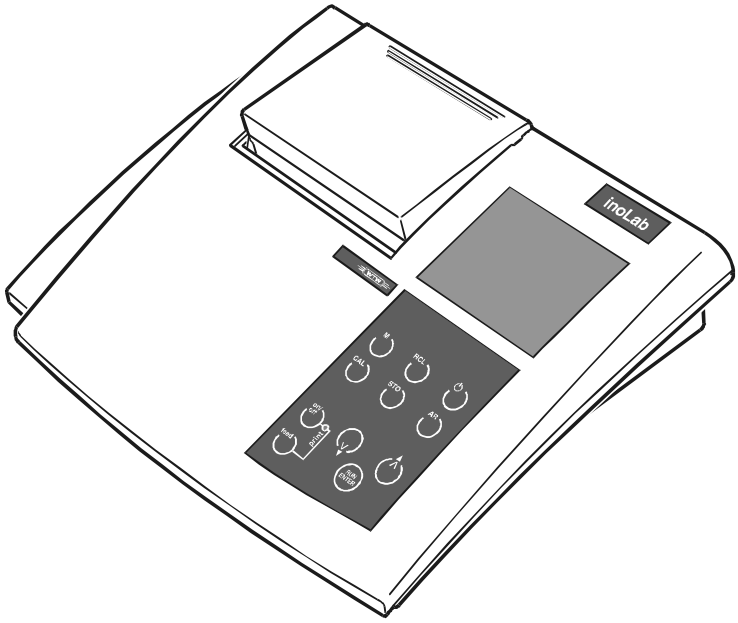
Operating Manual

inoLab
Oxi Level 2



Laboratory dissolved oxygen meter with integrated printer

Accuracy when going to press

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

Warranty declaration

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

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

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

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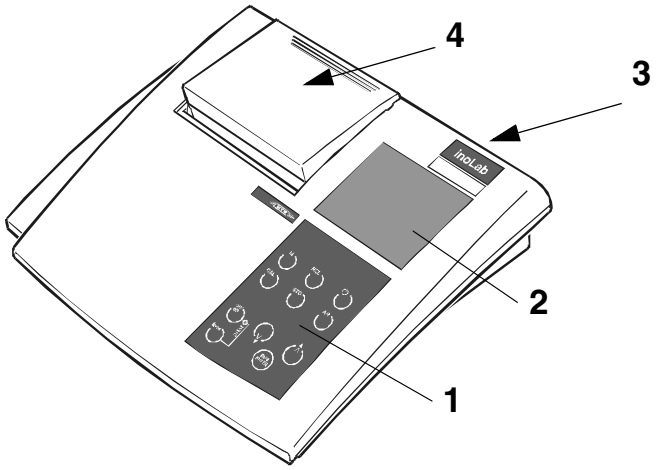
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1 Overview

The compact *inoLab Oxi Level 2* precision dissolved oxygen meter lets you perform D. O. measurements rapidly and reliably. The *inoLab Oxi Level 2* provides the highest degree of operating comfort, reliability and measuring safety for all applications.

The integrated printer enables the measurements to be documented in compliance with GLP. The proven OxiCal® calibration procedure and special *AutoRead* function support your work with the dissolved oxygen meter.



1 Keypad

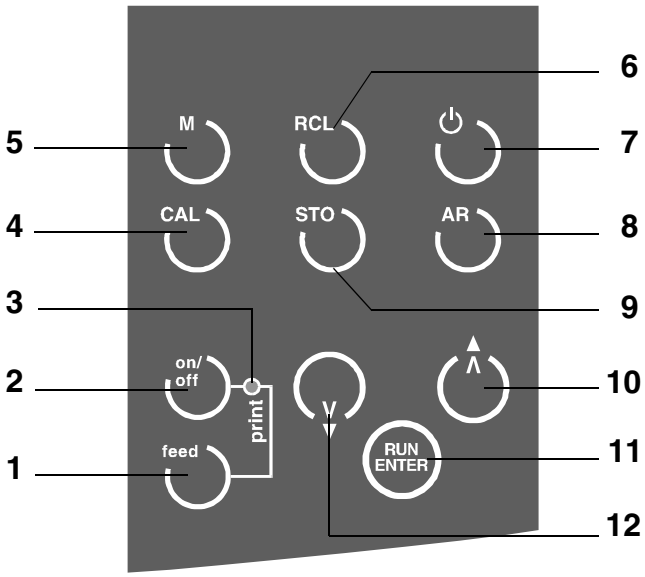
2 Display

3 Sockets

4 Printer

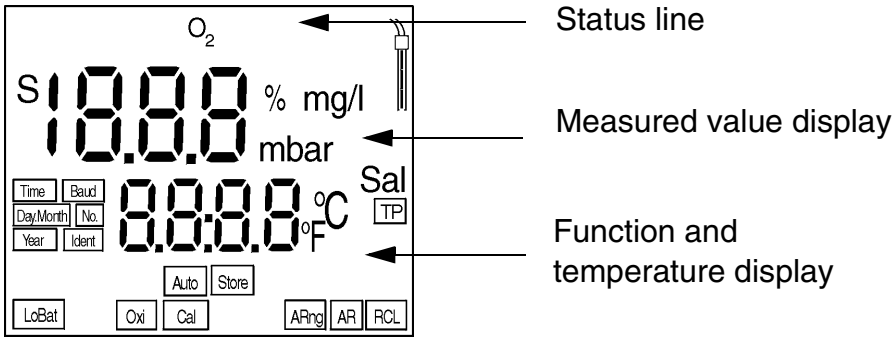
Note
The measuring instrument can also be delivered as part of a set.
Information on this and other accessories is available in the WTW catalog LABORATORY AND FIELD INSTRUMENTATION or via the Internet.

1.1 Keyboard

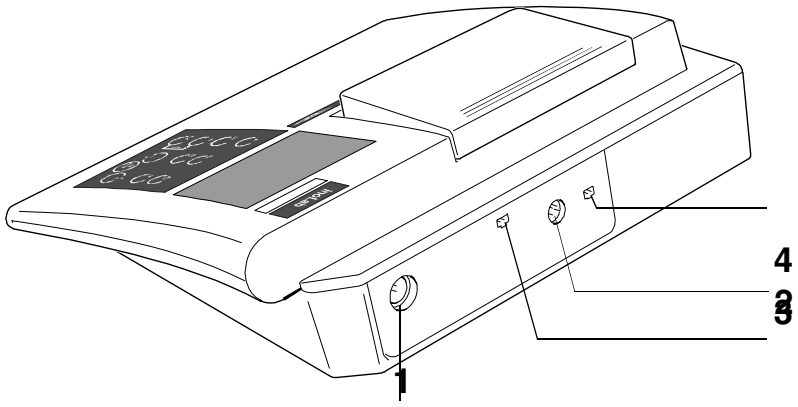


1	Paper feed/line feed (Only with the printer being off - Print LED lights up red)
2	Printer ON/OFF
3	Print LED Red: printer off (offline) or malfunction Green: printer ready for operation (online)
4	Call up calibration procedure
5	Select measuring mode
6	Display or transmit measured values
7	Measuring instrument ON/OFF
8	Activate/deactivate AutoRead function
9	Store measured value
10	Increase values, scroll
11	Confirm inputs, start AutoRead
12	Reduce values, scroll

1.2 Display



1.3 Sockets



Connectors:

1	D. O. probe with integrated temperature probe
2	Stirrer (StirrOx G)
3	RS232 interface/analog output
4	Plug-in power supply



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



Caution
On socket 2, use the WTW probe *StirrOx G* only.

2 Safety

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

Target group

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

Symbols used



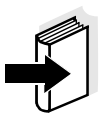
Caution
indicates instructions that have to be followed to prevent damage to your instrument.



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



Note
Indicates notes that draw your attention to special features.



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

2.1 Authorized use

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

2.2 General safety instructions

This instrument is constructed and tested in compliance with the EN 61010-1 safety regulations for electronic measuring instruments. It left the factory in a safe and secure technical condition.

Function and operational safety

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

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

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



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

Safe operation

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

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

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

Obligations of the operator

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

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

3 Commissioning

3.1 Scope of delivery

- Laboratory measuring instrument, inoLab Oxi Level 2
- Plug-in power supply
- Operating manual and short manual in the cover of the printer
- 4 x type AA Mignon 1.5 V batteries

3.2 Initial commissioning

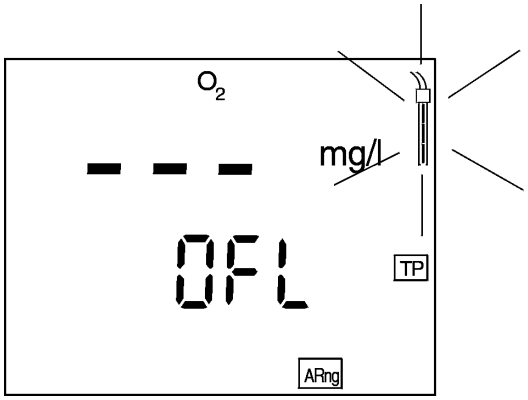
Perform the following activities:

- Set the date and time
- Connect the plug-in power supply (for printer functions)

Setting the date and time

1	Press and hold down the M key.
2	Press the ⏻ key. The *display test* appears briefly on the display. The measuring instrument then switches automatically to the setting of the baud rate.
3	Press the RUN/ENTER key repeatedly until the date flashes on the display.
4	Set today's date by pressing ∧ ∨.
5	Confirm with RUN/ENTER. The date (month) flashes on the display.
6	Set the current month by pressing ∧ ∨.
7	Confirm with RUN/ENTER. The year appears on the display.
8	Set the current year by pressing ∧ ∨.
9	Confirm with RUN/ENTER. The hour field flashes on the display.
10	Set the current time by pressing ∧ ∨.

11	Confirm with RUN ENTER. The minutes field flashes on the display.
12	Set the current time by pressing ↑ ↓.
13	Confirm with RUN ENTER. The measuring instrument then switches to the measuring mode; the probe symbol flashes.



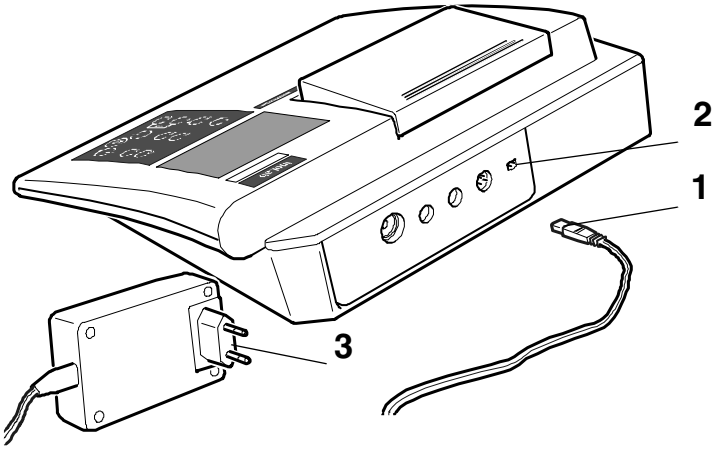
14	Switch off the instrument by pressing ⏻.

Connecting the plug-in power supply

The plug-in power supply supplies the dissolved oxygen meter with low voltage (7.5 V ... 12 V DC).

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

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



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

Note
You can also perform measurements without a plug-in power supply. However, the functions of the integrated printer and a connected stirrer can only be used when the plug-in power supply is connected.

4 Operation

4.1 Switch on the instrument

1	Place the instrument on a flat surface and protect it against intense light and heat.
2	Connect the D. O. probe to the measuring instrument.
3	Press the ⏻ key. The *display test* appears briefly on the display. The instrument then switches automatically to the previously selected measuring mode.
4	Calibrate or check the measuring instrument with the probe. The calibration is described from page 95 on.
5	Immerse the D. O. probe into the test sample.

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

- if the power is supplied by the plug-in power supply
- if the *AutoStore* function is active
- if a PC is connected
- if the communication cable is connected
- if the printer cable is connected (for external printers)

Note
Incorrect calibration of the D. O. probe will result in incorrect measured values. Therefore, regularly perform a calibration.

Temperature probe

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

4.2 Measuring

The following parameters can be measured:

- Oxygen concentration
- Oxygen saturation
- Oxygen partial pressure

The dissolved oxygen meter has the following functions:

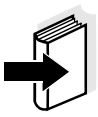
- AutoRange (automatic selection of the measuring range),
- AutoRead (drift control) to check the stability of the measuring signal. This ensures the reproducibility of the measuring signal. How to switch the AutoRead function on/off see page 93.



Caution
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.

4.2.1 Oxygen concentration

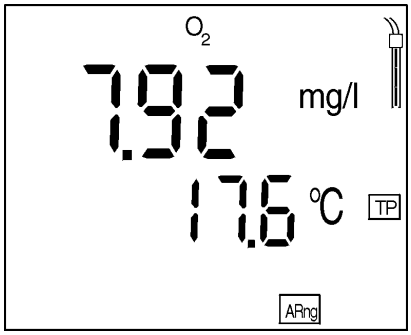
When measuring the concentration in test samples with a salt content of more than 1 g/l, a salinity correction is required.



Note
How to enter the current salt content is described in on page 100. How to switch the salinity correction on/off see below.

When you want to measure the oxygen concentration without salinity correction, proceed as follows:

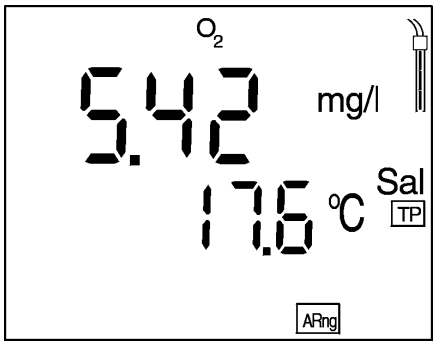
1	Switch on the instrument according to section 4.1.
2	Press the M key until the oxygen concentration in *mg/l* appears on the display.



Switching the salinity correction function on/off

To switch the salinity correction on, proceed as follows:

1	Switch on the instrument according to section 4.1.
2	With ∧ switch on the salinity correction function. *Sal* appears on the display. The salt content set up is taken into account for the measurement.

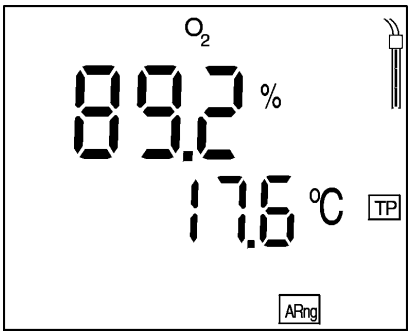


3	With ∨ switch off the salinity correction function. *Sal* disappears from the display.

4.2.2 Oxygen saturation

To measure the oxygen saturation proceed as follows:

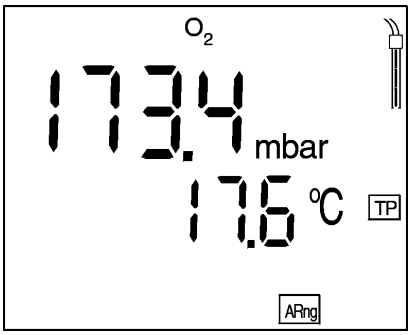
1	Switch on the instrument according to section 4.1.
2	Press the M key until the oxygen saturation in % appears on the display.



4.2.3 Oxygen partial pressure

To measure the oxygen partial pressure proceed as follows:

1	Switch on the instrument according to section 4.1.
2	Press the M key until the oxygen partial pressure in *mbar* appears on the display.



4.2.4 Measuring range selection, AutoRange

For each measuring parameter there are 2 measuring ranges. If the *AutoRange* function is ON, the dissolved oxygen meter changes to measuring range II as soon as measuring range I is exceeded. If AutoRange is OFF, the measuring range II is always active.

Status on delivery

AutoRange is switched on as a basic setting.

Measuring ranges

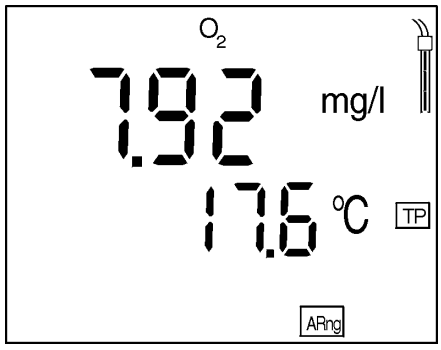
	mg/l	**%**	**mbar**
Measuring range I Resolution	0 ... 19.99 0.01	0 ... 199.9 0.1	0 ... 199.9 0.1
Measuring range II Resolution	0 ... 90.0 0.1	0 ... 600 1	0 ... 1250 1

There are 2 ways to switch the automatic measuring range selection on or off:

- in the configuration menu ()
- with the following steps

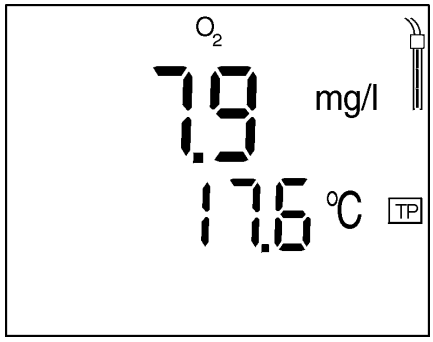
Switching AutoRange on

1	Switch off the measuring instrument using ⏻.
2	Press and hold down the ∧ key and simultaneously switch the instrument on with ⏻ to switch the AutoRead function on. *ARng* appears on the display.



Switching AutoRange off

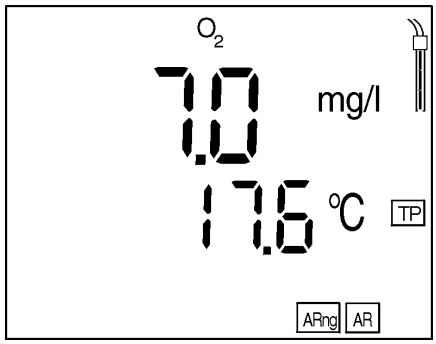
1	Switch off the measuring instrument using ⏻.
2	Press and hold down the ▽ key and simultaneously switch the instrument on with ⏻ to switch the AutoRead function off. *ARng dis*appears from the display, measuring range II is active.



4.2.5 AutoRead AR (drift control)

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

1	Call up the measuring mode using M.
2	Activate the AutoRead function using AR. The current measured value is frozen (hold function).
3	Start AutoRead by pressing RUN ENTER. AR flashes until a stable measured value is reached. This measured value is transmitted to the printer/ interface.



4	If necessary, start the next AutoRead measurement by pressing RUN ENTER.
5	To terminate the AutoRead function: Press AR.

Criteria For identical measuring conditions, the following applies:

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

4.2.6 Printing/transmitting measured values

Measured values (data records) can be:

- printed on the integrated printer or
- transmitted to the interface.

Note
To print, you must switch on the printer using the Print key on/off (Print LED lights up green).
To transmit to the interface, you must connect the interface cable. The integrated printer is then switched off automatically.

You can print/transmit measured values (data records) in 3 ways:

Switch on the data transmission (Int 2) (see page 110)

  – After expiry of the selected interval, the current data record is sent to the printer/interface.

- Switch on AutoStore (Int 1) (see page 103)
  – After expiry of the selected interval, the current data record is sent to the printer/interface and in addition is stored in the data store of the instrument.
  – AutoStore (Int 1) covers the *data transmission* interval (Int 2).
- Press the RUN ENTER key
  This manually triggers a printout of the current measured values at any time - independently of the selected intervals.

Note
If you connect a recorder (analog output), both the output to the integrated printer and the digital output are switched off.

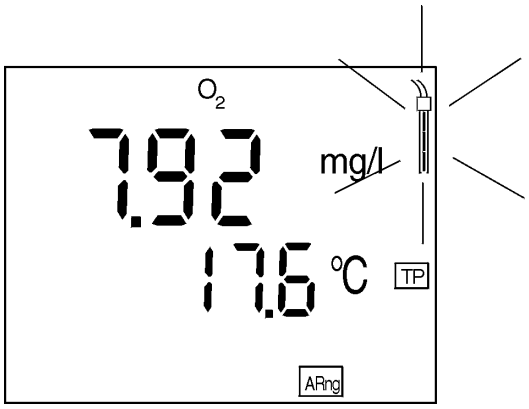
4.3 Calibrating

Why calibrate?

D. O. probes age. This changes the slope of the probes. As a result, an inexact measured value is displayed. Calibration determines the current slope of the probe and stores it in the instrument.

When to calibrate?

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



Calibration procedure

Calibration is made in water vapour saturated air. Use the OxiCal®-SL air calibration vessel (accessory) for calibration.

AutoRead

The *AutoRead* function is automatically activated during calibration. AR flashes on the display. The calibration process is finished when AR stops flashing.

Calibration protocol

The calibration protocol contains the calibration data of the current calibration. You can call up the calibration protocol by outputting the data storage ().

Note

You can automatically print out a calibration protocol after the calibration. To do so, switch on the printer before the calibration (Print LED lights up green). After a valid calibration, the protocol 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:     +++
```

Probe evaluation

After the calibration, the instrument automatically evaluates the current status of the probe using the relative slope. The relative slope does not affect the measuring accuracy. Low values indicate that the electrolytic filling will soon be depleted and the probe will have to be regenerated.

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

4.3.1 Starting the calibration

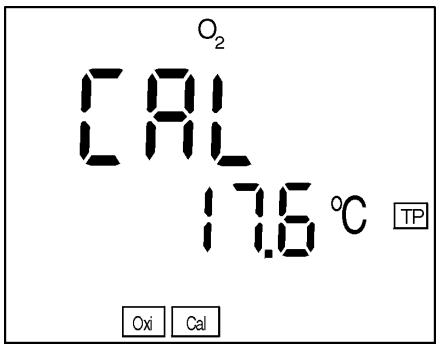
Note
You can have a calibration protocol printed automatically after each calibration. For this, switch on the printer (Print LED lights up green) before calibrating. After a valid calibration the protocol is printed.

To calibrate the instrument proceed as follows:

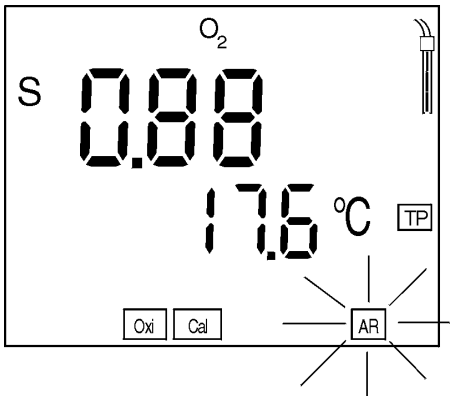
1	Connect the D. O. probe to the instrument.
2	Keep the OxiCal®-SL air calibration vessel ready.

Note
The sponge in the air calibration vessel must be moist (not wet). Observe the instructions in the OxiCal®-SL manual.

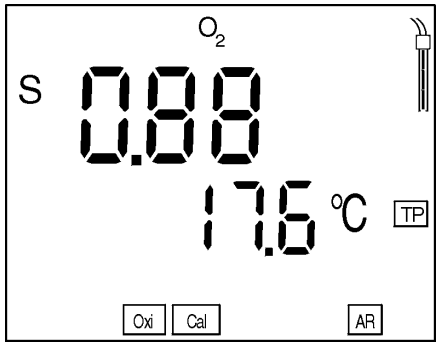
3	Put the D. O. probe into the air calibration vessel.
4	Press the CAL key repeatedly until the calibration mode appears.



5	Press the RUN ENTER key. AutoRead is activated, *AR* flashes.



6	As soon as a stable value is reached, *AR* stops flashing. Thus the calibration is finished and the probe symbol indicates the relative slope determined and the probe evaluation (see page 96).



7	With M change to the measuring mode.

Note
Refer to Kapitel 6 WHAT TO DO IF... for error elimination.

4.3.2 Calibration interval (Int 3)

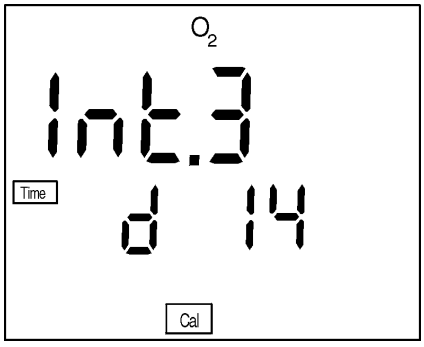
The flashing probe symbol reminds you to calibrate regularly. After the selected calibration interval (Int 3) expires, the probe symbol flashes. Measurements can continue.

Note
To ensure the high measuring precision of the measuring system, perform a calibration after the calibration interval expires.

Setting the calibration interval

The calibration interval (Int 3) is set to 14 days in the factory. The interval can be changed (1 ... 999 days):

1	Switch off the instrument.
2	Press M and hold down the key.
3	Press the ⏻ key. The *display test* appears briefly on the display. The instrument then switches automatically to the configuration level.
4	Press the RUN ENTER key until *Int 3* appears on the display.



5	Press ∧ ∨ to set the required time interval until the next calibration.
6	Confirm with RUN ENTER.
7	Change to the measuring mode by pressing M.

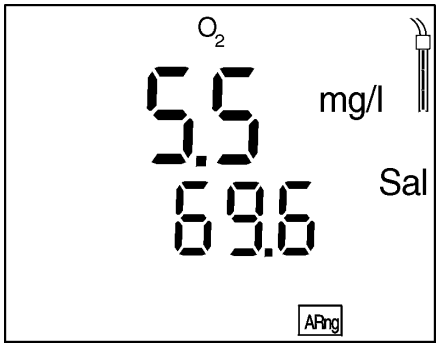
4.3.3 Entering the salt content (salinity)

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 determine the salinity of the test sample first. Before measuring, switch on the salinity correction.

Input

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

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



3	With ∧ ∨ enter the salt content.
4	With M change to the measuring mode.

Note
How to switch on the salinity correction is described on page 89.

4.4 Storing

The instrument has an internal data storage device. Up to 800 data records can be stored in it.
A complete data record consists of:

- Memory location
- Date
- Time
- Measured value
- Temperature
- I.D. number

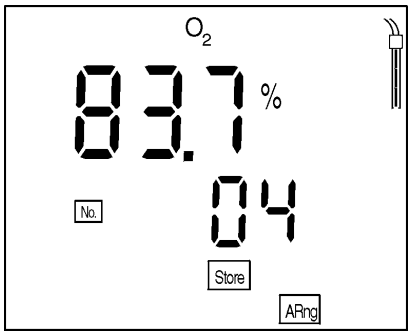
You can transmit measured values (data records) to the data storage in 2 ways:

- Manual storage (see page 101)
- Switching on the AutoStore (Int 1) function (see page 103).

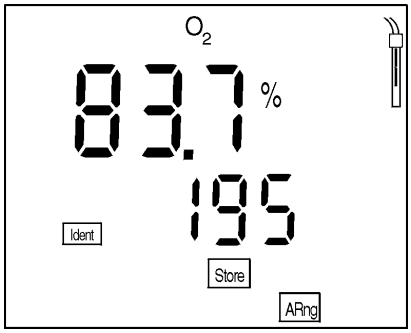
4.4.1 Manual storage

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

1	Press the STO key. The current number of the next free memory location appears on the display.



2	Confirm with RUN ENTER. The display changes to the input of the I.D. number.



3	Enter the required I.D. number (1 ... 999) by pressing ∧ ∨.
4	Confirm with RUN ENTER. The instrument changes to the measuring mode.

StoFull message

This message appears if all 800 memory locations are full.

You have the following options:

Store the current measured value. The oldest measured value (memory location 1) is overwritten by this	Press RUN ENTER
Return to the measuring mode without storing	Press any key
Output the data storage	See page 105
Delete the data storage	See page 109

4.4.2 Switching on AutoStore (Int 1)

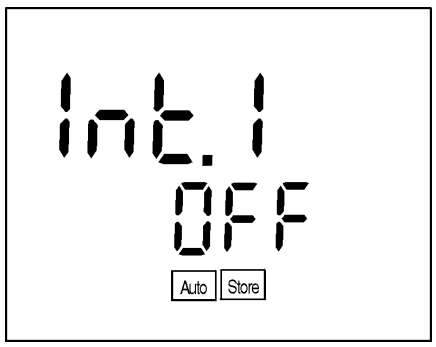
The storage interval (Int 1) determines the time interval between automatic storage processes.
After the time interval expires, the current data record is transmitted to the data storage and to the printer/interface.

The storage interval (Int 1) is set to OFF in the factory. Thus, the *AutoStore* function is switched off.
To switch the function on, set up a time interval (5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 60 min).

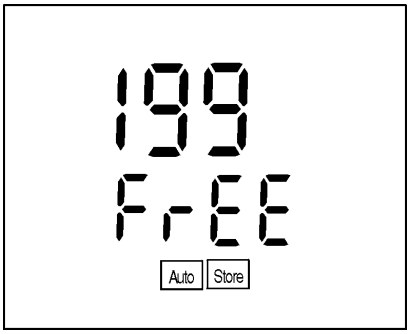
Note
When the *AutoStore* function is is switched on, the setting of the data transmission interval (Int 2) is ineffective (see page 110).

Setting the storage interval

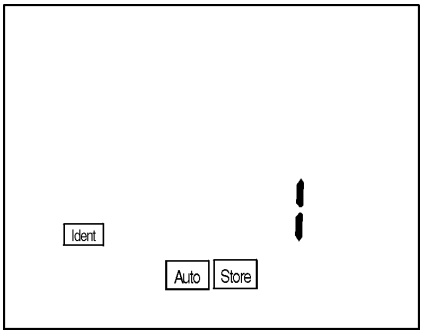
1	Press and hold down the RUN ENTER key.
2	Press the STO key. *Int 1* appears on the display.



3	Press the ∧ ∨ keys to set up the required time interval between storage processes.
4	Confirm with RUN ENTER. The number of free memory locations appears on the display.



5	As soon as all 800 memory locations are full, the AutoStore function is terminated (Int 1 = OFF). If too few storage locations are available for your measurements: – backup the data storage (see page 105) and – clear the data stored (see page 109).
6	Confirm with RUN ENTER. The prompt for the I.D. number appears on the display.



7	Press ∧ ∨ to set the required I.D. number.
8	Confirm with RUN ENTER. The instrument changes to the measuring mode and starts the measuring and storage procedure. *AutoStore* flashes on the display.

Note
The *AutoStore* function is interrupted if you perform other functions, e.g. output data storage.
After completing the other function, the *AutoStore* function continues. However, as a result, gaps can occur in the recording of the measured values.

Switching off the AutoStore

Switch off the *AutoStore* function by:

- Setting the storage interval (Int 1) to OFF or
- Switch the dissolved oxygen meter off and on again.

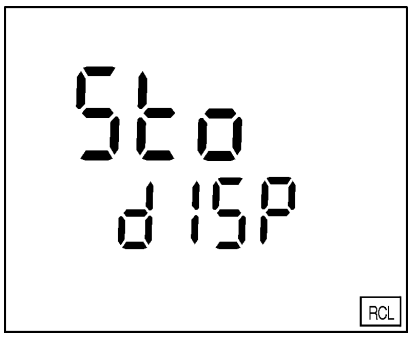
4.4.3 Outputting the data storage

The contents of the data storage can be output to the:

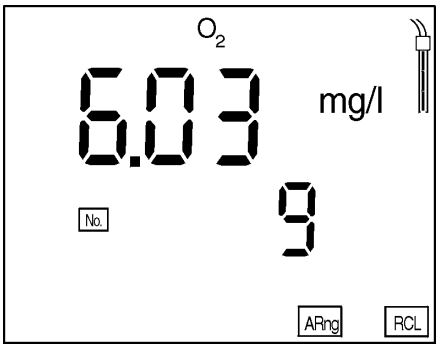
- display
- printer/interface

Outputting to the display

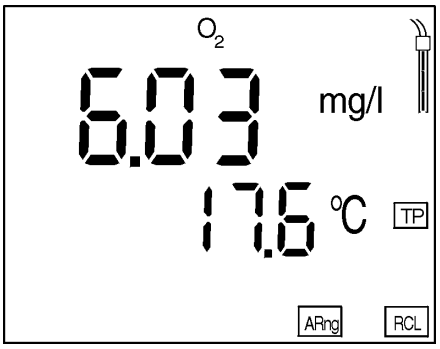
1	Press the RCL key repeatedly until *Sto disp* appears on the display.



2	Press the RUN ENTER key. A measured value appears on the display. The I. D. number of the data record appears under the measured value for approx. 2 s.



3	After approx. 2 s the temperature of the data record appears on the display. Stored data records are displayed together with the RCL display indicator.



You can perform the following activities:

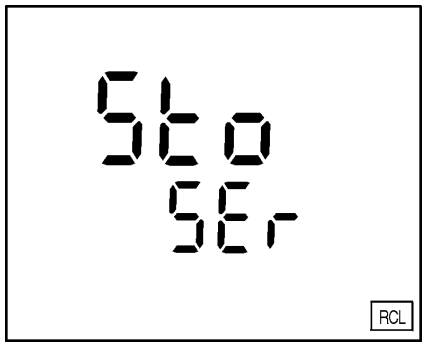
Display further parameters of the data record (I.D. no., date, time, memory location)	Press RUN ENTER
Advance one data record (memory location)	Press ∧
Go back one data record (memory location)	Press ∨

Note
If you want to find a specific parameter (e.g. date), proceed as follows:

1	Select the parameter (e.g. date) by pressing RUN ENTER.
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 to printer/interface

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



2	Press the RUN ENTER key. *Sto CAL* appears on the display. The calibration protocol is transmitted to the printer/interface. Following the calibration protocol, the complete contents of the storage is printed.

Note
You can the cancel the transmission by pressing M or RUN ENTER.

Sample printout

```
CALIBRATION PROTOCOL
 09.03.99     17:07
Device No.: 12345678
CALIBRATION 02
Cal Time: 02.03.99 / 14:19
Cal Interval:   14d
OxiCal        Tauto AR
Relative Slope:   0,88
Probe:     +++

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
```

The printout contains:

- Calibration protocol:
  - Date/time of the printout
  - Instrument number (Device No.)
  - Date/time of the calibration (Cal Time)
  - Calibration interval (Cal Interval)
  - Slope (Relative Slope)
  - Probe evaluation (Probe)
- Contents of the measuring storage:
  - Number of the storage location (No.)
  - Date/time of measurement
  - Measured value/unit
  - Temperature
  - Automatic temperature measurement (TAuto)

– AutoRead function (AR)
– Salinity (SAL)
– I.D. number (Ident)

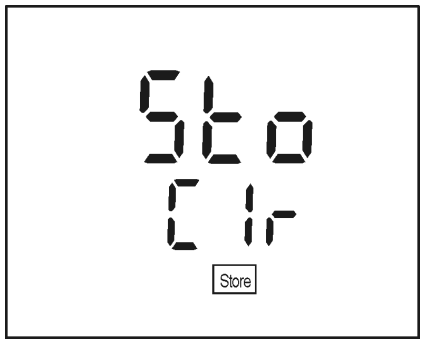
4.4.4 Clearing the storage

This function can erase the stored data records. 800 memory locations will then become available again.

Note
The *Clear store* function only appears if data records have already been stored in the storage. Otherwise, the instrument automatically changes to the measuring mode.

In order to delete all the data records, proceed as follows:

1	Switch off the instrument.
2	Press and hold down the STO key.
3	Press the ⏻ key. The *display test* appears briefly on the display.



4	Confirm the clearing process by pressing RUN ENTER. Pressing any other key stops the clearing process and the data records remain in the storage.

Note
The calibration data remain in the storage and can be called up via the calibration protocol.

4.5 Data transmission

You can use the following options to transmit data:

- One of the following options:
  - The *AutoStore* function (page 103) is used to periodically (*Int 1* storage interval) save measured values internally and output them on the printer/ interface.
  - The *data transmission interval (Int 2)* function is used to periodically output measured values to a printer/ interface (see below).
- The *Output data store* function (page 105) is used to output calibration data and stored measured values to a printer/interface.
- The analog recorder output (page 112) is used to output measured values as voltages.
- Data can be transmitted bidirectionally (page 114) using the KOM pilot communication package (accessory).

4.5.1 Data transmission interval (Int 2)

The interval for the data transmission (Int 2) is determined by the time interval between automatic data transmissions. After the time interval expires, the current data record is transmitted to the interface.

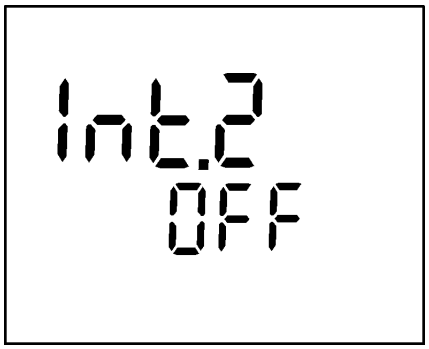


Note
The setting of the interval (Int 2) only has an effect when the storage interval (*AutoStore* function) is switched off.

Setting the *data transmission* interval

The interval is set to OFF in the factory.
To start the data transmission, set up an interval (5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 60 min):

1	Press and hold down the RUN ENTER key.
2	Press the AR key. *Int 2* appears on the display.



3	Press ∧ ∨ to set up the required time interval between storage processes.
4	Confirm with RUN ENTER. The instrument changes automatically to the measuring mode.

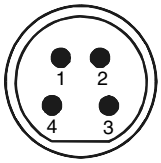
Note
If the *AutoStore* function is active, the data transmission is performed according to the setting of the storage interval (Int 1). Set the storage interval (Int 1) to OFF to activate the *data transmission* interval (Int 2).

Note
You can also set the *data transmission* interval (Int 2) in the *Configuration* menu (see page 115).

4.5.2 Recorder (analog output)

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

Socket assignment



RS 232
REC

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

Note
Activate the analog output by connecting 2 and 3.

The signal range of the analog output depends on the measured parameter 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

Oxygen 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 (RS232 interface)

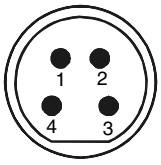
You can transmit data to a PC or an external printer via the RS232 interface.
Connect the interface to the instrument via the AK340/B cable (PC) or AK325/S cable (external printer).
The data output switches automatically to *RS232*.

Note
The RS232 interface is not galvanically isolated.
If it is connected to an earthed PC/printer, measurements cannot be made in earthed media as this would give incorrect results!

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

Baud rate	Selectable between: 1200, 2400, 4800, 9600
Handshake	RTS/CTS + Xon/Xoff
PC only:	
Parity	None
Data bits	8
Stop bits	1

Socket assignment

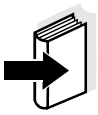


RS 232
REC

1 CTS
2 RxD
3 Ground
4 TxD

4.5.4 Remote control

The instrument can be remotely controlled from a PC. This requires the KOM pilot communication package that 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 package.

4.6 Configuration

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

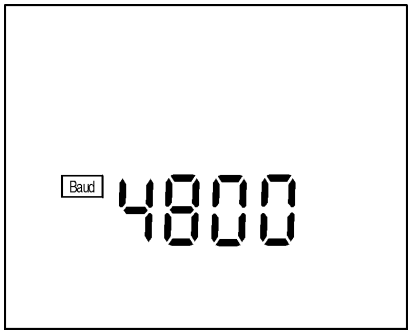
Baud rate	1200, 2400, **4800**, 9600
Data transmission interval (Int 2)	**OFF**, 5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, 30 min, 60 min
Calibration interval (Int 3)	1 ... **14** ... 999 d
Air pressure display	Current value in mbar (no input possible)
AutoRange ARng	**yes**, no
Temperature unit	°**C**, °F
Date/time	As required

Note

You can leave the configuration menu at any time. Parameters that have already been changed are stored. To do this, press the M key.

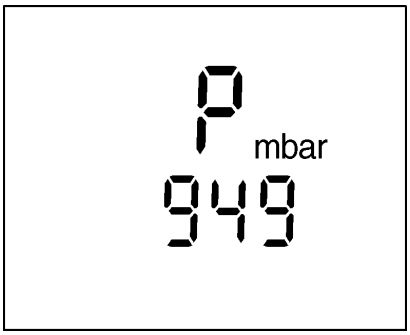
1	Switch off the instrument.
2	Press and hold down the M key.
3	Press the ⏻ key. *The display test* appears briefly on the display. The instrument then switches automatically to the setting of the baud rate.

Baud rate



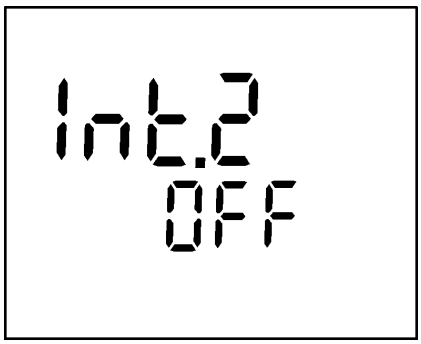
4	Set up the required baud rate by pressing ∧ ∨.
5	Confirm with RUN ENTER. *P mbar* appears on the display.

Air pressure display



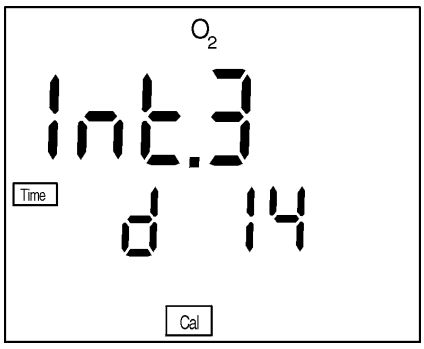
6	Confirm with RUN ENTER. *Int 2* appears on the display.

Data transmission interval



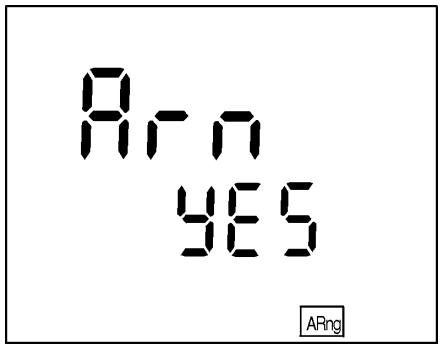
7	Set up the required time interval by pressing ∧ ∨.
8	Confirm with RUN ENTER. *Int 3* appears on the display.

Calibration interval



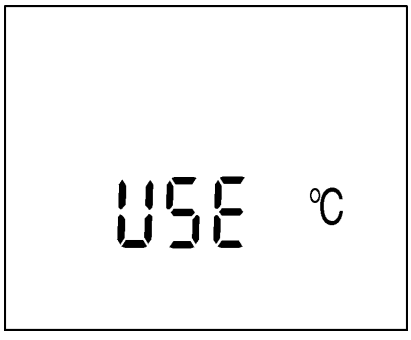
9	Set up the required time interval by pressing ▲ ▼.
10	Confirm with RUN ENTER. *ARng* appears on the display.

ARng (AutoRange)



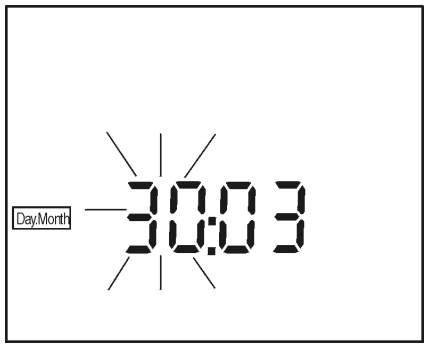
11	Change between *YES* and *no* by pressing ▲ ▼.
12	Confirm with RUN ENTER. *USE °C* appears on the display.

Temperature unit

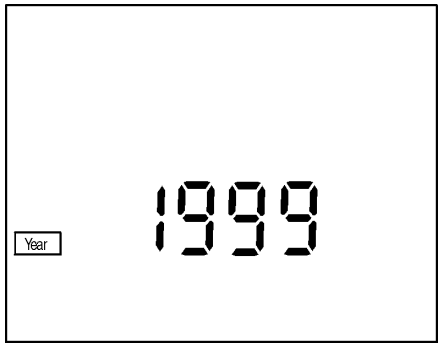


13	Change between °C and °F by pressing ▲ ▼.
14	Confirm with RUN ENTER. The date flashes on the display.

Date and time



15	Set today's date by pressing ▲ ▼.
16	Confirm with RUN ENTER. The date (month) flashes on the display.
17	Set the current month by pressing ▲ ▼.
18	Confirm with RUN ENTER. The year appears on the display.



19	Set the current year by pressing ▲ ▼.
20	Confirm with RUN ENTER. The hours flash on the display.
21	Set the current time by pressing ▲ ▼.
22	Confirm with RUN ENTER. The minutes flash on the display.
23	Set the current time by pressing ▲ ▼.
24	Confirm with RUN ENTER. The instrument changes automatically to the oxygen measuring mode.

4.7 Reset

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

Measuring parameters

The following measuring parameters (Oxi InI) are reset to the values they had on delivery:

Measuring mode	Oxygen concentration
AutoRange	yes
Relative slope	1.00
Salinity (value)	0.0
Salinity (function)	OFF



Note
When the measuring parameters are reset, the calibration data are lost. After the parameters have been reset, calibrate!

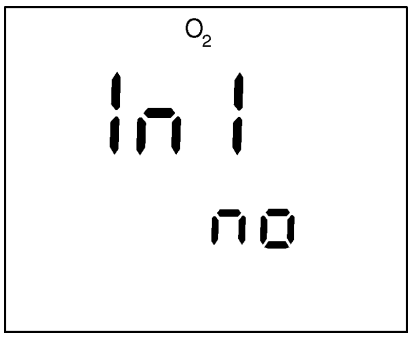
Configuration parameters

The following configuration parameters (InI) are reset to the values they had on delivery:

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

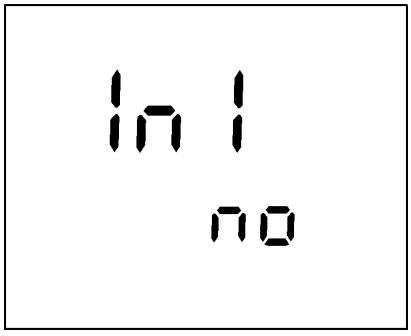
Resetting measuring parameters

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



3	Use ∧ ∨ to toggle between no and yes. yes: reset measuring parameters. no: retain settings.
4	Confirm with RUN ENTER. The instrument changes to the configuration parameters.

Resetting configuration parameters



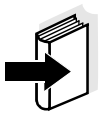
5	Toggle between no and yes by pressing ∧ ∨. yes: reset configuration parameters. no: retain settings.
6	Confirm with RUN ENTER. The instrument changes automatically to the oxygen measuring mode.

5 Maintenance, cleaning, disposal

5.1 Maintenance

The maintenance tasks are restricted to the following activities:

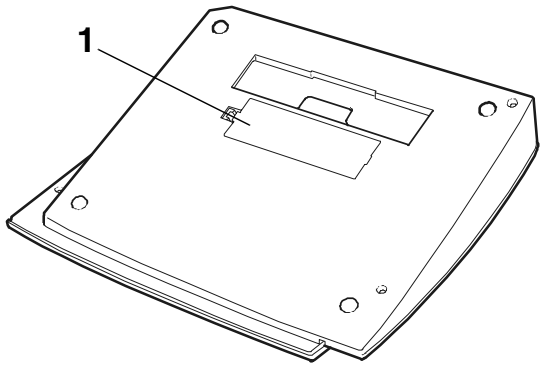
- replacing the batteries and
- replacing the roll of printer paper.



Note
See the relevant operating manual of the probe for instructions on maintenance of the probe.

5.1.1 Changing the batteries

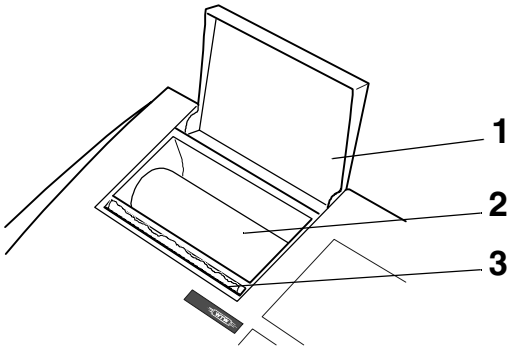
1	Open the battery compartment (1) on the underside of the instrument.
2	Remove the four batteries from the battery compartment.
3	Insert four new batteries (Type Mignon AA) into the battery compartment.
4	Close the battery compartment (1). The date (day) flashes on the display.
5	Set up the date and time according to section 3.2.



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

5.1.2 Replacing the roll of printer paper

1	Switch off the printer (Print LED lights up red).
2	Open the lid of the printer (1).
3	Remove the empty roll of paper (2).
4	Insert the new roll of paper: – Fold the leading edge of the paper inwards and thread it into the printer (3) from underneath. – Press the feed Print key (paper feed).
5	Close the lid of the printer (1).



Note
Only use original WTW rolls of printer paper. Information on this is given in the WTW catalog, LABORATORY AND FIELD INSTRUMENTATION or via the Internet.
You can also use HQ thermal paper that remains legible for at least 10 years.

5.2 Cleaning

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



Caution

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

5.3 Disposal

Packing

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

Batteries

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



Note

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

Measuring instrument

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

6 What to do if...

Error message, OFL	Cause	Remedy
	Display range exceeded	
	D. O. probe:	
	– Not connected	– Connect D. O. probe
	– Depleted	– Replace D. O. probe
	– Cable broken	– Replace D. O. probe
	– Short circuit between gold and lead electrode	– Clean D. O. probe, if necessary exchange it

Error message, E3	Cause	Remedy
	Invalid calibration	
	D. O. probe:	
	– Electrolyte depleted	– Regenerate D. O. probe
	– Membrane contaminated	– Clean membrane
	– Electrode system poisoned	– Regenerate D. O. probe
	– obsolete	– Replace D. O. probe
	– broken	– Replace D. O. probe

Error message, E7	Cause	Remedy
	Damaged membrane	
	– Membrane damaged	– Regenerate D. O. probe
	– Membrane head not tight enough	– Screw membrane head tight

AR flashes for a longer time

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

Probe symbol flashes

Cause	Remedy
– Calibrating interval expired	– Newly calibrate measuring system

LoBat display

Cause	Remedy
– Batteries almost depleted	– Replace batteries

to display

Cause	Remedy
– Timeout of the interface	– Checkout connected instrument

Measured values too low

Cause	Remedy
– Insufficient flow	– Provide flow to the probe

Measured values 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

Instrument does not react to keystroke

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

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

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

Integrated printer does not print

Cause	Remedy
– Printer switched off	– Switch on printer
– No mains power supply connected	– Connect mains power supply
– Interface cable connected	– Unplug cable
– No paper available	– Replace roll of paper
– *AutoStore* function is switched on with a longer interval duration (Int 1)	– Switch off *AutoStore* function

Integrated printer prints automatically

Cause	Remedy
– *AutoStore* function (Int 1) or *Data transmission* (Int 2) is switched on	– Switch off functions

Print key feed does not react

Cause	Remedy
– Printer is switched on	– Switch off printer
– Interface cable connected	– Unplug cable

Printer operating - paper not being printed

Cause	Remedy
– Paper inserted with wrong side upwards	– Turn the roll of paper around and insert it with the other side upwards

StoFull message

Cause	Remedy
– All 800 memory locations are full	– Output data store and clear data store

7 Technical data

Ambient temperature

Storage temperature	- 25 °C ... + 65 °C
Operating temperature	0 °C ... + 55 °C
Allowable relative humidity	Annual mean: < 75 % 30 days/year: 95 % Other days: 85 %

Measuring ranges and resolution

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

T [°C]	0,0 ... 50,0
T [°F]	+ 32,0 ... + 122,0

Accuracy (± 1 digit)

mg/l Concentration	± 0.5 % of the measured value at ambient temperature 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 ambient temperature 5 °C ... 30 °C
Temperature compensation	< 2 % at 0 ... 40 °C
T [°C]	± 0,1
T [°F]	± 0,2

Correction functions

Salinity correction	0 ... 70.0 SAL
Air pressure correction	automatic with integated pressure sensor in the range 500 ... 1100 mbar

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
Protective class	3, EN 61010-1 A2:1995
Climatic class	2, VDI/VDE 3540

Analog output

Automatic switch-over when the AK 323 recorder cable is connected.

	Voltage	Resolution
Saturation		
0 ... 200,0 % 0 ... 600 %	0 ... 2 V 0 ... 600 mV	0.1 % 1 %
Concentration		
0...20,00 mg/l 0...100,0 mg/l	0...2 V 0...1 V	0.01 mg/l 0.1 mg/l

Accuracy	± 0.5 % of displayed value ± 0.1 (% saturation) or ± 0,5 % of displayed value ± 0.01 mg/l
Internal resistance	< 5 ohms (currecnt limitation to max. 0.2 mA output current)

Serial interface

Automatic switch-over when the AK 340/B or AK 325/S cable is connected.

Type	RS 232, data output
Baud rate	can be set to 1200, 2400, 4800, 9600 Baud
Data bits	8
Stop bit	1
Parity	none
Handshake	RTS/CTS+Xon/Xoff
Cable length	max. 15m

Dimensions and weight

Length [mm]	250
Width [mm]	300
Height [mm]	70
Weight [kg]	Approx. 1.3 (without plug-in power supply)

Printer

Print principle	Matrix thermoprint
signs per line	26
printing width	89.6 mm
width of printing paper	112 mm
printing speed	40 signs/sec

Test marks

TÜV GS, UL/CUL, CE

Energy supply	Batteries	4 x 1.5 V AA type alkaline manganese batteries
	Runtime	Approx. 3000 operating hours
	Power supply	Plug-in power supply (Connection max. overvoltage category II) Plug-in power supply (Euro plug): FRIWO FW3288, 11.8134 Friwo Part No. 1816492 Input: 230V ~ / 50 Hz / 23 VA Output: 6 V = / 1,8 A /10,8 VA Plug-in power supply (US plug): FRIWO FW3288, 11.8451 Friwo Part No. 1816493 Input: 120V ~ / 60 Hz / 21,5 VA Output: 6 V = / 1,8 A Plug-in power supply (UK plug): FRIWO FW3288, 11.8453 Friwo Part No. 1770896 Input: 230V ~ / 50 Hz / 23 VA Output: 6 V = / 1,8 A

8 Lists

This chapter provides additional information and orientation aids.

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

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

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

Abbreviations

AR	AutoRead (drift control)
ARng	Automatic range switching Measuring instrument measures with highest resolution
Cal	Calibration
D. O. probe	Dissolved oxygen probe
disp	Display Displays the data storage on the screen
E3	Error message (see WHAT TO DO IF ...)
InI	Initialization Resets individual basic functions to the status they had on delivery
LoBat	Low Battery Batteries are almost empty
OFL	Overflow Display range exceeded
OxiCal	Automatic calibration
RCL	Recall memory dump
S	Relative slope
SELV	Safety Extra Low Voltage
SEr	Serial interface Output of the data storage on the RS 232 or on the internal printer
Sto	Store Memory
TP	Temperature probe Temperature measurement active
°C	Temperature unit, °Celsius
°F	Temperature unit, °Fahrenheit

Glossary

AutoRange Automatic measuring range selection

AutoRead Supervises the probe drift and releases the measured value only after the stability criterion has been reached. Thus, the highest precision and reproducibility is achieved.

Baud rate Transmission speed in bits/s

OxiCal® Automatic calibration

Oxygen saturation Relation of the pO_2 in the test sample to the pO_2 of air at the current air pressure. Example: 100% means that the test sample and the ambient air have the same pO_2 – air and test sample are balanced. According to DIN EN 25814, the oxygen saturation was also referred to as air saturation up to now.

Oxygen partial pressure pO_2 in mbar, i.e. the gas pressure that would prevail if only O_2 was available.

Relative slope Dimensionless factor, referring to the average slope value of newly regenerated probes of the same type.

Salinity Salt content of a solution (without dimension), given in ‰.

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9 Appendix

SENTON

CERTIFICATE

to the Electromagnetic Compatibility
to Test Report No. 52501-90110/-1

EUT:	InoLab Oxi Level 2 with printer
Uniform EMC-design:	InoLab Oxi Level 2, InoLab Oxi Level 2 with printer
Applicant:	WTW GmbH
Regulations:	EN 50081-1:1992 EN 50082-1:1992 FCC part 15 subpart B

Test result:

The tested sample is in compliance with the RFI requirements and the immunity requirements according to above referenced regulations.

The following severity levels have been achieved:

RFI-Emissions:	Requirements according to EN 50081-1:1992 FCC part 15 subpart B limit class A
Immunity:	Electrostatic Discharge according to IEC 801-2:1984 Air discharge: 8 kV
	Radiated Electromagnetic Fields according to IEC 801-3:1984 27 - 500 MHz: 3 V/m
	Electrical Fast Transients (Burst) according to IEC 801-4:1988 Power line: 1 kV; data line: 0.5 kV

March 29, 1999

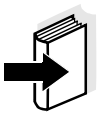
Roidl Johann
Senton GmbH

Date

Deutscher Akkreditierungs Rat
DAR

DAR-Registration No. TTI-P-G 062/94-30
DAR-Registration No. TTI-P-G 109/95-20

SENTON GmbH - EMV-Prüfzentrum - Äußere Frühlingsstraße 45 - D-94315 Straubing - Tel. 09421/55 22-0



Note
If you need further informationen or application notes you can ask for:

- Application reports
- Primers
- Safety data sheets.

You can find information on available literature in the WTW catalog, LABORATORY AND FIELD INSTRUMENTATION or via the Internet.