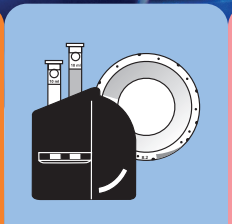
Lovibond® Water Testing

Tintometer® Group

Water Treatment Engineers Test Kit Advanced

56I701500



Engineers Kit System (Advanced)

Monitoring of water quality in closed circuits, evaporative cooling systems and boiler systems is an essential part of any water treatment Engineers daily tasks.

It has been proven that testing industrial waters on a regular basis can mitigate risks and system issues before they become problematic; including early detection of corrosion, scale and biofouling. This early detection allows water treatment professionals to make assessments of system efficacy and integrity in a timely manner, enabling decisions on treatment programs to achieve optimal system performance

This test kit provides the user with the primary tests in order to complete their daily tasks.

Note:

1. Further instructions can be found with the corresponding product.

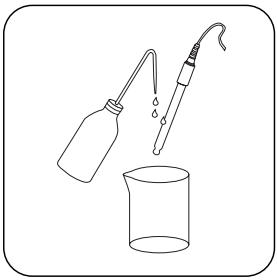
pH

-2 - 16

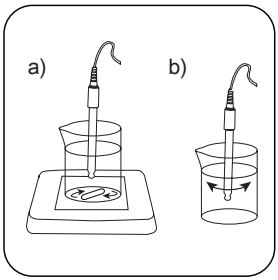
EN

Remarks

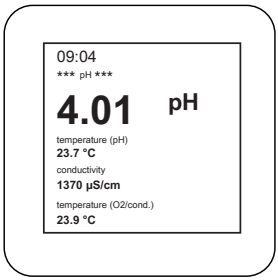
1. The description of the calibration, the preparation of the buffer solutions and the device settings are described in the detailed operating instructions. Detailed operating instructions are enclosed with the device.
2. Care should therefore be taken to ensure that:
   Faults, such as those caused by electrostatic charge, are avoided.
   Plug contacts are kept clean and dry.
   Electrodes are not immersed beyond the length of the shaft.
   The electrode is calibrated sufficiently often – the frequency of calibration depends on the electrode and its use.
   A suitable electrode is used.



Rinse the electrode with distilled or deionised water and carefully wipe with a paper towel.



Immerse the pH electrode including temperature sensor in the calibration solution. Ensure sufficient flow, e.g. by a) use a magnetic stirrer with a stirring fish (recommended) b) Sway the pH electrode in the solution.



The pH value can be read in operating mode. Stop stirring while doing this.

Alkalinity (P, M, OH) 56I700130

50 - 2400 mg/L $CaCO_3$

EN

Material

Reagents	Packaging Unit	Part Number
Alkalinity 4.5 Indicator TA4	65 mL	56L013865
Alkalinity LR Titrant TA3	65 mL	56L013965
Alkalinity HR Titrant PA2/TA2	65 mL	56L013665
Acidity / Alkalinity P Indicator PA1	65 mL	56L013565
Alkalinity OH Reagent PA3	65 mL	56L013765

The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

Preparation

Alkalinity Relationships:

The separate contributions to alkalinity from free caustic, carbonate and bicarbonate can be estimated using the P & M alkalinity relationship in the table below.

If	OH	CO_3	HCO_3
P = 0	0	0	M
P < M/2	0	2P	M-2P
P = M/2	0	2P	0
P > M/2	2P-M	2(M-P)	0
P = M	M	0	0

Remarks

1. Alkalinity P: The P refers to phenolphthalein the indicator originally used for titrating P Alkalinity. The colour change occurs at pH 8.3. Less hazardous alternatives are now used.
2. Alkalinity M: The M refers to methyl orange, the indicator originally used for titrating Total Alkalinity. Nowadays 4.5 indicator is used but old M terminology has remained.
3. Alkalinity OH: Barium chloride precipitates with carbonate ions to produce a white precipitate in the test. the remaining alkalinity present in the same sample attributed to the presence of hydroxide ions (OH).

Sampling

Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
50-150 mg/L	Alkalinity LR Titrant TA3	40 mL	5
100-300 mg/L	Alkalinity LR Titrant TA3	20 mL	10
200-600 mg/L	Alkalinity LR Titrant TA3	10 mL	20
200-600 mg/L	Alkalinity HR Titrant PA2TA2	40 mL	20
400-1200 mg/L	Alkalinity HR Titrant PA2TA2	20 mL	40
800-2400 mg/L	Alkalinity HR Titrant PA2TA2	10 mL	80

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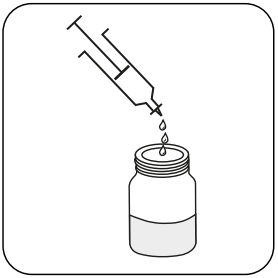
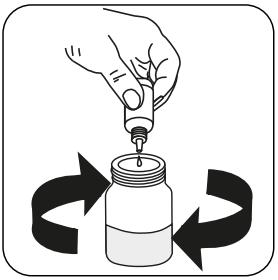
Determination of Alkalinity-P



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.

Add drops of **Acidity / Alkalinity P Indicator PA1** to give a **pink** colour. Note: If sample remains colourless, report the P Alkalinity as zero.

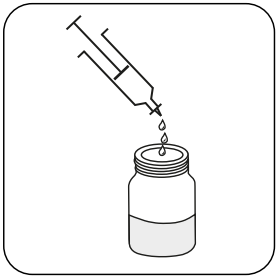
Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



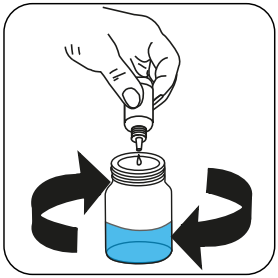
Add **Alkalinity LR Titrant TA3 or Alkalinity HR Titrant PA2/TA2** drop by drop to the sample until discolouration turns from **pink** to **colourless**.

Calculate test result: P Alkalinity (as $CaCO_3$) mg/L = Number of drops x factor (see table)

Determination of Alkalinity-M



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.



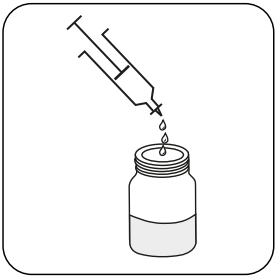
Add drops of **Alkalinity 4.5 Indicator TA4** to give a **pure blue** colour.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!

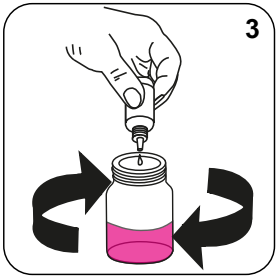
Add **Alkalinity LR Titrant TA3 or Alkalinity HR Titrant PA2/TA2** drop by drop to the sample until colouration turns from **blue** to **orange/yellow** .

Calculate test result: Total Alkalinity (as $CaCO_3$) mg/L = Number of drops x factor (see table)

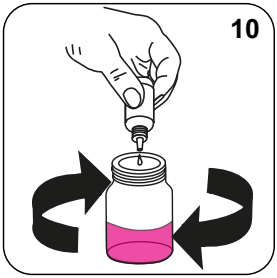
Determination of Alkalinity-OH



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.

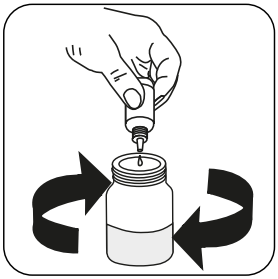


Add **3** drops of **Acidity / Alkalinity P Indicator PA1** to give a **pink** colour.



Add **10 drops Alkalinity OH Reagent**. Note: If sample remains colourless, report the P Alkalinity as zero.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Alkalinity LR Titrant TA3 or Alkalinity HR Titrant PA2/TA2** drop by drop to the sample until discolouration turns from **pink** to **colourless**.

Calculate test result: OH Alkalinity (as $CaCO_3$) mg/L = Number of drops x factor (see table)

Chloride 56I700190

20 - 12000 mg/L Cl^-

EN

Material

Reagents	Packaging Unit	Part Number
Chloride LR Titrant CC2	65 mL	56L014265
Chloride HR Titrant BC2	65 mL	56L014165
Chloride Indicator BC1/CC1	65 mL	56L714065

The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701
Syringe, plastic, 5 mL	1 Pieces	56A008501

Remarks

1. Alkaline samples such as boiler water will require neutralisation prior to testing.
2. Colours may vary depending on sample and test conditions.
3. Dilute samples of less than 10 mL to approximately 10-20 mL with distilled or deionised (chloride free) water.

Sampling

Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
20-75 mg/L	Chloride LR Titrant CC2	40 mL	2.5
50-150 mg/L	Chloride LR Titrant CC2	20 mL	5
100-400 mg/L	Chloride LR Titrant CC2	10 mL	10
100-400 mg/L	Chloride HR Titrant BC2	40 mL	10
200-600 mg/L	Chloride HR Titrant BC2	20 mL	20
400-1000 mg/L	Chloride HR Titrant BC2	10 mL	40
800-3000 mg/L	Chloride HR Titrant BC2	5 mL [3]	80
2000-6000 mg/L	Chloride HR Titrant BC2	2 mL [3]	200
4000-12000 mg/L	Chloride HR Titrant BC2	1 mL [3]	400

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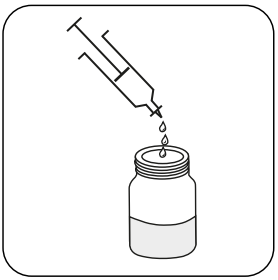


Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.

Add **10** drops of **Chloride Indicator BC1/CC 1 (Potassium Chromate)** to give a **yellow** colour.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!

Add **Chloride LR Titrant CC2 or Chloride HR Titrant BC2** drop by drop to the sample until colouration turns from **yellow** to **orange/brown** .

Calculate test result: Chloride (as Cl^-) mg/L = Number of drops x factor (see table)

Hardness Calcium 56I700270

5 - 600 mg/L $CaCO_3$

EN

Material

Reagents	Packaging Unit	Part Number
Hardness Calcium Buffer CH2	65 mL	56L014465
Hardness Calcium Indicator CH1P	Powder / 20 g	56P021620
Hardness LR Titrant TH3	65 mL	56L016265
Hardness HR Titrant TH4	65 mL	56L014565
Hardness Total Indicator TH1P	Powder / 40 g	56P028340
Hardness Total Buffer TH2	65 mL	56L016065

The following accessories are required.

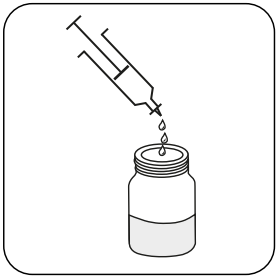
Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

Sampling

Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
5-15 mg/L	Hardness LR Titrant TH3	40 mL	0.5
10-30 mg/L	Hardness LR Titrant TH3	20 mL	1
20-60 mg/L	Hardness LR Titrant TH3	10 mL	2
50-150 mg/L	Hardness HR Titrant TH4	40 mL	5
100-300 mg/L	Hardness HR Titrant TH4	20 mL	10
200-600 mg/L	Hardness HR Titrant TH4	10 mL	20

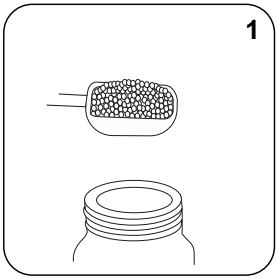
Determination of Hardness Calcium



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.

Add **4** drops of **Hardness Calcium Buffer CH2** per **10 mL** of sample.

Swirl to mix.

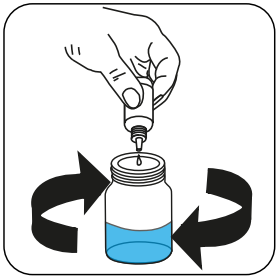


Add **1 measuring scoop(s) Hardness Calcium Indicator CH1P** .

Swirl to mix.

The sample will turn **wine red** .

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Hardness LR Titrant TH3 or Hardness HR Titrant TH4** drop by drop to the sample until colouration turns from **wine red** to **blue**.

Calculate test result: Total Hardness (as $CaCO_3$) mg/L = Number of drops x factor (see table)

Hardness, total 56I700280

5 - 600 mg/L $CaCO_3$

EN

Material

Reagents	Packaging Unit	Part Number
Hardness Total Buffer TH2	65 mL	56L016065
Hardness Total Indicator TH1P	Powder / 40 g	56P028340
Hardness LR Titrant TH3	65 mL	56L016265
Hardness HR Titrant TH4	65 mL	56L014565

The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

Remarks

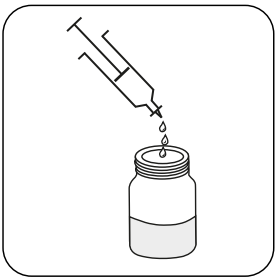
1. Colours may vary depending on sample and test conditions.
2. More than 1 ppm copper in the sample will prevent the pure blue endpoint from occurring.
3. To remove copper interference, add 1 drop of Iron Reagent FE6 before the addition of Hardness Total Buffer TH2. Iron Reagent FE6 is not supplied as standard in the hardness test pack, but can be purchased separately. (56L006365)

Sampling

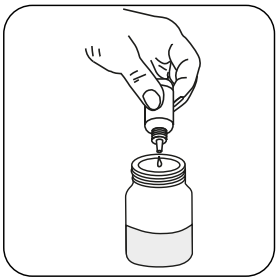
Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
5-15 mg/L $CaCO_3$	Hardness LR Titrant TH3	40 mL	0.5
10-30 mg/L $CaCO_3$	Hardness LR Titrant TH3	20 mL	1
20-60 mg/L $CaCO_3$	Hardness LR Titrant TH3	10 mL	2
50-150 mg/L $CaCO_3$	Hardness HR Titrant TH4	40 mL	5
100-300 mg/L $CaCO_3$	Hardness HR Titrant TH4	20 mL	10
200-600 mg/L $CaCO_3$	Hardness HR Titrant TH4	10 mL	20

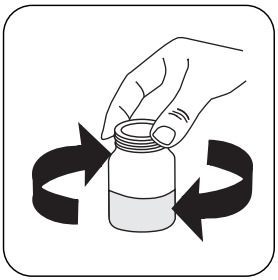
EN



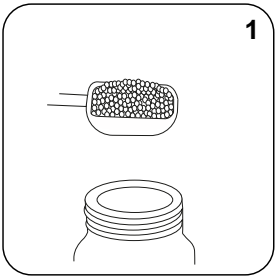
Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.



Add **4** drops of **Hardness Total Buffer TH2** per **10 mL** of sample.



Swirl to mix.

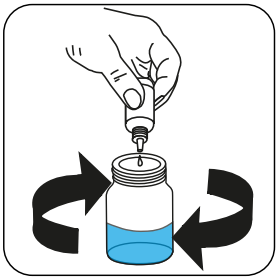


Add **1 measuring scoop(s) Hardness Total Indicator TH1P** .

Swirl to mix.

The sample will turn **wine red** .

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Hardness LR Titrant TH3 or Hardness HR Titrant TH4** drop by drop to the sample until colouration turns from **wine red** to **blue**.

Calculate test result: Total Hardness (as $CaCO_3$) mg/L = Number of drops x factor (see table)

Hydrogen Peroxide 56I700290

15 - 500 mg/L H_2O_2

EN

Material

Reagents	Packaging Unit	Part Number
Hydrogen Peroxide Buffer HP1	65 mL	56L041565
Hydrogen Peroxide HR Titrant HP2	65 mL	56L719965
Hydrogen Peroxide LR Titrant HP3	65 mL	56L649665

The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

Remarks

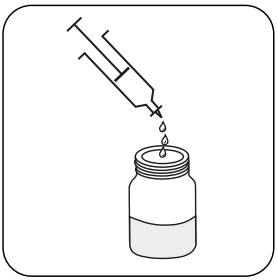
1. Colours may vary depending on sample and test conditions.
2. Other oxidising agents such as raw water residual chlorine will be included in the result but is not significant compared with the usual high concentration of peroxide employed in sanitising operations.

Sampling

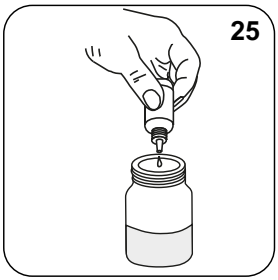
Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
1-12.5 mg/L	Hydrogen Peroxide LR Titrant HP3	40 mL	0.5
2-25 mg/L	Hydrogen Peroxide LR Titrant HP3	20 mL	1
4-50 mg/L	Hydrogen Peroxide LR Titrant HP3	10 mL	2
15-125 mg/L	Hydrogen Peroxide HR Titrant HP2	40 mL	5
25-250 mg/L	Hydrogen Peroxide HR Titrant HP2	20 mL	10
50-500 mg/L	Hydrogen Peroxide HR Titrant HP2	10 mL	20

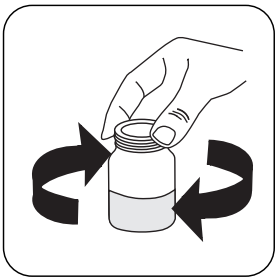
EN



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.

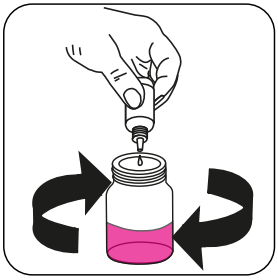


Add **25 drops Hydrogen Peroxide Buffer HP1**.



Swirl to mix.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Hydrogen Peroxide HR Titrant HP2 or Hydrogen Peroxide LR Titrant HP3** drop by drop to the sample until colouration turns from **colourless** to **pink**.

The color should persist for at least **30** seconds.

Calculate test result: Hydrogen Peroxide (as H_2O_2) mg/L = Number of drops x factor (see table)

Nitrite 56I700300

10 - 2000 mg/L $NaNO_2$

EN

Material

Reagents	Packaging Unit	Part Number
Nitrite Indicator N1	65 mL	56L017165
Nitrite Titrant N2	65 mL	56L017265

The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Test Tube 5/10 mL + Cap	1 Pieces	56A600401
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701
Plastic syringe, 1 ml	1 Pieces	56A013501

Remarks

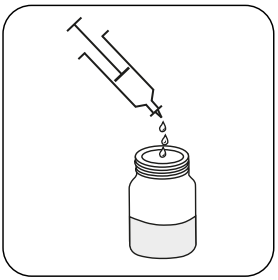
1. Colours may vary depending on sample and test conditions.
2. This test can be used to determine the nitrite reserve in cooling systems. Note that other reducing agents such as sulphite and ascorbic acid will increase the observed result.
3. Results from this test are expressed as sodium nitrite ($NaNO_2$). To convert from mg/L as sodium nitrite to mg/L as nitrite (NO_2), multiply the result obtained by 0.67.

Sampling

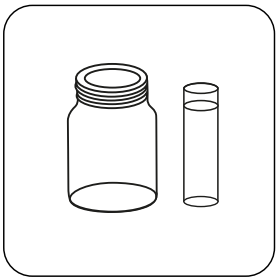
Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
10-40 mg/L	5 drops of Nitrite Indicator N1	40 mL	1.25
25-100 mg/L	4 drops of Nitrite Indicator N1	20 mL	2.5
50-150 mg/L	3 drops of Nitrite Indicator N1	10 mL	5
100-400 mg/L	2 drops of Nitrite Indicator N1	5 mL	10
300-1000 mg/L	1 drop of Nitrite Indicator N1	2 mL	25
500-2000+ mg/L	1 drop of Nitrite Indicator N1	1 mL	50

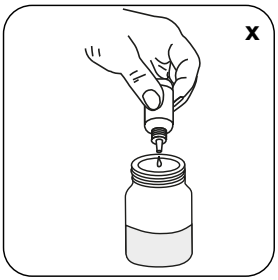
EN



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.



Use a titration jar for larger samples or test tube for smaller samples (5 mL or less).

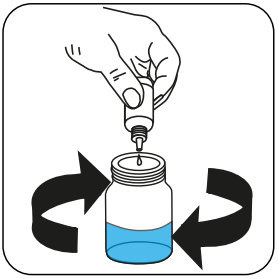


Add **X** drops of **Nitrite Indicator N1** reagent to the sample, according to the selected sample volume (see table in the notes).

Swirl to mix.

The sample will turn **orange (if nitrite is present)**.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Nitrite Titrant N2** drop by drop to the sample until colouration turns from **orange** to **blue**.

The color should persist for at least **10** seconds.

Calculate test result: Nitrite (as $NaNO_2$) mg/L = Number of drops x factor (see table)

Phosphonate 56I700320

0 - 20 mg/L HEDP

EN

Material

Reagents	Packaging Unit	Part Number
Phosphonate Neutraliser P1/2	65 mL	56L070465
Phosphonate Indicator P4L	65 mL	56L017565
Phosphonate pH Adjuster P3	65 mL	56L718365
Phosphonate Titrant P5	65 mL	56L017665

The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

Remarks

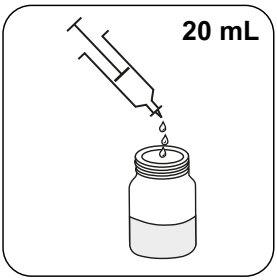
1. **Carry out the test on the Treated Water (Result A) and then on Untreated Water (Result B).**
2. Colours may vary depending on sample and test conditions.
3. This test is suitable for measuring AMP and HEDP type products.
4. Good results have also been obtained with PBSAM.
5. For accurate results the test should be calibrated to each product at typical system dose levels.
6. Standards should be prepared in water as similar as possible to system water (e.g. hard or soft).
7. Add factors into table.
8. Samples less than 20 mL should be diluted to approximately 20 mL with deionized water.

Sampling

Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

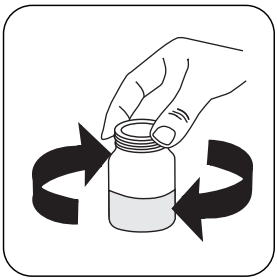
Expected Range	Titrant used	Sample Size	Factor
	Phosphonate Titrant P5		
	Phosphonate Titrant P5		
	Phosphonate Titrant P5		

EN

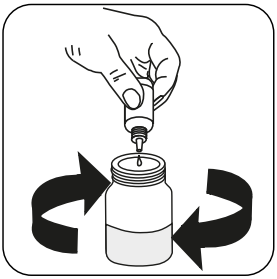


Fill the jar with **20 mL** of the sample.

Add **sufficient** drops of **Phosphonate Neutraliser P1/2** to give a **yellow** colour.

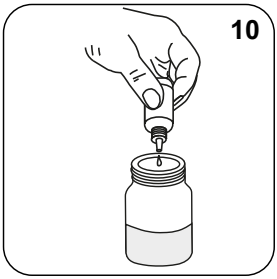


Swirl to mix.



Add drops of **Phosphonate pH Adjuster P3** until the sample is colourless .

Swirl to mix.

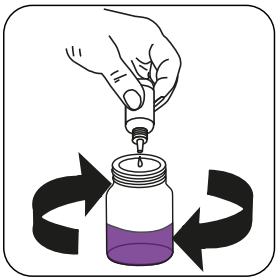


Add **10 drops Phosphonate Indicator P4L**.

Swirl to mix.

The sample will turn **light green** .

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Phosphonate Titrant P5** drop by drop to the sample until colouration turns through **grey** to **purple**.

Perform this test with treated (Result A) and untreated water (Result B).

Calculate test result: Product mg/L = Number of drops (result A - result B) x factor (see table)

Sulphite 56I700360

25 - 150 mg/L Na_2SO_3

EN

Material

Reagents	Packaging Unit	Part Number
Sulphite Indicator S1	Powder / 40 g	56P018640
Sulphite Titrant S2	65 mL	56L018765

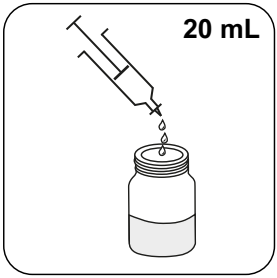
The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

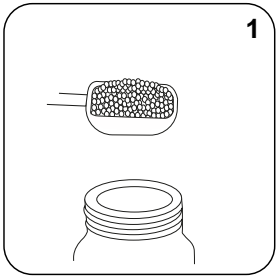
Remarks

1. Colours may vary depending on sample and test conditions.
2. Catalysed sulphite reacts quickly with atmospheric oxygen when hot, so the sample should be cooled during collection with the minimum of contact with air. It should be tested immediately after it has cooled. Care should be taken when obtaining samples.
3. Ignore any undissolved material after powder/tablet addition.
4. For concentrations of sodium sulphite above 150 mg/L take a 10 mL sample and use a factor of 10 (i.e. each drop of **Sulphite Titrant S2** used = 10mg/L Na_2SO_3).
5. Sulphite reserve may be expressed in different ways. To convert readings from sodium sulphite multiply the result obtained by the following factors.
   Sodium sulphite to sodium metabisulphite x 0.8
   Sodium sulphite to sulphite x 0.63

Determination of Sodium sulphite in boiler water



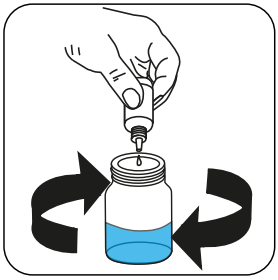
Fill the jar with **20 mL** of the cooled sample.



Add **1 measuring scoop(s) Sulphite Indicator S1** .

Swirl to mix.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Sulphite Titrant S2** drop by drop to the sample until colouration turns from **colourless** to **blue**.

Calculate test result: Sulphite (as Na_2SO_3) mg/L = Number of drops x 5

EN

Tannin 56I700370

50 - 300 mg/L Tannin

EN

Material

Reagents	Packaging Unit	Part Number
Tannin Indicator TN1	Powder / 50 g	56P014650
Tannin Titrant TN2	65 mL	56L019965

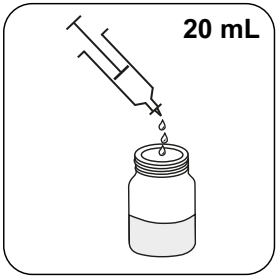
The following accessories are required.

Accessories	Packaging Unit	Part Number
Syringe, plastic, 20 mL	1 Pieces	56A006501
Titration jar with cap, plastic, 60 mL	1 Pieces	56A006701

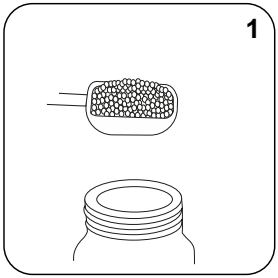
Remarks

1. Colours may vary depending on sample and test conditions.
2. Tannin is the name for lignin type compounds and therefore the factor in this method is of a general nature in line with the type of products in general use.
3. It is not necessary for all of the Tannin Indicator TN1 to dissolve.

Determination of Tannin in boiler water



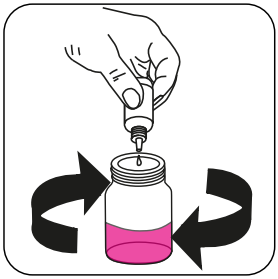
Fill the jar with **20 mL** of the cooled sample.



Add **1 measuring scoop(s) Tannin Indicator TN1** .

Swirl to mix.

Attention! Record the number of drops that will be added.
Note: Make sure to swirl the jar after adding each drop!



Add **Tannin Titrant TN2** drop by drop to the sample until colouration turns from **colourless** to **pink**.

The color should persist for at least **10** seconds.

Calculate test result: Tannin (as Tannin) mg/L = Number of drops x 10

Glycol

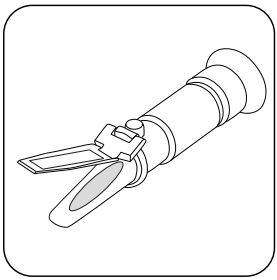
% PEG/MEG

Glycol/ Refractometer

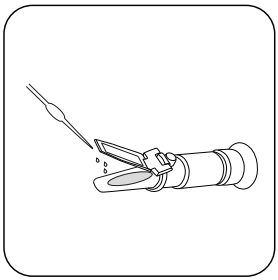
EN

Remarks

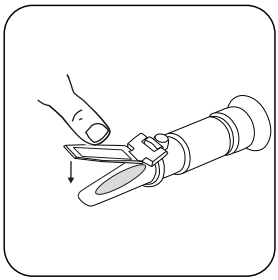
1. The description of the calibration is described in the detailed operating instructions. A detailed instruction manual is enclosed with the device.
2. Point the front end of the refractometer towards a bright light source when you want to take a reading.
3. After the measurement, wipe the measuring solution on the surface of the prism and the cover plate with a damp cotton cloth. Never immerse the device in water or hold it under running water as water may enter the device.
4. After drying, the refractometer should be stored safely. The refractometer is an optical measuring instrument and therefore very sensitive. Please handle it with care. Do not touch or scratch the optical surfaces. The refractometer should be stored in a dry, clean environment to prevent moisture and dust. Please avoid strong shaking.



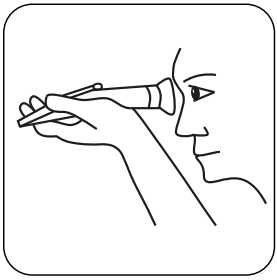
Lift the prism cover.



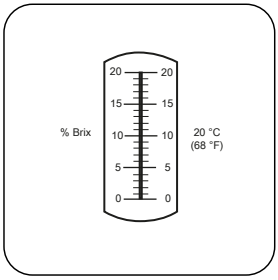
Place a few drops of the sample on the prism face.



Close the daylight plate and press it lightly.



Look through the eyepiece at the measuring scale.



Read the result at scale of light/dark boundary.

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

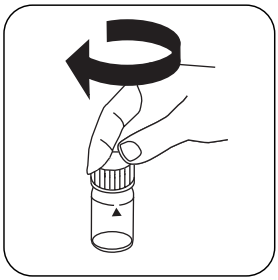
1. To get accurate results the sample temperature must be between 20 °C and 25 °C.
2. To avoid errors caused by contamination, rinse the vial and the accessories with Hydrochloric acid (approx. 20%) before the analysis. Then rinse them with deionised water.

Determination of Aluminium with Tablet

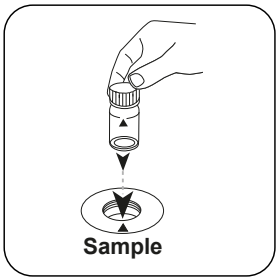
Select the method on the device.

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

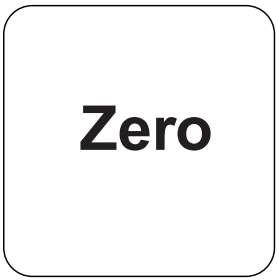
Fill 24 mm vial with **10 mL sample**.



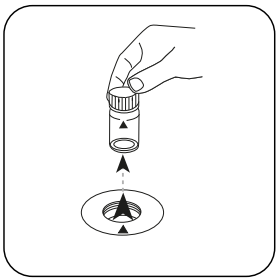
Close vial(s).



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

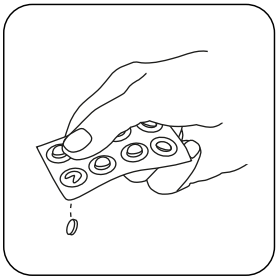


Press the **ZERO** button.

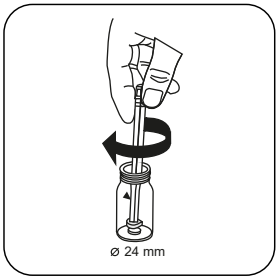


Remove the vial from the sample chamber.

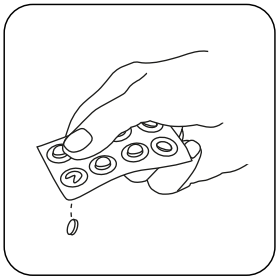
For devices that require **no ZERO measurement** , **start here**.



Add **ALUMINIUM No. 1 tablet** .

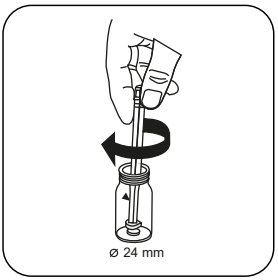


Crush tablet(s) by rotating slightly and dissolve.

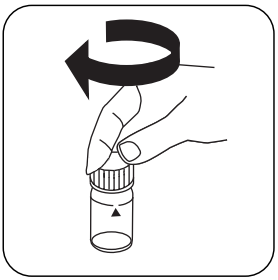


Add **ALUMINIUM No. 2 tablet** .

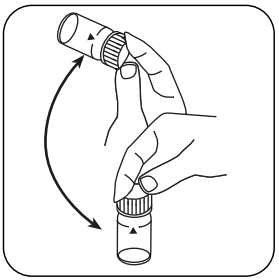
EN



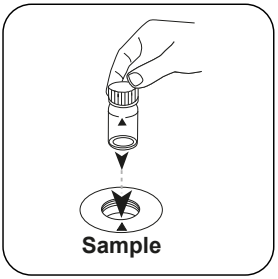
Crush tablet(s) by rotating slightly.



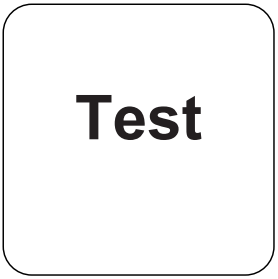
Close vial(s).



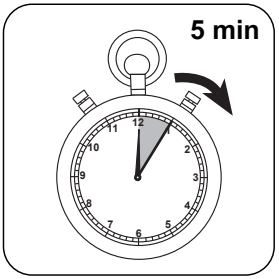
Dissolve tablet(s) by inverting.



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.

including stirring rod, 10 cm

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

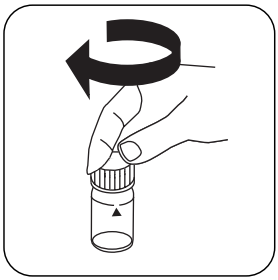
1. Cleaning of vials:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of oxidising agents (e.g. ozone and chlorine) may show lower results. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve 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

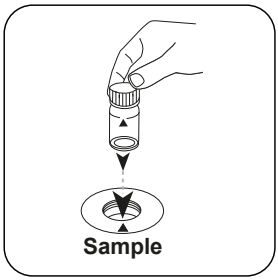
Select the method on the device.

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

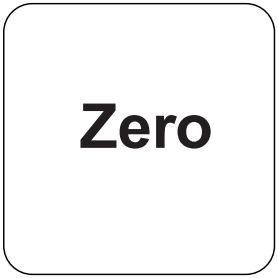
Fill 24 mm vial with **10 mL sample**.



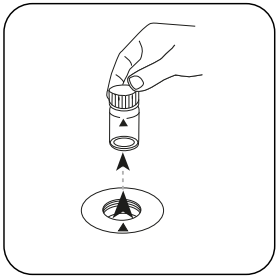
Close vial(s).



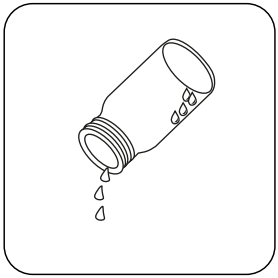
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.

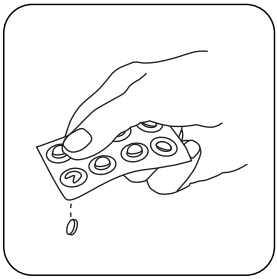


Remove the vial from the sample chamber.

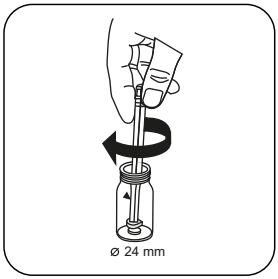


Empty vial except for a few drops.

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

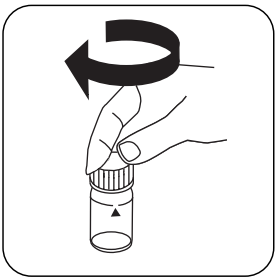


Add **DPD No. 1 tablet** .

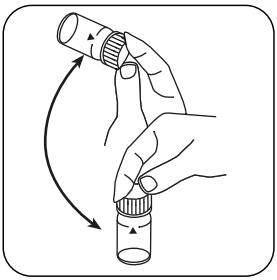


Crush tablet(s) by rotating slightly.

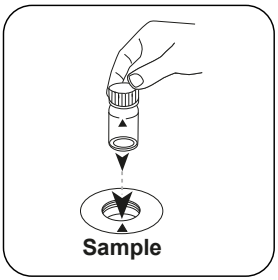
Fill up vial with **sample** to the **10 mL mark**.



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.

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).

[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

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).

Notes

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 with tablet

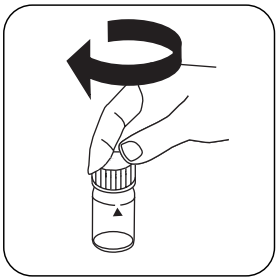
Select the method on the device.

In addition, choose the test: free

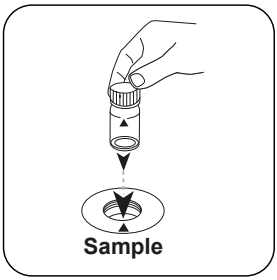
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

EN

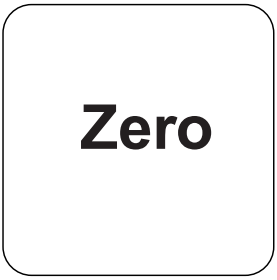
Fill 24 mm vial with **10 mL sample**.



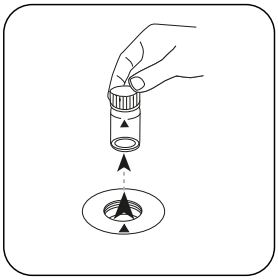
Close vial(s).



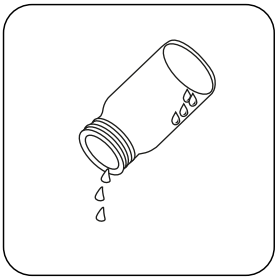
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.

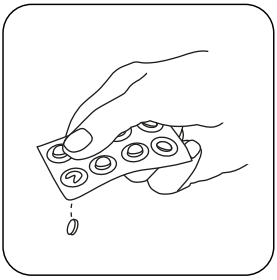


Remove the vial from the sample chamber.

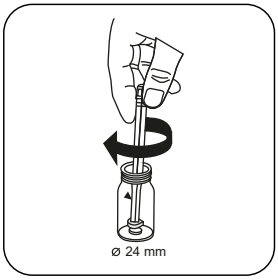


Empty vial except for a few drops.

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

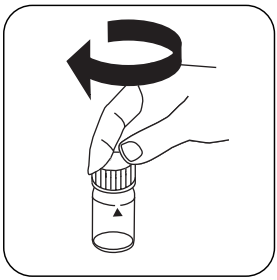


Add **DPD No. 1 tablet** .

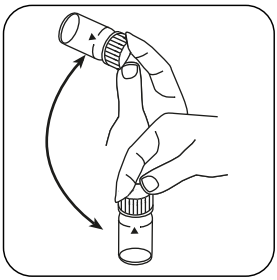


Crush tablet(s) by rotating slightly.

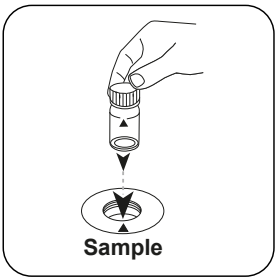
Fill up vial with **sample** to the **10 mL mark**.



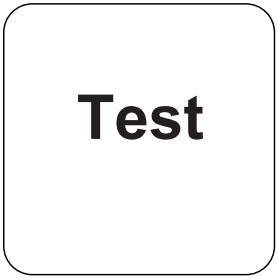
Close vial(s).



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.

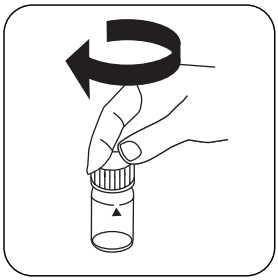
Determination of total Chlorine with tablet

Select the method on the device.

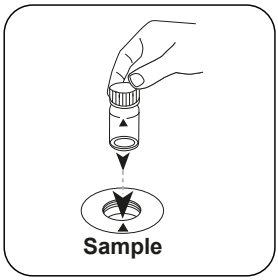
In addition, choose the test: total

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**.

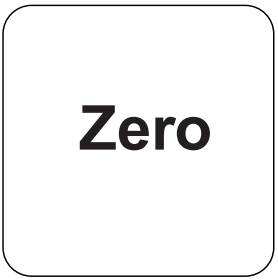


Close vial(s).

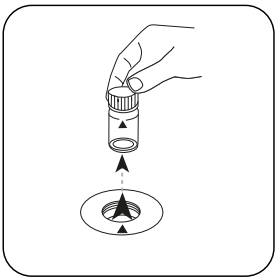


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



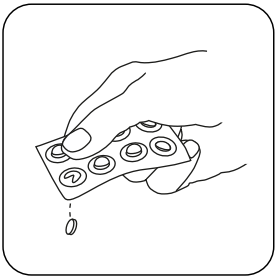
Press the **ZERO** button.



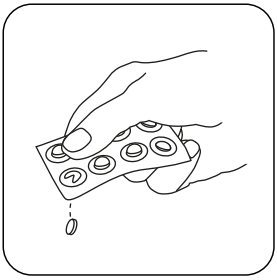
Remove the vial from the sample chamber.

Empty vial except for a few drops.

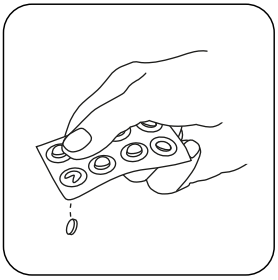
For devices that require **no ZERO measurement** , **start here**.



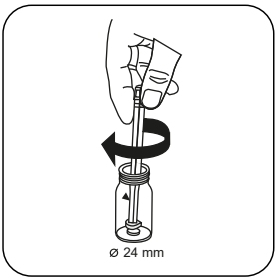
Add **DPD No. 1 tablet** .



Add **DPD No. 3 tablet** .

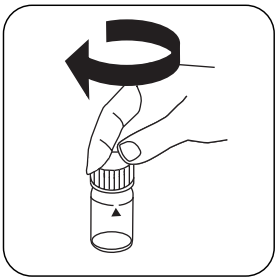


As an alternative to DPD No. 1 and No. 3 tablets, a DPD No. 4 tablet can be added.

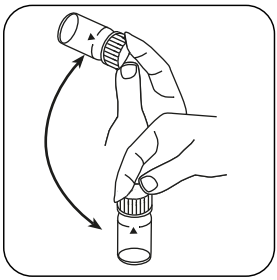


Crush tablet(s) by rotating slightly.

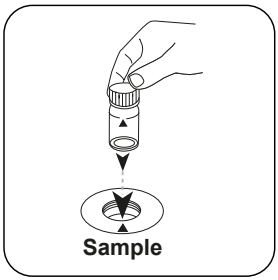
Fill up vial with **sample** to the **10 mL mark**.



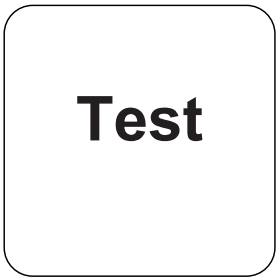
Close vial(s).



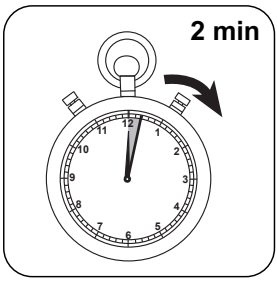
Dissolve tablet(s) by inverting.



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.

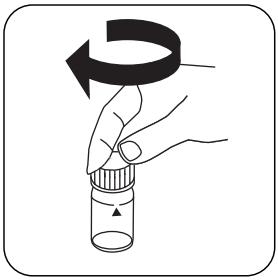
Determination of Chlorine differentiated with tablet

Select the method on the device.

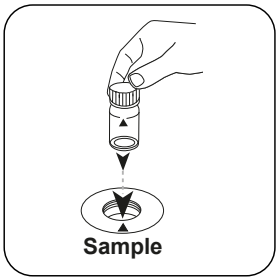
In addition, choose the test: differentiated

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**.

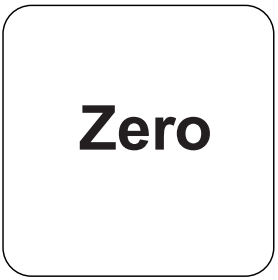


Close vial(s).

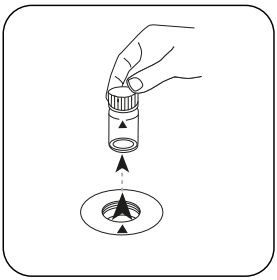


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN



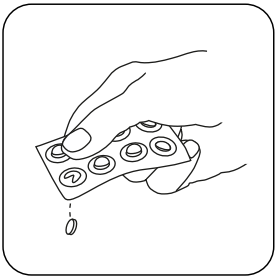
Press the **ZERO** button.



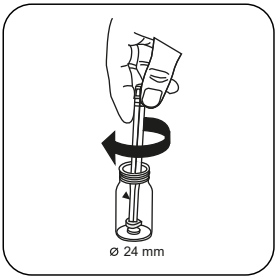
Remove the vial from the sample chamber.

Empty vial except for a few drops.

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



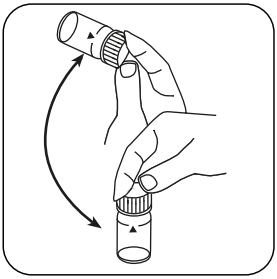
Add **DPD No. 1 tablet** .



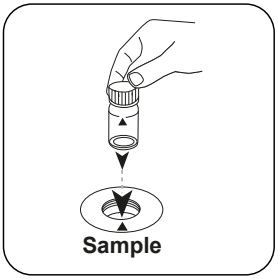
Crush tablet(s) by rotating slightly.

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

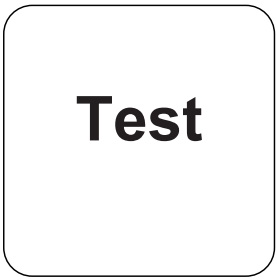
Close vial(s).



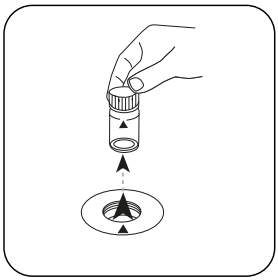
Dissolve tablet(s) by inverting.



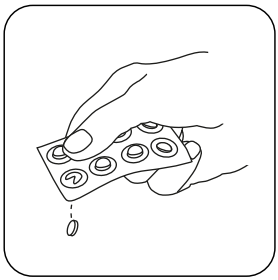
Place **sample vial** in the sample chamber. Pay attention to the positioning.



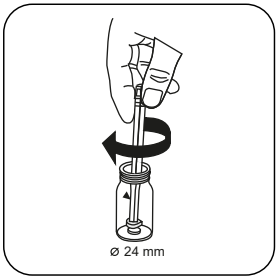
Press the **TEST** (XD: **START**)button.



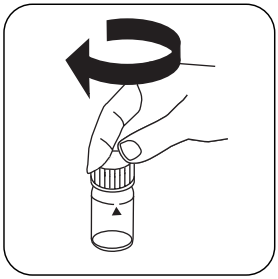
Remove the vial from the sample chamber.



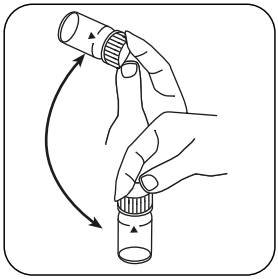
Add **DPD No. 3 tablet** .



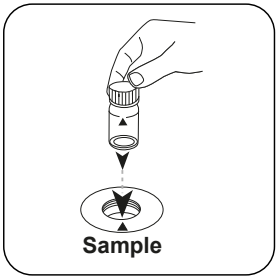
Crush tablet(s) by rotating slightly.



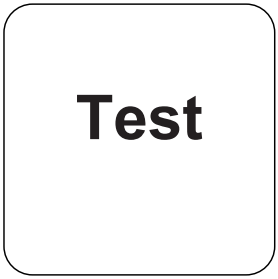
Close vial(s).



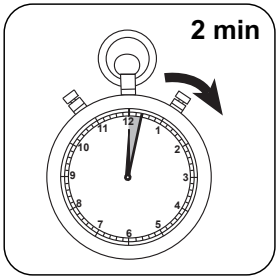
Dissolve tablet(s) by inverting.



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.

Persistant Interferences

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

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

EN

[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

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.

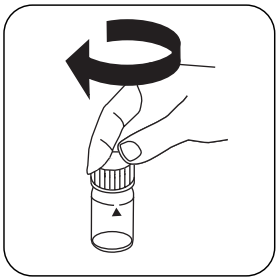
Determination of Copper, free with tablet

Select the method on the device.

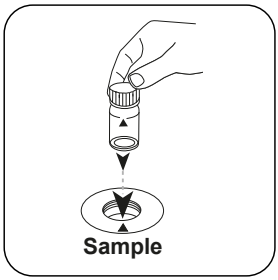
In addition, choose the test: free

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

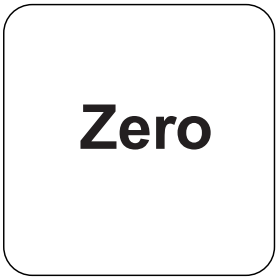
Fill 24 mm vial with **10 mL sample**.



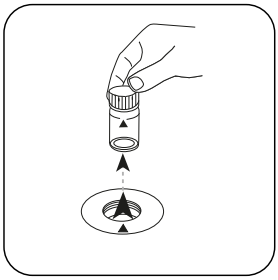
Close vial(s).



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

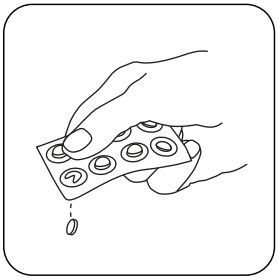


Press the **ZERO** button.

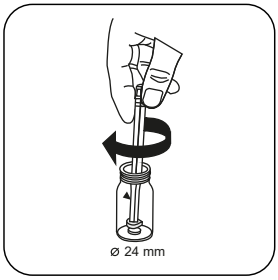


Remove the vial from the sample chamber.

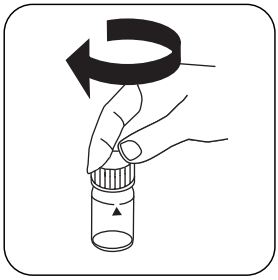
For devices that require **no ZERO measurement** , **start here**.



Add **COPPER No. 1 tablet** .

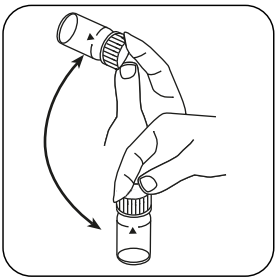


Crush tablet(s) by rotating slightly.

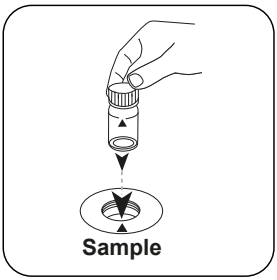


Close vial(s).

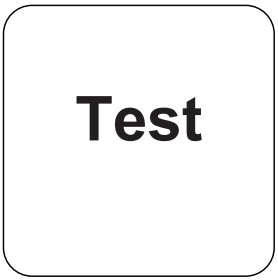
EN



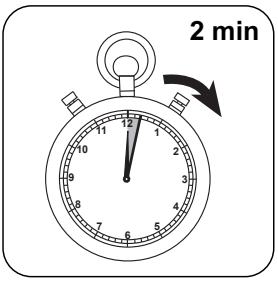
Dissolve tablet(s) by inverting.



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.

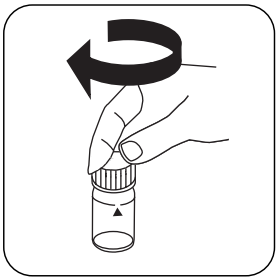
Determination of Copper, total with tablet

Select the method on the device.

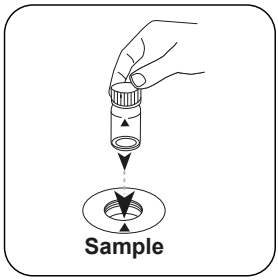
In addition, choose the test: total

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

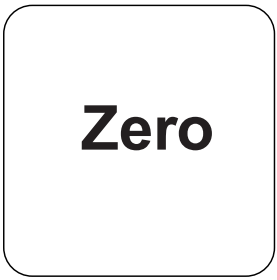
Fill 24 mm vial with **10 mL sample**.



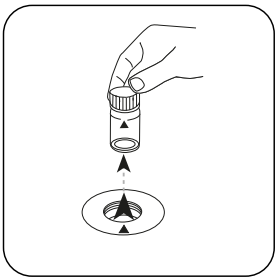
Close vial(s).



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

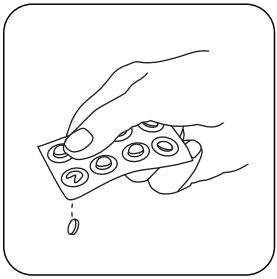


Press the **ZERO** button.

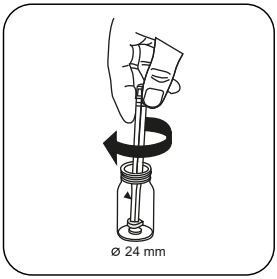


Remove the vial from the sample chamber.

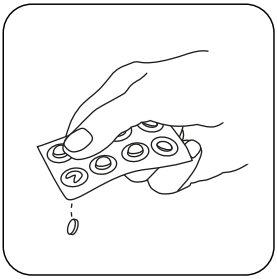
For devices that require **no ZERO measurement** , **start here**.



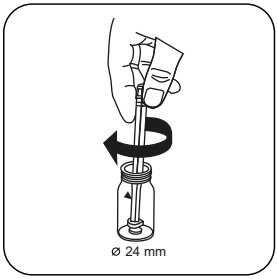
Add **COPPER No. 1 tablet** .



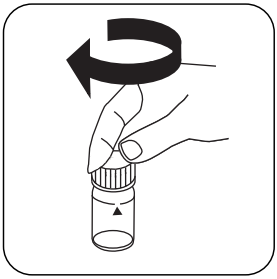
Crush tablet(s) by rotating slightly and dissolve.



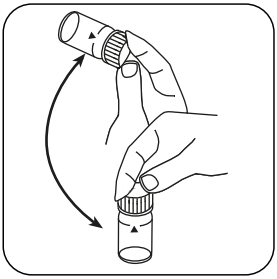
Add **COPPER No. 2 tablet** .



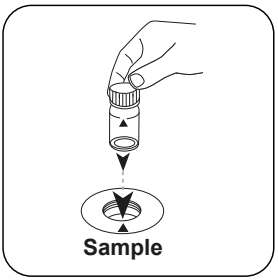
Crush tablet(s) by rotating slightly.



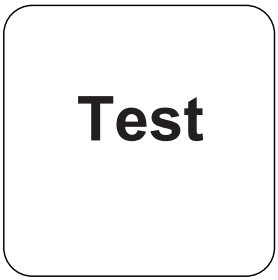
Close vial(s).



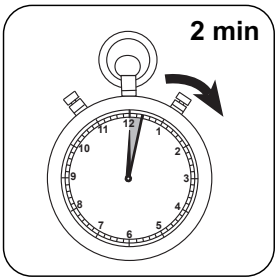
Dissolve tablet(s) by inverting.



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.

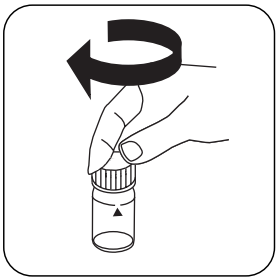
Determination of Copper, differentiated determination with Tablet

Select the method on the device.

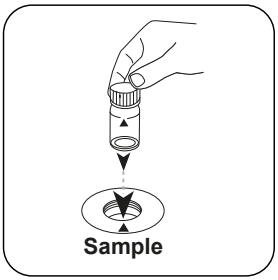
In addition, choose the test: differentiated

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

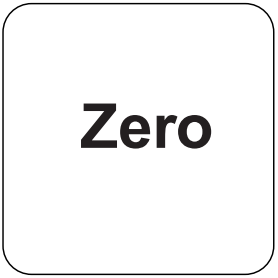
Fill 24 mm vial with **10 mL sample**.



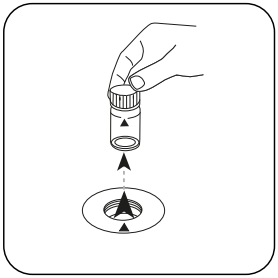
Close vial(s).



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

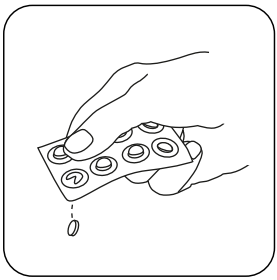


Press the **ZERO** button.

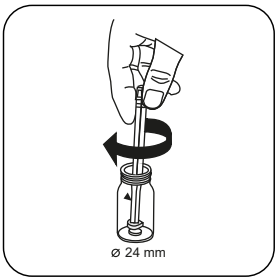


Remove the vial from the sample chamber.

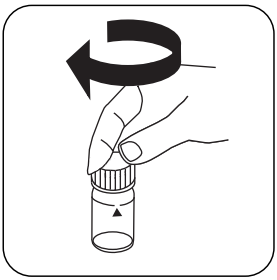
For devices that require **no ZERO measurement** , **start here**.



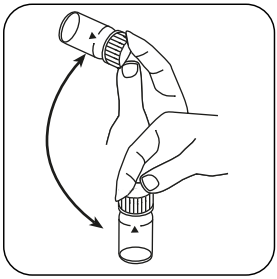
Add **COPPER No. 1 tablet** .



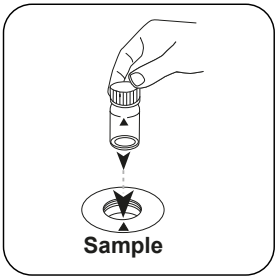
Crush tablet(s) by rotating slightly.



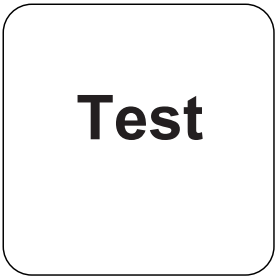
Close vial(s).



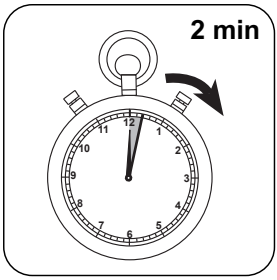
Dissolve tablet(s) by inverting.



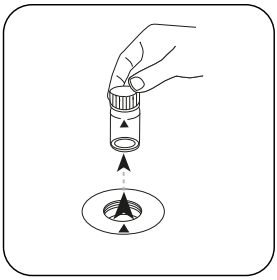
Place **sample vial** in the sample chamber. Pay attention to the positioning.



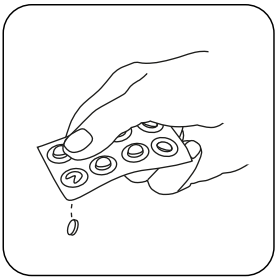
Press the **TEST** (XD: **START**)button.



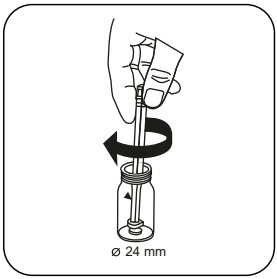
Wait for **2 minute(s) reaction time**.



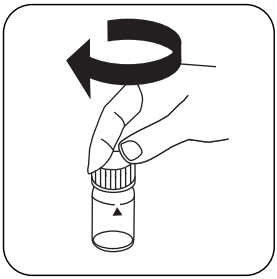
Remove the vial from the sample chamber.



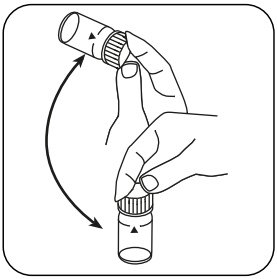
Add **COPPER No. 2 tablet** .



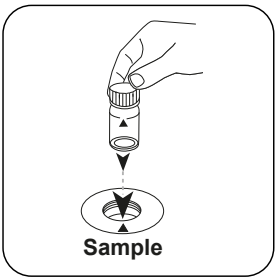
Crush tablet(s) by rotating slightly.



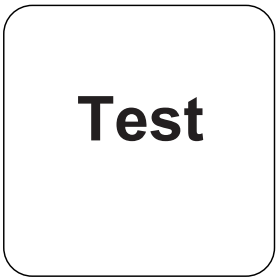
Close vial(s).



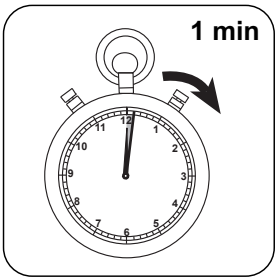
Dissolve tablet(s) by inverting.



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.

Persistant Interferences

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

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

Iron LR L (A) M225

0.03 - 2 mg/L Fe FE

Ferrozine / Thioglycolate

EN

Material

Required material (partly optional):

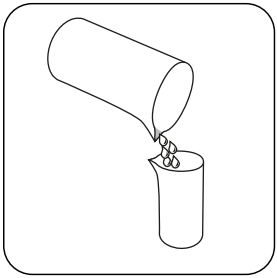
Reagents	Packaging Unit	Part Number
Acidity / Alkalinity P Indicator PA1	65 mL	56L013565
Hardness Calcium Buffer CH2	65 mL	56L014465
KP962-Ammonium Persulphate Powder	Powder / 40 g	56P096240
KS63-FE6-Thioglycolate/Molybdate HR RGT	30 mL	56L006330
Iron Reagent FE6	65 mL	56L006365
Iron Reagent FE5	65 mL	56L006165
Iron LR Reagent Set	1 pc.	56R018990

Preparation

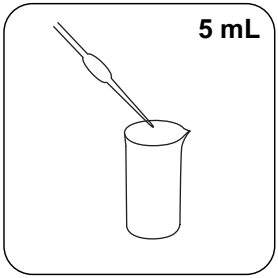
1. If there are strong complexing agents in the sample, the response time must be extended until no further colour development is seen. However, very strong iron complexes are not included in the measurement. In this event, the complexing agent must be destroyed by means of oxidation with acid/persulphate and the sample also neutralised to pH 6–9.
2. For the measurement of total iron, both suspended and dissolved, the sample must be boiled with acid/persulphate. It must be neutralised back to pH 6–9 and refilled to the original volume with deionised water.

Digestion

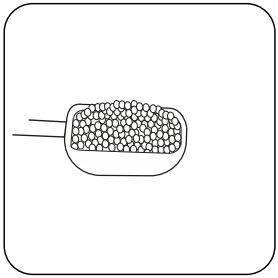
Total iron consists of suspended, soluble and complexed iron. The sample must be not filtered before measuring. To ensure homogenisation of the sample, deposed particles must be evenly distributed immediately prior to sampling by forcible shaking. A filtration of the sample is necessary for the determination of total soluble iron (including the complex iron compounds).The equipment required for the determination of total iron and reagents are not included in the standard delivery.



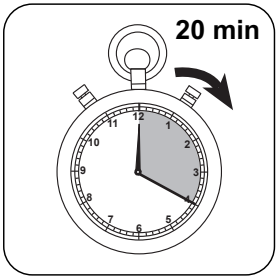
Fill a suitable digestion vessel with **50 mL homogenised sample**.



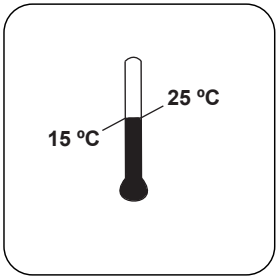
Add **5 mL 1:1 Hydrochloric acid**.



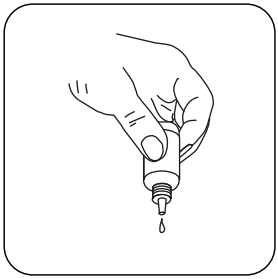
Add **a measuring scoop KP 962 (Ammonium Persulfat Powder)** .



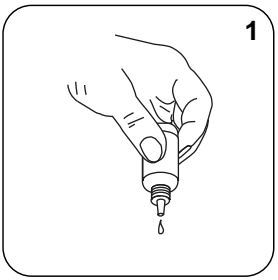
Boil the sample for **20 minutes** . A sample volume of about 25 mL should be retained;
If necessary, fill with deionised water.



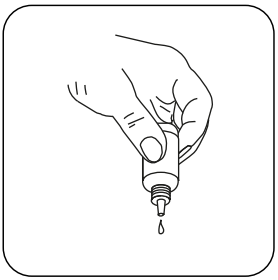
Allow the sample to cool to room temperature.



Hold cuvettes vertically and add equal drops by pressing slowly.



Add **1 drops Acidity / Alkalinity P Indicator PA1**.



Add **Hardness Calcium Buffer CH2** drop by drop to the same sample until colouration turns from light pink to red. **(Note: make sure to swirl the vial after adding each drop!)**

Fill the sample with **deionised water to 50 mL** .

EN

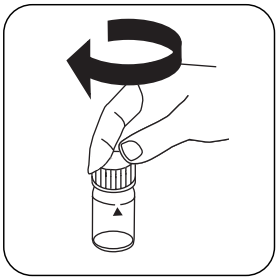
Determination of Iron, total LR (A) with liquid reagent

Select the method on the device.

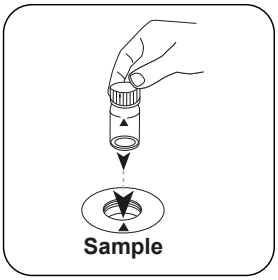
For testing of **Iron, total LR,** carry out the described **digestion**.

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

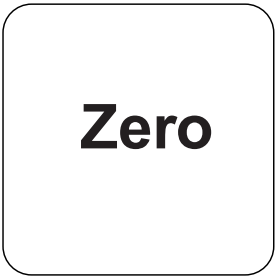
Fill 24 mm vial with **10 mL deionised water** .



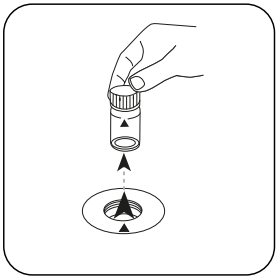
Close vial(s).



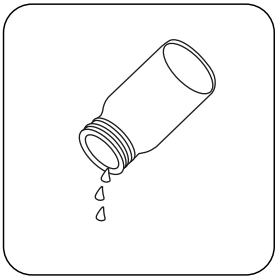
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.



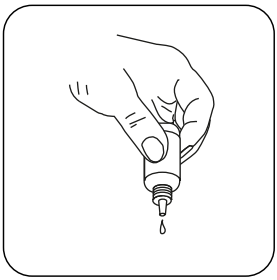
Remove the vial from the sample chamber.



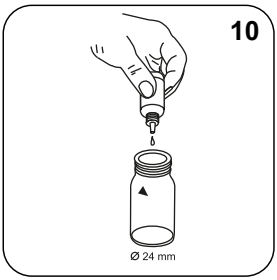
Empty vial.

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

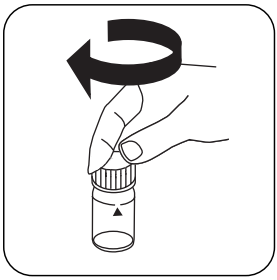
Fill 24 mm vial with **10 mL prepared sample** .



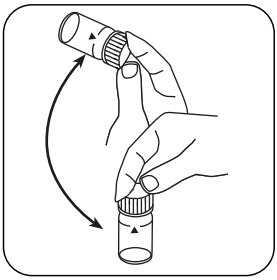
Hold cuvettes vertically and add equal drops by pressing slowly.



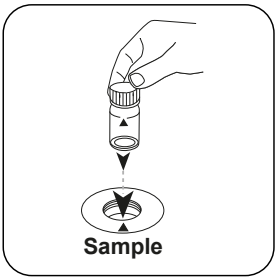
Add **10 drops Iron Reagent FE5**.



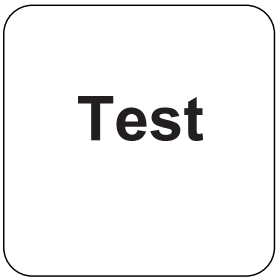
Close vial(s).



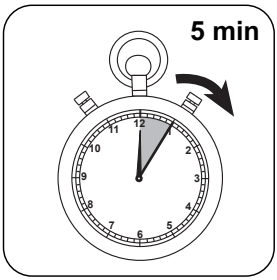
Invert several times to mix the contents.



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



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



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

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

The result in mg/L total Iron or when using a filtrated sample, in mg/l totale soluble Iron appears on the display.

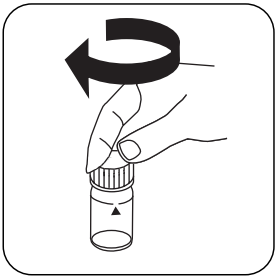
Determination of Iron LR (A) with liquid reagent

Select the method on the device.

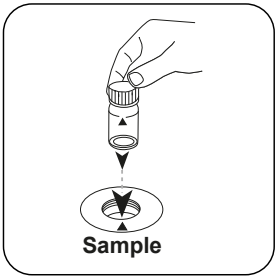
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

For determination of total dissolved iron the sample must be filtered prior to the test (pore size 0,45 µm). Otherwise, iron particles and suspended iron are measured.

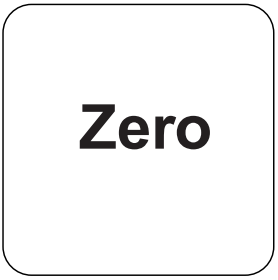
Fill 24 mm vial with **10 mL prepared sample** .



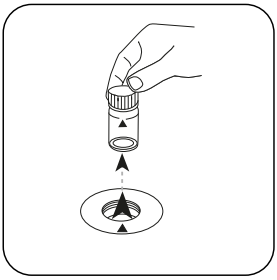
Close vial(s).



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

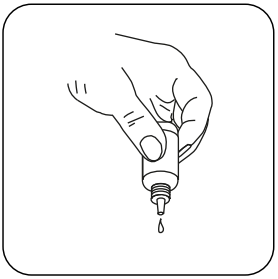


Press the **ZERO** button.

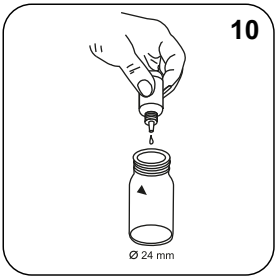


Remove the vial from the sample chamber.

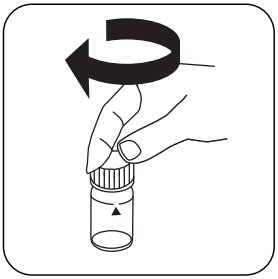
For devices that require **no ZERO measurement** , **start here**.



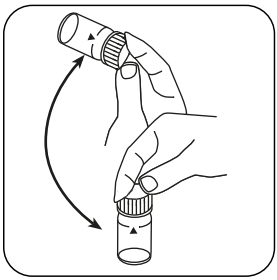
Hold cuvettes vertically and add equal drops by pressing slowly.



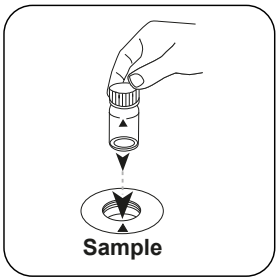
Add **10 drops Iron Reagent FE5**.



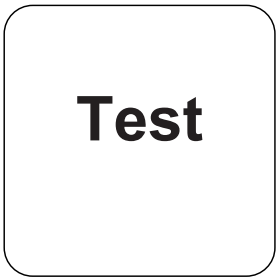
Close vial(s).



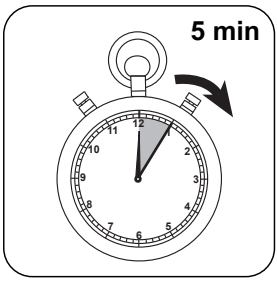
Invert several times to mix the contents.



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



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



Wait for **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.

Interference	from / [mg/L]
Co	8
Cu	2
Oxalat	500
CN^-	10

NO_2^-

Iron HR L M227

0.1 - 10 mg/L Fe

Thioglycolate

EN

Material

Required material (partly optional):

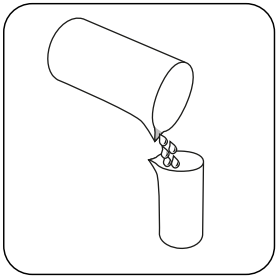
Reagents	Packaging Unit	Part Number
KP962-Ammonium Persulphate Powder	Powder / 40 g	56P096240
Acidity / Alkalinity P Indicator PA1	30 mL	56L013530
Acidity / Alkalinity P Indicator PA1	65 mL	56L013565
Hardness Calcium Buffer CH2	65 mL	56L014465
Calcium Hardness Buffer CH2	5 x 65 mL mL	56L014472
Iron HR Reagent Set	1 pc.	56R023590

Preparation

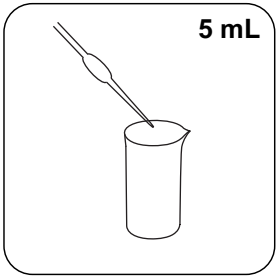
1. If there are strong complexing agents in the sample, the response time must be extended until no further colour development is seen. However, very strong iron complexes are not included in the measurement. In this event, the complexing agent must be destroyed by means of oxidation with acid/persulphate and the sample also neutralised to pH 6–9.
2. For the measurement of total iron, both suspended and dissolved, the sample must be boiled with acid/persulphate. It must be neutralised back to pH 6–9 and refilled to the original volume with deionised water.

Digestion

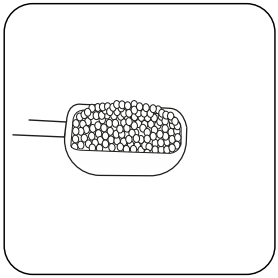
Total iron consists of suspended, soluble and complexed iron. The sample must be not filtered before measuring. To ensure homogenisation of the sample, deposed particles must be evenly distributed immediately prior to sampling by forcible shaking. A filtration of the sample is necessary for the determination of total soluble iron (including the complex iron compounds).The equipment required for the determination of total iron and reagents are not included in the standard delivery.



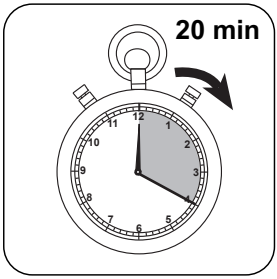
Fill a suitable digestion vessel with **50 mL homogenised sample**.



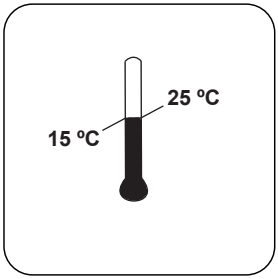
Add **5 mL 1:1 Hydrochloric acid**.



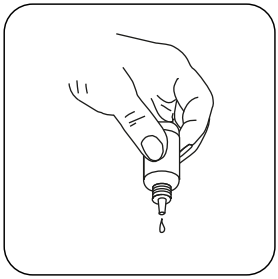
Add **a measuring scoop KP 962 (Ammonium Persulphat Powder)** .



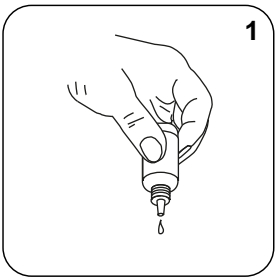
Boil the sample for **20 minutes** . A sample volume of about 25 mL should be retained;
If necessary, fill with deionised water.



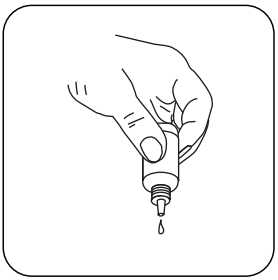
Allow the sample to cool to room temperature.



Hold cuvettes vertically and add equal drops by pressing slowly.



Add **1 drops Acidity / Alkalinity P Indicator PA1**.



Add **Hardness Calcium Buffer CH2** drop by drop to the same sample until colouration turns from light pink to red. **(Note: make sure to swirl the vial after adding each drop!)**

Fill the sample with **deionised water to 50 mL** .

EN

Determination of Iron, total HR with liquid reagent

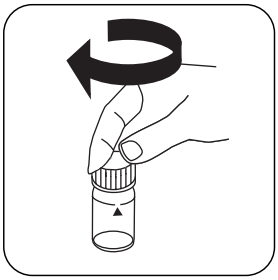
Select the method on the device.

For testing of **Iron, total HR with liquid reagent,** carry out the described **digestion**.

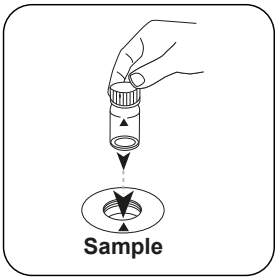
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

Total iron consists of suspended, soluble and complexed iron. The sample must be not filtered before measuring. To ensure homogenisation of the sample, deposed particles must be evenly distributed immediately prior to sampling by forcible shaking. A filtration of the sample is necessary for the determination of total soluble iron (including the complex iron compounds).The equipment required for the determination of total iron and reagents are not included in the standard delivery.

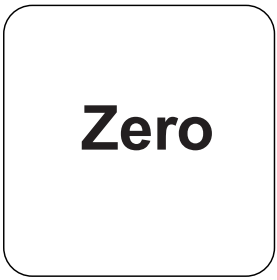
Fill 24 mm vial with **10 mL deionised water** .



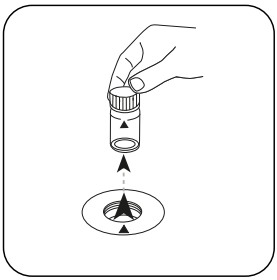
Close vial(s).



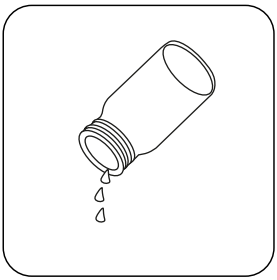
Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **ZERO** button.



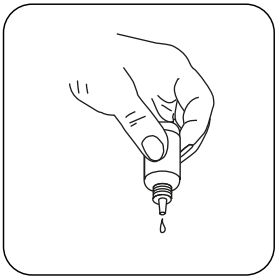
Remove the vial from the sample chamber.



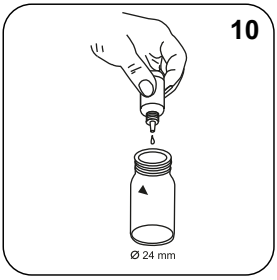
Empty vial.

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

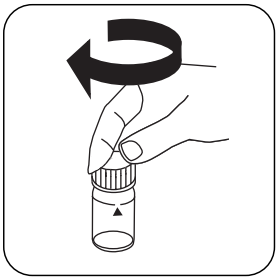
Fill 24 mm vial with **10 mL prepared sample** .



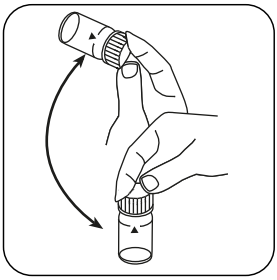
Hold cuvettes vertically and add equal drops by pressing slowly.



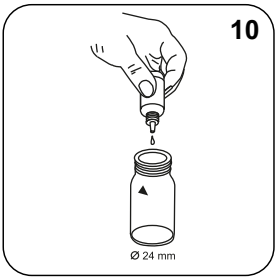
Add **10 drops Iron Reagent FE6**.



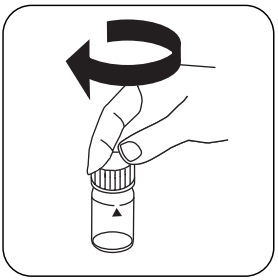
Close vial(s).



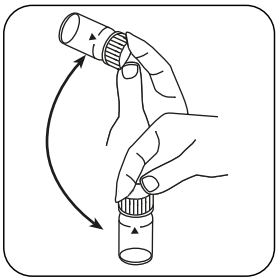
Invert several times to mix the contents.



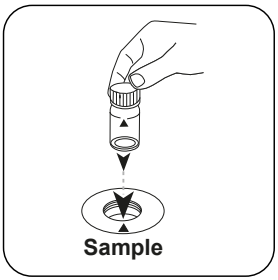
Add **10 drops Hardness Total Buffer TH2**.



Close vial(s).

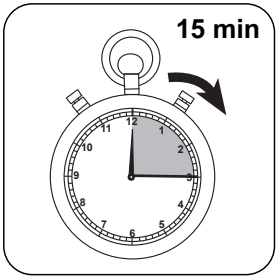


Invert several times to mix the contents.



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

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



Wait for **15 minute(s) reaction time**.

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

The result in mg/L total Iron or when using a filtrated sample, in mg/l totale soluble Iron appears on the display.

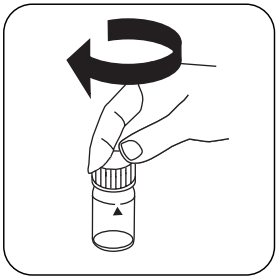
Determination of Iron HR with Liquid Reagent

Select the method on the device.

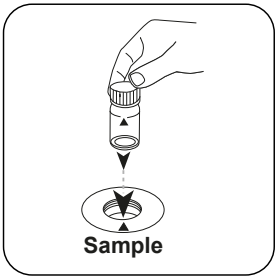
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

For determination of dissolved iron the sample must be filtered prior to the test (pore size 0,45 µm). Otherwise, iron particles and suspended iron are measured.

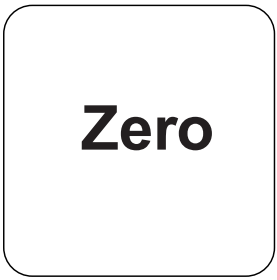
Fill 24 mm vial with **10 mL sample**.



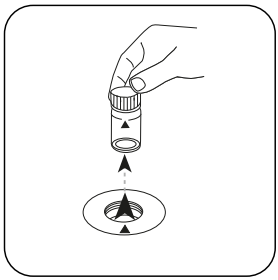
Close vial(s).



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

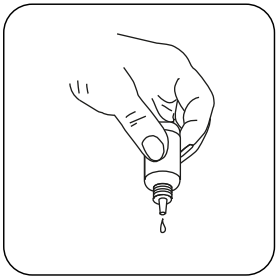


Press the **ZERO** button.

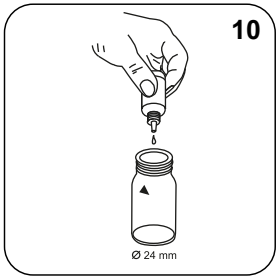


Remove the vial from the sample chamber.

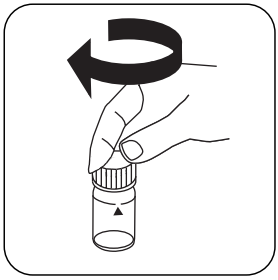
For devices that require **no ZERO measurement** , **start here**.



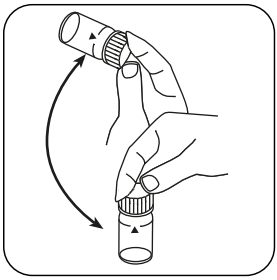
Hold cuvettes vertically and add equal drops by pressing slowly.



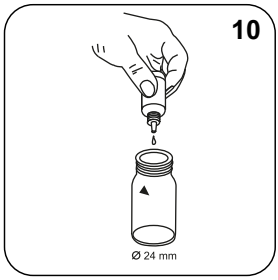
Add **10 drops Iron Reagent FE6**.



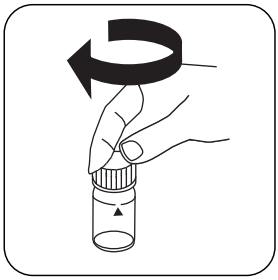
Close vial(s).



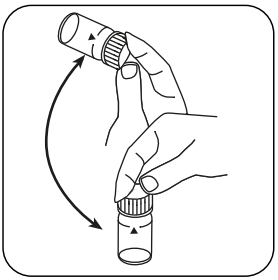
Invert several times to mix the contents.



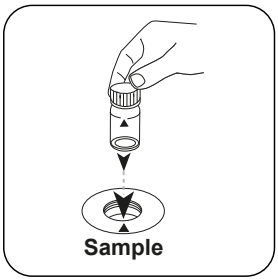
Add **10 drops Hardness Total Buffer TH2**.



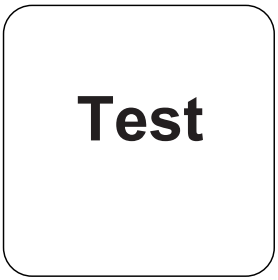
Close vial(s).



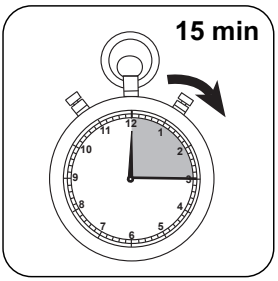
Invert several times to mix the contents.



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



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



Wait for **15 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.

Molybdate T **M250**

1 - 50 mg/L MoO_4 **Mo3**

Thioglycolate

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Molybdate HR No. 1	Tablet / 100	513060BT
Molybdate HR No. 1	Tablet / 250	513061BT
Molybdate HR No. 2	Tablet / 100	513070BT
Molybdate HR No. 2	Tablet / 250	513071BT
Set Molybdate No. 1/No. 2 100 Pc.#	100 each	517631BT
Set Molybdate No. 1/No. 2 250 Pc.#	250 each	517632BT

Notes

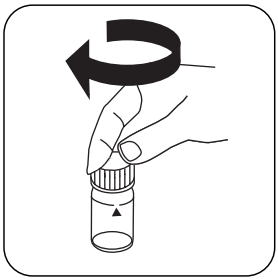
1. The tablets must be added in the correct sequence.

Determination of Molybdate HR with Tablet

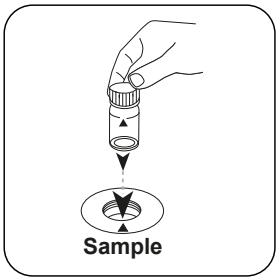
Select the method on the device.

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

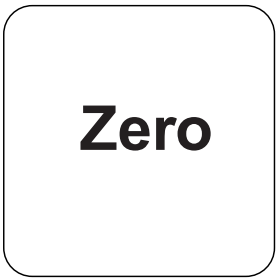
Fill 24 mm vial with **10 mL sample**.



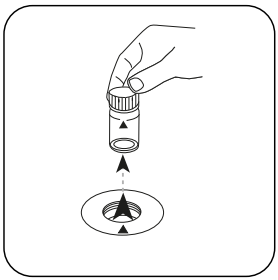
Close vial(s).



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



Press the **ZERO** button.

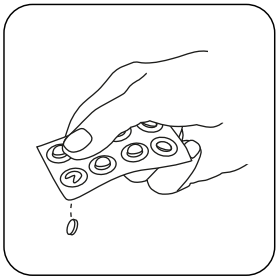


Remove the vial from the sample chamber.

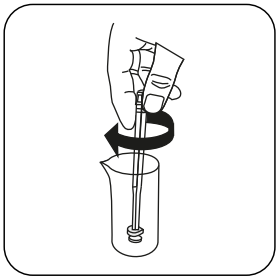
Empty vial.

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

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

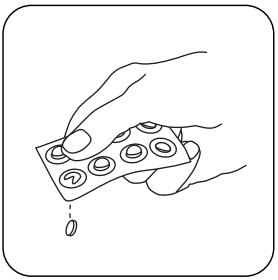


Add **MOLYBDATE HR No. 1 tablet** .

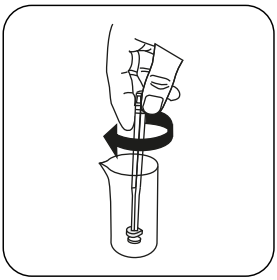


Crush tablet(s) by rotating slightly.

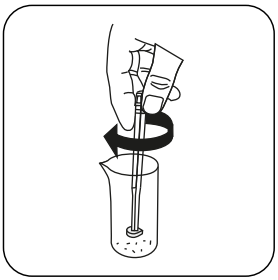
EN



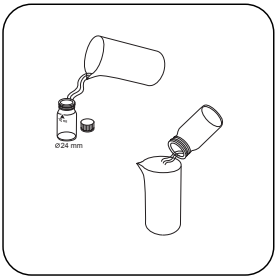
Add **MOLYBDATE HR No. 2 tablet** .



Crush tablet(s) by rotating slightly.

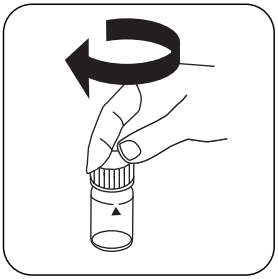


Dissolve the tablets using a clean stirring rod.

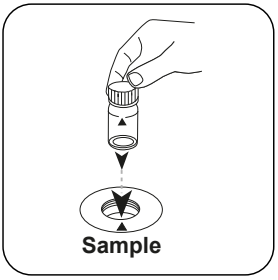


Rinse out vial with prepared sample .

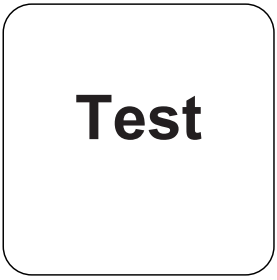
Fill up vial with **sample** to the **10 mL mark**.



Close vial(s).



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



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

The result in mg/L Molybdate/ Molybdenum appears on the display.

including stirring rod, 10 cm

Phosphate HR T M321

0.33 - 26 mg/L P

Vanadomolybdate

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Set Phosphate No. 1 HR/No. 2 HR 100 Pc. #	100 each	517661BT
Phosphate HR P1	Tablet / 100	515810BT
Phosphate HR P2	Tablet / 100	515820BT

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 yellow 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.

Notes

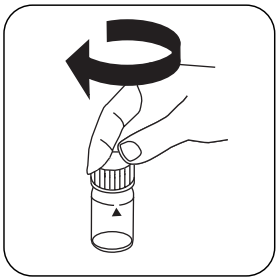
1. Only ortho-phosphate ions react.
2. For samples under 5 mg/L PO_4 it is recommended to analyse the water sample using Method 320 ”Phosphate ortho LR with Tablet“.

Determination of Phosphate, ortho HR with Tablet

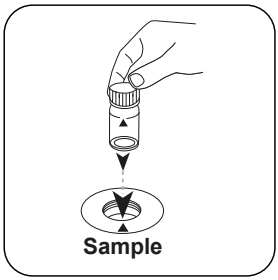
Select the method on the device.

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

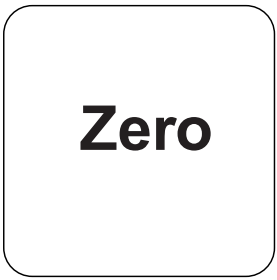
Fill 24 mm vial with **10 mL sample**.



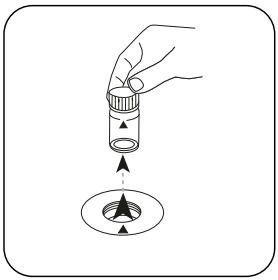
Close vial(s).



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

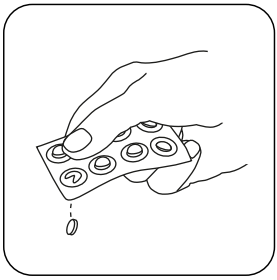


Press the **ZERO** button.

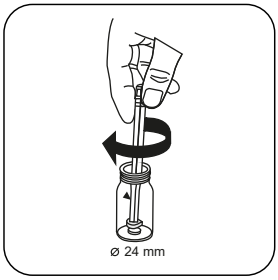


Remove the vial from the sample chamber.

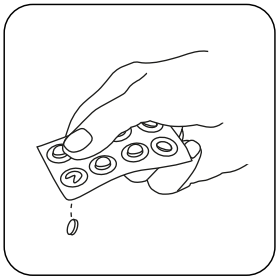
For devices that require **no ZERO measurement** , **start here**.



Add **PHOSPHATE HR P1 tablet** .

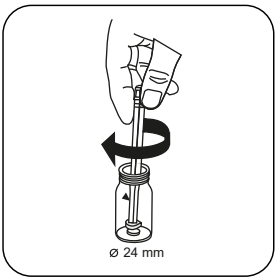


Crush tablet(s) by rotating slightly.

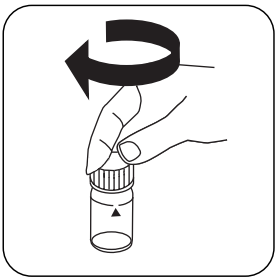


Add **PHOSPHATE HR P2 tablet** .

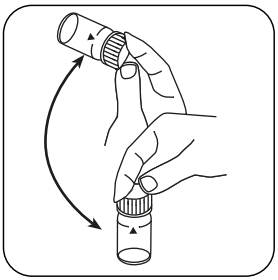
EN



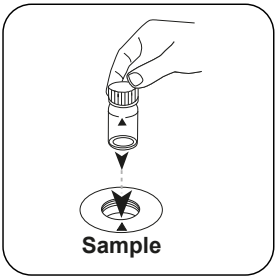
Crush tablet(s) by rotating slightly.



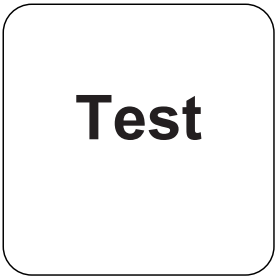
Close vial(s).



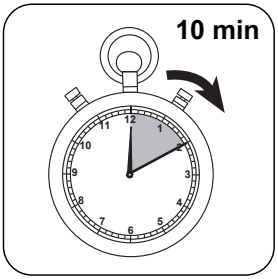
Dissolve tablet(s) by inverting.



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.

Interference	from / [mg/L]
Al	200
AsO_4^{3-}	in all quantities
Cr	100
Cu	10
Fe	100
Ni	300
H_2S	in all quantities
SiO_2	50
$Si(OH)_4$	10
S^{2-}	in all quantities
Zn	80

including stirring rod, 10 cm

PTSA M501

10 - 400 ppb

Fluorescence

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
PTSA standard addition solution, 1000 ppb	1 pc.	461210

Preparation

1. Before use, clean the vials and the accessories.
2. The outside of the vial must be clean and dry before starting the analysis. Clean the outside of the vials with a towel. Fingerprints or other marks will be removed.
3. The photometre is already factory calibrated, or the instrument was calibrated by the user. It is recommended to verify calibration accuracy by a Standard measurement:

- when in doubt about last calibration or accuracy of results
- once a mounth
  The verification measurement shall be done like a sample measurement.

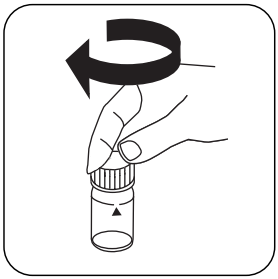
Notes

1. Use only vials with black lids for PTSA measurements.
2. Large temperature differences between the instrument and the environment can lead to errors. For best results, perform tests with sample temperatures between 20 °C (68 °F) and 25 °C (77 °F).
3. Vials and caps should be cleaned thoroughly **after each analysis** to prevent interferences.
4. To ensure maximum accuracy of test results, always use the reagent system supplied by the instrument manufacturer.
5. Do not pour used standards back into the bottle.
6. Spiking procedure possible (see Instruction Manual Photometer).

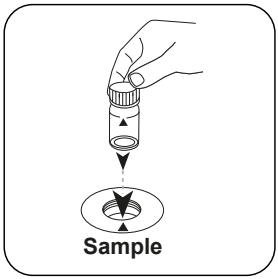
Determination of PTSA

Select the method on the device.

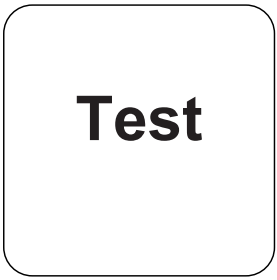
Fill PTSA mm vial with **10 mL sample**.



Close vial(s).



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



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

The result in ppb PTSA appears on the display.

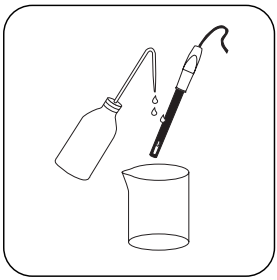
Conductivity SD 335

0 - 200 mS/cm

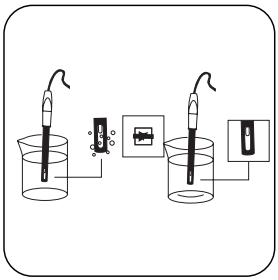
The following accessories are required.

EN

Accessories	Packaging Unit	Part Number
LC 12 for SD 320 / SD 325 Con, up to 200 mS/cm	1 Pieces	19805040



Rinse the electrode with distilled or deionised water and then with the sample.



Immerse the measuring cell in the sample. During measurement, ensure that there are no air bubbles on the electrode surface and that the electrode, as well as the temperature sensor, are sufficiently surrounded by the sample.

The measurement value can now be read off from the display. In the parameter configuration you can change the conductivity to TDS or salinity if required.

Hardness (Yes/No) Y/N

8 - 20 mg/L $CaCO_3$

EN

Material

Reagents	Packaging Unit	Part Number
Hardness Yes/No	Tablet / 100	515360BT

Sampling

1. Let the sample water flow for 30 seconds before taking the sample.

Remarks

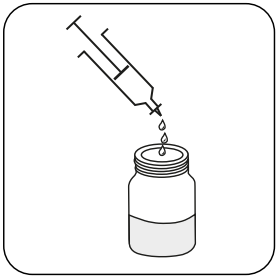
1. Colours may vary depending on sample and test conditions.
2. This test may be used to determine the performance of a softener unit by measuring the total hardness of softened water taken from the outlet. It is important to monitor hardness levels regularly as hardness breakthrough is indicative of exhausted resin and regeneration would be required.
3. Test result:
   Green Sample Colour : Hardness is less than the threshold level
   Red Sample Colour : Hardness is more than the threshold level

Sampling

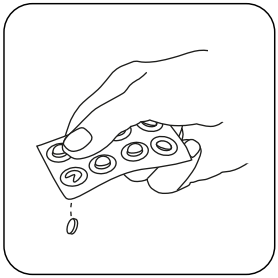
Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

Expected Range	Titrant used	Sample Size	Factor
10 mg/L	1 Tablette Hardness Yes/No	20 mL	
20 mg/L	1 Tablette Hardness Yes/No	10 mL	
16 mg/L	2 Tabletten Hardness Yes/No	25 mL	
8 mg/L	1 Tablette Hardness Yes/No	25 mL	

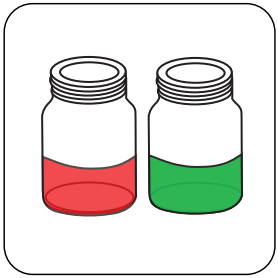
Determination of Hardness (Yes/No)



Attention!Select the appropriate sample volume according to the instructions in the chapter Sampling.



Add **x Hardness Yes/No tablet(s)**. **(See chapter Sampling under Titrant in the table.)**



The sample will turn **red or green (See chapter Notes.)**.

Read the test result: Note the color of the sample (red or green) (see Notes).

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