

reflex

Thinking solutions.

Pressurisation Systems



Reflexomat, Variomat, Variomat Giga



From the initial idea
to the solution



Reflex – The Company

Smooth operation in supply engineering thanks to system solutions

Reflex Winkelmann GmbH belongs to the Heating&Water division of the Winkelmann Group with 4,200 employees worldwide. The company is a leading brand manufacturer and solution provider for the smooth operation of water-carrying systems in supply engineering and modern building services. In addition to expansion vessels, we develop, manufacture and distribute innovative components and complete solutions for pressure-maintaining, water make-up, degassing, water treatment and storage as well as heat exchangers.

Extensive Product Range

Reflex represents a large range of products and services, offering innovative systems for heating, cooling and hot-water supply and a multitude of other services.

The Reflex product range comprises:

- Expansion Vessels
- Pressurisation Systems
- Water Make-Up Systems & Water Treatment
- Degassing Systems & Separation Technology
- Hot Water Storage Tanks & Heat Exchangers

**For constant reliable heat
and water supply.**

www.reflex.de

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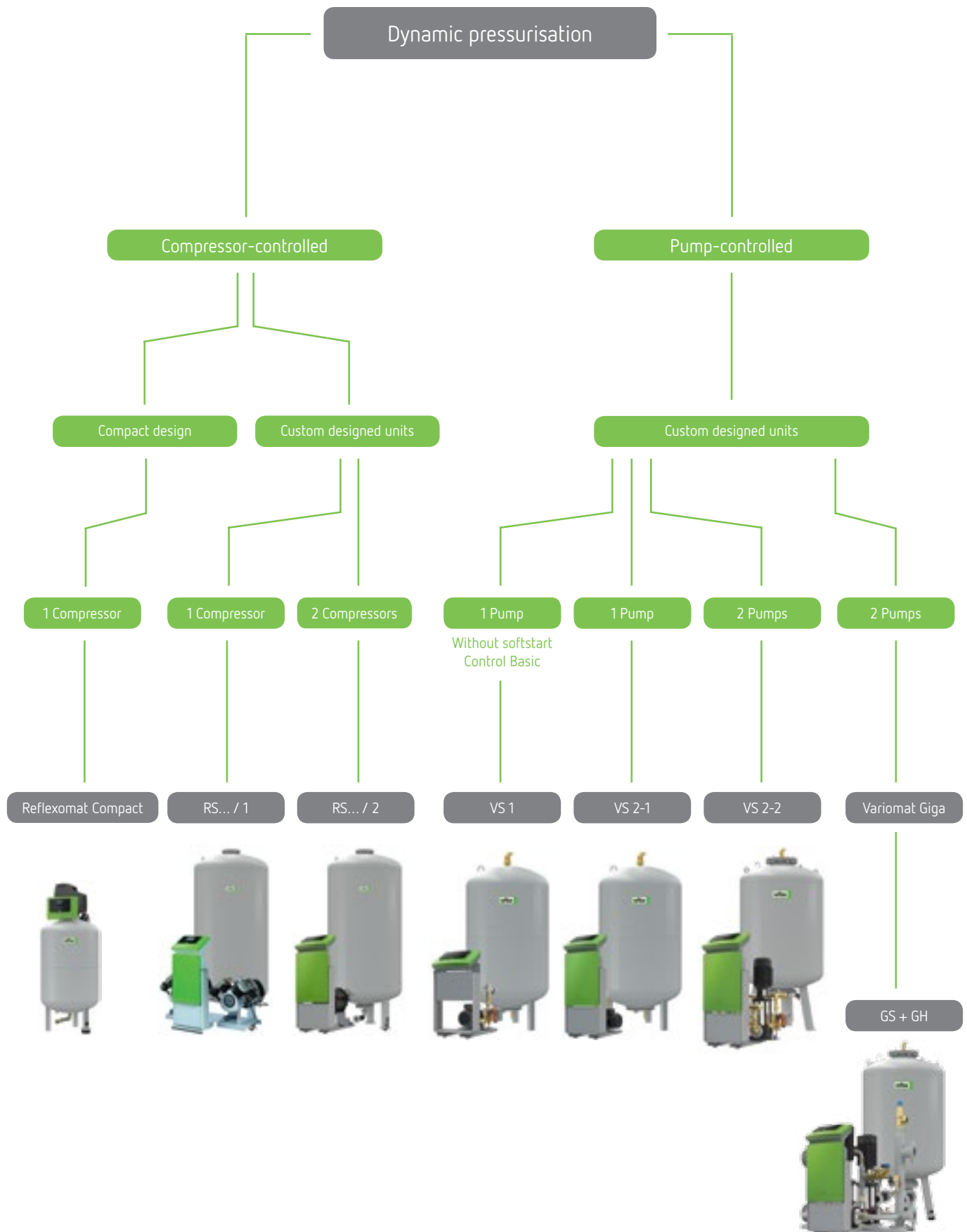
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Pressurisation Systems



Reflexomat

Pressurisation unit compressor-controlled



Reflex Control

Control Basic



- 2-line LCD display
- 8 control keys
- 2 status LED Integrated control of system pressure, deaeration and water make-up
- Manual and automatic operation
- Common fault output signal
- Input, for contact water meter
- RS-485 interface

Control Touch



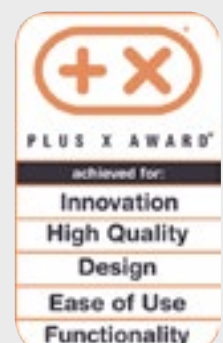
- 4.3" touch screen colour display
- Graphic user interface
- Simply structured plain text menus including operating instructions and help texts
- Integrated control of system pressure, deaeration and water make-up
- Manual and automatic operation
- Permanent display of the most important operating parameters in the system diagram
- Intelligent Plug & Play operational management
- Evaluation and storage of the most important operational data
- Extensive interfaces:
 - Input, for contact water meter
 - 2 x dry contact outputs for error messages
 - 2 x analogue outputs for pressure and vessel content
 - 2 x RS-485 interfaces
 - Plugs for Bluetooth module and HMS networks, as well as SD card

Control Remote

NEW!

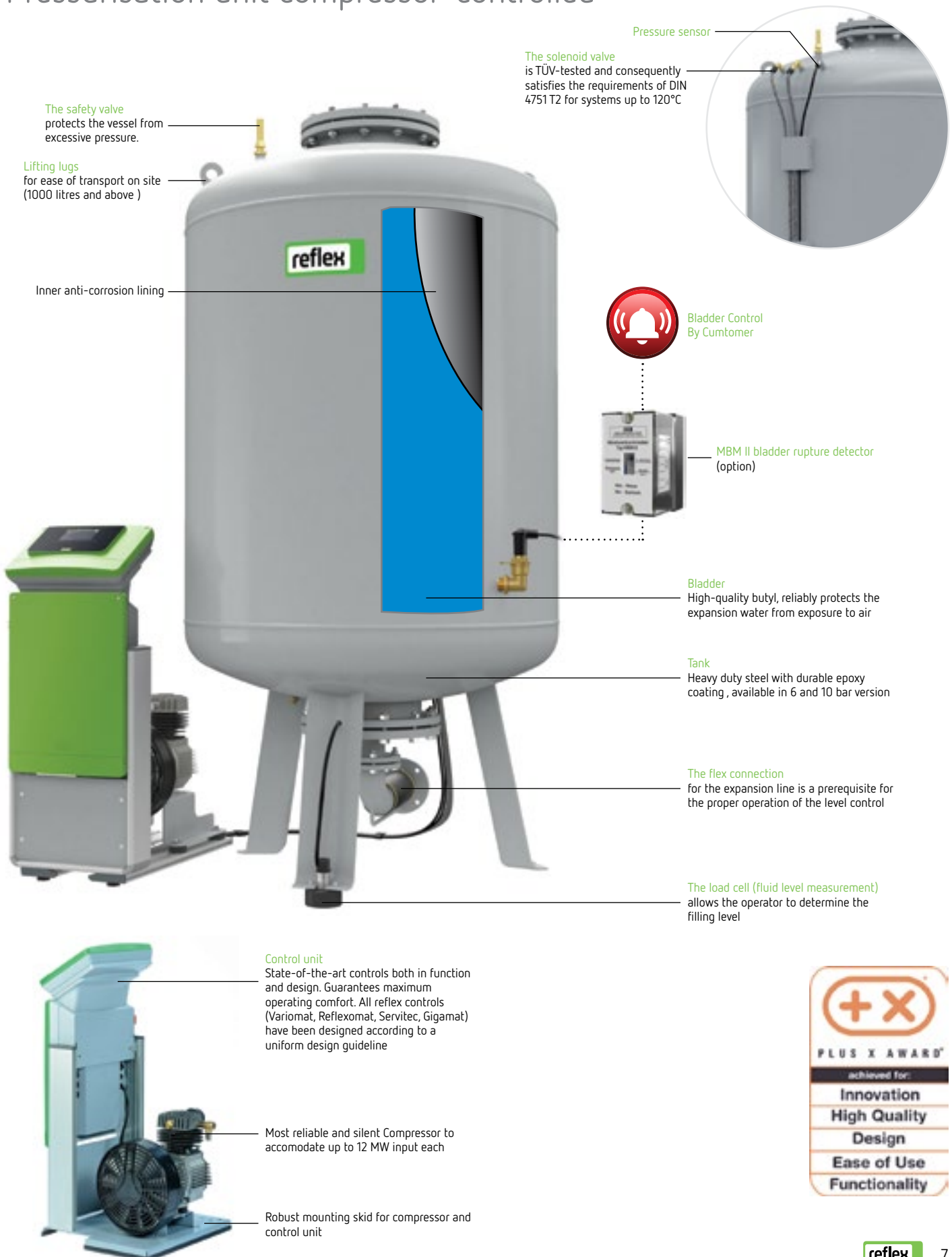


- Remote control via secure server
- System monitoring via PC or mobile device at any time and everywhere
- (Professional) remote servicing by Reflex Customer Service
- Reflex Remote Portal with intuitive user interface
- Simple management of multiple installations
- Visualisation of all parameters
- Diagrams for run-time monitoring
- Alarm messages via e-mail or messaging
- User-provided Internet or GSM connection
- Factory-installed or retrofitting, independent of Touch or Basic



Reflexomat

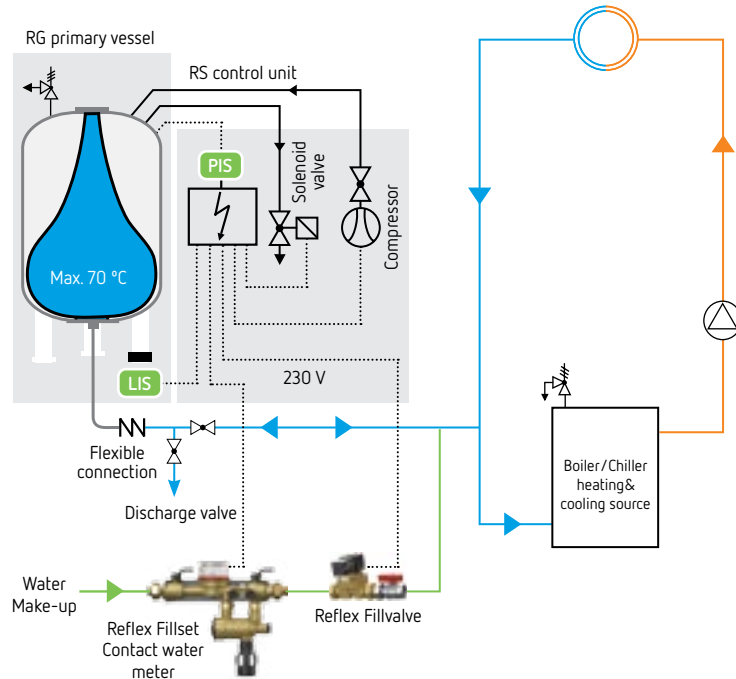
Pressurisation unit compressor-controlled



Reflexomat

Reflexomat System With 1 & 2 Compressors

Reflexomat up to 12 MW with 1 compressor



PIS

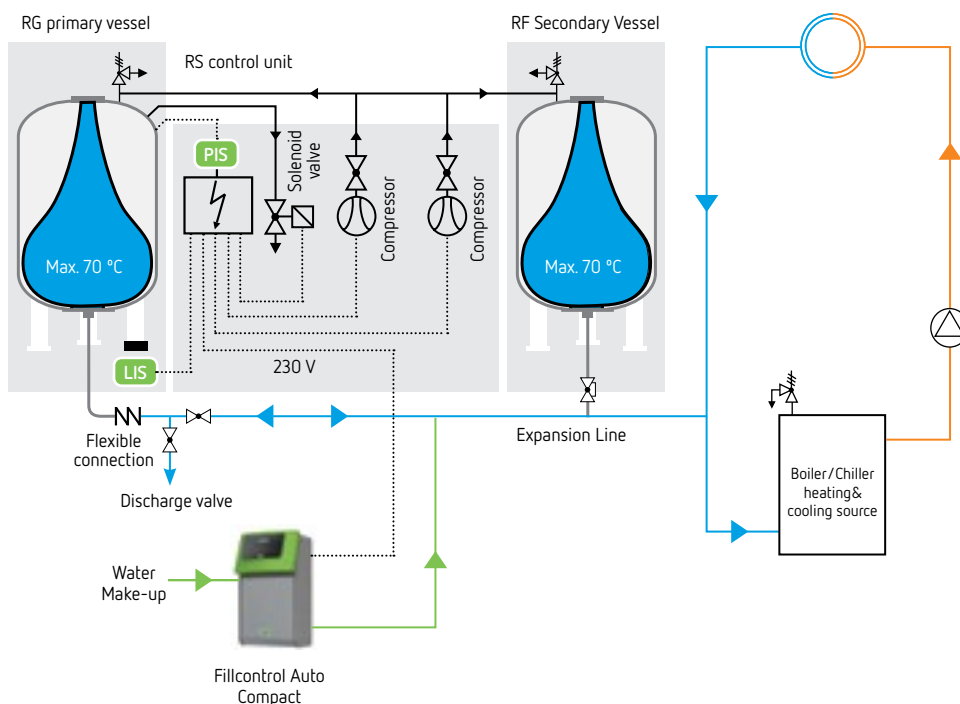
Pressure maintenance, compensating for the expansion volume

The compressor and solenoid valve are actuated in such a way that if pressure is maintained at approximately ± 0.1 bar, the expansion water flowing in or out via expansion line is compensated for in the basic vessel. Because pressure is "stored" in the form of an air buffer in the expansion vessel (basic vessel), the method of operation is very gentle. Reflexomats with 2 compressors work with load-based, automatically alternating operation and automatic malfunction switchover.

Note: The useful volume rate is 90 % for the compressor controlled pressurisation units.

Therefore according to calculations the required expansion tank size is smaller than static tank size.

Reflexomat up to 24 MW with 2 compressors



LIS

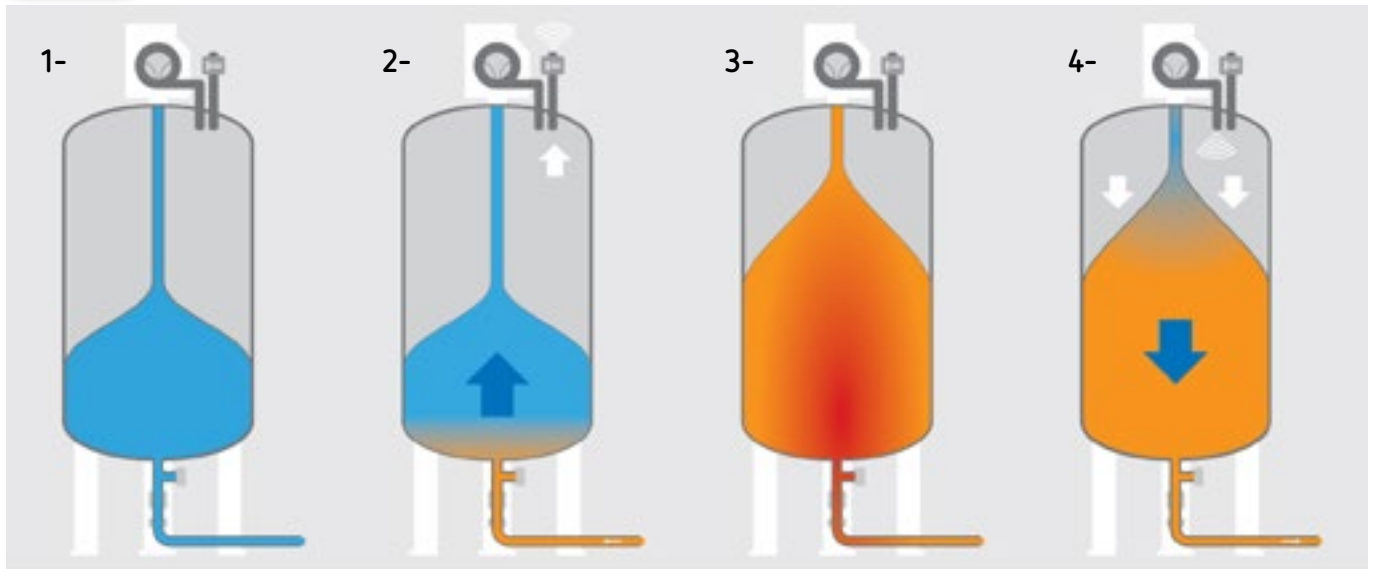
Water make-up

Water make-up in the event of system-based water losses is integrated into the Reflexomat controls. It is performed based on the filling level in the basic vessel. The level measurement is carried out by evaluating the weight of the basic vessel. The solenoid valve for water make-up and the Reflex Fillset with water meter and system separator can be ordered optionally. Water make-up is monitored by a leakage monitor and interrupted in the event of any malfunctions. The signals of a contact water meter can be evaluated (Reflex Fillset with contact water meter). The Reflex Fillcontrol Auto make-up station with integrated pump is available for very high system pressures.

Reflexomat

Reflexomat Working Principle for Heating & Cooling

HEATING



1. Low temperature

The unit is at rest with a small water reserve.

2. Temperature increase

The system pressure increases, hence, the air is discharged from the vessel and expansion water flows into the bladder until system pressure stabilizes to its setpoint.

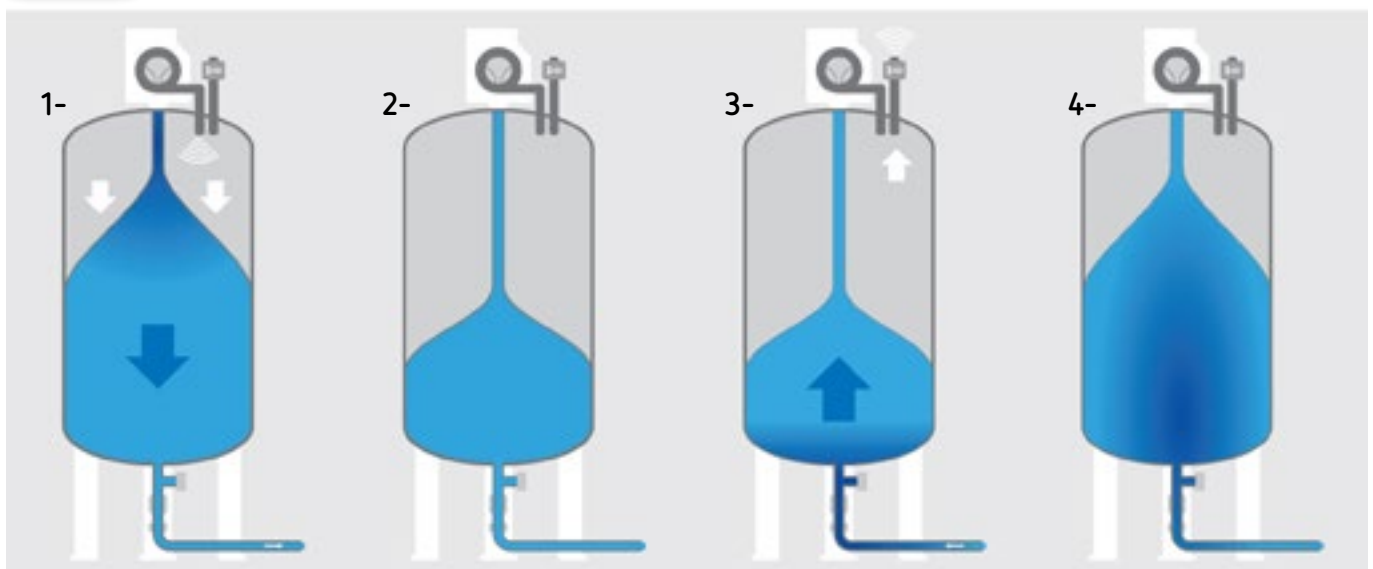
3. Full power

The unit reaches almost full capacity when the temperature increase is completed while maintaining a constant system pressure.

4. Cooling down

When system pressure drops, the compressor increases the vessel's pressure thus forcing water back to the system until pressure is restored.

COOLING



1. Cooling down

The system water volume and thus pressure decreases. Subsequently, the compressor increases the vessel's pressure in order to reinject water back to the system until pressure is stabilized.

2. Normal operation

The pressure is constant; the unit is at rest with a small water reserve.

3. Temperature increases

The system water volume and thus pressure increases. Consequently, air is discharged from the vessel in order to allow water into the bladder.

4. Maintenance, repair or breakdown

In these situations, the system pressure will increase accordingly. Thus the unit stores amounts of water in order to maintain the pressure constant, and prevents simultaneously water loss through the drainage system since a safety valve would have opened.



Video clips demonstrating the function of this and other products are available under www.reflex.de/services/fachwissen-und-beitraege/videothek/

Reflexomat Compact

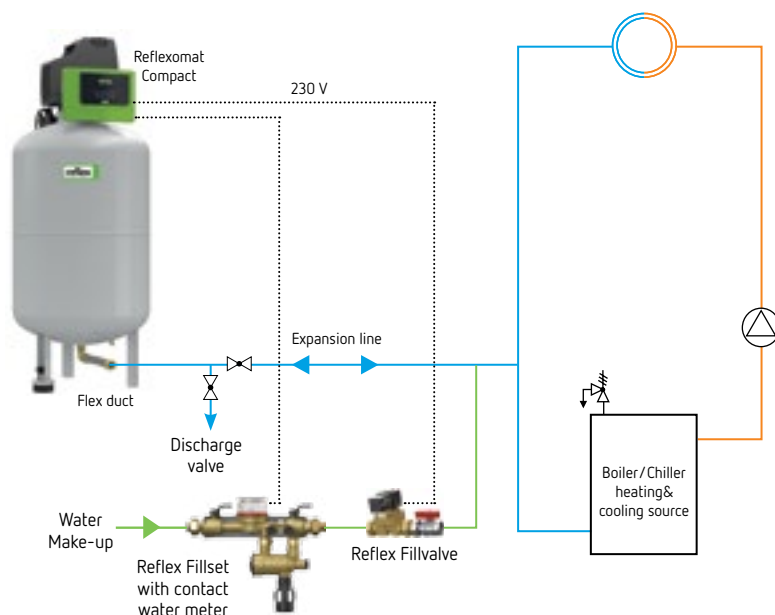
- Compact Compressor-controlled pressurisation unit for heating and chilled water systems
- Air cushion compartment has anti-corrosion lining
- Compact design
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Butyl diaphragm according to DIN EN 13831 norm part 3, max. operating temperature 70°C
- Maintains the pressure level within +/- 0.1 bar boundary
- Design pressure 6 bar
- Max. system flow temperature 120°C
- Degree of protection: IP 54
- With Control Basic
- Power supply 230 V
- 1 dry contact (BMS common fault signal)
- Featuring RS 485 interface



Type	Article No	Material Group	Ø D mm	H mm	h mm	System Connection	Power kW	Voltage V	Sound Level dB(A)	Weight kg
RC 200	8806405	31	634	1320	135	R 1	0.75	230 / 50 Hz	72	52.0
RC 300	8801705	31	634	1620	135	R 1	0.75	230 / 50 Hz	72	69.0
RC 400	8802805	31	740	1620	135	R 1	0.75	230 / 50 Hz	72	80.0
RC 500	8803705	31	740	1745	135	R 1	0.75	230 / 50 Hz	72	93.0

For 60 Hz operations, please consult us

Reflexomat Compact With Make-up System



Reflexomat Compact with replenish

Reflexomat Compact in combination with Reflex Fillvalve (solenoid valve) and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains. Reflex Fillvalve to be connected to the control unit to have signal for replenish.

The Fillset RPZ valve protects against backflow, providing protection against the contamination of mains cold water supply according to EN1717.

Reflexomat - Compressor - Controlled Dynamic Pressure Maintenance

- Compressor-controlled pressurisation system for heating and chilled water systems up to 120°C max. flow temperature
- Maintains the pressure level within ± 0.1 bar boundary
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Superior quality butyl bladder according to German DIN EN 13831 norm part 3, max. operating temperature 70°C
- Microprocessor control with display in 8 languages
- Permanent display of system pressure and tank volume level
- 230 V output for fully automated water make-up
- 2 dry contacts (common fault, min. water level) for touch control unit
- Data output through RS-485 (from VS 90/2 and VS 150)
- Durable epoxy coating with attractive grey colour

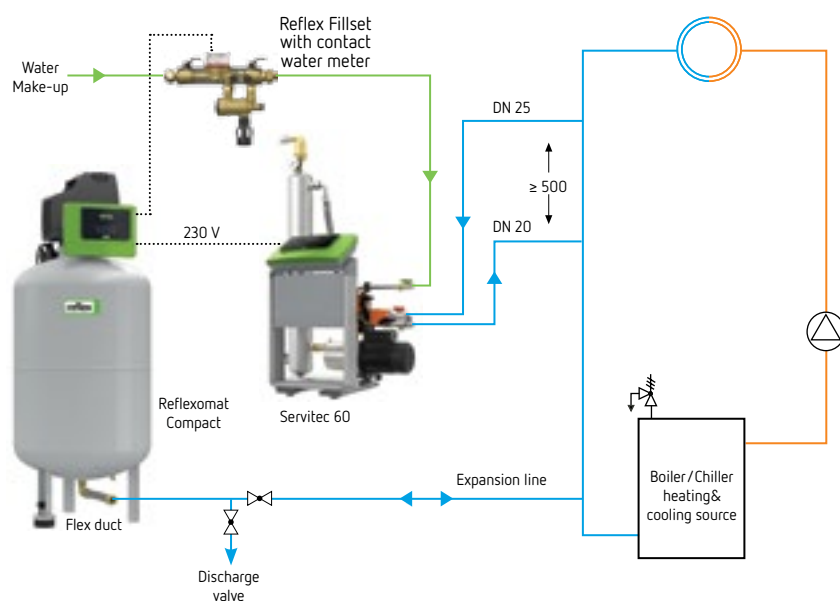


RG 200 - 600

Reflexomat
RS 300/1

RG 1000

Reflexomat, Degassing and Water Make-up With Servitec



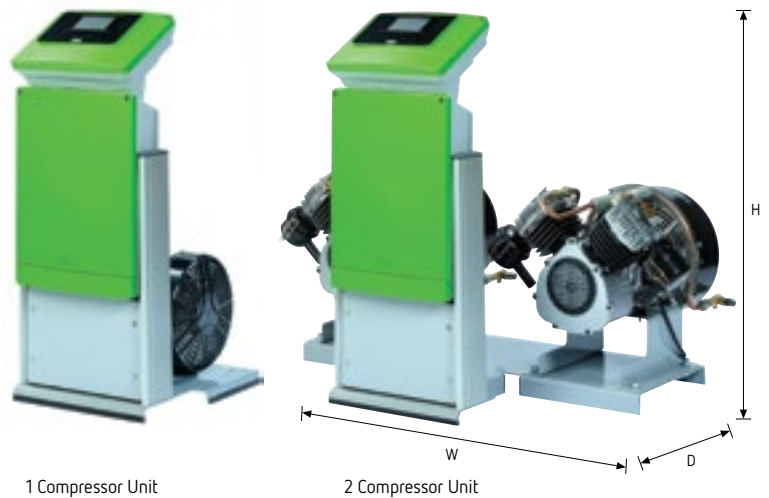
Reflexomat with Servitec

Reflexomat unit in combination with Servitec and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains via the Servitec device. By connecting the Servitec device in Levelcontrol mode to the Reflexomat control unit, make-up water is de-aerated before going into the system.

The Fillset RPZ valve protects against backflow, providing protection against the contamination of mains cold water supply. This combination can also be used for applications where the water supply comes from an adjacent container, as the Servitec device is self priming.

Reflexomat Control Unit

- Compressor-controlled pressurisation unit for heating and chilled water systems
- Degree of protection: IP 54
- Power supply 230/400 V
- Common fault signal and RS 485 interface
- Control Touch from RS 150 as standard,
- Control Touch: graphic menu display, permanent display of the operating parameters, extensive interfaces, e.g. for BMS connection, remote monitoring



RS control unit with 1 compressor

Type	Control Touch Article No	Material Group	Height (H) mm	Width (W) mm	Depth (D) mm	Power kW	Voltage V	Sound Level dB(A)	Weight kg	Compressor
RS 90/1	8880111*	33	415	395	520	0.75	230/50 Hz	72	21.0	≤ 600 l, RS 90/1 on vessel
RS 90/1	8880211*	33	690	395	345	0.75	230/50 Hz	72	25.0	≥ 800 l, RS 90/1 adjacent
RS 150/1	8880311	33	920	395	600	1.10	400/50 Hz	72	28.0	adjacent
RS 300/1	8880411	33	920	395	700	2.20	400/50 Hz	76	34.0	
RS 400/1	8880511	33	920	395	700	2.40	400/50 Hz	76	51.0	
RS 580/1	8880611	33	920	395	700	3.00	400/50 Hz	76	102.0	

* Control basic only
For 60 Hz operations, please consult us

RS control unit with 2 compressors

Type	Control Touch Article No	Material Group	Height (H) mm	Width (W) mm	Depth (D) mm	Power kW	Voltage V	Sound Level dB(A)	Weight kg	Compressor
RS 90/2	8882100	33	920	1225	800	1.50	230/50 Hz	72	33.0	adjacent
RS 150/2	8883100	33	920	1225	800	2.20	400/50 Hz	72	45.0	
RS 300/2	8884100	33	920	1225	800	4.40	400/50 Hz	76	61.0	
RS 400/2	8885100	33	920	1225	800	4.80	400/50 Hz	76	95.0	
RS 580/2	8886100	33	920	1225	800	6.00	400/50 Hz	76	197.0	

For 60 Hz operations, please consult us

Reflexomat Control Unit Without Compressor (For On Site Compressed Air)

Type	Article No	Material Group	H/W/D (mm)*	Weight kg*
≤ 600 litre, RS 90/1	8881100	33	415/395/520	9.0
> 800 litre, RS 90/1	8881105	33	690/395/345	9.0

* Without compressor

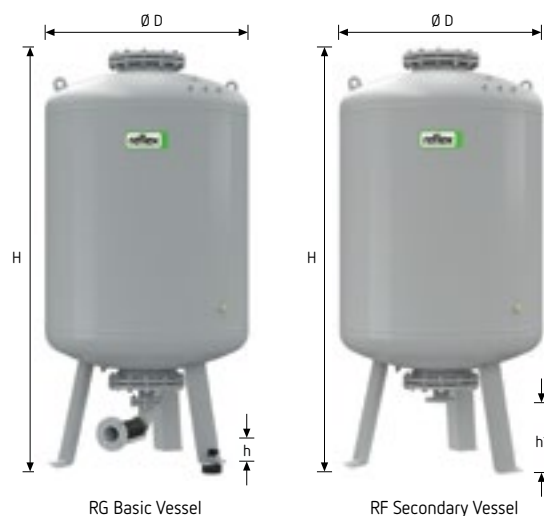
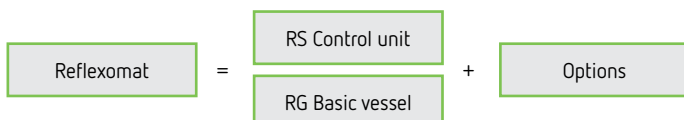
Solenoid Valve For On-site Compressed Air

Fitted ready-to-connect in the RS 90/1 control unit without compressor

MV 1/4 Article No: 7913000 Material Group: 35

Reflexomat Vessels

- Heavy duty steel tank
- Replaceable butyl bladder in accordance with DIN EN 13831
- Approval in accordance with the 2014/108/EC directives
- Max. operating temperature bladder: 70°C
- Max. system flow temperature: 120°C
- Durable epoxy coating with attractive grey colour



		RG Basic Vessel		RF Secondary Vessel (optional)		RG Basic Vessel				RF Secondary Vessel	
	Type	h mm	Article No	h1 mm	Article No	Article Group	Ø D mm	H mm	Connection	HG mm	Weight kg
6 bar	200	115	8799100	155	8789100	30	634	970*	R 1	1350	42.8
	300	115	8799200	155	8789200	30	634	1270*	R 1	1650	60.7
	400	100	8799300	140	8789300	30	740	1255*	R 1	1640	69.4
	500	100	8799400	140	8789400	30	740	1475*	R 1	1860	78.7
	600	100	8799500	140	8789500	30	740	1720*	R 1	2110	90.1
	800	100	8799600	140	8789600	30	740	2185	R 1	-	110.3
	1000	195	8650105	305	8652005	32	1000	2025	DN 65	-	308.6
	1500	185	8650305	305	8652205	32	1200	2025	DN 65	-	328.0
	2000	185	8650405	305	8652305	32	1200	2480	DN 65	-	380.0
	3000	220	8650605	334	8652505	32	1500	2480	DN 65	-	795.0
4000	220	8650705	334	8652605	32	1500	3065	DN 65	-	1.188.0	
5000	220	8650805	334	8652705	32	1500	3590	DN 65	-	1.115.0	
10 bar	350	190	8654000	190	8654300	30	750	1340	DN 40	-	230.0
	500	190	8654100	190	8654400	30	750	1600	DN 40	-	275.0
	750	180	8654200	180	8654500	30	750	2185	DN 50	-	345.0
	1000	165	8651005	285	8653005	32	1000	2065	DN 65	-	580.0
	1500	165	8651205	285	8653205	32	1200	2055	DN 65	-	800.0
	2000	165	8651305	285	8653305	32	1200	2515	DN 65	-	960.0
	3000	195	8651505	310	8653505	32	1500	2520	DN 65	-	1.425.0
	4000	195	8651605	310	8653605	32	1500	3100	DN 65	-	1.950.0
	5000	195	8651705	310	8653705	32	1500	3630	DN 65	-	2.035.0

* Height, with RS 90/1 control unit included
For 60 Hz operations, please consult us

Commissioning by Reflex - After Sales Service (Option)

Single compressor system **Article No : 7945600**
Double compressor system **Article No : 7945630**

Wall Bracket (Option)

- Wall mount facility for the RS 90/1 control unit in conjunction with RG 200, RG 300, RG 400, RG 500 and RG 600 expansion vessels (observe installation height H/HG)
- Incl. 3 m long connection hoses

Article No : 7881900 Material Group : 35



BMS Modules

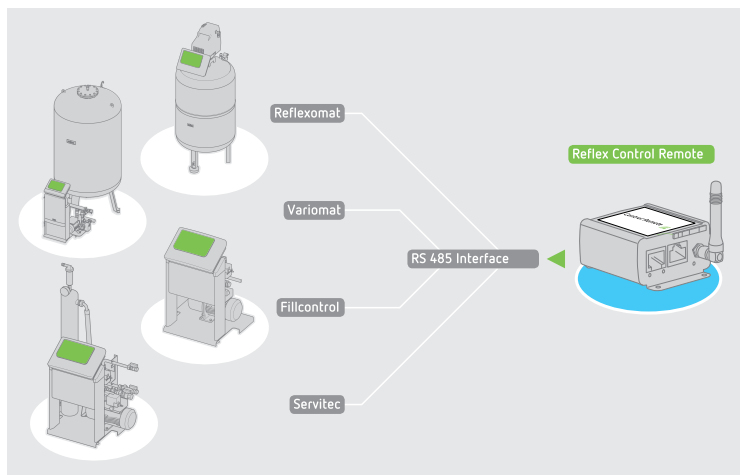
Type	Article No	Material Group	Weight kg
LonWorks Digital	8860000	86	1.5
LonWorks	8860100	86	1.9
Profi bus-DP	8860200	86	1.9
Ethernet	8860300	86	1.9
BACnet-IP for Control Touch	8860500	86	0.4
BACnet MS/TP for Control Touch	8860600	86	0.4
Modbus RTU for Control Touch	9125592	86	0.4
Profibus RTU for Control Touch	9118042	86	0.4
I/O Modules	8858405	35	1.0



Control Remote

Remote monitoring, diagnostics and at last remote-control maintenance are becoming increasingly important for the supervision of supply grid systems. For the responsible on-site operator, it is more and more difficult to find qualified support staff. Long distances to sites frequently prevent quick and continuous control.

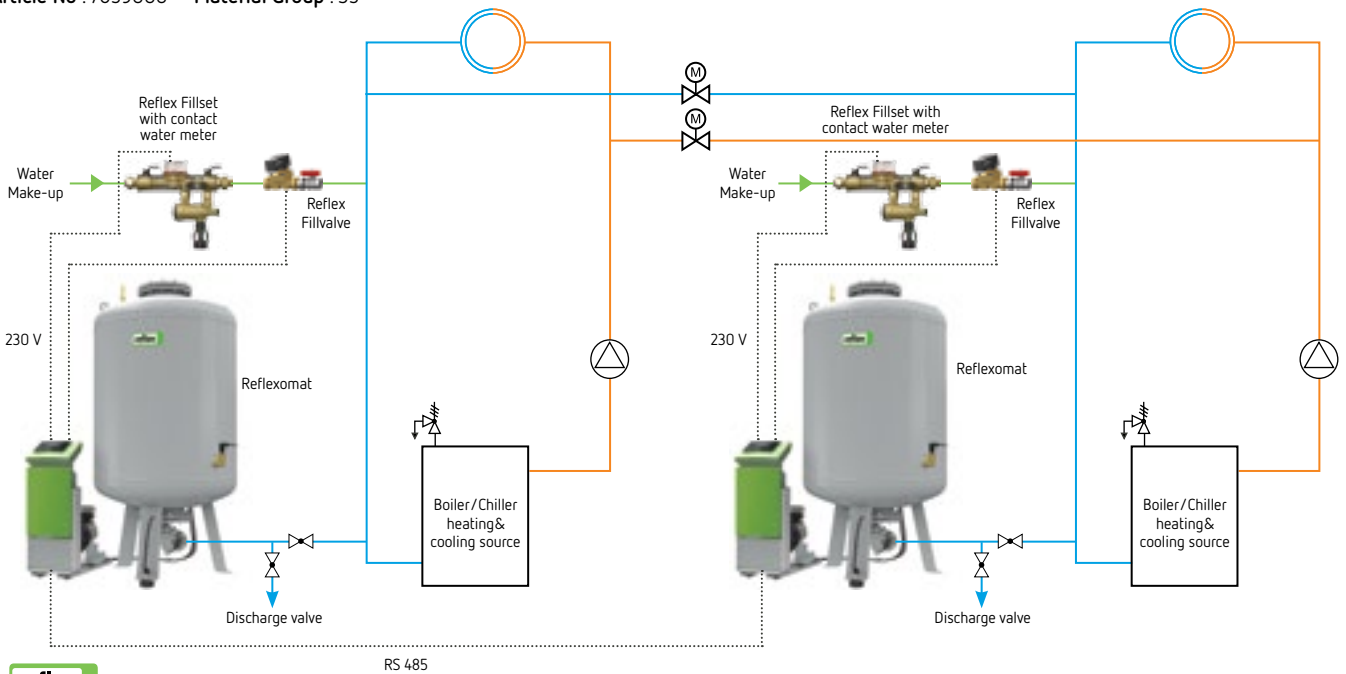
Type	Article No	Material Group	Length mm	Width mm	Height	Weight kg
Control Remote	8910800	86	83	60	34	0.3



Master - Slave Connection

- Software tool for operating up to 10 Reflexomats in a hydraulic group to a distance of 1000 m

Article No : 7859000 Material Group : 35



Reflexomat Make-up Valve

Reflex Fillvalve

- For water make-up within systems which are equipped with compressor controlled pressurisation units
- Operates on 230 V output from pressurisation unit

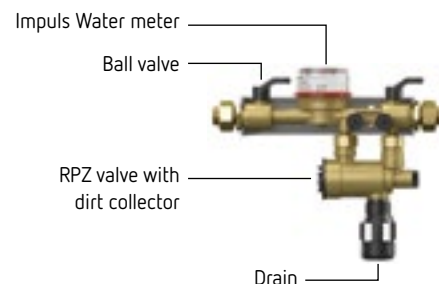
Article No : 7858300 Material Group : 35



Reflex Fillset With Impuls Water Meter

- Pre-fabricated assembly for direct connection of HVAC systems to water mains
- Total quantity of make-up water is measured by a water meter
- Prevents backflow of HVAC water into the water mains
- With German DVGW-approved BA-type backflow preventer
- Including wall bracket and isolation valves

Article No : 6811205 Material Group : 70



MBM II Bladder Rupture Detector

- For the signalling of bladder rupture in Reflexomat expansion
- Consists of a factory-mounted electrode and a relay
- Power supply 230 V / 50 Hz supply
- Three terminal dry contact
- Recommended: 1 device for each vessel
- MBM Electronics in two variants :



Relay
For on site mounting



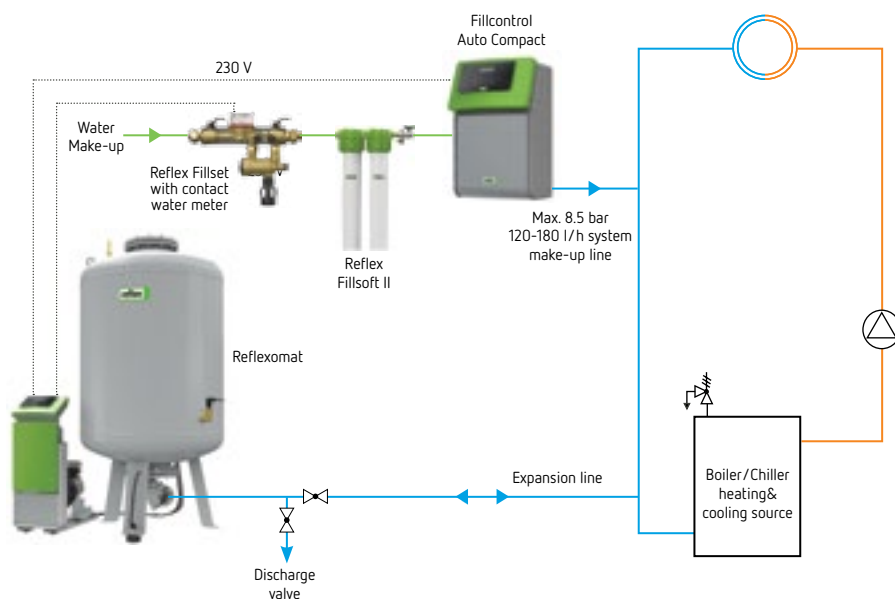
Electrode
Factory mounted

- For wall-mounting
- Factory-installed in the Touch Control cabinet

Article No : 7857700
Article No : 9122294

Material Group : 86
Material Group : 86

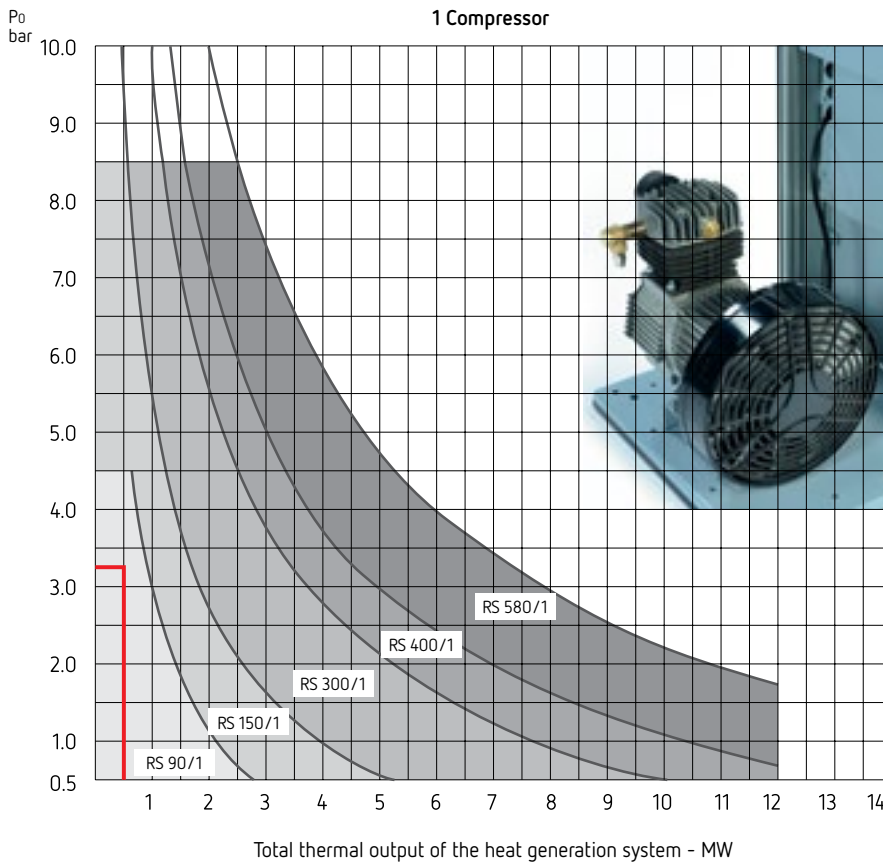
Reflexomat With Fillcontrol Auto Compact and Fillsoft II



Reflexomat with Fillcontrol Auto Compact

Reflexomat unit in combination with Fillcontrol Auto Compact, Fillsoft II and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains via the Fillcontrol Auto Compact. By connecting the Fillcontrol Auto Compact make-up unit to the Reflexomat control unit, make-up water is pumped into the system, if the pressure from the water mains is below system pressure. The make-up unit also include a break tank, which providing protection against contamination. By the Fillsoft device the system water can be totally softened or adjusted to the required level. The Fillset RPZ valve protects against backflow, providing protection against the contamination of mains cold water supply according to EN1717. By connecting the impuls water meter to the Reflexomat control unit the Fillmeter function is available.

Reflexomat Quick Selection



Selection Example

Output heat generator Q = 500 kW
 Water content V_s = 5000 litres
 Design temperature T = 70/50 °C
 Static height H_{st} = 30 m
 Expansion coefficient n = 0.0228

$$P_0 \geq \frac{H_{st} [m]}{10} \text{ bar} + 0.2 \text{ bar}$$

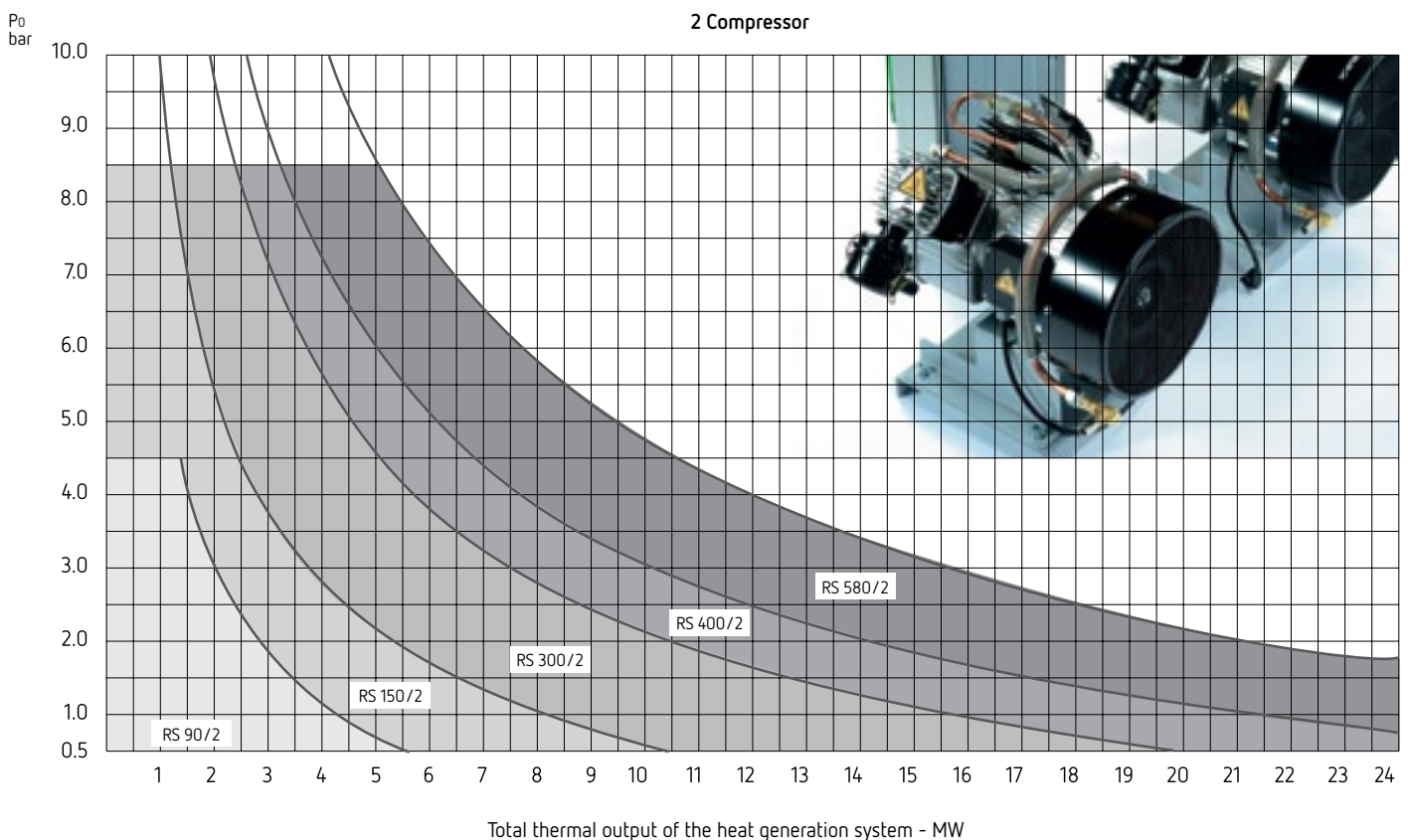
$$P_0 \geq \frac{30}{10} \text{ bar} + 0.2 \text{ bar} = 3.2 \text{ bar}$$

$$V_n \geq \frac{V_e + V_{ws}}{DF}$$

$$V_n \geq \frac{5000 \times (0.0228 + 0.005)}{0.9} = 155 \text{ liter}$$

Selected:

Control unit RS 90/1
 Expansion vessel RG 200
 SU Lock shield R 1x1



Variomat

Pump Controlled Pressurisation Systems

- Pressure maintenance
- Deaeration
- Water make-up



Reflex Control

Control Basic



- 2-line LCD display
- 8 control keys
- 2 status LED Integrated control of system pressure, deaeration and water make-up
- Manual and automatic operation
- Common fault output signal
- Input, for contact water meter
- RS-485 interface

Control Touch



- 4.3" touch screen colour display
- Graphic user interface
- Simply structured plain text menus including operating instructions and help texts
- Integrated control of system pressure, deaeration and water make-up
- Manual and automatic operation
- Permanent display of the most important operating parameters in the system diagram
- Intelligent Plug & Play operational management
- Evaluation and storage of the most important operational data
- Extensive interfaces:
 - Input, for contact water meter
 - 2 x dry contact outputs for error messages
 - 2 x analogue outputs for pressure and vessel content
 - 2 x RS-485 interfaces
 - Plugs for Bluetooth module and HMS networks, as well as SD card

Control Remote

NEW!

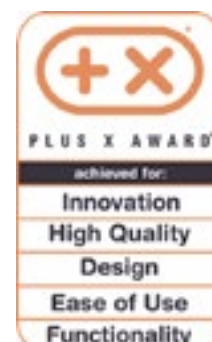
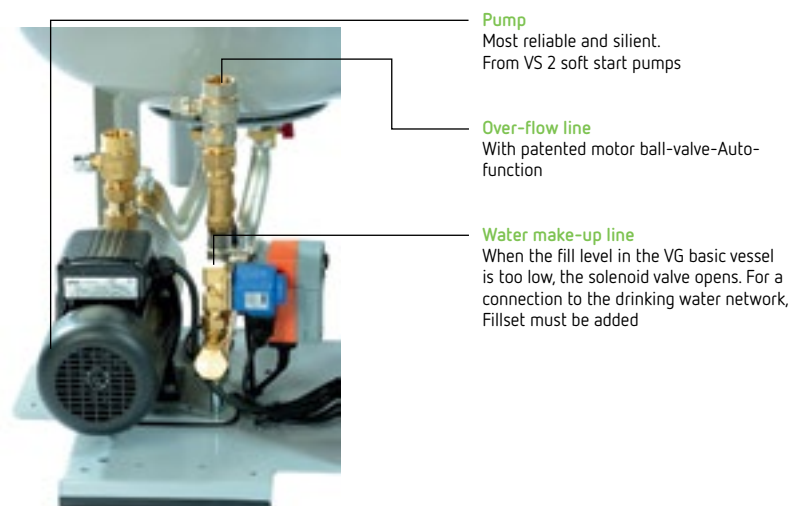


- Remote control via secure server
- System monitoring via PC or mobile device at any time and everywhere
- (Professional) remote servicing by Reflex Customer Service
- Reflex Remote Portal with intuitive user interface
- Simple management of multiple installations
- Visualisation of all parameters
- Diagrams for run-time monitoring
- Alarm messages via e-mail or messaging
- User-provided Internet or GSM connection
- Factory-installed or retrofitting, independent of Touch or Basic



Variomat

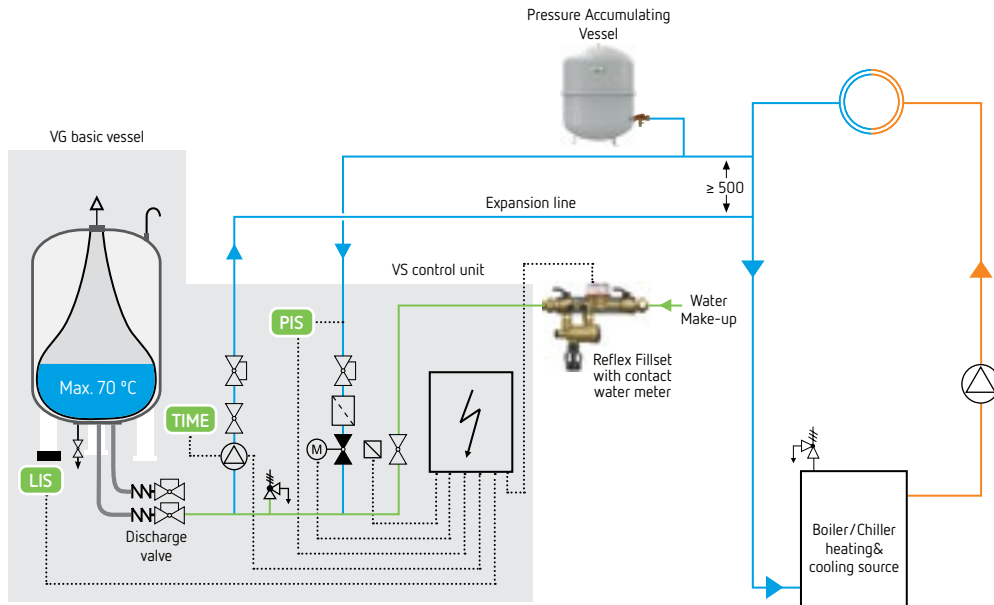
Pump Controlled Pressurisation Systems



Variomat

Variomat Pressurisation Systems

Variomat 1 up to 2 MW with 1 pump



PIS

Pressure maintenance, compensating for the expansion volume

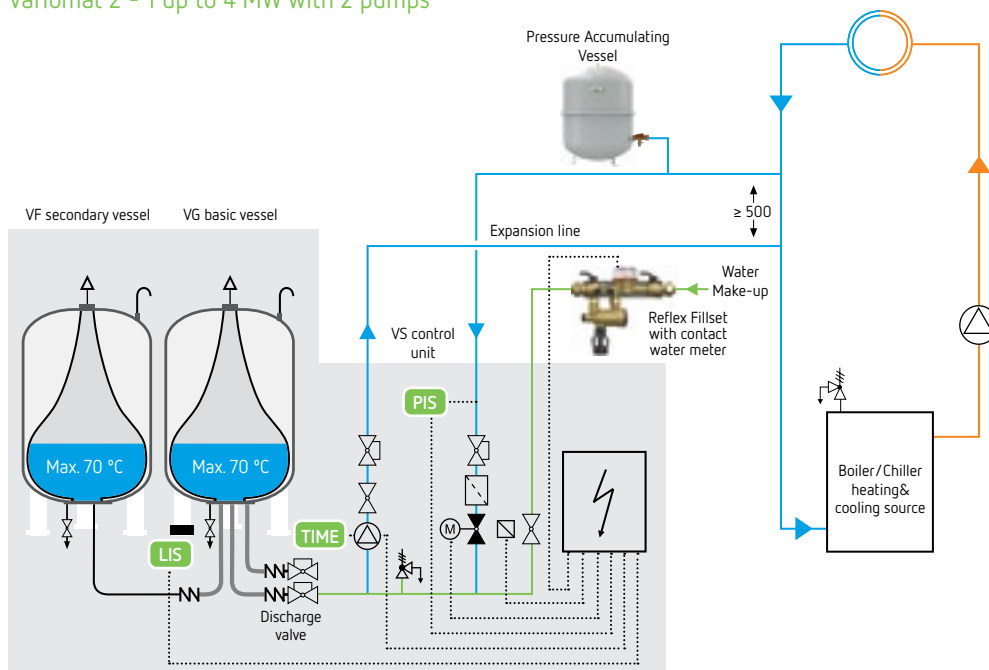
The pump and over flow valve are actuated in such a way that pressure remains constant within a range of around ± 0.2 bar. The expansion water is supplied to or discharged from the depressurised basic vessel in 2 separate expansion lines.

LIS

Water Make-up

The volume of discharged free gases and water losses are automatically replenished. The level measurement is carried out by evaluating the weight of the basic vessel. Water make-up based on the filling level in the basic vessel is monitored by a leakage monitor and interrupted in the event of any malfunctions. With the Variomat 2, the signals of a contact water meter can be evaluated (Reflex Fillset with contact water meter).

Variomat 2 - 1 up to 4 MW with 2 pumps



TIME

Deaeration

A part flow of the heating water is released into the basic vessel and thus degassed. The deaeration mode can be selected from the following versions:

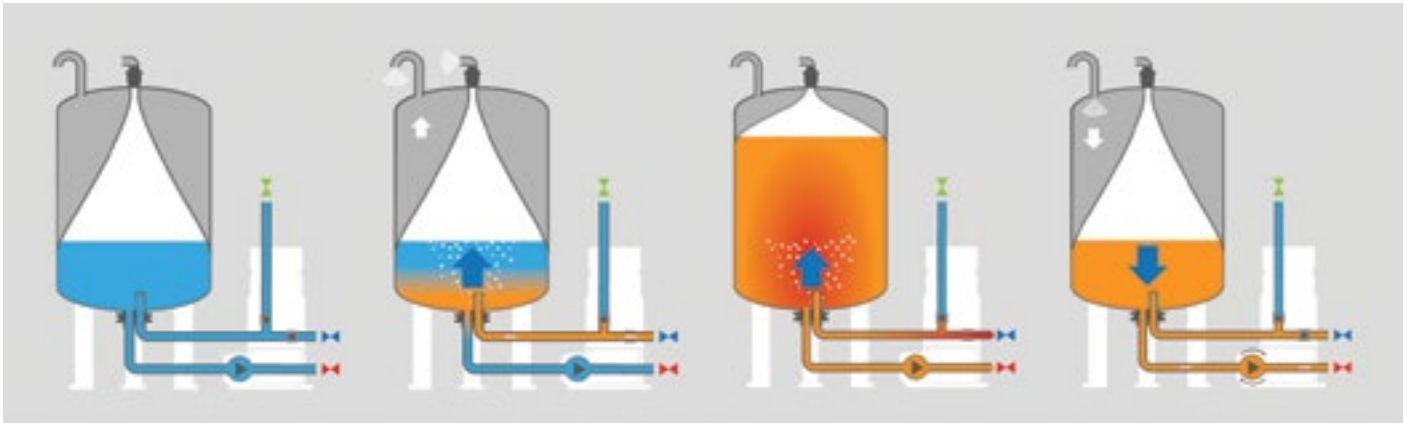
- Continuous deaeration: constant deaeration after startup and repairs in the supply system, to allow all residual air to be removed from the system.
- Follow-up deaeration: activated automatically after continuous deaeration and performed after every pump operation.
- Interval deaeration: performed after a specified schedule.

Note: The useful volume rate is 90 % for the pump controlled pressurisation units.

Therefore according to calculations the required expansion tank size is smaller than static tank size.

Variomat Working Principle for Heating & Cooling

HEATING



1. Low temperature

System pressure is constant, unit at rest with a small water reserve.

2. Temperature increase

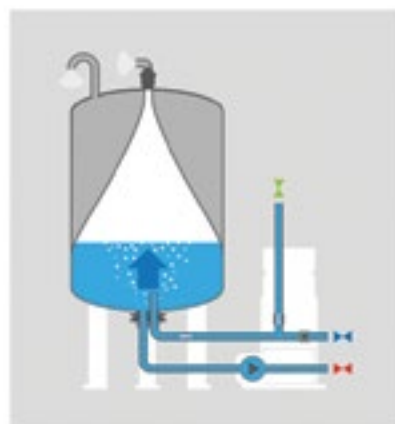
System pressure increase is detected. Hence, water flows into the bladder through the open valve and is de-aerated due to pressure drop.

3. Full power

The unit reaches almost full capacity when the temperature increase is completed. Pressure is maintained.

4. Cooling down

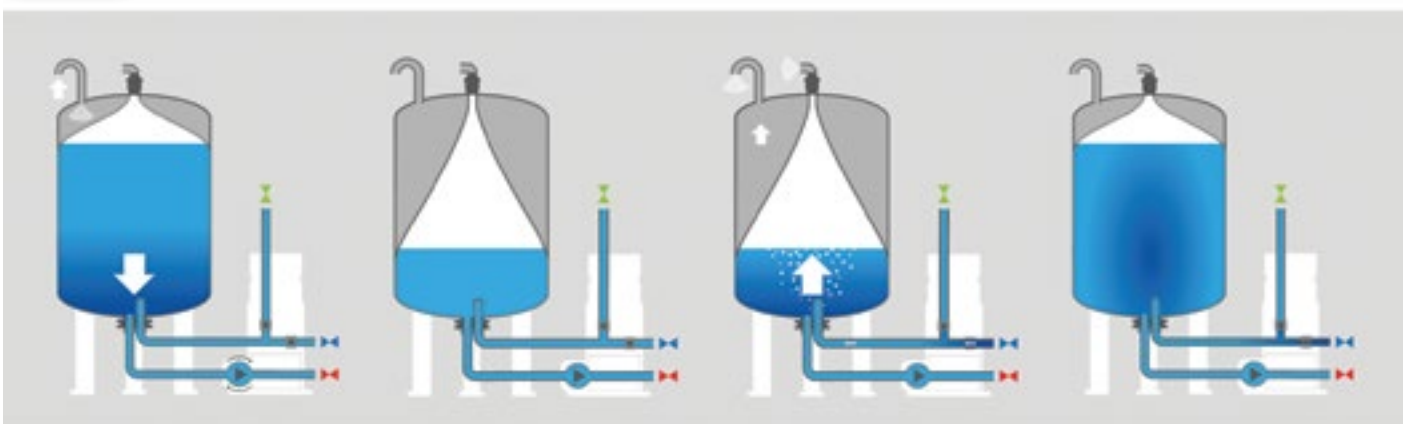
System pressure decreases; the de-aerated water is pumped back to the system until pressure's setpoint is restored.



5. Replenish

if the vessel's water volume drops under critical level, the unit refills the bladder until minimum water reserve.

COOLING



1. Cooling down

Water volume and thus pressure drops, the de-aerated water is pumped back to the system until pressure reaches defined level.

2. Low temperature

The unit is at rest with a small amount of water.

3. Temperature increase

Water volume and system pressure increases subsequently, the overflow valve opens in order to allow water into the depressurised vessel until pressure stabilizes.

4. Full power

The unit reaches almost full capacity when the temperature surge is completed all while maintaining pressure constant.



Video clips demonstrating the function of this and other products are available under www.reflex.de/services/fachwissen-und-beitraege/videothek/

Variomat Control Units

- Variomat controller VS 1 with Control Basic
- From Variomat controller VS 2 with Control Touch and soft start
- Perm. advance temperature 120°C
- Perm. operating temperature 70°C
- Perm. ambient temperature 0 - 45°C
- Sound level approx. 55 dB(A)
- Degree of protection: IP 54
- Water make-up connection Rp 1/2"
- Pump/overflow valve connection Rp 1/Rp 1
- Common fault signal and RS 485 interface



VS Control unit - 1 pump

Type	Control Touch Article No	Material Group	Po bar	Height mm	Width mm	Depth mm	Connection	Power kW	Voltage V	Sound Level dB(A)	Weight kg
VS 1	8910100*	38	≤ 2.5	680	530	580	2 x G 1	0.75	230/50 Hz	55	25.0
VS 2-1/60	8910200	38	≤ 4.8	920	470	730	2 x G 1	1.10	230/50 Hz	55	33.0
VS 2-1/75	8910300	38	≤ 6.5	920	530	640	2 x G 1	1.10	230/50 Hz	55	35.0
VS 2-1/95	8910400	38	≤ 8.0	920	530	640	2 x G 1	1.10	230/50 Hz	55	37.0
VS 1-1/140	8910500	38	≤ 13.5	920	530	640	2 x G 1	2.20	400/50 Hz	60	50.0

* Control basic only

For 60 Hz operations , please consult us



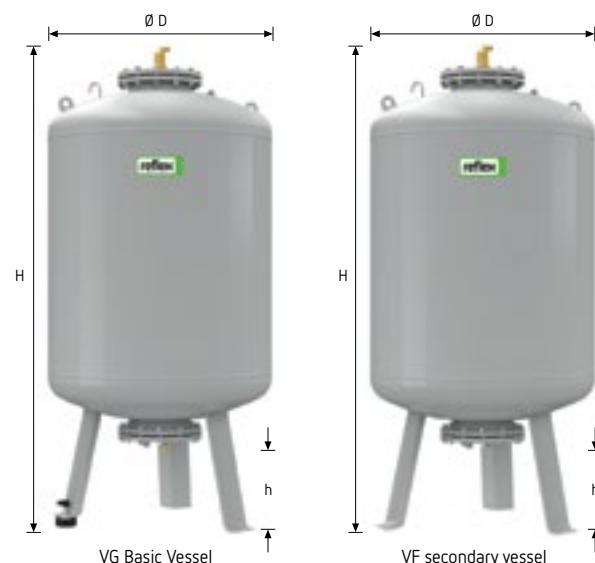
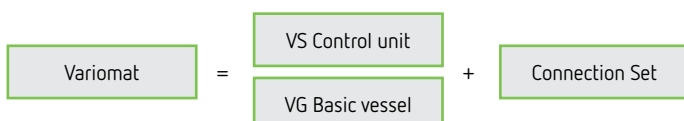
VS Control unit - 2 pumps

Type	Control Touch Article No	Material Group	Po bar	Height mm	Width mm	Depth mm	Connection	Power kW	Voltage V	Sound Level dB(A)	Weight kg
VS 2-2/35	8911100	38	≤ 2.5	920	700	780	2 x G 1 1/4	1.20	230/50 Hz	55	54.0
VS 2-2/60	8911200	38	≤ 4.8	920	700	780	2 x G 1 1/4	2.20	230/50 Hz	55	58.0
VS 2-2/75	8911300	38	≤ 6.5	920	720	800	2 x G 1 1/4	2.20	230/50 Hz	55	72.0
VS 2-2/95	8911400	38	≤ 8.0	920	720	800	2 x G 1 1/4	2.20	230/50 Hz	55	76.0
VS 1-2/140	8911500	38	≤ 13.5	920	720	800	2 x G 1 1/4	4.40	400/50 Hz	60	80.0

For 60 Hz operations , please consult us

Variomat Pressurisation Systems

- Heavy duty steel tank
- Approval in acc. with the 2014/108/EC directives
- Replaceable butyl bladder in accordance with DIN EN 13831
- Max. system temperature 120°C
- Max. operation temperature 70°C
- Durable epoxy coating with attractive grey colour



	VG Basic vessel	VF Secondary vessel						
Type	Article No	Article No	Material Group	Ø D mm	H mm	h mm	Connection	Weight kg
200	8600011	8610000	36	634	1060	146	G 1	41.4
300	8600111	8610100	36	634	1360	146	G 1	52.2
400	8600211	8610200	36	740	1345	133	G 1	72.2
500	8600311	8610300	36	740	1560	133	G 1	81.8
600	8600411	8610400	36	740	1810	133	G 1	96.8
800	8600511	8610500	36	740	2275	133	G 1	109.9
1000 Ø 740	8600611	8610600	36	740	2685	133	G 1	156.0
1000 Ø 1000	8600705	8610705	37	1000	2130	350	G 1	292.8
1500	8600905	8610905	37	1200	2130	350	G 1	320.0
2000	8601005	8611005	37	1200	2590	350	G 1	565.0
3000	8601205	8611205	37	1500	2590	380	G 1	795.0
4000	8601305	8611305	37	1500	3160	380	G 1	1080.0
5000	8601405	8611405	37	1500	3695	380	G 1	1115.0

Commissioning by Reflex - After Sales Service (Option)

Single pump system **Article No : 7945600**

Double pump system **Article No : 7945630**

Variomat Connection Set

- For connecting Variomat pump systems to VG basic vessels with protected shut-offs and screw connections



Variomat Connection set - 1 pump

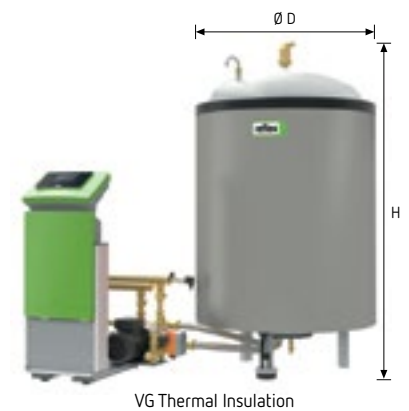
VG vessel (Ø/mm)	Article No	Material Group	Weight kg
480 - 740	6940100	39	2.0
1000 - 1500	6940200	39	3.0

Variomat Connection set - 2 pumps

VG vessel (Ø/mm)	Article No	Material Group	Weight kg
480 - 740	6940300	39	2.0
1000 - 1500	6940400	39	3.0

Thermal Insulation For Variomat Vessels

- 50 mm flexible foam thermal insulation with laminated grey PE cladding with zip fastener
- For heating applications only. For cooling water systems appropriate diffusion-resistant insulation must be provided on-site
- Removable, for assembly on site
- Fire classification of jacket-B2

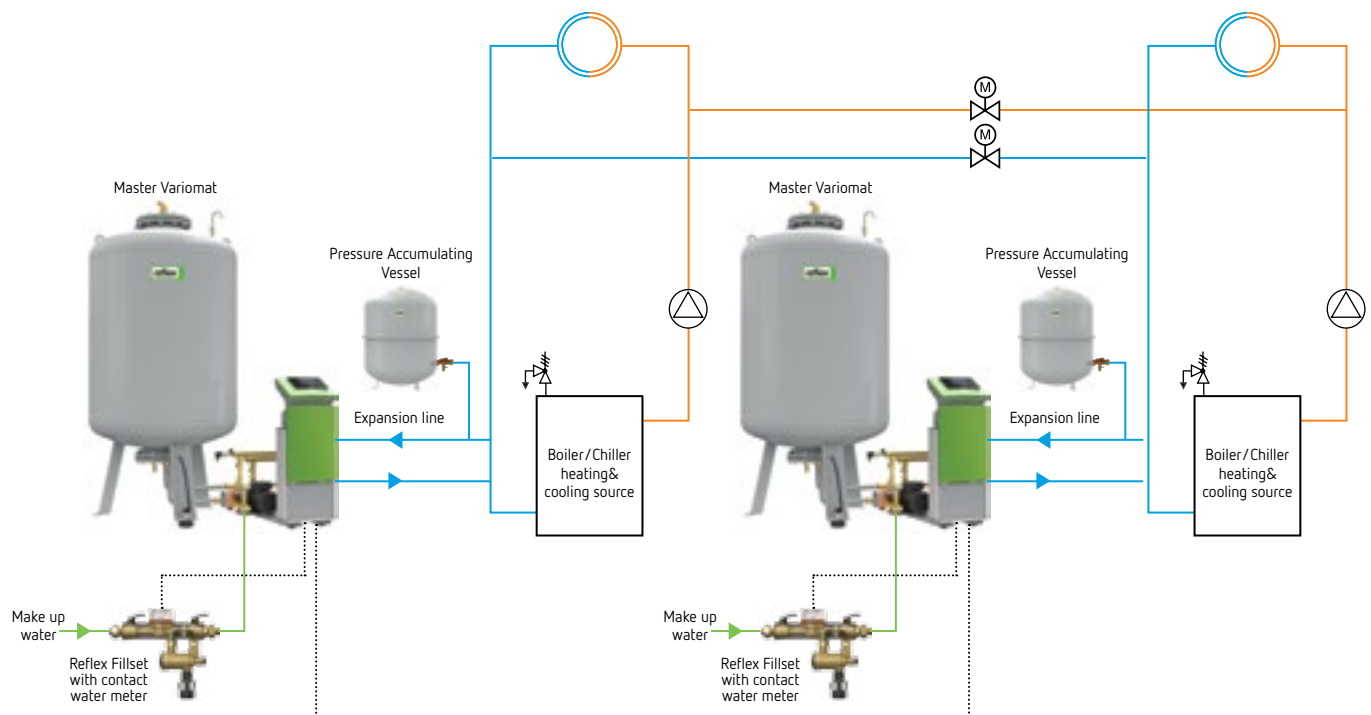


Type	Article No	Material Group	Ø D mm	H mm	h mm	Weight kg
VW 200	7985700	39	634	1060	146	3.0
VW 300	7986000	39	634	1360	146	3.5
VW 400	7995600	39	740	1345	133	4.5
VW 500	7983900	39	740	1560	133	5.5
VW 600	7995700	39	740	1810	133	6.0
VW 800	7993800	39	740	2275	133	8.0
VW 1000 Ø 740	7993900	39	740	2685	133	8.0
VW 1000 Ø 1000	7986800	39	1000	2130	350	9.0
VW 1500	7987000	39	1200	2130	350	10.6
VW 2000	7987100	39	1200	2590	350	13.0
VW 3000	7993200	39	1500	2590	380	15.0
VW 4000	7993300	39	1500	3160	380	17.0
VW 5000	7993400	39	1500	3695	380	21.8

Master - Slave Connection

- Software tool for operating up to 10 Variomat in a hydraulic group to a distance of 1000 m

Article No : 7859000 Material Group : 35



RS 485

MBM II Bladder Rupture Detector

- For the signalling of bladder rupture in Variomat expansion
- Consists of a factory-mounted electrode and a relay
- Power supply 230 V / 50 Hz supply
- Three terminal dry contact
- Recommended: 1 device for each vessel
- MBM Electronics in two variants :

- For wall-mounting
- Factory-installed in the Touch Control cabinet

Article No : 7857700
Article No : 9122294

Material Group : 86
Material Group : 86

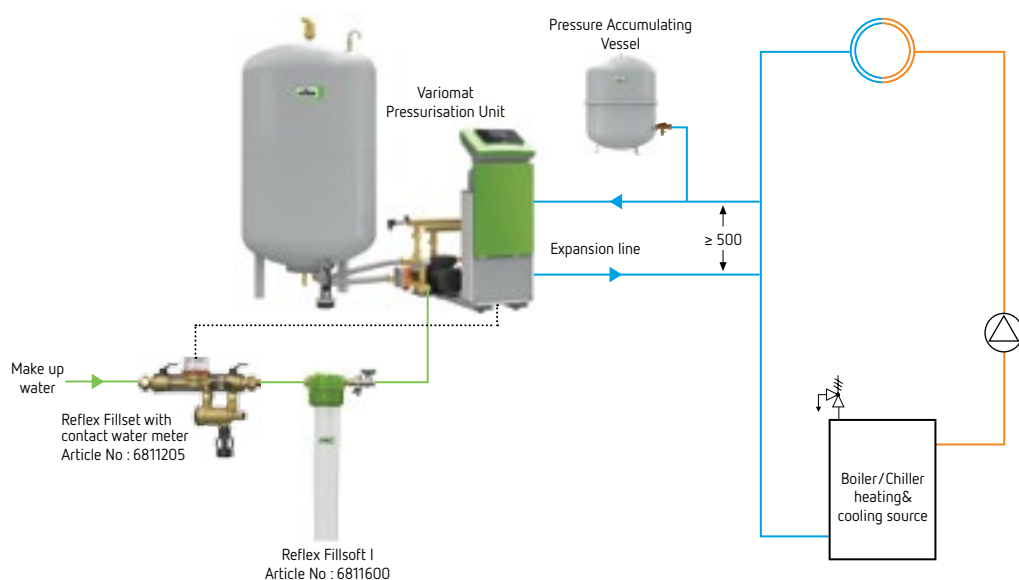


Relay
For on site mounting



Electrode
Factory mounted

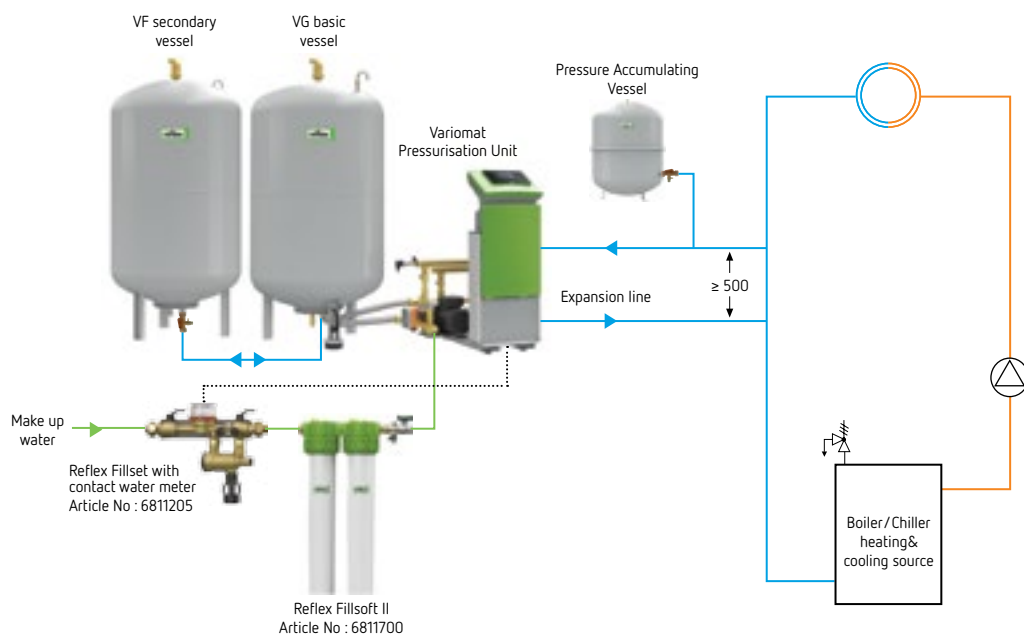
Variomat 1 water make-up with drinking water



Fillsoft I

Variomat unit in combination with Fillsoft I water softening device and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains. By the Fillsoft device the system water can be totally softened or adjusted to the required level. The Fillset RPZ valve protects against back-flow, providing protection against the contamination of mains cold water supply according to EN1717. By connecting the contact water meter to the Variomat control unit the Fillmeter function is available.

Variomat 2-1 water make-up via softening equipment



Fillsoft II

Variomat unit in combination with Fillsoft II water softening device for higher capacity and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains. By the Fillsoft device the system water can be totally softened or adjusted to the required level.

The Fillset RPZ valve protects against backflow, providing protection against the contamination of mains cold water supply according to EN1717. By connecting the contact water meter to the Variomat control unit the Fillmeter function is available.

Variomat Quick Selection

Selection Example

Output heat generator $Q = 500 \text{ kW}$
 Water capacity $V_s = 5000 \text{ litres}$
 Design temperature $T = 70/50 \text{ }^\circ\text{C}$
 Static height $H_{st} = 30 \text{ m}$
 Expansion coefficient $n = 0.0228$

$$P_0 \geq \frac{H_{st} [\text{m}]}{10} \text{ bar} + 0.2 \text{ bar}$$

$$P_0 \geq \frac{30}{10} \text{ bar} + 0.2 \text{ bar} = 3.2 \text{ bar}$$

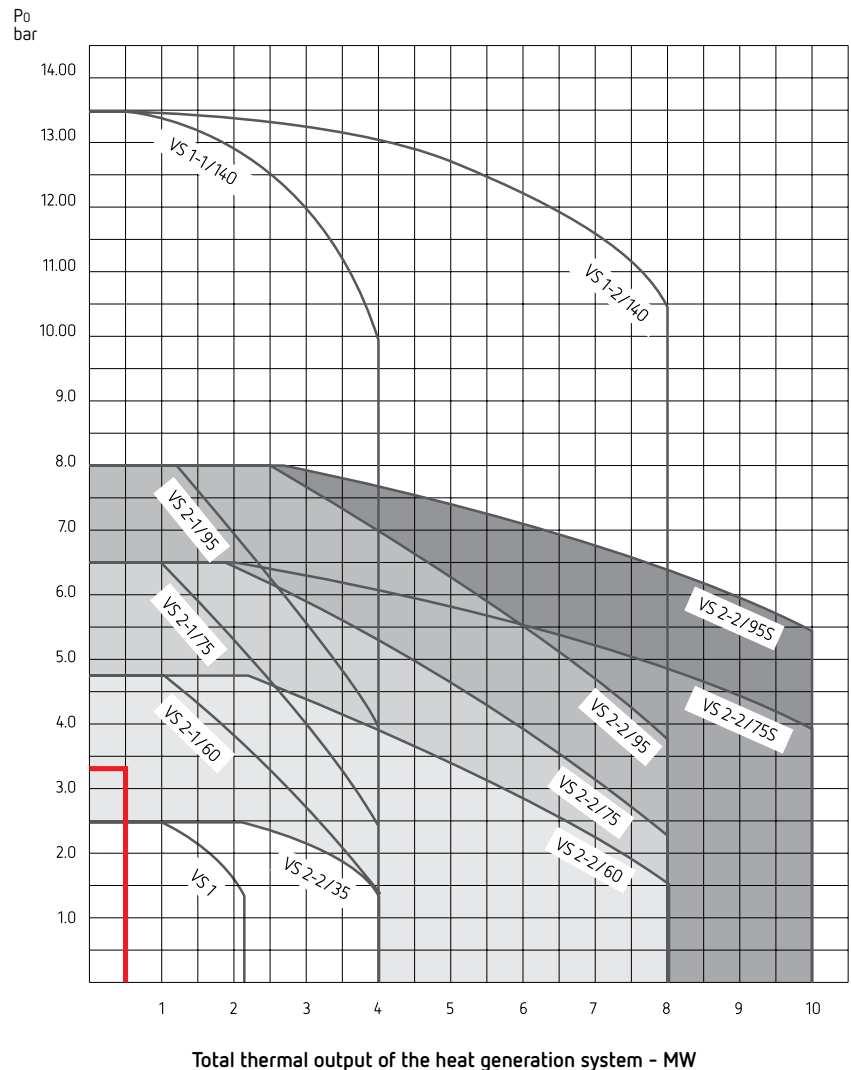
$$V_n \geq \frac{V_e + V_{ws}}{DF}$$

$$V_n \geq \frac{5000 \times (0.0228 + 0.005)}{0.9} = 155 \text{ liter}$$

Selected:

Control unit VS 2-1/60
 Expansion vessel VG 200
 Pressure Accumulating Vessel NG 80
 Connection set G 1"
 Make-up Reflex Fillset

- For cooling water systems up to 30°C only 50% of the nominal heating power should be considered when selecting the control unit
- In performance ranges $> 2 \text{ MW}$ we recommend using double pump systems



Variomat VG - VF Vessel Sizing

- Nominal volume V_n

Approximate value from the diagram →

or

Calculation acc. to formula ↓

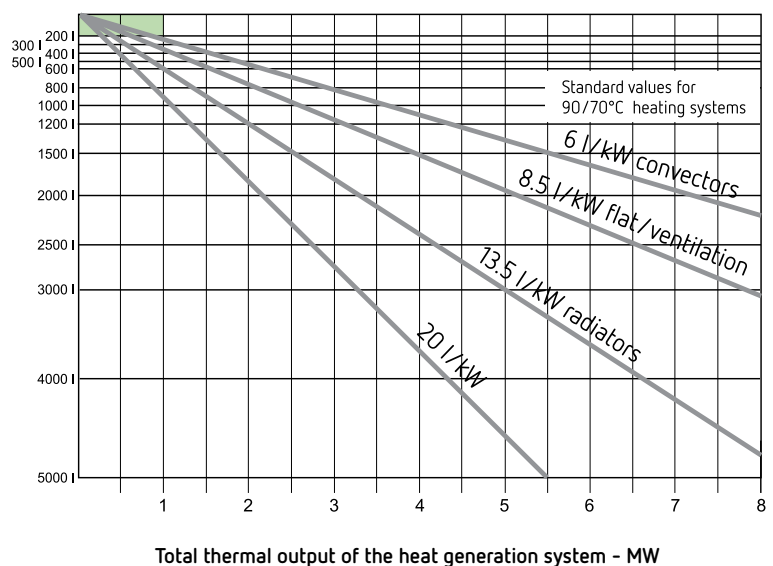
$$V_n \geq V_A \times \begin{matrix} 0.031 & [70^\circ\text{C}] \\ 0.045 & [90^\circ\text{C}] \\ 0.054 & [100^\circ\text{C}] \\ 0.063 & [110^\circ\text{C}] \end{matrix}$$

Setting flow temperature ↑

V_n = Nominal volume, liter

V_A = System water content, liter

- The nominal volumes can be distributed to several vessels (VG basic vessel and VF secondary vessel).



Variomat Giga

Pump Control Pressurisation Systems

- Pressure maintenance
- Deaeration
- Water make-up



Reflex Control

Control Touch



- 4.3" touch screen colour display
- Graphic user interface
- Simply structured plain text menus including operating instructions and help texts
- Integrated control of system pressure, deaeration and water make-up
- Manual and automatic operation
- Permanent display of the most important operating parameters in the system diagram
- Intelligent Plug & Play operational management
- Evaluation and storage of the most important operational data
- Extensive interfaces:
 - Input, for contact water meter
 - 2 x dry contact outputs for error messages
 - 2 x analogue outputs for pressure and vessel content
 - 2 x RS-485 interfaces
 - Plugs for Bluetooth module and HMS networks, as well as SD card

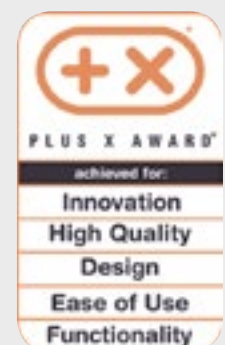


Control Remote

NEW!



- Remote control via secure server
- System monitoring via PC or mobile device at any time and everywhere
- (Professional) remote servicing by Reflex Customer Service
- Reflex Remote Portal with intuitive user interface
- Simple management of multiple installations
- Visualisation of all parameters
- Diagrams for run-time monitoring
- Alarm messages via e-mail or messaging
- User-provided Internet or GSM connection
- Factory-installed or retrofitting, independent of Touch or Basic



Variomat Giga

Pump Control Pressurisation Systems

The expansion bend
ensures the pressure compensation towards the atmosphere between reservoir wall and diaphragm.

GH Hydraulics
The 10 design models of the GH hydraulic system allows the hydraulic adjustment to the most different systems and environments.

GS Control unit
The GS control in 6 basic models ensures an excellent operating comfort. All reflex controls have been designed according to a uniform design guide line.

The sounding pipe
de-aeration extracts the gasses from the tank and prevents a de-aeration.

The high-quality butyl bladder
protects the expansion water from direct air admission.



Bladder Control
By Customer



MBM II bladder
rupture detector
(option)

The flex-connection
for the expansion line is required for the proper function of the level measurement.

The pressure cell
(level measurement)
allows to determine the reservoir level.

Over-flow line
with patented motor
ball-valve-auto function

Min. press. limiter

Connection
Expansion line DN 80/PN 16
Dimensioning

Shut-off
protected against
inadvertent closing

Throttle valve

Safety valve
for protection of the GG
and GF vessels

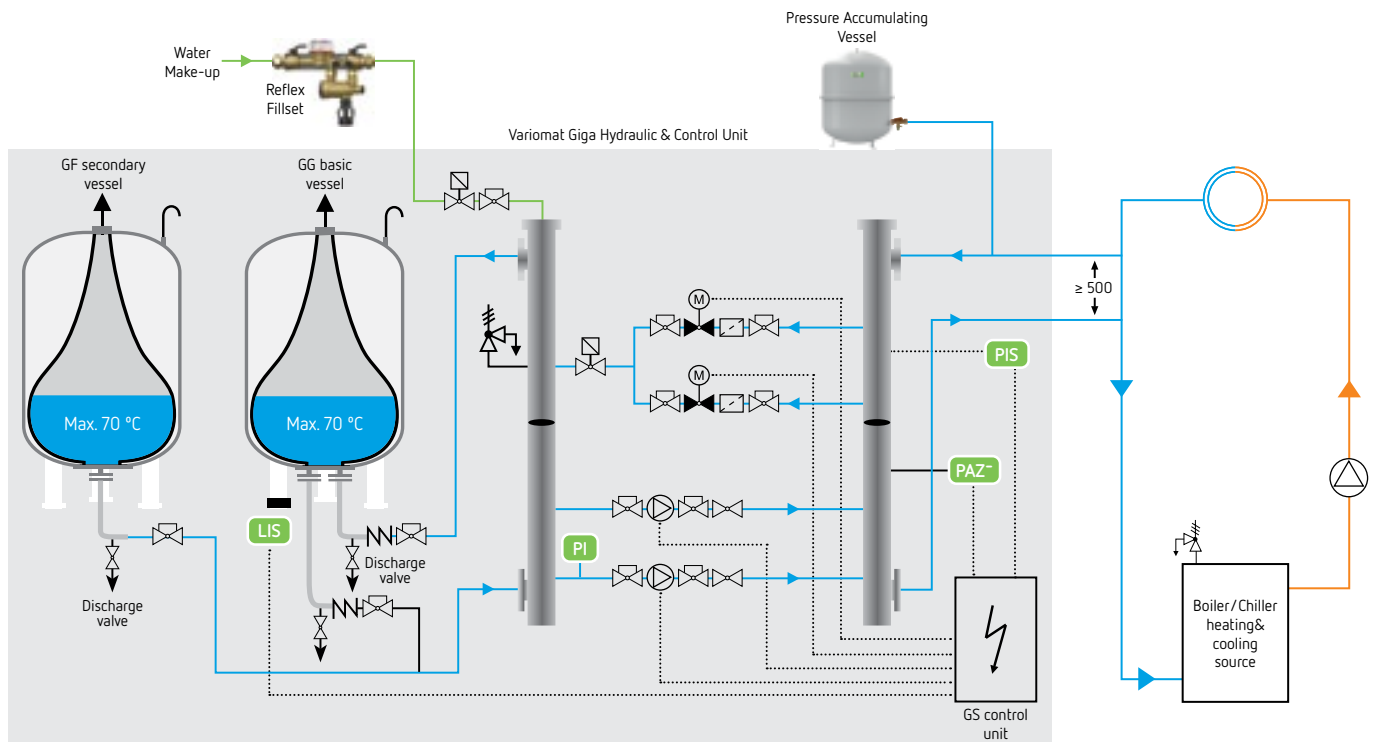
Water make-up
solenoid valve

Connection
GG Basic vessel DN 80/PN 6

Most reliable, silent pumps
with soft start feature

Variomat Giga

Variomat Giga Pressurisation Systems



PIS

Pressure maintenance, compensating for the expansion volume

The two pumps and two motorised ball valves are actuated in such a way that pressure remains constant within a range of around ± 0.2 bar. The expansion water is supplied to or discharged from the depressurised basic vessel in 2 separate expansion lines.

LIS

Water make-up

The volume of discharged free gases and water losses are automatically replenished. The level measurement is carried out by evaluating the weight of the basic vessel. Water make-up based on the filling level in the basic vessel is monitored by a leakage monitor and interrupted in the event of any malfunctions. With the Variomat 2, the signals of a contact water meter can be evaluated (Reflex Fillset with contact water meter).

PAZ

Pressure Limiter

If the min. operating pressure has fallen short at the component-inspected min. pressure controller PAZ, the electrical actuator in the overflow line is closed, and the heat generator is switched off. The min. pressure controller is to be installed on the expansion line, for medium pressure maintaining units on such unit.

TIME

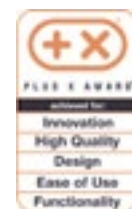
Deaeration

A part flow of the heating water is released into the basic vessel and thus degassed. The deaeration mode can be selected from the following versions:

- Continuous deaeration: constant deaeration after startup and repairs in the supply system, to allow all residual air to be removed from the system.
- Follow-up deaeration: activated automatically after continuous deaeration and performed after every pump operation.
- Interval deaeration: performed after a specified schedule.

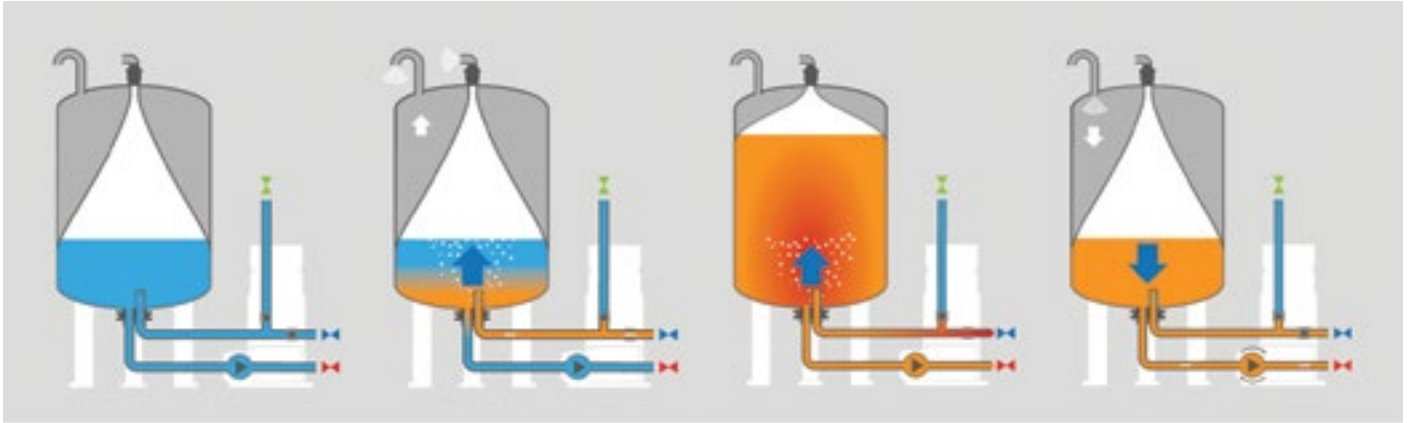
Note: The useful volume rate is 90 % for the pump controlled pressurisation units.

Therefore according to calculations the required expansion tank size is smaller than static tank size.



Variomat Giga Working Principle for Heating & Cooling

HEATING



1. Low temperature

System pressure is constant, unit at rest with a small water reserve.

2. Temperature increase

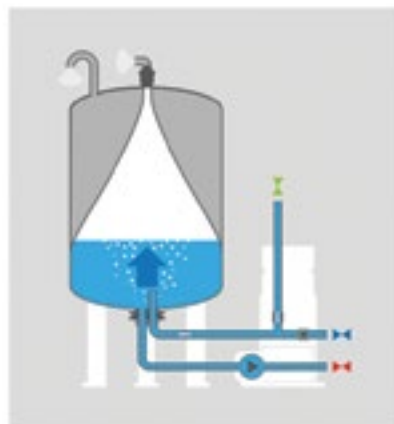
System pressure increase is detected. Hence, water flows into the bladder through the open valve and is de-aerated due to pressure drop.

3. Full power

The unit reaches almost full capacity when the temperature increase is completed. Pressure is maintained.

4. Cooling down

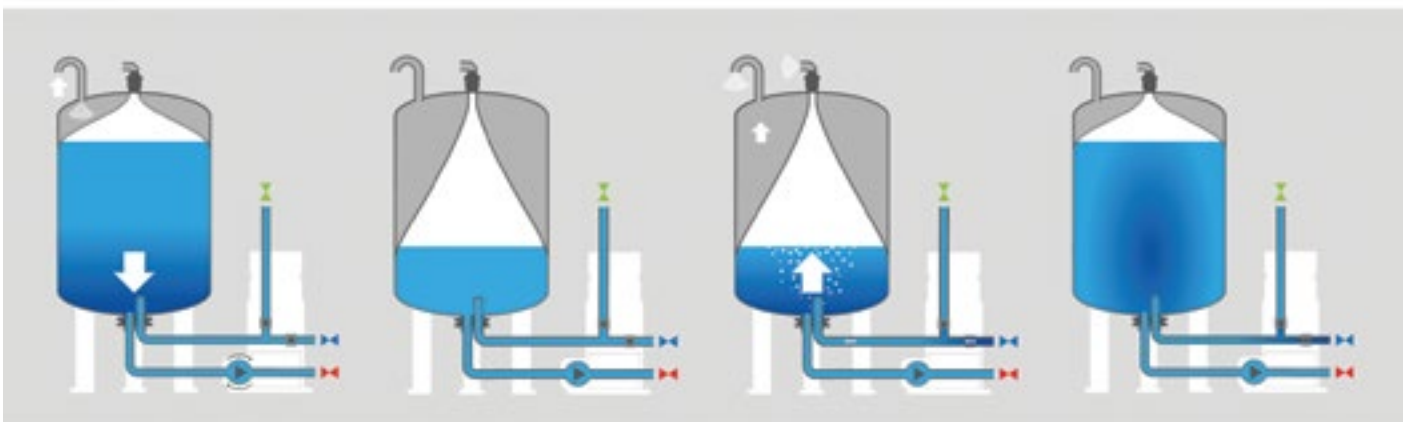
System pressure decreases; the de-aerated water is pumped back to the system until pressure's setpoint is restored.



5. Replenish

if the vessel's water volume drops under critical level, the unit refills the bladder until minimum water reserve.

COOLING



1. Cooling down

Water volume and thus pressure drops, the de-aerated water is pumped back to the system until pressure reaches defined level.

2. Low temperature

The unit is at rest with a small amount of water.

3. Temperature increase

Water volume and system pressure increases subsequently, the overflow valve opens in order to allow water into the depressurised vessel until pressure stabilizes.

4. Full power

The unit reaches almost full capacity when the temperature surge is completed all while maintaining pressure constant.



Video clips demonstrating the function of this and other products are available under www.reflex.de/services/fachwissen-und-beitraege/videothek/

Variomat Giga Control Systems

- Pump-controlled pressurisation system with integral water-make-up and deaeration (RL ≤ 70°C) for heating and cooling water systems
- With 2 pumps and 2 overflow valves
- Max. operating pressure 16 bar
- Max. system temperature 120°C*
- Max. operating temperature 0–70°C**
- Sound level approx. 55 dB(A)
- Pump connection DN 80/PN 16
- Basic vessel connection DN 80/PN 6
- Water make-up connection Rp 1/2



Variomat Giga Control Unit

Control Module

Type	Control Touch Article No	Material Group	Electrical Power kW	Voltage	Hydraulic Module	Height mm	Width mm	Depth mm	Weight kg
GS 1.1	8912500	38	2.20	230 V/50 Hz	GH 50/GH 70	1200	1170	1020	15
GS 3	8912600	38	6.60	400 V/50 Hz	GH 90/GH100	1200	1170	830	15
GS 4	8913000	38	8.0	400 V/50 Hz	GH 110/ GH130/GH140	600	210	830	15
GS 7.5	8919000	38	15.0	400 V/50 Hz	GH 150	600	210	830	15

Hydraulic Module

Type	Article No	Material Group	P ₀ bar	Height mm	Width mm	Depth mm	Weight kg
GH 50	8931000	38	≤ 4.0	1200	1170	830	195
GH 70	8932000	38	≤ 6.0	1200	1170	830	195
GH 90	8931400	38	≤ 8.0	1200	1170	830	265
GH 100	8931200	38	≤ 9.5	1200	1170	830	230
GH 110	8931700	38	≤ 10.0	1200	1170	830	270
GH 130	8931800	38	≤ 12.0	1200	1170	830	280
GH 140	8931300	38	≤ 13.0	1200	1170	830	273
GH 150	8931900	38	≤ 14.5	1200	1170	830	340

P₀ = Setting value on the control
= static height + evaporation pressure + 0.2 bar (recommended)

* According to maximum possible setting value - Temperature control 105°C, in accordance with DIN EN 12828

** Installation in the system return, diaphragm load of expansion vessels max. 70°C. Please consult us for permanent temperatures of ≤ 0°C

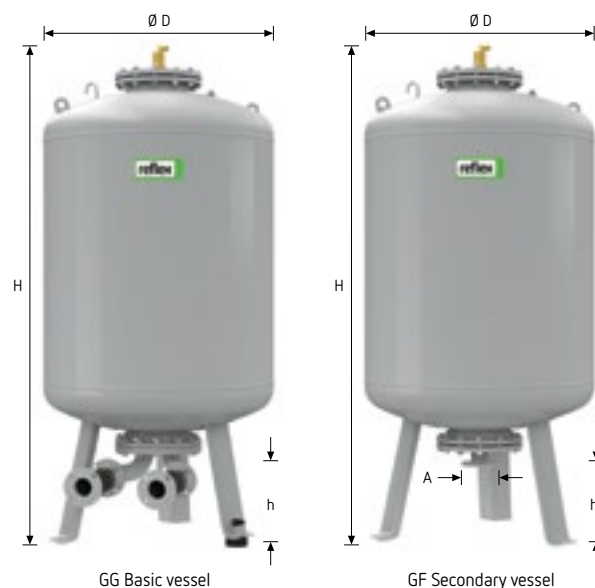
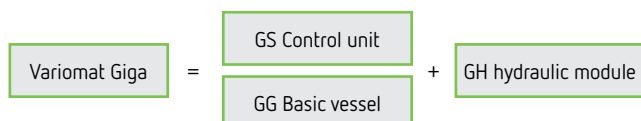
Safe Control

- Reliable water make-up for special applications
- Rp 1/2"
- Factory-assembly **Article No : 9119552** **Material Group : 86**
- As retrofit kit **Article No : 9119352** **Material Group : 86**



Variomat Giga Tanks

- Heavy duty steel tank
- Approval in acc. with the 2014/108/EC directives
- Replaceable butyl diaphragm in accordance with DIN EN 13831
- Max. system temperature 120°C
- Max. operation temperature 70°C
- Durable epoxy coating with attractive new colour



	GG Basic Vessel	GF Secondary vessel							
Type	Article No Grey	Article No Grey	Material Group	Ø D mm	H mm	h mm	h1 mm	A	Weight kg
1000	8920105	8930105	37	1000	2130	285	305	DN 65/PN 6	330.0
1500	8920305	8930305	37	1200	2130	285	305	DN 65/PN 6	465.0
2000	8920405	8930405	37	1200	2590	285	305	DN 65/PN 6	565.0
3000	8920605	8930605	37	1500	2590	314	335	DN 65/PN 6	795.0
4000	8920705	8930705	37	1500	3160	314	335	DN 65/PN 6	1.080.0
5000	8920805	8930805	37	1500	3695	314	335	DN 65/PN 6	1.115.0

MBM II Bladder Rupture Detector

- For the signalling of bladder rupture in Variomat expansion
- Consists of a factory-mounted electrode and a relay
- Power supply 230 V / 50 Hz supply
- Three terminal dry contact
- Recommended: 1 device for each vessel
- MBM Electronics in two variants :

- For wall-mounting
- Factory-installed in the Touch Control cabinet

Article No : 7857700
Article No : 9122294

Material Group : 86
Material Group : 86



Relay
For on site mounting



Electrode
Factory mounted

SV1 Safety Valve

- For additional protection of GG and GF vessels at nominal heating outputs > 10.5 MW

Article No : 6942100 **Material Group :** 81



Commissioning by Reflex - After Sales Service (Option)

Double pump system **Article No :** 7945630

BMS Modules

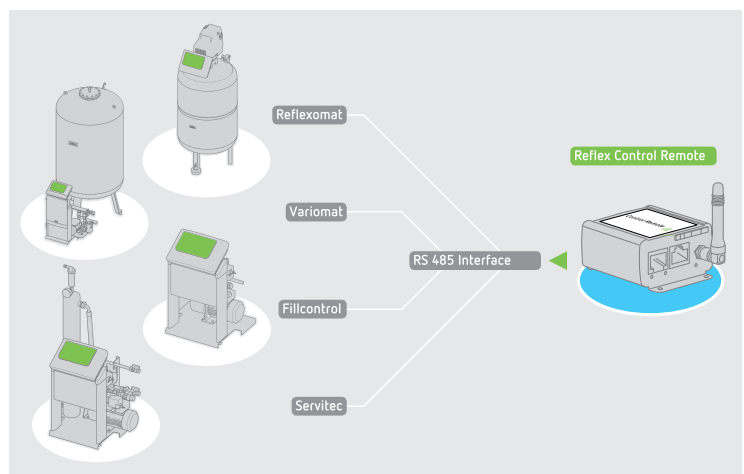
Type	Article No	Material Group	Weight kg
LonWorks Digital	8860000	86	1.5
LonWorks	8860100	86	1.9
Profi bus-DP	8860200	86	1.9
Ethernet	8860300	86	1.9
BACnet-IP for Control Touch	8860500	86	0.4
BACnet MS/TP for Control Touch	8860600	86	0.4
Modbus RTU for Control Touch	9125592	86	0.4
Profibus RTU for Control Touch	9118042	86	0.4
I/O Modules	8997705	71	1.0



Control Remote

Remote monitoring, diagnostics and at last remote-control maintenance are becoming increasingly important for the supervision of supply grid systems. For the responsible on-site operator, it is more and more difficult to find qualified support staff. Long distances to sites frequently prevent quick and continuous control.

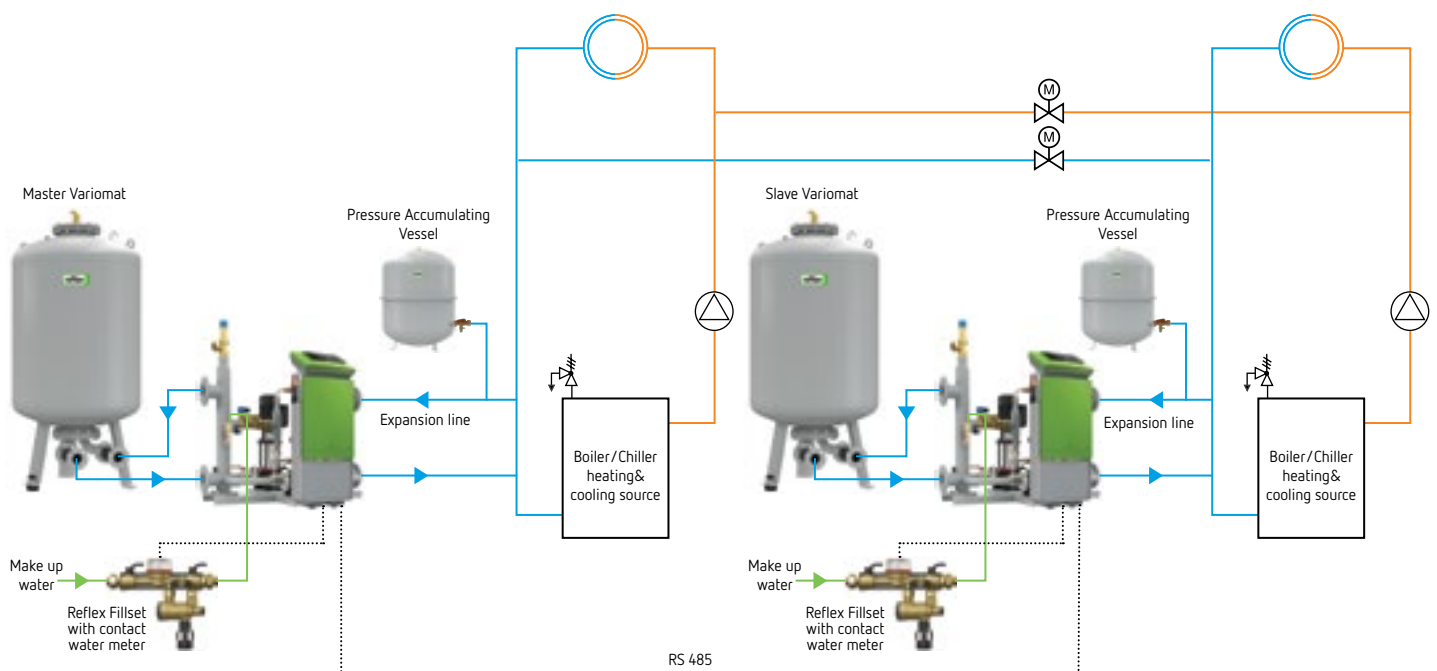
Type	Article No	Material Group	Length mm	Width mm	Height	Weight kg
Control Remote	8910800	86	83	60	34	0.3



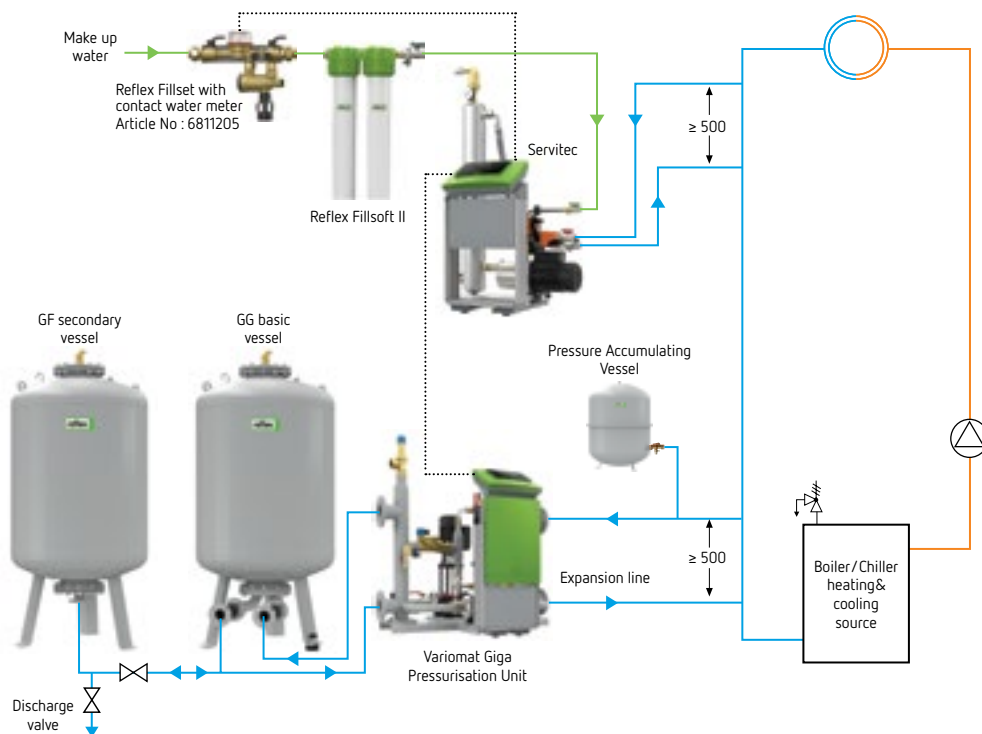
Master - Slave Connection

- Software tool for operating up to 10 Variomat Giga in a hydraulic group to a distance of 1000 m

Article No : 7859100 Material Group : 35



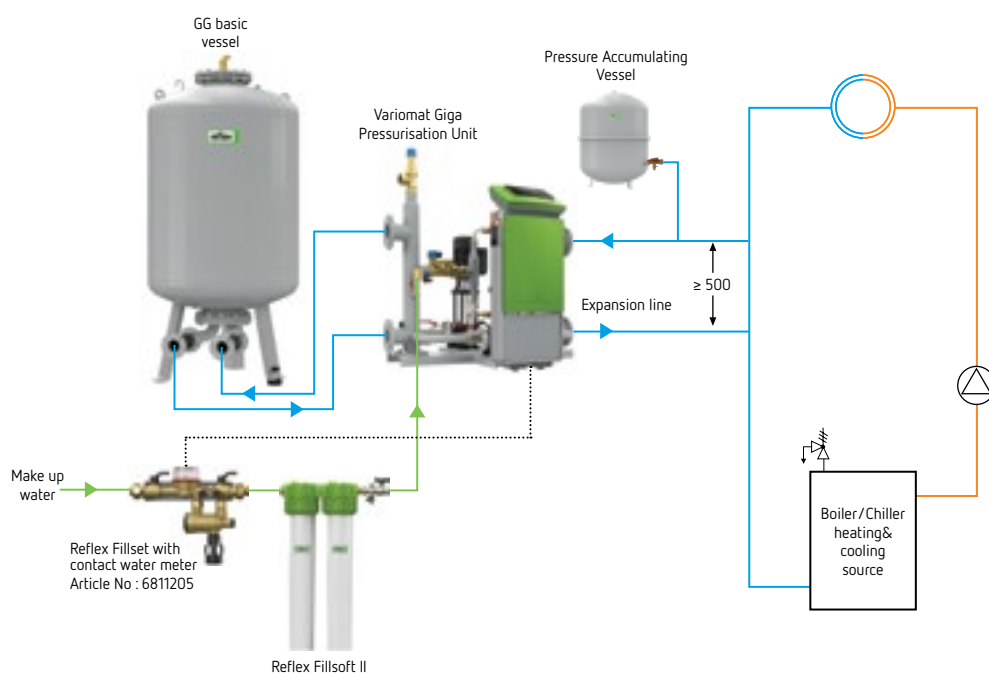
Variomat Giga With Servitec



Variomat Giga unit in combination with Servitec and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains via the Servitec device. By connecting the Servitec device in Levelcontrol mode to the Variomat Giga control unit, make-up water is de-aerated before going into the system.

The Fillset RPZ valve protects against backflow, providing protection against the contamination of mains cold water supply according to EN1717. By the Fillsoft device the system water can be totally softened or adjusted to the required level. By connecting the contact water meter to the Variomat Giga control unit the Fillmeter function is available. This combination can also be used for applications where the water supply comes from an adjacent container, as the Servitec device is self priming.

Variomat Giga With Softening Equipment



Variomat Giga unit in combination with Fillsoft II water softening device and Fillset RPZ valve. If the water level in the vessel drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains. By the Fillsoft device the system water can be totally softened or adjusted to the required level.

The Fillset RPZ valve protects against backflow, providing protection against the contamination of mains cold water supply according to EN1717. By connecting the contact water meter to the Variomat control unit the Fill-meter function is available.

Variomat Giga Quick Selection

Selection Example

Output heat generator $Q = 13 \text{ MW}$
 Water capacity $V_s = 50.000 \text{ litres}$
 Design temperature $T = 70/50 \text{ }^\circ\text{C}$
 Static height $H_{st} = 30 \text{ m}$
 Expansion coefficient $n = 0.0228$

$$P_0 \geq \frac{H_{st} [\text{m}]}{10} \text{ bar} + 0.2 \text{ bar}$$

$$P_0 \geq \frac{30}{10} \text{ bar} + 0.2 \text{ bar} = 3.2 \text{ bar}$$

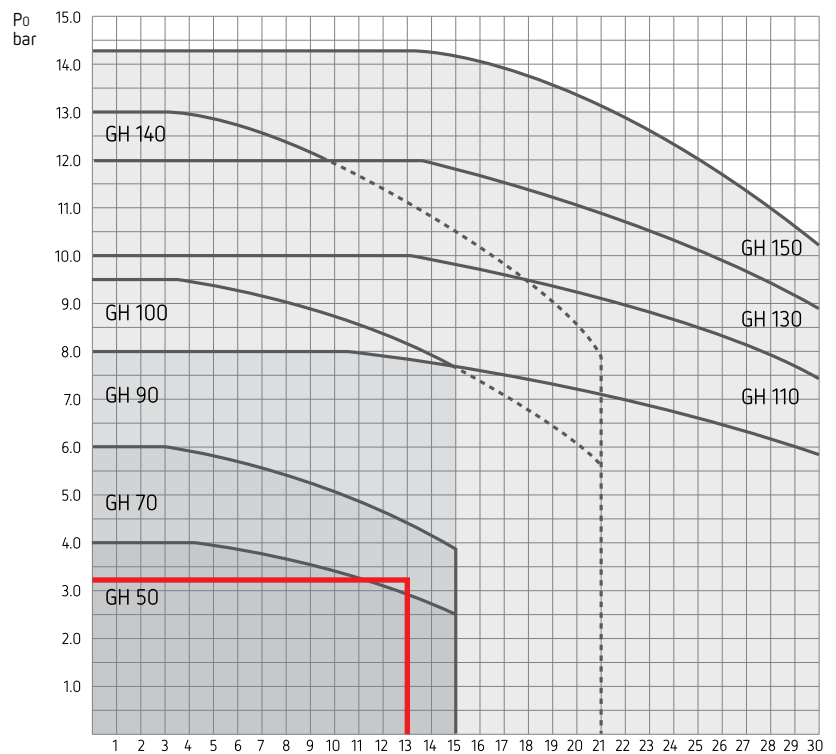
$$V_n \geq \frac{V_e + V_{ws}}{DF}$$

$$V_n \geq \frac{50.000 \times (0.0228 + 0.005)}{0.9} = 155 \text{ liter}$$

Selected:

Control unit GS 1.1
 Hydraulic module GH 70
 Expansion vessel GG 2000
 Make-up Reflex Fillset

- For cooling water systems up to 30°C only 50% of the nominal heating power should be considered when selecting the control unit
- In performance ranges $> 2 \text{ MW}$ we recommend using double pump systems



Total thermal output of the heat generation system - MW

Variomat Giga GG - GF Vessel Sizing

- Nominal volume V_n

Approximate value from the diagram →

or

Calculation acc. to formula ↓

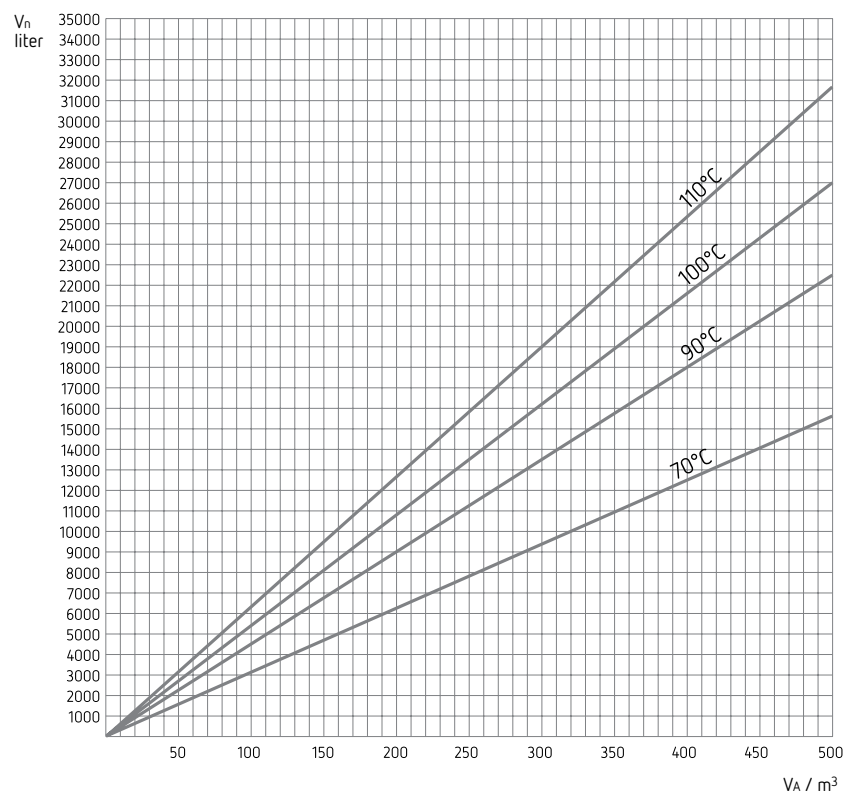
$$V_n \geq V_A \times \begin{matrix} 0.031 & [70^\circ\text{C}] \\ 0.045 & [90^\circ\text{C}] \\ 0.054 & [100^\circ\text{C}] \\ 0.063 & [110^\circ\text{C}] \end{matrix}$$

Setting flow temperature ↑

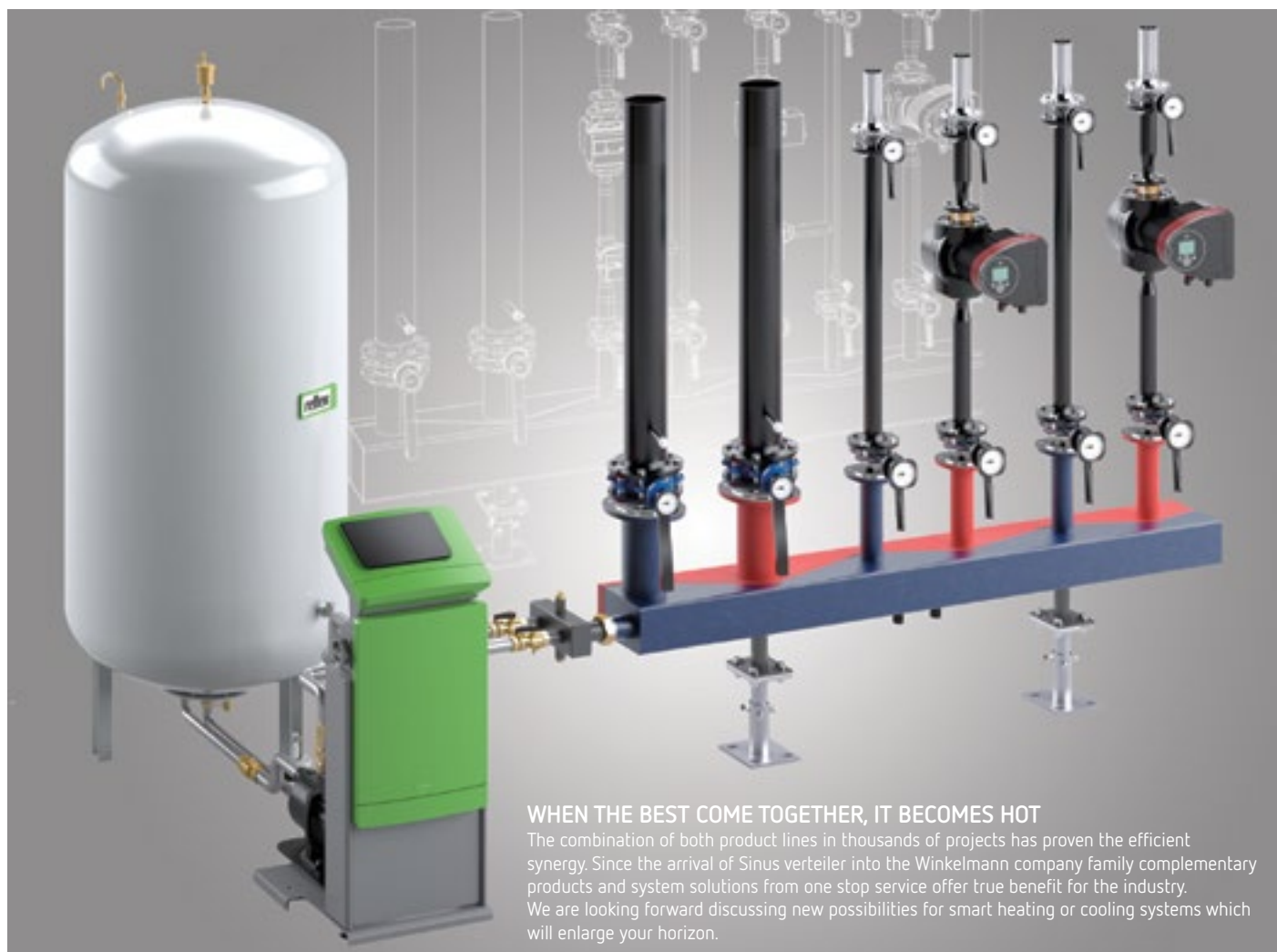
V_n = Nominal volume, liter

V_A = System water content, liter

- The nominal volumes can be distributed to several vessels (GG basic vessel and GF secondary vessel).



Reflex & Sinus Efficient Synergy

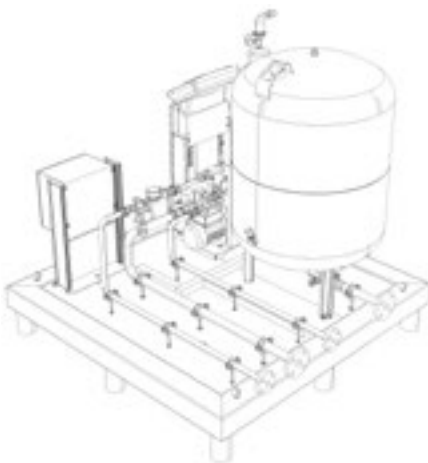


Tailor-made Solutions



Solution: Variomat Giga

High outputs and high pressures are the specialty of the Variomat Giga. Standard solutions are offered up to 30 MW and beyond that Reflex additionally offers non-standard solutions. In-line units are fitted upstream of the Variomat Giga in hot water networks. In all cases we would recommend planning and design in conjunction with Reflex.



Solutions for large-scale systems

Large heat generation systems on the primary side are typical for this sector. Heat is transported along a wide network of district heating pipes to a large number of small terminal stations, where it is transferred to the secondary side and supplied to customers. Reflex offers an extensive range of professional solutions for the primary side and for transfer to the secondary side




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The Reflex brand name is well known in Europe and throughout the world as a major leader in pressure control technology for heating, chilled and potable water applications. Our world wide growth has allowed us to build several state-of-the-art manufacturing facilities supplying the industry with outstanding quality products. Reflex Winkelmann GmbH having its headquarters in the Westfalian city of Ahlen is not only a recognized leader in expansion vessels but also a significant manufacturer of advanced system solutions such as compressor and pump-controlled pressurisation systems, automatic air separation systems and hot water heaters.



Reflex has achieved its significant global growth today thanks to the unique combination of its world-class manufacturing skills, dedication to high-product quality at an affordable price and its commitment to continuous technical training of its people, our most precious resource. Our tradition goes back to 1898. This family oriented company started its core business in the elaboration of steel. A business in which we are recognised leaders today. The Heinrich Winkelmann Group form the parent company to a whole group of diversified manufacturing companies serving the heating segment and the whole automotive industry with over 4.200 employees. A tradition of more than a hundred years in this business makes us real experts today.



Thinking solutions.

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