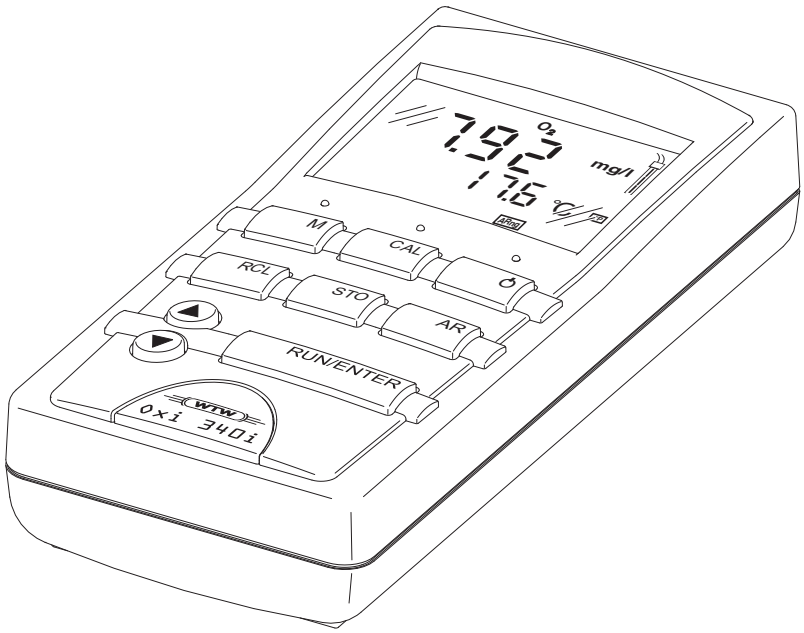
Operating manual

Handheld meter
Oxi 330i/340i



Oxygen measuring instrument

ba52306e04 03/2008

Accuracy when going to press

The use of advanced technology and the high quality standard of our instruments are the result of continuous development. This may result in differences between this operating manual and your instrument. 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 instrument described for 3 years from the date of purchase.
The instrument 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 instrument to readiness for use but not, however, to any further claim for damages. Improper handling or unauthorized opening of the instrument invalidates any warranty claim.

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

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1 Overview 5
1.1 SETs of equipment 6
1.2 Keypad 7
1.3 Display 8
1.4 Jack field 8

2 Safety 9
2.1 Authorized use 9
2.2 General safety instructions 10

3 Commissioning 11
3.1 Scope of delivery 11
3.2 Initial commissioning 11

4 Operation 13
4.1 Switching on the measuring instrument 13
4.2 Measuring 14
4.2.1 General information 14
4.2.2 Measuring the D. O. concentration 15
4.2.3 Measuring the D. O. saturation 16
4.2.4 Measuring the D. O. partial pressure 16
4.2.5 Selecting the measuring range, AutoRange . . . 17
4.2.6 AutoRead AR (drift control) 18
4.3 Calibrating 19
4.3.1 Calibrating with the air calibration vessel 21
4.3.2 Calibrating via a comparison measurement . . . 23
4.3.3 Entering the salt content (salinity) 25
4.4 Saving 26
4.4.1 Saving manually 26
4.4.2 Saving automatically 28
4.4.3 Outputting the data storage 30
4.4.4 Clearing the memory 34
4.5 Transmitting data (only Oxi 340i) 35
4.5.1 Data transmission interval (Int 2, Oxi 340i) 35
4.5.2 Recorder (analog output, Oxi 340i) 37
4.5.3 PC/external printer (RS 232 interface, Oxi 340i) 38
4.5.4 Remote control (Oxi 340i) 38
4.6 Configuration 39
4.7 Reset 42

5 Maintenance, cleaning, disposal 45
5.1 Maintenance 45
5.2 Cleaning 46
5.3 Disposal 46

6 What to do if... 47

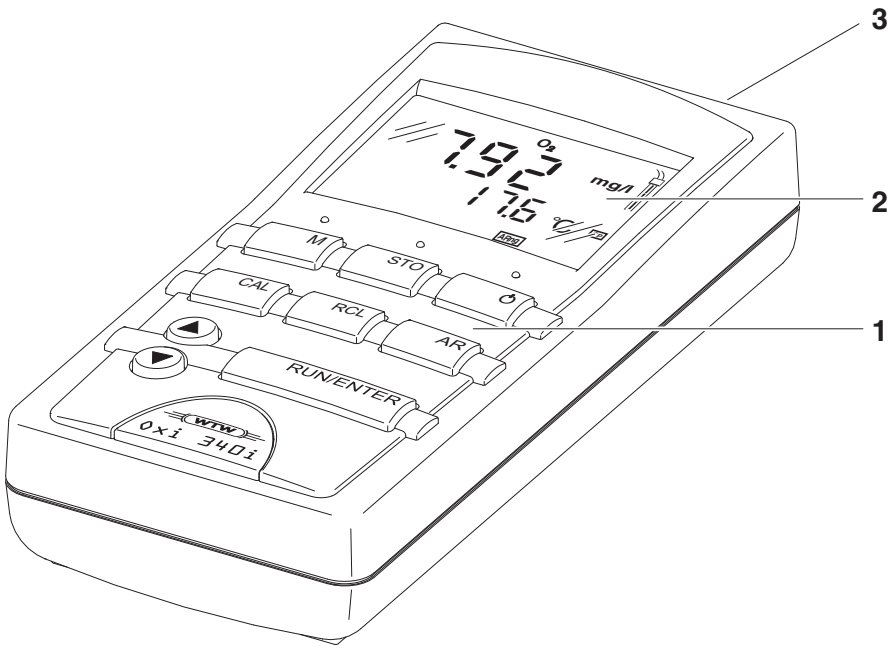
7 Technical data 51

8 Lists 55

1 Overview

The compact precision handheld meter Oxi 330i/340i enables you to carry out oxygen (D. O.) measurements rapidly and reliably.
The Oxi330i/340i handheld meter provides the maximum degree of operating comfort, reliability and measuring certainty for all applications.

The proven OxiCal® calibration procedure and the special *AutoRead* function support you in your work with the Oxi handheld meter.



1	Keypad
2	Sample display
3	Jack field

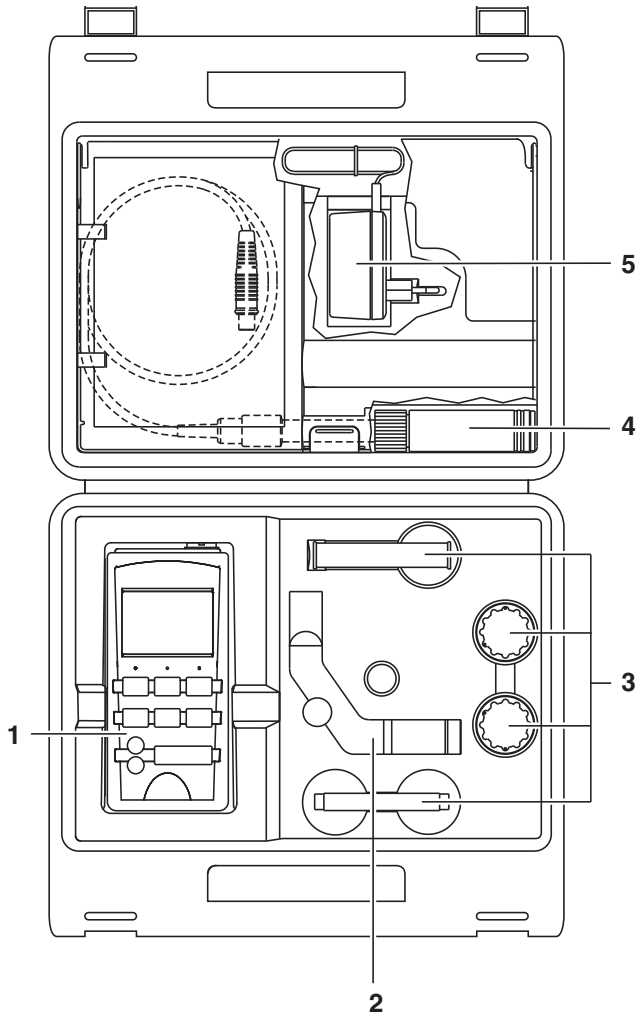
Note
If you need further information or application notes, you can obtain the following material from WTW:

- Application reports
- Primers
- Safety datasheets.

You will find information on available literature in the WTW catalog or via the Internet.

1.1 SETs of equipment

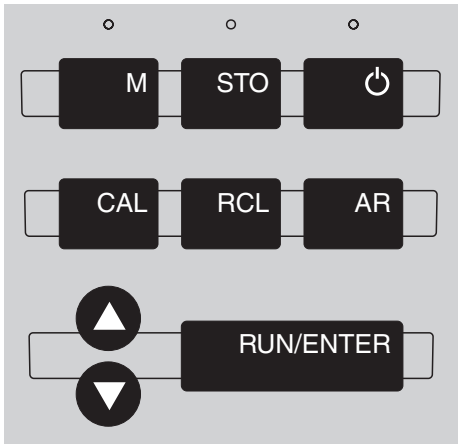
The measuring instrument is also available as part of individual SETs of equipment. You will find additional information on this and other accessories in the WTW catalog or via the Internet.



Set (sample configuration):

1	Measuring instrument, Oxi 330i/340i
2	Stand
3	– 50 ml ELY/G electrolyte solution for D.O. probes – 50 ml RL/G cleaning solution for D.O. probes – 3 WP 90/3 exchange membrane heads – SF300 abrasive film for D.O. probes
4	CellOx 325 D.O. probe with calibration vessel
5	Plug-in power supply, optional (340i only)

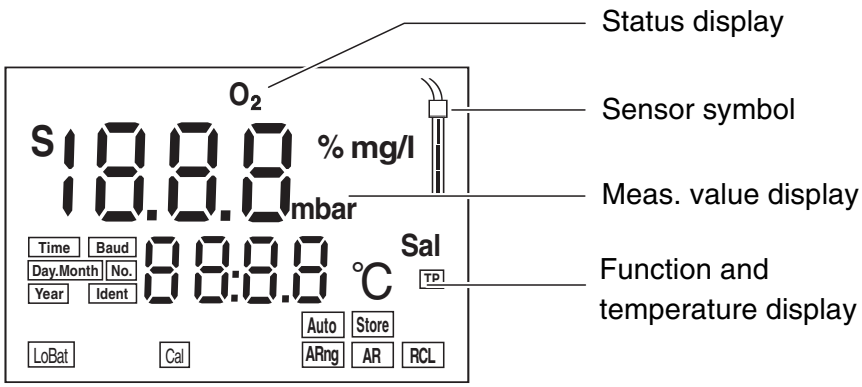
1.2 Keypad



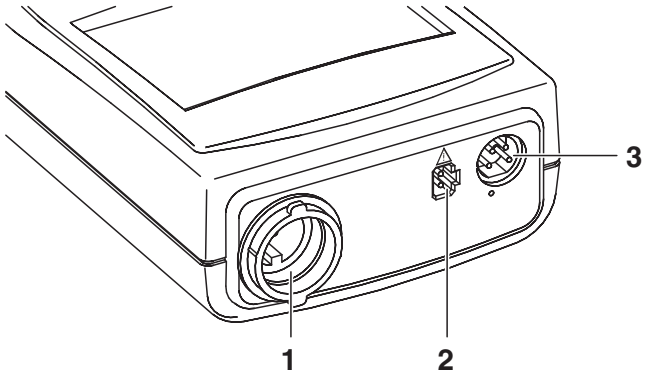
Key functions

M	Select the measuring mode **<M>**: – D. O. concentration – D. O. saturation – D. O. partial pressure
STO	Save a measured value **<STO>**
⏻	Switch measuring instrument on/off **<ON/OFF>**
CAL	Calibration; Select the calibration procedure **<CAL>**
RCL	Display/transmit measured values **<RCL>**
AR	Activate/deactivate the AutoRead function **<AR>**
▲	Switch on the salt content correction, Increase values, scroll **<▲ >**
▼	Switch off the salt content correction, Decrease values, scroll **<▼ >**
RUN/ENTER	Confirm entries, start AutoRead **<RUN/ENTER>**

1.3 Display



1.4 Jack field



1	D. O. probe
2	Plug-in power supply (optional) - Oxi 340i only
3	Serial interface RS 232 / analog output (recorder) , Oxi 340i only



Warning
Only connect probes to the measuring instrument that cannot return any voltages or currents that are not allowed
(> SELV and > current circuit with current limiting).
Nearly all probes - especially WTW probes - fulfill these conditions.

2 Safety

This operating manual contains basic instructions that you must follow during the commissioning, operation and maintenance of the measuring instrument. 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 measuring system.

Target group

The measuring instrument was developed for work in the field and in the laboratory.
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 safety instructions such as the label shown below to indicate various hazards or dangers:

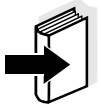


Warning
indicates instructions that must be followed precisely in order to avoid the possibility of slight injuries or damage to the instrument or the environment.

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

The authorized use of the measuring instrument consists exclusively of the measurement of the dissolved oxygen (D. O.) content of liquid media in the field and laboratory.
The technical specifications as given in chapter 7 TECHNICAL DATA must be observed. Only the operation and running of the measuring instrument according to the instructions given in this operating manual is authorized.
Any other use is considered to be **unauthorized**.

2.2 General safety instructions

This instrument is built and inspected according to the relevant guidelines and norms for electronic measuring instruments (see chapter 7 TECHNICAL DATA).
It left the factory in a safe and secure technical condition.

Function and operating safety

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

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

Safe operation

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

- 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 instrument.

Obligations of the purchaser

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

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

3 Commissioning

3.1 Scope of delivery

- Handheld meter, Oxi 330i or 340i
- Plug-in power supply, optional (340i only)
- Operating manual and short operating manual
- 4 batteries, 1.5 V Mignon type AA (in the instrument)

3.2 Initial commissioning

Perform the following activities:

- Set the date and time
- Connect the plug-in power supply, optional (340i only)

Setting the date and time

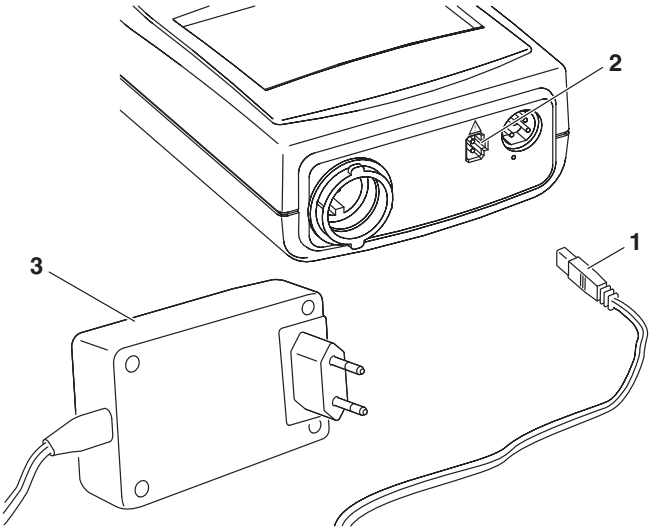
1	Press the **<M>** key and hold it down.
2	Press the **<ON/OFF>** key. The display test appears briefly on the display.
3	Press the **<RUN/ENTER>** key repeatedly until the date appears on the display.
4	Set the date of the current day with **<▲> <▼>**.
5	Confirm with **<RUN/ENTER>**. The date (month) flashes in the display.
6	Set the current month with **<▲> <▼>**.
7	Confirm with **<RUN/ENTER>**. The year appears on the display.
8	Set the current year with **<▲> <▼>**.
9	Confirm with **<RUN/ENTER>**. The hours flash on the display.
10	Set the current time with **<▲> <▼>**.
11	Confirm with **<RUN/ENTER>**. The minutes flash on the display.
12	Set the current time with **<▲> <▼>**.
13	Confirm with **<RUN/ENTER>**. The instrument switches to the measuring mode, the sensor symbol flashes.
14	Switch the instrument off using **<ON/OFF>**.

Connecting the plug-in power supply (340i)

You can either operate the measuring instrument with batteries or with the plug-in power supply. The plug-in power supply supplies the oxygen measuring instrument 340i with low voltage (12 V DC). This saves the batteries.

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

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



1	Plug the jack (1) into the socket (2) of the measuring instrument.
2	Connect the original WTW plug-in power supply (3) to an easily accessible mains socket.

Note
You can also measure without the plug-in power supply. The functions of a connected stirrer, however, can only be used when the plug-in power supply is connected.

4 Operation

4.1 Switching on the measuring instrument

1	Connect the D. O. probe to the measuring instrument.
2	Press the **<ON/OFF>** key. The display test appears briefly on the display. The relative slope for the probe type that was just connected subsequently appears for approx. one second. The measuring instrument then automatically switches to the measuring mode that was last selected. The display shows the relevant measured value.

Note
The measuring instrument has an energy saving feature to avoid unnecessary battery depletion. The energy saving feature switches the measuring instrument off if no key has been pressed for an hour. The energy saving feature is not active when the AutoStore function is active.

Measuring instrument 340i

The energy saving feature is also not active

- if the power is supplied by the plug-in power supply,
- if the communication cable and a PC with a running communication program are connected,
- if the recorder cable is connected,
- if the printer cable is connected (for external printers).

4.2 Measuring

4.2.1 General information

You can measure the following variables:

- D. O. concentration
- D. O. saturation
- D. O. partial pressure

The measuring instrument is supplied with the following functions:

- AutoRange (automatic measurement range selection),
- The AutoRead function (drift control) for checking the stability of the measurement signal. This ensures the reproducibility of the measuring signal. For details of how to switch the AutoRead function on/off, see section 4.2.6.

Preparatory activities

Perform the following preparatory activities when you want to measure:

1	Connect the D. O. probe to the measuring instrument.
2	In conjunction with the D. O. probe, check or calibrate the measuring instument. How to calibrate is described in section 4.3.
3	Select the measuring mode with **<M>**.

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

Note
The Oxi 340i handheld oxygen meter automatically recognizes the type of D.O. sensor that is connected (CellOx 325 or DurOx 325).

Temperature sensor

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

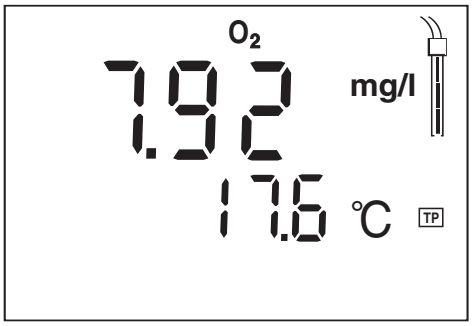
Warning
When connecting an earthed PC/printer, measurements cannot be performed in earthed media as incorrect values would result. The RS 232 interface is not galvanically isolated.

4.2.2 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 measured medium first. This is described in section 4.3.3 ENTERING THE SALT CONTENT (SALINITY).
Before measuring the oxygen, you have to switch on the salt content correction (see below).

You can measure the oxygen content without a salt content correction as follows:

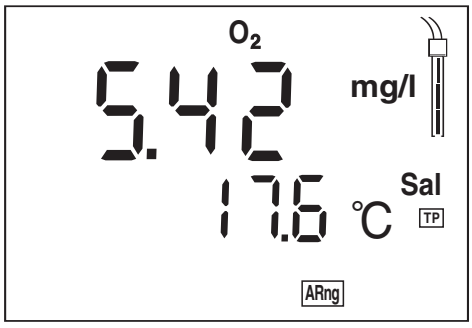
1	Perform the preparatory activities according to section 4.2.1.
2	Immerse the D. O. probe in the test sample.
3	Press the **<M>** key repeatedly until the D. O. concentration in *mg/l* appears on the display.



Switching on/off the salt content correction

Proceed as follows to switch on the salt content correction:

1	In the D. O. concentration measuring mode, switch on the salt content correction with **<▲>**. The *SAL* display indicator appears on the display. The value that was entered is taken into consideration during the measurement (see section 4.3.3).

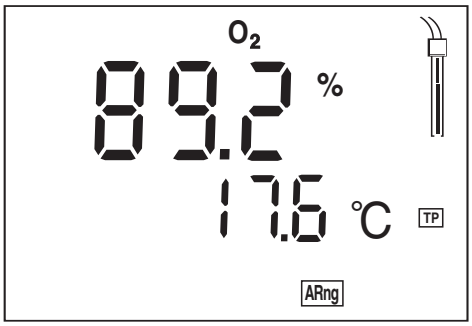


2	Switch the salt content correction off with **<▼>**. The SAL display indicator is no longer displayed.

4.2.3 Measuring the D. O. saturation

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

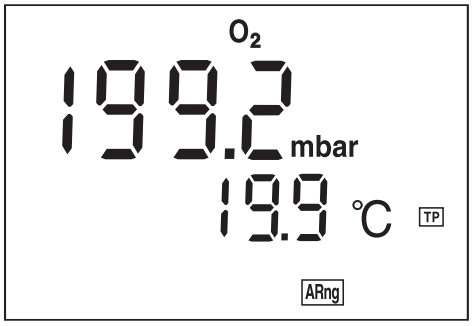
1	Perform the preparatory activities according to section 4.2.1.
2	Immerse the D. O. probe in the test sample.
3	Press the **<M>** key repeatedly until the saturation in % appears on the display.



4.2.4 Measuring the D. O. partial pressure

You can measure the D. O. partial pressure as follows:

1	Perform the preparatory activities according to section 4.2.1.
2	Immerse the D. O. probe in the test sample.
3	Press the **<M>** key repeatedly until the partial pressure in *mbar* appears on the display.



4.2.5 Selecting the measuring range, AutoRange

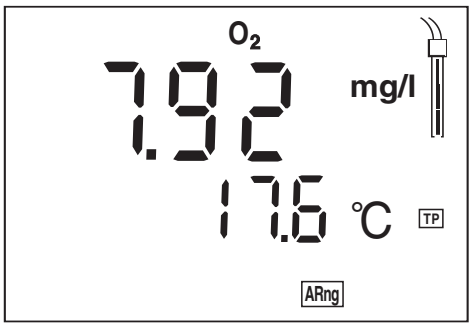
Sensors

You can use the DurOx 325 or CellOx 325 sensors. If the automatic recognition function recognizes the DurOx 325 sensor, the measurement is carried out at a lower resolution. The CellOx 325 sensor measures with a resolution that is a factor of 10 higher.

AutoRange

Each of the measuring parameters has 2 measuring ranges available. *AutoRange* causes the measuring instrument to change to measuring range II if measuring range I is exceeded, and also vice versa.

To switch the automatic measurement range selection on/off, see section 4.6 CONFIGURATION. When the AutoRange function is switched on, *ARng* appears on the display.



Measuring ranges/ resolutions with CellOx 325 D. O. probe

	mg/l	%	mbar
Measuring range I Resolution	0 ... 19.99 0.01	0 ... 199.9 0.1	0 ... 199.9 0.1
Measuring range II Resolution	0 ... 90.0 0.1	0 ... 600 1	0 ... 1250 1

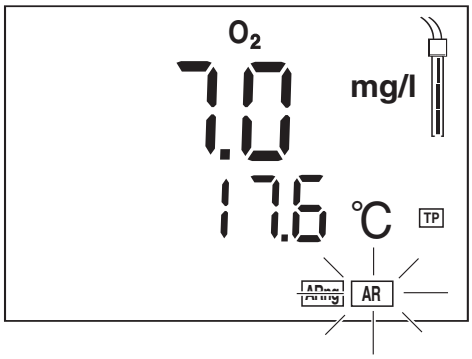
Measuring ranges/ resolutions with DurOx 325 D. O. probe

	mg/l	%	mbar
Measuring range I Resolution	0 ... 19.9 0.1	0 ... 199 1	0 ... 199 1
Measuring range II Resolution	0 ... 90 1	0 ... 600 1	0 ... 1250 1

4.2.6 AutoRead AR (drift control)

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

1	Select the measuring mode with **<M>**.
2	Activate the AutoRead function with **<AR>**. The current measured value is frozen (hold function).
3	Start AutoRead with **<RUN/ENTER>**. The AR display indicator flashes until a stable measured value is reached.



4	If necessary, start the next AutoRead measurement with **<RUN/ENTER>**.
5	To terminate the AutoRead function: Press the **<AR>** key.

Criteria With identical measurement conditions, the following applies:

Parameter	Reproducibility	Response time
D. O. concentration	better than 0.05 mg/l	> 10 seconds
D. O. saturation index	better than 0.6 %	> 10 seconds
D. O. partial pressure	better than 0.6 mbar	> 10 seconds

4.3 Calibrating

Why calibrate?

D. O. probes age. This changes the slope of the D. O. probe. Calibration determines the current slope of the probe and stores this value in the instrument.
Thus, you should calibrate at regular intervals.

Separate calibration of CellOx 325 and DurOx 325

The Oxi 330i/340i handheld meter enables the two sensor types, CellOx 325 and DurOx 325, to be calibrated separately from one another. The calibration of a specific sensor type does not affect the calibration of the other sensor type. When connecting a sensor, the calibration data stored for the respective sensor type are automatically used.

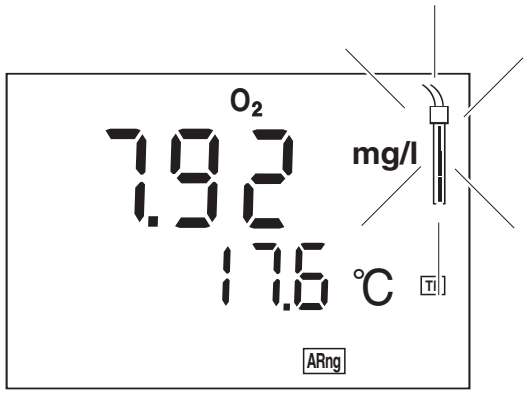
Calibration procedures

The Oxi 330i/340i provides 2 calibration procedures:

- Calibration in water vapor-saturated air.
  To calibrate the CellOx 325, use the OxiCal®-SL air calibration vessel (accessory), to calibrate the DurOx 325, use the OxiCal®-D air calibration vessel (contained in the scope of delivery of the sensor).
- Calibration via a comparison measurement (e. g. Winkler titration according to DIN EN 25813 or ISO 5813). At the same time, the relative slope is adapted to the comparison measurement by a correction factor.

When to calibrate?

- After connecting another D. O. probe
- If the sensor symbol flashes, i. e. after the calibration interval has expired



Setting the calibration interval

The calibration interval (Int 3) is set to 14 days in the factory. You can select the interval in the range of 1 ... 999 days.

Printing the calibration record (340i)

The calibration protocol contains the calibration data of the current calibration. You can transmit the calibration protocol to a printer via the serial interface (see page 33).

Note
You can automatically print a calibration protocol after the calibration. To do so, connect a printer to the interface according to section 4.5.3 before calibrating. After a valid calibration, the record is printed.

Sample printout:

```
CALIBRATION PROTOCOL
 02.03.99     14:19
Device No.: 12345678
CALIBRATION 02
Cal time: 02.03.99 / 14:19
Cal interval:   14d
OxiCal        Tauto AR
Relative Slope:   0,88
Probe:     +++
```

Sensor evaluation

After the calibration, the measuring instrument evaluates the current status of the sensor against the relative slope. The evaluation appears on the display. The relative slope has no effect on the measuring accuracy. Low values indicate that the electrolytic filling will soon be depleted and the probe has to be regenerated.

Display	Relative slope
	S = 0.8 ... 1.25
	S = 0.7 ... 0.8
	S = 0.6 ... 0.7
E3 Eliminate the error according to chapter 6 WHAT TO DO IF...	S < 0.6 or S > 1.25

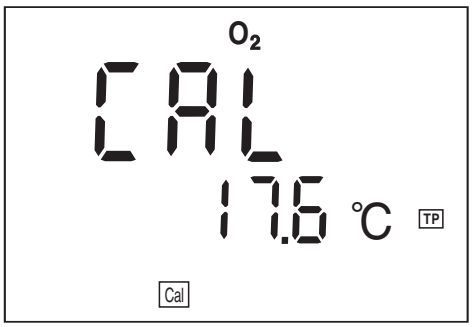
4.3.1 Calibrating with the air calibration vessel

Proceed as follows to calibrate the instrument:

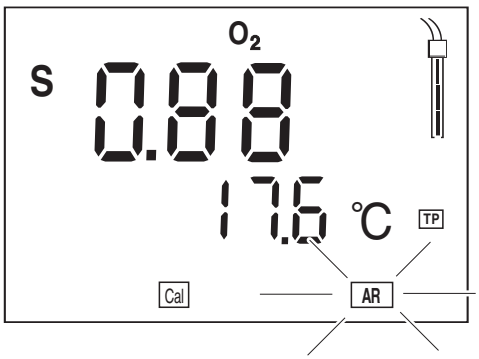
1	Connect the D. O. probe to the measuring instrument.
2	Keep an air calibration vessel ready for use.

Note
The sponge in the air calibration vessel must be moist (not wet). Follow the instructions in the OxiCal®-SL or DurOx 325 operating manual.

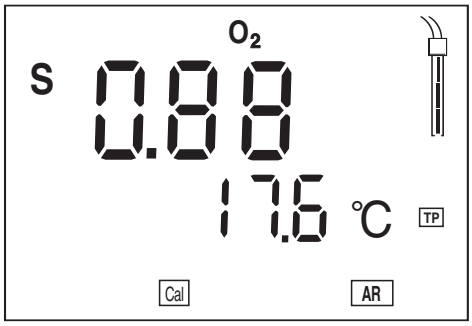
3	Put the D. O. probe into the air calibration vessel.
4	Press the **<CAL>** key repeatedly until *O_2 CAL* appears.



5	Press the **<RUN/ENTER>** key. AutoRead is active, *AR* flashes.



6	As soon as a stable value is reached, the *AR* display indicator stops flashing. This indicates that the calibration is complete; the sensor symbol shows the relative slope that was determined and the sensor evaluation (see page 20).



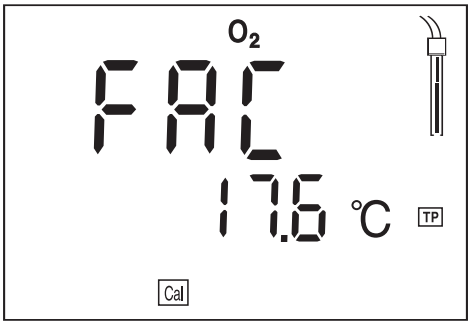
7	Switch to the measuring mode with **<M>**.

Note
In chapter 6 WHAT TO DO IF... , you will find the measures to take for error elimination.

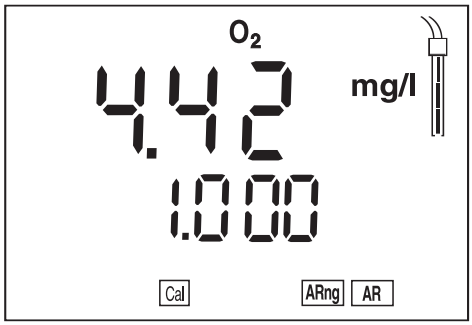
4.3.2 Calibrating via a comparison measurement

Proceed as follows to calibrate the instrument:

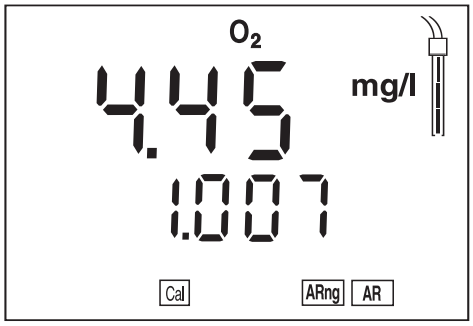
1	Connect the D. O. probe to the measuring instrument.
2	Press the **<CAL>** key repeatedly until *O_2 FAC* appears.



3	Immerse the D. O. probe in the calibrating solution.
4	Press the **<RUN/ENTER>** key. The AutoRead measurement begins. If the measured value is stable, the instrument displays the determined measured value and the correction factor of the relative slope (initial value = 1.000).



5	Remove the D. O. probe from the calibrating solution.
6	Perform a comparison measurement, e. g. Winkler titration, with the calibrating solution (determine the nominal value). Leave the measuring instrument switched on until the nominal value is determined.
7	Set the displayed value on the measuring instrument to the nominal value with **<▲> <▼>**. This changes the related correction factor of the relative slope.



8	Switch to the measuring mode with **<M>** or **<RUN/ENTER>** .

Note
If the correction factor deviates from 1.000, the display of the measured value unit flashes.

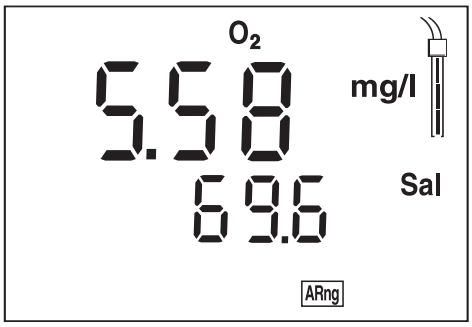
4.3.3 Entering the salt content (salinity)

A salt content correction is required in the oxygen concentration measurement of test samples with a salt content of more than 1 g/l. For this, you have to enter the salinity equivalent (the measured salinity) of the test sample (range 0.0 - 70.0) and to switch on the salinity correction.

Parameter	Value range
Salinity	0.0 ... 70.0 in steps of 0.1

Entering the salt content

1	Determining 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 **<M>**.

Note
How to switch on the salt content correction is described on page 15.

4.4 Saving

The measuring instrument has an internal data memory. It can store up to 800 data records.
A complete data record consists of:

- Storage location
- Date/time
- Measured value
- Temperature
- Temperature measuring procedure
- ID number

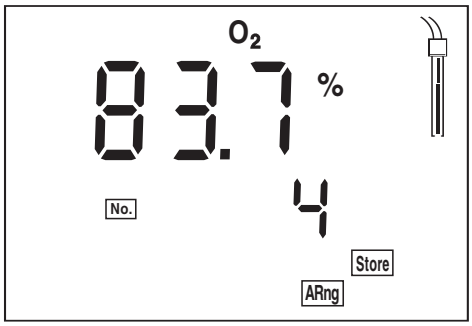
You can transmit measured values (data records) to the data storage in two ways:

- Save manually
- Switch on AutoStore (Int 1).

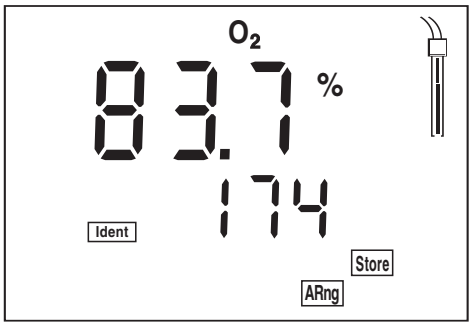
4.4.1 Saving manually

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

1	Press the **<STO>** key. The current number (location number *No.*) of the next free storage location appears under the current measured value on the display.



2	Confirm with **<RUN/ENTER>**. The display switches to entering the ID number.



3	Using **<▲> <▼>**, enter the required ID number (1 ... 999).
4	Confirm with **<RUN/ENTER>**. The instrument changes to the measuring mode.

Message StoFul

This message appears when all of the 800 storage locations are occupied.

You have the following options:

Saving the current measured value. The oldest measured value (storage location 1) will be overwritten by this	Press **<RUN/ENTER>**.
Returning to the measuring mode without saving	press any key
Outputting the data storage	see section 4.4.3
Clearing the memory	see section 4.4.4

4.4.2 Saving automatically

The save interval (Int 1) determines the chronological interval between automatic save processes.
After the fixed interval has expired, the current data record is transmitted to the storage and to the interface.

Setting the save interval

The default setting for the save interval (Int 1) is OFF.
By this, the AutoStore function is switched off.
To switch the function on, set an interval (5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 60 min):

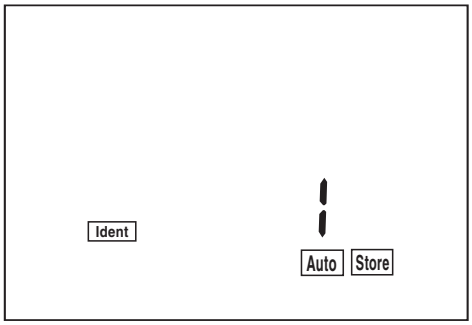
1	Press the **<RUN/ENTER>** key and hold it down.
2	Press the **<STO>** key. *Int 1* appears on the display.



3	Set the required interval between the saving procedures with **<▲>** **<▼>**.
4	Confirm with **<RUN/ENTER>**. The number of free memory locations appears on the display.



5	As soon as all of the 800 storage locations are occupied, *AutoStore* is terminated (Int 1 = OFF). If there are not enough storage locations available for your measurements: – Output and backup the data storage (see page 30) and – clear the memory (see page 34).
6	Confirm with **<RUN/ENTER>**. The prompt for the ID number appears on the display.



7	Set the required ID number with **<▲> <▼>**.
8	Confirm with **<RUN/ENTER>**. The instrument switches to the Oxi measuring mode and starts the measuring and saving process. *AutoStore* flashes on the display.

Note
The AutoStore function is interrupted if you start other functions, e.g. output the data storage.
After the function is finished, the AutoStore function is continued. By this, however, temporal gaps in the recording of the measured values will occur.

Switching off AutoStore

Switch AutoStore off by:

- setting the save interval (Int 1) to OFF, or
- switching the measuring instrument off and then on again.

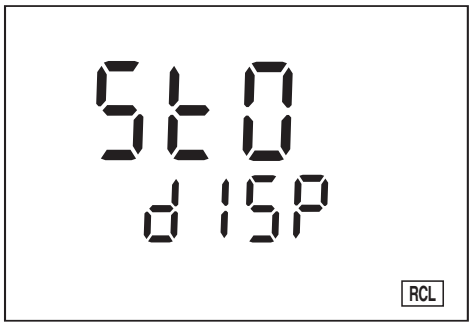
4.4.3 Outputting the data storage

You can output the contents of the data storage:

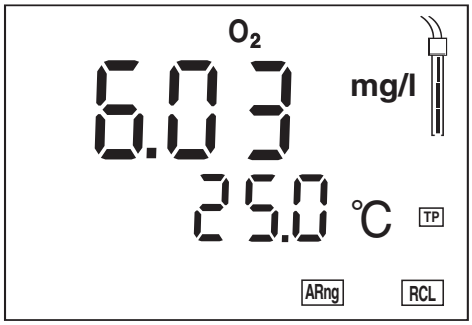
- Stored data on the display
- Calibration data on the display
- Stored data on the serial interface (only Oxi 340i)
- Calibration protocol to the interface (only Oxi 340i)

Outputting stored data on the display

1	Press the **<RCL>** key repeatedly until *StO dISP* appears on the display.



2	Press the **<RUN/ENTER>** key. A measured value appears on the display. The storage location of the data record is displayed for approx. 2 s, then the respective temperature appears.



You can perform the following activities:

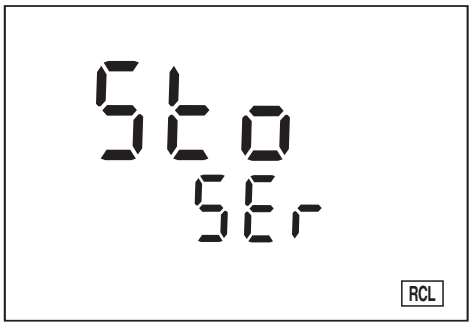
Display further elements of the data record (ID number, date, time, storage location)	Press **<RUN/ENTER>**
Advance one data record (storage location)	Press **<▲>**
Go back one data record (storage location)	Press **<▼>**

Note
If you want to search for a certain element (e.g. date), proceed as follows:

1	Using **<RUN/ENTER>**, select the element (e.g. date).
2	Press **<▲>** or **<▼>** repeatedly until the required date appears on the display. After approx. 2 s the temperature of the displayed measured value appears.

Outputting stored data to the interface (only Oxi 340i)

1	Press the **<RCL>** key repeatedly until *Sto SEr* appears on the display.



2	Press the **<RUN/ENTER>** key. The complete storage content is transmitted to the interface; during the data transmission the numbers of the currently transmitted storage locations run through. After the data transmission, the measuring instrument automatically switches to the measuring mode.

Note
You can cancel the transmission with **<M>** or **<RUN/ENTER>**.

After the instrument number, the printout contains the complete storage contents in ascending order of the storage location numbers.

Sample printout:

```
Device No.: 99990000

No.    1:
 09.03.99        17:10
 101.7 %         17.6°  C
Tauto          AR
Ident :  10

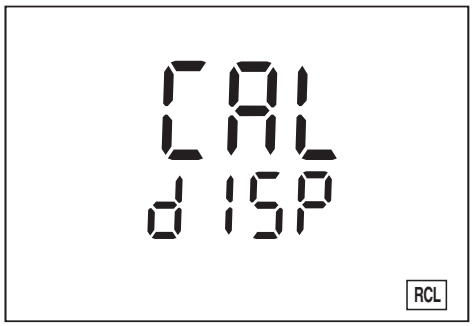
No.    2:
 09.03.99        17:11
 7.11 mbar       17.6°  C
Tauto          AR
Ident :  10

No.    3:
 09.03.99        17:12
  7.88 mg/l      17.6°  C
Tauto
Ident :  10

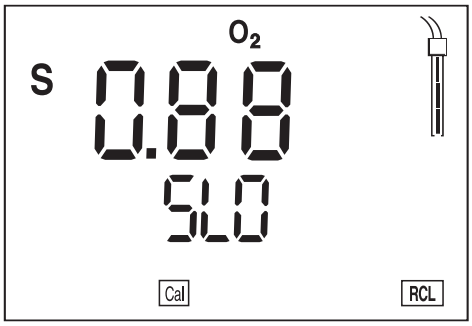
No.    4:
 09.03.99        17:15
  7.11 mg/l      17.8°  C
Tauto
 SAL = 17.9
Ident :   7
...
```

Outputting the calibration data on the display

1	Press the **<RCL>** key repeatedly until *CAL dISP* appears on the display.



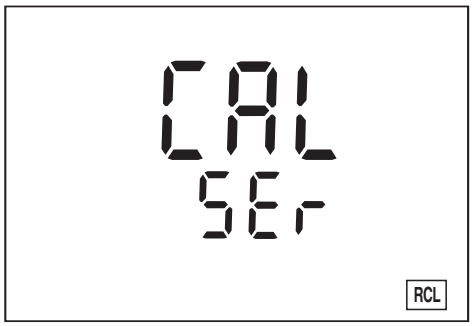
2	Press the **<RUN/ENTER>** key. The relative slope appears on the display:



3	Using **<M>** or **<RUN/ENTER>**, you can switch back to the measuring mode.

Outputting the calibration protocol on the interface (only Oxi 340i)

1	Press the **<RCL>** key repeatedly until *CAL* appears on the display.



2	Press the **<RUN/ENTER>** key. The calibration protocol is transmitted to the interface. After the data transmission, the measuring instrument automatically switches to the measuring mode.

Note
You will find a sample calibration protocol in PRINTING THE CALIBRATION RECORD (340I), page 19.

4.4.4 Clearing the memory

With this function, you can delete stored data records. 800 storage locations will then be available again.

Note
The *Clear memory* function only appears when there are data records stored in the memory. Otherwise, the measuring instrument automatically switches to the measuring mode.

Proceed as follows to clear all data records:

1	Switch off the measuring instrument.
2	Press the **<STO>** key and hold it down.
3	Press the **<ON/OFF>** key. The display test appears briefly on the display. Subsequently, *Sto clr* appears.



4	Confirm the clearing process with **<RUN/ENTER>**. Pressing any other key prevents the clearing, the data records will remain stored.

Note
The calibration data remain stored and can be called up.

4.5 Transmitting data (only Oxi 340i)

You have the following possibilities of transmitting data:

- One of the following options:
  - With the *AutoStore* function (page 28), measured values are periodically saved internally (save interval Int 1) and output on the interface.
  - With the *Data transmission interval* function (Int 2), measured values are periodically output on the interface (see below).
- With the *Output data storage* function (page 30), calibration data or saved measured values are output on the interface.
- Via the analog recorder output (page 37), measured values are output as voltage values.
- With the KOM pilot communication kit (accessory), data can be transmitted bidirectionally (page 38).



Note
If you connect a recorder (analog output), the output on the digital interface is switched off.

4.5.1 Data transmission interval (Int 2, Oxi 340i)

The interval to the data transmission (Int 2) determines the chronological interval between automatic data transmissions. After the selected interval expires, the current data record is transmitted to the interface.

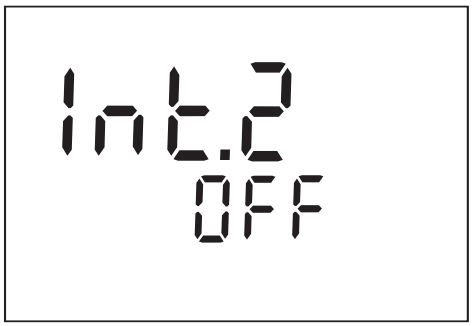


Note
When the *AutoStore* function is active, the data transmission is performed according to the setting of the save interval (Int 1). Set the save interval (Int 1) to OFF to activate the *Data transmission* interval (Int 2).

Setting the Data transmission interval

The default setting for the interval is OFF.
To start the data transmission, set an interval (5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 60 min):

1	Press the **<RUN/ENTER>** key and hold it down.
2	Press the **<RCL>** key. *Int 2* appears on the display.

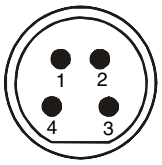


3	Set the required interval between the saving procedures with **<▲>** **<▼>**.
4	Confirm with **<RUN/ENTER>**. The measuring instrument automatically switches to the measuring mode.

4.5.2 Recorder (analog output, Oxi 340i)

You can transmit data to a recorder via the analog output. Connect the analog output to the recorder via the AK323 interface cable.
The data output automatically switches to *Recorder output.*

Socket assignment



RS 232
REC

1 free
2 Plug coding
3 Ground
4 Analog output
(internal resistance < 5 Ohm)

Note
The analog output is activated automatically in the cable by connecting 2 and 3.

The signal range of the analog output depends on the measured variable and the measuring range:

Concentration

Measuring range	Voltage	Resolution
0 ... 19.99 mg/l	0 ... 1999 mV	0.01 mg/l per 1 mV
0 ... 90.0 mg/l	0 ... 900 mV	0.1 mg/l per 1 mV

Saturation

Measuring range	Voltage	Resolution
0 ... 199.9	0 ... 1999 mV	0.1 % per 1 mV
0 ... 600 %	0 ... 600 mV	1 % per 1 mV

D. O. partial pressure

Measuring range	Voltage	Resolution
0 ... 199.9 mbar	0 ... 1999 mV	0.1 mbar per 1 mV
0 ... 1250 mbar	0 ... 1250 mV	1 mbar per 1 mV

4.5.3 PC/external printer (RS 232 interface, Oxi 340i)

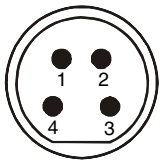
Via the RS 232 interface, you can transmit the data to a PC or an external printer.
Use the AK340/B (PC) or AK325/S (ext. printer) cable to connect the interface to the instruments.
The data output automatically switches to the *RS 232* interface.

Warning
The RS 232 interface is not galvanically isolated.
When connecting an earthed PC/printer, measurements cannot be performed in earthed media as incorrect values would result.

Set up the following transmission data on the PC/printer:

Baud rate	selectable between: 1200, 2400, **4800**, 9600
Handshake	RTS/CTS + Xon/Xoff
Parity	none
Data bits	8
Stop bits	1

Socket assignment



RS 232
REC

1 CTS
2 RxD
3 Ground
4 TxD

4.5.4 Remote control (Oxi 340i)

The measuring instrument can be remotely controlled from a PC. This requires the KOM pilot communication kit. It is available as an accessory.
The instrument is then controlled via commands that simulate keystrokes and request the current display contents.

Note
A more detailed description is provided within the scope of delivery of the communication kit.

4.6 Configuration

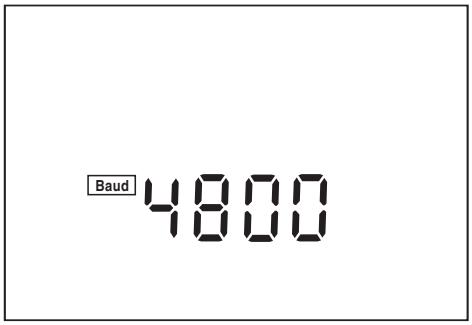
You can adapt the measuring instrument to your individual requirements. To do this, the following parameters can be changed (the status on delivery is marked in bold):

Baud rate	1200, 2400, **4800**, 9600
Air pressure display	Current value in mbar (no input possible)
Calibration interval (Int 3)	1 ... **14** ... 999 d
AutoRange ARng	**On** or off
Date/time	Any

Note
You can leave the configuration menu at any time with **<M>** . The parameters that have already been changed are stored.

1	Switch off the measuring instrument.
2	Press the **<M>** key and hold it down.
3	Press the **<ON/OFF>** key. The display test appears briefly on the display. The measuring instrument then switches automatically to the setting of the baud rate.

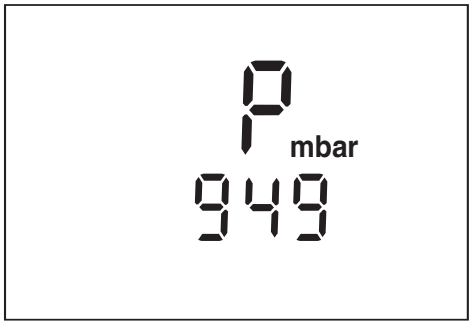
Baud rate (Oxi 340i)



4	Select the required Baud rate with **<▲> <▼>**.

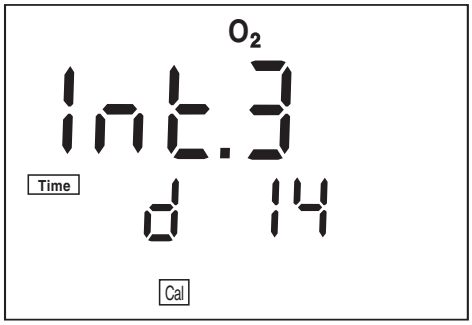
5	Confirm with **<RUN/ENTER>**. The current air pressure in *mbar* appears on the display.

Displaying the air pressure



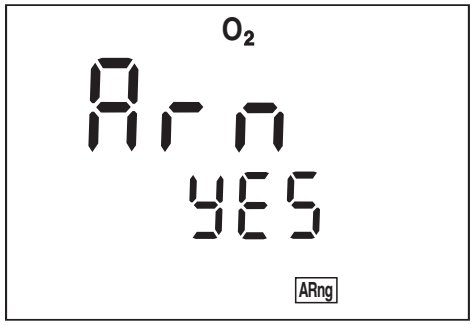
6	Confirm with **<RUN/ENTER>**. *Int 3* appears on the display.

Calibration interval



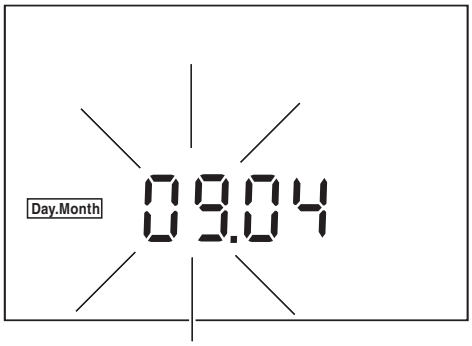
7	Set the required interval in days with **<▲> <▼>**.
8	Confirm with **<RUN/ENTER>**. *ARng* appears on the display.

AutoRange (automatic selection of the measurement range)



9	Using **<▲> <▼>**, switch between *no* and *YES*. *YES*: Switch on AutoRange. *no*: Switch off AutoRange.
10	Confirm with **<RUN/ENTER>**. on the display.

Date and time



11	Set the date of the current day with **<▲> <▼>**.
12	Confirm with **<RUN/ENTER>**. The date (month) flashes in the display.
13	Set the current month with **<▲> <▼>**.
14	Confirm with **<RUN/ENTER>**. The year appears on the display.
15	Set the current year with **<▲> <▼>**.
16	Confirm with **<RUN/ENTER>**. The hours flash on the display.
17	Set the current time with **<▲> <▼>**.
18	Confirm with **<RUN/ENTER>**. The minutes flash on the display.
19	Set the current time with **<▲> <▼>**.
20	Confirm with **<RUN/ENTER>**. The measuring instrument automatically switches to the measuring mode.

4.7 Reset

You can reset (initialize) the measurement parameters and the configuration parameters separately from one another.

Measurement parameters

The following measured parameters *(*O_2 *InI)* are reset to the default condition:

Measuring mode	D. O. concentration
AutoRange automatic measurement range selection	On (*YES*)
Relative slope	1.00
Correction factor of the relative slope	1.000
Salinity equivalent	0.0
Salt content correction	off

Note
The calibration data gets lost when the measuring parameters are reset. Recalibrate after performing a reset.

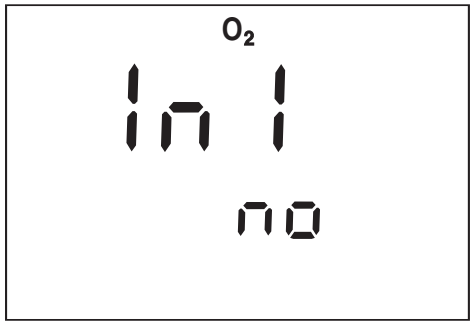
Configuration parameters

The following configuration parameters (*InI*) are reset to the delivery status:

Baud rate	4800
Interval 1 (automatic save)	OFF
Interval 2 (for data transmission)	OFF

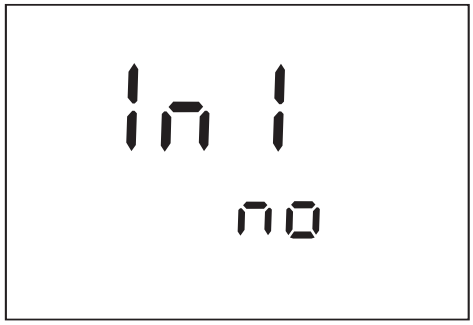
Resetting the measuring parameters

1	Press the **<RUN/ENTER>** key and hold it down.
2	Press the **<CAL>** key.



3	Using **<▲> <▼>**, switch between *no* and *YES*. *YES*: Resetting the measuring parameters *no*: Retaining settings.
4	Confirm with **<RUN/ENTER>**. The measuring instrument switches to the configuration parameters.

Resetting the configuration parameters



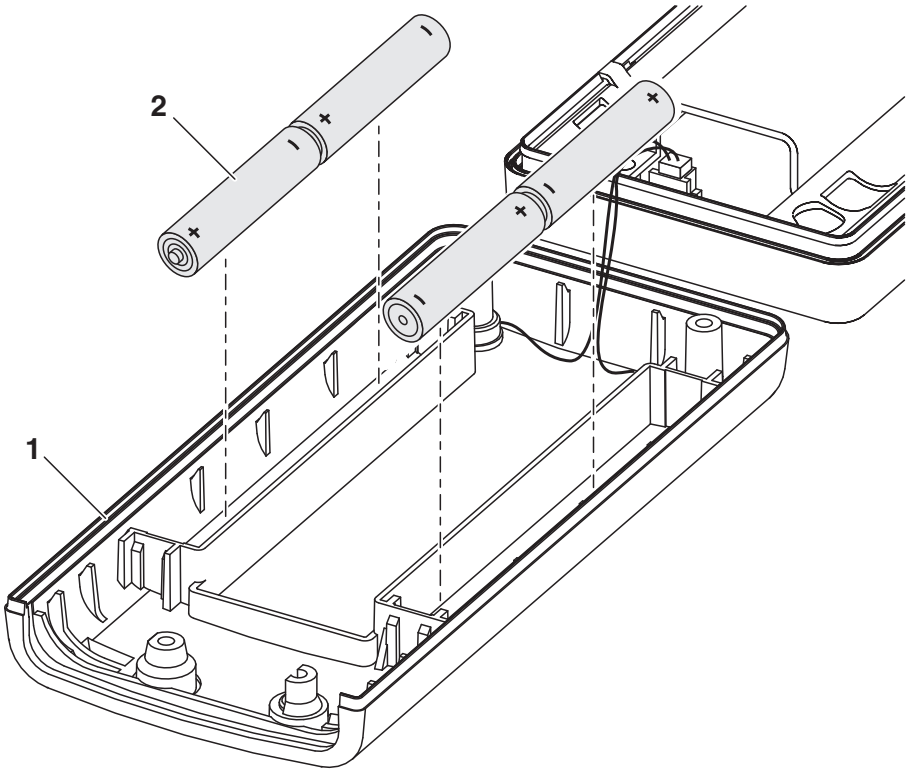
5	Using **<▲> <▼>**, switch between *no* and *YES*. *YES*: Resetting the configuration parameters *no*: Retaining settings.
6	Confirm with **<RUN/ENTER>**. The measuring instrument automatically switches to the measuring mode.

5 Maintenance, cleaning, disposal

5.1 Maintenance

The measuring instrument is almost maintenance-free.
The only maintenance task is replacing the batteries.
LoBat indicates that the batteries should be changed. The batteries are then largely depleted.

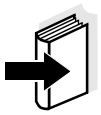
Replacing the batteries



1	Open the housing after the instrument has been switched off: – Undo the four screws on the underside of the instrument – Pull down the lower cover (1).
2	If necessary, take the four depleted batteries (2) out of the battery compartment.
3	Place four new batteries (type Mignon AA) in the battery compartment.
4	Close the lower cover (1).



Warning
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.



Note
For the maintenance of the sensors, follow the corresponding operating manual.

5.2 Cleaning

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



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

5.3 Disposal

Packing

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

Batteries

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



Note
This instrument contains batteries. Batteries that have been removed must only be disposed of at the recycling facility set up for this purpose or via the retail outlet.
It is illegal to dispose of them in household refuse.

Measuring instrument

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

6 What to do if...

LoBat display

Cause	Remedy
– Batteries almost empty	– Replace batteries (see section 5.1 MAINTENANCE)

Instrument does not react to keystroke

Cause	Remedy
– Operating condition undefined or EMC load unallowed	– Processor reset: Press the **<CAL>** and **<ON/OFF>** keys at the same time and release them again. The software version is displayed.

Error message OFL

Cause	Remedy
Display range exceeded	
D. O. probe:	
– Not connected	– Connect the probe
– Cable broken	– Replace probe
– Depleted	– Replace probe
– Short-circuit between gold and lead electrode	– Clean probe and replace it if necessary

Error message E3

Cause	Remedy
Invalid calibration	
D. O. probe:	
– Electrolyte solution depleted	– Regenerate probe
– Membrane contaminated	– Clean membrane
– Electrode system poisoned	– Regenerate probe
– Worn out	– Replace probe
– broken	– Replace probe

Error message E7

Cause	Remedy
Membrane damaged	
– Membrane damaged	– Regenerate probe
– Membrane head not screwed on tight enough	– Screw membrane head tight

AR flashes continuously

Cause	Remedy
No stable measured value	
– Membrane contaminated	– Clean membrane

Measured value too low

Cause	Remedy
– Insufficient flow	– Provide flow to the probe

Measured value too high

Cause	Remedy
– High amount of dissolved substances	– Correct solubility function using the salinity equivalent
– Air bubbles bump on the membrane with high velocity	– Avoid direct flow to the membrane
– The carbon dioxide pressure is too high (> 1 bar)	– Measuring not possible

Display to

Cause	Remedy
– Time-out of the interface	– Check the instrument that is connected

Probe symbol flashes

Cause	Remedy
– Calibration interval expired	– Recalibrate the measuring system

Message StoFull

Cause	Remedy
– All memory locations are full	– Output data storage and clear data storage

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

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

7 Technical data

Dimensions and weight

Length [mm]	172
Width [mm]	80
Height [mm]	37
Weight [kg]	Approx. 0.3

Mechanical structure

Type of protection	IP 66

Electrical safety

Protective class	III

Test certificates

cETLus, CE

Ambient conditions

Storage	- 25 °C ... + 65 °C
Operation	-10 °C ... + 55 °C
Climatic class	2

Measuring ranges/ resolutions with CellOx 325 D. O. probe

	mg/l	**%**	**mbar**
Measuring range I Resolution	0 ... 19.99 0.01	0 ... 199.9 0.1	0 ... 199.9 0.1
Measuring range II Resolution	0 ... 90.0 0.1	0 ... 600 1	0 ... 1250 1

Measuring ranges/ resolutions with DurOx 325 D. O. probe

	mg/l	**%**	**mbar**
Measuring range I Resolution	0 ... 19.9 0.1	0 ... 199 1	0 ... 199 1
Measuring range II Resolution	0 ... 90 1	0 ... 600 1	0 ... 1250 1

Measuring range/resolution of temperature

	°C
Measuring range (Resolution)	0 ... 50.0 (0.1)

Accuracy (± 1 digit)

mg/l Concentration	± 0.5 % of the measured value at an ambient temperature of 5 °C ... 30 °C
% Saturation	± 0.5 % of the measured value when measuring in the range of ± 10 K around the calibration temperature
mbar Partial pressure	± 0.5 % of the measured value at an ambient temperature of 5 °C ... 30 °C
Temperature compensation	< 2 % at 0 ... 40 °C
T [°C]	± 0.1

Correction functions

Salinity correction	0 ... 70.0 SAL
Air pressure correction	Automatic through installation of pressure sensor in the range 500 ... 1100 mbar

Analog output (only Oxi 340i)

Automatic switchover when the recorder is connected by the cable, AK 323.

Concentration	Voltage	Resolution
0 ... 19.99 mg/l	0 ... 1999 mV	0.01 mg/l per 1 mV
0 ... 90.0 mg/l	0 ... 900 mV	0.1 mg/l per 1 mV

Saturation	Voltage	Resolution
0 ... 199.9	0 ... 1999 mV	0.1 % per 1 mV
0 ... 600 %	0 ... 600 mV	1 % per 1 mV

D. O. partial pressure	Voltage	Resolution
0 ... 199.9 mbar	0 ... 1999 mV	0.1 mbar per 1 mV
0 ... 1250 mbar	0 ... 1250 mV	1 mbar per 1 mV

Accuracy	± 0.5 % of display value ± 0.1 (% saturation) or ± 0.5 % of the display value ± 0.01 mg/l

Internal resistance	< 5 Ohm (current limited to max. 0.2 mA output current)

Serial interface (only Oxi 340i)

Automatic switchover when a PC or a printer is connected via the cable, AK 340/B or AK 325/S.

Type	RS 232, data output
Baud rate	Selectable 1200, 2400, 4800, 9600 baud
Data bits	8
Stop bit	2
Parity	None
Handshake	RTS/CTS + Xon/Xoff
Cable length	Max. 15m

Power supply

Batteries	4x1.5V alkali-manganese batteries, Type AA
Operational life	Approx. 3000 operating hours
Mains (only Oxi 340i)	The following specifications apply to all plug-in power supplies: Connection max. Overvoltage category II Plug-in power supply unit (Euro, US , UK, Australian plug) FRIWO FW7555M/09, 15.1432 Friwo Part. No. 1822089 Input: 100 ... 240 V ~ / 50 ... 60 Hz / 400 mA Output: 9 V = / 1,5 A

Guidelines and norms used

EMC	E.C. guideline 89/336/EEC EN 61326-1:1997 EN 61000-3-2 A14:2000 EN 61000-3-3:1995 FCC Class A
Instrument safety	E.C. guideline 73/23/EEC EN 61010-1 A2:1995
Climatic class	VDI/VDE 3540
Type of protection	EN 60529:1991

FCC Class A Equipment Statement

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

8 Lists

This chapter provides additional information and orientation aids.

Abbreviations The list of abbreviations explains the indicators and the 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.

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

Abbreviations

AR	AutoRead (drift control)
ARng	Automatic range switching Measuring instrument measures with highest resolution
°C	Temperature unit, degrees Celsius
Cal	Calibration
D. O.	Dissolved Oxygen
E3	Error message see chapter 6 WHAT TO DO IF...
InI	Initialization Resets individual basic functions to the status they had on delivery
LoBat	Batteries almost empty (Low Battery)
OFL	Display range exceeded (Overflow)
OxiCal	Automatic calibration for D. O. measurements
SAL	Salinity
SELV	Safety Extra Low Voltage
TP	Temperature measurement active (Temperature Probe)

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.

Amperometry Name of a measuring technique. The signal (depending on the measured parameter) of the probe is the electric current. The electrical voltage remains constant.

AutoRange Name of the automatic selection of the measuring range.

AutoRead WTW name for a function to check the stability of the measured value.

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).

D. O. partial pressure Pressure caused by the oxygen in a gas mixture or liquid.

D. O. saturation Short name for the relative D. O. saturation.
Note: The D. O. saturation value of air-saturated water and the D. O. saturation value of oxygen-saturated water are different.

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).

Measuring system The measuring system comprises all the devices used for measuring, e. g. measuring instrument and probe. In addition, there is the cable and possibly an amplifier, terminal strip and armature.

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

OxiCal® WTW name for a procedure to calibrate D. O. measuring systems in water vapor saturated air.

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 measuring instrument.

Salinity The absolute salinity S_A of seawater corresponds to the relationship of the mass of dissolved salts to the mass of the solution (in g/Kg). In practice, this dimension cannot be measured directly. Therefore, the practical salinity is used for oceanographic monitoring. It is determined by measuring the electrical conductivity.

Salt content General designation for the quantity of salt dissolved in water.

Slope The slope of a linear calibration function.

Slope (relative) Designation used by WTW in the D. O. measuring technique. It expresses the relationship of the slope value to the value of a theoretical reference probe of the same type of construction.

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 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.

Index

A
Analog output 37
Authorized use 9
AutoRange 17
AutoRead 18
    Criteria 18

C
Calibrating 19
Calibration
    start 21
Calibration protocol (340i) 19
Connecting a printer 38
Connecting the plug-in power supply 12

D
Data record 26
Data transmission (interval) 36
Default condition 42
Display 8
Drift control 18

E
Electrode evaluation 20
Energy saving feature 13
Error messages 47

I
Initial commissioning 11
Initialization 42
Interval
    data transmission 35
    save 28

K
Keys 7

L
LoBat 47

M
Measuring ranges 17
Measuring ranges with CellOx325 51
Measuring ranges with DurOx 52
Measuring ranges with DurOx325 51
Measuring the D. O. concentration 15
Measuring the D. O. saturation 16

O
Operating safety 10

P
Printing
    calibration protocol 19

R
Remote control 38
Replacing the batteries 45
Reset 42
RS232 interface 38

S
Safety 9
Safety precautions 9
Salt content correction
    entering the salinity 25
    switching on 15
Save interval 28
Scope of delivery 11
Selecting the measuring range 17
Setting the baud rate 39
Setting the date 11, 41
Setting the time 11, 41
Slope 19

T
Temperature sensor 14

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