GB 3 in 1 Photometer Cl* pH* Cys

* with liquid reagents

● Operation

ON/OFF — Switch the unit on using the ON/OFF switch.

Cl — The display shows the following:

Mode — Select the test required using the MODE key:
Cl → pH → Cys → Cl → ..... (Scroll)

METHOD — The display shows the following:

Fill a clean vial with the water sample up to the 10 ml mark, replace the cap tightly and place the vial in the sample chamber with the Δ-mark on the vial aligned with the ∇–mark on the instrument.

Zero/Test — Press the ZERO/TEST key.

METHOD (flashing) — The method symbol flashes for approx. 3 seconds.

0.0.0 — The display shows the following:

After zero calibration is completed, remove the vial from the sample chamber.
Add the appropriate liquid reagent; a colour will develop in the sample.
Replace the cap tightly and place the vial in the sample chamber with the Δ and ∇ marks aligned.

Zero/Test — Press the ZERO/TEST key.

METHOD (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The result appears in the display.

Repeating the analysis:
Press the ZERO/TEST key again.
New zero calibration:
Press the MODE key until the desired method symbol appears in the display again.

● User messages

EOI	Light absorption too great. Reasons: zero calibration not carried out or, possibly, dirty optics.
÷**Err** or **HI**	Measuring range exceeded or excessive turbidity.
-**Err** or **LO**	Result below the lowest limit of the measuring range.
LO BAT	Replace 9 V battery, no further analysis possible.

● Technical data

Light source:	LED, filter (λ = 528 nm)
Battery:	9 V-block battery (Life 600 tests).
Auto-OFF:	Automatic switch off 5 minutes after last keypress
Ambient conditions:	5-40°C rel. humidity (non-condensing).
CE:	DIN EN 55 022, 61 000-4-2, 61 000-4-8, 50 082-2, 50 081-1, DIN V ENV 50 140, 50 204

● Chlorine 0,05 - 4,0 mg/l with liquid reagent

(a) Free Chlorine

0.0.0 — Perform zero calibration (see "Operation").
Empty the vial. Hold the drip bottle vertically and add evenly sized drops to the vial by pressing slowly (6 drops of DPD 1 buffer solution, 2 drops of DPD 1 reagent solution). Add the water sample to the 10 ml mark, replace the cap tightly, swirl to mix, and replace the vial in the compartment making sure the ∇ and Δ marks are aligned.

Zero/Test — Press the ZERO/TEST key.

Cl (flashing) — 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 coloured test solution. Replace the cap tightly, swirl to mix, and put the vial back into the sample chamber, repositioning the ∇ and Δ marks.
Wait for a colour reaction time of two minutes.

Zero/Test — Press the ZERO/TEST key.

Cl (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The result is shown in the display in mg/l total chlorine.
Rinse the vial and cap thoroughly after each test.

(c) Combined Chlorine

Combined Chlorine = Total Chlorine - Free Chlorine

Tolerance: 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: see chem. method notes, chlorine 3.)

● pH-value 6,5 - 8,4 with liquid reagent

0.0.0 — Perform zero calibration (see "Operation").
Hold the drip bottle vertically and add evenly sized drops to the vial by pressing slowly 6 drops of PHENOLRED-solution. Replace the cap tightly and place the vial in the sample chamber making sure the Δ and ∇ marks are aligned.

Zero/Test — Press the ZERO/TEST key.

pH (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The pH value is shown in the display.
Rinse the vial and cap thoroughly after each test.

Tolerance: ± 0.2 pH

● Cyanuric Acid 2 - 160 mg/l

•Cys — The display shows the following:

Pour 5 ml of the water sample into a clean vial and fill with deionised water to the 10 ml mark. Replace the cap tightly and place the vial in the sample chamber with the ∇-mark on the vial aligned with the Δ-mark on the instrument.

Zero/Test — Press the ZERO/TEST key.

•Cys (flashing) — The method symbol flashes for approx. 3 seconds.

0.0.0 — The display shows the following:

Add a CYANURIC ACID tablet and mix well to dissolve the tablet using a clean stirring rod. The presence of cyanuric acid will cause the solution to take on a milky appearance. Replace the cap tightly and shake the vial for about 20 seconds. Replace the vial in the sample chamber making sure the Δ and ∇ marks are aligned.

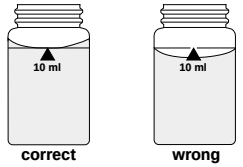
Zero/Test — Press the ZERO/TEST key.

•Cys (flashing) — The method symbol flashes for approx. 3 seconds.

RESULT — The result is shown in the display in mg/l cyanuric acid.

Tolerance: ± 10 mg/l

● Correct filling of the vial



● Troubleshooting: Guidelines for photometric measurements

1. Vials, caps and stirring rods should be cleaned thoroughly **after each analysis** to prevent errors being carried over. Even minor reagent residues can cause errors in the test results. Use the brush provided for cleaning.
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. 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 zero calibration and test with the Δ-mark on the vial aligned with the ∇–mark on the instrument.
5. Place the cover on the sample chamber for zero calibration and test.
6. Bubbles on the inside of the vial may also lead to errors. In this case, fit the vial with a clean stopper and remove bubbles by swirling the contents before starting test.
7. Avoid spillage of water or reagent solution in the sample chamber. If water should leak into the photometer housing, it can damage electronic components and cause corrosion.
8. Contamination of the windows over the light source and photo sensor in the sample chamber can result in errors. If this is suspected check the condition of the windows.
9. Large temperature differentials between the photometer and the operating environment can lead to incorrect measurement due to the formation of condensate in the area of the lens or on the vial (e.g).
10. To avoid errors caused by stray-light do not use the instrument in bright sunlight.

● Calibration Mode

Mode — Press MODE key and **keep it depressed**.

On/Off — Switch unit on using ON/OFF key.
Release MODE key after approx. 1 second.

CAL / Cl — Select the test required using the MODE key:
CAL Cl → CAL pH → CAL Cys → ..... (Scroll)

Zero/Test — Perform zero calibration (see "Operation").
Press the ZERO/TEST key.

METHOD — The method symbol flashes for approx. 3 seconds.

0.0.0 / CAL — The display shows the following in alternating mode:

Zero/Test — Place the calibration standard to be used in the sample chamber with the Δ and ∇ marks aligned.
Press the ZERO/TEST key.

METHOD — The method symbol flashes for approx. 3 seconds.

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

If the result displayed corresponds with the value of the calibration standard (within the tolerance quoted), exit calibration mode by pressing the ON/OFF key.

Mode / Zero/Test — Otherwise, 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 / RESULT + x — Pressing the relevant key until the displayed value equals the value of the calibration standard.

On/Off — 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

CAL — Factory calibration active.

cAL — Calibration has been set by the user.

● Recommended calibration values

Chlorine:	between 0,5 and 1,5 mg/l*
pH:	between 7,6 and 8,0*
Cyanuric acid:	between 30 and 60 mg/l

* or rather values mentioned in the reference standard kits

● User calibration : cAL
Manufacturing calibration : CAL

To reset the calibration to the factory setting:

Mode / Zero/Test — Press both the MODE and ZERO/TEST and **keep them depressed**.

On/Off — 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:

SEL / CAL — The calibration is reset to the factory setting.
(SEL stands for Select)

or:

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

Mode — Calibration is reset to the factory setting by pressing the MODE key. The following messages will appear in turn on the display:

SEL / CAL

On/Off — Switch the unit off using the ON/OFF key.

● User notes

E 10	Calibration factor "out of range"	
E 70	Cl:	Manufacturing calibration incorrect / erase
E 72	pH:	Manufacturing calibration incorrect / erase
E 74	Cys:	Manufacturing calibration incorrect / erase
E 71	Cl:	User calibration incorrect / erase
E 73	pH:	User calibration incorrect / erase
E 75	Cys:	User calibration incorrect / erase

● Chemical methods notes

● Chlorine

1. When taking samples, to minimise loss of chlorine, take care to avoid shaking or general aeration. Carry out the test immediately after sampling.
2. Colour development occurs at pH 6.3 – 6.5. The reagents contain a buffer to adjust to this range. Highly alkaline or acidic samples must however be neutralised before testing.
3. DPD Liquid reagent is formulated to measure in a concentration range of 0.05 - 4 mg/l. Any value displayed by the photometer which is above 4 mg/l is unrealistic. Chlorine concentrations above 4 mg/l can lead to low results due to bleaching of the colour. In these cases the sample should first be diluted with chlorine-free water and the test repeated - remember to multiply the result by the dilution factor.
4. As many household detergents (e.g. washing up liquid) have a chlorine demand, the subsequent determination of chlorine may give low results. In order to eliminate these errors we refer users to DIN 38 408 Part 4 Para 6.2:

   "The glass vessels should be free of substances with a chlorine demand. This can be achieved by storing them in a sodium hypochlorite solution (0.1 g/l) for 1 hour and then rinsing thoroughly with water."
5. After use replace the bottle caps securely noting the colour coding.
6. Store the reagent bottles in a cool, dry place ideally at between + 6°C and + 10°C.

● pH

1. When testing chlorinated water, the residual chlorine content can influence the colour reaction of the liquid reagent. This can be avoided without affecting the pH measurement process by adding a small crystal of sodium thiosulphate ($(Na_2S_2O_3 \times 5H_2O)$) to the sample before adding the PHENOLRED solution. PHENOLRED reagent tablets already contain thiosulphate.
2. Due to differing drop sizes, results can show a discrepancy of ± 0.2 pH units. This can be minimised by using a pipette (0.18 ml PHENOLRED solution is equivalent to 6 drops).
3. Seal the dropper bottle with the screw-on cap immediately after use to prevent evaporation of the solvent.
4. Store the reagent in a cool place at a temperature of between + 6°C and + 10°C.

● Cyanuric acid

The method on hand was developed from a gravimetric process for the determination of cyanuric acid. Based upon undefined edge conditions the deviations of the standard method may be greater.

● Method notes

Observe application options, analysis regulations and matrix effects of methods. Liquid reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
Material Safety Data Sheets: www.tintometer.de
Ensure proper disposal of reagent solutions.

Technical changes without notice
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