KHS CoolFlow
COLD WATER CIRCULATION

// Hygienically safe cold water temperatures against Legionella growth
// Sustainable water use through minimisation of flushing volumes
// Ensuring and documenting operation according to intended use
// Payback achievable in less than two years

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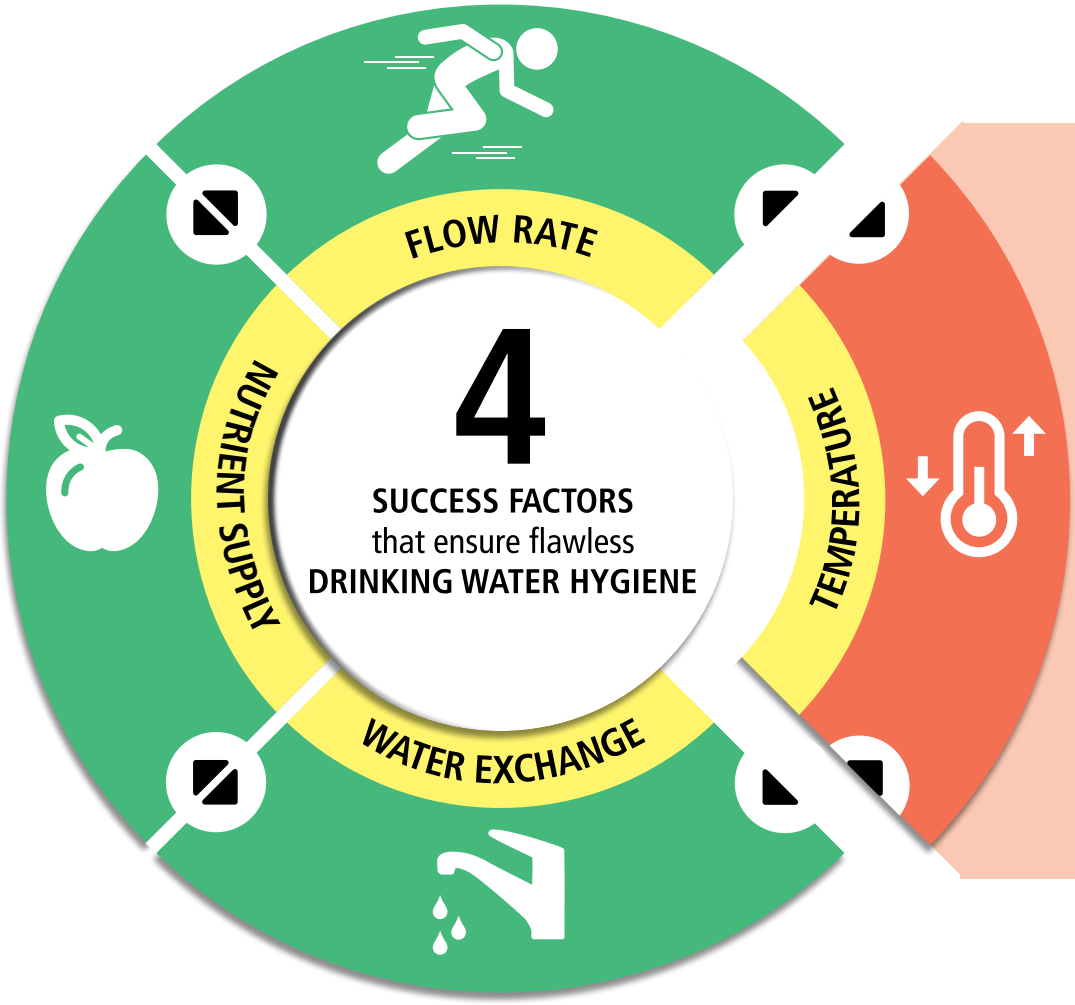
DRIVING PROGRESS

Four success factors

Challenges in the design and implementation of drinking water hygiene



The pipes should be sized in such a way that, during intended use, flow velocities occur several times a day that cause appreciable shear forces on the pipe walls.

The release of nutrients from materials must be reduced as far as technically possible. This also indirectly serves to prevent microbial growth both on the surface of the material and in the drinking water.

The design of a drinking water installation must result in a high water exchange in all sections, particularly in individual and floor supply pipes.

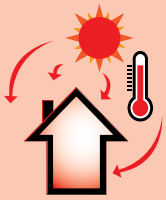
In circulating hot-water installations,
the temperature must be kept above 55°C at all points. However, the need to maintain a given temperature applies equally to the cold water: here the temperature should not exceed 25 °C (acc. German regulation).

Current obstacle

Cold water temperature – the design hurdle

INTERNAL HEAT LOADS

High heat loads in installation areas
Heat sources such as hot water pipes in plumbing and heating systems and components in electrical and ventilation systems cause a rise in temperature in the cold-water pipe to more than 25 °C in a two-hour stagnation phase, even if the insulation complies with DIN 1988-200.



EXTERNAL HEAT LOADS

High ambient air temperatures
High external air temperatures can cause ambient air temperatures of more than 25°C in buildings without air conditioning. In the event of stagnation, cold-water temperatures below 25°C can no longer be achieved as a result.

Incoming main water temperatures
Where drinking water is sourced near ground level in the summer months, the temperature of water fed into drinking water installations is higher (> 20 °C), reducing the maximum tolerable stagnation time even further.

Drinking water hygiene is the operator's responsibility

When stagnation occurs, the drinking water adapts to the temperature of the ambient air. This can lead to a change in the drinking water quality that is harmful to health. An increase in temperature to over 25 °C is particularly risky, as microorganisms such as Legionella multiply in lukewarm temperature ranges. Operators of public buildings have a particular obligation to ensure hygienically perfect drinking water throughout the entire drinking water installation at all times.

Purely to avoid stagnation, the total water content of the installation must be replaced every 7 days. If this cannot be guaranteed by normal use, flushing against stagnation must be carried out.

However, these measures are not sufficient if internal and external heat loads (see above) cause the temperature of the cold water to rise above 25 °C. In this case, additional temperature-controlled flushing is necessary; however, this is not justifiable in terms of economy and sustainability.

1

KHS Flow-Splitter unit – dynamic – Figure 650 02

2

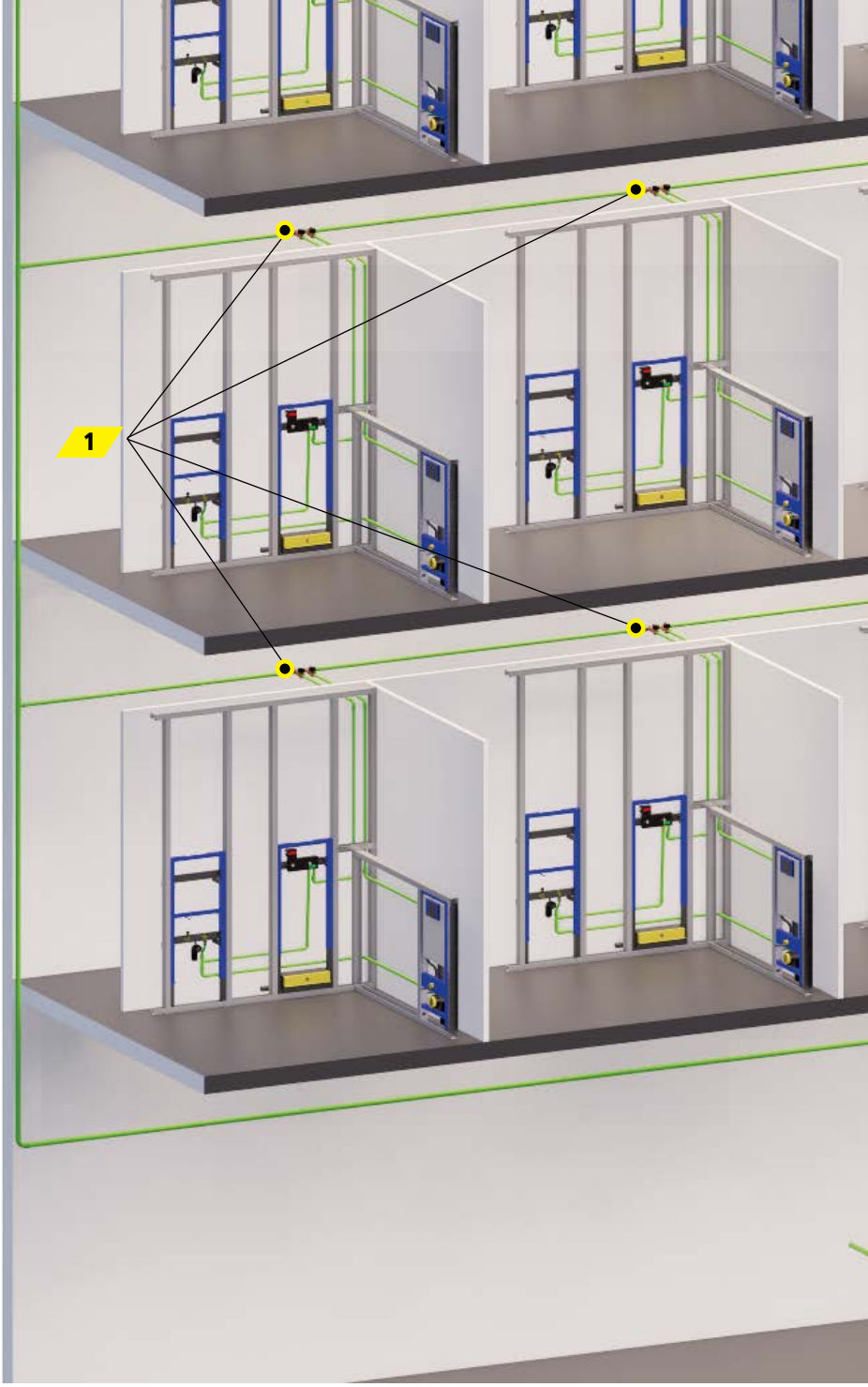
KHS Mini Control System MASTER 2.1 and SLAVE, Figure 686 02 008 and Figure 686 02 006

3

KHS Flush Point 230 V with CONTROL-PLUS, Figure 684 05

4

KHS temperature sensor Pt1000, Figure 628 0G



The solution

Permanently cold drinking water up to the tapping point

In many buildings, sustainable and economically justifiable protection against unacceptably high cold-water temperatures is only possible with cold water circulation with cooling. KHS CoolFlow instantaneously cools the drinking water precisely to 15 °C. The circulation volume flow is controlled in such a way that the recirculated drinking water measures 20 °C. Active temperature maintenance ensures that temperatures < 20 °C can be realised – even in buildings where thermal separation is only possible to a limited extent or where there are high heat loads in most installation areas.

In addition to temperature maintenance, water exchange is essential for maintaining drinking water hygiene. KHS CoolFlow balancing valve technology can not only hydraulically balance multiple circulation circuits but also ensure the water exchange required by the relevant standards.

In a cold water circulation system with KHS CoolFlow, there is less microbiological growth, and flushing volumes are sustainably reduced to a minimum.

KHS CoolFlow

The components

5

KHS CoolFlow
cold water balancing valve
Figure 615 0G

6

KHS CoolFlow
cooler,
Figure 610 01 001

7

KHS CoolFlow
chiller,
Figure 618 01

For detailed product information, see pages 6 and 7

See the
KHS CoolFlow
in action!

YouTube

Innovative installation method

Benefits for new builds and retrofitting

KHS CoolFlow ensures a controlled temperature maintenance of < 20 °C in all pipe sections and can be retrofitted in both conventional installations and Flow-Splitter installations. In an installation with Flow Splitters, the temperature can even be maintained right up to the tap connections. Additionally, the pipework already installed to cover the water demand is suitable for cold-water circulation and can also be used for this purpose. Existing Flow-Part installations can therefore be retrofitted with KHS CoolFlow with little effort or cost.

The KHS Flow-Splitter eliminates the need for additional valve technology including cabling up to the bathroom. A cold water balancing valve at the end of the line ensures hydraulic balancing and enables targeted water exchange on each floor. It is also possible to monitor the operating states, such as temperatures, at a central point with the KHS Mini Control System. Furthermore, with a Flow-Splitter installation, only one flush point is necessary per building section – this gives a clearer overview and reduces the number of components requiring maintenance.

KHS CoolFlow Components

KHS CoolFlow cold water balancing valve

Thermostatic balancing valve with integrated flushing function

3 functions – 1 valve

// Balancing function: Thermal balancing function with an operating range from 15°C to 20°C ensures automatic hydraulic balancing of the cold water circulation system
// Flushing function: turbulent flow in all areas of the drinking water installation
// Stop function: electrical stop function for absolute control of the system from a single central point

100 % design reliability

A single control range for all applications simplifies sizing and guarantees reliability at all design and operation stages).

Retrofittable

Existing KHS systems can be retrofitted with little effort or cost.

KHS CoolFlow
cold water balancing valve,
Figure 615 0G

KHS CoolFlow cooler

Flow-through drinking water cooler with integrated circulation pump

Huge output in a minimal space

With a space requirement of less than 0.5 m², buildings with a pipe length of up to 2000 m can be cooled to less than 20°C.

The all-rounder

An innovative storage solution means it can be used without restriction in all existing and new process-coolers and chillers.

The complete package

The pre-assembled compact unit with integrated circulation pump already contains all necessary components for the drinking water side, is insulated so as to be diffusion-tight and is preconfigured.

KHS CoolFlow
cold-water cooler,
Figure 610 01 001

Accessories

KHS CoolFlow chiller
4.7 (1.6–5.6) kW,
Figure 618 01 001-00

KHS CoolFlow chiller
7.6 (2.0-10.0) kW,
Figure 618 01 002-00

KHS CoolFlow chiller

Air-cooled chilled-water unit for connection to the KHS CoolFlow cooler

Demand-driven cold-water production

// Maximum efficiency thanks to preconfigured controller matched to the KHS CoolFlow cooler
// Infinitely variable cooling control with extremely low noise level of 68.5 dB(A)
// Low space requirement of less than 1.0 m² with a cooling capacity up to 10.0 kW

KHS CoolFlow data logger and gateway
for KHS CoolFlow cooler,
Figure 611 00

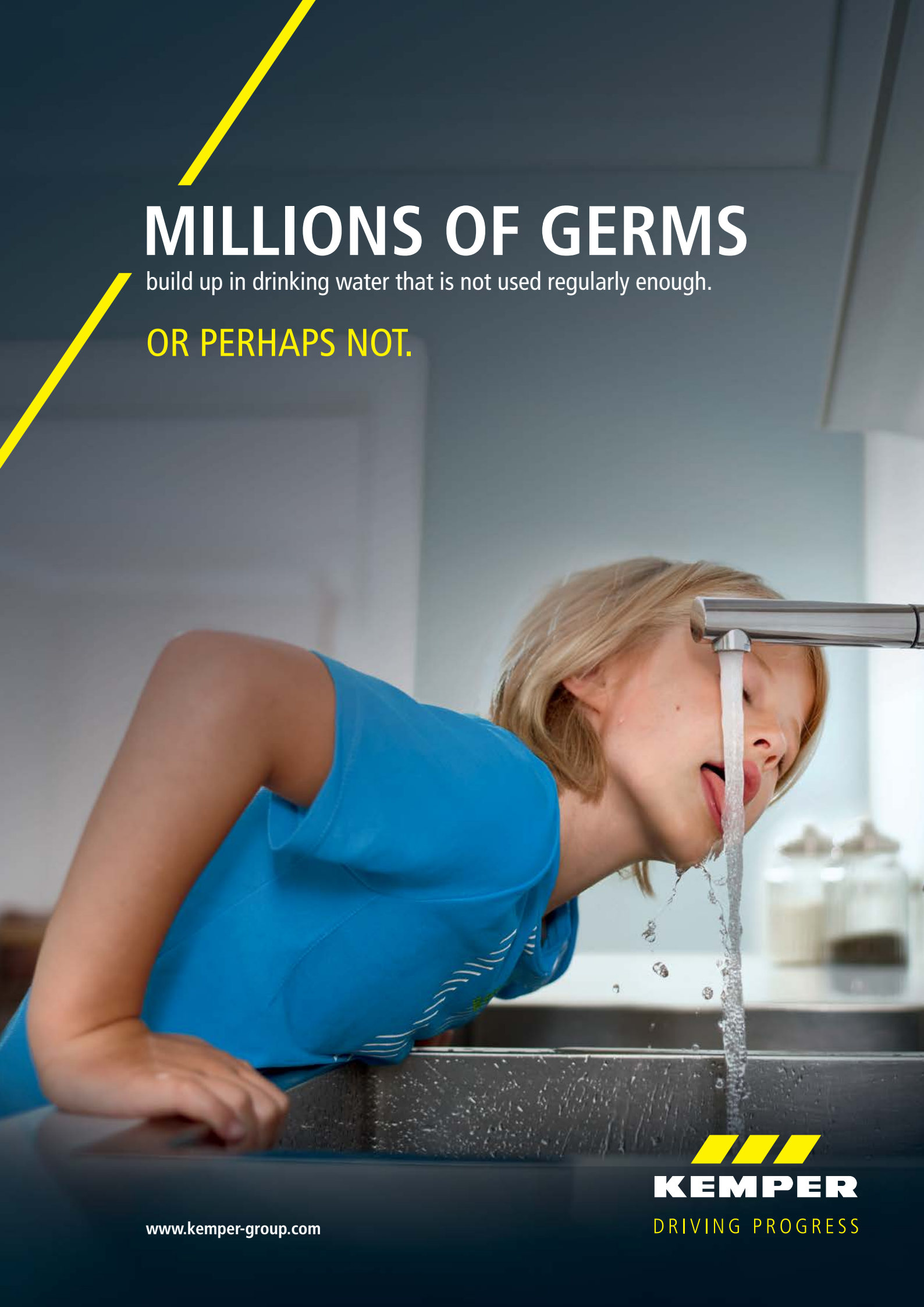
KHS CoolFlow data logger and gateway

for the KHS CoolFlow cooler for connection to the building management system

// saves all analysable parameters and serves as interface for the BMS/GA via Modbus TCP/IP
// Data storage on micro SD card supplied
// readable and writable data points provided via Ethernet using Modbus TCP/IP protocol

Further accessories

Designation/Figure No.	Part No.
KHS CoolFlow connection set for CoolFlow Chiller Figure 619 01	**6190100000**
Vibration damper set for cold water chiller, Figure 619 02	**6190200000**
Insulation shell for KHS CoolFlow cold-water balancing valves, Figure 471 27	**4712701500**


MILLIONS OF GERMS
build up in drinking water that is not used regularly enough.
OR PERHAPS NOT.
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Sustainable and economical control of your drinking water hygiene

Economic assessment of KHS CoolFlow

Application case

Real hotel

// Existing large building in the form of a hotel.

Problem definition

High heat load on the cold water

// Due to the structural conditions, it was not possible to implement separate risers for hot- and cold-water pipes.
// The building owner's requirement for a separate shut-off of the water pipework on each risers resulted in common pipework services in the false shafts with high heat loads.
// Above and beyond the frequent water exchange required by the relevant standards, further flushing quantities were needed to maintain the temperature.

Proposed solution

Cost-effective temperature control with KHS CoolFlow

// Active temperature maintenance of the drinking water by installing cold water circulation including cooling and hydraulic balancing of, volume volume flow.
// Ensuring the regular water exchange required by the relevant standards through a cold water balancing valve and terminal flush valve.
// Existing Flow-Splitter technology allows circulation of cooled drinking water up to the tap connections.
// Combined with the hot water circulation, the building owner has full temperature and stagnation control in the entire hot-water and cold-water installation.

Building data

PWC pipework length	2507 m
PWC water capacity	970.4 l
PWC inner surface area	152.88 m²

Hotel rooms	210
Floors	6
Cleaning rooms with basins	18
Basins	216
WCs	225
Showers	210

ROI calculation

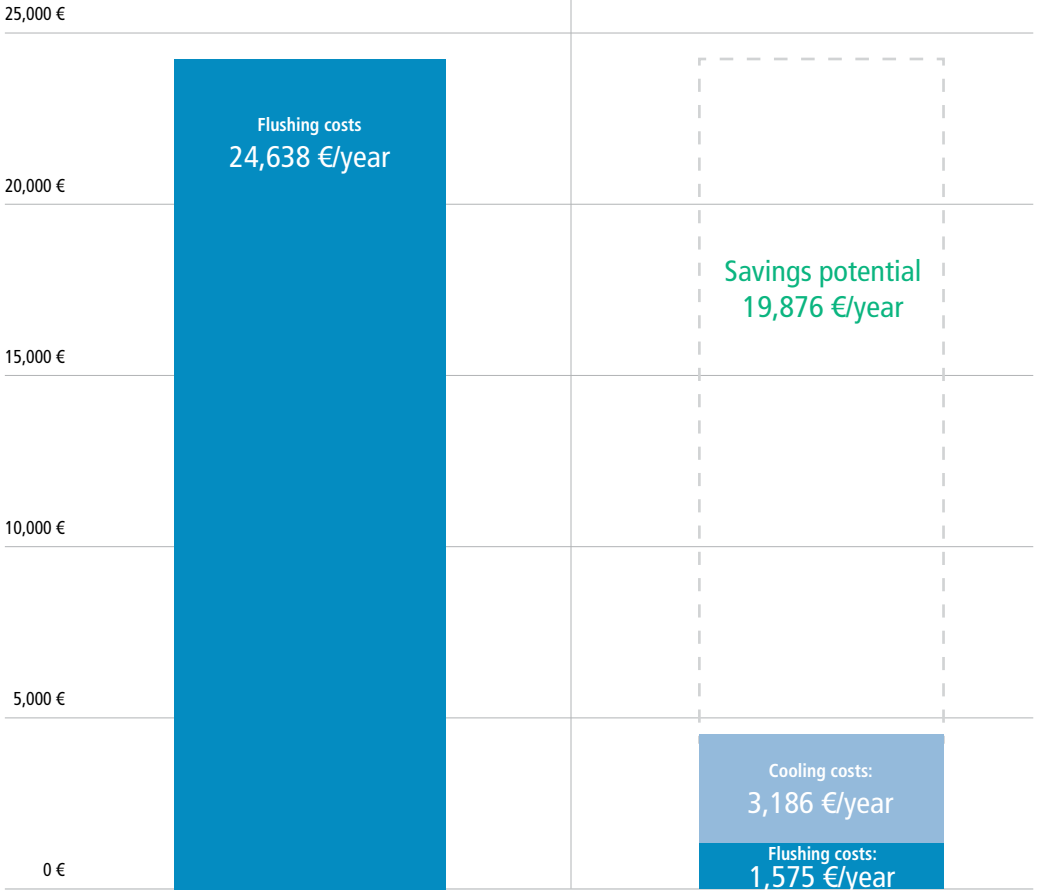
Application case: Large building real hotel
Flushing v. active cooling

Flushing

Internal and external heat loads can lead to the fresh drinking water being heated to a hygienically unsafe level within a very short time. This often results in short flushing intervals – the flushing volumes required to meet the specifications of the relevant standards (ϑ_{PWCmax} = 25°C) are increased drastically as a result.

Active cooling

From an economic and hygienic point of view, the use of cold-water circulation with cooling offers significant advantages under the above conditions. With permanent temperature maintenance (ϑ_{PWCmax} = 20°C), active drinking water cooling with KHS CoolFlow meets the highest requirements for drinking water hygiene. And at impressively low operating costs.



Flushing costs:

13.5 m³/day
flushing volume required
365 days/year
5 €/m³*

Σ **24,638 €/year**

Flushing costs:

6.06 m³/week flushing volume required
52 weeks/year
5 €/m³*

Σ **1,575 €/year**

Cooling costs:

// **5.01 kW**
cooling capacity required
// **5.51 SEER score**
Chillers
// **0.9 kW**
electrical power
// **8,760 h/year**
(operating hours)

7965 kWh/year
amount of energy required

0.40 €/kWh*
energy costs

Σ **3,186 €/year**

* Costs can vary from region to region.

Savings potential for cold water circulation

Using temperature control through cold water circulation, an annual savings in operating costs of approx. 19,876 € can be achieved compared with temperature control using flushing!

Operating cost savings approx. 19,876 €/year

Approx. 4,612 m³ of precious drinking water can be saved each year, especially in times of drinking water shortages. This corresponds to 25,622 bathtubs every year.

Water savings approx. 4,612 m³/year

Investment costs for cold-water circulation

Quantity	Designation	Gross unit price*	Total costs
1	KHS CoolFlow cooler	approx. 10,869.35 EUR	approx. 10,869.35 EUR
23	KHS CoolFlow cold-water balancing valve with actuator	approx. 502.77 EUR	approx. 11,563.71 EUR
1	Commissioning	approx. 800.00 EUR	approx. 800.00 EUR
1	CoolFlow Chiller (if no chilled-water unit present)	approx. 11,064.70 EUR	approx. 11,064.70 EUR
		Total	**approx. 34,297.06 EUR**

* as of 2023, subject to alterations

The installation costs are compensated by assuming gross prices.

Payback period

less than

1,73 Years

Read our references if
you need any more convincing!

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