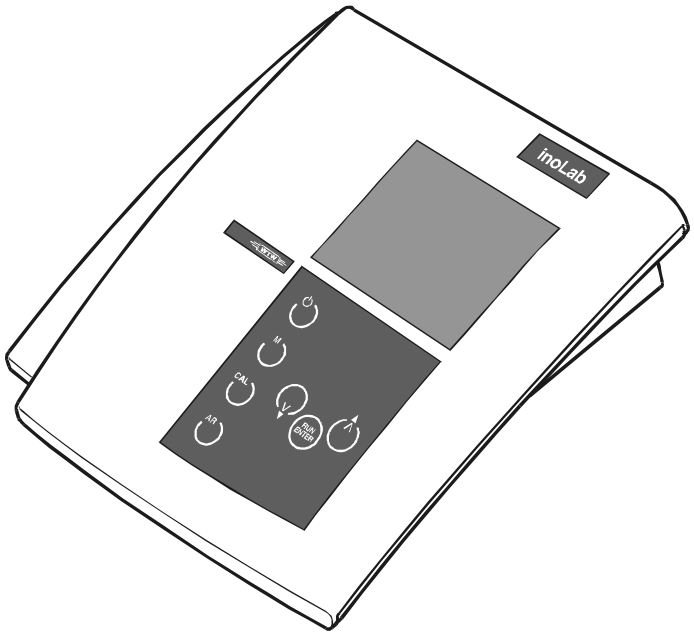
Operating Manual

inoLab
pH/Oxi Level 1



Measuring Instrument
for pH and Dissolved Oxygen

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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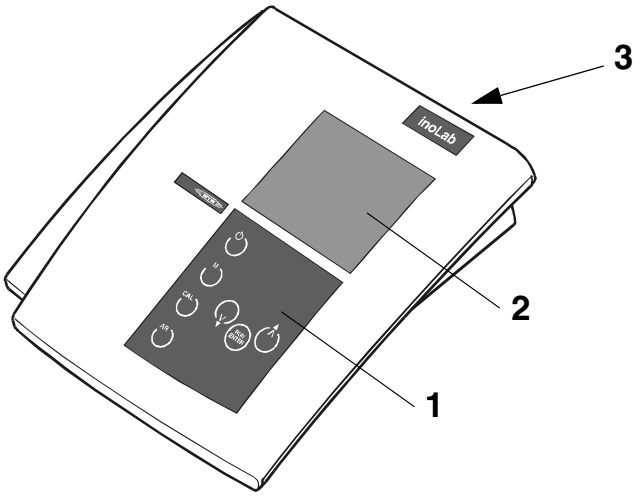
1 Overview

The compact *inoLab pH/Oxi Level 1* precision measuring instrument lets you perform pH, Redox, and D. O. measurements rapidly and reliably. The *inoLab pH/Oxi Level 1* provides the highest degree of operating comfort, reliability and measuring safety for all applications.

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



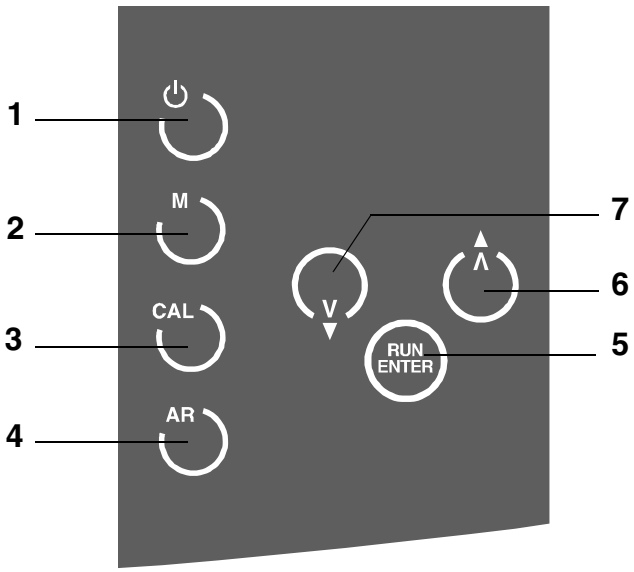
1 Keypad

2 Display

3 Sockets

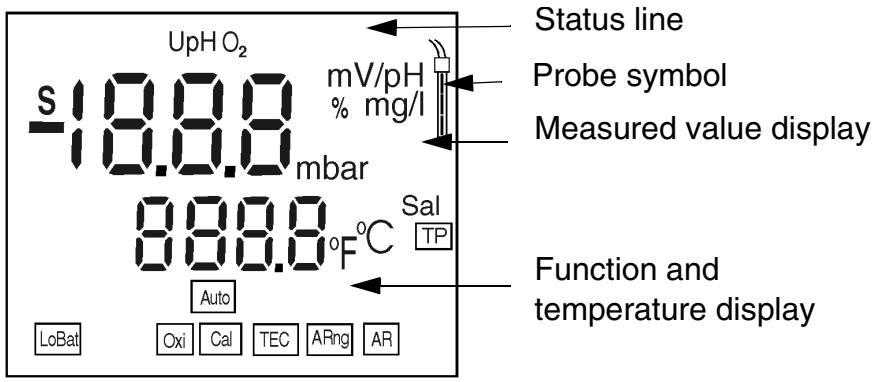
Note
The measuring instrument can also be delivered as part of a set.
Information on this and other accessories is available in the WTW catalog LABORATORY AND FIELD INSTRUMENTATION or via the Internet.

1.1 Keypad

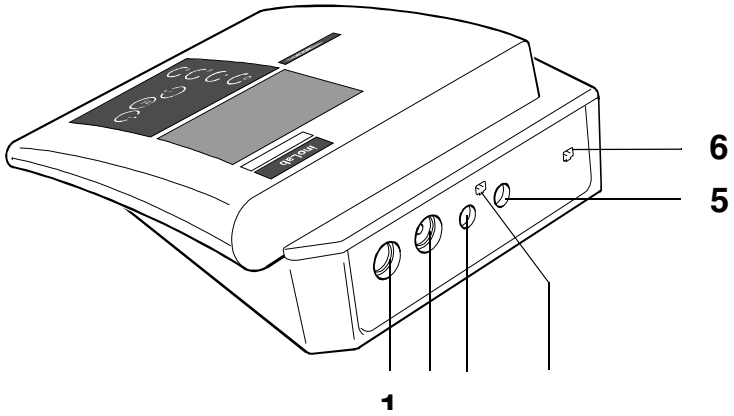


1	Measuring instrument ON/OFF
2	Select measuring mode
3	Call up calibration procedure
4	Activate/deactivate AutoRead
5	Confirm inputs, start AutoRead
6	Select measuring mode, increase values, scroll
7	Select measuring mode, reduce values, scroll

1.2 Display



1.3 Sockets



Connectors:

1	Dissolved oxygen probe
2	pH/Redox electrode
3	Temperature probe
4	Stirrer (StirrOx G)
5	Reference electrode
6	Mains power supply (option)

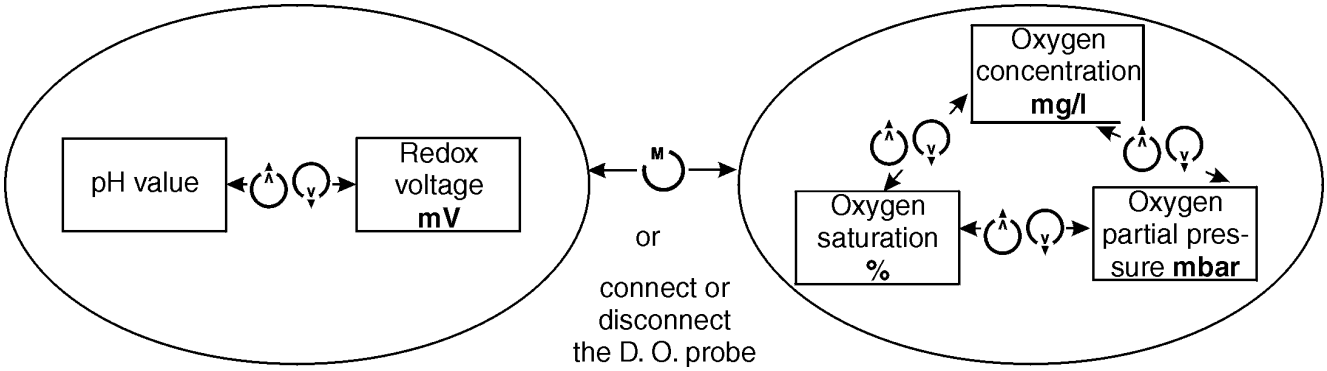
Caution

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

Caution
On socket 4, use the WTW probe *StirrOx G* only.

1.4 Operating structure

The following overview diagram shows which keys you have to press to select between the different measuring modes:



Note
The oxygen concentration, oxygen saturation, and oxygen partial pressure measuring modes only appear if a D. O. probe with temperature probe is connected to the instrument.

Note
When a D. O. probe with temperature probe is connected, the measuring instrument recognizes the probe and automatically switches to the previously selected oxygen measuring mode. As soon as the probe is disconnected, the instrument switches to the pH or Redox measuring mode.

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



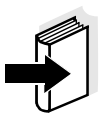
Caution
indicates instructions that have to be followed to prevent damage to your instrument.



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 electrodes, etc.

2.1 Authorized use

This instrument is authorized exclusively for measuring the pH, Redox, and dissolved oxygen 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 the 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

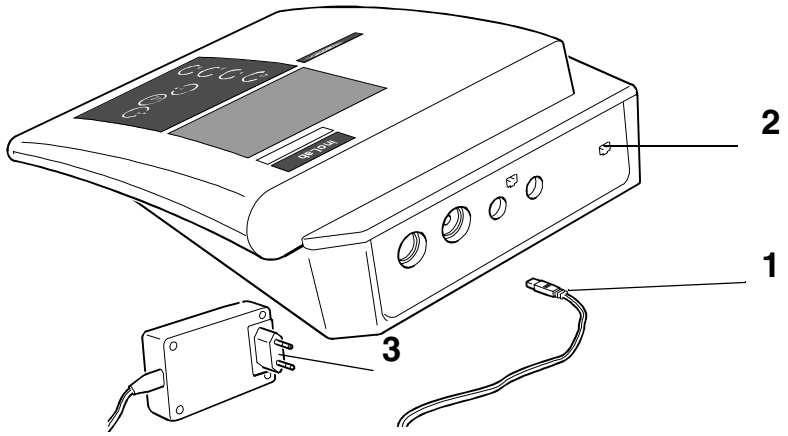
Note
You can adapt individual parameters to your requirements. To do so, change the default settings according to section 4.6 CONFIGURATION.

Connecting the plug-in power supply (optional)

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

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

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



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

Note
If a stirrer is operated via the measuring instrument, it is essential to use the plug-in power supply.

Scope of delivery

- Laboratory measuring instrument, inoLab pH/Oxi Level 1
- Operating manual and short manual
- 4 x type AA Mignon 1.5 V batteries

4 Operation

4.1 Switch on the instrument

1	Place the instrument on a flat surface and protect it against intense light and heat.
2	Press the ⏻ key. The *display test* appears briefly on the display. The instrument then switches automatically to the previously selected measuring mode.

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

4.2 Measuring the pH value/Redox voltage

Preparatory activities

Perform the following preparatory activities when you want to measure:

1	Press the M key repeatedly until the pH/Redox measurement appears on the display.
2	Connect the electrode to the instrument.
3	Adjust the temperature of the buffer or test solutions or measure the current temperature if the measurement is made without a temperature probe.
4	Calibrate or check the instrument with the electrode.
5	Select the measuring mode by pressing M.

Note

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

Temperature probe

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

Note

If you use a pH electrode without a temperature probe, the instrument is able to use the temperature probe of a D. O. probe that is also connected to the instrument and is immersed in the test sample. You have to set up this as described in section 4.6 CONFIGURATION. The TP display indicator flashes when the temperature probe of the D. O. probe is used.

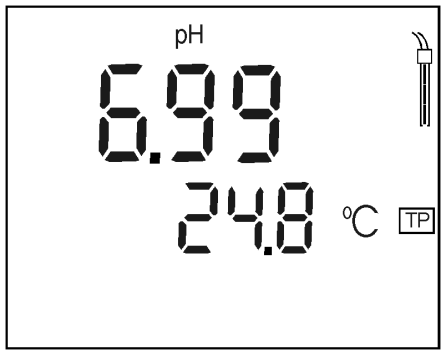
The temperature measurement is absolutely essential for a reproducible pH measurement. If the measurement is made without a temperature probe, proceed as follows:

1	Determine the current temperature using a thermometer.
2	Press and hold down the RUN ENTER key and set up the temperature using ∧ ∨.

Note
When calibrating without a temperature probe, set up the current temperature of the respective buffer solution manually using the ∧ ∨ keys while pressing and holding down the RUN ENTER key.

4.2.1 Measuring the pH value

1	Perform the preparatory activities according to section 4.2.
2	Immerse the pH electrode into the test sample.
3	Press the ∧ or ∨ key until *pH* appears in the status display. The pH value appears on the display.



4.2.2 AutoRead AR (drift control)

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

For identical measurement conditions, the following criterion applies:

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

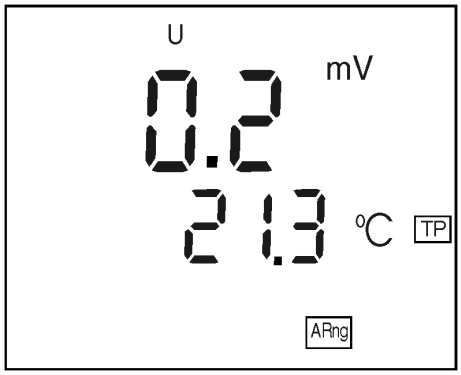
1	Call up the pH measuring mode by pressing ∧ ∨.
2	Immerse the pH electrode into the test sample.
3	Activate the AutoRead function by pressing AR. The current measured value is frozen (Hold function).
4	Start the AutoRead function by pressing RUN ENTER. AR flashes on the display until a stable measured value is reached.
5	If necessary, start the next AutoRead measurement by pressing RUN ENTER.
6	To terminate the AutoRead function: Press AR.

Note
The current AutoRead measurement (with acceptance of the current value) can be terminated at any time by pressing RUN ENTER. It is only possible to change to another measuring mode after AutoRead has been terminated.

4.2.3 Measuring the Redox voltage

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

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



Note
The AutoRange function is always active and automatically switches to the measuring range with the highest resolution.

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

4.3 Calibrating for pH measurements

Why calibrate?

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



Note
Always calibrate after connecting another pH electrode.

You can choose between 3 calibration procedures:

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

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

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

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

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

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

Preparatory activities

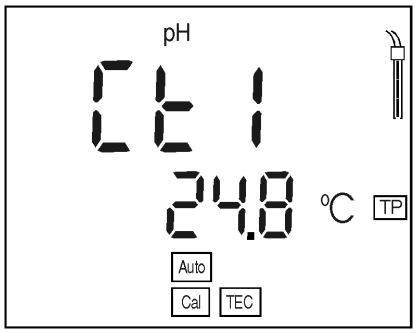
1	Switch on the instrument by pressing ⏻.
2	Press the M key repeatedly until the pH/Redox measurement appears on the display.
3	Connect the pH electrode to the instrument.
4	Keep the buffer solutions ready.
5	Adjust the temperature of the solutions and measure the current temperature if the measurement is performed without a temperature probe.

4.3.1 AutoCal TEC

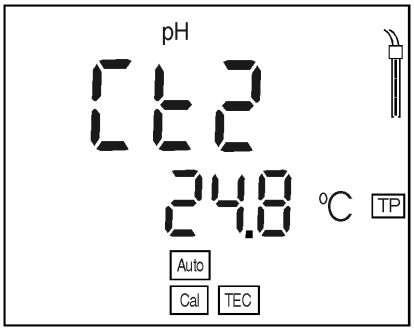
Use any two of the WTW technical buffer solutions for this procedure (pH 2.00, 4.01, 7.00, or 10.00).

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

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



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



5	Thoroughly rinse the electrode with distilled water.

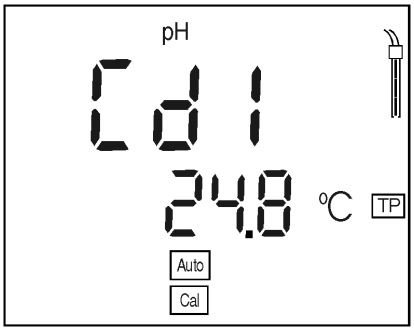
6	If necessary, set the temperature of the second buffer solution by pressing ∧ ∨.
7	Submerse the electrode in the second buffer solution.
8	Press the RUN ENTER key. AR flashes on the display. The electrode voltage (mV) appears on the display. As soon as a stable value is recognized, AR disappears. The probe symbol shows the electrode evaluation after the two-point calibration. The value of the slope (mV/pH) appears on the display.
9	Press the RUN ENTER key. The value of the asymmetry (mV) appears on the display.
10	To return to the measuring mode: Press the M key.

4.3.2 AutoCal DIN

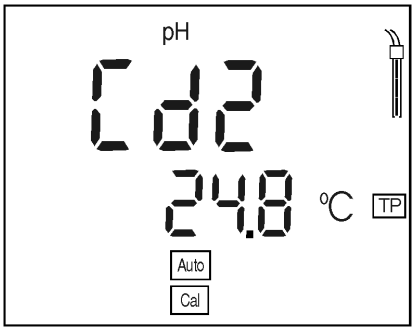
Use two different DIN buffer solutions (type A, C, D or F with the pH values 1.679, 4.006, 6.865, 9.180) for this procedure.

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

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



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



5	Thoroughly rinse the electrode with distilled water.

6	If necessary, set the temperature of the second buffer solution by pressing ∧ ∨.
7	Submerse the electrode in the second buffer solution.
8	Press the RUN ENTER key. AR flashes on the display. The electrode voltage (mV) appears on the display. As soon as a stable value is recognized, AR disappears. The sensor symbol shows the electrode evaluation after the two-point calibration. The value of the slope (mV/pH) appears on the display.
9	Press the RUN ENTER key. The value of the asymmetry (mV) appears on the display.
10	To return to the measuring mode: Press the M key.

4.3.3 ConCal

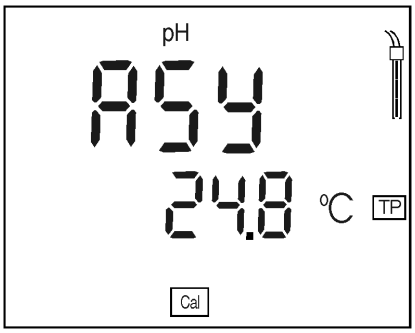
Two-point calibration

Use two buffer solutions for this procedure:

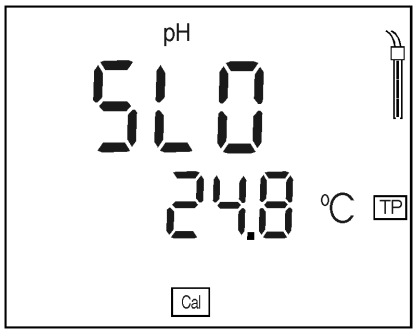
- pH 7.0 ± 0.5
- any other buffer solution

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

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



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



8	Thoroughly rinse the electrode with distilled water.
9	If necessary, set the temperature of the second buffer solution by pressing ↑ ↓.
10	Submerse the electrode in the second buffer solution.
11	Press the RUN ENTER key. The second measured pH value appears on the display.
12	Set the nominal pH value of the second buffer solution (at the current temperature).
13	Press the RUN ENTER key. The value of the slope (mV/pH) appears on the display. The sensor symbol shows the evaluation of the electrode after the two-point calibration.
14	Press the RUN ENTER key. The value of the asymmetry (mV) appears on the display again.
15	To return to the measuring mode: Press the M key.

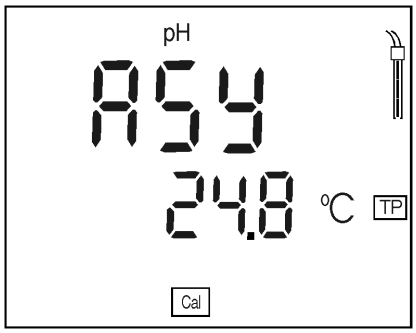
Single-point calibration

Use a buffer solution in the range pH = 7.0 ± 0.5 for this procedure.

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

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

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



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

4.4 Measuring the dissolved oxygen

The following parameters can be measured:

- Oxygen concentration
- Oxygen saturation
- Oxygen partial pressure

The measuring instrument 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 96.

Preparatory activities

Perform the following preparatory activities when you want to measure:

1	Connect the D. O. probe to the measuring instrument. The instrument recognizes the probe and automatically switches to the previously selected oxygen measuring mode. If the D. O. probe is already connected, press the M key repeatedly until the oxygen measuring mode appears.
2	Calibrate or check the measuring instrument with the probe. The calibration is described in section 4.5 from page 98 on.

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.

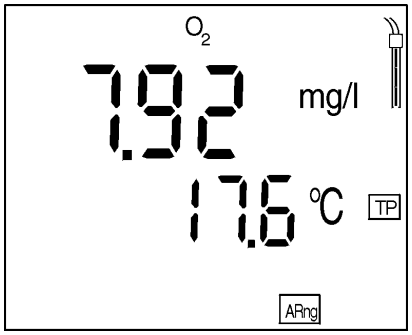
4.4.1 Oxygen concentration

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 section 4.5.2 on page 102. How to switch the salinity correction on/off see below.

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

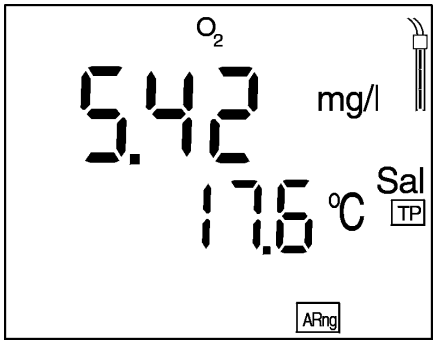
1	Perform the preparatory activities according to section 4.4.
2	Immerse the D. O. probe into the test sample.
3	Press the ↑ ↓ key until the oxygen concentration in *mg/l* appears on the display.



Switching the salinity correction function on/off

To switch the salinity correction on, proceed as follows:

1	Press and hold down the RUN ENTER key and with ↑ switch on the salinity correction function. *Sal* appears on the display. The salt content set up is taken into account for the measurement.

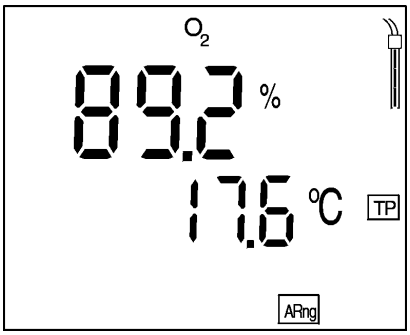


2	Press and hold down the RUN ENTER key and with ▽ switch off the salinity correction function. *Sal* disappears from the display.

4.4.2 Oxygen saturation

To measure the oxygen saturation proceed as follows:

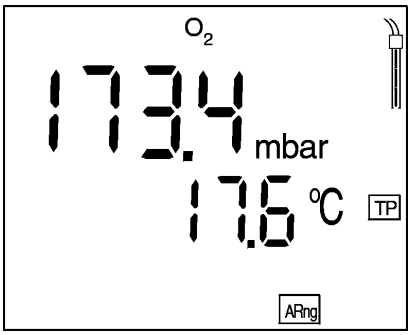
1	Perform the preparatory activities according to section 4.4.
2	Immerse the D. O. probe into the test sample.
3	Press the △ ▽ key until the oxygen saturation in % appears on the display.



4.4.3 Oxygen partial pressure

To measure the oxygen partial pressure proceed as follows:

1	Perform the preparatory activities according to section 4.4.
2	Immerse the D. O. probe into the test sample.
3	Press the ∧ ∨ key until the oxygen partial pressure in *mbar* appears on the display.

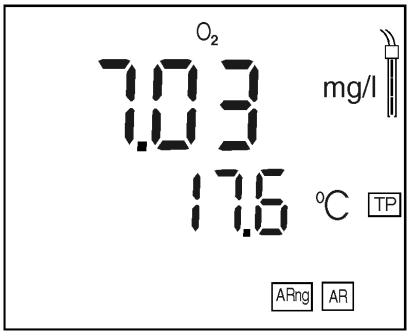


Note
The AutoRange function is always active and automatically switches to the measuring range with the highest resolution.

4.4.4 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 and/or ∧ ∨.
2	Immerse the D. O. probe into the test sample.
3	Activate the AutoRead function using AR. The current measured value is frozen (hold function).
4	Start AutoRead by pressing RUN ENTER. *AR* flashes until a stable measured value is reached.



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

Note
The current AutoRead measurement (with acceptance of the current value) can be terminated at any time by pressing RUN ENTER. It is only possible to change to another measuring mode after AutoRead has been terminated.

Criteria

For identical measuring conditions, the following applies:

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

4.5 Calibrating for D. O. measurements

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?

- At regular intervals (every 2 weeks)
- After connecting another D. O. probe

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.

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

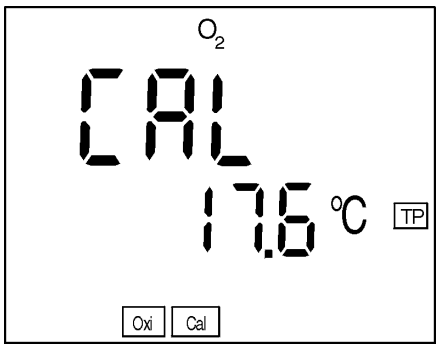
4.5.1 Starting the calibration

To calibrate the instrument proceed as follows:

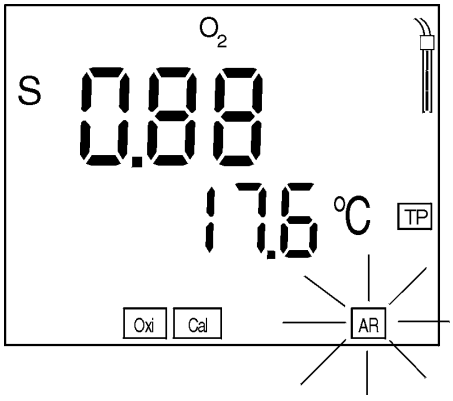
1	Connect the D. O. probe to the instrument.
2	Keep the OxiCal®-SL air calibration vessel ready.

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

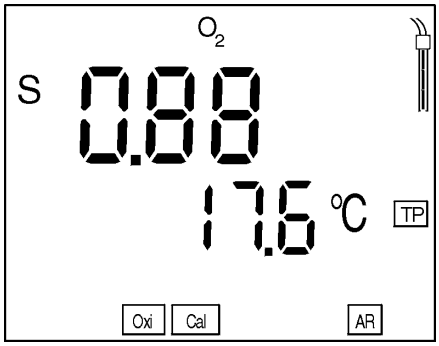
3	Put the D. O. probe into the air calibration vessel.
4	Press the CAL key repeatedly until the calibration mode appears.



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 99).



7	With M change to the measuring mode.

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

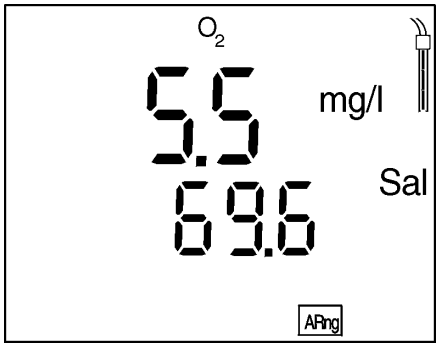
4.5.2 Entering the salt content (salinity)

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 and input 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 94.

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):

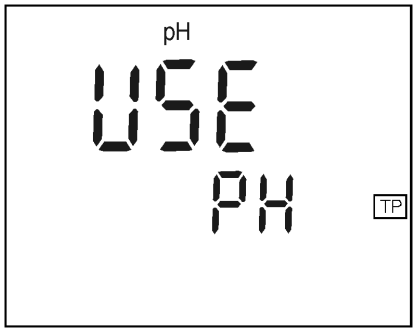
Temperature probe that is used for the pH measurement	**pH temperature probe**, O_2 temperature probe
Air pressure display	Current value in mbar (only if a D. O. probe is connected - no input possible)
Temperature unit	°**C**, °F

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.

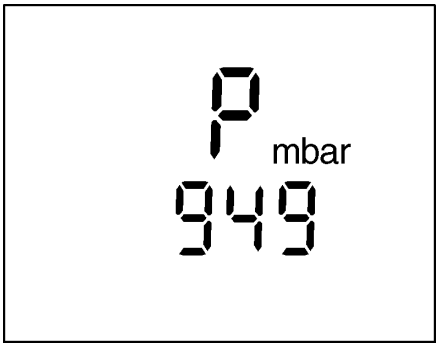
1	Switch off the instrument.
2	Press and hold down the M key.
3	Press the ⏻ key. The *display test* appears briefly on the display. The instrument then switches automatically to the setting of the temperature probe for the pH measurement.

Temperature probe



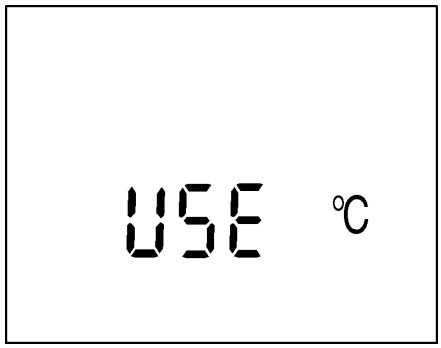
4	Set up pH TP or O2 TP by pressing ∧ ∨.
5	Confirm with RUN ENTER. *P* appears on the display and, if a D. O. probe is connected, the current air pressure in *mbar*.

Air pressure



6	Confirm with RUN ENTER. *USE* appears on the display.

Temperature unit



7	With ∧ ∨ select between *°C* and *°F* .
8	Confirm with RUN ENTER. The instrument automatically changes to the previously selected measuring mode.

4.7 Reset

Basic settings

You can reset (initialize) the settings for the pH and oxygen measurement separately.

pH measurement

The following functions for the pH measurement (pH InI) are reset to the values they had on delivery:

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

Oxygen measurement

The following functions for the oxygen measurement (O2 InI) are reset to the values they had on delivery:

Measuring mode	Oxygen concentration
Relative slope	1.00
Salinity (value)	0.0
Salinity (function)	off

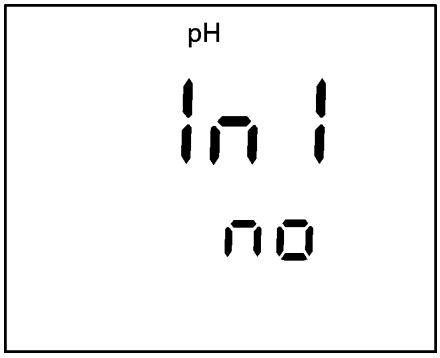


Note
After a reset, the calibration data are lost. Thus, calibrate after a reset.

Proceed as follows to reset the settings:

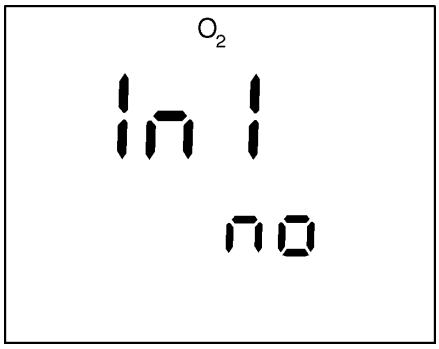
1	Press and hold down the RUN ENTER key.
2	Press the CAL key.

Resetting the pH settings



3	Toggle between no and yes by pressing ∧ ∨. yes: reset the settings for pH. no: retain settings.
4	Confirm with RUN ENTER. The instrument changes automatically to the settings for the oxygen measurement.

Resetting the oxygen settings



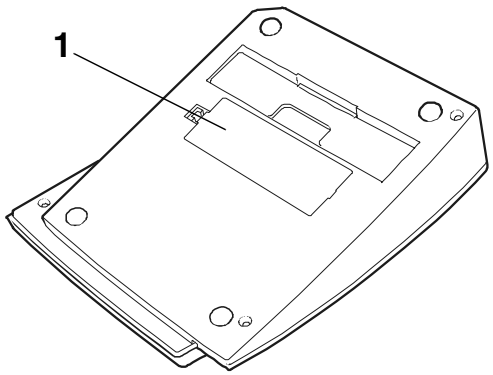
5	Toggle between no and yes by pressing ∧ ∨. yes: reset the settings for oxygen. no: retain settings.
6	Confirm with RUN ENTER. The instrument changes to the previously selected measuring mode.

5 Maintenance, cleaning, disposal

5.1 Maintenance

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

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



Caution

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

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

Only use leakproof alkaline manganese batteries.

Note

See the relevant operating manual of the probes and electrodes for instructions on maintenance.

5.2 Cleaning

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



Caution

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

5.3 Disposal

Packing

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

Batteries

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



Note

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

Measuring instrument

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

6 What to do if...

6.1 pH system messages

Error message, OFL

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

Error message, E3

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

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

No stable measured value

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

Obviously incorrect measured values

Cause	Remedy
pH electrode:	

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

6.2 Oxygen system messages

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

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

6.3 General errors

LoBat

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

Instrument does not react to keystroke

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

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

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

7 Technical Data

7.1 General 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 %

Dimensions and weight

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

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

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
	Mains power supply (option)	Connection max. overvoltage category II (valid for all plug-in power supplies): Plug-in power supply (Euro plug): FRIWO FW1199, 11.7864 Friwo Part. No. 1762613 Input: 230 V ~ / 50 Hz / 5.6 VA Output: 12 V = / 130 mA / 1.56 VA Plug-in power supply (US plug): FRIWO FW1199, 11.7880 Friwo Part. No. 1794043 Input: 120 V ~ / 60 Hz / 6 VA Output: 12 V = / 150 mA Plug-in power supply (UK plug): FRIWO FW1199, 11.7872 Friwo Part No. 1816491 Input: 230V ~ / 50 Hz / 5,6 VA Output: 12 V = / 130 mA / 1,56 VA

7.2 pH/Redox measurement

Measuring ranges and resolution

pH	- 2.00 ... + 16.00
U [mV]	- 199.9 ... + 199.9 - 1999 ... + 1999
T [°C]	- 5.0 ... + 105.0
T [°F]	+ 23.0 ... + 221.0

Accuracy (± 1 digit)

pH (after calibration)	± 0.01
U [mV]	± 0.3 (at + 15 °C ... + 35 °C) ± 1
T [°C]	± 0.1
T [°F]	± 0.2

Temperature input

Manually [°C]	- 5 ... + 100

7.3 Oxygen measurement

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

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

ABS	Plastic housing
AR	AutoRead (drift control)
ARng	Automatic range switching Measuring instrument measures with highest resolution
ASY	Asymmetry
AutoCal DIN	Automatic calibration with DIN buffer solutions
AutoCal TEC	Automatic calibration with WTW technical buffer solutions
°C	Temperature unit, Celsius
Cal	Calibration
Cd...	Calibration with DIN buffer solutions (acc. to DIN 19 266)
ConCal	Conventional one/two point calibration
Ct...	Calibration with WTW technical buffer solutions
D. O. probe	Dissolved oxygen probe
E3	Error message (see CHAPTER 6 WHAT TO DO IF...)
°F	Temperature unit, Fahrenheit
InI	Initialization Resets individual basic functions to the status they had on delivery
LoBat	Low Battery Batteries are almost empty
mV	Voltage unit
mV/pH	Unit of the electrode slope

OFL	Overflow Display range exceeded
Oxical	Automatic calibration
pH	pH value
S	Slope
Sal	Salinity
SELV	Safety Extra Low Voltage
SLO	Slope Slope setting on calibration
TP	Temperature probe Temperature measurement active
U_{ASY}	Asymmetry potential

Glossary

Asymmetry Zero point of a pH electrode.

AutoRange Automatic selection of the measuring range.

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

Buffer solution Stable solution with a precisely known pH value.

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

Drift control See AUTOREAD.

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

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.

Redox voltage Potentiometric quantity.

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

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

Salinity The salinity is a sum parameter especially for seawater; it gives the salt content of a solution (without dimension) in ‰.

Slope Specifies the voltage change per pH unit.

Test sample The substance to be measured. It can be liquid or solid.

Test solution Stable solution with a precisely known Redox voltage.

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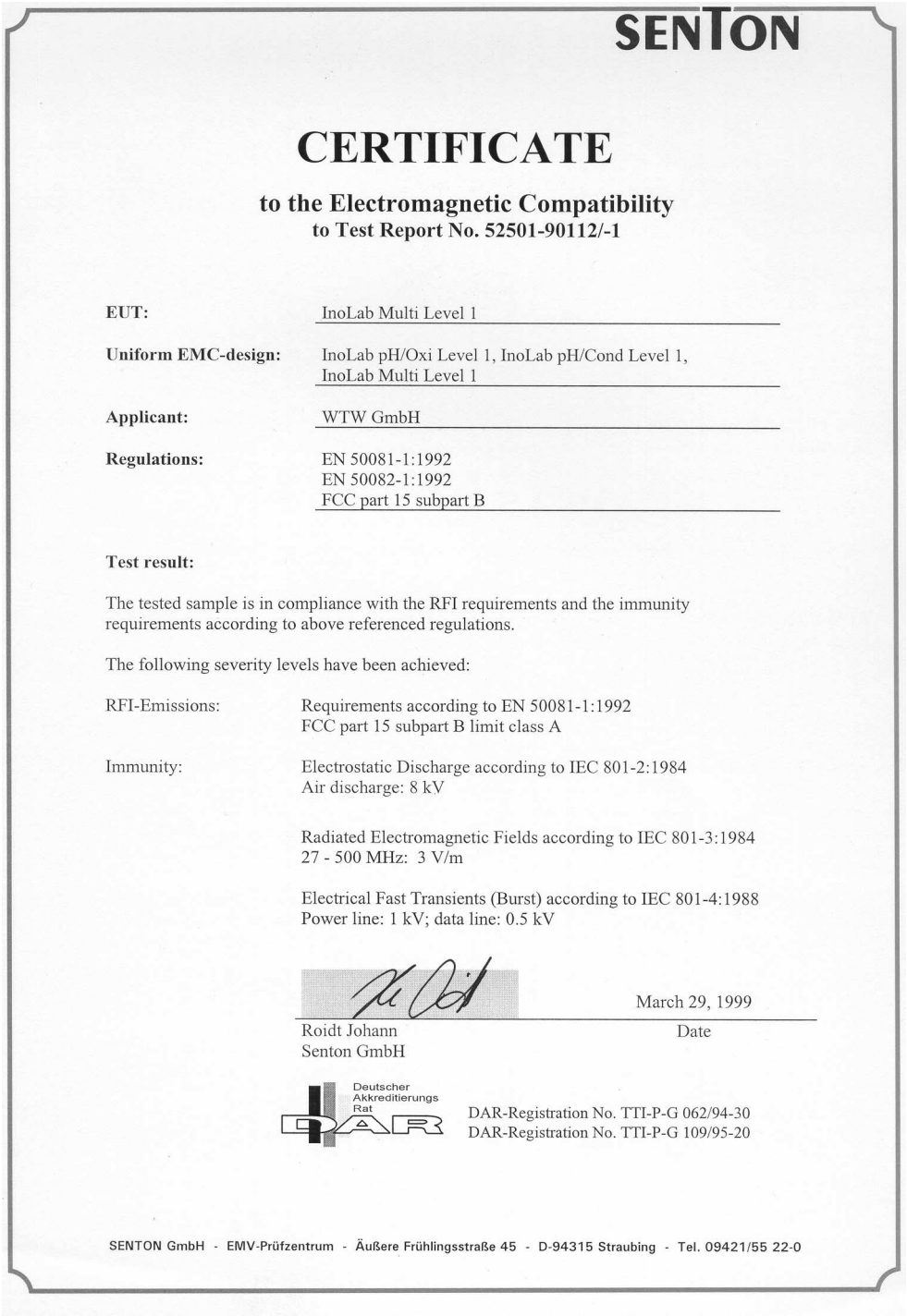
9 Appendix



SENTON

CERTIFICATE

to the Electromagnetic Compatibility
to Test Report No. 52501-90112/-1

EUT:	InoLab Multi Level 1
Uniform EMC-design:	InoLab pH/Oxi Level 1, InoLab pH/Cond Level 1, InoLab Multi Level 1
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

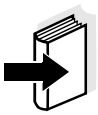
March 29, 1999

Roidt Johann — Date
Senton GmbH

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.