



## INSTRUCTION MANUAL

# **PORTABLE/ BENCHTOP MULTI-PARAMETER METER MODEL TPC 17**

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**PORTABLE/ BENCHTOP MULTI-PARAMETER METER  
MODEL TPC 17**

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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 12 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.

### **AC adaptor**

Connect the AC adapter (9 V, 300 mA for 230 V~ or 120 V~) to the DC socket. Avoid using an AC adaptor without NiMH batteries being inserted in the instrument! Do not hold the adaptor by wet hand!

### **Keyboard**

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

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

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

**PRINT** = Displayed value is printed through the USB output.

**HELP** = Built-in manual.

**HOLD** = Holds display when measuring.

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

### **Inputs**

The measuring electrodes should be connected to the corresponding coaxial pH/mV or EC 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.

### **Recorder output**

A recorder can be connected to the red (+) and black (-) terminals. Use only laboratory recorders with a high input impedance!

### **Digital output**

A standard USB output terminal is provided for interfacing the instrument with a computer. Data is sent in the ASCII code at a BAUD rate of 300...9600 bps (8 bit, no parity, 1 stopbit).

Serial port pinout specifications:

pin 1 : connected to pin 4 and pin 6

pin 2 : TxD, transmit data

pin 3 : RxD, receive data

pin 4 : connected to pin 1 and pin 6

pin 5 : Gnd, signal ground

pin 6 : connected to pin 1 and pin 4

pin 7 : connected to pin 8

pin 8 : connected to pin 7

pin 9 : not connected

### **System**

1. Select [MENU] by pressing **MODE**.
2. Select [SYSTEM] and press **CAL**.
3. Follow the instructions on the screen to adjust language, contrast and automatic power-off timer.

### **Date and Time**

1. Select [MENU] by pressing **MODE**.
2. Select [DATE/TIME] and press **CAL**.
3. Adjust the date and press **CAL** to adjust the date.
4. Adjust the time and press **CAL** to adjust the time.

### **Recorder**

1. Select [MENU] by pressing **MODE**.
2. Select [RECORDER] and press **CAL**.
3. Select the desired channel and press **CAL**.
4. Select the desired range and press **CAL** (only for conductivity).
5. Select the desired minimum level corresponding to a 0 V recorder output and press **CAL**.
6. Select the desired maximum level corresponding to a 2 V recorder output and press **CAL**.

### **Password**

1. Select [MENU] by pressing **MODE**.
2. Select [PASSWORD] and press **CAL**.
3. A private code can be programmed to avoid undesired access to the instrument.  
Choose [YES] and press **CAL** to enter your secret sequence of 5 keys.

### **Important**

- 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.

#### **Using pH electrodes with an abnormal zero point:**

1. Select [E0 = x mV] and press **CAL**.
  2. Enter the zero point of the electrode and press **CAL**.
- Press ↓ to change the resolution from 0.1 to 0.001 pH.

#### **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, adjust to the proper value and press **CAL**.
- Press ↓ to change the resolution from 1 to 0.1 mV.

#### **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. Calibrate to the proper value and press **CAL**.

#### **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 the three standards in memory (1413 μS/cm, 12.88 mS/cm, 111.8 mS/cm). Select the proper values or enter

manually special values and press **CAL**. The unused standards should be switched off.

3. Select the temperature to which all future measurements will be referred to (REF=25°C) and press **CAL**.
  4. Select whether or not automatic temperature compensation (ATC) should be applied and press **CAL**.
  5. 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.
  6. Rinse the cell several times with the sample, immerse it in that solution and read the display.
  7. Rinse the cell always after use and store it in distilled water (add some detergent to keep the spongy platinum surface in perfect condition).
- *When starting a titration, press  $\hat{e}$  to lock the actual range and avoid crossover errors due to differences in the measuring frequency. Press **MODE** to return to the normal measuring mode.*

#### **Capacitive compensation:**

1. Capacitive compensation increases accuracy in the very low conductivity ranges (<10  $\mu\text{S}/\text{cm}$ ). Select whether or not this compensation should be applied. Verify if the attached electrode is completely dry and press **CAL**. Select [COMP.ON] or [COMP.OFF] and press **CAL**. Follow the instructions on the screen.



### Resistivity measurement

1. Select [ $\Omega$ .cm] 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.

### Salinity measurement

1. Select [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.

### TDS measurement

1. Select [TDS] 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.

### 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!).

### GLP

1. Select the desired range by pressing **MODE** and then press **CAL**.
2. Select [GLP] and press **CAL**.
3. Select [SHOW REPORT] and press **CAL**. Browse with **←→↑↓** to show a complete calibration report. Press **PRINT** to print the report.

pH/mV/Conductivity/°C-meter

```
-----  
Date           : 15/05/2003  
Time           : 11:32:04  
Version        : 1.0
```

#### SETTINGS

```
-----  
Identification No : 003  
Password          : OFF  
pH/°C correction  : OFF  
Temp. probe       : ---  
Manual temp.      (°C) : 22.6
```

pH CALIBRATION

-----  
Date : 15/05/2003  
Time : 11:20:06  
Eo (mV) : 0

Buffer 4.008/6.865  
Slope (%) : 98.4  
Zero point (pH) : 6.871

Buffer 6.865/9.180  
Slope (%) : 98.2  
Zero point (pH) : 6.879

AVERAGE VALUES

-----  
Slope (%) : 98.3  
Zero point (pH) : 6.875  
Response time (s) : 11  
Temperature (°C) : 22.6

STATISTICS

-----  
Slope (%) : +0.4  
Zero point (pH) : +0.002  
Response time (s) : -1

**Calibration reminder**

1. Select the desired range by pressing **MODE** and then press **CAL**.
2. Select [INTERVAL] and press **CAL**.
3. Select the desired time interval between each automatic warning for a new calibration of the electrodes and press **CAL**.

**Data-logging**

1. Select [MENU] by pressing **MODE**.
2. Select [DATALOGGER] and press **CAL**.

**Start the data-logging:**

1. Select [STORE] and press **CAL**.
2. Select [RANGE] and press **CAL**.
3. Select the desired range and press **CAL**.
4. Select [INTERVAL] and press **CAL**.
5. Select the desired time interval between the data-logging and press **CAL**.
6. Select [NUMBER] and press **CAL**.
7. Select the desired number of values to be data-logged and press **CAL**.
8. Select [START] and press **CAL**.

9. Starts the data-logging according to the previous settings while a blinking [LOG] appears. When manual data-logging has been selected, press **PRINT** to put a next measurement into memory. In the meantime the display shows the logging-number e.g. [#0027].

**View the stored values on the display:**

1. Select [RECALL] and press **CAL**.
2. Select [TABLE] or [PRINT] to display or print the stored data and press **CAL** to continue. Follow the instructions on the screen.

**Erase the stored values:**

1. Select [ERASE] and press **CAL**. Follow the instructions on the screen.