



# ABB

## The Company

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

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

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.

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company and is indicative of our dedication to quality and accuracy.

EN ISO 9001:2000



Cert. No. Q 05907

EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A

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 |  | Direct current supply only                           |
|  | <b>Caution</b> – Risk of electric shock               |  | Alternating current supply only                      |
|  | Protective earth (ground) terminal                    |  | Both direct and alternating current supply           |
|  | Earth (ground) terminal                               |  | 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.

## Contents

|          |   |          |
|----------|---|----------|
| <b>1</b> | <b>Introduction .....</b>                 | <b>2</b> |
| 1.1      | Description .....                         | 2        |
| <b>2</b> | <b>Electrical Connections .....</b>       | <b>2</b> |
| 2.1      | Electrical Connections .....              | 2        |
| <b>3</b> | <b>Configuration .....</b>                | <b>4</b> |
| 3.1      | 4670, 8037, 9437 and 9438 Analyzers ..... | 4        |
| 3.2      | 8230 Series Analyzers .....               | 5        |
| 3.3      | 8240 Series Analyzers .....               | 6        |
| 3.4      | PROFIBUS Master Configuration .....       | 7        |
| <b>4</b> | <b>Profibus Database .....</b>            | <b>8</b> |
| 4.1      | 4670 Holding Registers .....              | 8        |
| 4.2      | 8230 Series Analyzers .....               | 9        |
| 4.3      | 8037 Analyzers .....                      | 11       |
| 4.4      | 8241 Single-stream Analyzers .....        | 12       |
| 4.5      | 8241 Multi-stream Analyzers .....         | 14       |
| 4.6      | 8242 Single-stream Analyzers .....        | 16       |
| 4.7      | 8242 Multi-stream Analyzers .....         | 18       |
| 4.8      | 9437 and 9438 Analyzers .....             | 20       |

## 1 Introduction

The netTAP is a modular, universal gateway device that enables connection of pre-configured Modbus ABB water analyzers to a PROFIBUS DP network. This manual describes how to connect the netTAP to 8037, 8230 Series, 8240 Series, 9437 and 9438 water analyzers. It also includes tables detailing the contents of the PROFIBUS registers of each analyzer.

This manual must be read in conjunction with the appropriate Operating Instructions, depending on the instrument type:

|  |           |
|--|-----------|
| 4670 Turbidity Systems                           | – IM/4670 |
| 8037 Sodium Monitor                              | – IM/8037 |
| 8231 Fluoride Monitor                            | – IM/8231 |
| 8232 Ammonia Monitor                             | – IM/8232 |
| 8234 Chloride Monitor                            | – IM/8234 |
| 8235 Chloride Monitor                            | – IM/8235 |
| 8236 Nitrate Monitor                             | – IM/8236 |
| 8237 Carbon Dioxide Monitor                      | – IM/8237 |
| 8241 Silica Monitor                              | – IM/8241 |
| 8242 Phosphate Monitor                           | – IM/8242 |
| 9437 Low and High Level Dissolved Oxygen Monitor | – IM/9437 |
| 9438 Low and High Level Dissolved Oxygen Monitor | – IM/9438 |

The netTAP unit must be installed as described in the Installation manual supplied with the device.

### 1.1 Description

The netTAP is equipped with two serial interfaces; a DSub PROFIBUS system connector and an in-built 5-wire cable for connection to the analyzers. The device is powered by a 24 V DC supply and is equipped with a diagnostics port to enable an RS232 connection to a PC.

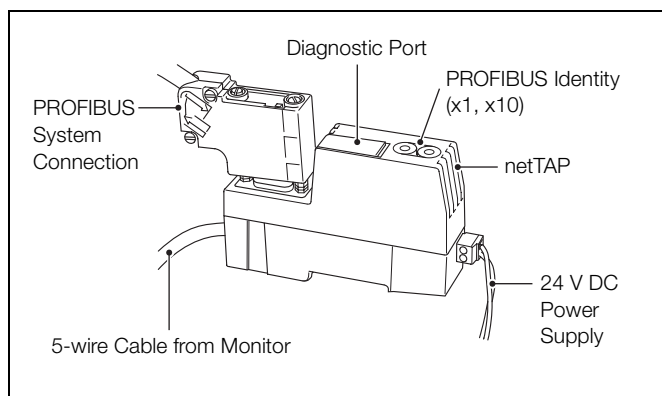


Fig. 1.1 netTAP Device

## 2 Electrical Connections

### 2.1 Electrical Connections

Connect the color-coded 5-wire cable supplied with the netTAP device to the monitor as shown in Figs. 2.1 to 2.3.

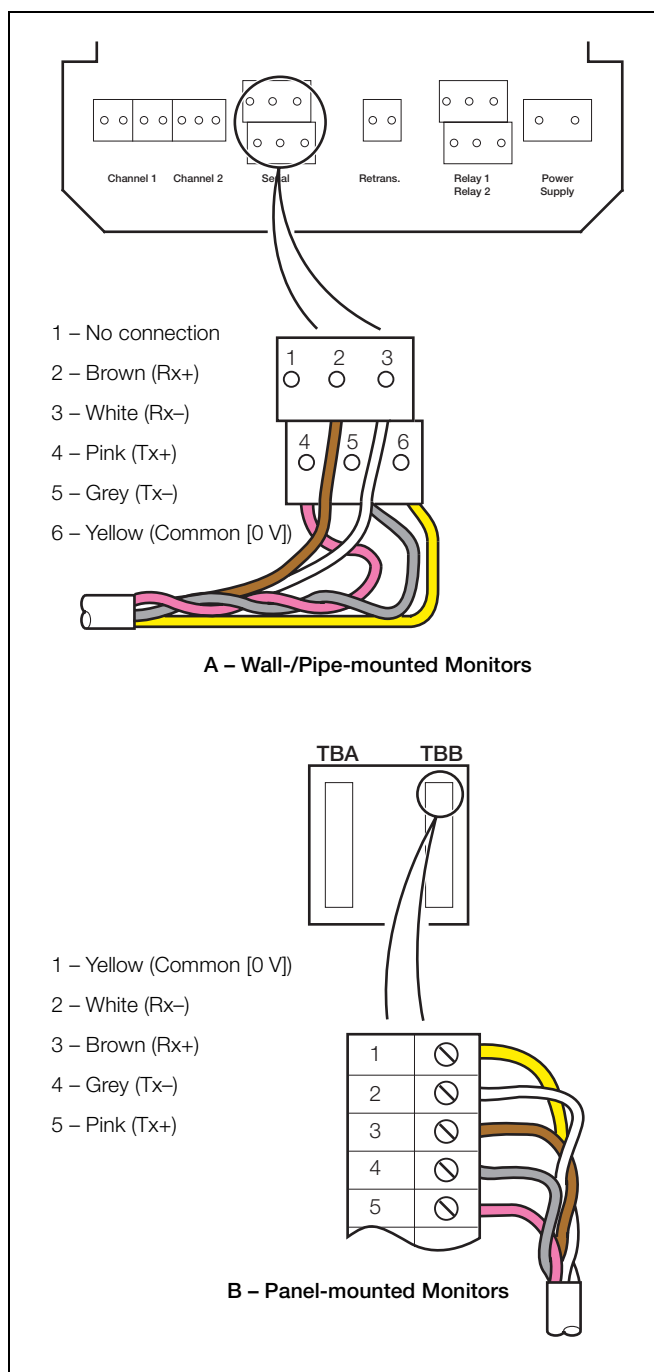


Fig. 2.1 Electrical Connections – 4670, 8037, 9437 and 9438 Analyzers

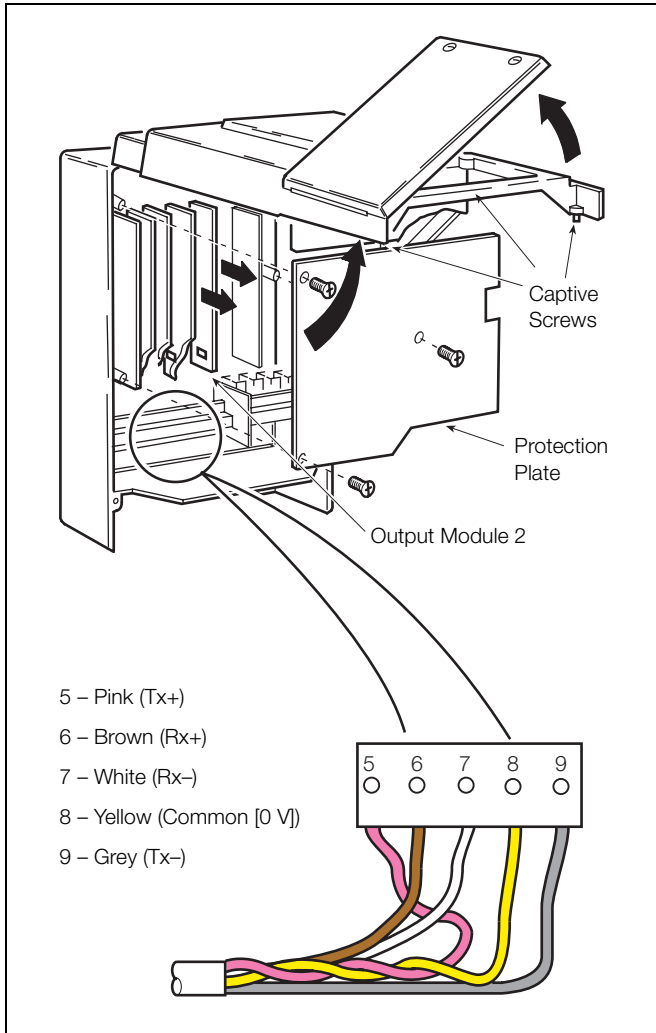


Fig. 2.2 Electrical Connections – 8230 Series Analyzers

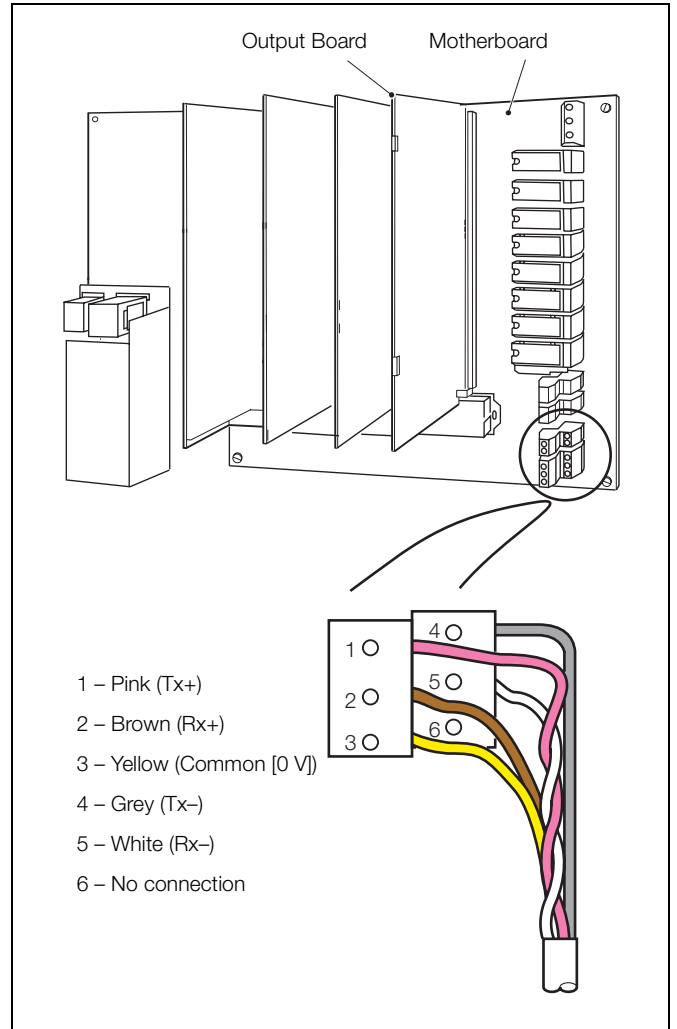


Fig. 2.3 Electrical Connections – 8240 Series Analyzers

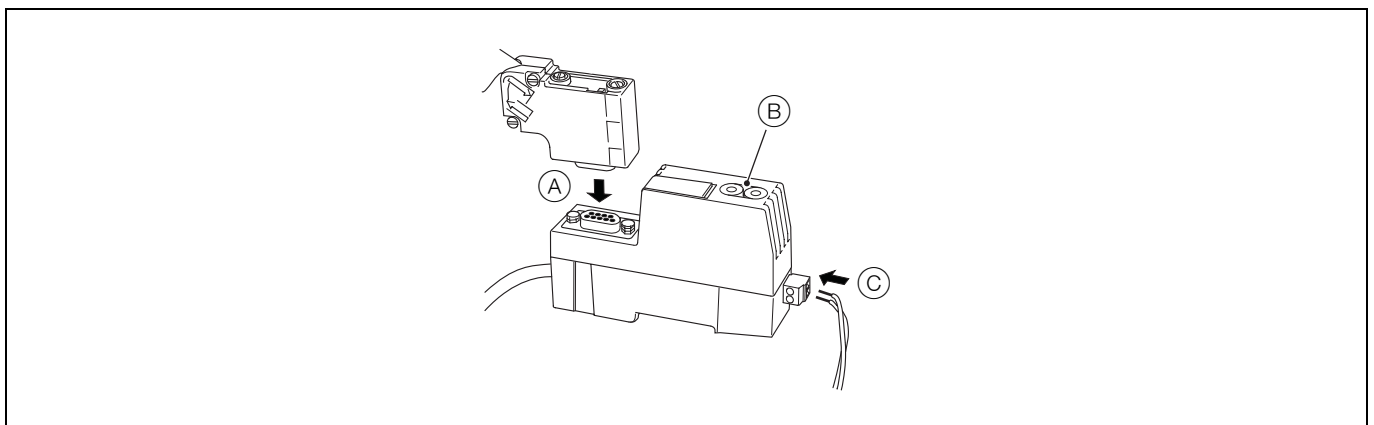


Fig. 2.4 netTAP Connections – 4670, 8037, 9437 and 9438 Analyzers

To connect the netTAP:

1. Connect the Profibus System Connection Plug (A).
2. Enter the Profibus Instrument Identity number on the dials (B).
3. Connect the 24 V dc (C).

### 3 Configuration

#### 3.1 4670, 8037, 9437 and 9438 Analyzers

The general programming procedure is as detailed in the relevant User Guide but with an additional SERIAL INTERFACE page between the SET UP OUTPUTS and ELECTRICAL CAL pages.

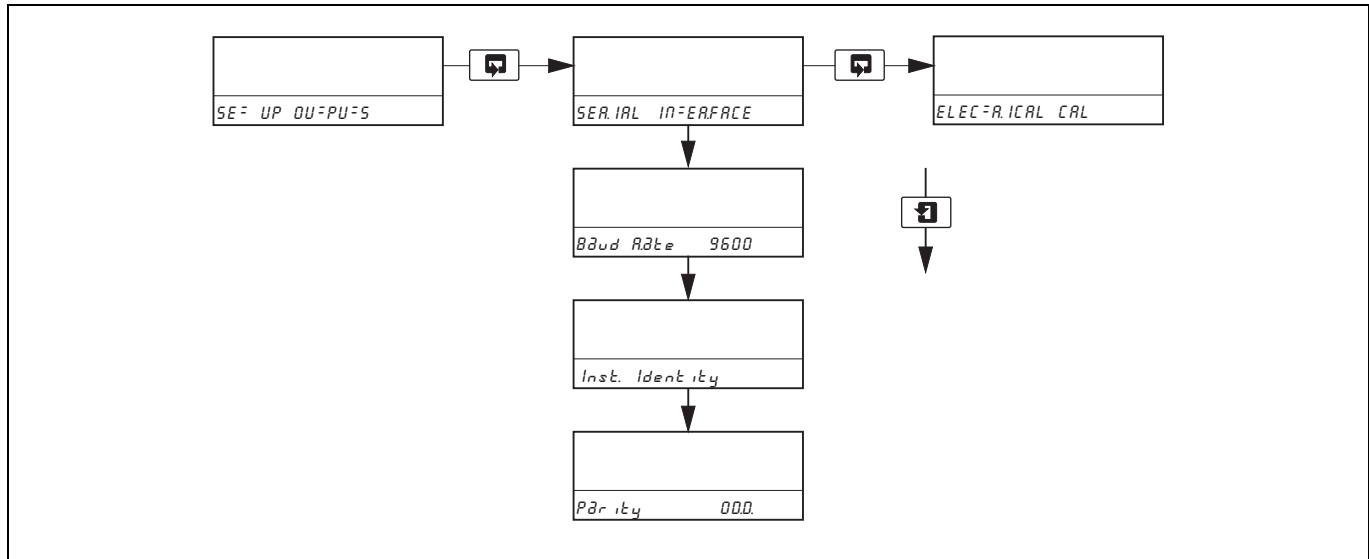
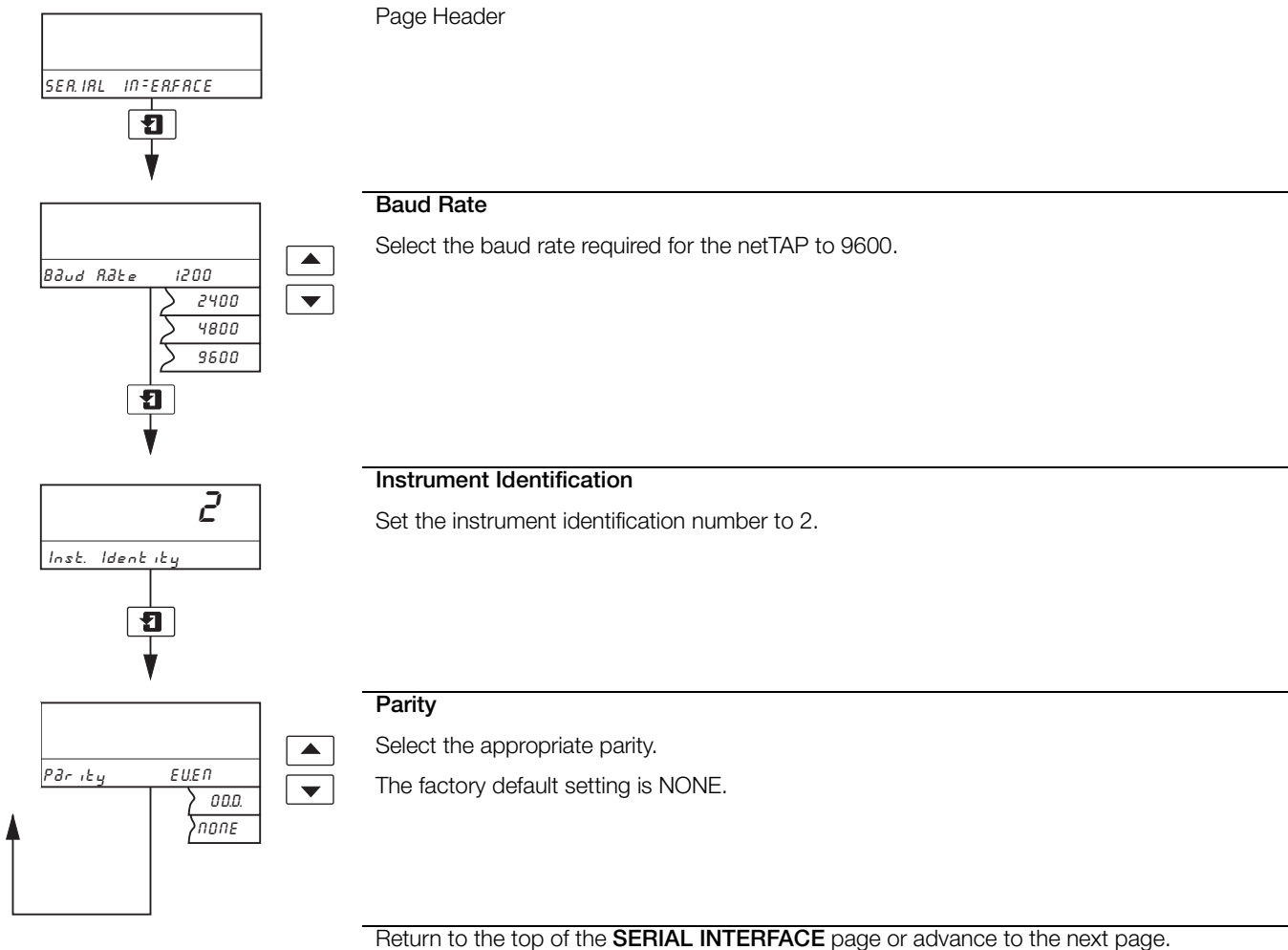


Fig. 3.1 8037, 9437 and 9438 Analyzers – Location of Serial Interface Page



### 3.2 8230 Series Analyzers

The general programming procedure is as detailed in the relevant User Guide, but with an additional **SERIAL INTERFACE** frame between the **SET UP ALARMS** and **SET UP CLOCK** frames.

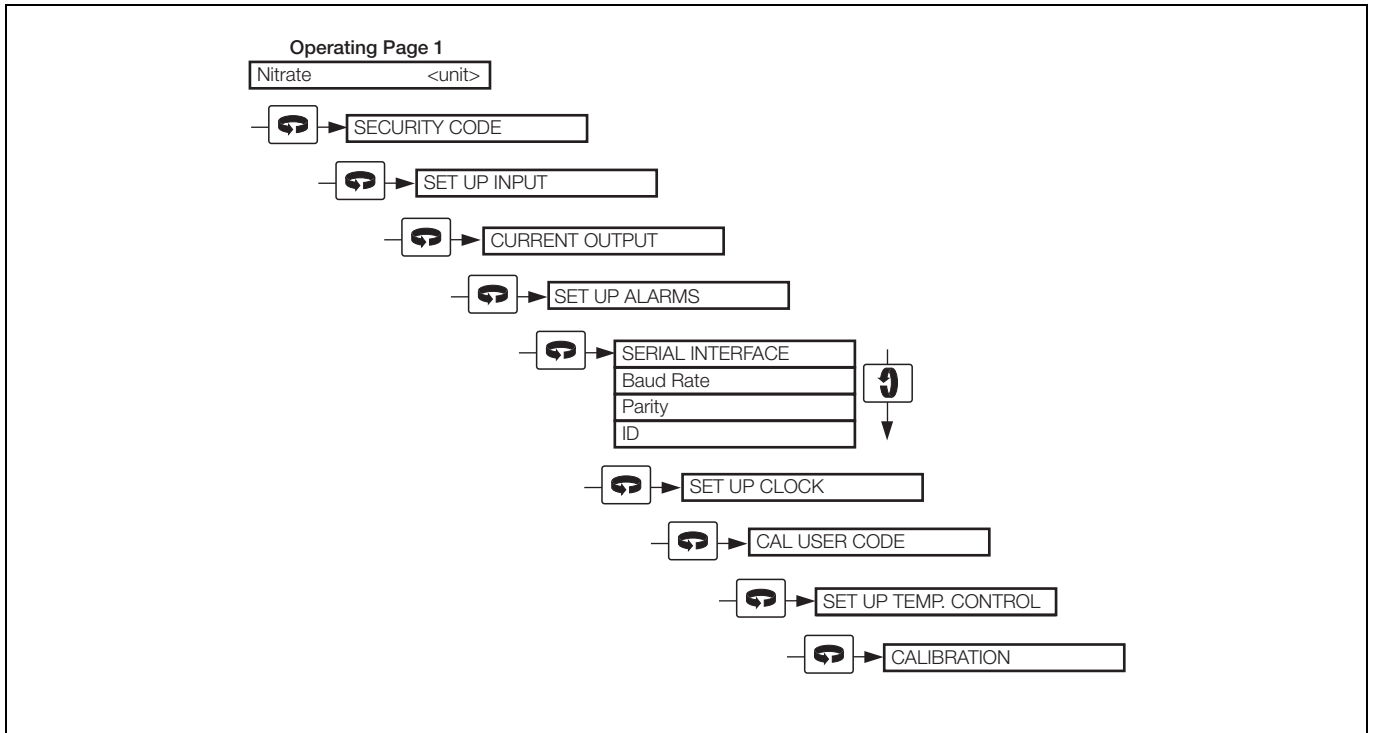
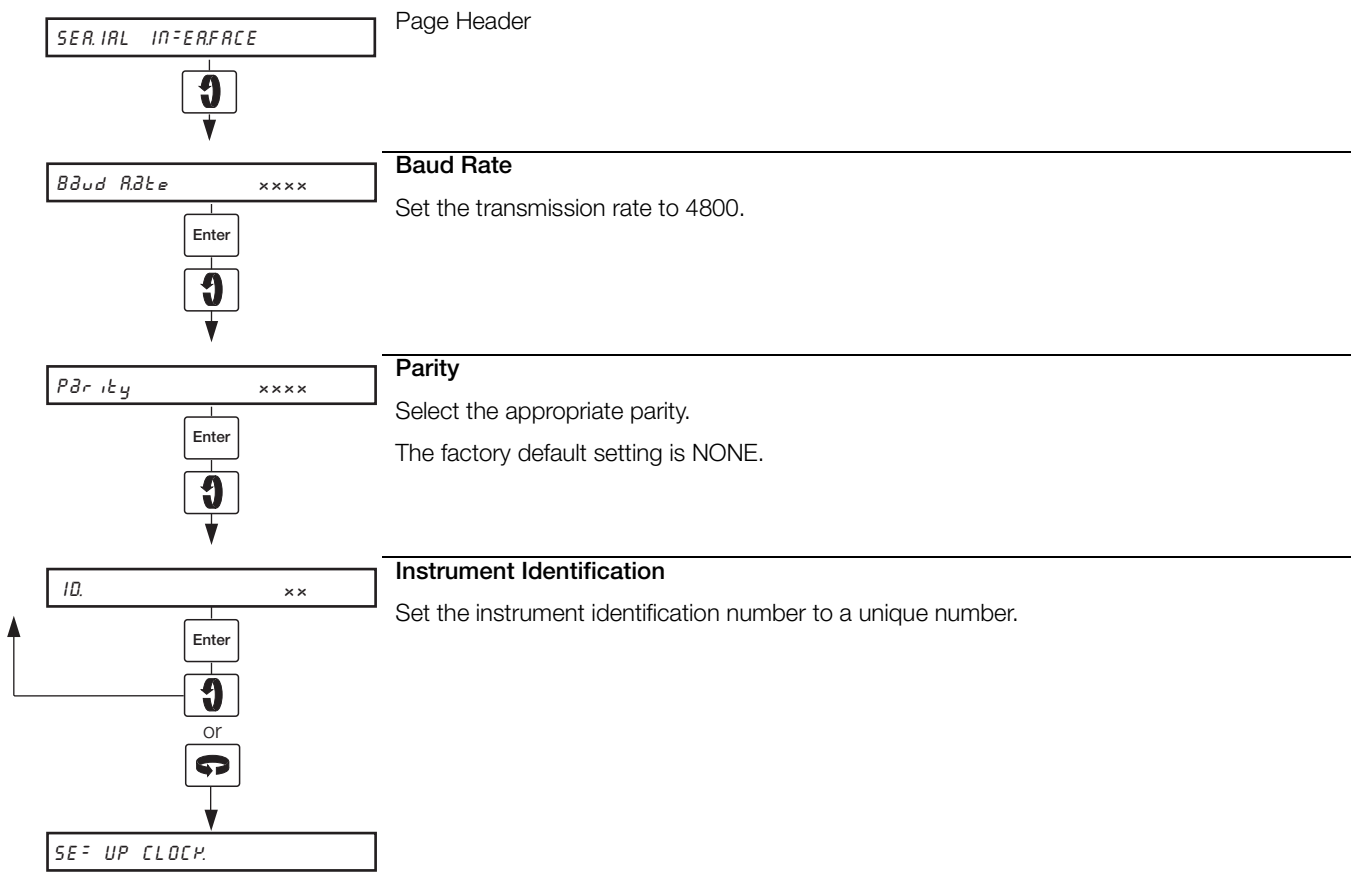


Fig. 3.2 8230 Series Analyzers – Location of Serial Interface Page



### 3.3 8240 Series Analyzers

The general programming procedure is as detailed in the relevant User Guide, but with an additional **SET UP SERIAL INTERFACE** frame in the **SET UP INSTRUMENT** page.

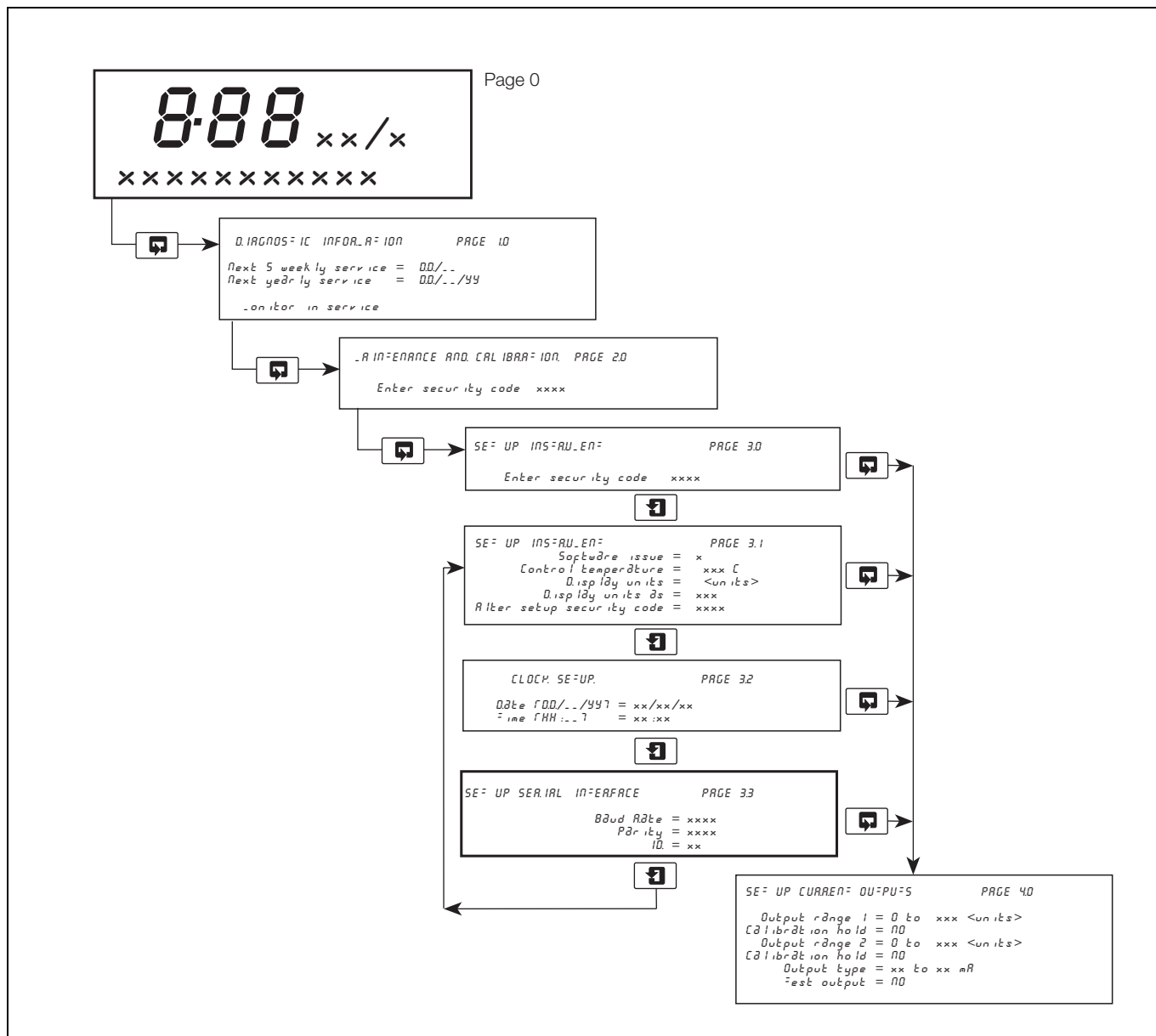
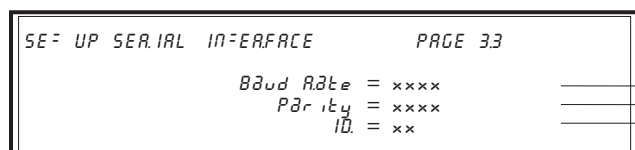


Fig. 3.3 8240 Series Analyzers – Location of Serial Interface Page



**Baud Rate**

Set the transmission rate to 9600.

**Parity**

Select the appropriate parity.

The factory default setting is NONE.

**Instrument Identification**

Set the instrument identification number to 2.



**3.4 PROFIBUS Master Configuration**

| Analyzer                  | Position | Datasets                   |
|---------------------------|----------|----------------------------|
| 4670, 8037, 9437 and 9438 | 000      | 64 byte input (0x40, 0x3F) |
| 8230 Series               | 000      | 64 byte input (0x40, 0x3F) |
|                           | 001      | 64 byte input (0x40, 0x3F) |
| 8240 Series               | 000      | 64 byte input (0x40, 0x3F) |
|                           | 001      | 64 byte input (0x40, 0x3F) |
|                           | 002      | 64 byte input (0x40, 0x3F) |

*Table 3.1 PROFIBUS Master Configuration*

## 4 Profibus Database

### 4.1 4670 Holding Registers

| Modbus Register | PROFIBUS Byte |                          |           |   |
|-----------------|---------------|--------------------------|-----------|---|
| Decimal         | Decimal       | Name                     | Data Type | Units   |
| 11              | 0 to 3        | Measured Turbidity value | Float     | See Turbidity Units   |
| 12              | –             |                          | –         | –   |
| 13              | 4 to 7        | Turbidity Span           | Float     | See Turbidity Units   |
| 14              | –             |                          | –         | –   |
| 15              | 8 to 11       | Set point A1             | Float     | See Turbidity Units   |
| 16              | –             |                          | –         | –   |
| 17              | 12 to 15      | Set point A2             | Float     | See Turbidity Units   |
| 18              | –             |                          | –         | –   |
| 19              | 16 to 19      | Retransmission Span      | Float     | See Turbidity Units   |
| 20              | –             |                          | –         | –   |
| 21              | 20 to 23      | Retransmission Zero      | Float     | See Turbidity Units   |
| 22              | –             |                          | –         | –   |
| 23              | 24 to 25      | Turbidity Sensor Type    | Integer   | 0 = 7997-100, 1 = 7997-200, 2 = 7997-201<br>3 = 7997-202, 4 = 7997-300, 5 = 7997-400  |
| 24              | 26 to 27      | Turbidity Units          | Integer   | 0 = Turbidity NTU, 1 = Turbidity FNU<br>2 = Suspended Solids mg/l<br>3 = Suspended Solids ppm, 4 = Turbidity FTU<br>5 = Turbidity FAU |
| 25              | 28 to 29      | ppm/NTU Coefficient      | Integer   | See the Operating Instructions (IM/4670)  |
| 26              | 30 to 31      | Alarm A1 Action          | Integer   | 0 = EA, 1 = EB  |
| 27              | 32 to 33      | Alarm A2 Action          | Integer   | 0 = EA, 1 = EB  |
| 28              | 34 to 35      | Retransmission Type      | Integer   | 0 = 0 to 10 mA, 1 = 0 to 20 mA, 2 = 4 to 20 mA  |
| 29              | 36 to 37      | Instrument Status        | Integer   | See Table 4.2   |
| 30              | –             |                          | –         | –   |
| 31              | –             |                          | –         | –   |

Table 4.1 4670 Holding Registers

| Bit     | Description             | Data                            |
|---------|-------------------------|---------------------------------|
| 4 to 15 | –                       | Always Zero                     |
| 3       | Turbidity Input Error   | 0 = ok, 1 = Error               |
| 2       | Non-Volatile Read Error | 0 = ok, 1 = Error               |
| 1       | Alarm 2 Status          | 0 = De-energized, 1 = Energized |
| 0       | Alarm 1 Status          | 0 = De-energized, 1 = Energized |

Table 4.2 4670 Instrument Status

## 4.2 8230 Series Analyzers

| Modbus Register | PROFIBUS Byte |                        |           |   |
|-----------------|---------------|------------------------|-----------|---|
| Decimal         | Decimal       | Name                   | Data Type | Units   |
| 1               | 0 to 3        | Measured ion value*    | Float     | See Ion Units   |
| 2               | -             | -                      | -         | -   |
| 3               | 4 to 7        | Measured millivolts    | Float     | mV  |
| 4               | -             | -                      | -         | -   |
| 5               | 8 to 11       | Measured Temperature   | Float     | Always in °C  |
| 6               | -             | -                      | -         | -   |
| 7               | 12 to 15      | Sensor Slope           | Float     | Slope percentage  |
| 8               | -             | -                      | -         | -   |
| 9               | 16 to 19      | Control Temperature    | Float     | Always in °C  |
| 10              | -             | -                      | -         | -   |
| 11              | 20 and 21     | Instrument Status      | Integer   | See Table 4.4   |
| 12              | 22 and 23     | Instrument Type        | Integer   | 0 = Fluoride, 1 = Ammonia, 2 = Nitrate, 4 = CO <sub>2</sub> , 5 = Low Level Chloride, 6 = Chloride  |
| 13              | 24 and 25     | Display as             | Integer   | 0 = Fluoride, 1 = Ammonia, 2 = Ammonium, 3 = Nitrogen (Ammonium), 4 = Nitrate, 5 = Nitrogen (Nitrate), 6 = CO <sub>2</sub> , 7 = Chloride, 8 = Sodium Chloride, 9 = High Level Chloride |
| 14              | 26 and 27     | Ion Units              | Integer   | 0 = mg/kg, 1 = mg/l, 2 = ppm  |
| 15              | 28 to 31      | Display Zero           | Float     | See Ion Units   |
| 16              | -             | -                      | -         | -   |
| 17              | 32 to 35      | Display Span           | Float     | See Ion Units   |
| 18              | -             | -                      | -         | -   |
| 19              | 36 and 37     | Calibration Interval   | Integer   | See Table 4.5   |
| 20              | 38 to 41      | Calibration Standard 1 | Float     | See Ion Units   |
| 21              | -             | -                      | -         | -   |
| 22              | 42 to 45      | Calibration Standard 2 | Float     | See Ion Units   |
| 23              | -             | -                      | -         | -   |
| 24              | 46 and 47     | Retransmission Curve   | Integer   | 0 = Linear, 1 = Logarithmic   |
| 25              | 48 to 51      | Retransmission Span    | Float     | See Ion Units   |
| 26              | -             | -                      | -         | -   |
| 27              | 52 to 55      | Retransmission Zero    | Float     | See Ion Units   |
| 28              | -             | -                      | -         | -   |
| 29              | 56 and 57     | Alarm A1 Enabled       | Integer   | 0 = Disabled, 1 = Enabled   |
| 30              | 58 and 59     | Alarm A1 Action        | Integer   | 0 = Energized Below, 1 = Energized Above  |
| 31              | 60 and 61     | Alarm A1 Failsafe      | Integer   | 0 = Non-Failsafe, 1 = Failsafe  |
| 32              | 62 and 63     | Alarm A1 Hysteresis    | Integer   | 0 to 5% of set point value  |
| 33              | 64 and 65     | Alarm A1 Delay         | Integer   | 0 to 60 minutes   |
| 34              | 66 and 69     | Alarm A1 Set point     | Float     | See Ion Units   |
| 35              | -             | -                      | -         | -   |
| 36              | 70 and 71     | Alarm A2 Enabled       | Integer   | 0 = Disabled, 1 = Enabled   |
| 37              | 72 and 73     | Alarm A2 Action        | Integer   | 0 = Energized Below, 1 = Energized Above  |
| 38              | 74 and 75     | Alarm A2 Failsafe      | Integer   | 0 = Non-Failsafe, 1 = Failsafe  |
| 39              | 76 and 77     | Alarm A2 Hysteresis    | Integer   | 0 to 5% of set point value  |
| 40              | 78 and 79     | Alarm A2 Delay         | Integer   | 0 to 60 minutes   |
| 41              | 80 to 83      | Alarm A2 Set point     | Float     | See Ion Units   |
| 42              | -             | -                      | -         | -   |
| 43              | 84 to 85      | Clock - Day            | Integer   | Day of the month  |
| 44              | 86 to 87      | Clock - Month          | Integer   | Month of the year   |

Table 4.3 8230 Series Holding Registers

| Modbus Register | PROFIBUS Byte |                            |           |                              |
|-----------------|---------------|----------------------------|-----------|------------------------------|
| Decimal         | Decimal       | Name                       | Data Type | Units                        |
| 45              | 88 to 89      | Clock - Year               | Integer   | Year                         |
| 46              | 90 to 91      | Clock - Hour               | Integer   | Time in 24 hour clock format |
| 47              | 92 to 93      | Clock - Minutes            | Integer   | Minutes                      |
| 48              | 94 to 95      | Next Calibration - Day     | Integer   | Day of the month             |
| 49              | 96 to 97      | Next Calibration - Month   | Integer   | Month of the year            |
| 50              | 98 to 99      | Next Calibration - Year    | Integer   | Year                         |
| 51              | 100 to 101    | Next Calibration - Hour    | Integer   | Time in 24 hour clock format |
| 52              | 102 to 103    | Next Calibration - Minutes | Integer   | Minutes                      |
| 53              | 104 to 105    | Last Calibration - Day     | Integer   | Day of the month             |
| 54              | 106 to 107    | Last Calibration - Month   | Integer   | Month of the year            |
| 55              | 108 to 109    | Last Calibration - Year    | Integer   | Year                         |
| -               | 110 to 128    | -                          | -         | -                            |

Table 4.3 8230 Series Holding Registers (Continued)

| Bit      | Description               | Data                            |
|----------|---------------------------|---------------------------------|
| 10 to 16 | -                         | Always Zero                     |
| 9        | Alarm 2 Status            | 0 = De-energized, 1 = Energized |
| 8        | Alarm 1 Status            | 0 = De-energized, 1 = Energized |
| 7        | Out of Service            | 0 = OK, 1 = Error               |
| 6        | Slow Error                | 0 = OK, 1 = Error               |
| 5        | Slope Error               | 0 = OK, 1 = Error               |
| 4        | Cal In Progress           | 0 = Complete, 1 = In Progress   |
| 3        | Out of Sample             | 0 = OK, 1 = Error               |
| 2        | Temperature Control Error | 0 = OK, 1 = Error               |
| 1        | Temperature Input Error   | 0 = OK, 1 = Error               |
| 0        | Ion Input Error           | 0 = OK, 1 = Error               |

Table 4.4 8230 Instrument Status

| Calibration Frequency | Time Between Calibrations |
|-----------------------|---------------------------|
| 0                     | 6 Hours                   |
| 1                     | 12 Hours                  |
| 2                     | 1 Day                     |
| 3                     | 2 Days                    |
| 4                     | 3 Days                    |
| 5                     | 4 Days                    |
| 6                     | 5 Days                    |
| 7                     | 6 Days                    |
| 8                     | 7 Day                     |

Table 4.5 8230 Calibration Intervals

### 4.3 8037 Analyzers

The PROFIBUS register file contains 64 bytes.

| Modbus Register | PROFIBUS Byte | Name                  | Data Type | Units   |
|-----------------|---------------|-----------------------|-----------|---|
| 11              | 0 to 3        | Measured Sodium Value | Float     | See Sodium Units ( <b>Modbus Register 24</b> )      |
| 12              | -             | -                     | -         | -   |
| 13              | 4 to 7        | Measured Millivolts   | Float     | mV  |
| 14              | -             | -                     | -         | -   |
| 15              | 8 to 11       | Measured Temperature  | Float     | See Temperature Units ( <b>Modbus Register 25</b> ) |
| 16              | -             | -                     | -         | -   |
| 17              | 12 to 15      | Millivolt Offset      | Float     | mV  |
| 18              | -             | -                     | -         | -   |
| 19              | 16 to 19      | Set point A1          | Float     | See Sodium Units ( <b>Modbus Register 24</b> )      |
| 20              | -             | -                     | -         | -   |
| 21              | 20 to 23      | Set point A2          | Float     | See Sodium Units ( <b>Modbus Register 24</b> )      |
| 22              | -             | -                     | -         | -   |
| 23              | 32 and 33     | Slope                 | Integer   | %   |
| 24              | 34 and 35     | Sodium Units          | Integer   | 0 = ppb, 1 = µg/l, 2 = µg/kg (see *)                |
| 25              | 36 and 37     | Temperature Units     | Integer   | 0 = Deg C, 1 = Deg F                                |
| 26              | 38 and 39     | Filter Time           | Integer   | Seconds   |
| 27              | 40 and 41     | Alarm A1 Action       | Integer   | 0 = Off, 1 = Low, 2 = High                          |
| 28              | 42 and 43     | Alarm A2 Action       | Integer   | 0 = Off, 1 = Low, 2 = High                          |
| 29              | 44 and 45     | Retransmission Curve  | Integer   | 0 = Linear, 1 = Logarithmic                         |
| 30              | 46 and 47     | Retransmission Type   | Integer   | 0 = 0 to 10mA, 1 = 0 to 20mA, 2 = 4 to 20mA         |
| 31              | 24 to 27      | Retransmission Span   | Float     | See Sodium Units ( <b>Modbus Register 24</b> )      |
| 32              | -             | -                     | -         | -   |
| 33              | 28 to 31      | Retransmission Zero   | Float     | See Sodium Units ( <b>Modbus Register 24</b> )      |
| 34              | -             | -                     | -         | -   |
| 35              | 48 and 49     | Instrument Status     | Integer   | See Table 4.7                                       |
| -               | 50 to 63      | -                     | -         | -   |

\* 10mg/l = 10000µg/l

Table 4.6 8037 Holding Registers

| Bit      | Description                     | Data                            |
|----------|---------------------------------|---------------------------------|
| 10 to 15 | -                               | Always Zero                     |
| 9        | Alarm 2 Status                  | 0 = De-energized, 1 = Energized |
| 8        | Alarm 1 Status                  | 0 = De-energized, 1 = Energized |
| 7        | Non-Volatile Read Error         | 0 = OK, 1 = Error               |
| 6        | -                               | Always Zero                     |
| 5        | Outputs Held During Calibration | 0 = No, 1 = Yes                 |
| 4        | Calibration In Progress         | 0 = Complete, 1 = In Progress   |
| 3        | Solution is Cold                | 0 = OK, 1 = Error               |
| 2        | Solution is Hot                 | 0 = OK, 1 = Error               |
| 1        | Short Circuit Pt1000            | 0 = OK, 1 = Error               |
| 0        | Open Circuit Pt1000             | 0 = OK, 1 = Error               |

Table 4.7 8037 Instrument Status

#### 4.4 8241 Single-stream Analyzers

| Modbus Register | PROFIBUS Byte |  |           |  |
|-----------------|---------------|--|-----------|--|
| Decimal         | Decimal       | Name   | Data Type | Units                                    |
| 1               | 0 to 3        | Silica Concentration                         | Float     | See Units                                |
| 2               | -             | -  | -         | -  |
| 3               | 4 to 7        | Optical System Temperature                   | Float     | Always in °C                             |
| 4               | -             | -  | -         | -  |
| 5               | 8 to 11       | Reaction Block Temperature                   | Float     | Always in °C                             |
| 6               | -             | -  | -         | -  |
| 7               | 12 and 13     | Displayed Slope                              | Integer   | Slope percentage                         |
| 8               | 14 and 15     | Displayed Offset                             | Integer   | Slope percentage                         |
| 9               | 16 and 17     | Instrument Status                            | Integer   | See Table 4.9                            |
| 10              | 18 and 19     | Alarm Status                                 | Integer   | See Table 4.11                           |
| 11              | 20 and 21     | Units  | Integer   | 0 = ppb, 1 = ug/l, 2 = ug/kg             |
| 12              | 22 and 23     | Display Span                                 | Integer   | 0 = 0 to 2000, 1 = 0 to 5000             |
| 13              | 24 and 25     | Calibration Type                             | Integer   | 0 = None, 1 = Routine, 2 = Baseline      |
| 14              | 26 and 27     | Auto Zero Cal Frequency                      | Integer   | See Table 4.10                           |
| 15              | 28 and 29     | Number of Auto Zeros between secondary calcs | Integer   | 0 to 10, 11 = Off                        |
| 16              | 30 and 31     | Time to Auto Zero Compensation               | Integer   | Minutes                                  |
| 17              | 32 and 33     | Time to Secondary Cal Compensation           | Integer   | Minutes                                  |
| 18              | 34 and 35     | Time to Recovery                             | Integer   | Minutes                                  |
| 19              | 36 and 37     | Secondary Calibration Concentration          | Integer   | See Units                                |
| 20              | 38 and 39     | Current Output 1 Hold Status                 | Integer   | 0 = No, 1 = Yes                          |
| 21              | 40 and 41     | Current Output 2 Hold Status                 | Integer   | 0 = No, 1 = Yes                          |
| 22              | 42 and 43     | Current Output Type                          | Integer   | 0 = 0-10 mA, 1 = 0-20 mA, 2 = 4-20 mA    |
| 23              | 44 and 45     | Current Output Range 1                       | Integer   | See Units                                |
| 24              | 46 and 47     | Current Output Range 2                       | Integer   | See Units                                |
| 25              | 48 and 49     | Alarm Failsafe                               | Integer   | 0 = No, 1 = Yes                          |
| 26              | 50 and 51     | Alarm Hysteresis                             | Integer   | 0 to 5% of set point value               |
| 27              | 52 and 53     | Alarm Delay                                  | Integer   | 0 to 99minutes                           |
| 28              | 54 and 55     | Alarm A1 On/Off Status                       | Integer   | 0 = Off, 1 = On                          |
| 29              | 56 and 57     | Alarm A1 Action                              | Integer   | 0 = Low, 1 = High                        |
| 30              | 58 and 59     | Alarm A1 Set point                           | Integer   | See Units                                |
| 31              | 60 and 61     | Alarm A2 On/Off Status                       | Integer   | 0 = Off, 1 = On                          |
| 32              | 62 and 63     | Alarm A2 Action                              | Integer   | 0 = Energized Below, 1 = Energized Above |
| 33              | 64 and 65     | Alarm A2 Set point                           | Integer   | See Units                                |
| 34              | 66 and 67     | Clock - Day                                  | Integer   | Day of the month                         |
| 35              | 68 and 69     | Clock - Month                                | Integer   | Month of the year                        |
| 36              | 70 and 71     | Clock - Year                                 | Integer   | Year                                     |
| 37              | 72 and 73     | Clock - Hour                                 | Integer   | Time in 24 hour clock format             |
| 38              | 74 and 75     | Clock - Minutes                              | Integer   | Minutes                                  |
| 39              | 76 and 77     | Next Auto Calibration - Day                  | Integer   | Day of the month                         |
| 40              | 78 and 79     | Next Auto Calibration - Month                | Integer   | Month of the year                        |
| 41              | 80 and 81     | Next Auto Calibration - Year                 | Integer   | Year                                     |
| 42              | 82 and 83     | Next Auto Calibration - Hours                | Integer   | Time in 24 hour clock format             |
| 43              | 84 and 85     | Next Auto Calibration - Minutes              | Integer   | Minutes                                  |
| 44              | 86 and 87     | Next Auto Zero Calibration - Day             | Integer   | Day of the month                         |
| 45              | 88 and 89     | Next Auto Zero Calibration - Month           | Integer   | Month of the year                        |
| 46              | 90 and 91     | Next Auto Zero Calibration - Year            | Integer   | Year                                     |

Table 4.8 8241 (Single-stream) Holding Registers

| Modbus Register | PROFIBUS Byte |                                    |           |                   |
|-----------------|---------------|------------------------------------|-----------|-------------------|
| Decimal         | Decimal       | Name                               | Data Type | Units             |
| 47              | 92 and 93     | Last Auto Zero Calibration - Day   | Integer   | Day of the month  |
| 48              | 94 and 95     | Last Auto Zero Calibration - Month | Integer   | Month of the year |
| 49              | 96 and 97     | Last Auto Zero Calibration - Year  | Integer   | Year              |
| 50              | 98 and 99     | Next Secondary Calibration - Day   | Integer   | Day of the month  |
| 51              | 100 and 101   | Next Secondary Calibration - Month | Integer   | Month of the year |
| 52              | 102 and 103   | Next Secondary Calibration - Year  | Integer   | Year              |
| 53              | 104 and 105   | Last Secondary Calibration - Day   | Integer   | Day of the month  |
| 54              | 106 and 107   | Last Secondary Calibration - Month | Integer   | Month of the year |
| 55              | 108 and 109   | Last Secondary Calibration - Year  | Integer   | Year              |

Table 4.8 8241 (Single-stream) Holding Registers (Continued)

| Bit      | Description                            | Data  |
|----------|--|---|
| 13 to 15 | –                                      | Always Zero   |
| 12       | Sample Status                          | 0 = OK, 1 = Out Of Sample                           |
| 11       | Upper Calibration Slope Alarm          | 0 = OK, 1 = Calibration Outside Upper Limits        |
| 10       | Lower Calibration Slope Alarm          | 0 = OK, 1 = Calibration Outside Lower Limits        |
| 9        | Calibration Offset Alarm               | 0 = OK, 1 = Calibration Outside Offset Limits       |
| 8        | Yearly Service Status                  | 0 = OK, 1 = Yearly Service Overdue                  |
| 7        | Five-weekly Service Status             | 0 = OK, 1 = Five-weekly Service Overdue             |
| 6        | Reagent Status                         | 0 = OK, 1 = Out of Reagent                          |
| 5        | Lower Limit Control Temperature Status | 0 = OK, 1 = Control Temperature Out of Range        |
| 4        | Upper Limit Control Temperature Status | 0 = OK, 1 = Control Temperature Out of Range        |
| 3        | Pump Status                            | 0 = Pumps are On, 1 = Pumps are Off                 |
| 2        | Hold Mode                              | 0 = Hold Mode Off, 1 = Hold Mode On                 |
| 1        | Monitor Calibration Status             | 0 = Not in Calibration, 1 = Calibration In Progress |
| 0        | Monitor Status                         | 0 = OK, 1 = Out of Service                          |

Table 4.9 8241 Instrument Status

| Calibration Frequency | Time Between Calibrations |
|-----------------------|---------------------------|
| 0                     | Off                       |
| 1                     | 12 Hours                  |
| 2                     | 1 Day                     |
| 3                     | 2 Days                    |
| 4                     | 3 Days                    |
| 5                     | 4 Days                    |
| 6                     | 5 Days                    |
| 7                     | 6 Days                    |
| 8                     | 7 Day                     |

Table 4.10 8241 Calibration Intervals

| Bit     | Description     | Data                                      |
|---------|-----------------|---|
| 8 to 15 | –               | Always 0                                  |
| 7       | Out of Service  | 0 = Out of Service, 1 = OK                |
| 6       | Cal in Progress | 0 = Normal Operation, 1 = Cal In Progress |
| 5       | Alarm 6         | 0 = De-energized, 1 = Energized           |
| 4       | Alarm 5         | 0 = De-energized, 1 = Energized           |
| 3       | Alarm 4         | 0 = De-energized, 1 = Energized           |
| 2       | Alarm 3         | 0 = De-energized, 1 = Energized           |
| 1       | Alarm 2         | 0 = De-energized, 1 = Energized           |
| 0       | Alarm 1         | 0 = De-energized, 1 = Energized           |

Table 4.11 8241 Alarm Status

#### 4.5 8241 Multi-stream Analyzers

| Modbus Register | PROFIBUS Byte |   |           |                                       |
|-----------------|---------------|---|-----------|---------------------------------------|
| Decimal         | Decimal       | Name  | Data Type | Units                                 |
| 1               | 0 to 3        | Silica Concentration --stream 1             | Float     | See Units                             |
| 2               | –             | –   | –         | –                                     |
| 3               | 4 to 7        | Silica Concentration --stream 2             | Float     | See Units                             |
| 4               | –             | –   | –         | –                                     |
| 5               | 8 to 11       | Silica Concentration --stream 3             | Float     | See Units                             |
| 6               | –             | –   | –         | –                                     |
| 7               | 12 to 15      | Silica Concentration --stream 4             | Float     | See Units                             |
| 8               | –             | –   | –         | –                                     |
| 9               | 16 to 19      | Silica Concentration --stream 5             | Float     | See Units                             |
| 10              | –             | –   | –         | –                                     |
| 11              | 20 to 23      | Silica Concentration --stream 6             | Float     | See Units                             |
| 12              | –             | –   | –         | –                                     |
| 13              | 24 to 27      | Optical System Temperature                  | Float     | Always in °C                          |
| 14              | –             | –   | –         | –                                     |
| 15              | 28 to 31      | Reaction Block Temperature                  | Float     | Always in °C                          |
| 16              | –             | –   | –         | –                                     |
| 17              | 32 and 33     | Displayed Slope                             | Integer   | slope percentage                      |
| 18              | 34 and 35     | Displayed Offset                            | Integer   | slope percentage                      |
| 19              | 36 and 37     | Instrument Status                           | Integer   | See Table 4.9                         |
| 20              | 38 and 39     | Alarm Status                                | Integer   | See Table 4.11                        |
| 21              | 40 and 41     | Units                                       | Integer   | 0 = ppb, 1 = ug/l, 2 = ug/kg          |
| 22              | 42 and 43     | Display Span                                | Integer   | 0 = 0 to 2000, 1 = 0 to 5000          |
| 23              | 44 and 45     | Calibration Type                            | Integer   | 0 = None, 1 = Routine, 2 = Baseline   |
| 24              | 46 and 47     | Auto Zero Cal Frequency                     | Integer   | See Table 4.10                        |
| 25              | 48 and 49     | Number of Auto Zeros between secondary cals | Integer   | 0 to 10, 11 = Off                     |
| 26              | 50 and 51     | Time to Auto Zero Compensation              | Integer   | Minutes                               |
| 27              | 52 and 53     | Time to Secondary Cal Compensation          | Integer   | Minutes                               |
| 28              | 54 and 55     | Time to Recovery                            | Integer   | Minutes                               |
| 29              | 56 and 57     | Secondary Calibration Concentration         | Integer   | See Units                             |
| 30              | 58 and 59     | Current Output Type                         | Integer   | 0 = 0-10 mA, 1 = 0-20 mA, 2 = 4-20 mA |
| 31              | 60 and 61     | Current O/P Out of Sample Indicator         | Integer   | 0 = No, 1 = Yes                       |
| 32              | 62 and 63     | Default Output Current for Out of Sample    | Integer   | percentage between 0 & 105%           |
| 33              | 64 and 65     | Current Output Range 1                      | Integer   | See Units                             |
| 34              | 66 and 67     | Current Output Range 2                      | Integer   | See Units                             |
| 35              | 68 and 69     | Current Output Range 3                      | Integer   | See Units                             |
| 36              | 70 and 71     | Current Output Range 4                      | Integer   | See Units                             |
| 37              | 72 and 73     | Current Output Range 5                      | Integer   | See Units                             |
| 38              | 74 and 75     | Current Output Range 6                      | Integer   | See Units                             |
| 39              | 76 and 77     | Alarm Failsafe                              | Integer   | 0 = No, 1 = Yes                       |
| 40              | 78 and 79     | Alarm Hysteresis                            | Integer   | 0 to 5% of set point value            |
| 41              | 80 and 81     | Alarm Configuration                         | Integer   | 0 = Concentration, 1 = Out of Sample  |
| 42              | 82 and 83     | Alarm A1 On/Off Status                      | Integer   | 0 = Off, 1 = On                       |
| 43              | 84 and 85     | Alarm A1 Action                             | Integer   | 0 = Low, 1 = High                     |
| 44              | 86 and 87     | Alarm A1 Set point                          | Integer   | See Units                             |
| 45              | 88 and 89     | Alarm A2 On/Off Status                      | Integer   | 0 = Off, 1 = On                       |

Table 4.12 8241 (Multi-stream) Holding Registers



| Modbus Register | PROFIBUS Byte |                                    |           |  |
|-----------------|---------------|------------------------------------|-----------|--|
| Decimal         | Decimal       | Name                               | Data Type | Units                                    |
| 46              | 90 and 91     | Alarm A2 Action                    | Integer   | 0 = Energized Below, 1 = Energized Above |
| 47              | 92 and 93     | Alarm A2 Set point                 | Integer   | See Units                                |
| 48              | 94 and 95     | Alarm A3 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 49              | 96 and 97     | Alarm A3 Action                    | Integer   | 0 = Low, 1 = High                        |
| 50              | 98 and 99     | Alarm A3 Set point                 | Integer   | See Units                                |
| 51              | 100 and 101   | Alarm A4 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 52              | 102 and 103   | Alarm A4 Action                    | Integer   | 0 = Energized Below, 1 = Energized Above |
| 53              | 104 and 105   | Alarm A4 Set point                 | Integer   | See Units                                |
| 54              | 106 and 107   | Alarm A5 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 55              | 108 and 109   | Alarm A5 Action                    | Integer   | 0 = Low, 1 = High                        |
| 56              | 110 and 111   | Alarm A5 Set point                 | Integer   | See Units                                |
| 57              | 112 and 113   | Alarm A6 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 58              | 114 and 115   | Alarm A6 Action                    | Integer   | 0 = Energized Below, 1 = Energized Above |
| 59              | 116 and 117   | Alarm A6 Set point                 | Integer   | See Units                                |
| 60              | 118 and 119   | Clock - Day                        | Integer   | Day of the month                         |
| 61              | 120 and 121   | Clock - Month                      | Integer   | Month of the year                        |
| 62              | 122 and 123   | Clock - Year                       | Integer   | Year                                     |
| 63              | 124 and 125   | Clock - Hour                       | Integer   | Time in 24 hour clock format             |
| 64              | 126 and 127   | Clock - Minutes                    | Integer   | Minutes                                  |
| 65              | 128 and 129   | Next Auto Calibration - Day        | Integer   | Day of the month                         |
| 66              | 130 and 131   | Next Auto Calibration - Month      | Integer   | Month of the year                        |
| 67              | 132 and 133   | Next Auto Calibration - Year       | Integer   | Year                                     |
| 68              | 134 and 135   | Next Auto Calibration - Hours      | Integer   | Time in 24 hour clock format             |
| 69              | 136 and 137   | Next Auto Calibration - Minutes    | Integer   | Minutes                                  |
| 70              | 138 and 139   | Next Auto Zero Calibration - Day   | Integer   | Day of the month                         |
| 71              | 140 and 141   | Next Auto Zero Calibration - Month | Integer   | Month of the year                        |
| 72              | 142 and 143   | Next Auto Zero Calibration - Year  | Integer   | Year                                     |
| 73              | 144 and 145   | Last Auto Zero Calibration - Day   | Integer   | Day of the month                         |
| 74              | 146 and 147   | Last Auto Zero Calibration - Month | Integer   | Month of the year                        |
| 75              | 148 and 149   | Last Auto Zero Calibration - Year  | Integer   | Year                                     |
| 76              | 150 and 151   | Next Secondary Calibration - Day   | Integer   | Day of the month                         |
| 77              | 152 and 153   | Next Secondary Calibration - Month | Integer   | Month of the year                        |
| 78              | 154 and 155   | Next Secondary Calibration - Year  | Integer   | Year                                     |
| 79              | 156 and 157   | Last Secondary Calibration - Day   | Integer   | Day of the month                         |
| 80              | 158 and 159   | Last Secondary Calibration - Month | Integer   | Month of the year                        |
| 81              | 160 and 161   | Last Secondary Calibration - Year  | Integer   | Year                                     |
| -               | 162 to 192    | Not Used                           |           |  |

Table 4.12 8241 (Multi-stream) Holding Registers (Continued)

#### 4.6 8242 Single-stream Analyzers

| Modbus Register | PROFIBUS Byte |   |           |  |
|-----------------|---------------|---|-----------|--|
| Decimal         | Decimal       | Name  | Data Type | Units  |
| 1               | 0 to 3        | Phosphate Concentration                     | Float     | See Units  |
| 2               | –             | –   | –         | –  |
| 3               | 4 to 7        | Optical System Temperature                  | Float     | Always in °C   |
| 4               | –             | –   | –         | –  |
| 5               | 8 to 11       | Reaction Block Temperature                  | Float     | Always in °C   |
| 6               | –             | –   | –         | –  |
| 7               | 12 and 13     | Displayed Slope                             | Integer   | Slope percentage   |
| 8               | 14 to 17      | Displayed Offset                            | Float     | Concentration value offset                                     |
| 9               | –             | –   | –         | –  |
| 10              | 18 and 19     | Instrument Status                           | Integer   | See Table 4.9  |
| 11              | 20 and 21     | Alarm Status                                | Integer   | See Table 4.11   |
| 12              | 22 and 23     | Units                                       | Integer   | 0 = ppm, 1 = mg/l  |
| 13              | 24 and 25     | Display Span                                | Integer   | 0 = 0 to 20 as P, 1 = 0 to 60 as PO <sub>4</sub> <sup>3-</sup> |
| 14              | 26 and 27     | Calibration Type                            | Integer   | 0 = None, 1 = Routine, 2 = Baseline                            |
| 15              | 28 and 29     | Auto Zero Cal Frequency                     | Integer   | See Table 4.10   |
| 16              | 30 and 31     | Number of Auto Zeros between secondary cals | Integer   | 0 to 10, 11 = Off  |
| 17              | 32 and 33     | Time to Auto Zero Compensation              | Integer   | Minutes  |
| 18              | 34 and 35     | Time to Secondary Cal Compensation          | Integer   | Minutes  |
| 19              | 36 and 37     | Time to Recovery                            | Integer   | Minutes  |
| 20              | 38 to 41      | Secondary Calibration Concentration         | Float     | See Units  |
| 21              | –             | –   | –         | –  |
| 22              | 42 and 43     | Current Output 1 Hold Status                | Integer   | 0 = No, 1 = Yes  |
| 23              | 44 and 45     | Current Output 2 Hold Status                | Integer   | 0 = No, 1 = Yes  |
| 24              | 46 and 47     | Current Output Type                         | Integer   | 0 = 0-10 mA, 1 = 0-20 mA, 2 = 4-20 mA                          |
| 25              | 48 to 51      | Current Output Range 1                      | Float     | See Units  |
| 26              | –             | –   | –         | –  |
| 27              | 52 to 55      | Current Output Range 2                      | Float     | See Units  |
| 28              | –             | –   | –         | –  |
| 29              | 56 and 57     | Alarm Failsafe                              | Integer   | 0 = No, 1 = Yes  |
| 30              | 58 and 59     | Alarm Hysteresis                            | Integer   | 0 to 5% of Set point value                                     |
| 31              | 60 and 61     | Alarm Delay                                 | Integer   | 0 to 99 minutes  |
| 32              | 62 and 63     | Alarm A1 On/Off Status                      | Integer   | 0 = Off, 1 = On  |
| 33              | 64 and 65     | Alarm A1 Action                             | Integer   | 0 = Low, 1 = High  |
| 34              | 66 to 69      | Alarm A1 Set point                          | Float     | See Units  |
| 35              | –             | –   | –         | –  |
| 36              | 70 and 71     | Alarm A2 On/Off Status                      | Integer   | 0 = Off, 1 = On  |
| 37              | 72 and 73     | Alarm A2 Action                             | Integer   | 0 = Energized Below, 1 = Energized Above                       |
| 38              | 74 to 77      | Alarm A2 Set point                          | Float     | See Units  |
| 39              | –             | –   | –         | –  |
| 40              | 78 and 79     | Clock - Day                                 | Integer   | Day of the month   |
| 41              | 80 and 81     | Clock - Month                               | Integer   | Month of the year  |
| 42              | 82 and 83     | Clock - Year                                | Integer   | Year   |
| 43              | 84 and 85     | Clock - Hour                                | Integer   | Time in 24 hour clock format                                   |
| 44              | 86 and 87     | Clock - Minutes                             | Integer   | Minutes  |
| 45              | 88 and 89     | Next Auto Calibration - Day                 | Integer   | Day of the month   |
| 46              | 90 and 91     | Next Auto Calibration - Month               | Integer   | Month of the year  |

Table 4.13 8242 (Single-stream) Holding Registers

| Modbus Register | PROFIBUS Byte |                                    |           |                              |
|-----------------|---------------|------------------------------------|-----------|------------------------------|
| Decimal         | Decimal       | Name                               | Data Type | Units                        |
| 47              | 92 and 93     | Next Auto Calibration - Year       | Integer   | Year                         |
| 48              | 94 and 95     | Next Auto Calibration - Hours      | Integer   | Time in 24 hour clock format |
| 49              | 96 and 97     | Next Auto Calibration - Minutes    | Integer   | Minutes                      |
| 50              | 98 and 99     | Next Auto Zero Calibration - Day   | Integer   | Day of the month             |
| 51              | 100 and 101   | Next Auto Zero Calibration - Month | Integer   | Month of the year            |
| 52              | 102 and 103   | Next Auto Zero Calibration - Year  | Integer   | Year                         |
| 53              | 104 and 105   | Last Auto Zero Calibration - Day   | Integer   | Day of the month             |
| 54              | 106 and 107   | Last Auto Zero Calibration - Month | Integer   | Month of the year            |
| 55              | 108 and 109   | Last Auto Zero Calibration - Year  | Integer   | Year                         |
| 56              | 110 and 111   | Next Secondary Calibration - Day   | Integer   | Day of the month             |
| 57              | 112 and 113   | Next Secondary Calibration - Month | Integer   | Month of the year            |
| 58              | 114 and 115   | Next Secondary Calibration - Year  | Integer   | Year                         |
| 59              | 116 and 117   | Last Secondary Calibration - Day   | Integer   | Day of the month             |
| 60              | 118 and 119   | Last Secondary Calibration - Month | Integer   | Month of the year            |
| 61              | 120 and 121   | Last Secondary Calibration - Year  | Integer   | Year                         |
| 62              | 122 and 123   | Optical Filter                     | Integer   | 0 = Filter1 1 = Filter2      |
| 63              | 124 and 125   | Color Compensation Frequency       | Integer   | See Table 4.10               |
| 64              | 126 to 129    | Color Compensation Applied         | Float     | Value (see units)            |
| 65              | -             | -                                  | -         | -                            |
| 66              | 130 and 131   | Color Compensation Day             | Integer   | Day of the month             |
| 67              | 132 and 133   | Color Compensation Month           | Integer   | Month of the year            |
| 68              | 134 and 135   | Color Compensation Year            | Integer   | Year                         |
| 69              | 136 and 137   | Color Compensation Hours           | Integer   | Time in 24 hour clock format |
| 70              | 138 and 139   | Color Compensation Minutes         | Integer   | Minutes                      |
| -               | 140 to 192    | Not Used                           | -         | -                            |

Table 4.13 8242 (Single-stream) Holding Registers (Continued)

#### 4.7 8242 Multi-stream Analyzers

| Modbus Register | PROFIBUS Byte |  |           |  |
|-----------------|---------------|--|-----------|--|
| Decimal         | Decimal       | Name   | Data Type | Units  |
| 1               | 0 to 3        | Phosphate Concentration - Stream 1           | Float     | See Units  |
| 2               | –             | –  | –         | –  |
| 3               | 4 to 7        | Phosphate Concentration - Stream 2           | Float     | See Units  |
| 4               | –             | –  | –         | –  |
| 5               | 8 to 11       | Phosphate Concentration - Stream 3           | Float     | See Units  |
| 6               | –             | –  | –         | –  |
| 7               | 12 to 15      | Phosphate Concentration - Stream 4           | Float     | See Units  |
| 8               | –             | –  | –         | –  |
| 9               | 16 to 19      | Phosphate Concentration - Stream 5           | Float     | See Units  |
| 10              | –             | –  | –         | –  |
| 11              | 20 to 23      | Phosphate Concentration - Stream 6           | Float     | See Units  |
| 12              | –             | –  | –         | –  |
| 13              | 24 to 27      | Optical System Temperature                   | Float     | Always in °C   |
| 14              | –             | –  | –         | –  |
| 15              | 28 to 31      | Reaction Block Temperature                   | Float     | Always in °C   |
| 16              | –             | –  | –         | –  |
| 17              | 32 and 33     | Displayed Slope                              | Integer   | Slope percentage   |
| 18              | 34 to 37      | Displayed Offset                             | Float     | Concentration value offset                                     |
| 19              | –             | –  | –         | –  |
| 20              | 38 and 39     | Instrument Status                            | Integer   | See Table 4.9  |
| 21              | 40 and 41     | Alarm Status                                 | Integer   | See Table 4.11   |
| 22              | 42 and 43     | Units  | Integer   | 3 = ppm, 4 = mg/l, 5 = mg/kg                                   |
| 23              | 44 and 45     | Display Span                                 | Integer   | 0 = 0 to 20 as P, 1 = 0 to 60 as PO <sub>4</sub> <sup>3-</sup> |
| 24              | 46 and 47     | Calibration Type                             | Integer   | 0 = None, 1 = Routine, 2 = Baseline                            |
| 25              | 48 and 49     | Auto Zero Cal Frequency                      | Integer   | See Table 4.10   |
| 26              | 50 and 51     | Number of Auto Zeros between secondary calcs | Integer   | 0 to 10, 11 = Off  |
| 27              | 52 and 53     | Time to Auto Zero Compensation               | Integer   | Minutes  |
| 28              | 54 and 55     | Time to Secondary Cal Compensation           | Integer   | Minutes  |
| 29              | 56 and 57     | Time to Recovery                             | Integer   | Minutes  |
| 30              | 58 to 61      | Secondary Calibration Concentration          | Float     | See Units  |
| 31              | –             | –  | –         | –  |
| 32              | 62 and 63     | Current Output Type                          | Integer   | 0 = 0 to 10 mA, 1 = 0 to 20 mA, 2 = 4 to 20 mA                 |
| 33              | 64 to 67      | Current Output Range 1                       | Float     | See Units  |
| 34              | –             | –  | –         | –  |
| 35              | 68 to 71      | Current Output Range 2                       | Float     | See Units  |
| 36              | –             | –  | –         | –  |
| 37              | 72 to 75      | Current Output Range 3                       | Float     | See Units  |
| 38              | –             | –  | –         | –  |
| 39              | 76 to 79      | Current Output Range 4                       | Float     | See Units  |
| 40              | –             | –  | –         | –  |
| 41              | 80 to 83      | Current Output Range 5                       | Float     | See Units  |
| 42              | –             | –  | –         | –  |
| 43              | 84 to 87      | Current Output Range 6                       | Float     | See Units  |
| 44              | –             | –  | –         | –  |
| 45              | 88 and 89     | Alarm Failsafe                               | Integer   | 0 = No, 1 = Yes  |
| 46              | 90 and 91     | Alarm Hysteresis                             | Integer   | 0 to 5% of set point value                                     |

Table 4.14 8242 (Multi-stream) Holding Registers

| Modbus Register | PROFIBUS Byte |                                    |           |  |
|-----------------|---------------|------------------------------------|-----------|--|
| Decimal         | Decimal       | Name                               | Data Type | Units                                    |
| 47              | 92 and 93     | Alarm Configuration                | Integer   | 0 = Concentration, 1 = Out of Sample     |
| 48              | 94 and 95     | Alarm A1 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 49              | 96 and 97     | Alarm A1 Action                    | Integer   | 0 = Low, 1 = High                        |
| 50              | 98 to 101     | Alarm A1 Set point                 | Float     | See Units                                |
| 51              | -             | -                                  | -         | -  |
| 52              | 102 and 103   | Alarm A2 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 53              | 104 and 105   | Alarm A2 Action                    | Integer   | 0 = Energized Below, 1 = Energized Above |
| 54              | 106 to 109    | Alarm A2 Set point                 | Float     | See Units                                |
| 55              | -             | -                                  | -         | -  |
| 56              | 110 and 111   | Alarm A3 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 57              | 112 and 113   | Alarm A3 Action                    | Integer   | 0 = Low, 1 = High                        |
| 58              | 114 to 117    | Alarm A3 Set point                 | Float     | See Units                                |
| 59              | -             | -                                  | -         | -  |
| 60              | 118 and 119   | Alarm A4 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 61              | 120 and 121   | Alarm A4 Action                    | Integer   | 0 = Energized Below, 1 = Energized Above |
| 62              | 122 to 125    | Alarm A4 Set point                 | Float     | See Units                                |
| 63              | -             | -                                  | -         | -  |
| 64              | 126 and 127   | Alarm A5 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 65              | 128 and 129   | Alarm A5 Action                    | Integer   | 0 = Low, 1 = High                        |
| 66              | 130 to 133    | Alarm A5 Set point                 | Float     | See Units                                |
| 67              | -             | -                                  | -         | -  |
| 68              | 134 and 135   | Alarm A6 On/Off Status             | Integer   | 0 = Off, 1 = On                          |
| 69              | 136 and 137   | Alarm A6 Action                    | Integer   | 0 = Energized Below, 1 = Energized Above |
| 70              | 138 to 141    | Alarm A6 Set point                 | Float     | See Units                                |
| 71              | -             | -                                  | -         | -  |
| 72              | 142 and 143   | Clock - Day                        | Integer   | Day of the month                         |
| 73              | 144 and 145   | Clock - Month                      | Integer   | Month of the year                        |
| 74              | 146 and 147   | Clock - Year                       | Integer   | Year                                     |
| 75              | 148 and 149   | Clock - Hour                       | Integer   | Time in 24 hour clock format             |
| 76              | 150 and 151   | Clock - Minutes                    | Integer   | Minutes                                  |
| 77              | 152 and 153   | Next Auto Calibration - Day        | Integer   | Day of the month                         |
| 78              | 154 and 155   | Next Auto Calibration - Month      | Integer   | Month of the year                        |
| 79              | 156 and 157   | Next Auto Calibration - Year       | Integer   | Year                                     |
| 80              | 158 and 159   | Next Auto Calibration - Hours      | Integer   | Time in 24 hour clock format             |
| 81              | 160 and 161   | Next Auto Calibration - Minutes    | Integer   | Minutes                                  |
| 82              | 162 and 163   | Next Auto Zero Calibration - Day   | Integer   | Day of the month                         |
| 83              | 164 and 165   | Next Auto Zero Calibration - Month | Integer   | Month of the year                        |
| 84              | 166 and 167   | Next Auto Zero Calibration - Year  | Integer   | Year                                     |
| 85              | 168 and 169   | Last Auto Zero Calibration - Day   | Integer   | Day of the month                         |
| 86              | 170 and 171   | Last Auto Zero Calibration - Month | Integer   | Month of the year                        |
| 87              | 172 and 173   | Last Auto Zero Calibration - Year  | Integer   | Year                                     |
| 88              | 174 and 175   | Next Secondary Calibration - Day   | Integer   | Day of the month                         |
| 89              | 176 and 177   | Next Secondary Calibration - Month | Integer   | Month of the year                        |
| 90              | 178 and 179   | Next Secondary Calibration - Year  | Integer   | Year                                     |
| 91              | 180 and 181   | Last Secondary Calibration - Day   | Integer   | Day of the month                         |
| 92              | 182 and 183   | Last Secondary Calibration - Month | Integer   | Month of the year                        |
| 93              | 184 and 185   | Last Secondary Calibration - Year  | Integer   | Year                                     |
| -               | 186 to 192    | Not Used                           | -         | -  |

Table 4.14 8242 (Multi-stream) Holding Registers (Continued)

#### 4.8 9437 and 9438 Analyzers

| Modbus Register | PROFIBUS Byte |                                 |           |  |
|-----------------|---------------|---------------------------------|-----------|--|
| Decimal         | Decimal       | Name                            | Data Type | Units  |
| 11              | 0 to 3        | Measured Dissolved Oxygen value | Float     | See Dissolved Oxygen Units                               |
| 12              | –             | –                               | –         | –  |
| 13              | 4 to 7        | Measured Sensor Current         | Float     | microamps  |
| 14              | –             | –                               | –         | –  |
| 15              | 8 to 11       | Measured Temperature            | Float     | See Temperature Units                                    |
| 16              | –             | –                               | –         | –  |
| 17              | 12 to 15      | Set point A1                    | Float     | See Dissolved Oxygen Units                               |
| 18              | –             | –                               | –         | –  |
| 19              | 16 to 19      | Set point A2                    | Float     | See Dissolved Oxygen Units                               |
| 20              | –             | –                               | –         | –  |
| 21              | 20 and 21     | Dissolved Oxygen Units          | Integer   | 0 = ppb, 1 = ug/l, 2 = ug/kg                             |
| 22              | 22 and 23     | Temperature Units               | Integer   | 0 = Deg C, 1 = Deg F                                     |
| 23              | 24 and 25     | Alarm A1 Type                   | Integer   | 0 = Off, 1 = Dissolved Oxygen, 2 = Temperature, 3 = Fail |
| 24              | 26 and 27     | Alarm A1 Action                 | Integer   | 0 = Low, 1 = High, 2 = Hi/Lo                             |
| 25              | 28 and 29     | Retransmission Curve            | Integer   | 0 = Linear, 1 = Bi-Linear, 2 = Logarithmic               |
| 26              | 30 and 31     | Retransmission Type             | Integer   | 0 = 0 to 10 mA, 1 = 0 to 20 mA, 2 = 4 to 20 mA           |
| 27              | 32 to 35      | Retransmission Span             | Float     | See Dissolved Oxygen Units                               |
| 28              | –             | –                               | –         | –  |
| 29              | 36 to 39      | Retransmission Zero             | Float     | See Dissolved Oxygen Units                               |
| 30              | –             | –                               | –         | –  |
| 31              | 40 and 41     | Instrument Status               | Integer   | See Table 4.16   |
| 32              | 42 to 64      | Not Used                        | –         | –  |

Table 4.15 9437 and 9438 Holding Registers

| Bit      | Description             | Data                            |
|----------|-------------------------|---------------------------------|
| 10 to 15 | –                       | Always Zero                     |
| 9        | Solenoid Drain Valve    | 0 = Closed, 1 = Open            |
| 8        | Alarm 1 Status          | 0 = De-energized, 1 = Energized |
| 7        | Non-Volatile Read Error | 0 = OK, 1 = Error               |
| 6        | –                       | Always Zero                     |
| 5        | Last Calibration Status | 0 = Passed, 1 = Failed          |
| 4        | Cal In Progress         | 0 = Complete, 1 = In Progress   |
| 3        | Solution is Cold        | 0 = OK, 1 = Error               |
| 2        | Solution is Hot         | 0 = OK, 1 = Error               |
| 1        | Short Circuit Pt1000    | 0 = OK, 1 = Error               |
| 0        | Open Circuit Pt1000     | 0 = OK, 1 = Error               |

Table 4.16 9437 and 9438 Instrument Status

# PRODUCTS & CUSTOMER SUPPORT

## Products

### Automation Systems

- for the following industries:
  - Chemical & Pharmaceutical
  - Food & Beverage
  - Manufacturing
  - Metals and Minerals
  - Oil, Gas & Petrochemical
  - Pulp and Paper

### Drives and Motors

- AC and DC Drives, AC and DC Machines, AC Motors to 1kV
- Drive Systems
- Force Measurement
- Servo Drives

### Controllers & Recorders

- Single and Multi-loop Controllers
- Circular Chart and Strip Chart Recorders
- Paperless Recorders
- Process Indicators

### Flexible Automation

- Industrial Robots and Robot Systems

### Flow Measurement

- Electromagnetic Flowmeters
- Mass Flowmeters
- Turbine Flowmeters
- Wedge Flow Elements

### Marine Systems & Turbochargers

- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

### Process Analytics

- Process Gas Analysis
- Systems Integration

### Transmitters

- Pressure
- Temperature
- Level
- Interface Modules

### Valves, Actuators and Positioners

- Control Valves
- Actuators
- Positioners

### Water, Gas & Industrial Analytics Instrumentation

- pH, Conductivity and Dissolved Oxygen Transmitters and Sensors
- Ammonia, Nitrate, Phosphate, Silica, Sodium, Chloride, Fluoride, Dissolved Oxygen and Hydrazine Analyzers
- Zirconia Oxygen Analyzers, Katharometers, Hydrogen Purity and Purge-gas Monitors, Thermal Conductivity

## Customer Support

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.

### United Kingdom

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

### United States of America

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:

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

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