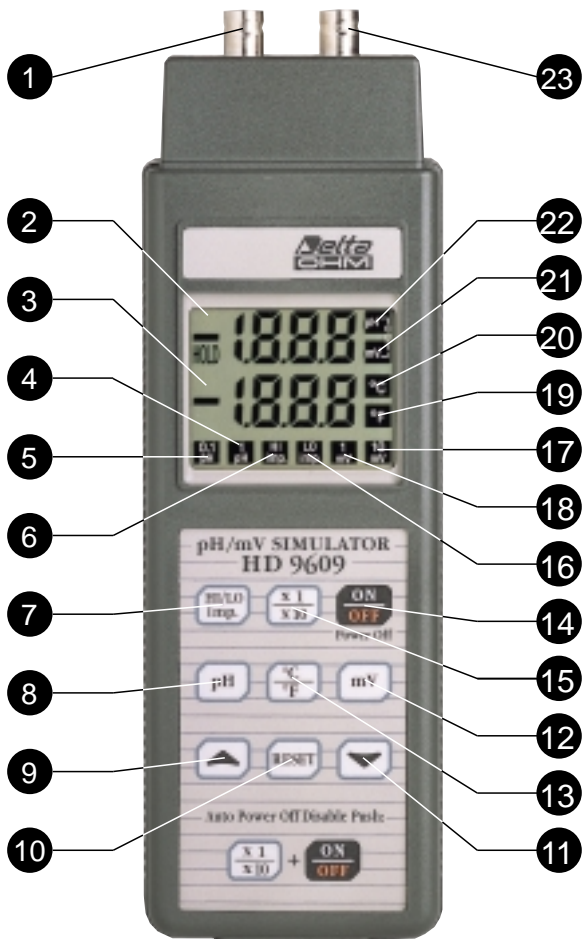


# HD 9609

## INSTRUCTIONS MANUAL



# HD 9609



# HD 9609

pH, mV SIMULATOR

ENGLISH

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1. Female BNC (output A). Simulation signal output for the transmitter or instrument in test mode.

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  2. LCD display.

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  3. Battery symbol.

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  4. 1 pH symbol. Indicates the active increase value in pH simulation.

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  5. 0.1 pH symbol. Indicates the active increase value in pH simulation.

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  6. HI Imp. symbol. Active when the instrument presents an output impedance of  $1G\Omega$ .

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  7. HI/LO Imp key. Selects the instrument output impedance ( $1G\Omega/100K\Omega$ ).

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  8. pH key. Activates the instrument for pH simulation.

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  9. ▲ key. Increases the simulation values.

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  10. Reset key. Activates reset status during simulation or for the compensation temperature.

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  11. ▼ key. Decreases the simulation values.

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  12. mV key. Activates the instrument for mV simulation.

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  13. °C/°F key. Selects the measuring unit of the compensation expressed in degrees Celsius or in degrees Fahrenheit.

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  14. ON/OFF key. Switches the instrument on and off.

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  15. x1/x10 key. Selects the increase or decrease value for the quantity being simulated.

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  16. LO Imp. symbol. Active when the instrument presents an output impedance of  $100K\Omega$ .

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  17. 10 mV symbol. Indicates the active increase value in mV simulation.

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  18. 1 mV symbol. Indicates the active increase value in mV simulation.

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  19. °F symbol. Indicates that the active measurement unit for the compensation temperature is in degrees Fahrenheit.

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  20. °C symbol. Indicates that the active measurement unit for the compensation temperature is in degrees Celsius.

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  21. mV symbol. Indicates that the instrument is performing mV simulation.

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  22. pH symbol. Indicates that the instrument is performing pH simulation.

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  23. Female BNC connector (output B). Low impedance output for instrument calibration.
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## GENERAL CHARACTERISTICS

The simulator HD 9609 is a portable instrument for checking and calibrating pH and mV measuring instruments. The characteristics of this instrument satisfy any checking and calibrating requirements for both portable and panel-mounted instruments; it may be used in laboratories, in industry or for checks in the field.

Despite its many functions, the instrument is simple to use: a large display, with dual indication, and a series of symbols allow it to be used even by unskilled personnel.

The HD 9609 sends to output in channel A the simulation of signals of an electrode for measuring pH, ORP, ISFET, in the range:

- 0 to 14 pH, with resolution 0.10 pH;
- $\pm 1999$  mV, with resolution 1 mV.

The user may choose between two output impedance values:

- 100 K $\Omega$ , low impedance;
- 1G $\Omega$ , high impedance.

The simulation of the electrode compensation temperature is manually programmed in the range from -20°C to +150°C, while the temperature is measured in degrees Celsius or Fahrenheit.

The pH simulation values may be manually set as desired, in steps of 0.1 or 1 pH.

The mV simulation values may be manually set as desired, in steps of 1 or 10 mV.

The HD 9609 is fed with an ordinary 9 Vdc alkaline battery.

The electronics are housed in a sturdy ABS case with ergonomic lines.

In designing and making the instrument, each detail has been assessed and selected in order to provide an instrument with high performance and excellent long-term measurement stability.

On request, the instrument may be certified by a SIT centre or by another centre recognized by the WECC.

## INSTRUMENT OPERATION



### ON/OFF key

Press this key repeatedly to switch the instrument on or off.


The instrument has a cut-out system (Auto Power

Off) which switches off automatically after about 8 minutes of inactivity.



### **x1/x10 + On/Off key**

If the x1/x10 key is pressed together with the ON/OFF key when switching on, the Auto Power Off function is deactivated. In this case the instrument does not use the Auto Power Off function and can be switched off only with the ON/OFF key.

The  symbol flashes at a frequency of 1 Hz.



### **x1/x10 key**

Pressing this key sets the increase and decrease parameter during setting of the pH or mV at output.

This key has a different function, depending on whether the instrument is simulating pH or mV.

- During pH simulation, pressing this key repeatedly enables you to change the size of pH variations from 0.1 pH to 1 pH and vice-versa.
- During mV simulation, pressing this key repeatedly enables you to change the size of mV variations from 1 mV to 10 mV and vice-versa.

The corresponding symbol remains active to indicate the parameter chosen.



### **HI/LO Impedance key**

Pressing this key sets the output impedance of the instrument.

The output impedance of channel A may be 100 K ohm or 1G ohm.

The active LO imp. symbol indicates an output impedance of 100 K ohm.

The active HI imp. symbol indicates an output impedance of 1G ohm.

The instrument is normally set with an output impedance of 100 K ohm.

The instrument setting with an output impedance of 1G ohm is useful when you want to check the current absorbed at input by the device connected (instrument or transmitter).

This is explained in the following example:

Suppose that a value of 7.00 pH is generated and that the value read on the connected instrument is

7.20 pH.

At a temperature of 25°C this difference corresponds to a drop of about 0.20 pH x -60 mV/pH x = 12 mV **on the output impedance** of 1GΩ, so it may be calculated that the current absorbed by the device connected is 12 mV/1GΩ = 12 pA.

Currents of 5 to 15 pA are typical absorption values for good quality pH measuring instruments. Higher values suggest malfunctions in the input circuit of the instrument being tested.



### **mV key (Output)**

Pressing this key sets the instrument to act as an mV simulator.

The voltage value in mV generated and present at output appears at the top of the display. the mV symbol is active.

Each time mV simulation is selected the instrument proposes the voltage value set previously.

**Note:** there is no connection between the simulated mV value and the simulated pH value; these values are set separately.



### **°C/°F key**

When this key is pressed alternately the temperature is shown at the bottom of the display in degrees C (Celsius) or degrees F (Fahrenheit).

This value is used when calculating the pH for automatic temperature compensation.

The active °C symbol on the display indicates that the temperature unit in degrees Celsius has been chosen.

The active °F symbol on the display indicates that the temperature unit in degrees Fahrenheit has been chosen.

### **Setting the pH compensation temperature**

Press the °C/°F key only once to activate the temperature setting procedure, in the active measuring unit.

The indications of the setting variations in mV or in pH disappear from the bottom of the display.

Using the ▲ and ▼ keys, change the value on the display until the desired value is obtained.

When the °C/°F key is pressed repeatedly the temperature unit changes from degrees C (Celsius) to degrees F (Fahrenheit) or vice-versa.



### pH key (Output)

Pressing this key sets the instrument to act as a pH simulator. The pH value generated and present at output appears at the top of the display.

The pH symbol is active.

Each time pH simulation is selected the instrument proposes the voltage value set previously.

**Note:** there is no connection between the simulated mV value and the simulated pH value; these values are set separately.



### ▼ key

During programming of the compensation temperature, this key is used to decrease the temperature value shown at the bottom of the display.

The minimum value that may be set is -20.0°C (-4.0°F).

In normal mode, this key is used to decrease directly the pH or mV value shown on the display and generated by the instrument at output.

The minimum pH value that may be set is 0.00 pH.

The minimum mV value that may be set is -1999 mV.



### Reset key

Pressing this key resets the function currently active on the instrument.

- If the instrument is in pH simulation, when this key is pressed it changes from the simulated pH value to the reset value, which for pH is 7.00 pH.
- If the instrument is in mV simulation, when this key is pressed it changes from the simulated mV value to the reset value, which for mV is 0.0 mV.
- If the instrument is in the phase for setting the compensation temperature, when this key is



pressed it passes from the temperature value shown at the bottom of the display to the reset value of 20.0°C (68.0°F).



**▲ key**

During programming of the compensation temperature, this key is used to increase the temperature value shown at the bottom of the display.

The maximum value that may be set is +150.0°C (+302°F).

In normal mode, this key is used to increase directly the pH or mV value shown on the display and generated by the instrument at output.

The maximum pH value that may be set is +14.00 pH.

The maximum mV value that may be set is +1999 mV.

## CONNECTING THE INSTRUMENT

BNC female connector (A).


With the pH/mV key the instrument can send to output the simulation of:

- a pH electrode;
- an ORP electrode for measuring redox potential (ORP);
- a specific ion electrode.

Instruments with a BNC female input are connected to the simulator with an extension cable and BNC double male connector CP 9509/BNC; for instruments with a special input a suitable connector is fitted onto the extension cable CP 9509 T.

## INSTRUMENT SIGNALS

### Low battery

If the battery has run down, or if its voltage has reached the limit value of 6.5 Volts, a beep sounds every 10 seconds and the  symbol appears permanently on the display. In these conditions the battery should be replaced as soon as possible.

If the voltage supplied by the battery is lower (less than 5.5 Volts), the instrument displays the message LOU and then switches off. The battery must be replaced before the instrument can be used.

After the battery has been replaced, when the instrument is switched on again it displays the LOU message to indicate that it switched off because the battery was too low. If the battery charge is sufficient, the LOU message disappears after a few seconds.

To change the battery, switch off the instrument and turn the screw that locks the battery compartment door on the rear of the instrument in an ANTICLOCKWISE direction.

After replacing it (with an ordinary 9 V alkaline battery), close the door again, inserting the tab in the slot provided and turn the screw in a CLOCKWISE direction.

### Attention:

ENSURE THAT THE INSTRUMENT IS SWITCHED OFF BEFORE CHANGING THE BATTERY!

If the malfunction persists, as regards battery voltage, the battery you have inserted is probably flat. (Remember that even new batteries that remain unused for a long period run down due to the phenomenon of self-discharge). Use a voltmeter to check the battery voltage with the instrument switched on. The voltage must be higher than about 9 Vdc.

### Parameter memory error

If the instrument displays the message ER1 after switching on, there has been an error in reading the instrument calibration parameters.

Switch the instrument on and off again. If the malfunction remains, try calibrating the instrument.

On completing calibration, switch the instrument on again. If the malfunction persists, send the instrument to DELTA OHM for repair.

## CALIBRATING THE INSTRUMENT

To calibrate the instrument, connect a precision voltmeter to output B on the instrument by means of a cable with a BNC double male connector.

The precision of the voltmeter must be higher than 10  $\mu$ V.

Access to the calibration procedure is obtained by switching on the instrument with the ON/OFF key and holding down the  $\blacktriangle$  key at the same time.

The voltage value 0.0 mV, generated at output on channels A and B of the instrument, appears at the top of the display. The message CAL appears at the bottom of the display.

On account of the low output impedance of the instrument (100 K $\Omega$ ) calibration cannot be performed directly on channel A (female BNC) as this operation would be put at risk.

For this purpose there is an extra output with very low impedance on channel B of the instrument (female BNC).

Instrument calibration is composed of three phases.

#### 1) Zero calibration.

- On the precision voltmeter connected to the instrument, a voltage value must be measured to the value of 0.0 Volt  $\pm$ 35  $\mu$ V.
- Perform calibration by pressing the  $\blacktriangle$  and  $\blacktriangledown$  keys so that the measured value is 0.0 Volt  $\pm$ 35  $\mu$ V.

#### 2) Gain calibration

- Press the Reset key until a reading of 1045 mV is shown on the display of the instrument.  
This means that gain calibration is activated for a simulation voltage of 1045.0 mV.
- On the reference voltmeter connected to the instrument, a voltage value close to 1045 mV  $\pm$ 35  $\mu$ V must be measured.
- Calibration is performed by pressing the  $\blacktriangle$  and  $\blacktriangledown$  keys so that the measured value is 1045 mV  $\pm$ 35  $\mu$ V.

#### 3) Switch off the instrument to memorize the calibrations performed.

## STORAGE AND MAINTENANCE

### Storage conditions:

- temperature: -10 .... +50°C;
- humidity: less than 85% relative humidity;
- do not store the instrument in places where:
  1. there is a high degree of humidity;
  2. the instrument is exposed to direct sunlight;
  3. the instrument is exposed to a source of high temperature;
  4. there are strong vibrations;
  5. there is steam, salt, gas or other corrosive elements.

### Maintenance

The simulator connectors and in particular the BNC connectors must never be wet.

A wet or dirty connector may be cleaned by washing it with a dehydrating solvent that does not leave residue (e.g. alcohol).

Always protect the connectors when not in use with the special plastic caps supplied with the instrument.

The instrument case, made of ABS plastic material, may be cleaned with alcohol or water, never with solvents or chemical detergents which could damage it.

## GUARANTEE

This instrument is strictly inspected before being sold. However if there should be any defect due to manufacture and/or transport, apply to the dealer from whom you bought the instrument.

The guarantee period is 2 (two) years from the date of purchase. The guarantee is limited to the instrument alone (excluding cables and connectors). During this period all defects will be repaired free of charge, except in cases where damage has been caused by neglect or incorrect use.

## TECHNICAL CHARACTERISTICS

pH simulation	0÷14 pH
pH resolution	0.1 pH
pH accuracy 20...25°C	0.002 pH
Thermal drift	±0.0005 pH/°C from -5°C to 20°C and from 25°C to 50°C
mV simulation	±1999 mV
mV resolution	1 mV
mV accuracy	±100 µV
Thermal drift mV scale	-199.9 ... +199.9: ±0.01 mV/°C from -5 to 20°C and from 25 to 50°C
mV thermal drift	-1999 ... +1999: ±0.05 mV/°C from -5 to 20°C and from 25 to 50°C
Noise 0÷10 Hz:	1µV peak/peak
Simulation of compensation temperature	-20 to 150°C (-4 to 302°F)
Output impedance	100 KΩ 1%, 1GΩ 5% No leading load capacity
Display	LCD 2 lines, 3 1/2 digits. Figure height approx. 12.5 mm.
Symbols	pH, mV, °C, °F, HI imp., LO imp., 0.1 pH, 1 pH, 1 mV, 10 mV
Signals	LOU, ER1, CAL
Work temperature	-5 to 50°C (23 to 122°F)
Power supply	9 Vdc alkaline battery. Low battery indication.
Consumption (instrument only)	5 mA lit, 20 µA off
Autonomy	about 200 hours
Dimensions	187 x 72 x 38 mm.
Weight	300 gr

## ORDER CODES

<b>HD 9609 K</b>	Kit composed of the instrument HD 9609, adapter cables CP 9509/BNC. CP 9509 T, carrying case.
<b>CP 9509/BNC</b>	Adapter cable L = 1 mt, male BNC connector on both ends.
<b>CP 9509 T</b>	Adapter cable L = 1 mt, BNC connector on only one end.
<b>CP 9509 S7</b>	Adapter cable L = 1 mt, BNC male connector on one end, S7 male connector on the other end

CE CONFORMITY	
Safety	EN61000-4-2, EN61010-1 level 3
Electrostatic discharge	EN61000-4-2 level 3
Electric fast transients	EN61000-4-4 level 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B

#### GUARANTEE CONDITIONS

All our appliances have been subjected to strict tests and are guaranteed for 24 months from date of purchase. The Company undertakes to repair or replace free of charge any parts which it considers to be inefficient within the guarantee period. Complete replacement of the instrument is excluded and no requests for damages are recognized, whatever their origin. Repairs are carried out in our own Technical Service Department. Transport expenses are borne by the buyer. **The guarantee does not include: accidental breakages due to transport, incorrect use or neglect, incorrect connection to voltage different from that contemplated for the instrument, probes, sensors, electrodes and all accessories.** Furthermore the guarantee is not valid if the instrument has been repaired or tampered with by unauthorized third parties, or adjusted for faults or casual checking. The guarantee is valid only if all parts of the guarantee card have been filled in. Any instruments sent for repairs must be accompanied by their guarantee certificate. For all disputes the competent court is the Court of Padua.



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