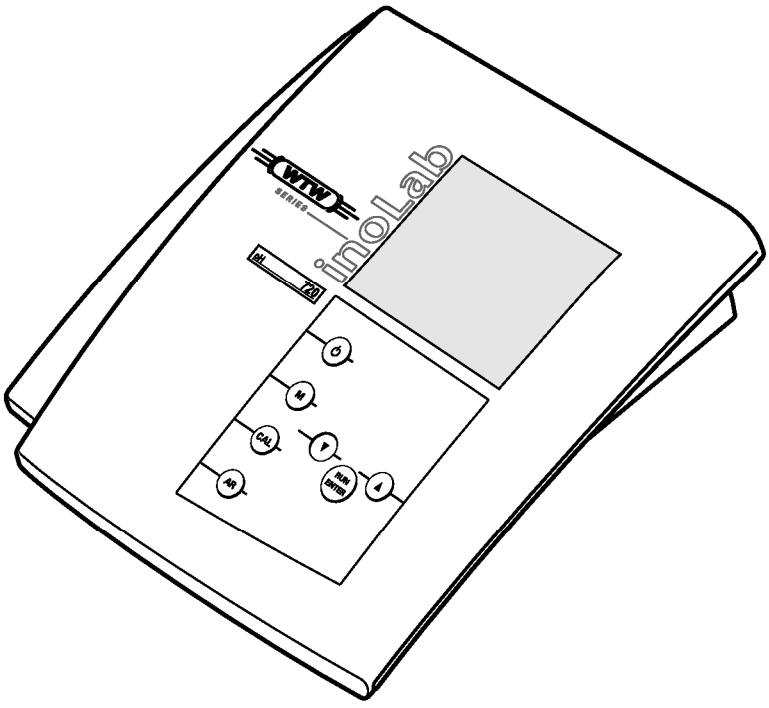
Operating Manual

# inoLab pH 720




**Laboratory pH meter**



ba75439e02 07/2004

**Accuracy when going to press**

The use of advanced technology and the high quality standard of our instruments are the result of continuous development. This may result in differences between this operating manual and your instrument.
We cannot guarantee that there are absolutely no errors in this manual. We are sure you will understand that we cannot accept any legal claims resulting from the data, figures or descriptions.

**Warranty declaration**

The designated instrument is covered by a warranty of three years from the date of purchase.
The instrument warranty extends to manufacturing faults that are determined within the period of warranty.
The warranty excludes components that are replaced during maintenance such as batteries, etc.

The warranty claim extends to restoring the instrument to readiness for use but not, however, to any further claim for damages. Improper handling or unauthorized opening of the instrument invalidates any warranty claim.

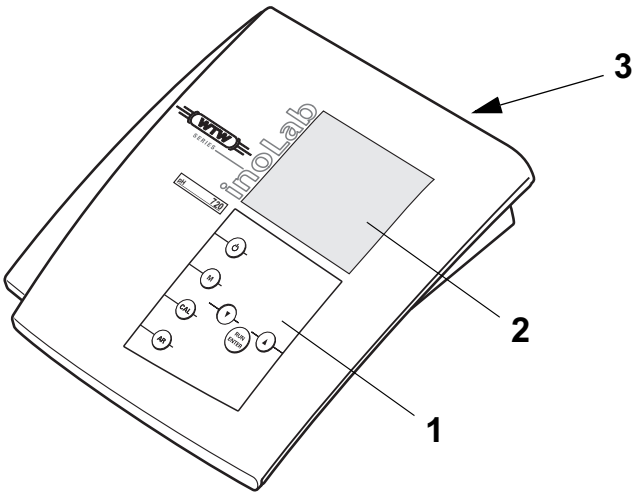
To ascertain the warranty liability, return the instrument and proof of purchase together with the date of purchase freight paid or prepaid.

**Copyright**

# 1 Overview

The compact inoLab pH 720 precision pH meter lets you perform pH measurements rapidly and reliably.
The inoLab pH 720 provides the highest degree of operating comfort, reliability and measuring safety for all applications.

The proven MultiCal® calibration procedures and special *AutoRead* function support your work with the pH meter.



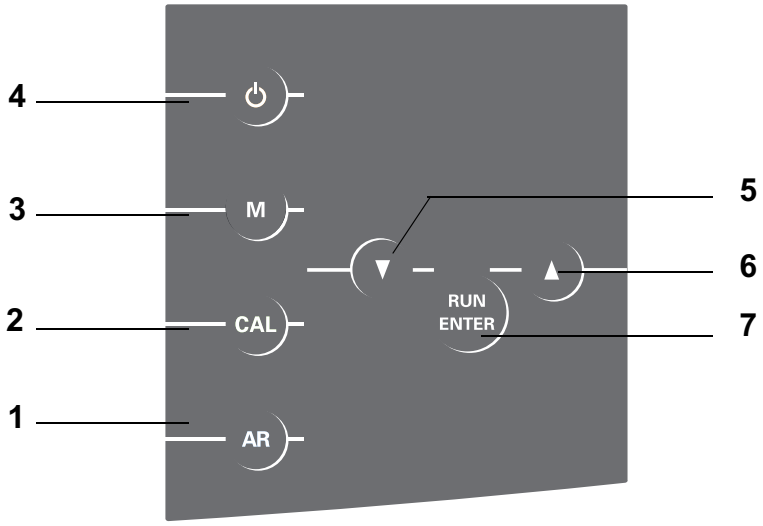

**1** Keypad

**2** Display

**3** Sockets

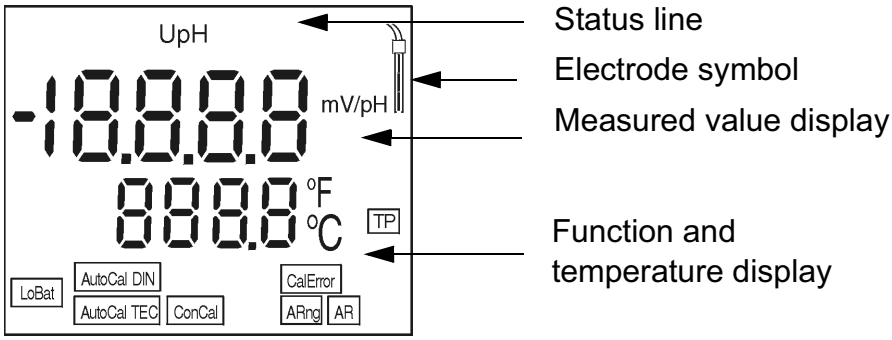
**Note**
The measuring instrument can also be delivered as part of a set.
Information on this and other accessories is available in the WTW catalog LABORATORY AND FIELD INSTRUMENTATION or via the Internet.

## 1.1 Keyboard

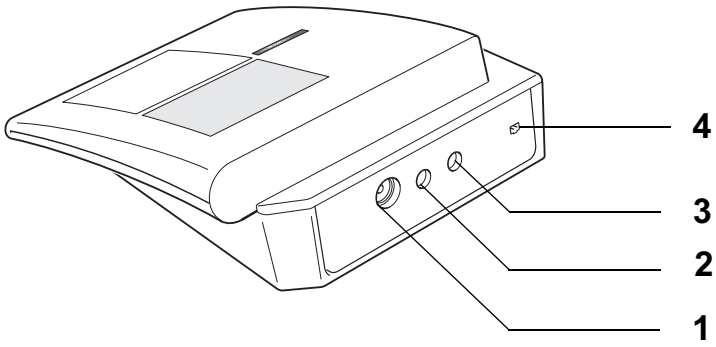



| | |
|---|---|
| **1** | Activate/deactivate AutoRead function |
| **2** | Call up calibration procedure |
| **3** | Select measuring mode |
| **4** | Measuring instrument ON/OFF |
| **5** | Reduce values, scroll |
| **6** | Increase values, scroll |
| **7** | Confirm inputs, start AutoRead |

## 1.2 Display




## 1.3 Sockets




Connectors:

| | |
|---|---|
| **1** | pH electrode |
| **2** | Temperature probe |
| **3** | Reference electrode |
| **4** | Plug-in power supply (option) |

**Caution**
Only connect probes to the instrument that cannot feed excessive voltages or currents (> SELV and > circuit with current limiter).
Almost all commercial electrodes - especially WTW electrodes - meet these requirements.

# 2 Safety

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

**Target group**

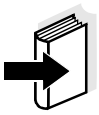
This measuring instrument was developed for use in the laboratory.
Thus, we assume that, as a result of their professional training and experience, the operators will know the necessary safety precautions to take when handling chemicals.

**Symbols used**

**Caution**
indicates instructions that have to be followed to prevent damage to your instrument.

**Warning**
indicates instructions that have to be followed to protect yourself and the instrument from dangerous electrical voltage.

**Note**
Indicates notes that draw your attention to special features.



**Note**
Indicates cross-references to other documents, e.g. application reports, operating manuals of combination electrodes, etc.

## 2.1 Authorized use

This instrument is authorized exclusively for pH and Redox measurements in the laboratory.
The technical specifications as given in chapter 7 TECHNICAL DATA must be observed. Only the operation and running of the measuring instrument according to the instructions given in this operating manual is authorized.
Any other use is considered **unauthorized**.

## 2.2 General safety instructions

This instrument is constructed and tested in compliance with the EN 61010-1 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 instrument can only be guaranteed if the generally applicable safety measures and the specific safety instructions in this operating manual are followed.

The smooth functioning and operational safety of the instrument can only be guaranteed under the climatic conditions specified in chapter 7 TECHNICAL DATA.

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

**Caution**
The instrument is only allowed to be opened by personnel authorized by WTW.

**Safe operation**

If safe operation is no longer possible, the instrument must be taken out of service and secured against inadvertent operation.
Safe operation is no longer possible if:

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

If you are in doubt contact the supplier of the instrument.

**Obligations of the operator**

The operator of this measuring instrument 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 manufacturer.

# 3 Commissioning

## 3.1 Scope of delivery

- Laboratory measuring instrument, inoLab pH 720
- Operating manual and short manual
- 4 x type AA Mignon 1.5 V batteries

## 3.2 Initial commissioning

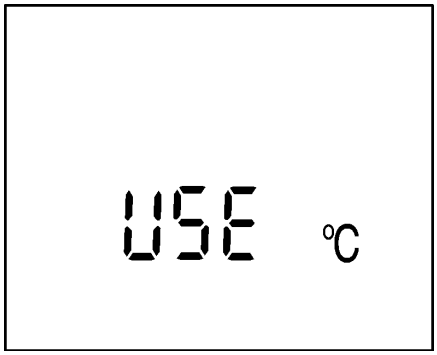
Perform the following activities:

- Set the °C or °F
- Set the resolution
- Connect the plug-in power supply (optional).

**Setting °C or °F**

The temperature can be displayed in °C or in °F. In the delivery condition, the measuring instrument is preset to °C. To change the unit proceed as follows:

| | |
|---|---|
| 1 | Switch the measuring instrument off. |
| 2 | Press and hold down the (M) key. |
| 3 | Press the (⏻) key. |




| | |
|---|---|
| 4 | Toggle between °C and °F by pressing (▼)(▲). |
| 5 | Confirm with (RUN ENTER).<br>The measuring instrument switches to the measuring mode. |

### Setting the resolution

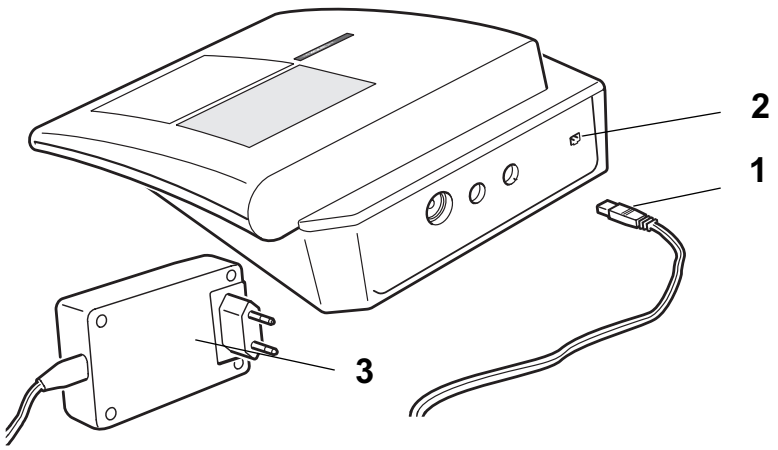
| | |
|---|---|
| 1 | Press and hold down the RUN ENTER key. |
| 2 | Press the M key.<br>The measured values are displayed with a high resolution, e. g. pH = 4.012. |
| 3 | Press the RUN ENTER and keys M again.<br>The measured values are displayed with a low resolution, e. g. pH = 4.01. |

### Connecting the plug-in power supply (optional)

The measuring instrument works battery-powered. It can, however, also be supplied by the plug-in power supply which is available as an accessory.

**Warning**
The line voltage on site must lie within the input voltage range of the original plug-in power supply unit (see chapter 7 TECHNICAL DATA).

**Caution**
Use original plug-in power supplies only
(see chapter 7 TECHNICAL DATA).




| | |
|---|---|
| 1 | Insert the plug (1) into the socket (2) of the pH meter. |
| 2 | Connect the original WTW plug-in power supply (3) to an easily accessible mains socket. |

# 4 Operation

## 4.1 Switch on the instrument

| | |
|---|---|
| 1 | Place the instrument on a flat surface and protect it against intense light and heat. |
| 2 | Press the ⏻ key.<br>The *Display test* appears briefly on the display.<br>The instrument then switches automatically to the previously selected measuring mode. |
| 3 | Connect the pH electrode to the instrument.<br>The measuring instrument is ready for operation. |

**Note**
The instrument has an energy saving feature to avoid unnecessary battery depletion.
The energy saving feature switches the instrument off if no key has been pressed for an hour.
The energy saving feature is not active if the instrument is supplied by the plug-in power supply.

## 4.2 Measuring

**Preparatory activities**

Perform the following activities when you want to measure:

| | |
|---|---|
| 1 | Connect the pH electrode to the instrument. |
| 2 | Adjust the temperature of the buffer or test solutions or measure the current temperature if the measurement is made without a temperature probe. |
| 3 | Calibrate or check the instrument with the pH electrode. |
| 4 | Select the measuring mode by pressing (M). |

**Note**
Incorrect calibration of the pH electrode will result in incorrect measured values. Therefore, regularly perform calibration before measuring.

**Temperature probe**

Measurements can be performed with and without a temperature probe. A connected temperature probe is indicated by TP on the display.

**Note**
The pH meter automatically recognizes the type of the temperature probe used. As a result, you can connect electrodes with the NTC 30 or Pt 1000.

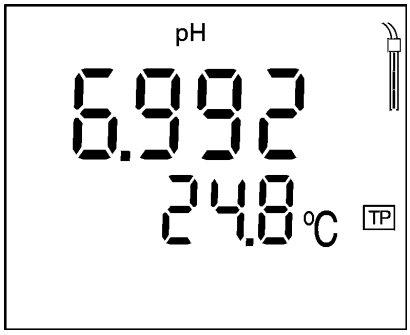
The temperature measurement is absolutely essential for a reproducible pH measurement. If the measurement is made without a temperature probe, proceed as follows:

| | |
|---|---|
| 1 | Determine the current temperature using a thermometer. |
| 2 | Set up the temperature by pressing (▼)(▲). |

**Note**
When calibrating without a temperature probe, set up the current temperature of the respective buffer solution manually by pressing the (▼)(▲) keys.

### 4.2.1 Measuring the pH value

| | |
|---|---|
| 1 | Perform the preparatory activities according to section 4.2. |
| 2 | Immerse the pH electrode into the test sample. |
| 3 | Press the (M) key until *pH* appears in the status display. The pH value appears on the display. |




**AutoRead AR (Drift control)**

The *AutoRead* function (drift control) checks the stability of the measurement signal. The stability has a considerable effect on the reproducibility of the measured values.

For identical measurement conditions, the following criteria apply:

- pH value: better than 0.02 (setting time: > 30 s)

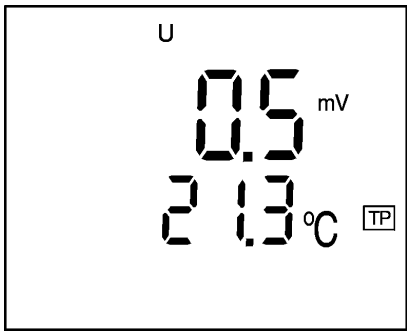
| | |
|---|---|
| 1 | Call up the pH measuring mode by pressing (M). |
| 2 | Activate the AutoRead function by pressing (AR). The current measured value is frozen (Hold function). |
| 3 | Start the AutoRead function by pressing (RUN ENTER). AR flashes on the display until a stable measured value is reached. |
| 4 | If necessary, start the next AutoRead measurement by pressing (RUN ENTER). |
| 5 | To terminate the AutoRead function: Press the (AR) key. |

**Note**
The current AutoRead measurement (with acceptance of the current value) can be terminated at any time by pressing RUN ENTER.

### 4.2.2 Measuring the Redox voltage

The instrument can measure the Redox voltage (mV) of a solution when connected with a Redox electrode, e.g. SenTix ORP.

| | |
|---|---|
| 1 | Perform the preparatory activities according to section 4.2. |
| 2 | Immerse the Redox electrode into the test sample. |
| 3 | Press the M key repeatedly until U appears in the status line.<br>The Redox voltage (mV) of the sample appears on the display. |
| 4 | Wait for a stable measured value. |




**Note**
Redox electrodes are not calibrated. However, you can check Redox electrodes using a test solution.

## 4.3 Calibrating

**Why calibrate?**

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

**When to calibrate?**

- After connecting another electrode
- When the sensor symbol flashes:
  - after expiry of the calibration interval
  - after a voltage interruption, e.g. battery change

**Calibration points**

Calibration can be performed using one, two or three buffer solutions (single point calibration, two-point calibration and three-point calibration). In three-point calibration, two separate asymmetry and slope values (ASY1/S1 and ASY2/S2) are determined for the two ranges between the three buffers. For measuring, the calibration values relevant for the respective range are used.

You can choose between 3 calibration procedures:

**AutoCal TEC**

is specially adapted to the WTW technical buffer solutions as a fully automatic two or three-point calibration. The buffer solutions are automatically recognized by the instrument.

**AutoCal DIN**

is specially adapted to permanently programmed buffer solutions according to DIN 19266 as a fully automatic two or three-point calibration. The buffer solutions are automatically recognized by the instrument.

**ConCal**

is the conventional two-point calibration with 2 freely selectable buffer solutions or single-point calibration as the rapid method.

**AutoRead**

In calibration using AutoCal TEC and AutoCal DIN, the *AutoRead* function is automatically activated.
The current AutoRead measurement (with acceptance of the current value) can be terminated at any time by pressing RUN ENTER.

## Calibration evaluation

After the calibration, the instrument automatically evaluates the current status. The asymmetry and slope are separately evaluated. The worst evaluation appears on the display.

| Display | Asymmetry [mV] | Slope [mV/pH] |
|---|---|---|
|  | -15 ... +15 | -60.5 ... -58 |
|  | -20 ... +20 | -58 ... -57 |
|  | -25 ... +25 | -61 ... -60.5<br>or<br>-57 ... -56 |
|  <br>Clean the electrode according to the sensor operating manual | -30 ... +30 | -62 ... -61<br>or<br>-56 ... -50 |
| E3<br>Clear the fault according to chapter 6 WHAT TO DO IF... | < -30 or<br>> 30 | < -62 or<br>> -50 |

## Preparatory activities

| | |
|---|---|
| 1 | Switch on the instrument by pressing ⏻. |
| 2 | Connect the pH electrode to the instrument. |
| 3 | Keep the buffer solutions ready. |
| 4 | Adjust the temperature of the solutions and measure the current temperature if the measurement is performed without a temperature probe. |

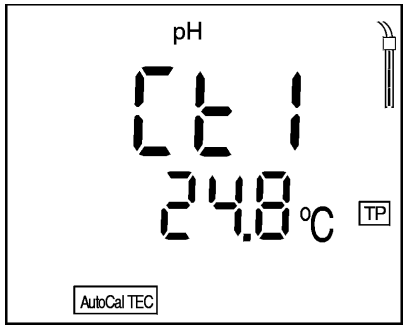
### 4.3.1 AutoCal TEC

Use any two or three of the WTW technical buffer solutions for this procedure in increasing or decreasing order (pH 2.00, 4.01, 7.00, or 10.01).

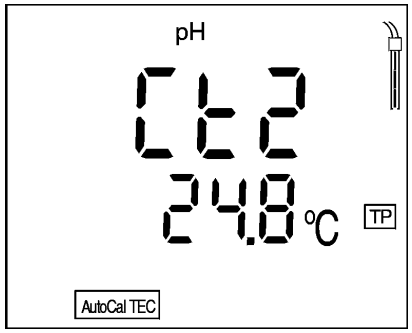
**Note**
The calibration for pH 10.01 is optimized for the WTW technical buffer solution TEP 10 Trace or TPL 10 Trace. Other buffer solutions can lead to an erroneous calibration. The correct buffer solutions are given in the WTW catalog or in the Internet.

**Note**
Steps 2, 6 and 13 are not required if you use a temperature probe.

| | |
|---|---|
| 1 | Press the CAL key repeatedly until the AutoCal TEC function display appears. |




| | |
|---|---|
| 2 | If necessary, set the temperature of the buffer solution by pressing ▼▲. |
| 3 | Submerse the pH electrode in the first buffer solution. |
| 4 | Press the RUN ENTER key.<br>AR flashes on the display.<br>The electrode voltage (mV) appears on the display.<br>As soon as a stable value is recognized, Ct2 appears. |




| | |
|---|---|
| 5 | Thoroughly rinse the electrode with distilled water. |
| 6 | If necessary, set the temperature of the second buffer solution by pressing ▼ ▲. |
| 7 | Submerse the electrode in the second buffer solution. |
| 8 | Press the RUN ENTER key.<br>AR flashes on the display.<br>The electrode voltage (mV) appears on the display.<br>As soon as a stable value is recognized, AR disappears.<br>The sensor symbol shows the electrode evaluation after the two-point calibration.<br>The value of the slope (mV/pH) appears on the display. |

**Note**
If the slope (*SLO*) is indicated on the display, you can change the unit of the slope with ▼ ▲.
The display in % refers to the Nernst slope, 59.2 mV/pH (100 x the slope determined/Nernst slope).

| | |
|---|---|
| 9 | Press the RUN ENTER key.<br>The value of the asymmetry (mV) appears on the display. |
| 10 | To return to the measuring mode: Press the M key or continue with three-point calibration. |

**Three-point calibration**

| | |
|---|---|
| 11 | Press the RUN ENTER key.<br>Ct3 appears on the display. |
| 12 | Thoroughly rinse the electrode with distilled water. |
| 13 | If necessary, set the temperature of the third buffer solution by pressing ▼ ▲. |
| 14 | Submerse the electrode in the third buffer solution. |
| 15 | Press the RUN ENTER key.<br>AR flashes on the display.<br>The electrode voltage (mV) appears on the display. As soon as a stable value is recognized, AR disappears.<br>The sensor symbol shows the electrode evaluation after the three-point calibration.<br>The value of the slope (mV/pH) appears on the display. |
| 16 | Press the RUN ENTER key.<br>The value of the asymmetry (mV) appears on the display. |
| 17 | To return to the measuring mode: Press the M key. |

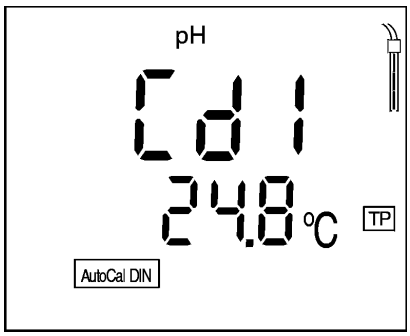
**Note**
You can also prematurely terminate the three-point calibration by pressing M. The values of the two-point calibration for the slope and asymmetry are then stored.

### 4.3.2 AutoCal DIN

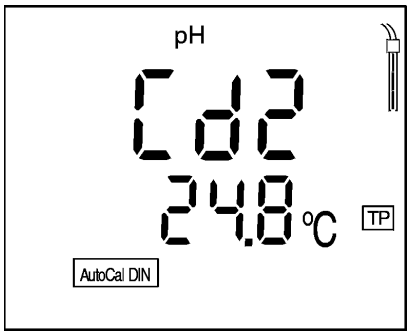
Use two or three different DIN buffer solutions (type A, C, D or F with the pH values 1.679, 4.006, 6.865, 9.180) for this procedure in increasing or decreasing order.

**Note**
Steps 2, 6 and 13 are not required if you use a temperature probe.

| | |
|---|---|
| 1 | Press the CAL key repeatedly until the AutoCal DIN function display appears. |




| | |
|---|---|
| 2 | If necessary, set the temperature of the buffer solution by pressing ▼ ▲. |
| 3 | Submerse the pH electrode in the first buffer solution. |
| 4 | Press the RUN ENTER key.<br>AR flashes on the display.<br>The electrode voltage (mV) appears on the display.<br>As soon as a stable value is recognized, Cd2 appears. |




| | |
|---|---|
| 5 | Thoroughly rinse the electrode with distilled water. |
| 6 | If necessary, set the temperature of the second buffer solution by pressing ▼ ▲. |
| 7 | Submerse the electrode in the second buffer solution. |
| 8 | Press the RUN ENTER key.<br>AR flashes on the display.<br>The electrode voltage (mV) appears on the display.<br>As soon as a stable value is recognized, AR disappears.<br>The sensor symbol shows the electrode evaluation after the two-point calibration.<br>The value of the slope (mV/pH) appears on the display. |

**Note**
If the slope (*SLO*) is indicated on the display, you can change the unit of the slope with ▼ ▲.
The display in % refers to the Nernst slope, 59.2 mV/pH (100 x the slope determined/Nernst slope).

| | |
|---|---|
| 9 | Press the RUN ENTER key.<br>The value of the asymmetry (mV) appears on the display. |
| 10 | To return to the measuring mode: Press the M key or continue with the three-point calibration. |

**Three-point calibration**

| | |
|---|---|
| 11 | Press the RUN ENTER key.<br>Cd3 appears on the display. |
| 12 | Thoroughly rinse the electrode with distilled water. |
| 13 | If necessary, set the temperature of the third buffer solution by pressing ▼▲. |
| 14 | Submerse the electrode in the third buffer solution. |
| 15 | Press the RUN ENTER key.<br>AR flashes on the display.<br>The electrode voltage (mV) appears on the display. As soon as a stable value is recognized, AR disappears.<br>The sensor symbol shows the electrode evaluation after the three-point calibration.<br>The value of the slope (mV/pH) appears on the display. |
| 16 | Press the RUN ENTER key.<br>The value of the asymmetry appears on the display (mV). |
| 17 | To return to the measuring mode: Press the M key. |

**Note**

You can also prematurely terminate the three-point calibration by pressing M. The values of the two-point calibration for slope and asymmetry are retained.

### 4.3.3 ConCal

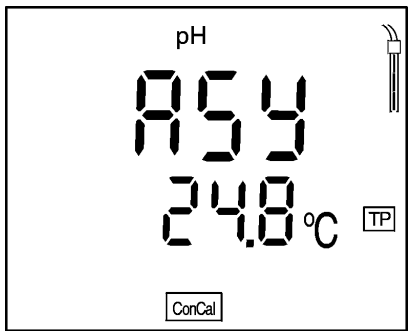
**Two-point calibration**

Use two buffer solutions for this procedure:

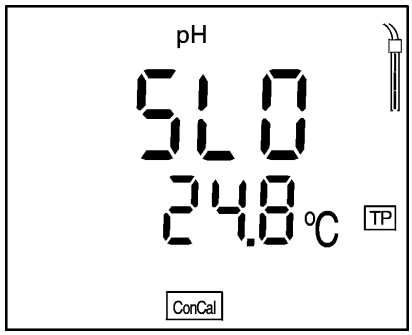
- pH 7.0 ± 0.5
- any other buffer solution

**Note**
Steps 2 and 9 are not required if you use a temperature probe.

| | |
|---|---|
| 1 | Press the CAL key repeatedly until the ConCal function display appears. |




| | |
|---|---|
| 2 | If necessary, set the temperature of the buffer solution by pressing ▼▲. |
| 3 | Submerse the pH electrode in the pH 7.0 ± 0.5 buffer solution. |
| 4 | Press the RUN ENTER key.<br>The measured pH value appears on the display. |
| 5 | Set the nominal pH value of the buffer solution (at the current temperature) by pressing the ▼▲ keys. |
| 6 | Press the RUN ENTER key.<br>The value of the asymmetry (mV) and the sensor symbol appear on the display. |
| 7 | Press the RUN ENTER key.<br>SLO(pe) appears on the display. |




| | |
|---|---|
| 8 | Thoroughly rinse the electrode with distilled water. |
| 9 | If necessary, set the temperature of the second buffer solution by pressing ▼ ▲. |
| 10 | Submerse the electrode in the second buffer solution. |
| 11 | Press the RUN ENTER key.<br>The second measured pH value appears on the display. |
| 12 | Set the nominal pH value of the second buffer solution (at the current temperature). |
| 13 | Press the RUN ENTER key.<br>The value of the slope (mV/pH) appears on the display.<br>The sensor symbol shows the evaluation of the electrode after the two-point calibration. |

**Note**
If the slope (*SLO*) is indicated on the display, you can change the unit of the slope with ▼ ▲.
The display in % refers to the Nernst slope, 59.2 mV/pH (100 x the slope determined/Nernst slope).

| | |
|---|---|
| 14 | Press the RUN ENTER key.<br>The value of the asymmetry (mV) appears on the display. |
| 15 | To return to the measuring mode: Press the M key or continue with the three-point calibration. |

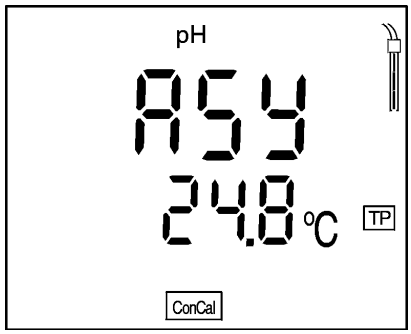
**Single-point calibration**

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.

**Note**
Only the electrode asymmetry is determined in single-point calibration. The slope of the last two-point calibration is retained.

**Note**
Step 2 is not required if you use a temperature probe. The TP display indicates an active temperature measurement.

| | |
|---|---|
| 1 | Press the CAL key repeatedly until the ConCal function display appears. |




| | |
|---|---|
| 2 | Set the temperature of the buffer solution by pressing ▼▲. |
| 3 | Submerse the pH electrode in the buffer solution. |
| 4 | Press the RUN ENTER key.<br>The measured pH value appears on the display. |
| 5 | Set the nominal pH value of the buffer solution (at the current temperature) by pressing the ▼▲ keys. |
| 6 | Press the RUN ENTER key.<br>The value of the asymmetry (mV) and the sensor symbol for the evaluation of the electrode appears on the display. |
| 7 | To return to the measuring mode: Press the M key. |

## 4.4 Reset

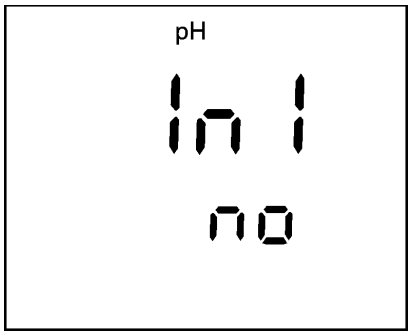
**Basic settings**

The following functions are reset (initialized) to the values they had on delivery:

| | |
|---|---|
| Measuring mode | pH |
| Asymmetry | 0 mV |
| Slope | -59.16 mV/pH |
| Calibration procedure | AutoCal TEC |
| Temperature, manual | 25 °C |
| Resolution of pH display | 0.01 |

Proceed as follows:

| | |
|---|---|
| 1 | Press and hold down the RUN ENTER key. |
| 2 | Press the CAL key. |



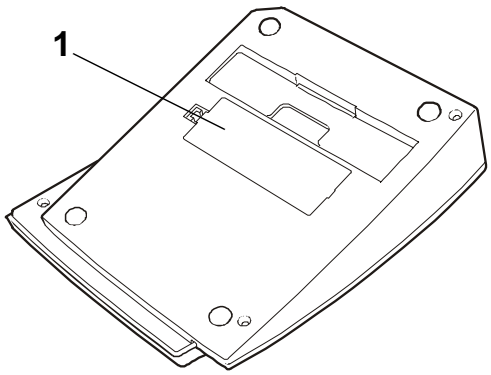

| | |
|---|---|
| 3 | Toggle between no and yes by pressing ▼ ▲.<br>yes: reset parameters.<br>no: retain settings. |
| 4 | Confirm with RUN ENTER.<br>The instrument changes automatically to the pH measuring mode. |

# 5 Maintenance, cleaning, disposal

## 5.1 Maintenance

The measuring instrument is almost maintenance-free. The only maintenance task is replacing the batteries:

| | |
|---|---|
| 1 | Open the battery compartment (1) on the underside of the instrument. |
| 2 | Remove the four batteries from the battery compartment. |
| 3 | Insert four new batteries (Type Mignon AA) into the battery compartment. |
| 4 | Close the battery compartment (1). |

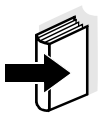



**Caution**

Make sure that the poles of the batteries are the right way round.

The ± signs in the battery compartment must correspond to the ± signs on the batteries.

Only use leakproof alkaline manganese batteries.



**Note**

See the relevant operating manual of the electrode for instructions on maintenance.

## 5.2 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.

## 5.3 Disposal

**Packing**

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

**Batteries**

This note refers to the battery regulation that applies in the Federal Republic of Germany. We would ask end-consumers in other countries to follow their local statutory provisions.

**Note**
In compliance with §14 of the BATTERY REGULATION, we would like to point out that this instrument contains batteries. Batteries that have been removed must only be disposed of at the recycling facility set up for this purpose or via the retail outlet.
It is illegal to dispose of them in household refuse.

**Measuring instrument**

Dispose of the measuring instrument as electronic waste at an appropriate collection point. It is illegal to dispose of them in household refuse.

# 6 What to do if...

**Error message, OFL**

| Cause | Remedy |
|---|---|
| pH electrode: | |
| – Not connected | – Connect electrode |
| – Air bubbles in front of the diaphragm | – Remove air bubbles |
| – Air in the diaphragm | – Extract air or moisten diaphragm |
| – Cable broken | – Replace electrode |
| – Gel electrolyte dried out | – Replace electrode |

**Error message, E3**

| Cause | Remedy |
|---|---|
| pH electrode: | |
| – Diaphragm contaminated | – Clean diaphragm |
| – Membrane contaminated | – Clean membrane |
| – Moisture in the plug | – Dry plug |
| – Electrolyte obsolete | – Replenish electrolyte or replace electrode |
| – Electrode obsolete | – Replace electrode |
| – Electrode broken | – Replace electrode |
| Measuring instrument: | |
| – Incorrect calibration procedure | – Select correct procedure |
| – Incorrect solution temperature (without temperature probe) | – Set up correct temperature |
| – Socket damp | – Dry socket |

| | |
|---|---|
| Buffer solutions: | |
| – Incorrect buffer solutions | – Change calibration procedure |
| – Buffer solutions too old | – Only use once. Note the shelf life |
| – Buffer solutions depleted | – Change solutions |

**No stable measured value**

| **Cause** | **Remedy** |
|---|---|
| pH electrode: | |
| – Diaphragm contaminated | – Clean diaphragm |
| – Membrane contaminated | – Clean membrane |

| | |
|---|---|
| Sample: | |
| – pH value not stable | – Measure with air excluded if necessary |
| – Temperature not stable | – Adjust temperature if necessary |

| | |
|---|---|
| Electrode + sample: | |
| – Conductivity too low | – Use suitable electrode |
| – Temperature too high | – Use suitable electrode |
| – Organic liquids | – Use suitable electrode |

**LoBat**

| **Cause** | **Remedy** |
|---|---|
| – Batteries almost depleted | – Replace batteries (see section 5.1 MAINTENANCE) |

**Obviously incorrect measured values**

| Cause | Remedy |
|---|---|
| pH electrode: | |
| – pH electrode unsuitable | – Use suitable electrode |
| – Temperature difference between buffer and sample too large | – Adjust temperature of buffers or samples |
| – Measuring procedure not suitable | – Follow special procedure |

**Instrument does not react to keystroke**

| Cause | Remedy |
|---|---|
| – Operating state undefined or EMC electric stress unallowed | – Processor reset: Press the (AR) key and switch on instrument |

**You would like to know which software version is in the instrument**

| Cause | Remedy |
|---|---|
| – e.g. question of the WTW service department | – Press the (AR) key and switch on instrument. The software version is displayed. |

# 7 Technical Data

| | | |
|---|---|---|
| **Ambient temperature** | Storage temperature | - 25 °C ... + 65 °C |
| | Operating temperature | 0 °C ... + 55 °C |
| | Allowable relative humidity | Annual mean: < 75 %<br>30 days/year: 95 %<br>Other days: 85 % |
| **Measuring ranges and resolution** | pH | - 2.000 ... + 19.999<br>- 2.00 ... + 19.99 |
| | U [mV] | - 999.9 ... + 999.9<br>- 1999 ... + 1999 |
| | T [°C] | - 5.0 ... + 105.0 |
| | T [°F] | + 23.0 ... + 221.0 |
| **Accuracy (± 1 digit)** | pH<br>(in the measuring range of 2 pH units around the calibration point) | ± 0.005<br>(at operating temperature + 15 °C ... + 35 °C )<br><br>± 0.01 |
| | U [mV] | ± 0.3 (at + 15 °C ... + 35 °C)<br>± 1 |
| | T [°C] | NTC 30: ± 0.1<br>PT 1000:<br>± 0.5 at 0 °C ... 15 °C<br>± 0.1 at 15 °C ... 35 °C<br>± 1 at 35 °C ... 55 °C |
| | T [°F] | NTC 30: ± 0.2<br>PT 1000:<br>± 0.9 at 32 °F ... 59 °F<br>± 0.2 at 59 °F ... 95 °F<br>± 1.8 at 95 °F ... 131 °F |

**Dimensions and weight**

| | |
|---|---|
| Length [mm] | 230 |
| Width [mm] | 210 |
| Height [mm] | 70 |
| Weight [kg] | Approx. 0.850 |

**Energy supply**

| | |
|---|---|
| Batteries | 4 x 1.5 V AA type alkaline manganese batteries |
| Runtime | Approx. 3000 operating hours |
| Mains power supply (option) | Connection max. overvoltage category II (valid for all plug-in power supplies):<br><br>Plug-in power supply unit<br>(Euro, US, UK, Australian plug)<br>FRIWO FW7555M/09, 15.1432<br>Friwo Part. No. 1822089<br>Input:<br>100 ... 240 V ~ / 50 ... 60 Hz / 400 mA<br>Output: 9 V = / 1,5 A |

**Guidelines and norms used**

| | |
|---|---|
| EMC | E.C. guideline 89/336/EEC<br>EN 61326-1:1997<br>EN 61000-3-2 A14:2000<br>EN 61000-3-3:1995<br>FCC Class A |
| Instrument safety | E.C. guideline 73/23/EEC |
| Protective class | 3, EN 61010-1 A2:1995 |
| Climatic class | 2, VDI/VDE 3540 |

**Test marks**

UL/CUL, CE

## 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.

# 8 Lists

This chapter provides additional information and orientation aids.

**Abbreviations** The list of abbreviations explains abbreviations that appear on the display or when dealing with the instrument.

**Specialist terms** The glossary briefly explains the meaning of the specialist terms. However, terms that should already be familiar to the target group are not described here.

**Index** The index helps you find the topics that you are looking for.

## Abbreviations

| | |
|---|---|
| AR | AutoRead (drift control) |
| ARng | Automatic range switching<br>Measuring instrument measures with highest resolution |
| ASY | Asymmetry |
| AutoCal DIN | Automatic calibration with DIN buffer solutions |
| AutoCal TEC | Automatic calibration with WTW technical buffer solutions |
| Cal | Calibration |
| Cd... | Calibration with<br>DIN buffer solutions (acc. to DIN 19 266) |
| ConCal | Conventional one/two point calibration |
| Ct... | Calibration with WTW technical buffer solutions |
| E3 | Error message (see WHAT TO DO IF ...) |
| InI | Initialization<br>Resets individual basic functions to the status they had on delivery |
| LoBat | Low Battery<br>Batteries are almost empty |
| mV | Voltage unit |
| mV/pH | Unit of the electrode slope |
| OFL | Overflow<br>Display range exceeded |
| pH | pH value |
| S | Slope |
| SELV | Safety Extra Low Voltage |

| | |
|---|---|
| SLO | Slope<br>Slope setting on calibration |
| TP | Temperature probe<br>Temperature measurement active |
| $U_{ASY}$ | Asymmetry potential |
| °C | Temperature unit, °Celsius |
| °F | Temperature unit, Fahrenheit |

## Glossary

**Asymmetry** Zero point of a pH electrode.

**AutoRead** Monitors the electrode drift and releases the measured value only after the stability criterion has been reached. In this way, this procedure ensures the highest degree of precision and reproducibility.

**Buffer solution** Stable solution with a precisely known pH value.

**Diaphragm** Contact point between the reference electrolytic solution and the sample.

**Drift control** See AUTOREAD.

**MultiCal®** Group term for the various WTW calibration procedures used for automatic calibration in buffer solutions.

**Redox voltage** Potentiometric quantity.

**Resolution** Number of decimal places that appear for a measured value.

**Slope** Specifies the voltage change per pH unit.

**Test solution** Stable solution with a precisely known Redox voltage.

## Index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