Lovibond® Water Testing

Tintometer® Group

Manual of Methods - PM6x0

Analytical procedures for analysis of water and waste water

$K_{S4.3}$ T — M20

0.1 - 4 mmol/L $K_{S4.3}$ — S:4.3

Acid / Indicator

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Alka-M-Photometer	Tablet / 100	513210BT
Alka-M-Photometer	Tablet / 250	513211BT

Remarks

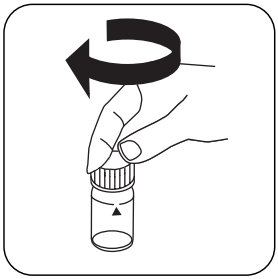
1. The terms Alkalinity-m, m-Value, total alkalinity and Acid demand to $K_{S4.3}$ are identical.
2. For accurate results, exactly 10 ml of water sample must be used for the test.

Determination of Acid capacity $K_{S4.3}$ with Tablet

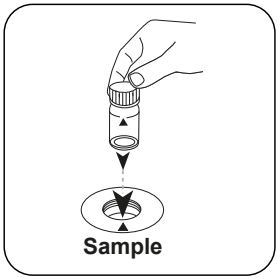
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

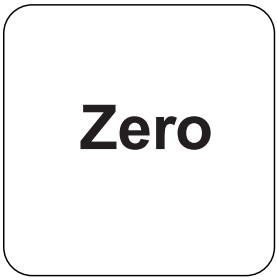
Fill 24 mm vial with **10 mL sample**.



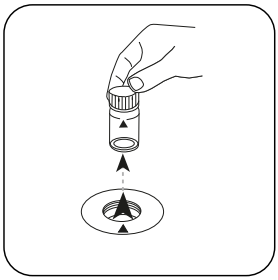
Close vial(s).



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

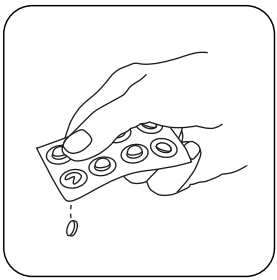


Press the **ZERO** button.

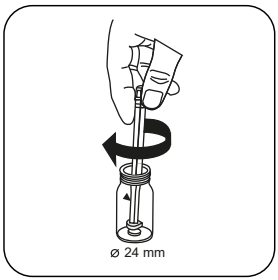


Remove the vial from the sample chamber.

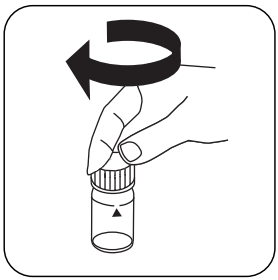
For devices that require **no ZERO measurement** , **start here**.



Add **ALKA-M-PHOTOMETER tablet**.

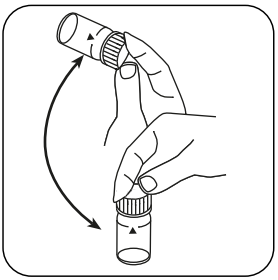


Crush tablet(s) by rotating slightly.

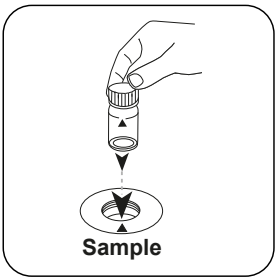


Close vial(s).

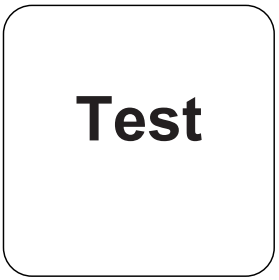
EN



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in Acid Capacity $K_{S4.3}$ appears on the display.

EN

Chemical Method

Acid / Indicator

Appendix

Derived from

DIN 38409 - H 7-2

Alkalinity-m T M30

5 - 200 mg/L $CaCO_3$ tA

Acid / Indicator

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Alka-M-Photometer	Tablet / 100	513210BT
Alka-M-Photometer	Tablet / 250	513211BT

Remarks

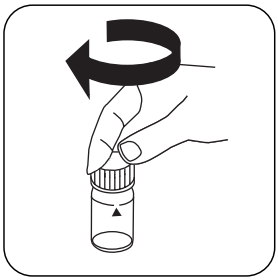
1. The terms Alkalinity-m, m-Value, total alkalinity and Acid demand to $K_{S4.3}$ are identical.
2. For accurate results, exactly 10 ml of water sample must be used for the test.

Determination of Alkalinity, total = Alkalinity-m = m-Value with Tablet

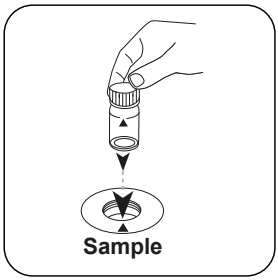
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

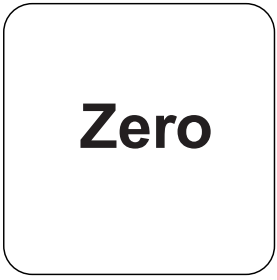
Fill 24 mm vial with **10 mL sample**.



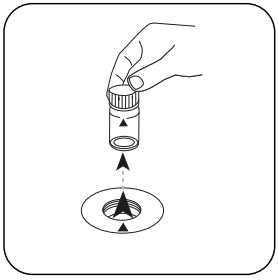
Close vial(s).



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

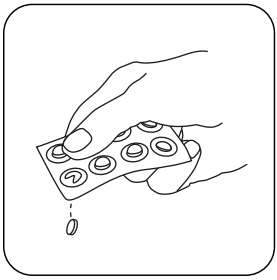


Press the **ZERO** button.

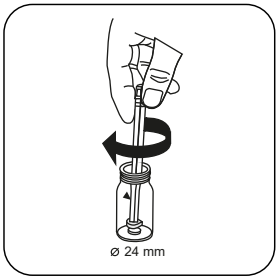


Remove the vial from the sample chamber.

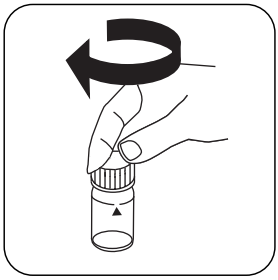
For devices that require **no ZERO measurement** , **start here**.



Add **ALKA-M-PHOTOMETER tablet**.

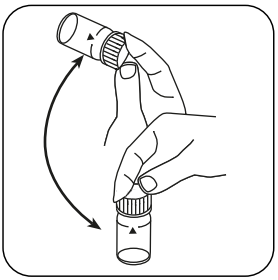


Crush tablet(s) by rotating slightly.

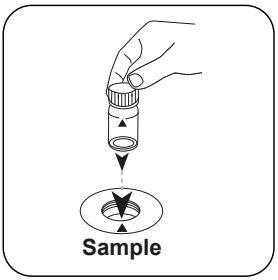


Close vial(s).

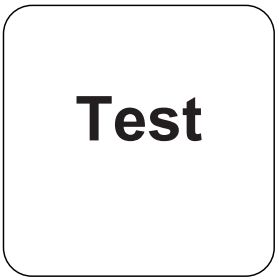
EN



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in Alkalinity-m appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	$CaCO_3$	1
	°dH	0.056
	°eH	0.07
	°fH	0.1
	°aH	0.058
	$K_{S4.3}$	0.02

Chemical Method

Acid / Indicator

Appendix

Derived from

EN ISO 9963-1

Alkalinity-m HR T M31

5 - 500 mg/L $CaCO_3$

Acid / Indicator

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Alka-M-HR Photometer	Tablet / 100	513240BT
Alka-M-HR Photometer	Tablet / 250	513241BT

Remarks

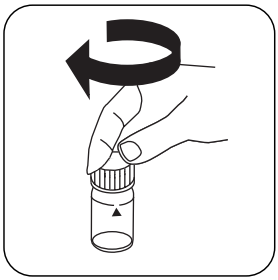
1. For verification of the result, check whether a thin yellow layer has formed on the bottom of the vial. If this is the case, mix the contents of the vial. This ensures that reaction is complete. Carry out the measurement again and reread the result.

Determination of Alkalinity HR, total = Alkalinity-m HR = m-Value HR with Tablet

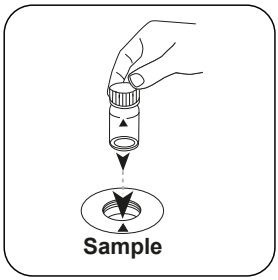
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

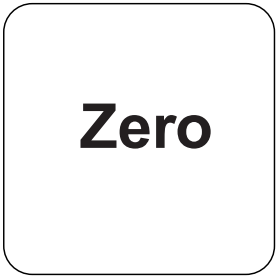
Fill 24 mm vial with **10 mL sample**.



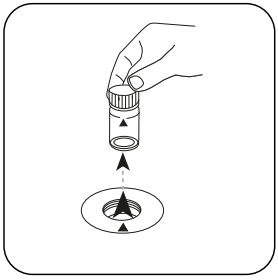
Close vial(s).



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

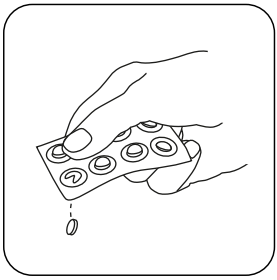


Press the **ZERO** button.

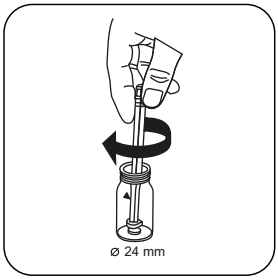


Remove the vial from the sample chamber.

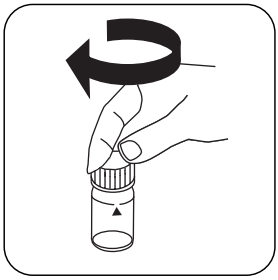
For devices that require **no ZERO measurement** , **start here**.



Add **ALKA-M-HR Photometer tablet**.

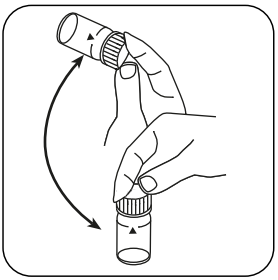


Crush tablet(s) by rotating slightly.

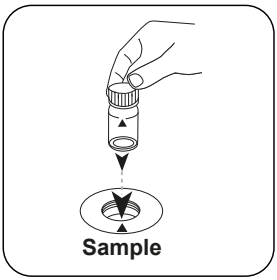


Close vial(s).

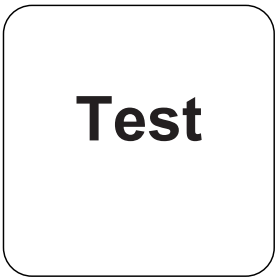
EN



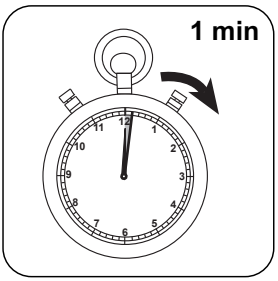
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **1 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in Alkalinity-m appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	$CaCO_3$	1
	°dH	0.056
	°eH	0.07
	°fH	0.1
	°aH	0.058
	$K_{S4.3}$	0.02

Chemical Method

Acid / Indicator

Appendix

Derived from

EN ISO 9963-1

Aluminium T M40

0.01 - 0.3 mg/L Al AL

Eriochrom Cyanine R

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Aluminium No. 1	Tablet / 100	515460BT
Aluminium No. 1	Tablet / 250	515461BT
Aluminium No. 2	Tablet / 100	515470BT
Aluminium No. 2	Tablet / 250	515471BT
Set Aluminium No. 1/No. 2 100 Pc.#	100 each	517601BT
Set Aluminium No. 1/No. 2 250 Pc.#	250 each	517602BT

Preparation

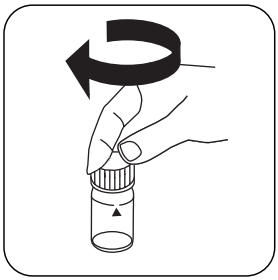
1. To get accurate results the sample temperature must be between 20 °C and 25 °C.
2. To avoid errors caused by contamination, rinse the vial and the accessories with Hydrochloric acid (approx. 20%) before the analysis. Then rinse them with deionised water.

Determination of Aluminium with Tablet

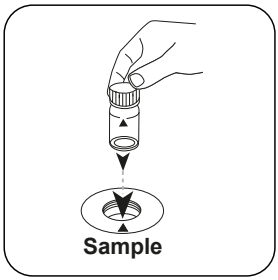
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

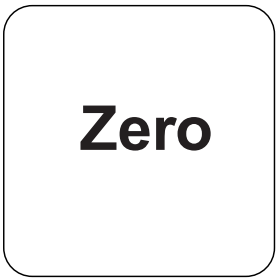
Fill 24 mm vial with **10 mL sample**.



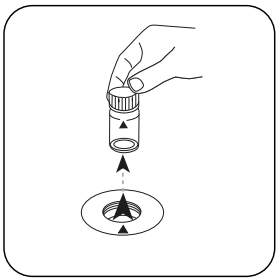
Close vial(s).



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

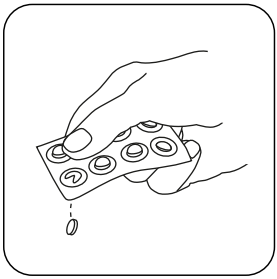


Press the **ZERO** button.

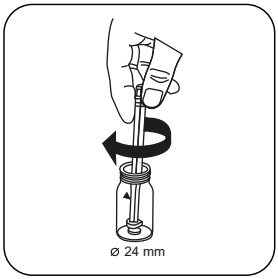


Remove the vial from the sample chamber.

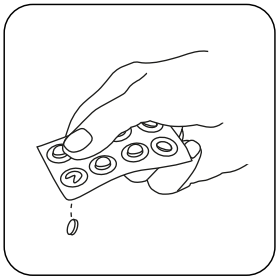
For devices that require **no ZERO measurement** , **start here**.



Add **ALUMINIUM No. 1 tablet** .

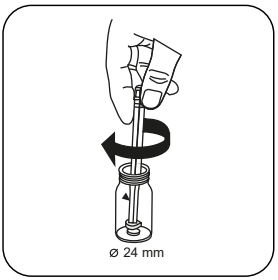


Crush tablet(s) by rotating slightly and dissolve.

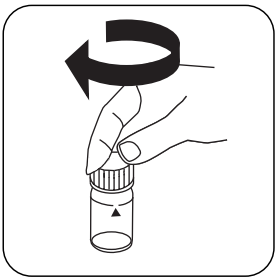


Add **ALUMINIUM No. 2 tablet** .

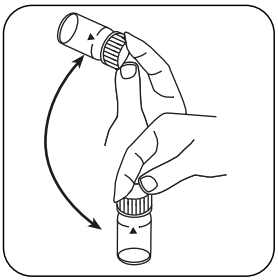
EN



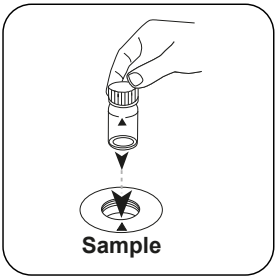
Crush tablet(s) by rotating slightly.



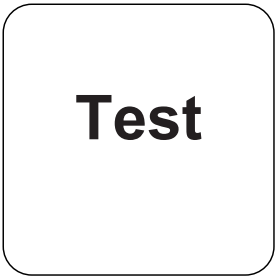
Close vial(s).



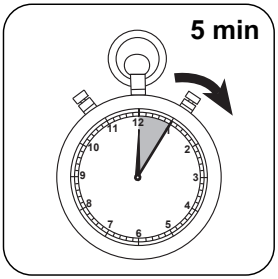
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **5 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Aluminium appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	Al	1
mg/l	Al_2O_3	1.8894

Chemical Method

Eriochrom Cyanine R

Appendix

Interferences

Removeable Interferences

- A low test result may be given in the presence of Fluorides and Polyphosphates. The effect of this is generally insignificant unless the water has fluoride added artificially. In this case, the following table should be used to determine the actual concentration of aluminium.
- A special tablet ingredient prevents the measurement being affected as a result of iron and manganese.

Fluoride	Displayed value: Aluminium [mg/L]					
[mg/L F]	0.05	0.10	0.15	0.20	0.25	0.30
0.2	0.05	0.11	0.16	0.21	0.27	0.32
0.4	0.06	0.11	0.17	0.23	0.28	0.34
0.6	0.06	0.12	0.18	0.24	0.30	0.37
0.8	0.06	0.13	0.20	0.26	0.32	0.40
1.0	0.07	0.13	0.21	0.28	0.36	0.45
1.5	0.09	0.20	0.29	0.37	0.48	---

Method Validation

Limit of Detection	0.02 mg/L
Limit of Quantification	0.044 mg/L
End of Measuring Range	0.3 mg/L
Sensitivity	0.17 mg/L / Abs
Confidence Intervall	0.014 mg/L
Standard Deviation	0.006 mg/L
Variation Coefficient	3.71 %

Bibliography

Richter, F. Fresenius, Zeitschrift f. anal. Chemie (1943) 126: 426

According to

APHA Method 3500-Al B

including stirring rod, 10 cm

Aluminium PP M50

0.01 - 0.25 mg/L Al AL

Eriochrom Cyanine R

EN

Material

Required material (partly optional):

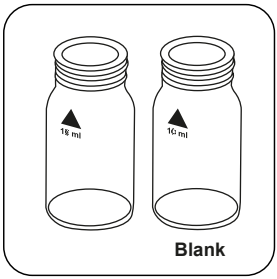
Reagents	Packaging Unit	Part Number
VARIO Aluminium Reagent, Set F20	1 Pieces	535000

Preparation

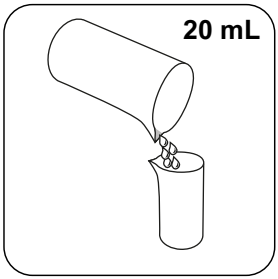
1. To get accurate results the sample temperature must be between 20 °C and 25 °C.
2. To avoid errors caused by contamination, rinse the vial and the accessories with Hydrochloric acid (approx. 20%) before the analysis. Then rinse them with deionised water.

Determination of Aluminium with Vario Powder Pack

Select the method on the device.

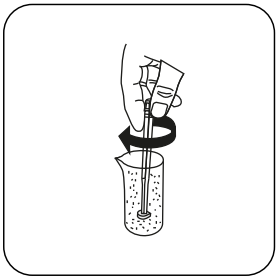


Prepare two clean 24 mm vials. Mark one as a blank.

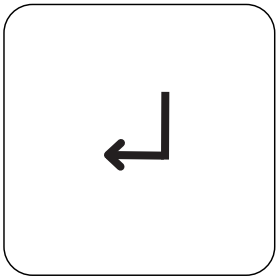


Put **20 mL sample** in 100 mL measuring beaker

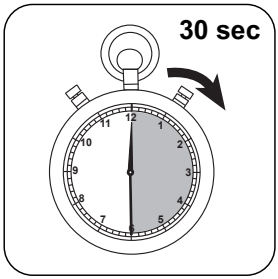
Add **Vario ALUMINIUM ECR F20 powder pack**.



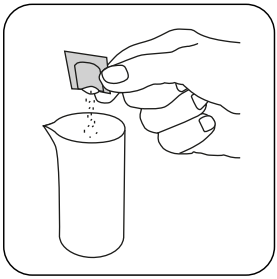
Dissolve the powder by mixing.



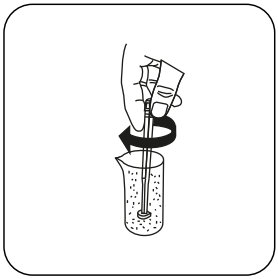
Press the **ENTER** button.



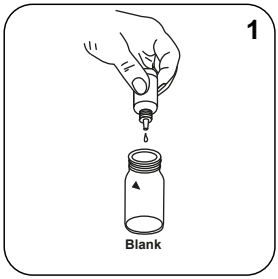
Wait for **30 second(s) reaction time**.



Add **Vario HEXAMINE F20 powder pack**.



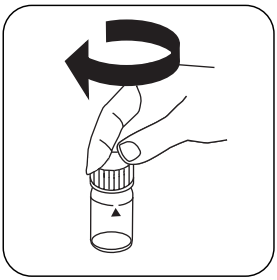
Dissolve the powder by mixing.



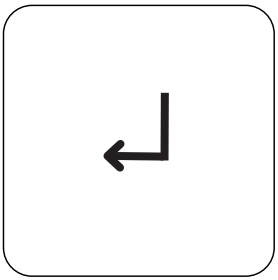
Place **1 drops Vario ALUMINIUM ECR Masking Reagent** in the blank.

EN

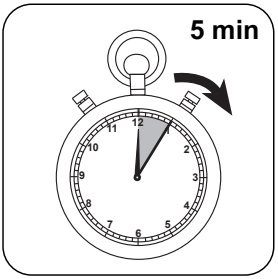
Place **10 mL pre-treated sample** in each vial.



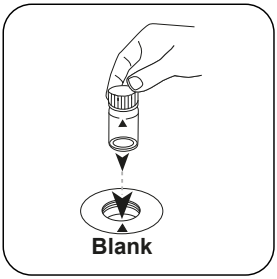
Close vial(s).



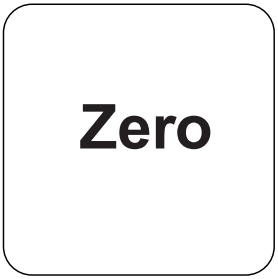
Press the **ENTER** button.



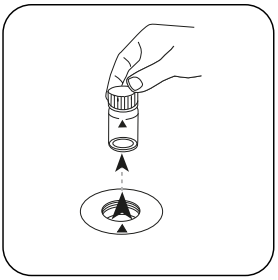
Wait for **5 minute(s) reaction time**.



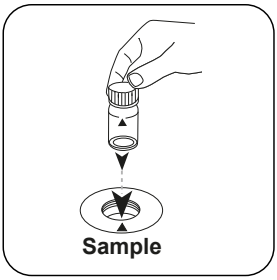
Place **blank** in the sample chamber. Pay attention to the positioning.



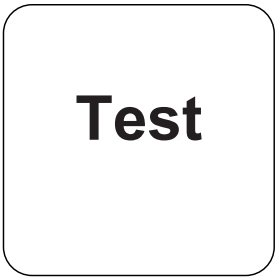
Press the **ZERO** button.



Remove the vial from the sample chamber.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L Aluminium appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	Al	1
mg/l	Al_2O_3	1.8894

Chemical Method

Eriochrom Cyanine R

Appendix

Interferences

Removeable Interferences

- A low test result may be given in the presence of Fluorides and Polyphosphates. The effect of this is generally insignificant unless the water has fluoride added artificially. In this case, the following table should be used to determine the actual concentration of aluminium.

Fluoride	Displayed value: Aluminium [mg/L]					
[mg/L F]	0.05	0.10	0.15	0.20	0.25	0.30
0.2	0.05	0.11	0.16	0.21	0.27	0.32
0.4	0.06	0.11	0.17	0.23	0.28	0.34
0.6	0.06	0.12	0.18	0.24	0.30	0.37
0.8	0.06	0.13	0.20	0.26	0.32	0.40
1.0	0.07	0.13	0.21	0.28	0.36	0.45
1.5	0.09	0.20	0.29	0.37	0.48	---

Bibliography

Richter, F. Fresenius, Zeitschrift f. anal. Chemie (1943) 126: 426

According to

APHA Method 3500-Al B

Ammonia T M60

0.02 - 1 mg/L N A

Indophenole Blue

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Ammonia No. 1	Tablet / 100	512580BT
Ammonia No. 1	Tablet / 250	512581BT
Ammonia No. 2	Tablet / 100	512590BT
Ammonia No. 2	Tablet / 250	512591BT
Set Ammonia No. 1/No. 2 100 Pc.#	100 each	517611BT
Set Ammonia No. 1/No. 2 250 Pc.#	250 each	517612BT
Ammonia Conditioning Powder	Powder / 26 g	460170

Preparation

1. Sea water samples:
   Ammonia conditioning reagent is required when testing sea water or brackish water samples to prevent precipitation (settlement) of salts.
   Fill the test tube with the sample to the 10 ml mark and add two level spoonful of Aluminium Conditioning Powder. Close the vials with the caps and swirl until the powder has dissolved. Then proceed as described.

Remarks

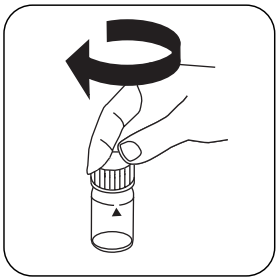
1. The AMMONIA No. 1 tablet will only dissolve completely after the AMMONIA No. 2 Tablet has been added.
2. The temperature of the sample is important for full colour development. At temperatures of below 20 °C the reaction period is 15 minutes.

Determination of Ammonium with Tablet

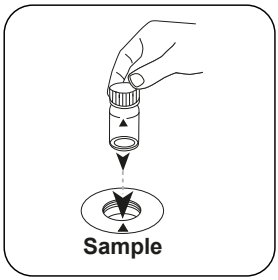
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

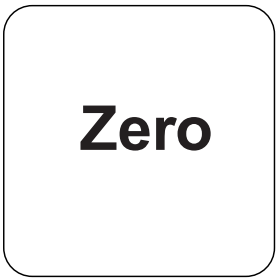
Fill 24 mm vial with **10 mL sample**.



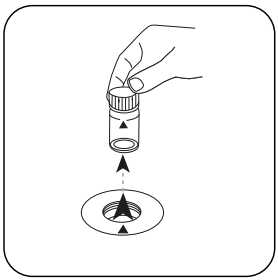
Close vial(s).



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

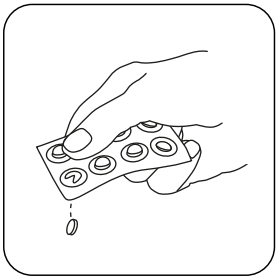


Press the **ZERO** button.

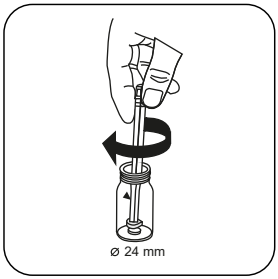


Remove the vial from the sample chamber.

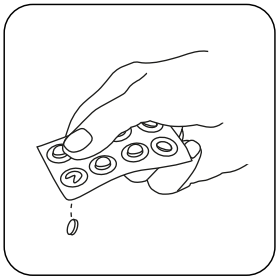
For devices that require **no ZERO measurement** , **start here**.



Add **AMMONIA No. 1 tablet** .

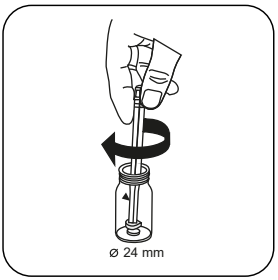


Crush tablet(s) by rotating slightly.

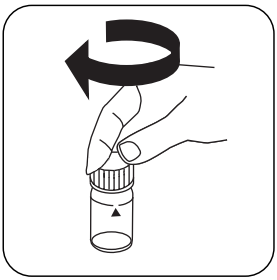


Add **AMMONIA No. 2 tablet** .

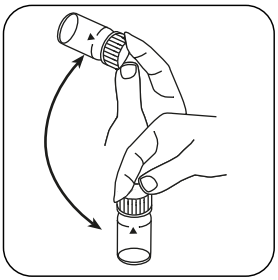
EN



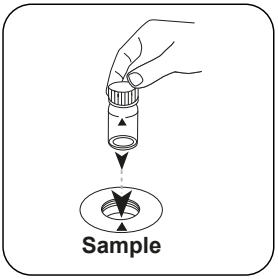
Crush tablet(s) by rotating slightly.



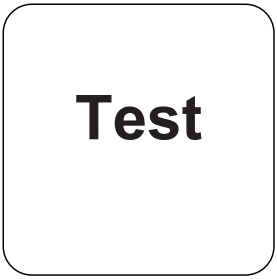
Close vial(s).



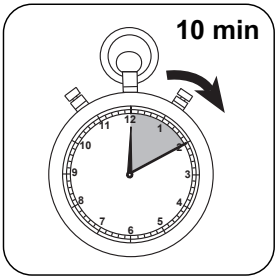
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **10 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Ammonium appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	N	1
mg/l	NH_4	1.2878
mg/l	NH_3	1.2158

Chemical Method

Indophenole Blue

Appendix

Interferences

Persistant Interferences

- Sulphides, cyanides, rhodanide, aliphatic amine and aniline interfere in higher concentrations.

Bibliography

Photometrische Analyseverfahren, Schwedt, Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 1989

According to

APHA Method 4500-NH3 F

including stirring rod, 10 cm

Chlorine (free) and Monochloramine M64

0.02 - 4.50 mg/L Cl_2 CL2

Indophenole method

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO Free Chlorine Reagent Solution - 30 ml	30 mL	531820
VARIO Monochlor F Rgt - 100	Powder / 100 Pieces	531810
Vario Rochelle Salt Solution, 30 ml [h)]	30 mL	530640

Remarks

1. Full colour development – temperature
   The reaction periods indicated in the manual refer to a sample temperature between 12 °C and 14 °C. Due to the fact that the reaction period is strongly influenced by sample temperature, you have to adjust both reaction periods according to the following table:

Sample temperature		Reaction period in **X** min
°C	°F	
5	41	10
7	45	9
9	47	8
10	50	8
12	54	7
14	57	7
16	61	6
18	64	5
20	68	5
23	73	2.5
25	77	2
> 25	> 77	2

2. Press [Enter] key to to cancel a reaction period.
3. Hold the bottle vertically and squeeze slowly.
4. To determine the chlorine concentration the difference between the monochloramine and the sum of monochloramine and chlorine is calculated. If one measured value exceeds the range limit the following message is displayed:
   $Cl_2[NH_2Cl] + Cl_2 > 4.5$ mg/L
   In this case the sample has to be diluted and the measurement repeated.

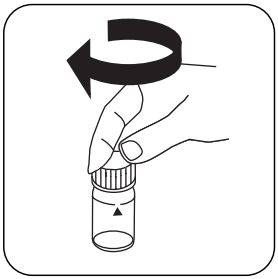
EN

Determination of Free Chlorine in absence of Monochloramine

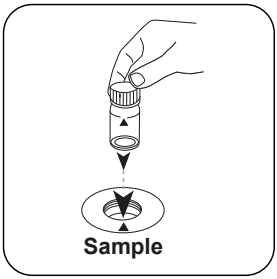
Select the method on the device.

In addition, choose the test: free Chlorine in absence of Monochloramine

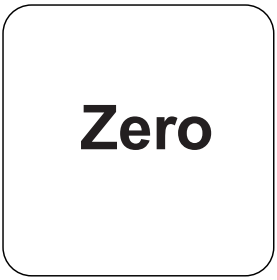
Fill 24 mm vial with **10 mL sample**.



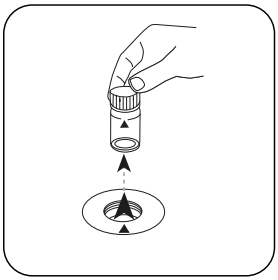
Close vial(s).



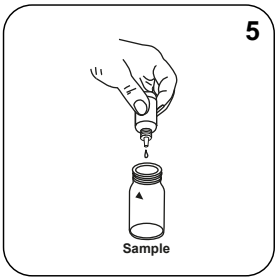
Place **sample vial** in the sample chamber. Pay attention to the positioning.



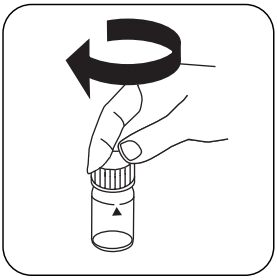
Press the **ZERO** button.



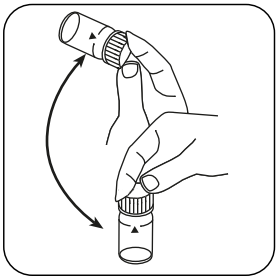
Remove the vial from the sample chamber.



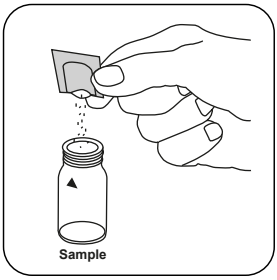
Add **5 drops Free Chlorine Reagent Solution** to the **sample vial**.



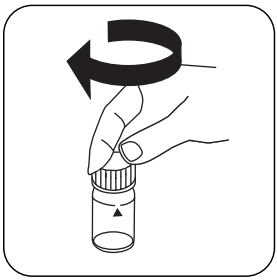
Close vial(s).



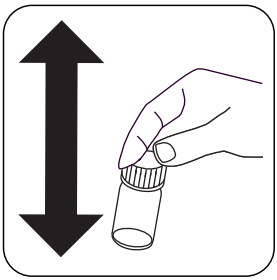
Invert several times to mix the contents (15 sec.).



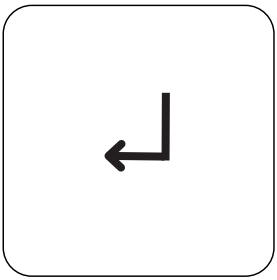
Add **Monochlor FRGT powder pack**.



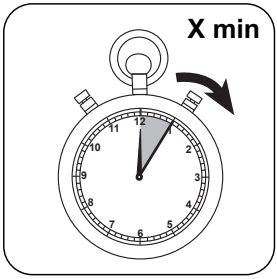
Close vial(s).



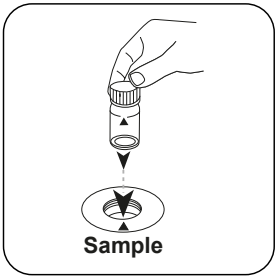
Dissolve the contents by shaking. (20 sec.)



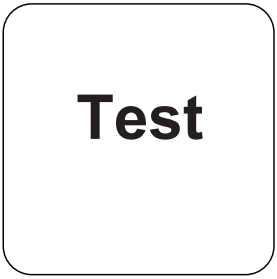
Press the **ENTER** button for countdown.
(XD: start timer)



Reaction time **X minute(s)** according to table. **Wait for reaction time**.



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



Press the **TEST** (XD: **START**)button.

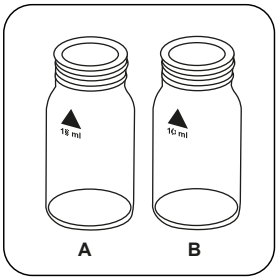
The result in mg/L free Chlorine appears on the display.

Determination of free Chlorine and Monochloramine

Select the method on the device.

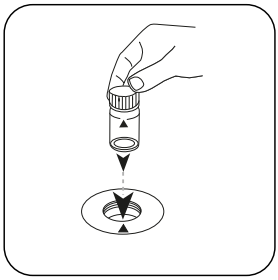
In addition, choose the test: Free Chlorine

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



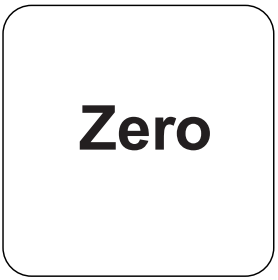
Prepare two clean 24 mm vials. Mark one as Chloramine and the other as Chlorine vial.

Place **10 mL sample** in each vial.

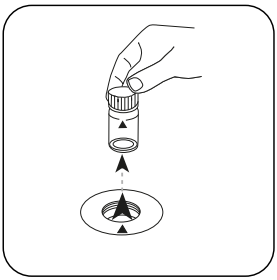


Place Chlorine **vial** in the sample chamber. • Pay attention to the positioning.

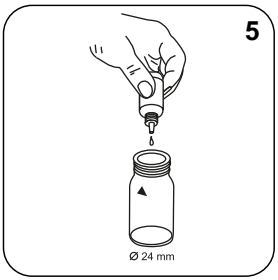
EN



Press the **ZERO** button.

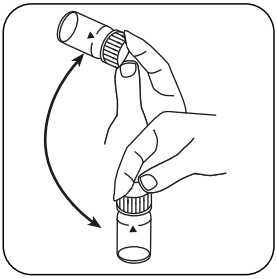


Remove the vial from the sample chamber.

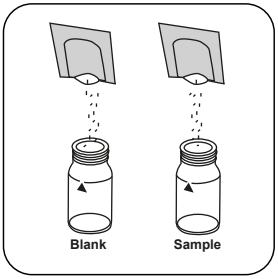


Add **5 drops Free Chlorine Reagent Solution** to the **Chlorine vial**.

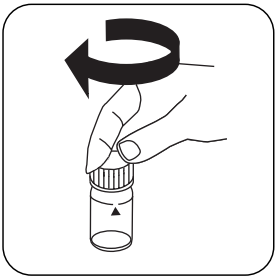
Close vial(s).



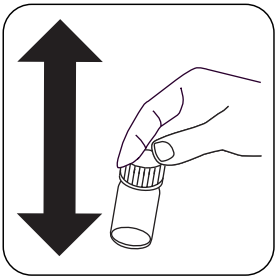
Invert several times to mix the contents (approx. 15 sec).



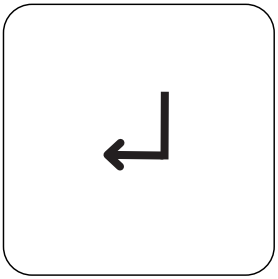
Add **a Monochlor FRGT powder pack** simultaneously in each vial.



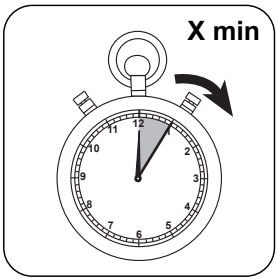
Close vial(s).



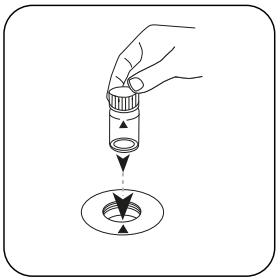
Dissolve the contents by shaking. (20 sec.)



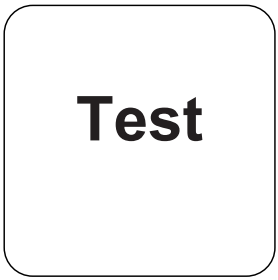
Press the **ENTER** button for countdown.
(XD: start timer)



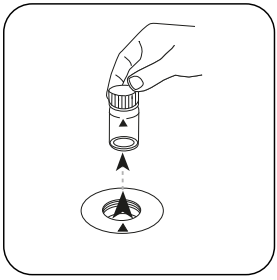
Reaction time **X minute(s)** according to table. **Wait for reaction time**.



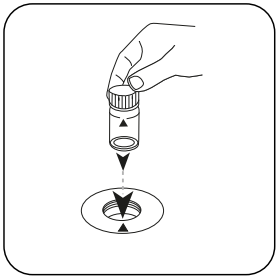
Place Chloramine **vial** in the sample chamber. • Pay attention to the positioning.



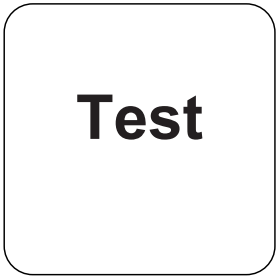
Press the **TEST** (XD: **START**)button.



Remove the vial from the sample chamber.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L Chlorine and mg/l Monochloramine - Chlorine Cl [NH_2Cl] appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	Cl_2	1
mg/l	NH_2Cl	0.72598
mg/l	$N[NH_2Cl]$	0.19754
mg/l	NH_3	0.24019

EN

Chemical Method

Indophenole method

Interferences

Removeable Interferences

Disturbances caused by precipitation caused by magnesium hardness of more than 400 mg / l $CaCO_3$ can be eliminated by adding 5 drops of Rochelle salt solution.

Interference	from / [mg/L]
Alanine (N)	1
Aluminium (Al)	10
Bromide (Br^-)	100
Bromine (Br_2)	15
Calcium ($CaCO_3$)	1000
Chloride (Cl^-)	18.000
Chlorine Dioxide (ClO_2)	5
Copper (Cu)	10
Dichloramine (Cl_2)	10
Fluoride (F^-)	5
Glycine (N)	1
Iron (II) (Fe^{2+})	10
Iron (III) (Fe^{3+})	10
Lead (Pb)	10
Permanganate	3
Nitrate (N)	100
Nitrite (N)	50
Sulfide	0.5

Interference	from / [mg/L]
Phosphate (PO_4)	100
Silica (SiO_2)	100
Sulfate (SO_4^{2+})	2600
Sulfite (SO_3^{2-})	50
Ozone	1
Tyrosine (N)	1
Urea (N)	10
Zinc (Zn)	5

Method Validation

Limit of Detection	0.010 mg/L
Limit of Quantification	0.03 mg/L
End of Measuring Range	4.5 mg/L
Sensitivity	1.78 mg/L / Abs
Confidence Intervall	0.044 mg/L
Standard Deviation	0.018 mg/L
Variation Coefficient	0.78 %

PHMB T M70

2 - 60 mg/L PHMB

Buffer / Indicator

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
PHMB Photometer	Tablet / 100	516100BT
PHMB Photometer	Tablet / 250	516101BT

Remarks

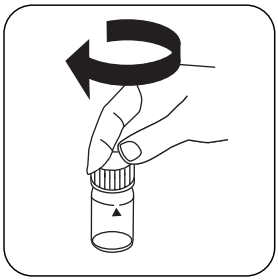
1. After the end of the test, the vials must be immediately rinsed and cleaned with a brush.
2. During extended use, vials and stirring rods can become discoloured blue. This discolouration can be easily removed if the vials and stirring rod are cleaned with a lab cleaner. Rinse thoroughly with tap water and then with deionised water.
3. With this test, the result will influence the analysis of the hardness and acid capacity of the water sample. This method is adjusted using water with the following composition:
   Calcium hardness: 2 mmol/l
   Acid capacity: 2.4 mmol/l.

Determination of PHMB (Biguanide) with Tablet

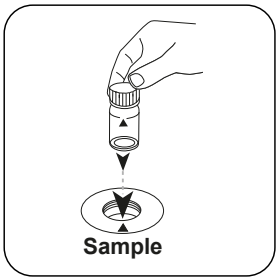
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

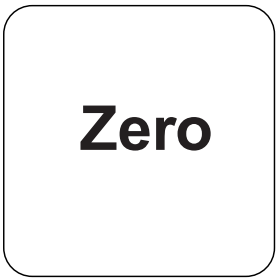
Fill 24 mm vial with **10 mL sample**.



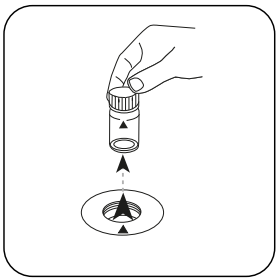
Close vial(s).



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

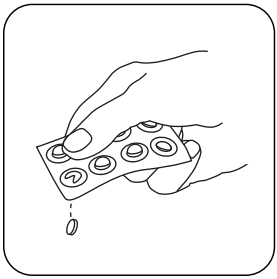


Press the **ZERO** button.

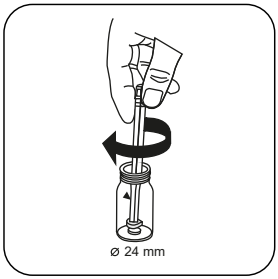


Remove the vial from the sample chamber.

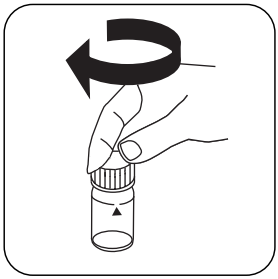
For devices that require **no ZERO measurement** , **start here**.



Add **PHMB PHOTOMETER tablet**.

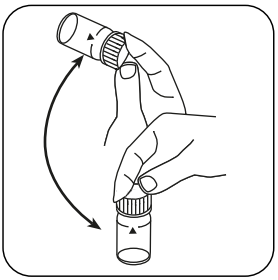


Crush tablet(s) by rotating slightly.

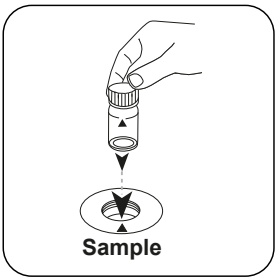


Close vial(s).

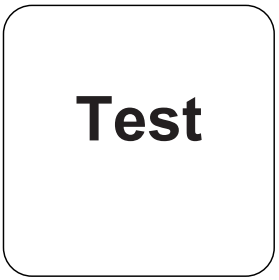
EN



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L PHMB appears on the display.

Chemical Method

Buffer / Indicator

Bromine T M80

0.05 - 13 mg/L Br_2 Br

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD No.1	Tablet / 100	511050BT
DPD No. 1	Tablet / 250	511051BT
DPD No. 1	Tablet / 500	511052BT
DPD No. 1 High Calcium e)	Tablet / 100	515740BT
DPD No. 1 High Calcium e)	Tablet / 250	515741BT
DPD No. 1 High Calcium e)	Tablet / 500	515742BT

Preparation

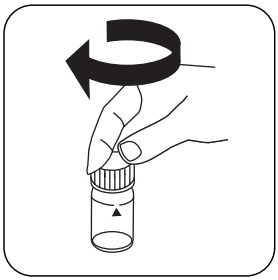
1. Cleaning of vials:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of oxidising agents (e.g. ozone and chlorine) may show lower results. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve this, all glassware should be placed in a sodium hypochlorite solution (0.1 g/L) for one hour and then rinsed thoroughly with deionised water.
2. When preparing the sample, Bromine outgassing, e.g. through the pipette or shaking, must be avoided. The analysis must take place immediately after taking the sample.
3. Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

Determination of Bromine with Tablet

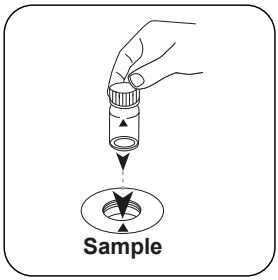
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

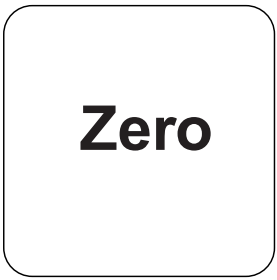
Fill 24 mm vial with **10 mL sample**.



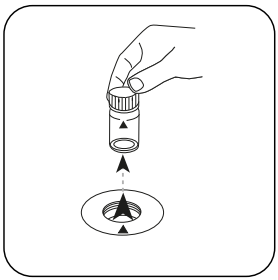
Close vial(s).



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



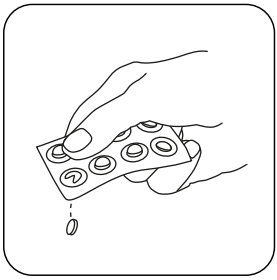
Press the **ZERO** button.



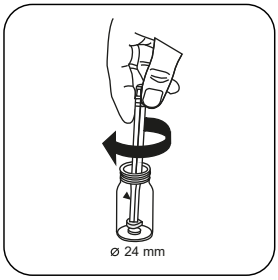
Remove the vial from the sample chamber.

Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.



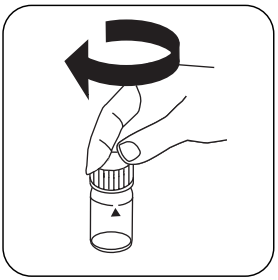
Add **DPD No. 1 tablet** .



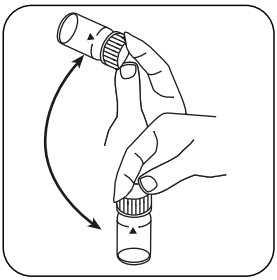
Crush tablet(s) by rotating slightly.

Fill up vial with **sample** to the **10 mL mark**.

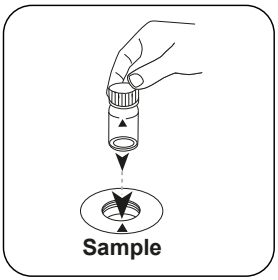
EN



Close vial(s).



Dissolve tablet(s) by inverting.



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

Press the **TEST** (XD: **START**)button.

The result in mg/L Bromine appears on the display.

Chemical Method

DPD

Appendix

Interferences

Persistant Interferences

1. All oxidising agents in the samples react like bromine, which leads to higher results.
2. Concentrations above 22 mg/L Bromine can lead to results within the measuring range of up to 0 mg/L. In this case, the water sample must be diluted. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

Derived from

US EPA 330.5 (1983)
APHA Method 4500 Cl-G

[e)] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity

Chlorine T M100

0.01 - 6.0 mg/L Cl_2 [a] CL6

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD No.1	Tablet / 100	511050BT
DPD No. 1	Tablet / 250	511051BT
DPD No. 1	Tablet / 500	511052BT
DPD No. 3	Tablet / 100	511080BT
DPD No. 3	Tablet / 250	511081BT
DPD No. 3	Tablet / 500	511082BT
DPD No. 1 High Calcium [e]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e]	Tablet / 500	515742BT
DPD No. 3 High Calcium [e]	Tablet / 100	515730BT
DPD No. 3 High Calcium [e]	Tablet / 250	515731BT
DPD No. 3 High Calcium [e]	Tablet / 500	515732BT
DPD No. 4	Tablet / 100	511220BT
DPD No. 4	Tablet / 250	511221BT
DPD No. 4	Tablet / 500	511222BT
DPD No. 3 Evo	Tablet / 100	511420BT
DPD No. 3 Evo	Tablet / 250	511421BT
DPD No. 3 Evo	Tablet / 500	511422BT
DPD No. 4 Evo	Tablet / 100	511970BT
DPD No. 4 Evo	Tablet / 250	511971BT
DPD No. 4 Evo	Tablet / 500	511972BT

Available Standards

Title	Packaging Unit	Part Number
ValidCheck Chlorine 1,5 mg/l	1 Pieces	48105510

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 deionised 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 colour 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 sulphuric acid or 1 mol/L sodium hydroxide).

Remarks

1. Evo tablets can be used as an alternative to the corresponding standard tablet (e.g. DPD No.3 Evo instead of DPD No.3).

EN

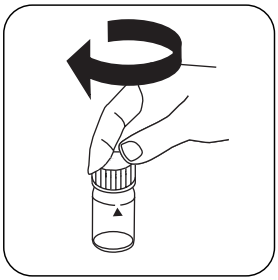
Determination of free chlorine with tablet

Select the method on the device.

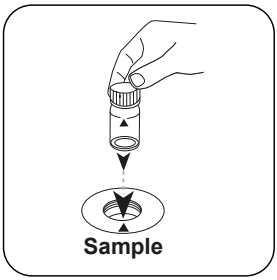
In addition, choose the test: free

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

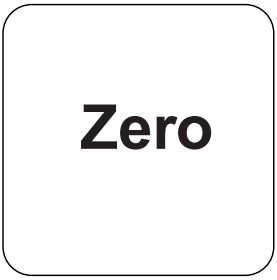
Fill 24 mm vial with **10 mL sample**.



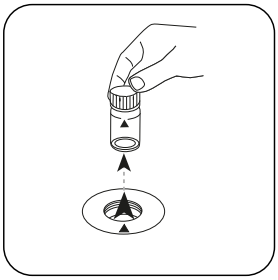
Close vial(s).



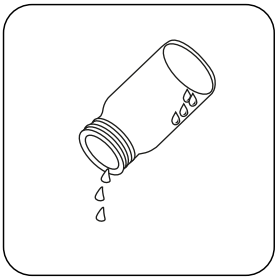
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.

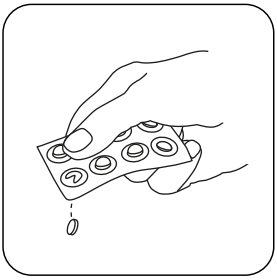


Remove the vial from the sample chamber.

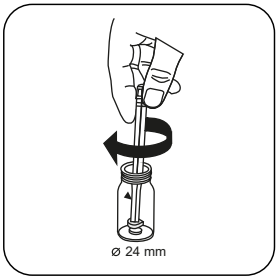


Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.

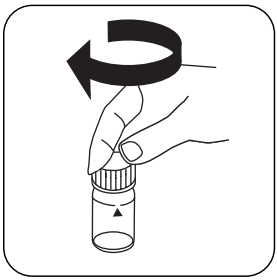


Add **DPD No. 1 tablet** .

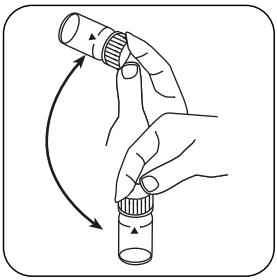


Crush tablet(s) by rotating slightly.

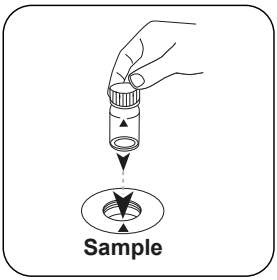
Fill up vial with **sample** to the **10 mL mark**.



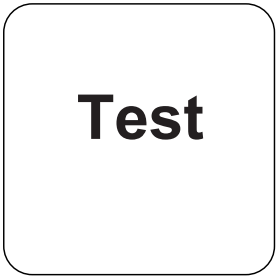
Close vial(s).



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L free chlorine appears on the display.

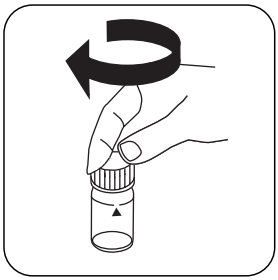
Determination of total Chlorine with tablet

Select the method on the device.

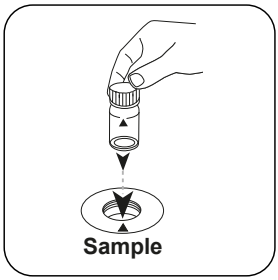
In addition, choose the test: total

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

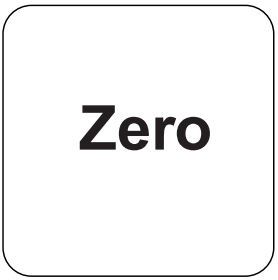


Close vial(s).

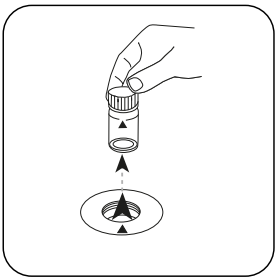


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



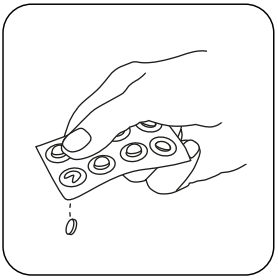
Press the **ZERO** button.



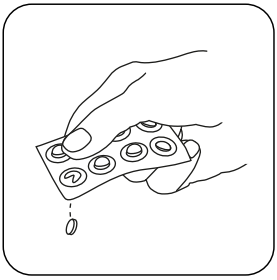
Remove the vial from the sample chamber.

Empty vial except for a few drops.

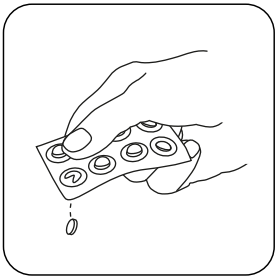
For devices that require **no ZERO measurement** , **start here**.



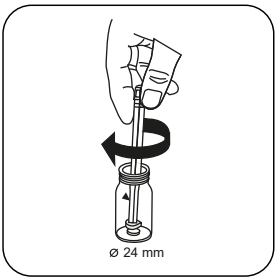
Add **DPD No. 1 tablet** .



Add **DPD No. 3 tablet** .

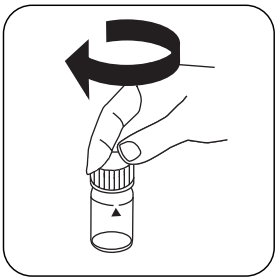


As an alternative to DPD No. 1 and No. 3 tablets, a DPD No. 4 tablet can be added.

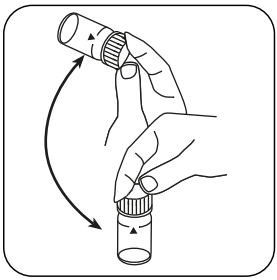


Crush tablet(s) by rotating slightly.

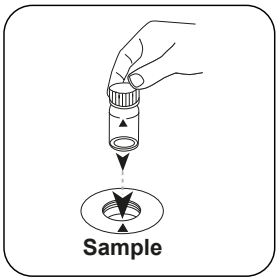
Fill up vial with **sample** to the **10 mL mark**.



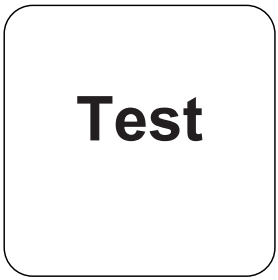
Close vial(s).



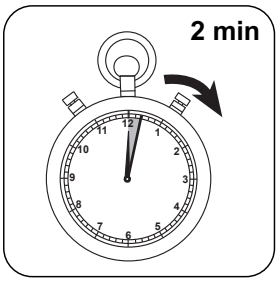
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L total Chlorine appears on the display.

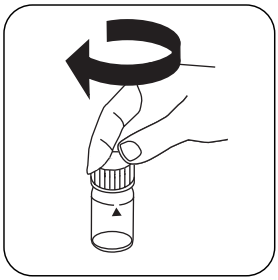
Determination of Chlorine differentiated with tablet

Select the method on the device.

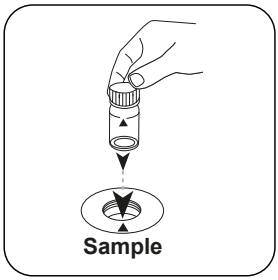
In addition, choose the test: differentiated

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

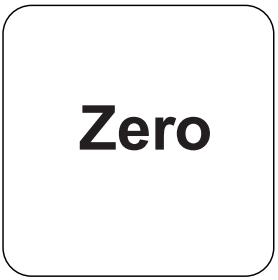


Close vial(s).

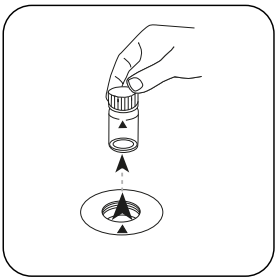


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



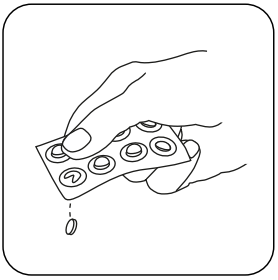
Press the **ZERO** button.



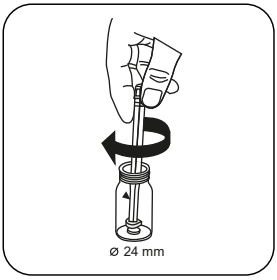
Remove the vial from the sample chamber.

Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.



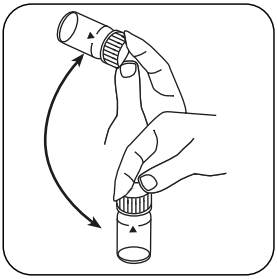
Add **DPD No. 1 tablet** .



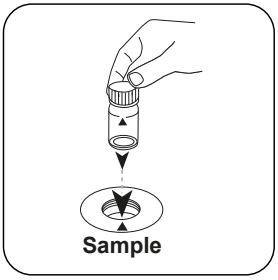
Crush tablet(s) by rotating slightly.

Fill up vial with **sample** to the **10 mL mark**.

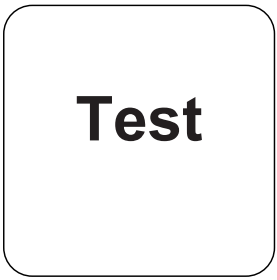
Close vial(s).



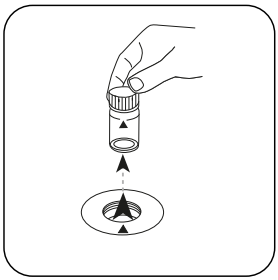
Dissolve tablet(s) by inverting.



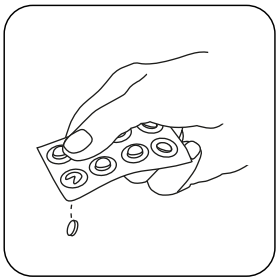
Place **sample vial** in the sample chamber. Pay attention to the positioning.



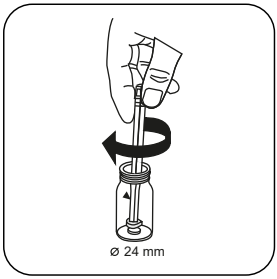
Press the **TEST** (XD: **START**)button.



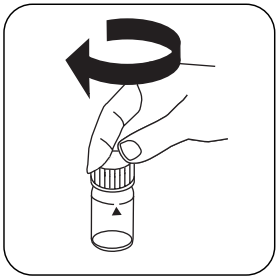
Remove the vial from the sample chamber.



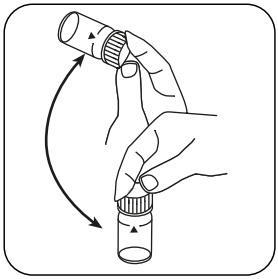
Add **DPD No. 3 tablet** .



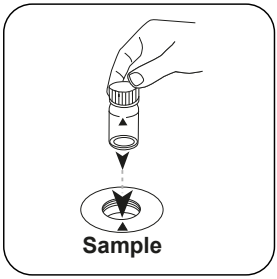
Crush tablet(s) by rotating slightly.



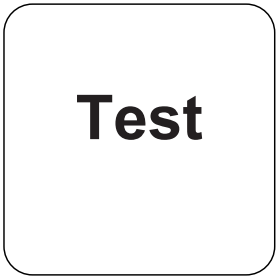
Close vial(s).



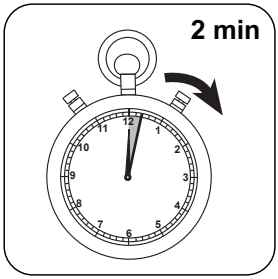
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free chlorine, mg/l combined chlorine, mg/l total chlorine appears on the display.

Chemical Method

DPD

Appendix

EN

Interferences

Persistant Interferences

- All oxidising 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.
- The use of reagent tablets in samples with high calcium content* and/or high conductivity* can lead to turbidity of the sample and therefore incorrect measurements. In this case, the alternative reagent tablet DPD No.1 High Calcium and reagent tablet DPD No.3 High Calcium should be used.
  *it is not possible to give exact values, because the development of turbidity depends on the composition and nature of the sample.
- Concentrations above 10 mg/L chlorine, in the event of using fluid reagents, can lead to results within the measuring range of up to 0 mg/L. In the event of a high concentration of chlorine, 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	0.02 mg/L
Limit of Quantification	0.06 mg/L
End of Measuring Range	6 mg/L
Sensitivity	2.05 mg/L / Abs
Confidence Intervall	0.04 mg/L
Standard Deviation	0.019 mg/L
Variation Coefficient	0.87 %

Conformity

EN ISO 7393-2

[a] determination of free, combined and total | [e] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity

Chlorine L M101

0.02 - 4.0 mg/L Cl_2 [a] CL6

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD 1 Buffer Solution, Blue Bottle	15 mL	471010
DPD 1 Buffer Solution	100 mL	471011
DPD 1 Buffer Solution	1 Pieces	471016
DPD 1 Reagent Solution, Green Bottle	15 mL	471020
DPD 1 Reagent Solution	100 mL	471021
DPD 1 Reagent Solution	1 Pieces	471026
DPD 3 Solution, Red Bottle	15 mL	471030
DPD 3 Solution	100 mL	471031
DPD 3 Solution	1 Pieces	471036
DPD Reagent Set	1 Pieces	471056

Available Standards

Title	Packaging Unit	Part Number
ValidCheck Chlorine 1,5 mg/l	1 Pieces	48105510

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 deionised 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 colour 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 Sulphuric acid or 1 mol/l Sodium hydroxide).

Remarks

1. After use, ensure the cuvettes are once again closed with the respective same-coloured screw caps.
2. Reagent sets are to be stored in the cool at +6 °C to +10 °C.

Determination of free chlorine with liquid reagent

Select the method on the device.

In addition, choose the test: free

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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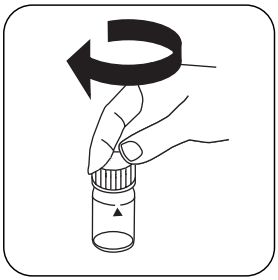
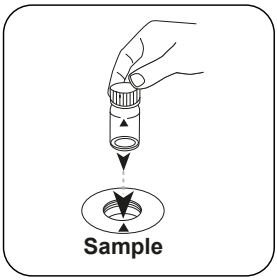
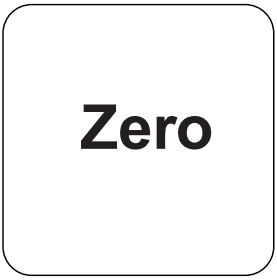
Fill 24 mm vial with **10 mL sample**.



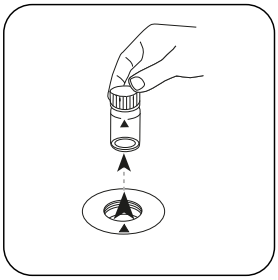
Close vial(s).



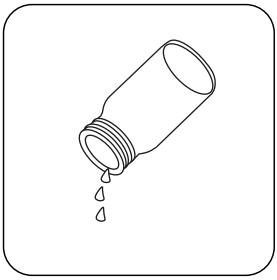
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.

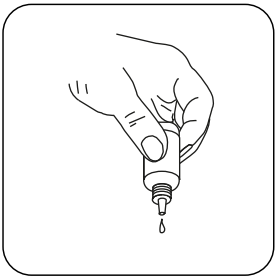


Remove the vial from the sample chamber.

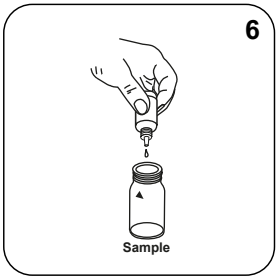


Empty vial.

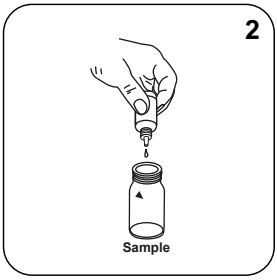
For devices that require **no ZERO measurement** , **start here**.



Hold cuvettes vertically and add equal drops by pressing slowly.

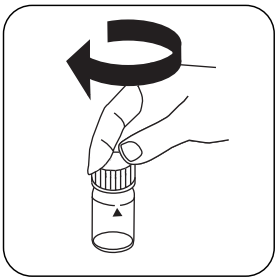


Add **6 drops DPD 1 Buffer Solution** to the **sample vial**.

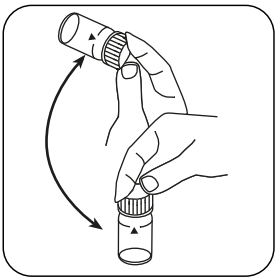


Add **2 drops DPD 1 Reagent Solution** to the **sample vial**.

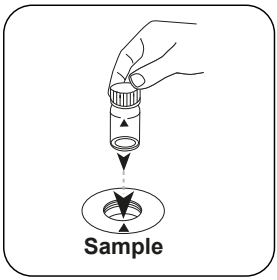
Fill up vial with **sample** to the **10 mL mark**.



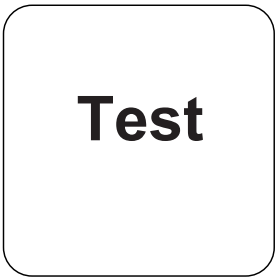
Close vial(s).



Invert several times to mix the contents.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L free chlorine appears on the display.

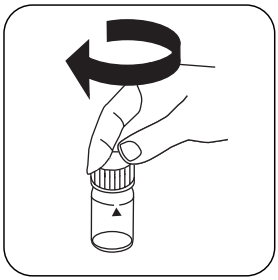
Determination of totale Chlorine with liquid reagent

Select the method on the device.

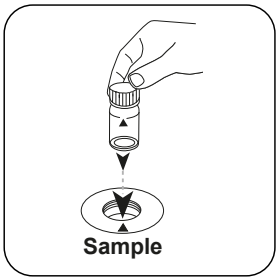
In addition, choose the test: total

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

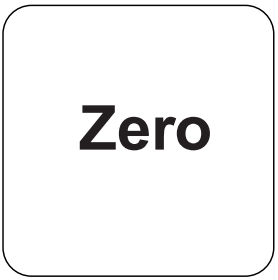


Close vial(s).

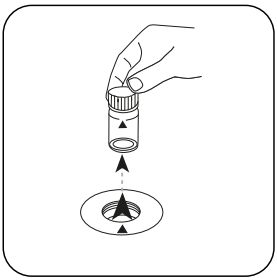


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



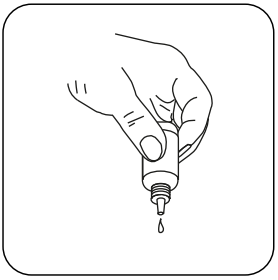
Press the **ZERO** button.



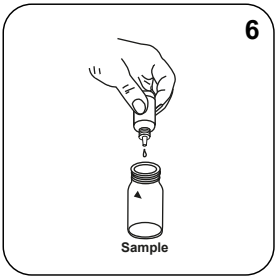
Remove the vial from the sample chamber.

Empty vial.

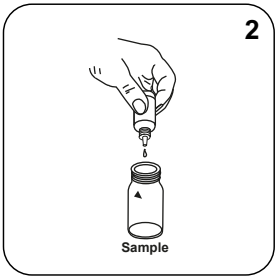
For devices that require **no ZERO measurement** , **start here**.



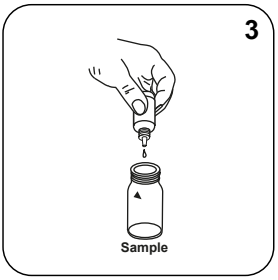
Hold cuvettes vertically and add equal drops by pressing slowly.



Add **6 drops DPD 1 Buffer Solution** to the **sample vial**.

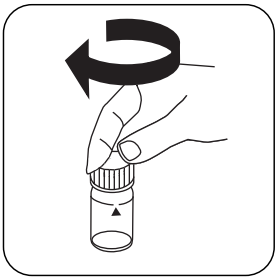


Add **2 drops DPD 1 Reagent Solution** to the **sample vial**.

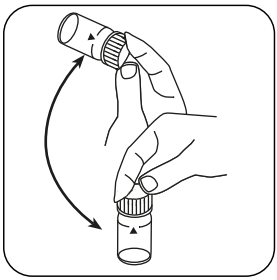


Add **3 drops DPD 3 Solution** to the **sample vial**.

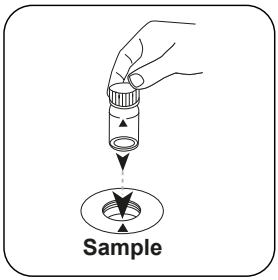
Fill up vial with **sample** to the **10 mL mark**.



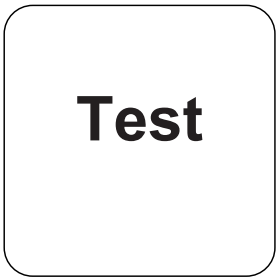
Close vial(s).



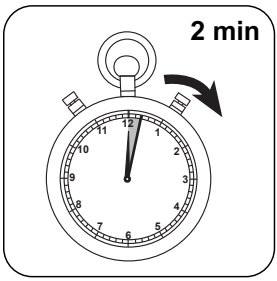
Invert several times to mix the contents.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L total Chlorine appears on the display.

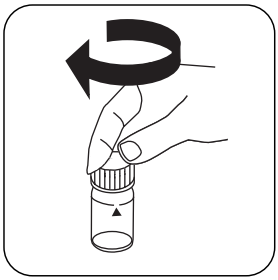
Determination of Chlorine differentiated with liquid reagent

Select the method on the device.

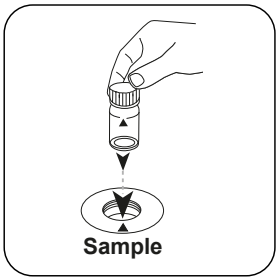
In addition, choose the test: differentiated

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

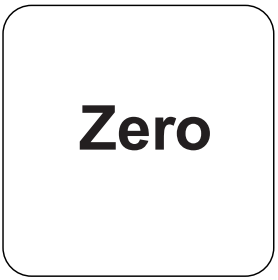


Close vial(s).

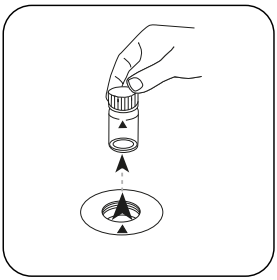


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



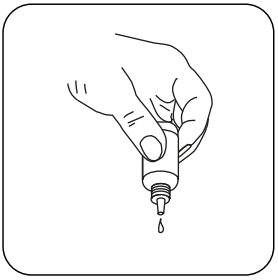
Press the **ZERO** button.



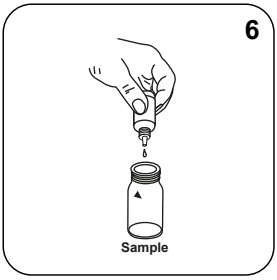
Remove the vial from the sample chamber.

Empty vial.

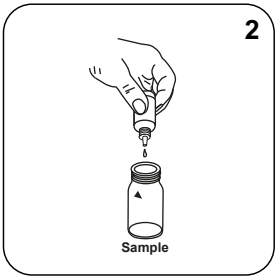
For devices that require **no ZERO measurement** , **start here**.



Hold cuvettes vertically and add equal drops by pressing slowly.



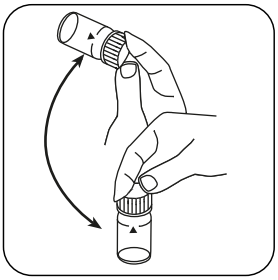
Add **6 drops DPD 1 Buffer Solution** to the **sample vial**.



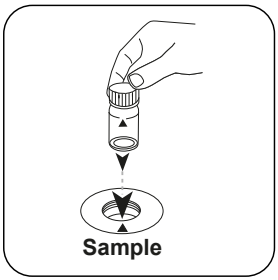
Add **2 drops DPD 1 Reagent Solution** to the **sample vial**.

Fill up vial with **sample** to the **10 mL mark**.

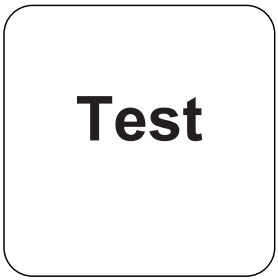
Close vial(s).



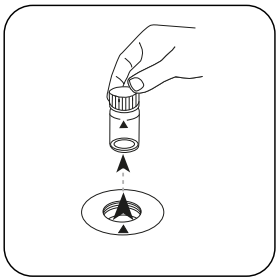
Invert several times to mix the contents.



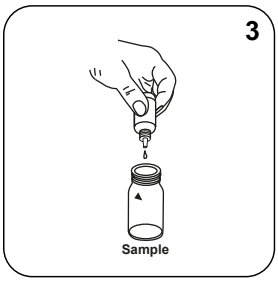
Place **sample vial** in the sample chamber. Pay attention to the positioning.



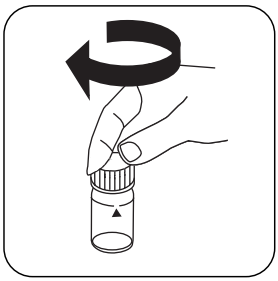
Press the **TEST** (XD: **START**)button.



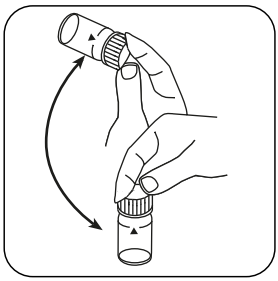
Remove the vial from the sample chamber.



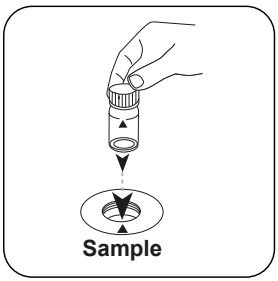
Add **3 drops DPD 3 Solution** to the **sample vial**.



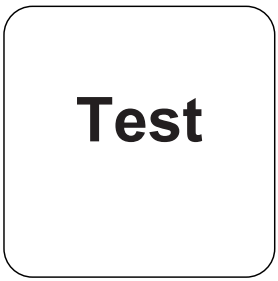
Close vial(s).



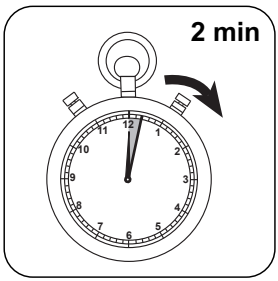
Invert several times to mix the contents.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free chlorine, mg/l gebundenes Chor, mg/l total chlorine appears on the display.

Chemical Method

DPD

Appendix

EN

Interferences

Persistant Interferences

- All oxidising 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 4 mg/L Chlorine, in the event of using fluid reagents, 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

Conformity

EN ISO 7393-2

[a] determination of free, combined and total

Chlorine HR T M103

0.1 - 10 mg/L Cl_2 [a] CL10

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD No. 1 HR	Tablet / 100	511500BT
DPD No. 1 HR	Tablet / 250	511501BT
DPD No. 1 HR	Tablet / 500	511502BT
DPD No. 3 HR	Tablet / 100	511590BT
DPD No. 3 HR	Tablet / 250	511591BT
DPD No. 3 HR	Tablet / 500	511592BT
Set DPD No. 1 HR/No. 3 HR 100 Pc. [#]	100 each	517791BT
Set DPD No. 1 HR/No. 3 HR 250 Pc. [#]	250 each	517792BT
DPD No. 1 High Calcium [e]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e]	Tablet / 500	515742BT
DPD No. 3 High Calcium [e]	Tablet / 100	515730BT
DPD No. 3 High Calcium [e]	Tablet / 250	515731BT
DPD No. 3 High Calcium [e]	Tablet / 500	515732BT
DPD No.3 HR Evo	Tablet / 100	511920BT
DPD No. 3 HREvo	Tablet / 250	511921BT
DPD No. 3 HREvo	Tablet / 500	511922BT

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 deionised 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 colour 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 sulphuric acid or 1 mol/L sodium hydroxide).

Remarks

1. Evo tablets can be used as an alternative to the corresponding standard tablet (e.g. DPD No.3 Evo instead of DPD No.3).

Determination of free chlorine HR with tablet

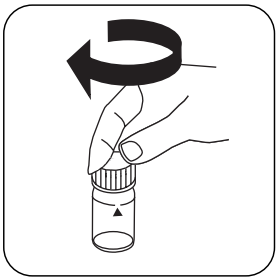
Select the method on the device.

In addition, choose the test: free

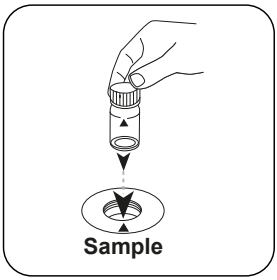
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

EN

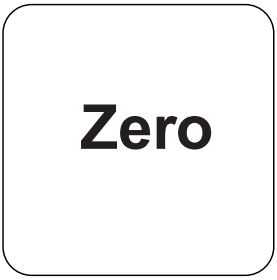
Fill 24 mm vial with **10 mL sample**.



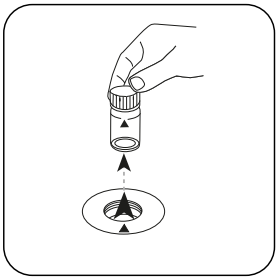
Close vial(s).



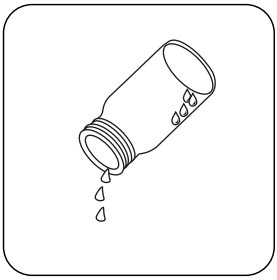
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.

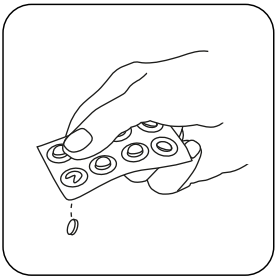


Remove the vial from the sample chamber.

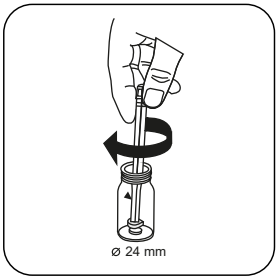


Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.

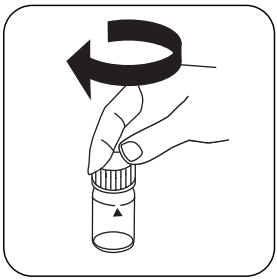


Add **DPD No. 1 HR tablet**.

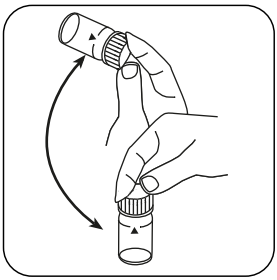


Crush tablet(s) by rotating slightly.

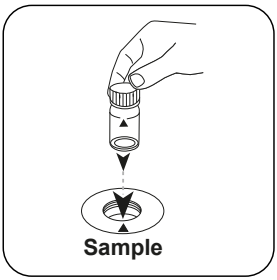
Fill up vial with **sample** to the **10 mL mark**.



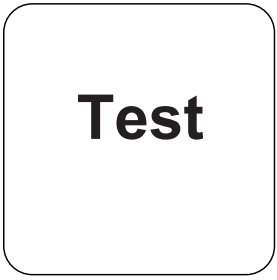
Close vial(s).



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L free chlorine appears on the display.

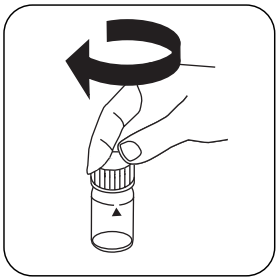
Determination of total Chlorine HR with tablet

Select the method on the device.

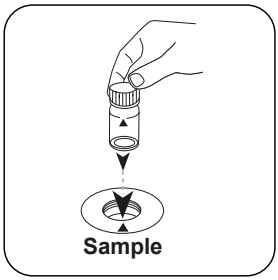
In addition, choose the test: total

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

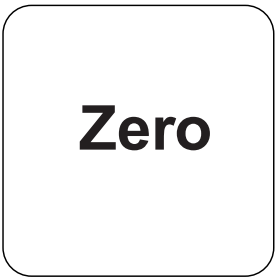


Close vial(s).

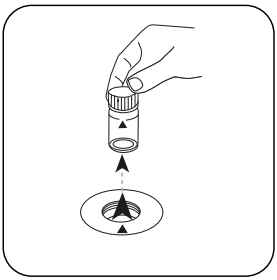


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



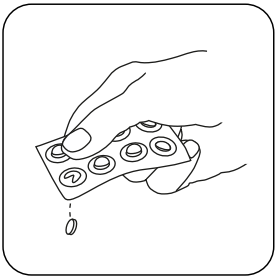
Press the **ZERO** button.



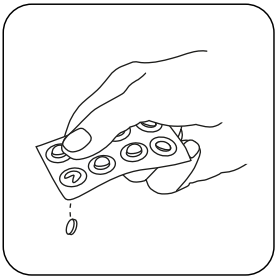
Remove the vial from the sample chamber.

Empty vial except for a few drops.

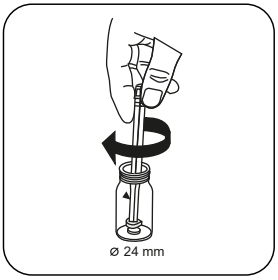
For devices that require **no ZERO measurement** , **start here**.



Add **DPD No. 1 HR tablet**.

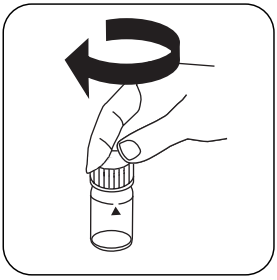


Add **DPD No. 3 HR tablet**.

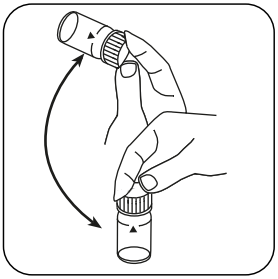


Crush tablet(s) by rotating slightly.

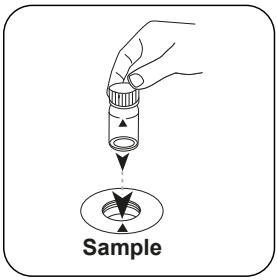
Fill up vial with **sample** to the **10 mL mark**.



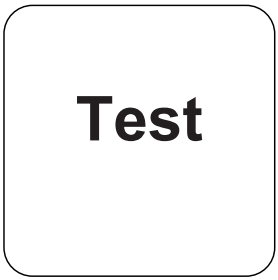
Close vial(s).



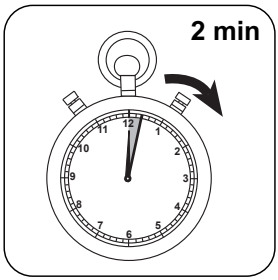
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

EN

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L total Chlorine appears on the display.

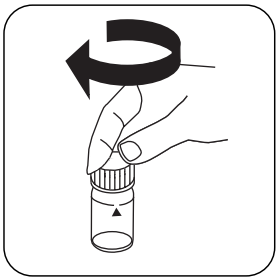
Determination of Chlorine HR differentiated with tablet

Select the method on the device.

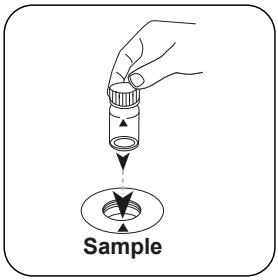
In addition, choose the test: differentiated

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

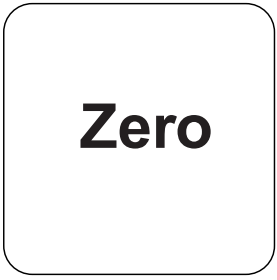
Fill 24 mm vial with **10 mL sample**.



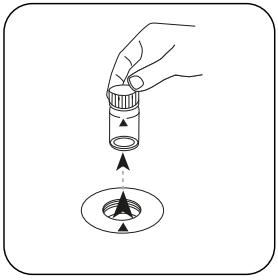
Close vial(s).



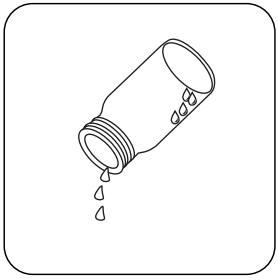
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.



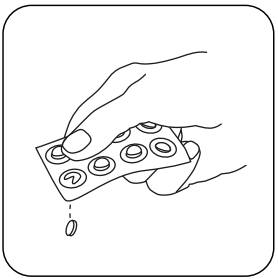
Remove the vial from the sample chamber.



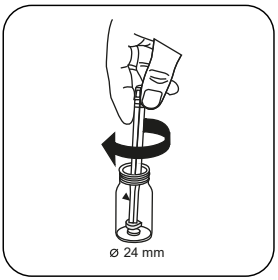
Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.

EN

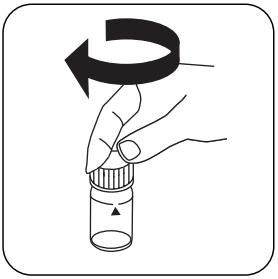


Add **DPD No. 1 HR tablet**.

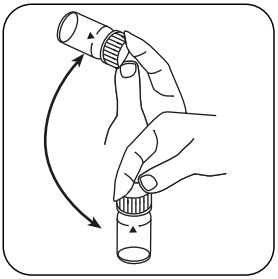


Crush tablet(s) by rotating slightly.

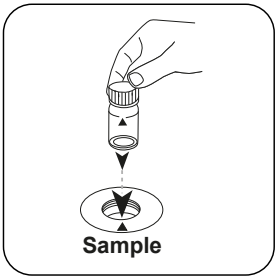
Fill up vial with **sample** to the **10 mL mark**.



Close vial(s).



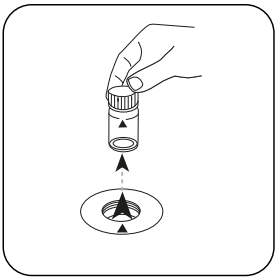
Dissolve tablet(s) by inverting.



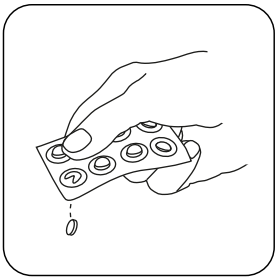
Place **sample vial** in the sample chamber. Pay attention to the positioning.

Test

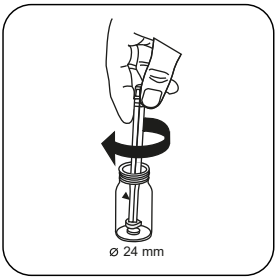
Press the **TEST** (XD: **START**)button.



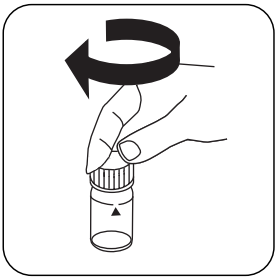
Remove the vial from the sample chamber.



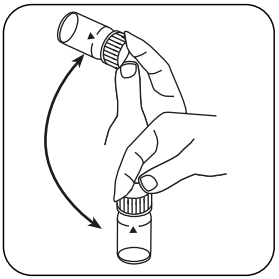
Add **DPD No. 3 HR tablet**.



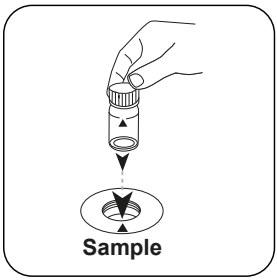
Crush tablet(s) by rotating slightly.



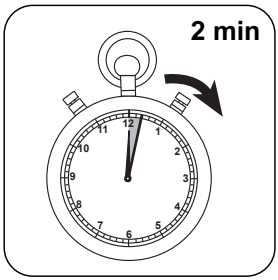
Close vial(s).



Dissolve tablet(s) by inverting.



Test



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

Press the **TEST** (XD: **START**)button.

Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free chlorine, mg/l combined chlorine, mg/l total chlorine appears on the display.

Chemical Method

DPD

Appendix

EN

Interferences

Persistant Interferences

- All oxidising 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.
- The use of reagent tablets in samples with high Calcium content* and/or high conductivity* can lead to turbidity of the sample and therefore incorrect measurements. In this case, the alternative reagent tablet DPD No. 1 High Calcium and reagent tablet DPD No. 3 High Calcium should be used.
  *it is not possible to give exact values, because the development of turbidity depends on the composition and nature of the sample.

Conformity

EN ISO 7393-2

[a)] determination of free, combined and total | [e)] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity | [#] including stirring rod, 10 cm

Chlorine PP M110

0.02 - 2 mg/L Cl_2 [a] CL2

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Chlorine Free DPD F10	Powder / 100 Pieces	530100
Chlorine Free DPD F10	Powder / 1000 Pieces	530103
Chlorine Total DPD F10	Powder / 100 Pieces	530120
Chlorine Total DPD F10	Powder / 1000 Pieces	530123

Available Standards

Title	Packaging Unit	Part Number
ValidCheck Chlorine 1,5 mg/l	1 Pieces	48105510

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 deionised 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 colour 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 Sulphuric acid or 1 mol/l Sodium hydroxide).

EN

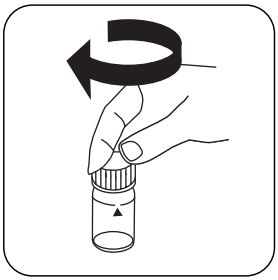
Determination of free chlorine with powder packs

Select the method on the device.

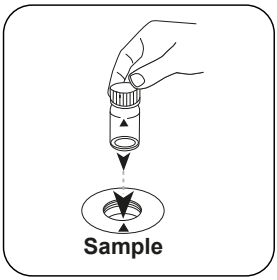
In addition, choose the test: free

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

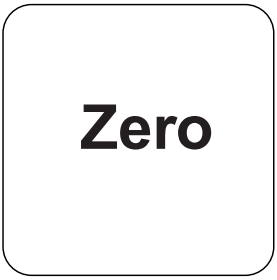
Fill 24 mm vial with **10 mL sample**.



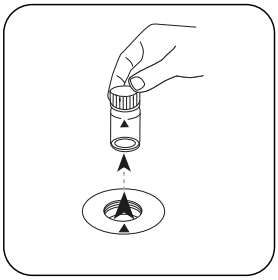
Close vial(s).



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

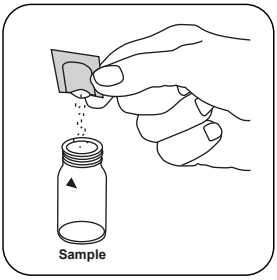


Press the **ZERO** button.

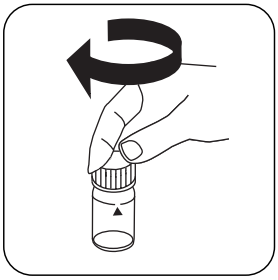


Remove the vial from the sample chamber.

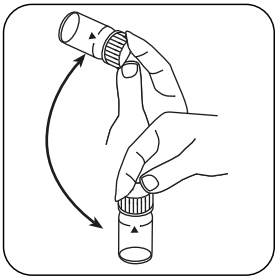
For devices that require **no ZERO measurement** , **start here**.



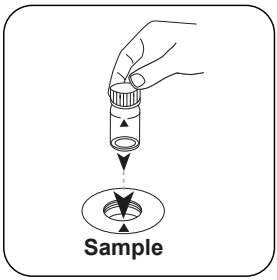
Add **Chlorine FREE-DPD/ F10 powder pack**.



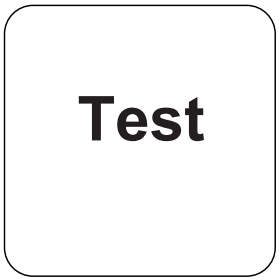
Close vial(s).



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



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



Press the **TEST** (XD: **START**)button.

The result in mg/L free chlorine appears on the display.

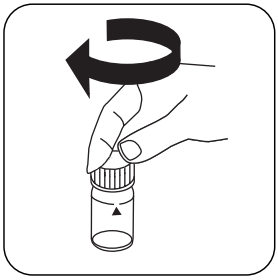
Determination of totale Chlorine with powder packs

Select the method on the device.

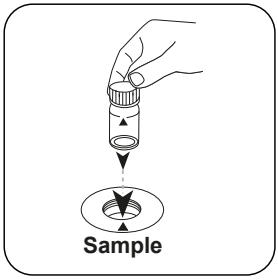
In addition, choose the test: total

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

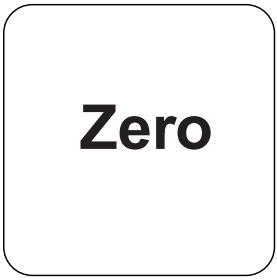
Fill 24 mm vial with **10 mL sample**.



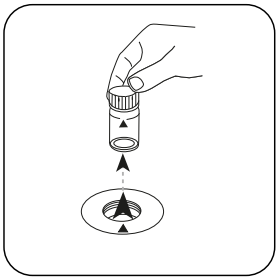
Close vial(s).



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



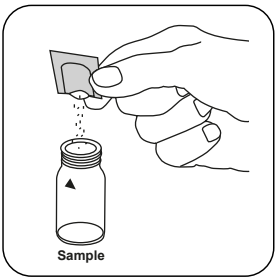
Press the **ZERO** button.



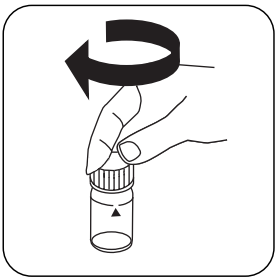
Remove the vial from the sample chamber.

For devices that require **no ZERO measurement** , **start here**.

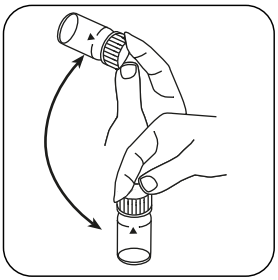
EN



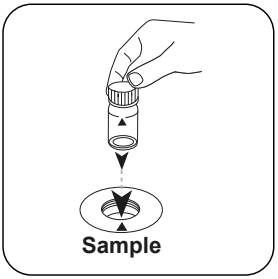
Add **Chlorine TOTAL-DPD/ F10 powder pack**.



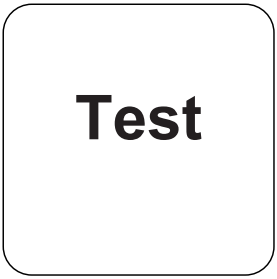
Close vial(s).



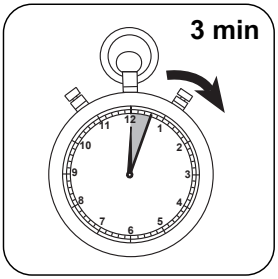
Invert several times to mix the contents (20 sec.).



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



Press the **TEST** (XD: **START**)button.



Wait for **3 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L total Chlorine appears on the display.

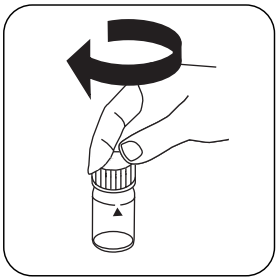
Determination of Chlorine differentiated with powder packs

Select the method on the device.

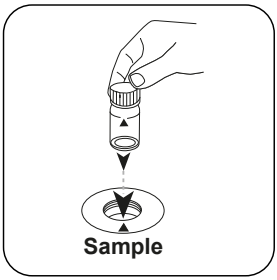
In addition, choose the test: differentiated

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

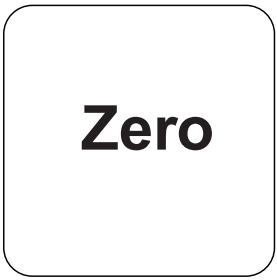
Fill 24 mm vial with **10 mL sample**.



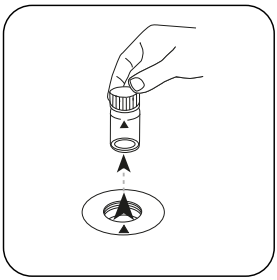
Close vial(s).



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

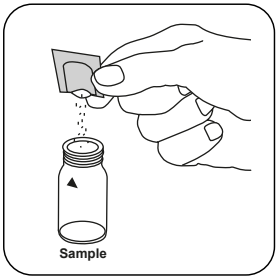


Press the **ZERO** button.

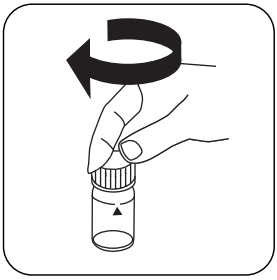


Remove the vial from the sample chamber.

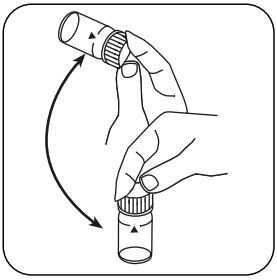
For devices that require **no ZERO measurement** , **start here**.



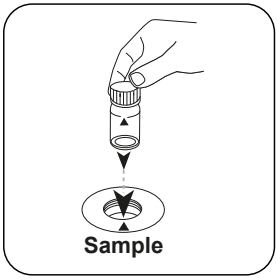
Add **Chlorine FREE-DPD/ F10 powder pack**.



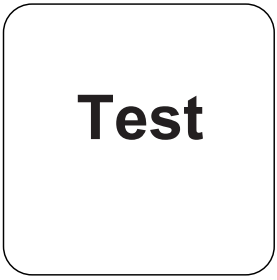
Close vial(s).



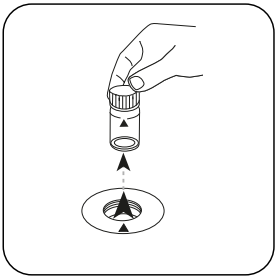
Invert several times to mix the contents (20 sec.).



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



Press the **TEST** (XD: **START**)button.

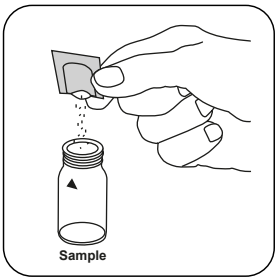


Remove the vial from the sample chamber.

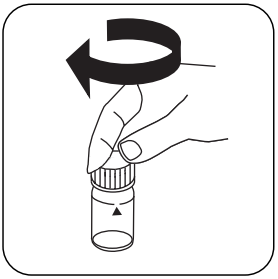
EN

Thoroughly clean the vial and vial cap.

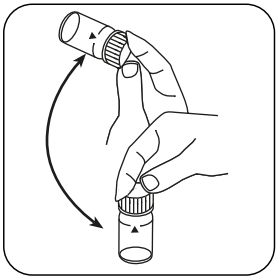
Fill 24 mm vial with **10 mL sample**.



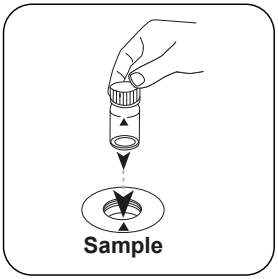
Add **TOTAL-DPD/ F10 powder pack**.



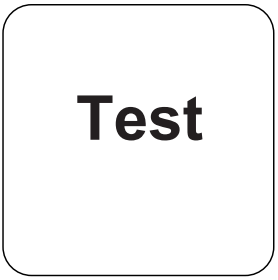
Close vial(s).



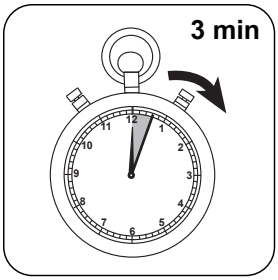
Invert several times to mix the contents (20 sec.).



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



Press the **TEST** (XD: **START**)button.



Wait for **3 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free chlorine, mg/l combined chlorine, mg/l total chlorine appears on the display.

Chemical Method

DPD

Appendix

Interferences

Persistant Interferences

- All oxidising 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

[a] determination of free, combined and total

Chlorine HR PP M111

0.1 - 8 mg/L Cl_2 [a] CL8

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Chlorine Free DPD F10	Powder / 100 Pieces	530100
Chlorine Free DPD F10	Powder / 1000 Pieces	530103
Chlorine Total DPD F10	Powder / 100 Pieces	530120
Chlorine Total DPD F10	Powder / 1000 Pieces	530123

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.

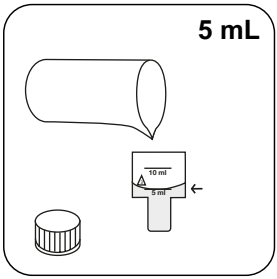
Preparation

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 deionised 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 colour 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 Sulphuric acid or 1 mol/l Sodium hydroxide).

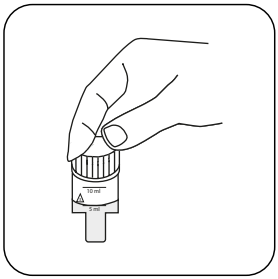
Determination of free chlorine HR with powder packs

In addition, choose the test: free

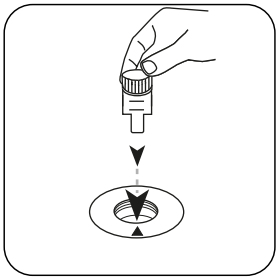
Select the method on the device.



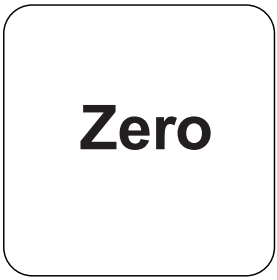
Fill 10 mm vial with **5 mL sample**.



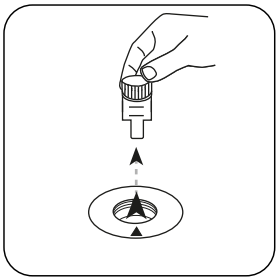
Close vial(s).



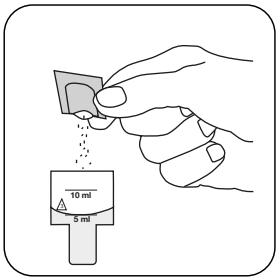
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



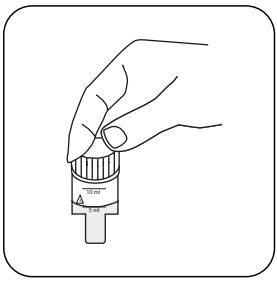
Press the **ZERO** button.



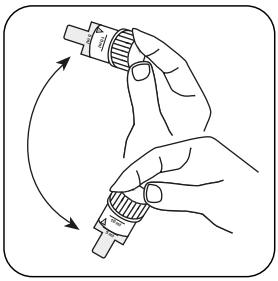
Remove **vial** from the sample chamber.



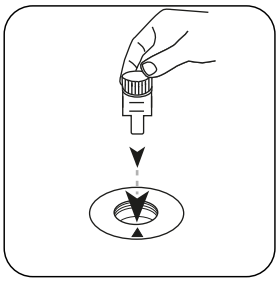
Add **two Chlorine FREE-DPD / F10 powder packs** .



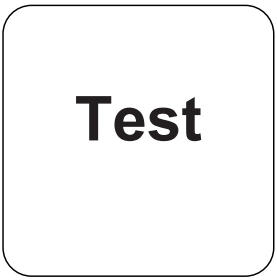
Close vial(s).



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



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



EN

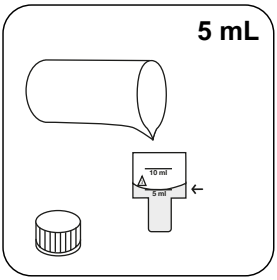
Press the **TEST** (XD: **START**)button.

The result in mg/L free chlorine appears on the display.

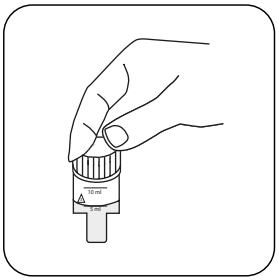
Determination of totale Chlorine HR with powder packs

In addition, choose the test: total

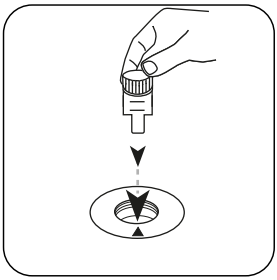
Select the method on the device.



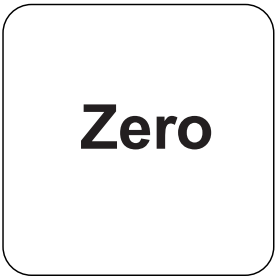
Fill 10 mm vial with **5 mL sample**.



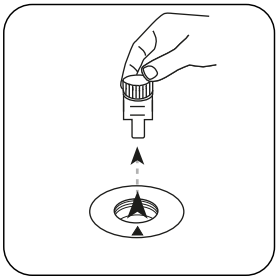
Close vial(s).



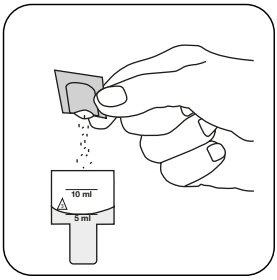
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



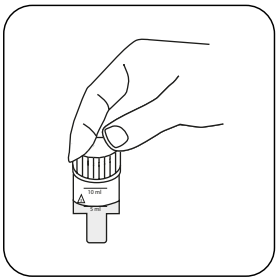
Press the **ZERO** button.



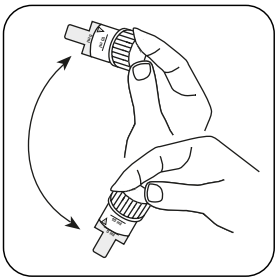
Remove **vial** from the sample chamber.



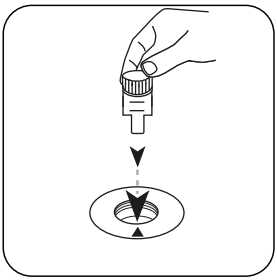
Add **two Chlorine TOTAL-DPD / F10 powder packs** .



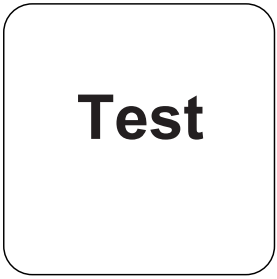
Close vial(s).



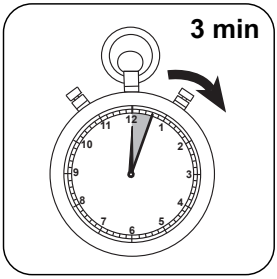
Invert several times to mix the contents (20 sec.).



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



Press the **TEST** (XD: **START**)button.



Wait for **3 minute(s) reaction time**.

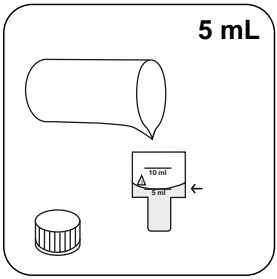
Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L total Chlorine appears on the display.

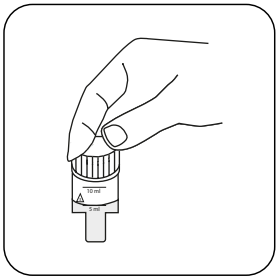
Determination of Chlorine HR differentiated with powder packs

Select the method on the device.

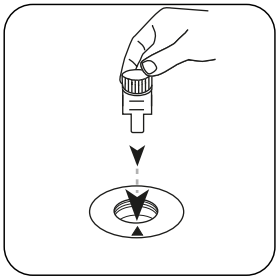
In addition, choose the test: differentiated



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



Close vial(s).

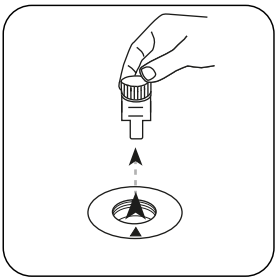


Place **sample vial** in the sample chamber. • Pay attention to the positioning.

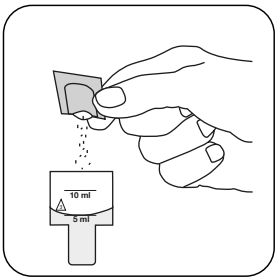
EN

Zero

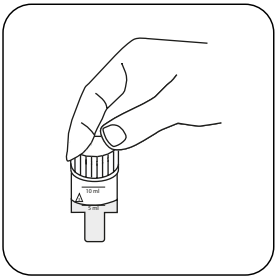
Press the **ZERO** button.



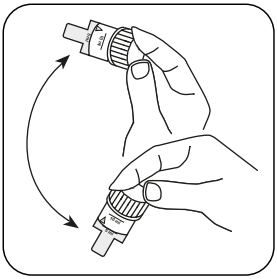
Remove **vial** from the sample chamber.



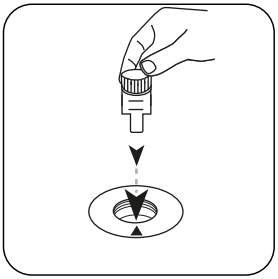
Add **two Chlorine FREE-DPD / F10 powder packs** .



Close vial(s).



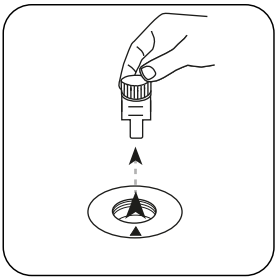
Invert several times to mix the contents (20 sec.).



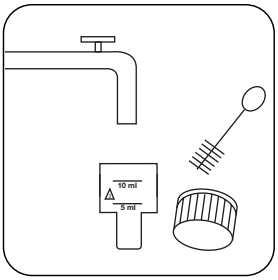
Place **sample vial** in the sample chamber. • Pay attention to the positioning.

Test

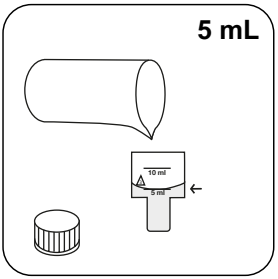
Press the **TEST** (XD: **START**)button.



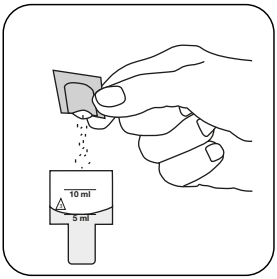
Remove **vial** from the sample chamber.



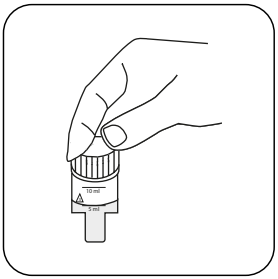
Thoroughly clean the vial and vial cap.



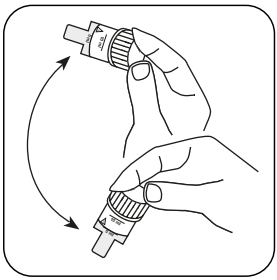
Fill 10 mm vial with **5 mL sample**.



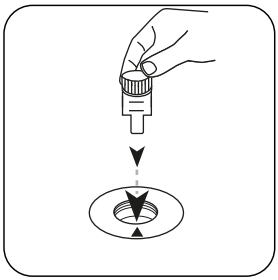
Add **two Chlorine TOTAL-DPD / F10 powder packs** .



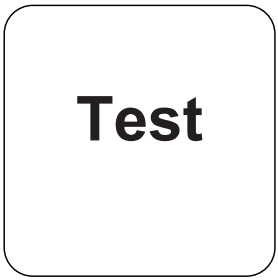
Close vial(s).



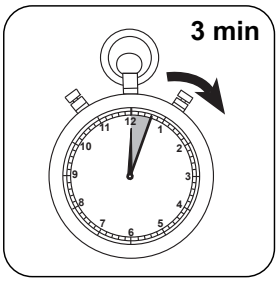
Invert several times to mix the contents (20 sec.).



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



Press the **TEST** (XD: **START**)button.



Wait for **3 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free chlorine, mg/l combined chlorine, mg/l total chlorine appears on the display.

Chemical Method

DPD

Appendix

EN

Interferences

Persistant Interferences

- All oxidising 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).

Conformity

EN ISO 7393-2

[a] determination of free, combined and total

Chlorine MR PP M113

0.02 - 3.5 mg/L Cl_2 [a] CL2

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO Chlorine Free DPD F10	Powder / 100 Pieces	530180
VARIO Chlorine Free DPD F10	Powder / 1000 Pieces	530183
VARIO Chlorine Total DPD F10	Powder / 100 Pieces	530190
VARIO Chlorine Total DPD F10	Powder / 1000 Pieces	530193

Available Standards

Title	Packaging Unit	Part Number
ValidCheck Chlorine 1,5 mg/l	1 Pieces	48105510

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 deionised 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 colour 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 sulphuric acid or 1 mol/L sodium hydroxide).

Remarks

1. The powder reagents used are marked in blue for easy identification The powder for the determination of free chlorine carries a closed and a dotted line. The powder for the determination of total chlorine has two closed lines.

Determination of free chlorine MR, with powder pack

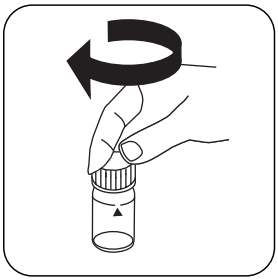
Select the method on the device.

In addition, choose the test: free

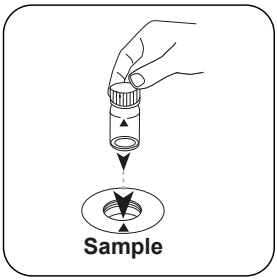
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

EN

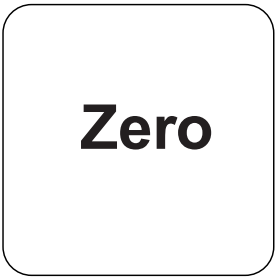
Fill 24 mm vial with **10 mL sample**.



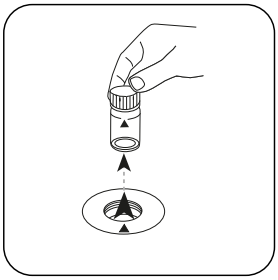
Close vial(s).



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

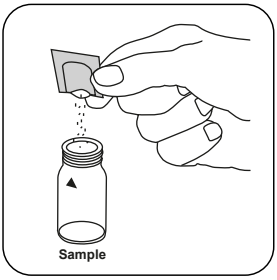


Press the **ZERO** button.

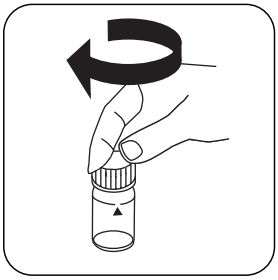


Remove the vial from the sample chamber.

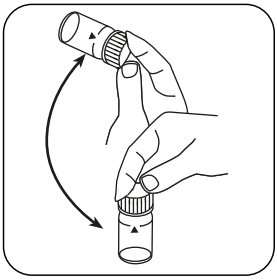
For devices that require **no ZERO measurement** , **start here**.



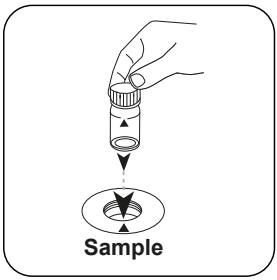
Add **VARIO Chlorine FREE-DPD/ F10 powder pack**.



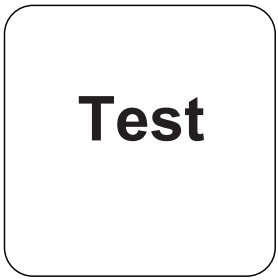
Close vial(s).



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



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



Press the **TEST** (XD: **START**)button.

The result in mg/L free chlorine appears on the display.

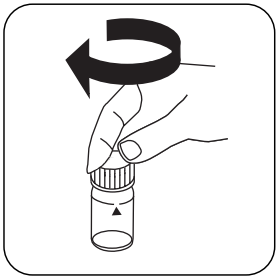
Determination of Chlorine differentiated MR with powder packs

Select the method on the device.

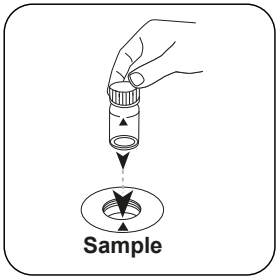
In addition, choose the test: differentiated

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

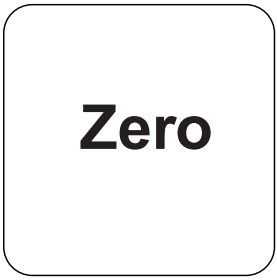
Fill 24 mm vial with **10 mL sample**.



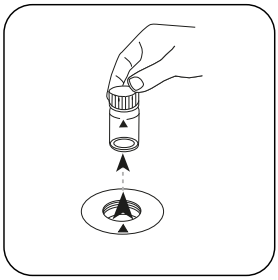
Close vial(s).



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



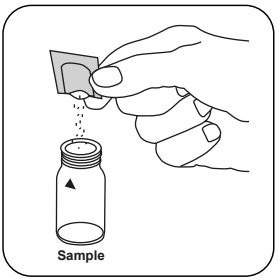
Press the **ZERO** button.



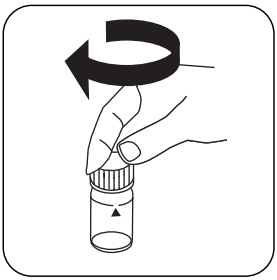
Remove the vial from the sample chamber.

For devices that require **no ZERO measurement** , **start here**.

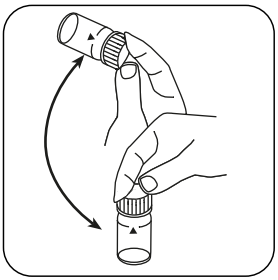
EN



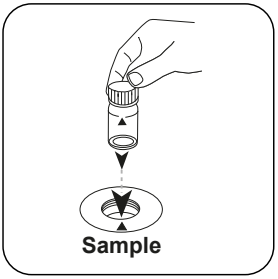
Add **VARIO Chlorine FREE-DPD/ F10 powder pack**.



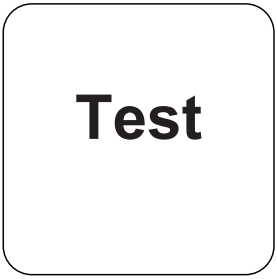
Close vial(s).



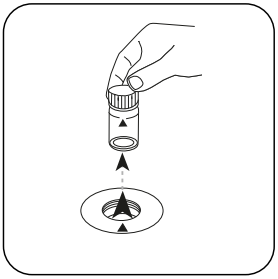
Invert several times to mix the contents (20 sec.).



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



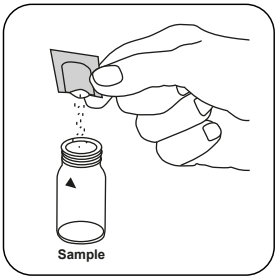
Press the **TEST** (XD: **START**)button.



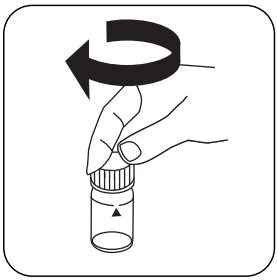
Remove the vial from the sample chamber.

Thoroughly clean the vial and vial cap.

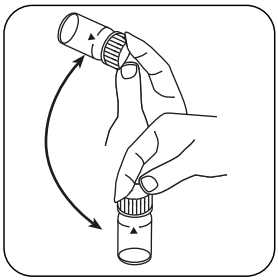
Fill 24 mm vial with **10 mL sample**.



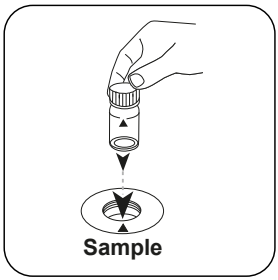
Add **Chlorine TOTAL-DPD/ F10 powder pack**.



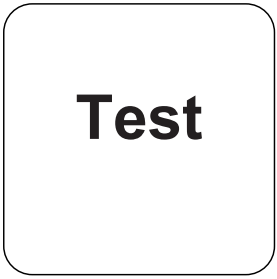
Close vial(s).



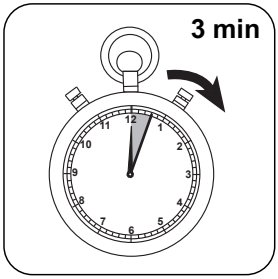
Invert several times to mix the contents (20 sec.).



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



Press the **TEST** (XD: **START**)button.



Wait for **3 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free chlorine, combined chlorine, total chlorine appears on the display.

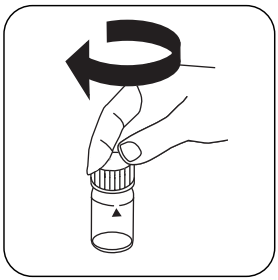
Determination of total Chlorine MR with powder packs

Select the method on the device.

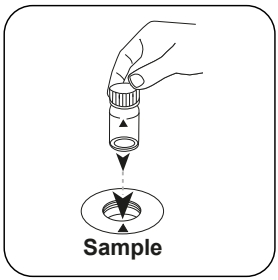
In addition, choose the test: total

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

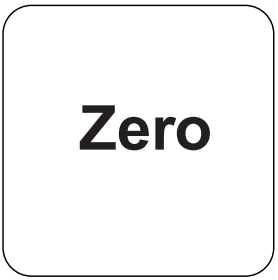
Fill 24 mm vial with **10 mL sample**.



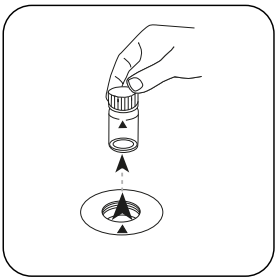
Close vial(s).



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

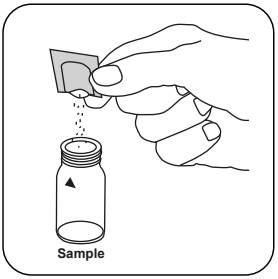


Press the **ZERO** button.

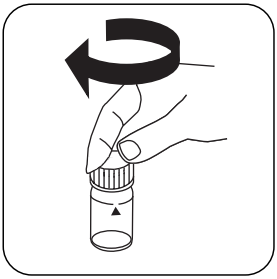


Remove the vial from the sample chamber.

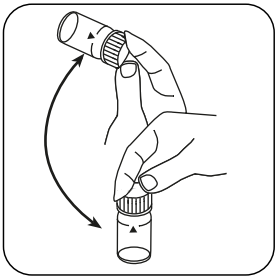
For devices that require **no ZERO measurement** , **start here**.



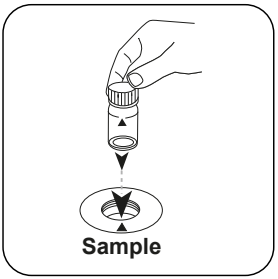
Add **VARIO Chlorine TOTAL-DPD/ F10 powder pack**.



Close vial(s).

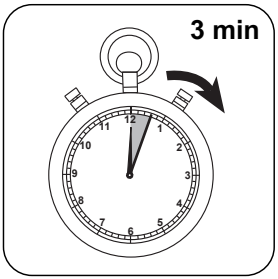


Invert several times to mix the contents (20 sec.).



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

Press the **TEST** (XD: **START**)button.



Wait for **3 minute(s) 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 oxidising agents in the samples react like chlorine, which leads to higher results.

EN

Removeable Interferences

- Interference from copper and iron (III) are eliminated by the addition of EDTA.
- Concentrations above 4 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	3.5 mg/L
Sensitivity	1.7 mg/L / Abs
Confidence Intervall	0.014 mg/L
Standard Deviation	0.006 mg/L
Variation Coefficient	0.34 %

[a] determination of free, combined and total

Chlorine dioxide T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD / Glycine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD No.1	Tablet / 100	511050BT
DPD No. 1	Tablet / 250	511051BT
DPD No. 1	Tablet / 500	511052BT
DPD No. 3	Tablet / 100	511080BT
DPD No. 3	Tablet / 250	511081BT
DPD No. 3	Tablet / 500	511082BT
Glycine [f)]	Tablet / 100	512170BT
Glycine [f)]	Tablet / 250	512171BT
DPD No. 3 High Calcium [e)]	Tablet / 100	515730BT
DPD No. 3 High Calcium [e)]	Tablet / 250	515731BT
DPD No. 3 High Calcium [e)]	Tablet / 500	515732BT
DPD No. 1 High Calcium [e)]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e)]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e)]	Tablet / 500	515742BT
Set DPD No. 1/No. 3 100 Pc.[#]	100 each	517711BT
Set DPD No. 1/No. 3 250 Pc.[#]	250 each	517712BT
Set DPD No. 1/Glycine 100 Stck. [#]	100 each	517731BT
Set DPD No. 1/Glycine 250 Stck. [#]	250 each	517732BT
Set DPD No. 1/No. 3 High Calcium 100 Pc. [#]	100 each	517781BT
Set DPD No. 1/No. 3 High Calcium 250 Pc. [#]	250 each	517782BT
DPD No. 3 Evo	Tablet / 100	511420BT
DPD No. 3 Evo	Tablet / 250	511421BT
DPD No. 3 Evo	Tablet / 500	511422BT

Sampling

1. When preparing the sample, 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 dioxide. 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 deionised water.
2. Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

Remarks

1. EVO tablets can be used as an alternative to the corresponding standard tablet (e.g. DPD No. 3 EVO instead of DPD No. 3).

Determination of Chlorine Dioxide, in absence of chlorine with tablet

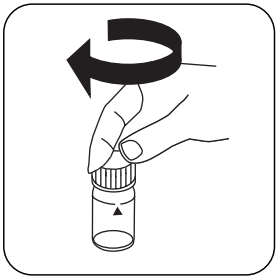
Select the method on the device.

In addition, choose the test: without Chlorine

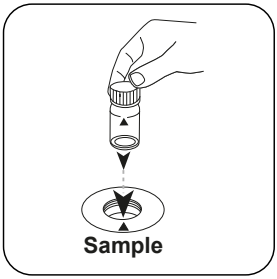
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

EN

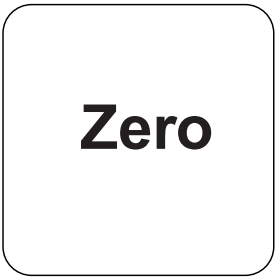
Fill 24 mm vial with **10 mL sample**.



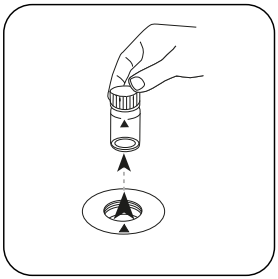
Close vial(s).



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



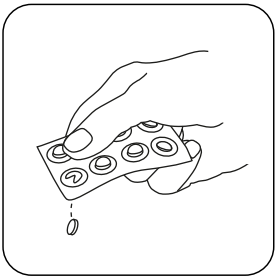
Press the **ZERO** button.



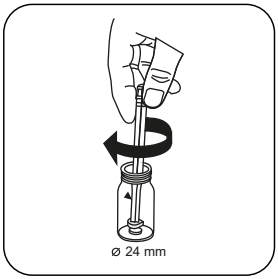
Remove the vial from the sample chamber.

Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.

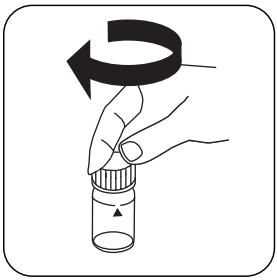


Add **DPD No.1 tablet** .

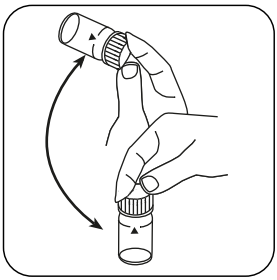


Crush tablet(s) by rotating slightly.

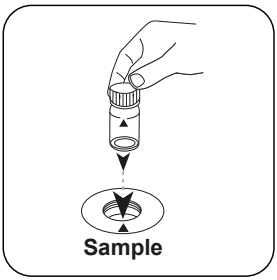
Fill up vial with **sample** to the **10 mL mark**.



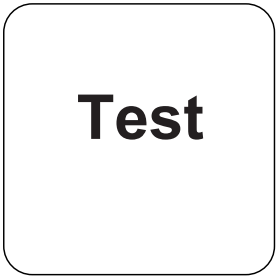
Close vial(s).



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L Chlorine Dioxide appears on the display.

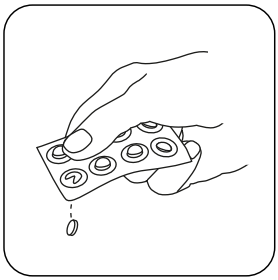
Determination of Chlorine Dioxide, in presence of chlorine with tablet

Select the method on the device.

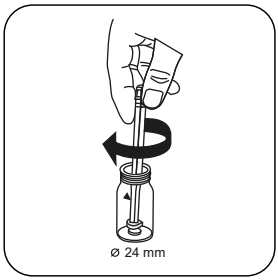
In addition, choose the test: in presence of Chlorine

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

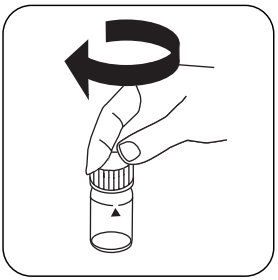


Add **GLYCINE tablet**.

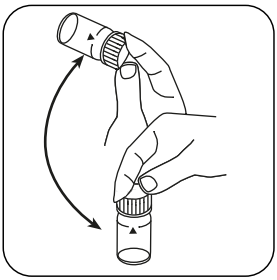


Crush tablet(s) by rotating slightly.

EN

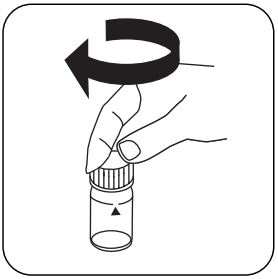


Close vial(s).

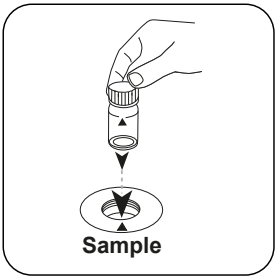


Dissolve tablet(s) by inverting.

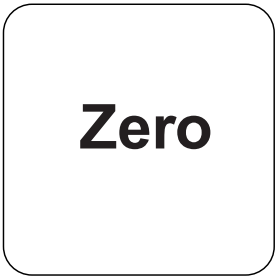
Fill a **second vial** with **10 mL sample** .



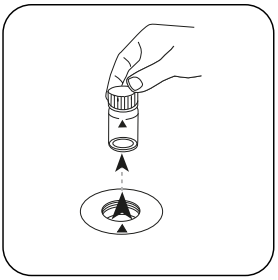
Close vial(s).



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



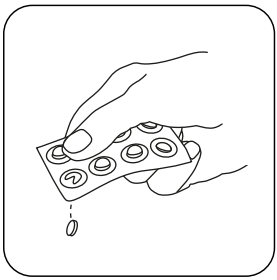
Press the **ZERO** button.



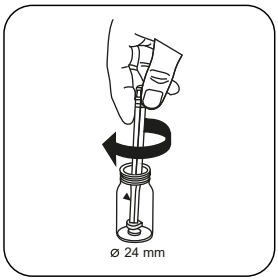
Remove the vial from the sample chamber.

Empty vial.

For devices that require **no ZERO measurement** , **start here**.

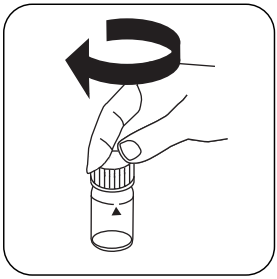


Add **DPD No. 1 tablet** .

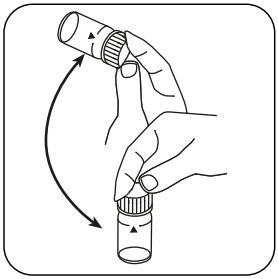


Crush tablet(s) by rotating slightly.

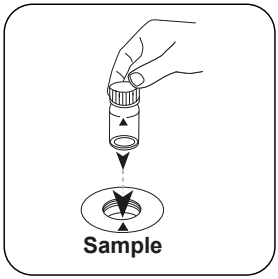
Fill prepared vial with prepared **glycine solution**.



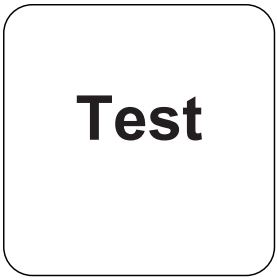
Close vial(s).



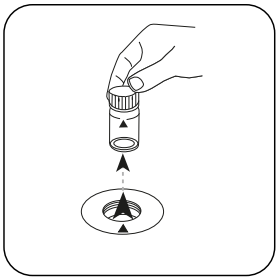
Dissolve tablet(s) by inverting.



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

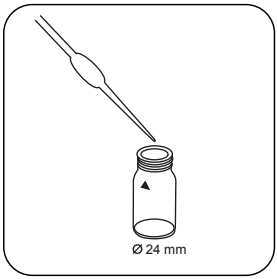


Press the **TEST** (XD: **START**)button.

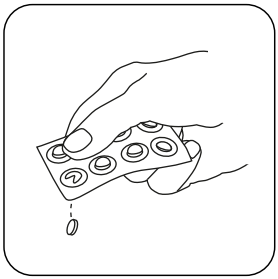


Remove the vial from the sample chamber.

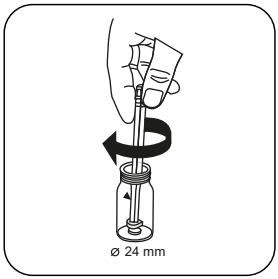
Thoroughly clean the vial and vial cap.



Fill vial with **some drops of** sample.



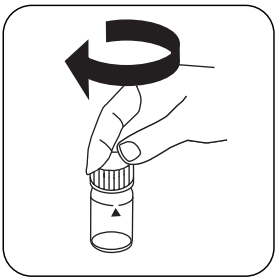
Add **DPD No. 1 tablet** .



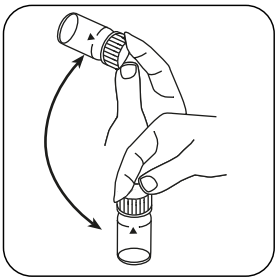
Crush tablet(s) by rotating slightly.

EN

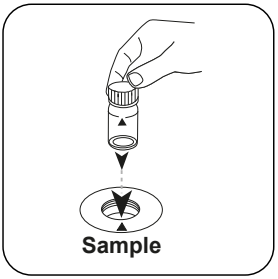
Fill up vial with **sample** to the **10 mL mark**.



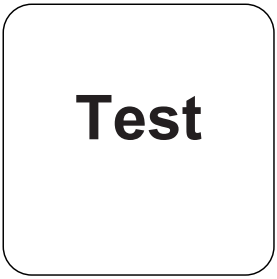
Close vial(s).



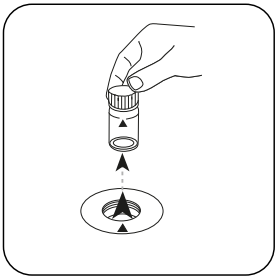
Dissolve tablet(s) by inverting.



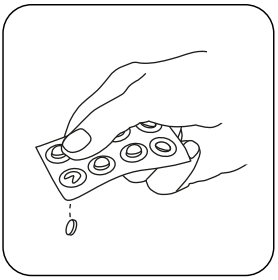
Place **sample vial** in the sample chamber. Pay attention to the positioning.



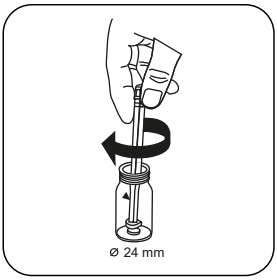
Press the **TEST** (XD: **START**)button.



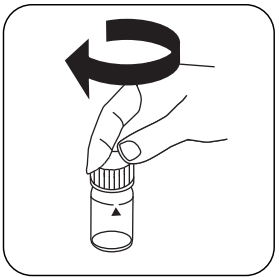
Remove the vial from the sample chamber.



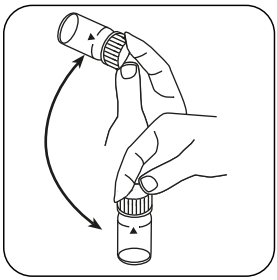
Add **DPD No.3 tablet** .



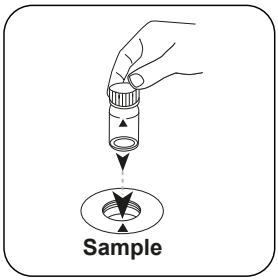
Crush tablet(s) by rotating slightly.



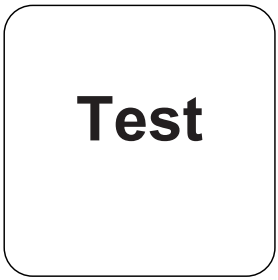
Close vial(s).



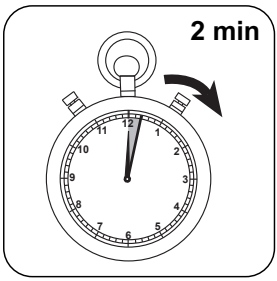
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Chlorine Dioxide appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Chemical Method

DPD / Glycine

Appendix

Interferences

Persistant Interferences

1. All oxidising agents in the samples lead to higher results.

Removeable Interferences

1. Concentrations above 19 mg/L chlorine dioxide can lead to results within the measuring range of up to 0 mg/L. In this case, the water sample must be diluted with water that is free from chlorine dioxide. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again.

Derived from

DIN 38408, Section 5

[e)] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity | [f)] additionally required for determination of bromine, chlorine dioxide and ozone in the presence of chlorine | # including stirring rod, 10 cm

Copper T **M150**

0.05 - 5 mg/L Cu[a)] **Cu**

Biquinoline

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Copper No. 1	Tablet / 100	513550BT
Copper No. 1	Tablet / 250	513551BT
Copper No. 2	Tablet / 100	513560BT
Copper No. 2	Tablet / 250	513561BT
Set Copper No. 1/No. 2 100 Pc.[#]	100 each	517691BT
Set Copper No. 1/No. 2 250 Pc.[#]	250 each	517692BT

Preparation

1. Strong alkaline or acidic water samples must be adjusted to pH 4 to 6 before analysis.

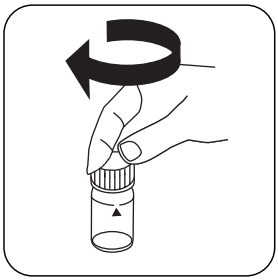
Determination of Copper, free with tablet

Select the method on the device.

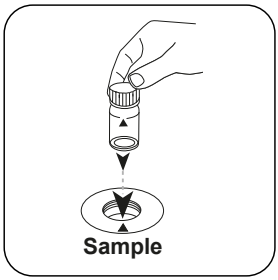
In addition, choose the test: free

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

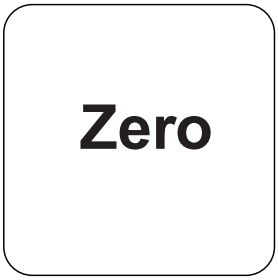
Fill 24 mm vial with **10 mL sample**.



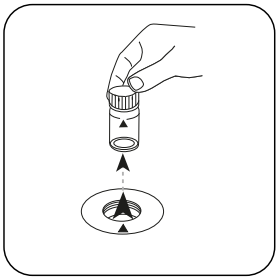
Close vial(s).



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

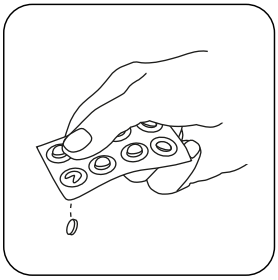


Press the **ZERO** button.

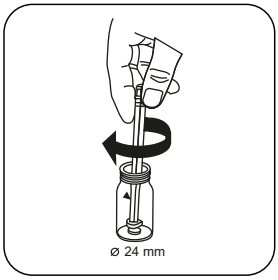


Remove the vial from the sample chamber.

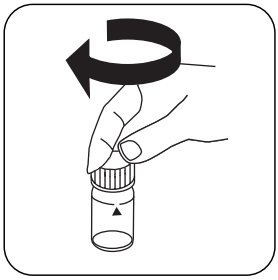
For devices that require **no ZERO measurement** , **start here**.



Add **COPPER No. 1 tablet** .

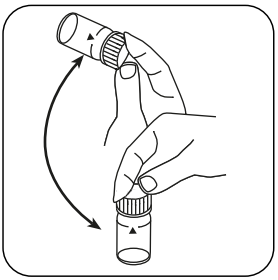


Crush tablet(s) by rotating slightly.

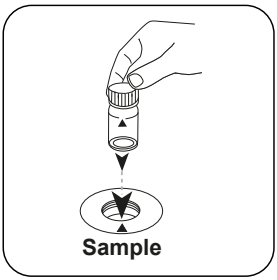


Close vial(s).

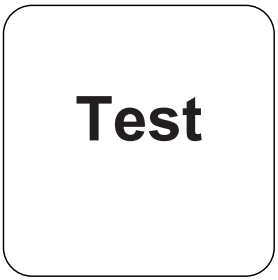
EN



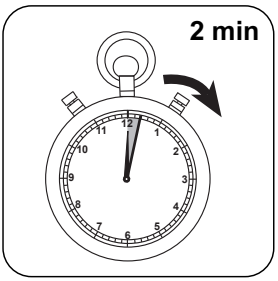
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free Copper appears on the display.

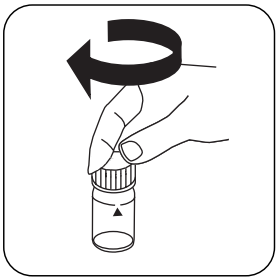
Determination of Copper, total with tablet

Select the method on the device.

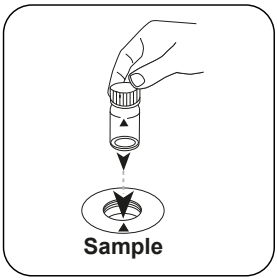
In addition, choose the test: total

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

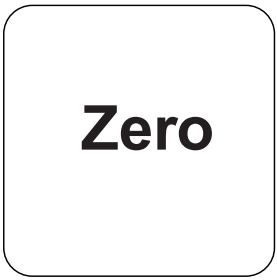
Fill 24 mm vial with **10 mL sample**.



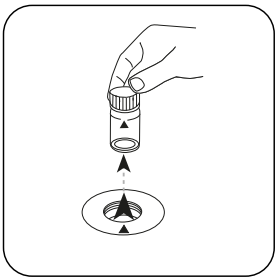
Close vial(s).



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

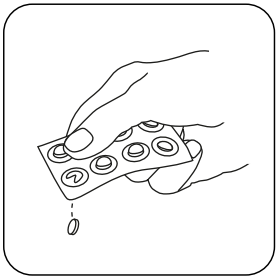


Press the **ZERO** button.

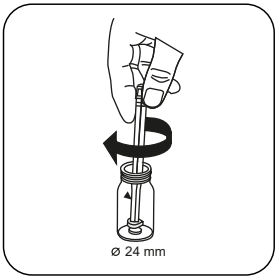


Remove the vial from the sample chamber.

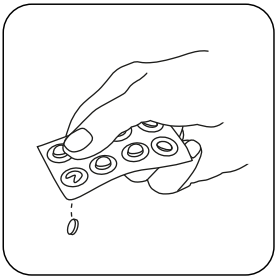
For devices that require **no ZERO measurement** , **start here**.



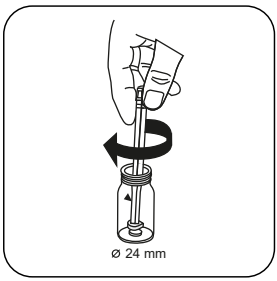
Add **COPPER No. 1 tablet** .



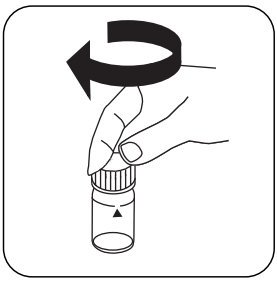
Crush tablet(s) by rotating slightly and dissolve.



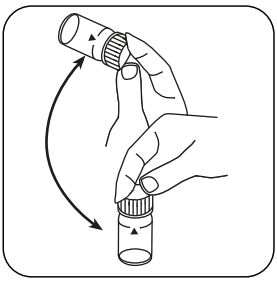
Add **COPPER No. 2 tablet** .



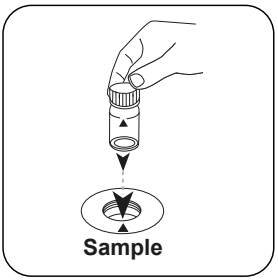
Crush tablet(s) by rotating slightly.



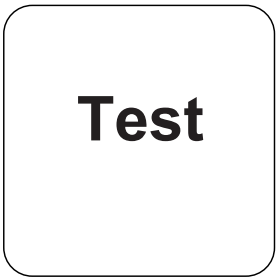
Close vial(s).



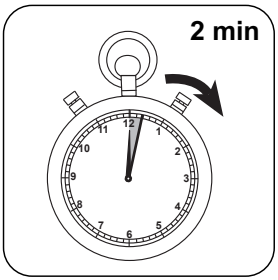
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

EN

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L total Copper appears on the display.

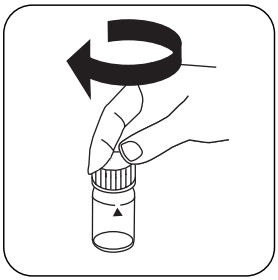
Determination of Copper, differentiated determination with Tablet

Select the method on the device.

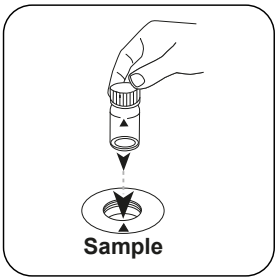
In addition, choose the test: differentiated

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

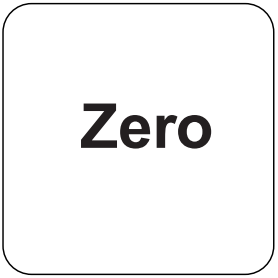
Fill 24 mm vial with **10 mL sample**.



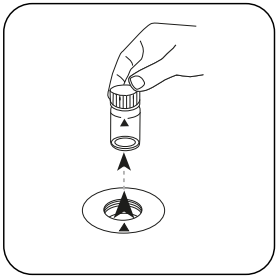
Close vial(s).



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

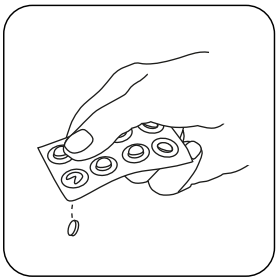


Press the **ZERO** button.

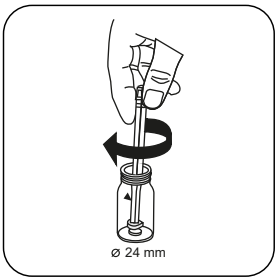


Remove the vial from the sample chamber.

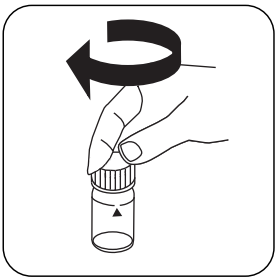
For devices that require **no ZERO measurement** , **start here**.



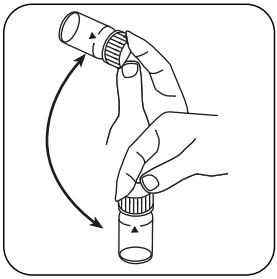
Add **COPPER No. 1 tablet** .



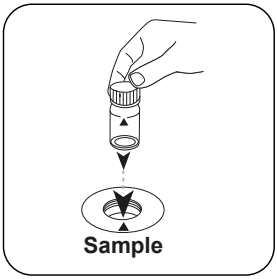
Crush tablet(s) by rotating slightly.



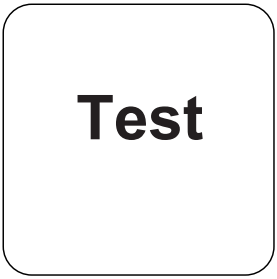
Close vial(s).



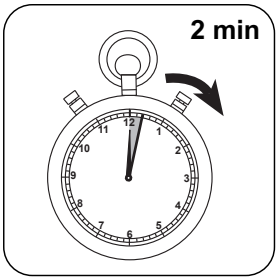
Dissolve tablet(s) by inverting.



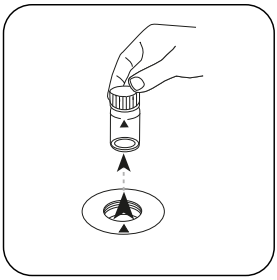
Place **sample vial** in the sample chamber. Pay attention to the positioning.



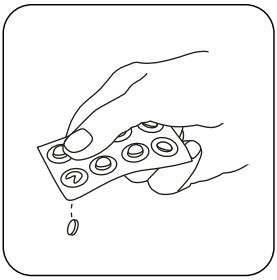
Press the **TEST** (XD: **START**)button.



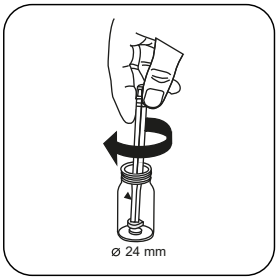
Wait for **2 minute(s) reaction time**.



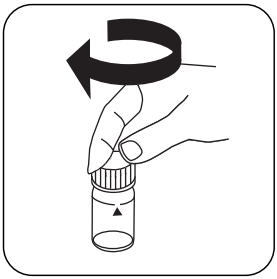
Remove the vial from the sample chamber.



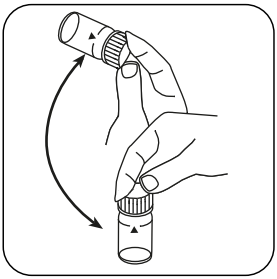
Add **COPPER No. 2 tablet** .



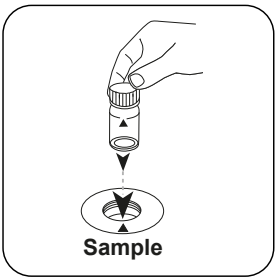
Crush tablet(s) by rotating slightly.



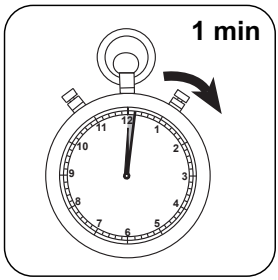
Close vial(s).



Dissolve tablet(s) by inverting.



Test



EN

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

Press the **TEST** (XD: **START**)button.

Wait for **1 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free Copper; combined Copper; total Copper appears on the display.

Chemical Method

Biquinoline

Appendix

Interferences

Persistant Interferences

1. Cyanide CN^- and Silver Ag^+ interfere with the test result.

Method Validation

Limit of Detection	0.05 mg/L
Limit of Quantification	0.15 mg/L
End of Measuring Range	5 mg/L
Sensitivity	3.8 mg/L / Abs
Confidence Intervall	0.026 mg/L
Standard Deviation	0.011 mg/L
Variation Coefficient	0.42 %

Bibliography

Photometrische Analyse, Lange/Vedjelek, Verlag Chemie 1980

[a] determination of free, combined and total | # including stirring rod, 10 cm

Copper PP M153

0.05 - 5 mg/L Cu Cu

Bicinchoninate

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO CU1 F10	Powder / 100 Pieces	530300
VARIO CU1 F10	Powder / 1000 Pieces	530303

Preparation

1. Digestion is required for the determination of total copper.
2. The pH value of the sample must be adjusted between 4 and 6 before analysis (with potassium hydroxide solution or nitric acid). Any resulting dilution must be taken into account in the result.
   Note: pH values above 6 can lead to Copper precipitation.

Remarks

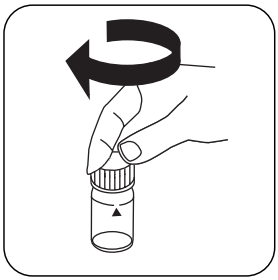
1. Accuracy is not affected by undissolved powder.

Determination of Copper, free with Vario Powder Pack

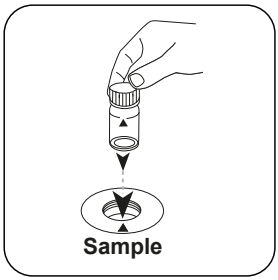
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

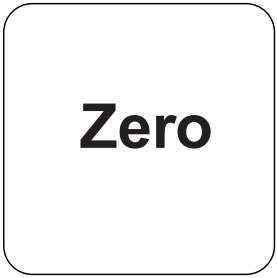
Fill 24 mm vial with **10 mL sample**.



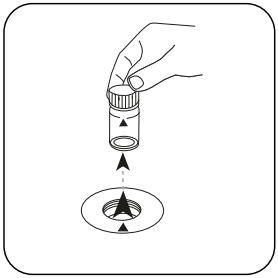
Close vial(s).



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

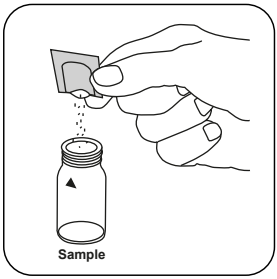


Press the **ZERO** button.

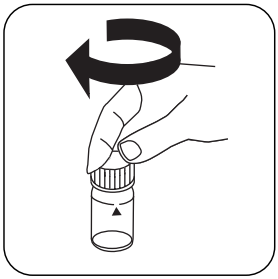


Remove the vial from the sample chamber.

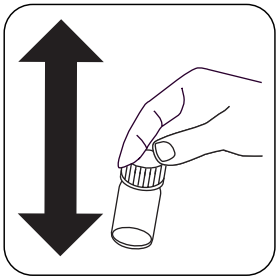
For devices that require **no ZERO measurement** , **start here**.



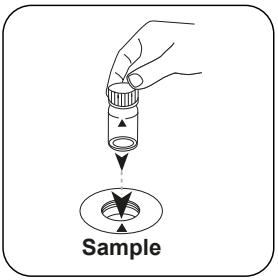
Add **Vario Cu 1 F10 powder pack**.

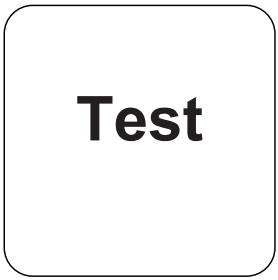


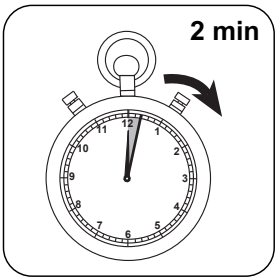
Close vial(s).



Mix the contents by shaking.







EN

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

Press the **TEST** (XD: **START**)button.

Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Copper appears on the display.

Chemical Method

Bicinchoninate

Appendix

Interferences

Persistant Interferences

Hardness, Al and Fe produce lower test results.

Removeable Interferences

1. Cyanide, CN^-: Cyanide prevents full colour development.
   Cyanide interference is eliminated as follows: Add 0.2 ml Formaldehyde to 10 ml water sample and wait for a
   reaction time of 4 minutes. (Cyanide is masked). After this perform the test as described. Multiply the result by 1.02 to correct the sample dilution by Formaldehyde.
2. Silver, Ag^+: If a turbidity remains and turns black, silver interference is likely. Add 10 drops of saturated Potassium chloride solution to 75 ml of
   water sample and filter it through a fine filter. Use 10 ml of the filtered water sample to perform test.

Method Validation

Limit of Detection	0.05 mg/L
Limit of Quantification	0.15 mg/L
End of Measuring Range	5 mg/L
Sensitivity	3.77 mg/L / Abs
Confidence Intervall	0.064 mg/L
Standard Deviation	0.027 mg/L
Variation Coefficient	1.07 %

Bibliography

S. Nakano, Y. Zasshi, 82 486 - 491 (1962) [Chemical Abstracts, 58 3390e (1963)]

Derived from

APHA Method 3500Cu

CyA T M160

10 - 160 mg/L CyA CyA

Melamine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
CyA-Test	Tablet / 100	511370BT
CyA-Test	Tablet / 250	511371BT
Deionised Water	250 mL	457022

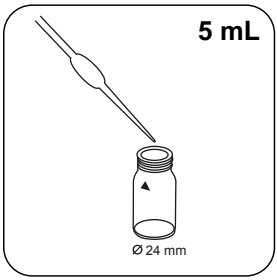
Remarks

1. Cyanuric acid causes an extremely fine distributed turbidity with a milky appearance. Individual particles are not attributable to the presence of cyanuric acid.

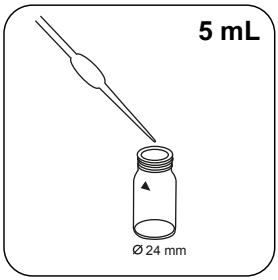
Determination of Cyanuric Acid Test with Tablet

Select the method on the device.

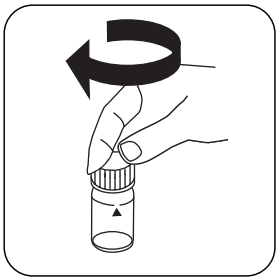
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



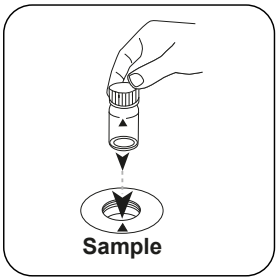
Fill 24 mm vial with **5 mL deionised water** .



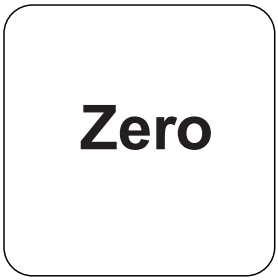
Put **5 mL sample** in the vial.



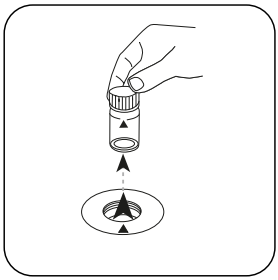
Close vial(s).



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

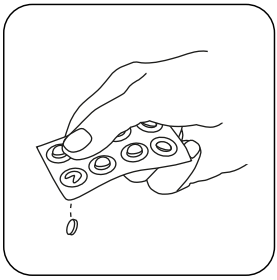


Press the **ZERO** button.

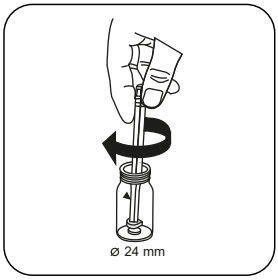


Remove the vial from the sample chamber.

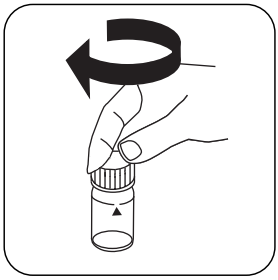
For devices that require **no ZERO measurement** , **start here**.



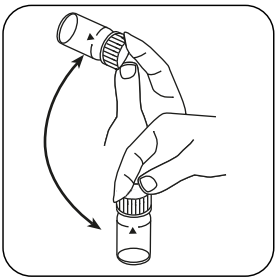
Add **CyA-Test tablet**.



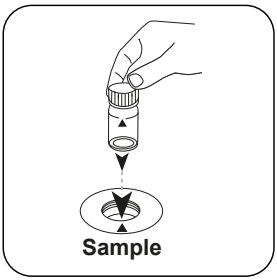
Crush tablet(s) by rotating slightly.



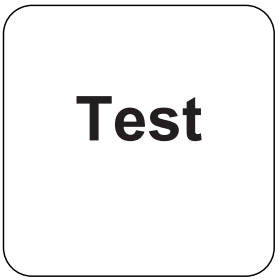
Close vial(s).



Invert several times to mix the contents (for at least 60 s until the tablet is completely dissolved).



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



Press the **TEST** (XD: **START**)button.

The result in mg/L Cyanuric Acid appears on the display.

Chemical Method

Melamine

Interferences

Persistant Interferences

1. Undissolved particles may lead to higher results. Therefore, it is important to dissolve the Tablet completely.

CyA HR T M161

10 - 200 mg/L CyA CyAH

Melamine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
CyA HR-Test	Tablet / 100	511430BT
CyA HR-Test	Tablet / 250	511431BT

Remarks

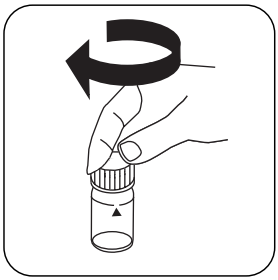
1. Cyanuric acid causes an extremely fine distributed turbidity with a milky appearance. Individual particles are not attributable to the presence of cyanuric acid.
2. After addition of the CyA-HR-Test tablet, it dissolves automatically within two minutes.
3. **The vial must not be moved after the addition of the CyA-HR-Test tablet.**

Determination of Cyanuric Acid Test with Tablet

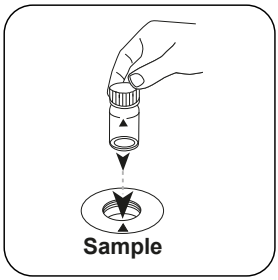
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

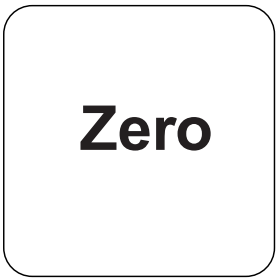
Fill 24 mm vial with **10 mL sample**.



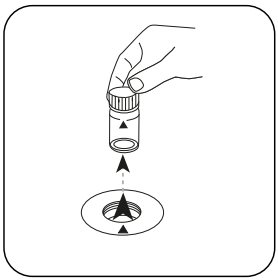
Close vial(s).



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

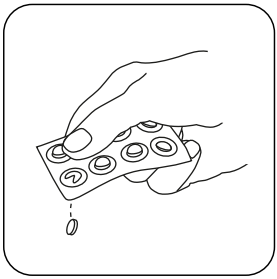


Press the **ZERO** button.

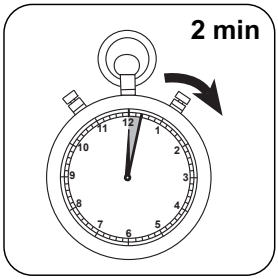


Remove the vial from the sample chamber.

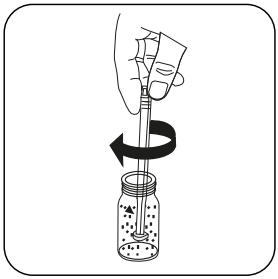
For devices that require **no ZERO measurement** , **start here**.



Add **CyA HR Test tablet**.

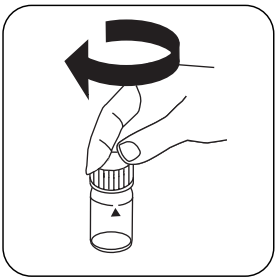


Wait for **2 minute(s) reaction time**.

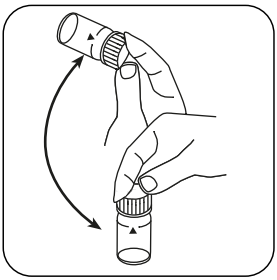


Dissolve the tablets using a clean stirring rod.

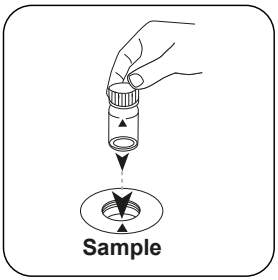
EN



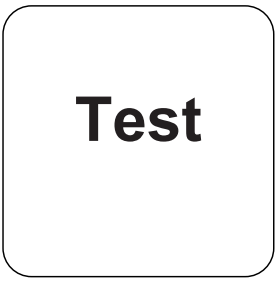
Close vial(s).



Invert several times to mix the contents (do not shake).



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



Press the **TEST** (XD: **START**)button.

The result in mg/L Cyanuric Acid appears on the display.

Chemical Method

Melamine

Interferences

Persistant Interferences

1. Undissolved particles may lead to higher results.

Method Validation

Limit of Detection	2.07 mg/L
Limit of Quantification	6.2 mg/L
End of Measuring Range	200 mg/L
Sensitivity	77.47 mg/L / Abs
Confidence Intervall	4.6 mg/L
Standard Deviation	4.78 mg/L
Variation Coefficient	4.55 %

Hardness Calcium (B) T M191

20 - 500 mg/L $CaCO_3$ CAH

Murexide

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Set Calcio H No. 1/No. 2 100 Pc.#	100 each	517761BT
Set Calcio H No. 1/No. 2 250 Pc.#	250 each	517762BT

Preparation

1. Strong alkaline or acidic water samples should be adjusted between pH 4 and pH 10 before the analysis (use 1 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

Remarks

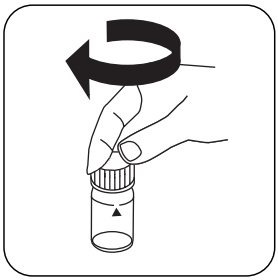
1. To optimise the readings, an optional batch-specific blind value method can be performed (see photometer description).
2. For accurate results, exactly 10 ml of water sample must be used for the test.
3. This method was developed from a volumetric procedure. Due to undefined boundary conditions, deviations from the standardised method may be greater.
4. The method works in the high measuring range with greater tolerances than in the low measuring range. When diluting samples, always measure in the first third of the range.

Determination of Hardness Calcium 2 with Tablet

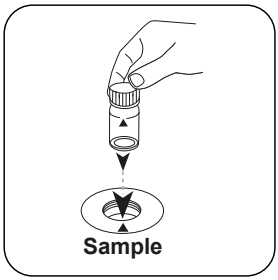
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

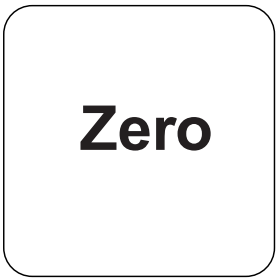
Fill 24 mm vial with **10 mL sample**.



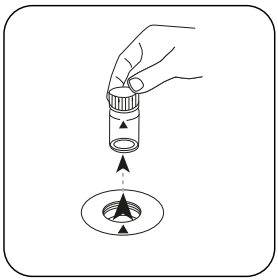
Close vial(s).



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

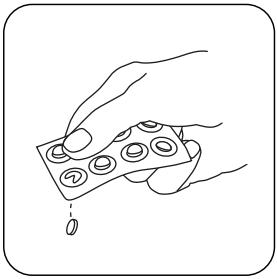


Press the **ZERO** button.

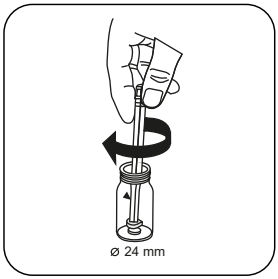


Remove the vial from the sample chamber.

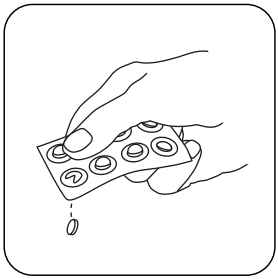
For devices that require **no ZERO measurement** , **start here**.



Add **CALCIO H No.1 tablet** .

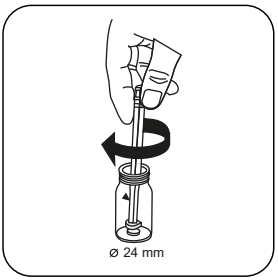


Crush tablet(s) by rotating slightly and dissolve.

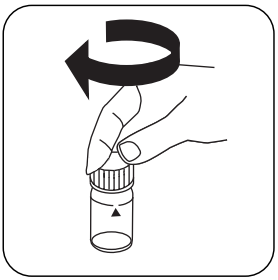


Add **CALCIO H No.2 tablet** .

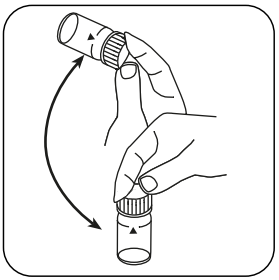
EN



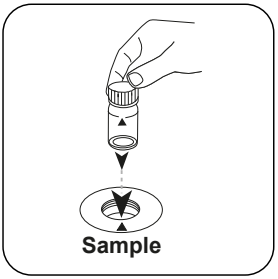
Crush tablet(s) by rotating slightly.



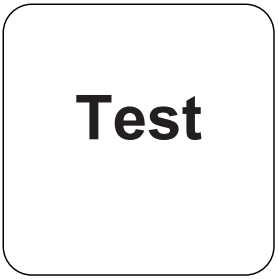
Close vial(s).



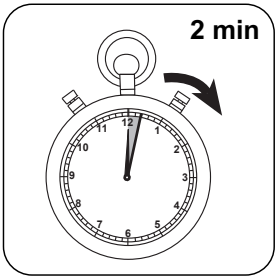
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in Calcium Hardness appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	$CaCO_3$	1
	°dH	0.056
	°eH	0.07
	°fH	0.1
	°aH	1

Chemical Method

Murexide

Appendix

Interferences

Persistant Interferences

1. Silver, mercury, cadmium, cobalt and copper interfere with the test result.

Interference	from / [mg/L]
Mg^{2+}	200 ($CaCO_3$)
Fe	10
Zn^{2+}	5

Bibliography

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980

including stirring rod, 10 cm

Hardness Ca and Mg L M199

0.05 - 4 mg/L $CaCO_3$

Calmagite

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Ca Mg Hardness Set	1 Pieces	475100
Ca Mg Hardness Sol 1, 15 mL	15 mL	471210
Ca Mg Hardness Sol 2, 15 mL	15 mL	471200
Ca Mg Hardness Sol 3 - 5 mL	5 mL	471230
Ca Mg Hardness Sol 4 - 5 mL	5 mL	471220

Preparation

Cleaning the vials:

1. To avoid errors, rinse the vials and lids thoroughly with deionised water (demineralised water) before use.

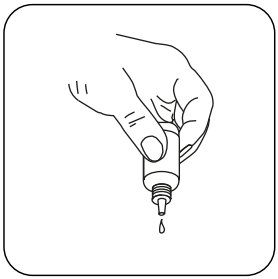
Remarks

1. On the XD7x00 the method is implemented under the method number M2511.

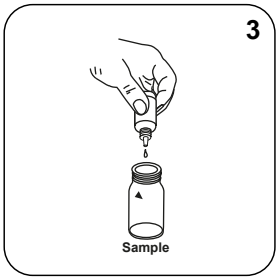
Determination of Hardness Calcium and Magnesium with liquid reagens

Select the method on the device.

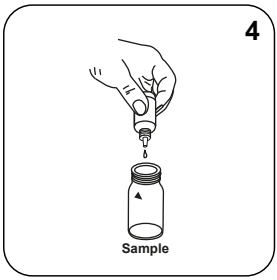
Fill 24 mm vial with **10 mL sample**.



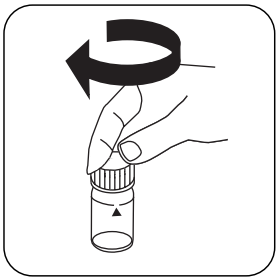
Hold cuvettes vertically and add equal drops by pressing slowly.



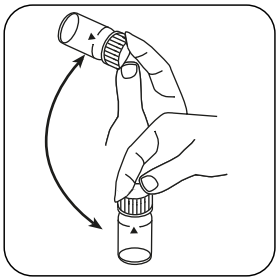
Add **3 drops Ca Mg Hardness SOL 1 (red bottle)** to the **sample vial**.



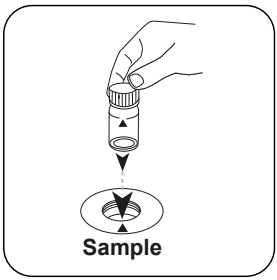
Add **4 drops Ca Mg Hardness SOL 2 (blue bottle)** to the **sample vial**.



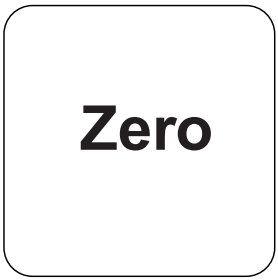
Close vial(s).



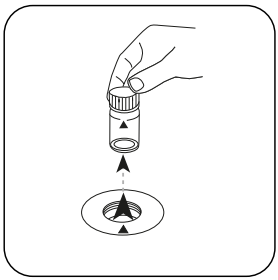
Invert several times to mix the contents (10x).



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

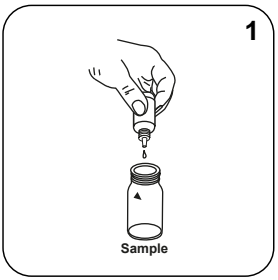


Press the **ZERO** (XD: **START**) button.

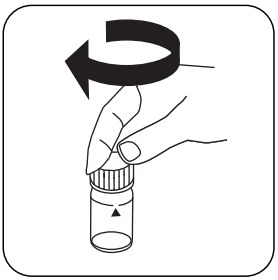


Remove the vial from the sample chamber.

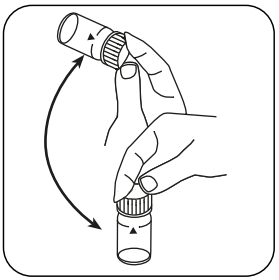
EN



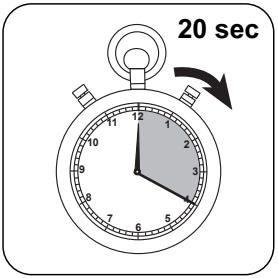
Add **1 drops Ca Mg Hardness SOL 3 (green bottle)** to the **sample vial**.



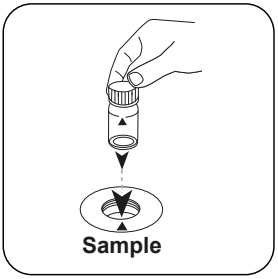
Close vial(s).



Invert several times to mix the contents.

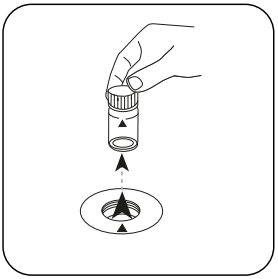


Wait for **20 second(s) reaction time**.

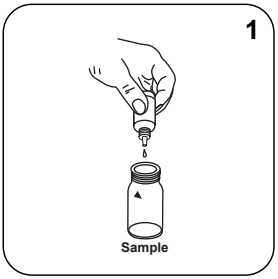


Place **sample vial** in the sample chamber. Pay attention to the positioning.

Press the **TEST** (XD: **START**)button.

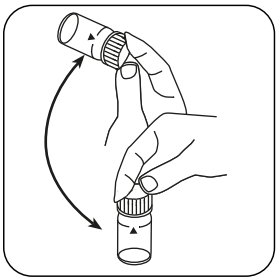


Remove the vial from the sample chamber.

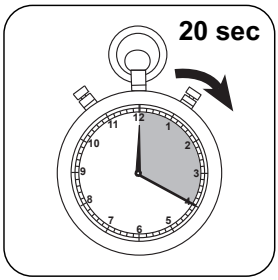


Add **1 drops Ca Mg Hardness SOL 4 (white bottle)** to the **sample vial**.

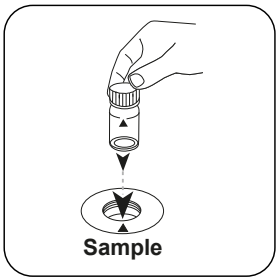
Close vial(s).



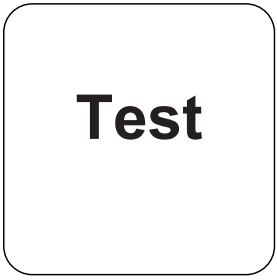
Invert several times to mix the contents.



Wait for **20 second(s) reaction time**.



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



Press the **TEST** (XD: **START**)button.

The result in **mg/L** [Ca]-$CaCO_3$ and [Mg]-$CaCO_3$ appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/L	$CaCO_3$	1
mg/L	Ca	0.4004
mg/L	$MgCO_3$	0.8424
mg/L	Mg	0.2428
	°dH	0.0560

Chemical Method

Calmagite

Interferences

Removeable Interferences

The Ca determination is disturbed by high Mg contents. For accurate Ca measurements, a dilution should be carried out.

Interference	from / [mg/L]
Cr^{3+}	0.25
Cu^{2+}	0.75
Fe^{2+}	1.4
Fe^{3+}	2.0
Mn^{2+}	0.20
Zn^{2+}	0.050

Hardness total T M200

2 - 50 mg/L $CaCO_3$ tH1

Metallphthaleine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Hardcheck P	Tablet / 100	515660BT
Hardcheck P	Tablet / 250	515661BT

Preparation

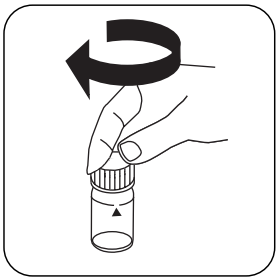
1. Strong alkaline or acidic water samples should be adjusted between pH 4 and pH 10 before the analysis (use 1 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

Determination of Hardness, Total with Tablet

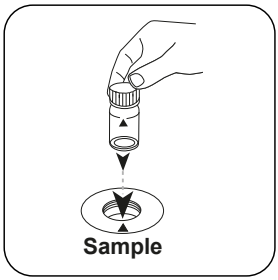
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

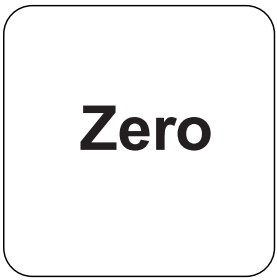
Fill 24 mm vial with **10 mL sample**.



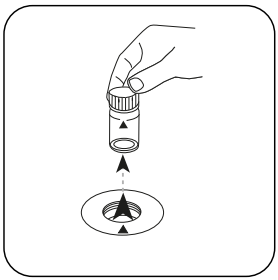
Close vial(s).



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

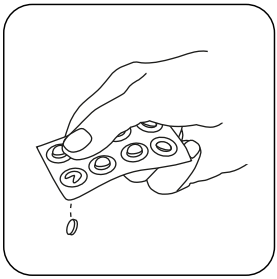


Press the **ZERO** button.

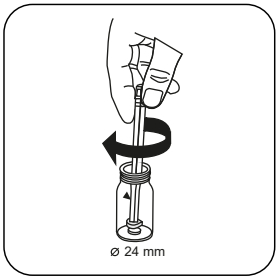


Remove the vial from the sample chamber.

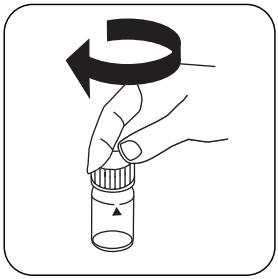
For devices that require **no ZERO measurement** , **start here**.



Add **HARDCHECK P tablet**.

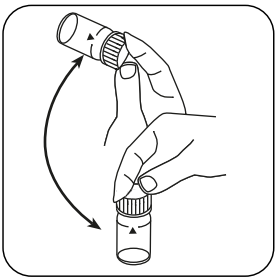


Crush tablet(s) by rotating slightly.

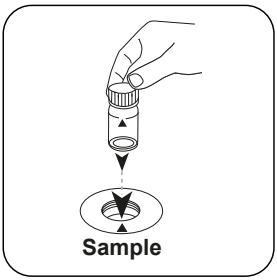


Close vial(s).

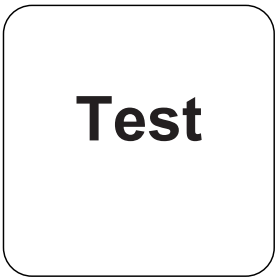
EN



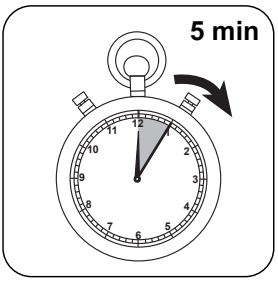
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **5 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in total Hardness appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	$CaCO_3$	1
	°dH	0.056
	°eH	0.07
	°fH	0.1
	°aH	1
mg/l	Ca	0.40043

Chemical Method

Metallphthaleine

Appendix

Interferences

Removeable Interferences

1. Interference from zinc and magnesium can be eliminated by the addition of 8-hydroxychinoline.
2. Concentrations of strontium and barium that occur in waters and soils do not interfere.

Method Validation

Limit of Detection	0.88 mg/L
Limit of Quantification	2.64 mg/L
End of Measuring Range	50 mg/L
Sensitivity	42.5 mg/L / Abs
Confidence Intervall	2.62 mg/L
Standard Deviation	1.08 mg/L
Variation Coefficient	4.17 %

Bibliography

Photometrische Analyseverfahren, Schwedt, Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 1989

Hardness total HR T **M201**

20 - 500 mg/L $CaCO_3$ [i)] **tH2**

Metallphthaleine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Hardcheck P	Tablet / 100	515660BT
Hardcheck P	Tablet / 250	515661BT

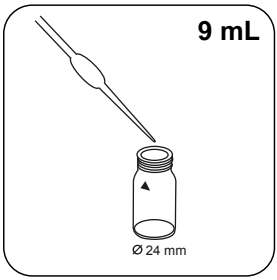
Preparation

1. Strong alkaline or acidic water samples should be adjusted between pH 4 and pH 10 before the analysis (use 1 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

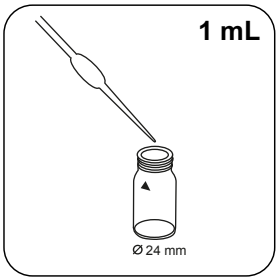
Determination of Hardness total HR with tablet

Select the method on the device.

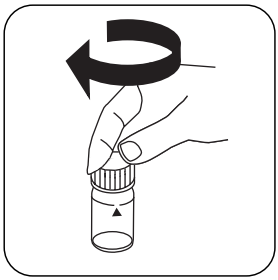
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



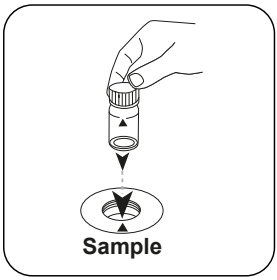
Fill 24 mm vial with **9 mL deionised water** .



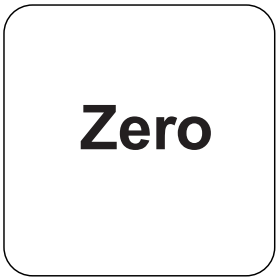
Put **1 mL sample** in the vial.



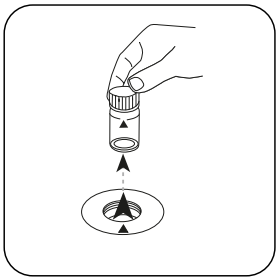
Close vial(s).



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

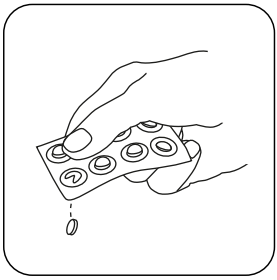


Press the **ZERO** button.

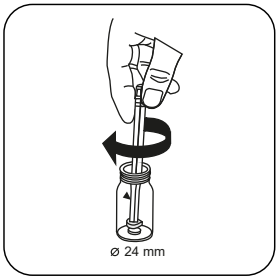


Remove the vial from the sample chamber.

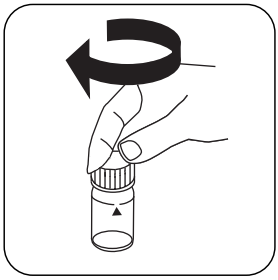
For devices that require **no ZERO measurement** , **start here**.



Add **HARDCHECK P tablet**.



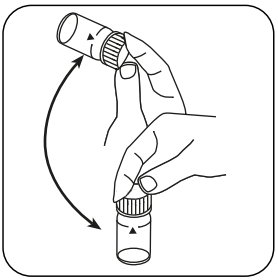
Crush tablet(s) by rotating slightly.



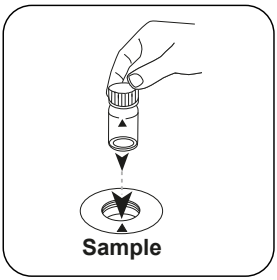
Close vial(s).

EN

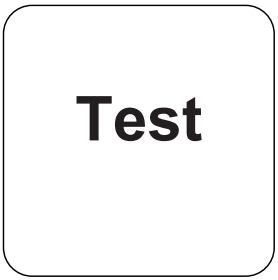
EN



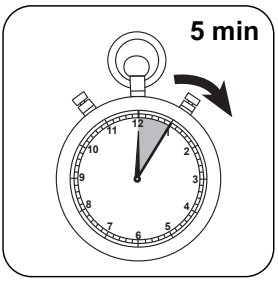
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **5 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in total Hardness appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	$CaCO_3$	1
	°dH	0.056
	°eH	0.07
	°fH	0.1
	°aH	1
mg/l	Ca	0.40043

Chemical Method

Metallphthaleine

Appendix

Interferences

Removeable Interferences

1. Interference from zinc and magnesium can be eliminated by the addition of 8-hydroxychinoline.
2. Concentrations of strontium and barium that occur in waters and soils do not interfere.

Bibliography

Photometrische Analyseverfahren, Schwedt, Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 1989

[i] high range by dilution

H_2O_2 T M210

0.03 - 3 mg/L H_2O_2

DPD / Catalyst

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Hydrogen Peroxide LR	Tablet / 100	512380BT
Hydrogen Peroxide LR	Tablet / 250	512381BT

Sampling

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

Preparation

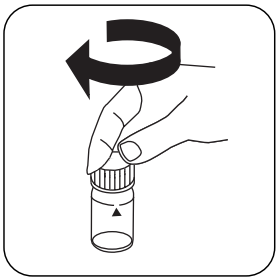
1. Cleaning of vials:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, this can lead to lower results. To avoid measurement errors, the glassware used should be pretreated accordingly. To achieve this, all glassware should be placed in a sodium hypochlorite solution (0.1 g/L) for one hour and then rinsed thoroughly with deionised water.
2. The DPD colour 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 Sulphuric acid or 1 mol/l Sodium hydroxide).

Determination of Hydrogen peroxide with Tablet

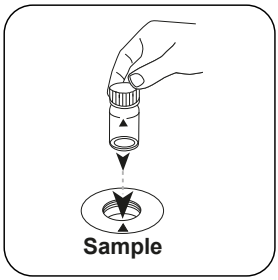
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

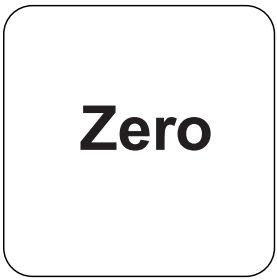
Fill 24 mm vial with **10 mL sample**.



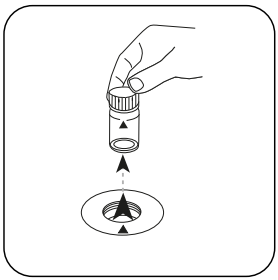
Close vial(s).



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



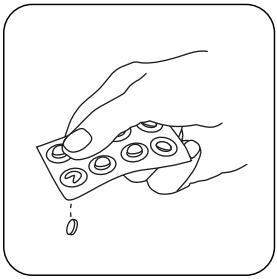
Press the **ZERO** button.



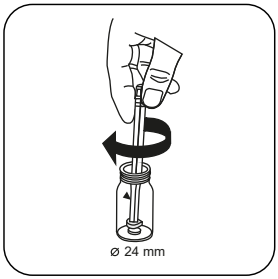
Remove the vial from the sample chamber.

Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.



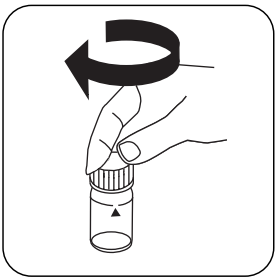
Add **HYDROGENPEROXIDE LR tablet**.



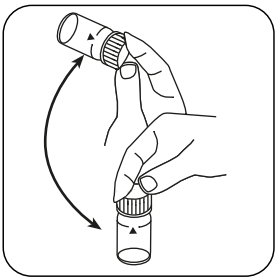
Crush tablet(s) by rotating slightly.

Fill up vial with **sample** to the **10 mL mark**.

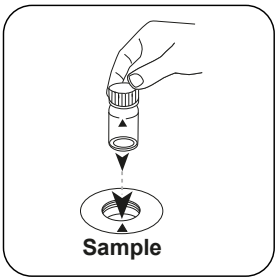
EN



Close vial(s).

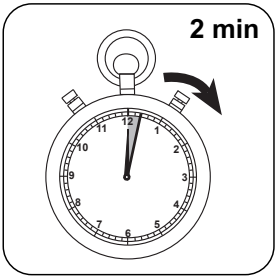


Dissolve tablet(s) by inverting.



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

Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L H_2O_2 appears on the display.

Chemical Method

DPD / Catalyst

Appendix

Interferences

Persistant Interferences

1. All oxidising agents in the samples react like hydrogen peroxide, which leads to higher results.

Removeable Interferences

1. Concentrations above 5 mg/L hydrogen peroxide can lead to results within the measuring range of up to 0 mg/L. In this case, the water sample must be diluted with water that is free from hydrogen peroxide. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, Lovibond

Derived from

US EPA 330.5
APHA 4500 Cl-G

Hypochlorite T M212

0.2 - 16 % NaOCl

Potassium Iodide

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Acidifying GP	Tablet / 100	515480BT
Acidifying GP	Tablet / 250	515481BT
Chlorine HR (KI)	Tablet / 100	513000BT
Chlorine HR (KI)	Tablet / 250	513001BT
Chlorine HR (KI)	Tablet / 100	501210
Chlorine HR (KI)	Tablet / 250	501211
Set Chlorine HR (KI)/Acidifying GP 100 Pc. #	100 each	517721BT
Set Chlorine HR (KI)/Acidifying GP 250 Pc. #	250 each	517722BT
Dilution set sodium hypochlorite	1 Pieces	414470

Remarks

1. This method provides a fast and simple test. The test can be performed on site but the result will not be as precise as a laboratory method.
2. By strictly following the test procedure, an accuracy of +/- 1 weight % can be achieved.

Determination of Sodium hypochlorite with Tablet

Select the method on the device.

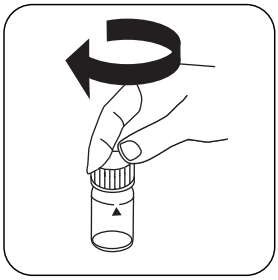
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

The sample is diluted x2000.

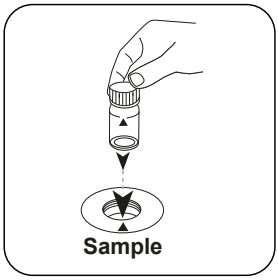
1. First rinse a 5 mL syringe with the solution to be examined and then fill to the 5 mL mark.
2. Empty the syringe into a 100-ml beaker.
3. Fill the measuring beaker up to the 100 mL mark with chlorine-free water.
4. Mix contents by stirring.
5. Fill a clean 5 mL syringe to the 1 mL mark with the diluted solution.
6. Empty the syringe into a clean 100 mL beaker.
7. Fill the measuring beaker up to the 100 mL mark with chlorine-free water.
8. Mix contents by stirring.

The test is performed with this solution.

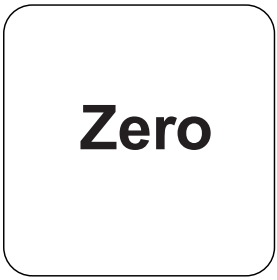
Fill 24 mm vial with **10 mL prepared sample** .



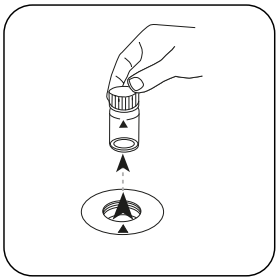
Close vial(s).



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



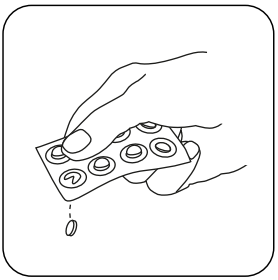
Press the **ZERO** button.



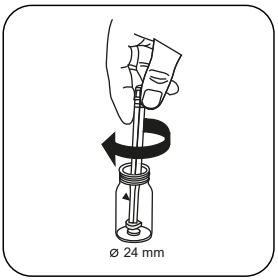
Remove the vial from the sample chamber.

For devices that require **no ZERO measurement** , **start here**.

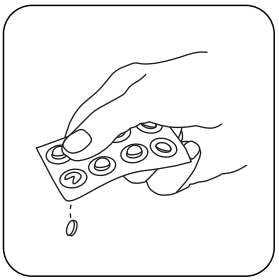
EN



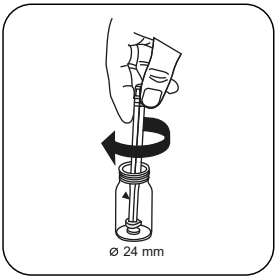
Add **CHLORINE HR (KI) tablet**.



Crush tablet(s) by rotating slightly.

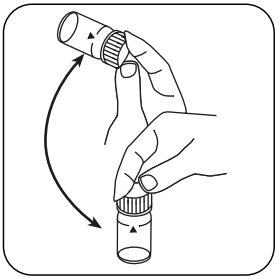


Add **ACIDIFYING GP tablet**.

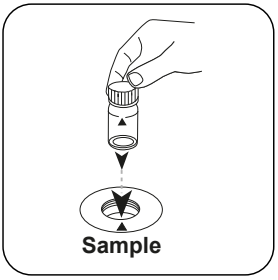


Crush tablet(s) by rotating slightly.

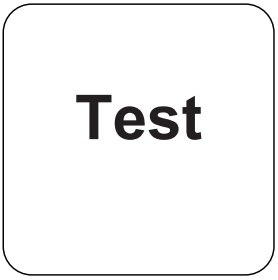
Close vial(s).



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The display will show the content of effective chlorine in % by weight (w/w %) relative to the **undiluted** sodium hypochlorite solution.

Chemical Method

Potassium Iodide

Appendix

Method Validation

Limit of Detection	0.03 %
Limit of Quantification	0.1 %
End of Measuring Range	16.8 %
Sensitivity	9.21 % / Abs
Confidence Intervall	0.12 %
Standard Deviation	0.05 %
Variation Coefficient	0.55 %

Derived from

EN ISO 7393-3

including stirring rod, 10 cm

H_2O_2 HR L — M214

40 - 500 mg/L H_2O_2 — HP2

Titanium Tetrachloride / Acid

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Reagent for Hydrogen Peroxide	15 mL	424991

Hazard Notes

1. The reference reagent contains a 25% sulphuric acid solution. It is recommended to wear appropriate protective clothing (protective goggles/gloves).

Preparation

1. The determination is held in strong acid medium. In the case of strongly alkaline samples (pH > 10), the samples must be acidified before measurement (with a 5% sulphuric acid solution at a ratio of 1:1).

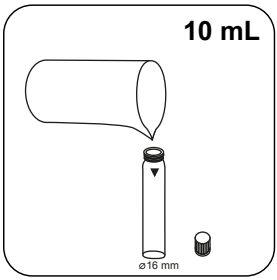
Remarks

1. The sample can be measured even 24 hours after the colour reaction.

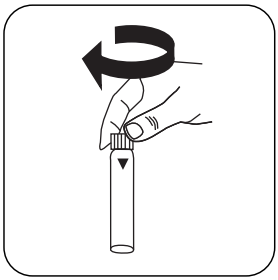
Determination of Hydrogen peroxide HR with liquid reagent

Select the method on the device.

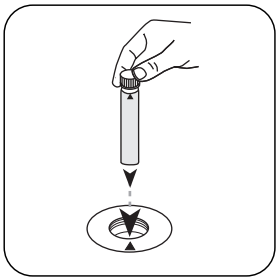
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



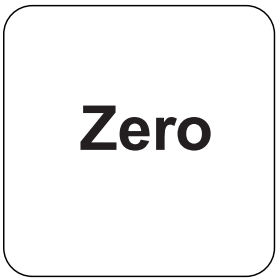
Fill 16 mm vial with **10 mL sample**.



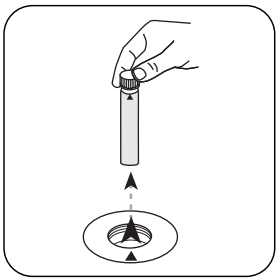
Close vial(s).



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

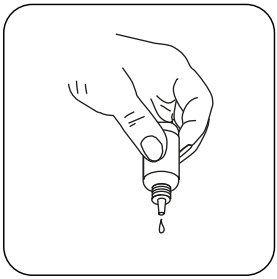


Press the **ZERO** button.

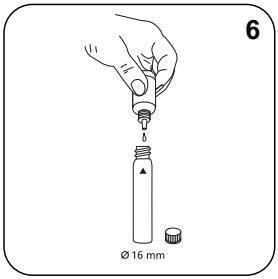


Remove **vial** from the sample chamber.

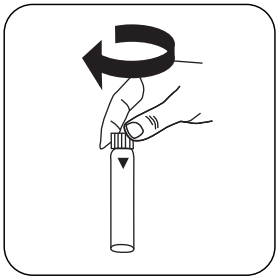
For devices that require **no ZERO measurement** , **start here**.



Hold cuvettes vertically and add equal drops by pressing slowly.

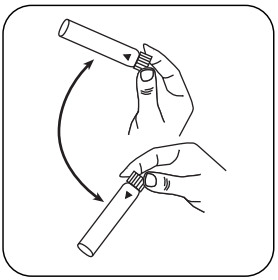


Add **6 drops H_2O_2-Reagent Solution**.

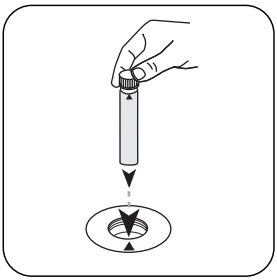


Close vial(s).

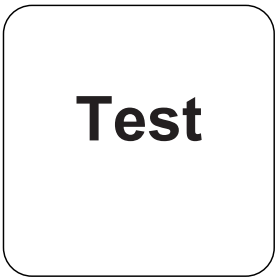
EN



Invert several times to mix the contents.



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



Press the **TEST** (XD: **START**)button.

The result in mg/L H_2O_2 appears on the display.

Chemical Method

Titanium Tetrachloride / Acid

Interferences

Removeable Interferences

1. Colour interference is eliminated as follows.
   A) Fill a clean vial with 10 ml of the water sample. Carry out zero calibration.
   b) Measure the sample without the addition of reagents. (Result B)
   c) Then measure the same sample with the addition of the reagents (Result A).
   Calculation of H_2O_2 Concentration = Result A - Result B.
2. Particles in the sample solution or turbidity distort the analysis and must be eliminated. This can be through centrifuging or simply filtering the sample solution prior to performing the measurement. Falsification of the measurement results should also be expected when working with coloured solutions.

Iodine T M215

0.05 - 3.6 mg/L I

DPD

EN

Material

Required material (partly optional):

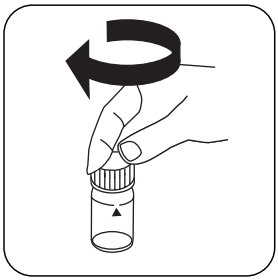
Reagents	Packaging Unit	Part Number
DPD No.1	Tablet / 100	511050BT
DPD No. 1	Tablet / 250	511051BT
DPD No. 1	Tablet / 500	511052BT
DPD No. 1 High Calcium [e)]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e)]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e)]	Tablet / 500	515742BT

Determination of Iodine with Tablet

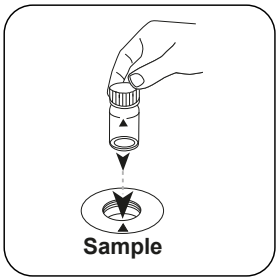
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

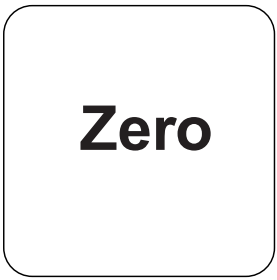
Fill 24 mm vial with **10 mL sample**.



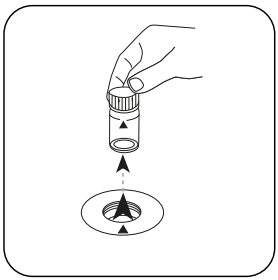
Close vial(s).



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



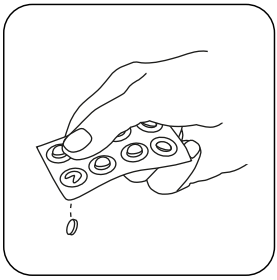
Press the **ZERO** button.



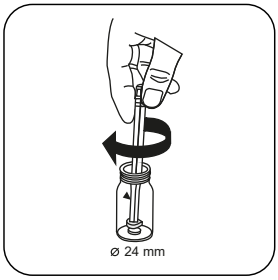
Remove the vial from the sample chamber.

Empty vial except for a few drops.

For devices that require **no ZERO measurement** , **start here**.



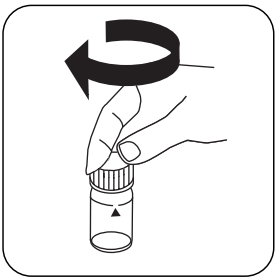
Add **DPD No. 1 tablet** .



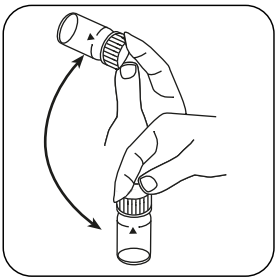
Crush tablet(s) by rotating slightly.

Fill up vial with **sample** to the **10 mL mark**.

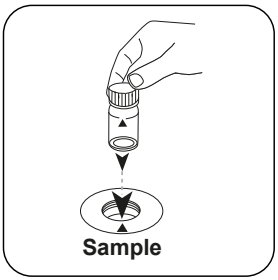
EN



Close vial(s).



Dissolve tablet(s) by inverting.



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

Press the **TEST** (XD: **START**)button.

The result in mg/L Iodine appears on the display.

Chemical Method

DPD

Appendix

Interferences

Persistant Interferences

1. All oxidising agents in the samples react like Iodine, which leads to higher results.

Derived from

EN ISO 7393-2

[e] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity

Iron T M220

0.02 - 1 mg/L Fe FE

Ferrozine / Thioglycolate

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Iron II LR (Fe^{2+})	Tablet / 100	515420BT
Iron II LR (Fe^{2+})	Tablet / 250	515421BT
Iron LR (Fe^{2+} und Fe^{3+})	Tablet / 100	515370BT
Iron LR (Fe^{2+} und Fe^{3+})	Tablet / 250	515371BT

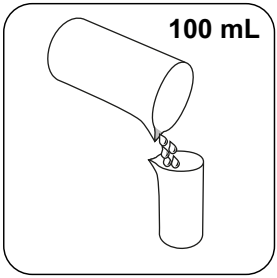
Preparation

1. Water that has been treated with organic compounds such as corrosion inhibitors, must be oxidised where necessary to break down the iron complex. 1 ml of concentrated Sulphuric acid (≥ 95 %) and 1 ml concentrated Nitric acid (≥ 65 %) is therefore added to to 100 ml water sample and boiled down to approximately half the volume. After cooling down, the digestion procedure is continued.

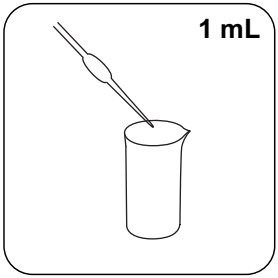
Remarks

1. This method is for the determination of total dissolved Fe^{2+} and Fe^{3+}.
2. For the determination of Fe^{2+}, the IRON (II) LR Tablet, instead of the IRON LR Tablet is used.

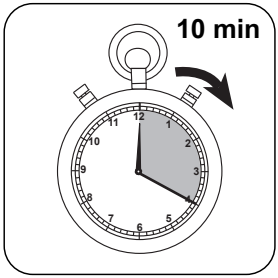
Digestion



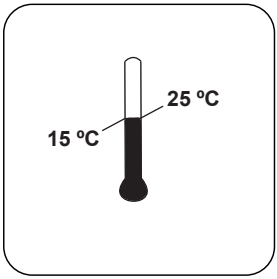
Fill a suitable sample vessel with **100 mL sample** .



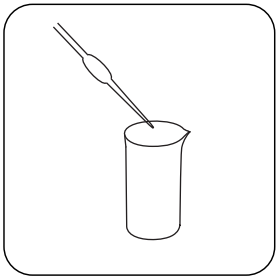
Add **1 mL concentrated sulfuric acid (≥ 95 %)** .



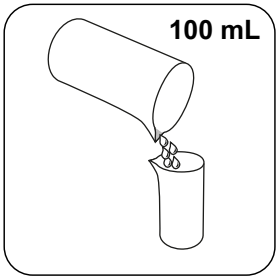
The sample is to be **heated for 10 minutes,** or for as long as it takes for everything to be completely dissolved.



Allow the sample to cool to room temperature.



Adjust **pH-value** of the sample with **ammonia solution (10-25 %) to 3-5**.



Fill the sample with **deionised water to 100 mL** .

This sample is used for the analysis of total solved and dissolved Iron.

Determination of Iron (II,III), dissolved with Tablet

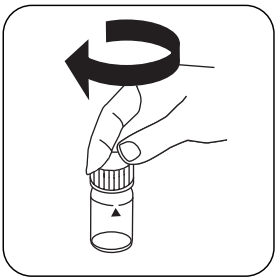
Select the method on the device.

For testing of **dissolved and undissolved Iron,** carry out the described **digestion**.

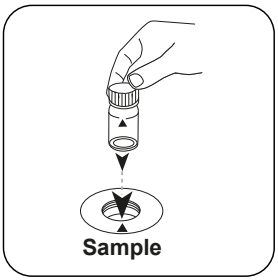
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

EN

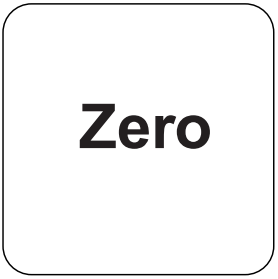
Fill 24 mm vial with **10 mL sample**.



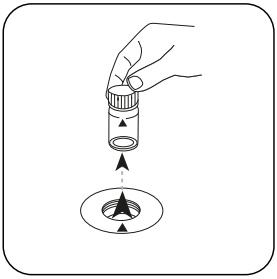
Close vial(s).



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

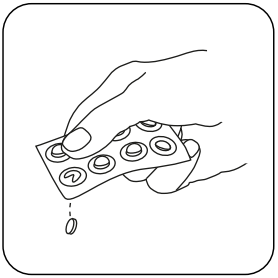


Press the **ZERO** button.

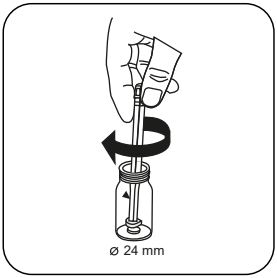


Remove the vial from the sample chamber.

For devices that require **no ZERO measurement** , **start here**.

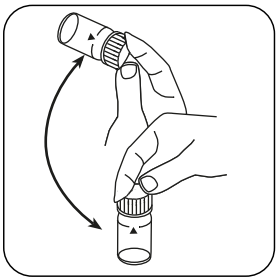


Add **IRON LR tablet**.

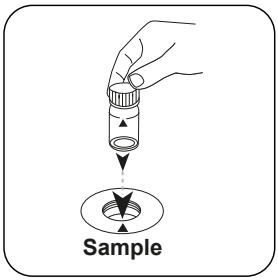


Crush tablet(s) by rotating slightly.

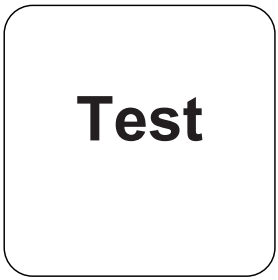
Close vial(s).



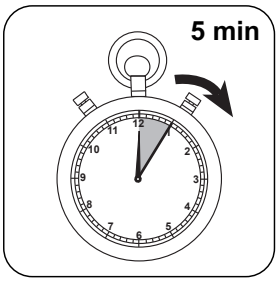
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **5 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Iron appears on the display.

Chemical Method

Ferrozine / Thioglycolate

Appendix

EN

Interferences

Removeable Interferences

1. The presence of copper increases the test result by 10 %. At a concentration of 10 mg/L copper in the sample, the measurement result is increased by 1 mg/L iron. The interference can be eliminated by the addition of thiourea

Method Validation

Limit of Detection	0.01 mg/L
Limit of Quantification	0.016 mg/L
End of Measuring Range	1 mg/L
Sensitivity	0.92 mg/L / Abs
Confidence Intervall	0.013 mg/L
Standard Deviation	0.005 mg/L
Variation Coefficient	1.23 %

Bibliography

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, p. 102

Oxygen active T M290

0.1 - 10 mg/L O_2

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD No. 4	Tablet / 100	511220BT
DPD No. 4	Tablet / 250	511221BT
DPD No. 4	Tablet / 500	511222BT

Preparation

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

Remarks

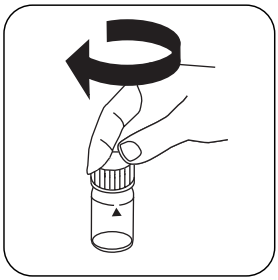
1. Active Oxygen is a synonym for a common disinfectant (based on “Oxygen“) in treating swimming pools.

Determination of Oxygen, active with Tablet

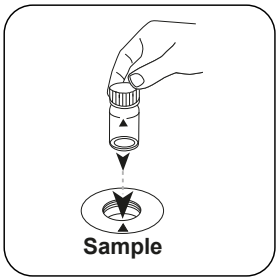
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

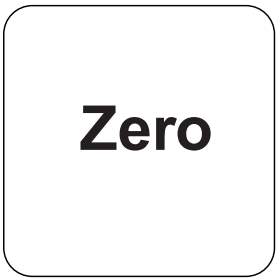
Fill 24 mm vial with **10 mL sample**.



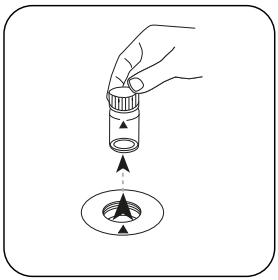
Close vial(s).



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

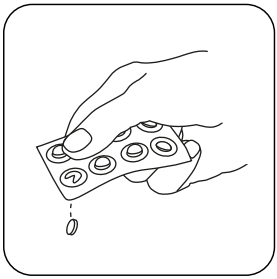


Press the **ZERO** button.

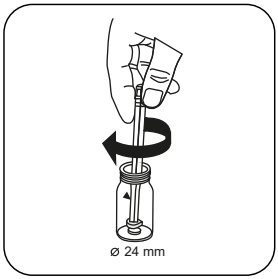


Remove the vial from the sample chamber.

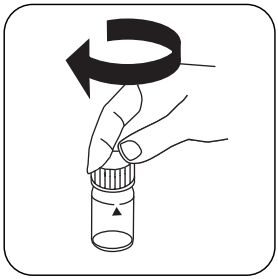
For devices that require **no ZERO measurement** , **start here**.



Add **DPD No. 4 tablet** .

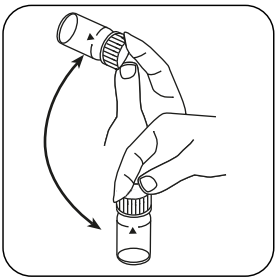


Crush tablet(s) by rotating slightly.

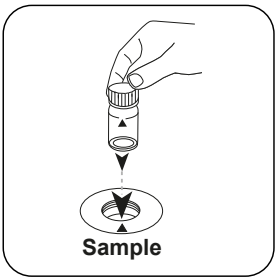


Close vial(s).

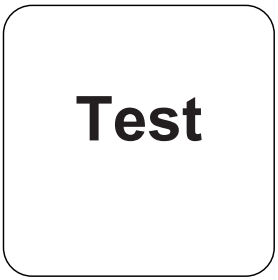
EN



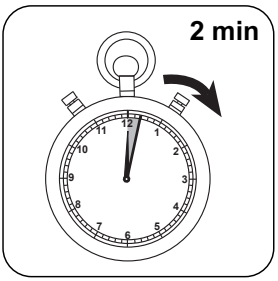
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Active Oxygen appears on the display.

Chemical Method

DPD

Interferences

Persistant Interferences

- All oxidising agents in the samples react like active oxygen, which leads to higher results.

Ozone T M300

0.02 - 2 mg/L O_3 O3

DPD / Glycine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
DPD No.1	Tablet / 100	511050BT
DPD No. 1	Tablet / 250	511051BT
DPD No. 1	Tablet / 500	511052BT
DPD No. 3	Tablet / 100	511080BT
DPD No. 3	Tablet / 250	511081BT
DPD No. 3	Tablet / 500	511082BT
DPD No. 1 High Calcium [e)]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e)]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e)]	Tablet / 500	515742BT
DPD No. 3 High Calcium [e)]	Tablet / 100	515730BT
DPD No. 3 High Calcium [e)]	Tablet / 250	515731BT
DPD No. 3 High Calcium [e)]	Tablet / 500	515732BT
Glycine [f)]	Tablet / 100	512170BT
Glycine [f)]	Tablet / 250	512171BT
Set DPD No. 1/No. 3 100 Pc.[#]	100 each	517711BT
Set DPD No. 1/No. 3 250 Pc.[#]	250 each	517712BT
Set DPD No. 1/No. 3 High Calcium 100 Pc. [#]	100 each	517781BT
Set DPD No. 1/No. 3 High Calcium 250 Pc. [#]	250 each	517782BT
Set DPD No. 1/Glycine 100 Stck. [#]	100 each	517731BT
Set DPD No. 1/Glycine 250 Stck. [#]	250 each	517732BT

Preparation

1. Cleaning of vials:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of oxidising agents (e.g. ozone and chlorine) may show lower results. 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 deionised water.
2. When preparing the sample, Ozone outgassing, e.g. through the pipette or shaking, must be avoided. The analysis must take place immediately after taking the sample.
3. Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

Determination of Ozone, in presence of Chlorine with tablet

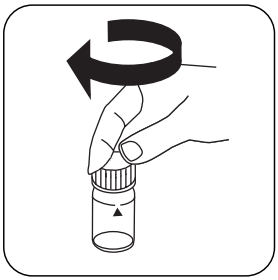
Select the method on the device.

In addition, choose the test: in presence of Chlorine

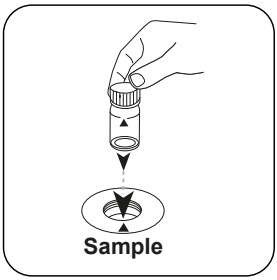
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

EN

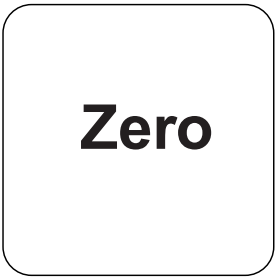
Fill 24 mm vial with **10 mL sample**.



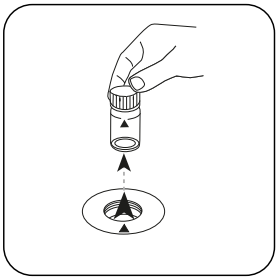
Close vial(s).



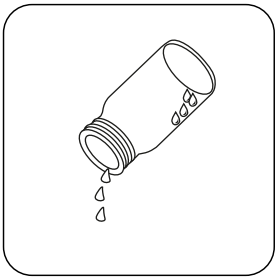
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.

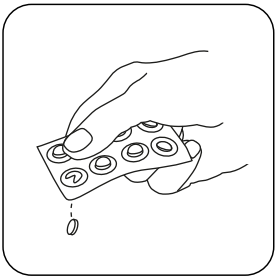


Remove the vial from the sample chamber.

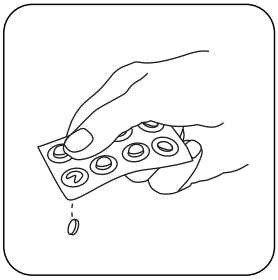


Empty vial except for a few drops.

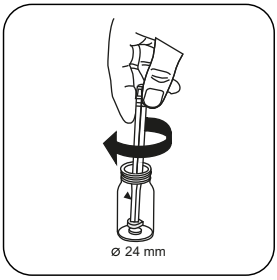
For devices that require **no ZERO measurement** , **start here**.



Add **DPD No. 1 tablet** .

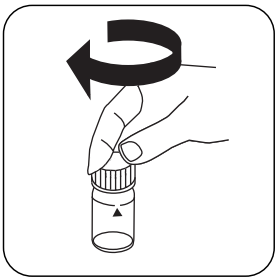


Add **DPD No. 3 tablet** .

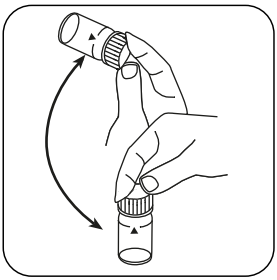


Crush tablet(s) by rotating slightly.

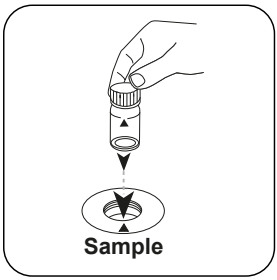
Fill up vial with **sample** to the **10 mL mark**.



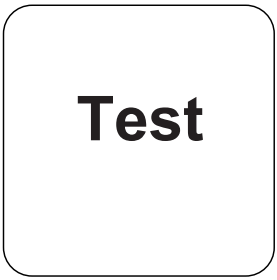
Close vial(s).



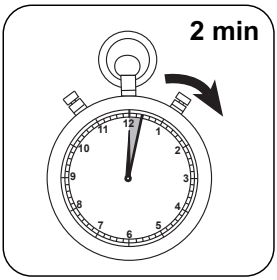
Dissolve tablet(s) by inverting.



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

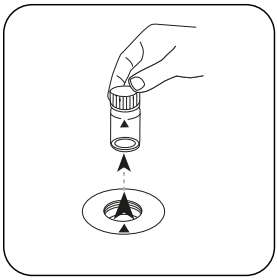


Press the **TEST** (XD: **START**)button.

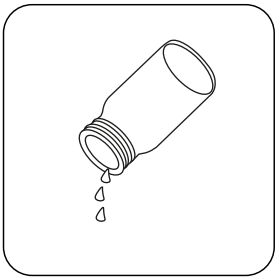


Wait for **2 minute(s) reaction time**.

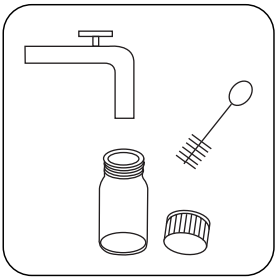
Once the reaction period is finished, the measurement takes place automatically.



Remove the vial from the sample chamber.



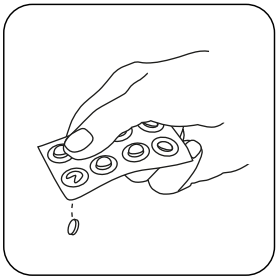
Empty vial.



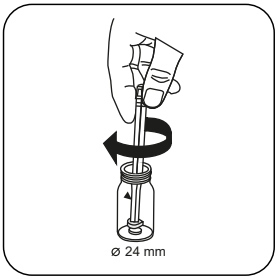
Thoroughly clean the vial and vial cap.

EN

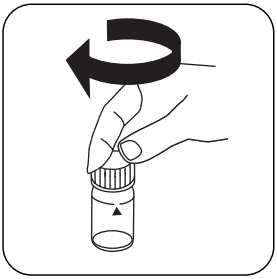
Fill a **second vial** with **10 mL sample** .



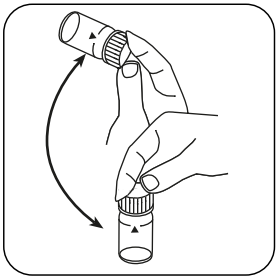
Add **GLYCINE tablet**.



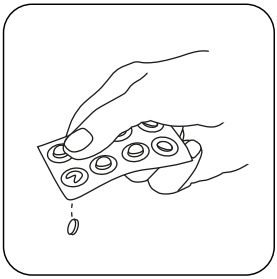
Crush tablet(s) by rotating slightly.



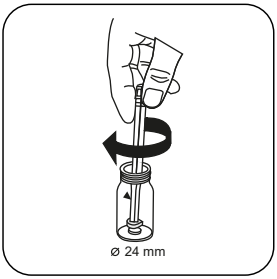
Close vial(s).



Dissolve tablet(s) by inverting.

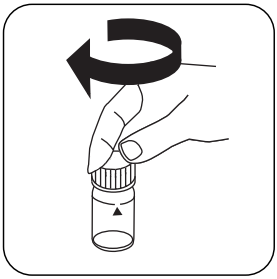


Add **one DPD No. 1 tablet** and **one DPD No. 3 tablet** straight from the foil into the first cleaned cuvette

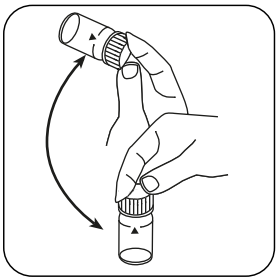


Crush tablet(s) by rotating slightly.

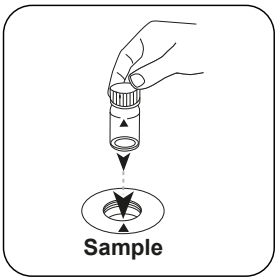
Fill prepared vial with prepared **glycine solution**.



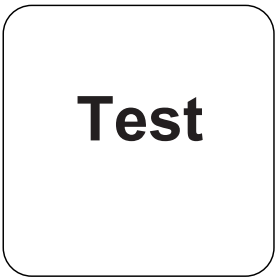
Close vial(s).



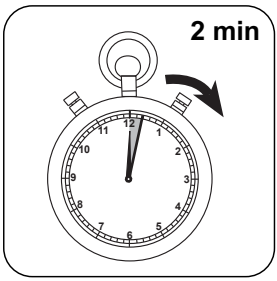
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Ozone; mg/l total chlorine appears on the display.

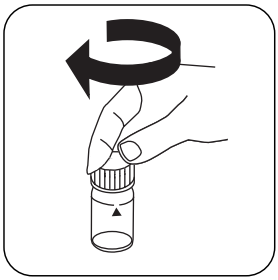
Determination of Ozone, in absence of chlorine with tablet

Select the method on the device.

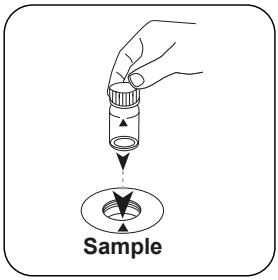
In addition, choose the test: without Chlorine

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

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

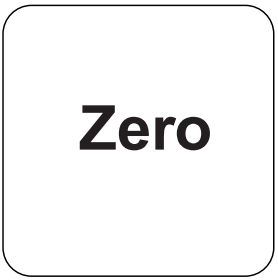


Close vial(s).

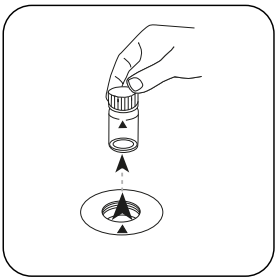


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



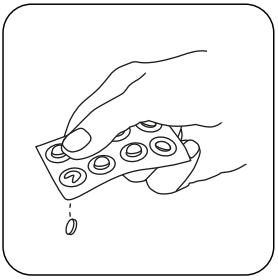
Press the **ZERO** button.



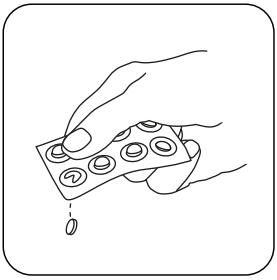
Remove the vial from the sample chamber.

Empty vial except for a few drops.

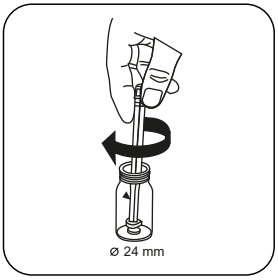
For devices that require **no ZERO measurement** , **start here**.



Add **DPD No. 1 tablet** .

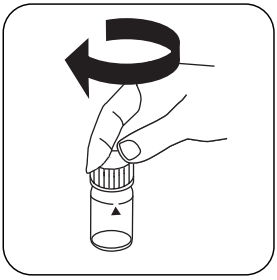


Add **DPD No. 3 tablet** .

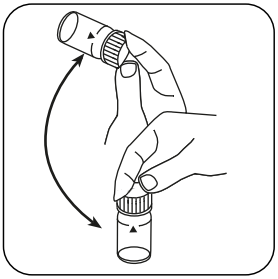


Crush tablet(s) by rotating slightly.

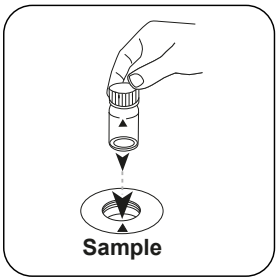
Fill up vial with **sample** to the **10 mL mark**.



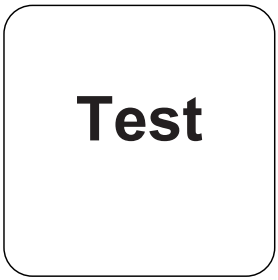
Close vial(s).



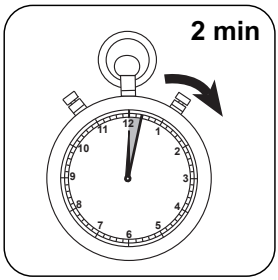
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Ozone appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	O_3	1
mg/l	Cl_2	1.4771

Chemical Method

DPD / Glycine

Appendix

Interferences

Persistant Interferences

1. All oxidising agents in the samples react like chlorine, which leads to higher results.
2. Concentrations above 6 mg/L Ozone can lead to results within the measuring range of up to 0 mg/L. In this case, the water sample must be diluted. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, Lovibond

Derived from

DIN 38408-3:2011-04

[e)] alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity | [f)] additionally required for determination of bromine, chlorine dioxide and ozone in the presence of chlorine | [#] including stirring rod, 10 cm

Phosphate LR T M319

0.05 - 4 mg/L PO_4 PO_4

Phosphomolybdenum Blue

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Phosphate No. 1 LR	Tablet / 100	513040BT
Phosphate No. 2 LR	Tablet / 100	513050BT
Phosphate No. 2 LR	Tablet / 250	513051BT
Set Phosphate No. 1 LR/No. 2 LR 100 Pc. #	100 each	517651BT

Preparation

1. Strongly buffered samples or samples with extreme pH values should be adjusted to between pH 6 and pH 7 before the analysis (use 1 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).
2. Ortho-Phosphate ions react with the reagent to form an intense blue colour. Phosphate, which is found in organic and condensed, inorganic (meta-, pyro- and polyphosphate) forms, must therefore be converted into ortho-phosphate ions prior to analysis. The pretreatment of the sample with acid and heat creates the conditions for the hydrolysis of the condensed, inorganic forms. Organically bound phosphate can be converted into ortho-phosphate ions by heating with acid and Persulphate.
   The amount of organically bound phosphate can be calculated:
   mg/L organic Phosphate = mg/L Phosphate, total - mg/L Phosphate, can be hydrolysed in acid.

Remarks

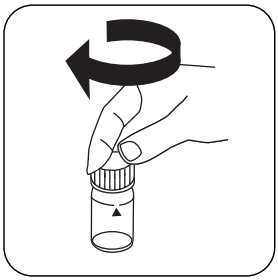
1. Only ortho-phosphate ions react.
2. The tablets must be added in the correct sequence.

Determination of Phosphate, ortho LR with Tablet

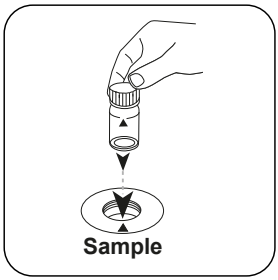
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

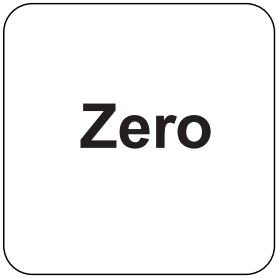
Fill 24 mm vial with **10 mL sample**.



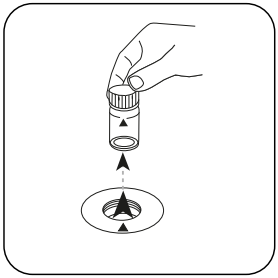
Close vial(s).



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

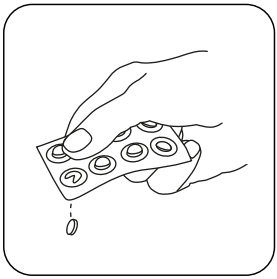


Press the **ZERO** button.

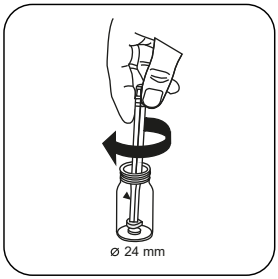


Remove the vial from the sample chamber.

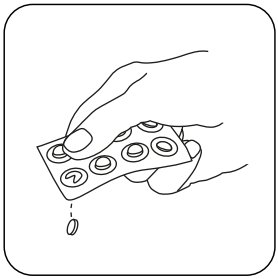
For devices that require **no ZERO measurement** , **start here**.



Add **PHOSPHATE No. 1 LR tablet**.

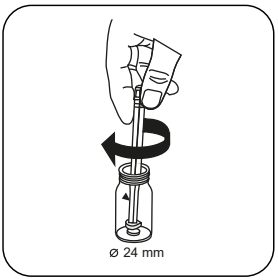


Crush tablet(s) by rotating slightly.

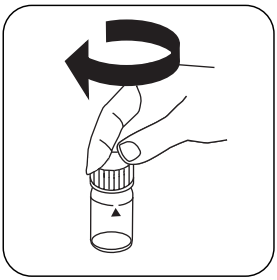


Add **PHOSPHATE No. 2 LR tablet**.

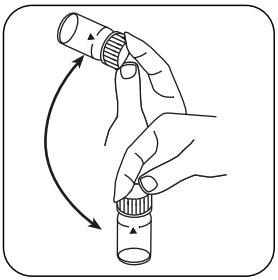
EN



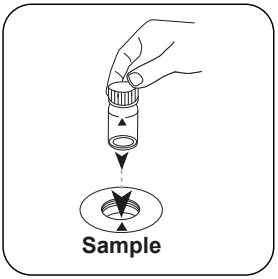
Crush tablet(s) by rotating slightly.



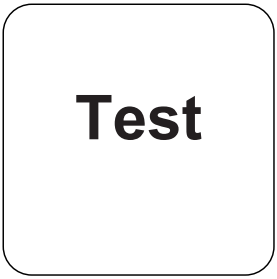
Close vial(s).



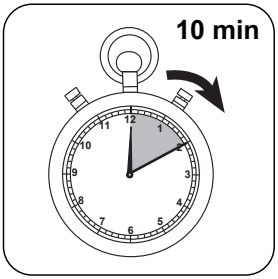
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **10 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L ortho-Phosphate appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	P	0.3261
mg/l	PO_4^{3-}	1
mg/l	P_2O_5	0.7473

Chemical Method

Phosphomolybdenum Blue

Appendix

Interferences

Interference	from / [mg/L]
Al	200
AsO_4^{3-}	in allen Mengen
Cr	100
Cu	10
Fe	100
Ni	300
H_2S	in allen Mengen
SiO_2	50
S^{2-}	in allen Mengen
Zn	80
V(V)	große Mengen
W(VI)	große Mengen

According to

DIN ISO 15923-1 D49
Standard Method 4500-P E
US EPA 365.2

including stirring rod, 10 cm

pH-value LR T M329

5.2 - 6.8 pH

Bromocresolpurple

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Bromocresol Purple Photometer	Tablet / 100	515700BT
Bromocresol Purple Photometer	Tablet / 250	515701BT

Remarks

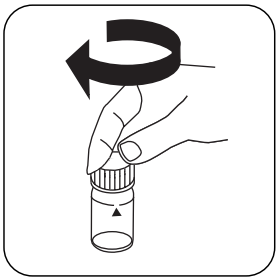
1. For photometric determination of pH values only use BROMCRESOL PURPLE tablets in black printed foil pack and marked with PHOTOMETER.
2. The accuracy of the colorimetric determination of pH values depends on various boundary conditions (buffer capacity of the sample, salt contents etc.).

Determination of pH value LR with Tablet

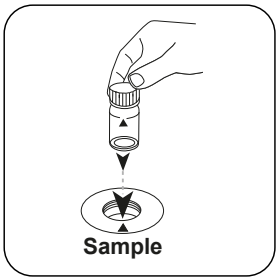
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

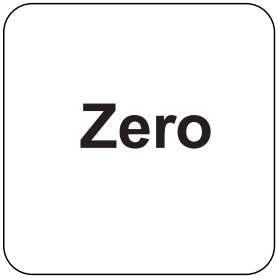
Fill 24 mm vial with **10 mL sample**.



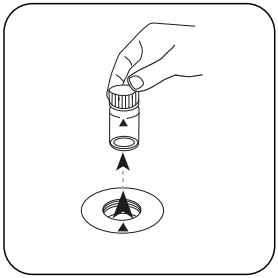
Close vial(s).



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

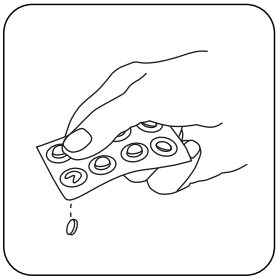


Press the **ZERO** button.

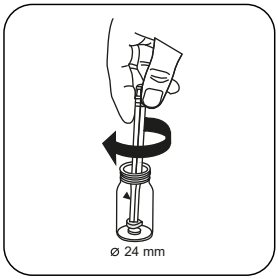


Remove the vial from the sample chamber.

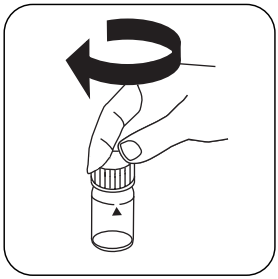
For devices that require **no ZERO measurement** , **start here**.



Add **BROMCRESOLPURPLE PHOTOMETER tablet**.

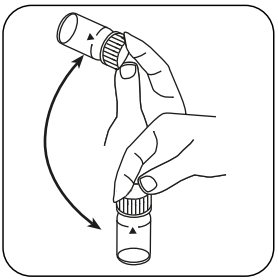


Crush tablet(s) by rotating slightly.

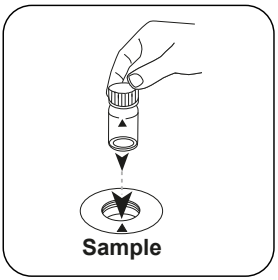


Close vial(s).

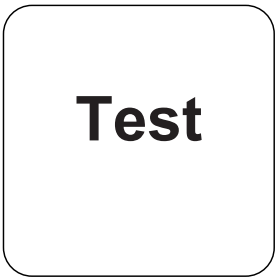
EN



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in pH value appears on the display.

Chemical Method

Bromocresolpurple

Appendix

Interferences

Persistant Interferences

- pH values below 5.2 and above 6.8 can produce results inside the measuring range. A plausibility test (pH-meter) is recommended.

Removeable Interferences

Salt error Correction of test results (average values) for samples with salt contents of:

Indicator	Salt content per sample		
Bromocresolpurple	½ molar -0.26	2 molars -0.33	3 molars -0.31

The values of Parson and Douglas (1926) are based on the use of Clark and Lubs buffers. 1 Mol NaCl = 58.4 g/L = 5.8 %

Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, London

pH-value T M330

6.5 - 8.4 pH PH

Phenol Red

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Phenol Red Photometer	Tablet / 100	511770BT
Phenol Red Photometer	Tablet / 250	511771BT
Phenol Red Photometer	Tablet / 500	511772BT

Remarks

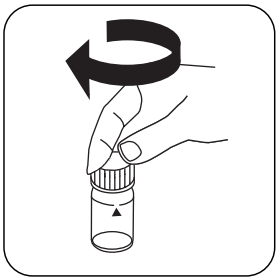
1. For photometric determination of pH values only use PHENOL RED tablets in black printed foil pack and marked with PHOTOMETER.

Determination of pH-value with Tablet

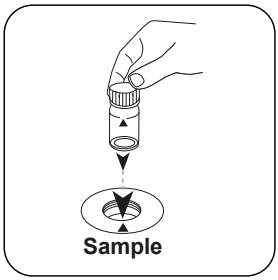
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

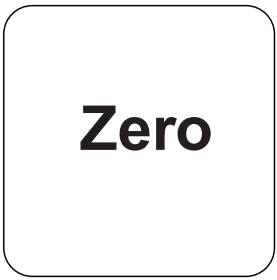
Fill 24 mm vial with **10 mL sample**.



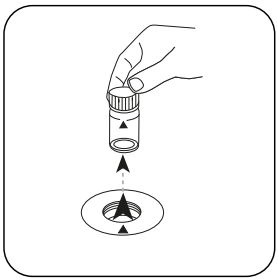
Close vial(s).



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

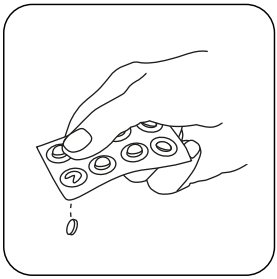


Press the **ZERO** button.

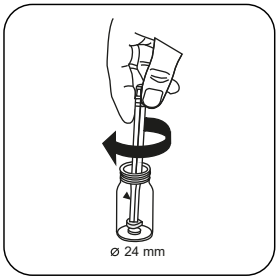


Remove the vial from the sample chamber.

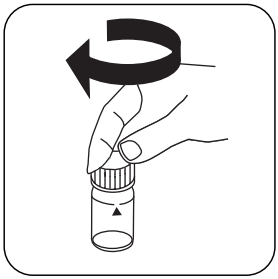
For devices that require **no ZERO measurement** , **start here**.



Add **PHENOL RED PHOTOMETER tablet**.

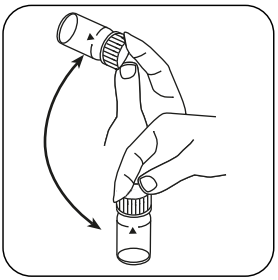


Crush tablet(s) by rotating slightly.

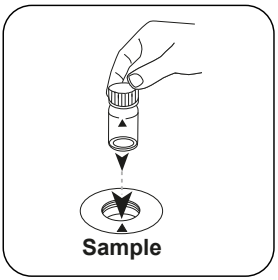


Close vial(s).

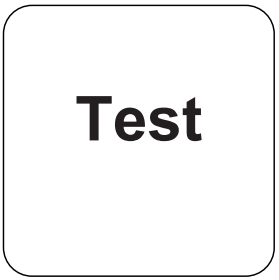
EN



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in pH value appears on the display.

Chemical Method

Phenol Red

Appendix

Interferences

Persistant Interferences

1. Water samples with little Carbonate hardness* can lead to false pH values.
   *$K_{S4.3}$ < 0.7 mmol/l ≙ total alkalinity < 35 mg/L $CaCO_3$.

Removeable Interferences

1. pH values below 6.5 and above 8.4 can produce results inside the measuring range. A plausibility test (pH-meter) is recommended.
2. Salt error
   For salt concentrations below 2 g/L, no significant error, is expected due to the salt concentration of the reagent tablet. For higher salt concentrations the measurement values
   have to be adjusted as follows:

Salt content per sample in g/L	30 (seawater)	60	120	180
Correction	-0.15[1)]	-0.21[2)]	-0.26[2)]	-0.29[2)]

[1)] according to Kolthoff (1922)
[2)] according to Parson and Douglas (1926)

Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, London

pH value L M331

6.5 - 8.4 pH PH

Phenol Red

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Phenol Red Solution	15 mL	471040
Phenol Red Solution	100 mL	471041
Phenol Red Solution in 6-pack	1 Pieces	471046

Preparation

1. Due to differing drop sizes results can show a discrepancy in accuracy by comparison with tablets.
   This can be minimised by using a pipette (0.18 ml equivalent to 6 drops).

Remarks

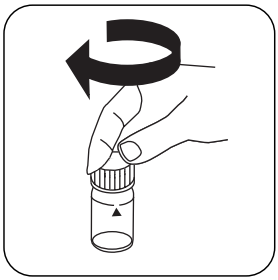
1. After use, ensure the cuvette is once again closed with the same-coloured screw caps.
2. Reagents are to be stored in the cool at +6 °C to +10 °C.

Determination of pH-value with liquid reagent

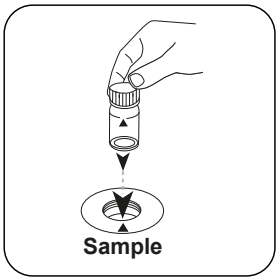
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

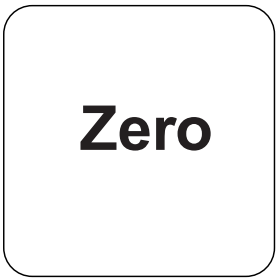
Fill 24 mm vial with **10 mL sample**.



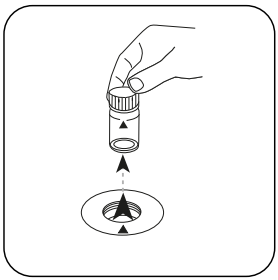
Close vial(s).



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

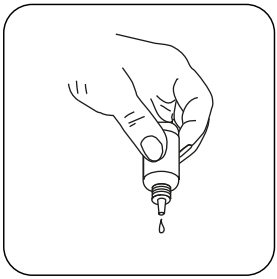


Press the **ZERO** button.

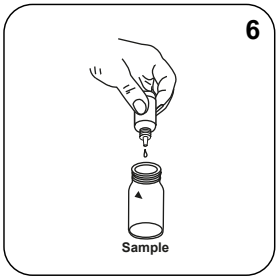


Remove the vial from the sample chamber.

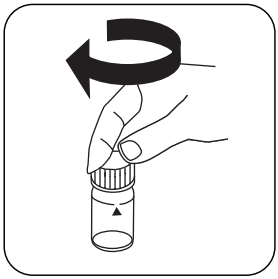
For devices that require **no ZERO measurement** , **start here**.



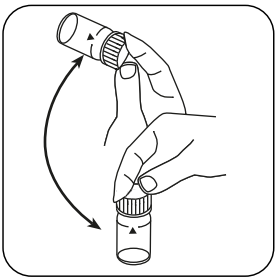
Hold cuvettes vertically and add equal drops by pressing slowly.



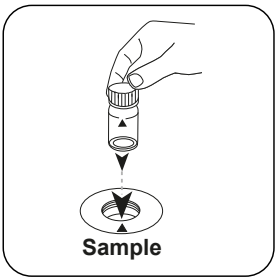
Add **6 drops PHENOL Red-Lösung** to the **sample vial**.



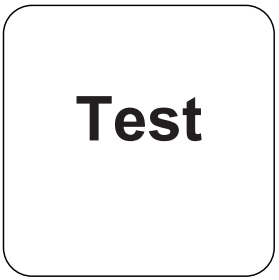
Close vial(s).



Invert several times to mix the contents.



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



Press the **TEST** (XD: **START**)button.

The result in pH value appears on the display.

Chemical Method

Phenol Red

Appendix

Interferences

Removeable Interferences

1. Salt error Correction of test results (average values) for samples with salt contents of:

2.

Salt content of the sample	Correction
30 g/L (seawater)	-0.15 [1)]
60 g/L	-0.21 [2)]
120 g/L	-0.26 [2)]
180 g/L	-0.29 [2)]
[1)] according to Kolthoff (1922)	[2)] according to Parson and Douglas (1926)

3. When testing chlorinated water the residual chlorine contents can influence the colour reaction of the liquid reagent. This can be avoided by adding a small crystal of Sodiumthiosulphate ($Na_2S_2O_3 \cdot 5\ H_2O$) to the sample solution before adding the PHENOL RED solution.

Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, London

pH-value HR T M332

8.0 - 9.6 pH

Thymol Blue

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Thymol Blue Photometer	Tablet / 100	515710BT
Thymol Blue Photometer	Tablet / 250	515711BT

Remarks

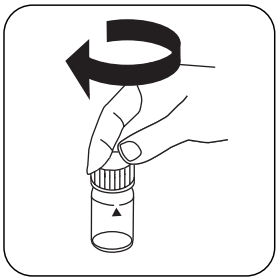
1. For photometric determination of pH values only use THYMOLBLUE tablets in black printed foil pack and marked with PHOTOMETER.
2. The accuracy of the colorimetric determination of pH values depends on various boundary conditions (buffer capacity of the sample, salt contents etc.).

Determination of pH-value with Tablet

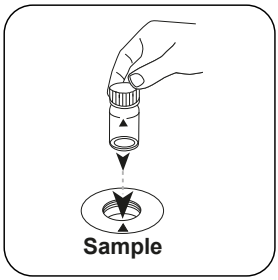
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

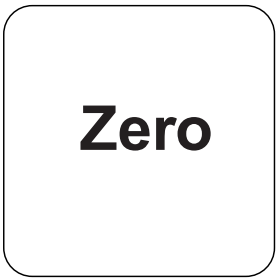
Fill 24 mm vial with **10 mL sample**.



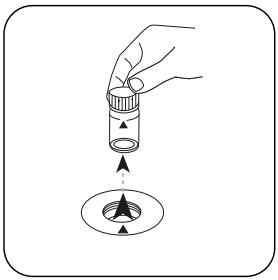
Close vial(s).



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

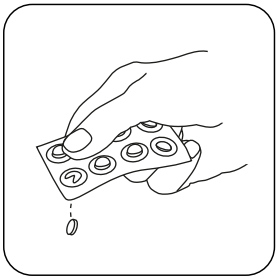


Press the **ZERO** button.

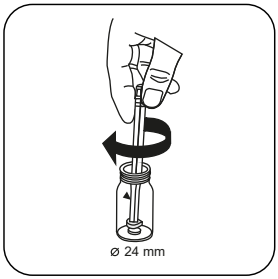


Remove the vial from the sample chamber.

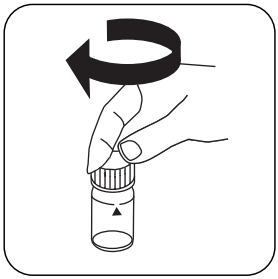
For devices that require **no ZERO measurement** , **start here**.



Add **THYMOLBLUE PHOTOMETER tablet**.

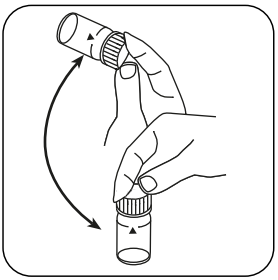


Crush tablet(s) by rotating slightly.

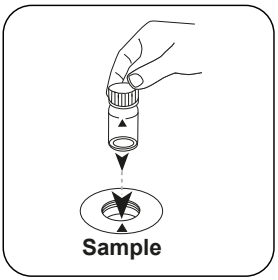


Close vial(s).

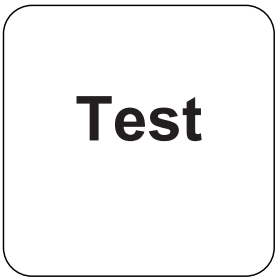
EN



Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.

The result in pH value appears on the display.

Chemical Method

Thymol Blue

Appendix

Interferences

Persistant Interferences

1. pH values below 8.0 and above 9.6 can produce results inside the measuring range. A plausibility test (pH-meter) is recommended.

Removeable Interferences

Salt error Correction of test results (average values) for samples with salt contents of:

Indicator	Salt content per sample		
Thymolblue	1 molar -0.22	2 molars -0.29	3 molars -0.34

The values of Parson and Douglas (1926) are based on the use of Clark and Lubs buffers. 1 Mol NaCl = 58.4 g/L = 5.8 %

Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, London

Sulphate T M355

5 - 100 mg/L SO_4^{2-}

Bariumsulphate Turbidity

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Sulfate Turbidity	Tablet / 100	515450BT
Sulfate Turbidity	Tablet / 250	515451BT

Remarks

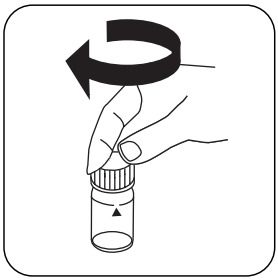
1. Sulphate causes a finely distributed turbidity with a milky appearance.

Determination of Sulphate with Tablet

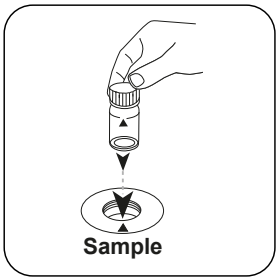
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

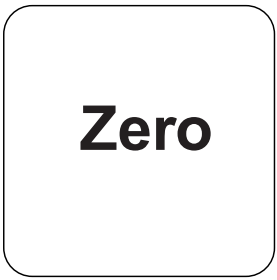
Fill 24 mm vial with **10 mL sample**.



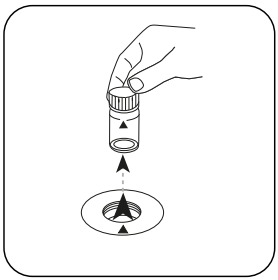
Close vial(s).



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

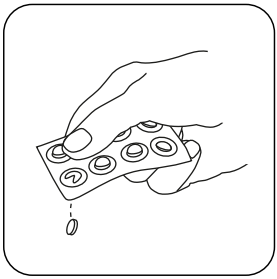


Press the **ZERO** button.

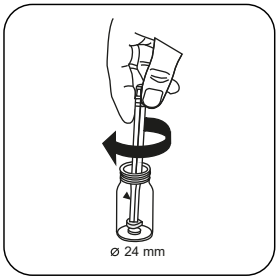


Remove the vial from the sample chamber.

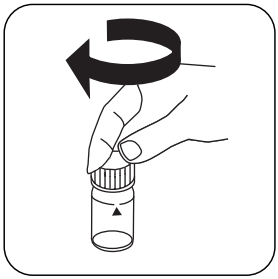
For devices that require **no ZERO measurement** , **start here**.



Add **SULFATE T tablet**.

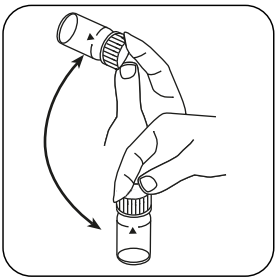


Crush tablet(s) by rotating slightly.

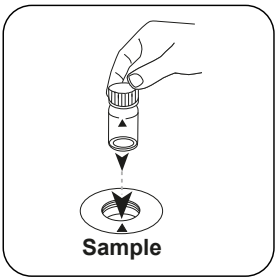


Close vial(s).

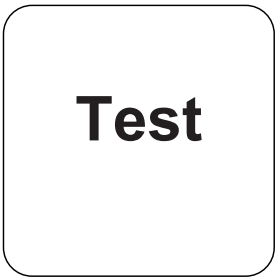
EN



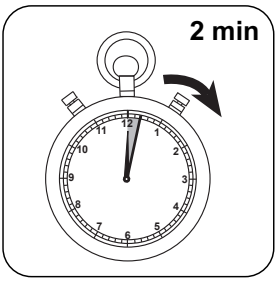
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Sulphate appears on the display.

Chemical Method

Bariumsulphate Turbidity

Appendix

Derived from

DIN ISO 15923-1 D49

Sulphate PP M360

5 - 100 mg/L SO_4^{2-} SO4

Bariumsulphate Turbidity

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO Sulfa 4 F10	Powder / 100 Pieces	532160

Remarks

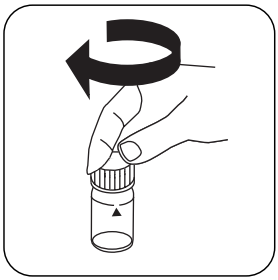
1. Sulphate causes a finely distributed turbidity.

Determination of Sulphate with Vario Powder Pack

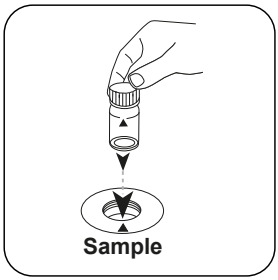
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

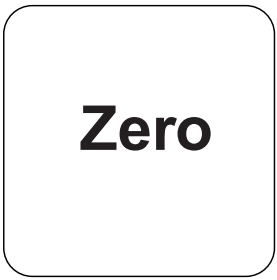
Fill 24 mm vial with **10 mL sample**.



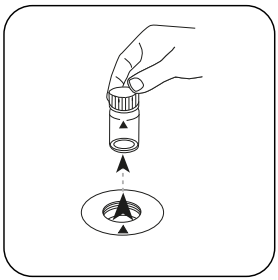
Close vial(s).



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

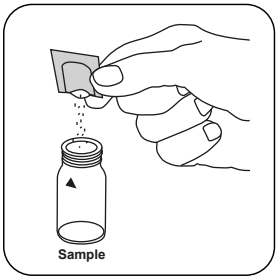


Press the **ZERO** button.

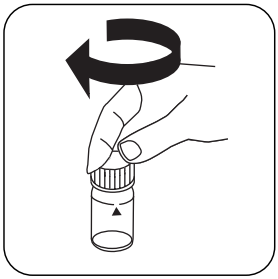


Remove the vial from the sample chamber.

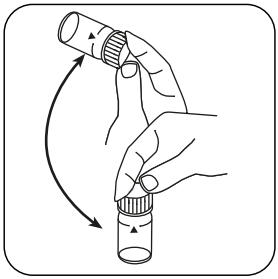
For devices that require **no ZERO measurement** , **start here**.



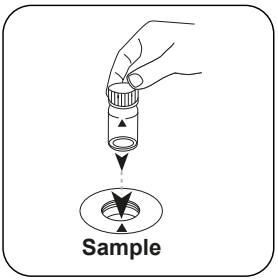
Add **Vario Sulpha 4/ F10 powder pack**.

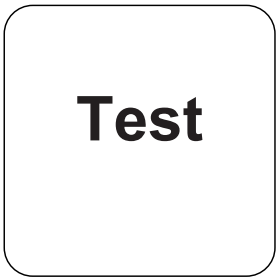


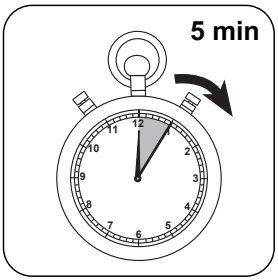
Close vial(s).



Invert several times to mix the contents.







EN

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

Press the **TEST** (XD: **START**)button.

Wait for **5 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Sulphate appears on the display.

Chemical Method

Bariumsulphate Turbidity

Appendix

According to

Standard Method 4500-SO42- E
US EPA 375.4

Derived from

DIN ISO 15923-1 D49

Urea T M390

0.1 - 2.5 mg/L Urea Ur1

Indophenol / Urease

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
UREA Reagent 1	15 mL	459300
UREA Reagent 2	10 mL	459400
Ammonia No. 1	Tablet / 100	512580BT
Ammonia No. 1	Tablet / 250	512581BT
Ammonia No. 2	Tablet / 100	512590BT
Ammonia No. 2	Tablet / 250	512591BT
Set Ammonia No. 1/No. 2 100 Pc.#	100 each	517611BT
Set Ammonia No. 1/No. 2 250 Pc.#	250 each	517612BT
Ammonia Conditioning Powder	Powder / 26 g	460170
Urea Pretreat (compensates for the interference of free Chlorine up to 2 mg/l)	Tablet / 100	516110BT
UREA Reagent Set	1 Set	517800BT

Preparation

1. The temperature of the sample should be between 20 °C and 30 °C.
2. The analysis must take place within one hour after taking the sample at the latest.
3. With the analysis of sea water samples, before the addition of Ammonia No. 1 Tablet, two scoops of ammonium conditioning powder must be added to the sample and dissolved by swirling.

Remarks

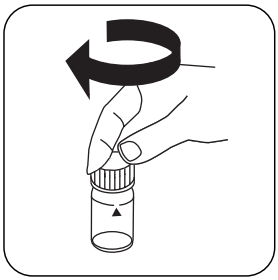
1. The AMMONIA No. 1 tablet will only dissolve completely after the AMMONIA No. 2 Tablet has been added.
2. Ammonium and chloramines are accounted for in the urea determination.

Determination of Urea with Tablet and Liquid Reagent

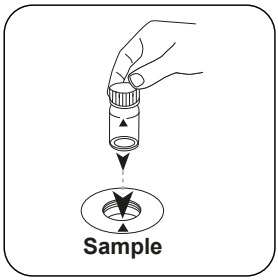
Select the method on the device.

For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

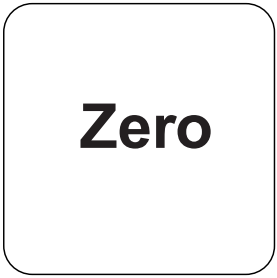
Fill 24 mm vial with **10 mL sample**.



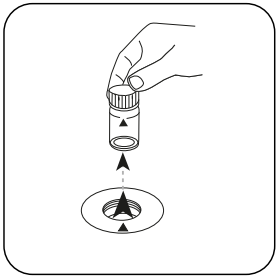
Close vial(s).



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

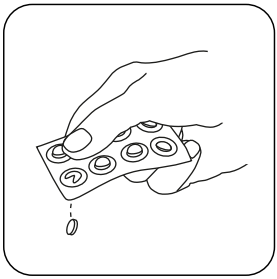


Press the **ZERO** button.

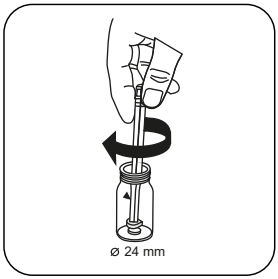


Remove the vial from the sample chamber.

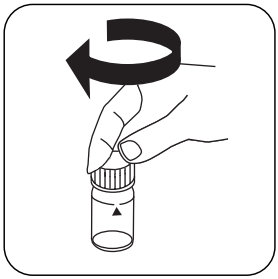
For devices that require **no ZERO measurement** , **start here**.



If free chlorine (HOCl) is present, add **a UREA PRETREAT tablet**.

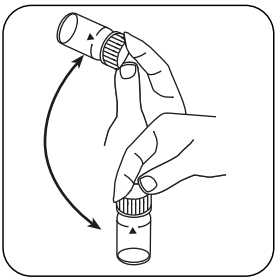


Crush tablet(s) by rotating slightly.

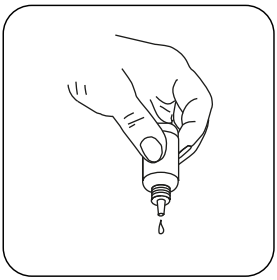


Close vial(s).

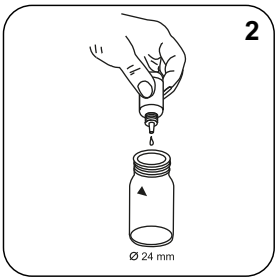
EN



Dissolve tablet(s) by inverting.

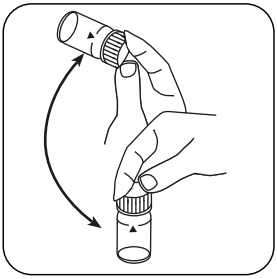


Hold cuvettes vertically and add equal drops by pressing slowly.

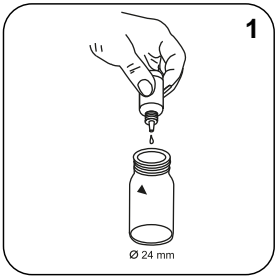


Add **2 drops Urea Reagenz 1**.

Close vial(s).

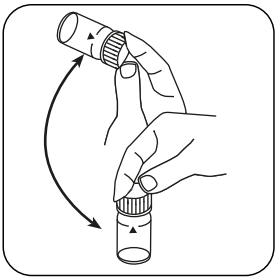


Invert several times to mix the contents.

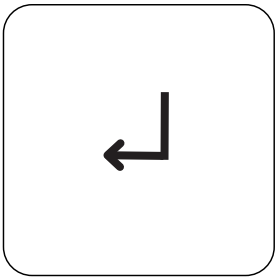


Add **1 drops Urea Reagenz 2**.

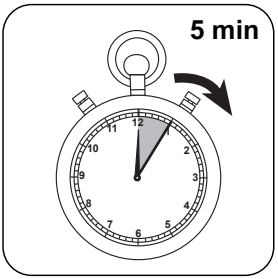
Close vial(s).



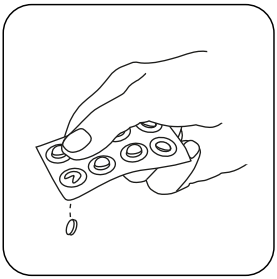
Invert several times to mix the contents.



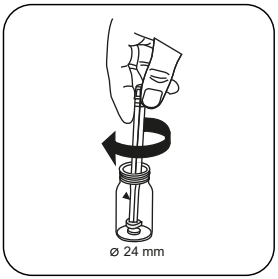
Press the **ENTER** button.



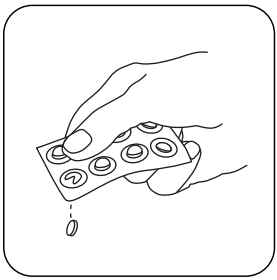
Wait for **5 minute(s) reaction time**.



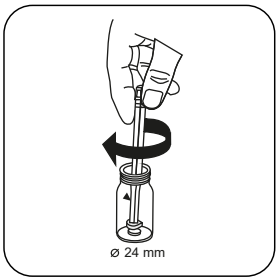
Add **AMMONIA No.1 tablet** .



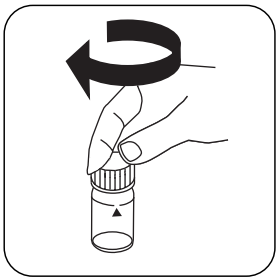
Crush tablet(s) by rotating slightly.



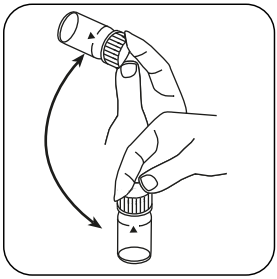
Add **AMMONIA No.2 tablet** .



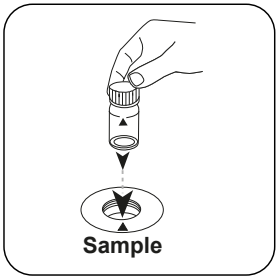
Crush tablet(s) by rotating slightly.



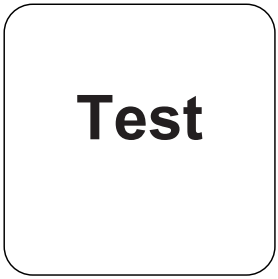
Close vial(s).



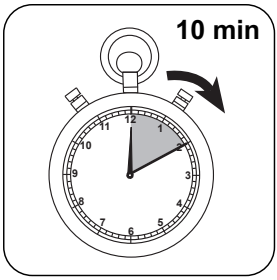
Dissolve tablet(s) by inverting.



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



Press the **TEST** (XD: **START**)button.



Wait for **10 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L Urea appears on the display.

Chemical Method

Indophenol / Urease

Appendix

EN

Interferences

Persistant Interferences

- Concentrations above 2 mg/L urea can lead to results within the measuring range. In this case, the water sample must be diluted with water that is free from urea and the measurement must be repeated (plausibility test).

Removeable Interferences

- A UREA PRETREAT Tablet eliminates the interference of free chlorine up to 2 mg/L (two tablets up to 4 mg/L, 3 tablets up to 6 mg/L).

Interference	from / [mg/L]
Cl_2	2

Bibliography

R.J. Creno, R.E. Wenk, P. Bohling, Automated Micromeasurement of Urea Using Urease and the Berthelot Reaction, American Journal of Clinical Pathology (1970), 54 (6), p. 828-832

including stirring rod, 10 cm

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