

## **Congratulations !**

Your new **microCHEM-Redox** transmitter module is a simple, lower power device for interfacing a Redox sensor with datalogging and process control equipment. The industry standard 0 to 1 V DC and 0 to 5 V DC outputs ensure that the **microCHEM-Redox** is compatible with most such devices.

The **microCHEM-Redox** 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.

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The manual is divided into the following sections:

### **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 **microCHEM-Redox**. It also contains a full listing of all of the items that you should have received with the 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 **microCHEM-Redox**, 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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#### **microCHEM-Redox Transmitter Module**

Handbook Version : 1.1  
Date : 23-Nov-2006  
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## 1. Introduction

### 1.1 Unpacking Information

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

	Part No
1. <b>microCHEM-Redox</b> Transmitter Module .....	111146
2. Mounting feet, kit of 4, complete with screws .....	NRMICRO
3. ZoBell Standard, 231mV .....	121309
(200mL each of Part A and Part B)	
4. <b>microCHEM-Redox</b> Handbook .....	130050

#### *Options that may have been ordered with your microCHEM-Redox:*

##### *Dip mounted Redox sensor...*

1. Submersible, Non-flow Redox Sensor, 5m ..... 111260
2. Intermediate Junction Redox Sensor, 5m ..... 121267
3. Submersible protective housing for Sensor ..... 111303

##### *Screw-in Redox sensor, and adaptor for 40mm PVC pipe...*

1. Screw-in, Non-flow Redox Sensor, 5m ..... 800021
2. ¼" BSP thread adaptor for 40mm PVC pipe ..... 111305

##### *Stainless Steel Solution Earth Rod...*

1. Stainless Steel Solution Earth Rod, 5m ..... 121360

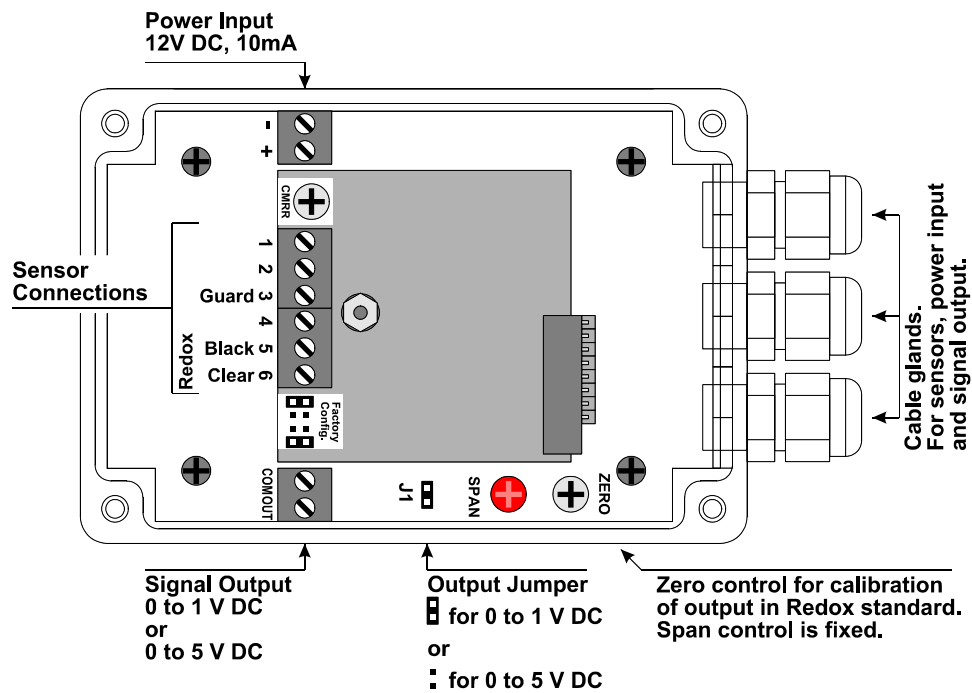
**1.2 Specifications**

Range .....	0 to 1000 mV
Resolution .....	$\pm 1\text{mV}$ (0 – 1 V DC Output) or $\pm 5\text{mV}$ (0 – 5 V DC Output)
Accuracy .....	$\pm 1\text{mV}$ (0 – 1 V DC Output) or $\pm 5\text{mV}$ (0 – 5 V DC Output)
Linearity .....	$\pm 1\text{mV}$ (0 – 1 V DC Output) or $\pm 5\text{mV}$ (0 – 5 V DC Output)
Repeatability .....	$\pm 1\text{mV}$ (0 – 1 V DC Output) or $\pm 5\text{mV}$ (0 – 5 V DC Output)
Ambient Drift.....	$<0.02\%$ Span / $^{\circ}\text{C}$
Long term drift.....	$<0.1\%$ per year
Input Impedance .....	$>3 \times 10^{12} \Omega$
Zero Range.....	$\pm 100 \text{ mV}$
Span Range .....	Factory-fixed span adjustment
Temperature Compensation .....	Not applicable for Redox
Common Mode Rejection .....	120 dB
Enclosure .....	Polycarbonate, waterproof to IP65
Analogue Outputs .....	0 to 1 V DC or 0 to 5 V DC
Isolation .....	Galvanic isolation of sensor input
Power .....	12V DC, approx 10mA
Dimensions .....	Enclosure : 125 x 85 x 56 mm PCB only : 115 x 77 mm (82 x 58 mm mounting hole centres)
Mass.....	Instrument only: Approx 250 g Full Kit : Approx 1.0 kg
Operating Environment: .....	Temperature : 0 to 45 $^{\circ}\text{C}$ Humidity : 0 to 95 % R.H.

## 2. Installation and Set-up

### 2.1 Connection and Configuration Diagram

The diagram below is provided as a reference for the terminal connections, configuration jumpers and user-adjustable trimmers that are discussed throughout this section.



## 2.2 Mounting the Enclosure

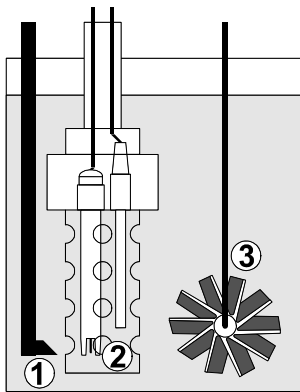
The **microCHEM-Redox** can be mounted directly onto a wall or into a separate enclosure using the mounting kit supplied. Please use the screws supplied to ensure that the waterproof integrity of the enclosure is not compromised.

## 2.3 Mounting the Sensors

Mounting the sensors is a very important aspect of the installation, and is often done incorrectly. In automatic control situations, the sensors should always be mounted as close as possible to the injection point. This will cause the sensors to detect the added chemicals immediately, and shut the addition off until mixing has taken place. For in-line mounting, it is important that chemicals are injected upstream. Additionally, the line must be run through a mixing chamber, such as a large drum, to ensure that the injected chemical has mixed in properly by the time the solution flows past the sensors. There must always be adequate flow of fresh sample past the sensor for accurate monitoring. The diagrams below show typical mounting arrangements for “dip” mounting and in-line mounting.

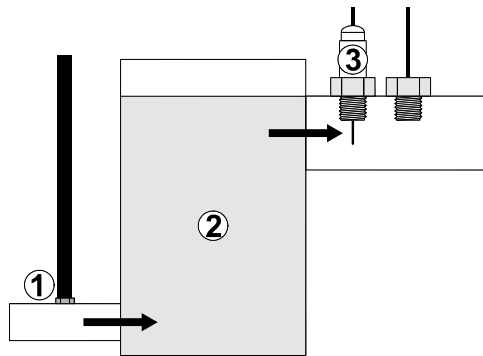
### ***Dip Mounting***

1. Injection point close to sensor.
2. Submersible housing to protect sensors and waterproof rear of cable (part no 111303).
3. Continuous stirring.



### ***In-line Mounting***

1. Injection point upstream from and close to sensor.
2. Mixing container after injection and before sensor.
3. Redox sensor mounted as close to vertical as practical.

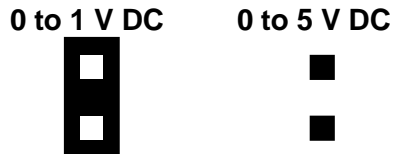


## 2.4 Terminal Connections

Terminal No.	Connection	Colour
<b>Sensor Connections</b>		
1	No Connection	
2	No Connection	
3	Solution Guard	Customer-defined. Green is recommended.
4	No Connection	
5	Redox Reference	Black
6	Redox Signal	Clear
<b>Power Input Connections</b>		
-	Negative of 12V DC Input	Customer-defined
+	Positive of 12V DC Input	Customer-defined
<b>Signal Output Connections</b>		
COM	Common of voltage output	Customer-defined
OUT	Positive of voltage output	Customer-defined

## 2.5 Selecting 0 to 1 V DC or 0 to 5 V DC Output

1. Locate the jumper labelled **J1** on the main circuit board.
2. Set **J1** to closed to select 0 to 1 V DC output.
3. Set **J1** to open to select 0 to 5 V DC output.



### **Note**

When setting **J1** to open, we recommend that it is fitted to one of the pins. This is a safe place to keep it, in case the **microCHEM-Redox** needs to be reset for 0 to 1 V DC output in the future.

## 2.6 CMRR Control

The Common Mode Rejection Ratio (CMRR) is factory-set with the CMRR trimmer.

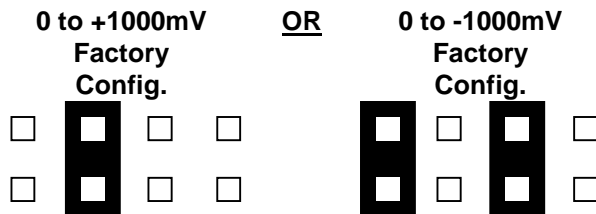
**DO NOT ATTEMPT TO ADJUST THE CMRR TRIMMER.**

If this trimmer is accidentally re-set, the unit would best be returned to the factory for re-calibration.

## 2.7 Factory Config. Jumpers

The **Factory Config.** jumpers are factory set, and must not be altered. In case any of these jumpers are changed or removed, re-fit them as shown below. The **microCHEM-Redox** must be switched OFF before changing jumper settings.

The setting of the Factory Config. jumpers is different for 0 to +1000mV and 0 to -1000mV. When the **microCHEM-Redox** is factory-set for either of these two ranges, further changes are made inside the unit. **DO NOT** change these jumpers to change the measurement range.

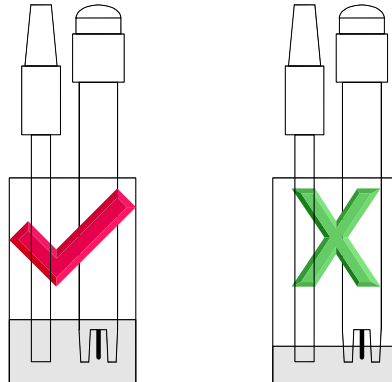




### 3. Calibration

#### 3.1 Calibration Procedure

1. Switch the **microCHEM-Redox** on.
2. Connect the Redox sensor and ensure that a solution guard rod is fitted. (see section 2.4). Remove the wetting cap from the Redox sensor.
3. Rinse the Redox sensor and guard rod in distilled water and blot them dry.
4. Make up a 1:1 solution of ZoBell Part A and ZoBell Part B. If a small vessel is used for calibration, around 10mL of each should suffice.
5. Place Redox sensor and guard rod into the ZoBell standard. Ensure that the Platinum tip and reference junction are both covered (see diagram below).



6. When the reading has stabilised, adjust the **ZERO** control until the output is 231mV (0-1V DC) or 1155mV (0-5V DC). This corresponds to the value of the ZoBell standard, which is 231mV.

***DO NOT ADJUST THE RED SPAN CONTROL. THIS IS FACTORY-FIXED AND DOES NOT REQUIRE RE-ADJUSTMENT.***

7. Rinse the Redox sensor and guard rod in distilled water and blot them dry.
8. Discard the used made-up ZoBell standard.
9. The **microCHEM-Redox** is now calibrated and ready for Redox measurements. Calibration should be performed at least monthly. Of course, more frequent calibration will result in greater confidence in results.

## 4. Troubleshooting

### 4.1 Instrument Function Troubleshooting

Symptom	Possible Causes	Remedy
Incorrect analogue output signal.	<ol style="list-style-type: none"> <li><b>J1 Output Jumper</b> incorrectly set for required output.</li> <li>Instrument is faulty.</li> </ol>	<p>Check that the <b>J1 Output Jumper</b> is correctly set for 0 to 1 V DC or 0 to 5 V DC output, as per requirements. Adjust if necessary (see section 2.5).</p> <p>Return to TPS for repair.</p>

### 4.2 Redox Troubleshooting

Symptom	Possible Causes	Remedy
Asymmetry (Zero) calibration fails (insufficient range with <b>ZERO</b> control).	<ol style="list-style-type: none"> <li>Reference junction blocked.</li> <li>Reference electrolyte contaminated.</li> </ol>	<p>Clean reference junction as per instructions supplied with the electrode.</p> <p>Flush with distilled water and replace electrolyte.</p>
Unstable readings.	<ol style="list-style-type: none"> <li>Solution guard not fitted.</li> <li>Reference junction blocked.</li> <li>Reference junction not immersed.</li> <li>KCl crystals around reference junction inside the electrolyte chamber.</li> </ol>	<p>Connect a solution guard rod to terminal 3 (see section 2.4).</p> <p>Clean reference junction as per instructions supplied with the electrode.</p> <p>Ensure that the Platinum tip AND the reference junction are fully immersed.</p> <p>Rinse electrolyte chamber with warm distilled water until dissolved. Replace electrolyte.</p>
Inaccurate readings, even when calibration is successful.	Reference junction blocked.	Clean reference junction as per instructions supplied with the electrode.
Output corresponds to approx 0 mV in all solutions	Electrical short inside electrode or in cable.	Test system with a new electrode and replace if necessary.

## **5. 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.

- **Always describe the fault in writing.**
- **Always return the sensors with the meter.**