INSTRUCTION MANUAL

PORTABLE / BENCHTOP
MULTI-PARAMETER METER
MODEL TPI 27

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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 **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 mains adapter to the DC socket. Do not hold the adapter by wet hand.

Keyboard

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

↑↓ = Buttons for browsing between the selected modes, for entering a value or for selecting a function.

OK = Proceeds a function.

CAL = Starts a calibration.

STORE = Stores the displayed value or send it to a computer or printer.

HOLD = Holds display when measuring.

Installation of the instrument

Inputs

The measuring electrodes should be connected to the coaxial input. Automatic temperature compensation and measurement are possible by connecting a Pt1000 temperature compensator to the banana connectors °C. Without compensator, the manual temperature compensation is automatically switched on.

Outputs

An isolated standard USB port is provided for interfacing the instrument with a computer.

Language
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [SYSTEM] and press **OK**.
4. Select [LANGUAGE] and press **OK**.
5. Select the desired language and press **OK**.

Contrast
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [SYSTEM] and press **OK**.
4. Select [CONTRAST] and press **OK**.
5. Adjust the contrast and press **OK**.

Date and time
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [SYSTEM] and press **OK**.

4. Select [DATE/TIME] and press **OK**.
5. Select [MODIFY] and press **OK**.
6. Adjust date and time and press **OK**.

Password
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [SYSTEM] and press **OK**.
4. Select [PASSWORD] and press **OK**.
5. A private code can be programmed to avoid undesired access to the instrument. Select [YES] and press **OK** to enter your secret sequence of 5 keys.

User standard tables
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [USER TABLES] and press **OK**.
4. Select [pH buffers] or [S/cm standards] and press **OK**.
5. Follow the instructions on the screen to enter the different values. The value for 25°C is obligatory!

Power management
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [SYSTEM] and press **OK**.
4. Select [POWER MANAGEMENT] and press **OK**.
5. Select [POWER OFF] (batteries or DC power) and press **OK**.
6. Adjust the time to shut down and press **OK.**
7. Select [BACKLIGHT] (only in case of DC power) and press **OK**.
8. Select [YES] or [NO] and press **OK.**

pH/ mV /temperature measurement

pH measurement
1. Select the desired mode (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 instrument permits to choose between the buffers in memory (1.68, 2.00, 4.00, 4.01, 6.87, 7.00, 9.18, 9.21, 10.01, 12.00, 12.45 + up to 5 user tables). Select the proper values and press **OK**.

The unused buffers should be switched off.

3. Rinse the electrodes with distilled water and immerse them in the first buffer solution. Select [CALIBRATE], press **OK** 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.

- *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.*

Using pH electrodes with an abnormal zero point
1. Press **CAL**.
2. Select [Eo = x mV] and press **OK**.
3. Enter the zero point of the electrode and press **OK**.

- *Hold **MODE** pressed and press □ to change the resolution from 0.1 to 0.001 pH.*

mV measurement
1. Select the desired mode (mV) by pressing **MODE.** The display will immediately show the measured value according to the previous calibration. Should you want to recalibrate, press **CAL**.
2. Immerse the electrodes in a standard solution of known potential. Select [CALIBRATE] and press **OK**. Adjust to the proper value and press **OK**.

- *Select [RESET] and press **OK** to reset the calibration.*
- *Hold **MODE** pressed and press □ to change the resolution from 1 to 0.1 mV.*

Temperature measurement
1. Select the desired mode (°C) by pressing **MODE**. Should you want to recalibrate, press **CAL**.
2. Immerse the Pt1000 in a solution of known temperature. Select [CALIBRATE] and press **OK**. Adjust to the proper value and press **OK**.

- *Select [RESET] and press **OK** to reset the calibration.*

- *Without Pt1000, press **CAL**, adjust the manual temperature compensation and proceed by pressing **OK**.*

Maintenance of 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.

Metal electrodes

Metal electrodes (Pt, Ag, Au) 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.*

Ion selective measurement
Calibration and measurement
1. Select the desired mode by pressing **MODE**. The display will immediately show the measured value according to the previous calibration. Should you want to recalibrate, press **CAL**.
2. Select the desired electrode number (1-9) and press **OK**.
3. Select the corresponding ion (e.g. NH_4^+) and press **OK**.
4. The instrument permits to choose between the possible standards (1, 10, 100 ng/l, 1, 10, 100 µg/l, 1, 10, 100 mg/l, 1, 10, 100 g/l). Select the proper values and press **OK**. The unused standards should be switched off.
5. Select [CALIBRATE] and press **OK**.
6. After rinsing the electrodes with distilled water, immerse them in the first standard solution. Select the first calibration value and press **OK** when readings are stable. Go on in the same way with the next standard solutions.
7. Decide whether a blank correction should be carried out or not. Follow the instructions on the screen. After rinsing the electrodes with distilled water, immerse them in a blank solution. When readings are stable press **OK**.
8. Rinse the electrodes with distilled water, immerse them in the samples, and read the concentration on the display.
- *Maintenance: we refer to the manual supplied with the ion specific electrodes.*

Good Laboratory Practice
1. Select the desired range by pressing **MODE** and then press **CAL**.
2. Select [GLP] and press **OK**.
3. Select [SHOW REPORT] and press **OK**. Browse with ↑↓ to show a complete calibration report.
4. Select [SEND REPORT] and press **OK** to send the report to a computer.

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

Data Storage in the internal memory
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [DATA] and press **OK**.

Start the data-logging
1. Select [ACTIVATE] and press **OK**.
2. Decide whether data-logging should be carried out or not and press **OK**.
3. Select [CONTINUOUS] and press **OK**.
4. Decide whether the oldest data should be overwritten when the memory limit is reached or not and press **OK**.
5. Select [INTERVAL] and press **OK**.
6. Select the desired time interval between the data-logging and press **OK**.
7. Return to the measurements by pressing **MODE**.
8. The data-logging starts according to the previous settings while the display shows the logging-number e.g. [LOG.00027].

Process the stored values
1. Select [PROCESS] and press **OK**.
2. Select [TABLE] or [SEND] to display or send the stored data and press **OK** to continue. Follow the instructions on the screen.

Erase the stored values
1. Select [PROCESS] and press **OK**.
2. Select [ERASE] and press OK. Follow the instructions on the screen.

External storage in a computer using USB
1. Press **MODE**.
2. Select [MENU] and press **OK**.
3. Select [USB] and press **OK**.
4. Select [INTERVAL] and press **OK**.
5. Select the desired interval between the transmitted data and press **OK**. Pre- set to zero if no automatic transmitting is required.
6. Select [BAUD] and press **OK**.
7. Select the desired transmission rate and press **OK**.

SPECIFICATIONS

pH	
Range	-2...+16 pH
Resolution	0.001 pH
Accuracy	0.1% ± 1 digit
Calibration	1...5 points
Buffers	11 pre-programmed 5 user specified
Temperature Compensation	-5...+105°C
ISO-pH	6...8 pH
Slope	80...120%
Zero point (Eo)	±999 mV
mV	
Range	±2000 mV
Resolution	0.1 mV
Accuracy	0.1% ± 1 digit
Calibration	1 point
ION	
Range	0.01 ng/l …. 100 g/l
Resolution	3 digits
Accuracy	0.5% ±1 digit
Calibration	2----5 points + blank
TEMPERATURE	
Range	0...100°C
Resolution	0.1°C
Accuracy	0.5°C
Calibration	1 point
INPUTS	
Measurement	BNC, 10^{12} Ω
Temperature	2 banana, for Pt1000
CALIBRATION	
Reminder	0…999 h
GLP	✓
DISPLAY	
LCD	128x64 pixels
White Backlight	✓
Hold function	✓
Selectable resolution	✓
Real time clock	✓

COMMUNICATION	
Interface with computer	USB, insulated
DATA-LOGGING	
Data sets	12000
Modes	All (4)
Manual or timed	✓
Interval	1… 9999 s
SECURITY	
Identification number	✓
Password protection	✓
AMBIENT CONDITIONS	
Temperature	0…40°C
Humidity	0….95%, non condensing
POWER SUPPLY	
Mains	100...240 VAC, 50/60 Hz
Low Voltage	9...15 VDC
Batteries	4x1.2 V, NiMH
DIMENSIONS	
WxDxH	12x25x5 cm
WEIGHT	
Meter	Approx.. 600 g