# Lovibond® Water Testing

## Tintometer® Group

# Photometer-System MD100




## Cl • pH • CyA • TA • CaH

GB **Instruction Manual**

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# CE-Konformitätserklärung / Declaration of CE-Conformity
# Déclaration de conformité CE / Dichiarazione di conformità CE / CE-Declaración de conformidad

**Hersteller / manufacturer / fabricant / produttore / fabricante:**
**Tintometer GmbH /** Schleefstraße 8-12 / 44287 Dortmund / Deutschland

Produktname / Product name / Nom du fabricant / Nome del prodotto / Nombre del productor: **MD 100**

**DE** EG-Konformitätserklärung gemäß RICHTLINIE **2004/108/EG** DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 15. Dezember 2004 und RICHTLINIE **2011/65/EU** DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 8. Juni 2011. Der Hersteller erklärt, dass dieses Produkt die Anforderungen der folgenden Produktfamiliennorm erfüllt:

**GB** Declaration of EC-Conformity according to DIRECTIVE **2004/108/EC** OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 2004, December the 15th and DIRECTIVE **2011/65/EU** OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 2011, June the 8th. The manufacturer declares that this product meets the requirements of the following product family standard:

**FR** Déclaration de conformité CE conformément à la DIRECTIVE **2004/108/CE** DU PARLEMENT EUROPÉEN ET DU CONSEIL du 15 décembre 2004 et DIRECTIVE **2011/65/UE** DU PARLEMENT EUROPÉEN ET DU CONSEIL du 8 juin 2011. La fabricant déclare que le produit est conforme aux exigences de la norme de famille de produits suivante :

**IT** Dichiarazione di conformità CE in conformità alla DIRETTIVA **2004/108/CE** DEL PARLAMENTO EUROPEO E DEL CONSIGLIO del 15 dicembre 2004 e DIRETTIVA **2011/65/UE** DEL PARLAMENTO EUROPEO E DEL CONSIGLIO del 8 Giugno 2011. Il produttore dichiara che il seguente prodotto soddisfa i requisiti della seguente norma per famiglia di prodotti:

**ES** CE - Declaración de conformidad conforme a la NORMA **2004/108/CE** DEL PARLAMENTO Y DEL CONSEJO EUROPEO del 15 de diciembre de 2004 y NORMA **2011/65/UE** DEL PARLAMENTO Y DEL CONSEJO EUROPEO del 8 de junio de 2011. El fabricante declara, que este producto cumple con las exigencias de la siguiente norma correspondiente a la familia de productos:

**DIN EN 61326-1:2006**

**DE** Gemäß den grundlegenden Prüfanforderungen für die Störfestigkeit (Tabelle 1) / Störaussendungen gemäß den Anforderungen für Geräte der Klasse B

**GB** Basic immunity test requirements (Table1) / Emission according to the requirements for class B equipment

**FR** Conformément aux exigences fondamentales relatives aux essais d'immunité (tableau 1) / Émissions parasites conformément aux exigences applicables aux appareils de la classe B

**IT** Conforme ai requisiti relativi al test di resistenza alle interferenze (Tabella 1) / Emissione in conformità ai requisiti per i dispositivi della classe B

**ES** De acuerdo a los requisitos básicos de verificación para la resistencia a interferencias (tabla 1) / Emisión de interferencias conforme a las exigencias para aparatos de clase B

Dortmund, 07.10.2014

Cay-Peter Voss, Managing Director

# GB Important Information

## ⚠ CAUTION ⚠

The accuracy of the instrument is only valid if the instrument is used in an environment with controlled electromagnetic disturbances according to DIN 61326.
Wireless devices, e.g. wireless phones, must not be used near the instrument.

**Important disposal instructions for batteries and accumulators**

EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows :

Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.



**Important Information**
**To Preserve, Protect and Improve the Quality of the Environment**
**Disposal of Electrical Equipment in the European Union**

Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste!

Tintometer GmbH will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, **excluding the cost of transportation** is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Tintometer instruments for disposal freight prepaid to your supplier.



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# GB General notes

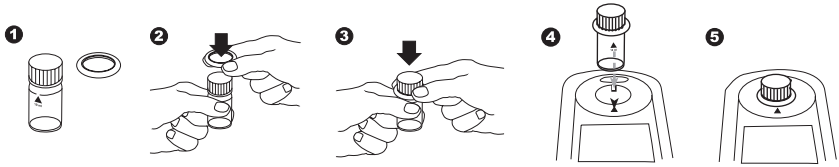
## Guidelines for photometric measurements

1. Vials, caps and stirring rods should be cleaned thoroughly **after each analysis** to prevent interference. Even minor reagent residues can cause errors in the test result.
2. The outside of the vial must be clean and dry before starting the analysis. Clean the outside of the vials with a towel to remove fingerprints or other marks.
3. Zero calibration and test must be carried out with the same vial as there may be slight differences in optical performance between vials.
4. The vials must be positioned in the sample chamber for zeroing and test with the Δ mark on the vial aligned with the ∇ mark on the instrument.
5. Always perform zeroing and test with the vial cap tightly closed. Only use the cap with a sealing ring.
6. Bubbles on the inside wall of the vial lead to incorrect measurements. To prevent this, remove the bubbles by swirling the vial before performing the test.
7. Avoid spillage of water into the sample chamber because this can lead to incorrect test results.
8. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using a moist cloth or cotton buds.
9. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
10. To avoid errors caused by stray light do not use the instrument in bright sunlight.
11. Always add the reagent tablets to the water sample straight from the foil without touching them with the fingers.
12. The reagents must be added in the correct sequence.

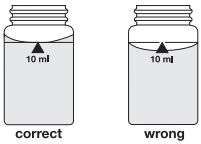
## Method notes

- Prior to measurement ensure that the sample is suitable for analysis (no major interferences) and does not require any preparation i.e. pH adjustment, filtration etc.
- Different Refill Packs available on request.
- Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
- Ensure proper disposal of reagent solutions.
- Material Safety Data Sheets are available on request (Internet: www.lovibond.com)

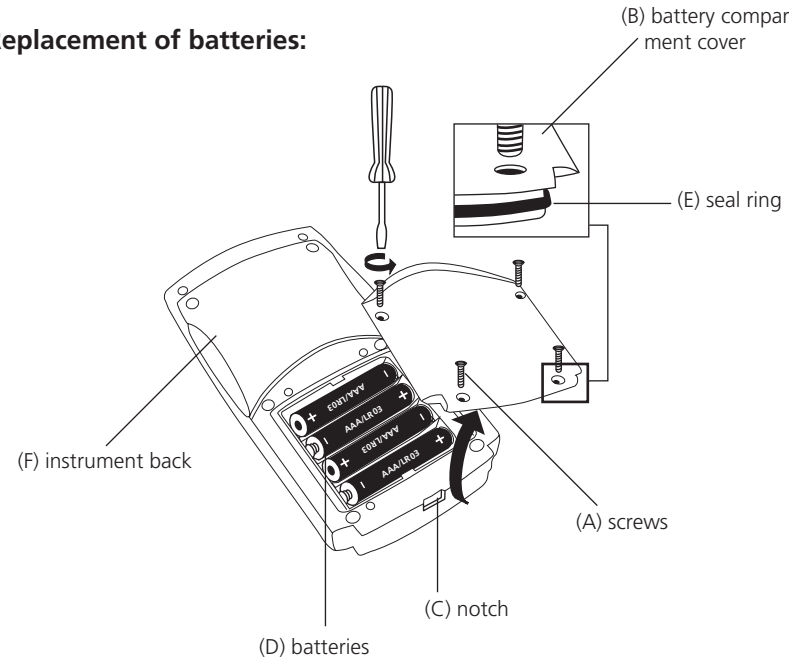
## Correct position of the vial (Ø 24 mm):




## Correct filling of the vial:




## Replacement of batteries:




**CAUTION:**

**To ensure that the instrument is water proof:**

- **seal ring (E) must be in position**
- **battery compartment cover (B) must be fixed with the four screws**

If the batteries are removed for more than one minute the date and time menu starts automatically when the photometer is switched on the next time.

## Operation

On Off

Switch the unit on using the [ON/OFF] key.

METHOD

The display shows the following:

Mode

Select the required test using the [MODE] key.

**Scroll Memory (SM)**
To avoid unnecessary scrolling for the required test method, the instrument memorizes the last method used before being switched off. When the instrument is switched on again, the scroll list comes up with the last used test method first.

METHOD

The display shows the following:

Fill a clean vial with the water sample up to the 10 ml mark, screw the cap on and place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key (see OTZ).

METHOD

The "Method" symbol flashes for approx. 8 seconds.

0.0.0

The display shows the following:

After zero calibration is completed, remove the vial from the sample chamber. The characteristic coloration appears after the addition of the reagents.

Replace the cap on the vial and place in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.
(For Countdown/reaction period see page 33)

METHOD

The "Method" symbol flashes for approx. 3 seconds.

RESULT

The result appears in the display.

The result is saved automatically.

Zero Test

**Repeating the test:**

Press the [ZERO/TEST] key again.

**OTZ (One Time Zero):**
The zero setting is held in memory until the instrument is switched off. It is not necessary to perform a new zero each time, if the water samples under test are from the same body of water and the conditions of testing are the same.
The zero setting can be repeated each time if necessary.

Zero Test

**Repeating the zero:**

Press the [ZERO/TEST] key for 2 seconds.

## Display backlight

Press the [ ! ] key to turn the display backlight on or off. The backlight is switched off automatically during the measurement.

## Recall of stored data

If the instrument is switched on, press the [!] key for more than 4 seconds, then release the [!] key to access the recall menu.

## Countdown / reaction period

If a reaction period is included in a method a countdown function can be used:

Press the [!] key and hold.
Press the [ZERO/TEST] key.
Release the [!] key; the countdown starts.
After the countdown is finished the measurement starts automatically.

It is possible to interrupt the countdown by pressing the [ZERO/TEST] key. Measurement starts immediately.

**Caution:**
**An incomplete reaction period can lead to incorrect test results.**

CL 6

## Chlorine with Tablet
## 0.01 – 6.0 mg/l

### a) free Chlorine

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Remove the vial from the sample chamber and **empty it, leaving a few drops remaining in the vial.**

Add **one DPD No. 1 tablet** straight from the foil to the water sample and crush the tablet using a clean stirring rod.

Add the water sample to the 10 ml mark.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero / Test

Press the [ZERO/TEST] key.

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l free Chlorine.

### b) total Chlorine

Add **one DPD No. 3 tablet** straight from the foil to the same water sample and crush the tablet using a clean stirring rod.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

! Zero / Test

**Wait for a reaction period of 2 minutes.**
(Countdown can be activated, see page 33)

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l total Chlorine.

### c) combined Chlorine

combined Chlorine = total Chlorine – free Chlorine

**Tolerances:**

0 – 1 mg/l: ± 0.05 mg/l
> 1 – 2 mg/l: ± 0.10 mg/l
> 2 – 3 mg/l: ± 0.20 mg/l
> 3 – 4 mg/l: ± 0.30 mg/l
> 4 – 6 mg/l: ± 0.40 mg/l

**Notes:**

1. Vial cleaning:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of Chlorine may show lower results. To avoid any measurement errors, only use glassware free of Chlorine demand.
   Preparation: Put all applicable glassware into Sodium hypochlorite solution (0.1 g/l) for one hour, then rinse all glassware 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. Preparing the sample:
   When preparing the sample, the lost of Chlorine, e.g. by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
4. 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 be adjusted between pH 6 and pH 7 before the reagent is added (use 0.5 mol/l Sulfuric acid resp. 1 mol/l Sodium hydroxide).
5. Exceeding the measuring range:
   Concentrations above 10 mg/l Chlorine can lead to results showing 0 mg/l. In this case, the water sample must be diluted with water free of Chlorine and the measurement repeated.
6. Turbidity (can lead to errors):
   The use of the DPD No. 1 tablet in samples with high Calcium ion contents* and/or high conductivity* can lead to turbidity of the sample and therefore incorrect measurements. In this case, the reagent tablet DPD No. 1 High Calcium should be used as an alternative. If turbidity does occur after the DPD No. 3 tablet has been added, this can be prevented by using the DPD No. 1 High Calcium tablet and the DPD No. 3 High Calcium tablet. The DPD No. 1 High Calcium should only be used in combination with the DPD No. 3 High Calcium.
   ** it is not possible to give exact values, because the development of turbidity depends on the nature of the sample.*
7. Oxidising agents such as Bromine, Ozone etc. interfere as they react in the same way as Chlorine.

| **Reagent** | **Form of reagent/Quantity** | **Order-No.** |
|---|---|---|
| **Set**<br>DPD No. 1 / No. 3 | Tablet / per 100<br>inclusive stirring rod | 517711BT |
| DPD No. 1 | Tablet / 100 | 511050BT |
| DPD No. 3 | Tablet / 100 | 511080BT |
| **Kombi-Pack**<br>DPD No. 1 HIGH CALCIUM /<br>DPD No. 3 HIGH CALCIUM | Tablet / per 100<br>inclusive stirring rod | 517781BT |
| DPD No. 1 HIGH CALCIUM | Tablet / 100 | 515740BT |
| DPD No. 3 HIGH CALCIUM | Tablet / 100 | 515730BT |

CL 6

## Chlorine with liquid reagent 0.02 – 4.0 mg/l

### a) free Chlorine

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Remove the vial from the sample chamber and empty the vial.

Fill the vial with drops of the same size by holding the bottle vertically and squeeze slowly:

**6 drops of DPD 1 buffer solution**

**2 drops of DPD 1 reagent solution**

Add the water sample to the 10 ml mark.

Close the vial tightly with the cap and invert several times to mix the contents.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l free Chlorine.

### b) total Chlorine

Immediately after measurement add

**3 drops of DPD 3 solution** to the already coloured test solution.

Close the vial tightly with the cap and invert several times to mix the contents.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

! Zero Test

**Wait for a reaction period of 2 minutes.**
(Countdown can be activated, see page 33)

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l total Chlorine.

### c) combined Chlorine

combined Chlorine = total Chlorine – free Chlorine

**Tolerances:**

0 – 1 mg/l: ± 0.05 mg/l
> 1 – 2 mg/l: ± 0.10 mg/l
> 2 – 3 mg/l: ± 0.20 mg/l
> 3 – 4 mg/l: ± 0.30 mg/l

**Notes:**

1. Vial cleaning:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of Chlorine may show lower results. To avoid any measurement errors, only use glassware free of Chlorine demand.
   Preparation: Put all applicable glassware into Sodium hypochlorite solution (0.1 g/l) for one hour, then rinse all glassware 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. Preparing the sample:
   When preparing the sample, the lost of Chlorine, e.g. by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
4. 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 be adjusted between pH 6 and pH 7 before the reagent is added (use 0.5 mol/l Sulfuric acid resp. 1 mol/l Sodium hydroxide).
5. Exceeding the measuring range:
   Concentrations above 4 mg/l Chlorine using liquid reagents can lead to results showing 0 mg/l. In this case, the water sample must be diluted with water free of Chlorine and the measurement repeated.
6. After using liquid reagents replace the bottle caps securely noting the colour coding. Store the reagent bottles in a cool, dry place ideally between 6 °C and 10 °C.
7. Oxidising agents such as Bromine, Ozone etc. interfere as they react in the same way as Chlorine.

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| **Set**<br>DPD No. 1 buffer solution<br>DPD No. 1 reagent solution<br>DPD No. 3 solution | (approx. 300 tests)<br>3 x Liquid reagent / 15 ml<br>1 x Liquid reagent / 15 ml<br>2 x Liquid reagent / 15 ml | 471056 |
| DPD No. 1 buffer solution | Liquid reagent / 15 ml | 471010 |
| DPD No. 1 reagent solution | Liquid reagent / 15 ml | 471020 |
| DPD No. 3 solution | Liquid reagent / 15 ml | 471030 |

CL 10

## Chlorine HR with DPD Tablet
## 0.1 – 10 mg/l

**a) free Chlorine**

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Remove the vial from the sample chamber and **empty it**, **leaving a few drops remaining in the vial**.

Add **one DPD No. 1 HR tablet** straight from the foil to the water sample and crush the tablet using a clean stirring rod.

Add the water sample to the 10 ml mark.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.

CL 10

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l free Chlorine.

**b) total Chlorine**

Add **one DPD No. 3 HR tablet** straight from the foil to the same water sample and crush the tablet using a clean stirring rod.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

! Zero Test

**Wait for a reaction period of 2 minutes.**
(Countdown can be activated, see page 33)

CL 10

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l total Chlorine.

**c) combined Chlorine**

combined Chlorine = total Chlorine – free Chlorine

**Tolerances:**

0 – 2 mg/l: ± 0.1 mg/l
> 2 – 4 mg/l: ± 0.3 mg/l
> 4 – 8 mg/l: ± 0.4 mg/l
> 8 – 10 mg/l: ± 0.5 mg/l

**Notes:**

1. Vial cleaning:
   As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the subsequent determination of Chlorine may show lower results. To avoid any measurement errors, only use glassware free of Chlorine demand.
   Preparation: Put all applicable glassware into Sodium hypochlorite solution (0.1 g/l) for one hour, then rinse all glassware thoroughly with deionised water.
2. Preparing the sample:
   When preparing the sample, the lost of Chlorine, e.g. by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
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 be adjusted between pH 6 and pH 7 before the reagent is added (use 0.5 mol/l Sulfuric acid resp. 1 mol/l Sodium hydroxide).
4. Turbidity (can lead to errors):
   Very high levels of calcium hardness (>1000 mg/l $CaCO_3$) may lead to turbidity when performing the test. If this occurs add one EDTA tablet to 10 ml of the water sample prior to run the test.
5. Oxidising agents such as Bromine, Ozone etc. interfere as they react in the same way as Chlorine.

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| DPD No. 1 HR | Tablet / 100 | 511500BT |
| DPD No. 3 HR | Tablet / 100 | 511590BT |

PH

## pH-value with Tablet
## 6.5 – 8.4

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Add **one PHENOL RED PHOTOMETER tablet** straight from the foil to the 10 ml water sample and crush the tablet using a clean stirring rod.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.

PH

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display as pH-value.

**Tolerance:** ± 0.1 pH

**Notes:**

1. For photometric determination of pH-values only use PHENOL RED tablets in black printed foil pack and marked with PHOTOMETER.
2. Water samples with low values of Alkalinity-m (below 35 mg/l $CaCO_3$) may give wrong pH readings.
3. pH-values below 6.5 and above 8.4 can produce results inside the measuring range. A plausibility test (pH-meter) is recommended.
4. The accuracy of the colorimetric determination of pH-values depends on various boundary conditions (buffer capacity of the sample, salt contents etc.).
5. Salt error
   Correction of test results (average values) for samples with salt contents of:

| Indicator | Salt contents | | |
|---|---|---|---|
| Phenol red | 1 molar<br>– 0.21 | 2 molar<br>– 0.26 | 3 molar<br>– 0.29 |

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

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| PHENOL RED PHOTOMETER | Tablet / 100 | 511770BT |

PH

## pH-value with liquid reagent
## 6.5 – 8.4

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Fill the vial with drops of the same size by holding the bottle vertically and squeeze slowly:

**6 drops of PHENOL RED solution**.

Close the vial tightly with the cap and invert several times to mix the contents.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero / Test

Press the [ZERO/TEST] key.

PH

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display as pH-value.

**Tolerance:** ± 0.2 pH

**Notes:**

1. When testing chlorinated water the residual chlorine contents can influence the colour reaction of the liquid reagent. This can be avoided (without interfering with the pH measurement) by adding a small crystal of Sodiumthiosulfate ($Na_2S_2O_3 \cdot 5\ H_2O$) to the sample before adding the PHENOL RED solution. PHENOL RED tablets already contain Thiosulfate.
2. Due to differing drop sizes results can show a discrepancy in accuracy by comparison with tablets. This can be minimised by using a pipette (0.18 ml PHENOL RED solution is equivalent to 6 drops).
3. After use replace the bottle cap securely.
4. **Store the reagent in a cool, dry place ideally between 6 °C and 10 °C.**

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| PHENOL RED solution | Liquid reagent / 15 ml | 471040 |

CyA

## CyA-TEST (Cyanuric acid) with Tablet 0 – 160 mg/l

0.0.0

Fill a clean vial (24 mm Ø) with **5 ml of the water sample** and **5 ml deionised water** (Note 1) and perform zero calibration (see "Operation").

Add **one CyA-TEST tablet** straight from the foil to the prepared water sample and crush the tablet using a clean stirring rod.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved (Notes 2, 3).

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.

CyA

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l Cyanuric acid.

**Tolerances:**

0 – 50 mg/l: ± 10 mg/l
> 50 – 100 mg/l: ± 15 mg/l
> 100 – 160 mg/l: ± 20 mg/l

**Notes:**

1. Use deionised water or tap water free of Cyanuric acid.
2. If Cyanuric acid is present a cloudy solution will occur.
   Small single particles are not necessarily caused by Cyanuric acid.
3. Dissolve the tablet completely (therefore swirl the vial approx. 1 minute).
   Un-dissolved particles of the tablet can cause results that are too high.

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| CyA-TEST | Tablet / 100 | 511370BT |

tA

## Alkalinity-m with Tablet
## 5 – 200 mg/l

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Add **one ALKA-M-PHOTOMETER tablet** straight from the foil to the 10 ml water sample and crush the tablet using a clean stirring rod.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.

Place the vial in the sample chamber making sure that the ╳ marks are aligned.

Zero / Test

Press the [ZERO/TEST] key.

tA

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l $CaCO_3$.

**Tolerance:** ± 5 % (full scale)

**Notes:**

1. The terms total Alkalinity, Alkalinity-m, m-Value and Alkalinity to pH 4.3 are identical.
2. For accurate results exactly 10 ml of water sample must be taken for the test.
3. Conversion table:

| | Acid demand to pH 4.3 DIN 38 409 ($K_{S4.3}$) | German °dH* | English °eH* | French °fH* |
|---|---|---|---|---|
| 1 mg/l $CaCO_3$ | 0.02 | 0.056 | 0.07 | 0.1 |

*Carbonate hardness (reference = Hydrogencarbonate-anions)

Example:
10 mg/l $CaCO_3$ = 10 mg/l · 0.056 = 0.56 °dH
10 mg/l $CaCO_3$ = 10 mg/l · 0.02 = 0.2 mmol/l

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| ALKA-M-PHOTOMETER | Tablet / 100 | 513210BT |

CAH

## Hardness, Calcium with Tablet
## 0 – 500 mg/l

0.0.0

Fill a clean vial (24 mm Ø) with **10 ml of the water sample** and perform zero calibration (see "Operation").

Add **one CALCIO H No. 1 tablet** straight from the foil to the water sample and crush the tablet using a clean stirring rod. Dissolve the tablet completely.

Add **one CALCIO H No. 2 tablet** straight from the foil to the same water sample and crush the tablet using a clean stirring rod.

Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved completely.

Place the vial in the sample chamber making sure that the ⧖ marks are aligned.

! Zero/Test

**Wait for a reaction period of 2 minutes.**
(Countdown can be activated, see page 33)

CAH

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display in mg/l $CaCO_3$.

**Tolerances:**

0 – 250 mg/l: ± 5 % (full scale)
251 – 500 mg/l: ± 10 % (full scale)

**Notes:**

1. Strong alkaline or acidic water samples must be adjusted to a pH-value between pH 4 and 10 before the tablets are added (use 1 mol/l Hydrochloride acid resp. 1 mol/l Sodium hydroxide).
2. Due to the accuracy of this method the result is rounded (in steps of 10 mg/l $CaCO_3$).
3. The tolerance of the method is increasing with higher concentrations. When diluting samples, this should be taken in account, always measuring in the first third of the range.
4. Interferences:
   - Magnesium hardness up to 200 mg/l $CaCO_3$ does not interfere.
   - Iron concentration above 10 mg/l may cause low results.
   - Zinc concentration above 5 mg/l may cause high results.
5. For highest accuracy a batch related user calibration can be performed.

| Reagent | Form of reagent/Quantity | Order-No. |
|---|---|---|
| **Set**<br>CALCIO H No. 1 / No. 2 | Tablet / per 100<br>inclusive stirring rod | 517761BT |

## Menu selections




Press the [MODE] key and **hold**.

Switch the unit on using the [ON/OFF] key.
Allow the 3 decimal points to be displayed before releasing the [MODE] key.

The [!] key allows for selection of the following menu points:




1 diS recall stored data

1 Prt printing stored data

2 3 setting the date and time

4 user calibration

The selected menu is indicated by an arrow in the display.




## 1 diS – Recall of stored data




After confirming the selection with the [MODE] key the photometer shows the last 16 data sets in the following format (automatically proceeds every 3 seconds until result is displayed):

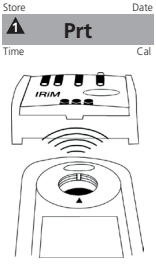
| | |
|---|---|
| Number | n xx (xx: 16...1) |
| Year | YYYY (e.g. 2014) |
| Date | mm.dd (monthmonth:dayday) |
| Time | hh:mm (hourhour:minuteminute) |
| Test | Method |
| Result | x,xx |




The [ZERO/TEST] key repeats the current data set.

The [MODE] key scrolls through all stored data sets.

Quit the menu by pressing [!] key.




## 1 Prt – Transmitting stored data (to Printer or PC)

**Note:** To print data, or to transmit to a PC, the optional IRiM (Infrared Interface Module) is required.

The IRiM Module and the connected printer/PC must be ready. Press the [MODE] key to start the transmitting, the instrument displays "PrtG" (Printing) for approx. 1 second followed by the number of the first data set and its transmission. All data sets will be transmitted one after the other. After finishing the instrument switches to test mode.

The print job can be cancelled by pressing the [On/Off] key. The instrument switches off.



E 132

If the instrument is not able to communicate with the IRiM, a timeout occurs after approx. 2 minutes. The error E 132 is displayed for approx. 4 seconds. Subsequently, the instrument switches to test mode (see also IRiM manual).




Mode

SET
DATE
YYYY
(2 sec.)

## 2 3 Setting date and time (24-hour-format)

After confirming the selection with the [MODE] key the value to be edited will be shown for 2 sec.

The setting starts with the year (YYYY) followed by the actual value to be edited. The same applies for month (mm), day (dd), hour (hh) and minutes (mm). Set the minutes first in steps of 10, press the [!] key to continue setting the minutes in steps of 1.

Mode

Increase the value by pressing the [MODE] key.

Zero Test

Decrease the value by pressing [ZERO/TEST] key.

!

Proceed to the next value to be edited by pressing [!] key.

After setting the minutes and pressing the [!] key the display will show "IS SET" and the instrument returns to the measurement mode.




cAL
CAL

## 4 User calibration

**Note:**

user calibration (Display in calibration mode)

factory calibration (Display in calibration mode)

CAL
METHOD

After confirming the selection with the [MODE] key the instrument will show CAL/"Method".
Scroll through methods using the [MODE] key.

Fill a clean vial with the standard up to the 10 ml mark, screw the cap on and place the vial in the sample chamber making sure that the ⧖ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.

METHOD

The method symbol flashes for approx. 8 seconds.

0.0.0

The display shows the following in alternating mode:

CAL

Perform calibration with a standard of known concentration (see "Operation").

Zero Test

Press the [ZERO/TEST] key.

METHOD

The method symbol flashes for approx. 3 seconds.

RESULT

The result is shown in the display, alternating with CAL.

CAL

If the reading corresponds with the value of the calibration standard (within the specified tolerance), exit calibration mode by pressing the [ON/OFF] key.

Changing the displayed value:




Pressing the [MODE] key once increases the displayed value by 1 digit.




Pressing the [ZERO/TEST] key once decreases the displayed value by 1 digit.

CAL

Press the corresponding key until the reading equals the value of the calibration standard.

RESULT + x




By pressing the [ON/OFF] key, the new correction factor is calculated and stored in the user calibration software.

: :

Confirmation of calibration (3 seconds).

**Note:** Seperate calibration of the measuring range for Bromine is not possible. The unit uses the calibration for the Chlorine measuring range (CL 6).

## Factory calibration reset

Resetting the user calibration to the original factory calibration will reset all methods and ranges.




A user calibrated method is indicated by an arrow while the test result is displayed.




To reset the calibration press both the [MODE] and [ZERO/TEST] key and **hold**.




Switch the unit on using the [ON/OFF] key.
Release the [MODE] and [ZERO/TEST] keys after approx. 1 second.

The following messages will appear in turn on the display:




The factory setting is active.
(SEL stands for Select)

**or:**




Calibration has been set by the user.
(If the user calibration is to be retained, switch the unit off using the [ON/OFF] key).




Calibration is reset to the factory setting by pressing the [MODE] key.




The following messages will appear in turn on the display:




Switch the unit off using the [ON/OFF] key.

## Technical Data

| | |
|---|---|
| Instrument | triple wavelength, automatic wavelength selection, direct reading colorimeter |
| Light source: | LEDs, interference filters (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF:<br>530 nm $\Delta\lambda$ = 5 nm<br>560 nm $\Delta\lambda$ = 5 nm<br>610 nm $\Delta\lambda$ = 6 nm |
| Wavelength accuracy | ± 1 nm |
| Photometric accuracy* | 3% FS (T = 20° C – 25° C) |
| Photometric resolution | 0.01 A |
| Power supply | 4 batteries (AAA/LR 03) |
| Operating time | 17hr operating time or 5000 test measurements in continuous mode when display backlight is off |
| Auto-OFF | automatic switch off<br>10 minutes after last keypress |
| Display | backlit LCD (on keypress) |
| Storage | internal ring memory for 16 data sets |
| Interface | IR interface for data transfer |
| Time | real time clock und date |
| Calibration | user and factory calibration<br>resetting to factory calibration possible |
| Dimensions | 155 x 75 x 35 mm (LxWxH) |
| Weight | approx. 260 g (incl. batteries) |
| Ambient conditions | temperature: 5–40°C<br>rel. humidity: 30–90% (non-condensing) |
| Waterproof | floating; as defined in IP 68 (1 hour at 0.1 meter) |
| CE | Certificate for Declaration of CE-Conformity at www.lovibond.com |

**measured with standard solutions*

To ensure maximum accuracy of test results, always use the reagent systems supplied by the instrument manufacturer.

## Operating messages

| | |
|---|---|
| **HI** | Measuring range exceeded or excessive turbidity. |
| **Lo** | Result below the lowest limit of the measuring range. |
| | Replace batteries, no further tests possible. |
| **btLo** | Battery capacity is too low for the display backlight; measurement is still possible. |
|   | A user calibrated method is indicated by an arrow while the test result is displayed (see "Factory calibration reset"). |

## Error codes

| | |
|---|---|
| **E27 / E28 / E29** | Light absorption too great. Reasons: e.g. dirty optics. |
| **E 10 / E 11** | Calibration factor "out of range" |
| **E 20 / E 21** | Too much light reaching the detector. |
| **E23 / E24 / E25** | Too much light reaching the detector. |
| **E 22** | Battery capacity was too low during measurement. Change battery. |

| | |
|---|---|
| **E 70** | CL 6: Factory calibration incorrect / erased |
| **E 71** | CL 6: User calibration incorrect / erased |
| **E 72** | CL 10: Factory calibration incorrect / erased |
| **E 73** | CL 10: User calibration incorrect / erased |
| **E 76** | pH: Factory calibration incorrect / erased |
| **E 77** | pH: User calibration incorrect / erased |
| **E 78** | CyA: Factory calibration incorrect / erased |
| **E 79** | CyA: User calibration incorrect / erased |
| **E 80** | tA: Factory calibration incorrect / erased |
| **E 81** | tA: User calibration incorrect / erased |
| **E 82** | CAH: Factory calibration incorrect / erased |
| **E 83** | CAH: User calibration incorrect / erased |

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