

GRUNDFOS OXIPERM PRO

The Oxiperm Pro offers superior water disinfection technology for all types of water systems. It has the following, unique features:

- Destroys both free bacteria and biofilm
- Uses chlorine dioxide, which is extremely efficient, but has no effect on the taste and smell of the water
- The robust design of the Oxiperm Pro ensures high operational reliability and low maintenance costs
- User-friendly operation
- Easy installation with no interruption of the building's water supply

GRUNDFOS OXIPERM PRO SUPREME WATER DISINFECTION

ALL ROUND CHLORINE DIOXIDE SOLUTIONS



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OXIPERM PRO INTRODUCTION

THE GRUNDFOS OXIPERM PRO SYSTEM ENSURES EFFECTIVE DISINFECTION OF WATER IN A SERIES OF APPLICATION AREAS

Water disinfection is of great importance in all buildings with drinking water consumption, and particularly in buildings that supply shower and bathing facilities. Water disinfection is also essential in applications where water mist is sprayed into the air, for instance cooling towers and evaporative condensers.

Grundfos' OxiperM Pro system ensures safe, clean water to all its end users in buildings such as:

- Hotels
- Hospitals
- Sports and swimming facilities
- Fitness centres
- Wellness resorts
- Residential buildings

Drinking water regulations

Worldwide drinking water regulations require clean and healthy water free of:

- Bacteria (legionella, salmonella etc.)
- Viruses (hepatitis, polio, norovirus etc.)
- Parasites (giardia, cryptosporidium, entamoeba etc.)
- Fungus spores (yeast, moulds etc.)

LEGIONELLA CONTROL BEGINS HERE

The problem

Naturally, the water we drink and shower in has to be clean if we are to stay healthy. Unfortunately, one of the most widespread health hazards in drinking water installations worldwide is connected to exceptionally resistant bacteria – legionella.

Legionella exist mainly in hot water systems with a low flow rate, areas of stagnation or badly serviced hot water tanks. A layer of slime in the water pipes called biofilm is the habitat for legionella and other microorganisms. The bacteria live, breed and thrive in biofilm in temperatures between 30 and 50°C and they constitute a severe health risk.

The solution

The Grundfos OxiperM Pro system is the all round solution to the hazard of both legionella and other kinds of micro organisms. It offers the following unique benefits that remain unmatched by other disinfection methods:

- Works on both bacteria and biofilm
- Affects highly chlorine resistant germs
- Efficient in areas of the pipe system with no flow (dead ends)
- No effect on the taste and smell of the water
- Sustained release effect for long-term disinfection



TOUGH PROBLEM – GENTLE SOLUTION

What are legionella bacteria?

Legionella bacteria are the primary source of legionnaire's disease – a potentially fatal disease, particularly for those with a weakened immune system. It is estimated that legionnaire's disease is responsible for 15-20,000 deaths in Europe every year.*

Legionella bacteria and the biofilm where they live and feed are highly resistant to most disinfection methods. That makes effective combat against them difficult, and their successful elimination calls for specific and highly specialised solutions.

The right solution is both tough and gentle

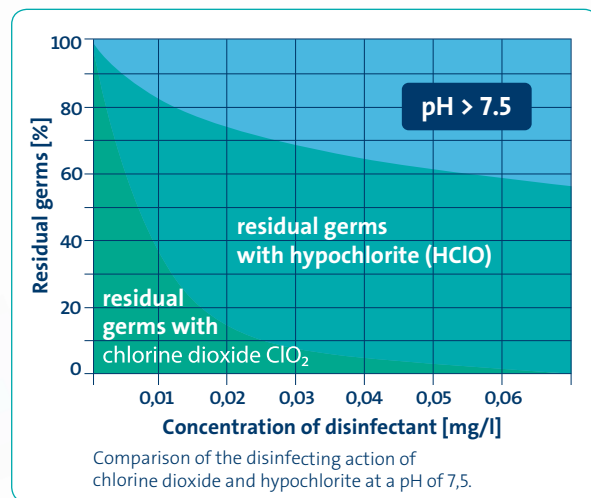
There are many approaches to fighting legionella bacteria and biofilm, but no approach is as efficient or gentle as the Grundfos Oxiperm Pro system. The system effectively battles legionella and biofilm without affecting the taste and smell of the water. By choosing Oxiperm Pro, you have made the right choice for the safety and comfort of the end consumers.

*Source: Robert Koch Institute, Berlin, 2008



Legionella pneumophila; the primary source to legionnaire's disease.

Comparison of the disinfectant action



Characteristics of typical disinfection solutions

This chart illustrates how the typical solutions for disinfection perform on a number of parameters. The chlorine dioxide solution of the Oxiperm Pro system is superior to the rest.

■ = Inferior
■ = Average
■ = Superior

Disinfection principle	Benefits							
	Removes biofilm	Effective against bacteria in biofilm	Effective against free bacteria	Affects water taste and smell	Sensitive to water-pH	Life cycle cost	User scalding risk	Long-term effect
Thermal treatment	No	Low	Mid	No	No	High	Yes	No
UV radiation	No	No	High	No	No	Mid	No	No
Filtration	No	No	No	No	No	Mid	No	No
Chlorination (hypochlorite sol.)	No	Mid	High	Yes	Yes	Low	No	Mid
Ozone	No	No	High	No	No	Low	No	No
Chlorine dioxide	Yes	High	High	No	No	Low	No	High



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THE BENEFITS

The chemistry of great benefits

The Oxiperm Pro system uses chlorine dioxide for the disinfection of water. This particular chemical compound presents a number of advantages that cannot be matched by any other disinfection method.

Removes both free legionella and biofilm

Legionella bacteria grow and reproduce in biofilm as does 90% of all bacteria in water systems. Biofilm is a layer of slime that exists in water pipes and especially in hot water tanks. Chlorine dioxide diffuses into the biofilm and destroys it from within, whereas other disinfectants only attack the surface of the film.

No effect on water taste and smell

Chlorine dioxide does not form the toxic chloramines and haloforms that are a by-product of chlorine-based disinfection methods. In effect, the water neither tastes nor smells of chlorine with the use of the Oxiperm Pro.

Water pH adaptable

With chlorine dioxide, no particular pH value is needed, which makes it an extremely flexible disinfectant.

Long-term effect

Chlorine dioxide has the best residual effect of all the available disinfection methods. It stays in the water system for several days, reaches into every crack of the pipe fittings, and even dissolves into dead-end pipes with no water flow.

Digital dosing

The Oxiperm Pro is a digital dosing system which makes it flexible, cost effective and eliminates the risk of overdosing.

Compact design

The Oxiperm Pro has a built-in measuring application, which measures the residual chlorine in the water. It also has an integrated digital dosing pump making it an all-in-one compact solution.

Low life cycle cost

Water disinfection with the Oxiperm Pro means reduced chemical use and reduced energy consumption. The chemical use is reduced due to the advanced batch-reaction-technology and the high-precision flow measurements that adjust the amount of chemicals to the current flow giving the Oxiperm Pro an extremely low overall life cycle cost.



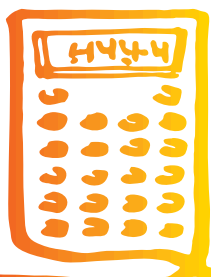
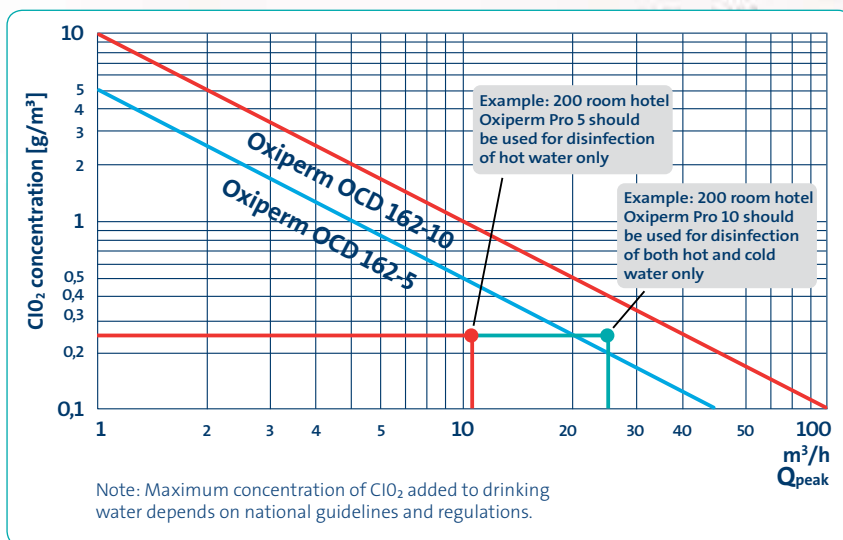
OXIPERM PRO SIZING

CONCENTRATION

Typical dosing rates in building applications are between 0,1 and 0,4 g/m³.

The exact quantity of required chlorine dioxide is defined by testing on-site. Samples are taken from the various water outlets in the building and tested for chlorine dioxide residual. Based on the residual amount, the unit settings can be adjusted. Contact your local Grundfos office for a detailed overview of the guidelines and regulations relevant to your project.

Selection chart



FLOW

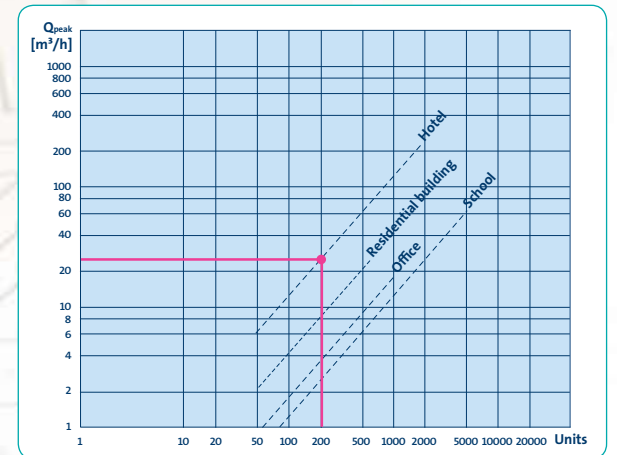
The required total consumption and maximum flow requirement depends on the building type. There is a big difference in annual water consumption, daily maximum consumption and the peak consumption in a block of flats compared to a five star hotel. If you have no reliable flow measurements in the building, the table below gives you an example of how to calculate peak water flow in various types of buildings in order to select the right Oxiperm Pro.

Example of calculation of maximum hourly flow rate in a 200-bed hotel

Annual water consumption: $Q_{year} = 180 \text{ m}^3/\text{bed}/\text{year}$
 Consumption period: 365 days/year
 Average daily consumption: $Q_{avg} = 180 / 365 = 0,5 \text{ m}^3/\text{bed}/\text{day}$
 Day factor: $f_d = 1,5$
 Maximum daily flow rate: $Q_{max} = 0,5 \times 1,5 = 0,75 \text{ m}^3/\text{bed}/\text{day}$
 Peak factor: $f_p = 4$
 Maximum hourly flow rate per unit: $Q_{peak} = 0,75 \times 4 / 24 = 0,125 \text{ m}^3/\text{bed}/\text{h}$
 Number of beds: $n = 200$
 Maximum hourly flow rate for the whole hotel: $Q_{peak} = 200 \times 0,125 = 25 \text{ m}^3/\text{h}$ (hot and cold water)
 Maximum hourly flow rate for the whole hotel: $Q_{peak} = 25 \times 0,4 = 10 \text{ m}^3/\text{h}$ (hot water only)

Alternatively, use the quick glance flow chart to the right.

Quick glance flow chart, Q_{peak}



Defining peak flow, Q_{peak}

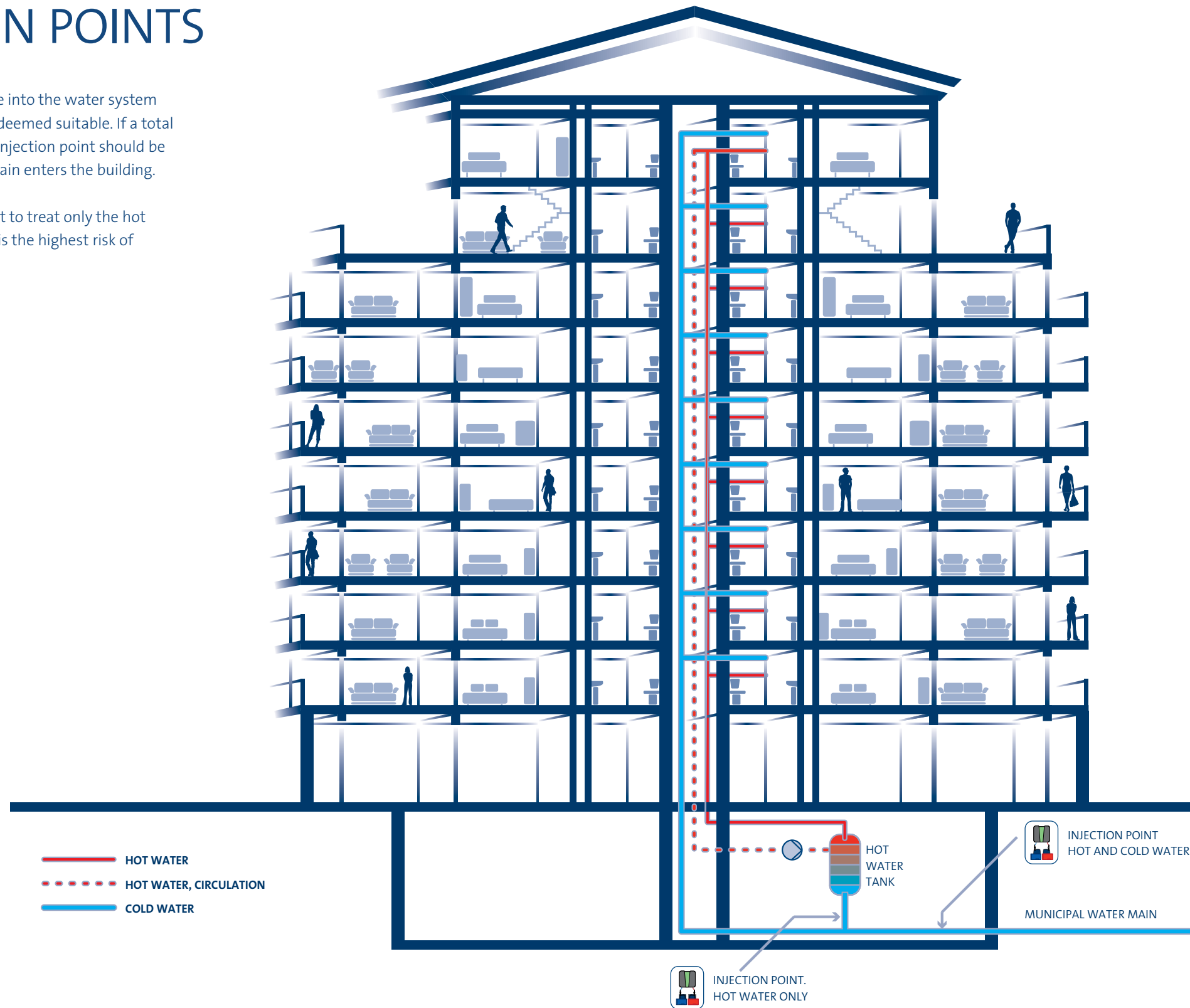
Building type	Unit	Q_{year} [m ³ per year]	Consumption period [days/year]	Q_{avg} [m ³ /unit/day]	f_d	Q_{max} [m ³ /unit/day]	f_p	Q_{peak} [m ³ /unit/h]
Residential building	Residents (2,5 pers.)	183	365	0,5	1,3	0,65	1,7	0,046
Office buildings	Employee	25	250	0,1	1,2	0,12	3,6	0,018
Shopping centre	Employee	25	300	0,08	1,2	0,1	4,3	0,018
Supermarket	Employee	80	300	0,27	1,5	0,4	3,0	0,050
Hotel	Bed	180	365	0,5	1,5	0,75	4,0	0,125
Hospital	Bed	300	365	0,8	1,2	1,0	3,0	0,120
School	Pupil	20	200	0,1	1,3	0,13	2,5	0,014

Above figures are assumptions based on Danish legislation DS 442/1989 Code of Practice for common water-works. Calculation of water flow etc. may vary from country to country depending on national guidelines and legislation.

INJECTION POINTS

Injection of chlorine dioxide into the water system can be done wherever it is deemed suitable. If a total disinfection is desired, the injection point should be located where the water main enters the building.

In most cases, it is sufficient to treat only the hot water system where there is the highest risk of bacteria growth.



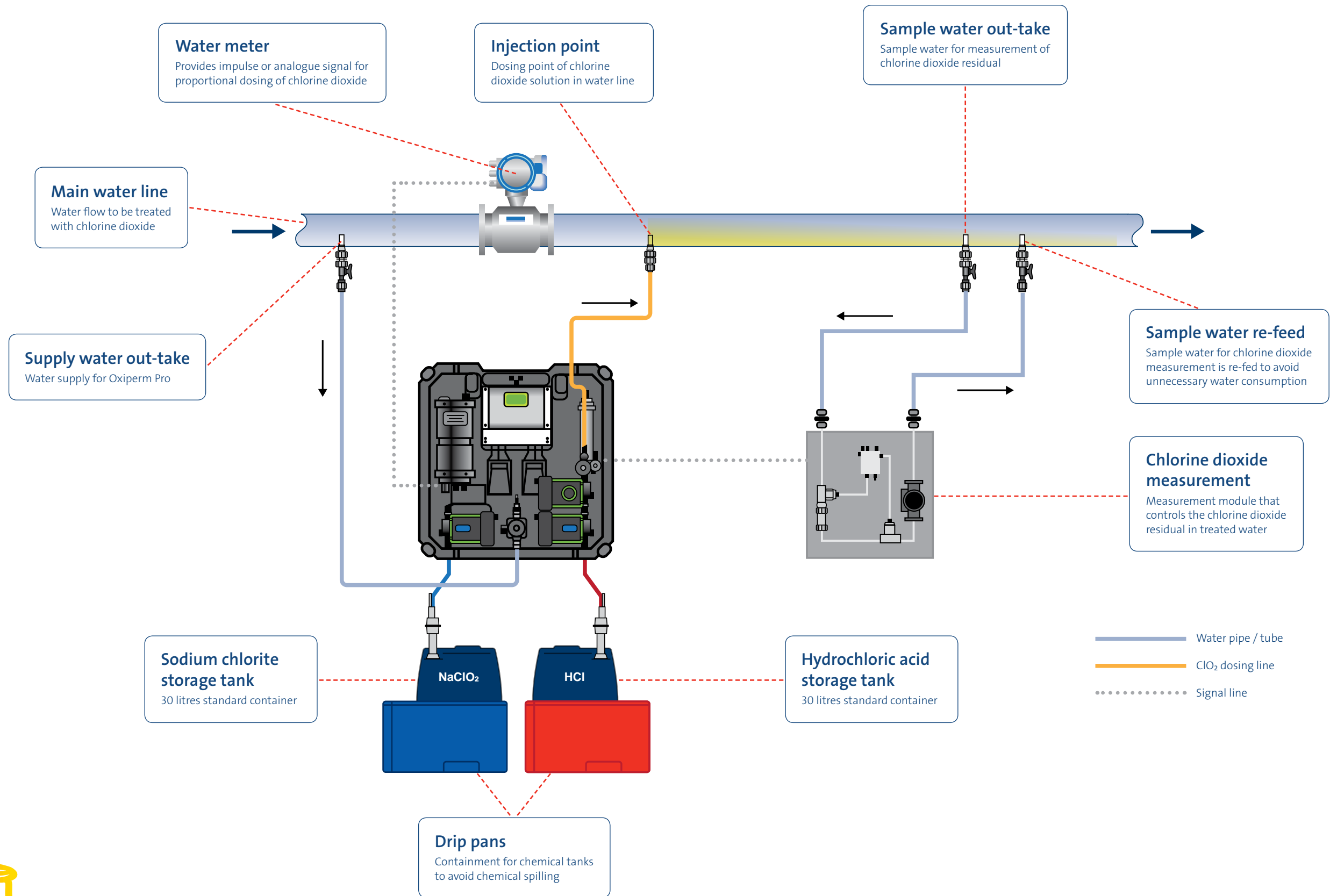
LE MERIDIEN BRISTOL – FIVE STAR HOTEL IN WARSAW

A five star hotel must deliver the very highest level of comfort and safety for its guests. Le Meridien Bristol in Warsaw opened in 1993 and relied on the expertise of Grundfos for all its installations. Grundfos provided circulation pumps, boosters and wastewater pumps. To ensure the guests' protection from legionella bacteria, the hotel chose to install the Oxiperm Pro. As a result, the hotel can continue to provide world-class service, and the health and safety of its guests is secured.



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THE DETAILS



Technical data

Chlorine dioxide generation capacity	OCD-162-5 OCD-162-10	5 mg/l 10 mg/l
Adjustment of the preparation capacity	manual by menu-controlled operator prompting, automatic by input signal	
Protection level	IP 65	electronics, dosing pumps, solenoid valve
Required concentration of chemicals	• HCl (to EN 939) • NaClO ₂ (to EN 938)	9% by weight 7,5% by weight
Admissible • ambient temperature • operation water temperature • chemicals temperature	5 - 35°C 10 - 30°C 10 - 35°C	
Admissible operation water pressure	3 to 6 bars	
Admissible relative air humidity	max 80% at 35°C, not condensing	
Concentration of the chlorine dioxide product solution	ca. 2 g/l (2000 ppm)	
Material	system rack fastening sleeves solenoid valve reaction / storage tank internal hoses gaskets	PP stainless steel PVC PVC PTFE FPM
Full text menu control for	• commissioning • entering operating parameters • rinsing the system • maintenance	
Connections	dosing line ClO ₂ dilution water	230 V hose 4/6" 115 V hose 1/8" x 1/4" 230 V hose 6/9" or 6/12" or PVC pipe DN10 115 V hose 1/4" x 3/8"

Electrical and electronic data

Mains connection	110/120 V / 50-60 Hz or 230/240 V / 50-60 Hz
Power consumption	ca. 50 VA
Analogue input	• input 0(4) - 20 mA (water meter) • measuring cell (ClO ₂ pH or Redox, temperature) (option)
Digital input	• contact water meter (min. 3 pulses/min., max. 50 pulses/sec) • remote On/Off
Analogue output	• output 0(4) - 20 mA (pump regulation) • measured value ClO ₂ 0(4) - 20 mA
Potential-free output	• alarm relay, 250 V / 6 A, max. 550 VA (chemicals empty signal, dosing time monitoring, preparation process time monitoring, wire break current output) • warning relay, 250 V / 6 A, max. 550 VA (chemicals empty pre-alert, maintenance) • ClO ₂ dosing pump

THINKING BUILDINGS

At Grundfos CBS, we are always thinking buildings, and our products contribute to making buildings that can almost think for themselves. We do not just consider our products as stand alone devices – we consider them an integral part of a living building whose purpose is to function in the best way possible for its inhabitants.

Our expertise is founded in decades of global experience and we are proud to share our knowledge with our clients. We are also determined to take the lead on new technologies and innovation opportunities.

To learn more about Grundfos CBS and to find out how we can be of assistance, contact Grundfos .

Grundfos CBS offers products across the full range of applications, including heating, air conditioning, waste water, booster systems, fire protection systems and district energy.

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