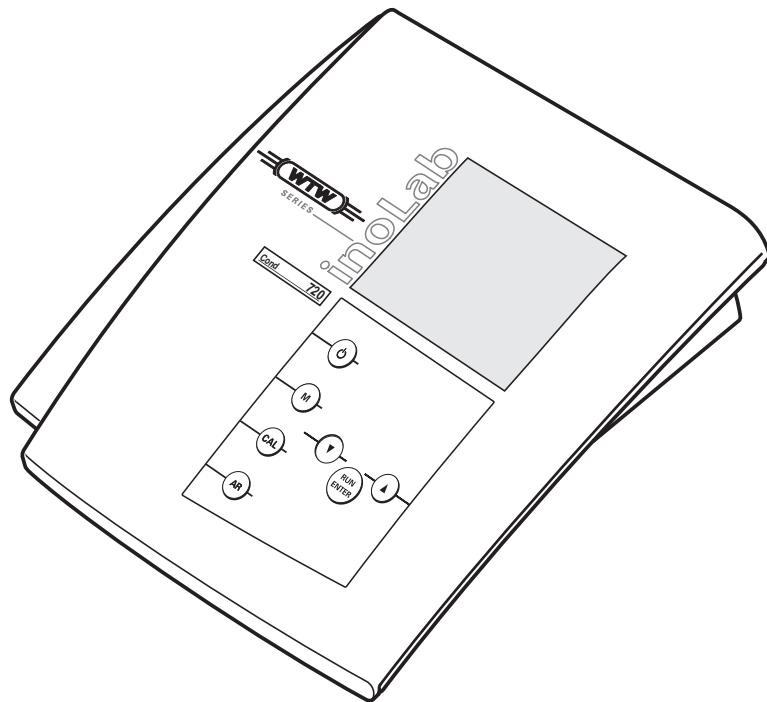


ba75440e

# inoLab Cond 720



Laboratory conductivity meter

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**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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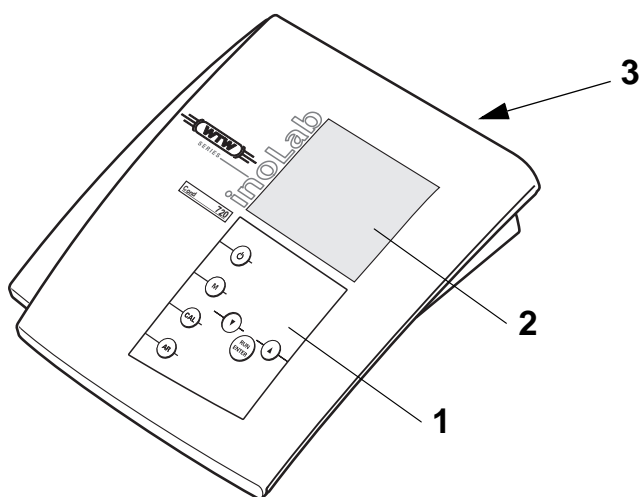


# 1 Overview

The compact inoLab Cond 720 precision conductivity meter lets you perform conductivity measurements rapidly and reliably.

The inoLab Cond 720 provides the highest degree of operating comfort, reliability and measuring safety for all applications.

The proven procedures to determine or set up the cell constant support your work with the conductivity meter.



1	Keypad
2	Display
3	Sockets

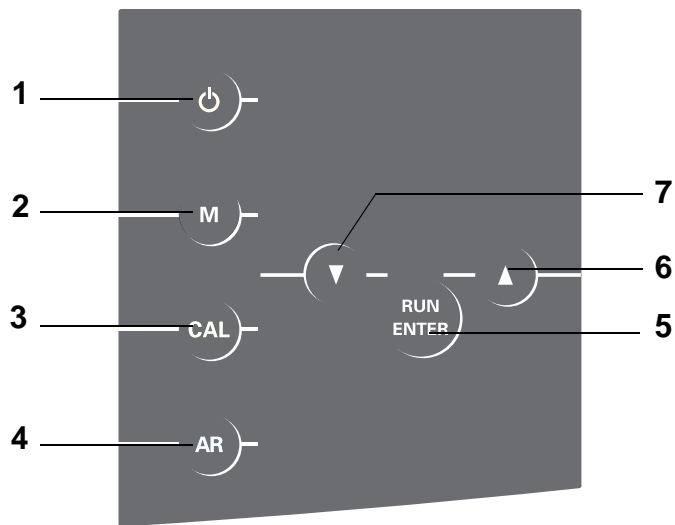


## Note

The measuring instrument can also be delivered as part of a set.

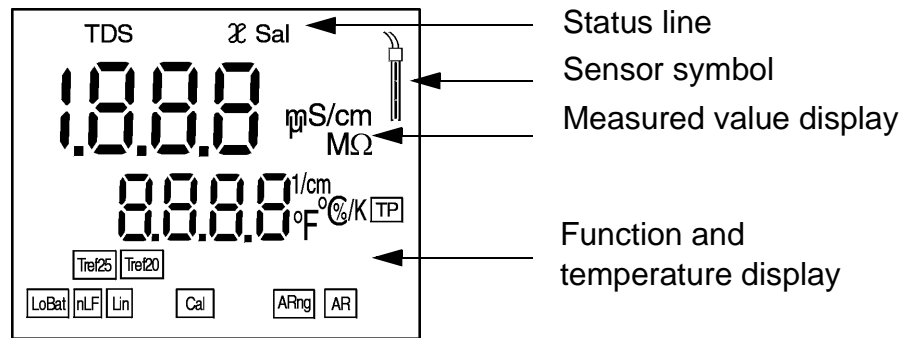
Information on this and other accessories is available in the WTW catalog LABORATORY AND FIELD INSTRUMENTATION or via the Internet.

### 1.1 Keyboard

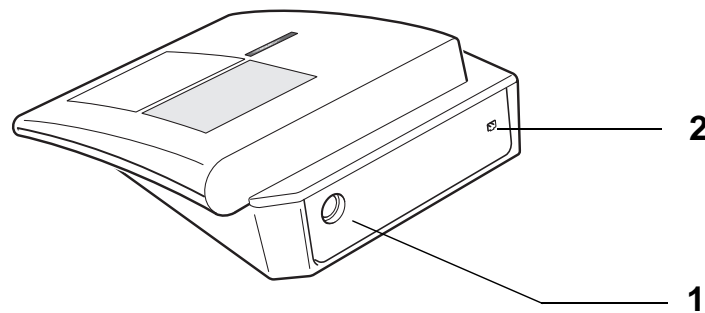


1	Measuring instrument ON/OFF
2	Select measuring mode
3	Set up or determine cell constant; select temperature compensation
4	Activate/deactivate AutoRead function
5	Confirm inputs, start AutoRead
6	Increase values, scroll
7	Reduce values, scroll

### 1.2 Display



### 1.3 Sockets



Connectors:

1	Conductivity measuring cell
2	Plug-in power supply (option)



#### Caution

Only connect measuring cells to the instrument that cannot feed excessive voltages or currents (> SELV and > circuit with current limiter).

Almost all commercial measuring cells - especially WTW measuring cells - meet these requirements.



## 2 Safety

This operating manual contains basic instructions that you must follow during the commissioning, operation and maintenance of the conductivity meter. 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 measuring cells, etc.

### 2.1 Authorized use

This instrument is authorized exclusively for measuring the conductivity, salinity, temperature and TDS (total dissolved solids) 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 IEN 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 adjust individual parameters to your measuring requirements. To do so, change the presettings according to section 4.5 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.



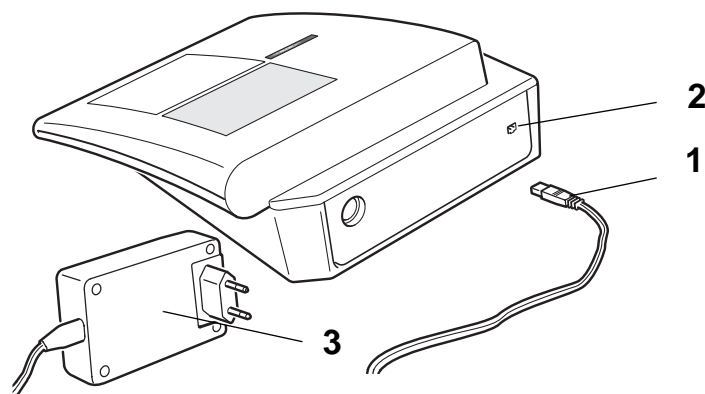
#### Warning

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 conductivity meter.                      |
| 2 | Connect the original WTW plug-in power supply (3) to an easily accessible mains socket. |

- Scope of delivery**
- Laboratory measuring instrument, inoLab Cond 720
  - 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	Connect the conductivity measuring cell to the instrument.
3	Press the  key. The <i>display test</i> appears briefly on the display. The instrument then switches automatically to the previously selected measuring mode.
4	Check the cell constant [C] (see page 16, CHECKING THE CELL CONSTANT).




#### Note

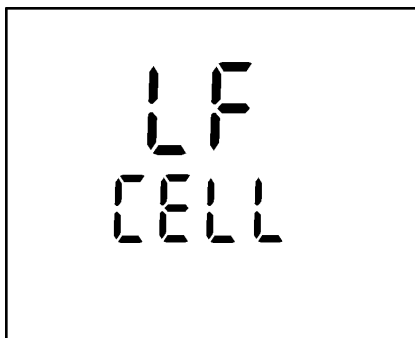
The instrument has an energy saving feature to avoid unnecessary battery depletion.


The energy saving feature switches the instrument off if no key has been pressed for an hour.

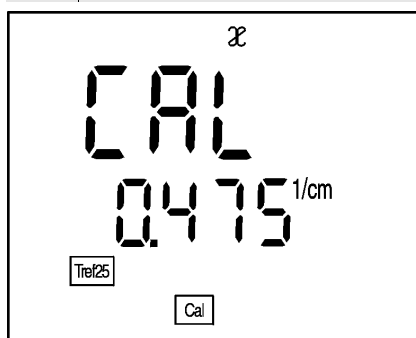
The energy saving feature is not active if the instrument is supplied by the plug-in power supply.


**Checking the cell constant**

- 1 Press the  key repeatedly until *LF CELL* is displayed.




- 2 Press the  key. The previously selected cell constant is displayed, e. g.  $0.475 \text{ cm}^{-1}$ .



- 3 To return to the measuring mode: press the  key when the correct cell constant is displayed.
- 4 If a different cell constant is to be set, proceed according to section 4.3 DETERMINING/SETTING UP THE CELL CONSTANT [C] on page 22.

**Preparatory activities****4.2 Measuring**

Perform the following activities when you want to measure:

1	Connect the measuring cell to the instrument.
2	Adjust the temperature of the test solutions or measure the current temperature if the measurement is made without a temperature probe.
3	Calibrate the instrument with the measuring cell or check the cell constant set up.
4	Select the measuring mode by pressing  .

**Temperature probe**



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

If you want to use a WTW conductivity measuring cell without a temperature probe, you have to connect it with an adapter (available at WTW).

**Note**




The conductivity meter automatically recognizes the type of the temperature probe used. As a result, you can connect electrodes with the NTC30 or Pt1000.

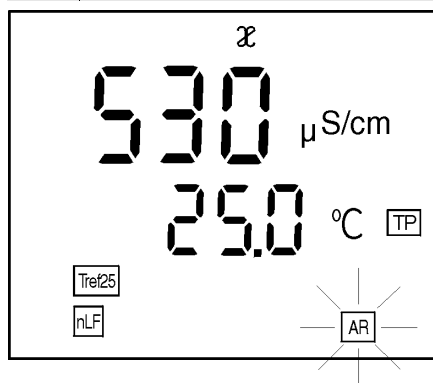
The temperature measurement is absolutely essential for a reproducible conductivity measurement. If the measurement is made without a temperature probe, proceed as follows:



1	Determine the current temperature using a thermometer.
2	Set up the temperature by pressing   .

### 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.


- 1 Call up the required measuring mode by pressing .
- 2 Activate the AutoRead function by pressing . The current measured value is frozen (Hold function).
- 3 Start the AutoRead function by pressing . AR flashes on the display until a stable measured value is reached.



- 4 If necessary, start the next AutoRead measurement by pressing .
- 5 To terminate the AutoRead function: Press the  key.



#### Note

The current AutoRead measurement (with acceptance of the current value) can be terminated at any time by pressing .

### 4.2.1 Conductivity / Specific resistance



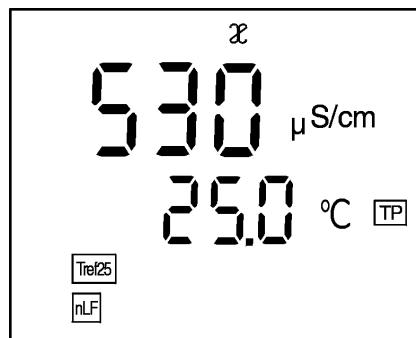
**Note**

You can display measured values in the units  $\mu\text{S}/\text{cm}$  (conductivity) or  $\text{M}\Omega\cdot\text{cm}$  (specific resistance). This setting is described in Abschnitt 4.5 CONFIGURATION.

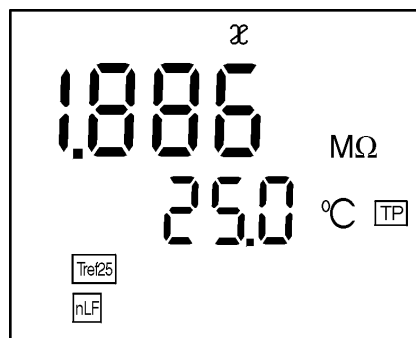
Thus, you can carry out conductivity measurements or measurements of the specific resistance:

- |   |  |
|---|--|
| 1 | Perform the preparatory activities according to section 4.2.   |
| 2 | Immerse the conductivity measuring cell into the test sample.  |
| 3 | Press the $\text{M}$ key until $\infty$ appears in the status display. Depending on the setting, one of the following display indicators appears on the display: |

**Conductivity**



**Specific resistance**

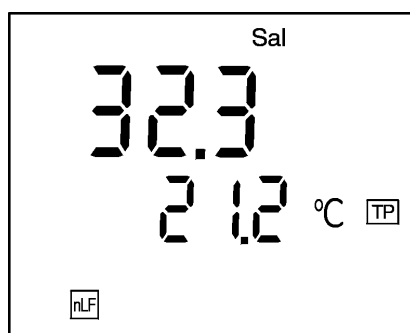


- |   |   |
|---|---|
| 4 | If necessary, set the temperature by pressing $\blacktriangle$ $\blacktriangledown$ (see section 4.2 on page 17). |
| 5 | Wait for a stable measured value.   |

### 4.2.2 Salinity

To measure the salinity, proceed as follows:

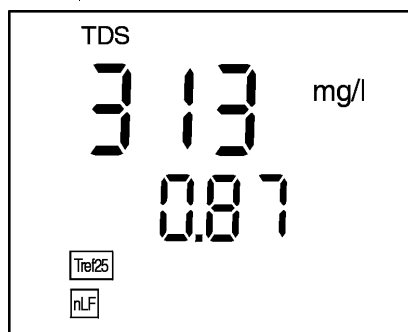
1	Perform the preparatory activities according to section 4.2.
2	Immerse the conductivity measuring cell into the test sample.
3	Press the $\text{M}$ key repeatedly until <i>Sal</i> appears in the status line. The salinity value of the sample appears on the display.
4	If necessary, set the temperature by pressing $\blacktriangle$ $\blacktriangledown$ (see section 4.2 on page 17).
5	Wait for a stable measured value.



### 4.2.3 TDS (total dissolved solids)

To measure the TDS, proceed as follows:

1	Perform the preparatory activities according to section 4.2.
2	Immerse the conductivity measuring cell into the test sample.
3	When measuring with an integrated temperature probe continue with step 4. When measuring without temperature probe: <ul style="list-style-type: none"> <li>– Determine the temperature of the test sample using a thermometer</li> <li>– Press the <math>\text{M}</math> key repeatedly until <math>\infty</math> appears in the status line</li> <li>– Enter the temperature using <math>\blacktriangle</math> <math>\blacktriangledown</math>.</li> </ul>
4	Press the $\text{M}$ key repeatedly until <i>TDS</i> appears in the status line. The TDS value of the sample appears.
5	Set up the TDS factor (0.40 ... 1.00) using $\blacktriangle$ $\blacktriangledown$ .



6 Wait for a stable measured value.



#### Note

Also refer to Application Report ... 084 KONDUCTOMETRICAL DETERMINATION OF THE TOTAL DISSOLVED SOLIDS (TDS).

**Why determine/set up the cell constant?****4.3 Determining/setting up the cell constant [C]**


Due to ageing, the cell constant slightly changes. As a result, an inexact measured value is displayed. Calibration determines the current value of the cell constant and stores this value in the instrument.

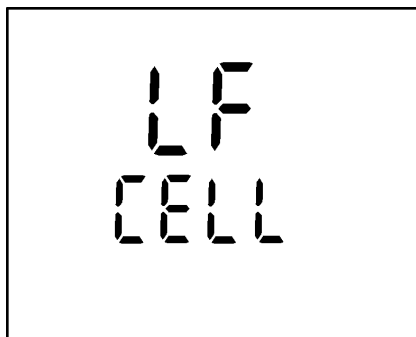
Thus, you should calibrate at regular intervals.



You can determine the cell constant of the conductivity measuring cell in the range 0.450 ... 0.500 cm<sup>-1</sup> or 0.800 ... 1.200 cm<sup>-1</sup> by calibrating in the control standard or set it up manually in the range 0.250... 2.500 cm<sup>-1</sup> or 0,090 ... 0,110 cm<sup>-1</sup>. Additionally, you can select the fixed cell constant 0.010 cm<sup>-1</sup>.

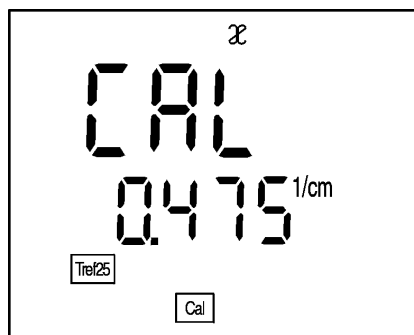
**Determining the cell constant (calibration in control standard)****4.3.1 Determining the cell constant (calibrating)**





Determine the cell constant as follows:

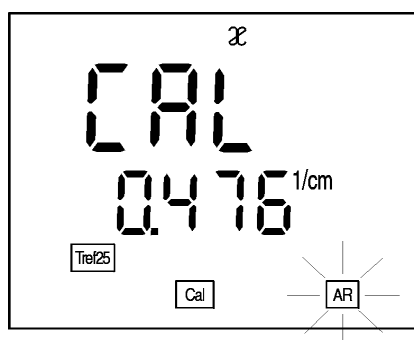
- 1 Press the  key repeatedly until *LF CELL* appears on the display.



- 2 Press the  key.
- 3 Press the  key repeatedly until the following is displayed.



- 4 Immerse the measuring cell into the 0.01 mol/l KCL control standard.
- 5 Press the  key.
  - If no temperature probe is connected, enter the current temperature of the solution using   and confirm with .
  - If a temperature probe is connected, the AR measurement to determine the cell constant starts. AR flashes until a stable signal is achieved. The determined cell constant is displayed; the measuring instrument automatically stores the cell constant.



### Note

If error message E3 appears see chapter 6 WHAT TO DO IF...

### AutoRead

During calibrating, the *AutoRead* function is automatically activated. The AR display flashes. The calibration procedure is finished when the AR display stops flashing.


**Note**

This method of automatically determining the cell constant by calibrating in the 0.01 mol/l KCL control standard can only be used for measuring cells with a cell constant in the range 0.450 ... 0.500 cm<sup>-1</sup> or 0.800 ... 1.200 cm<sup>-1</sup>.

**Calibration evaluation**

After calibrating, the instrument automatically evaluates the current condition of the calibration.

The evaluation appears on the display.

Display	Cell constant [cm <sup>-1</sup> ]
	0.450 ... 0.500 cm <sup>-1</sup> 0.800 ... 1.200 cm <sup>-1</sup>
E3 Perform error elimination according to chapter 6 WHAT TO DO IF...	outside of the ranges 0.450 ... 0.500 cm <sup>-1</sup> or 0.800 ... 1.200 cm <sup>-1</sup>

### 4.3.2 Setting the cell constant manually




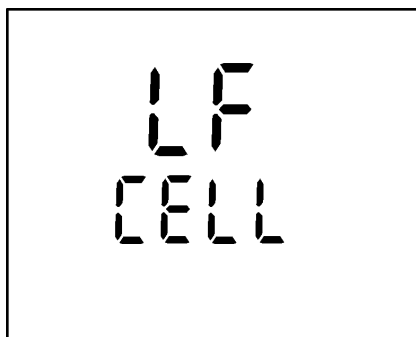
#### Note



The cell constant to be set up must either be taken from the operating manual of the measuring cell or is printed on the measuring cell.

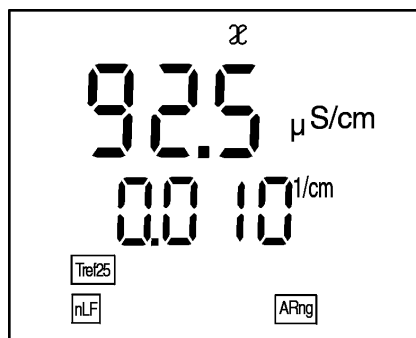
You can set the the cell constant manually as follows:


**Setting the fixed cell constant**  
**0.010 cm<sup>-1</sup>**

- 1 Press the  key repeatedly until *CELL* appears on the display.




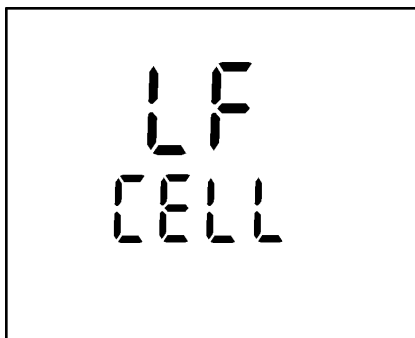
- 2 Press the  key.
- 3 Press the  key repeatedly until the cell constant 0.010 cm<sup>-1</sup> appears on the display.




- 4 To return to the measuring mode: Press the  key. From now on, the cell constant 0.010 cm<sup>-1</sup> will be used.

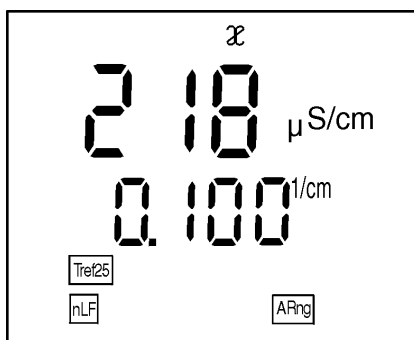
**Range**  
0.090 ... 0.110 cm<sup>-1</sup>



- 1 Press the  key repeatedly until *CELL* appears on the display.

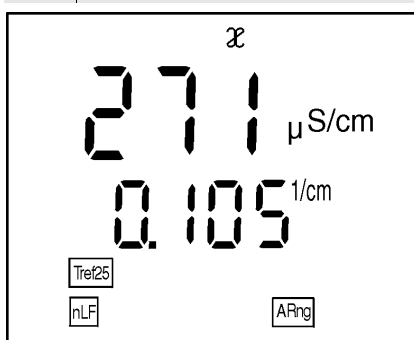



- 2 Press the  key.

- 3 Press the  key repeatedly until a cell constant in the range 0.090 ... 0.110 cm<sup>-1</sup> appears.



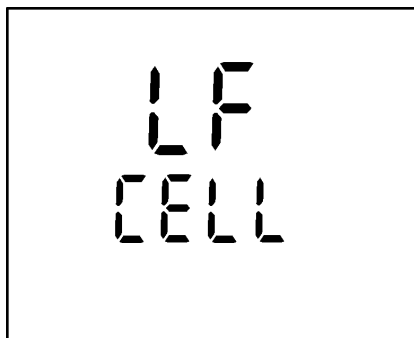
- 4 Set the cell constant to be used with  , e.g. 0.105 cm<sup>-1</sup>.



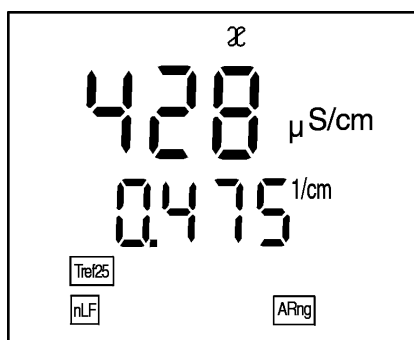
- 5 To return to the measuring mode: Press the  key. From now on, the new cell constant will be used.

**Range**  
0.250 ... 2.500 cm<sup>-1</sup>

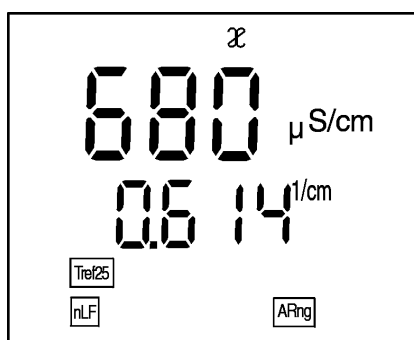
- 1 Press the  $\text{CAL}$  key repeatedly until *CELL* appears on the display.



- 2 Press the  $\text{RUN/ENTER}$  key.
- 3 Press the  $\text{CAL}$  key repeatedly until a cell constant in the range 0.250 ... 2.500 cm<sup>-1</sup> appears.



- 4 Set the cell constant to be used with  $\uparrow$   $\downarrow$ , e.g. 0.614 cm<sup>-1</sup>.



- 5 To return to the measuring mode: Press the  $\text{M}$  key. From now on, the new cell constant will be used.

#### 4.4 Setting up the temperature compensation TC

The calculation of the temperature compensation is based on the preset reference temperature, Tref 20 or Tref 25 (see section 4.5 CONFIGURATION ).

You can select one of the following temperature compensations:

- **Non-linear temperature compensation "nLF"**  
according to DIN 38404 or EN 27 888
- **linear temperature compensation "Lin"** with a coefficient that can be set in the range 0.001 ... 3.000 %/K
- **no temperature compensation**



#### Note

Select the following temperature compensations to work with the test samples given in the table:

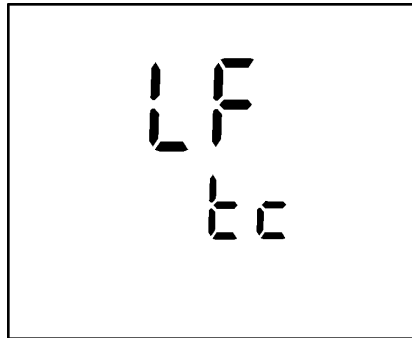
#### Application notes

Test sample	Temperature compensation TC	Display indicator
Natural water (ground water, surface water, drinking water)	nLF according to DIN 38404 EN 27 888	nLF
Ultrapure water	nLF according to DIN 38404 EN 27 888	nLF
Other aqueous solutions	Set linear temperature coefficient 0.001 ... 3.000 %/K	Lin
Salinity (seawater)	Automatically nLF according to IOT	Sal, nLF

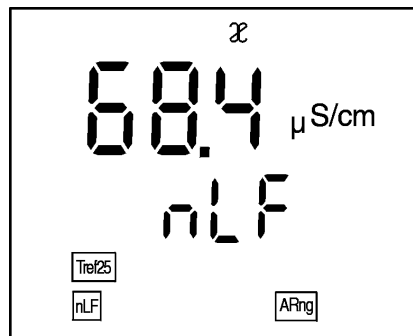
### Selecting the non-linear temperature compensation

To select the non-linear temperature compensation proceed as follows:

- 1 Press the **CAL** key repeatedly until *LF tc* appears on the display.



- 2 Press the **RUN ENTER** key.
- 3 Press the **CAL** key repeatedly until *nLF* appears on the display.

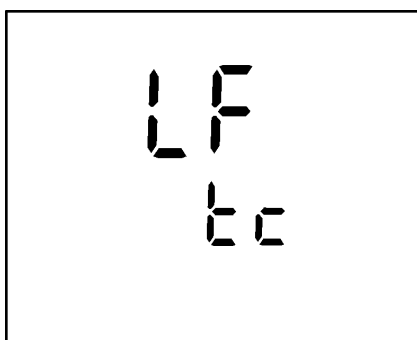


- 4 To return to the measuring mode: press the **M** key.

### Selecting the linear temperature compensation

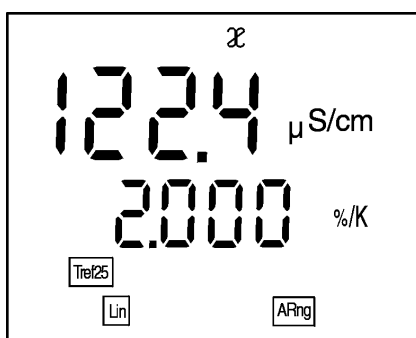
To select the linear temperature compensation proceed as follows:

- 1 Press the  $\text{CAL}$  key repeatedly until *LF tc* appears on the display.

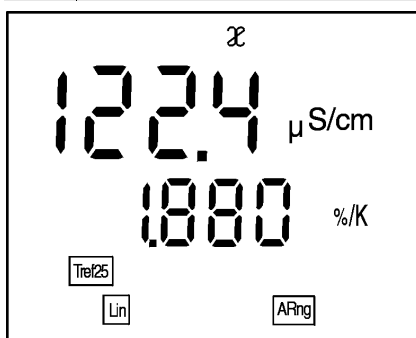


- 2 Press the  $\text{RUN/ENTER}$  key.

- 3 Press the  $\text{CAL}$  key repeatedly until the adjustable linear temperature coefficient appears on the display.




- 4 Set up the temperature coefficient, e. g. 1.880  $\text{\%/K}$  using  $\uparrow$   $\downarrow$ .

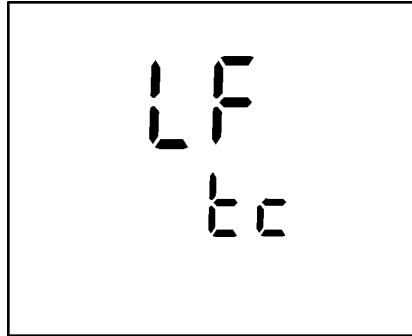


- 5 To return to the measuring mode: press the  $\text{M}$  key.


### Switching off the temperature compensation

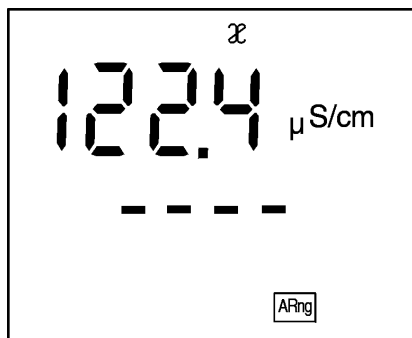
To switch off the temperature compensation proceed as follows:


- 1 Press the  key repeatedly until *LF tc* appears on the display.



- 2 Press the  key.

- 3 Press the  key repeatedly until the following display appears:





- 4 The temperature compensation has been switched off.
- 5 To return to the measuring mode: press the  key.

## 4.5 Configuration


You can adapt the conductivity meter to your individual requirements. To do this, the following parameters can be changed:

- Reference temperature 20 °C or 25 °C
- Conductivity measurement or resistance measurement
- °C or °F

1	Switch off the instrument.
2	Press and hold down the  key.
3	Press the  key. The display test appears briefly on the display. The instrument then switches automatically to the setting of the reference temperature.

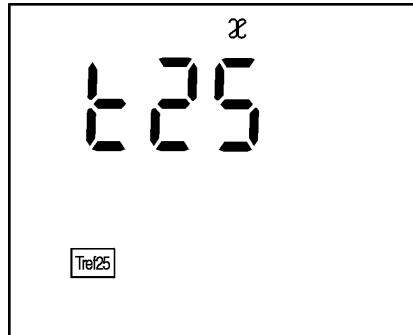


### Note

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

**Setting the reference temperature**

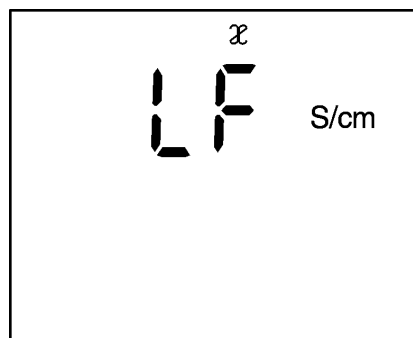
The reference temperature can either be set to 25 °C Tref25 or to 20 °C Tref20.  
 On delivery, the measuring instrument is set to 25 °C.



- |   |   |
|---|---|
| 1 | With   toggle between t25 <span style="border: 1px solid black; padding: 0 2px;">Tref25</span> and t20 <span style="border: 1px solid black; padding: 0 2px;">Tref20</span> . |
| 2 | Confirm with .<br>The instrument changes to the next setting mode.  |

**Conductivity and resistance measurement**

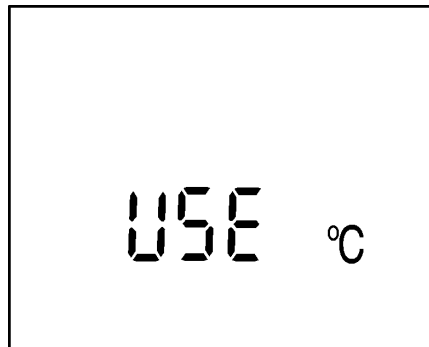
On delivery, the measuring instrument is set to conductivity measurement.




- |   |  |
|---|--|
| 3 | With   toggle between S/cm and MΩ.                                 |
| 4 | Confirm with .<br>The instrument changes to the next setting mode. |

**Setting °C or °F**

On delivery, the measuring instrument is set to °C.



5 | With ▲ ▼ toggle between °C and °F.



6 | Confirm with .  
The instrument changes to the measuring mode.

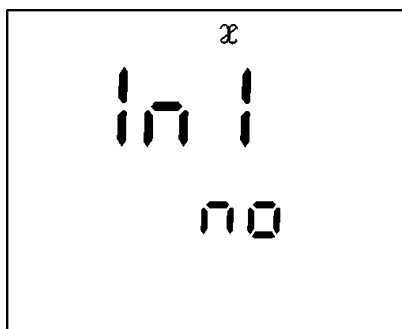
**Basic settings****4.6 Reset**




The following functions are reset (initialized) to the values they had on delivery:

Measuring mode	∞
Cell constant	0.475 cm <sup>-1</sup> (calibrated) 0.475 cm <sup>-1</sup> (set up)
Temperature compensation	nLF
Reference temperature	Tref25
Temperature coefficient of the linear temperature compensation	2.000 %/K
TDS factor	1.00

Proceed as follows:

- 1 Press and hold down the  key.
- 2 Press the  key.



- 3 Toggle between *no* and *YES* by pressing  .
  - YES: reset parameters.
  - no: retain settings.
- 4 Confirm with .
 

The instrument changes automatically to the measuring mode.

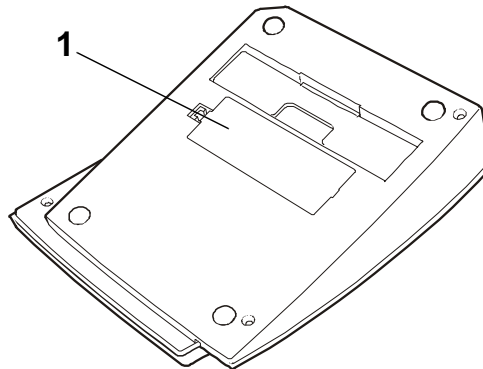


## 5 Maintenance, cleaning, disposal

### 5.1 Maintenance

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

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  $\pm$  signs in the battery compartment must correspond to the  $\pm$  signs on the batteries.

Only use leakproof alkaline manganese batteries.



#### Note

See the relevant operating manual of the measuring cell 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...

Error message, OFL	<b>Cause</b>	<b>Remedy</b>
	The measured value is outside the measuring range	
	<ul style="list-style-type: none"> <li>– Measuring cell not connected</li> <li>– Cable broken</li> </ul>	<ul style="list-style-type: none"> <li>– Connect measuring cell</li> <li>– Replace electrode</li> </ul>
Error message, E3	<b>Cause</b>	<b>Remedy</b>
	<ul style="list-style-type: none"> <li>– Measuring cell contaminated</li> <li>– Unsuitable calibration solution</li> </ul>	<ul style="list-style-type: none"> <li>– Clean measuring cell; if necessary, replace it</li> <li>– Check calibration solutions</li> </ul>
LoBat	<b>Cause</b>	<b>Remedy</b>
	<ul style="list-style-type: none"> <li>– Batteries almost depleted</li> </ul>	<ul style="list-style-type: none"> <li>– Replace batteries (see section 5.1 MAINTENANCE)</li> </ul>
Instrument does not react to keystroke	<b>Cause</b>	<b>Remedy</b>
	<ul style="list-style-type: none"> <li>– Operating state undefined or EMC electric stress unallowed</li> </ul>	<ul style="list-style-type: none"> <li>– Processor reset: Press the <b>AR</b> key and switch on instrument</li> </ul>
You would like to know which software version is in the instrument	<b>Ursache</b>	<b>Behebung</b>
	<ul style="list-style-type: none"> <li>– e.g. question of the WTW service department</li> </ul>	<ul style="list-style-type: none"> <li>– Press the <b>AR</b> key and switch on instrument. The software version is displayed.</li> </ul>



## 7 Technical Data

<b>Ambient temperature</b>	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 %
<b>Measuring ranges and resolution</b>	$\kappa$ [ $\mu\text{S}/\text{cm}$ ]	0.000 ... 1.999 (only with 0.010 $\text{cm}^{-1}$ cell constant )
		0.00 ... 19.99 (only with 0.010 $\text{cm}^{-1}$ constant and cell constant 0.090 ... 0.110 $\text{cm}^{-1}$ )
		0.0 ... 199.9
		0 ... 1999
	$\kappa$ [ $\text{mS}/\text{cm}$ ]	0.00 ... 19.99
		0.0 ... 199.9
		0 ... 500
	Spec. resistance [ $\text{M}\Omega \cdot \text{cm}$ ]	0.000 ... 1.999
0.00 ... 19.99		
0.0 ... 199.9		
0 ... 1999		
SAL	0.0 ... 70.0 according to the IOT table	
TDS [ $\text{mg}/\text{l}$ ]	0 ... 1999 Factor can be set in the range 0.40 ... 1.00	
T [ $^{\circ}\text{C}$ ]	- 5.0 ... + 105.0	
T [ $^{\circ}\text{F}$ ]	+ 23.0 ... + 221.0	

<b>Accuracy (± 1 digit)</b>	$\infty$	<p>No compensation: Accuracy ± 0.5 %</p> <p>Non-linear compensation <math>\boxed{nLF}</math> : Accuracy Test sample temperature ± 0.5 % 0 °C ... 35 °C according to EN 27 888; ± 0.5 % 35 °C ... 50 °C extended nLF function according to WTW measurements</p> <p>Linear compensation <math>\boxed{Lin}</math> : Accuracy Test sample temperature ± 0.5 % 10 °C ... 75 °C (the accuracy percentage always refers to the measured value!)</p>
<b>SAL</b>		<p>Range 0.0 ... 42.0</p> <p>Accuracy Test sample temperature ± 0.1 at 5 °C ... 25 °C ± 0.2 at 25 °C ... 30 °C</p>
<b>TDS [mg/l]</b>		<p>1</p>
<b>T [°C]</b>		<p>NTC 30: Accuracy ± 0.1</p> <p>PT 1000: Accuracy Operating temperature ± 0.5 0 °C ... 15 °C ± 0.1 15 °C ... 35 °C ± 1 35 °C ... 55 °C</p>
<b>T [°F]</b>		<p>NTC 30: Accuracy ± 0.2</p> <p>PT 1000: Accuracy Operating temperature ± 0.9 at 32 °F ... 59 °F ± 0.2 at 59 °F ... 95 °F ± 1.8 at 95 °F ... 131 °F</p>

<b>Cell constant, to be set</b>	C [cm <sup>-1</sup> ]	0.010 0.090 ... 0.110 0.250 ... 2.500
<b>Cell constant, calibrated</b>	C [cm <sup>-1</sup> ]	0.450 ... 0.500 0.800 ... 1.200
<b>Reference tempera- ture, selectable</b>	T <sub>REF</sub> [°C]	20 25
<b>Temperature input</b>	Manual [°C]	- 5 ... +100
<b>Dimensions and weight</b>	Length [mm]	230
	Width [mm]	210
	Height [mm]	70
	Weight [kg]	Approx. 0.850

<b>Energy supply</b>	Batteries	4 x 1.5 V AA type alkaline manganese batteries
	Runtime	Approx. 3000 operating hours
	Mains power supply (option)	<p>Connection max. overvoltage category II (valid for all plug-in power supply units):</p> <p>Plug-in power supply unit (Euro, US, UK, Australian plug)            FRIWO FW7555M/09, 15.1432            Friwo Part. No. 1822089            Input:            100 ... 240 V ~ / 50 ... 60 Hz / 400 mA            Output: 9 V = / 1,5 A</p> <p>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</p> <p>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</p> <p>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</p>

**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

**FCC Class A Equipment Statement**

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

**Test marks**      UL/CUL, CE



## 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**

$\kappa$	Conductivity value
AR	AutoRead (drift control)
ARng	Automatic range switching Measuring instrument measures with highest resolution
C	Cell constant $\text{cm}^{-1}$
Cal	Calibration
CELL	Cell constant
E3	Error message (see chapter 6 WHAT TO DO IF...)
InI	Initialization Resets individual basic functions to the status they had on delivery
Lin	Linear temperature compensation
LoBat	Low Battery Batteries are almost empty
nLF	Non-linear temperature compensation
OFL	Overflow Display range exceeded
Sal	Salinity
SELV	Safety Extra Low Voltage
TC	Temperature coefficient
TDS	Total dissolved solids
TP	Temperature Probe Temperature measurement active
Tref 20/T20	Reference temperature 20 °C
Tref 25/T25	Reference temperature 25 °C
°C	Temperature unit °Celsius
°F	Temperature unit Fahrenheit

## Glossary

<b>AutoRead</b>	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.
<b>Calibration</b>	The cell constant is determined through calibration. To do so, the conductivity measuring cell is immersed into a series of aqueous salt solutions with exactly known electric conductivity. The relevant conductivity values are determined using the conductivity measuring instrument.
<b>Cell constant</b>	<p>Linear factor describing the geometrical dimensions of a measuring cell and its electrodes.</p> <ul style="list-style-type: none"><li>• With the value of the cell constant you can roughly describe the application range of a conductivity measuring cell.</li><li>• The cell constant is determined through calibration in one or several calibration solutions.</li></ul>
<b>Conductivity</b>	The conductivity value is a sum parameter for the ion concentration of a test sample.
<b>Control standard solution</b>	Solution with a known conductivity to determine or check the conductivity.
<b>Drift control</b>	See AUTOREAD.
<b>Reference temperature</b>	In order to compare values measured at different temperatures, the values have to be converted to a fixed temperature. This temperature is 25 °C, or, as an exception, 20 °C.

<b>Resistance</b>	All substances (solids, liquids, or gases) with mobile charge carriers like for example electrons or ions have a finite ohmic resistance, which means they have an electric conductance that can be measured or an electric conductivity.
<b>Salinity</b>	The salinity is a sum parameter especially for seawater; it gives the salt content of seawater.
<b>Temperature compensation (TC)</b>	The temperature has a very strong impact on the electrical conductivity. To be able to compare measured values, it is necessary to temper or convert the test sample to a reference temperature.
<b>Test sample</b>	The substance to be measured. It can be liquid or solid.
<b>Total dissolved solids (TDS)</b>	Mass that remains of the substances dissolved in an aqueous solution after a fixed filtering and drying procedure, as far as these substances are not volatile under the conditions of this procedure. The total dissolved solids refer to the volume of the filtered aqueous sample used and are given in mg/l.

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