Pressurisation Systems

Reflexomat, Variomat, Variomat Giga
From the initial idea to the solution
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
Pressurisation Systems

Dynamic pressurisation

Compressor-controlled
- Compact design
  - 1 Compressor
    - Reflexomat Compact
  - Custom designed units
    - RS... / 1
    - RS... / 2

Pump-controlled
- Custom designed units
  - 1 Pump
    - Without softstart
      - Control Basic
    - VS 1
  - 2 Pumps
    - VS 2-1
    - VS 2-2
  - 2 Pumps
    - Variomat Giga
    - GS + GH
Reflexomat

Pressurisation unit compressor-controlled
Pressurisation Systems

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
- 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

NEW!

![Reflex Product Image]

![Reflex Product Image]

![Reflex Product Image]
Reflexomat

Pressurisation unit compressor-controlled

- Pressurisation Systems
- Robust mounting skid for compressor and control unit
- Most reliable and silent Compressor to accommodate up to 12 MW input each
- Control unit: State-of-the-art controls both in function and design. Guarantees maximum operating comfort. All reflex controls (Variomat, Reflexomat, Servitec, Gigamat) have been designed according to a uniform design guideline
- The safety valve protects the vessel from excessive pressure.
- Lifting lugs for ease of transport on site (1000 litres and above)
- Inner anti-corrosion lining
- MBM II bladder rupture detector (option)
- The solenoid valve is TÜV-tested and consequently satisfies the requirements of DIN 4751 T2 for systems up to 120°C
- Pressure sensor
- The load cell (fluid level measurement) allows the operator to determine the filling level
- The flex connection for the expansion line is a prerequisite for the proper operation of the level control
- Tank: Heavy duty steel with durable epoxy coating, available in 6 and 10 bar version
- Bladder: High-quality butyl, reliably protects the expansion water from exposure to air
- Bladder Control by Customer
- State-of-the-art controls both in function and design. Guarantees maximum operating comfort. All reflex controls (Variomat, Reflexomat, Servitec, Gigamat) have been designed according to a uniform design guideline
- Most reliable and silent Compressor to accommodate up to 12 MW input each
- Robust mounting skid for compressor and control unit

PLUS X AWARD

- achieved for: Innovation, High Quality, Design, Ease of Use, Functionality
Pressurisation Systems

Reflexomat

Reflexomat System With 1 & 2 Compressors

Reflexomat up to 12 MW with 1 compressor

Reflexomat up to 24 MW with 2 compressors

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 lines 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.

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 Working Principle for Heating & Cooling

**HEATING**

1. Low temperature
   The unit 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

Reflexomat Compact With Make-up System

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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Material Group</th>
<th>Ø D mm</th>
<th>H mm</th>
<th>h mm</th>
<th>System Connection</th>
<th>Power kW</th>
<th>Voltage V</th>
<th>Sound Level dBA</th>
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For 60 Hz operations, please consult us.
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

Reflexomat, Degassing and Water Make-up 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.
Pressurisation Systems

**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**

<table>
<thead>
<tr>
<th>Type</th>
<th>Control Touch Article No</th>
<th>Material Group</th>
<th>Height (H) mm</th>
<th>Width (W) mm</th>
<th>Depth (D) mm</th>
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* Control basic only

For 60 Hz operations, please consult us

**RS control unit with 2 compressors**

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For 60 Hz operations, please consult us

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

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<td>8881105</td>
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* 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

Reflexomat = RS Control unit + Options

Reflexomat Options

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*Height, with RS 90/1 control unit included

For 50 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
Pressurisation Systems

BMS Modules

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Material Group</th>
<th>Weight kg</th>
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<td>LonWorks Digital</td>
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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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
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<th>Width mm</th>
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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

Master - Slave Connection Diagram
Pressurisation Systems

**Reflexomat Make-up Valve**

- **Reflex Fill Valve**
  - 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

- **Reflexomat With Fillcontrol Auto Compact and Fillsoft II**
  - 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.

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

  *Article No*: 7857700  *Material Group*: 86
  *Article No*: 9122294  *Material Group*: 86
Reflexomat Quick Selection

Selection Example

Output heat generator \( Q = 500 \text{ kW} \)
Water content \( V_S = 5000 \text{ litres} \)
Design temperature \( T = 70/50 \degree \text{C} \)
Static height \( H_{st} = 30 \text{ m} \)
Expansion coefficient \( n = 0.0228 \)

\[
\begin{align*}
\text{Po} & \geq \frac{H_{st} \text{ [m]}}{10} \text{ bar} + 0.2 \text{ bar} \\
\text{Po} & \geq \frac{30}{10} \text{ bar} + 0.2 \text{ bar} = 3.2 \text{ bar} \\
V_n & \geq \frac{V e + V\text{ws}}{0.9} \\
V_n & \geq \frac{5000 \times (0.0228 + 0.005)}{0.9} = 155 \text{ liter}
\end{align*}
\]

Selected:
Control unit \( \text{RS 90/1} \)
Expansion vessel \( \text{RG 200} \)
SU Lock shield \( \text{R 1x1} \)
Variomat

Pump Controlled Pressurisation Systems

- Pressure maintenance
- Deaeration
- Water make-up
Pressurisation Systems

**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**
- 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

NEW!

**Pressurisation Systems**

- Reflex

**Plus X Award**

Achieved for:
- Innovation
- High Quality
- Design
- Ease of Use
- Functionality
Variomat

Pump Controlled Pressurisation Systems

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

Heavy duty steel tank

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

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

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.

MBM II bladder rupture detector (option)

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 Pressurisation Systems

**Variomat 1 up to 2 MW with 1 pump**

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.

**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).

**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/
Pressurisation Systems

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Control Touch</th>
<th>Article No</th>
<th>Material Group</th>
<th>P(0) bar</th>
<th>Height mm</th>
<th>Width mm</th>
<th>Depth mm</th>
<th>Connection</th>
<th>Power kW</th>
<th>Voltage V</th>
<th>Sound Level dB(A)</th>
<th>Weight kg</th>
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<td>P0</td>
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* Control basic only
For 60 Hz operations, please consult us

VS Control unit - 1 pump

VS Control unit - 2 pumps

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Article No</th>
<th>Material Group</th>
<th>Ø D mm</th>
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<th>h mm</th>
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**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**

<table>
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<th>VG vessel (Ø/mm)</th>
<th>Article No</th>
<th>Material Group</th>
<th>Weight kg</th>
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**Variomat Connection set - 2 pumps**

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<th>Article No</th>
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<td>1000 - 1500</td>
<td>6940400</td>
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</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Material Group</th>
<th>Ø D mm</th>
<th>H mm</th>
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<td>380</td>
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**Master - Slave Connection**

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

<table>
<thead>
<tr>
<th>Article No</th>
<th>7859000</th>
<th>Material Group</th>
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</thead>
</table>

![Diagram of Master - Slave Connection](image-url)
Pressurisation Systems

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 Article No: 7857700 Material Group: 86
  - Factory-installed in the Touch Control cabinet Article No: 9122294 Material Group: 86

Variomat 1 water make-up with drinking water

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

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: \( T = 70/50 \text{ °C} \)
- Static height: \( H_{st} = 30 \text{ m} \)
- Expansion coefficient: \( n = 0.0228 \)

\[
\begin{align*}
P_0 & \geq \frac{H_{st} \text{ [m]}}{10} \text{ bar} + 0.2 \text{ bar} \\
V_n & \geq \frac{V_e + V_{ws}}{DF} \\
V_n & \geq \frac{5000 \times (0.0228 + 0.005)}{0.9} = 155 \text{ liter}
\end{align*}
\]

**Selected:**
- Control unit: VG 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.

**Variomat VG - VF Vessel Sizing**

- Nominal volume \( V_n \)
- Approximate value from the diagram ➔
- Calculation acc. to formula ➔

\[
V_n \geq V_A \times
\begin{align*}
0.031 \text{ [70°C]} \\
0.045 \text{ [90°C]} \\
0.054 \text{ [100°C]} \\
0.063 \text{ [110°C]}
\end{align*}
\]

- 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
Pressurisation Systems

Reflex Control

- 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

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!
**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 guideline.

**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 guideline.

**Connection**
Expansion line DN 80/PN 16

**Dimensioning**

**Shut-off**
protected against inadvertent closing

**Throttle valve**

**Min. press. limiter**

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

**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

**Pressurisation Systems**

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

**Bladder Control**
By Customer

**MBM II bladder rupture detector**
(option)

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

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.

**Connection**
GG Basic vessel DN 80/PN 6

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

**Throttle valve**

**Shut-off**
protected against inadvertent closing

**Min. press. limiter**

**Safety valve**
for protection of the GG and GF vessels

**Water make-up solenoid valve**

**Connection**
Expansion line DN 80/PN 16

**Connection**
GG Basic vessel DN 80/PN 6

**Most reliable, silent pumps**
with soft start feature

**Pressurisation Systems**
**Variomat Giga**

**Variomat Giga Pressurisation Systems**

---

**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.

---

**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).

---

**Pressure Limiter**

If the min. operating pressure is fallen short at the component-instpected min. pressure controller PAZ, the electrical acutator 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.

---

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/
Pressurisation Systems

**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"

<table>
<thead>
<tr>
<th>Control Module</th>
<th>Material Group</th>
<th>Electrical Power kW</th>
<th>Voltage</th>
<th>Hydraulic Module</th>
<th>Height mm</th>
<th>Width mm</th>
<th>Depth mm</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS 11</td>
<td>8912500</td>
<td>38</td>
<td>2.20</td>
<td>230 V/50 Hz</td>
<td>GH 50</td>
<td>1200</td>
<td>1170</td>
<td>1020</td>
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<tr>
<td>GS 3</td>
<td>8912600</td>
<td>38</td>
<td>6.60</td>
<td>400 V/50 Hz</td>
<td>GH 90</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
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<tr>
<td>GS 4</td>
<td>8913000</td>
<td>38</td>
<td>8.0</td>
<td>400 V/50 Hz</td>
<td>GH 110/GH130/GH140</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
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<tr>
<td>GS 75</td>
<td>8919000</td>
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<td>15.0</td>
<td>400 V/50 Hz</td>
<td>GH 150</td>
<td>600</td>
<td>210</td>
<td>830</td>
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</tbody>
</table>

* = Setting value on the control
- Static height + evaporation pressure + 0.2 bar (recommended)

<table>
<thead>
<tr>
<th>Hydraulic Module</th>
<th>Material Group</th>
<th>P0 bar</th>
<th>Height mm</th>
<th>Width mm</th>
<th>Depth mm</th>
<th>Weight kg</th>
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</thead>
<tbody>
<tr>
<td>GH 50</td>
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<td>830</td>
<td>195</td>
</tr>
<tr>
<td>GH 70</td>
<td>8932000</td>
<td>≤ 6.0</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
<td>195</td>
</tr>
<tr>
<td>GH 90</td>
<td>8931400</td>
<td>≤ 8.0</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
<td>265</td>
</tr>
<tr>
<td>GH 100</td>
<td>8931200</td>
<td>≤ 9.5</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
<td>230</td>
</tr>
<tr>
<td>GH 110</td>
<td>8931700</td>
<td>≤ 10.0</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
<td>270</td>
</tr>
<tr>
<td>GH 130</td>
<td>8931800</td>
<td>≤ 12.0</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
<td>280</td>
</tr>
<tr>
<td>GH 140</td>
<td>8931300</td>
<td>≤ 13.0</td>
<td>1200</td>
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<td>830</td>
<td>273</td>
</tr>
<tr>
<td>GH 150</td>
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<td>≤ 14.5</td>
<td>1200</td>
<td>1170</td>
<td>830</td>
<td>340</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Material Group</th>
<th>Ø D mm</th>
<th>H mm</th>
<th>h mm</th>
<th>h₁ mm</th>
<th>A</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>8920105</td>
<td>Grey</td>
<td>37</td>
<td>1000</td>
<td>2130</td>
<td>285</td>
<td>305</td>
<td>DN 65/PN 6</td>
</tr>
<tr>
<td>1500</td>
<td>8920305</td>
<td>Grey</td>
<td>37</td>
<td>1200</td>
<td>2130</td>
<td>285</td>
<td>305</td>
<td>DN 65/PN 6</td>
</tr>
<tr>
<td>2000</td>
<td>8920405</td>
<td>Grey</td>
<td>37</td>
<td>1200</td>
<td>2590</td>
<td>285</td>
<td>305</td>
<td>DN 65/PN 6</td>
</tr>
<tr>
<td>3000</td>
<td>8920605</td>
<td>Grey</td>
<td>37</td>
<td>1500</td>
<td>2590</td>
<td>314</td>
<td>335</td>
<td>DN 65/PN 6</td>
</tr>
<tr>
<td>4000</td>
<td>8920705</td>
<td>Grey</td>
<td>37</td>
<td>1500</td>
<td>3160</td>
<td>314</td>
<td>335</td>
<td>DN 65/PN 6</td>
</tr>
<tr>
<td>5000</td>
<td>8920805</td>
<td>Grey</td>
<td>37</td>
<td>1500</td>
<td>3695</td>
<td>314</td>
<td>335</td>
<td>DN 65/PN 6</td>
</tr>
</tbody>
</table>

### 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: Article No: 7857700 Material Group: 86
  - Factory-installed in the Touch Control cabinet: Article No: 9122294 Material Group: 86

### 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
Pressurisation Systems

BMS Modules

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Material Group</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LonWorks Digital</td>
<td>8860000</td>
<td>86</td>
<td>1.5</td>
</tr>
<tr>
<td>LonWorks</td>
<td>8860100</td>
<td>86</td>
<td>1.9</td>
</tr>
<tr>
<td>Profibus-DP</td>
<td>8860200</td>
<td>86</td>
<td>1.9</td>
</tr>
<tr>
<td>Ethernet</td>
<td>8860300</td>
<td>86</td>
<td>1.9</td>
</tr>
<tr>
<td>BACnet-IP for Control Touch</td>
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<td>86</td>
<td>0.4</td>
</tr>
<tr>
<td>BACnet MS/TP for Control Touch</td>
<td>8860600</td>
<td>86</td>
<td>0.4</td>
</tr>
<tr>
<td>Modbus RTU for Control Touch</td>
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<td>86</td>
<td>0.4</td>
</tr>
<tr>
<td>Profibus RTU for Control Touch</td>
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<td>0.4</td>
</tr>
<tr>
<td>I/O Modules</td>
<td>8997705</td>
<td>71</td>
<td>1.0</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Article No</th>
<th>Material Group</th>
<th>Length mm</th>
<th>Width mm</th>
<th>Height mm</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Remote</td>
<td>8910800</td>
<td>86</td>
<td>83</td>
<td>60</td>
<td>34</td>
<td>0.3</td>
</tr>
</tbody>
</table>

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 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. By connecting the contact water meter to the Variomat Giga control unit the Fillmeter function is available.

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 Giga control unit the Fillmeter 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 \( T = 70/50 \text{ °C} \)

Static height \( H_{st} = 30 \text{ m} \)

Expansion coefficient \( n = 0.0228 \)

\[
\begin{align*}
P_0 & \geq \frac{H_{st} \text{ [m]}}{10} \text{ bar } + 0.2 \text{ bar} \\
P_0 & \geq \frac{30}{10} \text{ bar } + 0.2 \text{ bar } = 3.2 \text{ bar} \\
V_n & \geq \frac{V_e + V_{ws}}{DF} \\
V_n & \geq \frac{50,000 \times (0.0228 + 0.005)}{0.9} = 155 \text{ liter}
\end{align*}
\]

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 MW we recommend using double pump systems.

Variomat Giga GG - GF Vessel Sizing

- Nominal volume \( V_n \)
  - Approximate value from the diagram →
  - Calculation acc. to formula ↓

\[
V_n \geq V_A \times \begin{cases} 
0.031 & [70°C] \\
0.045 & [90°C] \\
0.054 & [100°C] \\
0.063 & [110°C]
\end{cases}
\]

Setting flow temperature ↑

\( V_n = \text{Nominal volume, liter} \)
\( V_A = \text{System water content, liter} \)

- The nominal volumes can be distributed to several vessels (GG basic vessel and GF secondary vessel).
The combination of both product lines in thousands of projects has proven the efficient synergy. Since the arrival of Sinus verteiler into the Winkelmann company family complementary products and system solutions from one stop service offer true benefit for the industry. We are looking forward discussing new possibilities for smart heating or cooling systems which will enlarge your horizon.

WHEN THE BEST COME TOGETHER, IT BECOMES HOT
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.
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.