



# 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.

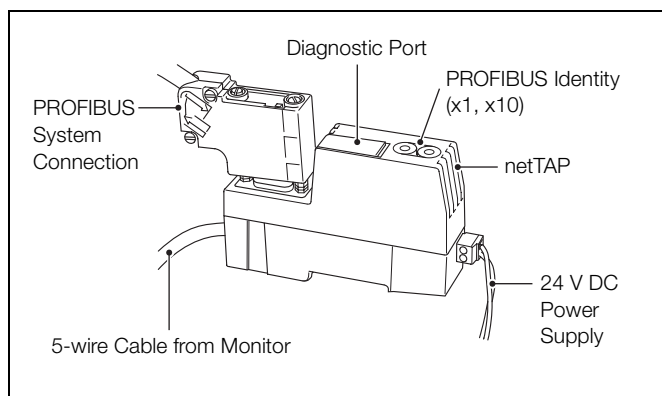


Fig. 1.1 netTAP Device

## 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.

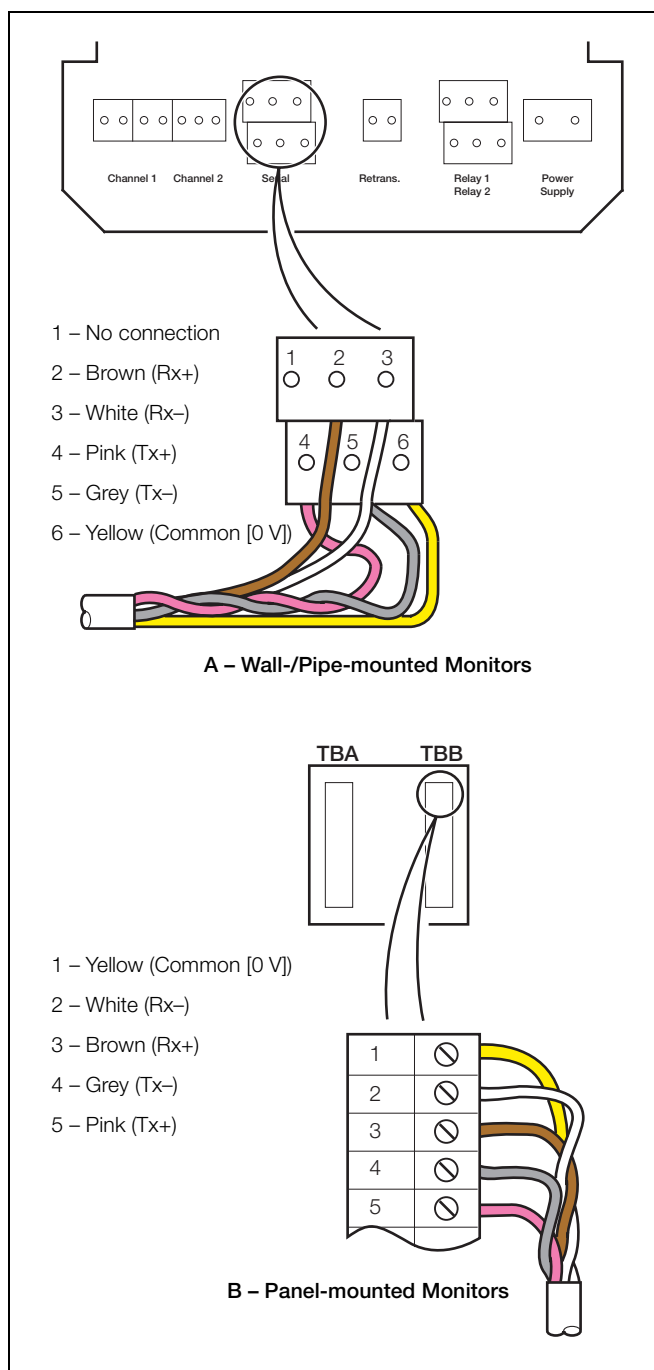


Fig. 2.1 Electrical Connections –  
4670, 8037, 9437 and 9438 Analyzers

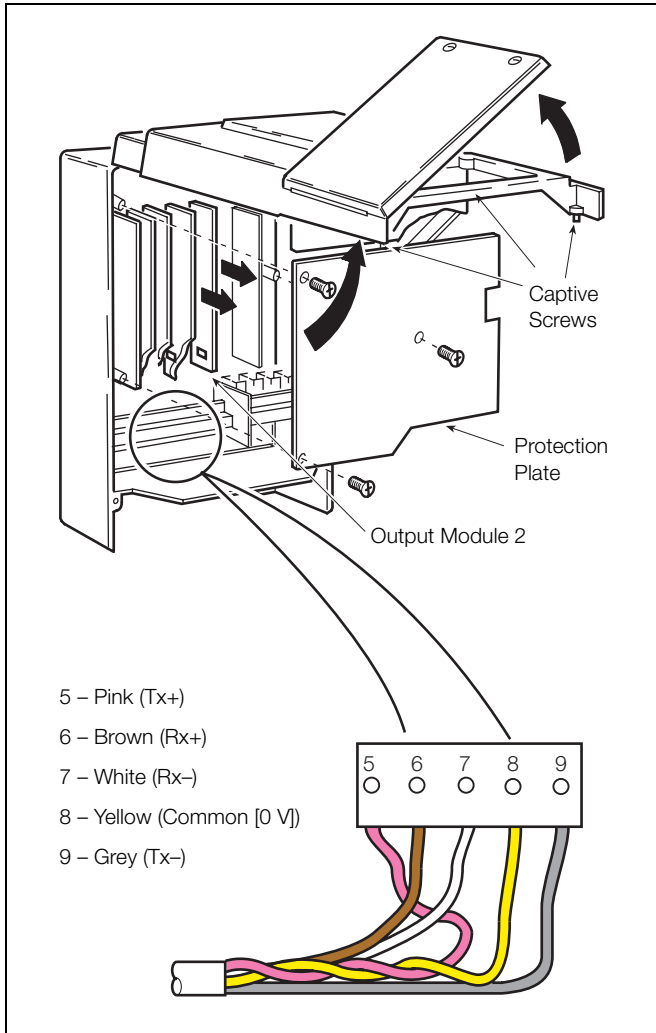


Fig. 2.2 Electrical Connections – 8230 Series Analyzers

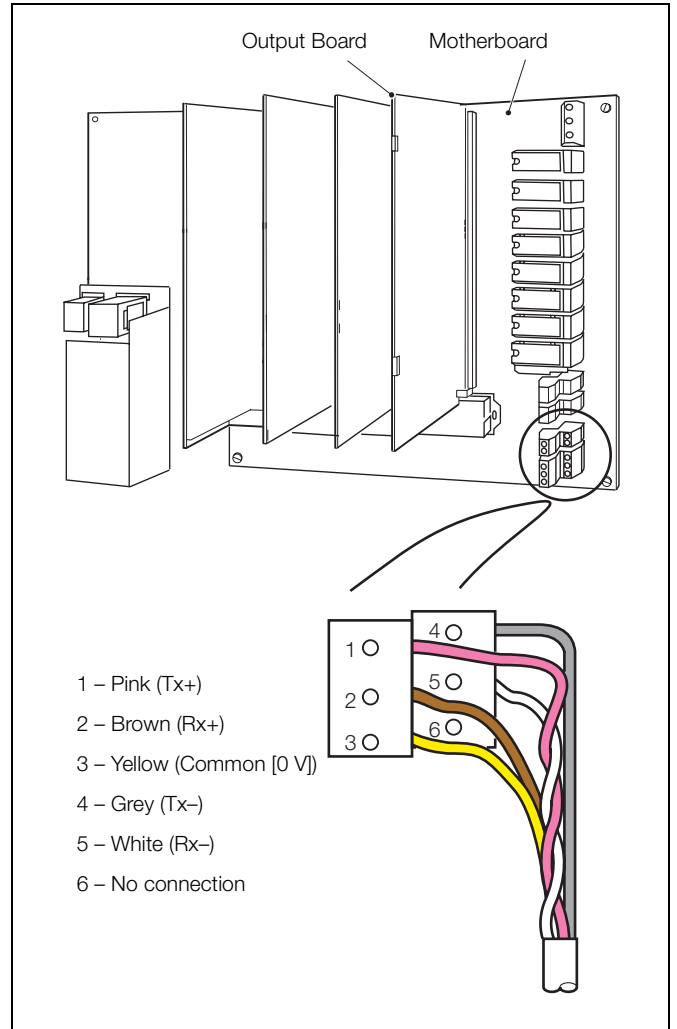


Fig. 2.3 Electrical Connections – 8240 Series Analyzers

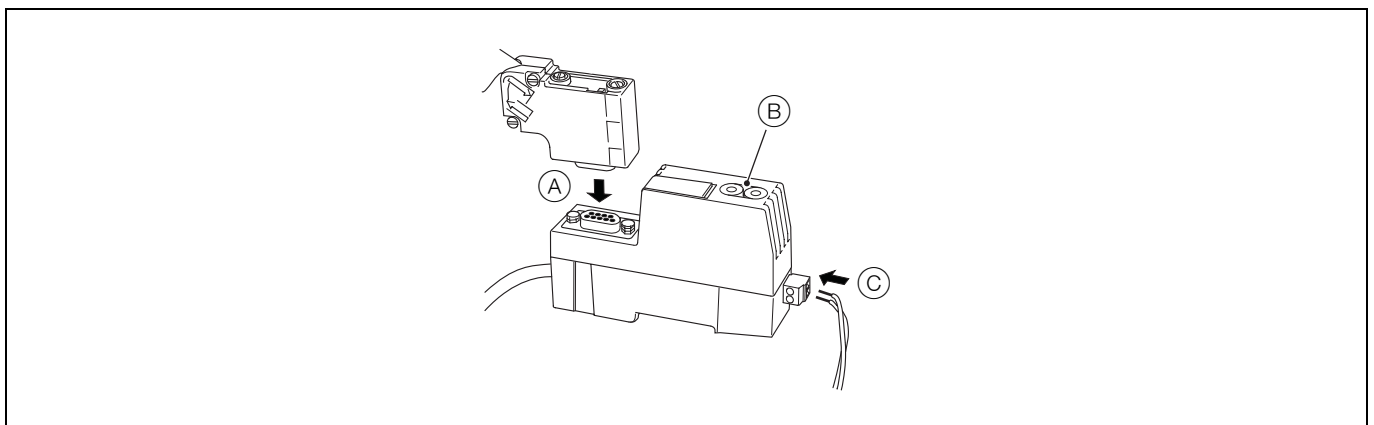


Fig. 2.4 netTAP Connections – 4670, 8037, 9437 and 9438 Analyzers

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.

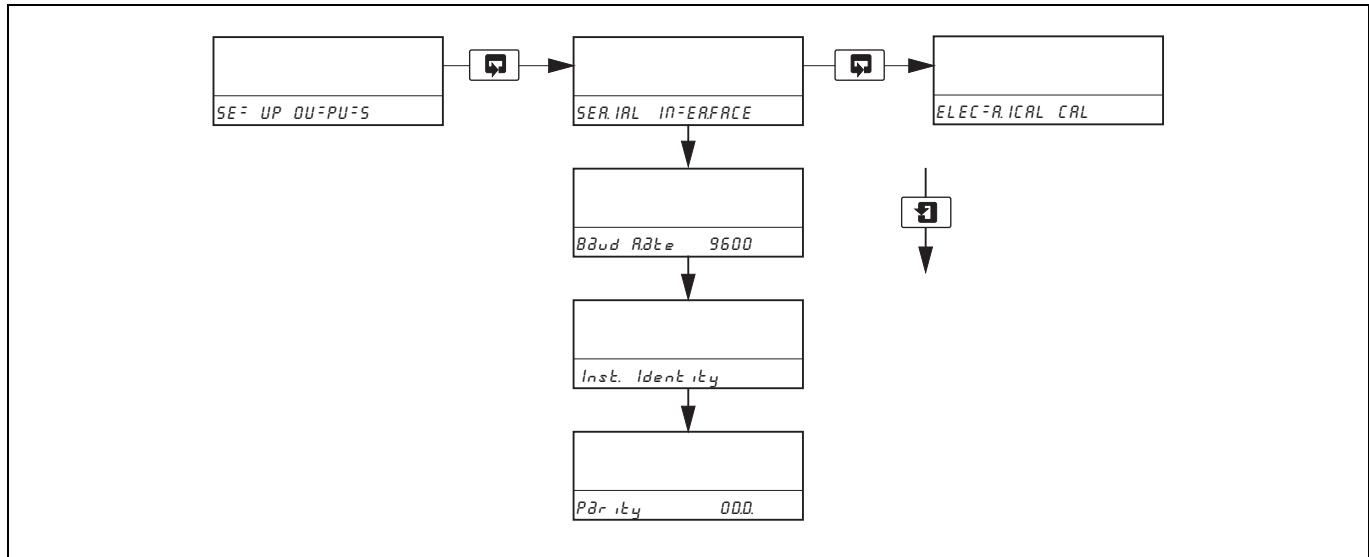
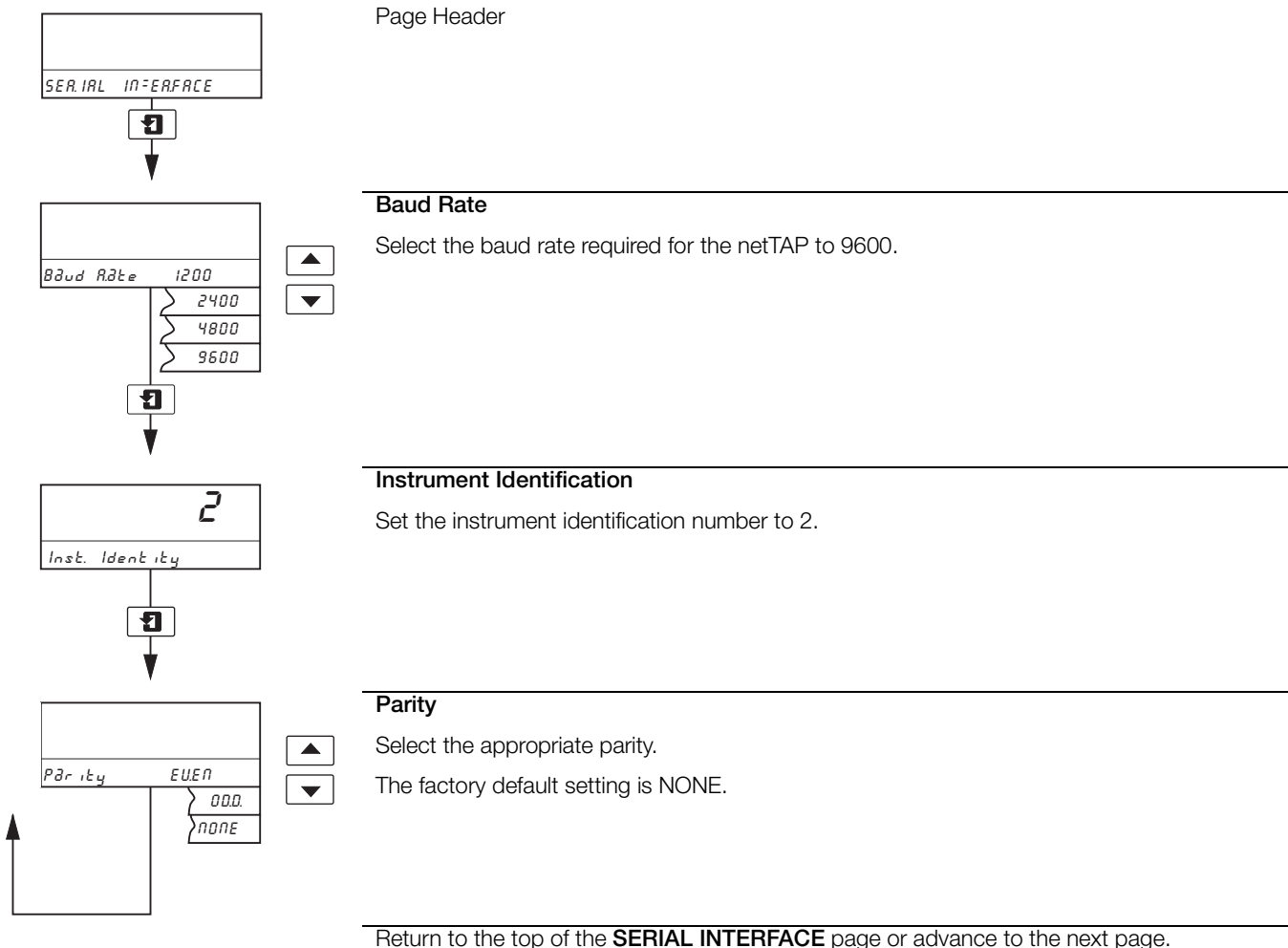


Fig. 3.1 8037, 9437 and 9438 Analyzers – Location of Serial Interface Page



### 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.

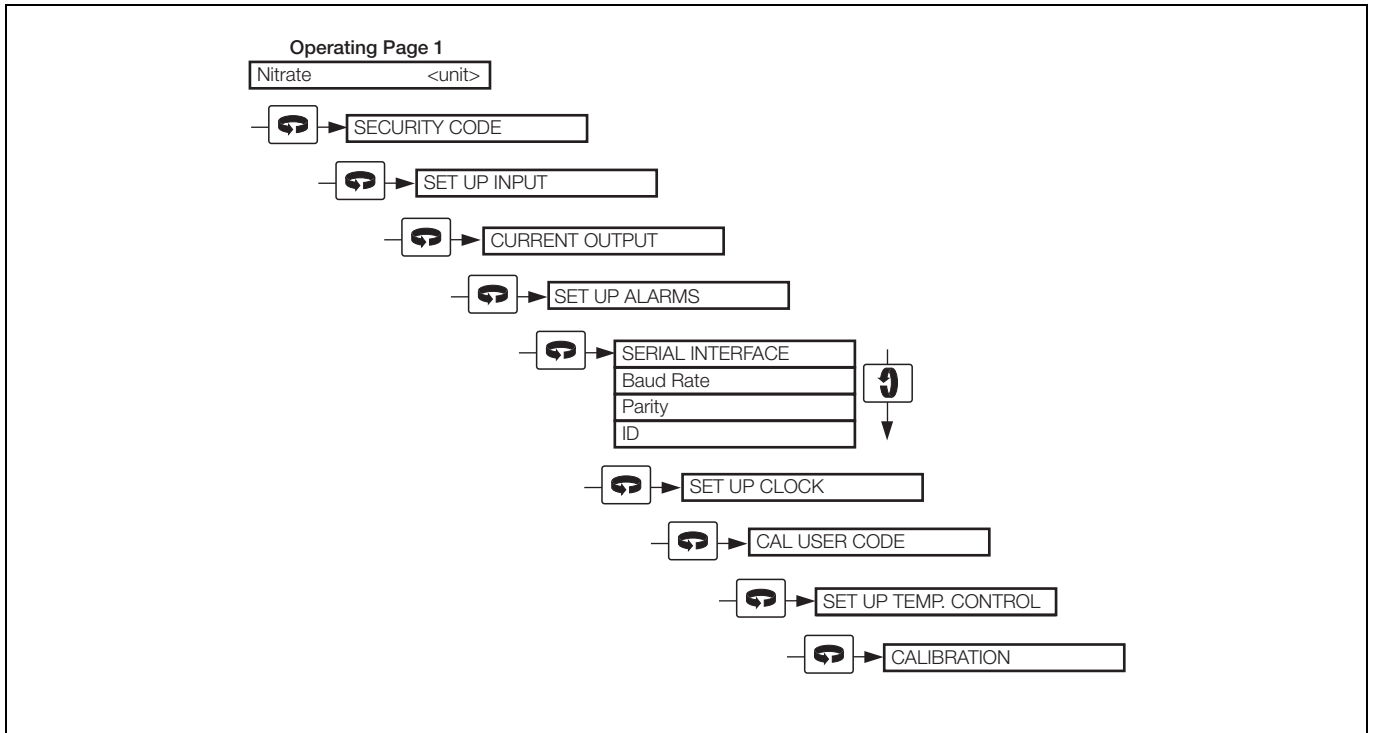
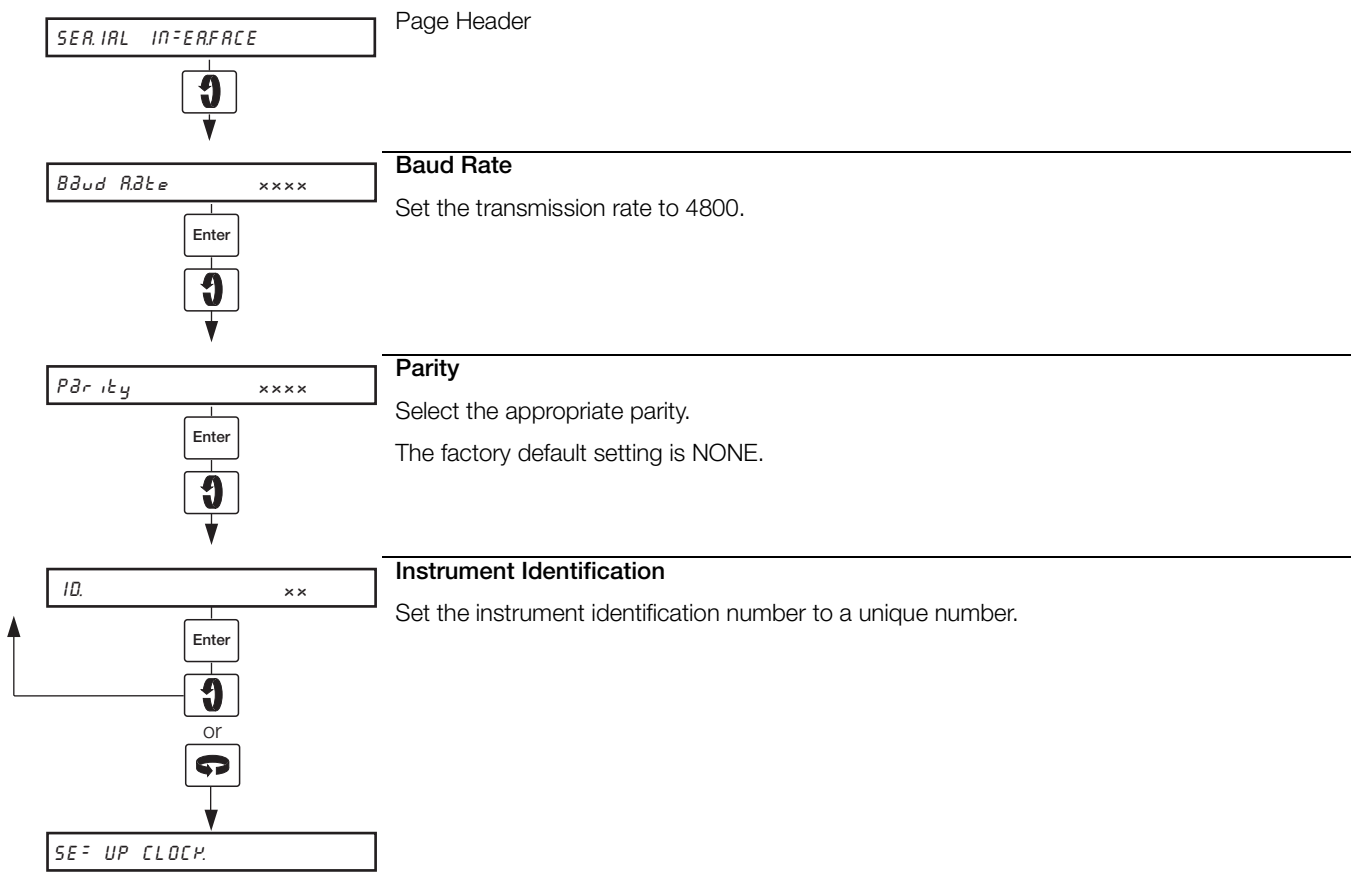


Fig. 3.2 8230 Series Analyzers – Location of Serial Interface Page



### 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.

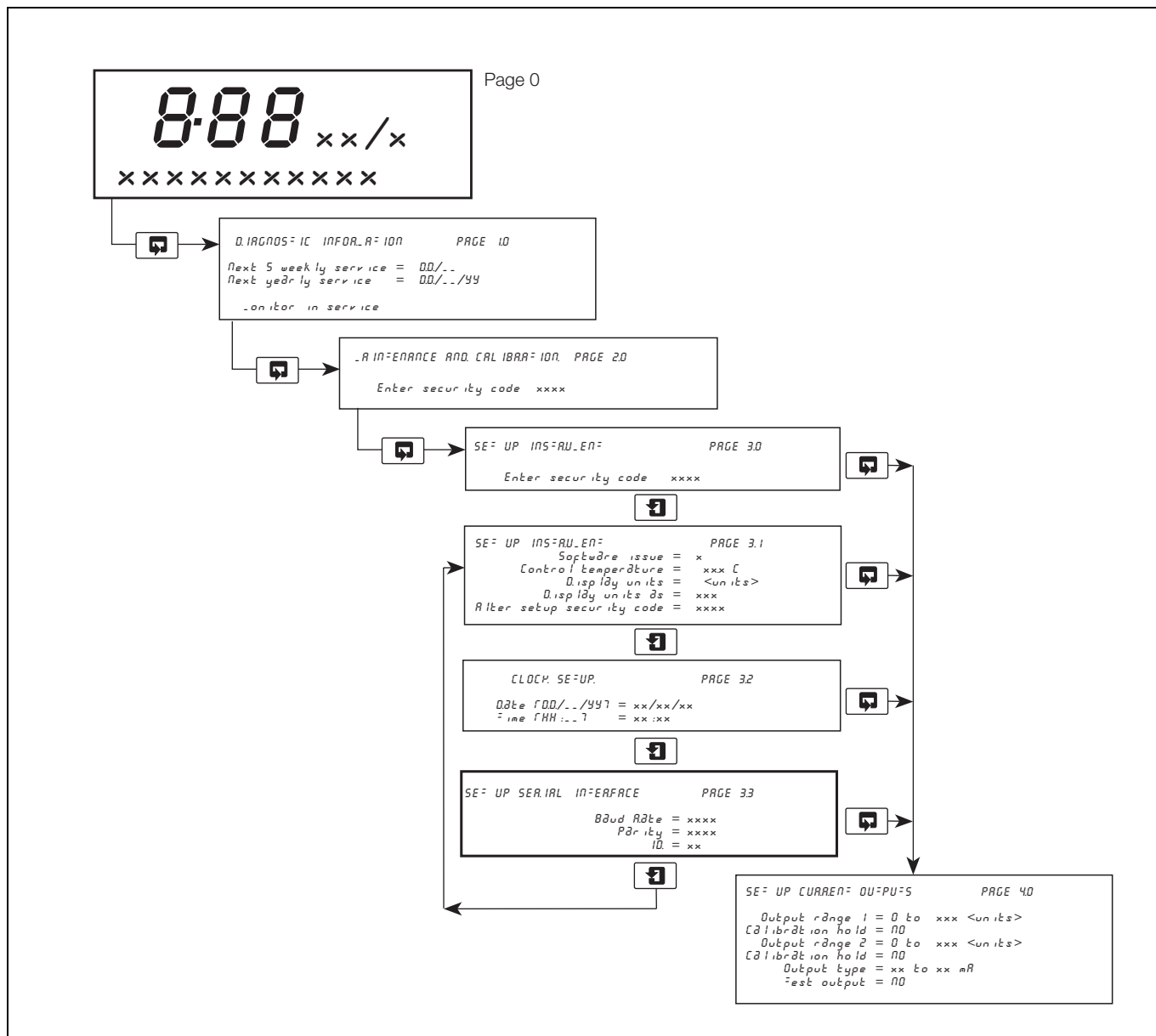
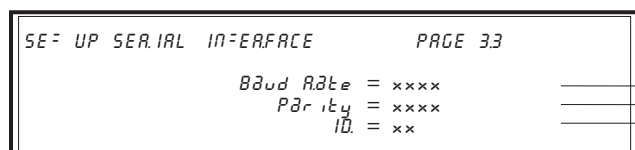


Fig. 3.3 8240 Series Analyzers – Location of Serial Interface Page



**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 3 = 7997-202, 4 = 7997-300, 5 = 7997-400
24	26 to 27	Turbidity Units	Integer	0 = Turbidity NTU, 1 = Turbidity FNU 2 = Suspended Solids mg/l 3 = Suspended Solids ppm, 4 = Turbidity FTU 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 cals	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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