CL 200 - Portable Chlorine Colorimeter

Instruction Manual

99561-78

IP57 WATERPROOF

ISO 9001: 2015

Environmental Express
www.environmentalexpress.com

Important Information

Important Information for consumers in the EU:
Disposal instructions for batteries and accumulator:

EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows : Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.

Disposal instructions for electrical equipment

Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste! We will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, excluding the cost of transportation is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Environmental Express instrument for disposal freight prepaid to your supplier.

Safety - General Instructions

The manufacturer’s liability and warranty for damage and consequential damates lapses with improper use, failure to follow this operating manual, use of insufficiently qualified specialized personnel or unauthorized changes to the instrument. The manufacturer is not liable for costs or damages that arise for the user or third parties due to the use of this instrument, especially in case of improper use of the instrument or misuse or faults in the connection or of the instrument. The manufacturer assumes no liability for print errors.

Safety information in the operating manual

This operating manual provides important information on the safe operation of the product. Read this operating manual thoroughly and make yourself familiar with the product before putting it into operation or working with it. The operating manual must be kept in the vicinity of the product so you can always find the information you need.

Guidelines for colorimetric measurements

1. Vials, caps and stirring rods should be cleaned thoroughly after each analysis to prevent interference. Even minor reagent residues can cause errors in the test result.
2. The outside of the vial must be clean and dry before starting the analysis. Clean the outside of the vials with a towel to remove fingerprints or other marks.
3. Zero calibration and test must be carried out with the same vial as there may be slight differences in optical performance between vials.
4. The vials must be positioned in the sample chamber for zeroing and test with the mark on the vial aligned with the mark on the instrument.
5. Always perform zeroing and test with the vial cap tightly closed. Only use the cap with a sealing ring.
6. Bubbles on the inside wall of the vial lead to incorrect measurements. To prevent this, remove the bubbles by swirling the vial before performing the test.
7. Avoid spillage of water into the sample chamber because this can lead to incorrect test results.
8. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using lint-free, moist cloths (oil-free) or cotton buds.
9. Large temperature differences between the instrument and the environment can led to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
10. To avoid errors caused by stray light do not use the instrument in bright sunlight.
11. Always add the reagent tablets to the water sample straight from the foil without touching them with the fingers.
12. The reagents must be added in the correct sequence.

Method Notes

1. Prior to measurement ensure that the sample is suitable for analysis (no major interferences and does not require any preparation i.e. pH adjustment, filtration etc
2. Different Refill Packs available on request.
3. Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
4. Ensure proper disposal of reagent solutions.
5. Material Safety Data Sheets are available on request or for immediate download on the web: www.environmentalexpress.com

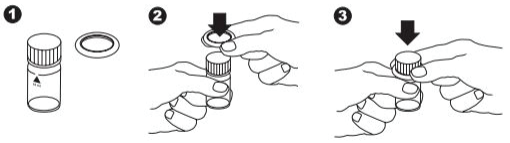
Technical Specifications

Instrument	automatic wavelength selection, direct reading colorimeter
Light source	LEDs, interference filters (IF) and photo-sensor in transparent cell chamber
Photometric Range	-2600 - 2600 mAbs
Operating Wavelenght	530 nm Δλ = 5 nm
Wavelength accuracy	± 1 nm
Photometric accuracy*	3 % FS (T = 20 °C – 25 °C)
Photometric resolution	0.01 A
Auto-OFF	automatic switch off 25 minutes after last keypress (different reaction times depend-ing on available method)
Display	backlit LCD (on keypress)
Time	real time clock and date
Calibration	user and factory calibration resetting to factory calibration possible
Ambient conditions	temperature: 5– 40 °C rel. humidity: 30–90 % (non-condensing)
Waterproof	floating; as defined in IP 68 (1 hour at 0.1 meter)
CE	Certificate for Declaration of CE-Conformity available for download at:

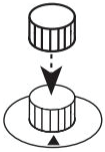
*measured with standard solutions

Guidelines for colorimetric measurements

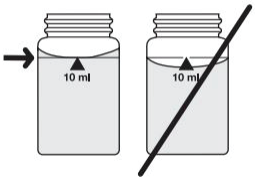
Placing the seal ring:



Placing the seal cap:

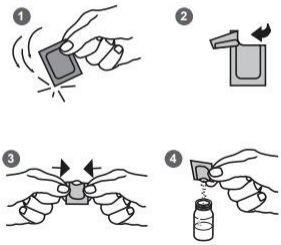


Correct filling of the vial:

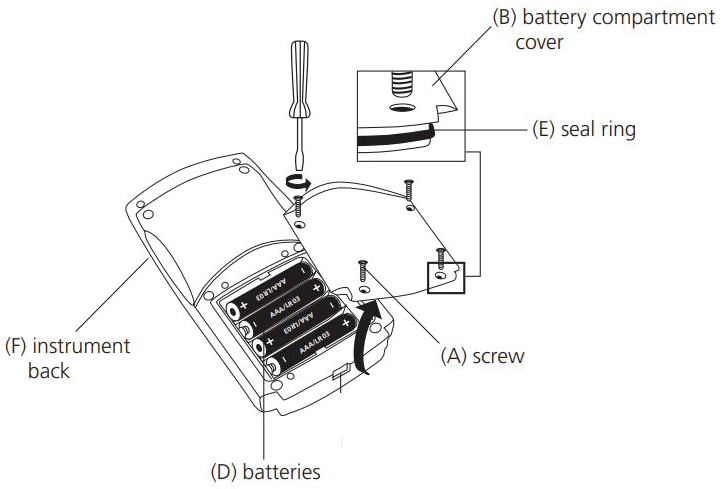


Correct handling of the reagents:

Powder Packs



Replacement of batteries:



CAUTION:
To ensure that the instrument is waterproof:
• seal ring (E) must be in position
• battery compartment cover (B) must be fixed with the four screws
If the batteries are removed for more than one minute the date and time menu starts automatically when the colorimeter is switched on the next time.

2 3 Setting date and time (24-hour-format)

Retrieve menu (see "Retrieve menu")

! 2x press = arrow symbols on Time & Date

Mode confirm

Mode Increase value

Zero / Test Decrease value

! Confirm the respective setting

! "IS SET" appears on the display after the final confirmation.

The instrument returns to the measurement mode.

Function Descriptions

OTZ (One Time Zero)
The One Time Zero is available for all photometer variants whereby the zero adjustment is carried out in a 24-mm round vial with sample water. It can be used if different tests are carried out with identical test conditions and the same water sample. The zero adjustment is saved until the device is switched off.
The zero setting can be repeated each time if necessary

One Time Zero (OTZ), 1x performing zero, then parameter measurement

Repeating the zero, Press the key for 2 seconds.

Countdown / reaction period

For methods with a reaction time, a countdown function can be switched on during the test for some methods.

press and hold

press

release

Countdown/reaction time runs, measurement takes place automatically after the time runs out.

Interrupt countdown/reaction time

Attention:
Non-compliance with reaction periods leads to incorrect test results.

Chlorine PP

0.02 - 2 mg/l Cl2 **CL2**

DPD

Method information

Instrument Name	Cuvette	Wavelength	Measuring Range
CL 200 Colorimeter	ø 24 mm	530 nm	0.02 - 2 mg/l Cl2

Required Materials

Description		Part Number
CL 200 Chlorine Colorimeter		99561-78
Sample Cells, ø 24 mm, Glass	12 Pack with lids & light shielding rings	99561-99

Required Reagents:

Description		Part Number
DPD Free, F10	100 Pack	99561-93
DPD Total, F10	100 Pack	99561-95

Optional Accessories:

Description		Part Number
Chlorine Reference Standard Kit	0 / 0.02 / 1.0 mg/l Verification Standards	99561-98
Primary Chlorine Standard Kit	EA; makes 100 ml of 1.5 ppm standard	99561-97
Light Shielding Rings	12 Pack	99562-03

Sampling

1. When preparing the sample, Chlorine outgassing, e.g. through the pipette or shaking, must be avoided.
2. The analysis must take place immediately after taking the sample.

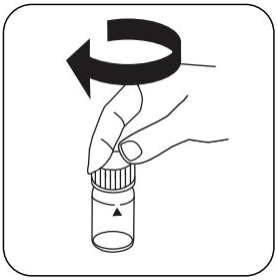
Preparation

1. Cleaning of vials:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, this can lead to lower results with the determination of Chlorine. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve this, all glassware should be placed in a sodium hypochlorite solution (0.1 g/L)for one hour and then rinsed thoroughly with deionized water.
2. For individual testing of free and total Chlorine, the use of different sets of glassware is recommended (EN ISO 7393-2, 5.3)
3. The DPD color development is carried out at a pH value of 6.2 to 6.5. The reagents therefore contain a buffer for the pH adjustment. Strong alkaline or acidic water samples must therefore be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulfuric acid or 1 mol/l Sodium hydroxide).

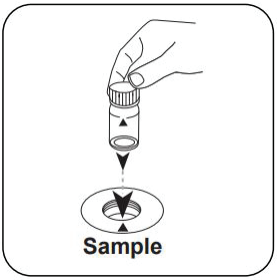
Measuring Free Chlorine with Powder Packs

1. Select the method on the device: CL2

Fill 24 mm vial with **10 ml sample.**



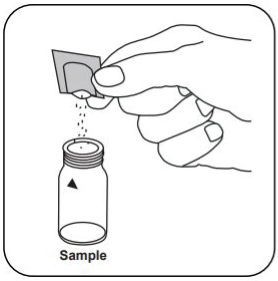
Close vial



Place **sample vial** in the sample chamber. Pay attention to the positioning.

Press the **ZERO** button

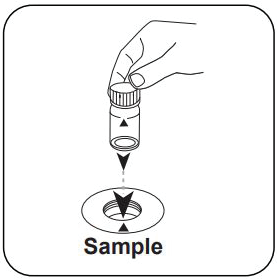
Remove the vial from the sample chamber.



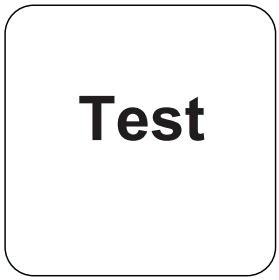
Add **Chlorine FREE-DPD/ F10** powder pack

Close vial

Invert several times to mix the contents (20 sec.)



Place **sample vial** in the sample chamber. Pay attention to the positioning.



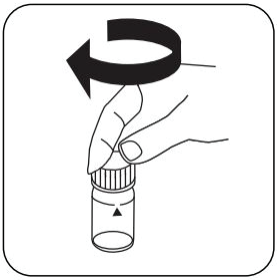
Press the **TEST** button

The result in mg/l free chlorine appears on the display

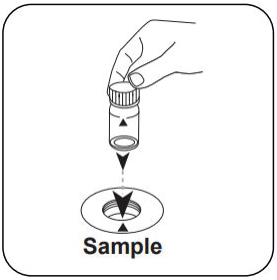
Measuring Total Chlorine with Powder Packs

1. Select the method on the device: CL2

Fill 24 mm vial with **10 ml sample.**



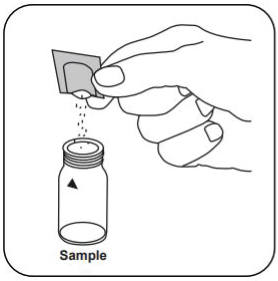
Close vial



Place **sample vial** in the sample chamber. Pay attention to the positioning.

Press the **ZERO** button

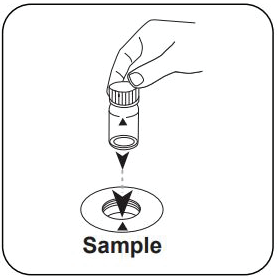
Remove the vial from the sample chamber.



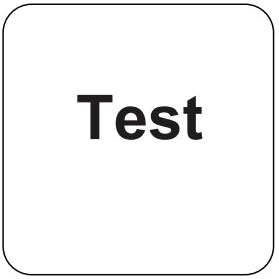
Add **Chlorine TOTAL-DPD/ F10** powder pack

Close vial

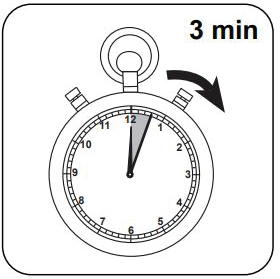
Invert several times to mix the contents (20 sec.)



Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **TEST** button



Wait for **3 minute reaction time**

Once the reaction period is finished, the measurement takes place automatically.
The result in mg/l total Chlorine appears on the display.

Chemical Method

DPD

Interferences

Persistant Interferences
- All oxidizing agents in the samples react like chlorine, which leads to higher results.

Removeable Interferences
- Interference from Copper and Iron (III) are eliminated by the addition of EDTA.
- Concentrations above 2 mg/L Chlorine, in the event of using Powder Packs, can lead-to results within the measuring range of up to 0 mg/L. In this case, the sample must be diluted with chlorine-free water. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

Interference	from / [mg/L]
CrO_4^{2-}	0.01
MnO_2	0.01

Method Validation

Limit of Detection	0.01 mg/L
Limit of Quantification	0.03 mg/L
End of Measuring Range	2 mg/L
Sensitivity	1.68 mg/L / Abs
Confidence Intervall	0.033 mg/L
Standard Deviation	0.014 mg/L
Variation Coefficient	1.34 %
Conformity	EN ISO 7393-2

Chlorine PP HR

0.1 - 8 mg/l Cl2 **CL8**

DPD

Method information

Instrument Name	Cuvette	Wavelength	Measuring Range
CL 200 Colorimeter	ø 10 mm	530 nm	0.1 - 8 mg/l Cl2

Required Materials

Description		Part Number
CL 200 Colorimeter		99561-78
Sample Cells, ø 10 mm, Plastic	12 Pack with lids	99562-01

Required Reagents:

Description		Part Number
DPD Free, F10	100 Pack	99561-93
DPD Total, F10	100 Pack	99561-95

Optional Accessories:

The following equipment and accessories must be on-hand to perform a test:

Description		Part Number
Chlorine Reference Standard Kit	0 / 0.02 / 1.0 mg/l Verification Standards	99561-97
Primary Chlorine Standard Kit	EA; makes 100 ml of 1.5 ppm standard	99561-98

Sampling

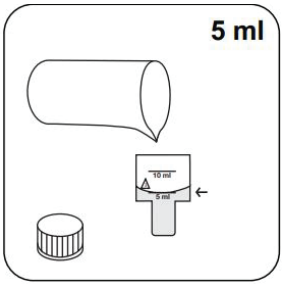
1. When preparing the sample, Chlorine outgassing, e.g. through the pipette or shaking, must be avoided.
2. The analysis must take place immediately after taking the sample.

Preparation

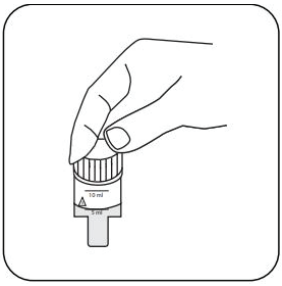
1. Cleaning of vials:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, this can lead to lower results with the determination of Chlorine. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve this, all glassware should be placed in a sodium hypochlorite solution (0.1 g/L)for one hour and then rinsed thoroughly with deionized water.
2. For individual testing of free and total Chlorine, the use of different sets of glassware is recommended (EN ISO 7393-2, 5.3)
3. The DPD color development is carried out at a pH value of 6.2 to 6.5. The reagents therefore contain a buffer for the pH adjustment. Strong alkaline or acidic water samples must therefore be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulfuric acid or 1 mol/l Sodium hydroxide).

Measuring Free Chlorine with Powder Packs

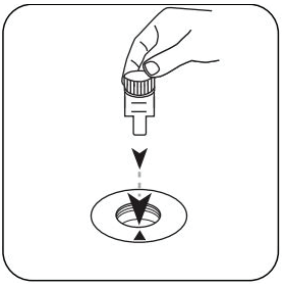
1. Select the method on the device: CL8



Fill 10 mm vial with **5 ml sample.**



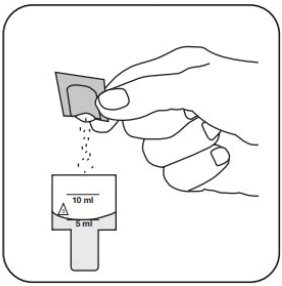
Close vial



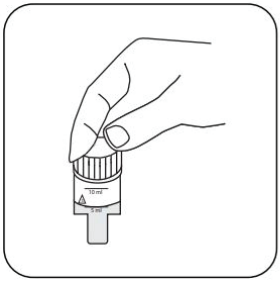
Place **sample vial** in the sample chamber. Pay attention to the positioning.

Press the **ZERO** button

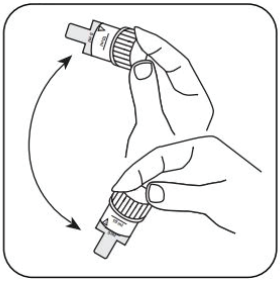
Remove the vial from the sample chamber.



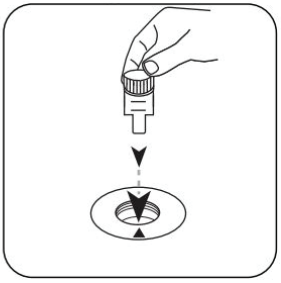
Add **two** Chlorine **FREE-DPD / F10** powder packs .



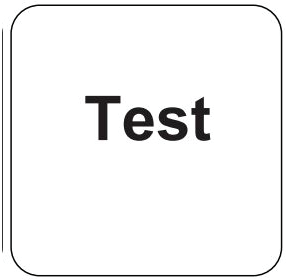
Close vial



Invert several times to mix the contents (20 sec.)



Place **sample vial** in the sample chamber. Pay attention to the positioning.

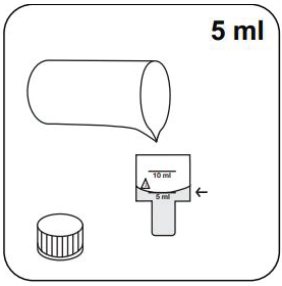


Press the **TEST** button

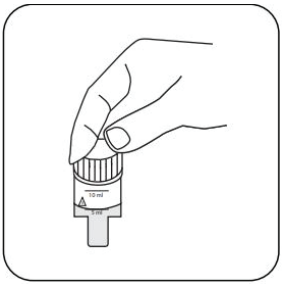
The result in mg/l free chlorine appears on the display

Measuring Total Chlorine with Powder Packs

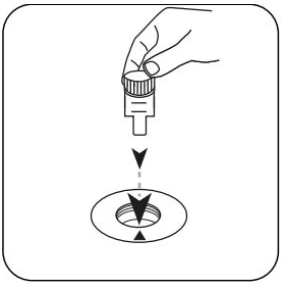
1. Select the method on the device: CL8



Fill 10 mm vial with **5 ml sample.**



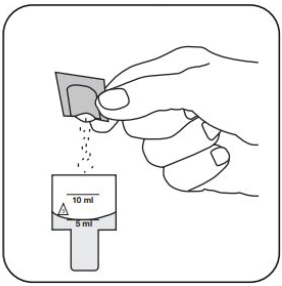
Close vial



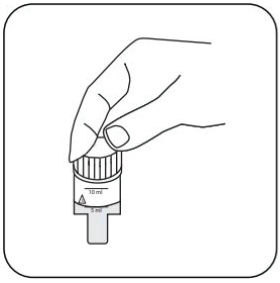
Place **sample vial** in the sample chamber. Pay attention to the positioning.

Press the **ZERO** button

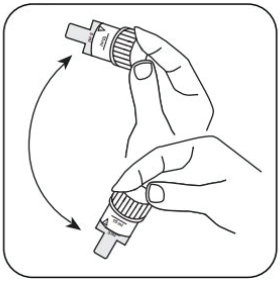
Remove the vial from the sample chamber.



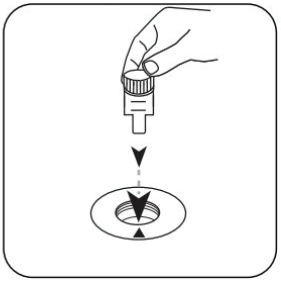
Add **two** Chlorine **TOTAL-DPD / F10** powder packs .



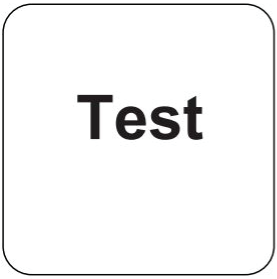
Close vial



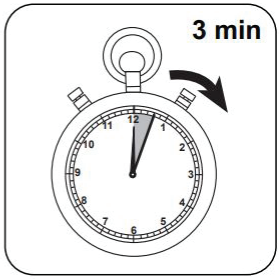
Invert several times to mix the contents (20 sec.)



Place **sample vial** in the sample chamber. Pay attention to the positioning.



Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **TEST** button

Once the reaction period is finished, the measurement takes place automatically.
The result in mg/l total Chlorine appears on the display.

Chemical Method

DPD

Interferences

Persistant Interferences
- All oxidizing agents in the samples react like chlorine, which leads to higher results.

Removeable Interferences
- Interference from Copper and Iron (III) are eliminated by the addition of EDTA.
- Concentrations above 8 mg/L Chlorine, in the event of using Powder Packs, can lead-to results within the measuring range of up to 0 mg/L. In this case, the sample must be diluted with chlorine-free water. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

Method Validation

Conformity	EN ISO 7393-2

Recall of stored data

The device has a ring memory. The last 16 measured values can be retrieved.

Switch the unit on

press for more than 4 seconds , then release, to access the recall menu

Scroll through data sets

Repeat the data set

Return to measurement mode

Display in the following format (automatically proceeds every 3 seconds until result is displayed):

Number	n xx (xx: 16...1)
Year	YYYY (e.g. 2014)
Date	mm.dd (monthmonth:dayday)
Time	hh:mm (hourhour:minuteminute)
Test	Method
Result	x.xx

Retrieve menu

Device is switched off

Mode — press and hold

On / Off — press briefly, release

Mode — release

Menu selections

!

oder

depending on device variant

press to select a menu point (scroll)

Selection of the following menu points:

- 1 diS recall stored data
- 1 Prt printing stored data
- 2 3 setting the date and time
- 4 user calibration

The selected menu is indicated by an arrow in the display.

1 diS – Recall of stored data

Retrieve menu (see "Retrieve menu")

Mode — Scroll through data sets

Zero / Test — Repeat the data set

! — Return to measurement mode

The device has a ring memory. The last 16 measured values can be retrieved.

Display in the following format (automatically proceeds every 3 seconds until result is displayed):

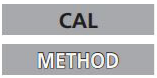
Number	n xx (xx: 16...1)
Year	YYYY (e.g. 2014)
Date	mm.dd (monthmonth:dayday)
Time	hh:mm (hourhour:minuteminute)
Test	Method
Result	x.xx

Display of current calibration setting

Retrieve menu (see "Retrieve menu")

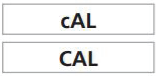
3x = arrow symbols on Cal or Cal on the display

confirm



Display alternates between: CAL/„Methode".

Note:



User calibration

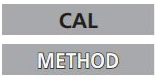
Factory calibration

User calibration

Retrieve menu (see "Retrieve menu")

3x = arrow symbols on Cal or Cal on the display

confirm

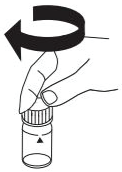


Display alternates between: CAL/„Methode".

selecting a method

Fill 24 mm vial with 10 ml sample.

The sample should consist of colourless and unclouded water (e.g. deionised water, pure drinking water).



close vial

Sample

Place the vial in the sample chamber.
Pay attention to the positioning.

Zero / Test

press

METHOD

flashes for approx. 8 seconds

0.0.0
CAL

The display shows the following in alternating mode:

Perform the measurement with a known standard concentration.

Zero / Test

press

METHOD

flashes for approx. 3 seconds

RESULT
CAL

The result is shown in the display, alternating with CAL.

If the result matches the value of the standard used (within the relevant tolerance), exit calibration mode.

On / Off

press

If the result is outside of the value (taking into account the tolerance), change the displayed value:

Mode

Press 1 x increases the displayed value by 1 digit.

Zero / Test

Press 1 x decreases the displayed value by 1 digit.

Press the corresponding key until the reading equals the value of the calibration standard.

CAL
RESULT + x

The result is shown in the display, alternating with CAL.

On / Off

press for more than 4 seconds

The user calibration is calculated and stored.

Factory calibration reset

Resetting the user calibration to the original factory calibration will reset all methods and ranges.

A user calibrated method is indicated by an arrow while the test result is displayed.

In order to reset the device to the factory calibration, proceed as follows:

press and **and hold both**

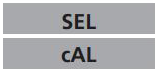
press briefly, release

release approx. 1 second.

The following messages will appear in turn on the display:

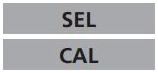
Factory calibration

oder:



User calibration

Calibration is reset to the factory setting by pressing the [MODE] key.



The following messages will appear in turn on the display:

Switch the unit off.

Environmental Express
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