

**reflex**

Thinking solutions.

# Pressurisation Systems



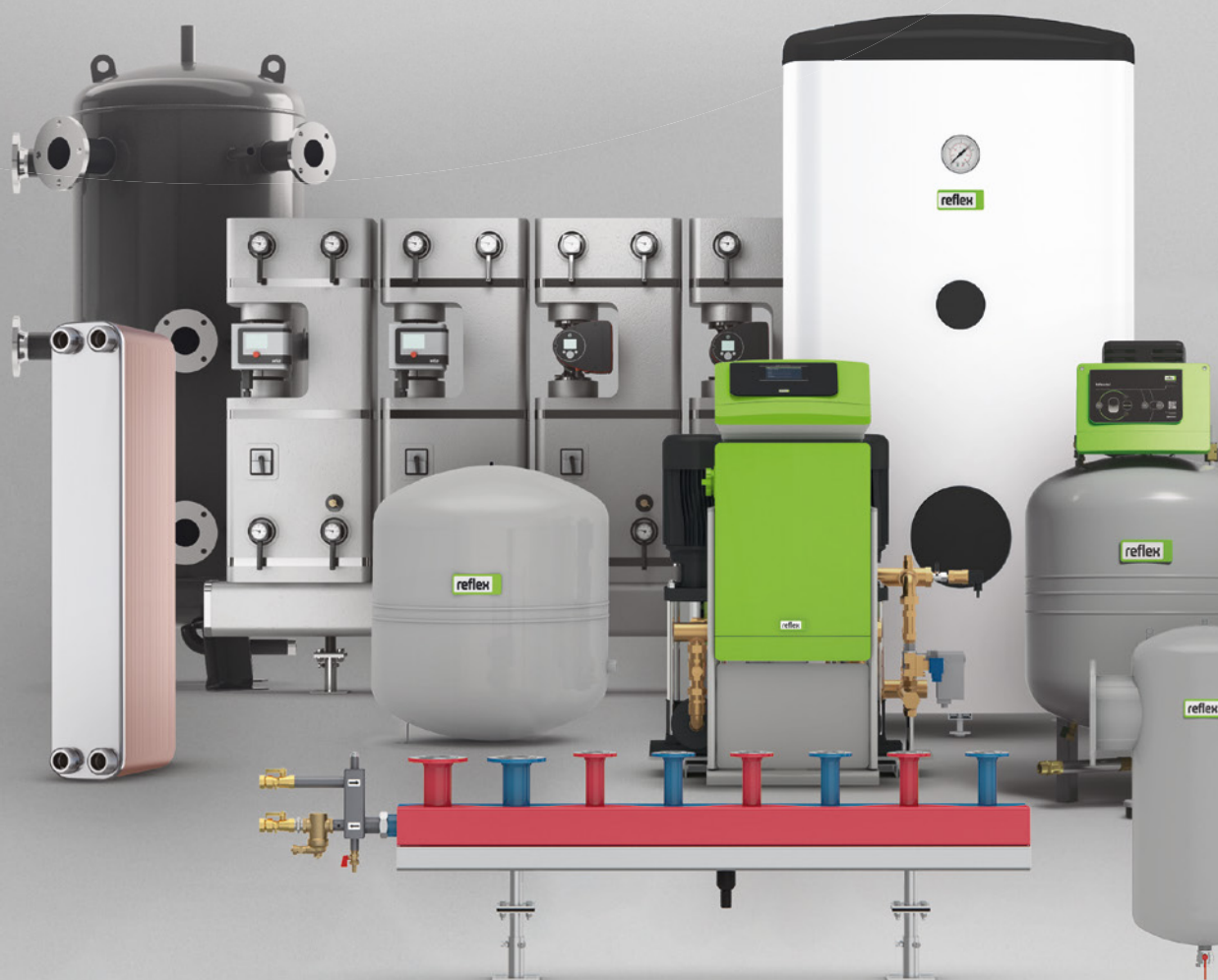
Reflexomat, Variomat

# Reflex—

a powerful brand for decades

Reflex Winkelmann GmbH 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.





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## New configuration software



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

→ Read more on [page 59](#)

# Reflex City

Variomat Giga

RSC Smart

Reflexomat XS

HOTEL



### Reliable pressure maintenance for any requirements

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.

We offer a broad portfolio of pressurisation stations to enable automated and precise pressure maintenance in systems with the broadest spectrum of different requirements: Office buildings from 100 kW heating capacity or more to power plants up to 300 MW, water as hot as 250 °C or cooling water with -10 °C, flat buildings 10 m tall to high-rises up to 200 m tall, as well as customised solutions for complex hydraulic systems.

# Dynamic pressure maintenance

## Basic principles of pressure maintenance

Pressure maintenance systems play a key role in heating, cooling and solar systems, as well as in pressure boosting systems. Essentially, they have to perform three important tasks:

1. To keep the pressure within permissible limits at all points of the system. This means the permissible operating pressure must not be exceeded, but also that a minimum pressure has to be ensured to prevent vacuums, cavitation and vaporisation.
2. To compensate volume fluctuations in the system water due to temperature fluctuation.
3. Balance out system-related water losses, e.g. by providing a water seal.

The pressure changes in a closed heating, cooling or solar

system when temperature or physical factors cause volume changes in the system water. The fluctuations in pressure must be controlled in these systems. This is achieved by maintaining pressure consistency with the use of expansion vessels that accommodate these changes in volume and keep the pressure within permissible limits. Depending on the relevant application, optimum pressure maintenance can be achieved with two different pressure maintenance systems:

- Static pressure maintenance system:  
Diaphragm expansion vessels
- Dynamic pressure maintenance system:  
Pressurisation stations

## Advantages of dynamic pressure maintenance

Pressure maintenance stations are the next generation improvement on conventional diaphragm expansion vessels with static pressure pads. The difference in principle lies in the addition of

a control unit that can be used to change the volume in a connected vessel and ensures highly efficient performance. This approach produces three key advantages:

1. **Automated and monitored operation**  
The control unit offers all the opportunities associated with automated and monitored operation, which is the decisive reason for a pressurisation station even for smaller capacities starting from around 300 kW.
2. **Smaller vessel volume saves space**  
Virtually the entire capacity of the expansion vessel can be used to accommodate expansion water. As a result, vessel volume can be reduced by up to approximately  $\frac{1}{3}$  compared to a diaphragm expansion vessel.
3. **Reliable pressure maintenance**  
The minimum operating pressure is programmed on the controller, which automatically monitors the pressure settings. Any deviations are immediately remedied to ensure reliable facility operation.

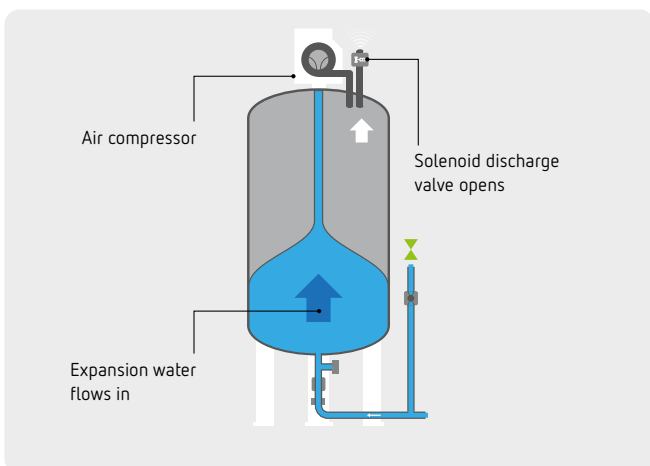
## Pressurisation stations made by Reflex

A distinction is made between two types of dynamic pressure maintenance system:

Compressor-controlled pressure maintenance: **Reflexomat**



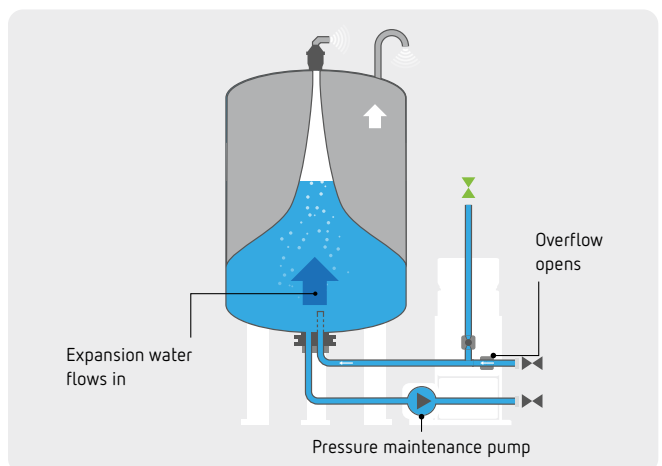
- A compressor controls the pressure on the gas side of the vessel.
- If the set pressure is exceeded, the overflow valve opens and releases air from the expansion vessel. With the pressure dropping, water flows out of the system into the expansion vessel. If the pressure falls below the programmed setting, the compressor cuts in and feeds air to the gas side of the expansion vessel. As a result, water is forced into the system.
- Reflexomat can be upgraded with additional make-up and degassing equipment. The option for intelligent make-up and degassing inclusion is already integrated in the control unit of Reflex Control.

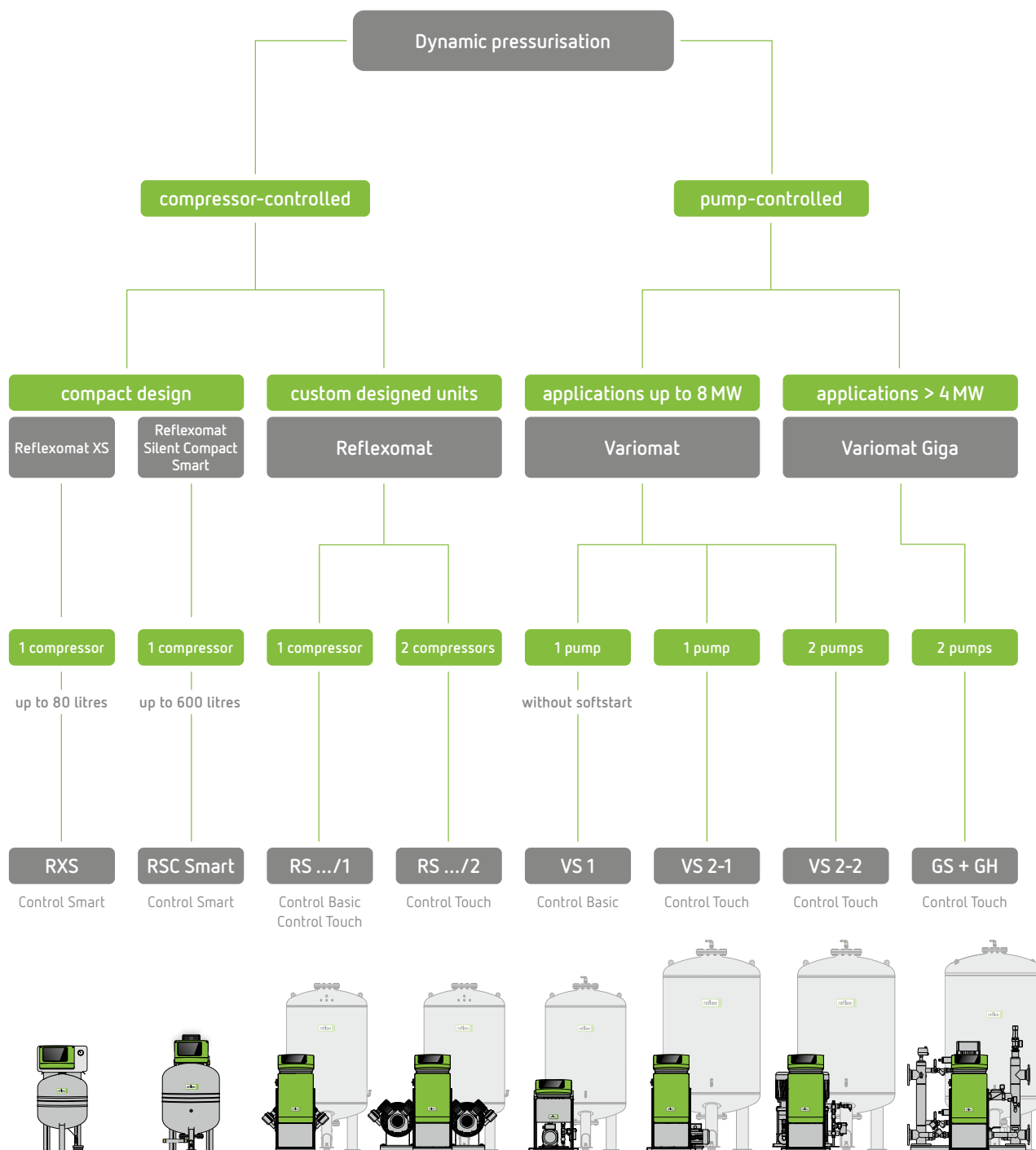


Pump-controlled pressure maintenance: **Variomat**



- Pumps are used to control the pressure on the water side.
- If the set pressure is exceeded, the overflow valve opens and releases water from the system into the expansion vessel. If the pressure falls below the programmed setting, the pump activates and conveys water from the expansion vessel into the system.
- Degassing is included in the performance specification of the Variomat: A timer controls a partial flow from system to pressureless expansion vessel, where it depressurises. In slight overpressure, released gases escape through a special valve.
- Make-up is also part of the performance specification. If the water falls below the lower level, the leakage and tube fracture detection capability ensures automatic make-up.





## Key advantages

### Precise and reliable pressure maintenance

- Flexible pressure maintenance within the tightest limits  $\pm 0.1$  bar
- Standard systems with one or two compressor units
- High-quality butyl diaphragm protects expansion water from air ingress

### Highly modern, user-friendly controller

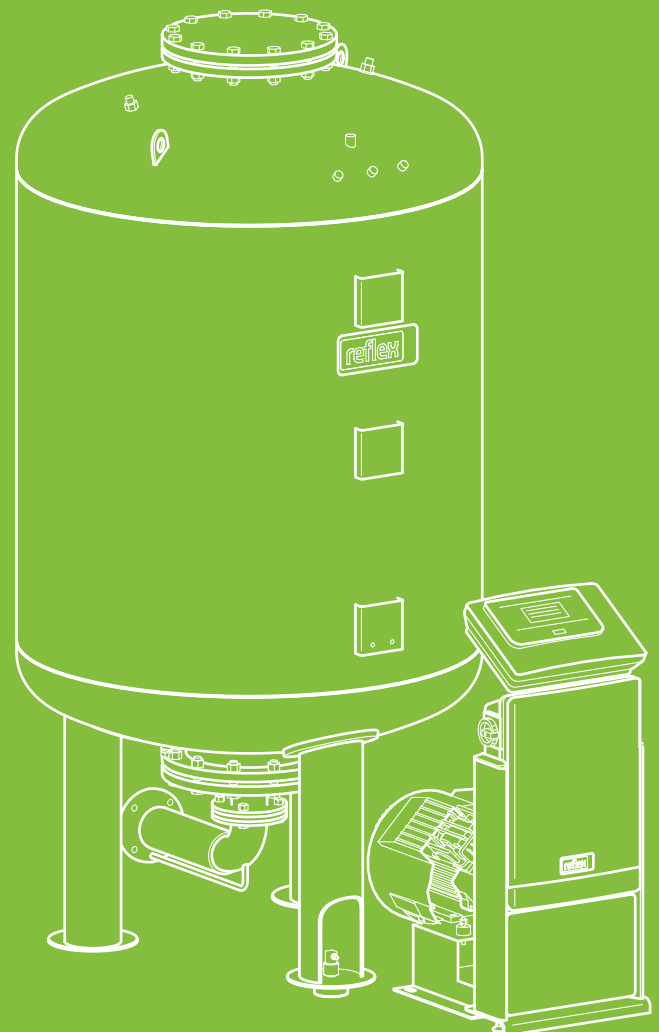
- With expandable microprocessor controller, the control concept Reflex Control
- Master-Slave operation enables parallel operation of up to 10 pressurisation stations (from RS 90/1)
- Fully automatic operation with data interface (from RS 90/1) for incorporation into modern building management systems

### Easy installation and commissioning

- Supplied pre-assembled and ready for operation
- Easy to install and put into service
- Low-maintenance operation

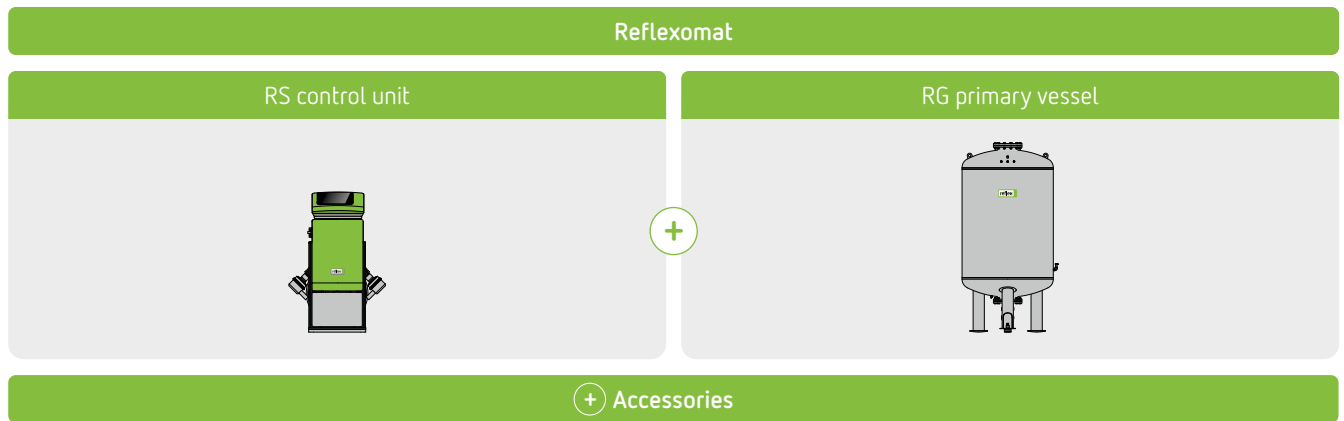
### Comprehensive system extension

- Automatic controlled make-up can be added in (controlled by the level sensor on the RG primary vessel)
- Combination with Reflex Servitec vacuum spray tube degassing (controlled via Reflexomat)

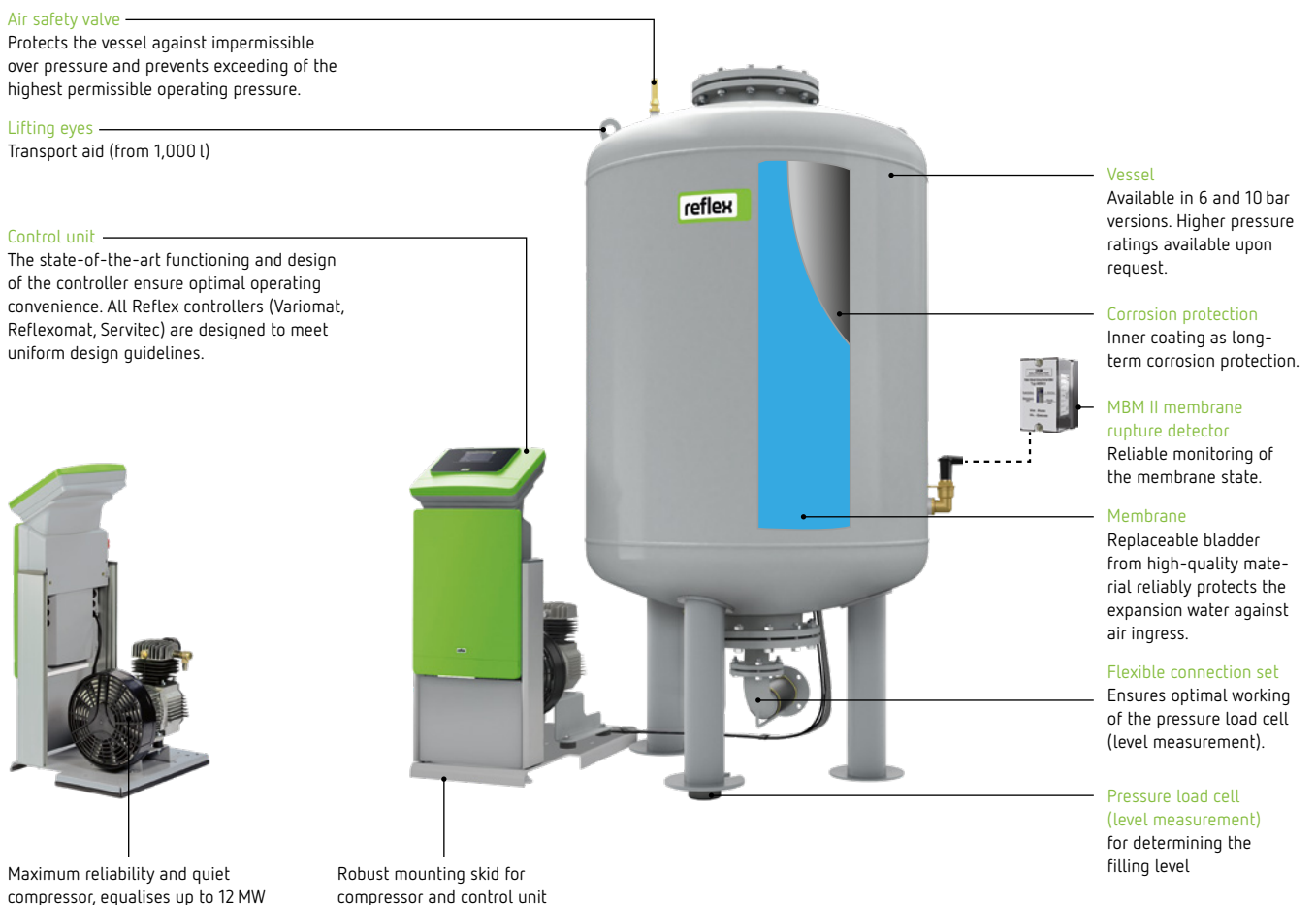


# Design, function and application

## Reflexomat – combination matrix



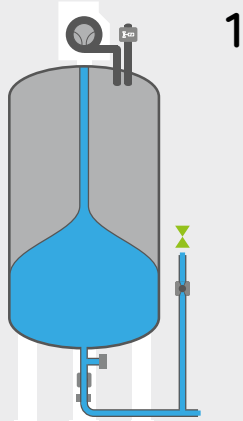
## Reflexomat design



## Reflexomat – functional principle for heating

### Low temperature

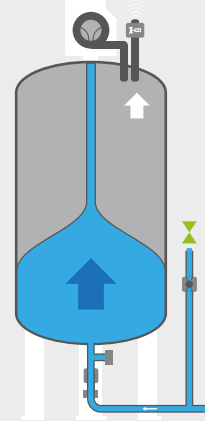
The Reflexomat is fed the minimum amount of water at the lowest system temperature.



1

### Temperature increase

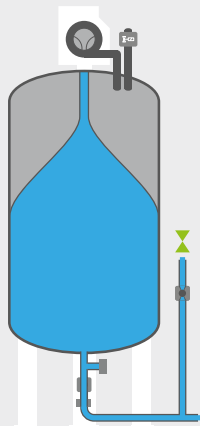
If the system temperature—and with it, the pressure—increases, the controller responds immediately by opening the solenoid discharge valve. The expansion water can then be taken up by the vessel.



2

### Full capacity

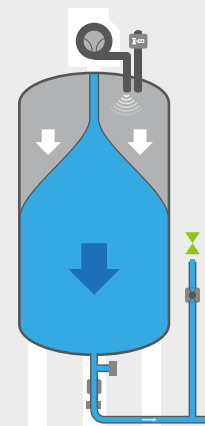
At maximum system temperature, the Reflexomat stores all the expansion water and reaches the maximum filling level in normal operation.



3

### Cool down

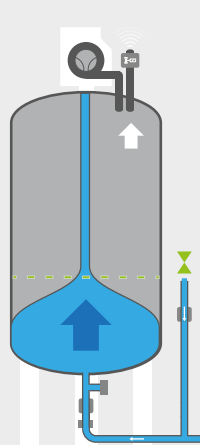
If the system cools down, the system pressure drops and the Reflexomat feeds the expansion water back into the system with the aid of the compressor. The maximum pressure fluctuation is  $\pm 0.1$  bar.



4

### Make-up

If the water content in the vessel sinks below the defined target value, the Reflexomat automatically opens the make-up valve (optional accessory) to balance out the water loss on the system side.



5

Video clips demonstrating the function of this and other products are available under

[www.youtube.com/@ReflexWinkelmannUnitedKingdom](https://www.youtube.com/@ReflexWinkelmannUnitedKingdom)



## Applications

Reflex pressurisation stations always consist of a controller, hydraulic system and one or more vessels. A huge range of customised solutions can be developed with the broad selection of matching components and the extremely precise control design.

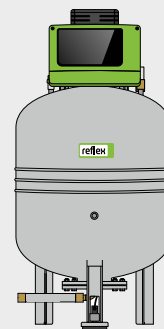
### Reflexomat XS (RXS)

- Compact and space-saving design
- One compressor
- Control unit on the expansion vessel
- up to 80 litre expansion vessel



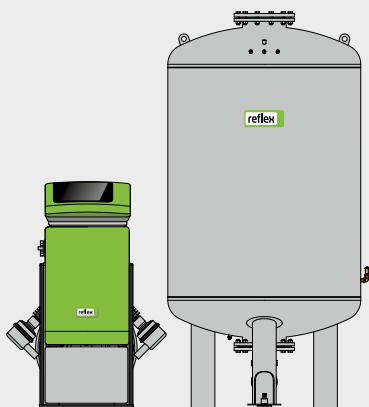
### Reflexomat Silent Compact Smart (RSC Smart)

- One compressor
- Control unit on the expansion vessel
- 200–500 litre expansion vessel



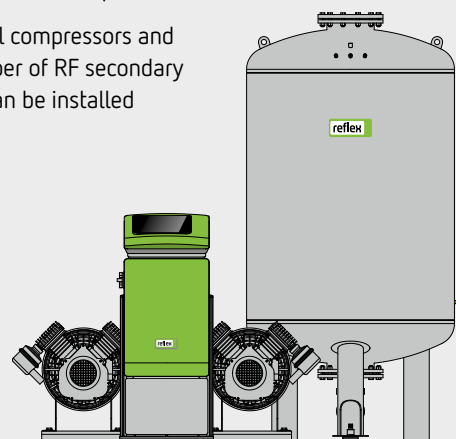
### Reflexomat (RS .../1)

- One compressor
- With separate control unit
- 200 – 5,000 litre expansion vessel
- Any number of RF secondary vessels can be installed



### Reflexomat (RS .../2)

- Two compressors
- With separate control unit
- 200 – 5,000 litre expansion vessel
- Additional compressors and any number of RF secondary vessels can be installed



Do your requirements extend beyond our standard solution to suit your individual requirements:  
[angebote@reflex.de](mailto:angebote@reflex.de)

# Reflexomat product range

## Reflexomat XS



Reflexomat XS



Reflexomat XS – with a wide range of pre-installed digital functions

### Technical Features

- compressor-controlled pressurisation system with a compact design for heating- and cold water systems according to EN 12828
- approval according to Pressure Equipment Directive 2014/68/EU
- diaphragm according to DIN EN 13831 norm
- ingress protection rating IP 54
- max. permissible operating overpressure
- power supply 230 V/50 Hz
- max. permissible operating temperature (at the membrane) 70 °C
- permissible ambient temperature 0 – 45 °C
- sound pressure level ~ 57 dB(A)
- automatic water make-up via Fillvalve possible
- max. perm. safety temperature in the system 110 °C
- **Control Smart controller** via Bluetooth with numerous digital functions:
  - Integrated p<sub>0</sub> wizard for ideal commissioning
  - RS-485 interface and factory-fitted Modbus RTU
  - Operating assistant for fault diagnosis, commissioning, service and maintenance

	Type	Art. No.	Connection c	Electric power [kW]	Ø d [mm]	Height h [mm]	Height h2 [mm]	Weight [kg]
70 °C	XS	8800100	G1"	0.25	480	1,016	153	28.00

## + Reflexomat XS accessories



### Commissioning

- **7945725**: Reflex commissioning Cat. 3 for Reflexomat Silent Compact Smart/Reflexomat XS/Servitec Mini/Servitec S with one compressor/one pump or Reflex Hydroflow freshwater station and Reflex Greenbox
- **7945726**: Reflex commissioning add. Cat. 3 for each additional system at the same location and on the same day – one compressor/one pump



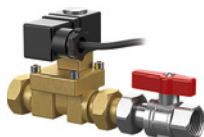
### Cap valve

- secured shut-off for maintenance and disassembly of expansion vessels
- with drainage
- according to DIN EN 12828
- 10 bar/120 °C



### Solenoid valve

- solenoid and ball valve
- for automatic water make-up with Reflexomat

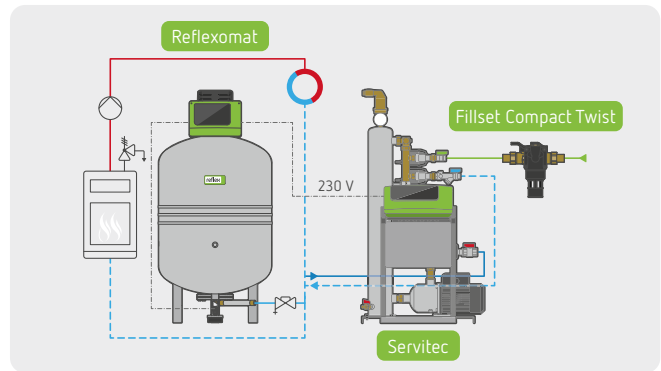


Type	Art. No.	Weight [kg]
Commissioning Cat. 3	7945725	–
Commissioning add. Cat. 3	7945726	–
Cap valve SU R 1" × 1"	7613100	0.57
Solenoid valve Fillvalve	7858300	0.95

# Reflexomat Silent Compact Smart



Reflexomat Silent Compact Smart



Reflexomat in combination with Servitec degassing and Fillset make-up

## Technical Features

- compressor-controlled pressurisation system with a compact design for heating- and cold water systems according to EN 12828
- approval according to Pressure Equipment Directive 2014/68/EU
- bladder (Butyl) according to requirement VDI/BTGA 6044
- sleeve for optional membrane rupture detector
- ingress protection rating IP 54
- max. permissible operating overpressure 6 bar
- power supply 230 V/50 Hz
- max. permissible operating temperature (at the membrane) 70 °C
- permissible ambient temperature 0–40 °C
- sound pressure level ~ 59 dB(A)
- **Control Smart controller** via Bluetooth with numerous digital functions:
  - Integrated p<sub>0</sub> wizard for ideal commissioning
  - RS-485 interface and factory-fitted Modbus RTU
  - Operating assistant for fault diagnosis, commissioning, service and maintenance
- automatic water make-up via Fillvalve possible
- max. perm. safety temperature in the system 110 °C

	Type	Art. No.	Connection c	Electric power [kW]	Ø d [mm]	Height h [mm]	Height h2 [mm]	Weight [kg]
		grey						
6 bar 70 °C	RSC Smart 200	8810200	G1"	0.80	634	1,223	118	52.40
	RSC Smart 300	8810300	G1"	0.80	634	1,523	118	60.40
	RSC Smart 400	8810400	G1"	0.80	740	1,509	103	74.00
	RSC Smart 500	8810500	G1"	0.80	740	1,729	103	84.40
	RSC Smart 600	8810600	G1"	0.80	740	2,130	103	96.00

## Smart Controller with many digital wizards



### Digital Display

Displays the volume level, the operating pressure and possible error codes, thus ensuring a rapid overview of the most important system parameters.

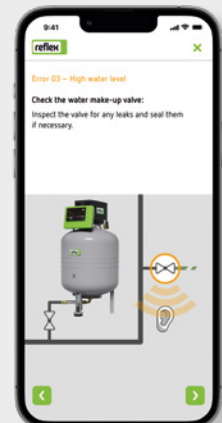
### Commissioning Wizard

Guides you through commissioning step-by-step, including initial filling instructions and parameter checks.



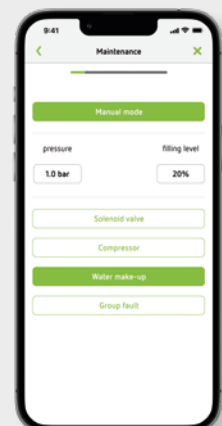
### Troubleshooting Wizard

Shows possible sources of errors in detail with images and guides you through troubleshooting with explanations.



### Maintenance Wizard

Makes maintenance easier because the technician is guided step-by-step through the maintenance measures.



Reflex Control Smart App

Now available  
for Android and iOS



## + Reflexomat Silent Compact Smart accessories



### Commissioning

- **7945725:** Reflex commissioning Cat. 3 for Reflexomat Silent Compact Smart/Reflexomat XS/Servitec Mini/Servitec S with one compressor/one pump or Reflex Hydroflow freshwater station and Reflex Greenbox
- **7945726:** Reflex commissioning add. Cat. 3 for each additional system at the same location and on the same day – one compressor/one pump



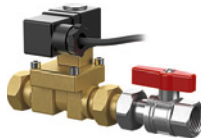
### Cap valve

- secured shut-off for maintenance and disassembly of expansion vessels
- with drainage
- according to DIN EN 12828
- 10 bar/120 °C



### Solenoid valve

- solenoid and ball valve
- for automatic water make-up with Reflexomat



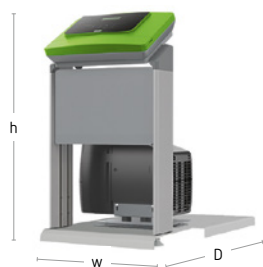
### Bladder rupture detector

- membrane rupture detector in vessels
- consisting of an electrode relay and an electrode (factory fitted)
- power supply 230 V/50 Hz
- floating output (changeover contact)



Type	Art. No.	Weight [kg]
Commissioning Cat. 3	7945725	–
Commissioning add. Cat. 3	7945726	–
Cap valve SU R 1" × 1"	7613100	0.57
Solenoid valve Fillvalve	7858300	0.95
Bladder rupture detector MBM II	7857700	0.62

## Reflexomat control units



Reflexomat Control Basic



Reflexomat Control Touch

### Technical Features

- compressor-controlled pressurisation system for heating and cold water systems in accordance with EN 12828
- max. perm. safety temperature in the system 110 °C
- max. permissible operating temperature 90 °C
- permissible ambient temperature 0–45 °C
- ingress protection rating IP 54
- power supply 230V/400V
- sound pressure level ~ 72 dB(A)
- group fault signal and RS 485 interface for internal communication
- Control Touch with graphical user interface, permanent display of operating parameters, wide array of interfaces, e.g. for control station connection, remote monitoring and system additions



More information about the Reflex Control concept is available from **page 55**

## Reflexomat control units



Type	Art. No.			Electric connection	Electric power [kW]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
		6 bar	10 bar						
RS control unit with 1 compressor									
Control Basic									
RS 90/1 besides*	–	8882800	–	230V/50Hz	0.75	683	470	550	25.00
Control Touch									
RS 90/1 T	–	8882900	–	230V/50Hz	0.75	921	480	491	32.00
RS 150/1 T	–	8880311	8881311	400V/50Hz	1.10	921	480	491	45.00
RS 300/1 T	–	8880411	8881411	400V/50Hz	2.20	921	370	630	48.00
RS 400/1 T	–	8880511	8881511	400V/50Hz	2.40	921	565	670	62.00
RS 580/1 T	–	8880611	8881611	400V/50Hz	3.00	921	636	803	84.00
RS control unit with 2 compressors									
Control Touch									
RS 90/2 T	–	8883000	–	230V/50Hz	1.50	921	498	550	45.00
RS 150/2 T	–	8883100	8883150	400V/50Hz	2.20	921	580	510	60.00
RS 300/2 T	–	8884100	8884150	400V/50Hz	4.40	921	1,000	752	90.00
RS 400/2 T	–	8885100	8885150	400V/50Hz	4.80	921	1,230	792	131.00
RS 580/2 T	–	8886100	8886150	400V/50Hz	6.00	921	1,301	874	196.10
RS control unit without compressor for compressed air supplied on-site <sup>1</sup>									
Control Basic									
RS mounted*	8881100	–	–	230V/50Hz	–	415	395	520	15.00
RS besides*	8881105	–	–	230V/50Hz	–	690	395	345	15.00
Control Touch									
RS external air T*	8881400	–	–	230V/50Hz	–	683	470	600	23.00

<sup>1</sup> Includes solenoid valve for the supply of user-provided compressed air (article no.: 7913000)

User-supplied compressed air, filtered and oil-free max. 10 bar

\* mounted = attached controller up to RG 600, besides = adjoining controller from RG 800, external air = site provided compressed air

## Reflexomat vessels



RG 500 l



RG 1,000 l

### Technical Features

- replaceable bladder according to DIN EN 13831
- approval according to Pressure Equipment Directive 2014/68/EU
- max. permissible operating temperature (at the membrane) 70 °C
- max. perm. safety temperature in the system 110 °C

	Primary vessel			Secondary vessel						
	Type	Art. No.	Height h2 [mm]	Type	Art. No.	Height h2 [mm]	Connection c	Ø d [mm]	Height h [mm]	Weight [kg]
6 bar 70 °C	RG 200	8799100	191	RF 200	8789100	191	G1"	634	989	40.00
	RG 300	8799200	191	RF 300	8789200	191	G1"	634	1,289	60.70
	RG 400	8799300	177	RF 400	8789300	177	G1"	740	1,277	69.40
	RG 500	8799400	177	RF 500	8789400	177	G1"	740	1,497	78.70
	RG 600	8799500	177	RF 600	8789500	177	G1"	740	1,807	90.10
	RG 800	8799600	177	RF 800	8789600	177	G1"	740	2,272	110.30
	RG 1000	8650105	190	RF 1000	8652005	460	DN 65/PN 6	1,000	2,025	308.60
	RG 1500	8650305	190	RF 1500	8652205	460	DN 65/PN 6	1,200	2,020	328.00
	RG 2000	8650405	190	RF 2000	8652305	460	DN 65/PN 6	1,200	2,480	380.00
	RG 3000	8650605	220	RF 3000	8652505	490	DN 65/PN 6	1,500	2,480	795.00
	RG 4000	8650705	220	RF 4000	8652605	490	DN 65/PN 6	1,500	3,053	1,100.00
10 bar 70 °C	RG 5000	8650805	220	RF 5000	8652705	490	DN 65/PN 6	1,500	3,588	1,115.00
	RG 350	8654000	196	RF 350	8654300	196	DN 40/PN 16	750	1,340	230.00
	RG 500	8654100	196	RF 500	8654400	196	DN 40/PN 16	750	1,600	275.00
	RG 750	8654200	182	RF 750	8654500	182	DN 50/PN 16	750	2,179	345.00
	RG 1000	8651005	168	RF 1000	8653005	460	DN 65/PN 16	1,000	2,062	580.00
	RG 1500	8651205	166	RF 1500	8653205	460	DN 65/PN 16	1,200	2,054	492.10
	RG 2000	8651305	166	RF 2000	8653305	460	DN 65/PN 16	1,200	2,514	583.50
	RG 3000	8651505	195	RF 3000	8653505	490	DN 65/PN 16	1,500	2,532	987.00
	RG 4000	8651605	195	RF 4000	8653605	490	DN 65/PN 16	1,500	3,107	1,192.00
	RG 5000	8651705	195	RF 5000	8653705	490	DN 65/PN 16	1,500	3,642	1,286.00

## + Reflexomat accessories



### Busmodule

- for exchanging data between controller and central building management system
- only bus modules type Ethernet and Profibus DP are suitable for a Control Basic controller



### Bracket

- Reflex wall bracket for Control Basic controller and modules
- design in 90 ° and 115 ° inclination for optimum readability

### I/O module

- two additional analogue outputs for pressure and level control
- six freely programmable digital inlets
- six freely programmable floating outputs



### Commissioning

- **7945600:** Reflex commissioning Cat. 1 for Reflexomat, Variomat, Servitec with one compressor/one pump
- **7945704:** Reflex commissioning add. Cat. 1 for each additional system at the same location and on the same day – one compressor/pump
- **7945630:** Reflex commissioning Cat. 2 for Reflexomat and Variomat with two compressors/pumps
- **7945721:** Reflex commissioning add. Cat. 2 for each additional system at the same location and on the same day – two compressors/pumps



### Cap valve

- secured shut-off for maintenance and disassembly of expansion vessels
- with drainage
- according to DIN EN 12828
- 10 bar/120 °C



### Mounting bracket

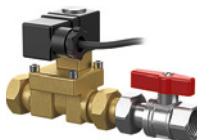
- wall console for compressor and Basic controller

### Master-Slave

- software tool
- for the operation of up to 10 Reflexomat units in a hydraulic network at up to 1,000 m distance

### Solenoid valve

- solenoid and ball valve
- for automatic water make-up with Reflexomat



### Bladder rupture detector

- membrane rupture detector in vessels
- consisting of an electrode relay and an electrode (factory fitted)
- power supply 230V/50 Hz
- floating output (changeover contact)



## + Reflexomat accessories



Type	Art. No.	Weight [kg]
<b>Busmodule</b>		
Busmodule BACnet MS/TP Touch	8860600	0.10
Busmodule BACnet-IP Touch	8860500	0.40
Busmodule Ethernet	8860300	1.90
Busmodule Modbus RTU Touch	9125592	0.20
Busmodule Profibus DP	8860200	3.00
Busmodule Profibus DP Touch	9118042	0.10
<b>Bracket</b>		
Bracket 115°	8894510	0.10
Bracket 90°	8894500	0.10
<b>I/O module</b>		
I/O module RS	8858405	1.00
<b>Commissioning</b>		
Commissioning Cat. 1	7945600	–
Commissioning Cat. 2	7945630	–
Commissioning add. Cat. 1	7945704	–
Commissioning add. Cat. 2	7945721	–
<b>Cap valve</b>		
Cap valve SU R 1" × 1"	7613100	0.57
<b>Mounting bracket</b>		
Mounting bracket 90°	7881900	4.50
<b>Solenoid valve</b>		
Solenoid valve Fillvalve	7858300	0.95
<b>Master-Slave</b>		
Master-Slave	7859000	0.10
<b>Bladder rupture detector</b>		
Bladder rupture detector MBM II	7857700	0.62

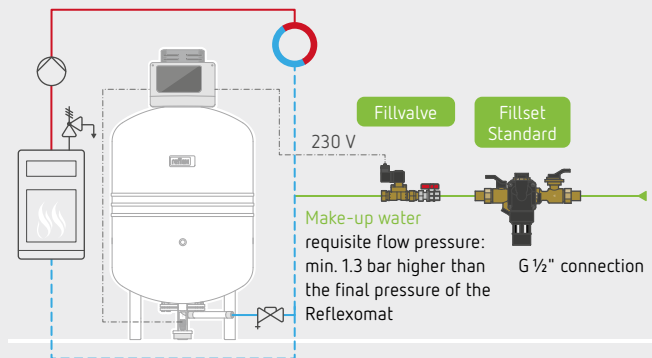
# Make-up options

To ensure lasting reliable and automatic operation of the system, we advise fitting the pressurisation equipment with make-up systems or adding Servitec degassing systems. This is particularly important for cooling water systems as any thermal venting

effects have to be entirely eliminated. Automatic make-up is already incorporated into the Reflexomat controller and is automatically activated if the primary vessel reaches make-up level.

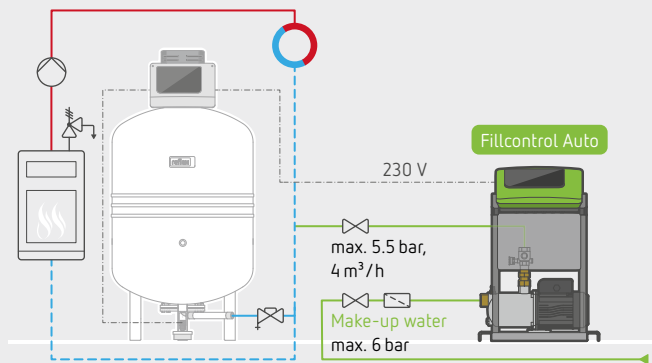
## Automatic make-up with Reflex Fillvalve

Make-up is controlled by the Reflex Fillvalve solenoid valve using the inherent pressure of the make-up water. If making up from the drinking water system, the Reflex Fillset with integrated DVGW-tested system separator must be installed upstream.



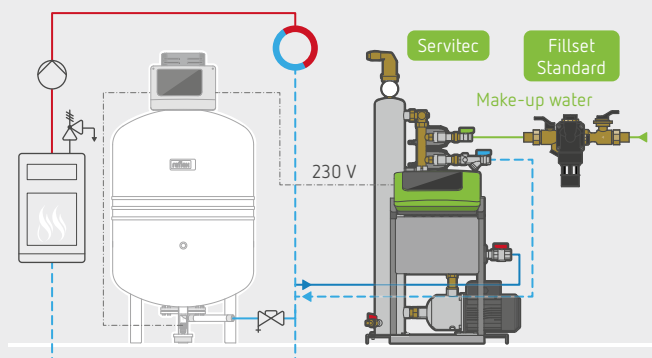
## Automatic make-up with Reflex Fillcontrol

Reflex Fillcontrol Auto is a make-up station with integrated pump (system separator vessel to isolate the system from the drinking water system as stipulated in DIN 1988). Reflex Fillcontrol Auto is generally used when the fresh water seal pressure is too low for direct make-up without pump support or when an intermediate vessel is needed to separate the system from the drinking water system.



## Make-up and degassing with Reflex Servitec

The Servitec vacuum spray tube degassing function centrally degasses the system water and—in Levelcontrol mode—ensures automated controlled make-up when the make-up level is reached in the Reflexomat's expansion vessel. When making up from the drinking water system, the Reflex Fillset must be installed upstream.



For further details, please consult our brochure **Water make-up systems & Water treatment technology**

### Ideal connection: Reflexomat and Servitec

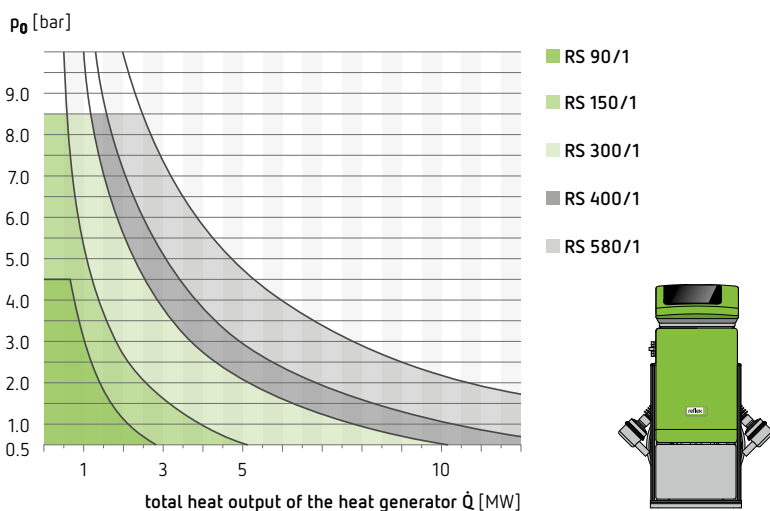


- Vacuum spray tube degassing with automatic make-up
- Ensures that the system and make-up water are nearly free of gas
- Avoids air problems caused by free gas bubbles at system high points, or in circulating pumps or control valves

# Selection and calculation

for heating systems up to 120 °C

## Reflexomat control unit — quick selection



Reflexomat with one compressor

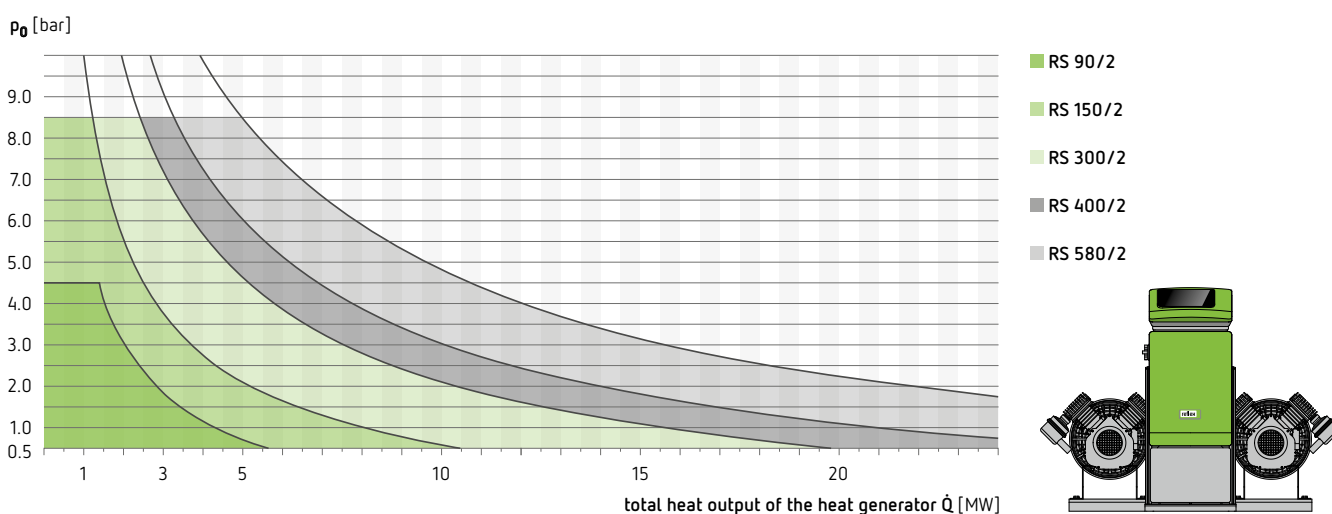
When selecting the control unit for cooling water systems to 30 °C, only 50 % of the rated heat output may be included in the calculation.

### Alternative calculation method

$$p_0 \geq \frac{H_{st} [m]}{10} + \begin{matrix} 0.2 \text{ bar } [\leq 100 \text{ °C}]^* \\ 0.5 \text{ bar } [105 \text{ °C}]^* \\ 0.7 \text{ bar } [110 \text{ °C}]^* \\ 1.2 \text{ bar } [120 \text{ °C}]^* \end{matrix}$$

$H_{st}$  = static height

\* Safety temperature



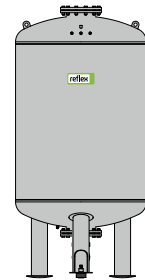
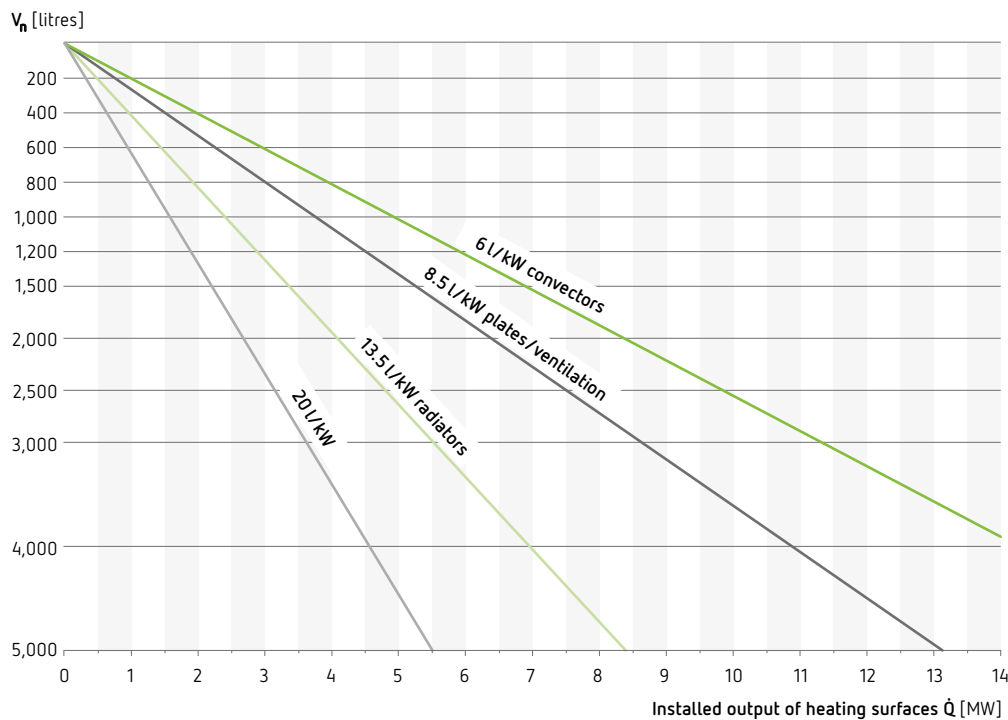
Reflexomat with two compressors

## Selection of the expansion lines

Expansion lines	DN 25 1"	DN 32 1 ¼"	DN 40 1 ½"	DN 50 2"	DN 65	DN 80	DN 100
$\dot{Q}/kW$ Length $\leq 10$ m	2,100	3,600	4,800	7,500	14,000	19,000	29,000
$\dot{Q}/kW$ Length $> 10$ m $\leq 30$ m	1,400	2,500	3,200	5,000	9,500	13,000	20,000

If the expansion line is longer than 10 m, we recommend choosing a size larger.

## Reflexomat vessels — quick selection



### Alternative calculation method

$$V_n \geq V_a \times \begin{matrix} 0.031 [70^\circ\text{C}]^* \\ 0.045 [90^\circ\text{C}]^* \\ 0.054 [100^\circ\text{C}]^* \\ 0.063 [110^\circ\text{C}]^* \end{matrix}$$

$V_n$  = Nominal volume

$V_a$  = Water content of the system

\* Design flow temperature

The nominal volume can be split between multiple vessels (RG primary and RF secondary vessels).

### Permissible operating pressure:

up to 800 litres: 6 bar  
 350, 500, 750 litres: 10 bar  
 more than 1,000 litres: 6 and 10 bar

Customised solutions and higher outputs or temperatures > 120 °C are available on request.



### Basic technical data

Heat generator capacity  $\dot{Q} = 500 \text{ kW}$   
 Water content  $V_a = 5,000 \text{ l}$   
 Rated temperature  $T = 70/50^\circ\text{C}$   
 Static height  $H_{st} = 30 \text{ m}$   
 Expansion coefficient  $n = 0.0228$

### Calculation

$$p_0 \geq \frac{H_{st} [\text{m}]}{10} \text{ bar} + 0.2 \text{ bar}$$

$$p_0 \geq \frac{30}{10} \text{ bar} + 0.2 \text{ bar} = 3.2 \text{ bar}$$

$$V_n \geq V_a \times 0.031 [70^\circ\text{C}]$$

$$V_n \geq 5,000 \times 0.031 [70^\circ\text{C}] = 155 \text{ l}$$

### Result

Control unit RS 90/1  
 Expansion vessel 200 l **RG 200**  
 SU operating valve **R 1 × 1**



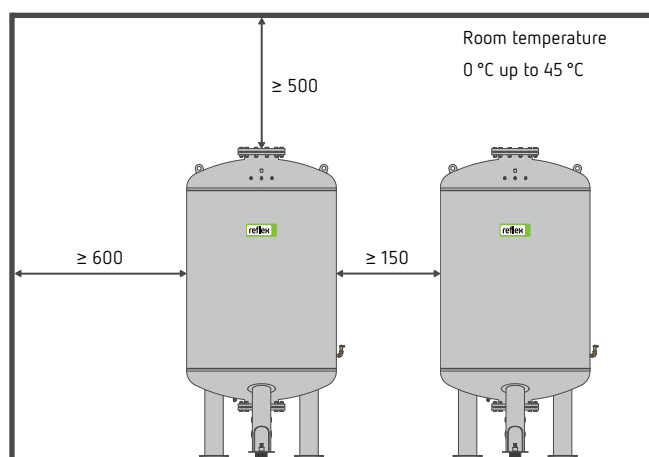
Selection  
example

# Installation and commissioning

## Installation notes

- When installing the oil meter, make sure it is always clean (no paint or coating, etc.).
- Primary vessel connections to dynamic pressure maintenance stations must always be flexible to ensure proper functional performance of the level sensor.
- The vessels must be placed on a firm and level base, make sure they are positioned at right angles and free standing. The control unit must be positioned at the same level as the vessels.
- When using secondary vessels, always use the same models and sizes.

**Note:** Please refer to our detailed operating instructions during installation and commissioning.

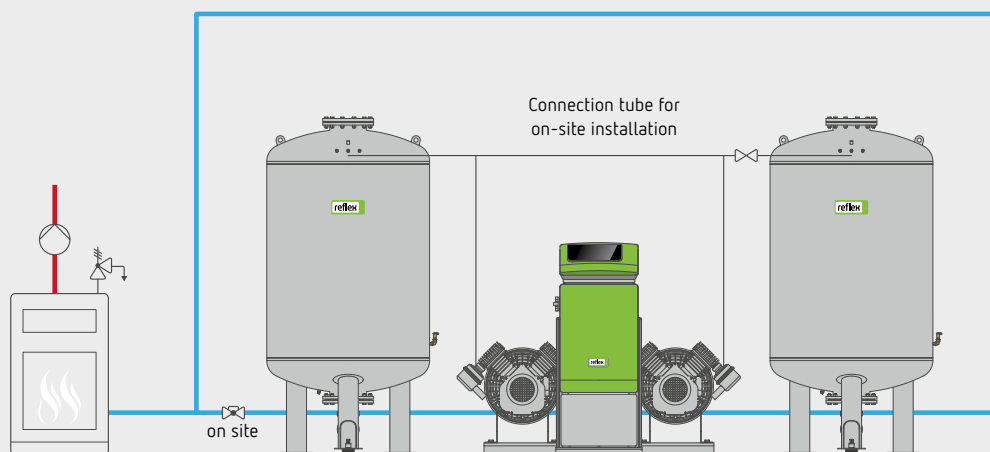


Installation clearances



### Installation example

#### 2-compressor system



## Hydraulic integration

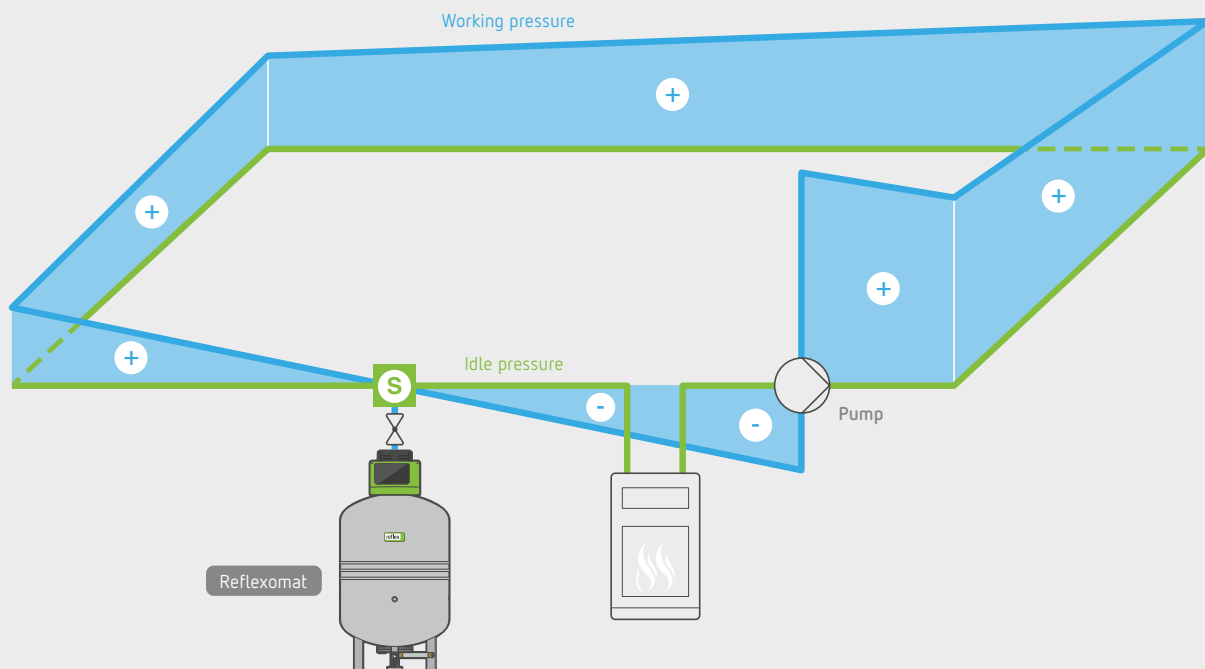
The hydraulic integration of the pressure maintenance into the facility system has a fundamental influence on the operating pressure distribution. The latter is composed of the pressure level when pressure maintenance is not in operation and the differential pressure when the circulating pump is running. We recommend the use of upstream pressure maintenance:

### Intake pressure maintenance (suction pressure maintenance)

The pressure maintenance function is tied in upstream of the circulating pump, i.e. on the suction side. This type is the most commonly used as it is the easiest to control.

- Direct connection of Reflexomat to heat generator
- Low temperature stress on the bladder
- If the bladder is at risk of permanent exposure to stress  $> 70^{\circ}\text{C}$ , Reflex V auxiliary vessels must be incorporated into the expansion line

- Use suction pressure maintenance!
- Only deviate in justified exceptions.
- Please don't hesitate to get in touch with us!



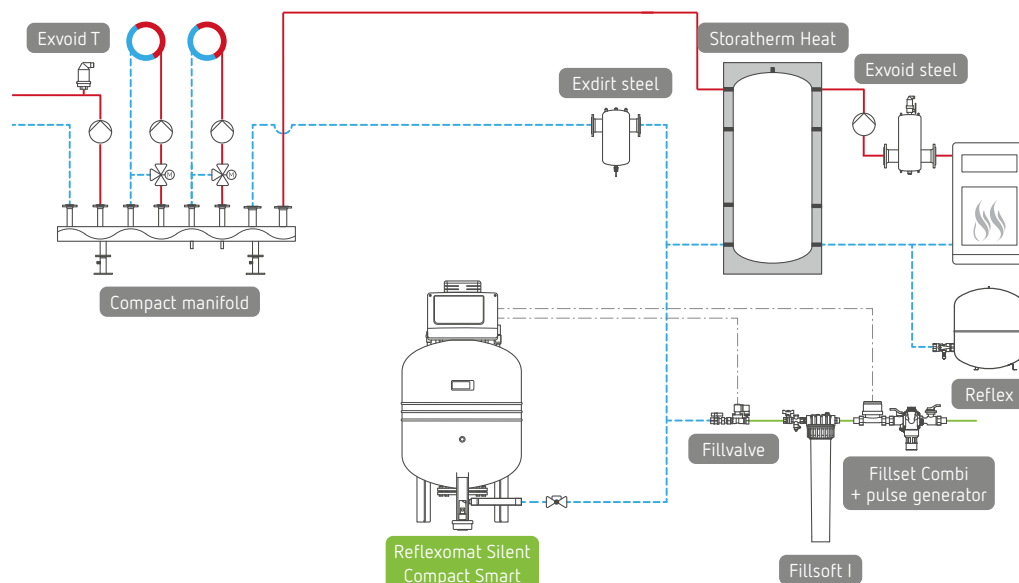
Pressure curve with upstream pressure maintenance (suction pressure maintenance)

# Installation examples

## Solution № 05 Reflexomat Silent Compact Smart

When installing the oil meter, make sure it is mounted on a base and always clean (no paint or coating, etc.).

Primary vessel connections to dynamic pressurisation stations must always be flexible to ensure proper functional performance of the level sensor.

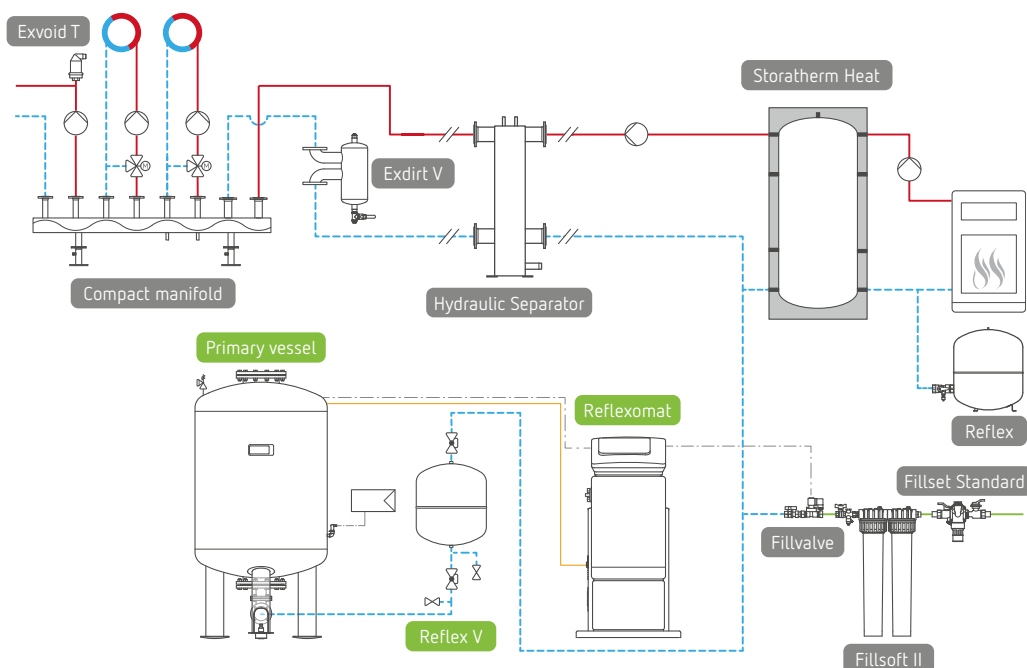


## Solution № 07 Reflexomat with 1 compressor and auxiliary vessel

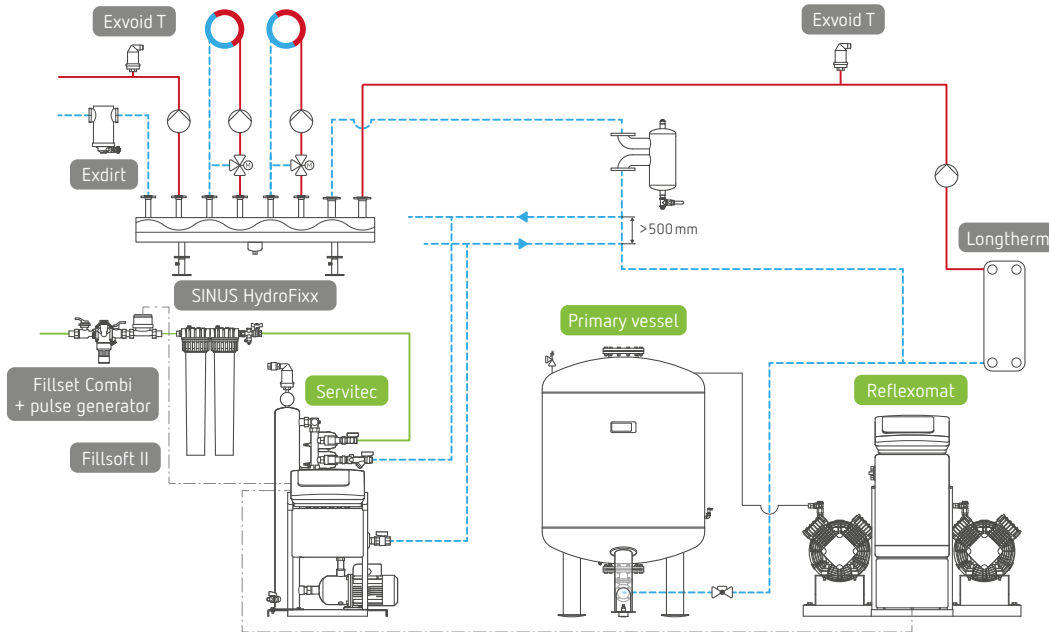
If the temperature of the media is less than 0 °C or more than 70 °C at the pressure maintenance integration point into the system, an auxiliary vessel must be installed to protect the bladder in the expansion vessel.

Incorporate an auxiliary vessel if the return flow temperature is > 70 °C!

An additional Hydraulic Separator is required if the pressure loss in the supply line to the manifold is too high and requires an additional pump. The separator enables the hot water storage tank to be discharged as required.



## Reflexomat with 2 compressors and Servitec degassing

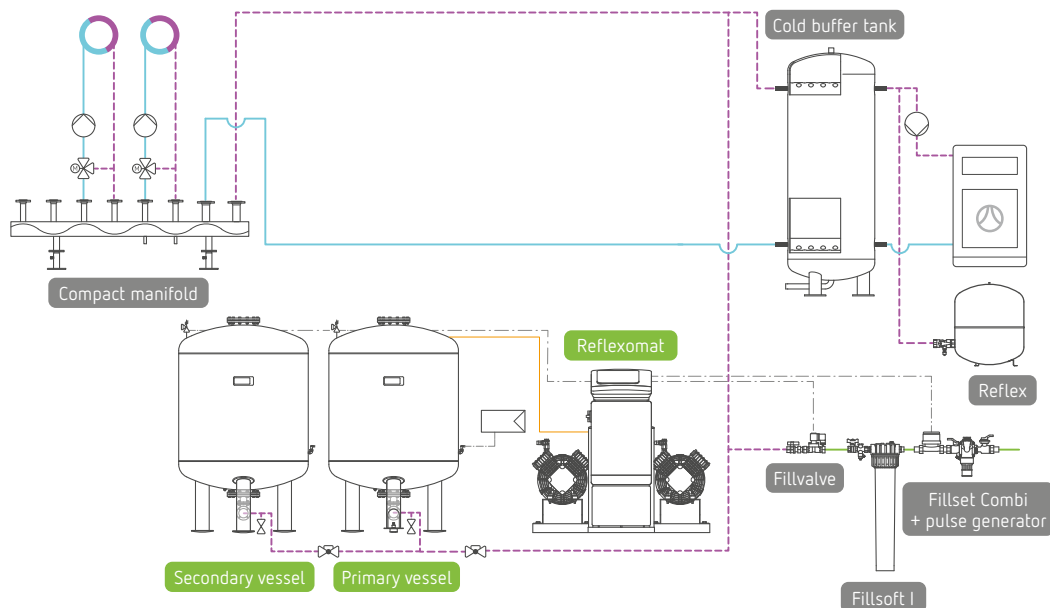
Solution № **08**


Servitec and Reflexomat must communicate with each other (both are fitted with a pressure sensor).

An electrical connection on site must be put in place between the appliances.

Servitec must be set to Levelcontrol mode.

## Reflexomat with secondary vessel in a cooling water system

Solution № **17**


Secondary vessels must be the same and size as the primary vessel.

In cooling applications, the pressure maintenance must be tied into the warmer medium to avoid condensate on the expansion lines. Dew point violation is usually prevented by the load case at higher temperatures.

# Variomat

## Key advantages

Pressure maintenance, degassing and make-up in a single system

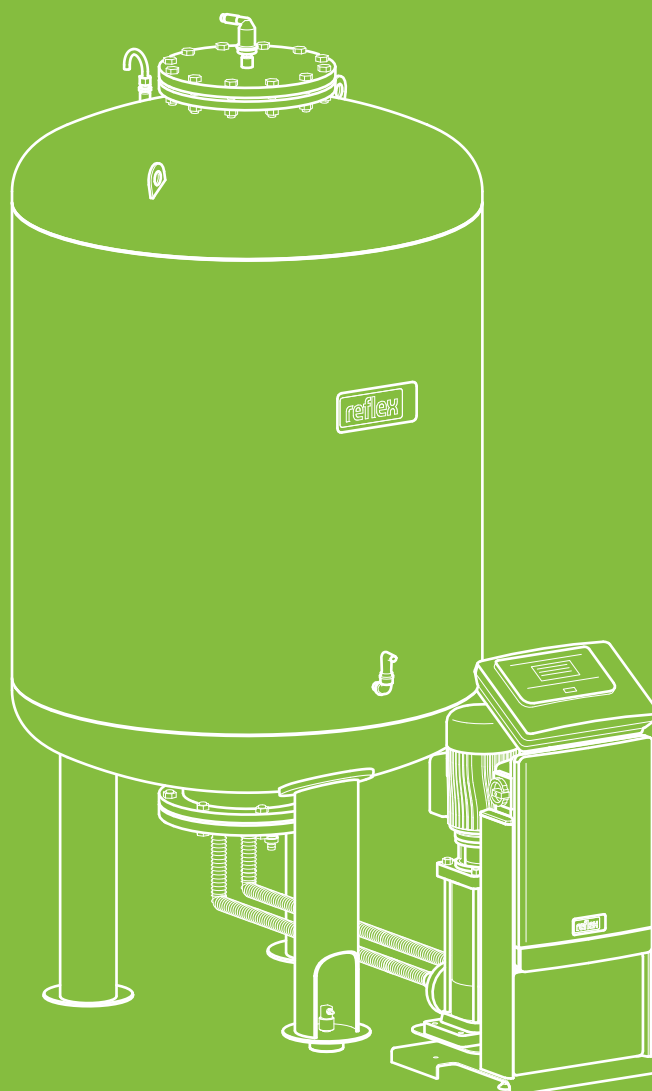
- Reliable pressure maintenance within very tight limits
- Efficient, atmospheric degassing of the system water for long-term operational safety
- Automatic make-up depending on the filling level

Easy installation and commissioning

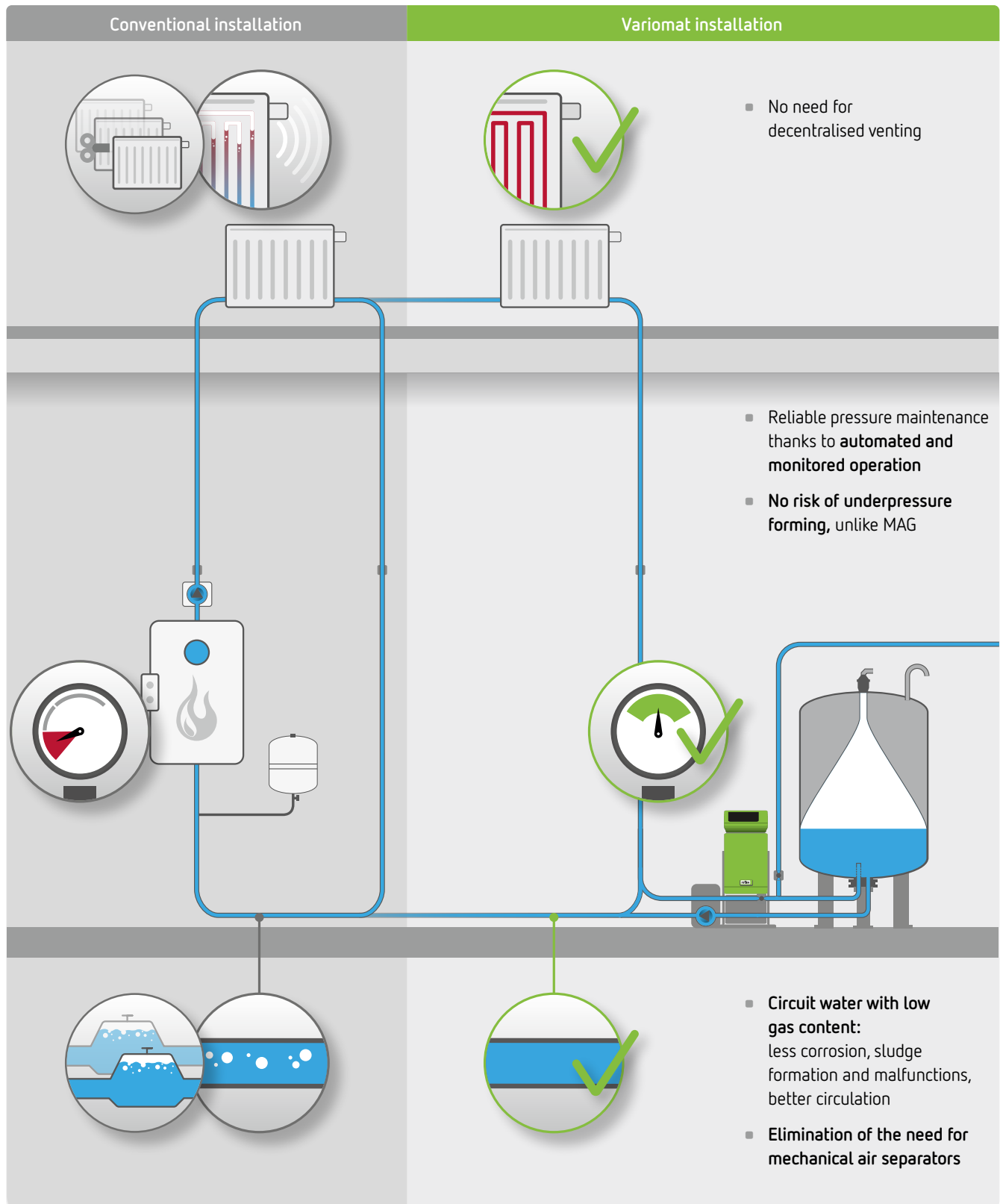
- Supplied pre-assembled and ready for operation
- Easy to install; no need for mechanical adjustments
- Low-maintenance operation

Highly modern, user-friendly controller

- Easy function and modern design ensure optimum operating convenience
- With extendable microprocessor controller Reflex Control
- Master-Slave operation enables parallel operation of up to 10 pressure maintenance stations
- Fully automatic operation with data interface for incorporation into modern building management

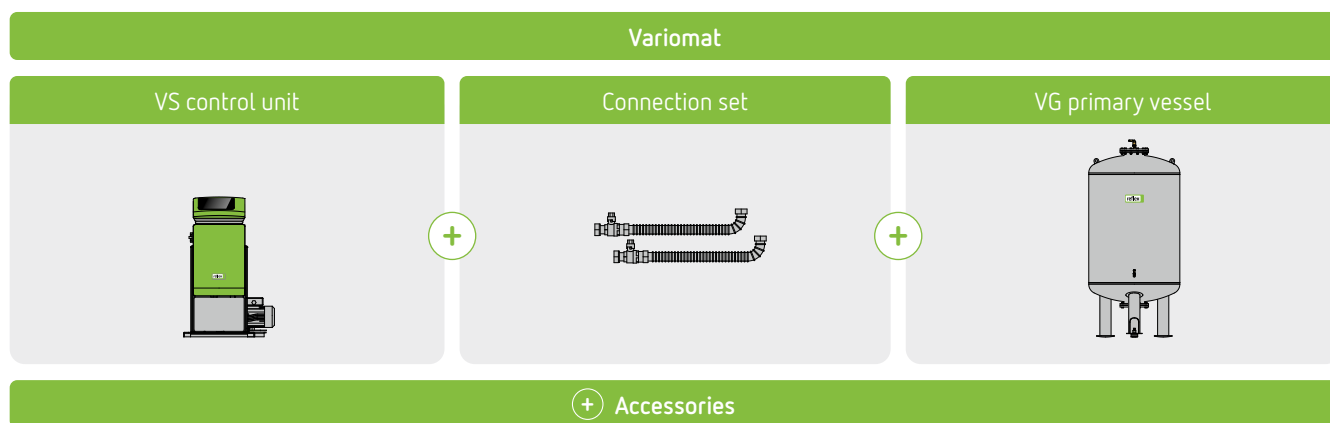


## Comparison using a heating system as an example

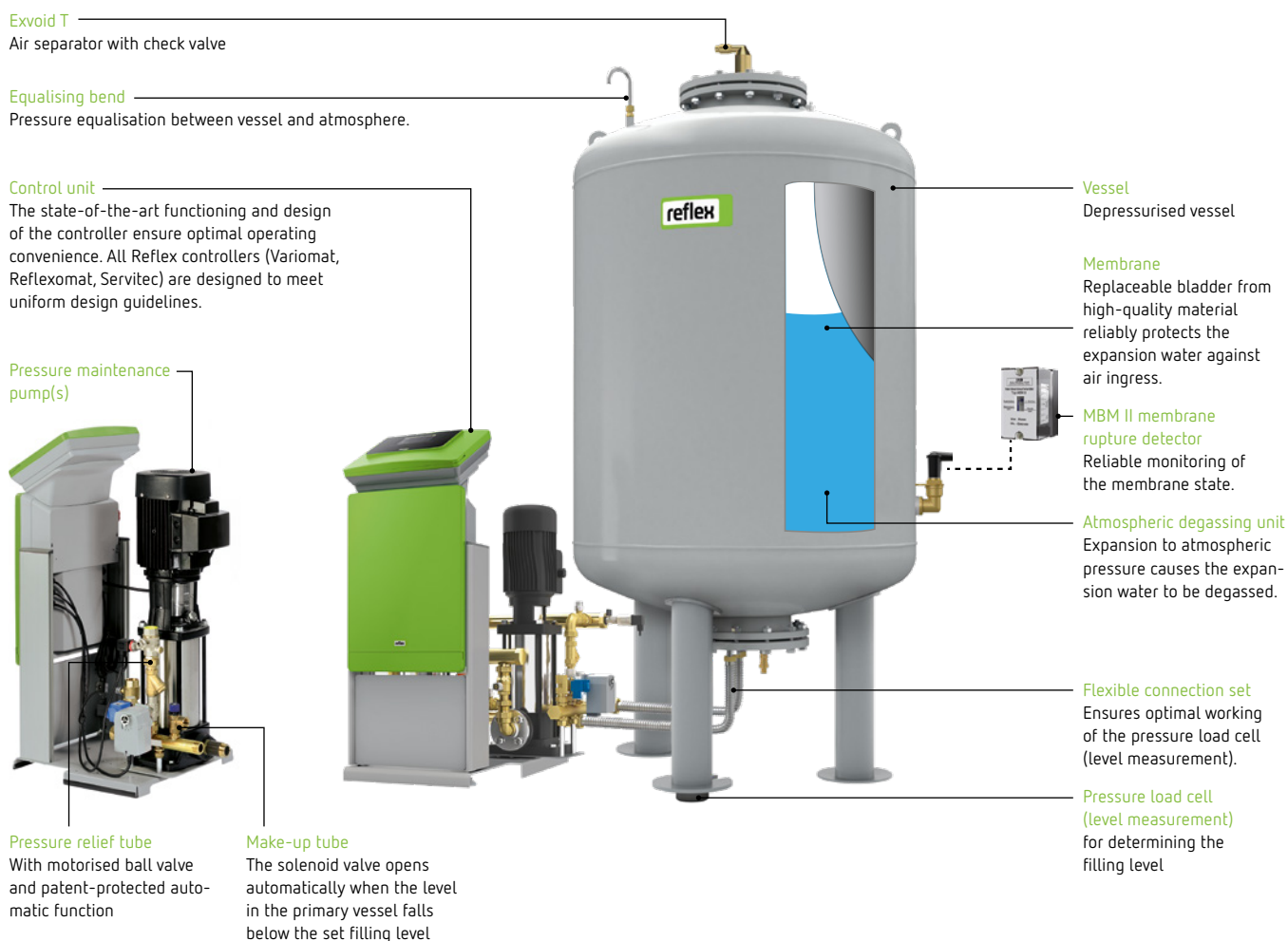


# Design, function and application

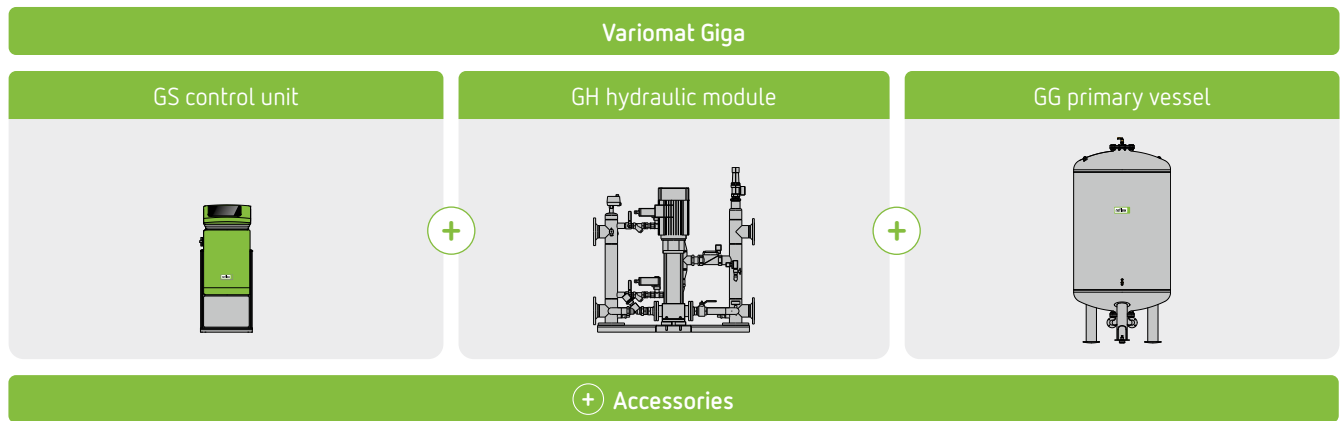
## Variomat – combination matrix



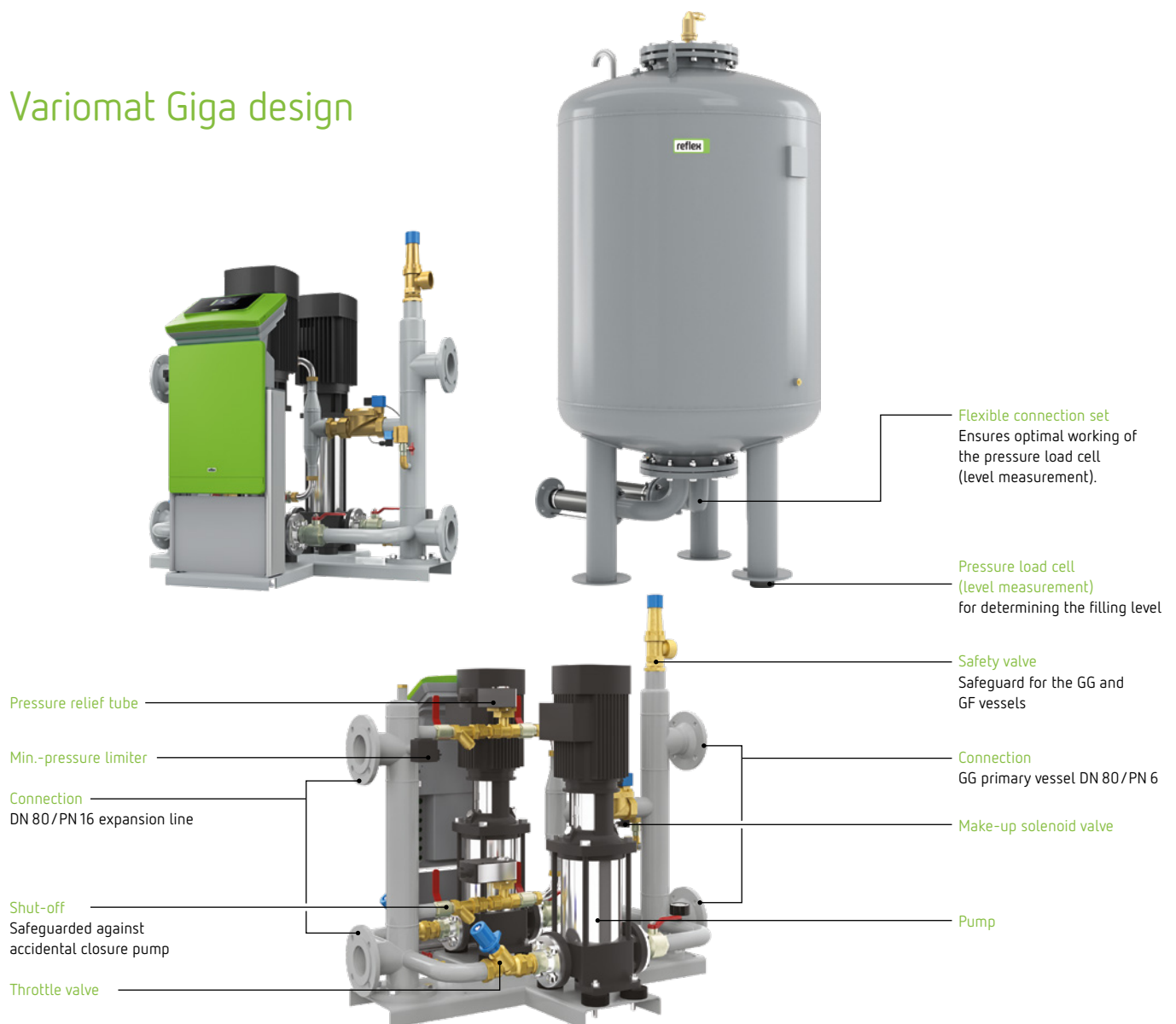
## Variomat design



## Variomat Giga – combination matrix



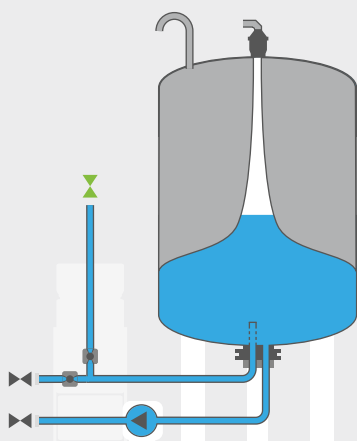
## Variomat Giga design



## Variomat – functional principle for heating

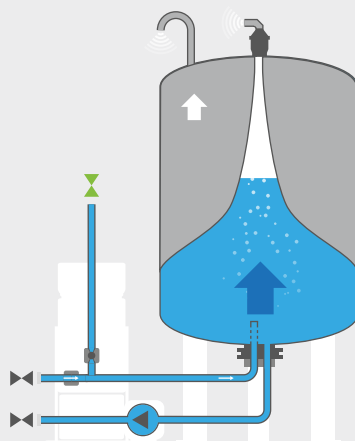
### Low temperature 1

The Variomat is fed the minimum amount of water at the lowest system temperature.



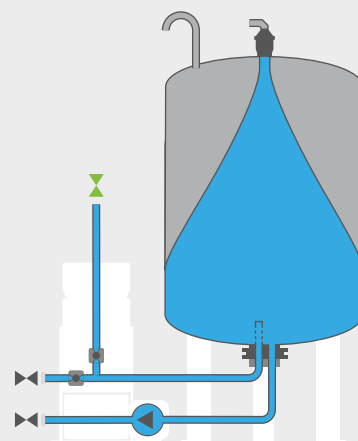
### Temperature increase 2

If the system temperature—and with it, the pressure—increases, the controller responds immediately by opening the pressure relief tube. Expansion water flows into the pressureless vessel and is degassed by means of pressure relief.



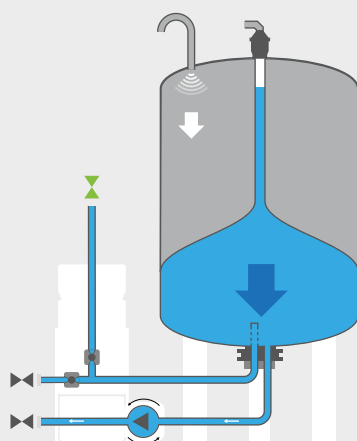
### Full capacity 3

At maximum system temperature, the Variomat stores all the expansion water and reaches the highest filling level in normal operation.



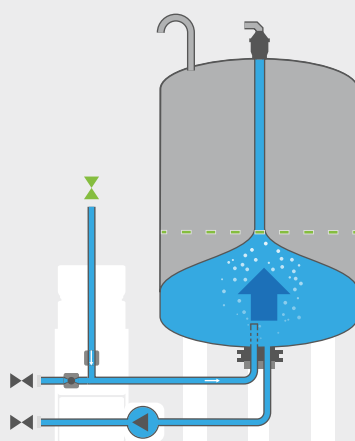
### Cool down 4

If the system cools down, the system pressure drops and the Variomat feeds the expansion water back into the system with the aid of the pump. The maximum pressure fluctuation is  $\pm 0.2$  bar.



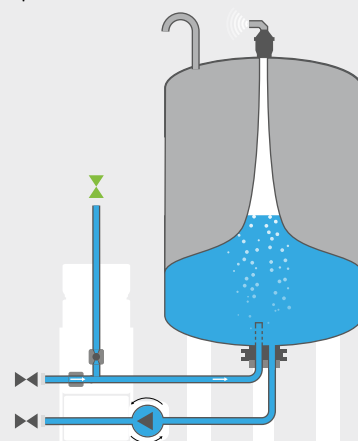
### Make-up 5

If the water content in the vessel sinks below the defined target value, the Variomat automatically opens the make-up valve to balance out the water loss on the system side.



### Continuous/interval degassing 6

Pump and overflow ball valve are both in operation. System pressure remains stable within the target value range. System water is specifically channelled through the primary vessel and degassed by means of pressure relief.



## Applications

By combining the various control and hydraulic designs, and different vessels, Variomat systems can meet requirements in a whole host of different areas.

Do your requirements exceed our standard products? Our Project Sales Team can customise a solution to suit your individual requirements:

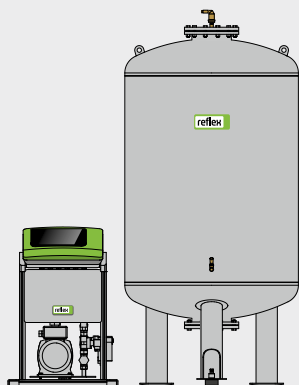


[project-sales@reflex.de](mailto:project-sales@reflex.de)

Variomat Giga can even satisfy the extreme requirements of industrial heat supply and district heating supply.

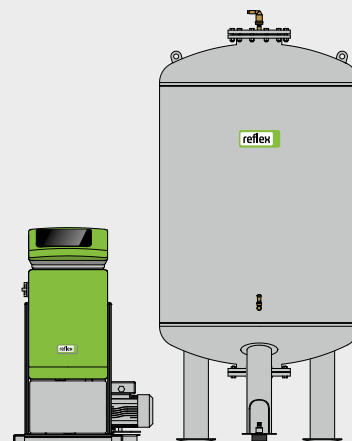
### Variomat (VS 1)

- One pump
- Without soft start
- Control Basic
- 200–500 litre expansion vessel



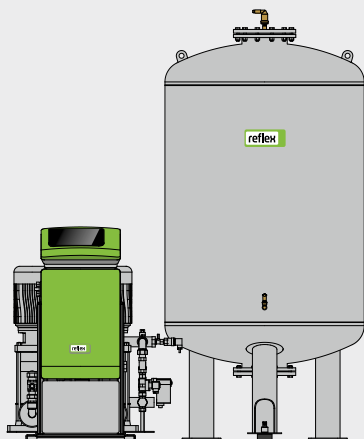
### Variomat (VS 2-1)

- One pump
- With soft start
- Control Touch
- 200–5,000 litre expansion vessel



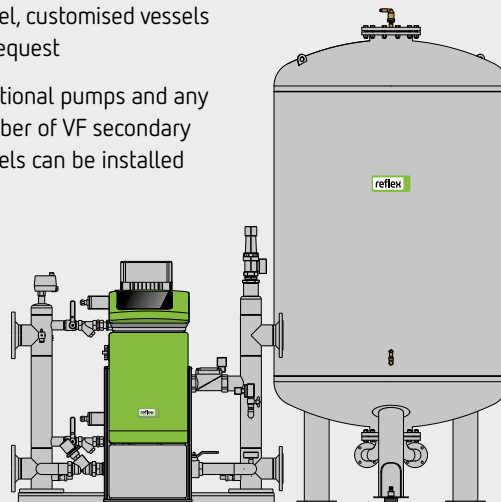
### Variomat (VS 2-2)

- Two pumps
- With soft start
- Control Touch
- 200–5,000 litre expansion vessel



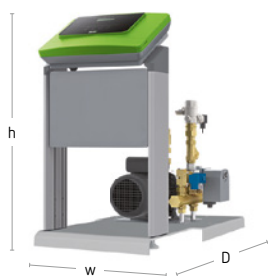
### Variomat Giga

- Two pumps
- Control Touch
- 1,000–5,000 litre expansion vessel, customised vessels on request
- Additional pumps and any number of VF secondary vessels can be installed



# Variomat product range

## Variomat control units



Variomat VS 1



Variomat VS 2-1/60



Variomat VS 2-2/95

### Technical Features

- pump-controlled pressurisation system with integral water make-up and degassing for heating and cold water systems in accordance with EN 12828
- Variomat controller VS 1 with Control Basic control unit
- from Variomat controller VS 2 with Control Touch controller and softstart
- max. perm. safety temperature in the system 110 °C
- permissible ambient temperature 0 – 45 °C
- sound pressure level ~ 55 dB(A)
- ingress protection rating IP 54
- connection water make-up Rp ½"
- group fault signal and RS 485 interface for internal communication



More information about the Reflex Control concept is available from **page 55**

## Variomat control units



	Type	Art. No.	Max. p <sub>0</sub> setting [bar]	Electric connection	Connection c	Electric power [kW]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
Control unit VS with 1 pump										
Control Basic controller										
6 bar 90 °C	VS 1	8910100	2.5	230V/50Hz	Rp 1"	0.70	681	495	535	25.00
Control Touch control unit										
10 bar 90 °C	VS 2-1/35	8910110	2.5	230V/50Hz	Rp 1"	0.80	921	495	536	30.00
	VS 2-1/60	8910200	4.8	230V/50Hz	Rp 1"	1.10	921	561	536	36.90
	VS 2-1/75	8910300	6.5	230V/50Hz	Rp 1"	1.10	921	480	561	49.90
	VS 2-1/95	8910400	8.0	230V/50Hz	Rp 1"	1.10	921	480	561	51.40
16 bar 90 °C	VS 1-1/140	8910500	13.0	400V/50Hz	Rp 1"	1.10	964	470	557	47.00
Control unit VS with 2 pumps										
Control Touch control unit										
10 bar 90 °C	VS 2-2/35	8911100	2.5	230V/50Hz	G 1 1/4"	1.50	921	630	735	63.00
	VS 2-2/60	8911200	4.8	230V/50Hz	G 1 1/4"	2.20	921	704	825	61.10
	VS 2-2/75	8911300	6.5	230V/50Hz	G 1 1/4"	2.20	921	704	706	89.00
	VS 2-2/95	8911400	8.0	230V/50Hz	G 1 1/4"	2.20	921	704	706	92.00
16 bar 90 °C	VS 1-2/140	8911500	13.0	400V/50Hz	Rp 1 1/4"	2.20	964	750	698	138.00

## Variomat vessels



VG 500 l



VG 1,000 l

### Technical Features

- replaceable bladder according to DIN EN 13831
- approval according to Pressure Equipment Directive 2014/68/EU
- max. permissible operating temperature (at the membrane) 70 °C
- max. perm. safety temperature in the system 110 °C

	Primary vessel			Secondary vessel						
	Type	Art. No.	Height h2 [mm]	Type	Art. No.	Height h2 [mm]	Connection c	Ø d [mm]	Height h [mm]	Weight [kg]
6 bar 70 °C	VG 200	8600011	191	VF 200	8610000	191	G1"	634	1,057	33.50
	VG 300	8600111	191	VF 300	8610100	191	G1"	634	1,357	55.20
	VG 400	8600211	178	VF 400	8610200	178	G1"	740	1,344	72.20
	VG 500	8600311	178	VF 500	8610300	178	G1"	740	1,564	81.10
	VG 600	8600411	177	VF 600	8610400	177	G1"	740	1,807	96.80
	VG 800	8600511	177	VF 800	8610500	177	G1"	740	2,272	109.90
	VG 1000/740	8600611	178	VF 1000/740	8610600	178	G1"	740	2,737	127.00
	VG 1000/1000	8600705	460	VF 1000/1000	8610705	460	G1"	1,000	2,127	270.00
	VG 1500	8600905	460	VF 1500	8610905	460	G1"	1,200	2,127	300.00
	VG 2000	8601005	460	VF 2000	8611005	460	G1"	1,200	2,587	400.00
	VG 3000	8601205	490	VF 3000	8611205	490	G1"	1,500	2,588	740.00
	VG 4000	8601305	490	VF 4000	8611305	490	G1"	1,500	3,160	820.00
	VG 5000	8601405	490	VF 5000	8611405	490	G1"	1,500	3,695	980.00

## ⊕ Variomat thermal insulation



### Variomat VW

- thermal insulation for Variomat vessels
- consisting of thick flexible foam
- insulation thickness for all use cases: 50 mm

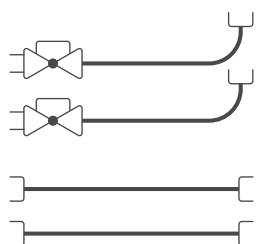


Type	Art. No.	Weight [kg]
VW 200	5990100	3.00
VW 300	5990200	3.50
VW 400	5991300	4.50
VW 500	5990000	5.50
VW 600	5990500	6.00
VW 800	5990300	8.00
VW 1000/740	5990400	8.00
VW 1000/1000	5991400	9.00
VW 1500	5991000	10.60
VW 2000	5989700	13.00
VW 3000	5108700	15.00
VW 4000	5989800	17.00
VW 5000	5991100	21.80

## + Variomat accessories



### Connection set



- Variomat connection set for single-pump systems: 2 connection hoses 1" × 1" male thread with secured shut-off
- Variomat connection set for two-pump systems: 2 connection hoses 1 1/4" × 1" male thread



The secured shut-off for systems with 1 pump is included in the connection set.  
The secured shut-off for systems with 2 pumps is included on the control unit.



### Busmodule

- for exchanging data between controller and central building management system
- only bus modules type Ethernet and Profibus DP are suitable for a Control Basic controller



### I/O module

- two additional analogue outputs for pressure and level control
- six freely programmable digital inlets
- six freely programmable floating outputs



### Commissioning

- **7945600:** Reflex commissioning Cat. 1 for Reflexomat, Variomat, Servitec with one compressor/pump
- **7945704:** Reflex commissioning add. Cat. 1 for each additional system at the same location and on the same day – one compressor/pump
- **7945630:** Reflex commissioning Cat. 2 for Reflexomat and Variomat with two compressors/pumps
- **7945721:** Reflex commissioning add. Cat. 2 for each additional system at the same location and on the same day – two compressors/pumps



### Master-Slave

- software tool
- for the operation of up to 10 Reflexomat/- Giga in one hydraulic network at up to 1,000 m distance

### Bladder rupture detector

- membrane rupture detector in vessels
- consisting of an electrode relay and an electrode (factory fitted)
- power supply 230V/50 Hz
- floating output (changeover contact)



### Valve

- reliable make-up for special applications
- part number available with pre-assembled Safecontrol on request
- Rp 1/2"



## + Variomat accessories



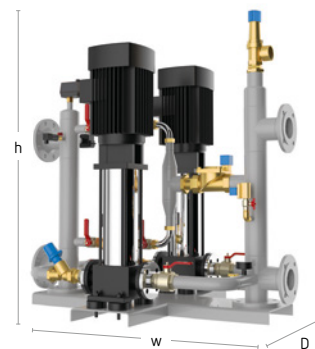
Type	Art. No.	Weight [kg]
<b>Connection set</b>		
Connection set VS 1/VS 2-1 Ø 480 – 740 mm	6940100	1.55
Connection set VS 1/VS 2-1 Ø 1,000 – 1,500 mm	6940200	1.90
Connection set VS 2-2 Ø 480 – 740 mm	6940300	1.85
Connection set VS 2-2 Ø 1,000 – 1,500 mm	6940400	2.10
<b>Busmodule</b>		
Busmodule BACnet MS/TP Touch	8860600	0.10
Busmodule BACnet-IP Touch	8860500	0.40
Busmodule Ethernet	8860300	1.90
Busmodule Modbus RTU Touch	9125592	0.20
Busmodule Profibus DP	8860200	3.00
Busmodule Profibus DP Touch	9118042	0.10
<b>I/O module</b>		
I/O module VS	8997705	1.00
<b>Commissioning</b>		
Commissioning Cat. 1	7945600	–
Commissioning Cat. 2	7945630	–
Commissioning add. Cat. 1	7945704	–
Commissioning add. Cat. 2	7945721	–
<b>Master-Slave</b>		
Master-Slave	7859100	0.10
<b>Bladder rupture detector</b>		
Bladder rupture detector MBM II	7857700	0.62
<b>Valve</b>		
Valve Safecontrol	9119352	0.97

# Variomat Giga product range

## Variomat Giga control units



Variomat Giga Control Unit GS



Variomat Giga Hydraulic GH

### Technical Features

- pump-controlled pressurisation system with integral water make-up and degassing for heating and cold water systems in accordance with EN 12828
- control module for hydraulic module:
  - GS 1.1 for GH 50/GH 70
  - GS 3 for GH 90/GH 100
- Control Touch control unit
- maximum operating safety due to 100 % redundant operation with two pumps and two overflow valves
- max. permissible operating overpressure 16 bar
- max. perm. safety temperature in the system 110 °C
- max. permissible operating temperature 90 °C
- sound pressure level ~ 55 dB(A)
- connection pump DN 80/PN 16
- connection Primary vessel DN 80/PN 6
- connection water make-up Rp ½"



Two control units can also be connected in parallel operation. For example, two standard Variomat Gigas with 30 MW each can be combined to form a single 60 MW system.

	Type	Art. No.	Max. p <sub>0</sub> setting [bar]	Electric connection	Connection c	Electric power [kW]	Height h [mm]	Width w [mm]	Depth D [mm]	Weight [kg]
Control Units										
	GS 1.1	8912500	–	230 V/50 Hz	–	2.20	921	380	477	7.60
	GS 3	8912600	–	400 V/50 Hz	–	6.00	921	380	477	7.10
Hydraulic modules										
16 bar 90 °C	GH 50	8931000	4.0	230 V/50 Hz	DN 80/PN 16	2.20	1,194	1,168	830	195.00
	GH 70	8932000	6.0	230 V/50 Hz	DN 80/PN 16	2.20	1,194	1,168	830	161.00
	GH 90	8931400	8.0	400 V/50 Hz	DN 80/PN 16	6.00	1,194	1,168	830	220.00
	GH 100	8931200	9.5	400 V/50 Hz	DN 80/PN 16	6.00	1,194	1,168	830	214.50
Control & hydraulic module										
16 bar 90 °C	GS 1.1 + GH 50	8931025	4.0	230 V/50 Hz	DN 80/PN 16	2.20	1,194	1,548	1,307	211.00
	GS 1.1 + GH 70	8931026	6.0	230 V/50 Hz	DN 80/PN 16	2.20	1,194	1,548	1,307	214.00
	GS 3 + GH 90	8931027	8.0	400 V/50 Hz	DN 80/PN 16	6.00	1,194	1,548	1,307	240.00
	GS 3 + GH 100	8931028	9.5	400 V/50 Hz	DN 80/PN 16	6.00	1,194	1,548	1,307	283.00

## Variomat Giga vessels



GG 1,000 l



GF 1,000 l

Technical  
Features

- replaceable bladder according to DIN EN 13831
- approval according to Pressure Equipment Directive 2014/68/EU
- max. permissible operating temperature (at the membrane) 70 °C
- max. perm. safety temperature in the system 110 °C

	Primary vessel			Secondary vessel						
	Type	Art. No.	Height h2 [mm]	Type	Art. No.	Height h2 [mm]	Connection c	Ø d [mm]	Height h [mm]	Weight [kg]
6 bar 70 °C	GG 1000	8920105	252	GF 1000	8930105	195	DN 65/PN 6	1,000	2,158	270.00
	GG 1500	8920305	245	GF 1500	8930305	195	DN 65/PN 6	1,200	2,158	340.00
	GG 2000	8920405	245	GF 2000	8930405	195	DN 65/PN 6	1,200	2,618	430.00
	GG 3000	8920605	275	GF 3000	8930605	225	DN 65/PN 6	1,500	2,606	651.00
	GG 4000	8920705	275	GF 4000	8930705	225	DN 65/PN 6	1,500	3,181	890.00
	GG 5000	8920805	275	GF 5000	8930805	225	DN 65/PN 6	1,500	3,716	980.00

## + Variomat Giga accessories



### Busmodule

- for exchanging data between controller and central building management system
- only bus modules type Ethernet and Profibus DP are suitable for a Control Basic controller



### I/O module

- two additional analogue outputs for pressure and level control
- six freely programmable digital inlets
- six freely programmable floating outputs



### Commissioning

- **7945724**: Reflex commissioning for Variomat Giga with two pumps



### Master-Slave

- software tool
- for the operation of up to 10 Reflexomat /- Giga in one hydraulic network at up to 1,000 m distance

### Bladder rupture detector

- membrane rupture detector in vessels
- consisting of an electrode relay and an electrode (factory fitted)
- power supply 230 V/50 Hz
- floating output (changeover contact)



### Safety valve

- safety valve SV1 for additional protection of GG and GF vessels at nominal heat capacities > 10.5 MV



### Valve

- reliable make-up for special applications
- part number available with pre-assembled Safecontrol on request
- Rp 1/2"



## + Variomat Giga accessories

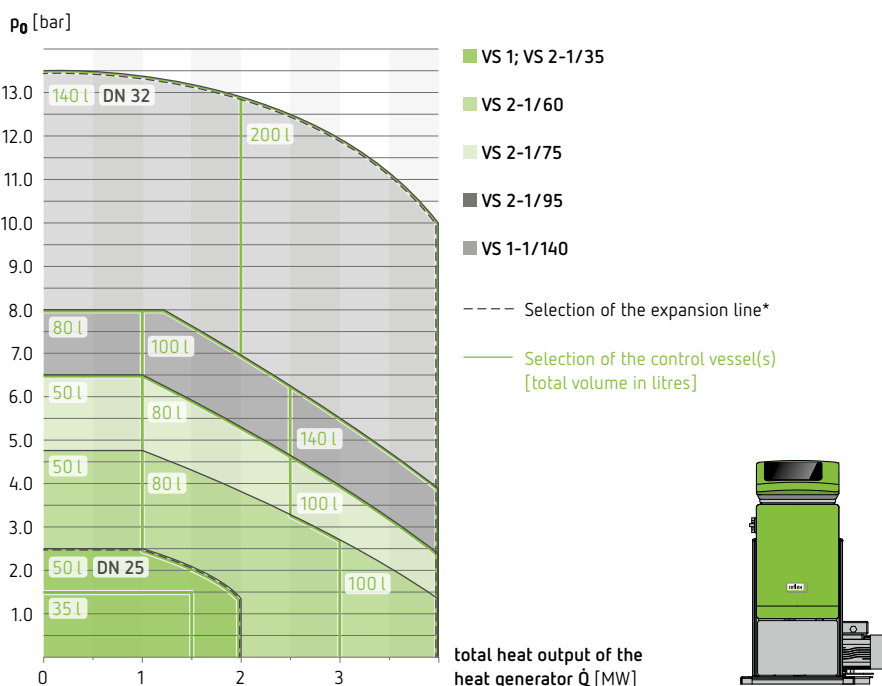


Type	Art. No.	Weight [kg]
<b>Busmodule</b>		
Busmodule BACnet MS/TP Touch	8860600	0.10
Busmodule BACnet-IP Touch	8860500	0.40
Busmodule Ethernet	8860300	1.90
Busmodule Modbus RTU Touch	9125592	0.20
Busmodule Profibus DP	8860200	3.00
Busmodule Profibus DP Touch	9118042	0.10
<b>I/O module</b>		
I/O module GS	8997700	1.00
<b>Commissioning</b>		
Commissioning Variomat Giga	7945724	–
<b>Master-Slave</b>		
Master-Slave	7859100	0.10
<b>Bladder rupture detector</b>		
Bladder rupture detector MBM II	7857700	0.62
<b>Safety valve</b>		
Safety valve SV 1	6942100	0.55
<b>Valve</b>		
Valve Safecontrol	9119352	0.97

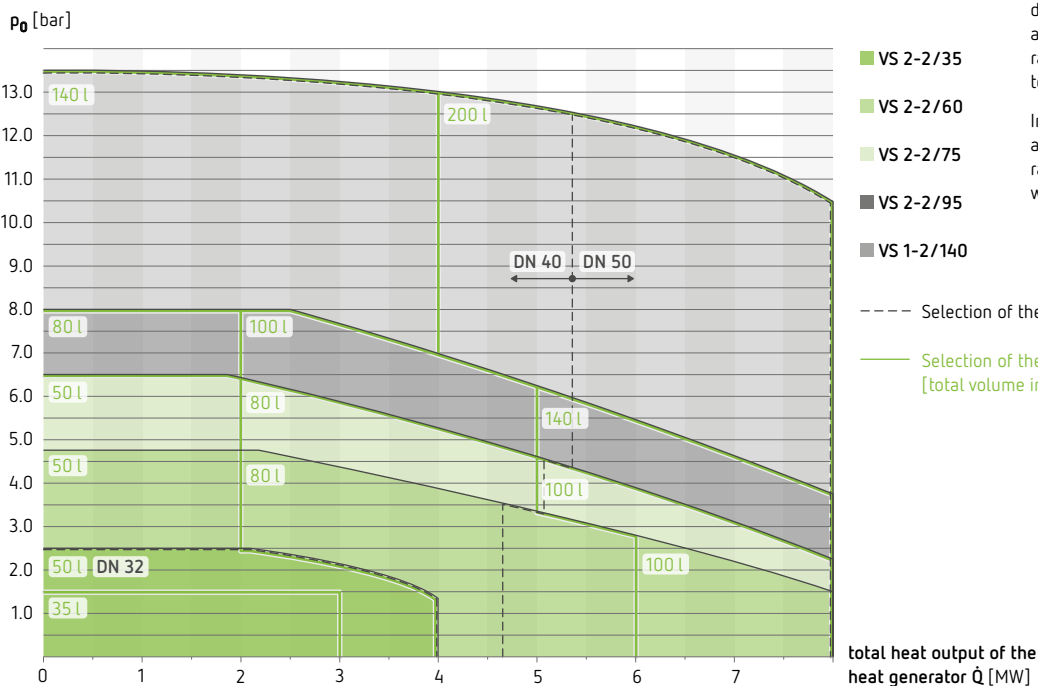
# Selection and calculation

for heating systems up to 120 °C

## Variomat control unit — quick selection



Variomat with one pump



Variomat with two pumps

### Selection of control units

#### Alternative calculation method

$$p_0 \geq \frac{H_{st} [m]}{10} + \begin{matrix} 0.2 \text{ bar } [\leq 100 \text{ }^\circ\text{C}]^* \\ 0.5 \text{ bar } [105 \text{ }^\circ\text{C}]^* \\ 0.7 \text{ bar } [110 \text{ }^\circ\text{C}]^* \\ 1.2 \text{ bar } [120 \text{ }^\circ\text{C}]^* \end{matrix}$$

$H_{st}$  = Static height

\* Safety temperature

### Selection of control vessels

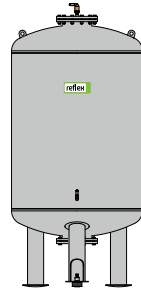
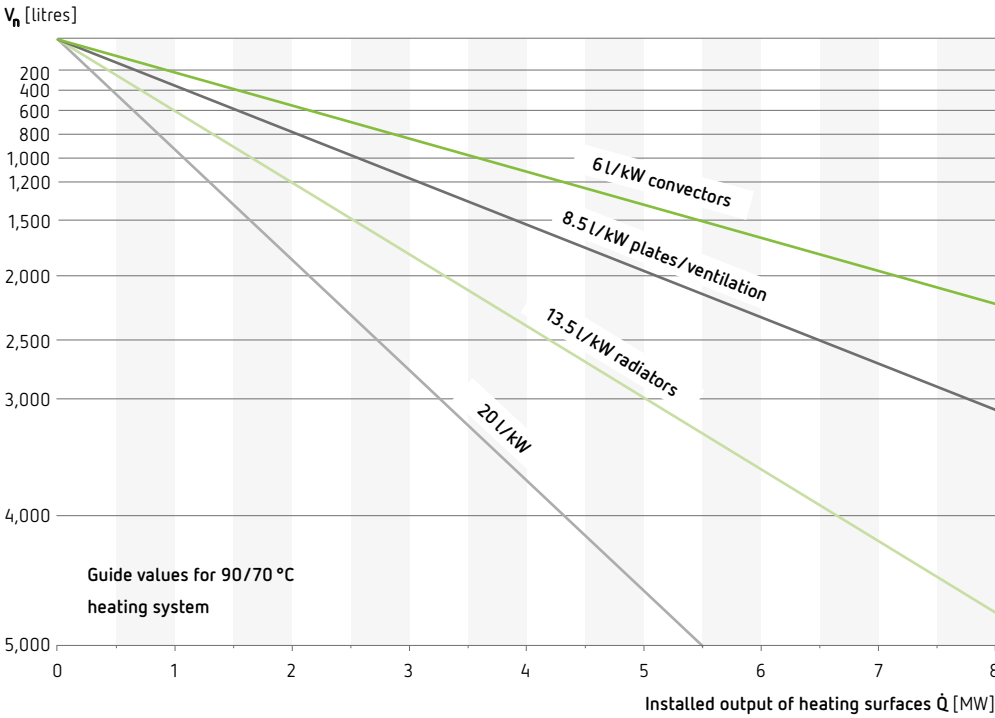
Unlike pressure expansion vessels or compressor-controlled pressure maintenance, gas cushions do not act as shock absorbers in pump-controlled pressure maintenance. A control vessel must therefore be incorporated to absorb the shocks occurring when the pump runs up and down.

If installed correctly, it does not share in the main task of maintaining pressure. The dimensioning of a control vessel is dictated by the characteristic values  $p_0$  and the expansion flow rate of the system, rather than by the type of pressure maintenance station.

In the absence of individual protection and pump redundancy, we recommend the rapid selection process described above when dimensioning the control vessels.

\* If the expansion line is longer than 10 m, we recommend choosing a size larger.

# Variomat vessels — quick selection



## Alternative calculation method

$$V_n \geq V_a \times \begin{matrix} 0.031 [70^\circ\text{C}]^* \\ 0.045 [90^\circ\text{C}]^* \\ 0.054 [100^\circ\text{C}]^* \end{matrix}$$

$V_n$  = Nominal volume  
 $V_a$  = System's water capacity  
 \* Design flow temperature

Nominal volume  $V_n$  approximation from sketch or calculated using a formula.

The nominal volume can be split between multiple vessels (VG primary and VF secondary vessels).

Customised solutions and higher outputs or temperatures > 120 °C are available on request.



## Basic technical data

Heat generator capacity  $\dot{Q} = 3,000 \text{ kW}$   
 Water content  $V_a = \text{unknown}$   
 (approximation from installed heat output  $\dot{Q} = 3,000 \text{ kW}$ , radiators, 90/70 °C, no additional district heating tubes)  
 Design temperature = 90 °C  
 Safety temperature = 110 °C  
 Static height  $H_{st} = 25 \text{ m}$   
 Expansion coefficient  $n = 0.0228$

## Calculation

$$p_0 \geq \frac{H_{st} [\text{m}]}{10} \text{ bar} + 0.7 \text{ bar} [110^\circ\text{C}]$$

$$p_0 \geq \frac{25}{10} \text{ bar} + 0.7 \text{ bar} = 3.2 \text{ bar}$$

Nominal volume from the sketch  $V_n = 1,800 \text{ l}$

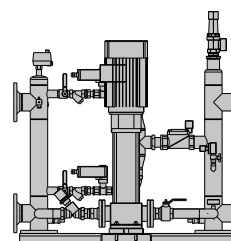
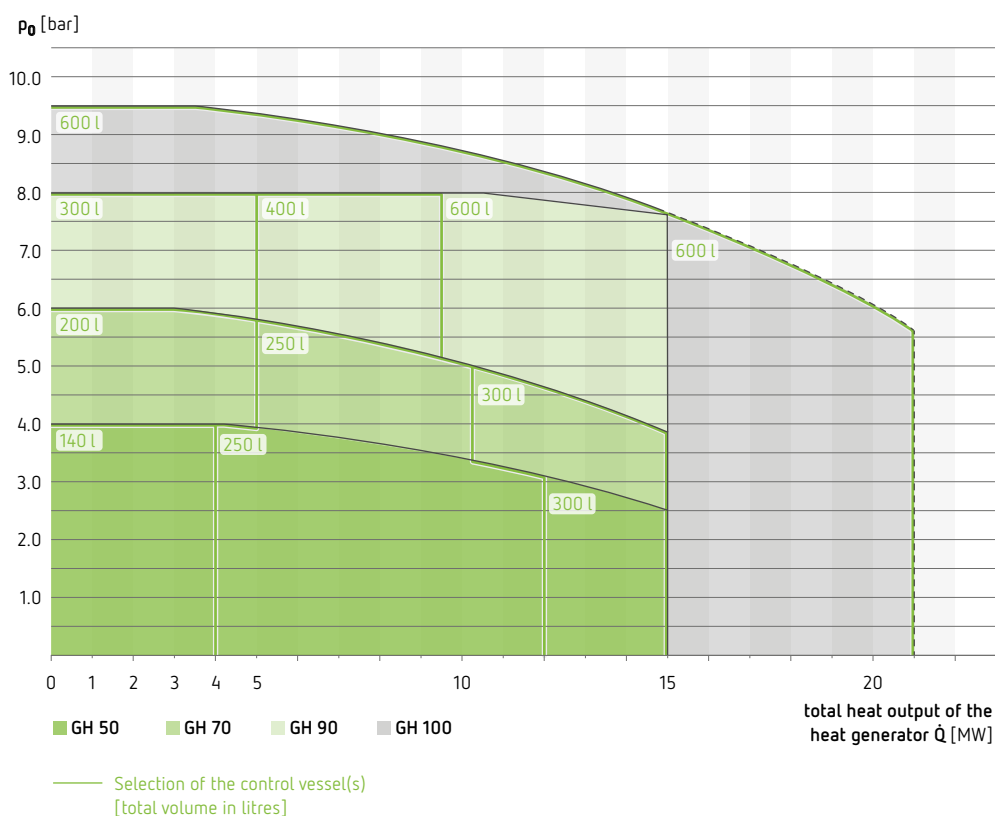
## Result

Control unit	VS 2-2/60
Primary vessel VG (e.g. Ø 1,000)	1,000 l
+ Secondary vessel VF	1,000 l
	= 2,000 l
VW heat insulation	1,000 l
Connection set	G 1 1/4"
SU cap valve	R 1 x 1
Expansion line	DN 50



Selection example

## Variomat Giga hydraulic module — quick selection



### Alternative calculation method

$$p_0 \geq \frac{H_{st} [m]}{10} + \begin{matrix} 0.2 \text{ bar } [\leq 100^\circ \text{C}]^* \\ 0.5 \text{ bar } [\leq 105^\circ \text{C}]^* \\ 0.7 \text{ bar } [\leq 110^\circ \text{C}]^* \\ 1.2 \text{ bar } [120^\circ \text{C}]^* \\ 1.9 \text{ bar } [130^\circ \text{C}]^* \\ 2.8 \text{ bar } [140^\circ \text{C}]^* \end{matrix}$$

$H_{st}$  = Static height  
\* Safety temperature

When selecting the control unit for cooling water systems to 30 °C, only 50 % of the rated heat output may be included in the calculation.



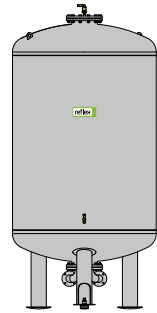
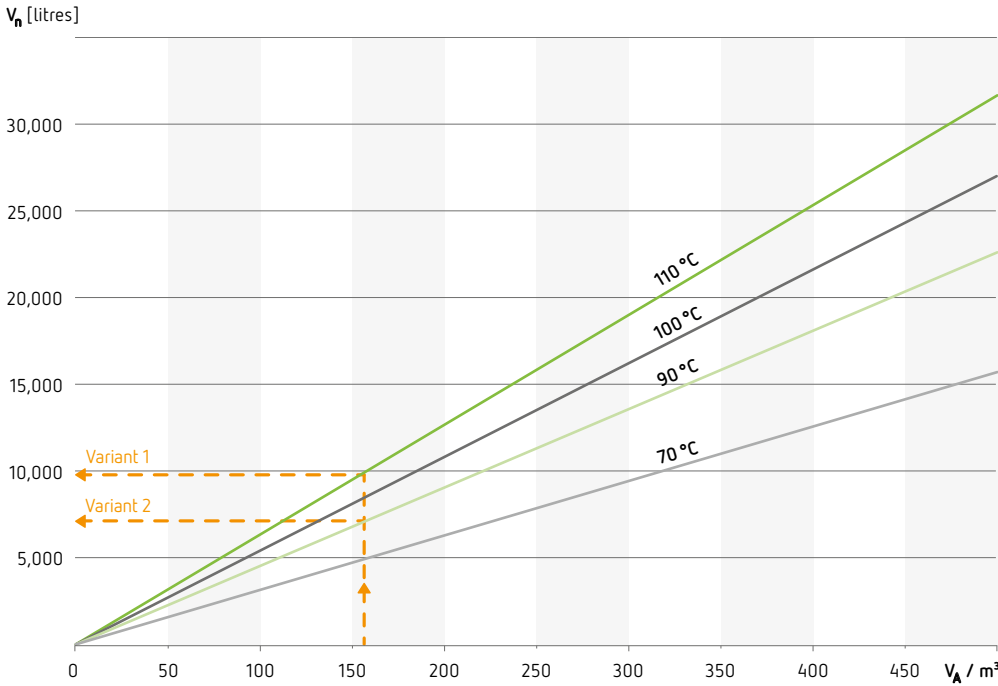
Larger models are available on request.

## Selection of the expansion lines

Expansion lines	DN 25 1"	DN 32 1 1/4"	DN 40 1 1/2"	DN 50 2"	DN 65	DN 80	DN 100
$\dot{Q}$ /kW Length $\leq 10$ m	2,100	3,600	4,800	7,500	14,000	19,000	29,000
$\dot{Q}$ /kW Length $> 10$ m $\leq 30$ m	1,400	2,500	3,200	5,000	9,500	13,000	20,000

If the expansion line is longer than **10 m**, we recommend choosing a size larger.

# Variomat Giga vessels — quick selection



## Alternative calculation method

$$V_n \geq V_A \times \begin{matrix} 0.031 [70^\circ\text{C}]^* \\ 0.045 [90^\circ\text{C}]^* \\ 0.054 [100^\circ\text{C}]^* \\ 0.063 [110^\circ\text{C}]^* \end{matrix}$$

$V_n$  = Nominal volume  
 $V_A$  = System's water capacity  
 \* Design flow temperature

Nominal volume  $V_n$  approximation from sketch or calculated using a formula.

The nominal volume can be split between multiple vessels (GG primary and GF secondary vessels).

Customised solutions and higher outputs or temperatures > 120 °C are available on request.



## Basic technical data

Heat generator capacity  $\dot{Q}$  =  $2 \times 6.5$  MW  
 = 13 MW  
 Water content  $V_A$  = 156  $m^3$   
 Design flow temperature = 110 °C  
 Design return temperature = 70 °C  
 Safety temperature = 120 °C  
 Static height  $H_{st}$  = 30 m

## Calculation – control unit

$$p_0 \geq \frac{H_{st} [m]}{10} \text{ bar} + 1.2 \text{ bar} [210^\circ\text{C}]$$

$$p_0 \geq \frac{25}{10} \text{ bar} + 1.2 \text{ bar} = 3.7 \text{ bar}$$

## Result – control unit

Control unit **GS 1.1**  
 Hydraulic module **GH 70**

## Calculation – vessel

**Variant 1**  
 $V_n$  for design flow temperature = 110 °C  
 $V_n = V_A \times 0.063 [110^\circ\text{C}]$   
 $V_n = 156 \text{ m}^3 \times 0.063 = 9.82 \text{ m}^3$

**Variant 2**  
 $V_n$  for average system temperature  $\frac{110 + 70^\circ\text{C}}{2} = 90^\circ\text{C}$   
 $V_n = V_A \times 0.045 [90^\circ\text{C}]$   
 $V_n = 156 \text{ m}^3 \times 0.045 = 7.02 \text{ m}^3^*$

\* The decision must be made after consultation with the operator and—if the systems are subject to mandatory testing—the Notified Body, as to whether the max. flow temperature or e.g. the average system temperature is to be used.

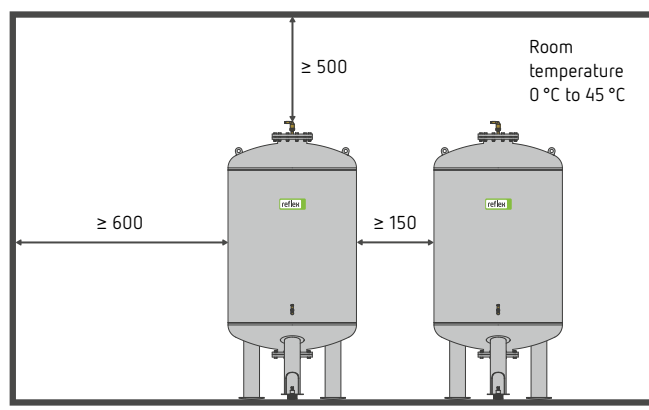


Selection example

# Installation and commissioning

## Installation notes

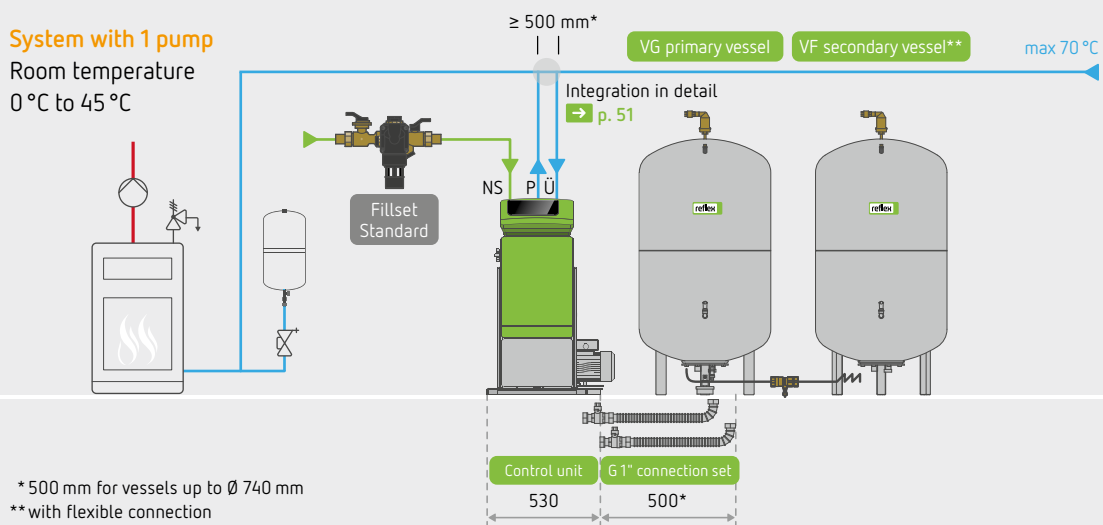
- Primary vessel connections must always be flexible to ensure proper functional performance of the level sensor.
- The connection set from the Reflex range of accessories must be used to connect the vessels. The secondary vessel is connected on site.
- Primary and secondary vessels must be installed on the same level (height) and close to each other.
- The control vessel is either tied into the expansion line or used as individual protection for the generator. The upstream pressure of control vessel  $p_0$  must be set to the minimum operating pressure  $p_0$  of the pressure maintenance station. Differences in static height must be taken into consideration.



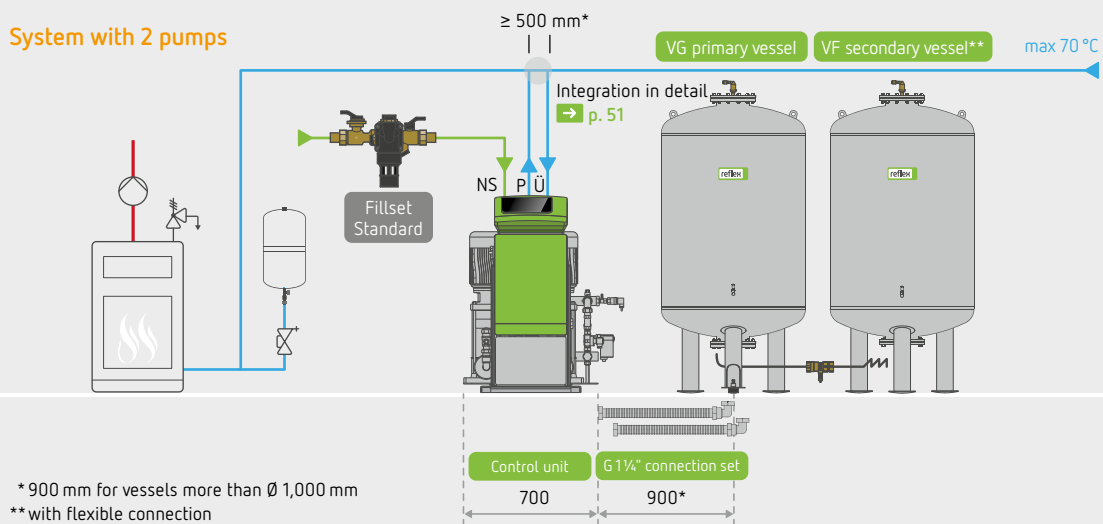
## Installation examples

### System with 1 pump

Room temperature  
0 °C to 45 °C



### System with 2 pumps



## Flow rates

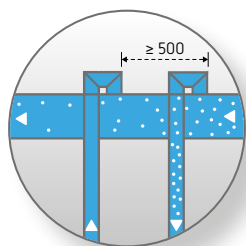
The Variomat degassing function will only work reliably if the Variomat is tied into a representative main flow of the facility system. The following minimum flow rates  $\dot{V}$  must be adhered to in operation. Given a spread of  $dT = 20\text{ K}$ , this corresponds to a minimum design output of the customer's facility of  $\dot{Q}$ .

	Variomat			
	1	2-1	2-2/35	2-2/60-95
$\dot{V}$	2 m³/h	4 m³/h	2 m³/h	4 m³/h
$\dot{Q}$	47 kW	94 kW	47 kW	94 kW

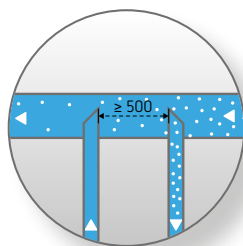
## Hydraulic integration

To avoid any coarse dirt getting directly into the Variomat, the connection tubes must be tied in from above, from the side, or from below as immersion tubes into the main line.

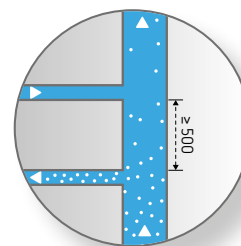
A minimum distance of 500 mm between the integration points must be observed.



from above



from below  
immersion tube



from the side  
(optionally horizontal  
or vertical)

## Caution: dirt!

- Tying the pump and pressure relief tubes into the system in such a way as to avoid the ingress of coarse dirt (see above). Dimensioning the expansion lines, see [pages 24 and 48](#).
- When connecting the make-up tube directly to a drinking water system, a Reflex Fillset (shut-off, system separator, water meter, dirt trap) must be installed upstream.
- If the Fillset is not installed, at the very least a dirt trap (mesh size  $< 0.25\text{ mm}$ ) must be incorporated to protect the make-up solenoid valve.
- The tube between the dirt trap and the solenoid valve must be kept as short as possible and must be flushed.

Please refer to our detailed operating instructions during installation and commissioning.

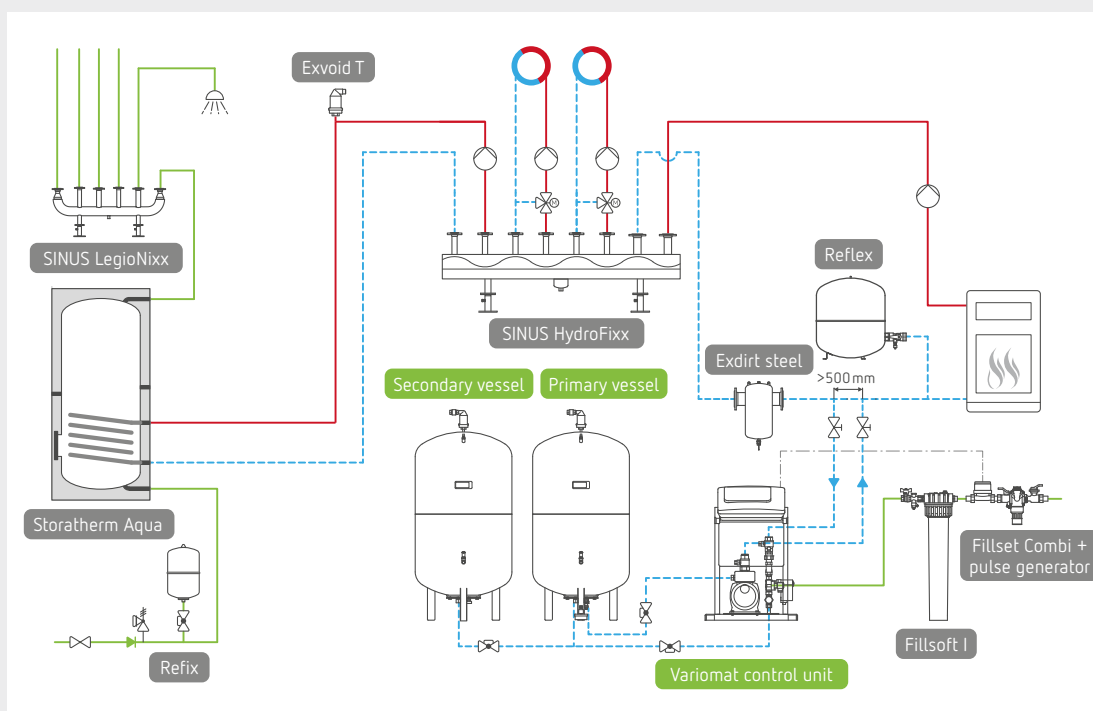


# Installation examples

## Solution № 09 Pressure maintenance and degassing by Variomat

Pump-controlled pressure maintenance with simultaneous degassing in a Reflex Variomat.

Reflex diaphragm expansion vessel as individual protection of the heat generator in the return flow.



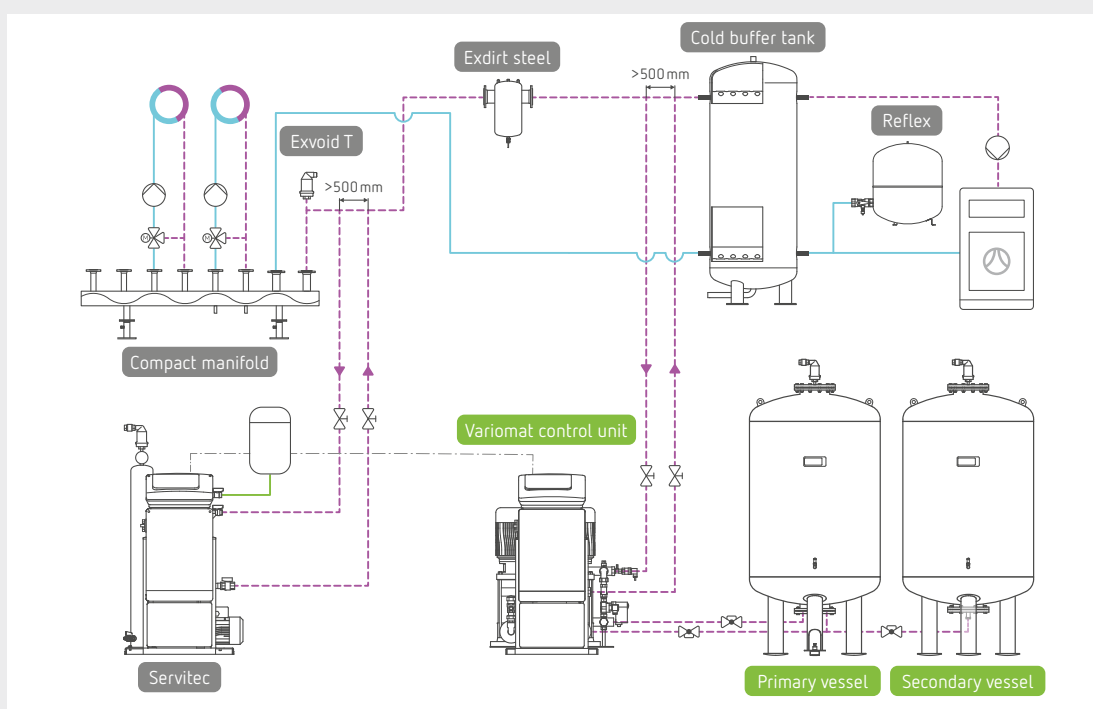
## Solution № 20 Variomat in cooling applications

Use of Servitec vacuum spray tube degassing to achieve maximum degassing performance.

When combining Servitec and Variomat, the degassing function on the Variomat must be deactivated.

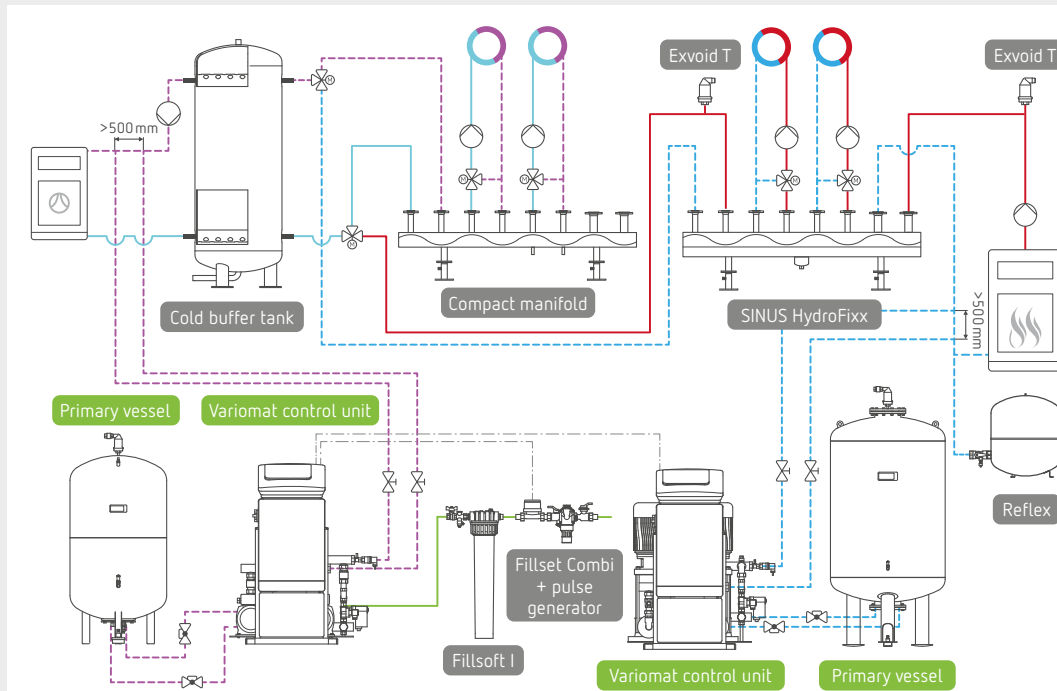
Automatic make-up of pre-mixed heat transfer medium, vessel supplied by installer.

When selecting the control unit for cooling water systems to 30 °C, only 50 % of the rated heat output may be included in the calculation.



## Variomat in Master-Slave operation

Solution № 14

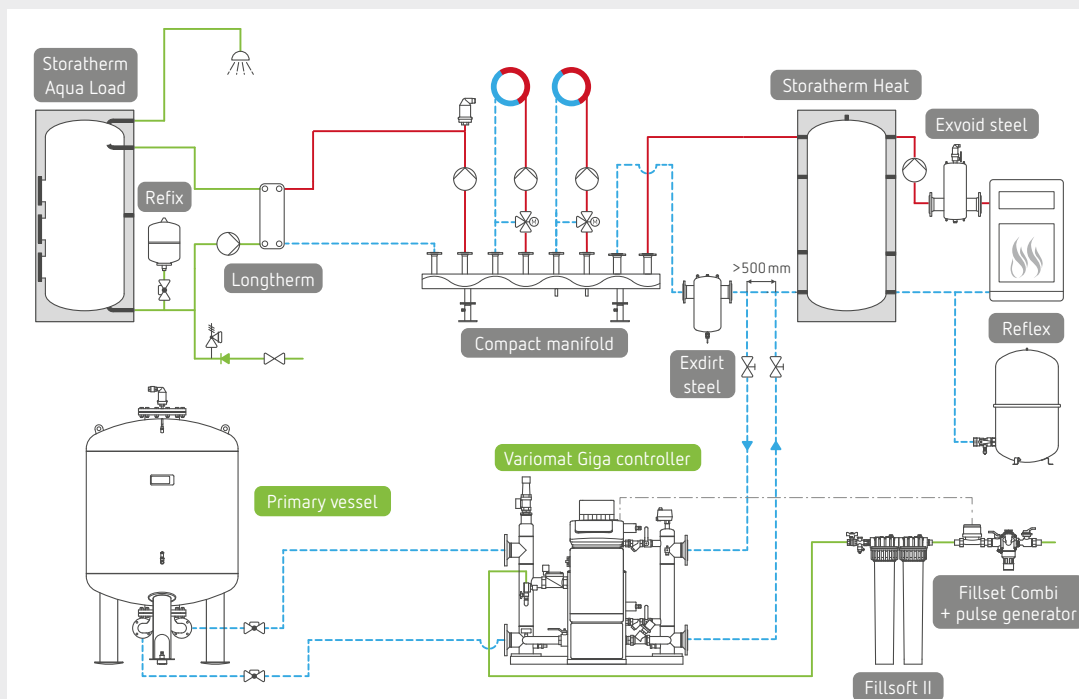


Hydraulically connected heating and cooling.

A Master-Slave configuration is only recommended if the systems are hydraulically connected or the stations at different levels; examples include summer and winter operation of cooling and heating systems, or a group of several heat generating systems.

## Variomat Giga

Solution № 12



Pressure maintenance in major facilities requiring large quantities of heat and hot water.

Connection of the vessels must be flexible. Factory connections are provided for this purpose. The tube connection between the hydraulic units and the vessels must be provided on site.

These diagrams are only meant to visualise the interconnections.  
Installation must be adapted to local conditions accordingly and must be specified in more detail.

# Reflex Control

## Key advantages

Extremely modern, user-friendly control concept,  
easy to operate and clearly structured

- Extendable microprocessor controller
- Reflex Control flexible control concept for fully automatic operation with data interface for incorporation into modern building management
- Enables communication between Servitec facilities, Reflex pressure maintenance stations, the Fillcontrol range, and a control centre



# Reflex Control overview

## Reflex Control systems

### 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× meter pulse inlet for contact water meter
  - 2× floating outputs for fault messages
  - 2× analogue parametrisable outputs for pressure & level
  - 2× RS-485 interfaces for connection to building management system and other networks
  - slots for HMS Networks and SD memory card

### Control Smart



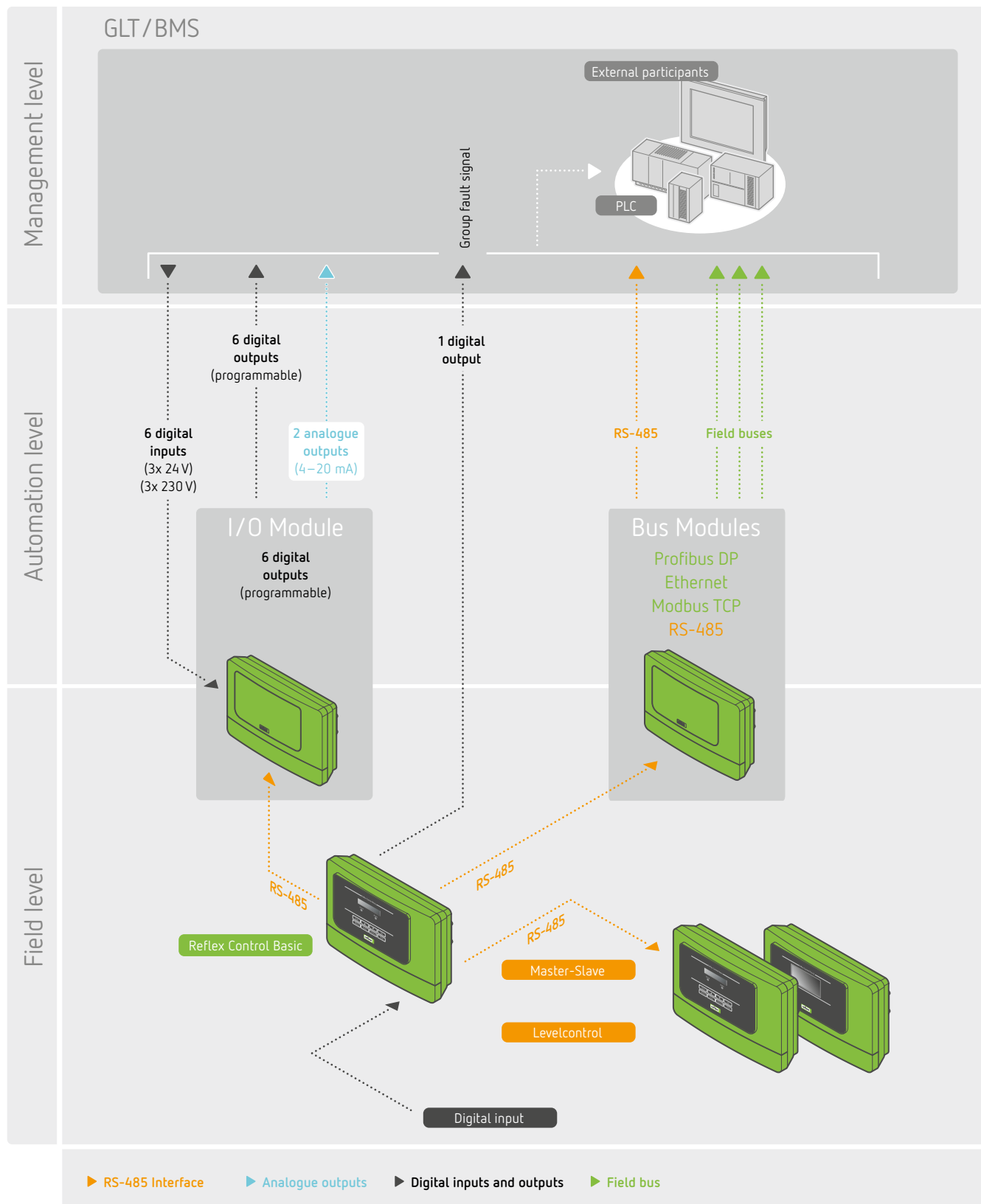
- access via Bluetooth interface
- quick and easy commissioning
- parametrisation of the degassing mode (continuous or intermittent operation, number of cycles) including days of the week and time
- fault message display
- system pressure checking
- software updates for the system control
- maintenance and troubleshooting wizard
- currently available for **Reflexomat XS, Reflexomat Silent Compact Smart, Fillcontrol Smart, Servitec Mini, Servitec S and Reflex Greenbox**

Now available  
for Android and iOS

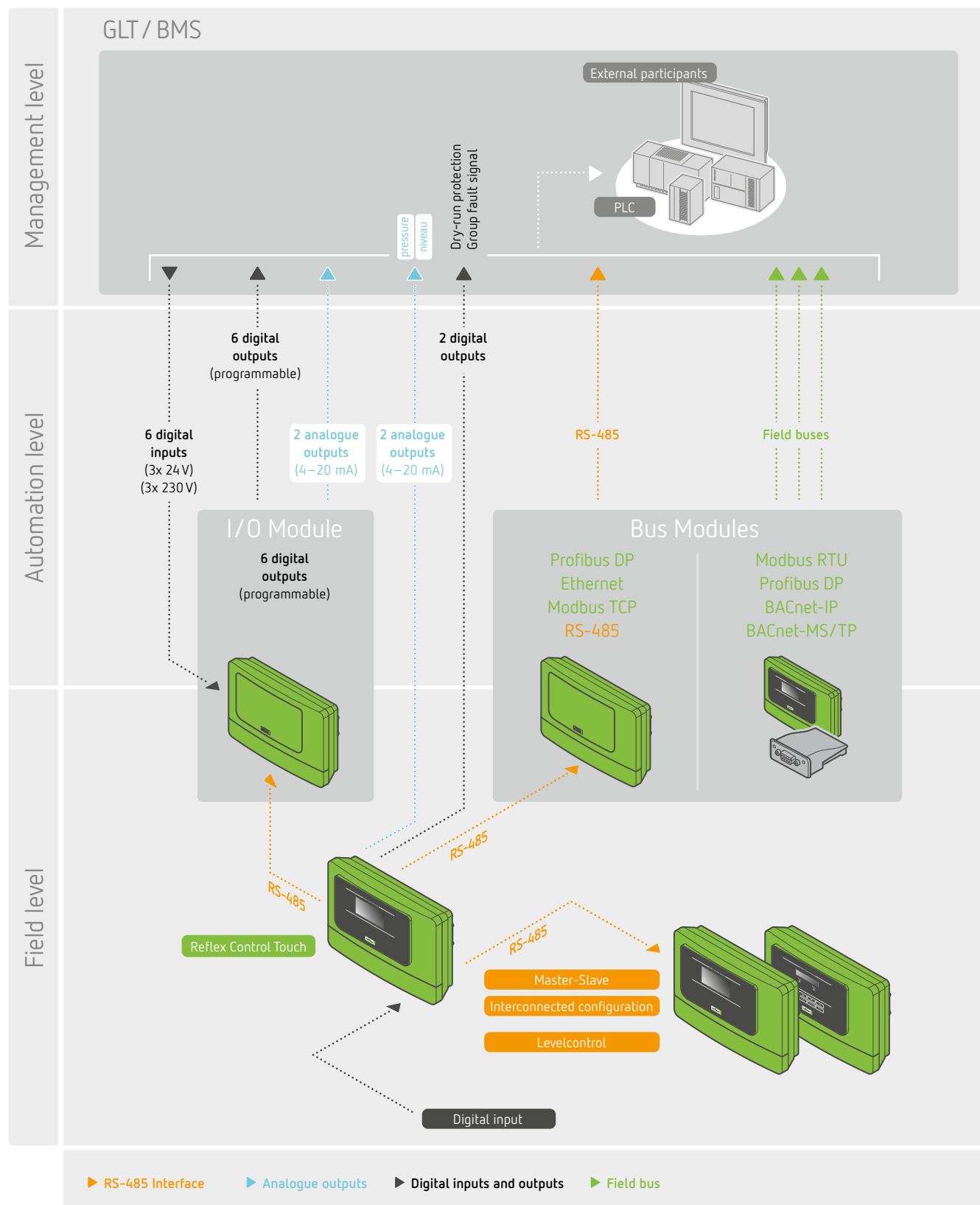


# Communication overview

## Reflex Control Basic





## Reflex Control Touch



# Network solutions using Reflex Control

The Reflex Control control concept ensures the flexible and easy networking of pressure maintenance, make-up and degassing. Reflex Control Touch and Control Basic are standard equipped with RS-485 data interface.

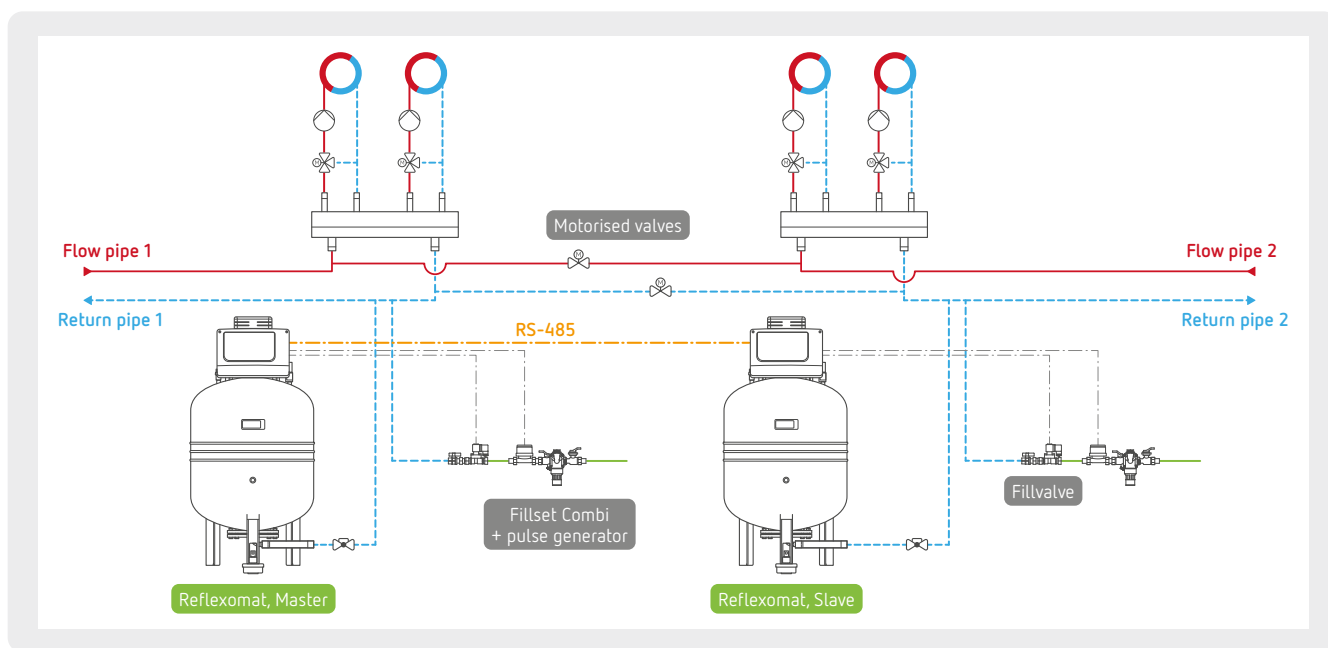
Additional I/O and bus modules with the required interfaces are available for sophisticated requirements, e.g. complex hydraulic systems with heating or cooling, or integrations to building management systems.

Bus protocol	Type of bus module /Interface	
	 Bus module for Basic and Touch	 Compact module for Touch
RS-485	●	—
Profibus DP	●	●
Ethernet	●	—
Modbus TCP	●	—
Modbus RTU	—	●
BACnet-IP	—	●
BACnet-MS/TP	—	●

## Master-Slave operation

Reflex Control really shows what it is capable of when connecting multiple facility parts together. A Master/Slave configuration can switch up to ten pressure maintenance stations in hydraulically coupled systems (e.g. combined heating/cooling network). In this mode of operation, pressure maintenance is performed by one facility (Master), while the other facilities (Slaves) are only used for volume compensation. The relevant current level of the Master facility is transferred cyclically to the Slaves.

If the level of a Slave facility deviates by more than  $\pm 5\%$  from the Master, level equalisation is initiated. The hardware in the controllers (Control Touch/ Basic) is ready for Master/Slave configuration. In addition to the relevant wiring of the controllers, facility-specific programming is required, which is performed by the Reflex customer service team and which must be ordered as an option for the relevant pressure maintenance station.



Two pressure maintenance stations as a Master/Slave configuration — using Reflexomats as an example

# 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](https://rsp.reflex.de/en)

## 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/en/services/after-sales-and-service](https://www.reflex-winkelmann.com/en/services/after-sales-and-service)

Technical hotline  
+49 2382 7069-9546  
[aftersales@reflex.de](mailto:aftersales@reflex.de)



Factory service centre  
+49 2382 7069-9505  
[aftersales@reflex.de](mailto:aftersales@reflex.de)



Commercial processing  
+49 2382 7069-7505  
[aftersales@reflex.de](mailto:aftersales@reflex.de)



## 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](https://www.reflex4experts.com/en)



### 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/en/services/after-sales-and-service/warranty](https://www.reflex-winkelmann.com/en/services/after-sales-and-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.

## Discover Reflex with augmented reality



1 Scan QR-Code.  
[reflex.de/en/city](https://reflex.de/en/city)



2 Download the Reflex Smart City app



3 Scan the title of this brochure and explore

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Thinking solutions.

**Reflex Winkelmann GmbH**  
Gersteinstrasse 19  
DE-59227 Ahlen  
+49 2382 7069-0  
info@reflex.de

[www.reflex-winkelmann.com/en](http://www.reflex-winkelmann.com/en)