

Variomat

Pump Controlled Pressurisation Systems

- Pressure maintenance
- Deaeration
- Water make-up

For Control Touch:



Control Unit

Control Basic



- 2-line LCD display
- 8 control keys
- 2 status displays
- 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 Basic S



- 2-line LCD display
- 2 status displays
- Integrated control of system pressure, deaeration and water make-up
- Manual and automatic operation
- 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, HMS networks and KNX module, as well as SD card



For ControlTouch:



Variomat

Pump Controlled Pressurisation Systems

The expansion bend guarantees the pressure compensation towards the atmosphere between the vessel wall and the diaphragm

The expansion bend guarantees maximum operating comfort. All Reflex controls (Variomat, Variomat Giga, Reflexomat, Servitec) have been designed according to a uniform design guideline

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

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

Heavy duty steel tank

MBM II bladder rupture detector (option)

The pressure expansion relief at atmospheric pressure results in the deaeration of the expansion water

The connection set connects the control unit with the VG basic vessel. For 1-pump systems, the protected shut-off is integrated in the connection set. With respect to 2-pump systems, the protected shut-off is located on the control unit

The pressure cell (level measurement) enables the determination of the vessel fill level



Pump
Most reliable and silent.
From VS 2 soft start pumps

Over-flow line
With patented motor ball-valve-Auto-function

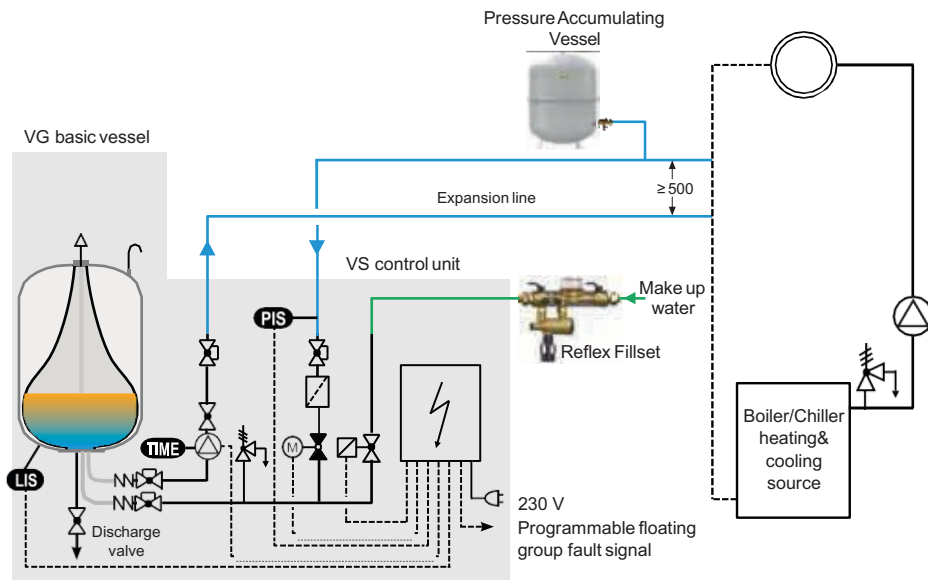
Water make-up line
When the fill level in the VG basic vessel is too low, the solenoid valve opens. For a connection to the drinking water network, Fillset must be added



Variomat

Variomat Pressurisation Systems

Variomat 1 up to 2 MW with 1 pump



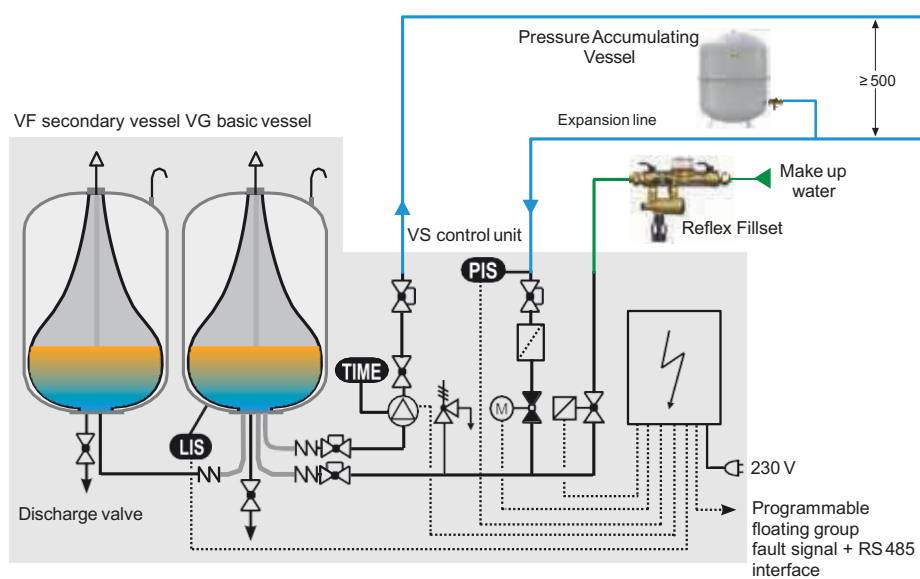
PIS Pressure maintenance, compensating for the expansion volume

The pump and overflow 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

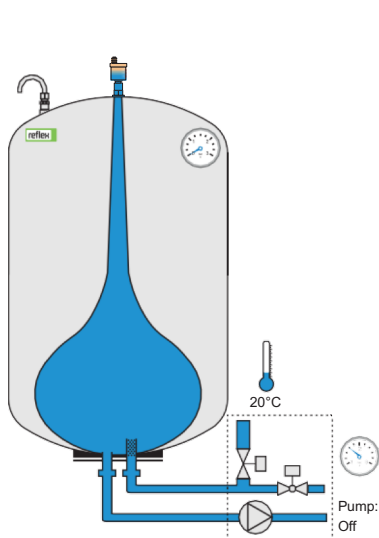
A part flow of the heating water is released into the basic vessel and thus degassed. The deaeration mode can be selected from the following versions:

- 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.

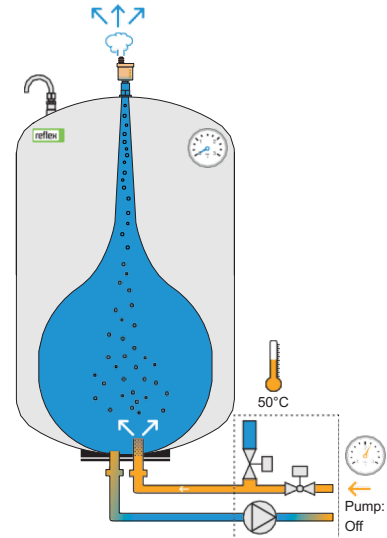
Note: The useful volume rate is 90 % for the pump controlled pressurisation units.

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

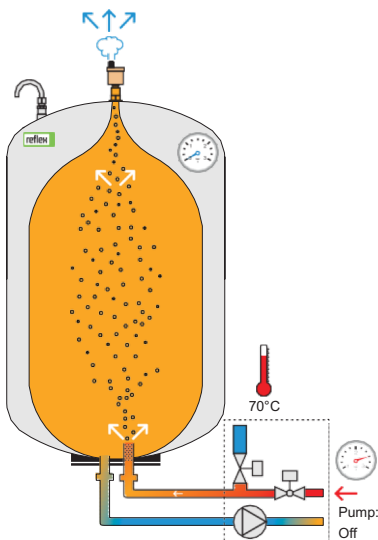
Variomat Working Principle



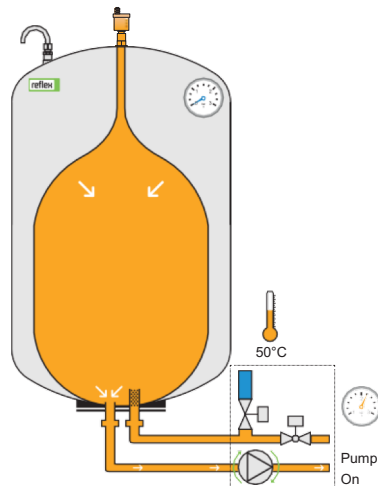
1. Low temperature
The unit contains a small amount of water. The unit is in rest.



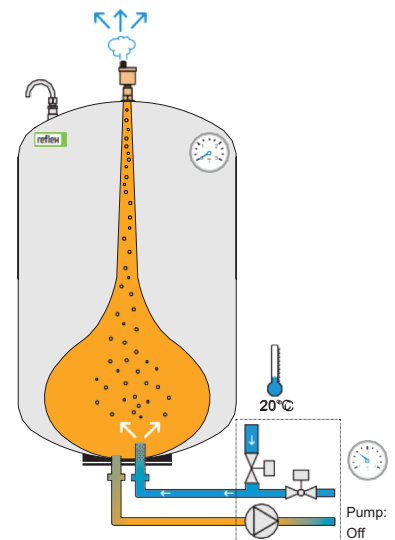
2. Temperature increase
The volume of water and the system pressure increase. The unit responds to this by opening the spill valve(s). Water flows into the pressureless vessel(s). The water in the vessel(s) is de-aerated due to the drop in pressure.



3. Full power
When the system has warmed up completely, the vessel will be almost full to capacity.



4. Cooling down
The volume of water and the system pressure decrease. The de-aerated water is pumped from the pressureless vessel back into the system. This restores the system pressure.



5. Replenish
If the water level in the vessel(s) drops to a critical level, an appropriate amount of water will be filled into the unit from the water mains. The water will be de-aerated (by pressure loss), before it's pumped into the system.

Variomat Control Units

- Variomat controller VS 1 with Control Basic
- From Variomat controller VS 2 with Control Touch and soft start
- Alternative, with control basic S
- Perm. advance temperature 120°C*
- Perm. operating temperature 70°C**
- Perm. ambient temperature 0 - 45°C
- Sound level approx. 55 dB
- 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	Control Basic S Article No	Material Group	P ₀ bar	Height mm	Width mm	Depth mm	Connection	Weight kg
VS 1	8910100*	-	38	≤ 2.5	680	530	580	2 x G 1	25.0
VS 2-1/60	8910200	8910150	38	≤ 4.8	920	470	730	2 x G 1	33.0
VS 2-1/75	8910300	8910160	38	≤ 6.5	920	530	640	2 x G 1	35.0
VS 2-1/95	8910400	8910170	38	≤ 8.0	920	530	640	2 x G 1	37.0
VS 1-1/140	8910500	8910550	38	≤ 13.5	920	530	640	2 x G 1	50.0

* Control basic only

Voltage operation : 230 V / 50 Hz except VS 140 → 400 V / 50 Hz

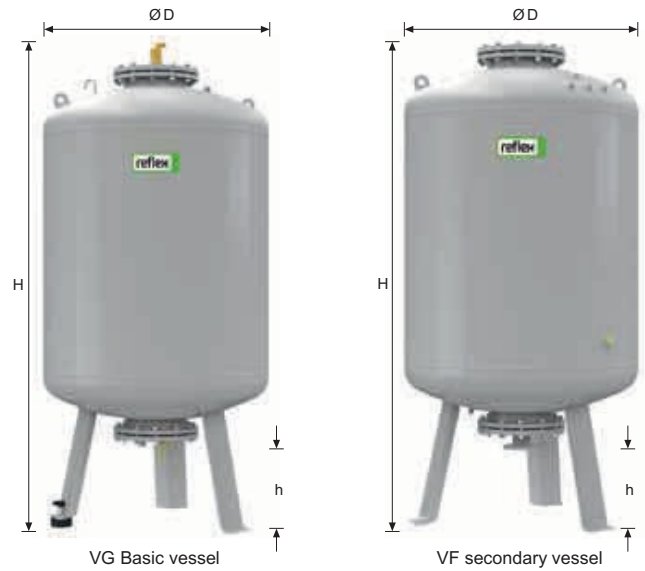
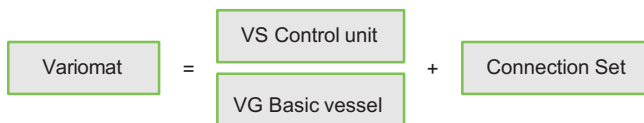


VS Control unit - 2 pumps

Type	Control Touch Article No	Control Basic S Article No	Material Group	P ₀ bar	Height mm	Width mm	Depth mm	Connection	Weight kg
VS 2-2/35	8911100	8911610	38	≤ 2.5	920	700	780	2 x G 1 ¼	54.0
VS 2-2/60	8911200	8911620	38	≤ 4.8	920	700	780	2 x G 1 ¼	58.0
VS 2-2/75	8911300	8911630	38	≤ 6.5	920	720	800	2 x G 1 ¼	72.0
VS 2-2/95	8911400	8911640	38	≤ 8.0	920	720	800	2 x G 1 ¼	76.0
VS 1-2/140	8911500	8911650	38	≤ 13.5	920	720	800	2 x G 1 ¼	80.0

Variomat Pressurisation Systems

- Heavy duty steel tank
- Approval in acc. with the Pressure Equipment Directive 97/23/EC
- 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



Type	VG Basic vessel Article No	VF secondary vessel Article No	Material Group	ØD 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

- 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 orange PE cladding with zip fastener



VG Thermal Insulation

VW thermal insulation for VG basic vessels

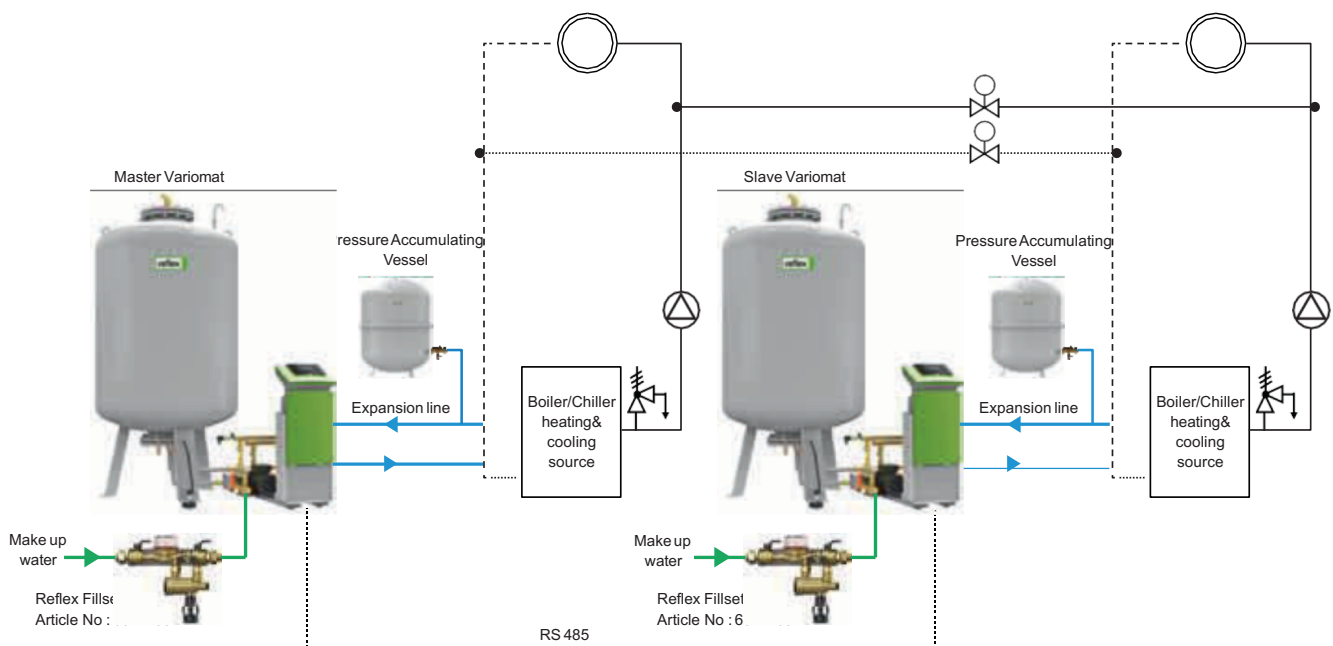
Type	Article No	Material Group	Ø D mm	H mm	h mm	Connection	Weight kg
200	7985700	N39	634	1060	146	G 1	3.0
300	7986000	N39	634	1360	146	G 1	3.5
400	7995600	N39	740	1345	133	G 1	4.5
500	7983900	N39	740	1560	133	G 1	5.5
600	7995700	N39	740	1810	133	G 1	6.0
800	7993800	N39	740	2275	133	G 1	8.0
1000 Ø 740	7993900	N39	740	2685	133	G 1	8.0
1000 Ø 1000	7986800	N39	1000	2130	350	G 1	10.0
1500	7987000	N39	1200	2130	350	G 1	12.5
2000	7987100	N39	1200	2590	350	G 1	15.0
3000	7993200	N39	1500	2590	380	G 1	16.0
4000	7993300	N39	1500	3160	380	G 1	18.0
5000	7993400	N39	1500	3695	380	G 1	24.0

Master - Slave Connection

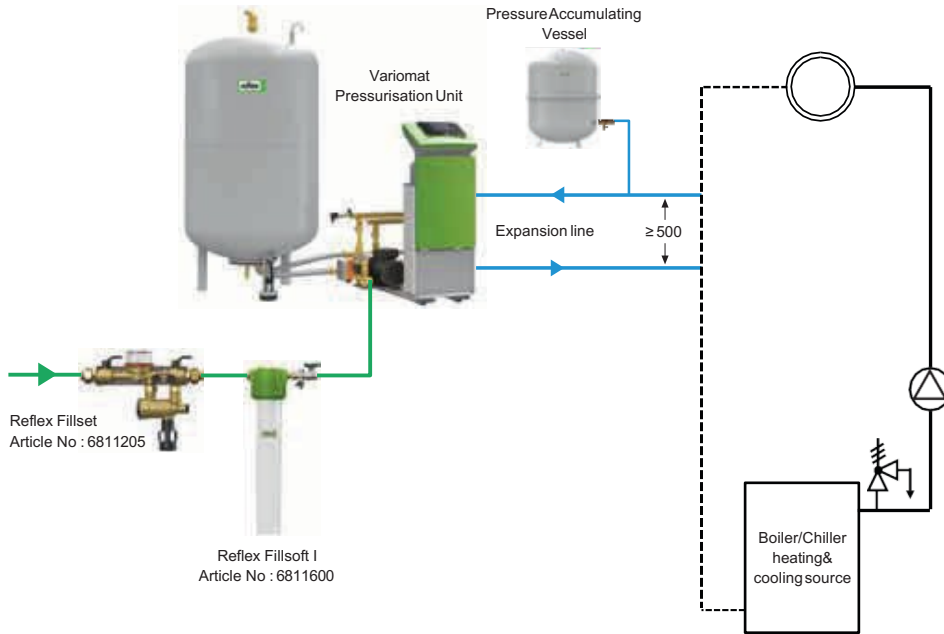
- Software tool for operating up to 10 Reflexomats in a hydraulic group to a distance of 1000 m

Article No : 7859000

Material Group : 35



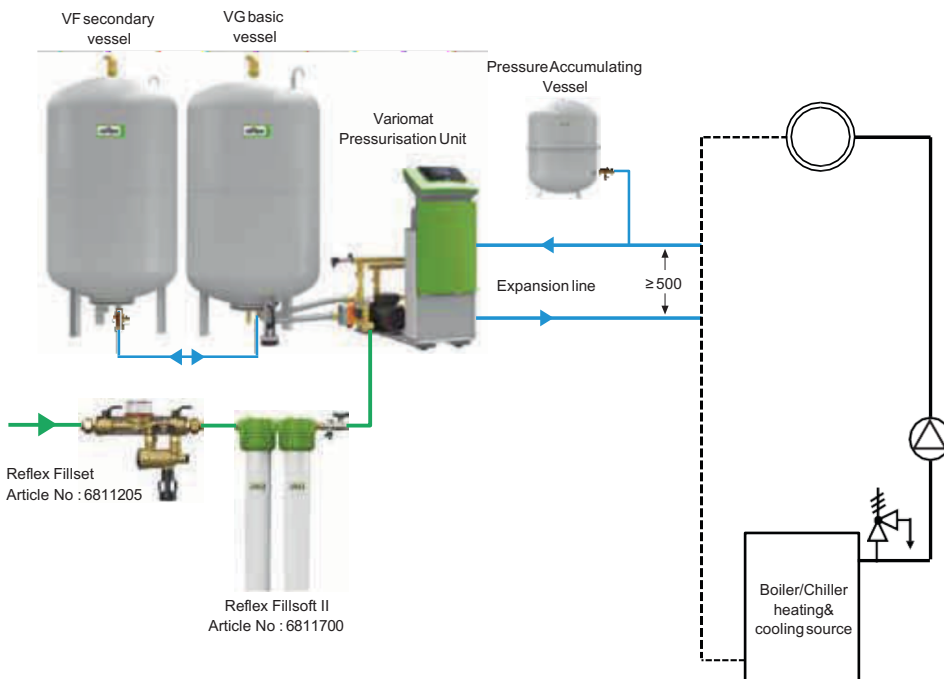
Variomat 1 water make-up with drinking water



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 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 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 kW
 Water capacity V_A = 5000 litres
 Design temperature T = 70/50 °C
 Static height H_{st} = 30 m
 Expansion coefficient n = 0.0228

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

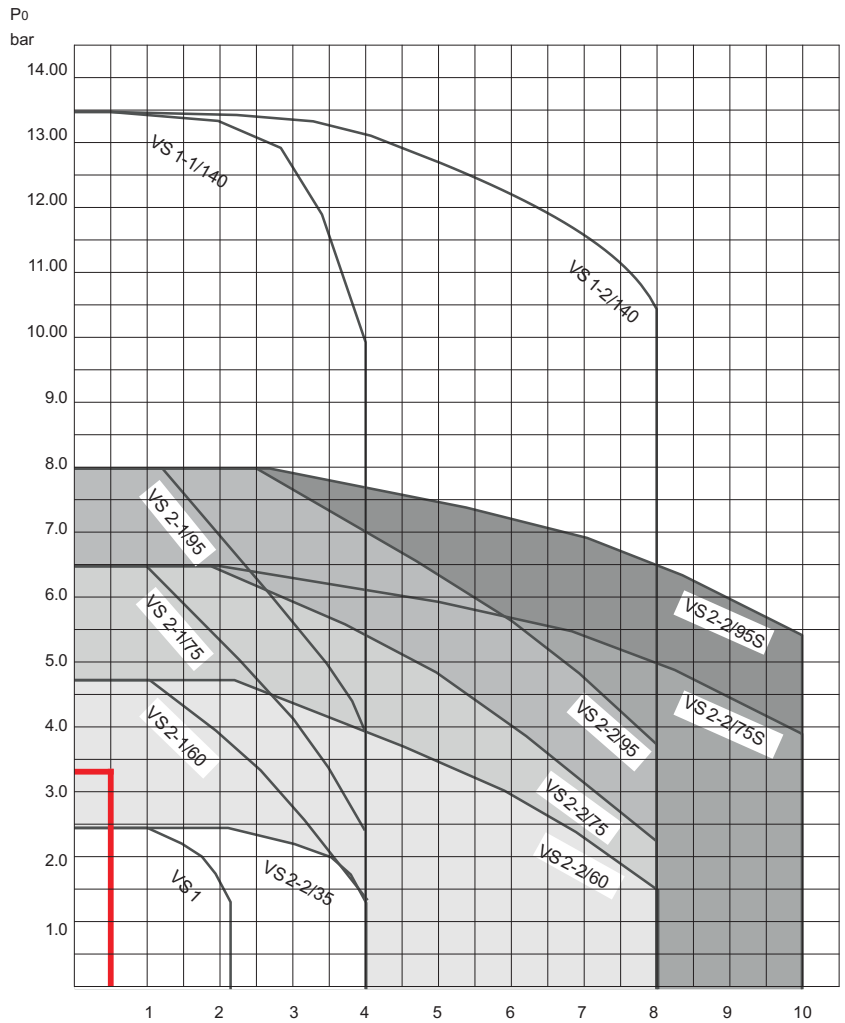
$$P_0 \geq \frac{30}{10} \text{ bar} + 0.2 \text{ bar} = 3.2 \text{ bar}$$

$$V_n \geq \frac{V_{ex} + V_{rez}}{F_{acc}}$$

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

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 MW we recommend using double pump systems



Total thermal output of the heat generation system - MW

Variomat VG - VF Vessel Sizing

- Nominal volume V_n

Approximate value from the diagram →

or

Calculation acc. to formula ↓

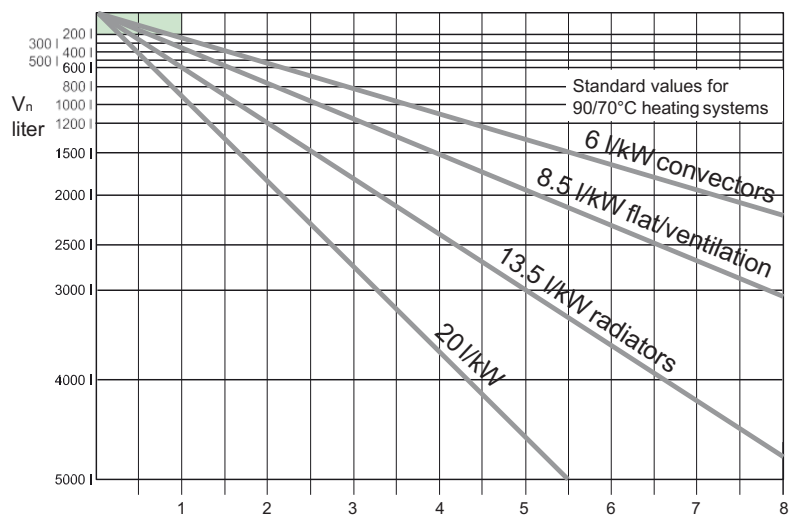
V _n ≥ V _A ×	0.031 [70°C]
	0.045 [90°C]
	0.054 [100°C]
	0.063 [110°C]

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).



Total thermal output of the heat generation system - MW