

Mu*Sy***tec**®
Mess,-Mobil und *Sy*stemtechnik

bischof
MESSGERÄTE

Operating Instructions

pH 24

Operating Method pH Measurement

pH electrodes produce an electrical voltage which as to its polarity and magnitude is dependent on the pH value. However the energy of these electrodes is so minimal that only special amplifiermeters are capable of obtaining an indication from them.

Measuring Instrument

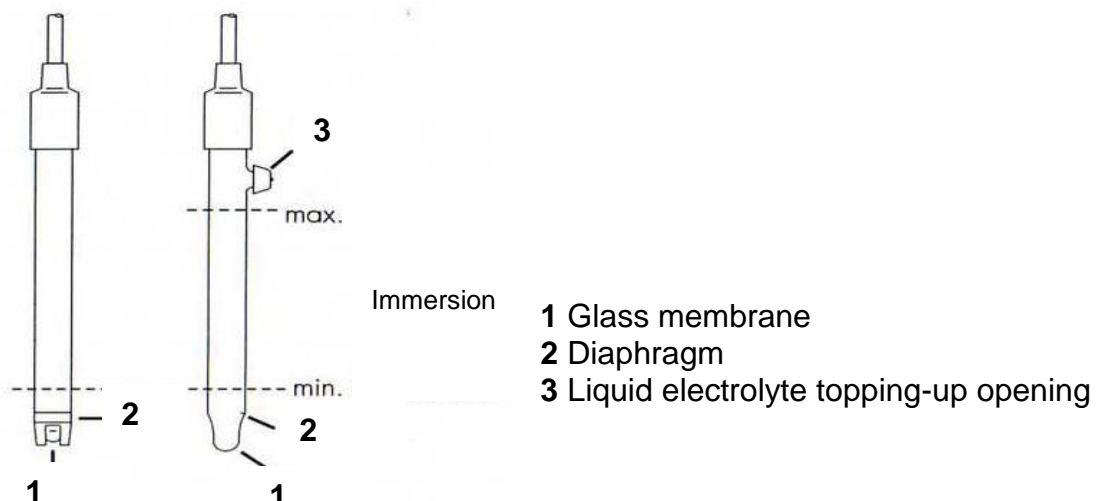
The casing of the pH24 is waterproof. Like all pH meters it is sensitive to moisture around the socket areas. Should the instrument come into contact with water thoroughly rinse the socket area with fully desalinated water (battery water) and dry it. Prolonged storage in extremely humid rooms (air humidity > 75%) leads to damage and produces misreadings.

pH Electrodes

Commonly these day pH electrodes are only used as “single-element measuring chains”. The soaking causes an atomically-dimensioned formation of a gel layer on the surface of the glass membrane. Electrical voltages, which depend on the pH value, develop within this gel layer. The contact to the measuring solution cuscus by means of a porous connection (e.g. ceramic), which is referred to as the diaphragm. After dry storage the pH electrodes are soaked for about 12 hours and are then operable.

Gel-type
Fracture-proof

laboratory electrode
with liquid electrolyte



Commissioning

Connect the adequately watered and calibrated electrode (→ Calibrating) to the measuring instrument. Carefully remove the watering cap. Remove the air bubbles in the membrane of the electrode by shaking it in the same manner in which one shakes a medical thermometer. Briefly open the sealing cap of the filling port (3) thus compensating the pressure. Immerse the electrode and switch in the measuring instrument (ON). Temporarily the processor self-test is indicated (– 1.8.8.8.E followed by 2.0, then the instrument switches to the pH indication. Set the temperature of the measuring liquid (→ Setting the temperature). Wait until the indication in the readout has become stable and then read of the measured value. If the indication «LOBAT» appears in the readout during the time the measurements are being taken then the battery has to be replaced by a fully charged one.

The electrode should be immersed only up to the filling port (maximum) – particularly when it is being used to take continual measurements.

Setting the temperature

When the instrument is switched on, press «MODE». On the readout the previously set temperature is showed. To adjust it, press «CAL». Now a flashing «C» is indicated. Press «MODE» and the temperature indication changes.

To change the temperature by 0,5 degrees press once briefly. For adjustments of a wider range keep pressed.

If the temperature is adjusted as desired, press «CAL» again – the new value is now stored. To go back the pH indication: press «MODE».

Calibrating

1. Prepare two buffer solutions and one vessel with water for rinsing.
2. Remove the watering cap of the electrode, briefly vent the topping-up opening for pressure compensation and connect the electrode to the instrument. Switch the instrument on (ON).
3. Measure the temperature of the buffer solution and adjust in on the pH 24 (→ Setting the temperature). Highest accuracy at 25 °Celsius.
4. Rinse the electrode, dab (not dry!) it, and put it into the buffer solution pH 7,00. Wait till the readout indicates a stable value*.

*Moving (stirring) the electrode accelerates the adaption

5. Press »CAL«: -the instrument indicates 7,00*, press »CAL« again, and the instrument indicates a value between 6,97 and 7,12 depending on the set temperature (see table, appendix) and a flashing »C«.
6. After that the instrument indicates the second buffer value pH 4,00.
7. Rinse the electrode, dab it and put it into the buffer solution pH 4,00. Wait 30 seconds and press »CAL« again. The instrument indicates a value between 4,00 and 4,06 depending on the set temperature (see table, appendix) and a flashing »C«.
8. Don't move the electrode during the calibration process (blinking »C«).
9. After that the instrument switches to pH indication, calibration is finished, the instrument is ready for measuring.

Setting a new acid/alkaline buffer value

The instrument is set to the standard combination pH 7,00 and pH 4,00 at 25°C. There are however the other following acid/alkaline values which can be called up:

pH 1,68	pH 9,21
pH 2,00	pH 10,00
pH 4,01	pH 12,45

To change the value carry out the sequence as in the case with "calibrating" up to Point 6. With for example the indication 4,00 press the »MODE« key so often until the desired new value is indicated. Continue with point 7 using the given buffer solution. The new buffer combination remains stored even after having switched the instrument off.

Setting a new neutral buffer value

Instead of using pH 7,00 the neutral value can also be calibrated with buffer pH 6,87. To change it, the sequence is to be as with "Calibrating" up to Point 4.

Press the »MODE« key so often until value pH 6,87 is indicated. Continue with Point 5 using buffer solution pH 6,87.

Maintenance, storage of pH electrodes

Electrodes which have a liquid electrolyte

Here the supply system is filled with potassium chloride solution (KCL). KCL diffuses continually into the atmosphere in small quantities. The resulting loss has to be compensated for from time to time by topping up. With dry storage the diffusing KCL forms salt crystals on the diaphragms and on the filling orifices. These deposits can be rinsed off without any misgivings.

For storing, the KCL-filled watering cap is just as suitable as a vessel filled with water. Basically drinking water is suitable, however a KCL solution which can be diluted to 1:10 by desalinated water is better. Distilled water is not suitable for storing purposes. Electrodes which have a liquid electrolyte have the advantage of being more accurate, they also have a longer service life and can be used practically in most applications. If the setting rate decreases after prolonged use then it can be improved frequently by using reactivating powder (Type Nr. 3902).

pH Electrodes which have a paste electrolyte

Such electrodes, also referred to as “gel-electrodes” are filled with KCL paste (gel). As this paste does not diffuse the electrodes do not have to be refilled. They do not have a filling orifice. They are the most favourably priced alternative to the laboratory electrode with limitations regarding the service life and the measuring accuracy. For storing it is recommended that the watering cap be filled with KCL.

Subsequent to dry storing the pH electrodes are only ready for use again after having been soaked for several hours.

The influence of the temperature on pH electrodes

With regard to the electrical potential which they produce pH electrodes are not only dependent on the pH value but also on the temperature.

The influence of the temperature is compensated for on the »pH24« by setting the temperature of the liquid.

The service life of pH electrodes

Even if they are well maintained pH electrodes have a limited service life which depends essentially on the operating conditions.

The »pH24« gives notification of a spent electrode by means of a »buf« or »CAL« indication

Buffer solution

Buffer solutions are used for calibrating and they are well protected against changes in the pH value. All the same the electrodes have to be thoroughly rinsed before being immersed in the buffer solution. Buffer solutions are themselves dependent on the temperature and this is catered for by the processor in the instrument. In order to make very precise measurements it is recommended that the temperature of the solutions be raised to 25°C.

Each »pH24« measuring instrument is provided with 50 ml of pH 4,00 buffer solution and 50 ml of pH 7,00 buffer solution. This quantity is sufficient for carrying out a maximum of 15 (fifteen) calibrations after which it is to be replenished. It is recommended that a supply quantity each of 250ml (type Nr. 3614/3617) or 1 liter (type Nr. 3624/3627).

In so far that measurements are taken predominantly in the alkaline range it is recommended that a buffer solution of pH 9,21 (25°C) be procured.

Battery

A spent battery is signified by means of the indication »LOBAT«. In order to exchange the battery (9V) open the battery compartment by loosening the two screws. Then re-tighten the screws securely in order to guarantee that the compartment remains watertight.

Guarantee

The instrument (without electrode) is guaranteed for a period of three years after the date of purchase.

The guarantee for the standard laboratory electrode with a liquid electrolyte is one year after the date of purchase.

The guarantee includes the no-charge repair in the event of flaws in the materials of faulty workmanship.

The prerequisite for a guarantee claim is the correct handling and storage of the instrument. Musytec[®] Abt. bischof Messgeräte is not liable for damage which results from the use of the instrument.

The guarantee becomes null and void if the instrument was opened.

Service

If the instrument has to be returned for repair then it is recommended that the complete measuring set be returned.

Note

The pH-Meter as well as the electrodes and the auxiliary solutions are to be kept out of the reach of children.

Please dispose of spent electrodes and batteries in a way which is compatible with the environment.

pH buffer solutions as well as KCL solutions supplied by Musytec® Abt. bischof Messgeräte do not require any special form of disposal.

Notifications of Faults

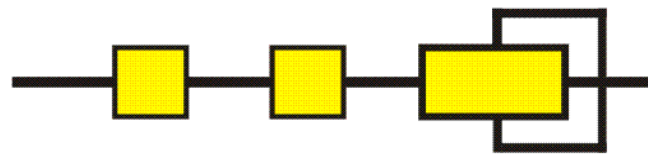
Or	The electrode is not connected or the lead to the electrode is broken (discontinuity)
CAL blinks	The calibration was interrupted with „MODE“ or the electrode is defective. <u>Assistance:</u> Repeat the calibration/exchange the electrode
buf	Faulty buffer solution or defective electrode. <u>Assistance:</u> Renew the buffer solution and check the coincidence with the buffer values in the indication. Exchange the electrode.
LOBAT	The battery is spent. Insert a new battery.
MEM	The instrument is defective. Return it for repair.

Technical Details

Measuring range:	pH 0.00 – 14.00
Resolution:	0.01 pH
Input resistance:	10 ¹² Ohm min.
Input current:	2pA max.
Electrode adaption:	Automatic
Temperature compensation:	manual 0 – 50°C
Socket:	BNC
Battery:	9V 6F22
Battery check:	Automatic in the indication
Electrode check:	Automatic in the indication
Ambient temperature:	0 – 45°C
EMV Emitted interference	EN 50081-1 Basic specification
EMV Interference stability	EN 50082-1 Basic specification

Recorded Buffer Values

Temp	7,00	4,00	9,21	1,68	2,00	4,01	6,87	10,00	12,45
0°	7,12	4,01	9,52	1,67	2,01	4,00	6,98	10,26	13,42
5°	7,09	4,01	9,45	1,67	2,01	4,00	6,95	10,17	13,21
10°	7,06	4,00	9,38	1,67	2,01	4,00	6,92	10,11	13,00
15°	7,04	4,00	9,32	1,67	2,00	4,00	6,90	10,05	12,81
20°	7,02	4,00	9,26	1,68	2,00	4,00	6,88	10,00	12,63
25°	7,00	4,00	9,21	1,68	2,00	4,01	6,87	9,94	12,45
30°	6,99	4,01	9,16	1,68	2,00	4,02	6,85	9,89	12,29
40°	6,97	4,03	9,06	1,69	2,00	4,04	6,84	9,82	11,98
50°	6,97	4,06	8,99	1,71	2,00	4,06	6,83	9,74	11,71



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