DOC024.52.93004

ORBISPHERE Model 3650 Atex

USER MANUAL

10/2019, Edition 13

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Section 1 General Information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website..

1.1 Safety information

NOTICE
The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

1.1.1 Use of hazard information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially or imminently hazardous situation that may result in minor or moderate injury.

NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

1.1.2 Service and repairs

None of the instrument's components can be serviced by the user. Only personnel from Hach are authorized to attempt repairs to the system and only components formally approved by the manufacturer should be used. Any attempt at repairing the instrument in contravention of these principles could cause damage to the instrument and corporal injury to the person carrying out the repair. It renders the warranty null and void and could compromise the correct working of the instrument and the electrical integrity or the CE compliance of the instrument.

If you have any problems with installation, starting, or using the instrument please contact the company that sold it to you. If this is not possible, or if the results of this approach are not satisfactory, please contact the manufacturer's Customer Service.

1.1.3 Interface box (model 29122)

WARNING

Explosion hazard. Only use the Interface Box 29122 in the safe area and **never** in the explosive area.

WARNING

The interface box should only be connected to an earthed power supply socket.

WARNING

In accordance with safety standards, it must be possible to disconnect the external power supply of the interface box in its immediate vicinity.

WARNING

Any maintenance of the interface box should be performed exclusively by personnel specialized and authorized to work on electrical equipment, in accordance with relevant local regulations.

WARNING

Disconnect the interface box from the power supply before carrying out any maintenance (including changing fuses).

WARNING

Electrical danger and fire hazard. Only use the supplied power cable. Only qualified experts may perform the tasks detailed in the installation section of this manual, while adhering to all locally valid safety regulations.

WARNING

Removable power cables must not be replaced with inadequately dimensioned power cables.

1.1.4 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists and indicates that only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.
	This symbol, when noted on the product, indicates that the marked item can be hot and should not be touched without care.
	This symbol, when noted on the product, indicates the presence of devices sensitive to electrostatic discharge and indicates that care must be taken to prevent damage to them.
	This symbol, when noted on the product, identifies a risk of chemical harm and indicates that only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol, if noted on the product, indicates the need for protective eye wear.
	This symbol, when noted on the product, identifies the location of the connection for protective earth (ground).
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems. In conformity with European local and national regulations, European electrical equipment users must now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.
	Products marked with this symbol indicates that the product contains toxic or hazardous substances or elements. The number inside the symbol indicates the environmental protection use period in years.
	Products marked with this symbol indicates that the product must only be used in the safe area and **never** in the explosive area.

1.2 Intrinsically safe conformity

Orbisphere series 3650Ex analyzers for gas measurement have been certified as Intrinsically Safe by:

LCIE (Laboratoire Central des Industries Electriques), 33 av. Division Leclerc, Fontenay aux Roses 92260, France.

Note: *LCIE is notified body number 0081 in accordance with the European ATEX Directive.*

LCIE certifies that this electrical apparatus has been found to comply with the essential Health and Safety Requirements: EN 60079-0, EN 60079-11.

These instruments are certified ⟨Ex⟩ II 1G EX ia IIC T4 Ga under EC type Examination Certificate number LCIE 03 ATEX 6003 X

Category	Explanation
⟨Ex⟩ **II 1 G**	ATEX marking: Surface apparatus with permanent explosive gas presence.
Ex	Explosion-proof apparatus built to the universal standards that follow.
ia	Type of protection: The highest category, based on a safety factor of 1.5 on two faults. No combination of two faults in the 3650Ex can produce a spark, or heating, causing ignition of an explosive atmosphere.
IIC	Gas group: Corresponds to the most flammable gases, including hydrogen.
T4	Temperature category: Maximum surface temperature of 135 ºC (250 ºF).
Ga	Equipment protection level

1.3 Product recycling information

ENGLISH

Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

Note: *For return for recycling, please contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.*

DEUTSCH

Elektrogeräte, die mit diesem Symbol gekennzeichnet sind, dürfen in Europa nach dem 12. August 2005 nicht mehr über die öffentliche Abfallentsorgung entsorgt werden. In Übereinstimmung mit lokalen und nationalen europäischen Bestimmungen (EU-Richtlinie 2002/96/EC), müssen Benutzer von Elektrogeräten in Europa ab diesem Zeitpunkt alte bzw. zu verschrottende Geräte zur Entsorgung kostenfrei an den Hersteller zurückgeben.

Hinweis: *Bitte wenden Sie sich an den Hersteller bzw. an den Händler, von dem Sie das Gerät bezogen haben, um Informationen zur Rückgabe des Altgeräts zur ordnungsgemäßen Entsorgung zu erhalten.*

FRANCAIS

A partir du 12 août 2005, il est interdit de mettre au rebut le matériel électrique marqué de ce symbole par les voies habituelles de déchetterie publique. Conformément à la réglementation européenne (directive UE 2002/96/EC), les utilisateurs de matériel électrique en Europe doivent désormais retourner le matériel usé ou périmé au fabricant pour élimination, sans frais pour l'utilisateur.

Remarque: *Veuillez vous adresser au fabricant ou au fournisseur du matériel pour les instructions de retour du matériel usé ou périmé aux fins d'élimination conforme.*

ITALIANO

Le apparecchiature elettriche con apposto questo simbolo non possono essere smaltite nelle discariche pubbliche europee successivamente al 12 agosto 2005. In conformità alle normative europee locali e nazionali (Direttiva UE 2002/96/EC), gli utilizzatori europei di apparecchiature elettriche devono restituire al produttore le apparecchiature vecchie o a fine vita per lo smaltimento senza alcun costo a carico dell'utilizzatore.

Nota: *Per conoscere le modalità di restituzione delle apparecchiature a fine vita da riciclare, contattare il produttore o il fornitore dell'apparecchiatura per un corretto smaltimento.*

DANSK

Elektriske apparater, der er mærket med dette symbol, må ikke bortskaffes i europæiske offentlige affaldssystemer efter den 12. august 2005. I henhold til europæiske lokale og nationale regler (EU-direktiv 2002/96/EF) skal europæiske brugere af elektriske apparater nu returnere gamle eller udtjente apparater til producenten med henblik på bortskaffelse uden omkostninger for brugeren.

Bemærk: *I forbindelse med returnering til genbrug skal du kontakte producenten eller leverandøren af apparatet for at få instruktioner om, hvordan udtjente apparater bortskaffes korrekt.*

SVENSKA

Elektronikutrustning som är märkt med denna symbol kanske inte kan lämnas in på europeiska offentliga sopstationer efter 2005-08-12. Enligt europeiska lokala och nationella föreskrifter (EU-direktiv 2002/96/EC) måste användare av elektronikutrustning i Europa nu återlämna gammal eller utrangerad utrustning till tillverkaren för kassering utan kostnad för användaren.

Obs! *Om du ska återlämna utrustning för återvinning ska du kontakta tillverkaren av utrustningen eller återförsäljaren för att få anvisningar om hur du återlämnar kasserad utrustning för att den ska bortskaffas på rätt sätt.*

ESPANOL

A partir del 12 de agosto de 2005, los equipos eléctricos que lleven este símbolo no deberán ser desechados en los puntos limpios europeos. De conformidad con las normativas europeas locales y nacionales (Directiva de la UE 2002/96/EC), a partir de esa fecha, los usuarios europeos de equipos eléctricos deberán devolver los equipos usados u obsoletos al fabricante de los mismos para su reciclado, sin coste alguno para el usuario.

Nota: *Sírvase ponerse en contacto con el fabricante o proveedor de los equipos para solicitar instrucciones sobre cómo devolver los equipos obsoletos para su correcto reciclado.*

NEDERLANDS

Elektrische apparatuur die is voorzien van dit symbool mag na 12 augustus 2005 niet meer worden afgevoerd naar Europese openbare afvalsystemen. Conform Europese lokale en nationale wetgegeving (EU-richtlijn 2002/96/EC) dienen gebruikers van elektrische apparaten voortaan hun oude of afgedankte apparatuur kosteloos voor recycling of vernietiging naar de producent terug te brengen.

Nota: *Als u apparatuur voor recycling terugbrengt, moet u contact opnemen met de producent of leverancier voor instructies voor het terugbrengen van de afgedankte apparatuur voor een juiste verwerking.*

POLSKI

Sprzęt elektryczny oznaczony takim symbolem nie może być likwidowany w europejskich systemach utylizacji po dniu 12 sierpnia 2005. Zgodnie z europejskimi, lokalnymi i państwowymi przepisami prawa (Dyrektywa Unii Europejskiej 2002/96/EC), użytkownicy sprzętu elektrycznego w Europie muszą obecie przekazywać Producentowi stary sprzęt lub sprzęt po okresie użytkowania do bezpłatnej utylizacji.

Uwaga: *Aby przekazać sprzęt do recyklingu, należy zwrócić się do producenta lub dostawcy sprzętu w celu uzyskania instrukcji dotyczących procedur przekazywania do utylizacji sprzętu po okresie użytkownia.*

PORTUGUES

Qualquer equipamento eléctrico que ostente este símbolo não poderá ser eliminado através dos sistemas públicos europeus de tratamento de resíduos sólidos a partir de 12 de Agosto de 2005. De acordo com as normas locais e europeias (Directiva Europeia 2002/96/EC), os utilizadores europeus de equipamentos eléctricos deverão agora devolver os seus equipamentos velhos ou em fim de vida ao produtor para o respectivo tratamento sem quaisquer custos para o utilizador.

Nota: *No que toca à devolução para reciclagem, por favor, contacte o produtor ou fornecedor do equipamento para instruções de devolução de equipamento em fim de vida para a sua correcta eliminação.*

1.4 Product disposal

Note: *The following only applies to European customers.*

Hach is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible. The European Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) that came into force on August 13 2005 aims to reduce the waste arising from electrical and electronic equipment; and improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment.

In conformity with European local and national regulations (EU Directive 2002/96/EC stated above), electrical equipment marked with the above symbol may not be disposed of in European public disposal systems after 12 August 2005.

Hach will offer to take back (**free of charge to the customer**) any old, unserviceable or redundant analyzers and systems which carry the above symbol, and which were originally supplied by Hach. Hach will then be responsible for the disposal of this equipment.

In addition, Hach will offer to take back (**at cost to the customer**) any old, unserviceable or redundant analyzers and systems which do not carry the above symbol, but which were originally supplied by Hach. Hach will then be responsible for the disposal of this equipment.

Should you wish to arrange for the disposal of any piece of equipment originally supplied by Hach, please contact your supplier or our After Sales Service department in for instructions on how to return this equipment for proper disposal.

Section 2 Specifications and Certifications

2.1 General technical data

3650EX Instrument	
Power Supply	Model 32960 non-rechargeable lithium battery
Battery Autonomy	60 hours continuous use
Signal Drift	< 0.5% of reading between service
Serial Output (RS232)	Baud rate: 9600; Stop Bits: 1; Start Bits: 0; Parity: None;
Temperature Compensation Range	-5 to 60°C
Instrument Operating Limits	0 to 45°C
Dimensions (HxWxD)	150 mm x 115 mm x 220 mm
Weight	2.4 kg
Enclosure	IP 65/NEMA 4
EMC Directive	EN 61326-1
ATEX Directive	EN 60079-0 EN 60079-11
LCIE 03 ATEX 6003 X	Ex II 1 G, EX ia IIC T4 Ga
ISO Certification	ISO9001/EN29001

29122 Interface Box	
Power Supply	120Vac 50/60Hz (Model 29122.A)
	230Vac 50/60Hz (Model 29122.B)
Power Consumption	11VA (Model 29122.A)
	7VA (Model 29122.B)
Fuse	Max current 250mA (Model 29122.A)
	Max current 100mA (Model 29122.B)
Operating Limits	0 to 45°C
Dimensions (HxWxD)	70 mm x 140 mm x 190 mm
Weight	0.65 kg
Enclosure	IP 20
Enclosure material	ABS FR (V0)
EMC Directive	EN 61326-1
LVD Directive	EN 61010-1

2.2 Analyzer gas and display options

Instrument Model	Gas Measured	Display Units	Maximum Display Resolution
3650EX/111	Oxygen	ppm/ppb (liquid)	1 ppb
3650EX/112	Oxygen	%/ppm (gaseous)	1 ppm
3650EX/113	Oxygen	ppm (liquid) % (gaseous)	0.001 ppm 0.001%
3650EX/114	Oxygen	kPa/Pa (gaseous)	1 Pa
3650EX/115	Oxygen	bar/mbar (gaseous)	1 mbar
3650EX/211	Hydrogen	ppm/ppb (liquid)	0.01 ppb
3650EX/212	Hydrogen	%/ppm (gaseous)	0.01 ppm

2.3 Theory of operation

2.3.1 Measuring oxygen

The sensor circuitry performs four functions:

- Applying a constant voltage to the anode
- Measuring the current flowing through the sensor
- Compensating this current for sample temperature variations
- Converting these resulting signals into a scaled current or voltage

The anode is held positive with respect to the cathode. Current flowing through the sensor due to oxygen reduction at the cathode is converted to a voltage by an amplifier, the proportionality between voltage and current being determined by the feedback resistance of this amplifier.

The output voltage is essentially a function of oxygen activity (partial pressure), temperature and membrane permeability. Corrections for variations in membrane permeability are made when the sensor is calibrated. The temperature compensation circuit accounts for temperature variations. Hence the output voltage varies only with oxygen concentration.

2.3.2 Measuring hydrogen

The sensor circuitry performs four functions:

- Maintaining a zero potential to the anode
- Measuring the current flowing through the sensor
- Compensating this current for sample temperature variations
- Converting these resulting signals into a scaled current or voltage

The anode is held neutral with respect to the cathode. Current flowing through the sensor due to hydrogen oxidation at the anode is converted to a voltage by an amplifier, the proportionality between voltage and current being determined by the feedback resistance of this amplifier.

The output voltage is essentially a function of hydrogen activity (partial pressure), temperature and membrane permeability. Corrections for variations in membrane permeability are made when the sensor is calibrated. The temperature compensation circuit accounts for temperature variations. Hence the output voltage varies only with hydrogen concentration.

2.4 3650Ex certificates

Refer to the IECEx Database web site for the IECEx Certificate of conformity:
http://iecex.iec.ch, with the Certificate reference: **LCI 09.0025X**

ATTESTATION D'EXAMEN UE DE TYPE
EU TYPE EXAMINATION CERTIFICATE

1 **Version : 04** — **LCIE 03 ATEX 6003 X** — **Issue : 04**

	Directive 2014/34/UE	**Directive 2014/34/EU**
2	Appareil ou Système de Protection destiné à être utilisé en Atmosphères Explosibles	Equipment or Protective System Intended for use in Potentially Explosive Atmospheres
3	Produit : MicroLogger portable	Product : Portable MicroLogger

Type: 3650EX

4	Fabricant :	Manufacturer :
	HACH LANGE Sàrl	
5	Adresse :	Address :
	6, route de Compois 1222 Vésenaz Switzerland	

6	Ce produit et ses variantes éventuelles acceptées sont décrits dans l'annexe de la présente attestation et dans les documents descriptifs cités en référence.	This product any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
7	Le LCIE, Organisme Notifié sous la référence 0081 conformément à l'article 17 de la directive 2014/34/UE du Parlement européen et du Conseil du 26 février 2014, certifie que ce produit est conforme aux Exigences Essentielles de Sécurité et de Santé pour la conception et la construction de produits destinés à être utilisés en atmosphères explosibles, données dans l'annexe II de la Directive.	LCIE, Notified Body number 0081 in accordance with article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014 certifies that product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
	Les résultats des vérifications et essais figurent dans le(s) rapport(s) confidentiel(s) N° :	The examination and test results are recorded in confidential report(s) N°:
	143781-690891, 112767-624064-1, 89388-580763-1, 60022484-515730-1, 60001647-1	
8	Le respect des Exigences Essentielles de Sécurité et de Santé est assuré par la conformité à :	Compliance with the Essential Health and Safety Requirements has been assured by compliance with :
	EN 60079-0:2012 + A11:2013 EN 60079-11:2012	
9	Le signe « X » lorsqu'il est placé à la suite du numéro de l'attestation, indique que cet appareil est soumis aux conditions particulières d'utilisation, mentionnées dans l'annexe de cette attestation.	If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.
10	Cette Attestation d'Examen UE de Type concerne uniquement la conception et la construction du produit spécifié. Des exigences supplémentaires de la directive sont applicables pour la fabrication et la fourniture du produit. Ces dernières ne sont pas couvertes par la présente attestation.	This EU Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
11	Le marquage du produit est mentionné dans l'annexe de cette attestation.	The marking of the product is specified in the schedule to this certificate.

Fontenay-aux-Roses, le 25 juillet 2017

Responsable de Certification
Certification Officer
Julien Gauthier

LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES
S.A.S au capital de 15.745.984 €
RCS Nanterre B 408 363 174
33 avenue du Général Leclerc
F - 92266 FONTENAY AUX ROSES

ATTESTATION D'EXAMEN UE DE TYPE - ANNEXE

EU TYPE EXAMINATION CERTIFICATE - SCHEDULE

1 **Version : 04** **LCIE 03 ATEX 6003 X** **Issue : 04**

12 DESCRIPTION DU PRODUIT

Le MicroLogger 3650EX est un analyseur de gaz portable, alimenté par pile, conçu pour mesurer la concentration d'oxygène ou d'hydrogène avec un capteur électrochimique externe.

L'appareil se compose d'un boitier en acier inoxydable (la façade et le support de la sonde en aluminium), d'un écran LCD, d'un clavier couvert par un film plastique, deux cartes électroniques et une pile. Il doit être équipé d'un capteur électrochimique de type 31xxxE ou X1Y0E, avec ou sans câble de rallonge de 3m à 999m.

L'appareil peut être alimenté par une alimentation externe quand il est raccordé à un ordinateur à travers un boitier d'interface, mais son utilisation n'est pas autorisée en atmosphère explosive. Cette configuration n'est pas certifiée dans le cadre de ce certificat.

Paramètres électriques de sécurité intrinsèque:
Alimenté par une pile lithium 3.6V, de type LS 26500 SAFT

DESCRIPTION OF PRODUCT

The MicroLogger 3650EX is a portable gas analyzer, battery powered, designed to measure oxygen or hydrogen gas concentration with external electrochemical sensor.

The equipment consists of a stainless steel enclosure (front of enclosure and sensor frame are made of aluminum), a LCD display, a plastic film panel keyboard, two electronic boards and one cell. It shall be equipped with an electrochemical sensor of type 31xxxE or X1Y0E, with or without sensor extension cable of 3m to 999m length.

The equipment can be powered by an external power supply when connected to a computer through an interface box, but its use is not allowed in explosive atmosphere. This configuration is not certified as part of this certificate.

Intrinsic safety electrical parameters:
Powered by 3.6V lithium cell type LS 26500 SAFT

DETAIL DE LA GAMME / RANGE DETAILS

Modèle / *Model*	Gaz mesuré / *Gas measured*	Affichage des unités / *Display units*
3650EX/111	Oxygène / *Oxygen*	ppm/ppb (liquide/*liquid)*
3650EX/112	Oxygène / *Oxygen*	%/ppm (gazeux/*gaseaous*)
3650EX/113	Oxygène / *Oxygen*	ppm (liquide/*liquid*) % (gazeux/*gaseous*)
3650EX/114	Oxygène / *Oxygen*	kPa/Pa (gazeux/*gaseous*)
3650EX/115	Oxygène / *Oxygen*	bar/mbar (gazeux/*gaseous*)
3650EX/211	Hydrogène / *Hydrogen*	ppm/ppb (liquide/*liquid*)
3650EX/212	Hydrogène / *Hydrogen*	%/ppm (gazeux/*gaseous*)

MARQUAGE

Le marquage du produit doit comprendre :

HACH LANGE
Adresse : …
Type : 3650EX
N° de fabrication : …
Année de fabrication : …
Ex II 1 G
Ex ia IIC T4 Ga
LCIE 03 ATEX 6003 X
0°C ≤ Tamb ≤ +45°C

L'appareil doit également comporter le marquage normalement prévu par les normes de construction qui le concernent sous la responsabilité du fabricant.

MARKING

The marking of the product shall include the following :

HACH LANGE
Address: …
Type: 3650EX
Serial number: …
Year of construction: …
Ex II 1 G
Ex ia IIC T4 Ga
LCIE 03 ATEX 6003 X
0°C ≤ Tamb ≤ +45°C

The equipment shall also bear the usual marking required by the product standards applying to such equipment under the manufacturer responsibility.

ATTESTATION D'EXAMEN UE DE TYPE - ANNEXE

EU TYPE EXAMINATION CERTIFICATE - SCHEDULE

1 **Version : 04** **LCIE 03 ATEX 6003 X** **Issue : 04**

13 CONDITIONS PARTICULIERES D'UTILISATION

Utiliser uniquement une pile non rechargeable de type LS 26500 SAFT. Le remplacement de la pile en atmosphère explosive est autorisé.

L'utilisation de l'entrée d'alimentation externe n'est pas autorisée en zone dangereuse. La liaison externe doit être équipée d'une protection pour limitation de tension lors de son utilisation dans la zone non dangereuse.

L'enveloppe de l'appareil contient plus de 15% d'aluminium. Elle doit être montée de manière à éviter tout risque d'étincelle par frottement ou impact.

L'utilisateur devra prendre toutes les précautions nécessaires pour s'assurer de l'absence de charges électrostatiques sur les parties métalliques et non métalliques accessibles de l'enveloppe.

SPECIFIC CONDITIONS OF USE

Use only non-rechargeable cell of type LS 26500 SAFT. Cell replacement is allowed in explosive area.

The use of the external power supply input is not allowed in hazardous area. External link shall be equipped with protection for voltage limitation when used in the non-hazardous area.

The equipment enclosure contains more than 15% aluminum. It must be mounted in such a manner as to eliminate any risk of sparks caused by friction or impact.

The user shall implement any the necessary actions to avoid any electrostatic discharges hazards on accessible metallic and non-metallic parts of the enclosure.

14 EXIGENCES ESSENTIELLES DE SANTE ET DE SECURITE

Couvertes par les normes listées au point 8.

ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

Covered by standards listed at 8.

15 DOCUMENTS DESCRIPTIFS

DESCRIPTIVE DOCUMENTS

N°	Description	Reference	Rev.	Date	Page(s)
1.	Notice d'utilisation (uniquement la partie en anglais) *User manual (English part only)*	DOC024.98.93004	Ed.3	2017/05	22
2.	Dossier technique *Technical file*	3650E.406	E	2017/04/13	44

16 INFORMATIONS COMPLEMENTAIRES

Essais individuels

Néant

Conditions de certification

Les détenteurs d'attestations d'examen UE de type doivent également satisfaire les exigences de contrôle de production telles que définies à l'article 13 de la Directive 2014/34/UE.

En accord avec l'Article 41 de la Directive 2014/34/UE, les attestations d'examen CE de type mentionnant la Directive 94/9/CE émises avant la date d'application de la Directive 2014/34/UE (20 avril 2016) peuvent être considérées comme émises en accord avec la Directive 2014/34/UE. Les nouvelles versions de ces attestations peuvent conserver le numéro de l'attestation d'origine émise avant le 20 avril 2016.

ADDITIONAL INFORMATIONS

Routine tests

None

Conditions of certification

Holders of EU type examination certificates are also required to comply with the production control requirements defined in article 13 of Directive 2014/34/EU.

In accordance with Article 41 of Directive 2014/34/EU, EC-Type Examination Certificates referring to Directive 94/9/EC that were in existence prior to the date of application of Directive 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. New issues of such certificates may continue to bear the original certificate number issued prior to 20 April 2016.

17 DETAILS DES MODIFICATIONS

Version 00 : 15/04/2003 Evaluation initiale suivant les normes EN 50014:1997 et EN 50020:2002.

DETAILS OF CHANGES

Issue 00: 2003/04/15 Initial assessment according to EN 50014:1997 and EN 50020:2002 standards.

ATTESTATION D'EXAMEN UE DE TYPE - ANNEXE

EU TYPE EXAMINATION CERTIFICATE - SCHEDULE

1 **Version : 04** **LCIE 03 ATEX 6003 X** **Issue : 04**

Version 01 : 31/03/2004	Changement de raison sociale, Orbisphere SA devient HACH ULTRA ANALYTICS.
Version 02 : 21/07/2009	- Changement de raison sociale en HACH LANGE Sàrl. - Mise à jour normative suivant les normes EN 60079-0:2006 et EN 60079-11:2007. - Utilisation d'une sonde de type X1Y0E - Utilisation des piles TADIRAN SL 2770 ou TL 5920. - Modifications de composants.
Version 3 : 20/02/2013	Mise à jour normative suivant les normes EN 60079-0:2009 et EN 60079-11:2012.
Version 4 : (*actuelle)*	- Les cartes numériques et analogiques précédentes ont été fusionnées dans une nouvelle carte (numéro de pièce Hach Lange: 1335C), les composants obsolètes ont été remplacés. - Mise à jour normative suivant la norme EN 60079-0:2012 + A11:2013. - Nouvelle plage de température ambiante : 0°C à +45°C. - L'appareil est alimenté uniquement par une pile SAFT LS 26500, les autres types utilisés précédemment sont supprimés.

Issue 01: 2004/03/31	Change in name of the company, Orbisphere SA becomes HACH ULTRA ANALYTICS.
Issue 02: 2009/07/21	- Change in name of the company to HACH LANGE Sàrl. - Normative update according to EN 60079-0:2006 and EN 60079-11:2007 standards. - Use of type X1Y0E probe. - Use of TADIRAN batteries types SL 2770 or TL 5920. - Modifications of components.
Issue 03: 2013/02/20	Normative update according to EN 60079-0:2006 and EN 60079-11:2012.
Issue 4: (*current)*	- Previous digital and analog boards have been merged into one new board (Hach Lange part number: 1335C), obsolete components have been replaced. - Normative update according to EN 60079-0:20112 + A11:2013 standard. - New ambient temperature range: 0°C to +45°C. - Apparatus is powered only by SAFT LS 26500 cell, other types previously used are removed.

WARNING

Electrical danger and fire hazard. Only use the supplied power cable. Only qualified experts may perform the tasks detailed in the installation section of this manual, while adhering to all locally valid safety regulations.

This section provides necessary information to install and connect the instrument. Should you have any questions, do not hesitate to contact your Hach representative regarding the installation procedure.

The series 3650Ex Intrinsically Safe Portable Analyzer is a self-contained instrument configured to make oxygen or hydrogen gas concentration measurements with Electrochemical (EC) Sensors in a hazardous area, in either liquid or gaseous samples.

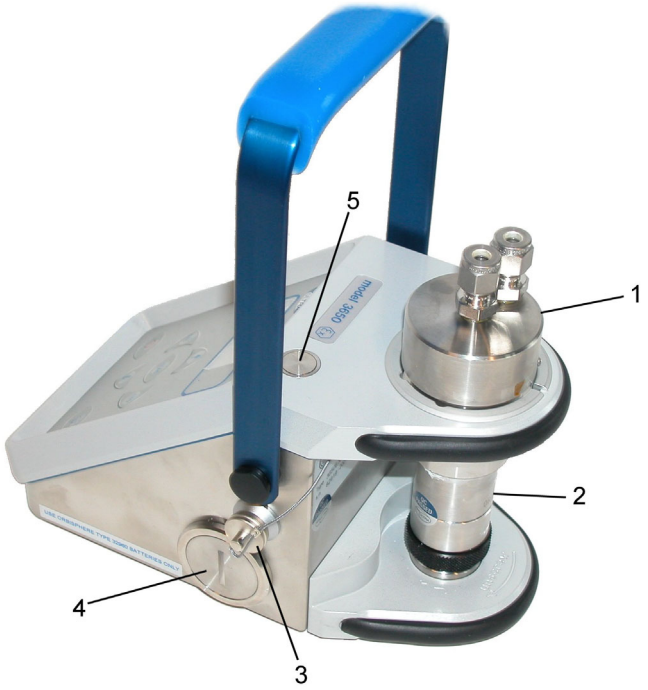


Figure 1 3650Ex instrument

1. Flow Chamber	4. Battery Cap
2. Electrochemical (EC) Sensor	5. Barometric Pressure Sensor Relief Valve
3. Pseudo RS-232 Port	

Refer to Instrument configurations on page 47 for a complete list of the instrument configurations available.

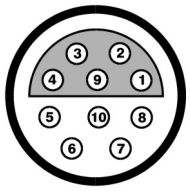
Up to 500 measurement values can be stored in memory and downloaded to a personal computer for further analysis.

The instrument is a portable unit and should be located convenient to the sample being analyzed.

- This instrument is powered by a special non-rechargeable Exproof lithium battery (model 32960).
- The battery may be changed in the hazardous area.
- Do not short circuit the battery.
- The instrument can be connected to a PC via the Interface Box (model 29122) **only in a safe area**.

3.1 Sensor installation

The electrochemical (EC) sensor connects to the instrument base through a 10-pin LEMO connector. A locking nut holds the sensor in place. Generally, the sensor is shipped already installed in the instrument. If this is not the case, for full installation instructions, please refer to the **Sensor Manual** provided with your instrument.



Sensor Signal	LEMO-10 Pin
Guard ring electrode	Pin 1
Not used	Pin 2
Temperature measurement	Pin 3
Counter electrode	Pin 4
Not used	Pin 5
Temperature measurement	Pin 6
Not used	Pin 7
Not used	Pin 8
Working electrode	Pin 9
Not used	Pin 10

3.2 Flow chamber installation

The model 32007E flow chamber draws the liquid or gaseous sample past the EC sensor. It attaches to the sensor with a threaded collar and is then sealed to the sensor with two O-rings.

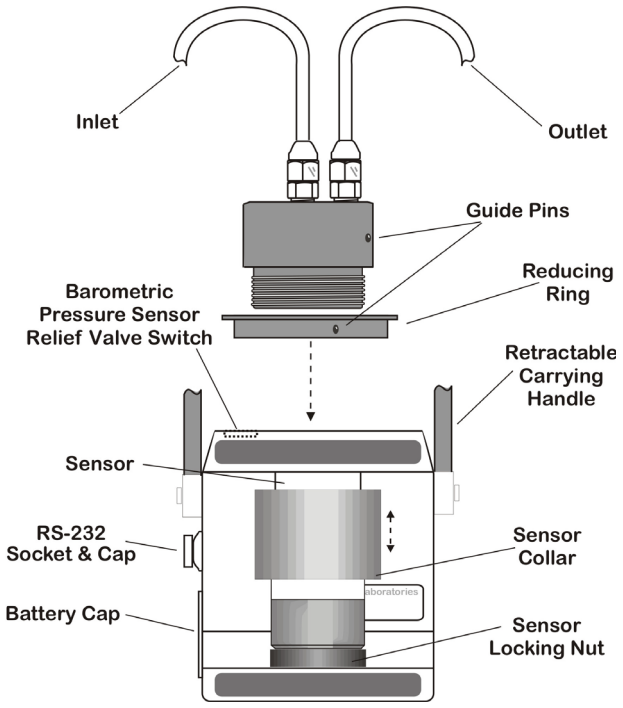


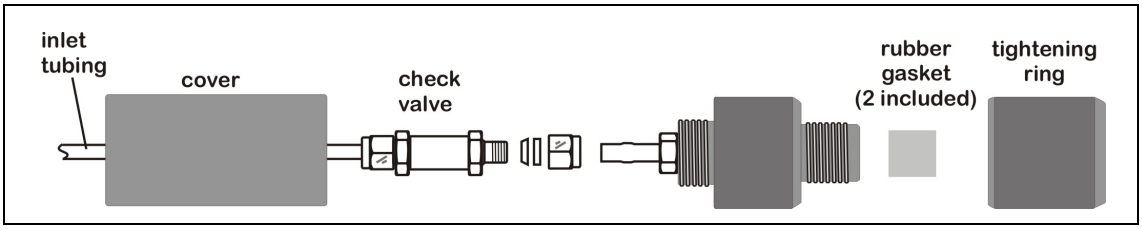
Figure 2 3650Ex (rear view) with 32007E flow chamber

The flow chamber's centrally located inlet and eccentrically located outlet use either ¼-inch or 6-mm diameter transparent plastic tubing. Connect by compression fittings to the sample source and to the drain, respectively.

You may also have received a model 32051 sample tube adapter to attach the flow chamber inlet tubing to the sampling point (Refer to Sample tube adapter (optional)).

3.3 Sample tube adapter (optional)

A model 32051A sample tube adapter can be attached to the flow chamber's inlet tubing. This adapter, in turn, attaches to 6 mm or ¼ inch stainless steel or flexible tubing using rubber gasket model 32813 (or, for 8 mm tubing, rubber gasket model 32814).



The tightening ring provides a compression fitting to the sample tube.

3.4 WinLog97 PC program installation

Install the WinLog97 program onto the PC by inserting the accompanying CD into your PC and running the SetUp program. Simply follow the on-screen instructions.

When finished, a new Windows Program Group labeled **Orbisphere** is created containing the software and help files.

3.5 Connections

3.5.1 3650Ex Instrument - PC connection

WARNING
Explosion hazard. Only use the Interface Box 29122 in the safe area and **never** in the explosive area.

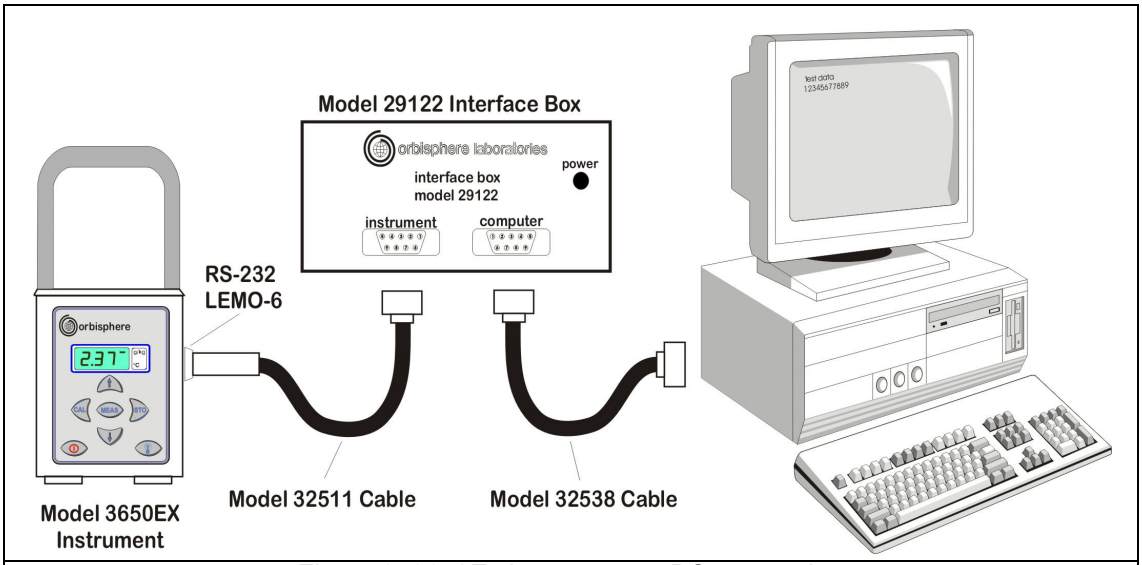


Figure 3 3650Ex instrument to PC connection

The model 29122 interface box must be used to connect the 3650EX instrument to a personal computer (PC) as illustrated in Figure 3. This unit converts TTL digital signals from the instrument to RS-232 compatible signals.

Ex	• This connection should be made exclusively within the safe area

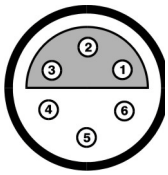
The interface box operates from 115 VAC or 230 VAC power. Make sure that the power is correct ***before*** connecting to a power supply. A green power LED is illuminated when the box is plugged into the power source.

Two cables are supplied with the model 29122 interface box:

- A model 32511 cable for connection between the 3650EX instrument LEMO-6 connector and the interface box
- A model 32538 cable for connection between the interface box and the PC.

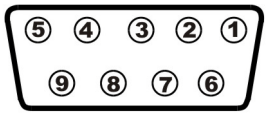
The connections should be made as indicated in Figure 3.

Note: *When the Interface Box is connected to the 3650Ex instrument, this also acts as a power supply to the instrument and disconnects the internal battery power source.*



Pseudo RS232 Signal	LEMO-6 Pin
Transmitted data (TTL-TXD)	Pin 1
Received data (TTL-RXD)	Pin 2
Not used	Pin 3
Not used	Pin 4
External voltage input (used with the model 29122 interface, **only** in safe area)	Pin 5
Ground	Pin 6

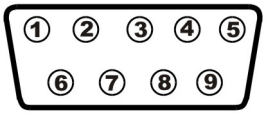
Interface Box to Instrument



9-Pin Female Connector

Pin	Use
Pin 1	Not Used
Pin 2	TTL Transmitted Data (TXD)
Pin 3	TTL Received Data (RXD)
Pin 4	Not Used
Pin 5	Power Supply (V+)
Pin 6	Not Used
Pin 7	Not Used
Pin 8	Not Used
Pin 9	Ground

Interface Box to PC



9-Pin Male Connector

Pin	Use
Pin 1	Not Used
Pin 2	RS-232 Transmitted Data (TXD)
Pin 3	RS-232 Received Data (RXD)
Pin 4	Not Used
Pin 5	Ground
Pin 6	Not Used
Pin 7	Not Used
Pin 8	Not Used
Pin 9	Not Used

Note: *If you use an adapter for the connection to the PC, make sure it is designed for this purpose and, thus, has all nine pins accessible. Some 25-to-9 pin adapters are supplied for specific use, such as a mouse, and these may have only certain pins available.*

3.6 Installation completion check list

3.6.1 Battery

The instrument is designed to work on battery power.

Install the Exproof lithium battery by first unscrewing the instrument's battery cap located on the right side of the instrument (refer to Figure 1 on page 17) with a coin or flat screwdriver. Then insert the battery pack lengthwise, positive end first, and replace the cap.

- Only the model 32960 battery can be used with this instrument.
- The battery may be installed or changed in the hazardous area

The power autonomy of the instrument is about 60 hours with a new battery. If battery power should drop, a **LO BAT** warning appears in the instrument LCD's top-left corner.

3.6.2 Electrical connections

The LEMO-6 connector on the right side of the instrument (refer to Figure 1 on page 17) is used for the connection to a PC. To connect the instrument to a PC, use the model 29122 interface box (refer to 3650Ex Instrument - PC connection on page 19).

- The instrument to PC connection should be used ***only in a safe area***.

Remember, connecting the instrument to the interface box means it is now powered by mains power and the battery power is by-passed.

3.6.3 Instrument clock setting

If you use the instrument to store measurements for downloading to a PC, you should verify the date and time settings of the instrument's internal clock, as described in Clock settings on page 44.

3.6.4 Electrochemical sensor

Before making any measurements, for GA2800 ATEX sensors perform the preparation procedure in the **GA2X00 Sensor Manual**. For other ATEX sensors perform the sensor service procedure as described in the **EC Sensor Manual**.

3.6.5 Flow chamber

The model 32007E flow chamber's inlet and outlet should be free of any obstructions. It is mounted by means of the sensor's collar, as shown in Figure 2 on page 18. A guide pin on the flow chamber surface prevents twisting during operation.

When switching from liquid to gaseous samples, ensure that the sensor membrane is dry. Ensure that the gas from the exit tube of the flow chamber (in gaseous mode) is released at atmospheric pressure and that it is constant.

3.7 Storage when not used

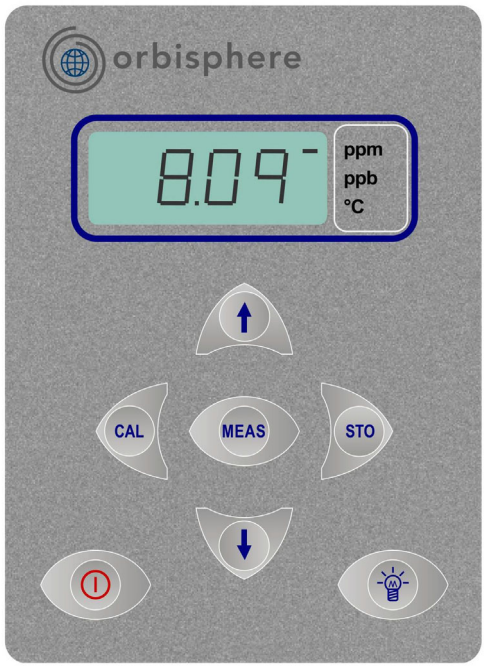
At the end of the workday clean the outside of the instrument and interface box (if used) with a damp cloth. Run clean water through the flow chamber to prevent passageways from clogging. You may wish to repeat sensor preconditioning (refer to Preconditioning sensors on page 25) prior to the next use.

If you do not expect not to use your sensor for more than a few months, you should clean the sensor as instructed in the **Sensor Manual** and then store it dry and with the calibration cap in place for protection.

Section 4 Operating Information

4.1 Operating 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, %, etc.) 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 (as indicated in Figure 1 on page 17) to enable atmospheric pressure equilibrium for sensor calibration, or for measurements in gaseous samples in % units.

The panel keyboard has the following push-button controls:

	Power switch. This turns instrument power on or off. The instrument starts in measurement mode
	Places the instrument in measurement mode
	Calibrates the analyzer against a reference sample. This button can be locked out from the WinLog97 PC program
	Stores a measurement value into memory
	Backlights the LCD for approximately three minutes
 	Toggles 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

To start the analyzer, press the keyboard **POWER** switch (located bottom left of the keyboard). When you turn power on, the instrument displays its model number briefly, and then starts in measurement mode.

You can access other instrument functions by pushing one of these keys while turning power on:

	Sensor calibration. Refer to Sensor calibration on page 40
	Start automatic data acquisition. Refer to Automatic data acquisition on page 26
	Start memory storage view. Refer to Viewing stored measurements on page 28
	Display program identification information

Once you have completed the installation and start-up procedures defined in Installation on page 17, the instrument can be operated independently, making measurements as a portable oxygen or hydrogen 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). The WinLog97 program operation is described in detail throughout the manual, where relevant.

4.2 Taking measurements

Once the system is calibrated, you should be able to begin 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 adjusting the knurled stainless steel knob on top of the flow chamber.

Minimum flow rates, measurement limits and response times for the various available membranes are given in the accompanying **Sensor Manual**.

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

To switch between gas measurement and temperature measurement, press the **Up/Down Arrow** buttons.

To backlight the LCD for approximately three minutes, press the **Backlight** button.

Note: *For measurements of gaseous samples in % units, you must open the barometric pressure sensor relief valve switch on the top of the instrument from time to time, to allow the pressure inside the instrument to equilibrate to the barometric pressure.*

4.2.1 Preconditioning sensors

You can expect a more rapid and accurate first result if you precondition the sensor before you take readings.

To precondition, connect the flow chamber to a convenient sampling source at or below expected O_2 or H_2 levels. If measurements take place in carbonated samples, precondition with carbonated water. Open the sampling valve on the flow chamber, just enough for a trickle. Then, switch on the instrument and watch the LCD. You will see the values drop.

Typically for oxygen, if you are measuring in the 0.1 **ppm** range, then only a short time is required for the display to fall to this level, whereas **ppb** level measurements may require the sensor to remain exposed to the sample for half an hour or more. You will establish your own requirement with experience.

Once the LCD displays the expected level of O_2 or H_2, close off the sample. The sensor is now preconditioned and ready to use.

You may want to precondition prior to each series of measurements, depending on frequency of use.

4.3 Storing measurements in the instrument

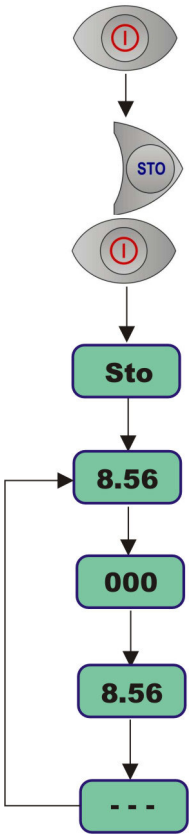
The instrument will store up to 500 gas measurement values, labeled by numbers 0 through 499, along with the current date and time of each measurement. You have the choice of acquiring this information manually or automatically, as described below.

Before storing measurements, you should verify the date and time settings of the instrument's internal clock, as described in Clock settings on page 44.

4.3.1 Automatic data acquisition

Note: *When the instrument is used to automatically store measurement data, all buttons except the* ***POWER*** *key are disabled. If enough time elapses to store all 500 values, the instrument will return to normal measurement mode and the buttons re-enabled.*

Before starting automatic measurement storage, first select the sampling rate desired using the Sampling Rate menu of the WinLog97 program (refer to Automatic data acquisition - Setting sampling intervals on page 35).



1. Switch the instrument **OFF** (by pressing the **POWER** key)
2. Then hold down the **STO** button while switching the instrument back **ON**. The LCD displays the message `Sto` for about one second
3. Normal gas concentration measurements are displayed for about two minutes
4. 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.
5. This storage sequence repeats automatically, at the rate specified by the WinLog97 program Sampling Rate menu. Values are stored sequentially in sample numbers `000` through `499`.

Note: *If you have not cleared previously stored values, the storage sequence automatically overwrites the older values, as they are stored.*

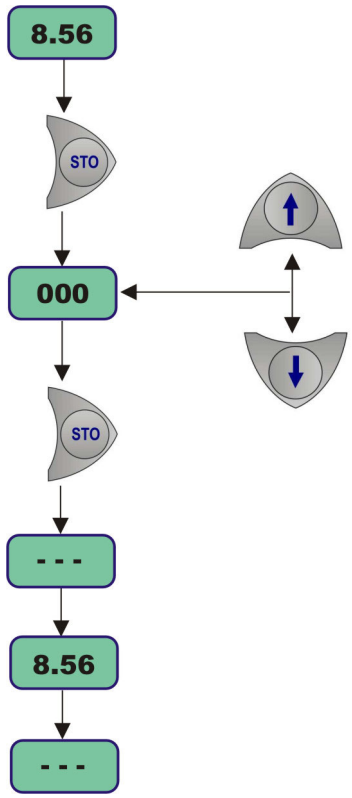
To end automatic storage, switch the instrument **OFF** (by pressing the **POWER** key) while it is in normal measurement mode and not while it is in the process of automatically storing data.

Switching **ON** again without holding down the **STO** button returns the instrument to measurement mode.

Note: *If you accidentally interrupt the automatic data storage by switching off the instrument while it is in the process of storing a value, and you then attempt to download the stored values by the WinLog97 program, you will get a Windows* ***Checksum Error*** *message, and you will not be able to view the measurement data. If this happens, then go back to the instrument and manually log one more value (as described in Manual data acquisition on page 27). You can then download your original set of values to your PC.*

4.3.2 Manual data acquisition

Note: *You cannot store measurement data manually if the instrument has already been set up to store the data automatically.*

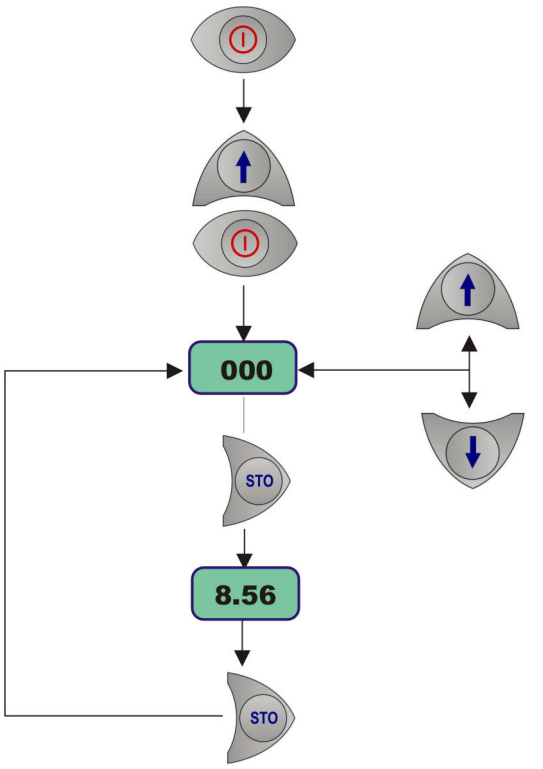


1. For the first measurement you wish to store, press the **STO** button once to display a sample number. The default sample number is `000` (for first time access), or the last used memory position where data was stored, incremented by a value of 1.
2. You can increase or decrease this number by pressing the **Up/Down Arrow** buttons within three seconds.
3. Should you decide at this point, not to store this particular measurement, just wait five seconds and the display returns to measurement mode. You may also exit this routine by pressing the **MEAS** button.
4. Press **STO** a second time, within five seconds of the first. The instrument then displays a brief clearing `[---]` message, followed by the gas concentration measurement value for about three seconds (e.g. `8.56` in the flow diagram)
5. The `[---]` message is displayed as this measurement value is stored
6. Repeat the above steps to store additional measurements.

If you stored the first value as sample `001`, the instrument automatically increases the next storage location, and labels it sample `002`. You can increase or decrease this number by pressing the **Up/Down Arrow** buttons.

Note: *If you label a sample number the same as a previously stored measurement value, the new measurement value overwrites the previously stored value.*

4.3.3 Viewing stored measurements



1. Switch the instrument **OFF** (by pressing the **POWER** key)
2. Hold down the **Up Arrow** button while switching the instrument back **ON**. The LCD displays a sample location number.
3. Scroll through the numbered sample locations of all the stored values using the **Up Arrow** and **Down Arrow** buttons.
4. 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.
5. 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.

4.4 Storing and accessing measurements from the PC

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. Refer to Options Setup on page 33 for additional information on the WinLog97 program.

4.4.1 Downloading stored values

To download the stored results from the instrument to the PC, choose the **DownLoad** data command from the **Logger** menu.

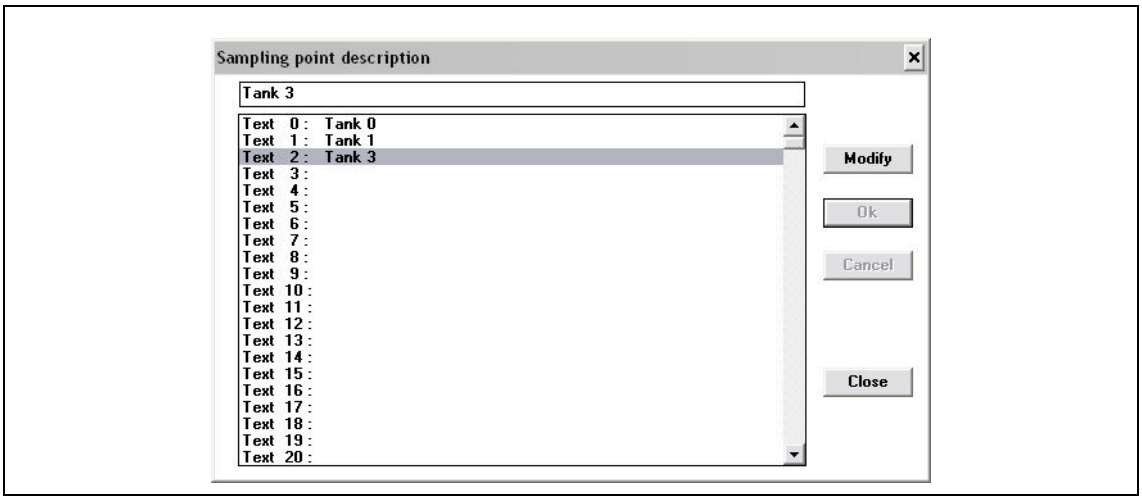
The **DownLoad** window presents a display of the stored measurements from the instrument. The window displays five columns of data:

- Sample (sequence number of the sample)
- Gas (concentration of the measured gas)
- Date (date of the measurement)
- Time (time of the measurement)
- Sample Description

The descriptions can be modified for your applications using the procedures described below.

4.4.2 Altering the sampling point descriptions

For help in identifying the locations of various sampling points that are stored by the instrument, you may choose the **Sampling Point Description** command from the **Logger** menu to bring up the dialog box.



The measurement values to be placed in positions 0 through 499 (identified as Text 0, Text 1... etc.) can be described however you wish. Double-click on a particular position (or click **Modify**), then type a description in the box as shown (e.g. **Tank 3**). Choose **OK** when finished entering a description.

When you Close this box, your modifications will be saved, and will appear in the **Sample Description** column for the ***next*** downloaded list. These descriptions can be modified again later as your requirements change.

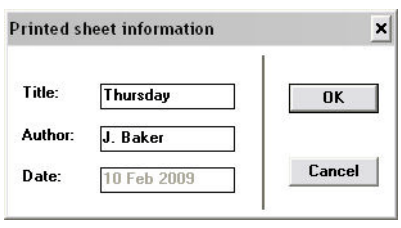
4.4.3 Copying values

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.

4.4.4 Saving values

To save this list of measurements as a text (**.txt**) 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. A dialog box appears, with a space to fill in with an eight-letter name. (The program automatically attaches a **.txt** suffix to these files.) If you have saved previous files, a grayed-out list of these names appears as well. Typical to Windows programs, **Directories** and **Drives** boxes can be used to locate other places to save (e.g. on a floppy disk). You may also type the drive and directory yourself when saving the file.

4.4.5 Printing values

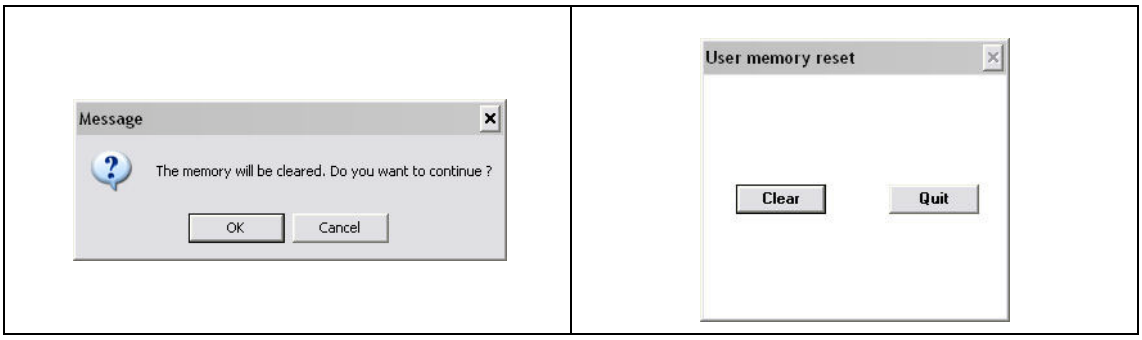


To place this list of measurements into a tabular format and send it to the Windows printer, choose the **Print** command from the **File** menu. The program asks you to enter **Title** and **Author** information. Note that the **Date** is fixed by your operating system.

The resulting printed list will include this information on each page.

4.4.6 Clearing stored values

To clear all the values stored in the instrument via the WinLog97 program, choose the **Clear Data** command from the **Logger** menu. Since this action will clear the storage memory of the instrument, a warning appears first.



Choose **OK** to bring up the next dialog box to confirm the clear action.

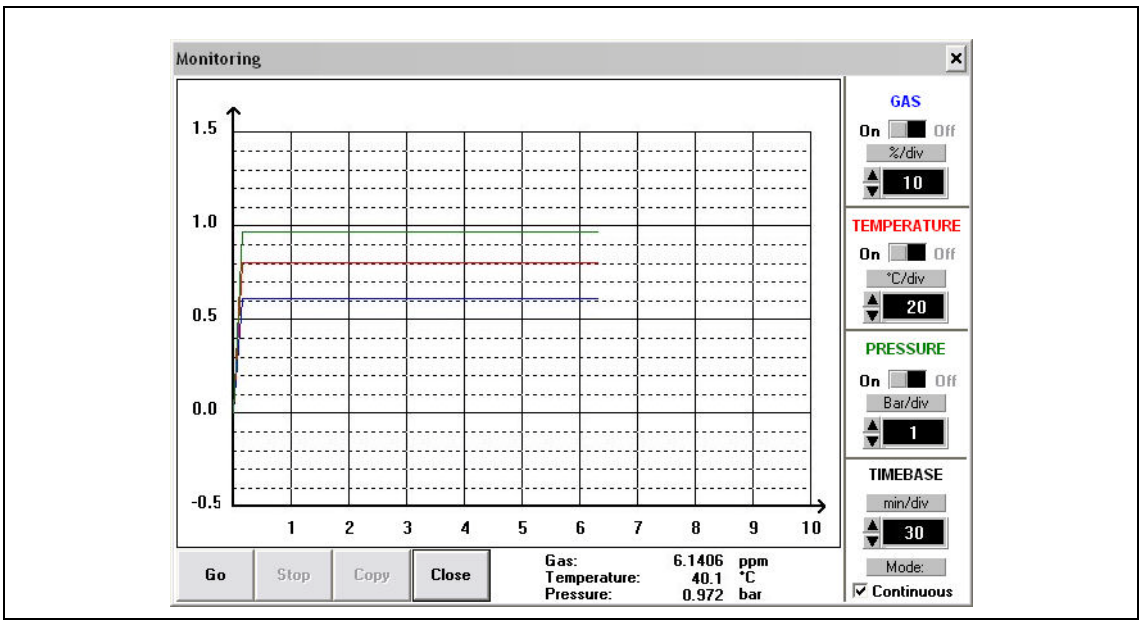
Choose **Clear** to start the memory clear operation. A message, **Reset should be completed** appears in this box when the task is finished.

Note: *You can accomplish the same thing passively, by simply allowing the analyzer to overwrite a set of stored values with new ones.*

4.5 Monitoring 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 Monitoring chart shows the gas concentration (in blue), temperature (in red), and pressure (in green) as the sample is being measured by the 3650Ex 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. The chart updating rate is determined by the time scale selected.

Timebase	Updating Rate*	Maximum Samples (10 divisions)
30 Seconds/Division	5 Seconds/Sample	60
1 Minute/Division	5 Seconds/Sample	120
10 Minutes/Division	5 Seconds/Sample	1,200
30 Minutes/Division	9 Seconds/Sample	2,000
1 Hour/Division	18 Seconds/Sample	2,000
2.5 Hours/Division	45 Seconds/Sample	2,000
*This chart's updating rate is independent from the acquisition rate (refer to Automatic data acquisition - Setting sampling intervals on page 35).		

Click on the **Continuous** box, in the lower right corner, 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**) at the right of the chart 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 at the right of the chart.

If your measurements do not chart properly, try using a higher or lower value scale or time base than the one displayed. Adjust these scale factors ***before*** starting the monitoring operation.

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 display, **Stop** to stop real-time 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.

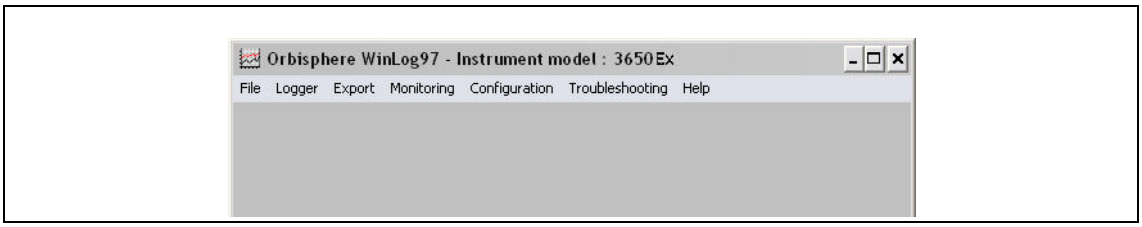
Finally, choose **Close** to close the Monitoring window.

Section 5 Options Setup

The WinLog97 program is an integral part of the analyzer. Running under Microsoft Windows®, it permits you to list and analyze up to 500 stored measurement values. The program also includes a special monitoring feature, which lets your computer act as a chart recorder, and enables a hardware test to ensure that the system is in good working order.

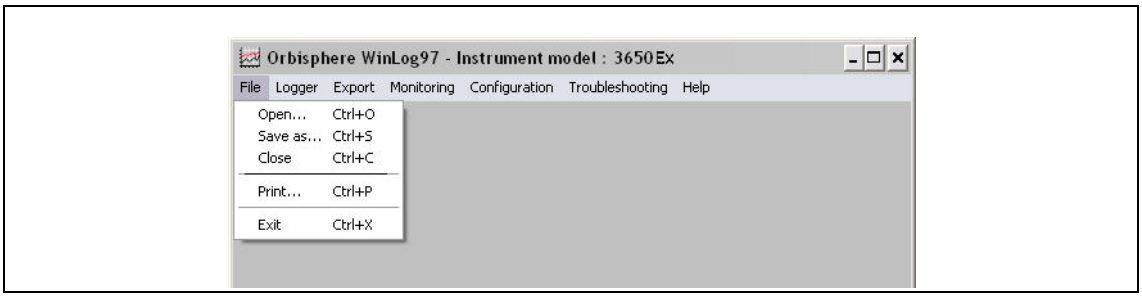
5.1 Main menu basics

When you start the program, it displays the **Main Menu**, which automatically maximizes on opening and appears as follows:



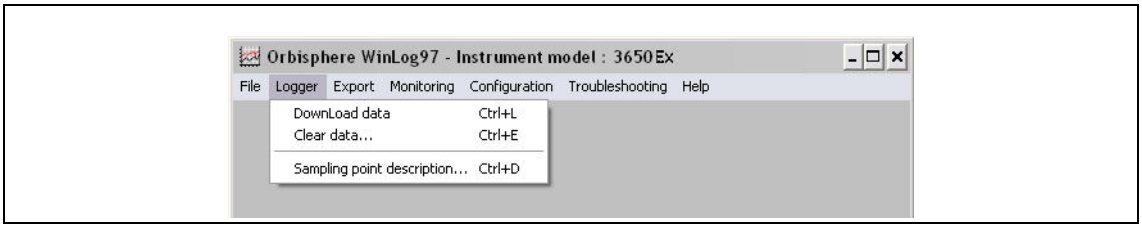
Throughout the WinLog97 program menus, you will see shortcut keys (such as Ctrl+P, to print a list of stored values). As you become familiar with the program, you may choose these keystroke commands for faster operation.

File, shown below, serves typical Windows file management needs.

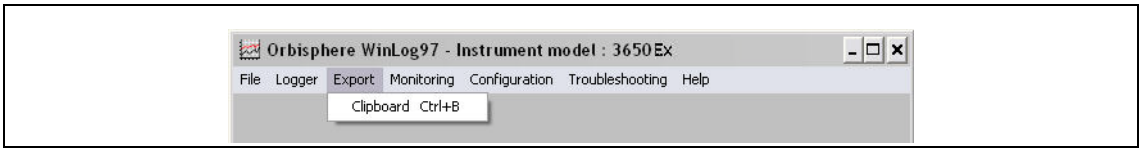


WinLog97 data files can be opened, saved under a different name, closed, or printed. You can also exit the program.

The **Logger** menu appears as follows. Here you can download measurement values from the instrument, make modifications to the sample list that can be used to identify sampling point locations, or clear the instrument's stored values.

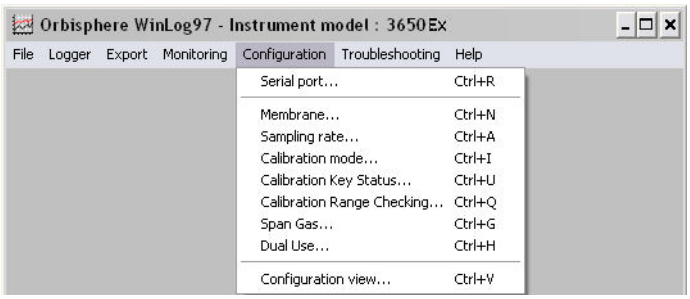


Export places your information into the Windows Clipboard, so that it can be pasted directly into other Windows programs. This is especially useful when working with spreadsheet programs, but the information can be pasted into word processing programs as well.

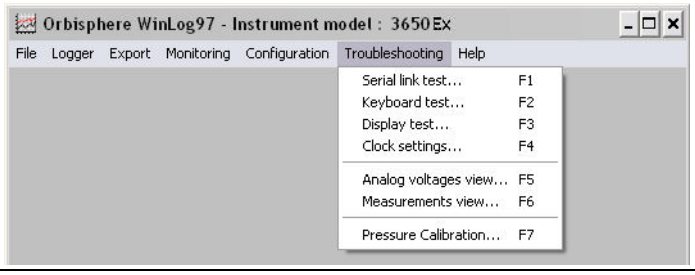


The **Monitoring** menu creates a running chart of real-time measurements (refer to Monitoring measurements in real-time on page 30). These can also be saved to the Windows Clipboard.

The **Configuration** menu lets you see how your system has been configured for your application. You may change the PC's COM port, the sensor membrane, automatic data acquisition rate, or the sensor calibration mode. You may also lock out the instrument's **CAL** button, or for calibration using a span gas, you may enter the span gas percentage.



The **Troubleshooting** menu includes a series of tests, permits the setting of the clock, and enables a barometric pressure calibration routine.

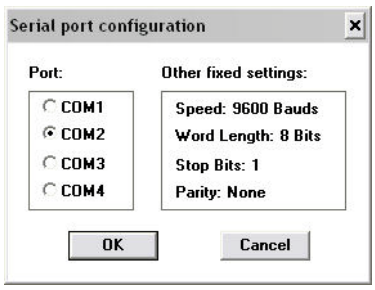


Finally, the **Help** menu gives access to the Help file and allows the identification of the WinLog97 program (version number and copyright date).

5.2 Instrument - PC connection

For the hardware connection of the instrument to a PC. Refer to WinLog97 PC program installation on page 19.

The **Configuration**, **Serial port** menu lets you choose one of four serial communication ports, as follows:

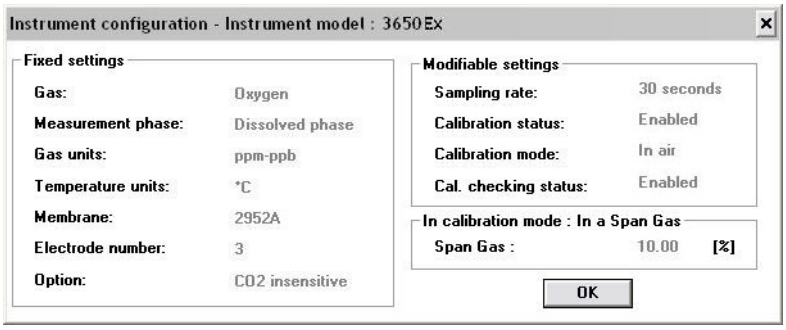


Usually, **COM1** is used to connect to a mouse, so try **COM2** first. You may find that a separate SetUp program supplied with your PC is necessary to activate this port.

Click on **OK** to activate the selected port. If the port you have selected here is adequate, the WinLog97 program will return to the main menu. Otherwise, you will see an **RS232 ERRORS** message advising you to select another port.

5.3 Reviewing instrument configuration

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



You may change a number of these settings using the WinLog97 program. The modifiable settings, and information relating to these settings are listed in the next section, Configuring the instrument.

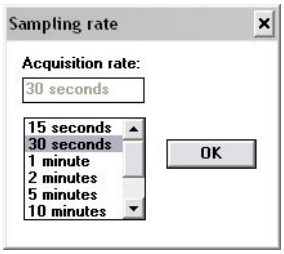
However, should you see any unexpected items listed on your screen which you are unable to correct, please contact your Hach representative.

5.4 Configuring the instrument

The 3650Ex analyzer can be readily configured for your application using the following commands in the **Configuration** menu. The instrument must be connected to your PC in order to change its configuration.

5.4.1 Automatic data acquisition - Setting sampling intervals

The instrument 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 the WinLog97 program's **Configuration**, **Sampling Rate** menu lets you select time intervals (acquisition rate) for this storage capability.



Use the slide bar to view and select a sampling rate, from 15 seconds to 1 hour. The selected rate is shown in the **Acquisition rate** window. Click **OK** to save this rate.

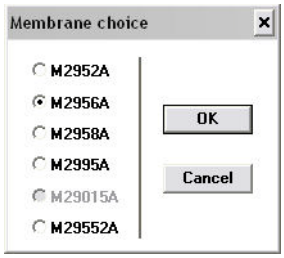
Once your choice is made, the instrument can be used independently of the WinLog97 program for data acquisition, as described in Automatic data acquisition on page 26.

Note: *The Acquisition rate set via this menu is independent from the monitoring chart updating rate described in Monitoring measurements in real-time on page 30. The sampling rate menu applies only to automatic data acquisition, while the chart updating rate is used only for displaying real-time results via the monitoring chart.*

5.4.2 Membrane selection

You may find it necessary to use a different type of membrane for different applications. Naturally, with any membrane change, you will need to re-calibrate (refer to Sensor calibration on page 40). You should also consider the changes in required flow rates and response times, which are specified in the accompanying **Sensor Manual**.

To re-configure the analyzer, choose **Configuration**, **Membrane** to bring up the box which reveals the membrane models available.



Choose **OK** when the desired membrane is selected.

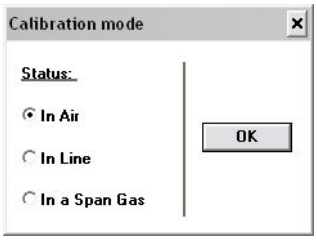
Note: *Only those membranes applicable for your instrument model can be selected. All other membranes are grayed out.*

5.4.3 Selecting type of calibration

5.4.3.1 Select from the PC

You can use the **Configuration**, **Calibration mode** command to select how the sensor is to be calibrated.

Note: *Only the calibration modes applicable to your sensor can be selected. Others will be grayed out.*

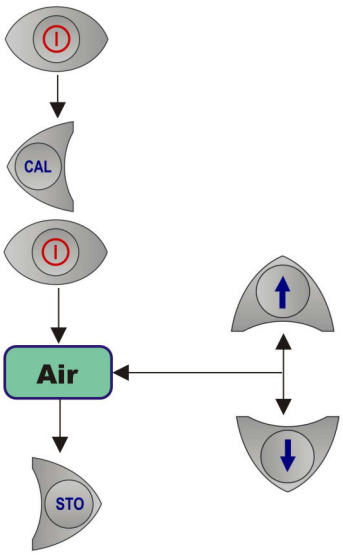


Choose **In Air** to allow calibration of the sensor in air (only applicable to Oxygen sensors). Choose **In Line** to calibrate the sensor directly in the sampling line, in a sample of known gas content.

In instrument models that measure gaseous samples, you may select **In a Span Gas** to calibrate. Choose **OK** when the desired mode is selected.

Note: *Calibration mode can also be selected from the instrument keyboard (see below).*

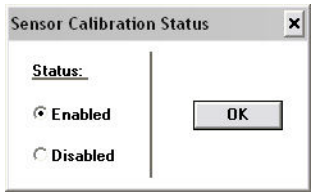
5.4.3.2 Select from the instrument



1. Switch the instrument power **OFF**
2. Switch the instrument on by holding down the **CAL** button and then pressing the **POWER** button while still pressing the **CAL** button
3. The instrument display will show either **SPA** for span gas calibration, **LI** for in line calibration, or **Air** for in air calibration
4. Use the **Up/Down Arrow** buttons to change the mode to your choice
5. Press the **STO** button to set the selected mode. The instrument displays **Sto** for a few seconds, then returns to measurement mode

5.4.4 Locking out the instrument's CAL button

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

	Choose **Disabled** to lock out the keyboard **CAL** button. To unlock this capability, choose **Enabled**. Choose **OK** when the desired mode is selected.

5.4.5 Sensor calibration range checking

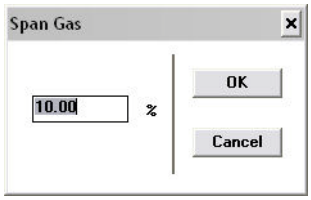
When calibration is performed for **In Air** and **In a Span Gas** calibration modes, the sensor measurement current is compared to an ideal current for the selected membrane to determine whether or not to complete the calibration. You can use the **Configuration**, **Calibration Range Checking** menu 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. Choose **OK** when the desired mode is selected.

5.4.6 Entering a span gas value

When calibrating the sensor in a span gas, use the **Configuration**, **Span Gas** menu to enter the concentration of the gas to be measured in the span gas.

	Enter the percentage of measurement gas in the span gas (e.g. 10.00%), then choose **OK**.

5.4.7 Dual use (model 3650Ex/113 only)

5.4.7.1 Change from the PC

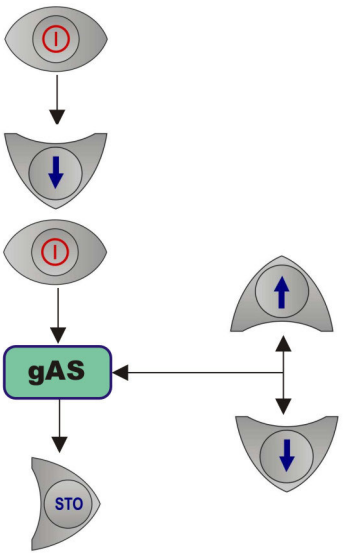
Use the **Configuration**, **Dual Use** menu to change the measurement phase (either dissolved or gaseous) for the model 3650Ex/113 dual-use analyzer.

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

Note: *You can also choose the measurement phase from the instrument keyboard (see below).*

5.4.7.2 Change from the instrument

With this dual phase instrument, you can also select the measurement phase (dissolved or gaseous) using the instrument panel buttons as follows.



1. Switch the instrument power **OFF**
2. Switch the instrument on by holding down the **Down Arrow** button and then pressing the **POWER** button while still pressing the **Down Arrow** button
3. The instrument will first display **USE** followed by either **dIS** for dissolved phase measurement in liquids or **gAS** for gaseous phase measurement
4. Use the **Up/Down Arrow** buttons to change the mode to your choice
5. Press the **STO** button to set the selected mode. The instrument displays **Sto** for a few seconds, then returns to measurement mode

Section 6 Calibrations

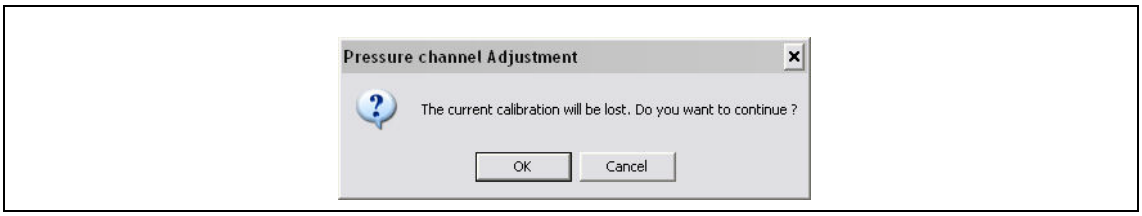
6.1 Atmospheric pressure equilibrium

Since the instrument is sealed against moisture, you must open the barometric pressure sensor relief valve switch on top of the instrument (refer to Figure 1 on page 17 for actual location) to permit the instrument to achieve atmospheric pressure equilibrium, and take an accurate barometric pressure reading.

This must be done with every calibration. To open the relief valve, depress and hold down the pressure sensor relief valve switch for five seconds, then release.

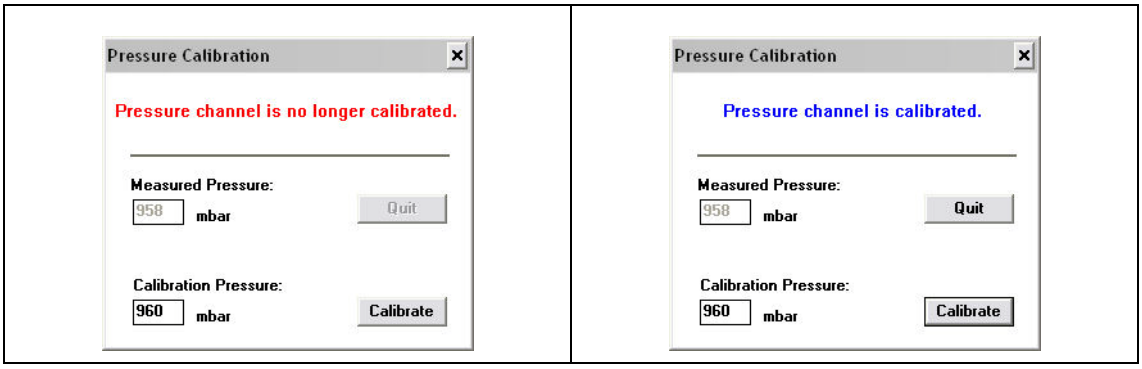
6.2 Pressure calibration

If you have access to an accurate barometer, you may wish to calibrate the instrument's internal barometric pressure sensor. This is done using the PC WinLog97 program. Choose **Troubleshooting**, **Pressure Calibration** and an informational message will appear to warn you that the instrument's current pressure calibration will be lost.



Choose **OK** to continue. The calibration procedure then displays a **Pressure Calibration** dialog box. The **Measured Pressure** value shows the current instrument pressure reading.

Note: *Since the instrument is sealed against moisture, you must open the barometric pressure sensor relief valve switch (location depicted in Figure 1 on page 17) to permit the instrument to achieve atmospheric pressure equilibrium, and take an accurate barometric pressure reading.*



Enter the current atmospheric pressure, in mbars, in the **Calibration Pressure** entry box. Choose **Calibrate** to direct the instrument to read and display the **Measured Pressure** using this calibration value.

Choose **Quit** when you are satisfied with the pressure calibration to return to normal operation.

6.3 Calibration range checking

When calibrating the sensor in air or in a span gas, as detailed in Sensor calibration below, the new calibration current should be between 25% to 175% of the ideal current (which is stored in the instrument's non-volatile memory for each membrane). If not, the instrument displays **Err** on its LCD and the system will not calibrate. When the system will not calibrate, it is likely that a sensor service will be required.

Refer to Troubleshooting on page 43, if you suspect any problems with the analyzer.

6.4 Sensor calibration

When delivered, the sensor is pre-calibrated. However, it should be re-calibrated on site, when being used for the first time, and always after a membrane change. If you have just replaced the membrane, allow at least half an hour for the membrane to settle before attempting to calibrate.

If you want to verify the accuracy of the calibration, place the analyzer back in measurement mode and compare your displayed gas concentration against the value in the appropriate tables found in the accompanying Calibration Tables booklet.

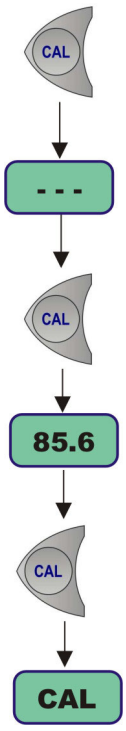
Your calibration is stored internally and is valid for the life of the sensor's membrane, thus it is not necessary to repeat the calibration procedure until after the next membrane change.

The sensor can be calibrated either by using a span gas or directly in line in a liquid sample. Additionally, oxygen sensors can be calibrated in air. The mode of calibration may be selected using the WinLog97 program or directly from the instrument (refer to Selecting type of calibration on page 36 for more details).

6.4.1 Calibration in a span gas

The span gas calibration procedure may be used if you have a supply of gas with a known concentration in %units (use O_2 for oxygen sensors or H_2 for hydrogen sensors). To perform this type of calibration, the instrument must be set for calibration **In a Span Gas**. The WinLog97 program also must be used in this procedure to set the gas concentration parameter.

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 gas concentration. Enter the percentage of gas in the span gas using the WinLog97 program (refer to Entering a span gas value on page 37).



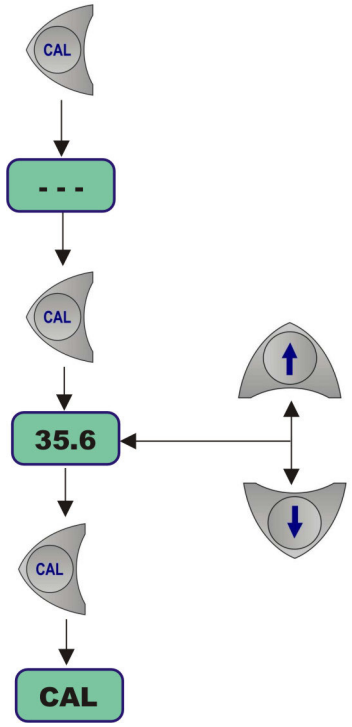
1. Press the **CAL** button. Remember, this button may have been locked out to prevent an accidental reset (refer to Locking out the instrument's CAL button on page 37 for details).
2. A brief clearing `[---]` message appears.
3. Press **CAL** again within a 3 second period.
4. The percentage of the measured current to the ideal one is displayed.
5. 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.

6.4.2 Calibration in line

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



1. Press the **CAL** button. Remember, this button may have been locked out to prevent an accidental reset (refer to Locking out the instrument's CAL button on page 37 for details).
2. A brief clearing `[---]` message appears.
3. Press **CAL** again within a 3 second period.
4. A measurement will flash on the LCD, showing the gas concentration of the calibration sample.
5. Assuming you know the gas content to be a certain value, you can adjust the displayed value with the **Up/Down Arrow** keys.
6. When the reading is adjusted to the known concentration, press **CAL** again.
7. The instrument displays **CAL** and returns to the measurement mode.

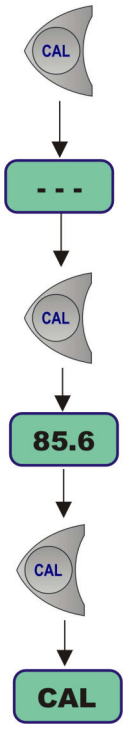
6.4.3 Calibration in air (oxygen sensors only)

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

In order to calibrate the sensor in air, you will need to extract it from its mounting or flow chamber, and wipe dry the sensor protection grille (if applicable).

Calibration is best achieved using the storage cap that protected the sensor during shipment. Put several drops of tap water in the cap, shake out the excess, and then attach it to the sensor by means of its collar. It is best to leave the cap slightly loose, to avoid compressing the air inside. The cap and sensor should be about the same temperature.

Switch on the instrument, if necessary, and wait a minute or so for the displayed measurement to settle.



1. Press the **CAL** button. Remember, this button may have been locked out to prevent an accidental reset (refer to Locking out the instrument's CAL button on page 37 for details).
2. A brief clearing `[---]` message appears.
3. Press **CAL** again within a 3 second period.
4. The percentage of the measured current to the ideal one is displayed.
5. 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.

Section 7 Maintenance and Troubleshooting

7.1 Maintenance

7.1.1 Instrument

If there are problems with the instrument, please contact your local Hach service representative.

7.1.2 Sensor

For information on sensor maintenance and servicing, please refer to the accompanying **Sensor Manual**.

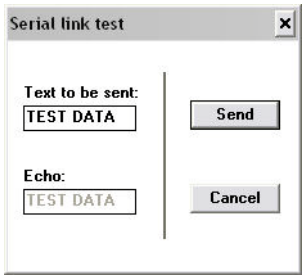
7.2 Troubleshooting

If your analyzer is behaving strangely (failing to calibrate, giving inappropriate measurement values, etc.) and you have attempted to rectify the problem by servicing the sensor, but to no avail, you may wish to use the **Troubleshooting** menu of the PC WinLog97 program 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 and placed in measurement mode to perform these tests.

7.2.1 Serial test

Normally, the analyzer will inform you of a disconnected RS-232 (serial) link when appropriate. However, you can confirm a good connection using the **Troubleshooting**, **Serial Link Test** by echoing a test message via the instrument.

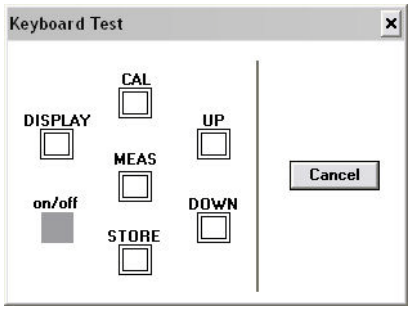


Enter text characters in the **Text to be sent** box, then click **Send**. If the serial link is operating correctly, the exact same text will be displayed back from the instrument in the **Echo** box.

Choose **Cancel** to exit from this test box.

7.2.2 Keyboard test

The **Troubleshooting**, **Keyboard Test** will reveal whether all the analyzer buttons are functioning correctly.

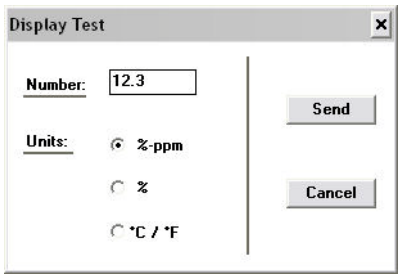


Press any one of the instrument's buttons (***except*** the **on/off** button) for a full second or more.

The appropriate square on-screen should darken (as illustrated for the **Down Arrow** button). Choose **Cancel** to exit from this test box.

7.2.3 Display test

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

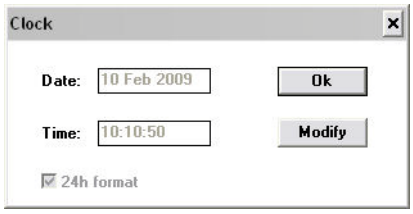


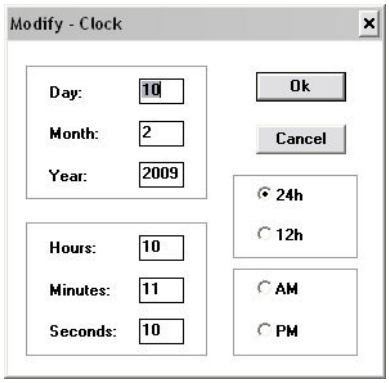
Type a number in the **Number** box (you may also select one of three units positions for the LCD's rightmost indicator bar as well). Then choose **Send**.

The number and indicator bar placement should appear on your instrument LCD.

7.2.4 Clock settings

Choose the **Clock settings** command to set the date and time in the instrument.



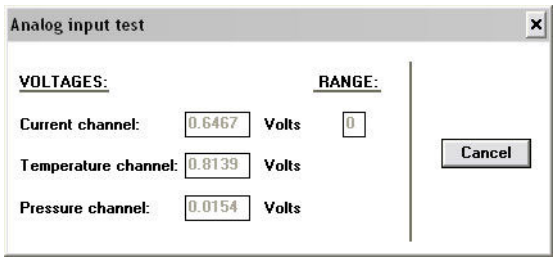


The first screen displays the current date and time as set in the instrument. If this is correct, choose **Ok**, else if either date or time must be changed, choose **Modify** to bring up the next screen.

Enter the current date and time and choose **Ok** to store the entry into the instrument. All measurements will be noted with the appropriate date and time when they are downloaded to the WinLog97 program.

7.2.5 Analog voltages view

The **Troubleshooting**, **Analog Voltage View** 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 a Hach service representative either on-site or over the phone.



When performing this test, if the system is over-range, you may receive a message that states, for example, **The current input is saturated**.

Similar messages will also appear, to warn when temperature and pressure limits are exceeded.

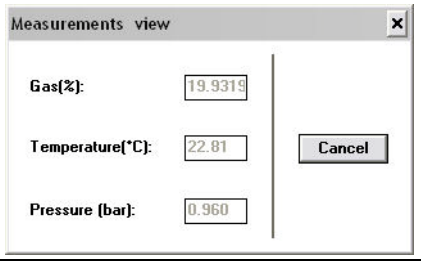
The voltage limits for normal operation are:

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

The **Range** window on the right side of the Current channel voltage indicates one of the four instrument ranges: 0 (less sensitive) to 3 (most sensitive).

7.2.6 Measurements view

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



Choose **Cancel** to exit from this display.

Section 8 Part Lists

8.1 Instrument configurations

Part N°	Description
3650Ex/111	Substance measured: Oxygen, RS232 (serial) output: requires part no. 29122, Special sensor: 31120E or GA2800 ATEX, Measurement units: ppm/ppb or ppm.
3650Ex/112	Substance measured: Oxygen, RS232 (serial) output: requires part no. 29122, Special sensor: 31120E or GA2800 ATEX, Measurement units: %/ppm or %.
3650Ex/113	Substance measured: Oxygen, RS232 (serial) output: requires part no. 29122, Special sensor: 31120E or GA2800 ATEX, Measurement units: ppm liquid phase, % gas phase.
3650Ex/114	Substance measured: Oxygen, RS232 (serial) output: requires part no. 29122, Special sensor: 31120E or GA2800 ATEX, Measurement units: kPa/Pa.
3650Ex/115	Substance measured: Oxygen, RS232 (serial) output: requires part no. 29122, Special sensor: 31120E or GA2800 ATEX, Measurement units: bar/mbar.
3650Ex/211	Substance measured: Hydrogen, RS232 (serial) output: requires part no. 29122, Special sensor: 31230E, Measurement units: ppm/ppb or ppm.
3650Ex/212	Substance measured: Hydrogen, RS232 (serial) output: requires part no. 29122, Special sensor: 31230E, Measurement units: %/ppm or %.

8.2 Spare parts

What follows is a listing of materials you may require to maintain your instrument. Be sure to mention the model number and item description when ordering.

Part N°	Description
32301	Electrochemical sensor cleaning and regeneration unit
32511.03	3 meter cable to connect 3650Ex instrument to interface box. Supplied with 2 connectors
32538.02	2 meter RS232 cable, to connect the interface box (29122) to a computer for the 3650Ex. Supplied with 2 female 9D connectors
32689	Windows software (WinLog97) for 3650Ex in English, French, German, or Spanish
32813	Rubber sealing gaskets for flow cell tubing adapters 32051 & 32051A. 6mm/¼" inside diameter. 5 pcs
32814	Rubber sealing gaskets for flow cell tubing adapters 32051 & 32051A. 8 mm inside diameter. 5 pcs
32960	3.6 V primary lithium non-rechargeable battery for 3650Ex
29122.X	PC Interface box, plus cables (32511, 32538) for 3650Ex. X: A=95-130VAC; B=207-253VAC
31120E.01	EC Sensor, Substance measured: Oxygen, Sensing head material: Stainless Steel, Guard ring: Silver, Maximum pressure: 50 bar, O-Ring: EPDM, Intrinsically safe
31230E.11	EC Sensor, Substance measured: Hydrogen, Sensing head material: Stainless Steel, Guard ring: Platinum, Maximum pressure: 100 bar, O-Ring: Viton, Intrinsically safe
32007E.110	Flow chamber in stainless steel (316) with 6 mm fittings for use with 3650Ex. Supplied with Viton O-rings
32007E.111	Flow chamber in stainless steel (316) with ¼" fittings for use with 3650Ex. Supplied with Viton O-rings
32513E.04	4 meter sensor cable for 31XX0E and 3650Ex. Supplied with attached connectors
32809.MM	6x4mm plastic tubing (per meter). MM=specify total length
GA280E-SVS	GA2800 oxygen sensor, ATEX, stainless steel, viton o-rings, cap with grille
GA280E-SKS	GA2800 oxygen sensor, ATEX, stainless steel, kalrez o-rings, cap with grille
GA280E-HVS	GA2800 oxygen sensor, ATEX, hastelloy, viton o-rings, cap without grille
GA280E-HKS	GA2800 oxygen sensor, ATEX, hastelloy, kalrez o-rings, cap without grille

For information on sensor spare parts and recharge kits, please refer to the accompanying **Sensor Manual**.

8.3 Accessories

Part N°	Description
32051A	Adapter for attaching flow cell inlet tubing to customer's sample tube. Includes one 6 mm (32813) and one 8 mm (32814) rubber sealing gasket.

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