

## **Congratulations !**

The **900-C** is a precision, research grade Conductivity instrument and is designed to give you many years of reliable service.

Despite its impressive list of features, the **900-C** is a breeze to operate. This manual has been designed to help you get started, and also contains some handy application tips. If at any stage you require assistance, please contact either your local TPS representative or the TPS factory in Brisbane.

The manual is divided into the following sections:

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### **1. Table of Contents**

Each major section of the handbook is clearly listed. Sub-sections have also been included to enable you to find the information you need at a glance.

### **2. Introduction**

The introduction has a diagram and explanation of the display and controls of the **900-C**. It also contains a full listing of all of the items that you should have received with unit. Please take the time to read this section, as it explains some of items that are mentioned in subsequent sections.

### **3. Main Section**

The main section of the handbook provides complete details of the **900-C**, including operating modes, calibration, troubleshooting, specifications, and warranty terms.

### **4. Appendices**

Appendices containing background information and application notes are provided at the back of this manual.

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**900-C**  
**Conductivity, TDS,**  
**Resistivity, Ratio, Meter**

Date : 07-Dec-1998

Author : MS

Version : 3.0

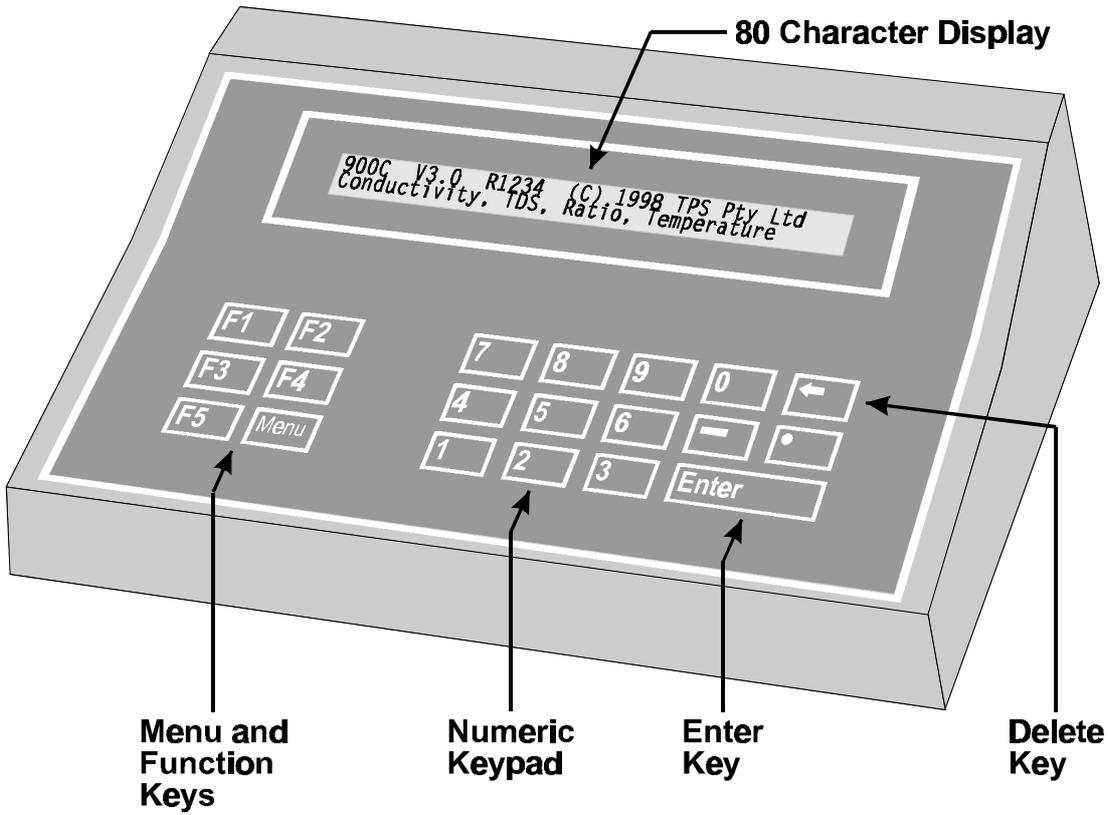
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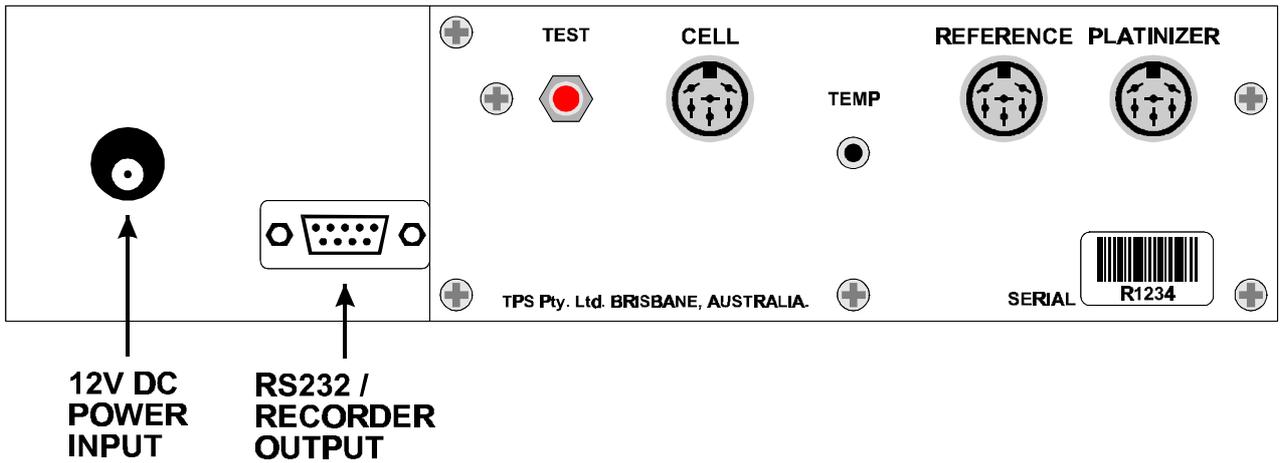
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# 1. Introduction

## 1.1 900-C Display and Controls



## 1.2 900-C Rear Panel Connectors



### 1.3 Menu and Function Keys

Press the **F1** to **F5** function keys to select desired options within the menu system.

Additionally, these keys perform the following function directly in normal measurement mode...

- F1** : Press to record readings into the Notepad. See section 9.
- F2** : Press to change up one range at a time, when the **900-C** is in manual ranging mode.  
See section 17.1.
- F3** : Press to start or stop automatic datalogging. See section 10.  
Alternatively, press to transmit current reading plus date and time to the optional RS232 port. See section 11.2.
- F4** : Press to change down one range at a time, when the **900-C** is in manual ranging mode.  
See section 17.1.
- F5** : Press to alternate between Automatic and Manual ranging when the **900-C** is in normal measurement mode.  
  
Press to obtain context-sensitive help messages where available. This function is disabled within menus.

### 1.4 Numeric Keypad

Used to enter values during set-up and calibration. A negative sign and decimal point are provided.

### 1.5 Enter Key

Press the **Enter** key to accept default values or those entered on the Numeric Keypad.

### 1.6 Delete Key

Press the **←** key to make corrections to values entered on the Numeric Keypad.

Press and hold this key at turn-on to initialise the **900-C**. See section 14.

### 1.7 80 Character Display

80 character alphanumeric display with user-friendly menu and context-sensitive help system. Shows Conductivity/TDS/Resistivity/Ratio, Temperature, Date and Time simultaneously.

## 1.8 Unpacking Information

Before using your new **900-C**, please check that the following accessories have been included:

Part No

### *Standard Kit...*

- |   |        |
|---|--------|
| 1. <b>900-C</b> Conductivity/TDS/Resistivity/Ratio Meter .... | 122102 |
| 2. k=1.0 Conductivity Sensor .....                            | 122206 |
| 3. Temperature/ATC Sensor .....                               | 121245 |
| 4. 2.76mS/cm Conductivity Standard, 200mL .....               | 122306 |
| 5. Plug-Pack Power Supply .....                               | 130044 |
| 6. <b>900-C</b> Handbook.....                                 | 130050 |

### *Options that may have been ordered with your 900-C...*

- |  |        |
|--|--------|
| 1. Flexible arm type electrode holder.....             | 130088 |
| 2. RS232 Serial Interface Option (includes cable)..... | 130029 |
| 3. Recorder Output Option (includes cable).....        | 130028 |
| 4. RS232 PLUS Recorder Output Option.....              | 130049 |
| (includes cable)                                       |        |
| 5. Communication software for Windows 3.1,.....        | 130086 |
| 95, and NT   |        |
| 6. Communication software for DOS .....                | 130075 |
| 7. RS232 Printer.....                                  | 130031 |
| 8. Platinizing solution, 20mL.....                     | 122300 |

### *Optional Sensors...*

- |  |        |
|--|--------|
| 1. k=0.1 Conductivity Sensor .....               | 122204 |
| 2. k=10 Conductivity Sensor .....                | 122202 |
| 3. k=0.1 Conductivity + Temperature Sensor ..... | 122225 |
| 4. k=1.0 Conductivity + Temperature Sensor ..... | 122227 |
| 5. k=10 Conductivity + Temperature Sensor .....  | 122223 |
| 6.   |        |

### *Other spares...*

- |                                   |        |
|-----------------------------------|--------|
| 7. RS232 Interface Cable.....     | 130022 |
| 8. Recorder Cable.....            | 130021 |
| 9. RS232 PLUS Recorder Cable..... | 130030 |

## 1.9 Specifications

### Ranges

Mode	k=0.1 Sensor	k=1.0 Sensor	k=10 Sensor	User k factor
<b>Conductivity, Siemens/cm</b>	0 to 2.000 $\mu\text{S/cm}$ 0 to 20.00 $\mu\text{S/cm}$ 0 to 200.0 $\mu\text{S/cm}$ 0 to 2000 $\mu\text{S/cm}$ 0 to 20.00 $\text{mS/cm}$	0 to 20.00 $\mu\text{S/cm}$ 0 to 200.0 $\mu\text{S/cm}$ 0 to 2000 $\mu\text{S/cm}$ 0 to 20.00 $\text{mS/cm}$ 0 to 200.0 $\text{mS/cm}$	0 to 200.0 $\mu\text{S/cm}$ 0 to 2000 $\mu\text{S/cm}$ 0 to 20.00 $\text{mS/cm}$ 0 to 200.0 $\text{mS/cm}$ 0 to 2000 $\text{mS/cm}$	5 ranges, depending on actual k factor
<b>Conductivity, Siemens/metre</b>	0 to 200.0 $\mu\text{S/m}$ 0 to 2000. $\mu\text{S/m}$ 0 to 20.00 $\text{mS/m}$ 0 to 200.0 $\text{mS/m}$ 0 to 2000 $\text{mS/m}$	0 to 2000. $\mu\text{S/m}$ 0 to 20.00 $\text{mS/m}$ 0 to 200.0 $\text{mS/m}$ 0 to 2000 $\text{mS/m}$ 0 to 20.00 $\text{S/m}$	0 to 20.00 $\text{mS/m}$ 0 to 200.0 $\text{mS/m}$ 0 to 2000 $\text{mS/m}$ 0 to 20.00 $\text{S/m}$ 0 to 200.0 $\text{S/m}$	5 ranges, depending on actual k factor
<b>TDS</b>	0 to 1.000 $\text{ppM}$ 0 to 10.00 $\text{ppM}$ 0 to 100.0 $\text{ppM}$ 0 to 1000 $\text{ppM}$ 0 to 10.00 $\text{ppK}$	0 to 10.00 $\text{ppM}$ 0 to 100.0 $\text{ppM}$ 0 to 1000 $\text{ppM}$ 0 to 10.00 $\text{ppM}$ 0 to 100.0 $\text{ppM}$	0 to 100.0 $\text{ppM}$ 0 to 1000 $\text{ppM}$ 0 to 10.00 $\text{ppK}$ 0 to 100.0 $\text{ppK}$ 0 to 1000 $\text{ppK}$	5 ranges, depending on actual k factor
<b>Resistivity</b>	0.50 to 99.99 $\text{M}\Omega.\text{cm}$ 50 to 9999 $\text{K}\Omega.\text{cm}$ 5.0 to 999.9 $\text{K}\Omega.\text{cm}$ 0.50 to 99.99 $\text{K}\Omega.\text{cm}$ 0.50 to 99.99 $\text{K}\Omega.\text{cm}$ 50 to 9999 $\Omega.\text{cm}$ 5.0 to 999.9 $\Omega.\text{cm}$	50 to 9999. $\text{K}\Omega.\text{cm}$ 5.0 to 999.9 $\text{K}\Omega.\text{cm}$ 0.50 to 99.99 $\text{K}\Omega.\text{cm}$ 50 to 9999 $\text{K}\Omega.\text{cm}$ 5.0 to 999.9 $\Omega.\text{cm}$ 5.0 to 999.9 $\Omega.\text{cm}$	5.0 to 999.9 $\text{K}\Omega.\text{cm}$ 0.50 to 99.99 $\text{K}\Omega.\text{cm}$ 50 to 9999 $\Omega.\text{cm}$ 5.0 to 999.9 $\Omega.\text{cm}$ 0.50 to 99.99 $\Omega.\text{cm}$ 0.50 to 99.99 $\Omega.\text{cm}$	5 ranges, depending on actual k factor
<b>Ratio</b>	0.000 to approx 1.500 1.50 to approx 15.00 (depending on span of sensor)	0.000 to approx 1.500 1.50 to approx 15.00 (depending on span of sensor)	0.000 to approx 1.500 1.50 to approx 15.00 (depending on span of sensor)	Ratio mode not available for user k factor.

### Temperature

**Range** : -10.0 to 120.0  $^{\circ}\text{C}$

**Resolution** : 0.1  $^{\circ}\text{C}$

**Accuracy** :  $\pm 0.2$   $^{\circ}\text{C}$

**Calibration** : Automatic calibration

**Temp. Sensor Offset Range** : -10.0  $^{\circ}\text{C}$  to +10.0  $^{\circ}\text{C}$

### General Specifications

**Temperature Compensation** : Automatic, 0 to 100  $^{\circ}\text{C}$

**Cond. Sensor Span Range** : k=0.1 Sensor : k=0.075 to k=0.133

k=1.0 Sensor : k=0.75 to k=1.33

k=10 Sensor : k=7.5 to k=13.3

User k factor :  $\pm 25\%$  of nominated k factor

**Memory** : 2300 readings including date and time

**Automatic Logging** : User-set for one reading every 1 to 90 seconds, minutes or hours.

**RS232 Port (optional)** : 300, 1200 & 9600 baud.

8 bits, no parity, 1 stop bit, XON/XOFF Protocol.

**Clock** : Calendar clock displays date, month, year, hours, minutes & seconds.

**Good Laboratory Practices** : Date, Time and Value of last Conductivity, TDS, Resistivity, Ratio and Temperature calibration are stored separately for k=0.1, k=1.0, k=10 and user-selected k factor sensors. This information can be recalled or sent to the optional RS232 port at any time.

**Power** : 12V DC, 50mA. Plug-pack power supply is included in standard kit.

**Dimensions** : 270 x 210 x 75 mm

<b>Mass</b>	: Instrument only	: Approx. 1.0 kg
	Full Kit	: Approx. 3.0 kg
<b>Environment</b>	Temperature	: 0 to 45 °C
	Humidity	: 0 to 90 % R.H.

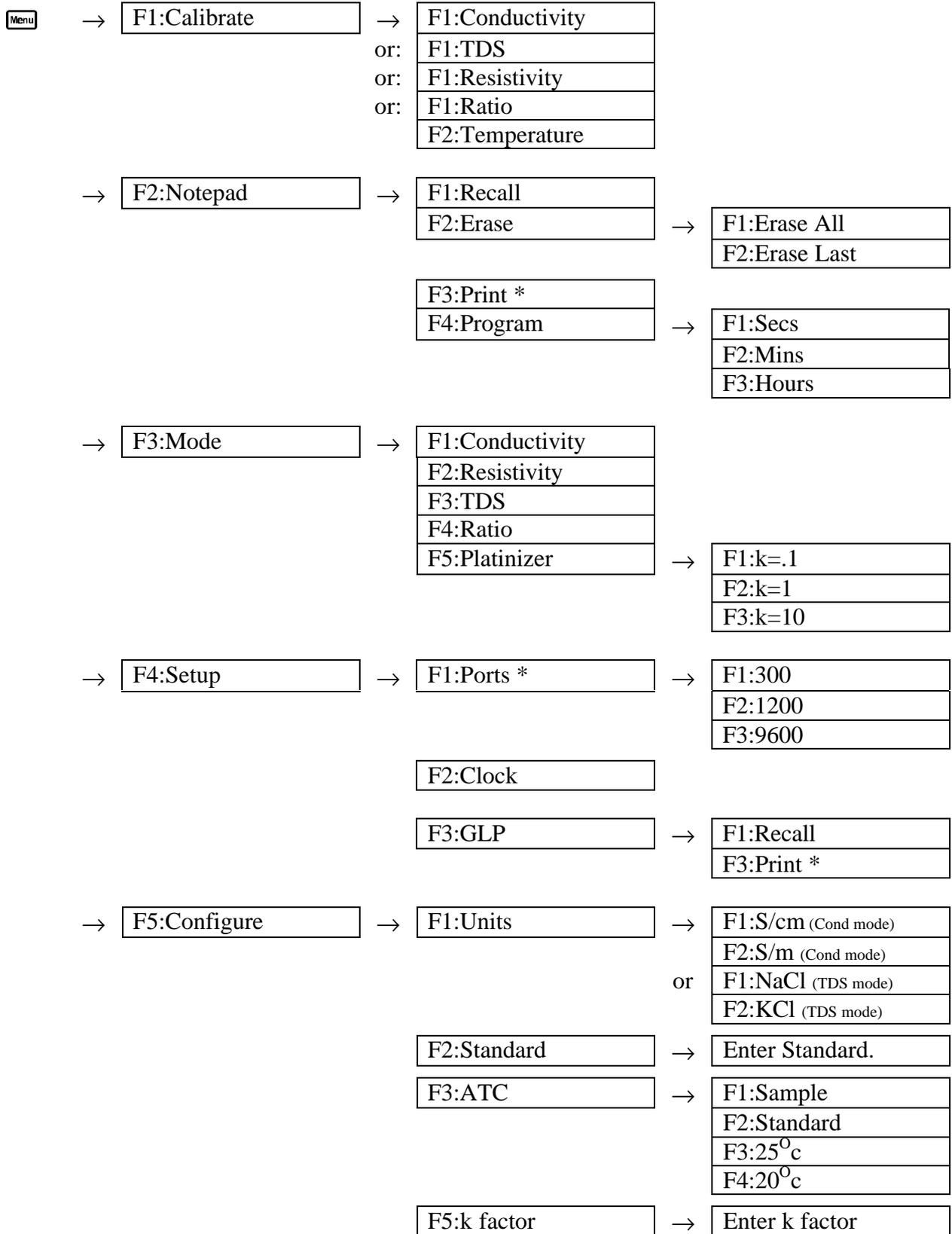
## **2. 900-C Menu Structure**

A detailed breakdown of the menu system of the **900-C** is shown below. This diagram provides a quick reference for the menu functions available for the **900-C**.

Press the function keys in normal display mode, to perform the following tasks:

- F1** : Press to record readings into the Notepad. See section 9.
- F2** : Press to change up one range at a time, when the **900-C** is in manual ranging mode.  
See section 17.1.
- F3** : Press to start or stop automatic datalogging. See section 10.  
If logging period is set to zero, press to transmit current reading plus date and time to the optional RS232 port. See section 11.2.
- F4** : Press to change down one range at a time, when the **900-C** is in manual ranging mode.  
See section 17.1.
- F5** : Press to alternate between Automatic and Manual ranging when the **900-C** is in normal measurement mode.  
  
Press to obtain context-sensitive help messages where available. This function is disabled within menus.
- Menu** : Press to access the user-friendly menu system, as detailed over the page.

**900-C Menu Structure...**



\* These functions available when RS232 Port option is fitted.

### 3. Conductivity Mode

#### 3.1 Selecting Conductivity Mode

1. Select Conductivity Mode (Menu → F3: Mode → F1: Conductivity).
2. The 900-C now proceeds to Conductivity measurement mode. Note that the decimal point will be replaced by a “ \* ” until a successful calibration has been performed (see section 3.8).

#### 3.2 Selecting Conductivity readout units

*The factory default setting for this item is S/cm. If this is satisfactory, go directly to section 3.3.*

1. Select the Display Units configuration menu (Menu → F5: Configure → F1: Units).
2. Press F1 to display Conductivity in units of S/cm (Siemens per centimetre).  
Press F2 to display Conductivity in units of S/m (Siemens per metre).  
Press Menu to quit without changing the current setting.

#### 3.3 Setting the Conductivity calibration standard

*The factory default for this item is 2.76mS/cm. If this is satisfactory, go directly to section 3.4.*

1. Select the Conductivity Standard entry (Menu → F5: Configure → F2: Standard).  
The following screen is now displayed...

```
Conductivity Standard: 2760 uS/cm
Range 20uS/cm to 2000mS/cm {2760}
```

2. Type in the value of the Conductivity standard that is to be used for calibration, including the decimal point. Use the ← key to make any corrections. Be sure to enter the value of the standard at the selected reference temperature (see section 3.4).
3. Press Enter to save the value of the standard solution.  
Alternatively, press Menu to quit without changing the current setting.
4. The 900-C will now ask you to enter the units for the Conductivity standard...

```
Conductivity Standard: 2760
Select Units  F1: uS/cm  F2: mS/cm
```

5. (a) If the 900-C is set up for S/cm (section 3.2)...  
Press F1 to set the Conductivity Standard as  $\mu$ S/cm.  
Press F2 to set the Conductivity Standard as mS/cm.  
or (b) If the 900-C is set up for S/m (section 3.2)...  
Press F1 to set the Conductivity Standard as  $\mu$ S/m.  
Press F2 to set the Conductivity Standard as mS/m.  
Press F3 to set the Conductivity Standard as S/m.
6. The Conductivity standard is now programmed for use at calibration.

#### 3.4 Setting the Reference Temperature

*The factory default setting for this item is 25°C. If this is satisfactory, go directly to section 3.5.*

1. Select the ATC configuration menu (Menu → F5: Configure → F3: ATC).
2. Press F3 to reference all readings to 25°C for Automatic Temperature Compensation.  
Press F4 to reference all readings to 20°C for Automatic Temperature Compensation.  
Press Menu to quit without changing the current setting.

### 3.5 Setting the ATC Slope for unknown samples

*The factory default setting for this item is 2.00 %<sup>o</sup>C. If this is satisfactory, go directly to section 3.6.*

The ATC Slope for the unknown sample solution is the rate at which the conductivity of the solution changes per degree Celsius. This Slope must be set correctly on the **900-C** to enable the Automatic Temperature Compensation system to work correctly. If the ATC Slope is not known, please refer to section 17.3 for details on how it can be calculated.

To set the ATC Slope for unknown samples...

1. Select ATC Slope entry (Menu → F5: Configure → F3: ATC → F1: Sample).

The following screen is displayed...

A. T. C. Slope of unknown: 2. 00%

2. Type in the ATC Slope of the unknown sample, including the decimal point. Use the  key to make any corrections. Enter 0.00% to obtain absolute readings, without temperature correction.
3. Press  to save the ATC Slope of the unknown solution. Alternatively, press  to quit without changing the current setting.

### 3.6 Setting the ATC Slope for the Calibration Standard

*The factory default setting for this item is 2.00 %<sup>o</sup>C. If this is satisfactory, go directly to section 3.7.*

The ATC Slope for the Calibration standard is the rate at which the conductivity of the solution changes per degree Celsius. This Slope must be set correctly on the **900-C** to enable the Automatic Temperature Compensation system to work correctly. If the ATC Slope is not known, please refer to section 17.3 for details on how it can be calculated.

To set the ATC Slope for the Calibration Standard...

1. Select ATC Slope entry for the Calibration Standard, (Menu → F5: Configure → F3: ATC → F2: Standard).

The following screen is displayed...

A. T. C. Slope of Standard: 2. 00%

2. Type in the ATC Slope of the Calibration Standard, including the decimal point. Use the  key to make any corrections. Enter 0.00% for absolute readings, without temperature correction.
3. Press  to save the ATC Slope of the Calibration Standard. Alternatively, press  to quit without changing the current setting.

### 3.7 Setting the Conductivity sensor k factor

*The 900-C automatically recognises the k factor for genuine TPS k=0.1, k=1.0 and k=10 sensors. If one of these sensors is being used, then go directly to section 3.8.*

1. Select k factor entry (Menu → F5: Configure → F4: k factor).
2. The k factor entry screen is now displayed...

Enter k Factor: 1.000

3. Enter the nominal k factor of the non-standard sensor using the numeric keypad. Use the  key to make any corrections.
4. Press  to save the k factor of the non-standard sensor. Alternatively, press  to quit without changing the current setting.

#### **Notes**

1. The allowable range of k factors for non-standard sensors is k=0.005 to k=30.00.
2. The exact k factor of the non-standard sensor is determined during calibration (section 3.8).
3. Manual k factor entry is not available for TPS k=0.1, k=1.0 and k=10 sensors. The exact k factor for these sensors is determined during calibration (section 3.8).

### 3.8 Conductivity Calibration

Before attempting a Conductivity calibration, ensure that the **900-C** has been set up correctly, according to sections 3.1 to 3.7. The calibration procedure detailed below uses the sample configurations shown in sections 3.1 to 3.7.

Also ensure that Temperature has been correctly calibrated (see section 7.1). A “ \* ” in the Temperature readout in place of the decimal point indicates that Temperature is NOT calibrated.

1. Plug the Conductivity sensor into the **CELL** socket and the temperature sensor into the **TEMP** socket. (The separate temperature sensor is not required for combination Conductivity/Temperature sensors.)
2. Rinse the Conductivity and temperature sensors in distilled water. Shake off as much water as possible. Blot the outside of the sensor dry. **DO NOT BLOT THE ELECTRODE PLATES.**

#### Zero Calibration

3. Let the sensor dry in air.
4. Select Conductivity Calibration (Menu → F1: Calibrate → F1: Conductivity).
5. The **900-C** will recognise the low conductivity signal and attempt a Zero calibration. For example...

0*01uS/cm	k=1*00	25. 0 <sup>0</sup> C
Press Enter to Zero probe or Menu Exit.		

6. When the reading has stabilised at or near zero, press **Enter** to calibrate or **Menu** to quit. The \* will not be removed after a zero calibration.

#### Standard Calibration

7. Place the Conductivity sensor into a sample of Conductivity standard, so that it is immersed correctly, with adequate clearance to the floor and walls of the vessel. See section 17.2 for details of correct sensor immersion.

**DO NOT** place the sensor directly into the bottle of standard. Discard the used sample of standard after use.

Select Conductivity Calibration (Menu → F1: Calibrate → F1: Conductivity). The calibration screen will be displayed, with the Conductivity standard to be used. For example...

2750*uS/cm	k=1*00	25. 0 <sup>0</sup> C
Press Enter to Calibrate. STD=2760 uS/cm		

8. When the reading has stabilised, press **Enter** to calibrate. The \* will now be replaced by a decimal point, if calibration was successful.
9. The **900-C** is now calibrated for Conductivity and is ready for use in this mode.

### 3.9 Conductivity Calibration Notes

1. A Zero calibration should be performed at least monthly. In low conductivity applications (where a zero error is particularly significant) a zero calibration may have to be done weekly.
2. A Standard calibration should be performed at least weekly. Of course, more frequent calibration will result in greater confidence in results.
3. Conductivity, TDS, Resistivity and Ratio calibration data is stored separately in memory. Ensure that the **900-C** has been correctly calibrated for the mode in which it will be used. The **900-C** does not require re-calibration when alternating between Conductivity, TDS, Resistivity and Ratio modes, providing the instrument has been correctly calibrated for each mode.
4. All calibration information is retained in memory when the **900-C** is switched off, even when the power supply is unplugged. This information can be recalled or printed later using the GLP function (see section 8).
5. The **900-C** displays the value of the standard to which it will attempt to calibrate. Ensure that the standard value displayed corresponds to the standard that you are using. Alter the Standards set-up if necessary (see section 3.3).

### 3.10 Conductivity Calibration Messages

1. If a Zero Calibration has been successfully performed, the **900-C** will display the following message...

**Zero ok**

2. If a Standard Calibration has been successfully performed, the **900-C** will display the following message, and the calculated k factor of the sensor. For example...

**Calibration ok. Calculated k=1.08**

3. If a Standard Calibration has failed, the **900-C** will display the following message, and the calculated k factor of the sensor. For example...

**Calibrate Failure. Check STD=2760 uS/cm  
Calc. K=3.64, Exceeds Limit.**

### Notes

1. The allowable k factor range is +/-25% of nominal. This range is ample to allow for correctly functioning Conductivity sensors. If calibration fails due to the k factor being outside these limits, then please consult the Troubleshooting guide (section 16.2) for possible remedies.

## 4. TDS Mode

### 4.1 Selecting TDS Mode

1. Select TDS Mode (Menu → F3: Mode → F3: TDS).
2. The 900-C now proceeds to TDS measurement mode. Note that the decimal point will be replaced by a “ \* ” until a successful calibration has been performed (see section 4.8).

### 4.2 Selecting TDS readout in terms of NaCl or KCl

*The factory default setting for this item is NaCl. If this is satisfactory, go directly to section 4.3.*

1. Select the Display Units configuration menu (Menu → F5: Configure → F1: Units).
2. Press F1 to display TDS in terms of NaCl (Sodium Chloride).  
Press F2 to display TDS in terms of KCl Potassium Chloride.  
Press Menu to quit without changing the current setting.

#### Note

The difference between the NaCl and KCl settings is the formula used for converting the Conductivity reading from the sensor to a TDS reading. Set this function for the predominant salt in the sample solution. All TPS TDS and Salinity standards are made up using NaCl.

### 4.3 Setting the TDS calibration standard

*The factory default for this item is 2000 ppm. If this is satisfactory, go directly to section 4.4.*

1. Select the TDS Standard entry (Menu → F5: Configure → F2: Standard).

The following screen is now displayed...

```
TDS Standard: 2000 ppm
Range 20 ppm to 500 ppK {2000}
```

2. Type in the value of the TDS standard that is to be used for calibration, including the decimal point. Use the ← key to make any corrections. Be sure to enter the value of the standard at the selected reference temperature (see section 4.4).
3. Press Enter to save the value of the standard solution.  
Alternatively, press Menu to quit without changing the current setting.
4. The 900-C will now ask you to enter the units for the TDS standard...

```
TDS Standard: 1000
Select Units  F1: ppm  F2: ppK
```

5. The TDS standard is now programmed for use at calibration.

### 4.4 Setting the Reference Temperature

*The factory default setting for this item is 25°C. If this is satisfactory, go directly to section 4.5.*

1. Select the ATC configuration menu (Menu → F5: Configure → F3: ATC).
2. Press F3 to reference all readings to 25°C for Automatic Temperature Compensation.  
Press F4 to reference all readings to 20°C for Automatic Temperature Compensation.  
Press Menu to quit without changing the current setting.

#### 4.5 Setting the ATC Slope for unknown samples

*The factory default setting for this item is 2.00 %<sup>o</sup>C. If this is satisfactory, go directly to section 4.6.*

The ATC Slope for the unknown sample solution is the rate at which the TDS of the solution changes per degree Celsius. This Slope must be set correctly on the **900-C** to enable the Automatic Temperature Compensation system to work correctly. If the ATC Slope is not known, please refer to section 17.3 for details on how it can be calculated.

To set the ATC Slope for unknown samples...

1. Select ATC Slope entry (Menu → F5: Configure → F3: ATC → F1: Sample).

The following screen is displayed...

A. T. C. Slope of unknown: 2. 00%

2. Type in the ATC Slope of the unknown sample, including the decimal point. Use the  key to make any corrections. Enter 0.00% to obtain absolute readings, without temperature correction.
3. Press  to save the ATC Slope of the unknown solution. Alternatively, press  to quit without changing the current setting.

#### 4.6 Setting the ATC Slope for the Calibration Standard

*The factory default setting for this item is 2.00 %<sup>o</sup>C. If this is satisfactory, go directly to section 4.7.*

The ATC Slope for the Calibration standard is the rate at which the TDS of the solution changes per degree Celsius. This Slope must be set correctly on the **900-C** to enable the Automatic Temperature Compensation system to work correctly. If the ATC Slope is not known, please refer to section 17.3 for details on how it can be calculated.

To set the ATC Slope for the Calibration Standard...

1. Select ATC Slope entry for the Calibration Standard, (Menu → F5: Configure → F3: ATC → F2: Standard).

The following screen is displayed...

A. T. C. Slope of Standard: 2. 00%

2. Type in the ATC Slope of the Calibration Standard, including the decimal point. Use the  key to make any corrections. Enter 0.00% for absolute readings, without temperature correction.
3. Press  to save the ATC Slope of the Calibration Standard. Alternatively, press  to quit without changing the current setting.

## 4.7 Setting the TDS sensor k factor

*The 900-C automatically recognises the k factor for genuine TPS k=0.1, k=1.0 and k=10 sensors. If one of these sensors is being used, then go directly to section 4.8.*

1. Select k factor entry (Menu → F5: Configure → F4: k factor).
2. The k factor entry screen is now displayed...

Enter k Factor: 1.000

3. Enter the nominal k factor of the non-standard sensor using the numeric keypad. Use the  key to make any corrections.
4. Press  to save the k factor of the non-standard sensor. Alternatively, press  to quit without changing the current setting.

### **Notes**

1. The allowable range of k factors for non-standard sensors is k=0.005 to k=30.00.
2. The exact k factor of the non-standard sensor is determined during calibration (section 4.8).
3. Manual k factor entry is not available for TPS k=0.1, k=1.0 and k=10 sensors. The exact k factor for these sensors is determined during calibration (section 4.8).

## 4.8 TDS Calibration

Before attempting a TDS calibration, ensure that the **900-C** has been set up correctly, according to sections 4.1 to 4.7. The calibration procedure detailed below uses the sample configurations shown in sections 4.1 to 4.7.

Also ensure that Temperature has been correctly calibrated (see section 7.1). A “ \* ” in the Temperature readout in place of the decimal point indicates that Temperature is NOT calibrated.

1. Plug the TDS sensor into the **CELL** socket and the temperature sensor into the **TEMP** socket. (The separate temperature sensor is not required for combination TDS/Temperature sensors.)
2. Rinse the TDS and temperature sensors in distilled water. Shake off as much water as possible. Blot the outside of the sensor dry. **DO NOT BLOT THE ELECTRODE PLATES.**

### Zero Calibration

3. Let the sensor dry in air.
4. Select TDS Calibration (  → **F1: Calibrate** → **F1: TDS**).
5. The **900-C** will recognise the low TDS signal and attempt a Zero calibration. For example...

0*01ppM	k=1*00	25. 0 <sup>0</sup> c
Press Enter to Zero probe or Menu Exit.		

6. When the reading has stabilised at or near zero, press  to calibrate or  to quit. The \* will not be removed after a zero calibration.

### Standard Calibration

7. Place the TDS sensor into a sample of TDS standard, so that it is immersed correctly, with adequate clearance to the floor and walls of the vessel. See section 17.2 for details of correct sensor immersion.

**DO NOT** place the sensor directly into the bottle of standard. Discard the used sample of standard after use.

Select TDS Calibration (  → **F1: Calibrate** → **F1: TDS**). The calibration screen will be displayed, with the TDS standard to be used. For example...

2000*ppM	k=1*00	25. 0 <sup>0</sup> c
Press Enter to Calibrate. STD=2000 ppM		

8. When the reading has stabilised, press  to calibrate. The \* will now be replaced by a decimal point, if calibration was successful.
9. The **900-C** is now calibrated for TDS and is ready for use in this mode.

#### 4.9 TDS Calibration Notes

1. A Zero calibration should be performed at least monthly. In low TDS applications (where a zero error is particularly significant) a zero calibration may have to be done weekly.
2. A Standard calibration should be performed at least weekly. Of course, more frequent calibration will result in greater confidence in results.
3. Conductivity, TDS, Resistivity and Ratio calibration data is stored separately in memory. Ensure that the **900-C** has been correctly calibrated for the mode in which it will be used. The **900-C** does not require re-calibration when alternating between Conductivity, TDS, Resistivity and Ratio modes, providing the instrument has been correctly calibrated for each mode.
4. All calibration information is retained in memory when the **900-C** is switched off, even when the power supply is unplugged. This information can be recalled or printed later using the GLP function (see section 8).
5. The **900-C** displays the value of the standard to which it will attempt to calibrate. Ensure that the standard value displayed corresponds to the standard that you are using. Alter the Standards set-up if necessary (see section 4.3).

#### 4.10 TDS Calibration Messages

1. If a Zero Calibration has been successfully performed, the **900-C** will display the following message...

**Zero ok**

2. If a Standard Calibration has been successfully performed, the **900-C** will display the following message, and the calculated k factor of the sensor. For example...

**Calibration ok. Calculated k=1.08**

3. If a Standard Calibration has failed, the **900-C** will display the following message, and the calculated k factor of the sensor. For example...

**Calibrate Failure. Check STD=2000 ppm  
Calc. K=3.64, Exceeds Limit.**

#### Notes

1. The allowable k factor range is +/-25% of nominal. This range is ample to allow for correctly functioning TDS sensors. If calibration fails due to the k factor being outside these limits, then please consult the Troubleshooting guide (section 16.2) for possible remedies.

## 5. Resistivity Mode

### 5.1 Selecting Resistivity Mode

1. Select Resistivity Mode (Menu → F3: Mode → F2: Resistivity).
2. The 900-C now proceeds to Resistivity measurement mode. Note that the decimal point will be replaced by a “ \* ” until a successful calibration has been performed (see section 5.7).

### 5.2 Setting the Resistivity calibration standard

*The factory default for this item is 362.3 W.cm (the resistivity value of 2.76mS/cm standard). If this is satisfactory, go directly to section 5.3.*

1. Select the Resistivity Standard entry (Menu → F5: Configure → F2: Standard).

The following screen is now displayed...

```
Resistivity Standard: 362. 3Ω. cm
Range 5Ω. cm to 50KΩ. cm {362. 3}
```

2. Type in the value of the Resistivity standard that is to be used for calibration, including the decimal point. Use the ← key to make any corrections. Be sure to enter the value of the standard at the selected reference temperature (see section 5.3).
3. Press Enter to save the value of the standard solution.  
Alternatively, press Menu to quit without changing the current setting.
4. The 900-C will now ask you to enter the units for the Resistivity standard...

```
Resistivity Standard: 362. 3
Select Units  F1: Ω. cm  F2: KΩ. cm
```

5. The Resistivity standard is now programmed for use at calibration.

### 5.3 Setting the Reference Temperature

*The factory default setting for this item is 25°C. If this is satisfactory, go directly to section 5.4.*

1. Select the ATC configuration menu (Menu → F5: Configure → F3: ATC).
2. Press F3 to reference all readings to 25°C for Automatic Temperature Compensation.  
Press F4 to reference all readings to 20°C for Automatic Temperature Compensation.  
Press Menu to quit without changing the current setting.

## 5.4 Setting the ATC Slope for unknown samples

*The factory default setting for this item is 2.00 %<sup>ρ</sup>C. If this is satisfactory, go directly to section 5.5.*

The ATC Slope for the unknown sample solution is the rate at which the resistivity of the solution changes per degree Celsius. This Slope must be set correctly on the **900-C** to enable the Automatic Temperature Compensation system to work correctly. If the ATC Slope is not known, please refer to section 17.3 for details on how it can be calculated.

To set the ATC Slope for unknown samples...

1. Select ATC Slope entry (Menu → F5: Configure → F3: ATC → F1: Sample).

The following screen is displayed...

A. T. C. Slope of unknown: 2. 00%

2. Type in the ATC Slope of the unknown sample, including the decimal point. Use the  key to make any corrections. Enter 0.00% to obtain absolute readings, without temperature correction.
3. Press  to save the ATC Slope of the unknown solution. Alternatively, press  to quit without changing the current setting.

## 5.5 Setting the ATC Slope for the Calibration Standard

*The factory default setting for this item is 2.00 %<sup>ρ</sup>C. If this is satisfactory, go directly to section 5.6.*

The ATC Slope for the Calibration standard is the rate at which the resistivity of the solution changes per degree Celsius. This Slope must be set correctly on the **900-C** to enable the Automatic Temperature Compensation system to work correctly. If the ATC Slope is not known, please refer to section 17.3 for details on how it can be calculated.

To set the ATC Slope for the Calibration Standard...

1. Select ATC Slope entry for the Calibration Standard, (Menu → F5: Configure → F3: ATC → F2: Standard).

The following screen is displayed...

A. T. C. Slope of Standard: 2. 00%

2. Type in the ATC Slope of the Calibration Standard, including the decimal point. Use the  key to make any corrections. Enter 0.00% for absolute readings, without temperature correction.
3. Press  to save the ATC Slope of the Calibration Standard. Alternatively, press  to quit without changing the current setting.

## 5.6 Setting the Resistivity sensor k factor

*The 900-C automatically recognises the k factor for genuine TPS k=0.1, k=1.0 and k=10 sensors. If one of these sensors is being used, then go directly to section 5.7.*

1. Select k factor entry (Menu → F5: Configure → F4: k factor).
2. The k factor entry screen is now displayed...

Enter k Factor: 1.000

3. Enter the nominal k factor of the non-standard sensor using the numeric keypad. Use the  key to make any corrections.
4. Press  to save the k factor of the non-standard sensor. Alternatively, press  to quit without changing the current setting.

### **Notes**

1. The allowable range of k factors for non-standard sensors is k=0.005 to k=30.00.
2. The exact k factor of the non-standard sensor is determined during calibration (section 5.7).
3. Manual k factor entry is not available for TPS k=0.1, k=1.0 and k=10 sensors. The exact k factor for these sensors is determined during calibration (section 5.7).

## 5.7 Resistivity Calibration

Before attempting a Resistivity calibration, ensure that the **900-C** has been set up correctly, according to sections 5.1 to 5.6. The calibration procedure detailed below uses the sample configurations shown in sections 5.1 to 5.6.

Also ensure that Temperature has been correctly calibrated (see section 7.1). A “ \* ” in the Temperature readout in place of the decimal point indicates that Temperature is NOT calibrated.

1. Plug the Resistivity sensor into the **CELL** socket and the temperature sensor into the **TEMP** socket. (The separate temperature sensor is not required for combination Resistivity/Temperature sensors.)
2. Rinse the Resistivity and temperature sensors in distilled water. Shake off as much water as possible. Blot the outside of the sensor dry. **DO NOT BLOT THE ELECTRODE PLATES.**

### Air Calibration

3. Let the sensor dry in air.
4. Select Resistivity Calibration (Menu → F1: Calibrate → F1: Resistivity).
5. The **900-C** will recognise the Over-range resistivity signal and attempt an Air calibration. For example...

Over-range	k=1*00	25.0 <sup>0</sup> c
Press Enter to Zero probe or Menu Exit.		

6. When the reading has stabilised at the Over-range reading, press **Enter** to calibrate or **Menu** to quit. The \* will not be removed after an Air calibration.

### Standard Calibration

7. Place the Resistivity sensor into a sample of Resistivity standard, so that it is immersed correctly, with adequate clearance to the floor and walls of the vessel. See section 17.2 for details of correct sensor immersion.

**DO NOT** place the sensor directly into the bottle of standard. Discard the used sample of standard after use.

Select Resistivity Calibration (Menu → F1: Calibrate → F1: Resistivity). The calibration screen will be displayed, with the Resistivity standard to be used. For example...

362* Ω.cm	k=1*00	25.0 <sup>0</sup> c
Press Enter to Calibrate. STD=362.3Ω.cm		

8. When the reading has stabilised, press **Enter** to calibrate. The \* will now be replaced by a decimal point, if calibration was successful.
9. The **900-C** is now calibrated for Resistivity and is ready for use in this mode.

## 5.8 Resistivity Calibration Notes

1. An Air calibration should be performed at least monthly. In high resistivity applications (where a zero error is particularly significant) an Air calibration may have to be done weekly.
2. A Standard calibration should be performed at least weekly. Of course, more frequent calibration will result in greater confidence in results.
3. Conductivity, TDS, Resistivity and Ratio calibration data is stored separately in memory. Ensure that the **900-C** has been correctly calibrated for the mode in which it will be used. The **900-C** does not require re-calibration when alternating between Conductivity, TDS, Resistivity and Ratio modes, providing the instrument has been correctly calibrated for each mode.
4. All calibration information is retained in memory when the **900-C** is switched off, even when the power supply is unplugged. This information can be recalled or printed later using the GLP function (see section 8).
5. The **900-C** displays the value of the standard to which it will attempt to calibrate. Ensure that the standard value displayed corresponds to the standard that you are using. Alter the Standards set-up if necessary (see section 5.2).

## 5.9 Resistivity Calibration Messages

1. If an Air Calibration has been successfully performed, the **900-C** will display the following message...

**Zero ok**

2. If a Standard Calibration has been successfully performed, the **900-C** will display the following message, and the calculated k factor of the sensor. For example...

**Calibration ok. Calculated k=1.08**

3. If a Standard Calibration has failed, the **900-C** will display the following message, and the calculated k factor of the sensor. For example...

**Calibrate Failure. Check STD=362.3Ω.cm  
Calc. K=3.64, Exceeds Limit.**

## Notes

1. The allowable k factor range is +/-25% of nominal. This range is ample to allow for correctly functioning Resistivity sensors. If calibration fails due to the k factor being outside these limits, then please consult the Troubleshooting guide (section 16.2) for possible remedies.

## 6. Ratio Mode

### 6.1 Selecting Ratio Mode

1. Plug a TPS k=0.1, k=1.0 or k=10 sensor into the **CELL** socket. User k factor sensors cannot be used in Ratio mode.
2. Plug a TPS sensor *with the same k factor* into the **REFERENCE** socket.
3. Select Ratio Mode (Menu → **F3: Mode** → **F4: Ratio**).
4. The **900-C** now performs a cell match check to ensure that the sensors have the same k factor. If this check fails, then the **900-C** will not proceed to Ratio mode. If this occurs, press Menu, then **F3: Mode**, and change back to Conductivity, TDS or Resistivity modes.
5. The **900-C** now proceeds to ratio measurement mode. Note that the decimal point will be replaced by a “ \* ” until a successful calibration has been performed (see section 6.2). For example...

Ratio Cell /Ref 1*100	k=1.00
31/12/98	12:00:00

### 6.2 Ratio Calibration

Ratio calibration involves placing both of the Conductivity sensors into the same value solution and setting the ratio reading to 1.000.

1. Ensure that matching k factor sensors have been plugged into the **CELL** and **REFERENCE** sockets, and Ratio mode has been selected (see section 6.1). A temperature sensor is not required for Ratio mode, but both solutions must be at the same temperature.
2. Rinse the Conductivity sensors in distilled water. Shake off as much water as possible. Blot the outside of the sensors dry. **DO NOT BLOT THE ELECTRODE PLATES**. Let the sensors dry in air.
3. Place the two Conductivity sensors into two separate beakers of the same solution. The solution that is to be used as the reference for ratio measurements is generally the most ideal. Ensure that the sensors are immersed correctly, with adequate clearance to the floor and walls of the vessel. See section 17.2 for details of correct sensor immersion.
4. Select Ratio Calibration (Menu → **F1: Calibrate** → **F1: Ratio**).
5. The **900-C** now checks that the sensors have the same k factor. The unit also checks that a suitable k factor is being used for the conductivity level of the reference solution. The following table details the acceptable limits of Conductivity for k=0.1, k=1.0 and k=10 sensors. All of these sensors will work to zero Conductivity, but accuracy below the recommended minimum Conductivities listed will be diminished.

Sensor k Factor	Recommended Minimum Conductivity	Maximum Limit of Conductivity
k=0.1	0.1 uS/cm	10 mS/cm
k=1.0	1 uS/cm	100 mS/cm
k=10	10 uS/cm	1000 mS/cm

6. The calibration screen is now displayed. For example...

Ratio Cell /Ref 1*100	k=1.00
Press Enter to Calibrate	

7. When the reading has stabilised, press **Enter** to calibrate. The \* will now be replaced by a decimal point, if calibration was successful.
8. The **900-C** is now calibrated for Ratio and is ready for use in this mode.

### 6.3 Ratio Calibration Notes

1. The two Conductivity sensors **MUST** be calibrated in separate containers, as they interfere with each other.
2. A Ratio calibration should be performed at least weekly. Of course, more frequent calibration will result in greater confidence in results.
3. Conductivity, TDS, Resistivity and Ratio calibration data is stored separately to in memory. Ensure that the **900-C** has been correctly calibrated for the mode in which it will be used. The **900-C** does not require re-calibration when alternating between Conductivity, TDS, Resistivity and Ratio modes, providing the instrument has been correctly calibrated for each mode.
4. All calibration information is retained in memory when the **900-C** is switched off, even when the power supply is unplugged. This information can be recalled or printed later using the GLP function (see section 8).
5. The **900-C** checks that the sensors have the same k factor, and that a suitable k factor is being used for the conductivity level of the solutions being measured whenever Ratio mode is selected and before every Ratio calibration.

### 6.4 Ratio Calibration Messages

1. If a Ratio Calibration has been successfully performed, the **900-C** will display the following message and the calculated span difference between the two sensors...

**Calibrate OK, Delta Span = 1.100**

2. If a Ratio Calibration has failed, the **900-C** will display the following message, and the failed span difference between the two sensors. For example...

**Calibrate Failed, Delta Gain > +/- 50%**  
**Check Cells, Ensure identical Standards**

### Notes

1. The allowable difference in k factor between the two sensors is 50% to 200%. This range is ample to allow for correctly functioning Conductivity sensors. If calibration fails due to the k factor being outside these limits, then please consult the Troubleshooting guide (section 16.3) for possible remedies.

## 7. Temperature

The temperature readout must be calibrated or manually set before attempting Conductivity, TDS or Resistivity calibration. The decimal point is replaced by a “ \* ” if the reading is not calibrated.

### 7.1 Temperature Calibration

1. Plug the temperature sensor into the **TEMP** socket.
2. Place the temperature sensor into a beaker of room temperature water, alongside a good quality mercury thermometer. Stir the probe and the thermometer gently to ensure an even temperature throughout the beaker.
3. Select Temperature Calibration (**Menu** → **F1: Calibrate** → **F2: Temperature**).

The Temperature Calibration screen is now displayed. For example...

Enter Actual Temperature : _	24.0°C
Temperature Calibration	Menu Quits

The current reading from the Temperature sensor is displayed on the far right of the top line.

4. When this reading has stabilised, use the Numeric Keypad to enter the same temperature as measured by the mercury thermometer.
5. Press the **Enter** key to calibrate the temperature readout.

Alternatively, press the **Menu** key to abort temperature calibration.

### 7.2 Temperature Calibration Notes

1. Temperature calibration information is retained in memory when the **900-C** is switched off, even when the power supply is removed. This information can be recalled later using the GLP function (see section 8).
2. Temperature does not need to be re-calibrated unless the Temperature sensor (or combination Conductivity/Temperature Sensor) is replaced or the meter is initialised.
3. If the Temperature sensor is unplugged, and a combination Conductivity/Temperature is used, then the Temperature readout needs to be re-calibrated.
4. If a Temperature sensor *AND* a combination Conductivity/Temperature are both connected, then the **900-C** obtains the Temperature reading from the separate Temperature sensor.

### 7.3 Calibration Messages

1. If a temperature calibration has been successfully performed, the **900-C** will display the following message and the offset of the sensor.

Temperature Calibration OK 0.1°C Offset
--

2. If a temperature calibration has failed, the **900-C** will display the following message, and the failed offset value of the sensor.

Temperature Calibration Failed 11.0°C Offset
---

3. The **900-C** has an allowable Offset range of  $-10.0$  to  $+10.0$  °C. If calibration fails due to the Offset being outside these limits, then please consult the Troubleshooting guide (section 16.3) for possible remedies.

## 8. Good Laboratory Practices (GLP)

The 900-C keeps a record of the date and time of the last Conductivity, TDS, Resistivity, Ratio and Temperature calibrations as part of GLP guidelines. The calibration data for k=0.1, k=1.0, k=10 and user k factor sensors are all stored separately.

### 8.1 To recall GLP information on the display

1. Switch the meter on.
2. Select the GLP menu (Menu → F4: Setup → F3: GLP).
3. Select F1: Recall from the menu.
4. The instrument model, firmware version number, and instrument serial number are displayed, along with a prompt describing how to scroll through the GLP information.

900C V3.0 R1234	@ 31/12/98 12:00
	F4: Next

5. Press the F4 key to sequentially scroll through the GLP information for all parameters. Press the F2 key to scroll back to previous data. The sequence of information displayed is shown below. Press Menu to abort at any time.

#### GLP Display sequence...

900C V3.0 R1234	@ 31/12/98 12:00
	F4: Next

↑ F2 ↓ F4

Cond Zero= 0.000uS/cm	31/12/98 09:00
k=. 1 Cond Calibrated	F2: Back F4: Next

↑ F2 ↓ F4

Cond k=0.10 @ 150.0 uS/cm	31/12/98 09:10
k=. 1 Cond Calibrated	F2: Back F4: Next

↑ F2 ↓ F4

TDS Zero= 0.000ppM	31/12/98 09:00
k=. 1 TDS Calibrated	F2: Back F4: Next

↑ F2 ↓ F4

TDS k=0.10 @ 69.5ppM	31/12/98 09:20
k=. 1 TDS Calibrated	F2: Back F4: Next

↑ F2 ↓ F4

Res. Zero OK	31/12/98 09:00
k=. 1 Res. Calibrated	F2: Back F4: Next

↑ F2 ↓ F4

Res. k=0.10 @ 362.3Ω.cm	31/12/98 09:30
k=. 1 Res. Calibrated	F2: Back F4: Next

↑ F2 ↓ F4

The information listed above is repeated for k=1, k=10 and User k factor sensors.	
---	--

↑ F2 ↓ F4

Ratio Delta Span 0.981	31/12/98 11:40
Ratio Calibrated	

↑ F2 ↓ F4

Temperature Offset=1.0°C	31/12/98 11:50
Temp. Calibrated	F2: Back F4: Ends

## 8.2 Failed Calibration

If calibration has failed, the GLP function will reset the date and time for the failed calibration to zero. The 900-C still shows the results for the last successful calibration, as shown in the following examples.

1. Failed Conductivity span calibration for k=1.0 sensor...

Cond k=1 @ 2760. uS/cm	00/00/00 00:00
k=1 Un- Calibrated	F2: Back F4: Next

2. Failed Temperature Offset Calibration...

Temperature Offset=1.0 <sup>0</sup> c	00/00/00 00:00
Temp. Un- Calibrated	F2: Back F4: Ends

## 8.3 Printing GLP Information to the RS232 Port

The GLP information stored in the instrument's memory can be sent to a printer or PC via the RS232 port. This function is available only when the optional RS232 port is fitted.

1. Switch the meter on.
2. Ensure that the **900-C** RS232 cable is connected to the instrument and to the printer or PC.
3. Send the GLP information to the RS232 port:

**Menu** → F4: Setup → F3: GLP → F3: Print

The message "Printing GLP Data" is displayed while sending the data to the RS232 port.

4. The GLP information is sent to the RS232 port in formatted ASCII text. For example...

```
900C V3.0 S0000 @ 31/12/1998 12:00
k=. 1 Cond Zero= 0.000uS/cm @ 31/12/1998 09:00
k=. 1 Cond k=0.10 @ 150.0uS/cm @ 31/12/1998 09:10
k=. 1 TDS Zero= 0.000ppM @ 31/12/1998 09:00
k=. 1 TDS k=0.10 @ 69.5ppM @ 31/12/1998 09:20
k=. 1 Res. Zero OK @ 31/12/1998 09:00
k=. 1 Res. k=0.10 @ 6.67KOhms @ 31/12/1998 09:30
k=1 Cond Zero= 0.00uS/cm @ 31/12/1998 09:40
k=1 Cond k=1.00 @ 2760. uS/cm @ 31/12/1998 09:50
k=1 TDS Zero= 0.00ppM @ 31/12/1998 09:40
k=1 TDS k=1.00 @ 1452. ppM @ 31/12/1998 10:00
k=1 Res. Zero OK @ 31/12/1998 09:40
k=1 Res. k=1.00 @ 362.3_0hms @ 31/12/1998 10:10
k=10 Cond Zero= 0.0uS/cm @ 31/12/1998 10:20
k=10 Cond k=10.0 @ 58.0mS/cm @ 31/12/1998 10:30
k=10 TDS Zero= 0.0ppM @ 31/12/1998 10:20
k=10 TDS k=10.0 @ 36.0ppK @ 31/12/1998 10:40
k=10 Res. Zero OK @ 31/12/1998 10:20
k=10 Res. k=10.0 @ 17.24_0hms @ 31/12/1998 10:50
User Cond Zero= 0.00uS/cm @ 31/12/1998 11:00
User Cond k=5.00 @ 2760. uS/cm @ 31/12/1998 11:10
User TDS Zero= 0.00ppM @ 31/12/1998 11:00
User TDS k=5.00 @ 1452. ppM @ 31/12/1998 11:20
User Res. Zero OK @ 31/12/1998 11:00
User Res. k=5.00 @ 362.3_0hms @ 31/12/1998 11:30
Ratio Delta Span= 1.100 @ 31/12/1998 11:40
Temperature Offset= 1.0oC @ 31/12/1998 11:50
Ends
```

#### 8.4 Instrument Serial Number

In case the serial number that is fitted to the rear of the **900-C** is removed or becomes illegible, it is also available on the **900-C** display.

1. The serial number is displayed at turn-on, for example...

<b>900Csr V3.0 R1234 © 1998 TPS Pty Ltd</b> <b>Conductivity, TDS, Resistivity, Ratio</b>
---

The “s” after **900C** is shown when the RS232 serial Port option is fitted.

The “r” after **900C** is shown when the Recorder Port option is fitted.

2. The serial number is displayed when recalling the GLP information (section 8.1).
3. The serial number is included on the printout of GLP information (section 8.3).
4. The GLP information can be downloaded to a PC using the optional Windows ® software (part number 130086).

#### 8.5 Additional GLP Features

Another GLP requirement is to record the date and time of every reading. The **900-C** does this for you when readings are recorded either with the Notepad function (section 9) or the Automatic Logging function (section 10).

## 9. Notepad Function

### 9.1 Recording Readings into the Notepad

To record readings into the Notepad memory...

1. Press **F1** in normal display mode. The display should now look like this:

	2. 76mS/cm	k=1. 00	25. 0 <sup>0</sup> c
Log#	1, Press F1	31/12/98	12: 00: 00

2. Press **F1**, to record Conductivity/TDS/Resistivity/Ratio, Temperature, Date and Time into the notepad. This will be labelled as reading number 1.

Alternatively, press **Menu** to quit without recording the reading.

3. Repeat steps 1 & 2 as often as required. The maximum number of readings that can be stored in the Notepad is 2300.

### 9.2 Recalling Readings from the Notepad

To recall records from the Notepad onto the 900-C display...

1. Select the Notepad menu (**Menu** → **F2: Notepad**)
2. Select **F1: Recal 1** from the menu.

Record number 1 is now displayed.

For example...

	2. 76mS/cm	k=1. 00	25. 0 <sup>0</sup> c
Log#1	, F2: ↑ F4: ↓	31/12/98	12: 00: 00

3. Press **F2** to display the next record.  
Press **F4** to display the previous record.  
Press and hold **F2** or **F4** to roll rapidly through the readings.  
To display a specific record, type in the desired record number using the Numeric Keypad and press **Enter**.  
Press **F3** to send the displayed record to the optional RS232 port.

### 9.3 Erasing Records from the Notepad

To erase records from the Notepad...

1. Select the Erase Notepad menu (**Menu** → **F2: Notepad** → **F2: Erase**)
2. The **900-C** now displays the Erase menu, for example...

```

Erase Notepad, ( 100 ) Select Option
F1: Erase All   F2: Erase Last   Menu Exits
  
```

The number of readings stored in the Notepad is displayed. See the “100” in the example above.

3. Press **F1** to erase all of the readings stored in the Notepad.  
 Press **F2** to erase the last recorded reading only.  
 Press **Menu** to quit without erasing any records.

### 9.4 Printing Records from the Notepad to the RS232 Port

This function is only available when the optional RS232 port is fitted.

1. Connect one end of the RS232 cable to the **RS232/Recorder** socket of the **900-C**.
2. Connect the other end of the RS232 cable to an RS232 Printer, or to the COM1 or COM2 ports of a PC.
3. Ensure that the baud rate for the printer or PC and the **900-C** are the same. If necessary, alter the baud rate of the **900-C** (see section 11.1).

The **900-C** uses XON/XOFF protocol. Ensure that the printer is set accordingly.

4. Select the Notepad menu. (**Menu** → **F2: Notepad**).
5. Select **F3: Print** from the menu.
6. Printing starts as soon as **F3** is pressed. The display shows the word “**Printing**” until printing is completed.

## **10. Automatic Datalogging**

The **900-C** can automatically log records into the Notepad. First the logging period must be programmed, then automatic logging can be started and stopped as required.

1. Select the Notepad menu (**Menu** → **F2: Notepad**)

2. Select **F4: Program** from the menu.

The display should now look similar to that shown below. The current Logging/Printing Period is displayed.

Enter Logging/Printing Period : 0 secs

3. Use the Numeric Keypad to set the period at which the **900-C** will automatically log records into memory or to the RS232 port.

Press **Enter** to save the Logging/Printing Period.

Press **Menu** to quit without changing the current setting.

4. After pressing **Enter**, the **900-C** will ask you to enter the units. The Logging/Printing Period you have set is also displayed. For example...

Logging/Printing Period : 2  
Select Units, F1: Secs, F2: Mins, F3: Hours

Press **F1** to save the Logging/Printing Period as seconds.

Press **F2** to save the Logging/Printing Period as minutes.

Press **F3** to save the Logging/Printing Period as hours.

5. If the optional RS232 port is fitted, the **900-C** will ask if the records are to be logged into the Notepad, or sent directly to the RS232 port. The display will look like this...

F1: Log to Notepad F2: Send to RS232

Press **F1** to log records into the Notepad (maximum of 2300 readings).

Press **F2** to send records directly to the RS232 port.

6. The automatic logging function is now programmed, and can be started and stopped as required.

7. To start automatic logging, press **F3** in normal display mode.

When the **900-C** is logging into the Notepad, the display will look like this...

	2. 76mS/cm	k=1. 00	25. 0 <sup>0</sup> c
Log#	1,	31/12/98	12: 00: 00

The log number will increment and the **900-C** will beep each time a reading is recorded.

If the **900-C** is sending records directly to the RS232 port, the display will look like this...

	2. 76mS/cm	k=1. 00	25. 0 <sup>0</sup> c
Sending		31/12/98	12: 00: 00

The **900-C** will beep each time a record is sent to the RS232 port.

8. Press **F3** to stop automatic logging.
9. **Note:** The clock must be set before the **900-C** will allow automatic logging to start. The message "**Clock Not Set**" is displayed if the clock is not set. See section 13 for details on setting the clock.

## **11. RS232 Port**

This section is applicable if the optional RS232 port is fitted.

### **11.1 Setting the Baud Rate**

1. Select the Ports Set-up menu (**Menu** → **F4: Setup** → **F1: Ports**)
2. The available baud rates are listed, along with the RS232 port configuration...

<b>Baud Rate:</b>	<b>F1: 300</b>	<b>F2: 1200</b>	<b>&gt;F3: 9600</b>
	<b>8 bits, No Parity, 1 Stop bit, XON/XOFF</b>		

The arrow indicates the current selection.

3. Press **F1** to select 300 baud.  
Press **F2** to select 1200 baud.  
Press **F3** to select 9600 baud.  
Press **Menu** to quit and retain the current setting.

### **11.2 Sending Readings to the RS232 Port**

Press **F3** to instantly send readings to the RS232 port whenever the **900-C** is in normal measurement mode. This function is disabled if the automatic logging period is set to greater than zero (see section 10).

Records can be sent directly to the RS232 port rather than stored in memory during automatic datalogging. See section 10 for details.

Press **F3** while recalling data on the display (see section 9.2) to send that record to the RS232 port.

### **11.3 RS232 Configuration**

The **900-C** RS232 configuration is 8 Bits, No Parity, 1 Stop Bit, XON/XOFF Protocol.

This information is displayed when setting the baud rate (see section 11.1)

### **11.4 Communication and Statistical Software**

Communication between the **900-C** and a PC can be handled with any RS232 communication software. The diskette supplied by TPS contains a BASIC program for this purpose. A Windows version is also optionally available (part number 130086).

Once the data is saved to disk, the next problem is how to use it. The data sent by the **900-C** is formatted in columns that can be imported by programs such as Microsoft<sup>®</sup> Excel<sup>®</sup> and Lotus 123<sup>®</sup>.

Information on how to use the software is provided in the README files on the diskette.

## 11.5 Commands

The following commands can be sent from a PC to the **900-C**. Note that <cr> denotes carriage return and <lf> denotes a line feed.

Action	Command	Notes
Request current data	?D<cr>	Returns the current Conductivity/TDS/Resistivity/Ratio, Temperature, date and time from the <b>900-C</b> . The log number returned is set to Zero.
Request logged data	?R<cr>	Returns all logged records from the <b>900-C</b> memory. The data ends with the message <b>ENDS</b> <cr>
Erase logged data	?E<cr>	Erases all logged records from the <b>900-C</b> memory. Returns the message <b>ERASED</b> <cr> to confirm that the records have been erased.
Request status information	?S<cr>	Returns the model name, firmware version number, instrument serial number and number of logged readings in memory, for example... <b>900C♦♦V3.0♦R1234♦2300</b> <cr>, where ♦ are spaces. Note that the number of logged readings is right-justified.
Request GLP information	?G<cr>	Returns all calibration GLP information, plus the instrument model, serial number and current date (see section 11.7 for data format and handshaking).

## 11.6 Data Format

Data is returned to the RS232 Port by the **900-C** in the following format...

**LLLL•DDDDDDUUUUU•TTTTTuuu•dd/mm/yyyy•hh: mm: ss**

where....

**LLLL** is the Log Number, 4 characters, right justified. The **900-C** sends a Zero for instant readings (see section 11.2).

• is one space

**DDDDDD** is the Conductivity, TDS, Resistivity or Ratio data, 6 characters, right justified.

**UUUUU** is the unit description, which can be any one of the following...

<b>uS/cm</b>	for $\mu$ S/cm in Conductivity mode.
<b>mS/cm</b>	for mS/cm in Conductivity mode.
<b>uS/M•</b>	for $\mu$ S/m in Conductivity mode.
<b>mS/M•</b>	for mS/m in Conductivity mode.
<b>ppM••</b>	for Parts per Million in TDS mode.
<b>ppK••</b>	for Parts per Thousand in TDS mode.
<b>_Ohms</b>	for Ohms in Resistivity mode.
<b>KOhms</b>	for Kilo Ohms in Resistivity mode.
<b>MOhms</b>	for Meg Ohms in Resistivity mode.
<b>•••••</b>	in Ratio mode
(“•” is one space.)	

• is one space.

**TTTTT** is Temperature data, 5 characters, right justified.

**uuu** is the unit description, sent as “**oC•**”, where “•” is one space.

• is one space.

**dd/mm/yyyy** is the date, month and year data. The year is sent as 4 digits for Year 2000 compliance.

• is one space

**hh: mm: ss** is the hours, minutes and seconds data.

When requested by a PC with the ?D or ?R commands (section 11.5), the data is terminated with a carriage return.

When the data is sent by the **900-C** using the Print function (section 9.4) or the Instant Send function (section 11.2), the data ends with a carriage return and a line feed.

## 11.7 GLP Data Format

GLP information is returned as up to 28 lines terminated by a carriage return. When using the “?G” command (section 11.5), the computer must respond with a character after receiving each line.

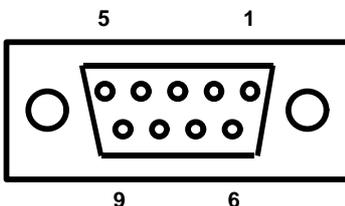
For example...

```

900C V3.0 S0000 @ 31/12/1998 12:00
k=. 1 Cond Zero= 0.000uS/cm @ 31/12/1998 09:00
k=. 1 Cond k=0.10 @ 150.0uS/cm @ 31/12/1998 09:10
k=. 1 TDS Zero= 0.000ppM @ 31/12/1998 09:00
k=. 1 TDS k=0.10 @ 69.5ppM @ 31/12/1998 09:20
k=. 1 Res. Zero OK @ 31/12/1998 09:00
k=. 1 Res. k=0.10 @ 6.67KOhms @ 31/12/1998 09:30
k=1 Cond Zero= 0.00uS/cm @ 31/12/1998 09:40
k=1 Cond k=1.00 @ 2760. uS/cm @ 31/12/1998 09:50
k=1 TDS Zero= 0.00ppM @ 31/12/1998 09:40
k=1 TDS k=1.00 @ 1452. ppM @ 31/12/1998 10:00
k=1 Res. Zero OK @ 31/12/1998 09:40
k=1 Res. k=1.00 @ 362.3_0hms @ 31/12/1998 10:10
k=10 Cond Zero= 0.0uS/cm @ 31/12/1998 10:20
k=10 Cond k=10.0 @ 58.0mS/cm @ 31/12/1998 10:30
k=10 TDS Zero= 0.0ppM @ 31/12/1998 10:20
k=10 TDS k=10.0 @ 36.0ppK @ 31/12/1998 10:40
k=10 Res. Zero OK @ 31/12/1998 10:20
k=10 Res. k=10.0 @ 17.24_0hms @ 31/12/1998 10:50
User Cond Zero= 0.00uS/cm @ 31/12/1998 11:00
User Cond k=5.00 @ 2760. uS/cm @ 31/12/1998 11:10
User TDS Zero= 0.00ppM @ 31/12/1998 11:00
User TDS k=5.00 @ 1452. ppM @ 31/12/1998 11:20
User Res. Zero OK @ 31/12/1998 11:00
User Res. k=5.00 @ 362.3_0hms @ 31/12/1998 11:30
Ratio Delta Span= 1.100 @ 31/12/1998 11:40
Temperature Offset= 1.0oC @ 31/12/1998 11:50
Ends

```

## 11.8 RS232 Port Connections



Pin No	Connection
2	Receive RS232 Data
3	Transmit RS232 Data
5	Ground

## 12. Recorder Port

This section is applicable if the optional Recorder port is fitted.

The optional Recorder Port can be used to send Conductivity, TDS, Resistivity or Ratio data to a chart recorder or other analogue logging device.

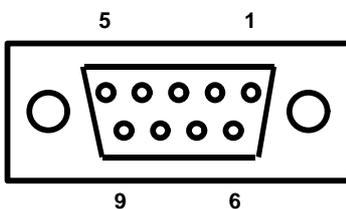
### 12.1 Recorder Port Specifications

Mode	Display Range	Output Range	Examples (Reading = mV Out)
Conductivity	0 to 2000 counts per range. Manual range selection recommended for recorder output See section 17.1.1.	0 to 2000 mV for all ranges.	If manual range selection is set to 0 to 2000 uS/cm, then... 500 uS/cm = 500 mV 2000 uS/cm = 2000 mV
TDS	0 to 1000 counts per range. Manual range selection recommended for recorder output. See section 17.1.1.	0 to 1000 mV for all ranges.	If manual range selection is set to 0 to 1000 ppM, then... 500 ppM = 500 mV 1000 ppM = 1000 mV
Resistivity	0 to 500 counts per range. Range Hold function must be used for logical output. See section 17.1.2.	0 to 2000 mV	250 Ω.cm = 1000 mV 500 KΩ.cm = 2000 mV
Ratio	0.000 to 1.500 1.50 to 15.00	0 to 1500 mV 150 to 1500 mV	1.000 = 1000 mV 5.00 = 500 mV

**Output Impedance** : Approximately 1000 Ohms

**Resolution** : Approximately 2 mV

### 12.2 Recorder Port Connections



Pin No	Connection
6	Recorder Output Signal
7	Recorder Output Common

### **13. Setting the Clock**

1. Select the Clock Set-up menu (**Menu** → F4: Setup → F2: Clock)
2. The display now shows the current time, for example...

```
Time is now      12:00
Enter new time  12:00
```

3. Use the Numeric Keypad to enter the current time, then press **Enter**.
4. Alternatively, press menu to quit and retain the current setting.
5. If you pressed **Enter** above, the display will now show the current date, for example...

```
Date is now      31/12/1998
Enter new date  31/12/1998   dd/mm/yyyy
```

6. Use the Numeric Keypad to enter the current date, then press **Enter**.
7. Alternatively, press menu to quit and retain the current setting.

#### **Notes**

1. The **900-C** tests that a valid day of the month is entered. If an invalid date is entered (eg. 31/02/1998), the **900-C** beeps and displays the message “**Invalid Date**”. The meter then returns to the clock setting screen, so that the correct date can be entered.
2. The **900-C** also tests for leap years.

## **14. Initialising the 900-C**

If the calibration settings of the **900-C** exceed the allowable limits, the unit may need to be initialised to factory default values. This action may be required if the sensor is replaced.

To initialise the **900-C**...

1. Switch the **900-C** off.
2. Press and hold the  key while switching the **900-C** back on.
3. The following messages should be displayed...

I n i t i a l i z i n g

then...

S y s t e m I n i t i a l i z e d  
U n i t s h o u l d b e R e - c a l i b r a t e d b e f o r e u s e

then...

900Csr V3.0 R1234 © 1998 TPS Pty Ltd  
C o n d u c t i v i t y , T D S , R e s i s t i v i t y , R a t i o

The “s” after **900C** is shown when the RS232 serial Port option is fitted.

The “r” after **900C** is shown when the Recorder Port option is fitted.

4. The meter then displays Conductivity, Temperature, Date and Time. Note that the decimal points have been replaced with a “ \* ”, to indicate that the unit requires re-calibration.

## **15. Instrument firmware version number**

If you need to phone or fax TPS for any further technical assistance, the version number of your **900-C** firmware may be of benefit to us. The version number is displayed by the **900-C** at turn-on.

## 16. Troubleshooting

### 16.1 General Errors

Error Message	Possible Causes	Remedy
<b>Factory Calibration Data Failure</b> <b>Temperature Readings may be Inaccurate</b>	The EEPROM chip which contains the factory calibration information has failed.	The unit must be returned to TPS for service. <ul style="list-style-type: none"> <li>• Temperature readings may be up to 10% incorrect.</li> <li>• Conductivity, TDS, Resistivity and Ratio readings will be accurate if calibrated in the same range as measurements.</li> </ul>
<b>EEPROM Write Failure</b> <b>Return to Factory for Service</b>	User calibration settings have been lost or corrupted.	Switch the meter OFF and switch back ON. If the problem persists, return the unit to TPS for service.
<b>Logged Data pointer failure</b> <b>All Logged Data Lost</b>	<ol style="list-style-type: none"> <li>1. Memory back-up battery has lost its charge to lack of use of the instrument.</li> <li>2. Memory back-up battery is faulty.</li> </ol>	<p>Recharge the memory back-up battery by switching the meter on for approx. 16 hours (this does not need to be continuous).</p> <p>Return the instrument to the factory to have a new rechargeable battery fitted.</p>

### 16.2 Conductivity, TDS, and Resistivity Troubleshooting

Symptom	Possible Causes	Remedy
Unit fails to calibrate, even with new probe.	Calibration settings outside of allowable limits due to previous failed calibration.	Initialize the unit. See section 14.
Unit attempts Span calibration instead of Zero calibration.	Sensor has Zero error.	Thoroughly rinse sensor in distilled water and allow to completely dry in air before attempting zero calibration. If instrument does not calibrate at Zero with sensor disconnected, then the instrument is faulty.
Standard calibration fails, and k factor is greater than 25% above the nominal value.	<ol style="list-style-type: none"> <li>1. Sensor is not immersed correctly.</li> <li>3. Sensor may have a build-up of dirt or oily material on electrode plates.</li> <li>4. Platinum-black coating has worn off.</li> <li>5. Standard solution is inaccurate.</li> <li>6. Sensor is faulty.</li> <li>7. Faulty instrument.</li> <li>8. k-factor incorrectly set if using non-TPS sensor.</li> </ol>	<p>Immerse sensor correctly, with adequate clearance to the floor and walls of the vessel, as per section 17.2.</p> <p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Sensor requires replatinization, as per section 17.5. Alternatively, return to the factory for replatinization.</p> <p>Replace standard solution.</p> <p>Return sensor to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per sections 3.7, 4.7, and 5.6.</p>
Standard calibration fails, and k factor is less than 75% below the nominal value.	<ol style="list-style-type: none"> <li>1. Standard solution is inaccurate.</li> <li>2. Sensor may have a build-up of conductive material, such as salt.</li> <li>3. Sensor is faulty.</li> <li>4. Faulty instrument.</li> <li>5. k-factor incorrectly set if using user-selectable k factor sensor.</li> </ol>	<p>Replace standard solution.</p> <p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Return sensor to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per sections 3.7, 4.7, and 5.6.</p>

*Continued over the page...*

*Conductivity, TDS and Resistivity Troubleshooting, continued...*

Inaccurate readings, even when calibration is successful.	<ol style="list-style-type: none"> <li>1. Sensor may have a build-up of dirt or oily material on electrode plates.</li> <li>2. Platinum-black coating has worn off.</li> </ol>	<p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Sensor requires replatinization, as per section 17.5. Alternatively, return to the factory for replatinization.</p>
Readings drift.	<ol style="list-style-type: none"> <li>1. Sensor may have a build-up of dirt or oily material on electrode plates.</li> </ol>	<p>Clean sensor, as per the instructions detailed in section 17.3.</p>
Readings are low or near zero.	<ol style="list-style-type: none"> <li>1. Sensor may have a build-up of dirt or oily material on electrode plates.</li> <li>2. Sensor is not immersed correctly.</li> <li>3. Sensor is faulty.</li> <li>4. Faulty instrument.</li> <li>5. k-factor incorrectly set if using user-selectable k factor sensor.</li> <li>6. Sensor is plugged into incorrect socket.</li> </ol>	<p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Immerse sensor correctly, with adequate clearance to the floor and walls of the vessel, as per section 17.2.</p> <p>Return sensor to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per sections 3.7, 4.7, and 5.6.</p> <p>Ensure that the sensor is plugged into the <b>CELL</b> socket.</p>

**16.3 Ratio Troubleshooting**

Any possible causes related to the sensor in this section could be due to the **CELL** or **REFERENCE** sensor or both. If in doubt, always check both sensors.

<b>Symptom</b>	<b>Possible Causes</b>	<b>Remedy</b>
Unit will not proceed to Ratio mode, even with matching k factor sensors connected to <b>CELL</b> and <b>REFERENCE</b> sockets	<ol style="list-style-type: none"> <li>1. Sensors are not correctly coded.</li> </ol>	<p>Ensure that sensor plugs are correctly coded. See section 17.7 for details.</p>
Cell / Solution match check fails, even with new probe.	<ol style="list-style-type: none"> <li>1. Calibration settings outside of allowable limits due to previous failed calibration.</li> </ol>	<p>Initialize the unit. See section 14.</p>
Calibration fails. Span difference between the two sensors is >200% or < 50%.	<ol style="list-style-type: none"> <li>1. Sensor is not immersed correctly.</li> <li>2. Sensor may have a build-up of dirt or oily material on electrode plates.</li> <li>3. Platinum-black coating has worn off.</li> <li>4. Standard solution is inaccurate.</li> <li>5. Sensor is faulty.</li> <li>6. Faulty instrument.</li> <li>7. k-factor incorrectly set if using non-TPS sensor.</li> </ol>	<p>Immerse sensor correctly, with adequate clearance to the floor and walls of the vessel, as per section 17.2.</p> <p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Sensor requires replatinization, as per section 17.5. Alternatively, return to the factory for replatinization.</p> <p>Replace standard solution.</p> <p>Return sensor to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per sections 3.7, 4.7, and 5.6.</p>
Inaccurate readings, even when calibration is successful.	<ol style="list-style-type: none"> <li>1. Sensor may have a build-up of dirt or oily material on electrode plates.</li> <li>3. Platinum-black coating has worn off.</li> </ol>	<p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Sensor requires replatinization, as per section 17.5. Alternatively, return to the factory for replatinization.</p>

*Continued over the page...*

*Ratio Troubleshooting, continued...*

Readings drift.	1. Sensor may have a build-up of dirt or oily material on electrode plates.	Clean sensor, as per the instructions detailed in section 17.3.
Readings are low or near zero.	<ol style="list-style-type: none"> <li>1. Sensor may have a build-up of dirt or oily material on electrode plates.</li> <li>2. Sensor is not immersed correctly.</li> <li>3. Sensor is faulty.</li> <li>4. Faulty instrument.</li> <li>5. k-factor incorrectly set if using user-selectable k factor sensor.</li> </ol>	<p>Clean sensor, as per the instructions detailed in section 17.3.</p> <p>Immerse sensor correctly, with adequate clearance to the floor and walls of the vessel, as per section 17.2.</p> <p>Return sensor to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per sections 3.7, 4.7, and 5.6.</p>

**16.4 Temperature Troubleshooting**

<b>Symptom</b>	<b>Possible Causes</b>	<b>Remedy</b>
Temperature inaccurate and cannot be calibrated.	<ol style="list-style-type: none"> <li>1. Faulty connector.</li> <li>2. Faulty temperature sensor.</li> </ol>	<p>Check the connector and replace if necessary.</p> <p>Fit new temperature probe, part number 121245, or combination Conductivity &amp; Temperature sensor.</p>
Displays flashing “OVR <sup>o</sup> c” when temperature probe plugged in.	<ol style="list-style-type: none"> <li>1. Faulty <b>TEMP</b> socket.</li> <li>2. Faulty temperature probe.</li> </ol>	<p>Return the instrument to the TPS factory for service.</p> <p>Fit a new temperature probe, part number 121245, or combination Conductivity &amp; Temperature sensor.</p>

## **17. Appendices**

### **17.1 Selecting Automatic or Manual Range Switching**

The Automatic Range switching function of the 900-C is ideal for most applications. When used in the mode, the 900-C will always provide the use with optimum resolution and accuracy for the measurement being taken.

If readings are being logged for later downloading to a PC for analysis, or if readings are being sent to the optional recorder port, it may be better to switch ranges manually. This will avoid unusual spikes or troughs in the data being output.

#### *17.1.1 Conductivity and TDS mode*

In Conductivity and TDS mode, press **F5** to alternatively select Automatic or Manual range switching.

When Manual range switching is selected press **F2** to switch up one range at a time, and **F4** to switch down one range at a time. The display shows prompts for these keys, for example...

2. 76mS/cm	k=1. 00	25. 0 <sup>0</sup> C
Range F2: ↑ F4: ↓	31/12/98	12: 00: 00

To avoid cluttering up the display for most applications, no prompt is displayed when Automatic range switching is selected. For example...

2. 76mS/cm	k=1. 00	25. 0 <sup>0</sup> C
	31/12/98	12: 00: 00

#### *17.1.2 Resistivity Mode*

In Resistivity mode, press **F5** to alternatively select Automatic range switching or Range Hold.

When Range Hold is selected, the display range cannot be changed. The display shows a prompt for to indicate that the range is being held, for example...

10. 0KΩ. cm	k=1. 00	25. 0 <sup>0</sup> C
Range Hold	31/12/98	12: 00: 00

To avoid cluttering up the display for most applications, no prompt is displayed when Automatic range switching is selected. For example...

10. 0KΩ. cm	k=1. 00	25. 0 <sup>0</sup> C
	31/12/98	12: 00: 00

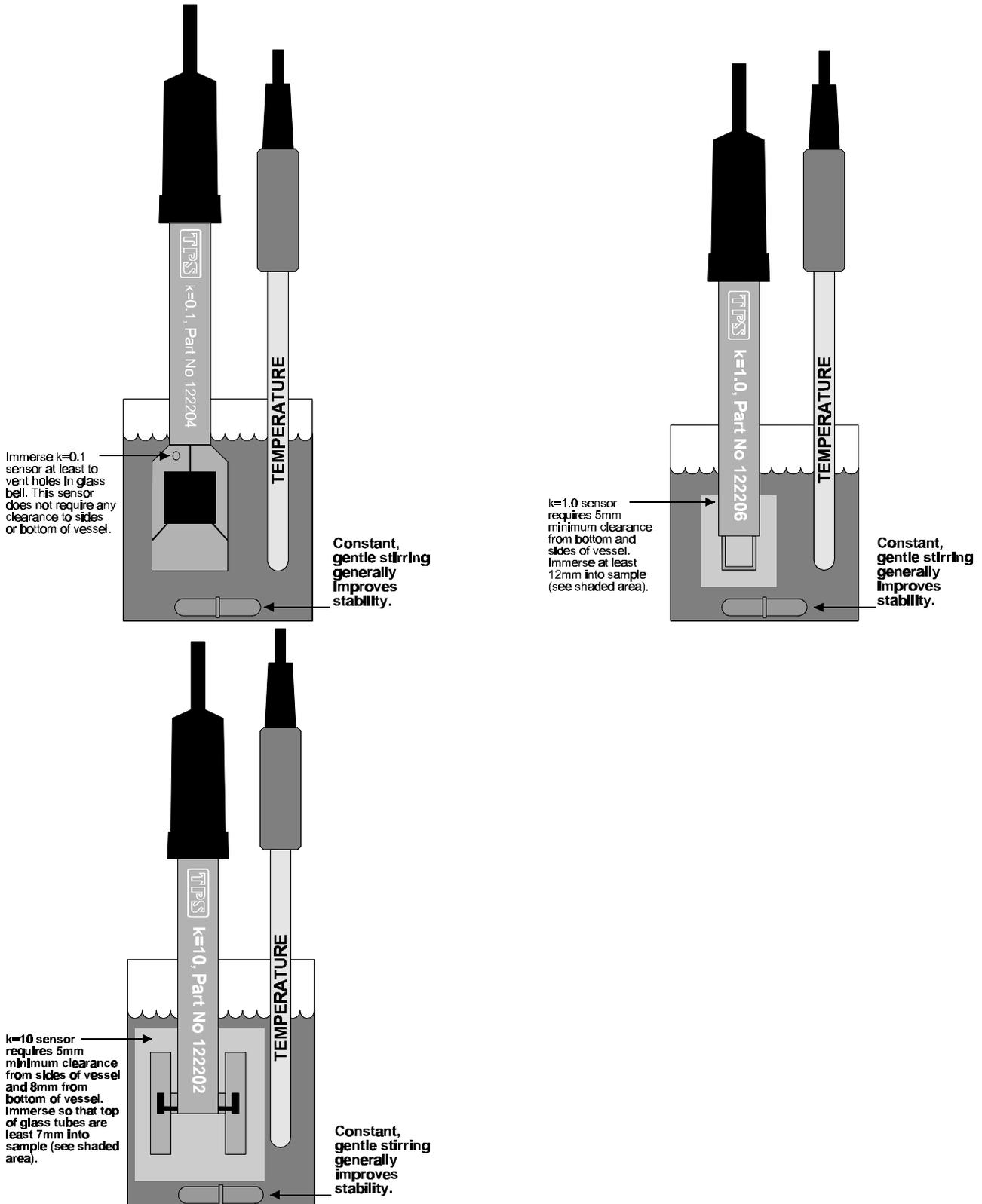
#### *17.1.3 Ratio Mode*

Manual range switching is not available in Ratio Mode.

## 17.2 Correct immersion of Conductivity sensors

Platinized platinum Conductivity sensors take measurements in a field around the electrode plates, not just directly between the plates. When a sensor is too close to the surface of the liquid being measured, or if it is too close to the floor or walls of the measurement vessel, Conductivity readings can be affected.

Conductivity sensors must therefore be correctly immersed into calibration standards and sample solutions for accurate measurements. The following diagrams show correct immersion depth and floor and wall clearance for TPS  $k=0.1$ ,  $k=1.0$  and  $k=10$  sensors.



**Notes**

1. If a Conductivity sensor is to be used in a vessel that is too small to allow correct sensor immersion, accurate results can still be obtained. To do this, ensure that the sensor is calibrated in the same size vessel at the same immersion as for sample measurements. Although the sensor's sensitivity is still affected, it will be affected to the same degree for calibration and for sample measurements.
2. Immersion levels for user-selectable k factor sensors may be different to those shown above. It would be advisable to conduct tests with these sensors to check when the floor and walls and liquid levels in the vessel begin to affect readings.

### 17.3 Calculating the ATC Slope of Solutions

The conductivity of all solutions changes as the temperature of the solution changes. The ATC Slope of a solution is the amount that this Conductivity changes per degree Celsius. The ATC Slope is dependant upon the chemicals dissolved in the solution, the concentration of those chemicals, and the actual temperature of the solution. Consider the following examples...

- A 0.02 Molar solution of KCl has a different ATC Slope to a 0.02 Molar solution of NaCl.
- A 0.02 Molar solution of KCl has a different ATC Slope to a 0.01 Molar solution of the same salt.
- A 0.02 Molar solution of KCl at 25 °C has a different ATC Slope to a 0.02 Molar solution of KCl at 15 °C.

To calculate the ATC Slope of a solution...

1. Set the ATC Slope for sample measurements to zero, with the following key sequence...

**Menu** → **F5: Configure** → **F3: ATC** → **F1: Sample** → **0.00** → **Enter**

2. Ensure that the temperature function has been calibrated (see section 7.1). The conductivity function does not need to be calibrated at this point.
3. Warm or cool the solution to approximately 5 °C below the temperature at which you expect to take sample measurements. Record the Conductivity and Temperature readings, once both have become stable.
4. Warm the solution to approximately 5 °C above the temperature at which you expect to take sample measurements. Record the Conductivity and Temperature readings, once both have become stable.
5. Apply the following formula, where C1 and T1 are the first readings taken, and C2 and T2 are the second readings taken...

$$\text{ATC Slope} = 100 \times \left( 10^{\left( \frac{\text{Log} \left( \frac{C2}{C1} \right)}{T2 - T1} \right)} - 1 \right)$$

6. Enter the result that is obtained as the ATC Slope of the solution.

(a) If this is the ATC Slope of the sample solution to be measured...

**Menu** → **F5: Configure** → **F3: ATC** → **F1: Sample** → **[result]** → **Enter**

(b) If this is the ATC Slope of the standard solution to be used for calibration...

**Menu** → **F5: Configure** → **F3: ATC** → **F2: Standard** → **[result]** → **Enter**

#### Note

To assist in calculating the ATC Slope the following information can be entered into a spreadsheet. This example has been specifically written for Microsoft® Excel®, although the syntax should be similar for other spreadsheet software.

	A	B
1	Conductivity 1	<Enter first Conductivity reading>
2	Temperature 1	<Enter first Temperature reading>
3	Conductivity 2	<Enter second Conductivity reading>
4	Temperature 2	<Enter second Temperature reading>
5	ATC Slope	=100*((10^((LOG10(B3/B1))/(B4-B2)))-1)

## 17.4 Care, Cleaning and Maintenance of Conductivity Sensors

### 17.4.1 Care of Conductivity sensors

The conductivity section of the sensor supplied with your **900-C** consists of two platinum plates that are plated with a layer of “platinum-black”. This is quite a soft layer and is required for stable, accurate measurements. In time, the platinum-black layer may wear off in some applications, at which time the sensor will require replatinizing (see section 17.5). You can help to maintain the platinum-black layer by following these simple rules:

1. **NEVER** touch or rub the electrode plates with your fingers, cloth etc.
2. Avoid using the sensor in solutions that contain a high concentration of suspended solids, such as sand or soil, which can abrade the electrode plates. Filter these types of solutions first, if possible.
3. Avoid concentrated acids. If you must measure acids, remove the sensor immediately after taking the measurement and rinse well with distilled water.

Conductivity sensors can be stored dry. Ensure that the sensor is stored in a covered container, to avoid dust and dirt build-up.

### 17.4.2 Cleaning of Conductivity of Sensors.

Platinized platinum Conductivity sensors can only be cleaned by rinsing in a suitable solvent. **DO NOT wipe the electrode plates**, as this will remove the platinum-black layer.

1. Rinsing in distilled water will remove most build-ups of material on the electrode plates.
2. Films of oils or fats on the electrode plates can usually be removed by rinsing the sensor in methylated spirits.
3. Stubborn contamination can be removed by soaking the sensor in a solution of 1 part Concentrated HCl and 10 parts distilled water. The sensor should not be soaked for more than approximately 5 minutes, otherwise the platinum-black layer may start to dissolve.
4. If all of these methods fail, then the last resort is to physically scrub the electrode plates, which will remove the contaminant and the layer of platinum-black. Use only a cloth or nylon scouring pad. **DO NOT USE STEEL WOOL**. The sensor will then need to be cleaned in HCl, as per step 3 and replatinized, as per section 17.5.

### 17.5 Determining if the instrument or sensor is faulty

A **TEST** button is provided on the rear of the **900-C** to help determine if the **900-C** or a conductivity sensor is faulty. Pressing this button disconnects the Conductivity sensor and applies a fixed resistance to the input. The **900-C** should display approximately the following values, depending upon the current calibration settings.

Conductivity	1000 uS/cm
TDS	500 ppM
Resistivity	1.00 KΩ.cm
Ratio	Test function not available for this mode

If the **900-C** is operating correctly, the reading should be totally stable and within  $\pm 25\%$ , depending on the current calibration settings.

If the reading is unstable or outside the above limits, the **900-C** should be returned to the factory for service, together with the Conductivity and Temperature sensors.

## 17.6 Replatinizing Conductivity Sensors

The **900-C** is fitted with an automatic sensor platinizing function to restore Conductivity sensors to correct performance. To replatinize Conductivity sensors...

1. Soak the sensor in a solution of 1 part Concentrated HCl and 10 parts distilled water for approximately 5 minutes.
2. Rinse the sensor well in distilled water.
3. Plug the Conductivity sensor into the **PLATINIZER** socket.
4. Immerse the sensor in platinizing solution, so that both of the platinum plates are well covered.

Platinizing solution is available from TPS (part no 122300). Alternatively, platinizing solution can be prepared by dissolving 1g of Hydrogen Chloroplatinate ( $\text{H}_2\text{PtCl}_6$ ) in 30mL of distilled water, and including about 0.01g of Lead Acetate ( $(\text{CH}_3\text{COO})_2\text{Pb}$ ) and a drop or two of concentrated HCl.

5. Select Platinizer mode (Menu → **F3: Mode** → **F5: Platinizer**). The Platinizer screen is now displayed...

<p><b>Platinizer, Use Cell in Platinizer socket</b>  <b>Select K F1: k=. 1 F2: k=1 F3: k=10</b></p>
---

6. (a) For TPS sensors...  
 Press **F1** if you are replatinizing a k=0.1 sensor.  
 Press **F2** if you are replatinizing a k=1.0 sensor.  
 Press **F3** if you are replatinizing a k=10 sensor.
- (b) For user-selectable k factor sensors...  
 Press **F1** for a sensor with a large surface area ( $>0.5\text{cm}^2$  per plate).  
 Press **F2** for a sensor with a large smaller area ( $<0.5\text{cm}^2$  per plate).
7. The **900-C** will now count down the correct platinizing time for the selected sensor. For example...

<p><b>Platinizing for 3: 00 minutes</b>      <b>Menu</b>  <b>Time remaining 2: 59 minutes</b>      <b>Quits</b></p>
---

Press **Menu** to quit platinizing at any time. Remove the sensor and rinse well in distilled water. If the sensor has not been fully platinized, start the process again from step 1.

8. When the platinizing cycle is complete, the following screen is displayed and the **900-C** will beep...

<p><b>Platinizing complete. Remove Cell</b>  <b>Press Menu to Exit</b></p>
--

Press **Menu** and remove the sensor from the platinizing solution. Rinse well in distilled water.

Remove the sensor and press **Menu** immediately, as the platinizing current is still on while the unit is beeping.

9. For user-selectable k factor sensors, check that the sensor has been platinized correctly. The coating should be a consistent, dull black layer. An under-platinized sensor will have a slightly shiny appearance. An over-platinized sensor will drop platinum-black off the plates when gently tapped. If the sensor is under or over-platinized start the process again from step 1. Platinize an under-platinized sensor for more time and an over-platinized sensor for less time.

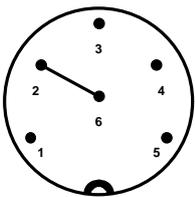
## 17.7 Conductivity Sensor Connections

Conductivity sensor connections for TPS sensors are as follows...

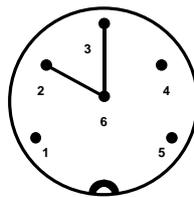
Pin No	k=0.1 Sensor	k=1.0 Sensor	k=10 Sensor	User k factor
1	Cell Plate	Cell Plate	Cell Plate	Cell Plate
2	Link to Pin 6	Link to Pin 6	No Connection	No Connection
3	No Connection	Link to Pin 6	No Connection	No Connection
4	Temp Sensor *	Temp Sensor *	Temp Sensor *	No Connection
5	Cell Plate	Cell Plate	Cell Plate	Cell Plate
6	Link to Pin 2. Temp Sensor common *	Link to Pins 2 and 3. Temp Sensor common *	Temp Sensor common *	No Connection

\* Temperature sensor connections to pins 4 and 6 are only applicable for combination conductivity and temperature sensors. Contact the factory for further details, if required. If in doubt do not make any connections to these pins, and use a separate temperature sensor (TPS part number 121245).

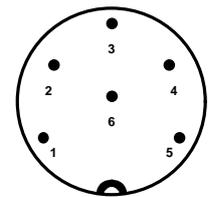
**k=0.1 Sensor**



**k=1.0 Sensor**



**k=10 Sensor**



Plugs shown above as viewed from the pin side of the plug.

For non-TPS sensors, the links in the plugs may be fitted for matching nominal k factors.

If a plug on a TPS sensor is replaced, be sure to install the links.

## **18. Warranty**

TPS Pty. Ltd. guarantees all instruments and sensors to be free from defects in material and workmanship when subjected to normal use and service. This guarantee is expressly limited to the servicing and/or adjustment of an instrument returned to the Factory, or Authorised Service Station, freight prepaid, within twelve (12) months from the date of delivery, and to the repairing, replacing, or adjusting of parts which upon inspection are found to be defective. Warranty period on sensors is three (3) months.

There are no express or implied warranties which extend beyond the face hereof, and TPS Pty. Ltd. is not liable for any incidental or consequential damages arising from the use or misuse of this equipment, or from interpretation of information derived from the equipment.

Shipping damage is not covered by this warranty.

### **PLEASE NOTE:**

A guarantee card is packed with the instrument or sensor. This card must be completed at the time of purchase and the registration section returned to TPS Pty. Ltd. within 7 days. No claims will be recognised without the original guarantee card or other proof of purchase. This warranty becomes invalid if modifications or repairs are attempted by unauthorised persons, or the serial number is missing.

### **PROCEDURE FOR SERVICE**

If you feel that this equipment is in need of repair, please re-read the manual. Sometimes, instruments are received for "repair" in perfect working order. This can occur where batteries simply require replacement or re-charging, or where the sensor simply requires cleaning or replacement.

TPS Pty. Ltd. has a fine reputation for prompt and efficient service. In just a few days, our factory service engineers and technicians will examine and repair your equipment to your full satisfaction.

To obtain this service, please follow this procedure:

Return the instrument AND ALL SENSORS to TPS freight pre-paid and insured in its original packing or suitable equivalent. INSIST on a proof of delivery receipt from the carrier for your protection in the case of shipping claims for transit loss or damage. It is your responsibility as the sender to ensure that TPS receives the unit.

Please check that the following is enclosed with your equipment:

- **Your Name and daytime phone number.**
- **Your company name, ORDER number, and return street address.**
- **A description of the fault. (Please be SPECIFIC.)**  
(Note: "Please Repair" does NOT describe a fault.)

Your equipment will be repaired and returned to you by air express where possible.

For out-of-warranty units, a repair cost will be calculated from parts and labour costs. If payment is not received for the additional charges within 30 days, or if you decline to have the equipment repaired, the complete unit will be returned to you freight paid, not repaired. For full-account customers, the repair charges will be debited to your account.