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PHT004TA

portable pH/mV/TA meter

OPERATING INSTRUCTIONS

Table of contents

1.GENERAL

1.1. Applications

pH measurements are performed in practically any laboratory:

- lacquers, paints, suspensions;
- molasses, jam, honey;
- small samples;
- non-aqueous solvents;
- surface measurements;
- ointments, creams and pastes;
- water samples;
- milk sample.

The PHT004TA is delivered with a plastic body pH electrode, but your are entirely free to select each other suitable for your purposes electrode.

2. INTRODUCTION

2.1. PHT004TA Front Panel and Controls

2.1.1. ***Display***

2 x 16-character, alphanumeric LCD display; backlight

2.1.2. BUTTONS

ON/OFF - Power button

CAL - Calibration button; for choice of options and modes; for entering the values in mode **<User Settings>** - ▲

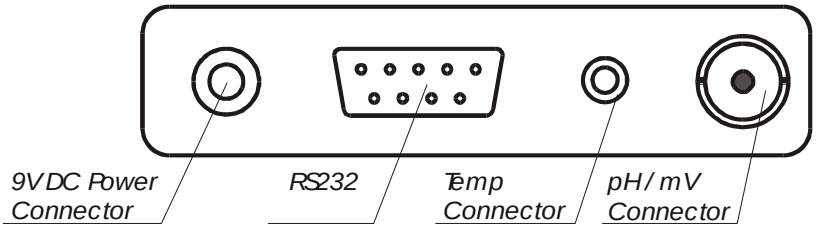
MODE - Function button

 - Print button; with **HOLD** button for switching of **<PC>** mode; in mode **<User Settings>** for changing of cursor position - ▶

HOLD - Button for freezing measured readings; for choice of options and numbers in mode **<User Settings>** - ▼ ; with button  for switching of **<PC>** mode

OK - Confirmation button; switches backlight in battery powered mode.

2.2. PHT004TA Rear Panel and Connectors



9V DC Power Connector
Used to connect 9V AC/DC Adapter. The PHT00**4**TA can use any 9V DC source with at least 400mA output. The **9V DC** connector has a positive tip.

RS 232 Connector
Used to connect the pH meter to the **PC**.

Temp Connector
Used to connect Temperature sensor. This sensor provides temperature readout as well as Automatic Temperature Compensation for pH readings.

pH / mV (BNC) Connector
Used to connect pH sensors.

2.3. Unpacking Information

Before using your new PHT004TA, please check that the following accessories have been included:

Item	Description	Qty
1.	PHT004TA (pH-mV-TA-Temperature) Instrument	1
2.	Holder for pH electrode and temperature sensor	1
3.	Temperature/ATC Sensor	1
4.	Combination pH Sensor	1
5.	Shorting cap (BNC)	1
6.	Container with KCl 20 ml	1
7.	Glass Beaker	1

8.	CD (PHiCOM)	1
9.	RS232 Cable (Null Modem, Link cable)	1
10.	AC/DC Power Adapter 9V	1
11.	Bank for pH buffer solution (empty)	3
12.	Buffer powder solution 250 ml pH 7.00 ± 0,01/20°C	1
13.	Buffer powder solution 250 ml pH 4.00 ± 0,01/20°C	1
14.	Buffer powder solution 250 ml pH 10.00 ± 0,01/20°C	1
15.	User's guide	1
16.	Carrying case	1

2.4. Specifications

	Ranges	Resolution	Accuracy
pH	0 to 14.00 pH	0.01 pH	±0.02 pH
mV	0 to ±500 mV	0.01 mV	±0.05 mV
Temperature	-10.0 to 120.0°C	0.1°C	±0.2 °C

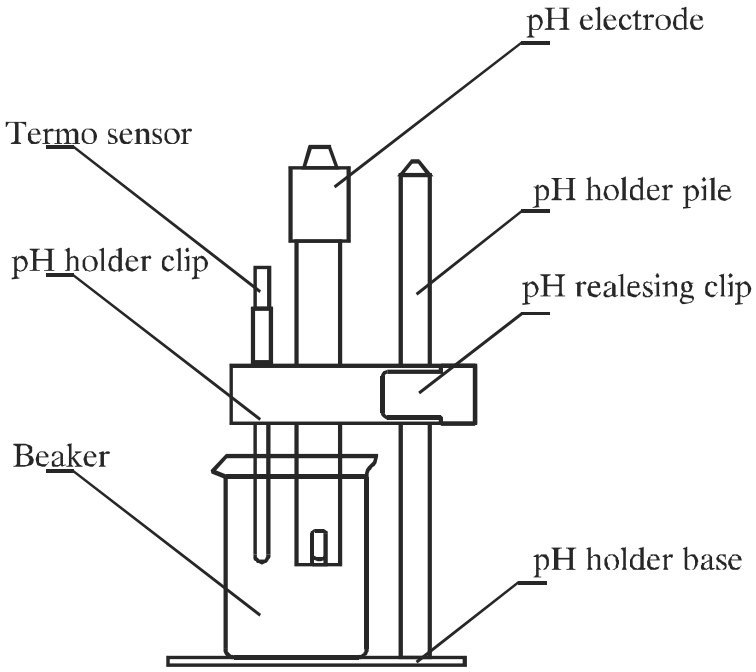
• Input Impedance : >3 x 10^{12}
• Temperature Compensation : 0 to 50.0 °C
• Power: 9V DC by AC/DC power adapter & four AA UM3 Mignon RA6 (LR 6) batteries (Rechargeable Alkaline batteries; 1,5 Ah; 5 years' shelf life)
• Dimensions: Instrument only: 155 x 92 x 54 mm
• Mass: Instrument only: Approx. 0.380 kg
• Dimensions: Full Kit: 415 x 358 x 88 mm
• Mass: Full Kit: Approx. 2.8 kg
• Environment Temperature : 0 to 45 °C
• Humidity: 0 to 90 % R.H.
• Protection class IP20

3. OPERATING MODES

3.1. Main

3.1.1. PREPARATION FOR WORK

a. Assembly pH Holder pile to the pH holder base by means of the screw M3 as it is shown to the figure.
b. Mount the pH holder clip to the pile by pressing the releasing clip.
c. Put the beaker.



3.1.2. CONNECTING THE pH ELECTRODE

During this operation, it is important that water does not get onto the BNC electrode connector. Also avoid touching the connector with soiled hands. Connect the pH Electrode sliding the Electrode connector over the socket (BNC Connector). Ensure that the slot of the connector is in the line with the protrusions of the socket. Rotate the connector clockwise until it locks. Be careful not to use excessive force in this operation.

3.1.3. CONNECTING THE TEMPERATURE SENSOR TO THE TEMP CONNECTOR

Connect the temperature probe to the phono jack on the rear **PHT004TA** meter panel.

3.1.4. SWITCHING ON

Press **ON/OFF** button to switch on the instrument.

ATTENTION! USE POWER ADAPTER ONLY FOR CHARGING BATTERIES. DISCONNECT IT WHEN THE PH METER WORKS IN MEASURING MODE.

Note:
a. If the instrument do not work more than 10 minutes, it will be switched off automatically. If the instrument work in **PC** mode, this option is not available, because in this mode the pH meter follows a long time process and sends the readings to the computer program. If there is another data transfer, the instrument will be switched off automatically 10 minutes after transfer latest data.

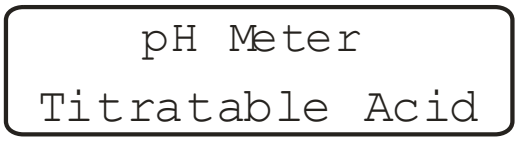
b. The instrument can work with battery power supply 15 hours. The full batteries recharge time is 10 hours.
c. Working with adapter the instrument recharge the batteries. There is not any risk of overcharge.

3.2. Main modes and functions

3 . 2 . 1. <MEASUREMENT > MODE

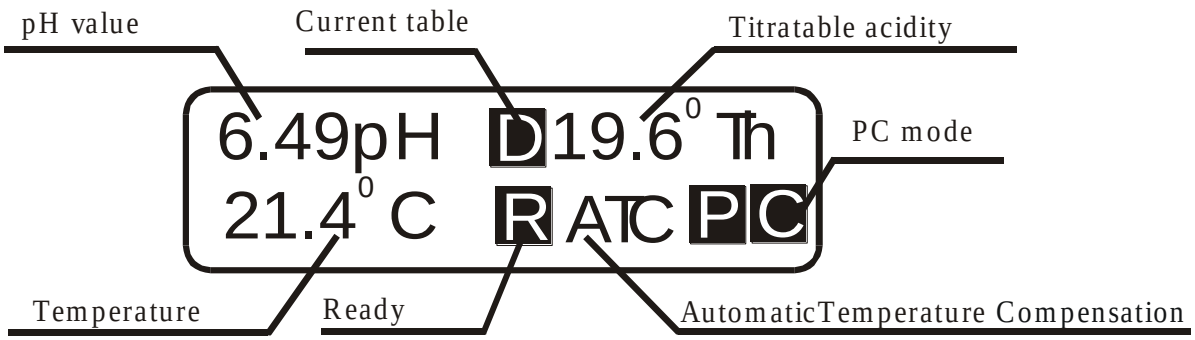
To measure pH with a conventional glass pH electrode, the meter uses a pH sensing glass bulb that is sensitive to hydrogen ions. The potential developed at the glass membrane is directly related to the pH of the solution. The glass electrode is paired with a reference electrode which completes the electrical measuring circuit and provides a stable reference point. These two electrodes are joined to create a combination electrode. The combination glass electrode is connected to the pH meter which reads the voltage, converts it to pH units, makes temperature correction and displays the result.

a. Remove the wetting cap from the pH sensor.
Rinse electrode and immerse the pH electrode and the temperature sensor in sample solution. Stir gently.
b. Press **ON/OFF** button to switch on the instrument;
After switching on by pressing the **ON/OFF** button, the device automatically enters measuring mode.



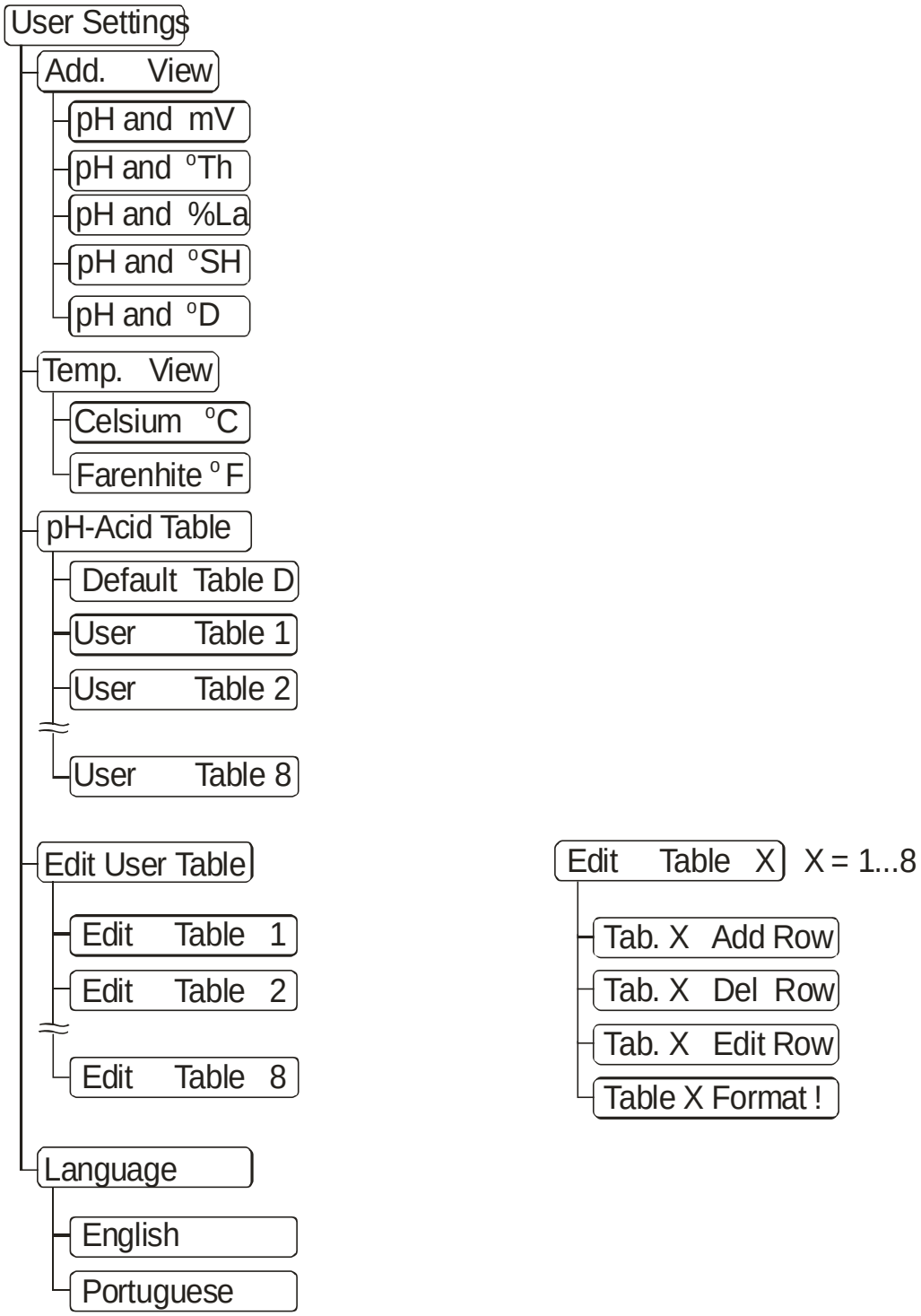
In **<Measurement>** mode the display shows:

- Current **pH** value
- Current table for transforming pH to titratable acidity / **1...8; D** /
- Titratable acidity / **°Th,°SH, °D, % La** /
- Sample temperature (or **25°C** and **77°F** – default)
- When the signal becomes stable, on the display appears the inverse symbol **<R>** (READY). This means that the signal variation is less than 0.07 pH or 0.08 mV compared to the previous measurement.
- If the device works in **HOLD** mode on the display appears inverse symbol **<H>**
- **ATC** (Automatic Temperature Compensation) if temperature sensor is connected to the device, otherwise display shows default values, without **ATC**
- When the function transmitting data to the PC is activated, display shows an inverse symbol **<PC>**



3 . 2 . 2. <USER SETTINGS> MODE

Press the **MODE** button.
The digital display will show a message **<USER SETTINGS>** for a few seconds.



On the screen appears the Main Menu.

You can choose one of options:

Add. View - Additional view
Temp. View - View of the temperature
PH-Acid Table - Table for transforming pH to titratable acidity
Edit User Table – Editing user tables
Language - Language selecting

Select the desired option, using the arrows (▲,▼).

3.2.2.1. Add. View

The device always shows pH value. This option allows you to show an additional parameter on the display.

Confirm your choice with **OK**.

pH and mV - pH and Tension in mV
pH and °Th - pH and titratable acidity in Degree Therner
pH and %La - pH and titratable acidity in % milk acidity
pH and °SH - pH and titratable acidity in Degree Soxhlet Henkel
pH and °D - pH and titratable acidity in Degree Dornic

Select an option, using the arrows (▲,▼). Confirm it with **OK** and will go back to the main setting menu.
Press **MODE** button to enter **<Measurement>** mode.

3.2.2.2. Temp. View

This option allows you to select the measuring unit of the temperature.

Confirm your choice with **OK**. The display shows:

Celsium °C - Temperature in Celsium degrees
Farenhite °F - Temperature in Farenhite degrees

Select an option, using the arrows(▲,▼). Confirm it with **OK** and will go back to the main setting menu.
Press the **MODE** button once again to enter in **<Measurement>** mode.

3.2.2.3. pH-Acid Table –Table for transforming pH value to titratable acidity

The device transforms pH to titratable acidity value using a table of correspondence. There are 8 user tables and one default table. Table D <Default> can not be edited.

There is not strong correlation between pH and titratable acidity.

pH is a unit to measure which describes the degree of acidity or alkalinity of a solution. It is measured on scale of 0 to 14. The term pH is derived from “p”, the mathematical symbol of the negative logarithm, and “H”, the chemical symbol of Hydrogen. The formal definition of pH is the negative logarithm of the Hydrogen ion activity.
Acidity can also be expressed as the titratable.

The **titratable acidity** of milk is the amount of a hydroxyl ion (OH-) solution of a given strength needed to increase the pH of a given amount of milk to a pH of about 8.4, the pH at which the normally used indicator, phenolphthalein, changes color from colorless to pink. What this test really does is to find out how much alkali is needed to change the pH from 6.0 to 8.4.

But the practice shows that for some type of milk there is a good relation between these two parameters. For example this relation can be presented as the table below:

°T	Variations	pH (average value)
Raw milk		
16	6,74 - 6,70	6,72
17	6,69 - 6,65	6,68
18	6,64 - 6,58	6,62
19	6,57 - 6,52	6,55
20	6,51 - 6,46	6,49
21	6,45 - 6,40	6,43
22	6,39 - 6,35	6,37
23	6,34 - 6,30	6,32
24	6,29 - 6,24	6,25

This table is put as a default table (**Table D**) in the pH-Meter.
If this table does not correspond to your type of milk you can make you self comparative measurements for both pH and titratable acidity and enter the results in one of the users tables - 1, 2….8 - See next section.

Confirm your choice with **OK**. The display shows:

Default Table D
User Table 1
User Table 2
.....
User Table 8

Select an option, using the arrows (▲,▼). Confirm it with **OK** and will go back to the main setting menu.
Press the **MODE** button once again to enter **< Measurement >** mode.

3.2.2.4. Edit User Table

A. Preliminary preparation for editing table.
1. Prepare minimum 10 samples of milk with different acidity.
2. Make measurements for both pH and titratable acidity.
- Use your pH-Meter for determination of pH value.
- Use the classical method (titration with NaOH) for determination of titratable acidity of the same samples of milk.

B. Editing tables

Permissible values:

pH	0.00 ± 14.00	by step 0.01
titratable acidity:		
°Th	0.0 ± 600.0	by step 0.1
%La	0.000 ± 5.400	by step 0.001
°SH	0.0 ± 240.0	by step 0.1
°D	0.0 ± 540.0	by step 0.1

There are two possible ways to enter the data into the pH meter:

1. *By hand*

- In **<User Settings>** mode, choose the option **Add. View,** to select the measurement unit for titratable acidity (°Th, %La, °SH or °D - See 3.2.2.1.) and press **OK**.
- Using the arrows (▲,▼), select **Edit User Table** and press **OK**. The display will show:

Select the user's table where you want to enter the data, for example <Edit Table 1> by **OK**.
The display shows:

There are four modes:
- adding row to the table **(Tab. 1 Add Row)**
- deleting row in the table **(Tab. 1 Del Row)**
- edit row in the table **(Tab. 1 Edit Row)**
- format of the table **(Table 1 Format !)**

Use (▲,▼) arrows to select the desired action.

Tab. 1 Add Row

Confirm by pressing **OK**. The display shows:

```
ADD ROW TO Tbl.1
06.50pH 017.0°Th
```

Using (▲,▼,►) arrows enter the ph value and corresponding titratable acidity value and confirm with **OK**. The instrument will automatically prompt the next pH value for adding.
If press **MODE** button four times will go back to the **<Measurement>** mode.

Tab. 1 Del Row

Confirm by pressing **OK**. The display shows:

```
Select row (DEL)
06.25pH 024.0°Th
```

Using (▼,▲) arrows select row for deleting and confirm with **OK**. The instrument will automatically prompt the next row for deleting. If there are only two rows left, this action will not be done and the display will show:

```
Table X have only
2 rows. Cant DEL
```

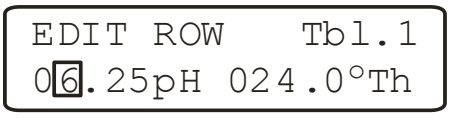
Press **OK** to go to one level closer to the main menu.
If press **MODE** button three times, will go back to the **<Measurement>** mode.

Tab. 1 Edit Row

Confirm by pressing **OK**. The display shows:

```
Select row(Edit)
06.25pH 024.0°Th
```

Select with (▼,▲) arrows row for editing and again confirm with **OK**.

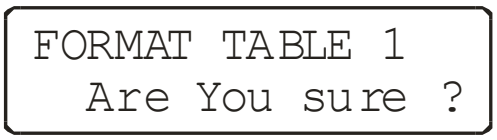


Using (▼,▲, ►) arrows, enter the desired values and confirm with **OK**
The instrument will automatically prompt the next row for editing.

If press the **MODE** button four times, will go back to the **<Measurement>** mode.

Table 1 Format !

If you choose these option with **OK**, the display will show:



Choosing this option with **OK**, the factory values will be restored. **All additional data will be lost!**
If press the **MODE** button three times, will go back to the **<Measurement>** mode.

2. By PC / RS232 connection/

Steps:
- Insert the CD into the PC CD drive;
- Install and start PHiCOM program;
- Prepare the pH meter for the receiving procedure:
a. Connect your pH meter to the PC by RS232 cable, provided by the producer;
b. Switch on the pH-Meter and next press MODE button to enter in <User Settings>mode. Now the pH meter is ready to receive the data.
- Follow the program instructions in Help menu, submenu <User Tables>.

3.2.2.5 Language

This option allows you to select the current language.

Confirm your choice with **OK**. The display shows:

Select an option, using the arrows(▲,▼). Confirm it with **OK** and will go back to the main setting menu.
Press the **MODE** button once again to enter in **<Measurement>** mode.

3.3. Sending data to the computer

a. Switch off the pH meter and the PC. Connect the provided RS232 cable to some free COM port to the PC and to the RS 232 connector of pH meter. First, switch on the pH meter, and next switch on the PC.
b. Start **PHICOM** program.

c. To start data transmitting, press the pH meters  button and then press **HOLD** button not releasing button  . Next release first **HOLD** button and then  . The inscription **PC** appears on the right corner of the display. The data will be sent online to the computer program.
d. To start data transmitting, press button **Start Tracking** of the computer program.
For full information use the programs Help menu.

Troubleshooting:
If there is not data received, check the following:
a. Make sure the RS232 cable is correctly connected or damaged;
b. Make sure **PHT004TA** settings are correct.
If you cannot find a solution, you can receive information by
E-mail: eonbg@eonbg.com

3.4. Printing the results

Connect a DEP 50 ESC/POS Printer to the pH meter by means of printer RS cable. Press button  to print the results, that are on the display in the moment of button pressing.

3.5. pH Electrode Care Tips

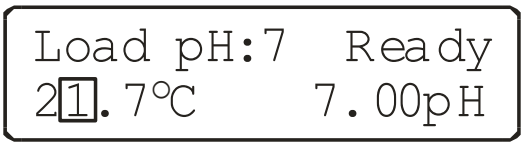
a. pH electrode should be rinsed thoroughly in tap water after each test.
b. Make sure to keep the electrode in storage solution (4 buffer (preferably) or tap water) between uses.
DO NOT USE DISTILLED WATER.
Note: PH Electrodes must be kept moist*. The pH electrode was shipped stored in a soaker storage bottle or vinyl cap, depending on model. The storage solution contained in the bottle is a potassium chloride solution. Do not be alarmed if white crystals form at the end of the electrode. It is simply potassium chloride. Rinse with water to dissolve the crystals before using the electrode. For storage, place the electrode back in the soaker bottle. If the potassium chloride solution evaporates or is lost, simply use pH buffer 4.0 or pH buffer 7.0 supplied for storage. DO NOT use distilled or deionized water as this will drastically reduce the electrode lifespan. If the pH electrode should dry out, soak the electrode up to 2 hours in pH buffer 4.0 solution. If the electrode is left dry for an extended period of time, rinse in a 10% HCl solution for 10 seconds. Rinse with tap water and store in a KCl solution overnight. This may regenerate the pH electrode. (For more information - see section "pH - additional information").*
c.The reference electrolyte needs to be refilled when the electrode has been used for an external period, or when the internal electrolyte has dried up. To accomplish this, follow the procedure described in section 5.2.5. Electrolyte Replacement (for refillable electrode only).

3.6. Calibration Mode

3.6.1. CALIBRATION FOR PH MEASUREMENT

Because electrodes vary in their response, you must standardize your pH meter and electrode to compensate for electrode variation. Standardize daily, or more often, for accurate results. This assures not only that the electrode is behaving properly but that the system is operating correctly. It is recommended that the user performs at least a 2-Point calibration using standard

buffers that adequately covers the expected measurement range prior to measurement. 1-Point Calibration can also be used for quick measurements. This pH meter allows automatic standardization using up to three buffers **pH 7**, **pH 4**, **pH 10**. The pH meter performs automatic temperature compensation.
Steps:
Press **CAL** button. The inscription **Load PH 7** appears on the display.
This message indicates that **pH 7** is ready for calibration.
Remove the wetting cap from the pH sensor. Rinse the pH and Temperature sensors in distilled water and blot them dry.
Place both sensors into a small sample of primary buffer that is at **pH 7**. The bulb and reference junction should both be covered.
DO NOT place the sensors directly into the buffer bottle.
Stir gently. Allow the electrode to reach a stable value, waiting for **Ready** inscription.



When **Ready** is on the display press **OK** key to start calibration. The message **Wait, please...** appears on the display. Wait for the measured pH value to stabilize. The next message **Load PH 4** will be displayed when the reading is ready. The instrument is calibrated with buffer **pH 7**.
To finish the 1-point calibration procedure press button **CAL**.
For **pH 4** and **pH 10** (2 or 3 point) calibration perform the above procedure without button **CAL**, following the pH meter prompts until completion.

When the 3-point calibration procedure is successfully completed, the device automatically goes to pH **<Measurement>** mode.

3.6.2. CALIBRATION FOR mV MEASUREMENT

This procedure requires special equipment - mV calibrator. The procedure can be made only in manufacture service or in another service authorized to make this. Bulteh 2000 Ltd. is a producer of a calibrator **PHC003** with the following specification:

Output voltage	0; ± 500 mV
Accuracy	±0.1mV
Temperature coefficient	<30 ppm/°C
Power Supply	220V

Use this calibrator or another one with such or better specification.

a. Press **ON/OFF** button to switch off the pH meter.
b. Wait for 30 seconds.
c. Press **CAL** button and then press **ON/OFF** button not releasing **CAL** button. The message **Calibrate mV - meter**
appears on the display.
d. Release **CAL** button for the next message **Insert 0.00 mV** to appear. The second row displays the present mV value.
e. Connect the mV calibrator connector instead of pH electrode. Set the mV calibrator to 0.00mV. The second row will display the real mV value. When the pH meter reaches a stable value (0.00 mV) press **OK** . The messages
Wait, please...

Insert + 500.00 mV appear on the display. If press **CAL** button the procedure will finish. The 1-point calibration procedure will now complete.
f. For 2-point calibration, set the mV calibrator to +500.00 mV and wait for stable value. Press **OK** and the messages
Wait, please...
Insert -500.00 mV will appear on the display. If press **CAL** button will finish the procedure. The 2-point calibration procedure now will complete.
g. For 3-point calibration, set the mV calibrator to - 500.00 mV and wait for stable value. Press **OK** and the 3-point calibration procedure is now completed. **Wait, please...** and
the pH meter automatically enter pH **<Measurement>** mode.

Use mV measuring mode:

A. To test the meter for correct operation.
Install the BNC (input) shorting cap. If the meter reads 0 ± 0.3 mV, it is measuring correctly.

Electrode Test	
pH 7	0 ± 30 mV
pH 4	169 to 186 mV more than pH 7
pH10	159 to 185 mV less than pH 7

B. To test the pH electrode
Place it in a good pH 7 buffer. Repeat for either a pH 4 or pH 10 buffer. The electrode signal must be within the limits shown on figure (when temperature is near 25° C or 77° F).

Press the **MODE** button again to enter **<Measurement>** mode.

3.6.3. RESTORING THE FACTORY (INITIAL) SETTINGS.

a. Press **ON/OFF** button to switch off the meter.
b. Wait for 30 seconds.
c. Press **HOLD** button and then press **ON/OFF** button not releasing **HOLD** button. The message **Work settings** appears on the display.
d. Release **HOLD** button to appear the next message:

Default Values?
Press Key OK.

There are 2 possibilities:
- Press **OK** to restore the factory (initial) settings. After this procedure the meter enter in pH measuring mode. In this case it is necessary to perform 3-point pH and mV calibration.
- Press any other key to exit from the procedure.

3.6.4. CALIBRATION NOTES

1. A 1-point calibration using a pH 7.00 buffer should be performed at least weekly. In applications where the sensor junction can become blocked (e.g. wines, dairy products, mining slurries etc.) a 1-point calibration may have to be done daily.
2. A full 3-point calibration should be performed at least monthly. Of course, more frequent calibration will result in greater confidence in results.

4. TROUBLESHOOTING

Symptom	Possible Causes	Remedy
Ph Meter displays: " Open" or "High mV" as a reading.	pH sensor not connected or faulty.	Connect pH sensor. Replace sensor if necessary.
Inaccurate readings, even when calibration is successful.	Reference junction blocked.	Clean reference junction as per instructions supplied with the sensor.
Displays around pH7.00 for all solutions.	Electrical short in connector	1. Check connector. Replace if necessary. 2. Replace sensor.
Displays 4-5 pH for all solutions.	Glass bulb or internal stem cracked.	Replace sensor.
Unstable readings.	1. Reference junction blocked. 2. Glass bulb not clean. 3. Bubble in glass bulb. 4. Faulty connection to meter. 5. Reference junction not immersed. 6. KCl crystals around reference junction, inside the electrolyte chamber.	Clean reference junction as per instructions supplied with the sensor. Clean glass bulb as per instructions supplied with the sensor. Flick the sensor to remove bubble. Check connectors. Replace if necessary. Ensure that the bulb AND the reference junction are fully immersed. Rinse electrolyte chamber with warm distilled water until dissolved. Replace electrolyte.
Ph Meter displays: " It's not 0.00mV (+500.00 or -500 mV)" in mV calibration mode.	The mV value from the mV calibrator is different from the required value with ± 40 mV.	1.Set the mV calibrator to the right value; 2. Check the connections; 3. Restore the factory (initial) settings (see section "3.6.3. Restoring the factory (initial) settings").
Ph Meter displays: " It's not pH7 (4 or 10)" in pH calibration mode.	The buffer solution pH is different from the required pH with ± 1.	1. Use right pH buffer solutions. 2. Check the pH electrode in mV mode (see section " 3.2.6. Use mV measuring mode to…" 3. Check the connections; 4. Restore the factory (initial) settings (see section "3.6.3.Restoring the factory (initial) settings").
Ph Meter displays: "EEPROM Error! Default Settings"	PROM is erased.	The ph meter starts automatically the self restoring procedure. After this message it is necessary to perform 3 point pH and mV calibration.
Ph Meter displays: "EEPROM Error! FATAL"	PROM is damaged.	This error can't be corrected by the user. Contact your dealer to make the repairs.
Ph Meter displays: "Error in table X Format tbl.? <OK>"	Error in table X values	The exit from this situation is formatting table X, press <OK>.

5. PH MEASUREMENT - ADDITIONAL INFORMATION

5.1. General

pH is a unit to measure which describes the degree of acidity or alkalinity of a solution. It is measured on scale of 0 to 14. The term pH is derived from “p”, the mathematical symbol of the negative logarithm, and “H”, the chemical symbol of Hydrogen. The formal definition of pH is the negative logarithm of the Hydrogen ion activity.

5.2. pH Electrode

For pH measurement meter needs a combination electrode, compatible with most pH electrodes that have BNC connectors and zero potential (the pH where the millivolt output of the electrode equals 0) near 7 pH.

5.2.1. ELECTRODE PART

The electrode is the most important part of the pH measurement. The electrode glass membrane is fragile and must be handled with care. To protect the glass membrane and to maintain activation, the glass membrane is covered by a protective rubber cap containing a suitable storage solution.

5.2.2. ELECTRODE CARE & ELECTRODE MAINTENANCE

pH Electrodes are susceptible to dirt and contamination and need to be clean regularly depending on the extent and condition of use. At no time should one touch or rub the glass bulb as this causes the build-up of electrostatic charge.

5.2.3. STORAGE

The best results, always keep the pH bulb wet. An optimal storage solution for combination electrode is pH 4 buffer (cleat not pink) with 225 grams of KCl per liter. Table salt, NaCl, can be used if KCl is not really available. Other pH buffers or tap water are also acceptable storage media, but avoid storage in de-ionized water. The protective rubber cap filled with the buffer solution provides ideal storage for long periods.

5.2.4. AFTER USE

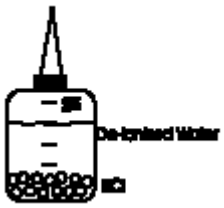
After measurement is complete, follow the sequence elaborated below for storage.

a) Wash the electrode and reference junction in de-ionized water.
b) Close the refilling hole by returning its rubber sleeve or stopper cap (Necessary for only refillable electrode).
c) Store the electrode as mentioned above (see section Storage).

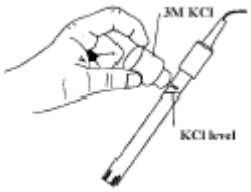
5.2.5. ELECTROLYTE REPLACEMENT (FOR REFILLABLE ELECTRODE ONLY)

The reference electrolyte needs to be refilled when the electrode has been used for an external period, or when the internal electrolyte has dried up. To accomplish this, follow the procedure detailed below.

a) Remove the protective rubber cap or sleeve.
Remove the protective rubber sleeve to expose the filling port of the electrode. Remove the old reference electrolyte with a syringe.



b) Fill the new reference electrolyte.
New electrolyte preparation:
Open the small container with KCl.
Add in de-ionized water until it reaches the level of 20 ml. Close the container and shake it to dissolve the KCl.



Add in fresh electrolyte until it reaches the level of the refilling port. The reference electrolyte used should be 3M (Mol) KCl. Replace the rubber sleeve.

c) Re-use the electrode
Rinse the liquid junction with de-ionized water.
Note: If these steps fail to restore normal electrode response, you may attempt to rejuvenate it.(See: Electrode Rejuvenation).

5.2.6. ELECTRODE CLEANING

Electrodes, which are mechanically intact, can often be restored to normal performance by one or combination of the following procedures.

a) Salt deposits:
Dissolve the deposit by immersing the electrode in tap water for ten to fifteen minutes. Then thoroughly rinse with de-ionized water.
b) Oil/Grease Films
Wash electrode pH bulb in a little detergent and water. Rinse electrode tip with de-ionized water.
c) Clogged Reference Junction: pH electrodes have junction, which allows the internal fill solution of the measuring electrode to leak out into the solution being measured. The junction can become clogged by particulate in the solution. If a clogged junction is suspected it is best to clear the junction.
Heat a dilute KCl solution to 60-80° C. Place the sensing portion of the pH electrode into the heated KCl solution for approximately 10 minutes. Allow the electrode to cool while immersed in some unheated KCl solution.
d) Protein Deposits
Prepare a 1% pepsin solution in 0.1M HCl. Allow the electrode to stand in this solution for five to ten minutes. Rinse the electrode with de-ionized water.

5.2.7. ELECTRODE ACTIVATION

Generally, if the procedure of storage and maintenance had been closely followed, the electrode can be used immediately. However, should the electrode response become sluggish, it may be possible that the bulb has dehydrated. The bulb can be rehydrated by immersing the electrode in an ideal storage solution (e.g. buffer pH 4 solution) for 1 - 2 hours. If this fails, the electrode may require re-activation.

If the above procedure does not reactivate the electrode to acceptable status, try rejuvenation the electrode by following the procedure outlined below.

5.2.8. REJUVENATION PROCEDURE

a) Dip and stir the electrode in freon or alcohol for 5 minutes.
b) Leave the electrode in tap water for 15 minutes.
c) Dip and stir the electrode in concentrated acid (HCl, H_2SO_4) for 5 minutes.
d) Repeat Step b - leave the electrode in tap water for 15 minutes.

e) Dip and stir in strong base (NaOH) for 5 minutes.
f) Repeat Step b - leave the electrode in tap water for 15 minutes.
g) Test with standard calibration solution.

Finally, test with standard calibration buffer solution to see if the electrode yields acceptable results. You may repeat steps ‘c’ to ‘f’ again for better response (maximum 3 times). If the response does not improve, then the electrode has completed its useful life. Replace with a new electrode.

5.3. Electrode Lifespan

pH electrodes have a finite lifespan due to their inherent properties. How long a pH electrode will last will depend on how it is cared and the solution it is used to measure. Even if an electrode is not used it still ages. Electrode demise can usually be characterized by a sluggish response, erratic readings or a reading which will not change. When this occurs an electrode can no longer be calibrated. pH electrodes are fragile and have a limited lifespan. How long an electrode will last is determined by how well the is maintained and the pH application. The harsher the system, the shorter the lifespan. For this reason it is always a good idea to have a back-up electrode on hand to avoid any system down time.

5.4. Buffer Solutions

Buffers are solutions that have constant pH values and the ability to resist changes in that pH level. They are used to calibrate pH measurement system.

5.5. Automatic Temperature Compensation (ATC)

Automatic Temperature compensation is contained within the meter, because pH measurement is temperature sensitive. To activate the ATC, simply plug in the temperature probe into the phono jack.

5.6. pH Electrode Calibration

pH Electrodes are like batteries; they run down with time and use. As an electrode ages, its glass changes resistance. For this reason, electrodes need to be calibrated on a regular basis. Calibration in pH buffer solution corrects for this change.
Calibration is an important part of electrode maintenance. This assures not only that the electrode is behaving properly but that the system is operating correctly.
Usually pH meters require calibration at 3 specific pH values. One calibration is usually performed at pH 7, second and third are typically performed at pH 4 and pH 10.
Attention: It is best to select a buffer as close as possible to the actual pH value of the sample to be measured. Use standard calibration buffers that the temperature and the sample solution are the same.

6. WARRANTY

Bulteh 2000 Ltd. guarantees all instruments and sensors 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 Authorized 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 sensors is three (3) months. There are no express or implied warranties which extend beyond the face hereof, and **Bulteh 2000 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.

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 sensor simply requires cleaning or replacement. **Bulteh 2000 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 **Bulteh 2000 Ltd.** 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 **Bulteh 2000 Ltd.** receives the unit.

7. WARRANTY CARD

This card must be completed at the time of purchase and the registration section returned to **Bulteh 2000 Ltd.** within 7 days. No claims will be recognized without the original guarantee card or other proof of purchase. This warranty becomes invalid if modifications or repairs are attempted by unauthorized persons, or the serial number is missing.

Serial N:

Date: