**Iron T****M220****0.02 - 1 mg/L Fe****FE****Ferrozine / Thioglycolate**

## 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 | $\lambda$ | Measuring Range  |
|-----------------------------------------------------------------------------|---------|-----------|------------------|
| MD 100, MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 600, PM 620, PM 630 | ø 24 mm | 560 nm    | 0.02 - 1 mg/L Fe |
| SpectroDirect                                                               | ø 24 mm | 562 nm    | 0.1 - 1 mg/L Fe  |
| XD 7000, XD 7500                                                            | ø 24 mm | 562 nm    | 0.02 - 1 mg/L Fe |

## Material

Required material (partly optional):

| Reagents                                         | Packaging Unit | Part Number |
|--------------------------------------------------|----------------|-------------|
| Iron II LR (Fe <sup>2+</sup> )                   | Tablet / 100   | 515420BT    |
| Iron II LR (Fe <sup>2+</sup> )                   | Tablet / 250   | 515421BT    |
| Iron LR (Fe <sup>2+</sup> und Fe <sup>3+</sup> ) | Tablet / 100   | 515370BT    |
| Iron LR (Fe <sup>2+</sup> und Fe <sup>3+</sup> ) | Tablet / 250   | 515371BT    |

## Application List

- Waste Water Treatment
- Cooling Water
- Boiler Water
- Galvanization
- Drinking Water Treatment
- Raw Water Treatment

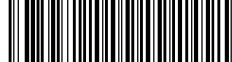
## Preparation

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

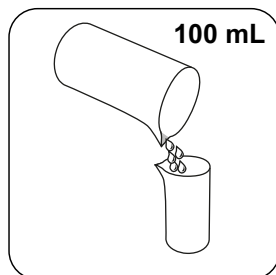


## Notes

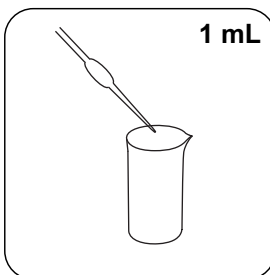
1. This method is for the determination of total dissolved  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$ .
2. For the determination of  $\text{Fe}^{2+}$ , the IRON (II) LR Tablet, instead of the IRON LR Tablet is used.



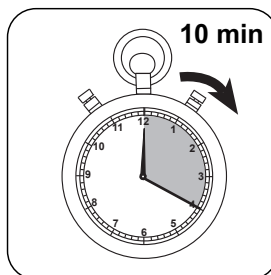
## Digestion



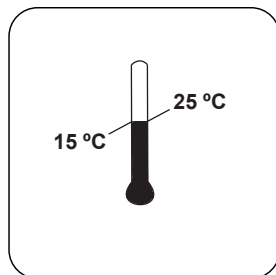
Fill a suitable sample vessel with **100 mL sample**.



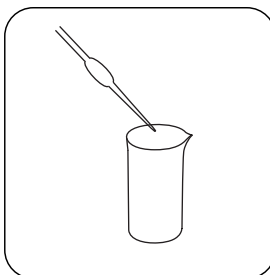
Add **1 mL concentrated sulfuric acid ( $\geq 95\%$ )**.



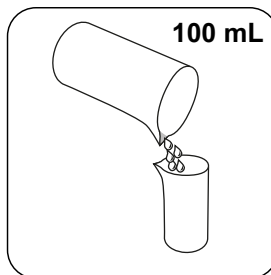
The sample is to be **heated for 10 minutes**, or for as long as it takes for everything to be completely dissolved.



Allow the sample to cool to room temperature.



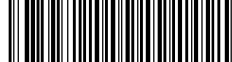
Adjust **pH-value** of the sample with **ammonia solution (10-25 %)** to 3-5.



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

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



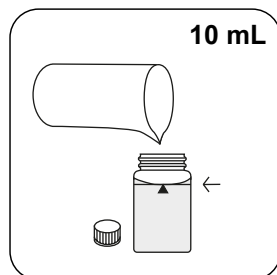


## Determination of Iron (II,III), dissolved with Tablet

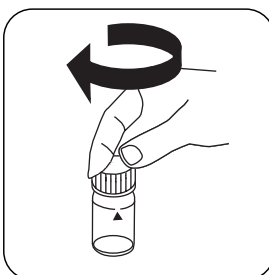
Select the method on the device.

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

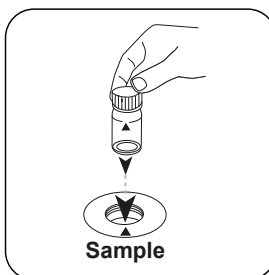
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



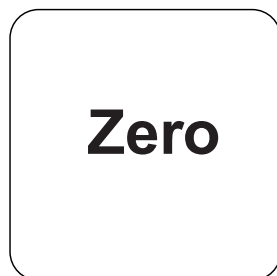
Fill 24 mm vial with **10 mL sample**.



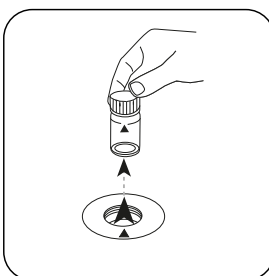
Close vial(s).



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

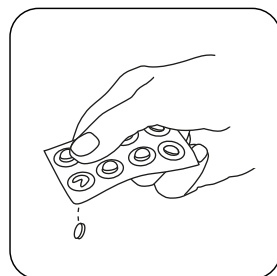


Press the **ZERO** button.

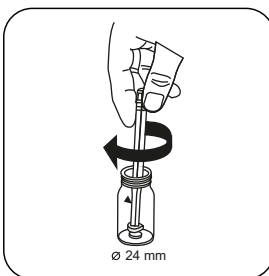


Remove the vial from the sample chamber.

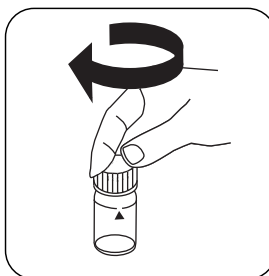
For devices that require **no ZERO measurement**, **start here**.



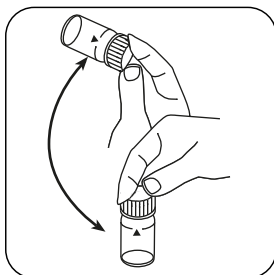
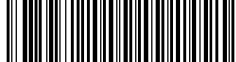
Add **IRON LR tablet**.



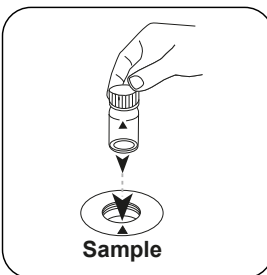
Crush tablet(s) by rotating slightly.



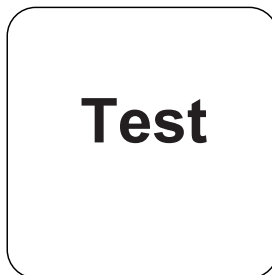
Close vial(s).



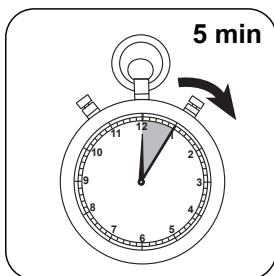
Dissolve tablet(s) by inverting.



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

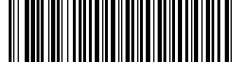


Press the **TEST** (XD: **START**) button.



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

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



## Chemical Method

Ferrozine / Thioglycolate

## Appendix

### Calibration function for 3rd-party photometers

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

|   | ø 24 mm                  | □ 10 mm                  |
|---|--------------------------|--------------------------|
| a | $-8.94304 \cdot 10^{-3}$ | $-8.94304 \cdot 10^{-3}$ |
| b | $9.35824 \cdot 10^{-1}$  | $2.01202 \cdot 10^{+0}$  |
| c |                          |                          |
| d |                          |                          |
| e |                          |                          |
| f |                          |                          |

## Interferences

### Removeable Interferences

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

## Method Validation

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

### Bibliography

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