor' screen.

Getting the Best Results

- 1 Handle the sensors with care.
- 2 Place the instrument on a flat surface free from vibration.
- 3 Do not disturb the instrument or sample during the test.
- 4 The sensor response compensates for sample temperature in the range 2 – 25° C (35 – 77° F). The precision of sensor response is enhanced at low temperature. Operation at sample temperatures above 25° C is not recommended.
- 5 Store the sensors at a temperature of less than 30° C.

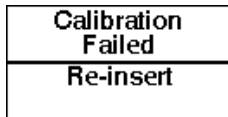
Entry of New Calibration Code

- 1 Slide the front catch to the right, and open the instrument case fully.
- 2 Press the blue lever, and insert the contacts of the calibration chip fully into the slot revealed. Release the blue lever.








- 3 Close the instrument lid and view the display. Check the new code number displayed on screen matches the number on the sensor packaging. A test can now be performed.
- 4 If the calibration procedure was unsuccessful, an error message will be displayed.
Do not remove the calibration chip. Just open and close the lid again to repeat the calibration.
- 5 Remove the calibration chip.

00644



Error Messages

The ChlordioXense features an error detection system to guide the user. After correcting each error, press  key to reset the instrument. Always use a fresh portion of sample if a sensor has been immersed in the water sample :-

Error	Action
Unable to read: Check sensor and contacts	1 Remove sensor, dry the contacts (see below). 2 Remove calibration chip.
Unable to read: Sensor already used	Remove and discard wet sensor. Dry the contacts (see below).
Unable to read: Sensor missing	Press  key then insert sensor and restart test.
Unable to read: Faulty Sensor	Remove and discard the sensor. Dry the contacts (see below). Press  key and start again with fresh sample and sensor.
Lid opened during test	Remove the sensor. Press  key and start again with fresh sample and sensor.
Sample not level during test	Remove the sensor. Press  key and start again with fresh sample and sensor.

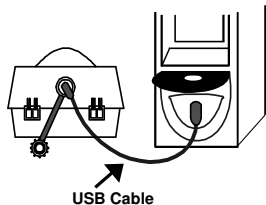
The instrument is fitted with integral electrical connectors for insertion of the sensors. If the contacts accidentally become wet, open the jaws with the blue lever and insert a Palintest Contact Drying Stick (CS 160). Wait a few seconds until it absorbs the water, then remove and insert the opposite end to check the contacts are dry. A dry 'Contact Drying Stick' may also be used to clean the contacts.

Adjusting Optional Settings and Data Handling (Set-Up Mode)

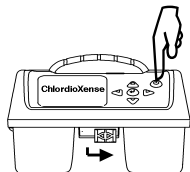
The ChlordioXense is designed for simplicity of use in the field. The user selectable options are only accessed when linked to the PC. Once selections have been made, these are stored in memory, and applied to each reading. A group of instruments can be coordinated, and the settings cannot be changed accidentally, or without supervisor intervention.

Enter SET-UP Mode

- 1 To engage SET-UP mode, connect the instrument to a PC via the USB port using USB cable PT 747 or equivalent.



- 2 Press and hold the power on/off button.



- 3 Scroll through the menu of options using the Δ ∇ keys, and press \leftarrow to select.



Selectable Options

Language


Press \leftarrow to show the available languages. Scroll Δ ∇ to highlight the required language. Press \leftarrow to select and return to the options list.

Show as ClO_2




Use the Δ ∇ keys to toggle between displaying your results as mg/l ClO_2 or as mg/l chlorine equivalence.


Clear Log

Press  to select. Use   keys to highlight **[Yes]** or **[No]**.






Press  to perform the action and return to the options list.


Reset Sample

Press  to select reset of sample number to 1. Use   keys to highlight **[Yes]** or **[No]**.






Press  to perform the action and return to the options list.


Set Time

Press  to edit the displayed time. Use   keys to increment/decrement the highlighted number. Use the   keys to move the highlight to different numbers.

Press  to accept the new time and return to the options list.


Set Date

Press  to edit the displayed date. Use the   keys to increment/ decrement the highlighted number. Use the   keys to move the highlight to different numbers.


Press  to accept the new date and return to the options list.

Date Format

Press  to select UK or US date format. Use the Δ ∇ keys to highlight either DD/MM/YYYY or MM/DD/YYYY.

Press  to select and return to options list.


Temperature Format

Press  to select the temperature scale for logged results. Use the Δ ∇ keys to highlight $^{\circ}\text{C}$ or $^{\circ}\text{F}$.

Press  to select and return to the options list.

Serial Number

Press  to view the instrument serial number.


Press  to return to the options list.

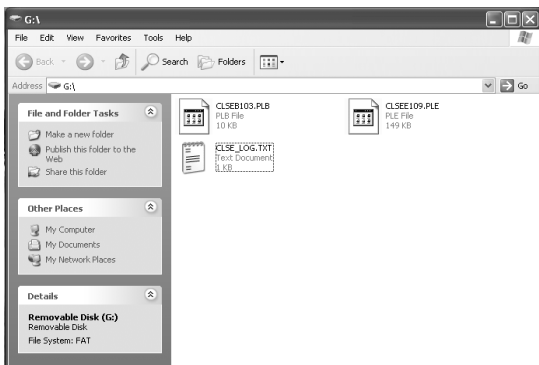
COMPUTER INTERFACE

The ChlordioXense USB port, once connected to a PC, can be used to access data stored in the instrument log, or to up-grade the instrument software.

When the ChlordioXense is connected to a PC, it behaves like a removable hard drive or USB memory stick.

Data Access

- 1 Connect the ChlordioXense to a PC using the USB cable.
- 2 Press and hold the  key until the title screen appears then release.
- 3 On the PC, open the hard drive window. Three files will be seen :-
- 4 Results are stored in the Log file, CLSE_LOG.TXT.



- Copy the file to the PC to view and handle the data.
- Open this file. Results appear as a text file. Each result appears on one line with spacing to allow easy opening in a spreadsheet program :-

CLO2_LOG - Notepad



File Edit Format View Help

DD/MM/YYYY	HH/MM	Sample	mg/l	C102/C12	°C	Batch
00000-000						
13/07/2009	15:41	002118	1.05	C102	10.6	00007
13/07/2009	15:31	002117	0.12	C102	10.0	00007
13/07/2009	15:27	002116	0.11	C102	12.3	00007
13/07/2009	14:48	002115	24.8	C102	21.3	00004
13/07/2009	14:45	002114	26.8	C102	21.4	00004
13/07/2009	14:43	002113	26.9	C102	21.3	00004
13/07/2009	14:41	002112	25.4	C102	21.1	00004
13/07/2009	14:32	002111	26.0	C102	20.9	00004
13/07/2009	14:27	002110	9.70	C102	21.8	00004
13/07/2009	14:25	002109	9.31	C102	21.6	00004
13/07/2009	14:22	002108	10.9	C102	21.4	00004
13/07/2009	14:17	002107	9.65	C102	21.4	00004
13/07/2009	14:11	002106	5.00	C102	22.2	00004
13/07/2009	14:08	002105	4.84	C102	22.2	00004
07/07/2009	15:52	002104	18.8	C102	22.7	00005
07/07/2009	15:50	002103	10.3	C102	22.4	00005
07/07/2009	15:46	002102	19.5	C102	22.5	00005
07/07/2009	15:43	002101	10.9	C102	22.8	00005
07/07/2009	15:21	002100	10.1	C102	22.2	00005
07/07/2009	15:18	002099	10.3	C102	22.2	00005
07/07/2009	15:10	002098	10.6	C102	22.0	00005
07/07/2009	15:09	002097	12.5	C102	22.1	00005
07/07/2009	15:01	002096	9.64	C102	21.7	00005
07/07/2009	15:00	002095	9.79	C102	21.7	00005
07/07/2009	14:56	002094	9.42	C102	21.6	00005
07/07/2009	14:55	002093	10.7	C102	21.6	00005
07/07/2009	14:49	002092	10.8	C102	21.7	00005
07/07/2009	14:47	002091	12.6	C102	21.8	00005
07/07/2009	14:43	002090	10.5	C102	21.6	00005
07/07/2009	14:41	002089	10.3	C102	21.7	00005
07/07/2009	14:39	002088	11.1	C102	21.7	00005
07/07/2009	14:36	002087	13.1	C102	21.8	00005
07/07/2009	14:33	002086	14.5	C102	21.5	00005
07/07/2009	14:29	002085	10.9	C102	21.6	00005
07/07/2009	14:26	002084	11.0	C102	21.7	00005
07/07/2009	14:21	002083	11.3	C102	21.7	00004
07/07/2009	14:03	002082	10.4	C102	21.6	00004
07/07/2009	13:59	002081	11.0	C102	21.6	00004
07/07/2009	13:55	002080	11.3	C102	21.5	00004
07/07/2009	13:50	002079	10.7	C102	21.7	00004
07/07/2009	13:47	002078	10.3	C102	21.8	00004
07/07/2009	12:30	002077	13.9	C102	21.9	00004
07/07/2009	12:27	002076	10.8	C102	21.7	00004
07/07/2009	12:21	002075	10.2	C102	22.0	00004
07/07/2009	12:19	002074	9.67	C102	21.8	00004
07/07/2009	12:15	002073	9.50	C102	21.9	00004
07/07/2009	12:13	002072	10.6	C102	21.7	00004
07/07/2009	12:06	002071	11.5	C102	21.7	00004
07/07/2009	12:04	002070	14.4	C102	21.7	00004
07/07/2009	12:01	002069	10.2	C102	21.7	00004
07/07/2009	11:59	002068	10.4	C102	21.6	00004

- To delete the results from the instrument memory, delete the log file on the hard drive window or from the instrument memory.
- Note that for security of the audit trail, it is not possible to save files to the log file stored in the instrument.

Software Upgrade

When new software is made available by Palintest, the ChlordioXense may be upgraded. Files will be available by e-mail or on the Palintest website.

- 1 Connect the ChlordioXense to a PC using the USB cable.
- 2 Press and hold the  key until the title screen appears. Release the  key.
- 3 On the PC, open the hard drive window.
- 4 Drag and drop the software upgrade (PLE.) file onto the hard drive window.
- 5 The new software will be programmed into the ChlordioXense. The instrument will re-start to run the new software.
- 6 When upgrading the PLE. file, the instrument should be turned off and then back on again in order for the new software to take effect.
- 7 Any logged data will be retained during this upgrade.

TECHNICAL INFORMATION

Principle

The ChlordioXense uses the electrochemical technique known as chronoamperometry. Chronoamperometry involves applying a fixed voltage to a working electrode and recording the resulting current-time dependence. The magnitude of the current is directly proportional to the concentration of chlorine in the test sample.

Once the sensor is inserted, the analysis is fully automatic and operator independent. The ChlordioXense precisely controls the sensor cycle, and captures and collates thousands of signal readings. The processor interprets these readings to identify ClO_2 , and determines the exact concentration. The instrument display gives a direct reading of the test result in mg/l.

No user calibration is required, because each sensor batch is assigned a 60 digit calibration code during manufacture. This code is used to construct a calibration curve that exactly matches the sensor batch. A pre-programmed, plug-in calibration chip is provided with each pack of sensors to automatically enter the calibration code into the instrument.

SYSTEM PERFORMANCE CHARACTERISTICS

	CHLORINE DIOXIDE	TEMPERATURE
Analysis Time	< 1 minute	< 1 minute
Precision Range	0.02 – 50 mg/l	0 – 100°C
Resolution	0.01 up to 1.0 mg/l 0.1 mg/l thereafter	0.1°C
Precision @ 12°C	≤ 5% CV @ 1.00	0.5°C
Limit of Detection	0.02 mg/l	N/A

GENERAL INFORMATION

Technical Specification – Instrument

Instrument Type	Fixed voltage potentiostat
Display	Backlit, graphical LCD (42 x 22 mm), with five language options and direct-reading of results in mg/l
User Selectable Options	Set time and date, date format, display language, reset sample number and temperature units
Data Logging	Stores 500 previous readings and offers prompts when 20 left
Interface	Waterproof USB connection to PC
Power	4 x 1.5v 'AA' alkaline batteries. Battery power saving system with auto switch-off after 5 minutes. Powered via USB port when connected to computer
Size	Instrument only 170 x 126 x 116 mm
Weight	975g


Technical Specification – Sensors

Sensor Type	Disposable, single-use, chrono-amperometric sensor
Calibration	Pre-calibrated during manufacture
Packaging	Individually packed in sealed foil
Storage Life	Two years
Storage Temp	2° C – 30° C (35° F – 86° F)

Calibration Check Standards

Certified electronic standards may be obtained from Palintest Ltd in the Chlordiox Check Standards Kit (CS 190).

Power Supply

The ChlordioXense is designed to operate on alkaline batteries. The instrument features an automatic battery condition check as part of the analysis cycle. If the batteries require replacement a 'Low Battery' warning message appears. The message can be cleared by pressing . The instrument continues to function correctly for several tests, but the batteries should be replaced as soon as possible. When the power supplied by the batteries is insufficient to carry out a test, the instrument displays the warning message continually and will not carry out a test.

The battery compartment, in the base of the instrument, is secured by four screws. To replace the batteries, remove the cover, pull out the battery pack and remove the old batteries. Replace all four batteries at once with fresh batteries, observing the correct polarity as marked in the battery holder.

Insert the battery pack in the base of the instrument, replace the battery compartment cover. Tighten the screws in diagonal pairs to ensure waterproof fit.

Use 4 x 1.5v 'AA' alkaline cells (type MN1500, LR6, E91 and AM3 or equivalent).

To avoid corrosion damage through leakage, remove batteries from the instrument if it is to be stored or left unused for a long period of time.

CARE AND MAINTENANCE

The ChlordioXense is designed to give long and trouble-free operation. The instrument is suitable for both laboratory and field use.

On no account should solvents or abrasive materials be used to clean the instrument.

Guarantee

The Palintest ChlordioXense is guaranteed for a period of two years from the date of purchase, excluding accidental damage or damage caused by unauthorised repair or misuse. Should repair be necessary, contact our Technical Services Department quoting the serial number shown on the instrument label. This guarantee does not affect statutory rights.

REORDERING INFORMATION

Part Number	Description
CS 300	ChlordioXense Instrument with Pack of 100 Sensors and Calibration Chip
CS 310	Pack of 100 Replacement ChlordioXense Sensors with Calibration Chip
CS 350	Pack of 500 Replacement ChlordioXense Sensors with Calibration Chip
CS 160	Pack of 20 Contact Drying Sticks
PT 747	USB Data Cable
CS 190	Chlordiox Check Standards Kit
PT 540	Sample Vessel
PT 543	Chlordiox Preparation Pack