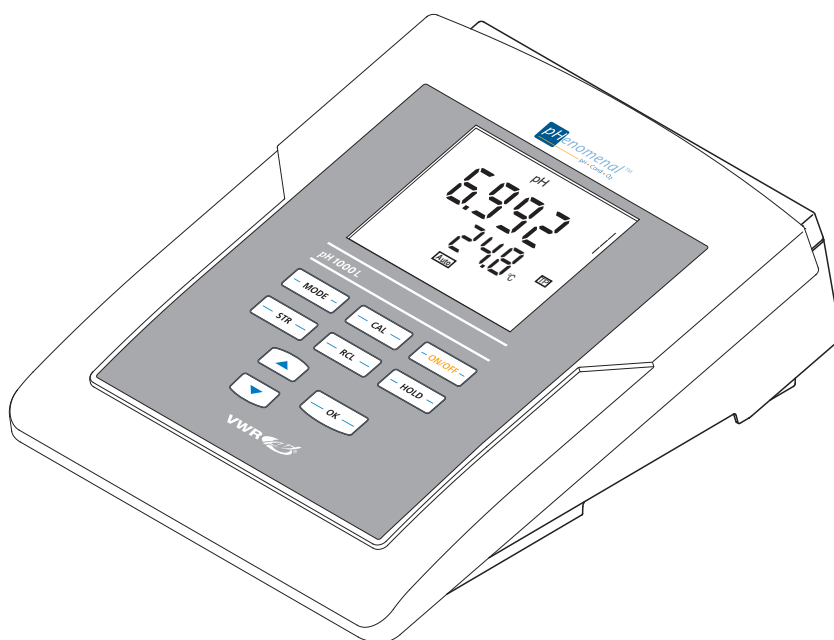




# pH meter pH 1000 L

## INSTRUCTION MANUAL



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# 1 Safety

This operating manual contains basic instructions that you must follow during the commissioning, operation and maintenance of the meter. Consequently, all responsible personnel must read this operating manual before working with the meter. The operating manual must always be available within the vicinity of the meter.

## Target group

The meter was developed for work in the laboratory. Thus, we assume that, as a result of their professional training and experience, the operators will know the necessary safety precautions to take when handling chemicals.

## Safety instructions

Safety instructions in this operating manual are indicated by the warning symbol (triangle) in the left column. The signal word (e.g. "Caution") indicates the level of danger:



### Warning

**indicates instructions that must be followed precisely in order to avoid possibly great dangers to personnel.**



### Caution

**indicates instructions that must be followed precisely in order to avoid the possibility of slight injuries or damage to the meter or the environment.**

## Further notes



### Note

indicates notes that draw your attention to special features.



### Note

indicates cross-references to other documents, e.g. operating manuals.

## 1.1 Authorized use

This meter is authorized exclusively for pH and ORP measurements in the laboratory.

The technical specifications as given in chapter 3 TECHNICAL DATA must be observed. Only the operation and running of the meter according to the instructions given in this operating manual is authorized.

Any other use is considered **unauthorized**.

## 1.2 General safety instructions

This meter is constructed and tested in compliance with the IEC 1010 safety regulations for electronic measuring instruments.

It left the factory in a safe and secure technical condition.

### Function and operational safety

The smooth functioning and operational safety of the meter can only be guaranteed if the generally applicable safety measures and the specific safety instructions in this operating manual are followed during operation.

The smooth functioning and operational safety of the meter can only be guaranteed under the environmental conditions that are specified in chapter 3 TECHNICAL DATA.

If the meter was transported from a cold environment to a warm environment, the formation of condensate can lead to the faulty functioning of the meter. In this event, wait until the temperature of the meter reaches room temperature before putting the meter back into operation.



### Safe operation

#### Caution

**The meter is only allowed to be opened by authorized personnel.**

If safe operation is no longer possible, the meter must be taken out of service and secured against inadvertent operation!

Safe operation is no longer possible if the meter:

- has been damaged in transport
- has been stored under adverse conditions for a lengthy period of time
- is visibly damaged
- no longer operates as described in this manual.

If you are in any doubt, please contact the supplier of the meter.

### Obligations of the purchaser

The purchaser of this meter must ensure that the following laws and guidelines are observed when using dangerous substances:

- EEC directives for protective labor legislation
- National protective labor legislation
- Safety regulations
- Safety datasheets of the chemical manufacturers.



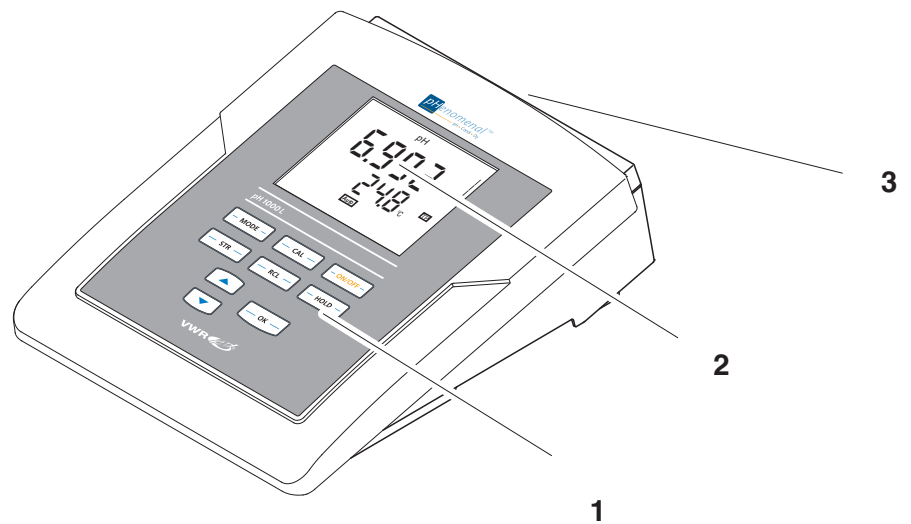
#### Caution

**In addition to the safety instructions mentioned here, also follow the safety instructions of the sensors used.**

**The operating manuals of the sensors are available on the supplied CD.**

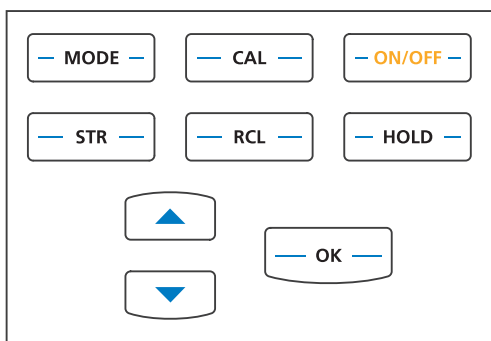
## 2 Overview

The compact pH 1000 L precision pH meter enables you to perform pH measurements rapidly and reliably. The pH 1000 L provides the maximum degree of operating comfort, reliability and measuring certainty for all applications.



1	Keypad
2	Display
3	Socket field

## 2.1 Keypad

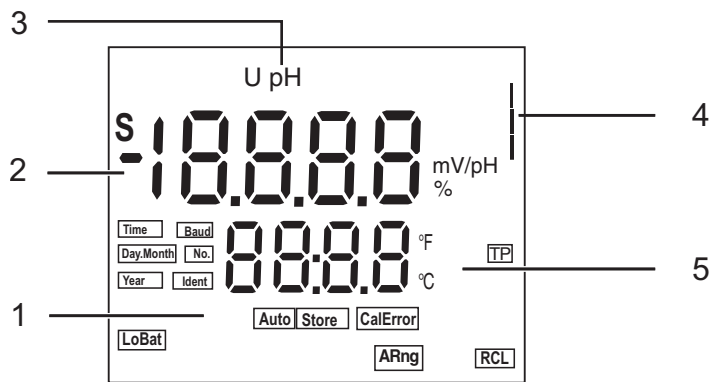


In this operating manual, keys are indicated by brackets <.> . The key symbol (e.g. <OK>) generally indicates a short keystroke (under 2 sec) in this operating manual. A long keystroke (approx. 2 sec) is indicated by the underscore behind the key symbol (e.g. <OK\_\_>).

	<ON/OFF>: <ON/OFF__>:	Switches the meter on or off Resets calibration data
	<MODE>: <MODE__>:	Selects the measured parameter Opens the setting menu for calibration and measurements
	<CAL>: <CAL__>:	Calls up the calibration procedure Displays the calibration data
	<STR>:	Saves a measured value manually
	<RCL>:	Displays the manually stored measured values
	<▲>	Increments values
	<▼>:	Decrements values
	<OK>: <OK__>:	Confirms entries Opens the setting menu for system settings
	<HOLD>:	Freezes the measured value (HOLD function)



## 2.2 Display

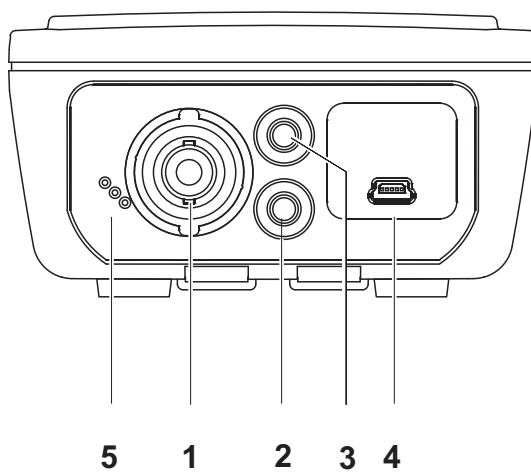


1	Status information
2	Measured value (with unit)
3	Measured parameter
4	Calibration evaluation
5	Measured temperature (with unit)

### Function display indicators

CalError	An error occurred during calibration
LoBat	With battery operation: Batteries almost empty
TP	Temperature measurement active
Store	Saving
Auto	Automatic stability control
S	The current measured value is retained (HOLD)
RCL	The data storage is open (RCL)

### 2.3 Socket field



1	pH electrode
2	Reference electrode
3	Temperature sensor
4	USB-B interface (device)
5	Connection for line adaptor
6	Service interface

### 3 Technical data

#### 3.1 General data

<b>Dimensions</b>	ca. 240 x 190 x 80 mm	
<b>Weight</b>	approx. 1.0 kg	
<b>Mechanical structure</b>	Type of protection	IP 43
<b>Electrical safety</b>	Protective class	III
<b>Test certificates</b>	CE	
<b>Ambient conditions</b>	Storage	- 25 °C ... + 65 °C
	Operation	0 °C ... + 55 °C
	Allowable relative humidity	Annual mean: < 75 % 30 days/year: 95 % Other days: 85 %
<b>Power supply</b>	Batteries	4 x 1.5 V alkali-manganese batteries, type AA
	Rechargeable batteries	4 x 1,2 V NiMH rechargeable batteries, type AA (no charging function)
	Operational life	up to 1000 h (operating hours with batteries)
	Power pack	Input: 100 ... 240 V ~ / 50 ... 60 Hz / 270 mA Output: 9 V = / 1.1 A Connection max. overvoltage category II Primary plugs contained in the scope of delivery: Euro, US, UK and Australian.
<b>Sensor input</b>	Input resistance	> 5 * 10 <sup>13</sup> ohm
	Input current	< 1 * 10 <sup>-12</sup> A
<b>Service interface</b>	This interface can be used for service purposes only.	
<b>USB interface</b>	Type	USB 1.1 (device) USB-B (device), data output
	Baud rate	Can be set to 1200, 2400, 4800, 9600 Baud
	Data bits	8
	Stop bits	2
	Parity	None
	Handshake	RTS/CTS
	Cable length	max. 3 m

**Guidelines and norms used**

EMC	EC guideline 89/336/EEC EN 61326 EN 61000-3-2 EN 61000-3-3 FCC Class A
Meter safety	EEC guideline 73/23/EEC EN 61010-1 ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1
IP protection class	EN 60529

**FCC Class A Equipment Statement**

*Note:* This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

### 3.2 Measuring ranges, resolution, accuracy

Measuring ranges, resolution	Parameter	Measuring range	Resolution	
	pH		- 2.0 ... + 20.0	0,1
			- 2.00 ... + 20.00	0,01
			- 2.000 ... + 19.999	0,001
	U [mV]		- 1200.0 ... + 1200.0	0,1
			- 2000 ... + 2000	1
	T [°C]		0.0 ... + 100.0	0,1
T [°F]		+ 32.0 ... + 212.0	0,1	

Manual temperature input	Parameter	Range	Increment
	T <sub>manual</sub> [°C]	- 25 ... + 130	1
	T <sub>manual</sub> [°F]	-13 ... + 266	1

Accuracy (± 1 digit)	Parameter	Accuracy	Temperature of the test sample
	<b><i>pH / range *</i></b>		
	- 2.0 ... + 20.0	± 0.1	+ 15 °C ... + 35 °C
	- 2.00 ... + 20.00	± 0.01	+ 15 °C ... + 35 °C
	- 2.000 ... + 19.999	± 0.005	+ 15 °C ... + 35 °C
	<b><i>U [mV] / range</i></b>		
	- 2000 ... + 2000	± 1	+ 15 °C ... + 35 °C
	-1200.0 ... +1200.0	± 0.5	+ 15 °C ... + 35 °C
	<b><i>T [°C] / temperature sensor</i></b>		
	NTC 30	± 0.2	
	PT 1000	± 0.2	

\* when measuring in a range of ± 2 pH around a calibration point



#### Note

The measuring ranges and accuracy values specified here apply exclusively to the meter. The accuracy of the combination electrodes and buffer solutions has to be taken into account additionally.



## 4 Commissioning

### 4.1 Scope of delivery

- pH 1000 L meter
- Power pack
- 4 batteries 1.5 V Mignon type AA
- Stand
- Stand base
- Short instructions
- CD-ROM with detailed operating manual

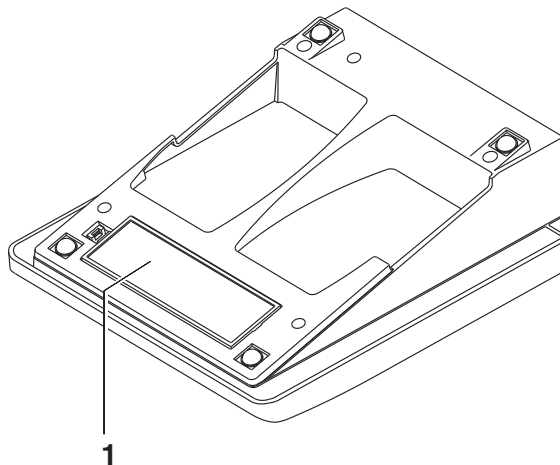
### 4.2 Initial commissioning

Perform the following activities:

- Insert the supplied batteries
- Connect the power pack (for line power operation only).
- Switch on the meter

#### 4.2.1 Inserting the batteries

- 1 Open the battery compartment (1) on the underside of the meter.



- |   |   |
|---|---|
| 2 | Place four batteries (type Mignon AA) in the battery compartment. |
| 3 | Close the battery compartment (1).                                |

**Caution**

**Make sure that the poles of the batteries are positioned correctly. The ± signs on the batteries must correspond to the ± signs in the battery compartment.**

**Note**

Alternatively, you can also use Ni-MH rechargeable batteries (type Mignon AA). In order to charge the batteries, an external charging device is required.

**4.2.2 Connecting the power pack****Caution**

**The line voltage at the operating site must lie within the input voltage range of the original power pack (see section 3.1).**

**Caution**

**Use original power packs only (see section 3.1).**

- |   |   |
|---|---|
| 1 | Insert the plug into the socket of the pH 1000 L.                     |
| 2 | Connect the original power pack to an easily accessible power outlet. |

**Note**

You can carry out measurements without the power pack.

**4.2.3 Switching on the meter**

- |   |   |
|---|---|
| 1 | Press the <ON/OFF> key.<br>A display test is briefly displayed.<br>Subsequently, the meter switches to the measuring mode (measured value display). |
|---|---|

**Switch-off interval**

The meter has an energy saving feature to avoid unnecessary battery depletion during battery operation.

The energy saving feature switches off the meter if no key was pressed during the specified interval (setting the switch-off interval see section



**Display illumination**

5.7.1). When the meter is operated with the power pack the energy saving feature is not active.

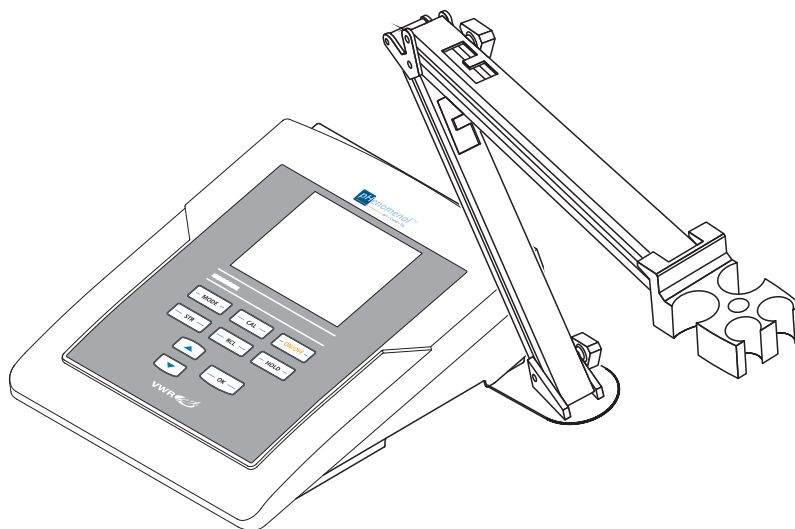
During battery operation, the meter automatically switches off the display illumination if no key has been pressed for 30 seconds (setting the display illumination see section 5.7.1). The illumination is switched on with the next keystroke again.

**4.2.4 Stand**

The stand base can be attached to the right side of the meter.

1	Screw the stand base to the underside of the meter.
2	Insert the stand rod in the stand base.

An arrangement of the meter with the stand may look as follows:





## 5 Operation

### 5.1 General operating principles

This section contains basic information on the operation of the pH 1000 L.

#### 5.1.1 Operating modes

The meter has the following operating modes:

- Measurement  
The display indicates the measurement data in the measured value display
- Calibration  
The display guides you through a calibration procedure with calibration information
- Storage  
The meter stores measuring data
- Configuration  
Settings and functions are displayed

#### 5.1.2 Operation

**Keys** The meter is operated via keys. The keys can have different functions with long or short keystrokes.

**Functions** Generally, with a short keystroke a function is carried out. A long keystroke opens a setting menu.

In a setting menu, settings are selected with the <▲><▼> keys. A setting is confirmed with <OK>. With confirming, the setting is finished and the next setting is displayed.

**Representation** In this operating manual, keys are indicated by brackets <..> . The key symbol (e.g. <OK>) generally indicates a short keystroke (under 2 sec) in this operating manual. A long keystroke (approx. 2 sec) is indicated by the underscore behind the key symbol (e.g. <OK\_\_>).

## 5.2 Measuring

### Preparatory activities

Perform the following preparatory activities when you want to measure:

1	Connect the pH combination electrode to the meter.
2	Adjust the temperature of the buffer solutions or test solutions, or measure the current temperature, if you measure without a temperature sensor.
3	Calibrate or check the meter with the combination electrode.
4	Select the measured parameter with <b>&lt;MODE&gt;</b> .



#### Note

Incorrect calibration of pH combination electrodes leads to incorrect measured values. Calibrate regularly before measuring.

### Stability control

During the measuring procedure, the stability control function is automatically activated. The stability control function (drift control) checks the stability of the measured pH signal and the stability of the measured temperature signal. The stability has a considerable effect on the reproducibility of the measured value.

The status display [Auto] flashes until a stable measured value is available. As soon as the measured value is stable the status display [Auto] stops flashing.

For identical measurement conditions, the following applies:

Measured parameter	Reproducibility	Response time
pH value	< 0.02 pH units	> 15 seconds
Temperature	< 0.3 °C of temperature value	> 15 seconds

### Temperature sensor

You can measure with or without a temperature sensor. If a temperature sensor is connected, it is indicated on the display by *TP*.



#### Note

The pH meter automatically recognizes the type of the temperature sensor used. Therefore, you can connect combination electrodes with an NTC30 or Pt1000.

The temperature measurement is absolutely essential for a reproducible pH measurement. If the measurement is made without a temperature sensor, proceed as follows:

1	Measure the current temperature using a thermometer.
---	--

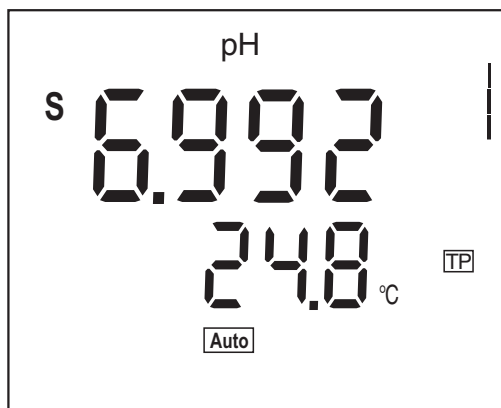
- 2 | Set the temperature value with <▲><▼>.

**Note**

When calibrating without temperature sensor, also set the current temperature of each buffer solution manually with the <▲><▼> keys.

**5.2.1 Hold function**

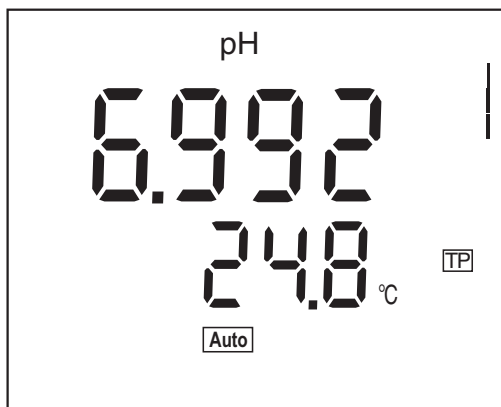
- 1 | Freeze the current measured value with <HOLD> (Hold function).  
An S is displayed in front of the current measured value as long as the Hold function is active.



- 2 | To terminate the Hold function: press the <MODE> or <HOLD> key.

**5.2.2 Measuring the pH value**

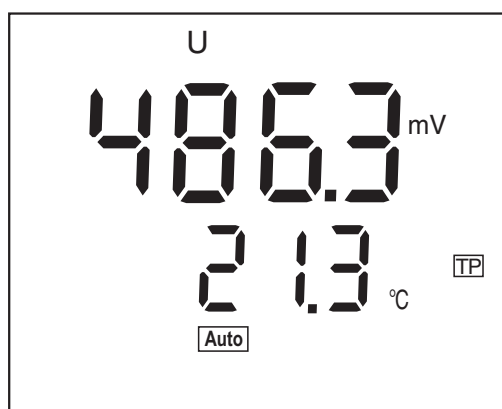
- 1 | Perform the preparatory activities according to section 5.2.
- 2 | Immerse the pH combination electrode in the test sample.
- 3 | Using <MODE>, scroll as necessary until the measured parameter *pH* is displayed.
- 4 | Wait for a stable measured value.  
The [Auto] display indicator flashes as long as the measured value is not yet stable.



### 5.2.3 Measuring the ORP

The meter can, in conjunction with an ORP electrode, measure the ORP (mV) of a solution.

1	Perform the preparatory activities according to section 5.2.
2	Immerse the ORP electrode in the test sample.
3	If necessary, call up the measured parameter U with <MODE>.
4	Wait for a stable measured value. The [Auto] display indicator flashes as long as the measured value is not yet stable.



**Note**

ORP electrodes are not calibrated. However, you can check ORP electrodes using a test solution.

### 5.3 Calibration

#### Why calibrate?

pH combination electrodes age. This changes the zero point (asymmetry) and slope of the pH combination electrode. As a result, an inexact measured value is displayed. Calibration determines the current values of the zero point and slope of the combination electrode and stores them in the measuring instrument. Thus, you should calibrate at regular intervals.

#### When do you have to calibrate?

- After connecting another combination electrode
- If the symbol for the calibration evaluation flashes on the display:
  - e.g. after the calibration interval has expired

#### CAL TEC CAL NIST

is adapted to the permanently programmed buffer solutions as a fully automatic single-point, two-point or three-point calibration. The buffer solutions are automatically recognized by the meter.

#### Buffer sets for calibration

You can use the buffer sets quoted in the table for an automatic calibration. The pH values are valid for the specified temperature values. The temperature dependence of the pH values is taken into account during calibration.

Buffer set	pH values	
	at 25 °C	(at 20 °C)
Technical buffer solutions ( <i>TEC1</i> ) by VWR	4.00	(4.00)
	6.98	(7.00)
	9.94	(10.00)
Technical buffer solutions ( <i>TEC2</i> )	2,00	
	4,00	
	7,00	
	10,011	
<i>NIST/DIN</i> buffer solutions by VWR	1.679	
	4.006	
	6.865	
	9.180	
	12.454	

#### Calibration points

Calibration can be performed using one, two or three buffer solutions in any order (single-point, two-point or three-point calibration). The meter determines the following values and calculates the calibration line as follows:

	Determined values	Displayed calibration data
1-point	ASY	<ul style="list-style-type: none"> <li>● Zero point = <i>ASY</i></li> <li>● Slope = Nernst slope (-59.16 mV/pH at 25 °C)</li> </ul>
2-point 3-point	ASY SLO	<ul style="list-style-type: none"> <li>● Zero point = <i>ASY</i></li> <li>● Slope = <i>SLO</i></li> </ul>



**Note**

You can display the slope in the units, mV/pH or %.  
 You can display the zero point in the units, mV or pH.

**CAL ANY**

This function is a conventional two-point calibration using two buffer solutions (pH 7.0 ± 0.5 and any other buffer solution) or a single-point calibration using any buffer solution and is used as a high-speed method.

**Stability control**

The calibration procedure automatically activates the stability control function. The current measurement with stability control can be terminated at any time (accepting the current value) by pressing **<OK>**.

**Calibration record**

When finishing a calibration, the new calibration values are first displayed as an informative message and stored.

**Displaying the calibration data**

You can display the data of the last calibration (see section 5.4).

**Calibration evaluation**

After calibrating, the meter automatically evaluates the calibration. The zero point and slope are evaluated separately. The worse evaluation of both is taken into account. The evaluation appears on the display as the symbol for the calibration evaluation and in the calibration record.

Symbol for calibration evaluation	Zero point [mV]	Slope [mV/pH]
	-20 ... +20	-60.5 ... -57
	-25 ... +25	-61 ... -60.5 or -57 ... -56



Symbol for calibration evaluation	Zero point [mV]	Slope [mV/pH]
<p style="text-align: center;"> </p> <p>Clean the combination electrode according to the electrode operating manual</p>	-30 ... +30	-62 ... -61 or -56 ... -50
<p><i>CalError</i></p> <p>Eliminate the error according to chapter 7 WHAT TO DO IF...</p>	< -30 or > 30	< -62 or > -50

**Preparatory activities**

1	Switch on the meter with <ON/OFF>.
2	Connect the pH combination electrode to the meter.
3	Keep the buffer solutions ready.
4	Adjust the temperature of the solutions and measure the current temperature if the measurement is made without temperature sensor.
5	Set the buffer set to be used for calibration as necessary.

**5.3.1 Calibration interval (Int.C)**

The calibration interval reminds you to calibrate regularly. After the specified calibration interval (*Int.C*) has expired, the symbol for the calibration evaluation flashes. It is still possible to measure.



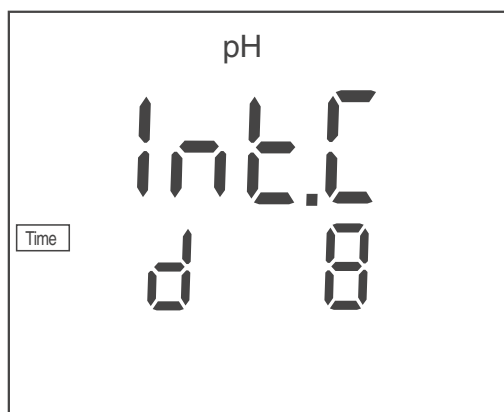
**Note**

To ensure the high measuring accuracy of the measuring system, calibrate after the calibration interval has expired.

**Setting the calibration interval**

The calibration interval (*Int.C*) is set to 7 days (*d7*) in the factory. You can change the interval (1 ... 999 days):

1	Open the menu for measurement settings with <MODE __>.
2	Confirm all settings with <OK> until <i>Int.C</i> is displayed.



3	Set the calibration interval with <▲><▼>.
4	Confirm the setting with <OK>.

### 5.3.2 Automatic calibration (CAL TEC, CAL NIST)

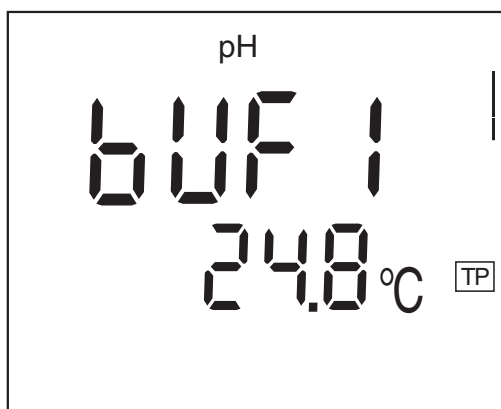
For the TEC and NIST procedures, use one to three buffer solutions of the relevant buffer set (Technical buffers or NIST buffers) in any order.



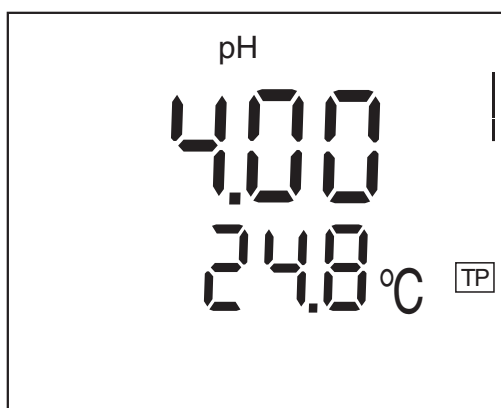
#### Note

The steps 2 and 6 are not necessary if you use a temperature sensor.

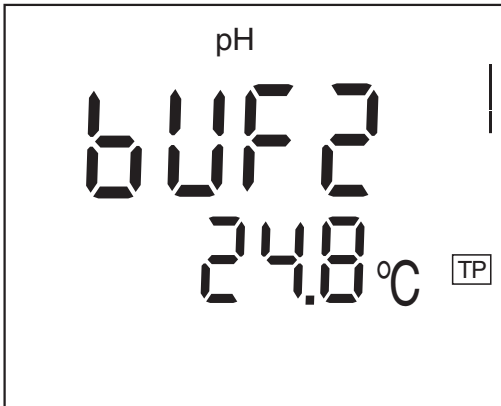
1	Press <CAL> repeatedly until the <i>TEC1</i> , <i>TEC2</i> or <i>NIST</i> function indicator appears.
2	Confirm the selected calibration procedure with <OK>. <i>BUF1</i> and the temperature are displayed.



3	If necessary, set the temperature of the buffer solution with <▲><▼>.
4	Immerse the pH combination electrode in the first buffer solution.
5	Start the measurement with <OK>. The [Auto] display indicator flashes. The electrode voltage (mV) or the nominal value of the buffer (setting: see section 5.7.2) is displayed.



6 | As soon as a stable value is recognized, *BUF2* appears.

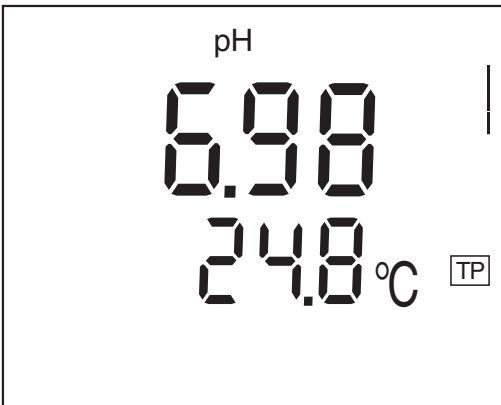


**Note**

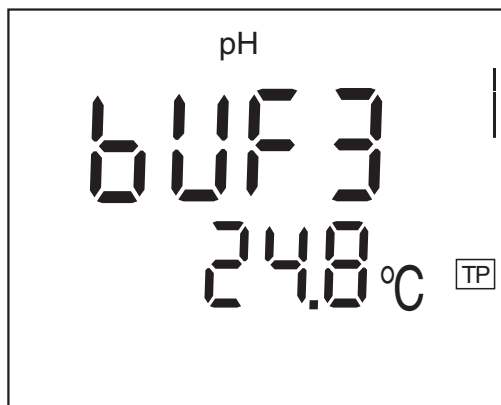
Here you can cancel the calibration procedure with **<MODE>**. This corresponds to a **single-point calibration**. The value of the zero point (ASY) is displayed. Pressing **<OK>** displays the value of the slope (SLO).

**Continuing with two-point calibration**

- 7 | Thoroughly rinse the combination electrode with distilled water.
- 8 | If necessary, set the temperature of the second buffer solution with **<▲><▼>**.
- 9 | Immerse the combination electrode in the second buffer solution.
- 10 | Press the **<OK>** key.  
The [Auto] display indicator flashes.  
The electrode voltage (mV) or the nominal value of the buffer (setting: see section 5.7.2) is displayed.



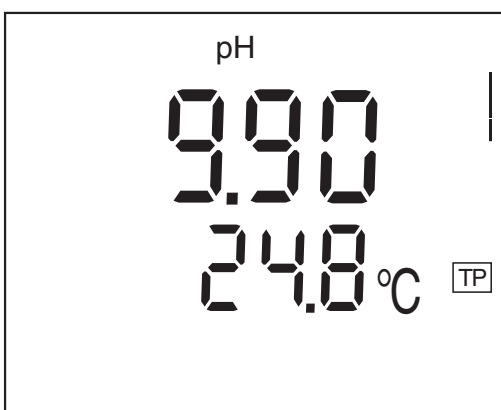
11 | As soon as a stable value is recognized, *BUF3* appears.

**Note**

Here you can cancel the calibration procedure with **<MODE>**. This corresponds to a **two-point calibration**. The value of the zero point (ASY) is displayed. Pressing **<OK>** displays the value of the slope (SLO).

**Continuing with three-point calibration**

12	Thoroughly rinse the combination electrode with distilled water.
13	If necessary, set the temperature of the third buffer solution with <b>&lt;▲&gt;&lt;▼&gt;</b> .
14	Immerse the combination electrode in the third buffer solution.
15	Press the <b>&lt;OK&gt;</b> key. The [Auto] display indicator flashes. The electrode voltage (mV) or the nominal value of the buffer (setting: see section 5.7.2) is displayed.



16	The asymmetry is displayed as soon as a stable value is recognized.
17	Press the <b>&lt;OK&gt;</b> key. The value of the slope (mV/pH) appears on the display.

18 | To return to the measuring mode: Press the <OK> key.



**Note**

While the zero point (*ASY*) is being displayed, you can change the unit of the zero point with <▲><▼>.

While the slope (*SLO*) is being displayed, you can change the unit of the slope with <▲><▼>.

The % display refers to the Nernst slope of 59.2 mV/pH at 25° C (100 x determined slope/Nernst slope).

**5.3.3 Conventional calibration (CAL ANY)**

**Single-point calibration**

Use any buffer solution for this rapid method. The calibration will be the more exact the nearer the pH value of the buffer solution is to that of the test sample.

**Two-point calibration**

Use two buffer solutions for this procedure:

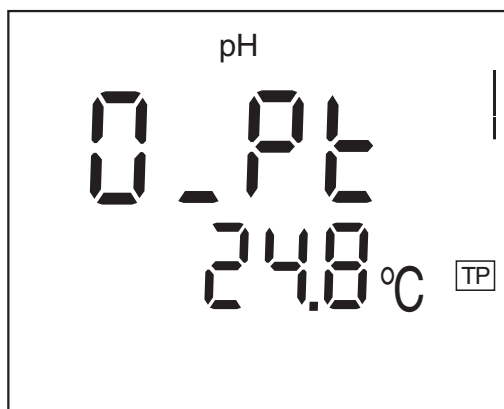
- pH 7.0 ± 0.5
- any other buffer solution



**Note**

The steps 2 and 9 are not necessary if you use a pH combination electrode with a temperature sensor.

- 1 | Press the <CAL> key repeatedly until *AnY* is displayed.
- 2 | Confirm the selected calibration procedure with <OK>. *0\_Pt* and the temperature are displayed.



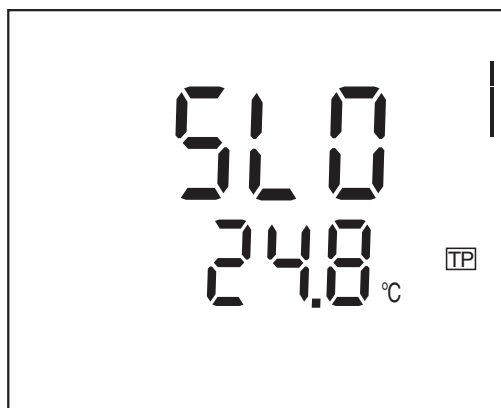
- 3 | If necessary, set the temperature of the first buffer solution with <▲><▼>.

4	Immerse the pH combination electrode in the first buffer solution (pH $7.0 \pm 0.5$ for two-point calibration).
5	Press the <OK> key. The measured pH value appears on the display.
6	When the measured value is stable, set the measured value to the nominal pH value of the buffer solution (at the current temperature) with <▲><▼>.
7	Press the <OK> key. SLO appears on the display.



### Note

Here you can cancel the calibration procedure with <MODE>. This corresponds to a **single-point calibration**. The value of the zero point (ASY) is displayed. The symbol for the calibration evaluation indicated the evaluation of the single-point calibration. Pressing <OK> displays the value of the slope (SLO).



8	To continue the two-point calibration, thoroughly rinse the combination electrode with deionized water.
9	If necessary, set the temperature of the second buffer solution with <▲><▼>.
10	Immerse the combination electrode in the second buffer solution.
11	Press the <OK> key. The second pH value appears on the display.
12	When the measured value is stable, set the measured value to the nominal pH value of the buffer solution (at the current temperature) with <▲><▼>.

- |    |  |
|----|--|
| 13 | Press the <OK> key.<br>The value of the zero point (ASY) is displayed. |
| 14 | Press the <OK> key.<br>The value of the slope (SLO) is displayed.      |
| 15 | Press the <OK> key.<br>The measuring mode is active.                   |

**Note**

While the zero point (ASY) is being displayed, you can change the unit of the zero point with <▲><▼>.

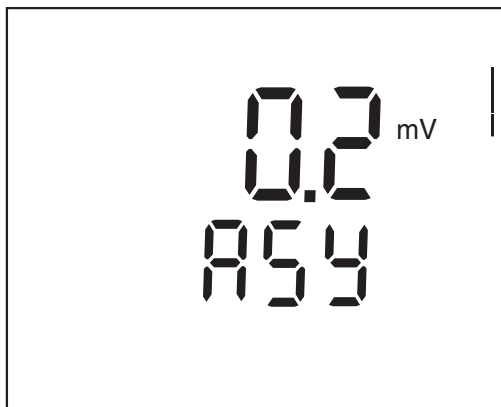
While the slope (SLO) is being displayed, you can change the unit of the slope with <▲><▼>.

The % display refers to the Nernst slope of 59.2 mV/pH at 25° C (100 x determined slope/Nernst slope).

**5.4 Downloading calibration data**

You can download calibration data to the display as follows:

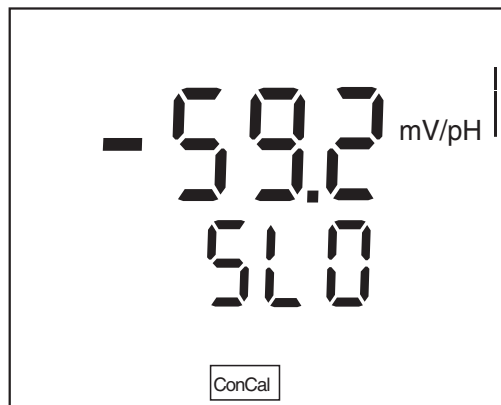
- |   |   |
|---|---|
| 1 | Pressing <CAL__> displays the calibration data (asymmetry). |
|---|---|

**Note**

While the zero point is being displayed you can switch over the unit of the zero point (ASY) with <▲><▼>.

- |   |                                  |
|---|----------------------------------|
| 2 | Press <OK> to display the slope. |
|---|----------------------------------|



**Note**

While the slope is being displayed you can switch over the unit of the slope (*SLO*) with <▲><▼>.

## 5.5 Storage in memory

The meter has an internal data memory. It can store up to 500 datasets.

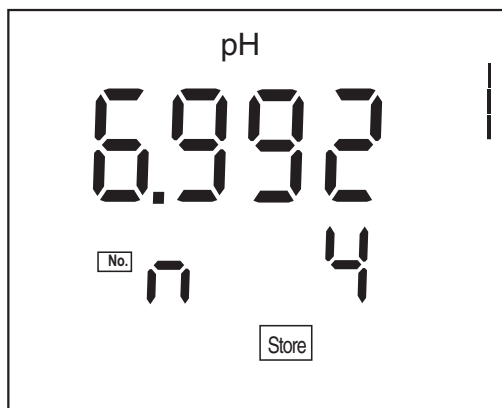
A complete dataset consists of:

- Date/time
- Memory location
- ID number
- Measured value
- Temperature
- Temperature measuring procedure (manual or automatic)

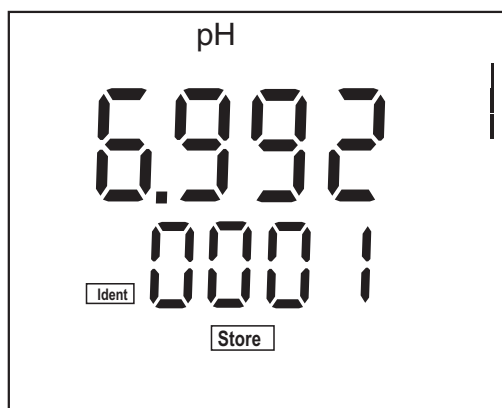
### 5.5.1 Storing measurement data

You can transmit a measured value to the data memory as follows:

- 1 Store the measurement dataset with <STR>. The consecutive number of the next free memory location is shown on the display.



- 2 Confirm with **<OK>**.  
The display switches to the entry of the ID number.



- 3 Using **<▲><▼>**, enter the required ID number (1 ... 9999).
- 4 Confirm with **<OK>**.  
The dataset is stored.  
The meter switches to the measuring mode.

### Message *StoFull*

This message appears when all of the 500 memory locations are occupied.

When the memory is full, you can:

- press **<OK>** to store the current measured value.  
The oldest measured value (memory location 1) will be overwritten by this
- press **<MODE>** to switch to the measured value display without storing
- download the data memory (see section 5.5.2)
- clear the memory (see section 5.5.3).

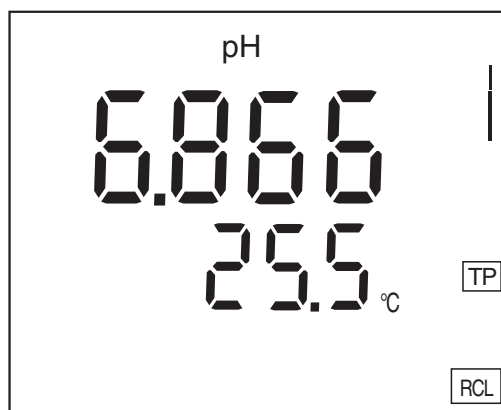
### 5.5.2 Downloading the data memory

You can download stored measurement datasets:

- to the display
- to the interface (see section 5.6.1)

#### Download to the display

1	Open the storage menu with <RCL>.
2	If necessary, scroll with <RCL> until <i>Sto disp</i> (measurement datasets) is displayed.
3	Press <OK> to display the dataset that was last stored. The memory location of the dataset is displayed for approx. 2 s, then the respective temperature appears.



While the memory is displayed you can:

- press <OK> to display further data of the dataset (ID number, date, time, memory location, temperature)
- press <▲> to display the next dataset
- press <▼> to display the previous dataset



#### Note

In order to search for certain data of the dataset, e.g. for the date, proceed as follows:

1	Use <OK> to scroll on until the required data, e. g. the date, is displayed.
2	Use <▲> or <▼> to scroll until the required date is displayed.

### 5.5.3 Erasing the data memory

You can erase all stored measurement datasets.

1	Open the memory menu with <b>&lt;RCL&gt;</b> .
2	If necessary, scroll with <b>&lt;RCL&gt;</b> until <i>Sto disp</i> or <i>Sto prt</i> is displayed.
3	Press <b>&lt;RCL__&gt;</b> to display the <i>Clr All</i> function.
4	Press <b>&lt;OK&gt;</b> to erase the entire contents of the memory. or Return to the measured value display with <b>&lt;MODE&gt;</b> . The stored data is retained.

### 5.5.4 Downloading calibration data

You can download calibration data:

- to the display
  - via the memory menu
  - via the calibration menu
- to the interface (see section 5.6.1)

#### Download to display via memory menu

1	Open the storage menu with <b>&lt;RCL&gt;</b> .
2	If necessary, scroll with <b>&lt;RCL&gt;</b> until <i>CAL diSP</i> is displayed.
3	Press <b>&lt;OK&gt;</b> to display the calibration data. Zero point, slope.

While the calibration data is displayed you can:

- press **<OK>** to display further calibration data (zero point (ASY), slope (SLO))
- press **<▲><▼>** to switch over the unit of the zero point (*Asy*) (while the zero point is being displayed)
- press **<▲><▼>** to switch over the unit of the slope (*Slo*) (while the slope is being displayed)
- press **<CAL\_\_>** to download the calibration record to the interface

## 5.6 Transmitting data

The meter has a USB-B interface (device).

Via this interface you can transmit data to a PC and update the meter software.



### Note

The respective interface cable has to be connected if you want to download data to the USB interface.

In addition, the driver for the USB interface must be installed on the PC from the enclosed CD-ROM (see section 5.6.4).

### Terminal program

Generally, a terminal program serves to establish a connection to a meter at a data interface and to communicate with the meter via a console on the display. A terminal program usually offers the possibility to save the contents of the console in a text file or print it.

Terminal programs are available by different manufacturers for different operating systems. The "HyperTerminal" terminal program is included in Windows (versions 95 to XP). It is in the program menu under *Accessories*.

More detailed information can be taken from the user information of the terminal program.



### Caution

**The interface is not galvanically isolated.**

**When a grounded PC is connected, measurements cannot be performed in grounded media as incorrect values would result.**

### 5.6.1 Options for data transmission

Via the USB interface you can transmit data to a PC.

The following table shows which data are transmitted to the interface in which way:

Data	Control	Operation / description
Current measured values	Manual	<ul style="list-style-type: none"> <li>● With &lt;OK&gt;.</li> <li>● Simultaneously with every manual storage process (see section 5.5.1).</li> </ul>
Stored measured values	Manual	<ul style="list-style-type: none"> <li>● All datasets (see section 5.6.2)</li> </ul>
Calibration records	Manual	<ul style="list-style-type: none"> <li>● Without display indication (see section 5.6.3).</li> <li>● During the display indication with &lt;CAL__&gt; (see section 5.5.4).</li> </ul>
	Automatic	<ul style="list-style-type: none"> <li>● At the end of a calibration procedure.</li> </ul>

### 5.6.2 Downloading stored measurement datasets

1	Open the storage menu with <RCL>.
2	If necessary, scroll with <RCL> until <i>Sto Prt</i> is displayed.
3	Press <OK> to download the measurement data to the interface.

### 5.6.3 Downloading calibration data

1	Open the storage menu with <RCL>.
2	If necessary, scroll with <RCL> until <i>CAL Prt</i> is displayed.
3	Press <OK> to download the calibration data to the interface.

#### 5.6.4 USB interface (device)

Connect the meter to the PC via a USB cable.



#### Installation of the USB driver on the PC

#### Warning

**The USB interface is not galvanically isolated. When a grounded PC is connected, measurements cannot be performed in grounded media as incorrect values would result.**

System requirements of the PC for installation of the USB driver:

- PC with at least one free USB connection and CD-ROM drive
- Windows 2000, Windows XP, Windows Vista.

1	Insert the supplied installation CD in the CD drive of your PC.
2	Install the driver from the CD. Follow the Windows installation instructions as necessary.
3	Connect the pH 1000 L to the PC via the USB interface. The meter is listed as a virtual COM interface among the connections in the Windows instrument manager.

### 5.7 Settings

You can adapt the meter to your individual requirements. The settings are done in the following menus:

- System settings (<OK\_\_>)
  - Display illumination (*LEd*)
  - Baud rate (*Baud*)
  - Switch-off interval (*t.Off*)
  - Date (*Day.Month*)
  - Date (Year)
  - Time (*Time*)
- Measurement settings (<MODE\_\_>)
  - Display of the buffer during calibration (pH nominal value or measured voltage value in mV)
  - Measured value resolution, pH (*0.000 / 0.00 / 0.0*)
  - Measured value resolution, U (*0.0 / 0*)
  - Temperature unit (*°C / °F*)
  - Calibration interval (*Int.C [0 ... 999]*)



#### Note

You can exit the setting menu at any time by pressing <MODE>.

Settings already modified and confirmed with <OK> are stored.

### 5.7.1 System settings

The default setting is printed in bold.

Display illumination ( <i>LEd</i> )	<b>Auto</b> , On, Off
Baud rate ( <i>Baud</i> )	1200, 2400, <b>4800</b> , 9600
Switch-off interval ( <i>t.Off</i> )	10, 20, 30, 40, 50 min, <b>1</b> , 2, 3, 4, 5, 10, 15, 20, 24 h
Date ( <i>Day.Month</i> )	Any
Date (Year)	Any
Time ( <i>Time</i> )	Any

1 | Open the menu for system settings with <OK\_\_>. The first system setting is displayed.

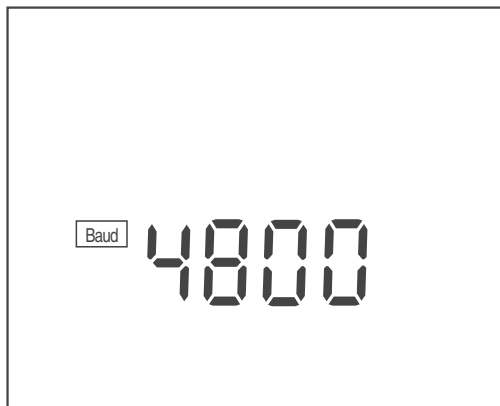
#### Display illumination (*LEd*)



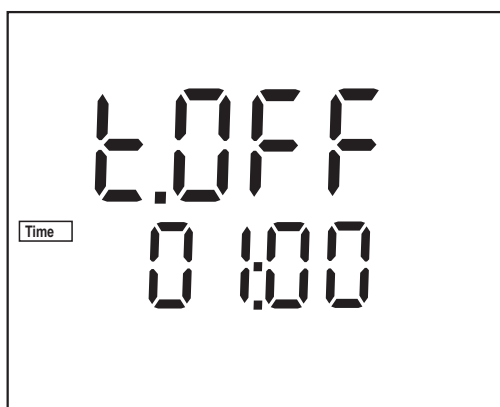
2 | Set the display illumination with <▲><▼> .

3 | Confirm with <OK>. *Baud*, the setting of the baud rate is displayed.



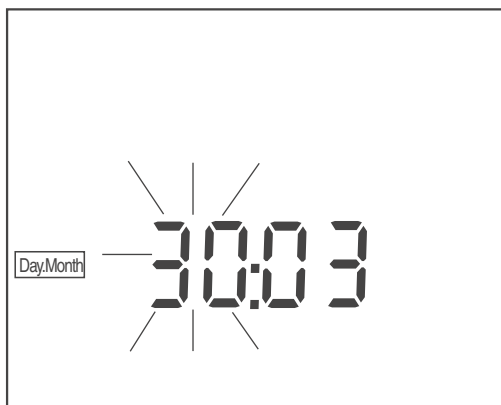
**Baud rate (*Baud*)**

- |   |   |
|---|---|
| 4 | Set the required baud rate with <▲><▼> .  |
| 5 | Confirm with <OK>.<br><i>t.OFF</i> , the setting of the switch-off interval is displayed. |

**Switch-off interval (*t.Off*)**

- |   |  |
|---|--|
| 6 | Set the switch-off interval with <▲><▼>.   |
| 7 | Confirm with <OK>.<br><i>Day.Month</i> , the setting of the date is displayed.<br>The day display flashes. |

## Date and time



8	Set the date of the current day with <▲><▼> .
9	Confirm with <OK>. The month display flashes.
10	Set the current month with <▲><▼> .
11	Confirm with <OK>. Year, the setting of the year is displayed.
12	Set the year with <▲><▼> .
13	Confirm with <OK>. The setting of the time is displayed. The hour display flashes.
14	Set the current hour with <▲><▼> .
15	Confirm with <OK>. The minute display flashes.
16	Set the current minute with <▲><▼> .
17	Confirm with <OK>. The system settings are completed. The meter switches to the measuring mode.

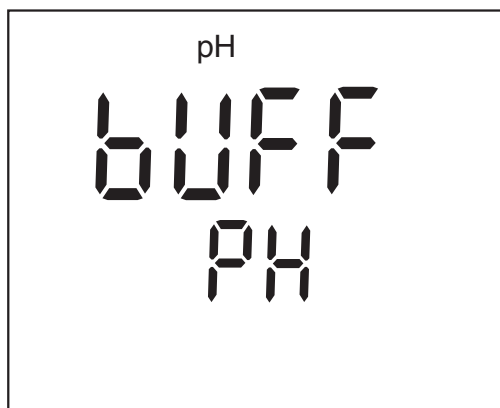
### 5.7.2 Measurement settings

These settings apply to calibration and measurement (the default setting is printed in bold).

Display during calibration ( <i>BUFFER</i> )	<b>pH</b> (buffer nominal value), <i>U</i> (combination electrode voltage)
Measured value resolution, pH	<b>0.000</b> , 0.00, 0.0
Measured value resolution, U	<b>0.0</b> , 0
Temperature unit ( <i>Unit</i> )	°C, °F
Calibration interval ( <i>Int.C</i> )	0 ... <b>7</b> ... 999 d

- 1 With <MODE\_\_> open the menu for measurement and calibration settings.  
The first setting is displayed.

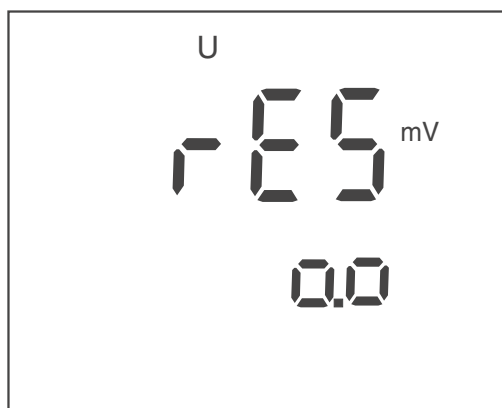
Display during  
calibration  
(*bUFF*)



- 2 Using <▲><▼>, select the *pH* or *U* display during calibration.
- 3 Confirm with <OK>.  
*rES*, the setting of the resolution is displayed.

**pH resolution  
(res)**

- 4 Select the resolution for the pH display with <▲><▼>.
- 5 Confirm with <OK>. *res*, the resolution of the voltage display (0.0, 0.00 or 0.000) appears on the display.

**U resolution  
(res)**

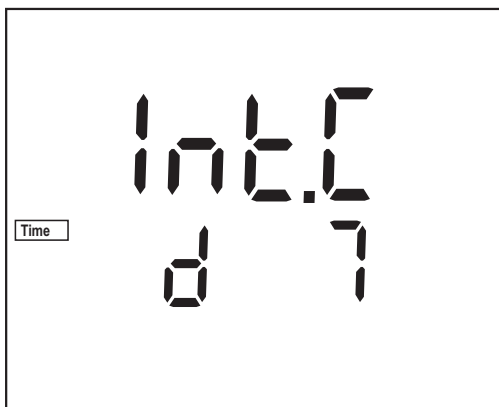
- 6 Using <▲><▼>, select the unit for the voltage display.
- 7 Confirm with <OK>. *Unit*, the setting of the unit of the temperature value is displayed.

### Temperature unit (*Unit*)



- |   |  |
|---|--|
| 8 | Using <▲><▼>, toggle between °C and °F.  |
| 9 | Confirm with <OK>.<br><i>Int.C</i> , the setting of the calibration interval is displayed. |

### Calibration interval (*Int.C*)



- |    |  |
|----|--|
| 10 | Set the interval with <▲><▼>.  |
| 11 | Confirm with <OK>.<br>The measurement settings are completed.<br>The meter switches to the measuring mode. |

## 5.8 Reset

### 5.8.1 Resetting calibration values

This function resets the calibration values to the default condition. All other meter settings are retained.

#### Calibration values in the default condition

Zero point	0 mV (pH 7.000)
Slope	-59.16 mV/pH (100 %)

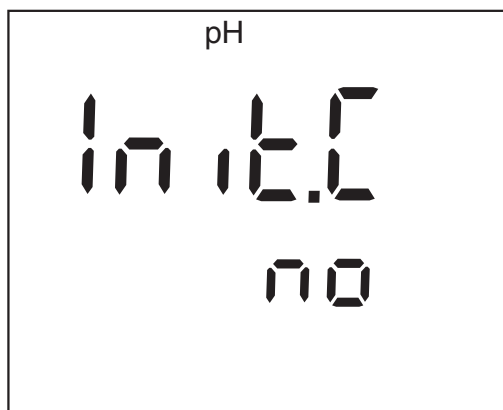


#### Note

The measuring system is not calibrated after a reset. Before measuring, recalibrate the meter.

#### Resetting calibration values

- 1 Press <ON/OFF\_\_> to open the menu for the reset of the calibration data.  
*Init.C* is displayed.



- 2 Press <▲><▼> to display *no* or *YES*.  
*YES*: Reset the calibration values.  
*no*: Retain the calibration values.
- 3 Confirm with <OK>.  
The menu is finished.  
The meter switches to the measuring mode.

### 5.8.2 Resetting all meter settings

This function resets all meter settings to the default condition. The relevant values are given in the following sections:

System settings	section 5.7.1
Measurement settings	section 5.7.2

#### Resetting the meter settings

- 1 Switch on the meter with **<ON/OFF>**.  
The display test appears briefly on the display.
- 2 During the display test, press **<MODE>** to open the menu for the reset of the meter settings.  
*Init* is displayed.



- 3 Press **<▲><▼>** to display *no* or *YES*.  
*YES*: Reset the meter settings.  
*no*: Retain the meter settings.
- 4 Confirm with **<OK>**.  
The menu is finished.  
The meter switches to the measuring mode.



#### Note

The measuring system is not calibrated after a reset. Before measuring, recalibrate the meter.

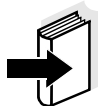




## 6 Maintenance, cleaning, disposal, accessories

### 6.1 Maintenance

The only maintenance activity required is replacing the batteries.

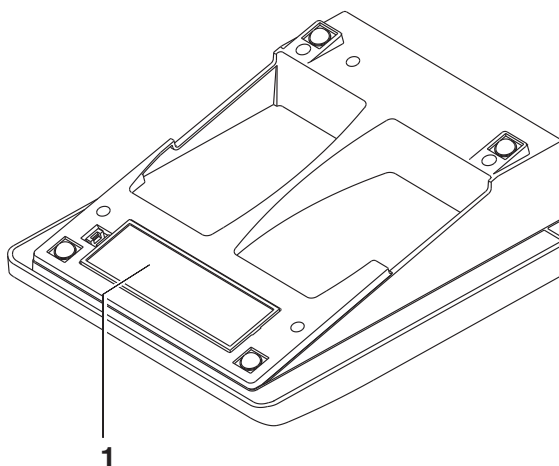


#### Note

See the relevant operating manuals of the combination electrodes for instructions on maintenance.

#### 6.1.1 Replacing the batteries

- |   |   |
|---|---|
| 1 | Open the battery compartment (1) on the underside of the meter. |
|---|---|



- |   |  |
|---|--|
| 2 | Remove the four batteries from the battery compartment.                      |
| 3 | Place four new batteries (type Mignon AA) in the battery compartment.        |
| 4 | Close the battery compartment (1).<br>The date (day) flashes in the display. |
| 5 | Set the date and time according to section 5.7.1.                            |



#### Caution

Make sure that the poles of the batteries are positioned correctly. The  $\pm$  signs on the batteries must correspond to the  $\pm$  signs in the battery compartment.

Only use leakproof alkaline manganese batteries.

**Note**

Alternatively, you can also use Ni-MH rechargeable batteries (type Mignon AA). In order to charge the batteries, an external charging device is required.

**6.2 Cleaning**

Occasionally wipe the outside of the measuring instrument with a damp, lint-free cloth. Disinfect the housing with isopropanol as required.

**Caution**

**The housing is made of synthetic material (ABS). Thus, avoid contact with acetone or similar detergents that contain solvents. Remove any splashes immediately.**

**6.3 Packing**

This meter is sent out in a protective transport packing. We recommend: Keep the packing material. The original packing protects the meter against damage during transport.

**6.4 Disposal**

This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste.

Instead it's your responsibility to correctly dispose of your equipment at lifecycle -end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment.

For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Thank you

## 6.5 Accessories

### 6.5.1 General information

Accessories	Order no.
SURVIVAL KIT PHENOMENAL	662-1166
Storage tube	662-1167
COMMUNICATION KIT (CD-ROM, USB cable, Manual)	662-1225
Articulated stand for 4 electrodes and temperature sensor	662-1169
Storage vessel	662-1248

### 6.5.2 pH / ORP

Electrodes (pH)	Order no.
pHenomenal 110 PH ELECTRODE PHENOMENAL GEL EPOXY BNC	662-1156
pHenomenal 111 PH ELECTRODE PHENOMENAL 3IN1 GEL 1M BNC	662-1157
pHenomenal 111-3 PH ELECTRODE PHENOMENAL 3IN1 GEL 3M BNC	662-1158
pHenomenal 220 PH ELECTRODE PHENOMENAL REFILL GLASS BNC	662-1159
pHenomenal 221 PH ELECTRODE PHENOMENAL 3IN1 GLASS 1M	662-1161
pHenomenal 221-3 PH ELECTRODE PHENOMENAL 3IN1 GLASS 3M	662-1162
pHenomenal MIC 220 PH ELECTRODE PHENOMENAL MICRO REFILL BNC	662-1163
pHenomenal SPEAR 220 PH ELECTRODE PHENOMENAL COMB. SPEAR TYPE	662-1164

<b>Electrodes (ORP)</b>	<b>Order no.</b>
pHenomenal ORP 220 REDOX ELECTRODE PHENOMENAL KOMB. 1M BNC	662-1165

<b>Solutions</b>	<b>Order no.</b>
Buffer pH 4 AVS TITRINORM, 100 ml	32095.184
Buffer pH 7 AVS TITRINORM, 100 ml	32096.187
Buffer pH 10 AVS TITRINORM, 100 ml	32040.185
Buffer NIST pH 4.01, 30 x 30 ml	1.99001.0001
Buffer NIST pH 7, 30 x 30 ml	1.99002.0001
Buffer NIST pH 10, 30 x 30 ml	1.99004.0001
Storage Solution (3 moles/l KCl), 100 ml	83605.180
Cleaning Solution Pepsine/Hydrochloric acid, 100 ml	83603.180

## 7 What to do if...

Error message <i>OFL, UFL</i>	Cause	Remedy
	pH combination electrode:	
	– Measured value outside the measuring range	– Use suitable combination electrode
	– Air bubble in front of the diaphragm	– Remove air bubble
	– Air in the diaphragm	– Extract air or moisten diaphragm
	– Cable broken	– Replace combination electrode
	– Gel electrolyte dried out	– Replace combination electrode
Error message <i>CalError</i>	Cause	Remedy
	pH combination electrode:	
	– The values determined for zero point and slope of the combination electrode are outside the allowed limits.	– Recalibrate
	– Diaphragm contaminated	– Clean diaphragm
	– Combination electrode broken	– Replace combination electrode
	Buffer solutions:	
	– Incorrect buffer solutions	– Change calibration procedure
	– Buffer solutions too old	– Use only once. Note the shelf life
	– Buffer solutions depleted	– Change solutions

**No stable measured value**

<b>Cause</b>	<b>Remedy</b>
pH combination electrode:	
– Diaphragm contaminated	– Clean diaphragm
– Membrane contaminated	– Clean membrane
Test sample:	
– pH value not stable	– Measure with air excluded if necessary
– Temperature not stable	– Adjust temperature if necessary
Combination electrode + test sample:	
– Conductivity too low	– Use suitable combination electrode
– Temperature too high	– Use suitable combination electrode
– Organic liquids	– Use suitable combination electrode

**Symbol for calibration evaluation flashes**

<b>Cause</b>	<b>Remedy</b>
– Calibration interval expired	– Recalibrate the measuring system

**Display, LoBat**

<b>Cause</b>	<b>Remedy</b>
– Batteries almost empty	– Replace the batteries (see section 6.1 MAINTENANCE)

**Obviously incorrect measured values**

<b>Cause</b>	<b>Remedy</b>
pH combination electrode:	
– pH combination electrode unsuitable	– Use suitable combination electrode
– Temperature difference between buffer and test sample too high	– Adjust temperature of buffer or sample solutions
– Measurement procedure not suitable	– Follow special procedure

**Meter does not react to keystroke**

<b>Cause</b>	<b>Remedy</b>
– Operating condition undefined or EMC load unallowed	– Processor reset: Press the <b>&lt;OK&gt;</b> and <b>&lt;ON/OFF&gt;</b> key simultaneously.

**You want to know which software version is in the meter**

<b>Cause</b>	<b>Remedy</b>
– E. g., a question by the service department	– Switch on the meter. During the display test, display the software version with <b>&lt;OK&gt;</b> .





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### Web Resources

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- Complete technical service contact information
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**Contact us** For information or technical assistance contact your local VWR representative or visit [www.vwr.com](http://www.vwr.com).

## 10 Warranty

VWR International warrants that this product will be free from defects in material and workmanship for a period of two (2) years from date of purchase. If a defect is present, VWR will, at its option, repair, replace, or refund the purchase price of this product at no charge to you, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear.

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