TPS Model 900-P
Microprocessor pH - mV - Temperature Meter

Congratulations !

You have purchased the latest in instrumentation for Laboratory pH measurements. We hope that your new 900-P will provide you with many years of reliable service.

This manual has extensive details. Please read carefully.

If at any stage we can be of assistance, please contact either your local TPS representative or the TPS factory directly.

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Contents

1. General Information

1.1 Introduction

The 900P pH / mV / Temperature Meter is a Microprocessor-based unit with an eighty character LCD Alphanumeric Display. The processor intelligence provides ease of calibration, improved stability and accuracy, and simplicity of operation. All parts used are readily available. This ensures complete serviceability should it be required.

The 900-P is a major step forward in laboratory and field electrochemical measurement. Operation of the 900-P is via a fully sealed, membrane keypad. This keypad and the intelligent 80 character LCD display, make operation of the 900-P very simple.

On-line "HELP" messages, at calibration and other functions are included.

An RS232 computer interface port can be fitted to the 900-P, if required. With this option, the 900-P can download readings directly into a computer or a serial printer.

1.2 Display

An 80 character LCD alphanumeric display shows Readings, Error Messages and On-line Help.

1.3 Keypad

A water-resistant membrane keypad of 20 keys allows input of Setup information and the selection of operating Modes.

There are 2 groups of keys…
- 5 function keys and a Menu key
- 10 numeric entry keys, decimal, minus, backspace (delete) and an Enter key.

The Function Keys F1, F2, F3, and F4, are used to select menus and parameters. The F5 key will display HELP information.

1.4 Data Entry

The following notes are a general guide to Data Entry…

1. The present value of the Data will be displayed until a key is pressed.

2. Pressing the [Menu] key will exit Data Entry and leave the Data unchanged.

3. Press the required keys to enter the desired data.
   For negative data, press the [–]key first.
   Press [Enter] to finish data entry and store new data.
   Use backspace key [←], to correct typing errors, one at a time.

4. If the Data entered exceeds the allowable limits, the 900-P will beep and display the limits. Enter new data or exit unchanged, with [Menu].

1.5 Connectors

Connector Description	Function
TEMP	3.5mm phono jack for Temperature Sensor input.
SENSOR	BNC connector for pH, Redox or Ion Selective electrode input. Suitable for single and combination style sensors.
REF	4mm jack for Reference electrode input. Used when a separate reference electrode is required.
POLARISATION	Polarisation voltage output for Double Platinum electrode for Karl Fischer titrations.
GUARD	Used for solution Guard or "earth" connection where metal or grounded vessels are used for samples.
POWER	240V AC Power input (120V optional)

1.6 "Help" Information
The 900-P has help messages available when using Menus and Functions.

Press function key [F5] and the "HELP" message will be displayed.

Press [F5] when in pH mode to display the pH probe Asymmetry and Slope. These are the values that were calculated and stored at the most recent re-calibration.

2. Startup

2.1 General Requirements
While the keypad of the 900-P is splash resistant, avoid using in damp areas and wipe dry immediately if wet.

Prolonged exposure to direct sunlight should be avoided.

The 900-P should be operated in a cool dry environment.

2.2 Turn On
Plug in the power lead and turn ON. The 900-P will perform a memory test and display Model and Option details and proceed to "RUN MODE" displaying pH and Temperature Data.

Corruption of Memory contents can occur as the result of Low Battery Volts (Meter unused for very long periods), or severe electrical events (eg lightning surges). If the Memory test fails the message :

"Calibration, Configuration and Data Lost"

will be displayed and the 900-P will perform an Initialisation. See section 7 for details.

3. pH Measurement

3.1 pH Mode Selection
The pH operating mode of the 900-P is selected using the "Mode" Menu.

Enter the following sequence of key presses to select the required pH mode…

Menu → F1:Mode → F1:pH .01   (to select pH with 0.01 resolution)
                          or   F2:pH .001   (to select pH with 0.001 resolution)

3.2 pH Calibration
1. Plug the pH sensor into the **SENSOR** socket and the temperature sensor into the **TEMP** socket.
2. Switch the meter on.
3. Select the required pH Mode (see section 3.1).
4. Ensure that temperature has already been calibrated, or manually set (see sections 5.2 and 5.5).
5. Remove the wetting cap from the pH sensor.
6. Rinse the pH and Temperature sensors in distilled water and blot them dry.
7. Place both electrodes into a small sample of pH buffer, so that the bulb and reference junction are both covered.

    DO NOT place the electrodes directly into the buffer bottle.
8. Select pH Calibration.   Menu → **F3:Calibrate pH**
9. If pH4.00, pH6.88 or pH9.23 buffer is being used, simply press [Enter] to calibrate when the reading has stabilised. These buffers are automatically recognised, along with their temperature coefficients.

    If an alternative pH buffer is being used, enter the pH value of the buffer at the current temperature, and then press [Enter] to calibrate.
10. A 1 point calibration has now been performed. Note that the uncalibrated warning will not be removed until a full 2 point calibration has been performed.
11. Rinse the pH and Temperature electrodes in distilled water and blot them dry.
12. Place both sensors into a small sample of pH Buffer that is at least 2 pH away from the first calibration point. Ensure that the bulb and reference junction are both covered. **DO NOT** place the electrodes directly into the buffer bottle.
13. Select pH Calibration   Menu → **F3:Calibrate pH**
14. If pH4.00, pH6.88 or pH9.23 buffer is being used, simply press [Enter] to calibrate when the reading has stabilised. These buffers are automatically recognised, along with their temperature coefficients.

    If an alternative pH buffer is being used, enter the pH value of the buffer at the current temperature, and then press [Enter] to calibrate.
15. A full 2 point calibration has now been performed. The 900-P is ready for use. Discard the used samples of buffer.

3.3 Calibration Notes

1. High pH buffers, such as pH9.23 and pH10.01, are highly unstable. Avoid using these buffers if possible. Discard immediately after use.
2. A 1-point calibration should be performed at least weekly. In applications where the electrode junction can become blocked, such as dairy products, mining slurries etc, a 1-point calibration may have to be done daily.
3. A full 2-point calibration should be performed at least monthly. Of course, more frequent calibration will result in greater confidence in results.
4. All calibration information is retained in memory when the 900-P is switched off.
5. The 900-P displays the value of the pH buffer to which it will attempt to calibrate. Ensure that the buffer value displayed corresponds to the buffer that you are using, or enter an alternative buffer value.

3.4 Calibration Messages

1. If a 1-point calibration has been successfully performed, the 900-P will display the calculated asymmetry of the electrode, along with the current slope of electrode.

   eg: **Asymmetry Calibration Successful**
        +0.10pH Asym   100.0% Slope

2. If a 1-point calibration has failed, the 900-P will display the failed asymmetry value of the electrode.

   eg: **Calibrate FAILED, -1.5 pH Asymmetry**
        Repeat Cal. or Initialise Calibration

3. If a 2-point calibration has been successfully performed, the 900-P will display the calculated asymmetry and slope of the electrode.

   eg: **Slope & Asymmetry Calibration Successful**
        +0.10pH Asym   99.0% Slope

4. If a 2-point calibration has failed, the 900-P will display the failed slope value of the electrode.

   eg: **Calibrate FAILED, 80% Slope**
        Repeat Cal. or Initialise Calibration

4. Millivolt Measurement

4.1 mV Mode Selection
The mV operating mode of the 900-P is selected using the "Mode" Menu.

Enter the following sequence of key presses to select mV mode…

Menu → F1:Mode → F3:mV

4.2 mV Calibration
The mV section is factory calibrated. There is no user-calibration facility for this mode.

5. Temperature Measurement

The 900-P uses a separate stainless steel sensor for temperature measurement. If this temperature sensor is not connected, the 900-P automatically reverts to manual temperature compensation.

When the temperature probe is connected, temperature is shown as "**Temp 25.0$^\text{o}$C**"

When the temperature probe is *not* connected, temperature is shown as "**Man 25.0$^\text{o}$C**"

5.1 Temperature Calibration

The temperature readout must be calibrated or manually set before attempting pH calibration.

5.2 Calibration Procedure

1. Plug the temperature sensor into the **TEMP** socket.
2. Switch the meter on.
3. Place the 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.
4. Select Temperature Calibration [Menu] → **F2:Temperature**
5. The reading from the probe is now displayed on the far right of the display.
6. When the reading on the right has stabilised, enter the same temperature as shown by the mercury thermometer, using the numeric keypad.
7. Press [Enter] to calibrate the temperature readout.
   Alternatively, press the [Menu] key to abort temperature calibration.

5.3 Calibration Notes

1. Temperature calibration information is retained in memory when the 900-P is switched off.
2. Temperature does not need to be recalibrated unless the Temperature probe is replaced or the meter is initialized.

5.4 Calibration Messages

1. If a temperature calibration has been successfully performed, the 900-P will display the following message…
   1 Point Calibration OK
2. If a temperature calibration has failed, the 900-P will display the following message…
   Cal. FAILED, Offset Error.

5.5 Manual Temperature Setting

If the temperature sensor is not connected, the temperature of the sample solution must be set manually for accurate pH measurements. A separate thermometer will be required for this.

1. Switch the meter on.
2. Measure the temperature of the sample.
3. Select Temperature Calibration [Menu] → **F2: Temperature**
4. The current temperature setting is now displayed.
5. Enter the temperature of the sample, using the numeric keypad.
6. Press [Enter] to save the temperature value.

   Alternatively, press the [Menu] key to quit and retain the current setting.

5.6 Measuring Unknown Temperatures

Always stir solution and allow time to stabilise when measuring temperature.

6. Troubleshooting

6.1 General Errors

Error Message	Possible Causes	Remedy
Factory Calibration Data Failure. **mV and Temperature Readings Inaccurate**	The EEPROM chip which contains the factory calibration information has failed.	The unit must be returned to TPS for service. • mV & Temperature readings may be up to 10% incorrect. • pH readings will be accurate after a 2-point calibration (use manual temperature compensation).
EEPROM Write Failure **Return to Factory for Service**	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.

6.2 pH and mV 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 7.
1 Point calibration fails (Asymmetry is greater than +/-1.00 pH).	1. Reference junction blocked.	Clean reference junction, as per instructions supplied with the electrode.
	2. Reference electrolyte contaminated.	Flush with distilled water and replace electrolyte.
2 Point calibration fails (Slope is less than 85.0%).	1. Buffer set incorrectly	For automatic buffer recognition, ensure that you are using pH4.00, pH6.88 or pH9.23 buffer. Otherwise, ensure that the buffer value is entered correctly at calibration.
	2. Glass bulb not clean.	Clean glass bulb as per instructions supplied with the electrode.
	3. Electrode is aged.	Attempt rejuvenation, as per instructions supplied with the electrode. If not successful, replace electrode.
	4. Connector is damp.	Dry in a warm place.
	5. Buffers are inaccurate.	Replace buffers.
Unstable readings.	1. Electrolyte chamber needs to be refilled.	Refill with saturated KCl filling solution.
	2. Reference junction blocked.	Clean reference junction, as per instructions supplied with the electrode.
	3. Glass bulb not clean.	Clean glass bulb as per instructions supplied with the electrode.
	4. Bubble in glass bulb.	Flick the electrode to remove bubble.
	5. Faulty connection to meter.	Check connectors. Replace if necessary.
	6. Reference junction not immersed.	Ensure that the bulb AND the reference junction are fully immersed.
	7. KCl crystals around reference junction, inside the electrolyte chamber.	Rinse electrolyte chamber with warm distilled water until dissolved. Replace electrolyte.
Inaccurate readings, even when calibration is successful.	Reference junction blocked.	Clean reference junction, as per instructions supplied with the electrode.
Displays 7.00 for all solutions.	Electrical short in connector.	1. Check connector. Replace if necessary. 2. Replace electrode.
Displays 4-5 pH for all solutions.	Glass bulb or internal stem cracked.	Replace electrode.

6.3 Temperature Troubleshooting

Symptom	Possible Causes	Remedy
Displays Over-range when temperature probe is plugged in.	1. Faulty temperature probe.	Fit new temperature probe, part number 121245.
Temperature inaccurate and cannot be calibrated.	1. Faulty connector.	Check the connector and replace if necessary.
	2. Faulty temperature probe.	Fit new temperature probe, part number 121245.
Displays "Man" when temperature probe plugged in.	1. Faulty **TEMP** socket.	Return the instrument to the TPS factory for service.

7. RS232 Port

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

7.1 Setting the Baud Rate

1. Select RS232 Baud Rate Set-up: Menu → **F4:RS232** → **F2:Baud Rate**
2. Press F1 to select 300 baud
   Press F2 to select 1200 baud
   Press F3 to select 9600 baud

   Ensure that the baud rate matches the baud rate set on the printer or PC with which the 900-P is communicating.

7.2 Sending Readings to the RS232 Port

The 900-P can send readings to the RS232 port instantly, or at a pre-set print rate.

To send readings to the RS232 port instantly, press the [F3] key during normal measurement.

To send readings to the RS232 port at a pre-set print rate…

1. Select RS232 Print Rate Set-up: Menu → **F4:RS232** → **F1:Print Rate**

   The current print rate is displayed at the cursor.

2. Use the numeric keypad to enter the desired print rate, in seconds.

   The print rate can be set from 0 to 9999 seconds.

   Set the print rate to ZERO when using commands from a remote computer.

3. The 900-P will begin to transmit readings to the RS232 port when it resumes normal measurement mode.

7.3 RS232 Configuration

The 900-P RS232 configuration is 8 bits, No Parity, 1 Stop Bit, XON/XOFF Protocol.

7.4 Communication and Statistical Software

Communication between the 900-P and a PC can be handled with any RS232 communication software. BASIC software for this purpose is available from TPS.

Once the data is saved to disk, the next problem is how to use it. The data is formatted in columns that can be imported by programs such as Microsoft® Excel® and Lotus 123®.

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

7.5 Commands

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

Action	Command	Notes
Request current data	?D<cr>	Returns the current pH/mV and Temperature from the 900-P. The print rate must be set to zero (see section 7.2).

7.6 Data Format

A.   Data is returned to the RS232 port by the 900-P in the following format when requested by a PC with the ?D command (section 7.5):

DDDDDDD◆UUUUU◆◆TTTTT◆oC<cr>

or B.   Data is sent to the RS232 port by the 900-P in the following format when it is sent by the 900-P using the Print function (section 7.2):

DDDDDDD◆UUUUU◆◆TTTTT◆oC<cr><lf>

where: DDDDDDD is the pH or mV Data. Maximum 7 characters, right justified.

    ◆   is one space.

    UUUUU is the unit description, either pH or mV, left justified.

    ◆◆   is two spaces.

    TTTTT is the Temperature Data. Maximum 5 characters, right justified.

    oC is the Temperature unit description, left justified.

    <cr> is carriage return, ASCII character 13

    <lf> is line feed, ASCII character 10

Notes:

1. Data corresponds to the Mode selected, ie pH or mV.

2. **9999999** is sent when the Data is over-range,

3. **BUSY**<cr> is sent when the 900-P is Busy, i.e. in menus etc., or when Data is not available.

8. Recorder Output Option

This section is applicable when the optional analogue recorder output is fitted. The recorder output corresponds to the currently selected display mode. There is no output when the 900-P is in any of the menus.
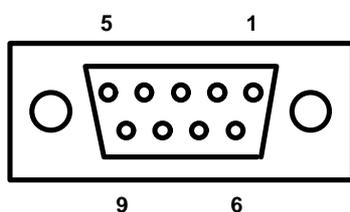
The output voltages are as follows:

pH   : 0 to 14.00 pH for 0 to 2000 mV
             i.e. pH7.00 = 1000 mV Output

mV   : -1500 to +1500 mV for 0 to 2000 mV Output
             i.e. 0 mV Reading = 1000 mV Output

Output impedance approx 1000 Ohms.

8.1 RS232 / Recorder Output Socket Connections

Pin No	Connection
1	Chassis
2	Receive RS232 Data
3	Transmit RS232 Data
4	+10 V DC Power Output
5	Ground
6	Recorder Output Signal
7	Recorder Output Common
8	No Connection
9	No Connection

9. Initialising the 900-P

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

To initialize the 900-P:

1. Switch the 900-P off.

2. Press and hold the [←] key while switching the 900-P back on.

3. The following messages should be displayed…

<div align="center">

Initializing

then…

System Initialized
Unit should be Re-calibrated before use.

</div>

4. The meter then displays pH and Temperature. A warning that the pH is uncalibrated is also displayed.

10. Specifications

Ranges

pH   : 0 to 14.00 and 0 to 14.000 pH
mV   : 0 to ±500.0 & 0 to ±1500 mV (auto-ranging)
Temperature   : -10.0 to 120.0 $^{\text{O}}$C

Resolution

pH   : 0.01 and 0.001 pH
mV   : 0.1 and 1 mV
Temperature   : 0.1 $^{\text{O}}$C

Accuracy (instrument)

pH   : ±0.01 and ±0.002 pH
mV   : ±1 and +/-0.15 mV
Temperature   : ±0.2 $^{\text{O}}$C

Compensation   : Automatic and Manual Temperature Compensation, 0 to 100 $^{\text{O}}$C

Calibration   : Automatic pH Asymmetry, pH Slope and Temperature Compensation.

Display   : 2 line x 40 Character alphanumeric LCD for readings, Menus, Help and Error Messages.

Keypad   : 5 Function Keys, Menu key and 14 data entry keys.

Stability
Instrument   : Better than 0.1 % of any Mode Full Scale
Sensors   : Subject to sensor condition

Power   : 240 V AC, 50 Hz.
                                      Other voltages by request.

Dimensions   : 270 x 210 x 75 mm.

Weight: : Typical System Shipping Weight: 3 Kg

11. Spares and Accessories

The 900-P standard kit includes :

	Part No
900-P Meter	121101
pH Electrode	121207
Temperature Sensor	121245
pH6.88 Buffer, 200mL	121306
pH4.00 Buffer, 200mL	121381
900-P Handbook	130050
Mains power lead	WMIEC

Options

Flexible arm style electrode holder	130088
RS232 Computer Interface (includes cable)	130029
Recorder Output (includes cable)	130028
RS232 PLUS Recorder Output (includes cable)	130049

Please contact the factory for the name of your nearest TPS distributor.
TPS Pty. Ltd.
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12. Appendices

12.1 pH Electrode Fundamentals

A combination pH Electrode is two electrodes in one. The sensing membrane is the round or spear shaped bulb at the tip of the electrode. This produces a voltage that changes with the pH of the Solution. This voltage is measured with respect to the second part of the electrode, the reference section. The reference section makes contact with the sample solution using a salt bridge, which is referred to as the reference junction. A saturated solution of KCl is used to make contact with the sample. It is vital that the KCl solution has an adequate flow rate in order to obtain stable, accurate pH measurements.

12.1.1 Asymmetry of a pH Electrode

An "ideal" pH electrode produces 0 mV output at 7.00 pH. In practice, pH electrodes, generally produce 0 mV output at slightly above or below 7.00 pH. The amount of variance from 7.00 pH is called the asymmetry. Figure 12-1 illustrates how asymmetry is expressed.
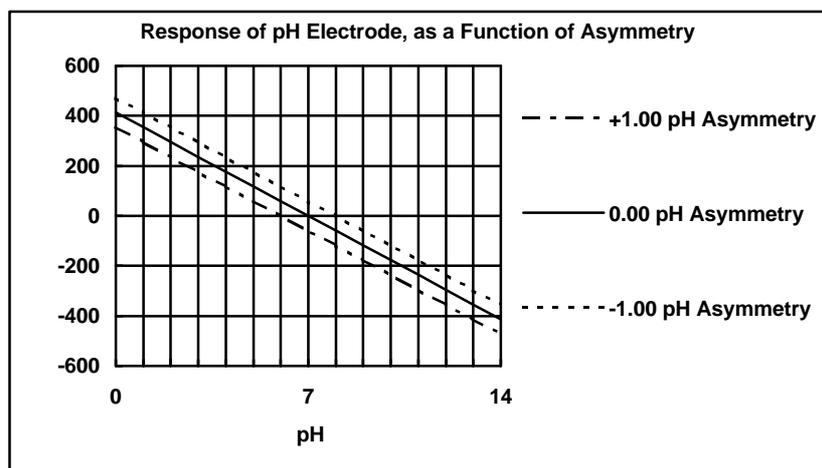

Figure 12-1

12.1.2 The Slope of a pH Electrode

As mentioned above, a pH electrode produces 0 mV output at around 7.00 pH. As the pH goes up, an "ideal" pH electrode produces -59mV/pH unit at 25 °C As the pH goes down, an ideal pH electrode produces +59mV/pH unit. In practice, pH electrodes usually produce slightly less than this. The output of a pH electrode is expressed as a percentage of an ideal electrode. For example, an ideal electrode that produces 59mV/pH unit has "100% Slope". An electrode that produces 50.15mV/pH unit has "85% Slope" (see Figure 12-2).
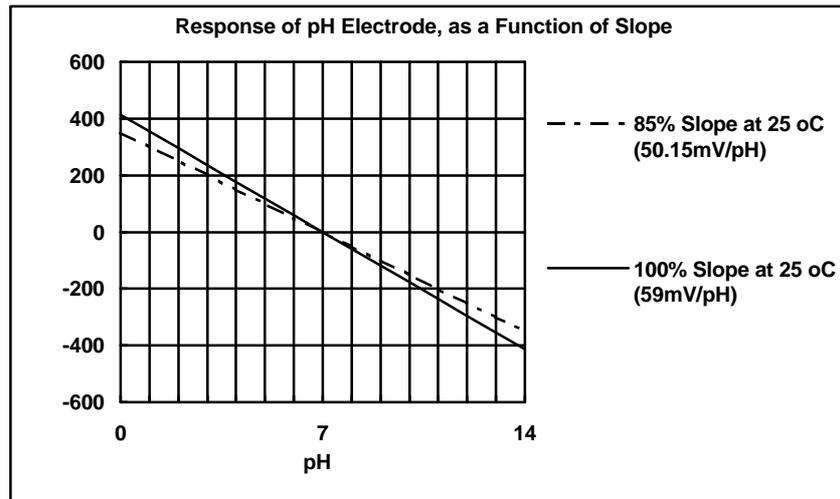
Figure 12-2

12.1.3 Temperature Compensation

The slope of a pH electrode (section 12.1.2) is affected by temperature. This effect is compensated for either by using an Automatic Temperature Compensation (ATC) probe or by entering the sample temperature manually. Figure 12-3 shows the slope of a pH electrode at various temperatures.
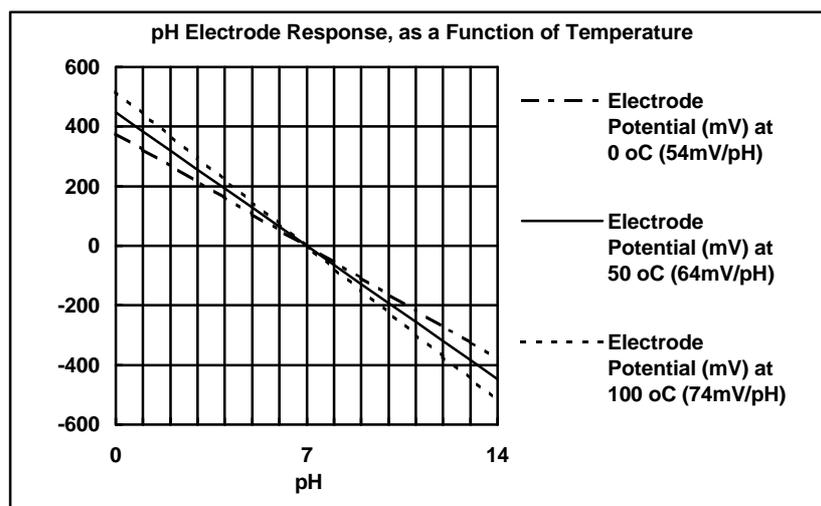
Figure 12-3

12.2 Guard Connector

In some circumstances, the pH or mV readings may become unstable. This may be due to static charge in the sample vessel, or electrical noise from nearby electrical equipment. In these cases, a solution guard may eliminate the problem.

A solution earth rod is available from TPS (part no 121360). This connects directly to the **Guard** socket. Alternatively, run a wire from the **Guard** socket to a stainless steel fitting in contact with the sample.

12.3 Polarisation Connector

The polarisation output connector on the rear panel is for Karl Fischer titrations. This titration is a method for determining minute quantities of water in non-aqueous liquids.

The TPS Double Platinum electrode (part no 122207) has two connectors. The larger BNC connector fits to the **Sensor** socket and the smaller 3.5mm phono plug fits to the **Polarisation** socket.

DO NOT PLUG THE DOUBLE PLATINUM ELECTRODE INTO THE TEMPERATURE SOCKET.

When performing Karl Fischer titrations, ensure that the 900-P is in mV mode.

12.4 Checking the reference junction of a pH electrode.

If pH readings are inaccurate or unstable, the reference junction of the electrode may be blocked. The following test can be performed to determine if the reference junction of a pH electrode is making adequate contact with the sample solution.

1. Calibrate the 900-P, as per section 3.2.

2. Dilute 1 part of pH6.88 buffer with 9 parts of distilled water.

3. Measure the pH of the diluted buffer. The result should be 7.06 +/-0.02 pH.

4. If the value obtained is outside of these limits, then clean the reference junction, as per the instructions supplied with the pH electrode.

5. Re-calibrate the 900-P and repeat the test.

6. If the value obtained is still outside 7.06 +/-0.02 pH, then the electrode should be replaced.

12.5 Determining if an instrument or electrode is faulty

The following test can be performed to help determine if the 900-P or the pH electrode is faulty.

1. Initialize the 900-P (see section 7).

2. Disconnect the pH electrode.

3. Connect the centre pin of the **SENSOR** connector with the outside frame of the connector, using a short piece of wire or a paper clip etc.

4. The meter should display approximately pH7.00, depending on the current calibration settings.

5. If the 900-P is operating correctly, the reading should be totally stable with the wire firmly in place. If not, the meter requires servicing.

6. Now carefully disconnect the wire from the centre pin only (make sure the other end of the wire remains connected to the outside frame of the connector).

7. The reading should steadily drift away from 7.00 (either up or down) at a rate of approximately 1 pH or less every 3 seconds. If the drift rate is faster than this, then input circuitry of the 900-P is faulty and requires servicing.

13. Warranty

TPS Pty. Ltd. guarantees all instruments and electrodes 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 electrodes 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 electrode. 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 electrode 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 labor 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.