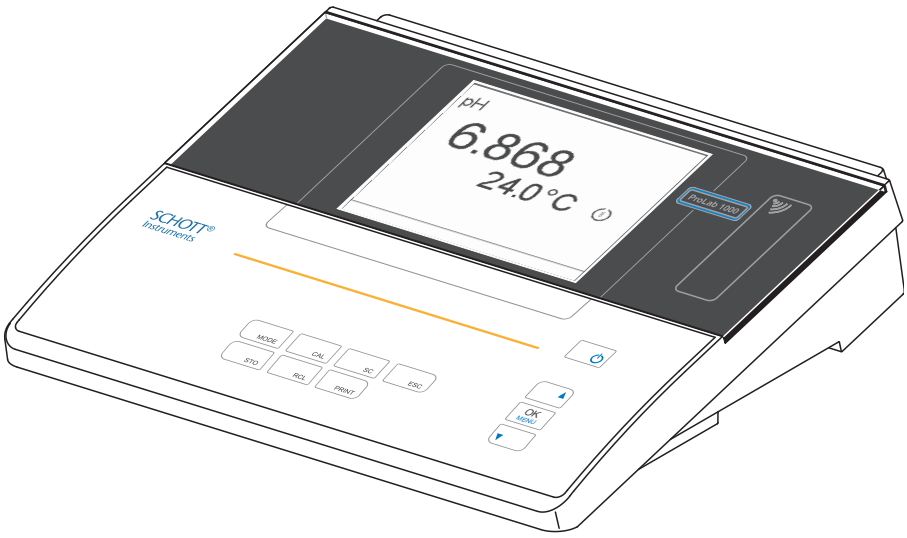
Operating manual

SCHOTT®
Instruments

ProLab 1000



pH / ISE meter
with automatic sensor recognition
and electronic access control

ba75576e04 01/2011

Accuracy when going to press

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

Warranty

We guarantee the meter described for 3 years from the date of purchase.
The meter warranty covers manufacturing faults that are discovered within the warranty period.
The warranty does not cover components that are replaced during maintenance work, e. g. batteries.

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

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

CE conformity
Radio data transmission

SI Analytics GmbH hereby declares that the ProLab 1000 meter is in compliance with the basic requirements and the other relevant regulations of the directive 1999/5/EC.
The EC declaration of conformity can be requested from SI Analytics GmbH.

Copyright

KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY
DÉCLARATION DE CONFORMITÉ

Wir erklären in alleiniger Verantwortung, dass das Produkt

pH-/ISE-Messgerät ProLab 1000

auf das sich diese Erklärung bezieht, übereinstimmt mit den Angaben im Kapitel

We declare under our sole responsibility that the product

pH / ISE measuring instrument ProLab 1000

to which this declaration relates is in conformity with the specifications in the chapter

Nous déclarons sous notre seule responsabilité que le produit

Appareil de mesure pour pH/ISE ProLab 1000

auquel se réfère cette déclaration est conforme aux indications du chapitre

Technische Daten
pH-/ISE-Messgerät ProLab 1000
3. März 2010

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D-55122 Mainz
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3. März, March 3, 3 mars 2010
AGQSF 0000-A105-02/100303

Contents

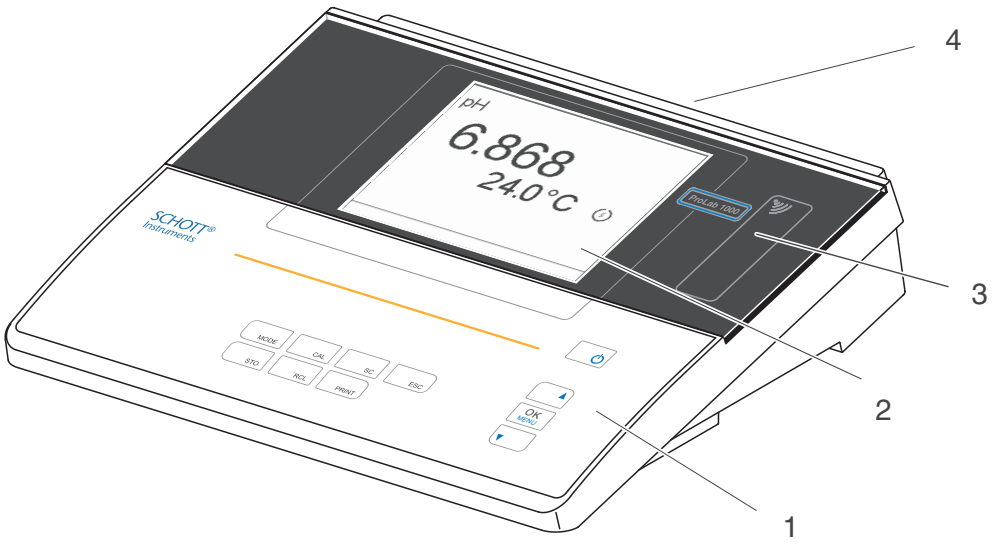
1 Overview

1.1 General features

The ProLab 1000 precision pH meter enables you to perform pH, ORP and ion-selective measurements rapidly and reliably.
The ProLab 1000 provides the maximum degree of ease of use, reliability and, above all, measuring certainty for all applications.

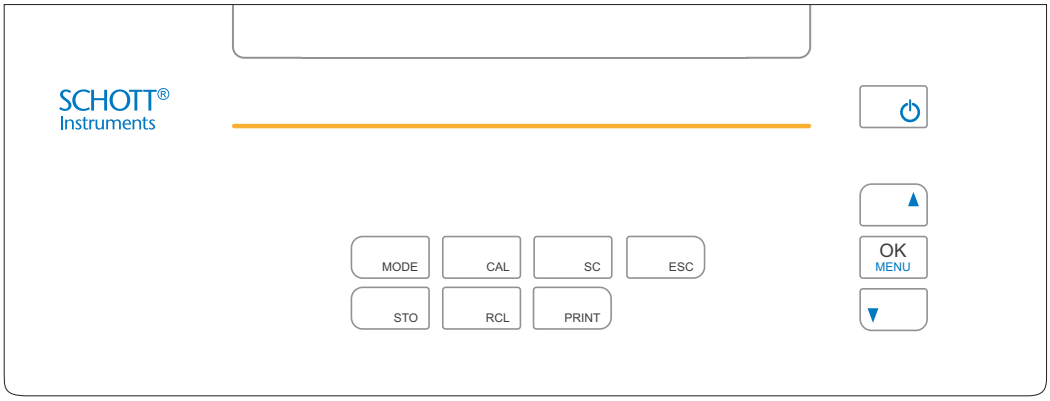
The proven calibration procedures, and stability control function (SC) and the sensor recognition function support your work with the meter.

In addition, the ProLab 1000 provides an electronic access control. Documented measurement data is thus automatically assigned to a user.



1	Keypad
2	Display
3	Reader field for electronic access control
4	Socket field

1.2 Keypad



In this operating manual, keys are indicated by brackets <..> .
The key symbol (e.g. **<MENU/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. **<MENU/OK__>**).

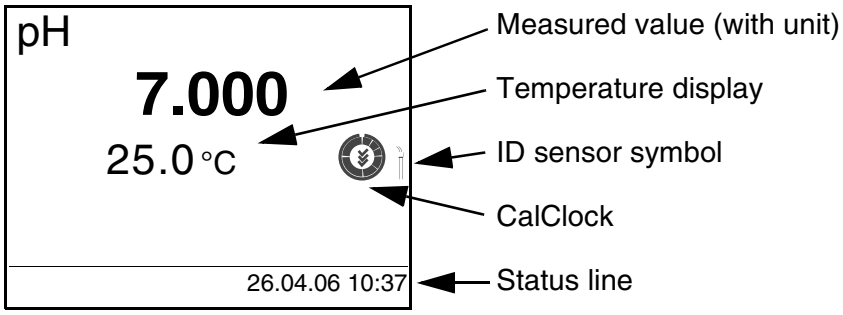
Key functions

⏻	**<On/Off>**	Switch the meter on/off
MODE	**<MODE>** **<MODE__>**	Select measured parameter Activate operation lock
CAL	**<CAL>** **<CAL__>**	Call up calibration procedure Open menu for calibration data storage
SC	**<SC>**	Switch on or off the stability control function manually.
STO	**<STO>** **<STO__>**	Store measured value Open menu for automatic storing function
RCL	**<RCL>** **<RCL__>**	Open menu for manually stored measured values Open menu for automatically stored measured values
PRINT	**<PRINT>** **<PRT__>**	Print Open menu for automatic printing
▲	**<▲>**	Increment values, scroll

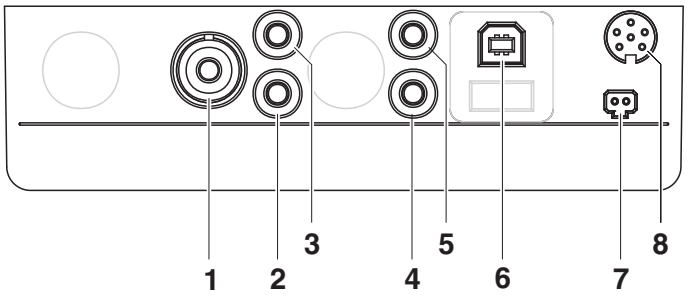
▼	**<▼>**	Decrement values, scroll
OK MENU	**<MENU/OK>** **<MENU/OK__>**	Confirm entries Open setting menu for system settings
ESC	**<ESC>**	Return to higher menu level / Cancel inputs

1.3 Display

The graphic display displays the measurement data. The illumination enables to read the display even in the darkness.



1.4 Socket field



Connections:

1	pH electrode
2 + 4	Reference electrode
3	Temperature sensor
5	Dead stop connection (e.g. for double platinum electrodes)
6	USB interface
7	Power pack
8	RS232 interface/analog output

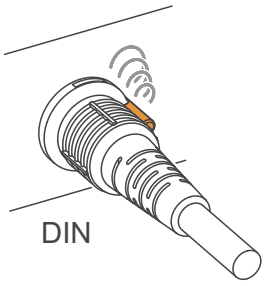
CAUTION

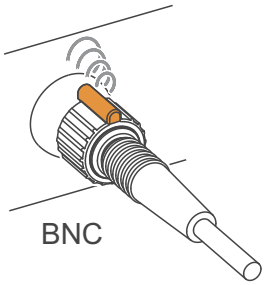
Only connect sensors to the meter that cannot return any voltages or currents that are not allowed (> SELV and > current circuit with current limiting).
Nearly all commercial sensors - especially SI Analytics sensors - fulfill these requirements.

1.5 Automatic sensor recognition

The automatic sensor recognition function enables

- to operate a sensor with different meters without recalibrating
- to operate different sensors with one meter without recalibrating
- to assign measurement data to a sensor
  - measurement datasets are always downloaded to the interface with the sensor type and sensor series number.
  - measurement datasets are always stored together with the sensor type and sensor series number.
- to assign calibration data to a sensor
  - calibration data is always downloaded to the interface with the sensor type and sensor series number.





To be able to use the automatic sensor recognition function a meter is required that supports the automatic sensor recognition (e.g. ProLab 1000), and a sensor (ID sensor) that is suitable for sensor recognition.

In every ID sensor, sensor data is stored that clearly identifies the sensor.
The sensor data is sent to the meter automatically via radio communication and used for sensor identification there.

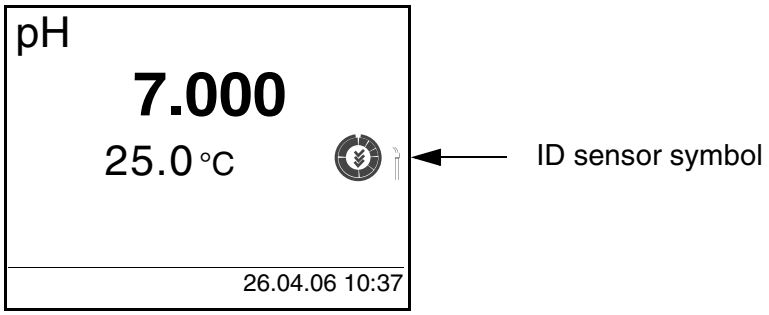
Note
With the ProLab 1000 meter, you can also operate non-ID sensors. Then, however, you cannot use the advantages of the sensor recognition function.

ID sensors

SI Analytics ID sensors support the automatic sensor recognition function. Their sensor designation has the addition "ID", e.g. A 161 1M DIN-ID electrode.

Note
Information on available ID sensors is given on the Internet or directly by SI Analytics.

ID sensors connected to the ProLab 1000 meter can be recognized by the ID sensor symbol on the display of the meter.



Sensor data from ID sensors

ID sensors transmit the following sensor data to the meter:

- SENSOR ID
  - Sensor type
  - Sensor series number
- Calibration data
  - Calibration date
  - Calibration characteristics
  - Calibration interval
  - Selected buffer set (pH electrodes only)

The calibration data is updated in the ID sensor after each calibration procedure. The ID sensor symbol flashes while this is done.

Note
While the ID sensor symbol is flashing, the sensor must not be disconnected because otherwise the calibration data will not be completely transmitted. The sensor will then have no valid calibration.

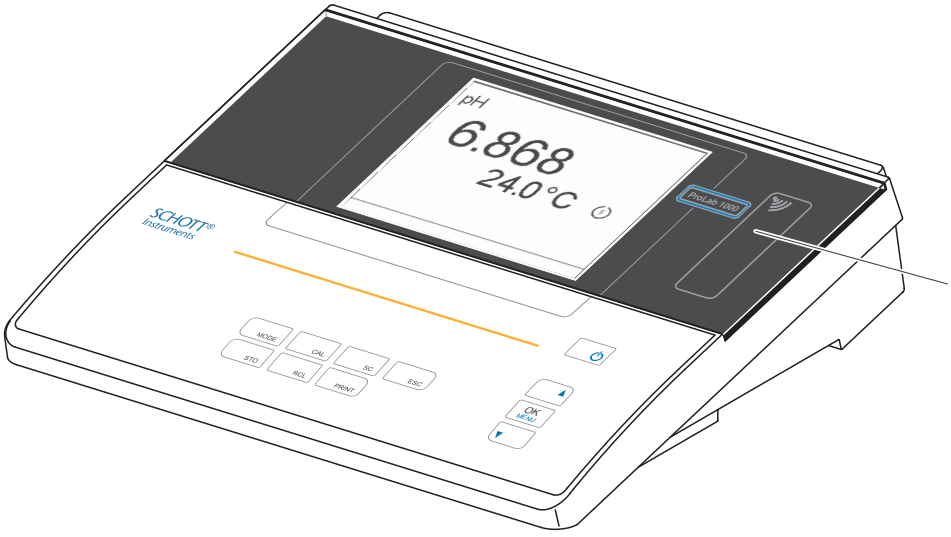
Note
If non-ID sensors are used, the calibration data from the meter is used and also stored in the meter.

1.6 Electronic access control

The ProLab 1000 always documents measurement data and calibration data with an ID number (*USER ID*).
If the *USER ID* is assigned to a certain user, all measurement data is also assigned to the user in compliance with GLP.

The *USER ID* is easily and safely transmitted to the ProLab 1000 via an electronic key. Each electronic key in the form of a keyring pendant contains a key number. The key number is read by the meter via a contactless radio data connection and used as the *USER ID*.

The meter checks the access authorization for the *USER ID*.
Measurements with an electronic key are only possible if the *USER ID* is registered in the meter.
The measuring data is then documented along with the registered *USER ID*.



Reader unit for access control

If the *USER ID* of the electronic key is not registered in the meter, access to the meter with this electronic key is denied.
Anonymous access is always possible. For anonymous access, the *USER ID* 0 is used automatically.

By labeling measurement data without electronic key with *USER ID* 0, this data can be separated from the GLP-compliant documentation of measurements.

2 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 measuring system. 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.

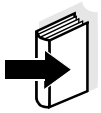
Safety instructions

The individual chapters of this operating manual use the following safety instruction to indicate various types of danger:

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.

2.1 Authorized use

This meter is authorized exclusively for pH, ORP and ion-selective measurements in the laboratory.
The technical specifications as given in chapter 7 TECHNICAL DATA (page 83) 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**.

2.2 General safety instructions

This instrument is built and inspected according to the relevant guidelines and norms for electronic measuring instruments (see page 83).
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 7 TECHNICAL DATA (page 83).

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

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.

3 Commissioning

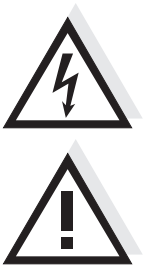
3.1 Scope of delivery

- ProLab 1000 laboratory meter
- Power pack
- 4 batteries 1.5 V Micro type AAA
- 1 electronic administrator key (as keyring pendant)
- 1 electronic key (as keyring pendant)
- Cover
- USB cable (Z875)
- CD-ROM with USB driver
- Operating manual

3.2 Power supply

The power pack supplies the meter with low voltage (9 V DC).

The batteries are only used to buffer the system time if the power supply is interrupted.



CAUTION
The line voltage at the operating site must lie within the input voltage range of the original power pack (see page 83).

CAUTION
Use original power packs only (see page 83).

1	Insert the plug into the socket of the meter.
2	Connect the original power pack to an easily accessible power outlet.

3.3 Initial commissioning

Perform the following activities:

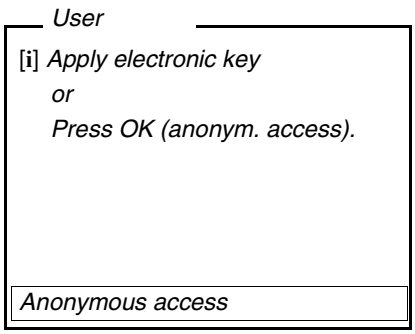
- Insert the batteries (see page 77)
- Connect the power pack (see page 17).
- Switch on the meter (see page 19)
- Set the language (see page 23)
- Set the date and time (see page 25)
- Set up the access authorization for electronic keys (see page 27)

4 Operation

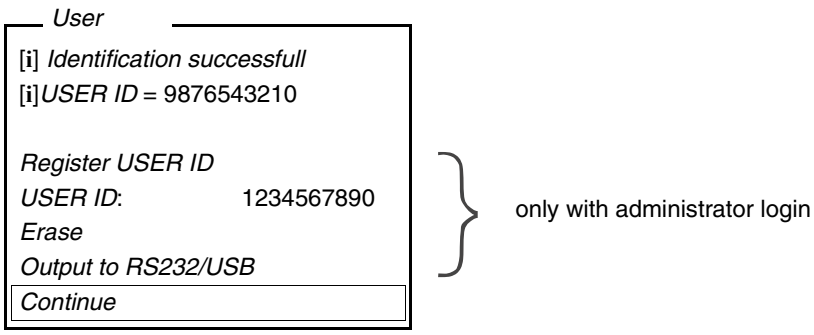
4.1 Switch the meter on and off

Switching on

1	Press the **<On/Off>** key. The display shows the meter designation and software version. Subsequently, the access control display appears.



2	Start anonymous access with **<MENU/OK>**. The meter switches to the measuring mode. or Place the electronic key on the read field and leave it there for approx. 2 seconds until the key has been recognized. The display shows the *USER ID* that was read.



3	Confirm the displayed data with **<MENU/OK>**. The meter switches to the measuring mode.

Switching off

1	Press the **<On/Off>** key. The meter is switched off.

4.2 General operating principles

This section contains basic information on the operation of the ProLab 1000.

Operating elements, display

An overview of the operating elements and the display is given on page 8 and page 9.

Operating modes, navigation

An overview of the operating modes and navigation of the ProLab 1000 is given on page 20 and page 21.

4.2.1 Operating modes

The meter has the following operating modes:

- Measuring
  Measurement data of the connected sensor appears in the measured value display
- Calibration
  The course of a calibration with calibration information, functions and settings is displayed
- Storage in memory
  The meter stores measuring data automatically or manually
- Transmitting data
  The meter transmits measuring data and calibration records to the serial interface automatically or manually.
- Setting
  The system menu or a sensor menu with submenus, settings and functions is displayed

4.2.2 Navigation

Measured value display

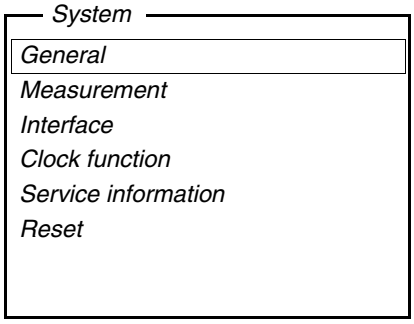
In the measured value display, you can

- open the relevant measuring menu with **<MENU/OK>**.
- open the system menu with the sensor-independent settings with **<MENU/OK__>**.
- change the display in the selected measuring window (e. g. pH <–> mV) by pressing **<MODE>**.

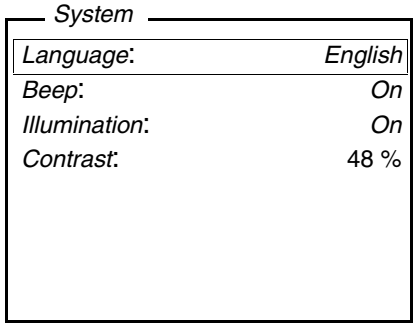
Menus and dialogs

The menus for settings and dialogs contain further submenus. The selection is made with the **<▲><▼>** keys. The current selection is displayed in a frame.

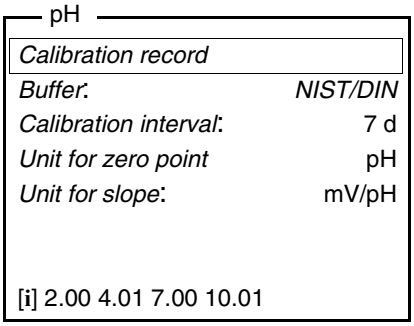
- Submenus
  The name of the submenu is displayed at the upper edge of the frame. Submenus are opened by confirming with **<MENU/OK>**.
  Example:



- Settings
  Settings are indicated by a colon. The current setting is displayed on the right-hand side. The setting mode is opened with **<MENU/OK>**. Subsequently, the setting can be changed with **<▲><▼>** and **<MENU/OK>**.
  Example:

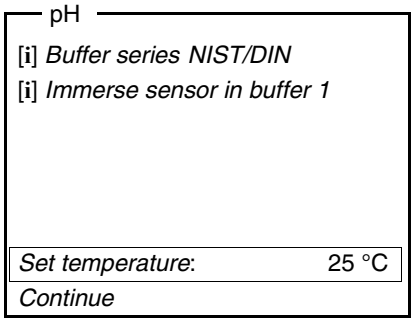


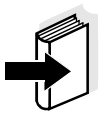
- Functions
  Functions are indicated by the name of the function. They are immediately carried out by confirming with **<MENU/OK>**.
  Example: Display the *Calibration record* function.



Messages

Information or operating instructions are designated by the [**i**] symbol. They cannot be selected.
Example:





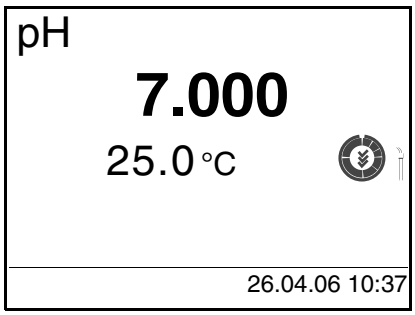
Note

The principles of navigation are explained in the two following sections by reference of examples:

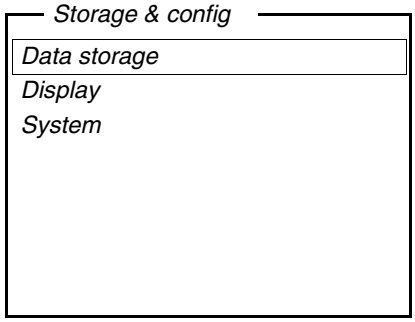
- Setting the language (see page 23)
- Setting the date and time (see page 25)

4.2.3 Navigation example 1: Setting the language

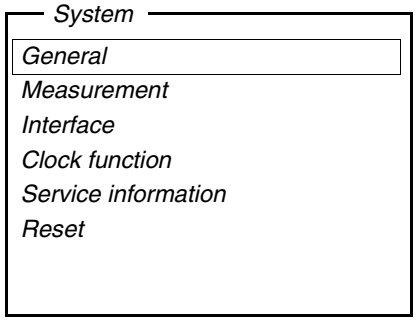
1	Switch on the meter (see page 19)



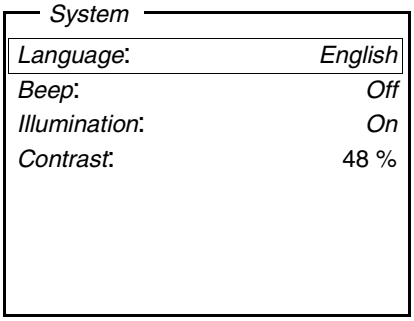
2	In the measured value display: Open the system menu with **<MENU/OK>** (press for approx. 2 s). The meter is in the setting mode.



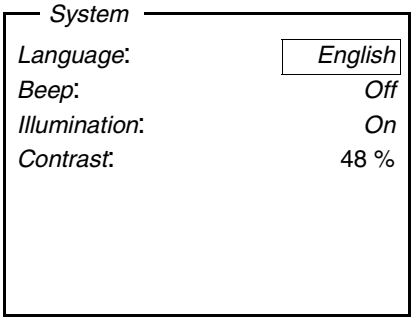
3	Select the *System* submenu with **<▲><▼>**. The current selection is displayed in a frame.
4	Open the *System* submenu with **<MENU/OK>**.



5	Select the *General* submenu with **<▲><▼>**. The current selection is displayed in a frame.
6	Open the *General* submenu with **<MENU/OK>**.



7	Open the setting mode for the *Language* with **<MENU/OK>**.



8	Select the required language with **<▲><▼>**.
9	Confirm the setting with **<MENU/OK>**. The setting becomes active the next time the system menu is called up.

4.2.4 Navigation example 2: Setting the date and time

The meter has a clock with a date function. The date and time are indicated in the status line of the measured value display. This indication can be switched off. When storing measured values and calibrating, the current date and time are automatically stored as well.

The correct setting of the date, time and date format is important for the following functions and displays:

- Current date and time
- Calibration date
- Identification of stored measured values.

Therefore, check the time at regular intervals.

Note
After a drop of the voltage of the buffer batteries (empty batteries), the date and time are reset and have to be adjusted again.

Setting the date, time and date format

The data format can be switched from the display of day, month, year (*dd.mm.yy*) to the display of month, day, year (*mm/dd/yy* or *mm.dd.yy*).

1	In the measured value display: Open the system menu with **<MENU/OK__>** (press for approx. 2 s). The meter is in the setting mode.
2	Using **<▲><▼>** and **<MENU/OK>**, select and confirm the *System* / *Clock function* menu. The setting menu for the date and time appears.
3	Using **<▲><▼>** and **<MENU/OK>**, select and confirm the *Time* menu. The seconds are highlighted.

System

Time:	14:53:40
Date:	26.04.06
Date format:	*dd.mm.yy*

4	Change and confirm the setting with **<▲><▼>** and **<MENU/OK>**. The minutes are highlighted.

5	Change and confirm the setting with **<▲><▼>** and **<MENU/OK>**. The hours are highlighted.
6	Change and confirm the setting with **<▲><▼>** and **<MENU/OK>**. The time is set.
7	If necessary, set the *Date* and *Date format*. The setting is made similarly to that of the time.
8	If necessary, select and set the *Date* with **<▲><▼>** and **<MENU/OK>**.
9	To make further settings, switch to the next higher menu level with **<ESC>**. or Switch to the measured value display with **<MODE>**. The meter is in the measuring mode.

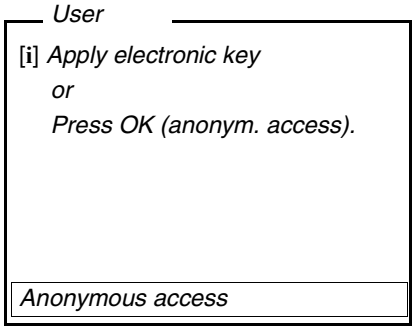
4.3 Access control

When the meter is delivered, only the enclosed electronic administrator key has an access authorization for the meter.
The administrator can set up access authorizations for electronic keys (see below).
Anonymous access (*USER ID*: 0) is always possible.

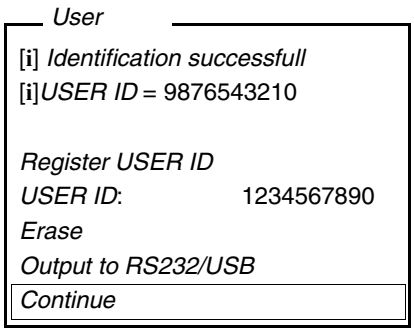
4.3.1 Administrating access authorizations

The ProLab 1000 provides basic functions to administrate access authorizations. The administrator can set up, erase and display access authorizations. The administrating functions are available to the administrator immediately after registration only.

1	When the meter is switched on: Switch off the meter with **<On/Off>**.
2	Press the **<On/Off>** key. The display shows the meter designation and software version. Subsequently, the access control display appears.



3	Place the electronic administrator key on the read field and leave it there for approx. 2 seconds until the key has been recognized.. The *USER ID* and the functions for access control are displayed.



Adding new *USER ID*s

4	Using **<▲><▼>** and **<MENU/OK>**, select and confirm the menu item, *Register USER ID*. An info text for registration is displayed.
5	Place the electronic key on the reader field. The *USER ID* is displayed and registered.
6	Use **<MENU/OK>** to complete the registration.

Displaying registered *USER ID*s

7	Using **<▲><▼>** and **<MENU/OK>**, select and confirm the *USER ID* menu item.
8	Using **<▲><▼>**, display the registered *USER ID*s individually.
9	If necessary (e.g. for deleting), confirm a *USER ID* with **<MENU/OK>**.

Erasing a registered *USER ID*

10	Using **<▲><▼>** and **<MENU/OK>**, select and confirm the *Erase* menu item. A safety query appears. After confirming the erasure, the access authorization for the currently displayed key number is erased.

Outputting a list of the registered *USER ID*s

11	Using **<▲><▼>** and **<MENU/OK>**, select and confirm the menu item, *Output to RS232/USB*. The list of all key numbers with access authorization is downloaded to the interface.

Switching to the measuring mode

12	Confirm the data with **<MENU/OK>**. The meter switches to the measuring mode.

4.3.2 Lost your electronic key?

Without an electronic key with access authorization, anonymous access is possible only: (*USER ID* 0).

Electronic key

Keys for additional users are available from SI Analytics GmbH.
The access authorization for new keys is set up by the administrator (see page 27).

Electronic administrator key

If the electronic administrator key is lost, the access authorization for a new electronic administrator key can be set up in the factory only.

The addresses and telephone numbers of SI Analytics GmbH are given on the cover of this operating manual.

4.3.3 Lock

The activated lock prevents the inadvertent usage of the meter or registered *USER ID* during running operation.
The lock can only can only be released with the currently registered electronic key or the administrator key.

Note
The lock can only be activated in the measuring mode of operation.
With anonymous access (*USER ID*: 0), the lock function is not available.

Activating the lock

1	If necessary, switch to the measuring mode with **<MODE>**.
2	Use **<MODE__>** to activate the lock. The registered *USER ID* is locked against inadvertent use.

Releasing the lock

1	Press any key.
2	Place the registered electronic key or administrator key on the reader field. Place the registered electronic user key or administrator key on the read field and leave it there for approx. 2 seconds until the key has been recognized. The lock is released.

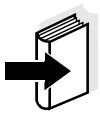
4.4 System settings (system menu)

The system menu comprises the following settings:

- *Data storage* (see page 30)
- *Display* (see page 30)
- *System* (see page 31).

4.4.1 *Data storage*

This menu contains all functions to display, edit and erase stored measured values and calibration records.



Note
Detailed information on the data storage functions of the ProLab 1000 is given on page 61.

4.4.2 *Display*

With the aid of the *Display* submenu, you can modify the measured value display to meet your requirements. When doing so, you can display or hide the following elements:

- Date indication in the status line
- Time indication in the status line

Settings

In the measured value display, open the system menu with **<MENU/ OK__>**. After completing the settings, switch to the measured value display with **<MODE>**.

Menu item	Setting	Description
Display / *Time*:	*On* *Off*	Display of the time in the system status line
Display / *Date:*	*On* *Off*	Display of the date in the system status line

4.4.3 *System*

Overview

The following sensor-independent meter features can be adjusted in the system menu/*System* and its submenus:

- Menu language
- Beep on keystroke
- Display illumination
- Display contrast
- Unit of the temperature display
- Data interface
- Clock and date function
- Function to reset all sensor-independent system settings to the default condition

Settings

In the measured value display, open the system menu with **<MENU/ OK__>**. After completing the settings, switch to the measured value display with **<MODE>**.

Menu item	Setting	Description
System / *General* / *Language*	*Deutsch* *English* *(further)*	Select the menu language
System / *General* / *Beep*	*On* *Off*	Switch on/off the beep on keystroke
System / *General* / *Illumination*	*On* *Off*	Switch the display illumination on/off
System / *General* / *Contrast*	*0 ... 100 %*	Change the display contrast
System / *Measurement* / *Temperature unit*	*°C* *°F*	Temperature unit, degrees Celsius or degrees Fahrenheit. All temperatures are displayed with the selected unit.
System / *Measurement* / *Stability control*	*Auto* *Off*	Switch on or off the automatic *Stability control* (see page 32).
System / *Interface* / *Baud rate*	*1200, 2400, 4800, 9600, 19200*	Baud rate of the data interface

Menu item	Setting	Description
System / *Interface* / *Output format*	*ASCII* *CSV*	Output format for data transmission For details, see page 71
System / *Interface* / *Output header*		The header is output to the interface in csv format.
System /*Clock function*	*Time* *Date* *Date format*	Settings of time and date. For details, see page 25
System /*Service information*		Meter information: Series number and software version
System /*Reset*	-	Resets the system settings to the default values. For details, see page 75

4.4.4 Automatic *Stability control*

The automatic *Stability control* function continuously checks the stability of the measurement signal. The stability has a considerable impact on the reproducibility of measured values.

You can activate or switch off the automatic *Stability control* function (see page 31).

The automatic *Stability control* function is carried out:

- as soon as the measured value is outside the allowed stability range
- when you switch over between the measured parameters with **<MODE>**.

In this case, the measured parameter flashes on the display.

4.5 pH value / ORP voltage

4.5.1 General information

You can measure the following variables:

- pH value [ ]
- ORP [mV]

CAUTION

When connecting an earthed PC/printer, measurements cannot be performed in earthed media as incorrect values would result. The RS232 and USB interfaces are not galvanically isolated.

Temperature measurement

For reproducible pH measurements, it is essential to measure the temperature of the test sample.
You have the following options to measure the temperature:

- Automatic measurement of the temperature by the temperature sensor (NTC30 or Pt1000) integrated in electrode.
- Measurement by an external temperature sensor.
- Manual determination and input of the temperature.

The display of the temperature indicates the active temperature measuring mode:

Temperature sensor	Resolution of the temp. display	Mode
yes	*0.1 °C*	Automatic with temperature sensor
-	*1 °C*	Manual

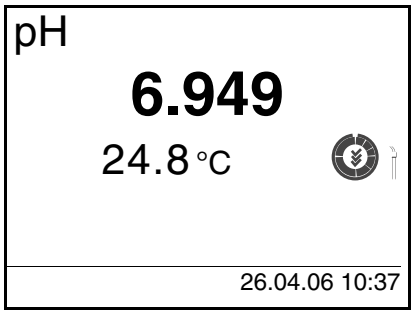
Preparatory activities

Perform the following preparatory activities when you want to measure:

1	Connect a pH or ORP electrode to the meter.
2	If necessary, select the pH or mV display with **<MODE>**.
3	Adjust the temperature of the solutions and measure the current temperature if the measurement is made without a temperature sensor.
4	Calibrate or check the meter with the electrode.

4.5.2 Measuring the pH value

1	Perform the preparatory activities (see page 33).
2	Immerse the pH electrode in the test sample.



3	Select the pH or mV display with **<MODE>**.

Stability control

The Stability control function checks the stability of the measurement signal. The stability has a considerable impact on the reproducibility of measured values. The display of the measured parameter flashes until a stable measured value is available.

Independent of the setting for automatic *Stability control* (see page 32) in the *System* menu, you can start the *Stability control* function manually at any time.

1	If necessary, select the displayed measured value with **<MODE>**.
2	Freeze the measured value with **<SC>**. In the status line, [SC] is displayed.
3	With **<MENU/OK>** activate the *Stability control* function. [SC] flashes while the stability control is active. As soon as a stable measured value is recognized, the current measurement data is downloaded to the interface. Measurement data meeting the criterion for stability control is marked by SC.

Note
You can terminate prematurely the *Stability control* function with **<MENU/OK>** manually at any time. If the *Stability control* function is terminated prematurely, the current measurement data is not downloaded to the interface.

4	Using **<SC>** or **<MODE>**, release the frozen measured value. The [SC] status display disappears. The display switches to the previous indication.

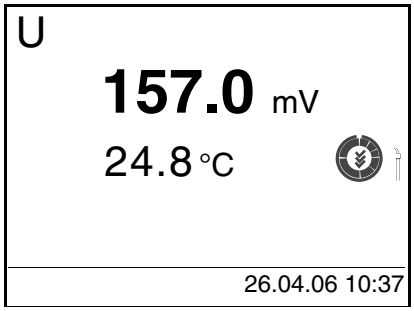
Criteria With identical measurement conditions, the following applies:

Measured parameter	Reproducibility	Response time
pH value	Better than 0.01	> 15 seconds

4.5.3 Measuring the ORP

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

1	Perform the preparatory activities (see page 33).
2	Immerse the ORP electrode in the test sample.



3	Select the mV display with **<MODE>**.

Stability control

The Stability control function checks the stability of the measurement signal. The stability has a considerable impact on the reproducibility of measured values. The display of the measured parameter flashes until a stable measured value is available.

Independent of the setting for automatic *Stability control* (see page 32) in the *System* menu, you can start the *Stability control* function manually at any time.

1	If necessary, select the displayed measured value with **<MODE>**.
2	Freeze the measured value with **<SC>**. In the status line, [SC] is displayed.
3	With **<MENU/OK>** activate the *Stability control* function. [SC] flashes while the stability control is active. As soon as a stable measured value is recognized, the current measurement data is downloaded to the interface. Measurement data meeting the criterion for stability control is marked by SC.

Note
You can terminate prematurely the *Stability control* function with **<MENU/OK>** manually at any time. If the *Stability control* function is terminated prematurely, the current measurement data is not downloaded to the interface.

4	Using **<SC>** or **<MODE>**, release the frozen measured value. The [SC] status display disappears. The display switches to the previous indication.

Criteria With identical measurement conditions, the following applies:

Measured parameter	Reproducibility	Response time
ORP voltage	better than 0.3 mV	> 15 seconds

4.5.4 Settings for pH and ORP measurements

Overview

The following settings are possible for pH and ORP measurements:

- Resolution
- *Calibration interval*
- Buffers for calibration
- *Unit for zero point*
- *Unit for slope*
- *Calibration record* (display)
- *Calibration history*

Settings

The settings are made in the measuring menu of the pH/ORP measurement. To open it, activate the relevant measuring window in the measured value display and press **<MENU/OK>**. After completing the settings, switch to the measured value display with **<MODE>**.

Menu item	Possible setting	Description
Calibration / *Calibration record*	-	Displays the calibration record of the last calibration.
Calibration / *Calibration history*	-	Displays the calibration history of the last calibrations.
Calibration / *Buffer*	*NIST/DIN* *TEC* *...*	Buffer sets to be used for pH calibration (see page 40).
Calibration / *Calibration interval*	*1 ... 999 d*	*Calibration interval* for the pH electrode (in days). The meter reminds you to calibrate regularly by the flashing CalClock in the measuring window.
Calibration / *Unit for zero point*	*mV* *pH*	Unit for the zero point.
Calibration / *Unit for slope*	*mV/pH* *%*	Unit of the slope. The % display refers to the Nernst slope of -59.16 mV/pH ([determined slope/Nernst slope] x 100).

Menu item	Possible setting	Description
Man. temperature	*-20 ... +130 °C*	Entry of the manually determined temperature. For measurements without temperature sensor only.
Reset	-	Resets all sensor settings to the delivery condition (see page 74).
High resolution pH	*On* *Off*	Resolution of the pH display: *On* = 0.001 *Off* = 0.01
High resolution mV	*On* *Off*	Resolution of the mV display: *On* = 0.1 mV *Off* = 1 mV

4.5.5 pH calibration

Why calibrate?

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

When do you have to calibrate?

- After connecting a non-ID electrode
- If the CalClock has expired and flashes

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 the calibration.

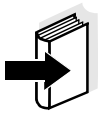
No.	Buffer set *	pH values	at
1	DIN buffers according to DIN 19266 and NIST Traceable Buffers	1.679 4.006 6.865 9.180 12.454	25 °C
2	Technical buffers	2.000 4.010 7.000 10.011	25 °C
3	Merck1*	4.000 7.000 9.000	20°C
4	Merck2 *	1.000 6.000 8.000 13.000	20°C
5	Merck3 *	4.660 6.880 9.220	20°C
6	Merck4 *	2,000 4,000 7,000 10,000	20 °C
7	Merck5 *	4,010 7,000 10,000	25 °C

No.	Buffer set *	pH values	at
8	DIN 19267	1.090 4.650 6.790 9.230	25 °C
9	Mettler US *	1.679 4.003 7.002 10.013	25 °C
10	Mettler EU *	1.995 4.005 7.002 9.208	25 °C
11	Fisher 1*	2.007 4.002 7.004 10.002	25 °C
12	Fluka BS *	4.006 6.984 8.957	25 °C
13	Radiometer *	1.678 4.005 7.000 9.180	25 °C
14	Baker *	4.006 6.991 10.008	25 °C
15	Metrohm *	3.996 7.003 8.999	25 °C
16	Beckman *	4.005 7.005 10.013	25 °C
17	Hamilton DC *	4.005 7.002 10.013	25 °C
18	Precisa *	3.996 7.003 8.999	25 °C

No.	Buffer set *	pH values	at
8	DIN 19267	1.090 4.650 6.790 9.230	25 °C
9	Mettler US *	1.679 4.003 7.002 10.013	25 °C
10	Mettler EU *	1.995 4.005 7.002 9.208	25 °C
11	Fisher 1*	2.007 4.002 7.004 10.002	25 °C
12	Fluka BS *	4.006 6.984 8.957	25 °C
13	Radiometer *	1.678 4.005 7.000 9.180	25 °C
14	Baker *	4.006 6.991 10.008	25 °C
15	Metrohm *	3.996 7.003 8.999	25 °C
16	Beckman *	4.005 7.005 10.013	25 °C
17	Hamilton DC *	4.005 7.002 10.013	25 °C
18	Precisa *	3.996 7.003 8.999	25 °C

No.	Buffer set *	pH values	at
19	Reagecon TEC *	2,000 4,010 7,000 10,000	25 °C
20	Reagecon 20 *	2,000 4,000 7,000 10,000 13,000	20 °C
21	Reagecon 25 *	2,000 4,000 7,000 10,000 13,000	25 °C
22	Riedel-de Haen *	2,000 4,000 7,000 10,000	20 °C

* Brand names or trade names are trademarks of their respective owners protected by law (see page 91).



Note
The buffers are selected in the sensor menu (*Buffer* setting, see page 38).

Calibration points

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

	Determined values	Displayed calibration data
1-point	*ASY*	● Zero point = *ASY* ● Slope = Nernst slope (-59.16 mV/pH at 25 °C)
2-point	*ASY* *SLO*	● Zero point = *ASY* ● Slope = *SLO*
3-point to 5-point	*ASY* *SLO*	● Zero point = *ASY* ● Slope = *SLO* The calibration line is calculated by linear regression.

Note
You can display the slope in the units, mV/pH or % (see page 31).

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).

Calibration record

When finishing a calibration, the new calibration values are displayed as an informative message ([**i**] symbol) first. Then you can decide whether you want to take over these values of the new calibration or whether you want to continue measuring with the old calibration data. After accepting the new calibration values the calibration record is displayed.

Display of calibration data and download to interface

You can have the data of the last calibration displayed (see page 68). Subsequently, you can transmit the displayed calibration data to the interface, e. g. to a printer or PC, with the **<PRINT>** key.

Note
The calibration record is automatically transmitted to the interface after calibrating.

Sample record:

```
Printing date 26.04.06  16:13
ProLab 1000
Ser. no. 06249876
USER ID: 1234567890

CALIBRATION pH
Calibration date 20.04.06  10:14:03
A 161 1M DIN-ID
Ser. no. A062498765
USER ID: 1234567890

Cal. interval        7 d
NIST/DIN
Buffer 1             6.86
Buffer 2             9.18
Voltage 1            7.2 mV     26.3 °C
Voltage 2            -171 mV    26.3 °C
Slope                -59.2 mV/pH
Zero point           -0.5 mV
Sensor               +++
```

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 and in the calibration record.

Display	Calibration record	Zero point [mV]	Slope [mV/pH]
	+++	-18 ... +18	-60.5 ... -57.5
	++	-22 ... +22	-57.5 ... -56
	+	-26 ... +26	-61 ... -60.5 or -56 ... -55
	-	-30 ... +30	-62 ... -61 or -55 ... -50
Clean the electrode according to the sensor operating manual			
CalError	*CalError*	< -30 or > 30	... -62 or ... -50
Eliminate the error according to chapter 6 WHAT TO DO IF... (page 79)			

Preparatory activities

Perform the following preparatory activities when you want to calibrate:

1	Connect a pH electrode to the meter. The pH measuring window is displayed.
2	Keep the buffer solutions ready. Adjust the temperature of the buffer solutions, or measure the current temperature, if you measure without a temperature sensor.

4.5.6 Calibration interval

The calibration interval and calibration evaluation are indicated on the display as the CalClock.

CalClock

The remaining time of the calibration interval is indicated by the segmented ring around the calibration evaluation. This segmented ring reminds you to calibrate regularly.

After the specified calibration interval has expired the outside circle of the CalClock 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 is set to 7 (d7) days in the factory.
You can change the interval (1 ... 999 days):

1	Open the menu for measurement settings with **<MENU/OK>**.
2	In the *Calibration* / *Calibration interval* menu, set the calibration interval with **<▲><▼>**.
3	Confirm the setting with **<MENU/OK>**.
4	Exit the menu with **<MODE>**.

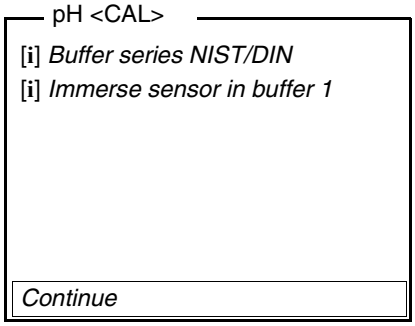
4.5.7 Calibrating

Make sure the *Buffer* setting is correctly set in the sensor menu (see page 38).

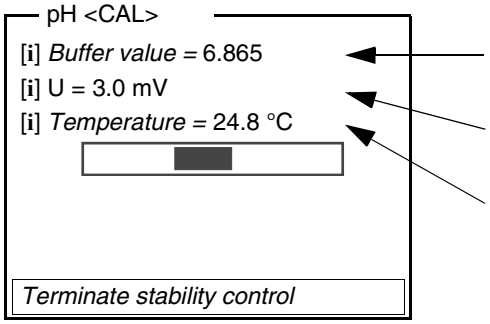
Use any one to five buffer solutions of the selected buffer set in ascending or descending order.

The *NIST/DIN* calibration is described below. With other buffer sets, other nominal buffer values are displayed. Apart from that, the procedure is identical.

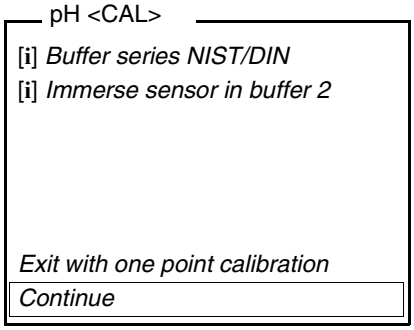
1	Press **<MODE>** to select the measured parameter pH or mV in the measured value display.
2	Start the calibration with **<CAL>**. The calibration display appears.



3	Immerse the electrode in buffer solution 1.
4	If the *Set temperature* menu item appears, measure and enter the temperature of the buffer manually (measurement without temperature sensor).
5	Select *Continue* with **<▲><▼>** and press **<MENU/OK>**. The buffer is measured. The measured value is checked for stability (Stability control).



6	Wait for the end of the measurement with Stability control or accept the calibration value with **<MENU/OK>**. The calibration display for the next buffer appears.

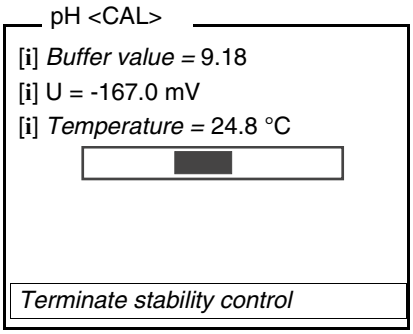


7	For single-point calibration, select *Exit with one point calibration* with **<▲><▼>** and confirm with **<MENU/OK>**. The calibration is completed as a single-point calibration. The new calibration values are displayed as a message ([**i**]). You have the following options: ● Accept the new calibration values with **<MENU/OK>**. Subsequently, the calibration record is displayed and downloaded to the interface at the same time. ● To switch to the measured value display without accepting the new calibration values, press **<MODE>** or **<ESC>**.

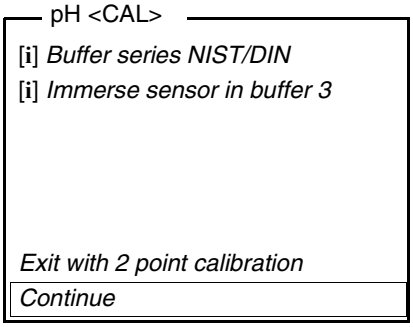
Note
For **single-point calibration**, the meter uses the Nernst slope (-59.16 mV/pH at 25 °C) and determines the zero point of the electrode.

Continuing with two-point calibration (*Buffer*: *NIST/DIN*)

8	Thoroughly rinse the electrode with distilled water.
9	Immerse the electrode in buffer solution 2.
10	If the *Set temperature* menu item appears, measure and enter the temperature of the buffer manually (measurement without temperature sensor).
11	Select *Continue* with **<▲><▼>** and press **<MENU/OK>**. The buffer is measured. The measured value is checked for stability (Stability control).



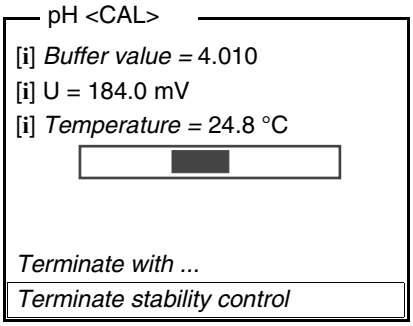
12	Wait for the measurement with stability control to be completed or *Terminate stability control* with **<MENU/OK>** and accept the calibration value. The calibration display for the next buffer appears.



13	For two-point calibration, select *Exit with 2 point calibration* with **<▲><▼>** and confirm with **<MENU/OK>**. The calibration is completed as a two-point calibration. The new calibration values are displayed as a message ([**i**]). You have the following options: ● Accept the new calibration values with **<MENU/OK>**. Subsequently, the calibration record is displayed and downloaded to the interface at the same time. ● To switch to the measured value display without accepting the new calibration values, press **<MODE>** or **<ESC>**.

Continuing with three-point to five-point calibration (*Buffer NIST/DIN*)

14	Thoroughly rinse the electrode with distilled water.
15	Immerse the electrode in buffer solution 3.
16	If necessary, measure the temperature of buffer 3 manually, then enter and confirm it with **<▲><▼>** and **<MENU/OK>** in the *Set temperature* setting.
17	Select *Continue* with **<▲><▼>** and press **<MENU/OK>**. The buffer is measured. The measured value is checked for stability (Stability control).



18	Switch to measurement of the next buffer with **<MENU/OK>**. or When all buffers have been measured, use **<▲><▼>** to select the *Terminate with ...* menu item and confirm with **<MENU/OK>**. The calibration procedure is terminated. The new calibration values are displayed as a message ([**i**]). You have the following options: ● Accept the new calibration values with **<MENU/OK>**. Subsequently, the calibration record is displayed and downloaded to the interface at the same time. ● To switch to the measured value display without accepting the new calibration values, press **<MODE>** or **<ESC>**.

Note
After a five-point calibration the calibration procedure is automatically terminated. The menu item *Terminate with ...* is not displayed.

Note
The calibration line is calculated by linear regression.

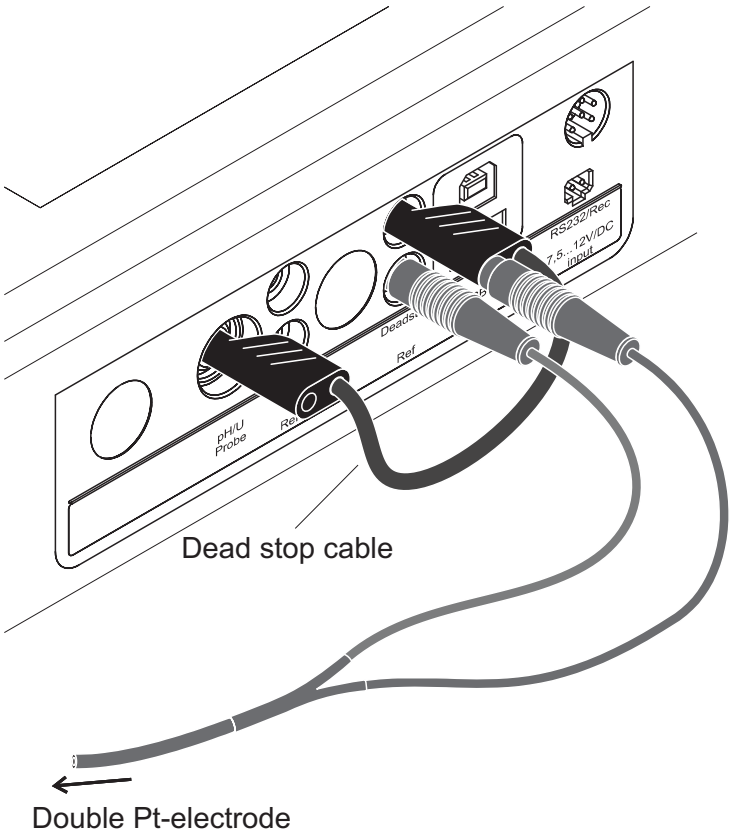
4.5.8 Measurements with dead stop function

Measurements with dead stop function are normally used for measured value logging during a manual dead stop titration (e.g. Karl Fischer titration).

A voltage is present at the dead stop sockets. The voltage value is constant before the end point of the titration is reached.
Even with a small excess of titration solution, a very strong voltage drop occurs.
Thus the end point of the titration is reached.

Preparatory activities

1	Connect the pH socket and dead stop socket with the dead stop cable.
2	Connect a double Pt electrode, e.g. type Pt 1400, to the dead stop sockets of the meter.



3	Immerse the double Pt electrode in the test sample.
4	On the meter, switch to the mV display with **<MODE>**.

4.6 Ion concentration

4.6.1 General information

Note
Incorrect calibration of ion sensitive electrodes will result in incorrect measured values. Calibrate regularly before measuring.

CAUTION
When connecting an earthed PC/printer, measurements cannot be performed in earthed media as incorrect values would result. The RS232 and USB interfaces are not galvanically isolated.

Temperature measurement with ISE measurements

For reproducible measurements of the ion concentration, it is essential to measure the temperature of the test sample.
You have the following options to measure the temperature:

- Measurement by a temperature sensor.
- Manual determination and input of the temperature.

The meter recognizes whether a suitable sensor is connected and automatically switches on the temperature measurement.

The display of the temperature indicates the active temperature measuring mode:

Temperature *sensor*	Resolution of the temp. display	Mode
-	*1 °C*	Manual
yes	*0.1 °C*	Automatic with temperature sensor

* If this is not required you can unplug the second sensor and enter the temperature manually.

Preparatory activities

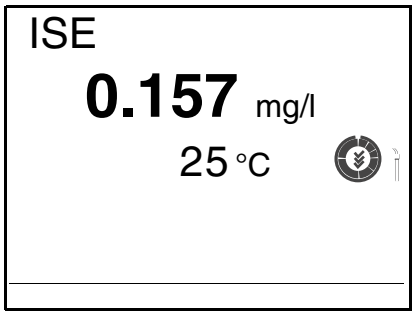
Perform the following preparatory activities when you want to measure:

1	Connect the ISE combination electrode to the meter. The pH/ISE measuring window is displayed.
2	If necessary, select the ISE display (unit, mg/l) with **<MODE>**.
3	Measure the temperature of the test sample using a thermometer.
4	Calibrate or check the meter with the electrode.

Note
While no valid calibration is available, e.g. in the delivery condition, "Error" appears in the measured value display.

4.6.2 Measuring the ion concentration

1	Perform the preparatory activities according to page 52.
2	Immerse the electrode in the test sample.



Stability control

The Stability control function checks the stability of the measurement signal. The stability has a considerable impact on the reproducibility of measured values. The display of the measured parameter flashes until a stable measured value is available.

Independent of the setting for automatic *Stability control* (see page 32) in the *System* menu, you can start the *Stability control* function manually at any time.

1	If necessary, select a channel (measured value) with **<▲><▼>**.

2	Freeze the measured value with **<SC>**. The display switches to the display of the selected channel as necessary. In the status line, [SC] is displayed.
3	With **<MENU/OK>** activate the *Stability control* function. [SC] flashes while the stability control is active. As soon as a stable measured value is recognized, the current measurement data is downloaded to the interface. The measured values of all channels meeting the criterion for stability control are marked by SC.

Note
You can terminate prematurely the manual *Stability control* function with **<MENU/OK>** manually at any time. If the manual *Stability control* function is terminated prematurely, the current measurement data is not downloaded to the interface.

4	Using **<SC>** or **<MODE>**, release the frozen measured value. The [SC] status display disappears. The display switches to the previous indication.

Criteria

With identical measurement conditions, the following applies:

Measuring signal	Reproducibility	Response time
Electrode voltage	better than 0.1 mV	> 30 seconds

Temperature while calibrating and measuring

For precise ISE measurements the temperature difference between measurement and calibration should not be greater that 2 K. Therefore, adjust the temperature of the standard and measuring solutions accordingly. If the temperature difference is greater the *[TempErr]* warning appears in the measured value display.

4.6.3 Settings for ISE measurements

Overview

The following settings are possible for ISE measurements:

- *Calibration record* (display)
- *Calibration history*

Settings

The settings are made in the measuring menu of the ISE measurement. To open it, activate the relevant measuring window in the measured value display and press the **<MENU/OK>** key. After completing the settings, switch to the measured value display with **<MODE>**.

Menu item	Possible setting	Description
Calibration / *Calibration record*	-	Displays the calibration record of the last calibration.
Calibration / *Calibration history*	-	Displays the calibration history of the last calibrations.
Man. temperature	-20 ... +130 °C	Entry of the manually determined temperature. For measurements without temperature sensor only.
Ion type	*Ag, Br, Ca, Cd, Cl, CN, Cu, F, I, K, Na, NO3, Pb, S, NH3, NH4, CO2*	Selection of the ion type to be measured
Unit	*mol/l, mg/kg, ppm, %, mg/l*	Selection of the unit for the display of the measurement result and calibration standards.
Density	0.001 ... 9.999 *g/ml, kg/l*	Adjustable density of the test sample (only with *Unit*: mg/kg, ppm, %)

4.6.4 Calibrating for ISE measurements

Why calibrate?

Ion-selective electrodes age and are temperature-dependent. This changes the slope. As a result, an inexact measured value is displayed. Calibration determines the current value of the slope of the electrode and stores it in the instrument.

Thus, you should calibrate before each measurement and at regular intervals.

When to calibrate?

- Before any measurement if possible
- After connecting another ISE electrode
- When the CalClock flashes, e. g. after a voltage interruption

Standard solutions

Use two to seven different standard solutions. The standard solutions have to be selected in either increasing or decreasing order.

Note
The unit of the standard solution and measurement result is selected in the *Calibration* / *Unit* menu.

Standard solution (Std 1 - 7)	**Values [mg/l]**
Unit [mg/l]	0.010 ... 500000
Unit [mol/l]	0.100 ... 5000 µmol/l 10.00 ... 5000 mmol/l
Unit [mg/kg]	0.010 ... 500000
Unit [ppm]	0.010 ... 500000
Unit [%]	0.001 ... 50000

Note
The measurement precision is also dependent on the selected standard solutions. Therefore, the selected standard solutions should cover the expected value range of the subsequent concentration measurement.

Temperature while calibrating and measuring

For precise ISE measurements the temperature difference between measurement and calibration should not be greater that 2 K. Therefore, adjust the temperature of the standard and measuring solutions accordingly. If the temperature difference is greater the *[TempErr]* warning appears in the measured value display.

ISE Cal

This is the conventional **two-point** to **seven-point calibration procedure** that uses 2 to 7 freely selectable standard solutions. The concentration expected in the measurement determines the concentration of the calibration standards.

Stability control

During calibration, the stability control is automatically activated. The current measurement with stability control can be terminated at any time (accepting the current value).

Calibration record

When finishing a calibration, the new calibration values are displayed as an informative message ([**i**] symbol) first. Then you can decide whether you want to take over these values of the new calibration or whether you want to continue measuring with the old calibration data. After accepting the new calibration values the calibration record is displayed.

Note
Based on the calibration data, the calibration line is determined in sections according to the Nernst equation modified by Nikolski.

Display of calibration data and download to interface

You can have the data of the last calibration displayed (see page 68). Subsequently, you can transmit the displayed calibration data to the interface, e. g. to a printer or PC, with the **<PRINT>** key.

Note
The calibration record is automatically transmitted to the interface after calibrating.

Sample record:

```
Printing date 26.04.06  16:13
ProLab 1000
Ser. no. 06249876
USER ID: 1234567890

Calibration ISE
Calibration date 20.04.06  10:14:03
USER ID: 1234567890

Standard 1           0.010 mg/l
Standard 2           0.020 mg/l
Voltage 1            0.0 mV 24.0 °C
Voltage 2            9.0 mV 24.0 °C
Slope                29.9 mV
Sensor               +++
```

Calibration evaluation

After calibrating, the meter automatically evaluates the calibration.

Display	Calibration record	Magnitude of the slope [mV]
	+++	50.0 ... 70.0 or 25.0 ... 35.0
Error Eliminate the error according to chapter 6 WHAT TO DO IF... (page 79)	*Error*	< 50 or > 70 or < 25 or > 35

Preparatory activities

Perform the following preparatory activities when you want to calibrate:

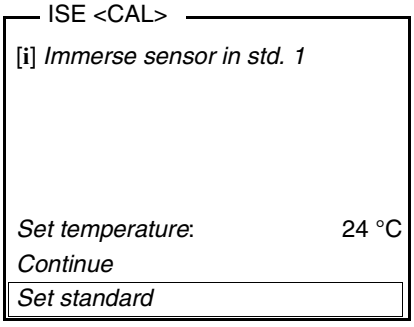
1	Connect the ISE combination electrode to the meter. The pH/mV/ISE measuring window is displayed.
2	Keep the standard solutions ready.
3	Measure the temperature of the standard solutions using a thermometer.

Carrying out an ISE calibration

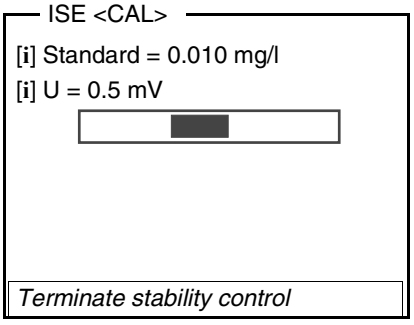
Proceed as follows to calibrate the meter:

1	In the measured value display, select the ISE measuring window with **<▲><▼>** and **<MODE>**.

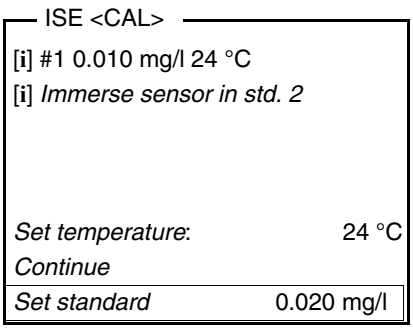
2	Start the calibration with **<CAL>**. The calibration display appears.



3	Thoroughly rinse the electrode with distilled water.
4	Immerse the electrode in standard solution 1.
5	Using **<▲><▼>**, select the *Set standard* setting and press **<MENU/OK>** .
6	Set the concentration of the standard solution with **<▲><▼>** and press **<MENU/OK>**.
7	Measure the temperature of the standard solution using a thermometer.
8	Select the *Set temperature* setting with **<▲><▼>** and press **<MENU/OK>**.
9	Set the temperature with **<▲><▼>** and press **<MENU/OK>**.
10	Select *Continue* with **<▲><▼>** and press **<MENU/OK>**. The standard solution is measured. The measured value is checked for stability (Stability control).

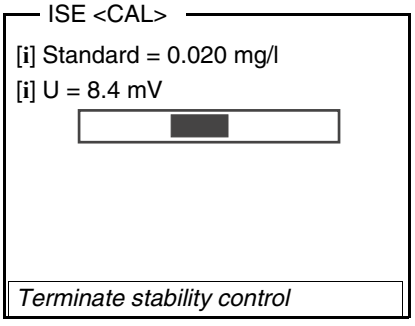


11	Wait for the end of the measurement with Stability control or accept the calibration value with **<MENU/OK>**. The calibration display for the next standard solution appears.

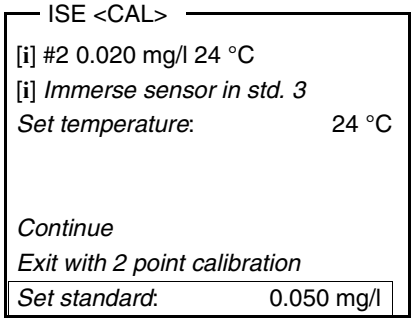


Continuing with two-point calibration

12	Thoroughly rinse the electrode with distilled water.
13	Immerse the electrode in standard solution 2.
14	Using **<▲><▼>**, select the *Set standard* setting and press **<MENU/OK>** .
15	Set the concentration of the standard solution with **<▲><▼>** and press **<MENU/OK>**.
16	Measure the temperature of the standard solution using a thermometer.
17	Select the *Set temperature* setting with **<▲><▼>** and press **<MENU/OK>**.
18	Set the temperature with **<▲><▼>** and press **<MENU/OK>**.
19	Select *Continue* with **<▲><▼>** and press **<MENU/OK>**. The standard solution is measured. The measured value is checked for stability (Stability control).



20	Wait for the end of the measurement with Stability control or accept the calibration value with **<MENU/OK>**. The calibration display for the next standard solution appears.



21	For two-point calibration, select *Exit with 2 point calibration* with **<▲><▼>** and confirm with **<MENU/OK>**. The calibration is completed as a two-point calibration. The new calibration values are displayed as a message ([**i**]). You have the following options: ● Accept the new calibration values with **<MENU/OK>**. Subsequently, the calibration record is displayed and downloaded to the interface at the same time. ● To switch to the measured value display without accepting the new calibration values, press **<MODE>** or **<ESC>**.

Continuing with three-point to seven-point calibration

Repeat the steps 12 to 20 in the same way with the third and further standard solutions as necessary. After finishing the last calibration step, the new calibration values are displayed as a message ([**i**]).

You have the following options:

- Accept the new calibration values with **<MENU/OK>**. Subsequently, the calibration record is displayed and downloaded to the interface at the same time.
- To switch to the measured value display without accepting the new calibration values, press **<MODE>** or **<ESC>**.

4.7 Storage

You can transmit measured values (datasets) to the data storage in two ways:

- Manual storage (see page 62)
- Automatic storage at intervals (see page 63)

Each storage process transmits the current dataset to the interface at the same time.

Measurement dataset

A complete dataset consists of:

- Date/time
- *USER ID*
- Meter designation with series number
- SENSOR ID
  - Sensor designation
  - Sensor series number
- *SAMPLE ID*
- Measured value of the connected sensor
- Measured temperature value of the connected sensor
- Info on stability control: *SC* appears with the measured value if the Stability control criterion was met while storing (stable measured value). Otherwise, there is no *SC* display.

Storage locations

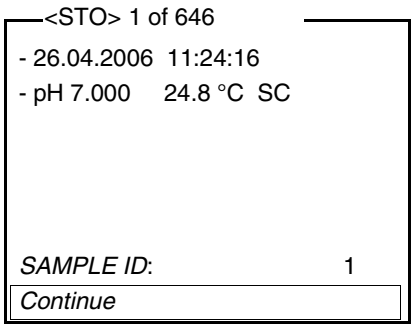
The meter has separate data storages for manually stored measured values and automatically stored measured values.

Storage	Maximum number of datasets
Manual storage	329
Automatic storage	5628

4.7.1 Manual storage

Proceed as follows to transmit to the data storage and simultaneously download to the interface a measurement dataset:

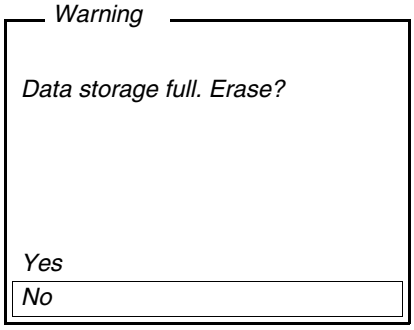
1	Open the menu for manual storage with **<STO>**.



2	If necessary, use **<▲><▼>** and **<MENU/OK>** to change and confirm the *SAMPLE ID* (1 ... 999). The dataset is stored. The meter switches to the measured value display.

If the data storage is full

The following window appears if all storage locations are occupied:



You have the following options:

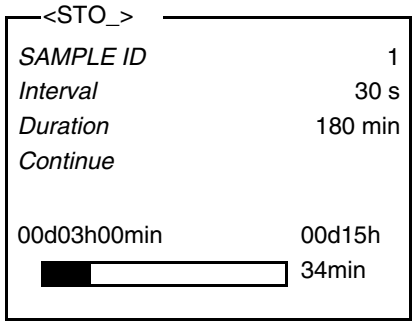
- To erase the entire data storage, confirm *Yes*.
- To cancel the storage process and switch to the measured value display, confirm *No*. Then you can e.g. transmit the stored data to a PC (see page 65) and subsequently erase the storage (see page 68).

4.7.2 Automatic storage at intervals

The storage interval (*Interval*) determines the chronological interval between automatic storage processes. Each storage process transmits the current dataset to the interface at the same time.

Configuring the automatic storage function

1	Open the menu for automatic storage with **<STO__>**.



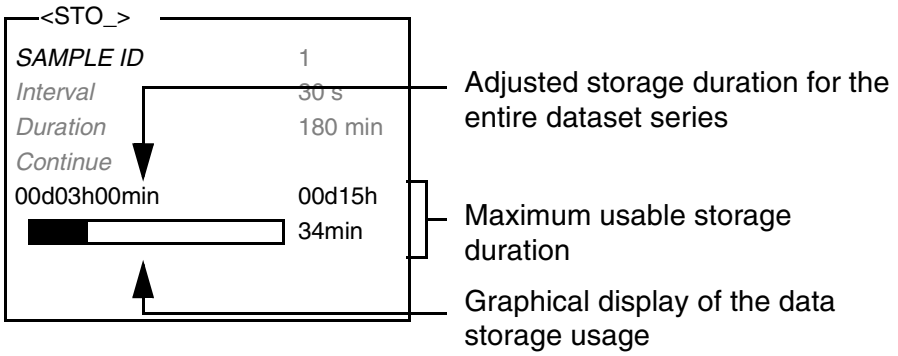
Settings

You can configure the automatic storage function with the following settings:

Menu item	Possible setting	Description
SAMPLE ID	*1 ... 999*	Determine the sample designation for the series of datasets.
Interval	*1, 5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 60 min*	Storage interval. The lower limit of the storage interval can be restricted by the number of free storage locations. The upper limit is restricted by the storage duration.
Duration	*1 min ... x min*	Storage duration. Specifies after which time the automatic storage should be terminated. The lower limit of the storage duration is restricted by the storage interval. The upper limit is restricted by the number of free storage locations.

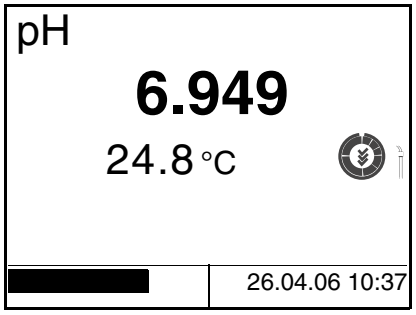
Data storage administration

The two lower display lines indicate the use of the data storage calculated in advance for the selected settings:



Starting the automatic storage function

To start the automatic storage function, select *Continue* with **<▲><▼>** and confirm with **<MENU/OK>**. The meter switches to the measured value display.

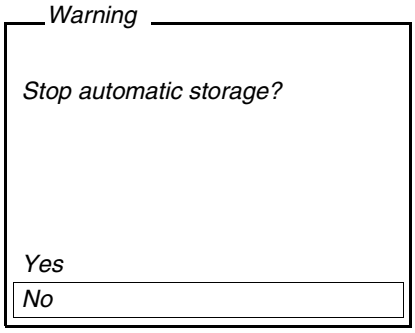


The active automatic storage function can be recognized from the progress bar in the status line. The progress bar indicates how much of the adjusted storage duration has already expired.

Terminating the automatic storage function prematurely

Proceed as follows to switch off the automatic storage function before the adjusted storage duration has expired:

1	With **<STO__>** open the following window.



2	Select and confirm *Yes* with **<▲><▼>** and **<MENU/OK>**. The meter switches to the measured value display. The automatic storage function is terminated.

4.7.3 Reading the measurement data storage

You can select the contents of the manual or automatic measurement data storage by means of different filter criterions and

- read them out on the display, and
- download them to the interface.

Each measurement data storage has a separate erasure function for the entire contents, independent of the filter settings.

Editing the data storage

The data storage is edited in the *System* / *Data storage* menu.
In the measured value display, open the system menu with **<MENU/OK__>**. With the **<RCL>** or **<RCL__>** key you can move directly to the menu for the manual or automatic data storage.

Note
The settings are explained here using the manual storage as an example. The same settings and functions are available for the automatic storage.

Settings

Menu item	Setting/ function	Description
Data storage / *Manual data storage* / *Display*	-	Displays in pages all measuring datasets that correspond to the filter settings (see menu *Data filter*). Further options: ● Scroll through the datasets with **<▲><▼>**. ● Output the displayed dataset to the interface with **<PRINT>**. ● Quit the display with **<ESC>**.
Data storage / *Manual data storage* / *Output to RS232/USB*	-	Outputs to the interface all measuring datasets that correspond to the filter settings. The download takes place in ascending order of the storage location number. The process can take several minutes. To terminate the process prematurely, press **<ESC>**.
Data storage / *Manual data storage* / *Data filter*	*-> see explanations below this table, page 67*	Allows to set certain filter criteria in order to display datasets and download them to the interface.
Data storage / *Manual data storage* / *Erase*	-	Erases the entire contents of the selected measuring data storage, independent of the filter settings. **Note:** All calibration data remains stored when performing this action.

Data filter

Menu item	Setting/ function	Description
Filter		Filter criteria:
	No filter	Data filter switched off
	Date & SAMPLE ID	Selection according to period and *SAMPLE ID*.
	SAMPLE ID	Selection according to *SAMPLE ID*
	Date	Selection according to period
From	*TT.MM.JJ*	Selects all datasets within the specified period.
Until	*TT.MM.JJ*	
SAMPLE ID	0 ... 999	Selects all datasets with the specified *SAMPLE ID*.

Display presentation of a dataset

30.04.2006 11:24:16 (1)
ProLab 1000: 06249876
USER ID: 1234567890
A 161 1M-BNC-ID: A062498765
SAMPLE ID: 1
- pH 7.000 24.8 °C SC

Sample printout

```
26.04.06  16:03
ProLab 1000
Ser. no. 06249876
USER ID: 1234567890

SAMPLE ID: 1
A 161 1M-BNC-ID
Ser. no. A062498765
pH  6.12 24.8 °C , SC, +++


_____________________________________________

26.04.06  16:13
ProLab 1000
06249876
USER ID: 1234567890

SAMPLE ID: 1
A 161 1M-BNC-ID
Ser. no. A062498765
pH  7.13 24.8 °C , SC, +++
```

Quitting the display

To quit the display of stored measuring datasets, you have the following options:

- Switch directly to the measured value display with **<MODE>**.
- Quit the display and move to the next higher menu level with **<ESC>** or **<MENU/OK>**.

4.7.4 Erasing the data storage

How to erase the measured value storage is described on page 65.

4.7.5 Displaying and downloading calibration records

You can display and then output to the interface the calibration data.

Note
ID sensors have to be connected to the meter.

Displaying the calibration record of a selected sensor

The calibration record of the last calibration can be found under the *Calibration* / *Calibration record* menu item in the respective measuring menu. To open it, activate the relevant measuring window in the measured value display and press **<MENU/OK>**.

Displaying the calibration records of all sensors

The calibration records of the last calibration of all sensors can be found under the *Data storage* / *Calibration data storage* menu item in the system menu. In the measured value display, open the system menu with **<MENU/OK__>**.

With the **<CAL__>** key you can go directly to the *Calibration data storage* menu.

Menu item	Setting/ function	Description
Data storage / *Calibration data storage* / *Display*	-	Displays the calibration records. Further options: ● Scroll through the calibration records with **<▲><▼>**. ● Output the displayed calibration record to the interface with **<PRINT>**. ● Quit the display with **<ESC>** or **<MENU/OK>**. ● Switch directly to the measured value display with **<MODE>**.
Data storage / *Calibration data storage* / *Output to RS232/USB*	-	Outputs to the interface the calibration records.

Sample printout

```
Printing date 26.04.06  16:13
ProLab 1000
Ser. no. 06249876
USER ID: 1234567890

CALIBRATION pH
Calibration date 20.04.06  10:14:03
A 161 1M DIN-ID
Ser. no. A062498765
USER ID: 1234567890

Cal. interval        7 d
DIN
Buffer 1             6.86
Buffer 2             9.18
Voltage 1            7.2 mV     26.3 °C
Voltage 2            -171 mV    26.3 °C
Slope                -59.2 mV/pH
Zero point           -0.5 mV
Sensor               +++
_____________________________________

CALIBRATION ISE
Calibration date 20.04.06  10:14:03
Standard 1           0.010 mg/l
Standard 2           0.020 mg/l
Voltage 1            38.5 mV    25.0 °C
Voltage 2            58.0 mV    23.0 °C
```

4.7.6 Displaying and downloading calibration history

You can display and then output to the interface the calibration data.

Note
ID sensors have to be connected to the meter.

The calibration history of a sensor can be found

- under the *Calibration* / *Calibration history* menu item in the respective measuring menu. To open it, activate the relevant measuring window in the measured value display and press **<MENU/OK>**.
- under the *Data storage* / *Calibration history* menu item in the system menu.
  In the measured value display, open the system menu with **<MENU/OK__>**.

Menu item	Setting/ function	Description
Data storage / *Calibration history* / *pH* *ISE*	- *Display*	Displays the calibration history. Further options: ● Scroll through the calibration records with **<▲><▼>**. ● Quit the display with **<ESC>** or **<MENU/OK>**. ● Switch directly to the measured value display with **<MODE>**.
	- *Output to RS232/ USB*	Outputs to the interface the calibration history.

4.8 Transmitting data (to a PC or printer)

The meter has two interfaces:

- RS232 interface (serial port)
- USB interface (device)

Via both interfaces, you can transmit data to a PC and update the meter software.

The RS232 interface enables to transmit data to an external serial printer.

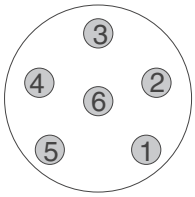
Note
The relevant interface cable has to be connected if you want to download data to an interface (USB or RS232).
It is not possible to download data to both interfaces (USB and RS232) at the same time. After connecting a meter to the USB socket the RS232 interface is inactive. The RS232 interface is active if no meter is connected to the USB interface.

CAUTION
The RS232 and USB interfaces are not galvanically separated. When connecting an earthed PC/printer, measurements cannot be performed in earthed media as incorrect values would result.

4.8.1 RS232 interface

1	Connect the interface to the PC or printer via the cable Z390 (PC) or Z393 (ext. printer).
2	If necessary, disconnect a connected USB cable from the meter.
3	Set up the following transmission data on the PC/printer: – Baud rate: selectable from 1200, 2400, 4800, 9600, – Handshake: RTS/CTS + Xon/Xoff – PC only: – Parity: none – Data bits: 8 – Stop bits: 1

Socket assignment (RS232)



RS 232

1 *
2 RxD
3 TxD
4 *
5 SGnd
6 CTS

* not used

4.8.2 USB interface (device)

Connect the interface to the PC via the supplied Z875 USB cable. The data output automatically switches to *USB*. The RS232 interface is deactivated.

Installation of the USB driver on the PC

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

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

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

4.8.3 Options for data transmission

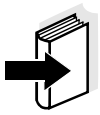
Via the RS232 interface, you can transmit data to a PC or external printer. The following table shows which data is transmitted to the interface in which way:

Data	Control	Operation / description
Current measured values of the connected sensor	Manual	● With **<PRINT>**. ● Simultaneously with every manual storage process (see page 62).
	automatic, at intervals	● With **<PRT__>**. Then you can set the transmission interval. ● Simultaneously with every automatic storage process (see page 63).
Stored measured values	Manual	● Displayed dataset: with **<PRINT>** after recall from data storage. ● All datasets according to the filter criteria via the *Output to RS232/USB* function. For details, see page 65.
Calibration records	Manual	● Calibration record of a sensor with **<PRINT>** (after calling up from the data storage or at the end of a calibration procedure). ● after calling up from the data storage via the *Output to RS232/USB* function. For details, see page 68.
	automatic	● For the respective sensor at the end of a calibration procedure.

Note
The following rule applies: Except for the menus, the display content is generally downloaded to the interface with **<PRINT>** (displayed measured values, measurement datasets, calibration records).

4.8.4 Operation with MultiLab pilot

With the aid of the MultiLab pilot software, you can record and evaluate measuring data with a PC. The data is transmitted after the meter was connected to the RS232 serial interface (COM port) or the USB interface of the PC.



Note
More detailed information can be found in the MultiLab pilot operating manual.

4.9 Reset

You can reset (initialize) all sensor settings and sensor-independent settings separately from each other.

4.9.1 Resetting the sensor settings

Note
The calibration data is reset to the default settings together with the measuring parameters. Recalibrate after performing a reset.

pH

The following settings for pH measurements are reset to the default settings with the *Reset* function:

Setting	Default settings
Cal. interval	7 d
Unit for slope	mV/pH
Measured parameter	pH
High resolution pH	*On*
High resolution mV	*On*
Zero point	0 mV
Slope	-59.16 mV
Temperature, manual	25 °C

The sensor settings are reset under the *Reset* menu item in the respective measuring menu. To open it, activate the relevant measuring window in the measured value display and press the **<MENU/OK>** key.

4.9.2 Resetting the system settings

The following system settings can be reset to the delivery status:

Setting	Default settings
Language	*Deutsch*
Temperature unit	°C
Beep	*On*
Baud rate	4800 Baud
Output format	ASCII
Contrast	40 %
Illumination	*On*

The system settings are reset under the *System* / *Reset* menu item in the system menu. In the measured value display, open the system menu with **<MENU/OK__**>.

5 Maintenance, cleaning, disposal

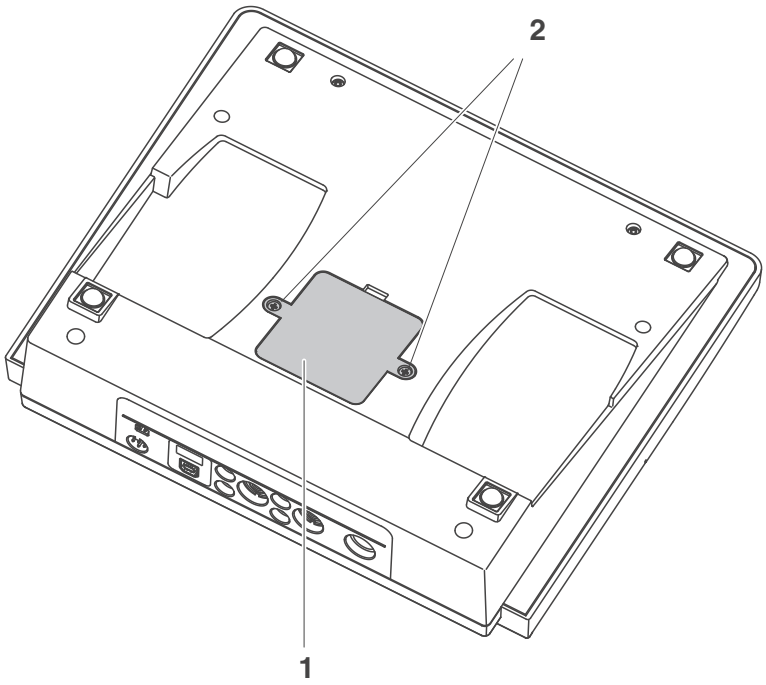
5.1 Maintenance

The only maintenance activity required is replacing the batteries.

Note
For maintenance of the electrodes refer to the relevant operating manuals.

Replacing the batteries

1	Using a screw driver, unscrew the screws (2) of the lid of the battery compartment.



2	Open the battery compartment (1) on the underside of the meter.
3	Remove the four batteries from the battery compartment.
4	Place four new batteries (type Micro AAA) in the battery compartment.
5	Close the battery compartment (1). The date (day) flashes on the display.
6	Using a screw driver, tighten the screws (2) of the lid of the battery compartment.
7	Set the date and time (see page 25)

CAUTION
Make sure that the poles of the batteries are the right way round. The ± signs on the batteries must correspond to the ± signs in the battery compartment.
Only use leakproof alkaline manganese batteries.

5.2 Cleaning

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

CAUTION
The housing components are made out of synthetic materials (polyurethane, ABS, PMMA), metal and glass. Thus, avoid contact of the synthetic material with acetone and similar detergents that contain solvents. Remove any splashes immediately.

5.3 Disposal

Note
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 the instrument in household refuse.

6 What to do if...

6.1 pH and ORP measurement

Error message
Err1

Cause	Remedy
pH electrode:	
– Measured value outside the measuring range	– Use a suitable electrode
– Air bubble in front of the junction	– Remove air bubble
– Air in the junction	– Extract air or moisten junction
– Cable broken	– Replace electrode
– Gel electrolyte dried out	– Replace electrode

Error message
Err2

Cause	Remedy
– No electrode connected	– Connect electrode
– Setting time during calibration too long	– Adjust temperature if necessary – Recalibrate

Error message
Err4

Cause	Remedy
– Temperature not stable during calibration.	– Adjust temperature if necessary – Recalibrate

Error message
CalError

Cause	Remedy
pH electrode:	
– The values determined for zero point and slope of the electrode are outside the allowed limits.	– Recalibrate
– Junction contaminated	– Clean junction
– Electrode broken	– Replace electrode

Cause	Remedy
Buffer solutions:	
– Incorrect buffer solutions	– – Change buffer solutions
– Buffer solutions too old	– Use only once. Note the shelf life
– Buffer solutions depleted	– Change buffer solutions

No stable measured value

Cause	Remedy
pH electrode:	
– Junction contaminated	– Clean junction
– Membrane contaminated	– Clean membrane
Test sample:	
– pH value not stable	– Measure with air excluded if necessary
– Temperature not stable	– Adjust temperature if necessary
Electrode + test sample:	
– Conductivity too low	– Use a suitable electrode
– Temperature too high	– Use a suitable electrode
– Organic liquids	– Use a suitable electrode

Obviously incorrect measured values

Cause	Remedy
pH electrode:	
– Not connected	– Connect electrode
– Cable broken	– Replace electrode
– pH electrode unsuitable	– Use a suitable electrode
– Temperature difference between buffer and test sample too high	– Adjust temperature of buffer or sample solutions

Cause	Remedy
– Measurement procedure not suitable	– Follow special procedure

CalClock flashes

Cause	Remedy
– Calibration interval expired	– Recalibrate the measuring system

6.2 ISE measurement

Error message *Err1*

Cause	Remedy
– Measuring range exceeded	– Dilute test sample

Obviously incorrect measured values

Cause	Remedy
– Electrode not connected	– Connect electrode
– Cable broken	– Replace electrode

***Error message,* Error (invalid calibration)**

Cause	Remedy
ISE electrode:	
– Moisture in the plug	– Dry plug
– Electrode obsolete	– Replace electrode
– Electrode unsuitable for the range to be measured	– Use suitable electrode
– Socket damp	– Dry socket
Calibration procedure:	
– Wrong sequence of standards for three point calibration	– Select correct sequence
– Calibration standards do not have the correct temperature (max. ± 2 °C temperature difference)	– Adjust the temperature of the calibration standards

Warning *[TempErr]*

Cause	Remedy
– Temperature difference between measurement and calibration greater than 2 K.	– Adjust the temperature of the test sample

Warning *[ISEErr]*

Cause	Remedy
– Electrode voltage outside calibrated range	– Recalibrate

6.3 General errors

Meter does not react to keystroke

Cause	Remedy
– Operating condition undefined or EMC load unallowed	– Processor reset: Press the **<On/Off>** and **<SC>** key simultaneously.

Time is lost

Cause	Remedy
– Buffer batteries empty	– Exchange buffer batteries (see page 77)

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7 Technical data

7.1 General data

Dimensions approx. 240 x 280 x 70 mm

Weight approx. 2.5 kg (without power pack)

Mechanical structure Type of protection IP 54

Electrical safety Protective class III

Test certificates cETLus, CE

Ambient conditions

Storage	- 25 °C ... + 65 °C
Operation	+ 5 °C ... + 45 °C
Climatic class	2

Power supply

Power pack	FRIWO FW7555M/09, 15.1432.500-00 Friwo Part. No. 1883259 Input: 100 ... 240 V ~ / 50 ... 60 Hz / 400 mA Output: 9 V = / 1.5 A Connection max. overvoltage category II Primary plugs contained in the scope of delivery: Euro, US, UK and Australian.
Batteries (to buffer the system clock in the case of a power failure)	4 x 1.5 V alkali-manganese batteries, Type AAA

Serial interface Connection of the PC cable (Z390) or printer cable (Z393)

Baud rate	adjustable: 1200, 2400, 4800, 9600, 19200 Baud
Type	RS232, data output
Data bits	8
Stop bits	2
Parity	None
Handshake	RTS/CTS
Cable length	Max. 15m

USB interface Automatic switch-over when a USB cable is connected.

Type	USB 1.1 (device)
Cable length	max. 3 m

Guidelines and norms used

EMC	EC guideline 2004/108/EC EN 61326-1 Class B FCC Class A

Instrument safety	EC guideline 2006/95/EC EN 61010-1 ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1
Radio data transmission	EC guideline 1999/5/EC EN 300 330-2 EN 50364 EN 60950-1
Climatic class	VDI/VDE 3540
IP protection class	EN 60529

7.2 Measuring ranges, resolution, accuracy

7.2.1 pH/ORP

Measuring ranges, resolution

Variable	Measuring range	Resolution
pH	- 2.000 ... + 20.000 - 2.00 ... + 20.00	0.001 0.01
U [mV]	- 1999.9 ... + 1999.9 - 1999 ... + 1999	0.1 1
T [°C]	- 10.0 ... + 120.0	0.1

Manual temperature input

Variable	Range	Increment
T_{manual} [°C]	- 10 ... + 130	1

Accuracy (± 1 digit)

Variable	Accuracy	Temperature of the test sample
pH	± 0.003 ± 0.01	+ 15 °C ... + 35 °C
U [mV] */ range*		
- 999.9 ... + 999.9	± 0.2	+ 15 °C ... + 35 °C
- 1999 ... + 1999	± 1	+ 15 °C ... + 35 °C
T [°C] */ temperature sensor*		
	± 0.1	0 °C ... + 55 °C

Note
The measuring ranges and accuracy values specified here apply exclusively to the meter. The accuracy of the sensors has also to be taken into account.

7.2.2 ISE

Measuring ranges, resolution

Variable	Measuring range	Resolution
ISE [mg/l]	0.000 ... 10.000 10.00 ... 100.00 100.0 ... 1000.0 1000 ... 999999	0.001 0.01 0.1 1
ISE [µmol/l]	0.000 ... 9.999 10.00 ... 99.99 100.0 ... 999.9 1000 ... 999999	0.001 0.01 0.1 1
[mmol/l]	10.00 ... 99.99 100.0 ... 999.9 1000 ... 999999	0.01 0.1 1
ISE [mg/kg]	0.000 ... 9.999 10.00 ... 99.99 100.0 ... 999.9 1000 ... 999999	0.001 0.01 0.1 1
ISE [ppm]	0.000 ... 9.999 10.00 ... 99.99 100.0 ... 999.9 1000 ... 999999	0.001 0.01 0.1 1
ISE [%]	0.000 ... 9.999 10.00 ... 99.99 100.0 ... 999.9 1000 ... 999999	0.001 0.01 0.1 1

Manual temperature input

Variable	Range	Increment
T_{manual} [°C]	- 20 ... + 130	1

Note
The measuring ranges and accuracy values specified here apply exclusively to the meter. The accuracy of the sensors has also to be taken into account.

Note
The measuring ranges and accuracy values specified here apply exclusively to the meter. The accuracy of the sensors has also to be taken into account.

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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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

8 Lists

This chapter provides additional information and orientation aids.

Abbreviations The list of abbreviations explains the indicators and abbreviations that appear on the display and in the manual.

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.

Trademarks used The list comprises the trademarks used in the present document and their owners.

Index The index will help you to find the topics that you are looking for.

Abbreviations

°C	Temperature unit, degrees Celsius
°F	Temperature unit, degrees Fahrenheit
Cal	Automatic calibration using a selected buffer set
d	Day
h	Hour
j	Year
LoBat	Batteries almost empty (Low battery)
m	Month
mV	Voltage unit
mV/pH	Unit of the electrode slope (internat. mV)
pH	pH value
S	Slope (internat. k)
SELV	Safety Extra Low Voltage
U	Voltage

Glossary

Adjusting — To manipulate a measuring system so that the relevant value (e. g. the displayed value) differs as little as possible from the correct value or a value that is regarded as correct, or that the difference remains within the tolerance.

AutoRange — Name of the automatic selection of the measuring range.

Calibration — Comparing the value from a measuring system (e. g. the displayed value) to the correct value or a value that is regarded as correct. Often, this expression is also used when the measuring system is adjusted at the same time (see adjusting).

Electrode zero point — The zero point of a pH electrode is the pH value at which the electromotive force of the pH electrode at a specified temperature is zero. Normally, this is at 25 °C.

Electromotive force of an electrode — The electromotive force (voltage) U of the electrode is the measurable electromotive force of an electrode in a solution. It equals the sum of all the galvanic voltages of the electrode. Its dependency on the pH results in the electrode function, which is characterized by the parameters, slope and zero point.

Junction — The junction is a porous body in the housing wall of reference electrodes or electrolyte bridges. It forms the electrical contact between two solutions and makes electrolyte exchange more difficult. The expression, junction, is also used for ground or junction-less transitions.

Measured parameter — The measured parameter is the physical dimension determined by measuring, e. g. pH, conductivity or D.O. concentration.

Measured value — The measured value is the special value of a measured parameter to be determined. It is given as a combination of the numerical value and unit (e. g. 3 m; 0.5 s; 5.2 A; 373.15 K).

Molality — Molality is the quantity (in Mol) of a dissolved substance in 1000 g solvent.

Offset potential — The measurable potential of a symmetrical electrode, the membrane of which is immersed in a solution with the pH of the nominal electrode zero point. The asymmetry is part of the offset potential.

ORP voltage — The ORP is caused by oxidizing or reducing substances dissolved in water if these substances become effective on an electrode surface (e. g. a gold or platinum surface).

pH value — The pH is a measure of the acidic or basic effect of an aqueous solution. It corresponds to the negative decadic logarithm of the molal hydrogen ions activity divided by the unit of the molality. The practical pH value is the value of a pH measurement.

Potentiometry	Name of a measuring technique. The signal (depending on the measured parameter) of the electrode is the electrical potential. The electrical current remains constant.
Reset	Restoring the original condition of all settings of a measuring system.
Resolution	Smallest difference between two measured values that can be displayed by a meter.
Slope	The slope of a linear calibration function.
Stability control	Name for a function to check the stability of the measured value.
Standard solution	The standard solution is a solution where the measured value is known by definition. It is used to calibrate a measuring system.
Test sample	Designation of the test sample ready to be measured. Normally, a test sample is made by processing the original sample. The test sample and original sample are identical if the test sample was not processed.
Zero point	Designation for the offset potential of a pH electrode. It is the measurable potential of a symmetrical electrode, the membrane of which is immersed in a solution with the pH of the nominal electrode zero point (pH = 7).

Trademarks used

Trademark	Owner of the trademark
Baker	Mallinckrodt Baker, Inc.
Beckman	Beckman Instruments, Inc.
Fisher	Fisher Scientific Company
Fluka	Fluka AG
Hamilton	Hamilton Company Corporation
Merck	Merck KGaA
Metrohm	Metrohm AG
Mettler Toledo	Mettler Toledo
Precisa	Precisa Instruments AG
Radiometer	Radiometer
SCHOTT	Schott Glas AG
Windows	Microsoft Corporation

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Appendix

A.1 Firmware update

General information

With the Update_ProLab1000_2000 program and a PC you can update the firmware of the ProLab 1000 to the newest version.
Available firmware updates can be found on the Internet.

Connect the meter to a PC for the update.

For the update via the USB interface, the following is required:

- a free USB interface (virtual COM port) on your PC
- the driver for the USB interface (installation of the USB driver from the installation CD-ROM, see page 71)
- the USB cable (included in the scope of delivery of the ProLab 1000).

For the update via the RS232 interface, the following is required:

- a free RS232 interface on your PC
- the RS232 cable, Z390.

Program installation

1	With the installation program, "Install_Update_ProLab1000_2000_Vx_yy_English.exe", install the firmware update program on a PC.

Program start

2	Start the "Update_ProLab1000_2000" program from the Windows start menu.
3	If necessary, change the language in the language menu.

Firmware update

4	Connect the ProLab 1000 to a USB interface (virtual COM port) of the PC with the aid of the USB interface cable. or Connect the ProLab 1000 to a serial interface (COM port) of the PC with the aid of the Z390 interface cable.
5	Switch on the ProLab 1000.
6	Start the updating procedure with OK in the firmware update program.
7	Follow the instructions of the firmware update program. During the programming process, a corresponding message and a progress bar (in %) is displayed. The programming process takes approx. two minutes. A terminatory message is displayed after a successful programming process. The firmware update is completed.

8	Disconnect the ProLab 1000 from the PC. The ProLab 1000 is ready for operation.

After switching the meter off and on you can check whether the meter has taken over the new software version.

A.2 Menus

A.2.1 *Data storage*

Storage & config (**<MENU/OK__>**)

- *Data storage*
  - *Manual data storage* **(<RCL>)**
    - *Display*
    - *Output to RS232/USB*
    - *Data filter*
      - *Filter*
        - *No filter*
        - *Date & SAMPLE ID*
        - *SAMPLE ID*
        - *Date*
      - *From* : *TT.MM.JJ*
      - *Until* : *TT.MM.JJ*
      - *SAMPLE ID :* 0 ... 999
    - *Erase*
  - *Automatic data storage* **(<RCL__>)**
    - *Display*
    - *Output to RS232/USB*
    - *Data filter*
    - *Erase*
  - *Calibration data storage* **(<CAL__>)**
    - *Display*
    - *Output to RS232/USB*
  - *Calibration history*
    - *pH*
    - *ISE*
- *Display* (see page 98)
- *System* (see page 98)

A.2.2 *Display*

Storage & config (**<MENU/OK__>**)
- *Data storage* (see page 97)
- *Display*
  - *Time* : *On* /*Off*
  - *Date* : *On* /*Off*
- *System* (see page 98)

A.2.3 *System*

Storage & config (**<MENU/OK__>**)
- *Data storage* (see page 97)
- *Display* (see page 98)
- *System*
  - *General*
    - *Language*
      - *Deutsch*
      - *English*
      - (etc.)
    - *Beep* : *On* /*Off*
    - *Illumination* : *On* /*Off*
    - *Contrast* : *0 ... 100 %*
  - *Measurement*
    - *Temperature unit* : ° C /° F
    - *Stability control* : *Auto* / *Off*
  - *Interface*
    - *Baud rate* : *1200, 2400, 4800, 9600, 19200*
    - *Output format* : *ASCII* / *CSV*
    - *Output header*
  - *Clock function*
    - *Time*
    - *Date*
    - *Date format*
      - *Service information*
      - *Reset*

A.2.4 <STO__>

<STO__> (**<STO__>**)
- *SAMPLE ID* : *1 ... 999*
- *Interval* : *1, 5 s, 10 s, 30 s,*
  1 min, 5 min, 10 min, 15 min, 30 min, 60 min
- *Duration* : *1 min ... x min*

A.2.5 <PRT__>

<PRT__> (**<PRT__>**)
- *Interval* : *1, 5 s, 10 s, 30 s,*
  1 min, 5 min, 10 min, 15 min, 30 min, 60 min

A.2.6 pH/U

pH/U (**<MENU/OK>**)

- *Calibration*
  - *Calibration record*
  - *Calibration history*
  - *Buffer*
    - *NIST/DIN*
    - *TEC*
    - Merck 1
    - Merck 2
    - Merck 3
    - Merck 4
    - Merck 5
    - DIN 19267
    - Mettler US
    - Mettler EU
    - Fisher 1
    - Fluka BS
    - Radiometer
    - Baker
    - Metrohm
    - Beckman
    - Hamilton DC
    - Precisa
    - Reagecon TEC
    - Reagecon 20
    - Reagecon 25
    - Riedel-de Haen
  - *Calibration interval* : *1 ... 999 d*
  - *Unit for zero point* : mV / pH
  - *Unit for slope* : mV/pH / %
  - *Man. temperature* : *-20 ... +130 °C*
- *Reset*
- *High resolution pH* : *On* / *Off*
- *High resolution mV* : *On* / *Off*

A.2.7 ISE

ISE (**<MENU/OK>**)

- *Calibration record*
- *Calibration history*
- *Man. temperature* : *-20 ... +130 °C*
- *Ion type*
  - *Ag, Br, Ca, Cd, Cl, CN, Cu, F, I, K, Na, NO3, Pb, S, NH3, NH4, CO*
- *Unit*
  - *mol/l, mg/kg, ppm, %, mg/l*
- *Density* (mg/kg, ppm, %)
  - *g/ml, kg/l*

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