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773 pH/mV Simulator

Instructions for Use

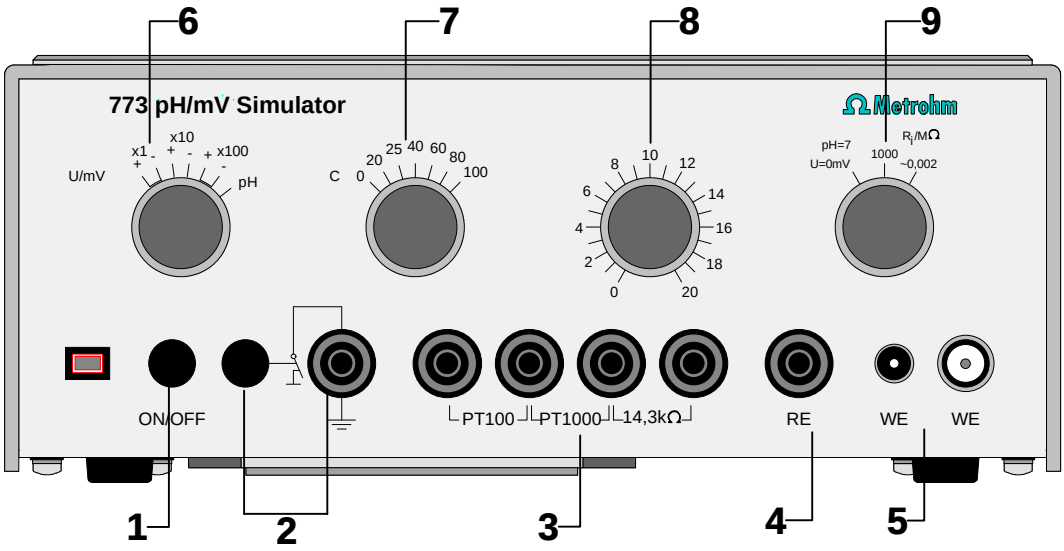
8.773.1003

99.11 ti

Table of Contents

1 Overview

1.1 Instrument



1 **On/Off switch** (with pilot lamp)
The instrument switches itself off automatically after 50 minutes.

2 **Test of insulation resistance**

3 **Sockets for checking the temperature measuring input, polarization sources and conductivity meters**

4 **Socket for the reference electrode (RE)**

5 **Sockets for the working electrode (WE)**

6 **Selection switch for measured quantity**

7 **Temperature compensation for pH measurement**

8 **Measurement switch**

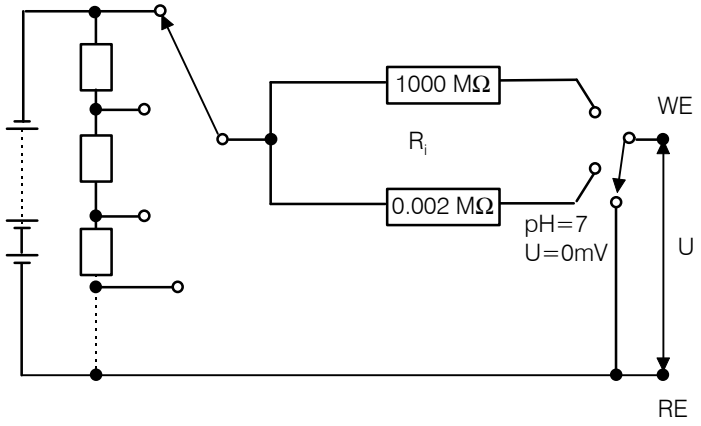
9 **Impedance switch: Simulation of the electrode impedance**

Table on top panel with exact notation of measured values.
Battery compartment on the bottom panel (rear panel for series 2).
Type plate on rear panel.

1.2 Purpose

With the 773 pH/mV Simulator, instruments which measure potentials can be aligned and checked, e.g. Titrinos, Titroprocessors, pH meters, ion meters, etc. In addition, the input impedance of the measuring amplifier and the insulation resistance of the accompanying cable can be checked. The temperature measuring input, the measuring input for polarized electrodes (Ipol) and conductivity meters can also be checked.
The Simulator produces a pH value or a potential value in the range from pH = ± 20.000 and U = ± 2000.00 mV respectively.

1.3 Circuit diagram

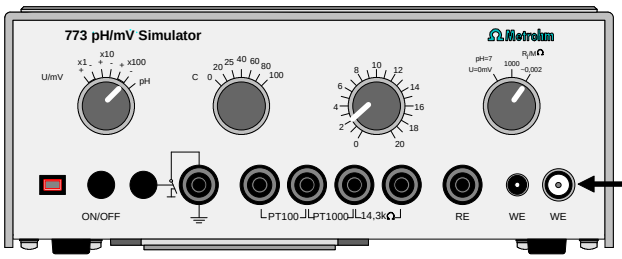


2 Operation

Before you use the instrument for the first time you must insert the batteries. The battery compartment is found on the bottom panel of the instrument. Press the battery compartment tongue downwards to open the compartment. Insert the 4 batteries (Mignon 1.5V-LR6) according to the diagram in the battery compartment (take care that the plus poles are in the correct position!).
The instrument switches itself off automatically after 50 minutes operation.
In order to avoid incorrect measurements resulting from exhausted batteries, the 773 pH/mV Simulator switches itself off when the voltage is insufficient. The batteries must then be replaced. The batteries have a working life of approx. 1 to 2 years (depending on use).

Checking the pH
Microprocessor-controlled pH meters and titrators measure U/mV and pH via the same analog measuring input as a potential value. They then calculate the pH from it by using the pH calibration parameters and the temperature. The processor system is checked each time that the instrument is switched on so that it is virtually impossible that this conversion could be incorrect and not be noticed. This means that for microprocessor-controlled instruments only the potential U/mV needs to be checked. Neither the pH nor the temperature compensation requires checking. This has the advantage that the calibration parameters do not need to be set to standard values.

2.1 Aligning/Checking the potential U/mV



1. Connect the socket "WE" of the 773 pH/mV Simulator with the measuring input of the instrument with the 6.2150.040 Cable.
   For instruments with an E-plug (e.g. 670, 636) use the 6.2150.030 Cable.
   For checking the instrument and its electrode cable:
   Screw off the cable from the sensor and insert it in socket "WE" of the 773 pH/mV Simulator.
   If you normally work with separate electrodes then remove the cable from the reference electrode and insert it in socket "RE" of the 773.
2. Switch on the 773 pH/mV Simulator; the pilot lamp lights up.
3. Set the instrument to be checked to "Measure U".
4. Select the required factor and sign for U (switch 6).
   Example with measurement switch on "2":

Switch setting	Measured value
+ x1	2 mV
- x100	-200 mV

5. Set impedance switch R_i to 0.002 MΩ.
6. Set the required value with the measurement switch and read off the measured value on the instrument being checked.
   Compare this measured value with the value given in the table.
   Please take into account both the resolution of your instrument's display and the information about tolerances given in the 'Instructions for Use' for your instrument.
7. Set impedance switch R_i to 1000 MΩ. The measured value on the instrument being checked should differ from the value obtained in step 6 by less than 1 mV.
   Examples:

Set on pH Simulator	Read off on instrument
1500 mV, Ri= ≈ 0.002 MΩ	1495 mV
1500 mV, Ri= 1000 MΩ	1494.9 mV
⇒ alignment poor, high-impedance OK.	

Set on pH Simulator	Read off on instrument
1500 mV, Ri= ≈ 0.002 MΩ	1500 mV
1500 mV, Ri= 1000 MΩ	1494.9 mV
⇒ alignment OK, high-impedance poor. Check the electrode cable!	

Note: the value 0 mV can also be set directly with switch (9) (setting 0 mV).

2.2 Aligning/Checking the pH

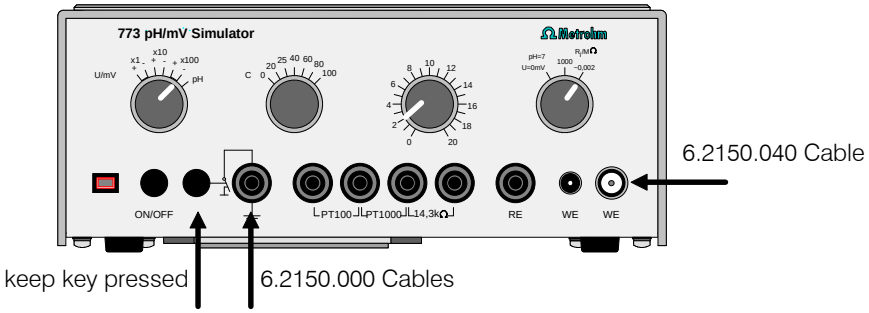
1. Connect the socket "WE" of the 773 pH/mV Simulator with the measuring input of the instrument with the 6.2150.040 Cable.
   For instruments with an E-plug (e.g. 670, 636) use the 6.2150.030 Cable.
   For checking the instrument and its electrode cable:
   Screw off the cable from the sensor and insert it in socket "WE" of the 773 pH/mV Simulator.
   If you normally work with separate electrodes then remove the cable from the reference electrode and insert it in socket "RE" of the 773.
2. Switch on the 773 pH/mV Simulator; the pilot lamp lights up.
3. Set slope = 1 and pHas = 7 on the instrument to be checked.
4. Set the instrument to be checked to "Measure pH".
5. Select "pH", (switch 6).
6. Set impedance switch R_i to 0.002 MΩ.
7. Select the temperature on the 773 pH/mV (switch 7). It must be the same as the measuring temperature of the instrument being tested.
8. Set the required value with the measurement switch and read off the measured value on the instrument being checked.
   Compare this measured value with the value given in the table.
   Please take into account both the resolution of your instrument's display and the information about tolerances given in the 'Instructions for Use' for your instrument.
9. Set impedance switch R_i to 1000 MΩ. The measured value on the instrument being checked should differ from the value obtained in step 8 by less than pH=0.01.
   Examples:

Set on pH Simulator	Read off on instrument
pH=2, Ri= ≈ 0.002 MΩ	pH=1.97
pH=2, Ri= 1000 MΩ	pH=1.95
⇒ alignment poor, high-impedance OK.	

Set on pH Simulator	Read off on instrument
pH=2, Ri= ≈ 0.002 MΩ	pH=2.00
pH=2, Ri= 1000 MΩ	pH=1.95
⇒ alignment OK, high-impedance poor. Check the electrode cable!	

Note: pH 7 can also be set directly with switch (9) (setting pH = 7).

2.3 Checking the insulation of the separate reference point

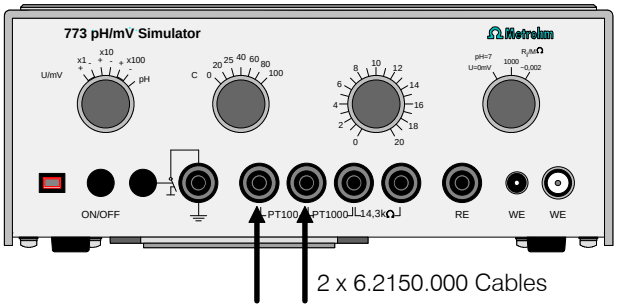


1. Set up the instruments as for checking the U value.
2. In addition connect the earthing socket of the 773 pH/mV Simulator with the earthing socket of the instrument being checked.
   For instruments with earthed measuring inputs (e.g. Titrinos) this check is irrelevant.
3. On the 773 pH/mV Simulator press the key beside the earthing socket and keep it pressed until the measured value drift is stable.
   The measured value with the key depressed should not differ by more than 2 mV from the value obtained without pressing down the key.

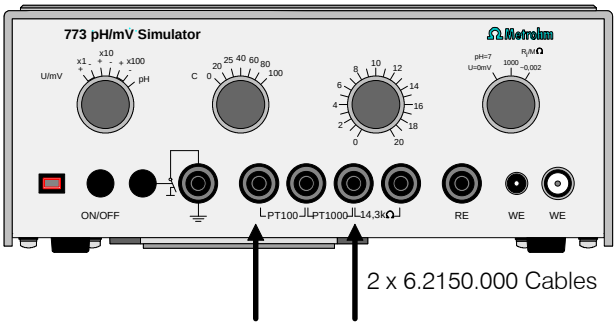
2.4 Checking the temperature compensation for pH measurements

1. Set up the instruments as for checking the pH.
2. Set pH 13 on the 773 pH/mV Simulator.
3. Set the measuring temperature of the instrument being checked to 0 °C. Set the temperature on the 773 pH/mV Simulator to 0 °C as well.
   The measured value must only vary within the given tolerances. These tolerances can be found in the ‘Instructions for Use’ of the instrument being checked.
4. Carry out the same check at 100 °C.

2.5 Checking the temperature measuring input T/°C



1. Connect the sockets "PT100" and "PT1000" of the 773 pH/mV Simulator with the temperature measuring input of the instrument with separate 6.2150.000 Cables.
   For instruments with DIN plugs (e.g. 670, 636) use 6.2150.010 Cable.
2. Set the instrument being checked to temperature measurement. The measured value should be approx. 0 °C (exact value given in the table - field PT100/T and PT1000/T).
3. Plug the cables into the 773 pH/mV Simulator as follows:

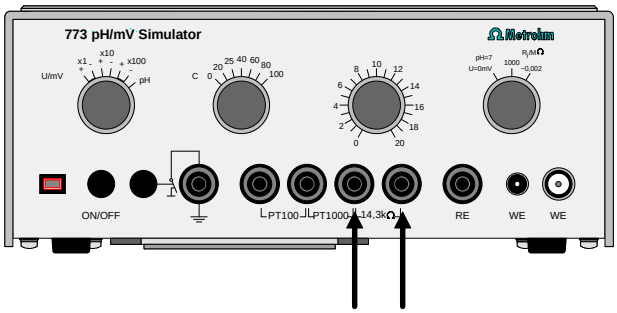


   The measured value should be approx. 25 °C (exact value given in the table - field Add.data, red).
   This check is not possible for instruments which can only measure with Pt100 (e.g. 670, 636).

Please take into account both the resolution of your instrument's display and the information about tolerances given in the 'Instructions for Use' for your instrument.

2.6 Checking the polarization source

For microprocessor-controlled instruments it is better to check the polarization source with the aid of the instrument diagnosis; please refer to the 'Instructions for Use' of the instrument or titrator. The cable connections are shown below.



6.2150.050 Cable

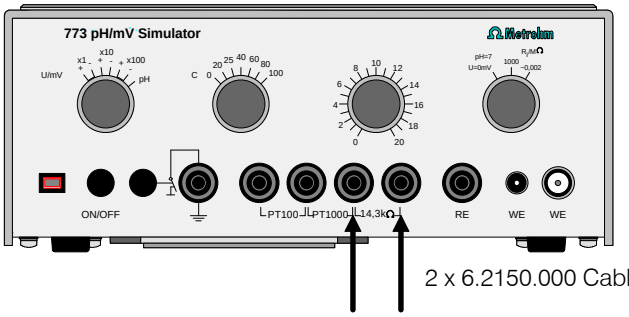
If no diagnosis instructions are available please proceed as follows:

1. Connect the sockets "14.3 kΩ" of the 773 pH/mV Simulator with the Pol measuring input of the instrument being checked with 6.2150.050 Cable.
   For instruments with banana plugs (e.g. 692) use 6.2150.000 Cables.
2. Set the instrument being checked to measurement with polarized electrodes (Ipol).
3. The measured value depends on the polarization current and is calculated as follows:
   U = R x I = 14.3 kΩ x set polarization current
   Example with Ipol = 1 uA:
   Measured value U = 14.3 kΩ X 1 uA = 14.3 mV

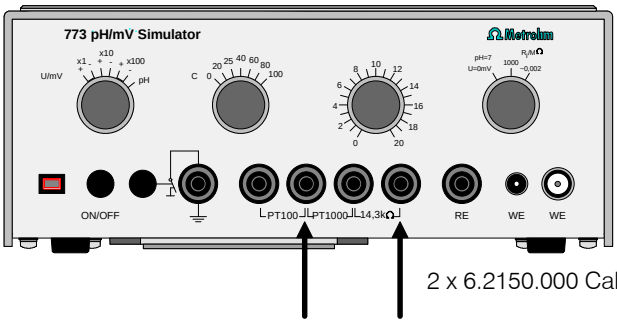
   The polarization potential source Upol can be checked similarly. The measured value is calculated from
   I = U/R

The exact values for the resistances can be found in the table on the upper side of the instrument (field R-Test / R). Please take into account both the resolution of your instrument's display and the information about tolerances given in the 'Instructions for Use' for your instrument. With low values for the polarization current or potential the variations may be slightly higher.

2.7 Checking conductivity meters



1. Connect the sockets "14.3 kΩ" of the 773 pH/mV Simulator with the measuring input of the instrument with the two 6.2150.000 Cables.
2. Note the values for the cell constant and the temperature set on the instrument being checked. Set cell constant = 1 and the reference temperature which is valid for the instrument (20 or 25 °C).
3. Set the instrument being checked to "Measure conductivity".
4. The value should be approx. 70 uS (exact value in the table - field R-Test / G).
5. If you are using the "Pt100" sockets of the 773 pH/mV Simulator then the measured value should be approx. 10 mS (= 10 000 uS) (exact value in the table - field Pt100 / G).
   For the "Pt1000" sockets the measured value should be approx. 1 mS (1000 uS) (exact value in the table - field Pt1000 / G).
6. Now use the following sockets:

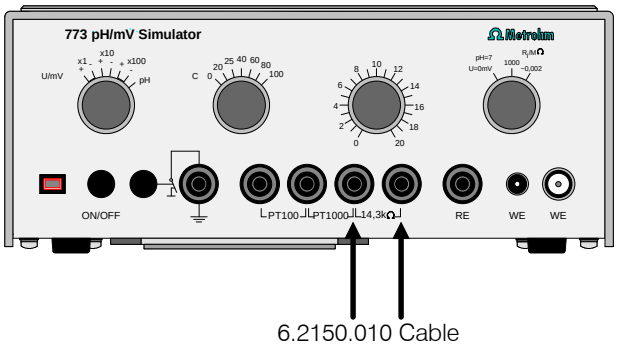


   The measured value should be approx. 65 uS (exact value in the table - field Add.data, green).
7. Reset the actual values for the cell constant and temperature on the instrument being checked.

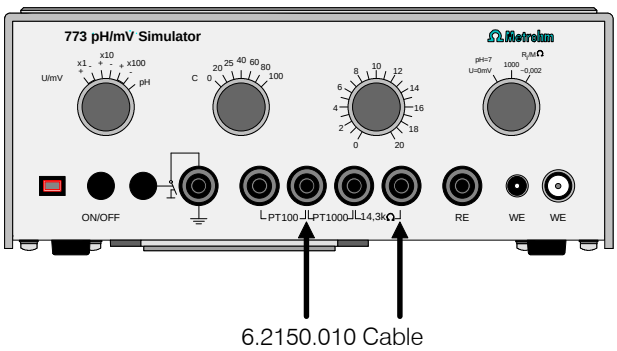
Please take into account both the resolution of your instrument's display and the information about tolerances given in the 'Instructions for Use' for your instrument.

2.8 Checking the 617 and 679 Rancimats

The measurement of the conductivity and the presentation on the printer can be checked channel by channel. The conductivity is read off from the display.
The temperature of the heating block is not important. It may be necessary to create the starting condition (for 679 T> 50 °C).



1. Connect the socket "14.3 kΩ" of the 773 pH/mV Simulator with the measuring input of the Rancimat with the 6.2150.010 Cable.
2. Note the cell constant and the printer settings. Set the cell constant to 1 and make the following printer settings:
   cond.range 20 uS/cm
   paper feed 20 cm/h
   Press <Start> on the Rancimat.
3. The measured value should be approx. 70 uS (exact value in the table - field R-Test / G).
   Allow each channel to print out 2-3 times.
4. When the printer is not printing out an active channel make the following connections:



   The measured value should be approx. 65 uS (exact value in the table - field Add.data / green).
   Allow each channel to print out 2-3 times again.
5. Repeat steps 3 and 4 for all channels.
6. Measure the alteration in conductivity in the Rancimat printout.
7. Reset the actual values for the cell constant and printer settings on the Rancimat.

3 Appendix

3.1 Technical data

Simulated pH values

Range ..... pH = 0...20
Divisions ..... ΔpH = 1

Temperatures for pH compensation ..... 0, 20, 25, 40, 60, 80, 100 ° C

Simulated potential values

Range	Divisions
U = 0...20 mV	ΔU = 1 mV
U = 0...200 mV	ΔU = 10 mV
U = 0...2000 mV	ΔU = 100 mV

Turn-on transient

1...10 minutes after switch-on: typically 25 x 10^{-6}

Influence of ambient temperature

Range	Typically
U = ±0...20 mV	100 x 10^{-6}/K
U = ±0...200 mV	20 x 10^{-6}/K
U = ±0...2000 mV	15 x 10^{-6}/K

Longterm stability (2 years)

Voltage source (pH/mV) ..... < 0.3 ‰
Resistance for temperature check ..... < 2 ‰

Source resistances

at U = 0 mV or pH = 7 ..... < 1 Ω
Ri = 1000 MΩ ± 20 %
Ri ~ 0.002 MΩ between -20 ... +20 mV ..... max. 2.2 kΩ
-200 ... +200 mV ..... max. 1.8 kΩ
-2000 ... +2000 mV ..... max. 600 Ω

Power supply

4 Mignon 1.5V-LR6 batteries; 2200 mAh
Working life 1-2 years
Automatic switch-off after 50 minutes
In order to avoid incorrect measurements resulting from exhausted batteries the pH/mV Simulator switches itself off when the voltage is insufficient.

Ambient temperature

Nominal working range ..... 0...+50 ° C
Storage and transport ..... -40...+70 ° C

General construction

Safety specifications according to IEC 1010/EN61010-1, class 3
IP 40

Dimensions

Width 225 mm
Height 90 mm
Depth 95 mm

Weight ..... 1.5 kg

3.2 Warranty and certificates

3.2.1 Warranty

The warranty regarding our products is limited to rectification free of charge in our workshops of defects that can be proved to be due to material, design or manufacturing faults which appear within 12 months from the day of delivery. Transport costs are chargeable to the purchaser.
For day and night operation, the warranty is valid for 6 months.
Glass breakage in the case of electrodes or other glass parts is not covered by the warranty. Checks which are not a result of material or manufacturing faults are also charged during the warranty period.
For parts of outside manufacture insofar as these constitute an appreciable part of our instrument, the warranty stipulations of the manufacturer in question apply.
With regard to the guarantee of accuracy, the technical specifications in the Instructions for Use are authoritative.
Concerning defects in material, construction or design as well as the absence of guaranteed features, the purchaser has no rights or claims except those mentioned above.
If damage of the packaging is evident on receipt of a consignment or if the goods show signs of transport damage after unpacking, the carrier must be informed immediately and a written damage report demanded. Lack of an official damage report releases METROHM from any liability to pay compensation.
If any instruments and parts have to be returned, the original packaging should be used if at all possible. This applies above all to instruments, electrodes, buret cylinders and PTFE pistons. Before embedment in wood shavings or similar material, the parts must be packed in a dustproof package (for instruments, use of a plastic bag is imperative). If open assemblies are enclosed in the scope of delivery that are sensitive to electromagnetic voltages (e.g. data interfaces etc.) these must be returned in the associated original protective packaging (e.g. conductive protective bag). (Exception: assemblies with built-in voltage source belong in a non-conductive protective packaging). For damage which arises as a result of non-compliance with these instructions, no warranty responsibility whatsoever will be accepted by METROHM.

3.2.2 Maintenance

We recommend that you have the instrument serviced by the Metrohm Service Department at intervals of 2 years. Send it packed in its case together with the cables supplied with it.

3.2.3 Certificate

Certificate of Conformity and System Validation

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity:	773 pH/mV Simulator
Name of manufacturer:	Metrohm Ltd., Herisau, Switzerland

This Metrohm instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission

EN50081-1/92, EN55022/class B, EN55011/class B — Generic emission

Electromagnetic compatibility: Immunity

EN50082-2/95 — Immunity
IEC1000-4-2/95/class 3 — Static discharge
IEC61000-4-3/95, ENV50204/93/class 3 — Radiated rf electromag.field immunity

Security specifications

IEC1010 class3, EN61010 class3, UL3101-1, EN60947:IP40

The technical specifications are documented in the instruction manual.

Metrohm Ltd. is holder of the SQS certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

Herisau, September 23, 1999

Dr. J. Frank	Ch. Buchmann
Development Manager	Production and Quality Assurance Manager

Ionenanalytik • Analyse des ions • Ion analysis • Análisis iónico
773 pH/mV Simulator

CE

EU Declaration of Conformity

The company Metrohm AG, Herisau, Switzerland, certifies herewith, that the following instrument:

773 pH/mV Simulator

meets the CE mark requirements of EU Directives 89/336/EWG and 72/23/EWG.

Source of specifications:

EN 50081-1	Electromagnetic compatibility, basic specification Emitted Interference
EN 50082-2	Electromagnetic compatibility, basic specification Interference Immunity
EN 61010	Safety requirements for electrical laboratory measurement and control equipment

Description of apparatus:

Instrument which produces exact voltage values for aligning and control of pH/voltage measuring devices.

Herisau, September 23, 1999

Dr. J. Frank	Ch. Buchmann
Development Manager	Production and Quality Assurance Manager

3.3 Scope of supply and ordering information

773 pH/mV Simulator 2.773.0010
including the following accessories:

1 Set of batteries, type 1.5V-LR6, 4 pcs 6.2133.000
2 Cables plug B/plug B 6.2150.000
1 Cable 2 x plug B/plug DIN 6.2150.010
1 Cable plug head G/plug E 6.2150.030
1 Cable plug head G/plug F 6.2150.040
1 Cable plug F/2 x plug B 6.2150.050
1 Case 6.2716.030
1 Instructions for Use for 773 pH/mV Simulator 8.773.1003
1 Certificate for 773 Simulator

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