reflex

Thinking solutions.

Vacuum spray-tube degassing

Servitec, Servitec Mini

Reflex —
a powerful brand for decades

Reflex Winkelmann GmbH — part of the Building+ Industry division — is a leading provider of highquality 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 tanks and plate heat exchangers, as well as hydraulic manifold and tank components. Reflex Winkelmann GmbH has about 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.

Contents

New configuration software

Reflex Solutions **Pro**
rsp.reflex.de/en

→ Read more on page 30

Reflex City

Efficient degassing solutions of any size

Living, shopping, working, manufacturing: cities are synonymous with diversity. The requirements for supply technology are as individual as the buildings themselves. Whether it's a 5 kW facility in a detached home or a safety-related cooling system in a computer centre — Reflex offers products and solutions for systems of all sizes and complexities. As shown in our Reflex City concept.

Our Servitec degassing systems ensure maximum comfort. Thanks to the increased water quality, homeowners benefit from more living comfort, installers from reduced maintenance costs and system operators from long-term operational reliability and efficiency. Servitec systems are available for virtually any system size and can be used in heating, cooling and district heating systems.

Servitec vacuum spray pipe degassing

Key advantages

Powerful, central degassing of content and make-up water

- Actively degases even dissolved gases; separates up to 90 %
- Extremely efficient, confirmed by impartial institutes and tests

Lasting operational reliability of the entire heating/cooling system

- Protects against long-term damage from corrosion and deposits, resulting in less maintenance and a longer service life of the entire system
- Prevents plant failure caused by gas and air pockets

Optimum heat transfer medium for improved performance and potential energy savings of up to 10.6 %

- Optimises heat transfer, reduces energy costs and CO_2 emissions
- Patented valve switch mechanism for fully automated hydraulic balancing
- Efficiency improvement can be maximised by combining with Exdirt dirt and sludge separators

Easy installation and commissioning

- Plug-and-play function
- Auto setup for easy and safe commissioning

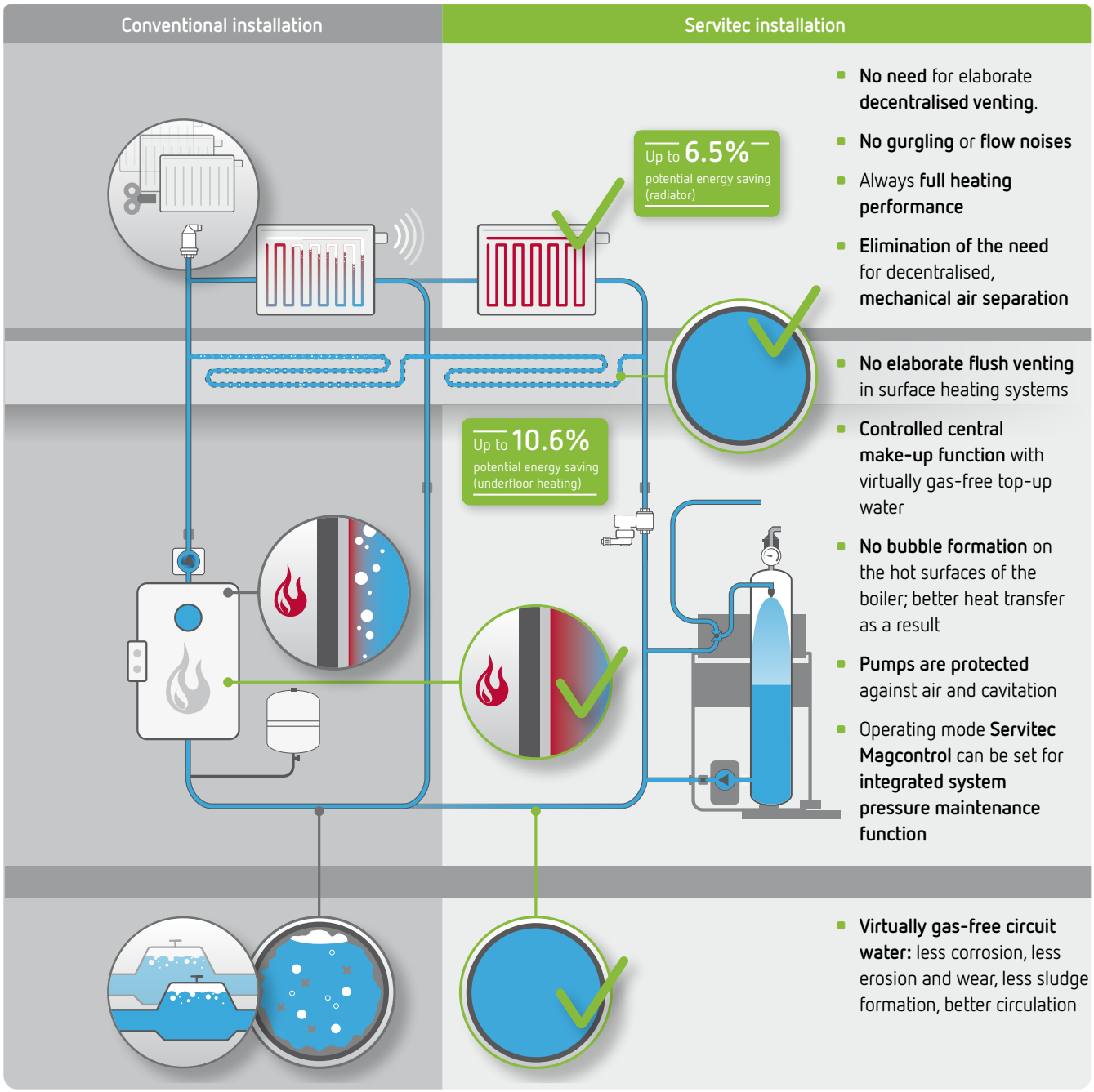
Highly modern, user-friendly controller

- With extendable microprocessor controller, Reflex Control*
- Enables communication between Servitec systems, Reflex pressure maintenance stations, the Fillcontrol range, and a control centre
- Fully automatic operation with data interface for incorporation into modern building management*
- Servitec Mini and Servitec S with app control using Reflex Control Smart

* Doesn't apply to Servitec Mini, which is accessed via Reflex Control Smart and Bluetooth.

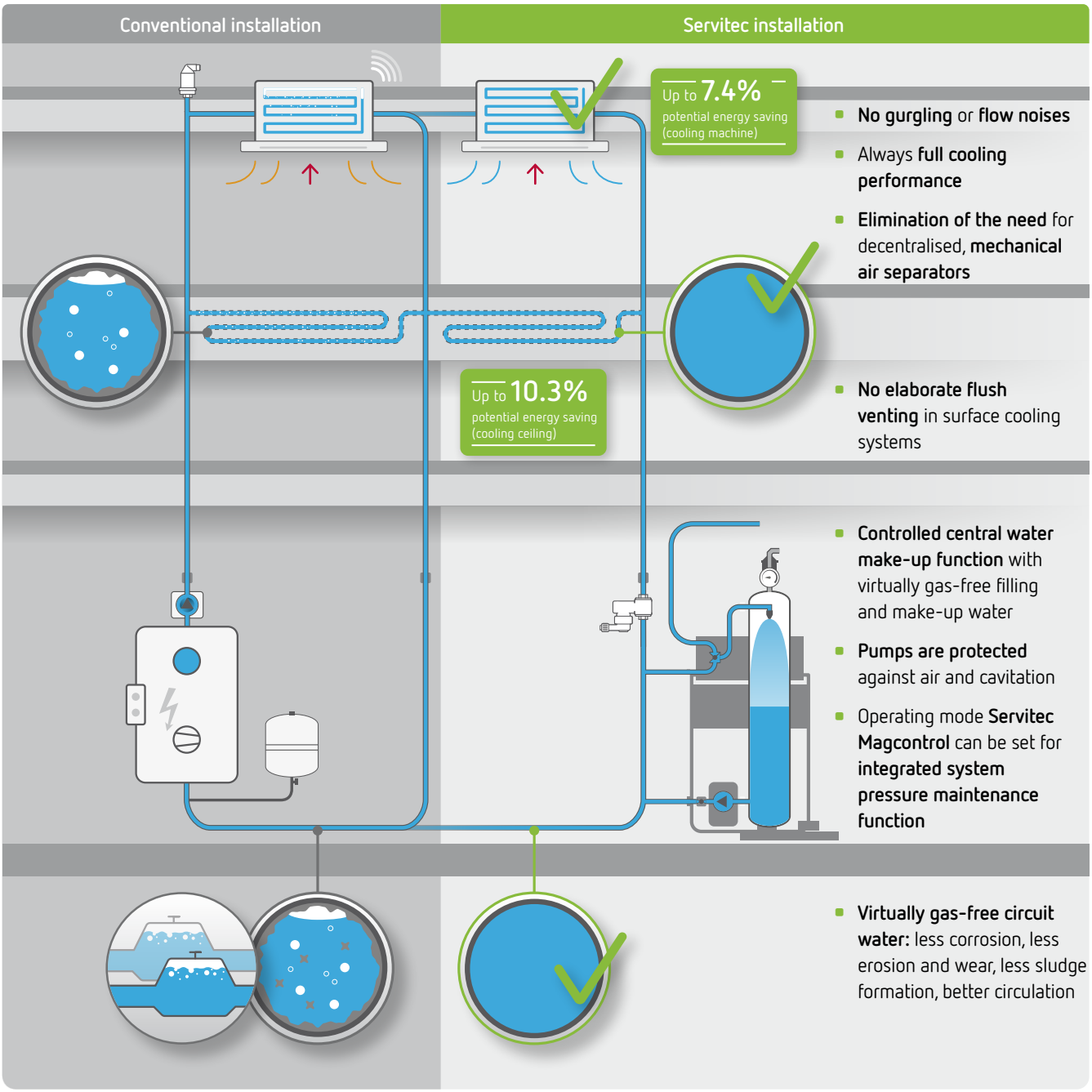
Servitec solves the gas problem in heating and cooling systems

Gas pockets in water heating/cooling systems can impair their functionality to the extent that entire components and systems can break down completely. They reduce energy transmission efficiency and create resistance and the risk of corrosion. Corrosion encourages the formation of dirt and sludge in heating and cooling circuits which, in turn, can result in further impairment of the entire system. Degassing systems such as Servitec vacuum spray-tube degassing offer a centralised means of removing virtually all gas bubbles and dissolved gases from the system water. Problems with air are reliably mitigated, even in large-scale branch systems with intricate surface heating facilities. This results in optimised system hydraulics with a gas-free heat transfer medium for efficient heat transfer and a longer service life of heating and cooling systems.



Comparison using a cold water system as an example

Water is the medium that plays a key role in cold water systems as an important system component and the most frequently used source of energy in building facilities. Accordingly the same applies to optimising the system water in terms of degassing as for heating systems. As the solubility of gas in water is dictated by pressure and temperature, cold water in its natural state already contains a much higher share of dissolved gases compared, for example, to water in heating systems. If the water temperature falls, as well, as is the case with cooling systems, gas absorption increases. As such, using Servitec to actively degas dissolved gases as well is particularly recommended.



Background information on water quality

Water as the most important system component

Energy in heating and cooling systems is defined as the amount of input power that ultimately ends up hot or cold. Two key factors play a role. Firstly, the use of input energy to adjust the temperature of the heat transfer medium — which is usually water. Secondly, the transportation and, especially, dispersion of heat, or absorption in the case of cooling applications. The essential prerequisite for the appropriate and efficient distribution of heat is an uninterrupted flow of volume and mass into each part of the system.

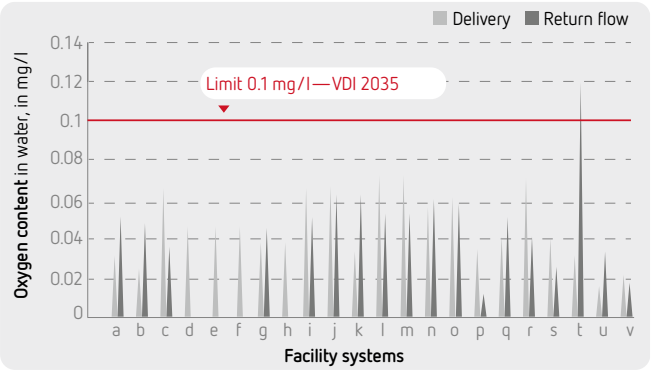
Air — and the gases it contains — is the enemy of every system

The main components of air are nitrogen (78 %) and oxygen (21 %). Keeping things simple, these gases can be found in 10-degree water at a ratio of 62 % nitrogen and 38 % oxygen. System water always contains dissolved nitrogen and oxygen as a result of the filling and top-up water.

Each of the two elements has a different effect.

> Oxygen

The oxygen in air is the main cause of corrosion of iron materials. Oxygen in a heating or cooling system reacts quickly and, if continuously fed in, can cause damage in the long run. So-called acid corrosion can be neglected at proper pH, and the concentration of dissolved oxygen in the water determines the corrosion. The particles formed in the chemical reactions can deposit on the inside of the tube and act as an insulating layer. If the process continues to repeat itself through the typical mechanisms of air and gas infeed, this can lead to a reduction in heat transfer as well as to corrosion phenomena and damage to system parts after just a few years of operation.

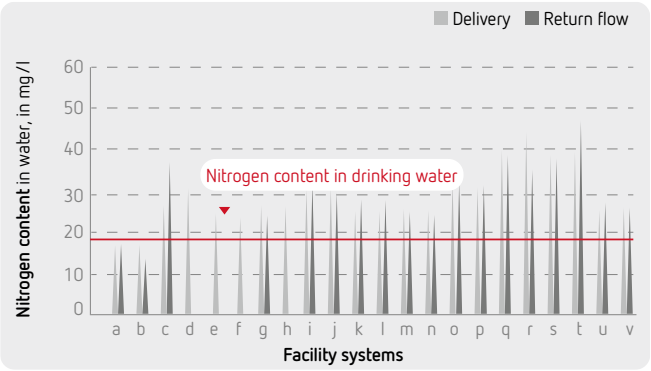


Oxygen content in the circulation water of different facility systems
(field measurements performed by Dresden TU)

The illustration above depicting field measurements of the oxygen content in the circulation water of different facility systems performed by Dresden TU, Germany and documented in Report AiF (2002) shows clearly how willingly oxygen reacts with system components. In virtually all instances, the measured oxygen content is below the limit of 0.1 mg/l specified in VDI 2035. Corrosion uses up virtually all the oxygen in the system.

> Nitrogen

By contrast, nitrogen is an inert gas that does not react.
It remains dissolved in the system water in the form of micro-bubbles and continues to accumulate. The solubility of nitrogen in water is dependent on temperature and pressure (Henry's Law). The lower the pressure and the higher the temperature, the less nitrogen can be bound by water. In large quantities, the water can no longer bind a gas and so it occurs freely in bubble form. Highest points and relatively calm spots tend to favour the precipitation of nitrogen bubbles, which means that these areas can be prone to malfunctions and disrupted circulation if nitrogen accumulates accordingly. The hydraulic system malfunctions and heat exchange performance in the heating and cooling elements is impaired. The hydraulic balancing process loses its effect and can even lead to the failure of individual parts of the system depending on the gas and air inclusions.

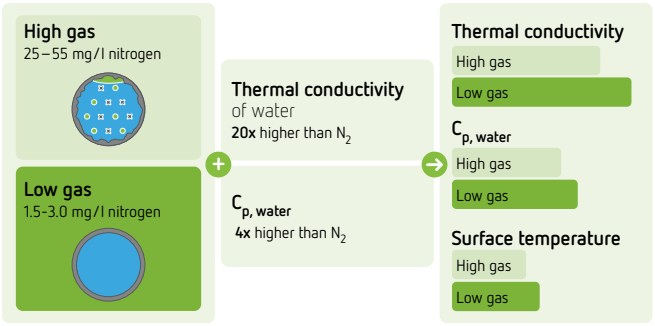


Nitrogen content in the circulation water of different facility systems
(field measurements performed by Dresden TU)

An analysis of the field measurements of the nitrogen content in the circulation water of different facility systems in the aforementioned report shows an accumulation of nitrogen concentration that is, in most cases, higher than the natural concentration of 18 mg/l. In 95 % of the examined trouble systems, free nitrogen proved to be the cause of gas, and consequently circulation, problems.

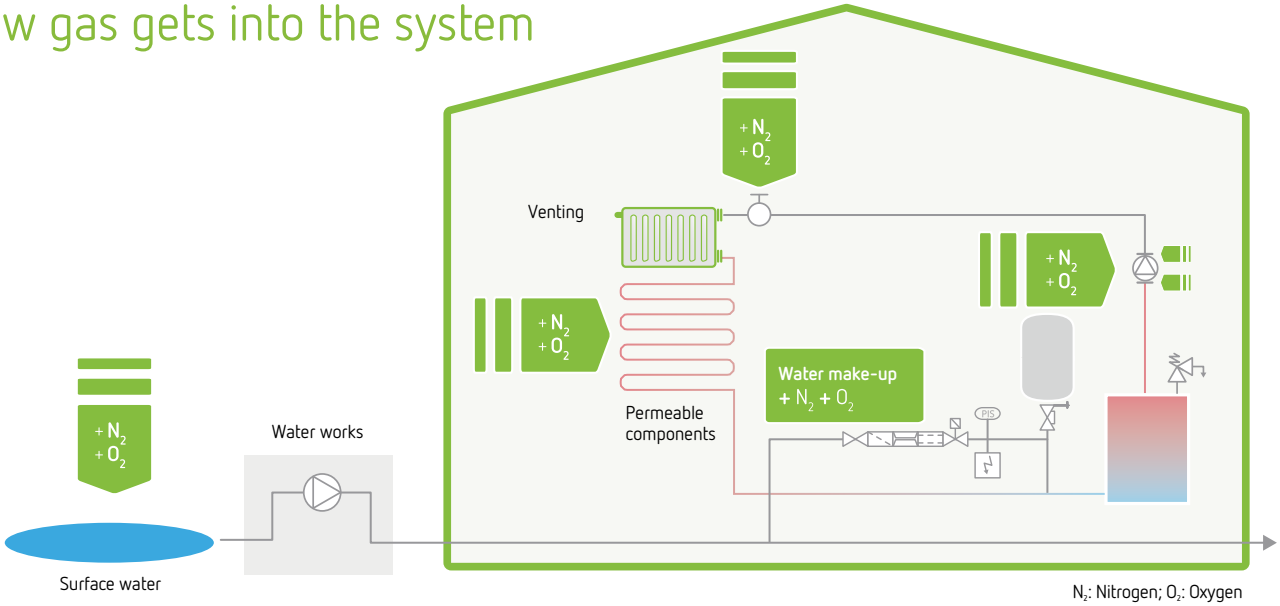
Energy characteristics of high-gas and low-gas media

Compared to pure water, nitrogen has far poorer thermodynamic properties as a heat transfer medium. The specific heat capacity of water is four times above that of nitrogen, while its thermal conductivity is about 20 times higher. To reach the target temperatures on the receiver side therefore requires more work in the form of energy, depending on the nitrogen concentration involved. Depending on its configuration, the system will therefore continually try to balance itself by feeding in more or less energy. In other words: energy is wasted, costs are higher, and temperature regulation performance is impaired.



Gas accumulations in the system water and its thermodynamic impacts

How gas gets into the system



N_2: Nitrogen; O_2: Oxygen

Schematic representation of air and/or gas ingress into a system

- **Through filling and make-up water**
  Drinking water naturally contains 18 mg/l nitrogen and 11 mg/l oxygen.

- **Through residual air when refilling and topping up**
  After repairs, for example. Studies show a strong charge in the filling water, which is far above the natural value of the drinking water and therefore has other causes.

- **Through permeable system components**
  In comparison to traditional building materials such as steel and copper, a considerable amount of air can diffuse into the system through plastic and rubber tubes.

- **Through chemical reactions**
  Corrosion and decay can cause gases to be released. In some facilities, for example, larger amounts of nitrogen and methane are detected in the system water.

- **Through air intake**
  In the case of a pressure maintenance malfunction, for example. Air frequently gets into the facility system through failure to reach the minimum operating pressure. This is why, in the event of any air problems, you should always check the exact function and setting of the pressure maintenance first.

Water heating and cooling systems are watertight.
No water heating and cooling system is gastight.

Heating and cooling with optimised system water

Appropriate, preferably centralised, equipment must be used to extract gas from sealed systems. In addition to conventional thermal degassing in hot water systems >110 °C, three methods have become commonplace in heating, solar and cooling water systems, which Reflex can supply for various applications: Vacuum spray-tube degassing, atmospheric degassers and micro-bubble separators.

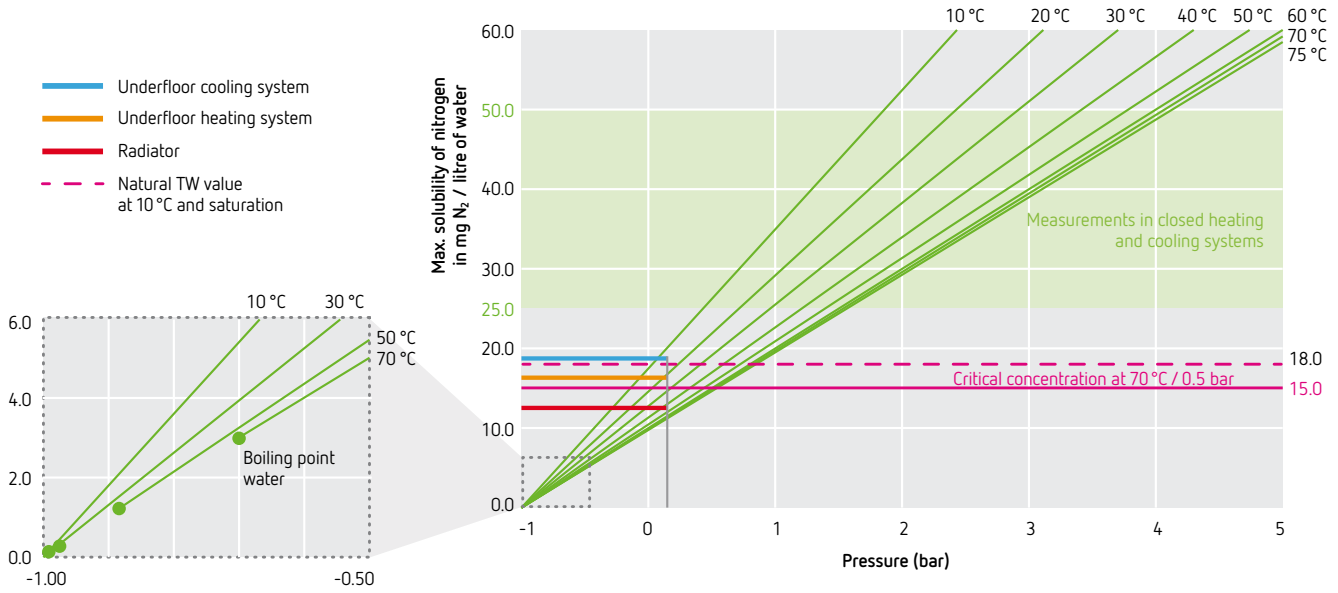
Henry's Law

Henry's Law (named after English chemist William Henry) describes the solubility properties of gas in liquid. The associated physical characteristics are used in degassing and separation technology. The Servitec vacuum spray-tube degassing technology developed by Reflex makes use of the physical behaviour of gas in liquid as described in Henry's Law, The Law defines the solubility behaviour of gases in a liquid as follows:

The concentration of a gas in a liquid is directly proportional to the partial pressure of the gas above the liquid.

In other words: If the partial pressure of the gas above the liquid increases, the number of particles dissolved in the liquid also increases. If the partial pressure decreases, gas particles diffuse out of the liquid. In order to exploit this effect, a vacuum is created in the Servitec spray-tube. The combination of spraying and the large contact area within this sphere leads to the release of the dissolved gases, which are extracted by an air vent.

The figure below represents the maximum solubility of nitrogen in water according to Henry. Solubility decreases as the temperature rises and the pressure falls. That explains, for example, why radiators upstairs often suffer from circulation problems. Assuming for pressure maintenance purposes that the minimum overpressure is set at 0.5 bar relative to the highest point, the solubility of nitrogen at a supply temperature of 70 °C is 15 mg/l (example in below graphic). Nitrogen concentrations of ≤ 15 mg/l generally do not present problems.

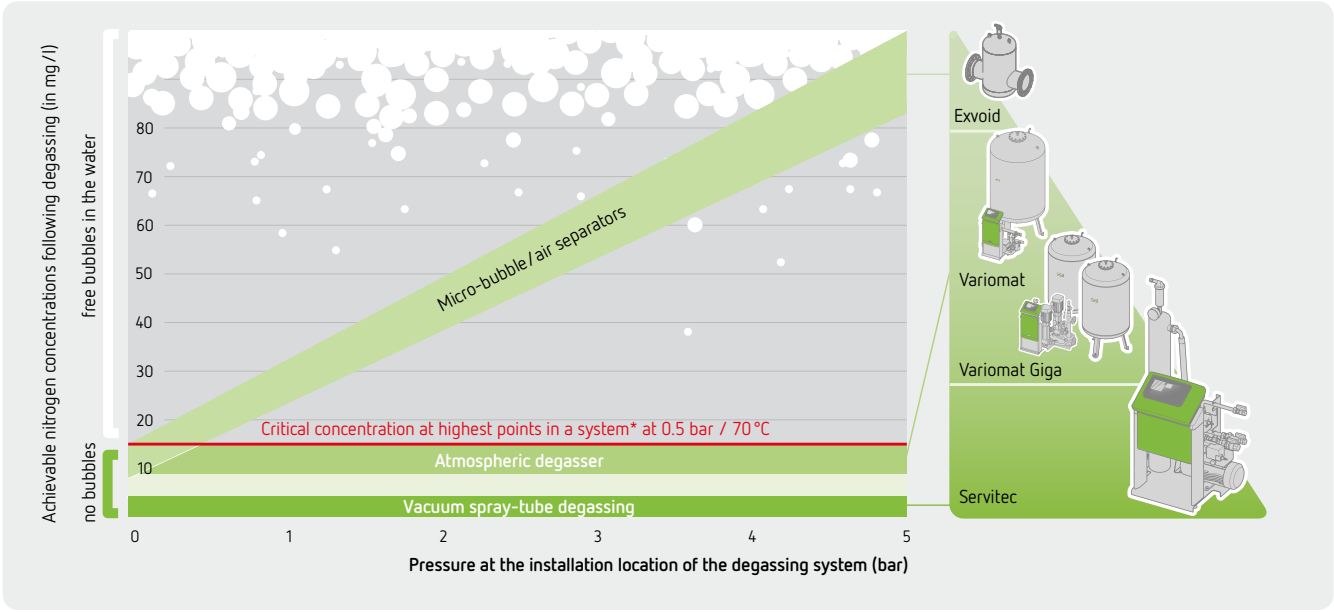


Maximum solubility of nitrogen in water according to Henry

Reflex degassing and separating products: A comparison

To visualise the effectiveness of the various degassing systems, we want to show the physically and technically possible minimisation of nitrogen content in tap water, depending on the pressure conditions at the location of installation.

Nitrogen was used as the measuring gas as — because of its inert nature — it is not used up in secondary reactions and therefore does not distort the measurement result.



Degassing performance of Reflex products

Mechanical air separators: Exvoid / Extwin
Can only extract free gas, not dissolved gas. They are most effective when installed at the absolute highest points. Since most facilities nowadays are designed with the manifold at the bottom, however, they are usually installed in less favourable, lower positions which compromises effectiveness enormously.

Atmospheric degassers: Variomat
Can prevent free gas bubbles in the circulation water.
Are best suited as centralised venting systems but not specifically for oxygen extraction. Erosion caused by two-phase flow can be largely avoided.

Vacuum spray-tube degassing: Servitec
Can reduce the entire gas content to virtually zero and combats both corrosion (reactive gases) and erosion (inert gases).
Gas solubility is virtually zero in a vacuum. Nevertheless, the degassing performance of static vacuum degassers is poor because of the idle vacuum. Excellent degassing performance is only achieved through stimulation, e.g. by spraying water in the vacuum (vacuum spray-tube degassing). Consequently, vacuum spray-tube degassing is one of the most efficient technologies available in the marketplace.

- Gas undersaturation at the critical system point* can only be achieved with degassers.
- Vacuum spray-tube degassing can achieve virtually complete elimination of the gas.
- When filling or topping up using vacuum spray-tube degassers, undersaturation is achieved and, above all, the oxygen content in the filling water is reduced by about ⅔.

* Critical system point (KP) = point during operation at which the greatest risk of bubble formation exists (e.g. highest points, heat generators, control valves, pumps), which must, however, be prevented to avoid malfunctions. It is the reference point for calculating the achievable gas saturation performance of degassers and gas separators.

Proven efficiency

Greater efficiency means less environmental pollution and lower costs despite maximum temperature regulation performance. Reflex Winkelmann has a range of product solutions on the market that are capable of increasing the efficiency of water heating and cooling systems by up to 10.6 %. The results of the technological product potential were established independently by the ifes Institute (for applied energy simulation and facility management).

TÜV Nord was then commissioned to perform an independent verification of the study, which confirmed the maximum achievable energy saving effects. An added benefit for the environment and in terms of cost efficiency: In addition to saving emissions and energy costs, the system developed by Reflex also reduces maintenance and investment costs. This means everyone stands to benefit whether it's a private household, business or large-scale industry.

Dresden TU
Centre for Energy Technology

Background

Background on the research topic "Gases in small and medium-sized water heating networks and cooling circuits", final report, for the period from 01/05/1999 to 31/10/2001 conducted under the auspices of the AIF (Otto von Guericke) and financed within the budget of the Federal Ministry of Economics and Technology (BMWi).

Ifes Institute
Institute for applied energy simulation and facility management

Background

Design and organisation of a strategy that uses flow simulation to evaluate the use of Reflex degassing systems to raise the efficiency of heating systems.

TÜV Nord
TÜV NORD Systems GmbH & Co. KG

Background

Impartial evaluation of the simulation results with regard to the energy efficiency of Reflex degassing systems.

Simulation example: **Radiator heating**

15 kW Heating load

6.5 %
Efficiency improvement
in the simulated result*

In a typical existing detached house with 15 kW radiator heating, the use of Servitec vacuum degassing, Reflex pressure maintenance, and dirt and sludge separators can save around 2,000 kilowatt hours of heating energy or 500 kilograms of carbon dioxide per annum. This corresponds to a maximum increase in efficiency of 6.5 %.

Simulation example: **Underfloor heating system**

30 kW Heating load

10.6 %
Efficiency improvement
in the simulated result*

The effects of the Reflex system in the simulation of a conventional existing semi-detached house with modern, low-consumption, low-temperature underfloor heating are even more pronounced: For a system with 30 kW heating, this represents a maximum saving of around 6,300 kilowatt hours of primary energy or 1.5 tonnes of carbon dioxide per annum. The increase in efficiency therefore amounts to a maximum of 10.6 %.

Practical example: **Residential construction**

13 kW Heating load

8.6 %
Efficiency improvement
measured in practice*

Residential construction companies have been using Servitec systems for several years. A Servitec Mini was installed in a 13-kW detached house with underfloor heating. Initial measurements show that substantially fewer kilowatt hours were billed compared to the previous year. Compared to a similar winter temperature-wise, efficiency was found to be 8.6 % better.

Practical example: **Cold water system**

2.6 MW Cooling load

3.02 %
Efficiency improvement
measured in practice*

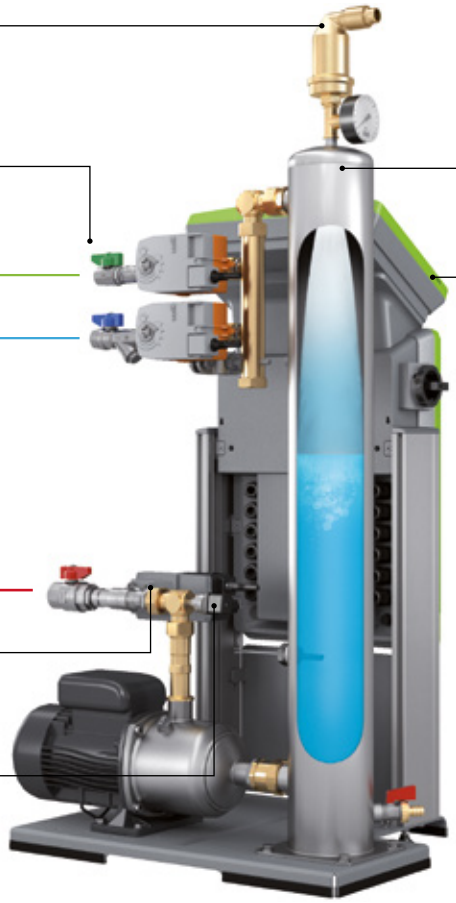
A Servitec 60 was integrated into the cold water system of a company from Singapore. Measurements and analyses performed by an external energy consultant and auditor verified a potential energy saving of 3.02 % in practice (reduced energy transport and primary energy cost). This equates to 258 fewer tons of CO_2 every year and annual operating cost savings of about € 39,000.

* Relative to the energy generator's primary energy.

Design, function and application

Servitec design

Servitec



Dipstick-tube degassing unit
Allows gas to escape and is vacuum-tight

Safe Control
Motor-controlled ball valve for reliable water make-up

Make-up water G ½"

Gas-rich circuit water G ½"

Gas-poor circuit water G 1"

Patented valve switch
for fully automated hydraulic balancing

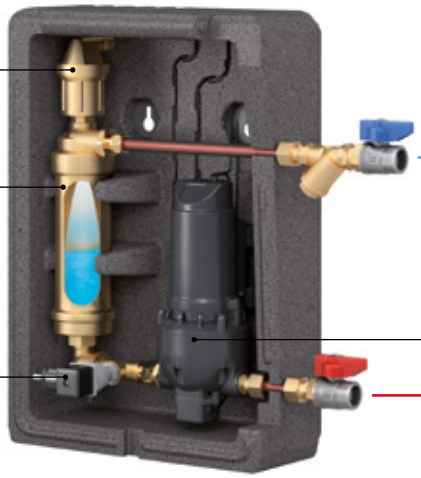
Integrated pressure sensor

Vacuum spray-tube
Height and diameter are coordinated to guarantee atomisation of the water in a large free vacuum as soon as the degassing cycle starts.

Controller
The degassing cycles are processed in an optimised timing programme.

Hydraulic system
The integrated plug&play function management of the controller automatically adjusts the hydraulics with the regulating ball valve to the system pressure conditions.

Servitec Mini



Dipstick-tube degassing unit
Allows gas to escape and is vacuum-tight

Vacuum spray pipe
Height and diameter are coordinated to guarantee atomisation of the water in a large free vacuum when the degassing cycle starts.

Integrated pressure sensor

Shut-off valve
with filter insert

Gas-rich circuit water DN 15

Sturdy diaphragm pump

Gas-poor circuit water DN 15

Functional principle

Servitec products actively degas even dissolved gases by extracting part of the flow of content water from the system, degassing it in the vacuum and returning it virtually gas-free back to the system. Automatic ball valves keep the partial flow steady, regardless of the pressure conditions in the facility.

Videos showing how this and other products work can be found at

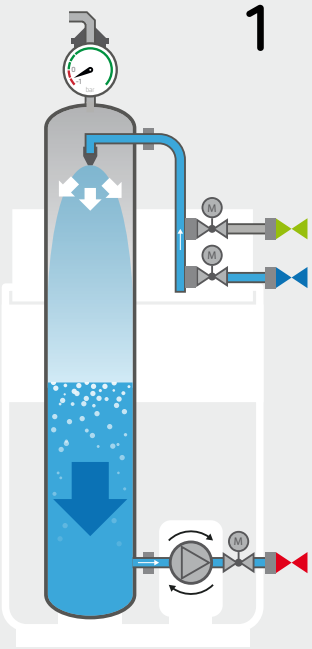
www.reflex-winkelmann.com/int/services-downloads/video-area

Vacuum creation

1

The pump switches on, the water level drops and a vacuum is created in the vacuum spray-tube.

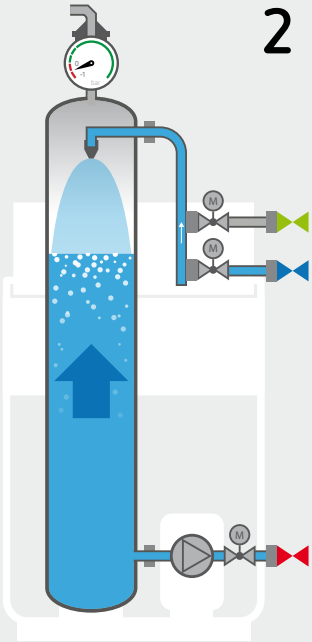
The circulation water (optionally: make-up water) is sprayed finely into the vacuum, which releases the dissolved gases as a result of the vacuum and the large contact surface.



Degassing

2

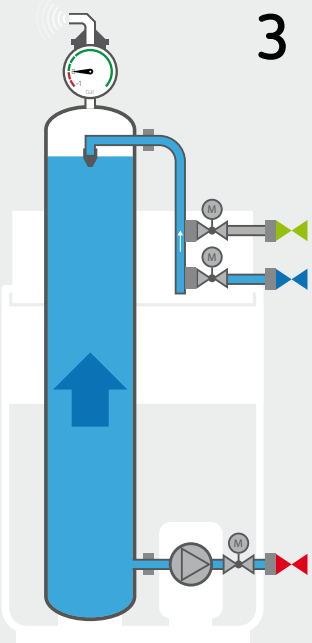
The pump switches off. Water continues to be sprayed until the vacuum spray-tube is completely full again. If there is an active make-up request, a switch-over enables high-gas make-up water in the vacuum spray-tube to be degassed too.



Discharge

3

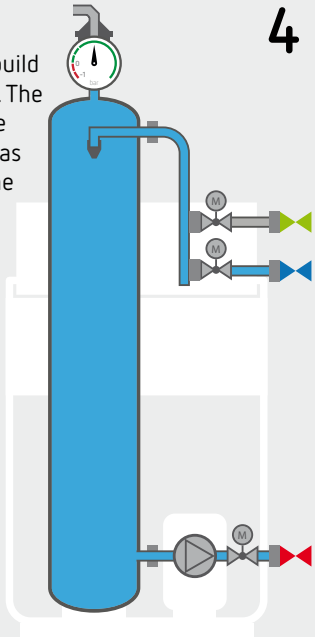
All released gases are discharged safely by the large and quick air vent.



Down time

4

System pressure starts to build up again in the spray-tube. The system water located in the pipe contains virtually no gas and is pumped back into the network in the next cycle.

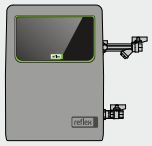


Applications

Reflex products offer reliable protection against gas and dirt problems in large and small systems. The standard portfolio covers system volumes of up to 220 m³ and can be integrated into existing and new buildings with ease. Servitec systems are found in the widest range of buildings: centrally heated residential and industrial buildings, district heating systems, greenhouses, lawn heating systems in football stadiums, closed cooling circuits — and especially in systems with cooling ceilings.

Servitec Mini

- Compact, affordable solution for facility systems containing little water
- Application examples: Detached, semi-detached houses, apartment buildings, nursery schools, public offices, small businesses



Sytem capacities up to **100** kW

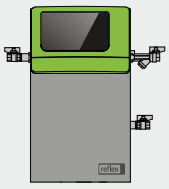
Pressures up to **2,5** bar

System volumes up to **1** m³

+1 m³ buffer storage

Servitec S

- For small and mid-sized facilities
- Application examples: Apartment buildings, small school buildings, small business and office complexes

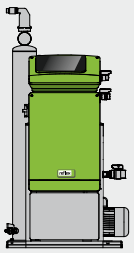


Pressures up to **4,5** bar

Sytem volumes up to **6** m³*

Servitec 35/60/75/95/120

- Technically sophisticated systems for mid-sized and larger facilities
- Application examples: Offices, industrial buildings, skyscrapers

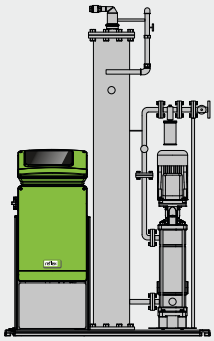


pressures up to **9** bar

System volumes up to **220** m³

Servitec special system

- Customised solutions for larger facilities
- Special requirements, such as high temperatures and pressures, high make-up quantities, stainless steel models, etc.
- Application examples: Computer centres, district heating systems



pressures up to **>9** bar

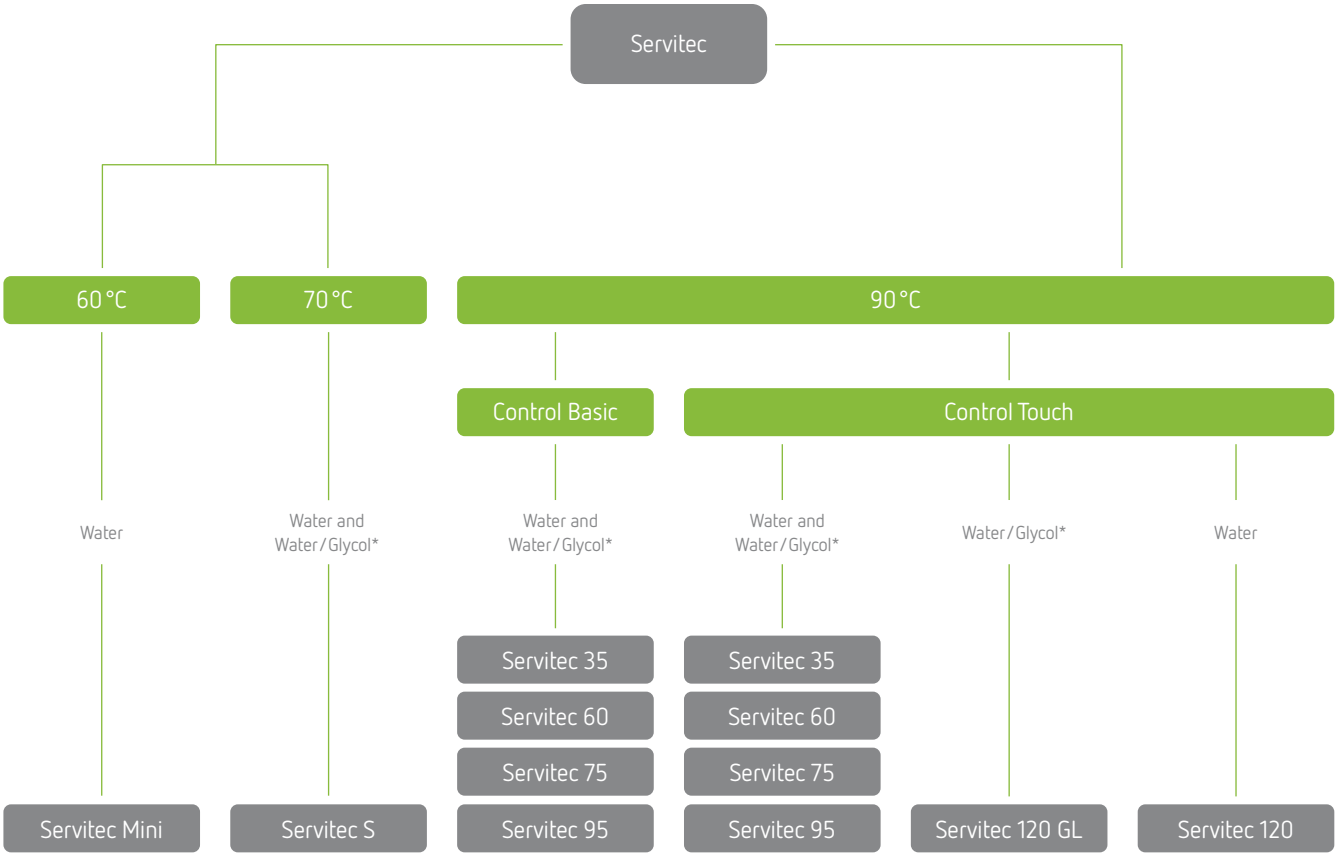
System volumes **>220** m³

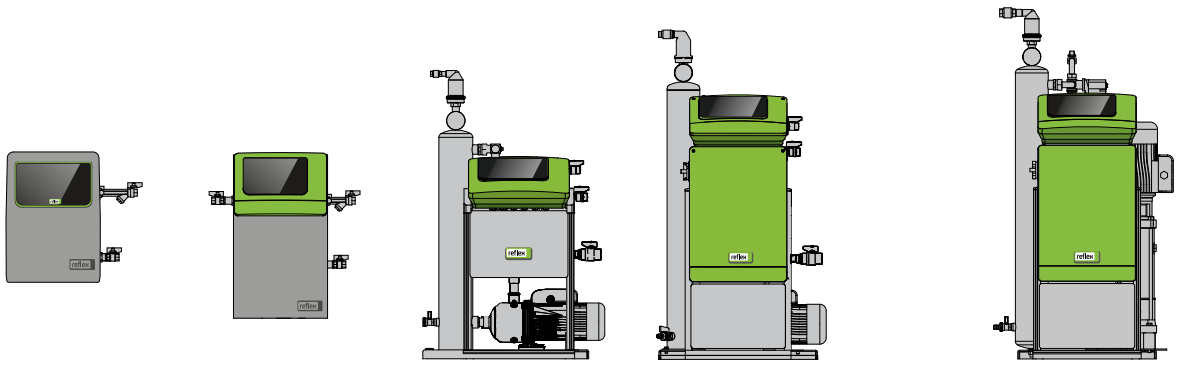
Do your requirements extend beyond our standard products? Our Project Sales Team can customise a solution to suit your individual requirements: angebote@reflex.de

* Max. system volume for system degassing / check max. make-up quantities for each specific system.

Servitec product overview

NEW: Product portfolio adjusted for a better overview





* Max. glycol content 50 %.

Reflex Control controllers

Controllers

Control Basic

- 2-line LCD display
- 8 operating keys
- 2 status displays
- Integrated control of system pressure, degassing and water make-up
- Manual and automatic operation
- Floating-contact external group fault signal
- Counting pulse inlet for contact water meter
- RS-485 interface for BMS connection via Busmodules

Control Touch

- 4.3" touch screen colour display
- Graphical user interface
- Simply structured plain text menus, incl. operating instructions and help documentation
- Integrated control of system pressure, degassing and water make-up
- Manual and automatic operation
- Permanent display of key operating parameters on system diagram
- Intelligent plug-and-play function management
- Key operating data can be analysed and stored
- Wide array of interfaces:
  - → 1 x meter pulse inlet for contact water meter
  - → 2 x floating outputs for fault messages
  - → 2 x analogue parametrisable outputs for pressure & level
  - → 2 x RS-485 interfaces for connection to building management system and other networks
  - → Slots for HMS Networks and SD memory card

Control Smart

- Access via Bluetooth interface
- Parameterisation of the degassing mode (continuous or intermittent operation, number of cycles) including days of the week and time
- Fault message display
- System pressure checking
- Software updates
- currently available for Servitec Mini and Servitec S

Servitec product portfolio

Servitec Mini

Servitec Mini

Technical features

- With fully automatic microprocessor control
- Max. permissible operating pressure: 4 bar
- Permissible operating temperature: 60 °C
- Permissible ambient temperature: 0 to 45 °C
- Rated electrical current: < 0.3 A
- Max. system volume: 1 m³, although this applies solely to the water content in the heating surfaces and distribution lines; buffer storage tanks of up to 1,000 litres can be added.

NEW: Reflex Control Smart — app control of Servitec Mini!

- Quick and easy commissioning of Servitec Mini
- Access via Bluetooth interface
- Parameterisation of the degassing mode (continuous or intermittent operation, number of cycles) including days of the week and time
- Displays fault messages
- Check the system pressure
- Software updates

Now available
for Android and iOS

Automatic water make-up

Fillcontrol Plus Compact

Technical features

Fillcontrol Plus Compact

- Compact automatic make-up station, can be used for systems with an expansion vessel as per DIN 1988 and DIN EN 1717
- With type BA system separator
- water make-up capacity approx. 0.5 m³/h where Δp = 1.5 bar
- Permissible maximum input pressure: 10 bar

	Type	Art. No.	DG	System volume V_A up to [m³]	Operating pressure [bar]	Electric power [kW]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
4 bar 60 °C	Mini	8835800	0028	1	0.5 – 2.5	0.06	420	295	220	5.60
Servitec Mini & Fillcontrol Plus Compact										
4 bar 60 °C	Mini & Fillcontrol Plus Compact	8835900	0028	1	0.5 – 2.5	0.06	420	295	220	8.60

Further information, an explanatory video, product descriptions and a funding application for the Reflex Servitec Mini can be found at www.servitec-mini.com

Servitec

Servitec S

Servitec 35 Control Basic

Servitec 75 Control Touch

Servitec 75 Control Basic

New: Product portfolio adjusted for better understanding

Technical features

- Permissible operating overpressure:
  → 8 bar: Types S, 35, 60
  → 10 bar: Types 75, 95, 120
- Floating contact for group message
- Optional water make-up from storage tank (supplied by installer)
- Flexible setting of Servitec Magcontrol (for diaphragm expansion vessels) or Levelcontrol (for pressure maintenance stations) operating modes
- Suitable for facilities that use water (W) and water / glycol mixtures (GL) containing max. 50 % glycol

	Type	Art. No.	DG	System volume V_A up to* [m³]	System volume V_A GL up to* [m³]	Operating pressure [bar]	Electric power [kW]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
Control Smart controller Suitable for water and water-glycol mixtures											
70 °C GL, W	S	8832000	0028	6	4	0.5 – 4.5	0.20	572	340	211	12.40
Control Basic controller, Suitable for water and water-glycol mixtures											
90 °C GL, W	35	8831100	0053	220	50	0.5 – 2.5	0.75	965	553	486	31.40
	60	8831200	0053	220	50	0.5 – 4.5	1.10	1.150	600	486	35.80
	75	8831300	0053	220	50	1.3 – 5.4	1.10	1.150	573	633	50.60
	95	8831400	0053	220	50	1.3 – 7.2	1.10	1.150	573	633	51.40
Control Touch control unit, Suitable for water and water-glycol mixtures											
90 °C GL, W	35/T	8832100	0053	220	50	0.5 – 2.5	0.85	965	553	486	34.40
	60/T	8832200	0053	220	50	0.5 – 4.5	1.10	1.150	600	486	38.80
	75/T	8832300	0053	220	50	1.3 – 5.4	1.10	1.150	573	633	53.60
	95/T	8832400	0053	220	50	1.3 – 7.2	1.10	1.150	573	633	54.40
Control Touch control unit, Suitable for water-glycol mixtures											
90 °C GL	120/T GL	8832550	0053	–	50	1.3 – 9.0	1.50	1.150	578	598	53.00
Control Touch control unit, Suitable for water											
90 °C W	120/T	8832500	0053	220	–	1.3 – 9.0	1.50	1.150	578	598	53.00

Custom designs upon request: System volume > 220 m³ and working pressure > 9.0 bar
*Max. system volumes for system degassing / max. make-up quantities must be taken into account for the specific system.

⊕ Accessories

I/O modules

- Two additional analogue outputs for pressure and level control
- Six freely programmable digital inputs
- Six freely programmable floating outputs

Bus modules

- For exchanging data between controller (RS485) and central building management system

Type	Control	Art. No.	DG
Busmodule			
Busmodule BACnet MS/TP*	Control Touch, Control Basic	8860600	0086
Busmodule BACnet-IP Touch*	Control Touch	8860500	0086
Busmodule Ethernet*	Control Touch, Control Basic	8860300	0086
Busmodule Modbus RTU Touch*	Control Touch	9125592	0086
Busmodule Profibus DP*	Control Touch, Control Basic	8860200	0086
Busmodule Profibus DP Touch*	Control Touch	9118042	0086
I/O-module			
I/O-module SE*	Control Touch, Control Basic	8860400	0071
Commissioning			
Commissioning Cat. 1*	Control Touch, Control Basic	7945600	0095
Commissioning add. Cat. 1*	Control Touch, Control Basic	7945704	0095
Commissioning Cat. 3**	–	7945725	0095
Commissioning add. Cat. 3**	–	7945726	0095

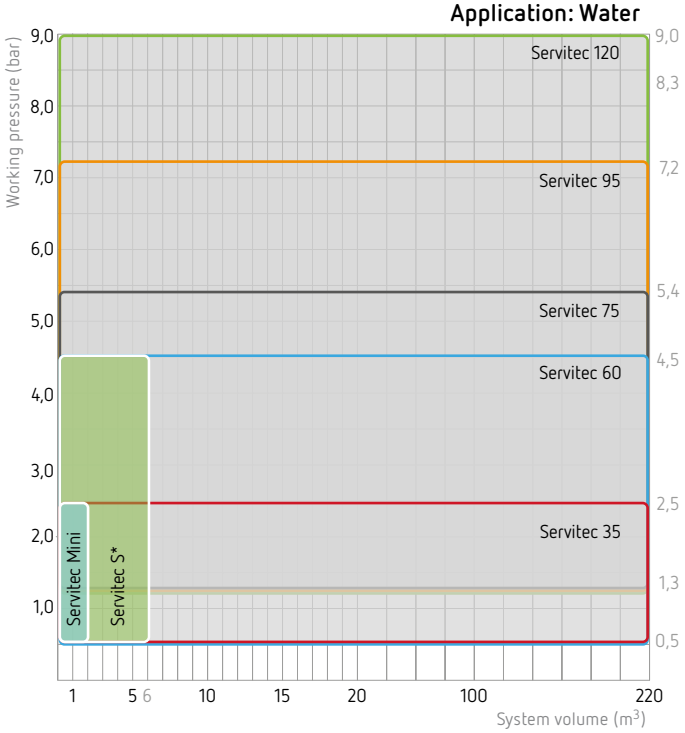
*except for Servitec S and Servitec Mini
**only for Servitec S

Selection and calculation

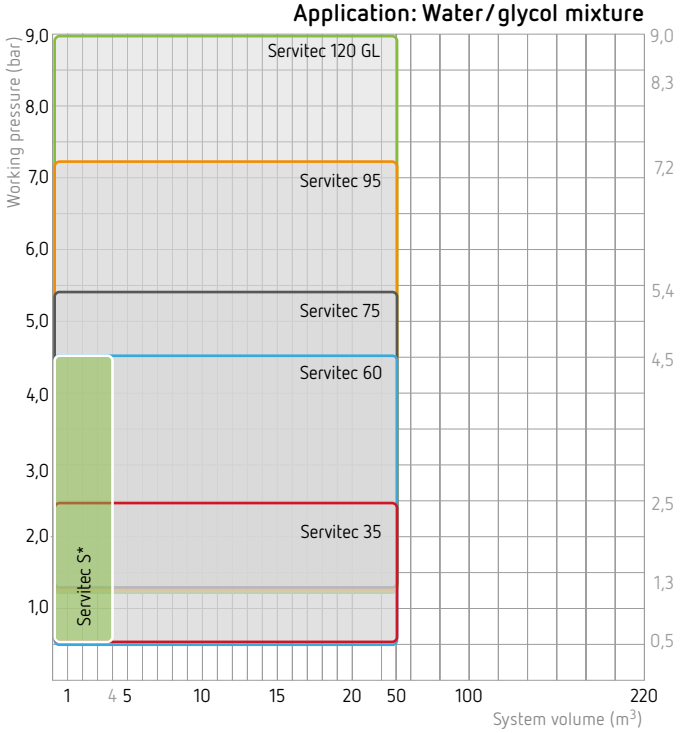
Servitec quick selection

The dimensions of the Servitec degassing system are dictated by the maximum operating pressure and volume of the facility, and the required make-up quantity.

Application: Water



Application: Water / glycol mixture



Maximum operating temperature

60 °C 70 °C 90 °C

* Max. system volume for system degassing / check max. make-up quantities for each specific system.

- The recommended system volumes are conditional upon the network volume being degassed, at least partially once a fortnight.
- Please bear in mind that — since Servitec can only be operated in the indicated pressure range — the pressure at the Servitec tie-in point must not be higher or lower than the indicated operating pressures. We recommend customised solutions for non-standard conditions.
- The operating range of the equipment must be within the operating range of the pressure maintenance system between supply pressure p_a and final pressure p_e.
- **Recommendation:** Combining dirt and sludge separators produces very efficient synergies for optimising the operation of technical water facilities.

Customised planning with the Reflex Pro calculation program

Reflex Solutions **Pro**
rsp.reflex.de/en

Installation and commissioning

Installation notes

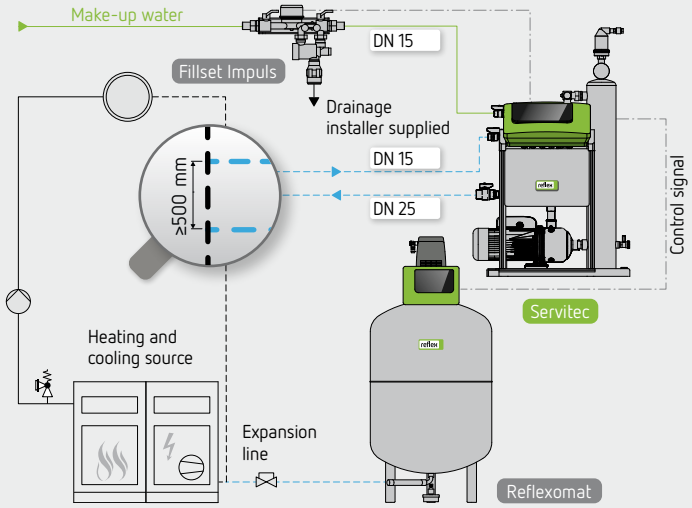
- Servitec must be connected to the system on the piping side.
- Servitec must be tied in on the facility side in the return flow and upstream of any return flow admixture.
- Installation in the main volume flow of the circuit water ensures optimum degassing performance.
- If connecting the Servitec make-up directly to drinking water networks, a system separator, such as Reflex Fillset, must be used.

Water feed notes

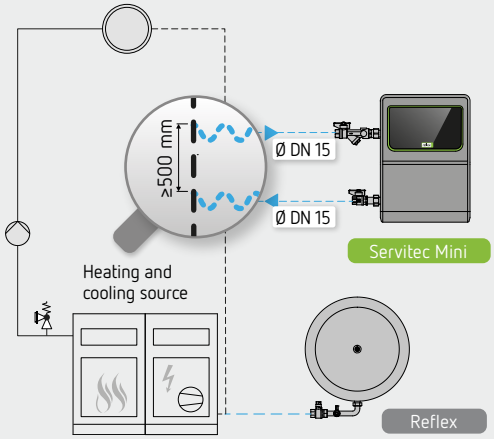
While the degassing cycle is running, no water is present in the degassing tank during creation of the vacuum. As such, this water must be accommodated by the pressure maintenance system and taken into account when calculating the relevant expansion volume in order to prevent pressure fluctuations in the system:

Servitec Mini	V_D = 0,5 l
Servitec S	V_D = 1,0 l
Servitec 35 – 120	V_D = 6,0 l

Tie in

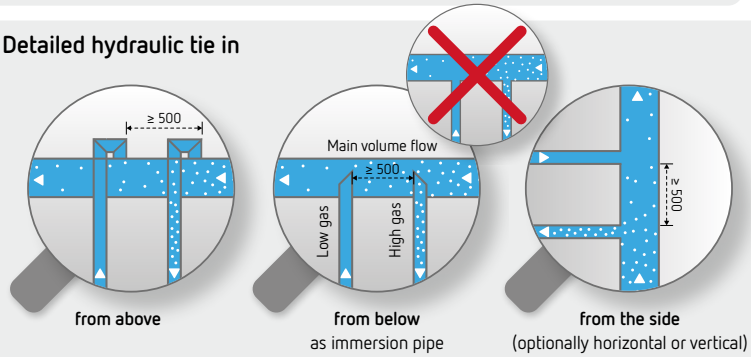


- If the pipe is > 25 m long, select a nominal diameter one size larger.
- If the make-up line is > 4 m long, a Refix WG water shock arrestor must be installed between the Servitec and the make-up fitting (to balance out any temperature-related medium expansion).



- Flexible hose connection to the existing piping network
- Use of shut-offs at the tie ins
- Max. pipe length 5 m

Detailed hydraulic tie in



from above

from below
as immersion pipe

from the side
(optionally horizontal or vertical)

- Tie in connection pipes from above, the side and below as an immersion pipe. Avoid butted tie ins from below at all times (risk of soiling).
- Observe minimum spacing of 500 mm between tie in points, consider the direction of flow and flush the pipelines.

Configuring the controller

1. Degassing mode

Continuous and interval degassing

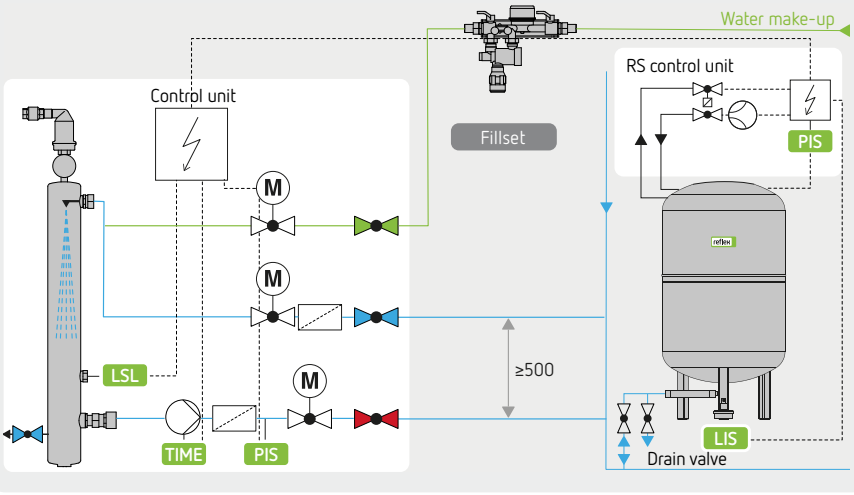
- Continuous or interval degassing mode switches on and off at specific times
- Continuous degassing is generally performed during commissioning of after performing repairs. Interval degassing is activated automatically after continuous degassing.

Duration of continuous degassing

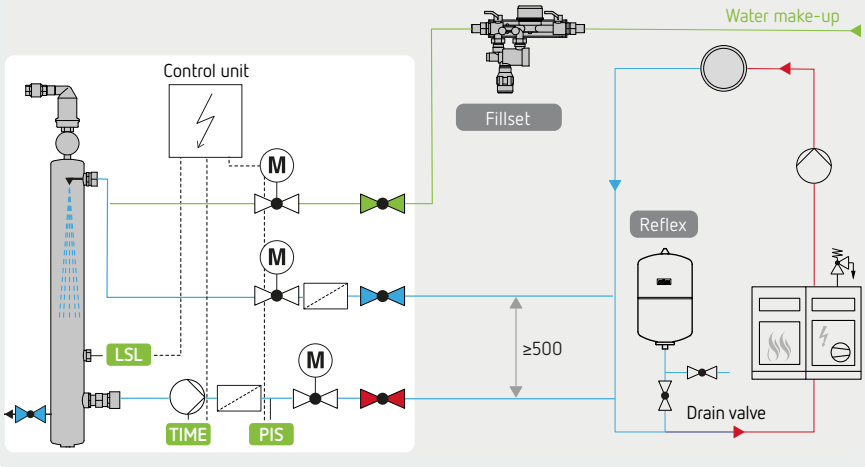
- Depending on the network volume;
  Recommendation: if using water, run half of the network volume through Servitec once, if using water / glycol mixtures, five times the network volume

2. Water make-up operating modes

Levelcontrol mode
For facilities with pump- or compressor-controlled pressure maintenance stations with level-dependent water make-up



Magcontrol mode
For facilities with diaphragm expansion vessels with pressure-dependent water make-up



LIS

Filling, level-dependent water make-up, Levelcontrol

- Automatic, controlled make-up if the water in the expansion vessel of the pump- or compressor-controlled pressure maintenance station falls below the minimum level
- Servitec degassing of the make-up water

PIS

Filling, pressure-dependent water make-up, Magcontrol

- Pressure is shown on the display
- Pressure above and below the permissible range is signalled
- Automatic, controlled make-up when filling pressure drops below 0.2 bar
- Servitec degassing of the make-up and filling water

TIME

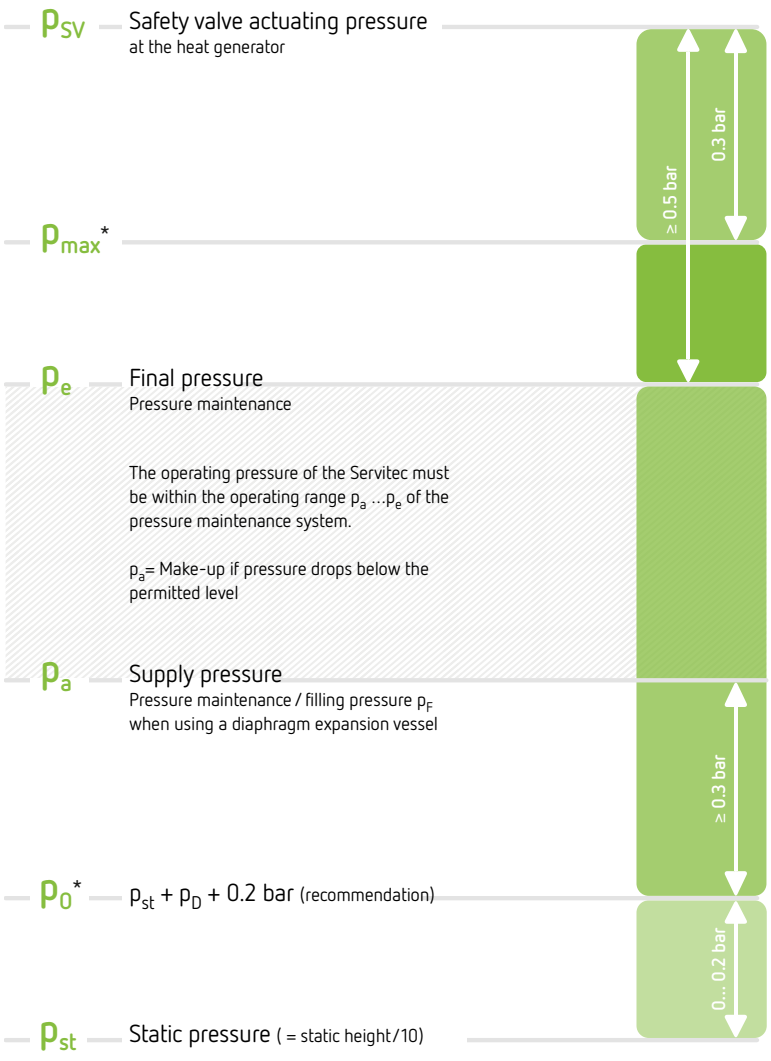
Degassing

- Vacuum degassing of a partial flow of the circuit water as per an optimised schedule with selectable degassing mode
- Continuous degassing (after commissioning)
- Interval degassing (automatically activated after continuous degassing)

Tender texts, data sheets, CAD web catalogue incl. BIM data are available at **www.reflex-winkelmann.com/en**

3. Setting the minimum operating pressure

The minimum operating pressure and safety valve pressure must be set in Magcontrol mode.



* Fault message if pressure is higher or lower than permitted

p_{SV}
When selecting the right Servitec for your system, please always consider the actuating pressure of the safety valve relative to the max. operating pressure. System parameters may be amended or adjusted over time to ensure that your Servitec is always covering the full pressure range of the system.

p_0
Set the appropriate minimum operating pressure on your Servitec for the static height of your facility. Water make-up is regulated automatically, depending on pressure levels, in the relevant operating modes.

The following example uses a Servitec 35 in Magcontrol mode to visualise the design parameters relative to the appropriate pressure parameters.

Basic technical data

Supply temperature	= 70 °C
(evaporating pressure p_D	= 0 bar)
Static pressure p_{st}	= 11 mWS
	(11 mWS ~ 1.1 bar)

Settings Servitec

p_0 (p_{st} + p_D + 0.2 bar (recommendation))	= 1.3 bar
p_{SV}	= 3.0 bar

Resulting pressures of relevance for make-up

In = 1.4 bar
Out = 1.6 bar

Example: Heating system

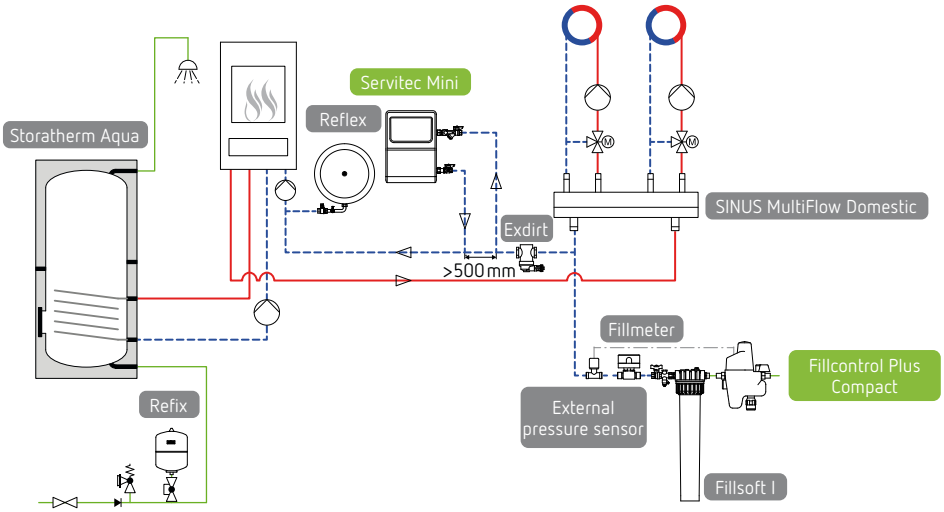
Installation examples

Solution № 01 Servitec Mini with Fillcontrol Plus Compact

Servitec Mini with automatic water make-up via Fillcontrol Plus Compact for direct connection to the drinking water supply system. An external pressure sensor is required when using Fillcontrol Plus Compact with Fillsoft.

Servitec Mini must always be tied into the return flow, in the direction of flow.

To ensure compliance with VDI 2035, use Fillsoft with a softening or demineralising cartridge (depending on the quality of the water and the specifications of the boiler manufacturer).

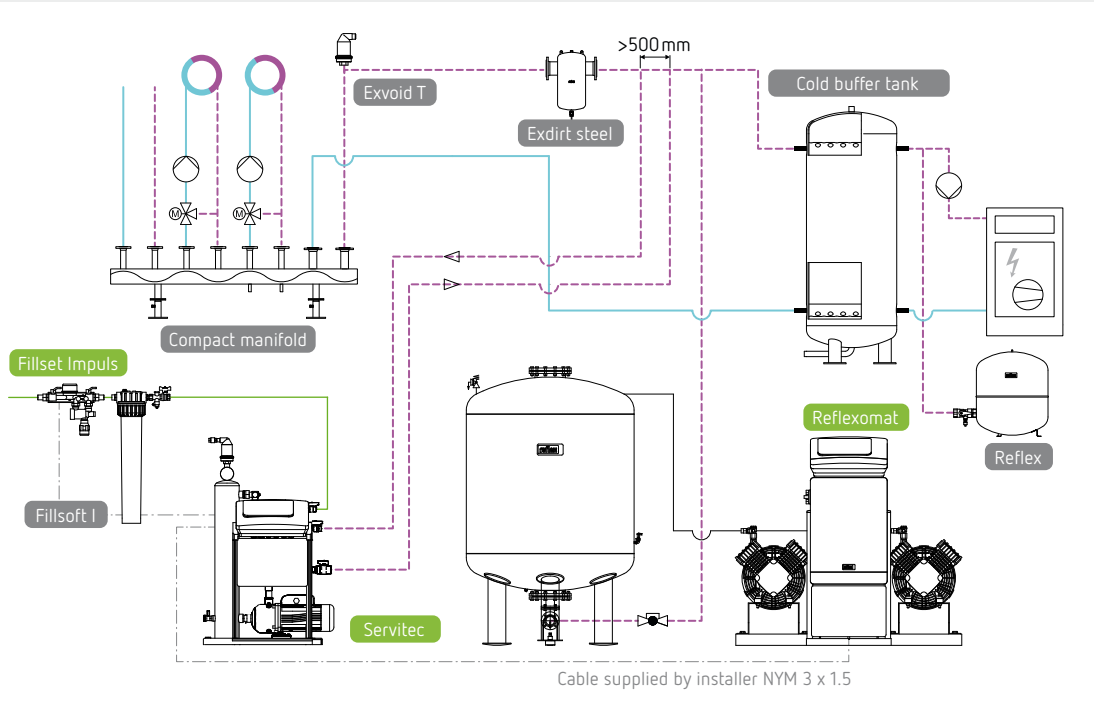


Solution № 18 Servitec with Reflexomat and Fillsoft

An electrical connection must be planned on site to enable communication between Servitec and Reflexomat (both appliances must be fitted with a pressure sensor).

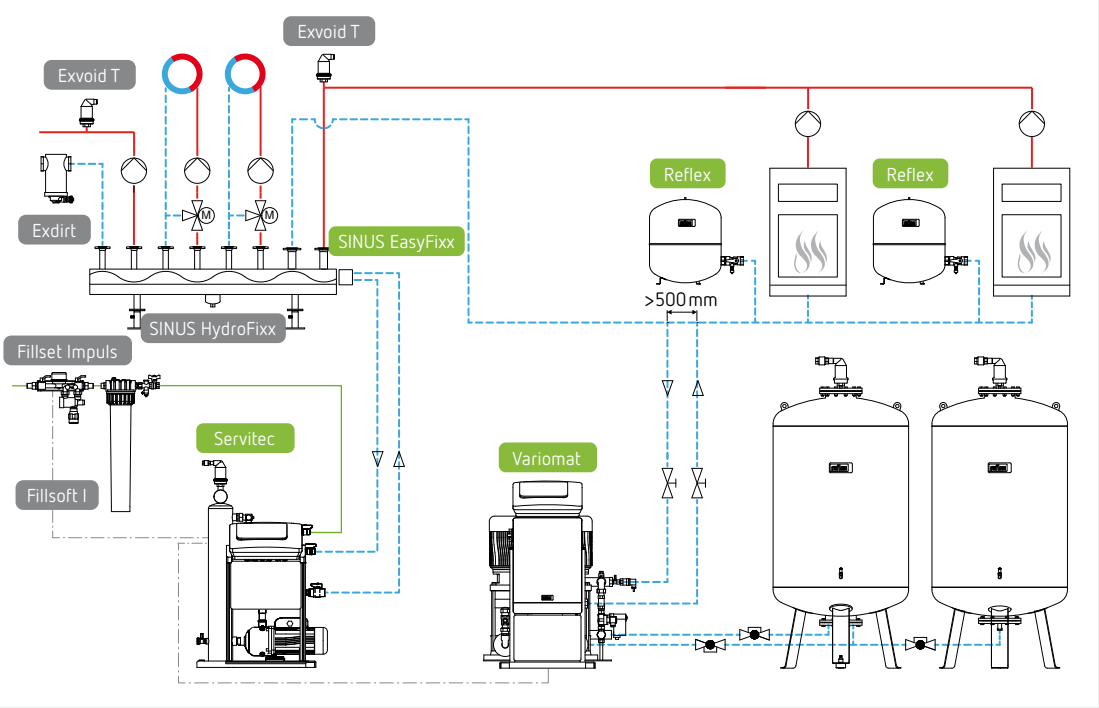
Set Servitec to Levelcontrol mode.

When connecting Servitec to drinking water supply systems, integrate a system separator such as Fillset Impuls with contact water meter.
The contact water meter is read by the Servitec controller.



Servitec with Variomat and SINUS EasyFixx

Solution № 11



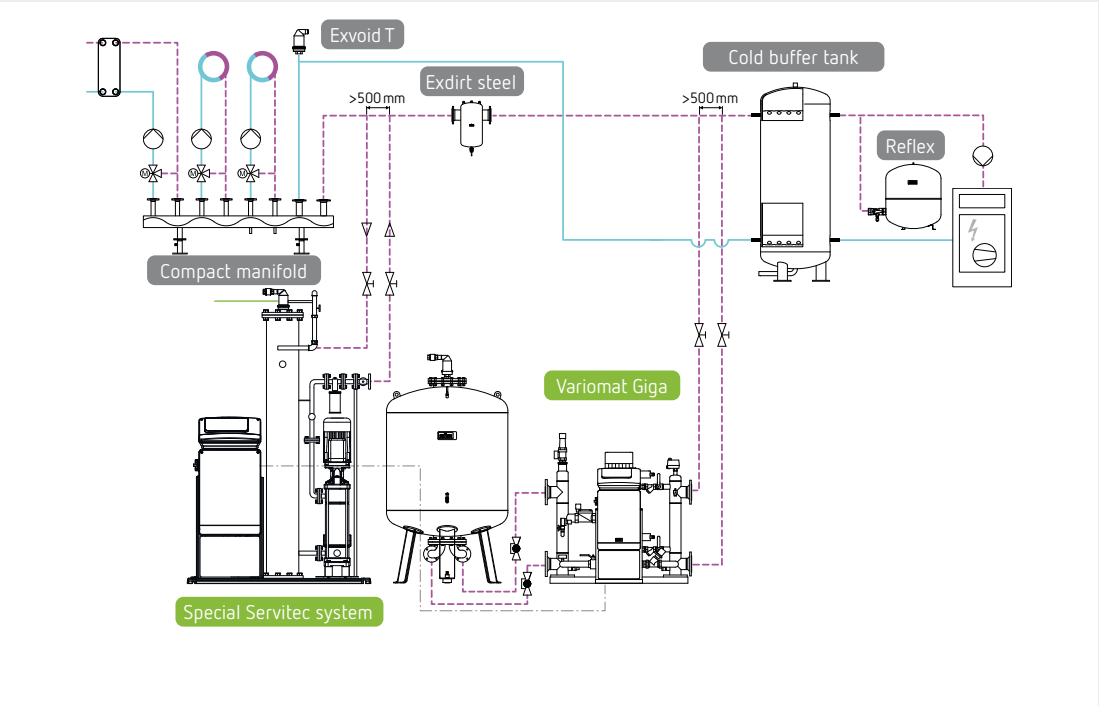
Use of Servitec to achieve maximum degassing performance. Deactivate degassing on the Variomat.

When combining Servitec and Variomat, include Reflex diaphragm expansion vessels in the design to safe-guard each boiler individually and to act as control vessels.

Sinus EasyFixx is a simple and fault-free means of connecting Servitec; it enables direct connection to the manifold and optimises the hydraulic tie in to the pressure raising system.

Customised Servitec with Variomat Giga in cold water system

Solution № 21



Customised Servitec with high-perform-ance Variomat Giga pressure maintenance for challenging requirements.

Reflex expansion vessel to individually safeguard the cold source.

To maximise efficiency and operational reliabil-ity when using Servitec, install an Exdirt dirt and sludge separator.

The diagram is only meant to visualise the interconnections.
Installation must be adapted to local conditions accordingly and must be specified in more detail.

Customised solutions

Systems of all sizes and complexities

In addition to our standard portfolio, we can also design and manufacture Servitec systems to customer specifications and in larger sizes. Many of our customised Servitec systems are in use around the globe, where they have been tailored to all sorts of specific customer requirements. Our strength lies in supporting and planning comprehensive projects and facilities for high performance, high pressures, and high water temperatures.

What we can offer

- Higher flow rates and system volumes
- Higher operating pressures
- Lower or higher operating temperatures
- Stainless steel models
- Special cold water applications

Temperatures up to **300** °C

System capacities up to **800** MW

Pressures up to PN **25**

System volumes up to **18,000** m³

+ Make-up volumes up to **15** m³ h

Your benefits

- Years of experience in all areas of customised solutions (power plants, district heating systems, geothermal systems, etc.)
- Hot water system certification as per EN 12953 and TRD 604
- International team with local knowledge
- Highest quality standards
- Tested processes
- Broad spectrum of activities (virtually no limitations in respect of facility size, pressures, temperatures, makes)
- Specialists for all sorts of customised solutions
- Incorporation of international standards, such as ASME, ANSI etc.

Selected references

Heating plant, Hamm municipal utilities

Product solution
Servitec special system

Customer-specific requirement
Large water make-up quantity

Objective achieved
Reduction in the large quantity of chemicals used to bind oxygen because the expansion vessel was open to the atmosphere.

System parameters

Capacity:	20 MW
System pressure:	7 bar
Temperature:	130 / 64 °C
System volume:	approx. 890 m³
Servitec degassing performance:	7 m³ / h

Böblingen municipal utilities

Product solution
Servitec special system

Customer-specific requirement
High performance parameters (temperatures and volumes)

Objective achieved
Optimised system operation without malfunctions, and maintenance reduced by 60 %

System parameters

Capacity:	49 MW
System pressure:	7 bar
Temperature:	130 / 80 °C
System volume:	approx. 1,200 m³
Servitec degassing performance:	12 m³ / h

Reflex added value

Our digital services

Reflex Solutions Pro —
Complete product solutions quickly and easily
The next generation of the proven configuration tool allows products from the entire Reflex portfolio to be individually compiled and configured to suit a specific system, irrespective of size — from a single-family home to residential buildings and industrial premises. Whether a single product or a complete system, just choose the application, then enter the relevant system parameters, Reflex Solutions Pro works out the appropriate configuration quickly and precisely. With one click, you can download the complete documentation such as product data, tender texts and BIM data.

Start designing your configuration now for free:

rsp.reflex.de/en

Reflex Training — expertise gives us the edge

Close to our headquarters in Ahlen, professional craftsmen, planners and operators gear up to meet the challenges posed by heating and hot water supply in modern building technology. From installation and planning to consulting and technical operation, the Reflex Training Centre and its team aligns its programme to those partners who want to learn more about technology, standards and service from the horse's mouth. Newly acquired expertise is put into practice, refined and experienced straight away on Reflex systems in a former manor house that has been refurbished to modern-day standards in the German region of Westphalia. Realistic simulations and a comprehensive portfolio of systems help to put the content learned to practical use, skilfully combining theory with practical aspects. The Reflex4Experts training courses are now also available online, for example, as webinars for PC, tablet or smartphone, and include short, interesting learning units on current and exciting topics that can be easily followed in the office, at home or on the road.

More information is available at www.reflex4experts.com/en

Reflex Training Center
+49 2382 7069-9581
seminare@reflex.de

Our performance promise — Reflex After-Sales & Service

Supply technology systems are becoming increasingly complex. This is true for the technology as well for documentation and testing requirements. With Reflex After-Sales & Service, you remain in good hands after your purchase. Our years of expertise specialising in the Reflex product world ensure the full safety and functionality of your system.

- Expertise and many years of experience with all Reflex products
- Qualified personnel with expertise in the latest products and guidelines
- Compliance with statutory regulations and therefore also with liability and warranty provisions
- Systems optimally adapted for maximum efficiency and functionality

You can find more information about all our services at www.reflex-winkelmann.com/int/services-downloads/after-sales-service

Warranty extension to five years
From now on, you can register your system after it has been commissioned by us or by a service partner certified by us. If you enter into a maintenance contract at the same time, you are entitled to a warranty extension to five years. Take advantage of this opportunity easily at www.reflex-winkelmann.com/int/services-downloads/after-sales-service/warranty on our home page or simply use the sticker on your product to access registration.

Registration is not only possible at the time of commissioning but is also valid for all systems with a manufacturing date of up to six months from the year of manufacture 2020.

With the new online service order, we are optimising the service for our customers even further. It takes just a few clicks to create the order form, and it can be processed directly in our system. This makes our service even faster and more customer friendly.

5 YEARS GUARANTEE

Factory service centre
+49 2382 7069-9505
aftersales@reflex.de

Technical hotline
+49 2382 7069-9546
aftersales@reflex.de

Commercial processing
+49 2382 7069-7505
aftersales@reflex.de

Discover Reflex with augmented reality

1 Scan QR-Code.
reflex.de/en/city

2 Download the
Reflex Smart City app

3 Scan the title of this brochure
and explore

RE1880enE / 9127861 / 08-2023
Subject to technical modifications

Always up to date

Further product literature and materials can be downloaded at or hard copies ordered from
www.reflex-winkelmann.com/int/services-downloads

reflex
Thinking solutions.

Reflex Winkelmann GmbH
Gersteinstrasse 19
DE-59227 Ahlen
+49 2382 7069-0
info@reflex.de
www.reflex-winkelmann.com/en

A WINKELMANN BUILDING+INDUSTRY BRAND