

● **Operation**



Switch the unit on using the "power" switch.

CI

This display shows the method.
If using the AQ2070 meter, press the "mode" key to select the analysis CL → CLP → CL.
If using a multi meter, press the "mode" key until the desired method is displayed.



The display shows the selected method.

Fill a clean vial with the sample up to the 10 ml mark, screw the cap on, and place in the sample chamber with the ∇ vial mark aligned with the Δ housing mark.



Press the "zero/test" key.



The method symbol flashes for approx. 3 seconds.

0.0.0

Confirms zero calibration.

After zero calibration is completed, remove the vial from the sample chamber.
The characteristic color starts to appear after the addition of the reagent tablet(s) (see "Method Preparation").
Cap the vial again and place in the sample chamber with the ∇ and Δ marks aligned.



Press the "zero/test" key.



The method symbol flashes for approx. 3 seconds.

RESULT

The result appears in the display.

Repeat the analysis:

Press the "zero/test" key once again.

New zero calibration:

Press the "mode" key until the desired method symbol appears in the display again.

● **User messages**

E01

Light absorption too great. Reason - e.g. soiled lens.

-Err

Measuring range exceeded or excessive turbidity.

-Err

Result below measuring range limit.

LO BAT

Replace 9 V battery immediately; no further analysis are possible.

● **Technical data**

Optics: LED: λ = 528 nm
 Battery: 9 V block battery (life = approx. 600 tests)
 Auto-OFF: Auto unit switch-off occurs approx. 5 minutes after a key was last pressed.
 Ambient conditions: 5-40°C
 30-90% rel. humidity (non-condensing)
 Compliance: 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 FCC Part 15 Class A
 ICES – 003 Issue 2

● **CL - Chlorine Tablets** 0.05 - 6.0 mg/l Method Preparation
For USEPA regulatory use, valid range 0.1 - 4.0 mg/l Cl

0.0.0

(a) Free Chlorine

Perform zero calibration (see "Operation").
Empty the vial and then add a DPD No. 1 tablet. Crush the tablet with a clean stir rod then add the sample to the 10 ml mark. Mix well with the stir rod to dissolve the tablet completely. Screw the cap on and replace the vial in the sample chamber 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.

(b) Total Chlorine

Remove the vial and add one DPD No. 3 tablet to the colored test solution. Mix to dissolve with the stir rod. Replace the cap and put the vial back into the sample chamber, re-align the Δ and ∇ marks.



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. Rinse the vial and cap thoroughly after each test.

(c) Combined Chlorine

Combined Chlorine = Total Chlorine - Free Chlorine

(d) Total Chlorine (using DPD No. 4)

If a reading of free chlorine is not required, total chlorine can be measured directly by using a DPD No. 4 tablet only.

0.0.0

Perform zero calibration (see "Operation").
Empty the vial and then add a DPD No. 4 tablet. Crush the tablet with a clean stir rod then add the sample to the 10 ml mark. Mix well with the stir rod to dissolve the tablet. Screw the cap on and replace the vial in the sample chamber 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 total chlorine.

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

● **Calibration Standards**

Use Orion AC2073 Chlorine Standards.

● **CLP - Chlorine Powders** 0 - 2.0 mg/l Method Preparation
For USEPA regulatory use, valid range 0.1 - 2.0 mg/l Cl

0.0.0

(a) Free Chlorine

Perform zero calibration (see "Operation").
Use the same vial with 10 ml of sample from the zero calibration. Take one Chlorine Free DPD Powder Pack, tap down gently and tear open in the direction of the text. Add the contents to the sample vial. Screw the cap onto the vial tightly and swirl vigorously to dissolve the powder. **Immediately** replace the vial in the sample chamber making sure the Δ and ∇ marks are aligned.



Press the "zero/test" key.

CLP

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: ± 0.05 mg/l ; > 1-2 mg/l: ± 0.10 mg/l

(b) Total Chlorine

0.0.0

Perform zero calibration (see "Operation").

Use the same vial with 10 ml of sample from the zero calibration. Take one Chlorine Total DPD Powder Pack, tap down gently and tear open in the direction of the text. Add the contents to the sample vial. Screw the cap onto the vial tightly and swirl vigorously to dissolve the powder. Immediately replace the vial in the sample chamber making sure the Δ and ∇ marks are aligned.

Wait for a color reaction time of two minutes.



Press the "zero/test" key.

CLP

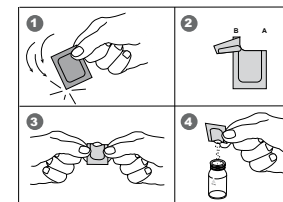
The method symbol flashes for approx. 3 seconds.

RESULT

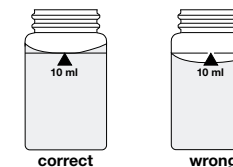
The result is shown in the display in mg/l total chlorine.

Tolerance: 0-1 mg/l: ± 0.05 mg/l ; > 1-2 mg/l: ± 0.10 mg/l

● **Opening Powder Packs**



● **Correct filling of the vial**



correct

wrong

● Calibration mode



Switch to CL mode and power off the unit.



Press and hold "mode" key.



Switch unit on using "power" key.
Release "mode" key after approx. 1 second.

CAL

These messages will alternate in the display.
If necessary, press "mode" key until the desired method alternates with CAL, CL → CLP → CL.

METHOD



Perform zero calibration as described.
Press the "zero/test" key.

METHOD

The method symbol flashes for approx. 3 seconds.

0.0.0

These messages will alternate in the display.

CAL

Place the standard to be used in the sample chamber with the ▽ and ▲ marks aligned (see "Method Preparation"). 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 corresponds to the value of the standard used (within the allowed tolerance), exit calibration mode by pressing the "power" key.



Pressing the "mode" key once increases the displayed result by 1 digit.



Pressing the "zero/test" key once decreases the displayed result by 1 digit.

CAL

Continue pressing the keys until the displayed result corresponds to the value of the standard used.

RESULT + X



If you press the "power" key twice, the new correction factor is calculated and stored in the user calibration level.

: : Confirms calibration (3 seconds).

● Note

CAL

Factory calibration active.

cAL

Calibration has been set by the user.

● Recommended calibration value

Chlorine (tablets): between 0.5 and 4.0 mg/l Cl₂

Chlorine (powders): between 0.5 and 1.5 mg/l Cl₂

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● User calibration : cAL Factory calibration : CAL



The unit can be reset to the factory calibration as follows:



Press and hold both "mode" and "zero/test" together.

Switch the unit on using the "power" key. Release "mode" and "zero/test" keys after approx. 1 second.

The following messages will alternate in the display.

SEL

The unit is reset to factory settings.
(SEL stands for Select)

CAL

or:

SEL

The unit operates with a calibration performed by the user. (If the user calibration is to be retained, switch the unit off using the "power" key.)

cAL



Factory calibration is activated by pressing the "mode" key. The following messages will alternate in the display:

SEL

CAL



Switch the unit off using the "power" key.

● User notes

E 10

Calibration factor "out of range"

E 70

Factory calibration incorrect / deleted

E 71

User calibration incorrect / deleted

Technical changes without notice.
Printed in Germany.

● Chemical method notes - Chlorine

1. Preparing the sample:

When preparing the sample, the escape of chlorine gases, e.g. by pipetting or shaking must be avoided. The analysis must take place immediately after sampling. The DPD color development is carried out with a pH value of 6.5, therefore the reagent contains a buffer. Strongly alkaline or acidic samples must be neutralized before analysis.

2. Exceeding the measurement range:

Concentrations above the range may produce incorrect results. If so, dilute with chlorine demand-free water and repeat the measurement.

● Method notes

Observe application options, analysis regulations and matrix effects of methods. Reagent tablets are designed for use in chemical analysis only and should be kept well out of the reach of children.

If necessary, request material safety data sheets.

Ensure proper disposal of reagent solutions.

● Avoiding errors in photometric measurements

1. Thoroughly clean vials, caps and stir rod **after each analysis** in order to prevent carry-over errors. Even minute reagent residues lead to incorrect measurements. Use the supplied brush for cleaning.
2. Ensure that the outer walls of the vials are dry and clean before performing the analysis. Fingerprints or water droplets on the light entry surfaces of the vials lead to incorrect measurements.
3. "Zero calibration" and "Test" must be performed using the same vial, since different vials can possess slightly different tolerances.
4. For "Zero calibration" and "Test", ensure that the vial is always positioned in the sample chamber in such a way that the graduation with the white triangle points toward the marking on the housing.
5. Always perform "Zero calibration" and "Test" with capped vials.
6. Bubbles on the inside walls of the vial lead to incorrect measurements. To prevent this, cap the vial and remove the bubbles by swirling the vial before performing the test.
7. You must prevent water from penetrating into the sample chamber. The entry of water into the housing of the photometer can destroy electronic components and lead to corrosion damage.
8. Soiling of the lens (LED and photosensor) in the sample chamber leads to incorrect measurements. Check - and if necessary clean - the light entry surfaces of the sample chamber at regular intervals. Clean using a moist cloth and cotton balls.
9. Always add the reagent tablets to the sample straight from the foil without touching them with your fingers.
10. Major temperature differentials between the photometer and the environment can lead to incorrect measurements - e.g. due to the formation of condensate in the area of the lens or on the vial. Specified tolerances at T = 20 °C.
11. For best results pipette samples.