

## **Congratulations !**

You have purchased the latest in Handheld Temperature instrumentation. We trust that your new **MC-87** Dual Channel Thermometer will give you many years of reliable service.

The **MC-87** is a breeze to operate. This manual has been designed to help you get started, and also contains some handy 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 **MC-87**. It also contains a full listing of all of the items that you should have received with your **MC-87**. 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 **MC-87**, including operating modes, troubleshooting, specifications, and warranty terms.

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## **Model MC-87 Dual Channel Thermometer**

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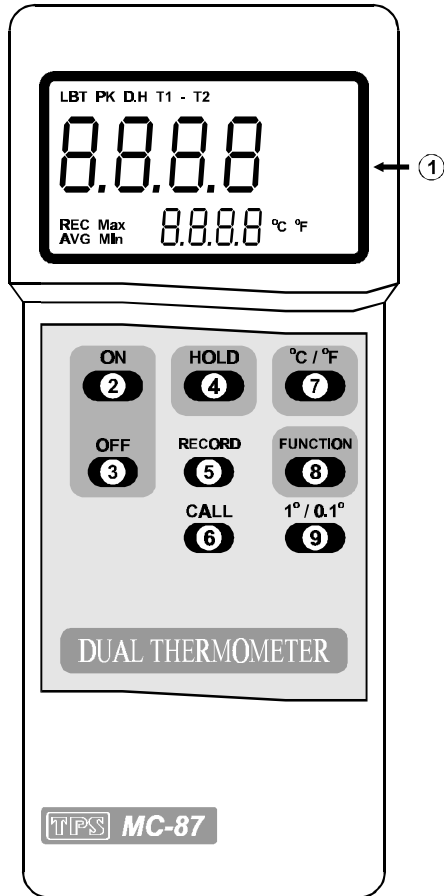
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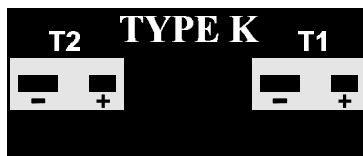
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## 1. Introduction

### 1.1 MC-87 Display and Controls



### 1.2 MC87 Connectors



① **Display**

Custom Liquid Crystal Display with simultaneous readout of both channels, plus mode enunciators.

② **Power ON Button**

Press to switch the **MC-87** ON.

③ **Power OFF Button**

Press to switch the **MC-87** OFF.

④ **Data Hold Button**

Press to freeze the current readings on the display. This feature is useful when taking readings in rapidly changing environments.

⑤ **Max/Min Record Button**

Press to begin recording Maximum and Minimum temperature data for both channels. The **MC-87** will continue to record Max/Min data until the Record button is pressed again, or the unit is switched off.

⑥ **Max/Min Recall Button**

Press to recall Maximum temperature data while the **MC-87** is in Record mode (see above). Press a second time to recall Minimum temperature data while the **MC-87** is in Record mode. Press a third time to return to normal temperature measurement.

⑦ **°C / °F Units Select Button**

Press to alternate between readout in degrees Celsius and degrees Fahrenheit.

⑧ **Function Select Button**

Press to alternate between T1, T2 and T1 minus T2 as the main (large) reading. This button is disabled when the **MC-87** is in Max/Min Record mode.

⑨ **1° / 0.1° Select Button**

Press to alternate between 1 and 0.1 degrees resolution. Readout range in 1° mode is -50 to 1230 °C or -50 to 1999 °F. Readout range in 0.1° mode is -50 to 199.9 °C or -50 to 199.9 °F.

### 1.3 Unpacking Information

Before using your new **MC-87**, please check that the following accessories have been included:

	Part No
1. <b>MC-87</b> Dual Channel Thermometer	124109
2. Stab type sensor (750 °C max)	124204
3. 9V Battery	130026
4. <b>MC-87</b> Handbook	130050

Options that may have been ordered with your **MC-87**:

1. Air/Gas sensor	124205
2. Surface sensor	124203
3. NiCad Rechargeable battery and charger	130007
4. Hard Plastic Carry Case	130057

### 1.4 Specifications

Mode	Ranges	Resolution	Accuracy (instrument)	Accuracy (sensor)
°C	-50 to 199.9 °C	0.1 °C	±(1% + 1 °C)	±3%
	-50 to 1230 °C	1 °C	±(1% + 1 °C)	±0.75%
°F	-50 to 199.9 °F	0.1 °F	±(1% + 2 °F)	±3%
	-50 to 1999 °F	1 °F	±(1% + 2 °F)	±0.75%
°C	T1 – T2	0.1 & 1 °C	±(1% + 2 °C)	
°F	T1 – T2	0.1 & 1 °F	±(1% + 3 °F)	

Display	: Custom liquid crystal display. Dual readout of both channels, plus mode enunciators
Sensor Type	: Type K Thermocouple (NiCr-NiAl)
Input Impedance	: 10 Meg ohm
Power	: 9V Alkaline Battery for 200 hours operation. Optional NiCad battery/charger pack available.
Dimensions	: 180 x 72 x 32 mm
Mass	: Instrument only : Approx 200g Full Kit : Approx 1.0kg
Environment	Temperature : 0 to 50 °C Humidity : 0 to 90 % R.H.

## **2. Temperature Measurement**

1. Press the Power ON button to switch the **MC-87** ON.
2. The default readout units are degrees Celsius. Press the **°C / °F** button to alternate between °C and °F units.
3. The default display resolution is 1 degree. Press the **1° / 0.1°** button to alternate between 1 and 0.1 degree resolution. The maximum reading in the **0.1°** position is 199.9° (Celsius or Fahrenheit).

### **2.1 Single Sensor Measurement**

1. Insert a Type K thermocouple sensor into the **T1** socket. Ensure that the polarity is correct by aligning the **+** and **-** signs on the sensor's connector and the **T1** socket.
2. Press the **Function** button until the display shows the **T1** indicator. This mode displays the T1 sensor reading on the main (large) display.

### **2.2 Dual Sensor Measurement**

1. Insert a Type K thermocouple sensor into each of the **T1** and **T2** sockets. Ensure that the polarity is correct by aligning the **+** and **-** signs on the sensor's connector and the **T1** and **T2** sockets.
2. The types of sensors can be mixed (eg: stab type, air/gas type or surface type), but they must both be Type K thermocouples.
3. Press the **Function** button until the display shows the **T1** indicator to display the T1 sensor reading on the main (large) display, and the T2 sensor reading on the secondary (small) display.

Alternatively, press the **Function** button until the display shows the **T2** indicator to display the T2 sensor reading on the main (large) display, and the T1 sensor reading on the secondary (small) display.

### 2.3 Differential Temperature Measurement

1. Insert a Type K thermocouple sensor into each of the **T1** and **T2** sockets. Ensure that the polarity is correct by aligning the **+** and **-** signs on the sensor's connector and the **T1** socket.
2. The types of sensors can be mixed (eg: stab type, air/gas type or surface type), but they must both be Type K thermocouples.
3. Press the **Function** button until the display shows the **T1 – T2** indicator. The **MC-87** now displays the difference between the T1 and T2 sensor readings on the main (large) display, and the T1 sensor reading on the secondary (small) display.

### 2.4 Maximum/Minimum Temperature Measurement

To begin recording Maximum and Minimum temperature data...

1. Press the **Function** button to select **T1**, **T2** or **T1 – T2** as the main (large) display. See sections 2.1, 2.2 and 2.3 for details on function selection.
2. Press the **Record** button to begin recording Maximum and Minimum values for the main (large) displayed data. The "**REC**" enunciator is now displayed.
3. To recall Maximum temperature data, press the **CALL** button. The "**Max**" enunciator is now displayed.

To recall Minimum temperature data, press the **CALL** button a second time. The "**Min**" enunciator is now displayed.

To return to displaying current values on the main (large) display, press the **CALL** button a third time.

4. Press the **Record** button to stop recording Maximum and Minimum data.

### Notes

1. The **CALL** function is only available while the **MC-87** is in Record mode.
2. Switching the **MC-87** off stops **Record** mode, and current Maximum and Minimum data is lost.
3. The **MC-87** always records Maximum and Minimum values for data on the main (large) display.

## 2.5 Freezing the Reading on the Display

When taking measurements in a rapidly changing environment, or in a difficult to reach area, the operator is able to freeze the display. This allows readings to be correctly noted.

To freeze the display, press the **HOLD** button. The **D.H** enunciator will be displayed.

To resume normal measurement, press the **HOLD** button again. The **D.H** enunciator will be switched off.

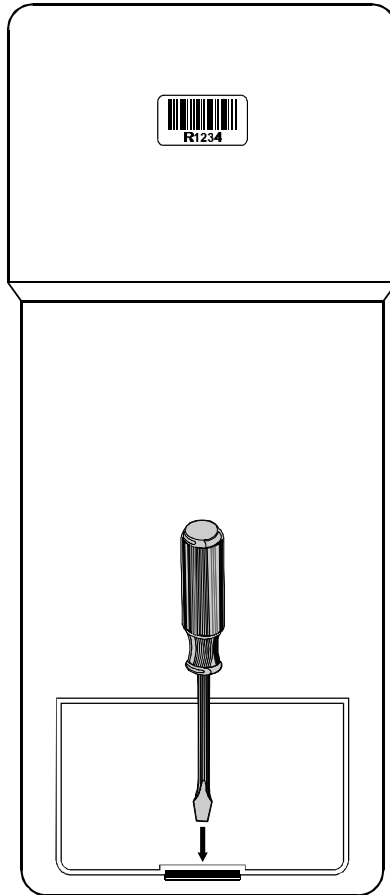
## 2.6 Measurement Notes

When the sensor's plug is first connected to either the **T1** or **T2** sockets, allow 1 to 2 minutes for the temperature of the plug to come to equilibrium with the temperature of the socket. This is essential for optimum accuracy.



### **3. Battery Replacement**

1. When the battery volts drops below 6.5-7.5V the “**LBT**” enunciator is displayed. When this occurs the battery must be replaced as soon as possible, otherwise readings will become inaccurate.
2. Remove the battery cover on the rear of the instrument with a screwdriver (see diagram below).
3. Remove the battery and replace it with a new 9V battery. Alkaline batteries are preferred.
4. Replace the battery cover, ensuring that it clicks into place.



#### 4. Troubleshooting

Symptom	Possible Causes	Remedy
Unstable readings	<ol style="list-style-type: none"> <li>1. Plug/Socket contacts are dirty or corroded.</li> <li>2. Battery is low</li> <li>3. Sensor is faulty.</li> </ol>	<p>Clean Plug/Socket contacts.</p> <p>Replace battery.</p> <p>Replace sensor.</p>
Display shows just “- - - -”.	<ol style="list-style-type: none"> <li>1. Meter has over-ranged.</li> <li>2. <b>T1/T2/T1-T2</b> selector is switched to <b>T1-T2</b> with only 1 sensor connected.</li> <li>3. Sensor has been connected with incorrect polarity</li> </ol>	<p>If <b>0.1°/1°</b> selector is set to <b>0.1°</b>, then switch to <b>1°</b>.</p> <p>Switch to <b>T1</b> or <b>T2</b> or connect a second sensor.</p> <p>Check that the <b>+</b> &amp; <b>-</b> signs on the sensor's plug and the <b>T1</b> or <b>T2</b> socket have been aligned correctly.</p>
Meter will not turn on.	Battery is exhausted.	Replace the battery.
Reading does not change. Fixed at one value.	Data Hold function is switched on.	Press <b>HOLD</b> button to switch off <b>D.H</b> enunciator.

## **5. 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 electrodes and rechargeable batteries 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.)**
- **Either \$13.50 for return freight for units under warranty,**  
**or \$24 to cover inspection costs and return freight.**

(These amounts are not applicable to full-account customers.)

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.

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