1. CHARACTERISTICS OF THE METER

CP-105 pH-meter enables measurement of: pH, redox potential and temperature.
The measurement is made with use of replaceable heads:

GP-105 - for measurements of pH in water with low deposit content and temperature;

GPX-105s- for measurement of pH in water with deposits, sewage soil etc. and temperature.

2. SWITCHING THE METER ON AND OFF

After switching the meter on with the ⏻ button all symbols are displayed on the display.

Pic. 1

It is a display test. After 2 seconds part of the symbols disappears and depending on the kind of connected measuring head the meter enters the measuring mode of specific function.

The meter switches off after pressing the ⏻ button or automatically after 10 minutes of non-use.

Displaying of HLP (HELP) symbol informs that the meter has lost the manufacturer's calibration settings and it should be sent to service for repair. no Probe symbol informs that the measuring head has been broken.

3. REPLACING THE HEADS

The choice of the head depends on the kind of the solutions which will be measured. The meter downloads all the parameters and characteristics stored in the head.
The user's calibration data are stored in the head after it has been disconnected from the meter. It is not necessary to calibrate it each time the head is replaced. The information how to restore the manufacturer's calibration data has been given below.

To change the head, unscrew the ring which connects the head with the meter and replace the head. Thanks to the special shape of the head's ending it is impossible to connect it in inappropriate way. Next, **screw the ring precisely and put the protective cap on.**

3.1. Restoring the manufacturer's parameters of the head

To restore the manufacturer's calibration data of the head connected with the meter, switch the meter off and than press and hold the ON/OFF and switch the meter on simultaneously. `tLr` symbol will be displayed what informs about deleting the user's calibration characteristic and restoring the manufacturer's calibration data.

4. CHOOSING THE HEAD

The **CP-105** meter with **GP-105** head is designed for measurements in liquids with low deposits and salts content. Measurements in samples with deposits may destroy the head. Measurements in such samples should be made with **GPX-105s** head.

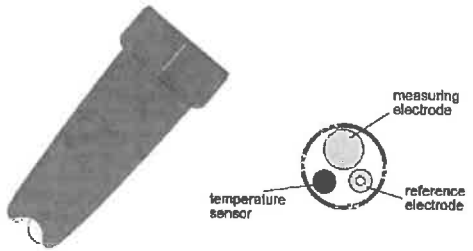
Basic maintenance activities are:

- **washing the electrodes after every measurement;**
- **watering the sponge in the protective cap (GP-105);**
- **calibrating the electrodes periodically.**

More detailed description of activities is given below.

4.1. Activating the membrane of the measuring head

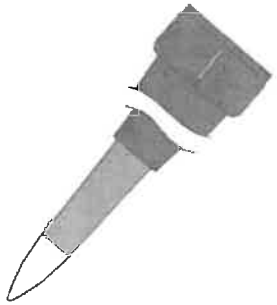
New **GP-105** head requires measuring electrode activation.



Pic. 2. pH measuring head **GP-105**

To activate the **GP-105** head it is necessary to water the sponge in the protective cap with distilled water, place it on the head and wait about 1 hour. During breaks between the measurements the protective cap should be placed on the head. Each 7 – 10 days the sponge should be watered. **If the sponge is dry, the measuring electrode membrane won't be active and the meter will not measure or will measure incorrectly.**

In case of using the **GPX-105s** head (pic. 3) it should be activated by immersing it in saturated KCl solution for a few hours (3 – 4 cm deep). During breaks between measurements it is necessary to store it in the saturated KCl solution (the meter doesn't have to be disconnected).



Pic. 4.

5. CHOOSING THE UNIT

During the measurement with the pH head the **CP-105** meter enables displaying the result in **pH** or **mV**.

To choose the unit:

- holding the button press the button simultaneously and next release both buttons. The meter will enter the unit choice mode, First, Unit, (unit) symbol will be displayed for a moment and next the chosen unit will be displayed;
- by pressing the button choose the Ph (pH) or U (mV) unit;
- press the button, for a moment a Con symbol will be displayed and next, the meter will return to the measuring mode.

CAUTION: during measurements in mV the displayed value is absolute - without taking into consideration the calibration made in the pH mode.

6. CALIBRATION

Along with time all pH electrodes change their characteristics, what makes measurement errors occur. To eliminate them, it is necessary to carry out calibration which should be repeated each 3 weeks. The calibration is made in buffer solutions. The calibration points are constant and their values are: 4.00 pH, 7.00 pH and 10.00 pH (values of the solutions given for 20 ^{0}C). **Before starting calibration it is necessary to remove the previous calibration parameters from the meter's memory.**

To do it, press and hold the button, when the meter is off and simultaneously turn the meter on by pressing the button. **This way of switching the meter on should be used only before calibration.**

The calibration may be made in 3, 2 or in 1 buffer solution. When both acids and alkalis will be measured, 3 point calibration should be made. 2 point calibration should be made in case of frequent measurements in acids (in 4.00 pH, and 7.00 pH buffer solutions should be used), or alkalis (7.00 pH and 10.00 pH buffer solutions should be used).

After placing the electrode in the buffer solution the meter automatically detects its value.

1 point calibration should be done in 7.00 pH buffer solution, this type of the calibration is the least accurate.

6.1. The process of calibration

After deleting the calibration data according to the chapter 3.1:
a. take the protective cap off the head with electrodes;
b. rinse the head with distilled water and immerse it in 7.00 pH standard solution, about 2 - 3 cm deep;
c. wait till the reading stabilises (usually it slightly differs from the standard value)
d. press the (Cal) button till the CAL symbol appears on the display;
e. after a while the CAL symbol will disappear and the corrected value of measurement equal to the standard solution value will be displayed. The calibration in first solution is finished.
f. rinse the head with distilled water and finish or continue calibration in the next standards repeating the activities from points b to e.

The order of using the standard solutions is freely chosen.

If after disappearing the CAL symbol the value on the display will be slightly different from the value of the standard solution, press the (Cal) button once again. If other standard solution than those listed above will be used a Err sign will be displayed. This same symbol will show if the electrode's characteristics changes to such an extent that its calibration won't be possible. In this case it is necessary to replace the head according to the chapter 3

7. pH MEASUREMENT

7.1. Measurement of solutions with low deposit's content with GP-105 head

To start the measurement, take the cap off and immerse the head about 2 - 3 cm deep in the solution. It is not recommended to immerse it deeper. Wait till the reading stabilises and read the value. The stabilisation time is similar to standard electrodes and can take about 10 seconds up to 1 min.
Measurements of sewage or waters with high content of deposits may cause irreversible damage to **GP-105** head.

It is very important to remember that after every measurement the electrodes should be rinsed with distilled water. (immerse the end of the head in distilled water and make a few vertical moves). Otherwise, the contamination which deposits on the electrode will increase the error and after some time will make the measurements impossible (not always the deposits can be seen). During field work it is necessary to take a bottle with distilled water to wash the electrodes. After finishing work it is necessary to wash the electrodes and put the protective cap on.

The pH electrode's membrane is made of thin glass, therefore during measurement it is necessary to be careful and avoid any, strikes. Even the slightest break on the glass makes the measurement impossible.

7.2. Waste water measurement with GPX-105s head

Before starting measurement, prepare the head according to the instructions given in its separate manual. It is important to use a sleeve suitable for the type of measurement. Next, rinse the electrode and immerse it about 3 – 4 cm deep in the solution, wait until the reading stabilises and check it. The stabilisation may last from 10 seconds to 1 minute. Longer stabilisation period informs that the electrode below the plastic sleeve should be replaced (for details, check the head's manual). Each time after measurement **the end of the head should be immersed in the distilled water. Before working in the field, take the plastic bottle with distilled water to rinse the head. Deposits left on the head's membrane may hinder next measurements.**

After finishing the measurement it is necessary to put the rubber wetting cup on the electrode's glass membrane to protect it from breaking.

8. REDOX POTENTIAL MEASUREMENT

After connecting **GR-105k** head, for redox measurement, with the meter choose the measurement in the mV units according to the chapter 5. The redox electrode does not require calibration and in this measurement mode there is no calibration function. It may be checked in the controlling solution. The measurement procedure is identical as for pH measurement.

9. REPLACING THE pH HEAD

While measuring, the electrode's membrane is loosing it's efficiency and in the reference electrode the gel electrolyte is using up. Time of work of the electrodes may vary from 1 to 2 years under condition of using it in the way it is designed for. The whole head is replaceable as described in the chapter 3
After replacing the head it should be calibrated according to chapter 6.1.

10. TEMPERATURE MEASUREMENT

CP-105 meter enables the temperature measurement while making pH and conductivity measurements. To make the measurement it is necessary to press and hold the ⏲ button – the temperature value in ^{0}C will be displayed. After releasing the button, in the place of the temperature the value of the main measurement function will be displayed (pH or conductivity).

11. REPLACING THE BATTERIES

When Lo sign appears on the display on turns with the measured value, the battery should be changed. In order to change the battery, unscrew the top of the meter and remove the three used up batteries by pulling the tape. Next thing is to put in new batteries (type LR44, voltage 1,5V). **It is important to pay attention if the batteries, are put in according to the marks in the battery box. All batteries should be placed in the same direction. The negative pole is on the side of the flat spring and the positive pole is on the side of the spiral spring of the meter.** Placing the batteries in wrong direction may destroy the meter.

Pic. 5. The way of placing the batteries in the battery box

The best way to insert the batteries is to put them from the side of flat spring, one after another, and move them to the spiral spring. A very important thing is to screw the top correctly. When very long break in work is forecasted it is advisable to remove the batteries from the meter, because sometimes their breaking and what follows damaging the meter is possible. The lifespan on new, unused batteries is about 7 months.
Taking the batteries out and leaving the meter without them won't cause loosing the calibration data.

12. NOTICES

The meter is waterproof and it has been controlled before sale. The tightness of the meter is ensured by 3 sealing rings. Two of them are at both ends of the meter's body and the third one inside the nut holding the measuring heads. When replacing the head or the batteries it is advisable to lubricate the rings with silicone grease., to make unscrewing the parts easier. Before screwing the meter back together it is necessary to check whether the seals are in the right place and screw the nuts correctly back. Otherwise, the meter may loose its waterproofnes what increases the risk of inundation and breakdown. This kind of failure is not repaired on the warranty conditions.

Because of the type of material of which the body of the meter and heads are made and also because of construction of the electrodes, measurements in temperatures higher than 70 ^{0}C are impossible (except temperature measurement with use of sensors with cable).

The housing is not resistant to solvents.

If during the work an HLP sign will be displayed it informs that the meter is damaged and should be sent for repair.

13. TECHNICAL DATA

pH measurement

Range	0 ÷ 14.00 pH
Resolution	0.01 pH
Accuracy	±0.02 pH ± 1 digit
Input impedance	>10^{12} Ω
Temperature compensation range.	-5 ÷ 60 ^{0}C

mV (redox) measurement

Range	±1200 mV
Resolution	1 mV
Accuracy	±1 mV ± 1 digit
Input impedance	>10^{12} Ω

Temperature measurement

Range	-5 ÷ 60 ^{0}C
Resolution	0.1 ^{0}C
Accuracy	0,8 ^{0}C with temperature sensor

Other

Power	3 x LR44 Batteries
Weight	60 g
Dimensions	L = 180 mm ϕ 26 mm
Work time (continuous)	80 h