

**reflex**

Thinking solutions.

# Water make-up systems & Water treatment technology



Fillset/Fillcontrol  
Fillsoft

# Reflex— a powerful brand for decades

Reflex Winkelmann GmbH—part of the Building+ Industry division—is a leading provider of high-quality heating and hot water supply technology systems. Under its Reflex brand, the company, which has its headquarters in Ahlen in the German region of Westphalia, develops, produces and sells not only diaphragm expansion vessels, but also innovative components and holistic solutions for pressure maintenance, water make-up, degassing and water treatment, storage water heaters and plate heat exchangers, as well as hydraulic manifold and tank components. Reflex Winkelmann GmbH has over 2,000 employees worldwide, giving it an international presence in all major markets.

With its energy-efficient and sustainable products, the company is already doing its bit to help the environment, as evidenced by its commitment to sustainability and the climate policy goals agreed by the German Federal Government. This support is built on proven technologies and future-oriented innovations. What's more, Reflex Winkelmann GmbH works together with others as equals, always maintains its focus on the customer and offers additional services such as its own factory service centre fleet and a comprehensive range of training options.





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## New configuration software



Reflex Solutions Pro  
**[rsp.reflex.de/en](http://rsp.reflex.de/en)**

→ Read more on [page 30](#)

# Reflex City

Fillcontrol Plus Compact

Fillsoft



### **Water make-up systems and water treatment technology**

Living, shopping, working and producing: city-life means diversity. Supply technology requirements are as individual as the buildings themselves. Reflex offers products and solutions for any size and complexity ranging from a 5 kW system in a detached home or a safety-related cooling system in a computer centre. This is reflected in the Reflex City concept.

A heat transfer medium needs to be constantly available at a sufficient quantity and quality no matter what the size of the system. Local requirements such as water quality also need consideration. Reflex water make-up and water treatment technologies put you always on the safe side.



# Water make-up and water treatment

A heat transfer medium needs to be constantly available at a sufficient quantity and quality. This is required in heating and cold water systems to achieve optimal heat transport with minimal

loss during transfer. Reflex water make-up systems unite the three functions of system separation, water treatment and water make-up monitoring.



## Water make-up

Insufficient water in heating and cooling systems impairs functioning of the pressure maintenance being used. This can result in air inclusion, massive circulation faults, cavitation at the circulating pumps and, in the worst case, total failure of the system. Water make-up systems according to EN 12828 are therefore recommended which also act as pressure control devices. With its Fillcontrol series, Reflex provides a wide range of solutions for the long-term stable operation of a wide variety of system types.

- ✓ Avoids insufficient water and thereby
- ✓ Prevents air problems
- ✓ The system separation required for potable water supply systems and DIN EN 1717 compliant

### DIN EN 1717:

Protection against contamination in potable water systems and general requirements on safety equipment to prevent backflow contamination.

German version EN 1717:2000 Technical regulation from the DVGW

## Water treatment

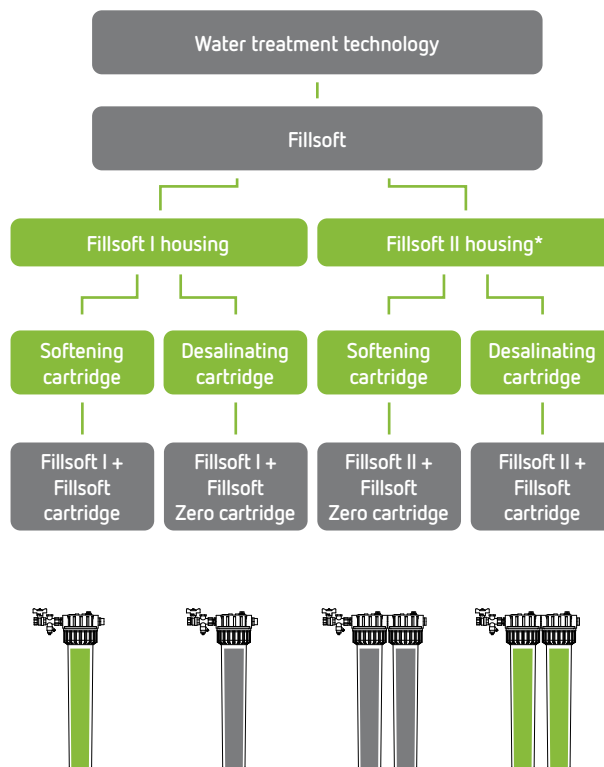
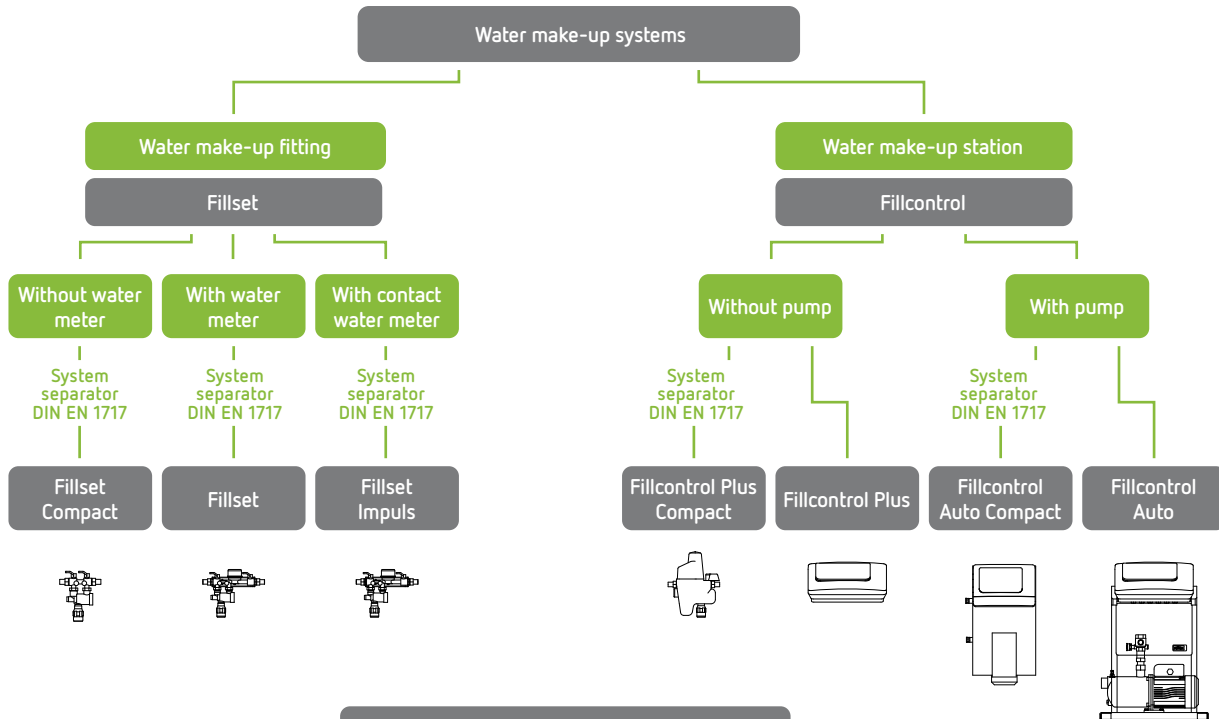
Modern boilers are expected to withstand constantly increasing heating surface loads leading to an increased risk of deposits, especially limescale. Performance is then reduced and, in the worst case, boilers can become irreparably damaged. To prevent this, Reflex Fillsoft offers a water treatment programme which treats filling and water make-up water according to standards. Reflex recommends Fillsoft for any water make-up system because it significantly contributes to system safety and requires little effort.

- ✓ Ensures VDI 2035-compliant water quality
- ✓ Prevents scaling and corrosion
- ✓ Reduces silting in pipelines, pumps and fittings
- ✓ Reduces energy consumption

### Directive of Association of German Engineers (VDI) 2035 Sheet 1:

"Prevention of damage from scaling in hot-water heating and water heating systems" and "Prevention of damage in hot water heating systems, heated-water corrosion"

## Reflex water make-up systems and water treatment technology



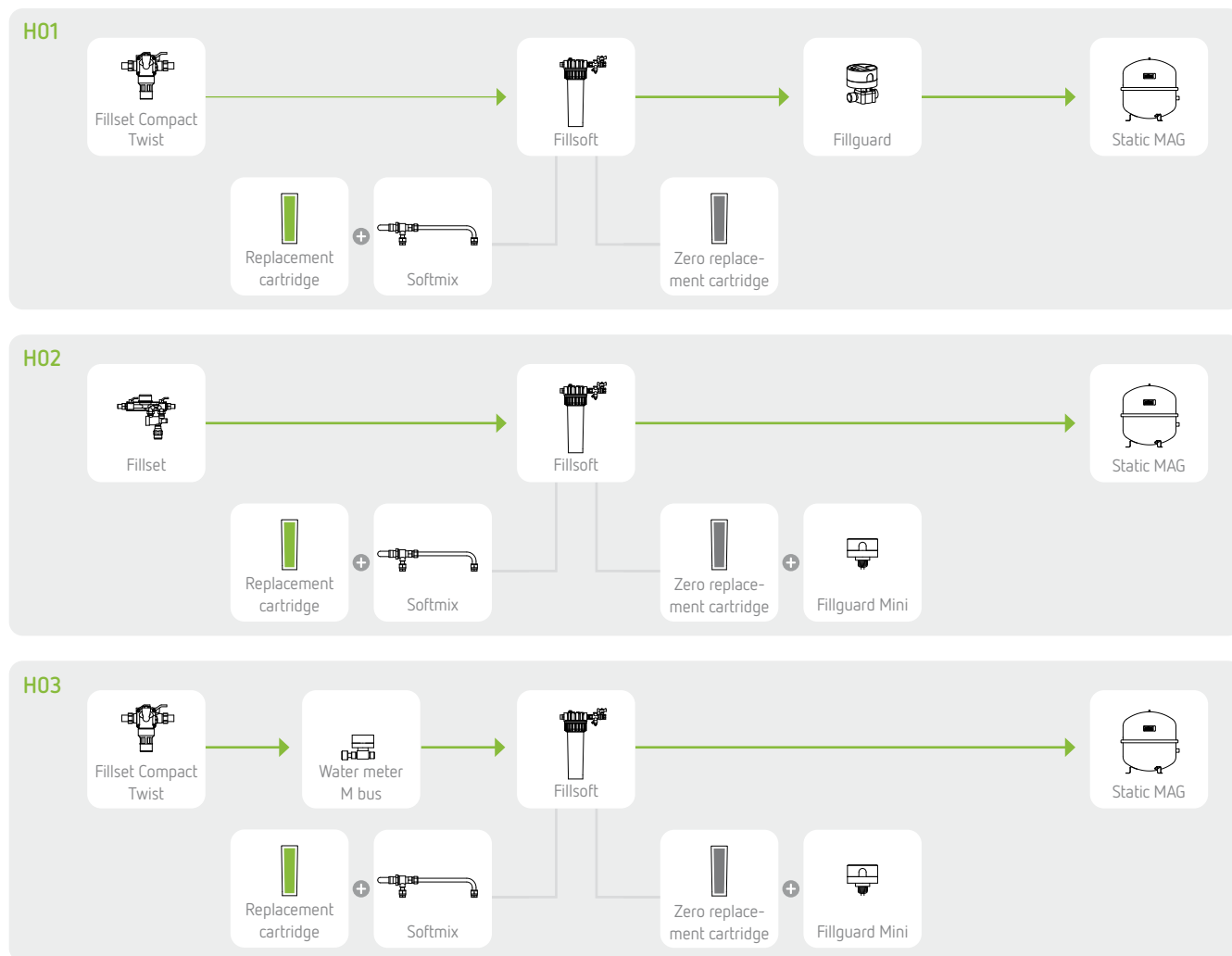
\*Note: A combination of 1 softening and 1 desalinating cartridge is not possible when using Fillsoft II.

# Options for application and combinations

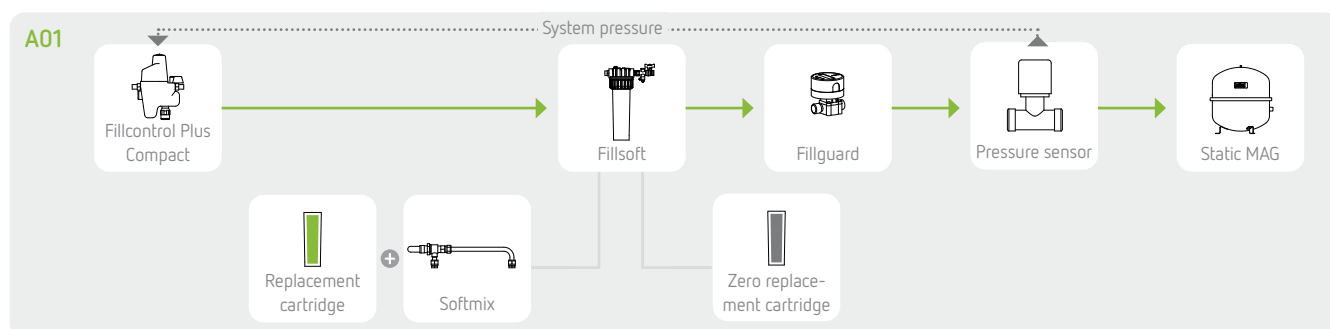
Combining Fillcontrol water make-up systems with Fillsoft water treatment technology is as obvious as it is practical. Which combinations are specifically recommended depend on the

system being planned. Example systems are presented in the following to show combinations and possible range of functions.

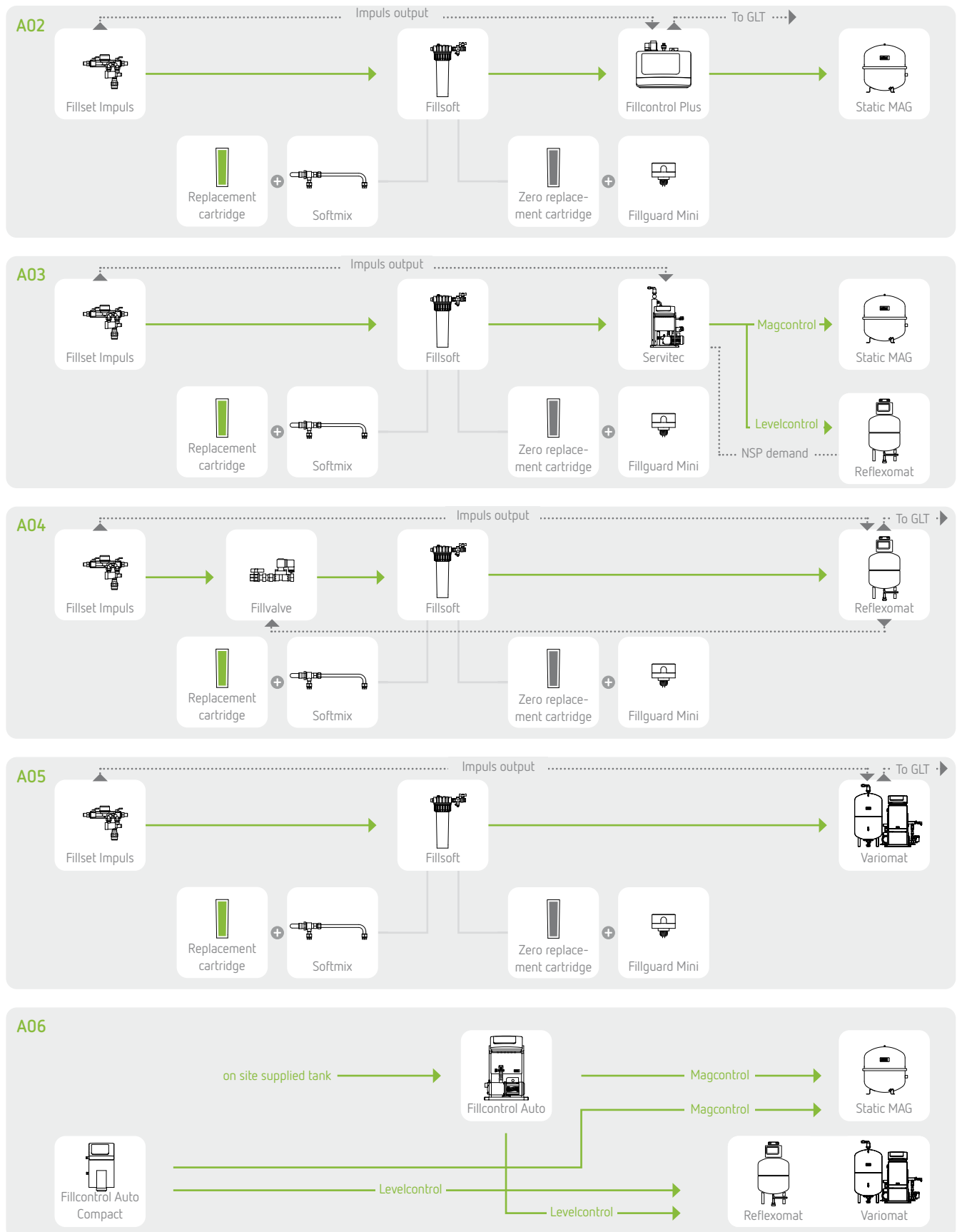
## Manual water make-up



## Automatic water make-up





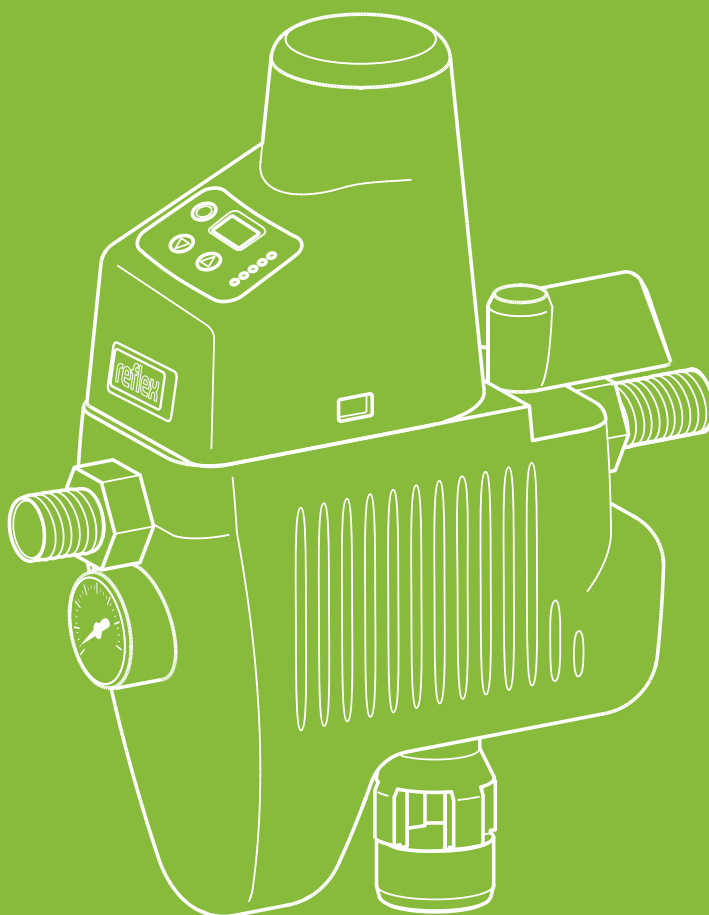


# Fillset and Fillcontrol

## Key advantages

### Solutions for every requirement

- Monitoring system pressure and water make-up for insufficient pressure
- Reliably preventing air problems by a sufficient water seal in the expansion vessel
- Fulfilling requirements for a safe water make-up from potable water supply systems in accordance with DIN EN 1717 and DIN 1988
- Version with water meter and impulse output available; combinable with all Reflex Control controllers, and simultaneously evaluates total water make-up quantities/controls capacity from a Fillsoft water treatment fitting



# Function, application, construction

## Fillset system separation and manual water make-up

**DIN EN 1717**

Fillset water make-up fittings provide DIN EN 1717 compliant system separation to enable heating or cooling water systems to be connected to potable water systems. Fillset can be used directly for manual water make-up or installed upstream from automatic solutions such as the Fillcontrol Auto.

- Flow rate: 0.8 m<sup>3</sup>/h
- Permissible operating temperature: 60 °C
- Permissible operating pressure: 10 bar

## Function

Manual water make-up is performed by hand by opening and closing the shut-off. When combined with automatic water make-up systems, the shut-off is permanently open. When a contact water meter is used, it is wired to the Reflex controller which calculates the required water make-up quantities.

## Application

Can be used for direct manual water make-up or as an upstream system separator for automatic water make-up systems.

**Fillset Compact**


- Particularly space-saving, basic variant without water meter
- System separator according to DIN 1988-100 or DIN EN 1717 (BA), with integrated dirt trap

**Fillset**

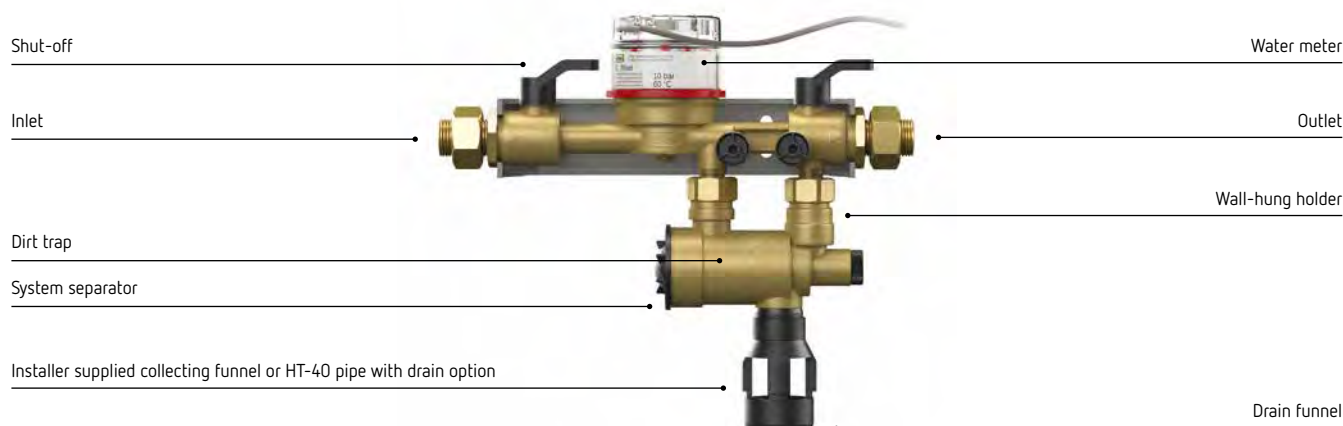

- With integrated water meter for monitoring water make-up quantities
- System separator according to DIN 1988-100 or DIN EN 1717 (BA), with integrated dirt trap

**Fillset Impuls**


- With contact water meter, which can be evaluated by all Reflex Control controllers
- System separator according to DIN 1988-100 or DIN EN 1717 (BA), with integrated dirt trap

## Construction

Construction of a water make-up fitting based on the Fillset Impuls



## Fillcontrol water make-up station without pump



### Function

Water make-up takes place using the pressure of the fresh water system. If the pressure falls below the initial pressure or the filling pressure at the pressure sensor, the water make-up control valve opens and allows fresh water to flow into the system.

### Application

- For pressure-dependent, water make-up in systems with expansion vessels
- The inlet pressure  $p$  must be at least 1.3 bar above the system's minimum operating pressure ( $p_0$ ), otherwise a Fillcontrol with pump needs to be used.

#### Fillcontrol Plus Compact



The compact solution for small systems with an expansion vessel. It has a DIN EN 1717 compliant system separator already integrated, and the controller functions fully independently via an integrated system pressure sensor.

- Flow rate: 0.4 m<sup>3</sup>/h
- Permissible operating temperature: 70 °C
- Permissible operating pressure: 10 bar

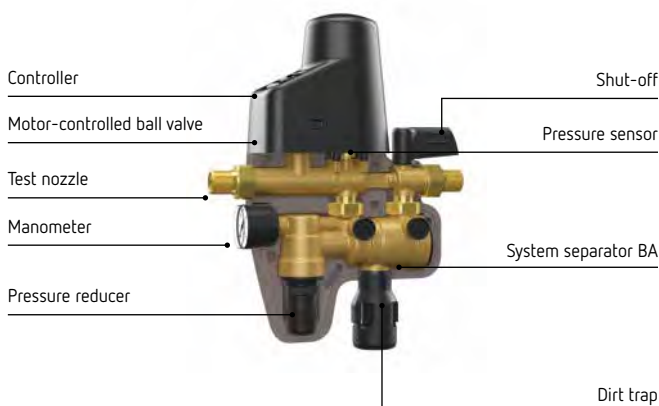
#### Fillcontrol Plus



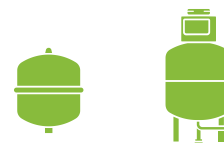
The Fillcontrol Plus provides the full operating range of the Reflex Control Basic controller including for small systems. It can be operated as both pressure- and level-dependent. System separation to potable water supply systems requires an upstream Fillset connection.

- Flow rate: 1.4 m<sup>3</sup>/h
- Permissible operating temperature: 90 °C
- Permissible operating pressure: 10 bar

### Construction



## Fillcontrol water make-up station with pump



### Function

The pressure generated by the pump enables water make-up in systems with minimum operating pressures ( $p_o$ ) of up to around 7 bar. When operated with an expansion vessel, the water make-up control valve opens when the filling pressure at the pressure sensor is insufficient—as in a system without a pump. When operated with a pressure maintenance station, insufficient fill-levels in the expansion vessel ensures the control valve opens.

### Application

- For pressure-dependent make-up with expansion vessels as well as for level-dependent make-up with pressure maintenance stations
- Used when the fresh water supply pressure is too low for direct feeding without a pump, or when an intermediate tank is required to separate the system from the potable water supply system
- The flow rate is not suitable for filling systems

Fillcontrol Auto Compact



The Fillcontrol Auto Compact works fully independently from the pressure in a fresh water network. It can be operated as both pressure- and level-dependent with the relevant setting easily made via the Control controller. For level-dependent operation, the pressure maintenance station and water make-up are directly connected together via the controller. The Fillcontrol Auto can be directly connected to the potable water supply system according to DIN 1988 thanks to the integrated system separator vessel.

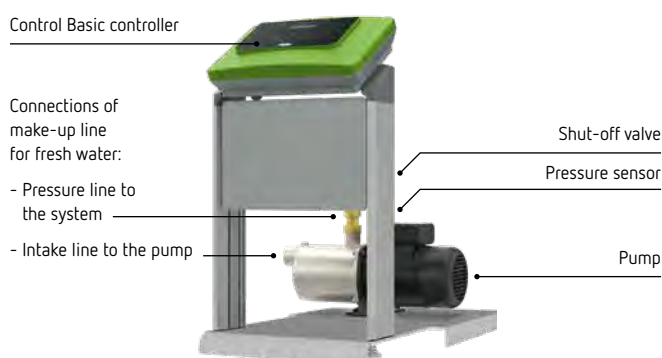
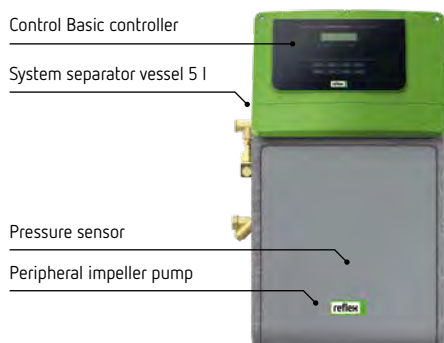
- Water make-up quantity: 0.12–0.18 m<sup>3</sup>/h
- Permissible operating temperature: 30 °C
- Permissible operating pressure: 10 bar
- Operating range: Up to 8.5 bar

Fillcontrol Auto (glycol-compatible)



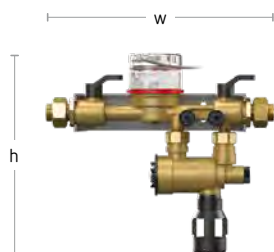
For special applications, the Fillcontrol Auto is also available in a glycol-compatible variant. The range of functions corresponds to that of the Fillcontrol Auto but without a system separator vessel due to installer-supplied water make-up tanks generally being used, e.g. mixing tanks in solar systems.

- Water make-up quantity: ≤ 4 m<sup>3</sup>/h
- Permissible operating temperature: 70 °C
- Permissible operating pressure: 8 bar
- Operating range: Up to 5.5 bar



# Fillset products

## Fillset



Fillset

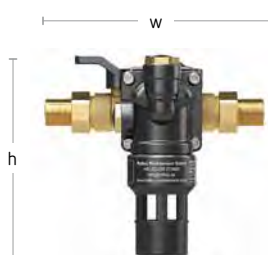
### Technical features

- Connection group for make-up systems according to DIN 1988 and DIN EN 1717
- For direct connection to potable water supply systems
- With DVGW-tested system separator type BA
- Inlet and outlet shut-offs
- Incl. standard or contact water meter and wall-hung holder
- Permissible operating pressure 10 bar, permissible operating temperature 60 °C

	Type	Art. No.	DG	Connection inlet/outlet	Flow rate $k_{vs}$ [m <sup>3</sup> /h]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
10 bar 60 °C	Standard 0,8	6811105	0070	R ½"/R ½"	0.8	226	293	110	1.70
	Impuls 0,8	6811205	0070	R ½"/R ½"	0.8	226	293	110	2.80

## Fillset Compact Twist

NEW!



Fillset Compact

### Technical features

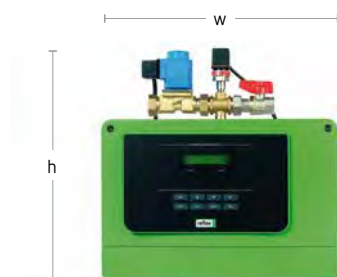
- Connection assembly for water make-up systems according to DIN 1988 and DIN EN 1717
- For direct connection to drinking water supply systems
- With DVGW-tested system separator of Type BA
- Isolating fixtures at inlet and outlet
- Without water meter or with M-Bus water meter
- Permissible operating pressure 10 bar, permissible operating temperature 65 °C

	Type	Art. No.	DG	Connection inlet/outlet	Flow rate $k_{vs}$ [m <sup>3</sup> /h]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
10 bar 65 °C	Compact Twist	6811805	0070	R ½"/R ½"	0.86	157	175	117	2.42
	Compact Twist M-Bus	6811855	0070	R ½"/R ½"	0.86	157	175	117	2.42



# Fillcontrol products

## Fillcontrol Plus



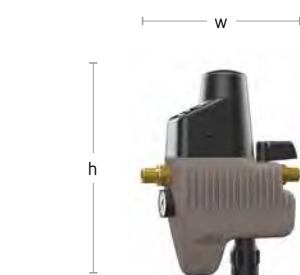
Fillcontrol Plus

### Technical features

- For monitoring expansion vessel pressure and for automatic make-up of the set supply pressure
- Incl. wall-hung holder and with Control Basic controller
- RS-485 interface, connection of bus/expansion modules possible
- Capacity monitoring of a Fillsoft water treatment system possible
- Supply voltage: 230 V/50 Hz
- Permissible maximum input pressure 10 bar
- Permissible operating pressure 10 bar, permissible operating temperature 90 °C

	Type	Art. No.	DG	Connection inlet/outlet	Flow rate $k_{vs}$ [m³/h]	Flow rate $k_{vs}$ with Fillset [m³/h]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
10 bar 90 °C	Plus 1,4	8812100	0070	G ¾"/G ½"	1.4	0.7	292	340	270	2.50
	Plus 1,4 E	8812200	0070	G ¾"/G ½"	1.4	0.7	320	340	270	2.50
Commissioning										
	Fillcontrol Plus	7945723	0095	–	–	–	–	–	–	0.00

## Fillcontrol Plus Compact



Fillcontrol Plus Compact

### Technical features

- Compact automatic make-up station, can be used for systems with an expansion vessel in accordance with DIN 1988 and DIN EN 1717
- With type BA system separator
- Controlled make-up
- Supply voltage: 230 V/50 Hz
- Make-up capacity approx. 0.5 m³/h where  $\Delta p = 1.5$  bar
- Permissible maximum input pressure 10 bar
- Permissible operating temperature 70 °C

	Type	Art. No.	DG	Outlet pressure [bar]	Connection inlet/outlet	Flow rate $k_{vs}$ [m³/h]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
10 bar 70 °C	Plus Compact	6811500	0079	0.5 – 5.0 bar	R ½"/R ½"	0.4	304	240	90	3.00
	FE*	9112004	0178	–	–	–	90	70	45	0.30

\*In combination with Fillsoft, an external pressure sensor must be planned on the system side for measuring the required make-up pressure

# Fillcontrol products

## Fillcontrol Auto



Fillcontrol Auto

### Technical features

- **Automatic** water make-up system with integrated pump
- Fillcontrol Auto for make-up, e.g. from containers or conditioning systems
- Systems equipped with Control Basic controller for easy operation
- RS-485 interface, connection of bus/expansion modules possible
- Fillcontrol Auto suitable for applications with max. 50 % antifreeze
- Permissible maximum input pressure 10 bar
- Permissible operating pressure 10 bar
- Maximum pump pressure 5.5 bar
- Permissible operating temperature 70 °C

	Type	Art. No.	DG	Connection inlet/outlet	Delivery rate [m³/h]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
10 bar 70 °C	Auto 5.5	8812300	0070	G 1 ¼" / G1"	4.2	683	471	440	18.60

## Fillcontrol Auto Compact










Fillcontrol Auto Compact

### Technical features

- **Automatic** water make-up system with integrated pump
- Fillcontrol Auto Compact with built-in vessel as system separator
- System equipped with Control Basic controller for easy operation
- RS-485 interface, connection of bus/expansion modules possible
- Includes system separator according to DIN 1988 and DIN EN 1717
- Permissible maximum input pressure 10 bar
- Permissible operating pressure 10 bar
- Maximum pump pressure 8.5 bar
- Permissible operating temperature 30 °C

	Type	Art. No.	DG	Connection inlet/outlet	Overflow connection	Delivery rate [m³/h]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
10 bar 30 °C	Auto Compact 8.5	8688500	0070	G ¾" / G ¾"	DN32 / PN16	0.12 – 0.18	619	579	287	19.10

# Overview

	Water make-up fittings			Automatic water make-up systems		Automatic water make-up with pump	
							
	Fillset Compact	Fillset	Fillset Impuls	Fillcontrol Plus	Fillcontrol Plus Compact	Fillcontrol Auto Compact	Fillcontrol Auto
DVGW-tested system separation	yes	yes	yes	no — upstream system separator installation	yes	System separator vessel	no — upstream system separator installation
K <sub>vs</sub>	0.8 m <sup>3</sup> /h	0.8 m <sup>3</sup> /h	0.8 m <sup>3</sup> /h	1.4 m <sup>3</sup> /h	0.4 m <sup>3</sup> /h	0.12–0.18 m <sup>3</sup> /h	4.2 m <sup>3</sup> /h
Pump	—	—	—	—	—	8.5 bar	8.5 bar
Integrated shut-off	yes	yes	yes	yes	yes	yes	yes
Wall-hung holder		yes	yes	yes		yes	
Automatic water make-up				time, cycle, or total-quantity dependent		time, cycle, or total-quantity dependent	time, cycle, or total-quantity dependent
				Level control on pressure maintenance systems		Level control on pressure maintenance systems	Level control on pressure maintenance systems
				Magcontrol pressure-dependent	Magcontrol pressure-dependent	Magcontrol pressure-dependent	Magcontrol pressure-dependent
Fault message				yes	yes	yes	yes
Water meter		yes	Contact water meter				
Evaluation water softening				with contact water meter		with contact water meter	with contact water meter

## Intelligent alternative

The Reflex Servitec vacuum spray pipe degassers and Variomat pressure maintenance stations have integrated, automatic make-up. Find out more in the corresponding product brochure or at [www.reflex-winkelmann.com/int](http://www.reflex-winkelmann.com/int)



# Installation and commissioning

## Pressure setting

System pressures are shown on a display and monitored in the controller. When falling below the supply pressure  $p < p_0 + 0.3$  bar, controlled make-up takes place. Malfunctions such as burst pipes or leakages are shown and can be forwarded via a signal contact. Pressures immediately prior to make-up must be at least 1.3 bar above the inlet pressure of the expansion vessel. Make-up quantities  $V$  can be determined from the  $k_{vs}$  value.

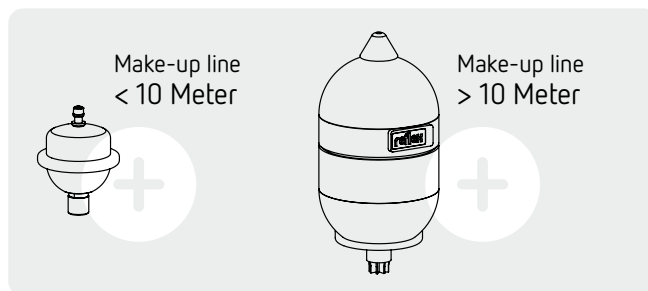
Minimum flow pressure  $p \geq p_0^* + 1,3 \text{ bar}$

Make-up quantity  $\dot{V} \approx \sqrt{p^* - (p_0 + 0,3)} \times k_{vs}$

## Note on make-up line

Depending on the length of the make-up line (after the system separator, system side), thermal expansion of the cold make-up water may cause fluctuations in volume.

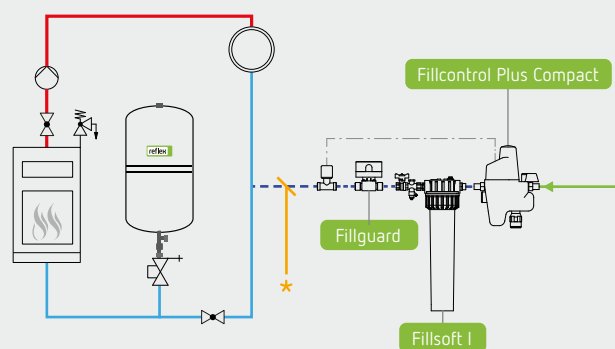
- If the length is less than 10 m, a Reflex water shock arrestor is to be used.
- From a length of 10 m, we recommend the use of a small reflex expansion vessel to guarantee reliable operation.



## Integration

### Reflex Fillcontrol Plus Compact

- The DVGW-tested system separator permits connection directly to potable water supply systems.
- An external pressure sensor must be included on the system side to measure the required make-up pressure.
- Water meter and electrical conductivity measurement of Fillsoft for softening and desalination is based on the flow rate from the Reflex Fillguard.

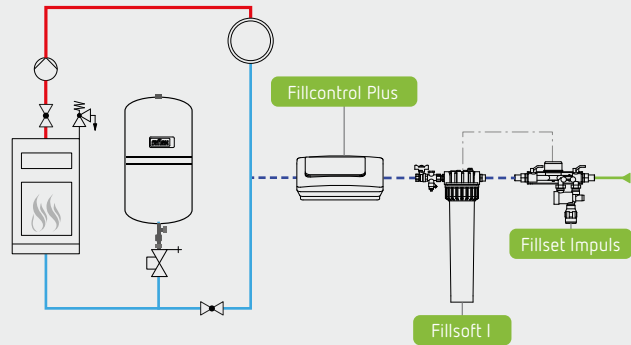


- \* DN 15 < 2 m connection pipe
- DN 20 < 10 m connection pipe
- DN 25 > 10 m connection pipe

The diagrams serve only as illustrations of the connections.  
They are to be amended to local conditions and to be made more specific.

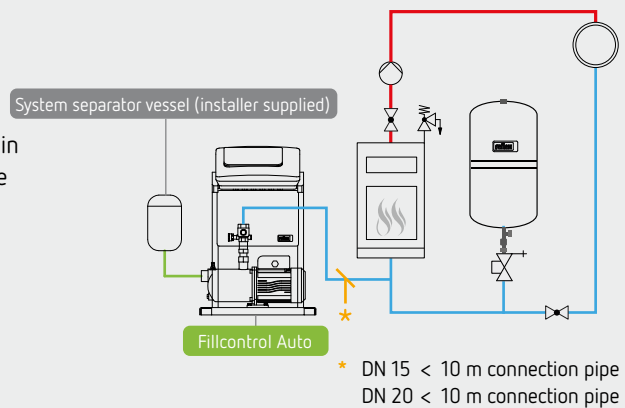
### Reflex Fillcontrol Plus

- Connecting the Reflex Fillcontrol Plus to potable water supply systems requires upstream connection of a Reflex Fillset with a DVGW-tested system separator.
- The contact water meter from Fillset Impuls transmits filling and water make-up quantities to the Fillcontrol Plus controller.
- The make-up line therefore needs to be integrated into the system so that the safety valve on the system side provides pressure protection against excessive pressure from the potable water supply system. Alternatively, a pressure reducer with a safety valve must be installed in the make-up line.



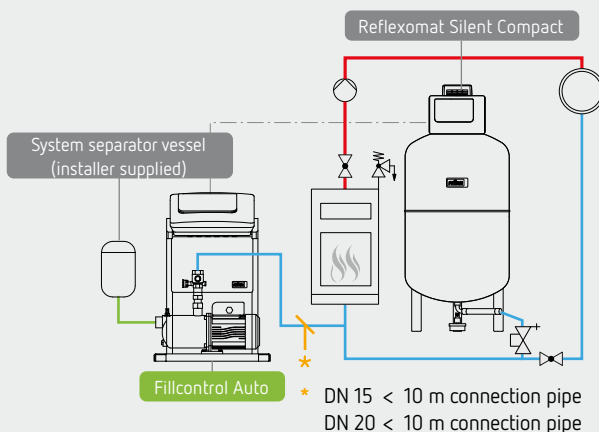
### Reflex Fillcontrol Auto with pressure-dependent control in a system with an expansion vessel

- In systems with expansion vessels, Fillcontrol Auto is set to pressure-dependent control. Water make-up then takes place at insufficient filling pressure or supply pressure in the expansion vessel. Integrating the make-up line must take place near the expansion vessel.
- The connection pipes from the system separator vessel to the pump (intake line) and from the pump to the system (pressure line) are installer supplied.



### Reflex Fillcontrol Auto with level-dependent control in a system with compressor pressure maintenance

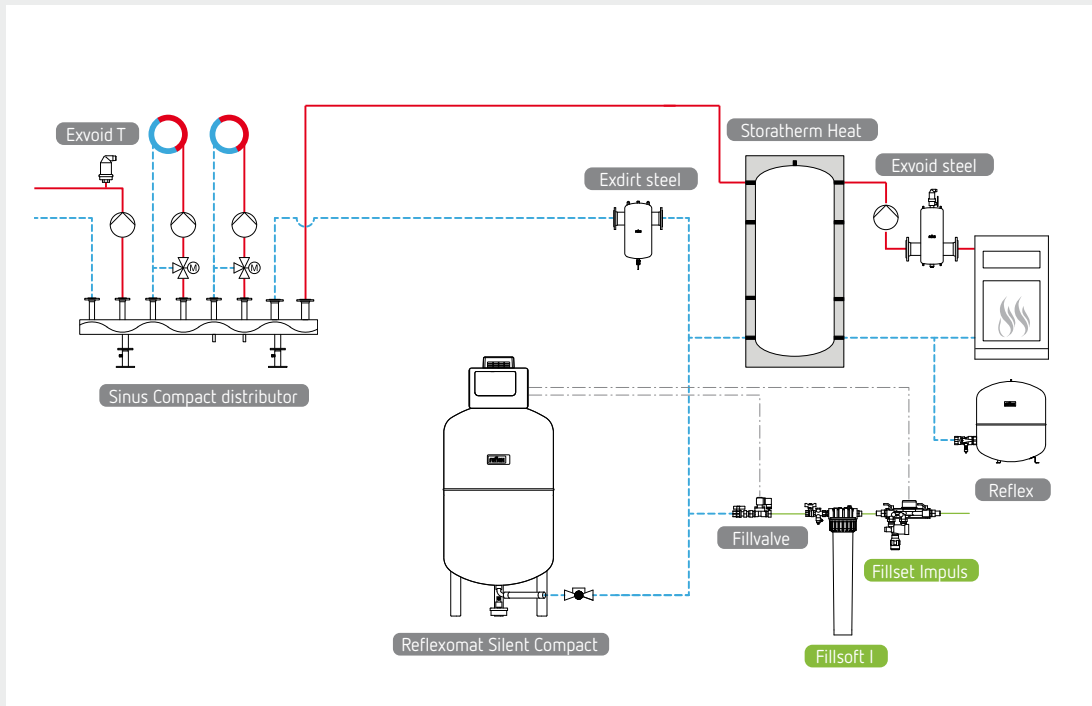
- In systems with pump- or compressor-controlled pressure maintenance stations, Fillcontrol Auto is set to level-dependent control. Water make-up then takes place depending on the LS filling level in the pressure maintenance station's expansion vessel. A 230 V input is available for this purpose.
- The connection pipes from the system separator vessel to the pump (intake line) and from the pump to the system (pressure line) are installer supplied.



# Installation examples

## Fillset Impuls and automatic make-up via Fillvalve

Solution № **05**



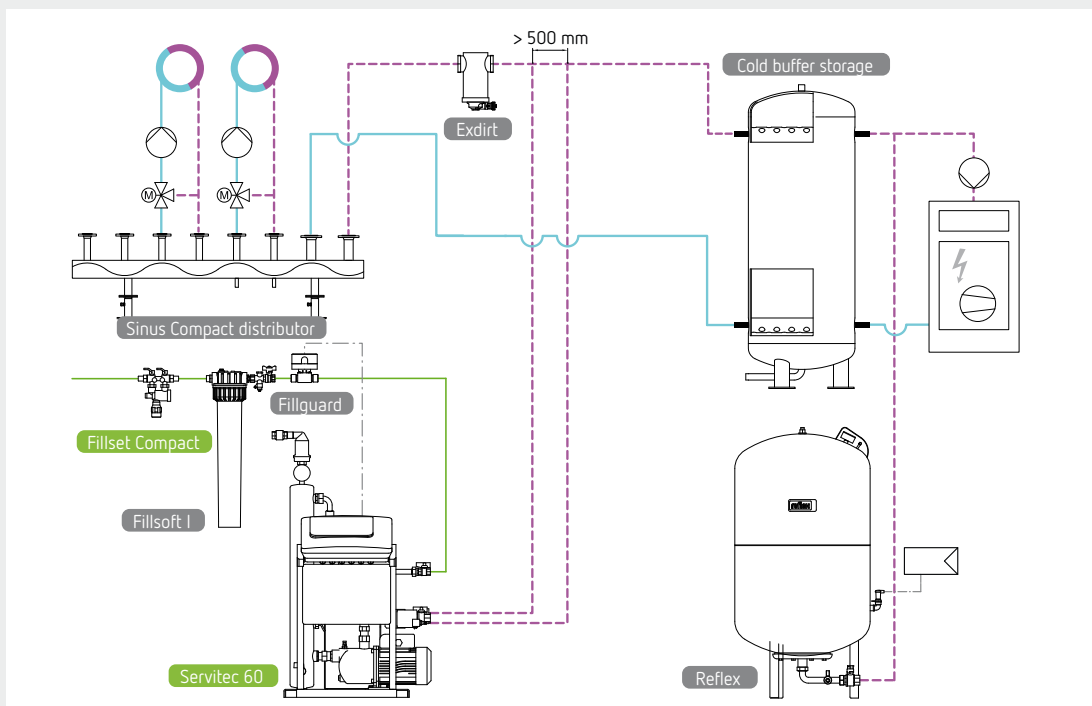
Reflexomat pressure maintenance stations are equipped with a logic integrated in the Reflex Control controller for softening and make-up.

An upstream solenoid valve with ball valve (Fillvalve) integrated in the controller is sufficient as a make-up control valve.

Further information can be found in the brochure on "pressurisation systems".

## Automatic make-up via Servitec

Solution № **16**



Automatic make-up takes place via the Servitec vacuum spray-tube degassing system.

Fillset Impuls acts as a system separator to the potable water supply system. The contact water meter for determining filling and make-up quantities is connected with the Servitec controller and evaluated by it.

Further information can be found in the brochure on "vacuum spray-tube degassing".

The diagrams serve only as illustrations of the connections. They are to be amended to local conditions and to be made more specific.



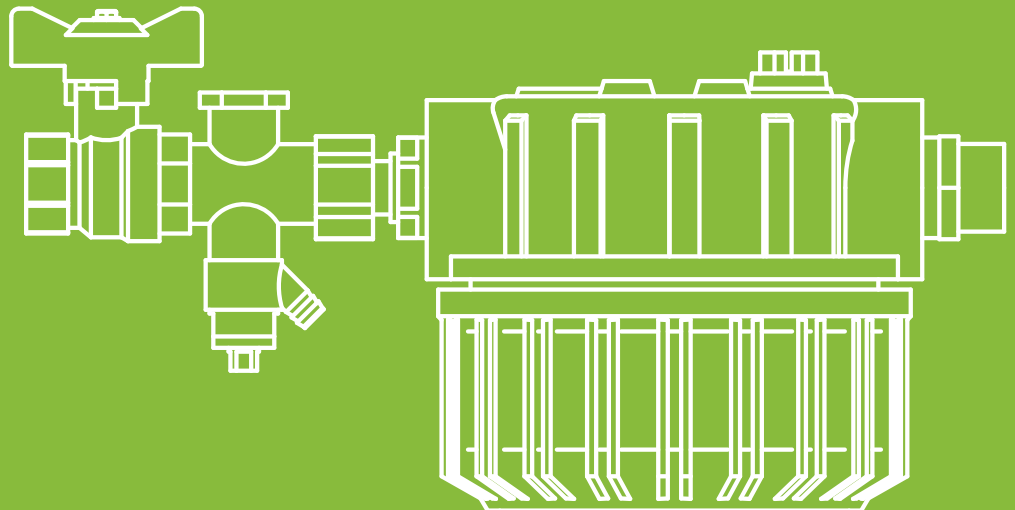
## Key advantages

### Fillsoft softening

- Sustainable system protection and energy saving through the reduction of limescale deposits
- VDI 2035 compliant
- Prevents thermal and mechanical overloading
- Simple and compact assembly as well as easy handling due to simple cartridge changing
- Low acquisition costs for extra system safety

### Fillsoft desalination

- Reduces limestone deposits and corrosion from chlorides, sulphates, nitrates, phosphates
- VDI 2035 compliant
- Efficient heat transfer and reduced silting of system components
- Easy capacity monitoring using Reflex Fillguard

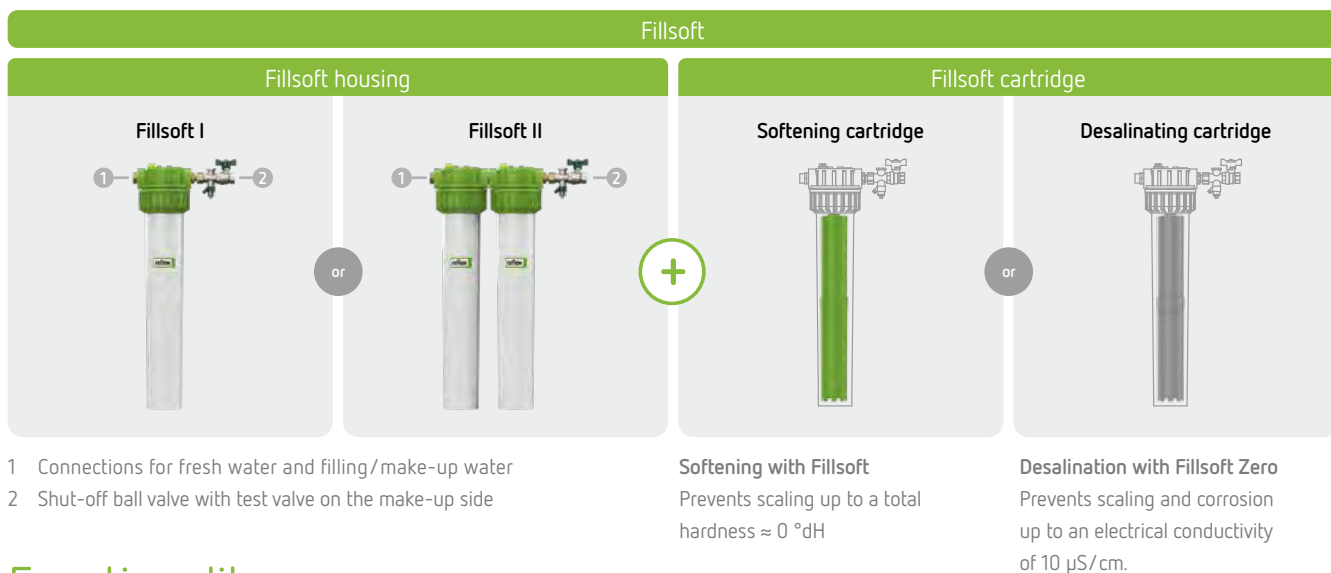
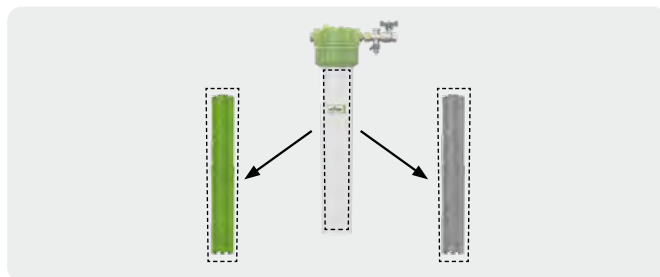


# Construction, function and application

## Fillsoft construction

The Fillsoft housing accepts either a softening (Fillsoft) or a desalination cartridge (Fillsoft Zero) and complements all Reflex make-up systems so that filling and top-up water is fed, controlled and treated, into the system.

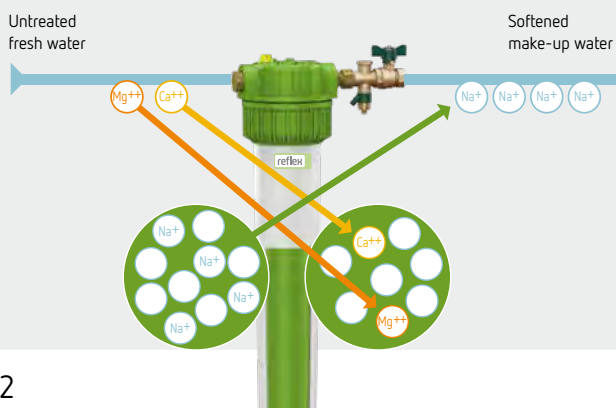
With the aid of a highly efficient Na-ion exchanger, the requirements of VDI 2035 Sheet 1 "Prevention of damage in hot water heating systems" are met.



## Functionality

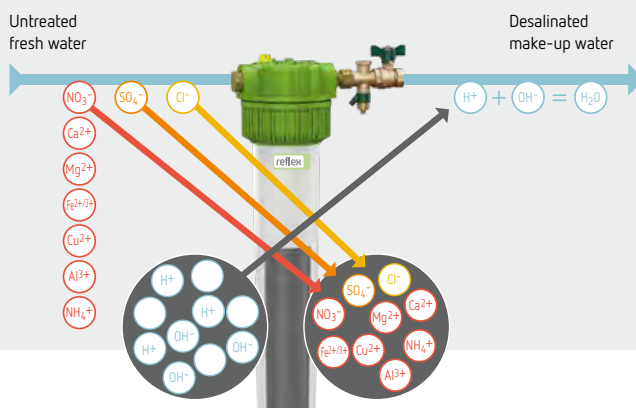
### Water softening with Fillsoft

Softening (reduction of water hardness,  $^\circ\text{dH}$ ) takes place according to the cation exchange principle. Hard fresh water is fed over an exchanger column. Hardness-forming magnesium and calcium ions are replaced by sodium ions from resin beads and the water becomes soft. When the sodium ions are depleted, the cartridge requires replacement. pH values and conductivity are not affected by the process.



### Desalination with Fillsoft Zero

Desalination is carried out according to the principle of cation and anion exchange. Fillsoft Zero enables demineralization of filling and top-up water. All minerals are absorbed by the cartridge. If conductivity, and thus the number of ions, increases, the cartridge's capacity decreases and the cartridge requires replacement. Conductivity can be read from the Fillguard.



## Application

### When is softening necessary?

#### Problem

- Scaling

#### Objective

- Prevention of scaling in heat generation systems (boilers and heat exchangers) to protect against limescale deposits

#### Applications

- In small and medium-sized heating and potable water systems

#### Basis for assessment

- Overall regional water hardness
- Limit values based on system size and in accordance with VDI 2035
- Information from heat generator manufacturers and system operators who may have their own requirements for filling and top-up water

#### Compliance with guidelines

- VDI 2035 Sheet 1 (formerly: VDI 2035 Sheet 1)

#### VDI 2035 guidelines

##### Overall water hardness (according to table)

- Recommended limit values for overall water hardness according to VDI 2035, Sheet 1

Group	Total heating capacity	Total hardness [°dH] as a function of the spec. system volume $V_A$ (system volume / lowest individual heating capacity) (system volume / lowest individual heating capacity)		
		< 20 l/kW	≥ 20 l/kW und < 50 l/kW	≥ 50 l/kW
1	< 50 kW	≤ 16,8 °dH	≤ 11,2 °dH	< 0,11 °dH
2	50 kW–200 kW	≤ 11,2 °dH	≤ 8,4 °dH	< 0,11 °dH
3	200 kW–600 kW	≤ 8,4 °dH	≤ 0,11 °dH	< 0,11 °dH
4	> 600 kW	< 0,11 °dH	< 0,11 °dH	< 0,11 °dH

#### Determining water status

- Water hardness can be obtained from local supply companies or determined using Reflex hardness measuring instruments.

### When is desalination necessary?

- Scaling and water-side corrosion

- Prevention of scaling and corrosion to reduce different materials, such as limescale deposits and silting, from interacting with pipelines, pumps and fittings

- In small and medium-sized heating and potable water systems
- When aluminium materials are used in heat generators or in systems with special water requirements, softened water is usually insufficient so low-saline operation is required

- Water conductivity (through correlation iteratively also water hardness; exact values only by conductivity measurement)
- Low or high salt operation according to VDI 2035
- Information from heat generator manufacturers and system operators who may have their own requirements for filling and top-up water

- VDI 2035 Sheet 1 (formerly: VDI 2035 Sheets 1 and 2)

#### Conductivity

- Conductivity of < 100 µS/cm is required
- Some manufacturers require that make-up water is desalinated to < 10 µS/cm

#### Conductivity values for heating water

	Low salinity	Saline
Electr. conductivity at 25 °C	< 100 µS/cm	100–1.500 µS/cm
Appearance	Appearance free of sedimenting substances	
pH value at 25 °C	8,2–10,0	
Oxygen [ ]	< 0,1 mg/l	< 0,02 mg/l

- Conductivity defines the total salt content (= total amount of minerals in the water) and can easily be measured using a conductivity sensor or Reflex Fillguard.

# Fillsoft products

## Fillsoft housing



Fillsoft I housing

Fillsoft II housing

Fillsoft cartridge

Fillsoft Zero cartridge

### Technical features

- Water treatment fitting for heating water make-up according to VDI 2035
- Fillsoft softening (green) cartridge capacity 6000 l<sup>x</sup>dH
- Fillsoft desalination (grey) cartridge capacity 3000 l<sup>x</sup>dH
- Including monting materials
- Max. operating pressure 8 bar
- Max. operating temperature 40 °C

	Type	Art. No.	DG	PQ [pce]	Colour	Capacity* [l <sup>x</sup> dH]	Cartridge places [pce]	Max. continuous flow [l/h]	Connection inlet/outlet	Height h [mm]	Width w [mm]	Weight [kg]
Fillsoft housing												
8 bar 40 °C	FG I	9125660	0178	80	–	–	1	360	Rp ½"/Rp ½"	600	260	1.90
	FG II	9125661	0178	32	–	–	2	360	Rp ½"/Rp ½"	600	380	3.60
Fillsoft cartridges												
8 bar 40 °C	FSP 6000	6811800	0078	100	Green	6,000	–	–	/	513	–	1.50
	FZP 3000	9125662	0078	100	Grey	3,000	–	–	/	513	–	1.50

\*Use of two cartridges doubles the capacity

## Accessories Fillsoft and Fillsoft Zero

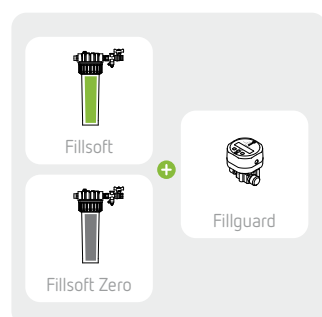
### Fillguard (replaces Fillmeter)

The Fillguard continuously measures the capacity and/or conductivity of Fillsoft softening and demineralising. The light signal switches on if too high.



- All-in-one combination of water meter and electrical conductivity measurement for monitoring softening or demineralising via Fillsoft or Fillsoft Zero
- Continuous capacitance and/or conductivity measurement
- Light signal when too high
- Simple and flexible assembly
- Rotatable display
- Can be connected to Servitec S and Servitec Touch control unit

For Fillsoft or Fillsoft Zero

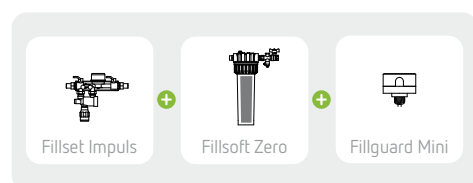


### Fillguard Mini

The Fillguard Mini is a conductivity measuring cell to monitor the capacity of the "Fillsoft Zero" desalination process and is installed directly on top of the cartridge of the Fillsoft Zero.

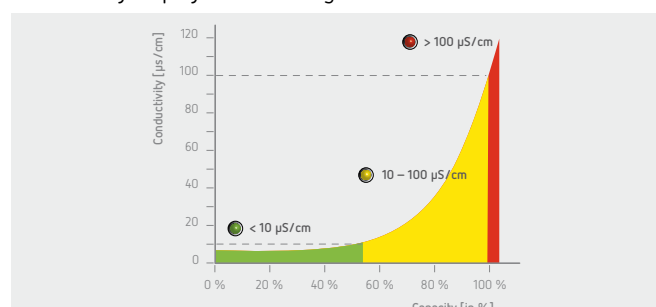


For Fillsoft Zero in combination with Fillset Impuls



- Delivered fully functional and ready for immediate use
- Continuously measures make-up water conductivity
- The conductivity range is displayed using three LEDs. Depending on the required conductivity, the limit value can be read from the LEDs
- According to VDI 2035, a conductivity of less than 100  $\mu\text{S}/\text{cm}$  is considered a low-salt operation
- Cartridge replacement should be carried out at a conductivity of 100  $\mu\text{S}/\text{cm}$ , and after 18 months at the latest
- The battery is designed for 10 years of operation

### Conductivity display from the Fillguard Mini



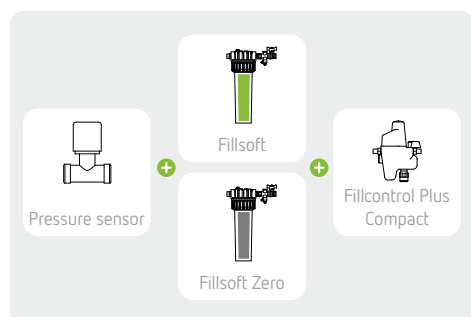
## Accessories Fillsoft and Fillsoft Zero

### Fillsoft FE

- To use Fillsoft in combination with Fillcontrol Plus Compact



For Fillsoft or Fillsoft Zero in combination with Fillcontrol Plus Compact



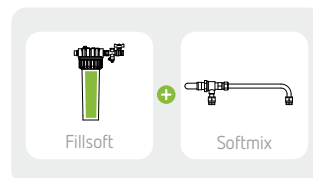
### Softmix for softening

- Blending device for Fillsoft softening



The hardness of soft water is determined after Fillsoft softening is reduced to values below 0.11 °dH. This is often below the required target water hardness and also leads to increased consumption of Fillsoft cartridges. With the Softmix blending device, target water hardness can be adjusted via controlled mixing of fresh water, enabling optimised consumption.

### For Fillsoft



Type	Art. No.	DG	Weight [kg]
<b>Fillsoft Accessories (Softening)</b>			
Fillsoft °dH-Set	6811900	0086	0.10
Fillsoft Softmix	9119219	0178	0.20
<b>Fillsoft Accessories (Desalination)</b>			
Fillsoft Fillguard Mini	9125762	0178	0.06
<b>Accessories for Fillsoft (softening) and Fillsoft Zero (desalination)</b>			
Fillsoft FE*	9112004	0178	0.30
Fillsoft Fillguard	9127968	0178	0.40
Fillsoft Tool	9200276	0086	0.40
<b>Commissioning</b>			
Commissioning Cat. 4	7945722	0095	0.00

\*In combination with Fillsoft, an external pressure sensor must be planned on the system side for measuring the required make-up pressure



# Selection and calculation

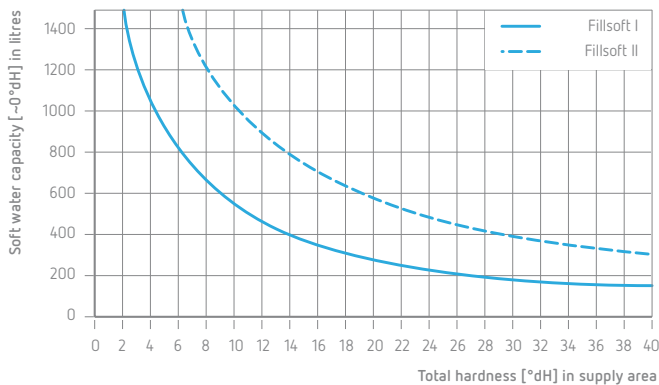
## Capacity calculation

Depending on the capacity, Fillsoft I is recommended to be used with one resin cartridge or with Fillsoft II, two cartridges. Criteria for deciding whether softening or desalination is necessary can be found on [page 23](#).

### Softening

#### Softening capacity

The capacity of the Fillsoft cartridge depends on the overall regional water hardness. The cartridge must be replaced when the capacity has been reached. The following diagrams show this dependency for Fillsoft I and Fillsoft II.



### Desalination

**Fillsoft Zero cartridge with a basic capacity of 3000 lx °dH.**

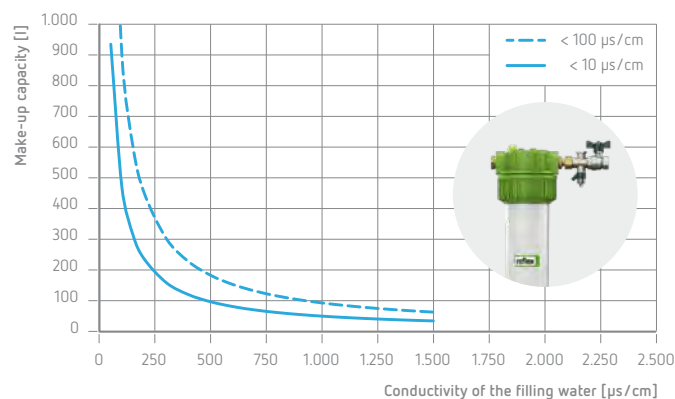
#### Desalination capacity

The capacity of the Fillsoft Zero cartridge depends on the conductivity of the filling water. The following diagrams show this dependency for Fillsoft I and Fillsoft II.

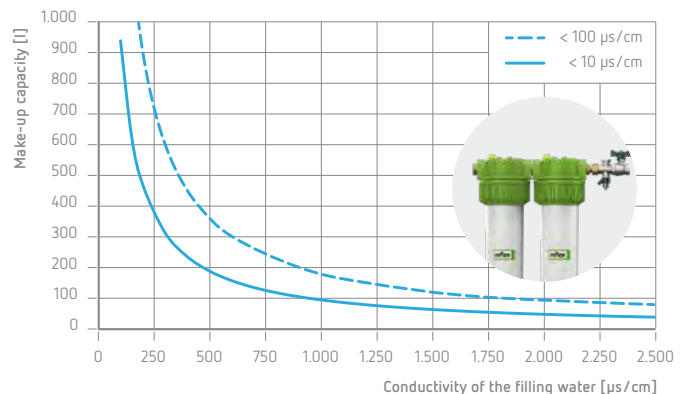
If a low-salt operation is needed, there are also special requirements for oxygen content. We then recommend using degassing via Servitec or Variomat.



The actual yield of the cartridge in the case of desalination is dependent on the local water conditions and can only be checked by measuring the conductivity during the filling or water make-up.



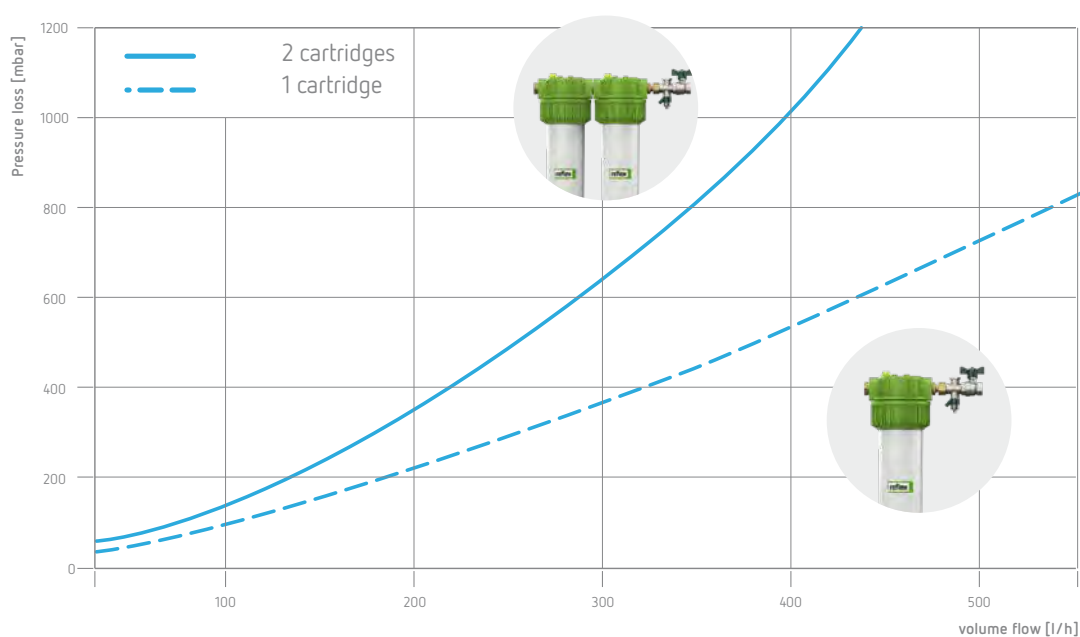
Desalination capacity with Fillsoft I



Desalination capacity with Fillsoft II

## Pressure loss

Pressure loss when using Fillsoft can be determined with the aid of the diagram. A distinction is made here between Fillsoft I and Fillsoft II. Whether a softening or desalination cartridge is used is not relevant here.



Customised planning with the  
Reflex Pro calculation

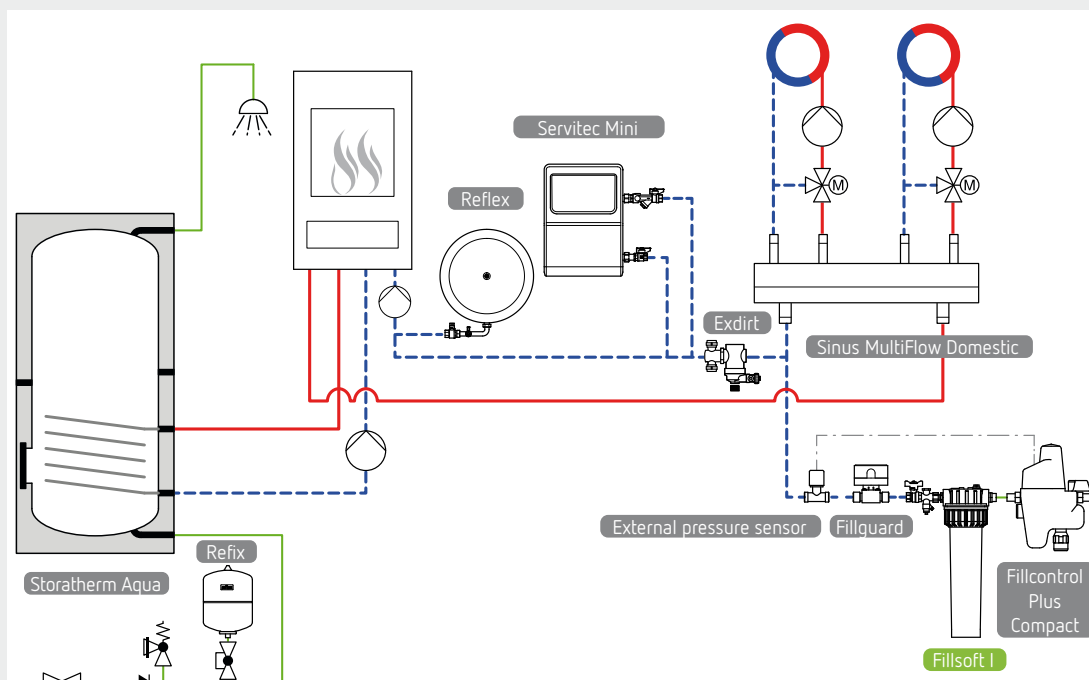


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# Installation examples

## Fillsoft I with Fillguard make-up monitoring

Solution № **01**



Fillsoft is integrated into the make-up line.

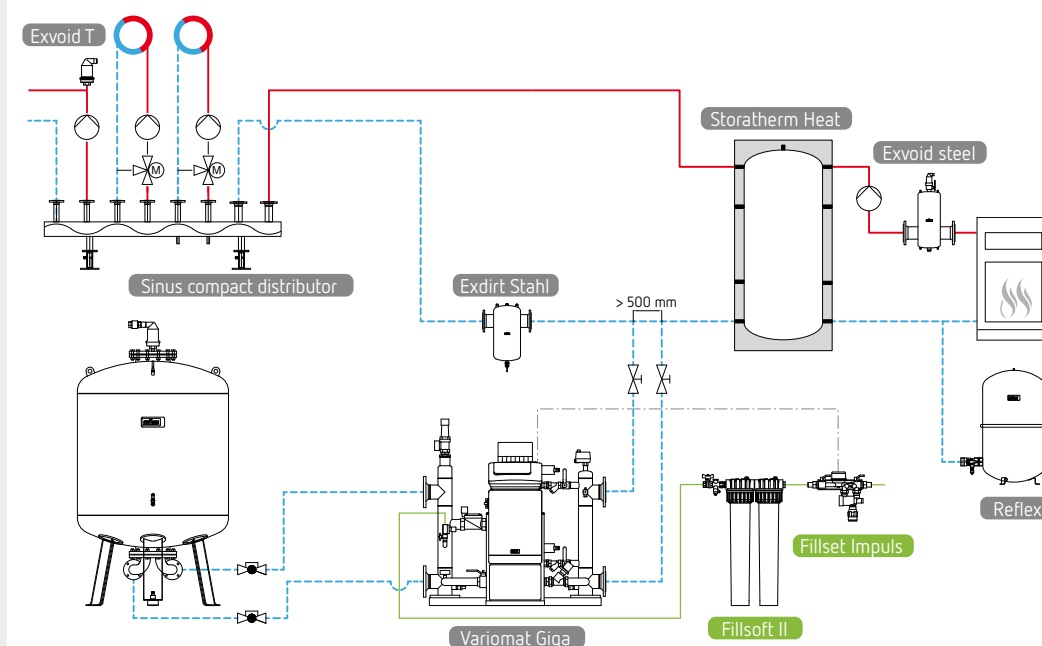
For small single-boiler systems, which may be equipped with a wall mounted unit, softening at < 50 kW may already be necessary.

When using Fillsoft Plus Contact, an external pressure sensor is to be planned on the system side to measure the correct make-up pressure.

Fillguard as capacity control indicates an empty cartridge.

## Fillsoft II with Fillset Impuls make-up fitting

Solution № **13**



Fillsoft II can be used for higher capacities.

Fillset Impuls with a contact water meter is connected upstream to protect the potable water supply system and is evaluated by the Variomat controller.

The diagrams serve only as illustrations of the connections.  
They are to be amended to local conditions and to be made more specific.

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Heat exchangers get a warranty extension to 5 years. This does not cover faults in the installation that lead to premature wear or reduced function, such as:

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- Corrosion due to leakage current
- Significant deviations from the water quality requirements specified in the instructions



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