



Chlorine PP

110

0.02 - 2 mg/l Cl_2^{a}

CL2

DPD

Instrument specific information

The test can be performed on the following devices. In addition, the required cuvette and the absorption range of the photometer are indicated.

Instrument Type	Cuvette	λ	Measuring Range
MD 100, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	ø 24 mm	530 nm	0.02 - 2 mg/l Cl_2^{a}
SpectroDirect, XD 7000, XD 7500	ø 24 mm	510 nm	0.02 - 2 mg/l Cl_2^{a}

Material

Required material (partly optional):

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

Application List

- Waste Water Treatment
- Disinfection Control
- Boiler Water
- Cooling Water
- Raw Water Treatment
- Pool Water Control
- Pool Water Treatment
- Drinking Water Treatment

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.

Preperation

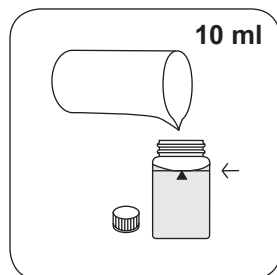
1. Cleaning of vials:
As many household cleaners (e.g. dishwasher detergent) contain reducing substances, this can lead to lower results with the determination of Chlorine. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve this, all glassware should be 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).

Implementation of the provision free chlorine with powder packs

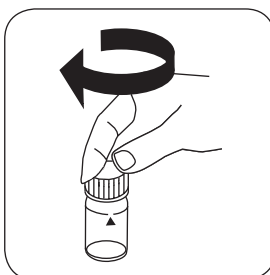
Select the method on the device

In addition, choose the test: free

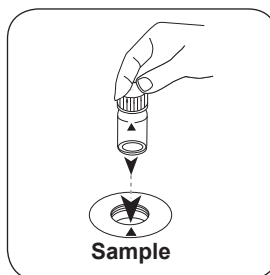
For this method, no ZERO measurements are to be carried out with the following devices: XD 7000, XD 7500



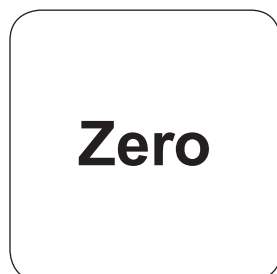
Fill 24 mm vial with **10 ml sample**.



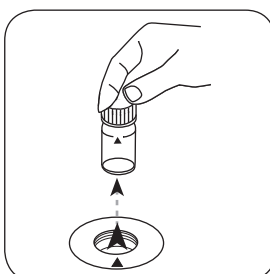
Close vial(s).



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

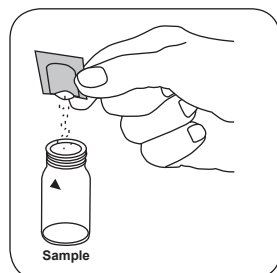


Press the **ZERO** button.

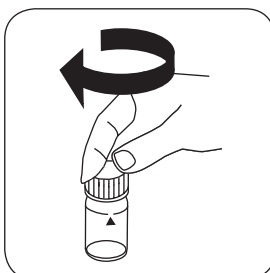


Remove the vial from the sample chamber.

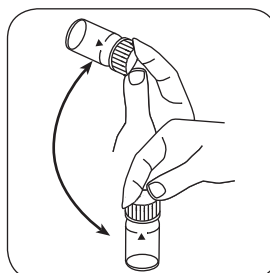
For devices that require **no ZERO measurement**, start here.



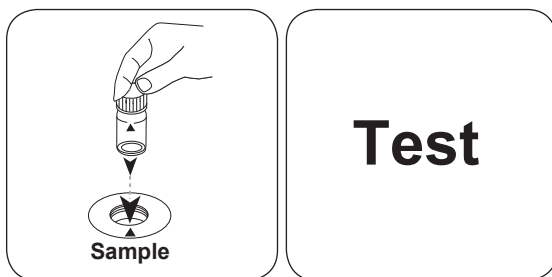
Add Chlorine **FREE-DPD/ F10** powder pack.



Close vial(s).



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



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

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

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

Implementation of the provision totale Chlorine with powder packs

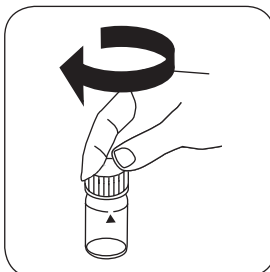
Select the method on the device

In addition, choose the test: total

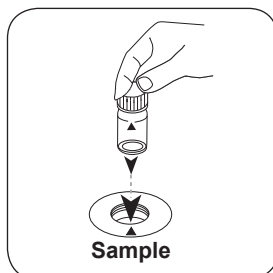
For this method, no ZERO measurements are to be carried out with the following devices: XD 7000, XD 7500



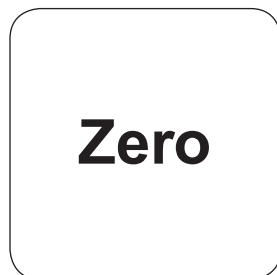
Fill 24 mm vial with **10 ml sample**.



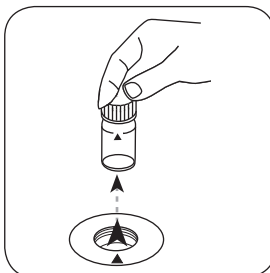
Close vial(s).



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

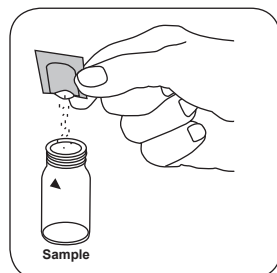


Press the **ZERO** button.

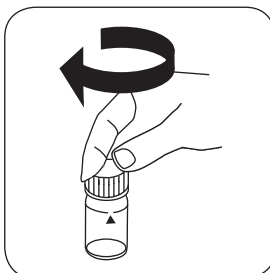


Remove the vial from the sample chamber.

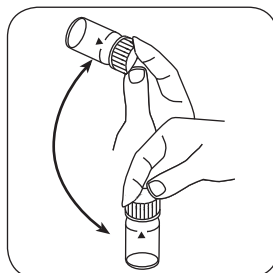
For devices that require **no ZERO measurement**, start here.



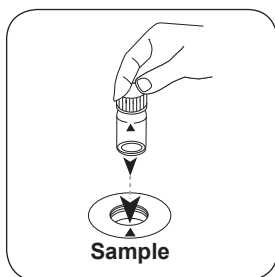
Add **Chlorine TOTAL-DPD/ F10 powder pack**.



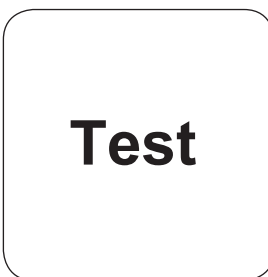
Close vial(s).



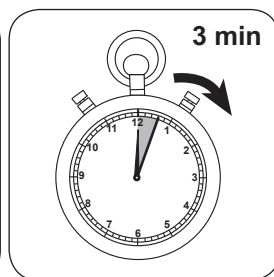
Invert several times to mix the contents (20 sec.).



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



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



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

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

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

Implementation of the provision Chlorine differentiated with powder packs

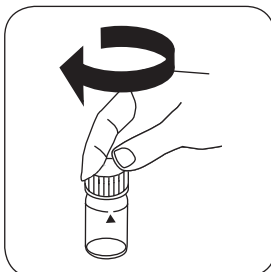
Select the method on the device

In addition, choose the test: differentiated

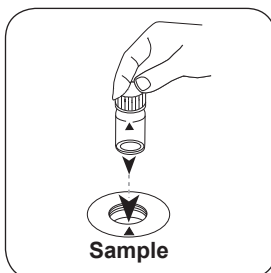
For this method, no ZERO measurements are to be carried out with the following devices: XD 7000, XD 7500



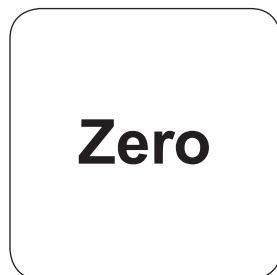
Fill 24 mm vial with **10 ml sample**.



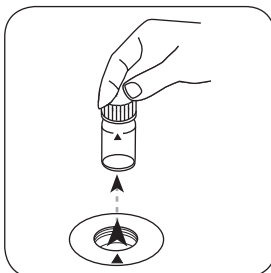
Close vial(s).



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

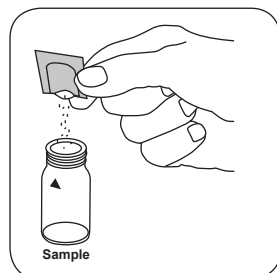


Press the **ZERO** button.

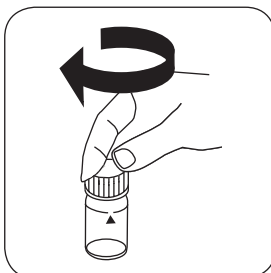


Remove the vial from the sample chamber.

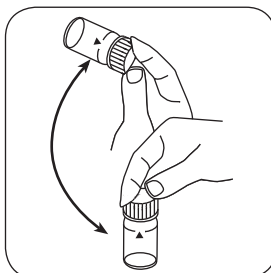
For devices that require **no ZERO measurement**, start here.



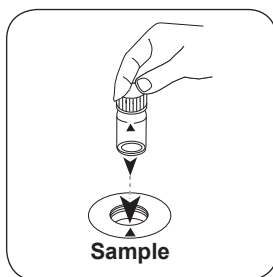
Add Chlorine **FREE-DPD/ F10** powder pack.



Close vial(s).



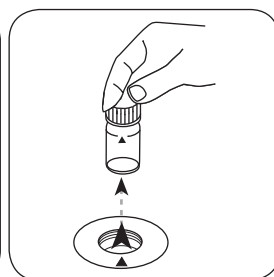
Invert several times to mix the contents (20 sec.).



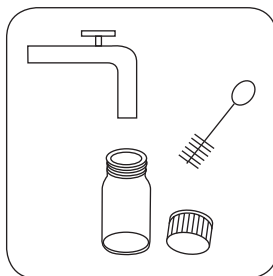
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



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



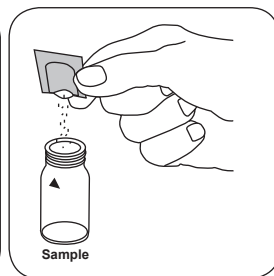
Remove the vial from the sample chamber.



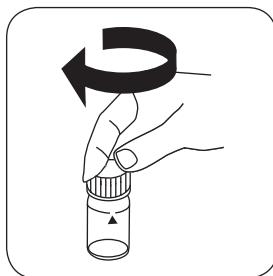
Thoroughly clean the vial and vial cap.



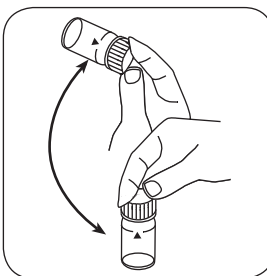
Fill 24 mm vial with **10 ml sample**.



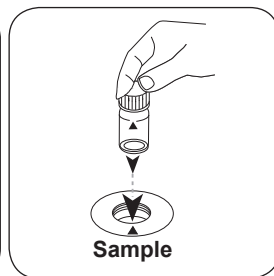
Add **TOTAL-DPD/ F10 powder pack**.



Close vial(s).

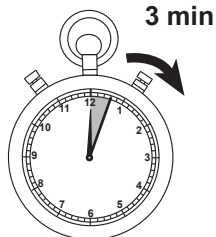


Invert several times to mix the contents (20 sec.).



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

Test



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

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

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

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

Chemical Method

DPD

Appendix

Interferences

Persistent Interferences

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

Removeable Interferences

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

Interference	from / [mg/l]
CrO ₄ ²⁻	0.03
MnO ₂	0,03

Method Validation

Limit of Detection	0.008 mg/l
Limit of Determination	0.025 mg/l
End of Measuring Range	2 mg/l
Sensitivity	0.45 mg/l
Confidence Range	0.01 %
Standard Deviation	0.002 µg
Variation Coefficient	0.21 %

Conformity

EN ISO 7393-2

^{a)} determination of free, combined and total | ^{b)} Reactor is necessary for COD (150 °C), TOC (120 °C) and total -chromium, - phosphate, -nitrogen, (100 °C) | ^{c)} MultiDirect: Adapter is necessary for Vacu-vials® (Order code 19 20 75) | ^{d)} Spectroquant® is a Merck KGaA Trademark | ^{e)} alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity | ^{f)} additionally required for determination of bromine, chlorine dioxide and ozone in the presence of chlorine | ^{g)} Reagent recovers most insoluble iron oxides without digestion | ^{h)} additionally required for samples with hardness values above 300 mg/l CaCO₃ | ⁱ⁾ high range by dilution | ^{j)} including stirring rod, 10 cm