

# HD 9212

## INSTRUCTIONS MANUAL



# HD 9212

pH METER THERMOMETER

ENGLISH

## GENERAL CHARACTERISTICS

The instrument allows measurements of pH, mV or temperature to be taken with a passive 4-wire Pt100 probe of the series TP9...

### pH measurement

It is possible to take pH measurements by connecting a pH electrode to the instrument (Fig. 1).

While measuring pH the instrument performs temperature compensation with the set temperature value.

pH measurement is possible in the range from -2.00 to 16.00 pH; the work range is from 0.00 to 14.00 pH and the value is indicated in hundredths of pH.

If the measurement exceeds the indicated limits or the electrode is not connected, the Err code appears on the display.

### mV measurement

When a pH electrode, an electrode for measuring the redox potential or a specific ion electrode is connected, the instrument performs mV measurement (Fig. 1).

mV measurement is in the range  $\pm 1999$  mV. The mV resolution of the instrument is 0.1 mV in the range  $\pm 199.9$  mV and 1 mV in the remaining range.

If the measurement exceeds the indicated limits or the electrode is not connected, the Err code appears on the display.

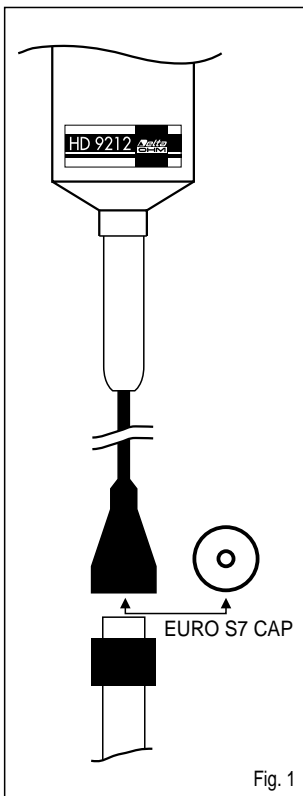


Fig. 1

## Temperature measurement

Temperature measurements may be taken by connecting to the instrument a 4-wire Pt100 probe of the series TP9... (Fig. 2).

Temperature measurement is possible in the range from  $-50.0^{\circ}\text{C}$  to  $-199.9^{\circ}\text{C}$ . The resolution of the instrument is  $0.1^{\circ}\text{C}$ .

The temperature may be displayed in either Centigrade or Fahrenheit degrees.

If no temperature probe is fitted (and the pH or mV probe is fitted), the compensation temperature of the pH electrode is displayed, the setting of which is described below.

If the temperature measurement exceeds the indicated limits or the electrode is not connected, and there is no pH or mV probe connected, the Err code appears on the display.

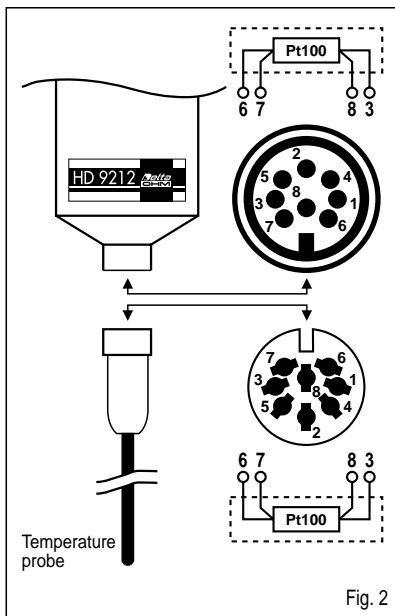


Fig. 2

## Switching the instrument on and off

The instrument is switched on and off by pressing the On/Off button.

While switching on the instrument, all the symbols light up on the display for 2 seconds (test display), and the set calibration code of the instrument (with the messages C01, C02 or C03), used for measurement, and the pH measurement value are shown.

## Auto power off

The instrument is provided with an auto power off function which switches it off 8 minutes after the last button has been pressed.

### Disabling auto power off

The auto power off function is disabled during switching on of the instrument, by pressing simultaneously, for at least 1 second, the On/Off and °C/°F buttons.

When the auto power off function is disabled the battery symbol flashes.

### Instrument calibration code

The instrument can operate with 3 calibration or work codes (calibration codes). These three codes are:

- C01 calibration code set in the factory, cannot be changed
- C02 calibration code for the instrument, may be changed
- C03 calibration code for the instrument plus probe, may be changed

When the instrument is switched on, for 2 seconds it shows the previously set work code on the display with the messages C01, C02 or C03.

### Changing the work code (instrument calibration code) to be used

1. Switch on the instrument, holding down the On/Off and CAL buttons simultaneously for at least 1 second.

During this phase the auto power off function is automatically disabled (the battery symbol flashes).

After performing test display, the instrument shows the CAL message and, after a few moments, C01, C02 or C03 (depending on the work code used previously) with the message C flashing.

2. Using the ▲ and ▼ buttons, select the work code that you intend to use, C01, C02 or C03.
3. Confirm the work code by pressing the CAL button. The instrument switches off, after having displayed the CAL message.  
If you have selected a work code different from those available, the instrument switches off but the previously set work code is not changed.
4. Switch the instrument on again and check that the desired work code is used.

### Displaying measurements in pH or in mV

By pressing the pH/mV button it is possible to display the measurement taken at the instrument input in pH or mV units.

The unit in which the value is measured is indicated on the display.

When switched on, the instrument is set for pH measurement.

### Displaying temperature and changing the measuring unit

By pressing the °C/°F button it is possible to display the temperature measured (if a 4-wire Pt100 temperature probe of the series TP9... is connected) or the pH electrode compensation temperature (if a pH electrode is connected).

By pressing the °C/°F button repeatedly it is possible to display the temperature in °C or in °F.

The unit chosen for measuring the temperature value is indicated on the display.

### Temperature compensation of the pH electrode

The instrument performs temperature compensation of the pH electrode with the set temperature value.

Before measuring the pH, store the temperature of the solution to be examined, measuring it with the 4-wire Pt100 temperature probe of the series TP9.

The value measured and shown on the display is stored by pressing the CAL button (the instrument shows the CAL message for a brief moment).

On disconnecting the temperature probe and connecting the pH electrode, the instrument uses the previously stored temperature value to calculate the temperature compensation of the pH measurement.

The temperature value used for temperature compensation may be changed at will even while taking the pH measurement. To this, proceed as follows:

1. display the compensation temperature in °C by pressing the °C/°F button;
2. press the CAL button to enable modification of the temperature value (the °C symbol flashes);
3. set the desired temperature value with the ▲ and ▼ buttons;
4. press the CAL button again to confirm and store the value, the instrument shows the CAL message for a moment, and the °C symbol stops flashing.

### Calibration of the pH electrode

The pH electrode must be calibrated from time to time to correct losses in efficiency of the electrode.

The instrument recognizes three calibration buffer solutions: pH 6.86 for calibrating the offset of the electrode, and pH 4.01 or pH 9.18 for calibrating amplification, in a basic and acid environment respectively.

The instrument does not make automatically the compensation temper-

ature with respect to the buffer value. The compensation must be done manually.

Before calibrating the electrode, the compensation value of the pH electrode must be set in the instrument; this is equal to the temperature value of the buffer solutions used, and is set with a temperature probe or directly with the ▲ and ▼ buttons (see the description in the previous paragraph).

### **Calibration of the offset**

1. Connect a pH electrode to the input of the instrument; insert the electrode in the buffer solution at pH 6.86.  
Stir the electrode in the solution so as to eliminate any air bubbles and wait until the measurement has become stable.
2. When the measurement is stable press the CAL button.  
The symbol indicating pH flashes and the display shows the desired pH value.
3. By pressing the ▲ and ▼ buttons it is possible to change the pH value until it coincides with the value of the buffer solution used, at the set temperature for calibration of the electrode.
4. When CAL is pressed the instrument quits calibration of the offset of the electrode and the pH symbol stops flashing. The instrument shows the CAL message for a moment.  
At this point the instrument shows a value equal to that of the buffer solution used, at the set temperature.

### **Calibration of amplification**

1. Insert the pH electrode in the buffer solution at pH 4.01 or pH 9.18.  
Stir the electrode in the solution so as to eliminate any air bubbles.
2. When the measurement is stable press the CAL button.  
The symbol indicating pH flashes and the display shows the desired pH value, depending on the buffer solution used.
3. By pressing the ▲ and ▼ buttons it is possible to change the pH value until it coincides with the value of the buffer solution used, at the set temperature for calibration of the electrode.
4. When CAL is pressed the instrument quits calibration of amplification. The pH symbol stops flashing. The instrument shows the CAL message for a few moments.  
At this point the instrument shows a value equal to that of the buffer solution used, at the set temperature.

This completes calibration of the pH electrode.

## PROCEDURE FOR CALIBRATING THE INSTRUMENT (WORK CODE C02)

### Selecting the work code for calibrating the instrument

1. Switch on the instrument, holding down the On/Off and CAL buttons simultaneously for at least 1 second.

During this phase the auto power off function is automatically disabled (the battery symbol flashes). The instrument shows the CAL message and, after a few moments, C01, C02 or C03 (depending on the work code used previously) with the message C flashing.

2. Using the ▲ and ▼ buttons, select the work code C06.
3. Confirm the work code by pressing the CAL button. The instrument displays the work code C02 for a few moments.

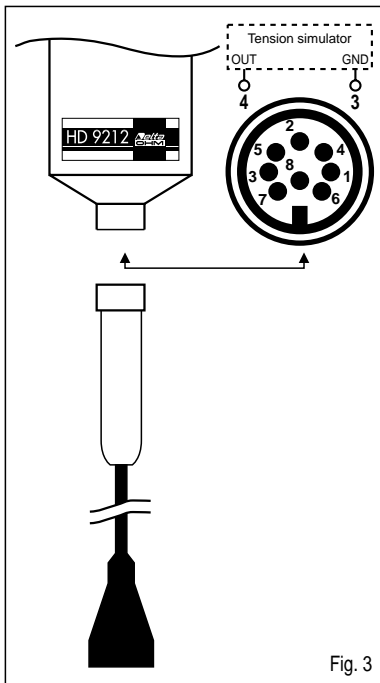


Fig. 3

The voltage input must be calibrated first, then the temperature input.

Using the pH/mV button, select mV measurement to calibrate the voltage input. First calibrate the offset (0.0 mV), the first calibration point, and then amplification (480 mV), the second calibration point.

**First voltage calibration point**

1. Connect a voltage simulator to the input of the instrument (Fig. 3); simulate a value of 0.0 mV, that is the first calibration point.
2. When the measurement is stable press the CAL button.  
The symbol indicating mV flashes and the display shows the value 0.0°C.
3. By pressing the ▲ and ▼ buttons it is possible to change the mV value until it coincides with the value of the simulator (in this case a value different from 0.0 mV must be simulated).
4. When CAL is pressed again the instrument quits calibration of the first calibration point. The mV symbol stops flashing. The instrument shows the CAL message for a few moments.  
At this point the indication on the instrument coincides with that set on the simulator.

**Second voltage calibration point**

1. At input of the instrument, simulate the second calibration point, 480 mV, or a value less than 490 mV.
2. When the measurement is stable press the CAL button.  
The symbol indicating mV flashes and the display shows the value 480 mV.
3. By pressing the ▲ and ▼ buttons it is possible to change the mV value until it coincides with the value of the simulator (in this case a value different from 480 mV must be simulated).
4. When CAL is pressed again the instrument quits calibration of the second calibration point. The mV symbol stops flashing. The instrument shows the CAL message for a few moments.  
At this point the indication on the instrument coincides with that set on the simulator.

This concludes voltage calibration of the input.

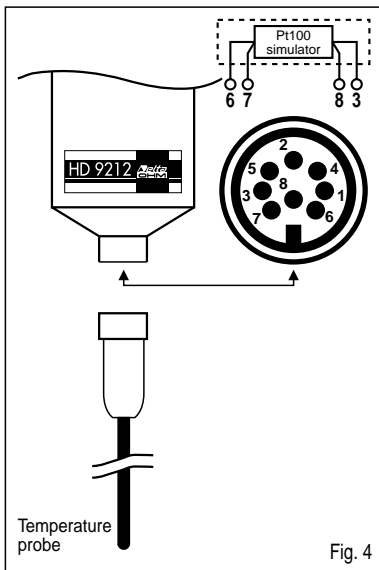
By selecting display in °C it is possible to calibrate the temperature of the instrument. First calibrate the offset (0.0°C), the first calibration point, and then amplification (197.0°C), the second calibration point.

### First temperature calibration point

1. Connect a 4-wire Pt100 simulator to the input of the instrument (Fig. 4); simulate a value of 0.0°C, that is the first calibration point.
2. When the measurement is stable press the CAL button.  
The symbol indicating °C flashes and the display shows the value 0.0°C.

3. By pressing the ▲ and ▼ buttons it is possible to change the °C value until it coincides with the value of the simulator (in this case a value different from 0.0°C must be simulated).

4. When CAL is pressed again the instrument quits calibration of the first calibration point. The °C symbol stops flashing. The instrument shows the CAL message for a few moments. At this point the indication on the instrument coincides with that set on the simulator.



### Second temperature calibration point

1. At input of the instrument, simulate the second calibration point, 197.0°C, or a value less than 199.9°C.
2. When the measurement is stable press the CAL button.  
The symbol indicating °C flashes and the display shows the value 197.0°C.
3. By pressing the ▲ and ▼ buttons it is possible to change the °C value until it coincides with the value of the simulator (in this case a value different from 197.0°C must be simulated).

4. When CAL is pressed again the instrument quits calibration of the first calibration point.

The °C symbol stops flashing and the auto power off function is restored (the battery symbol stops flashing). The instrument shows the CAL message for a few moments.

At this point the indication on the instrument coincides with that set on the simulator.

This completes calibration of the instrument and the calibration values are stored in the work code C02.

## **PROCEDURE FOR CALIBRATING THE INSTRUMENT AND ITS PROBE IN VOLTAGE OR THE PASSIVE 4-WIRE PT100 TEMPERATURE PROBE (WORK CODE C03)**

### **Selecting the work code for calibrating the instrument**

1. Switch on the instrument, holding down the On/Off and CAL buttons simultaneously for at least 1 second.

During this phase the auto power off function is automatically disabled (the battery symbol flashes).

The instrument shows the CAL message and, after a few moments, C01, C02 or C03 (depending on the work code used previously) with the message C flashing.

2. Using the ▲ and ▼ buttons, select the work code C08.
3. Confirm the work code by pressing the CAL button. The instrument displays the work code C03 for a few moments.

The voltage input must be calibrated first, then the temperature input.

By selecting mV display it is possible to calibrate the voltage input of the instrument plus the probe. First calibrate the offset (0.0 mV), the first calibration point, and then amplification (480 mV), the second calibration point.

### **First voltage calibration point**

1. The voltage probe chosen for the combination is connected to the instrument (Fig. 1). The probe will be immersed in the chosen buffer solution. The simulated voltage will be, for example, 0.0 mV, that is the first calibration point.
2. When the measurement is stable press the CAL button.  
The symbol indicating mV flashes and the display shows the value 0.0 mV.

3. By pressing the ▲ and ▼ buttons it is possible to change the mV value until it coincides with the reference value.
4. When CAL is pressed again the instrument quits calibration of the first calibration point. The mV symbol stops flashing. The instrument shows the CAL message for a few moments.  
At this point the indication on the instrument coincides with the value of the reference buffer solution.

### Second voltage calibration point

1. Insert the probe in the buffer solution with a voltage corresponding to the second calibration point, 480 mV, or a value less than 490 mV.
2. When the measurement is stable press the CAL button.  
The symbol indicating mV flashes and the display shows the value 480°C.
3. By pressing the ▲ and ▼ buttons it is possible to change the mV value until it coincides with the reference value.
4. When CAL is pressed again the instrument quits calibration of the second calibration point. The mV symbol stops flashing. The instrument shows the CAL message for a few moments.  
At this point the indication on the instrument coincides with the value of the reference buffer solution.

By selecting display in °C it is possible to calibrate the temperature of the instrument plus the probe. First calibrate the offset (0.0°C), the first calibration point, and then amplification (197.0°C), the second calibration point.

### First temperature calibration point

1. The passive 4-wire Pt100 probe chosen for the combination is connected to the instrument (Fig. 2) and will be inserted in a calibrating furnace; the temperature of the furnace will be, for example, 0.0°C, corresponding to the first calibration point.
2. When the measurement is stable press the CAL button.  
The symbol indicating °C flashes and the display shows the value 0.0°C.
3. By pressing the ▲ and ▼ buttons it is possible to change the °C value until it coincides with the value of the reference probe in the calibration furnace.
4. When CAL is pressed again the instrument quits calibration of the first calibration point. The °C symbol stops flashing. The instrument shows the CAL message for a few moments.  
At this point the indication on the instrument coincides with the value of the probe in the calibration furnace.

## Second calibration point

1. Insert the probe in a furnace with a temperature corresponding to the second calibration point, for example 197.0°C, or a value less than 199.9°C.
2. When the measurement is stable press the CAL button.  
The symbol indicating °C flashes and the display shows the value 197.0°C.
3. By pressing the ▲ and ▼ buttons it is possible to change the °C value until it coincides with the value of the reference probe in the calibration furnace.
4. When CAL is pressed again the instrument quits calibration of the first calibration point. The °C symbol stops flashing and the auto power off function is restored (the battery symbol stops flashing). The instrument shows the CAL message for a few moments.  
At this point the indication on the instrument coincides with the value of the probe in the calibration furnace.

This completes calibration of the instrument and its probe and the calibration values are stored in the work code C03.

**NOTE:** Once the instrument has been calibrated with its probes, the same probes must be used to obtain correct measurements.

## ERRORS AND DISPLAY

### Measuring error

If the probe to be used for the measurement selected is not corrected or is in error status (faulty probe or measurement out of the range that can be represented), the Err message is displayed.

### Low battery voltage

If the battery voltage is low the battery symbol remains lit, informing the user that it is time to change the battery. The auto power off disable function is cancelled.

### Battery voltage too low

If the battery voltage falls even further, below a minimum threshold for operation, the battery symbol remains lit, the instrument displays the message LOU and then it switches off after 1 second. The battery must therefore be changed before the instrument can be used again.

**Reading and writing error of sets of instrument calibration parameters**

If errors occur in the reading or writing of the sets of parameters for calibrating the instrument, the Er1 code is shown alternately with the measurement. In this case it is necessary to switch the instrument off and on again, if the signal is repeated, calibration must be repeated.

If the error persists, send the instrument to the manufacturer for repairs. In the event of error in reading the parameters, the instrument can operate temporarily with the default values.

**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.

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



DELTA OHM SRL  
 VIA G. MARCONI, 5 - 35030 CASELLE DI SELVAZZANO (PD) - ITALY  
 TEL. 0039-0498977150 r.a. - FAX 0039-049635596  
 e-mail: [deltaohm@tin.it](mailto:deltaohm@tin.it) - Web Site: [www.deltaohm.com](http://www.deltaohm.com)