KEMPER hygiene system KHS®

WRAS APPROVED PRODUCT

Domestic Cold Water (DCW)

- Maintenance of hygiene and temperature
- Significant reduction of flushing water by controlled flushing processes

Domestic Hot Water (DHW)

- Stable temperature maintenance up to outlets in the sanitary installation
- Reduction of the heat losses of up to 40 %

KEMPER

Contents

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”Water must flow!”

The innovation at KEMPER:

KEMPER Hygiene System KHS®
Health, economy and ecology in focus

Establishment of good quality and hygiene through induced circulation and a specific, targeted, flushing regime in the domestic water systems.

Water is the “No. 1 foodstuff” for life.

In order to maintain the water hygiene and to improve the quality of the water in the system, KEMPER developed the KHS hygiene system. It guarantees fresh, cool water can always be drawn off at all outlets.

The main goal of the KEMPER KHS hygiene system is to prevent stagnation and the consequential, negative impact on the quality of the cold domestic water.

KEMPER KHS can be designed into the domestic cold water system cost effectively. The innovative valve technology and new solutions within KHS gives a data logging facility, prevents stagnation in all areas and ensures water quality. This system does not need chemicals for cleaning and gives a quick return on investment.

Legislation, engineering standards, guidelines & directives
Continuous enjoyment of the "No. 1 foodstuff"

The design, installation and operation of domestic water systems is legally regulated through the EU Water Directive 2001 and the UK Water Regulations 1999.
Domestic water systems are to be designed, installed and maintained in accordance with the relevant legislation, standards and directives.

These requirements affect both the cold and hot domestic water and the designers, installers and operator of the system.

The requirements to install and maintain the domestic water quality up to the take-off point are presented in the following table for the cold and hot water.

UK Standards and Regulation

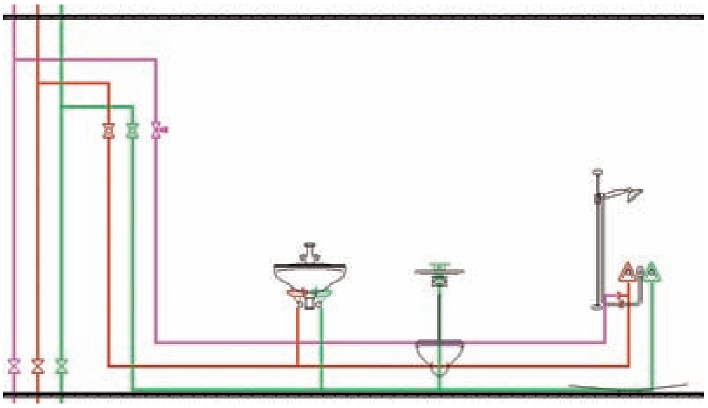
EU Drinking Water Directive 2001 UK Water Regulations 1999

Domestic Hot Water	Domestic Cold Water
BS 6700:2006 + A1:2009 Design, Installation, Testing and Maintenance of Services supplying water for domestic use within buildings and their grounds (BS EN 806 & BS EN1717 will supercede BS 6700)	BS 6700:2006 + A1:2009 Design, Installation, Testing and Maintenance of Services supplying water for domestic use within buildings and their grounds (BS EN 806 & BS EN1717 will supercede BS 6700)
BS1710 Identification of Pipelines and Services	BS1710 Identification of Pipelines and Services
Domestic water services Products/Materials must be approved by the "Water Regulations Advisory Scheme"	Domestic water services Products/Materials must be approved by the "Water Regulations Advisory Scheme"
The Approved Code of Practice for Legionnaires Disease: The Control of Legionella Bacteria in Water Systems (ACOP L8:2001)	The Approved Code of Practice for Legionnaires Disease: The Control of Legionella Bacteria in Water Systems (ACOP L8:2001)
The Department of Health Technical Memorandum for Water Systems (HTM 04-01:2006) The Control of Legionella, Hygiene, "Safe" Hot Water, Cold Water and Drinking Water systems	The Department of Health Technical Memorandum for Water Systems (HTM 04-01:2006) The Control of Legionella, Hygiene, "Safe" Hot Water, Cold Water and Drinking Water systems
Statutory Requirements The Health and Safety at Work Act 1974 Health & Safety Offences Act 2008 The Management of Health and Safety at Work regs; 1992 The Control of Substances Hazard to Health regs; 2002 UK Water Supply, (Water Quality), regs; 1999	Statutory Requirements The Health and Safety at Work Act 1974 Health & Safety Offences Act 2008 The Management of Health and Safety at Work regs; 1992 The Control of Substances Hazard to Health regs; 2002 UK Water Supply, (Water Quality), regs; 1999
Guidance for Homes NHBC Foundation in partnership with the BRE Trust: Water efficiency in new homes An introductory guide for housebuilders Pub NF20 Sect 4.4 Avoidance of Stagnation	Guidance for Homes NHBC Foundation in partnership with the BRE Trust: Water efficiency in new homes An introductory guide for housebuilders Pub NF20 Sect 4.4 Avoidance of Stagnation

Legislation, standards, directives and technical literature serve to protect the drinking water and the safe use of the "No. 1 foodstuff"!

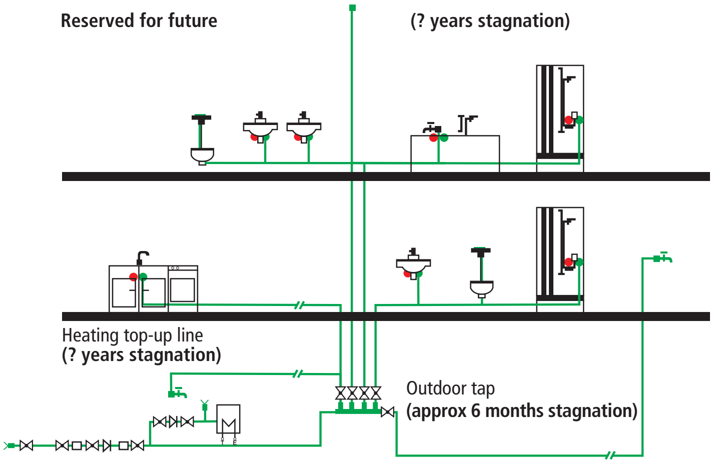
This is how plumbing was installed in the past

Up to now in residential, commercial and public buildings (hotels, hospitals, doctor's offices, etc.), potable water systems have been installed using T-pieces branching to the outlets. The consequential stagnation due to dead-legs in the branches is nothing unusual. In hot water systems the installation of return lines, regulated by DRVs or thermally operated valves has already asserted itself. However, remnant stagnation from after the return, to the outlet, still continues to exist. By looping in the outlet points as close as possible in a ring, the remaining stagnation can also be prevented in the DHW system.



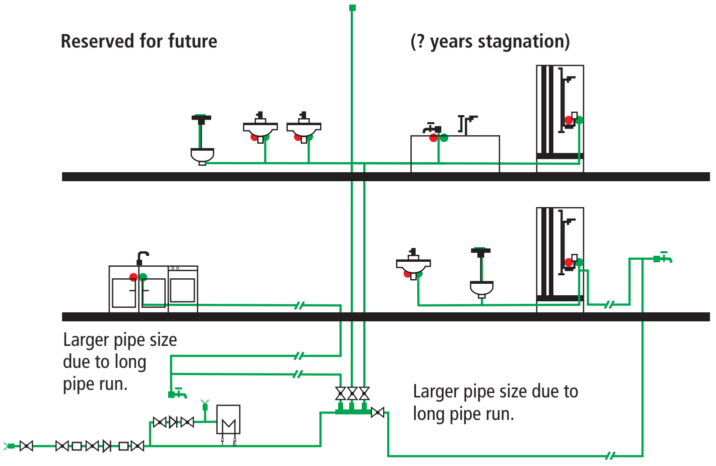
Conventional installation in DCW. With obvious dead-legs.
Looping in the take-offs for DCW and DHW in a ring is recommended as the solution.

Normal installation in a single-family house with all the known weak points. Stagnation across decades with the consequential hygiene and health risks can occur.



DCW installation with stagnation in seldom-used lines. Branch line installation.

A better installation but still with weak points. Depending on the pipe lengths while looping, larger pipe sizes must be used, due to the flow requirement. However, this solution is often not possible with conventional floor layouts.

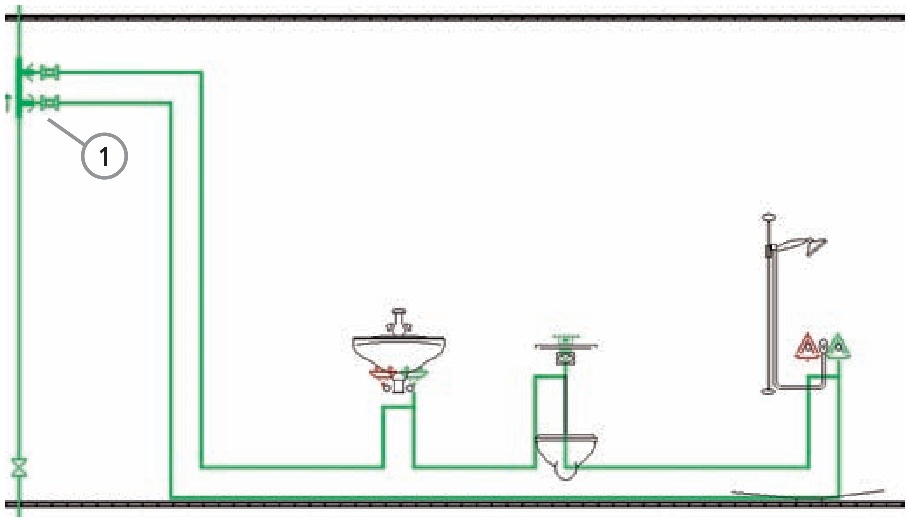


DCW installation without stagnation in seldom-used lines. Long pipe run.
Increased installation expense.

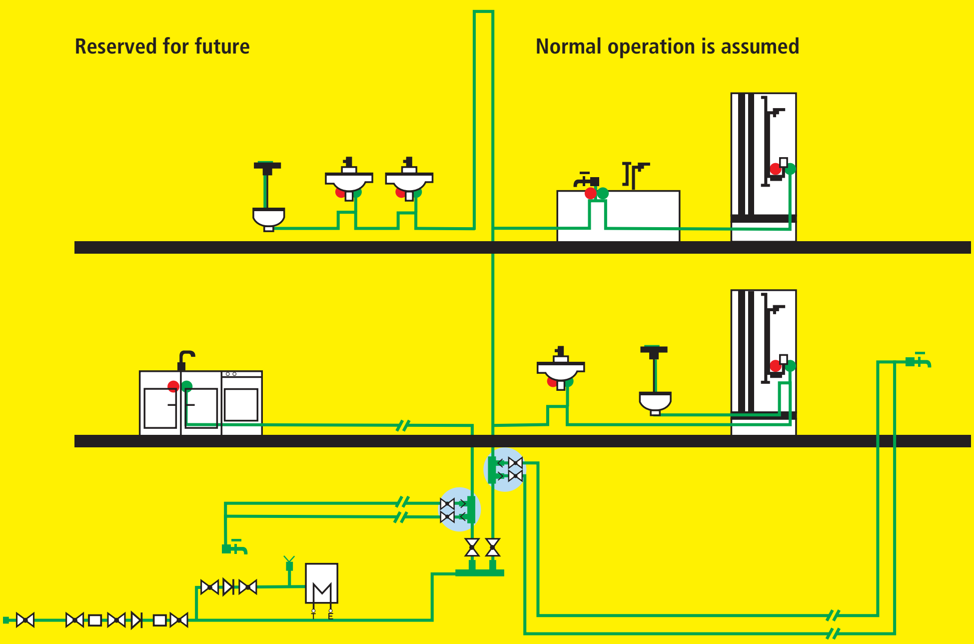
The KHS solution in DCW

Hygienically safe installation with KEMPER KHS Multi-Circ Distributor Units and innovative pipe-runs.

1 KHS-Multi-Circ Distributor Unit



DCW installation without dead-legs.

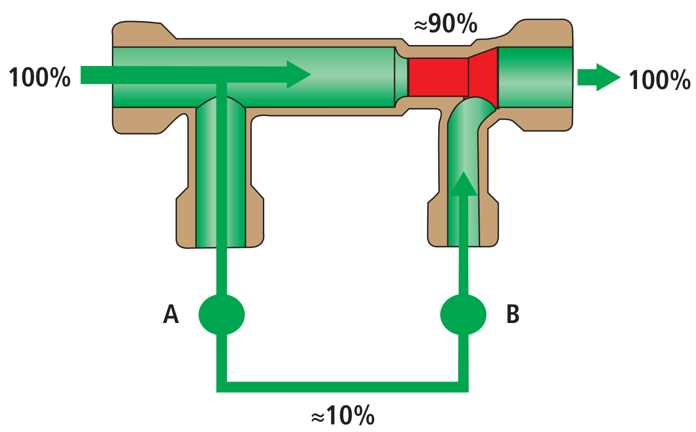


DCW installation without stagnation in seldom used sections. Minimisation of dead-legs.

KHS-Multi-Circ Distributor Unit
-static- for DCW

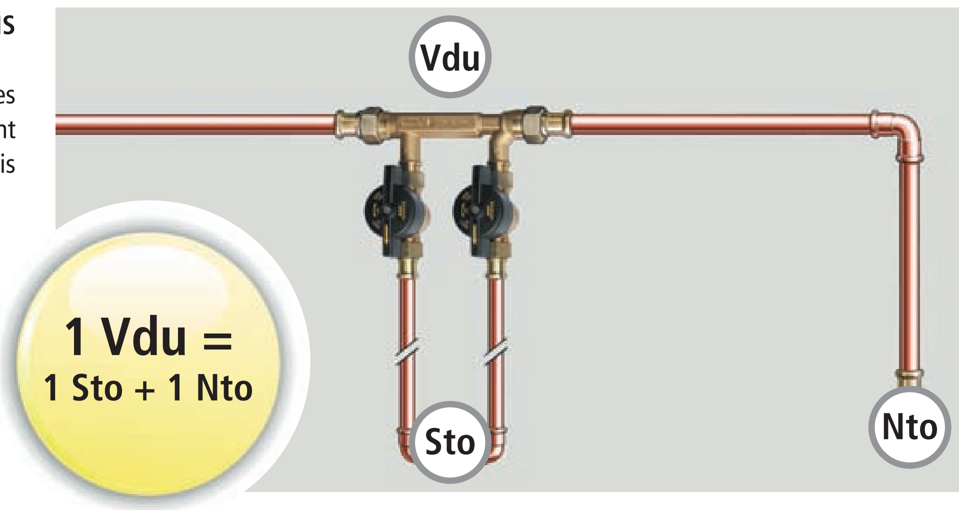
Giovanni Battista Venturi
Simply ingenious - ingeniously simple. The principle discovered by Giovanni Battista Venturi still meets all requirements even today. In his productive period (*1746 in Bibbiano † 1822 in Reggio nell´Émilia) he also developed the venturi pump and the venturi nozzle.

The flow distributor’s operation is based on the principle of the Venturi nozzle. The minimum pressure difference between Supply line A and Return line B causes an induced flow in the branch. The drive comes from water removal after the KHS-Multi-Circ Distributor Unit. The entire water content in the branch is thus changed, stagnation is prevented and the water temperature is kept low.



When does it make sense to use a KHS Multi-Circ Distributor Unit?
A venturi distributor unit always makes sense when a seldom-used take-off point can be driven by a take-off point that is used as intended.

Vdu: Multi-Circ Distributor Unit
Sto: Seldom used take-off point
Nto: Normally used take-off point

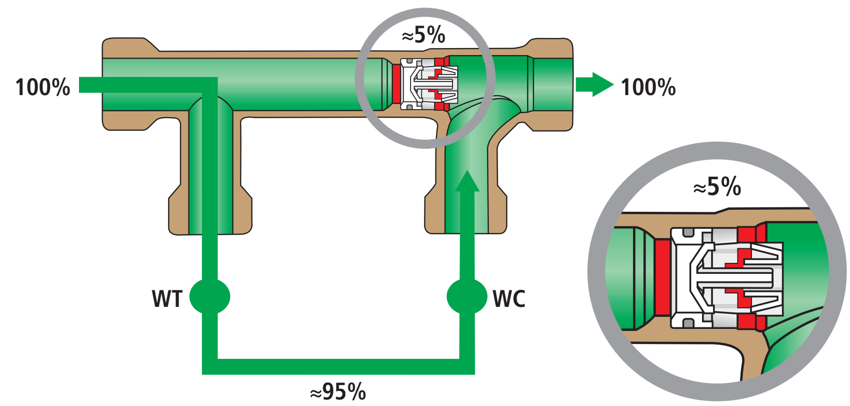


KHS-Multi-Circ Distributor Unit
-dynamic- for DCW

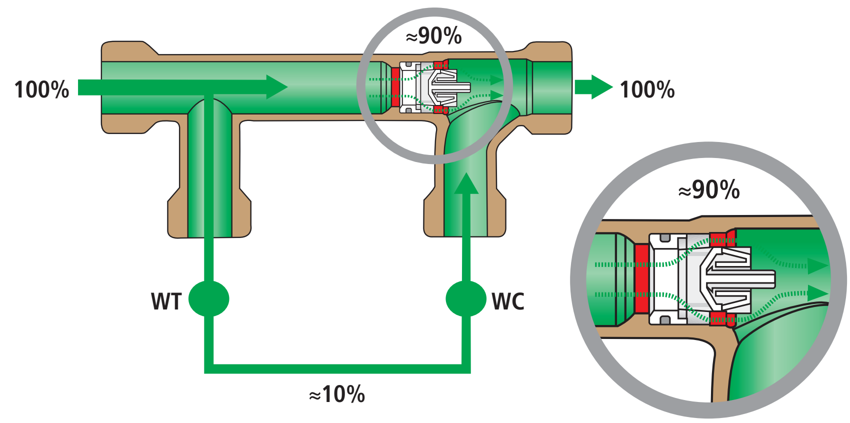
Ingeniously simple – simply dynamic
Small flows in the main – lots of movement in the branch ring.

With the KHS Multi-Circ Distributor Unit -dynamic-, another step towards **stagnation prevention** has been achieved. With an additional component in the venturi nozzle, the dynamic distribution unit is capable of achieving a maximum flow through the connected branch rings; even with the smallest flow rates in the main or in the riser.

Explanation
During small flow in the main, ≈ 95 % flows through the ring!



Small volume flows in the main line or in the riser:
The dynamic venturi nozzle remains nearly completely closed - nearly the entire flow needed for supply is driven through the ring. The opening pressure of the dynamic venturi nozzle is not reached.

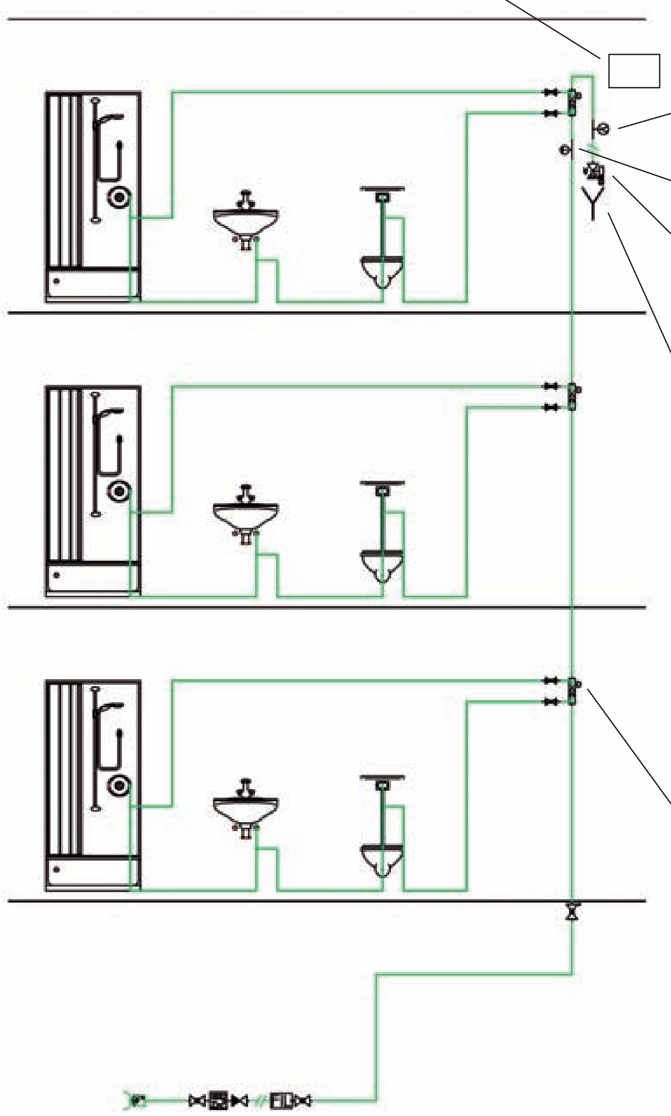


High volume flows in the main line or in the riser:
The dynamic venturi nozzle opens - the majority of the flow passes directly through the flow distributor in the main line and a partial flow is diverted through the ring due to the venturi effect. The opening pressure of the dynamic venturi nozzle is reached.

KHS-Multi-Circ Distributor Unit -dynamic-

Drinking water hygiene
through periodic flushing of the DCW system

KHS Mini System Control MASTER
Figure 686 02 005 and SLAVE Figure 686 02 006



KHS flow sensor Figure 138 4G 015

Multi-tee temperature sensor
Figure 128 or Figure 129 + T5100 140 00 003

KHS-full flow plus with spring-reset / servo drive
Figure 696 01

Drain connection in accordance with
BS EN 1717, air break to drain at entry

KHS drain with overflow monitoring DN 20 - DN 32
Figure 688 00

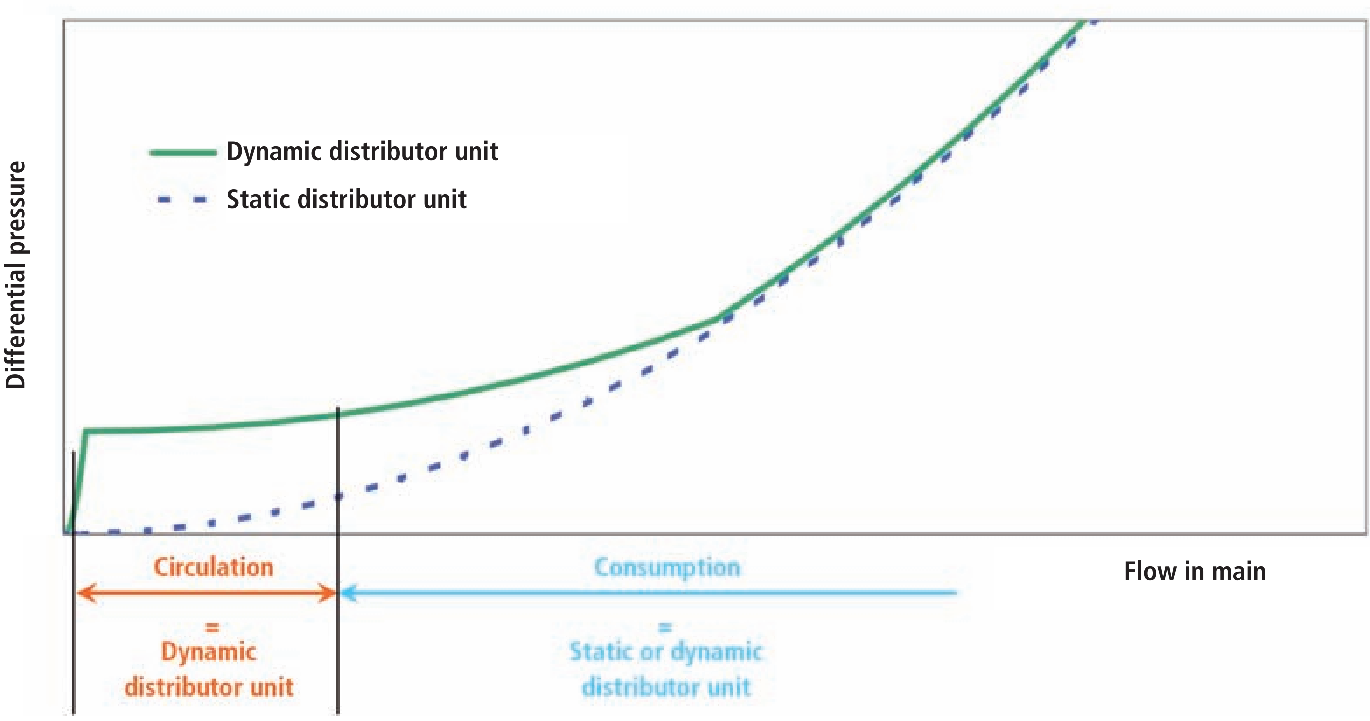
 or 

KHS-Multi-Circ Distributor Groups
Figure 650 00 Figure 650 02

Cold water schematic showing induced flows through the bathrooms by using the KHS-Multi-Circ Distributor unit and an end of line flushing valve to ensure hygienic and efficient operation. The flushing can be programmed, controlled and logged using sensor systems (volumetric flow and temperature measurement) in conjunction with the KHS-Mini System Control (MASTER/SLAVE technology).

KHS-Multi-Circ Distributor Unit

Characteristics of KHS Multi-Circ Distributor Unit -static- and -dynamic-



The KHS Multi-Circ Distributor Unit -dynamic- stands out from the well-known KHS Multi-Circ Distributor Unit -static- in that it reacts and operates 'dynamically'. In the 'Circulation' function, the main is nearly completely closed and the branch ring flows approx 95 % of the total. As the demand increases the flow increases to the point that the dynamic nozzle starts to open.

During higher demand, the main line is completely opened so that the flow required further down the system, as well as the flow to cover the heat losses in the bathroom branches, is achieved.

Because of the previously described operating principle, the KHS Multi- Circ Distributor Unit -dynamic- can be used in both the DCW as well as in the DHW system with great efficiency. Even at the lowest flow rates, a flow is induced in the branch ring due to the available differential pressure generated.

Prevent stagnation and maintain the temperature effectively

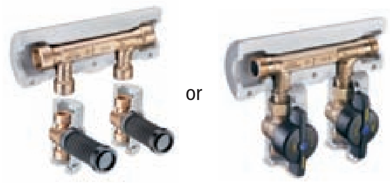
For DCW

- Constant water exchange
- Low temperature DCW system
- High volume flow in the branch ring
- Small volume flow in main

For DHW/DHWC

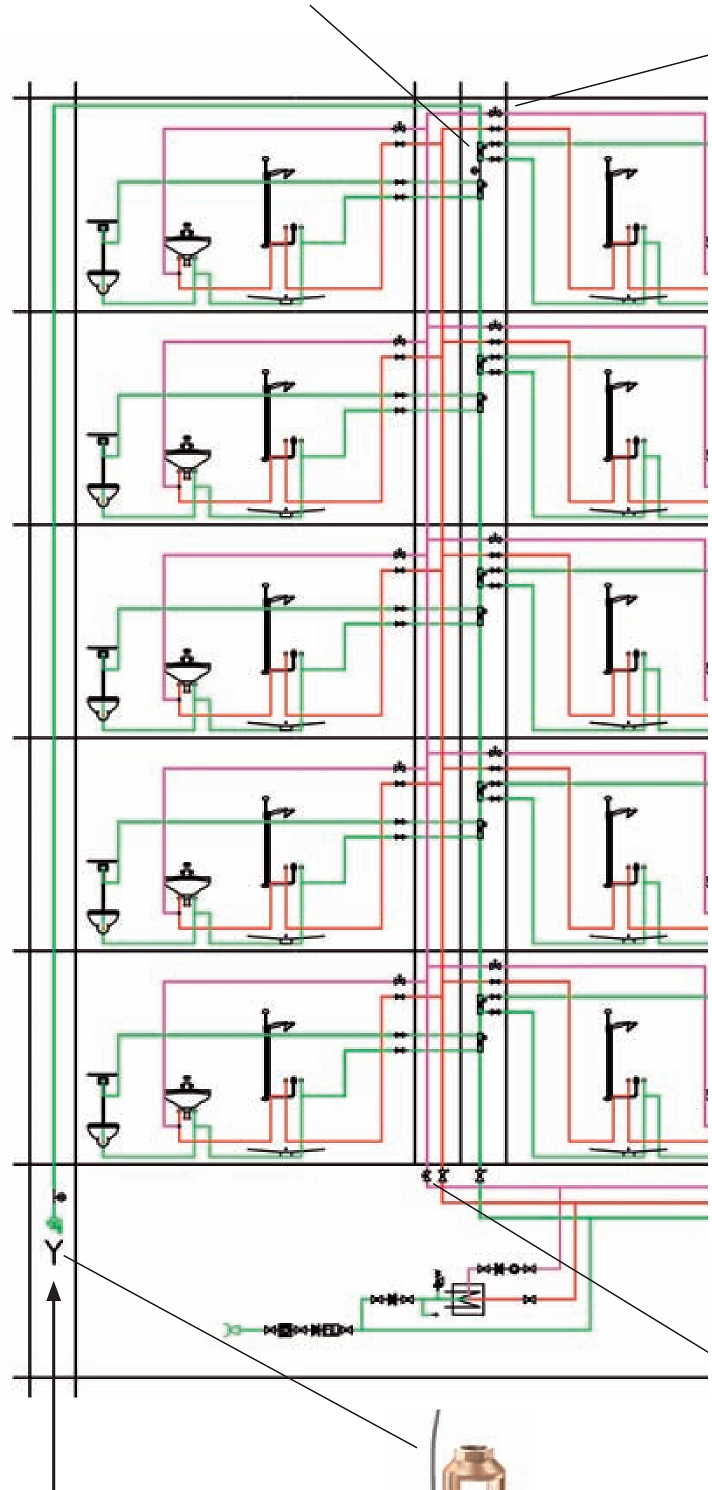
- Constant water exchange
- Due to the stable flow throughout the system by branch ring circulation, and by demand, the temperature of the DHW is maintained as required, where required.

KHS application in major projects
e.g. hospital

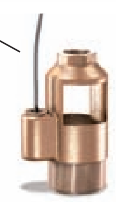


KHS-Multi-Circ Distributor Groups
Figure 650 00 Figure 650 02

In hospitals, it requires great effort by the operator to ensure the systems are 'ready to use' in individual rooms. The rooms are not always occupied, or the sanitary installations are not constantly used by patients who are often confined to bed. Nowadays, building services providers ensure the flushing of sanitary installations in unused rooms by opening the take-off points at regular intervals. A popular variation in the pipe installation is the horizontal distribution with connections to the individual bathrooms along the corridors. To accomplish that, an installation designed with the KEMPER KHS Hygiene System, and calculated using the KEMPER Dendrit CAD calculation software, is shown adjacent as an example.



Waste-water connection in accordance with BS EN 1717 air break to drain



KHS drain with overflow monitoring
Figure 688 00

Regular water exchange with the KEMPER KHS Hygiene System through:

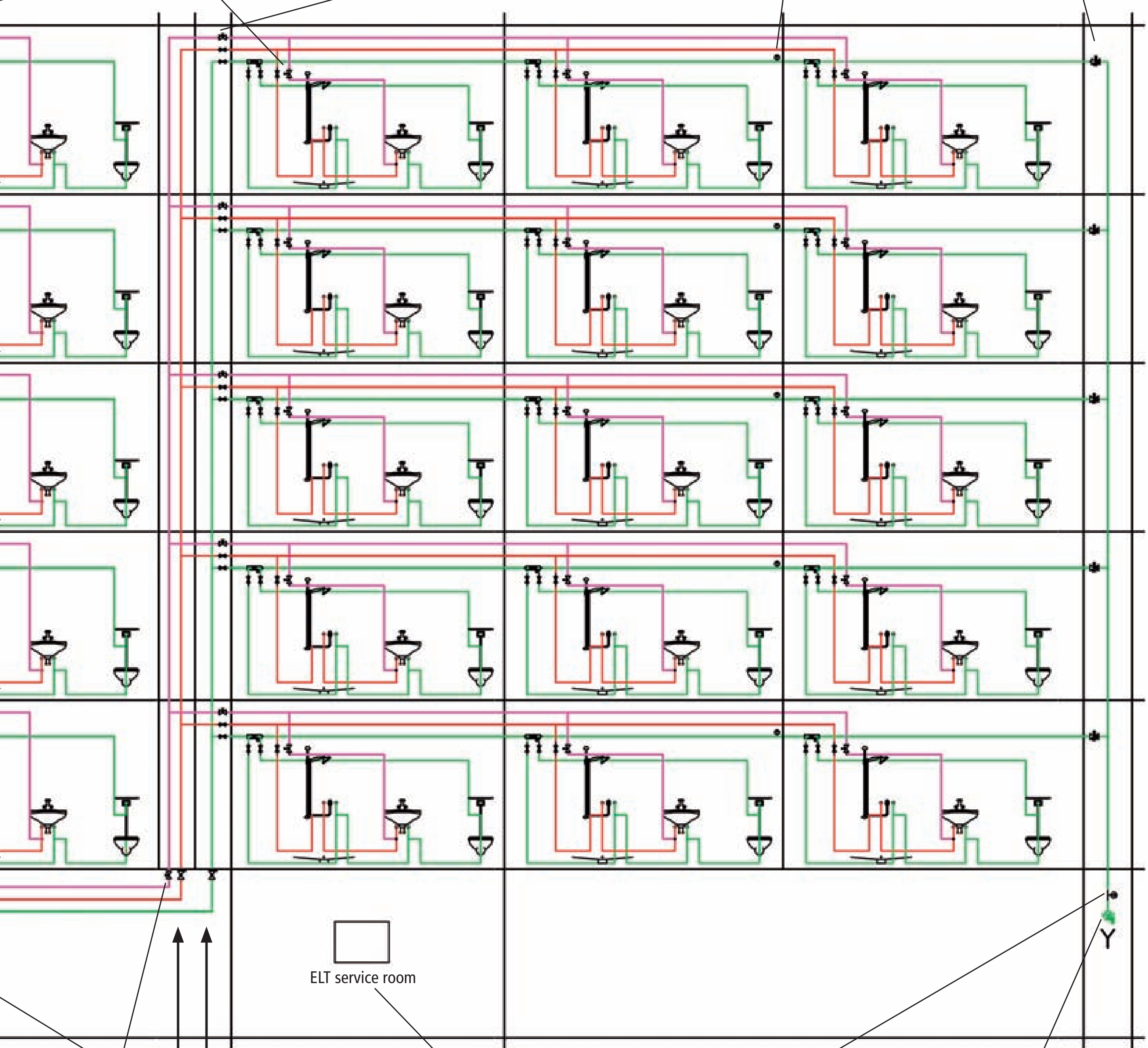
- KHS Multi-Circ Distributor Unit -dynamic- in the cold and hot domestic water systems
- Sensors for monitoring and documenting (Volumetric flow and temperature measurement)
- Control of the flushing through KHS-Logic control system
- Reduction of the circulation heat losses by reducing the pipeline in branches
- Regulation of DHWC system through Multi-Therm regulating valves
- Temperature maintenance in the DCW and DHW by separating the cold and hot supply lines in separate shafts

Eta-Therm
Figure 130 or Figure 510

Multi-Fix
Figure 150 or Figure 151

Multi-tee Figure 128 or
Figure 129 + T5100 140 00 003

KHS-full flow with servodrive
Figure 696 00



Prevent heat transfer, provide separate supply line paths for DCW and DHW!

Multi-Fix
Figure 150 or Fig. 151

KHS-Logic control system
Figure 686 02 003

KHS flow measurement
sensor Figure 138 4G 015

KHS-full flow-plus with spring-reset servodrive
Figure 696 01

KEMPER regulating valves
the solution for legionella problems

KEMPER ’Eta-Therm’, automatic valve

The KEMPER ‘Eta-Therm’ automatic regulating valve is designed for use on small recirculating secondary hot water systems to maintain the water temperature between 56°C and 58°C. It is generally used on individual circuits of less than 12m in length, or to control individual bathrooms or apartments. When set at its normal operating position the valve never isolates therefore it prevents stagnation and stops the temperature dropping below 50°C. During periods of low, or no demand the valve automatically regulates to maintain the set water temperature.
This also has the advantage of keeping the supply pipe work to the outlets ’live’, preventing water wastage; when running off water waiting for the delivery temperature to increase. Regulating valves in the riser helps the function of the ‘Eta-Therm’ due to the valve’s authority. Therefore, ‘Eta-Therm’ must not be installed in the riser.

When the system requires thermal disinfection, this is achieved without any manual adjustment of the valve, which responds automatically to the increasing circulation temperature.
The valves should be installed at the end of the secondary circuit to ensure the water upstream of the valve is maintained between 56°C and 58°C. If the design specification or site conditions require a different set temperature this can be easily achieved within the range of 56 to 58°C.

KEMPER ’Eta-Therm’ automatic regulating valve for general installation Figure 130 and for concealed installation Figure 540

KEMPER ’Multi-Fix‘, static valve

The KEMPER ’Multi-Fix’ manual double regulating valve is designed for use on recirculating secondary hot water systems allowing the water temperature to be measured and adjusted.
The ’Multi-Fix’ is part of the KEMPER range of valves which includes the ’Multi-Therm’, ‘Eta-Therm’ and ‘Multi-Tee’ designed to maintain the secondary re-circulating return water at 58°C. Traditionally a commissioning set or a thermometer and double regulating valve have been used to control the flow but site condition can necessitate small changes in installation which affect the heat loss from the system.
The ’Multi-Fix’ valve combines a double regulating control valve, with a temperature pocket, and thermometer into one valve for ease of installation and use. The valve should be installed at the end of the index or least favoured branch of a multi-branch system to ensure the water is at the desired temperature.
The valve can also be installed on the return of the recirculating system prior to the calorifier. Installing valves at these two positions ensures that water in the other branches exceeds the specified temperature allowing the ’Multi-Therm’ and ‘Eta-Therm’ valves to control the return water temperature.
The thermometer probe allows the temperature to be measured easily and the ’Multi-Fix’ valve set to maintain the specified temperature, eliminating the effects of any site conditions which could affect the water temperature.

KEMPER ’Multi-Fix’ manual/static circulation regulating valve Figure 150 and Figure 151

KEMPER KHS Mini Control System
for small and medium size projects

According to the standards, the chemical, physical and microbiological parameters for domestic water are to be maintained at the take-off point.
The pertinent standards and directives such as DIN 1988-2 and VDI 6023 frequently name stagnation as the cause for noncompliance with these parameters. Every domestic water installation must operate as intended. This goal can be achieved with targeted flushing measures, for example.

The KEMPER KHS Mini Control System can run small and medium sized buildings such as schools, kindergartens, small plants, industry, department stores, holiday homes, etc. This control is an improvement on the existing and proven KEMPER Logic Control System.
With the intelligent MASTER/SLAVE technology, the operating modes of time, temperature and flushing volume with overflow monitoring for each individual flushing group can be individually configured.

MASTER/SLAVE technology
The basic version includes the MASTER control as the smallest solution for performing flushing measures in the domestic water system, with triggering for the flush valve, and signal evaluation.
By using the integrated CAN BUS technology in the MASTER, up to 31 SLAVE controls can be triggered directly by the MASTER control with a graphic display.
That means in buildings up to 32 KHS flush groups (flush valve, temperature and volume flow sensor, overflow monitoring) can be connected using the MASTER-SLAVE technology. The MASTER-SLAVE flush groups can be manually configured on the MASTER or through configuration software with a customer provided PC via an optional USB interface cable. The evaluation of the flushing process is performed via a **flushing log** in Excel format.

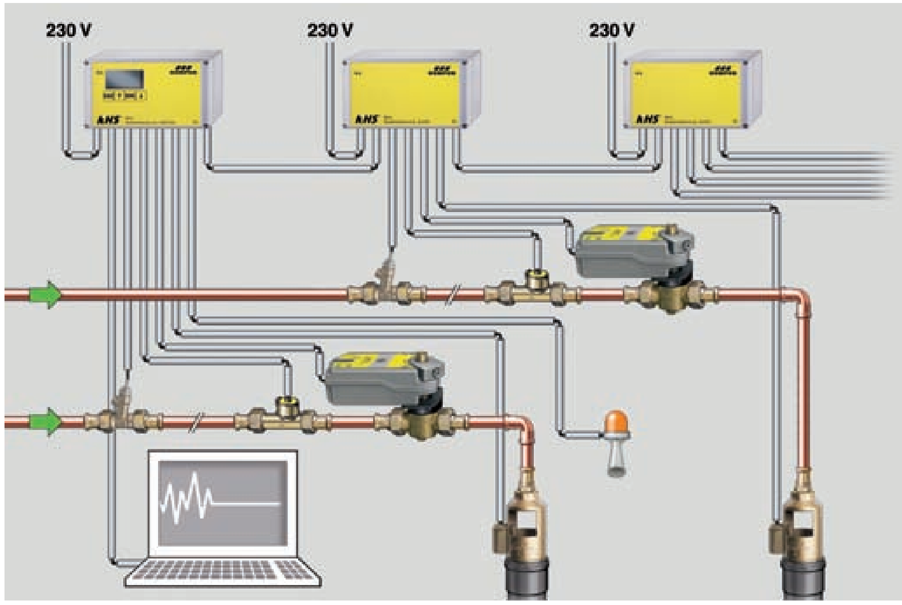
Advantages at a glance

- Intelligent flushing in small and medium size buildings
- Three flushing modes: Time, temperature or volume
- Documentation of the flushing process in a “Flushing log”
- Easy to operate MASTER-SLAVE system

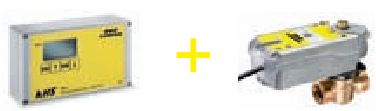
The KHS-MASTER/SLAVE technology

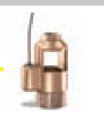
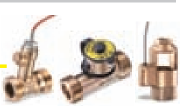
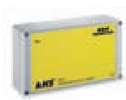
Positioning the individual MASTER or SLAVE controls directly at the flushing groups ensures short cable runs. The supply voltage for each controller is 230 volts.

For the optional configuration and output of the flushing processes in Excel format on the customer PC, one merely needs an optionally available USB interface cable to connect the KHS-MASTER control to the PC. The alarm message can be optionally Output through the KHS Overflow Monitor as an acoustic or visual signal.



Basic Unit*



	KEMPER KHS-Mini System Control Unit MASTER/SLAVE					
	Flushing group with components** Selectable combination of individual components					
	Basic Unit	**Individual Components**				
Function Overview		+ 	+ 	+ 	+ 	+ 
Operation mode: Time-controlled flushing	X	X	X	X	X	X
Operation mode: Specified volume flushing				X	X	X
Operation mode: Temperature-controlled flushing			X		X	X
Combined operation modes			X	X	X	X
Overflow monitoring with alarm and alarm lock		X				X
Number of flushing groups with program assignmenat	 **1-MASTER- + 31-SLAVES- max.** 					
System set-up and flushing log	USB cable + software, connecting -MASTER- to client PC (minimum system requirement: Windows XP or higher) 					

* Basic KHS-Mini system control unit: smallest functional unit is 1 MASTER and 1 flushing valve

** Flushing group: comprising 1 MASTER or SLAVE, 1 KHS VAV valve with spring reset servo drive, 1 KHS temperature sensor Pt 1000, 1 KHS flowmeter fitting, 1 KHS free discharge with overflow monitoring

The operator can choose between three operating modes

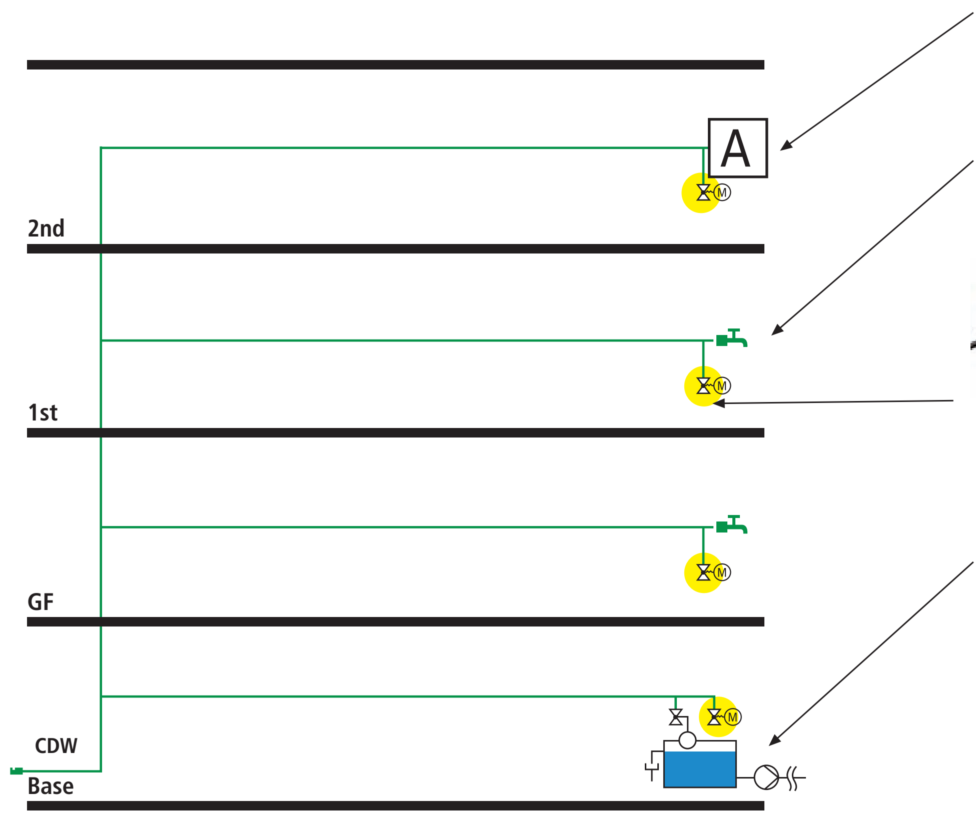
1 **The time controlled flushing process** for the domestic cold water system using the preset flushing times (e.g. max. 5 flushing intervals across one day or individual flushing intervals on different days during a week).

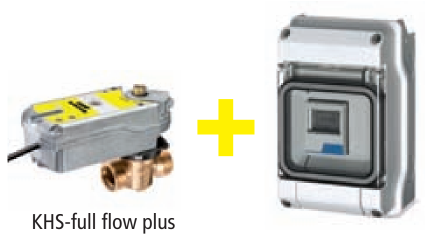
2 **The flow volume controlled flushing process** for the domestic cold water using preset flushing volumes during programmed flushing times.

3 **The temperature controlled flushing process.** Here, a reference temperature (e.g. on the DCW mains connection) is constantly compared with multiple temperatures in the system. The system control triggers flushing if the temperature difference exceeds the preset target temperature difference.

Potable cold water hygiene by flushing end of line

One thing is for sure: a preventative strategy as opposed to a reactive strategy is the only correct one.





Recommendation:
In order to use the accruing flushed water, collect the water in a storage tank (e.g. rainwater harvesting systems, outdoor rainwater facilities, etc).

KEMPER Dendrit CAD

Innovative software supports designing with KHS

Powerful software is needed to be able to portray, simulate and calculate complex systems.

In cooperation with Dendrit and other competent market partners, KEMPER has developed software that meets all the requirements resulting from our technology.

KEMPER Dendrit CAD

KEMPER Dendrit CAD provides designers with extensive facilities for building services design: A range of valves and pumps, layouts and drawings of the pipelines, calculation of the hydraulic situation and simulation of the complete plant in the hot and cold water systems can be selected.

Advantages at a glance

- Global and comprehensive programme for precise calculation and simulation of domestic water systems
- With CAD user interface and an innovative drawing generator
- Innovative pipe designs including riser and branch details in conjunction with the KEMPER valve range and the KHS hygiene system in the domestic water system can be presented, calculated and simulated
- Application for hot and cold domestic water, wastewater and other building services applications
- Time savings through comprehensive integrated planning
- Permanent support and up-dates through the Münster University of Applied Sciences and Prof. Bernd Rickmann

KHS-Multi-Circ Distributor Unit -static-

1. KHS-Venturi flow distributor group concealed installation in sanitary block Figure 640 00/01/03/04

3. KHS-Venturi flow distributor group concealed installation in riser/ corridor area Figure 640 02/05

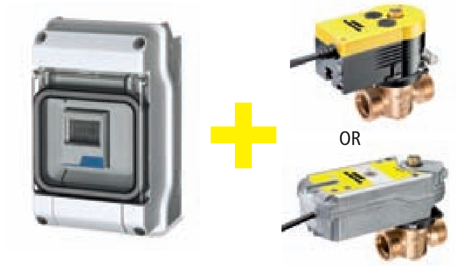
KHS-Multi-Circ Distributor Unit -dynamic-

2. KHS-Venturi flow distributor group concealed installation in sanitary block DN 15 – DN 32 Figure 650 00

4. KHS-Venturi flow distributor group concealed installation in sanitary block DN 15 - DN 32 Figure 650 02

Automatic flushing units

10. KHS-hygienic flushing unit with control valves and cover Figure 686 03



11. KHS timer set Figur 686 06

12. KHS Mini Control System MASTER Figure 686 02 005 and SLAVE Figure 686 02 006

13. KHS-Logic control system Figure 686 02 003

14. KHS-USB adapter cable (connects MASTER with PC) with set-up and logging software Figure 686 02 016

Sensor system

5. KHS temperature sensor valve Pt1000 with male threaded union end Figure 629 0G

7. KHS flow measurement sensor with male threaded union end Figure 638 4G/138 4G 015

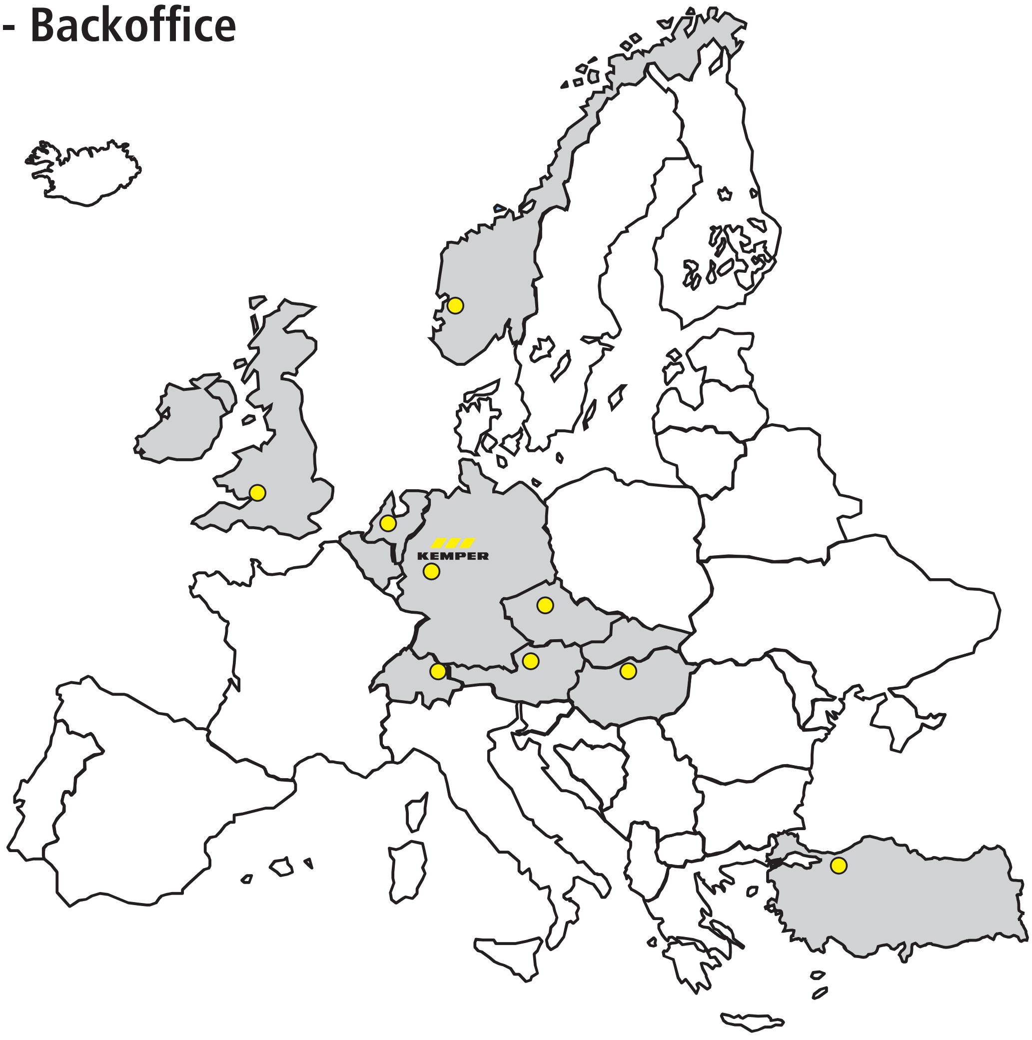
9. KHS drain with overflow monitoring DN 20 - DN 32 Figure 688 00

Flush valves

6. KHS-full flow Maximum flow isolating ball valve with servodrive Figure 686 00

8. KHS-full flow-plus with spring-reset servodrive Figure 686 05

KEMPER contact
Contact persons - Backoffice



Team UK

Chris Rhodes
Gebr. Kemper UK & Ireland Limited
2 Ripple Court
Brockeridge Business Park
Twyning / Tewkesbury
Gloucestershire, GL20 6FG
Great Britain
Phone +44 16 84 85 49 32
Fax +44 16 84 85 49 31
Mobile +44 77 64 85 98 88
CRhodes@kemper-uk.com
www.kemper-uk.com

Team Export

Judith Frohne
Phone +49 (0) 27 61 89 12 43
Fax +49 (0) 27 61 89 14 07
jfrohne@kemper-olpe.de

Alexandra Werthebach
Phone +49 (0) 27 61 89 11 28
Fax +49 (0) 27 61 89 14 07
awerthebach@kemper-olpe.de

Annika Alfes
Phone +49 (0) 27 61 89 14 37
Fax +49 (0) 27 61 89 14 07
aalfes@kemper-olpe.de

KEMPER contact
Export representations

Austria
August Stöttner
(Sales management Austria)
Wolfshütte 27
A-4901 Ottnang
Phone +43 (0) 7 67 62 07 20
Mobile +43 (0) 67 67 55 61 56
stoettner@ad-kemper-olpe.de
Post code areas:
4000-6000, 8700-9000

Great Britain, Ireland
Chris Rhodes
Gebr. Kemper UK & Ireland Limited
2 Ripple Court
Brockeridge Business Park
Twyning / Tewkesbury
Gloucestershire, GL20 6FG
Great Britain
Phone +44 16 84 85 49 32
Fax +44 16 84 85 49 31
Mobile +44 77 64 85 98 88
CRhodes@kemper-uk.com
www.kemper-uk.com

Belgium and Holland
Hans Donker
Koeweistraat 7b
NL-4181CD Waardenburg
Phone +31 (0) 4 18 65 15 55
Fax +31 (0) 4 18 65 25 55
Mobile +31 (0) 6 43 04 41 30
donker@ad-kemper-olpe.de

Switzerland
Kemper Armaturen AG
Feldmoosstrasse 12
CH-8853 Lachen
Phone +41 (0) 55 241 26 22
Fax +41 (0) 55 241 25 55
schweiz@kemper-olpe.de

Luxemburg
Michael Wurm
Schubertstraße 8
57482 Wenden
Phone +49 (0) 27 62 49 05 74
Fax +49 (0) 27 62 49 05 35
Mobile +49 (0) 17 16 75 06 61
wurm@ad-kemper-olpe.de

Technical Consultant
Jürgen Weinheimer
Im Pfahlstück 2
56332 Löf / Mosel
Phone +49 (0) 26 05 8 49 95 21
Fax +49 (0) 26 05 8 49 95 22
Mobile +49 (0) 1 51 11 44 47 75
weinheimer@ad-kemper-olpe.de

Shanghai
Kemper Trading (Shanghai)
Co.,Ltd.Zhai Pin
5th floor, China Merchants Tower
161LuJiaZui (E) Road, Pudong
Shanghai 200120
China
Phone +86 021 587 53 53-118
Fax +86 021 58 76 77 38
zhaipin@kemper.sh.cn

Turkey
AVC Endüstriyel Ürünler Ltd.
Ahmet Ergoz
Can Sokak No: 7/B
TR-34742 Kozyatagı Kadıköy - Istanbul
Phone +90 (0) 216 384 43 67
Fax +90 (0) 216 384 43 69
Ahmet.Ergoz@Avc.Com.Tr

Singapore
Kemper Asia Pacific RO
Raymond Yang Yu Fook
Block 526, #20-120
Bukit Batok Street 51
Singapore 650526
Phone +65 96 31 17 48
Fax +65 66 18 47 33
rayyang@kemper.per.sg

Hungary
Aquatherm-Hungaria Kft.
Dévai György
Dunalejaro 14
H-1211 Budapest
Phone +36 (0) 14 25 40 95
Fax +36 (0) 14 27 12 33
gyuri_devai@aquatherm.hu

Norway
Froster AS
Lars Frost
Sandviksveien 30
N-5036 Bergen
Phone +47 (0) 55 36 58 55
Fax +47 (0) 55 21 51 60
post@froster.no

Czech Republic / Slovakia
Kemper CZ - Jiří Hýsek
BC Klamovka
Plzeňská 155/113
CZ-150 00 Praha 5
Phone +42 (0) 2 55 73 96 10
Fax +42 (0) 2 55 73 96 10
Mobile +42 (0) 6 02 64 08 63
jhysek@kemper-armatury.cz

Radek Weiss
Na Konci 151
CZ-66405 Tvarozná
Phone +42 (0) 5 39 00 80 96
Fax +42 (0) 5 39 00 80 97
Mobile +42 (0) 6 08 10 80 07
RWeiss@kemper-armatury.cz

United Arab Emirates
Kemper Regional Offi ce Middle East
SALWO Trading Ltd.
P.O.Box: 17372
J.A.F.Z., Dubai, U.A.E.
Phone +971 48 81 05 91
Fax +971 48 81 05 93

Wolfgang Spies
Mobile +971 5 04 57 76 97
wspies@emirates.net.ae

Alexander Spies
Mobile +971 5 04 50 92 63
alexanderspies@mac.com

KEMPER

Kemper UK & Ireland Ltd.
2 Ripple Court
Brockeridge business park
Twyning
Tewkesbury
Glos, GL20 6FG
Phone +44 16 84 - 85 49 30
Fax +44 16 84 - 85 49 31
www.kemper-uk.com
info@kemper-uk.com

Gebr. Kemper GmbH + Co. KG
Metallwerke
Harkortstraße 5
57462 Olpe

Phone +49 27 61 - 8 91 - 0
Fax +49 27 61 - 8 91 - 1 75

info@kemper-olpe.de
www.kemper-olpe.de

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