

Variomat Giga with Touch controller

hydraulic modules:

GH 50 / GH 70 / GH 90 / GH 100

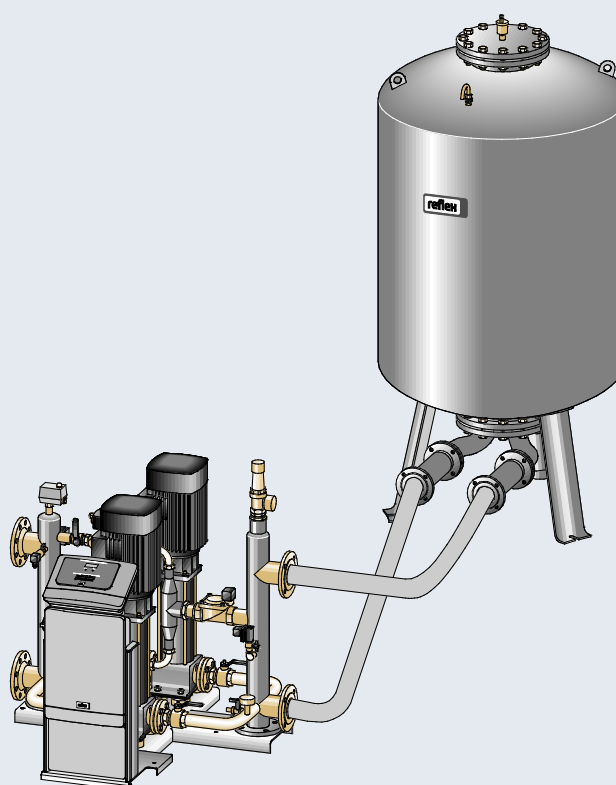
control modules

GS 1.1 / GS 3

GB

Operating manual

Original operating manual



1	Notes on the operating manual.....	5
2	Liability and guarantee.....	5
3	Safety.....	6
3.1	Explanation of symbols.....	6
3.1.1	Symbols and notes used.....	6
3.2	Personnel requirements	7
3.3	Personal protective equipment	7
3.4	Intended use	7
3.5	Inadmissible operating conditions.....	7
3.6	Residual risks	8
4	Description of the device.....	9
4.1	Description.....	9
4.2	Overview	9
4.3	Identification	10
4.3.1	Nameplate	10
4.3.2	Type code.....	10
4.4	Function	11
4.5	Scope of delivery.....	13
4.6	Optional equipment and accessories	13
5	Technical data	14
5.1	Control unit.....	14
5.2	Hydraulic module.....	14
5.2.1	Dimensions and connections	14
5.2.2	Pressures and mechanical assemblies.....	14
5.3	Tanks.....	15
6	Installation.....	16
6.1	Installation conditions	17
6.1.1	Incoming inspection	17
6.2	Preparatory work	17
6.3	Execution.....	18
6.3.1	Positioning.....	18
6.3.2	Installation of add-on components for the tanks.....	19
6.3.3	Tank installation	20
6.3.4	Hydraulic connection.....	21
6.3.5	Fitting the thermal insulation.....	26
6.3.6	Fitting the level sensor	27
6.4	Make-up and degassing variants	28
6.4.1	Function	28
6.5	Electrical connection	34
6.5.1	Terminal plan, connection component.....	35
6.5.2	Terminal plan, operating unit.....	37
6.5.3	RS-485 interface.....	38
6.5.4	I/O module interface	40
6.6	Installation and commissioning certificate.....	41
7	Commissioning.....	42
7.1	Checking the requirements for commissioning.....	42
7.2	Determining the P ₀ minimum operating pressure for the controller	42

7.3	Modifying the controller's start routine	44
7.4	Filling the tanks with water	47
7.4.1	Filling with a hose	47
7.4.2	Filling with the solenoid valve in the make-up	47
7.5	Commissioning the pumps	48
7.6	Venting the pump	49
7.6.1	Checking the pumps' direction of rotation	49
7.6.2	Building up pump pressure	50
7.6.3	Setting the pump delivery volume	50
7.7	Setting the minimum pressure limiter	50
7.8	Parametrising the controller in the Customer menu	51
7.9	Starting Automatic mode	51
8	Operation	52
8.1	Automatic mode	52
8.2	Manual mode	53
8.3	Stop mode	54
8.4	Summer operation	55
8.5	Restarting	55
9	Controller	56
9.1	Operator panel	56
9.2	Calibrating the touch screen	57
9.3	Configuring settings in the controller	58
9.3.1	Customer menu	58
9.3.2	Service menu	61
9.3.3	Default settings	61
9.3.4	I/O module default setting	62
9.3.5	Setting degassing programmes	64
9.3.6	Degassing programmes – overview	66
9.4	Messages	67
10	Maintenance	71
10.1	Maintenance schedule	72
10.2	External tightness and function test	72
10.3	Cleaning the dirt trap	73
10.4	Cleaning the tanks	74
10.5	Checking switching points	75
10.6	Maintenance certificate	77
10.7	Inspection	78
10.7.1	Pressure-bearing components	78
10.7.2	Inspection prior to commissioning	78
10.7.3	Inspection intervals	78
11	Disassembly	79
12	Annex	80
12.1	Reflex Customer Service	80
12.2	Conformity and standards	81
12.3	Certificate No. of the CE type test	82
12.4	Guarantee	82

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 80 .

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

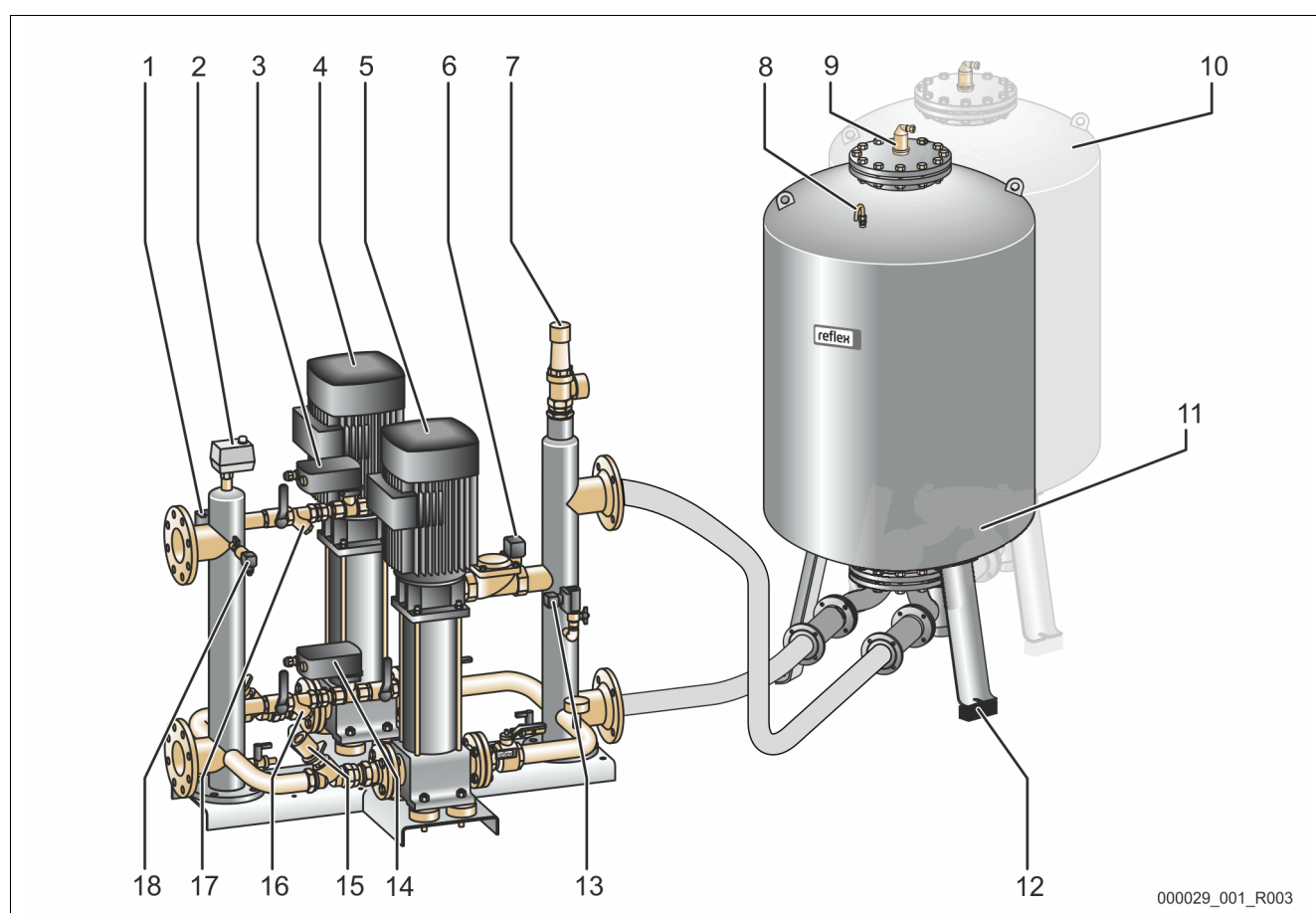
4.1 Description

The Variomat Giga GS 1.1 / GS3 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 Giga GS 1.1 / GS3 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



000029_001_R003

1	"PAZ" Minimum pressure limiter
2	"TAZ" temperature limiter, set to 70° C for protection of the diaphragms
3	Overflow valve (motor ball valve)
4	"PU" pump
5	"PU" pump
6	"AC" actuator for "PAZ" minimum pressure limiter
7	"SV" safety valve
8	"VE" aeration and de-aeration
9	"DV" degassing valve

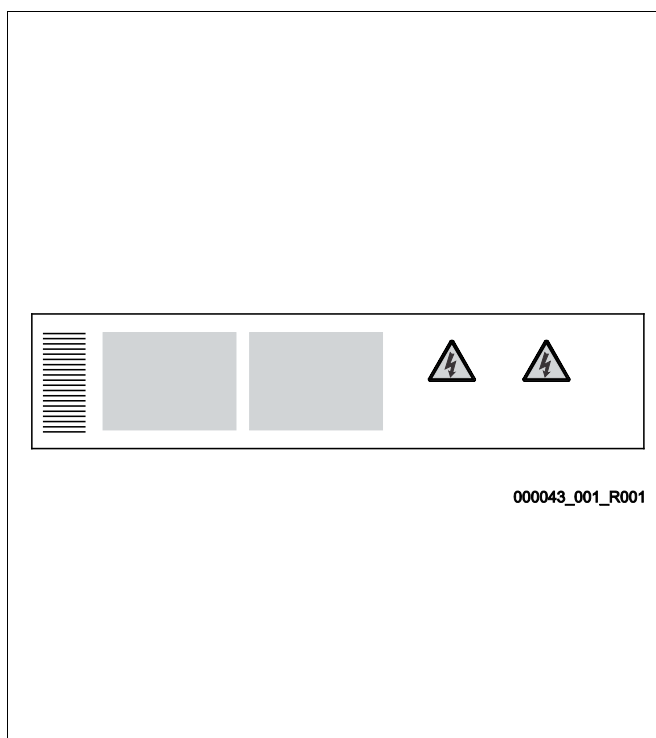
10	Secondary tank (optional)
11	Primary tank
12	"LIS" pressure pick-up for level sensing
13	"WV" make-up valve
14	Overflow valve (motor ball valve)
15	"FC" throttle valve with secured shut-off device
16	"ST" dirt trap
17	"ST" dirt trap
18	"PIS" pressure transducer

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.

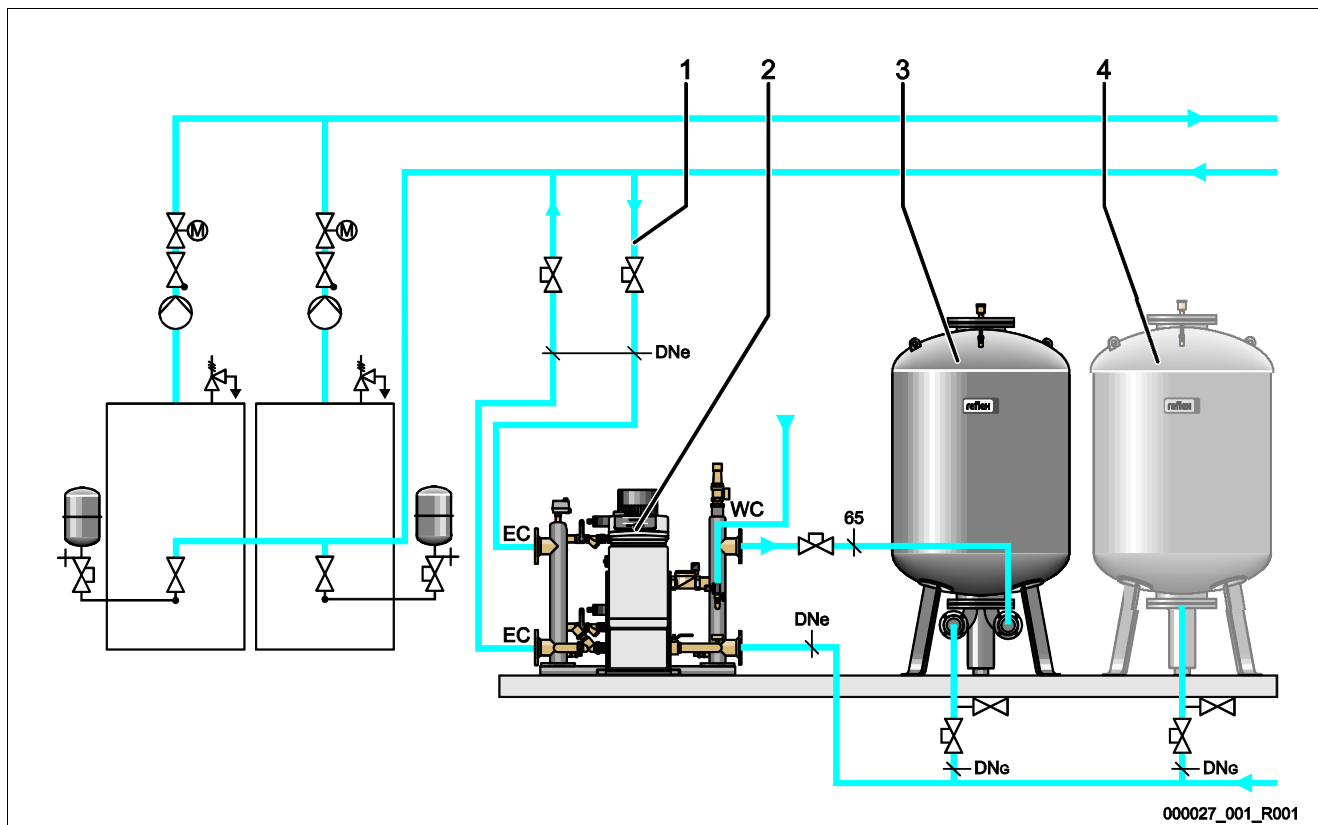
Information on nameplate	Meaning
Type	Device name
Serial No.	Serial number
min. / max. allowable pressure P	Minimum/maximum permissible pressure
max. continuous operating temperature	Maximum temperature for continuous operation
min. / max. allowable temperature / flow temperature TS	Minimum / maximum 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	Device designation	Variomat Giga GH 50, GS 1.1, GG 5000 I, GF 5000 I 1 2 3 4 5 6
2	Hydraulic module	
3	Control module	
4	Primary tank	
5	Nominal volume	
6	Secondary tank	

4.4 Function



1	Expansion line
2	Control unit
3	Primary tank
4	Secondary tank (optional)

DN _e	Expansion line diameter
DN _G	Pump intake line diameter
WC	Make-up line
EC	Expansion line connection
	<ul style="list-style-type: none"> Gas-rich water inlet Degassed water outlet

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. The device essentially comprises a controller and at least one expansion tank.

Expansion tank

The expansion tank is used to degas the system water. One primary tank and multiple optional secondary tanks (expansion tanks) may be connected. Diaphragms separate 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 hydraulic module.

Control unit

The control unit comprises a control module and a hydraulic module.

- Control module
 - comprising the Control Touch controller and the power connection unit. All pressurisation, degassing and make-up processes within the hydraulic module are monitored and controlled by the Control Touch controller.
- Hydraulic module
 - The hydraulic module contains the "PU" pumps, the "PV" overflow valves, the "MV" make-up valve and the "AC" actuator for limiting the minimum pressure.

The "PIS" pressure transducer records the pressure and the "LIS" pressure pick-up registers the level; both values are displayed at Control Touch. Interfaces enable the use of additional Control Touch functions, see chapter 6.5.3 "RS-485 interface" on page 38.

Maintaining pressure

The equipment equalises the expansion water and constantly maintains the pressure with a tolerance of ± 0.2 bar.

- The pressure in the system rises when the water is heated. When the pressure set at Control Touch 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 again rises.

The control unit ensures that the pressure is maintained. The Control Touch regulates a constant pressure. Additional "MAG" expansion tanks support a constant pressure.

Degassing

Two "EC" expansion lines are required to degas the system water.

- One line for gas-rich water from the system to the hydraulic module.
- One return line for degassed water from the hydraulic module 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 through the de-pressurised primary tank. The free and dissolved gases in the system water are separated by the difference between the atmospheric pressure in the primary tank's air space and the pressure of the system water. The separated gases are removed from the primary tank via the "DV" degassing valve. The control unit ensures the hydraulic equalisation by regulating the stroke of a motor ball valves used as "PV" overflow valves. You may select from the three degassing programmes (Continuous, Interval or Run-on degassing) stored in the Control Touch controller.

Make-up

The Control Touch also regulates the make-up with water for the system. Depending on the water level in the primary tank, the "WV" make-up valve is opened or closed.

- The system determines the water level with the "LIS" pick-up at the primary tank base.
- The values triggering a make-up with water for the system are stored in Control Touch and may be changed, if required see chapter 7.8 "Parametrising the controller in the Customer menu" on page 51.

The system monitors the number of requests for make-up over a specific time interval. It also monitors the make-up time within a cycle. In combination with a contact water meter, the system can monitor the individual make-up quantities within a cycle and the total make-up quantity.

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:

- Control unit
 - "GS" control module and "GH" hydraulic module, pre-assembled as the control unit.
- Primary tank
 - Accessories are provided as a package at the tank base.
 - "VE" aeration and de-aeration
 - "DV" degassing valve
 - Reducing sleeve
 - "LIS" pressure pick-up

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.



Note!

The I/O module is optional for the Variomat Giga with GS 1.1 control module.

- Order the optional I/O module from the Reflex Customer Service, see chapter 12.1 "Reflex Customer Service" on page 80 .

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)
GS 1.1	2.2	230 / 50, 16	IP 54	2	Optional	230, 2	55	8.0
GS 3	6.6	230 / 50, 20	IP 54	2	Yes	230, 2	55	9.1

5.2 Hydraulic module

5.2.1 Dimensions and connections

Type	Weight (kg)	Height (mm)	Width (mm)	Depth (mm)	Primary tank connection	System connection	Make-up connection
GH 50	195	1200	1170	830	2 × DN 80 / PN 6	2 × DN 80 / PN 16	Rp ½
GH 70	206	1200	1170	830	2 × DN 80 / PN 6	2 × DN 80 / PN 16	Rp ½
GH 90	270	1200	1170	830	2 × DN 80 / PN 6	2 × DN 80 / PN 16	Rp ½
GH 100	275	1200	1170	830	2 × DN 80 / PN 6	2 × DN 80 / PN 16	Rp ½

5.2.2 Pressures and mechanical assemblies

Type	Permissible operating overpressure (bar)	p ₀ Primary tank (bar)	Number of pumps	Number of overflow valves	Number of actuators	Number of make-up valves	Number of safety valves
GH 50	16	≤ 4.0 bar	2	2	1	1	1
GH 70	16	≤ 6.0 bar	2	2	1	1	1
GH 90	16	≤ 8.0 bar	2	2	1	1	1
GH 100	16	≤ 9.5 bar	2	2	1	1	1

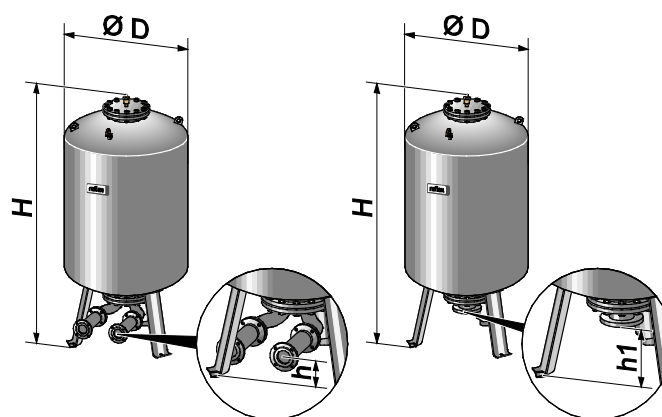
5.3 Tanks

The tanks are manufactured from steel with exterior coating. A diaphragm prevents the direct contact of the expansion water with the inner tank wall.



Note!

The DIN 4807 T3 compliant diaphragm can be replaced.



000021_001_R001

Primary tank

Secondary tank

Type	Diameter Ø "D" (mm)	Weight (kg)	Connection (inches)	Height "H" (mm)	Height "h" (mm)	Height "h1" (mm)
Giga - 1000	1000	330	DN 65 / PN 6	2130	285	305
Giga - 1500	1200	465	DN 65 / PN 6	2130	285	305
Giga - 2000	1200	565	DN 65 / PN 6	2590	285	305
Giga - 3000	1500	795	DN 65 / PN 6	2590	314	335
Giga - 4000	1500	1080	DN 65 / PN 6	3160	314	335
Giga - 5000	1500	1115	DN 65 / PN 6	3695	314	335

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.

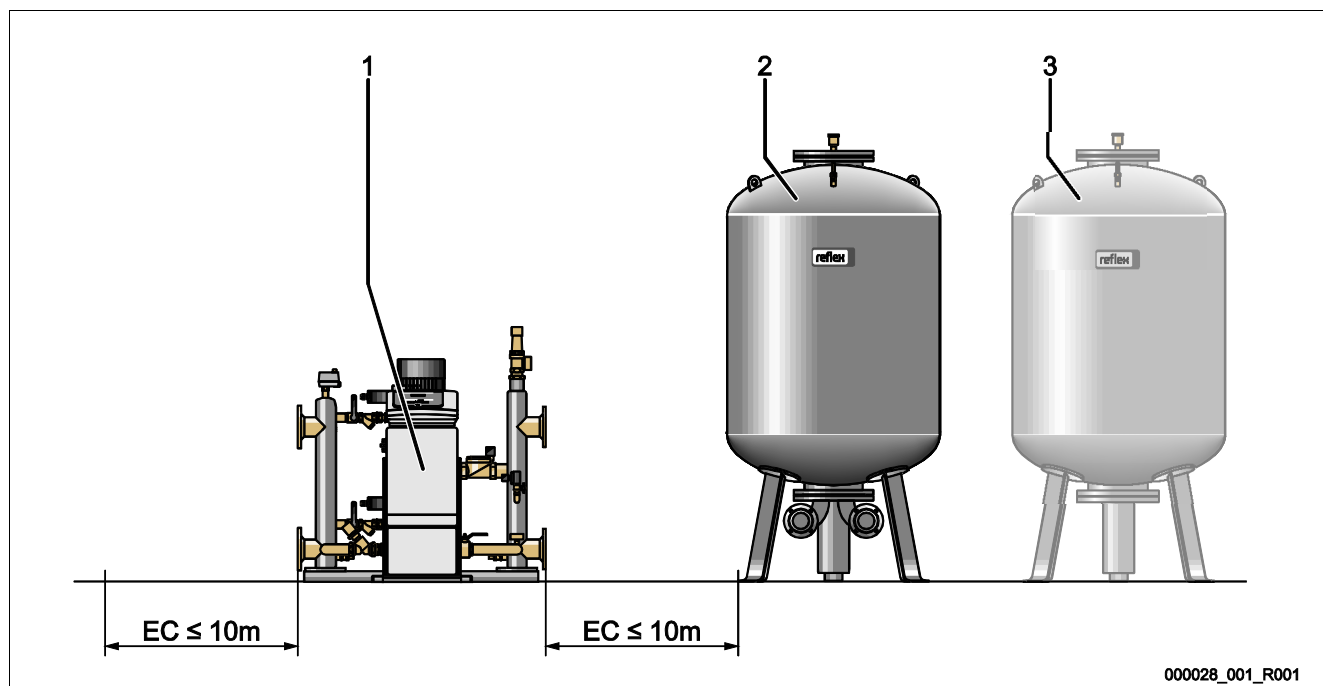


Notice!

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

6.3.1 Positioning

Determine the device position.



1	Control unit
2	Primary tank

3	Secondary tank (optional)
EC	Connection line

Install the control unit and the tanks at the same level. In addition to its base plate, the control unit has adjustable mounts for accurate adjustment.



Note!

- Do not exceed the maximum length of 10 metres for the "EC" connecting lines, see chapter 6.3.4 "Hydraulic connection" on page 21 .
- Ensure a continuously rising "EC" connecting line between the pump connection of the control unit and the primary tank.

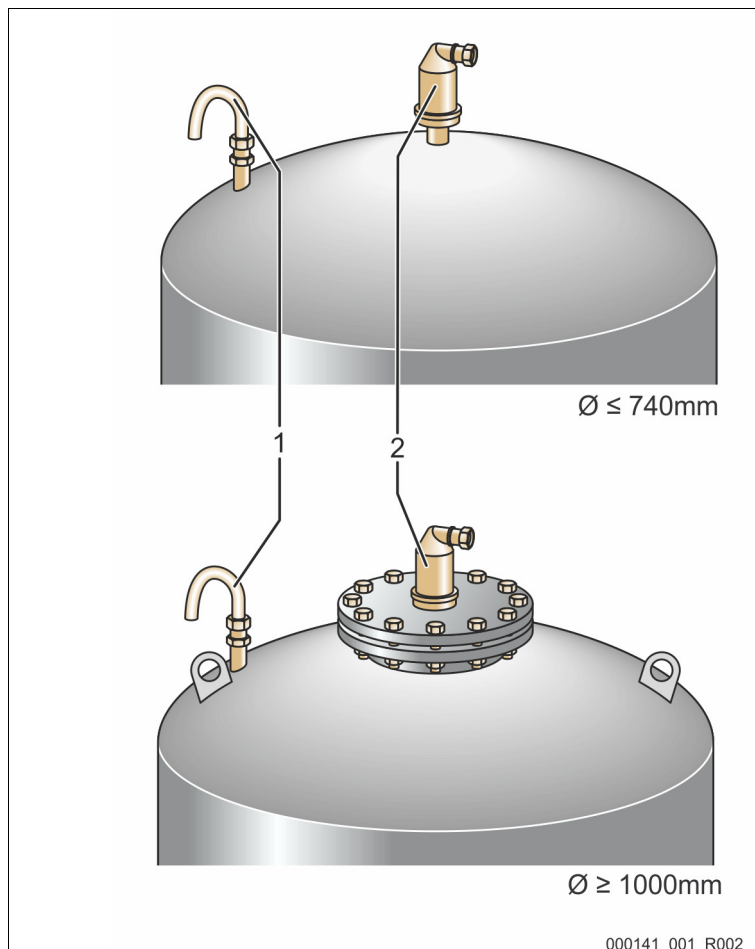
6.3.2 Installation of add-on components for the tanks

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 27 .



Note!

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

6.3.3 Tank installation

ATTENTION

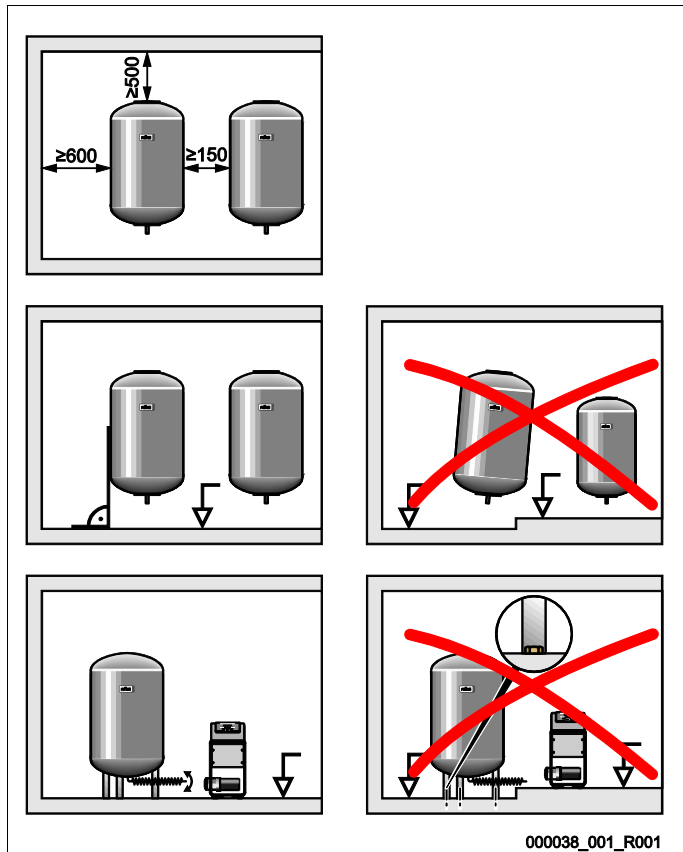
Damage due to improper installation

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.

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.
 - Place the tanks with sufficient distances to sides and ceiling.
- Install the tanks on a level surface.
- Ensure rectangular and free-standing position of the tanks.
- Use only tanks of the same type and dimensions when using secondary tanks.
- Ensure proper functioning of the "LIS" level sensor.
ATTENTION Property damage caused by overpressure. Do not attach the tanks firmly to the floor.
- Install the control unit on the same level as the tanks.



6.3.4 Hydraulic connection

ATTENTION

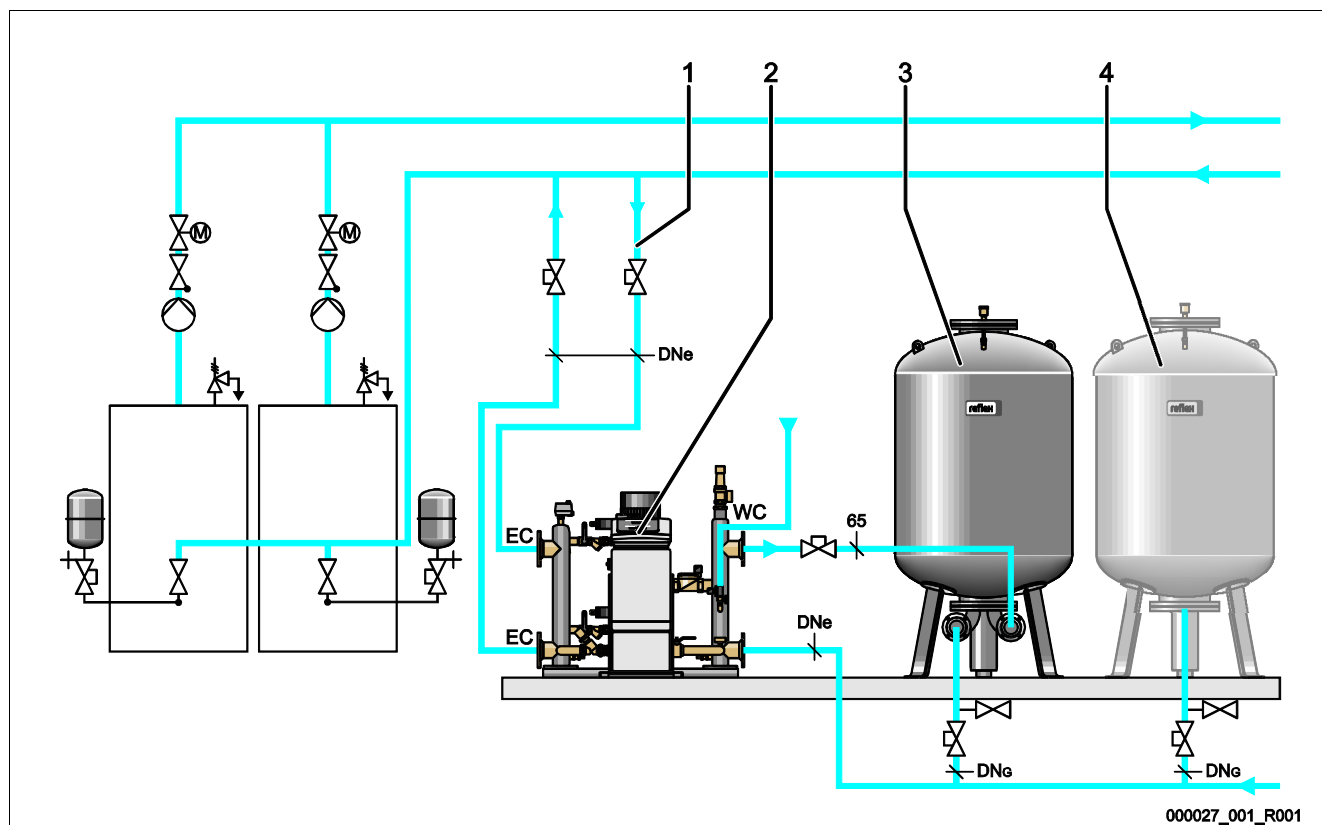
Damage due to improper installation

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 overview

Integrate with the "V" main flow volume of the system. Viewed in system flow direction, you must integrate the gas-rich water expansion line upstream of the expansion line transporting the degassed water.



1	Expansion line for gas-rich water
2	Variomat Giga
3	Primary tank
4	Secondary tank (optional)

DNe	Expansion line diameters
EC	Expansion line connections <ul style="list-style-type: none"> • Gas-rich water inlet • Degassed water outlet
DNp	Suction line to pump diameter
WC	Make-up line

Installing the "EC" expansion line with degassing function

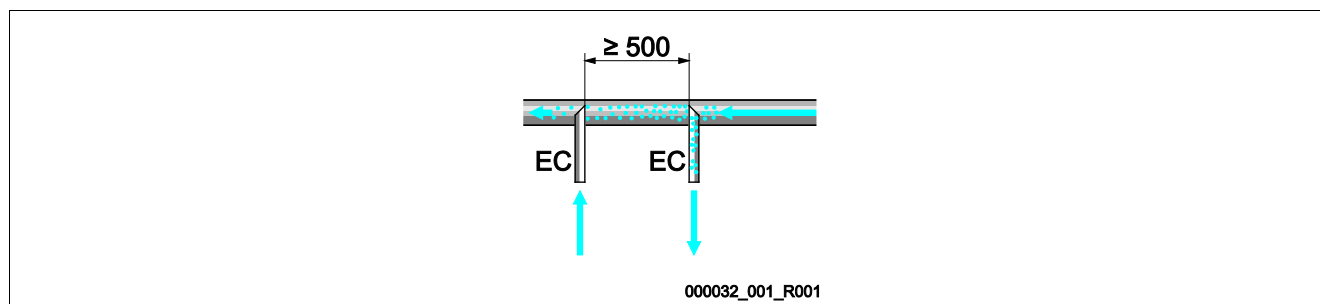
Install two expansion lines.

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

Installing the "EC" expansion line without degassing function

If you don't use the degassing function for the system, you require only one "EC" expansion line from the control unit to the facility system, see chapter 6.4 "Make-up and degassing variants" on page 28 .

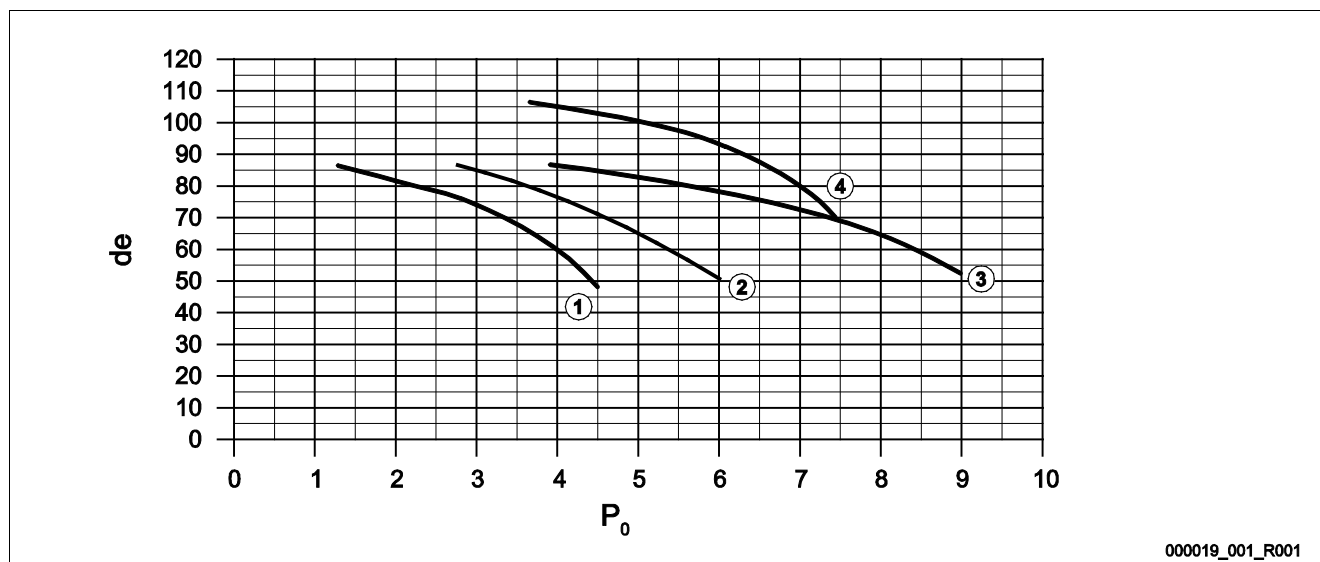
Integrating the "EC" expansion line into the facility system



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

Selecting the conduit diameter for the "EC" expansion line

Use the diagram to select the inner diameter of the "EC" expansion line from the control unit to the facility system, taking the maximum length of 10 metres into account.



1	GH 50 hydraulic module
2	GH 70 hydraulic module
3	GH 100 hydraulic module

4	GH 90 hydraulic module
P ₀	Minimum working pressure in bar
d _e	Inner diameter in mm



Note!

- The water temperature at the connection point of both "EC" expansion lines must be in the range of 0 °C to 70 °C.
- When one "EC" expansion line is used, water temperatures > 70 °C at the expansion line's integration point are permitted. For this purpose, install an appropriate interim tank in the expansion line.

6.3.4.1 Expansion lines to the tanks

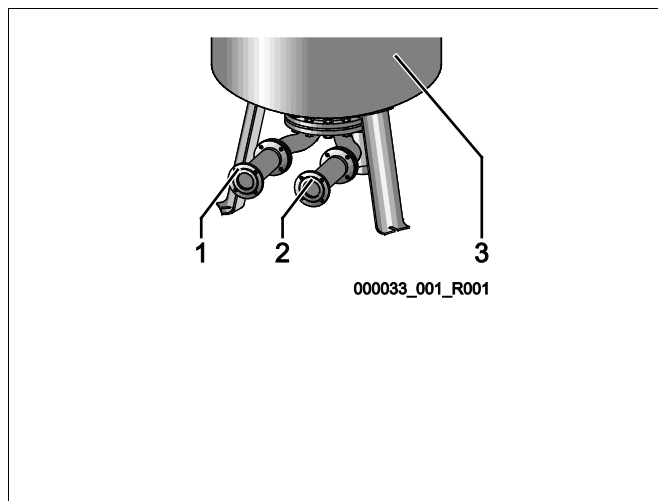
The primary tank (3) is used for degassing and features two connections:

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

- One line for the gas-rich water of the overflow line (2).
- One line for the degassed water of the pump suction line (1).

The connection pieces are flexibly pre-installed to ensure the proper functioning of the "LIS" level sensor.



Size of the connection line for installing the overflow line at the primary tank (system side)

For the connection line, use a pipe with a DN 65 nominal diameter and a secured shut-off device.

Size of the "DN_G" connection line for the pump suction line at the primary tank and the secondary tanks (pump side)

The size for DN_G depends on the size of the "DN_e" expansion line to the facility system and the number of primary and secondary tanks.

- Determine the size of the "DN_e" expansion line to the facility system, see chapter 6.3.4 "Hydraulic connection" on page 21 .
- Select the size of the "DN_G" expansion line from the table below. The size depends on the number of primary and secondary tanks.
- Install a secured shut-off device in the "DN_G" expansion line.

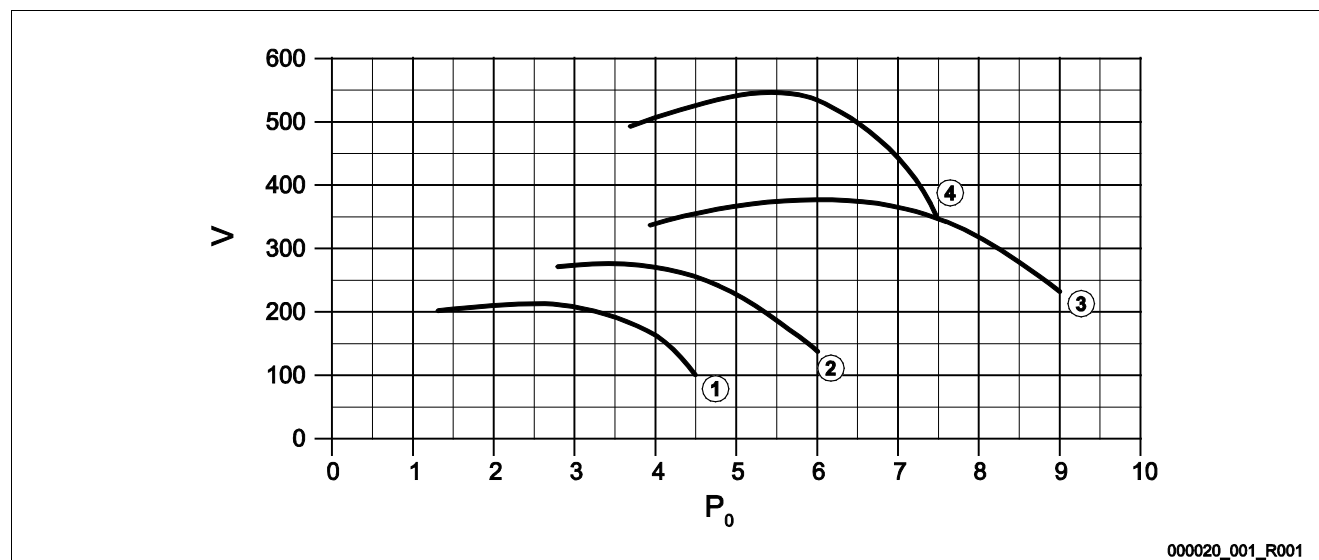
"DN _e " connection line to the facility system	50	65	80	100	125
Number of primary and secondary tanks	"DN _G " connection line for the pump suction line				
1	50	65	80	100	125
2	40	50	60	65	100
3	40	40	50	60	65
4	40	40	40	50	60
5	40	40	40	50	60
6	40	40	40	40	50
7	40	40	40	40	50
8	40	40	40	40	50
9	40	40	40	40	40
10	40	40	40	40	40



Note!

For draining the primary and secondary tanks, use a pipe diameter of at least DN 25 mm and a secure shut-off device.

6.3.4.2 Buffer tank connections



1	GH 50 hydraulic module
2	GH 70 hydraulic module
3	GH 100 hydraulic module

4	GH 90 hydraulic module
V	Minimum volume for buffer tanks in litres
P ₀	Minimum working pressure in bar

Thanks to the degassing function of the Variomat Giga, the facility system has only a low pressure storage capacity.

Minimise the switching frequency by installing a buffer tank. Install the buffer tank in the "EC" expansion line to the system or as individual protection to the producers in the heating or cooling water systems, see chapter 6.4 "Make-up and degassing variants" on page 28 .

The "V" minimum volume for the buffer tank is shown in the above diagram.

**Note!**

If required, you may distribute the "V" minimum volume to several small buffer tanks.

6.3.4.3 Safety valve connection

CAUTION

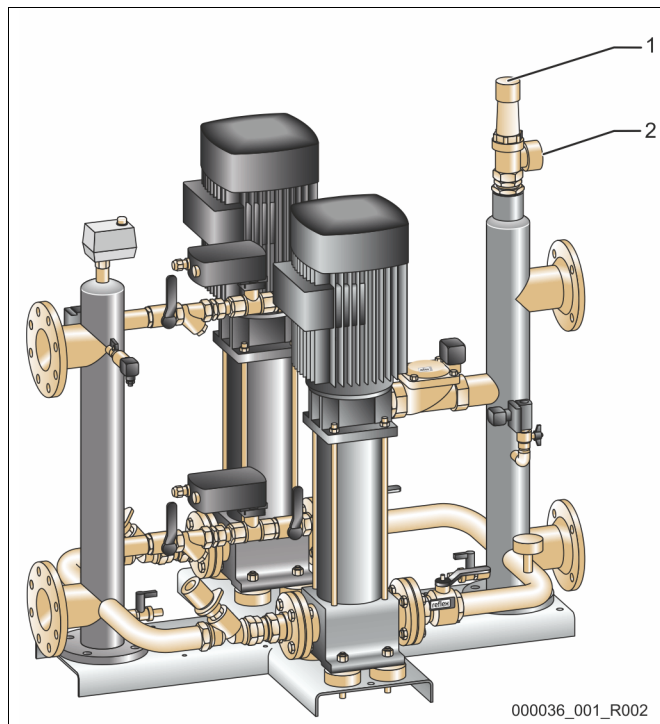
Hot water vapour can cause burns to skin and eyes.

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.

Install a blow-off line at the "SV" safety valve.

- The blow-off line must terminate unimpeded and observable.
- At a length of ≤ 2 metres, the nominal diameter of the blow-off line matches the connection at the outlet of the safety valve.
- For lengths of > 2 metres, see the planning documents for the nominal diameter.



000036_001_R002

1	"SV" safety valve
2	Blow-off line connection



Note!

Comply with the attached operating instructions.

6.3.4.4 Make-up line

A "WV" make-up valve with a nominal diameter DN 15" is installed on the "GH" hydraulic module. The "GS" control module uses the determined level to regulate the make-up valve.

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.



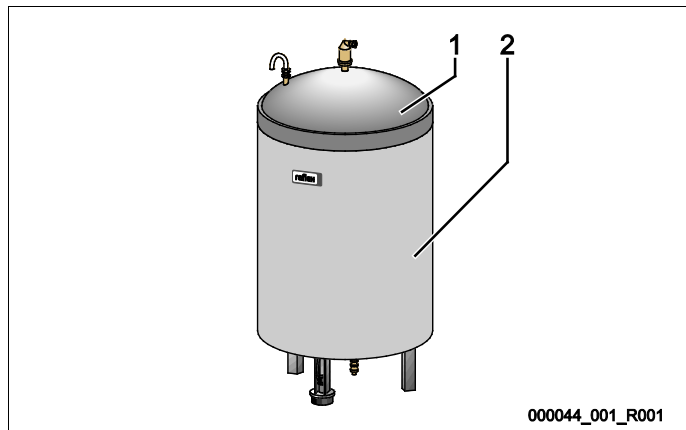
Note!

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 7.8 "Parametrising the controller in the Customer menu" on page 51 .

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 Make-up and degassing variants

ATTENTION

Corrosion damage resulting from oxygen-rich water

The annual make-up with oxygen-rich water must not exceed 5 % of the system volume. Otherwise, corrosion may cause damage to the pressurisation station and the entire installation.

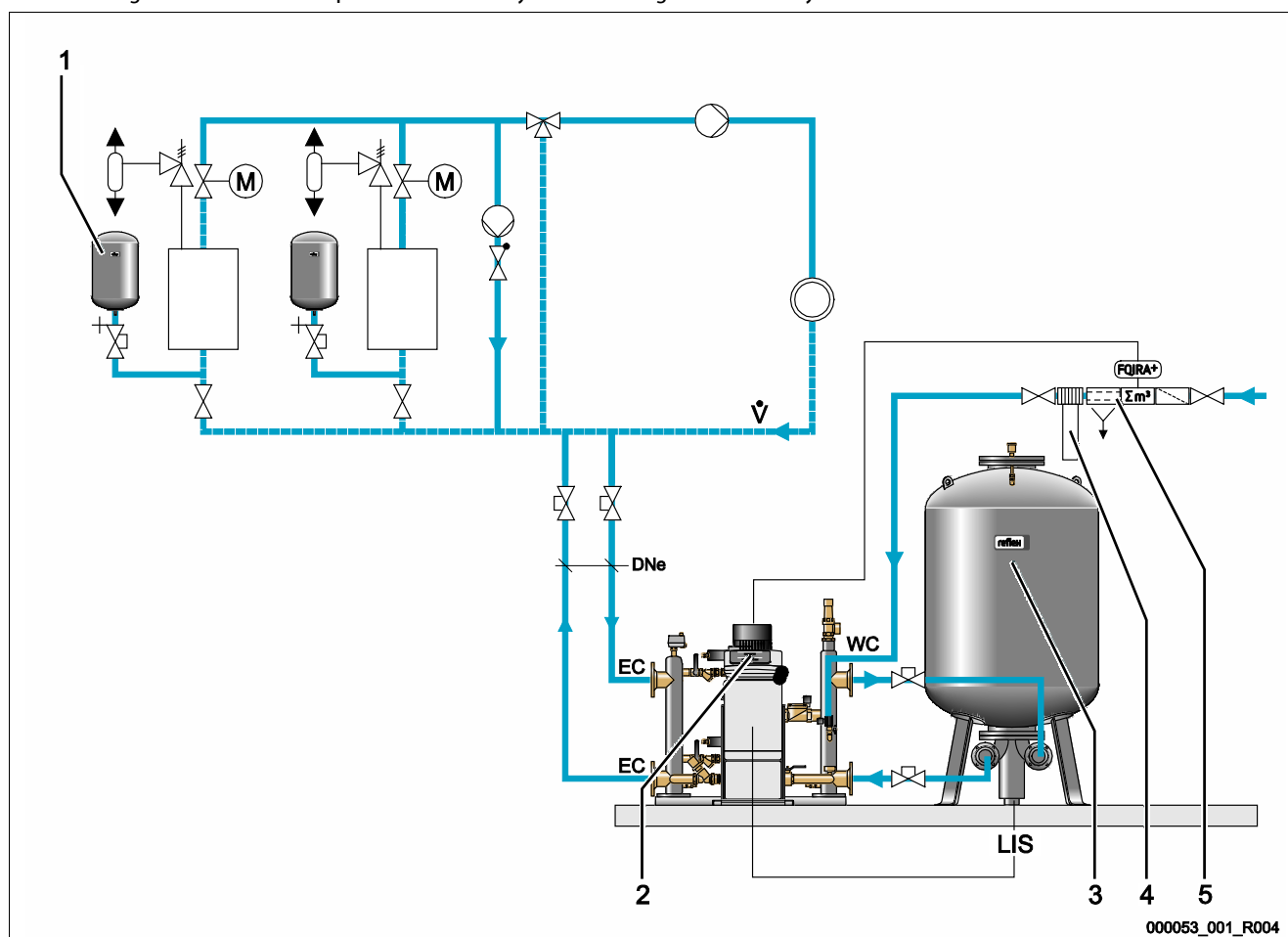
- Install a Fillset Impulse with integrated FQIRA+ contact water meter as an optional accessory.

6.4.1 Function

The water make-up and degassing functions can be adjusted to the specific requirements of your installation. Some examples are shown below.

6.4.1.1 Use in systems with buffer tanks for individual protection

The switching actions must be adapted to the actual system. The diagram shows only control lines to be installed at the site.



1	Diaphragm-type expansion tank (buffer tank)
2	Control unit
3	Primary tank
4	Reflex "Fillsoft" water softening system
5	Reflex "Fillset Impulse" make-up system
\dot{V}	Main volume flow

DNe	Expansion line diameters
WC	Make-up line
EC	Expansion line connections <ul style="list-style-type: none"> • Gas-rich water inlet • Degassed water outlet
LIS	Pressure pick-up

If heat generators are equipped with diaphragm-type expansion tanks for an individual protection, they are used as buffer tanks for Variomat Giga.

The following conditions must be met:

- The suction pressure must be maintained
- Make-up with softened drinking water < 1 m³/h
 - The "GH" hydraulic module is fitted with a "WV" make-up valve to be prepared for make-up.

Connect the "EC" expansion lines into the main volume flow. It is the system side in systems with central return flow admixture or hydraulic switching points.

- A sufficiently large partial flow of system water is degassed.
- Degassing occurs in the primary tank of the Variomat Giga using atmospheric pressure.

Specify the following settings in the Customer menu:

- Select either Continuous or Interval degassing.
- Select make-up "With softening".

Settings in the Customer menu, see chapter 9 "Controller" on page 56 .



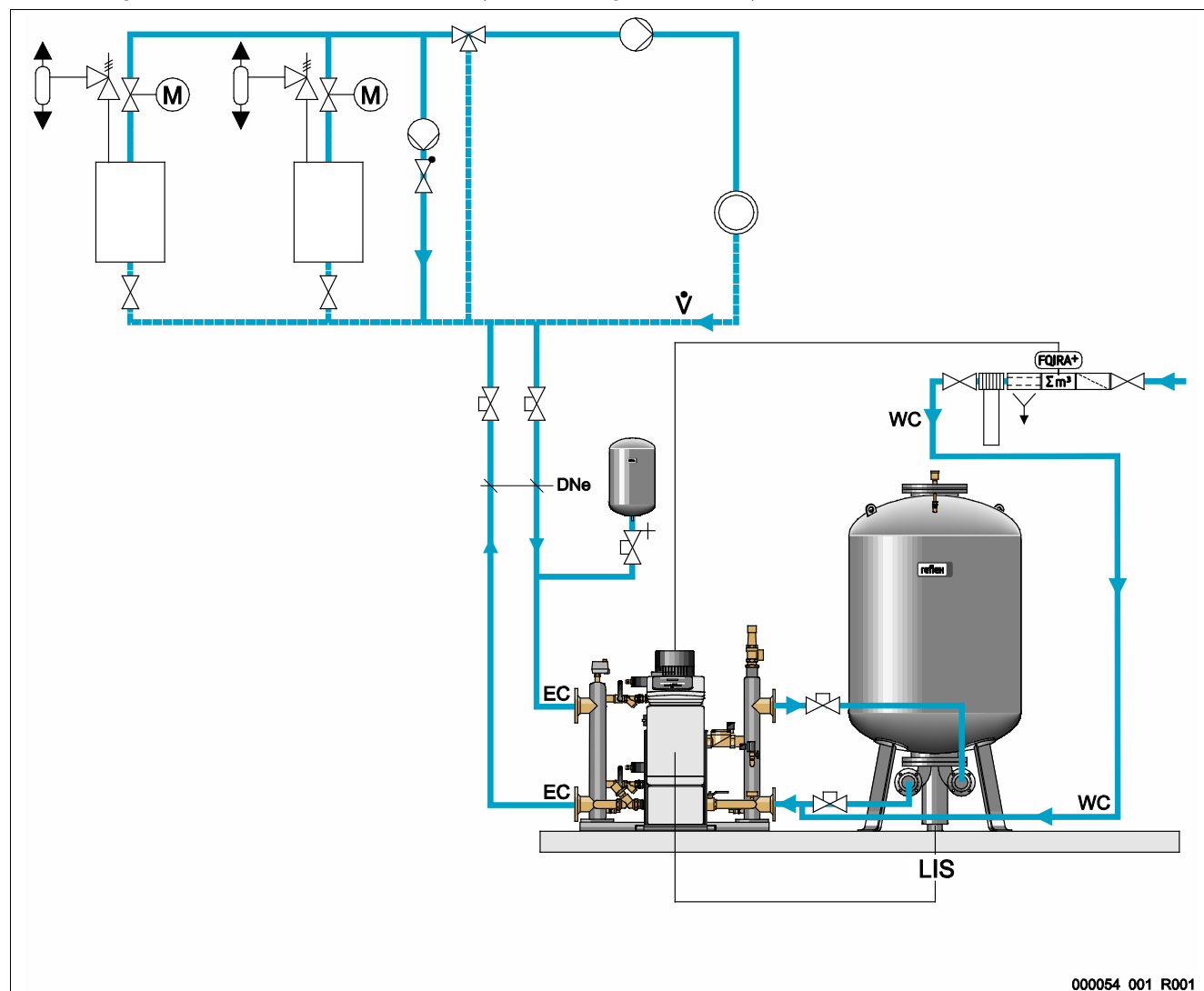
Note!

Use Reflex make-up systems for a make up with drinking water flow < 1 m³/h.

- Fillset Impulse combined with Fillsoft softening system. The integrated "FQIRA+" contact water meter monitors the make-up quantities and displays the necessary change of the softening cartridge at the controller, see chapter 4.6 "Optional equipment and accessories" on page 13 .

6.4.1.2 Use in a system with buffer tank on expansion line

The switching actions must be adapted to the actual system. The diagram shows only control lines to be installed at the site.



1	Diaphragm-type pressure expansion tank (buffer tank)
2	Control unit
3	Primary tank
4	Reflex "Fillsoft" water softening system
5	Make-up system with contact water meter

\dot{V}	Main volume flow
DNe	Expansion line diameter
EC	Expansion line connections <ul style="list-style-type: none"> Gas-rich water inlet Degassed water outlet
WC	Make-up line
LIS	Pressure pick-up

The heat generators are not fitted with diaphragm-type expansion tanks for individual protection.

A buffer tank is installed on the expansion line of the overflow side from the system to Variomat Giga.

The following conditions must be met:

- The suction pressure must be maintained
- Make-up with softened drinking water $\geq 1 \text{ m}^3/\text{h}$
 - The "WV" make-up valve from the "GH" hydraulic module is closed with a blind plug.
 - For make-up volumes of $\geq 1 \text{ m}^3/\text{h}$, you must install user-supplied make-up systems with appropriate capacity.
 - The make-up valve of the user-supplied make-up system is connected to the Variomat Giga controller.
 - The "WC" make-up line is connected to the de-pressurised connection line to the primary tank.

Connect the "EC" expansion lines into the main volume flow. It is the system side in systems with central return flow admixture or hydraulic switching points.

- A sufficiently large partial flow of system water is degassed.
- Degassing occurs in the primary tank of the Variomat Giga using atmospheric pressure.

Specify the following settings in the Customer menu:

- Select either Continuous or Interval degassing
- Select make-up "With softening"

Settings in the Customer menu, see chapter 9 "Controller" on page 56 .



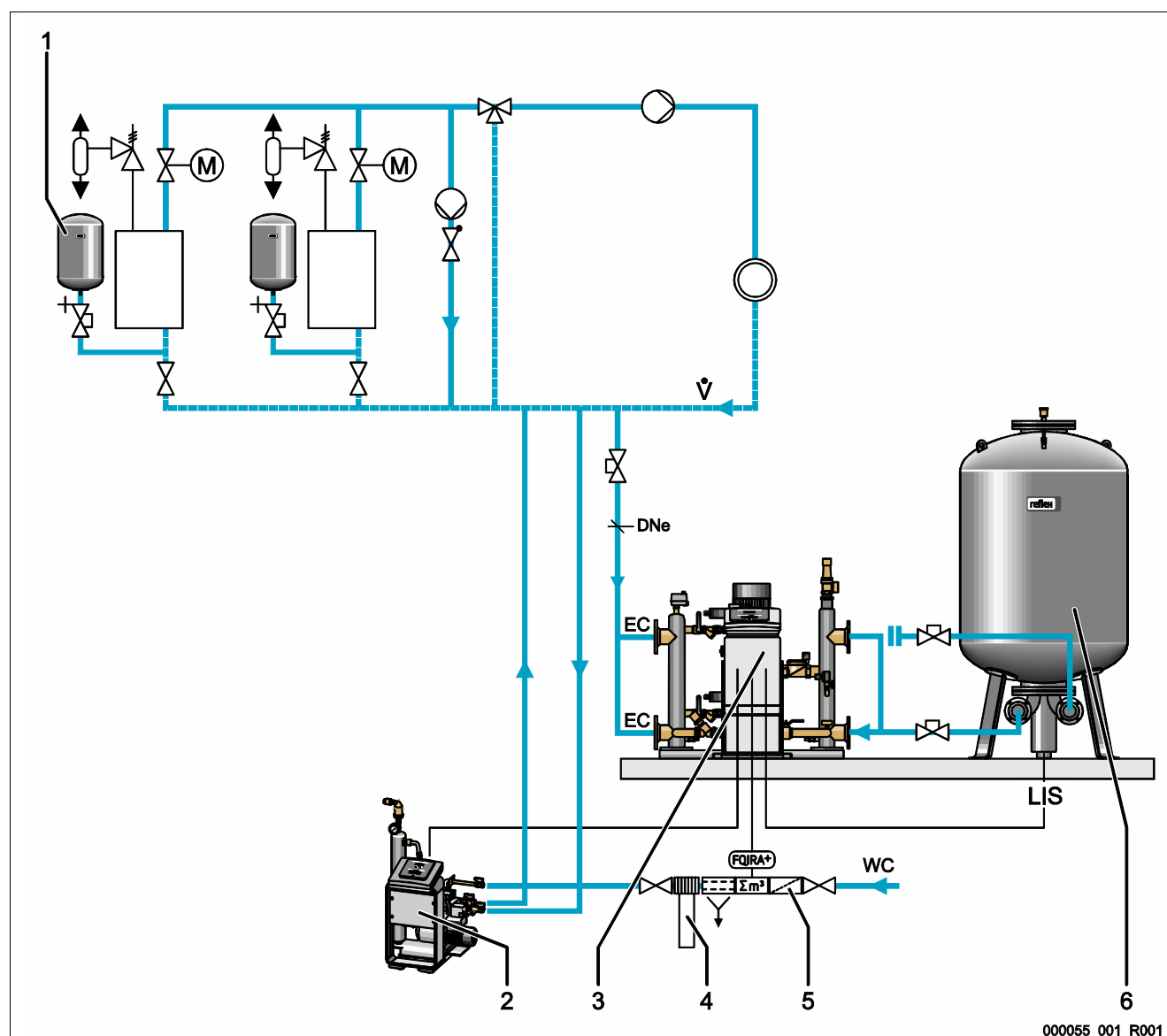
Note!

Use a contact water meter for make-up quantities $\geq 1 \text{ m}^3/\text{h}$.

- The Reflex "FQIRA+" contact water meter is connected with the controller and monitors the make-up quantities, see chapter 4.6 "Optional equipment and accessories" on page 13 .

6.4.1.3 Use in systems with buffer tanks for individual protection and vacuum spray degassing

The switching actions must be adapted to the actual system. The diagram shows only control lines to be installed at the site.



1	Diaphragm-type pressure expansion tank (buffer tank)
2	Reflex "Servitec 35-95" vacuum spray degassing
3	Control unit
4	Reflex "Fillsoft" water softening system
5	Reflex "Fillset Impulse" make-up system
6	Primary tank

\dot{V}	Main volume flow
DNe	Expansion line diameters
EC	Expansion line connections <ul style="list-style-type: none"> Gas-rich water inlet Degassed water outlet
WC	Make-up line
LIS	Pressure pick-up

The Variomat Giga is operated without make-up and degassing function. The above diagram shows an example of a make-up and degassing function with a Servitec35 -95" ,,, Reflex vacuum spray degassing device.

The following conditions must be met:

- The suction pressure must be maintained.
- Vacuum psray degassing of the make-up and system water with Reflex Servitec, see chapter 4.6 "Optional equipment and accessories" on page 13 .
- Make-up with drinking water $< 1 \text{ m}^3/\text{h}$

Connect the Variomat Giga without degassing function as follows:

- Close the "WV" make-up valve from the "GH" hydraulic module with a blind plug.
- Install an "EC" expansion line from the system to the "GH" hydraulic module.
- Install a connection line from the "GH" hydraulic module to the primary tank.
 - Use a blind flange to close the connection for the overflow line from the primary tank.

Connect the Reflex Servitec vacuum spray degassing as follows:

- Transfer the make-up line from the Variomat Giga controller to the Reflex Servitec controller using a control line.
- Connect the "EC" expansion lines into the main volume flow. It is the system side in systems with central return flow admixture or hydraulic switching points.
 - A sufficiently large partial flow of system water is degassed.

Make the following adjustments to the setting in the Variomat Giga controller's Customer menu:

- Select "No degassing".
- Select make-up "With softening".

Settings in the Customer menu, see chapter 9 "Controller" on page 56 .



Note!

The Reflex Servitec meets the following conditions for degassing.

- Degassing of a system volume up to maximal 220 m³.
- Degassing of make-up water to a maximum flow volume of 0.55 m³/h.



Note!

Use Reflex make-up systems when you make up with a drinking water flow $< 1 \text{ m}^3/\text{h}$.

- Fillset Impulse combined with Fillsoft softening system. The integrated "FQIRA+" contact water meter in Fillset Impulse monitors the make-up quantities and displays the necessary change of the softening cartridge at the controller, see chapter 4.6 "Optional equipment and accessories" on page 13 .

6.5 Electrical connection

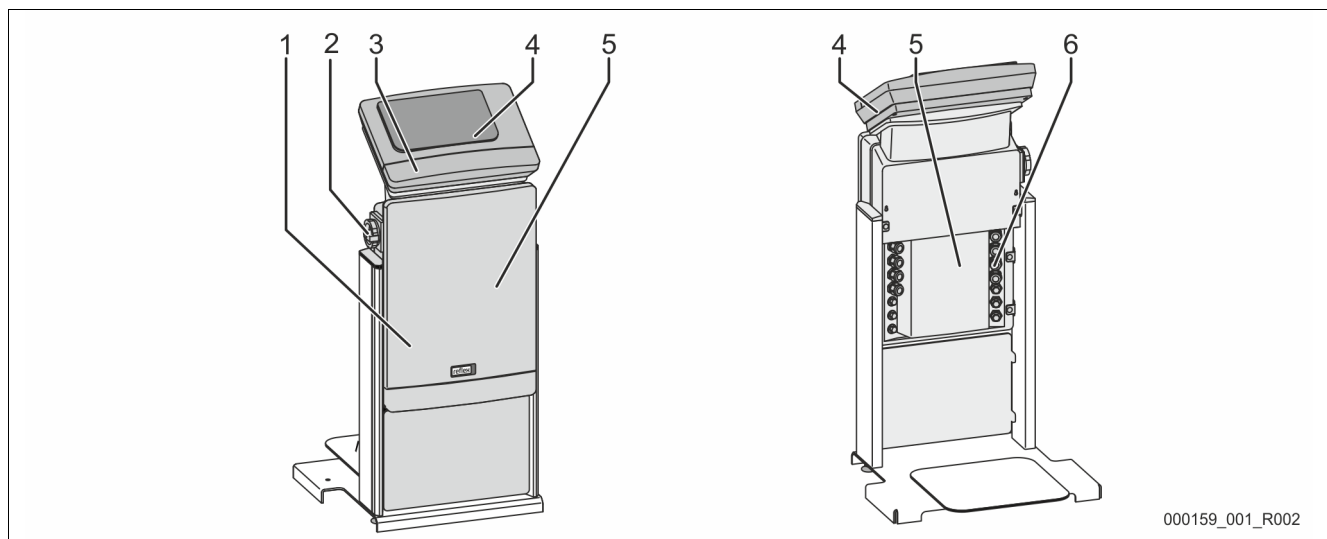
⚠ DANGER

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) <ul style="list-style-type: none"> • RS-485 interfaces • Pressure and Level outputs

4	Touch control
5	Connection component rear
6	Cable bushings <ul style="list-style-type: none"> • Supply and fusing • Floating contacts • "CO" compressor connection

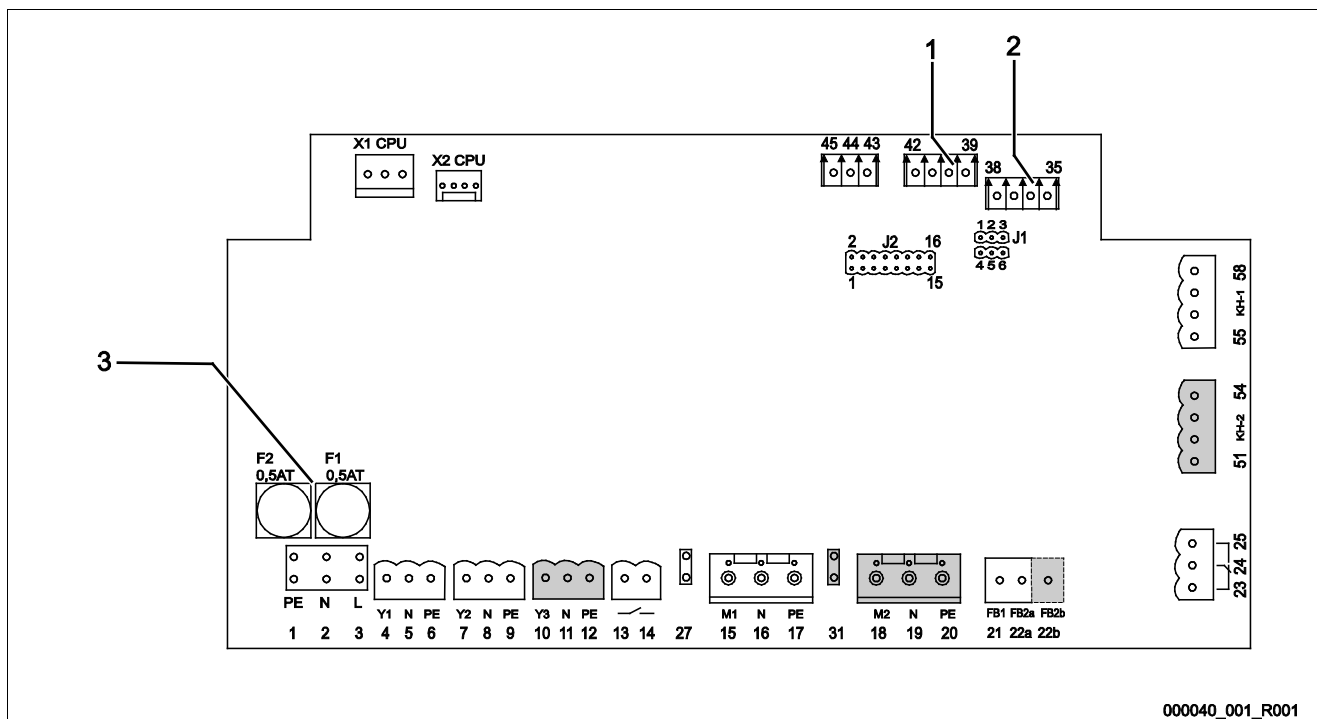
The following descriptions apply to standard systems and are limited to the necessary user-provided connections.

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 plan, connection component

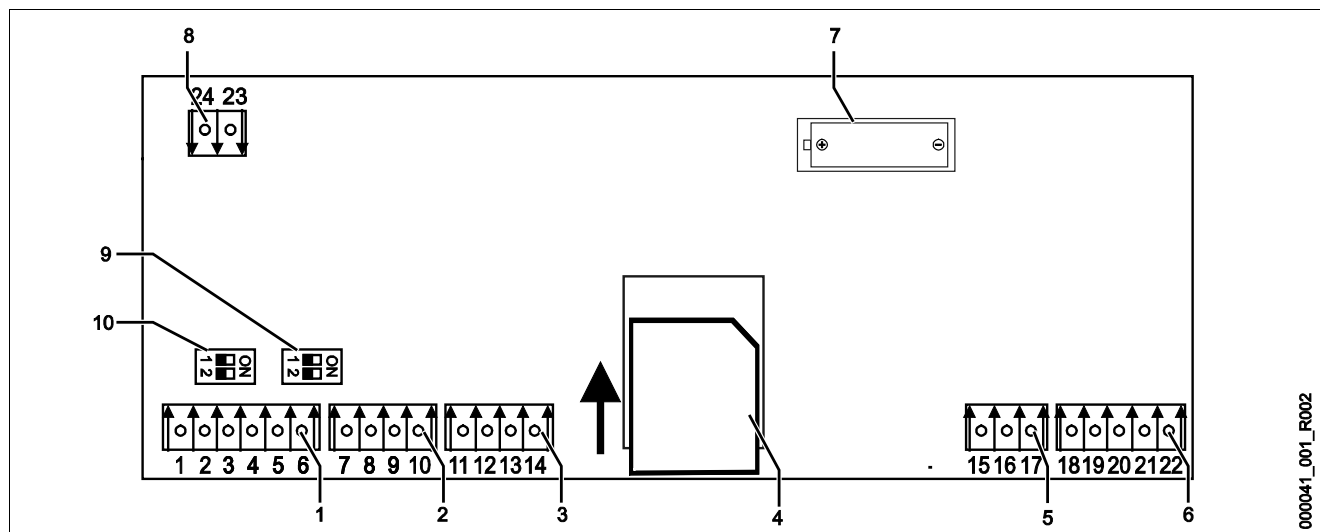


1	Pressure	3	Fuses
2	Level		

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)		

6.5.2 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		

6.5.3 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 67 .
 - All entries in the fault memory.

The following bus modules are optionally available for interface communication:

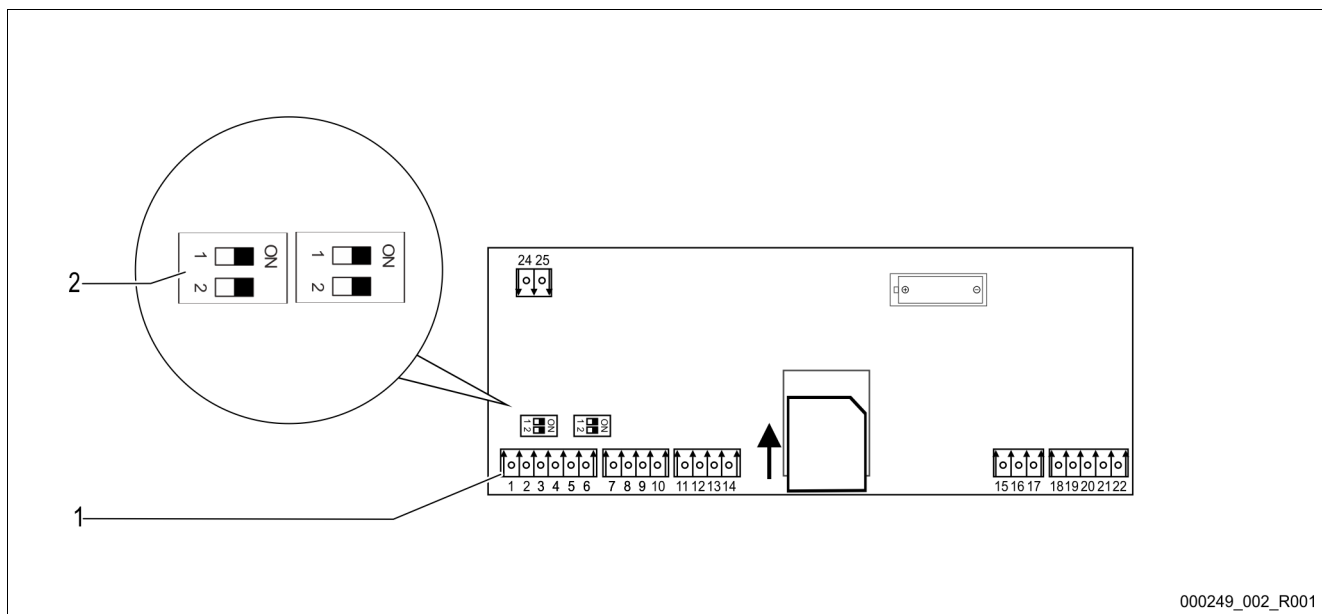
- Lonworks Digital
- Lonworks
- Profibus-DP
- Ethernet
- Optional I/O module.

**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.

6.5.3.1 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:

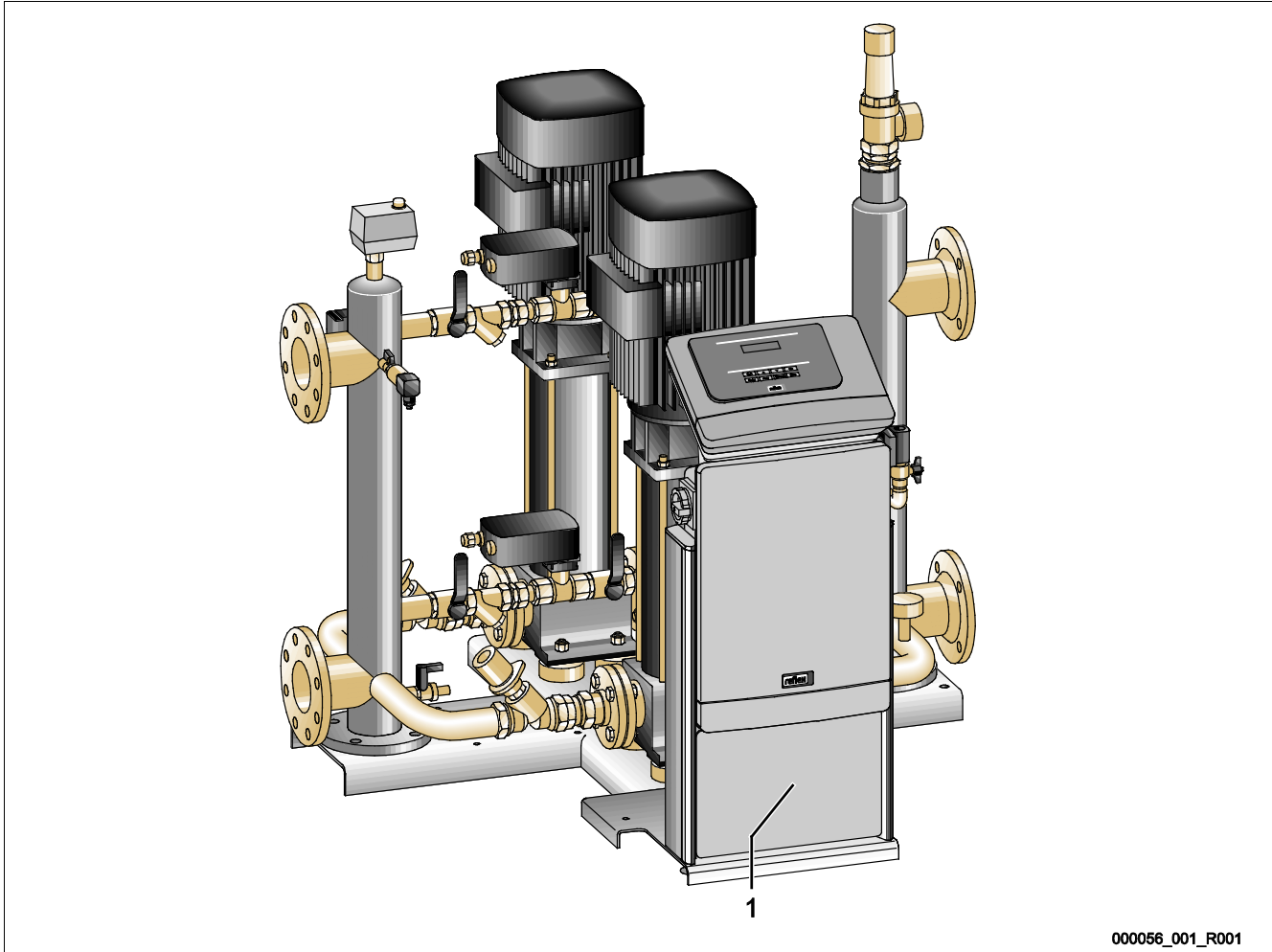
1. Use a screened cable to connect the RS-485 interface to the main circuit board.
 - S 1
 - Terminal 1 (A+)
 - Terminal 2(B-)
 - Terminal 3(GND)
2. Connect the cable screen at one side.
 - Terminal 18
3. Activate the terminator on the main circuit board.
 - Dip switch 1



Note!

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

6.5.4 I/O module interface



000056_001_R001

1	I/O module
---	------------

The GS 3 control module features an additional I/O module. This I/O module provides 6 digital inputs and 6 potential outputs. Their assignment is freely programmable for the user's requirements. When the I/O module is connected, you can assign additional bus modules to the RS-485 interface. The controller provides the necessary power. Connection is made at the RS-485 S2 interface.

► **Note!**

Standard settings for the I/O module, see chapter 6.5.4 "I/O module interface" on page 40 .

► **Note!**

The I/O module is optional for the Variomat Giga with GS 1.1 control module.

- Order the optional I/O module from the Reflex Customer Service, see chapter 12.1 "Reflex Customer Service" on page 80 .

► **Note!**

A separate operating instruction is provided with I/O module to give you detailed connection information.

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 10.6 "Maintenance certificate" on page 77 .

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

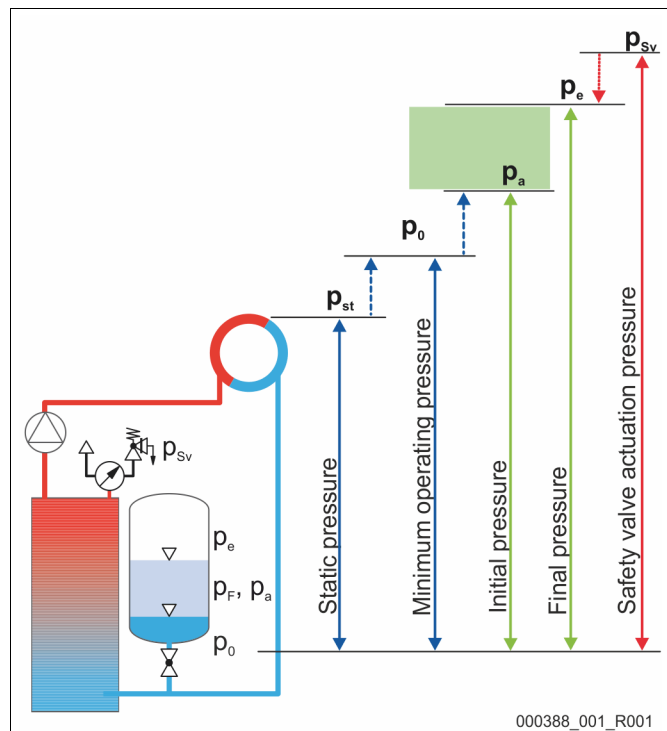
The device will be ready for commissioning when the tasks described in the "Installation" chapter have been completed. The system designer or an assigned expert is responsible for carrying out the commissioning. Commission the storage tank according to the information in the corresponding installation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

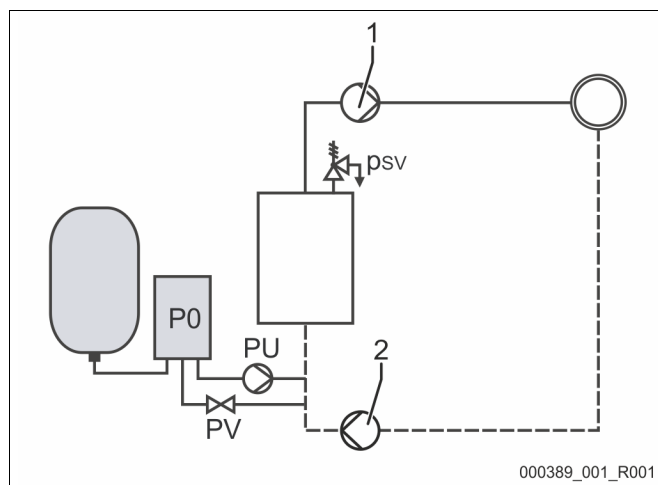
7.2 Determining the P_0 minimum operating pressure for the controller

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)



1	Suction pressure maintenance – Device on the suction side of the system's circulating pump
2	Final pressure maintenance • Device on the discharge side of the system's circulating pump



The "P₀" minimum operating pressure is calculated as follows:

	Calculation	Description
p _{st}	= h _{st} /10	h _{st} in metres
p _D	0.0 bar	for safety temperatures ≤ 100 °C (212° F)
	0.5 bar	for safety temperatures = 110°C (230° F)
d _p	60 - 100 % of the differential pressure of the circulating pump	Depending on the hydraulics
P ₀	≥ p _{st} + p _D + 0.2 bar* (suction pressure maintenance)	Enter the calculated value in the start routine of the controller, see chapter 7.3 "Modifying the controller's start routine" on page 44 .
	≥ p _{st} + p _D + d _p + 0.2 bar* (final pressure maintenance)	

* Addition of 0.2 bar recommended, no addition in extreme cases

Calculation example for "P₀" minimum operating pressure:

Heating system: Static height 18 m, run-on temperature 70 °C (158° F), safety temperature 100 °C (212° F).

Example calculation for suction pressure maintenance:

$$P_0 = p_{st} + p_D + 0.2 \text{ bar}^*$$

$$p_{st} = h_{st}/10$$

$$p_{st} = 18 \text{ m}/10$$

$$p_{st} = 1.8 \text{ bar}$$

$$p_D = 0.0 \text{ bar at a safety temperature of } 100 \text{ °C (212° F)}$$

$$P_0 = 1.8 \text{ bar} + 0 \text{ bar} + 0.2 \text{ bar}$$

$$P_0 = 2.0 \text{ bar}$$



Note!

- The initial and final pressure of the following components must not overlap with the actuation pressure of the safety valve.
 - Overflow solenoid valves
 - Pumps
- The actuation pressure must not fall below the minimum value of the actuation pressure of the safety valve.



Note!

Avoid dropping below the minimum operating pressure. Vacuum, vaporisation and the formation of vapour bubbles are thus excluded.

7.3 Modifying the controller's start routine


Note!

For handling the operator panel see chapter 9.1 "Operator panel" on page 56

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 58.

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 42.
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 P₀ minimum operating pressure for the controller" on page 42 .
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 .

Start routine Step 4

(005) Min. operating pressure p₀

1.8 bar

OK

2.9 bar 0 %

Start routine Step 5

(002) Time

09:30

OK

2.9 bar 0 %

Start routine Step 6

(003) Date

10.03.16

OK

2.9 bar 0 %

Start routine Step 7

(121) Tank size

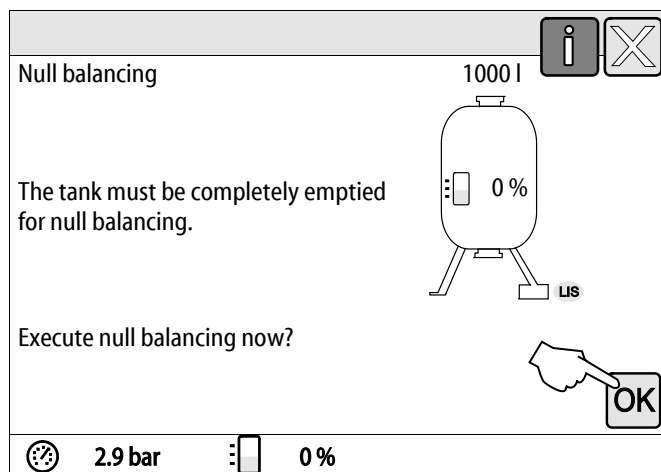
Weight	156 kg
Volume	1000 l
Diam.	740 mm

1000 l

OK

2.9 bar 0 %

- 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 27 .
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 80 .

**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:

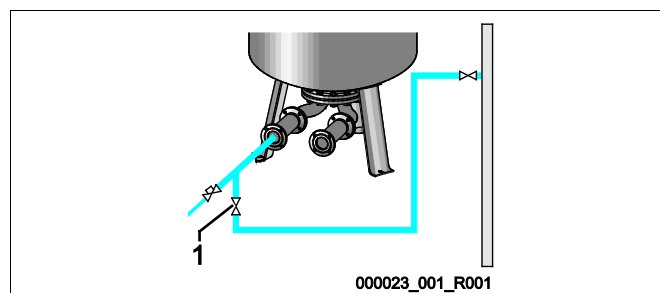
- Control unit and primary tank.
- Control unit and primary tank and one secondary tank.
- Control unit and primary tank and more than one secondary tanks.

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

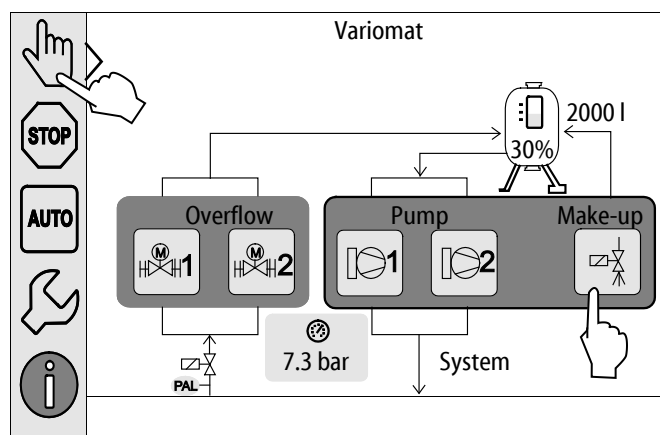
Preferably use a water hose to fill the primary tank with water when the automatic make-up device is not yet connected.

- 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.



7.5 Commissioning the pumps

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 injury caused by escaping pressurised water.

Injuries to the skin or eyes can result from contact with pressurised water.

- Slowly loosen the venting screws for the pressure to escape from the pumps.
 - Wear suitable personal protective equipment (safety gloves and goggles, for example).
-

DANGER

Risk of serious injury or death due to electric shock

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

- Switch off the pumps' power supply.
 - Ensure that the pumps cannot be switched back on by other persons.
 - Ensure that installation work for the electrical connection of the pump is carried out by an electrician, and in compliance with electrical engineering regulations.
-

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.
-

Check the pumps for:

- Sufficient ventilation
- Correct direction of rotation (for a 400 V connection)
- Correct pump pressure

7.6 Venting the pump

CAUTION

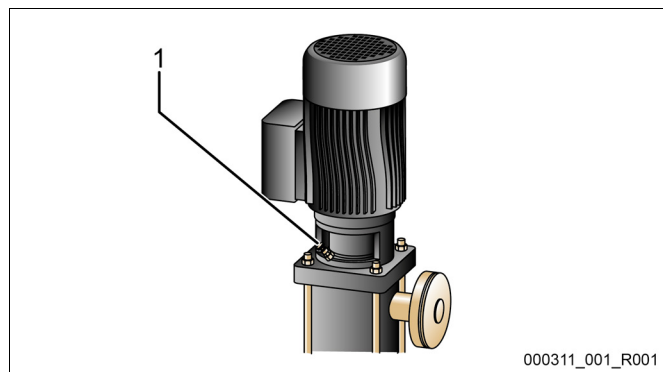
Risk of burns

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" pumps as follows:

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



000311_001_R001

1 Vent screw



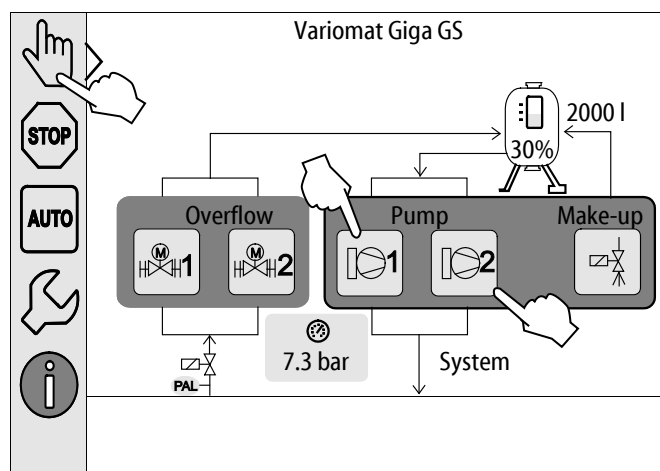
Note!

- Repeat venting after the first starting of the pump. It is possible that subsequent air cannot escape with the pumps stationary.
- Repeat the venting process if the pumps do not create any discharge capacity.

7.6.1 Checking the pumps' direction of rotation

Check the pumps for correct direction of rotation. The pumps have been electrically connected for the same direction of rotation at the factory.

1. Use the "Manual mode" button to switch to "Manual" mode.
2. For testing, manually switch the pumps (1) and (2) on.
 - Let the pumps run for a short time.
3. At the fan wheel, check the direction of rotation.
 - The correct direction of rotation is additionally identified by an arrow at the fan cover of the motor or the drive lantern.
4. If the pumps rotate in the wrong direction, change the direction of rotation at the terminal strip in the connection unit of the control module.



Note!

Change the pumps' direction of rotation only at the terminal strip in the connection unit, see chapter 6.5.1 "Terminal plan, connection component" on page 35.

7.6.2 Building up pump pressure

- Manually switch on the "PU" pumps one after another, see chapter 8.2 "Manual mode" on page 53 .
 - If the pumps are stuck, use a screwdriver to rotate the pumps at the fan wheel.
- Slowly open the shut-off devices in the "EC" expansion lines to the system.
- Leave the pumps switched on until the $P_0 + 0.3$ bar minimum operating pressure is reached and maintained.
 - The pump pressure must be set to the $P_0 + 0.3$ bar minimum operating pressure for the "PAZ" minimum pressure limiter to be able to unlatch, see chapter 7.7 "Setting the minimum pressure limiter" on page 50 .

**Note!**

If the pumps don't build up pressure, vent the pumps again until the require $P_0 + 0.3$ bar minimum working pressure is attained.

7.6.3 Setting the pump delivery volume

The "FC" throttle valves are installed at the pumps' pressure side; they are also used as secure shut-off devices. The throttle valves are used to adjust the water delivery volume to the system capacity. This setting is made at the factory.

**Note!**

Comply with the attached operating instructions.

7.7 Setting the minimum pressure limiter

The "GH" hydraulic module is fitted with a mechanical "PAZ" minimum pressure limiter. The "AC" actuator in the overflow line closes when the pressure drops below the " P_0 " minimum working pressure. The Control Touch displays a fault message, see chapter 9.4 "Messages" on page 67 .

- Set the minimum pressure limiter to the " P_0 " minimum working pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 42 .
- During commissioning, actuate the release key of the minimum pressure limiter.
 - The minimum pressure limiter is active.
- If the minimum pressure limiter trips in operation, you also actuate the release key.

**Note!**

You can only release the minimum pressure limiter when the " P_0 " minimum working pressure is exceeded by at least 0.3 bar.

**Note!**

Comply with the attached operating instructions.

7.8 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 58 .
- For information about controller operation, see chapter 9.1 "Operator panel" on page 56 .

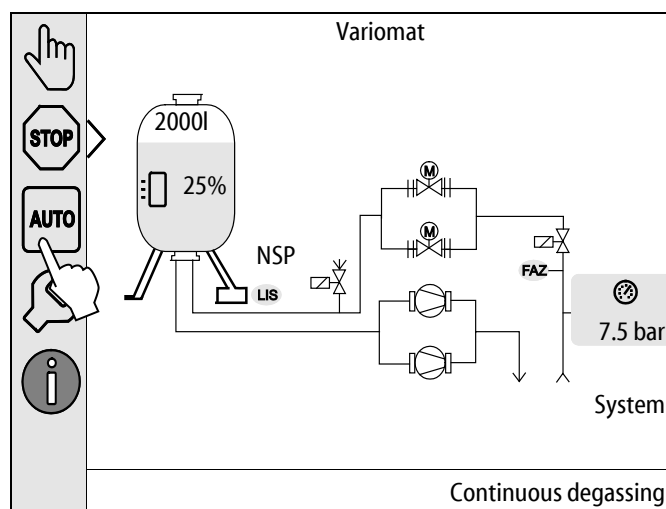
7.9 Starting Automatic mode

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.

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.



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 10.3 "Cleaning the dirt trap" on page 73 .

8 Operation

8.1 Automatic mode

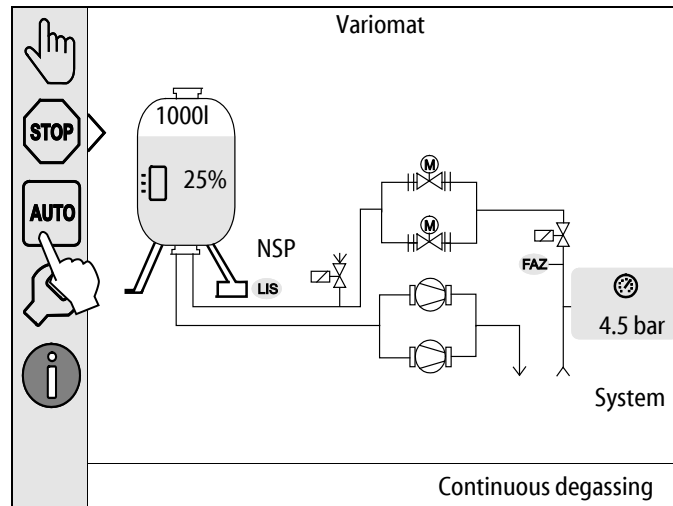
After successful commissioning, start the Automatic mode from the device. The Automatic mode is suitable for continuous device operation and the controller monitors the following functions:

- 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:

- Pumps 1 and 2
- Overflow valves 1 and 2
- The make-up solenoid valve

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.

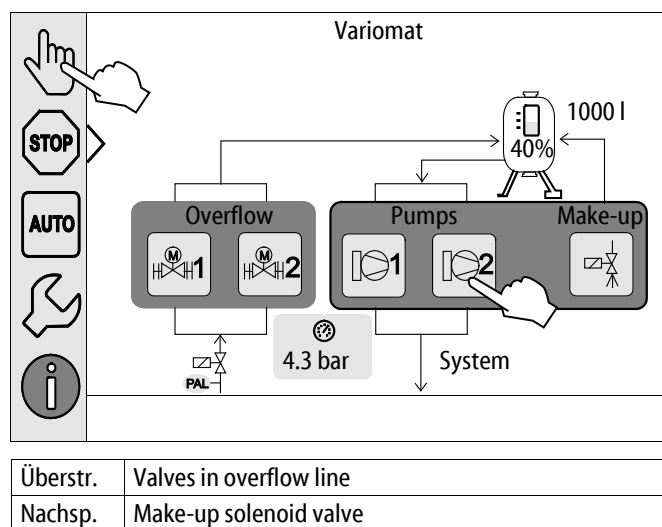
Press the desired button:

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

1. Press "Manual mode".
2. Select the desired function.
 - Pumps 1 and 2
 - Valve in overflow line 1 and 2
 - Make-up solenoid valve

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

Press "AUTO" to return to Automatic mode.



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

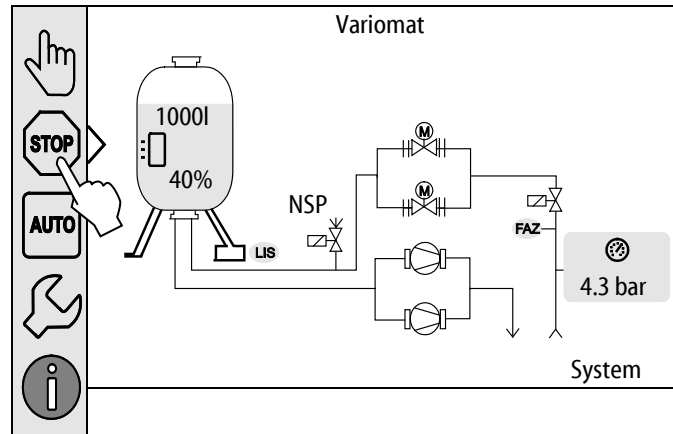
Use stop mode when carrying out maintenance on the device.

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

The following functions are deactivated:

- The pumps are switched off.
- The valves in the overflow line are closed.
- The solenoid valve in the 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 52 .



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.

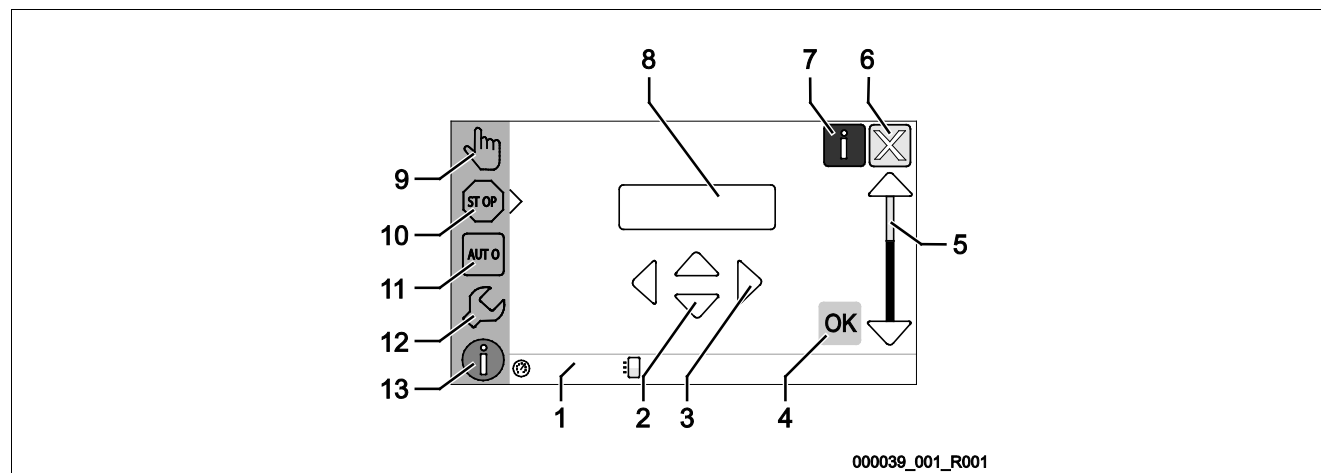


Note!

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

9 Controller

9.1 Operator panel



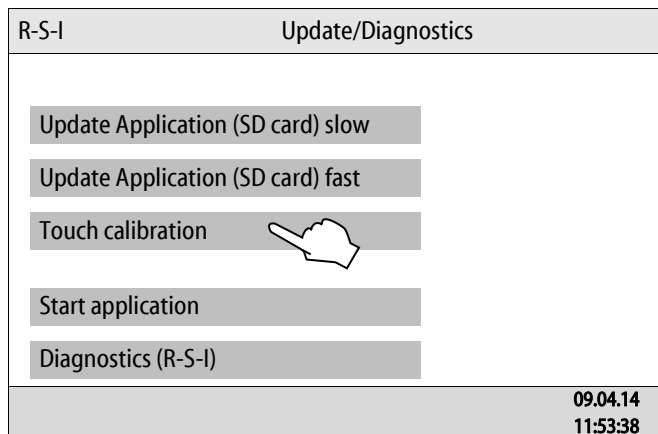
1	Message line
2	"▼"/"▲" buttons <ul style="list-style-type: none"> Set digits.
3	"◀"/"▶" buttons <ul style="list-style-type: none"> Select digits.
4	"OK" button <ul style="list-style-type: none"> Confirm/acknowledge input. Browse in the menu.
5	"Up" and "Down" scroll bar <ul style="list-style-type: none"> "Scroll" in the menu.
6	"Scroll back" button <ul style="list-style-type: none"> Cancel. Move backward up to the main menu.
7	"Display help texts" button <ul style="list-style-type: none"> Opens help texts.

8	Display value
9	"Manual mode" button <ul style="list-style-type: none"> For function tests.
10	"Stop mode" button <ul style="list-style-type: none"> For commissioning.
11	"Automatic mode" button <ul style="list-style-type: none"> For continuous operation.
12	"Set-up menu" button <ul style="list-style-type: none"> For setting parameters. Fault memory. Parameter memory. Display settings. Primary tank information. Software version information.
13	"Info menu" button <ul style="list-style-type: none"> Displays general information.

9.2 Calibrating the touch screen

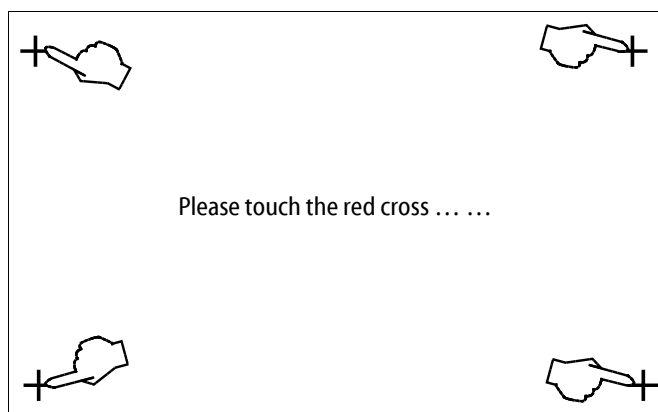
You can calibrate the touch screen when touching the desired buttons does not work satisfactorily.

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 56 .

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 <ul style="list-style-type: none"> – 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 42 .
010	Degassing > <ul style="list-style-type: none"> • Degassing programme <ul style="list-style-type: none"> • No degassing • Continuous degassing • Interval degassing • Run-on degassing
011	<ul style="list-style-type: none"> • Continuous degassing time
023	Make-up > <ul style="list-style-type: none"> • Maximum make-up time ...min
024	<ul style="list-style-type: none"> • Maximum make-up cycles ... /2 h
027	<ul style="list-style-type: none"> • With water meter "Yes/No" <ul style="list-style-type: none"> – If "Yes", continue with 028 – If "No", continue with 007
028	<ul style="list-style-type: none"> • Make-up quantity (Reset) "Yes/No" <ul style="list-style-type: none"> – If "Yes", reset to "0"
029	<ul style="list-style-type: none"> • Maximum make-up quantity ... l
030	<ul style="list-style-type: none"> • Softening "Yes/No" <ul style="list-style-type: none"> – If "Yes", continue with 031 – If "No", continue with 007

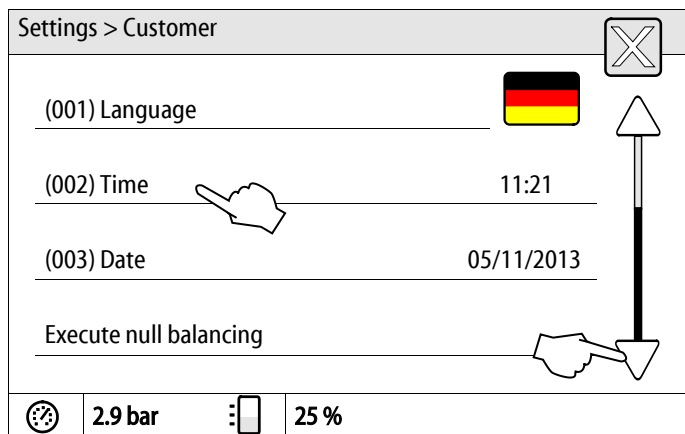
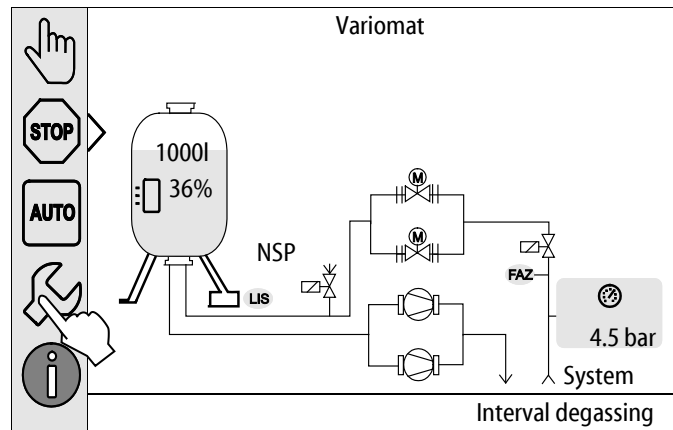
PM code	Description
007	Maintenance interval... months
008	Floating contact <ul style="list-style-type: none"> • Message selection > <ul style="list-style-type: none"> • Message selection: only messages marked with "✓" are output. • All messages: All messages are output.
015	Change remote data "Yes/No"
	Fault memory > History of all messages
	Parameter memory > History of parameter input
009	Display settings > Brightness, screen saver <ul style="list-style-type: none"> • Brightness ... %
010	<ul style="list-style-type: none"> • Screen saver brightness ... %
011	<ul style="list-style-type: none"> • Screen saver delay ...min
018	<ul style="list-style-type: none"> • Secure access "Yes/No"
	Information > <ul style="list-style-type: none"> • Tank <ul style="list-style-type: none"> • Volume • Weight • Diameter • Position <ul style="list-style-type: none"> – 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:

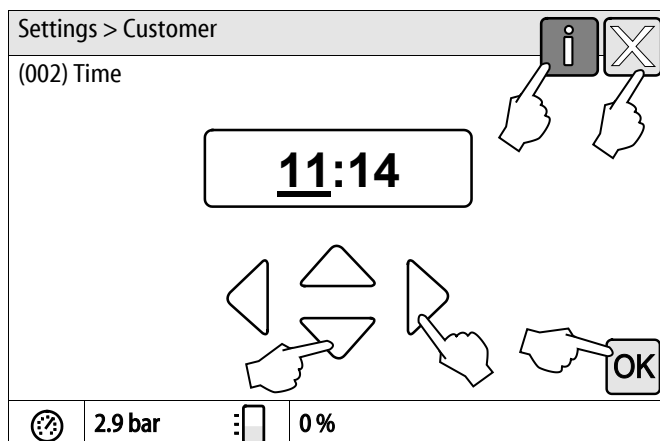
1. Press "Settings".
 - The controller switches to the setting area.
2. Press "Customer >".
 - The controller opens the Customer menu.
3. Press the required area.
 - The controller switches to the selected area.
 - Use the scroll bar to navigate through the list.



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 42 .
Next maintenance	12 months	Time left to the next due maintenance.
Floating alarm contact	All	see chapter 9.4 "Messages" on page 67 .
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 I/O module default setting

The factory provides default settings for the inputs and outputs of the I/O module. This default setting can be changed, if required, and adjusted to local conditions.

Responses by the inputs 1-6 of the I/O module are recorded and displayed in the controller's fault memory. The message code (ER code) now has a "4" before the input number, see chapter 9.4 "Messages" on page 67.

Location	Signal evaluation	Message text	Fault memory entry	Priority	Action	Switching
Inputs						
1	N.C.	External temperature monitoring	yes	yes	Overflow solenoid valves are closed	Group alarm on main PCB
2	N.C.	Emergency-Off	yes	yes	<ul style="list-style-type: none"> Pumps are switched off Overflow solenoid valves are closed Make-up solenoid valve is closed 	Group alarm on main PCB
3	N.C.	Manual make-up	yes	yes	Make-up solenoid valve open	Output relay 5
4	N.O.	External min. - pressure	yes	yes	Overflow solenoid valves are closed	<ul style="list-style-type: none"> Group alarm on main PCB Output relay 4
5	N.O.	Manual pump 1	yes	yes	Pump 1 switched on	Output relay 5
6	N.O.	Manual OF-1	yes	yes	Overflow solenoid valve 1 open	Output relay 5
Outputs						
1	Changeover contact	---	---	---	Pumps disabled	Message ER-Code 04
2	Changeover contact	---	---	---	Overflow solenoid valves open	
3	Changeover contact	---	---	---	Make-up solenoid valve open	
4	Changeover contact	---	---	---	<ul style="list-style-type: none"> Minimum pressure Maximum pressure 	Message ER-Code 01 <ul style="list-style-type: none"> Minimum pressure Message ER-Code 10 <ul style="list-style-type: none"> Maximum pressure
5	Changeover contact	---	---	---	<ul style="list-style-type: none"> Manual mode Stop mode Inputs 3, 5, 6 of the I/O module active 	

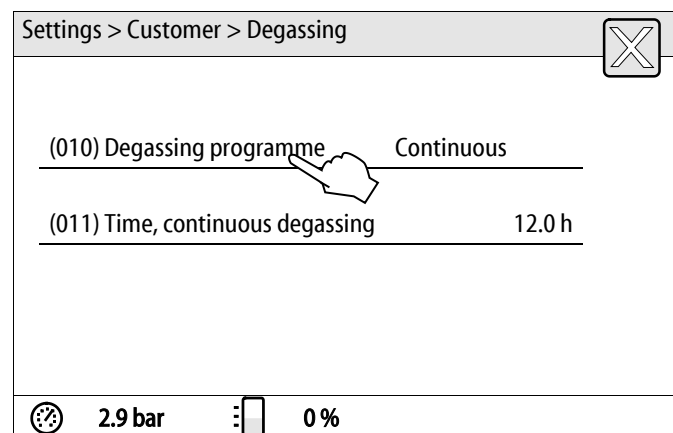
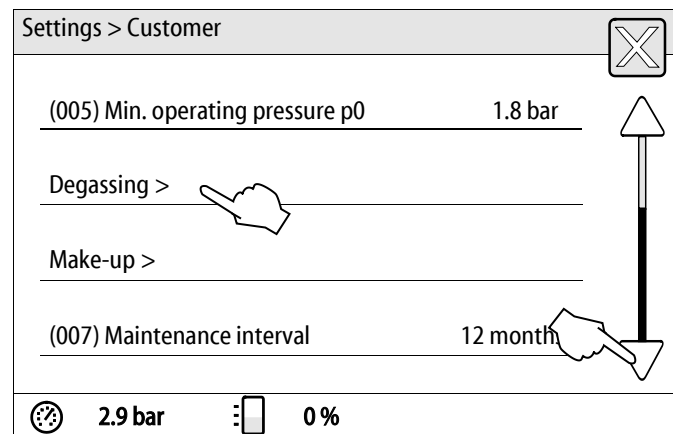
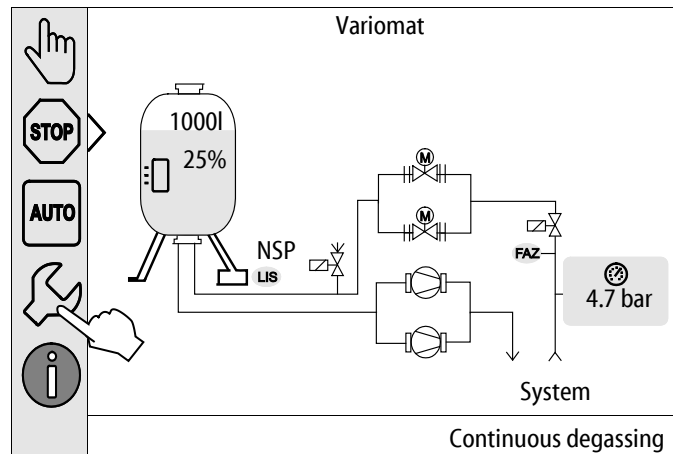
Location	Signal evaluation	Message text	Fault memory entry	Priority	Action	Switching
6	Changeover contact	Make-up fault	---	---	Make-up setting values exceeded	Message ER-Code 06 • Make-up time Message ER-Code 07 • Make-up cycles Message ER-Code 11 • Make-up quantity Message ER-Code 15 • Make-up valve Message ER-Code 20 • Maximum make-up quantity


Note!

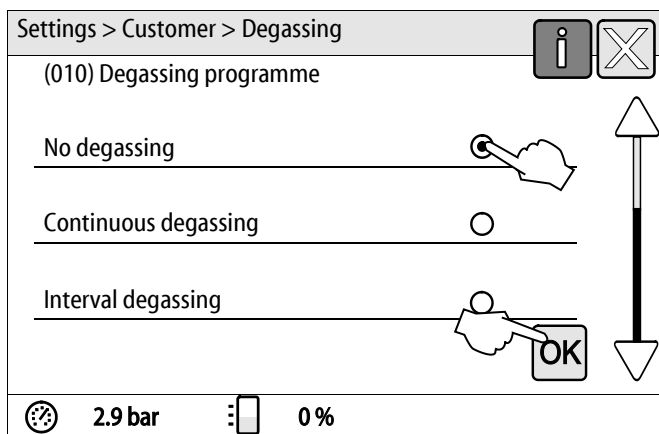
For system-specific settings of the inputs and outputs, please contact the Reflex Customer Service.

9.3.5 Setting degassing programmes

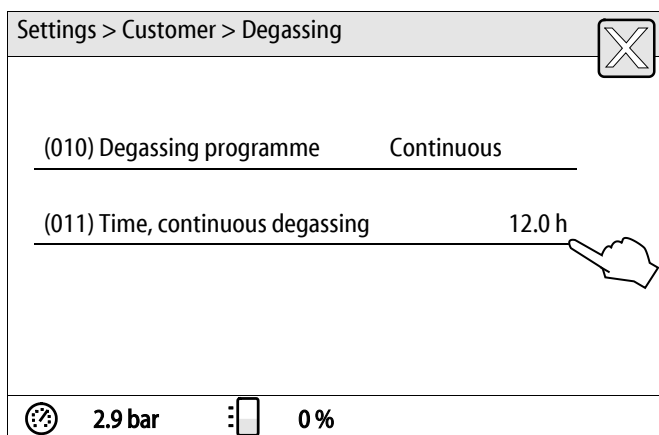
1. Press "Settings".
 - The controller switches to the setting area.
2. Press "Customer >".
 - The controller opens the Customer menu.
3. Press "Degassing >".
 - The controller switches to the selected area.
 - Use the scroll bar to navigate through the list.
4. Press "(010) Degassing programme".
 -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



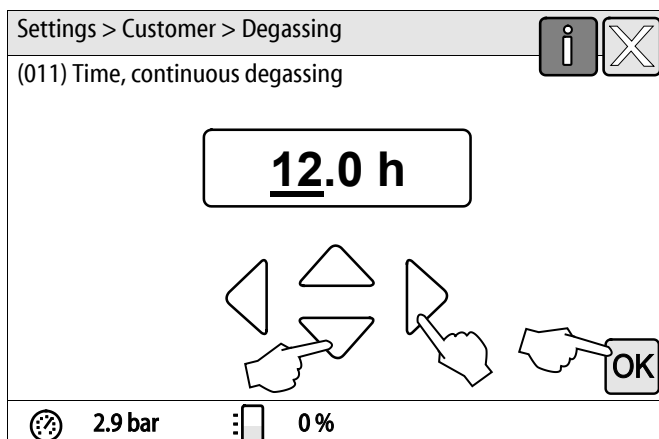
6. Press "(011) Time, continuous degassing".



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.



9.3.6 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 7.8 "Parametrising the controller in the Customer menu" on page 51.

To reset a fault message, proceed as follows:

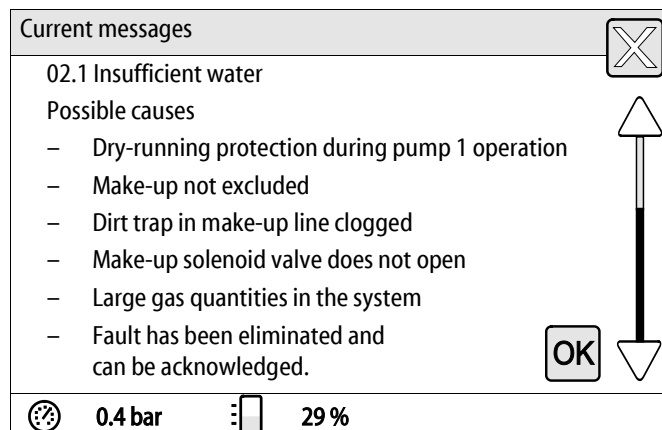
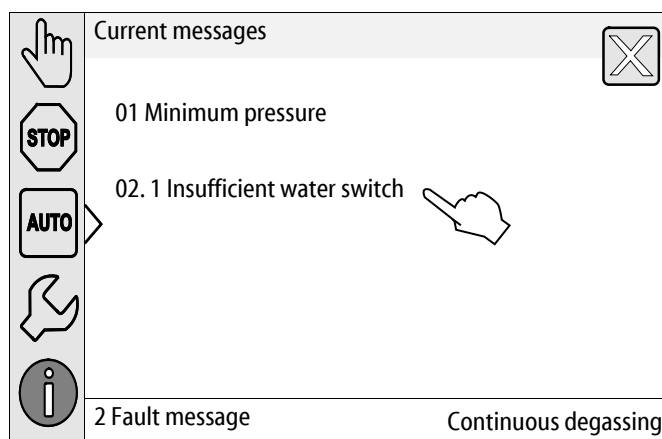
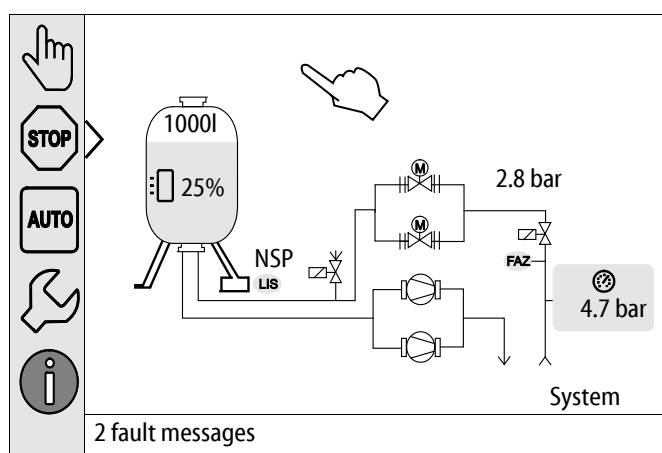
1. Touch the display.

- 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	Causes	Remedy	Alarm reset
01	Min. pressure	<ul style="list-style-type: none"> Set value not reached. Water loss in the system. Pump fault. Controller in Manual mode 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check water level. Check pump. Set the controller to Automatic mode. 	"OK"
02.1 02.2	Insufficient water pump 1 Insufficient water pump 2	<ul style="list-style-type: none"> Set value not reached. Make-up disabled. Air in the system. Dirt trap clogged. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 04.2	Pump 1 Pump 2	Pump disabled. <ul style="list-style-type: none"> Pump jammed. Pump motor defective. Pump motor contactor tripped. Fuse defective. 	<ul style="list-style-type: none"> Rotate the pump with screwdriver. Replace the pump motor. Electrically test the pump motor. Replace the fuse. 	"OK"
05	Pump run-on time	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Set value exceeded. Water loss in the system. Make-up line not connected. Make-up rate insufficient. Make-up hysteresis too low. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check water level. Connect make-up line 	"OK"

ER Code	Alarm	Causes	Remedy	Alarm reset
07	Make-up cycles	Set value exceeded.	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Seal any leak in the system. 	"OK"
08	Pressure measurement	Controller receives incorrect signal.	<ul style="list-style-type: none"> Connect the plug. Check functioning of the pressure sensor. Check the cable for damage. Check the pressure sensor. 	"OK"
09	Level sensor	Controller receives incorrect signal.	<ul style="list-style-type: none"> Check functioning of the load cell. Check the cable for damage. Connect the plug. 	"OK"
10	Maximum pressure	<ul style="list-style-type: none"> Set value exceeded. Overflow line disabled. Dirt trap clogged. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check functioning of the overflow line. Clean the dirt trap. 	"OK"
11	Make-up quantity	"With water meter" must be activated in the Customer menu. <ul style="list-style-type: none"> Set value exceeded. Severe water loss in the system. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check water loss in the system and repair, if necessary. 	"OK"
15	Make-up valve	Contact water meter measures without make-up request.	Check the make-up valve for leaks.	"OK"
16	Power failure	No power.	Connect to power supply.	–
19	Stop > 4 h	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.	"OK"
21	Maintenance recommended	Set value exceeded.	Perform maintenance and reset the maintenance counter upon completion.	"OK"
24	Softening	<ul style="list-style-type: none"> Set value for soft water capacity exceeded. Time interval for replacement of the softening cartridge exceeded. 	Replace the softening cartridges.	"OK"
29	Communication	<ul style="list-style-type: none"> Master/slave communication fault Network fault 	<ul style="list-style-type: none"> Check using the separate installation, operation and maintenance manual. Inform Reflex Customer Service. 	–
30	I/O module fault	<ul style="list-style-type: none"> I/O module defective. Connection between option card and controller faulty. Option card defective. 	Inform Reflex Customer Service.	–

ER Code	Alarm	Causes	Remedy	Alarm reset
31	EEPROM defective	<ul style="list-style-type: none"> EEPROM defective. Internal calculation error. 	Inform Reflex Customer Service.	"OK"
32	Undervoltage	Supply voltage not achieved.	Check power supply.	–
33	Adjustment parameter faulty	EPROM parameter memory defective.	Inform Reflex Customer Service.	–
34	Main board communication faulty	<ul style="list-style-type: none"> 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 missing	Short-circuit of input voltage.	Check wiring of the ball valve.	–
44	Minimum pressure limiter	<ul style="list-style-type: none"> Set value exceeded. 	<ul style="list-style-type: none"> "P₀" minimum operating pressure set correctly? Minimum pressure limiter set correctly? Minimum, pressure limiter released? 	"OK"

**Note!**

Messages identified with "OK" must be confirmed with the "OK" button on the display. The device operation is otherwise interrupted. The readiness for operation is maintained for all other messages. They are displayed.

**Note!**

If necessary, you can set the output of messages via a floating contact in the Customer menu.

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 10.6 "Maintenance certificate" on page 77.

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, see chapter 10.2 "External tightness and function test" on page 72 .. <ul style="list-style-type: none"> "PU" pump Screw connections Check valve downstream of "PU" pump "SV" safety valve 	▲	■		Annually Annually Annually Semi-annually
Clean "ST" dirt trap, see chapter 10.3 "Cleaning the dirt trap" on page 73 .	▲	■	●	Depending on the operating conditions
Check the make-up switching points, see chapter 10.5 "Checking switching points" on page 75 .	▲			Annually
Check the pressure maintenance switching points, see chapter 10.5 "Checking switching points" on page 75 .	▲			Annually

10.2 External tightness and function test

External tightness and function test

The device is in Automatic mode.

Check the following device components:

- "PU" pumps and screw fittings.
 - Leaks at the connections
- Check the check valves downstream of the "PU" pumps for direct closing.
 - Flow-generated noises in the check valve
 - Frequent pump switching
- Manually vent the "SV" safety valve.
 - After blow-off, the safety valve must close tightly

10.3 Cleaning the dirt trap

CAUTION

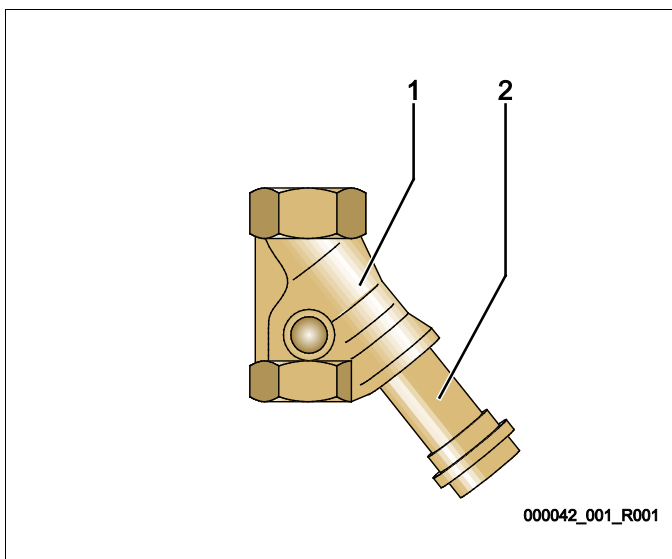
Risk of injury due to pressurised liquid

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 7.6 "Venting the pump" on page 49 .
- Switch to Automatic mode.



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



Notice!

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

10.4 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 47 .
10. Switch to Automatic mode.

10.5 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 42 .
- 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 10.4 "Cleaning the tanks" on page 74 .

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 61 .

10.6 Maintenance certificate

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

[illegible]

10.7 Inspection

10.7.1 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).

10.7.2 Inspection prior to commissioning

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

10.7.3 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



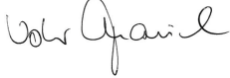
Technical hotline

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		
<p>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</p> <p>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</p>		
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	<p>Vessel article 4 paragraph (1) a) i) 2. indent (Annex II table 2) with</p> <ul style="list-style-type: none"> accessories article 4 (1) d): membrane, deaerator, breather pipe and drain valve with flexible connection set (Variomat) respectively system connection (Variomat Giga) <p>Assembly article 4 (2) b) consisting of:</p> <p>Vessel article 4 paragraph (1) a) i) 2. indent (Annex II table 2) with</p> <ul style="list-style-type: none"> 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	<p>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.</p>	
 <p>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</p>	<p>Ahlen, 19.07.2016</p> <p> Norbert Hülsmann Members of the Management</p> <p> Volker Mauel Members of the Management</p>	

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.

Reflex Winkelmann GmbH
Gersteinstraße 19
59227 Ahlen, Germany

Telephone: +49 (0)2382 7069-0
Fax: +49 (0)2382 7069-588
www.reflex.de