

## **INSTRUCTION MANUAL**

# **BENCHTOP MULTI-PARAMETER METER MODEL TMULTI 37**

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BENCHTOP MULTI-PARAMETER METER  
MODEL TMULTI 37

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## **Introduction**

This instrument is manufactured with the latest technology and needs no particular maintenance. **Toshcon** certifies that this instrument was thoroughly inspected and tested at the factory prior to shipment and found to meet all requirements defined by contract under which it is furnished. However, dimensions and other physical characteristics may differ.

The normal operating temperature should be between 0° and 40°C. Never use the instrument in a room with high humidity (>95 %) or at very low temperatures (condensation water!).

## **Warranty**

This instrument (excluding all accessories) is warranted against defective material and workmanship for a period of eighteen (18) months from the date of shipment ex factory. **Toshcon** will repair all defective equipment returned to it during the warranty period without charge, provided the equipment has been used under normal laboratory conditions and in accordance with the operating limitations and maintenance procedures in this instruction manual and when not having been subject to accident, alteration, misuse or abuse. A return authorisation must be obtained from **Toshcon** before returning any product for warranty repair on a freight prepaid basis!

**Toshcon** is not liable for consequential damages arising out of the use or handling of its products.

## **Servicing**

In the event of this instrument being returned for servicing, the owner is requested to remove the power supply lead and **NOT** to send the following items unless they are suspect:

Manual

Cables

Accessories

If serious malfunctioning occurs, stop using the unit immediately and consult your Local **Toshcon** dealer.

## **Batteries**

The batteries can be replaced by opening the bottom compartment of the cabinet.

Only use NiMH batteries!

## Keyboard

**MODE** = Selects all modes or escapes from error traps, calibration procedures, etc. by returning to the original mode.

**CAL** = Starts or proceeds a calibration or a function.

**↑↓** = Button for entering a value or for selecting a function.

**ON/OFF** = Switches the instrument ON or OFF.

## AC adaptor

Connect the AC adaptor (9 V, 300 mA for 230 V~ or 120 V~) to the DC socket. **Avoid to use an AC adaptor without NiMH batteries being inserted in the instrument!**

Do not hold the adaptor by wet hand!

## Set-up

1. Select [SETTINGS] by pressing **MODE**.
2. Follow the instructions on the screen to adjust language, contrast and automatic power-off timer or to erase the memory. Press **CAL** to confirm or **MODE** to exit.

## Inputs

The measuring electrodes should be connected to the corresponding coaxial pH/mV or EC/O<sub>2</sub> connectors. Automatic temperature compensation and temperature measurements are possible by plugging a Pt1000 temperature probe into the °C terminals. You can also use an electrode with built-in Pt1000. Its banana plugs should be inserted in the °C terminals. Without Pt1000, the manual temperature compensation is automatically switched on.

## Important

- Never immerse a pH electrode and an oxygen electrode together in the same solution!
- A blinking decimal point warns you for unstable measurements. Wait to read the display!
- Stirring the solution during the measurements promotes the homogeneity and is obligatory!
- The instrument will refuse automatic calibration when the electrode is unstable. Insufficient stirring or a worn electrode may be the cause.

### **pH measurement**

1. Select [pH] by pressing **MODE**. The display will immediately show the measured value according to the previous calibration. Should you want to recalibrate, press **CAL**.
2. The display shows three of the 9 buffers in memory (1.68, 4.00, 4.01, 6.87, 7.00, 9.18, 9.21, 10.01, 12.45). Select the proper buffers and press **CAL**. The unused buffer should be switched off.
3. Rinse the electrodes with distilled water and immerse them in the first buffer solution. Select [CALIBRATE], press **CAL** and follow the instructions on the screen until the calibration is finished.
4. After rinsing the electrodes with distilled water, immerse them in the samples and read the display.
5. Rinse the electrodes always with distilled water after use and store them in a 3...4 M KCl solution.

### **mV measurement**

1. Select [mV] by pressing **MODE**. The display will immediately show the measured value according to the previous calibration (optional). Should you want to recalibrate, press **CAL**.
2. Immerse the electrodes in a standard solution of known potential. Select [CALIBRATE] and press **CAL**. Calibrate to the proper value and press **CAL** again or press **MODE** to reset the factory settings.
3. Rinse the electrodes always with distilled water after use and store them in a 3...4 M KCl solution.

### **GLP**

1. Select the desired range by pressing **MODE**.
2. Press **CAL**, select GLP and press **CAL** to display a complete calibration report.

### **Logging data**

1. Press **↓** to store the displayed value in memory. The display shows a next storage address.
2. Select the desired address and press **CAL** to enter the measured value in memory.

### **Recalling data**

1. Press **↓** to recall the stored data. The display shows a list of stored values.

2. Select the desired address to read the stored values.
3. Press **MODE** to return to the normal measurements.

### **Conductivity measurement**

1. Select [S/cm] by pressing **MODE**. The display will immediately show the measured value according to the previous calibration. Should you want to recalibrate, press **CAL**.
2. The display shows one of the 3 standards in memory (0.01, 0.1, 1 M KCl). Select the proper standard and press **CAL**. Also select the temperature to which all future measurements will be referred to.
3. After rinsing the cell several times with the standard solution, immerse it in that standard. The solution temperature is not so critical but should lie between 0°C and 30°C. When no Pt1000 is used, do not forget to compensate manually first! Select [CALIBRATE], press **CAL** and follow the instructions on the screen until the calibration is finished.
4. Rinse the cell several times with the sample, immerse it in that solution and read the display.
5. Rinse the cell always after use and store it in distilled water (add some detergent to keep the spongy platinum surface in perfect condition).

### **TDS/Salinity measurement**

1. Select [TDS] or [SAL] by pressing **MODE**. The display will immediately show the measured value according to the previous calibration. Should you want to recalibrate, press **CAL**. Proceed as for conductivity.

### **Temperature measurement**

1. Select [°C] by pressing **MODE**. Without Pt1000, adjust the manual temperature compensation and proceed by pressing **MODE**. Should you want to recalibrate, press **CAL**.
2. Immerse the Pt1000 in a standard solution of known temperature. Select [CALIBRATE] and press **CAL**. Calibrate to the proper value and press **CAL** again or press **MODE** to reset the factory settings.

### **Maintenance of pH electrodes**

**A pH electrode is active and stable only after wetting!** For this purpose it must be immersed for **at least ten hours** in a 3...4 M KCl solution. During short interruptions (e.g. storage) the

electrode should be immersed in a 3...4 M KCl solution. In doing this it is always kept ready for use. When the interruption is longer than a month, refill the closing cap with 3...4 M KCl and plug it on the electrode tip in order to protect the glass bulb. Before use, ensure that the reference part of the electrode is topped up with a 3...4 M KCl solution.

**Avoid a low pressure inside the electrode!** Therefore always remove the closure from the refilling aperture during the measurements as well as during the calibration.

This allows the saltbridge solution to flow through the ceramic liquid junction and prevents contamination of the electrolyte. For the same reason, the inside level should always be higher than the outside level of the measuring solution.

Close the refilling aperture again when storing the electrode.

A polluted electrode may be cleaned with a soft detergent or 0.1 M HCl. Greasy substances may be removed with acetone or alcohol (**never do this with plastic electrodes!**).

If the electrode is polluted by proteinaceous materials (such as blood), it should stand in a cleaning solution overnight and then be cleaned with distilled water before use. The pH electrode wears away by being used. If the electrode tends to respond slower and calibration becomes difficult, even after cleaning, it should be replaced by a new one.

### **Maintenance of metal electrodes**

**Metal electrodes (Pt, Ag, Au):** Metal electrodes are always ready for use. During short interruptions they are immersed in distilled water. **They should be cleaned regularly:**

- Silver electrodes are immersed in a concentrated ammonia solution during one hour.
- Platinum or gold electrodes are immersed in concentrated nitric acid during one hour.

### **Maintenance of conductivity electrodes**

**A conductivity cell is active and stable only after wetting!**

For this purpose it must be immersed for **at least one hour** in distilled water. Rinse the cell always after use and store it in distilled water (add some detergent to keep the spongy platinum surface in perfect condition).

A polluted cell may be cleaned with a soft detergent or diluted nitric acid. Greasy substances may be removed with acetone or alcohol (**never do this with plastic electrodes!**).



## Specifications

<b>pH</b>	
<i>Range</i>	0...14 pH
<i>Resolution</i>	0.01 pH
<i>Accuracy</i>	0.2% ± 1 digit
<i>Calibration</i>	1...3 points
<i>Buffers</i>	9 pre-programmed
<i>Temperature Compensation</i>	0...100°C
<i>ISO-pH</i>	6...8 pH
<i>Slope</i>	80...120%
<i>mV</i>	
<i>Range</i>	±1000 mV
<i>Resolution</i>	1 mV
<i>Accuracy</i>	0.2% ± 1 digit
<i>Calibration</i>	1 point
<b>CONDUCTIVITY</b>	
<i>Range</i>	0...1000 mS/cm
<i>Resolution</i>	0.01 µS/cm
<i>Accuracy</i>	1% f.s. of range
<i>Calibration</i>	1 point
<i>Standards</i>	0.01/0.1/1M KCl
<i>Cell Constant</i>	0.1/1/10 cm <sup>-1</sup> ± 30%
<i>Temperature Compensation</i>	0...100°C
<i>Reference Temperature</i>	20° or 25°C
<i>Temperature Coefficient</i>	natural waters (EN27888)
<b>SALINITY</b>	
<i>Range</i>	0...70 ppt
<i>Resolution</i>	0.1 ppt
<b>TDS</b>	
<i>Range</i>	0...100 g/l
<i>Resolution</i>	0.1 mg/l
<b>TEMPERATURE</b>	
<i>Range</i>	0...100°C
<i>Resolution</i>	0.1°C
<i>Accuracy</i>	0.5°C
<i>Calibration</i>	1 point
<b>INPUTS</b>	
<i>pH/mV</i>	BNC, 1012
<i>Conductivity/ Dissolved Oxygen</i>	BNC
<i>Temperature</i>	2 banana, for Pt1000
<b>DATA-LOGGING</b>	
<i>Memory</i>	300 values + temperature

<b>DISPLAY</b>	
<i>LCD</i>	122x32 pixels
<i>White Backlight</i>	ü
<i>Languages</i>	EN, NL, FR, DE
<b>POWER SUPPLY</b>	
<i>Mains</i>	210...250 VAC, 50/60 Hz
<i>Low Voltage</i>	9...15 VDC
<i>Batteries</i>	4x1.2 V, NiMH
<b>DIMENSIONS</b>	
<i>WxDxH</i>	10x20x4 cm
<b>WEIGHT</b>	
<i>Meter</i>	400 g



