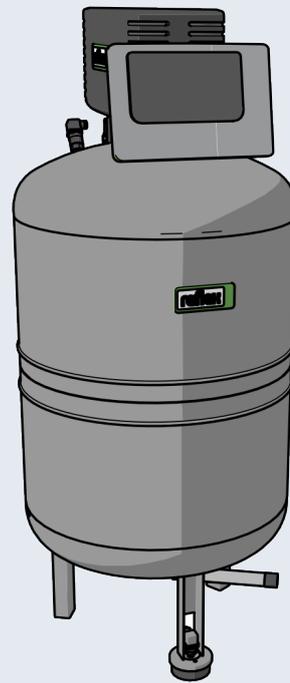


# Reflexomat Silent Compact

Reflexomat RSC

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.

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.

- ▶ **Notice!**  
Every person installing this equipment or performing any other work at the equipment is required to carefully read this operating manual prior to commencing work and to comply with its instructions. The manual is to be provided to the product operator and must be stored near the product 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 17.

## 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

Assembly, commissioning and maintenance as well as connection of the electrical components may only be carried out by knowledgeable and appropriately qualified electricians.

### 3.3 Personal protective equipment



Use the prescribed personal protective equipment as required (e.g. ear protection, eye protection, safety shoes, helmet, protective clothing, protective gloves) when working on the system.

Information on personal protective equipment requirements is set out in the relevant national regulations of the respective country of operation.

### 3.4 Intended use

The device is a pressure maintaining station for heating and cooling water systems. It is used 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 minimized 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 Reflexomat Silent Compact RSC is a compressor-controlled pressurisation unit for heating and cooling water systems. Essentially, the RSC comprises a control unit and a "RG" primary vessel as an expansion vessel with up to 500 litres nominal volume. The control unit is factory-installed at the primary vessel. All electric and air connections between control unit and expansion vessel are pre-installed.

The expansion vessel is fitted with a membrane to divide the vessel into an air space and a water space. preventing the ingress of atmospheric oxygen into the expansion vessel.

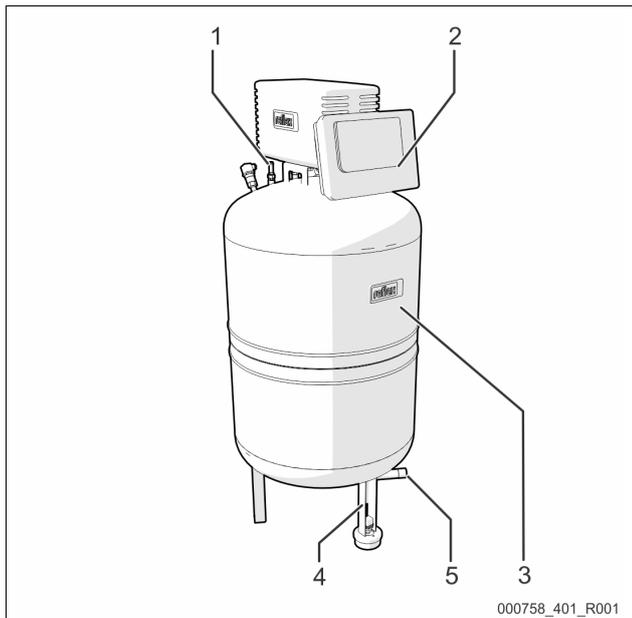
The RSC provides optimisation for pressurisation and make-up:

- No direct sucking in of air due to regulation of pressurisation and optional automatic make-up.
- No circulation issues caused by free bubbles in the circuit water.
- Reduced corrosion damage due to oxygen removal from make-up water.

**Note!**

Connection of secondary vessels is not possible.

**4.2 Overview**



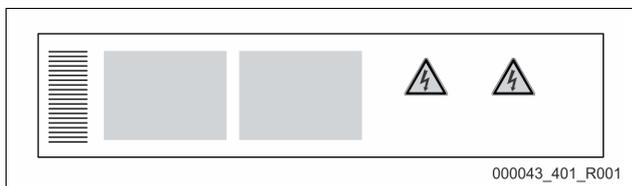
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1	"SV" safety valve	3	"RG" primary vessel
2	"RC" control unit • Compressor • "Reflex Control Basic" controller	4	"LIS" level sensor
		5	Expansion vessel "EC"

**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.



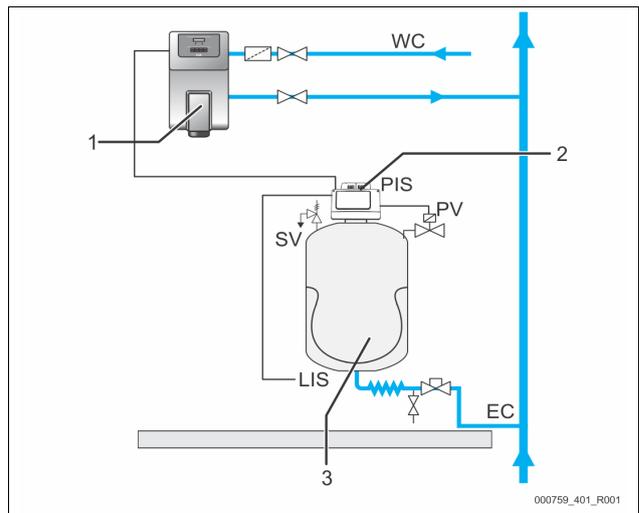
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Information on the type plate	Meaning
Type	Device name
Serial No.	Serial number
min. / max. allowable pressure P	Minimum/maximum permissible pressure
max. continuous operating temperature	Maximum temperature for continuous operation
min. / max. allowable 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 - a line	Factory set actuating pressure of the safety valve
at site	Set actuating pressure of the safety valve

**4.3.2 Type code**

No.		Type code Reflexomat Silent Compact		
1	RSC = Reflexomat Silent Compact	Reflexomat	RSC	500
2	Primary vessel nominal volume		1	2

**4.4 Function**



000759\_401\_R001

1	Make-up with water using "Fillcontroll Auto"
2	Control unit
3	Primary vessel as expansion vessel
WC	Make-up pipe
PIS	Pressure sensor
SV	Safety valve
PV	Solenoid valve
LIS	Pressure load cell
EC	Expansion pipe

**Expansion vessel**

A diaphragm divides the interior of the vessel into an air space and a water space. This prevents the ingress of atmospheric oxygen into the expansion water. The primary vessel is connected to the control unit downstream and connected hydraulically to the system circuit. Pressure relief is provided on the air side by the "SV" safety valves of the vessel.

**Control unit**

The control unit comprises a "CO" compressor and the "Reflex Control Basic" controller. Via the primary vessel, 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.

### Pressurisation

- If the water is heated, it expands and the pressure increases in the system circuit. If the pressure set at the controller is exceeded, the "PV" solenoid valve opens and discharges air from the primary vessel. Water flows from the system into the primary vessel and the pressure drops in the system circuit until the pressure in the system circuit and the primary vessel is equalised.
- The pressure in the system circuit 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 vessel. This displaces water out of the primary vessel into the system circuit. The pressure in the system circuit rises.

### Make-up

The addition of more water is controlled within the controller. The "LIS" pressure load cell measures the water level and sends this value to the controller of the pressurisation unit. This controls an external make-up. Water is directly added into the system circuit in a controlled manner by monitoring the make-up time and the make-up cycles.

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

#### Note!

Additional equipment for topping up water, see chapter 4.6 "Optional equipment and accessories" on page 5.

### 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:

- Reflexomat Silent Compact
  - One primary tank and one compact control unit.
- "LIS" pressure load cell for level sensing.

### 4.6 Optional equipment and accessories

- 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 make-up and degassing with water:
  - Reflex Servitec 30 (25)
  - Reflex Servitec 35-95
- Fillset for make-up with water.
  - With integrated system separator, water meter, dirt trap and shut-off devices for the "WC" make-up line.
- Fillset Impulse with FQIRA+ contact water meter for make-up with 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 the 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:
    - Profibus DP
    - Ethernet
- Diaphragm rupture monitor

#### Note!

Separate operating instructions are supplied with accessories.

## 5 Technical data

### 5.1 Control unit

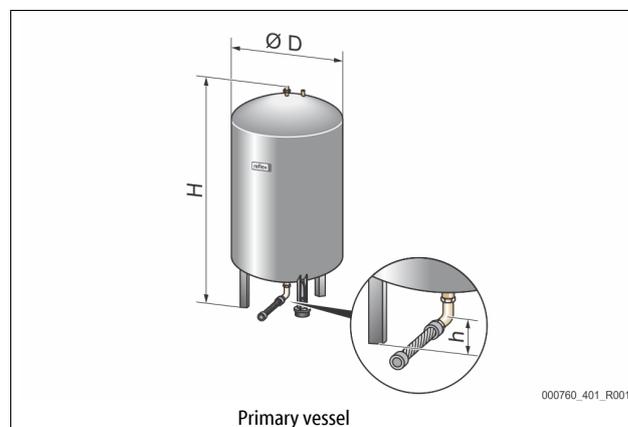
#### Note!

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
- Electric power: 0.75 kW
- Degree of protection: IP 54
- Power supply: 230 V, 50 Hz, 3 A
- Electrical voltage: 230 V, 2 A
- Number of RS-485 interfaces: 1
- I/O module: No

Type	Noise level (dB)	Weight (kg)
RSC 200	<59	52
RSC 300	<59	69
RSC 400	<59	80
RSC 500	<59	93

### 5.2 Vessel



#### Note!

The following values apply for all types:

- Permissible operating pressure: 6 bar
- Connection: R1 "

Type	Diameter Ø "D" (mm)	Weight (kg)	Height "H" (mm)	Height "h" (mm)
200	634	37	970	115
300	634	54	1270	115
400	740	65	1255	100
500	740	78	1475	100

## 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 and commissioning 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 vessel.
- Filling and drainage 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 5 .
- Use only approved transport and lifting equipment.
  - The load fastening points on the vessel 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 them being stressed or strained.
- If necessary, provide support structures for the pipes or equipment.

Proceed as follows for the installation:

- Position the device.
- Create the water-side connections of the control unit to the system.
- Create the interfaces according to the terminal plan.

#### 6.3.1 Locating the vessel

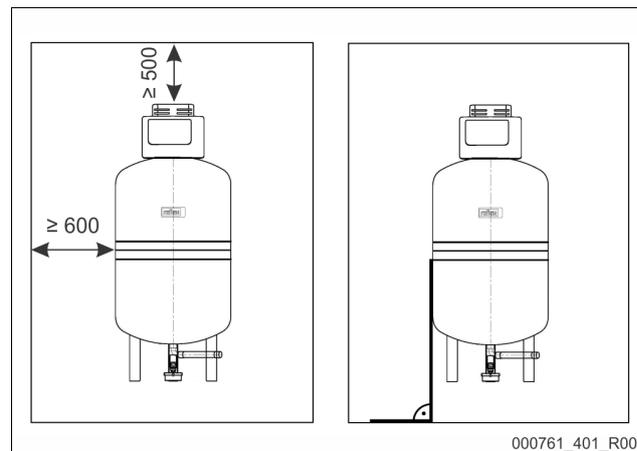
#### **ATTENTION**

##### 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 them being stressed or strained.
- If necessary, provide support structures for the pipes or equipment.

Observe the following tips when siting the vessel:



- All flange openings are inspection and maintenance openings.
  - Locate the vessel with a sufficient side and top clearance.
- Install the vessel on a level surface.
- Ensure a perpendicular and free-standing position.
- Ensure proper functioning of the "LIS" level sensor.
 

**ATTENTION** Property damage caused by overpressure. Do not attach the vessel firmly to the floor.

### 6.3.2 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 vessels.

#### 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 them being stressed or strained.
- If necessary, provide support structures for the pipes or equipment.

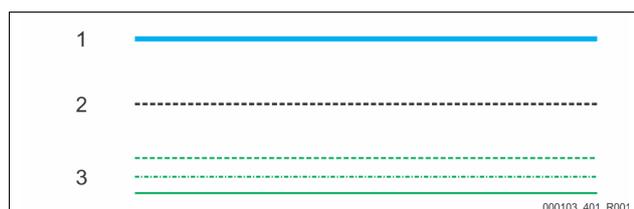
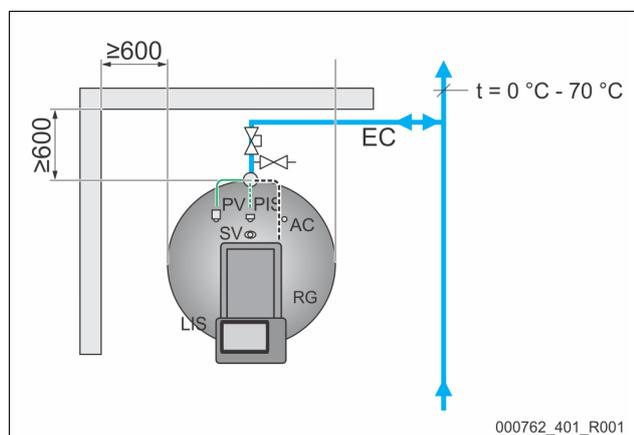
#### ATTENTION

##### 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.

### 6.3.2.1 Water-side connection



1	Expansion pipe	SV	Safety valve
2	Compressed air line	PV	Solenoid valve
3	Data line	PIS	Pressure sensor
RG	Primary vessel	AC	Compressed air line
LIS	Level sensor	EC	Expansion pipe

To ensure the proper functioning of the "LIS" level sensor, you must use the supplied hose to flexibly connect the primary vessel to the system circuit. The primary vessel has a protected shut-off device and a drain in the "EC" expansion line.

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

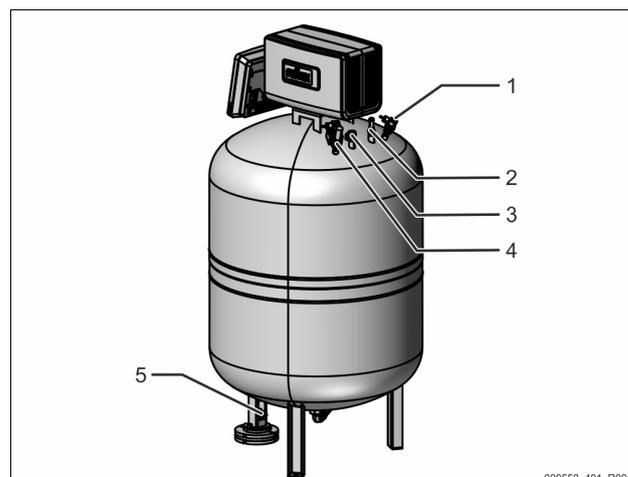
At temperatures below or above 0 °C – 70 °C, you must install in-line vessels between the system circuit and the Reflexomat.

#### Note

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.

### 6.3.2.2 Control unit connection

The connections are labelled in colour and the allocation captioned.



1	Pressure sensor, red "PIS" identification
2	"SV" safety valve
3	Compressed air connection
4	Overflow solenoid valve, blue "PV" identification
5	Level measurement, yellow "LIS" identification

The connections of the Reflexomat Silent Compact are pre-fitted in the factory.

Fitting the level sensor, see chapter 6.3.3 "Fitting the level sensor" on page 7 .

### 6.3.3 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 vessel has been placed at its final position, see chapter 6.3.1 "Locating the vessel" on page 6 . Comply with the following instructions:

- Remove the transport securing device (squared timber) at the vessel base of the primary vessel.
- Replace this transport securing device with the pressure load cell.
- Avoid shock-type loading of the pressure load cell by, for example, subsequent alignment of the vessel.
- Perform a null balancing of the filling level when the primary vessel is aligned and fully emptied, see chapter 9.2 "Configuring settings in the controller" on page 12 .

#### Standard values for level measurements:

Primary vessel	Measuring range
200 l	0 – 4 bar
300 - 500	0 – 10 bar

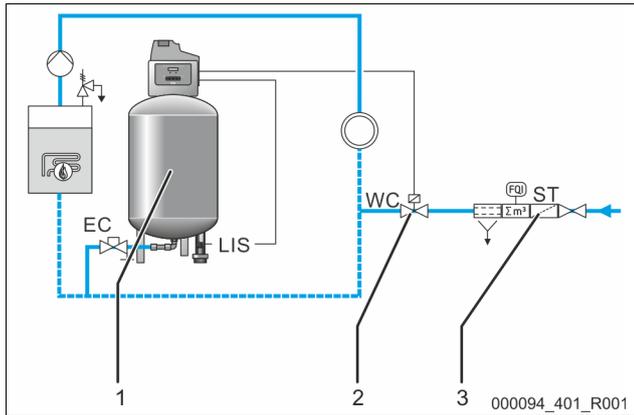
### 6.4 Make-up and degassing variants

#### 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 Silent Compact with solenoid valve and ball valve.



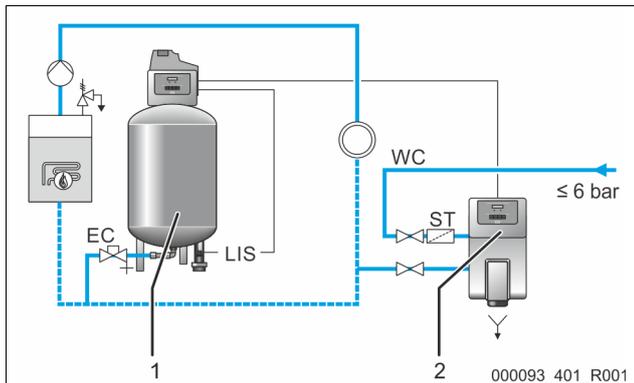
1	Reflexomat Silent Compact
2	Solenoid valve with ball valve
3	Reflex Fillset
ST	Dirt trap

WC	Make-up pipe
LIS	Level sensor
EC	Expansion pipe

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 5. If you don't use a Reflex Fillset, you must use an "ST" dirt trap with a mesh size  $\geq 0.25$  mm for the make-up.

**6.4.1.2 Make-up with pump**

Reflexomat Silent Compact with Reflex Fillcontrol Auto



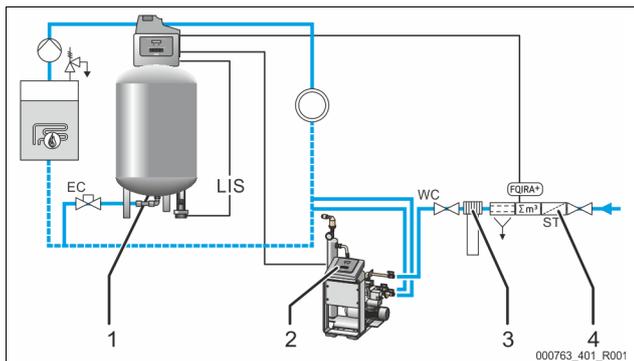
1	Reflexomat Silent Compact
2	Fillcontrol Auto
WC	Make-up pipe

ST	Dirt trap
EC	Expansion pipe
LIS	Level sensor

Water make-up with Fillcontrol Auto is suitable for make-up at high system pressures of up to 8.5 bar. The "ST" dirt trap is part of the deliverables.

**6.4.1.3 Make-up with softening and degassing**

Reflexomat Silent Compact and Reflex Servitec.



1	Reflexomat Silent Compact
2	Reflex Servitec
3	Reflex Fillsoft
4	Reflex Fillset Impulse

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

The Reflex Servitec degassing and make-up unit degasses the water from the system circuit and the make-up water. The automatic water make-up for the system circuit is controlled by the pressurisation system. Reflex Fillsoft additionally softens the make-up water.

- Reflex Servitec degassing and make-up unit, see chapter 4.6 "Optional equipment and accessories" on page 5.
- Reflex Fillsoft softening systems and Reflex Fillset Impulse, see chapter 4.6 "Optional equipment and accessories" on page 5.

**Note!**

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.**

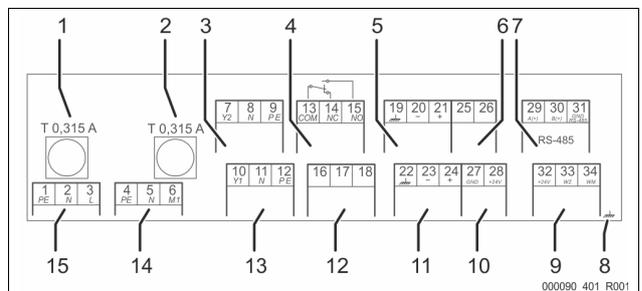
If live parts are touched, there is risk of life-threatening injuries.

- 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.

All electric connections between control unit and expansion vessel are pre-installed.

1. Connect the mains plug to the 230 V power supply.
  2. Activate the system.
- The electrical connection is completed.

**6.5.1 Terminal diagram**



1	"L" fuse for electronics and solenoid valves
2	"N" fuse for solenoid valves
3	Overflow valve (not for motor ball valve)
4	Group message
5	Optional for second pressure value
6	Motor ball valve (control connection)
7	RS-485 interface
8	Shielding
9	Digital inputs
	• Water meter
	• Insufficient water
10	Motor ball valve (energy connection)
11	Pressure analogue input
12	External make-up request
13	Make-up valve
14	"CO" compressor
15	Mains supply

Terminal number	Signal	Function	Wiring
1	PE	230 V power supply via mains cable and plug.	Factory
2	N		
3	L		
4	PE	Compressor for maintaining the pressure.	Factory
5N	N		
6 M1	M 1		
7	Y2	Overflow solenoid valve.	Factory
8	N	• For controlling pressurisation in the overflow line.	
9	PE		
10	Y 1	230 V output for water make-up. • To control a Reflex Fillcontrol, for example.	User, optional
11	N		
12	PE		
13	COM	Group message (floating).	User, optional
14	NC		
15	NO		
16	Not assigned	External make-up request.	---
17	Make-up (230 V)	• Not used with the Reflexomat.	
18	Make-up (230 V)		
19	PE shield	Level analogue input. • Display at the controller. • Activation of the make-up.	Factory prepared, sensor plug must be inserted on site
20	- Level (signal)		
21	+ Level (+ 18 V)		
22	PE (shield)	Pressure analogue input. • Display at the controller. • Control of pressurisation.	Factory
23	- Pressure (signal)		
24	+ Pressure (+ 18 V)		
25	0 – 10 V (correcting variable)	Motor ball valve • Not used with the Reflexomat.	---
26	0 – 10 V (feedback)		
27	GND		
28	+ 24 V (supply)		
29	A	RS-485 interface.	User, optional
30	B		
31	GND		
32	+ 24 V (supply) E1	Supply for E1 and E2.	Factory
33	E1	Contact water meter (in Fillset, for example), see chapter 4.6 "Optional equipment and accessories" on page 5. • Evaluation of the make-up. If contact 32/33 is closed = meter pulse.	User, optional
34	E2	Insufficient water switch. • Not used with the Reflexomat. If contact 32/34 is closed = OK.	---

## 6.5.2 RS-485 interface

This interface is used to retrieve all controller data and to enable the communication with control centres or other devices.

The following data can be requested:

- Pressure and level.
- Compressor operating states.
- Operating states of the ball valve in the overflow line.
- Operating states of make-up via solenoid valve.
- Aggregate volume of the FQIRA + contact water meter.
- All messages, see chapter 9.2.2 "Messages" on page 14.
- All entries in the fault memory.

**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.

### 6.5.2.1 Connecting the RS-485 interface

- Use a shielded cable to connect the interface to terminals 1 – 6 of the main board in the control cabinet.
  - For connecting the interface, see chapter 6.5 "Electrical connection" on page 8.
- When using the device with a control centre not supporting an RS-485 interface (RS-232, for example), you must use a corresponding adapter.

**Note!**  
• For connecting the interface use only a cable with these properties.
 

- LJYCY (TP), 4 × 2 × 0.8, maximum overall bus length 1000 m.

## 7 Commissioning

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

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

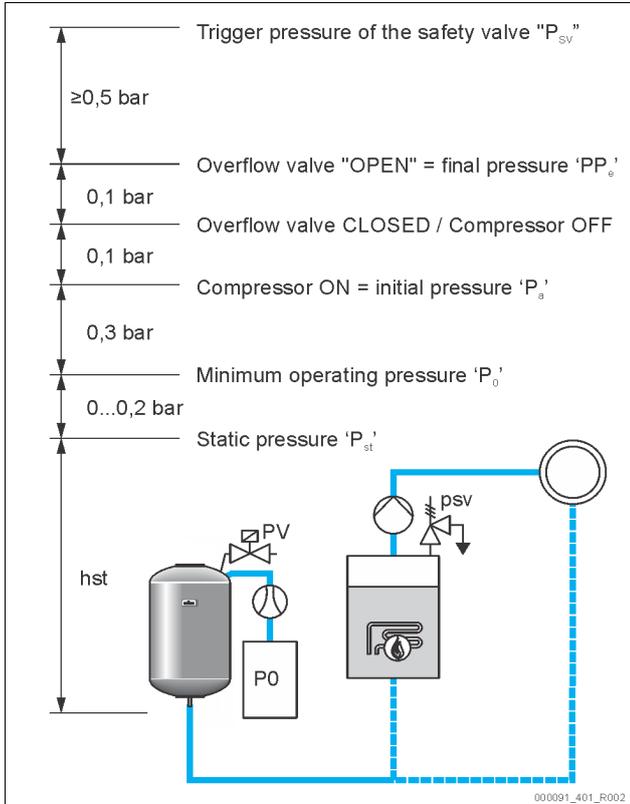
### 7.1 Checking the requirements for commissioning

The device will be ready for initial commissioning when the tasks described in the "Installation" chapter have been completed. Note the following information on initial commissioning:

- The water-side connection of the vessel to the system circuit has been established.
- The vessel is not filled with water.
- The valves for emptying the vessel are open.
- The system circuit is filled with water and gas-vented.
- The electrical connection has been created according to applicable national and local regulations.

### 7.2 Reflexomat switching points

The "P<sub>0</sub>" minimum operating pressure is determined by the location of the pressurisation. The controller calculates the switching points for the "PV" solenoid valve and the "CO" compressor from the "P<sub>0</sub>" minimum operating pressure.



The "P<sub>0</sub>" 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 10 .
$P_{st} = h_{st}/10$	$h_{st}$ 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

**Note!** Avoid dropping below the "P<sub>0</sub>" 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 12 .

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. Parameter changes or checks are possible after the start routine in the customer menu is exited, see chapter 9.2 "Configuring settings in the controller" on page 12 .

**Note!** Plug in the contact plug to provide power (230 V) to the controller.

You are now in Stop mode. The "Auto" LED on the operator panel has extinguished.

Indication on the display	Meaning
Reflexomat	Device name
Language	Standard software in various languages.
Read the operating manual	Prior to commissioning, read the entire operating manual and verify the proper assembly.
Min. op. pressure	Enter the value for the minimum operating pressure. <ul style="list-style-type: none"> <li>Calculation of the minimum operating pressure, see chapter 7.2 "Reflexomat switching points" on page 10 .</li> </ul>
Time	Change the flashing display items for "Hour", "Minute", and "Seconds" to the current time. <ul style="list-style-type: none"> <li>The time of an alarm will be stored in the fault memory.</li> </ul>
Date	Change the flashing display items for "Day", "Month", and "Year" to the current date. <ul style="list-style-type: none"> <li>The date of an alarm will be stored in the fault memory.</li> </ul>
00500 l / 740 mm GB = 0093 kg	Select the size of the "VG" primary vessel. <ul style="list-style-type: none"> <li>For the primary vessel data, see the type plate or, see chapter 5 "Technical data" on page 5 .</li> </ul>
1 % / 1.7 bar Null balancing!	Null balancing of the level sensor. <ul style="list-style-type: none"> <li>The controller checks whether the level measuring signal matches the dimensional data of the "VG" primary vessel. The primary vessel must be fully emptied, see, see chapter 6.3.3 "Fitting the level sensor" on page 7 .</li> </ul>
0 % / 1.0 bar Null balancing concluded successfully!	Upon successful conclusion of the null balancing, confirm with "OK" on the controller operator panel.
Cancel null balancing?	Select "Yes" or "No" on the controller display and confirm with "OK" on the controller operator panel.
No	<ul style="list-style-type: none"> <li><b>Yes:</b> The "VG" primary vessel is fully emptied and the device is installed as per the instructions.                             <ul style="list-style-type: none"> <li>Null balancing is still not possible, confirm with "Yes". The start routine is terminated. Use the customer menu to repeat the null balancing, see chapter 9.2 "Configuring settings in the controller" on page 12 .</li> <li>Contact Reflex Customer Service, see chapter 12.1 "Reflex Customer Service" on page 17 .</li> </ul> </li> <li><b>No:</b> The start routine restarts.                             <ul style="list-style-type: none"> <li>Check the prerequisites for the commissioning, see chapter 7.1 "Checking the requirements for commissioning" on page 9 .</li> </ul> </li> </ul>
Terminate routine?	This message appears on the display only after null balancing has been successful.
No	Select "Yes" or "No" on the controller display and confirm with "OK" on the controller operator panel. <ul style="list-style-type: none"> <li><b>Yes:</b> The start routine is terminated, the device automatically switches to Stop mode.</li> <li><b>No:</b> The start routine restarts.</li> </ul>
0 % / 2.0 bar STOP	The level indication is at 0 %.

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

## 7.4 Venting the vessel

### 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, the primary vessel must be vented.

- Open the vessel's discharge ports to allow the air to escape.
- Select Automatic mode on the controller's operator panel, see chapter 7.6 "Starting Automatic mode" on page 11.

The "CO" compressor builds up the pressure required venting. This pressure is 0.4 bar above the set minimum operating pressure. The vessel's diaphragm is acted on by this pressure and the water side in the vessel is vented. Close the discharge ports of all vessel after the compressor has been automatically shut down.

### Note!

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

## 7.5 Filling the vessel with water

Prerequisite for fault-free filling is a make-up pressure at least 1.3 bar above the set minimum pressure "P<sub>0</sub>".

- Without automatic make-up:
  - Use the discharge ports or the system circuit to manually fill the vessel to approximately 30 % of the vessel volume, see chapter 6.4 "Make-up and degassing variants" on page 7.
- With automatic make-up:
  - The vessel is automatically filled to approximately 12 % of the vessel volume, see chapter 6.4 "Make-up and degassing variants" on page 7.

## 7.6 Starting Automatic mode

Automatic operation can be set after initial commissioning. Start the automatic mode at the operator panel of the controller.

The following prerequisites must be met for automatic operation:

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

Press "Auto" for automatic mode at the controller operator panel.

- The "Auto" LED at the operator panel illuminates to visually signal automatic mode.

### Note!

Initial commissioning is completed and the device is in continuous operation.

## 8 Operation

### 8.1 Operating modes

#### 8.1.1 Automatic mode

##### Use:

After initial commissioning has been successfully completed

##### Start:

Press "AUTO".

##### Functions:

- Automatic mode is suitable for continuous device operation and the controller monitors the following functions:
  - Pressurisation
  - Expansion volume compensation
  - Automatic make-up.
- The "CO" compressor and the "PV1" solenoid valve are regulated by the controller so that the pressure remains constant in a regulation range of  $\pm 0.1$  bar.
- Faults are indicated and evaluated in the display.

#### 8.1.2 Manual mode

##### Use:

For testing and maintenance tasks.

##### Start:

Press "Manual" on the controller. The Auto LED at the operator panel flashes to visually indicate that Manual mode is active.

##### Functions:

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

- "CO" compressor.
- "PV1" overflow solenoid valve.
- The solenoid valve of the "WV1" make-up.

You can switch several functions after each other and test them at the same time.

- |               |  |
|---------------|--|
| 30 % 2.5 bar  | • Use the "Switch up/down" keys to select the function.  |
| CO1!* PV1 WV1 | <ul style="list-style-type: none"> <li>– "CO1" = compressor</li> <li>– "PV1" = Solenoid valve in the overflow line</li> <li>– "WV1" = solenoid valve make-up</li> </ul> (* selected and active units are marked with "!"). |

- Press "OK".
  - Confirm the selection or shut-down of the individual functions.
- "Quit" button
  - Shut-down of the individual functions in reverse order.
  - Press "Quit" for the last time and the system moves in Stop mode.
- "Auto" button
  - Return to Automatic mode.

### Note!

Manual operations cannot be performed if safety-relevant parameters would be exceeded. Switching is then disabled.

#### 8.1.3 Stop mode

##### Use:

For device commissioning.

##### Start:

Press "Stop" on the controller. The Auto LED at the operator panel extinguishes.

##### Functions:

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.

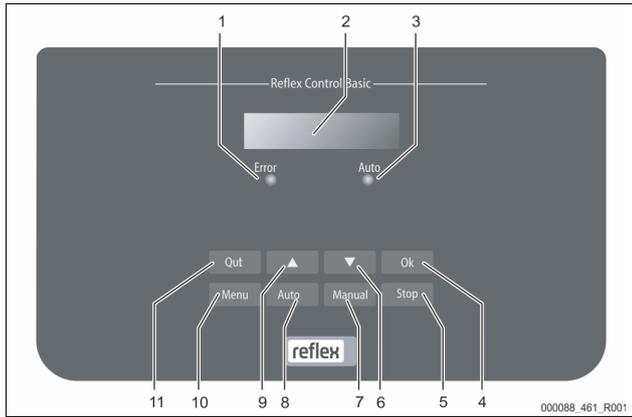
### Note!

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.

## 9 Controller

### 9.1 Operator panel



1	Error LED • The Error LED illuminates in the event of a fault
2	Display
3	Auto LED • The Auto LED illuminates green in Automatic mode • The Auto LED flashes green in Manual mode • The Auto LED is not illuminated when the system is stopped
4	OK • Confirm actions
5	Stop • For commissioning and entry of new values in the controller
6	"Back" to the previous menu
7	Manual • For tests and maintenance tasks
8	Auto • For continuous operation
9	"Forward" to the next menu
10	Menu • Call up the Customer menu
11	Quit • Acknowledge messages

#### Selecting and changing parameters

- Use "OK" (5) to select the parameter.
- Use the "▼" (7) or "▲" (9) arrow keys to change the parameter.
- Use "OK" (5) to confirm the parameter.
- Use the "▼" (7) or "▲" (9) arrow keys to switch to a different menu option.
- Use "Quit" (11) to switch to a different menu level.

### 9.2 Configuring settings in the controller

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

System-specific values can be corrected via the customer menu. In the course of initial commissioning, the factory settings must first be adjusted for the system-specific conditions.

**Note!**  
For a description of the operation, see chapter 9.1 "Operator panel" on page 12.

All grey marked menu items must be reviewed during commissioning.

Press "Manual" to switch to manual operation.  
Press "Menu" to display the first main menu option "Customer menu".

Indication on the display	Meaning
Customer menu	Switch to the next main menu option.
Language	Standard software in various languages.
Time:	Adjust the "Hour", "Minute", and "Second" display when each begins to flash. This time is used for entries in the fault memory.
Date:	Adjust the "Day", "Month", and "Year" display when each begins to flash. This date is used for entries in the fault memory.
1 % / 1.7 bar Null balancing?	The controller checks whether the level sensor signal matches the value entered for the "RG" primary vessel in the controller, see chapter 7.3 "Modifying the controller's start routine" on page 10. <b>Note!</b> The "RG" primary vessel must be completely empty.
0 % / 0 bar Null balancing successfully concluded!	One of the following messages appears on the display: • Null balancing concluded successfully Confirm with the "▼" button. • Empty vessel and repeat the process Confirm with "OK".
0 % / 0 bar Cancel null balancing? No	This message appears when null balancing has failed. Select "Yes" or "No" on the display. • <b>YES:</b> The "RG" primary vessel is empty and the device is installed as per the instructions. If null balancing is still not possible, cancel with "Yes". Contact your Reflex Customer Service. • <b>NO:</b> Check the prerequisites for the commissioning, see chapter 7.1 "Checking the requirements for commissioning" on page 9. The controller's start routine has been restarted. Confirm the selection of "yes" or "no" with "OK".
Min.op.pressure 01.8 bar	Enter the value for the minimum operating pressure. <b>Note!</b> Calculation of minimum operating pressure, see chapter 7.2 "Reflexomat switching points" on page 10.
Make-up	Switch to the "Make-up" main menu. • Press "OK" to open the menu. • Use the "▼▲" buttons to open the sub-menu.
Make-up: ON at: 08 %	If the water content is below the specified vessel size, add water, see chapter 7.3 "Modifying the controller's start routine" on page 10. • If an automatic make-up device (Fillcontrol for example) is installed, make-up will be actuated automatically; otherwise the make-up must be manually activated.
Make-up: OFF at: 12 %	Terminate the water make-up when the specified vessel size is exceeded. • If an automatic make-up device is installed, make-up will be shut off automatically; otherwise the make-up must be manually deactivated. • If you have selected "No" for automatic make-up, the system will not return any further queries about the make-up.
Max. make-up time 010 min.	Pre-selected time for a make-up cycle. Upon expiry of this set time, the system interrupts the make-up and returns the "Make-up time" fault message.
Max. make-up cycles 003 / 2 h	If the set number of make-up cycles is exceeded within two hours, the system interrupts the make-up and returns the "Make-up cycles" fault message.

Indication on the display	Meaning	Indication on the display	Meaning	
With water meter. YES	<ul style="list-style-type: none"> <li><b>YES:</b> FQIRA+ contact water meter is installed, see chapter 4.6 "Optional equipment and accessories" on page 5 . This is the prerequisite for the make-up volume monitoring and the operation of a softening system.</li> <li><b>NO:</b> A contact water meter is not installed (standard model).</li> </ul>	Floating fault contact YES	<p>For the output of messages to the floating contact, see chapter 9.2.2 "Messages" on page 14 .</p> <ul style="list-style-type: none"> <li><b>YES:</b> Output of all messages.</li> <li><b>NEIN:</b> Output of all messages identified with "xxx" ("01", for example).</li> </ul>	
Make-up volume 000020 l	<p>Only displayed if "YES" has been set in the "With water meter" menu option.</p> <ul style="list-style-type: none"> <li>Use "OK" to delete the counter. <ul style="list-style-type: none"> <li>Press <b>YES</b> to reset the value displayed to "0".</li> <li>Press <b>NO</b> to retain the displayed value.</li> </ul> </li> </ul>	Fault memory>	<p>Switch to the "Fault memory" sub-menu.</p> <ul style="list-style-type: none"> <li>Press "OK" to open the menu.</li> <li>Use the "▼▲" buttons to open the sub-menu.</li> </ul>	
Max. make-up volume 000100 l	<p>This value is only displayed if "YES" has been set in the "With water meter" menu option.</p> <ul style="list-style-type: none"> <li>When the set volume is exceeded, the system interrupts the make-up process and returns the error message "Max. make-up volume exceeded".</li> </ul>	ER 01...xx	<p>The last 20 alarms are stored with fault type, date, time, and fault code. See the chapter "Messages" for more information about the ER... messages.</p>	
With softening YES	<p>This value is only displayed if "YES" has been set in the "With water meter" menu option.</p> <ul style="list-style-type: none"> <li><b>YES:</b> Further queries follow about softening.</li> <li><b>NEIN:</b> The system does not offer more queries regarding the softening process.</li> </ul>	Parameter memory>	<p>Switch to the "Parameter memory" sub-menu.</p> <ul style="list-style-type: none"> <li>Press "OK" to open the menu.</li> <li>Use the "▼▲" buttons to open the sub-menu.</li> </ul>	
Disable make-up? YES	<p>This value is only displayed if "YES" has been set in the "With softening" menu option.</p> <ul style="list-style-type: none"> <li><b>YES:</b> The system stops the make-up process when the set soft water capacity is exceeded.</li> <li><b>NEIN:</b> The system does not stop the make-up process. The system displays the "Softening" message.</li> </ul>	P0 = xx.x bar Date   Time	<p>The last 10 entries of the minimum working pressure are stored with date and time.</p>	
Hardness reduction 10 °dH	<p>This value is only displayed if "YES" has been set in the "With softening" menu option.</p> <ul style="list-style-type: none"> <li>Hardness reduction is calculated from the difference of the overall water hardness <math>G_{H_{actual}}</math> and the target water hardness <math>G_{H_{target}}</math>. <math>Hardness\ reduction = G_{H_{actual}} - G_{H_{target}}</math> °dH</li> </ul> <p>Enter the value in the controller. Consult the manufacturer information for third-party products.</p>	Vessel info 00500 l	<p>The system displays the values for the volume and the diameter of the "RG" primary vessel.</p> <ul style="list-style-type: none"> <li>If you identify differences to the information provided on the primary vessel's nameplate, please contact the Reflex Customer Service.</li> </ul>	
Cap. soft water 05000 l	<p>This value is only displayed if "YES" has been set in the "With softening" menu option.</p> <p>The attainable soft water capacity is calculated from the type of softening used and the specified hardness reduction.</p> <ul style="list-style-type: none"> <li>Fillsoft I, soft water capacity <math>\leq 6000/hardness\ red.</math> l</li> <li>Fillsoft II, soft water capacity <math>\leq 12000/hardness\ red.</math> l</li> </ul> <p>Enter the value in the controller. Consult the manufacturer information for the values of third-party products.</p>	<b>Reflexomat</b> V1.00	<p>Information about the software version</p>	
Remaining cap. soft w. 000020 l	<p>This value is only displayed if "YES" has been set in the "With softening" menu option.</p> <ul style="list-style-type: none"> <li>Available soft water capacity.</li> </ul>	<b>9.2.1 Default settings</b>		
Replacement 18 months	<p>This value is only displayed if "YES" has been set in the "With softening" menu option.</p> <ul style="list-style-type: none"> <li>Manufacturer specification for the replacement interval of the softening cartridges, regardless of the calculated soft water capacity. The system displays the "Softening" message.</li> </ul>	<p>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.</p>		
Next maintenance 012 months	<p>Recommended maintenance messages.</p> <ul style="list-style-type: none"> <li>Off: Without maintenance recommendation.</li> <li>001 – 060: Maintenance recommendation in months.</li> </ul>	<b>Customer menu</b>		
		<b>Parameter</b>	<b>Setting</b>	<b>Comment</b>
		Language	DE	Display language.
		Minimum operating pressure "P <sub>0</sub> "	1.8 bar	see chapter 7.2 "Reflexomat switching points" on page 10 .
		Next maintenance	12 months	Time left to the next due maintenance.
		Volt-free contact	YES	see chapter 9.2.2 "Messages" on page 14 .
		Make-up		
		Make-up "ON"	8 %	
		Make-up "OFF"	12 %	
		Maximum make-up volume	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")		
		Shut off make-up	No	In the case of soft water residual capacity = 0
		Hardness reduction	8°dH	= Target – Actual
		Maximum make-up volume	0 Litres	
		Soft water capacity	0 Litres	
		Cartridge replacement	18 months	Replace cartridge.

**Service menu**

Parameter	Setting	Comment
<b>Pressurisation</b>		
Compressor "ON"	P <sub>0</sub> + 0.3 bar	Differential pressured added to the "P <sub>0</sub> " minimum operating pressure.
Compressor "OFF"	P <sub>0</sub> + 0.4 bar	Differential pressured added to the "P <sub>0</sub> " 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 <sub>0</sub> + 0.4 bar	Differential pressured added to the "P <sub>0</sub> " minimum operating pressure.
Overflow line "OPEN"	P <sub>0</sub> + 0.5 bar	Differential pressured added to the "P <sub>0</sub> " minimum operating pressure.
Maximum pressure	P <sub>0</sub> + 3 bar	Differential pressured added to the "P <sub>0</sub> " minimum operating pressure.

Parameter	Setting	Comment
<b>Filling levels</b>		
Insufficient water "ON"	5 %	
Insufficient water "OFF"	12 %	
Solenoid valve in overflow line "CLOSED"	90 %	

**9.2.2 Messages**

The display provides alarms in plain text and the ER codes shown in the list. Use the arrow buttons to scroll through multiple alarms displayed at the same time. The fault memory stores the last 20 alarms for review, see chapter 9.2 "Configuring settings in the controller" on page 12.

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

- ▶ **Note!**  
Clearing of the cause must be confirmed by pressing the "Ack" button on the operator panel. All other alarms are automatically reset as soon as the cause has been eliminated.
- ▶ **Note!**  
Floating contacts, setting in the Customer menu, see chapter 9.2 "Configuring settings in the controller" on page 12.

ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
01	Minimum pressure	YES	<ul style="list-style-type: none"> <li>• Set value not reached.</li> <li>• Water loss in the system.</li> <li>• Compressor fault.</li> <li>• Controller in Manual mode.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Check water level.</li> <li>• Check compressor.</li> <li>• Set the controller to Automatic mode.</li> </ul>	"Quit"
02.1	Insufficient water	-	<ul style="list-style-type: none"> <li>• Set value not reached.</li> <li>• Make-up disabled.</li> <li>• Air in the system.</li> <li>• Dirt trap clogged.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Clean the dirt trap.</li> <li>• Check functioning of the "PV1" solenoid valve.</li> <li>• If necessary, manually add water.</li> </ul>	-
03	High water	YES	<ul style="list-style-type: none"> <li>• Set value exceeded.</li> <li>• Make-up disabled.</li> <li>• Water intake through a leak in a thermal transfer medium of the user.</li> <li>• Vessel too small.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Check functioning of the "WV1" solenoid valve.</li> <li>• Drain water from the "VG" vessel.</li> <li>• Check site heat transfer medium for leaks.</li> </ul>	-
04.1	Compressor	YES	<ul style="list-style-type: none"> <li>• Compressor disabled.</li> <li>• Fuse defective.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set values in the Customer or Service menu.</li> <li>• Replace the fuse.</li> </ul>	"Quit"
05	Compressor run time	-	<ul style="list-style-type: none"> <li>• Set value exceeded.</li> <li>• Severe water loss in the system.</li> <li>• Air lines leaking.</li> <li>• Solenoid valve in the overflow line does not close.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Check the water loss and correct, if necessary.</li> <li>• Seal any leak in the air system.</li> <li>• Check functioning of the "PV1" solenoid valve.</li> </ul>	-
06	Make-up time	-	<ul style="list-style-type: none"> <li>• Set value exceeded.</li> <li>• Water loss in the system.</li> <li>• Make-up line not connected.</li> <li>• Make-up rate insufficient.</li> <li>• Make-up hysteresis too low.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Check water level.</li> <li>• Connect make-up pipe</li> </ul>	"Quit"
07	Make-up cycles	-	Set value exceeded.	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Seal any leak in the system.</li> </ul>	"Quit"
08	Pressure measurement	YES	Controller receives incorrect signal.	<ul style="list-style-type: none"> <li>• Connect the plug.</li> <li>• Check functioning of the pressure sensor.</li> <li>• Check the cable for damage.</li> <li>• Check the pressure sensor.</li> </ul>	"Quit"
09	Level sensor	YES	Controller receives incorrect signal.	<ul style="list-style-type: none"> <li>• Check functioning of the load cell.</li> <li>• Check the cable for damage.</li> <li>• Connect the plug.</li> </ul>	"Quit"
10	Maximum pressure	-	<ul style="list-style-type: none"> <li>• Set value exceeded.</li> <li>• Pressure relief pipe not functioning.</li> <li>• Dirt trap clogged.</li> </ul>	<ul style="list-style-type: none"> <li>• Check set value in the Customer or Service menu.</li> <li>• Check functioning of the pressure relief pipe.</li> <li>• Clean the dirt trap.</li> </ul>	"Quit"

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

## 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 "Quit" to acknowledge the "Maintenance recommended" message. Reset the maintenance counter in the Customer menu.



#### Note!

Arrange for maintenance tasks must be carried out only by specialist personnel or Reflex Customer Service.

## 10.1 Maintenance schedule

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

Activity	Check	Wait	Clean	Interval
Check for leaks. • "CO" compressor. • Screw connections of the compressed air connections.	x	x		Annually
Check switching points. • Switch on pressure "CO" compressor. • Insufficient water. • Make-up with water.	x			Annually
Clean "ST" dirt trap. – see chapter 10.4.1 "Cleaning the dirt trap" on page 17 .	x	x	x	Depending on the operating conditions
Remove condensate from the primary vessel. – see chapter 10.4 "Cleaning the vessel" on page 16 .	x	x	x	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 "Reflexomat switching points" on page 10.
- Level sensor at the primary vessel.

Preparation

1. Switch to Automatic mode.
2. Close the cap valves upstream of the vessel.
3. Record the displayed filling level (value in %).
4. Drain the water from the vessel.

Check 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.

Check 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 water make-up and continue to drain the water from the vessel.
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 vessel

If necessary, remove condensate from the vessel, see chapter 10.4 "Cleaning the vessel" on page 16.

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 vessel 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 %.

Check 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.

 **Note!**  
If no automatic make-up is connected, manually fill the vessel with water up to the noted level.

 **Note!**  
The setting values for pressurisation, filling levels and make-up can be found in the chapter Default settings, see chapter 9.2.1 "Default settings" on page 13.

## 10.3 Cleaning

### 10.3.1 Cleaning the vessel

#### 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 vessel to remove condensate. The cleaning intervals depend on the local operational conditions.

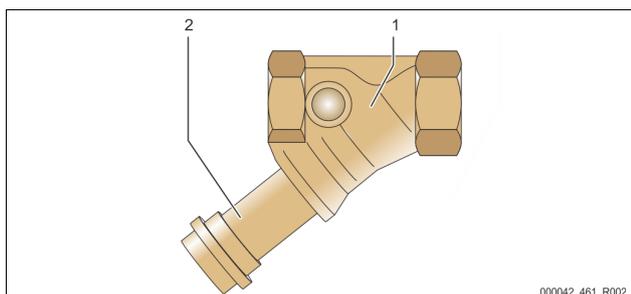
##### Vessel with permanently installed diaphragm

1. Record the level value displayed at the controller.
2. Press "Manual" at the operator panel to switch the controller into Manual mode.
3. Remove the silencer from the "PV" overflow solenoid valve.
4. Install a suitable hose in the "PV" overflow solenoid valve to drain condensate.
  -  **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. Ensure proper connections for condensate draining. Wear suitable personal protective equipment (safety glasses and safety gloves, for example).
5. Slowly open the "PV" overflow solenoid valve.
  - Manually add water if the pressure in the system circuit drops significantly.
  - If the "PV" overflow solenoid valve discharges more than 5 litres of water or condensate, you must check the diaphragm for rupture.
    - The vessel must be replaced if the diaphragm has ruptured.
6. Close the "PV" overflow solenoid valve if the display indicates a 100% level.
7. Start the "CO" compressor to build up pressure.
  - If you had to add water during draining the condensate, you must monitor the pressure build up. At excessive pressure rise, drain water from the system circuit accordingly.
8. Switch the controller into Automatic mode when the recorded level is displayed at the controller.
9. Remove the hose from the "PV" overflow solenoid valve and fit the silencer.
10. Maintenance is completed.

Regularly clean the primary vessel to remove condensate. The cleaning intervals depend on the local operational conditions.

### 10.3.2 Cleaning the dirt trap

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



1	"ST" dirt trap	2	Dirt trap insert
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- Switch to Stop mode.
  - Press "Stop" on the controller's operator panel.
- Close the ball valves upstream and downstream of the "ST" (1) dirt trap.
- 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.
- Re-open the ball valves upstream and downstream of the "ST" (1) dirt trap.
- Switch to Automatic mode.
  - Press "Auto" on the controller's operator panel.

#### Note

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

### 10.4 Inspection

#### 10.4.1 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).

#### 10.4.2 Inspection prior to commissioning

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

#### 10.4.3 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).

#### Strength 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 specified by the operating company based on a safety evaluation taking into consideration the actual operating conditions, experience with the mode of operation and charging material and the applicable 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 dismantling, block off all "water"-side connections to the device.
- De-pressurise the device by venting it.

- Disconnect the system from the power supply and secure it against unintended reactivation.
- Disconnect the power cable of the device from the power supply.
- Open the discharge ports at the vessel until water and compressed air are completely removed.
- Undo all hose and pipe connections from the vessel and the control unit of the device to the system and remove them completely.

## 12 Annex

### 12.1 Reflex Customer Service

#### Central customer service

Central telephone number: +49 (0)2382 7069 - 0

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

Fax: +49 (0)2382 7069 - 9523

E-mail: [service@reflex.de](mailto:service@reflex.de)

#### Technical Hotline

For questions about our products

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

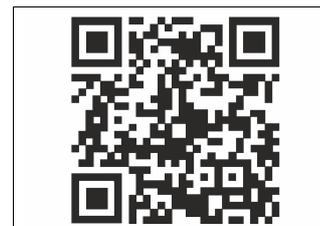
Monday to Friday 8:00 to 16:30

### 12.2 Conformity and standards

Device conformity declarations are available on the Reflex homepage.

[www.reflex-winkelmann.com/konformitaetserklaerungen](http://www.reflex-winkelmann.com/konformitaetserklaerungen)

Alternatively, scan the QR code:



### 12.3 Guarantee

The respective statutory guarantee regulations apply.

**EN** **Installation and commissioning certificate** - This device has been installed and commissioned in accordance with the instructions provided in the operating manual. The settings in the controller match the local conditions.



Typ / Type:	
P <sub>0</sub>	
P <sub>SV</sub>	
Fabr. Nr. / Serial-No.	









Thinking solutions.

Reflex Winkelmann GmbH  
Gersteinstraße 19  
59227 Ahlen, Germany



+49 (0)2382 7069-0

+49 (0)2382 7069-9546

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