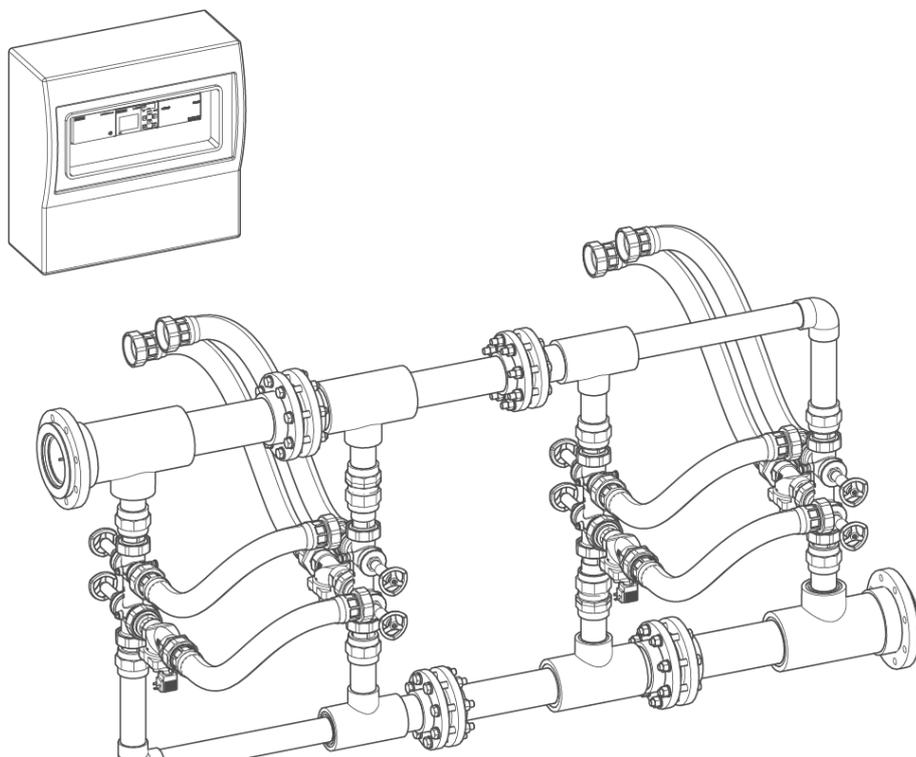


We understand water.



Accessories | Cascade connection for parallel piping of
Delta-p

Operation manual

grünbeck

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Original operation manual

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1 Introduction

This manual is intended for owners/operating companies, operators, users as well as qualified specialists and ensures the safe and efficient handling of the product. The manual is an integral part of the product.

- ▶ Carefully read this manual and the included manuals on the components before you operate the product.
- ▶ Adhere to all specified safety instructions and handling instructions of this manual.
- ▶ Keep this manual and all other applicable documents, so that they are available when needed.

Illustrations in this manual are for basic understanding and may differ from the actual design.

1.1 Validity of the manual

This manual applies to the following products:

- Double cascade connection Delta-p 1" and 1¼"
- Double cascade connection Delta-p 1½" and 2"
- Triple cascade connection Delta-p 2"
- Quadruple cascade connection Delta-p 2"

1.2 Other applicable documents

The following documents shall be deemed as applicable documents for the product:

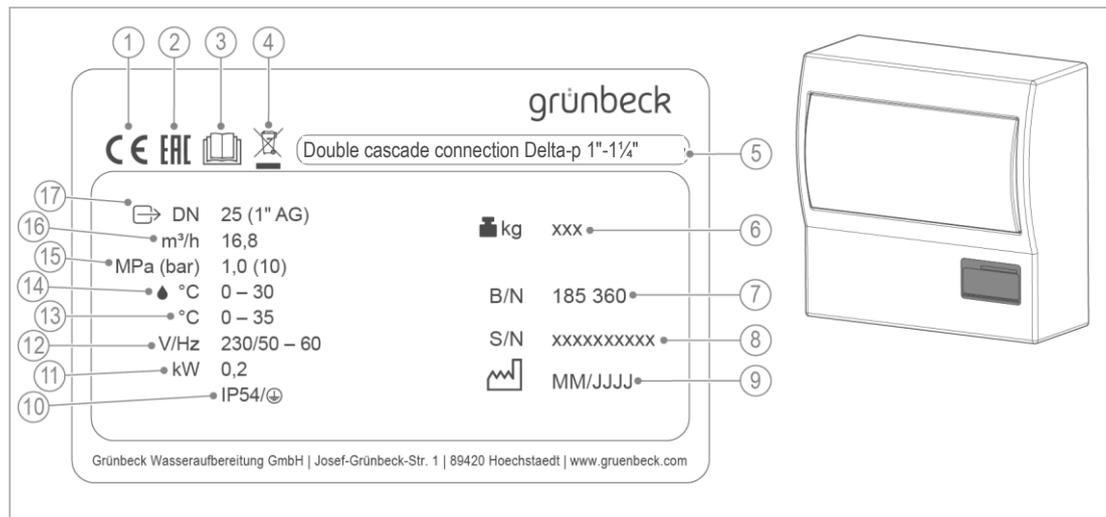
- Operation manual of water softener Delta-p/Delta-p-I, order no. TD3-BM001
- Mounting instructions for parallel piping of Delta-p, order no. 185 965
- For Grünbeck's technical service:
Technical service manual of water softener Delta-p/Delta-p-I, order no. 185 951
- Electric circuit diagram, order no.: 185 964

1.3 Product identification

You can identify your product based on the product designation and the order no. indicated on the type plate.

- ▶ Check whether the products indicated in chapter 1.1 correspond to your product.

The type plate is located on the switch box of the cascade connection.



Bezeichnung		Bezeichnung	
1	CE mark	10	Protection/protection class
2	EAC test mark	11	Connected load
3	Observe operation manual	12	Power supply
4	Disposal information	13	Ambient temperature
5	Product designation	14	Water temperature
6	Weight	15	Nominal pressure
7	Order no.	16	K_V value
8	Serial no.	17	Nominal connection diameter Solenoid valve
9	Date of manufacture		

1.4 Symbols used

Important information in this manual is characterised by symbols.



Warnings in connection with a signal word that you must heed for your personal safety.



Important information or requirements



Useful information or tip



Written documentation required



Refers to information in this manual or in other documents.



Work that may only be carried out by qualified specialists.



Work that may only be carried out by qualified electricians.



Work that may only be carried out by Grünbeck's technical service or by a qualified specialist trained by Grünbeck.

1.5 Depiction of warnings

This manual contains information and instructions that you must comply with for your personal safety. The information and instructions are highlighted by a warning symbol and have the following structure:



SIGNAL WORD Type and source of danger

- Possible consequences
- ▶ Preventive measures

The following signal words were defined subject to the degree of danger and may be used in the present document:

Warning symbol and signal word		Consequences if the information/ instructions are disregarded
 DANGER		Death or serious injuries
 WARNING	Personal injuries	Possible death or serious injuries
 CAUTION		Possible moderate or minor injuries
	Damage to property	Possible damage to components, the product and/or its function or damage to an object in its vicinity

1.6 Demands on personnel

During the individual phases in the service life of the system, different persons carry out work on the system. The respective tasks require different skills.

1.6.1 Qualification of personnel

Personnel	Requirements
Operator/user	<ul style="list-style-type: none"> No special expertise required Knowledge of the tasks assigned Knowledge of possible dangers in case of incorrect behaviour. Knowledge of necessary protective equipment and protective measures Knowledge of residual risks
Owner/operating company	<ul style="list-style-type: none"> Product-specific expertise Statutory regulations on work safety and accident prevention
Qualified specialist Electrical engineering Plumbing and HVAC technology Transport	<ul style="list-style-type: none"> Professional training Knowledge of relevant standards and regulations Knowledge of detection and prevention of possible risks Knowledge of statutory regulations on accident prevention
Technical service (Grünbeck's technical service/authorised service company)	<ul style="list-style-type: none"> Extended product-specific expertise Trained by Grünbeck

1.6.2 Authorisations of personnel

The following table describes which tasks may be performed by whom.

	Operator/ user	Owner/ operating company	Qualified specialist	Technical service
Transport and storage			X	X
Installation and mounting			X	X
Start-up			X	X
Operation and handling	X	X	X	X
Cleaning		X	X	X
Inspection	X	X	X	X
Maintenance semi-annual			X	X
annual				X
Troubleshooting	X	X	X	X
Repair			X	X
Shutdown and restart/recommissioning			X	X
Dismantling and disposal			X	X

1.6.3 Personal protective equipment

- ▶ As an owner/operating company, make sure that the required personal protective equipment is available.

The following components fall under the heading of personal protective equipment (PPE):



Protective gloves



Protective footwear



Protective overall



Protective goggles

2 For your safety

Here, you will find information on the safe operation of the product.

2.1 Safety measures

- Only operate the system if all components are installed properly.
- Observe the local regulations on drinking water protection, accident prevention and occupational safety.
- Do not make any changes, alterations, extensions or program changes on the system.
- Only use genuine spare parts for maintenance or repair. If unsuitable spare parts are used, the warranty for the system will be void.
- Always keep the premises locked against unauthorised access to protect imperilled or untrained groups of persons from residual risks.
- Observe the maintenance intervals (refer to chapter 7.2). Failure to comply can result in microbiological contamination of your drinking water system.

2.1.1 Mechanical safety

- Safety equipment must never be removed, bridged, or otherwise tampered with.
- For all work on the system that cannot be carried out from the ground, use stable, safe and self-standing climbing aids.
- Make sure that the system is set up in a way that it cannot tip over and that the stability of the system is guaranteed at all times.

2.1.2 Pressure-related hazards

- Components may be under pressure. Risk of injuries and damage to property due to escaping water and unexpected movement of components. Check the system's pressure lines at regular intervals.
- Prior to starting repair or maintenance work, make sure that all system components concerned are depressurised.

2.1.3 Electrical safety

In case of contact with live components there is an immediate risk of death due to electric shock. Damage to insulation or individual components can be life-threatening.

- Only have qualified electricians carry out electrical work on the system.
- If live components are damaged, immediately switch off the power supply and arrange for repair.
- Switch off the supply voltage before working on electrical system parts. Discharge residual voltage.
- Never bridge electrical fuses. Do not disable fuses. Observe the correct current ratings when replacing fuses.
- Keep moisture away from live parts. Moisture can cause short-circuits.

2.2 Product-specific safety instructions

2.2.1 Signals and warning devices on the product

Labels on the product



Risk of electric shock



The attached information and pictograms must be clearly legible. They must not be removed, soiled, or painted over.

- ▶ Observe all warnings and safety instructions.
- ▶ Immediately replace illegible or damaged symbols and pictograms.

2.3 Transport and storage

2.3.1 Dispatch/Delivery/Packaging

- ▶ Immediately check the product for completeness and transport damage.
- ▶ In case of visible transport damage, proceed as follows:
 - Do not accept the delivery or only accept it under reserve.
 - Note the extent of damage on the transport documents or on the carrier's delivery note.
 - Initiate a complaint.

2.3.2 Transport

- ▶ Transport the product in its original packaging only.

2.3.3 Storage

- ▶ Protect the product from the following impacts when storing it:
 - Moisture, wetness
 - Environmental impacts such as wind, rain, snow, etc.
 - Frost, direct sunlight, severe heat exposure
 - Chemicals, dyes, solvents, and their vapours

3 Product description

3.1 Intended use

- The cascade connection is designed exclusively for use in industrial and commercial applications.
- The cascade connection is used in conjunction with water softeners Delta-p/Delta-p-I connected in parallel.
- The cascade control registers system flows via the controller (GENO-IONO-matic₃). Cascading is done by actuating the solenoid valves (by manual actuation).

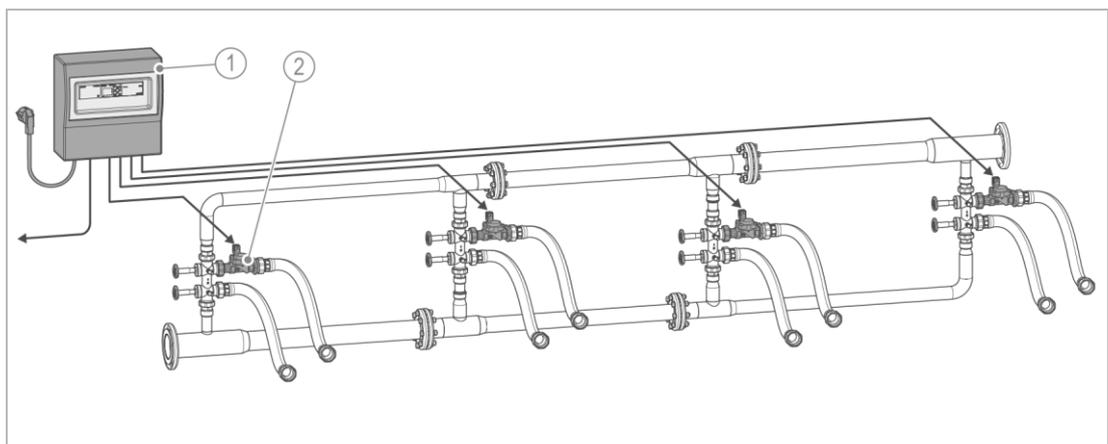


The software of the water softeners Delta-p/Delta-p-I must correspond to the latest version. It may be necessary to update the software.

Optional cascading is possible as of the following serial numbers of the Delta-p/Delta-p-I:

System	Serial number	System	Serial number
Delta-p 1"	010412	Delta-p-I 1"	020185
Delta-p 1¼"	030343	Delta-p-I 1¼"	035142
Delta-p 1½"	040117	Delta-p-I 1½"	042575
Delta-p 2"	045071	Delta-p-I 2"	047591

3.2 Product components



Designation	Function
Cascade control	<p>The cascade control is installed in a plastic switch box.</p> <ul style="list-style-type: none"> • Central voltage-free collective fault contact for all systems to control system by client on site. • The cascade control is pre-wired and ready for connection and features cables of 5 m in length each to the solenoid valves and to the GENO-IONO-matic₃ controller. <p>The electric connecting line to the hardness monitoring system (option) is not included in the scope of supply.</p>
Solenoid valve	<p>Depending on the system size and the systems connected in parallel, one solenoid valve (NOC) each is added to the connection block of the parallel piping.</p>

3.3 Functional description

In case of a system configuration for high flow rates, it is nevertheless possible that only small quantities are consumed on site. Due to the technical start-up limits of the mechanical meters, these shortfalls in quantities lead to unregistered consumption of capacity.

In order to prevent resulting residual hardness downstream of the water softeners, the systems are switched on or off from the soft water supply via valves when the flow rates increase or decrease.

The control units of the water softeners Delta-p feature a switching output that passes on the flow rate of the respective system to the controller of the cascade connection. In the cascade control, a flow threshold is set for cascading.

After the cascade has been reached (30 % of the nominal volume flow of the system(s)), the next system - starting from the master system - is then added on in the multiple connection by opening a solenoid valve in the soft water pipe. The flow via the systems is cut in half.

In case of triple or quadruple systems, the third or fourth water softener Delta-p is added to the soft water supply. In case of decreasing flow rates, the cascade switches backwards to the master system.

After every regeneration of the master system, the cascade control switches the task on to the next system, so that over time, there is a uniform load on all systems.

The cascade control also offers the option to cascade the system via a tank with digital level signals. To do so, one more switching contact (level signal) is required in each case than systems are installed.



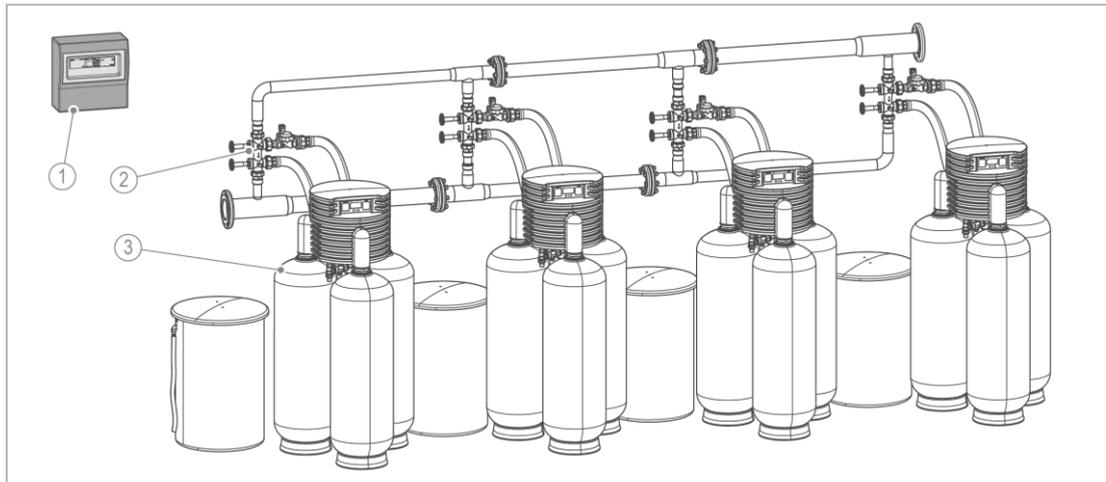
In case of a power failure, all solenoid valves are open, so that soft water can be withdrawn from all systems.

4 Installation



The installation of the system may only be carried out by a qualified specialist.

Installation example for cascade connection Delta-p (quadruple)



Designation

- 1 Cascade control
- 2 Parallel piping (quadruple) with connection kits

Designation

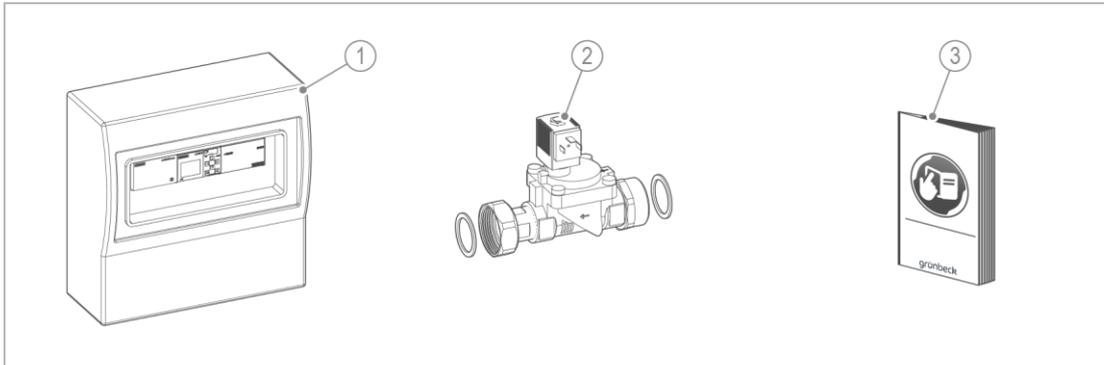
- 3 Water softener Delta-p/Delta-p-I

4.1 Requirements for the installation site

Observe local installation directives, general guidelines and technical specifications.

- A Schuko socket is required within a distance of approx. 1.2 m of the system. The socket outlet requires permanent power supply and must not be coupled with light switches, emergency heating switch or the like.

4.2 Checking the scope of supply



Item	Designation	Item	Designation
1	Switch box	2	Solenoid valve
3	Operation manual		

► Check the scope of supply for completeness and damage.

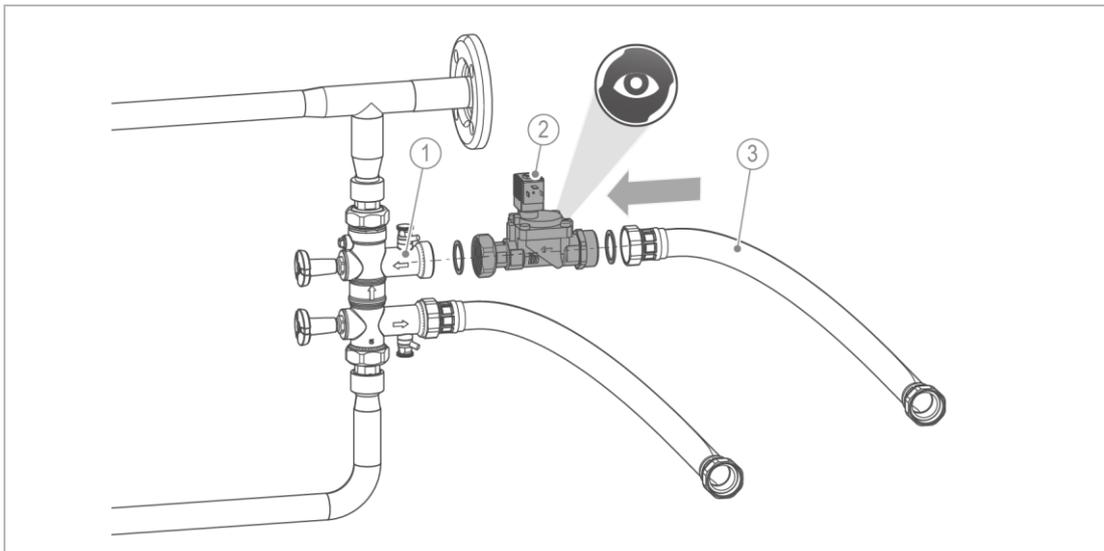
4.3 Water installation



The corresponding parallel piping is mounted (refer to mounting instructions, order number 185 965).

The shut-off valves are closed and the lines are non-pressurised hydraulically.

4.3.1 Installing the solenoid valves

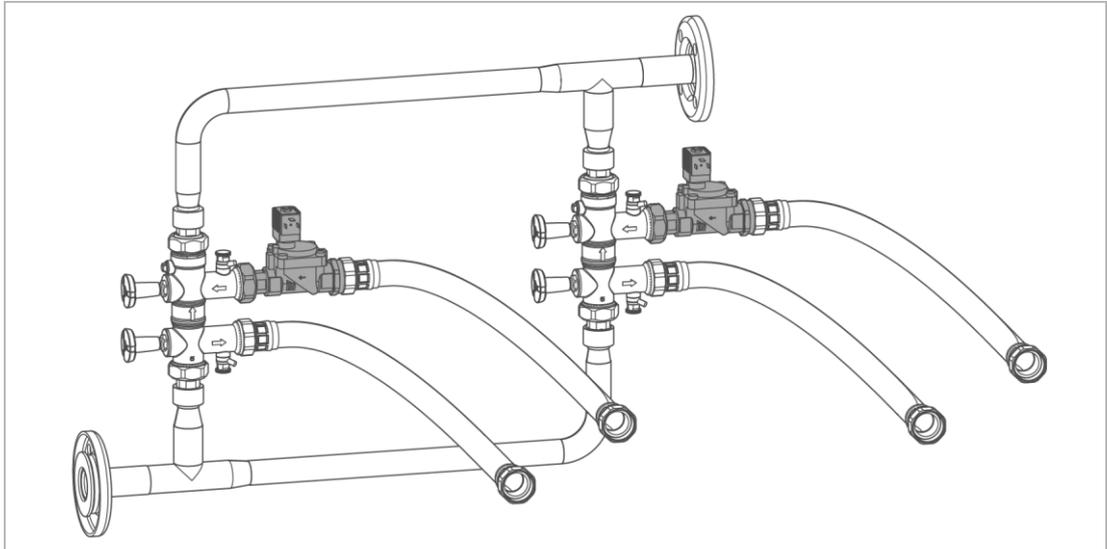


Designation
1 Connection block (soft water line)
2 Pre-assembled solenoid valve

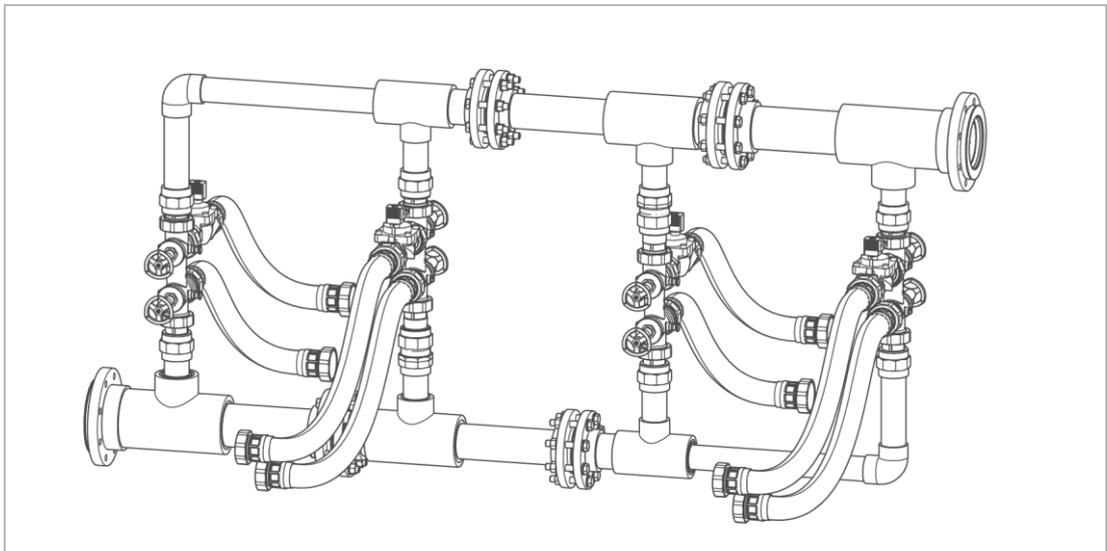
Designation
3 Connection hose (soft water)

1. Install the solenoid valve on the connection block (soft water line) using the disconnectable water meter screw connection – observe the flow direction.
2. Connect the connection hose to the solenoid valve.

Example: Parallel piping (double) made of stainless steel



Example: Parallel piping (quadruple) made of PVC



» The solenoid valves are installed.

4.4 Electrical installation



The electrical installation may only be carried out by a qualified electrician.



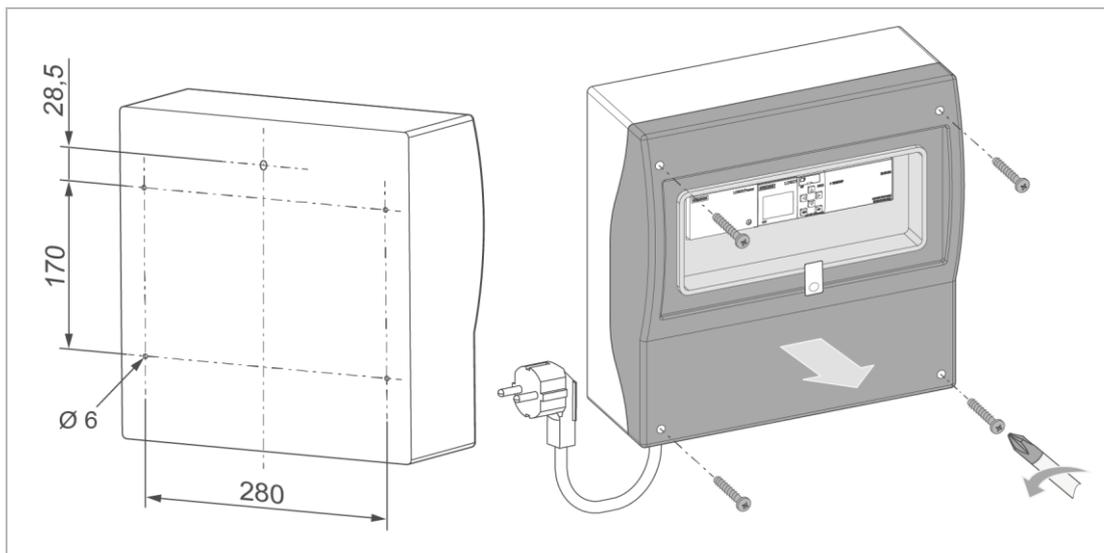
DANGER Life-threatening voltage of 230 V

- Risk of severe burns, cardiovascular failure, fatal electric shock.
- ▶ Check the system for proper condition prior to start-up/commissioning
- ▶ Switch off the supply voltage before working on electrical system parts.
- ▶ Secure the system against restart.
- ▶ Discharge residual voltage.
- ▶ Only use suitable, undamaged tools.
- ▶ Use personal protective equipment – do not work with wet hands.

4.4.1 Installing the switch box



The client has to firmly install the switch box according to the wall situation. The fastening material is not included in the scope of supply.



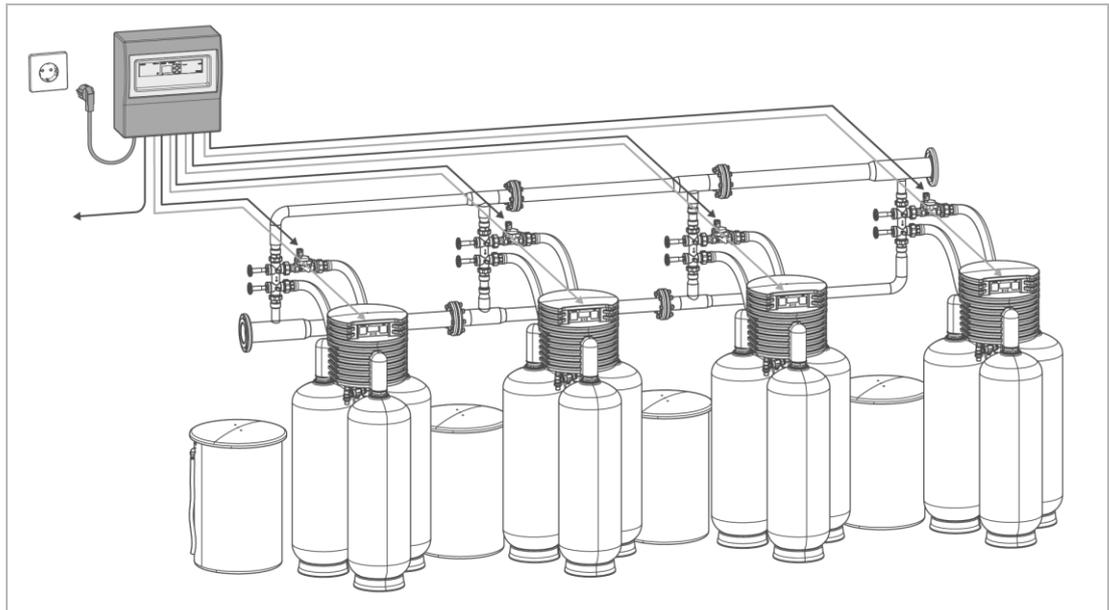
1. Prepare the housing for fastening according to the situation on site.
 - b Break through the holes on the back.
 - c Open the upper part of the housing – loosen the 4 screws.
2. Position the housing near the water softener Delta-p – pay attention to the length of the cables for power supply and interfaces when doing so.
3. Fasten the housing smoothly and evenly using the fastening material provided by the client on site (aligned horizontally and vertically)

4.4.2 Make the electrical connections



For electrical connections, refer to electric circuit diagram, order no. 185 964.

- ▶ Connect the electric lines to the solenoid valves and to the GENO-IONO-matic₃ controller of the water softener Delta-p.
- ▶ If necessary, connect the voltage-free collective fault contact for all systems to the clients's system.



4.4.3 Settings in the GENO-IONO-matic₃ controller (Delta-p) as of SW 3.06



Refer to the operation manual of water softener Delta-p/Delta-p-I, order no. TD3-BM001.

The following settings on the water softener Delta-p are required to communicate with the cascade control:

4.4.3.1 Einstellungen in Code 113

Index	Parameter/Unit	Remarks	Setting
0	Function Programmable input (Terminals 28/29)	1 = External release of regeneration	1
1	Function Programmable output (Terminals 42 ... 44)	2 = Closed during the entire regeneration	2

- ▶ Make the specified settings for Index 0 and 1 in the installer level (Code 113).

4.4.3.2 Settings in Code 142

Index	Parameter/Unit	Remarks	Setting
L	Pulse division for EXAcount pulse output 1: ...	For the pulse output, the input pulses of the water meters Exchanger*/Exchanger**/blending are used. Divider "0" is reserved for parameterisation of the cascade connection.	0

- ▶ Make the specified settings for Index L in the technical service level (Code 142).

5 Start-up



The start-up may only be carried out by Grünbeck's technical service.

5.1 Starting up the product

- ▶ Establish the power supply – plug in the mains plug.
- ▶ Parameterise the cascade control, if required (refer to chapter 6.2).
- ▶ Check the cascade control for function.
- ▶ Check the system for leaks.

5.2 Handing over the product to the owner/operating company

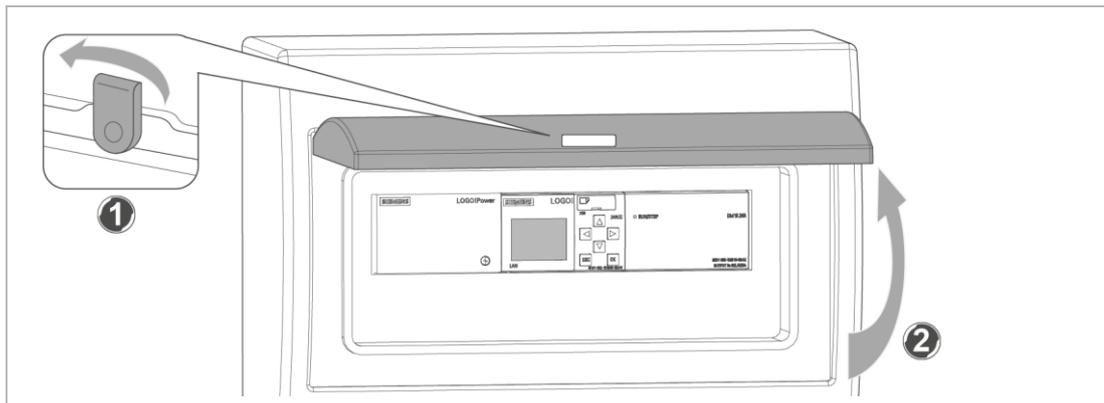
- ▶ Explain to the owner/operating company how the cascade control and the water softener work.
- ▶ Use the manual to brief the owner/operating company and answer any questions.
- ▶ Inform the owner/operating company about the need for inspections and maintenance.
- ▶ Hand over all documents to the owner/operating company for keeping.

6 Operation

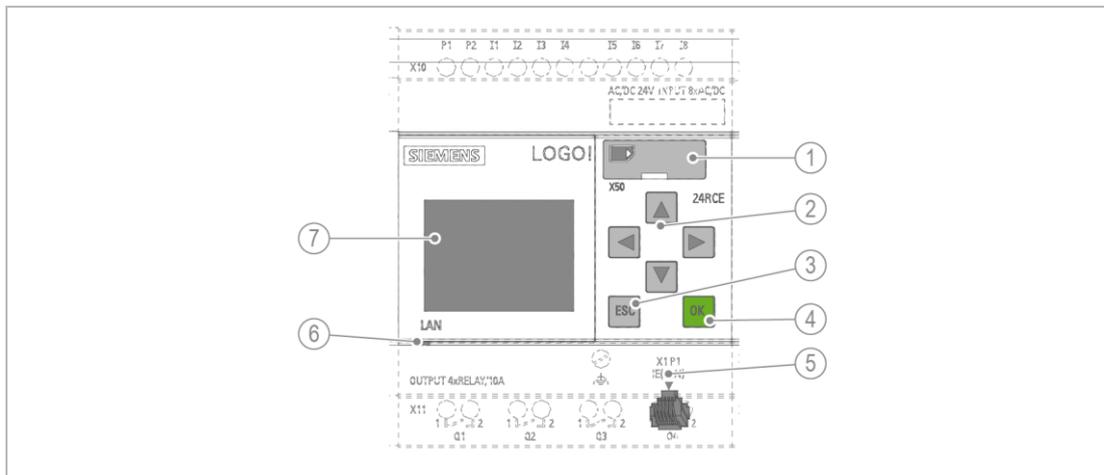
Normally, no intervention by the owner/operating company/operator is required during operation.

6.1 Operating the cascade control

The system is controlled by means of the PLC controller Siemens Logo.



1. Unlock the lock.
2. Flip the lid upwards.
 - » The lid locks at a 90° angle.



Designation

- | | |
|---|---------------------------------|
| 1 | Slot for memory card (micro SD) |
| 2 | Navigation buttons |
| 3 | ESC button |
| 4 | OK button |

Designation

- | | |
|---|--------------------|
| 5 | LAN connection |
| 6 | LAN indicator lamp |
| 7 | Display |

6.1.1 Operating concept

The menu consists of one level.

- ▶ Use the navigation buttons  and  to change the displays.

Setting values

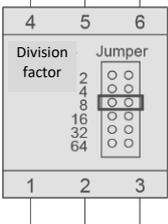
1. Press and hold the  button for 3 seconds.
 - » The input field has a black background.
4. Switch between different input fields within a display by using the navigation buttons  and .
5. Press  to change a value.
 - » The input field with a black background is flashing.
6. Change the setting value using the navigation buttons  and  or trigger an action with .
7. Press  to quit the settings.

6.1.2 Menu structure

In the different displays, there are purely informative elements as well as elements where settings can be made or actions can be triggered.

Info levels

No.	Display	Explanation
0		Information: <ul style="list-style-type: none"> • Basic display • Time • Date
1		Information: <ul style="list-style-type: none"> • Indication of software version

No.	Display	Explanation
		 <p>As of software update V07, the division factor – jumper at pulse divisions 3A1 – 3A4 must always be set to divisor 8.</p>
<p>2</p> <div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> <p style="text-align: center;">Maintenance</p> <p>System 1: Off</p> <p>System 2: Off</p> <p>System 3: Off</p> <p>System 4: Off</p> <p>[ON] = System OFF</p> </div>		<p>Information:</p> <ul style="list-style-type: none"> • Maintenance <p>For maintenance work, the water softeners can be put out of operation via the solenoid valves.</p> <p>Actions:</p> <ul style="list-style-type: none"> • Systems are active, Off • Systems are in maintenance mode, ON
<p>4</p> <div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> <p>System overview</p> <p>Master system 1</p> <p>Valve 1: OPEN</p> <p>Valve 2: CLOSED</p> <p>Valve 3: CLOSED</p> <p>Valve 4: CLOSED</p> </div>		<p>Information:</p> <ul style="list-style-type: none"> • System overview <p>Indicates the master system and the switching state of the solenoid valves installed in the soft water pipe.</p> <ul style="list-style-type: none"> • OPEN/CLOSED  <p>The valve belonging to the master system must be shown as OPEN – only in case of cascading via flow rate.</p>
<p>5</p> <div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> <p>Flow rates</p> <p>Total 0.00 m³/h</p> <p>System 1: 0.00 m³/h</p> <p>System 2: 0.00 m³/h</p> <p>System 3: 0.00 m³/h</p> <p>System 4: 0.00 m³/h</p> </div>		<p>Information:</p> <ul style="list-style-type: none"> • Flow rates <p>Indicates the total flow and the flow rates of the respective system in m³/h.</p> <ul style="list-style-type: none"> • The illustration shows the maximum cascading of 4 systems

6.2 Setting the system (Code 00290)



The following work may only be carried out by Grünbeck's technical service.

In order to activate Code level 00290:

1. Simultaneously press the **ESC** + **▶** button in any Info level.
 - » A yellow background appears in the display.



After 60 seconds, the program automatically quits the Code level.

Simultaneously press the **ESC** + **◀** button in order to quit the Code level.

8. Enter the Code **00290** as follows:
 - a Press and hold **ESC** for 3 seconds.
 - b Press **OK** to change the value.
 - » Display changes to 6 digits.
 - c Use the **◀** button to set the cursor to the 3rd digit from the right.
 - d Use the **▼** and **▲** buttons to set the value to **00290**.
 - e Press **OK**.
 - f Press **ESC** to quit the settings.

No.	Display	Explanation
1	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Operation via flow OFF</p> <p>Level (ON) Flow (OFF)</p> <p style="text-align: center;">▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Operating mode <p>Actions:</p> <ul style="list-style-type: none"> • Level <p>Cascading via digital switches (e.g. level control on the tank).</p> <div style="border-left: 2px solid blue; padding-left: 10px; margin-left: 20px;"> <p> For cascading, there must always be one more switching contact (level) than water softeners are installed.</p> <p> In case of cascading into a non-pressurised system, the systems must be throttled down.</p> </div> <ul style="list-style-type: none"> • Flow rate <p>Cascading via adjustable flow rates (as a percentage of the respective continuous system flow).</p> <ul style="list-style-type: none"> • e.g. 30 % of 12 m³/h – water softener Delta-p 2"
2	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>System type Double</p> <p>2: 3: (ON) 4: (OFF)</p> <p style="text-align: center;">▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • System type <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the systems to be cascaded. <p>(e.g. menu item 4: 4 systems in parallel operation)</p>
3	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>System size 1</p> <p>1 – 1 " 3 – 1 ½ "</p> <p>2 – 1 ¼ " 4 – 2 "</p> <p style="text-align: center;">▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • System size <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the system size that is cascaded. <p>(e.g. menu item 4: 4 water softeners Delta-p 2")</p>

No.	Display	Explanation
4	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Water meter pulse rate OFF</p> <p>0.0773 (ON) 0.0314 (OFF)</p> <p>▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Water meter pulse rate of Delta-p <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the soft water meters installed in the Delta-p. <div style="border-left: 2px solid blue; padding-left: 10px; margin-top: 10px;">  <p>As of software update V2.53 (Delta-p), the water meters installed in the systems have a pulse rate of 0.0314 l/pulse.</p> </div>
5	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Setting value for peak flow activation</p> <p>30% (10 – 90 %)</p> <p>▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Setting value of peak flow activation <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the flow value at which a further system is repeatedly switched on. <p>Example:</p> <p>Water softener Delta-p 1½"</p> <p>Nominal flow: 8 m³/h</p> <p>Peak flow activation: 30 %</p> <ul style="list-style-type: none"> • Master system 1: <ul style="list-style-type: none"> • Flow rate 2.4 m³/h (30 %) • System 2 joins in immediately <ul style="list-style-type: none"> • Master system 1 and system 2: <ul style="list-style-type: none"> • Flow rate 8.0 m³/h + 2.4 m³/h = 10.4 m³/h; • System 3 switches on as well.
6	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Delay Valves close after peak flow deactivation</p> <p>30% (0 – 4999 sec)</p> <p>▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Delay Valves <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the time after which the systems are switched off once again if the flow is undershot (threshold value set).

No.	Display	Explanation
7	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Valve type --- NO ---</p> <p>Off (NO=OFF/NC=ON)</p> <p>▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Valve type <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the solenoid valves installed in the soft water pipe. <div style="border-left: 2px solid green; padding-left: 10px; margin-top: 10px;">  <p>Factory setting: NO-type solenoid valves (normally open = flow) are installed as standard.</p> </div>
8	<div style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Signal type for release of water monitoring system --- NO ---</p> <p>Off (NO=OFF/NC=ON)</p> <p>▼</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Signal type for release <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the output to the automatic water analysis system GENO-softwatch Komfort, so that measurement is locked when the system is idle (no flow).
9	<div style="border: 1px solid gray; padding: 10px;"> <p>Delay release of water monitoring system, when flow is present</p> <p>ON [M:S] : 99:59 m OFF [M:S] : 00:10 m</p> </div>	<p>Information:</p> <ul style="list-style-type: none"> • Delay Release of water monitoring device <p>Actions:</p> <ul style="list-style-type: none"> • Parameterisation of the delay time after which a hardness monitoring system, for instance, shall be locked for measurements.

7 Cleaning, inspection, maintenance

Regular maintenance ensures trouble-free and hygienic operation.

- ▶ Clean the product at regular intervals.
- ▶ Carry out an inspection at least every 2 months.
- ▶ Have maintenance carried out by Grünbeck's technical service, or a qualified specialist trained by Grünbeck, at least once a year.
- ▶ Only use genuine spare and wearing parts from Grünbeck.



By concluding a maintenance contract, you ensure that all maintenance work is carried out on time.

7.1 Cleaning



WARNING

Cleaning of live components with a damp cloth.

- Risk of electric shock.
- Sparking possible due to short circuit
- Switch off the voltage supply as well as any external voltage prior to starting the cleaning work.
- ▶ Wait for at least 15 minutes and make sure that the components do not carry any voltage.
- ▶ Do not open any switch cabinets.
- ▶ Do not use any high-pressure equipment for cleaning and do not blast electrical/electronic devices with water.



CAUTION!

Climbing onto system components

- Risk of falling when climbing onto system components.
- ▶ Do not climb onto system components such as pipes, racks, etc.
- ▶ Use stable, safe and self-standing climbing aids such as step ladders, pedestals, etc. when cleaning components located at high levels.

NOTE:

Do not clean the system with cleaning agents containing alcohol/solvents.

- These substances damage the plastic components.
- ▶ Use a mild/pH-neutral soap solution.
- ▶ Only clean the outside of the product.
- ▶ Do not use any strong or abrasive cleaning agents.

- ▶ Wipe the housing with a damp cloth.
- ▶ Dry the surfaces with a cloth.

7.2 Intervals



By way of regular inspections and maintenance, malfunctions can be detected in time and system failures might be avoided.

- ▶ (As owner/operating company) Determine which components have to be inspected and maintained at which intervals (load-dependent).

The following interval table shows the minimum intervals for the activities to be performed.

Task	Interval	Execution
Inspection	2 months	<ul style="list-style-type: none"> • Visually check for damage and leaks • Check solenoid valves for function • Read the display for fault messages
Maintenance	6 months	<ul style="list-style-type: none"> • Perform a functional check • Refer to the operation manual of Delta-p/ Delta-p-I for additional items
	annual	<ul style="list-style-type: none"> • Perform a functional check • Read the setting values on the controller • Visually check connectors and electric cables for damage • Refer to the operation manual of Delta-p/ Delta-p-I for additional items
Maintenance and repair	5 years	<ul style="list-style-type: none"> • Replace the seals of the solenoid valves

7.3 Inspection

Regular inspections increase the operational reliability of your product.

- ▶ Carry out an inspection at least every 2 months.
Proceed as follows:
 1. Visually check for damage and leaks.
 2. Check the solenoid valves for function.
 3. Read the display for possible fault messages.

7.4 Maintenance



Carrying out annual maintenance work requires specialist knowledge. This kind of maintenance work may only be carried out by Grünbeck's technical service or by a qualified specialist trained by Grünbeck.



DANGER

Electrical voltage during interventions on the system

- Risk of severe burns, cardiovascular failure, fatal electric shock.
- Due to the water, short-circuits and voltage transmissions may occur.
- ▶ Only have qualified electricians carry out electrical work on the system.
- ▶ Before starting work on active system parts, make sure they are de-energised. Ensure their de-energised state for the duration of the work. Observe the following 5 safety rules while doing so:
 - a Disconnect from voltage.
 - b Secure against restart.
 - c Verify that no voltage is present.
 - d Ground and short-circuit.
 - e Cover or block off adjacent live parts.

7.4.1 Semi-annual and annual maintenance

- ▶ Carry out all work on the water softener Delta-p/Delta-p-I required in the scope of inspection and maintenance work (refer to the operation manual and the technical service manual of Delta-p/Delta-p-I).
1. Perform a functional check on the cascade connection.
 2. Read the setting values of the system.
 3. Visually check the electrode cables and connectors of the solenoid valves for damage.

7.5 Spare parts

For an overview on the spare parts, go to our spare parts catalogue www.gruenbeck.com. You can obtain the spare parts from your local Grünbeck representative.

7.6 Wearing parts

Wearing parts are listed below:

- Seals
- Solenoid valves

8 Malfunktions



WARNING

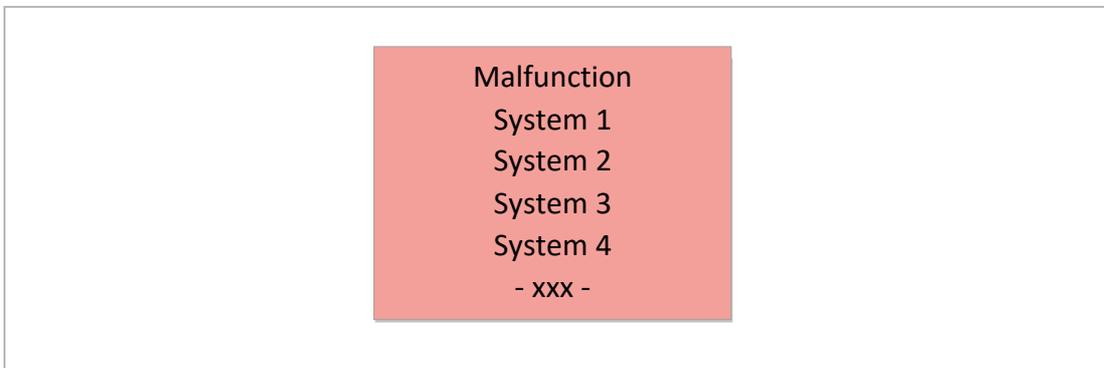
Contaminated water due to stagnation.

- Risk of infectious diseases.
- ▶ Have malfunctions remedied immediately.

8.1 Display messages

In case of a malfunction, the controller display flashes in red.

The following appears on the display: Time of occurrence and type of malfunction.



To acknowledge the faults:

- ▶ Press and hold **ESC** and simultaneously press **▲** + **ON**.
- » The fault is acknowledged.

Display	Explanation	Remedy
<p>Hardness breaking through System 1 System 2 System 3 System 4 Acknowledge? Off</p>	<ul style="list-style-type: none"> • Hardness breaking through <p>The optional automatic water analysis system GENO-softwatch Komfort signals hardness breaking through on the active master system.</p> <p>The active master system is switched off and the next system becomes the master system.</p> <p>The fault is displayed for the master system which had been in operation at the time the hardness was breaking through.</p>	<ul style="list-style-type: none"> ▶ Acknowledge the fault.

Display	Explanation	Remedy
<p>Malfunction System 1 System 2 System 3 System 4 Hardness monitoring device</p>	<ul style="list-style-type: none"> System malfunction of water softener Delta-p or automatic water analysis system GENO-softwatch <p>System malfunctions of the water softener Delta-p and the automatic water analysis system GENO-softwatch Komfort are indicated on the cascade control as well.</p> <p>The faults can be picked up as voltage-free collective fault signal and relayed via a voltage-free collective fault contact.</p>	<ul style="list-style-type: none"> The fault is automatically acknowledged after it has been acknowledged on the water softener Delta-p or the automatic water analysis system GENO-softwatch Komfort.
<p>Malfunction Max. Level SYSTEM LOCKED! Acknowledge? Off</p>	<ul style="list-style-type: none"> Level malfunction <p>In the operating mode "Level", an overflow level is analysed. If it is connected, water flows into the tank even though cascading is completed.</p> <p>The faults can be relayed via voltage-free collective fault contact.</p>	<ul style="list-style-type: none"> Check the status of the level. Eliminate the fault.
<p>All systems out of operation (no water available)</p>	<ul style="list-style-type: none"> Level malfunction <p>During maintenance, all systems can be taken out of the water supply.</p> <p>The faults can be relayed via voltage-free collective fault contact.</p>	<ul style="list-style-type: none"> Carry out maintenance work. Acknowledge the fault.

9 Dismantling and disposal

9.1 Dismantling



Have this work performed by qualified specialists only.

1. Disconnect the cascade connection from mains – discharge residual voltage.
2. Remove the connection hoses from the water softener Delta-p.
3. Remove the parallel piping.
4. Remove the water softener Delta-p/Delta-p-l.

9.2 Disposal

- ▶ Observe the applicable national regulations.

Packaging

- ▶ Dispose of the packaging in an environmentally sound manner.

Product



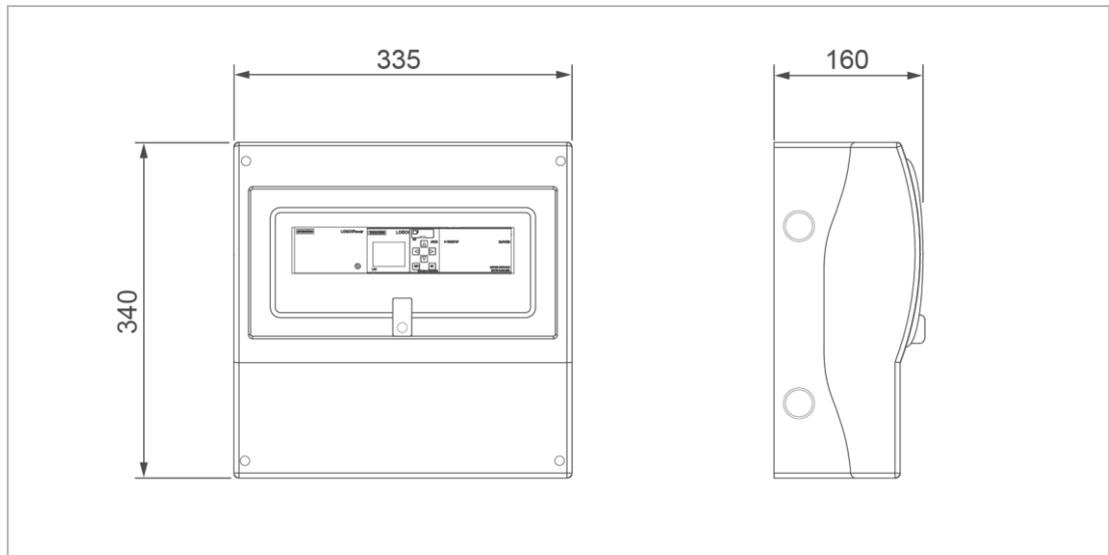
If this symbol (crossed out wheeled bin) is on the product, this product and the electrical and electronic components must not be disposed of as household waste.

- ▶ Dispose of the electrical and electronic products or components in an environmentally sound manner.
- ▶ If your product contains batteries or rechargeable batteries, dispose of them separately from your product.



For more information on take-back and disposal, go to www.gruenbeck.com.

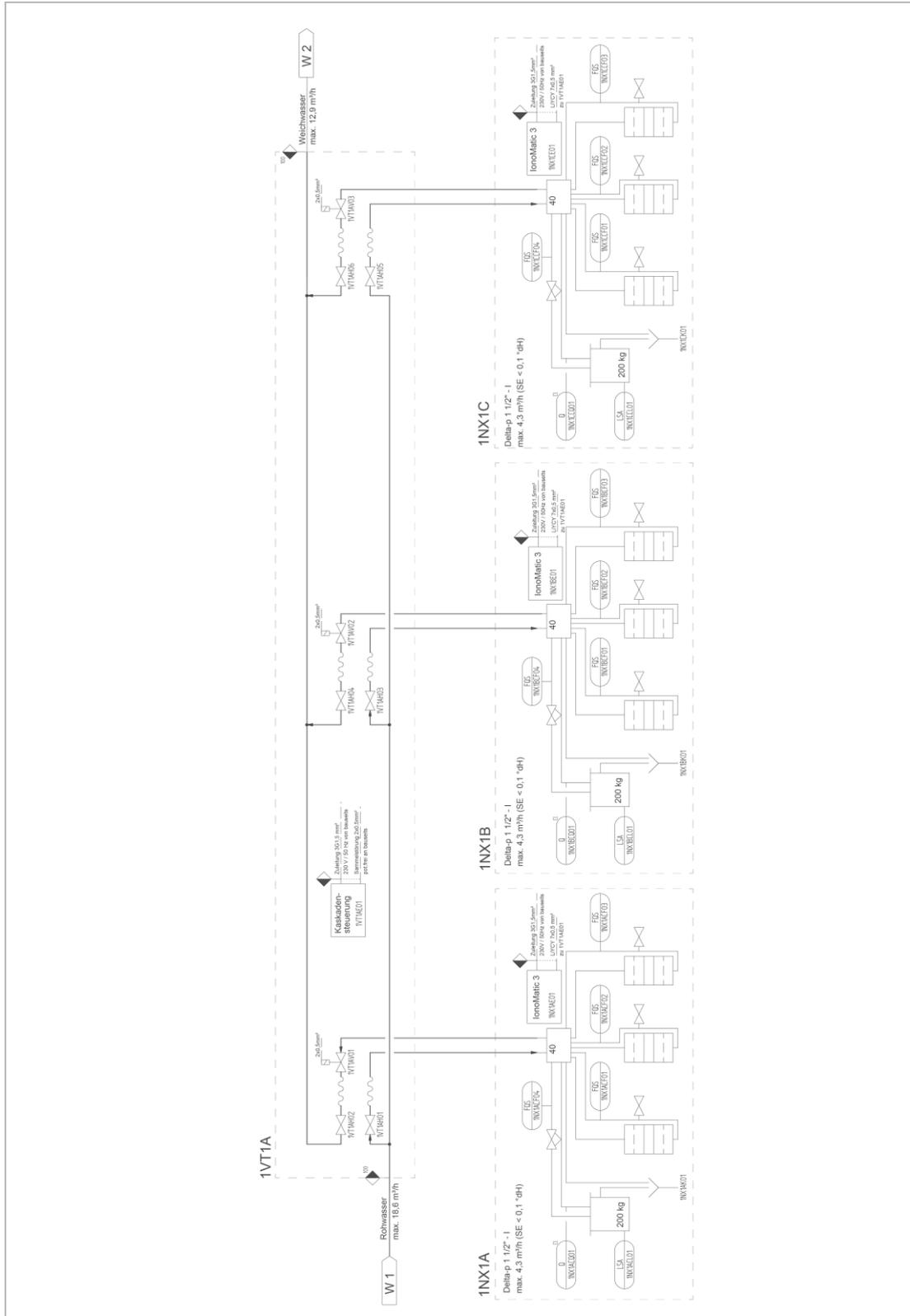
10 Technical specifications



Cascade connection for parallel piping of Delta-p					
		Double	Double	Triple	Quadruple
Dimensions and weights		1" + 1¼"	1½" + 2"	2"	2"
Width x height x depth	mm	335 x 340 x 160			
Shipping weight, approx.	kg	11.5	14.4	17.6	20.8
Connection data					
Nominal connection diameter Solenoid valve		DN 25	DN 40		
Power supply	V/Hz	230 / 50 – 60			
Connected load	kW	0.2			
Protection/protection class		IP54/⚡			
Performance data					
Nominal pressure		PN 10			
Kv value	m³/h	16.8	29.5		
General data					
Water temperature	°C	0 – 30			
Ambient temperature	°C	0 – 35			
Max. humidity (non-condensing)	%	≤ 70			
Order no.		185 360	185 365	185 370	185 375

10.1 Functional diagram (PID)

Exemplary flow chart of triple cascading:



	Coding	Designation
8	1VT1A	Triple parallel piping of Delta-p 1½" VA
9	1VT1AE01	Cascade connection Delta-p 1½" – triple
0	1VT1AV01, 02, 03	Solenoid valve
1	1VT1AH01, 03, 05	Raw water shut-off valve
2	1VT1AH02, 04, 06	Soft water shut-off valve
3	1NX1A	Water softener Delta-p 1½" I with pedestal
4	1NX1B	Water softener Delta-p 1½" I with pedestal
5	1NX1C	Water softener Delta-p 1½" I with pedestal
6	1NX1AE01, BE01, CE01	IONO-matic ₃ controller
7	1NX1ACL01, BCL01, CCL01	Pre-alarm salt supply (in the brine tank)
8	1NX1AK01, BK01, CK01	Drain connection Delta-p, DN 50 acc. to DIN EN 1717

Medium	Designation
W1	Inlet: Raw water max. 18.6 m ³ /h
W2	Outlet: Soft water max. 12.9 m ³ /h

11 Operation log



- ▶ Document the initial start-up/commissioning and all maintenance activities.
- ▶ Copy the maintenance sheets, if necessary.

Cascade connection for parallel piping of Delta-p | Type: _____

Serial no.: _____

11.1 Start-up log

Customer					
Name:					
Address:					
Installation/Accessories					
Water softener (type):					
Operating values					
Water pressure	bar				
Residential water meter reading	m ³				
Hardness unit	°dH	°f	mol/m ³	°e	°ppm
Raw water hardness 1	<input type="checkbox"/>				
Soft water hardness 1	<input type="checkbox"/>				
Raw water hardness 2	<input type="checkbox"/>				
Soft water hardness 2	<input type="checkbox"/>				
Raw water hardness 3	<input type="checkbox"/>				
Soft water hardness 3	<input type="checkbox"/>				
Raw water hardness 4	<input type="checkbox"/>				
Soft water hardness 4	<input type="checkbox"/>				
Remarks					
Start-up					
Company:					
Service technician:					
Work time certificate (no.):					
Date/signature:					

EU Declaration of Conformity

In accordance with the EU Low-Voltage Directive 2014/35/EU, Appendix IV



This is to certify that the system designated below meets the safety and health requirements of the applicable European guidelines in terms of its design, construction and execution.

If the system is modified in a way not approved by us, this certificate is void.

Cascade connection for parallel piping of Delta-p

double (2 x 1" / 2 x 1¼" / 2 x 1½" / 2 x 2")

triple (3 x 2"), quadruple (4 x 2")

Serial no.: Refer to type plate

The aforementioned system also complies with the following directives and provisions:

- EMC (2014/30/EU)

The following harmonised standards have been applied:

- DIN EN 61000-6-2:2006-03
- DIN EN 61000-6-3:2011-09
- DIN EN 60730-1:2017-05

The following national standards and regulations have been applied:

- DIN 19636-100:2008-02
- DIN EN 14743:2007-09

Responsible for documentation:

Dipl.-Ing. (FH) Markus Pöpperl

Manufacturer

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89420 Hoechstädt/Germany

Hoechstädt/Germany, 01/06/2020

A handwritten signature in blue ink, appearing to be 'M. Pöpperl', is written over a horizontal line.

By power of attorney Dipl.-Ing. (FH) Markus Pöpperl

Head of Technical Product Design

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