1. **Scope and Objectives:**

To determine pH, Electrical Conductivity, Total Dissolved Solids and Salinity using Hach Pocket Pro™+ tester

2. **Definitions:**

   ❖ **pH** is the negative logarithm of the hydrogen-ion concentration in moles per liter. In water samples it is determined by the measurement of a voltage produced between an electrode responsive to hydrogen ions (glass electrode) and a reference electrode (usually a calomel electrode) when both are immersed in the sample. A difference of 1 pH unit produces a potential charge of 58.16 mV at 25degree centigrade. pH of natural water is controlled by the carbon dioxide / bicarbonate equilibrium and usually ranges from 4.0 to 9.0. The majority of waters are slightly basic (pH > 7) due to the presence of bicarbonates and carbonates.

   ❖ **Electrical Conductivity**:The ability of water to conduct an electric current is known as conductivity or specific conductance and depends on the concentration of ions in solution. Conductivity is measured in millisiemens per metre ($1 \text{ mS m}^{-1} = 10 \text{ µS cm}^{-1} = 10 \text{ µmhos cm}^{-1}$).

   TDS concentration describes the presence of inorganic salts and small amounts of organic matter in water. EC and TDS are correlated and usually expressed by a simple equation

   $$TDS = k \, EC \text{ (in 25 degree centigrade)}$$

SOP

This multi-parameter tester is for use in general water samples. This Pocket Pro™+ tester measures the pH, conductivity, TDS (total dissolved solids) and salinity of general water samples.

3. **Sampling and preservation:-**

Determination of the pH and EC of water should, if possible, be made in situ or in the field immediately after a water sample has been collected.
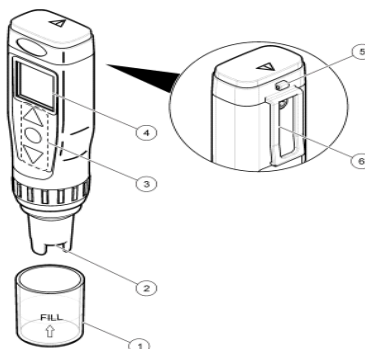
4. **Apparatus**

   i. Beaker 100ml

   ii. Tissue paper

   iii. Pocket Pro™+ tester

5. **Reagents:**

   i.   **Standards : pH**: 4.01, 7.00, 10.01

   ii. **Conductivity:** 147 µS/cm, 1413 µS/cm and 12.88 mS/cm

   ❖ Refer to Figure 1.

Figure 1 Product features

1	Sensor cap	3	Keypad	5	Lanyard attachment
2	Sensor	4	Display	6	Pocket clip

Figure 2 Product components
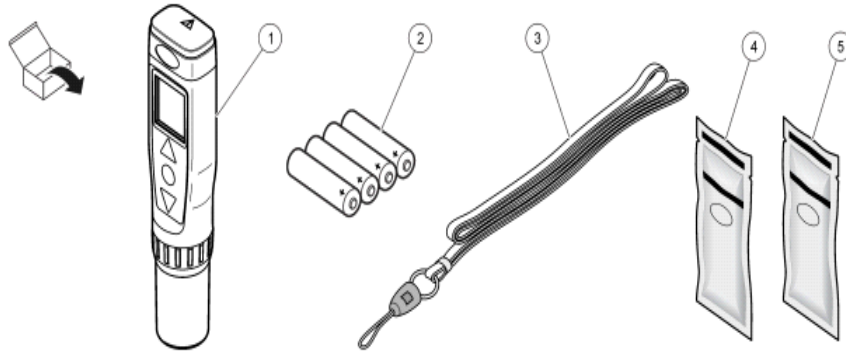
1	Pocket Pro+ tester	3	Lanyard	5	SINGLET™ (1413 µS/cm)
2	AAA alkaline batteries (4x)	4	SINGLET™ (7.00 pH)		

Figure 3 Install the batteries

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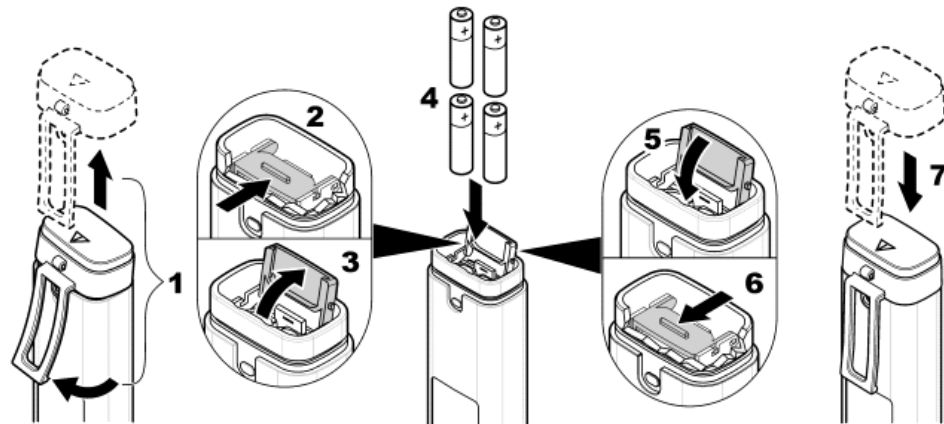
Figure 4 Display overview
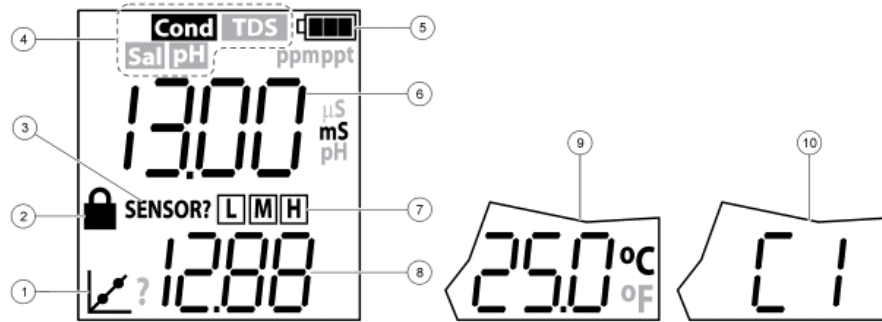
1	Calibration icon	5	Battery icon	9	Temperature
2	Lock icon	6	Parameter value	10	Custom standard (C1, C2)[6]
3	Sensor? icon	7	Calibration standard(s) measured for last calibration (low, medium, high)[4]		
4	Parameter[3]	8	Calibration standard(s) expected[5]		

Figure 5 Keypad overview
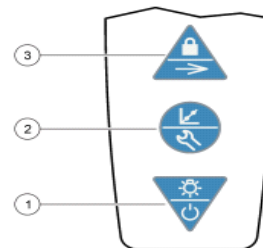
1	Power/Backlight key	2	Calibration/Settings key	3	Lock/Parameter key

Table 2 Key functions

Key	Description
☼ ⏻	Push and hold to set the power to on or off. Push to set the backlight to on or off. After 1 minute of no activity, the backlight switches off.
↙ ✎	Push to start a calibration of the parameter shown at the top of the display. To exit a calibration, push and hold. Push and hold until "SEt" shows on the display to go to the settings menu. To exit the settings menu, push and hold until "End" shows on the display. When in the settings menu, push to scroll through the settings. *Note: Power cannot be set to off while in settings or calibration mode.*
🔒 �	Push and hold to scroll through the parameters measured. Push to set the lock feature to on or off. When the lock feature is on, the lock icon shows and the parameter value on the display does not change.

5. Procedure: The daily test procedure includes following two (2) steps :

(i) Calibration before measurement

(ii) Sample measurement

(i) Calibration before measurement

Auto calibration – pH Items to collect: One, two or three auto-recognition calibration standards

1. Push and hold ⚙ to set the power to on.

2. Remove the cap from the sensor.

3. Push and hold ⚲ until pH shows.

4. Push ⬐ to go to calibration mode. The auto-recognition standard(s) to measure shows on the bottom line. Note: If "C1" shows on the bottom line, do not continue. Set the tester to auto calibration mode.

5. Rinse the sensor and cap with deionized water and blot dry.

6. Pour the auto-recognition standard shown into the cap to the fill line.

7. Put the sensor fully into the cap.

8. When the measurement is stable, push ⬐ to save the measurement. The measured value flashes three times.

10. Push and hold ⬐ to go to continuous measurement mode. "END" shows on the display.

11. Rinse the sensor and cap with deionized water and blot dry.

Auto calibration – conductivity

1. Push and hold ⚙ to set the power to on.

SOP

2. Remove the cap from the sensor.

3. Push and hold ➤ until Conductivity shows.

4. Push ↙ to go to calibration mode. The auto-recognition standard(s) to measure shows on the bottom line. Note: If "C1" shows on the bottom line, do not continue. Set the tester to auto calibration mode.

5. Rinse the sensor and cap with deionized water and blot dry.

6. Pour the auto-recognition standard shown into the cap to the fill line.

7. Put the sensor fully into the cap.

8. When the measurement is stable, push ↙ to save the calibration and go to continuous measurement mode. The measured value will flash 3 times and then stop. Then, "END" shows on the display.

9. Rinse the sensor and cap with deionized water and blot dry.

(ii) Sample measurement

1. Set the power to on.

2. Remove the cap from the sensor.

3. If the lock icon shows on the display, push to go to continuous measurement mode.

4. Push and hold ➤ to select the parameter to measure (i.e., Conductivity). Note: Only one parameter can be measured at one time.

5. Rinse the sensor and cap with deionized water and blot dry.

6. Pour the water sample into the cap to the fill line.

SOP

7. Put the sensor fully into the cap. The measured value shows on the top line.

9. When done with measurements:

 a. Rinse the sensor and cap with deionized water.

 b. Put the cap on the tester.

 c. Set the power to off.

6. Expression Of Results

  ➢ pH- Round the raw value to one decimal place for reporting value. ex. 10.76 rounded off to one decimal place is 10.8

  ➢ Conductivity has many units (mS/m, μS/m, S/m). Relationship among units are, "1S/m = 1000mS/m = 10000μS/cm) - To report the result, "mS/m" or "S/m" is recommendable units in the International However, potable water has low EC, so it is expressed as μS/m.

  ➢ TDS is measured in mg/l

7. Reference

  ❖ Hach Pocket Pro™+ tester Manual

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