

# Reliable measuring and control

Precision by design



# Precision in detail

## Overall perfection – the optimum in control circuits



### Working together for **accurate** results

The precise interplay between metering pumps, controllers and sensors is a guarantee for optimum metering.

ProMinent provides you with the best possible safety thanks to optimally coordinated components.

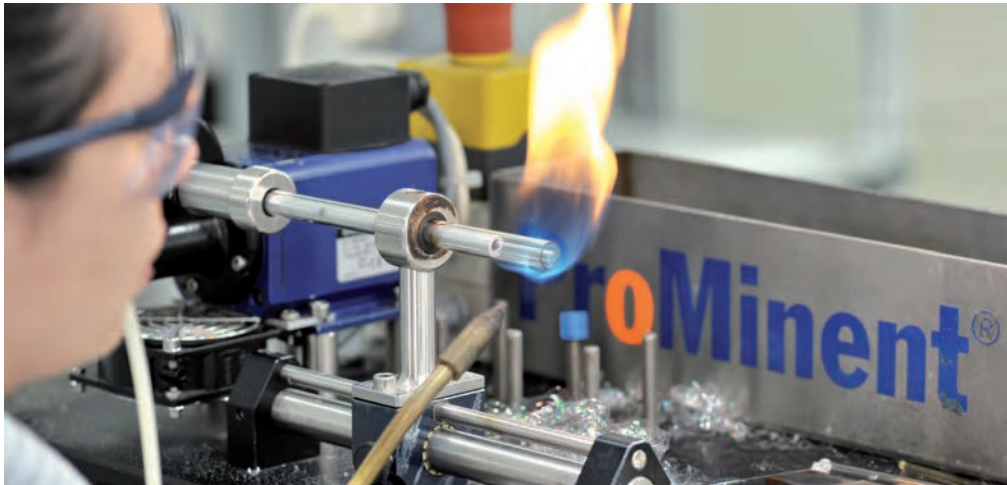
- Metering pumps that only meter the volume of chemicals needed at any time
- Sensors that deliver absolutely reliable and precise measured values in real time
- Controllers that match your customer-specific applications with technical precision

Choose your efficient complete solution from ProMinent for your specific metering task.





# Comprehensive solutions for precise metering, measuring and controlling



## Metering pumps

Chemical metering is the core task of any metering pump – and ProMinent offers metering pumps covering every performance class and design. The market leader in solenoid diaphragm pumps also offers an exceptional range of medium- and high-pressure pumps.

- Solenoid diaphragm pumps:  
up to 75 l/h
- Motor-driven diaphragm pumps:  
up to 1000 l/h
- Hydraulic diaphragm pumps:  
up to 50,000 l/h
- Plunger pumps:  
up to 38,000 l/h
- Non-standard metering pumps

## Sensor technology

The DULCOTEST® line of sensors offers the wide availability of online chemical measuring parameters that enable a limit value to be monitored or a closed control circuit to be constructed.

- pH value
- ORP
- Electrolytic conductivity
- Turbidity
- Free chlorine
- Total available chlorine
- Chlorine dioxide
- Chlorite
- Bromine
- Ozone
- Dissolved oxygen
- Hydrogen peroxide
- Peracetic acid
- Fluoride
- Temperature

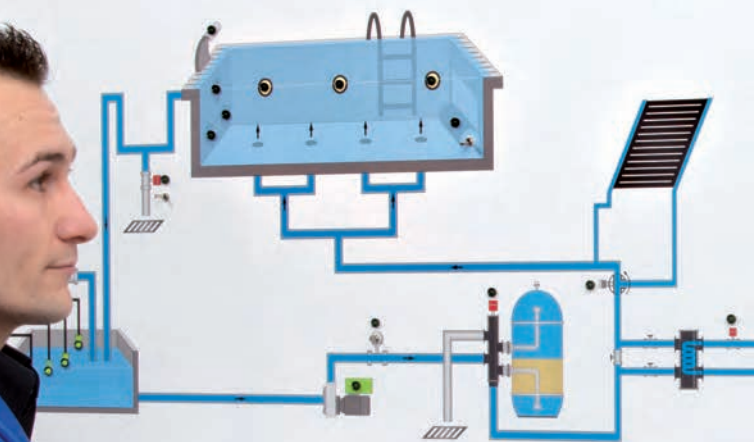
DULCOTEST® sensors deliver precise, reliable, application-specific measured values in real time. The sensors can be optimally integrated into the ProMinent control circuit along with controllers and metering pumps. Suitable bypass, installation and immersion fittings are also available for specific integration into the process.

## Measuring and control technology

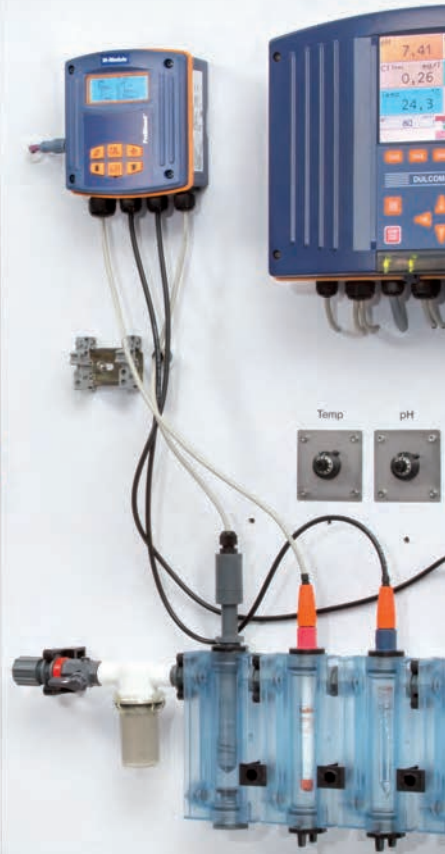
ProMinent's controllers can be easily adapted to your specific application. Gradual performance increments and application-optimised functions offer the perfect solution for every application. ProMinent offers complete product ranges from simple measuring signal conversion for transmission to a central control unit to calibratable instruments with measured value displays and controllers optimised for complex, application-specific control tasks in various industries. PROFIBUS® DP and Modbus RTU components are available for integrating circuits into a higher-level control system.

- Compact controller
- 1-channel controller D1C
- 1- and 2-channel multi-parameter controller DACa
- Multi-channel controller DULCOMARIN® II
- Various measuring transducers / transmitters
- Manual measuring instruments

DULCOMARIN® II für beste Wasserqualität  
in Ihrem Pool-Kreislauf



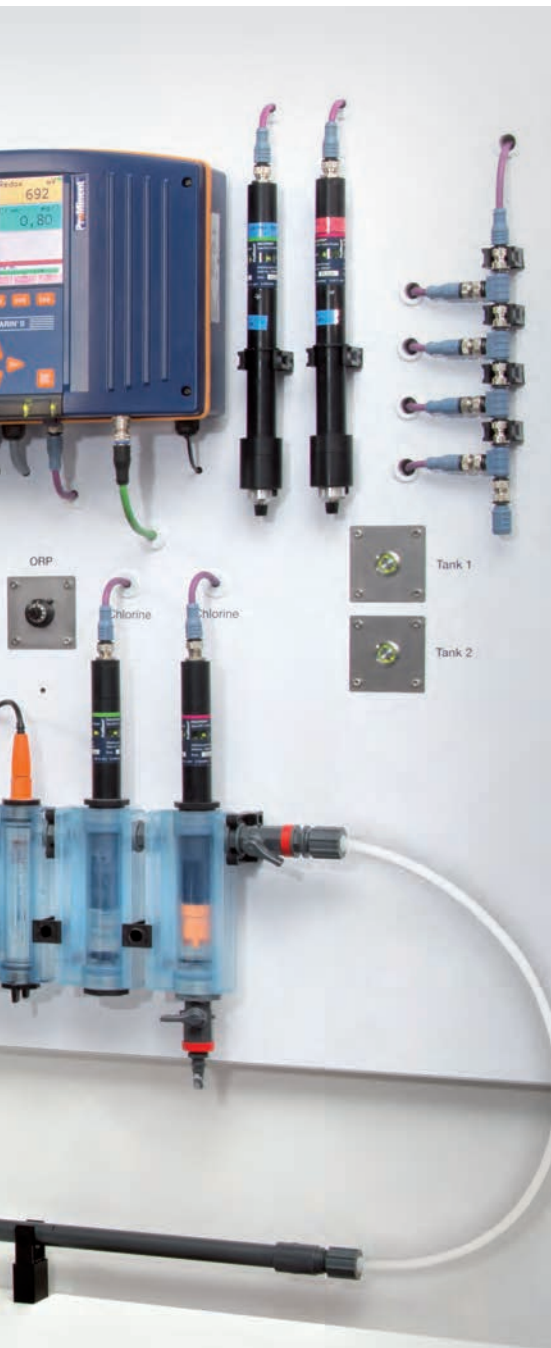
DULCOMARIN® II for optimum water quality  
in your pool circulation system





# Measuring and control technology made easy

## Process measurement stations fully assembled and ready for operation



**Online process measurement stations** are fully assembled and quickly started up. They are central components of control circuits for metering chemicals. The measured values are available in real time around the clock: this applies equally to the efficient control of chemical parameters in process water and determining the quality of treated water.

ProMinent measuring and control stations are offered with DULCOTROL® and DULCODOS® Pool as complete online measuring and control units for potable water, food and beverage applications, cooling water, waste water and swimming pools. Different designs are available to suit a range of applications. Individual configurations are also offered for customer-specific applications.

- Reliable and precise measurement
- Simple and flexible installation
- Economical thanks to minimal maintenance requirements
- Long operational lifetime thanks to high-grade materials and robust construction
- Precise handling

Users profit from extremely quick delivery times and straightforward commissioning thanks to plug & play technology. All of the components required for measurement, control and monitoring of the different types of water are coordinated with each other and mounted on a PE plate wired ready for connection.

### Benefits

- All of the components are perfectly coordinated and wired ready for connection
- Configuration of 1-3 measuring points, depending on the measuring, control or monitoring task
- The application-specific ordering system enables straightforward, quick and correct configuration of your measuring and control station



# Measuring and control technology

## Perfection for every requirement



### Maximum safety

#### DULCOTROL® potable water

Panel-mounted measuring and control stations for reliable treatment and monitoring of potable and similar water as well as for rinsing water and industrial/process water for use in the food and beverage industry:

- Disinfection
- CIP (Cleaning In Place)
- pH value adjustment
- Monitoring

#### Water to be measured

- Potable water
- Process water, product water
- Rinsing water, industrial water

#### Available measured variables (one of a combination of 2 measured variables)

- Free chlorine
- Total available chlorine
- pH value
- ORP
- Chlorine dioxide
- Chlorite
- Hydrogen peroxide
- Peracetic acid
- Conductivity, temperature
- Ozone
- Fluoride
- Dissolved oxygen

### Optimally purified

#### DULCOTROL® Waste Water

Panel-mounted measuring and control stations for waste water treatment:

- pH neutralisation and pH value adjustment
- Disinfection of purified water
- Elimination of reducing agents and oxidants for the purpose of detoxification
- Desalination of process water
- Monitoring of rinsing water
- Control of dissolved oxygen at the biological clarifying stage

#### Water to be measured

- Clear waste water
- Waste water with viscous media (turbid)
- Waste water with viscous media (containing sludge)
- Waste water with fluoride and pH < 7

#### Available measured variables (up to 3 combinations)

- pH value
- ORP
- Total chlorine
- Conductivity
- Chlorine dioxide
- Ozone
- Hydrogen peroxide
- Fluoride
- Temperature

# Metering, measuring and control systems DULCODOS® POOL

## DULCODOS® Pool, the right type for every requirement

The metering systems DULCODOS® Pool ensure the best water quality.

The systems come in four different designs. It's easy to work out which type is best suited to your requirements.



### DULCODOS® Pool Soft

DULCODOS® Pool Soft is especially suited to private pools used by a small number of people. It uses active oxygen compounds, which are less effective than chlorine. Water treatment with active oxygen is a good alternative for ecologically-minded pool owners or if users are allergic to chlorine. DULCODOS® Pool Soft uses no chlorine chemicals.

- For swimming pools with a volume of up to 100 m<sup>3</sup>



### DULCODOS® Pool Basic

DULCODOS® Pool Basic regulates the pH value and chlorine content via the ORP. This is the direct measurement of effective oxidation in the water and is therefore an indication of the disinfectant effect and concentration of the metered chlorine. The concentration of chlorine cannot be determined with accuracy with this process. ORP measurements allow a particular range of chlorine to be set. DULCODOS® Pool Basic is robust and requires little maintenance.

- For swimming pools with circulation capacity of up to 200 m<sup>3</sup>



### DULCODOS® Pool Comfort

DULCODOS® Pool Comfort uses highly specific chlorine measuring cells to control the chlorine content. The concentration of chlorine in the water can be determined and set with accuracy. The effectiveness of the pool filter is boosted by an integrated feeder assembly for flocculants, resulting in crystal-clear water! Numerous features to enhance operating convenience, such as measured values being mapped by a screen plotter or remote control from your PC, iPad or other tablet device using an integrated web server, make the metering system very popular with customers.

- For swimming pools with circulation capacity of up to 225 m<sup>3</sup>



### DULCODOS® Pool Professional

In addition to the features described above, DULCODOS® Pool Professional also measures the combined chlorine. This is an important parameter in public pools. It can be incorporated in the building management system via OPC and KNX and alarm messages can be sent by text or e-mail. Eco!Mode reduces the amount of energy consumed by the filter pumps. The integrated soft

PLC can be used to operate several peripheral devices and functions. The swimming pool controller becomes the central control unit for all the swimming pool technology.

- For swimming pools with circulation capacity of up to 1,130 m<sup>3</sup>

# Transmitter DULCOMETER® and controller DULCOMETER® Compact

Simple and compact



## Transmitter

### DULCOMETER® DULCOPAC

The DULCOPAC transmitter is designed for top hat rail mounting in control cabinets. It measures and controls the measured variables pH, ORP, chlorine, bromine, peracetic acid, hydrogen peroxide and conductivity in aqueous solutions. A typical application for the DULCOPAC is general water treatment and waste water treatment.

- Compact housing for installation on top hat rails
- Up to 10 measuring and control modules per power supply module

## Measuring transducer

### DULCOTEST®

#### PHV1, RH V1, Pt 100 V1, FPV1 and FP100V1

- For pH value, ORP, fluoride and temperature
- Space-saving installation on the sensor
- Cost-effective transmitter without display and calibration function

## Transmitter

### DULCOMETER® DMT

DULCOMETER® transmitters of type DMT are compact two-wire transducers for use with the measured variables pH, ORP, chlorine, conductive conductivity and temperature. They convert the primary sensor signal into a standard 4-20 mA signal and enable disturbance-free connection of the sensor to remote controllers (e.g. PLC Programmable Logic Controller) or DULCOMETER® controllers.

- With display and calibration of the measured value at the location of the sensor
- Optional connection to PROFIBUS® DP

## Basic controller

### DULCOMETER® Compact

The DULCOMETER® Compact controller for the measured variables pH, ORP, chlorine, conductive and inductive conductivity is supplied with the standard functions for basic applications in water treatment. The measured variable pH and ORP are available in a single controller and can easily be selected. Operation is language-independent.

Measured variable	Measuring and adjustment range
pH value	0–14
ORP	-1,000–1,000 mV
Chlorine	0.05–5 ppm
Conductive conductivity	0.5 µS/cm–20 mS/cm (auto-ranging)
Inductive conductivity	20 µS/cm - 2,000 mS/cm



# Controller

## DULCOMETER® D1Cb/D1Cc

### Universal standard



#### Controller

##### DULCOMETER® D1Cb/D1Cc

The controllers DULCOMETER® D1Cb (wall-mounted) and D1Cc (control cabinet installation) are the standard controllers for applications in potable water, waste water and cooling water treatment. Its basic model is equipped with 14 measured variables.

- Sensor monitoring and safety function to prevent incorrect metering
- 22 operating languages in the controller
- 14 measured variables selectable from the menu

#### Key applications

- Potable water and sewage treatment
- Industrial and process water treatment
- Swimming pool water treatment

#### Measured variables

- pH/ORP
- Conductive conductivity via mA
- Chlorine dioxide
- Chlorine
- Chlorite
- Ozone
- Fluoride
- Hydrogen peroxide
- Peracetic acid
- Dissolved oxygen
- Temperature
- Analogue signal

# Controller DULCOMARIN®

## Multi-parameter controller diaLog DACa

### Intelligent control



#### Controller DULCOMETER® diaLog DACa

The new one or two channel multi-parameter controller diaLog DACa was specially developed for the continuous measurement and control of parameters needed in liquid analysis. Sensors from 14 freely selectable measured variables can be connected per channel.

The standard field buses are available for communication with the control level. The incorporated data, calibration and event logger records all measured values, control variables, digital inputs, calibration values, warning and error messages with a time stamp. The diaLog DACa controller uses intelligent control functions to complete the control circuit between ProMinent DULCOTEST® sensors and ProMinent® metering pumps, offering special functions as required in water treatment.

- Two bidirectional PID controllers
- Integrated data logger with SD card
- Interference variable processing (flow)
- pH compensation for chlorine
- Various field buses
- Digital sensors

#### Key applications

- Potable water and waste water treatment
- Industrial and process water treatment
- Swimming pool water treatment

#### Measured variables

- |                                  |                     |
|----------------------------------|---------------------|
| ■ pH/ORP                         | ■ Ozone             |
| ■ Bromine                        | ■ Fluoride          |
| ■ Conductive conductivity via mA | ■ Hydrogen peroxide |
| ■ Chlorine dioxide               | ■ Peracetic acid    |
| ■ Chlorine                       | ■ Dissolved oxygen  |
| ■ Chlorite                       | ■ Temperature       |
|                                  | ■ Analogue signal   |



#### Advanced controller DULCOMARIN® II

The multi-parameter, multi-channel measurement and control system DULCOMARIN® II guarantees complete transparency of all measurement and control processes within networked systems. As the world's first bus system for potable water treatment and swimming pool engineering, it networks sensors and actuators at the field level. DULCOMARIN® II is simple to operate via the large illuminated colour display and can control up to 16 water systems or filtration circuits. An OPC server, web server and Profibus DP are available for communication with the superordinate systems (e.g. building management systems).

#### Measured variables

- pH value
- ORP
- Free chlorine
- Total available chlorine
- Combined chlorine
- Chlorine dioxide
- Chlorite
- Temperature
- Turbidity (via mA inputs)
- Fluoride, ammonia, UV intensity, flow

# Sensors for pH/ORP and fluoride sensor technology

## DULCOTEST® potentiometric sensors

### Application-optimised measurements

#### pH and ORP

The DULCOTEST® range of pH and ORP electrodes provides a wide range of options to solve key measurement problems in the monitoring and treatment of different types of water. The fields of application cover everything from simple water treatment tasks through to complex industrial process applications with stringent requirements in terms of temperature, pressure, contamination tolerance and chemical resistance.

#### Fluoride

Ion-selective electrodes are offered in two measuring ranges to measure fluoride for potable and waste water applications.

- Excellent durability thanks to high-end glass quality (pH) and the optimum combination of automated and manual manufacturing
- Precise and reliable measurement for efficient processes and maximum process safety
- Custom process integration through special designs with individual fitting lengths, cable lengths and plugs available
- Optimum operational lifetime yield for electrodes thanks to rapid delivery and short storage duration
- Ultra-simple installation and maintenance by means of rotating cable connection, with fixed cable and plug-in versions



Medium	Temperature / pressure	Sensor type	Application
clear, pH 3-14	max. 100 °C, 3 bar max. 25 °C, 6 bar	PHEP-H	Chemical processes
clear, pH 2-12	max. 80 °C, kein Überdruck	PHEN	Chemically contaminated water Low-conductivity water >50 µS/cm
		RHEN	Chemically contaminated water Low-conductivity water >50 µS/cm
	max. 60 °C, 3 bar	PHEP	Swimming pool water, potable water (glass shaft)
		PHEK	Swimming pool, aquarium (plastic shaft)
		RHEP	Swimming pool water, potable water (glass shaft)
		RHEK	Swimming pool, aquarium (plastic shaft)
max. 80 °C, 6 bar	PHEP/PHEPT	Process water	
	RHEP-Pt	Process water	
	RHEP-Au	Chemically contaminated water, e.g. CN <sup>-</sup> , ozone treatment	
solid residues, turbidity	max. 80 °C, 6 bar	PHER	Cooling water, waste water
		RHER	Cooling water, waste water
Solid residues, not transparent	max. 80 °C, 6 bar	PHEX	Suspensions, sludge, emulsions
		RHEX	Suspensions, sludge, emulsions
clear, containing fluoride, pH < 5	max. 50 °C, 7 bar	PHEF	Exhaust air scrubber, semiconductor industry, electroplating



# Sensors for disinfectants and oxidising agents

## DULCOTEST® amperometric sensors

### High process safety thanks to innovation

Amperometric sensors in the DULCOTEST® product range provide measured values for the most diverse disinfectants, such as chlorine, bromine, chlorine dioxide, ozone and their resulting by-products. The selective and precise measured values guarantee maximum process safety and are available round the clock for monitoring or control in real time. ProMinent sets new standards in sen-

sor technology: Innovative sensors, such as those for chlorite, total chlorine, peracetic acid, hydrogen peroxide and the contamination-tolerant xxR types, open up whole new applications. The sensors are available with a broad spectrum of measuring ranges, various designs and connection versions for DULCOMETER® controllers as well as custom versions for special applications.



Measured variable	Applications	Graduated measuring ranges	Connection to DULCOMETER®	Sensor type	
Free chlorine	Potable water, swimming pool water	0.01 – 100 mg/l	D1C, DAC	CLE 3-mA-xppm, CLE 3.1-mA-xppm	
	Washing water from F&B	10 – 200 mg/l	D1C, DAC	CLR 1-mA-xppm	
	Potable water, swimming pool water	0.01 – 100 mg/l	DULCOMARIN® II	CLE-CAN-xppm, CLE 3.1-CAN-xppm	
	Potable water, swimming pool water, in-situ Electrolysis (without diaphragm)	0.02 – 10 mg/l	D1C, DAC	CLO 1-mA-xppm	
	Hot water up to 70 °C, (legionella), in-situ electrolysis (without diaphragm)	0.02 – 2 mg/l	D1C, DAC	CLO 2-mA-2ppm	
	Potable water, swimming pool water		0.01 – 50 mg/l	DMT	CLE 3-DMT-xppm
			0.05 – 5 mg/l	DULCOMARIN® II	CLE 3-CAN-xppm, CLE 3.1-CAN-xppm
0.05 – 5 mg/l			COMPACT	CLB 2-µA-5ppm, CLB 3-µA-5ppm	
Cooling, process, waste water, water with higher pH values (stable)	0.01 – 10 mg/l	D1C, DAC	CBR 1-mA-xppm		
Total available chlorine	Swimming pool water with chlororganic disinfectants	0.02 – 10 mg/l	D1C, DAC	CGE 2-mA-xppm CGE 3-mA-xppm	
		0.01 – 10 mg/l	DULCOMARIN® II	CGE 2-CAN-xppm	
Total chlorine	Potable, raw, process and cooling water	0.01 – 10 mg/l	D1C, DAC	CTE 1-mA-xppm	
			DMT	CTE 1-DMT-xppm	
			DULCOMARIN® II	CTE 1-CAN-xppm	
Combined chlorine	Swimming pool water	0.02 – 2 mg/l	DAC	CTE 1-mA-2 ppm, CLE 3.1-mA-2 ppm	
		0.01 – 10 mg/l	DULCOMARIN® II	CTE 1-CAN-xppm, CLE 3.1-CAN-xppm	
Total available bromine	Cooling water, swimming pool water, whirlpool water with organic or inorganic bromine compounds	0.02 – 10 mg/l	DULCOMARIN® II	BRE 3-CAN-10ppm	
	Cooling water, waste water, swimming pool, whirlpool water, bromine with BCDMH	0.01 – 10 mg/l	D1C, DAC	BCR 1-mA-xppm	
Free and combined bromine	Cooling, process, waste water, water with higher pH values (stable)	0.02 – 20 mg/l	D1C, DAC	CBR 1-mA-xppm	
Chlorine dioxide	Potable water	0.01 – 10 mg/l	D1C, DAC	CDE 2-mA-xppm	
	Bottle washing system	0.02 – 2 mg/l	D1C, DAC	CDP 1-mA	
	Hot water up to 60 °C, cooling water, waste water, irrigation water	0.01 – 10 mg/l	D1C, DAC, DULCOMARIN® II	CDR 1-mA-xppm CDR 1-CAN-xppm	
Chlorite	Potable water, washing water	0.02 – 2 mg/l	D1C, DAC, DULCOMARIN® II	CLT 1-mA-xppm CLT 1-CAN-xppm	
Ozone	Potable, industrial, process and swimming pool water	0.02 – 2 mg/l	D1C, DAC	OZE 3-mA-xppm	
Ozone / zero ozone monitoring	Polluted water	0.002 – 2mg/l	D1C, DAC	OZR 1-mA-xppm	
Dissolved oxygen	Potable water, surface water	2 – 20 mg/l	D1C, DAC	DO 1-mA-xppm	
	Aeration tanks, clarification plants	0.1 – 10 mg/l	D1C, DAC	DO 2-mA-xppm	
Peracetic acid	CIP (cleaning in place), aseptic foodstuff filling	1 – 2,000 mg/l	D1C, DAC	PAA 1-mA-xppm	
Hydrogen peroxide	Clear water, fast control	1 – 2,000 mg/l	D1Ca	Perox-Sensor, PEROX-H2.10	
	Process, swimming pool water	0.5 – 2,000 mg/l	D1C, DAC	PER1-mA-xppm	

# Conductivity sensors **DULCOTEST®** Turbidity measuring points **DULCO® turb C**

Versatile **and** precise



## Conductivity sensors

### **DULCOTEST®**

The broad range of DULCOTEST® conductivity sensors offers the perfect choice of sensor with optimum cost-effectiveness for any task, from simple water treatment through to complex industrial process water applications.

- 25 different sensor types for a broad range of requirements: measuring range, temperature, chemical resistance, contamination tolerance and process integration
- From simple conductometric 2-electrode sensors to inductive high-end sensors
- Precise and reliable measurement enables efficient processes and maximum process safety
- High operational service life and long maintenance intervals reduce downtime and increase the availability of the measured values
- Complete ready mounted sets containing fitting and sensor enable easy, fast and trouble-free installation



## Turbidity measuring points

### **DULCO® turb C**

The DULCOTEST® measuring points for turbidity DULCO® turb C, which come in the TUC1, TUC2, TUC3 and TUC4 versions, are compact online turbidity measuring points, comprising sensor, flow fitting and measuring device.

They are used primarily in potable water treatment applications for all treatment stages, from raw water monitoring and filter monitoring through to measurement of fine turbidity in dispensed potable water at 0.02 NTU (FNU).

Further applications include the turbidity monitoring of lightly contaminated service water and waste water as well as water to be treated from the food and beverage industry up to turbidity values of 1000 NTU.

- Depending on the selected design, the system conforms to the worldwide standard ISO 7027 and the European standard DIN EN 27027 or the US standard USEPA 180.1
- Optionally available with sample cell ultrasonic cleaning system

# First-class measuring and control technology for an exclusive wellness experience



## “A premium classspa”

The Dolder Grand Hotel & “Curhaus” in Zurich is among the most beautiful wellness hotels in Switzerland. The water treatment technology provided by ProMinent is a major contributor to ensuring that the exclusive experience in this breathtaking spa remains unforgettable.

Pumps and controllers from ProMinent ensure effective disinfection and neutralisation of the pool water in the gigantic 4000 m<sup>2</sup> spa.

The water for the swimming pool, whirlpools and aroma pools is efficiently treated in multiple stages using seven separate circuits. The control signals to all the metering pumps are sent via LAN from the central control unit DULCOMARIN® II DULCO®-net, which forms the “brains” of the water treatment system. In an interview, Carsten Behr, Director of Engineering for the spa area, gives his assessment of the control system.

Mr Behr, what is the purpose of the DULCOMARIN® II DULCO®-net in your facility?

**Carsten Behr:** “The innovative controller from ProMinent is responsible for accurately controlling all the metering pumps in the system and displaying all the relevant information for the operator.”

How does this affect the water quality?

**Carsten Behr:** “The safe and controlled neutralisation and disinfection in the Aqua Zone of the Dolder Grand ensures that premium water quality is guaranteed around the clock.”

Do you benefit in any other ways?

**Carsten Behr:** “Our running costs are reduced in two ways: firstly due to the minimal use of chemicals and secondly due to automated water care, which is achieved through the integration and connection of intelligent measuring, control and metering technology within the higher-level process control system.”



# Service



## Global service locally

You can benefit from ProMinent's services even if you are not yet our customer.

Our pre-sales service will ensure that you obtain the optimum solution to meet your individual needs.

Thanks to our worldwide presence in over 100 countries, our service is available wherever you need it.

- Advice on product selection
- Application and process optimisation
- Project planning

However, our commitment does not end with delivery. We also provide you with a comprehensive after-sales service, which lasts for the entire service life of your equipment. This maximises your productivity and minimises your operating costs.

- Assembly/installation
- Commissioning
- Maintenance
- Spare parts service
- Repairs
- Troubleshooting

## Contact worldwide

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### Experts in Chemical Feed and Water Treatment

The ProMinent® Group is at home in over 100 countries across the globe. We supply products, systems and service solutions with the same standards

all over the world: quality and reliability. All our experience and expertise in water treatment and metering technology is at your disposal – any time, anywhere.

**ProMinent Group**

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