# D.O. meter
# OX 4000 L

## OPERATING MANUAL



ECN: 664-0039

Version:    4
Issued:    5, 9, 2012

CE

*pH*enomenal™
pH • Cond • O₂

# 1    Safety

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

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

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

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

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

**Further notes**

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

**Note**
indicates cross-references to other documents, e.g. operating manu-
als.

## 1.1    Authorized use

This meter is authorized exclusively for oxygen measurements in the
laboratory.
The technical specifications as given in chapter 3 TECHNICAL DATA must
be observed. Only the operation and running of the meter according to
the instructions given in this operating manual is authorized.
Any other use is considered **unauthorized**.

## 1.2    General safety instructions

This meter is constructed and tested in compliance with the IEC 1010
safety regulations for electronic measuring instruments.
It left the factory in a safe and secure technical condition.

**Function and operational safety**

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

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

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

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

**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.

**Caution**
**In addition to the safety instructions mentioned here, also follow the safety instructions of the sensors used.**
**The operating manuals of the sensors are available on the supplied CD.**

# 2    Overview

The OX 4000 L compact precision dissolved oxygen (D.O.) meter
enables you to perform D.O. measurements quickly and reliably.
The OX 4000 L provides the maximum degree of reliability, ease of use
and measuring certainty for all applications.
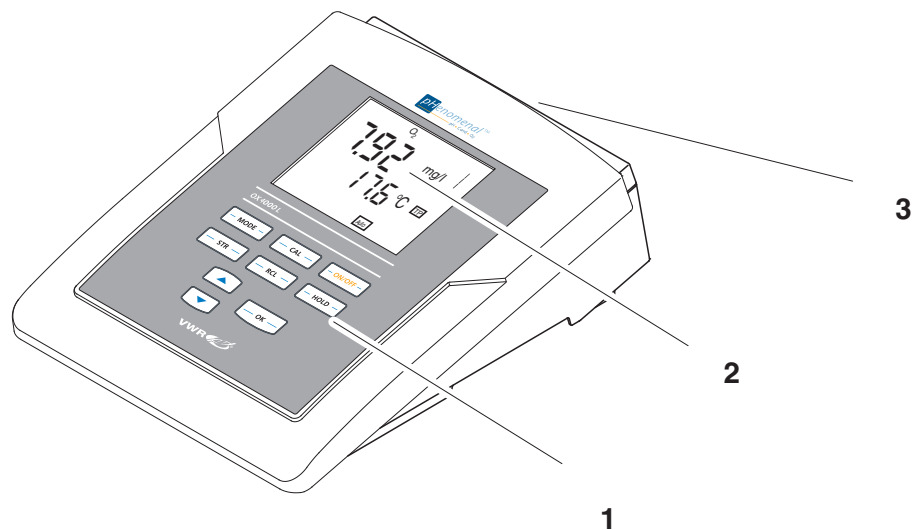


| | |
|---|---|
| **1** | Keypad |
| **2** | Display |
| **3** | Socket field |

## 2.1    Keypad



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

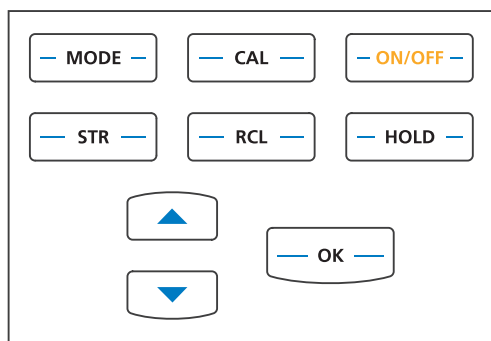| | | |
|---|---|---|
| ON/OFF | **<ON/OFF>:**<br>**<ON/OFF__>:** | Switches the meter on or off<br>Resets calibration data |
| MODE | **<MODE>:**<br>**<MODE__>:** | Selects the measured parameter<br>Opens the setting menu for calibration and measurements |
| CAL | **<CAL>:**<br>**<CAL__>:** | Calls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

## 2.2 Display
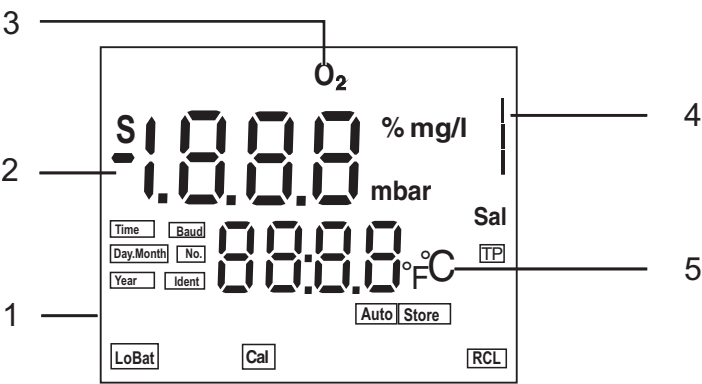


| 1 | Status information |
|---|---|
| 2 | Measured value (with unit) |
| 3 | Measured parameter |
| 4 | Calibration evaluation |
| 5 | Measured temperature (with unit) |

**Function display indicators**

| LoBat | With battery operation: batteries almost empty |
|---|---|
| TP | Temperature measurement active |
| Store | Saving |
| Auto | Automatic stability control |
| S | The current measured value is retained (HOLD) |
| RCL | The data storage is open (RCL) |

## 2.3 Socket field
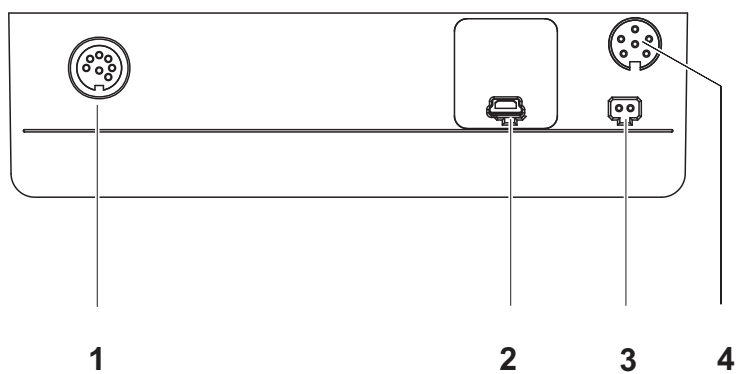
| | | | | |
|---|---|---|---|---|
| **1** | | **2** | **3** | **4** |

| | |
|---|---|
| **1** | D.O. sensor |
| **2** | USB-B interface (device) |
| **3** | Connection for power pack |
| **4** | Service interface |

# 3     Technical data

## 3.1     General data

| | | |
|---|---|---|
| **Dimensions** | Approx. 240 x 190 x 80 mm | |
| **Weight** | Approx. 0,8 kg (without power pack, without stand) | |
| **Mechanical structure** | Type of protection | IP 43 |
| **Electrical safety** | Protective class | III |
| **Test certificates** | CE | |

| | | |
|---|---|
| **Ambient conditions** | Storage | - 25 °C ... + 65 °C |
| | Operation | 0 °C ... + 55 °C |
| | Allowable relative humidity | Annual mean: < 75 %<br>30 days/year: 95 %<br>Other days: 85 % |

| | | |
|---|---|
| **Power supply** | Batteries | 4 x 1.5 V alkali-manganese batteries, type AA |
| | Rechargeable batteries | 4 x 1.2 V NiMH rechargeable batteries, type AA<br>(no charging function) |
| | Operational life | up to 1000 h (operating hours with batteries) |
| | Power pack | Input: 100 ... 240 V ~ / 50 ... 60 Hz / 270 mA<br>Output: 9 V = / 1.1 A<br>Connection max. overvoltage category II<br>Primary plugs contained in the scope of delivery: Euro, US, UK and Australian. |

| | |
|---|---|
| **Service interface** | This interface can be used for service purposes only. |

| | | |
|---|---|
| **USB interface** | Type | USB 1.1 (device)<br>USB-B (device), data output |
| | Baud rate | Can be set to<br>1200, 2400, 4800, 9600 Baud |
| | Data bits | 8 |
| | Stop bits | 2 |
| | Parity | None |
| | Handshake | RTS/CTS |
| | Cable length | max. 3 m |

| **Guidelines and norms used** | EMC | EC guideline 89/336/EEC<br>EN 61326<br>EN 61000-3-2<br>EN 61000-3-3<br>FCC Class A |
| --- | --- | --- |
| | Meter safety | EC guideline 73/23/EEC<br>EN 61010-1<br>ANSI/UL 61010-1<br>CAN/CSA-C22.2 No. 61010-1 |
| | IP protection class | EN 60529 |

## FCC Class A Equipment Statement

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

## 3.2    Measuring ranges, resolution, accuracy

**Measuring ranges, resolution**

| Parameter | Measuring range | Resolution |
|---|---|---|
| D.O. concentration [mg/l] | 0 ... 20.00 | 0.01 |
| Saturation [%] | 0 ... 200.0 | 0.1 |
| T [°C] | 0 ... 50.0 | 0.1 |

**Accuracy (± 1 digit)**

| Parameter | Accuracy |
|---|---|
| D.O. concentration [mg/l] | ± 0.5 % of measured value at ambient temperature + 5 °C ... + 30 °C |
| Saturation [%] | ± 0.5% of measured value when measuring in the range of ± 10 K around the calibration temperature |
| T (°C) | ± 0.1 |

**Correction functions**

| Temperature compensation | Accuracy better than 2 % at 0 ... + 40 °C |
|---|---|
| Salinity correction | 0.00 ... 35.0 SAL |
| Air pressure correction | Automatic through integrated pressure sensor in the range of 500 ... 1100 mbar |

**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.

# 4   Commissioning

## 4.1   Scope of delivery

- Meter OX 4000 L
- Power pack
- 4 batteries 1.5 V Mignon type AA
- Stand
- Stand base
- Short instructions
- CD-ROM with detailed operating manual

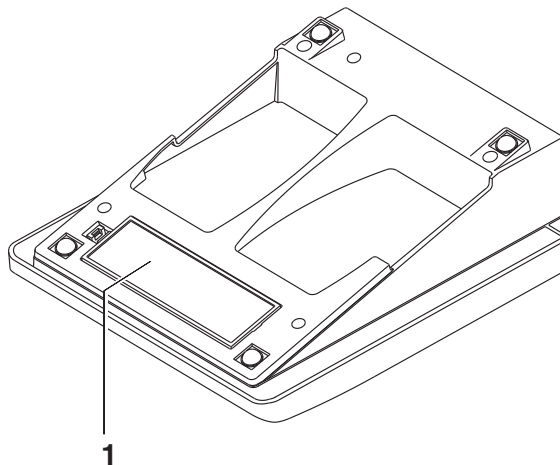## 4.2   Initial commissioning

Perform the following activities:

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

### 4.2.1   Inserting the batteries

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



**1**

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

| 3 | Close the battery compartment (1). |

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

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

### 4.2.2   Connecting the power pack

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

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

| 1 | Insert the plug into the socket of the OX 4000 L. |
| 2 | Connect the original power pack to an easily accessible power outlet. |

**Note**
You can carry out measurements without the power pack.

### 4.2.3   Switching on the meter

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

**Switch-off interval**   The meter has an energy saving feature to avoid unnecessary battery
depletion during battery operation.
The energy saving feature switches off the meter if no key was pressed
during the specified interval (setting the switch-off interval see section
5.5.1).
When the meter is operated with the power pack the energy saving fea-
ture is not active.

**Display illumination**   During battery operation, the meter automatically switches off the display illumination if no key has been pressed for 30 seconds (setting the display illumination see section 5.5.1). The illumination is switched on with the next keystroke again.

### 4.2.4   Stand

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

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

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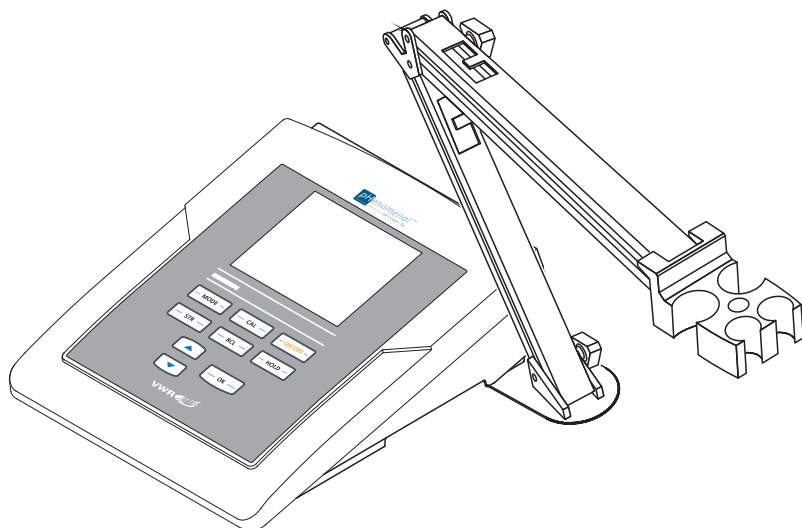
# 5    Operation

## 5.1    General operating principles

This section contains basic information on the operation of the
OX 4000 L.

### 5.1.1    Operating modes

The meter has the following operating modes:

- Measurement
  The display indicates the measurement data in the measured value
  display

- Calibration
  The display guides you through a calibration procedure with calibra-
  tion information

- Storage
  The meter stores measurement data

- Configuration
  Settings and functions are displayed

### 5.1.2    Operation

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

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

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

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

## 5.2    Measuring

**Preparatory activities**    Perform the following preparatory activities when you want to measure:

| 1 | Connect the D.O. sensor to the meter. |
|---|---|
| 2 | Calibrate or check the meter with the sensor. |
| 3 | Select the measured parameter with **<MODE>**. |

**Stability control [Auto]**    During the measuring procedure, the stability control function is automatically activated. The stability control function [Auto] checks the stability of the measured oxygen signal and the stability of the measured temperature signal. The stability has a considerable effect on the reproducibility of the measured value.
The status display [Auto] flashes until a stable measured value is available. As soon as the measured value is stable the status display [Auto] stops flashing.

For identical measurement conditions, the following applies:

| Measured parameter | Time interval | Stability in the time interval |
|---|---|---|
| D.O. concentration | 10 seconds | Δ : better than 0.05 mg/l |
| DO saturation | 10 seconds | Δ : better than 0.6 % |
| Temperature | 10 seconds | Δ : better than 0.02 °C |

**Temperature sensor**    The temperature measurement is absolutely essential for a reproducible oxygen measurement. If a temperature sensor is integrated in the sensor, it is indicated on the display by [TP].

### 5.2.1 Hold function

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



| 2 | To terminate the Hold function: press the **<MODE>** or **<HOLD>** key. The S in front of the measured value is no longer displayed. |
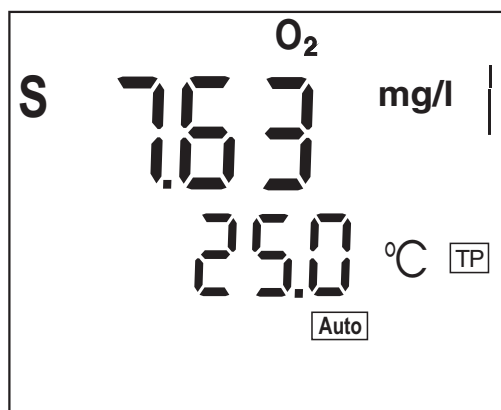
### 5.2.2 General information

You can measure the following parameters:

- D.O. concentration
- DO saturation

**Preparatory activities**    Perform the following preparatory activities when you want to measure:

| 1 | Connect the D.O. sensor to the meter. |
| 2 | Calibrate or check the meter with the D.O. sensor. How to calibrate is described in section 5.2.5. |
| 3 | Select the measuring mode with **<MODE>**. |

**Note**
Incorrect calibration of D.O. sensors will result in incorrect measured values. Calibrate at regular intervals.

**Note**

The OX 4000 L D.O. meter automatically recognizes the type of connected D.O. sensor (OXY 11).

**Temperature sensor**

The D.O. sensor has an integrated temperature sensor that always measures the current temperature of the test sample.

**Warning**

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

### 5.2.3   Measuring the D.O. concentration

**Note**

When measuring the concentration of test samples with a salt content of more than 1 g/l, a salinity correction is required. For this, you have to measure and input the salinity of the test sample first. This is described in section 5.2.7 ENTERING THE SALT CONTENT (SALINITY).
Switch on the salinity correction prior to measuring the D.O. content (see below).

You can measure the D.O. content without salinity correction as follows:

| 1 | Perform the preparatory activities according to section 5.2.2. |
|---|---|
| 2 | Immerse the D. O. sensor in the test sample. |
| 3 | Press the **<MODE><>** key repeatedly until the D. O. concentration in *mg/l* appears on the display. |
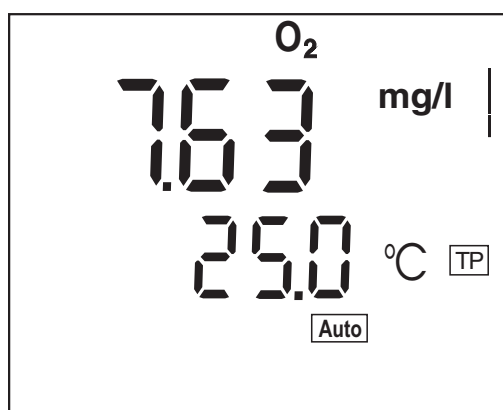


**Stability control**

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

**Switching on/off the salinity correction**    Proceed as follows to switch on the salt content correction:

| 1 | In the D.O. concentration mode, switch on the salinity correction with **<▲>**. The *SAL* display indicator appears on the display. The entered value (see section 5.2.7) is taken into account for the measurement. |



| 2 | Switch off the salinity correction with **<▼>**. The SAL display indicator is no longer displayed. |

### 5.2.4   Measuring the D.O. saturation

You can measure the D. O. saturation as follows:

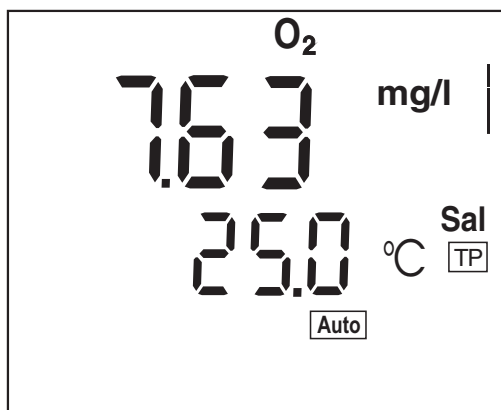| | |
|---|---|
| 1 | Perform the preparatory activities according to section 5.2.2. |
| 2 | Immerse the D. O. sensor in the test sample. |
| 3 | Press the **<MODE>** repeatedly until the saturation in % appears on the display. |
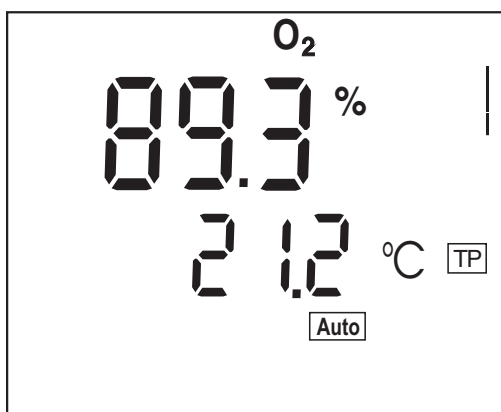
O₂

**89.3** %

**21.2** °C  TP

Auto

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

### 5.2.5   D.O. calibration

**Why calibrate?**   D.O. sensors age. This changes the slope of the D.O. sensor. Calibration determines the current slope of the sensor and stores this value in the instrument.

**When to calibrate?**
- After connecting another D.O. sensor
- When the sensor symbol flashes (after the calibration interval has expired).

**Calibration procedure**   Calibration in water vapor-saturated air.
Use an air calibration vessel for calibration.

**Note**
The OXY 11 sensor is zero-current free (see operating manual OXY 11). Therefore the calibration of the zero point is not necessary and even not provided.

**Stability control [Auto]**   In calibration, the stability control [Auto] function is automatically activated.

**Displaying the calibration data**   You can have the data of the last calibration displayed (see section 5.2.6).

**Calibration evaluation**   After the calibration, the meter automatically evaluates the current status of the calibration. The evaluation appears on the display and in the calibration record.

| Display | Calibration record | Relative slope |
|---|---|---|
| I<br>I<br>I | +++ | S = 0.8 ... 1.25 |
| I<br>I | ++ | S = 0.7 ... 0.8 |
| I | + | S = 0.6 ... 0.7 |
| *Error*<br>Eliminate the error according to chapter 6 WHAT TO DO IF... | *Error* | S < 0.6 or S > 1.25 |

<table>
<tr><td rowspan="2" valign="top"><strong>Calibration in<br>water vapor<br>saturated air<br>(air calibration vessel)</strong></td><td colspan="2">Proceed as follows to calibrate the instrument:</td></tr>
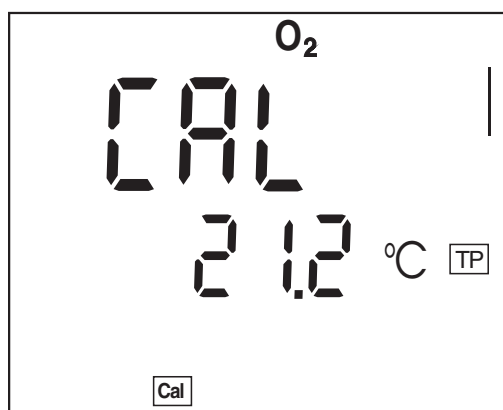<tr><td>1</td><td>Connect the D.O. sensor to the meter.</td></tr>
</table>

| 1 | Connect the D.O. sensor to the meter. |
|---|---|
| 2 | Put the D.O. sensor into the air calibration vessel. |

**Note**
The sponge in the air calibration vessel must be moist (not wet). Leave the sensor in the air calibration vessel for a time long enough to adjust.

| 3 | Start the calibration with **<CAL>**. |
|---|---|

O₂
CAL
21.2 °C TP
Cal

| 4 | Start the measurement with **<OK>**.<br>The measured value is checked for stability (stability control).<br>The [Auto] status display disappears. |
|---|---|
| 5 | Wait for the end of the AutoRead measurement or accept the calibration value with **<OK>**.<br>The calibration data is displayed. |
| 6 | Switch to the measured value display with **<OK>**. |

### 5.2.6 Displaying calibration records

| 1 | Press **<CAL___>** to display the calibration data. |
|---|---|

While the calibration data is being displayed you can:

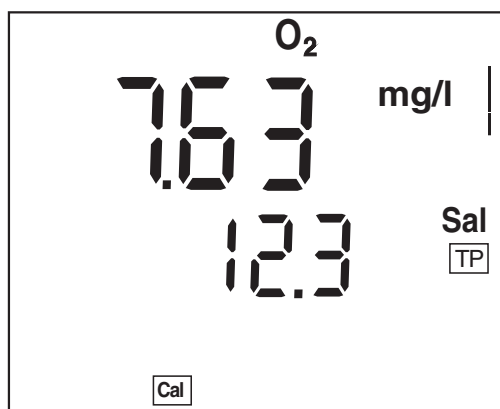press **<CAL___>**     to download the calibration record to the interface

### 5.2.7   Entering the salt content (salinity)

A salt content correction is required in the D.O. concentration measurement of test samples with a salt content of more than 1 g/l. To do this, you have to enter the salinity equivalent (the measured salinity) of the test sample (range 0.0 - 35.0) and to switch on the salinity correction.

| Parameters | Value range |
|------------|-------------|
| Salinity | 0.0 ... 35.0 in 0.1 increments |

**Entering the salinity**

| 1 | Determine the salinity of the test sample (any method). |
|---|---------------------------------------------------------|
| 2 | Press the **<CAL>** key repeatedly until *Sal* appears on the display. |



| 3 | Enter the salt content with **<▲>** **<▼>**. |
|---|------------------------------------------------|
| 4 | Switch to the measuring mode with **<MODE>**. |

**Note**
How to switch on the salt content correction is described on page 22.

## 5.3    Storage in memory

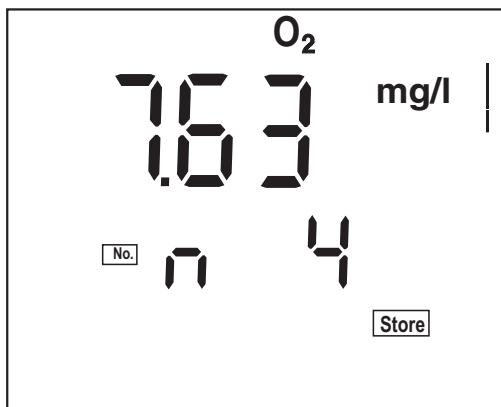The meter has an internal data memory. It can store up to 500 datasets.

A complete dataset consists of:

● Date/time

● Memory location

● ID number

● Measured value

● Temperature

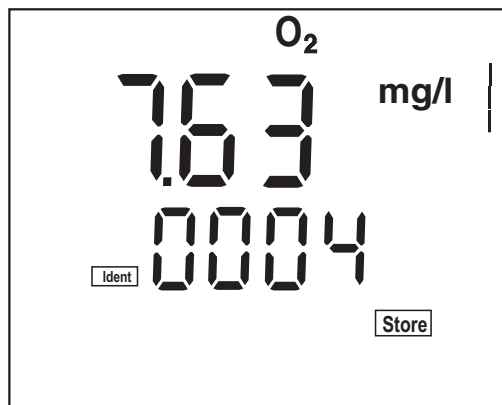● Temperature measuring procedure (manual or automatic)

### 5.3.1   Storing measurement data

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

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



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

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

**Message *StoFull***      This message appears when all of the 500 memory locations are occu-
pied.

When the memory is full, you can:

● press **<OK>**       to store the current measured value.
                 The oldest measured value (memory location 1)
                 will be overwritten by this

● press           to switch to the measured value display without
 **<MODE>**        storing

● download the data memory (see section 5.3.2)

● clear the memory (see section 5.3.3).

### 5.3.2 Downloading the data memory

You can download stored measurement datasets:

● to the display

● to the interface (see section 5.4.1)

**Download to the display**

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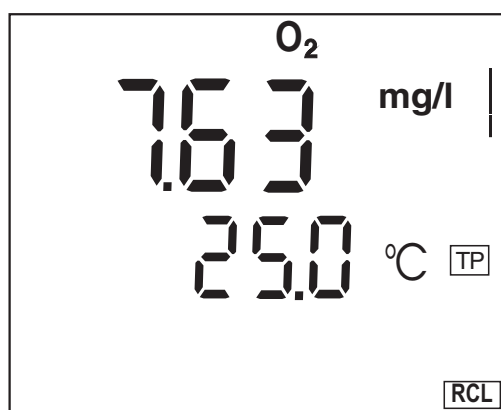


While the memory is being displayed you can:

● press **<OK>**      to display further data of the dataset (ID number, date, time, memory location, temperature)

● press **<▲>**      to display the next dataset

● press **<▼>**      to display the previous dataset

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

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

### 5.3.3   Erasing the data memory

You can erase all stored measurement datasets.

| 1 | Open the storage menu with **<RCL>**. |
|---|---|
| 2 | If necessary, scroll with **<RCL>** until *Sto disp* or *Sto prt* is displayed. |
| 3 | Press **<RCL__>** to display the *Clr All* function. |
| 4 | Press **<OK>** to erase the entire contents of the memory.<br>or<br>Return to the measured value display with **<MODE>**.<br>The stored data is retained. |

### 5.3.4   Downloading calibration data

You can download calibration data:

● to the display

– via the memory menu

– via the calibration menu

● to the interface (see section 5.4.1)

**Download to display via memory menu**

| 1 | Open the storage menu with **<RCL>**. |
|---|---|
| 2 | If necessary, scroll with **<RCL>** until *CAL diSP* is displayed. |
| 3 | Press **<OK>** to display the calibration data. |

While the calibration data is being displayed you can:

press **<CAL__>**      to download the calibration record to the interface

## 5.4    Transmitting data

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

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

**Note**
The interface cable has to be connected if you want to download data to the USB interface.
In addition, the driver for the USB interface must be installed on the PC from the enclosed CD-ROM (see section 5.4.4).

**Terminal program**    Generally, a terminal program is used to establish a connection to an instrument at a data interface and to communicate with this connection via a console on the display. A terminal program normally enables you to store in a text file or print out the contents of the console.

Terminal programs are available from different manufacturers for different operating systems. Windows (versions 95 to XP) includes the terminal program, "HyperTerminal". It is under accessories in the program menu.

More detailed information is given in the user information of the terminal program.

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

### 5.4.1   Options for data transmission

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

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

| Data | Control | Operation / description |
|---|---|---|
| Current measured values | Manual | • With **<OK>**.<br>• Simultaneously with every manual storage process (see section 5.3.1). |
| Stored measured values | Manual | • All datasets (see section 5.4.2) |
| Calibration records | Manual | • Without display indication (see section 5.4.3).<br>• During the display indication with **<CAL__>** (see section 5.3.4). |
|  | Automatic | • At the end of a calibration procedure. |

### 5.4.2   Downloading stored measurement datasets

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

### 5.4.3   Downloading calibration data

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

### 5.4.4 USB interface (device)

Connect the interface to the PC via a USB cable.



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

**Installation of the USB
driver on the PC**

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

● PC with at least one free USB connection and CD-ROM drive

● Windows 2000, Windows XP, Windows Vista.

| 1 | Insert the supplied installation CD in the CD drive of your PC. |
|---|---|
| 2 | Install the driver from the CD.<br>Follow the Windows installation instructions as necessary. |
| 3 | Connect the OX 4000 L to the PC via the USB interface.<br>The meter is listed as a virtual COM interface among the con-<br>nections in the Windows instrument manager. |

## 5.5    Settings

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

- System settings (**<OK__>**)
    - Display illumination (*LEd*)
    - Baud rate (*Baud*)
    - Switch-off interval (*tOff*)
    - Date (*Day.Month*)
    - Date (*Year*)
    - Time (*Time*)
- Measurement settings (**<MODE__>**)
    - Temperature unit (*°C / °F*)
    - Calibration interval (*Int.C* [0 ... 999])

**Note**
You can exit the setting menu at any time by pressing **<MODE>**. Settings already modified and confirmed with **<OK>** are stored.

### 5.5.1   System settings

The default setting is printed in bold.

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

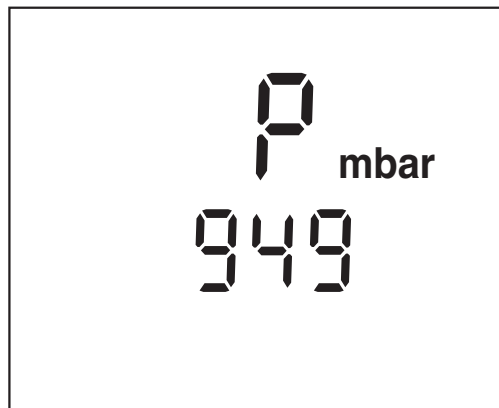| | |
|---|---|
| 1 | Open the menu for system settings with **<OK__>**. The first system setting is displayed. |

**Display illumination
(*LEd*)**

```
 LEd
Auto
```

| 2 | Set the display illumination with **<▲><▼>** . |
|---|---|
| 3 | Confirm with **<OK>**.<br>*Baud,* the setting of the baud rate is displayed. |

**Baud rate (*Baud*)**

```
Baud 4800
```
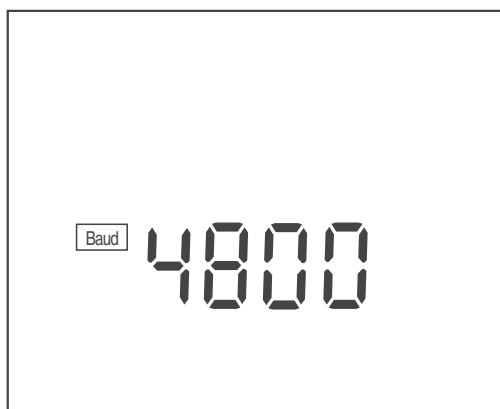
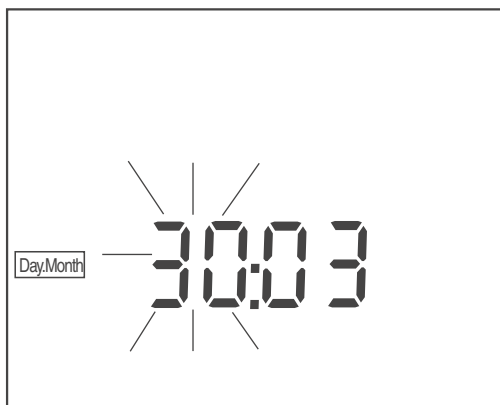| 4 | Set the required baud rate with **<▲><▼>** . |
|---|---|
| 5 | Confirm with **<OK>**.<br>The display shows the current air pressure. |

**Air pressure**

```
P
  mbar
949
```

| 6 | Confirm with **<OK>**.<br>*.OFF,* the setting of the switch-off interval is displayed. |
|---|---|

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

```
.OFF
Time   01:00
```
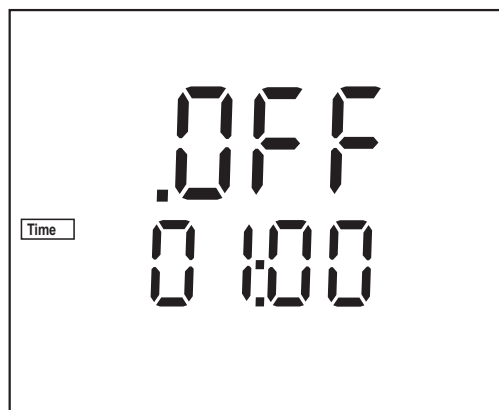
| 7 | Set the switch-off interval with **<▲><▼>**. |
|---|---|
| 8 | Confirm with **<OK>**.<br>*Day.Month*, the setting of the date is displayed.<br>The day display flashes. |

**Date and time**



| 9  | Set the date of the current day with **<▲><▼>** . |
|----|----------------------------------------------------|
| 10 | Confirm with **<OK>**.<br>The month display flashes. |
| 11 | Set the current month with **<▲><▼>** . |
| 12 | Confirm with **<OK>**.<br>*Year*, the setting of the year is displayed. |
| 13 | Set the year with **<▲><▼>** . |
| 14 | Confirm with **<OK>**.<br>The setting of the time is displayed.<br>The hour display flashes. |
| 15 | Set the current hour with **<▲><▼>** . |
| 16 | Confirm with **<OK>**.<br>The minute display flashes. |
| 17 | Set the current minute with **<▲><▼>** . |
| 18 | Confirm with **<OK>**.<br>The system settings are completed.<br>The meter switches to the measuring mode. |

### 5.5.2   Measurement settings

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

| Setting | Default settings |
|---------|------------------|
| Temperature unit (*Uni*) | °**C**, °F |
| Calibration interval (*Int.C*) | *0 ... **14** ... 999 d* |

**Temperature unit (*Uni*)**

| 1 | Open the menu for measurement settings with **<MODE__>**. *Uni*, the setting of the unit of the temperature value is displayed. |



| 2 | Using **<▲><▼>**, toggle between *°C* and *°F*. |
| 3 | Confirm with **<OK>**. *Int.C*, the setting of the calibration interval is displayed. |

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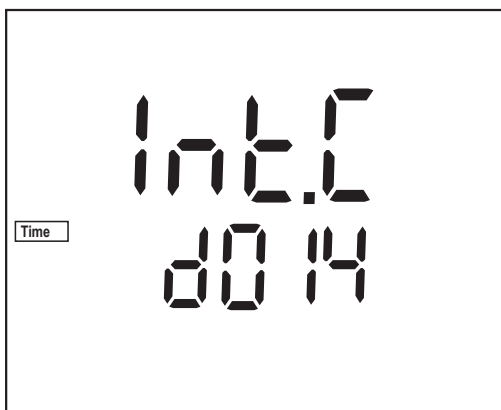


| 4 | Set the interval with **<▲><▼>**. |
| 5 | Confirm with **<OK>**. The measurement settings are completed. The meter switches to the measuring mode. |

## 5.6    Reset

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

### 5.6.1    Resetting the measurement settings

The following measuring parameters are reset to the delivery status:

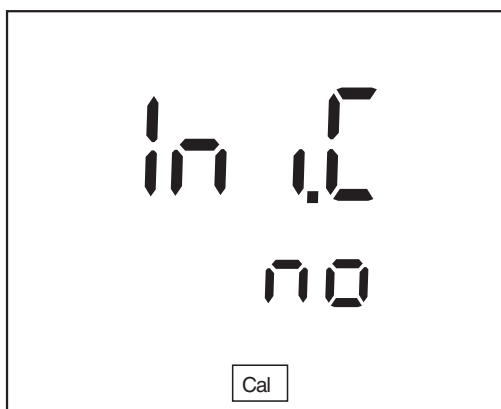| Measuring mode | D.O. concentration |
|---|---|
| Relative slope | 1.00 |
| Salinity | 0.0 |
| Salinity correction | Off |

All system settings are retained.

**Note**

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

**Resetting the measurement settings**

| 1 | Press **<ON/OFF＿>** to open the menu for the reset of the measurement settings. *Ini.C* is displayed. |



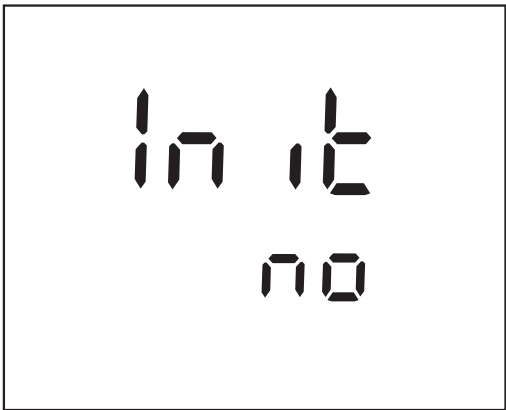| 2 | Press **<▲><▼>** to display *no* or *YES*. *YES*: Reset the measurement settings. *no*: Retain the measurement settings. |
| 3 | Confirm with **<OK>**. The menu is finished. The meter switches to the measuring mode. |

### 5.6.2 Resetting the system settings

The following system settings are reset to the default condition:

| Setting | Default settings |
|---|---|
| Calibration interval | 14 d |
| Measured parameter | D.O. concentration |
| Relative slope | 1.00 |
| Salt content correction | Off |
| Salinity | 0.0 |
| Temperature unit | °C |
| Baud rate | 4800 |
| Switch-off interval (.Off) | 1 h |

**Resetting the system settings**

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



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

# 6    Maintenance, cleaning, disposal, accessories

## 6.1    Maintenance

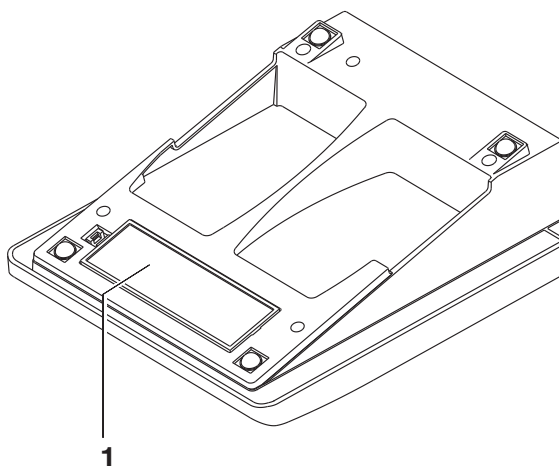The only maintenance activity required is replacing the batteries.

**Note**
See the relevant operating manuals of the measuring cells for instructions on maintenance.

### 6.1.1    Replacing the batteries

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



**1**

| 2 | Remove the four batteries from the battery compartment. |
| 3 | Place four new batteries (type Mignon AA) in the battery compartment. |
| 4 | Close the battery compartment (1). The date (day) flashes on the display. |
| 5 | Set the date and time according to section 5.5.1. |

**Caution**
**Make sure that the poles of the batteries are positioned correctly. The ± signs on the batteries must correspond to the ± signs in the battery compartment.**
**Only use leakproof alkaline manganese batteries.**

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

## 6.2    Cleaning

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

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

## 6.3    Packing

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

## 6.4    Disposal

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

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

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

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

Thank you.

## 6.5    Accessories

| Measuring cells | Order no. |
|---|---|
| pHenomenal OXY 11<br>OXYGEN SENSOR PHENOMENAL 3M 8 PIN | 664-0042 |

| Accessories | Order no. |
|---|---|
| SURVIVAL KIT PHENOMENAL | 662-1166 |
| COMMUNICATION KIT<br>(CD-ROM, USB cable, Manual) | 662-1225 |
| MAINTENANCE KIT OXYGEN | 664-0049 |
| Extension stick | 662-1167 |

# 7    What to do if...

**Error message**
***OFL, UFL***

| Cause | Remedy |
|---|---|
| – Measured value outside the measuring range | – Use suitable measuring cell |

**Symbol for calibration evaluation flashes**

| Cause | Remedy |
|---|---|
| – Calibration interval expired | – Recalibrate the measuring system |

**Display,**
***LoBat***

| Cause | Remedy |
|---|---|
| – Batteries almost empty | – Replace the batteries (see section 6.1 MAINTENANCE) |

**Meter does not react to keystroke**

| Cause | Remedy |
|---|---|
| – Operating condition undefined or EMC load unallowed | – Processor reset: Press the **<OK>** and **<ON/OFF>** key simultaneously. |

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

| Cause | Remedy |
|---|---|
| – E. g., a question by the service department | – Switch on the meter. During the display test, display the software version with **<OK>**. |

**Error message,**
***E3***

| Cause | Remedy |
|---|---|
| Invalid calibration | |
| D.O. sensor: | |
| – Electrolyte solution depleted | – Replace and refill the membrane cap |
| – Membrane contaminated | – Clean membrane |
| – Electrode system poisoned | – Clean the electrodes |
| – Membrane damaged | – Replace and refill the membrane cap |
| – Obsolete | – Replace sensor |
| – Broken | – Replace sensor |

# 8    Index

# 9      Technical service

**Web Resources**

Visit the VWR's website at www.vwr.com for:

● Complete technical service contact information

● Access to VWR's Online Catalogue, and information about accessories and related products

● Additional product information and special offers

Contact us For information or technical assistance contact your local VWR representative or visit. www.vwr.com.

# 10    Warranty

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

For your protection, items being returned must be insured against possible damage or loss. This warranty shall be limited to the replacement of defective products. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

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