# POLYMETRON Model 9245 Sodium Analyzer

User Manual

09/2014, Edition 15

# Section 1 General Information

## 1.1 Disclaimer

The information in this manual has been carefully checked and is believed to be accurate. However, Lange assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, Lange reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation.

## 1.3 Safety information

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.

To 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.

***Note:** This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

### 1.3.1 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. |

### 1.3.2 Safety recommendations

For safe operation, it is imperative that these service instructions be read before use and that the safety recommendations mentioned herein be scrupulously respected. If repairs or adjustments are necessary, the analyzer should be returned to an authorized  service center.

If danger warnings are not heeded to, serious material or bodily injury could occur.

| ⚠ **WARNING** |
|---|
| In accordance with safety standards, it must be possible to disconnect the power supply of the analyzer in its immediate vicinity. |

| ⚠ **WARNING** |
|---|
| The installation of the analyzer should be performed exclusively by personnel specialized and authorized to work on electrical installations, in accordance with relevant local regulations. |

### 1.3.3 Service and repairs

None of the analyzer's components can be serviced by the user. Only personnel from  or its approved representative(s) is (are) authorized to attempt repairs to the system and only components formally approved by the manufacturer should be used. Any attempt at repairing the analyzer in contravention of these principles could cause damage to the analyzer 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 analyzer and the electrical integrity or the CE compliance of the analyzer.

If you have any problems with installation, starting, or using the analyzer 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.

### 1.3.4 Potential safety hazards

The following potential safety hazards are associated with operating the analyzer:

- Electrical (line voltage)
- Potentially hazardous chemicals

### 1.3.5 Precautionary labels

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

| | |
|---|---|
|  | This symbol, when noted on a product, indicates a potential hazard which could cause serious personal injury and/or death. The user should reference this instruction manual for operation and/or safety information. |
|  | 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 indicates the need for protective hand wear. |
|  | This symbol, when noted on the product, identifies the location of the connection for protective earth (ground). |
|  | This symbol, when noted on a product, indicates the instrument is connected to alternate current. |
|  | 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 conforms to relevant South Korean EMC standards. |

### 1.3.6 EMC compliance statement (Korea)

| Type of equipment | Additional information |
|---|---|
| A 급 기기<br>( 업무용 방송통신기자재 ) | 이 기기는 업무용 (A 급 ) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 , 가정외의 지역에서 사용하는 것을 목적으로 합니다 . |
| Class A equipment<br>(Industrial Broadcasting and Communication Equipment) | This equipment meets Industrial (Class A) EMC requirements. This equipment is for use in industrial environments only. |

## 1.4 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.*

## 1.5 Product disposal

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

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.

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 will then be responsible for the disposal of this equipment.

In addition, 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 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 , please contact your supplier or our After Sales Service department in Geneva for instructions on how to return this equipment for proper disposal.

## 1.6 Restriction of hazardous substances (RoHS)

The European Union RoHS Directive and subsequent regulations introduced in member states and other countries limits the use of six hazardous substances used in the manufacturing of electrical and electronic equipment.

Currently, monitoring and control instruments do not fall within the scope of the RoHS Directive, however  has taken the decision to adopt the recommendations in the Directive as the target for all future product design and component purchasing.

***Note:** The following only applies to exports of this product into the People’s Republic of China.*

含有有毒或者危险物质及成分的产品。

环保使用期限标记（年）

| | 有毒或者危险物质和成分 | | | | | |
|---|---|---|---|---|---|---|
| 部件名称 | 铅 | 汞 | 镉 | 六价铬 | 多溴联苯 | 多溴联苯醚 |
| Transmitter box | X | | | | | |
| CPU PCB (with battery) | O | | | | O | |
| Power PCB | O | | | | O | |
| RS485 PCB | O | | | | | |

O: 表示所有此类部件的材料中所含有毒或危险物质低于限制要求

X: 表示至少有一种此类部件材料中所含有毒或危险物质高于限制要求

# Section 2 Specifications

## 2.1 Technical specifications

Specifications are subject to change without notice.

**Table 1 Technical specifications**

| PERFORMANCE SPECIFICATIONS | |
|---|---|
| Measuring range | 0 to 10,000 ppb freely programmable<br>0 to 200 ppm with K-Kit option |
| Accuracy | Non-cationic application:<br>± 0.1 ppb or ± 5% of reading, whichever is greater<br>Cationic application:<br>± 2 ppb or 5% reading, whichever is greater |
| Repeatability | < 0.02 ppb or 1.5% reading, whichever is greater within 10°C variation |
| Response time | 0.1 to 10 ppb T(90%) = 180 secs |
| Electrode type | pH glass electrode |
| Number of channels | 1 channel |
| Interference phosphate 10 ppm | Measurement variation less 0.1 ppb. |
| Sample temperature interference | < 0.5% / °C |
| **ENVIRONMENTAL REQUIREMENTS** | |
| Typical environment | Power station / indoor / demineralized water plant or instrumentation room |
| Suspended solids | < 2 NTU, no oil, no grease. |
| Temperature range for storage | -20 to 60°C (2 to 140°F) |
| Relative humidity | 10 to 80% |
| Ambient temperature | 5 to 50°C (41 to 122°F) |
| Sample temperature variation | Stabilization in 10 mins from 15°C to 30°C |
| pH range of sample | Non-cationic application: 6 to 10 pH<br>Cationic application: 2 to 10 pH |
| Flow rate | 6 to 9 L/hour |
| Pressure | 0.2 to 6 bar (3 - 87 psi) |
| Acidity | Less than 250 ppm (equivalent $CaCO_3$) |
| Power supply voltage fluctuation | ± 10% |
| Over voltage category | 2 (according to standard EN 61010-1) |
| Pollution degree | 2 (according to standard CEI 664) |
| Altitude | < 2000 m |
| Measurement category | Cat II, Class 1 (overvoltage < 1500V) |

| MECHANICAL SPECIFICATIONS | |
|---|---|
| Maximum panel dimension | 850 x 450 x 252.5mm [33.46 x 17.71 x 9.94in]<br>(H x L x D) |
| Inlet | Simple fittings for 6 mm O.D. tubing or ¼" O.D. in PE-low density.<br>¼" OD in PHED-PTFE-SS as option |
| Outlet | Barbed stem for 12 mm (½" I.D.) hose |
| Protection rate | Transmitter: IP65 (NEMA 4)<br>Panel: IP50 (Dust protection)<br>Optional Enclosure: IP54 (Splash water proof),<br>Instrument is designed to avoid DIPA vapor inside the enclosure. All DIPA vapor is collected and sent to the instrument drain |
| Cell | PMMA - compact (minimum tubing) |
| Flame rate | Conform UL |
| Maximum weight | 15 - 30 Kg |
| **INTERFACE SPECIFICATIONS** | |
| Mains power supply | 100 - 240 VAC, 50-60 Hz, ± 10%, automatic switching |
| Max. consumption | 80 VA. |
| Fuse | 5x20 cartridge T2AL-250V following CEI127 |
| Display | Last Cal Date, Historical, Concentration, Temperature, Potential |
| Analog outputs | Number: 4<br>4-20 or 0-20 mA (650 ohms)<br>Linear / Dual / Logarithm<br>Smart |
| Relays | 1 x Relay (conc)<br>1 x Relay (conc)<br>1 x Warning<br>1 x System |
| Logic input | Start/Standby<br>Remote AutoCal |
| **STANDARDS** | |
| EMC requirements | EMC Directive 2004/108/EC; EN 61326-1<br>***NOTICE***<br>This is a Class A product intended for use in an industrial environment. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.<br>***NOTICE***<br>Measurement variations of less than 5% of the full range can occur if the instrument is subject to a strong electromagnetic field. |
| European safety standards | EN 61010-1 for low voltage safety |
| International standards | cETLus |

## 2.2 Model identification system

The analyzer identification number and the instrument serial number are located on the label on the back panel, and can be found on order confirmation and invoice papers.

- **0** Standard (0.01 to 10,000 ppb)
- **1** Kit K (1 ppb to 200 ppm)
  - **0** Panel Version
  - **1** Wall-Mount Enclosure
    - **0** Standard
    - **1** With RS485
    - **2** With Profibus
      - **0** Standard
      - **1** With AutoCal

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | **9** | **2** | **4** | **5** | **=** | **A** | **=** | | | | |

Figure 1 Model identification matrix

**Example:**

**09245=A=0021**

- Analyzer model 9245 single channel, grab sample, manual calibration
- Standard version (0.01 to 10,000 ppb)
- Panel version
- With Profibus option
- With AutoCal option

# Section 3 Analyzer Overview

## 3.1 Overview

The Polymetron 9245 Sodium Analyzer is a continuous on-line monitor for direct measurement of sodium in power generation processes.

The measurement is based on a direct potentiometric technique using a highly sensitive sodium glass electrode. The difference of potential between the glass electrode and the reference electrode is directly proportional to the logarithm of sodium concentration as shown by the Nernst law:

$$E = E_0 + \frac{RT}{F} \ln \left( a_{Na+} + \sum_{S=1}^{m} K_{Na\text{-}S}\, a_S \frac{1}{Z_S} \right) + E_D$$

With:

- $K_{Na\text{-}S}$ : Selectivity constant of the ion S
- $a_S$ : Activity of the ion S
- $Z_S$ : Valency of the ion S
- $E_D$ : Diffusion potential (conductivity dependant)

The analyzer features low maintenance, automatic or manual process calibration and uses a sodium-sensitive glass electrode together with a reference electrode to measure sodium concentrations in a sample that has been previously conditioned to a pH > 10.5.

The pH value can be set to between 10.7 and 11.6 pH and is controlled by measuring the conductivity of the conditioned sample.

External grab sample analysis is also available for this high-accuracy analyzer.

The physical system consists of two integrated units, the electronics control section and the liquid handling section.

## 3.2 Schematic process overview

The illustration below shows the major components of the analyzer.

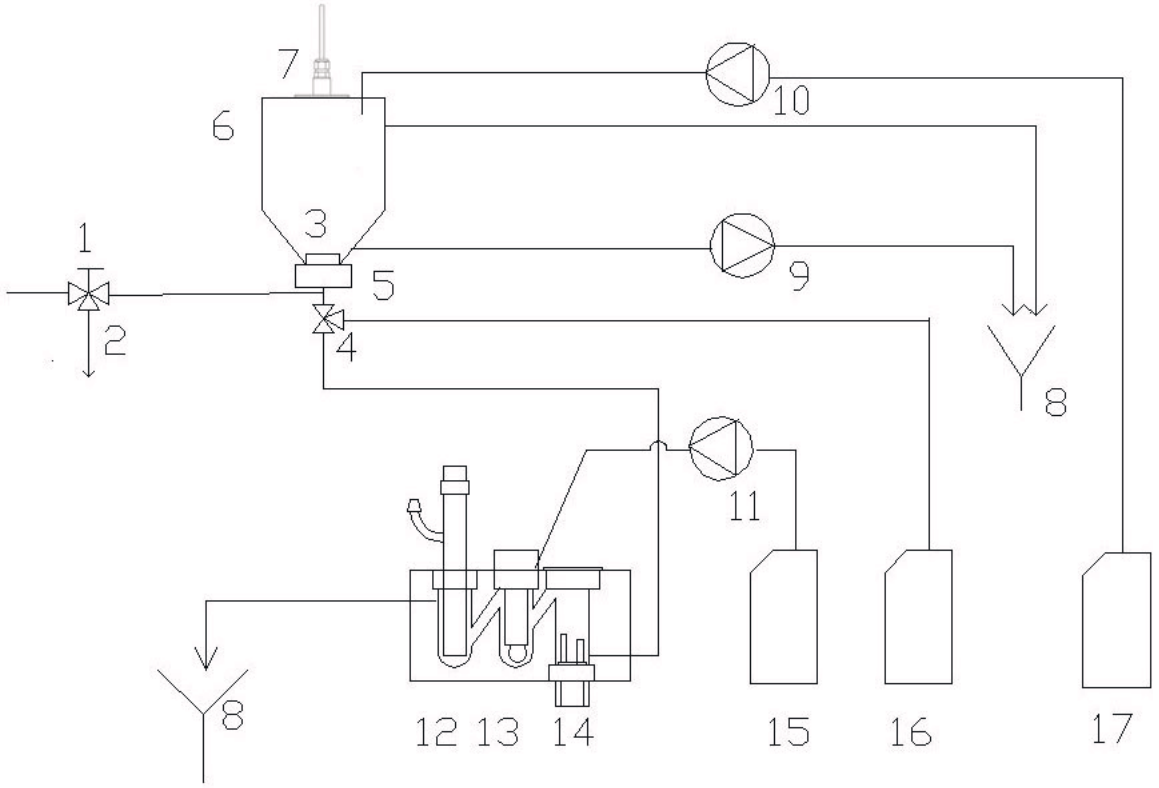


Figure 2 Analyzer overview diagram

| | | |
|---|---|---|
| 1 - Sample inlet flow adjustment | 7 - Sample level detector | 13 - Sodium ion-selective electrode |
| 2 - Fast loop sample outlet | 8 - Drain | 14 - Temperature electrode |
| 3 - Magnetic stirrer | 9 - Drain pump | 15 - Reactivation solution |
| 4 - Conditioning valve | 10 - Auto-calibration pump | 16 - Conditioning solution |
| 5 - Stirrer motor | 11 - Reactivation pump | 17 - Calibration solution |
| 6 - Overflow vessel | 12 - Reference electrode | |

## 3.3 Presentation of the analyzer

### 3.3.1 Analyzer front panel

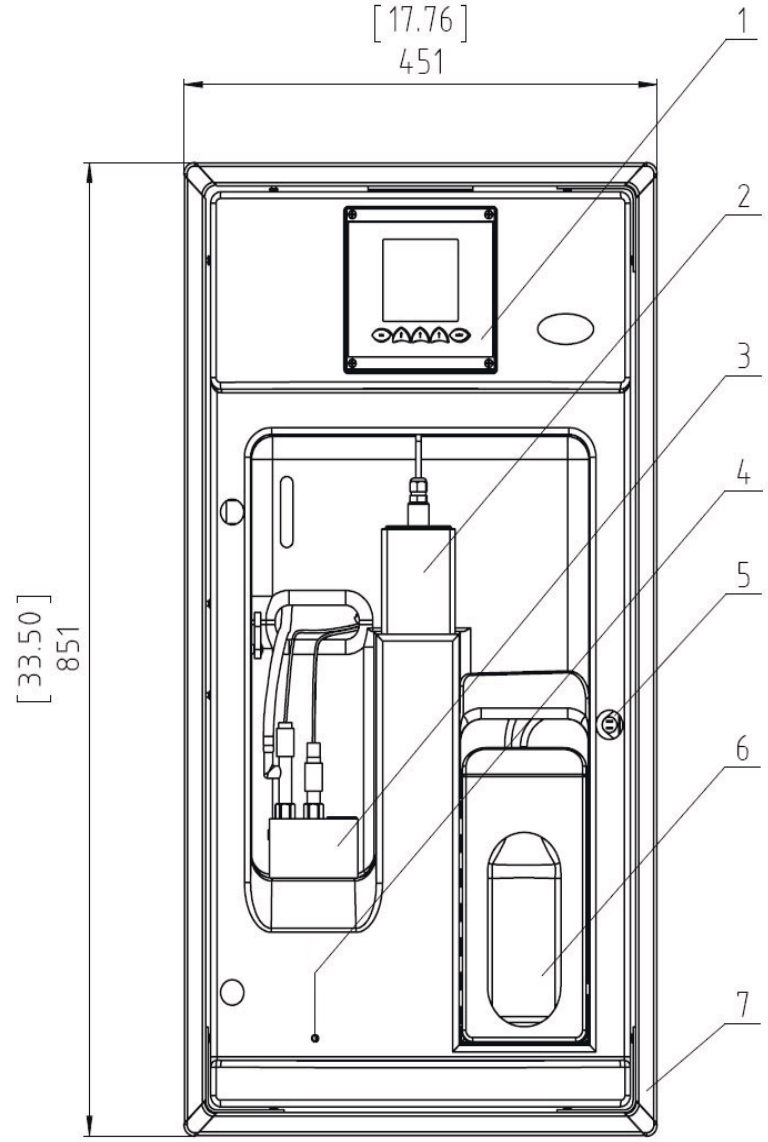


Figure 3 Analyzer front panel

| | |
|---|---|
| 1 - User interface | 5 - Door lock |
| 2 - Overflow vessel | 6 - Reagent shelf |
| 3 - Measuring cell | 7 - Frame for panel mounting |
| 4 - Flow rate adjustment | |

### 3.3.2 Analyzer rear panel

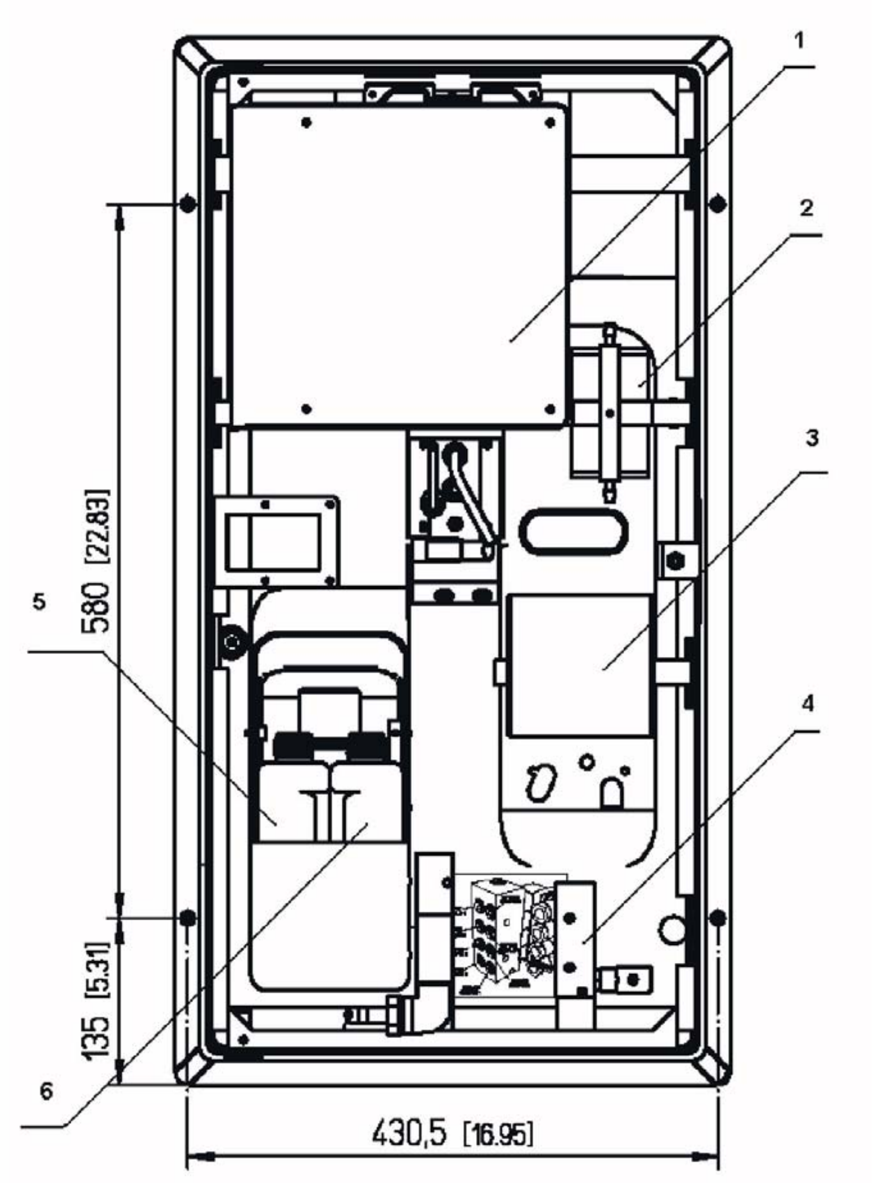


Figure 4 Analyzer rear panel

| | |
|---|---|
| 1 - Local controller box | 4 - Sample inlet valves |
| 2 - Electrolyte reservoir | 5 - Calibration canister |
| 3 - Pump box | 6 - Reactivation reagent canister |

## 3.4 Conditioning reagent

highly recommends the use of Diisopropylamine (DIPA) as the conditioning reagent. Other reagents such as ammonia or ethanolamine can be applied, providing the specification limitations imposed by amines other than DIPA are clearly understood.

The following graph (Figure 5 below) shows the curves obtained using DIPA and ammonia as conditioning reagents. As can be seen, the DIPA curve remains linear at a much lower sodium concentration resulting in better accuracy, repeatability, a lower detection limit, and a lower rate of reagent consumption.

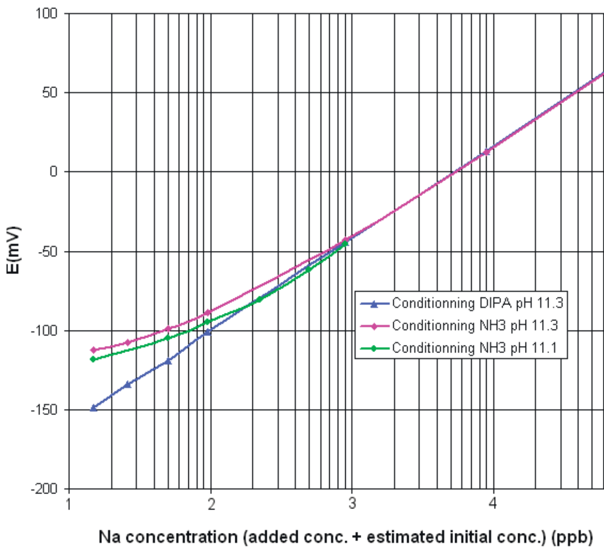


Figure 5 Calibration curves obtained with DIPA and $NH_3$ as reagents

The following table shows the comparable values of detection limit, accuracy, repeatability, and consumption for DIPA, ammonia, and ethanolamine:

| | **DIPA**<br>**[$C_6H_{15}N$]** | **Ammonia**<br>**[$NH_3$]** | **Ethanolamine**<br>**[$H_2N(CH_2)_2OH$]** |
|---|---|---|---|
| Lowest detection limit | 0.01ppb | 2ppb | 5ppb |
| Accuracy (non-cationic applications) | The greater of ± 0.1ppb or ± 5% of the reading | The greater of ± 1ppb or ± 5% of the reading | The greater of ± 2ppb or ± 7% of the reading |
| Accuracy (cationic applications) | The greater of ± 2ppb or ± 5% of the reading | The greater of ± 2ppb or ± 5% of the reading | The greater of ± 2ppb or ± 7% of the reading |
| Repeatability within a 10°C variation | The greater of < 0.02ppb or ±1.5% of the reading | The greater of < 0.1ppb or ±1.5% of the reading | The greater of < 0.2ppb or ±2% of the reading |
| Consumption of 1 liter at 25°C for a pH measurement of 10 to 10.5 | approx. 13 weeks | approx. 3 weeks | approx. 7 weeks |

***Note:** As recommends DIPA to be used as the conditioning reagent, all references relating to the conditioning reagent throughout this manual will be to DIPA.*

## 3.5 pH regulation

### 3.5.1 Non-cationic applications

In order to ensure the accuracy and the repeatability of low sodium concentrations, pH must be constant and preferably maintained at or above 11.2 to maintain the lowest proton interference.

The 9245 uses the injection of vapor of diisopropylamine (DIPA) to obtain high pH level without sodium contamination. Using the siphon effect of the liquid sample column, DIPA is mixed with the sample without using any pump or pressurized gas. A fine regulation of the siphon effect is performed using a 3-way valve.

In temperature variations, the system automatically modifies the gas/liquid ratio and then adds DIPA vapors to compensate the DIPA solubility in the sample.

If the sample is already partially conditioned by a customer system (e.g. with $NH_3$ up to pH 9.5 - 10.5), the regulation system evaluates the pH and adds the necessary DIPA quantity to reach its $pH_{target}$ ± 0.2 and minimizes DIPA consumption.

The pH can be set to between 10.7 and 11.6 pH. The DIPA consumption is 500 mL/month at 25°C for a sample $pH_{target}$ of 11.2.

### 3.5.2 Cationic applications

Instruments to be used in cationic applications are configured at the factory and can be identified by their model number of 09245=A=**1**xxx (the **1** identifies it as being for cationic applications).

Measurement of trace level sodium concentrations after cationic resin processes requires an assisted conditioning because the pH in the sample to be measured will only be between 2 and 4.

The 9245 analyzer uses a gas pump with no moving parts (based on the piézo principal) to effect this assisted conditioning. The pump is controlled by the analyzer’s electronics and works according to the amount of sample conditioning required. The flow rate of the pump is factory set at 200 cc/min of gas.

An exit tube ensures that any DIPA vapors not dissolved in the sample are recovered and evacuated to the drain along with the sample.

In a cationic application, the 9245 does not use conductivity to evaluate the pH. However, it can be adjusted according to the sample pH by a time ratio of the conditioning valve aperture. A specific $T_{gas}/T_{water}$ ratio is used for each channel in order to minimize the DIPA consumption and to adjust a constant pH.

The usual $T_{gas}/T_{water}$ ratio values are as follows:

| pH | Tgas/Twater Ratio |
|---|---|
| 2 | 180% |
| 2.3 | 80% |
| 2.6 | 50% |
| 2.9 | 30% |
| 3.5 | 15% |
| 4.0 | 10% |

Refer to Sample pH conditioning check on page 47 for the procedure to select the correct ratio in relation to the initial pH sample.

**DIPA consumption**

The consumption of DIPA will depend on the values defined in the above table. With a ratio of 100% (i.e. the volume of sample is equal to the volume of gas) the consumption of DIPA will be approximately 90 mL/day.

The following table gives additional typical consumption according to the Tgas/Twater ratio setup:

| Tgas/Twater Ratio | Consumption (days per liter) |
|---|---|
| 180% | 6.25 |
| 150% | 7.5 |
| 100% | 11 |
| 80% | 14 |
| 50% | 22.5 |
| 30% | 37 |

The instrument continuously monitors the use of DIPA. A warning alarm will be triggered if the calculated volume in the bottle is less than 100 mL. A system alarm (and suspension of measurements) will be triggered when the calculated volume is less than 50 mL.

## 3.6 Measurement process

The 9245 requires an on-line measurement time which defines the measurement time of the sample, and how often the measurement values are stored in memory. Regardless of this value the alarms, analog outputs and RS 485 serial communication output are updated regularly (see Analyzer outputs on page 29). The recommended (and default) value is 10 minutes, which will ensure 3 months of data stored internally.

The smart rinse facility can be used for rinsing the measurement cell after a calibration, grab sample or sensor reactivation. If used, a maximum rinse time must be entered.

### 3.6.1 Smart rinse option

The measurement cell is rinsed by the analyzer after a calibration, grab sample, or sensor reactivation process and prior to resuming sample measurements. Set the smart rinsing parameter to **No** (see Measure steps on page 73) for a fixed rinse cycle of 10 minutes or set to **Yes** to invoke the smart rinsing option which better guarantees the accuracy of measurements after the rinsing cycle.

If the parameter is set to **Yes**, a maximum rinse time must be defined. To ensure a fast rinse the recommended time is 60 minutes with a flow rate of 6 to 9 L/hour. During the rinse process, as soon as the analyzer determines that measurements are stable it will revert back to sample measurement mode. If there is an increase in the sodium concentration at any time, then after a 5 minute period the rinsing will be aborted and the analyzer will revert back to sample measurement mode.

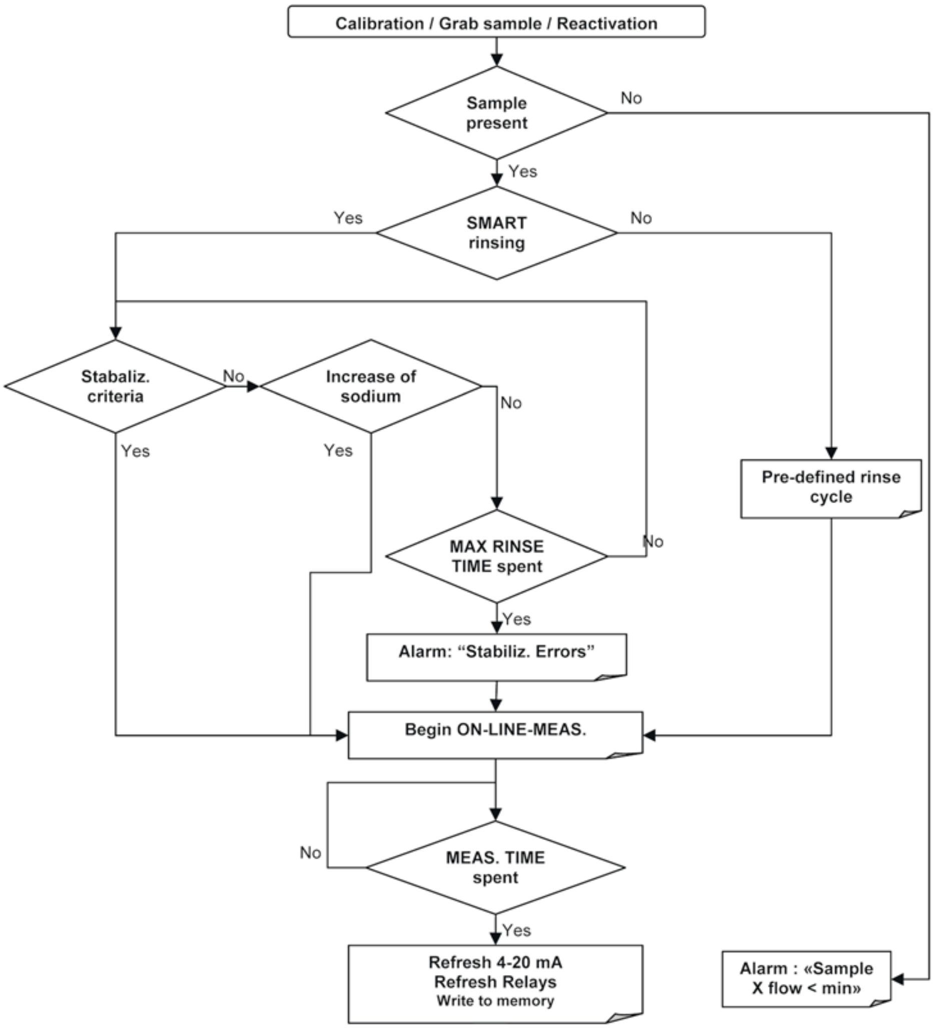


Figure 6 Rinsing process after a calibration, grab sample or sensor reactivation

## 3.7 Automatic calibration cycle

The following section gives an overview of the automatic calibration process. For details on setting up and running this process, refer to the section entitled Calibration on page 85.

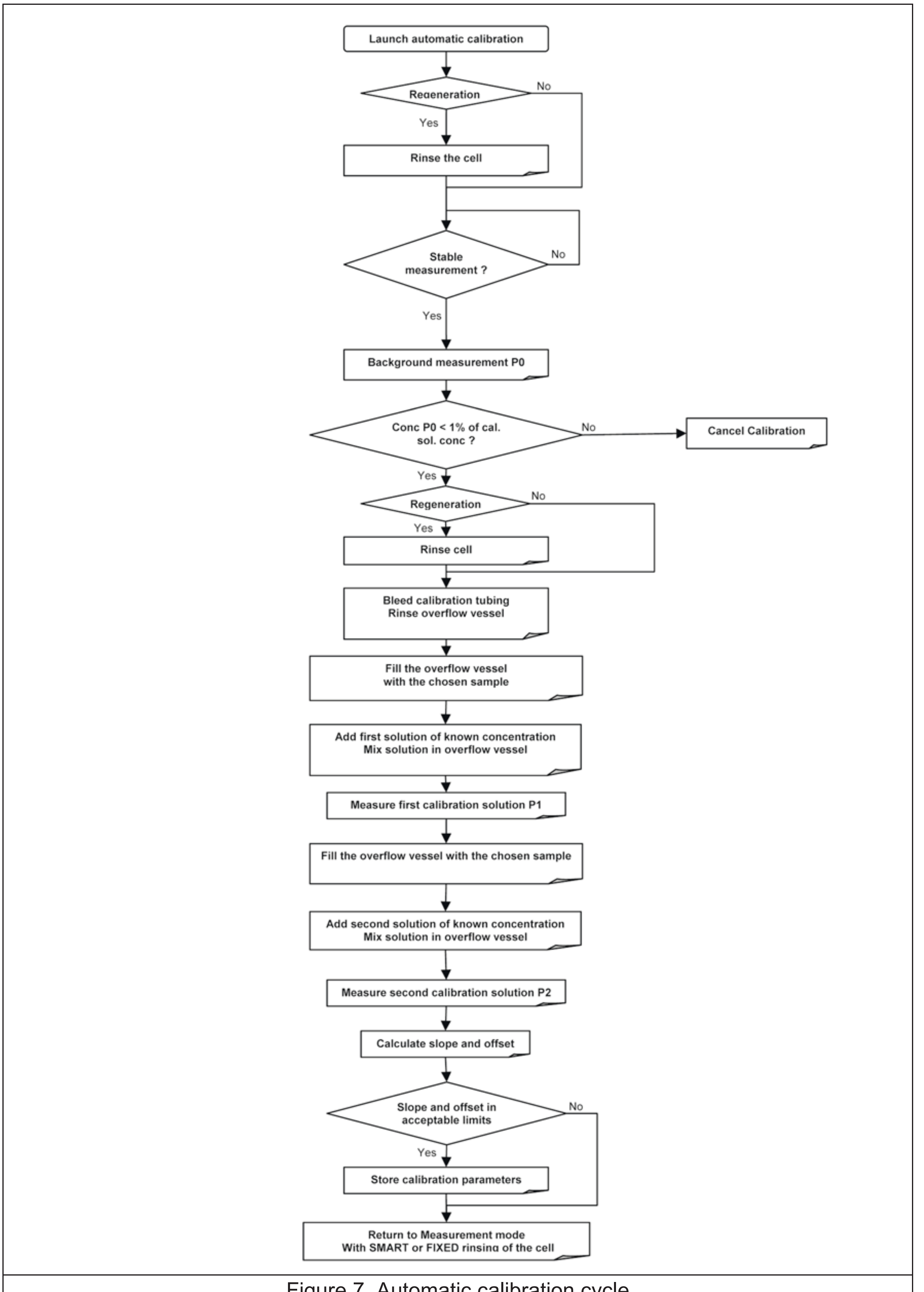


Figure 7 Automatic calibration cycle

This process calculates the slope and offset of the ISE sodium electrode and the reference electrode. It is based on the measurement of the potential and temperature of three different samples, two of which contain known concentrations of sodium:

- Measurement of a first sample of unknown concentration
- Measurement of a second sample of known concentration
- Measurement of a third sample of known concentration

The additions of known concentration are made to the overflow vessel which is partially emptied to avoid any spillage. The volume of the overflow vessel has been factory defined during preparation of the instrument. This parameter can only be modified by a qualified service technician.

The sample to which the known additions will be made is measured. This measurement must be stable and less than 1 per thousand of calibration solution concentration and becomes the background point measurement **P0** displayed on the analyzer.

The cycle is as follows:

1. **Phase 1:** The sample to which the known additions will be made is measured. This measurement must be stable and less than 1 thousandth of the calibration solution concentration. This becomes the background point measurement **P0** displayed on the analyzer.
2. **Phase 2:** The electrode is reactivated. This consists of injecting Sodium Nitrate into the solution to maintain a high level of sodium measurement for a minimum of 5 minutes.
3. **Phase 3:** The measurement cell is rinsed. The overflow vessel is then refilled with fresh sample.
4. **Phase 4:** The overflow vessel is drained slightly to allow enough room for the addition of the first calibration solution.
5. **Phase 5:** The first calibration solution of known concentration is added and mixed with the sample. The overflow vessel is drained into the measurement cell and the first concentration measured and displayed as **P1** on the analyzer.
6. **Phase 6:** The overflow vessel is rinsed and refilled with fresh sample.
7. **Phase 7:** The overflow vessel is drained slightly to allow enough room for the addition of the second calibration solution.
8. **Phase 8:** The second calibration solution of known concentration is added and mixed with the sample. The overflow vessel is drained into the measurement cell and the second concentration measured and displayed as **P2** on the analyzer.
9. **Phase 9:** The slope and offset are calculated and displayed. If the calculated slope and offset values are within the acceptable limits they will be used for all future measurements. Normal measurement is then resumed starting with a smart or fixed rinsing step.

## 3.8 Manual calibration cycle

The following section gives an overview of the manual calibration process. For details on setting up and running this processes, refer to the section entitled Calibration on page 85.

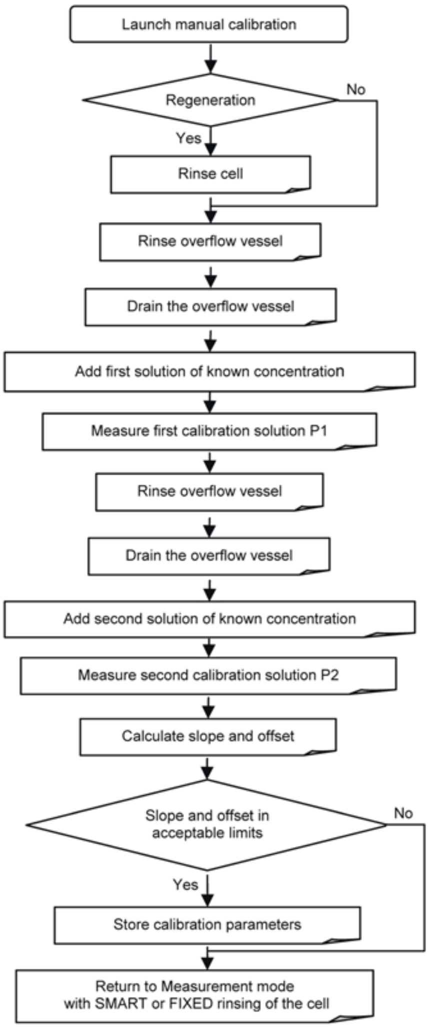


Figure 8 Manual calibration cycle

This process calculates the slope and offset of the ISE sodium electrode and the reference electrode. It is based on the measurement of potential and temperature of two different samples of known sodium concentration.

The concentration values of the two calibration solutions must be entered into the analyzer prior to calibration (see Two point calibration on page 89). The lower concentration should be greater than 50 ppb and the relationship between low and high concentration should be 10 or more. The recommended low value is 100 ppb and the high value is 1,000 ppb.

The cycle is as follows:

1. **Phase 1:** The electrode is reactivated. This consists of injecting Sodium Nitrate into the solution to maintain a high level of sodium measurement for a minimum of 5 minutes.
2. **Phase 2:** The measurement cell is rinsed.
3. **Phase 3:** The overflow vessel is rinsed and refilled with fresh sample.
4. **Phase 4:** The overflow vessel is drained, and the system waits for the operator to fill the overflow vessel with the low value calibration solution.

5. **Phase 5:** The overflow vessel is drained into the measurement cell and the first concentration measured.
6. **Phase 6:** The overflow vessel is rinsed and then drained. The system waits for the operator to fill the overflow vessel with the high value calibration solution.
7. **Phase 7:** The overflow vessel is drained into the measurement cell and the second concentration measured.
8. **Phase 8:** The slope and offset are calculated and displayed. If the calculated slope and offset values are within the acceptable limits they will be used for all future measurements. Normal measurement is then resumed starting with a smart or fixed rinsing step.

## 3.9 Grab sample measurement cycle

The following section gives an overview of the grab sample measurement process. For details on setting up and running this process, refer to the section entitled Grab sample on page 62.

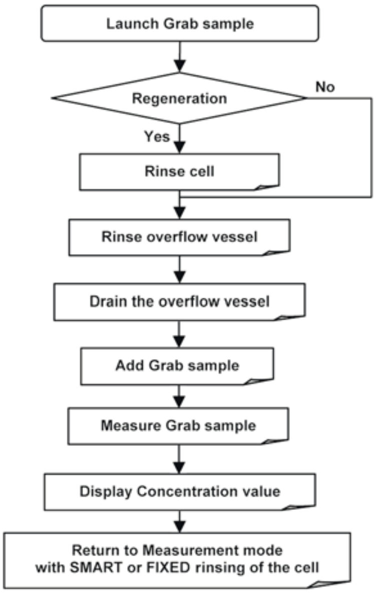


Figure 9 Grab sample measurement cycle

The measurement cycle is as follows:

1. **Phase 1:** The electrode is reactivated. This consists of injecting Sodium Nitrate into the solution to maintain a high level of sodium measurement for a minimum of 5 minutes (this step can be skipped if time is more important than accuracy).
2. **Phase 2:** When reactivation has completed, the measurement cell is rinsed for 10 minutes or, if the reactivation has been skipped then the overflow vessel is emptied and refilled with the sample used for calibration.
3. **Phase 3:** The overflow vessel is drained, and the system waits for the operator to fill the overflow vessel with the grab sample.
4. **Phase 4:** The overflow vessel is drained into the measurement cell and the sample concentration measured.
5. **Phase 5:** The measurement value is displayed. Normal measurement is then resumed starting with a smart or fixed rinsing step.

## 3.10 Analyzer outputs

The following tables shows the outputs (screen, analog, alarm relays and RS485) generated by the analyzer during the various processes (measurement, grab sample, calibration and sensor reactivation).

For the grab sample and calibration processes, see Automatic calibration cycle on page 25, Manual calibration cycle on page 27, and Grab sample measurement cycle on page 28 for a definition of each phase referred to in the table.

The terminology used in the tables is as follows:

- Frozen - output frozen at the last concentration value measured
- Actual - output shows the actual concentration value being measured

For the RS485 output, several variables are accessible:

- Address 0 - actual concentration value being measured
- Address 2, 4, 6, 8 - concentration value for channel 1 to 4 respectively
- Address 163 shows the analyzer status:
    - 1 - number of channel
    - 5 - grab sample mode
    - 10 - auto calibration mode
    - 11 - manual calibration mode
    - 13 - sensor reactivation mode

### 3.10.1 Sensor reactivation

| Action | Screen | 4-20 mA | Alarms | RS485 | |
|---|---|---|---|---|---|
| | | | | Address 0 | Others |
| | Frozen | Frozen | Frozen | Frozen | Adr 163=13 |

### 3.10.2 Standard measurement process

| Action | Screen | 4-20 mA | Alarms | RS485 | |
|---|---|---|---|---|---|
| | | | | Address 0 | Others |
| Rinsing step | Frozen | Frozen | Frozen | Frozen | |
| Measurement | Actual | Updated during last minute of measurement. | Updated during last minute of measurement. | Actual | Address 2, 4, 6, 8: Updated at end of the cycle |

### 3.10.3 Grab sample process

| Action | Screen | 4-20 mA | | Alarms | RS485 | |
|---|---|---|---|---|---|---|
| | | Conc. | Other prog. | | Address 0 | Others |
| Phase 1 | Frozen | Frozen | Event Grab Sample | N/A | Frozen | Address 163=5 |
| Phase 2 | | | | | | |
| Phase 3 | | | | | | |
| Phase 4 | | | | | | |
| Phase 5 | Actual | Actual | | | Actual | |

### 3.10.4 Auto calibration process

| Action | Screen | 4-20 mA | | Alarms | RS485 | |
|---|---|---|---|---|---|---|
| | | Conc. | Other prog. | | Address 0 | Others |
| Phase 1 | Actual | Actual | Event Calibration | N/A | Actual | Address 163=10 |
| Phase 2 | Frozen | Frozen | | | Frozen | Address 163=13 |
| Phase 3 | | | | | | |
| Phase 4 | | | | | | Address 163=10 |
| Phase 5 | Actual | Actual | | | Actual | |
| Phase 6 | Frozen | Frozen | | | Frozen | |
| Phase 7 | | | | | | |
| Phase 8 | Actual | Actual | | | Actual | |
| Phase 9 | Frozen | Frozen | | | Frozen | |

### 3.10.5 Manual calibration process

| Action | Screen | 4-20 mA | | Alarms | RS485 | |
|---|---|---|---|---|---|---|
| | | Conc. | Other prog. | | Address 0 | Others |
| Phase 1 | Frozen | Frozen | Event Calibration | N/A | Frozen | Address 163=13 |
| Phase 2 | | | | | | Address 163=11 |
| Phase 3 | | | | | | |
| Phase 4 | | | | | | |
| Phase 5 | Actual | Actual | | | Actual | |
| Phase 6 | Frozen | Frozen | | | Frozen | |
| Phase 7 | | | | | | |
| Phase 8 | Actual | Actual | | | Actual | |

## 3.11 Available options

### 3.11.1 K-Kit (cationic)

For a high acidity water such as that from a cation exchanger outlet, the regular gaseous conditioning is not sufficient to raise the pH to values superior to 10.3. The forced-gas conditioning system (K-kit) is then needed.

The K-Kit option includes a gas pump with no moving parts, a power supply board, additional hydraulics and full installation instructions.

For further information contact your local  representative.

### 3.11.2 Static heat exchanger system

A static heat exchanger system is available as an option. It comes complete with inlet and outlet connectors (4/6mm tubing) and mounting (2 flanges and screws).

Very easy to install, and requiring no voltage supply, this compact (350 x 40mm) product absorbs changes of heat even on samples flowing at 5 L/h per channel.

Specially designed for POWER applications, it has a high resistance to corrosion and deposits, and allows incoming samples from 0 - 60°C to be released to the analyzer within its operating range of 5 - 45°C.

For further information contact your local  representative.

# Section 4 Installation

**⚠ WARNING**

The analyzer should only be assembled by qualified staff. Mains power should only be connected once installation has been completed and checked.

## 4.1 Analyzer inspection and unpacking

The instrument has been factory tested and checked prior to shipping. We nevertheless recommend that you perform a visual inspection in order to ensure that it has not been damaged. Any marked packaging is a potential sign of damage that may not be immediately visible. Keep all packaging in the event of claims.

## 4.2 Instrument preparation

**⚠ WARNING**

Do not connect power prior to mounting and plumbing the instrument.

**⚠ CAUTION**

Personal injury hazard. Instruments or components are heavy. Use assistance to install or move. Make sure that the wall mounting is able to hold 4 times the weight of the equipment.

Before installing the analyzer, think about the following:

- Place the analyzer close to the sample point. This will allow the response time to be reduced.
- The sample should be homogenous and representative.
- The temperature of the sample should be between 5 and 45°C.
- The pressure of the sample should be between 0.2 and 6 bar and remain relatively stable.
- The solution should be free of particles. The sample lines should be in PE/PTFE/FEP (4x6 mm).
- Avoid any location with a corrosive atmosphere or subject to liquid spills.
- Chose a dry and dust-free location.
- The ambient temperature of the analyzer should not exceed 45°C. If the temperature is below 5°C, the analyzer should be installed in a heated cabinet (not provided by ).

## 4.3 Instrument mounting

**CAUTION**

Whether the instrument is to be mounted on a panel or wall, it is important to note that it must be placed in an upright position with the transmitter at the top. It is recommended to use a spirit level to ensure that the instrument is correctly positioned and not leaning to one side or forward. This is essential to guarantee the accuracy of the analyzer.

### 4.3.1 Panel mounting

For the panel mount model, the dimensions of the panel and fixation holes are as follows:

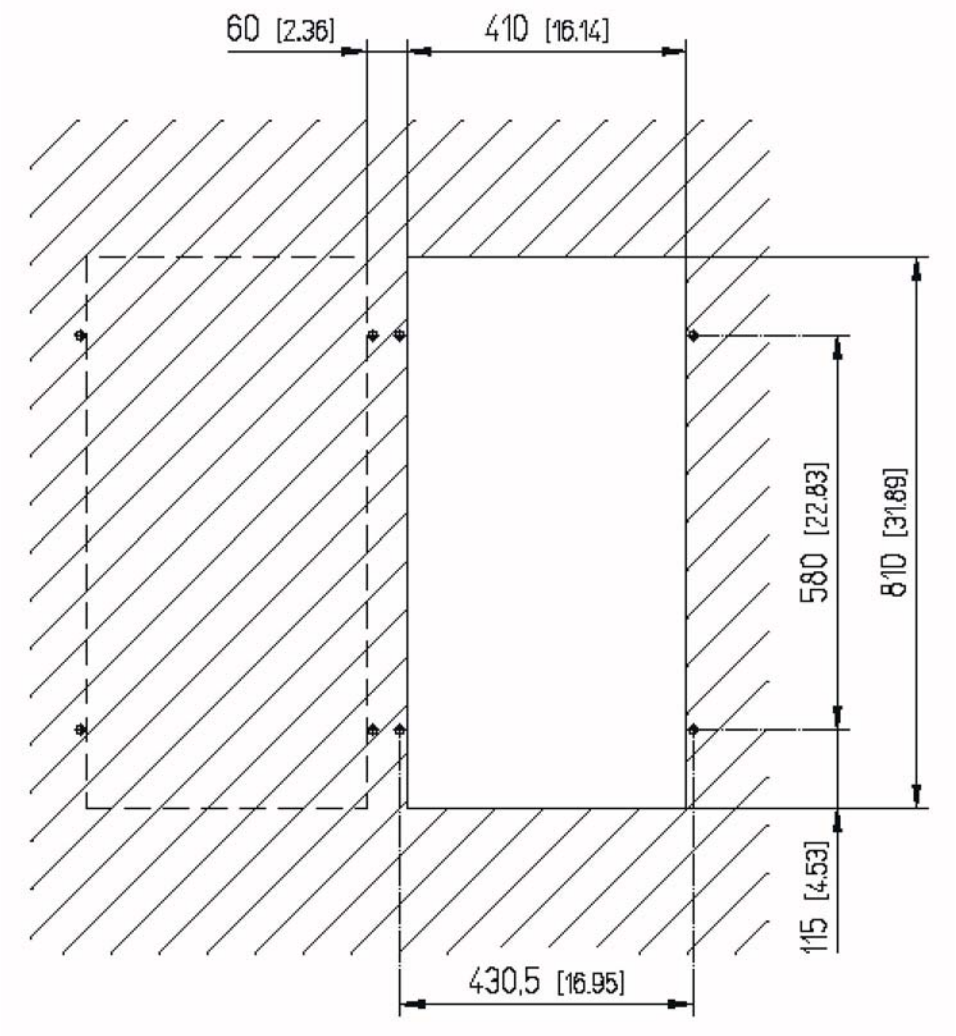


Figure 10 Panel mount

All dimensions above are in millimeters [inches].

### 4.3.2 Wall mounting

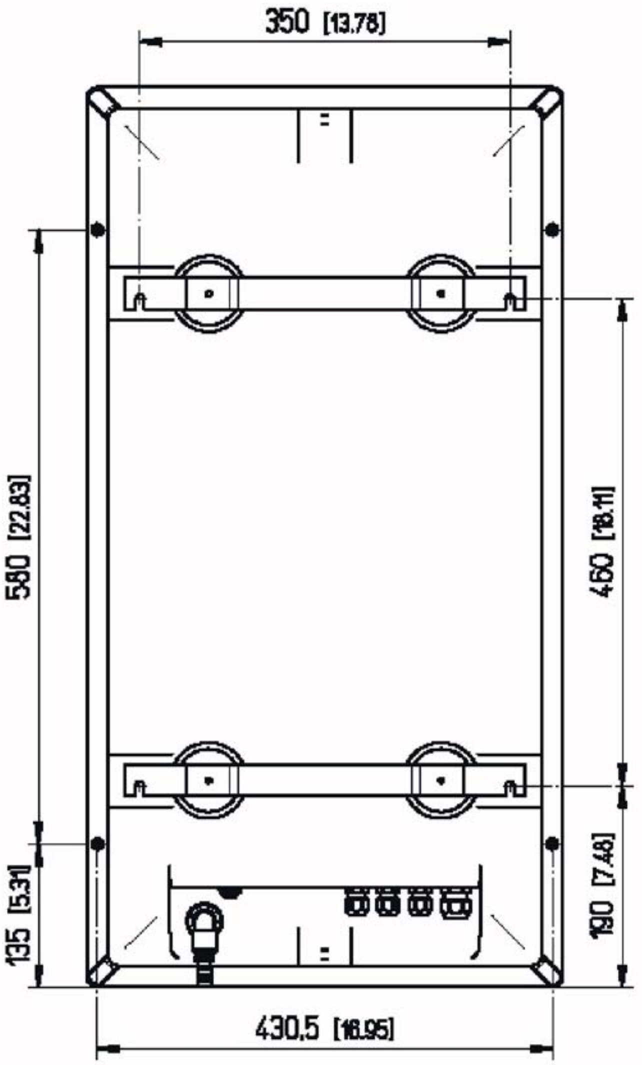
Use the wall mounting kit to fix the instrument to the wall.

Figure 11 Wall mount kit

Use these to drill the four holes for fixing the instrument on the wall. The distance between the two pieces is 460 mm.

**CAUTION**

It is extremely important to respect this gap of 460 mm to avoid bending the cabinet out of shape while fitting.



## 4.4 Step-by-step installation

**WARNING**

No intervention should be made on the instrument without first switching off the power.

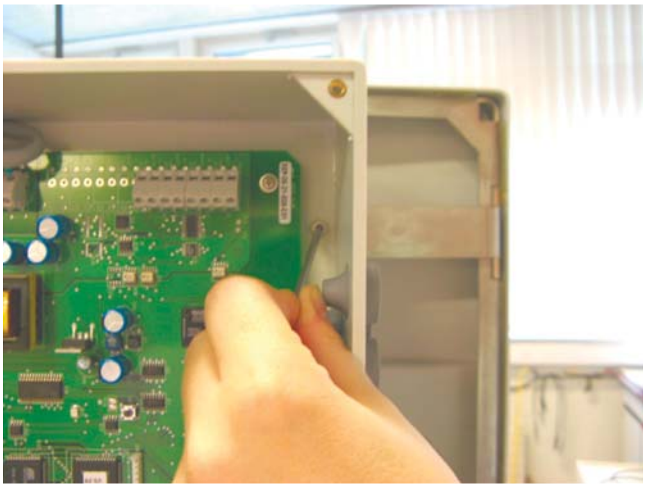
The electrical installation should be carried out by duly qualified personnel. A supply voltage of 100-240 VAC is acceptable without changing the configuration. The power supply terminals can be removed from their housing to make connection easier.

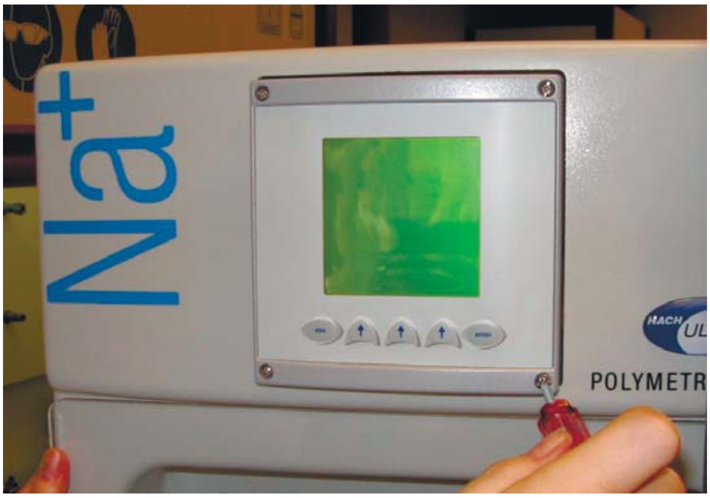
For safety reasons, it is imperative to respect the working procedure below:

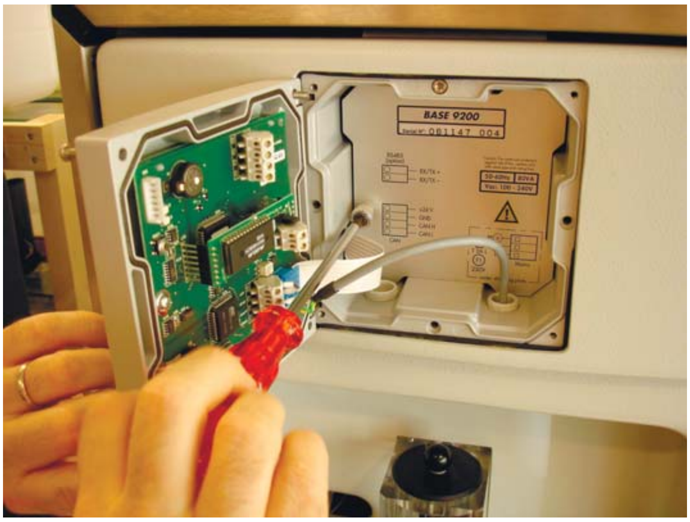
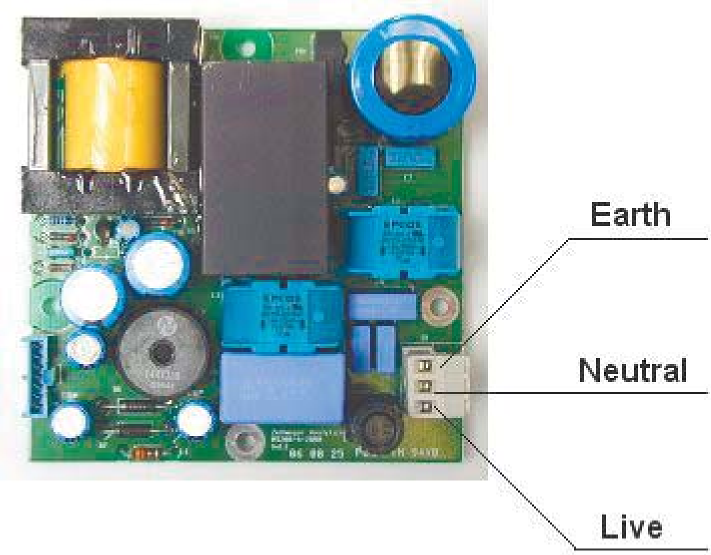
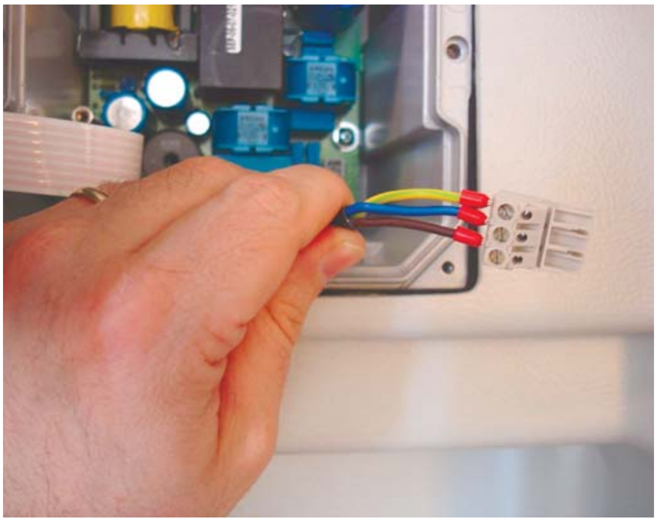
- Use a three-wire power cable (live + neutral + earth), sized for supplying the required power.
- The instrument should be connected to the mains via a circuit-breaker or fuse whose value should be less or equal to 20 A. It should be located in proximity and be identified.
- This connection should cut-off the live and the neutral when electrical problems occur or when the user wishes to intervene inside the instrument. On the other hand, the earth conductor should always be connected.

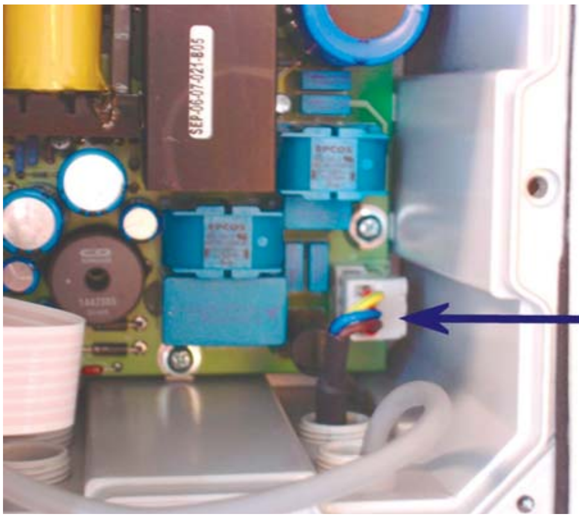
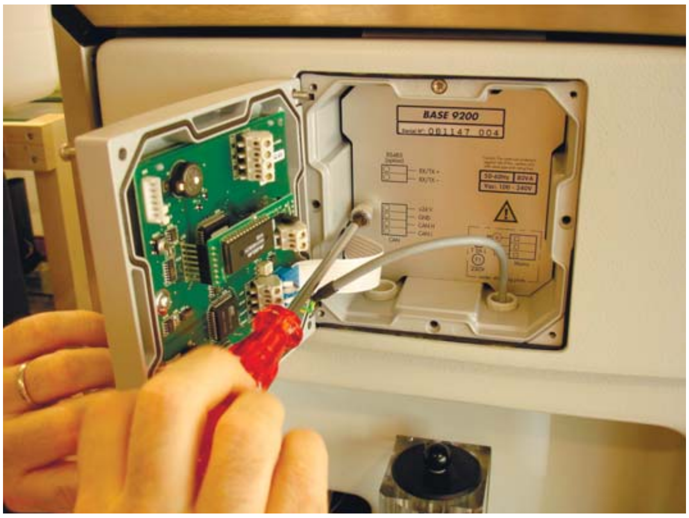
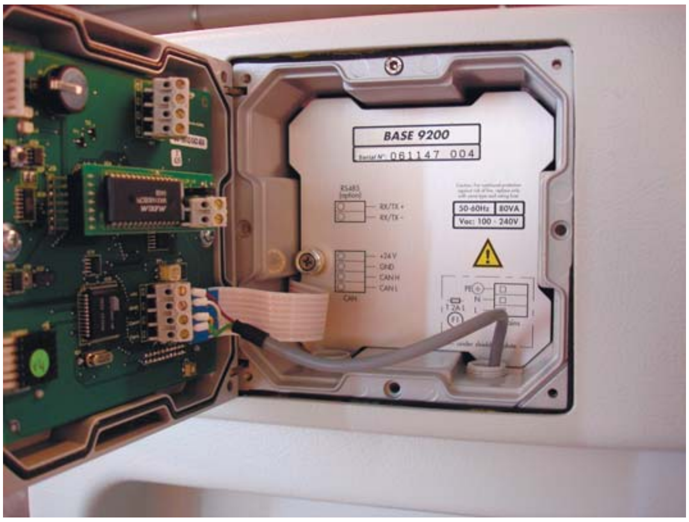
### 4.4.1 Mains power connection

1. Open the glass window and then open the panel to have access to the rear side of the analyzer.

| | |
|---|---|
| **2.** Pass the power supply cable through the cable gland located at the back left of the bottom of the cabinet. |  |
| **3.** Open the I/O connection box on the rear panel. |  |
| **4.** Unscrew the two fixing elements... |  |

| | |
|---|---|
| **5.** ...and allow the I/O box to rotate down. |  |
| **6.** Pass the mains power cable through the back end cable gland on the transmitter enclosure. |  |
| **7.** Open the transmitter front door. |  |

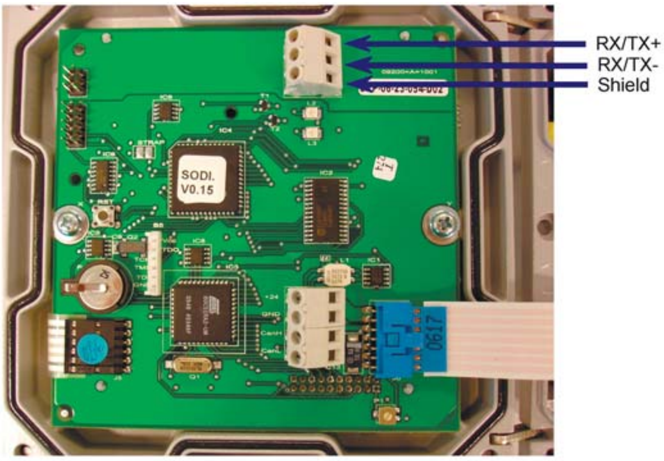
| | |
|---|---|
| **8.** Remove the metallic shielding plate protecting access to the main board. |  |
| **9.** Take the power supply connector and note where the earth, live, and neutral must be connected. |  |
| **10.** Connect the power supply cables to the connector... |  |

| | |
|---|---|
| **11.** ...and put the connector back in place. |  |
| **12.** Replace the metallic shielding plate. |  |
| |  |

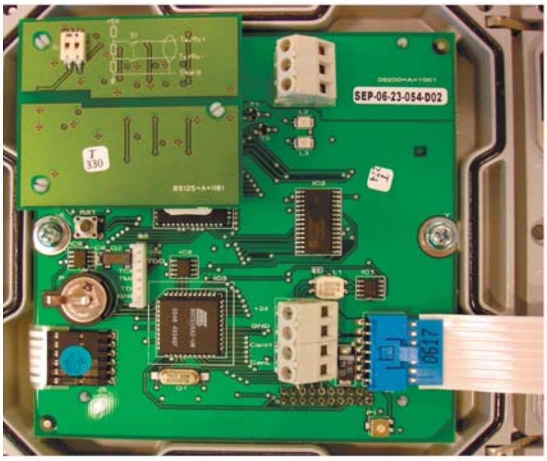
### 4.4.2 RS485 connection

1. Connect the RS485 communication cable as indicated.

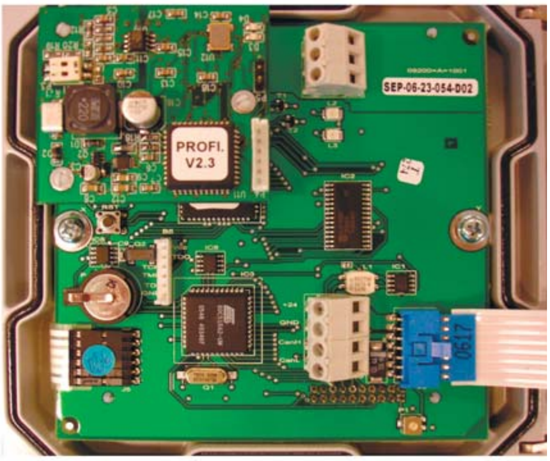
   Connection is the same on the CPU board for both the JBUS/MODBUS and PROFIBUS options.



CPU board without RS485 option

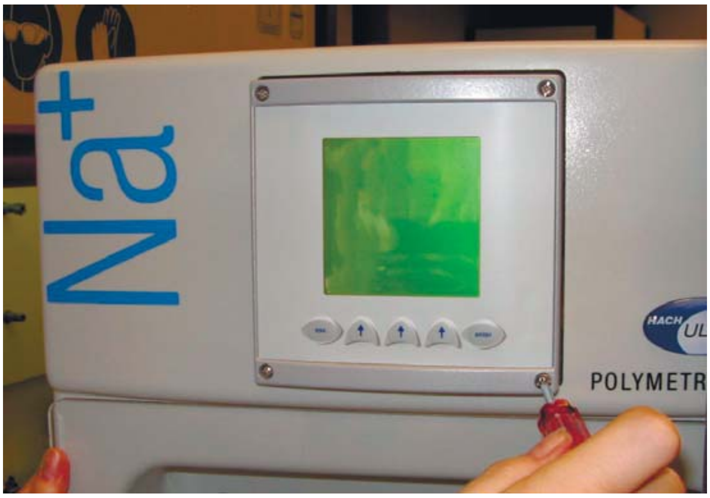


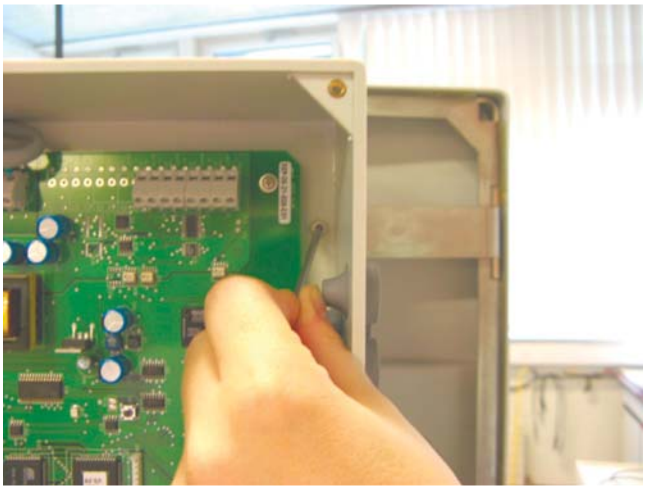
CPU board with JBUS/MODBUS option



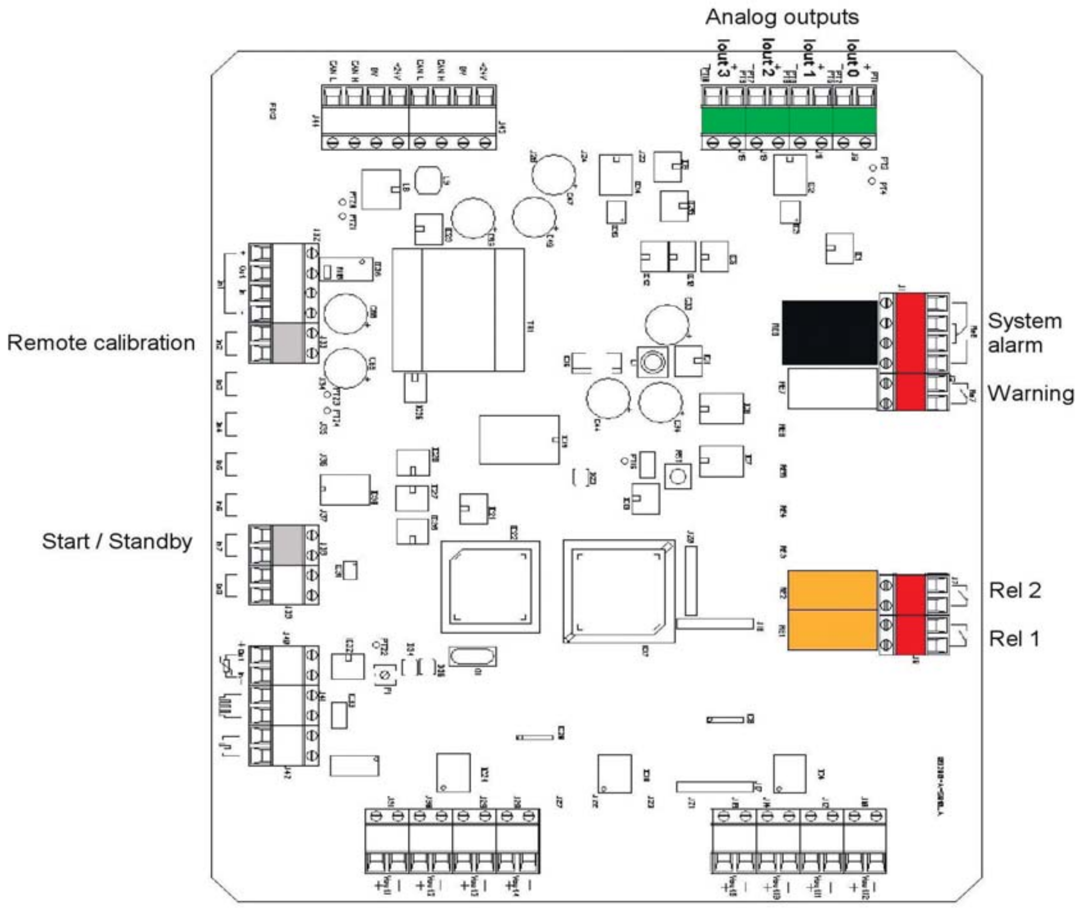
CPU board with PROFIBUS option

2. Close the transmitter door.

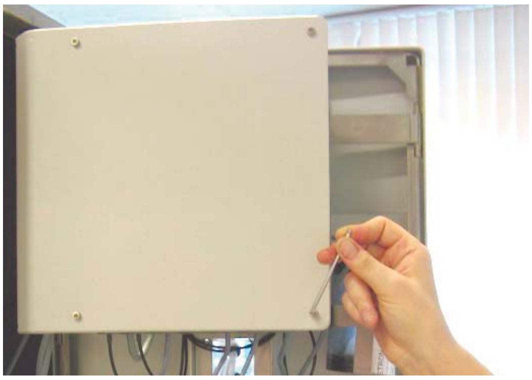


| | |
|---|---|
| **3.** Put the I/O box back in its normal position. |  |
| **4.** Fix the I/O box back in place with the 2 screws. |  |

## 4.4.3 Input/Output connections



1. **Analog output – Iout 0** is used for the current signals of the measurement. Other analog outputs can be freely linked to different parameters like measurement, temperature – refer to the section entitled User Setup on page 71 for details.
2. **Relays – Rel 8** is linked to the system alarm and is normally energized. **Rel 7** is linked to the warning alarm. The position of the contact represented on the diagram above corresponds to a state when the relay is not energized. See Alarms on page 76 for more information on the relays.
3. **Logical Inputs (2) –** one input allows the analyzer to be put on standby by providing 1 dry circuit which will then be closed to place the analyzer on standby until that circuit is re-opened. The second input is to launch the remote calibration (same principle as sample measurement by-pass).
   - - **In 2** (on J32) for remote calibration
   - - **In 7** (on J38) to put the analyzer on standby

| | |
|---|---|
| **4.** Close the I/O box. |  |

### 4.4.4 Sample tubes installation

- **Sample inlet connections** - 6 mm (or ¼") in polyethylene or PTFE or FEP. If particulate matter is present in the sample, pre-filtration is necessary. A filter should be inserted in the sample line. One is available as an option. Use new pipes for all connections during installation.
- **Flow rate** - 6 to 9 L/hour
- **Pressure** - 0.2 to 6 bars (8 to 100 psig)
- **Sample acidity** - Sample acidity should not be more than 300 ppm $CaCO_3$
- **Temperature** - Temperature must be between 5 to 45 °C

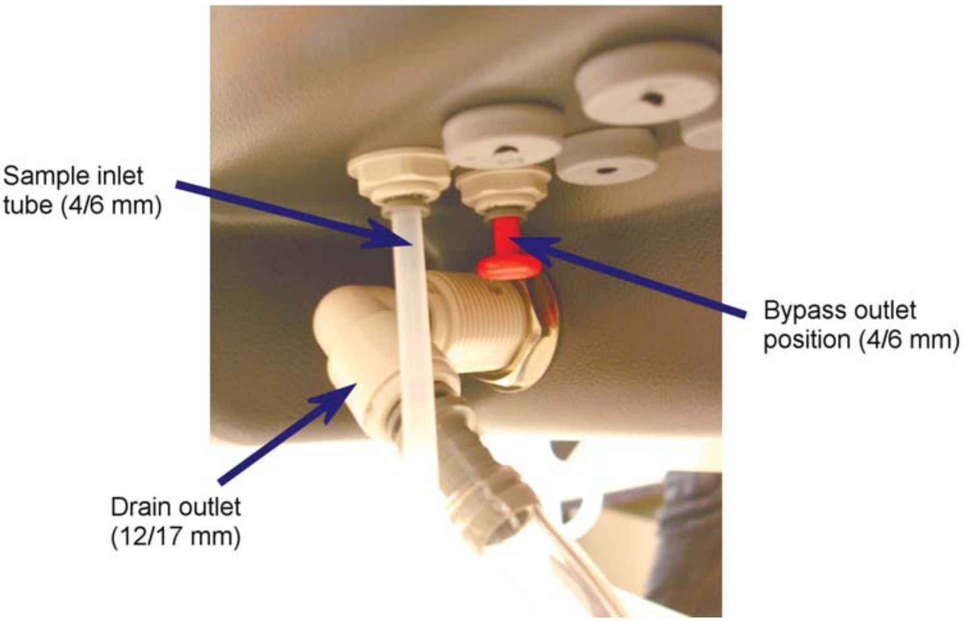
***Note:** For continuous monitoring of sample with a temperature between 5-10°C it is recommended that the installation should include a static heat-exchanger system (see Accessories - Options - Maintenance kits on page 107 for a list of part numbers).*

At this stage of the installation, make sure that the flow valve is closed.

Connect the pipes by inserting them into the quick release connections found under the sampling block.

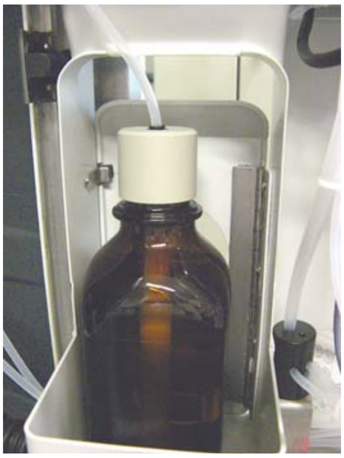
Be sure that the sample line is correctly flushed before any connection to avoid particle injection into the 9245 hydraulic system.

1. Connect the drain outlet.
2. Connect the sample inlet/outlets.



### 4.4.5 Reagents installation

1. Prepare the reagents according to Reagent Preparation on page 115. Install the reagent canisters in their place and connect them to their respective tubes.
2. Install and connect the conditioning solution (diisopropylamine). The diagrams show an analyzer for non-cationic applications. Analyzers for cationic applications have a small pump installed above and to the left of the reagent canisters.

| | | |
|---|---|---|
|  |  |  |

| | |
|---|---|
| 3. Install and connect the reactivation solution (blue R label). |  |
| 4. If you have this option, install and connect the auto calibration solution (yellow CAL label). |  |

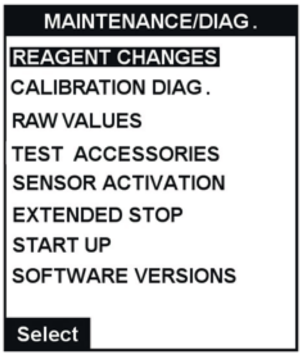
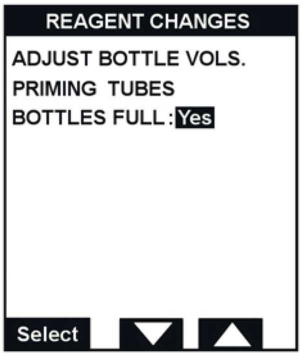
## 4.4.6 Magnetic stirrer installation

| | |
|---|---|
| **1.** On the front of the panel, remove the plastic bag from the overflow vessel |  |
| **2.** Remove the magnetic stirrer from the bag and install it in the overflow vessel |  |

### 4.4.7 Reagents volume declaration

***Note:*** *As you will now be using the analyzer menus to input data, it may be useful to familiarize yourself with the data entry procedures by reading the section entitled Data entry on page 53 of this manual.*

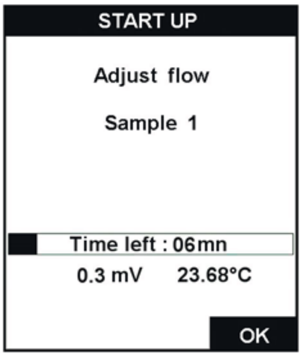
1. Open the sample valve and check that there is no leakage in the hydraulic path.
2. Power on the analyzer.
3. Select the **Menu** option from the display.

| | |
|---|---|
| 4. Select **MAINTENANCE/DIAG.** from the main menu and press **Enter** |  |
| 5. Select the **REAGENT CHANGES** option and press **Enter** |  |
| 6. Set the **BOTTLES FULL** parameter to **Yes** and press **Enter**.<br>7. Press **Esc** to return to the **MAINTENANCE/DIAG.** menu. |  <br>BOTTLES FULL : Yes |

### 4.4.8 Flow rate adjustment

1. From the **MAINTENANCE/DIAG.** menu select **START UP** and press **Enter**
2. First, the system automatically primes both the calibration and reactivation tubes.
3. Check that there are no air bubbles in the reagent tubes for reactivation and auto calibration.

4. The next step allows you to regulate the sample flow rate on the measurement channel.
5. The analyzer automatically empties and refills the overflow vessel to determine the flow rate which is displayed on screen.
6. The flow rate should be 6 to 9 L/hour.


START UP

Adjust flow

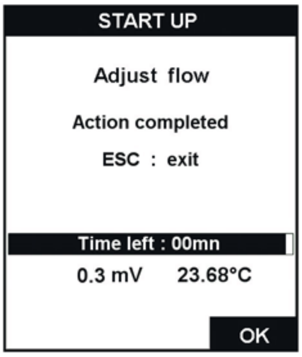
Sample 1

Time left : 06mn

0.3 mV 23.68°C

7. Using a screwdriver, regulate the channel’s sample flow by turning counter-clockwise to increase the flow rate or clockwise to decrease the flow rate.
8. The process is repeated until the flow is correctly regulated for the channel. At this point select **OK**.

9. On completion, an **Action completed** message will be displayed. Select **Esc** to exit.


START UP

Adjust flow

Action completed

ESC : exit

Time left : 00mn

0.3 mV 23.68°C

## 4.4.9 Sample pH conditioning check

***Note:*** *At this stage, the electrodes should not have been installed.*

### 4.4.9.1 Non-cationic applications

1. Install a calibrated pH sensor in the center position of the measurement chamber which is normally used for the ISE sodium electrode.
2. On the analyzer, press **Start** on the main menu to start the measurement process.
3. Check that the pH value of the sample after conditioning is greater than 10.5. If not, check the quality of the conditioning product used.

### 4.4.9.2 Cationic applications

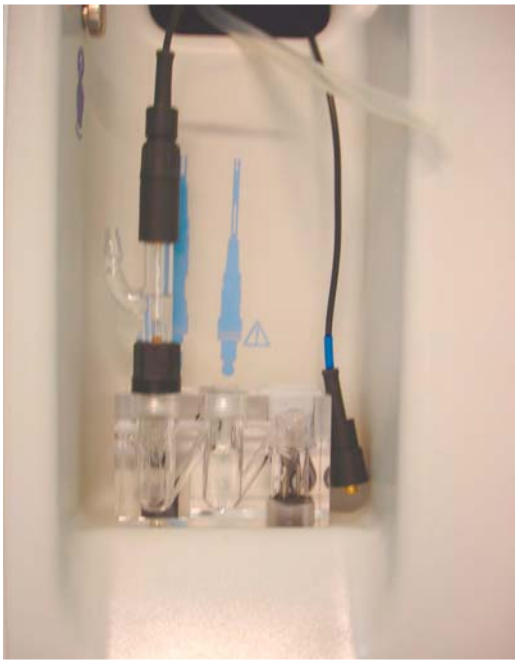
1. With a calibrated pH sensor, measure the pH of the sample outside of the analyzer.
2. Determine the gas injection time ratio depending on the sample pH. Enter this value into the analyzer as described in Total gas/water ratio (cationic applications only) on page 73. The standard values are listed below:

| pH | Tgas/Twater Ratio |
|---|---|
| 2 | 180% |
| 2.3 | 80% |
| 2.6 | 50% |
| 2.9 | 30% |
| 3.5 | 15% |
| 4.0 | 10% |

3. Install the same pH sensor in the center position of the measurement chamber.
4. On the analyzer, press **Start** on the main menu to start the measurement process.
5. Measure the pH in the conditioned sample to check if the pump ratios are efficient enough to obtain a pH of around 11.0. If necessary, update the ratio to maintain a final constant pH of 11.0 ± 0.2.

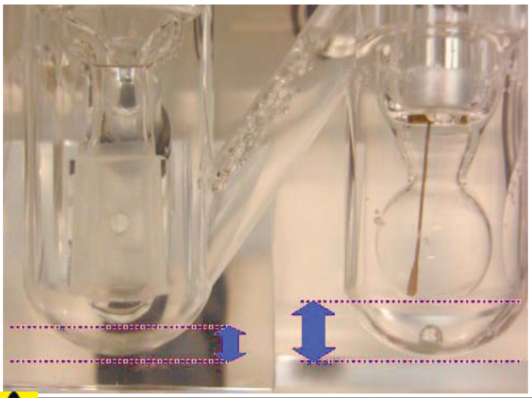
### 4.4.10 Reference electrode installation

| | |
|---|---|
| **1.** Remove the reference sensor from its box.<br>**2.** Remove the plastic reservoir from the bottom (the storage solution is KCl 3M) and install the O-ring as shown. |  |
| **3.** With care, turn the bottom electrolyte tube ferrule with a maximum ¼ turn to lock it. |  |
| **4.** Remove the plastic plug on the entry port. |  |

| | |
|---|---|
| **5.** Install the reference electrode in the extreme left measurement chamber.<br>**6.** Connect the reference cable (the one ***without*** the blue label on it) to the reference electrode. |  |
| **7.** Connect the electrolyte tube to the reference electrode. |  |

### 4.4.11 Sodium ion selective electrode installation

***Note:*** *It is critical to preserve the integrity of the sodium ion selective electrode as much as possible. This is why this electrode must be installed at the very last moment after all other adjustments.*

| | |
|---|---|
| **1.** Remove the sodium ion selective sensor from its box.<br>**2.** Remove the plastic reservoir from the bottom (the storage solution is standard tap water) and shake gently (as you would a thermometer) to dispose of any bubbles.<br>**3.** Install the O-ring as indicated right. |  |
| **4.** Install the ISE in the center position of the measurement chamber.<br>**5.** Connect the AS7 cable (with the blue label) to the electrode. |  |
| |  |

**CAUTION**

After the electrodes installation, it is very important that none of the electrode heads are touching the bottom part of the measuring cell. An example of the electrodes correct position is shown above.

## 4.4.12 Fill electrolyte reservoir

<table>
<tr>
<td>

1. The electrolyte reservoir is located at the back of the analyzer.
2. Take the KCl electrolyte bottle and insert the tip of the tapered spout into the reservoir inlet tube (illustrated right) as far as it will go but without exerting any extra pressure.
3. Squeeze on the bottle as many times as necessary to fill the reservoir to about 3/4 of its capacity. If you have any difficulty filling the reservoir, raise the spout of the bottle very slightly to avoid an air lock.

</td>
<td>

</td>
</tr>
<tr>
<td>

4. Using thumb and forefinger, pump on the electrolyte tube between the reservoir and the reference electrode to remove any air bubbles that may have formed.
5. If necessary, clean any KCl drops from the analyzer and the reservoir.

</td>
<td>

</td>
</tr>
</table>

## 4.5 Analyzer stabilization

At this stage the analyzer has been completely installed, but needs to run for a period of time to stabilize.

1. Press **Start** on the main menu to start the measurement process.
2. Leave the system to run for a couple of hours before starting any calibrations.

## 4.6 Analyzer setup

After the analyzer has stabilized, the system and user parameters must be set, followed by an initial calibration.

1. **SYSTEM SETUP** - see System Setup on page 65.
2. **USER SETUP**- see User Setup on page 71.
3. **CALIBRATION** - see Calibration on page 85 and launch a two point calibration.

***Note:** The complete calibration cycle will last around 1 hour. However, the instrument cannot be calibrated until at least one complete measurement cycle has been successfully performed. An attempt to calibrate the instrument before this will result in a "**Not authorized**" message being displayed.*

*__Note:__ All screen display examples in the following sections are shown as black on a white background for reasons of clarity, and do not necessarily reflect the actual colors used on the instrument display.*

## 5.1 Data entry

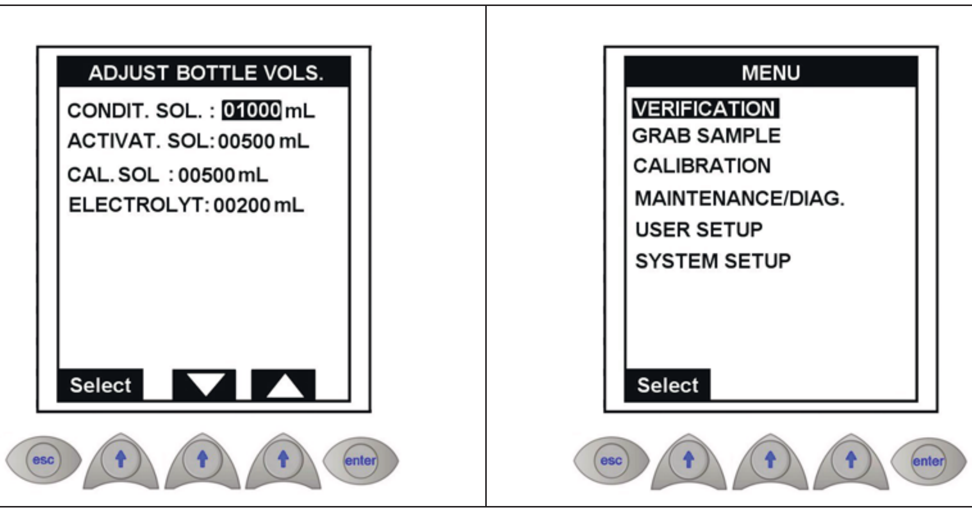
### 5.1.1 Function keys

The display panel of the 9245 has 5 function keys (illustrated below) to allow menu option selection, field selection, and data entry options.

Figure 12 Function keys

- The **Esc** key cancels data input or goes back to the previous screen.
- The **Enter** key validates the input and goes on to the next step.
- The **Up Arrow** keys select the option displayed immediately above them on the screen.

When a screen requiring data entry is displayed, the first editable field is always highlighted (as illustrated left in Figure 13 below). To select other fields on the screen, scroll through them by pressing the **Up Arrow** function key under the **Select** option. As each field is selected, the data element available for update is highlighted.


ADJUST BOTTLE VOLS.

CONDIT. SOL. : 01000 mL
ACTIVAT. SOL: 00500 mL
CAL. SOL : 00500 mL
ELECTROLYT: 00200 mL

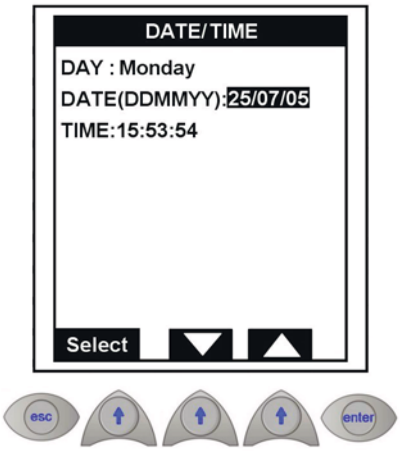
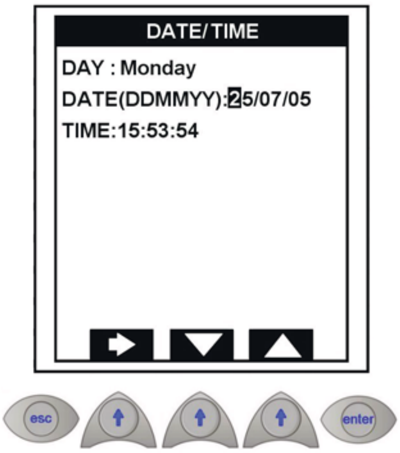
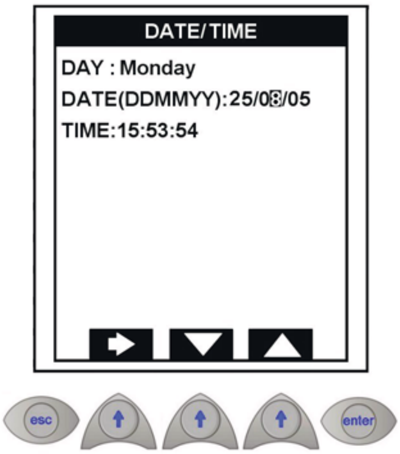
Figure 13 Field and menu selection

The same is also true when a menu is displayed (as illustrated right in Figure 13 above). In this case, the first available option is always highlighted. Scroll to the required option by pressing the **Up Arrow** function key under the **Select** option.

Data entry is effected in a variety of ways depending upon the characteristics of the data field being accessed. The following examples show the different ways of entering data when required.

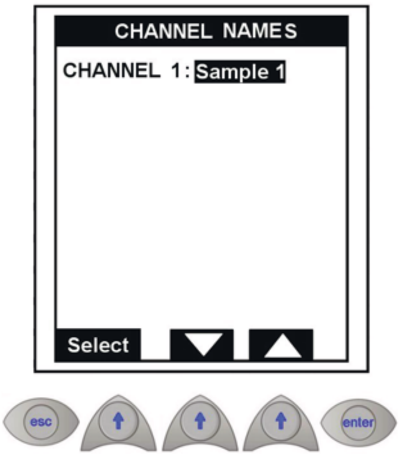
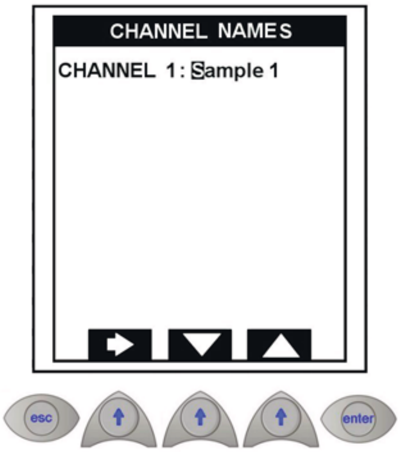
## 5.1.2 Numeric fields

These fields require that the user enter one or more numeric values into a field. The type of field determines the available input. In some fields only digits 0 through 9 would be available to select whereas in other fields the decimal point and/or minus sign may also be available.

| | |
|---|---|
| <br>DATE/TIME<br>DAY : Monday<br>DATE(DDMMYY):25/07/05<br>TIME:15:53:54<br> | The highlighted field in the example left is a numerical data element which requires input from the user.<br>As this is a date field, only digits 0 through 9 will be available for selection.<br>For data elements such as these, press the function key under either the **Up Arrow** or **Down Arrow** options to initiate data entry. |
| <br>DATE/TIME<br>DAY : Monday<br>DATE(DDMMYY):25/07/05<br>TIME:15:53:54<br> | The first digit will then be highlighted, and a new **Right Arrow** option replaces the **Select** option at the bottom of the screen.<br>Press the function key under the **Up Arrow** option to increase the value of the field by 1.<br>Press the function key under the **Down Arrow** option to decrease the value of the field by 1.<br>Press the function key under the **Right Arrow** option to accept the currently displayed digit and move one digit to the right (i.e. 5 in the example left).<br>Press the **Enter** function key to accept the data and move to the next input field. |
| <br>DATE/TIME<br>DAY : Monday<br>DATE(DDMMYY):25/08/05<br>TIME:15:53:54<br> | It is not necessary to enter data into each of the available data elements that make up the data field.<br>For example, if it was required to simply change the date from the 25/07/07 to 25/08/07, the following steps are all that are required:<br>• Press the function key under the **Right Arrow** option until the digit 7 is highlighted.<br>• Press the function key under the **Up Arrow** option to increase the value of the field by 1 to 8.<br>• Press the **Enter** function key to accept the complete data field (25/08/07) and move to the next data input field. |

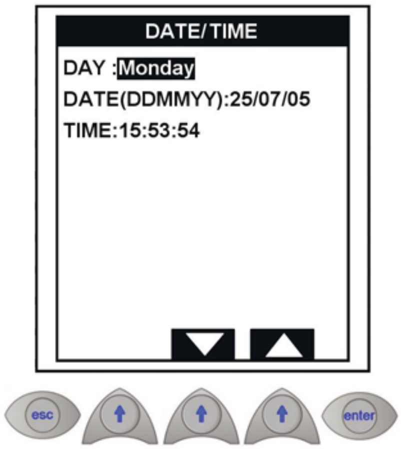
### 5.1.3 Alphanumeric fields

These fields require that the user enter one or more alphanumeric values into a field. The type of field determines the available input. In some fields only upper case alpha characters may be allowed, in others upper and lower case alphanumeric characters my be allowed, etc.

| | |
|---|---|
| <br>CHANNEL NAMES<br>CHANNEL 1: Sample 1<br> | In this example, a name is required to give to the channel. The complete alphanumeric character set is available to choose from, including upper and lower case alpha characters.<br>Press the function key under either the **Up Arrow** or **Down Arrow** options to initiate data entry. |
| <br>CHANNEL NAMES<br>CHANNEL 1: Sample 1<br> | The first character will then be highlighted, and a new **Right Arrow** option replaces the **Select** option at the bottom of the screen.<br>Press the function key under the **Up Arrow** or **Down Arrow** option to scroll through the list of available characters.<br>Press the function key under the **Right Arrow** option to accept the currently displayed character and move to the next character.<br>Press the **Enter** function key to accept the complete field and move to the next data input field. |

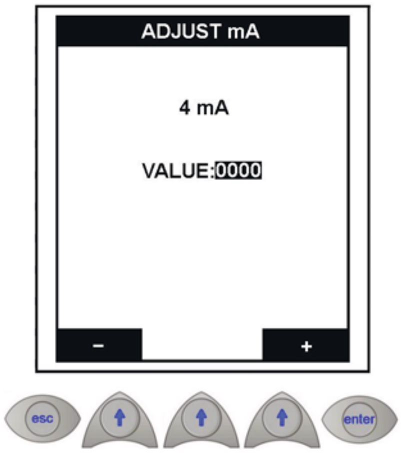
## 5.1.4 List element fields

This type of data entry is where a pre-defined list of available data values are available to the user who must select the one which is applicable. Free-format text is not allowed.

| | |
|---|---|
| <br>DATE/TIME<br>DAY :Monday<br>DATE(DDMMYY):25/07/05<br>TIME:15:53:54<br> | The highlighted field in the example left is a data element where there is only a limited number of valid options (i.e. the seven days of the week).<br>For data elements such as these, press the function key under the **Up Arrow** option to scroll forward through the pre-defined list (in this example Tuesday, Wednesday, Thursday...) or press the function key under the **Down Arrow** option to scroll backward through the list.<br>When the required list element is displayed press the **Enter** function key to accept the data and move to the next data input field. |

## 5.1.5 Incremental value fields

These are fields where a value is displayed on the screen and the user has the option of increasing or decreasing the value.

| | |
|---|---|
| <br>ADJUST mA<br>4 mA<br>VALUE:0000<br> | In this example, the whole value, rather than an individual digit, is highlighted.<br>Use the **Up Arrow** function keys under the plus or minus symbols to increase or decrease the value by 1.<br>On completion press the **Enter** function key, to accept the new value. |

## 5.1.6 Data entry input errors

After entering data for a field, the system will verify the validity of the data. For example, if a date of 41/12/07 is entered, the system will not accept it. If any field is found to be invalid, an appropriate error message will be displayed at the bottom of the screen and the system reverts back to the original value for that field.

Press one of the **Up Arrow** function keys to acknowledge the error, and re-enter the data, or **Esc** to acknowledge the error and exit the screen.

## 5.2 Measurement screens

### 5.2.1 Principal display

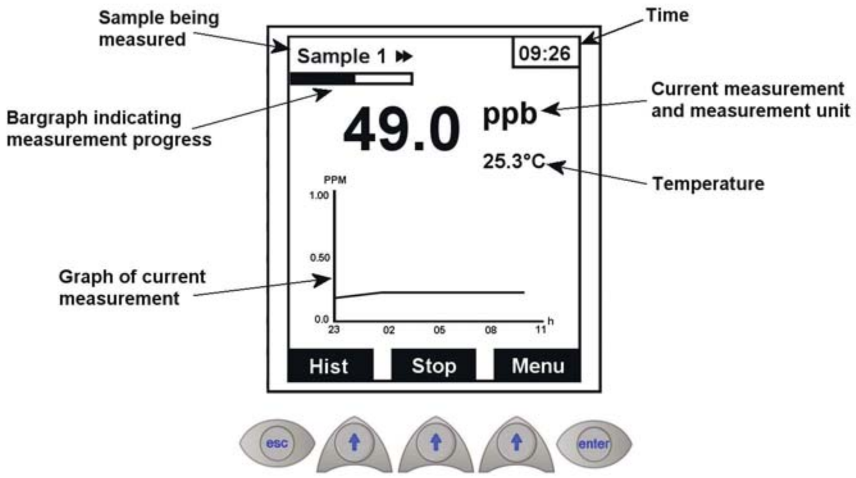


Figure 14 Principal measurement screen

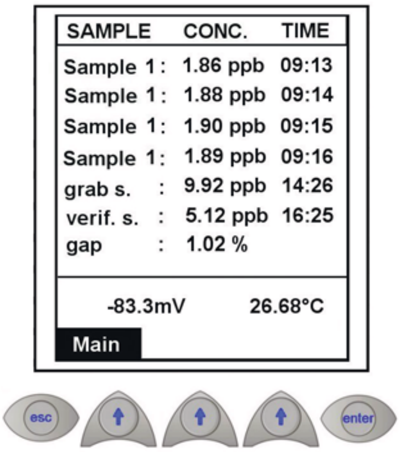
An example of this display is given above. It shows the details of the current sample being measured, both numerically and graphically.

The x-axis and y-axis of the graph are user-definable. The x-axis (horizontal) is defined by the value set in the graph time base parameter (see Graph time base on page 76) and the y-axis (vertical) is defined by the high and low values in the Analog Output 1 scale (see mA outputs on page 80).

The options at the bottom of the screen will include three of the following:

- **Hist** - Selecting this option will show the last four measurements (see Figure 15 on page 58 as an example). The details of the current measurement are also displayed.
- **Stop** - Select this option to stop the current process on the analyzer. This could be a measurement, verification or grab sample process. The option is only available when one of these processes is currently running. You will be asked for confirmation (**YES** or **NO**) that you want to stop the process.
- **Start** - Select this option to start the analyzer measurement process. This option is only available if the analyzer has been stopped.
- **Menu** - This will bring up the main menu screen as illustrated in Figure 17 on page 59.
- **Alarm** - This option will appear flashing on the screen if any alarms have been set. Selecting this option will take you to the alarms screen as illustrated in Figure 16 on page 58.

## 5.2.2 Historical display



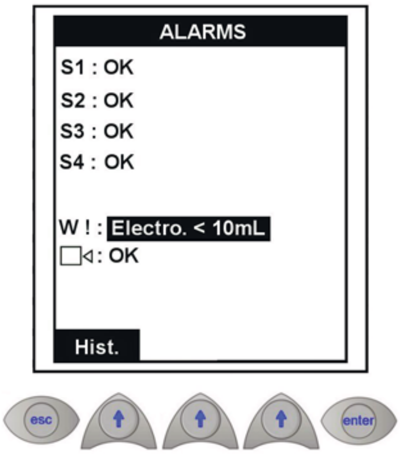
```
SAMPLE      CONC.     TIME
Sample 1 :  1.86 ppb  09:13
Sample 1 :  1.88 ppb  09:14
Sample 1 :  1.90 ppb  09:15
Sample 1 :  1.89 ppb  09:16
grab s.  :  9.92 ppb  14:26
verif. s. : 5.12 ppb  16:25
gap      :  1.02 %

   -83.3mV       26.68°C
Main
```

Figure 15 Historical measurement screen

This screen shows the last four sample measurements, the last grab sample measurement and the last verification and gap measurements. Underneath these measurements, the actual potential between the glass electrode and the reference electrode is displayed along with the temperature.

Select **Main** to return to the main measurement screen.

## 5.2.3 Alarms screen



```
        ALARMS
S1 : OK
S2 : OK
S3 : OK
S4 : OK

W ! : Electro. < 10mL
☐◁ : OK


Hist.
```

Figure 16 Alarm screen

Alarms S1-S4 relate to the four alarm outputs. This is followed by the warning alarm (W!) and the system alarm (small graphic). The message against each alarm will indicate **OK** (no problems encountered), **INACTIVE** (the alarm has been deactivated), or a message indicating the reason for the alarm.

For information on setting up the alarms, please refer to Alarms on page 76. In addition, Table 6 on page 79 lists all the possible error messages and indicates the type of alarm (warning or system). If a manual alarm acceptance has been set up, select **Enter** to deactivate the alarms.

Select **Hist.** to go to the history display, or **Esc** to return to the measurement display.

## 5.3 Main menu

For a diagrammatic view of the complete menu structure, please refer to Menu structure overview on page 64.

The main menu is accessible from any one of the measurement screens (as illustrated in Figure 14 on page 57 for example). To access the main menu screen press the **Up Arrow** function key under the **Menu** option.

***Note:*** *Access to the Main Menu will require a password if a* ***PROGRAMMING*** *password has been set (see Passwords on page 68).*

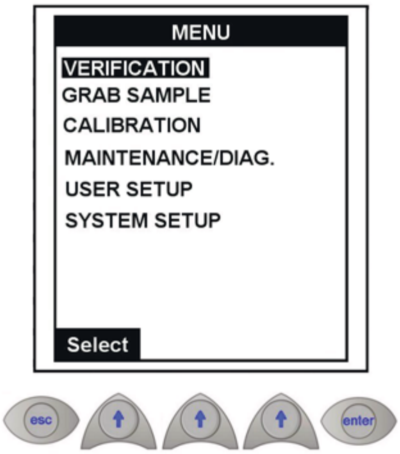


Figure 17 Main menu screen

The first option in the menu will always be highlighted by default. To scroll to the option required, press the **Up Arrow** function key under the **Select** option.

***Note:*** *Scrolling past the last item in the list will take you back to the first item. It is not possible to scroll upwards through any list.*

Detailed information on each of the main menu options is available elsewhere in this manual as follows:

- **VERIFICATION** - See section entitled Verification on page 60
- **GRAB SAMPLE** - See section entitled Grab sample on page 62
- **CALIBRATION** - See section entitled Calibration on page 85
- **MAINTENANCE/DIAG.** - See section entitled Maintenance and Diagnostics on page 93
- **USER SETUP** - See section entitled User Setup on page 71
- **SYSTEM SETUP** - See section entitled System Setup on page 65

## 5.3.1 Verification

This option allows you to verify the measurement using a solution of known sodium concentration.

Concentration of the known solution should be higher than 20 ppb (100 ppb is recommended) to ensure a preparation step in a range with lower risks of contamination.

***Note:** This is a measurement verification cycle only, and no adjustments to parameters or calibration data will be made.*

VALID. SOL : 05.00ppb

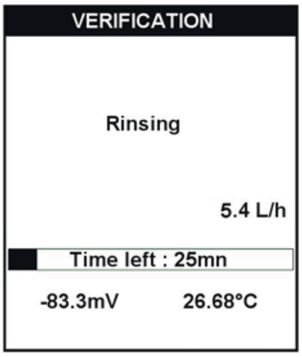
First enter the concentration of the verification solution in the **VALID. SOL** field.

Select **START** to commence the process.

SENSOR ACTIVATION

The first step of this cycle allows the reactivation of the electrode. The message **SENSOR ACTIVATION** is displayed.

Select **Yes** to reactivate the sensor. Select **No** if time is more important than accuracy.



Rinsing

5.4 L/h

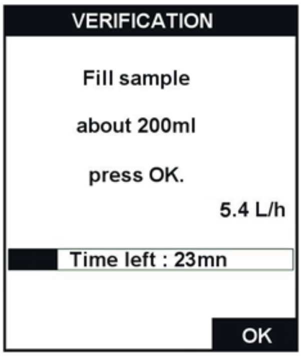
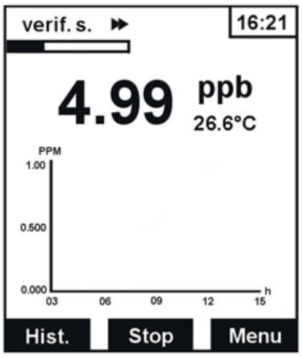
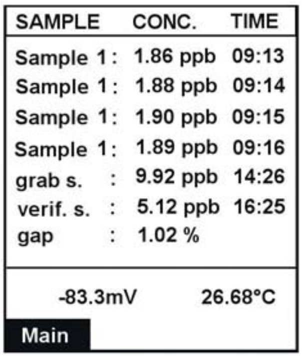
Time left : 25mn

-83.3mV 26.68°C

The reactivation process is automatically followed by a rinsing of the overflow vessel and measuring cell using the process sample.

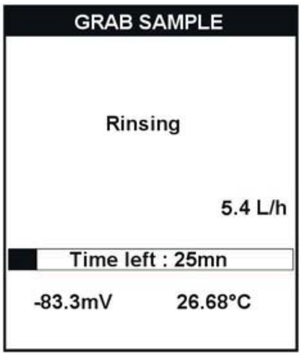
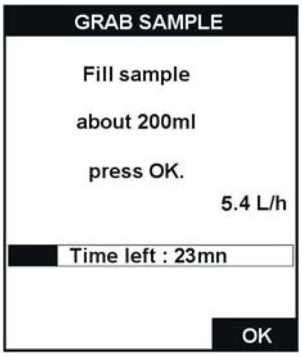
A progress bar (regularly refreshed) is displayed showing the time remaining to complete the verification process.

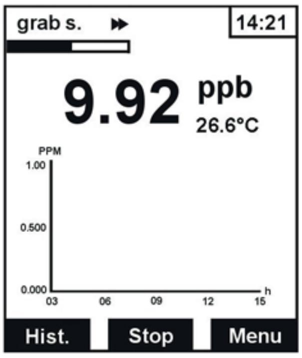
Flow rate and measurements are also displayed.

| | |
|---|---|
| <br>VERIFICATION<br>Fill sample<br>about 200ml<br>press OK.<br>5.4 L/h<br>Time left : 23mn<br> | Upon completion of the rinsing step, the analyzer is ready for the first manual step in the cycle.<br>Place the sample level detector on the side and pour approximately 200 mL of the solution into the overflow vessel, as prompted on screen. Manual introduction is complete when the sample overflows at the back of the overflow vessel.<br>Place the sample level detector back on top of the overflow vessel and select **OK** to start the measurement. |
| <br>verif. s. ▸▸ 16:21<br>4.99 ppb<br>26.6°C<br> | The display switches back to the main measurement screen and displays the measurement value.<br>The progress bar at the top of the screen monitors the measurement time of the sample.<br>If you wish to abort the process at any time during the measurement cycle, select **Stop**. |
| <br>SAMPLE CONC. TIME<br>Sample 1 : 1.86 ppb 09:13<br>Sample 1 : 1.88 ppb 09:14<br>Sample 1 : 1.90 ppb 09:15<br>Sample 1 : 1.89 ppb 09:16<br>grab s. : 9.92 ppb 14:26<br>verif. s. : 5.12 ppb 16:25<br>gap : 1.02 %<br>-83.3mV 26.68°C<br> | Once measurement of the solution is complete, the measured value and time will be displayed against **verif. s**. This should be almost identical to the value entered in the **VALID. SOL** field previously.<br>The value displayed in **gap**, will be the percentage difference between the concentration of the verification solution entered in the **VALID. SOL** field, and the concentration measured by the instrument. If this value is too high, then a calibration of the analyzer is recommended.<br>Once the cycle is complete, the analyzer automatically reverts back to standard measurement mode.<br>Select **Main** to go back to the main measurement screen. |

## 5.3.2 Grab sample

***Note:*** *It is recommended that the grab sample should have a concentration of > 10 ppb and should be at the same temperature as during calibration for better accuracy. Under these conditions, measurement with manual introduction gives 5% accuracy from 10 ppb to 10 ppm at a temperature which is within ± 5 °C of the temperature during calibration.*

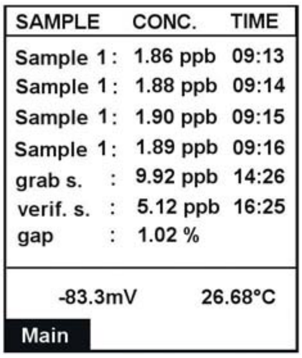
| | |
|---|---|
|  | Similar to the verification process, this option allows measurement of a sample of your choice.<br>Before starting this process, ensure you have a sample of approximately 200 mL to measure. |
|  <br>SENSOR ACTIVATION<br> | The first step of this cycle allows the reactivation of the electrode. The message **SENSOR ACTIVATION** is displayed.<br>Select **Yes** to reactivate the sensor. Select **No** if time is more important than accuracy. |
|  <br>Rinsing<br>5.4 L/h<br>Time left : 25mn<br>-83.3mV 26.68°C | The reactivation process is automatically followed by a rinsing of the overflow vessel and measuring cell using the process sample.<br>A progress bar (regularly refreshed) is displayed showing the time remaining to complete the process.<br>Flow rate and measurements are also displayed. |
|  <br>Fill sample<br>about 200ml<br>press OK.<br>5.4 L/h<br>Time left : 23mn<br> | Upon completion of the rinsing step, the analyzer is ready for the first manual step in the cycle.<br>Place the sample level detector on the side and pour approximately 200 mL of the solution into the overflow vessel, as prompted on screen. Manual introduction is complete when the sample overflows at the back of the overflow vessel.<br>Place the sample level detector back on top of the overflow vessel and select **OK** to start the measurement. |



The display switches back to the main measurement screen and displays the measurement value.

The progress bar at the top of the screen monitors the measurement time of the sample.

If you wish to abort the process at any time during the measurement cycle, select **Stop**.



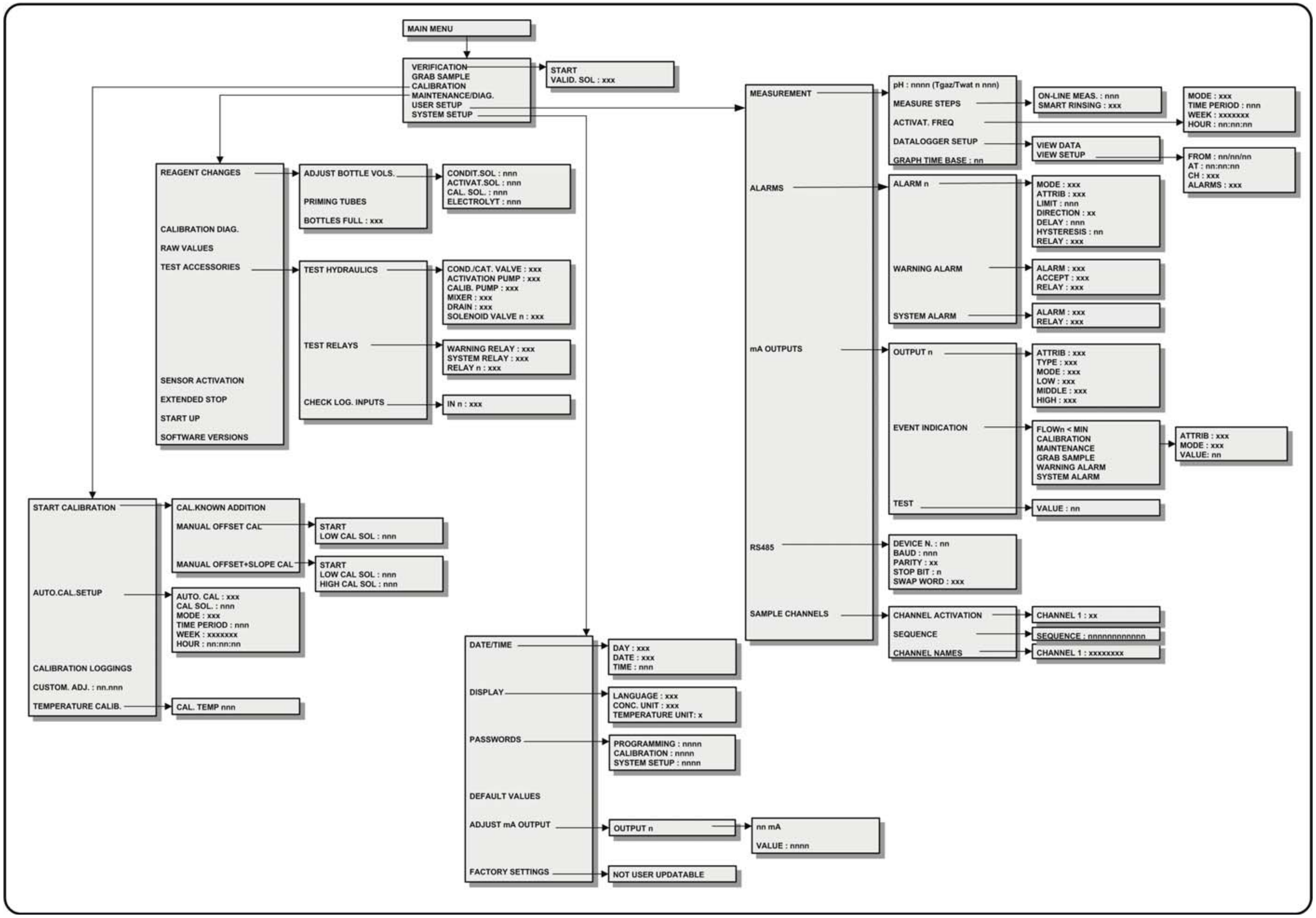
```
SAMPLE      CONC.      TIME
Sample 1 :  1.86 ppb   09:13
Sample 1 :  1.88 ppb   09:14
Sample 1 :  1.90 ppb   09:15
Sample 1 :  1.89 ppb   09:16
grab s.  :  9.92 ppb   14:26
verif. s.:  5.12 ppb   16:25
gap      :  1.02 %

    -83.3mV        26.68°C
```

Once measurement of the sample has completed, the measurement value and time will be displayed against **grab s**.

Once the cycle is complete, the analyzer automatically reverts back to standard measurement mode.

Select **Main** to go back to the main measurement screen.

## 5.4 Menu structure overview



# Section 6 System Setup

Before attempting to setup the analyzer, ensure that you have read and understood how to enter and update data fields as described in the section entitled Function keys on page 53.

| | |
|---|---|
| <br> <br>PASSWORD:0000 | Press the **Up Arrow** function key under the **Menu** option on the measurement screen to display the Main Menu.<br>Access to the Main Menu will require a password if a **PROGRAMMING** password has been set (see Passwords on page 68).<br>The password is a 4-digit numeric field. Enter the value.<br>Press the **Enter** function key to accept and validate the password. |
| <br> | If no password has been set, or once a valid password has been entered, then the Main Menu will be displayed.<br>Press the **Up Arrow** function key under the **Select** option to scroll through the menu until you reach the **SYSTEM SETUP** option, then press the **Enter** function key. |

| | |
|---|---|
| <br> | The System Setup Menu is displayed. |

## 6.1 System setup - Menu overview

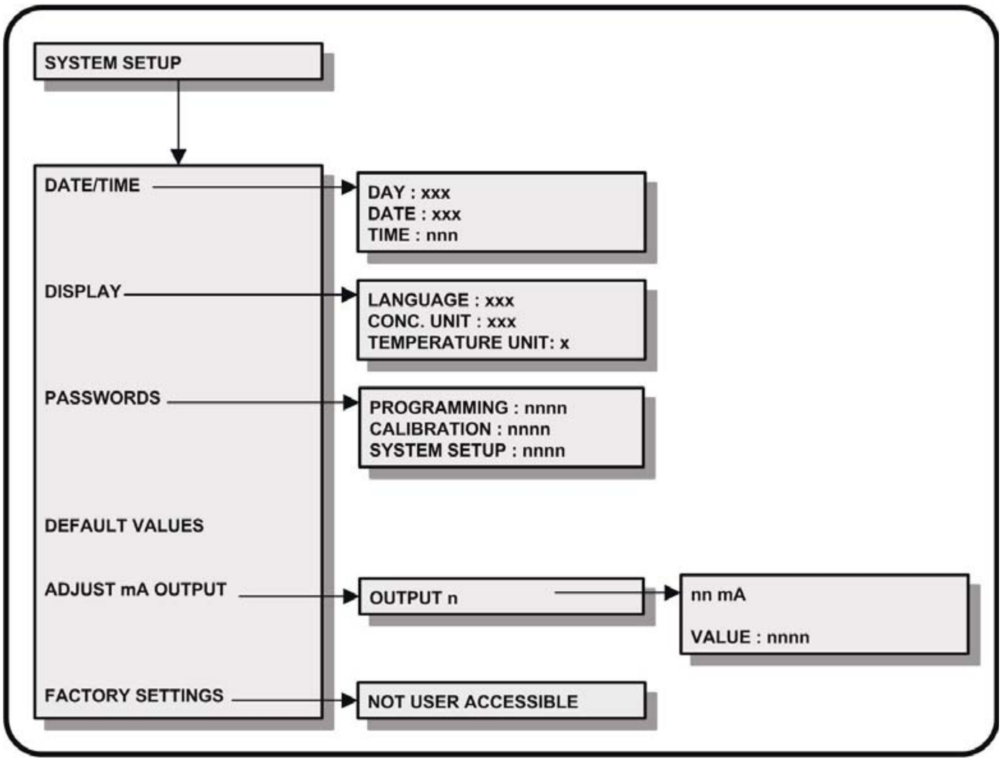
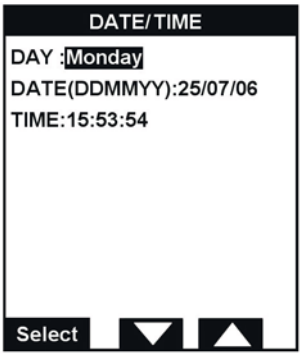


Figure 18 System setup menu

## 6.2 Date and time

| | |
|---|---|
| <br> | Select the **DATE/TIME** option to access the date/time sub-menu. |
| <br> <br>DAY :Monday<br>DATE(DDMMYY):25/07/06<br>TIME:15:53:54 | This option allows you to set up the system date and time.<br>Scroll to the required day and press the **Enter** function key.<br>Enter the day, month, and year.<br>Enter the time in HH:MM:SS format (24 hour clock).<br>On completion press **Esc** to return to the main System Setup menu. |

## 6.3 Display options

| | |
|---|---|
| <br> | Select the **DISPLAY** option to set up the display parameters. |
| <br>DISPLAY<br>LANGUAGE:GB<br>CONC.UNIT:ug-mg/L<br>TEMPERATURE UNIT:°C | Select the **LANGUAGE**, **CONC. UNIT** and **TEMPERATURE UNIT** fields in turn, and set your preferences by scrolling through the available options (listed in Table 2 below). |

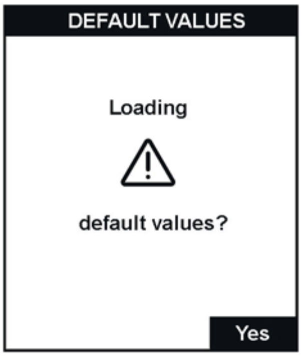
**Table 2 Display options**

| | Value | Description |
|---|---|---|
| **Language** | GB | English |
| | D | German |
| | Sp | Spanish |
| | I | Italian |
| | F | French |
| **Concentration Units** | µg-mg/L | Micrograms - Milligrams / Liter |
| | ppb/ppm | Parts per Billion / Parts per Million |
| **Temperature Units** | °C | Degrees Celsius |
| | °F | Degrees Fahrenheit |

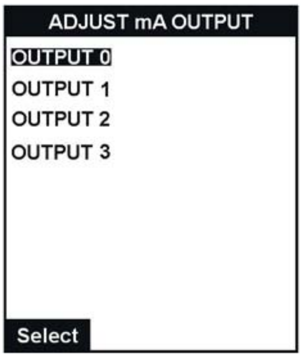
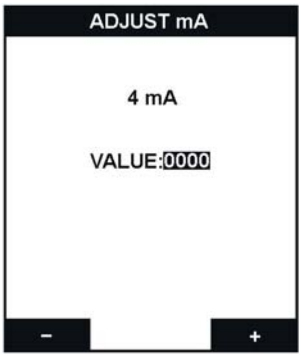
## 6.4 Passwords

| | |
|---|---|
|  | Select the **PASSWORDS** option to set passwords for access to programming, calibration and system setup options.<br>By default all passwords are set to 0000. |
|  <br>PROGRAMMING:0000<br>CALIBRATION:0000<br>SYSTEM SETUP:0000 | Each password is a 4-digit numeric field. Enter the required value for each of the three passwords. A value of 0000 signifies no password is required to gain access to those menu options. |

## 6.5 Default values

| | |
|---|---|
|  | Select the **DEFAULT VALUES** option to erase all the previously set user parameters and load the default values (refer to Default Configuration on page 111 for a list of all the default values). |
|  <br>Loading<br>⚠<br>default values?<br> | A warning message is displayed and confirmation of this action is required.<br>To exit from the screen without loading the default values, press the **Esc** function key.<br>To load the default values, select the **Yes** option.<br>A number of informational screens will be displayed during the process.<br>When the process is complete, the display reverts to the measurement screen. |

## 6.6 Adjust mA output

| | |
|---|---|
| <br>SYSTEM SETUP<br>TIME<br>DISPLAY<br>PASSWORDS<br>DEFAULT VALUES<br>ADJUST mA OUTPUT<br>FACTORY SETTINGS<br>Select | Select the **ADJUST mA OUTPUT** option to access the analyzer's analog output parameters. These can be set to 0-20 mA or 4-20 mA (see details on how this is done in mA outputs on page 80).<br>Each mA output can be individually calibrated on 2 points.<br>Adjustments should be made based on accurate readings from a multimeter. |
| <br>ADJUST mA OUTPUT<br>OUTPUT 0<br>OUTPUT 1<br>OUTPUT 2<br>OUTPUT 3<br>Select | You have the option to adjust any of the six available outputs. The process is exactly the same for each of the outputs.<br>Select the mA output you wish to change to display the next screen.<br>Ensure the multimeter is connected to the selected output. |
| <br>ADJUST mA<br>4 mA<br>VALUE:0000<br>–<br>+ | The option to increase or decrease the low end value (0 mA or 4 mA depending on your setting) is displayed.<br>Change the value up or down by selecting the **Minus** or **Plus** indicators at the bottom of the screen.<br>On completion press the **Enter** function key and the display changes to **20 mA**.<br>Enter the adjustment value in the same way as for the low end value. On completion press the **Enter** function key, and the display reverts back to the main **ADJUST mA OUTPUT** screen, to allow you to select the next output to adjust. |

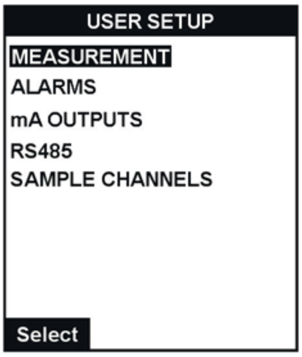
## 6.7 Factory settings

| | |
|---|---|
| <br>SYSTEM SETUP<br>TIME<br>DISPLAY<br>PASSWORDS<br>DEFAULT VALUES<br>ADJUST mA OUTPUT<br>FACTORY SETTINGS<br>Select | **This option is reserved for qualified service personnel.**<br>If you believe that changes to the settings may be required, please contact your local representative. |

# Section 7 User Setup

Before attempting to setup the analyzer, ensure that you have read and understood how to enter and update data fields as described in the section entitled Function keys on page 53.

The default and available settings for these options are listed in Default Configuration on page 111. For easy reference, it is recommended that once the user setup process has been completed, your specific settings should be logged in this table.

| | |
|---|---|
|  | Press the **Up Arrow** function key under the **Menu** option on the Measurement Screen to display the Main Menu.<br>Access to the Main Menu will require a password, if a **PROGRAMMING** password has been set (see Passwords on page 68).<br>The password is a 4-digit numeric field. Enter the value.<br>Press the **Enter** function key to accept and validate the password. |
|  | If no password has been set, or once a valid password has been entered, then the Main Menu will be displayed.<br>Press the **Up Arrow** function key under the **Select** option to scroll through the menu until you reach the **USER SETUP** option, then press the **Enter** function key. |
|  | The User Setup Menu is displayed. |

## 7.1 User setup - Menu overview

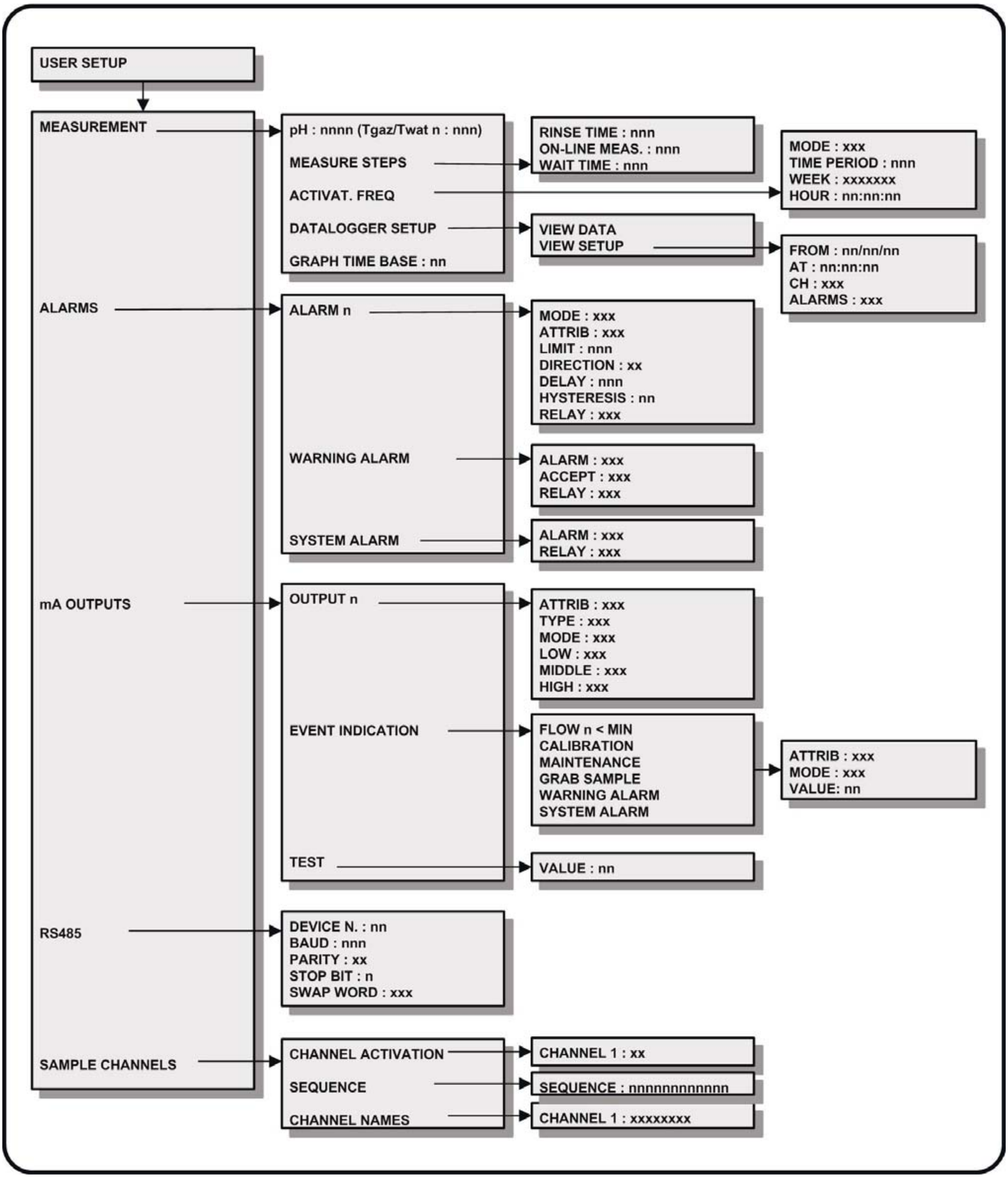


Figure 19 User setup menu

## 7.2 Measurement

### 7.2.1 Targeted pH (non-cationic applications only)

| | |
|---|---|
|  MEASUREMENT<br>pH : 11.20<br>MEASURE STEPS<br>ACTIVAT. FREQ<br>DATALOGGER SETUP<br>GRAPH TIME BASE : 12h<br>Select | If the analyzer has been set up for non-cationic applications, the screen illustrated left is displayed.<br>Select the **pH** option and enter the target pH value for your application. The measured pH value of the sample in the measuring cell should be within ±0.2 pH of the target. |

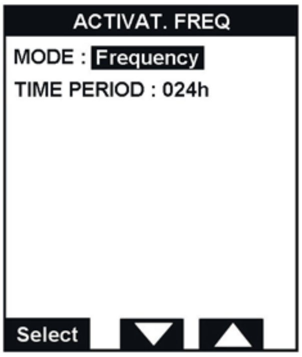
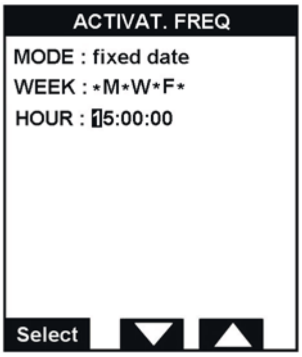
### 7.2.2 Total gas/water ratio (cationic applications only)

| | |
|---|---|
|  MEASUREMENT<br>Tgaz/Twat(%) : 0020<br>MEASURE STEPS<br>ACTIVAT. FREQ : 024h<br>DATALOGGER SETUP<br>GRAPH TIME BASE : 12h<br>Select | If the analyzer has been set up for cationic applications, the screen illustrated left is displayed.<br>Enter the ratio of gas to water to minimize the DIPA consumption. This is part of the installation procedure and is explained in more detail in Sample pH conditioning check on page 47. |

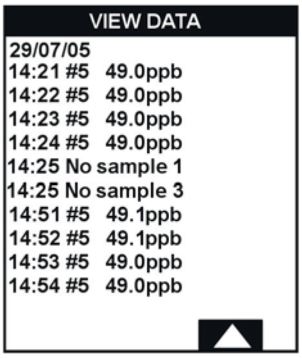
### 7.2.3 Measure steps

| | |
|---|---|
|  MEASUREMENT<br>pH : 11.20<br>MEASURE STEPS<br>ACTIVAT. FREQ<br>DATALOGGER SETUP<br>GRAPH TIME BASE : 12h<br>Select | Select the **MEASURE STEPS** option to set up the measurement timings.<br>The measurement and rinse processes are explained in more detail in Measurement process on page 24. **Please ensure you have read this before entering any of the measure step parameters.** |
|  MEASURE STEPS<br>ON LINE MEAS. : 010 mn<br>SMART RINSING : Yes<br>MAX. RINSE TIME : 045mn<br>Select | The on line measurement time defines the measurement time of the sample and how often the measurement values are stored in memory. It is recommended to leave this time at the default value of 10 minutes.<br>If smart rinsing is required after a calibration, grab sample or sensor reactivation, set this parameter to **Yes** and define the maximum rinse time. |

## 7.2.4 Reactivation frequency

| | |
|---|---|
| <br>MEASUREMENT<br>pH : 11.20<br>MEASURE STEPS<br>ACTIVAT. FREQ<br>DATALOGGER SETUP<br>GRAPH TIME BASE:12h<br> | Select the **ACTIVAT. FREQ** option to set the time period between electrode reactivation. When this time period expires, the electrode is reactivated automatically with an injection of a small amount of reactivation solution. |
| <br>ACTIVAT. FREQ<br>MODE : Frequency<br>TIME PERIOD : 024h<br> | Set the reactivation mode to either a **Frequency** or a **fixed date**.<br>If set to frequency, the recommended time period is 24 hours so that the electrode is reactivated on a daily basis.<br>***Note:*** *If this value is set to zero, then no electrode reactivation will take place during the calibration process and as such the calibration may be inaccurate. It is highly recommended to set this parameter to 24.* |
| <br>ACTIVAT. FREQ<br>MODE : fixed date<br>WEEK : *M*W*F*<br>HOUR : 15:00:00<br> | If set to a fixed date, define the day and time of the week when reactivation takes place. Set the day of the week to an asterisk if reactivation is not to take place on that day.<br>When the days have been defined, set the time in HH:MM:SS.<br>In the example screen shown left, reactivation will occur automatically every Monday, Wednesday and Friday at 3 o’clock in the afternoon. |

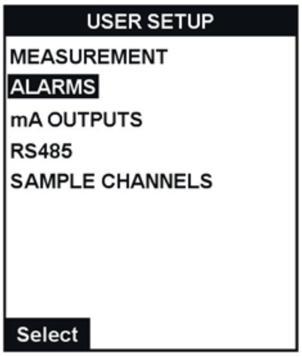
## 7.2.5 Datalogger setup

| | |
|---|---|
| <br>MEASUREMENT<br>pH : 11.20<br>MEASURE STEPS<br>ACTIVAT. FREQ<br>DATALOGGER SETUP<br>GRAPH TIME BASE : 12h<br>Select | This option allows you to view data held in the analyzer's internal memory. |
| <br>DATALOGGER SETUP<br>VIEW DATA<br>VIEW SETUP<br>Select | Select the **VIEW DATA** option to display the requested data. |
| <br>VIEW DATA<br>29/07/05<br>14:21 #5 49.0ppb<br>14:22 #5 49.0ppb<br>14:23 #5 49.0ppb<br>14:24 #5 49.0ppb<br>14:25 No sample 1<br>14:25 No sample 3<br>14:51 #5 49.1ppb<br>14:52 #5 49.1ppb<br>14:53 #5 49.0ppb<br>14:54 #5 49.0ppb<br>▲ | All information matching the parameters selected in the **VIEW SETUP** option is displayed on the screen.<br>If the data covers more than one screen, an **Arrow** key will be displayed at the bottom. Use this key to scroll through the data. |
| <br>VIEW DATA<br>FROM : 01/12/05<br>AT : 00:00:00<br>CH : All<br>ALARMS : Yes<br>➡ ▼ ▲ | Select the **VIEW SETUP** option to define the parameters for the data you wish to view.<br>The **FROM** data field is the date (DD/MM/YY) from which you want to start viewing data.<br>The **AT** data field is the time (HH:MM:SS format) from which you want to start viewing the data.<br>Set the **CH** field to **All** or **Channel 1** to view data.<br>If you wish to see the **ALARMS** information (both system and warning alarms), select **Yes** in this field, or **No** if alarm information is not required. |

### 7.2.6 Graph time base

| | |
|---|---|
| <br> <br>pH : 11.20<br>GRAPH TIME BASE: 12h | For graphical displays, enter the number of hours as the base line for the graph. This can be 4, 8, 12, 16, 20 or a 24 hour period. |

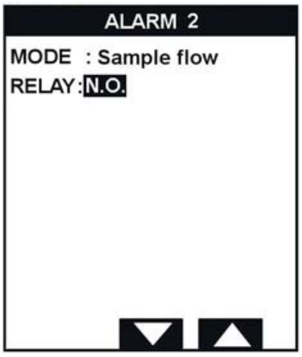
## 7.3 Alarms

| | |
|---|---|
| <br> | Select the **ALARMS** option to set up the parameters for all the alarms including the system and warning alarms. |
| <br> | Select the alarm to set up. |

### 7.3.1 Alarms 1 and 2

**Table 3 Alarms 1 and 2 parameters**

| | Value | Description |
|---|---|---|
| **Mode** | Limit | Trigger the alarm when the measurement is above or below a pre-defined limit |
| | Sample flow | Trigger the alarm when the sample flow rate is too low |
| | Active channel | Trigger the alarm when the channel is active i.e. during the measurement cycle |
| | None | Alarm not required |
| **Attributes** | Channel 1 | Defines the channel number on which the alarm is triggered |
| **Limit** | nnnn | Define the limit when the alarm should be triggered |
| **Direction** | Up | Trigger alarm when measurement is above the limit |
| | Down | Trigger alarm when measurement is below the limit |
| **Delay** | nnn seconds | The delay (in seconds) before the alarm is activated |
| **Hysteresis** | nn% | Hysteresis % |
| **Relay** | N.O. | Normally open |
| | N.C. | Normally closed |

| | |
|---|---|
| <br>ALARM 2<br>MODE : Limit<br>ATTRIB. : Channel 1<br>LIMIT : 21.00ppm<br>DIRECTION : Up<br>DELAY : 015s<br>HYSTERESIS : 05%<br>RELAY : N.O. | Depending on the mode set, a different screen will be displayed.<br>The example left shows the **Limit** mode screen.<br>The example illustrated indicates that alarm number 2 is set up on Channel 1, and the alarm is triggered after a delay of 15 seconds when a measurement of 21.00 ppm is exceeded. |
| <br>ALARM 2<br>MODE : Sample flow<br>RELAY : N.O. | With the mode set to either **Active Channel** or **Sample Flow**, you only have the possibility of setting the relay, as illustrated left. |

### 7.3.2 Warning alarm

**Table 4 Warning alarm parameters**

| | Value | Description |
|---|---|---|
| **Alarm** | Yes | Activate the warning alarm |
| | No | Deactivate the warning alarm |
| **Accept** | Manual | When the alarm is triggered, turn it off by pressing the **Enter** function key |
| | Auto | When the alarm is triggered, it will turn itself off only when the reason for the alarm being triggered is no longer valid |
| **Relay** | N.O. | Normally open |
| | N.C. | Normally closed |

WARNING ALARM
ALARM :Yes
ACCEPT: Auto
RELAY :N.O.

Set the parameters as required (see explanations in Table 4 above).

### 7.3.3 System alarm

**Table 5 System alarm parameters**

| | Value | Description |
|---|---|---|
| **Alarm** | Yes | Activate the system alarm |
| | No | Deactivate the system alarm |
| **Relay** | N.O. | Normally open |
| | N.C. | Normally closed |

SYSTEM ALARM
ALARM :Yes
RELAY :N.C.

Set the parameters as required (see explanations in Table 5 above).

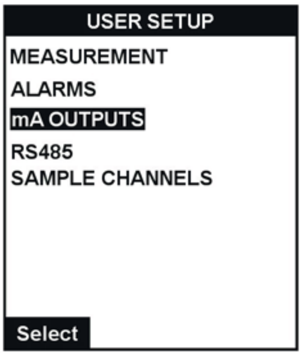
### 7.3.4 System and warning alarm table

The following table lists the different system and warning alarms:

**Table 6 System and warning alarms**

| Message | Description | Category |
|---|---|---|
| Reset measure mod. | Reset the measure module | **System** |
| Reset LC module | Reset the local controller module | **System** |
| LC Error | Local controller module error | **Warning** |
| Err. measure mod. | Measure module error | **Warning** |
| Comms error | Communication error | **Warning** |
| Temp > 45°C (113°F) | Temperature too high | **Warning** |
| Temp < 5°C (45°F) | Temperature too low | **Warning** |
| Measure error | Measurement error | **Warning** |
| Meas.time over | Measurement cycle time too long | **Warning** |
| Cal.time over | Calibration cycle time too long | **Warning** |
| Flow x < min | Not enough sample | **Warning** |
| No condit. | No sample conditioner (< 50 mL) | **System** |
| Channel inhib. | The sample measurement is by-passed | **Warning** |
| Cal. sol < 100 mL | Calibration solution level low | **Warning** |
| Electro. < 10 mL | Electrolyte volume level low | **Warning** |
| Activ. sol. < 100 mL | Reactivation solution level low | **Warning** |
| Condit. < 100 mL | Conditioning solution level very low | **Warning** |
| P0 too high | Base measurement P0 is too high | **Warning** |
| P2 < 5 x P1 | 2nd point calibration < 5 times 1st point | **Warning** |
| Slope drift | Slope over tolerance | **Warning** |
| Offset drift | Offset over tolerance | **Warning** |
| Stabilize error | Stability criteria for accuracy not reached | **Warning** |
| Sample x < C | Sample concentration x is below threshold C | **Warning** |
| Sample x < 0 ppb | Sample concentration x is negative | **Warning** |
| Sample x > 1000 ppm | Sample concentration is too high | **Warning** |

## 7.4 mA outputs

| | |
|---|---|
|  | Select the **mA OUTPUTS** option to set up the parameters for all the analog outputs. |
|  | From the list available, select the mA output you wish to set. |

### 7.4.1 Outputs 0 to 3

**Table 7 Analog output parameters**

| | **Description** |
|---|---|
| **Attribute** | Choose the attribute that triggers the analog output:<br>• Measurement channel<br>• Temperature<br>• Current (mV)<br>***Note:*** *The attribute variable cannot be applied to* ***Output 0****, which is reserved for the continuous live output signal.* |
| **Type** | Choose either a 0-20 mA or 4-20 mA analog output |
| **Mode** | Select between linear, dual or logarithm (see graph in Figure 20 on page 81). This parameter is only selectable if the attribute is set to a measurement channel. |
| **Low** | The value corresponding to the low end of the scale |
| **Middle** | The value corresponding to the mid-point of the scale (only available in dual mode) |
| **High** | The value corresponding to the high end of the scale |

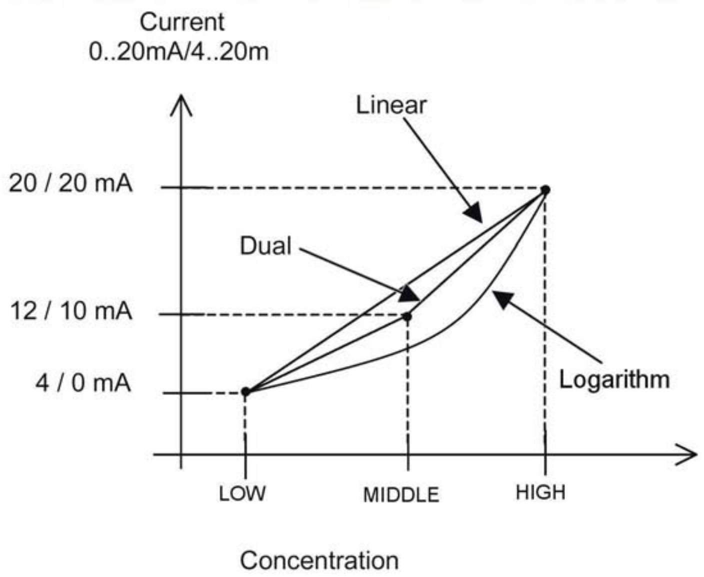
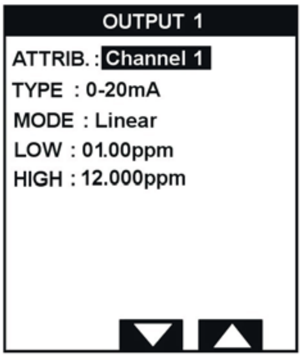


Figure 20 Linear and dual slopes


OUTPUT 1

ATTRIB. : Channel 1
TYPE : 0-20mA
MODE : Linear
LOW : 01.00ppm
HIGH : 12.000ppm

The screen illustrated left shows the **Linear** mode.

As shown, an analog output will be activated on a measurement. The lower end of the scale will be 0 mA on a value of 1 ppm and the high end of the scale will be 20 mA on a value of 12 ppm.

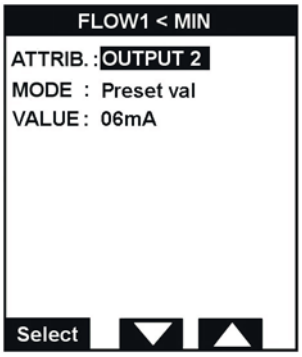
The difference in display between this **Linear** mode and the **Dual** mode, is that an extra field (**MIDDLE**) is required in addition to the **LOW** and **HIGH** values.

***Note: Output 1** should always be assigned to the measurement channel (as illustrated above). The low and high values will be the values on the y-axis of the graphical display on the main measurement screen (see Figure 17 on page 59).*

## 7.4.2 Event indication

Select the **EVENT INDICATION** option in the mA Outputs menu to display the options available for event setting.

Select the option for which you want to set an event.



FLOW1 < MIN

ATTRIB. : OUTPUT 2

MODE : Preset val

VALUE : 06mA

Define the attribute for the event. This is one of the 6 mA outputs (0 to 3) or None.

The **MODE** can be either a **Preset val** or **Frozen**.

If a preset value is chosen, you will be required to enter the value of the analog output that will be forced, when that event occurs.

In the illustration left, as **FLOW3 < MIN** was the event chosen, then when then the flow rate drops below the minimum allowed, a value of **6 mA** will be forced on analog **OUTPUT 2**.

### 7.4.3 Test

TEST

VALUE:00mA

This option allows you to enter a value into the mA field.

Press the **Enter** function key to force this value on all the analog outputs. The value can then be verified with the use of a multimeter connected to the analyzer.

## 7.5 RS485 (or PROFIBUS)

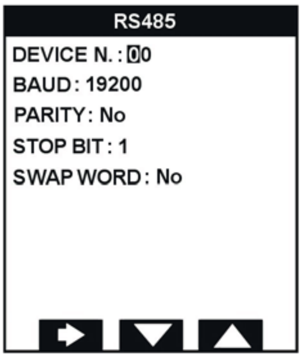
***Note:*** *If the PROFIBUS option has been installed, then the menu option will show* ***PROFIBUS*** *rather than RS485, and the PROFIBUS parameters will need to be installed.*

Select the **RS485** option to set up the parameters for the communications protocol.

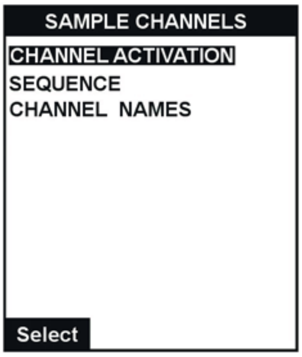
An RS-485 communications interface card can be purchased as an option with a communications protocol of MODBUS-JBUS.

**Table 8 Communications parameters**

| | | |
|---|---|---|
| **Device N.** | The number of the Monec device (0-33) | RS485 and PROFIBUS |
| **Baud** | Transmission speed (600, 1200, 2400, 4800, 9600 or 19200) | Only required for RS485 |
| **Parity** | Odd, even, or no | Only required for RS485 |
| **Stop Bit** | 1 or 2 | Only required for RS485 |
| **Swap Word** | Yes or No. Yes will reverse the order of the data transmitted | RS485 and PROFIBUS |

| | |
|---|---|
| <br>RS485<br>DEVICE N. : 00<br>BAUD : 19200<br>PARITY : No<br>STOP BIT : 1<br>SWAP WORD : No | Enter the parameters as described in Table 8 on the previous page.<br>Press the **Enter** function key to accept each data element.<br>On completion, press the **Esc** function key to return to the user setup screen. |

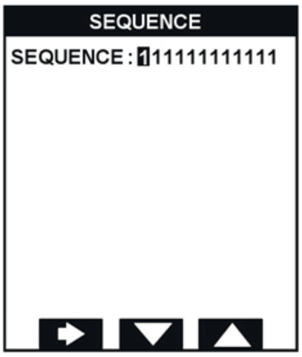
## 7.6 Sample channels

| | |
|---|---|
|  | Select the **SAMPLE CHANNELS** option to set up the parameters for the sample channels. |
|  | These options allow the activation or deactivation of the measurement channels, and the assignment of a name to the channel.<br>Measurements are only taken on active channels.<br>As this is a single channel analyzer, the number of channels is set to 1. |

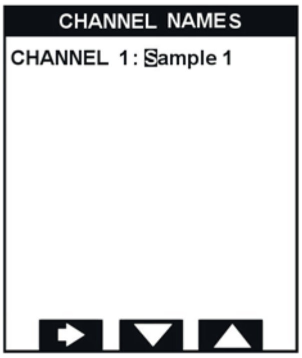
### 7.6.1 Channel activation

| | |
|---|---|
| <br>CHANNEL ACTIVATION<br>CHANNEL 1: Activ | Using the **Up** and **Down Arrow** keys, define whether the channel is active (**Activ**) or inactive (**Inactiv**). |

## 7.6.2 Sequence

| | |
|---|---|
| <br>SEQUENCE<br>SEQUENCE : 111111111111 | For this version of the analyzer (single channel), samples can only be analyzed on channel 1. Therefore, the default sequence (as illustrated left) should be left as is. |

## 7.6.3 Channel names

| | |
|---|---|
| <br>CHANNEL NAMES<br>CHANNEL 1 : Sample 1 | Define the name of the channel with free-format alphanumeric text up to a maximum of 8 characters. |

# Section 8 Calibration

## 8.1 General

Before attempting to calibrate the analyzer, ensure that you have read and understood how to enter and update data fields as described in the section entitled Function keys on page 53.

***Note:** The instrument cannot be calibrated until at least one complete measurement cycle has been successfully performed. An attempt to calibrate the instrument before this will result in a "**Not authorized**" message being displayed.*

In order to obtain accurate measurement results, the analyzer should be calibrated on a regular basis. Two basic methods of calibration are available:

- **Automatic calibration** - Parameters can be set up so that the analyzer will perform a calibration automatically on pre-defined days at a pre-defined time (see Automatic calibration setup on page 90). This type of calibration is always done using known calibration solution concentrations.
- **Manual calibration** - The user can manually perform a calibration on an ad-hoc basis.

***Note:** Before starting a calibration It is very important to ensure that the **Reactivation Frequency** parameter (see Reactivation frequency on page 74) is greater than zero. If set to zero, the electrode reactivation process will not take place during calibration and as such the measurement results may well be out of limits.*

To access the calibration menu, select **CALIBRATION** from the main menu and press the **Enter** function key.

## 8.2 Calibration solution concentrations

***Important Note:** The maximum concentration value for any calibration solution **cannot be greater than 2000 ppm**. Any value superior to this is outside the analyzer specifications and cannot be processed.*

### Manual calibration

For a manual calibration, the calibration solutions must be between **100 ppb and 2000 ppm** and must respect the following rules:

- LOW CAL SOL must be ≥ sample concentration of $Na^+$ and a minimum of 100 ppb
- HIGH CAL SOL = (LOW CAL SOL x 10)

**Example 1**: sample concentration of $Na^+$ = 20 ppb

→ LOW CAL SOL = minimum value = 100 ppb $Na^+$

→ HIGH CAL SOL = (100 ppb x 10) = 1000 ppb $Na^+$

**Example 2**: sample concentration of $Na^+$ = 450 ppb

→ LOW CAL SOL = ≥ sample concentration of $Na^+$ = 500 ppb $Na^+$

→ HIGH CAL SOL = (500 ppb x 10) = 5000 ppb $Na^+$

***Note:** The values **LOW CAL SOL** and **HIGH CAL SOL** must be entered into the system (see One point calibration on page 88 or Two point calibration on page 89).*

### Automatic calibration

For an automatic calibration, the calibration solution must be between **10 ppm and 2000 ppm** and must respect the following rules:

- CAL SOL minimum = 10 ppm
- CAL SOL = (sample concentration of $Na^+$ x 1000)

**Example 1**: sample concentration of $Na^+$ = 0.1 ppb

→ CAL SOL = minimum value = 10 ppm $Na^+$

**Example 2**: sample concentration of $Na^+$ = 1 ppm

→ CAL SOL = (1 ppm x 1000) = 1000 ppm $Na^+$

***Note:** The value **CAL SOL** must be entered into the system (see Automatic calibration setup on page 90).*

## 8.3 Calibration - Menu overview

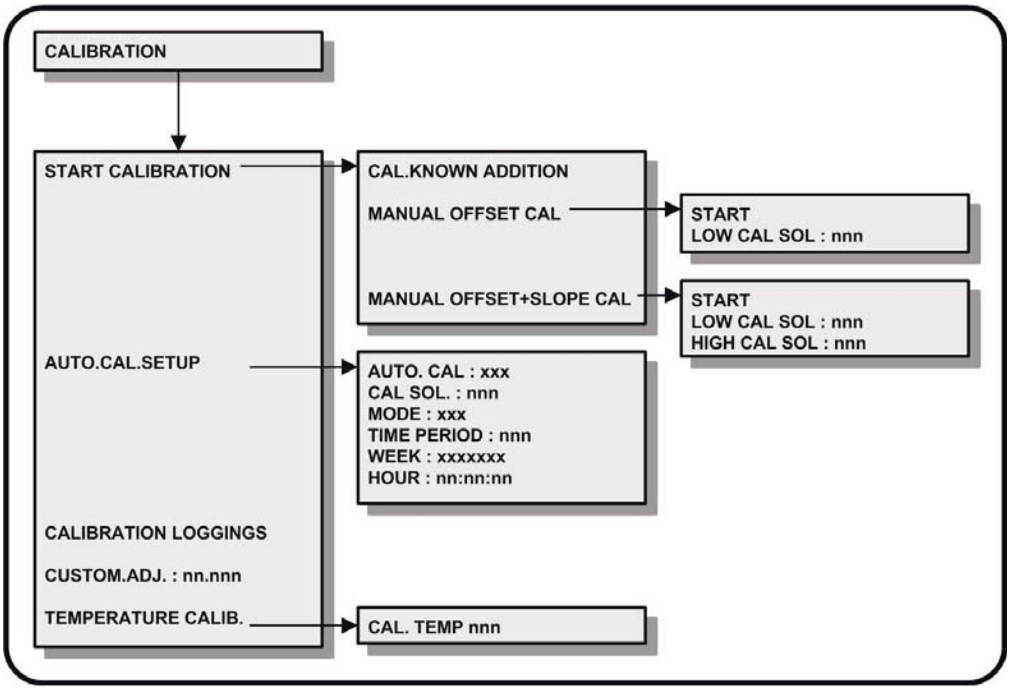


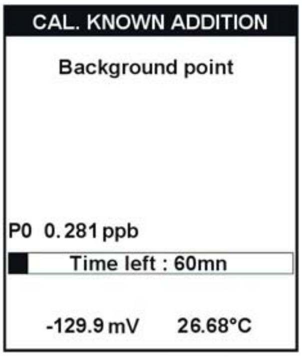
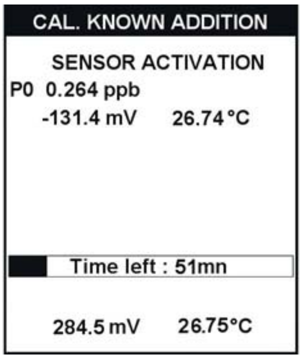
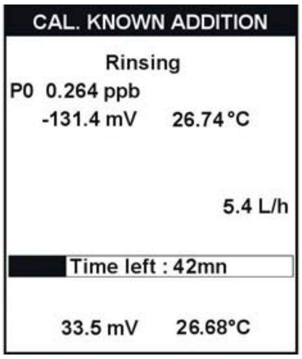
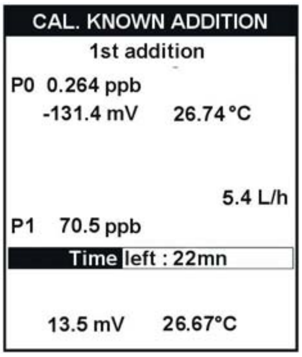
Figure 21 Calibration menu

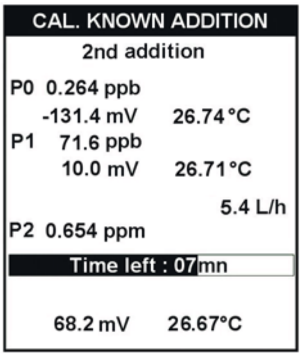
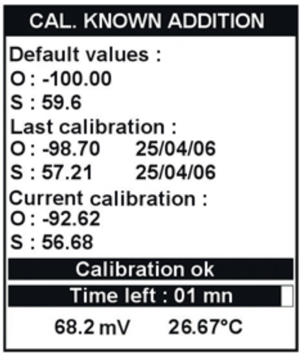
## 8.4 Start calibration

| | |
|---|---|
|  | Select the **START CALIBRATION** option to calibrate the analyzer manually. |

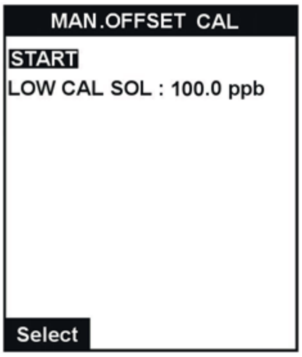
### 8.4.1 Calibrate known addition

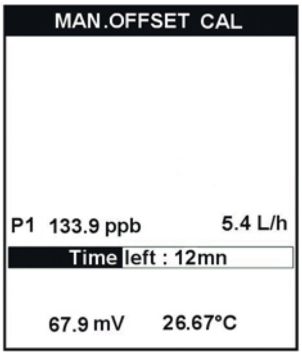
| | |
|---|---|
|  | Select the **CAL.KNOWN ADDITION** option to calibrate the analyzer by mixing the sample with a known concentration of calibration solution.<br>The concentration of the calibration solution is defined in Automatic calibration setup on page 90.<br>The instrument first checks that the volume of calibration solution remaining is enough. If not, a warning alarm is activated and the instrument returns to normal measurement with the original parameters. |

| | |
|---|---|
| <br>CAL. KNOWN ADDITION<br>Background point<br>P0 0.281 ppb<br>Time left : 60mn<br>-129.9 mV 26.68°C | If the volume of solution is OK, the background point measurement (**P0**) to be used as the base measurement value is taken. This is the measurement against the sample before any additions of the calibration solution have been made.<br>A progress bar is displayed showing the progress to date and approximate time remaining.<br>The instrument waits for a stable measurement (a variation of less than 1 mV per minute) or for a maximum of 10 minutes. |
| <br>CAL. KNOWN ADDITION<br>SENSOR ACTIVATION<br>P0 0.264 ppb<br>-131.4 mV 26.74°C<br>Time left : 51mn<br>284.5 mV 26.75°C | The measurement must be stable and less than 1 per thousand of the calibration solution concentration, otherwise the instrument returns to normal measurement with the original parameters. Provided the measurement is OK, the P0 measurement details are displayed on screen.<br>If the reactivation frequency parameter is not zero (as is highly recommended), the electrode will be reactivated. |
| <br>CAL. KNOWN ADDITION<br>Rinsing<br>P0 0.264 ppb<br>-131.4 mV 26.74°C<br>5.4 L/h<br>Time left : 42mn<br>33.5 mV 26.68°C | When the reactivation process is complete, the overflow vessel is rinsed to remove all traces of sample. |
| <br>CAL. KNOWN ADDITION<br>1st addition<br>P0 0.264 ppb<br>-131.4 mV 26.74°C<br>5.4 L/h<br>P1 70.5 ppb<br>Time left : 22mn<br>13.5 mV 26.67°C | After rinsing, the overflow vessel is re-filled with sample plus 2mL of the calibration solution.<br>The sample is then measured and the details displayed against **P1**. |

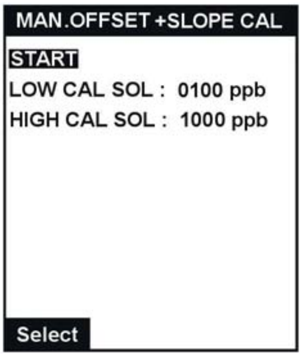
| | |
|---|---|
| <br>CAL. KNOWN ADDITION<br>2nd addition<br>P0 0.264 ppb<br>-131.4 mV 26.74 °C<br>P1 71.6 ppb<br>10.0 mV 26.71 °C<br>5.4 L/h<br>P2 0.654 ppm<br>Time left : 07mn<br>68.2 mV 26.67°C | When the measurement is stable, the details are displayed at the top of the screen against measurement P1.<br>The overflow vessel is then rinsed and re-filled with sample plus 20mL of the calibration solution.<br>This sample is then measured and the details displayed against **P2**. |
| <br>CAL. KNOWN ADDITION<br>Default values :<br>O : -100.00<br>S : 59.6<br>Last calibration :<br>O : -98.70 25/04/06<br>S : 57.21 25/04/06<br>Current calibration :<br>O : -92.62<br>S : 56.68<br>Calibration ok<br>Time left : 01 mn<br>68.2 mV 26.67°C | Once the final measurement is stable, the offset and slope for this calibration are calculated.<br>The default values of the offset and slope are displayed along with the calculated values for the last and current calibration.<br>A message is displayed indicating the success or failure of the calibration.<br>For the details on how this success or failure condition is determined, and how to proceed, see the description in Calibration results on page 91. |

## 8.4.2 One point calibration

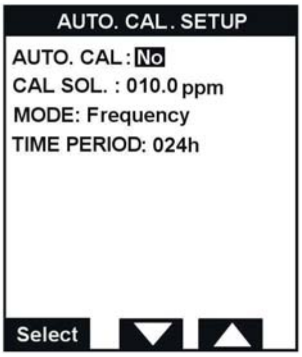
| | |
|---|---|
| <br>START CALIBRATION<br>CAL.KNOWN ADDITION<br>MAN.OFFSET CAL<br>MAN.OFFSET +SLOPE CAL<br>Select | Select the **MAN.OFFSET CAL** option to start the one point calibration process.<br>This process requires that a calibration solution of known sodium concentration is available.<br>Refer to Calibration solution concentrations on page 85 for information regarding the concentration of the calibration solution. |
| <br>MAN.OFFSET CAL<br>START<br>LOW CAL SOL : 100.0 ppb<br>Select | If necessary, enter the concentration of the calibration solution, and select **START** to initiate the calibration process.<br>Then, provided the reactivation frequency parameter is not zero (as is highly recommended), the electrode is reactivated.<br>On completion this is followed by a rinsing of the overflow vessel. |

| | |
|---|---|
| <br>MAN.OFFSET CAL<br>Fill low cal.sol<br>about 200ml<br>press OK.<br>Time left : 23mn<br> | When prompted, fill the overflow vessel with the calibration solution and select **OK** to start the measurement. |
| <br>MAN.OFFSET CAL<br>P1 133.9 ppb 5.4 L/h<br>Time left : 12mn<br>67.9 mV 26.67°C | The calibration solution is measured and the results displayed.<br>Once the final measurement is stable, the offset for the calibration is calculated.<br>The success or failure screen is then displayed (see examples in Calibration results on page 91). |

## 8.4.3 Two point calibration

| | |
|---|---|
| <br> | Select the **MAN.OFFSET+SLOPE CAL** option to start the two point calibration process.<br>This process requires that two calibration solutions of known sodium concentrations are available.<br>Refer to Calibration solution concentrations on page 85 for information regarding the concentrations of the calibration solution. |
| <br>MAN.OFFSET +SLOPE CAL<br>START<br>LOW CAL SOL : 0100 ppb<br>HIGH CAL SOL : 1000 ppb<br> | If necessary, enter the concentrations of the calibration solution, and select **START** to initiate the calibration process.<br>Then, provided the reactivation frequency parameter is not zero (as is highly recommended), the electrode is reactivated.<br>On completion this is followed by a rinsing of the overflow vessel.<br>The process is then very similar to the one-point calibration above, except after the instrument measures the low value calibration solution, the overflow vessel will be rinsed and you will be asked to fill it with the high value calibration solution.<br>The success or failure screen is then displayed (see examples in Calibration results on page 91). |

## 8.5 Automatic calibration setup

| | |
|---|---|
| <br>CALIBRATION<br>START CALIBRATION<br>AUTO.CAL.SETUP<br>CALIBRATION LOGGINGS<br>CUSTOM.ADJ : 00.000ppb<br>TEMPERATURE CALIB.<br>Select | Select the **AUTO. CAL. SETUP** option to access its sub-menu and set the calibration parameters.<br>This allows the analyzer to be automatically calibrated at pre-defined and regular intervals.<br>The process is the same as described in Calibrate known addition on page 86 except it is initiated automatically at the pre-defined time. |
| <br>AUTO. CAL. SETUP<br>AUTO. CAL : No<br>CAL SOL. : 010.0 ppm<br>MODE: Frequency<br>TIME PERIOD: 024h<br>Select | Turn the automatic calibration on or off by selecting **Yes** or **No** as appropriate.<br>Note that even if this is set to **Yes**, it is still possible to calibrate the analyzer manually if required. |
| <br>AUTO. CAL. SETUP<br>AUTO. CAL : Yes<br>CAL SOL. : 010.0 ppm<br>MODE : fixed date<br>WEEK : *M*W*F*<br>HOUR : 19:30:00 | **CAL.SOL** defines the concentration of the calibration solution. Refer to Calibration solution concentrations on page 85 for information regarding the concentration of the calibration solution.<br>**MODE** can either be set up to a **fixed date** or to a specified **Frequency**.<br>If the mode is set to **fixed date**, enter the day(s) of the **WEEK** when the calibration will be performed. Set the day to an asterisk to skip that day.<br>Set the **HOUR** field (HH:MM:SS format on a 24 hour clock) to the time the automatic calibration should start.<br>In the illustration left, a calibration is set to start on a fixed time scale and will begin every Monday, Wednesday and Friday at 19:30 in the evening.<br>If the mode is set to **frequency**, then the week and hour data fields will be replaced by a **TIME PERIOD** field. Enter the calibration frequency in hours into this field. |

## 8.6 Calibration results

After the slope and offset have been calculated, the default parameters, last calibration details and current calibration details are displayed, along with a “**Calibration ok**” or “**Calibration error**” message.

The criteria for accepting or rejecting the calibration is as follows:

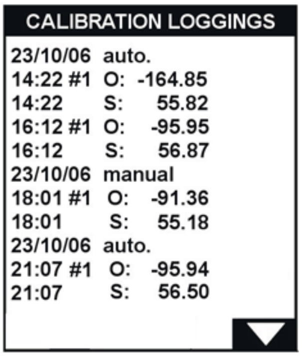
- The slope must be within ± 10% of the standard slope
- The offset must be within ± 59 mV from the reference point

If the calibration is accepted, the parameters are updated and the instrument returns to the normal measurement mode after a short delay.

If the calibration is rejected an alarm is set and the parameters remain unchanged. After a short delay the analyzer returns to the normal measurement mode.

For details of the calibration results, select the calibration loggings option as described below.

## 8.7 Calibration loggings

| | |
|---|---|
|  | Select the **CALIBRATION LOGGINGS** option to view historical information about previous calibrations. |
| CALIBRATION LOGGINGS<br>23/10/06 auto.<br>14:22 #1 O: -164.85<br>14:22 S: 55.82<br>16:12 #1 O: -95.95<br>16:12 S: 56.87<br>23/10/06 manual<br>18:01 #1 O: -91.36<br>18:01 S: 55.18<br>23/10/06 auto.<br>21:07 #1 O: -95.94<br>21:07 S: 56.50 | The screen will list the following information about previous calibrations:<br>• Date and time.<br>• Whether the calibration was automatic or manual.<br>• The values of the slope and offset.<br>Use the **Arrow** key to scroll through the data. |

## 8.8 Custom adjustment

| | |
|---|---|
|  <br>CUSTOM.ADJ : 00.000ppb | Where the analyzer displays values that are slightly above or below the expected value, the **CUSTOM.ADJ** option can be used to manually adjust the measurement value.<br>Enter a positive or negative value which will be added to the measurement value.<br>This option can only be used to make minor adjustments. The allowable adjustment value is between -0.1 ppb and +0.1 ppb.<br>If the displayed and expected values differ significantly, the analyzer should be recalibrated. |

## 8.9 Temperature calibration

| | |
|---|---|
|  <br>CUSTOM.ADJ : 00.000ppb | Select the **TEMPERATURE CALIB.** option to calibrate the temperature electrode. |
|  <br>RAW. TEMP. : 27.52 °C<br>CAL. TEMP. : 27.52 °C<br>when ready<br>press OK. | The measured temperature reading is displayed in the raw temp field.<br>Take a temperature reading with a certified thermometer and press **OK** to continue.<br>Then enter this temperature reading into the **CAL.TEMP.** field.<br>Press **OK** to calibrate. |

# Section 9 Maintenance and Diagnostics

Periodic maintenance will ensure accurate and consistent analysis results. Verify the levels of the calibration solution and reagents and refill where necessary.

## 9.1 Maintenance schedule

The following table shows the suggested maintenance schedule for the 9245 Sodium Analyzer. Selection of parts for preventive maintenance is detailed in Accessories - Options - Maintenance kits on page 107.

**Table 9 Maintenance schedule**

| | Daily | Weekly | Monthly | Every 3 Months | Every 6 Months | Yearly | Every 2 Years | As Needed |
|---|---|---|---|---|---|---|---|---|
| Verification | | | X | | | X | | X |
| Calibration | | X | | | | | | X |
| Electrode reactivation | X | | | | | | | X |
| Temperature calibration | | | | | | X | | X |
| Refill calibration solution | | | | X | | | | X |
| Refill reactivation solution | | | | X | | | | X |
| Refill electrolyte solution | | | | X | | | | X |
| Electrodes manual cleaning (with paper/tissue) | | | | | X | | | X |
| Conditioning solution (non-cationic applications) | | | | X | | | | X |
| Conditioning solution (cationic applications) | Refer to DIPA consumption on page 23 for an indication on how often the conditioning solution will need to be changed. | | | | | | | X |
| Solenoid valves | | | | | | | X | X |
| **The following items are performed by the service group** | | | | | | | | |
| System check-up | | | | | | X | 🟩 | |
| External audit | | | | | | X | 🟩 | |

## 9.2 Battery replacement

The transmitter is delivered with a CR1220 (3V) lithium battery included to safeguard the time function in the instrument when not powered up. Should this internal battery malfunction or require replacement it must be replaced with exactly the same battery type CR1220 (3V) UL Certified (compulsory VARTA, RENATA or MATSUSHITA).

**⚠ WARNING**

There is a risk of explosion if the replacement battery does not correspond to the correct model as indicated above. Do not throw away used batteries, but send them to a local recycling center.

## 9.3 Local controller board replacement

**WARNING**

Potential electrocution hazard. Always disconnect power to the instrument before making any electrical connections.

**CAUTION**

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

If replacing the local controller board (part number 09200=A=5012) refer to Figure 22 for interface connection details.

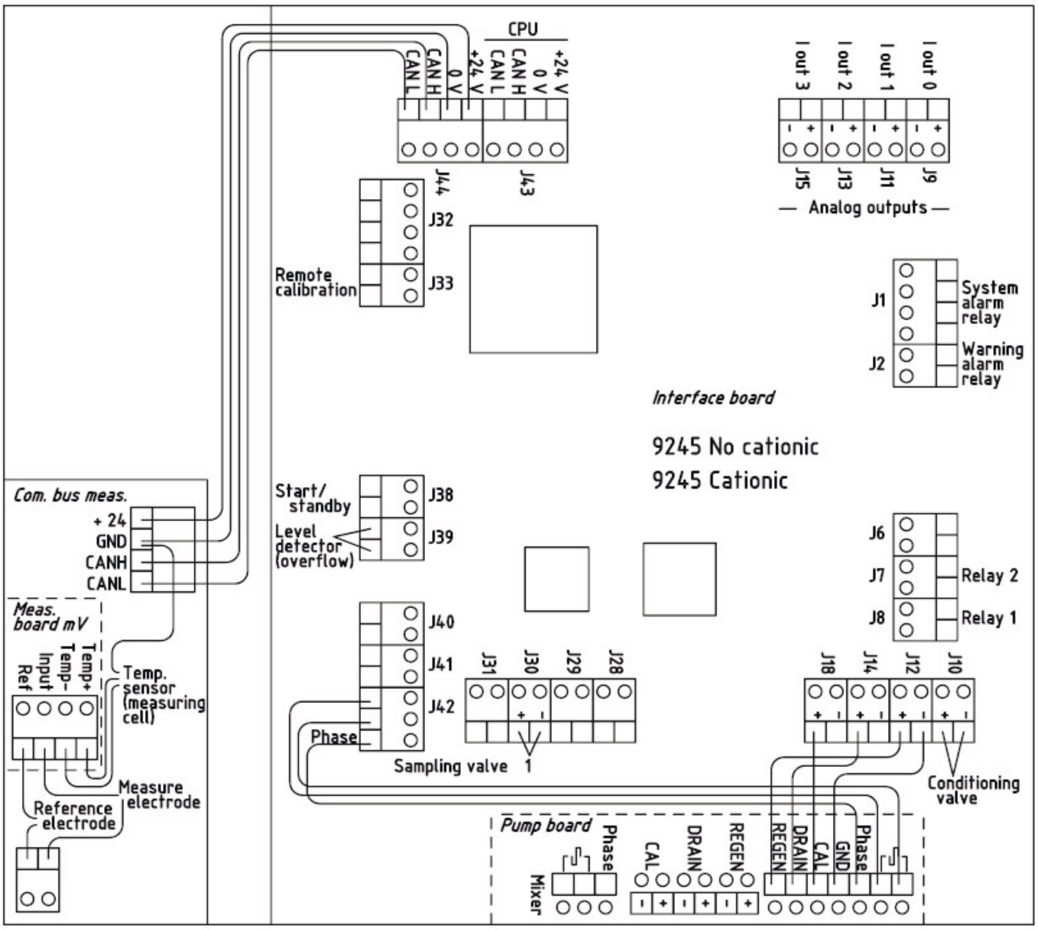


Figure 22 Interface board connections

## 9.4 Fuse replacement

The following illustration shows the position of the fuse, which is located next to the mains connectors on the power supply board under the shielding plate.

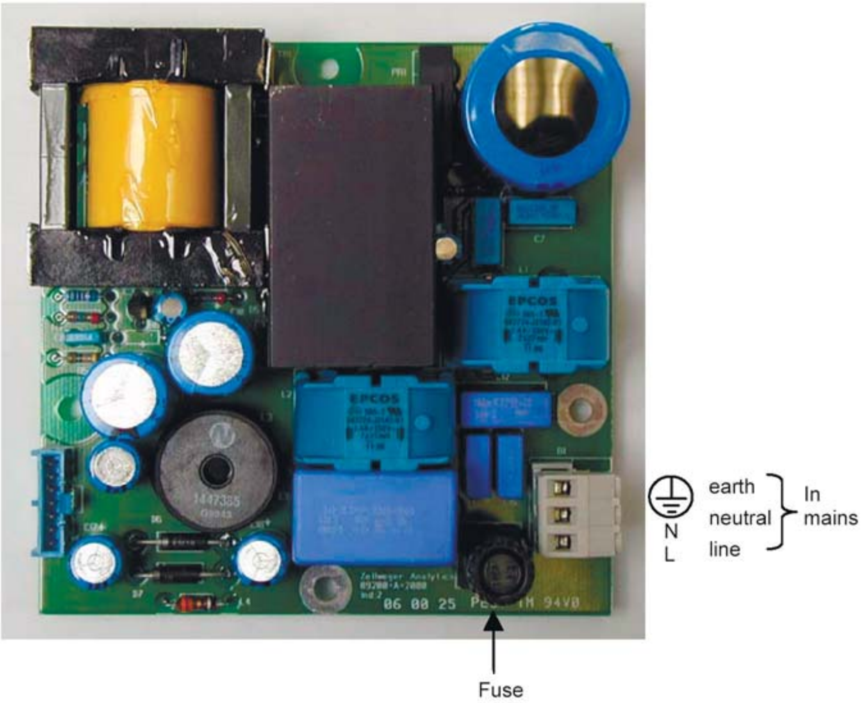


Figure 23 Location of the fuse

Two replacement fuses are supplied with the instrument and these must be used to replace faulty or blown fuses.

If for any reason these replacements are no longer available, only the following alternatives should be used:

- JDYX2, LITEFUSE, type 213, rated 2 AT, 250 VAC
- JDYX2, SIBA, Type 179120, rated 2 AT, 250 VAC
- JDYX2, SCHURTER, Type FST, rated 2 AT, 250 VAC

If there is any difficulty in obtaining these replacement fuses, please contact your local representative for advice and assistance.

## 9.5 Cleaning and decontamination

The analyzer does not normally require any cleaning or decontamination. The internal cycle is only in contact with clean, pure water.

If needed, clean the exterior of the instrument with a moist cloth and a mild soap solution. Never use cleaning agents such as turpentine, acetone or similar products to clean the instrument, including the display and any accessories.

## 9.6 Maintenance and diagnostics menu option

There are a number of maintenance and diagnostic procedures that can be performed using the software. These options can be found in the **MAINTENANCE/DIAG.** menu option of the main menu, and are explained in detail in the rest of this section.

The maintenance and diagnostics screen gives a list of maintenance procedures.

Select **MAINTENANCE/DIAG.** from the main menu to display the maintenance and diagnostics screen.

## 9.7 Maintenance and diagnostics - Menu overview

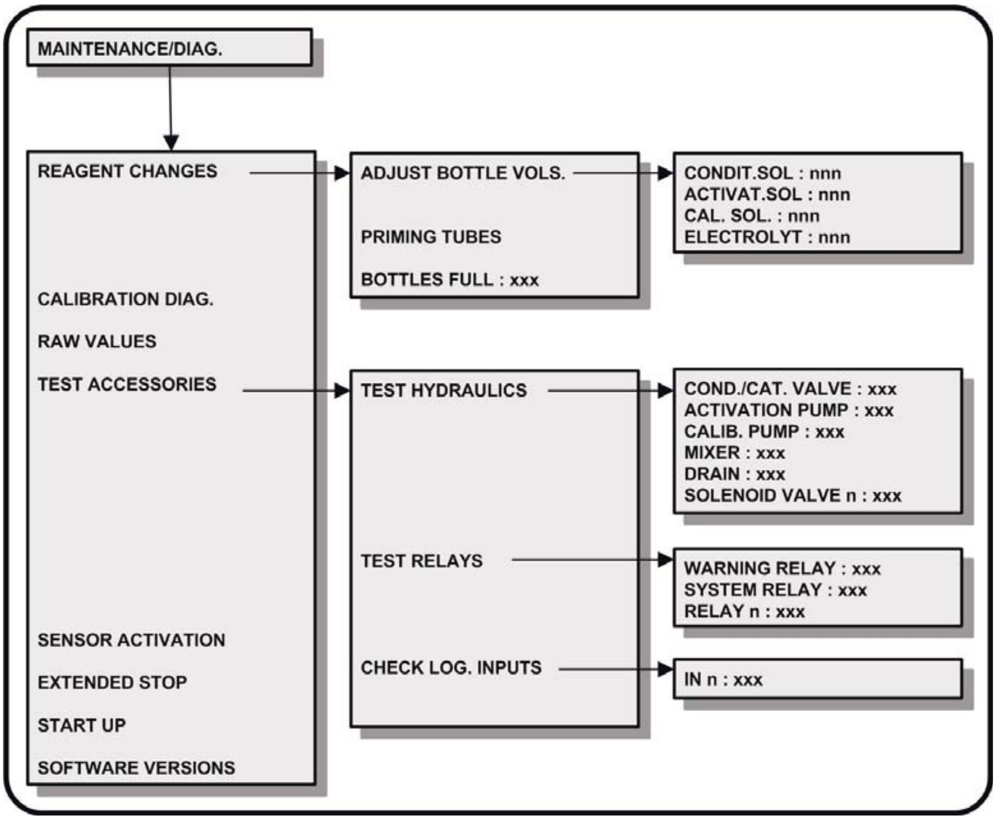
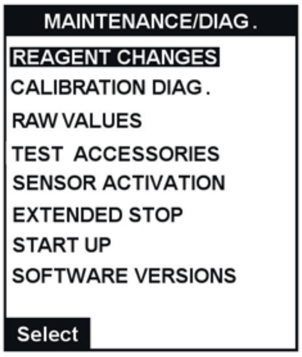


Figure 24 Maintenance and diagnostics menu

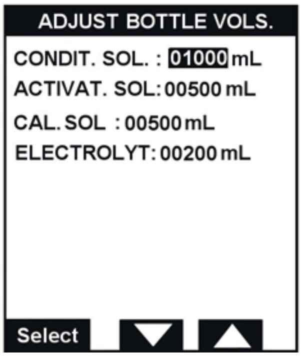
## 9.8 Reagent changes

| | |
|---|---|
|  | This procedure is applicable to each change of reagent solution. It allows the regulation of the volumes of solutions in the bottles.<br>The analyzer consistently checks the consumption of these solutions, triggering an alarm when these levels get too low.<br>This option **must** be selected each time a solution is refilled or changed to reset the measurement parameters. |

***Note:** The conditioning reagent and electrolyte consumption are approximate measurements, so a discrepancy between measurement and actual consumption may occur. The conditioning solution consumption has been measured for a pH of 11.2 at an ambient temperature of 25°C.*

For the alarm levels for the reagents, please refer to the table in System and warning alarm table on page 79.

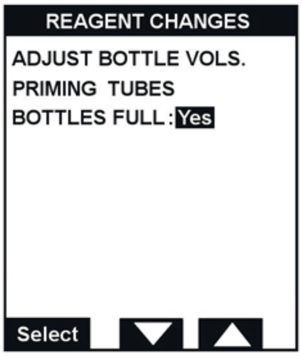
### 9.8.1 Adjust bottle volumes

| | |
|---|---|
|  | Select the **ADJUST BOTTLE VOLS.** option to set the reagent volumes.<br>This option should be used to set the default values of reagents or when bottles are being used that are not full (see Bottles full on page 97). |
| ADJUST BOTTLE VOLS.<br>CONDIT. SOL. : 01000 mL<br>ACTIVAT. SOL: 00500 mL<br>CAL. SOL : 00500 mL<br>ELECTROLYT: 00200 mL<br> | Enter the volumes for the conditioning solution, reactivation solution, calibration solution and electrolyte in milliliters.<br>Press **Select** to move from one field to another to keep the value displayed, or press **Enter** on completion of a field to move to the next.<br>Press the **Esc** function key on completion. |

## 9.8.2 Priming tubes

| | |
|---|---|
| <br>REAGENT CHANGES<br>ADJUST BOTTLE VOLS.<br>PRIMING TUBES<br>BOTTLES FULL : Yes<br>Select | After refilling the bottles (reference electrolyte, calibration solution and reactivation solution) and/or after exchanging the empty bottle of conditioning reagent with a new one, select the **PRIMING TUBES** option.<br>This will set off the process to purge and refill the tubes. |
| <br>PRIMING TUBES<br>Please wait...<br>Time left : 06mn<br>0.3 mV 23.68°C | A progress bar is displayed while the process executes.<br>Press the **Esc** function key at any time to abort the process and return to the menu. |

## 9.8.3 Bottles full

| | |
|---|---|
| <br>REAGENT CHANGES<br>ADJUST BOTTLE VOLS.<br>PRIMING TUBES<br>BOTTLES FULL : Yes<br>Select ▼ ▲ | If the bottles of reagent are full, select **Yes** and the default values for the volumes will be set. These values can be viewed and modified by selecting the **ADJUST BOTTLE VOLS.** option in the menu.<br>If you select **No** to this option, you will manually have to enter the correct values using the **ADJUST BOTTLE VOLS.** option. |

## 9.9 Calibration diagnostics

| | |
|---|---|
|  | This option is used by after sales service technicians to verify that the last calibration was working correctly. |

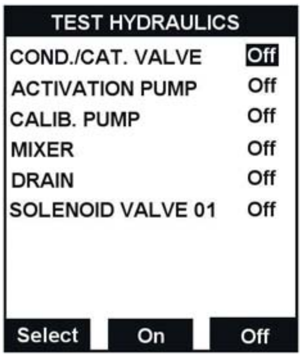
## 9.10 Raw values

| | |
|---|---|
|  | This option is used by after sales service technicians to verify that the electrodes are functioning correctly. |

## 9.11 Test accessories

| | |
|---|---|
|  | This option allows you to check that a number of accessories, as well as the alarm relays and logical inputs are functioning correctly. |

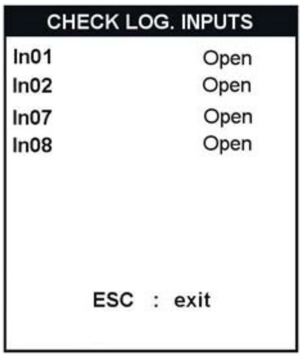
### 9.11.1 Hydraulics

| | |
|---|---|
|  | **TEST HYDRAULICS** allows you to check that all accessories apart from relays and logical inputs are working correctly. |
|  | The screen allows selection of the solenoid valves, the conditioning valve, the pumps, the mixer or the drain.<br>Select the element you wish to test and then select **On** to activate it or **Off** to deactivate.<br>Note that if the conditioning valve is turned **On** here, it cannot be turned **Off** using this option. The instrument will turn it off automatically after 50 test cycles.<br>Press **Esc** to exit the screen. |

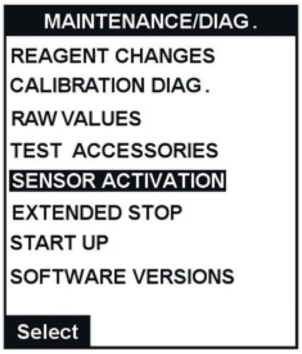
### 9.11.2 Relays

| | |
|---|---|
|  | Select this option to check that all eight relays are working correctly. |
|  | Select the relay you wish to test and then select **On** to activate it or **Off** to deactivate it.<br>Press **Esc** to exit the screen. |

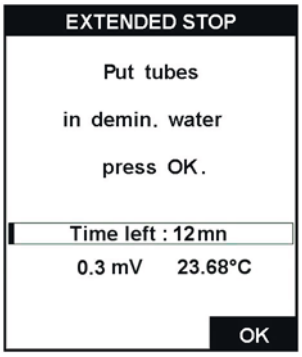
## 9.11.3 Logical inputs

| | |
|---|---|
|  | Choose this option to check the logical inputs status. |
|  <br>In01 Open<br>In02 Open<br>In07 Open<br>In08 Open<br> | Each logical input shows either **Open** or **Closed** to indicate its current status.<br>Press **Esc** to exit the screen. |

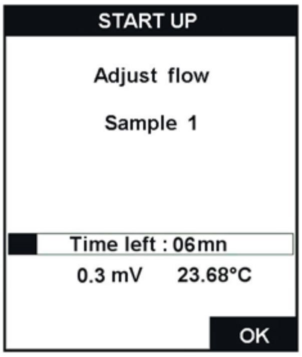
## 9.12 Sensor reactivation

| | |
|---|---|
|  | Usually, the electrode is reactivated automatically based on the time delay set in Reactivation frequency on page 74.<br>This option allows for a manual reactivation. |

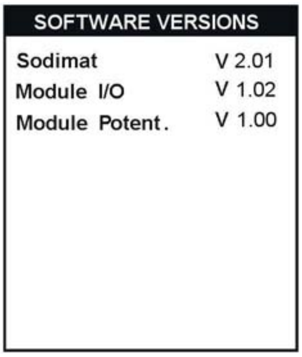
## 9.13 Extended stop

| | |
|---|---|
| <br>MAINTENANCE/DIAG.<br>REAGENTS REFILL<br>CALIBRATION DIAG.<br>RAW VALUES<br>TEST ACCESSORIES<br>SENSOR ACTIVATION<br>EXTENDED STOP<br>START UP<br>SOFTWARE VERSIONS<br>Select | If the instrument is not to be used for an extended period of time, select this option to shut the analyzer down in a controlled manner. |
| <br>EXTENDED STOP<br>Put tubes<br>in demin. water<br>press OK.<br>Time left : 12mn<br>0.3 mV 23.68°C<br>OK | Place all the tubes in demineralized water for cleaning.<br>Press **OK** to continue |
| <br>EXTENDED STOP<br>Please wait...<br>Time left : 12mn<br>0.3 mV 23.68°C | A progress bar will be displayed whilst the shut down is being performed. |
| <br>EXTENDED STOP<br>Store Electrodes<br>See Operator Manual<br>ESC : exit<br>Time left : 01mn<br>0.3 mV 23.68°C | On completion, you will be informed to remove and store the electrodes.<br>Press **ESC** to exit |

## 9.14 Startup

| | |
|---|---|
|  | This process guides you through various steps required to set the instrument up for initial measurements, or to restart after a long period of inactivity. This includes regulating the sample flow and purging the pumps of reagent. |
|  <br>Adjust flow<br>Sample 1<br>Time left : 06mn<br>0.3 mV 23.68°C<br> | This step allows you to regulate the sample flow on each configured measurement channel.<br>Regulate the flow of the sample to ensure a slight overflow into the overflow vessel.<br>Select **OK** to continue.<br>On completion, an **Action completed** message will be displayed. Select **Esc** to exit. |

## 9.15 Software versions

| | |
|---|---|
|  | Select the **SOFTWARE VERSIONS** option for information regarding the name and version of the installed software. |
|  <br>Sodimat V 2.01<br>Module I/O V 1.02<br>Module Potent. V 1.00 | The screen illustrated left will be shown.<br>The installed software versions for the analyzer are displayed for informational purposes.<br>To exit the display, press the **Esc** function key. |

# Section 10 Troubleshooting

## 10.1 General faults

**⚠ WARNING**

Before opening the instrument, ensure the power supply has been switched off.

**Table 10 General Faults**

| MALFUNCTION | POSSIBLE CAUSE | REMEDIES |
|---|---|---|
| No display on the screen. | No power. | The instrument is not properly connected. Check power and connection. |
| | Defective fuse. | Replace fuse (see Fuse replacement on page 94 for details). |
| | Cable connecting power with CPU board is not properly plugged in. | Check plugs. |
| | Connection between CPU board and PSU module is not correct. | Check plugs. |
| | Short circuit in power supply board. | Visually check power supply. |
| | Hardware is defective. | Call the Service Technician. |
| Display is incorrect. | Malfunctioning CPU board or software is defective. | RESET the instrument by temporarily interrupting the power (5-10 secs). Call the Service Technician. |
| Keyboard does not operate; all keys are inactive. | CPU malfunctioning, external interferences. | Check the keyboard connection plugs. If there is still no response, RESET the instrument by temporarily interrupting the power (5-10 seconds). Check each key again. If there is no change, call the Service Technician. |
| Measurement unstable (standard applications). | Electrode not properly connected. | Check the electrode is properly connected. |
| | Interferences. | Look for any chemical, temperature or pressure source of interference. |
| | Measuring cable shielding is not well connected. | Check and connect. |
| | No electrolyte. | Refill the electrolyte solution. |
| | Incorrect conditioning. | Verify conditioning reagent bottle is not empty. Verify tubing between conditioning bottle and overflow is correctly connected. |
| | | Verify if solenoid valve for overflow vessel is blocked and replace it if needed. |
| | Defective measurement board. | If problem persists, call the Service Technician. |
| Measurement unstable (cationic applications). | Incorrect conditioning. | Adjust the pH in the measuring cell until it is between 11 and 11.2. |
| | | Verify if solenoid valve for overflow vessel is blocked and replace it if needed. |
| | Defective pump. | Verify in a beaker of water that the pump is working correctly. Flow rate should be around 250 cc/min. |
| | No diisopropylamine. | Replace the bottle of diisopropylamine. |
| | No electrolyte. | Refill the electrolyte solution. |
| | Electrode not working. | Change the electrode and verify the problem is fixed. |

**Table 10  General Faults**

| MALFUNCTION | POSSIBLE CAUSE | REMEDIES |
|---|---|---|
| Grab sample is not correct. | Calibration is not correct. | See below. |
| | Activation has been skipped. | Start a new grab sample again. |
| | Electrode too slow. | Set activation setup to 24 hours frequency.<br>Manually activate the electrode by immersing it for 10 minutes in activation solution.<br>If the problem persists, change the electrode. |
| Measurement is not correct. | Instrument was not correctly programmed. | Check programming parameters - correspondence with the electrode characteristics. |
| | Electrode not well connected. | Check all electrode connections. |
| | Measurement board is defective. | Check measurement board with a voltage generator. If measure is not correct, change the measurement board. |
| | System, including electrode, not properly calibrated. | Calibrate the whole system (electrode connected). Check the calibration solution. |
| | Electrode does not function, may be incompatibility with the application. | Visually check the electrode and the correspondence between the application and the electrode specifications. |
| | CPU board is defective. | If error persists, call the Service Technician. |
| | Electrode is too slow. | Check Slope parameter. If Slope higher than 60 mV/decade, or lower than 55 mV/decade, it may be that the electrode is too slow. Manually activate the electrode by immersing it for 10 minutes in activation solution.<br>If the problem persists, change the electrode. |
| | No electrolyte. | Refill the electrolyte solution. |
| | Incorrect conditioning. | Verify pH at the outlet of the cell (see minimum pH for maximum detection limit table). Verify conditioning reagent level. |
| | | Verify if solenoid valve for overflow vessel is blocked and replace it if needed. |
| | No sample being delivered | Verify if solenoid valve for sample is blocked and replace it if needed. |
| Temperature measurement is not correct. | Conductivity sensor not properly connected. | Check the conductivity sensor is properly connected. Check it is not defective. |
| | Temperature not calibrated. | Calibrate temperature. |
| | Defective measuring board. | If problem cannot be solved, call the Service Technician. |
| Calibration parameters are questionable. | Electrode too slow. | Set activation setup to 24 hours frequency.<br>Manually activate the electrode by immersing it for 10 minutes in activation solution.<br>If the problem persists, change the electrode. |
| | Calibration solution is empty. | Refill the calibration canister. |
| | Calibration solution is polluted. | Change the calibration solution. |
| | Drain valve cannot open. | Change the valve or call the Service Technician. |
| | Drain pump is inefficient. | Remove it and clean the internal valve. |
| | Analyzer frame is not vertical. | Install the analyzer vertically. |

**Table 10 General Faults**

| MALFUNCTION | POSSIBLE CAUSE | REMEDIES |
|---|---|---|
| Pump not working (cationic applications). | Option not activated. | Call a Service Technician. |
| | Pump is not connected. | Verify the electrical connections and voltage. If the voltage is around 70 volts change the pump. |
| | Instrument not in START mode. | Verify the instrument is in START mode. Stop and restart. |
| | System alarm activated. | Check there is no system alarm. |
| Data on the screen cannot be removed. | Malfunctioning CPU board and/or some other transmitter hardware is defective. | Make sure the electrode is properly connected. |
| | | Reset. |
| | | Program the instrument again. |
| | | If steps 1-3 do not remedy the problem, reset the instrument by interrupting the power for 5-10 secs. |
| | | If problem cannot be solved, call the Service Technician. |
| Alarm relays do not drop out. | Instrument was not properly programmed. | Check whether the relay parameters have been properly programmed. |
| | Hardware is defective. | Check that the programmed set points are compatible with the programmed measuring range. |
| | | Check the relay characteristics with an ohmmeter. |
| | | If problem cannot be solved, call the Service Technician. |
| Wrong output current, output current remains at 0 or 20 mA. | Instrument was not properly programmed. | Check the output-current parameters. |
| | Defective connections of the Monec display with peripherals. | Check cables. |
| | Hardware is defective. | Compare the measured value with the output-current measurement. |
| | | If problem persists, call the Service Technician |
| | Output current not calibrated. | Calibrate output current. |

## 10.2 Detection of functional faults

**Table 11 Lack of precision**

| PROBLEM | CAUSE/SOLUTION |
|---|---|
| Electrolyte is polluted. | Check parts and change the electrolyte. |
| Electrolyte leaks. | Check parts and change the electrolyte. |
| Error during calibration or incorrect calibration. | Calibrate again to check the parameters. If the error is confirmed, check the calibration current (too high, too low or unstable). |
| Temperature has not been calibrated. | Check the temperature given by the transmitter and calibrate it (see Temperature calibration on page 92). If you have chosen manual compensation check the value is correct. |
| Flow rate too low (6 to 9 L/hour recommended). | Check the sample inlet circuit. |
| The sample temperature or pressure is out of specification. | Change the electrode location or modify the sample so that it meets the specifications. |

## 10.3 Miscellaneous problems

**Table 12 Miscellaneous problems**

| PROBLEM | CAUSE/SOLUTION |
|---|---|
| The electrode potential is null when measuring. | There is no electrolyte in the electrode (possible leakage). |
| | There is no sample in the cell. |
| The electrode potential is negative. | Connection problem (loose contact) to the anode circuit. |
| | Leak of electrolyte. |
| The sample temperature does not correspond to specifications. | There may be a short-circuit on the temperature connection or temperature electrode calibration was not performed correctly. |
| Concentration displayed on the screen falls abnormally. | Replace the electrolyte. |
| | The sample flow rate is insufficient. |

# Section 11 Spare Parts and Accessories

## 11.1 Accessories - Options - Maintenance kits

**Table 13 Accessories, options & maintenance kits**

| Description | Part Number |
|---|---|
| Optional kit for Profibus DP: board + operator's manual | 09125=A=1485 |
| Optional kit for RS485 JBUS/MODBUS: board + operator's manual | 09125=A=2485 |
| 1 year spare part kit for 9245-9240 (all ranges). Includes items and quantities below.<br>1 x 09240=C=0310 reference electrode for 9245-9240 sodium analyzer<br>1 x 09240=C=0320 sodium glass electrode for 9245-9240 sodium analyzer<br>1 x 363140,00500 KCl 3M electrolyte for reference electrode, 500 mL<br>2 x 595=000=002 in-line filter<br>1 x complete tubing + fitting + tube weight for Autocal<br>1 x complete tubing + fitting + tube weight for Reactivation<br>1 x complete tubing Reactivation pump to Measuring Cell<br>0.3m x PTFE Tubing Ø 2 x 6mm<br>0.475m x 151575,00006 PolyEthylene tubing Ø 4 x 6mm<br>0.37m x 151399,90002 Tygon tubing Ø 1.6 x 3.2mm | 09240=A=8000 |
| 2 years spare part kit for 9240/9245 solenoid valves replacement | 09240=A=8001 |
| Kit for Instrumentation Technicians on 9245-9240. Includes items below.<br>1 x 689=132=008 Sampling solenoid valve, 3/2 way, NPS 0.8 (0.2 - 6 bars)<br>1 x 09240=A=9172 IP 65 connector for 9245-9240 sample electrovalve w/ molded cable<br>1 x 689=132=024 Sampling electrovalve 3/2 way (on overflow vessel)<br>1 x 09240=A=9171 IP 65 connector for 9245-9240 electrovalve on OFV w/ molded cable<br>2 x 578=602=703 Quick fitting for Ø 8 mm O.D. tubing<br>6 x 578=601=703 Quick fitting for Ø 6 mm O.D. tubing<br>1 x 09200=A=5510 Internal bus communication module for 9245-9240 sodium analyzer<br>1 x 09240=A=1500 Potentiometric measurement module for 9245-9240 sodium analyzer<br>1 x 09200=A=5511 CAN module card for multi channel<br>1 x 09120=A=1500 Dual conductivity measuring board<br>1 x 09240=A=0320 Cable AS7, Length 1M, Connectors mounted both ends<br>1 x 695=004=004 Pump 24VDC, membrane, 0.1 L/mn, for 924x flush pump<br>1 x 32965 Locking key for 924x enclosure | 09240=A=8010 |
| Kit of canisters for 9245-9240 sodium analyzer. Includes:<br>2 x bottles 0.5L with caps, stickers and tubing for Reactivtion and AutoCal<br>1 x Flask PolyEthylene 1L with anti-drop spout | 09240=A=8020 |
| Wall-mount enclosure for 9245-9240 sodium analyzer made of ABS (windows in PMMA) | 09240=A=8305 |
| Kit for installation of option "cationic application" | 09240=A=8315 |
| Static heat exchanger system complete (no consumables, 1-4 channels). Includes inlet & outlet connectors (for 4/6mm tubing) and mounting (2 x flanges and screws) | 09240=A=8400 |
| Static heat exchanger system complete, US version (no consumables, 1-4 channels). Includes inlet & outlet connectors (for 1/4 inch OD tubing) and mounting (2 x flanges and screws) | 09240=A=8405 |
| Kit for an installation in USA (for 9245 mono-channel version) w/ pre-mounted imperial (1/4"OD) quick connectors. For Operator Manual in US () format, see P/N DOC026.53.00741 | 09245=A=8300 |
| Optional Automatic calibration, complete for installation on 9245 sodium<br>Recommended for sample < 0.1ppb | 09245=A=8310 |

## 11.2 Spare parts - In contact with sample

**Table 14 Spare parts - In contact with sample**

| Description | Part Number |
|---|---|
| Cleaning brush for static heat exchanger system | 09240=A=9840 |
| Sample level detector kit (cable, level detector, overflow cell cap, update instructions) | 09240=A=8100 |
| Tubing silicone Ø 12x17 mm (per meter) – from 924x column to drain | 359110,52012 |
| Set of tools for disconnecting in and out sampling tubes on 924x quick fittings | 578=507=602 |
| Quick fitting for Ø 6mm external diameter (O.D.) tubing | 578=601=703 |
| Quick fitting for Ø 8mm external diameter (O.D.) tubing | 578=602=703 |
| Tubing in PTFE, Ø 2x6 mm (per meter) | 590=060=026 |
| In-Line filter for tubing 4mm I.D; body made of PP | 595=000=002 |
| Sampling solenoid valve, 3/2way, NPS 0.8 (0.2 - 6 bars)<br>For connector, see P/N 09240=A=9172<br>For mounting, special torx screw driver at P/N 820=000=006 | 689=132=008 |
| Solenoid valve on over-flow vessel, 3/2 ways (also called conditioning valve)<br>For connector, see P/N 09240=A=9171<br>For mounting, special torx screw driver at P/N 820=000=006 | 689=132=024 |
| Pump 24VDC, membrane, 0.1L/mn, for 924x-flush pump | 695=004=004 |

## 11.3 Spare parts - In contact with cell or electrodes

**Table 15 Spare parts - In contact with cell or electrodes**

| Description | Part Number |
|---|---|
| Electrolyte reservoir for 9245-9240 complete (includes mounting and tubing) | 09240=A=0700 |
| Conductivity sensor for 9245-9240<br>For tightening, see seal P/N 429=120=030<br>For mounting, see threaded sleeves P/N 359015,20035) | 09240=C=0256 |
| Reference electrode for 9245-9240 sodium analyzer | 09240=C=0310 |
| Sodium glass electrode for 9245-9240 sodium analyzer | 09240=C=0320 |
| Threaded sleeve PG13.5 | 359015,20035 |
| Reference electrolyte KCl 3M, 500 ml | 363140,00500 |
| O-Ring 12x3mm, EPDM | 429=120=030 |
| Cap in PE for 6mm Ø hole - Like gas canal of 9245-9240 measurement cell. | 431=210=006 |
| Cap in PE for 20mm Ø hole - Like first well of 9245-9240 measurement cell | 431=210=020 |
| Flask PolyEthylene 1L with anti-drop spout | 490=001=040 |
| Silicone tubing Ø 6x8 mm (per meter) | 590=160=080 |

## 11.4 Spare parts - In contact with reagents or standard solution

**Table 16 Spare parts - In contact with reagents or standard solution**

| Description | Part Number |
|---|---|
| Conditioning DIPA bottle w/ MSDS sticker (for 9073, 9186 , 924x).<br>For tap, see P/N 09240=A=0510; for porous cartridge, see 09073=C=0340 | 09073=A=0310 |
| Porous cartridge for gaseous conditioning in 9245-9240, 9186, 9073 | 09073=C=0340 |
| DIPA Merck bottle cap adapter (GL40 -> GL45) | 09073=C=0350 |
| Orion monoethylamine bottle cap adapter | 09186=C=0360 |
| Anti-backflush valve complete for 9245-9240 analyzer on the AutoCalibration port of the OverFlowVessel | 09240=A=7170 |
| DIPA bottle complete with porous cartridge, tap | 09240=A=9510 |
| Tap for DIPA bottle with quick connector (compatible with bottles P/N 490=010=011 and former P/N 09073=A=0310) | 09240=A=0510 |
| Tubing in PTFE, Ø 0.8x.6 mm (per meter) | 151065,08699 |
| Tygon tubing Ø 1.6X3.2mm (per meter) | 151399,90002 |
| Tubing in PE (low density), Ø 6x8 mm (per meter) | 151400,22387 |
| Tubing in PE (low density), Ø 4x6 mm (per meter) | 151575,00006 |
| Teflon coated magnetic stirrer Ø 4.5X15mm (for 9245-9240 analyzers) | 226=004=013 |
| 9186, 924x conditioning bottle (for tap, see P/N 09240=A=0510; for porous cartridge, see 09073=C=0340) | 490=010=011 |
| Stopper (red) for quick fitting, Ø 6mm | 578=401=501 |
| Gas-pump 80V, (highly resistant to aggressive vapor of DIPA) | 695=004=006 |
| Micro-pulses pump for Auto-calibration | 695=114=000 |
| Micro-pulses pump for regeneration | 695=114=005 |

## 11.5 Electronics

**Table 17 Electronics**

| Description | Part Number |
|---|---|
| CPU board with display for Monec E9200, loaded with latest software | 09200=A=1045 |
| Power supply board for Monec E9200 | 09200=A=2000 |
| Complete transmitter MONEC 9200 for 9245-9240 sodium analyzers | 09200=A=4000 |
| User's connections / Interface board for 9245 mono-channel analyzer | 09200=A=5012 |
| Internal bus communication module for 9245-9240 | 09200=A=5510 |
| Cable AS7, valid as is for 9245-9240 MEAS. - Cut blue ring for REF.<br>(0.75m; connectors mounted both ends) | 09240=A=0320 |
| Potentiometric measurement module for 9245-9240 sodium analyzers. | 09240=A=1500 |
| IP 65 connector for 9245-940 electrovalve on OFV (conditioning) w/ molded cable (400mm; equipped w/ insulated-wire-ferrules) | 09240=A=9171 |
| IP 65 connector for 9245-940 sample electrovalve w/ molded cable<br>(920mm; equipped w/ insulated-wire-ferrules) | 09240=A=9172 |

## 11.6 Additional hardware

**Table 18 Additional hardware**

| Description | Part Number |
|---|---|
| Door (all equipped to mount) on 9245 - 9240 sodium analyzers (in PMMA) | 09240=C=0201 |
| Locking key for 924x enclosure (same as 410/510 wall-mount) | 32965 |
| Elbow torx screw driver T6 | 820=000=006 |

# Section 12 Default Configuration

## 12.1 User configuration table

| | | | User Configuration | |
|---|---|---|---|---|
| **Option** | **Default Value** | **Possible Values** | **Selected Values** | **Date** |
| | | | | |
| **MEASUREMENT** | | | | |
| pH | 11.20 | 09.00 - 12.50 | | |
| Tgaz/Twater % | 20 | 0000 - 0250 | | |
| On-line measure time | 10 minutes | 0 - 9999 minutes | | |
| Smart rinsing | No | Yes or No | | |
| Max. rinse time | 45 minutes | 0 - 500 minutes | | |
| Reactivation frequency | 24 hours | 0 - 999 hours | | |
| Reactivation fixed date | SMTWTFS 15:00:00 | Any day and time | | |
| Graph time base | 12 hours | 4 hours<br>8 hours<br>12 hours<br>16 hours<br>20 hours<br>24 hours | | |
| **ALARMS / ALARM 1** | | | | |
| Mode | Limit | Limit<br>Active channel<br>Sample flow<br>None | | |
| Attrib | Channel 1 | Channel 1 | | |
| Limit | 1.00 ppm | 0 - 9990 ppm | | |
| Direction | Up | Up<br>Down | | |
| Delay | 0 seconds | 0 - 999 seconds | | |
| Hysteresis | 0% | 0 - 10% | | |
| Relay | N.O. | N.O.<br>N.C. | | |
| **ALARMS / ALARM 2** | | | | |
| Mode | Limit | Limit<br>Active channel<br>Sample flow<br>None | | |
| Attrib | Channel 1 | Channel 1 | | |
| Limit | 1.00 ppm | 0 - 9990 ppm | | |
| Direction | Up | Up<br>Down | | |
| Delay | 0 seconds | 0 - 999 seconds | | |
| Hysteresis | 0% | 0 - 10% | | |
| Relay | N.O. | N.O.<br>N.C. | | |

| | | | User Configuration | |
|---|---|---|---|---|
| **Option** | **Default Value** | **Possible Values** | **Selected Values** | **Date** |
| | | | | |
| | | **ALARMS / ALARM 3** | | |
| Mode | Limit | Limit<br>Active channel<br>Sample flow<br>None | | |
| Attrib | Channel 1 | Channel 1 | | |
| Limit | 1.00 ppm | 0 - 9990 ppm | | |
| Direction | Up | Up<br>Down | | |
| Delay | 0 seconds | 0 - 999 seconds | | |
| Hysteresis | 0% | 0 - 10% | | |
| Relay | N.O. | N.O.<br>N.C. | | |
| | | **ALARMS / ALARM 4** | | |
| Mode | Limit | Limit<br>Active channel<br>Sample flow<br>None | | |
| Attrib | Channel 1 | Channel 1 | | |
| Limit | 1.00 ppm | 0 - 9990 ppm | | |
| Direction | Up | Up<br>Down | | |
| Delay | 0 seconds | 0 - 999 seconds | | |
| Hysteresis | 0% | 0 - 10% | | |
| Relay | N.O. | N.O.<br>N.C. | | |
| | | **ALARMS / WARNING ALARM** | | |
| Alarm | Yes | Yes<br>No | | |
| Accept | Manual | Auto.<br>Manual | | |
| Relay | N.O. | N.O.<br>N.C. | | |
| | | **ALARMS / SYSTEM ALARM** | | |
| Alarm | Yes | Yes<br>No | | |
| Relay | N.O. | N.O.<br>N.C. | | |
| | | **mA OUTPUTS / OUTPUT 0** | | |
| Type | 0-20 mA | 0-20 mA<br>4-20 mA | | |
| Mode | Linear | Linear<br>Dual<br>Logarithm | | |
| Low | 0 ppb | 0 - 9990 ppm | | |
| Middle | 100 ppb | 0 - 9990 ppm | | |
| High | 1 ppm | 0 - 9990 ppm | | |

| | | | User Configuration | |
|---|---|---|---|---|
| **Option** | **Default Value** | **Possible Values** | **Selected Values** | **Date** |
| | | | | |
| **mA OUTPUTS / OUTPUT 1** | | | | |
| Attrib | Channel 1 | Channel 1<br>Temper.<br>mV<br>None | | |
| Type | 0-20 mA | 0-20 mA<br>4-20 mA | | |
| Mode | Linear | Linear<br>Dual<br>Logarithm | | |
| Low | 0 ppb | 0 - 9990 ppm | | |
| Middle | 100 ppb | 0 - 9990 ppm | | |
| High | 1 ppm | 0 - 9990 ppm | | |
| **mA OUTPUTS / OUTPUT 2** | | | | |
| Attrib | None | Channel 1<br>Temper.<br>mV<br>None | | |
| Type | 0-20 mA | 0-20 mA<br>4-20 mA | | |
| Mode | Linear | Linear<br>Dual<br>Logarithm | | |
| Low | 0 ppb | 0 - 9990 ppm | | |
| Middle | 100 ppb | 0 - 9990 ppm | | |
| High | 1 ppm | 0 - 9990 ppm | | |
| **mA OUTPUTS / OUTPUT 3** | | | | |
| Attrib | None | Channel 1<br>Temper.<br>mV<br>None | | |
| Type | 0-20 mA | 0-20 mA<br>4-20 mA | | |
| Mode | Linear | Linear<br>Dual<br>Logarithm | | |
| Low | 0 ppb | 0 - 9990 ppm | | |
| Middle | 100 ppb | 0 - 9990 ppm | | |
| High | 1 ppm | 0 - 9990 ppm | | |
| **mA OUTPUTS / EVENT INDICATION / FLOW1 - 4 < MIN** | | | | |
| Attrib | None | None<br>Output 0 - 5 | | |
| Mode | Frozen | Preset value<br>Frozen | | |
| **mA OUTPUTS / EVENT INDICATION / CALIBRATION** | | | | |
| Attrib | None | None<br>Output 0 - 5 | | |
| Mode | Frozen | Preset value<br>Frozen | | |

| | | | User Configuration | |
|---|---|---|---|---|
| **Option** | **Default Value** | **Possible Values** | **Selected Values** | **Date** |
| | | | | |
| **mA OUTPUTS / EVENT INDICATION / MAINTENANCE** | | | | |
| Attrib | None | None<br>Output 0 - 5 | | |
| Mode | Frozen | Preset value<br>Frozen | | |
| **mA OUTPUTS / EVENT INDICATION / GRAB SAMPLE** | | | | |
| Attrib | None | None<br>Output 0 - 5 | | |
| Mode | Frozen | Preset value<br>Frozen | | |
| **mA OUTPUTS / EVENT INDICATION / WARNING ALARM** | | | | |
| Attrib | None | None<br>Output 0 - 5 | | |
| Mode | Frozen | Preset value<br>Frozen | | |
| **mA OUTPUTS / EVENT INDICATION / SYSTEM ALARM** | | | | |
| Attrib | None | None<br>Output 0 - 5 | | |
| Mode | Frozen | Preset value<br>Frozen | | |
| **RS485** | | | | |
| Device no. | 0 | 0 - 33 | | |
| Baud | 19200 | 600<br>1200<br>2400<br>4800<br>9600<br>19200 | | |
| Parity | No | No<br>Odd<br>Even | | |
| Stop bit | 1 | 1<br>2 | | |
| Swap word | Yes | No<br>Yes | | |
| **SAMPLE CHANNELS / CHANNEL ACTIVATION** | | | | |
| Channel 1 | Activ | Activ<br>Inactiv | | |
| **SAMPLE CHANNELS / SEQUENCE** | | | | |
| Sequence | 111111111111 | 1 | | |
| **SAMPLE CHANNELS / CHANNELS NAME** | | | | |
| Channel 1 | sample 1 | Free format | | |

# Section 13 Reagent Preparation

⚠ **CAUTION**

To familiarize yourself with handling precautions, dangers and emergency procedures, always review the MSDS (see Material Safety Data Sheets (MSDS) on page 119) prior to handling containers, reservoirs, and delivery systems that contain chemical reagents and standards. Protective eye wear is always recommended when contact with chemicals is possible.

## 13.1 Conditioning Reagent

- Use of Diisopropylamine in the conditioning bottle is the recommended solution (CAS no: 108-18-9; see Diisopropylamine (DIPA) on page 119 for the MSDS). Other reagents can be used but are not recommended (refer back to Conditioning reagent on page 21 for an explanation).
- A minimum pH of 10.5 should be maintained when measured in the central well of the measuring cell.
- Replenish the reagent every 3 months, or more frequently if necessary.

***Note:** Careful selection of the chemical company supplying DIPA will allow direct connection of the bottles to the diffuser cap, avoiding the need for decanting.*

The standard conditioner cap (G45 thread) fits on our bottles. An optional cap is available that adapts wide-mouth MERCK bottles to the pH conditioner/bottle cap (see Spare parts - In contact with reagents or standard solution on page 109). These caps avoid transferring the solution to the original DIPA bottle supplied by us. Other adapters are available on request.

## 13.2 Standard Solutions

The preparation of standard solutions for calibration and grab samples requires having very clean containers and paying careful attention to avoid the risk of pollution during preparation. It is important to rinse well all containers used in the preparation and storage of the solutions. In addition, all volumes and quantities need to be very precise.

It is not advisable to prepare static sodium solutions of less than 50 ppb because these low concentration solutions can quickly become contaminated, which in turn changes the concentration.

### 1 g/L Na Solution

1. Rinse at least 3 times a 1L volumetric flask (“A” class) with ultra pure water. The cleanliness of the flask is essential.
2. Put 2.543 g NaCl inside this flask and add ultra pure water almost to the line delimiting the volume.
3. Shake the flask until the salt is dissolved and add ultra pure water the flask to the line delimiting the final volume of 1L.
4. Shake a final time.
5. Store this solution in a plastic bottle (label & date), well rinsed beforehand with ultra pure water.

### 10 ppm Na Solution

1. Rinse at least 3 times a 1L volumetric flask (“A” class) with ultra pure water. The cleanliness of the flask is essential.
2. Measure very precisely 10 mL of the previous solution (1 g/L) with a micro-pipette or a glass pipette (“A” class and well rinsed beforehand) and put it inside the volumetric flask.
3. Add ultra pure water to the line delimiting the final volume of 1L and shake it.
4. Before transferring into the storage canister, rinse it well with ultra pure water a first time and with a small fraction of the 10ppm Na solution a second time.
5. Transfer to the storage canister (label & date).

**Standard Solution 100 ppb**

This solution is of **LOW** concentration for manual calibration and verification samples.

1. Rinse at least 3 times a 1L volumetric flask ("A" class) with ultra pure water. The cleanliness of the flask is essential.
2. Measure very precisely 10 mL of the 10 ppm Na solution with a micro-pipette or a glass pipette ("A" class and well rinsed beforehand) and put it inside this volumetric flask.
3. Add ultra pure water to the line delimiting the final volume of 1L and shake it.
4. Before transferring into the storage canister, rinse it well with ultra pure water a first time and with a small fraction of the 100 ppb Na solution a second time.
5. Transfer to the storage canister (label & date).

**Standard Solution 1000 ppb**

This solution is of **HIGH** concentration for manual calibration and verification samples.

1. Rinse at least 3 times a 1L volumetric flask ("A" class) with ultra pure water. The cleanliness of the flask is essential.
2. Measure very precisely 100 mL of the 10 ppm Na solution with a micro-pipette or a glass pipette ("A" class and well rinsed beforehand) and put it inside this volumetric flask.
3. Add ultra pure water to the line delimiting the final volume of 1L and shake it.
4. Before transferring into the storage canister, rinse it well with ultra pure water a first time and with a small fraction of the 1000 ppb Na solution a second time.
5. Transfer to the storage canister (label & date).

The **HIGH** and **LOW** standard solutions are typically ten times different in sodium concentration for an accurate calibration and an immediate understanding in slope changes.

Any concentration difference can be used with the requirement that the **HIGH** solution should be at least five times the concentration of the **LOW** solution. It is necessary to have a significant change in electrode output to achieve an accurate calibration.

## 13.3 Automatic Calibration Solution (10 ppm Na)

1. Rinse at least 3 times a 1L volumetric flask ("A" class) with ultra pure water. The cleanliness of the flask is essential.
2. Measure very precisely 10 mL of the previous solution (1 g/L) with a micro-pipette or a glass pipette ("A" class and well rinsed beforehand) and put it inside the volumetric flask.
3. Add ultra pure water to the line delimiting the final volume of 1L and shake it.
4. Before transferring into the canister for this solution (label C) on the analyzer, rinse it well with ultra pure water a first time and with a small fraction of the 10ppm Na solution a second time.
5. If you have too much of this solution for this bottle, rinse another plastic bottle and store it in there (label & date).

## 13.4 3M KCl

1. To prepare 1L of 3M KCl, rinse at least 3 times a 1L volumetric flask (“A” class) with ultra pure water. The cleanliness of the flask is essential.
2. Put 223.5 g of KCl inside this flask and add ultra pure water almost to the line delimiting the volume.
3. Shake the flask until the salt is dissolved and add ultra pure water to the flask up to the line delimiting the final volume of 1L.
4. Shake a final time.
5. Transfer to the storage canister (label & date).

## 13.5 0.5M $NaNO_3$

1. Rinse 3 times a 1L volumetric flask (“A” class) with ultra pure water. The cleanliness of the flask is essential.
2. Put 42.5g of $NaNO_3$ inside this flask and add ultra pure water almost to the line delimiting the volume.
3. Shake the flask until the salt is dissolved and add ultra pure water to the flask until the line delimiting the final volume of 1L.
4. Shake a final time.
5. Put 500 mL of this solution in the correct bottle for this solution on the analyzer.
6. If you have too much of this solution for this bottle, rinse another plastic bottle and store it in there (label & date).

# Section 14 Material Safety Data Sheets (MSDS)

## 14.1 Diisopropylamine (DIPA)

| 1. IDENTIFICATION OF THE SUBSTANCE |
|---|
| Catalogue No: 803646 |
| Product name: diisopropylamine for synthesis |

| 2. COMPOSITION / INFORMATION ON INGREDIENTS |
|---|
| CAS no: 108-18-9 |
| Molecular weight: 101.19 |
| Chemical formula: $C_6H_{15}N$ |
| EC index no: 612-048-00-5 |
| EINECS number: 203-558-5 |

| 3. HAZARDS IDENTIFICATION |
|---|
| Highly flammable. Irritating to eyes, respiratory system and skin. |

| 4. FIRST AID MEASURES |
|---|
| After skin contact: wash off with plenty of water. Remove contaminated clothing. |
| After eye contact: rinse out with plenty of water for at least 10 minutes with the eyelid held wide open. Summon eye specialist. |
| After inhalation: fresh air. |
| If swallowed: give plenty of water to drink, induce vomiting. Summon doctor. |

| 5. FIRE FIGHTING MEASURES |
|---|
| Suitable extinguishing media: water, $CO_2$, foam, powder |
| Special risks: combustible. Vapors heavier than air. Formation of explosive mixtures possible with air.<br>Keep away from sources of ignition. The following may develop in event of fire: NO. |

| 6. MEASURES IN CASE OF ACCIDENTAL SPILLAGE |
|---|
| Soak up with a liquid absorbent, e.g. Chemizorb® or Rhonesec®. Clean contaminated area. |

| 7. HANDLING AND STORAGE |
|---|
| Handling: no further requirements. |
| Storage: store tightly closed, cool, dry, protected from air. Take measures to prevent electrostatic charging. |

| 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION |
|---|
| Personal protective equipment:<br>• respiratory protection: required when vapors/aerosols are generated. Filter K (acc. to DIN 3181) for $NH_3$<br>• eye protection: required<br>• hand protection: required<br>• industrial hygiene: change contaminated clothing. Application of skin-protective barrier cream recommended. Wash hands after working with substance. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Form: liquid

Color: colorless

Odor: amine-like

Ph value: not available

Melting temperature: -96°C

Boiling temperature: 83 - 84°C

Ignition temperature: 295°C DIN51794

Flash point: -17°C DIN51755

Explosion limits:

- Lower: 1.5 vol%
- Upper: 8.5 vol%

Vapor pressure: (20°C) 100 hPa

Density: (20°C) 0.72 $g/cm^3$

Solubility in:

- water (20°C) soluble
- organic solvents (20°C) soluble

## 10. STABILITY AND REACTIVITY

Conditions to be avoided: none

Substances to be avoided: oxidizing agents, acids

Hazardous decomposition products: no information available

Further information: hygroscopic, sensitive to air

## 11. TOXICOLOGICAL INFORMATION

Acute toxicity: DL50 (oral, rat) = 770 mg/kg

Further toxicological information:

- after skin contact: severe irritations
- after eye contact: severe irritation
- after inhalation: irritations of the mucous membranes, coughing, and dyspnoea. Danger of skin absorption

## 12. ECOLOGICAL INFORMATION

Do not allow to enter drinking water supplies, waste water, or soil!

## 13. DISPOSAL CONSIDERATIONS

Product: there are no uniform EC regulation for the disposal of chemicals or residues. Chemical residues generally count as special waste. The disposal of the latter is regulated in the EC member countries through corresponding laws and regulations, and in the federal republic of germany also by the individual federal states. We recommend that you contact either the authorities in charge or approved waste disposal companies which will advise you on how to dispose of special waste.

Packaging: disposal in accordance with local legal provisions.

## 14. TRANSPORT INFORMATION

DOT:

- Shipping Name: Diisopropylamine
- UN Number: UN1158
- Hazard Class: 3,8
- Packing Group: PG II
- Label(s): Flammable liquid, corrosive

IATA:

- Shipping Name: Diisopropylamine
- UN Number: UN1158
- Hazard Class: 3,8
- Packing Group: PG II
- Label(s): Flammable liquid, corrosive

## 15. REGULATORY INFORMATION AND REFERENCES

United States:

- Toxic Substance Control Act (TSCA): Listed
- Superfund Amendments and Reauthorization Act (SARA 302): Not Listed
- Superfund Amendments and Reauthorization Act (SARA 313): Not Listed

International:

- European Inventory of Existing Chemical Substances (EINECS): No. 203-558-5

Canada:

- Canadian Domestic Substances List (DSL): Listed
- Canadian Non Domestic Substances List (NDSL): Not Listed

## 16. OTHER INFORMATION

Consider all national and local rules and regulations.

The above-mentioned data correspond to our current state of knowledge. They serve as a description of the products in regard to necessary safety measures and do not guarantee the described chemical properties. These indications describe the safety precautions to take against the related product and they are not a guaranty of the described product properties.

## 14.2 Potassium chloride

| 1. IDENTIFICATION OF THE SUBSTANCE |
|---|
| Intended/recommended use: electrolyte for reference electrode in 9245 sodium analyzer |
| Chemical formula: KCl 3M in water |
| Molecular weight: 74.55 g/mol |
| Product name: Potassium Chloride |

| 2. COMPOSITION / INFORMATION ON INGREDIENTS | |
|---|---|
| Ingredients: | Hazardous |
| KCl: | Not hazardous |
| Water ($H_2O$): | Not Hazardous |

| 3. HAZARDS IDENTIFICATION |
|---|
| Critical hazards to man:<br>No danger Avoid: Skin contact: **X** Ingestion: **X** Inhalation: **X** Eye contact: **X** |
| Critical hazards to environment: none. |

| 4. FIRST AID MEASURES | | |
|---|---|---|
| Immediate professional medical assistance required: yes no **X** | | |
| | **Symptoms** | **General First Aid procedures** |
| Inhalation: | Inhaling mist can cause mucus membrane irritation. | Remove to fresh air. Provide oxygen if needed. |
| Skin contact: | Mild irritation. | Wash with soap and water. |
| Eye contact: | Irritation | Immediately flush with water, holding eyelids open. If problems persist, get medical attention. |
| Ingestion: | Large doses may cause nausea, vomiting, and abdominal pain. May affect heart. | Drink plenty of water induce vomiting, and if necessary, get medical attention if irritation persists. |

| 5. FIRE FIGHTING MEASURES |
|---|
| Fire hazard: None: **X** Flammable: Avoid heat, flame, sparks: |
| Fire extinguishing media to be used: Suitable extinguishing media in adaptation to materials stored in the immediate neighborhood. Prevent fire-fighting water from entering surface water or groundwater. |
| Special risk: Non-combustible. |
| Explosion hazard: None |

| 6. MEASURES IN CASE OF ACCIDENTAL SPILLAGE |
|---|
| Personal precautions: Do not inhale vapors/aerosols.<br>Environmental precautions: Do not allow entering sewerage system.<br>Methods for cleaning up: Clean up with absorbent paper and air out area. |

| 7. HANDLING AND STORAGE |
|---|
| Handling: No further information. |
| Storage: Tightly closed. |

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Protective clothing: None: Overalls: Glasses: Gloves: **X** Other:

Ventilation: None: Vent hood: Mechanical (General): Special:

**Individual protection**: Protective clothing should be selected specifically for the working place. Wash hands after handling. Avoid prolonged exposure.

**Respiratory protection**: Required when vapors/aerosols are generated or use in a chemical fume hood.

**Skin Protection**: Wear compatible chemical resistant gloves.

**Eye Protection**: Wear protection glasses.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**: liquid. **Odor**: odorless. **Color**: colorless

| | | | |
|---|---|---|---|
| Boiling point: 100-107°C | Vapor pressure:<br>That of water | Vapor density (air=1): N/A | Melting point: 0°C |
| Specific gravity ($H_2O$=1):1 | Evaporation rate N/A | Autoflammability N/A | pH in solution: neutral |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| Stability: | Stable: **X** Unstable:<br>Conditions to avoid: No information available |
| Hazardous reactions: | No: **X** Possible:<br>Materials to avoid: strong oxidizing agents, strong acids |

Hazardous decomposition or by-products: no information available

## 11. TOXICOLOGICAL INFORMATION

Toxicity: No information available

Laboratory tests show no adverse mutagenic effects.

## 12. ECOLOGICAL INFORMATION

Environmental toxicity: quantitative data on ecological effect of this product are not available.

## 13. DISPOSAL CONSIDERATIONS

Observe all federal, state, and local environmental regulations.

## 14. TRANSPORT INFORMATION

No special precautions. Not subject to transport regulations.

## 15. REGULATORY INFORMATION AND REFERENCES

No special regulations.

## 16. OTHER INFORMATION

Consider all national and local rules and regulations.

The above-mentioned data correspond to our current state of knowledge. They serve as a description of the products in regard to necessary safety measures and do not guarantee the described chemical properties. These indications describe the safety precautions to take against the related product and they are not a guaranty of the described product properties.

## 14.3 Sodium chloride

| 1. IDENTIFICATION OF THE SUBSTANCE |
|---|
| Intended/recommended use: 10 ppm (Na) calibration standard for 9245 sodium analyzer |
| Chemical formula: NaCl 10 ppm in water |
| Molecular weight: 58.44 g/mol |
| Product name: Sodium Chloride |

| 2. COMPOSITION / INFORMATION ON INGREDIENTS | |
|---|---|
| Ingredients: | Hazardous |
| NaCl: | Not hazardous |
| Water ($H_2O$): | Not Hazardous |

| 3. HAZARDS IDENTIFICATION |
|---|
| Generally not hazardous in normal handling, however good laboratory practices should always be used. Avoid long term exposure to skin or by inhalation. |
| Critical hazards to environment: none. |

| 4. FIRST AID MEASURES | | |
|---|---|---|
| Immediate professional medical assistance required: yes no **X** | | |
| | **Symptoms** | **General First Aid procedures** |
| Inhalation: | Inhaling mist can cause mucus membrane irritation. | Remove to fresh air. |
| Skin contact: | Mild irritation. | Wash exposed area with soap and water. |
| Eye contact: | Irritation. | Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. |
| Ingestion: | If swallowed in large amounts, can disrupt biological process. | Give several glasses of milk or water. Vomiting may occur spontaneously, but it is not necessary to induce. Never give anything by mouth to an unconscious person. |

| 5. FIRE FIGHTING MEASURES |
|---|
| Fire hazard: None: **X** Flammable: Avoid heat, flame, sparks: |
| Fire extinguishing media to be used: Any means suitable for extinguishing surrounding fire |
| Special risk: Non-combustible. |
| Explosion hazard: None |

| 6. MEASURES IN CASE OF ACCIDENTAL SPILLAGE |
|---|
| This material is non hazardous, wipe up and dispose of down drain. |

| 7. HANDLING AND STORAGE |
|---|
| Store in a cool dry place and tightly closed. This Material is not considered hazardous. Store away from water reactive material. |

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Protective clothing: None: **X** Overalls: Glasses: Gloves: Other:
Ventilation: None: **X** Vent hood: Mechanical (General): Special:

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**: liquid. **Odor**: odorless. **Color**: colorless

| | | | |
|---|---|---|---|
| Boiling point: 100°C | Vapor pressure:<br>That of water | Vapor density (air=1): N/A | Melting point: 0°C |
| Specific gravity ($H_2O$=1):1 | Evaporation rate N/A | Autoflammability N/A | pH in solution: neutral |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| Stability: | Stable: **X** Unstable:<br>Conditions to avoid: No information available |
| Hazardous reactions: | No: **X** Possible:<br>Materials to avoid: Water reactive materials |

Hazardous decomposition or by-products: no information available

## 11. TOXICOLOGICAL INFORMATION

Toxicity: No information available
Laboratory tests show no adverse mutagenic effects.

## 12. ECOLOGICAL INFORMATION

Environmental toxicity: none

## 13. DISPOSAL CONSIDERATIONS

Observe all federal, state, and local environmental regulations.

## 14. TRANSPORT INFORMATION

No special precautions. Not subject to transport regulations.

## 15. REGULATORY INFORMATION AND REFERENCES

No special regulations.

## 16. OTHER INFORMATION

Consider all national and local rules and regulations.

The above-mentioned data correspond to our current state of knowledge. They serve as a description of the products in regard to necessary safety measures and do not guarantee the described chemical properties. These indications describe the safety precautions to take against the related product and they are not a guaranty of the described product properties.

## 14.4 Sodium nitrate

| 1. IDENTIFICATION OF THE SUBSTANCE |
|---|
| Intended/recommended use: 0.5 M $NaNO_3$ reactivation solution for 9245 sodium analyzer |
| Chemical formula: $NaNO_3$ 0.5 M (42.5 g/L) in water |
| Molecular weight: 85 g/mol |
| Product name: Sodium Nitrate |

| 2. COMPOSITION / INFORMATION ON INGREDIENTS | |
|---|---|
| Ingredients: | Hazardous |
| $NaNO_3$: | Hazardous |
| Water ($H_2O$): | Not Hazardous |

| 3. HAZARDS IDENTIFICATION |
|---|
| Critical hazards to man:<br>No danger Avoid: Skin contact: **X** Ingestion: **X** Inhalation: Eye contact: **X** |
| Critical hazards to environment: none. |

| 4. FIRST AID MEASURES | | |
|---|---|---|
| Immediate professional medical assistance required: yes no **X** | | |
| | **Symptoms** | **General First Aid procedures** |
| Inhalation: | Inhaling mist can cause mucus membrane irritation. | Remove to fresh air. |
| Skin contact: | Mild irritation. | Wash exposed area with soap and water. |
| Eye contact: | Irritation. | Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. |
| Ingestion: | If swallowed in large amounts, can disrupt biological process. | Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention. |

| 5. FIRE FIGHTING MEASURES |
|---|
| Fire hazard: None: Flammable: Avoid heat, flame, sparks: **X** |
| Fire extinguishing media to be used: Any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool. |
| Special risk: *dried* $NaNO_3$ is sensitive to mechanical impact (explosion). |
| Explosion hazard: *dried* $NaNO_3$ decomposes explosively when heated > 538°C. |

| 6. MEASURES IN CASE OF ACCIDENTAL SPILLAGE |
|---|
| Remove all sources of ignition. |

| 7. HANDLING AND STORAGE |
|---|
| Store in a cool dry place and tightly closed. Store away from water reactive material. |

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Protective clothing: None: **X** Overalls: Glasses: Gloves: **X** Other:
Ventilation: None: **X** Vent hood: Mechanical (General): Special:

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**: liquid. **Odor**: odorless. **Color**: colorless

| | | | |
|---|---|---|---|
| Boiling point: 100-103°C | Vapor pressure:<br>That of water | Vapor density (air=1): N/A | Melting point: 0°C |
| Specific gravity ($H_2O$=1):1 | Evaporation rate N/A | Autoflammability N/A | pH in solution: neutral |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| Stability: | Stable: **X** Unstable:<br>Conditions to avoid: No information available |
| Hazardous reactions: | No: **X** Possible:<br>Materials to avoid: Water reactive materials; Reacts with acids to emit toxic fumes of $NO_2$ |

Hazardous decomposition: Emits nitrous oxides when heated

## 11. TOXICOLOGICAL INFORMATION

Oral rat LD50: 1267 mg of $NaNO_3$/kg.
Investigated as a tumorigen, mutagen, reproductive effector.

## 12. ECOLOGICAL INFORMATION

Environmental toxicity: N/A

## 13. DISPOSAL CONSIDERATIONS

Observe all federal, state, and local environmental regulations.

## 14. TRANSPORT INFORMATION

No special precautions for small quantities (< 5L). For higher quantities use precautions
According to UN/NA: UN1498 Packing Group: III

## 15. REGULATORY INFORMATION AND REFERENCES

No special regulations.

## 16. OTHER INFORMATION

Consider all national and local rules and regulations.

The above-mentioned data correspond to our current state of knowledge. They serve as a description of the products in regard to necessary safety measures and do not guarantee the described chemical properties. These indications describe the safety precautions to take against the related product and they are not a guaranty of the described product properties.