

Reflexomat with Touch controller

with one compressor:

RS 90/1 T, RS 150/1, RS 300/1, RS 400/1, RS 580/1

with two compressors:

RS 90/2, RS 150/2, RS 300/2, RS 400/2, RS 580/2

GB

Operating manual

Original operating manual



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1 Notes on the operating manual

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

The operating manual will help you to:

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

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

This operating manual describes the device with basic equipment and interfaces for optional equipment with additional functions. For optional equipment and accessories, see chapter 4.6 "Optional equipment and accessories" on page 14 .



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 62 .

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

Reflexomat with touch control and one compressor

- One "RG" primary tank as expansion tank.
- Control unit.
 - Touch control with one compressor as stand-alone console.



Note!

The connection of "RF" secondary tanks to the "RG" primary tank is optionally possible.

Reflexomat with touch control and two compressors

- One "RG" primary tank as expansion tank.
 - Control unit
 - Touch control with two compressors as stand-alone console.

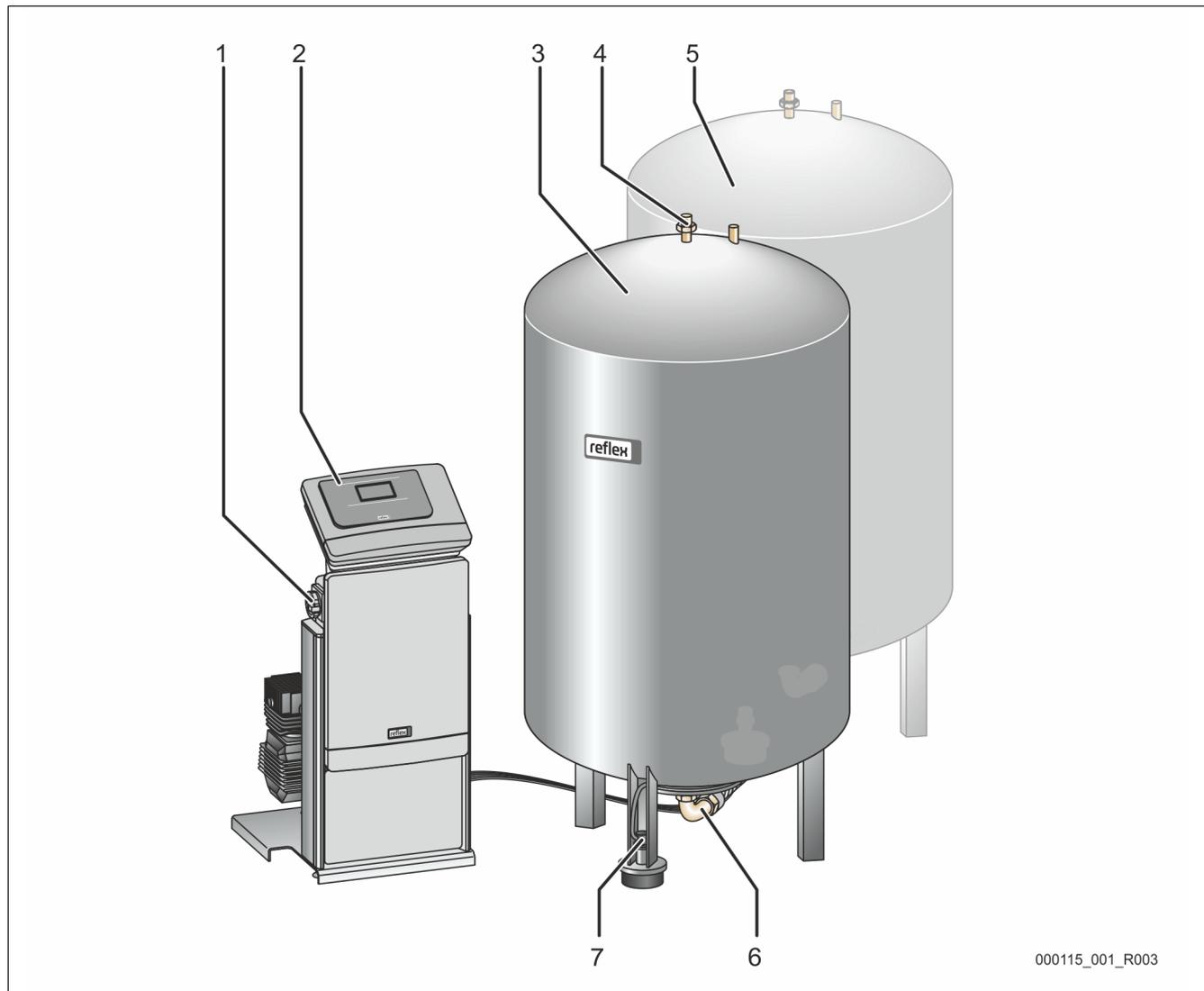


Note!

The connection of "RF" secondary tanks to the "RG" primary tank is optionally possible.

4.2 Overview

Reflexomat with touch control and one compressor

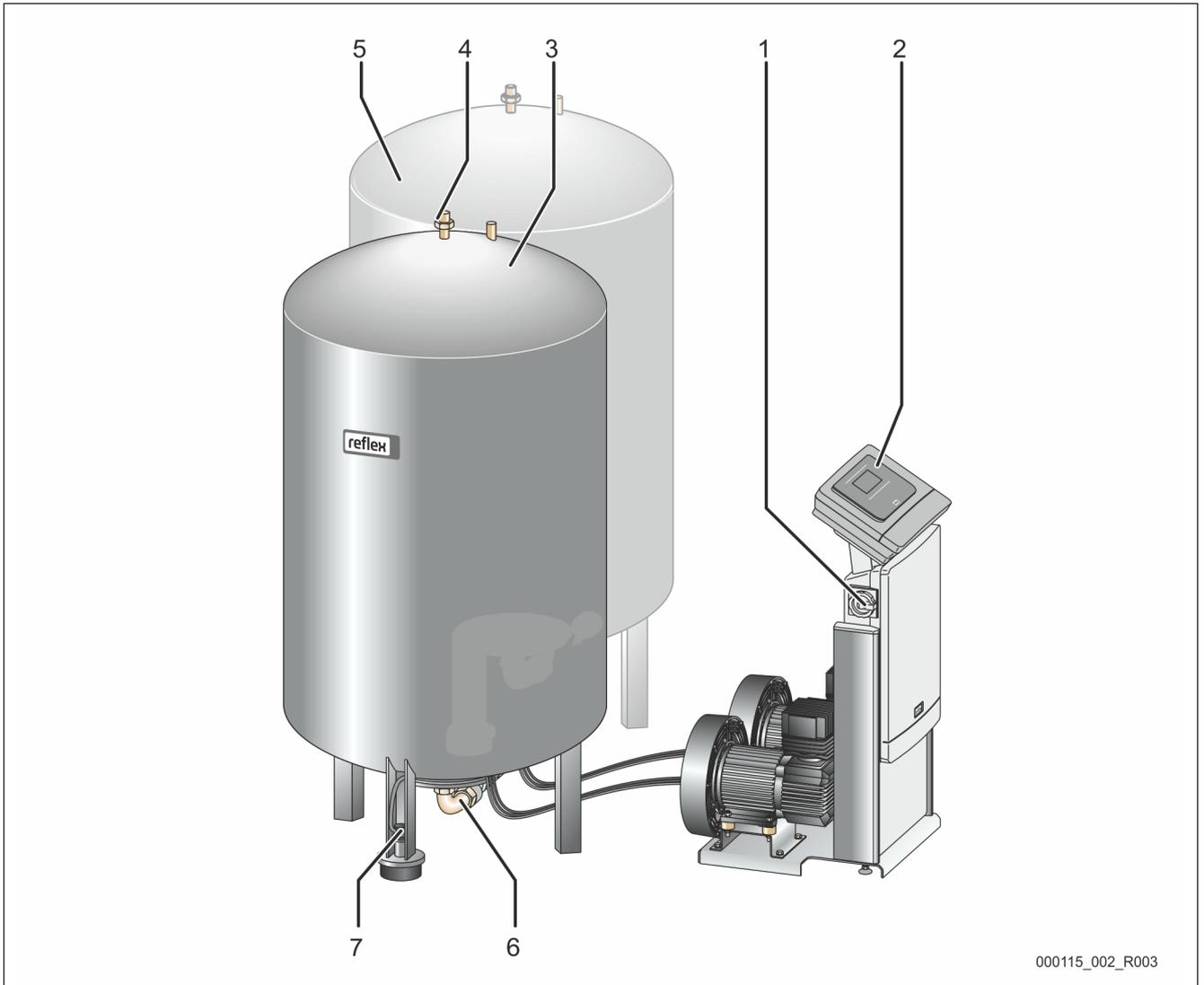


000115_001_R003

1	Main switch
2	Control unit <ul style="list-style-type: none"> • Compressor(s) • "Reflex Control Touch" controller
3	"RG" primary tank

4	"SV" safety valve
5	"RF" secondary tank (optional)
6	"EC" expansion line
7	"LIS" level sensor

Reflexomat with touch control and two compressors



000115_002_R003

1	Main switch
2	Control unit <ul style="list-style-type: none"> • Compressor(s) • "Reflex Control Touch" controller
3	"RG" primary tank

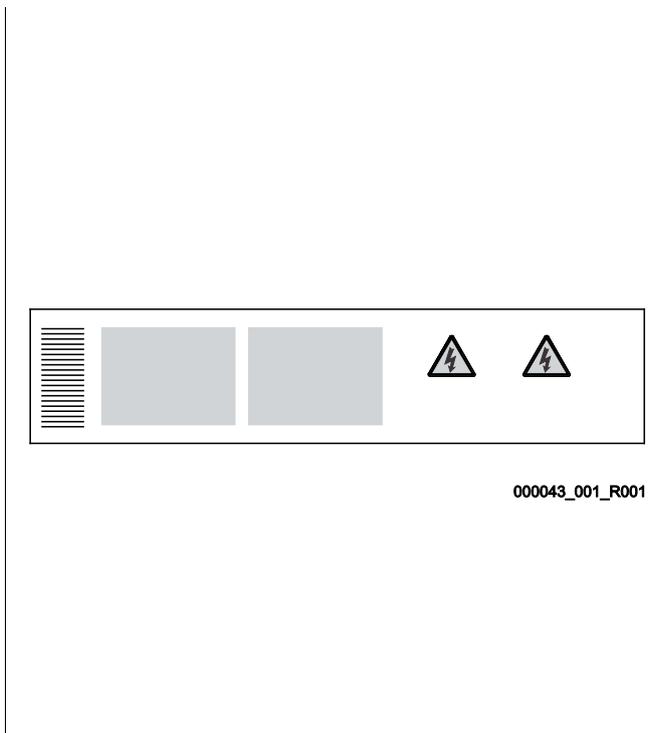
4	"SV" safety valve
5	"RF" secondary tank (optional)
6	"EC" expansion line
7	"LIS" level sensor

4.3 Identification

4.3.1 Nameplate

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

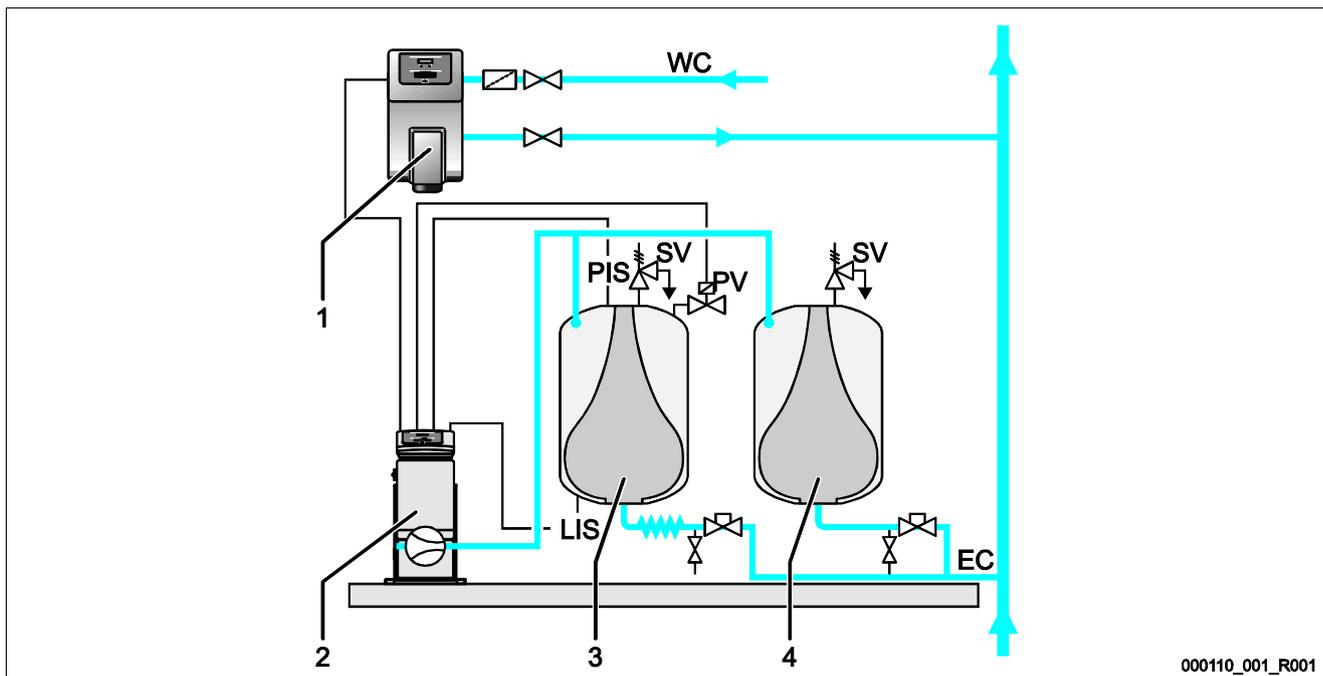
Information on nameplate	Meaning
Type	Device name
Serial No.	Serial number
min. / max. allowable pressure P	Minimum/maximum permissible pressure
max. continuous operating temperature	Maximum temperature for continuous operation
min. / max. allowable temperature / flow temperature TS	Minimum / maximum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



4.3.2 Type code

No.		Reflexomat RS type key
1	Control unit designation	Reflexomat RS 90 / 1, RG 1000 I, RF 1000 I 1 2 3 4 5 6
2	Number of compressors	
3	"RG" primary tank	
4	Nominal volume	
5	"RF" secondary tank	
6	Nominal volume	

4.4 Function



1	Water make-up with "Fillcontroll Auto"
2	Control unit
3	Primary tank as expansion tank
4	Secondary tank as additional expansion tank
WC	Make-up line

PIS	Pressure sensor
SV	Safety valve
PV	Solenoid valve
LIS	Pressure load cell
EC	Expansion line

Expansion tanks

One primary tank and multiple optional secondary tanks may be connected. A diaphragm separates the tanks' interiors into an air and a water space, preventing the ingress of atmospheric oxygen into the expansion water. The primary tank is connected to the control unit downstream and connected hydraulically to the plant system. The pressure is protected at the air side by the "SV" safety valves of the tanks.

Control unit

The control unit comprises one or – optionally – two "CO" compressor(s) and the "Reflex Control Touch" controller. Via the primary tank, the pressure is measured with the "PIS" pressure sensor and the water level with the "LIS" pressure load cell and the values then displayed in the controller display.

Maintaining pressure

- If the water is heated, it expands and the pressure increases in the plant system. If the pressure set at the controller is exceeded, the "PV" solenoid valve opens and discharges air from the primary tank. Water flows from the system into the primary tank and the pressure drops in the plant system until the pressure in the plant system and the primary tank is equalised.
- The pressure in the plant system drops when the water cools. When the pressure drops below the set value, the "CO" compressor cuts in and delivers compressed air into the primary tank. This displaces water out of the primary tank into the plant system. The pressure in the system rises.

Make-up

The addition of more water is controlled within the controller. The "LIS" pressure load cell determines the water level and sends this value to the controller of the pressure maintaining station. The controller actuates an external make-up device. Water is directly added into the system in a controlled manner by monitoring the make-up time and the make-up cycles.

If the water level in the primary tank falls below minimum, a fault message is output from the controller and shown in the display.



Note!

For optional equipment for water make-up, see chapter 4.6 "Optional equipment and accessories" on page 14 .

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 pressure-maintaining equipment:

- Control unit with one or two compressor(s) including compressed air line(s).
- Primary tank with flexible water connection.
- "LIS" pressure load cell for level sensing.

4.6 Optional equipment and accessories

- Secondary tanks with connection sets for the primary tank.
- For make-up with water
 - Make-up without pump:
 - Solenoid "Fillvalve" with ball valve and Reflex Fillset for make-up with drinking water.
 - Make-up with pump:
 - Reflex Fillcontrol Auto, with integrated pump and a system separation vessel or Auto Compact
- For water make-up and degassing:
 - Reflex Servitec 30 (25)
 - Reflex Servitec 35-95
- Fillset for make-up with drinking water.
 - With integrated system separator, water meter, dirt trap and locking mechanisms for the "WC" make-up line.
- Fillset Impulse with FQIRA+ contact water meter for make-up with drinking water.
- Fillsoft for softening or desalination of the make-up water from the drinking water network.
 - Fillsoft is installed between Fillset and the device. The device controller evaluates the make-up quantities and signals a required replacement of the softening cartridges.
- Optional expansions for Reflex controllers:
 - I/O module for standard communication.
 - Master-Slave-Connect for master controllers for maximum 10 devices.
 - Bus modules:
 - Lonworks Digital
 - Lonworks
 - Profibus DP
 - Ethernet
- Diaphragm rupture monitor



Note!

Separate operating instructions are supplied with accessories.

5 Technical data

5.1 Control unit



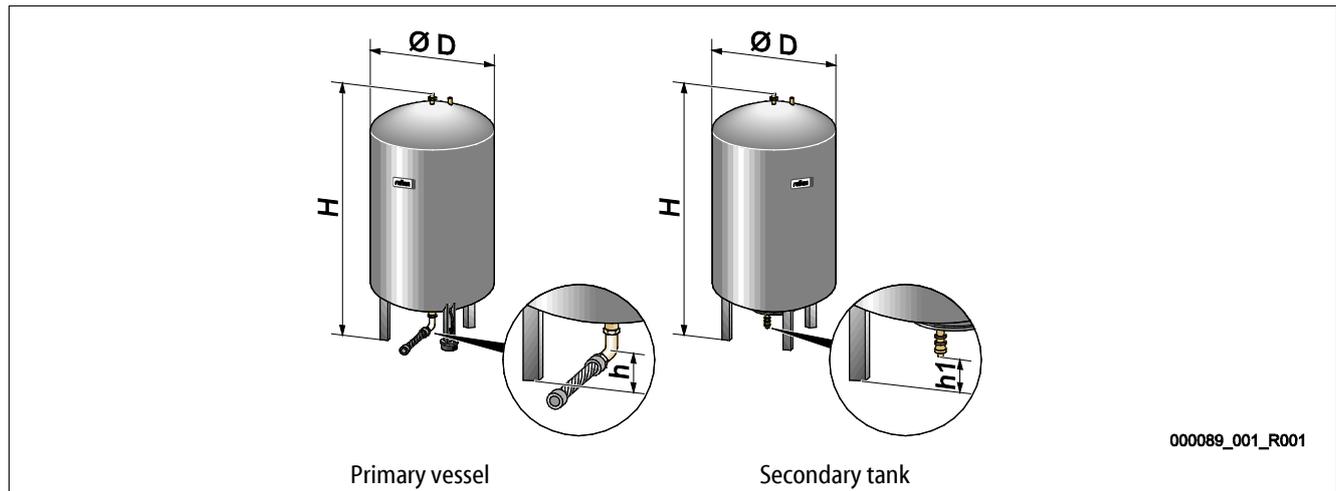
Note!

The following values apply for all control units:

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

Type	Power output (kW)	Power supply (V / Hz , A)	Degree of protection	Number of RS-485 interfaces	I/O module	Electrical voltage control unit (V, A)	Noise level (dB)	Weight (kg)
RS 90/1 T	0.75	230 / 50, 3	IP 54	1	No	230, 2	72	32
RS 90/2	1.5	230 / 50, 6.5	IP 54	1	No	230, 2	72	45
RS 150/1	1.1	400 / 50, 5	IP 54	1	No	230, 2	72	45
RS 300/1	2.2	400 / 50, 10	IP 54	1	No	230, 2	76	48
RS 300/2	4.4	400 / 50, 19	IP 54	1	No	230, 2	76	86
RS 400/1	2.4	400 / 50, 10.5	IP 54	1	No	230, 2	76	62
RS 400/2	4.8	400 / 50, 21	IP 54	1	No	230, 2	76	118
RS 580/1	3	400 / 50, 13	IP 54	1	No	230, 2	76	102
RS 580/2	6	400 / 50, 26	IP 54	1	No	230, 2	76	196

5.2 Tanks



Type	Diameter Ø "D" (mm)	Weight (kg)	Connection (inches)	Height "H" (mm)	Height "h" (mm)	Height "h1" (mm)
6 bar - 200	634	37	R1	970	115	155
6 bar - 300	634	54	R1	1270	115	155
6 bar - 400	740	65	R1	1255	100	140
6 bar - 500	740	78	R1	1475	100	140
6 bar - 600	740	94	R1	1720	100	140
6 bar - 800	740	149	R1	2185	100	140
6 bar - 1000	1000	156	DN65	2025	195	305
6 bar - 1500	1200	465	DN65	2025	185	305
6 bar - 2000	1200	565	DN65	2480	185	305
6 bar - 3000	1500	795	DN65	2480	220	334
6 bar - 4000	1500	1080	DN65	3065	220	334
6 bar - 5000	1500	1115	DN65	3590	220	334
10 bar - 350	750	230	DN40	1340	190	190
10 bar - 500	750	275	DN40	1600	190	190
10 bar - 750	750	345	DN50	2185	180	180
10 bar - 1000	1000	580	DN65	2065	165	285
10 bar - 1500	1200	800	DN65	2055	165	285
10 bar - 2000	1200	960	DN65	2515	165	285
10 bar - 3000	1500	1425	DN65	2520	195	310
10 bar - 4000	1500	1950	DN65	3100	195	310
10 bar - 5000	1500	2035	DN65	3630	195	310

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).
-

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.
-



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 15 .
- 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.



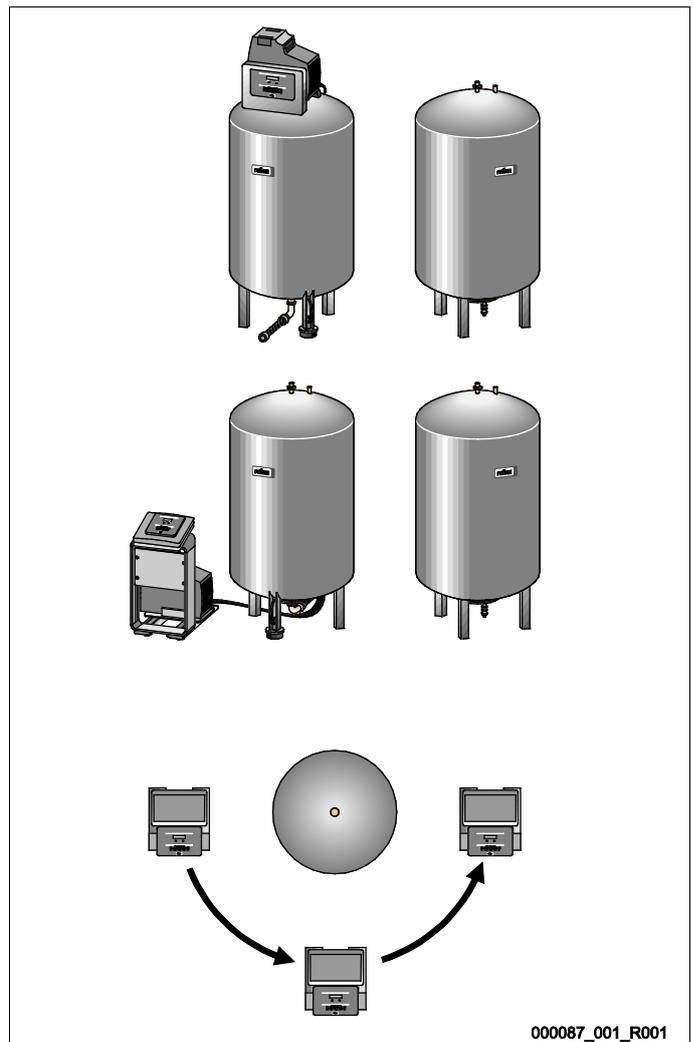
Notice!

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

6.3.1 Positioning

Determine the device position.

- Control unit
 - Primary tank
 - Optional secondary tank
- The control unit can be installed on either side or in front of the primary tank. The distance of the control unit to the primary tank results from the connection set supplied.



6.3.2 Tank installation

ATTENTION**Damage due to improper installation**

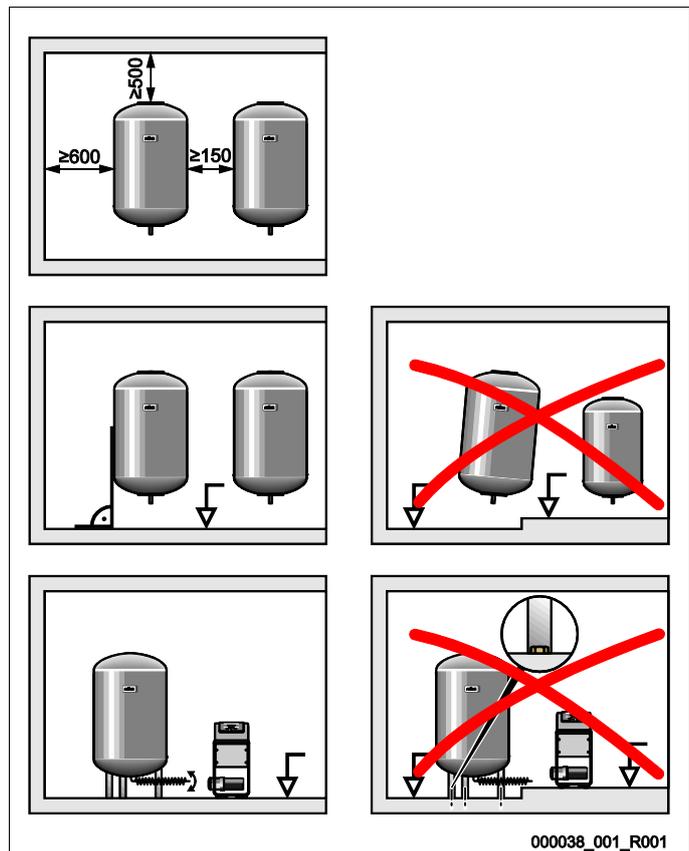
Additional device stresses may arise due to the connection of pipes or system equipment.

- 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.



6.3.3 Connection to the facility system

⚠ CAUTION

Risk of injury due to falls or stumbling

Bruising caused by falls or stumbling over cables or pipes during installation.

- Wear personal protective equipment (helmet, protective clothing, gloves, safety boots).
 - Ensure proper installation of cables and pipes between the control unit and the tanks.
-

ATTENTION

Damage due to improper installation

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

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

ATTENTION

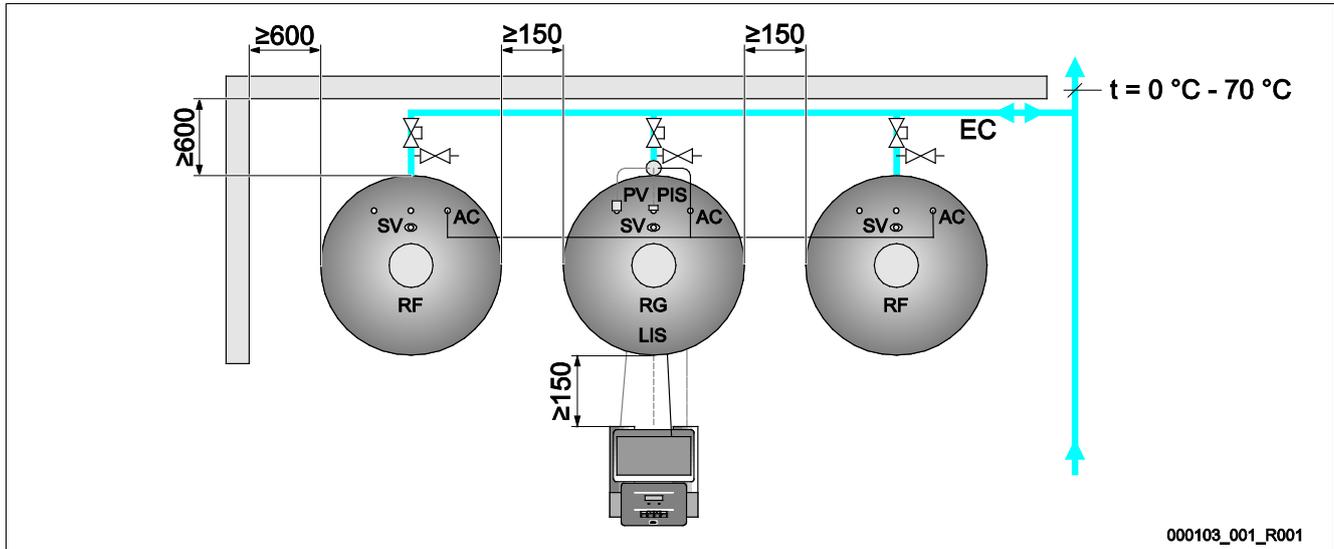
Damage to cables and pipes

If cables and pipes are not routed professionally between tanks and the control unit, they may become damaged.

- Route cables and pipes in a professional manner over the flooring.
-

6.3.3.1 Water-side connection

The following describes the exemplary installation of the control unit before the primary tank and the connection of two secondary tanks. Proceed accordingly for other installation variants.



RF	Secondary tank
RG	Primary tank
SV	Safety valve
PV	Solenoid valve

PIS	Pressure sensor
AC	Compressed air line
EC	Expansion line

To ensure the proper function of the "LIS" level sensor, you must use the supplied hose to flexibly connect the primary tank to the system.

The "EC" expansion line provides secure locking and emptying for primary tank and the optional secondary tanks. If more than one tank is used, a collective line to the system is installed.

Use points with temperatures between 0 °C and 70 °C to connect to the system. This is the return of the generator in heating systems and the flow in refrigeration systems.

At temperatures below or above 0 °C – 70 °C, you must install in-line vessels between the system and the Reflexomat.

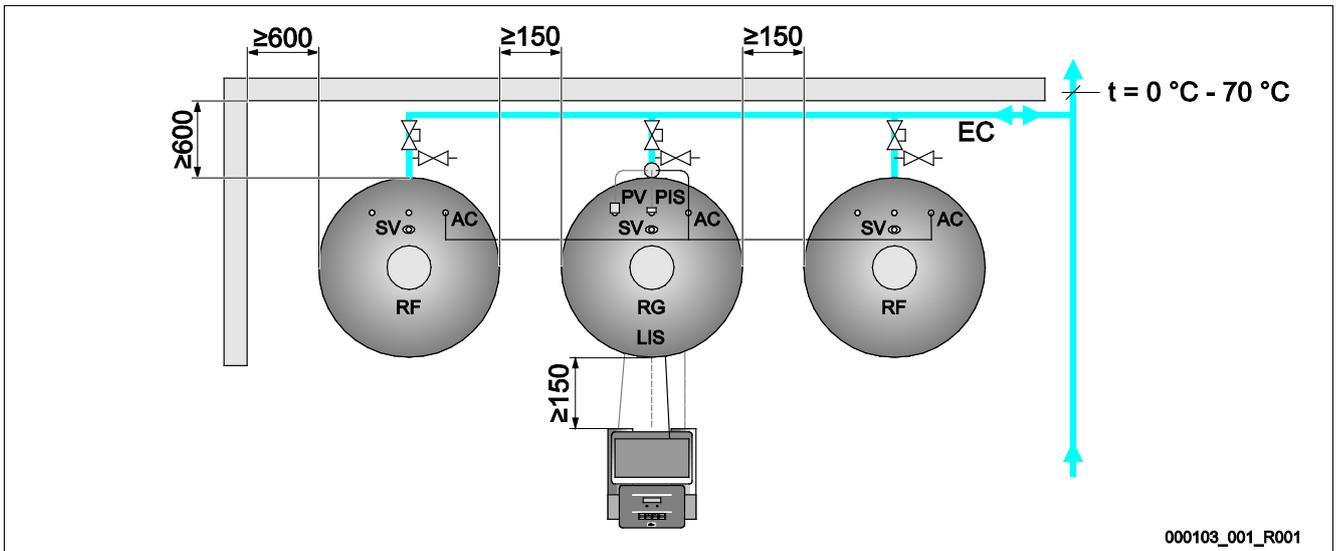


Notice!

For details regarding the switching of Reflexomats or in-line vessels and the dimensions of the expansion lines, please see the planning documents. More information is also provided in the Reflex Planning Guide.

6.3.3.2 Control unit connection

The following describes the exemplary installation of the control unit before the primary tank and the connection of two secondary tanks. Proceed accordingly for other installation variants.



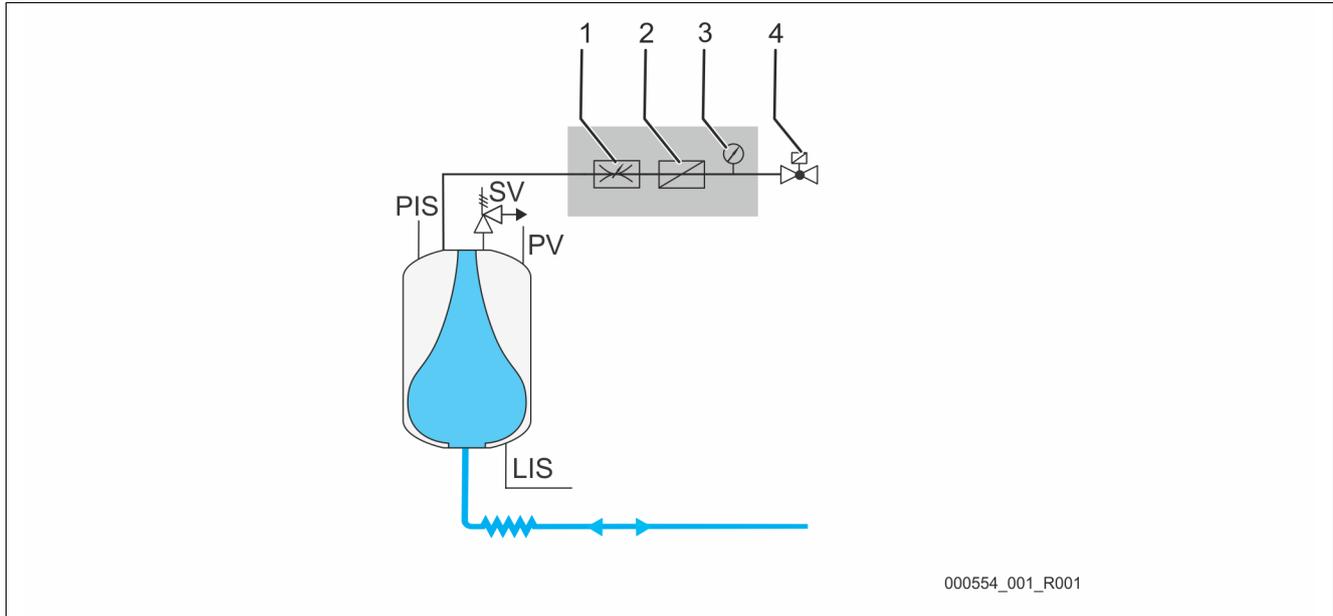
RF	Secondary tank
RG	Primary tank
SV	Safety valve
PV	Solenoid valve

PIS	Pressure sensor
AC	Compressed air line
EC	Expansion line

- The "PV" solenoid valve, the "PIS" pressure transducer and the corresponding cables are factory-installed on the primary tank.
 - Run the cable through the assembly pipe on the rear of the primary tank to the control unit.
- Subsequently install the level sensor at the primary tank, see chapter 6.3.5 "Fitting the level sensor" on page 25 .
 - Attach the cable to the "LIS" pressure pick-up of the level sensor and run the cable to the control unit.
- The flexible compressed air hose is connected with the control unit. Run the compressed air hose through the assembly pipe as well.
 - Control unit with one compressor:
 - Connect the compressed air line directly to the "AC" compressed air connection of the primary tank.
 - Control unit with two compressors or additional secondary tank:
 - First install the supplied distributor at the "AC" compressed air connection of the primary tank.
 - Connect the compressed air lines of the compressors via the distributor.
 - Use the supplied connection sets to connect the secondary tanks.

6.3.4 Connection to an external compressed air line

An external pressure supply can optionally be connected to the Reflexomat. When doing so it must be ensured that a pressure reducer is fitted in the external pressure line. The minimum pressure to be set depends on the relevant pressure rating of the tank.



1	Pressure reducer, site attachment
2	Dirt trap, site attachment
3	Pressure gauge, site attachment
4	Solenoid valve, supplied by Reflex

PIS	Pressure sensor
SV	Safety valve
PV	Overflow solenoid valve
LIS	Level sensor

Instead of the compressor, a solenoid valve is actuated in the external compressed air line, which releases the compressed air for the vessel. The solenoid valve is activated by the controller. The electrical connection of the solenoid valve is made via the terminal for the compressor in the respective controller.

Properties of the external compressed air:

- Quality
 - Fluid group 2 according to the Pressure Equipment Directive 2014 / 68 EU.
 - DIN ISO 8573-1 Class 1.
- Oil-free
 - **ATTENTION** Diaphragm damage caused by oil-containing compressed air. Keep the compressed air free of oil.
- Compressed air
 - **ATTENTION** Damage to the tank. The compressed air must be reduced to the respective tank pressure rating.



Note!

See chapter "Terminal plan" for the solenoid valve electrical connection.

6.3.5 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 6.3.2 "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 6.3.2 "Tank installation" on page 20 .
- Perform a null balancing of the filling level when the primary tank is aligned and fully emptied, see chapter 9.3 "Configuring settings in the controller" on page 46 .

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

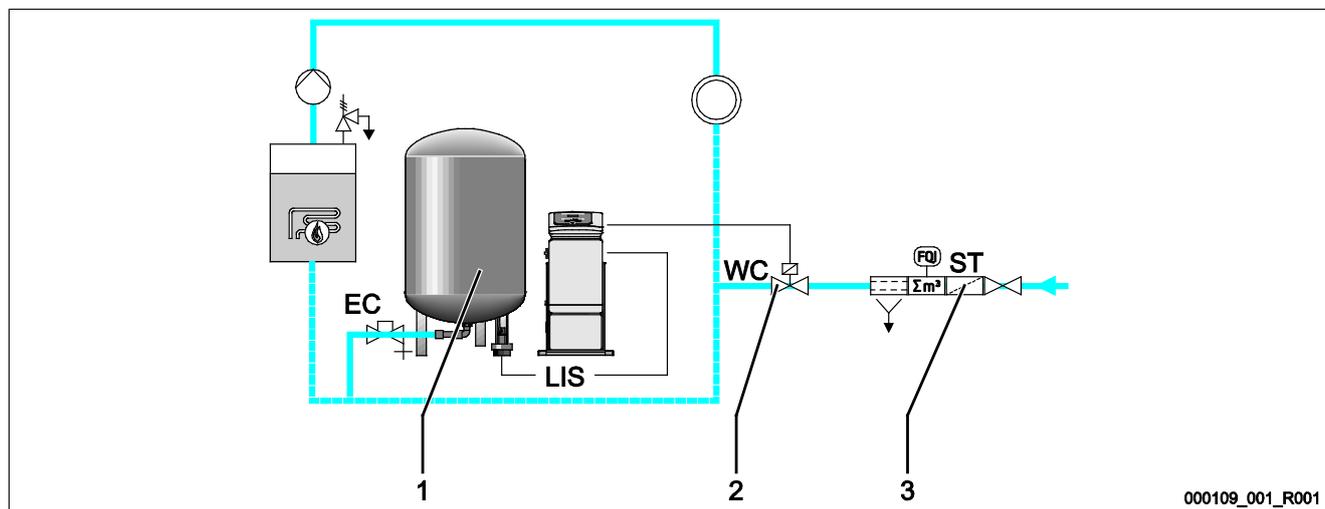
6.4 Make-up and degassing variants

6.4.1 Function

The filling level is recorded in the primary tank by the "LIS" level sensor and evaluated in the controller. When the water level falls below the value specified in the controller's customer menu, the external make-up is activated.

6.4.1.1 Make-up without pump

Reflexomat RS with solenoid valve and ball valve.



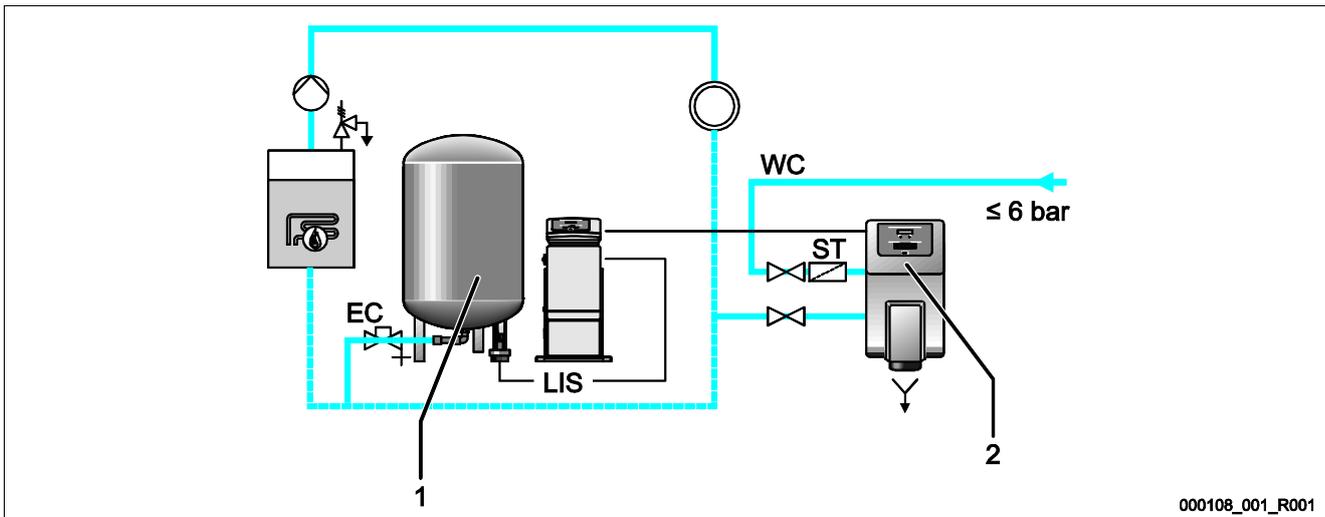
1	Reflexomat RS
2	Solenoid valve "Fillvalve" with ball valve
3	Reflex Fillset
ST	Dirt trap

WC	Make-up line
LIS	Level sensor
EC	Expansion line

Preferably, you should use the Reflex Fillset with integrated system separator when using drinking water for make-up, see chapter 4.6 "Optional equipment and accessories" on page 14 . If you don't use a Reflex Fillset, you must use an "ST" dirt trap with a mesh size ≥ 0.25 mm for the make-up.

6.4.1.2 Make-up with pump

Reflexomat RS with Reflex Fillcontrol Auto



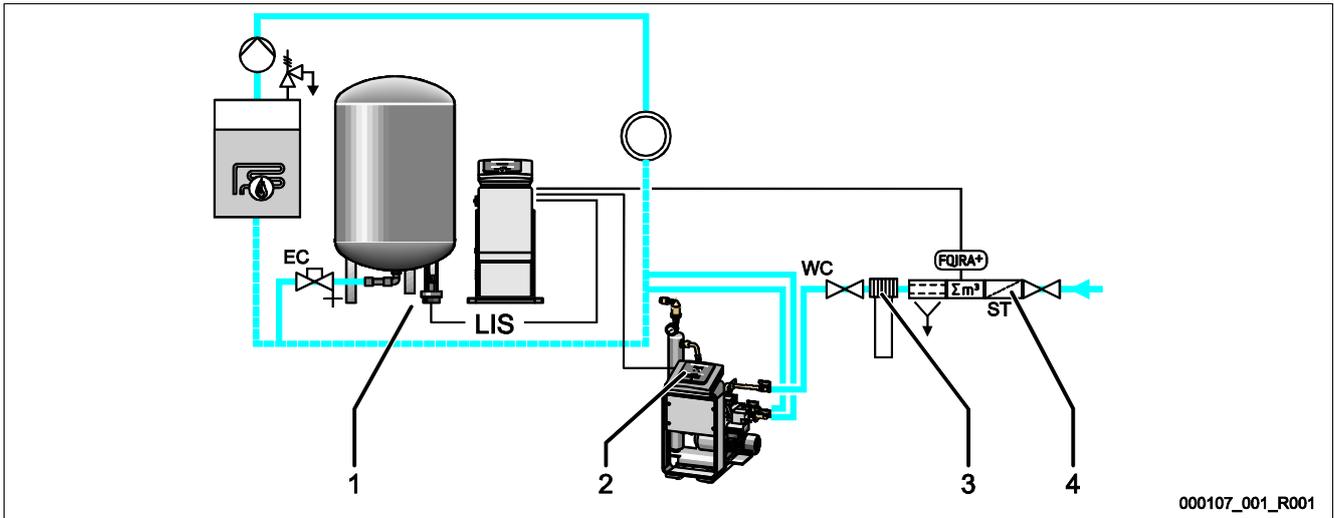
1	Reflexomat RS
2	Fillcontrol Auto
WC	Make-up line

ST	Dirt trap
EC	Expansion line
LIS	Level sensor

Water make-up with Fillcontrol Auto is suitable for make-up at high system pressures of up to 8.5 bar, see chapter 4.6 "Optional equipment and accessories" on page 14 . The "ST" dirt trap is part of the deliverables.

6.4.1.3 Make-up with softening and degassing

Reflexomat RS and Reflex Servitec.



000107_001_R001

1	Reflexomat RS
2	Reflex Servitec
3	Reflex Fillsoft
4	Reflex Fillset Impulse

ST	Dirt trap
WC	Make-up line
LIS	Level sensor
EC	Expansion line

The Reflex Servitec degassing and make-up station degasses the water from the facility system and the make-up water. The automatic water make-up for the facility system is controlled by the pressure maintenance system. Reflex Fillsoft additionally softens the make-up water.

- Reflex Servitec degassing and make-up station, see chapter 4.6 "Optional equipment and accessories" on page 14 .
- Reflex Fillsoft softening systems and Reflex Fillset Impulse, see chapter 4.6 "Optional equipment and accessories" on page 14 .



Notice!

When using Reflex Fillsoft softening systems, always install the Reflex Fillset Impulse.

- The controller evaluates the make-up quantities and signals a required replacement of the softening cartridges.

6.5 Electrical connection

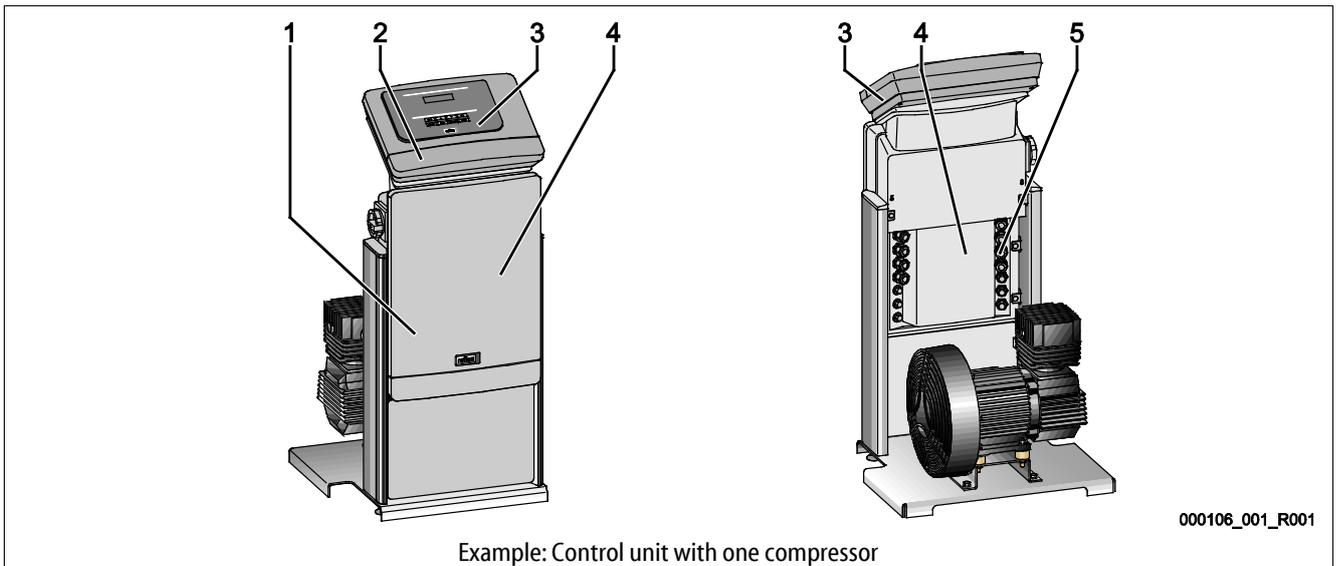
⚠ DANGER

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.



Example: Control unit with one compressor

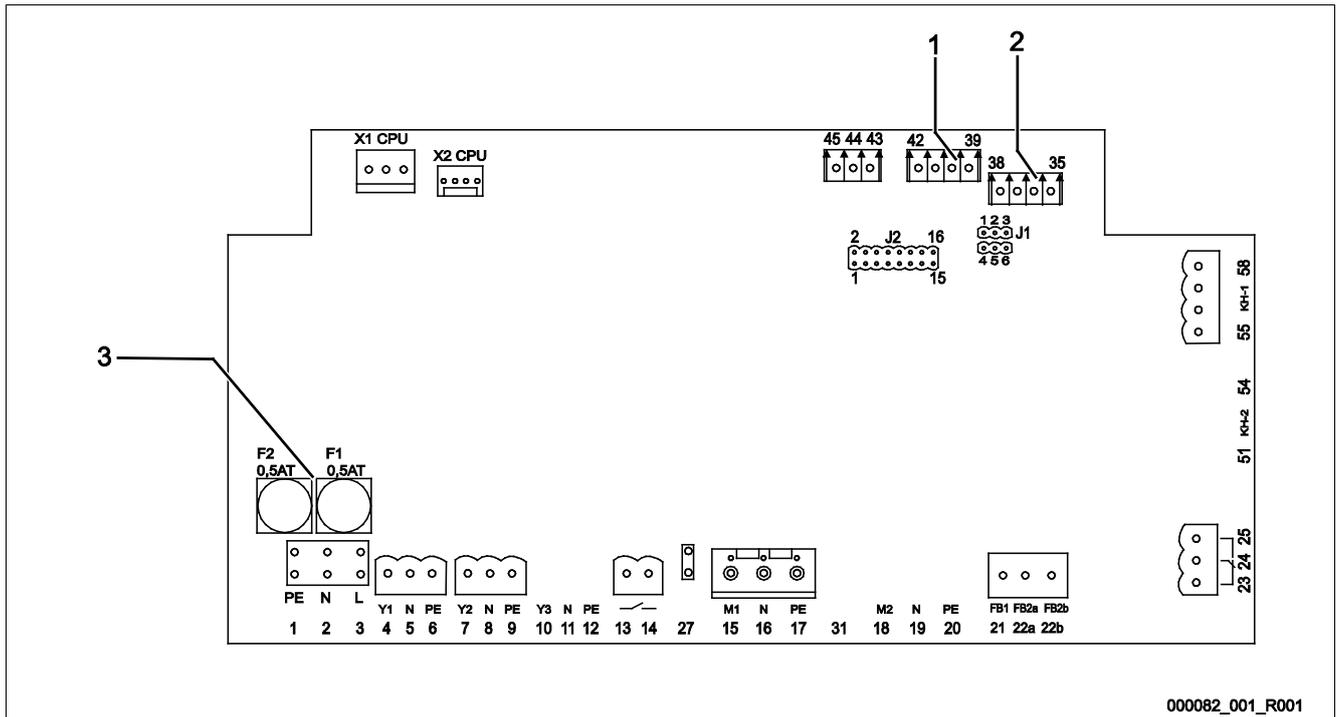
1	Connection component cover (hinged)
2	Operating unit cover (hinged) <ul style="list-style-type: none"> • RS-485 interfaces • Pressure and Level outputs
3	Touch control

4	Connection component rear
5	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.
 - Connection unit, see chapter 6.5.1 "Terminal plan, connection component" on page 30 .
 - Operating unit, see chapter 6.5.2 "Terminal plan, operating unit" on page 32 .
 - Note that the fusing for the device connection is to be provided by the user, see chapter 5 "Technical data" on page 15 .

6.5.1 Terminal plan, connection component



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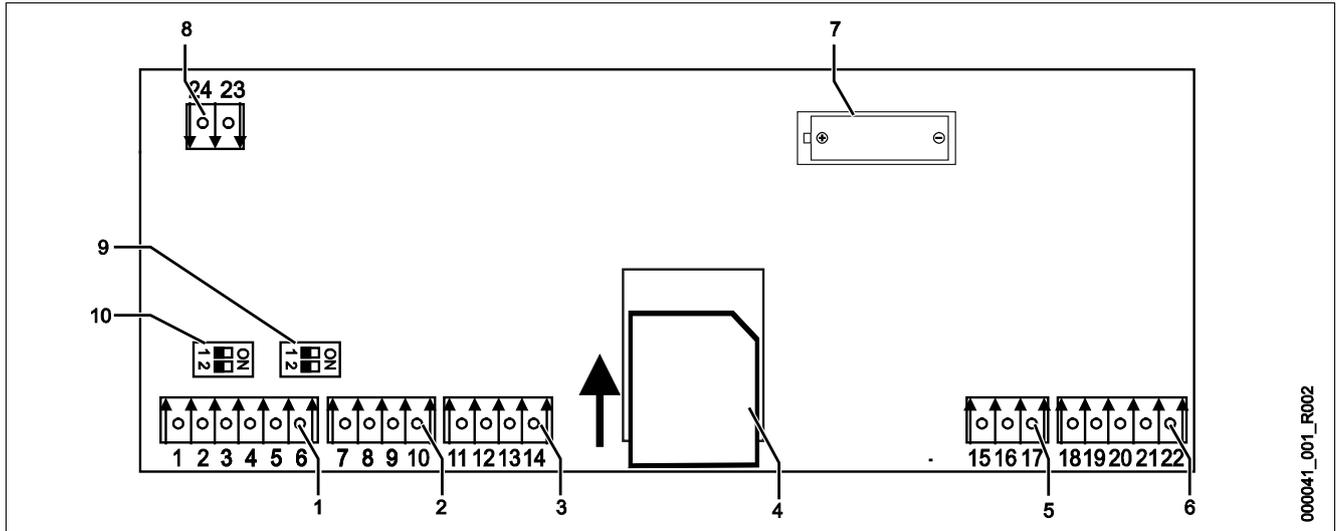
1	Pressure
2	Level

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

Terminal number	Signal	Function	Wiring
Supply			
X0/1	L	230 V supply Reflexomat RS 90	User supplied
X0/2	N		
X0/3	PE		
X0/1	L1	400 V supply Reflexomat RS 150 ... 580	User supplied
X0/2	L2		
X0/3	L3		
X0/4	N		
X0/5	PE		
Circuit board			
4	Y1	WV make-up valve	User, optional
5	N		
6	PE		
7	Y2	PV 1 solenoid valve	User supplied
8	N		
9	PE		
13		Dry-running protection message (floating)	User, optional
14			

Terminal number	Signal	Function	Wiring
23	NC	Group message (floating)	User, optional
24	COM		
25	N.O.		
35	+18 V (blue)	Analogue input, LIS level measuring at the primary tank	User supplied
36	GND		
37	AE (brown)		
38	PE (shield)		
39	+18 V (blue)	PIS pressure sensor analogue input at the primary tank	User, optional
40	GND		
41	AE (brown)		
42	PE (shield)		
43	+24 V	Digital inputs	User, optional
44	E1	E1: Contact water meter	Factory-provided
1	PE	Voltage supply	Not assigned
2	N		
3	L		
10	Y3	PV 2 solenoid valve	Factory-provided
11	N		
12	PE		
15	M1	Compressor 1 with 230 V systems, with 400 V systems via 6K1 motor protection	Factory-provided
16	N		
17	PE		
18	M2	Compressor 2 with 230 V systems, with 400 V systems via 6K1 motor protection	Factory-provided
19	N		
20	PE		
21	FB1	Compressor 1 voltage monitoring	Factory-provided
22a	FB2a	Compressor 2 voltage monitoring	Factory-provided
22b	FB2b	External make-up request together with 22a	---
27	M1	Flat plug for supply, compressor 1	Factory-provided
31	M2	Flat plug for supply, compressor 2	Factory-provided
45	E2	E2: Insufficient water switch	Factory-provided
51	GND	Solenoid valve 2	---
52	+24 V (supply)		
53	0 – 10 V (correcting variable)		
54	0 – 10 V (feedback)		
55	GND	Solenoid valve 1	---
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
2	I/O interface
3	I/O interface (reserve)
4	SD card
5	10 V supply

6	Analogue outputs for Pressure and Level
7	Battery compartment
8	Supply voltage, bus modules
9	RS-485 connection
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			

6.5.3 RS-485 interface

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

- S1 interface
 - Using this interface, you can operate maximum 10 devices in a master/slave network.
- S2 interface
 - "PIS" pressure and "LIS" level.
 - "CÖ" compressor operating states.
 - Operating states of the "PV" solenoid valve in the overflow line.
 - Operating states of the "WV" solenoid valve in the overflow line.
 - Cumulated quantity of the FQIRA + contact water meter.
 - All messages, see chapter 9.3.3 "Messages" on page 50 .
 - All entries in the fault memory.

6.5.3.1 Connecting the RS-485 interface

Connect the interface as follows:

1. For connecting the interface use only a cable with these properties:
 - LJYCY (TP), 4 × 2 × 0.8, maximum overall bus length 1000 m.
2. Use a shielded cable to connect the interface to terminals 29, 30, 31 of the main board in the control cabinet.
 - For connecting the interface, see chapter 6.5 "Electrical connection" on page 29 .
3. When using the device with a control centre not supporting an RS-485 interface (RS-232, for example), you must use a corresponding adapter.

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 10.4 "Maintenance certificate " on page 59 .

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.

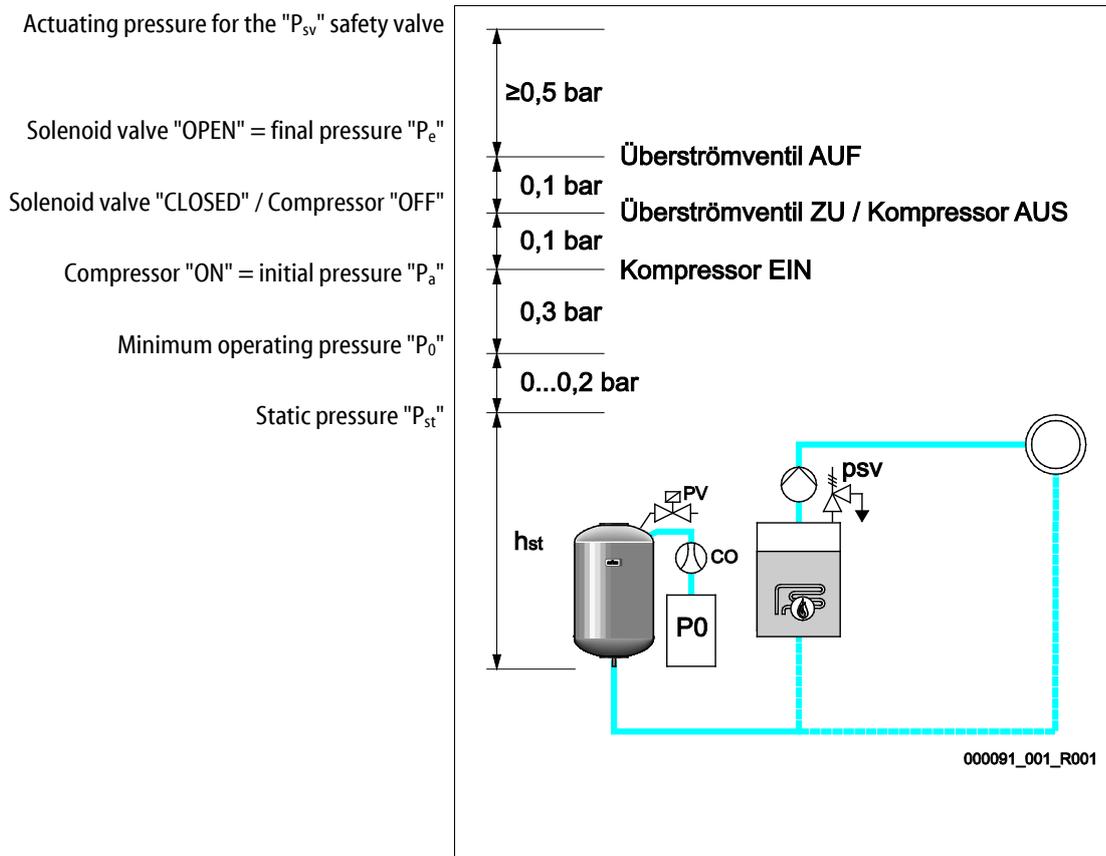
7.1 Checking the requirements for commissioning

The device is ready for commissioning when the tasks described in Chapter Installation have been concluded. Comply with the following instructions for 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 P₀ minimum operating pressure for the controller

The "P₀" minimum operating pressure is determined by the location of the pressure maintaining device. The controller calculates the switching points for the "PV" solenoid valve and the "CO" compressor from the "P₀" minimum operating pressure.



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

$P_0 = P_{st} + P_D + 0.2 \text{ bar}^*$	Enter the calculated value in the start routine of the controller, see chapter 7.3 "Modifying the controller's start routine" on page 36 .
$P_{st} = h_{st}/10$	h_{st} in metres
$P_D = 0.0 \text{ bar}$	for safety temperatures $\leq 100 \text{ }^\circ\text{C}$
$P_D = 0.5 \text{ bar}$	for safety temperatures $= 110 \text{ }^\circ\text{C}$

*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, safety temperature 100 °C.

Calculation example:

$$P_0 = P_{st} + P_D + 0.2 \text{ bar}^*$$

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

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

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

$$P_D = 0.0 \text{ bar at a safety temperature of } 100 \text{ }^\circ\text{C}$$

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

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



Notice!

Avoid dropping below the "P₀" minimum operating pressure. Vacuum, vaporisation and cavitation are thus excluded.

7.3 Modifying the controller's start routine



Note!

During commissioning, you must once execute the start routine.

- For information about controller operation, see chapter 9.1 "Operator panel" on page 44 .

The start routine is used to adjust the required parameters for the device commissioning. It commences with the first activation of the controller and can be run only once. The settings can be changed or checked in the Customer menu after the start routine has terminated see chapter 9.3.1.1 "Customer menu – overview" on page 46 .

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 35 .
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 completely 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.

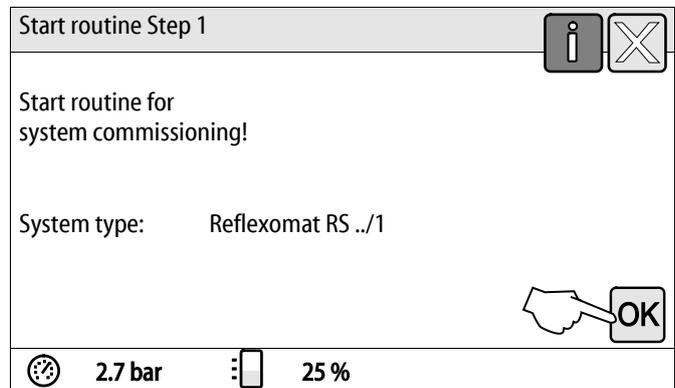


Note!

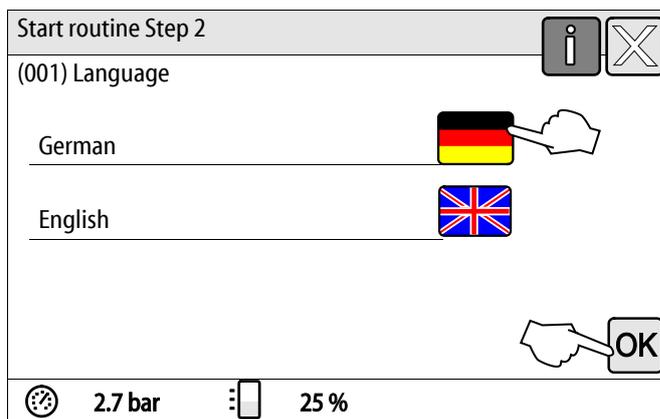
Provide the power supply (230 V) for the controller by pressing the main switch at the control unit.

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.

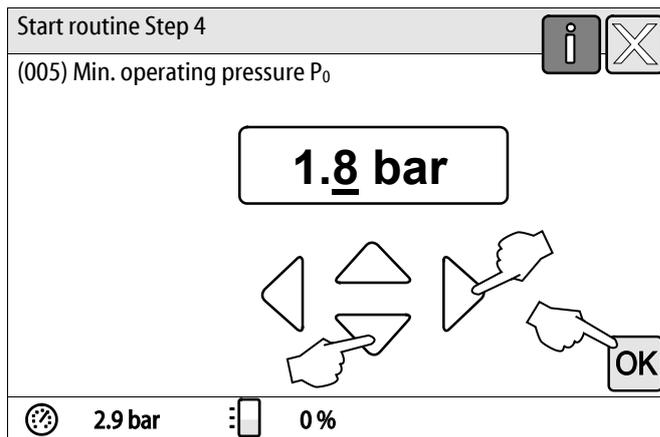


2. Select the required language and conform your entry with "OK".



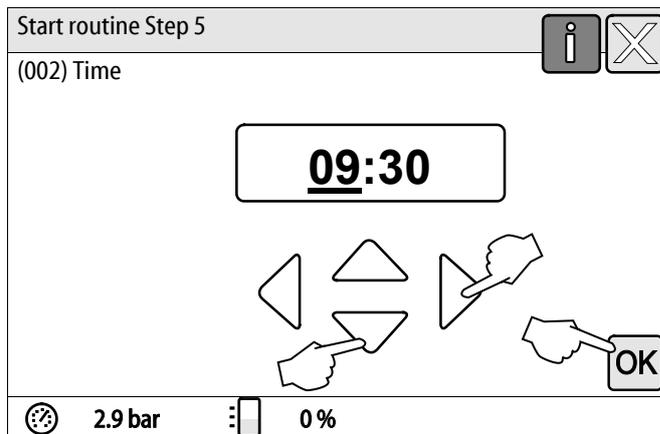
3. Select the calculated minimum operating pressure and conform your entry with "OK".

- For calculation of the minimum operating pressure, see chapter 7.2 "Determining the P₀ minimum operating pressure for the controller" on page 35 .



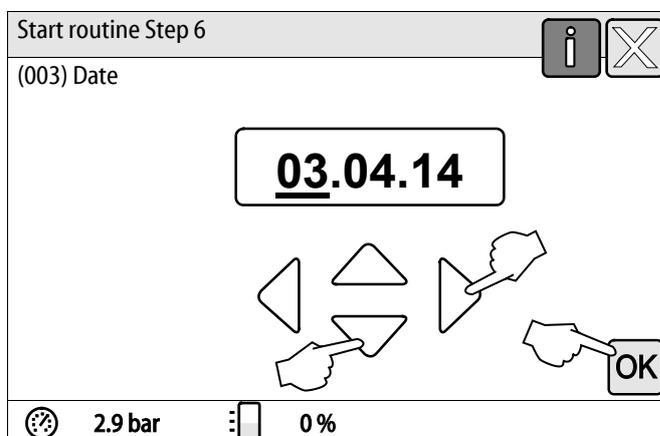
4. Set the time.

- 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.

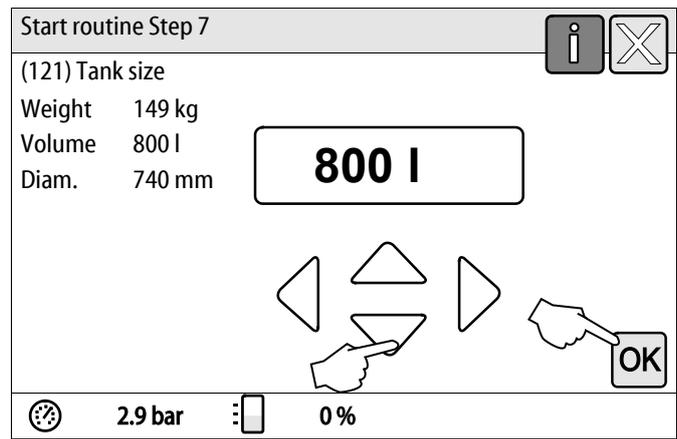


5. Set the date.

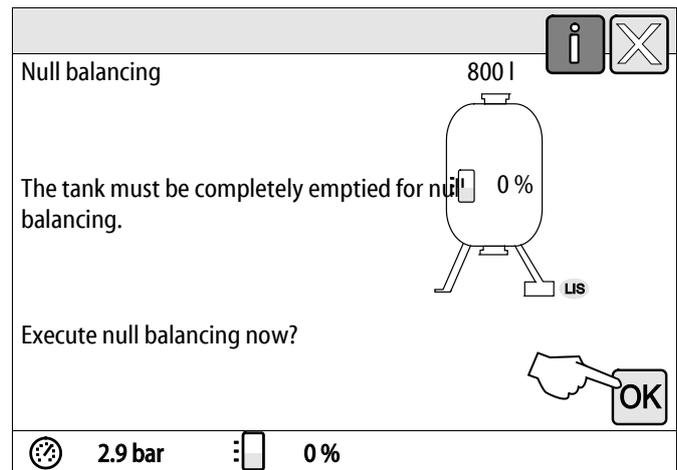
- Use the "Left" and "Right" buttons to select the display value.
- Use the "Up" and "Down" buttons to change the display value.
- Confirm your entries with "OK".
- The date of an alarm will be stored in the fault memory of the controller.



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 15 .



- The controller checks whether the level measuring signal matches the dimensional data of the primary tank. The primary tank must be fully emptied, see see chapter 6.3.5 "Fitting the level sensor" on page 25 .
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 62 .



Note!

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

7.4 Tank venting

CAUTION

Risk of burns on hot surfaces

Excessive surface temperatures on the compressor can result in skin burns.

- Wear suitable personal protective equipment (safety gloves, for example).
-

Upon completion of the start routine, you must vent the primary tank and the secondary tanks, if applicable.

- Open the tanks' discharge ports to permit the air to escape.
- Select Automatic mode on the controller's operator panel, see chapter 8.1.1 "Automatic mode" on page 41 .

The "CO" compressor builds up the pressure required venting. This pressure is 0.4 bar above the set minimum operating pressure. The tanks' diaphragms are pressurised to this level and the water side in the tanks is vented. Close the discharge ports of all tanks after the compressor has automatically shut down.



Notice!

Inspect all compressed air connections between the control unit and the tanks for leaks. Subsequently, slowly open all cap valves at the tanks to create the water-side connection to the facility system.

7.5 Filling the tanks with water

Prerequisite for fault-free filling is a make-up pressure at least 1.3 bar above the set minimum pressure "P₀".

- Without automatic make-up:
 - Use the discharge ports or the facility system to manually fill the individual tank to approximately 30 % of the tank volume, see chapter 6.4 "Make-up and degassing variants" on page 26 .
- With automatic make-up:
 - The tanks are automatically filled to approximately 12 % of the tank volume, see chapter 6.4 "Make-up and degassing variants" on page 26 .

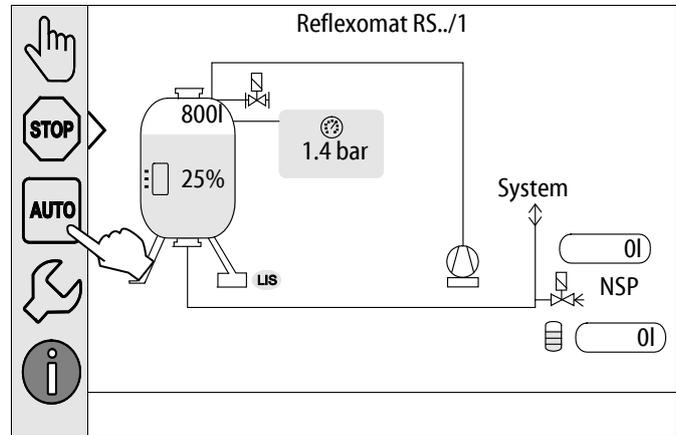
7.6 Starting Automatic mode

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

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

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

1. Press "AUTO".
 - The "CO1" compressor is switched on.



Note!

The commissioning process is now concluded.

8 Operation

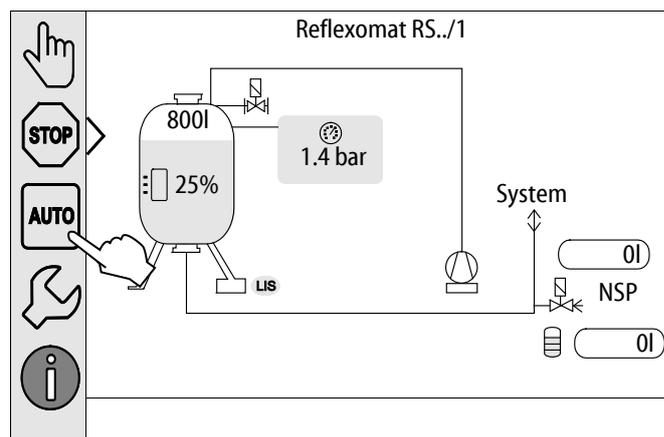
8.1 Operating modes

8.1.1 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
- Automatic make-up

1. Press "AUTO".
 - The "CO" compressor and the "PV1" solenoid valve are regulated by the controller so that the pressure remains constant at a regulation range of ± 0.1 bar.
 - Faults are displayed and evaluated.



8.1.2 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:

- "CO1" compressor
- Solenoid valve in "PV1" overflow line
- Solenoid valve of the "WV1" make-up

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

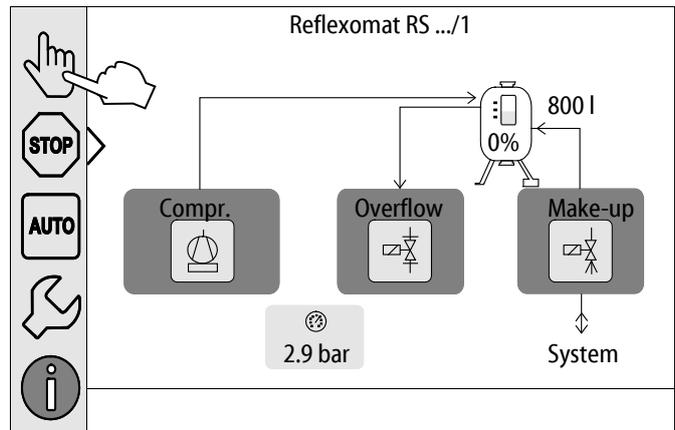
- The button has a green background. The function is switched off.

Press the desired button:

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

1. Press "Manual mode".
2. Select the desired function.
 - "CO1" compressor
 - Solenoid valve in "PV1" overflow line
 - Solenoid valve of the "WV1" make-up

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



Kompr.	"CO1" compressor
Überstr.	Solenoid valve in "PV1" overflow line
Nachsp.	Solenoid valve of the "WV1" make-up



Notice!

- Manual operation can not be performed if safety-relevant parameters are exceeded.
- Switching is blocked if safety-relevant settings are exceeded.

8.1.3 Stop mode

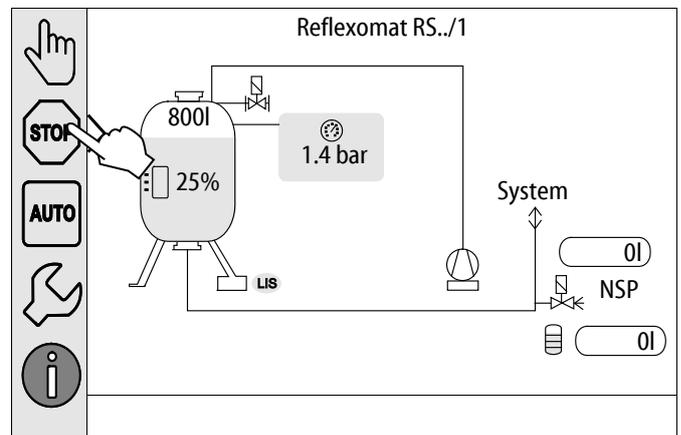
The Stop mode is intended for the device commissioning.

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

The following functions are deactivated:

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

1. Press "STOP".



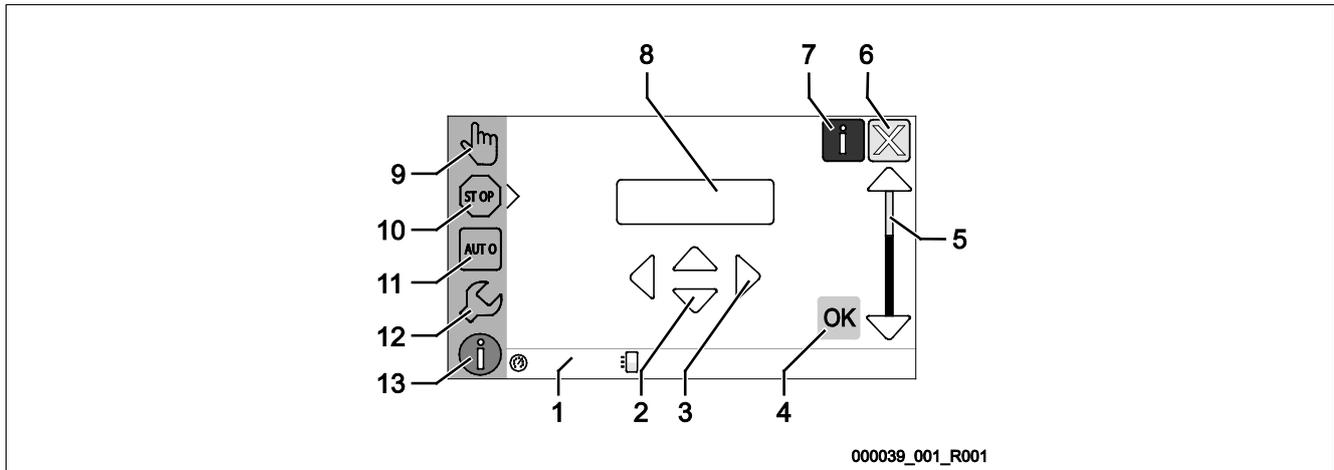
Notice!

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.

9 Controller

9.1 Operator panel



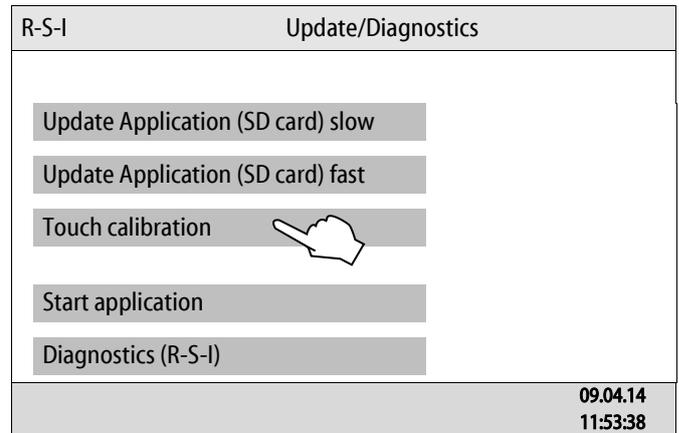
1	Message line
2	"▼"/"▲" buttons • Set digits.
3	"◀"/"▶" buttons • Select digits.
4	"OK" button • Confirm/acknowledge input. • Browse in the menu.
5	"Up" and "Down" scroll bar • "Scroll" in the menu.
6	"Scroll back" button • Cancel. • Move backward up to the main menu.
7	"Display help texts" button • Opens help texts.

8	Display value
9	"Manual mode" button • For function tests.
10	"Stop mode" button • For commissioning.
11	"Automatic mode" button • For continuous operation.
12	"Set-up menu" button • For setting parameters. • Fault memory. • Parameter memory. • Display settings. • Primary tank information. • Software version information.
13	"Info menu" button • Displays general information.

9.2 Calibrating the touch screen

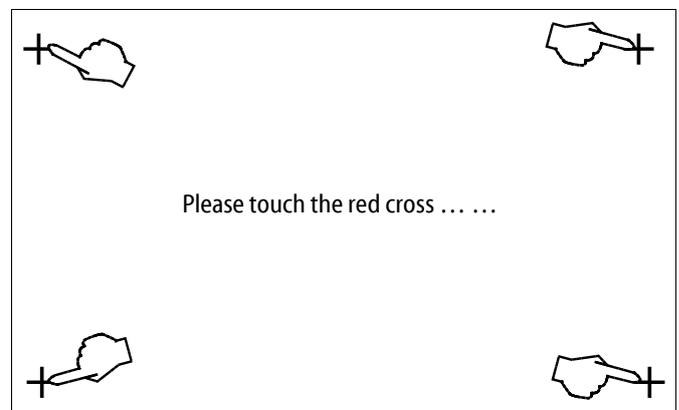
You can calibrate the touch screen when touching the desired buttons does not work satisfactorily.

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.

9.3.1.1 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 44 .

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

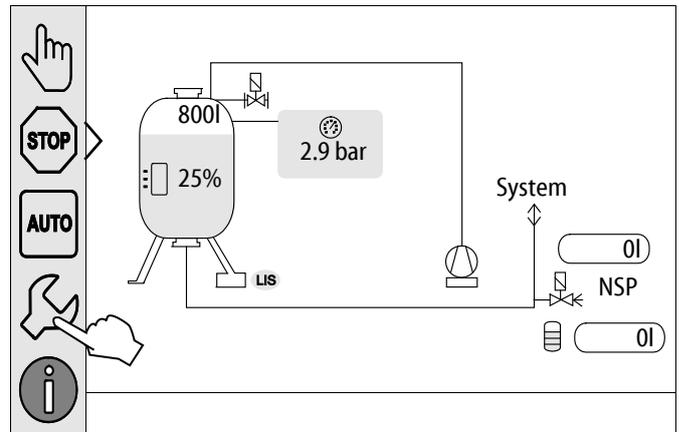
PM code	Description
001	Select the language
002	Set the time
003	Set the date
	Execute null balancing <ul style="list-style-type: none"> – The primary tank must be empty! – The system checks whether the signal from the level sensor matches the selected primary tank.
005	Set the P ₀ minimum operating pressure, see chapter 7.2 "Determining the P ₀ minimum operating pressure for the controller" on page 35 .
	Make-up >
021	• Make-up ON at ... %
022	• Make-up OFF at ... %
023	• Maximum make-up time ... min
024	• Maximum make-up cycles ... /2 h
027	• With contact water meter "Yes/No" <ul style="list-style-type: none"> – If "Yes", continue with 028
028	• Reset make-up quantity "Yes/No"
029	• Maximum make-up quantity ... l
030	• With softening "Yes/No" <ul style="list-style-type: none"> – If "Yes", continue with 031
031	• Block make-up "Yes/No" (if water capacity is exhausted)
033	• Hardness reduction ... °dH = GH _{actual} – GH _{target}
032	• Soft water capacity <ul style="list-style-type: none"> • Fillsoft I: Soft water capacity = 6000 l / hardness reduction • Fillsoft II: Soft water capacity = 12000 l / hardness reduction
034	• replacement interval ... months (for softening cartridges according to manufacturer).
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.
	Fault memory > History of all messages
	Parameter memory > History of parameter input
	Display settings > Brightness, screen saver
009	• Brightness ... %
010	• Screen saver brightness ... %
011	• Screen saver delay ... min
	Information > <ul style="list-style-type: none"> • Tank: Tank information • 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:

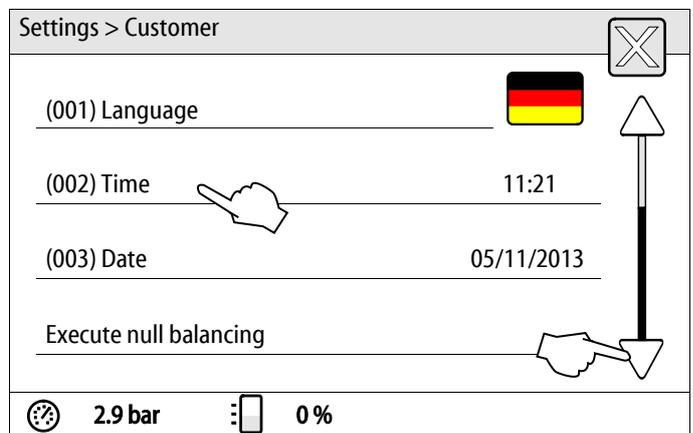
1. Press "Settings".
 - The controller switches to the setting area.



2. Press "Customer >".
 - The controller opens the Customer menu.

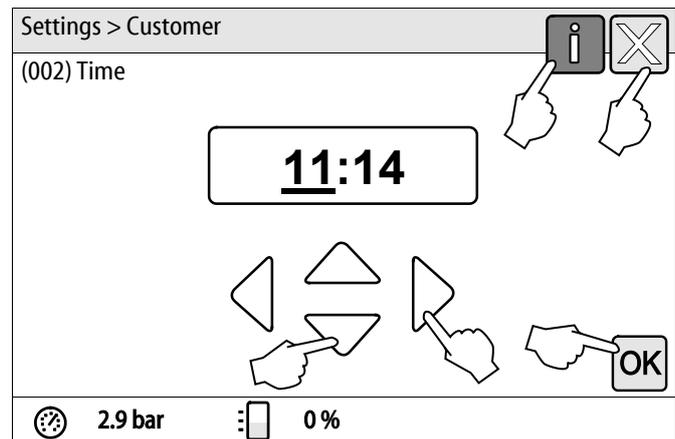


3. Press the required area.
 - The controller switches to the selected area.
 - Use the scroll bar to navigate through the list.



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 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 35 .
Next maintenance	12 months	Time left to the next due maintenance.
Floating alarm contact	YES	see chapter 9.3.3 "Messages" on page 50 .
Make-up		
Make-up "ON"	8 %	
Make-up "OFF"	12 %	
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	30 minutes	
Maximum make-up cycles	6 cycles within 2 hours	
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.

Service menu

Parameter	Setting	Remarks
Pressurisation		
Compressor "ON"	$P_0 + 0.3 \text{ bar}$	Differential pressured added to the " P_0 " minimum operating pressure.
Compressor "OFF"	$P_0 + 0.4 \text{ bar}$	Differential pressured added to the " P_0 " minimum operating pressure.
"Compressor run time exceeded" message	240 minutes	The message is displayed after the compressor runs for 240 minutes.
Overflow line "CLOSED"	$P_0 + 0.4 \text{ bar}$	Differential pressured added to the " P_0 " minimum operating pressure.
Overflow line "OPEN"	$P_0 + 0.5 \text{ bar}$	Differential pressured added to the " P_0 " minimum operating pressure.
Maximum pressure	$P_0 + 3 \text{ bar}$	Differential pressured added to the " P_0 " minimum operating pressure.
Filling levels		
Insufficient water "ON"	5 %	
Insufficient water "OFF"	12 %	
Solenoid valve in overflow line "CLOSED"	90 %	
Water quantity for each contact	10 litres / contact	Optional, if a contact water meter is installed (such as Fillset Impulse).

9.3.3 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.

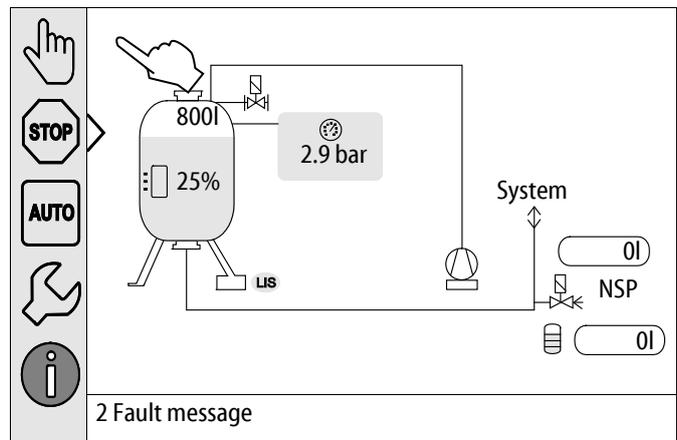
Message causes can be eliminated by the operator or a specialist workshop. If this is not possible, contact the Reflex Customer Service.

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

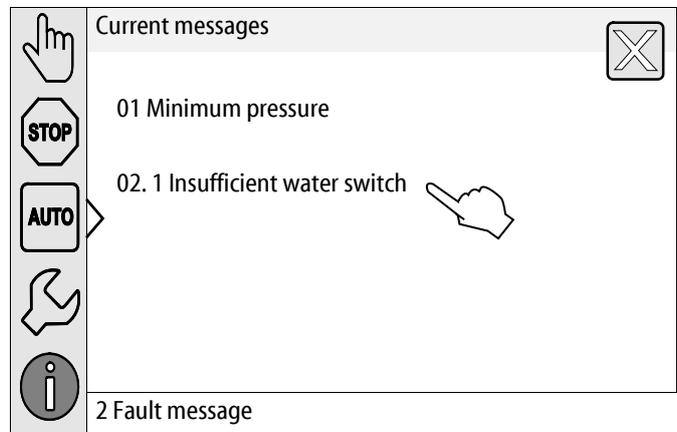
- ▶ **Note!**
Floating contacts, setting in the Customer menu, see chapter 9.3 "Configuring settings in the controller" on page 46 .

To reset a fault message, proceed as follows:

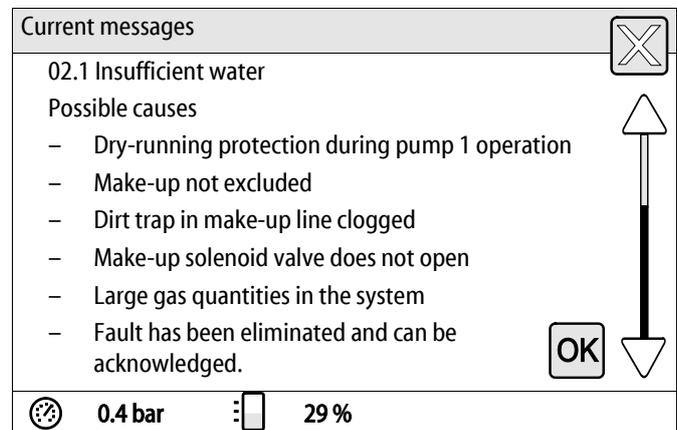
1. Touch the display.



- The current fault messages are displayed.
2. Touch a fault message.



- The system displays the possible causes for the fault.
3. When the fault is eliminated, confirm the fault with "OK".



ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
01	Min. pressure	–	<ul style="list-style-type: none"> • Set value exceeded. • Water loss in the system. • Compressor fault. • Controller in Manual mode. 	<ul style="list-style-type: none"> • Check set value in the Customer or Service menu. • Check water level. • Check compressor. • Set the controller to Automatic mode. 	"OK"
02.1 02.2	Compressor 1 insufficient water Compressor 2 insufficient water	–	<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. • If necessary, manually add water. • Check functioning of the "PV1" solenoid valve. • Clean the dirt trap. 	–
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. • 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 primary tank. • Check user's thermal transfer medium for leaks. 	–
04.1 04.2	Compressor 1 Compressor 2	–	<ul style="list-style-type: none"> • Compressor disabled. • Fuse defective. 	<ul style="list-style-type: none"> • Check functioning of "CO" compressor. <ul style="list-style-type: none"> – Check in manual mode, reduce back pressure. • Replace the fuse. 	"OK"
05	Compressor run-on time	–	<ul style="list-style-type: none"> • Set value exceeded. • Severe water loss in the system. • Air lines leaking. • 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. • Seal any leak in the air system. • 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 high. 	<ul style="list-style-type: none"> • Check set value in the Customer or Service menu. • Check water level. • Connect make-up line. • Increase make-up quantity. • Correct the make-up hysteresis in the Service menu. 	"OK"

ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
07	Make-up cycles	–	<ul style="list-style-type: none"> Set value exceeded. Leakage in the system. 	<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. 	"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	–	<p>Only if "With water meter" is activated in the Customer menu.</p> <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. Water quantity per contact incorrectly set in the Service menu. 	"OK"
15	Make-up valve	–	Contact water meter measures without make-up request.	<ul style="list-style-type: none"> Check the "WV" 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.	Carry out maintenance.	"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"
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	Floating contact	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 too low.	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).	–



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

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).

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.

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 10.4 "Maintenance certificate" on page 59.

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. • "CO" compressor. • Screw connections of the compressed air connections.	▲	■		Annually
Check switching points. • "CO" compressor cut-in pressure. • Insufficient water. • Make-up with water.	▲			Annually
Clean "ST" dirt trap. – see chapter 10.3.2 "Cleaning the dirt trap" on page 58 .	▲	■	●	Depending on the operating conditions
Remove condensate from the primary tank and the secondary tanks, if applicable. – see chapter 10.3.1 "Cleaning the tanks" on page 57 .	▲	■	●	Annually

10.2 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 35 .
- Level sensor at the primary tank.

Preparation

1. Switch to Automatic mode.
2. Close the cap valves upstream of the tanks.
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 "CO" compressor.
 - The compressor cuts in at $P_0 + 0.3$ bar.
 - The compressor cuts out at $P_0 + 0.4$ 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 8 %.

Checking Insufficient water "On"

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

Cleaning the tanks

If necessary, remove condensate from the tanks, see chapter 10.3.1 "Cleaning the tanks" on page 57 .

Activating the device

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

Checking Insufficient water "Off"

14. 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 8 %.

Checking Make-up "Off"

15. If necessary, check the make-up value displayed at the controller.
 - The automatic make-up is deactivated at a level display of 12 %.

Maintenance is completed.



Notice!

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



Notice!

The setting values for pressure maintenance, filling levels and make-up are provided in the chapter Standard settings, see chapter 9.3.2 "Default settings" on page 48 .

10.3 Cleaning

10.3.1 Cleaning the tanks

CAUTION

Risk of injury due to pressurised liquid

Injuries can occur during maintenance work if the connections have been installed incorrectly because condensate under pressure can suddenly escape.

- Ensure proper connections for the draining of condensate.
- Wear suitable personal protective equipment (safety gloves and safety goggles, for example).

Regularly clean the primary tank and the secondary tanks from condensate. The cleaning intervals depend on the local operational conditions.

Tanks with replaceable diaphragm

1. Close the cap valves upstream of the tanks.
2. Record the displayed level value at the controller and empty the tank of water and compressed air.
3. Switch off the main switch and withdraw the mains plug.
4. Open the drain taps at the tanks and drain the condensate.
 - If more than 5 litres of water or condensate are discharged, you must check the tank.
 - Check the diaphragm for rupture.
 - Check the tank interior walls for corrosion damage.

 **CAUTION** – Risk of injury caused by escaping pressurised liquid. Injuries can occur during maintenance work if the connections have been installed incorrectly because condensate under pressure can suddenly escape.

5. Close the tanks' drain taps.
6. Connect the mains plug and switch on the main switch.
7. Open the cap valves of the tanks and secure against unauthorised "closing".
8. Fill water and compressed air into the tanks until the recorded level value is reached.

Maintenance is completed.



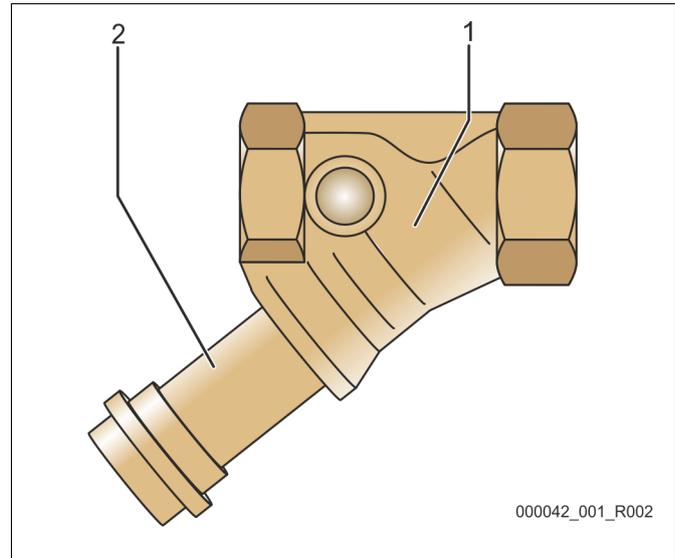
Note!

Check the installation location of the tanks for sufficient ventilation if the tank interior wall are damaged by corrosion, see chapter 6.2 "Preparatory work" on page 18.

10.3.2 Cleaning the dirt trap

Regularly clean the "ST" dirt trap. The cleaning intervals depend on the local operational conditions.

1. Switch to Stop mode.
 - Press "Stop" on the controller's operator panel.
2. Close the ball valves upstream and downstream of the "ST" (1) dirt trap.
3. Slowly unscrew the dirt trap insert (2) from the dirt trap in order for the residual pressure to escape from the pipeline segment.
4. Pull the mesh from the dirt trap insert and rinse it with clear water. Use a soft brush for cleaning.
5. 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.
6. Re-open the ball valves upstream and downstream of the "ST" (1) dirt trap.
7. Switch to Automatic mode.
 - Press "Auto" on the controller's operator panel.



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

**Note!**

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

10.5 Inspection

10.5.1 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).

10.5.2 Inspection prior to commissioning

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

10.5.3 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 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 disassembly, disconnect all water-sided connections from the device.
- De-pressurise the device by venting 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 and remove all cables from the terminals of the device controller.

 **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 discharge ports at the tanks until water and compressed air are completely removed.
6. Undo all hose and pipe connections to the tanks and the control unit of the device to the system and remove them completely.
7. If necessary, remove the tanks and the control unit from the system area.

12 Annex

12.1 Reflex Customer Service

Central customer service

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

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

Fax: +49 (0)2382 7069 - 523

E-mail: service@reflex.de

Technical hotline

For questions about our products

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

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

12.2 Conformity and standards

EU-Declaration of conformity for the electrical devices in pressure maintenance, make-up and degassing systems	
1.	This is to certify that the products conform with the most important protection requirements set forth in the Council Directives on the harmonization of the laws of the member states relating to electromagnetic compatibility (2014/30/EU). The following standards were used to evaluate the products: DIN EN 61326 – 1:2013-07 DIN EN 61439 – 1:2012-06
2.	This is to certify that the control boxes conform with the most important requirements of the low voltage directive (2014/35/EU). The following standards were used to evaluate the products: DIN EN 61010 – 1:2011-07 BGV A2
EU-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: Reflexomat, Reflexomat Compact 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	Assembly article 4 (2) b) consisting of: Vessel article 4 paragraph (1) a) i) 2. indent (Annex II table 2) with <ul style="list-style-type: none"> • accessories article 4 (1) d): membrane (Reflexomat) respectively diaphragm (Minimat, Reflexomat Compact), system connection and safety valve (air side) and optionally • accessories article 4 (1) d): control unit
Fluid group	2
Conformity assessment acc. to module	B + D Reflexomat, Reflexomat Compact
Labelling acc. to Directive 2014/68/EU	CE 0045
Safety valve (air side) (category IV)	Confirmed and signed by the manufacturer of the safety valve according to the requirements of directive 2014/68/EU.
Certificate-No. of EU Type Approval	see annex
Certificate-No. QA System (module D)	07 202 1403 Z 0780/15/D/1045
Notified Body for certification of QA System	TÜV Nord Systems GmbH & Co. KG Große Bahnstraße 31, D - 22525 Hamburg
Registration-No. of the Notified Body	0045
Signed for and on behalf of	The object of the declaration described above is in conformity with the relevant Union harmonisation legislation - Pressure Equipment Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014.
 <p>Manufacturer Reflex Winkelmann GmbH Gersteinstraße 19 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</p>

12.3 Certificate No. of the CE type test

Type			Certificate number
Reflexomat RS	200 – 800 litres	6 bar – 120 °C	07 202 1403 Z 0622/1/D0045
	1000 – 5000 litres	6 bar – 120 °C	07 202 1403 Z 0011/2/D0045
	300 – 800 litres	10 bar – 120 °C	07 202 1403 Z 0413/2/D0045_Rev.1
	350 – 5000 litres	10 bar – 120 °C	07 202 1403 Z 0411/2/D0045

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

12.4 Guarantee

The respective statutory guarantee regulations apply.



Thinking solutions.

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