

# GB Photometer CI (Powder Pack) VARIO

## ● Operation



Switch the unit on using the ON/OFF switch.

CI

The display shows the following:

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 in the sample chamber with the Δ-mark on the vial aligned with the ∇-mark on the instrument.



Press the ZERO/TEST key.



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 reagent ; a colour will develop in the sample.

Screw the cap back on and place the vial in the sample chamber with the Δ and ∇ marks aligned.



Press the ZERO/TEST key.



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 ( $\lambda = 528 \text{ nm}$ )
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 0.01 - 2.0 mg/l with Powder Pack

0.0.0

### (a) Free Chlorine

Perform zero calibration (see "Operation"). Remove the vial from the sample chamber. Add a VARIO Chlorine FREE-DPD/F10-Powder Pack. Screw the cap on and shake the vial for 20 seconds. Replace the vial in the sample chamber immediately making sure the Δ and ∇ marks are aligned.



Press the ZERO/TEST key.

CI

The method symbol flashes for approx. 3 seconds.

RESULT

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

**Tolerance:** 0-1 mg/l:  $\pm 0.05 \text{ mg/l}$  ; > 1-2 mg/l:  $\pm 0.10 \text{ mg/l}$

### (b) Total Chlorine

Perform zero calibration (see "Operation"). Remove the vial from the sample chamber. Add a VARIO Chlorine TOTAL-DPD/F10-Powder Pack. Screw the cap on and shake the vial for 20 seconds. Replace the vial in the sample chamber making sure the Δ and ∇ marks are aligned.



**Wait for a colour reaction time of 3 minutes.**

Press the ZERO/TEST key.

CI

The method symbol flashes for approx. 3 seconds.

RESULT

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

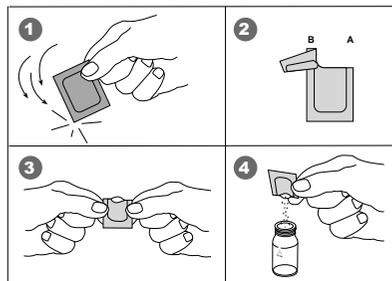
**Tolerance:** 0-1 mg/l:  $\pm 0.05 \text{ mg/l}$  ; > 1-2 mg/l:  $\pm 0.10 \text{ mg/l}$

### (c) Combined Chlorine

Combined Chlorine = Total Chlorine - Free Chlorine

**Rinse the vial and cap thoroughly after each test.**

## ● Opening Powder Packs



## ● Method notes

Consider applications, procedures and matrix effects (interferences). 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: [www.tintometer.de](http://www.tintometer.de)

## ● Chemical methods notes

### ● Chlorine

#### 1. Vial cleaning

As many household cleaners (e.g. dishwasher detergent) contain reducing substances, the use of such cleaners can create a chlorine demand of the glass ware and the following test for chlorine may show lower results.

In order to avoid a large chlorine demand, pretreat sample container and glass ware according to ISO 7393 / Part 1 and Part 2:

"The glass ware should be free of chlorine demand and used exclusively for this test (determination of free chlorine and total chlorine). Chlorine demand-free glass ware is obtained by soaking it in a sodium hypochlorite solution (0.1 g/l) for at least 1 hour and then rinsing thoroughly with deionized water."

N.B.: As an alternative to the sodium hypochlorite solution, the glass ware may be placed in chlorinated swimming pool water and then thoroughly rinsed with deionized water before use.

Do not use the same vials for free and total chlorine determination.

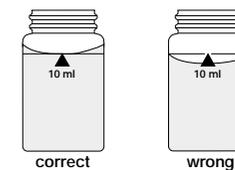
#### 2. Preparing the sample

When preparing the sample, the loss of chlorine, e.g. by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample. The DPD colour develops at a pH value of 6.5. The reagent therefore contain a buffer for the pH value adjustment. Strongly alkaline or acidic water must, however, be neutralised before the analysis.

#### 3. Exceeding of the measuring range

Concentrations above 10 mg/l of chlorine can produce results within the measuring range up to 0 mg/l. For exceeding the range, the water sample must be diluted with chlorine-free water and measured again.

## ● Correct filling of the vial



## ● Calibration Mode



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



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

**CAL**

The following messages appear in the display in alternating mode:



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

≡ **METHOD** ≡

The method symbol flashes for approx. 3 seconds.

**0.0.0**

The display shows the following in alternating mode:

**CAL**



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**

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

**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.



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**

Pressing the relevant key until the displayed value 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

**CAL**

Factory calibration active.

**cAL**

Calibration has been set by the user.

## ● Recommended calibration value

Chlorine: between 0,5 and 1,5 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:



Press both the MODE and ZERO/TEST and **keep them depressed**.



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**

The calibration is reset to the factory setting.

**CAL**

(SEL stands for Select)

**or:**

**SEL**

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

**cAL**



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

**SEL**

**CAL**



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 71**

Cl: User calibration incorrect / erase

## ● Troubleshooting: Guidelines for photometric measurements

1. Vials, stoppers 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. Fingerprints or droplets of water on the sides of the vial can result in errors.
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 graduations facing toward the housing mark.
5. Zero calibration and test must be carried out with the sample chamber lid closed.
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 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, for example, the formation of condensate in the area of the lens or on the vial.
10. To avoid errors caused by stray-light do not use the instrument in bright sunlight.