

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.

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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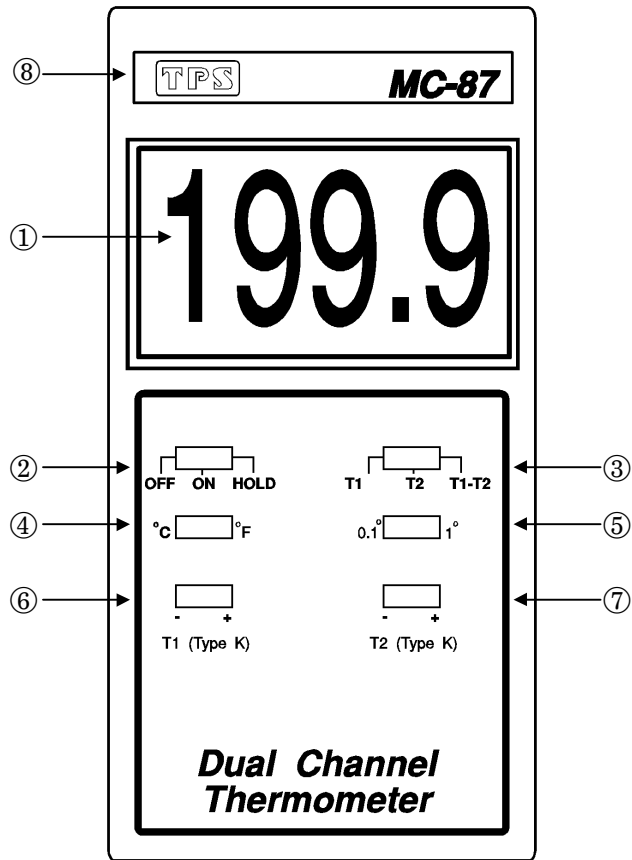
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1. Introduction

1.1 MC-87 Display and Controls



- ① **Display**
3½ digit Liquid Crystal Display with 18 mm digits.
- ② **OFF / ON / HOLD**
Used to switch the **MC-87** on and off. Also used to freeze a reading on the display. This feature is useful in rapidly changing environments.
- ③ **T1 / T2 / T1-T2**
Selects the reading of the sensor plugged into the **T1** or **T2** sockets. Also used to calculate the difference between the sensors in sockets **T1** and **T2**.
- ④ **°C / °F**
Selects readout in either °Celcius or °Fahrenheit units.
- ⑤ **0.1° / 1°**
Selects 0.1° resolution for readings up to 199.9°C/°F, or 1° resolution for readings up to 1300°C/1999°F.
- ⑥ **T1 (Type K)**
Sensor input number **T1**. Suitable for all type K thermocouples.
- ⑦ **T2 (Type K)**
Sensor input number **T2**. Suitable for all type K thermocouples.
- ⑧  **TPS**
The TPS logo. Your guarantee of **T**echnology, **P**recision and **S**ervice, in electrochemistry.

1.2 Unpacking Information

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

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

1.3 Specifications

Mode	Ranges	Resolution	Accuracy (instrument)	Accuracy (sensor)
°C	-50 to 199.9 °C	0.1 °C	±(0.3% + 1 °C)	±3%
	-50 to 1300 °C	1 °C	±(0.5% + 1 °C)	±0.75%
°F	-50 to 199.9 °F	0.1 °F	±(0.3% + 2 °F)	±3%
	-50 to 1999 °F	1 °F	±(0.3% + 2 °F)	±0.75%
°C	T1 – T2	0.1 & 1 °C	±(0.3% + 2 °C)	
°F	T1 – T2	0.1 & 1 °F	±(0.3% + 3 °F)	

Display	: 18mm Liquid Crystal Display 3½ digits, max display 1999
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	: 157 x 78 x 35 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. Switch the **OFF/ON/HOLD** selector to the **ON** position.
2. Switch the **°C / °F** selector to the desired position.
3. Switch the **0.1° / 1°** selector to the desired resolution. Note the maximum reading in the **0.1°** position is 199.9°.

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. Switch the **T1/T2/T1-T2** sensor selector to **T1**.
3. The display will show the reading from the sensor.

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** 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. Switch the **T1/T2/T1-T2** sensor selector to **T1** to display the reading from the sensor connected to the **T1** socket.
4. Switch the **T1/T2/T1-T2** sensor selector to **T2** to display the reading from the sensor connected to the **T2** socket.

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. Switch the **T1/T2/T1-T2** sensor selector to **T1-T2**.
4. The display will show the difference between the two sensors (ie: **T1** minus **T2**).

2.4 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.

1. To freeze the display, switch the **OFF/ON/HOLD** selector to **HOLD**.
2. To resume normal measurement, switch the **OFF/ON/HOLD** selector back to **ON**.
3. To switch the instrument off, switch the **OFF/ON/HOLD** selector to **OFF**.

2.5 Measurement Notes

When the sensor's plug is first connected to either the **T1** or **T2** sockets, allow 1-2 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 display shows "**BAT**" in the lower left hand corner. When this occurs the battery must be replaced as soon as possible, otherwise readings become inaccurate.
2. Loosen the battery cover screw on the rear of the **MC-87** so that the battery cover can slide away.
3. Remove the battery and replace it with a new 9V battery. Alkaline batteries are preferred.
4. Replace the battery cover and re-tighten the screw.

4. Troubleshooting

Symptom	Possible Causes	Remedy
Unstable readings	<ol style="list-style-type: none"> 1. Plug/Socket contacts are dirty or corroded. 2. Battery is low 3. Sensor is faulty. 	<p>Clean Plug/Socket contacts.</p> <p>Replace battery.</p> <p>Replace sensor.</p>
Display shows just "1 ." or "-1 ."	<ol style="list-style-type: none"> 1. Meter has over-ranged. 2. T1/T2/T1-T2 selector is switched to T1-T2 with only 3. Sensor has been connected with incorrect polarity 	<p>If 0.1^o/1^o selector is set to 0.1^o, then switch to 1^o.</p> <p>Switch to T1 or T2 or connect a second sensor.</p> <p>Check that the + & – signs on the sensor's plug and the T1 or T2 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.	OFF/ON/HOLD selector switched to HOLD position.	Switch back to ON for normal operation.

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.)
- **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 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.**