

# DIT-L Photometer

Installation and operating instructions



Other languages

<http://net.grundfos.com/qr/i/95727435>



Material safety data sheets

<http://net.grundfos.com/qr/i/98351242>

## Original installation and operating instructions

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**Warning**

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

## 1. Symbols used in this document

**Warning**

If these safety instructions are not observed, it may result in personal injury.

**Caution**

If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

**Note**

Notes or instructions that make the job easier and ensure safe operation.

## 2. General safety instructions

**Warning**

Reagents are formulated exclusively for chemical analysis and must not be used for any other purpose. Reagents must not get into the hands of children. Some of the reagents contain substances which are not entirely harmless environmentally.

Be aware of the ingredients and take proper care when disposing of the test solution.

**Warning**

Read the method description completely before performing the test. Be aware of the risks of using the required reagents by reading the MSDS (Material Safety Data Sheets). Failure could result in serious injury to the operator or damage to the photometer.

Material Safety Data Sheets are available on [www.grundfos.com](http://www.grundfos.com)

The accuracy of the photometer is only valid if the photometer is used in an environment with controlled electromagnetic disturbances according to DIN 61326.

**Caution**

Wireless devices, for example wireless phones, must not be used near the photometer.

## 3. General information

These installation and operating instructions contain all information important for users of the DIT-L compact photometers.

Should you require further information, or should you encounter problems that are not described in sufficient depth in this manual, please contact Grundfos.

### 3.1 Delivery contents

Inspect all items carefully to ensure that every part of the list below is present and no visible damage has occurred during shipment.

If there is any damage or missing items, please contact your local distributor immediately.

A DIT-L standard delivery comprises:

- 1 photometer in a plastic case
- 4 batteries (type AAA/LR03)
- 1 installation and operating instructions
- 1 certificate of compliance
- 3 round vials with cap and gasket, Ø24
- 1 stirring rod, plastic
- 1 cleaning brush
- 1 starter kit (100 tablets each: *DPD No. 1*, *DPD No. 3*, *Glycine*, *Phenol red photometer*).

### 3.2 Applications

The DIT-L compact photometer is suitable for quick analysis of the concentration of chlorine, chlorine dioxide or ozone and of the pH value in water-treatment monitoring.

Fields of application:

- drinking water treatment
- swimming pool and bathing water treatment
- water treatment in general.

### 3.3 Avoidance of danger



#### Warning

Do not dismantle the photometer components!  
Cleaning, maintenance and repair must only be carried out by authorised personnel.

If safe operation cannot be ensured any longer, the DIT-L compact photometer is to be taken out of service and safeguarded against unintentional operation. This is the case under the following circumstances:

- The DIT-L compact photometer has visible damage.
- The DIT-L compact photometer seems to be inoperative.
- After a long storage time under unfavourable circumstances.

### 3.4 Nameplate

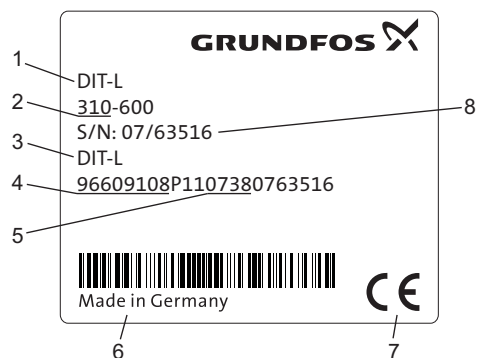


Fig. 1 Nameplate of DIT-L

Pos.	Description
1	Type designation
2	Model
3	Product name
4	Product number
5	Year and week of production
6	Country of origin
7	Marks of approval, CE mark etc.
8	Serial number

### 4. Technical data

Display	LCD, backlit when a key is pressed
Light source	2 LEDs, interference filter (IF) and photosensors arranged in pairs in a transparent measurement chamber. Wavelength ranges: $\lambda_1 = 530 \text{ nm}$ (IF $\Delta\lambda = 5 \text{ nm}$ ) $\lambda_2 = 560 \text{ nm}$ (IF $\Delta\lambda = 5 \text{ nm}$ )
Wavelength accuracy	$\pm 1 \text{ nm}$
Photometric accuracy	3 % FS (full scale, $T = 20 \text{ }^\circ\text{C} - 25 \text{ }^\circ\text{C}$ ), measured with standard solutions
Photometric resolution	0.01 A
Operating panel	acid and solvent-resistant touch-sensitive keypad with acoustic signal
Power supply	4 batteries (AAA/LR03); lifetime approx. 5000 tests
Auto OFF	10 minutes after a key was last pressed
Storage capacity	internal ring memory for 16 data sets
Interface	IR interface for data transfer
Time	real-time clock and date
Calibration	user and factory calibration; resetting to factory calibration possible.
Dimensions	155 x 75 x 35 mm (L x W x H)
Weight	approx. 260 g (batteries included)
Dimensions packed	440 x 305 x 145 mm (L x W x H)
Weight packed	1860 g
Operating conditions	5-40 $^\circ\text{C}$ ; relative humidity: 30-90 % (not condensing)
Permissible storage temperature	-20 to +70 $^\circ\text{C}$
Enclosure class	IP67

To ensure maximum accuracy of test results, always use the reagent systems supplied by Grundfos. See section [7.2 Table of methods and reagents](#).

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## 5. Commissioning

### 5.1 Replacement of batteries

Although the screws are dismantled, the battery compartment cover provides resistance against opening due to the special sealing.

**Caution**

For opening don't use tools, which can cause damage to the device!

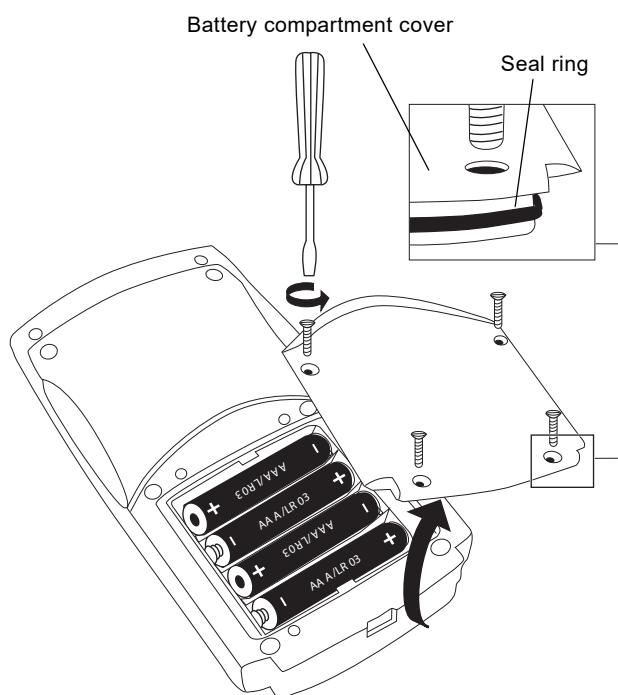


Fig. 2 Replacement of batteries (back)

To ensure that the photometer is waterproof, the seal ring must be in position and the battery compartment cover must be fixed with the four screws.

**Caution**

If the batteries are removed for more than one minute, the date and time menu will start automatically when the photometer is switched on again. See section [6.8.3 Setting date and time \(24-hour format\)](#).

**Note**

EC guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of together with ordinary domestic waste.

## 6. Operation

**Note**

White display texts are place holders for selected method names or displayed results.

### 6.1 Start

**On/Off**

Switch on the unit using the [On/Off] key.

**METHOD**

"METHOD" appears in the display.

**Mode**

Select the required test method using the [Mode] key.

To avoid unnecessary scrolling for the required test method, the photometer has a Scroll Memory (SM) function memorising the latest method used before being switched off.

When the photometer is switched on again, the scroll list comes up with the last used test method first.

### 6.2 Zero setting

**METHOD**

appears in the display.

Fill a clean vial with the water sample up to the 10 ml mark, screw the cap on and place the vial correctly in the sample chamber. See [fig. 3](#).

**Zero/Test**

Press the [Zero/Test] key. See also section [6.4 OTZ \(One Time Zero\)](#).

**METHOD**

The method symbol flashes for approx. 8 seconds.

**0.0.0**

"0.0.0" appears in the display.

### 6.3 Test

After completing zero setting, 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 it correctly in the sample chamber. See [fig. 3](#).

**Zero/Test**

Press the [Zero/Test] key. See also section [6.7 Countdown/reaction period](#).

**METHOD**

The method symbol flashes for approx. 3 seconds.

The result appears in the display.

The result is saved automatically.

**Zero/Test**
**Repeating the test:**

Press the [Zero/Test] key again.

### 6.4 OTZ (One Time Zero)

The zero setting is held in memory until the photometer is switched off. It is not necessary to perform a new zero setting every 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 at any time, if necessary.

**Zero/Test**
**Repeating the zero setting:**

Press the [Zero/Test] key for 2 seconds.

### 6.5 Display backlight

**!**

To turn the display backlight on or off, press the [!] key. The backlight is switched off automatically during the measurement.

### 6.6 Recall of stored data

**!**

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

### 6.7 Countdown/reaction period

If a reaction period is included in a method (total chlorine, ozone), a countdown function can be used:

**!**

Press the [!] key and hold it.

**Zero/Test**

Press the [Zero/Test] key.

Release the [!] key; the countdown starts.




After the countdown is finished, the measurement will start automatically.

It is possible to interrupt the countdown by pressing the [Zero/Test] key. Measurement will start immediately.


**Caution**

An incomplete reaction period can lead to incorrect test results!


## 6.8 Menu selection

-  Press the [Mode] key and hold it.
-  Switch on the unit using the [On/Off] key. Allow the three decimal points to be displayed before releasing the [Mode] key.
-  The [!] key allows for selection of the following menu points:

 Recalling stored data


 Transmitting stored data to a PC (printing)




 Setting date and time

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

### 6.8.1 diS - Recalling stored data



-  After confirming the selection using the [Mode] key the photometer shows the last 16 data sets in the following format (automatically proceeding every 3 seconds until the result is displayed):
  - number: xx (16...1)
  - year: YYYY (e.g. 2010)
  - date: MM.dd (monthmonth.dayday)
  - time: hh:mm (hourhour:minute) minute)
  - method
  - result: x.xx


-  To repeat the current data set, press the [Zero/Test] key.
-  To scroll through all stored data sets, press the [Mode] key.
-  To quit the menu, press the [!] key.

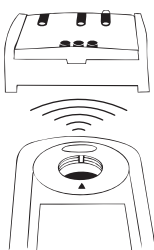
### 6.8.2 Prt - Transmitting stored data (to a PC)




**Caution**

Transmitting data to a PC requires the optional DIT-IR (Infrared Interface Module). Standard Baud rate of DIT-L is 9600 and can not be changed.

-  **PrtG** The DIT-IR module and the connected PC must be ready. Press the [Mode] key to start the transmission. The photometer will display "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 photometer switches to test mode.




-  To cancel the print job, press the [On/Off] key. The photometer switches off.
- If the photometer is not able to communicate with the DIT-IR, a time-out occurs after approx. 2 minutes. The error "E 132" will be displayed for approx. 4 seconds. Subsequently, the photometer switches to test mode. See also the DIT-IR installation and operating instructions.




**E 132**

### 6.8.3 Setting date and time (24-hour format)



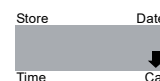
-  After confirming the selection using the [Mode] key, the value to be edited will be shown for 2 seconds.

**SET** 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, then press the [!] key to continue setting the minutes in steps of 1.



-  To increase the value, press the [Mode] key.
-  To decrease the value, press the [Zero/Test] key.
-  To proceed to the next value to be edited, press the [!] key.

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


### 6.8.4 User calibration



**Note:**

- CAL** User calibration (display in calibration mode)
- CAL** Factory calibration (display in calibration mode)
- CAL** After confirming the selection using the [Mode] key, the display will show "CAL" and "METHOD" alternately.
-  To scroll through methods, use the [Mode] key. Fill a clean vial with the Reference Standard reagent up to the 10 ml mark, screw the cap on and place the vial correctly in the sample chamber. See fig. 3.
-  Press the [Zero/Test] key.
- METHOD** The method symbol flashes for approx. 8 seconds.
- 0.0.0** The display shows zero confirmation "0.0.0" and "CAL" alternately.

Perform calibration with a Reference Standard reagent of known concentration, as described in the selected method.



-  Press the [Zero/Test] key.

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

**RESULT** "RESULT" appears in the display, alternating with "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:**

-  To increase the displayed value by 1 digit, press the [Mode] key once.
-  To decrease the displayed value by 1 digit, press the [Zero/Test] key once.

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

**CAL** To calculate the new correction factor and store it in the user calibration software, press the [On/Off] key.

**Cal** Confirmation of the calibration (3 seconds) appears in the display.

**Caution**

A separate calibration of the chlorine dioxide and ozone measuring ranges is not possible. The calibration of the chlorine measuring range is used as a reference.

**6.8.5 Resetting to factory calibration**

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

A user-calibrated method is indicated by an arrow pointing to "Cal" while the test result is displayed.



To reset the calibration, proceed as follows:

Press both the [Mode] and [Zero/Test] keys and hold.



Switch on the photometer using the [On/Off] key.



Release the [Mode] and [Zero/Test] keys after approx. 1 second.

The following messages will appear in the display alternately:

**SEL**

The factory setting is active.

**CAL**

("SEL" means 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**

To reset the calibration to the factory setting, press the [Mode] key for all methods simultaneously.

**Mode****SEL**

"SEL" and "CAL" appear in the display alternately.

**CAL****On/Off**

Switch the unit off using the [On/Off] key.

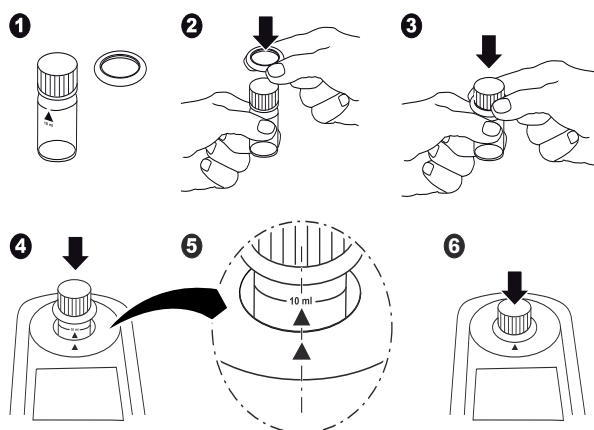
**7. Methods****7.1 Important notes****7.1.1 Guidelines for photometric measurements**

- Vials, caps and stirring rods should be cleaned thoroughly after each analysis to prevent interferences. Even minor reagent residues can cause errors in the test result.
- The outside of the vial must be clean and dry before starting the analysis. Fingerprints or other marks on the vials will lead to incorrect measurements.
- Zero setting and test must be carried out with the same vial, as there may be slight differences in optical performance between vials.
- The vials must be positioned in the sample chamber for zeroing and test with the mark on the vial (white triangle) aligned with the mark on the photometer. See fig. 3.
- Always perform zeroing and test with the vial cap tightly closed. Only use cap with gasket (fig. 3) in order to avoid light entering the sample chamber.
- 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.
- Avoid spillage of water into the sample chamber as this can lead to incorrect test results.
- 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.

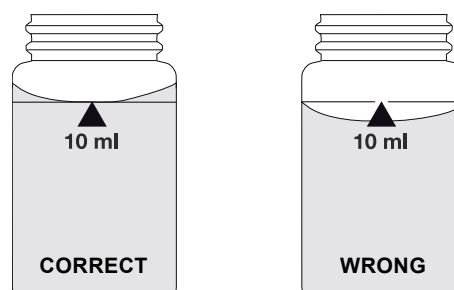
- Large temperature differences between the photometer and the environment can lead to errors, for example due to the formation of condensation in the cell chamber or on the vial.
- To avoid errors caused by stray light, do not use the photometer in bright sunlight.
- Always add the reagent tablets to the water sample straight from the foil without touching them with the fingers.
- The reagents must be added in the correct sequence.

**7.1.2 Method notes**

- Prior to measurement, ensure that the sample is suitable for analysis (no major interferences) and does not require any preparation such as pH adjustment, filtration etc.
- 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. ([www.grundfos.com](http://www.grundfos.com))

**7.1.3 Correct position of the vial (Ø24)**

**Fig. 3** Correct position of the vial

**7.1.4 Correct filling of the vial**

**Fig. 4** Correct filling of the vial

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## 7.2 Table of methods and reagents

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

Method	Analysis	Differentiation	Range	Tolerance	Dissolution	Analyses per PU	Article description	Product number	See section	
CL 6	chlorine, free	free	0.01 - 6 mg/l Cl <sub>2</sub>	in mg/l: 0-1: ± 0.05 > 1-2: ± 0.1 > 2-3: ± 0.2 > 3-4: ± 0.3 > 4-6: ± 0.4	0.01	250	DPD No. 1 tablets	95727747	7.3.2	
	chlorine, free (high Ca)						DPD No. 1 high calcium tablets	95727748		
	chlorine, total	free & combined differentiated					DPD No. 1 tablets or DPD No. 1 high calcium tablets	95727747 95727748	7.3.3	
	chlorine, total	not differentiated					DPD No. 3 tablets DPD No. 4 tablets	95727750 95727751	7.3.4	
CLO2	chlorine dioxide	in absence of Cl <sub>2</sub>	0.02 - 11 mg/l ClO <sub>2</sub>	in mg/l: 0-1.9: ± 0.08 >1.9-3.8: ± 0.15 >3.8-5.7: ± 0.34 >5.7-7.6: ± 0.48 >7.6-11: ± 0.67	0.01	250	DPD No. 1 tablets	95727747	7.4.2	
	chlorine dioxide	in presence of Cl <sub>2</sub>					DPD No. 1 tablets	95727747	7.4.3	
							Glycine tablets	95727752		
CL 6	Chlorine dioxide analysis*	Chlorine dioxide, chlorite, free chlorine, combined chlorine	0.01 - 6 mg/l	in mg/l: 0-1: ± 0.05* > 1-2: ± 0.1* > 2-3: ± 0.2* > 3-4: ± 0.3* > 4-6: ± 0.4*	0.01	250	DPD No. 1 tablets	95727747	7.5	
							DPD No. 3 tablets	95727750		
							Glycine tablets	95727752		
							100	DPD Acidifying tablets		98032751
								DPD Neutralising tablets		98032752
O3	ozone	in absence of Cl <sub>2</sub>	0.02 - 2 mg/l O <sub>3</sub>	as chlorine with factor 0.677	0.01	250	DPD No. 1 tablets	95727747	7.6.2	
		DPD No. 3 tablets					95727750			
	ozone	in presence of Cl <sub>2</sub>					DPD No. 1 tablets	95727747	7.6.3	
							DPD No. 3 tablets	95727750		
							Glycine tablets	95727752		
PH	pH, photometric	phenol red	6.5 - 8.4 pH	± 0.1	0.01	250	Phenol red photometer tablets	95727753	7.7	

PU = packing unit

\* The measurements are performed with method "CL 6" as the photometer doesn't supply a specific method for the determination of these parameters. The values of tolerance apply to the individual measurement. For calculation with multiple values, be aware of error propagation!

### Turbidity can lead to errors

The use of the *DPD No. 1* tablet (No. [95727747](#)) 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* (No. [95727748](#)) should be used as an alternative. Even if turbidity does occur after the *DPD No. 3* tablet (No. [95727750](#)) tablet has been added, this can be prevented by using the *DPD No. 1 high calcium* tablet. (No. [95727748](#)).

\* It is not possible to give exact values, because the development of turbidity depends on the nature of the sample.

#### 7.2.1 Starter kit

Description of content	Analyses per PU
DPD No. 1	100
DPD No. 3	100
Glycine	100
Phenol red photometer	100



### 7.3 Chlorine, 0.01 - 6.0 mg/l Cl<sub>2</sub>

CL 6

Start the photometer and select method. See section [6.1 Start](#).

#### 7.3.1 Important notes

- Vial cleaning:  
As many household cleaners (such as 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.
- For individual testing of free and total chlorine, the use of different sets of glassware is recommended.  
See EN ISO 7393-2, section 5.3.
- When preparing the sample, the escape of chlorine gas, for example by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
- 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 sulphuric acid and 1 mol/l sodium hydroxide, respectively).
- For concentrations between 6.0 and 10 mg/l, the photometer shows that the measuring range [Hi] has been exceeded. 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 (plausibility test).
- Turbidity can lead to errors:  
The use of the *DPD No. 1* tablet (No. [95727747](#)) 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* (No. [95727748](#)) should be used as an alternative. Even if turbidity does occur after the *DPD No. 3* tablet (No. [95727750](#)) tablet has been added, this can be prevented by using the *DPD No. 1 high calcium* tablet. (No. [95727748](#)).
- \* ) It is not possible to give exact values, because the development of turbidity depends on the nature of the sample.
- All oxidising agents in the samples interfere as they react in the same way as chlorine.

#### 7.3.2 Free chlorine

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 1* tablet (No. [95727747](#)) or *DPD No. 1 high calcium* straight from the foil to the water sample and crush the tablets using a clean stirring rod.
4. Add the water sample to the 10 ml mark.
5. Close the vial tightly with the cap and swirl gently several times until the tablets are dissolved.
6. Place the vial correctly in the sample chamber. See fig. 3.
7. Press the [Zero/Test] key.

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

"RESULT" appears in the display in mg/l free chlorine.

#### 7.3.3 Total chlorine (free and combined differentiated)

1. At first, carry out the method described in section [7.3.2 Free chlorine](#).
2. Add one *DPD No. 3* tablet (No. [95727750](#)) straight from the foil to the same water sample and crush the tablet using a clean stirring rod.
3. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
4. Place the vial correctly in the sample chamber. See fig. 3.
5. Wait for a reaction period of 2 minutes. Countdown can be activated.  
See section [6.7 Countdown/reaction period](#).
6. Press the [Zero/Test] key.

!

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

"RESULT" appears in the display in mg/l total chlorine.

#### 7.3.4 Total chlorine (not differentiated)

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 4* tablet (No. [95727751](#)) straight from the foil to the water sample and crush the tablet using a clean stirring rod.
4. Add the water sample to the 10 ml mark.
5. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
6. Place the vial correctly in the sample chamber. See fig. 3.
7. Press the [Zero/Test] key.

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

"RESULT" appears in the display in mg/l total chlorine.

#### 7.3.5 Combined chlorine

At first, determine and note down the values of total chlorine (section [7.3.3 Total chlorine \(free and combined differentiated\)](#)) and free chlorine (section [7.3.2 Free chlorine](#)).

#### Calculation:

Combined chlorine = total chlorine - free chlorine

#### 7.3.6 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



## 7.4 Chlorine dioxide, 0.02 - 11 mg/l ClO<sub>2</sub>

CLO2

Start the photometer and select method.

See section [6.1 Start](#).

### 7.4.1 Important notes

- Vial cleaning:  
As many household cleaners (such as dishwasher detergent) contain reducing substances, the subsequent determination of chlorine dioxide 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.
- When preparing the sample, the escape of chlorine dioxide gas, for example by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
- The DPD colour development is carried out at a pH value of 6.2 to 6.5. The reagent tablet therefore contains a buffer for the pH adjustment.  
Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the tablet is added (use 0.5 mol/l sulphuric acid and 1 mol/l sodium hydroxide, respectively).
- For concentrations between 11.0 and 19 mg/l, the photometer shows that the measuring range is exceeded [Hi].  
Concentrations above 19 mg/l chlorine dioxide can lead to results showing 0 mg/l. In this event, the water sample must be diluted with water free of chlorine dioxide. 10 ml of the diluted sample should be mixed with the reagent and the measurement repeated (plausibility test).
- All oxidising agents in the samples interfere as they react in the same way as chlorine dioxide.

### 7.4.2 In the absence of chlorine

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 1* tablet (No. [95727747](#)) straight from the foil to the water sample and crush the tablet using a clean stirring rod.
4. Add the water sample to the 10 ml mark.
5. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
6. Place the vial correctly in the sample chamber. See [fig. 3](#).
7. Press the [Zero/Test] key.

Zero/Test

CLO2

The method symbol flashes for approx. 3 seconds.

RESULT

"RESULT" appears in the display in mg/l chlorine dioxide.

### 7.4.3 In the presence of chlorine

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting.  
See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 1* tablet (No. [95727747](#)) straight from the foil to the water sample and crush the tablet using a clean stirring rod.
4. Fill a second clean vial with 10 ml of the water sample.
5. Add one *Glycine* tablet (No. [95727752](#)) straight from the foil and crush the tablet using a clean stirring rod.
6. Transfer the contents of the second vial into the prepared vial.
7. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
8. Place the vial correctly in the sample chamber. See [fig. 3](#).
9. Press the [Zero/Test] key.

Zero/Test

CLO2

The method symbol flashes for approx. 3 seconds.

RESULT

"RESULT" appears in the display in mg/l chlorine dioxide.

### 7.4.4 Tolerances

0 - 1.9 mg/l:	± 0.1 mg/l
> 1.9 - 3.8 mg/l:	± 0.2 mg/l
> 3.8 - 5.7 mg/l:	± 0.4 mg/l
> 5.7 - 7.6 mg/l:	± 0.6 mg/l
> 7.6 - 11.0 mg/l:	± 0.8 mg/l

## 7.5 Chlorine dioxide analysis (ClO<sub>2</sub>, chlorite, Cl<sub>2</sub> free, Cl<sub>2</sub> combined) 0.01 - 6 mg/l

CL 6

### 7.5.1 Important notes

This analysis is used for differentiated determination of:

- chlorine dioxide
- chlorite
- free chlorine
- combined chlorine

The measurements are performed with method "CL 6" as the photometer doesn't supply a specific method for the determination of these parameters. The values determined during measurement (see section [7.5.2 Measurements](#)) are not the effective quantities of certain parameters. The effective quantities have to be calculated out of the determined values after measurement. (See section [7.5.3 Calculation](#))

Caution

The values of tolerance (see section [7.2 Table of methods and reagents](#)) apply to the individual measurement. For calculation with multiple values, be aware of error propagation!

## 7.5.2 Measurements

0.0.0

1. Fill a clean vial ( $\varnothing 24$ ) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 1* tablet (No. [95727747](#)) straight from the foil and crush the tablet using a clean stirring rod.
4. Fill a second clean vial with 10 ml of the water.
5. Add one *Glycine* tablet (No. [95727752](#)) straight from the foil and crush the tablet using a clean stirring rod.
6. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
7. Transfer the contents of the second vial into the prepared vial.
8. Close the vial tightly with the cap and swirl gently several times until the tablets are dissolved.
9. Place the vial correctly in the sample chamber. See fig. [3](#).
10. Press the [Zero/Test] key.

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

**Write down the result as: reading G**

11. Remove the vial from the sample chamber, empty the vial, rinse vial and cap several times. Fill with a few drops of the water sample.
12. Add one *DPD No. 1* tablet (No. [95727747](#)) straight from the foil and crush the tablet using a clean stirring rod.
13. Add the water sample to the 10 ml mark.
14. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
15. Place the vial correctly in the sample chamber. See fig. [3](#).
16. Press the [Zero/Test] key.

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

**Write down the result as: reading A**

17. Remove the vial from the sample chamber.
18. Add one *DPD No. 3* tablet (No. [95727750](#)) straight from the foil to the same water sample and crush the tablet using a clean stirring rod.
19. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
20. Place the vial correctly in the sample chamber. See fig. [3](#).
21. Wait for a reaction period of 2 minutes.
22. Press the [Zero/Test] key.

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

**Write down the result as: reading C**

23. Remove the vial from the sample chamber.
24. Add one *DPD Acidifying* tablet (No. [98032751](#)) straight from the foil to the same water sample and crush the tablet using a clean stirring rod.

25. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
26. Wait for a reaction period of 2 minutes.
27. Add one *DPD Neutralising* tablet (No. [98032752](#)) straight from the foil to the same water sample and crush the tablet using a clean stirring rod.
28. Close the vial tightly with the cap and swirl gently several times until the tablet is dissolved.
29. Place the vial correctly in the sample chamber. See fig. [3](#).
30. Press the [Zero/Test] key.

Zero/Test

CL 6

The method symbol flashes for approx. 3 seconds.

RESULT

**Write down the result as: reading D**

31. Calculate parameters, see section [7.5.3 Calculation](#).

## 7.5.3 Calculation

The effective quantities of the desired parameters can be calculated from the measured readings as follows:

Parameter	Formula
Chlorine dioxide	5 G
Chlorite	D - (C + 4 G)
Free chloride	A - G
Combined chloride	C - A

7.6 Ozone, 0.02 - 1 mg/l O<sub>3</sub>

O3

Start the photometer and select method.

See section [6.1 Start](#).

## 7.6.1 Important notes

- Vial cleaning:  
As many household cleaners (such as dishwasher detergent) contain reducing substances, the subsequent determination of ozone 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.
- When preparing the sample, the escape of ozone gas, for example by pipetting or shaking, must be avoided. The analysis must take place immediately after taking the sample.
- The DPD colour development is carried out at a pH value of 6.2 to 6.5. The reagent tablet therefore contains a buffer for the pH adjustment.  
Strong alkaline or acidic water samples must be adjusted between pH 6 and pH 7 before the tablet is added (use 0.5 mol/l sulphuric acid and 1 mol/l sodium hydroxide, respectively).
- For concentrations between 1.0 and 6 mg/l, the photometer shows that the measuring range is exceeded [Hi].  
Concentrations above 6 mg/l ozone can lead to results showing 0 mg/l. In this event, the water sample must be diluted with water free of ozone. 10 ml of the diluted sample should be mixed with the reagent and the measurement repeated (plausibility test)
- All oxidising agents in the samples interfere as they react in the same way as ozone.

## 7.6.2 In the absence of chlorine

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 1* tablet (No. [95727747](#)) and one *DPD No. 3* tablet (No. [95727750](#)) straight from the foil to the water sample and crush the tablets using a clean stirring rod.
4. Add the water sample to the 10 ml mark.
5. Close the vial tightly with the cap and swirl gently several times until the tablets are dissolved.
6. Place the vial correctly in the sample chamber. See fig. 3.
7. Wait for a reaction period of 2 minutes. (The countdown function can be used, see section [6.7 Countdown/reaction period](#).)
8. Press the [Zero/Test] key.



O3

The method symbol flashes for approx. 3 seconds.

RESULT

"RESULT" appears in the display in mg/l ozone.

## 7.6.3 In the presence of chlorine

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Remove the vial from the sample chamber and empty it, leaving a few drops in the vial.
3. Add one *DPD No. 1* tablet (No. [95727747](#)) and one *DPD No. 3* tablet (No. [95727750](#)) straight from the foil to the water sample and crush the tablets using a clean stirring rod.
4. Add the water sample to the 10 ml mark.
5. Close the vial tightly with the cap and swirl gently several times until the tablets are dissolved.
6. Place the vial correctly in the sample chamber. See fig. 3.
7. Wait for a reaction period of 2 minutes. (The countdown function can be used, see section [6.7 Countdown/reaction period](#).)
8. Press the [Zero/Test] key.



O3

The method symbol flashes for approx. 3 seconds.

RESULT

The display shows result 1. Note down the result.

9. Rinse vial and cap thoroughly. Fill the vial with a few drops of the water sample.
10. Add one *DPD No. 1* tablet (No. [95727747](#)) and one *DPD No. 3* tablet (No. [95727750](#)) straight from the foil to the water sample and crush the tablets using a clean stirring rod.
11. Fill a second clean vial with 10 ml of the water sample.
12. Add one *Glycine* tablet (No. [95727752](#)) straight from the foil and crush the tablet using a clean stirring rod.
13. Transfer the contents of the second vial into the prepared vial.
14. Close the vial tightly with the cap and swirl gently several times until the tablets are dissolved.
15. Place the vial correctly in the sample chamber. See fig. 3.



O3

16. Wait for a reaction period of 2 minutes. (The countdown function can be used, see section [6.7 Countdown/reaction period](#).)

17. Press the [Zero/Test] key.

The method symbol flashes for approx. 3 seconds.

RESULT

The display shows result 2.

### Calculation:

Ozone (mg/l) = result 1 - result 2

## 7.6.4 Tolerances

0 - 0.67 mg/l: ± 0.03 mg/l

> 0.67 - 1.35 mg/l: ± 0.07 mg/l

> 1.35 - 2.0 mg/l: ± 0.14 mg/l

## 7.7 pH value, 6.5 - 8.4 pH

PH

Start the photometer and select method.

See section [6.1 Start](#).

### 7.7.1 Important notes

1. For photometric determination of pH values, only use *Phenol red* tablets (No. [95727753](#)) in black printed foil pack and marked with *photometer*.
2. Water samples with a very small buffer capacity will give too small pH values. Water samples with low values of alkalinity-m (equals KS 4.3 < 0.7 mmol/l equals total alkalinity < 35 mg/l CaCO<sub>3</sub>) may therefore give wrong pH readings.
3. pH values below 6.5 and above 8.4 can produce wrong 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 content etc.).
5. Salt error.  
Correction of test results (average values) for samples with a salt content as follows:

Indicator	Salt content of the sample		
	1 molar	2 molar	3 molar
Phenol red	-0.21	-0.26	-0.29

The values of Parsons and Douglas (1926) are based on the use of Clark and Lubs buffers.

1 mol NaCl = 58.4 g/l = 5.8 %

### 7.7.2 Measurement

0.0.0

1. Fill a clean vial (Ø24) with 10 ml of the water sample and perform zero setting. See section [6.2 Zero setting](#).
2. Add one phenol red photometer tablet (No. [95727753](#)) straight from the foil to the 10 ml water sample and crush the tablets using a clean stirring rod.
3. Close the vial tightly with the cap and swirl gently several times until the tablets are dissolved.
4. Place the vial correctly in the sample chamber. See fig. 3.
5. Press the [Zero/Test] key.



PH

The method symbol flashes for approx. 3 seconds.

RESULT



"RESULT" appears in the display as pH value.

### 7.7.3 Tolerance

± 0.1 pH.

## 8. Fault finding

### 8.1 Operating messages

<b>Hi</b>	Measuring range exceeded or excessive turbidity.
<b>Lo</b>	Result below lowest limit of the measuring range.
	Replace batteries, no further tests possible.
<b>btLo</b>	Battery capacity is too low for the display backlight, tests are still possible.
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;"> <small>Store Cal</small>  <b>RESULT</b>  <small>Time</small> </div> <div style="margin-left: 5px;"> <small>Date</small>    <small>Cal</small> </div> </div>	A user-calibrated method is indicated by an arrow while the test result is displayed. See section <a href="#">6.8.5 Resetting to factory calibration</a> .

### 8.2 List of faults/error codes

<b>E27/E28/E29</b>	Light absorption too great. Reasons: dirty optics, etc.
<b>E 10 / E 11</b>	Calibration factor out of range.
<b>E 20 / E 21</b>	Too much light reaching the detector.
<b>E23/E24/E25</b>	Too much light reaching the detector.
<b>E 22</b>	Battery capacity was too low during the measurement. Change battery.
<b>E 70</b>	CL 6: Factory calibration incorrect/deleted
<b>E 71</b>	CL 6: User calibration incorrect/deleted
<b>E 76</b>	pH: Factory calibration incorrect/deleted
<b>E 77</b>	pH: User calibration incorrect/deleted
<b>E 132</b>	Prt: Communication with DIT-IR failed

## 9. Spare parts

Description	Quantity	Product No
Round vial, Ø24, with cap and gasket	Pack of 5	95727768
	Pack of 12	95727769
Plastic stirring rod, length 13 cm	1 piece	95727771

## 10. Disposal

This product or parts of it must be disposed of in an environmentally sound way. Use appropriate waste collection services. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheellie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal

authorities. The separate collection and recycling of such products will help protect the environment and human health.

### Note

The 2006/66/EC guideline requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste.

## Declaration of conformity

**GB: EC Declaration of Conformity**

We, Grundfos, declare under our sole responsibility that the products DIT-L, DIT-M and DIT-IR, to which this declaration relates, are in conformity with these Council directives on the approximation of the laws of the EC member states:

**ES: Declaración CE de Conformidad**

Nosotros, Grundfos, declaramos bajo nuestra entera responsabilidad que los productos DIT-L, DIT-M y DIT-IR, a los cuales se refiere esta declaración, están conformes con las Directivas del Consejo en la aproximación de las leyes de los Estados Miembros del EM:

**IT: Dichiarazione di Conformità CE**

Grundfos dichiara sotto la sua esclusiva responsabilità che i prodotti DIT-L, DIT-M e DIT-IR, ai quali si riferisce questa dichiarazione, sono conformi alle seguenti direttive del Consiglio riguardanti il riavvicinamento delle legislazioni degli Stati membri CE:

**NL: EC Overeenkomstigheidsverklaring**

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat de producten DIT-L, DIT-M en DIT-IR waarop deze verklaring betrekking heeft, in overeenstemming zijn met de Richtlijnen van de Raad in zake de onderlinge aanpassing van de wetgeving van de EG Lidstaten betreffende:

**RO: Declarație de conformitate CE**

Noi, Grundfos, declarăm pe propria răspundere că produsele DIT-L, DIT-M și DIT-IR, la care se referă această declarație, sunt în conformitate cu aceste Directive de Consiliu asupra armonizării legilor Statelor Membre CE:

**RU: Декларация о соответствии EC**

Мы, компания Grundfos, со всей ответственностью заявляем, что изделия DIT-L, DIT-M и DIT-IR, к которым относится настоящая декларация, соответствуют следующим Директивам Совета Евросоюза об унификации законодательных предписаний стран-членов ЕС:

**DE: EG-Konformitätserklärung**

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte DIT-L, DIT-M und DIT-IR, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EU-Mitgliedsstaaten übereinstimmen:

**FR: Déclaration de Conformité CE**

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits DIT-L, DIT-M et DIT-IR, auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des Etats membres CE relatives aux normes énoncées ci-dessous :

**LT: EB atitikties deklaracija**

Mes, Grundfos, su visa atsakomybe pareiškiame, kad gaminiai DIT-L, DIT-M ir DIT-IR, kuriems skirta ši deklaracija, atitinka šias Tarybos Direktyvas dėl Europos Ekonominės Bendrijos šalių narių įstatymų suderinimo:

**PL: Deklaracja zgodności WE**

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze wyroby DIT-L, DIT-M oraz DIT-IR, których deklaracja niniejsza dotyczy, są zgodne z następującymi wytycznymi Rady d/s ujednoczenia przepisów prawnych krajów członkowskich WE:

**RS: Deklaracija o usklađenosti EU**

Mi, kompanija Grundfos, izjavljujemo pod punom vlastitom odgovornošću da je proizvod DIT-L, DIT-M i DIT-IR, na koji se odnosi deklaracija ispod, u skladu sa dole prikazanim direktivama Saveta za usklađivanje zakona država članica EU.

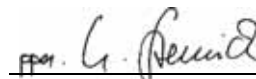
**TR: EC uygunluk bildirgesi**

Grundfos olarak bu beyannameye konu olan DIT-L, DIT-M ve DIT-IR ürünlerinin, AB Üyesi Ülkelerin kanunlarını birbirine yaklaştırma üzerine Konsey Direktifleriyle uyumlu olduğunun yalnızca bizim sorumluluğumuz altında olduğunu beyan ederiz:

- EMC Directive (2004/108/EC).  
Standard used: EN 61326-1: 2006, Class B (DIT-M: Interference resistance Class A).
- RoHS Directives (2011/65/EU and 2015/863/EU).  
Standard used: EN 50581:2012

This EC declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 95727435).

Pfintzal, 1st March 2018



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