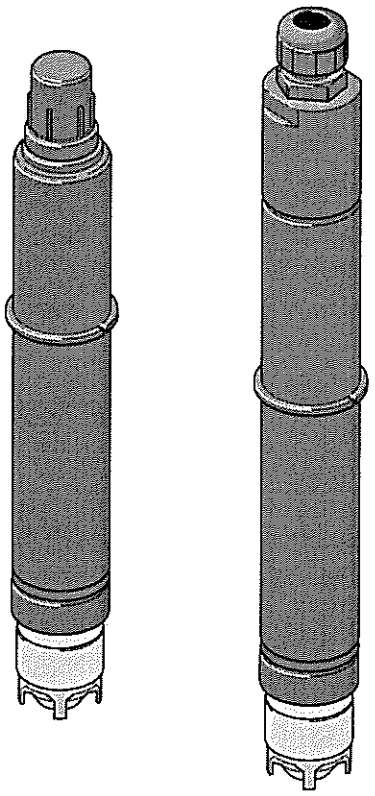
Instruction Manual

DULCOTEST® Chlorine Probe for organically bound chlorine
Model CGE 2-mA-2 ppm
Model CGE 2-mA-10 ppm
Model CGE 2-4P-10 ppm



Before attempting installation, please read instruction manual thoroughly. Do not discard!
Any part which has been subject to misuse is excluded from the warranty!

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Instruction Manual DULCOTEST® Chlorine Probe CGE
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Subject to technical alterations.

Table of Contents

1 Application 1
2 Safety Guidelines 1
3 Components and Function 2
4 Transport and Storage 4
5 Assembly 5
6 Installation 6
7 Operation 7
7.1 Run-in Period 7
7.2 Calibration 7
7.3 Trouble Shooting 8
7.4 Maintenance 9
7.5 Decommissioning 9
8 Disposal of Waste 10
9 Ordering Guidelines 10
10 Technical Data 11
10.1 Guidelines and Standards observed 11

Guidelines for Users

This instruction manual contains
the product description in the main text,

- numbered points
- ▶ instructions

and safety guidelines illustrated by the following symbols:



Take Care!

If safety guidelines are ignored, personal injury and damage to equipment may result!



Attention!

If safety guidelines are ignored, damage to equipment may result!



Attention!

Guidelines for disposal of packaging.



Important!

Working guidelines.

1 Application

⚠ **Attention!**

- *The probe is intended only for use with organically bound chlorine and free chlorine in water in swimming pools or water of a similar quality.*
- *The probe may only be placed in an in-line probe housing type DLG III A (914955), DLG III B (914956) or in DGM (module 25 mm) in order to comply with flow parameters.*
  We do not guarantee the equipment if other in-line probe housings are used.
- *The voltage supply to the measuring instrument (and the measuring cell) must not be interrupted. A restart must always take place after a longer (> 2 h) break in the voltage supply (see page 7).*

2 Safety Guidelines

We accept no liability for personal injury or damage to equipment resulting from non-compliance with safety guidelines.

⚠ **Take Care!**

- *If equipment is being installed outside Germany, the current national regulations for care, maintenance and calibration intervals must be observed.*
- *When dealing with chlorinated water and solutions, wear protective glasses and clothing.*
- *The probe cell and peripheral equipment must only be operated by appropriately trained and authorised personnel.*
- *Non-ProMinent ' -products should not be used in any part of the probe cell.*
- *Probe cell model CGE 2-4P-10 ppm must only be connected to a ProMinent control unit using the appropriate connector, e.g. CLWS and Dialog-Chlorine controller.*
- *Do not use the probe in conditions which are outside the range of the metering equipment.*
- *Do not use the probe in water containing surfactants.*
- *Avoid contact between electrolyte and the skin or mouth. The electrolyte is mildly poisonous and can cause damage to health.*
- *Incorrect dosing can occur due to air bubbles in the water sample. Air bubbles can cling to the sensor's membrane which can cause readings which are too low, leading to incorrect dosing.*

- *Avoid incorrect dosing due to probe failure! Before dismantling the probe, switch off all downstream control units, or reset manually. Probe failure can result in the control unit/metering equipment giving a false reading, leading to incorrect dosing.*
- *When dismantling probes de-pressurise the system! Close the stop valves in front of and behind the in-line probe housing. Fluid can escape from the probe if dismantled under pressure.*
- *After placing into operation, the sensor must be kept moist at all times.*
- *In an emergency first disconnect the control unit from the power supply. If fluid leaks out from the in-line probe housing (DGM/DLG), close the stop valves (installed by the client) on the inlet and outlet.*
- *Before opening the DGM/DLG observe on-site safety guidelines.*
- *Do not exceed the maximum permissible operating pressure: 1 bar (DLG) or 3 bar (DGM)!*
- *Take care not to let flow drop below the minimum flow rate! Observe the flow rate by using a metering/control unit. If the readings are to be used for regulating equipment, should the minimum flow rate not be reached, switch off control unit or switch to constant load.*
- *Examine probe regularly for dirt, deposits and air bubbles. Remove air bubbles by tapping the DLG/DGM. Remove dirt by rinsing in running water.*

3 Components and Function

Components The chlorine probe consists of two parts: the electrode shaft and the membrane cap. The membrane cap filled with electrolyte represents the measurement chamber into which the electrodes enter. The measurement chamber is separated from the water sample by a micro-porous membrane.

The preamplifier which is encased in plastic is located in the upper part of the shaft, which transforms the primary signal from the probe into 4-20 mA. The mA-model is a probe with a passive 4-20-mA two-core interface circuit, i.e. the control unit provides the power supply, e.g. DULCOMETER® D1C, D2C, DULCOMARIN®.

The probe contains an integrated temperature compensator.

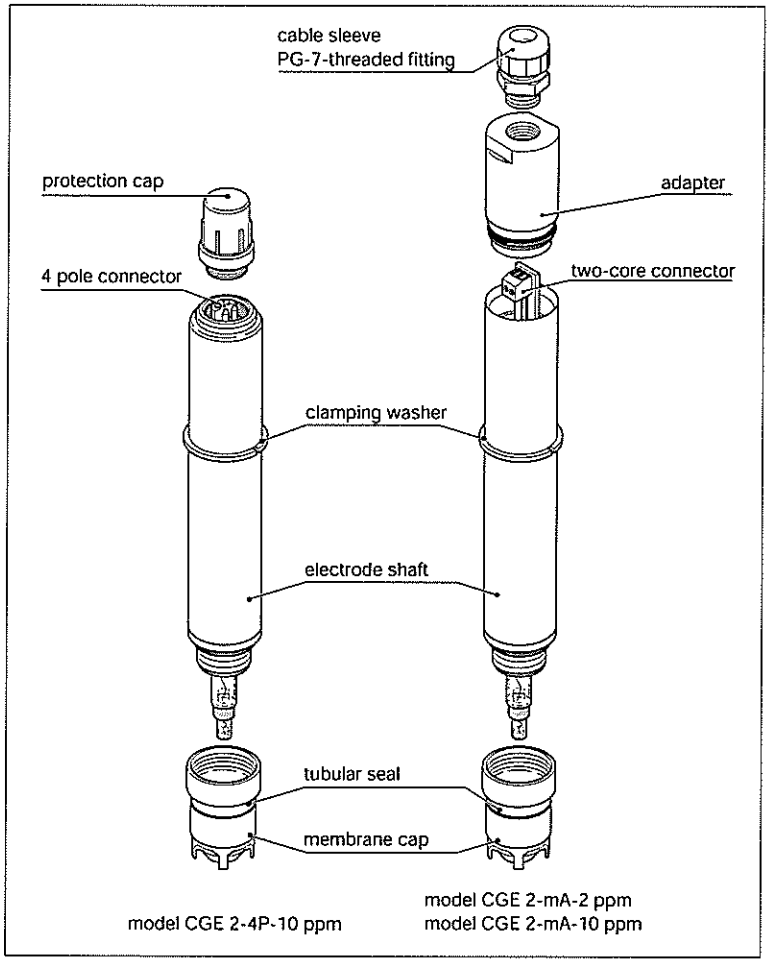
Measures Free chlorine (HOCl, OCl^-) and organically bound chlorine (Isocyanuric acid $C_3N_3H_3O_3$ in the form of Trichlorisocyanuric acid or Trichlorisocyanurate $C_3N_3Cl_3O_3$ organically bound chlorine)

Function The chlorine probe CGE is a membrane-covered amperometric dual electrode probe. The collector is a platinum cathode, the backplate electrode a silver anode (operating on the voltametric principle).

The sensor signal is virtually unaffected by pH within the operational range of the probe. The electrical current is transformed by the probe-preamplifier into a standard output signal (4-20 mA) and transmitted to the display (CGE-mA).

Advantages The CGE-probe measurement signal responds exactly in accordance with the DPD-analysis. In this way the still active chlorine compound may be accurately measured.

Fig. 1
Probe components



4 Transport and Storage

Important!

The probe should be transported only in the original packaging. Keep the packaging complete with styropor sections and in the event of repair or replacement under warranty return the probe cell in this packaging.

Attention!

Please note when disposing of packaging that styropor is a hazardous waste.

Packaging

- Styropor shells
- Carton

Contents

- Probe cell CGE
- Electrolyte, nozzle
- Membrane cap, replacement membrane cap
- Screw driver
- Instruction manual

▶ Check contents against delivery document!

Storage

• Storage life of probe including membrane in original packaging	1 year
• Storage life of electrolyte in original bottles (P. No.: 792892)	max. 1 year
• Storage and transport temperature	+5 to +50 °C
• Humidity	max. 90 % rel. humidity below dewpoint

5 Assembly

Take Care!

When handling chlorinated water and solutions wear protective glasses and clothing!

Attention!

- *Do not disturb or damage membrane or electrodes.*
- *Electrolyte is light sensitive: Electrolyte bottles must be kept closed at all times after use! Do not transfer electrolyte into containers which may allow light to enter.*
- *Electrolyte should not be kept for longer than 1 year (for date of manufacture see label).*
- *Ensure that no bubbles form when pouring electrolyte.*
- *Membrane caps may be used only once.*

Pouring Electrolyte

- ▶ Open the electrolyte bottle and screw on the nozzle supplied.
- ▶ Force out excess air.
- ▶ Fill the membrane cap with electrolyte ensuring that no bubbles form: Place the electrolyte bottle fully onto the membrane cap (see Fig. 2) and slowly squeeze the electrolyte in one steady stream out of the bottle, while continuously retracting the bottle. The cap is completely full when the electrolyte reaches the lower thread.

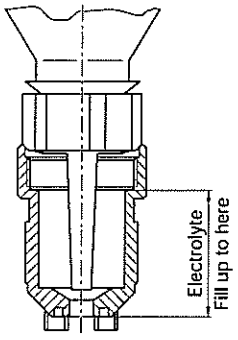


Fig. 2: Membrane cap

Assembling the probe cell

- ▶ Position the electrode shaft vertically over the filled membrane cap.
- ▶ Take care not to dislodge the tubular seal with your fingers!
- ▶ Screw the membrane cap in by hand. This will cause excess electrolyte to escape through an aperture beneath the tubular seal in the membrane cap.
- ▶ Wipe away the escaped electrolyte with a soft paper tissue, or similar.
- ▶ After filling and assembling the membrane cap, close the electrolyte bottle once more and rinse the unscrewed nozzle well under water to remove any electrolyte adhering to the surface.

⚠ **Attention!**

Before inserting the probe cell into the flow housing, de-pressurise the system. Close the stop valves in front of and behind the device.

Insertion or withdrawal of probe cell into or out of the in-line probe housing should be carried out slowly!

Insertion of probe cell into the in-line probe housing:

DLG
- ▶ Push the O-ring from beneath the probe as far as the clamping washer.
- ▶ Insert the probe cell into the flow housing.
- ▶ Fix the probe cell in place with stoppers.

DGM
- ▶ Push the O-ring from beneath the probe as far as the clamping washer; leave plain washer in DGM.
- ▶ Insert the probe cell into the DGM and fix into place with locking screws until the O-ring forms a watertight seal: the correct insertion depth of the probe is set by the clamping washers.

6 Installation

⚠ **Attention!**

The probe output signal is not electrically isolated.

4P-model *4P-model may only be connected to the control unit using an appropriate connector (e.g. CLWS for Chlorine)!*

mA-model *Observe the correct polarity for the mA-model cable:*
1 = plus, 2 = minus.

Do not drop below the voltage requirement of 16 V DC, even for short periods! The current should be able to withstand a minimum load of 35 mA at 16 V DC. During periods of intermittent use do not switch off the metering system!
Dosing devices may be controlled by timer switches!
Too low a voltage will lead to a faulty reading which may result in dangerous over-dosing of chlorine!

Ensure other circuits are electrically isolated!
The in-line metering or evaluation equipment must be isolated from both the probe and the power supply.

The mA-model is a probe with a passive 4-20-mA two-core interface, i.e. the electrical current is supplied externally or from a control unit. If a ProMinent® voltage regulator is used, (e.g. DULCOMARIN®, DULCOMETER® D2C or D1C) all safety requirements will be automatically met.
If using an alternative device please note:

Terminals: 16-24 V DC, min. 35 mA at 16 V DC
max. load: 1 W

Electrical installation

- ▶ Unscrew the upper section of the probe cell anti-clockwise and remove.
- ▶ Loosen threaded fitting PG-7 and pass the two-core cable through so that there is a five cm length of bared wire inside the probe cell.
- ▶ Attach the wire to the terminal block:
  1 = plus, 2 = minus.
- ▶ Tighten up threaded connector PG-7.
- ▶ Insert the upper section of the probe cell completely into the housing and tighten up in a clockwise direction.

7 Operation

After a run-in period the probe may be calibrated. It is recommended that calibration be repeated after 24 hours.

7.1 Run-in Period

In order to give stable readings the probe requires a run-in period.

First commissioning:	24 hours run-in time recommended
Second commissioning:	approx. 12-24 hours

7.2 Calibration

⚠ **Attention!**

- *When installing this equipment outside Germany, current national regulations for calibration intervals must be observed!*
- *Each time the membrane is replaced, carry out slope test.*

Conditions

- Flow to the in-line probe housing must correspond to chapter 10 Technical Data, page 11.
- pH value within permissible range.
- Probe and sample at equal temperature.

Zero calibration not required

Slope test

- ▶ Determine chlorine content with chlorine testing kit using DPD-1 method.
- ▶ Input the value obtained into the control unit/metering device in accordance with the instruction manual.
- ▶ Repeat calibration at regular intervals.

7.3 Trouble Shooting

Fault	**Probe does not calibrate – Metering device/control unit > DPD-1 measurement**	
Possible cause/remedy	Membrane cap damaged	▶ Examine membrane cap for tears and replace if necessary
	Interference from contaminating materials in the water (see chapter 10, page 11)	▶ Test water for contaminating materials and replace water if necessary
	Short circuit in the leads	▶ Examine leads for short circuit and replace if necessary
	pH value too low (< pH 5.5)	▶ Adjust pH value (pH 5.5-9.5)
	DPD chemicals too old	▶ Use new DPD chemicals and repeat calibration
Fault	**Probe does not calibrate – Metering device/control unit < DPD-1 measurement**	
Possible cause/remedy	Deposits on the membrane cap	▶ Examine membrane cap for deposits and replace if necessary
	Water sample flow < 20 l/h	▶ Test flow and correct if necessary (> 20 l/h; recommended 40 l/h)
	pH value too high (> pH 9.5)	▶ Adjust pH value (pH 5.5-9.5)
	Air bubbles on the outside of the membrane	▶ Remove air bubbles by tapping, if necessary, to increase flow
	Electrolyte leaking	▶ Replace membrane cap
Fault	**Negative values recorded**	
Possible cause/remedy	Insufficient run-in period	▶ Repeat calibration after 24 hours
	Interference from contaminating materials in water (see chapter 10, page 11)	▶ Test water for contaminating materials and replace water if necessary
	Chlorine content below the minimum measurement range of the instrument	▶ Add chlorine and re-calibrate
Fault	**Fluctuating values**	
Possible cause/remedy	Air bubbles on outside of membrane	▶ Remove air bubbles by tapping and increase flow if necessary
	Membrane damaged	▶ Examine membrane for tears and replace if necessary

7.4 Maintenance

⚠ **Attention!**

- *Maintain probe regularly in order to ensure perfect operation.*
- *Avoid uncontrolled dosing due to probe failure! Before dismantling the probe switch off downstream control unit, or reset manually. Probe failure can result in the control unit/metering equipment giving a false reading, leading to incorrect dosing.*
- *When dismantling the probe, de-pressurise the system! Close stop-valves in front of and behind the mounting device. Fluid can escape when dismantling probe.*
- *When installing this equipment outside Germany, current national regulations for maintenance - and calibration intervals must be observed!*

Maintenance intervals Daily, weekly, after each use.

Maintenance tasks

- ▶ Test the values given by the chlorine probe by means of a chlorine testing kit (DPD 1) and re-calibrate probe if necessary.
- ▶ If probe and control unit/metering device no longer correspond, replace the membrane and electrolyte and then recalibrate.

7.5 Decommissioning

Decommissioning

- ▶ Unclip probe cell
- ▶ Loosen reducing pipe nipple
- ▶ Remove probe cell from in-line probe housing
- ▶ Unscrew membrane cap and discard
- ▶ Rinse electrode in clean water, and dry in a dust free area
- ▶ Loosely screw in a new membrane cap to protect the electrodes

Re-commissioning

- ▶ Fill new membrane cap with electrolyte and screw together: observe run-in period (see chapter 7.1, page 7)

8 Disposal of Waste

Attention!

Dispose of styropor packaging shells as hazardous waste.

The sensor may be returned to any branch of ProMinent for disposal.

9 Ordering Guidelines

Standard delivery comprises

- 1 sensor complete with membrane cap
- 1 replacement membrane cap
- 1 bottle of electrolyte

Complete pack

The probe may only be ordered as a complete set:

• CGE 2-4P-10 ppm, 1 instruction manual	P. No. 792838
• CGE 2-mA-2 ppm, 1 instruction manual	P. No. 792843
• CGE 2-mA-10 ppm, 1 instruction manual	P. No. 792842

Accessories

Replacement parts pack:

• 2 membrane caps, 1 bottle of electrolyte, 1 instruction manual	P. No. 740048
• 1 bottle of electrolyte (50 ml)	P. No. 792892

Assembly pack

• for DLG III	P. No. 815079
• for DGM	P. No. 791818

10 Technical Data

Measures	organically bound chlorine
Application	swimming pool water and water of similar quality, drinking water
Instrument measurement range	4P- and mA-models: 0.1-10 mg/l mA-model only: 0.02-2.0 mg/l
pH range	5.5-9.5
Temperature range	5-45 °C temperature compensated; no temperature zero-point
Storage temperature	frost-free between 5 °C and 50 °C
Dissolution	corresponds to measurement range limits below
Maximum pressure	DLG III A/B: 1 bar DGM: 3 bar
Flow	recommended: 40 l/h in in-line probe housing DLG III A/B or DGM minimum: 20 l/h maximum: 100 l/h
Cross sensitivity	Bromine, Iodine, Ozone and ClO_2 lead to false readings
Shelf life Membrane cap	typically 1 year depending on water quality
Component materials	membrane cap: PPE orange shaft: PVC black
Output Signal	CGE-mA: 4-20 mA CGE-4P: 0-2 V
Protective System	IP 65

10.1 Guidelines and Standards observed

EU-Guidelines	EU EMC RL 89/336/EEC, 91/263/EEC subsequently 92/31/EEC
International Standards	EN 50 081-1 EN 50 082-2
National Standards	not applicable
Examinations and Licences	not applicable

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