

Variomat with Touch controller

with one pump:

VS 2-1/35 /60 /75 /95

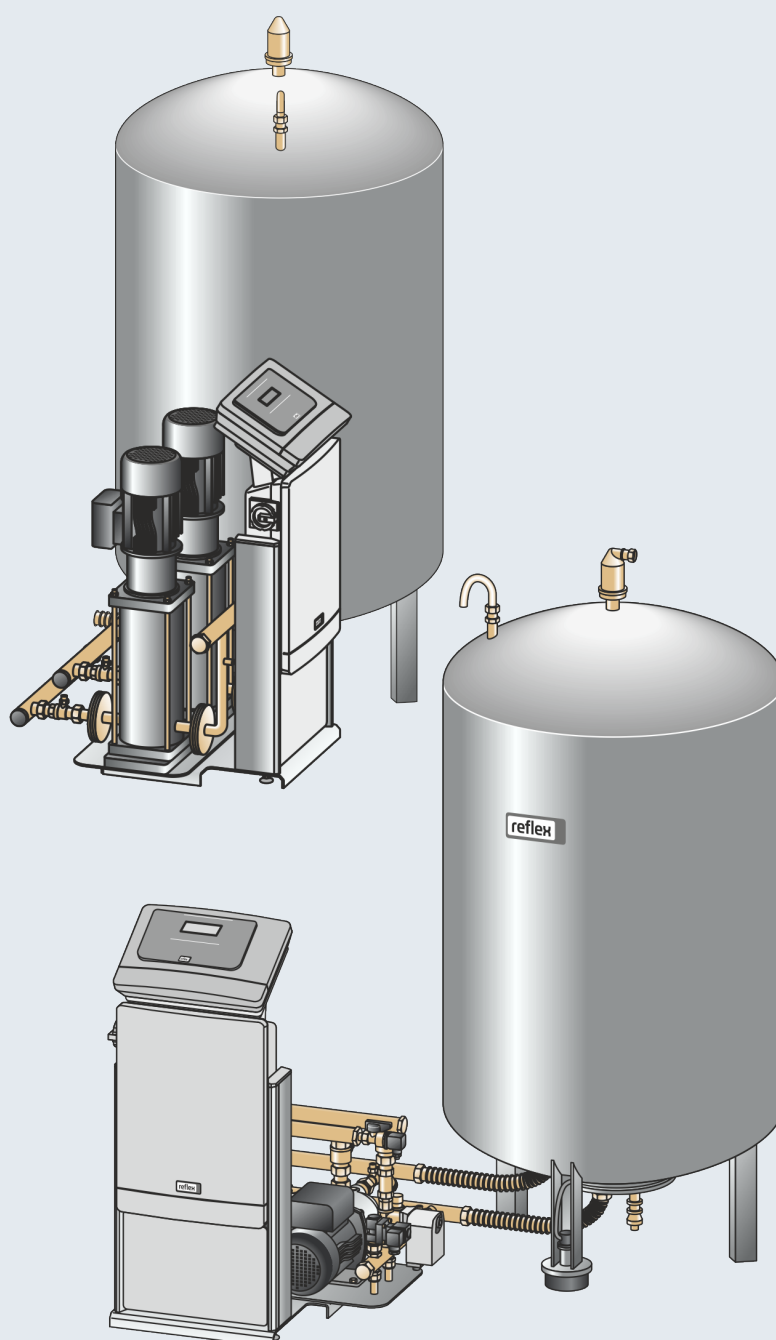
with two pumps:

VS 2-2/35 /60 /75 /95

GB

Operating manual

Original operating manual



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1 Notes on the operating manual

This operating manual is an important aid for ensuring the safe and reliable functioning of the device.

The operating manual will help you to:

- avoid any risks to personnel.
- become acquainted with the device.
- achieve optimal functioning.
- identify and rectify faults in good time.
- avoid any faults due to improper operation.
- cut down on repair costs and reduce the number of downtimes.
- improve the reliability and increase the service life of the device.
- avoid causing harm to the environment.

Reflex Winkelmann GmbH accepts no liability for any damage resulting from failure to observe the information in this operating manual. In addition to the requirements set out in this operating manual, national statutory regulations and provisions in the country of installation must also be complied with (concerning accident prevention, environment protection, safe and professional work practices, etc.).

This operating manual describes the device with basic equipment and interfaces for optional equipment with additional functions. For optional equipment and accessories, see chapter 4.6 "Optional equipment and accessories" on page 13 .



Note!

Every person installing this equipment or performing any other work at the equipment is required to carefully read this manual prior to commencing work and to comply with its instructions. The manual is to be provided to the device operator and must be stored near the device for access at any time.

2 Liability and guarantee

The device has been built according to the state of the art and recognised safety rules. Nevertheless, its use can pose a risk to life and limb of personnel or third persons as well as cause damage to the system or other property.

It is not permitted to make any modifications at the device, such as to the hydraulic system or the circuitry.

The manufacturer shall not be liable nor shall any warranty be honoured if the cause of any claim results from one or more of the following causes:

- Improper use of the device.
- Unprofessional commissioning, operation, service, maintenance, repair or installation of the device.
- Failure to observe the safety information in this operating manual.
- Operation of the device with defective or improperly installed safety/protective equipment.
- Failure to perform maintenance and inspection work according to schedule.
- Use of unapproved spare parts or accessories.

Prerequisite for any warranty claims is the professional installation and commissioning of the device.



Note!

Arrange for Reflex Customer Service to carry out commissioning and annual maintenance, see chapter 12.1 "Reflex Customer Service" on page 72 .

3 Safety

3.1 Explanation of symbols

3.1.1 Symbols and notes used

The following symbols and signal words are used in this operating manual.

DANGER

- Danger of death and/or serious damage to health
 - The sign, in combination with the signal word 'Danger', indicates imminent danger; failure to observe the safety information will result in death or severe (irreversible) injuries.
-

WARNING

Serious damage to health

- The sign, in combination with the signal word 'Warning', indicates imminent danger; failure to observe the safety information can result in death or severe (irreversible) injuries.
-

CAUTION

Damage to health

- The sign, in combination with the signal word 'Caution', indicates danger; failure to observe the safety information can result in minor (reversible) injuries.
-

ATTENTION

Damage to property

- The sign, in combination with the signal word 'Attention', indicates a situation where damage to the product itself or objects within its vicinity can occur.
-



Note!

This symbol, in combination with the signal word 'Note', indicates useful tips and recommendations for efficient handling of the product.

3.2 Personnel requirements

Only specialist personnel or specifically trained personnel may install and operate the equipment.

The electric connections and the wiring of the device must be executed by a specialist in accordance with all applicable national and local regulations.

3.3 Personal protective equipment

When working at the system, wear the stipulated personal equipment such as hearing and eye protection, safety boots, helmet, protective clothing, protective gloves.



See the national regulation of your country for personal protective equipment required.

3.4 Intended use

The device is a pressure maintaining station for heating and cooling water systems. It is intended to maintain the water pressure and to add water within a system. The devices may be used only in systems that are sealed against corrosion and with the following water types:

- Non-corrosive
- Chemically non-aggressive
- Non-toxic

The ingress of atmospheric oxygen by permeation into the entire heating and cooling water system, make-up water and similar must be reliably minimised during operation.

3.5 Inadmissible operating conditions

The device is not suitable for the following applications:

- Mobile system operation.
- Outdoor operation.
- For use with mineral oils.
- For use with flammable media.
- For use with distilled water.

**Note!**

It is not permitted to make any modifications to the hydraulic system or the circuitry.

3.6 Residual risks

This device has been manufactured to the current state of the art. However, some residual risk cannot be excluded.

CAUTION

Risk of burns on hot surfaces

Hot surfaces in heating systems can cause burns to the skin.

- Wear protective gloves.
 - Please place appropriate warning signs in the vicinity of the device.
-

CAUTION

Risk of injury due to pressurised liquid

If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.

- Ensure proper installation, removal or maintenance work.
 - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.
-

WARNING

Risk of injury due to heavy weight

The devices are heavy. Consequently, there is a risk of physical injury and accidents.

- Use suitable lifting equipment for transportation and installation.
-

4 Description of the device

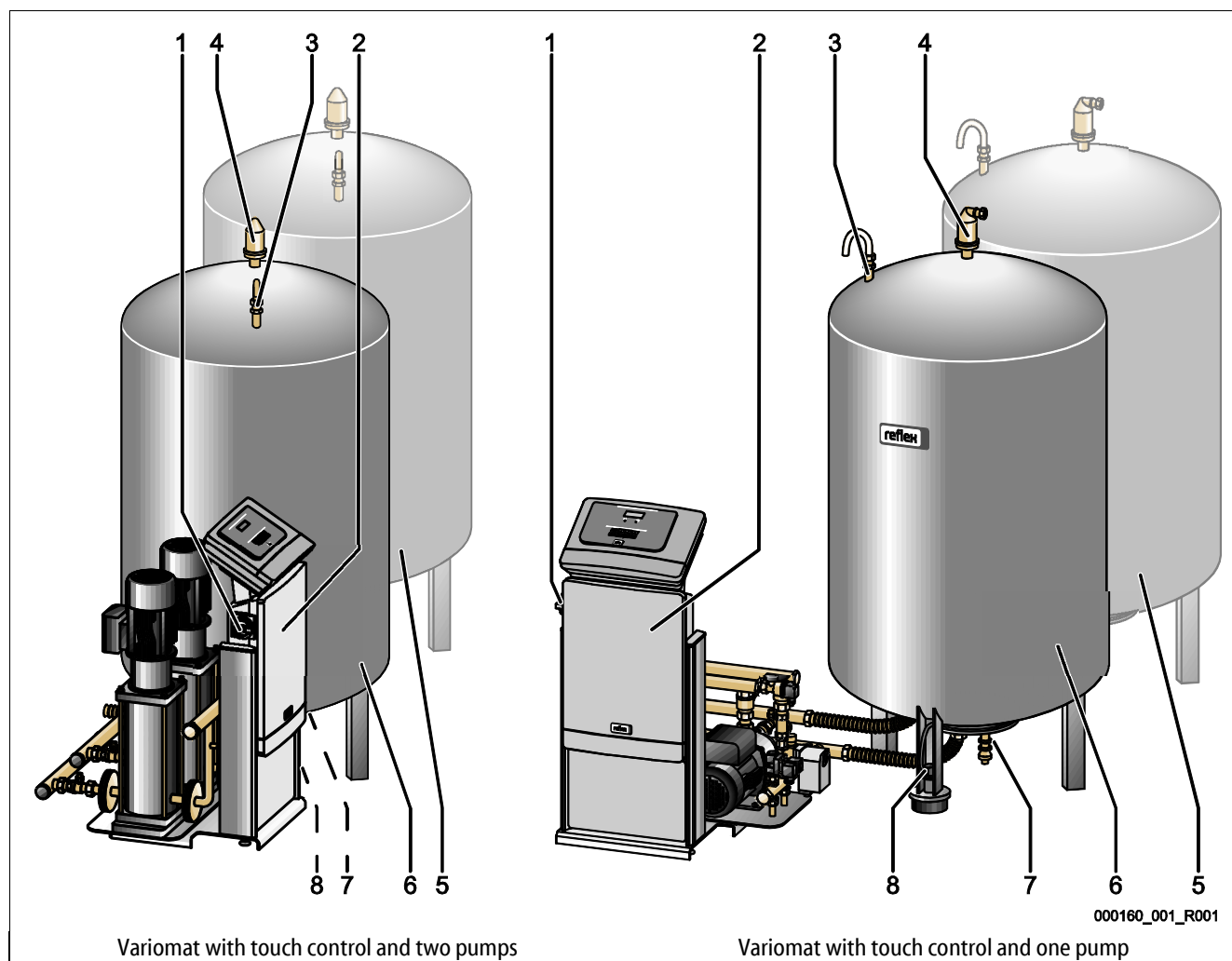
4.1 Description

The Variomat with touch control is a pump-controlled pressure maintaining, make-up and degassing station for heating and cooling water systems. The Variomat is essentially a controller with pumps and at least one expansion tank. The expansion tank is fitted with a diaphragm to divide the tank into an air space and a water space, preventing the ingress of atmospheric oxygen into the expansion water.

The Variomat with touch control provides the following safety features:

- Optimisation of all pressure maintaining, degassing and make-up processes.
 - No direct intake of air thanks to a regulation of the pressure maintenance with automatic make-up.
 - No circulation issues caused by free bubbles in the circuit water.
 - Reduced corrosion damage due to oxygen removal from fill and make-up water.

4.2 Overview



1	Main switch
2	Control unit • Pump(s) • "Reflex Control Touch" controller
3	"VE" equalisation elbow
4	"DV" degassing valve

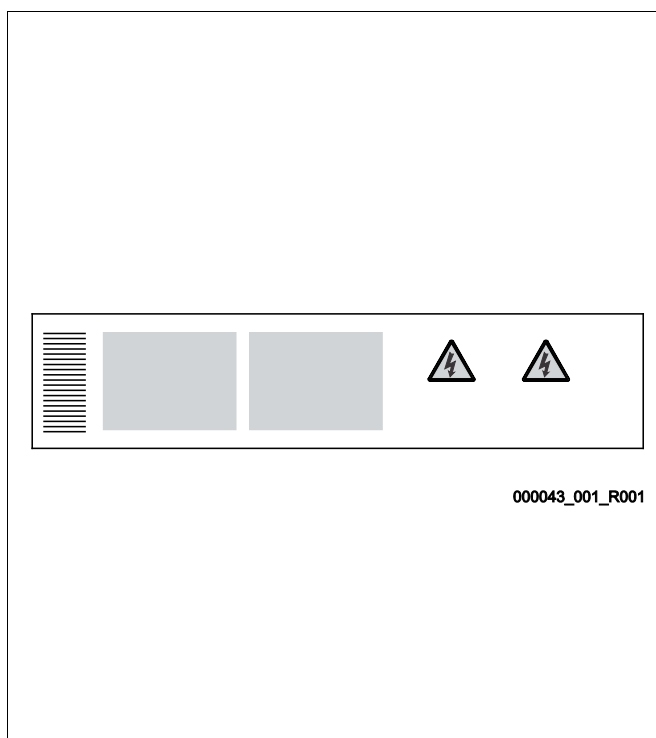
5	"VF" secondary tank
6	"VG" primary tank
7	"FD" feed and drain cock
8	"LIS" level sensor

4.3 Identification

4.3.1 Nameplate

The nameplate provides information about the manufacturer, the year of manufacture, the manufacturing number and the technical data.

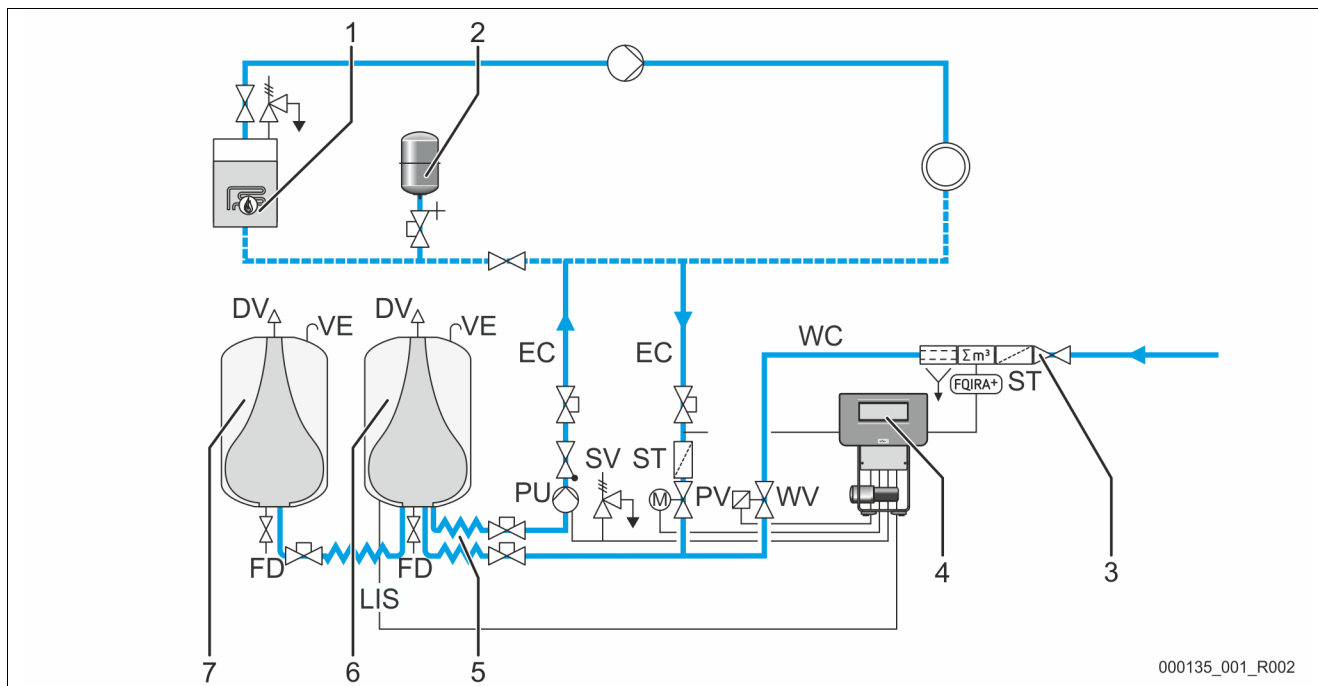
Information on nameplate	Meaning
Type	Device name
Serial No.	Serial number
min. / max. allowable pressure P	Minimum/maximum permissible pressure
max. continuous operating temperature	Maximum temperature for continuous operation
min. / max. allowable temperature / flow temperature TS	Minimum / maximum permissible temperature / TS flow temperature
Year built	Year of manufacture
min. operating pressure set up on shop floor	Factory-set minimum operating pressure
at site	Set minimum operating pressure
max. pressure safety valve factory - aline	Factory-set opening pressure of the safety valve
at site	Set opening pressure of the safety valve



4.3.2 Type code

No.		Type code (example)
1	Control unit designation	Variomat VS 1, VG 500 I, VF 500 I 1 2 3 4 5 6
2	Number of pumps	
3	"VG" primary tank	
4	Nominal volume	
5	"VF" secondary tank	
6	Nominal volume	

4.4 Function



000135_001_R002

1	Heating system
2	"MAG" pressure expansion tank
3	Reflex Fillset Impulse, see chapter 4.6 "Optional equipment and accessories" on page 13 .
4	Control unit
5	Hydraulic inlets • For gas-rich water • For degassed water
6	Primary tank air space
7	Secondary tank air space
ST	Dirt trap
FQIRA+	Contact water meter
WC	Make-up line

WV	Make-up valve
PIS	Pressure sensor
PV	Overflow valve (motor ball valve)
PU	Pump (pressure maintenance)
SV	Safety valve
EC	Expansion line • For gas-rich water • For degassed water
FD	Feed and drain cock
LIS	Pressure load cell
DV	Degassing valve
VE	Ventilation

The device is a pressurisation station for heating and cooling water systems. It is used for maintaining pressure, making-up and degassing the water in heating and cooling systems. It comprises a control unit consisting of a controller with hydraulics and at least one expansion tank.

Expansion tank

One primary tank and multiple optional secondary tanks may be connected. A diaphragm separates the tanks into an air and a water space, preventing the penetration of atmospheric oxygen into the expansion water. The "VE" line connects the air space with the atmosphere. The primary tank is hydraulically flexibly connected to the control unit. The function of the "LIS" level measuring using a pressure pick-up is thus ensured.

Control unit

The control unit contains the hydraulic system and the controller. The "PIS" pressure transducer records the pressure and the "LIS" pressure pick-up registers the level; both values are displayed at the controller.

Maintaining pressure

The pressure in the system rises when the water is heated. When the pressure set at the controller is exceeded, the "PV" overflow valve opens and drains water from the system into the primary tank, using the "EC" expansion line. The pressure within the system drops. The pressure in the system drops when the water cools. When the pressure drops below the set value, the "PU" pump is activated and uses the "EC" expansion line to transport water from the primary tank back into the system. The pressure in the system rises. The controller ensures that the pressure is maintained, further supported by the stabilisation provided by the "MAG" expansion tank.

Degassing

Two "EC" expansion lines are required to degas the system water. One line is intended for gas-rich water from the system, and the other one serves to return the degassed water to the system. During the degassing action, the "PU" pump and the "PV" overflow valve are in operation. This transports a gas-rich partial flow of the system water V through the de-pressurised primary tank. Atmospheric pressure is used to separate the free and dissolved gases and to discharge them through the "DV" degassing valve. The controller ensures the hydraulic equalisation by regulating the stroke of the "PV" overflow valve (motor ball valve). There are three different modes for this process: continuous, interval or run-on degassing.

Make-up

When the water level in the primary tank falls below the minimum, the "WV" make-up valve opens until the set level is again reached. During the make-up process, the number of requests, the time and the make-up duration within a cycle are monitored. Using a FQIRA+ contact water meter, the system monitors each individual make-up volume and the overall make-up volume.

4.5 Scope of delivery

The scope of delivery is described in the shipping document and the content is shown on the packaging. Immediately after receipt of the goods, please check the shipment for completeness and damage. Please notify us immediately of any transport damage.

Basic pressurisation equipment:

- The device on a pallet.
 - Control unit and "VG" primary tank.
 - Primary tank with accessories are packed on the tank base.
 - "VE" aeration and de-aeration
 - "DV" degassing valve
 - Reducing sleeve
 - "LIS" pressure pick-up
 - Plastic sleeve with operating manual.

4.6 Optional equipment and accessories

The following optional equipment and accessories are available for this device:

- Thermal insulation for the primary tank.
- Secondary tanks
 - Accessories are provided as a package at the tank base
 - "VE" aeration and de-aeration
 - "DV" degassing valve
 - Reducing sleeve
- Accessories with BOB pipe for "TAZ+" temperature limiter
- Fillset for make-up with water.
 - Fillset with integrated back flow preventer, water meter, dirt trap, and locking mechanisms for the "WC" make-up line.
- Fillset Impulse with FQIRA+ contact water meter for make-up with water.
- Servitec for make-up and degassing.
- Fillsoft for softening the make-up water from the public water network.
 - The Fillsoft is installed between the Fillset and the device. The device controller evaluates the make-up quantities and signals the required replacement of the softening cartridges.
- Enhancements for the device controller:
 - I/O module for standard communication.
 - Communication module for external operation of the controller
 - Master-Slave-Connect for master controllers for maximum 10 devices.
 - Combined switching to increase capacity and parallel switching of 2 hydraulically directly connected systems
 - Bus modules:
 - Lonworks Digital
 - Lonworks
 - Profibus DP
 - Ethernet
- Diaphragm rupture monitor.



Note!

Separate operating instructions are supplied with accessories.

5 Technical data

5.1 Control unit



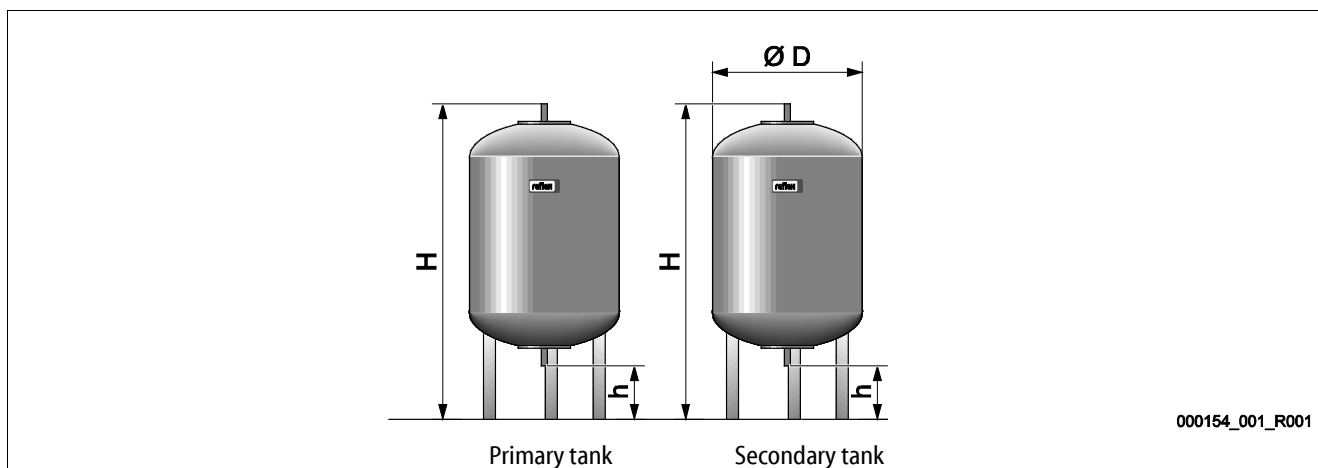
Note!

The following values apply for all control units:

- Permissible flow temperature: 120 °C
- Permissible operating temperature: 70 °C
- Permissible ambient temperature: 0 °C – 45 °C

Type	Power output (kW)	Power supply (V / Hz , A)	Degree of protection	Number of RS-485 interfaces	I/O module	Electrical voltage control unit (V, A)	Noise level (dB)	Weight (kg)
VS 2-1/35	1.1	230 / 50, 5	IP 54	1	No	230, 2	55	29
VS 2-1/60	1.1	230 / 50, 5	IP 54	1	No	230, 2	55	37
VS 2-1/75	1.1	230 / 50, 5	IP 54	1	No	230, 2	55	50
VS 2-1/95	1.1	230 / 50, 5	IP 54	1	No	230, 2	55	53
VS 2-2/35	1.2	230 / 50, 5	IP 54	1	No	230, 2	55	58
VS 2-2/60	2.2	230 / 50, 10	IP 54	1	No	230, 2	55	61
VS 2-2/75	2.2	230 / 50, 10	IP 54	1	No	230, 2	55	89
VS 2-2/95	2.2	230 / 50, 10	IP 54	1	No	230, 2	55	92

5.2 Tanks



Note!

Optional heat insulation is available for primary tanks, see chapter 4.6 "Optional equipment and accessories" on page 13 .

Type	Diameter Ø "D" (mm)	Weight (kg)	Connection (inches)	Height "H" (mm)	Height "h" (mm)
6 bar - 200	634	37	G1	1060	146
6 bar - 300	634	54	G1	1360	146
6 bar - 400	740	65	G1	1345	133
6 bar - 500	740	78	G1	1560	133
6 bar - 600	740	94	G1	1810	133
6 bar - 800	740	149	G1	2275	133
6 bar - 1000/740	740	156	G1	2685	133
6 bar - 1000/1000	1000	320	G1	2130	350
6 bar - 1500	1200	465	G1	2130	350
6 bar - 2000	1200	565	G1	2590	350
6 bar - 3000	1500	795	G1	2590	380
6 bar - 4000	1500	1080	G1	3160	380
6 bar - 5000	1500	1115	G1	3695	380

6 Installation

DANGER

Risk of serious injury or death due to electric shock.

If live parts are touched, there is risk of life-threatening injuries.

- Ensure that the system is voltage-free before installing the device.
 - Ensure that the system is secured and cannot be reactivated by other persons.
 - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.
-

CAUTION

Risk of injury due to pressurised liquid

If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.

- Ensure proper installation, removal or maintenance work.
 - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.
-

CAUTION

Risk of burns on hot surfaces

Hot surfaces in heating systems can cause burns to the skin.

- Wear protective gloves.
 - Please place appropriate warning signs in the vicinity of the device.
-

CAUTION

Risk of injury due to falls or bumps

Bruising from falls or bumps on system components during installation.

- Wear personal protective equipment (helmet, protective clothing, gloves, safety boots).
-



Note!

Confirm that installation and start-up have been carried out correctly using the installation, start-up and maintenance certificate. This action is a prerequisite for the making of warranty claims.

- Have the Reflex Customer Service carry out commissioning and the annual maintenance.

6.1 Installation conditions

6.1.1 Incoming inspection

Prior to shipping, this device was carefully inspected and packed. Damages during transport cannot be excluded.

Proceed as follows:

1. Upon receipt of the goods, check the shipment for
 - completeness and
 - possible transport damage.
2. Document any damage.
3. Contact the forwarding agent to register your complaint.

6.2 Preparatory work

Condition of the delivered device:

- Check all screw connections of the device for tight seating. Tighten the screws as necessary.

Preparing the device installation:

- No access by unauthorised personnel.
- Frost-free, well-ventilated room.
 - Room temperature 0 °C to 45 °C (32 °F to 113 °F).
- Level, stable flooring.
 - Ensure sufficient bearing strength of the flooring before filling the tanks.
 - Ensure that the control unit and the tanks are installed on the same level.
- Filling and dewatering option.
 - Provide a DN 15 filling connection according to DIN 1988 - 100 and En 1717.
 - Provide an optional cold water inlet.
 - Prepare a drain for the drain water.
- Electric connection, see chapter 5 "Technical data" on page 14 .
- Use only approved transport and lifting equipment.
 - The load fastening points at the tanks must be used only as installation resources.

6.3 Execution

ATTENTION

Damage due to improper installation

Additional device stresses may arise due to the connection of pipes or system equipment.

- Ensure that pipes are connected from the device to the system without stresses being induced.
- If necessary, provide support structures for the pipes or equipment.

For installation, proceed as follows:

- Position the device.
- Complete the primary tank and the optional secondary tanks.
- Create the water-side connections of the control unit to the system.
- Create the interfaces according to the terminal plan.
- Install the water connections between optional secondary tanks to each other and to the primary tank.



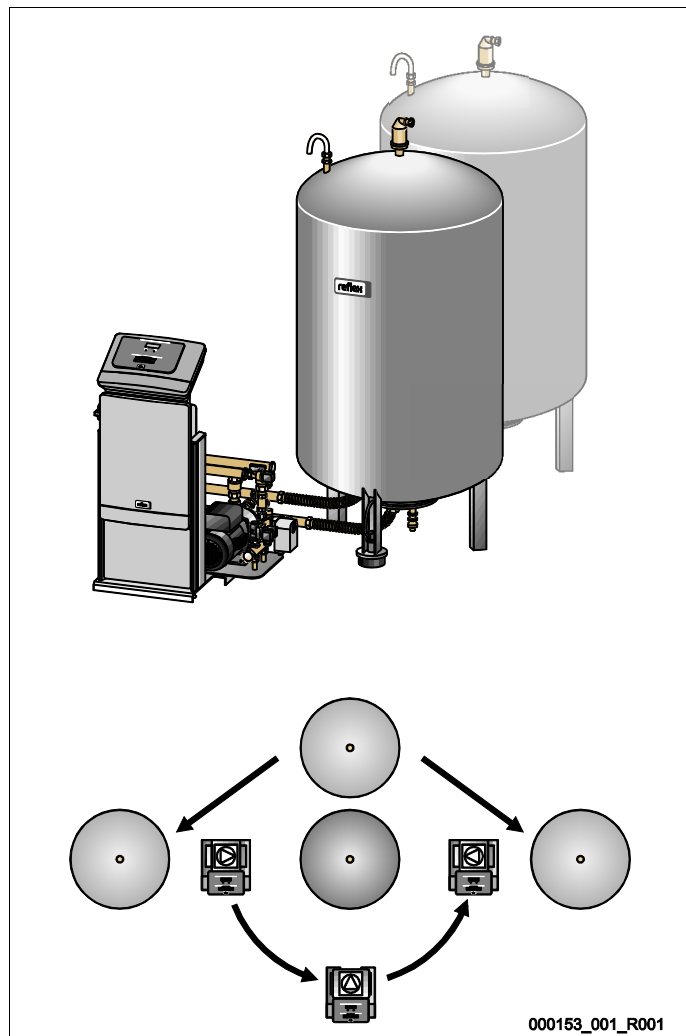
Notice!

For installation, note the operability of the valves and the inlet options of the connecting lines.

6.3.1 Positioning

Determine the positions for the control unit, the primary tanks and the secondary tanks (if used).

- Variomat 2-1:
 - The control unit can be installed on either side or in front of the primary tank. The distance of the control unit to the primary tank results from the connection set supplied.
- Variomat 2-2:
 - The control unit can be installed on either side or in front of the primary tank. The distance of the control unit to the primary tank results from the connection set supplied.



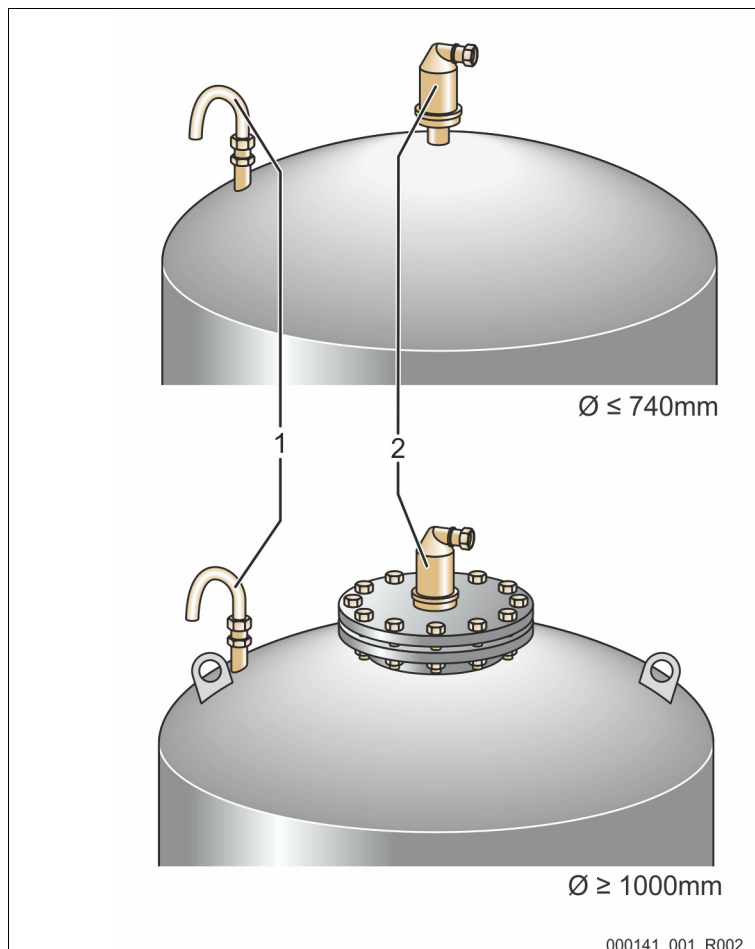
6.3.2 Installation of add-on components for the tanks

The add-on components are packed in plastic bags and attached to the base of the devices.

- Pressure compensation elbow (1).
- Reflex Exvoid with pre-fitted check valve (2)
- "LIS" pressure pick-up

For add-on components, proceed as follows:

1. Install the Reflex Exvoid (2) at the connection of the corresponding tank.
2. Remove the protective cap from the degassing valve.
3. Use the compression fitting to install the pressure compensation elbow (1) for aeration and ventilation at the tanks.



Note!

Install the "LIS" pressure pick-up only after finalising the installation of the primary tank, see chapter 6.3.6 "Fitting the level sensor" on page 26 .



Note!

To ensure fault-free operation, do not seal off the aeration and ventilation.

6.3.3 Tank installation

ATTENTION

Damage due to improper installation

Additional device stresses may arise due to the connection of pipes or system equipment.

- Ensure that pipes are connected from the device to the system without stresses being induced.
- If necessary, provide support structures for the pipes or equipment.

ATTENTION

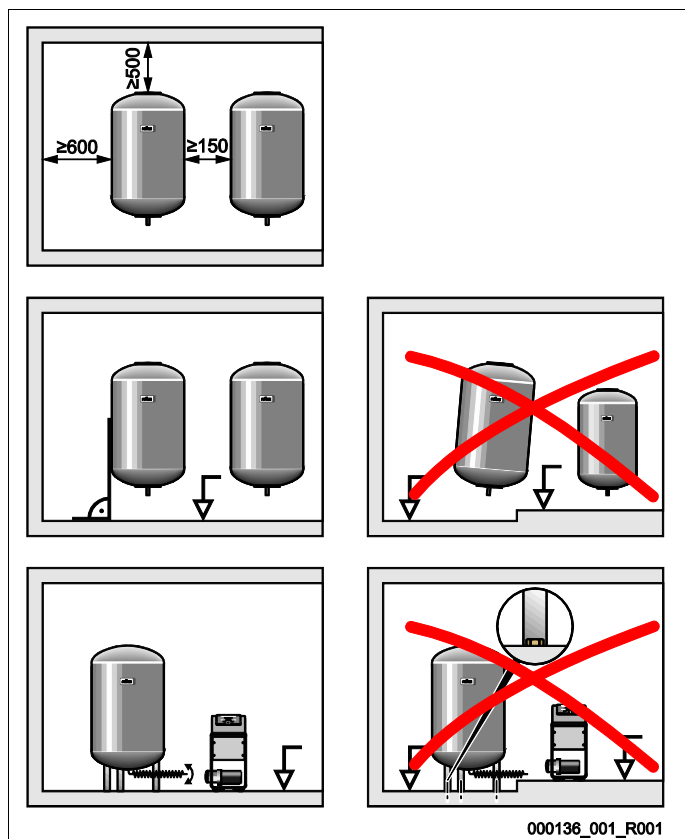
Device damage resulting from dry running of the pump

If the pump is incorrectly connected, there is a risk of dry-running.

- Ensure that the connections for the overflow collector and the pump are not interchanged.
- Ensure correct connection of the pump to the primary tank.

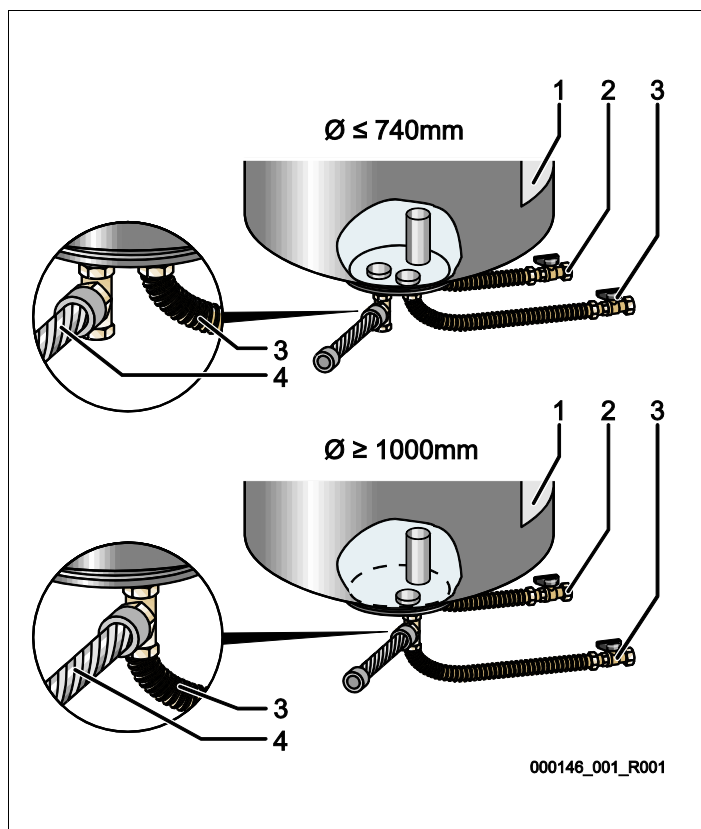
Comply with the following notes regarding the installation of the primary tank and the secondary tanks:

- All flange openings at the tanks are viewing and maintenance openings. Install the primary tank and the secondary tanks, if provided, with sufficient spaces at the sides and the top.
- Install the tanks on a level surface.
- Ensure rectangular and free-standing position of the tanks.
- If you use secondary tanks in addition to the primary tank, ensure that all tanks are of the same type and dimensions.
- Do not attach the tanks to the flooring to ensure the functioning of the "LIS" level sensor.
- Install the control unit on the same level as the tanks.



(All data in mm)

- Align the primary tank.
 - The distance of the primary tank to the control unit must match the length of the connection set.
- Connect the connection set (2) and (3) with the screw fittings and gaskets to the connections at the lower tank flange of the primary tank.
 - Ensure that you connect the connection set for the overflow collector to the connection (2) below the label (1).
 - Interchanging the connections may cause the pump to run dry.
- For tanks up to 740 mm Ø:
 - Connect the connection set (2) and (3) to the two free 1-inch barrel nipples at the tank flange.
 - Connect the connection set (4) of the secondary tank to the T-joint at the outlet of the tank flange.
- For tanks from 1000 mm Ø:
 - Connect the connection set (2) to the 1-inch barrel nipple of the tank flange.
 - Connect the connection sets (3) and (4) to the T-joint at the 1-inch barrel nipple of the tank flange.



1	Adhesive label	3	"Pump" connection set
2	"Overflow collector" connection set	4	Secondary tank connection set



Note!

If necessary, install the supplied connection set (4) at the optional secondary tank. Connect the connection set (4) with a user-supplied flexible pipeline to the primary tank.

6.3.4 Hydraulic connection

6.3.4.1 Connection to the facility system

CAUTION

Hot water vapour can cause burns to skin and eyes.

Hot steam can escape from the safety valve. The hot steam will cause scalding of the skin and eyes.

- Ensure that the blow-off line of the safety valve is routed so that injuries are not possible.
-

ATTENTION

Damage due to improper installation

Additional device stresses may arise due to the connection of pipes or system equipment.

- Ensure that pipes are connected from the device to the system without stresses being induced.
 - If necessary, provide support structures for the pipes or equipment.
-

Connection to the primary tank

The control unit is positioned to the primary tank as determined by the selected installation variant, and is connected to the tank using its connection set, see chapter 6.3.3 "Tank installation" on page 20.

The connections to the system are identified by adhesive labels on the control unit:

Pumpen Zur Anlage

Pump to system connection

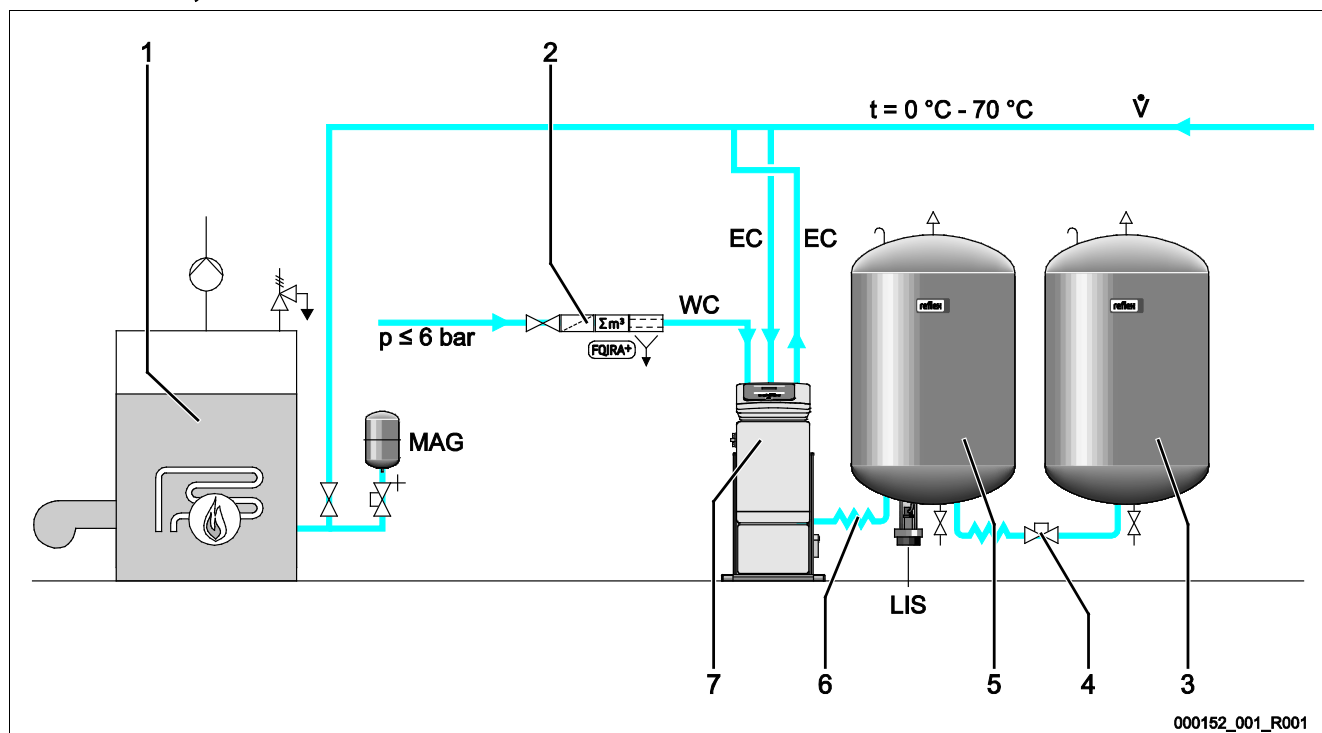
Überströmung Zur Anlage

Overflow valve to system
connection

Nachspeisung Zum Behälter

Make-up to system connection

Connection to the system



1	Heat generator
2	For optional equipment and accessories, see chapter 4.6 "Optional equipment and accessories" on page 13 .
3	Secondary tank
4	Reflex rapid-action coupling R 1 x 1
5	Primary tank
6	Primary tank connection set

7	Typical representation of the control unit
EC	Degassing line - Gas-rich water from the system - Degassed water to the system
LIS	"LIS" level sensor
WC	Make-up line
MAG	Pressure expansion tank

If required, install a diaphragm expansion tank $MAG \geq 35$ litres (Reflex N, for example). It reduces the switching frequency and can be also used in the individual protection of the heat generators. According to DIN / EN 12828, the installation of valves between the device and the heat generator is required for heating systems. Otherwise secure locking mechanisms must be fitted.



Note!

Due to the optimal degassing capacity of the device, we recommend the installation of a diaphragm expansion tank $MAG \geq 35$ litre (Reflex N, for example).

"EC" expansion lines

Because of the degassing function, you must install two "EC" expansion lines.

- One line to the system for the gas-rich water.
- One line to the system for the degassed water.

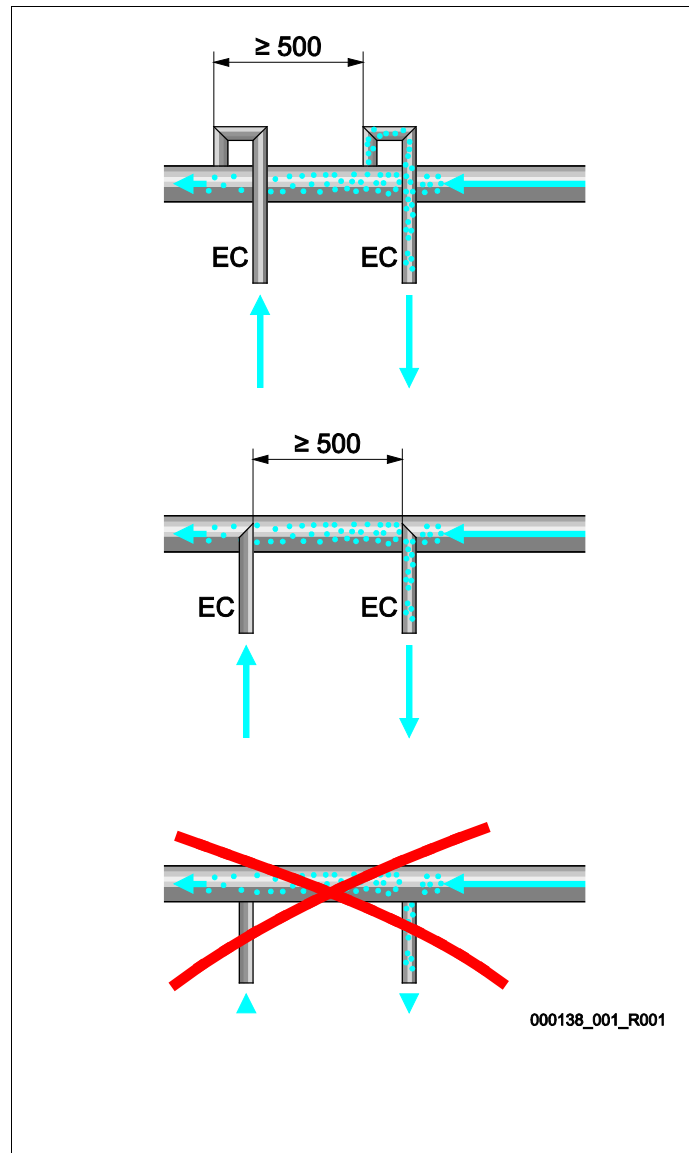
The "DN" nominal connection diameter for the "EC" expansion lines must be designed for the " P_0 " minimum operating pressure.

Calculation P_0 , see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 37.

The "DN" nominal connection diameter applies to an expansion line length of up to 10 m. Beyond this length, select the next larger dimension. Integrate with the "V" main flow volume of the system. Viewed in the system flow direction, the gas-rich expansion line must be connected upstream of the expansion line transporting the degassed water.

Ensure that particulate dirt cannot enter and thus creating an overload of the "ST" dirt trap. Connect the "EC" expansion lines according to the following installation variants.

Type	Minimum operating pressure p_0 (bar)	DN25	DN32	DN40	DN50
VS 1	≥ 2.0	X			
VS 1	0.5 - 2.0		X		
VS 2-1			X		
VS 2-2/35			X		
VS 2-2	≤ 3.5				X
VS 2-2	> 3.5			X	
VS 140			X		

**Note!**

The water temperature at the connection point of the "EC" expansion lines must be in the range of 0 °C to 70 °C. The use of auxiliary tanks does not increase the range of use. Because the thermal protection is not ensured due to the flow during the degassing phase.

6.3.4.2 Make-up line

If you don't connect the automatic water make-up, you must close the connection of the "WC" make-up line with a R ½ " blind plug.

- Prevent a potential device fault by ensuring manual water make-up.
- Install at least one "ST" dirt trap with a mesh size ≤ 0.25 mm close upstream to the make-up solenoid valve.
 - Install a short line between the "ST" dirt trap and the solenoid valve.



Note!

Use a pressure reducer in the "WC" make-up line if the idle pressure exceeds 6 bar.



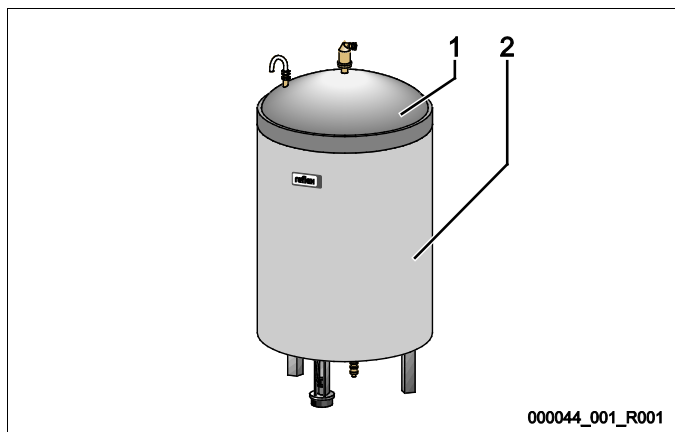
Note!

If you use make-up water from the potable water system, you may need the Reflex Fillset for the "WC" make-up line, see chapter 4.6 "Optional equipment and accessories" on page 13 .

- Reflex make-up systems such as Reflex Fillset are designed for make-up lines with a flow rate < 1 m³/h.

6.3.5 Fitting the thermal insulation

Install the optional thermal insulation (2) around the primary tank (1) and close the insulation with the zip fastener.



Note!

For heating systems, insulate the primary tank and the "EC" expansion lines against heat loss.

- Thermal insulation is not required for either the primary tank top or the secondary tank.



Note!

On-site, install thermal insulation when condensate forms.

6.3.6 Fitting the level sensor

ATTENTION

Damage to the pressure load cell due to unprofessional installation

Incorrect installation may result in damage to the "LIS" level sensor, malfunctioning and incorrect measurements from the pressure load cell.

- Comply with the instructions regarding the installation of the pressure load cell.

The "LIS" level sensor uses a pressure load cell. This pressure pick-up is to be installed after the primary tank has been placed at its final position, see chapter 6.3.3 "Tank installation" on page 20 . Comply with the following instructions:

- Remove the transport securing device (squared timber) at the vessel base of the primary tank.
- Replace this transport securing device with the pressure load cell.
 - In the case of a tank volume of 1000 l (Ø 1000 mm) or more, use the supplied screws to attach the pressure load cell at the vessel base of the primary tank.
- Avoid shock-type loading of the pressure load cell by, for example, subsequent alignment of the vessel.
- Use flexible hoses to connect the primary tank and the first secondary tank.
 - Use only the supplied connection sets, see chapter 6.3.3 "Tank installation" on page 20 .
- Perform a null balancing of the filling level when the primary tank is aligned and fully emptied, see chapter 7.6 "Parametrising the controller in the Customer menu" on page 43 .

Standard values for level measurements:

Primary vessel	Measuring range
200 l	0 – 4 bar
300 – 500 l	0 – 10 bar
600 – 1000 l	0 – 25 bar
1500 – 2000 l	0 – 60 bar
3000 – 5000 l	0 – 100 bar

6.4 Switching and make-up variants

6.4.1 Function

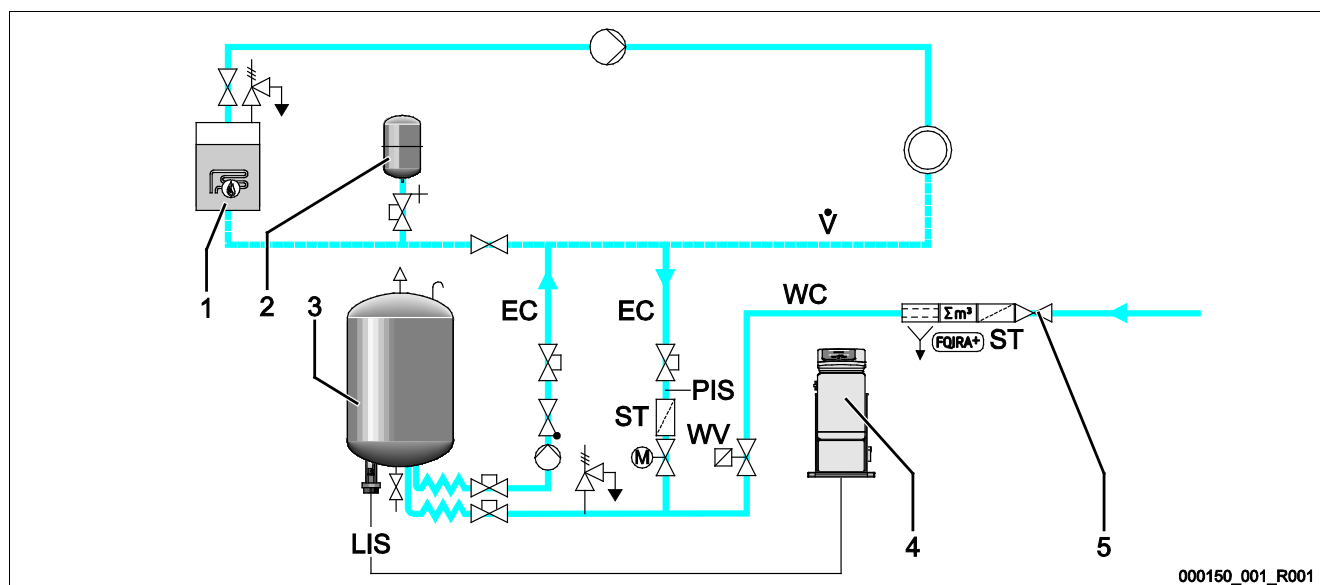
The current filling level is recorded in the primary tank by the "LIS" level sensor and evaluated in the controller. The value for the minimum filling level is specified in the controller's Customer menu. If the level drops below the defined minimum, the "WV" make-up valve opens and fills the primary tank.



Note!

To complete the make-up function from the drinking water system, Reflex offers the Fillset with integrated system separator and Fillsoft softening equipment, see chapter 4.6 "Optional equipment and accessories" on page 13.

6.4.1.1 Using a single-tank system



1	Heat generator
2	"MAG" pressure expansion tank
3	Primary tank
4	Control unit
5	Reflex Fillset, see chapter 4.6 "Optional equipment and accessories" on page 13.
ST	Dirt trap

WC	Make-up line
PIS	Pressure transducer
WV	Make-up solenoid valve
EC	Degassing line - For gas-rich water from the system. - For degassed water into the system.
LIS	Level sensor

Single-tank system ≤ 350 kW, water temperature < 100 °C.

- Use the Reflex Fillset with integrated system separator when using drinking water for make-up.
 - If you don't use a Reflex Fillset, you must use an "ST" dirt trap with a mesh size ≥ 0.25 mm for the make-up.

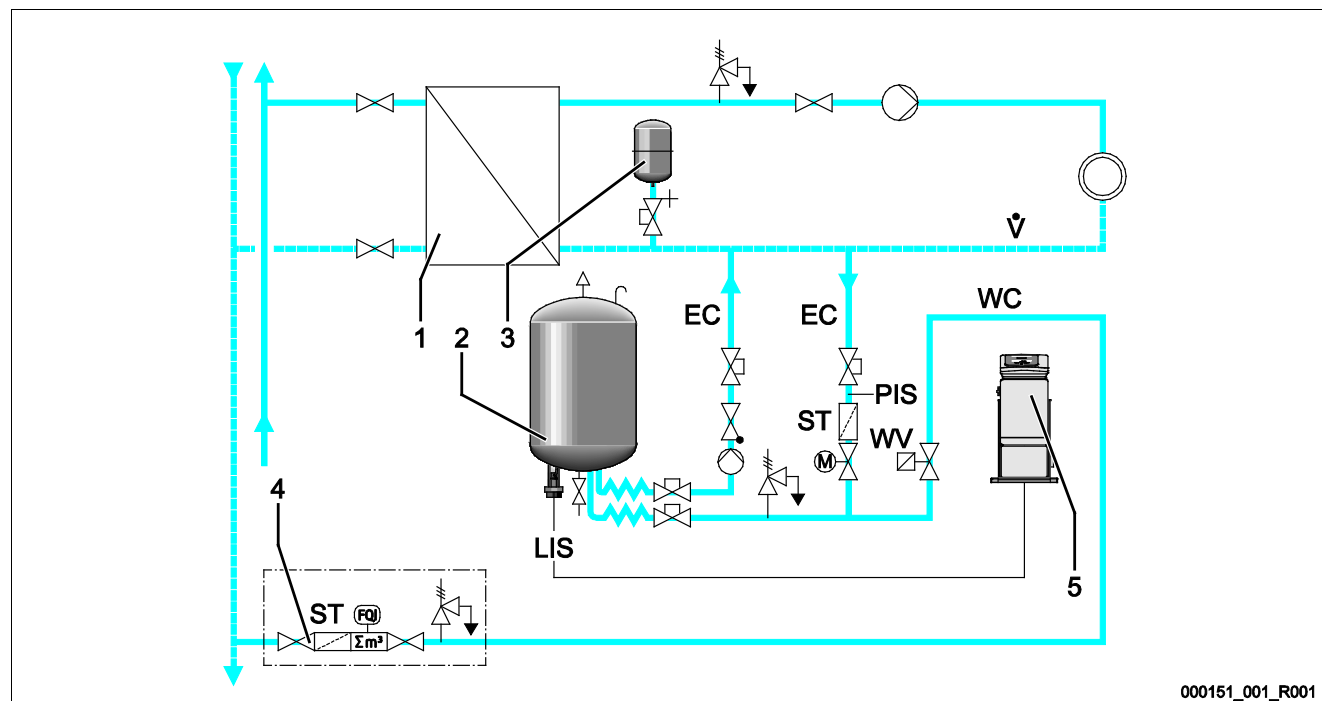


Notice!

The quality of the make-up water must comply with the applicable standards such as VDI 2035.

- If you cannot meet this quality, use the Reflex Fillsoft to soften the make-up water from the potable water network, see chapter 4.6 "Optional equipment and accessories" on page 13.

6.4.1.2 Using a district heating substation



1	District heating substation
2	Primary tank
3	"MAG" pressure expansion tank
4	User-supplied make-up unit
5	Control unit
WC	Make-up line

PIS	Pressure transducer
WV	Make-up solenoid valve
ST	Dirt trap
EC	Degassing line - For gas-rich water from the system. - For degassed water into the system.
LIS	Level sensor

District heating water is particularly suited as make-up water.

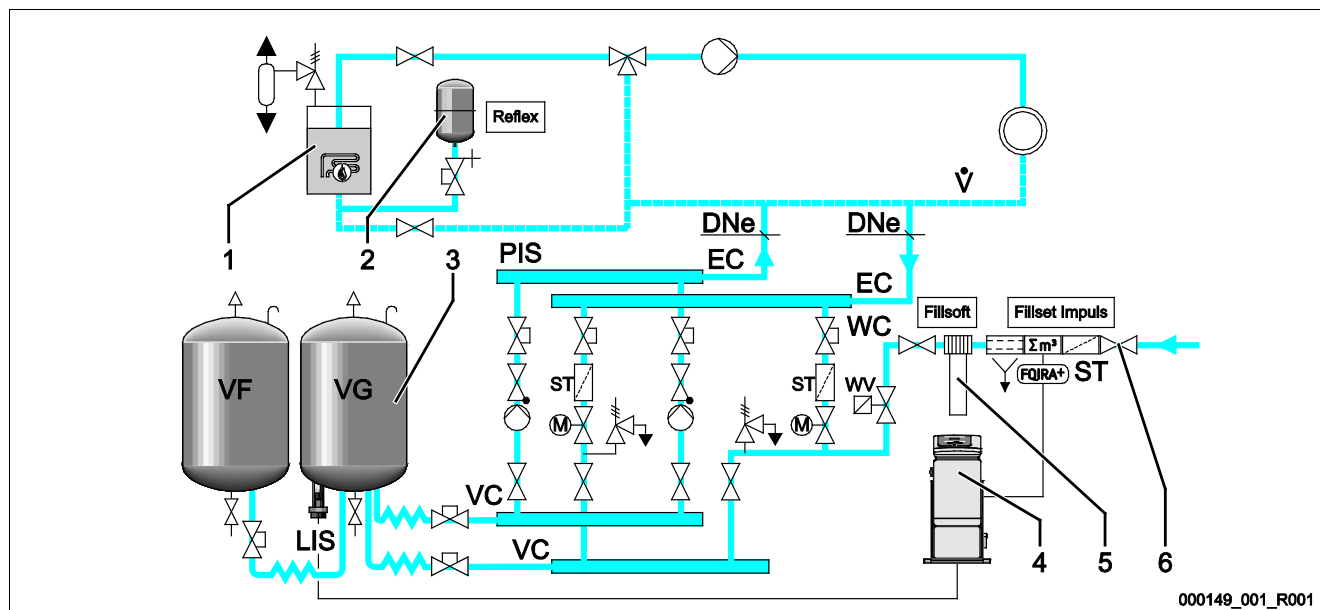
- Water treatment is not necessary.
- Use an "ST" dirt trap with a mesh size ≥ 0.25 mm for the make-up.



Notice!

You require approval by the supplier of the district heating water.

6.4.1.3 Use in a system with central return flow admixture



1	Heat generator
2	"MAG" pressure expansion tank
3	Primary tank
4	Control unit
5	Reflex Fillsoft, see chapter 4.6 "Optional equipment and accessories" on page 13 .
6	Reflex Fillset Impulse, see chapter 4.6 "Optional equipment and accessories" on page 13 .

WC	Make-up line
PIS	Pressure transducer
WV	Make-up solenoid valve
ST	Dirt trap
EC	Degassing line - For gas-rich water from the system. - For degassed water into the system.
LIS	Level sensor

Using a softening system for the water make-up.

- Always integrate the device in the "V" main volume flow to ensure degassing the system water. It is the system side in systems with central return flow admixture or hydraulic switching points. The tank of the heat generator must be fitted with an individual protective device.
- When using Reflex Fillsoft softening systems, always install the Fillset Impulse.
 - The device controller evaluates the make-up quantities and signals a required replacement of the softening cartridges.



Notice!

The quality of the make-up water must comply with the applicable standards such as VDI 2035.

6.5 Electrical connection

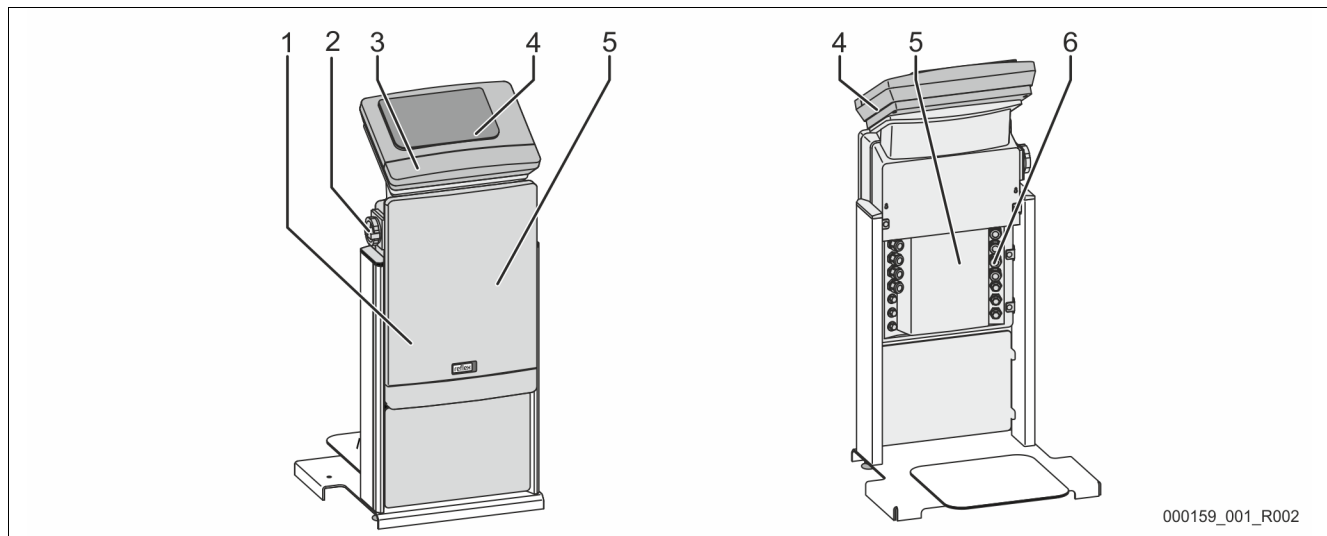
⚠ DANGER

Risk of serious injury or death due to electric shock.

If live parts are touched, there is risk of life-threatening injuries.

- Ensure that the system is voltage-free before installing the device.
- Ensure that the system is secured and cannot be reactivated by other persons.
- Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

For the electrical connection, you must differentiate between a connection component and an operating component.



000159_001_R002

1	Connection component cover (hinged)
2	Main switch
3	Operating unit cover (hinged) • RS-485 interfaces • Pressure and Level outputs

4	Touch control
5	Connection component rear
6	Cable bushings • Supply and fusing • Floating contacts • "CO" compressor connection

The following descriptions apply to standard systems and are limited to the necessary user-provided connections.

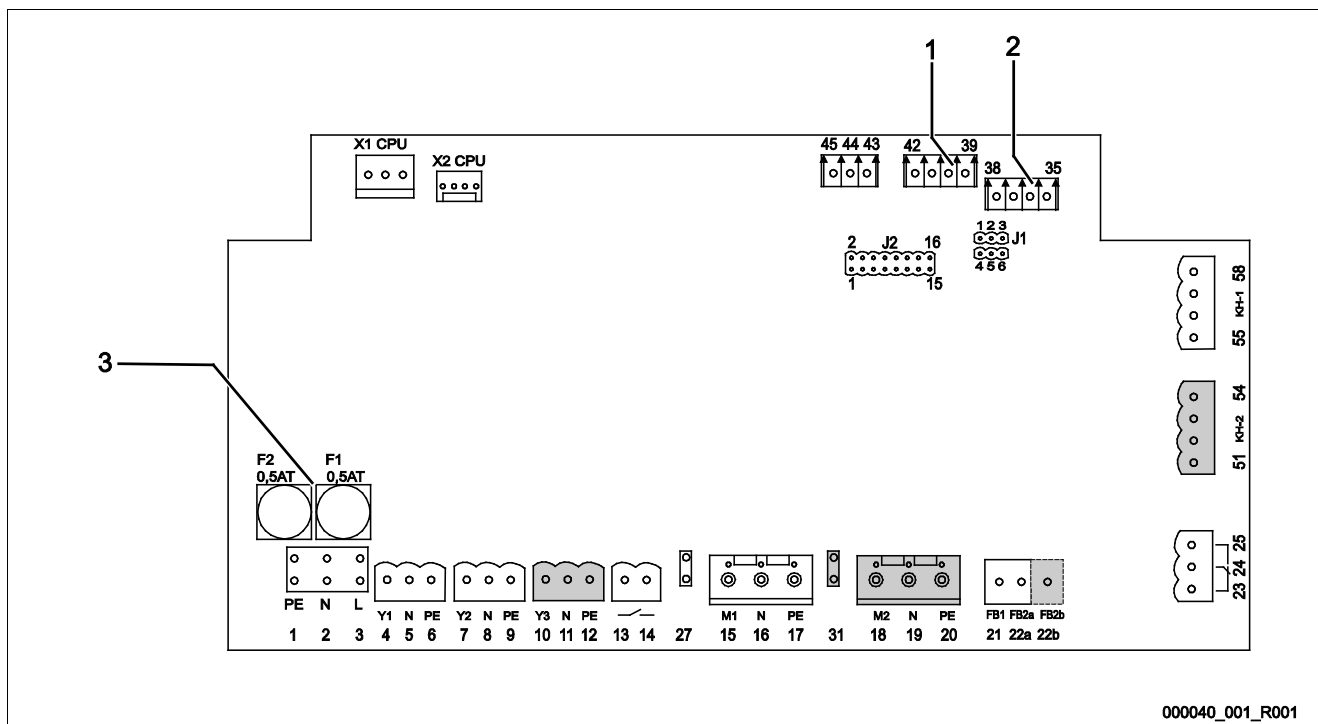
1. Shut down the system and secure it against unintentional reactivation.
2. Remove the covers.

⚠ DANGER Risk of serious injury or death due to electric shock. Some parts of the device's circuit board may still carry 230 V voltage even with the device physically isolated from the power supply. Before you remove the covers, completely isolate the device controller from the power supply. Verify that the main circuit board is voltage-free.

3. Insert a suitable screwed cable gland for the cable bushing at the rear of the connection component. M16 or M20, for example.
4. Thread all cables to be connected through the cable glands.
5. Connect all cables as shown in the terminal diagrams.
 - Note that the fusing for the device connection is to be provided by the user, see chapter 5 "Technical data" on page 14.

6.5.1 Terminal diagram

6.5.2 Terminal plan, connection component



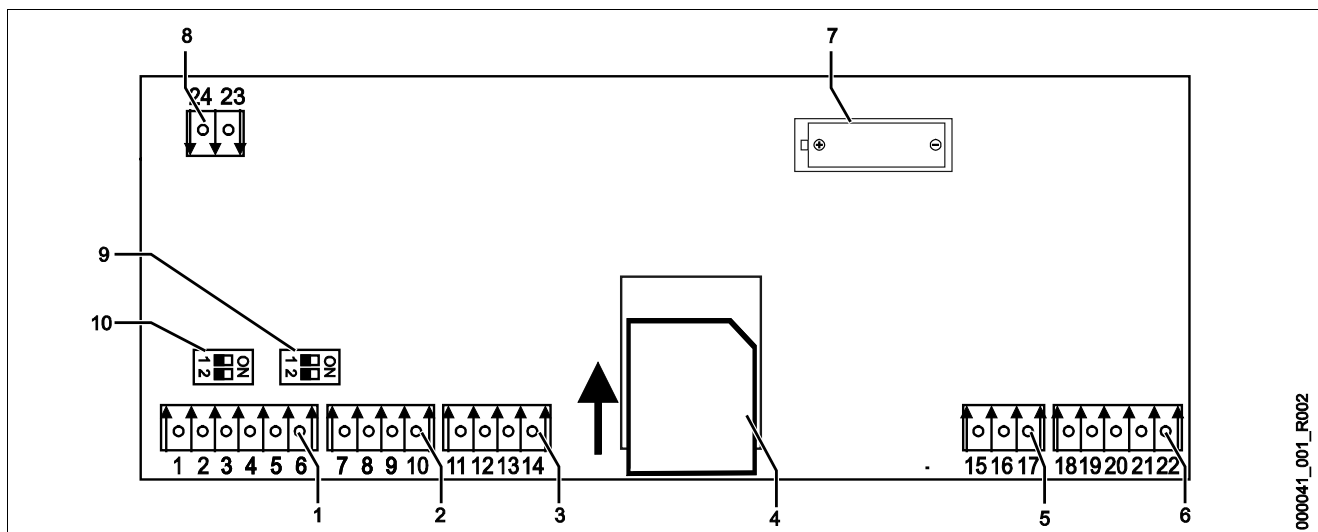
1	Pressure
2	Level

3	Fuses
---	-------

Terminal number	Signal	Function	Wiring
Supply			
X0/1	L	Supply 230 V, maximal 16 A	User supplied
X0/2	N		
X0/3	PE		
X0/1	L1	Supply 400 V, maximal 20 A	User supplied
X0/2	L2		
X0/3	L3		
X0/4	N		
X0/5	PE		
Circuit board			
1	PE	Voltage supply	Factory-provided
2	N		
3	L		
4	Y1	WV make-up solenoid valve	User, optional
5	N		
6	PE		

Terminal number	Signal	Function	Wiring
7	Y2	PV 1 overflow valve (motor ball valve or solenoid valve)	---
8	N		
9	PE		
10	Y3	PV 2 overflow valve (motor ball valve or solenoid valve)	---
11	N		
12	PE		
13		Dry-running protection message (floating)	User, optional
14			
15	M1	PU 1 pump	Factory-provided
16	N		
17	PE		
18	M2	PU 2 pump	Factory-provided
19	N		
20	PE		
21	FB1	Pump 1 voltage monitoring	Factory-provided
22a	FB2a	Pump 2 voltage monitoring	Factory-provided
22b	FB2b	External make-up request together with 22a	Factory-provided
23	NC	Group message (floating)	User, optional
24	COM		
25	N.O.		
27	M1	Flat plug for supply, pump 1	Factory-provided
31	M2	Flat plug for supply, pump 2	Factory-provided
35	+18 V (blue)	Analogue input, LIS level measuring at the primary tank	On-site
36	GND		
37	AE (brown)		
38	PE (shield)	Analogue input, "PIS" pressure measuring at the primary tank	User, optional
39	+18 V (blue)		
40	GND		
41	AE (brown)	Digital inputs	User, optional
42	PE (shield)		
43	+24 V		
44	E1	E1: Contact water meter	Factory-provided
45	E2	E2: Insufficient water switch	---
51	GND	PV 2 overflow valve (motor ball valve), only in VS 2-2	Factory-provided
52	+24 V (supply)		
53	0 – 10 V (correcting variable)		
54	0 – 10 V (feedback)	PV 1 overflow valve (motor ball valve)	Factory-provided
55	GND		
56	+24 V (supply)		
57	0 – 10 V (correcting variable)		
58	0 – 10 V (feedback)		

6.5.3 Terminal plan, operating unit



1	RS-485 interfaces	6	Analogue outputs for Pressure and Level
2	I/O interface	7	Battery compartment
3	I/O interface (reserve)	8	Supply voltage, bus modules
4	SD card	9	RS-485 connection
5	10 V supply	10	RS-485 connection

Terminal number	Signal	Function	Wiring
1	A	RS-485 interface S1 networking	User supplied
2	B		
3	GND S1		
4	A	RS-485 interface S2 modules: Expansion or communication module	User supplied
5	B		
6	GND S2		
18	Y2PE (shield)	Analogue outputs: Pressure and Level Standard 4 – 20 mA	User supplied
19	Pressure		
20	GNDA		
21	Level		
22	GNDA		
7	+5 V	I/O interface: Interface to the main circuit board	Factory
8	R × D		
9	T × D		
10	GND IO1		
11	+5 V	I/O interface: Interface to the main circuit board (reserve)	---
12	R × D		
13	T × D		
14	GND IO2		
15	10 V~	10 V supply	Factory
16			
17	FE		

6.5.4 RS-485 interface

Use the S1 and S2 RS-485 interface to retrieve all controller data and to enable the communication with control centres or other devices.

- S1 interface
 - A maximum 10 devices can be used in a master-slave linked circuit via the this interface.
- S2 interface
 - "PIS" pressure and "LIS" level.
 - Operating modes of the "PU" pumps.
 - Operating states of the motorised ball valve/solenoid valve.
 - Values of the "FQIRA +" contact water meter.
 - All messages, see chapter 9.4 "Messages" on page 59 .
 - All entries in the fault memory.

The following bus modules are optionally available for interface communication:

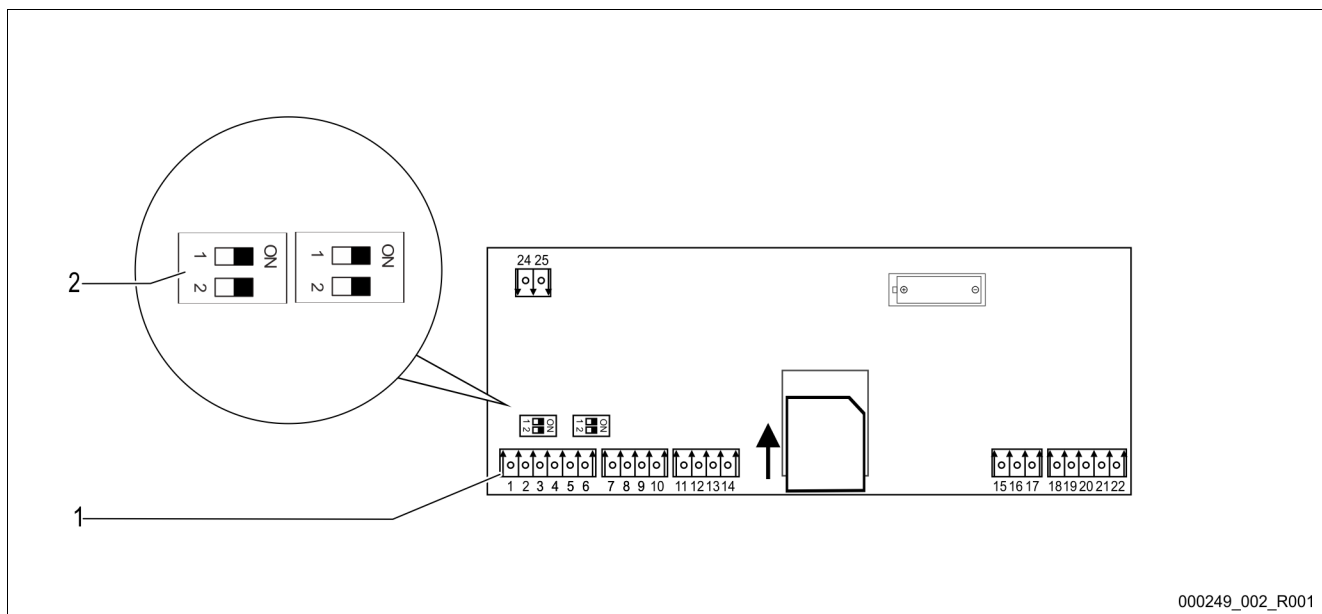
- Lonworks Digital
- Lonworks
- Profibus-DP
- Ethernet
- Optional I/O module.

**Note!**

If required, please contact the Reflex Customer Service for the protocol of the RS-485 interface, details of the connections and information about the accessories offered.

6.5.4.1 Connecting the RS-485 interface

Main circuit board of the Control Touch controller.



1	Connection terminals for RS-485 connection	2	Dip switch 1
---	--	---	--------------

Proceed as follows:

1. Use a screened cable to connect the RS-485 interface to the main circuit board.
 - S 1
 - Terminal 1 (A+)
 - Terminal 2(B-)
 - Terminal 3(GND)
2. Connect the cable screen at one side.
 - Terminal 18
3. Activate the terminator on the main circuit board.
 - Dip switch 1



Note!

Activate the terminator when the device is at the beginning or the end of the RS-485 network.

6.6 Installation and commissioning certificate

Data shown on the nameplate:	P ₀
Type:	P _{SV}
Serial number:	

This device has been installed and commissioned in accordance to the instructions provided in the Operating Manual. The settings in the controller match the local conditions.



Note!

When any factory-set values of the device are changed, you must enter this information in the Maintenance certificate, see chapter 10.5 "Maintenance certificate " on page 69 .

For the installation

Place, date	Company	Signature

For the commissioning

Place, date	Company	Signature

7 Commissioning



Note!

Confirm that installation and start-up have been carried out correctly using the installation, start-up and maintenance certificate. This action is a prerequisite for the making of warranty claims.

- Have the Reflex Customer Service carry out commissioning and the annual maintenance.

7.1 Checking the requirements for commissioning

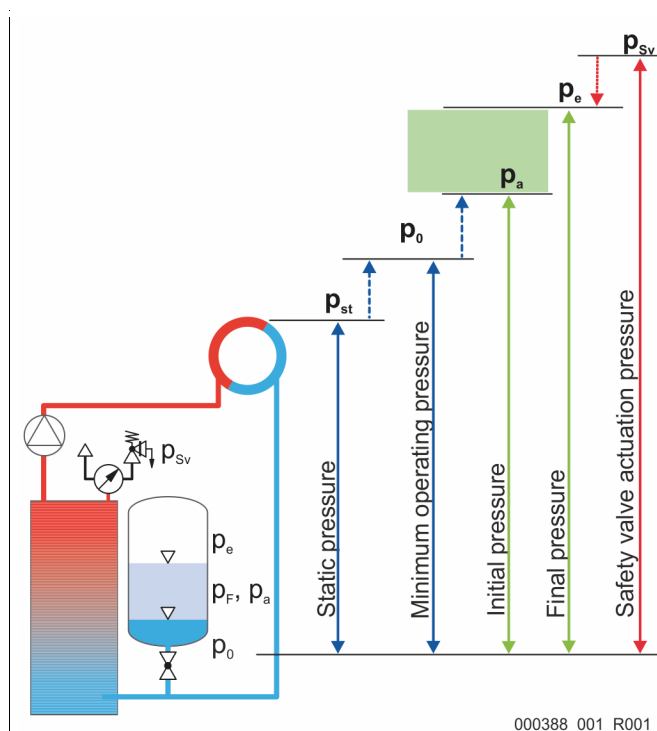
The device will be ready for commissioning when the tasks described in the "Installation" chapter have been completed. The system designer or an assigned expert is responsible for carrying out the commissioning. Commission the storage tank according to the information in the corresponding installation manual. Note the following information on commissioning:

- The control unit is connected to the primary tank and the secondary tanks, if provided.
- The water connections of the tanks to the facility system are established.
- The tanks are not filled with water.
- The valves for emptying the tanks are open.
- The facility system is filled with water and gas-vented.
- The electrical connection has been created according to applicable national and local regulations.

7.2 Determining the P_0 minimum operating pressure for the controller

The " p_0 " minimum operating pressure is determined by the location of the pressure maintaining device. The controller calculates the switching points for the "PV" overflow solenoid valves and the "PU" pumps from the minimum operating pressure.

	Description	Calculation
p_{st}	Static pressure	= static head (h_{st})/10
p_0	Minimum operating pressure	
p_a	Initial pressure (pump "ON")	= $p_0 + 0.3$ bar
	Static pressure (overflow solenoid valve "CLOSED" / Pump "OFF")	
p_e	Final pressure (overflow solenoid valve "OPEN")	$\leq p_{sv} - 0.5$ bar (for $p_{sv} \leq 5.0$ bar) $\leq p_{sv} \times 0.9$ (for $p_{sv} > 5.0$ bar)
p_{sv}	Safety valve actuation pressure	$= p_0 + 1.2$ bar (for $p_{sv} \leq 5.0$ bar) $= 1.1 \times p_0 + 0.8$ bar (for $p_{sv} > 5.0$ bar)



7.3 Modifying the controller's start routine



Note!

For handling the operator panel see chapter 9.1 "Operator panel" on page 49

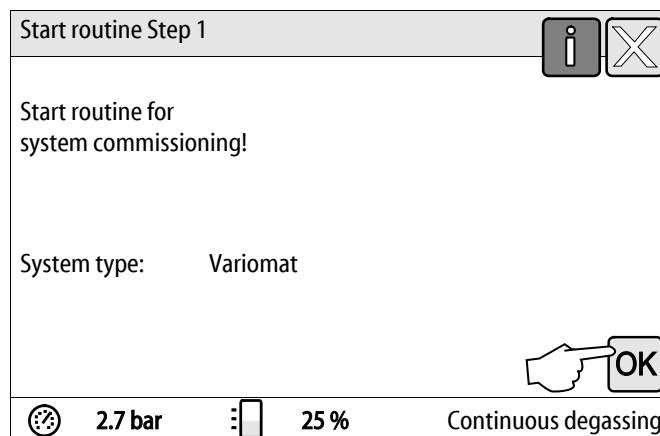
The start routine is used to set the required parameters for the device commissioning. It commences with the first activation of the controller and can be run only once. Parameters can be changed or checked in the customer after the start routine has terminated, see chapter 9.3.1 "Customer menu" on page 51 .

A three-digit PM code is assigned to the setting options.

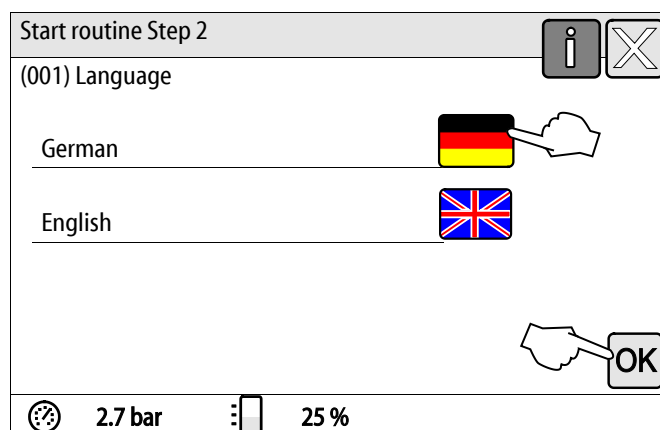
Step	PM code	Description
1		Start of the start routine
2	001	Select the language
3		Remember: Prior to installation and commissioning, read the operating manual!
4	005	Set the "P ₀ " minimum operating pressure, see chapter 7.2 "Determining the P ₀ minimum operating pressure for the controller" on page 37.
5	002	Set the time
6	003	Set the date
7	121	Select the primary tank nominal volume
8		Null balancing: The primary tank must be empty! The system checks whether the signal from the level sensor matches the selected primary tank.
		End of the start routine. The stop mode is active.

The system automatically displays the first page of the start routine when you switch on the device for the first time.

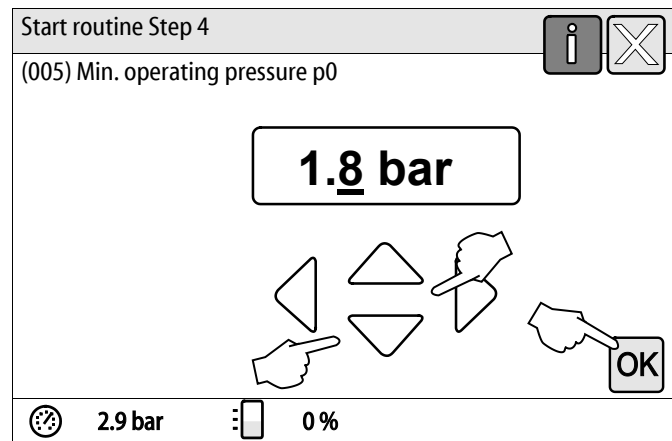
1. Press "OK".
 - The start routine moves to the next page.



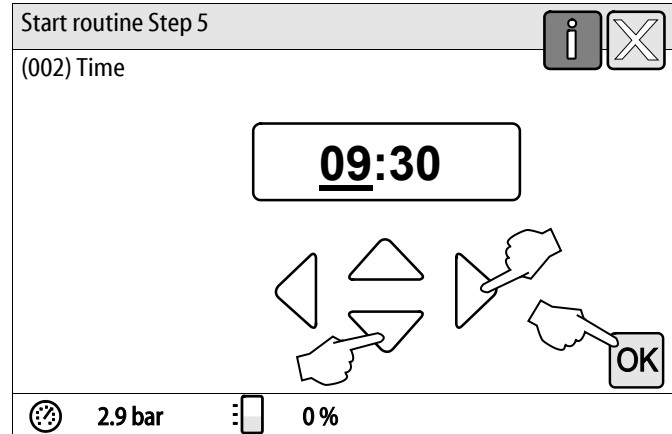
2. Select the required language and conform your entry with "OK".



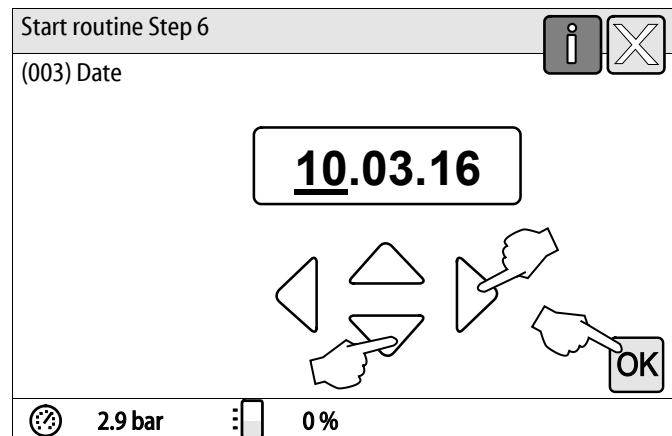
3. Select the calculated minimum operating pressure and conform your entry with "OK".
 - For calculation of the minimum operating pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 37.



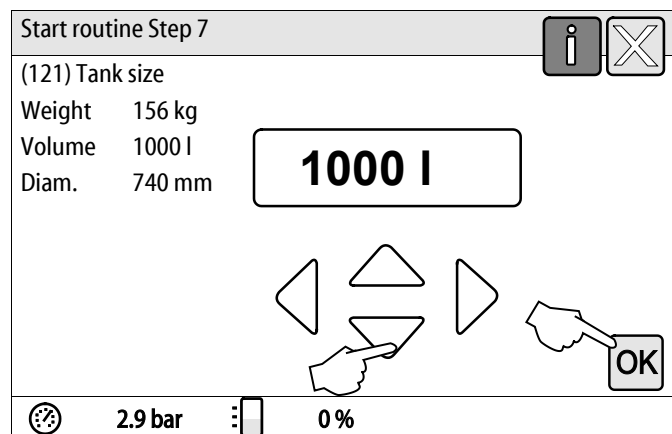
4. Set the time.
 - Use the "Left" and "Right" buttons to select the display value.
 - Use the "Up" and "Down" buttons to change the display value.
 - Confirm your entries with "OK".
 - The time of an alarm will be stored in the fault memory of the controller.



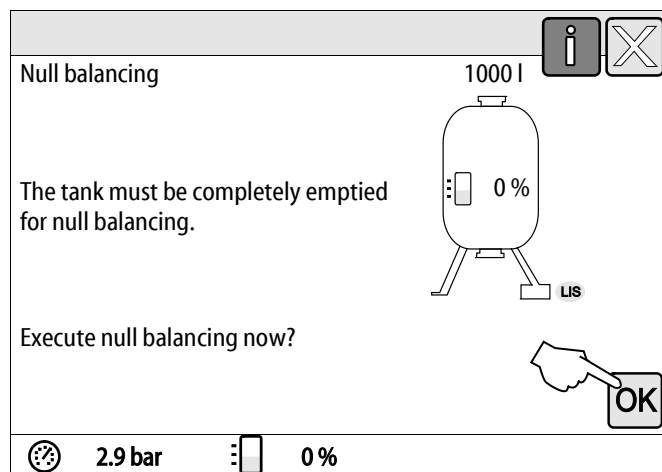
5. Set the date.
 - Use the "Left" and "Right" buttons to select the display value.
 - Use the "Up" and "Down" buttons to change the display value.
 - Confirm your entries with "OK".
 - The date of an alarm will be stored in the fault memory of the controller.



6. Select the size of the primary tank.
 - Use the "Up" and "Down" buttons to change the display value.
 - Confirm your entries with "OK".
 - For the primary tank data, see the name plate or see chapter 5 "Technical data" on page 14.



- The controller checks whether the level measuring signal matches the dimensional data of the primary tank. The primary tank must be fully emptied, see chapter 6.3.6 "Fitting the level sensor" on page 26 .
7. Press "OK".
- Null balancing is executed.
 - If null balancing is not successfully completed, you cannot commission the device. In this event, please contact Customer Service, see chapter 12.1 "Reflex Customer Service" on page 72 .



Note!

After successful conclusion of the start routine, you are in Stop mode. Do not yet switch to Automatic mode.

7.4 Filling the tanks with water

The following information applies to the devices:

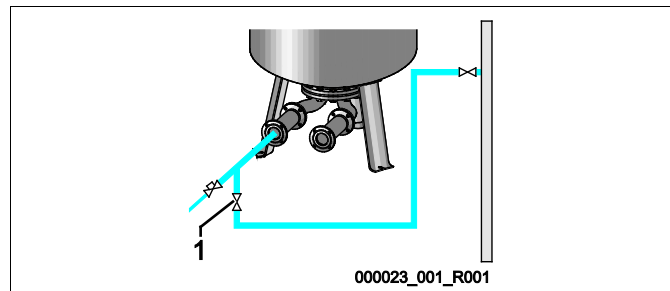
- Control unit and primary tank.
- Control unit and primary tank and one secondary tank.
- Control unit and primary tank and more than one secondary tanks.

Facility system	System temperature	Filling level of primary tank
Heating system	$\geq 50\text{ °C}$ (122° F)	Approx. 30 %
Cooling system	$< 50\text{ °C}$ (122° F)	Approx. 50 %

7.4.1 Filling with a hose

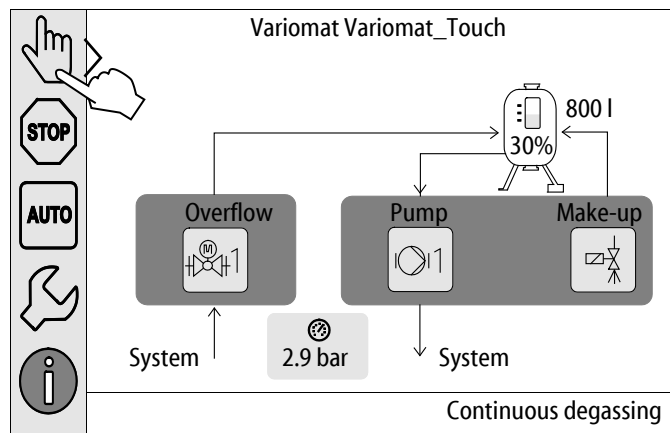
Preferably use a water hose to fill the primary tank with water when the automatic make-up device is not yet connected.

- Use a vented water hose filled with water.
- Connect the water hose to the external water supply and the "FD" feed and drain cock (1) at the primary tank.
- Check whether the shut-off valves between control unit and primary tank are open (supplied pre-wired in open position).
- Fill the primary tank with water until the filling level has been reached.



7.4.2 Filling with the solenoid valve in the make-up

1. Use the "Manual mode" button to switch to "Manual" mode.
2. Open the "WV make-up valve" via the corresponding button until the specified filling level is reached.
 - Continuously monitor this process.
 - If a high-water alarm is generated, the make-up valve "WV make-up valve" is automatically closed.



7.5 Venting the pump

⚠ CAUTION

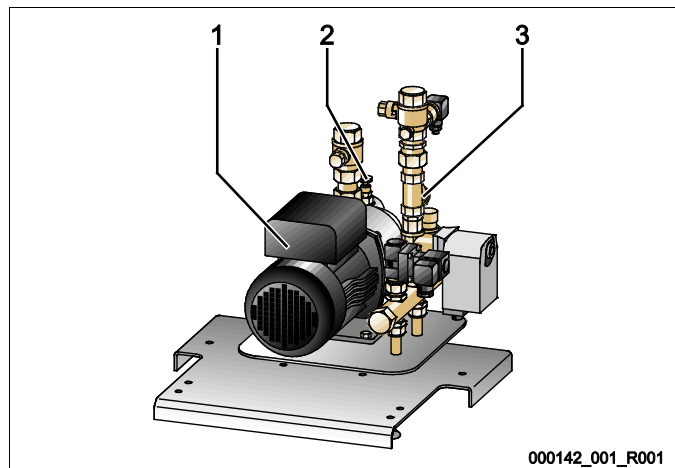
Risk of burns

Escaping hot medium can cause burns.

- Maintain a sufficient distance from the escaping medium.
- Wear suitable personal protective equipment (safety gloves and goggles).

Vent the "PU" pump as follows:

- Remove the vent screw (2) from the pump (1) and vent the pump until bubble-free water escapes.
- Screw the vent screw (2) back in and tighten.
- Check the vent screw (2) for leaks.



1	"PU" pump
2	"AV" vent screw
3	"ST" dirt trap



Notice!

Repeat the venting process if the pump does not deliver.

7.6 Parametrising the controller in the Customer menu

Use the Customer menu to display or correct system-specific values. In the course of commissioning, the factory settings must be adjusted for the system-specific conditions.

- For adjusting the default settings, see chapter 9.3 "Configuring settings in the controller" on page 51 .
- For information about controller operation, see chapter 9.1 "Operator panel" on page 49 .

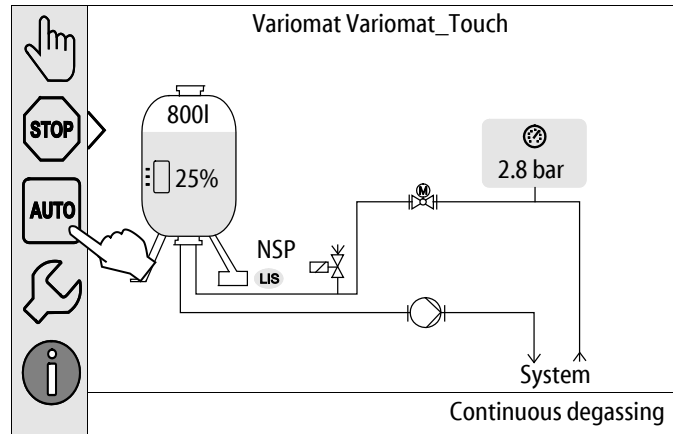
7.7 Starting Automatic mode

Automatic operation is executed as conclusion of the initial commissioning. The following prerequisites must be met for automatic operation:

- The device is filled with compressed air and water.
- All required settings are defined in the controller.

Start the automatic mode at the operator panel of the controller.

1. Press "AUTO".
 - The "PU" pump and the "PV" overflow valve are regulated so that the pressure remains constant at a regulation of ± 0.2 bar.
 - Faults are displayed and evaluated.



Note!

The commissioning process is now concluded.

Notice!

The "ST" dirt trap in the "DC" degassing line must be cleaned after the expiry of the continuous degassing time at the latest, see chapter 10.2 "Cleaning the dirt trap" on page 65 .

8 Operation

8.1 Automatic mode

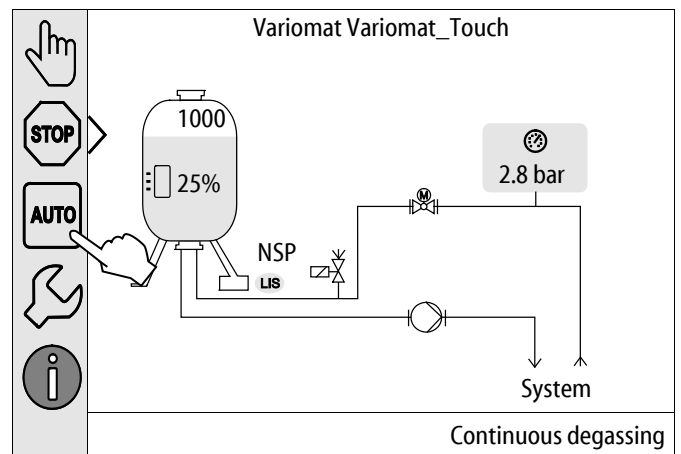
After successful commissioning, start the Automatic mode from the device. The controller monitors the following functions:

- Maintain pressure
- Compensate expansion volume
- Degas
- Automatic make-up

To start the Automatic mode, proceed as follows:

1. Press "AUTO".
 - The "PU" pumps and the "PV" overflow valves are regulated so that the pressure remains constant at a regulation of ± 0.2 bar.
 - Faults are displayed and evaluated.

Automatic mode is activated.



8.2 Manual mode

The manual mode is intended for test and service tasks.

Manual mode enables you to select the following functions and to perform a test run:

- "PU" pump.
- "PV1" overflow solenoid valve.
- "WV1" solenoid valve for the make-up.

You have the option to simultaneously switch multiple functions and to test them in parallel. Switch the function on and off by touching the corresponding button:

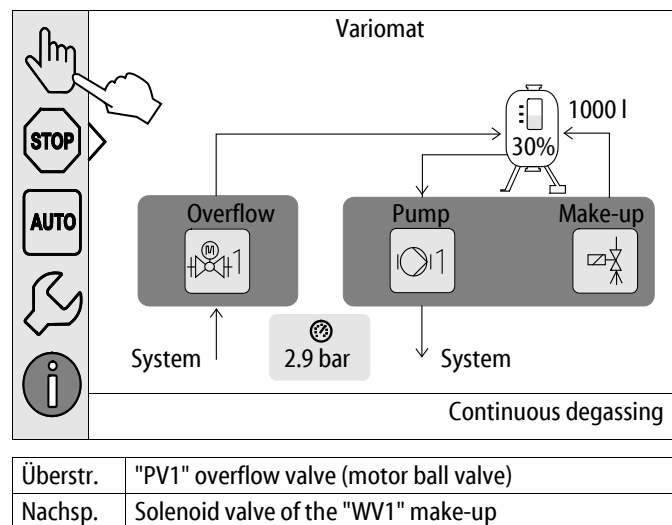
- The button has a green background. The function is switched off.

Press the desired button:

- The button has a blue background. The function is switched on.

1. Press "Manual mode".
2. Select the desired function.
 - "PU1" = Pump
 - "PV1" = Overflow valve
 - "WV1" = Make-up solenoid valve

The controller displays the change of the filling level and the pressure of the tank.



Note!

Manual operation can not be performed if safety-relevant parameters are exceeded.

- Switching is blocked if safety-relevant parameters are exceeded.

8.3 Stop mode

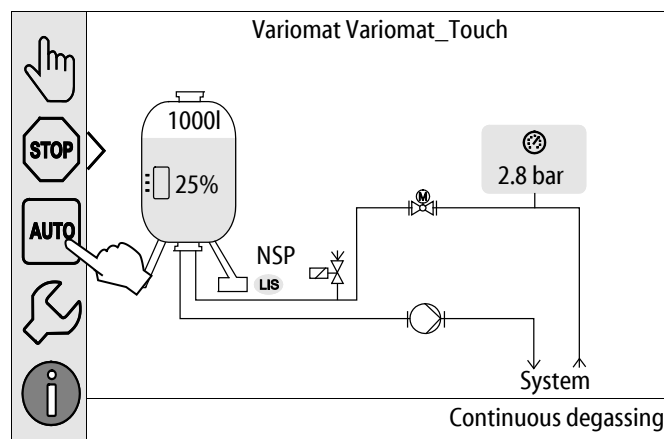
Use stop mode when carrying out maintenance on the device.

Except for the display of information, the device is non-functional in Stop mode. Function monitoring is stopped.

The following functions are deactivated:

- The "PU" pump is switched off.
- The solenoid valve in the "PV" overflow line is closed.
- The solenoid valve in the "WV" make-up line is closed.

1. Press "STOP".



Note!

The system returns an alarm if the Stop mode is activated for more than 4 hours.

- If "Floating alarm contact?" in the Customer menu is set to "Yes", the system outputs the alarm to the group alarm contact.

8.4 Summer operation

The degassing of the network water is not necessary if the circulating pumps of the system are shut down during Summer because gas-rich water cannot reach the device.

In this event, use the Customer menu to shut down the degassing action to save energy.

After Summer, select the "Interval degassing" degassing programme in the Customer menu or "Continuous degassing", if required.

For a detailed description of the selection of degassing programmes, see chapter 8.1 "Automatic mode" on page 45 .



Note!

The pressure maintaining feature of the device must remain operative in Summer.

- Automatic mode remains active.

8.5 Restarting



CAUTION

Risk of injury due to pump start-up

Hand injuries may occur when the pump starts up if you turn the pump motor at the impeller using a screwdriver.

- Switch the pump to a zero-volts state before turning the pump at the fan wheel with a screwdriver.
-

ATTENTION

Device damage due to pump start-up

Pump damage may occur when the pump starts up if you turn the pump motor at the impeller using a screwdriver.

- Switch the pump to a zero-volts state before turning the pump at the fan wheel with a screwdriver.
-

After an extended standstill time (the device is de-energised or in Stop mode), the pumps may jam. For this reason, use a screwdriver to rotate the pumps at the fan wheel of the pump motors before restarting.

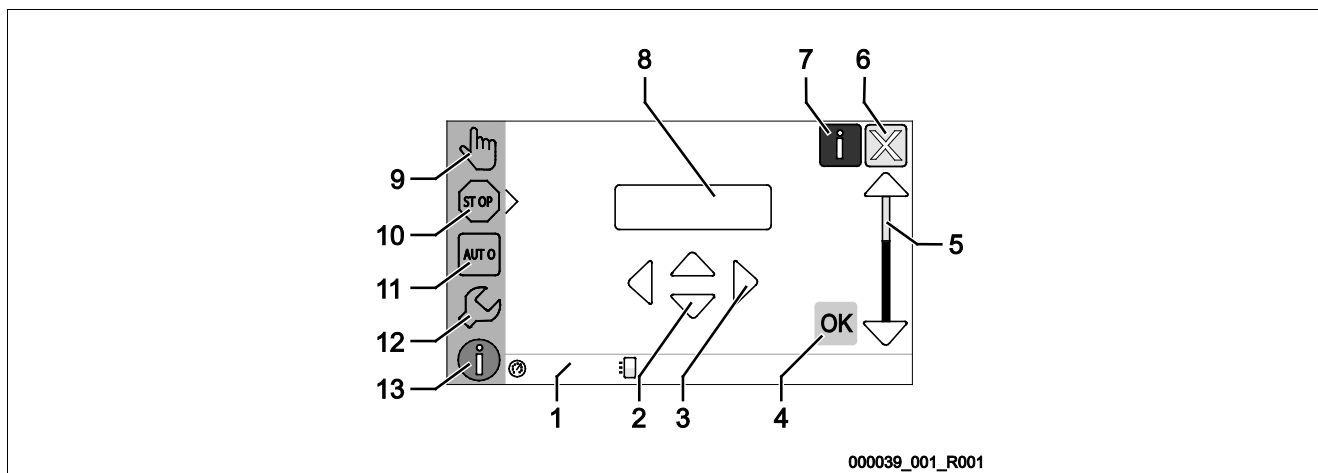


Note!

A jamming of the pumps is prevented during operation thanks to forced starting action (after 24 hours).

9 Controller

9.1 Operator panel

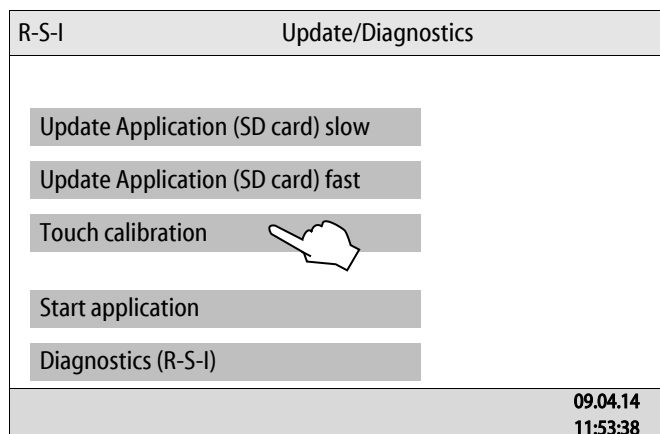


1	Message line	8	Display value
2	"▼"/"▲" buttons • Set digits.	9	"Manual mode" button • For function tests.
3	"◀"/"▶" buttons • Select digits.	10	"Stop mode" button • For commissioning.
4	"OK" button • Confirm/acknowledge input. • Browse in the menu.	11	"Automatic mode" button • For continuous operation.
5	"Up" and "Down" scroll bar • "Scroll" in the menu.	12	"Set-up menu" button • For setting parameters. • Fault memory. • Parameter memory. • Display settings. • Primary tank information. • Software version information.
6	"Scroll back" button • Cancel. • Move backward up to the main menu.	13	"Info menu" button • Displays general information.
7	"Display help texts" button • Opens help texts.		

9.2 Calibrating the touch screen

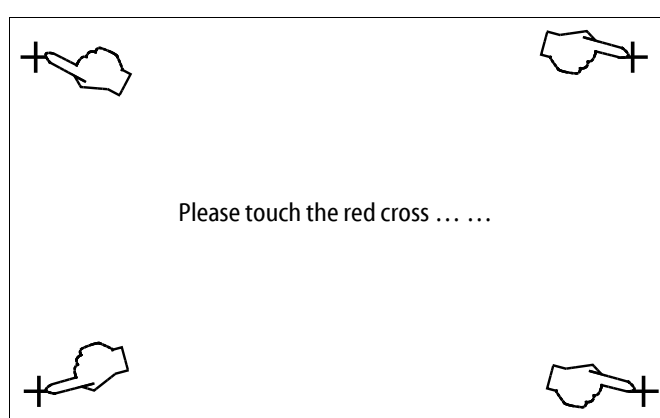
You can calibrate the touch screen when touching the desired buttons does not work satisfactorily.

1. Switch the device off at the main switch.
2. Touch and hold with your finger the touch field.
3. Switch on the main switch while touching the touch field.
 - When starting the program, the controller automatically switches to the "Update/Diagnostics" function.
4. Touch the "Touch calibration" button.



5. Touch the displayed crosses on the touch screen after each other.
6. Switch the device off and on again at the main switch.

The touch screen is fully calibrated.



9.3 Configuring settings in the controller

You can configure the controller settings regardless of the currently selected and active operating mode.

9.3.1 Customer menu

9.3.1.1 Customer menu – overview

Use the Customer menu to correct or determine system-specific values. In the course of commissioning, the factory settings must be adjusted for the system-specific conditions.



Note!

For a description of the operation, see chapter 9.1 "Operator panel" on page 49 .

A three-digit PM code is assigned to the setting options.

PM code	Description
001	Select the language
002	Set the time
003	Set the date
	Execute null balancing – The primary tank must be empty – The system checks whether the signal from the level sensor matches the selected primary tank.
005	Set the P_0 minimum operating pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 37 .
010	Degassing > • Degassing programme • No degassing • Continuous degassing • Interval degassing • Run-on degassing
011	• Continuous degassing time
023	Make-up > • Maximum make-up time ...min
024	• Maximum make-up cycles ... /2 h
027	• With water meter "Yes/No" – If "Yes", continue with 028 – If "No", continue with 007
028	• Make-up quantity (Reset) "Yes/No" – If "Yes", reset to "0"
029	• Maximum make-up quantity ... l
030	• Softening "Yes/No" – If "Yes", continue with 031 – If "No", continue with 007

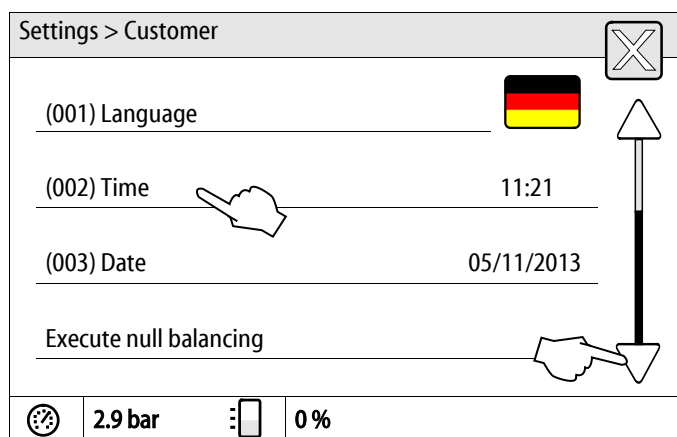
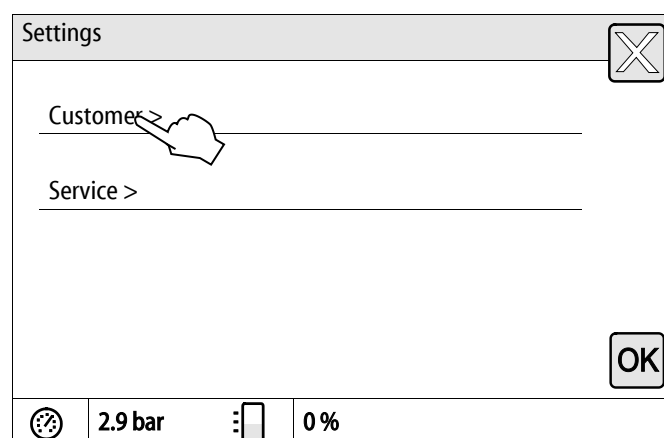
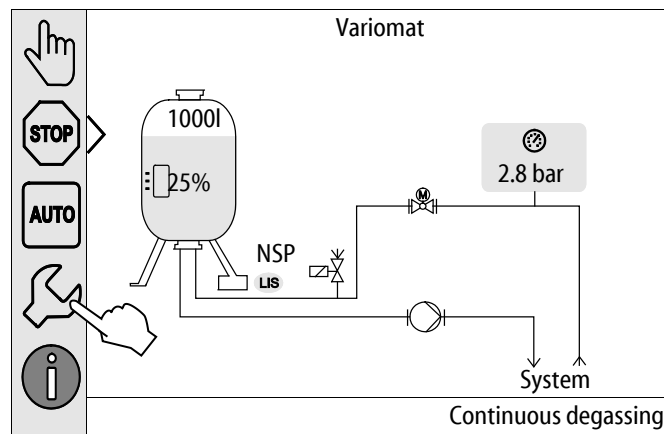
PM code	Description
007	Maintenance interval... months
008	Floating contact • Message selection > • Message selection: only messages marked with "√" are output. • All messages: All messages are output.
015	Change remote data "Yes/No"
	Fault memory > History of all messages
	Parameter memory > History of parameter input
009	Display settings > Brightness, screen saver • Brightness ... %
010	• Screen saver brightness ... %
011	• Screen saver delay ... min
018	• Secure access "Yes/No"
	Information > • Tank • Volume • Weight • Diameter • Position – Position in % • Software version

9.3.1.2 Setting the customer menu - "Time" example

The setting of system-specific values is explained below using the setting of the time as example.

To adjust the system-specific values, proceed as follows:

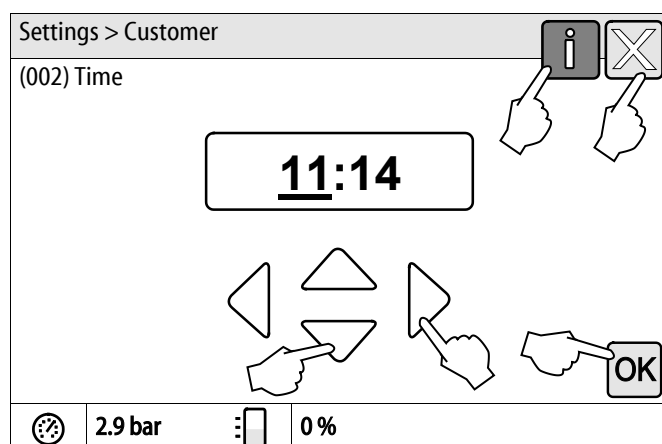
1. Press "Settings".
 - The controller switches to the setting area.
2. Press "Customer >".
 - The controller opens the Customer menu.
3. Press the required area.
 - The controller switches to the selected area.
 - Use the scroll bar to navigate through the list.



4. Set the system-specific values for the individual areas.
 - Use the "Left" and "Right" buttons to select the display value.
 - Use the "Up" and "Down" buttons to change the display value.
 - Confirm your entries with "OK".

Press "i" to display a help text for the selected area.

Press "X" to cancel your input without saving the new settings. The controller automatically opens again the list.



9.3.2 Service menu

This menu is protected with a password. It can be accessed only by the Reflex Customer Service.

9.3.3 Default settings

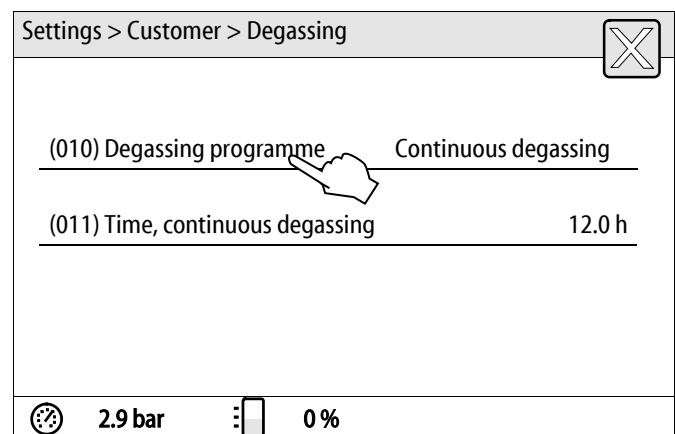
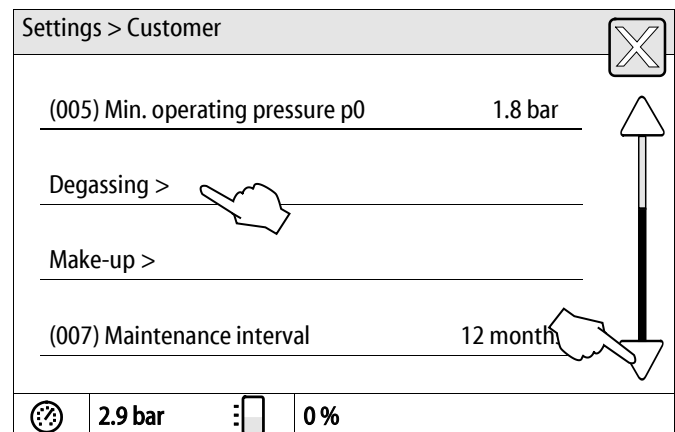
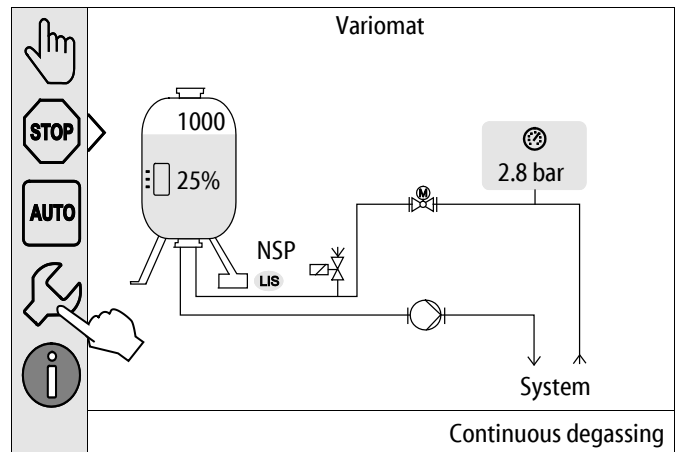
The device controller is shipped with the following default settings. Use the Customer menu to adjust these values to local conditions. In specific cases, it is possible to further adjust the values in the Service menu.

Customer menu

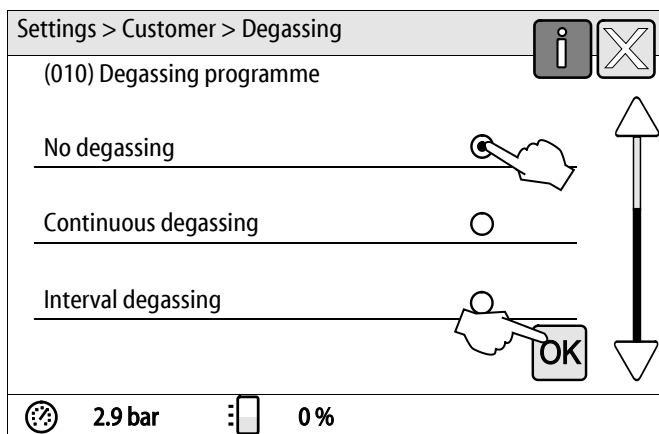
Parameter	Setting	Remarks
Language	EN	Display language.
Minimum operating pressure "P ₀ "	1.8 bar	see chapter 7.2 "Determining the P ₀ minimum operating pressure for the controller" on page 37 .
Next maintenance	12 months	Time left to the next due maintenance.
Floating alarm contact	All	see chapter 9.4 "Messages" on page 59 .
Make-up		
Maximum make-up quantity	0 Litres	Only if make-up has been selected in the customer menu with "With water meter Yes".
Maximum make-up time	20 minutes	
Maximum make-up cycles	3 cycles within 2 hours	
Degassing		
Degassing programme	Continuous degassing	
Continuous degassing time	12 hours	Default setting
Softening (Only if "With softening Yes")		
Lock make-up	No	In the case of soft water residual capacity = 0
Hardness reduction	8°dH	= Target – Actual
Maximum make-up quantity	0 Litres	
Soft water capacity	0 Litres	
Cartridge replacement	18 months	Replace cartridge.

9.3.4 Setting degassing programmes

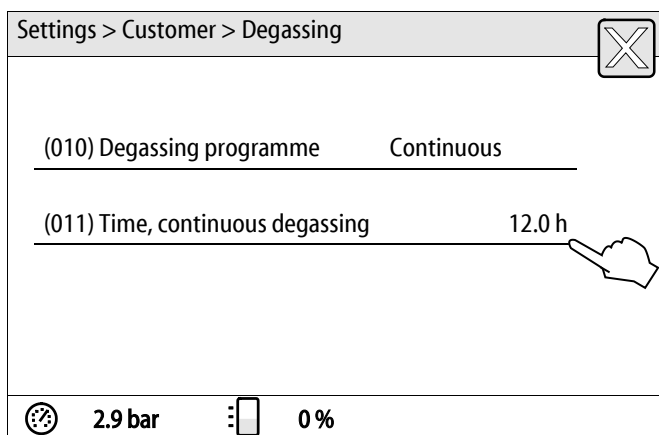
1. Press "Settings".
 - The controller switches to the setting area.
2. Press "Customer >".
 - The controller opens the Customer menu.
3. Press "Degassing >".
 - The controller switches to the selected area.
 - Use the scroll bar to navigate through the list.
4. Press "(010) Degassing programme".
 - The controller opens the list of degassing programmes.



5. To select a menu item, press the "Up" or "Down" scroll bar until this menu item is displayed.
 - Press the desired button.
 - "No degassing" is selected in this example. Continuous degassing and interval degassing are deselected.
 - Confirm your selection with "OK".
 - Degassing is deactivated.



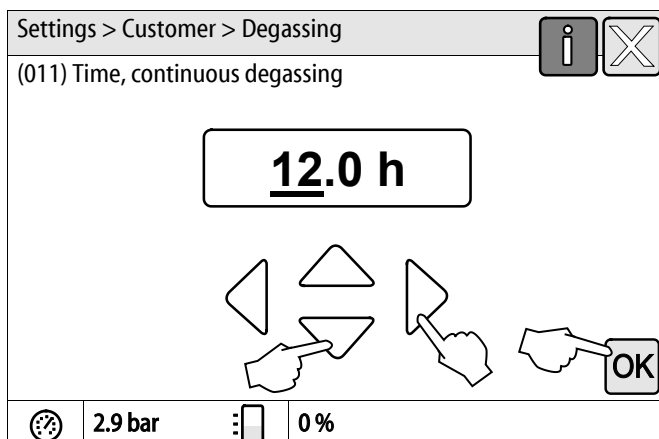
6. Press "(011) Time, continuous degassing".



7. Set the time for continuous degassing.
 - Use the "Left" and "Right" buttons to select the display value.
 - Use the "Up" and "Down" buttons to change the display value.
 - Confirm your entries with "OK".

Press "i" to display a help text for the selected area.

Press "X" to cancel your input without saving the new settings. The controller automatically opens again the list.



9.3.5 Degassing programmes – overview

No degassing

This programme is selected when the temperatures of the media to be degassed exceed the permissible Variomat temperature of 70° C (158° F) or the Variomat is combined with a Servitec vacuum degassing system.

Continuous degassing

This programme is selected after commissioning and repairs of the connected system. The device will continuously degas for a set period of time. Air bubbles within the system are quickly removed.

Start/setting:

- Automatic start after execution of the start routine during commissioning.
- Activated from the Customer menu.
- The degassing time can be set in the Customer menu, dependent on the actual system.
 - The default setting is 12 hours. Subsequently, the system automatically switches to "Interval degassing" mode.

Interval degassing

The interval degassing is stored for continuous operation as default setting in the Customer menu. Degassing is continuous during an interval. An idling time follows an interval. You have the option to limit the interval degassing to a specified time window. You can set the times only in the Service menu.

Start/setting:

- Automatic activation upon expiry of continuous degassing.
- Degassing interval, the default setting is 90 seconds.
- Pause, the default setting is 120 minutes
- Start/End, 8:00 – 18:00 hours.

9.4 Messages

The messages are impermissible deviations from the normal state. They can be output either via the RS-485 interface or via two floating message contacts.

The controller displays the messages with a help text.

Message causes can be eliminated by the operator or a specialist workshop. If this is not possible, contact the Reflex Customer Service.



Note!

When the cause for the message is eliminated, you must acknowledge the fault with "OK" at the controller's operator panel.

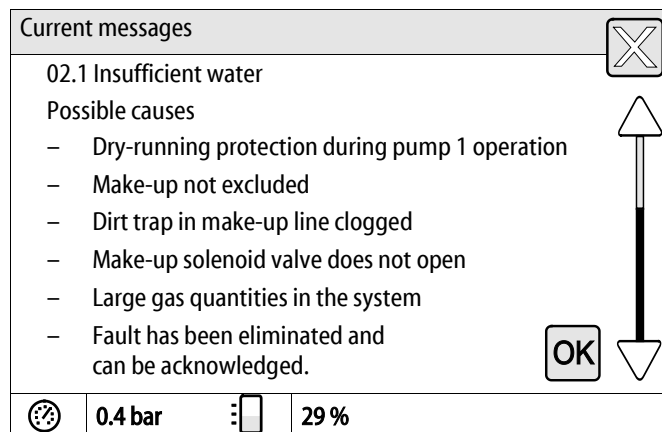
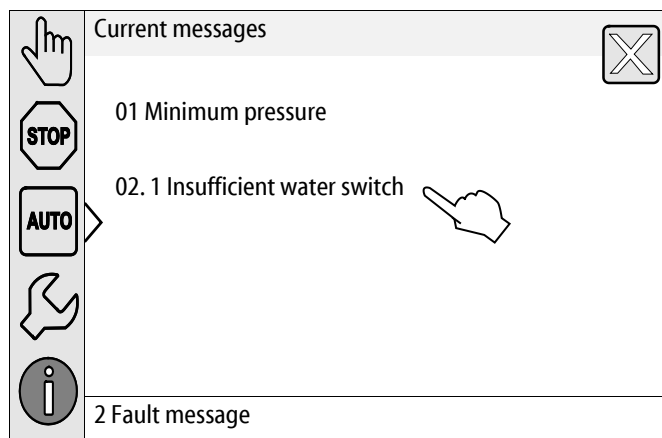
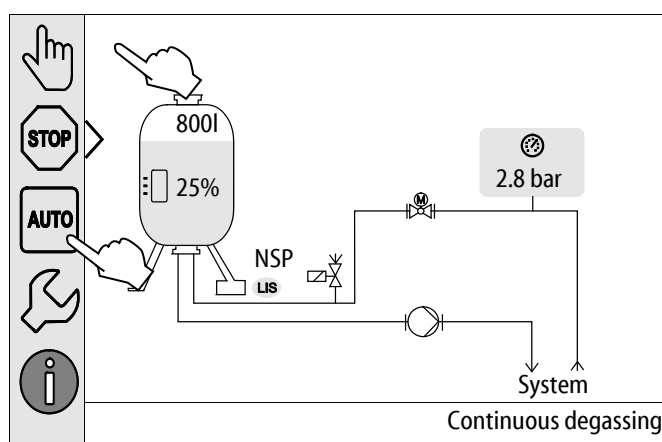


Note!

Floating contacts, setting in the Customer menu, see chapter 7.6 "Parametrising the controller in the Customer menu" on page 43 .

To reset a fault message, proceed as follows:

1. Touch the display.
 - The current fault messages are displayed.
2. Touch a fault message.
 - The system displays the possible causes for the fault.
3. When the fault is eliminated, confirm the fault with "OK".



ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
01	Minimum pressure	YES	- Set value not reached. - Water loss in the system. - Pump fault. - Controller in Manual mode	- Check set value in the Customer or Service menu. - Check water level. - Check pump. - Set the controller to Automatic mode.	"Quit"
02.1	Insufficient water	-	- Set value not reached. - Make-up disabled. - Air in the system. - Dirt trap clogged.	- Check set value in the Customer or Service menu. - Clean the dirt trap. - Check functioning of the "PV1" solenoid valve. - If necessary, manually add water.	-
03	High water	YES	- Set value exceeded. - Make-up disabled. - Water intake through a leak in a thermal transfer medium of the user. "VG" and "VF" tanks too small.	- Check set value in the Customer or Service menu. - Check functioning of the "WV1" solenoid valve. - Drain water from the "VG" tank. - Check site heat transfer medium for leaks.	-
04.1	Pump	YES	Pump disabled. - Pump jammed. - Pump motor defective. - Pump motor contactor tripped. - Fuse defective.	- Rotate the pump with screwdriver. - Replace the pump motor. - Electrically test the pump motor. - Replace the fuse.	"Quit"

ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
05	Pump run time	-	- Set value exceeded. - Severe water loss in the system. - Cap valve at the intake side closed. - Air in the pump. - Solenoid valve in the overflow line does not close.	- Check set value in the Customer or Service menu. - Check the water loss and correct, if necessary. - Open the cap valve. - Vent the pump. - Check functioning of the "PV1" solenoid valve.	-
06	Make-up time	-	- Set value exceeded. - Water loss in the system. - Make-up line not connected. - Make-up rate insufficient. - Make-up hysteresis too low.	- Check set value in the Customer or Service menu. - Check water level. - Connect make-up line	"Quit"
07	Make-up cycles	-	Set value exceeded.	- Check set value in the Customer or Service menu. - Seal any leak in the system.	"Quit"
08	Pressure measurement	YES	Controller receives incorrect signal.	- Connect the plug. - Check functioning of the pressure sensor. - Check the cable for damage. - Check the pressure sensor.	"Quit"
09	Level sensor	YES	Controller receives incorrect signal.	- Check functioning of the load cell. - Check the cable for damage. - Connect the plug.	"Quit"
10	Maximum pressure	-	- Set value exceeded. - Overflow line disabled. - Dirt trap clogged.	- Check set value in the Customer or Service menu. - Check functioning of the overflow line. - Clean the dirt trap.	"Quit"
11	Make-up quantity	-	"With water meter" must be activated in the Customer menu. - Set value exceeded. - Severe water loss in the system.	- Check set value in the Customer or Service menu. - Check water loss in the system and repair, if necessary.	"Quit"

ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
15	Make-up valve	-	Contact water meter measures without make-up request.	Check the make-up valve for leaks.	"Quit"
16	Power failure	-	No power.	Connect to power supply.	-
19	Stop ➤ hours	-	Device is in Stop mode for more than 4 hours.	Set the controller to Automatic mode.	-
20	Max. Make-up volume	-	Set value exceeded.	Reset the "Make-up quantity" meter in the Customer menu.	"Quit"
21	Maintenance recommended	-	Set value exceeded.	Perform maintenance and reset the maintenance counter upon completion.	"Quit"
24	Softening	-	- Set value for soft water capacity exceeded. - Time interval for replacement of the softening cartridge exceeded.	Replace the softening cartridges.	"Quit"
30	I/O module fault	-	- I/O module defective. - Connection between option card and controller faulty. - Option card defective.	Inform Reflex Customer Service.	-
31	EEPROM defective	YES	- EEPROM defective. - Internal calculation error.	Inform Reflex Customer Service.	"Quit"
32	Undervoltage	YES	Supply voltage not achieved.	Check power supply.	-
33	Adjustment parameter faulty	YES	EPROM parameter memory defective.	Inform Reflex Customer Service.	-
34	Communication Main board faulty	-	- Connecting cable defective. - Main board defective.	Inform Reflex Customer Service.	-
35	Digital input voltage faulty	-	Short-circuit of input voltage.	Check the wiring at the digital inputs (water meter, for example).	-
36	Analogue input voltage faulty	-	Short-circuit of input voltage.	Check the wiring at the analogue inputs (pressure/level).	-
37	Input voltage Ball valve missing	-	Short-circuit of input voltage.	Check wiring of the ball valve.	-

10 Maintenance

DANGER

Risk of serious injury or death due to electric shock.

If live parts are touched, there is risk of life-threatening injuries.

- Ensure that the system is voltage-free before installing the device.
 - Ensure that the system is secured and cannot be reactivated by other persons.
 - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.
-

CAUTION

Risk of injury due to pressurised liquid

If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.

- Ensure proper installation, removal or maintenance work.
 - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.
-

The device is to be maintained annually.

- The maintenance intervals depend on the operating conditions and the degassing times.

The annual maintenance is displayed upon expiry of the set operating time. Use "OK" to acknowledge the "Maintenance recommended" message. Reset the maintenance counter in the Customer menu.



Note!

The maintenance intervals for the secondary tanks may be extended to 5 years if operation has been trouble-free.



Note!

Maintenance work must be carried out and confirmed by specialist personnel or the Reflex Customer Service, see chapter 10.5 "Maintenance certificate" on page 69.

10.1 Maintenance schedule

The maintenance schedule is a summary of maintenance tasks to be carried out regularly.

Maintenance task	Conditions			Interval
▲ = Check, ■ = Service, ● = Clean				
Check for leaks. • "PU" pump. • Screw connections. • Check valve downstream of "PU" pump.	▲	■		Annually
Clean "ST" dirt trap. – see chapter 10.2 "Cleaning the dirt trap" on page 65 .	▲	■	●	Depending on the operating conditions
Clear sludge from the primary tank and the secondary tanks. – see chapter 10.3 "Cleaning the tanks" on page 66 .	▲	■	●	Depending on the operating conditions
Check the make-up switching points. – see chapter 10.4 "Checking switching points" on page 67 .	▲			Annually
Check the Automatic mode switching points. – see chapter 10.4 "Checking switching points" on page 67 .	▲			Annually

10.2 Cleaning the dirt trap

⚠ CAUTION

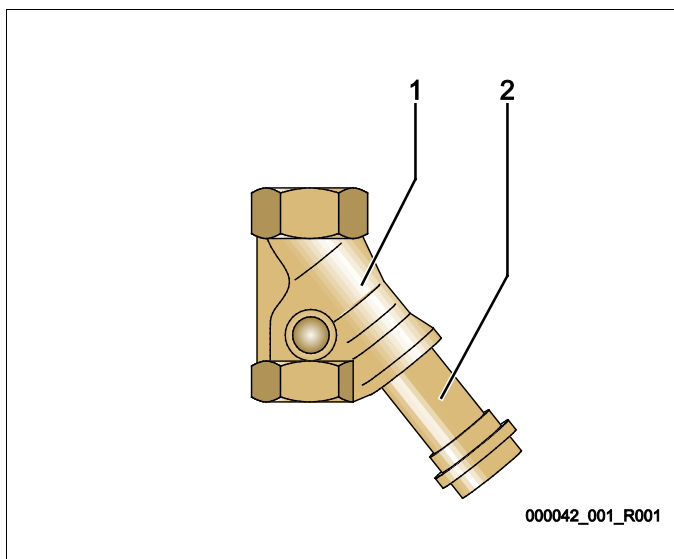
Risk of injury due to pressurised liquid

If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.

- Ensure proper installation, removal or maintenance work.
- Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.

The "ST" dirt trap must be cleaned after the expiry of the continuous degassing time at the latest. An inspection is also required after longer lasting operation.

- Switch to Stop mode.
- Close the ball vales upstream of the "ST" dirt trap (1) and the primary tank.
- Slowly unscrew the dirt trap insert (2) from the dirt trap in order for the residual pressure to escape from the pipeline segment.
- Pull the mesh from the dirt trap insert and rinse it with clear water. Use a soft brush for cleaning.
- Re-insert the mesh into the dirt trap insert, check the gasket for damage, and screw the dirt trap insert back into the housing of the "ST" (1) dirt trap.
- Open the ball vales upstream of the "ST" dirt trap (1) and the primary tank.
- Vent the "PU" pump, see chapter 7.5 "Venting the pump" on page 43 .
- Switch to Automatic mode.



1	"ST" dirt trap	2	Dirt trap insert
---	----------------	---	------------------



Notice!

Clean all other installed dirt traps (in the Fillset, for example).

10.3 Cleaning the tanks

CAUTION

Risk of injury due to pressurised liquid

If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.

- Ensure proper installation, removal or maintenance work.
 - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.
-

Clean the primary tank and the secondary tanks from sludge deposits.

1. Switch to Stop mode.
2. Empty the tanks.
 - Open the "FD" feed and drain cocks and empty the tanks completely from water.
3. Remove the hose connection between the primary tank and the device and the secondary tank, if provided.
4. Remove the lower vessel covers from the tanks.
5. Remove any sludge from the covers and the spaces between the diaphragms and the tanks.
 - Check the diaphragms for tearing.
 - Check the tank interior walls for corrosion.
6. Reinstall the covers on the tanks.
7. Reinstall the flange connection between the primary tank and the device and the secondary tank, if provided.
8. Close the "FD" feed and drain cocks at the tanks.
9. Use the "FD" feed and drain cock to fill the primary tank with water, see chapter 7.4 "Filling the tanks with water" on page 42 .
10. Switch to Automatic mode.

10.4 Checking switching points

Prerequisite for checking the switching points are the following correct settings:

- Minimum operating pressure P_0 , see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 37 .
- Level sensor at the primary tank.

Preparation

1. Switch to Automatic mode.
2. Close the cap valves upstream of the tanks and the "EC" expansion lines.
3. Record the displayed filling level (value in %).
4. Drain the water from the tanks.

Checking the cut-in pressure

5. Check the cut-in and cut-out pressure of the "PU" pump.
 - The pump cuts in at $P_0 + 0.3$ bar.
 - The pump cuts out at $P_0 + 0.5$ bar.

Checking the Make-up "On"

6. If necessary, check the make-up value displayed at the controller.
 - The automatic make-up is activated at a level display of 20 %.

Checking Insufficient water "On"

7. Switch off the make-up and continue to drain water from the tanks.
8. Check the displayed value for the "Insufficient water" filling level message.
 - Insufficient water "On" is displayed at the controller at a minimum filling level of 5 %.
9. Switch to Stop mode.
10. Switch off the main switch.

Cleaning the tanks

If necessary, remove condensate from the tanks, see chapter 10.3 "Cleaning the tanks" on page 66 .

Activating the device

11. Switch on the main switch.
12. Activate the make-up.
13. Switch to Automatic mode.
 - Depending on the filling level and pressure, the "PU" pump and the automatic make-up will be switched on.
14. Slowly open the cap valves upstream of the tanks and secure them against unintended closing.

Checking Insufficient water "Off"

15. Check the displayed value for the Insufficient water "OFF" filling level message.
 - Insufficient water "Off" is displayed at the controller at a minimum filling level of 7 %.

Checking Make-up "Off"

16. If necessary, check the make-up value displayed at the controller.
 - Automatic make-up is deactivated at a level display of 25 %.

Maintenance is completed.



Note!

If automatic make-up is not connected, you must manually fill the tanks with water to the recorded filling level.



Note!

The setting values for pressure maintenance, filling levels and make-up are provided in the chapter Standard settings, see chapter 9.3.3 "Default settings" on page 55 .

10.5 Maintenance certificate

All maintenance tasks have been completed according to the Reflex Installation, Operating and Maintenance Manual.

[illegible]

10.6 Inspection

10.6.1 Pressure-bearing components

Comply with all applicable national regulations for the operation of pressure equipment. De-pressurise all pressurised components prior to inspection (see disassembly information).

10.6.2 Inspection prior to commissioning

In Germany, follow the Industrial Safety Regulation [Betriebssicherheitsverordnung] Section 15 and Section 15 (3) in particular.

10.6.3 Inspection intervals

Recommended maximum inspection intervals for operation in Germany pursuant to Section 16 of the Industrial Safety Regulation [Betriebssicherheitsverordnung] and the vessel classification of the device in diagram 2 of the Directive 2014/68/EC, applicable in strict compliance with the Reflex Installation, Operation and Maintenance Manual.

External inspection:

No requirement according to Annex 2, Section 4, 5.8.

Internal inspection:

Maximum interval according to Annex 2, Section 4, 5 and 6; if necessary, suitable replacement actions are to be taken (such as wall thickness measurement and comparison with the design specification which may be requested from the manufacturer).

Tightness test:

Maximum interval according to Annex 2, Section 4, 5 and 6.

Furthermore, compliance with Section 16 of the Industrial Safety Regulation and Section 16 (1) in particular, in conjunction with Annex 2, Section 4, 6.6 and Annex 2, Section 4, 5.8, must be ensured.

The actual intervals must be determined by the user on the basis of a safety-technical assessment taking into account the real operational conditions, the experience with the operation and the charging material, and the national regulations for the operation of pressure equipment.

11 Disassembly

DANGER

Risk of serious injury or death due to electric shock.

If live parts are touched, there is risk of life-threatening injuries.

- Ensure that the system is voltage-free before installing the device.
- Ensure that the system is secured and cannot be reactivated by other persons.
- Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

CAUTION

Risk of burns

Escaping hot medium can cause burns.

- Maintain a sufficient distance from the escaping medium.
- Wear suitable personal protective equipment (safety gloves and goggles).

CAUTION

Risk of burns on hot surfaces

Hot surfaces in heating systems can cause burns to the skin.

- Wait until hot surfaces have cooled down or wear protective safety gloves.
- The operating authority is required to place appropriate warning signs in the vicinity of the device.

CAUTION

Risk of injury due to pressurised liquid

If installation or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or steam suddenly escapes.

- Ensure proper disassembly.
- Ensure that the system is de-pressurised before performing the disassembly.

- Prior to dismantling, block off all "water"-side connections to the device.
- Vent the device to de-pressurise it.

1. Disconnect the system from the power supply and secure it against unintended reactivation.
2. Disconnect the power cable of the device from the power supply.
3. Disconnect all cables from the terminals of the device control unit and remove them.

 **DANGER** – Risk of serious injury or death due to electric shock. Some parts of the device's circuit board may still carry 230 V voltage even with the device physically isolated from the power supply. Before you remove the covers, completely isolate the device controller from the power supply. Verify that the main circuit board is voltage-free.

4. Disconnect the secondary tank (if provided) on the water side from the system and the primary tank.
5. Open the "FD" feed and drain cocks at the tanks until they are completely empty and de-pressurised.
6. Undo all hose and pipe connections to the tanks and the control unit of the device to the system and remove them completely.
7. If necessary, remove the tanks and the control unit from the system area.

12 Annex

12.1 Reflex Customer Service

Central customer service

Switchboard: Telephone number: +49 (0)2382 7069 - 0

Customer Service extension: +49 (0)2382 7069 - 9505

Fax: +49 (0)2382 7069 - 523

E-mail: service@reflex.de

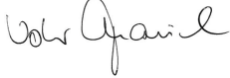
Technical hotline

For questions about our products

Telephone number: +49 (0)2382 7069-9546

Monday to Friday, 8:00 a.m. – 4:30 p.m.

12.2 Conformity and standards

EU-Declaration of conformity for the electrical devices in pressure maintenance, make-up and degassing systems		
1. This is to certify that the products conform with the most important protection requirements set forth in the Council Directives on the harmonization of the laws of the member states relating to electromagnetic compatibility (2014/30/EU). The following standards were used to evaluate the products: DIN EN 61326 – 1:2013-07 / DIN EN 61439 – 1:2012-06 2. This is to certify that the control boxes conform with the most important requirements of the low voltage directive (2014/35/EU). The following standards were used to evaluate the products: DIN EN 61010 – 1:2011-07 / BGV A2		
Declaration of conformity of a pressure equipment (a vessel / an assembly)		Design – Manufacturing – Product Verification
This declaration of conformity is issued under the sole responsibility of the manufacturer.		
Pressure expansion vessels / pressure maintenance systems: Variomat, Variomat Giga universally applicable in heating, solar and cooling systems		
type	according to name plate of vessel / assembly	
Serial no.	according to name plate of vessel / assembly	
Year of manufacture	according to name plate of vessel / assembly	
max. allowable pressure (PS)	according to name plate of vessel / assembly	
Test pressure (PT)	according to name plate of vessel	
min. / max. allowable temperature (TS)	according to name plate of vessel / assembly	
max. continuous operating temperature membrane / diaphragm	according to name plate of vessel / assembly	
Operating medium	Water / dry air	
The conformity of the product described above with the provisions of the applied Directive(s) is demonstrated by compliance with the following standards / regulations:	Pressure Equipment Directive, prEN 13831:2000 or EN 13831:2007 or AD 2000 according to name plate of vessel	
Pressure equipment	Vessel article 4 paragraph (1) a) i) 2. indent (Annex II table 2) with accessories article 4 (1) d): membrane, deaerator, breather pipe and drain valve with flexible connection set (Variomat) respectively system connection (Variomat Giga) Assembly article 4 (2) b) consisting of: Vessel article 4 paragraph (1) a) i) 2. indent (Annex II table 2) with accessories article 4 (1) d): membrane, deaerator, breather pipe and drain valve with flexible connection set (Variomat) respectively system connection (Variomat Giga) accessories article 4 (1) d): control unit with safety valve (Variomat) respectively control unit / hydraulic with safety valve, safety pressure limiter and safety temperature limiter (Variomat Giga)	
Fluid group	2	
Conformity assessment acc. to module	B + D	Variomat, Variomat Giga
Labelling acc. to Directive 2014/68/EU	CE 0045	
Safety valve (category IV) see operating instructions p. 11	Variomat SV	Confirmed and signed by the manufacturer of the safety valve according to the requirements of directive 2014/68/EU.
Certificate-No. of EC Type Approval	see annex 2	
Certificate-No. QA System (module D)	07 202 1403 Z 0780/15/D/1045	
Notified Body for certification of QA System	TÜV Nord Systems GmbH & Co. KG Große Bahnstraße 31, D - 22525 Hamburg	
Registration-No. of the Notified Body	0045	
Signed for and on behalf of	The object of the declaration described above is in conformity with the relevant Union harmonisation legislation - Pressure Equipment Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014. Ahlen, 19.07.2016   Norbert Hülsmann Volker Mauel Members of the Management	
reflex Manufacturer Reflex Winkelmann GmbH Gersteinstraße 19 D - 59227 Ahlen - Germany Telefon: +49 (0)2382 7069 -0 Telefax: +49 (0)2382 7069 -588 E-Mail: info@reflex.de		

12.3 Certificate No. of the CE type test

Type			Certificate number
Variomat	200 – 1000 litres	6 bar – 120 °C	07 202 1 403 Z 0621/1/D0045
	1000 – 5000 litres	6 bar – 120 °C	07 202 1 403 Z 0013/2/D0045

You will find an up-to-date list under www.reflex.de/zertifikate.

Type			Certificate number
Variomat Giga	1000 – 10,000 litres	6 bar – 120 °C	07 202 1 403 Z 0008/2/D0045 Rev.1
	27000 litres	2 bar – 125°C	07 202 1 403 Z 1452/14/D1045

You will find an up-to-date list under www.reflex.de/zertifikate.

12.4 Guarantee

The respective statutory guarantee regulations apply.



Thinking solutions.

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