

Chlorine HR 10 T

M104
0.1 - 10 mg/L Cl₂^{a)}
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
SpectroDirect, XD 7000, XD 7500	□ 10 mm	510 nm	0.1 - 10 mg/L Cl ₂ ^{a)}

Material

Required material (partly optional):

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



Application List

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

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. Variations in the length of the vial can extend the measuring range:
 - 10 mm vial: 0.1 mg/L - 10 mg/L, solution: 0.01
 - 20 mm vial: 0.05 mg/L - 5 mg/L, solution: 0.01
 - 50 mm vial: 0.02 mg/L - 2 mg/L, solution: 0.001
2. EVO tablets can be used as an alternative to the corresponding standard tablet (e.g. DPD No. 3 EVO instead of DPD No. 3).

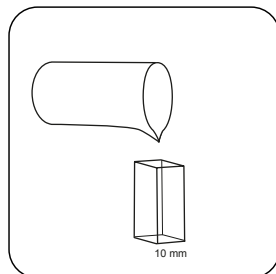


Determination of Chlorine HR, free with tablet

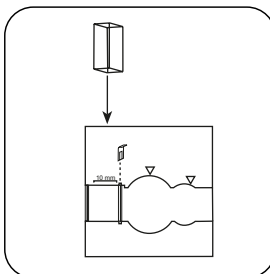
Select the method on the device.

In addition, choose the test: free

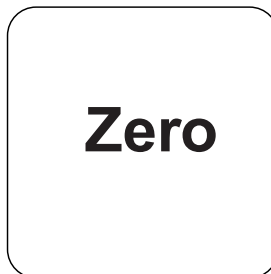
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



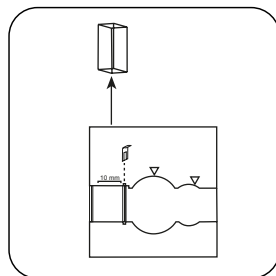
Fill 10 mm vial with sample.



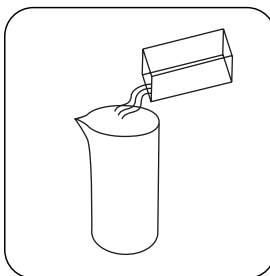
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



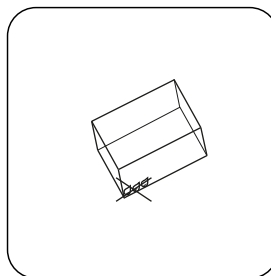
Press the **ZERO** button.



Remove **vial** from the sample chamber.

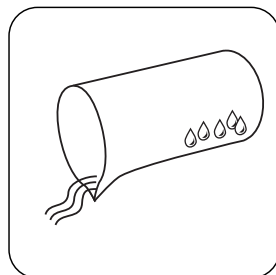


Empty vial.

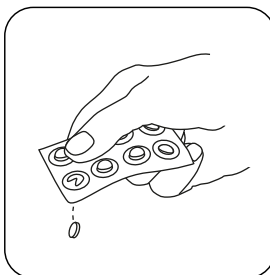


Dry the vial thoroughly.

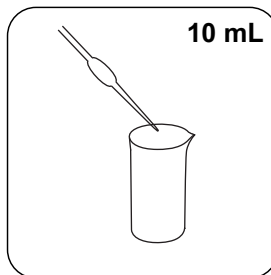
For devices that require **no ZERO measurement**, **start here**.



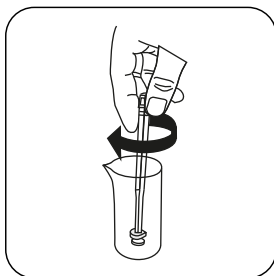
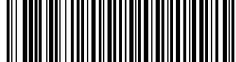
Rinse a beaker **with the sample and empty it, leaving a few drops remaining** in the beaker.



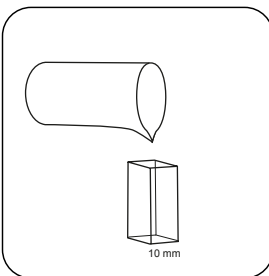
Add **DPD No.1 HR tablet**.



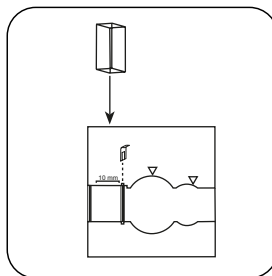
Add **10 mL sample**.



Crush tablet(s) by rotating slightly and dissolve.



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



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

Test

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

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

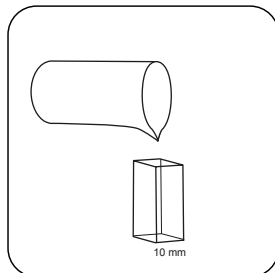


Determination of Chlorine HR, total with tablet

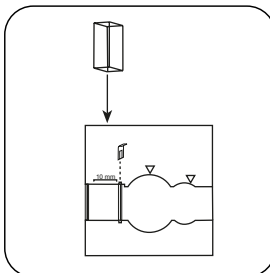
Select the method on the device.

In addition, choose the test: total

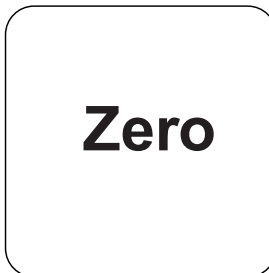
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



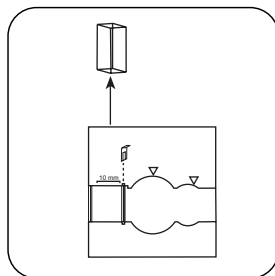
Fill 10 mm vial with sample.



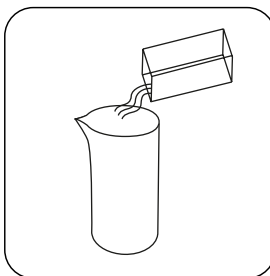
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



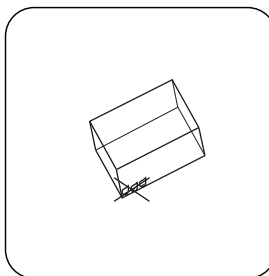
Press the **ZERO** button.



Remove **vial** from the sample chamber.

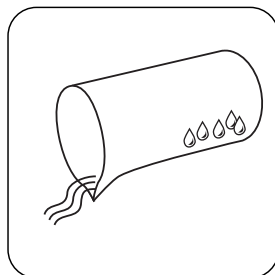


Empty vial.

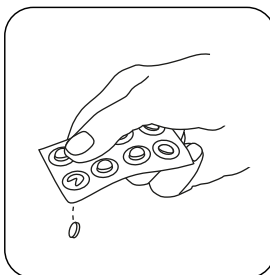


Dry the vial thoroughly.

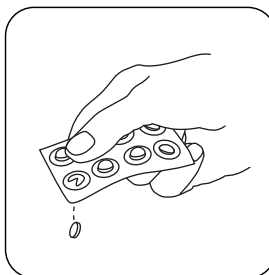
For devices that require **no ZERO measurement**, **start here**.



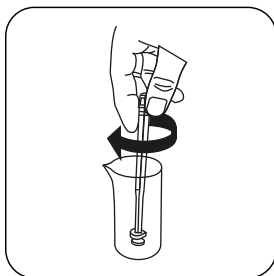
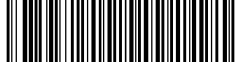
Rinse a beaker **with the sample and empty it, leaving a few drops remaining** in the beaker.



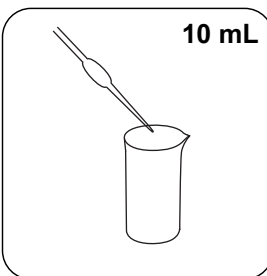
Add **DPD No.1 HR tablet**.



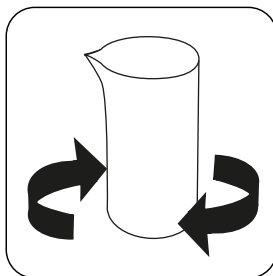
Add **DPD No.3 HR tablet**.



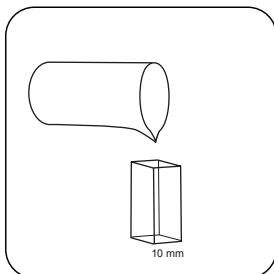
Crush tablet(s) by rotating slightly.



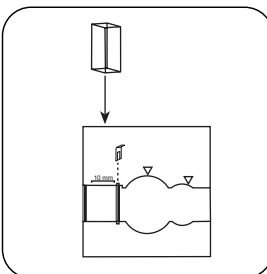
Add **10 mL sample**.



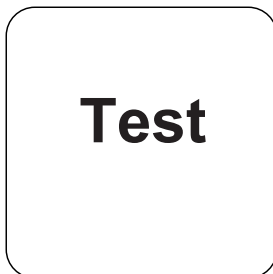
Dissolve tablet(s) by inverting.



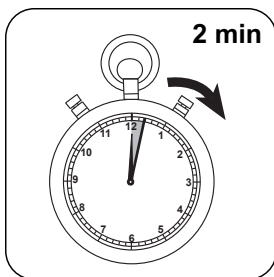
Fill **10 mm vial** with **sample**.



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



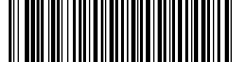
Press the **TEST** (XD: **START**) button.



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.

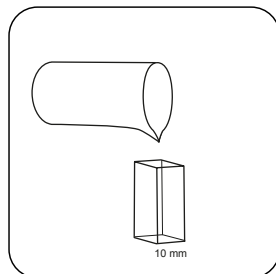


Determination of Chlorine HR, differentiated with tablet

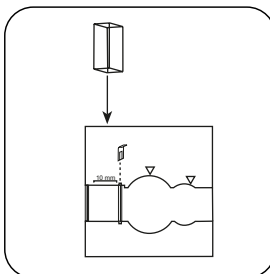
Select the method on the device.

In addition, choose the test: differentiated

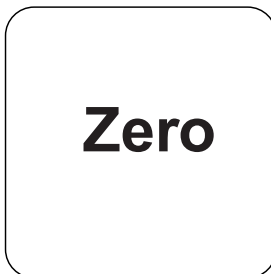
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



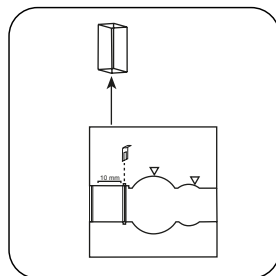
Fill 10 mm vial with sample.



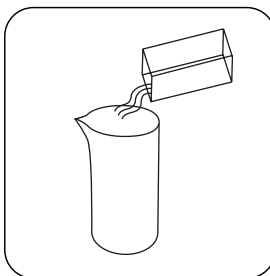
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



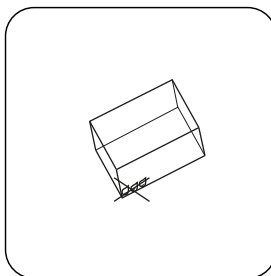
Press the **ZERO** button.



Remove **vial** from the sample chamber.

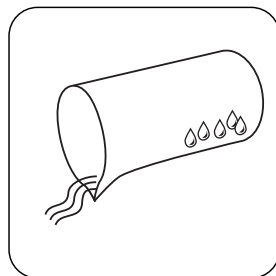


Empty vial.

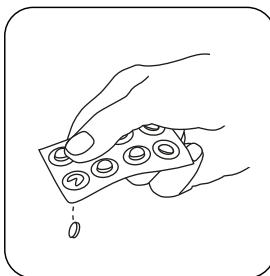


Dry the vial thoroughly.

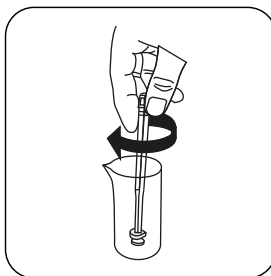
For devices that require **no ZERO measurement**, **start here**.



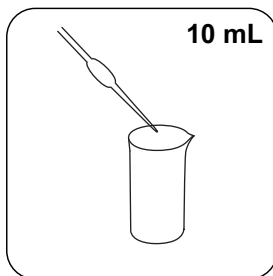
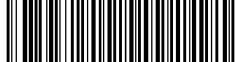
Rinse a beaker **with the sample and empty it, leaving a few drops remaining** in the beaker.



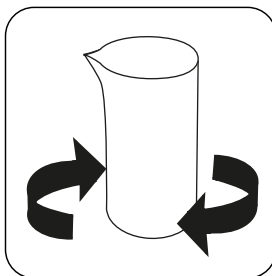
Add **DPD No.1 HR tablet**.



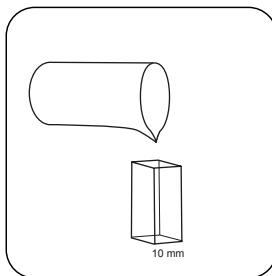
Crush tablet(s) by rotating slightly.



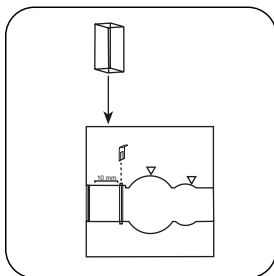
Add **10 mL sample**.



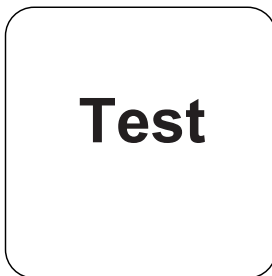
Dissolve tablet(s) by
inverting.



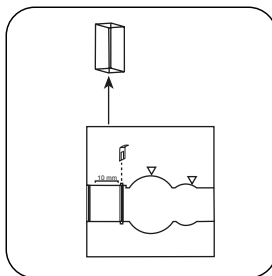
Fill **10 mm vial** with **sample**.



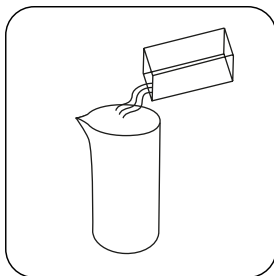
Place **sample vial** in the
sample chamber. • Pay
attention to the positioning.



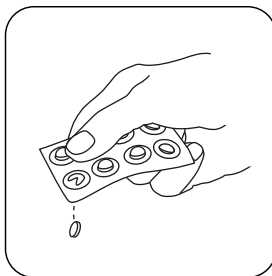
Press the **TEST** (XD:
START) button.



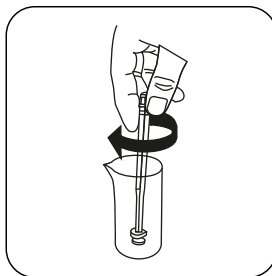
Remove **vial** from the
sample chamber.



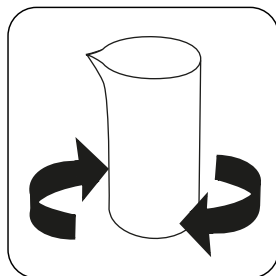
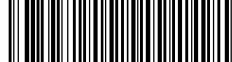
Return the sample solution
completely to the sample
vessel.



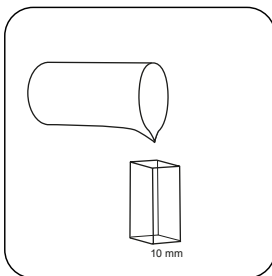
Add **DPD No.3 HR tablet**.



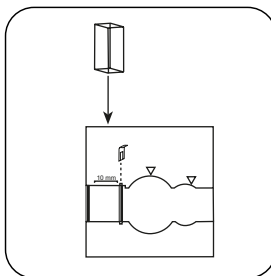
Crush tablet(s) by rotating
slightly.



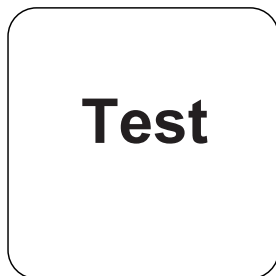
Dissolve tablet(s) by inverting.



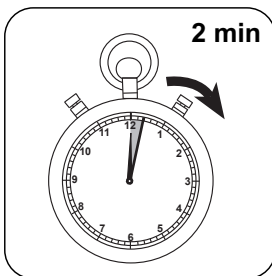
Fill 10 mm vial with sample.



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



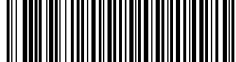
Press the **TEST** (XD: **START**) button.



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

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

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



Chemical Method

DPD

Appendix

Calibration function for 3rd-party photometers

$$\text{Conc.} = a + b \cdot \text{Abs} + c \cdot \text{Abs}^2 + d \cdot \text{Abs}^3 + e \cdot \text{Abs}^4 + f \cdot \text{Abs}^5$$

	□ 10 mm
a	$1.42151 \cdot 10^{-1}$
b	$3.06749 \cdot 10^{+0}$
c	$4.92199 \cdot 10^{-1}$
d	
e	
f	

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.
- The use of reagent tablets in samples with high Calcium content* and/or high conductivity* can lead to turbidity of the sample and therefore incorrect measurements. In this case, the alternative reagent tablet DPD No. 1 High Calcium and reagent tablet DPD No. 3 High Calcium should be used.

*it is not possible to give exact values, because the development of turbidity depends on the composition and nature of the sample.

Interference	from / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Conformity

EN ISO 7393-2

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