



BUILDING TECHNOLOGY VALVES AND SYSTEMS

Uncompromising drinking water hygiene and
corrosion resistance


KEMPER
DRIVING PROGRESS



This brochure contains extracts from KEMPER product brochures.

All detailed product information such as brochures, installation and operating instructions, films and texts for invitations to tender are available on our website for you to download!



<https://www.kemper-olpe.de/oc/business-units/building-technology/service/downloads/>



1	Stop valves and manifolds	<ul style="list-style-type: none"> • WESER, ECO, STANDARD and NIRO free flow stop valves • Quarter turn stop valves • Manifolds and manifold sets • Free flow stop valves with flange connection 	1
2		<ul style="list-style-type: none"> • Anti-pollution check valves EA • Backflow preventers type CA and BA (RPZ) • FK-4 RPZ outlet valve type BA • RPZ outlet valve type BA for appartments • FK-5 break tank station • Heating filling combination • Leak detection system 	2
3	Pressure reducing valves, filters and safety groups	<ul style="list-style-type: none"> • Pressure reducing valve • Filter • Automatic backwash • Safety groups • Flanged pressure reducer 	3
4	Regulating valves	<ul style="list-style-type: none"> • MULTI-THERM automatic regulating valves • ETA-THERM floor regulating valves, surface mounted and concealed • MULTI-FIX-PLUS static regulating valves 	4
5	Measuring products	<ul style="list-style-type: none"> • CONTROL-PLUS flow and temperature sensor • CONTROL-PLUS hand-held measuring instrument • MULTI-T adapter 	5
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7	Stop valve water meter combinations	<ul style="list-style-type: none"> • RG120 stop valve water meter series • RG120 stop valve water meter combinations • RG120-DUO stop valve water meter assembly blocks 	7
8	Frost-proof outdoor valves	<ul style="list-style-type: none"> • FROSTI® frost-proof outdoor valves • FROSTI®-PLUS frost-proof outdoor valves 	8
9	TRESOR wall cabinets	<ul style="list-style-type: none"> • TRESOR and MINI-TRESOR built-in wall cabinets • TRESOR and MINI-TRESOR surface-mounted wall cabinets 	9
10	Other valves	<ul style="list-style-type: none"> • Sampling Valves (sampling valves made of gunmetal and stainless steel, sampling valves for angle valves) • Fire-extinguishing valves (hose connection valve wall hydrant type F, hose connection valve wall hydrant type S) 	10
11	Insulation shells		11
12	Hygiene system KHS ®	<ul style="list-style-type: none"> • KHS Flow Splitter, KHS Floor Box • Anti-stagnation assemblies and controls (KHS Timer Set, KHS Mini System Control, KHS HS2 Hygienic Flushing, KHS LOGIC System Control) 	12
13	Thermal Separator		13
14	ThermoSystem KTS ®	<ul style="list-style-type: none"> • KTS ThermoBox • KTS ThermoStation • KTS ThermoTank S 	14
15	Dendrit building installation design software		15



Gunmetal as a material



Advantages at a glance

- Thanks to its high Cu content, gunmetal is immune to dezincification
- Gunmetal can be used in all situations for all water qualities in accordance with the German Drinking Water Ordinance
- Gunmetal can be used without restriction in accordance with the DIN/DVGW Rules concerning drinking water, even beyond 2013 (DIN 50930-6, DIN 15664, DIN EN 806, etc.)
- Gunmetal is particularly corrosion-resistant
- Gunmetal is made from recycled material (old valves and components) without any loss of quality, thus protecting the environment and conserving resources
- Gunmetal provides you with security! Now and in the future!

KEMPER gunmetal is the ideal valve and plumbing material - now and in the future

Gunmetal is a valve and plumbing material standardised according in accordance with DIN 50930-6 / DIN EN 1982, which is particularly suitable for sanitary installa-

tion engineering thanks to its wide range of possible applications, for example as a valve material for isolating, securing and regulating valves, as fitting material for

pipe system components and as a construction material in water, filter and recycling engineering.

Gunmetal statements relating to DIN 50930-6, the list of the German Environment Agency (UBA) (UBA positive list of metallic materials hygienically suitable for drinking water) or the 4 MS list (Four Member States list):

"Gunmetal can be used without limitation in drinking water in Europe".

The composition of gunmetal alloy used by KEMPER meets the requirements of DIN 50930-6. The element contents of lead (Pb) and nickel (Ni) are so limited that the material meets the latest requirements of the Drinking Water Directive.

Series of tests in laboratories accredited according to German and European standards have duly confirmed these results in

recent years. In the tests carried out, it was proved that after a brief running-in phase, all relevant measured migration values were below half of the parameter values, which for lead is below 5 µg/litre.

As a result, gunmetal is on the list of the UBA and the 4 MS list and is free for use in drinking water installation. Through countless attestations in the form of 3.1 certificates, the gunmetal used by KEMPER since 2001 has proved that the mechanical characteristic values are

significantly higher than the minimum values of the DIN EN 1982 standard. The reasons for the positive results of KEMPER gunmetal are the corrosion resistance of the material, which is well known on the market, and the components made from this.



You can download the latest version of the **UBA positive list** and the **4 MS list** from the website of the German Environment Agency: <http://www.umweltbundesamt.de/themen/wasser/trinkwasser/trinkwasser-verteilen/anerkennung-harmonisierung-4ms-initiative>

Corrosion behaviour of gunmetal

Gunmetal is one of the most corrosion-resistant copper materials and is characterised by outstanding resistance to external influences.

The special material suitability even under extreme water conditions makes gunmetal ideal for use in drinking water installations. In addition to use in the drinking water sector, the material gunmetal has also proved

successful with water containing carbonic acid and salt. This is why it is also frequently used in the mining industry.

Dezincification

As gunmetal consists only of alpha structures due to its high copper content and contains only 5% zinc, this material cannot dezincify in the usual applications, and neither surface nor plug dezincification occurs.

Stress crack corrosion

On account of the special material structure, stress crack corrosion is also unknown in gunmetal.



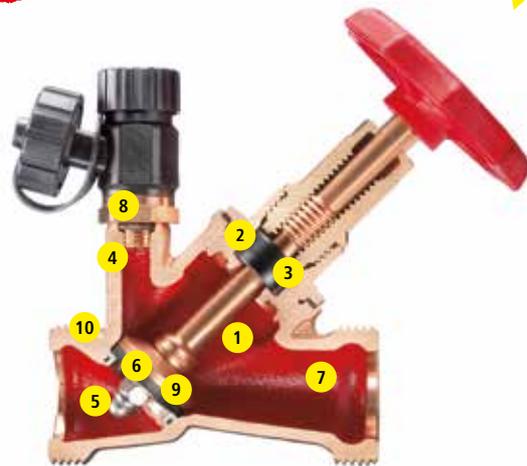
Stop valves and manifolds

The WESER valve
Innovation leader for over
40 years

- 1 Designed for drinking water hygiene, prevents growth of bacteria
- 2 Permanent operational safety through maintenance-free EPDM spindle seal which can be replaced **under full system pressure**
- 3 Permanently smooth operation through self-greasing spindle seal and actuating thread separate from the medium
- 4 Dezincification-free and corrosion-resistant gunmetal, recommended by the German Environment Agency
- 5 Erosion-resistant stainless steel valve seat
- 6 Particularly pressure and temperature-resistant through seat seal made of special EPDM
- 7 Low pressure losses due to flow-optimised design

FREE OF DEAD SPOTS

10 YEAR WARRANTY



- 8 Insulation can be easily adapted according to the Energy Saving Ordinance **without removal** of the drain valve
- 9 Freely mounted rotating cone prevents wear on the seat seal
- 10 With internal or external threads, or **can be pressed directly** onto various pipe systems

Always an idea ahead!
Chronology of a trendsetter

1971

1982

2001

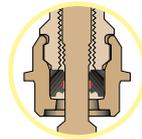
2004

2006

2007

2012

2016



1971: First drinking water stop valve made of gunmetal

1982: Market innovation: valve Free of dead spots with maintenance-free spindle seal

2001: Development of today's state-of-the-art gunmetal alloy (can be used beyond 2013)

2004: Use of a stainless steel seat

2006: Market innovation: spindle seal can be replaced under full system pressure

2007: Introduction of 10-year warranty for Fig. 173

2012: 10-year warranty is extended to cover the complete WESER series

2016: Standardisation of the valve housing through plugged drain hole

KEMPER stop valves and manifolds

Required approvals:

KEMPER valves have all the necessary approvals. All components are subject to strict requirements which can only be guaranteed through a high level of quality assurance. Thus a 100% routine test is taken for grant-

ed for KEMPER valves, and is the prerequisite for the reliable attainment of DIN/ DVGW, SVGW, ÖVGW, KIWA, KTW and noise protection certification.



KEMPER free flow stop valve made of stainless steel with flat-sealing male thread Fig. 073 1G



KEMPER Double Port Manifold Set Fig. V2



KEMPER quarter turn stop valve with female thread Fig. 385 00



KEMPER WESER free flow stop valve with hard moulded Geberit MEPLA connection Fig. 190 40

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KEMPER ECO-KOMPAKT flange stop valve

Very short design and light weight

The ECO-KOMPAKT flange stop valve by KEMPER is the first compact valve of its kind for drinking water, made of the tried and tested material gunmetal. On account of its very short design, the ECO-KOMPAKT fits even in installation situations where there is little space. Its low weight and easy installation result in a further advantage in day-to-day installation practice.

With regulating cone and locking device as stroke limiter

Maintenance free spindle sealing

Free of dead spots

The first valve in this design made of tried and tested gunmetal material

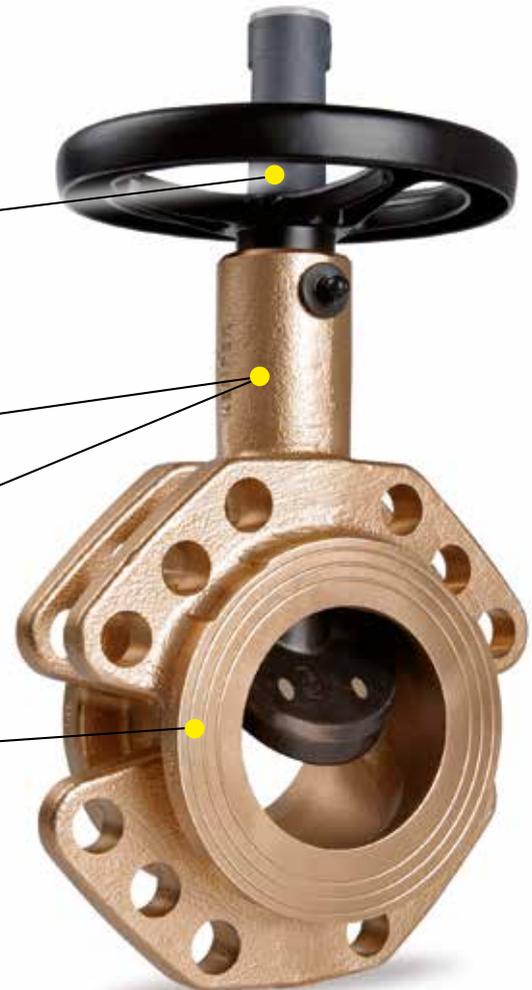
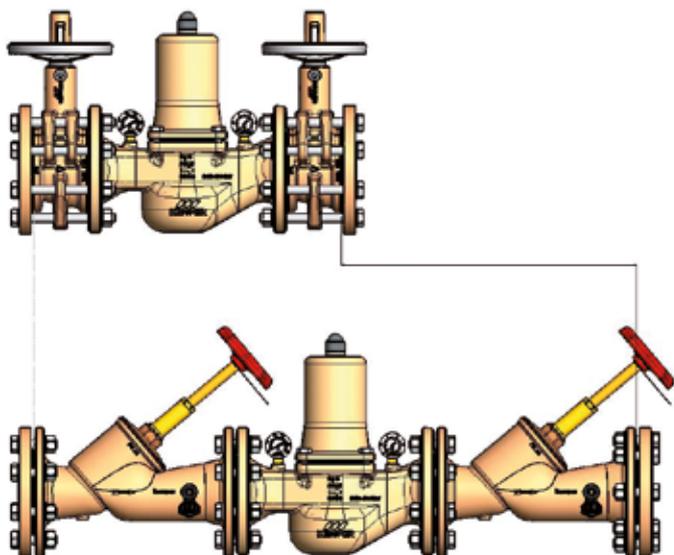


Fig. 122 01

Advantages at a glance

- Space-saving and easy installation
- The only KOMPAKT flange stop valve made of gunmetal with DVGW certificate according to DIN 3546-1
- High operational reliability through non-rotating spindle and thread outside the medium
- Energy efficient, with low pressure loss
- Free of dead spots
- Maintenance free spindle sealing
- One-piece housing without additional sealing surfaces
- With regulating cone and locking device as stroke limiter



Installation example for DN 80
Savings: 460 mm end-to-end length 12 kg weight

FREE OF DEAD SPOTS

Freedom from dead spots:

This means hygienic safety in the installation. Through the consistently shaped geometry of KEMPER stop valves and of the upper part, movement is generated in the whole of the valve as soon as water flows. In this way, and only in this way, can a concentration of undesirable substances and the propagation of microbiology be prevented in dead spots.

KEMPER flanged valves

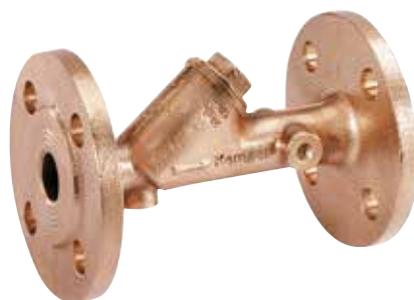
KEMPER free flow stop valve, made of gunmetal in the wetted parts, 10 years warranty, maintenance-free spindle seal with self-greasing EPDM lip seal, replaceable under pressure up to DN 80, Free of dead spots, with flange connection, from DN 20-150, Fig. 135

KEMPER dirt trap made of gunmetal with inclined seat with interchangeable double filter insert made of stainless steel, nominal pressure PN 16 with flange connection, from DN 50-100, Fig. 605 00

KEMPER free flow combined stop and check valve, made of gunmetal in the wetted areas, with check valves with stainless steel closing spring and testing device, maintenance-free spindle seal with self-lubricating EPDM lip seal, Free of dead spots, with flange connection, from DN 50-100, Fig. 137



KEMPER free flow stop valve with flange connection
Fig. 135



KEMPER dirt trap
Fig. 605 00



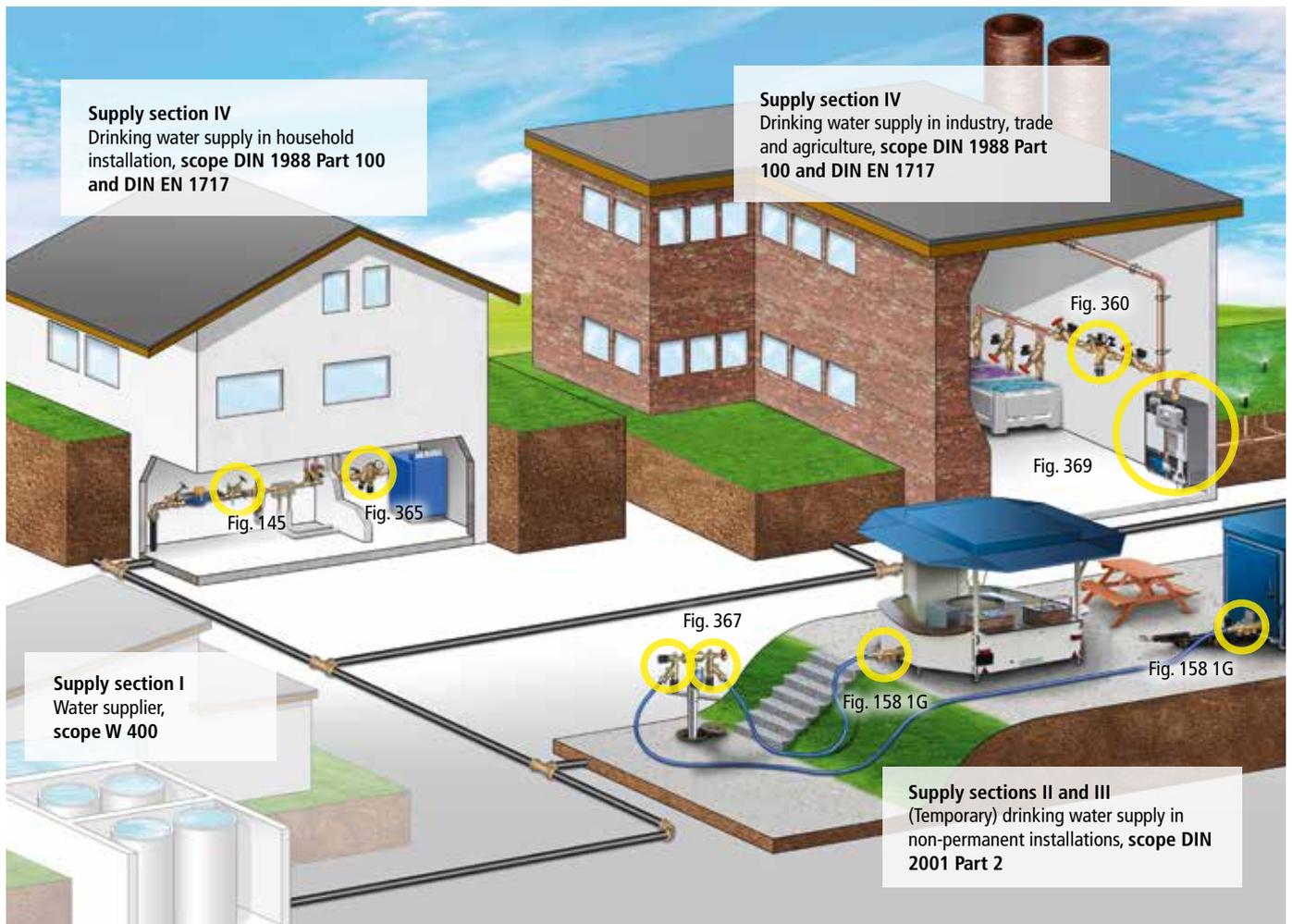
KEMPER Free-flow combined stop and check valve
Fig. 137

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Safety valves

Supply sections and applicable standard sections



DIN EN 1717/DIN 1988-100

DIN EN 1717 defines a uniform European-wide standard in the supply section "Drinking Water" for the protection of drinking water against non-potable water. This standard differentiates the areas of

use for Safety valves and defines the fluid categories. Consequently, in addition to water utilities, planners and plumbers are particularly exposed to an increasing liability risk. DIN 1988-100, in addition to DIN EN

1717, defines national principles to protect drinking water from fluids up to category 5.

Fluid categories as defined in DIN EN 1717

Category	Definition	Examples	Possible higher category
Category 1 	Water intended for human consumption, taken directly from a drinking water installation.	Drinking water, water under high pressure	
Category 2 	Fluid that does not represent a danger to human health. Fluids that are suitable for human consumption, including water from a drinking water installation, that may show a change in taste, smell, colour or temperature (heating or cooling).	Coffee, tea, iron bacteria, stagnant drinking water in a drinking water system (a), chilled drinking water, steam (in contact with foodstuffs), sterile water, demineralised water, cooking food, treated drinking water (b)	
Category 3 	Fluid representing a health hazard due to the presence of one or more toxic or very toxic substances (c).	Rinsing water for crockery and kitchen appliances, heating water without additives, cistern water, water + surface-active substances (c), softened water (softening systems) (c), water and corrosion protection agents (c), water and antifreeze (c), water and algaecides (c), water and detergents (c), water and disinfectants (c), water and coolants (c), washing fruit and vegetables (d) (food establishments)	X X X X X X X X
Category 4 	Fluid that represents a health hazard for human beings through the presence of one or more toxic or very toxic substances or one or more radioactive, mutagenic or carcinogenic substances.	(e.g. hydrazine, lindane, insecticides)	
Category 5 	Fluid that represents a health hazard for human beings through the presence of microbial or viral pathogens of infectious diseases (contamination, danger to life).	Hepatitis viruses, salmonella, E. coli bacteria Washing machine water, swimming pool water, watering places for animals, WC water	

(a) Some substances may increase the risk (temperature, materials)

(b) Treated drinking water within buildings (with the exception of the device)

(c) Distinction between category 3 and 4 is, in principle, LD50 = 200 mg/kg body weight according to EU directive 93/92 of 23.04.1993

(d) Category 5 for pre-wash and wash water, Category 3 for rinsing water

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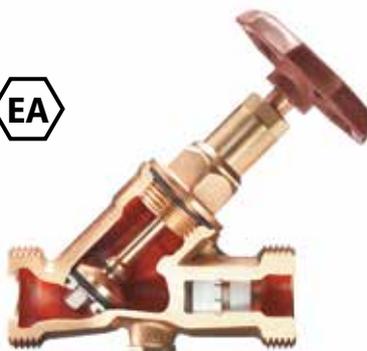
Drinking water protection up to and including fluid category 2



KEMPER check valve EA



KEMPER check valve (RV) for protection purposes
Fig. 158



KEMPER combined stop and check valve (KRV) to secure and isolate, with maintenance-free lip seal
Fig. 145



KEMPER combined stop and check valve (KRV) with fixed Geberit MAPRESS press connection, stainless steel
Fig. 060 01

Advantages at a glance

- Opening pressure only 10 hPa
- Can be fitted with Pt 1000 temperature sensor or thermometer
- Wear-resistant stainless steel valve seat
- Rotatable valve disc to avoid wear on the gasket
- Spindle seal replaceable under system pressure
- Free of dead spots
- Resistant to corrosion, made of gunmetal and stainless steel according to UBA positive list

Drinking water protection up to and including fluid category 3



KEMPER backflow preventer CA

Advantages at a glance

- With stainless steel mesh at inlet
- Free of dead spots
- Resistant to corrosion, made of gunmetal according to UBA positive list



Fig. 362
DN 15-20

* in conjunction with isolating device on the inlet side

Drinking water protection up to and including fluid category 4



KEMPER PROTECT backflow preventer BA

Advantages at a glance

- Maintenance-friendly thanks to three integrated test valves
- With stainless steel mesh at inlet
- Free of dead spots
- Resistant to corrosion, made of gunmetal according to UBA positive list



Fig. 360
DN 15-50

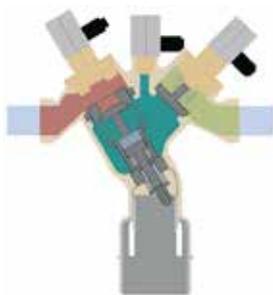


The three-chamber system

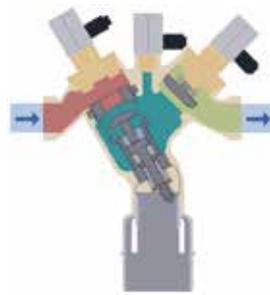
Technically sophisticated, which is why it is so reliable: The KEMPER PROTECT backflow preventer BA is based on a sophisticated

three-chamber system with supply pressure, medium pressure and back pressure zones. The differential pressure controllers

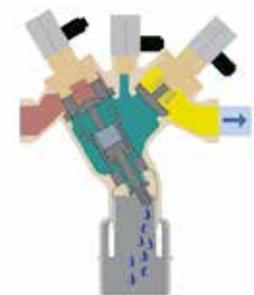
of the protection cartridge on the inlet side and the check valve (RV) on the outlet side ensure reliability and a high degree of security.



1. Rest position (under operating pressure) If there is no removal of water, the check valve and the bleeder valve on the inlet and outlet sides are closed.



2. Flow position When water is being removed, the check valves on the inlet and outlet sides are open and the bleeder valve is closed.



3. Disconnection position In the event of siphon backflow, the pressure on the inlet side drops. The bleeder valve reacts before the differential pressure falls below 140 mbar. The check valves on the inlet and outlet sides close, the bleeder valve opens.



Fig. 361
DN 65-150

Advantages at a glance

- For protection in large-scale plants
- Free of dead spots
- Resistant to corrosion, made of stainless steel according to UBA positive list

* in conjunction with isolating device on the inlet and outlet sides ** dirt trap required in the inlet side

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KEMPER FK-4 RPZ outlet valve type BA

The European standard DIN EN 1717 says under 5.3.2 Connections:

All connections to the drinking water installation are regarded as permanent connections. This means that all protection devices against backflow, back pressure and siphon backflow must be designed as if there were a permanent connection. Valves with hose connections must be designed in such a way that the maximum expected protection case can be covered.



No longer permitted! ¹⁾

Standard-compliant solution

¹⁾ In new buildings or in old buildings if prior rights do not apply (lack of protection in accordance with DIN 1988 Part 4)

Advantages at a glance

➤ High-speed filling: up to 75 % time saving compared to standard manufacturers

➤ Integrated isolating function

➤ Inseparable unity of backflow preventer and outlet valve (satisfies duty to ensure public safety!)

➤ Free of dead spots

➤ Resistant to corrosion, made of gunmetal according to UBA positive list

KEMPER FK-4 for the protection of the drinking water installation up to fluid category 4 is manufactured from the corrosion-resistant material gunmetal.

Isolation takes place before the backflow preventer cartridge. This prevents water leakage when not in use. FK-4 is available in the dimensions DN 15, 20, 25 and 50.



Fig. 367 01 015/020

Drinking water protection up to and including fluid category 4



Applications: Drinking water with chemicals

- 1 Connection of chemical cleaning apparatus using KEMPER FK-4. Use in accordance with DIN 1988 Part 100, Table A1, use case No. 10.
- 2 Connection of a coating device with KEMPER FK-4. Use in accordance with DIN 1988 Part 100, Table A1, use case No. 9.



- 3 Connection of a drinks trolley with KEMPER FK-4. Use in accordance with DIN 2001 Part 2.
- 4 Connection of a mixing plant. Refilling with KEMPER FK-4. Use in accordance with DIN 1988 Part 100, Table A1, use case No. 9.



Applications in household installations

- 1 Connection of a high-pressure cleaner with/without the addition of chemicals using KEMPER FK-4. Use in accordance with DIN 1988 Part 100, Table A1, use case No. 33.
- 2 Connection of a boot cleaning system with KEMPER FK-4. Use in accordance with DIN 1988 Part 100, Table A1, use case No. 55.



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Drinking water protection up to and including fluid category 4



KEMPER backflow preventer type BA for apartments

Standard-compliant heating filling in the living area ⁽¹⁾

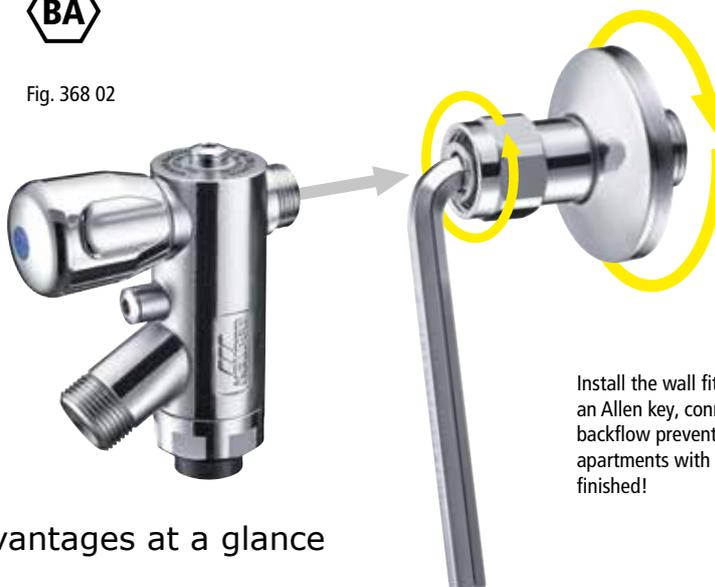
In accordance with the Drinking Water Ordinance (TrinkwV), heating systems must be protected for filling and refilling (e.g. with reduced-pressure-zone backflow preventer BA)⁽¹⁾. This of course also applies to apartment heating systems!

Here, however, the necessary retrofitting with suitable valves is problematic: while the installation conditions are usually very cramped, the installation dimensions of the protection equipment are large. In addition, from an appearance point of view, many of these technical valves cannot be integrated in a bathroom or kitchen.

SAFE
according to
DVGW W 570-3,
DIN EN 12729 TrinkwV
and AVBWasserV



Fig. 368 02



Install the wall fitting using an Allen key, connect the backflow preventer type BA for apartments with a union nut, finished!

The solution:

The KEMPER backflow preventer type BA for apartments allows the standard-compliant protection of central and apartment heating systems. Visually, it blends in very well with the visible areas of bathrooms or kitchens. Thanks to its wall fitting, the backflow preventer type BA for apartments can easily be installed even in small niches.

Advantages at a glance

- High-quality design for visible installation
- Thanks to wall fitting, can also be used in cramped situations
- Free of dead spots

⁽¹⁾ in accordance with DIN EN 1717 / DIN 1988-100



KEMPER backflow preventer type BA for apartments for refilling a central heating system in a single-family dwelling.



KEMPER backflow preventer type BA for apartments for topping up a gas-fired boiler in a bathroom.

Drinking water protection up to and including fluid category 4



KEMPER FILL-MATIC

For filling the heating system, with comfort functions

The KEMPER FILL-MATIC 4 makes it easy and safe to fill and refill the heating system. The extremely compact valve combination permanently connects the drinking water installation with the heating system. The heart of the system is a reduced pressure zone backflow preventer BA using

proven cartridge technology, which even allows the protection of systems up to fluid category 4 (e.g. for the use of inhibitors or a water softening system). The integrated pressure reducing valve with dirt trap ensures a constant refilling pressure. The system is thus automatically filled up to the

preset pressure. With the help of the downstream pressure gauge, you can keep an eye on the system pressure at all times. In addition, FILL-MATIC facilitates the maintenance of the backflow preventer by means of a maintenance organ located on the inlet side.

- 1 Pressure gauge
- 2 Stop valve
- 3 Pressure reducing valve cartridge with integrated dirt trap

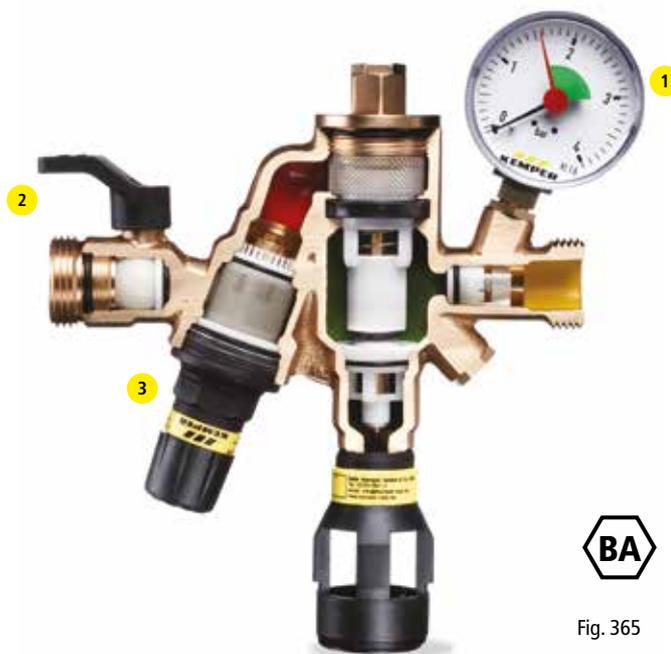


Fig. 365

Advantages at a glance

- Constant refilling pressure through integrated pressure reducing valve with stainless steel dirt trap
- Integrated pressure gauge
- Insulating shell, EnEV-compliant
- Free of dead spots
- Resistant to corrosion, made of gunmetal according to UBA positive list

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Drinking water protection fluid category 5



KEMPER FK-5 break tank station

Powerful – comfortable – standard-compliant

Fluid category 5 to meet the strictest requirements

Due to the significant risk to human health caused by category 5 fluids, indirect separation from the drinking water system must be ensured.

The FK-5 break tank station meets this requirement through an integrated Type "AB" drain. And it also has many functional highlights!



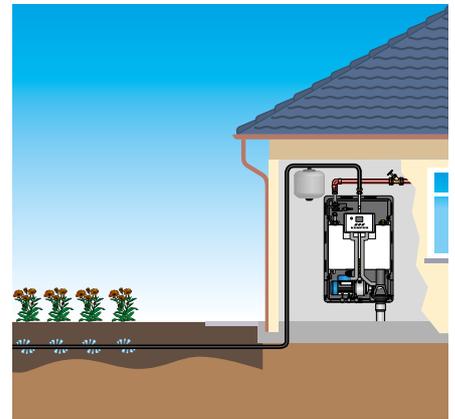
The following applications show examples of danger zones for fluid category 5 in accordance with DIN 1988 Part 100, Application Table A1.



Type "AB" drain



Water playground with source outlets



Subsurface irrigation



Cattle troughs



Cooling towers

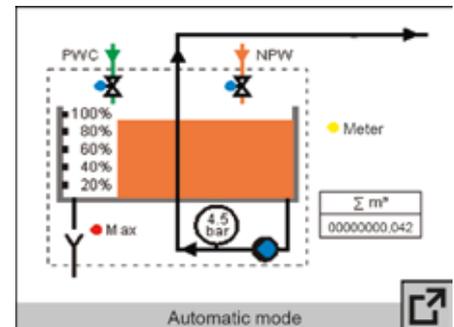
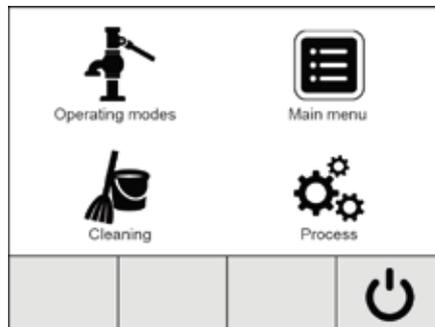
Fig. 369

* in conjunction with isolating device on the inlet side

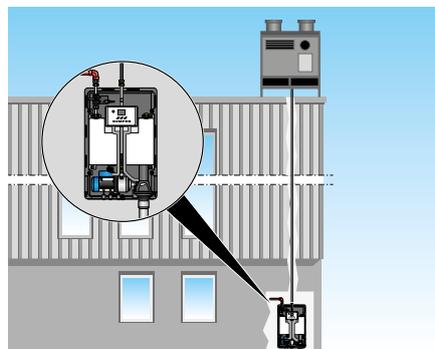
Drinking water protection fluid category 5



Comfortable use of functional diversity
Operating advantage thanks to touch screen control.



Overcome delivery heads, supply volumes
Wide range of services for many application areas.



Example: Building with a height of 30 m



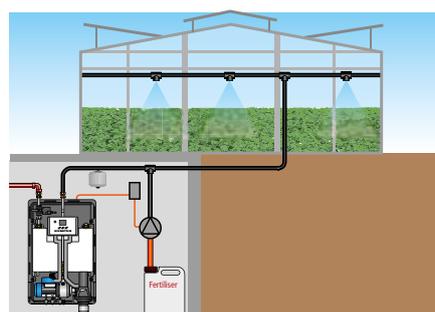
Example: Irrigation with high volume flow

Automated operation, vandalism prevention
Usage optimisation with time control and operating time selection.



Operating times		
Monday	off	00:00 - 00:00
Tuesday	off	00:00 - 00:00
Wednesday	off	00:00 - 00:00
Thursday	off	00:00 - 00:00
Friday	off	00:00 - 00:00
Saturday	off	00:00 - 00:00
Sunday	off	00:00 - 00:00

Practical solutions for applications
Control of metering pumps and connection of a second water source (e.g. rain water, well water, process water).



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Drinking water protection fluid category 5

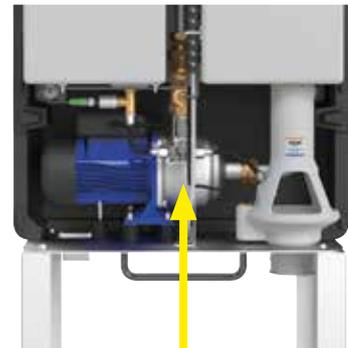


Stop germ growth

Inlet pipe flushing and tank cleaning

Automatic flushing inlet 1			
Monday	off	00:00	0 min
Tuesday	off	00:00	0 min
Wednesday	off	00:00	0 min
Thursday	off	00:00	0 min
Friday	off	00:00	0 min
Saturday	off	00:00	0 min
Sunday	off	00:00	0 min

↗ ↑ ↓ OK



Tank cleaning set

Know what is happening

Data storage for building management

USB port
1. Save fault log
2. Save consumption log
3. Save short-term log
4. Firmware update

🏠 ↑ ↓ OK

BMS link:

➤ There is a dry contact for outputting a fault signal to the BMS.

Accessories

Enhancement options and optional accessories



FK-5 rainwater utilisation set, Fig. 369 01



FK-5 container cleaning set, Fig. 369 02



FK-5 rack, Fig. 369 03

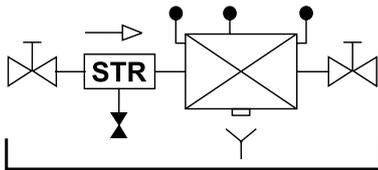


FK-5 overflow monitoring, Fig. 369 04

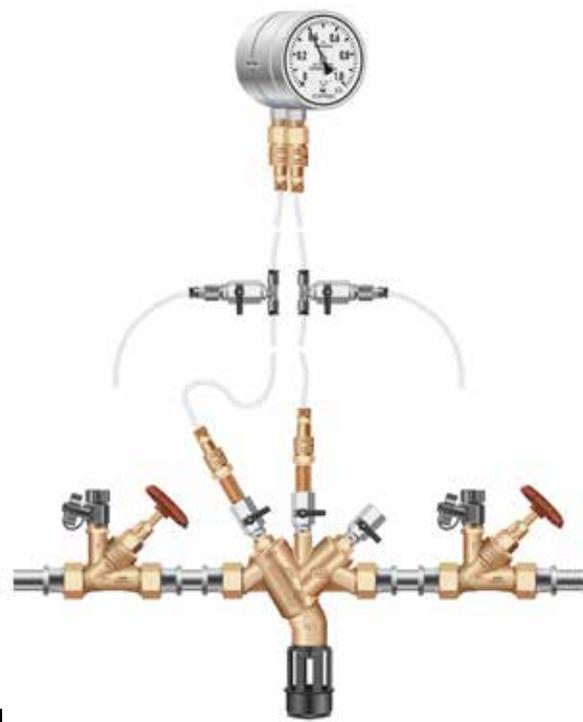
KEMPER differential pressure meter for backflow preventer BA

Planning objective:

➤ Protection of drinking water, risk minimisation



Protection device backflow preventer BA



Advantages at a glance

- For the prescribed annual maintenance according to DIN EN 806-5
- For checking the safety and the function of the backflow preventer according to DIN EN 12729
- Suitable for carrying out maintenance for all Safety valves in accordance with DIN EN 1717, in particular for all backflow preventers BA Figs. 360, 361, 367, 368 and heater filling combination Fig. 365

KEMPER differential pressure measuring kit consisting of:



Fig. 360 99

- Diaphragm spring differential pressure gauge (display up to 0.1 MPa (1 bar) differential pressure)
- With pre-assembled pressure hoses
- With ball valves for bleeding and the targeted reduction of the supply pressure
- Including adapter for screwing onto IG 1/4 and 1/2 test valves without using tools
- Including quick coupler to connect the pressure hoses
- With back pressure gauge with quick coupler to test the check valve on the outlet side
- In practical aluminium case

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KEMPER leak detection system

Water damage due to leaks in drinking water systems can cause enormous damage.

Installations or supply lines are to be considered as critical components, since they can create a risk of flooding. A leak may lead to the destruction of highly sensitive fixtures, e.g. in computer rooms and archives. The interruption of operation in business premises can also mean a loss of customers. Data loss and time to re-commissioning are very expensive. If intangible assets are affected in the private sector, the personal loss is usually irreparable. In property which is used seasonally (e.g. holiday apartments) and which is left unattended for a long time, leaks can lead to immense damage.



Preventive measures

Leak detection by means of sensors

Thanks to the targeted detection of damage-causing water, huge follow-up costs can be avoided. When the water sensor detects a leak, it sends a pulse to the leakage controller. This initiates a safe, pressure surge-free isolation of the drinking water line affected.

Time-controlled protection

Security through individual programming: In addition to the basic setting of leakage monitoring, time intervals can also be programmed to open and close the safety valves. This means that the supply line in question can be shut off in the event of absence or non-use, e.g. when shops,

schools or offices are closed.



Fig. 620 00

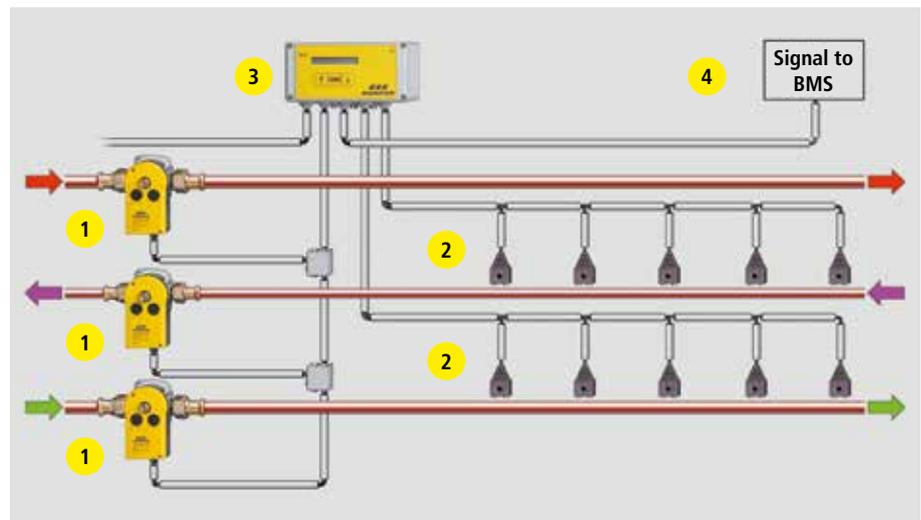
Fig. 620 00 001

Leak detection system Fig. 620 00 DN 15-32, Fig. 620 01 DN 15-32 with spring return actuator, Fig. 620 03 DN 40-50 with spring return actuator

An overview of the options

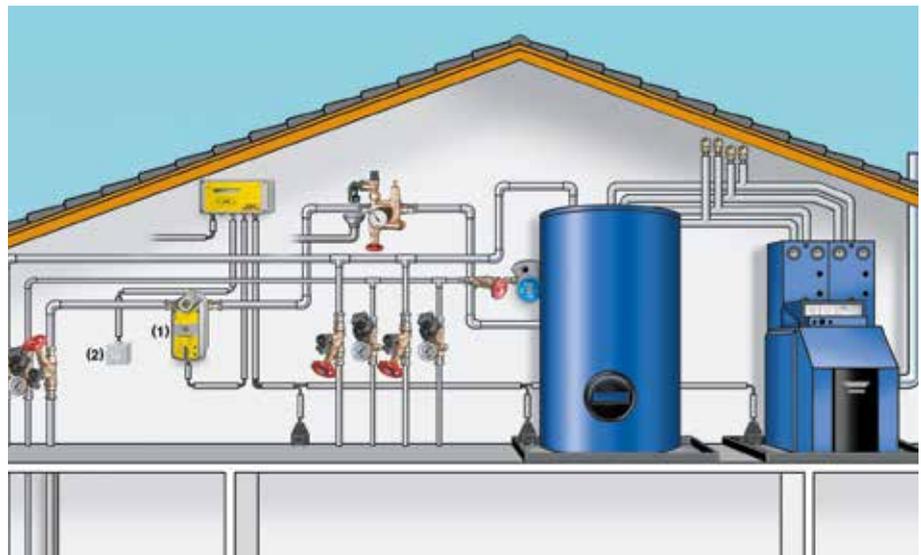
1) Leak monitoring

- 1 KHS stop valve with actuator (up to max. 10 units)
- 2 Max. 50 water sensors with up to 2 possible detection circuits (max. 25 water sensors each per detection circuit)
- 3 KEMPER leakage control system
- 4 Forwarding of alarm, e.g. from the connection room or roof technical plant area with DW warning to BMS



Example roof technical plant area

Through targeted detection in a roof technical plant area, the PWC inlet pipe is closed in the event of a leak (1). This happens both in the event of leaks in the drinking water system as well as in heating-side leaks and leaks in the roof, for example. This prevents damage to the structure and the building installations. In large buildings it is possible to forward the alarm directly to the building management system (BMS). The external pushbutton (2) allows the use of the leak safety valve as maintenance cut-off.



Example server room

Three KHS Quarter turn stop valve-plus full flow stop valves are connected in parallel to the leakage control system. The water sensors are located in the false floor in the server room. In this way, leaks are detected at an early stage. A failure of the computers with data loss is prevented, as the three KHS quarter turn stop valves cut off PWC, PWH and PWH-C at the same time. The installation of an alarm horn supports leak detection acoustically. It is also possible to forward a fault signal to the BMS.



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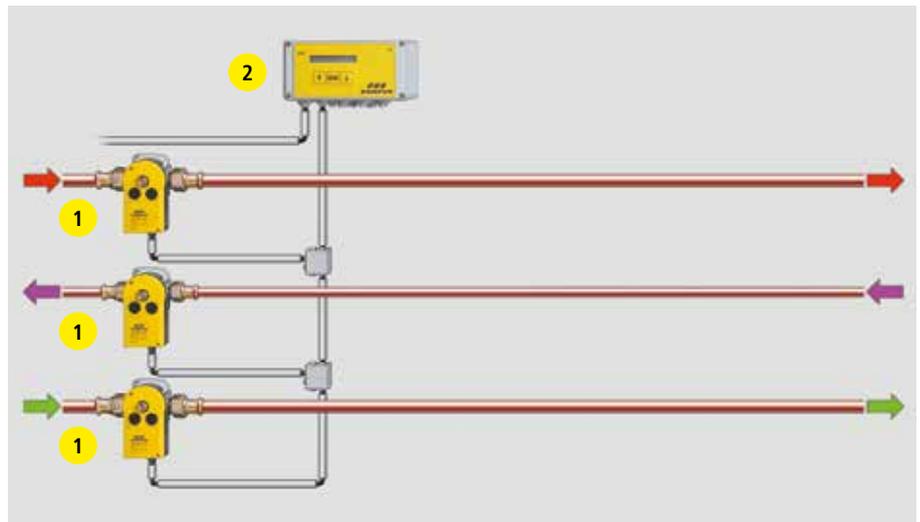
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2) Time-controlled protection

The timer programme allows automatic protection of the building during periods of extended absence or when leaving the building. It is possible to set 16 cut-off and opening times.

- 1** KHS stop valve with actuator (up to max. 10 units)
- 2** KEMPER leakage control system



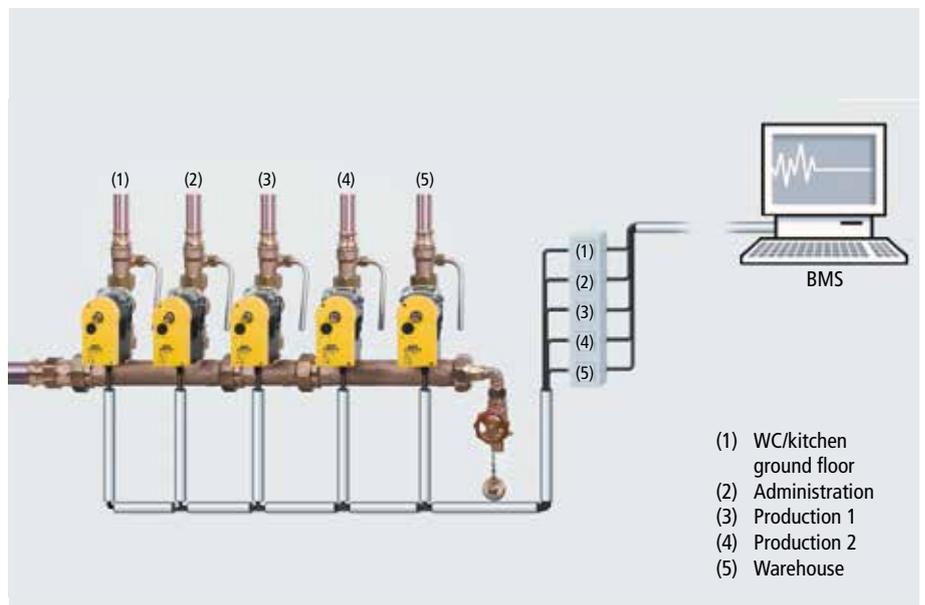
Example launderette with timer monitoring

After the launderette closes, the drinking water lines to the washing machines are automatically closed. Damage is avoided. Safely and reliably.



Example connection to building management system

Safety through motor-operated cut-off devices by KEMPER. When the occupants leave the building, house, apartment etc., the KHS stop valve is motor-closed, either manually by means of a key-operated button or automatically by means of the building management system. With this technology, valves in false ceilings or under hall roofs can also be opened or closed quickly and easily. Programmed service intervals guarantee the correct functioning of the motor-driven full flow stop valves.



KEMPER leak detection system

The components



KHS quarter turn stop valve with actuator
Fig. 620 00



KHS quarter turn stop valve PLUS with
spring return actuator
Fig. 620 01/03

Fig. 620 00 001

KEMPER leak detection system

Consisting of a leakage control system with integrated timer and quarter turn stop valve with 230 V actuator and a water sensor.

With KHS quarter turn stop valve with actuator (supply voltage 230 V AC)	Order No.	Nominal width
	6200001500	DN 15, AG (G) $\frac{3}{4}$
	6200002000	DN 20, AG (G) 1
	6200002500	DN 25, AG (G) 1 $\frac{1}{4}$
	6200003200	DN 32, AG (G) 1 $\frac{1}{2}$
With KHS quarter turn stop valve with spring return actuator (supply voltage 230 V AC)	Order No.	Nominal width
	6200101500	DN 15, AG (G) $\frac{3}{4}$
	6200102000	DN 20, AG (G) 1
	6200102500	DN 25, AG (G) 1 $\frac{1}{4}$
	6200103200	DN 32, AG (G) 1 $\frac{1}{2}$
	6200304000	DN 40, AG (G) 1 $\frac{3}{4}$
	6200305000	DN 50, AG (G) 2 $\frac{3}{8}$

Advantages at a glance

- Leakage monitoring and time-controlled flushing of the drinking water system
- Reliable detection of a leak by means of a water sensor with immediate isolation of the drinking water system
- Space-saving, easily retrofittable solution for new build and retrofit
- DVGW-approved full flow stop valve without pressure surge when closing/opening, according to DIN EN 13828
- Timer programmes allow automatic protection when leaving the building or during prolonged absence
- Leaks are indicated by acoustic and visual alarm sent to the leakage control system
- Forwarding of alarm to a building management system (BMS) possible



Pressure regulators, filters and safety groups

Cost-effective - multi-functional - space saving



Advantages at a glance

- Can be flexibly combined thanks to modular design with base flange for all function modules
- Complete from DN 15-50
- Wetted parts made of gunmetal and stainless steel and high-quality plastic parts with KTW approval
- DVGW approval for Figs. 710, 712 and 713
- Proven technology with long service life

KEMPER pressure reducing valve DM



Fig. 710

Advantages at a glance

- Correct end-to-end length for replacement of common market models
- Any installation position through 360° rotatable cartridge, thus preset pressure can always be read off
- Hygienic design with visibly integrated dirt trap
- Pressure range 1.5-5.5 bar can easily be preset without additional tools

KEMPER Filter F



Fig. 712

Advantages at a glance

- Differential pressure-controlled back-flush display and monthly maintenance display
- Fast, easy and operator-friendly back-flushing technology
- Hygienic design through opaque filter cup to prevent microbial contamination
- KEMPER automatic backwash Fig. 712 99 004 available as an accessory
- Thanks to the modular base flange, installation is possible in horizontal as well as in vertical pipes

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KEMPER automatic back-flush for filters



Fig. 712 99 004

Additional flush trigger functions: Triggering the automatic back-flush through the building management system (BMS) or remote switch

The automatic back-flush can be remotely triggered by a potential-free switching circuit. In this way, a back-flush log can be created quickly and easily through the BMS. This may be used as proof of maintenance in accordance with VDI 3810 Sheet 2.

Additional position feedback functions: Remote monitoring through a BMS

For remote monitoring of the open-close position of the ball valve, we recommend installing evaluation electronics in the central control engineering with a 0...10 V input. When the mains voltage is applied, an actual value of less than 0.5 V means the ball valve is open. At a value between 5 V and 6 V, the ball valve is closed.

Advantages at a glance

- Drinking water hygiene through automated back-flushing
- Flushing may be triggered by means of remote switch or BMS
- Flushing valve position feedback to the BMS possible
- Very easy programming - read off the back-flush duration from the table and enter the line number in the device
- 16 intervals possible (from four minutes to three months)
- Display of back-flushes performed
- Very simple installation

KEMPER safety group S



Fig. 714 - 716

Advantages at a glance

- Compact design in conjunction with all the necessary components with minimal space requirements
- Hygienic, streamlined design
- To prevent excessive pressure in closed domestic water heaters of up to 1,000 litres
- With stop valve, controllable check valves and additional 2nd isolation, diaphragm safety valve drain device according to DIN EN 1717
- Thanks to the modular base flange, installation is possible in horizontal as well as in vertical pipes

KEMPER pressure reducing valves and filters

Pressure reducing valve

Pressure reducing valves compensate for pressure fluctuations and pressure peaks in the public pipeline network and provide for uniform pressure in the domestic water installation system. Pressure reducing valves may be integrated in the filter.

With a pressure reducing valve, the pressure can be reduced, for example, in order to reduce water consumption or to preserve technical equipment

and valves and to prevent malfunctions. **Filter and pressure reducing valve-filter combinations in accordance with DIN EN 13443-1 and DIN EN 1567.**

Filters can be combined with pressure reducing valves. The compact design makes possible the cost-effective and space-saving installation of filters and pressure reducing valves. Unlike replaceable filters, the filter element of back-flushing filters,

which normally has to be cleaned, does not need to be replaced. Here, the filter insert is cleaned by means of back-flushing. In the back-flushing process, the water first flows through the filter insert, as in normal operation, and the impurities are held back.

KEMPER pressure reducing valve, flanged

➤ The only large model with DIN/DVGW approval



KEMPER pressure reducing valve, flanged
Fig. 711, DN 65-80

Advantages at a glance

- Wetted parts made of gunmetal and stainless steel
- Compact design thanks to compressed, optimised installation height
- DIN/DVGW-approved according to DIN EN 1567
- Pressure range can be preset from 0.1 to 0.7 MPa (1-7 bar), pressure rating PN 16/PN 25
- Easy maintenance when installed
- Smooth, easy pressure adjustment is possible during operation
- Option of controlling the supply and back pressure using the pressure gauge included in the scope of delivery
- Optimised flow rate

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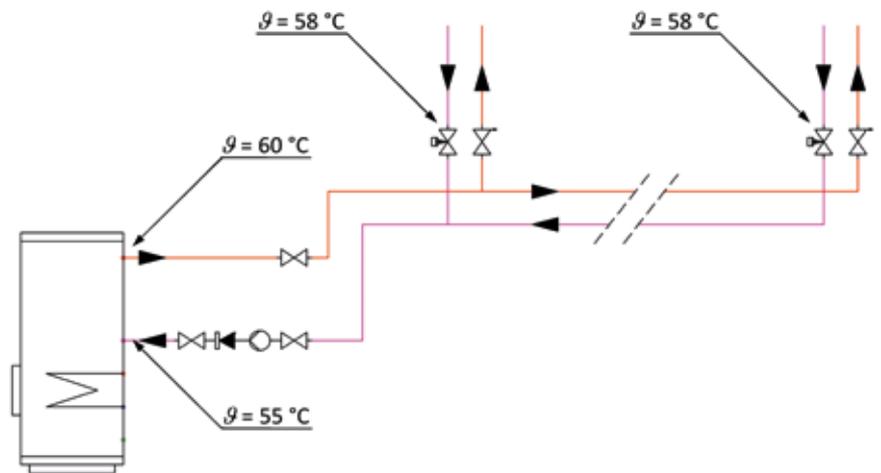


Regulating valves

**Risk area hot water:
Protect drinking water systems from legionella bacteria**

To reduce the growth of legionella bacteria in drinking water installations, particular importance is attached to compliance with drinking water temperatures. For this reason, a temperature of 60°C must be maintained at the hot water outlet of the domestic hot water heater, and the temperature may only fall below this temperature for a period of minutes.

Throughout the hot water network, the temperature must not fall below 55 °C. Since the hot water would cool down when not in use, it must be kept at this temperature permanently with the help of circulation systems. A prerequisite for the correct



Schematic structure of a circulation system (temperature conditions with hydraulic balancing)



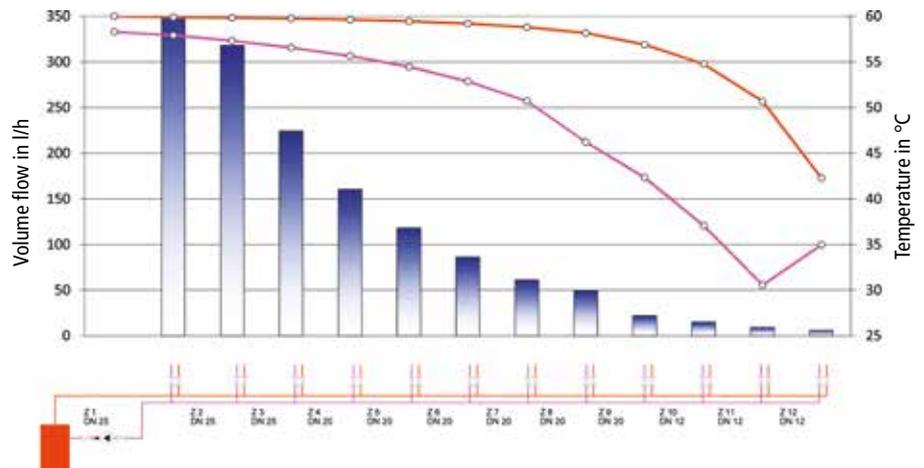
functioning of the hot water system is the hydraulic balancing of the circulation system. A correctly dimensioned circulation system ensures that the temperature never falls below 55 °C at any point in the supply system. Floor distribution lines represent an exception to this, as they are subject to the 3-litre rule.

tems must be designed to take account of drinking water hygiene aspects. This is effected in accordance with DIN 1988, Part 300, and the DVGW worksheets W 551 and W 553. The dimensioning of circulation systems must therefore take account not only of functional and economic aspects, but also of drinking water hygiene.

The dimensioning of domestic hot water heating, distribution and circulation sys-

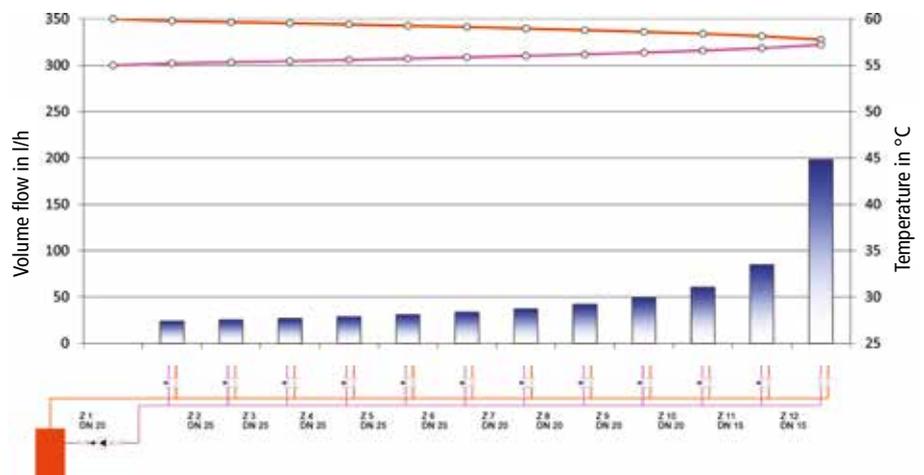
Drinking water circulation systems: The need for hydraulic balancing

The circulation volume flow must be able to transport the quantity of heat that is lost through the surface of the pipeline system. This means that a specific preset water temperature can be maintained only if a state of equilibrium can be ensured at all points in the circulation system. If "hydraulic balancing" is not effected, the volume flows and thus also the temperatures of the currently calculated case cannot be achieved in the described system!



Volume flow distribution and temperature curve in a circulation system without regulation

In the pressure loss calculation, the available pressure difference of the pump must be "consumed" as far as possible in each circulation circuit of the system, taking account of minimum internal diameters and maximum speeds. The difference remaining in the pressure loss calculation between the available pump pressure and the calculated system pressure losses must be throttled. Statically or thermostatically controlled circulation regulating valves are used here. This hydraulic balancing of a circulation system is therefore a fundamental prerequisite for correct functioning.



Volume flow distribution and temperature curve in a circulation system with static regulation

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Hydraulic balancing for circulation in the riser

1 KEMPER MULTI-THERM circulation regulating valve

Through the use of automatic circulation regulating valves, the amount of work involved in regulating measures can be significantly reduced!

With the KEMPER MULTI-THERM circulation regulating valve, hydraulic balancing can easily be implemented in a "classical" two pipe circulation system in the riser.



Fig. 141 0G (including dial thermometer and drain valve)

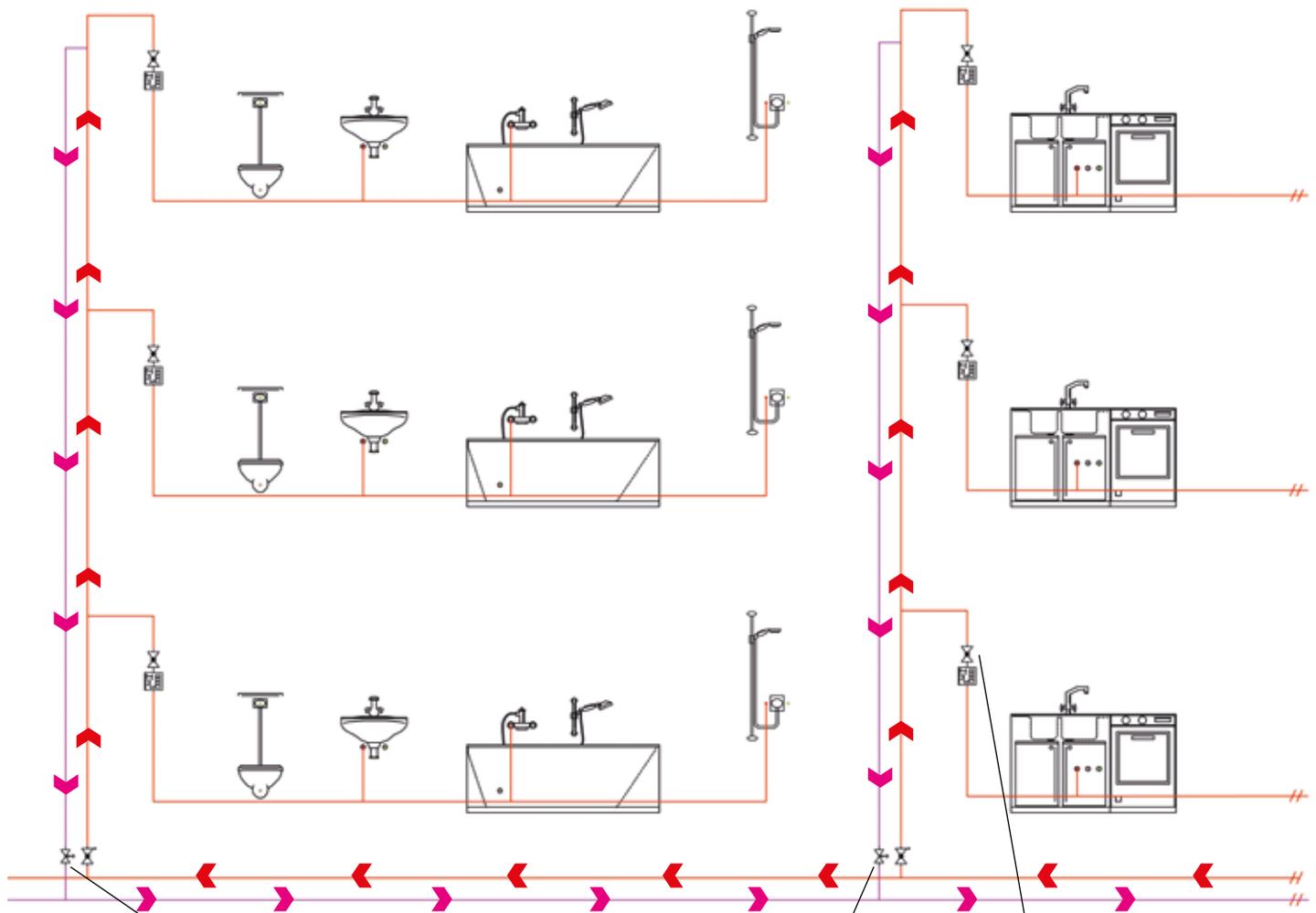
This is how versatile MULTI-THERM is!

MULTI-THERM combines several functions in one valve: fine-tuning, cutting off, draining and monitoring the temperature of the volume flow using thermal control. Here, MULTI-THERM works not only in the operating temperature range of 50-65°C, but also automatically supports thermal disinfection at temperatures > 70°C.



Fig.	Article description
141 0G	MULTI-THERM, made of gunmetal, male thread, DN 15-25
143 00	MULTI-THERM, made of gunmetal, female thread, DN 15-25
143 22	MULTI-THERM, made of gunmetal, MAPRESS press connection, DN 15-20
143 40	MULTI-THERM, made of gunmetal, MEPLA press connection, DN 15-20
041 0G	NIRO MULTI-THERM, made of stainless steel, male thread, DN 15

Schematic diagram of a circulation system with circulation in the riser



Combination of apartment water meter and circulation

With apartment water meters, it is possible to install the circulation in the riser. Here, hydraulic balancing between the risers is guaranteed by thermostatically controlled valves. It is important to ensure that the non-circulating volume does not exceed three litres in the floors.



1 MULTI-THERM
Fig. 141 0G



Quarter turn stop valve as a
concealed valve
Fig. 585 00

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Hydraulic balancing with circulation as far as the floor

2 KEMPER ETA-THERM floor regulating valve

If it is necessary to obtain hot water immediately after opening a tap, whether on account of hygiene requirements or for reasons of comfort, an automatic regulating valve is required for the hydraulic balancing of the floor circulation system (see branch diagram on the following page)!

Since very small volume flows are required to maintain the temperature in the floor on account of reduced heat-dissipating surfaces, KEMPER developed the ETA-THERM floor regulating valve specifically for this case. Its k_v value ($k_{v,min} = 0.05$, $k_{v,max} = 0.4$) is specially tailored to meet the needs of the floor area.

The KEMPER ETA-THERM floor regulating valve is available in 2 versions. Installation is possible in the area of the individual cut-off valve in plumbing units as a concealed regulating valve or as a surface-mounted regulating valve.



with sleeve connection Fig. 131 00



with sleeve connection Fig. 540 02

Fig.	Article description
130 0G	ETA-THERM, adjustment range 56 °C-58 °C, surface-mounted version, male thread, DN 15
131 00	ETA-THERM, adjustment range 56 °C-58 °C, surface-mounted version, female thread, DN 15
134 0G	ETA-THERM, adjustment range 62 °C-64 °C, surface-mounted version, male thread, DN 15
136 00	ETA-THERM, adjustment range 62 °C-64 °C, surface-mounted version, female thread, DN 15
540 02	UP-ETA-THERM, adjustment range 56 °C-58 °C, concealed version, female thread, DN 15
540 62	UP-ETA-THERM, adjustment range 62 °C-64 °C, concealed version, female thread, DN 15

3 KEMPER MULTI-FIX-PLUS circulation regulating valve

In circulation circuits, only the first regulating valve may be thermostatically controlled. For systems with several hydraulic levels, therefore, additional static regulating valves are required (see branch diagram on the following page)!

KEMPER MULTI-FIX-PLUS circulation regulating valves allow the manual setting of fine volume flows on the basis of defined valve setting values.



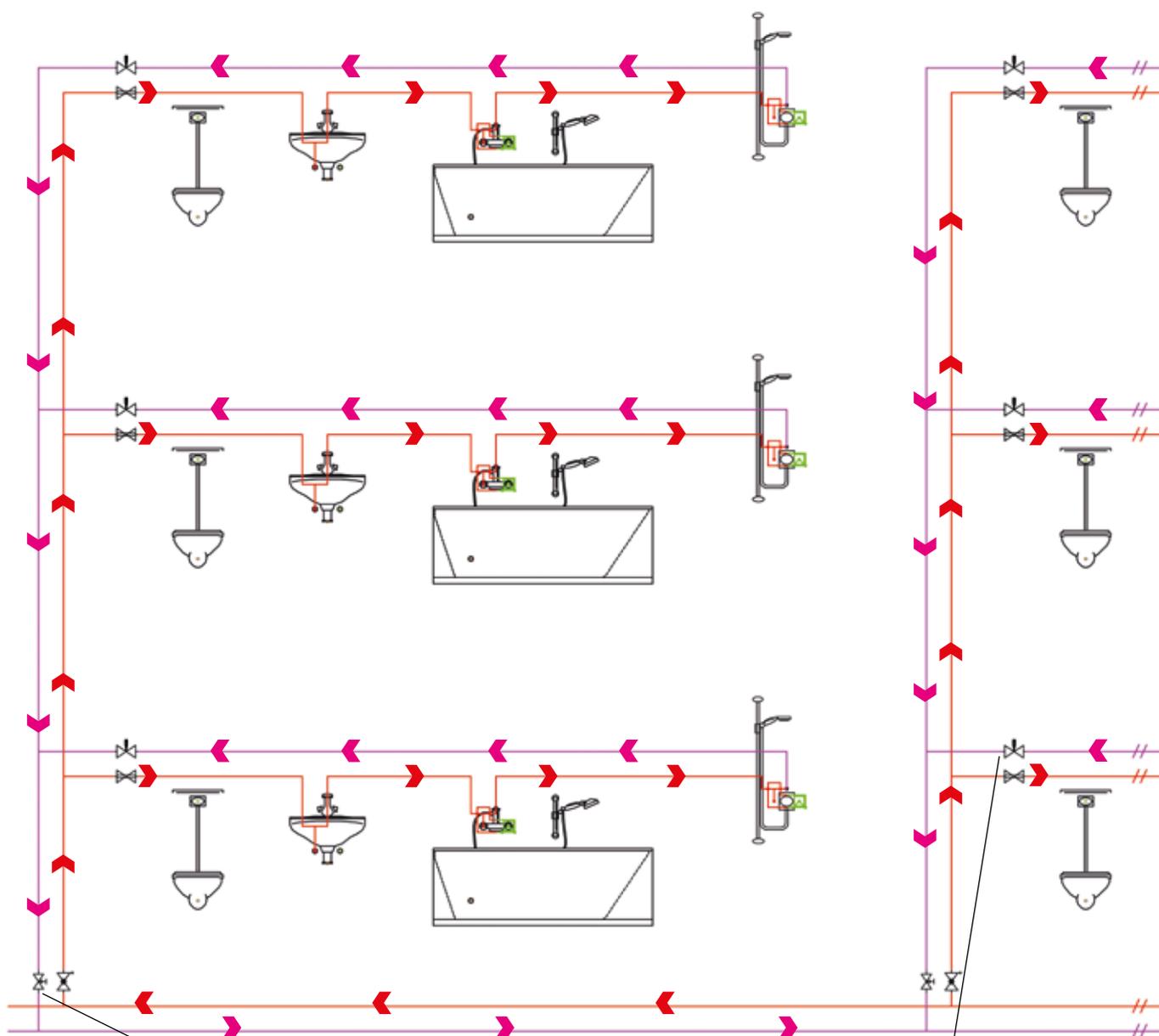
Fig. 150 6G



Fig. 151 06

Fig.	Article description
150 6G	MULTI-FIX-PLUS, with thermometer and plugged drain port, male thread, DN 15-50
151 06	MULTI-FIX-PLUS, with thermometer and plugged drain port, female thread, DN 15-32

Schematic diagram of a circulation system with circulation as far as the tapping point outlet with two-stage adjustment



Combination of static and thermal

If you have multi-stage adjustment, it is important to note that there is always only one thermostatically controlled valve in the circulation circuit. In order to maintain valve authority, only the first valve in the circulation circuit may be a thermostatic valve.



3 MULTI-FIX-PLUS
Fig. 150 6G



2 ETA-THERM
Fig. 130 or Fig. 540

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Measuring products

KEMPER CONTROL-PLUS - fast and accurate

The often time-consuming and costly adjustment of equipment and piping systems has finally been brought to an end: the perfect solution is called **KEMPER CONTROL-PLUS**.

The valve together with the mobile hand-held measuring instrument gives you clarity and mercilessly exposes existing interference factors. Volume flows can be clearly identified and adjusted, and operating states can be documented. This increases safety in the operation of existing and new installations.

Through the adjustment of the necessary volume flows, the temperature presence at the tapping point outlet is substantially improved. The adjustment of the circulation system by setting the volume flows and monitoring the temperatures lead to the utilisation of the maximum possible energy savings potential. The effective, time-saving adjustment of installations is achieved through the combination of the measuring valve with KEMPER MULTI-FIX-PLUS regulating valves. With the optional sensor measuring module, the measurement data of the sensor can easily be read off at the accessible measuring point.



KEMPER CONTROL-PLUS:
Flow and temperature measurement valve Fig. 138 4G with hand-held measuring instrument Fig. 138 00 002, sensor measuring module 138 00 011, MULTI-FIX-PLUS Fig. 150 2G and sampling valve Fig. 187

Application areas in new and existing buildings

KEMPER CONTROL-PLUS BMS version, output signal 4...20 mA

The output signal of 4...20 mA as well as the integrated PT 1000 allow simple and direct connection to the building management system. In this way, volume flow, flow velocity and temperature can be measured with the KEMPER CONTROL-PLUS measuring valve and forwarded to the building management system.



Fig. 138 6G

The visible difference between this and the standard version is the grey marking on the cap.

KEMPER CONTROL-PLUS hand-held measuring instrument

For the determination and adjustment of volume flows. For the exact recording and documentation of operating states. Digital display of the measured values for volume flow, temperature and flow velocity.

Data logger function for the storage and PC evaluation of up to 4000 reading points. The data are read out through a USB interface.



Fig. 138 00 002

KEMPER CONTROL-PLUS flow and temperature measurement valve

The flow measurement valve with integrated vortex flow sensor and Pt 1000 is designed for the exact determination of volume flows, flow velocities and temperatures in the drinking water installation.



Fig. 138 4G

KEMPER sensor measuring module

The use of the KEMPER sensor measuring module makes sense in parts of the building where no evaluation of the sensor signals is possible with a building management system and where the quick and reliable temporary monitoring of temperatures and flow rates is necessary.

The KEMPER sensor measuring module has three main functions:

1. It serves as a defined interface between the hand-held measuring instrument and various sensors. In addition to the CONTROL-PLUS, Pt 100, Pt 1000 and other sensors with 4...20 mA or 0...10 V output signal (e.g. pressure measuring sensors) can also be connected.
2. The measuring point and the type of sensor can be permanently stored in the sensor measuring module. They are then automatically forwarded to the hand-held measuring instrument for each evaluation.
3. The measured values of inaccessible sensors can be read out in an accessible area using the sensor measuring module and the hand-held measuring instrument.



Fig. 138 00 011

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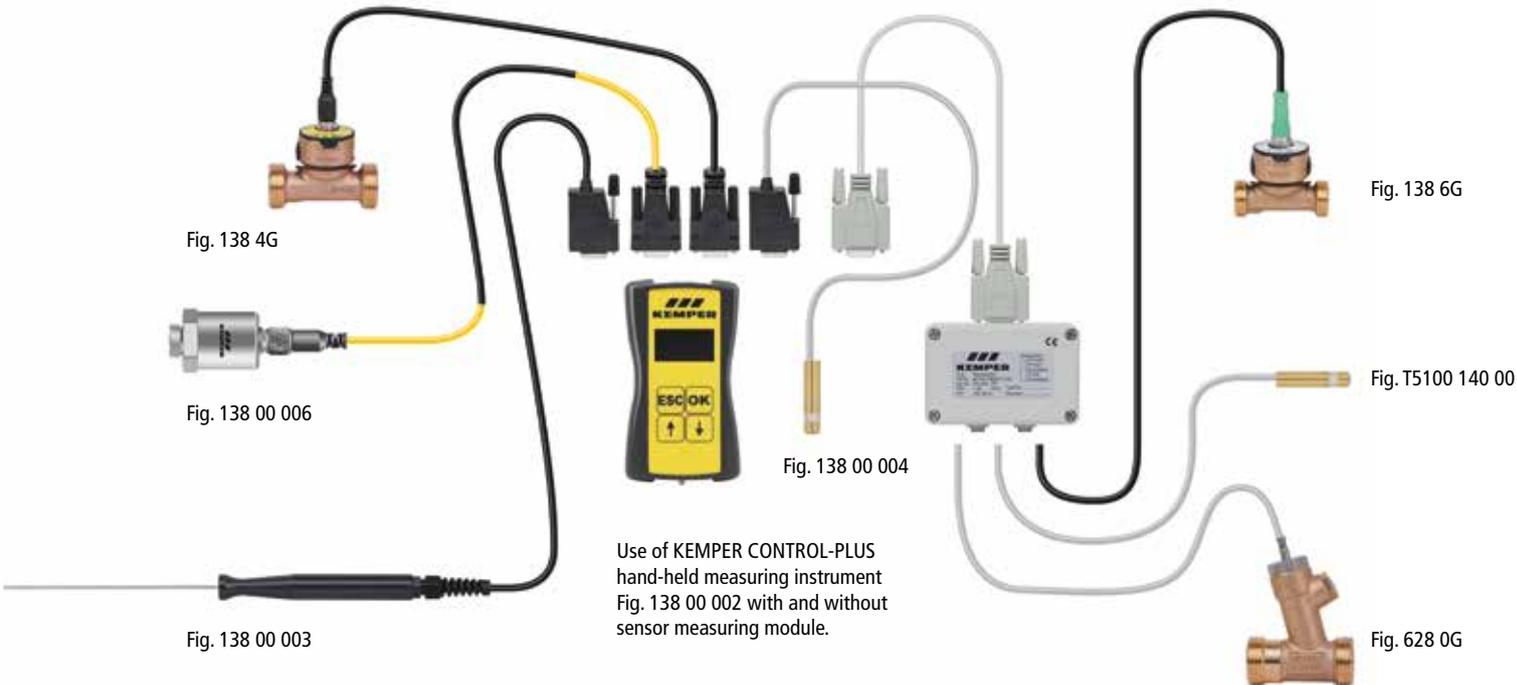
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Measuring/Reading/Saving



Use of KEMPER CONTROL-PLUS hand-held measuring instrument Fig. 138 00 002 with and without sensor measuring module.

The sensor measuring module serves as the interface between the hand-held measuring instrument and KEMPER CONTROL PLUS sensors to measure temperature, volume flow or system pressure (sensors with 4...20 mA or 0...10 V output signal) if they are permanently installed in inaccessible areas such as below suspended ceilings, in shafts, supply ducts etc. In this case, the sensor measuring module is mounted in an accessible place so that the data can easily be read out.

The KEMPER CONTROL-PLUS pressure measuring sensor Fig. 138 00 006 is used for the exact determination of pressure

conditions between 0 and 1 MPa (0-10 bar) in buildings. With its G 1/4 male thread, it can be connected to all commercially available valve drain cams or to the KEMPER MULTI-T adapter.

The KEMPER CONTROL-PLUS temperature sensor Fig. 138 00 003 is used for the exact measurement of water temperature in the range from 0-99°C, for example, to determine the temperature presence at a tapping point outlet in accordance with DIN 1988-200.

The KEMPER Pt 1000 temperature measurement valve Fig. 628 0G is used for the

exact measurement of the water temperature in the range from 0-99°C, whereby this is permanently fitted into the drinking water installation to determine the temperature at a specific point. The KEMPER CONTROL-PLUS volume flow sensor Fig. 138 4G/138 6G is used for the exact measurement of the volume flow in drinking water systems in accordance with its measuring range. Signals with 0-10V (Fig. 138 4G) as well as signals with 4-20mA (Fig. 138 6G) can be generated and forwarded.

Advantages of the KEMPER CONTROL-PLUS range of sensors:

- High measuring accuracy of the volume flow at low flow velocities of 0.2-2.5 m/s
- With frequency output in conjunction with the hand-held measuring instrument, as well as with a 4-20mA output for building management systems
- Simple digital display of volume flow, pressure, temperature and flow velocity on the hand-held measuring instrument
- Measured data can be stored and read out with the sensor measuring module
- Volume flow measurement for pipes with dimensions DN 10-50
- Short, robust sensor housing made of gunmetal
- Pressure measurement between 0 and 1 MPa (0-10 bar)

KEMPER MULTI-T adapter

Multi-functional and universal

The MULTI-T adapter can be used at any point to record and check operating states in the entire drinking water installation. Suitable for KEMPER Measuring products as well as valves by other manufacturers.



KHS temperature measurement valve Pt 1000
Fig. 628



KEMPER MULTI-T adapter Fig. 128 with drainage

Advantages at a glance

- Can be used flexibly in the entire drinking water installation for emptying, sampling and temperature measurement
- With Pt 1000 for connection from the building management system, 4-wire available
- R 1/2 outlet with integrated sensor port for the installation of the KEMPER dial thermometer (see above) or of the temperature sensor
- R 1/4 outlet for the installation of the KEMPER sampling or drain valve
- Universal, can be equipped with Measuring products from other manufacturers
- Low pressure-loss full bore
- High quality, in proven gunmetal quality, resistant to aggressive water
- Free of dead spots

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Concealed solutions

UP-PLUS concealed valves

The wide range of KEMPER UP-PLUS products gives planners and plumbers free rein when it comes to choosing material, function, installation and connection technology. This versatility not only offers a whole

package of important benefits, but also pays off by saving costs in every installation: flexibility for all walls with future-oriented technology.

Advantages at a glance

- With isolating, regulating and pre-setting function
- Free of dead spots
- Variable installation depth up to 180 mm
- Can be combined with grip or operating cover
- Made entirely of gunmetal, resistant to aggressive water
- Made entirely of stainless steel, for special applications
- With maintenance-free spindle seal
- DIN/DVGW and noise protection certification + plastic parts with KTW approval



KEMPER full flow stop valve with sleeve connection
Fig. 585 00



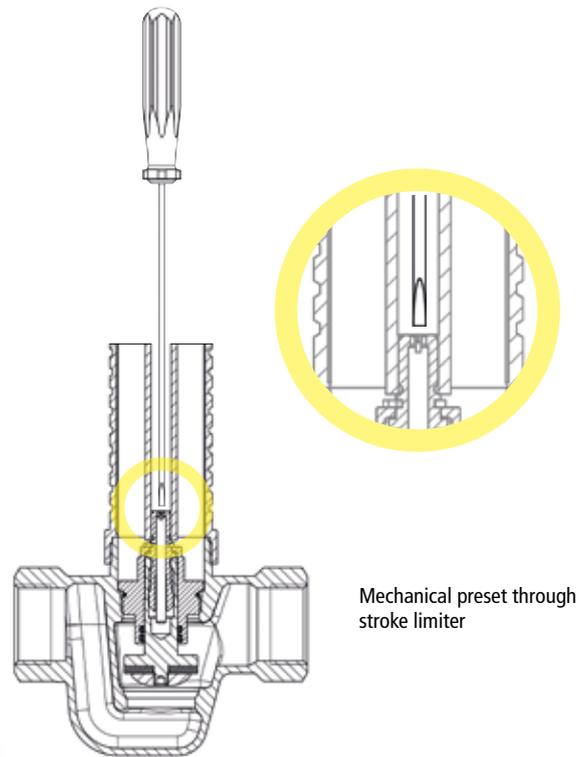
KEMPER UP-PLUS made of stainless steel with sleeve connection and set for final installation (grip unit)
Fig. 056 10 + Fig. 590 00

Flexible in function, connection technology and installation

Well thought-out design details in the upper part of the valve, the plastic shaft and valve housing allow a wide range of applications for KEMPER UP-PLUS valves.

Function:

- Isolating
- Quantity regulation through mechanical presetting



Mechanical preset through stroke limiter

Connection system:

- Universal female thread connection
- Press connections for SANPRESS/PROFIPRESS and MAPRESS systems



KEMPER UP-PLUS concealed valve with fixed press connection with SC Contur SANPRESS and PROFIPRESS systems
Fig. 560 06



KEMPER UP-PLUS with permanently integrated MAPRESS press connection and set for final installation (operating cover)
Fig. 522 02 + Fig. 591 00

Installation type:

- For traditional drywall
- For pre-wall installations with optional fixing set



Fixing set for UP-PLUS valves
Fig. 597 00

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Stop valve water meter combinations

In old and new buildings, water meters must be installed as quickly as possible for the needs-based charges for hot and cold water; these must be mathematically correct and visually perfect. For the maintenance of the water meters, cut-offs should be provided on the floor.

The solution:

The KEMPER range of water meter cut-offs made of the reliable material gunmetal with a defined dimension between the cut-off unit and the water meter.



Advantages at a glance

- Suitable for every installation situation: brickwork, partition and pre-wall installation
- Space-saving dimensions of 90, 120, 130 and 153 mm
- With concealed valve free of dead spots for favourable flow, with maintenance-free spindle seal
- Perfectly aligned installation due to solid connection of water meter and stop valves
- Wetted parts made entirely of gunmetal, resistant to aggressive water
- Optionally available with G2 coaxial multi-water meter housing based on the HWW model or with a manufacturer-specific water meter housing for the installation of water meters for apartments

KEMPER RG120 stop valve water meter series

Operational safety thanks to the perfect choice of materials and KEMPER know-how

The successful KEMPER range of water meter valves has been enhanced by the innovative RG120 series. This self-contained series includes stop valve water meter combinations and mounting blocks in the well-known versions with manufacturer-specific and universal water meter housings. The innovation lies in the new production method of the valve body from just one sin-

gle casting (cast in one piece). This results in unbeatable advantages:

➤ **No soldered joints**

➤ **No pieces of piping**

➤ **No adapters**

The reduced end-to-end length of the valves in the mounting block also reduces the required amount of highly durable, pressure and tension-resistant PU rigid

foam. The maintenance of drinking water hygiene is supported by the use of the corrosion-resistant material gunmetal, which has also proved its worth in sanitary technology.

Reliable safety and high cost-effectiveness – the KEMPER RG120 series of water meters combines both!



RG120 stop valve water meter combination
Fig. 855 47



RG120 handle made of die casted zinc,
Fig. 596 11



RG120 DUO mounting block Fig. 854

RG120 stop valve water meter combination

➤ Dimension only 120 mm

➤ Entire water meter section from just one single casting (cast in one piece)

➤ Available with manufacturer-specific or universal water meter housing

➤ HWW model with cast-on fastening base

RG120 DUO stop valve water meter mounting blocks

➤ Dimension only 120 mm

➤ Entire water meter sections from just one single casting (cast in one piece)

➤ Through pre-mounted bracket can be used universally for brickwork, partition and pre-wall installation

➤ Divisible into two RG120 MONO blocks

➤ For time-saving, clean installation, can be tiled over directly

➤ Optimum heat insulation through pressure and tension-resistant PU rigid foam

➤ Optimum sound insulation, moisture repellent, building material class B2

➤ Available with manufacturer-specific or universal water meter housings

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Frost-proof outdoor valves

Intelligent frost damage prevention, site-optimised installation

The tried and tested KEMPER frost-proof outdoor valve reliably protects your drinking water hygiene throughout the year! With the FROSTI®PLUS kit for new buildings or with the pre-assembled FROSTI® unit for subsequent installation, KEMPER offers the right version for all installation situations.



Advantages at a glance

- Protects the building and plumbing from frost damage through the automatic draining process after every use.
- Hygienically safe: no stagnation volume
- Above-average drainage capacity of 40 l per minute at 0.1 MPa (1.0 bar) flow pressure
- All wetted parts in closed state are made of gunmetal and so can be used for all drinking water qualities
- With DVGW and noise protection certification

Automatic draining after every cut-off operation

FROSTI®-PLUS

The kit allows the installation of the valve as early as the construction phase. The drain housing is mounted after the outside wall has been completed.



Only one end-to-end length for all standard installation depths (for wall thicknesses from 150-415 mm*)



Continuous adjustment to outside wall thicknesses with extensions (from 150-655 mm)



with operating grip
Fig. 574 00

with socket wrench bonnet
Fig. 574 03

* for surface mounting

FROSTI®

The factory pre-assembled valve for subsequent quick and easy installation on already finished outer walls. With a total external diameter of only 27 mm and movable rosette.



For wall thicknesses from 150 - 492 mm, can be extended to any length on the construction site



Universal R 1/2" connection and 15 mm Cu pipe for soldering and pressing



with socket wrench
bonnet Fig. 577 02

Perfect accessories - for the sake of the building



Simple fixing with the fixing set Order no. 5740000500 to outdoor walls with thick insulation. The stabilisation of the tap in the brickwork protects it from signs of wear and tear on the exterior finish.



FROSTI® sealing sleeve Order no. 5740000600, for fast, reliable sealing against moisture penetration.

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TRESOR wall cabinets



- 1 Lockable built-in wall cabinet made of high-quality, brushed stainless steel No. 1.4404
- 2 With socket outlet combination 230V/400V, Mennekes brand, protection class IP 44, equipment freely definable as required
- 3 With KEMPER frost-proof outdoor valve with automatic draining function, with DVGW and noise protection certification

Advantages at a glance

- Comfortable water and electricity supply at a central point in the outdoor area
- Elegant in design, since made entirely from high-quality stainless steel No. 1.4404
- Reliable protection from unauthorized removal of water and electricity, even during use, through integrated flap for hose and cable connection
- Security key lock can be retrofitted to an existing locking system
- With KEMPER frost-proof outdoor valve: guaranteed frost-proof through automatic drainage
- Wired ready for connection with socket outlet combinations for 230 and 400 volts, Mennekes brand, IP 44, available for D, A, CH, F, CZ; optionally with residual current protective device in the box
- Reliable isolation of water and electrical connections in accordance with VDE directive for humid areas and rooms VDE 0100, Part 737
- Available as a modular system: size and equipment freely definable as required

KEMPER MINI-TRESOR Fig. 211/212

Technically sophisticated and elegant in design: KEMPER TRESOR, the compact supply station for outdoors, allows comfortable water and electricity supply simultaneously at a central location. No matter what application and what device, you can find the right size and equipment here.



KEMPER MINI-TRESOR built-in wall cabinet, Fig. 211, H/W/D: 340x300x120 mm, the compact supply station for the single-family dwelling



KEMPER MINI-TRESOR surface-mounted wall cabinet, Fig. 212, H/W/D: 315/280/132 mm

KEMPER TRESOR Figs. 210/213/214

The supply station with various connection options, such as water and power supply for 230 V/400 V.



KEMPER TRESOR built-in wall cabinet, Fig. 210, H/W/D: 470x250x120 mm, for concealed installation



KEMPER TRESOR surface-mounted wall cabinet, Fig. 213, H/W/D: 510x285x130 mm, for subsequent quick and clean installation in already finished outer walls and in case the wall is not thick enough for flush-mounted installation. The KEMPER TRESOR surface-mounted wall cabinet Fig. 214 is available specially for chlorine-based environments (e.g. swimming pools).

Secure and comfortable application

Secure for public buildings (schools, kindergartens, hotels, fire stations), events (markets, festivals), camp sites, housing construction



Comfortable for a wide range of applications with electricity and water, for the garden, patio, penthouse apartment (lawn mowers, electric grill)

Installation situation

The compact KEMPER TRESOR supply unit can be easily integrated in brickwork or concrete walls and blends harmoniously into the architecture.



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Other valves

Sampling valves

In any case, the right choice

Existing standards and regulations must be fulfilled - that is the basic prerequisite for a sampling valve! Furthermore, however, there are other requirements which installation engineers, samplers and operating companies have to meet. The availability of **variants for all areas of application**⁽¹⁾ and **cost-saving, variable installation options**⁽²⁾ are just as important as the option of **using alternative disinfection methods**⁽³⁾, as well as the ability to take samples easily. In addition, **dripping sampling points**⁽⁴⁾ – even after repeated flaming – or **unauthorised water removal**⁽⁵⁾ (water theft) are not acceptable.



KEMPER sampling valve Fig. 187 or made of stainless steel Fig. 087

KEMPER sampling valve with check valve Fig. 188 01 for use with angled stop valve



Ready for anything!

Sampling valves have to meet a wide range of requirements



⁽¹⁾ Sampling valve variants

In addition to the sampling valves made of gunmetal and stainless steel for sampling from the branch, KEMPER also offers a variant for sampling at the angled stop valve, that is, in the periphery. KEMPER thus provides the right product solution for every area of application of sampling valves.

In addition to complying with all standards to be fulfilled, it should also be easy to retrofit sampling valves. KEMPER sampling valves for sampling from the branch therefore fit the G 1/4 and G 3/8 drain valve connections of existing stop valves and regulating valves.

⁽²⁾ Cost-saving, variable installation

The ability to rotate the valve by 360° in two planes always permits vertical sampling with a pencil-thick flow of water.

⁽³⁾ Alternative disinfection methods

In addition to the option of flaming, the outlet pipe for chemical disinfection can simply be removed by means of a clamping ring connection.

⁽⁴⁾ No more dripping sampling points

Flaming leads to high thermal stress on the materials used. KEMPER sampling valves are therefore fitted with metallic seals in the area of the valve body fixation and the outlet pipe attachment. The V-seal in the cut-off consists of temperature-resistant PTFE, to be able to guarantee a permanent seal here – against the system pressure.

⁽⁵⁾ No more unauthorised removal of water

In order to prevent "water theft", KEMPER sampling valves for sampling from the branch can only be operated using the triangular key provided*.

* Gunmetal version only

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Systemic examination

Sampling from the branch

For organisational and technical reasons, sampling from the branch is often the most practicable solution. It is important that this measure should be coordinated in advance with those responsible.

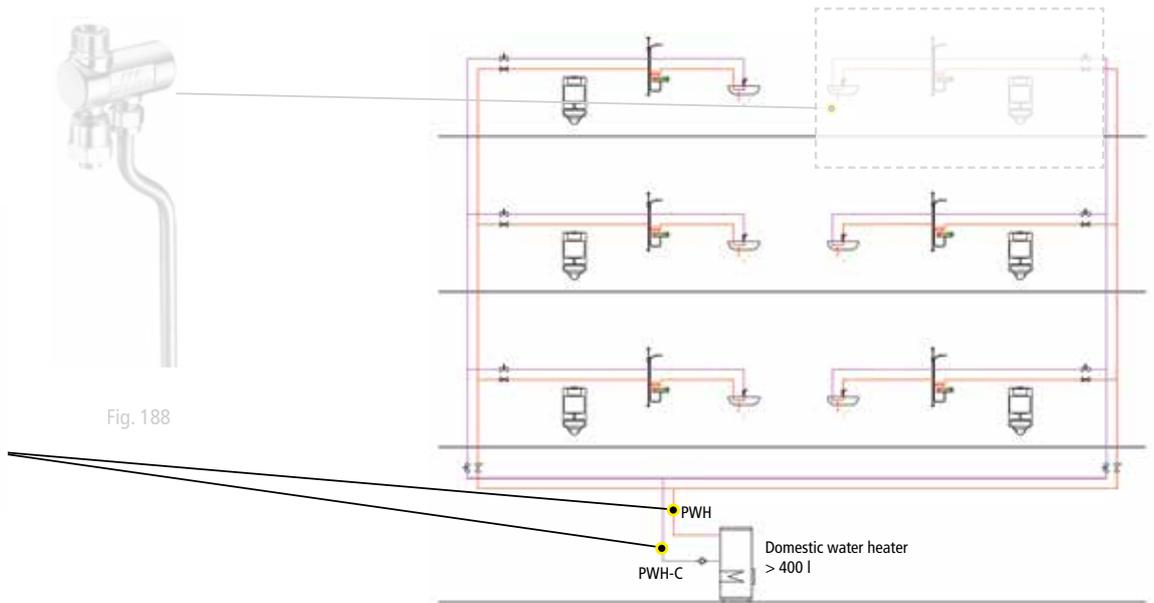
The sampling points shown here are a recommendation by Gebr. Kemper GmbH + Co. KG. In general, however, the following applies: The Public Health Department decides when, where and how samples are taken (§ 20, Order by the Public Health Department).



Fig. 187



Fig. 188



KEMPER MULTI-T adapter with sampling valve

Advantages of the KEMPER sampling valve for branch and distribution lines

- For all application areas – including the food and pharmaceutical industries
- For installation at standard drain ports of valves
- Permanently sealed isolation
- Sampling in all installation positions possible
- Thermal and chemical disinfection possible
- DVGW-approved

* Gunmetal version only

Cut running costs

Investment in the right sampling valve

The sampling valves specially developed by KEMPER can be used in the entire drinking water installation (hot and cold water).

Going beyond the specifications of the DVGW worksheet W 551, the sampling valve can be used by municipal water suppliers and in the household area at the drinking water transfer point at the house connection.

The KEMPER sampling valve can be flamed for microbiological examinations, has a V-seal made of microbiologically safe material (PTFE) and allows for easy, safe and reliable sampling.



KEMPER sampling valve
Fig. 187 (gunmetal) or Fig. 087
(stainless steel)

Application areas for KEMPER sampling valves

Gunmetal Fig. 187	Stainless steel Fig. 087
All DW installations in public buildings as well as, for example: hotels, hospitals, nursing homes, care homes, schools, kindergartens	Food production plants: e.g: breweries, dairies, abattoirs, bakeries
Housing construction	
Industrial plants	Industrial plants (e.g. DI water)
Laboratories	
Systems on board land, water and air vehicles	In water supply fields with special material characteristics

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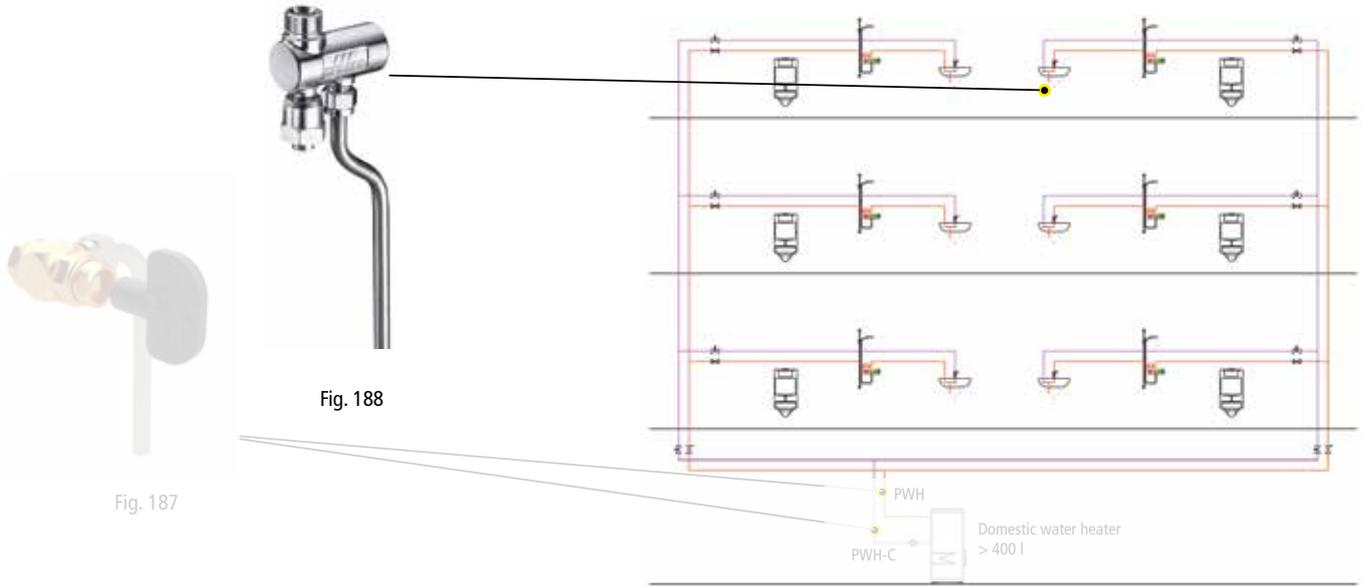
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Examination at tapping point outlets

Sampling at the angled stop valve



No interruption of operation during installation

By installing the KEMPER sampling valve at the outlet of the angled stop valve, installation is now also possible during on-going operation! There is no need to cut off the branch and disassemble the angled stop valve. Shut-downs and the consequential additional costs are prevented.



1. No branch cut-off



2. No disassembly of the angled stop valve



Advantages of the KEMPER sampling valve for sampling in the periphery

- No interruption of operation during sampling
- Check valve to avoid backflow influences via outlet (Fig. 188 01)
- Permanently sealed isolation
- Thermal and chemical disinfection possible
- DVGW-approved

Eliminating disruptive factors

When sampling at tapping point outlets (here washbasin)

Technical malfunctions can result in incorrect analysis results of the sampling. In favourable cases, microbiological pollution is also assigned to unpolluted areas – unnecessary measures are initiated there. In the worst case, however, actual hazardous bacterial growth is not recognised as such.

Possible technical disruptive factors

In practice, there are often unclear, so-called "watered down" samples at outlet valves. This may be due to the nature of the outlet valve. Technical defects in the valve can lead to the overflow of cold water to hot water. The sample is "watered down".

Mixing is also possible during sampling at the valve outlet, caused by the mechanical scald protection.

The samplers are frequently not aware of these problems, which rarely attract attention during "normal operation". As a result, this means that microbiology overflowing from the cold drinking water is found in the hot drinking water and in the circulation system.

In addition, the admixture of cold water (PWC) when sampling hot drinking water (PWH) leads to dilution. In extreme cases, only very small microbiological concentra-

tions are detected in the PWH, although the technical action value has actually been exceeded by far.

Possible solution for sampling in the plumbing unit at taps

Through the use of the innovative KEMPER sampling valve on the angled stop valve, the described technical disruptive factors are ruled out. A check valve in the pass of the sampling valve Fig. 188 01 prevents PWC from influencing sampling in the PWH. **Result:** Only the PWH quality is examined.



Sampling at the tap. In a mechanically preset valve, admixture always occurs.



Sampling at the PWH angled stop valve. In the event of a technical defect in the valve, it is possible that the PWC could overflow into the sample for PWH.



Sampling using a KEMPER sampling valve with integrated check valve under a washbasin. Return flow or overflowing of PWC to PWH is ruled out.

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Fire-extinguishing valves

KEMPER hose connection valve for wall hydrant

Problem definition: Reliability of wall hydrant valves in the event of a fire

Fire extinguishers and extinguishing water systems are facilities for preventive fire protection and are not for domestic use (see DIN EN 1717). They are used for the **rescue and protection of people and for fire fighting.**" ⁽¹⁾

The fire protection concept for a building defines the fire extinguishing water systems with which the fire is to be fought and also finally extinguished. Permanent, non-automatic extinguishing systems with fire extinguishing hose connection devices for wall hydrants play an important part in the field of fire extinguishing water systems. The planning and design of the equipment is regulated in DIN 14462.

In case of a fire, the functional safety and reliability of the wall hydrant valve type F ⁽²⁾ (fire department) must therefore have top priority.

If, in the event of a fire, a valve cannot be opened, or if it cannot be operated because it is stiff, this can have fatal consequences. In this case, the fire cannot be tackled quickly and effectively, so that valuable time for fire-fighting and rescuing persons is lost.

Thousands of wall hydrant valves in existing systems must be kept permanently safe and functional through maintenance and repair to ensure that they do not fail in an emergency.

In case of maintenance in existing systems, undesirable leaks and water damage may also occur if the open/close function fails in wall hydrant valves.

Operational safety is no longer guaranteed, so that the entire wall hydrant valve must be replaced.

(1) DIN 14462:2009-04, Water conduit for fire extinguishing - Planning and installation of fire hose systems and water conduit for fire extinguishing

(2) DIN 14461-3:2006-06, Delivery valve installations for fire fighting purposes - Part 3: Fire hose valves for nominal pressure PN 16, hose connection wall hydrant valve; size 2: specially for Type F wall hydrants (fire department) in accordance with DIN 14461-1 and with DIN 14461-6

Advantages at a glance



All wetted parts made of gunmetal DIN 50930-6



Bonnet protected against destruction since it can only be loosened with a special tool



Two different versions for use in new and existing buildings



Universal connection for all pipes: flat sealing with G2" male thread and flat sealing with G2" union nut



Hand wheel made of metal



Easy to install thanks to accessible key surface on the housing



Pressure rating PN 16

The solution: KEMPER hose connection valve Fig. 112

You can rely on this! The KEMPER hose connection valve for Type F wall hydrants with its reliable design, made of the corrosion-resistant and durable material gunmetal, is the reliable solution for wall hydrants in buildings with different types of use.

The smooth-running upper part does not stick even after long periods out of commission and guarantees immediate readiness for use.

The ease of installation lies in the wrench surfaces integrated in the housing.

The special bonnet, which can only be factory-installed using special tools, offers protection from manipulation in the area of the valve bonnet. The hose connection valve is available with a 2" union nut on the inlet side, or also with a G2" flat sealing union connection.



Fig. 112 01 050

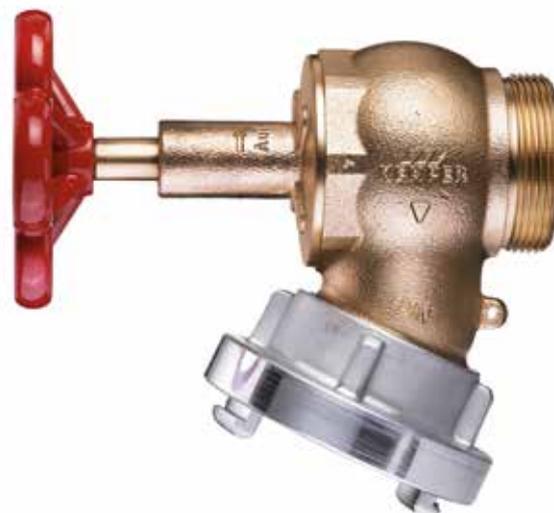


Fig. 112 00 050

Modern valve technology down to the last detail

The requirements for hose connection valves for Type F wall hydrants in accordance with DIN 14461-3:

- Max. 3.5 revolutions for full opening/closing
- "Open" marking on the bonnet
- Chambered seal disc (metallic sealing)
- Rotatable valve disc
- Replaceable seal disc

The KEMPER hose connection valve meets the requirements of the product standard and in addition offers advantages for planning, maintenance and operation – during longer periods of non-use as well as during operation.

Also available:

KEMPER hose connection valve for wall hydrant Type S (self-help)

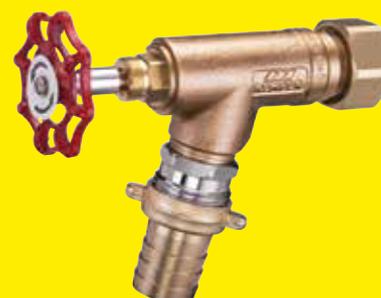


Fig. 119

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Insulation shells

The German Energy Saving Ordinance (EnEV 2016) requires the insulation of all valves

The insulation of pipelines and valves is mandatory according to EnEV 2016:

The German Energy Saving Ordinance (EnEV 2016) is intended to reduce human-induced global warming and achieve the sustainable use of primary energy resources.

The EnEV 2016 places demands on systems for heating, indoor air and hot water provision. For cold water pipes, insulation measures also have to be taken into account to combat condensation, frost and heat from outside.



Article 4 (5), (6) specifies that heat distribution pipes and hot water pipes installed for the first time, as well as their valves, must be insulated (Appendix 5).



Article 10 (2) of the EnEV lays down a retrofit deadline for heat distribution pipes and hot water pipes, including their valves.

Energy savings through KEMPER insulation shells

With KEMPER insulation shells you can achieve a noticeable reduction in the primary energy requirements of buildings. An economic advantage for you, a benefit for the environment.

Note:



The general planning of insulation shells prevents subsequent insulation measures.

In order to avoid subsequent time-consuming and thus expensive insulation measures, suitable insulation shells for each valve must be included in the material list in the planning and tendering phase.

KEMPER insulation shells for the fast and inexpensive insulation of KEMPER valves, to avoid:



Energy / heat loss in accordance with EnEV 2016



Condensation formation in accordance with DIN 1988-200



Bacterial growth in PWC/PWH systems in accordance with VDI/DVGW 6023

With insulation shells by KEMPER, you will meet the requirements of the EnEV!

Permanent or also removable: everything is possible



KEMPER insulation shells – easy and safe to close:

➤ close ➤ clip in place ➤ finished!

KEMPER insulation shells

- can be reliably closed and opened again thanks to the mounting clips, or
- can be permanently bonded to prevent condensation, using standard adhesives.



Insulation shells for KEMPER regulating valves are essential to meet the hygiene requirements in the drinking water circulation in accordance with TrinkwV (2012 edition) and the DVGW worksheets W 551, W 553 (bacterial growth in PWH systems).

Advantages at a glance

- with CE labelling
- Made of PE material, suitably shaped for KEMPER valves
- Building material class B1 in accordance with DIN 4102 T1
- High temperature resistance
- Low thermal conductivity
- No condensation formation
- Quick and easy installation
- Impermeable if bonded with standard adhesives
- Reliable closing thanks to the mounting clips included



KEMPER insulation shell, universal, for all KEMPER free flow valves
Fig. 471 10



KEMPER insulation shell specially for KEMPER MULTI-THERM automatic circulation regulating valve
Fig. 471 11



KEMPER insulation shell specially for KEMPER MULTI-FIX PLUS manual circulation regulating valve
Fig. 471 26



KEMPER insulation shell specially for KEMPER stop valve water meter combinations
Fig. 471 16



KEMPER insulation shell specially for KEMPER full flow stop valves and flow and temperature measurement valves
Fig. 471 19



KEMPER insulation shell specially for KEMPER UP-PLUS and ETA-THERM concealed valves
Fig. 471 14

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KEMPER hygiene system **KHS**[®]

The focus is on drinking water hygiene, economy and ecology

Drinking water is the "No. 1 Food" for mankind.

KEMPER has developed the KHS hygiene system in order to maintain drinking water hygiene and to improve the quality of drinking water in the house installation. The main objective of the KEMPER KHS hygiene system is to prevent stagnation and the consequent adverse influence on the quality of drinking water.

Maintaining drinking water hygiene can

have a direct impact on our health. With the KEMPER KHS hygiene system, the operation of the drinking water installation as defined at the planning stage is guaranteed over the entire life cycle of a building.

"Water must flow!"

"Water is a friendly element to whomever is familiar with it and knows how to treat it."

Johann Wolfgang von Goethe (1749 – 1832)

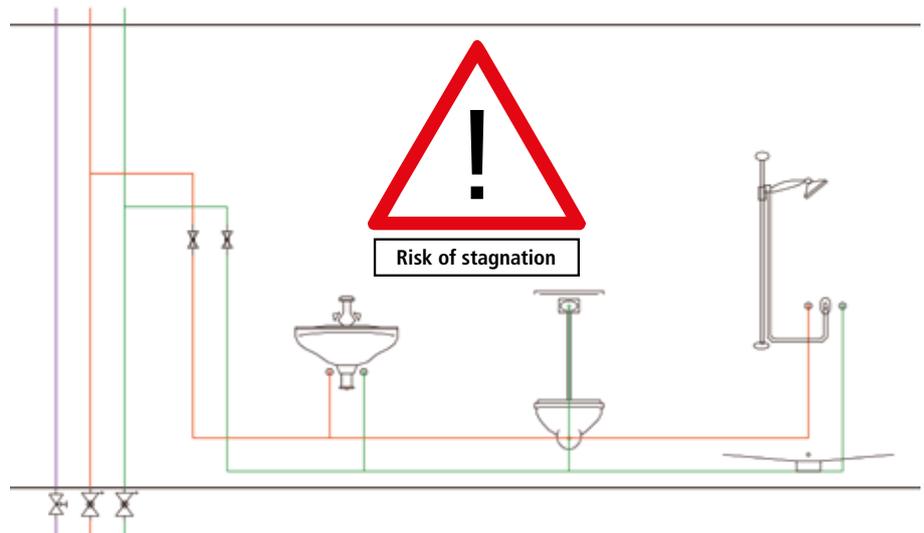


This is how installation was carried out up to now

In housing construction as well as in public buildings (hotels, hospitals, doctor's surgeries etc.), the terminal T adapter installation was carried out in cold drinking water (PWC) and hot drinking water (PWH) up to now.

This results in stagnation areas in dead legs. In order to replace the body of water, comprehensive and cost-intensive flushing measures are required in some cases.

According to DIN EN 806
 PWC = Potable Water Cold
 PWH = Potable Water Hot
 PWH-C = Potable Water Hot (Circulation)

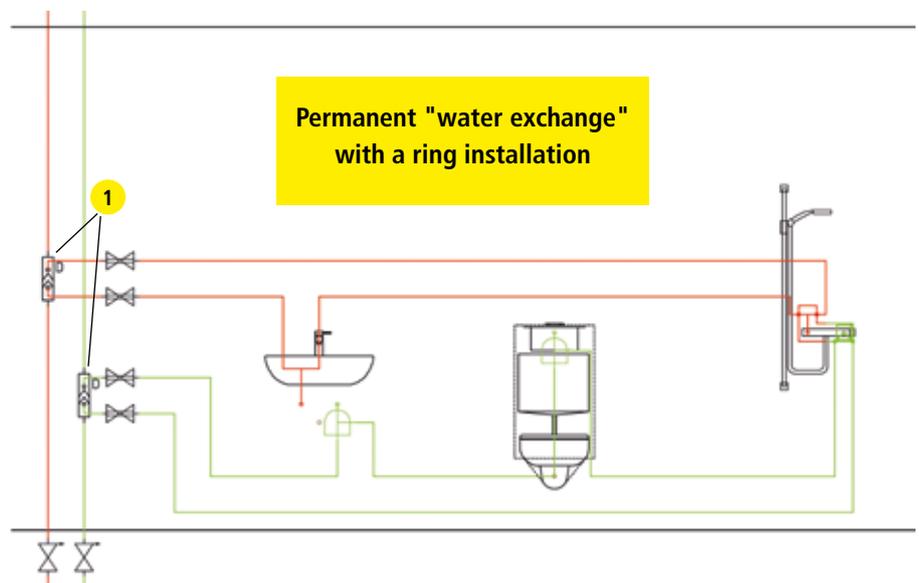


Standard T installation in the plumbing unit. Stagnation areas with a high risk of contamination arise when there are infrequently used tapping point outlets.

The solution: KHS



1 KHS flow splitter



Hygienically safe installation with a KEMPER KHS flow splitter in conjunction with a ring installation. Through water movement in the riser, multiple water exchanges take place in the ring circuit when the dynamic flow splitter is used (no additional flushing device required in the ring).

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KHS flow splitter

-dynamic-

The basis of the KEMPER KHS hygiene system is the KHS dynamic flow splitter, which can be used both in the cold (PWC) as well as the warm (PWH) drinking water installation.

The KHS flow splitter -dynamic- works according to the principle of the venturi valve, developed by Giovanni Battista Venturi. Due to the minimal pressure difference, the main volume flow is divided up into a ring volume flow and a through volume flow by means of the venturi valve.

Through an additional component in the venturi valve, the KHS flow splitter -dynamic- is in a position to achieve a maximum flow through the connected rings even with very small volume flows in the distribution line/in the riser. The dynamic venturi valve remains almost closed for small volume flows, and thus approximately 95 % of the volume flow passes through the ring. If the opening pressure of the venturi valve is reached due to a higher volume flow, then the percentage share of the volume flow in the direction of flow is continuously increased, with the flow through the ring remaining strong on account of the venturi effect.

The drive is effected by the removal of water after the KHS flow splitter. The entire water content of the ring line is exchanged until immediately before the tapping point outlets, stagnation and possible bacterial growth is avoided and the drinking water temperature is kept low.

On account of the components used, installation in the installation shaft or in the suspended ceiling is easily possible. Regular maintenance of the components is not required.



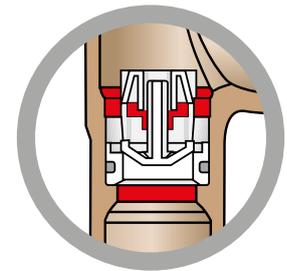
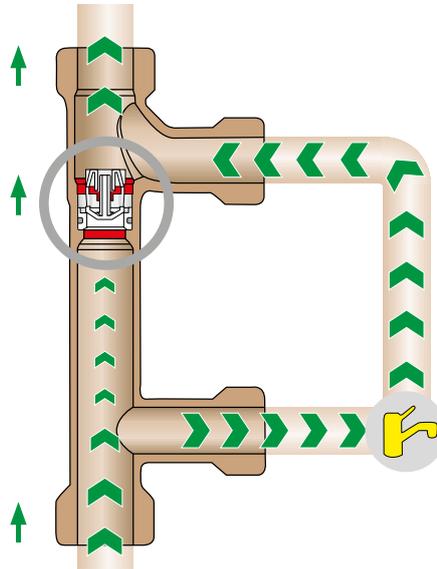
KHS flow splitter -dynamic- Fig. 650

KHS flow splitter

-dynamic-

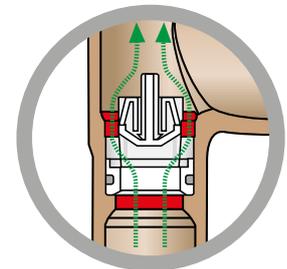
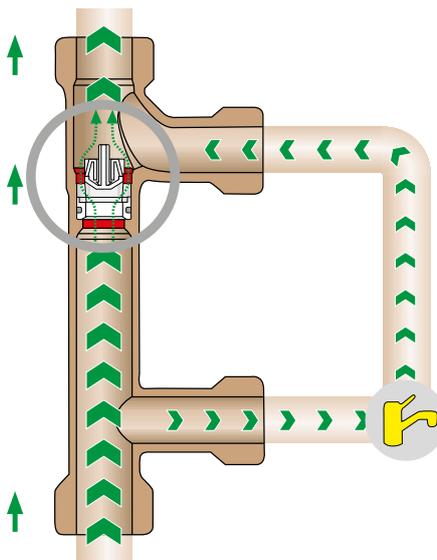
Small volume flow in the distribution line/in the riser:

The dynamic venturi valve remains almost completely closed – almost the entire volume flow required for supply purposes is directed through the ring. The opening pressure of the dynamic venturi valve is not reached.



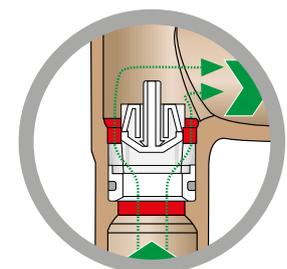
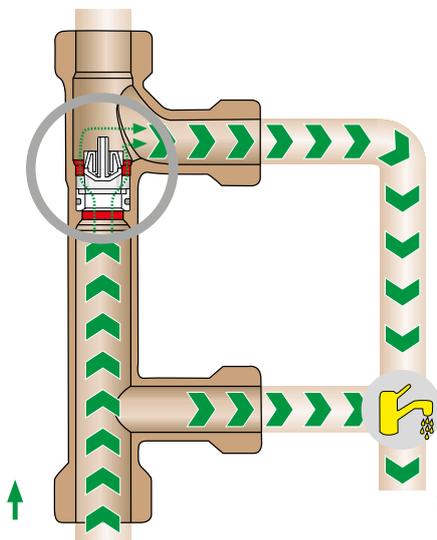
Greater volume flow in the distribution line/in the riser:

The dynamic venturi valve opens when the opening pressure is reached – the largest share of the volume flow flows directly through the flow splitter in the pass, whereby a part of the volume flow is redirected into the ring because of the well-known venturi effect.



Tapping in the ring:

The dynamic venturi valve opens when the opening pressure is reached – the volume flow is divided into the two branches of the flow splitter. This allows the ring to be installed with a small nominal diameter. Low pressure losses occur in the ring, which has a positive effect on the nominal diameters of the distribution lines and a water booster.



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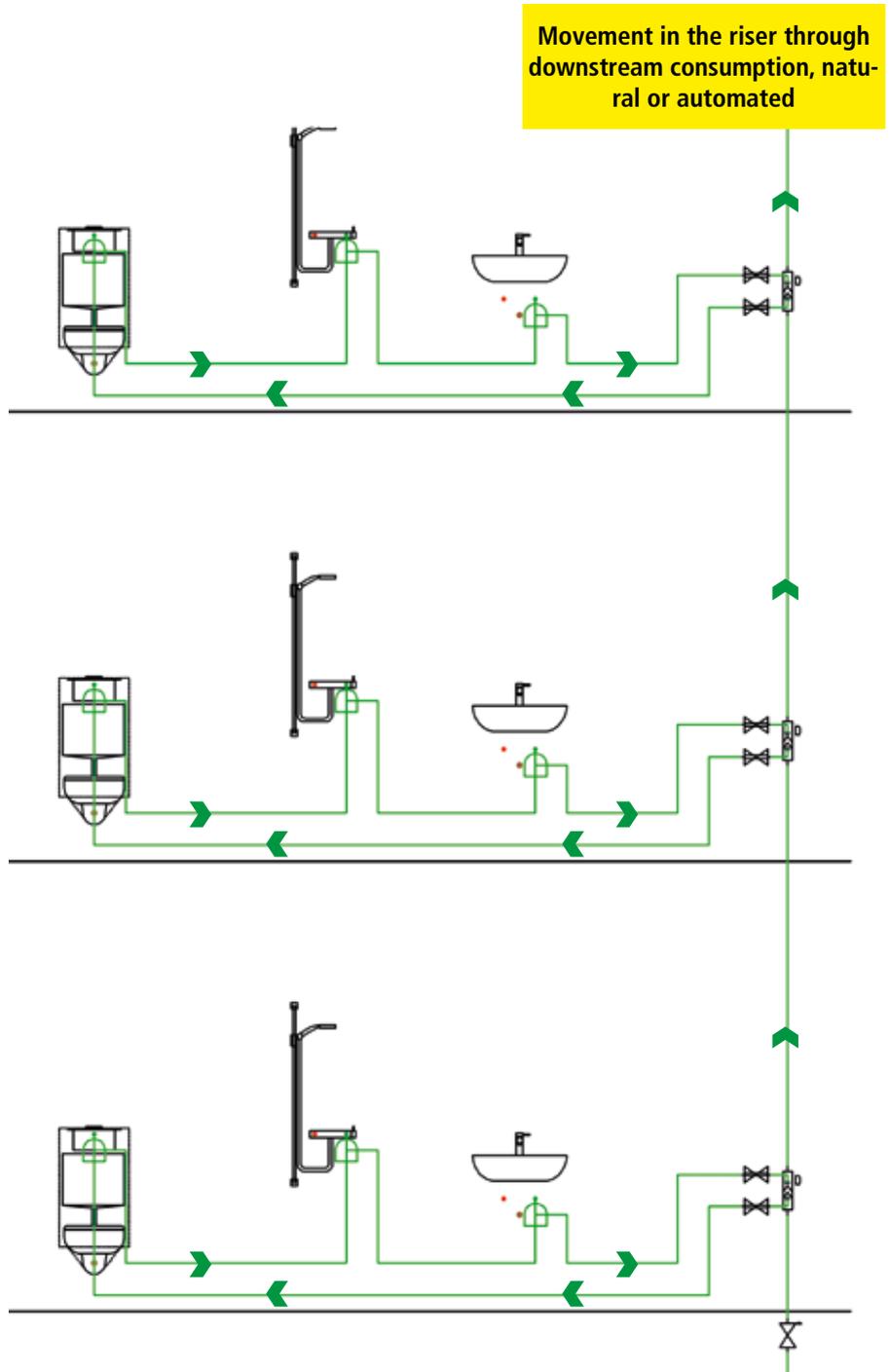
KHS flow splitter

-dynamic- for PWC

There are stagnation areas in many drinking water installations, caused by rarely used or terminal tapping point outlets. Through the use of the KHS flow splitter -dynamic- possible stagnation is avoided by subsequent consumption.

This consumption can be achieved by a consumer used for the intended purpose or by an automatically generated water exchange. Consumers used for the intended purpose and the expected stagnation areas must be coordinated with the system operating organisation in order to define the most suitable location for KHS flow splitters.

On the right is an illustration of a hygienically safe installation with the KHS flow splitters in the riser and innovative pipework. Water exchange is achieved through the washbasin used for the intended purpose in several rings connected in series. Operation for the intended purpose is achieved together with the movement generated by the automatic exchange of water.



KHS flow splitter

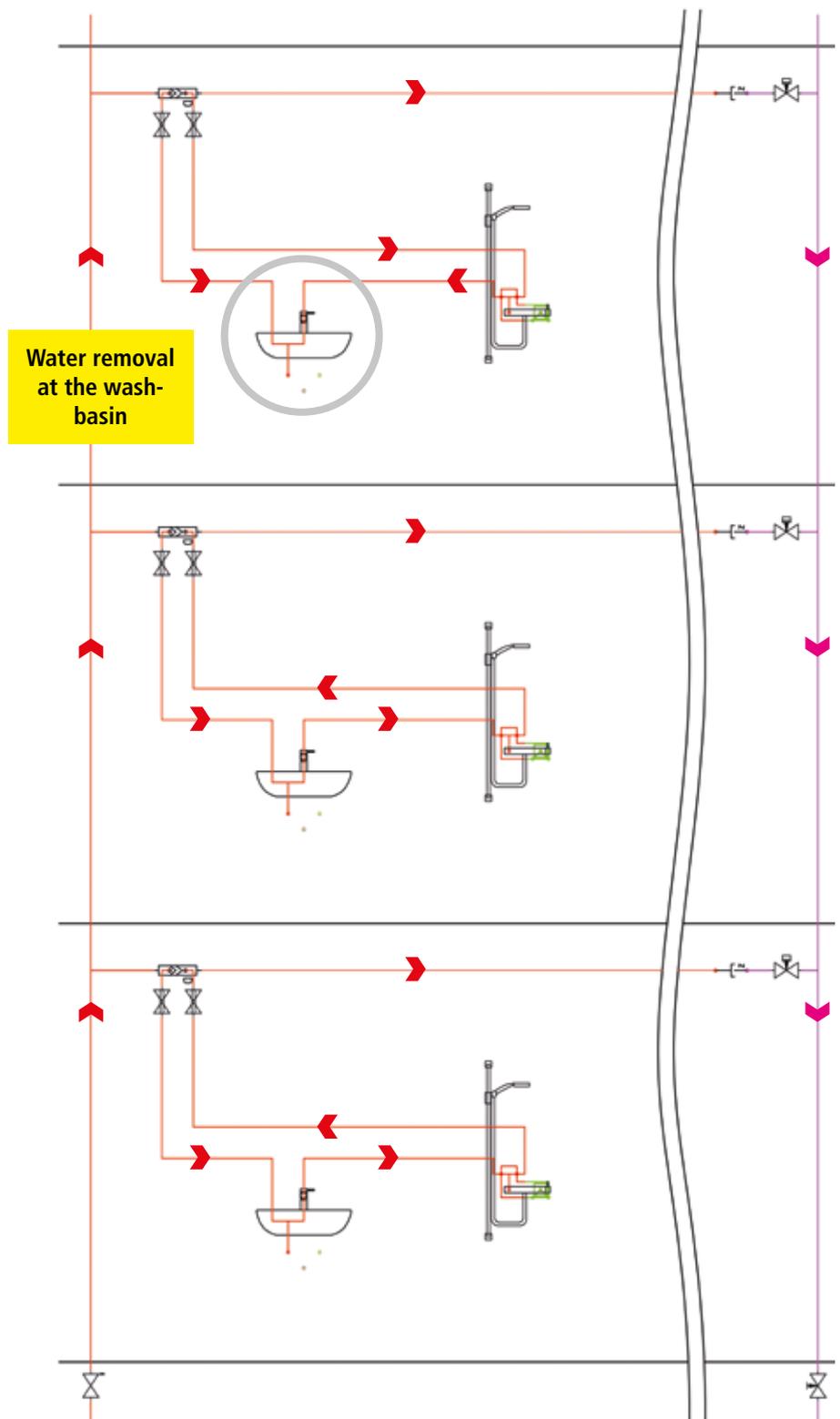
-dynamic- for PWH

Optimised circulation with an energy-related and economic advantage

If the KHS flow splitter -dynamic- is used in hot drinking water (PWH), installation in the plumbing units can only be carried out using consumption lines. The individual line rings of the plumbing units are connected to a distribution line using the KHS flow splitter.

The function lines for the circulation (PWH-C) are not required in the area of the distribution line and the plumbing unit. The use of regulating valves is reduced to the end of the distribution lines. Through the two-sided connection of the tapping point outlets in the ring, supply is improved (particularly in the case of a series-type shower systems).

In case of consumption, the dynamic venturi valve is opened because of the higher volume flow in the distribution line/in the riser. The greater proportion of the volume flow flows directly through the flow splitter in the pass. Through the KHS flow splitter, a partial volume flow required for temperature maintenance is redirected through the plumbing unit (in the ring). The temperature in the ring is kept at a high level. If no consumption takes place in case of circulation, the water flows through the pipeline system on account of the circulation volume flow driven by the circulation pump, thus ensuring temperature maintenance in the entire hot drinking water installation (PWH). The specifications of the DVGW worksheet W 551 and DIN 1988-300 are complied with. The reduced piping installation in the area of circulation lines and the surface reduction in the area of the hot drinking water installation can reduce circulation losses by up to 15%.



Effectively avoid stagnation and maintain the temperature

➤ Continuous water exchange

➤ High-temperature PWH system in case of circulation and consumption through stable circulation volume flow in the ring

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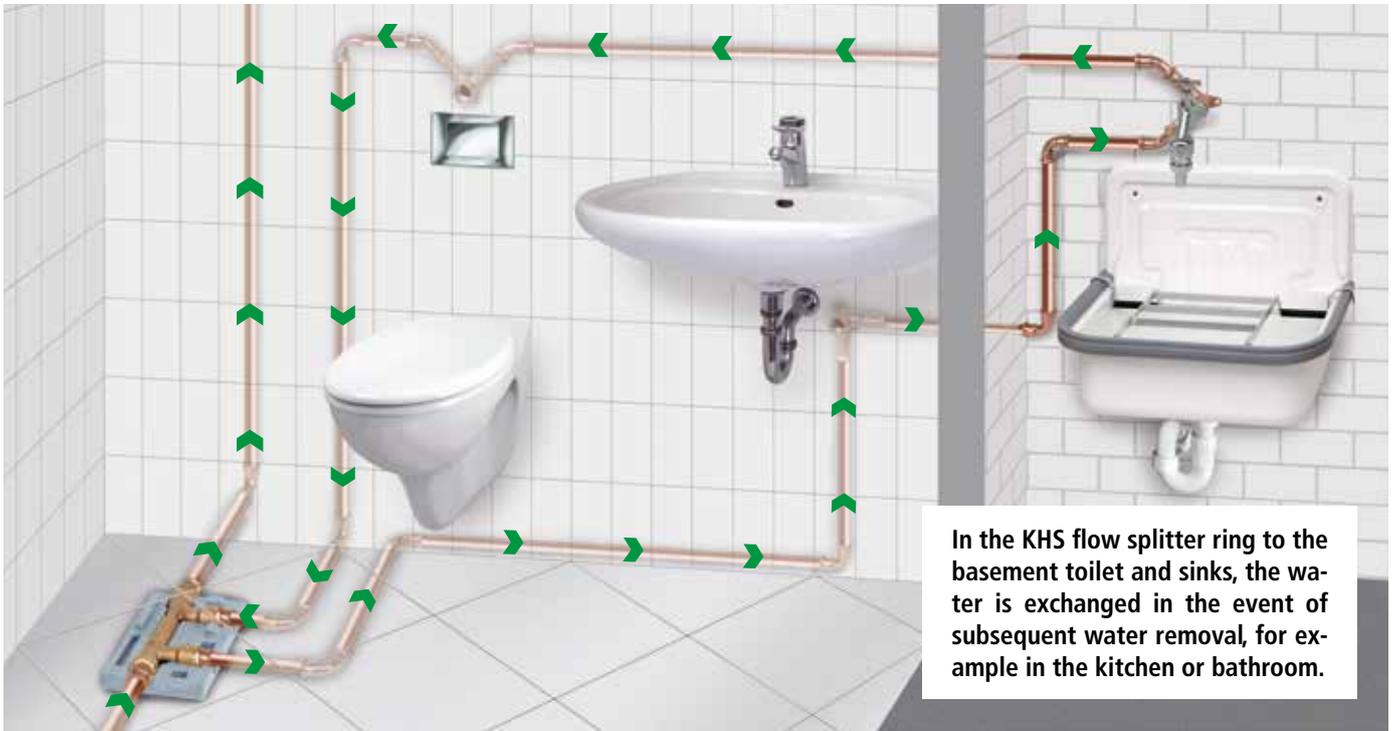
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Static flow splitter in the KHS floor box

The solution for just one ring in a single-family dwelling

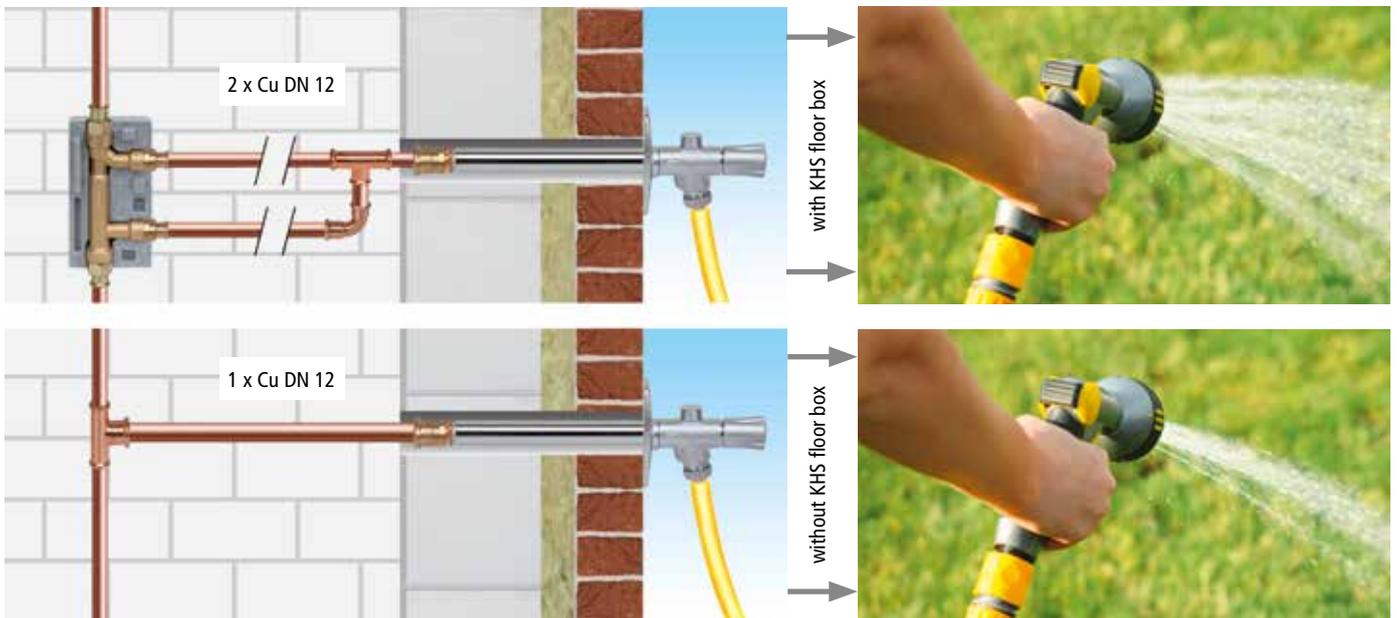


In the KHS flow splitter ring to the basement toilet and sinks, the water is exchanged in the event of subsequent water removal, for example in the kitchen or bathroom.

When the tapping point in the KHS floor box ring is actuated, the supply runs through both sides of the ring. This means that two DN 12 lines in the ring are sufficient to achieve almost the same drainage capacity as one single DN 20 line. This guarantees a sufficient supply e.g. of KEMPER FROSTI® (drainage capacity approx. 40

l/min at 1 bar flow pressure). In addition, stagnation is prevented in the FROSTI® supply line in the winter months.

l/min at 1 bar flow pressure). In addition, stagnation is prevented in the FROSTI® supply line in the winter months.



Ensuring operation for the intended purpose⁽¹⁾

By means of automated water exchange measures

During the "life of a building", the type of use or the behaviour of the building user changes. The actual frequency and volume of withdrawing often deviate strongly from the originally planned values in subsections of the drinking water installation or even

throughout the entire building. The intended use is no longer guaranteed. The necessary restoration of the originally planned conditions of use, however, is possible using "forced tapping". This also encourages water exchange in the flow splitter

rings. Depending on the property situation, the automation of this tapping can be effected in different ways.

⁽¹⁾ VDI/DVGW 6023, hygiene-conscious planning, implementation, operation for drinking water installations, April 2013

Possible stagnation areas:



Sports facilities, schools, public authorities

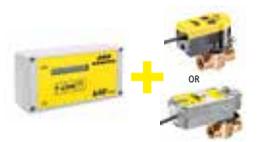


Hospitals, nursing homes, doctors' surgeries



Hotels, shopping centres, individual tapping outlets

Possible automation



KHS Timer Set



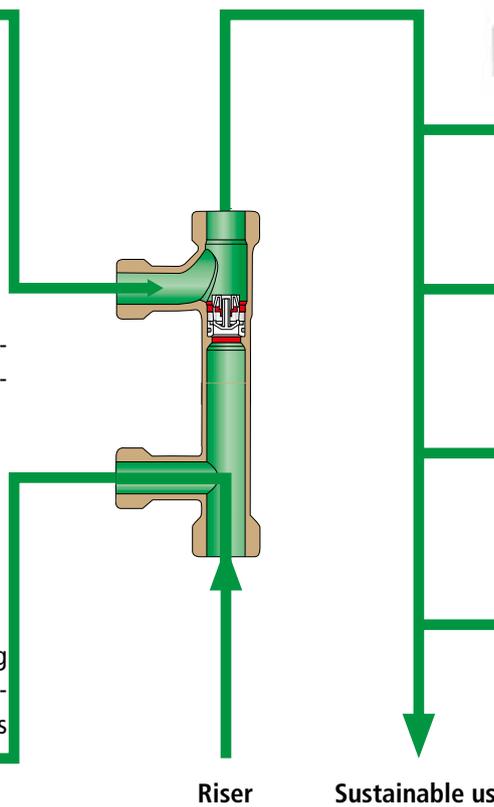
KHS Mini System Control



KEMPER HS2 Hygienic Flushing



KHS LOGIC System Control



Riser

Sustainable usage

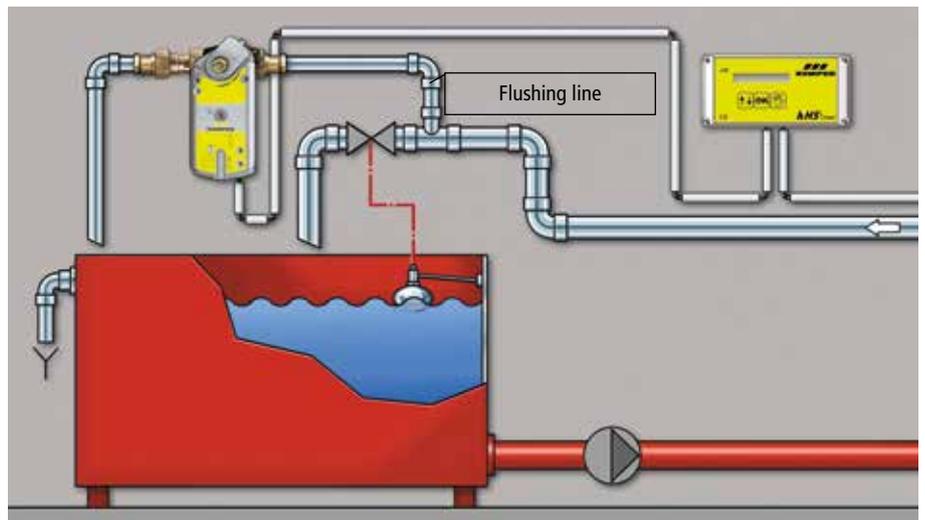
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KHS Timer Set

Easy time control

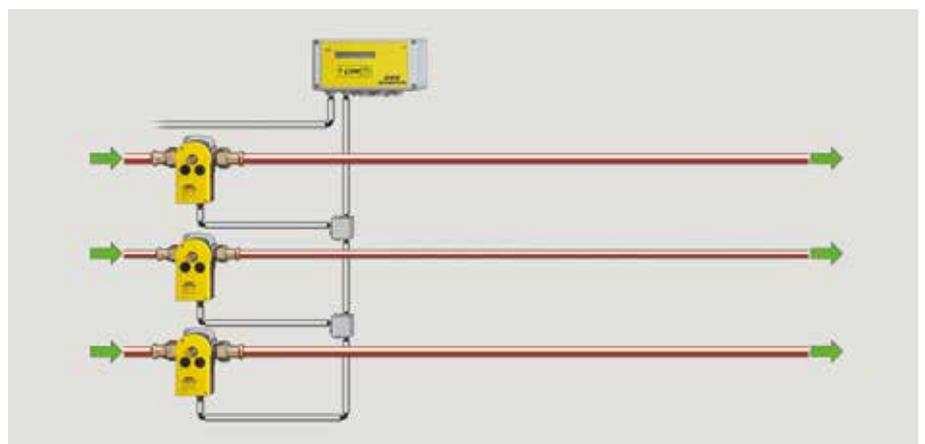
The KEMPER KHS Timer Set allows automatically time-controlled water exchange in individual pipe lines (for example single lines to apparatuses).

The time control system makes it possible to set 16 flushing intervals. The combination of KHS drain with overflow monitoring guarantees the automatic closing of KHS Quarter turn stop valve full flow stop valves in case of backflow in the waste water network.



KHS Timer Set with spring return actuator
Fig. 686 09 DN 15-32,
Fig. 685 09 DN 40-50

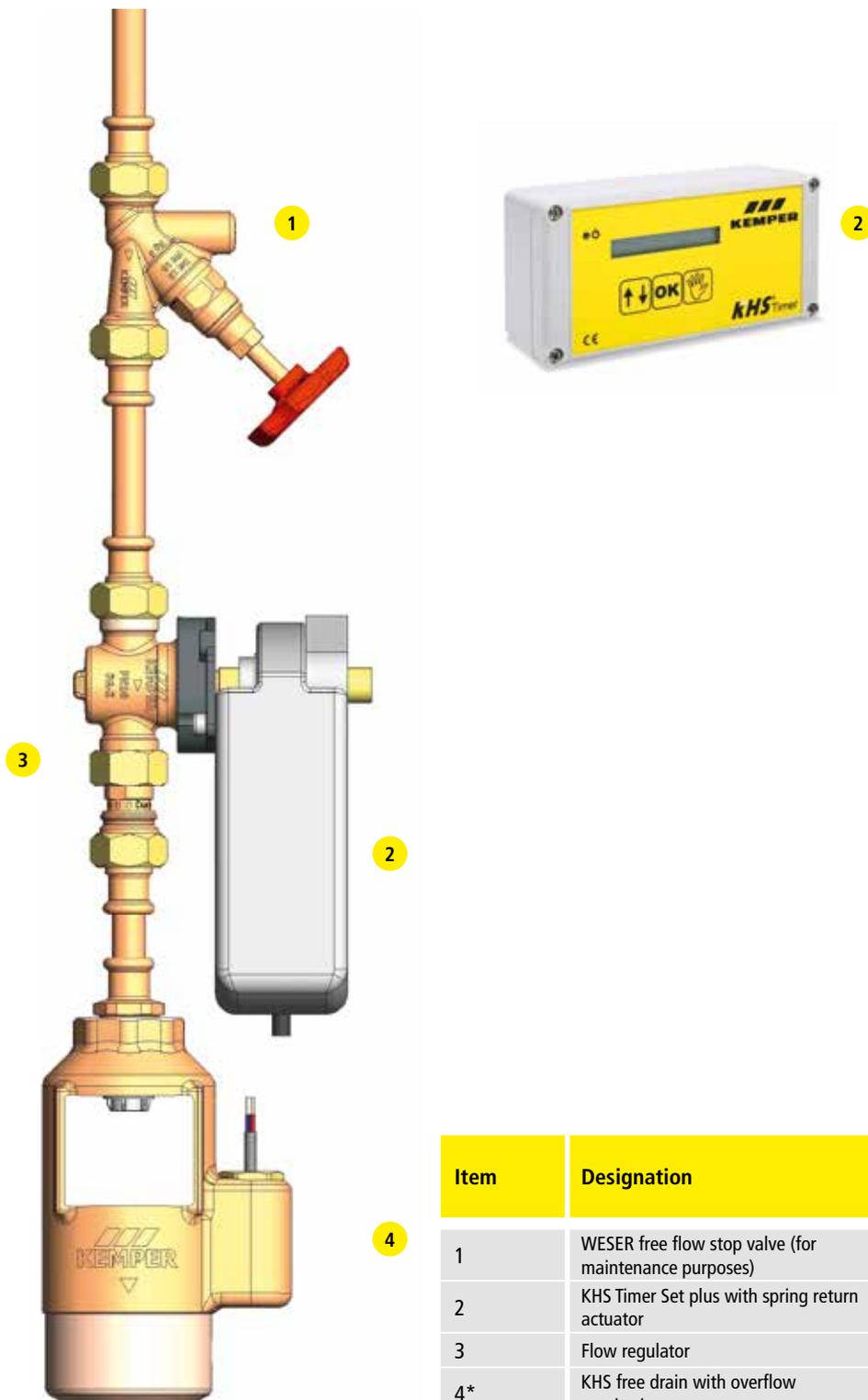
During periods of extended absence or when you leave the building, it is also possible to secure the drinking water installation of a building by closing the connected KHS Quarter turn stop valve full flow stop valves. Here, 16 timer programs can also be set for opening and closing.



KHS Timer Set with actuator
Fig. 686 08 DN 15-32

KHS Timer Set

Water exchange group



Item	Designation	Fig.
1	WESER free flow stop valve (for maintenance purposes)	173 2G
2	KHS Timer Set plus with spring return actuator	686 09
3	Flow regulator	697
4*	KHS free drain with overflow monitoring	688 00

*Required only for fixed connection to the wastewater network

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KHS Mini System Control

For all objects

With the KEMPER KHS Mini System Control, specific water exchange measures can be implemented change to ensure compliance with drinking water hygiene in all types of buildings.

In the KHS Mini System Control, a control unit is assigned to each water exchange group. A water exchange group consists of a maximum of

- 1x MASTER or 1x SLAVE
- 1x KHS quarter turn stop valve PLUS with actuator
- 1x KHS temperature measurement valve
- 1x KHS flow measurement valve
- 1x KHS free outlet with overflow monitoring

Thanks to MASTER/SLAVE technology, a MASTER controller can address up to 62 other water exchange groups with SLAVE controllers. Thanks to the decentralised

configuration, long cable paths can be dispensed with. Only a CAN bus cable connects the controllers to each other. From the MASTER, the maximum cable length of the CAN bus is 1000 metres in any direction (2000 metres in all).

With the KHS Mini System Control, a water exchange process may be effected by means of three operating modes.

- Time controlled water exchange
- Volume controlled water exchange
- Temperature controlled water exchange

The Master controller has a USB interface, which allows a simple backup of the data (log book, configuration and measured data). Parameterisation through ready-to-use configuration files as well as the installation of software updates is also effected by means of the USB interface. In addition, all water exchange groups can be configured by hand directly on the MASTER.

MASTER 2.0 also allows the operation of the controller by smartphone, tablet PC or laptop. Another point of focus is data logging. In conjunction with flow and temperature sensors, operating states in the entire drinking water network can be recorded.

Building on this, the MASTER 2.0 can be connected to a building management system. There are three protocols to choose from:

- Modbus TCP/IP
- BACnet IP
- BACnet MS/TP

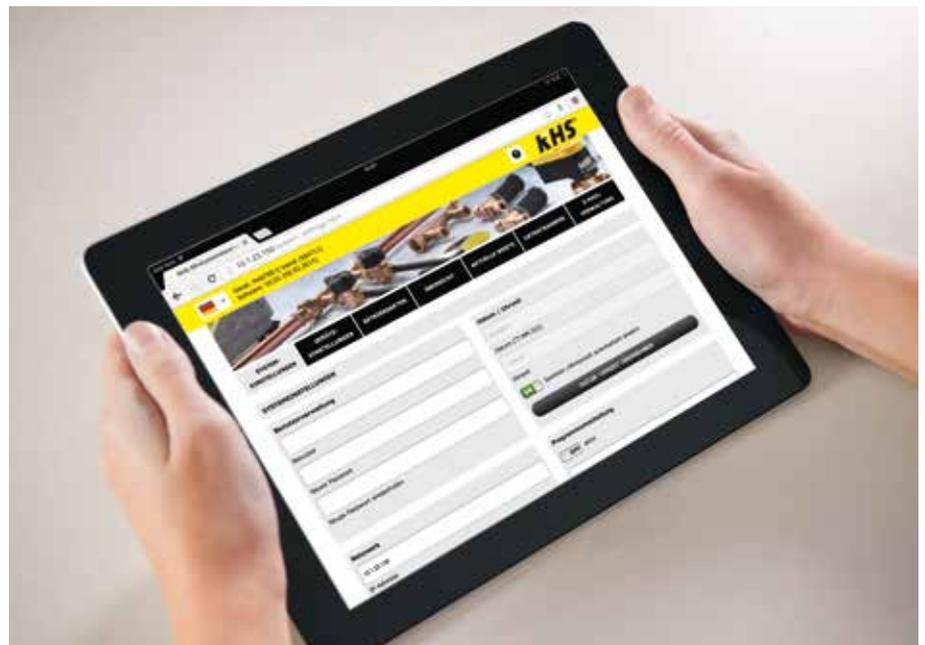
The connection allows access to data points that permit the visualisation, evaluation and control of all flushing valves and sensors connected using the MASTER/SLAVE system.



MASTER 2.0 Fig. 686 02 008



SLAVE Fig. 686 02 006



Web-based with MASTER 2.0

KHS Mini System Control

For all objects

A special feature of the KHS Mini System control MASTER 2.0 is the A/B valve technology. In A/B valve technology, up to five risers or distribution lines are connected to one common flushing line. Here, one A valve and the B valve are successively opened and closed together. This guarantees that there is no idling in the flushing lines and there is no water exchange between the pipelines to be flushed.

A/B valve technology

Example of a flushing process:

➤ Open A1 and B1 in accordance with the defaults, close A1 and B1

➤ Open A2 and B1 in accordance with the defaults, close A2 and B1

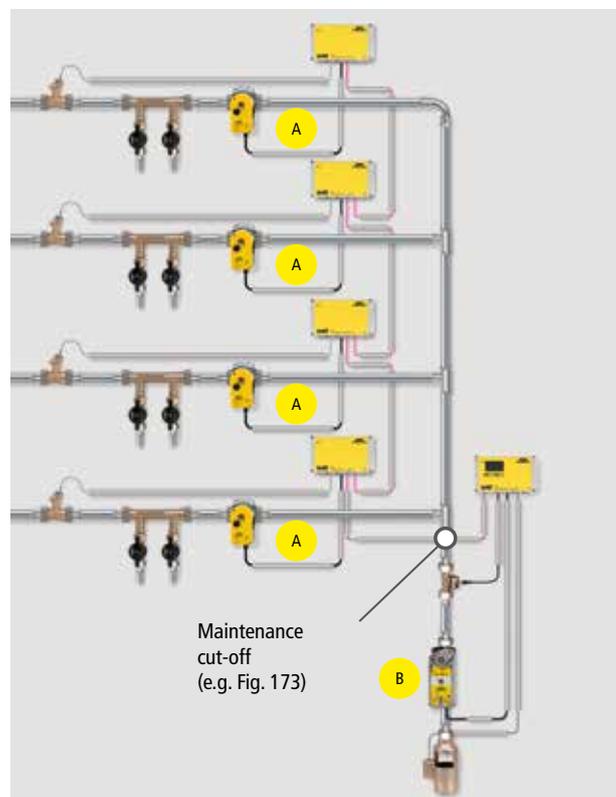
➤ Open A3 and B1 in accordance with the defaults, close A3 and B1

➤ Open A4 and B1 in accordance with the defaults, close A4 and B1

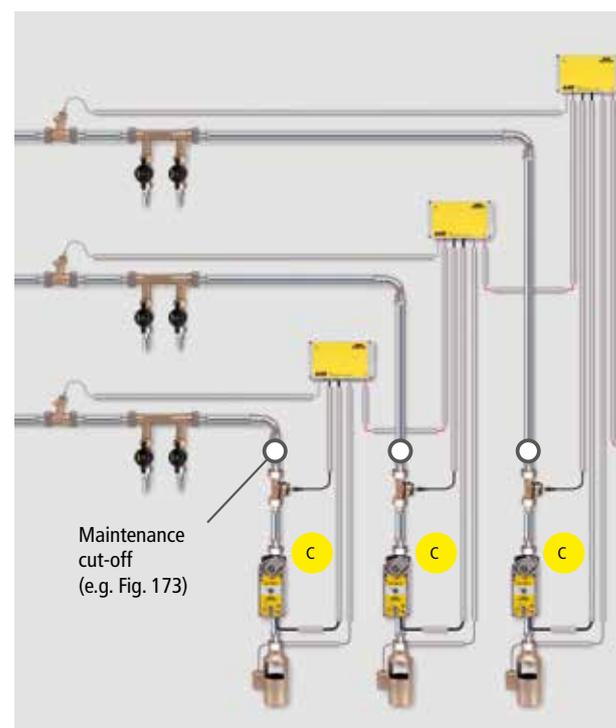
The C valve technology makes it possible to perform water exchanging measures in one single riser or one individual distribution line independent of other water exchanging valves.

Advantages at a glance

- Intelligent water exchange in all object types
- Security through documentation of the water exchange processes
- Forwarding of the flushing logs to e-mail recipients through Master 2.0
- Comfortable, web-based user interface



C valve technology



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KEMPER HS2 Hygienic Flushing

Water exchange group: autonomous or with MASTER 2.0

From single-family dwellings to hospitals:

HS2 Hygienic Flushing was developed for use in all types of buildings. Its variably selectable flushing output of 4 l/min, 10 l/min or 15 l/min guarantees the optimum flow through both small and large pipe dimensions.

Fully networked:

The digital I/O interface is available for connection to the BMS. This allows flushing operations to be triggered and fault messages to be sent.

Clearly structured and easy-to-read:

For configuration and for particularly user-friendly saved data read-out, the user has two facilities available:



➤ **Separate operation of hygienic flushing by means of a smartphone/tablet with HS2 app**

➤ **Centralised addressing of all hygiene flushing unit through connection to the MASTER 2.0 of the KHS Mini System Control**

Advantages at a glance

- Simple and fast configuration of all device settings
- Displays current values
- Forwarding of the flushing logs to e-mail recipients through Master 2.0
- Saves and transfers configurations to HS2 Hygienic Flushing

HS2 app - easy to understand and clear user guidance

You can download the app in the Building Technology service section of the KEMPER website at www.kemper-olpe.de, or here:



HS2 Hygienic Flushing in detail

A great variety of functions in the smallest of spaces



Item	Designation	Not visible on the screen:
1	Overflow monitoring	Flow measurement valve
2	Bluetooth interface for HS2 app	Interface for optional external temperature measuring valve (Pt 1000)
3	Integrated anti-siphon trap	Flow regulator (4 l/min, 10 l/min, 15 l/min)
4	Individual or double connection	Maintenance cut-off
5	LED status display	Mass storage for flushing and event logs
6	Test button	Buzzer for fault messages
7	Free outlet	CAN bus interface for connection to the KHS Mini System Control MASTER 2.0
		Digital I/O interface for connection to the BMS

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KHS LOGIC System Control

For large-scale properties

KEMPER KHS LOGIC System Control is the intelligent solution for large-scale objects (e.g. hotels, hospitals etc.).

In addition to the implementation of water exchange measures and compliance with temperature $< 25^{\circ}\text{C}$ in a PWC, the temperature level in the PWH/PWH-C can also be monitored with the KHS LOGIC System Controller. For this, the KHS LOGIC System Controller has an alarm function. The operating states (PWC and PWH) are automatically logged.

KHS LOGIC System Control is flexible in its application and can be controlled centrally. To operate and read out the logs, a customer PC is required on which a browser is installed to call up the web server. This consists of a programmable controller unit that stores the water exchange programs. Motor-operated valves, temperature and volume flow sensors, overflow monitoring and KHS hygiene flushing operations can be connected.

The user has the option of choosing between three modes:

➤ **Time controlled water exchange**

➤ **Temperature controlled water exchange**

➤ **Specified water volume**



KHS LOGIC System Control Fig. 686 02 003



KHS LOGIC system control Fig. 686 02 003

KHS LOGIC System Control

A/B/C valve technology

In A/B valve technology, up to five risers or distribution lines are connected to one common flushing line. Here, one A valve and the B valve are successively opened and closed together. This guarantees that there is no idling in the flushing lines and there is no water exchange between the pipelines to be flushed.

A/B valve technology

Example of a flushing process:



Open A1 and B1 in accordance with the defaults, close A1 and B1



Open A2 and B1 in accordance with the defaults, close A2 and B1



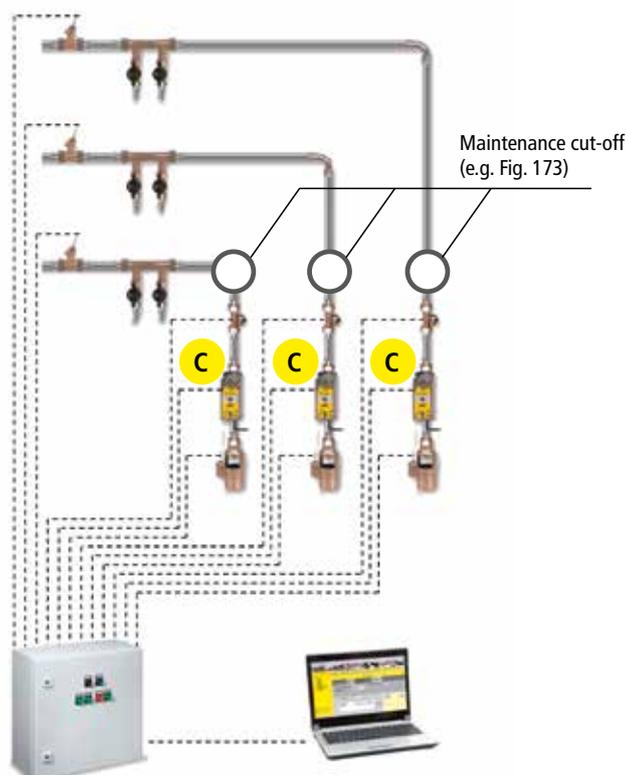
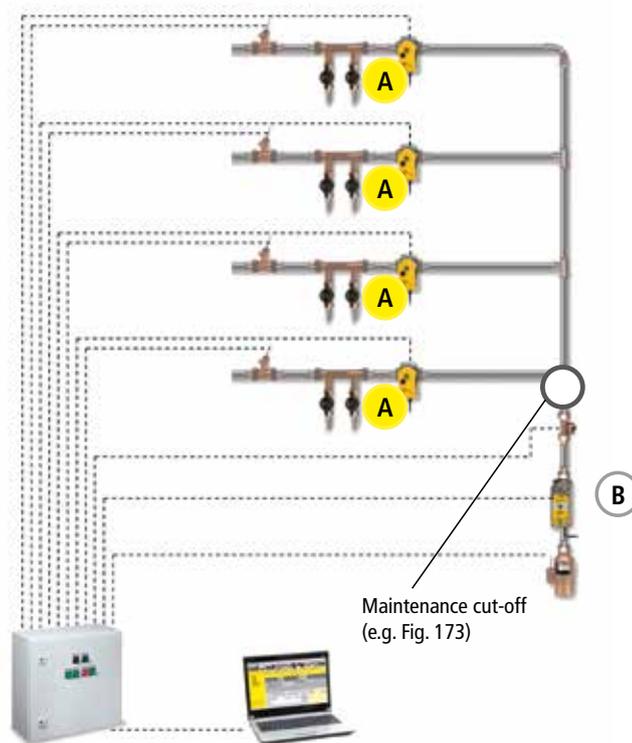
Open A3 and B1 in accordance with the defaults, close A3 and B1



Open A4 and B1 in accordance with the defaults, close A4 and B1

The C valve technology makes it possible to perform water exchanging measures in one single riser or one individual distribution line independent of other water exchanging valves

C valve technology



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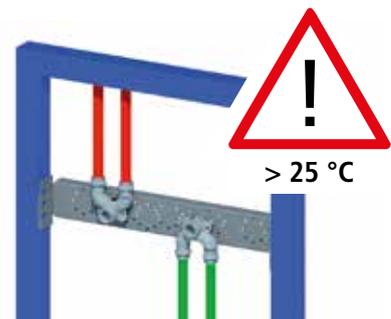
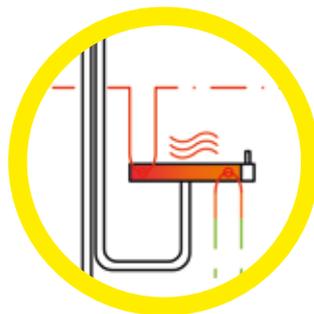
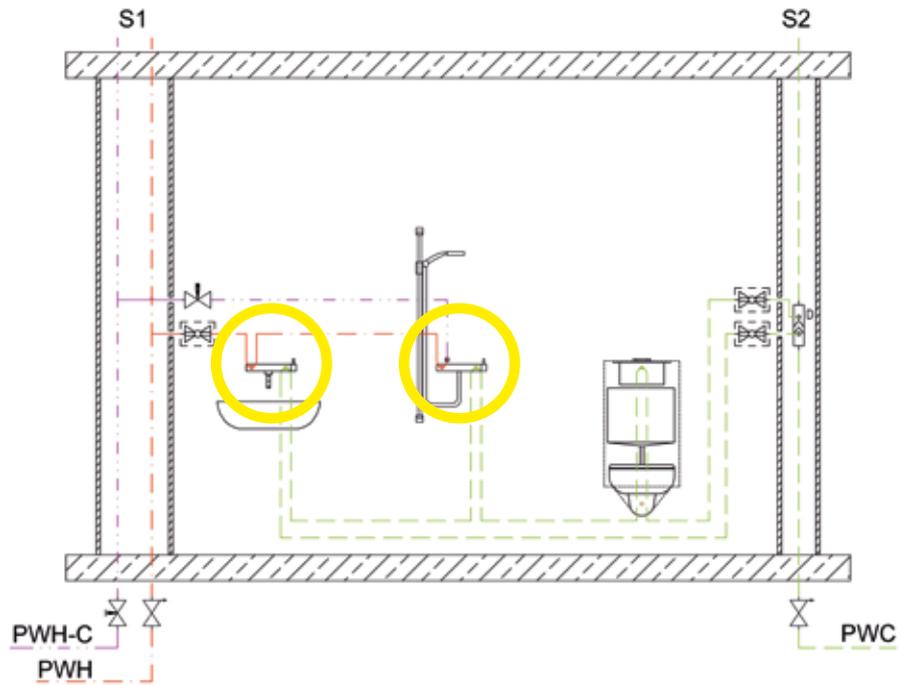


Thermal Separator

Caution - Heat transmission! Hygienic risks in mixing taps

Even if installation was effected correctly in accordance with the generally recognised rules of practice, the risk of temperature transfers in mixing taps has not necessarily been averted. In the case of circulation mode, there are temperatures of approx. 60 °C at double drop ear elbows of the taps on the hot water side. Mixing taps and cross beams installed here act as thermal bridges and thus heat the cold water to temperatures that are hygienically extremely problematic. Scientific studies clearly show that the normatively required upper limit of 25 °C cannot be met here. This applies even if the lines are installed properly – "hot water up" and "cold water down".

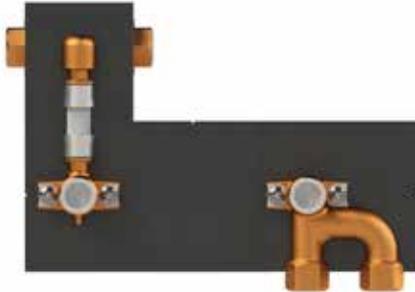
In the mixing taps themselves, a residual amount of water remains after water removal. If this residual water heats up to > 25 °C, these are ideal multiplication conditions for micro-organisms, which can settle very well on the rough inner surface of the tap.



Installation situation: double drop ear elbow on the hot water side

Doubly effective

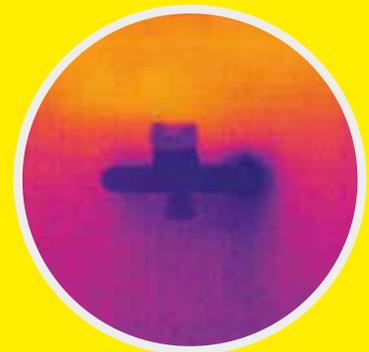
Heat transmission reliably avoided



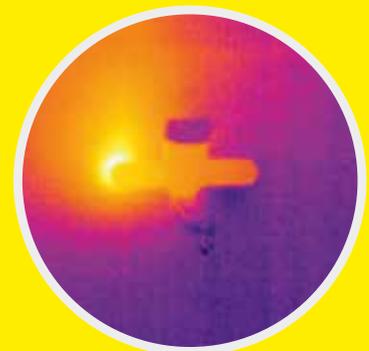
Thermal separator in the sectional view

In circulation systems, the KEMPER thermal separator reliably prevents unwanted heat transmission from the hot water to the mixing tap and the connected cold water. On the one hand, thermal separation is effected through the use of a heat spacer element between the hot water connection and an integrated drop ear elbow. On the other hand, the location of the drop ear elbow below the hot water connection brings about a thermal stratification in the medium – on account of the density difference, no hot water moves down to the drop ear elbow.

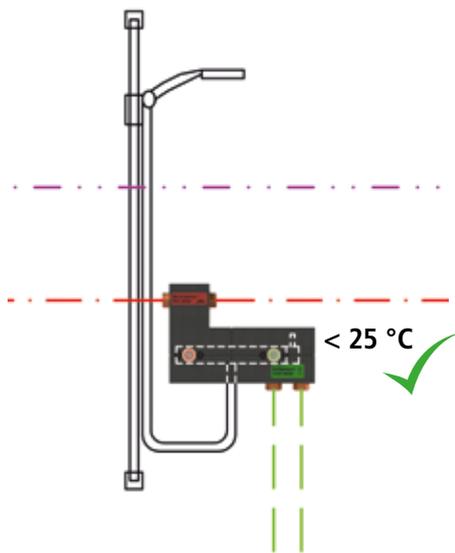
Thermography of two mixing taps that are connected to a circulation line:



Mixing tap connected using a thermal separator.



Mixing tap connected using double drop ear elbows.



Thermal separated shower faucet

The correct functioning of the heat spacer element depends on its length, diameter and material. These parameters are accurately coordinated with each other in the prefabricated mounting block, so that correct functioning is guaranteed and no unnecessary stagnation areas are created.

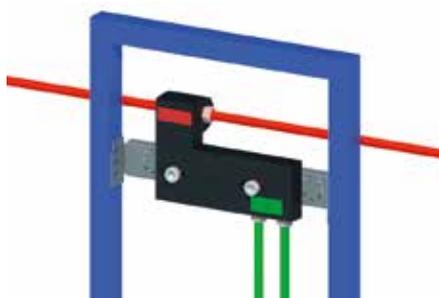
For easy, soundproofed installation as a mounting block, the thermal separator is made of pressure and tension-resistant PU foam. The pitch of 150 mm can be varied by separating the mounting block.

KEMPER Thermal Separator Figure 550 01

DN	Innengewinde
15	Rp 1/2

Advantages at a glance

- guaranteed temperatures < 25 °C in the PWH drop ear elbow in the pure circulation case
- 20 % cost advantage compared to equivalent self-build solution
- universal installation possible at all common pre-wall systems and in all installation situations



Installation example of a pre-wall module

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KEMPER ThermoSystem **KTS**[®]

KTS turns energy efficiency + drinking water hygiene into a system!

The right choice of a drinking water heating system depends on the type and use of a building. Generally speaking, the provision of hygienic drinking water has top priority. Heating should therefore take place directly as it is needed. The storage of warmed up drinking water is to be avoided. Heating systems should still be energy efficient and offer a high level of comfort as well as a reliable supply at all tapping point outlets. KEMPER meets these requirements to the highest degree with the KTS ThermoSys-

tem. Using the continuous flow principle, KTS heats the drinking water either with fresh water stations located at a central point within the building or with decentralised apartment stations in the individual service units. Both ThermoBoxes (centralised, from page 77) and ThermoStations (decentralised, from page 81) can be optimally designed for the system in question.



Advantages at a glance

- Energy-efficient operation
- Low investment costs due to precise, use-orientated system design
- Fast presence and high consistency of the outlet temperature (PWH) for small and large removal quantities
- Can also be used for aggressive drinking water*
- Low limescale precipitation due to patented positioning of the plate heat exchanger

* Plate heat exchanger made of solid stainless steel

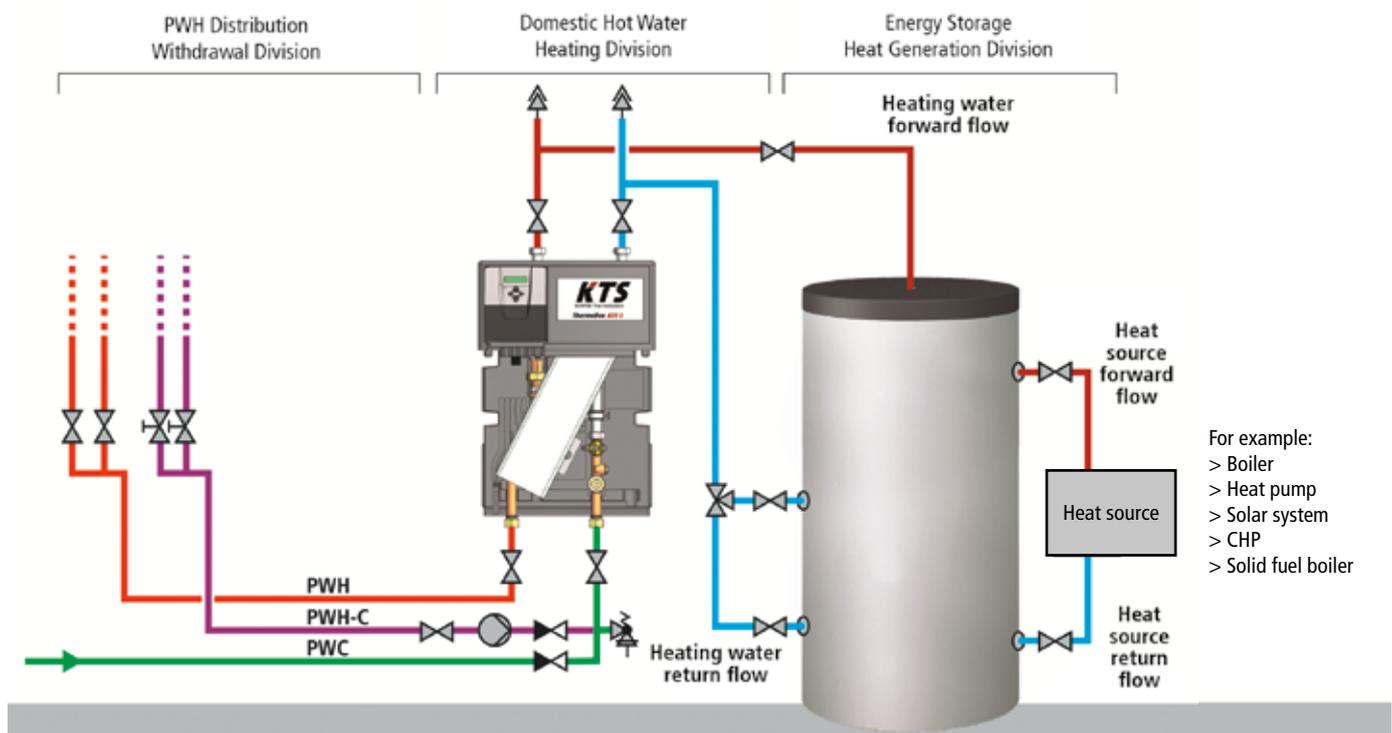
Centralised heating systems

The intelligent functional principle

KTS heats the drinking water at a central point within the building by means of ThermoBoxes as fresh water stations. KTS ThermoBoxes allow the all-in planning and creation of a hygienic and energy-optimized

domestic hot water heating system with the usual KEMPER quality. This includes not only the connected hot drinking water system but also the circulation system (PWH and PWH-C). In particular, a constant outlet

temperature at all tapping point outlets is achieved through the high control quality of the integrated control unit in the ThermoBoxes.



According to DIN 1988-200, the KEMPER KTS ThermoSystem is an indirectly heated continuous flow domestic hot water heating system. The thermal energy required for domestic hot water heating is stored in a buffer tank on the heating side. The domestic hot water is solely heated in flow.

If one or several draw-off points for heated domestic hot water are opened, the plate heat exchanger heats the required quantity of domestic hot water. The draw-off flow rate is determined exactly by a flow rate sensor.

At the same time different temperatures are measured. The control uses this information to activate the controller of the high-efficiency pump, which pumps the

heating water out of the buffer tank, the KTS ThermoTank.

The KTS ThermoTank has internal baffle plates which guarantee the low-turbulence and low-mixing charging and discharging of an energy-efficient storage facility for thermal energy. To make the best possible use of the low return temperatures to increase efficiency, mixing with warmer layers in the buffer tank must be avoided. To this end a thermostatically activated 3-way changeover valve is inserted in the return pipe to the buffer tank. Depending on the set temperature, the return water is fed specifically into the bottom or middle area of the buffer tank. Unlike domestic hot water tanks, in which this is questionable from a hygienic point of view, in buffer

tanks the formation of temperature stratification is explicitly required from an energy point of view.

Recharging of the buffer tank is controlled precisely by two Pt 1000 sensors attached to the buffer tank. The KTS ThermoBox is delivered electrically and hydraulically pre-assembled. The recharging requirement can be transmitted to the heat generator via a floating contact of the control. The optimised arrangement of the system components makes maintenance easy.

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Cascade arrangement

The tailor-made solution for large properties

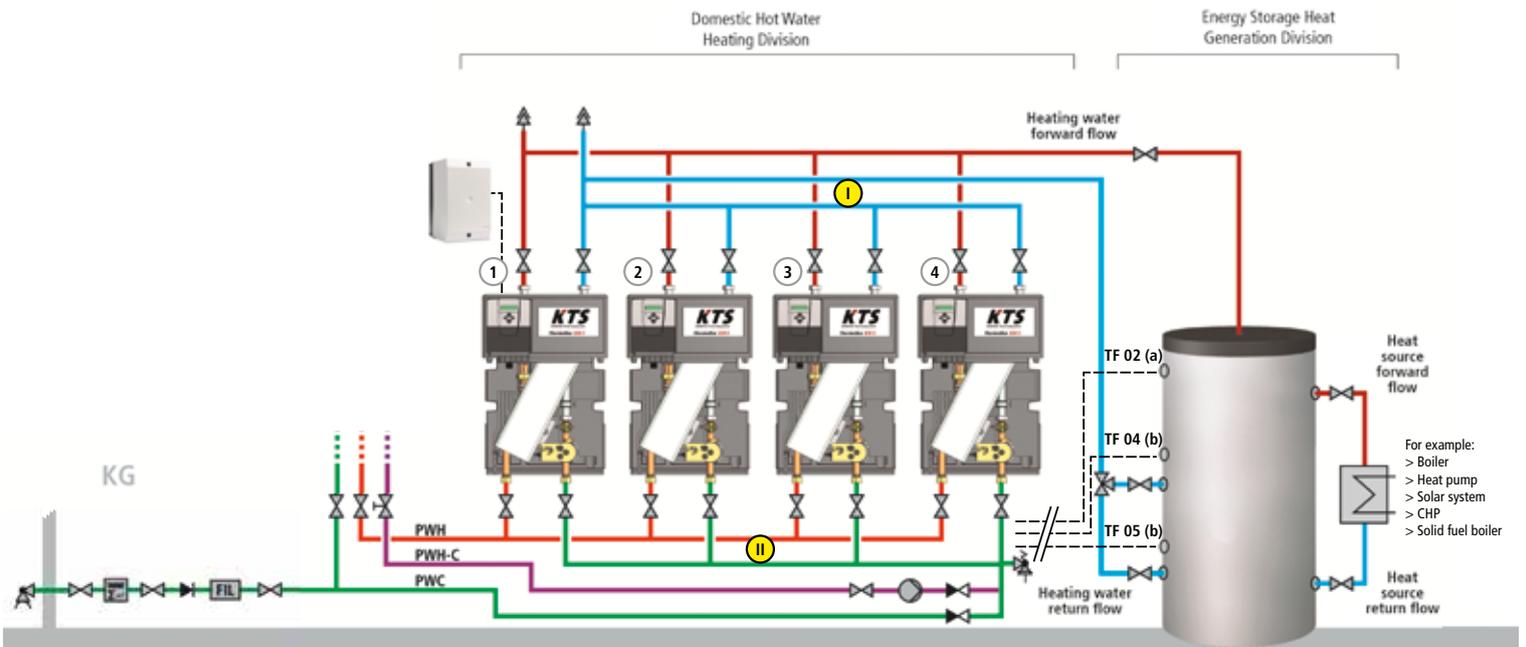
Up to four ThermoBox modules can be connected together to form a cascade to cover the demand of high draw-up flow rates. In this way the PWH demand of small flow rates (e.g. one draw-off point) through to peak flow rates with high simultaneity can be covered.

Thanks to the cascade arrangement, high control quality is achieved across the com-

plete bandwidth of the PWH demand and what is more, is always at the energy optimum. Continuous alternation of the modules is achieved by the patented cascade rotation. This ensures uniform capacity utilisation of the individual units at all times.

The necessary communication between the ThermoBox modules takes place via Mod-Bus. Connection to an existing building

management system is possible using the KTS ComLog module, or also by ModBus. The KTS ComLog module can also be used as a data logger for recording the operating parameters.



Overview: Performance range with KEMPER KTS ThermoBox equipment

KTS ThermoBox S Fig. 920	B30 S	B40 S	B50 S	B60 S
PWH removal flow rate [l/min] ⁽¹⁾	3.5 - 39	3.5 - 46	3.5 - 55	6.0 ⁽²⁾ - 63
PWH temperature [°C]	50 - 65			
Thermal disinfection	75 °C to 80 °C (PWH) possible manually			
PWH removal capacity [kW]	136	160	192	220

(a) Temperature TF 02 required for ThermoBox control ① to ④

(b) Temperature required only for controllers with a master function

① Hydraulic linking of the primary circuit (HTG) by means of "Tichelmann"

② Hydraulic linking of the secondary circuit (PWH/PWC) by means of "Tichelmann"

⁽¹⁾ At PWH = 60 °C and storage temperature 82 °C

⁽²⁾ Applies for 10K storage temperature increase. The minimum removal volume flow is to be increased by 2 l/min for each additional 5K increase.

KTS planning support

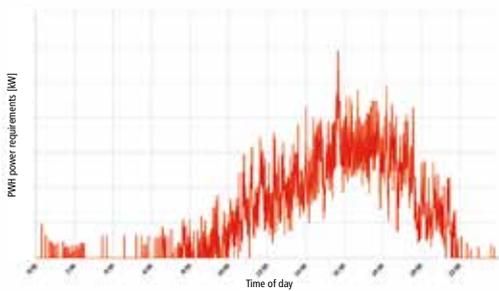
Know-how for energy efficiency and security of supply

Use-orientation is an important factor in the KTS design! For this, data collected and analysed in detail concerning water consumption and user profiles in medium-sized and large properties are used as demand profiles. The demand profiles database is continuously being extended. The profiles can be individually adjusted and

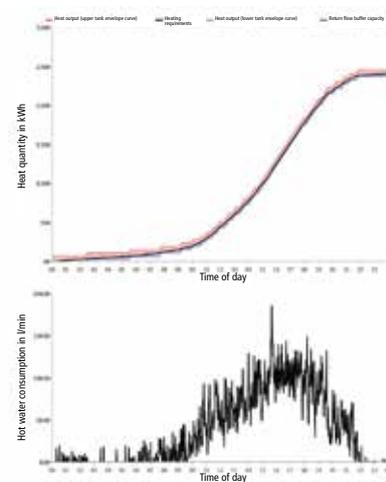
combined to obtain a realistic representation of user behaviour.

The calculation of the PWH value is target-orientated, independent of the user profile. When the circulation heat demand is added, the actual cumulative heat demand required is obtained (PWH + PWH-C). Pre-

cisely matched to the determined demand, the KTS can be designed "centrally" to be energy-optimised. The heat supply required is available at all times.

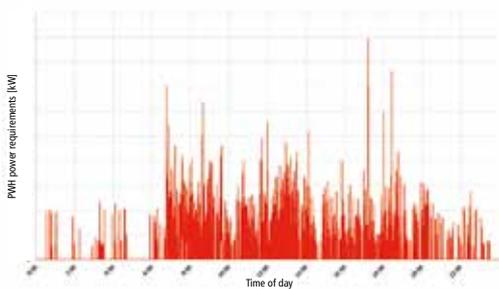


Measured demand profile of a swimming pool

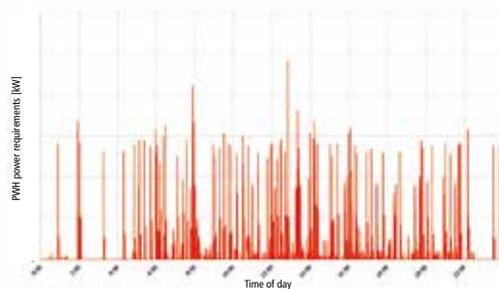


Calculated sum line

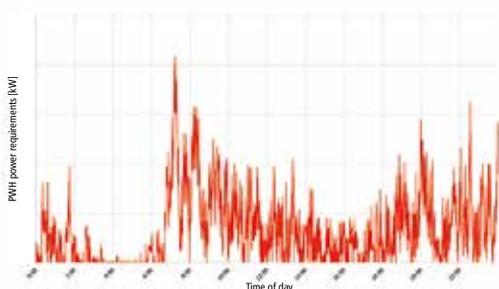
➔ Continuously growing demand profile database



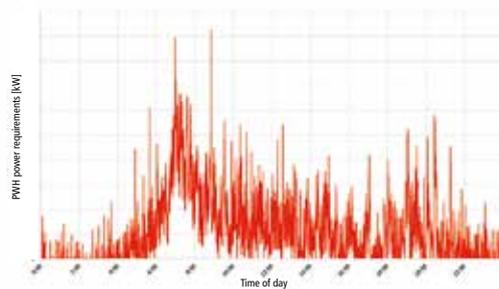
Demand profile: Care home for the elderly



Demand profile: Hospital intensive care ward



Demand profile: Student hall of residence



Demand profile: Hospital ward block

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The KTS ThermoBox

The "heart" of domestic hot water heating

1 Control unit

Adaptive controller through "neuronal networks" with high control quality. The output control of the pump is optimised automatically by the controller and adjusted to your property. One recharging request and one fault message can be output by each controller. BMS-compatible through ModBus in conjunction with the ComLog module. A ModBus connection also ensures communication between the ThermoBoxes.

2 Pump

The high-efficiency pump output is controlled according to the pulse width modulation principle. Longer pump life due to patented cooling of the pump mechanism by means of the stack effect. Compliance with the energy efficiency index (EEI) according to EC Directive.

3 Gravity brake

in the heating flow with integrated ventilation position.

4 Pt 1000 temperature measurement sensor

for recording the PWH temperature as a control variable. The location directly in the medium prevents the otherwise high temperature fluctuations that usually occur.

5 Plate heat exchanger

made of stainless steel, for all domestic hot water qualities (also available as Cu soldered variant, usable up to domestic hot water electrical conductivity of 500 µS/cm). Fast cooling of the secondary side after removal by patented inclined position of the heat exchanger. This prevents excessive limescale precipitation.

6 Flow sensor

according to the vortex principle for exact determination of the PWH volume flow on removal and in circulation mode.

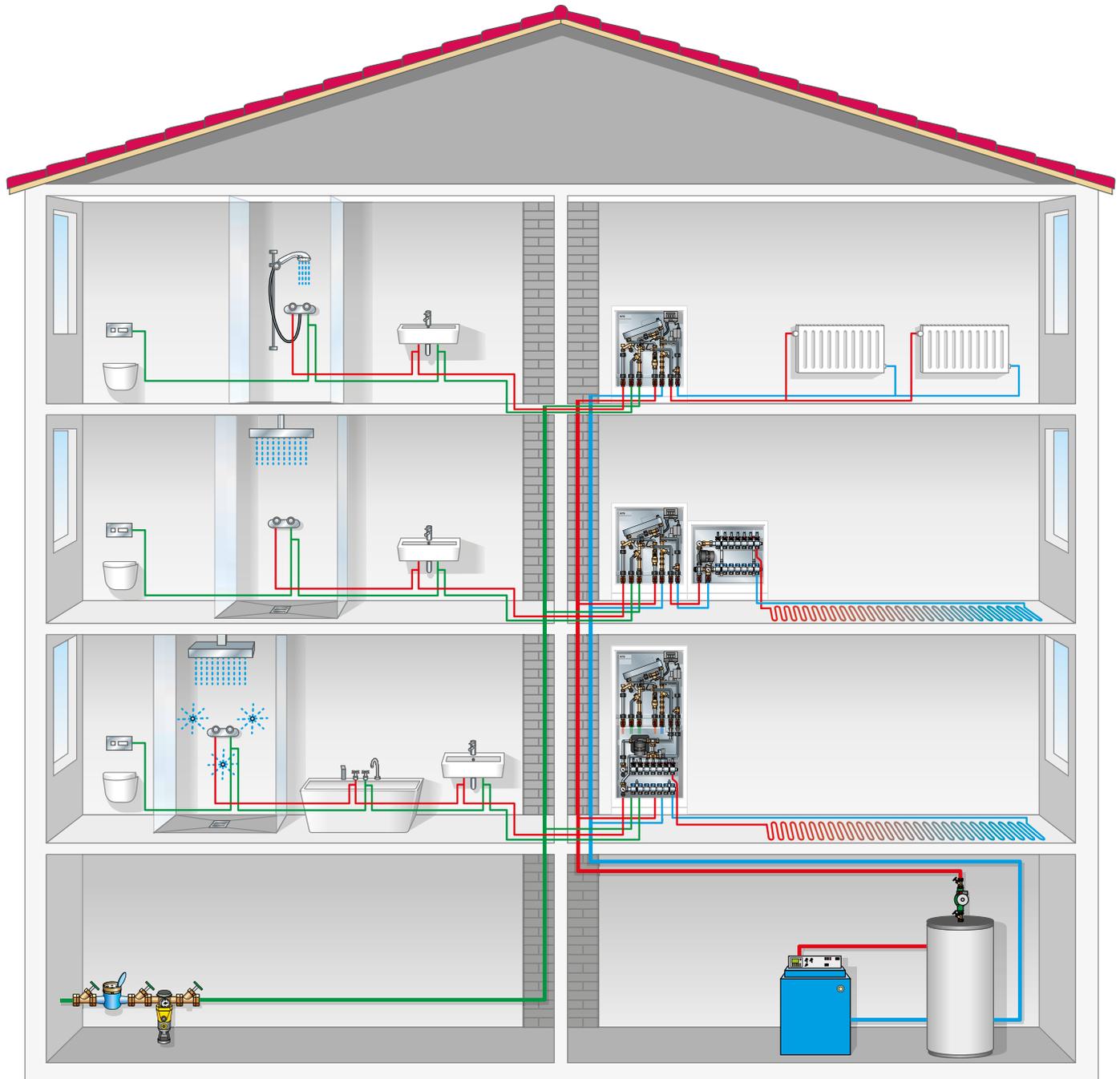
7 Full flow stop valve with actuator

only for cascade units for switching further ThermoBoxes on or off in the cascade group.



Decentralised heating systems

Group supply through apartment stations



Unlike centralised drinking water heating systems, apartment stations heat the drinking water decentrally, in the immediate vicinity of the areas to be supplied. In addition to the cold water, therefore, only the required thermal energy has to be fed from a central buffer tank to the stations –

domestic hot water distribution lines are not required. Within the individual supply areas, the pipework volume of one flow path usually remains < 3 l. In addition, under these conditions, no circulation lines are required in the entire building. Risk areas for drinking water hygiene are min-

imised. Since the heating systems in these areas are normatively considered to be small systems, the domestic hot water temperature can be set to a level $< 60^{\circ}\text{C}$.

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Streamlining the heat supply

Cutting costs with KTS ThermoStations

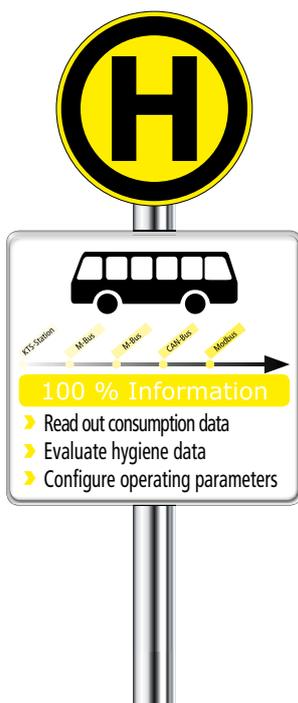
STREAMLINING

The KTS ThermoStation is the new innovative basis for a decentralised continuous flow domestic water heating system. In its design, attention was consistently paid to the reduction of pressure losses and, at the same time, high thermal transmission performance. In conjunction with the latest scientific findings in the field of system dimensioning it is possible, on account of the high performance bandwidth of the KTS ThermoStation, to design the entire heat supply system optimally from the point of view of energy consumption, and to reduce this to the minimum that is actually required. Starting with the piping system, including insulation and fire protection bushings, to the buffer tank and the heat generators, significant reductions are possible compared to systems with conventional apartment stations.



HYGIENE AND LIMESCALE PROTECTION

When it comes to drinking water hygiene and limescale protection, KTS ThermoStations are ideally equipped. They monitor the need for forced flushing and trigger it by means of hygienic flushing, which can be optionally connected. Thanks to a further intelligent additional function, the HS2 is in a position to effectively reduce limescale precipitation in the plate heat exchanger.

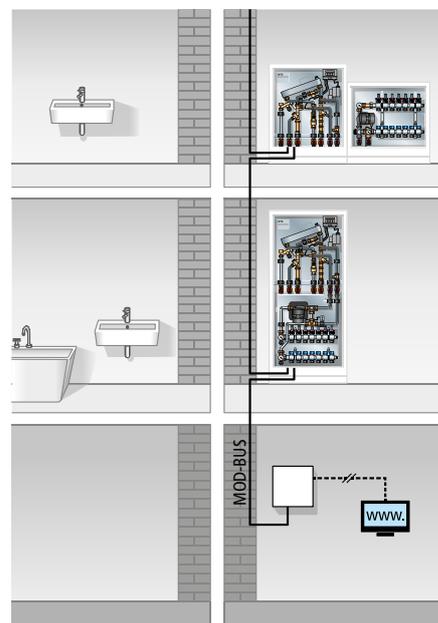


NETWORKING

The fact that KTS ThermoStations can be interconnected allows planners, tradesmen, facility managers and operating companies to carry out a large number of tasks from a central point in the building or through the Internet, for example reading out consumption data, monitoring functions or troubleshooting. Through one bus system alone, up to 246 KTS ThermoStations can be put into service and configured. In this way it is possible to carry out fault diagnosis and software updates without the need to enter homes. The same applies to the reading of consumption data, allowing separate bus systems for heat and water meters to be dispensed with and thus reducing fire protection measures. Logs can be generated as verification that hygiene measures have been carried out.

Advantages at a glance

- Innovative design for "leaner" heating systems
- Connectivity for centralised readout/control
- Hygiene and limescale protection function by means of KHS HS2 Hygienic Flushing
- High energy efficiency
- Automatic hydraulic balancing in the heating pipe network
- Materials (on the drinking water side) in accordance with § 17 of the UBA list



Ideal object-specific planning

Flexible, easy and clean installation

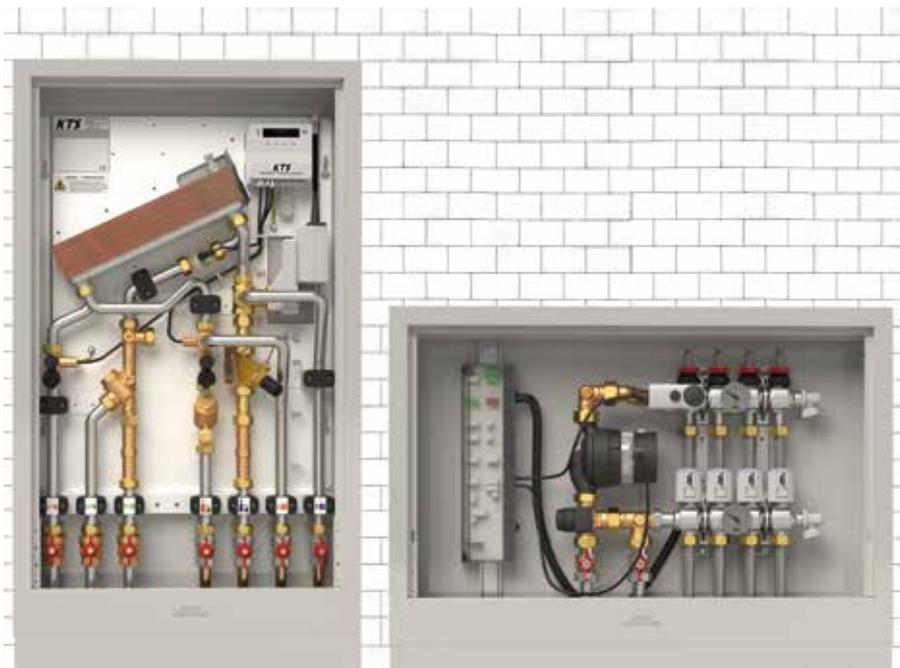
KTS ThermoStations were developed on the basis of the latest scientific findings on the optimum energy-specific design of decentralised hot water heating systems. All components and their positioning are therefore structurally designed for the consistent prevention of pressure losses. Three versions with particularly high flow rates (15, 20 and 25 l/min*) offer a performance bandwidth which, if calculated on an object-specific basis, allows cost-effective reductions in the entire heat supply system. Significantly lower forward/return flow temperatures compared to conventional systems also ensure a high level of energy efficiency and encourage the use of renewable energy sources!

For connection to living space heating, the KTS ThermoStation is flexible. High-quality built-in cupboards are available for combination with the panel heating module as well as for the use of the external panel heating group. The easy handling, the clear structure and the compact installation depth (110 mm**) guarantee simple and clean installation.

The hydraulic balancing of the ThermoStation in the heating pipe network is done automatically by means of differential pressure controllers. KTS thus not only saves costs and time in the construction phase, but also during operation for an energy-efficient heat supply.

170 hPa
pressure loss
at 15 l/min and
70 kW ThermoStation

* For PWC 10 °C, PWH 50 °C and forward flow temperature 65 °C **
Without circulation module



KTS ThermoStation with external KTS panel heating group



KTS ThermoStation with external KTS panel heating group

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The KTS ThermoStation

1 Plate heat exchanger
made of stainless steel for all drinking water qualities. New innovative design for very high power output with very small dimensions and low pressure losses.

2 Flow and temperature sensor
for the exact determination of the hot water volume flow when tapping and in circulation mode. Integrated Pt 1000 temperature sensor for simultaneous detection of the inlet temperature.

3 Pt 1000 temperature sensor
for the exact recording of the hot water temperature directly in the medium.

4 Control unit
for domestic water heating to meet your needs. The self-adjusting control logic ensures a high control quality and efficient operation.

5 High-response control valve
for the precise control of the heating medium volume flow for domestic hot water heating. With automatic priority circuit.

6 Dirt trap
For protecting the downstream installation from coarse particles.

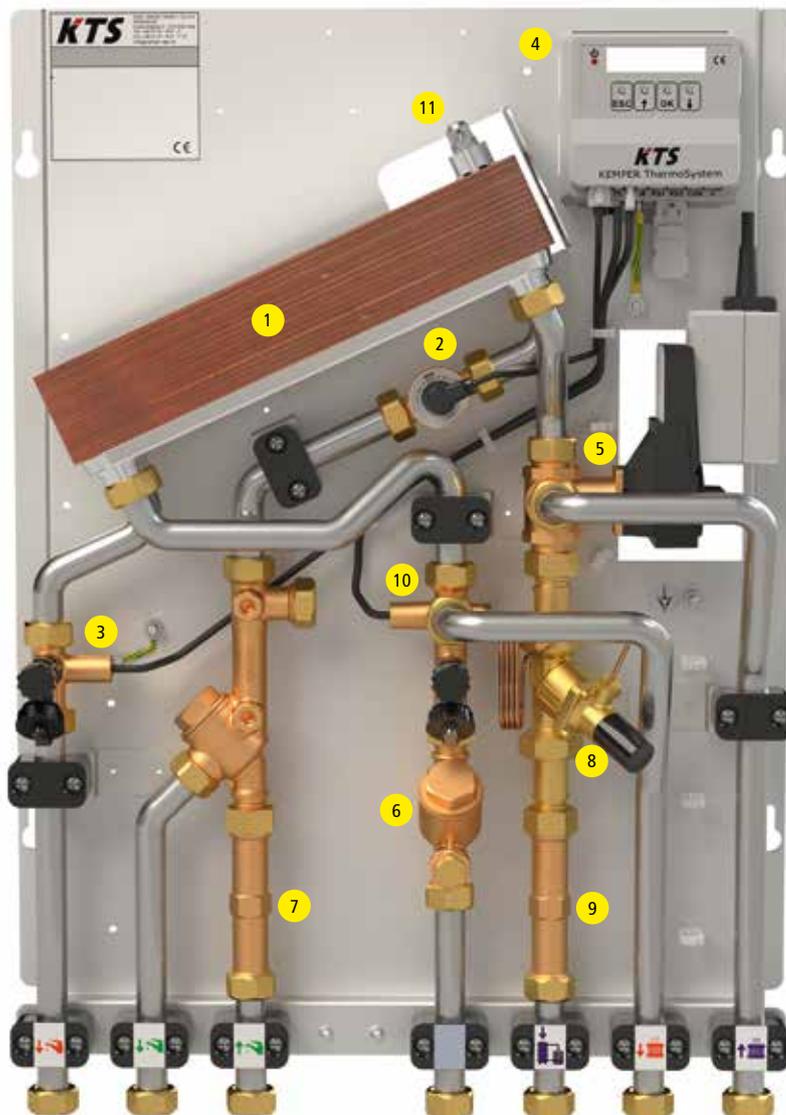
7 Adapter 110 mm for water meter

8 Differential pressure controller
for automatic hydraulic balancing of the KTS ThermoStation in the heating pipe network.

9 Adapter 110 mm for heat meter

10 Pt 1000 temperature sensor
for precise detection of the heating medium forward flow temperature.

11 Bleed valve
for easy bleeding of the heating circuit.



KTS ThermoStation, as apartment station without heating connection, Fig. 930 T/Fig. 940 T

Removal flow rate*	Power kW*	Cu-soldered plate heat exchanger stainless steel Fig.	Solid stainless steel plate heat exchanger Fig.
15 l/min.	42	9301500400	9401500400
20 l/min.	56	9302000400	9402000400
25 l/min.	70	9302500400	9402500400

KTS ThermoStation, as apartment station with heating connection, Fig. 930 TH/Fig. 940 TH

Removal flow rate*	Power kW*	Cu-soldered plate heat exchanger stainless steel Fig.	Solid stainless steel plate heat exchanger Fig.
15 l/min.	42	9301500100	9401500100
20 l/min.	56	9302000100	9402000100
25 l/min.	70	9302500100	9402500100

* for PWH 50 °C, PWC 10 °C and heating forward flow 65 °C

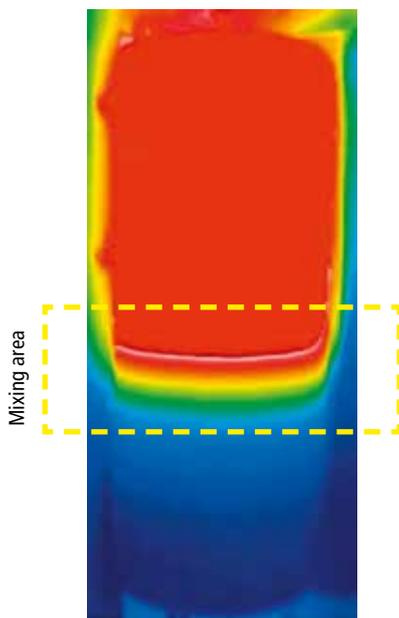
KTS ThermoTank S

Optimised "energy tank" for domestic hot water heating

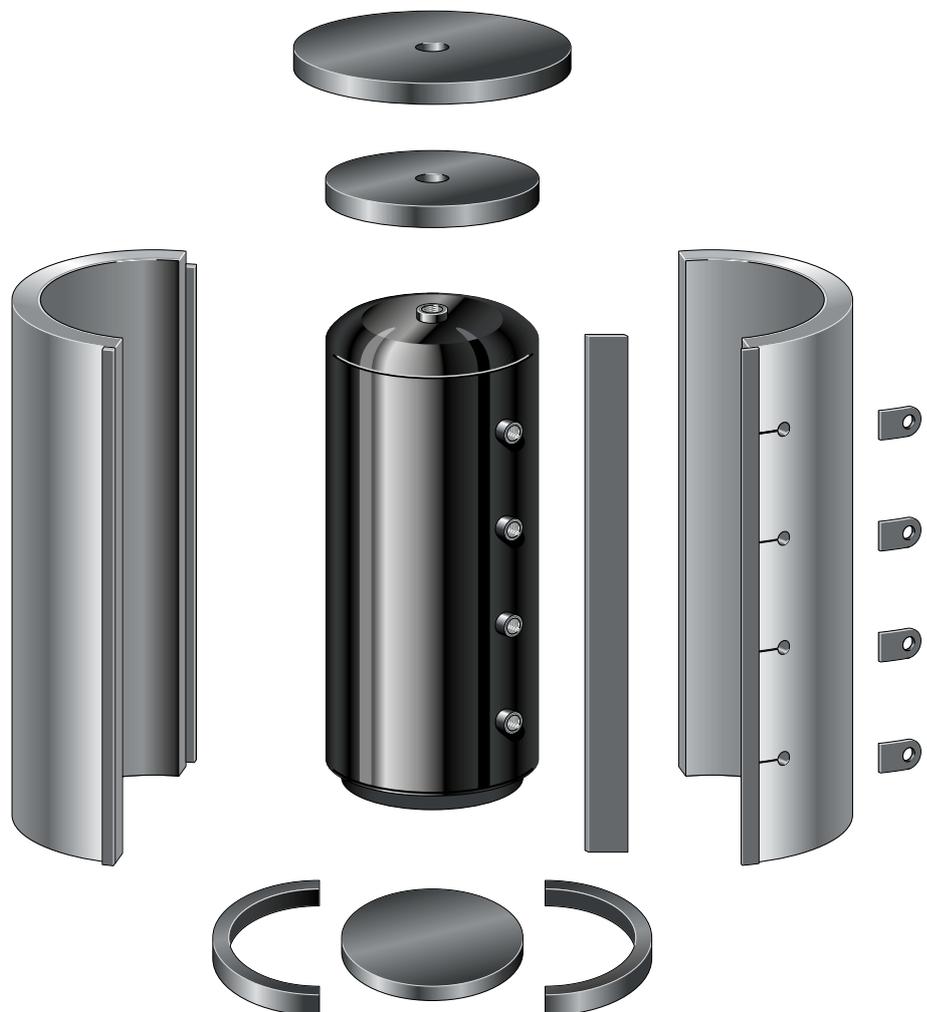
The KTS ThermoTank is a heating medium buffer tank, which has been developed with the help of state-of-the-art flow simulation software. This achieves energy-optimised, temperature-dependent stratification during the charging and discharging process of the heat transfer medium. The internal baffle plates guarantee the low-turbulence and low-mixing charging and discharging of an energy-efficient storage facility for thermal energy.

The unitised construction of the insulation allows retrofitting even in an already completed pipe installation. Hook strips help to ensure easy closure. Subsequent dismantling and renewed refastening is also no problem. The insulation made of rigid non-woven fabric is characterised by its optimised fit and conforms to building material class B1. The energy-efficient storage of the heating medium works thanks to the very low thermal conductivity. The

variable heights of the temperature sensors allow the temperature zones to be arranged individually. This in turn guarantees the coordination of the ThermoSystem with the heating system. Among other things, this allows the timing of the heat source to be optimised and temperature zones to be adjusted to different heat source combinations.



Thermographic image of the KEMPER KTS ThermoTank



Advantages at a glance

- Intelligent energy storage with KEMPER know-how
- Baffle plate for low-turbulence and low-mixing action charging and discharging for the energy-efficient storage of thermal energy
- (Optional) generous dimensioning and number of connections

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EVERYONE BELIEVED THAT
CIRCULATION SYSTEMS
CANNOT BE CONTROLLED.

UNTIL OUR REGULATING VALVES
THEMSELVES LEARNED HOW TO
KEEP THE WATER AT THE RIGHT
TEMPERATURE.





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