

# 8037 Sodium Monitor



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We are an established world force in the design and manufacture of measurement products for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

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We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

EN ISO 9001:2000



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Stonehouse, U.K.



## Electrical Safety

This equipment complies with the requirements of CEI/IEC 61010-1:2001-2 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use'. If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

## Symbols

One or more of the following symbols may appear on the equipment labelling:

|  |   |
|--|---|
|  | <b>Warning</b> – Refer to the manual for instructions |
|  | <b>Caution</b> – Risk of electric shock               |
|  | Protective earth (ground) terminal                    |
|  | Earth (ground) terminal                               |

|  |  |
|--|--|
|  | Direct current supply only                           |
|  | Alternating current supply only                      |
|  | Both direct and alternating current supply           |
|  | The equipment is protected through double insulation |

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

### Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.

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## 1 INTRODUCTION

This manual describes the installation and operation of the 8037 Sodium Monitor. Fig. 1.1 shows a schematic of the system.

The Model 8037 is a microprocessor controlled on-line monitor for measuring sodium in steam raising plant. Sampling points include mixed bed outlets in water treatment plants, extraction pump discharge, boiler feed, boiler drum and steam.

Mounted on a plastic backplate, and protected by a hood, is a clear acrylic flowcell, containing a sodium ion responsive electrode and silver/silver chloride reference electrode measuring the sodium concentration in the sample. The flowcell also houses a temperature sensor for temperature correction of electrode output.

The measurement range is  $0.1 \mu\text{g kg}^{-1}$  to  $10 \text{mg kg}^{-1}$  with current output covering a minimum of two decades.

The correct pH value of the sample is achieved by pretreatment with an alkaline vapor.

Calibration is carried out using standard solutions of known value under the control of the transmitter unit.

Two types of transmitter are available, a wall mounted version and a panel mounted 1/4 DIN-sized version.

Microprocessor electronics control the functions of the transmitters. Instrument operation and programming is via four tactile membrane switches located on the front panel. Programmed functions are protected from unauthorized alteration by a five-digit security code.

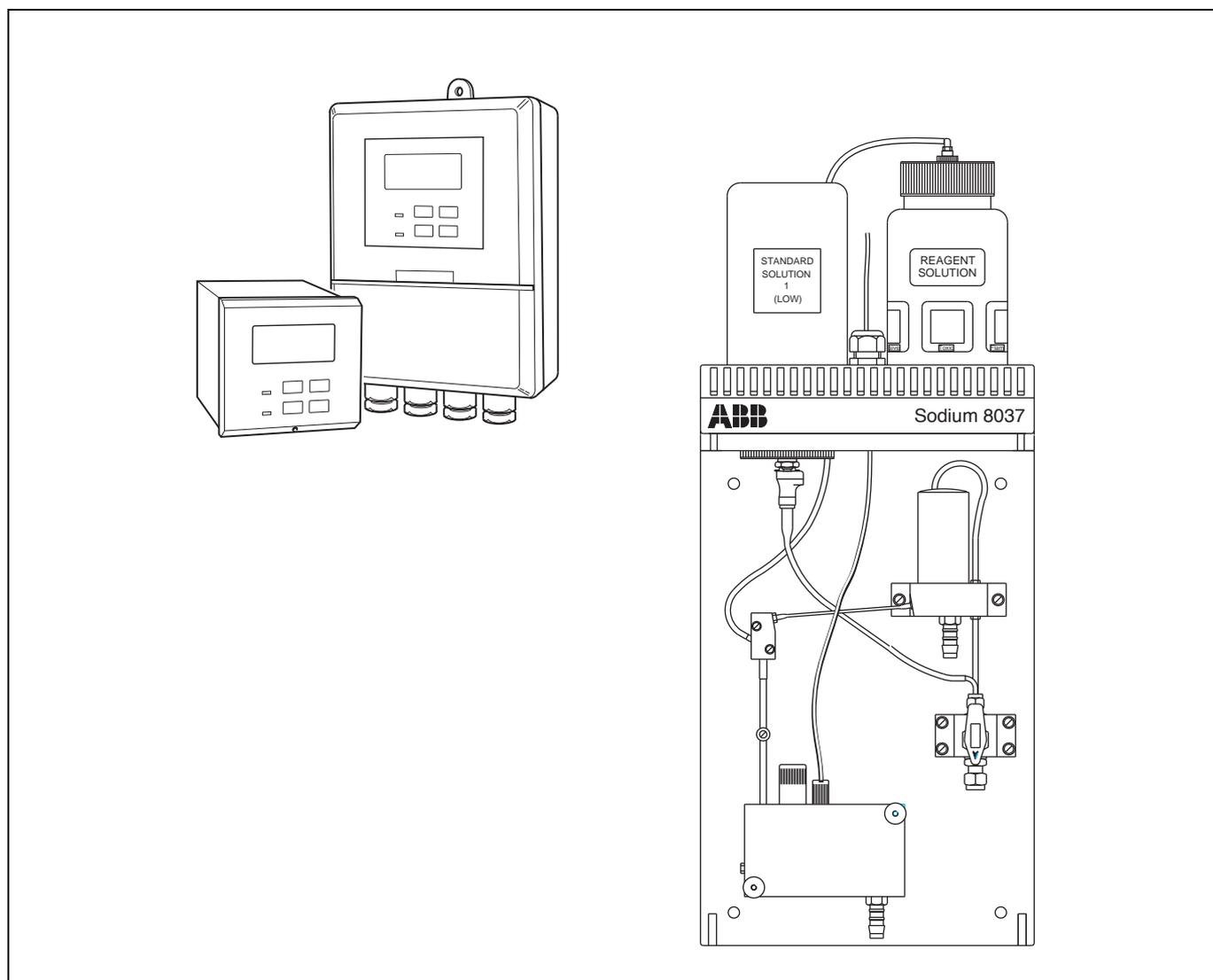


Fig. 1.1 System Schematic

## 2 MECHANICAL INSTALLATION

### 2.1 Siting Requirements

#### 2.1.1 Transmitters

**Caution.** Mount the instruments in a clean, vibration-free area, avoiding direct radiant heat, sunlight and drafts. Avoid sites containing chlorination equipment.

**Note.** It is preferable to mount the transmitter at eye level, thus allowing an unrestricted view of the front panel displays and controls.

Sensor Panels should be mounted not more than 10 metres from any associated sample cooler.

The standard solution and reagent containers are mounted at the top of the sensor panel. The standard solution container is connected to the sensor unit via a quick release coupling.

The transmitter may be mounted alongside or up to 10 metres away from the sensor panel.

**Note.** Cable attached electrodes have a maximum cable length of 1 metre.

Cable detached electrode options are supplied with a cable assembly maximum length of 10 metres.

If the transmitter is to be mounted directly above the sensor panel, allow at least 250 mm separation between the units for access to the standard and reagent solution containers - see Fig. 2.2.

#### 2.1.2 Sensor Panel

Wall mounting is by four 8 mm diameter fasteners on 325 x 200 mm centres. Sufficient access space, as detailed previously, must be left for making cable connections to the transmitters and for the mounting of standard solution and reagent containers.

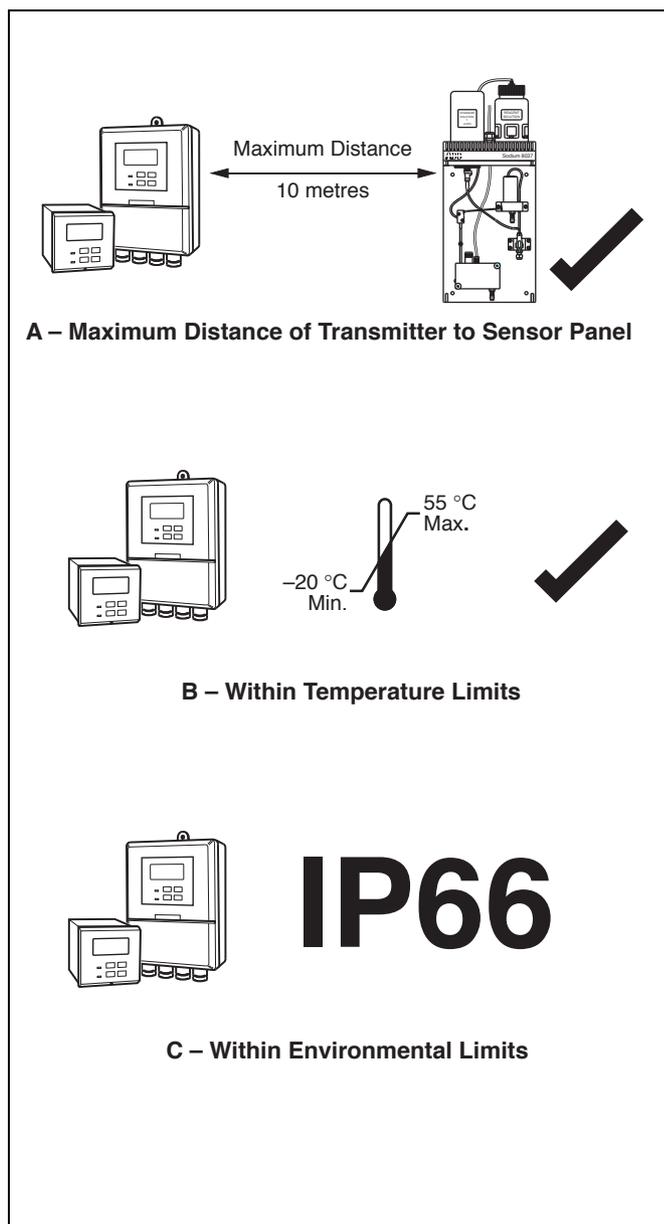


Fig. 2.1 Siting Requirements - Transmitter/Sensor Panel

## 2.2 Mounting the Instrument

### 2.2.1 Wall/Pipe Mounted Instruments

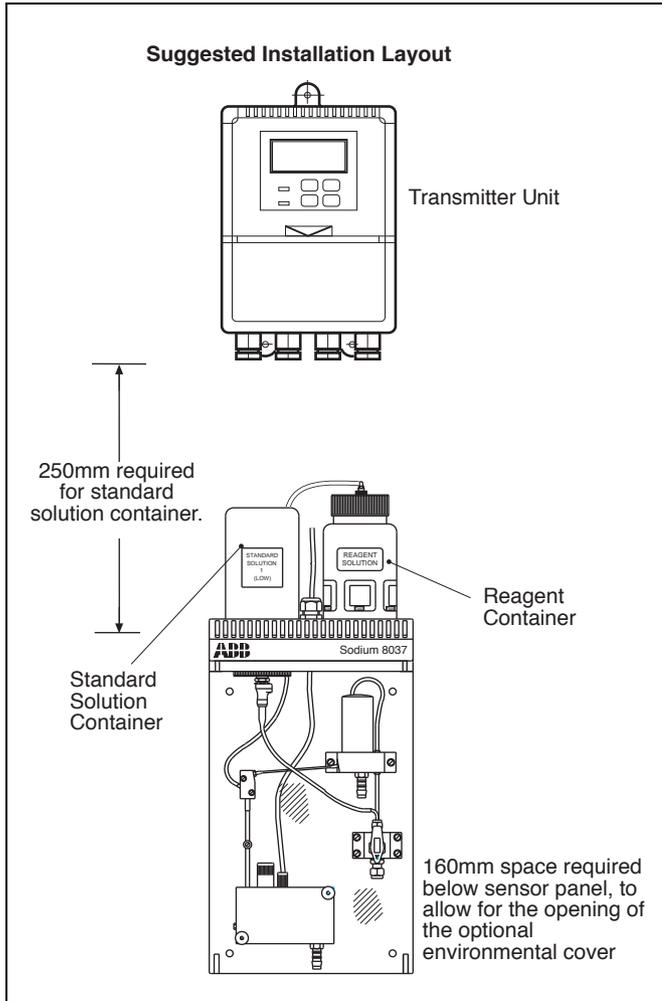


Fig. 2.2 Installation Layout

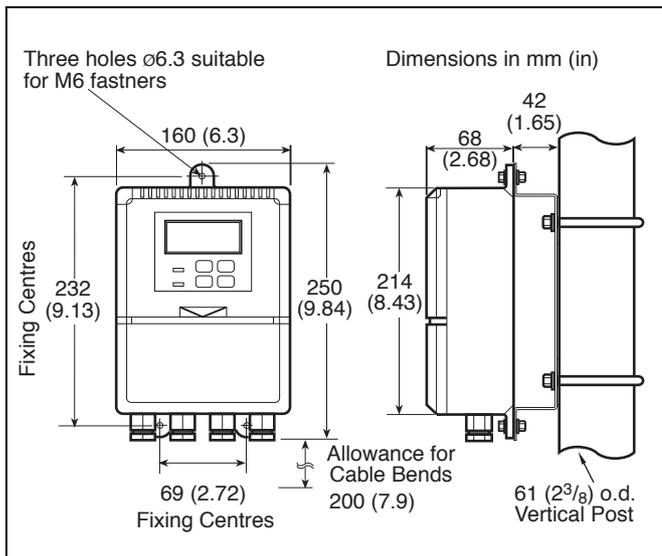


Fig. 2.3 Overall Dimensions

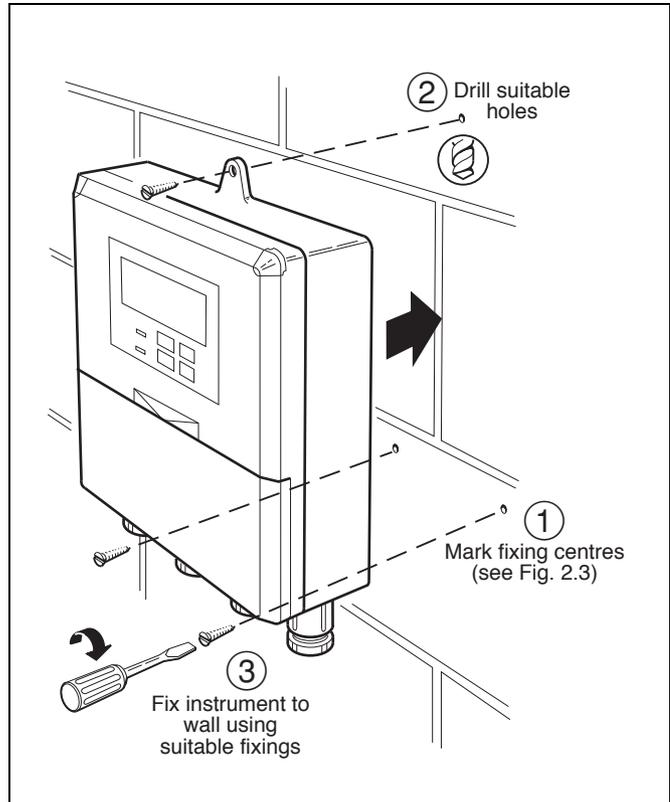


Fig. 2.4 Wall Mounting

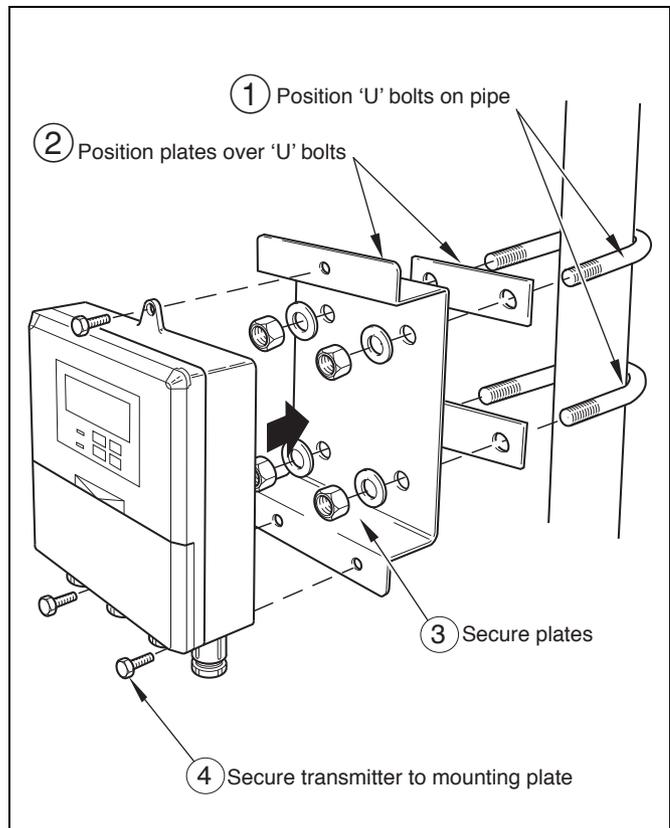


Fig. 2.5 Pipe Mounting

2.2.2 Panel-Mounted Instrument

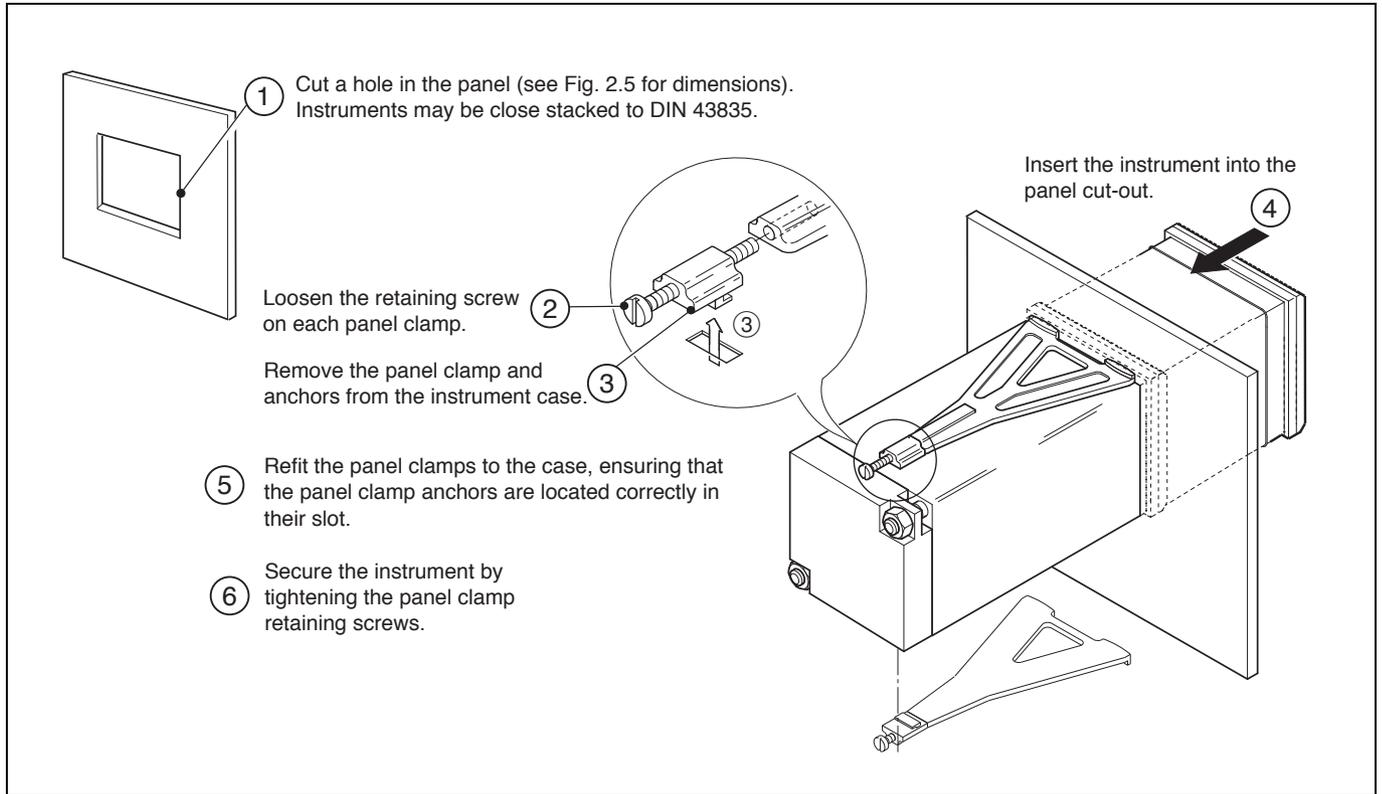


Fig. 2.6 Panel Mounting

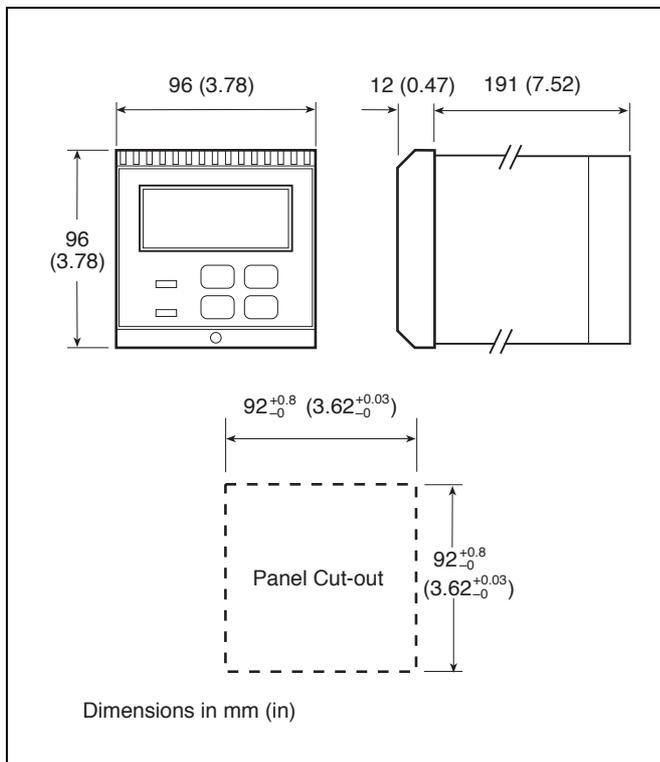


Fig. 2.7 Overall Dimensions

## 2.3 The Sensor Panel

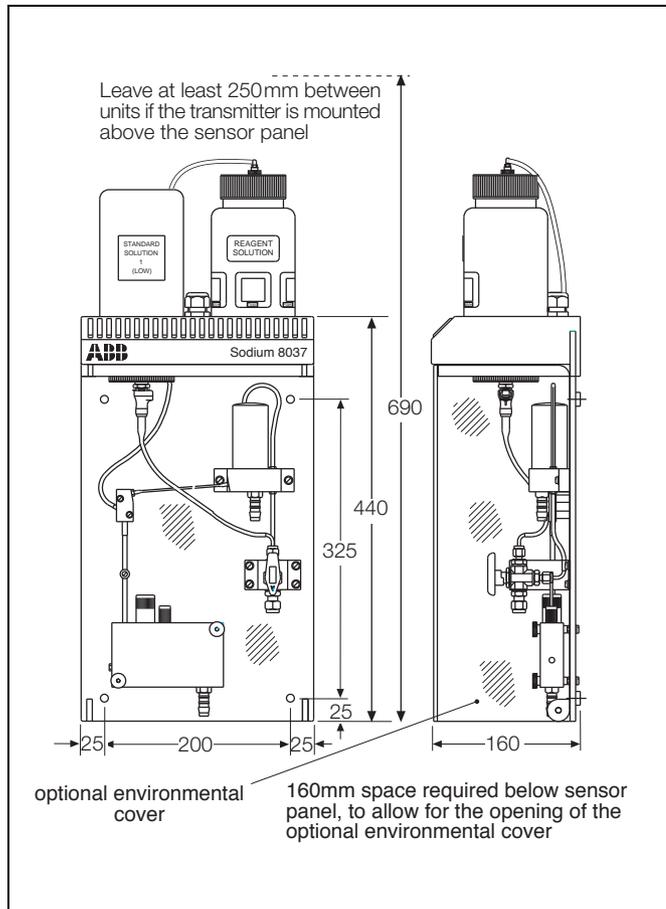


Fig. 2.8 Installing the Sensor Panel

## 2.4 External Pipe Connections

### 2.4.1 Inlet

The sample should be connected to the sensor panel using 6.3 mm (1/4 in) o.d. tubing (stainless steel or rigid plastic). Connect this to the lower coupling of the 3-way changeover valve.

The inlet tubing should be of sufficient wall thickness to withstand the highest sample pressure, and pipe lengths should be kept short.

Where particulate matter is present (e.g. magnetite in boiler samples) it is recommended that a 60 micron sample filter is fitted to the sample line.

A shut-off valve (not supplied with the equipment) is necessary in the sample inlet.

### 2.4.2 Drains

The drains from the sensor unit consist of two stub pipe connections suitable for 10 mm (3/8 in) bore plastic or rubber tubing. Alkaline effluent from the sensor panel flow cell appears at one connection and uncontaminated sample drains from the other.

The two connections can either be linked by a 'Y' piece and taken to a contaminated drain, or they can be kept separate and led to appropriate drains.

### 3 ELECTRICAL CONNECTIONS

**Warning.**

Before making any connections, ensure that the power supply, any high voltage-operated control circuits, and high common mode voltage are switched off.  
Although certain instruments are fitted with internal fuse protection, a suitably rated external protection device, e.g. fuse or miniature circuit breaker (m.c.b), must also be fitted by the installer.

#### 3.1 Electrode and Temperature Compensator Connections

Connect the sodium and reference electrodes as shown below to transmitter terminals as shown in Fig. 3.6 or Fig. 3.7.

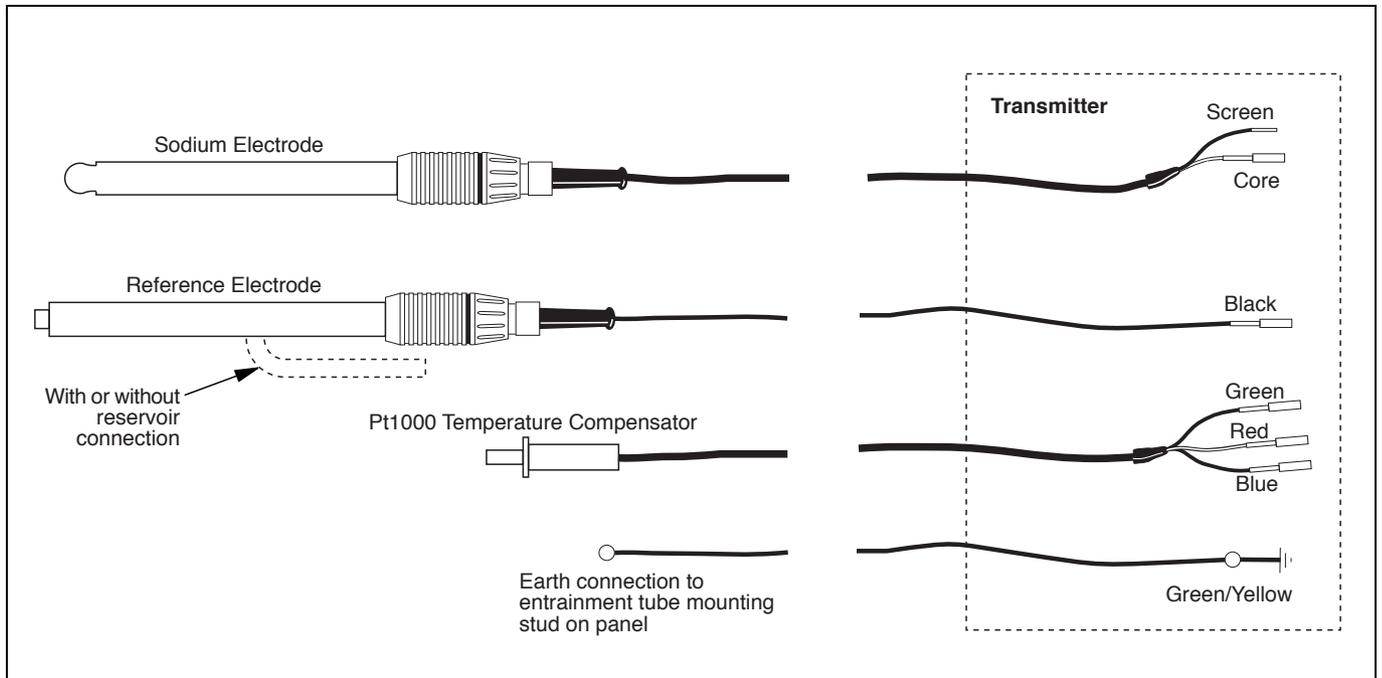


Fig. 3.1 Electrode Attached Wiring

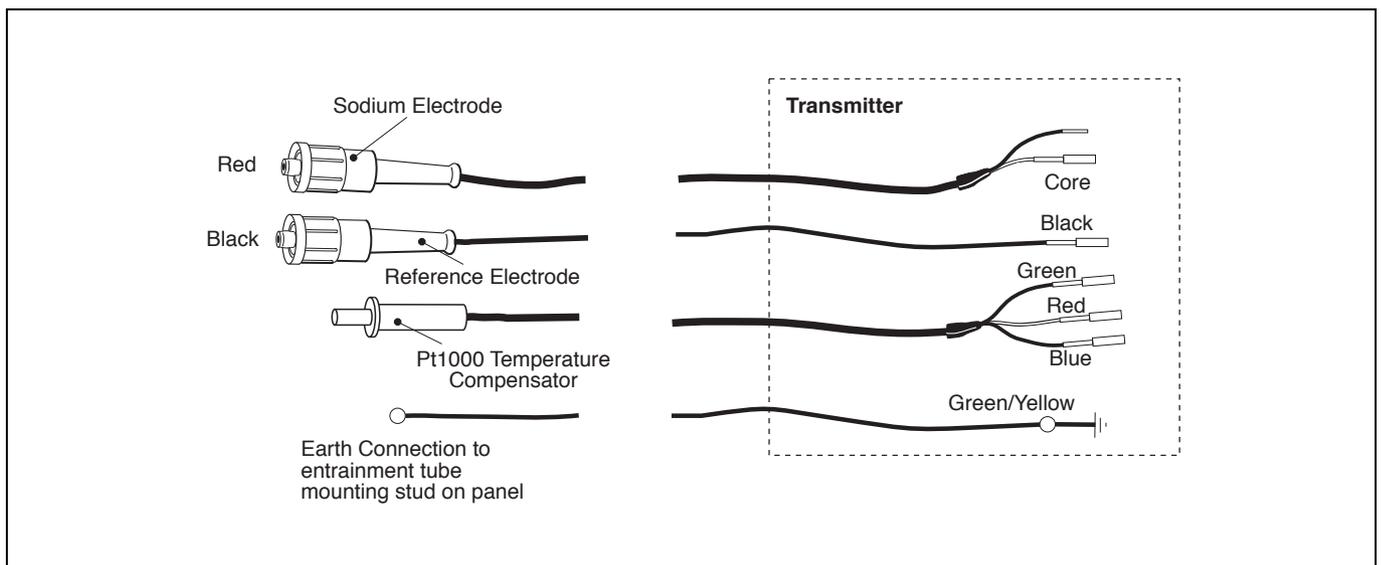


Fig. 3.2 Electrode Detached Connections

### 3.2 Access to Transmitter Terminals

#### 3.2.1 Wall-mounted Instruments

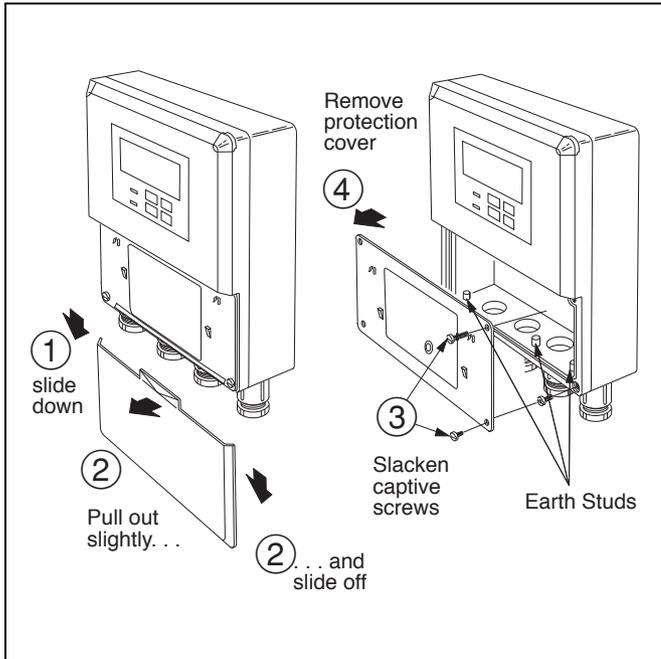


Fig. 3.3 Access to Terminals - Wall Mounted Instrument

#### 3.2.2 Panel-mounted Instruments

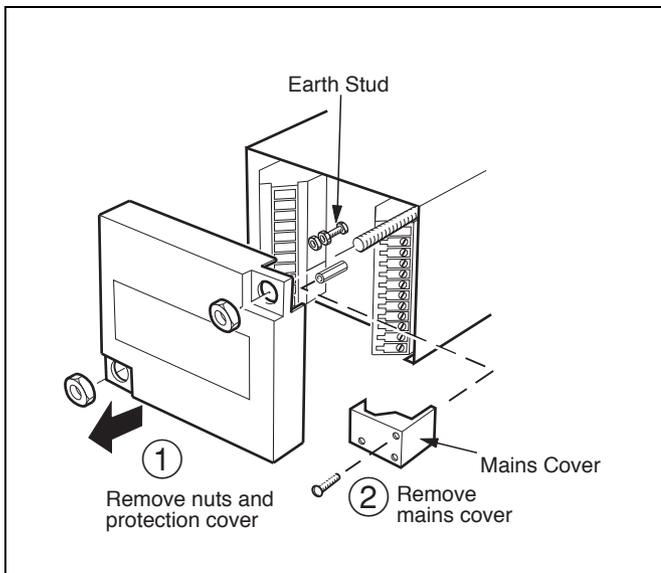


Fig. 3.4 Access to Terminals - Panel Mounted Instrument (Rear View)

### 3.3 Connections, General

**Note.**

- ⊕ Earthing (grounding) - stud terminals are fitted to the transmitter case for bus-bar earth (ground) connection - see Fig. 3.3 or Fig. 3.4. It is also recommended that the inlet tubing be earth (ground) bonded.
- ⊕ Cable lengths - The cable length between the flowcell, on the sensor panel and the transmitter unit is provided as ordered, and suitably terminated at both ends.
- ⊕ Cable routing - always route the signal cable and mains-carrying/relay cables separately, ideally in earthed metal conduit.  
Ensure that the cables enter the transmitter through the glands nearest the appropriate screw terminals and are short and direct. Do not tuck excess cable into the terminal compartment.
- ⊕ Cable glands & conduit fittings - ensure a moisture-tight fit when using cable glands, conduit fittings and blanking plugs/bungs (M20 holes). The M16 glands ready-fitted to wall-mounted instruments accept cable of between 4 and 7 mm diameter. The L.H.S. M16 gland is fitted with a multiway gland seal for the sensor cables and the sensor panel earth (ground) cable.
- ⊕ Relays -the relay contacts are voltage-free and must be appropriately connected in series with the power supply and the alarm/control device which they are to actuate. Ensure that the contact rating is not exceeded. Refer also to Section 3.3.1 for relay contact protection details when the relays are to be used for switching loads.
- ⊕ Retransmission output - Do not exceed the maximum load specification for the selected current retransmission range.  
Since the retransmission output is isolated the -ve terminal must be connected to earth (ground) if connecting to the isolated input of another device.

#### 3.3.1 Relay Contact Protection and Interference Suppression

If the relays are used to switch loads on and off, the relay contacts can become eroded due to arcing. Arcing also generates radio frequency interference (RFI) which can result in instrument malfunction and incorrect readings. To minimize the effects of RFI, arc suppression components are required; resistor/capacitor networks for a.c. applications or diodes for d.c. applications. These components can be connected either across the load or directly across the relay contacts. On 8037 instruments the RFI components must be fitted to the relay terminal block along with the supply and load wires - see Fig. 3.5.

For a.c. applications the value of the resistor/capacitor network depends on the load current and inductance that is switched. Initially, fit a 100R/0.022  $\mu$ F RC suppressor unit (part no. B9303) as shown in Fig. 3.5A. If the instrument malfunctions (incorrect readings) or resets (display shows 88888) the value of the RC network is too low for suppression - an alternative value must be used. If the correct value cannot be obtained, contact the manufacturer of the switched device for details on the RC unit required.

For d.c. applications fit a diode as shown in Fig. 3.5B. For general applications use an IN5406 type ( 600 V peak inverse voltage at 3 A - part no. B7363)

**Note.** For reliable switching the minimum voltage must be greater than 12 V and the minimum current greater than 100 mA.

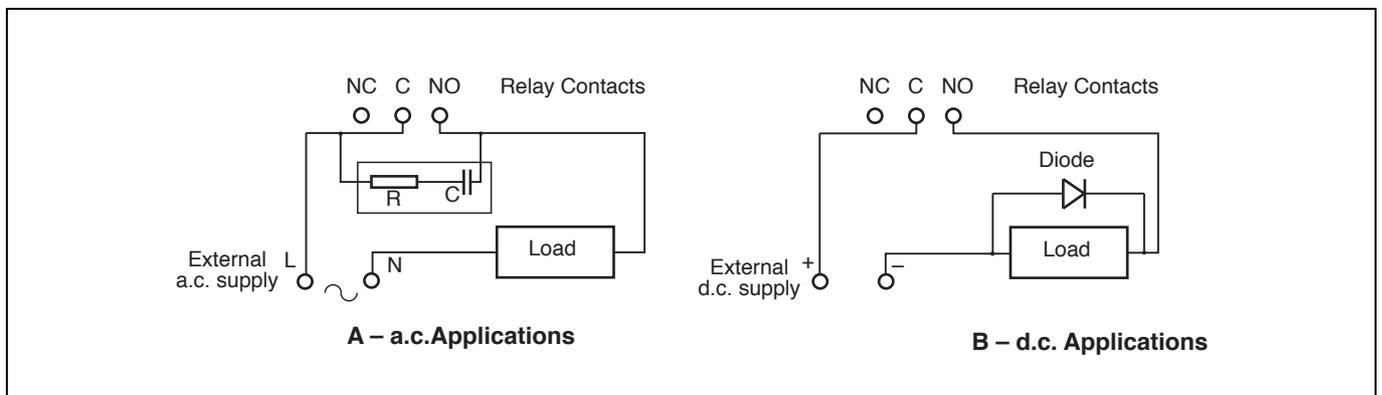


Fig. 3.5 Relay Contact Protection

### 3.4 Wall-mounted Instrument Connections

**Note.** Connections for 2nd retransmission facility (optional) are shown in the appendix.

**Caution.** Slacken terminal screws fully before making connections.

**Note.** Refer to Fig. 3.3 for Access to Terminals.

**Note.** When 'attached' type electrodes are used (see section 4.1.1, page 13) it is advisable to make them electrical connections at the time of installing the electrodes into the liquid handling panel - see section 4.1, page 13.

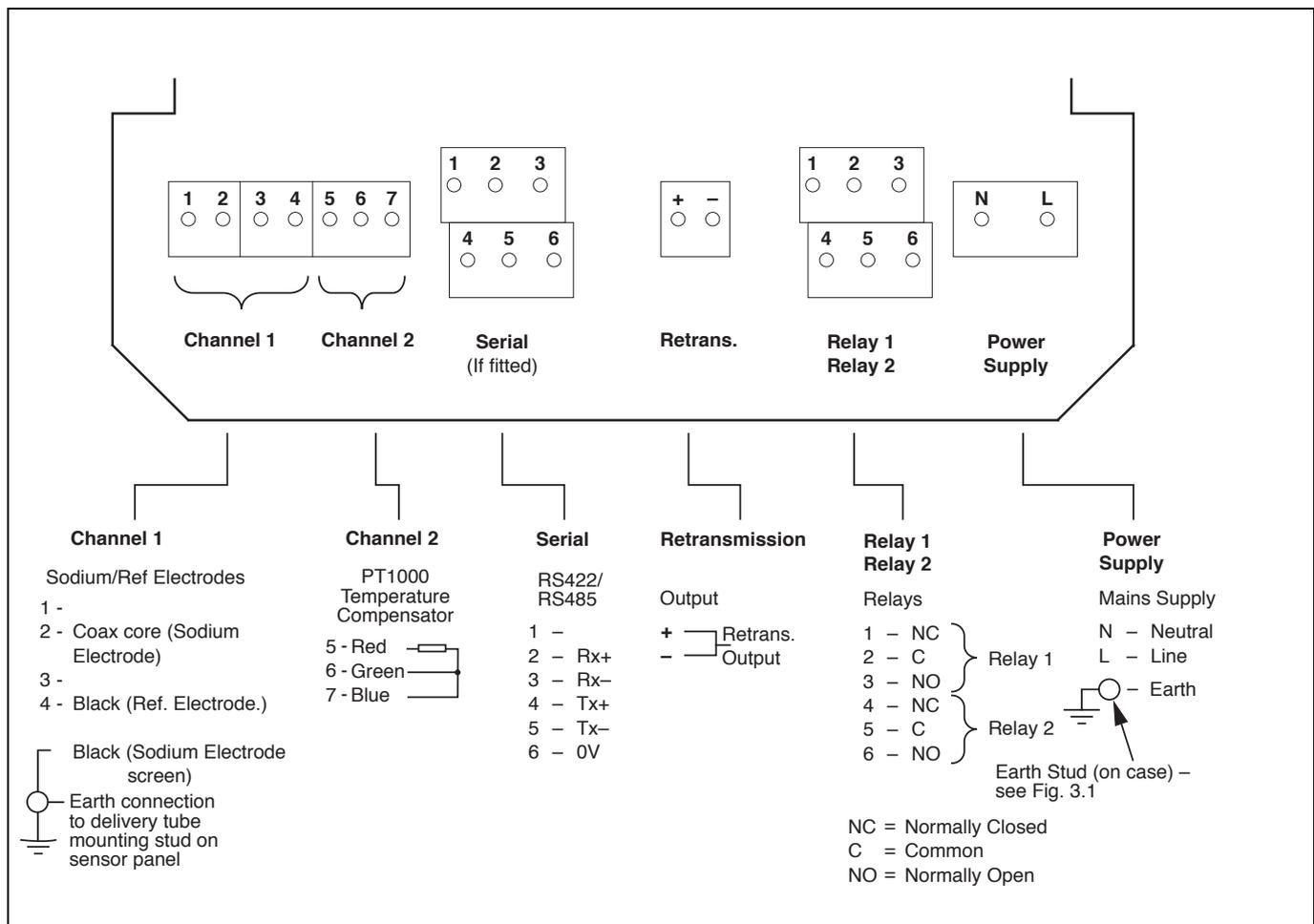


Fig. 3.6 Wall-mounted Instrument Connections

### 3.5 Panel-mounted Instrument Connections

**Note.** Connections for 2nd retransmission facility (optional) are shown in the appendix.

**Caution.** Slacken terminal screws fully before making connections.

**Note.** Refer to Fig. 3.4 for Access to Terminals.

**Note.** When 'attached' type electrodes are used (see section 4.1.1, page 13) it is advisable to make them electrical connections at the time of installing the electrodes into the liquid handling panel - see section 4.1, page 13.

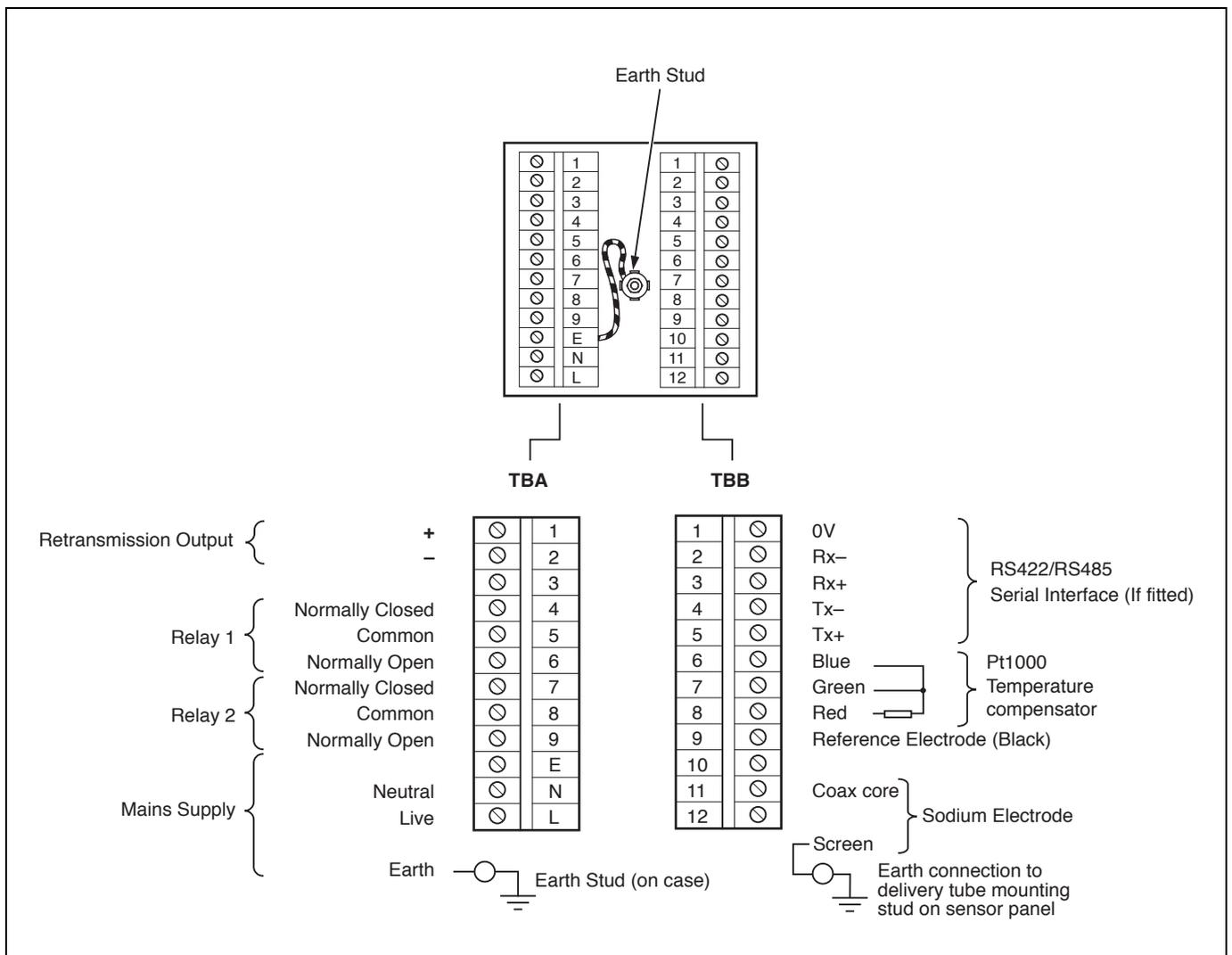


Fig. 3.7 Panel-mounted Instrument Connections

### 3.6 Selecting the Mains Voltage

#### 3.6.1 Wall-mounted Instrument

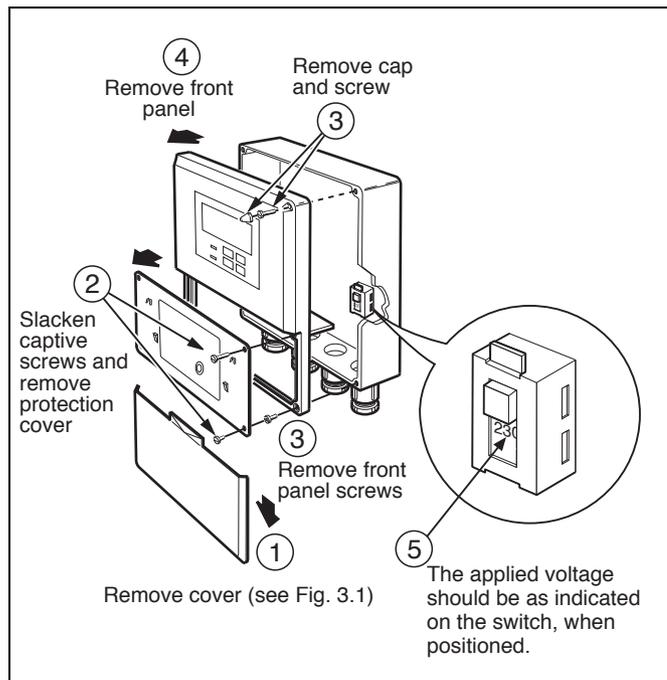


Fig. 3.8 Selecting the Mains Voltage - Wall-mounted Instrument

#### 3.6.2 Panel-mounted Instrument

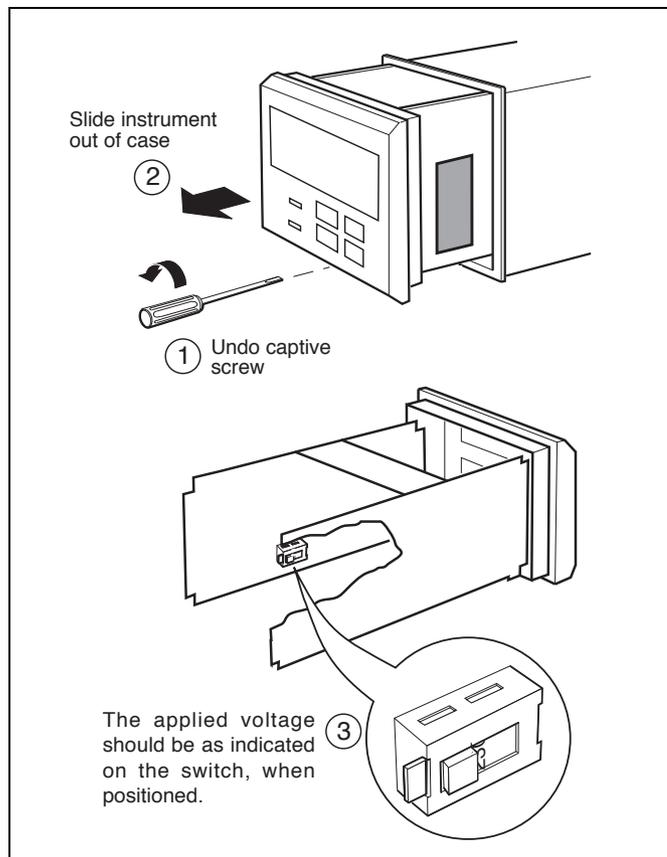


Fig. 3.9 Selecting the Mains Voltage - Panel-mounted Instrument

## 4 SETTING UP

### 4.1 Setting Up the Sensor Panel

**Note.** Two types of electrode are available:

1. Cable attached.
2. Cable detached (see below).

#### 4.1.1 Cable Attached Electrodes

1. Unpack the sodium electrode and carefully remove the rubber teat. Unscrew the cylindrical plastic holder from the flow cell - see Fig. 4.1, and slide the electrode fully into the holder. Carefully screw the holder, with electrode, into the appropriate bore of the flow cell so that the electrode bulb passes through the 'O' ring.

Position the electrode so that when the plastic holder is tightened against the 'O' ring, the bulb of the electrode is just above the bottom of the chamber.

Connect the tagged ends of the electrode cable to the transmitter - see Fig. 3.1 and Fig. 3.6 or Fig. 3.7.

2. Unpack the reference electrode and remove the rubber teat. Remove the black rubber filling hole plug. Remove the supplied 'O' ring (temporarily secured to the top of the right-hand chamber), and fit the 'O' ring over the electrode body. Carefully position the electrode centrally in the right-hand chamber of the flowcell so that the ceramic plug is between 5 and 10 mm from the bottom of the chamber.

Connect the tagged ends of the electrode cable to the transmitter - see Fig. 3.1 and Fig. 3.6 or Fig. 3.7.

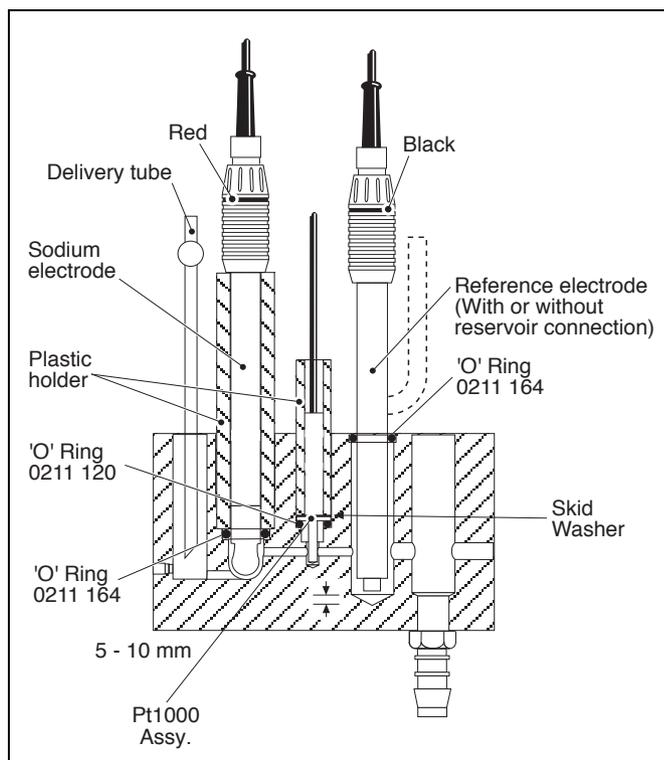


Fig. 4.1 Flowcell

#### 4.1.2 Cable Detached Electrodes

1. Proceed as described in section 4.1.1a to install the sodium electrode and then connect the red connector to the electrode - see Fig. 4.1 and Fig. 4.2.
2. Proceed as described in section 4.1.1b to install the reference electrode, and then connect the black connector to the electrode - see Fig. 4.1, Fig. 4.2 and Fig. 4.3.

#### 4.2 Sensor Panel

1. Fill the reagent solution container with appropriate solution, as described in Section 8.1.1.
2. Open the shut-off valve upstream of the sensor panel and adjust it until sample is overflowing from the constant head unit. The maximum and minimum flow rates are given in Section 10.
3. Ensure that sample is passing from the constant head unit to the flow cell, and that the entrainment of reagent is operating correctly. Leave at least one hour.
4. Set up the transmitter as described in Section 6.1.
5. Carry out a two point calibration as detailed in Section 6.3. A two point calibration is necessary, initially.
6. The monitor is now ready for use.

**Note.** It is extremely important that the 'O' rings are correctly fitted and that the inside of the electrode connectors are dry and completely sealed. Moisture reduces the circuit impedance and affects the performance of the monitor.

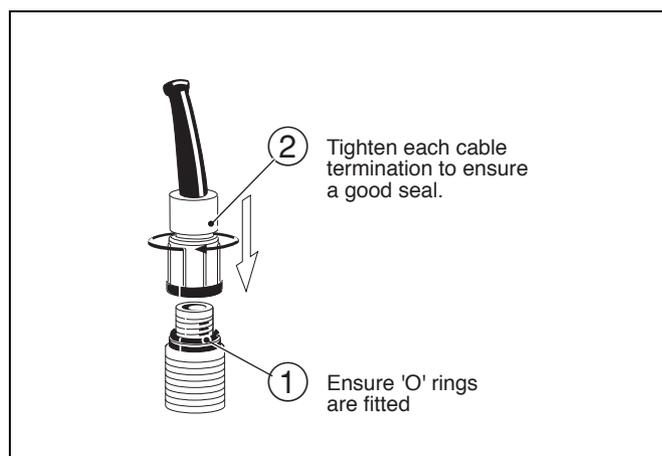


Fig. 4.2 Electrode Connections

### 4.3 Fitting the reservoir (option)

The reservoir comes partially assembled as shown in Fig. 4.3.

Complete the assembly and fit the reservoir as shown in Fig. 4.3.

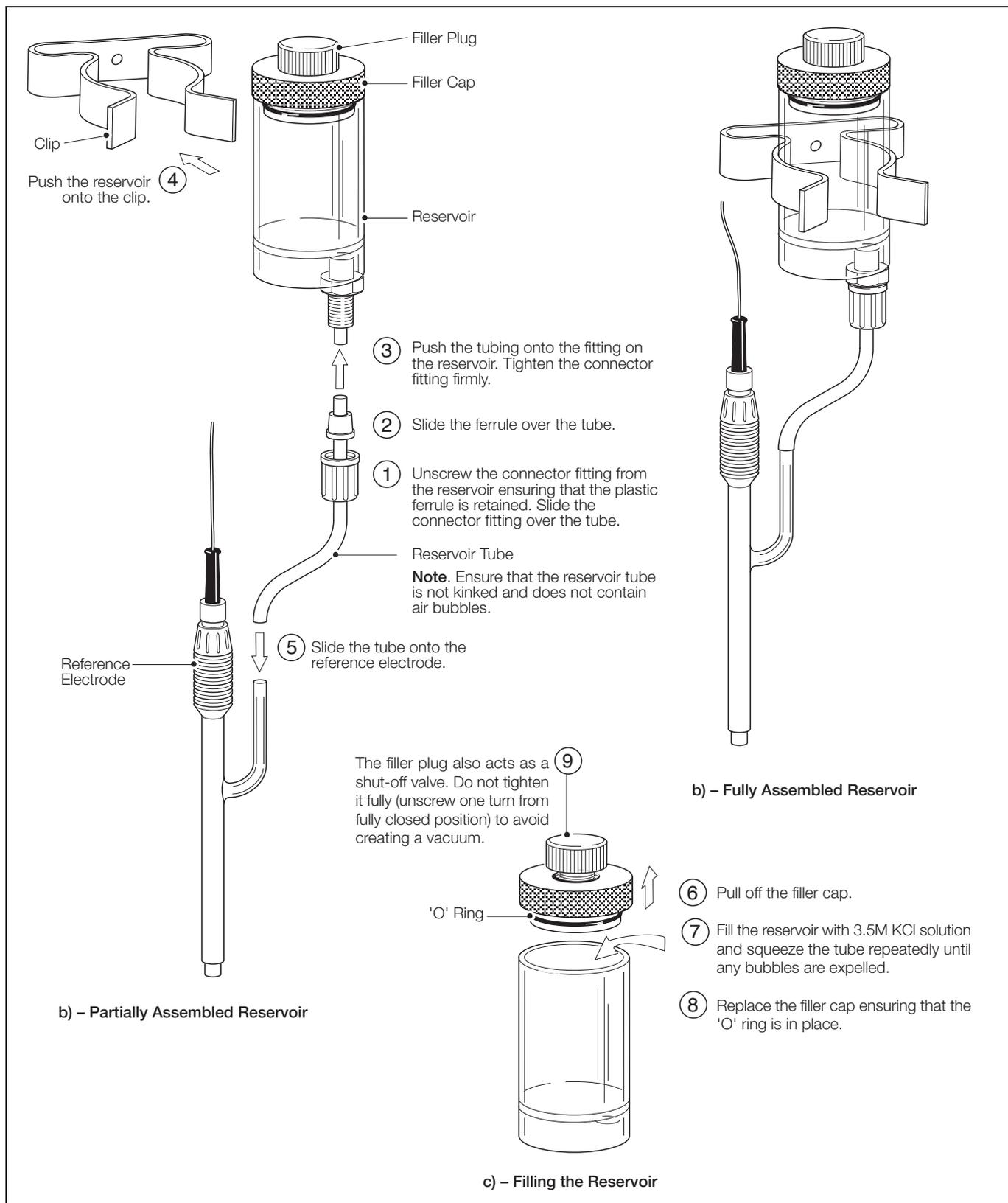


Fig. 4.3 Fitting and Filling the Reservoir

#### 4.4 Principle of Operation

A flow schematic is shown in Fig. 4.3 and the physical layout of the unit is shown in Fig. 4.4.

The sample enters the monitor via the compression fitting on the 3-way changeover valve. It then passes through the changeover valve to the constant head unit which removes the effect of changes in sample pressure and flow-rate. A small tube overflowing into the constant head on one side, ensures self starting when the sample is lost, and enables the monitor to function over a wide sample flow range.

The sample is then delivered to the entrainment 'T' piece and stainless steel entrainment tube, where an alkaline vapor reagent is added to raise the pH value, before flowing past the sodium and reference electrodes mounted in the flowcell. Finally, the sample leaves the flowcell and exits to drain.

The potential developed between the sodium ion-responsive electrode and silver/silver chloride reference electrode is logarithmic with respect to changes in sodium ion concentration. The signal from the electrode pair is connected to the 8037 transmitter.

A temperature sensor, fitted into the flowcell, detects the temperature of the sample. The sensor is connected to the transmitter unit which compensates for changes in output from the electrode pair over a range of 5 to 55 °C.

Calibration is carried out manually after connection of the calibration tube to the standard solution container. The 3-way changeover valve on the liquid handling panel is manually changed over from sample to standard solution. The calibration is initiated from the transmitter unit, where it is controlled by the microprocessor. The standard takes the same path as the sample through the liquid handling panel.

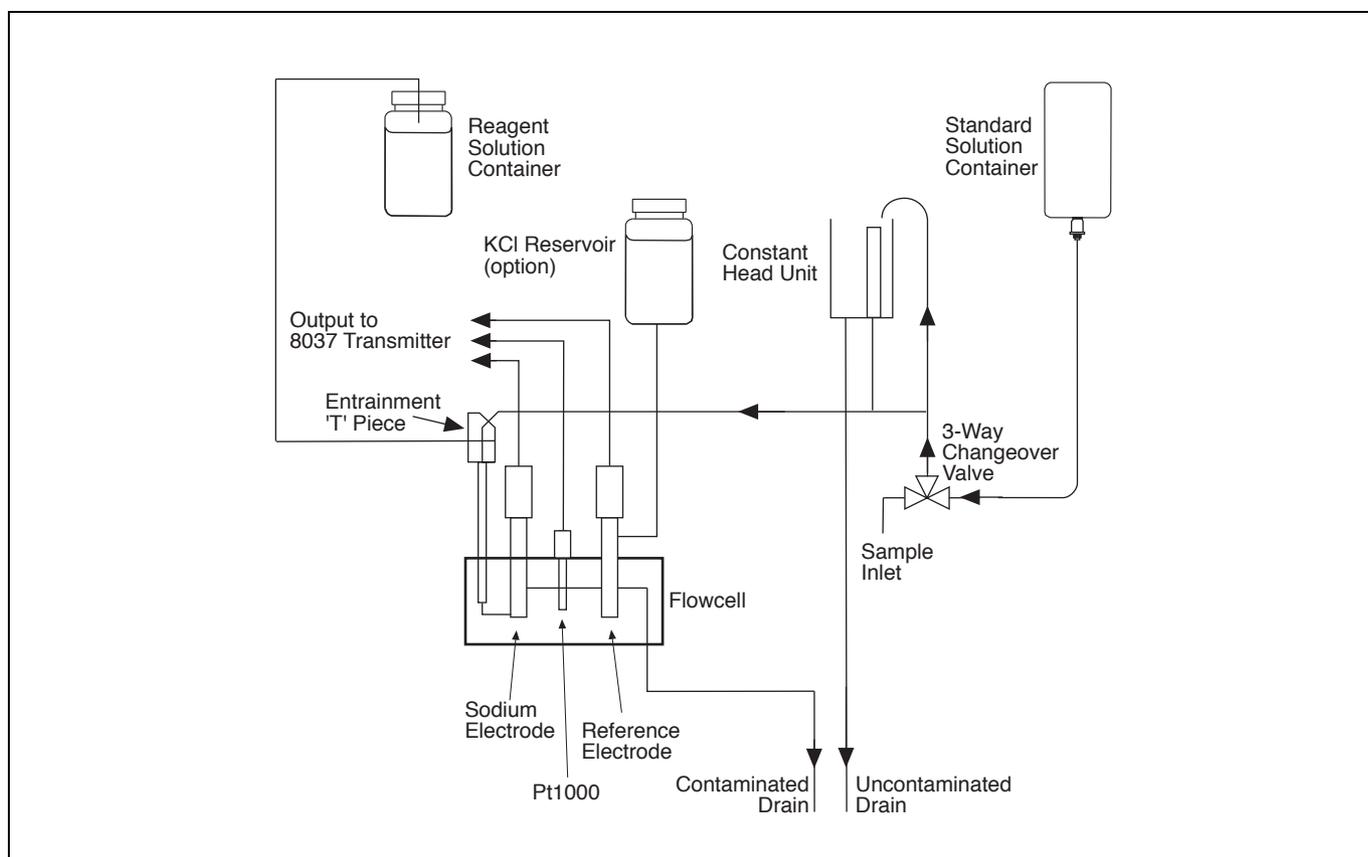


Fig. 4.4 Schematic Flow Diagram

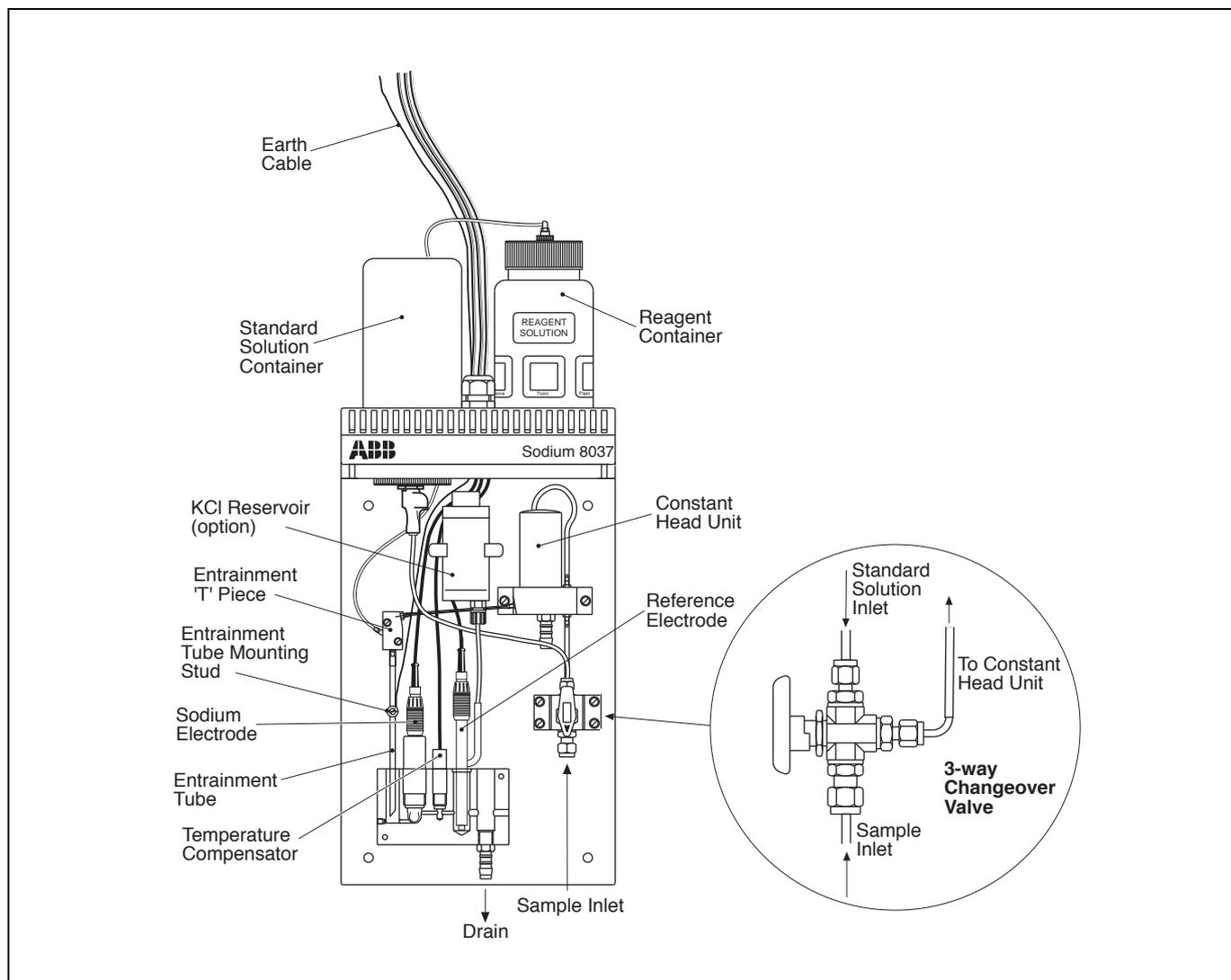


Fig. 4.5 Layout of Sensor Panel

## 5 CONTROLS AND DISPLAYS

### 5.1 Displays

The display comprises a 5-digit, 7-segment digital upper display line and a 16-character dot-matrix lower display line. The upper display line shows numerical values of sodium ion concentration, temperature, alarm set points or programmable parameters. The lower display line shows the associated units or programming information. The lower display line shows the associated units or programming information.

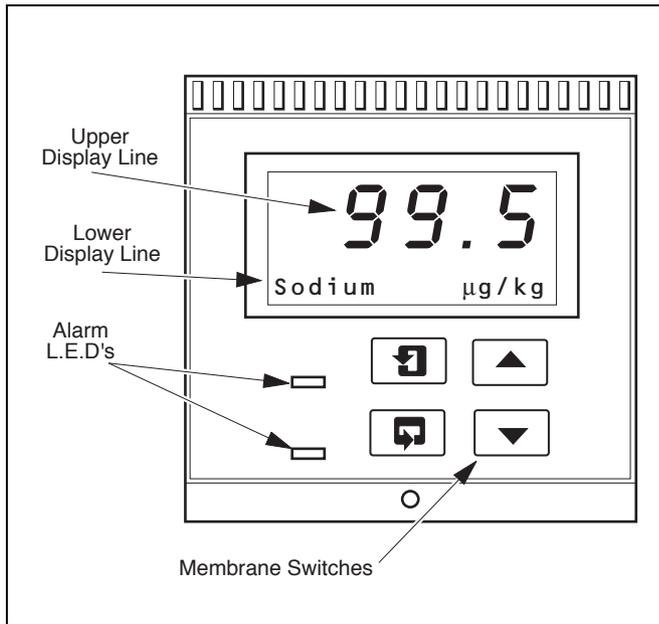


Fig. 5.1 Location of Controls and Displays

### 5.2 Switch Familiarization

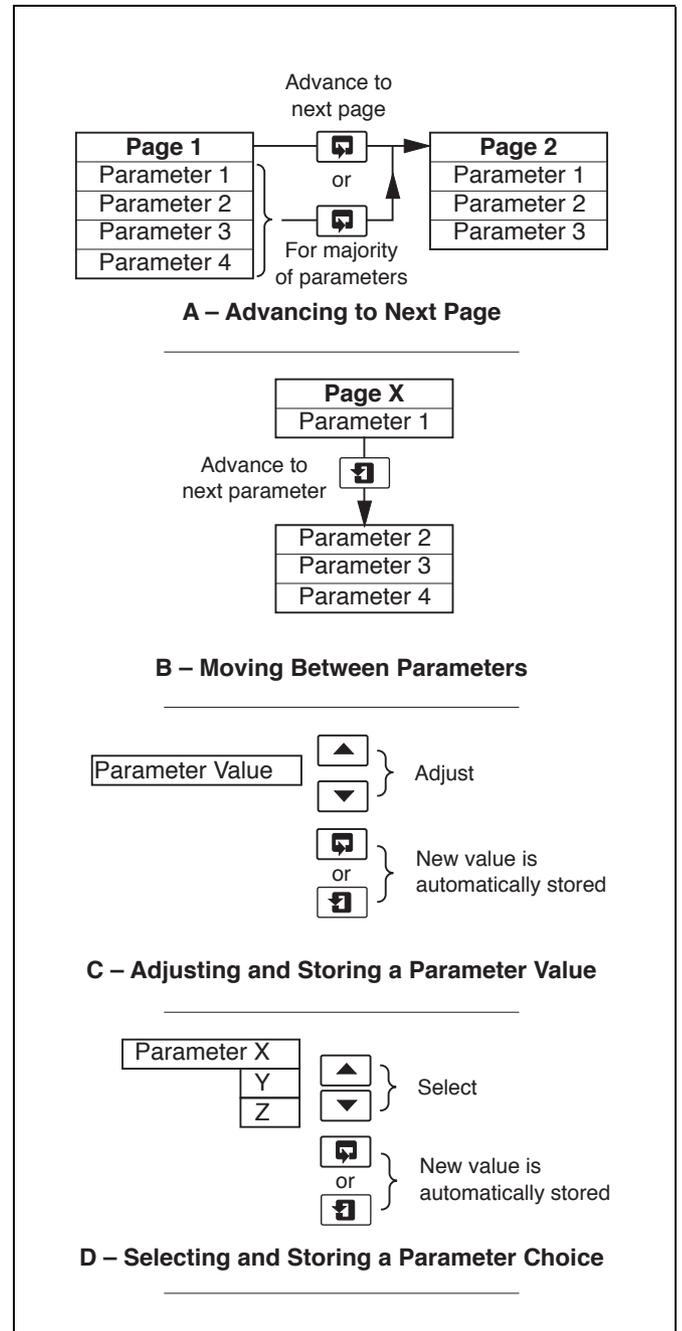


Fig. 5.2 Membrane Switch Functions

# 6 STARTUP AND OPERATION

## 6.1 Instrument Start-up

**Note.** For instruments configured for a 2nd retransmission page refer to the overall programming chart in the appendix.

Ensure all electrical connections have been made and switch on the power supply. If the instrument is being commissioned for the first time, calibration and programming of parameters is required.

The overall operating and programming chart is shown in Fig. 6.1.

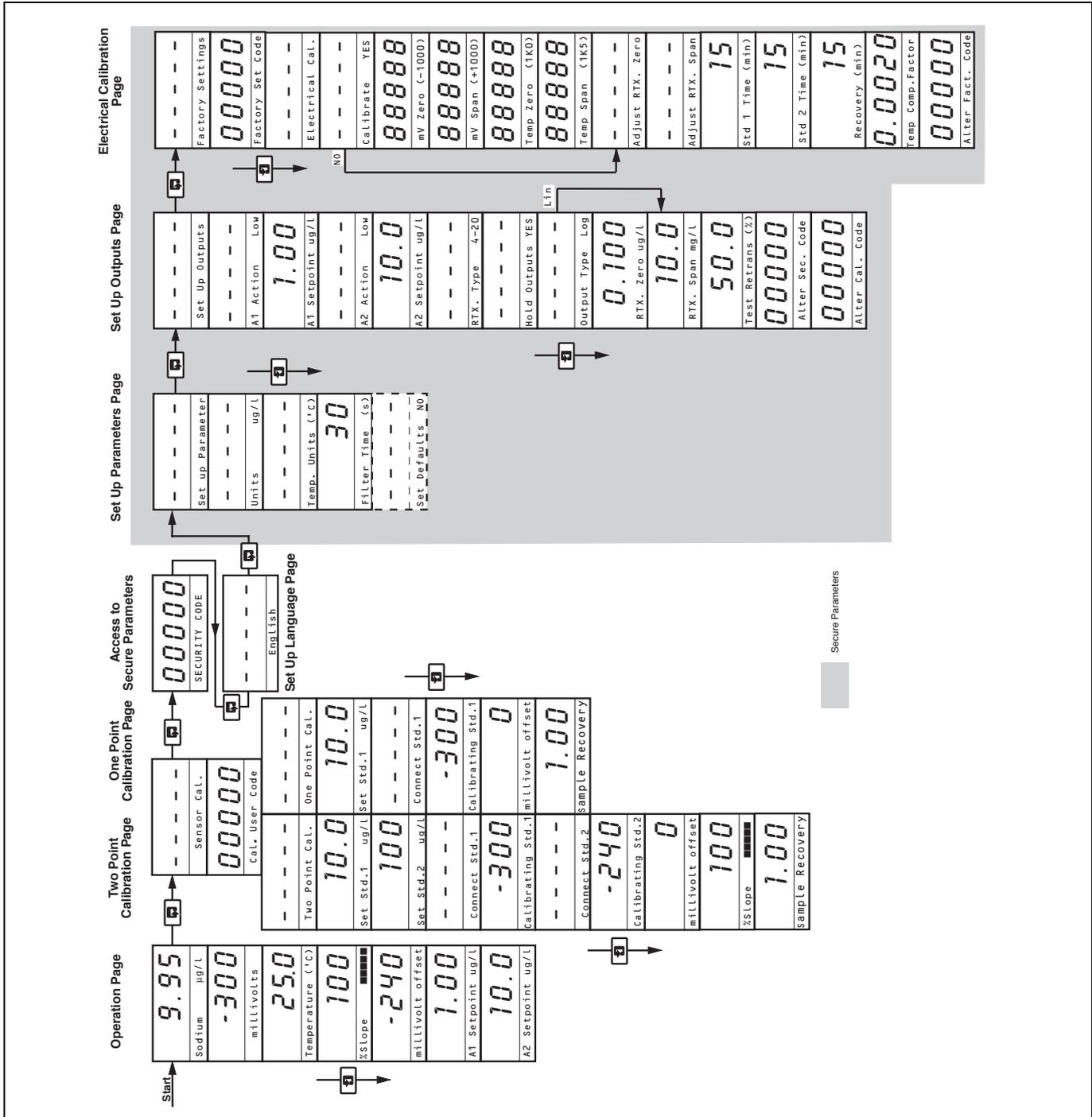


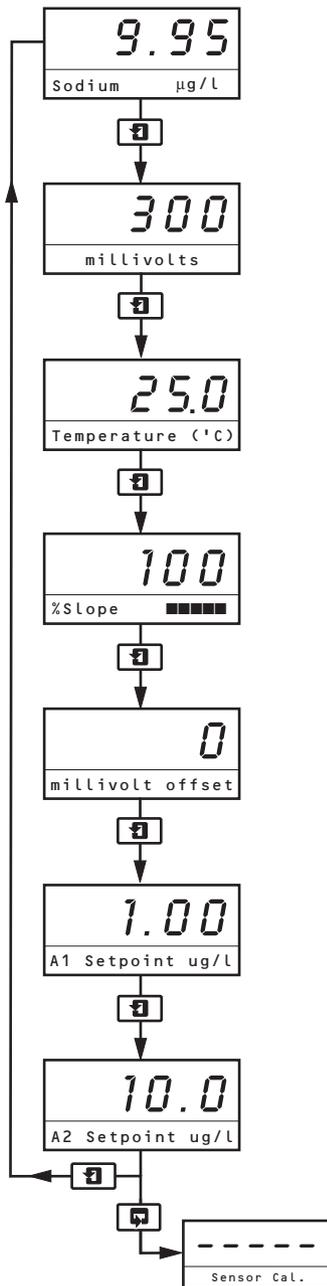
Fig. 6.1 Overall Programming Chart

Either single or two point calibrations can be carried out depending on the operating conditions. The Slope of a sodium electrode is relatively stable, therefore frequent two point calibration may be unnecessary. It is suggested that single point calibration should be done weekly and two point calibration carried out monthly, but a suitable schedule must be determined to suit the operating conditions.

Before starting an automatic calibration sequence, rinse the standard solution containers with high purity water and fill with fresh standard solutions. If a single point calibration is to be done only one solution (STD1) is required. If a two point calibration is to be done, the lower value solution should be used first.

**Note.** A flashing display indicates an out of range condition.

## 6.2 Operation Page



The measured sodium value is displayed in  $\mu\text{g kg}^{-1}$ .

- press to advance to next parameter

or

- press to Advance to **Calibration Pages**, see section 6.3, page 20.

---

The measured millivolts from the electrode pair is displayed.

---

The measured temperature from the Pt1000 is displayed.

---

The % Slope is displayed numerically and in bars (see calibration pass and fail limits).

**Note.** The % Slope is shown on the upper display.

---

The millivolt offset is displayed. This represents the difference in millivolt output of the electrode pair compared with the ideal output.

---

Alarm 1 setpoint value is displayed.

If Alarm 1 Action is set to 'Off', then this is not displayed.

---

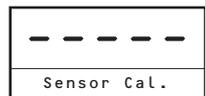
Alarm 2 setpoint value is displayed.

If Alarm 2 Action is set to 'Off', then this is not displayed.

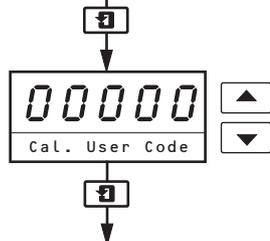
---

Advance to **Calibration Pages**, see section 6.3, page 20.

### 6.3 Sensor Calibration

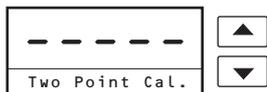


Sensor Calibration page header.

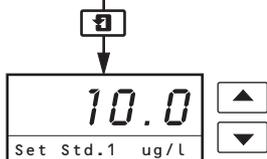


Enter the required calibration password between 00000 and 19999. If an incorrect value is entered, access to the sensor calibration is prevented and the display returns to the top of the sensor calibration page.

#### 6.3.1 Two Point Calibration Page

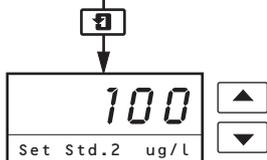


Select two point sensor calibration. This is always necessary for an initial setup.



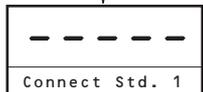
Set the calibration standard solution value between 0.10  $\mu\text{g kg}^{-1}$  and 10.0  $\text{mg kg}^{-1}$ .

**Note.** See Section 8.1.2 regarding the minimum concentration for static sodium solutions.

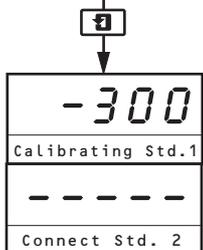


Set the calibration standard solution value between 0.50  $\mu\text{g kg}^{-1}$  and 10.0  $\text{mg kg}^{-1}$ .

**Note.** Standard 2 is always greater than Standard 1, and must be at least five times the value of Standard 1.



Connect the Standard 1 solution using the quick release coupling, and operate the 3-way changeover valve to allow the solution to pass through the flowcell.

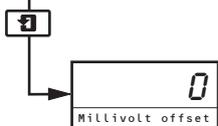


During calibration (15 minutes), the millivolt output from the electrode pair is displayed.

Disconnect the quick release coupling from the Standard 1 bottle and connect the Standard 2 solution in the same manner as Standard 1.

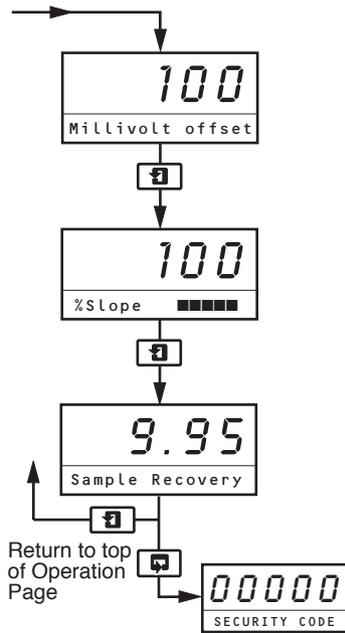


During calibration the millivolt output from the electrode pair is displayed.



continued on next page...

...continued from previous page



---

After 15 minutes, Millivolt Offset is displayed for a few seconds, followed by the %Slope display.

---

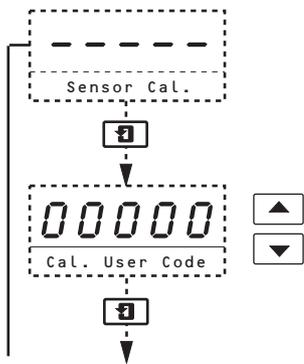
The % Slope is calculated and is used to indicate the quality of the electrode pair.

---

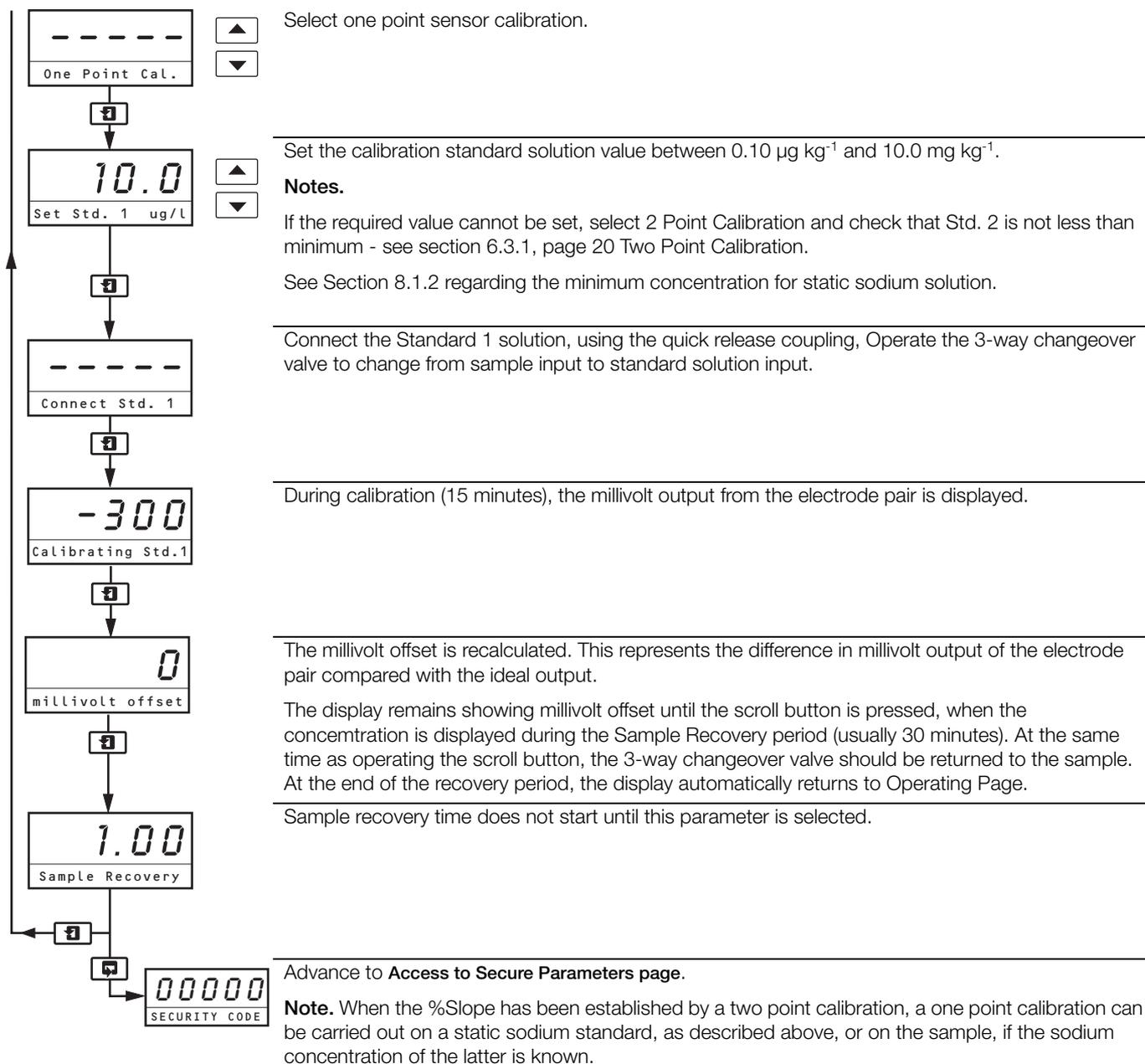
The display remains showing %Slope until the scroll button is pressed, when the concentration is displayed during the Sample Recovery period (usually 30 minutes). At the same time as operating the scroll button, the 3-way change-over valve should be returned to sample.  
At the end of this period, the display automatically returns to the Operating Page.

---

Advance to **Access to Secure Parameters page**.



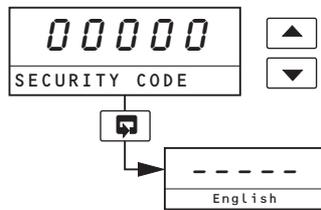
### 6.3.2 One Point Calibration Page



## 7 PROGRAMMING AND ELECTRICAL CALIBRATION

### 7.1 Access to Secure Parameters

A 5-digit security code is used for access to the secure parameters.

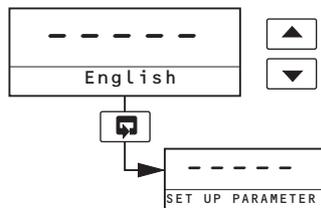


#### Security Code

Enter the required code number, between 00000 and 19999, to gain access to the secure parameters. If an incorrect value is entered, access to subsequent programming pages is prevented and the display reverts to the Operating Page.

Advance to **Select Language Page**, see section 7.2, page 23.

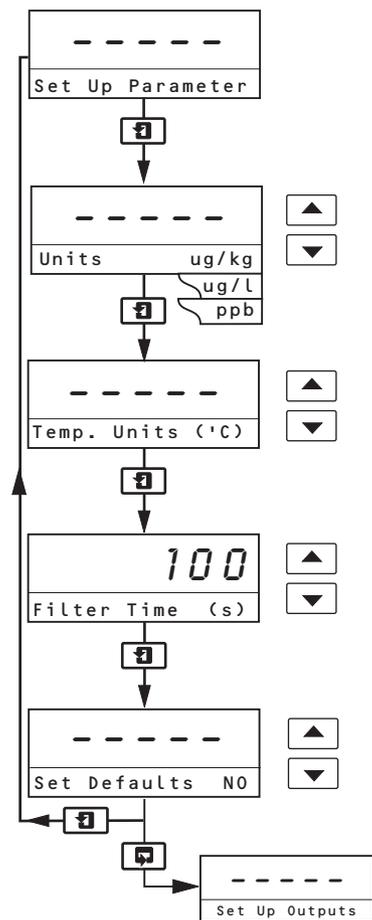
### 7.2 Select Language Page



Use the buttons to select the required language (English, French, German or Spanish).

Advance to **Set Up Parameters Page**.

### 7.3 Set Up Parameters Page



- press to advance to next parameter

or

- press to advance to **Set Up Outputs Page**, see section 7.4, page 25.

---

#### Units

The measured units can be displayed in  $\mu\text{g kg}^{-1}$ ,  $\mu\text{g l}^{-1}$  or ppb.

---

#### Temperature Units

The measured temperature can be displayed in degrees C or degrees F.

---

This is used to prevent short term variations in reading. A setting of 100 seconds will usually be found to give acceptably stable readings. The range is 10 to 500.

---

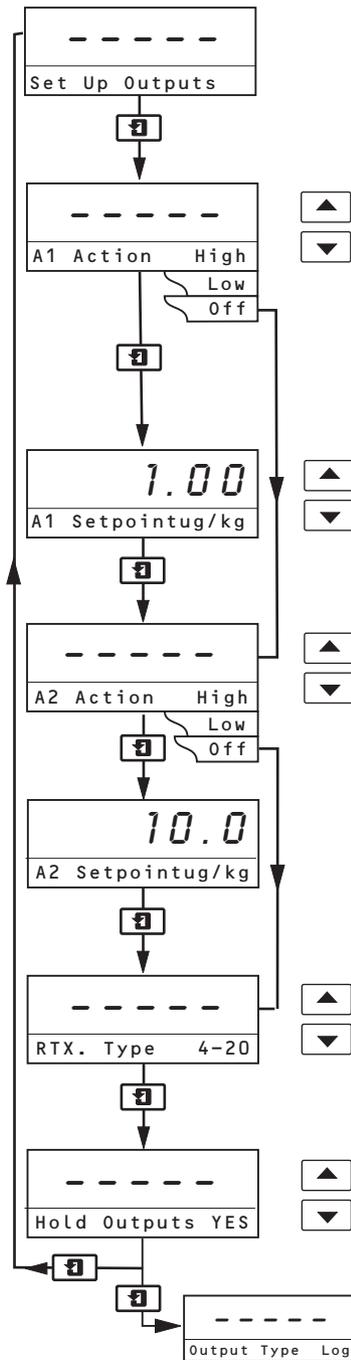
If 'YES' is selected, default values of zero millivolt offset and 100% Slope are inserted in the software.

**Note.** Previous calibration data will be lost

---

Advance to **Set Up Outputs Page**, see section 7.4, page 25.

### 7.4 Set Up Outputs Page



- press to advance to next parameter

or

- press to advance to **Set Up Outputs Page**, see section 7.4, page 25.

---

#### Alarm 1 Action

For 'Fail-safe' alarm operation the relay's alarm state must be the same as the power-down state, i.e. the relay is de-energised.

The set point band is defined as the actual value of the set point plus or minus the hysteresis value. The hysteresis value is  $\pm 1\%$  of the full span value displayed in the **Set Up Parameter Page** - see section 7.3, page 24. Alarm action occurs if the input value is above or below the set point band. If the input moves within the set point band the last alarm action is maintained.

---

The Alarm 1 set point can be set to any value between  $0.10 \mu\text{g kg}^{-1}$  and  $10.0 \text{ mg kg}^{-1}$ .

---

#### Alarm 2 Action

Repeat as for Alarm 1 Action above.

---

The Alarm 2 set point can be set to any value between  $0.10 \mu\text{g kg}^{-1}$  and  $10.0 \text{ mg kg}^{-1}$ .

---

Select the current output range. 0 to 10 mA, 0 to 20 mA or 4 to 20 mA.

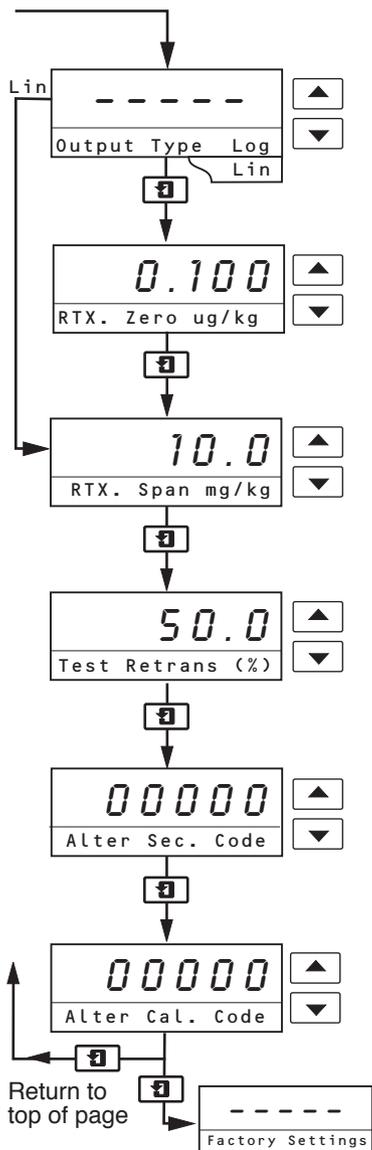
---

The current output and the relays can be held to prevent inadvertant operation during a sensor calibration. Select 'YES' to hold outputs, otherwise select 'NO'.

---

continued on next page...

...continued from previous page



The current output can be set to Logarithmic or Linear. To select Logarithmic select 'Log'. Otherwise select 'Lin'.

The zero current output can be set to any value between 0.10  $\mu\text{g kg}^{-1}$  and 100  $\mu\text{g kg}^{-1}$ . This is only available for Logarithmic output.

**Note.** For Linear output, the zero value is always 0  $\mu\text{g kg}^{-1}$ .

The span current output can be set to any value between 10.0  $\mu\text{g kg}^{-1}$  and 10.0  $\text{mg kg}^{-1}$  (logarithmic or linear).

**Note.** For Logarithmic output, the minimum span is two decades, and the maximum is four decades.

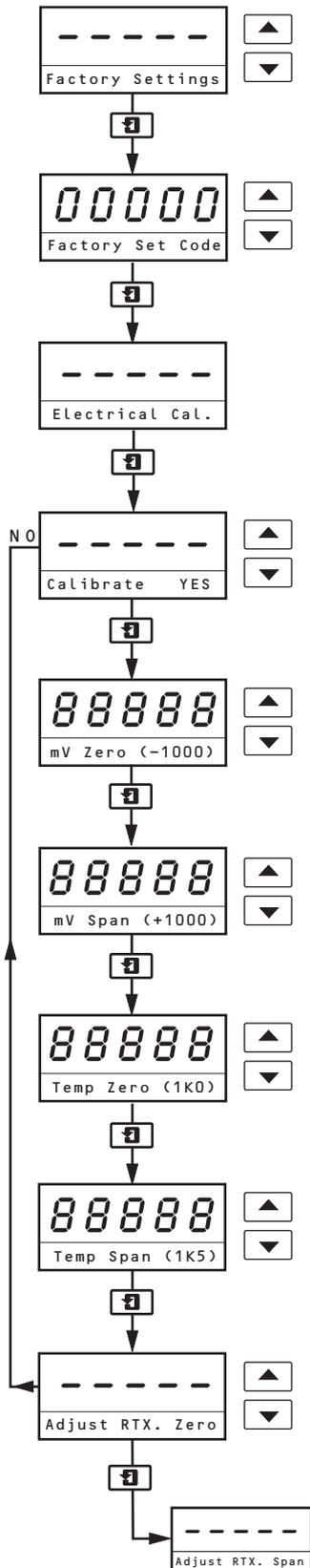
The instrument can transmit a signal of 0, 25, 50, 75 or 100% of the current output range.

Set the security code to a value between 00000 and 19999.

Set the calibration code to a value between 00000 and 19999.

Advance to **Factory Settings Page**

### 7.5 Factory Settings



Parameters in these pages are factory set and should not normally require adjustment. They can only be set up if the necessary equipment is available.

---

Enter the security code to access Electrical Calibration

---

Electrical Calibration Header

---

Select 'YES' to access the electrical calibration sequence. Select 'NO' to advance to Adjust current output zero.

---

Set the millivolt source to -1000 mV and allow the instrument display to stabilize.

Advance to next parameter.

---

Set the millivolt source to +1000 mV and allow the instrument display to stabilize.

Advance to next parameter.

---

Set the temperature simulator resistance box to 1000 ohms, and allow the instrument to stabilize.

Advance to next parameter.

---

Set the temperature simulator resistance box to 1500 ohms, and allow the instrument to stabilize.

Advance to next parameter.

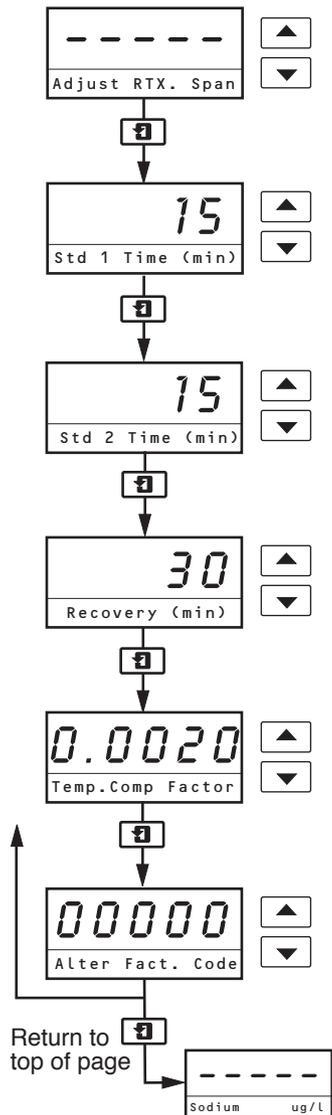
---

Adjust the milliamp reading to 4 mA.

---

continued on next page...

...continued from previous page.



Adjust the milliamp reading to 20 mA.

---

**Time for calibration on Standard 1.**

Usually set to 15 minutes, but can be set between 1 and 30 minutes. (1 minute is used for electrical simulation of calibration).

---

**Time for calibration on Standard 2.**

Usually set to 15 minutes, but can be set between 1 and 30 minutes (1 minute is used electrical simulation of calibration).

---

**Recovery Time.**

Time after returning to sample before the alarms are reactivated. Usually set to 30 minutes, but adjustable between 1 and 120 minutes.

---

**Temperature Compensation Factor.**

Represents the degree of electrical temperature compensation which is applied when calculating the sodium concentration value. Can be adjusted between 0.0010 and 0.0050, but is usually set to 0.0038.

---

Set the security code to a value between 00000 and 19999.

---

Return to **Operating Page**, see section 6.2, page 19.

## 8 MAINTENANCE

### 8.1 Chemical Solutions

The reagents and calibration solutions detailed in this section are required to keep the monitor operating. Solutions should be stored in plastic bottles and where possible, should be freshly made.

#### 8.1.1 Reagent Solutions

Two alternative reagent solutions may be used, depending on the required lower limit of measurement. Concentrated ammonia solution, which provides adjustment of sample pH to 10.7 is suitable for measurements of sodium ion to approximately  $0.5 \mu\text{g kg}^{-1}$ . At concentrations below this, hydrogen ion interference becomes significant and a reagent of 50% diethylamine solution should be used. This adjusts the sample pH between 11.2 and 11.5 and enables measurements to be made down to  $0.1 \mu\text{g kg}^{-1}$ .

1. Concentrated ammonia solution - one litre.

**Warning.** This reagent should only be handled under a fume hood. It causes burns and is irritating to the eyes, respiratory system and skin. Wear rubber gloves and eye protection. In warm weather pressure increases in the bulk container of ammonia and the cap must be released with care.

A 35% w/v solution (s.g. 0.88) is recommended, but lower concentrations, to a minimum of 30% w/v (s.g. 0.89), can be used - see section 8.1.1, page 29 which relates sodium concentration and pH.

2. Diethylamine Solution - (50%)

**Warning.** Diethylamine is an extremely inflammable and irritating colorless liquid with a strong smell of ammonia. It should be handled with care at all times. The following points should also be noted:

- ◇ Avoid breathing vapor and avoid contact with skin and eyes.
- ◇ Work under a fume hood, wearing rubber gloves and eye protection.
- ◇ In the event of a fire, extinguish with water spray, foam, dry powder or carbon dioxide.
- ◇ If a spillage occurs, shut off all possible sources of ignition, and instruct others to keep at a safe distance. Mop up spillage with plenty of water, diluting greatly. Ventilate the area well to evaporate any remaining liquid and dispel vapor.
- ◇ Effluent from the monitor contains diethylamine (if this reagent is used). Contact with it should also be avoided.

Put 500 ml of high purity water into the reagent container and carefully add 500 ml of analytical reagent grade diethylamine ( $\text{C}_2\text{H}_5)_2\text{NH}$ . Swirl the solution and allow it to cool to room temperature before fitting the container cap.

#### 8.1.2 Standard Solutions

The following instructions refer to the preparation of  $100 \mu\text{g l}^{-1}$  and  $1 \text{ mg l}^{-1}$  sodium, LOW and HIGH standard solutions respectively, but any concentrations can be prepared within the measuring range selected by appropriate dilution of the stock solution. For all practical purposes, ' $\mu\text{g l}^{-1}$ ' can be considered to be equal to ' $\mu\text{g kg}^{-1}$ ' ('ppb') and ' $\text{mg l}^{-1}$ ' equal to ' $\text{mg kg}^{-1}$ ' ('ppm').

Stock solution ( $1000 \text{ mg l}^{-1}$  sodium ions)

1. Dissolve 2.543 ( $\pm 0.001$ ) g of analytical reagent grade sodium chloride in approximately 100 ml high purity water. Transfer this solution to a one litre volumetric flask and make up to the one litre mark with more high purity water to give a stock solution of  $1000 \text{ mg l}^{-1}$  sodium ions. Store in a plastic container.
2. Pipette 10 ml of this solution to a one litre volumetric flask. Make up to the one litre mark with high purity water to give a solution of  $10 \text{ mg l}^{-1}$  sodium ions.
3. Pipette 10 ml of the  $10 \text{ mg l}^{-1}$  solution into a one litre volumetric flask and make up to the one litre mark with high purity water to give the LOW standard solution of  $100 \mu\text{g l}^{-1}$  sodium ions. Transfer this solution to the bottle labelled STANDARD SOLUTION 1 (LOW).
4. Transfer 100 ml of the  $10 \text{ mg l}^{-1}$  solution to a one litre volumetric flask and make up to the mark with high purity water to give the HIGH standard solution of  $1 \text{ mg l}^{-1}$  sodium ions. Transfer this solution to the bottle labelled STANDARD SOLUTION 2 (HIGH).
  - a. It is not advisable to prepare static sodium solutions of less than  $50 \mu\text{g l}^{-1}$  because low concentration solutions rapidly become contaminated and change in concentration.
  - b. Although the HIGH and LOW standard solutions are typically one decade apart in sodium concentration, any concentration difference can be used within the constraints of i) above and 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.

**Note.** High purity water = water containing less than  $2 \mu\text{g l}^{-1}$  sodium ions and a specific conductivity of less than approximately  $0.2 \mu\text{S cm}^{-1}$ .

### 8.1.3 Etch Solution

(for use on applications where the sample sodium concentration is below  $1 \mu\text{g kg}^{-1}$  - see section 8.2.2, page 30).

**Warning.** Sodium Fluoride is toxic. Avoid inhaling the dust and prevent contact with skin and eyes. Wear a dust mask, rubber gloves and eye protection. When prepared, the etch solution contains 0.1 M Hydrofluoric acid (0.2% HF). Take care to prevent contact with skin and eyes.

Dissolve 5.0 ( $\pm 0.2$ ) g analytical grade sodium fluoride, NaF, in approximately 400 ml high purity water. Add to this solution 20 ( $\pm 0.2$ ) ml 5M acetic acid\* ( $\text{CH}_3\text{COOH}$ ) and dilute to one litre.

\* 5M acetic acid can be prepared from concentrated acid by adding 144 ( $\pm 1$ ) ml analytical reagent grade glacial acetic acid (1.05 s.g.) to 500 ml of high purity water.

**Warning.** When preparing the acetic acid solution, carry out operation under a fume hood and observe the appropriate precautions when handling concentrated acids.

### 8.1.4 Salt Bridge Solution

This solution is required for refilling the double junction silver/silver chloride reference electrode at extended intervals. The solution supplied with the electrode (3.5 M potassium chloride) should be used for refilling using the plastic filler provided.

## 8.2 Scheduled Servicing

The following procedures are guides to the maintenance requirements of the monitor. The procedure chosen depends on the particular installation and sample conditions.

### 8.2.1 Weekly

If the monitor is continuously running at high concentrations ( $>100 \mu\text{g kg}^{-1}$ ) a weekly Single Point Calibration is recommended - see section 4.1, page 13. See also Section 8.4.1 which refers to the reference electrode.

### 8.2.2 Monthly

1. Replace the bottle of reagent solution. The level of solution should not be allowed to fall below about three-quarters full. On low ambient temperature installations and for low sodium concentrations, the solution may require replacement more frequently.
2. Reference electrodes. Refill using the solution supplied with the electrode:
  - For versions with a reservoir, check the level in the reference electrode reservoir and refill if the level is below 10mm (0.4 in.).
  - For versions without a reservoir, ensure the level is above the flow cell block. Refill as required.
3. The following procedures should be carried out:
  - When the sodium concentration is above  $1 \mu\text{g kg}^{-1}$ , carry out a Two Point Calibration - see section 6.3, page 20; note the Slope value.

- When the sodium concentration is below  $1 \mu\text{g kg}^{-1}$ , apply the following reactivation/etch procedure before carrying out a Two Point Calibration:

**Note.** When used for prolonged periods at low concentrations, leeching of sodium ions from the electrode surface accelerates the ageing process of the electrode which is shown by poor response time, low Slope value and a limitation to respond to low levels. Calibration may then be in error owing to slow response and poor reproducibility.

The reactivation procedure minimizes problems from these sources.

1. Remove the sodium electrode from the flowcell and slide off the sleeve and 'O' ring; it is unnecessary to detach the electrode lead.
2. Prepare two plastic beakers, one containing about 50 ml of etch solution, the other about 200 ml high purity water.
3. Dip the electrode in the etch solution for 60 ( $\pm 5$ ) seconds; then rinse in high purity water.

**Caution.** It is important not to exceed the etch time or the performance of the electrode may be permanently degraded.

4. Dispose of the etch solution by diluting to waste with plenty of water. Use fresh etch solution each time.
5. Fit the 'O' ring and sleeve and return the electrode to the flowcell. Run the monitor for one to two hours on low level sodium sample before attempting a calibration. No further calibration should be needed until the next reactivation procedure.

**Note.**

- ⚡ It is important that this procedure is carried out at regular monthly intervals and that the process is started as soon as a new electrode is put into service.
- ⚡ It is extremely difficult to recover an 'old' electrode.

### 8.2.3 12-Monthly

1. Check the condition of all plastic tubing; replace it as required.
2. Clean the flowcell and the Pt1000 Temperature Compensator, to remove any deposits.

To remove the Temperature compensator, unscrew the compensator sleeve (see Fig. 4.1) and withdraw the compensator from the flowcell.

When replacing the compensator, ensure that the O-ring is in place below the flange on the compensator, and the skid washer is in place above the flange.

### 8.3 Shut-Down Procedures

1. Close the sample valve upstream of the monitor.
2. Remove the reagent container and safely dispose of the solution. Rinse the containers thoroughly.

**Warning.** For safe handling instructions of reagent solutions - see section 8.1.1, page 29.

3. Fill the calibration solution container with high purity water and do a single point calibration to flush the system.
4. Remove the electrodes and follow procedure in Section 8.3.1.
5. Use a syringe to flush all tubing with high purity water. This removes any particulate deposits.
6. Switch off the mains supply to the Transmitter Unit.

#### 8.3.1 Storage of Electrodes

Fill the rubber teat, supplied with the sodium electrode, with 1 mg kg<sup>-1</sup> sodium containing a few drops of concentrated ammonia solution - see section 8.1.1, page 29 for safe handling of ammonia solutions. Push the teat over the end of the electrode. Fill the rubber teat supplied with the reference electrode with salt bridge solution and push the teat over the end of the electrode. Refit the filling hole plug to seal the refill aperture.

**Note.** Do not let either electrode dry out.

### 8.4 Unscheduled Servicing

#### 8.4.1 Diagnostic Messages

The following table shows the messages displayed on the measured sodium value scroll in the Operating page.

| Condition                  | 5 Character Display  | 16 Character Display  |
|----------------------------|----------------------|-----------------------|
| Pt1000 > 2000w             | Flashes Sodium Value | Open Circuit. Pt1000  |
| Pt1000 < 500w              | Flashes Sodium Value | Short Circuit. Pt1000 |
| Sample Temperature > 55 °C | Flashes 'Hot'        | Solution too hot      |
| Sample Temperature < 5 °C  | Flashes 'Cold'       | Solution is cold      |

Table 8.1 Messages

#### 8.4.2 Calibration pass and fail limits

After a two point calibration, the percentage Slope is calculated. The calibration pass limits and their meanings are shown below in Table 8.2.

Any unpredictable problems may be due to the standard or reagent solutions. If doubts exist about the integrity of these solutions they should be replaced with freshly prepared solutions in the early stages of the fault finding investigations.

The accuracy of the monitor is controlled by the condition of all the solutions involved, one or more of which can be incorrectly made or contaminated.

Measuring the pH of the effluent from the flowcell indicates adequate buffering. The minimum pH depends on the minimum sodium concentration, but the pH value is calculated as:

pH must be greater than pNa + 3 , so ideally at:

100 µg kg<sup>-1</sup> Na+, the pH must be greater than 8.4

10 µg kg<sup>-1</sup> Na+, the pH must be greater than 9.4

1 µg kg<sup>-1</sup> Na+, the pH must be greater than 10.4

0.1 µg kg<sup>-1</sup> Na+, the pH must be greater then 11.4

**Note.** If the reagent is allowed to become completely exhausted, the reading may be very erratic due to the lack of ionic strength adjustment of the high purity sample.

Mechanical components involved with liquid handling should be systematically checked for leaks or blockages as they change the chemical conditions around the electrode. Most problems are found to be associated with the chemistry and the liquid handling section.

#### 8.4.3 Replacement of Plastic Tubing

In time, certain sections of plastic tubing require replacement, due to leakage, blockages or poor condition. It is good practice to replace all plastic tubing every twelve months. Use only the correct size and type of tube.

Two specific sections of tubing are critical:

1. Between the constant head unit and the entrainment 'T' piece: Cut 100 mm of the 1 mm i.d. silicon rubber tube and fit onto the tube connectors. The tube should be taut; any changes to this tube interfere with the flow and self starting characteristics.
2. Between the reagent container and entrainment 'T' piece; this must be a polyethylene lined tube which has good chemical resistance to the reagent.

| Percent Slope | Displayed Lights  | Action   |
|---------------|-------------------|--|
| ±110%         | 5 lights flashing | Calibration unacceptable.<br>New coefficients ignored and the 8037 transmitter unit continues to use the last known good coefficients. Check correct standard solutions have been used or entered.   |
| ±93%          | 5 lights          | Calibration accepted. New coefficients saved into non-volatile memory.   |
| ±86%          | 4 lights          | Calibration accepted. New coefficients saved into non-volatile memory.<br>Electrode pair are deteriorating.  |
| ±79%          | 3 lights          | Calibration accepted. New coefficients saved into non-volatile memory. Recommend electrode pair are serviced or replaced.  |
| <79%          | 2 lights flashing | Calibration unacceptable.<br>New coefficients ignored and the 8037 transmitter unit continues to use the last known good coefficients.<br>Check that correct standard solutions have been used or entered.<br>If solutions are satisfactory, replace the electrode pair and calibrate. |

Table 8.2 Calibration Pass Limits

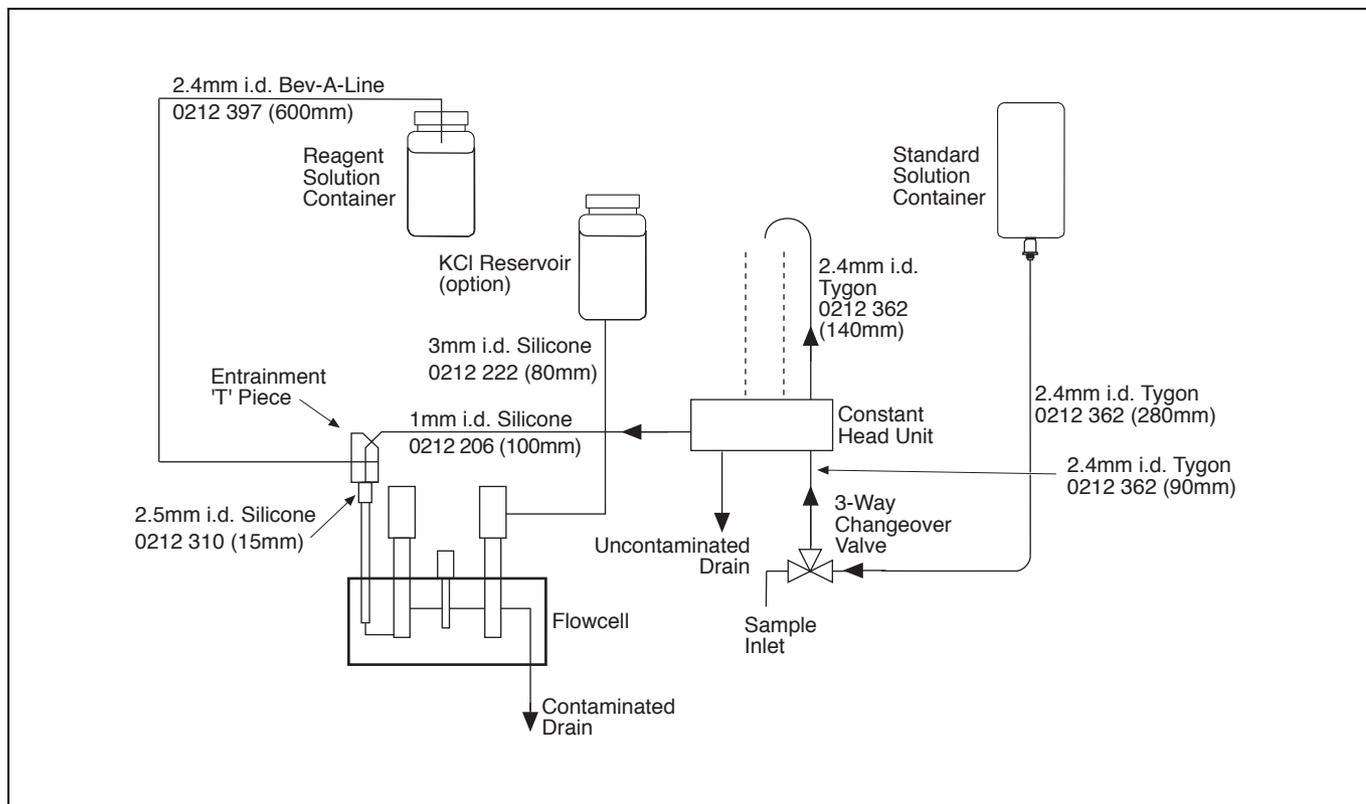


Fig. 8.1 Replacement of Plastic Tubing

## 9 SPARES LIST

No consumable spares are required for this instrument.

### Refurbishment Spares. One Year's Requirement.

| Part no. | Description  | No. Required |
|----------|--|--------------|
| 1048 836 | Low level sodium electrode (cable detached)  | 1            |
| 1048 837 | Low level sodium electrode (cable attached)  | 1            |
| 1436 836 | Reference electrode (cable detached)   | 1            |
| 1436 837 | Reference Chloride electrode (cable attached)  | 1            |
| 1436 840 | Reference electrode reservoir head type (cable detached)   | 1            |
| 8037 140 | Refurbishment Spares Kit ('O' rings & Tubing).<br><b>Note.</b> This does not include the tubing for the KCL Reservoir option | 1            |
| 0212 222 | 3mm i.d. Silicone tubing 1m (KCl Reservoir option)   | 1            |

### Strategic Spares Rarely Requiring Replacement

| Part no. | Description  | No. Required |
|----------|--|--------------|
| 8037 150 | Reservoir-fed Reference Electrode Upgrade Kit            | 1            |
| 0214 047 | Tube connector 1.5 mm                                    | 6            |
| 0214 059 | Mini-Plug (end of flowcell)                              | 2            |
| 0214 071 | Tube Connector 2.5mm i.d. tube                           | 6            |
| 0214 526 | Hose connector 9.5 mm on constant head unit and flowcell | 2            |
| 8061 660 | Knurled nut on flowcell                                  | 2            |
| 8036 216 | Entrainment 'T' piece                                    | 1            |
| 8035 677 | Entrainment/earthing tube                                | 1            |
| 8037 095 | Reagent bottle assembly                                  | 1            |
| 8037 085 | Standard solution bottle assembly (LOW)                  | 1            |
| 8037 086 | Standard solution bottle assembly (HIGH)                 | 1            |
| 0216 513 | Male coupling used in standard solution bottle assembly  | 2            |
| 8037 055 | Pt1000 Temperature Compensator Assembly (1m)             | 1            |
| 8037 056 | Pt1000 Temperature Compensator Assembly (3m)             | 1            |
| 8037 057 | Pt1000 Temperature Compensator Assembly (5m)             | 1            |
| 8037 058 | Pt1000 Temperature Compensator Assembly (10m)            | 1            |
| 8037 062 | Pt1000 assembly clamp screw                              | 1            |
| 8037 063 | Pt1000 assembly thrust washer                            | 1            |

| Part no. | Description   | No. Required |
|----------|---|--------------|
| 8037 050 | Flowcell complete assy. (less electrodes)   | 1            |
| 8037 070 | Constant head unit assembly   | 1            |
| 8036 286 | Sodium electrode retaining sleeve   | 1            |
| 0216 558 | 3-way change over valve   | 1            |
| 8037 110 | Environmental cover assembly kit  | 1            |
| 8037 115 | Ammonia Condensate Trap   | 1            |
| 0216 514 | Female coupling used to connect Standard mixture bottle to 3-way changeover valve | 1            |

### Cable Detached Electrodes

| Part no. | Description                              | No. Required |
|----------|--|--------------|
| 1401 500 | Sodium Electrode cable assembly (1m)     | 1            |
| 1403 500 | Sodium Electrode cable assembly (3m)     | 1            |
| 1405 500 | Sodium Electrode cable assembly (5m)     | 1            |
| 1410 500 | Sodium Electrode cable assembly (10m)    | 1            |
| 1431 875 | Reference Electrode cable assembly (1m)  | 1            |
| 1431 876 | Reference Electrode cable assembly (3m)  | 1            |
| 1431 877 | Reference Electrode cable assembly (5m)  | 1            |
| 1431 878 | Reference Electrode cable assembly (10m) | 1            |

### PCB Assemblies, Wall Mounted

| Part no.  | Description   | No. Required |
|-----------|---|--------------|
| 8037 570  | Complete Main PCB Assy. for single current O/P                    | 1            |
| 8037 571  | Complete Main PCB Assy. for single current O/P plus Serial/ModBus | 1            |
| 8037 572  | Complete Main PCB Assy. for 2 current O/P ver.                    | 1            |
| 4600/0295 | Display PCB Assy.   | 1            |
| 8037 580  | Sodium Module PCB Assy.   | 1            |
| 4600/0405 | Retransmission Output Module Assy                                 | 1            |

**PCB Assemblies, Panel Mounted**

| <b>Part no.</b> | <b>Description</b>  | <b>No.<br/>Required</b> |
|-----------------|---|-------------------------|
| 8037 575        | Complete Main PCB Assy. (cropped) for single current O/P          | 1                       |
| 8037 571        | Complete Main PCB Assy. for single current O/P plus Serial/ModBus | 1                       |
| 8037 576        | Complete Main PCB Assy. (cropped) for 1 O/P plus Serial/ModBus    | 1                       |
| 8037 577        | Complete Main PCB Assy. (cropped) for 2 current O/P               | 1                       |
| 4600/0246       | Main PCB Assy. (cropped) (PSU)                                    | 1                       |
| 4600/0285       | Mother PCB Assy   | 1                       |
| 8037 580        | Sodium Module PCB Assy.   | 1                       |
| 4600/0405       | Retransmission O/P Module Assy                                    | 1                       |

**Consumables**

| <b>Part no.</b> | <b>Description</b>                      | <b>No.<br/>Required</b> |
|-----------------|---|-------------------------|
| 1431 242        | Reference electrolyte 3.5M KCL (3x60ml) | 1                       |

## 10 Specification

### General

#### Display

|                |  |
|----------------|--|
| Measured value | 5-digit, 7-segment back-lit LCD                    |
| Information    | 16-character, single-line, dot matrix back-lit LCD |

#### Display range

0.01 µg kg-1 to 10 mg.kg-1

#### Units of measure

ppb / ppm  
µg/l / mg/l  
µg kg-1 / mg.kg-1

#### Current output expansion

Scale expansion between 2 and 4 decades logarithmic or the equivalent linearized  
Programmable in the range 0.10 µg kg-1 to 10 mg kg-1  
Maximum load resistance 500 Ohms (20 mA)

#### Display resolution

|              |          |              |    |              |
|--------------|----------|--------------|----|--------------|
| 0.01 µg kg-1 | in range | 0.01 µg kg-1 | to | 9.99 µg kg-1 |
| 0.1 µg kg-1  | in range | 10.0 µg kg-1 | to | 99.9 µg kg-1 |
| 1 µg kg-1    | in range | 100 µg kg-1  | to | 999 µg kg-1  |
| 0.01 mg kg-1 | in range | 1.00 mg kg-1 | to | 9.99 mg kg-1 |

#### Accuracy

±10 % of concentration or ±0.1 µg kg-1 whichever is the greater (when sample temperature is within ±5 °C (±9 °F) of calibration temperature)

#### Reproducibility

±5 % of concentration or 0.1 µg kg-1 (whichever is the greater) at constant temperature

#### Response time

1 to 100 µg kg-1 less than 4 minutes for 90 % step change  
100 to 1 µg kg-1 less than 6 minutes for 90 % step change

#### Temperature compensation

Automatic within ±5 °C (±9 °F) of calibration temperature

#### Current outputs

One, fully isolated  
Two, fully isolated (optional)  
0 to 10, 0 to 20 or 4 to 20 mA, programmable

#### Serial communication

RS422/RS485 (optional)  
Modbus compatible

#### Alarms

Two fail-safe, high and low concentration alarms  
Hysteresis ±1 % of FSD (fixed)  
Relay contacts (single pole changeover)

|         |                 |                  |
|---------|-----------------|------------------|
| Rating  | 250 V AC        | 250 V DC max.    |
|         | 3 A AC          | 3 A DC max.      |
| Loading | (non-inductive) | 750 VA 30 W max. |
|         | (inductive)     | 75 VA 3 W max.   |

Insulation, contacts to earth: 2 kV RMS

#### Calibration

Manual initiation of calibration sequence  
Calibration frequency (typically) weekly for 1-point, and 4-weekly for 2-point calibration

### Installation Information

#### Sample temperature

5 to 55 °C (41 to 131 °F)

#### Sample flow

50 ml/min-1 to 500 ml/min-1

#### Sample pressure (gauge)

Maximum 0.14 bar (2 psi)  
Outlet from sensing panel must go to atmospheric drain

#### Ambient temperature

0 to 55 °C (32 to 131 °F)

#### Dimensions of sensing panel

250 mm (9.84 in) wide x 440 mm (17.32 in) high  
(690 mm [27.16 in] high to clear bottle assemblies) x  
160 mm (6.29 in) deep

#### Mounting for sensing panel

Four holes – 8.5 mm (0.33 in) diameter  
200 mm (7.87 in) horizontal  
325 mm (12.79 in) vertical

#### Weight of sensing panel

11 kg (24.3 lb) (including optional environmental cover)

#### Connections to sensing panel

Sample inlet 1/4 in OD compression fitting (6.3 mm)  
Sample drains 10 mm (0.39 in) ID flexible, atmospheric drain

#### Dimensions of transmitter unit

Wall-mount unit  
160 mm (6.29 in) x 214 mm (8.42 in) x 68 mm (2.67 in)  
Panel-mount unit  
96 mm (3.78 in) x 96 mm (3.78 in) x 191 mm (7.52 in)  
(cut-out 92 mm [3.62 in] x 92 mm [3.62 in])

#### Weight of transmitter unit

Wall-mount: 2 kg (4.41 lb)  
Panel-mount: 1.5 kg (3.31 lb)

#### Power supply requirements

115 V nom. ±15 V, 50/60 Hz or  
230 V nom. ±30 V, 50/60 Hz

#### Power consumption

<10 VA

#### Insulation, mains to earth

2 kV RMS

#### Max. cable core sizes

Mains supply 32/0.2 mm  
Signal 24/0.2 mm

#### Maximum distance between sensor & transmitter unit

10 m (32.8 ft)

### Environmental Data

#### Storage temperature limits

0 °C to 55 °C (32 to 131 °F)

#### Operating humidity limits

Up to 95 % RH non-condensing

#### Environmental protection

Wall-mount transmitter IP66/NEMA4X  
Panel-mount transmitter IP66/NEMA4X (front)

## Appendix A

### A.1 Optional 2nd Retransmission Output

This appendix contains additional information for the second retransmission output and must be used in conjunction with details given in the main body of this document.

Electrical connections shown in Fig. A.1 and Fig. A.2 replace those in Fig. 3.6 and Fig. 3.7. Programming information is shown on page 39 and 40.

**Warning.** Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltages are switched off.

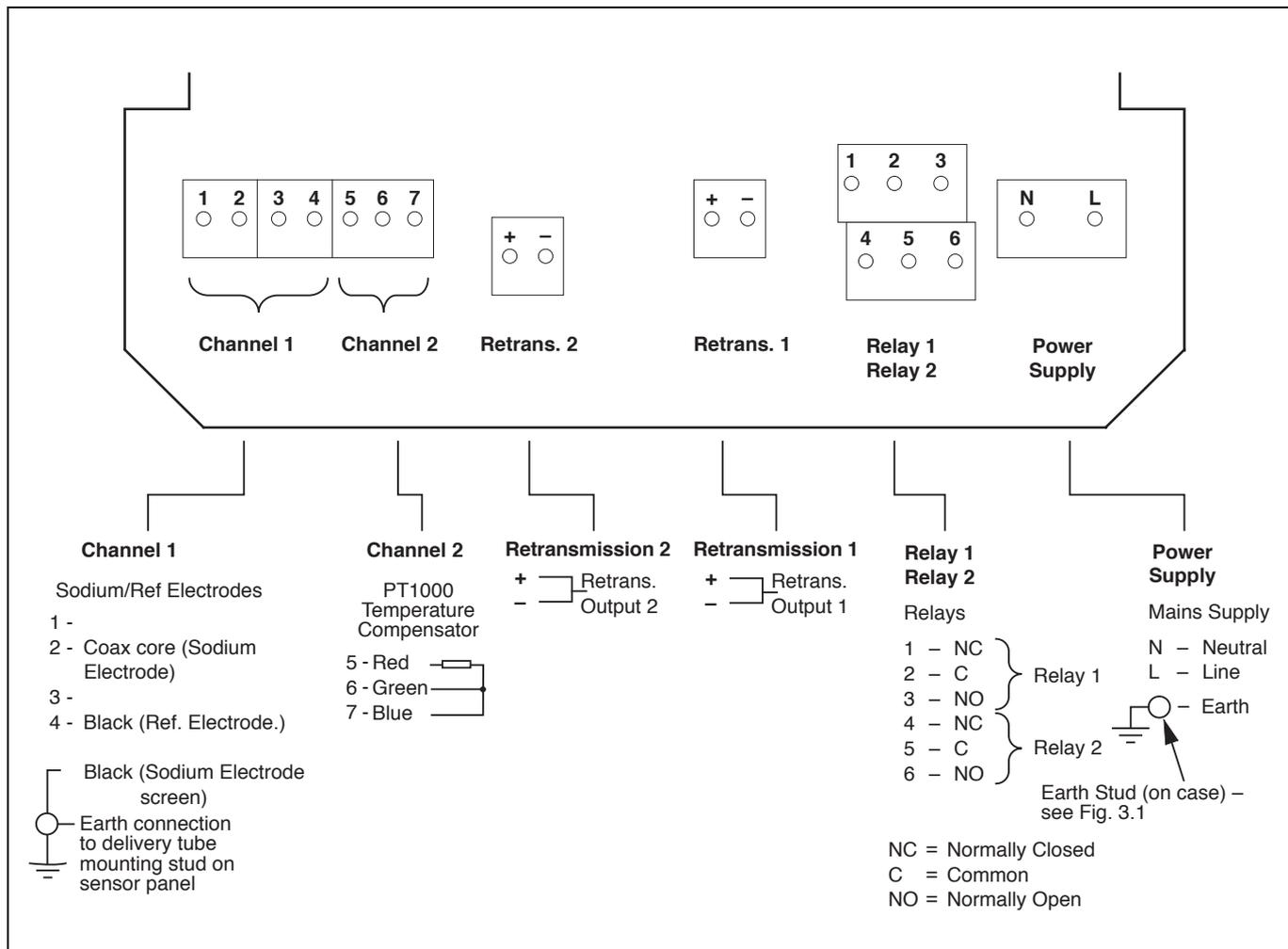


Fig. A.1 Second Retransmission Connections, Wall/Pipe-mounted Instruments

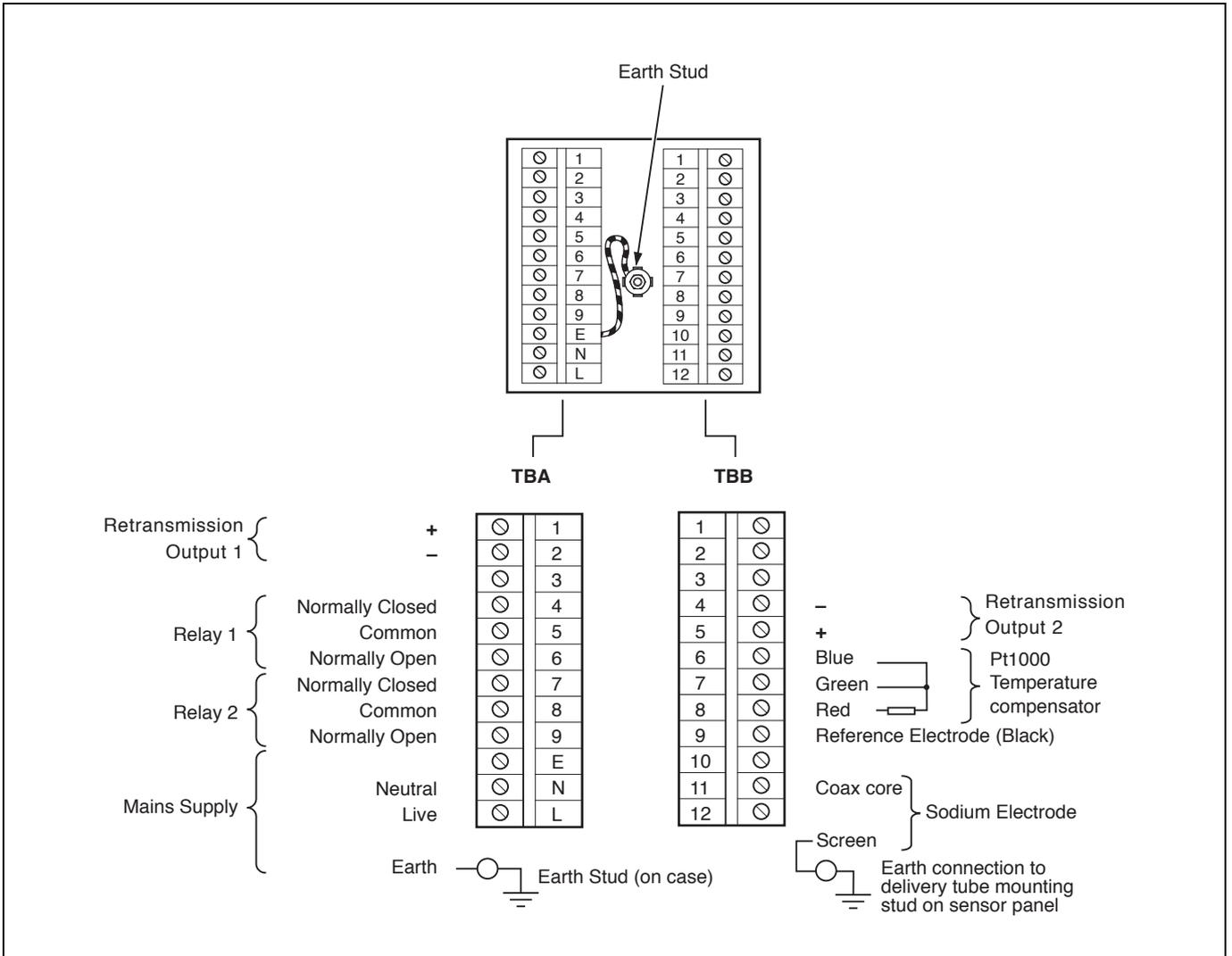


Fig. A.2 Second Retransmission Connections, Panel-mounted Instruments

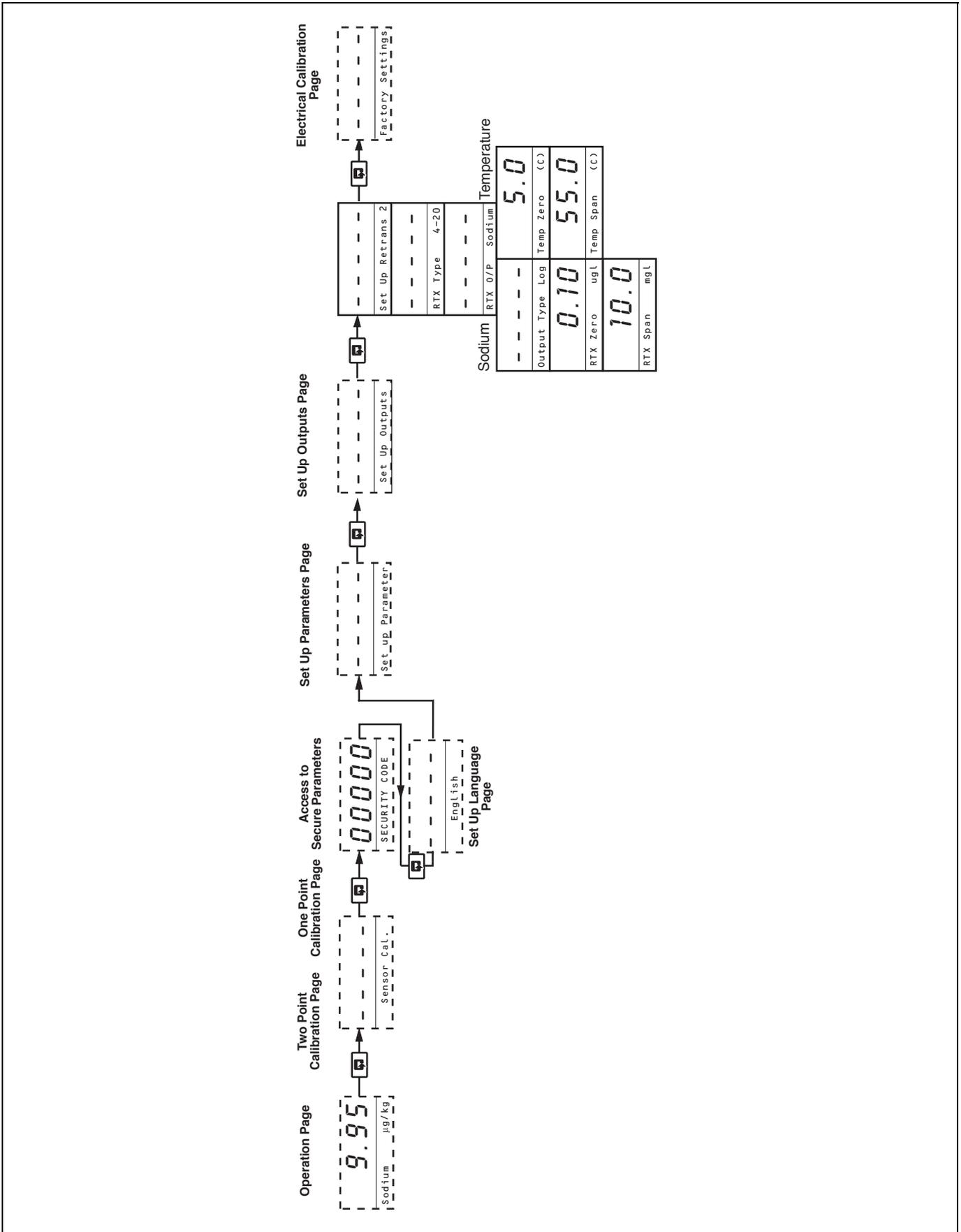
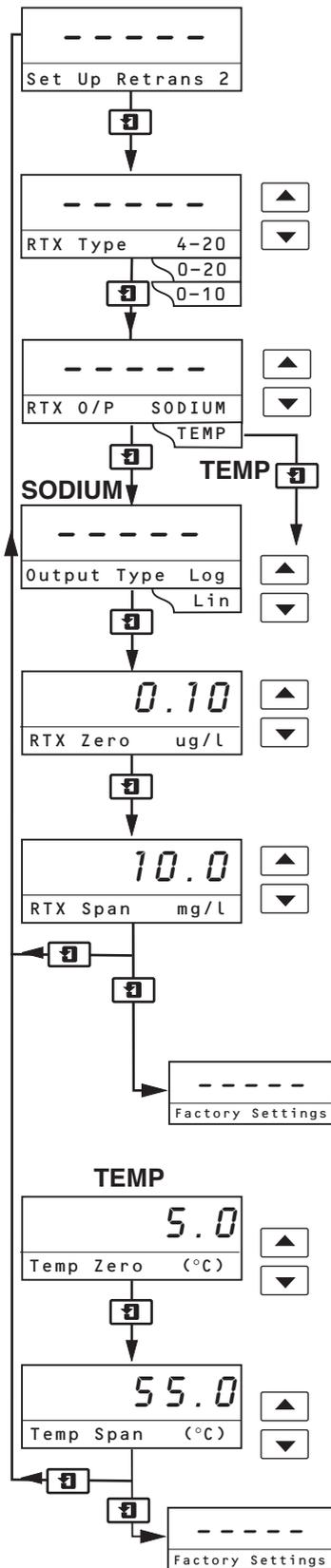


Fig. A.3 Overall Programming Chart Showing Position of Second Retransmission Output Page



**Retransmission 2 Page Header**

**Retransmission 2 Output Current Range**

The retransmission 2 output can be selected from three mA current ranges to ensure compatibility with the peripheral device connected.

**Retransmission Output Assignment**

The retransmission output can be assigned to monitor sodium or temperature.

SODIUM: range as for Retransmission 1 Output.

TEMP: programmable - see below.

The current output can be set to Logarithmic or Linear. To set to Logarithmic select 'Log'. Otherwise set to 'Lin'.

The zero current output can be set to any value between 0.10  $\mu\text{g kg}^{-1}$  and 100  $\mu\text{g kg}^{-1}$ . This is only available for Logarithmic output.

**Note.** For Linear output the zero value is always 0  $\mu\text{g kg}^{-1}$ .

The span current output can be set to any value between 10.0  $\mu\text{g kg}^{-1}$  and 10.0  $\text{mg kg}^{-1}$  (Logarithmic or Linear).

**Note.** For Logarithmic output the minimum span is two decades, and the maximum span is four decades.

Advance to **Factory Settings Page**.

The zero output can be set to any value between 5°C and 45°C (41°F to 113°F). See Note below.

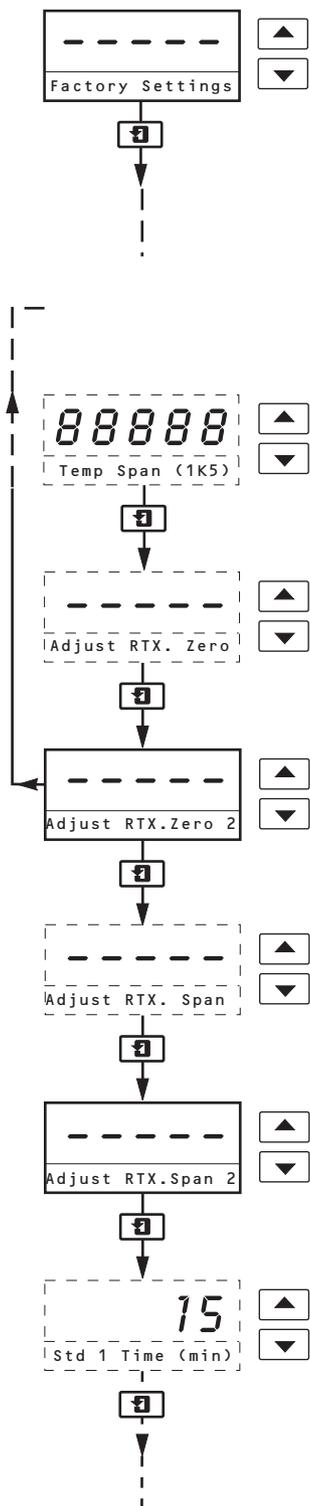
The span output can be set to any value between 15°C and 55°C (59°F to 131°F). See Note below.

Advance to **Factory Settings Page**

**Note.** The minimum range between Zero Output and Span Output is 10°C (18°F).

### Factory Settings Page

**Note.** The Factory Settings page, see page see section 7.5, page 27, will have two extra parameters which will require setting as shown below.



---

Adjust the milliamp reading to 4 mA.

---

Advance to next parameter.

---

Adjust the milliamp reading to 20 mA.

---

Advance to next parameter.

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We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

### UK

ABB Limited  
Tel: +44 (0)1453 826661  
Fax: +44 (0)1453 829671

### USA

ABB Inc.  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

### Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification. Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

- A listing evidencing process operation and alarm logs at time of failure.
- Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

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