

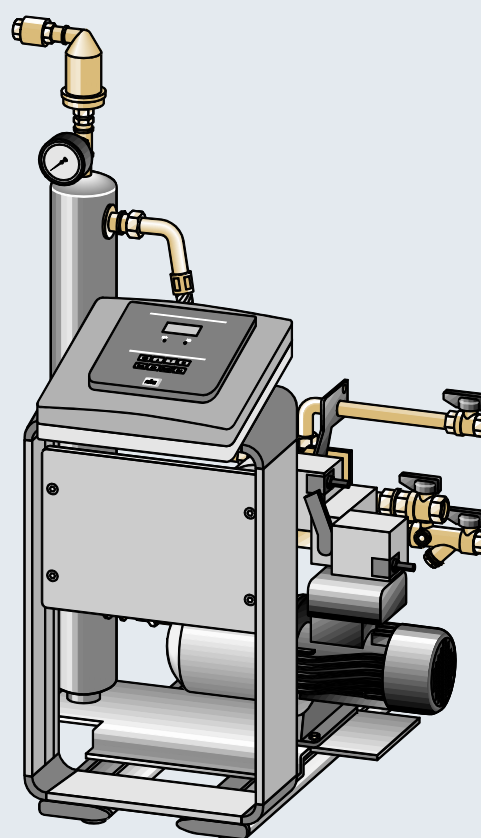
Vacuum spray degassing

Servitec 35-95

GB

Operating manual

Original operating manual



1	Notes on the operating manual.....	5
2	Liability and guarantee.....	5
3	Safety.....	6
3.1	Explanation of symbols.....	6
3.2	Personnel requirements	7
3.3	Personal protective equipment	7
3.4	Intended use.....	7
3.5	Inadmissible operating conditions.....	7
3.6	Residual risks	8
4	Description of the device.....	9
4.1	Description.....	9
4.2	Overview	9
4.3	Identification	10
4.3.1	Type code.....	10
4.4	Function	11
4.5	Scope of delivery.....	14
4.6	Optional equipment and accessories	14
5	Technical data	15
5.1	Electrical system.....	15
5.2	Dimensions and connections.....	15
5.3	Operation	16
6	Installation.....	17
6.1	Installation conditions	18
6.1.1	Incoming inspection	18
6.2	Preparatory work	18
6.3	Execution.....	19
6.3.1	Fitting the add-on components.....	19
6.3.2	Floor/wall installation	20
6.3.3	Hydraulic connection.....	21
6.4	Switching and make-up variants.....	24
6.4.1	Pressure-dependent "Magcontrol" make-up mode.....	24
6.4.2	Level dependent "Levelcontrol" make-up mode	25
6.5	Electrical connection	26
6.5.1	Terminal diagram	27
6.5.2	RS-485 interface.....	29
6.6	Installation and commissioning certificate.....	29
7	Commissioning.....	30
7.1	Checking the requirements for commissioning.....	30
7.2	Setting the minimum operating pressure for Magcontrol	30
8	Controller	32
8.1	Operator panel	32
8.2	Modifying the controller's start routine	33
8.3	Filling the device with water and venting	34
8.4	Vacuum test.....	36
8.5	Use the device to fill the facility system with water	37
8.6	Parametrising the controller in the Customer menu	38
8.7	Starting Automatic mode.....	41

9	Operation	42
9.1	Operating modes	42
9.1.1	Automatic mode.....	42
9.1.2	Manual mode	43
9.1.3	Stop mode	43
9.1.4	Summer operation	44
9.1.5	Restarting	44
9.2	Controller	45
9.2.1	Customer menu	45
9.2.2	Service menu.....	45
9.2.3	Default settings	46
9.2.4	Messages	47
10	Maintenance	50
10.1	Exterior leak test	51
10.2	Cleaning	52
10.2.1	Cleaning the dirt trap.....	52
10.3	Inspecting system degassing and make-up degassing	52
10.4	Maintenance certificate	53
10.5	Inspection	54
10.5.1	Pressure-bearing components.....	54
10.5.2	Inspection prior to commissioning.....	54
10.5.3	Inspection intervals.....	54
11	Disassembly	55
12	Annex	57
12.1	Reflex Customer Service	57
12.2	Conformity and standards.....	58
12.3	Certificate No. of the CE type test.....	59
12.4	Guarantee	59

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 57 .

3 Safety

3.1 Explanation of symbols

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 used in plant systems for stationary heating and cooling circuits. 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.

Minimise the entry of atmospheric oxygen throughout the plant system and into the make-up water.



Note!

Ensure the quality of the make-up water as specified by national regulations.

- For example, VDI 2035 or SIA 384-1.



Note!

- To ensure fault-free operation of the system for the long-term, glycols whose inhibitors prevent corrosion phenomena must always be used for systems operating with water/glycol mixtures. It must also be ensured that no foam is formed due to the substances in the water. Otherwise this could endanger the entire function of the vacuum spray tube degassing as this can lead to sedimentation in the vent pipe and therefore leaks.
- The specifications of the respective manufacturer are always decisive for the specific properties and mixing ratio of the water/glycol mixtures.
- Types of glycol must not be mixed and the concentration is generally to be checked every year (see manufacturer information).

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.
-

CAUTION

Risk of injury upon coming into contact with glycol containing water

Contact with glycol containing water in plant systems for cooling circuits can result in irritation of the skin and eyes.

- Use personal protective equipment (safety clothing, gloves and goggles, for example).
-

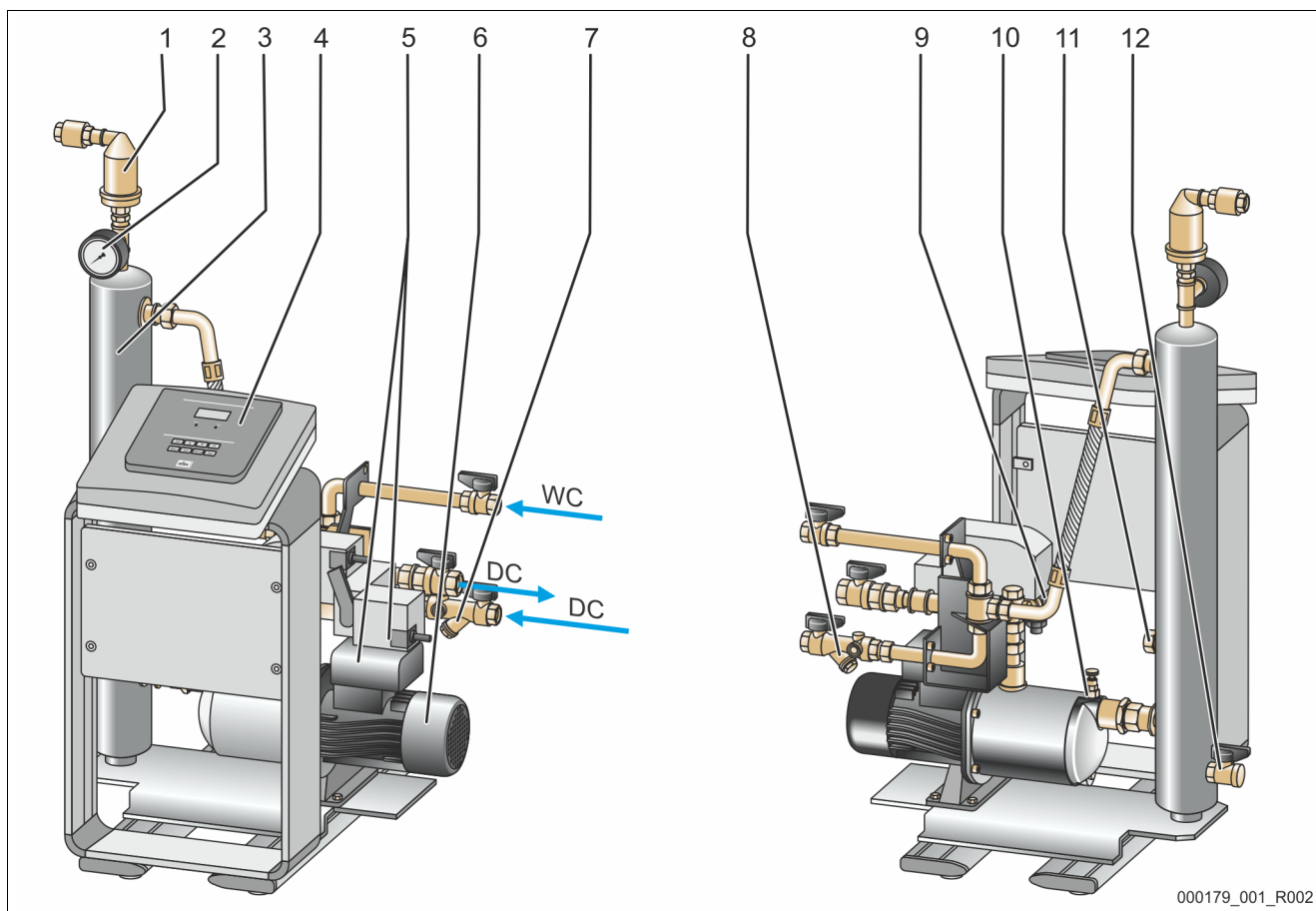
4 Description of the device

4.1 Description

The device is a degassing and make-up station. Its main areas of application are heating and cooling circuits and systems in which interruptions of operations due to dissolved or free gases. The device provides the following safety features:

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

4.2 Overview



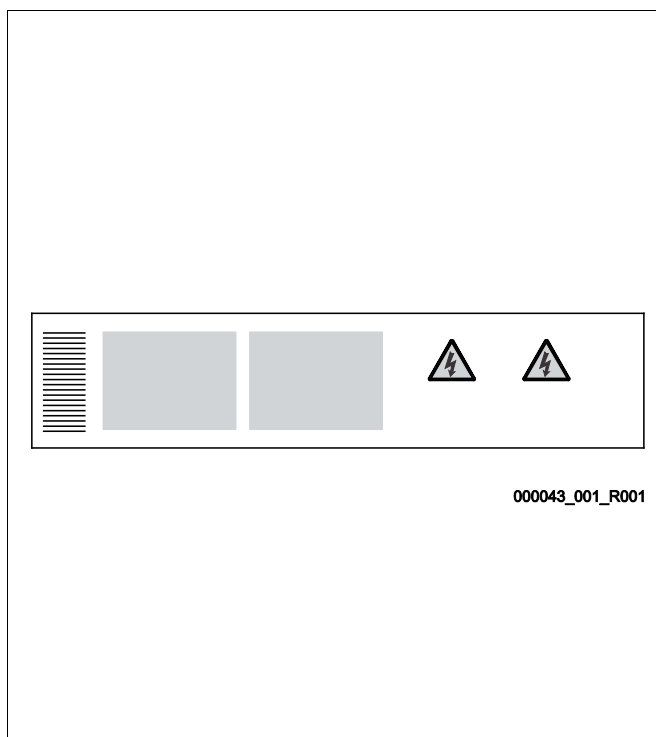
1	"DV" degassing valve
2	"PI" vacuum gauge
3	"VT" vacuum spray tube
4	Controller
5	"CD" 3-ways motor ball valve for the hydraulic regulation of system and make-up degassing
6	"PU" pump
7	"ST" dirt trap
8	"ST" dirt trap

9	"PIS" pressure transducer
10	"AV" vent screw
11	Insufficient water switch
12	Füll- und Entleerungshahn
WC	Make-up connection
DC	Degassing connection
	<ul style="list-style-type: none"> • Degassed water outlet • Gas-rich water inlet

4.3 Identification

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



4.3.1 Type code

No.		Type code (example)
1	Device name	Servitec 35 Touch 1 2 3
2	Pump head height	
3	Controller type	

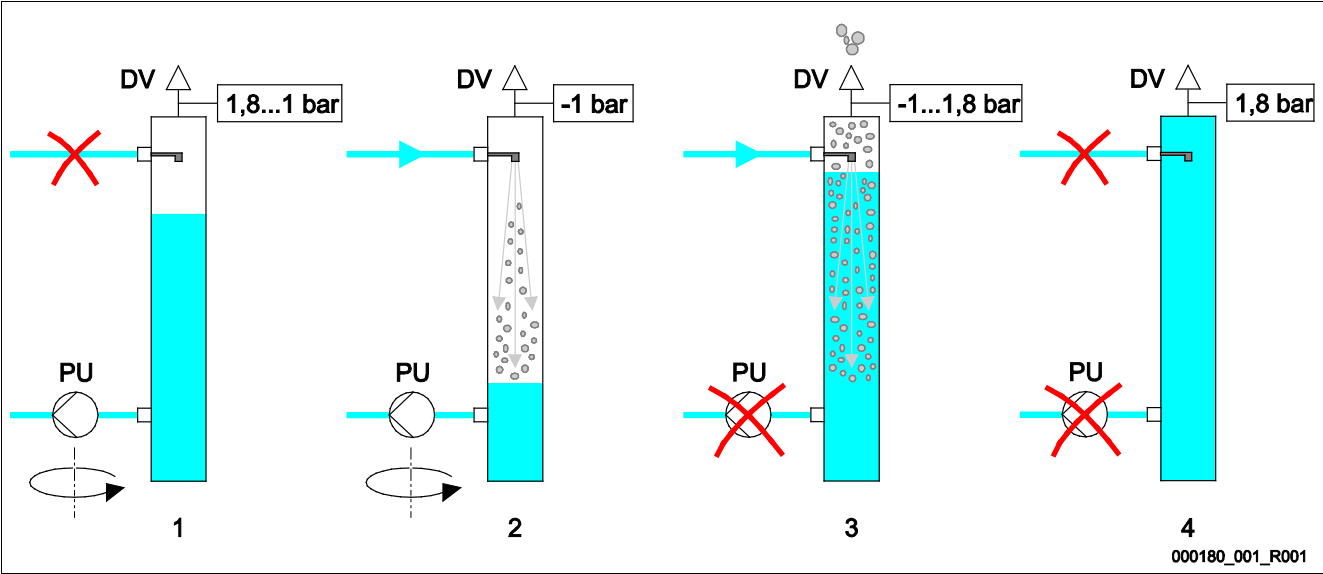
4.4 Function

The device is suited for the degassing of water from the plant and make-up water. It removes up to 90 % of the dissolved gases from the water. The degassing operation uses timer-controlled cycles. A cycle comprises the following phases:

- Drawing the vacuum
 - The "DC" feed of gas-rich water from the plant to the "VT" vacuum spray tube is closed. The "PU" pump creates a vacuum in the spray tube until the water saturation pressure is reached. For cold water, the "PI" vacuum gauge indicates a vacuum of - 1 bar.
- Atomisation
 - The "DC" feed of gas-rich water from the plant to the "VT" vacuum spray tube is opened. Depending on the requirement, partial flows of the gas-rich plant water and the make-up water are atomised in the vacuum spray tube via the "DC" and "WC" lines. The large surface of the atomised water and the gas saturation headway to the vacuum result in a degassing of the water. The "PU" pump returns degassed water from the vacuum spray tube to the system where it again begins to dissolve gases.
- Discharge
 - The "PU" pump shuts off. The system continues to inject and degas water in the "VT" vacuum spray tube. The water level in the vacuum spray tube rises. The gases separated from the water are discharged via the "DV" degassing valve.
- Idling time
 - When the gas has been discharged, the device will remain in idle until the next cycle is started.

Sequence of a degassing cycle in the "VT" vacuum spray tube pump

Cooling water system ≤ 30 °C, System pressure 1.8 bar, "DC" system degassing in operation, "WC" make-up degassing closed.



1	Vacuum is drawn
2	Injection

3	Discharge
4	Idling time

Degassing

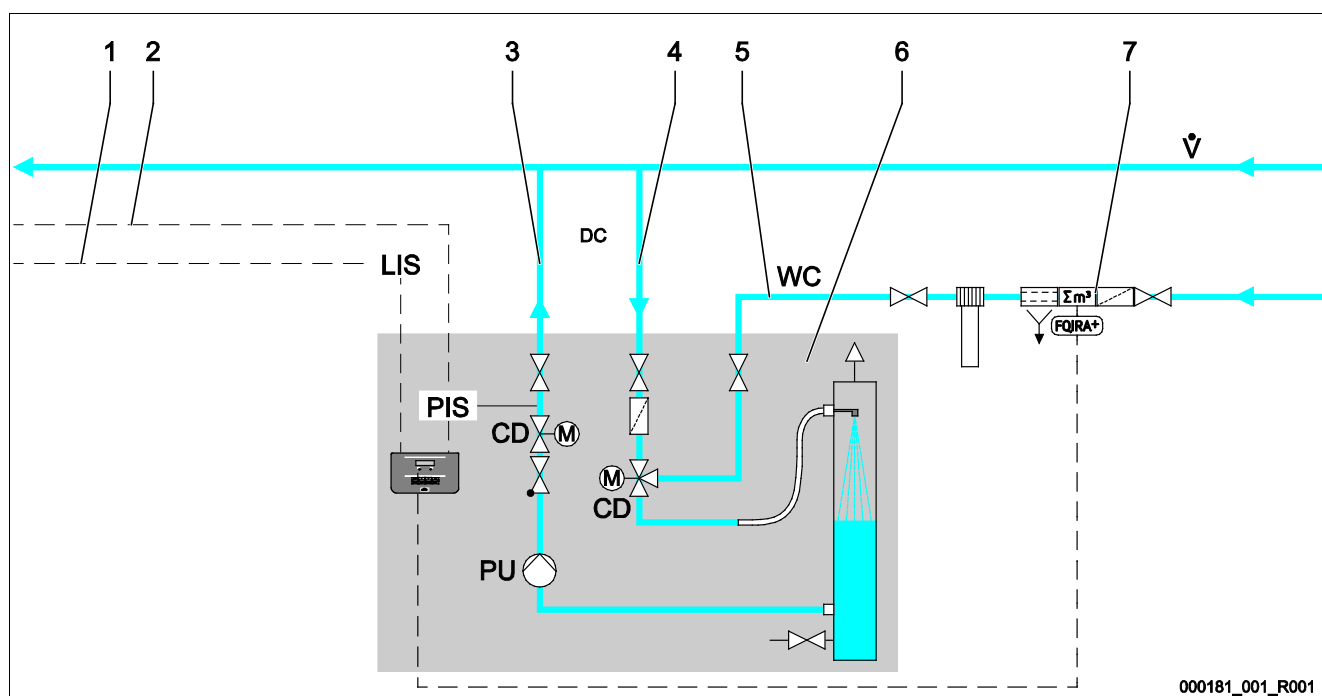
The entire degassing process is hydraulically synchronised by the "CD" motor adjustment apparatus and the device controller. The system monitors the operating states and displays them at the controller. The controller provides 3 different degassing programmes and 2 different make-up variants for selection and setting.

Degassing programmes

- Continuous degassing: For continued degassing over several hours or days in a sequence of degassing cycles without idling periods. This programme is recommended after commissioning and repairs.
- Interval degassing: Interval degassing comprises a limited number of degassing cycles. There is a pause time between the intervals. This programme is recommended for continuous operation.
- Make-up degassing: Is automatically activated for every water make-up during continuous or interval degassing. The process is the same as in continuous degassing. The degassing time is limited by the make-up time.

Make-up variants

There are two make-up variants. Both are monitored via the make-up time and the make-up cycles.



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1	Signal line from the "LIS" level sensor for the "Levelcontrol" make-up variant
2	Signal line from the "PIS" pressure transducer for "Magcontrol" make-up variant
3	"DC" degassing line (degassed water)
4	"DC" degassing line (gas-rich water)

5	"WC" makeup line
6	Device
7	Optional equipment and accessories see chapter 4.6 "Optional equipment and accessories" on page 14

Magcontrol:

For systems with diaphragm-type pressure expansion tank.

- Using the integrated "PIS" pressure transducer, the system registers and monitors the pressure in the heating or cooling system. The make-up degassing process is activated as soon as the pressure drops below the calculated filling pressure.

Levelcontrol:

For systems with pressurisation stations.

- Depending on the level in the tank for the "LIS" pressure maintenance station, water is added directly into the station. The make-up function can be triggered by an external 230 V ~ signal.

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 degassing equipment:

- Device controller.
- "DV" degassing valve, box-packaged.
- Plastic sleeve with operating manual and electric wiring diagram (attached to the device).

The device is pre-assembled and shipped on a pallet.

4.6 Optional equipment and accessories

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

- Fillset for make-up with water.
 - Fillset with integrated backflow preventer, water meter, dirt trap, and locking mechanisms for the "WC" make-up line.
- Fillset Impulse with FQIRA+ contact water meter for make-up with water.
 - If the Fillset Impulse with FQIRA+ contact water meter is installed in the make-up line, you can regulate the entire make-up quantity and the soft water capacity of Fillsoft softening systems. The operational reliability of the device is assured and prevents the automatic make-up during major water loss or small leaks.
- Fillsoft for softening the make-up water from the public 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.
- Enhancements for the device controller.
 - Use the RS-485 interface to retrieve various data from the controller and to communicate with control centres or other devices., see chapter 6.5.2.1 "Connecting the RS-485 interface" on page 29 . You need the following items for the communication of the RS-485 interface with control centres or other devices:
 - Bus modules for the communication with control centres
 - Lonworks Digital
 - Lonworks
 - Profibus-DP
 - Ethernet
 - I/O module for standard communication
- Reflexomat for system with pressure-maintaining stations.
 - The Reflexomat and device combination is preferred. Despite the degassed network, Reflexomat assured an extremely elastic operation at constant pressure. Make-up is executed depending on the water level measured with the "LIS" level sensor of the Reflexomat in the expansion tank of the pressure maintaining station. For a make-up request, the Reflexomat controller activates a 230 V signal to the device controller.
- Gas discharge measurement for an optimised degassing operation.



Notice!

Separate installation, operation, and maintenance instructions are supplied with the accessories and optional equipment.

5 Technical data



Note!

The following values apply for all systems:

- Permissible flow temperature: 120 °C
- Permissible inlet pressure for make-up: 1.3 bar – 6 bar
- Make-up capacity: 0.55 m³/h
- Separation level, dissolved gases: ≤ 90 %
- Separation level, free gases: 100 %
- Degree of protection: IP 54

5.1 Electrical system

Type	Power output (kW)	Power supply (V / Hz)	Fusing (A)	Number of RS-485 interfaces	I/O module	Electrical voltage control unit (V, A)	Noise level (dB)
35	0.7	230 / 50	10	1	No	230, 4	55
60	1.1	230 / 50	10	1	No	230, 4	55
60 GL	1.1	230 / 50	10	1	No	230, 4	55
75	1.1	230 / 50	10	1	No	230, 4	55
75 GL	1.1	230 / 50	10	1	No	230, 4	55
95	1.1	230 / 50	10	1	No	230, 4	55
95 GL	1.1	230 / 50	10	1	No	230, 4	55
120	1.5	230 / 50	10	1	No	230, 4	55

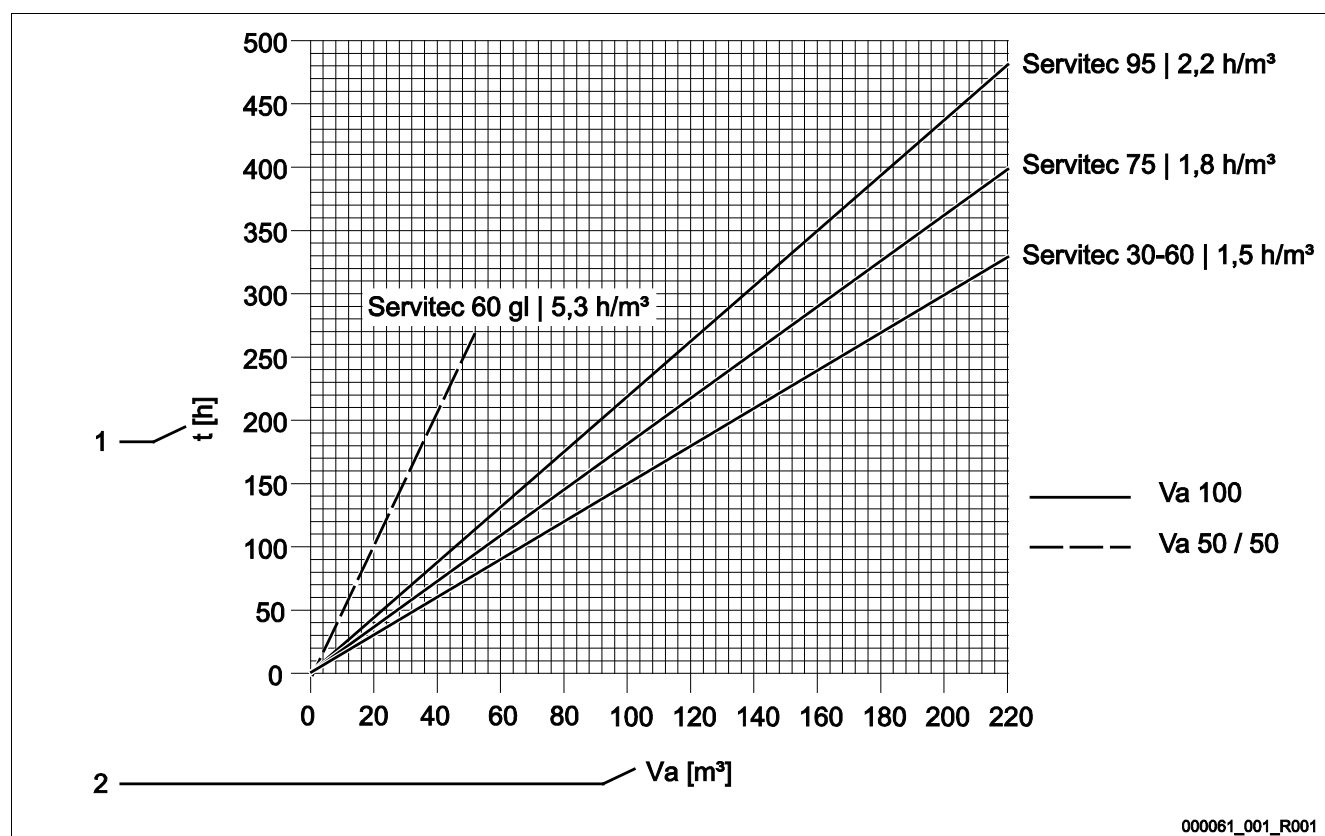
5.2 Dimensions and connections

Type	Weight (kg)	Height (mm)	Width (mm)	Depth (mm)	Degassing device connection	Degassing system connection	Make-up connection
35	42	1030	620	440	IG ½ "	Internal thread 1 "	IG ½ "
60	40	1215	685	440	IG ½ "	Internal thread 1 "	IG ½ "
60 GL	40	1215	685	440	IG ½ "	Internal thread 1 "	IG ½ "
75	39	1215	600	525	IG ½ "	Internal thread 1 "	IG ½ "
75 GL	39	1215	600	525	IG ½ "	Internal thread 1 "	IG ½ "
95	40	1215	600	525	IG ½ "	Internal thread 1 "	IG ½ "
95 GL	49	1215	600	525	IG ½ "	Internal thread 1 "	IG ½ "
120	43	1215	600	525	IG ½ "	Internal thread 1 "	IG ½ "

5.3 Operation

Type	System volume (100% water) (m ³)	System volume (50% water) (m ³)	Working pressure (bar)	Permissible operating gauge pressure (bar)	Setpoint overflow valve (bar)	Operating temperature (°C)
35	220	–	0.5 – 2.5	8	–	>0 – 70
60	220	–	0.5 – 4.5	8	–	>0 – 70
60	220	–	0.5 – 4.5	8	–	>0 – 90
60 GL	–	50	0.5 – 4.5	8	–	>0 – 70
75	220	–	0.5 – 5.4	10	–	>0 – 70
75	220	–	1.3 – 5.4	10	–	>0 – 90
75 GL	–	50	0.5 – 5.4	10	–	>0 – 70
95	220	–	0.5 – 7.2	10	–	>0 – 70
95	220	–	1.3 – 7.2	10	–	>0 – 90
95 GL	–	50	0.5 – 7.2	10	–	>0 – 70
120	220	–	1.3 – 9	10	–	>0 – 90

Approximate values for the maximal "Va" system volume to be degassed under extreme conditions during commissioning at a nitrogen reduction from 18 mg/l to 10 mg/l.



1 Continuous degassing "t" [h]

2 System volume "Va" [m³]

6 Installation

DANGER

Risk of serious injury or death due to electric shock.

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

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

CAUTION

Risk of injury due to pressurised liquid

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

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

CAUTION

Risk of burns on hot surfaces

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

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

CAUTION

Risk of injury due to falls or bumps

Bruising from falls or bumps on system components during installation.

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



Note!

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

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

6.1 Installation conditions

6.1.1 Incoming inspection

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

Proceed as follows:

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

6.2 Preparatory work

Condition of the delivered device:

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

Preparing the device installation:

- Frost-free, well-ventilated room.
- Ambient temperature > 0 to maximal 45 °C.
- Level, stable flooring with a drainage facility.
- Filling connection DN 15 to DIN 1988 -100/ -600 / DIN EN 1717.
- Electric connection 230 V~, 50/60 Hz, 16 A with upstream ELCB: Tripping current 0.03 A.

The device can be operated in two different modes for making up with water. When installing the device, note its position with the system:

- Pressure-dependent make-up of system water (Magcontrol).
 - Install the device in the vicinity of the pressure expansion vessel.
- Level-dependent make-up of system water (Levelcontrol).
 - Install the device at the system side in the return upstream of the return flow admixture.



Note!

Comply with the Reflex planning directive.

- During planning, take into account that the working range of the device must be between the "pa" initial pressure and the "pe" final pressure in the working range of the pressurisation system.

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.

In heating systems, preferably install the device in the return side.

- In this manner, you ensure that the device is operated within the permissible pressure and temperature ranges.
- In systems with return admixtures or hydraulic switching points, the device must be installed upstream of the admixture point to ensure degassing in the "V" main flow volume at temperatures $\leq 70\text{ °C}$ (special types up to $\leq 90\text{ °C}$).

CAUTION – damage due to improper connection! Bear in mind that the device may be subject to additional stresses through the connection of piping or hose connections to the plant system. Ensure that all connections to the plant system are free from stresses. If necessary, provide support structures for the pipes.

CAUTION – Property damage caused by leaks! Leaks in the connection pipes to the device can cause material damage to the plant system. Use only connection pipes with appropriate resistance against the plant system temperature.

The device is pre-wired and must be adapted for the local system conditions. Complete the water-side connection to the system and the electric connection as shown in the terminal diagram, see chapter 6.5 "Electrical connection" on page 26.

CAUTION – damage due to improper Installation. Bear in mind that the device may be subject to additional stresses through the connection of piping or system equipment. Ensure that all pipe connections to the plant are free from stresses. If necessary, provide support structures for the pipes or equipment.

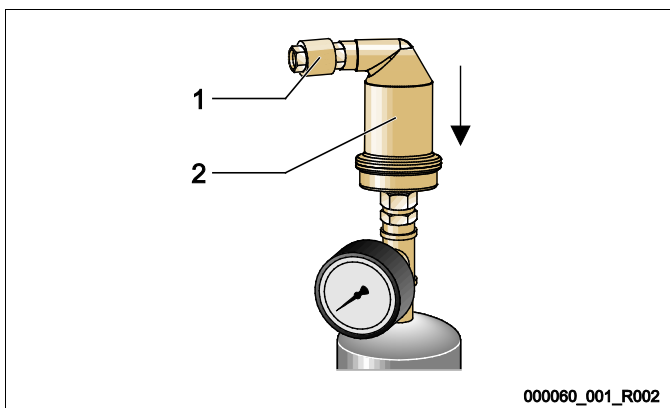


Note!

During installation, pay attention to the operability of the valves and the inlet options for the connecting lines.

6.3.1 Fitting the add-on components

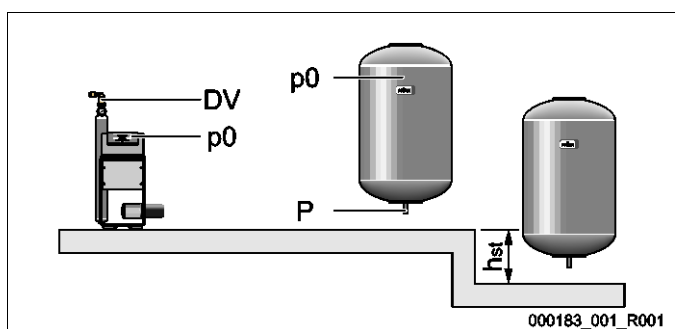
Install the "DV" degassing valve (2) with the check valve (1) on the "VT" vacuum spray tube. Check all screw fittings of the device for proper seating.



6.3.2 Floor/wall installation

Floor mounting

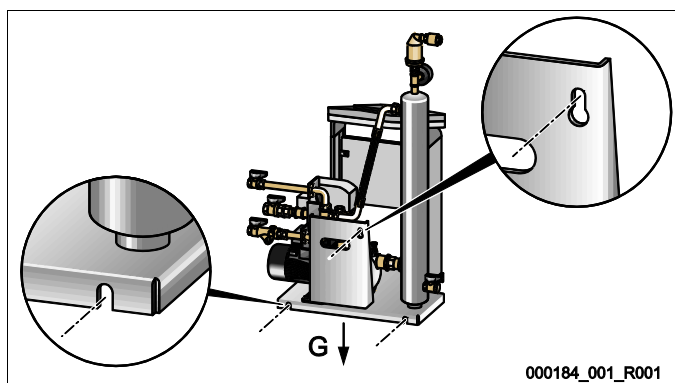
The device is installed on the floor. Select the attachment means according to the floor properties and the weight of the device.



Wall mounting

Applicable only to Servitec 35 and Servitec 60 as an option to floor mounting.

Use the slots provided at the housing rear to attach the device at the wall. Select the attachment means according to the wall properties and the "G" weight of the device.

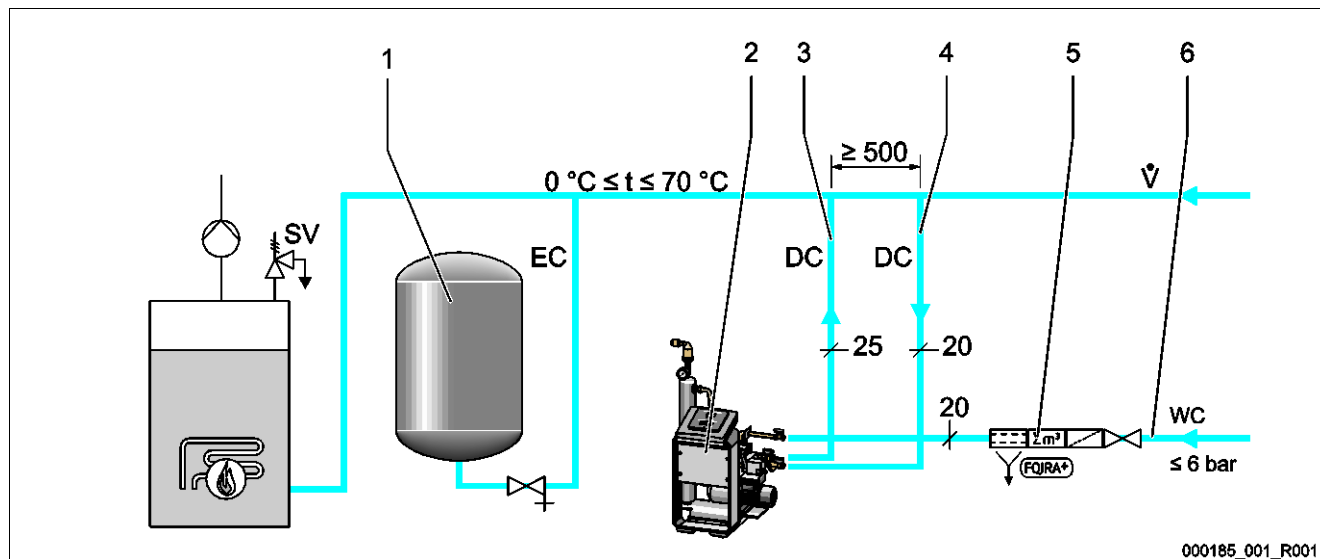


6.3.3 Hydraulic connection

6.3.3.1 Degassing line to the system

The device requires two "DC" degassing lines to the system. One degassing line is intended for gas-rich water from the system, and the other one serves to return the degassed water to the system. For both degassing lines, shut-off devices have been pre-installed at the device. The connection of the degassing lines must be made within the main volume flow of the overall system.

Device installation in a heating system – Pressure maintenance with diaphragm-type "MAG" expansion tank



1	Pressure expansion tank
2	Device
3	"DC" degassing line (degassed water)

4	"DC" degassing line (gas-rich water)
5	Optional equipment and accessories see chapter 4.6 "Optional equipment and accessories" on page 14
6	"WC" makeup line

The degassing lines into the system are installed near the integration of the "EC" expansion line. This ensures stable pressure conditions. If you operate the device with pressure-dependent water make-up, you must install the system near the diaphragm-type "MAG" pressure expansion tank. This ensures that the pressure in the diaphragm-type expansion tank is monitored. In this case, select the "Magcontrol" operating mode in the controller.

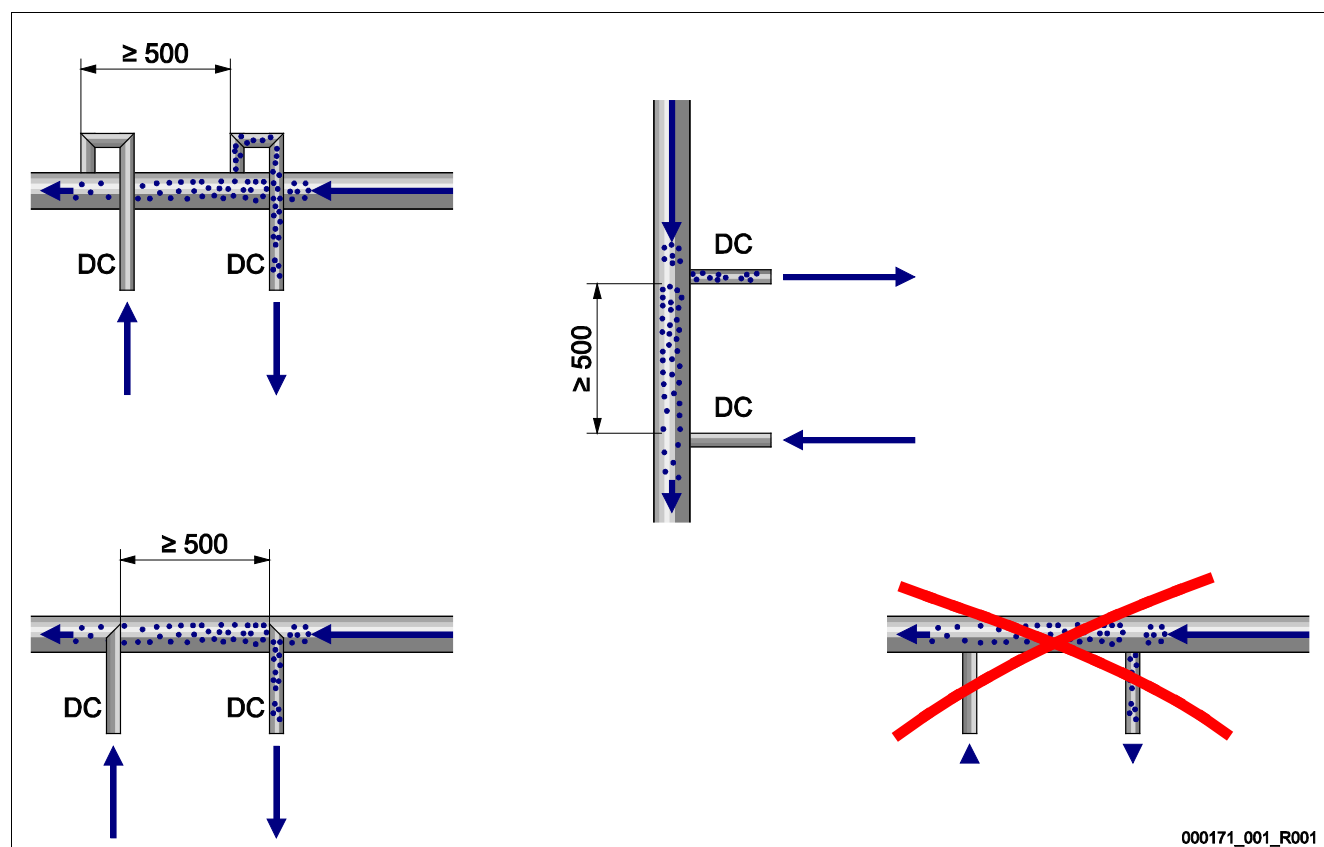


Note!

- Ensure the integration in the "V" main flow volume when using switching variants with hydraulic switching points and return admixtures.
 - For switching and make-up variants, see chapter 6.4 "Switching and make-up variants" on page 24 .

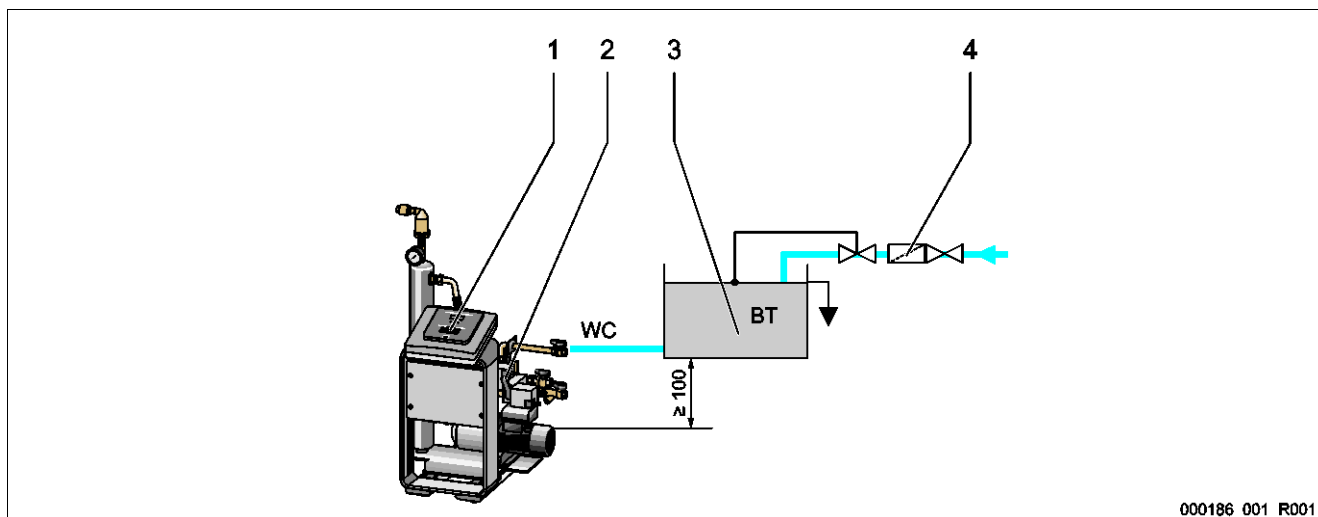
Installation detail of the "DC" degassing line

Connect the "DC" degassing lines as shown below.



- Ensure that particulate dirt cannot enter and thus create an overload of the "ST" dirt trap.
- Connect the degassing line for gas-rich water upstream of the degassing line for degassed water in system flow direction.
- Ensure that the water temperature is in the range $0\text{ °C} \leq 70\text{ °C}$. The return line side should be preferred for heating systems. Consequently the degassing capacity will be independent of the temperature.

6.3.3.2 Make-up line



000186_001_R001

1	Device
2	"CD" 3-ways motor ball valve

3	"BT" system separator vessel
4	"ST" dirt trap

For a water make-up via a "BT" mains disconnect receptacle, its bottom edge must be at least 100 mm above the "PU" degassing pump.

For various Reflex make-up variants, see chapter 6.4 "Switching and make-up variants" on page 24 .

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

Prevent a potential device fault by ensuring manual water make-up.

Install at least one "ST" dirt trap with a mesh size ≤ 0.25 mm closely upstream of the "CD" 3-way motor ball valve.



Note!

Use a pressure reducer in the "WC" makeup line if the idle pressure exceeds 6 bar.

6.4 Switching and make-up variants

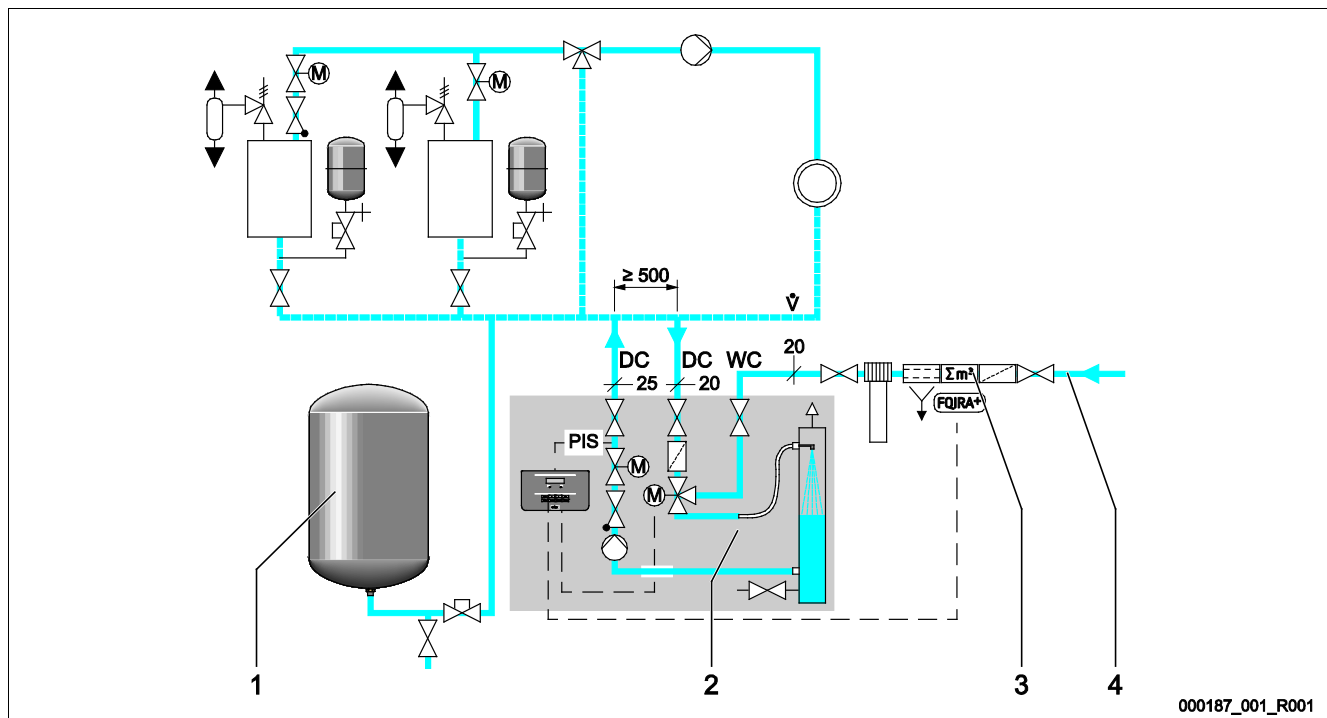
Select the make-up variant in the Customer menu of the device controller, see chapter 8.6 "Parametrising the controller in the Customer menu" on page 38 .

Choose from one of the following make-up variants in the Customer menu:

- Pressure-dependent "Magcontrol" make-up.
 - In a facility system with diaphragm expansion tank.
- Level-dependent "Levelcontrol" make-up.
 - In a facility system with pressure maintaining station.

6.4.1 Pressure-dependent "Magcontrol" make-up mode

Example representation of a multi-tank system with hydraulic switching point and a "MAG" diaphragm-type expansion tank.



1	"MAG" pressure expansion tank
2	Device

3	Optional equipment and accessories see chapter 4.6 "Optional equipment and accessories" on page 14
4	"WC" makeup line

The "Magcontrol" operating mode is set in the Customer menu of the device controller. This operating mode is used for plant systems with a diaphragm-type expansion tank. The make-up action depends on the pressure. The required "PIS" pressure sensor is integrated in the device. The "DC" degassing lines are connected close to the diaphragm-type expansion tank. In this way precise pressure monitoring is enable for demand-matched make-up as.

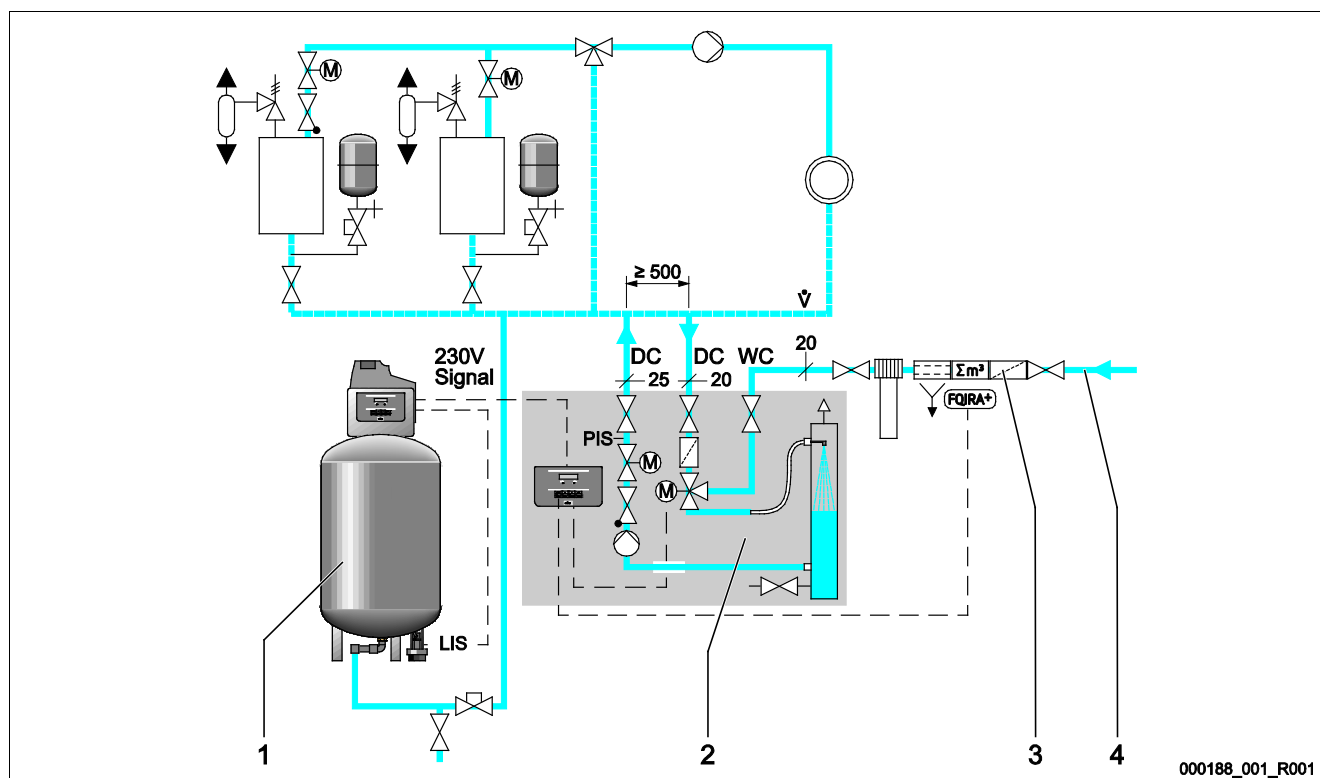


Note!

Connect the degassing lines at the return side of the system upstream of the hydraulic switching point. In this manner the permissible temperature range of 0°C - 70 °C is adhered to.

6.4.2 Level dependent "Levelcontrol" make-up mode

Example representation of a multi-tank system with return flow admixture and compressor-controlled pressure maintaining station.



000188_001_R001

1	Pressurisation station	3	Optional equipment and accessories see chapter 4.6 "Optional equipment and accessories" on page 14
2	Device	4	"WC" makeup line

The "Levelcontrol" operating mode is set in the Customer menu of the device controller. This operating mode is used for facilities with pressurisation stations and enables flexible operation at constant pressure.

Demand-matched water make-up takes place depending on the measured water level in the expansion tank of the pressurisation station. The "LIS" pressure transducer determines the water level and sends this value to the controller of the pressure maintaining station. The controller sends a 230 V signal to the device controller if the water level is too low. Water make-up takes place in a controlled manner by monitoring the make-up time and the make-up cycles via the "WC" make-up line.

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.
-

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.
-

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

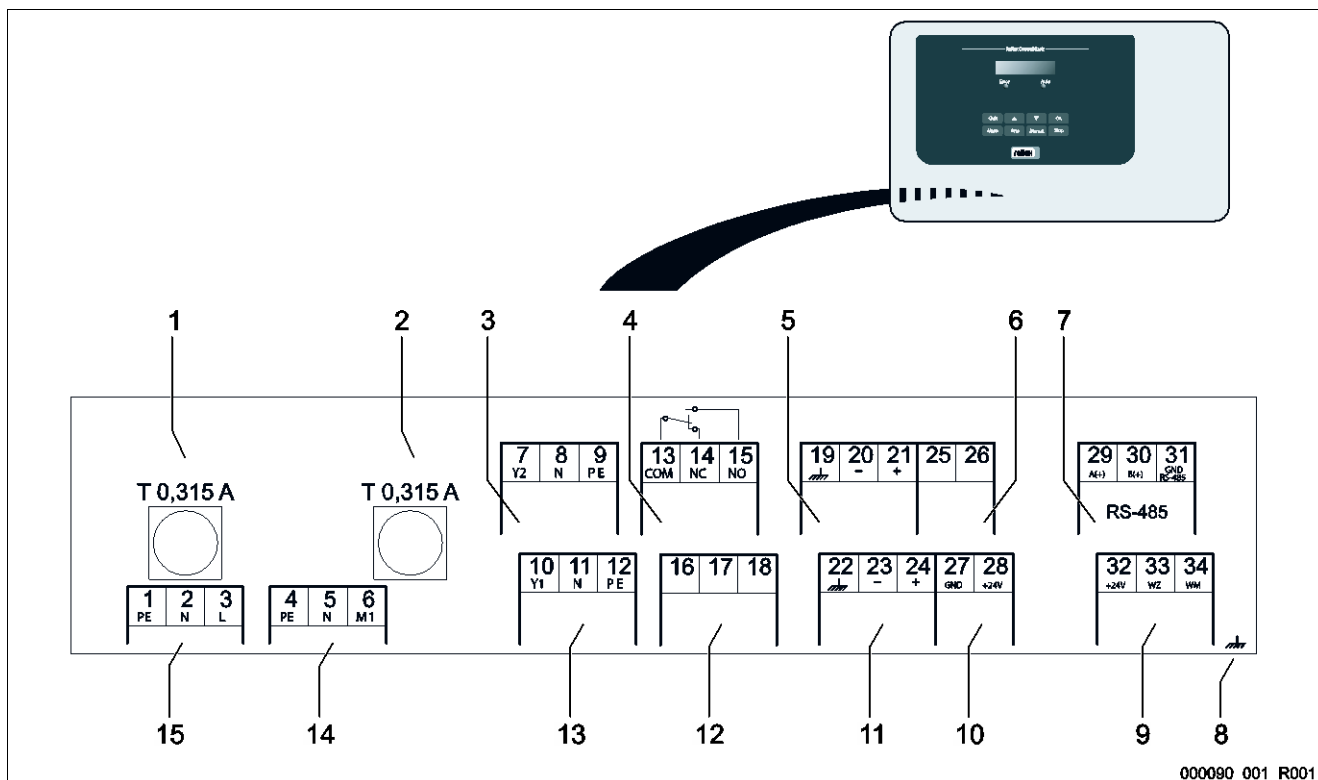
1. Disconnect the system from the power source and secure it against unintentional reactivation.
2. Remove the cover.

 **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. Install a screwed cable gland suitable for the respective cable. M16 or M20, for example.
4. Thread all cables to be connected through the cable gland.
5. Connect all cables as shown in the terminal diagram.
 - Note that the fusing for the device connection is to be provided by the user, see chapter 5 "Technical data" on page 15 .
6. Install the cover.
7. Connect the mains plug to the 230 V power supply.
8. 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	"CD" 3-ways motor ball valve
7	RS-485 interface
8	Shielding

9	Digital inputs <ul style="list-style-type: none"> Water meter Insufficient water
10	"CD" 3-ways motor ball valve
11	Pressure analogue input
12	External makeup demand (Levelcontrol only)
13	Makeup valve
14	Pump
15	Mains supply

Terminal number	Signal	Function	Wiring
1	PE	230 V power supply via mains cable and plug.	Pre-wired
2	N		
3	L		
4	PE	"PU" pump for degassing.	Pre-wired
5N	N		
6 M1	M 1		
7	Y2	Overflow solenoid valve Not used in standard model	---
8	N		
9	PE		
10	Y 1	"CD" 3-ways motor ball valve for regulating the degassing of makeup and system water.	Pre-wired
11	N		
12	PE		
13	COM	Group message (floating).	User, optional
14	NC		
15	NO		
16	Not assigned	External makeup demand from a pressurisation station; controller must be set to "Levelcontrol"!	User, optional
17	Makeup (230 V)		
18	Makeup (230 V)		
19	PE shield	Level analogue input, not used by the device.	---
20	- Level (signal)		
21	+ Level (+ 18 V)		
22	PE (shield)	Pressure analogue input for display and makeup; controller must be set to "Magcontrol"!	Pre-wired
23	- Pressure (signal)		
24	+ Pressure (+ 18 V)		
25	0 – 10 V (correcting variable)	"CD" 3-ways motor ball valve, not used with the device.	---
26	0 – 10 V (feedback)		
27	GND		
28	+ 24 V (supply)		
29	A	RS-485 interface.	User, optional
30	B		
31	GND		
32	- Level	Insufficient water switch - dry-running protection	s. 34
33	E1	Contact water meter, for example in Fillset, see chapter 4.6 "Optional equipment and accessories" on page 14 , for makeup evaluation, contact 32/33 closed = meter pulse.	User, optional
34	+ Level	Insufficient water switch, contact 32/34. Lead the cable of the insufficient water switch through the cable gland and connect at the terminals	Connection polarity is unimportant.

6.5.2 RS-485 interface

6.5.2.1 Connecting the RS-485 interface

Connect the interface as follows:

1. For connecting the interface use only a cable with these properties:
 - LJYC (TP), $4 \times 2 \times 0.8$, 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 26 .
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 53 .

For the installation

Place, date	Company	Signature

For the commissioning

Place, date	Company	Signature

7 Commissioning



Note!

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

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

7.1 Checking the requirements for commissioning

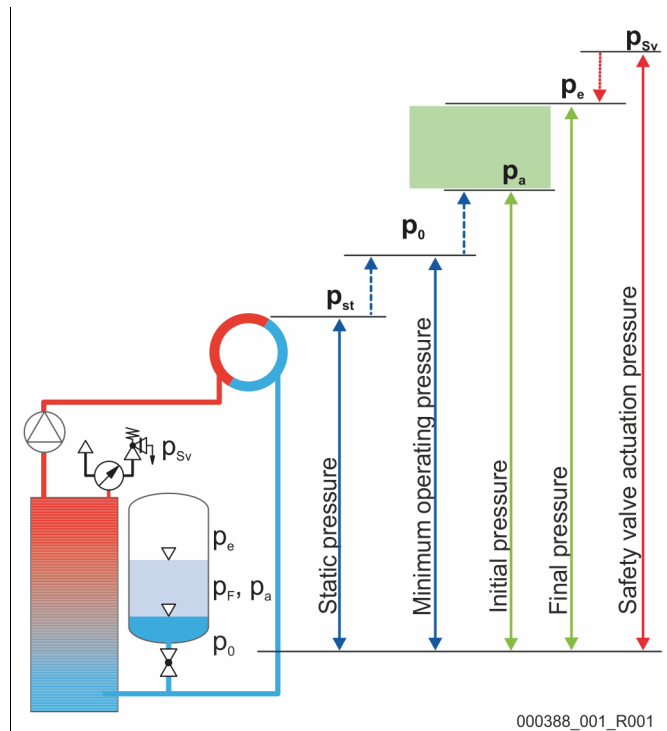
The device will be ready for commissioning when the tasks described in the "Installation" chapter have been completed.

- The device has been mounted.
- The connections of the device to the system has been created and the facility system pressure maintenance is operational.
 - Degassing line to the facility system.
 - Degassing line from the facility system.
- The water-side connection of the device to the make-up has been created and is operational, if automatic make-up is required.
- The connection pipes of the device have been purged and cleaned of welding residue and dirt before commissioning.
- The entire system is filled with water and all gases have been vented in order to ensure a circulation through the entire system.
- The electrical connection has been created according to applicable national and local regulations.

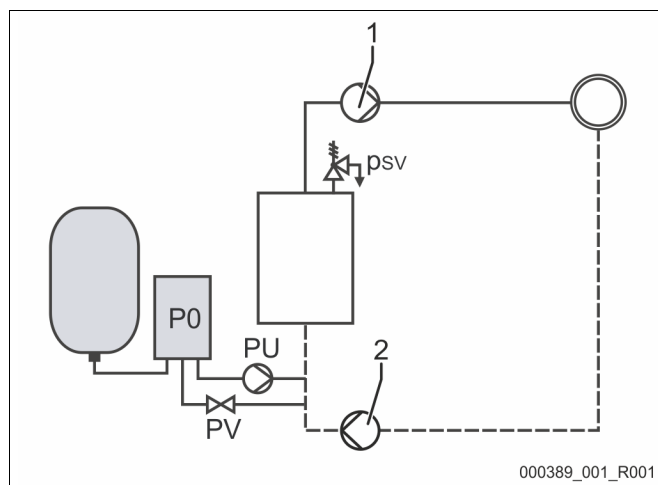
7.2 Setting the minimum operating pressure for Magcontrol

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

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



1	Suction pressure maintenance <ul style="list-style-type: none"> Device on the suction side of the system's circulating pump
2	Final pressure maintenance <ul style="list-style-type: none"> Device on the discharge side of the system's circulating pump



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

	Calculation	Description
p _{st}	= h _{st} /10	h _{st} in metres
p _D	0.0 bar	for safety temperatures ≤ 100 °C (212° F)
	0.5 bar	for safety temperatures = 110°C (230° F)
d _p	60 - 100 % of the differential pressure of the circulating pump	Depending on the hydraulics
P ₀	≥ p _{st} + p _D + 0.2 bar* (suction pressure maintenance)	Enter the calculated value in the start routine of the controller, see chapter 8.2 "Modifying the controller's start routine" on page 33 .
	≥ p _{st} + p _D + d _p + 0.2 bar* (final pressure maintenance)	

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

Calculation example for "P₀" minimum operating pressure:

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

Example calculation for suction pressure maintenance:

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

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

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

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

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

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

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



Note!

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

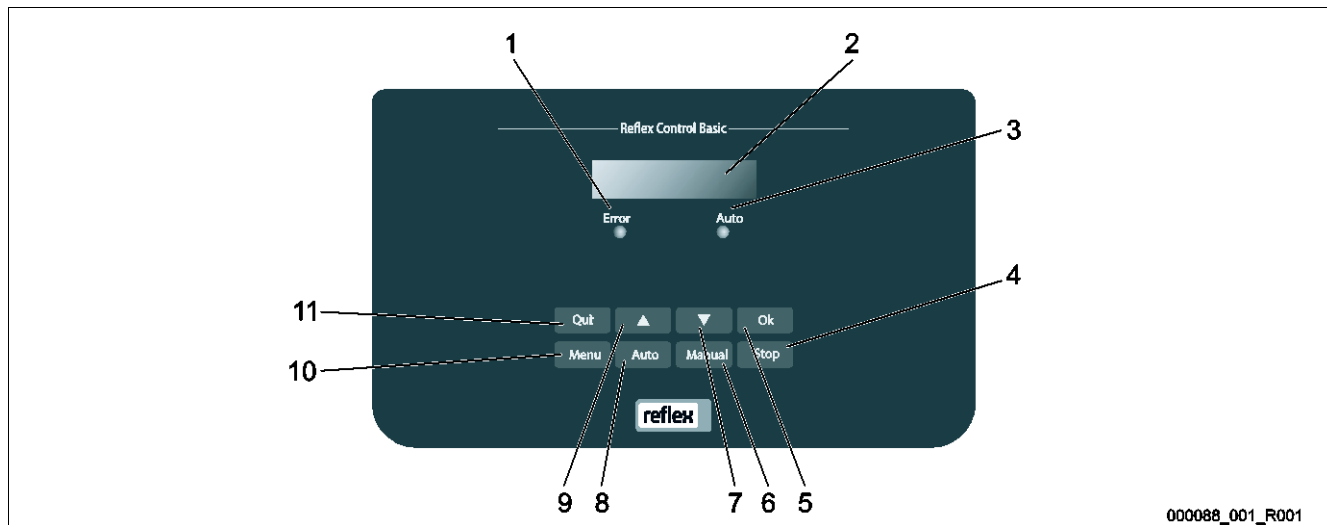


Note!

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

8 Controller

8.1 Operator panel



000088_001_R001

1	Error LED <ul style="list-style-type: none"> The Error LED illuminates in the event of a fault
2	Display
3	Auto LED <ul style="list-style-type: none"> 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	Stop <ul style="list-style-type: none"> For commissioning and entry of new values in the controller
5	OK <ul style="list-style-type: none"> Confirm actions
6	Manual <ul style="list-style-type: none"> For tests and maintenance tasks

7	"Back" to the previous menu
8	Auto <ul style="list-style-type: none"> For continuous operation
9	"Forward" to the next menu
10	Menu <ul style="list-style-type: none"> Call up the Customer menu
11	Quit <ul style="list-style-type: none"> Acknowledge messages

Selecting and changing parameters

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

8.2 Modifying the controller's start routine

The start routine enables the setting of the essential parameters required for the device's commissioning. It commences with the first activation of the controller and can be run only once. Parameters can be changed or checked in the customer after the start routine has terminated see chapter 9.2.1 "Customer menu" on page 45 .



Notice!

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.

Magcontrol:

Select this setting if you want to realise a pressure-dependent automatic make-up in a system with diaphragm expansion tank.

Levelcontrol:

Select this setting if you want to operate a level-dependent make-up in a system with pressure maintenance station.

Standard software with various languages.

Prior to commissioning, read the entire operating manual and verify the proper assembly.

Only displayed if "Magcontrol" has been selected in the "Servitec" menu option.

P0 calculation, see chapter 7.2 "Setting the minimum operating pressure for Magcontrol" on page 30 .

Only displayed if "Magcontrol" has been selected in the "Servitec" menu option.

- Specify the tripping pressure of the applicable safety valve for the device protection. This is usually the safety valve at the system heat generator.

Change the flashing display items for "Hour", "Minute", and "Seconds" to the current time. The time of an alarm will be stored in the fault memory.

Change the flashing display items for "Day", "Month", and "Year" to the current date. The date of an alarm will be stored in the fault memory.

Select in the message line and confirm with "OK":

yes: The start routine is terminated. Servitec automatically switches to stop mode.

no: The start routine restarts.

The pressure is displayed only in "Magcontrol" mode.

Servitec
Magcontrol

Language

Read the operating manual!

Min. op. pressure

Safety valve pressure

Time:

Date:

Terminate start routine?

2.0 bar
STOP



Notice!

You are in Stop mode. Please do not switch from the start routine to Automatic mode after entering the parameters.

8.3 Filling the device with water and venting

CAUTION

Risk of injury due to pump start-up

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

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

ATTENTION

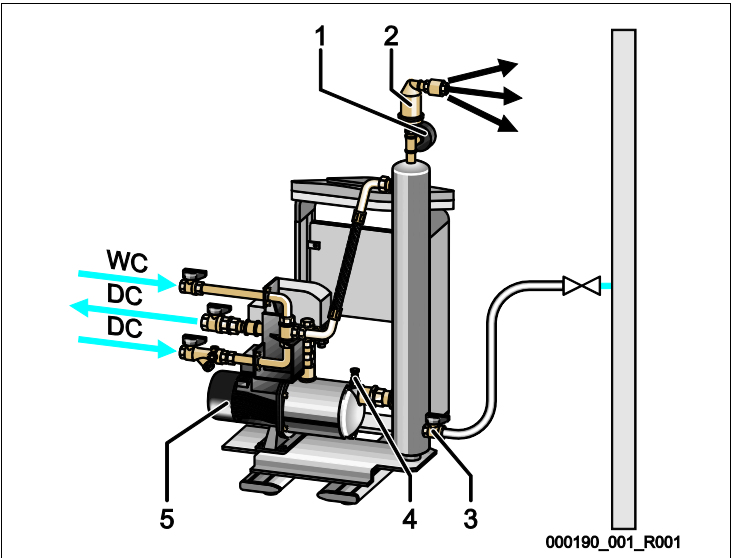
Device damage due to pump start-up

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

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

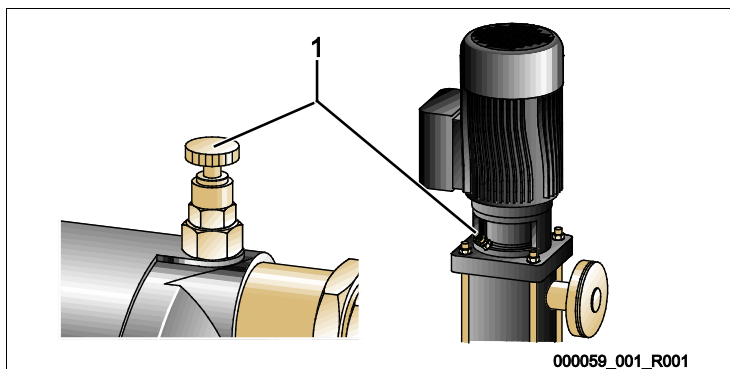
Fill water into the device.

1. Connect a hose at the feed and drain cock (3) of the "VT" vacuum spray tube.
2. Fill the "VT" vacuum spray tube with water.
 - Air escapes via the "DV" degassing valve (2) and the water pressure can be read at the "PI" vacuum gauge (1).



1	"PI" vacuum gauge	4	Vent screw
2	"DV" degassing valve	5	"PU" pump
3	Feed and drain cock		

3. Start turning the "PU" vacuum pump at the fan wheel of the pump motor using a screwdriver.
4. Unscrew the vent screw (1). The "PU" pump is vented.
5. Close the feed and drain cock.



1	Vent screw
---	------------



Notice!

The "PU" pump must not run when the device is filled with water.



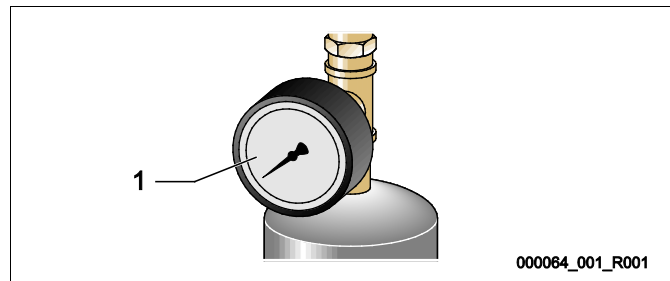
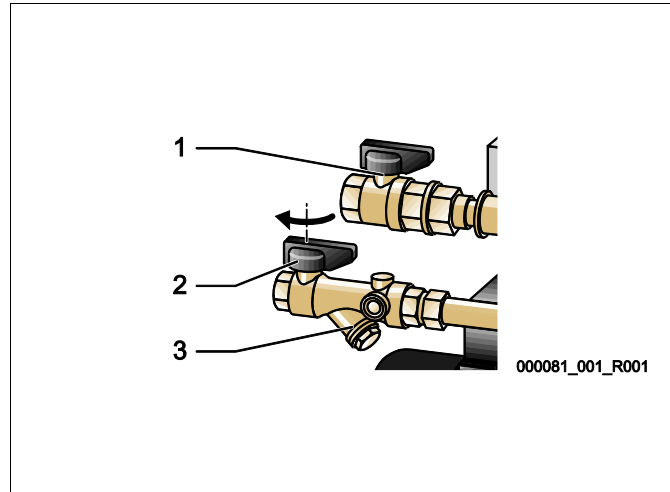
Notice!

Do not fully unscrew the vent screw. Wait until air-free water appears. Repeat the venting process until the "PI" vacuum gauge displays a vacuum.

8.4 Vacuum test

Carefully perform the vacuum test to ensure the proper functioning of the device.

- 1 Close the ball valve (2) with dirt trap (3). The second ball valve (1) remains open.
 - 2 Generate a vacuum with the manual mode of the controller.
 - Press "Manual" on the controller's operator panel.
 - Use the "Back" toggle button to select "SE" system degassing at the operator panel.
 - The pump will start after a time delay of 50 seconds.
 - 3 Use the "Back" toggle button to switch off "SE" system degassing after the pump runs for 10 seconds.
 - Record the vacuum value displayed at the vacuum gauge.
-
- 4 Observe the "PI" vacuum gauge (1) for approximately 10 minutes. The pressure must not change. If the pressure has increased, check the device for leaks.
 - Check all screw fittings at the "VT" vacuum spray tube for leaks.
 - Check the vent screw at the "PU" pump for leaks.
 - Check the "DV" degassing valve at the "VT" vacuum spray tube for leaks.
-
- 5 After the vacuum test has been concluded successfully, open the ball valve with dirt trap.
 - 6 If the controller displays the "Insufficient water" error message, confirm with "Quit".
- ☒ The vacuum test is completed.



Note!

- The obtainable vacuum corresponds to the saturation pressure at the existing water temperature.
 - At 10 °C, a vacuum of approximately -1 bar can be obtained.

Note!

- Repeat steps 2 to 4 until no further pressure rise is observed.

8.5 Use the device to fill the facility system with water

In systems with a water volume less than 3000 litres and a pressure maintenance with diaphragm-type pressure expansion tanks, the device may be used to fill with degassed water. Thus, the oxygen content and the content of free gases is reduced for commissioning.

Set the controller to the following operating modes:

- "Magcontrol" automatic make-up, see chapter 9.2.1 "Customer menu" on page 45 .
- Manual operation, see chapter 9.1.2 "Manual mode" on page 43 .
 - "NE" make-up degassing mode.

The controller calculates the required filling pressure. As soon as this value has been attained, the controller automatically stops the filling process. If the maximum filling time (10 hours by default) is exceeded, the system aborts the make-up process with an error message. After the cause has been found, acknowledge the error message by pressing "Quit" at the controller's operating panel and continue with the filling process, see chapter 9.2.4 "Messages" on page 47 . After filling is completed, you must vent the system to ensure proper circulation through the entire system.



Notice!

- Monitor the system for the entire automatic filling process..



Notice!

- Filling the system with water is not part of the deliverables of the Reflex Customer Service.

8.6 Parametrising the controller in the Customer menu

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



Notice!

Operation description, see chapter 8.1 "Operator panel" on page 32 .

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".

Switch to the next main menu option.

Customer menu

Standard software with various languages.

Language

Adjust the "Hour", "Minute", and "Second" display when each begins to flash.
This time is used for entries in the fault memory.

Time:

This date is used for entries in the fault memory.

Date:

Adjust the "Day", "Month", and "Year" display when each begins to flash.

Magcontrol:

Select this setting if you want to realise a pressure-dependent automatic make-up in a system with diaphragm expansion tank.

Servitec 30:

Levelcontrol:

Select this setting if you want to realise a level-dependent make-up in system with pressure maintenance station.

Only displayed if "Magcontrol" has been selected in the "Servitec" menu option.

Min. op. pressure

P0 calculation, see chapter 7.2 "Setting the minimum operating pressure for Magcontrol" on page 30 .

Only displayed if "Magcontrol" has been selected in the "Servitec" menu option.

Safety valve pressure

- Specify the tripping pressure of the applicable safety valve for the device protection.
This is usually the safety valve at the system heat generator.

Switch to the "Degassing" sub-menu.

Degassing

Switch to the next list item.

Degassing

For a detailed description, see chapter 9.1.1 "Automatic mode" on page 42 .

Select from 3 degassing programmes:

Degas. programme

- Continuous degassing
- Interval degassing
- Make-up degassing

Time setting for Continuous degassing.

- For commissioning, we recommend to set the time for continuous degassing depending on the system volume and the glycol content, see chapter 5.3 "Operation" on page 16.

Time Continuous. degas.

Switch to the "Make-up" sub-menu.

Make-up

Switch to the next list item.

Make-up

Maximum time for a make-up cycle. Upon expiry of the set time, the system interrupts the make-up and returns the "Make-up time" fault message.

Max. make-up time

If the set number of make-up cycles is exceeded within 2 hours, the system interrupts the make-up and returns the "Make-up cycles" fault message.

Max. make-up cycles

This setting is relevant for the actuation of the "CD" 3-ways motor ball valve in make-up degassing.

Make-up pressure

Standard: Make-up pressure > 2.3 bar.

1.3 – 2.3 bar: The make-up pressure is in this range.

< 1.3 bar: The make-up pressure is less than 1.3 bar

yes: FQIRA+ contact water meter is installed, see chapter 4.6 "Optional equipment and accessories" on page 14.
This is the prerequisite for the make-up quantity monitoring and the operation of a softening system.

With water meter

no: A contact water meter is not installed (standard).

Only displayed if "YES" has been set in the "With water meter" menu option.

Make-up quantity

OK Delete meter:

yes: The displayed make-up quantity is set to 0.

no: The displayed water quantity is retained.

Only displayed if "YES" has been set in the "With water meter" menu option.

Max. make-up quantity

When the set quantity is exceeded, the system interrupts the make-up process and returns the error message "Max. make-up quantity exceeded".

Only displayed if "YES" has been set in the "With water meter" menu option.

With softening

yes: The system offers more queries regarding the softening process.

no: The system does not offer more queries regarding the softening process.

Only displayed if "YES" has been set in the "With softening" menu option.

Lock make-up?

yes: The system stops the make-up process when the set soft water capacity is exceeded.

no: The system does not stop the make-up process. The system displays the "Softening" message.

Only displayed if "YES" has been set in the "With softening" menu option.

Is calculated from the difference of the overall water hardness GH_{actual} and the target water hardness GH_{target} as defined by the manufacturer specification:

$$\text{Hardness reduction} = GH_{\text{actual}} - GH_{\text{target}} \text{ °dH}$$

Enter the value in the controller. Consult the manufacturer information for third-party products.

Hardness reduction

Only displayed if "YES" has been set in the "With softening" menu option.

The attainable soft water capacity is calculated from the type of softening used and the specified hardness reduction.

- Fillsoft I : Soft water capacity $\leq 6000/\text{hardness red. I}$
- Fillsoft II : Soft water capacity $\leq 12000/\text{hardness red. I}$

Enter the value in the controller. Consult the manufacturer information for third-party products.

Cap. soft water

Only displayed if "YES" has been set in the "With softening" menu option.

Available soft water capacity.

Remaining cap. soft w.

Only displayed if "YES" has been set in the "With softening" menu option.

Manufacturer specification for the replacement interval of the softening cartridges, regardless of the calculated soft water capacity. The system displays the "Softening" message.

Replacement in

Recommended maintenance message.

Off: Without maintenance recommendation.

001 – 060: Maintenance recommendation in months.

Next maintenance

For the output of messages to the floating contact, see chapter 9.2.4 "Messages" on page 47 .

yes: Output of all messages.

no: Output of all messages identified with "xxx" ("01", for example).

Floating fault contact

Switch to the fault memory or into the next main menu option.

Fault memory

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.

ER 01...xx

Switch to the parameter memory or into the next main menu option.

Parameter memory

The last 10 entries of the minimum working pressure are stored with date and time.

P0 = xx.x bar

Position of the "CD" motor ball valve at the pressure side of the pump to the controller of the degassing process.

Pos. motor ball valve

Information about the software version.

Servitec 35-95

8.7 Starting Automatic mode

Automatic mode can be started as soon as the system is filled with water and the gases contained have been vented.

- Press "Auto" on the controller's operator panel.

During commissioning, continuous degassing is automatically activated to remove any residual free or dissolved gases from the system. This time can be set in the Customer menu as required by the system conditions. The default setting is 24 hours. Subsequent to the continuous degassing, the device automatically switches to interval degassing.



Note!

The commissioning process is now concluded.



Notice!

The "ST" dirt trap in the "DC" degassing line must be cleaned after the expiry of the continuous degassing time at the latest, see chapter 10.2.1 "Cleaning the dirt trap" on page 52 .

9 Operation

9.1 Operating modes

9.1.1 Automatic mode

Upon successful commissioning, you can activate the automatic mode with the degassing functions and, optionally, the automatic make-up. The device controller monitors the functions. Faults are displayed and evaluated.

For automatic mode, you can set three different degassing programmes in the Customer menu, see chapter 8.6 "Parametrising the controller in the Customer menu" on page 38. Relevant information is displayed in the message line of the controller display.

Continuous degassing of the system water

Continuous degassing

Select this programme after commissioning and repairs of the connected system. The device will continuously degas for a set period of time. Free and dissolved gases are quickly removed. Upon request of make-up, make-up degassing is automatically activated for the set make-up time. In "Magcontrol" mode, the pressure is monitored and displayed.

Start/setting:

- Automatic start after execution of the start routine during commissioning.
- Activated from the Customer menu.
- Degassing time. Can be set in the Customer menu, dependent on the actual system. The default setting is 24 hours. After expiry of the set time, the device automatically switches to interval degassing.

Interval degassing of the system water

Servitec
Interval degassing

Designed for continuous operation. An interval comprises a number of degassing cycles, with the number to be set in the Service menu. An idling time follows an interval. The daily start of the interval degassing can be set to a specific time.

Start/setting:

- Automatic activation upon expiry of continuous degassing.
- Degassing cycles: 8 cycles per interval, to be set in the Service menu.
- Start time interval: To be set in the Service menu.
- Idling time between intervals: To be set in the Service menu.

Degassing the make-up water

Servitec
Make-up degassing

Is automatically activated for every make-up during continuous or interval degassing. The corresponding setting must have been made in the Customer menu.

The 3-ways motor ball valve switches the volume flow from system to make-up water. The process is the same as in continuous degassing. If the system water is not to be degassed or if the system is in Summer operation with circulating pumps shut down, you can activate the make-up degassing in the Customer menu.

Activation/setting:

- Automatic activation for every make-up.
- Activated from the Customer menu.
- Degassing time = Make-up time.

9.1.2 Manual mode

The manual mode is intended for test and service tasks.

Press "Manual" at the controller. The Auto LED at the operator panel flashes to visually indicate that manual mode is active. Manually activate or deactivate the "SE" system degassing or the "NE" make-up degassing.

"SE" system degassing of the system water

The system degassing process corresponds to the continuous degassing in Automatic mode. The degassing time, however, is not automatically limited. This setting is required for the vacuum test during commissioning see chapter 8.4 "Vacuum test" on page 36 and test runs during service calls see chapter 10.3 "Inspecting system degassing and make-up degassing" on page 52 .

"NE" make-up degassing of the fill and make-up water

The make-up degassing is required for test runs during service calls see chapter 10.3 "Inspecting system degassing and make-up degassing" on page 52 and in the "Magcontrol" mode when filling the entire system with water.

- "Next" and "Back" buttons
 - Selecting "NE" or "SE".
- "Auto" button
 - Return to Automatic mode.

		2.5 bar
NE ▼ *	SE ▲ *	010 h

* Flashing mode "NE ▼" or "SE ▲" is activated

9.1.3 Stop mode

The Stop mode is intended for the device commissioning.

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

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

The "PU" pump is switched off. 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.

9.1.4 Summer operation

The degassing of the network water is not assured if the circulating pumps of the system are shut down during Summer because gas-rich water cannot reach the device. In order to save energy, use the Customer menu to set the degassing programme to make-up degassing. If the device is operated with make-up degassing during Summer, you must switch to interval or continuous degassing after the circulating pumps have been activated.

Setting in the Customer menu, see chapter 8.6 "Parametrising the controller in the Customer menu" on page 38 .

Select from 3 degassing programmes.

- Continuous degassing
 - For commissioning and repairs.
- Interval degassing
 - For continuous operation (time-controlled).
- Make-up degassing
 - Only for make-up water. The machine is not degassed.

Degas. programme Make-up degassing



Notice!

For a detailed description of the selection of degassing programmes, see chapter 4.4 "Function" on page 11 .

9.1.5 Restarting



CAUTION

Risk of injury due to pump start-up

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

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

ATTENTION

Device damage due to pump start-up

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

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

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



Notice!

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

9.2 Controller

9.2.1 Customer menu

Use the Customer menu to set the device controller during commissioning. You can then correct or retrieve system-specific values during operation, see chapter 8.6 "Parametrising the controller in the Customer menu" on page 38 .

9.2.2 Service menu

This menu is protected with a password. It can be accessed only by the Reflex Customer Service. A partial summary of the settings stored in the Service menu is provided in the Chapter Default settings, see chapter 9.2.3 "Default settings" on page 46 .

9.2.3 Default settings

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

Customer menu

Parameter	Setting	Remarks
Language	EN	Display language
Servitec	Magcontrol	For systems with diaphragm-type pressure expansion tank
Minimum operating pressure p0	1.5 bar	Only Magcontrol
Safety valve, pressure	3.0 bar	Pressure value for the safety valve of the heat generator in the system to trip
Next maintenance	12 months	Time left to the next due maintenance
Floating alarm contact	YES	Only the messages marked in the message list
Makeup		
Maximum makeup quantity	0 Litres	Only if controller with "With water meter yes"
Maximum makeup time	20 minutes	Magcontrol and Levelcontrol
Maximum makeup cycles	3 cycles within 2 hours	Magcontrol and Levelcontrol
Degassing		
Degassing programme	Continuous degassing	
Continuous degassing time	24 hours	
Softening (Only if "With softening yes")		
Lock makeup	No	In the case of soft water residual capacity = 0
Hardness reduction	8°dH	= Target – Actual
Maximum makeup quantity	0 Litres	Attainable makeup quantity
Soft water capacity	0 Litres	Attainable water capacity
Cartridge replacement	18 months	Replace cartridge

Service menu

Parameter	Setting	Remarks
Makeup		
Pressure differential, "NSP" makeup	0.2 bar	Only Magcontrol
Pressure differential, filling pressure PF – P0	0.3 bar	Only Magcontrol
Maximum filling duration	10 h	Only Magcontrol
Degassing		
Idling times between degassing intervals	12 hours	Idling times between the degassing intervals
Number of degassing cycles for each interval	n = 8	Number of degassing cycles in one interval
Daily start	08:00 h	Start of the daily degassing intervals

9.2.4 Messages

The display provides alarms in plain text and the ER codes listed below. 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 9.2.1 "Customer menu" on page 45 .

Alarm causes can be eliminated by the operator or a specialist workshop. Please contact the Reflex customer service for alarms that cannot be repaired.



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 9.2.1 "Customer menu" on page 45 .

ER Code	Alarm	Floating contact	Cause	Remedy	Alarm reset
01	Minimum pressure	Yes	For "Magcontrol" setting only. <ul style="list-style-type: none"> Set value not reached. Water loss in the system. Pump fault. Expansion tank defective. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check water level. Check pump. Check expansion tank. 	-
02.1	Insufficient water	-	Dry running protection: Insufficient water switch <ul style="list-style-type: none"> Defective. Not cabled. Triggered for too long. 	<ul style="list-style-type: none"> Check insufficient water switch. Open the degassing pipe. Clean the dirt trap. Replace the degassing valve. 	Quit
02.2	Insufficient water	-	Dry running protection: Insufficient water switch has actuated too often.	<ul style="list-style-type: none"> Clean the dirt trap. Replace the degassing valve. 	Quit
02.4	Insufficient water	-	Vacuum during makeup feed.	Open the makeup ball valve.	-
04.1	Pump	Yes	Pump disabled. <ul style="list-style-type: none"> Pump jammed. Pump motor defective. Pump motor contactor (Klixon) tripped. Fuse defective. 	<ul style="list-style-type: none"> Rotate the pump with screwdriver. Replace the pump motor. Electrically test the pump motor. Replace the 10 A fuse. 	Quit

ER Code	Alarm	Floating contact	Cause	Remedy	Alarm reset
06	Makeup time	-	<ul style="list-style-type: none"> Set value exceeded. Water loss in the system. Makeup line not connected. Makeup rate insufficient. Makeup hysteresis too low. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check water level. Connect make-up line. 	Quit
07	Makeup cycles	-	Set value exceeded.	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Seal the leak in the system. 	Quit
08	Pressure measurement	-	For "Magcontrol" setting only. <ul style="list-style-type: none"> Controller receives incorrect signal. 	<ul style="list-style-type: none"> Connect the plug. Check the cable for damage. Check the pressure sensor. 	Quit
10	Maximum pressure	-	For "Magcontrol" setting only. <ul style="list-style-type: none"> Set value exceeded. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Set the tripping pressure of the safety valve. 	-
11	Back-up volume	-	"With water meter" must be activated in the Customer menu. <ul style="list-style-type: none"> Set value exceeded. Severe water loss in the system. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Check the water loss and correct, if necessary. 	Quit
14	Discharge period	-	<ul style="list-style-type: none"> Set value exceeded. "DC" degassing line closed. Dirt trap clogged. 	<ul style="list-style-type: none"> Check set value in the Customer or Service menu. Open the degassing pipe. Clean the dirt trap. 	Quit
15	Makeup valve	-	Contact water meter measures without makeup request.	Check the 3-ways motor ball valve for leaks.	Quit
16	Power failure	-	No power.	Connect to power supply.	-

ER Code	Alarm	Floating contact	Cause	Remedy	Alarm reset
19	Stop > 4 hours	-	Device is in stop mode for more than 4 hours.	Set the controller to Automatic mode.	-
20	Maximum makeup quantity	-	Set value exceeded.	Reset the "Makeup quantity" meter in the Customer menu.	Quit
21	Maintenance recommendation	-	Set value exceeded.	Carry out maintenance.	Quit
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.	Quit
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. 	<ul style="list-style-type: none"> Replace the I/O module. Check the connection between option card and controller. Replace the option card. 	-
31	EEPROM defective	Yes	<ul style="list-style-type: none"> EEPROM defective. Internal calculation error. 	Inform Reflex Customer Service.	Quit
32	Undervoltage	Yes	Supply voltage not achieved.	Check power supply.	-
33	Adjustment parameter faulty	-	EPROM parameter memory defective.	Inform Reflex Customer Service.	Quit
34	Main board communication faulty	-	<ul style="list-style-type: none"> Connecting cable defective. Main board defective. 	Inform Reflex Customer Service.	Quit
35	Digital input voltage faulty	-	Short-circuit of input voltage.	Check the wiring at the digital inputs (water meter, for example).	-
36	Analogue input voltage faulty	-	Short-circuit of input voltage.	Check the wiring at the analogue inputs (pressure/level).	-
37	No input voltage for the 3-ways motor ball valve	-	Short-circuit of input voltage.	Check the wiring at the 3-ways motor ball valve.	-

10 Maintenance

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

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

The 'Servitec' must be serviced annually or after 16,000 degassing intervals, whichever comes first.



Note!

This corresponds to a continuous degassing time of approximately 14 days or a continuous degassing time of 7 days + 1 year interval degassing with a standard setting.

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

The following recommended standard value must not be exceeded:

- Continuous degassing: Continuous degassing time for the largest "Va" system volume, see chapter 5 "Technical data" on page 15 .
- Interval degassing: Setting values according to the Service menu.

The annual maintenance is displayed upon expiry of the set operating time. Use "Quit" to acknowledge the "Maintenance recommended" message.



Note!

Maintenance work must be carried out and confirmed by specialist personnel or the Reflex Customer Service.

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

Maintenance task	Conditions			Interval
▲ = Check, ■ = Service, ● = Clean				
Check for leaks, see chapter 10.1 "Exterior leak test" on page 51 . • "PU" pump • Screw connections • "DV" degassing valve	▲	■		Annually
Vacuum function test. – see chapter 8.4 "Vacuum test" on page 36	▲			Annually
Clean the dirt trap. – see chapter 10.2.1 "Cleaning the dirt trap" on page 52	▲	■	●	Depending on the operating conditions
Check the controller settings.	▲			Annually
Function test. • "SE" system degassing • Makeup degassing "NE" see chapter 10.3 "Inspecting system degassing and make-up degassing" on page 52	▲			Annually
When operating with water/glycol mixtures • Control of the mixing ratio. • If necessary, adjust according to manufacturer information.	▲			Annually

10.1 Exterior leak test

Check the following device components for leaks:

- Pump
- Screw connections
- Degassing valves

Proceed as follows:

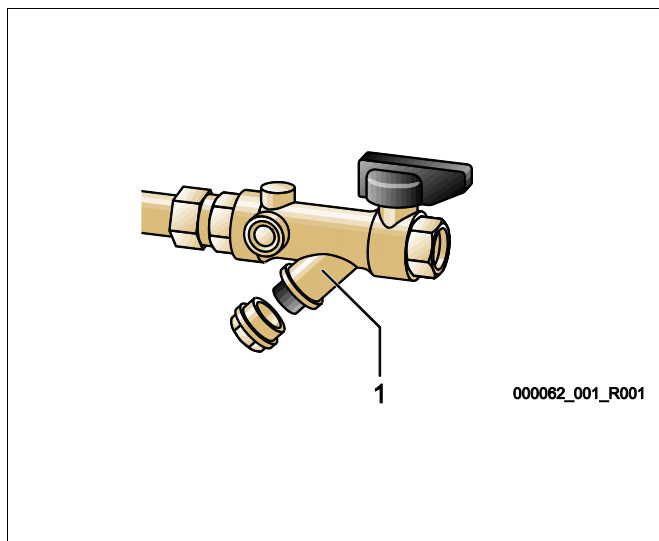
- Seal any leaks at the connections or replace the connections, if required.
- Seal leaking screw connections or replace, if required.

10.2 Cleaning

10.2.1 Cleaning the dirt trap

The "ST" dirt trap in the "DC" degassing line must be cleaned after the expiry of the continuous degassing time at the latest. Check the dirt traps after every filling action or extended operation.

1. Press "Stop" on the controller's operator panel.
 - The device is non-functioning and the "PU" pump is shut down.
2. Close the ball valve upstream of the "ST" (1) dirt trap.
3. Slowly unscrew the cap with the dirt trap insert at the dirt trap to release any residual pressure in the pipeline section.
4. Pull the mesh from the cap and rinse it with clear water. Use a soft brush for cleaning.
5. Re-insert the mesh into the cap, check the gasket for damage, and screw the cap back into the housing of the "ST" (1) dirt trap.
6. Open the ball valve upstream of the "ST" (1) dirt trap.
7. Press "Auto" on the controller's operator panel.
 - The device is switched on and the "PU" pump is in operation.



Notice!

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

10.3 Inspecting system degassing and make-up degassing

Inspect the "SE" system degassing followed by the "NE" make-up degassing.

Press "Manual" at the controller to switch to manual mode. The Auto LED at the operator panel flashes to visually indicate that manual mode is active. Manually activate or deactivate the "SE" system degassing and the "NE" make-up degassing.

You should run at least ten cycles each in the "SE" and the "NE" modes. The gas must be eliminated before the next cycle starts. Subsequently, check the following conditions:

- With cold water, the "PI" vacuum gauge must eventually show a value of approx. -1 bar.
- The "Insufficient water" message must not be displayed at the controller.

After the inspection is completed, reset the device to Automatic mode.

- "Next" and "Back" buttons
 - Selecting "NE" or "SE".
- "Auto" button
 - Return to Automatic mode.

		2.5 bar
NE ▼ *	SE ▲ *	010 h

* Flashing mode "NE ▼" or "SE ▲" is activated

10.4 Maintenance certificate

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

[illegible]

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 14 and Section 14 (3) No. 6 in particular. This regulation demands an inspection prior to commissioning only for PS-V > 50 bar x litres. This is not the case with this device. Customised systems with special spray tubes may be affected, in which case the shipping documents will contain a corresponding note.

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.
-

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.
-

CAUTION

Risk of burns

Escaping hot medium can cause burns.

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

CAUTION

Risk of burns on hot surfaces

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

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

CAUTION

Risk of injury due to pressurised liquid

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

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

Prior to the disassembly, lock out the "DC" degassing lines and the "WC" make-up line from the system and de-pressurise the device. Then disconnect the device from all electrical power sources.

Proceed as follows:

1. Disconnect the system from the power supply and secure it against unintended reactivation.
2. Lock out the "DC" degassing lines and the "WC" make-up line.
3. Disconnect the power cable of the device from the power supply.
4. Disconnect 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.

5. Open the "FD" drain cock at the "VT" spray tube of the device until the spray tube no longer contains any water.
6. If necessary, physically remove the device from the system.

The dismantling process is completed.

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 - 9588

E-mail: 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

Declaration of conformity for electrical installations in the pressure maintaining, makeup or degassing systems

- We hereby confirm that the products meets the essential protection requirements as established in the Council Directive to approximate the laws of the Member States relating to electromagnetic compatibility (2014/30/EU).
The following Standards have been applied to assess the products: DIN EN 61326 – 1:2013-07
- We hereby confirm that the control cabinets meet the essential requirements of the Low-voltage Directive (2014/35/EU).
The following Standards have been applied to assess the products: DIN EN 61010 – 1:2011-07; BGV A2




Declaration of conformity for a pressure device (tank or assembly)

Applied assessment of conformity procedure according to the Pressure Equipment Directive 2014/68/EU of the European Parliament and the Council of 15 May 2014

Design, manufacture, and testing of pressure equipment

Vacuum spray tube and degassing system: Servitec

For universal application in heating, solar and cooling water systems

Type	According to tank nameplate	
Serial No.	According to tank nameplate	
Year of manufacturing	According to tank nameplate	
min. / max. permissible pressure (PS)	According to tank nameplate	
Test pressure (PT)	According to tank nameplate	
Min. / max. permissible temperature (TS)	According to tank nameplate	
Charging material	Water	
Standards and set of rules	Pressure Equipment Directive AD 2000 according to tank nameplate	
Pressure equipment	<p>Tank / vacuum spray tube Article 4 Para. (1) a) i) 2. dash (Annex II, diagram 2) with</p> <ul style="list-style-type: none"> Accessories, Article 4 Para. (1) d): Spray tube, degassing valve, vacuum gauge, pressure connection with nozzle, level switch, feed and drain cock, connection hose, suction connection <p>Assembly Article 4 Para. 2 clause b comprising:</p> <ul style="list-style-type: none"> Tank / vacuum spray tube Article 4 Para. (1) a) i) 2. dash (Annex II, diagram 2) with Accessories, Article 4 Para. (1) d): Spray tube, degassing valve, vacuum gauge, pressure connection with nozzle, level switch, feed and drain cock, connection hose, suction connection Accessories, Article 4 Para. (1) d): Controller with control cabinet and operating panel, check valve, pressure transducer, 1" ball valve, ½" ball valve, ½" ball valve with dirt trap, pump, 3-ways motor ball valve, 2-ways motor ball valve, pump drain screw, pump vent screw 	
Fluid group	2	
Conformity assessment to module	B+D	Servitec
Labelling according to Directive 2014/68/EU	CE 0045	
Certificate No. of the design type examination	See Annex 2	
Certificate No., QA system (Module D)	07 202 1403 Z 0780/15/D/1045	
Notified body for the assessment of the QA system	TÜV Nord Systems GmbH & Co. KG Große Bahnstraße 31, 22525 Hamburg, Germany	
Register No. of the notified body	0045	
Manufacturer	<p>The manufacturer declares that the pressure equipment (the tank / the assembly) complies with the requirements of Directive 2014/68/EU.</p> <div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 30%;">  <p>Reflex Winkelmann GmbH Gersteinstraße 19 59227 Ahlen - Germany Telephone: +49 2382 7069 -0 Fax: +49 2382 7069 -9588 E-mail: info@reflex.de</p> </div> <div style="width: 30%; text-align: center;">  Norbert Hülsmann Members of the Board of Directors </div> <div style="width: 30%; text-align: center;">  Volker Mauel </div> </div>	

12.3 Certificate No. of the CE type test

Type			Certificate number
Servitec	DN 150 - DN 250	10 bar/16 bar – 120 °C	04 202 1 450 03 00210

12.4 Guarantee

The respective statutory guarantee regulations apply.



Thinking solutions.

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