

HAND HELD pH METER

MS2000-pH, MS2012-pH



TECHICAL DESCRIPTION AND INSTRUCTIONS FOR USAGE

PLOVDIV 2002

I. DESIGNATION

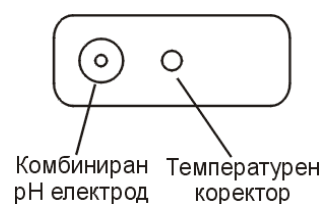
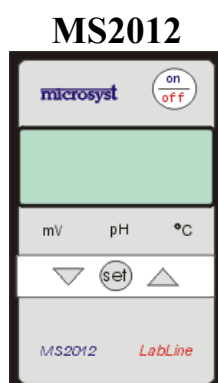
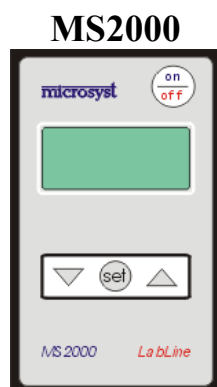
The hand held instruments MS2000-pH and MS2012-pH are designed for measurement of the activity of the hydrogen ions (pH) and the temperature in the analyzed solution. They also can be used as high-resistant millivoltmeters.

The high accuracy, combined with little dimensions and weight make them unique in the cases, when you need quick analysis of the pH during the work, far from the chemical laboratory, in field conditions.

II. TECHNICAL DATA

	MS2000-pH	MS2012-pH
Range and accuracy of measurement	pH -2.00 ... 16.00 / ± 0.01 °C 0.0 ... 100.0 / ± 0.1 mV -700 ... 700 / ± 0.3	
Input resistance	> 10 ¹² Ω	
Temperature compensation	Automatic (Pt1000) or Manual	
Calibration	Automatic, with memorizing at switching off of the power supply	
Buffers for calibration	pH 1.68, 3.78, 4.01, 6.86, 9.18, 12.45 NBS (DIN 19266) - automatic All the other buffers in the range 0.00 ... 14.00 pH	
Accuracy at temperature correction of the calibrating buffers for NBS standard	± 0.003	
Isopotential of electrode system	7 (±1) pH; 0 (±74.04) mV	
Display	LCD 2 x 8 letter-digit	LCD 3 ½ digits
Operating Temperature	0 ... 50 °C	
Operating Relative Humidity	< 85 % RH	
Power Supply	9 V battery	
Overall dimensions (WxHxL)	100 x 65 x 25 mm	
Weight	max 200 g	

III. FRONT, BACK PANEL AND BUTTONS





- Switching ON /OFF of the instrument
- Refuse from operating mode CALIBRATION, return step back



- Start operating mode CALIBRATION
- Pass to operating mode CALIBRATION
- Confirm the correction (ENTER)



- Select work screen pH, mV, °C
- Increase the set-pointed value



- Select work screen pH, mV, °C
- Decrease the set-pointed value

IV. INSTRUCTIONS FOR USAGE

1. General instructions

- 1.1. For precise measurement you have to observe all technological rules for correct measurement
- 1.2. The storage, the preparation for work and the usage of the electrodes and the buffer solutions is realized according to the requirements of the company producer
- 1.3. Before usage the instrument must be tuned to nominal operating conditions, according to the technical data

2. Preparation for work

- 2.1. The jacks of the temperature and the combined pH electrodes must be switched on to the jacks of the instrument
- 2.2. pH electrode must be prepared according to its passport
- 2.3. The temperature electrode does not require special preparation


3. General instructions for washing of the electrodes

- 3.1. The glass membrane and the internal surface of the electrode must be washed well with distilled water
- 3.2. The pH electrode must be dried by filter paper ONLY from its outer side. Do not rub the spherical membrane
- 3.3. In the measuring container must be poured approximately 5 ml of the next solution for analysis – buffer or sample
- 3.4. The electrodes must be dipped in the liquid
- 3.5. The solution must be stirred energetically by spinning motion for approximately 10 seconds, so the liquid must wet well the glass membrane
- 3.6. After this procedure the pH electrode is prepared for measurement and it must be dipped in the measured solution
- 3.7. The electrodes must remain dipped in the liquid for approximately 30 seconds, after that the reading of the data can be realized

* For a new measurement you have to repeat points 3.1. to 3.7.


* It is recommended the washing of the pH electrodes to be realized by special sprayer, loaded with deionized water

V. SWITCHING ON / SWITCHING OFF OF THE INSTRUMENT

-  – Switching on – press only once
- Switching off – press and hold for 3 sec

VI. OPERATING MODE “MEASUREMENT”




In operating mode MEASUREMENT on the display appear two of the three parameters – pH, mV, °C for model MS2000-pH or one of them for MS2012-pH.

-  – These buttons change the parameters indicated on the display

VII. TEMPERATURE COMPENSATION

MS2000-pH and MS2012-pH are with automatic or manual temperature correction of the value of pH. The instrument recognizes if sensor Pt100 is switched on and changes the operating mode - automatic (with Pt100 sensor) or manual (without Pt100 sensor).

If on the display there is a flashing “°C” for model MS2000-pH or flashing decimal point for model MS2012-pH, the instrument is in operating mode of MANUAL TEMPERATURE CORRECTION. In this status the user can set-point the temperature of the measured fluid.

-  – Press only once. Flashing marker appears
-  – Change the value of the temperature
-  – Confirm the input value of the temperature. The instrument automatically passes to operating mode MEASUREMENT

VIII. SELECT STANDARD CALIBRATING SOLUTIONS

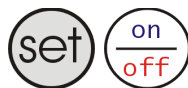
MS2000-pH and MS2012-pH provide automatic temperature correction of pH by standard calibrating buffers of NBS standard (1.68, 3.78, 4.01, 6.86, 9.18, 12.45 pH) and all the rest buffers 0.00 ... 14.00 pH - “Free” standard (but their values must be set-pointed by the user).



Press and hold this button



Press to switch on the instrument



Release the buttons



- Select calibrating standard
- **nbS** or **FrE** for MS2012
- **Buff Set NBS** or **Buff Set Free** for MS2000



Confirm the selected standard

The instrument passes to operating mode
MEASUREMENT

IX. SENSITIVITY, ASYMMETRY AND ERRORS



Pressing and holding this button in operating mode
MEASUREMENT on the display is read sensitivity – SLP



Pressing and holding this button in operating mode
MEASUREMENT on the display is read asymmetry – AST

The range of the admissible significances for sensitivity and asymmetry is:

$$30.0 < \text{SLP} < 65.0 \text{ mV/pH}$$



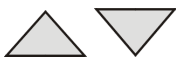


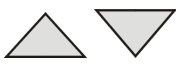


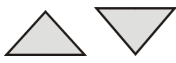


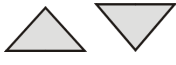

$$5.00 < \text{AST} < 9.00 \text{ pH}$$

An error may appear after the measurement of the sensitivity – SLP and the asymmetry - AST of the electrode system, if one of the two parameters is out of the range of the admissible significances. In that case on the display appears “---“.


Probable reasons for errors:

- Discrepancy of the set-pointed value of the calibrating buffer and the solution in the measuring container.
- Defective electrode system
- Fault of the connection of the electrode system

X. OPERATING MODE “CALIBRATION”

Stage	Display		Buttons	Operation
	MS2000	MS2012		
Stage 1				Press and hold for 3 sec
Stage 2	Load Buffer	bF1		Load the first calibrating buffer in the measuring container, as point IV. 3 is kept.
Stage 3				Press it to confirm
Stage 4	Buffer XX.XX	XX.XX		Set-point the value of the first calibrating buffer
Stage 5				Press it to confirm the input value
Stage 6.1*		°C		Press it to confirm. Only for model MS2012
Stage 6.2*	°C XX.X	XX.X		Set-point the value of the temperature of the measured solution
Stage 6.3*				Press it to confirm the input value
Stage 7	Wait			Auto Read – Wait! Data calculation. The instrument automatically passes to the next stage
Stage 8	Change Buffer	bF2		Change the calibrating buffer as point IV. 3 is observed
Stage 9				Press it to confirm (Stage3)
Stage 10	Buffer XX.XX	XX.XX		Set-point the value of the second calibrating buffer (Stage 4)
Stage 11				Press it to confirm the input value (Stage 5)
Stage 12.1*		°C		Press it to confirm. Only for model MS2012 (Stage 6.1*)
Stage 12.2*	°C XX.X	XX.X		Set-point the value of the temperature of the measured solution (Stage 6.2*)
Stage 12.3*				Press it to confirm the input value (Stage 6.3*)
Stage 13	Wait			Auto Read – Wait! Data calculation. The instrument automatically passes to operating mode MEASUREMENT

Attention:

- * You can return to operating mode MEASUREMENT by pressing button , before you have reached Stage 5.
- * If the temperature electrode is switched on, stages 6 and 12 drop off.

XI. DETERMINATION OF THE PARAMETERS OF THE ELECTRODE SYSTEM

The methods aim at determination the coordinates of the isopotential system in mV and of the real temperature coefficient. So it is necessary to take down the potential from the electrode system, corresponding to two buffer solutions at two temperatures, supported by thermostat.

- Isopotential of the electrode system:

$$E_0 = \frac{(E_2 - E_1) * (pH_3 * E_4 + pH_4 * E_3) - (E_4 - E_3) * (pH_1 * E_2 + pH_2 * E_1)}{(pH_4 + pH_3) * (E_2 - E_1) - (pH_2 + pH_1) * (E_4 - E_3)}$$

- Real temperature coefficient:

$$F = \frac{[(E_4 - E_3)/(pH_3 - pH_4) - (E_2 - E_3)/(pH_1 - pH_2)]}{(t_2 - t_1)},$$

where:

t_1 – value of the first temperature in °C

t_2 – value of the second temperature in °C

pH_1 – value of the first buffer solution at t_1

pH_2 – value of the second buffer solution at t_1

pH_3 – value of the first buffer solution at t_2

pH_4 – value of the second buffer solution at t_2

E_1 – potential of the electrode system in mV for pH_1 at t_1

E_2 – potential of the electrode system in mV for pH_2 at t_1

E_3 – potential the electrode system in mV for pH_1 at t_2

E_4 – potential of the electrode system in mV for pH_2 at t_2

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