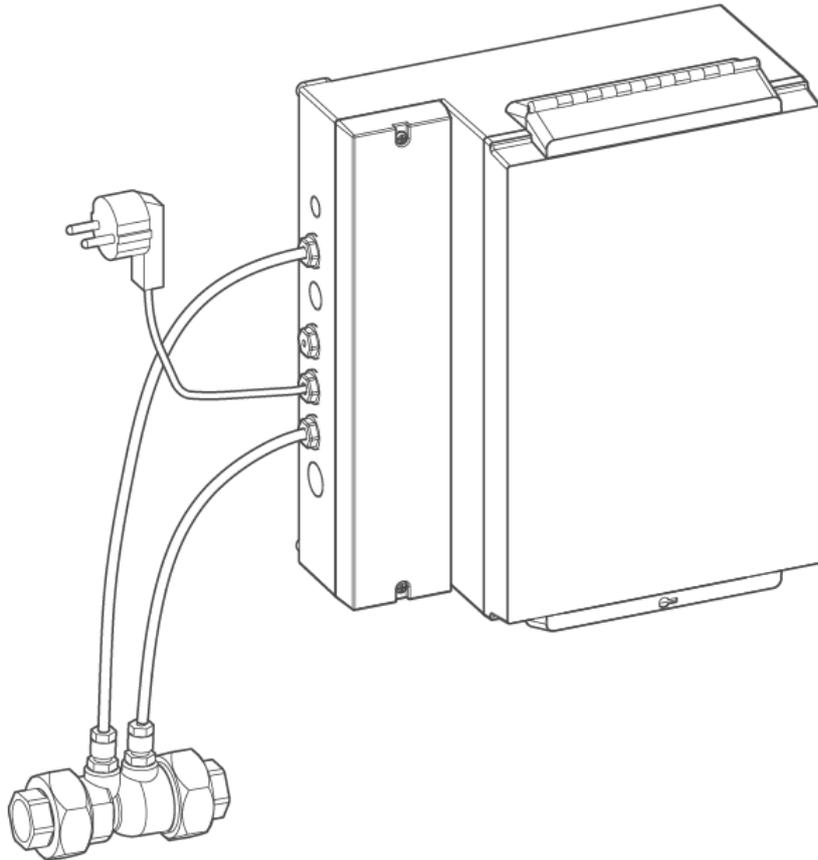


We understand water.



Hardness control measuring device | GENO-control

Operation manual

grünbeck

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Subject to technical modifications.
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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 instructions contained within it on the components before you operate your product.
- ▶ Adhere to all safety instructions and instructions for action.
- ▶ Keep this instruction 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 version.

1.1 Validity of the manual

This manual applies to following product:

- Hardness control measuring device GENO-control

1.2 Other applicable documents

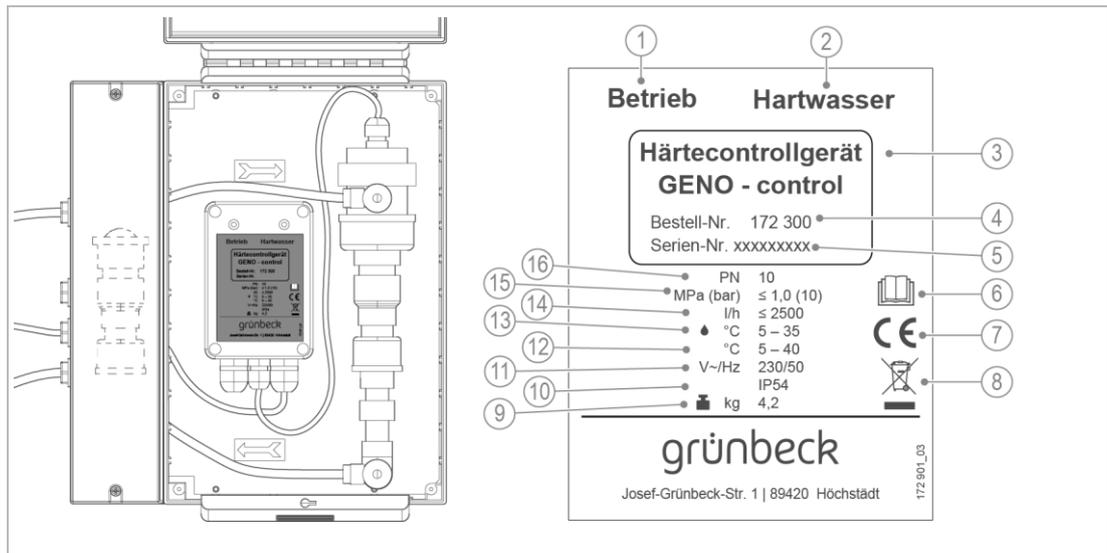
- None

1.3 Product identification

You can identify your product by means of the product designation and the order number on the type plate.

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

The type plate is located on the control unit in the housing.



Designation	
1	“Operation” display
2	“Hard water” display
3	Product designation
4	Order no.
5	Serial no.
6	Observe the Operation Manual
7	CE mark
8	Disposal information

Designation	
9	Weight
10	Protection
11	Mains connection
12	Ambient temperature
13	Water temperature
14	Flow rate
15	Operating pressure
16	Nominal pressure

1.4 Symbols used

Symbol	Meaning
	Danger and risk
	Important information or prerequisite
	Useful information or tip
	Written documentation required
	Reference to further documents
	Work that is only allowed to be carried out by qualified specialists
	Work that is only allowed to be carried out by qualified electricians
	Work that is only allowed to be carried out by technical service personnel

1.5 Depiction of warnings

This manual contains information that you must comply with for your personal safety. The information is marked with a warning sign and has the following structure:



SIGNAL WORD Type and source of danger

- Possible consequences
- ▶ Preventive measures

The following signal words are defined depending on the degree of danger and may be used in this document:

Warning sign and signal word		Consequences when disregarding the information/instructions
 DANGER		Death or serious injuries
 WARNING	Personal injury	Possible death or serious injuries
 CAUTION		Possible moderate or minor injuries
NOTE	Property damage	Possible damage to components, the product and/or its functions, or anything in its vicinity

1.6 Personnel requirements

During the individual life cycle phases of the product, different people carry out work tasks on the product. The work tasks require different qualifications.

1.6.1 Qualification of personnel

Personnel	Prerequisites
Operator/user	<ul style="list-style-type: none"> • No special expertise • Knowledge of the tasks assigned • Knowledge of possible dangers in the case of inappropriate conduct • Knowledge of the necessary protective equipment and protective measures • Knowledge of residual risks
Owner/operating company	<ul style="list-style-type: none"> • Product-specific expertise • Knowledge of statutory regulations for safety and accident prevention
Qualified specialist <ul style="list-style-type: none"> • Electrical engineering • Sanitary engineering (SHK) • 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 activities are allowed to be performed by whom.

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

1.6.3 Personal protective equipment

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

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



Protective gloves



Protective goggles

2 Safety

2.1 Safety measures

- Only operate your product if all components are installed properly.
- Adhere to the applicable local guidelines on drinking water protection, accident prevention and occupational safety.
- Do not make any changes, conversions, extensions or program modifications to your product.
- Only use genuine spare parts for maintenance or repair.
- Keep the premises locked to prevent unauthorised access and to protect endangered/non-instructed people from residual risks.
- Observe the maintenance intervals (refer to chapter 8.2). Failure to comply can result in microbiological contamination of your drinking water system.

2.1.1 Mechanical dangers

- Safety devices must never be removed, bridged, or otherwise tampered with.
- For all work on the product that cannot be carried out from the ground, use stable, safe, independently standing climbing aids.
- Ensure that the product is solidly fixed to the wall surface and that the accessibility and safety of the product is guaranteed at all times.

2.1.2 Pressure-related hazards

- Components can be under pressure. There is a risk of injuries and damage to property due to escaping water and unexpected movement of components. Check the pressure pipes on the system regularly for leaks.
- Before starting repair and maintenance work, make sure that all affected components are depressurised.

2.1.3 Electrical dangers

There is an immediate danger of fatal injury from electric shock when touching live components. Damage to the insulation or individual components can be life-threatening.

- Only have a qualified electrician carry out electrical work on the product.
- In case of damage to live components, switch off the voltage supply immediately and arrange for repair.
- Switch off the supply voltage before working on electrical components. Discharge the residual voltage.
- Never bypass electrical fuses. Do not put fuses out of operation. Observe the correct current rating when replacing fuses.
- Keep moisture away from live parts. Moisture can cause a short-circuit.

2.1.4 Group of persons requiring protection

- Children must not play with the product.
- This product can be used by children over 8 years of age and persons with limited abilities or lack of experience if they are supervised or instructed in the safe use of the product and understand the resulting hazards.
- Cleaning and maintenance must not be carried out by children.

2.2 Product-specific safety instructions

Identification marks on the product



Risk of electric shock



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

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

2.3 Conduct in an emergency

2.3.1 If there is a water leak

1. Deenergise the device – pull out the mains plug.
2. Locate the leak.
3. Eliminate the cause of the water leak.

3 Product description

3.1 Intended use

- The GENO-control automatic hardness control measuring device is used to monitor fully softened water. The hardness control measuring device protects downstream systems from hard water.
- The GENO-control hardness control measuring device continuously monitors the residual hardness without using chemicals or water.
- The GENO-control hardness control measuring device is intended exclusively for use in industrial and commercial applications.

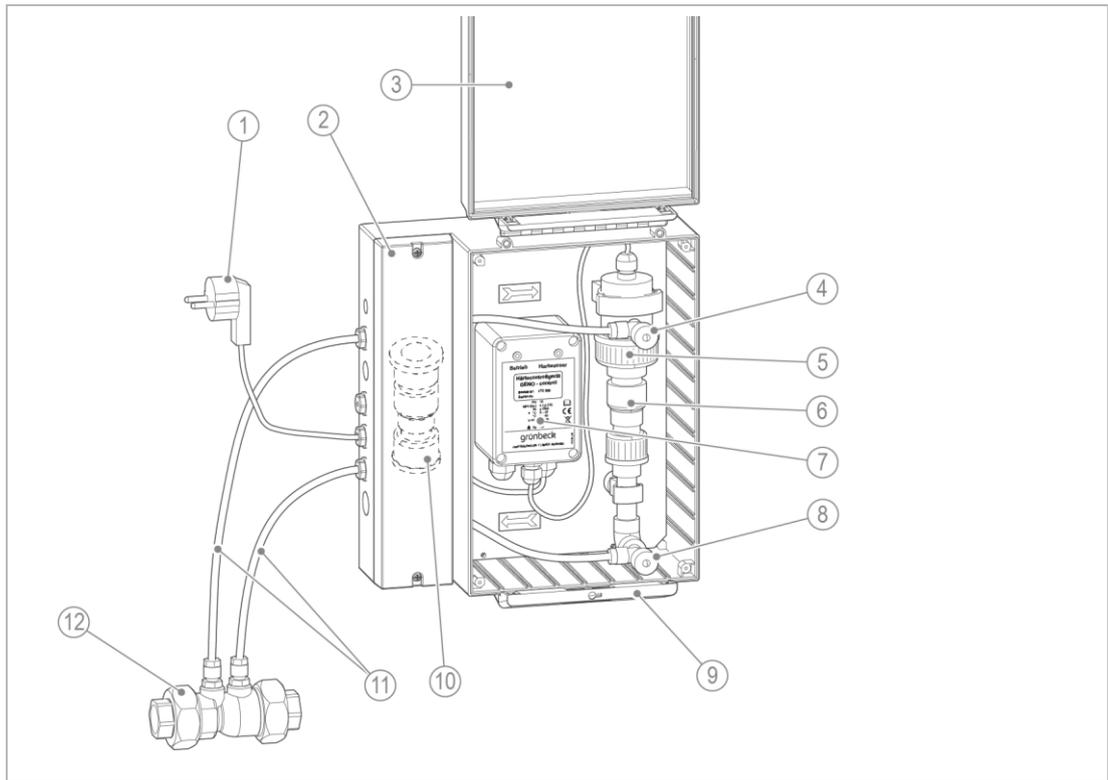
3.1.1 Foreseeable misuse

- Use of the GENO-control hardness control measuring device in systems/processes that constantly require water with total hardness < 0.1 °dH.

Application limits

- The GENO-control hardness control measuring device has correspondingly slow release times depending on the withdrawal quantity and hardness (refer to Section 3.4).
- Short-term, minor hardness breakthroughs do not result in a false trip (e.g. when starting up the entire system).

3.2 Product components



Designation	Function
1 Mains plug	for Schuko socket, 230 V/50 Hz
2 Cover	for line connections
3 Lid	made of transparent plastic
4 Shut-off valve	Measuring water inlet
5 Transmitter unit	with reed contact
6 Hardness sensor	with special resin on a resin expansion/shrinkage basis to check the measuring water for hardness breakthrough
7 Control unit	Controlled via a transmitter unit with reed contact and display of the operating state via two LEDs. Possibility of an error message output to a Central Control Station (CCS).
8 Shut-off valve	Measuring water outlet
9 Housing	lockable
10 Spare sensor	for replacement during maintenance
11 Sampling lines	for the inlet and outlet of soft water
12 Differential pressure sensor	for discharging and returning the required measuring water to the soft water pipe

3.3 Functional description

The differential pressure sensor installed in the soft water pipe generates a lower differential pressure when there is flow. This means that a partial flow is routed through the hardness sensor installed in the bypass and returned to the main flow.

The sensor is triggered when there is a break-through of hardness. This causes the special resin in the hardness sensor to shrink. The visual "hard water" indicator is activated via a transmitter unit with Reed contact. At the same time, the voltage-free contact can be used to activate a visual or acoustic alarm signal or to switch off a reverse osmosis system.

3.4 GENO-control release times

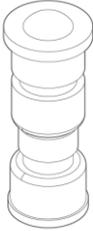
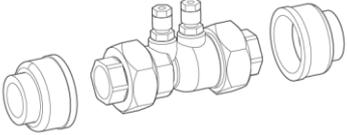
The GENO-control hardness control measuring device is not, or only conditionally, applicable upstream from systems/processes that constantly require water with a total hardness < 0.1 °dH.

► Observe the following table with release times:

Withdrawal volume l/h	Water hardness °dH	Inlet pressure bar	Outlet pressure bar	Activation time Min.
30	3	3	2.9	110 – 270
30	15	3.1	2.9	15 – 25
100	3	3	2.9	90 – 120
100	15	3.2	3.1	10 – 20
500	3	3	2.9	70 – 110
500	15	3	2.9	8 – 20
1000	3	3	2.9	50 – 90
1000	15			10 – 20
2000	3	3.5	3.3	60 – 120
2000	15	2	1.8	6 – 16

3.5 Accessories

Your product can be retrofitted with accessories. Please contact your local Grünbeck representative or Grünbeck's headquarters in Hoechstädt for details.

Illustration	Product	Order no.						
	<p>Spare sensor as hardness sensor for the GENO-control hardness control measuring device</p>	<p>172 304</p>						
	<p>Differential pressure sensor made of brass with straight screw connections (male thread 1/4") for sampling lines, non-return valve type RV 281 and with additional PVC union nuts and adhesive sockets DN 20 (Ø 25 mm) for plastic line</p>	<table border="1"> <tbody> <tr> <td data-bbox="735 920 1326 981"> <p>3/4" Max. flow rate: 3.3 m³/h</p> </td> <td data-bbox="1326 920 1437 981"> <p>172 303</p> </td> </tr> <tr> <td data-bbox="735 981 1326 1041"> <p>1 1/4" Max. flow rate: 10.1 m³/h</p> </td> <td data-bbox="1326 981 1437 1041"> <p>172 305</p> </td> </tr> <tr> <td data-bbox="735 1041 1326 1102"> <p>2" Max. flow rate: 25.0 m³/h</p> </td> <td data-bbox="1326 1041 1437 1102"> <p>172 309</p> </td> </tr> </tbody> </table>	<p>3/4" Max. flow rate: 3.3 m³/h</p>	<p>172 303</p>	<p>1 1/4" Max. flow rate: 10.1 m³/h</p>	<p>172 305</p>	<p>2" Max. flow rate: 25.0 m³/h</p>	<p>172 309</p>
<p>3/4" Max. flow rate: 3.3 m³/h</p>	<p>172 303</p>							
<p>1 1/4" Max. flow rate: 10.1 m³/h</p>	<p>172 305</p>							
<p>2" Max. flow rate: 25.0 m³/h</p>	<p>172 309</p>							

4 Transport and storage

4.1 Dispatch/delivery/packaging

- ▶ Check immediately upon receipt for completeness and transport damages.
- ▶ Proceed as follows if there is visible transport damages:
 - Do not accept the delivery or only under subject to reservation.
 - Note the extent of damage on the transport documents or on the delivery note of the forwarder.
 - Initiate a complaint.

4.2 Transport

- ▶ Transport the product in its original packaging only.

4.3 Storage

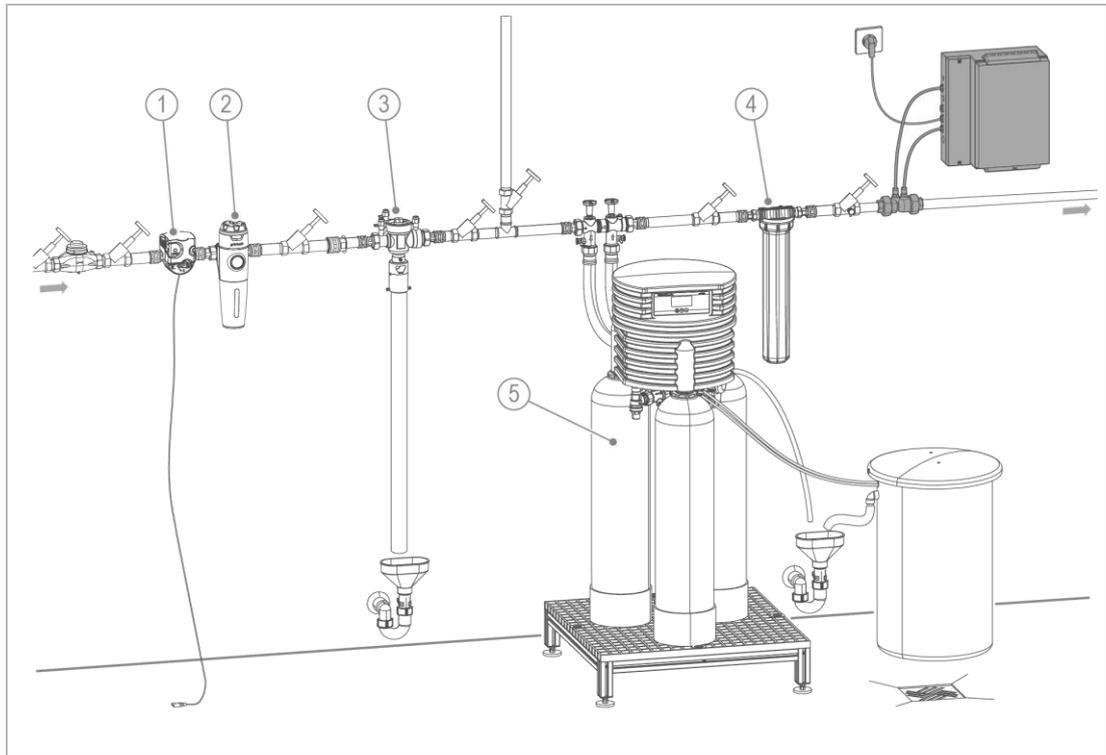
- ▶ Protect the product from the following impacts when storing it:
 - Moisture, wetness
 - Environmental impacts such as wind, rain, snow, etc.
 - Frost, direct sunlight, severe heat exposure
 - Chemicals, dyes, solvents and their vapours

5 Installation



The installation of the system represents a major intervention in the drinking water system and only a qualified specialist may install such systems.

Installation example



Designation

- | | |
|---|-------------------------------|
| 1 | Safety device protectliQ |
| 2 | Drinking water filter pureliQ |
| 3 | System separator GENO-DK 2 |

Designation

- | | |
|---|--------------------------------|
| 4 | Activated carbon filter AKF |
| 5 | Water softener such as Delta-p |

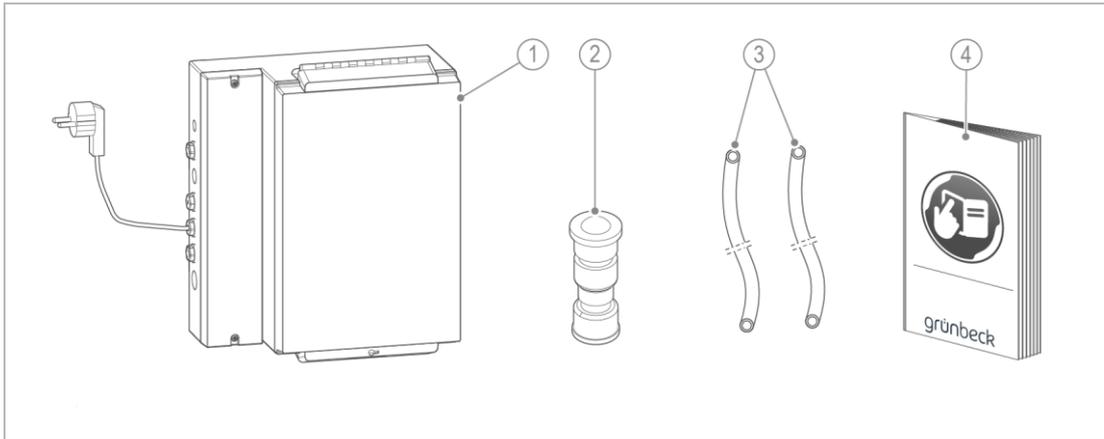
5.2 Requirements with regard to the installation site

Observe local installation directives, general guidelines and technical specifications.

- The required wall surface must be level and have sufficient strength and load-bearing capacity to support the product's weight.
- The installation site must be frost-proof and ensure the product's protection from chemicals, dyes, solvents and their vapours.

- A floor drain suitable for the system size must be available at the installation site or a protection device e.g. protectliQ or a protection device with water stop of the same quality must be installed.
- A Schuko socket is required for the electrical connection at a distance of approx. 1.2 m from the system.

5.3 Checking the scope of supply



Designation	Designation
1 Complete hardness control measuring device	3 2x sampling lines 1 m long (id=4/od=6 mm)
2 Spare sensor in the housing	4 Operation manual

► Check the scope of supply for completeness and damage.

5.4 Installing the product

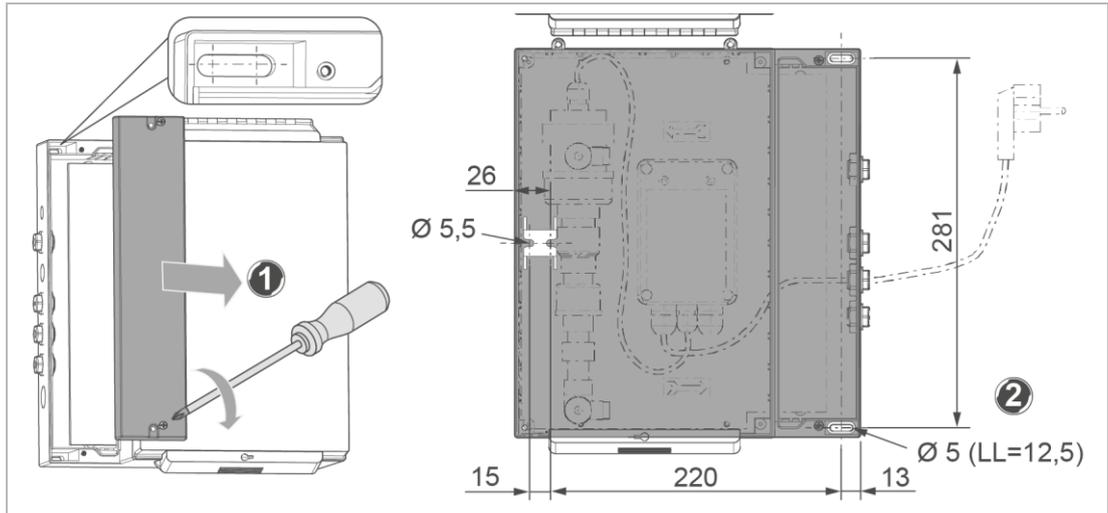
► Install the product in a dry, easily accessible and clearly visible location.

5.4.1 Mounting the housing



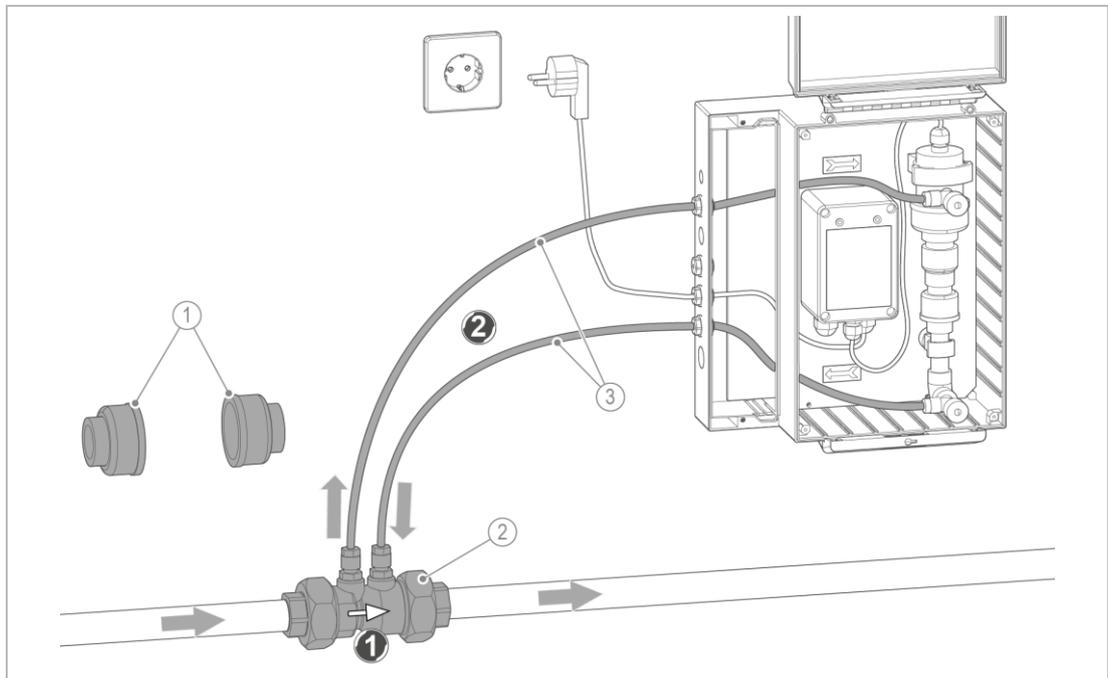
A solid fastening of the product must be provided on site according to the wall situation. Fixing accessories are not included in the scope of delivery.

► Determine the on-site fixing accessories - according to the local wall situation.



1. Remove the cover for line connections - loosen 2 screws.
2. Position the hardness control measuring device near the flow fitting - in doing so take note of the lengths for mains power cables and sampling lines.
3. Fasten the housing vertically to the wall using fastening accessories (recommendation: stainless steel flat head screws) - take note of the dimensions and size of the holes.

5.4.2 Installing the differential pressure transmitter



Designation	Designation
1 2x PVC union nuts with insert DN20 (Ø 25 mm)	2 Differential pressure transmitter with non-return valve
	3 Sampling lines

1. Install the differential pressure transmitter in the soft water pipe immediately after the softening system.
 - a Take note of the flow direction on the differential pressure transmitter.
 - b Ensure that the hose connections are pointing upwards.
2. Connect the sampling lines to the differential pressure transmitter.
3. Shorten the sampling lines if necessary.
4. Connect the sampling lines to the shut-off valves for the sampling water inlet and outlet.

5.5 Electrical installation



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



WARNING Electrical voltage at the control unit

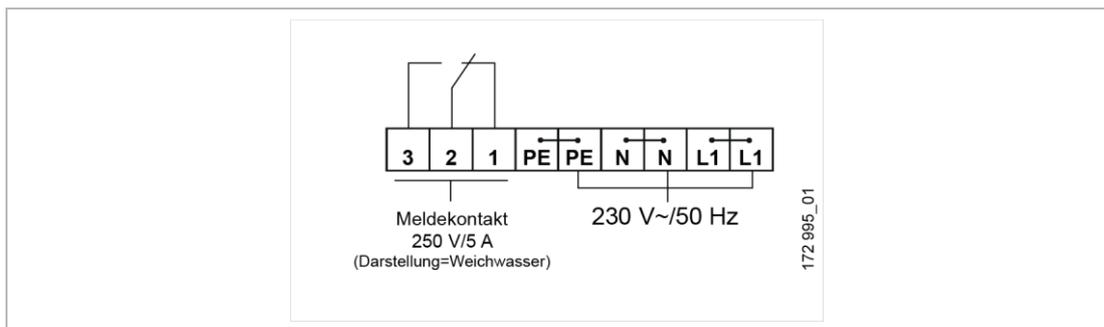
- Electric shock
- ▶ Disconnect the unit from the power supply before opening the control unit.

5.5.1 Connecting the voltage-free contact



Possibility of an error message output to a Central Control Station (CCS).

1. Open the control unit.



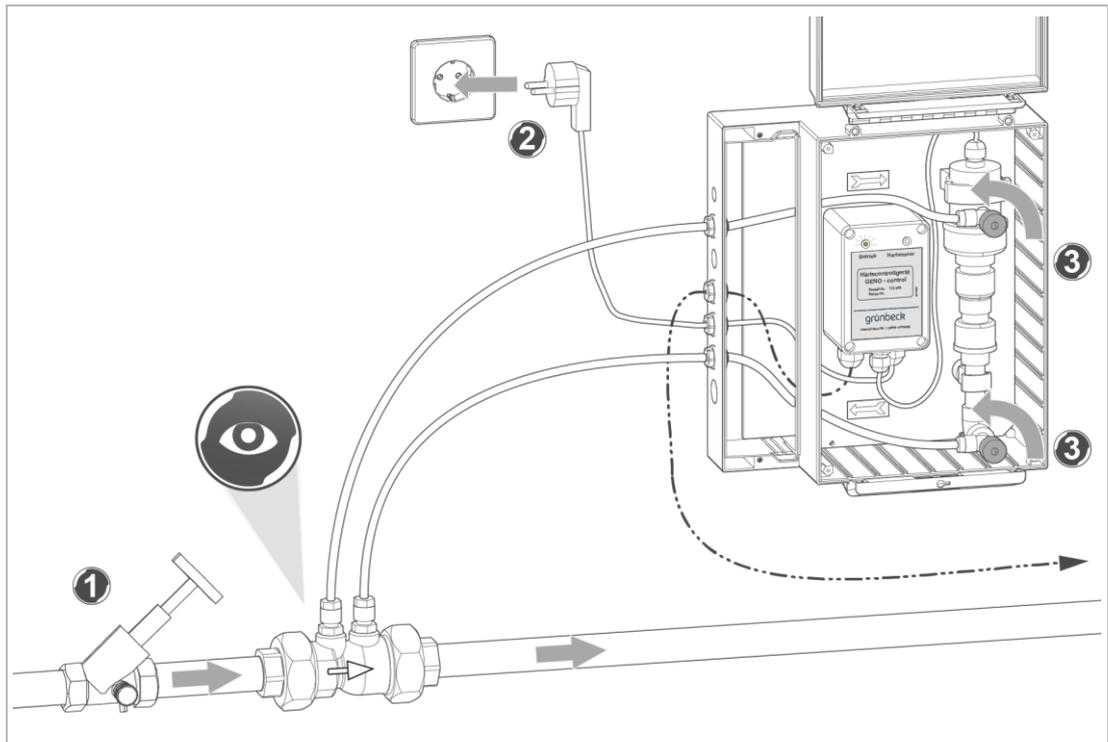
2. Connect a voltage-free signal contact to terminals 1, 2, 3.
3. Close the control unit.

6 Start-up



The initial start-up of the product is only allowed to be carried out by the customer service.

6.1 Checking the product



1. Check whether there is soft water.
2. Plug the mains plug into the socket.
 - » **Operation** display lights up.
3. Slowly open both shut-off valves.
4. Check all joints for leak tightness.

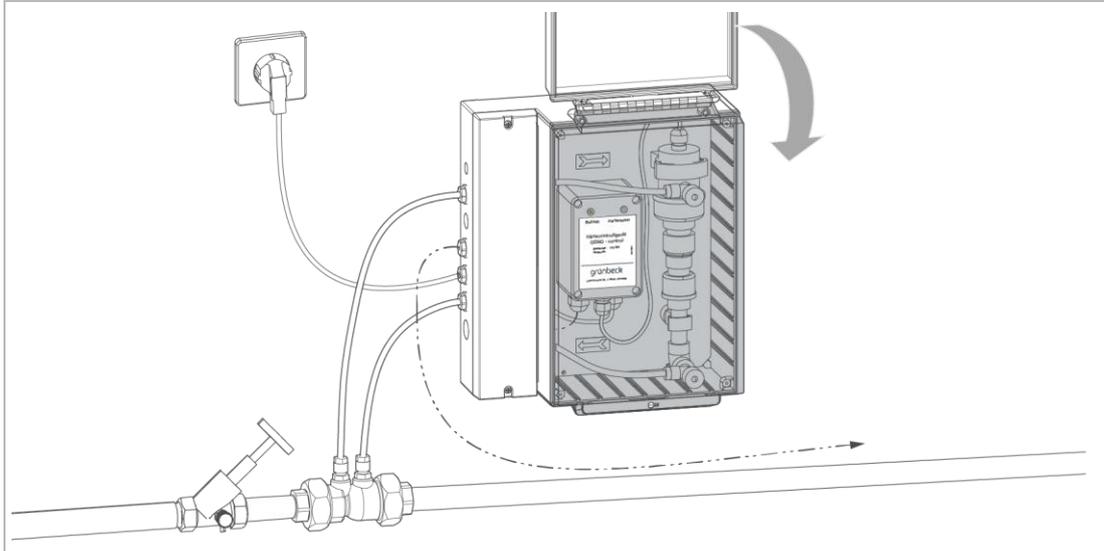
6.2 Electrical connection to reverse osmosis system

- Connect the contact to the terminals of the reverse osmosis system.

Device/system	Terminals		
	1	2	3
GENO-control			
GENO-OSMO-MSR		X1/116	3K1 42
HL-300 resp. HL-X		X1/21	X1/29
RO/AVRO 125 K		X8/22	X8/23
GENO OSMO-X	67	66	



When connecting to a GENO-OSMO-X reverse osmosis system, set the residual hardness logon in the reverse osmosis system control to "Comfort" (refer to customer service instructions order no. 750 929).



- ▶ Place the spare sensor in the device.
- ▶ Close the cover for line connections and the lid.
- » The device is ready for operation.

6.3 Handing over the product to the owner/user

- ▶ Explain to the owner/user how the product works.
- ▶ Use the manual to brief the owner/operator and answer any questions.
- ▶ Inform the owner/user about the need for inspections and maintenance.
- ▶ Hand over all documents to the owner/operator for storage.

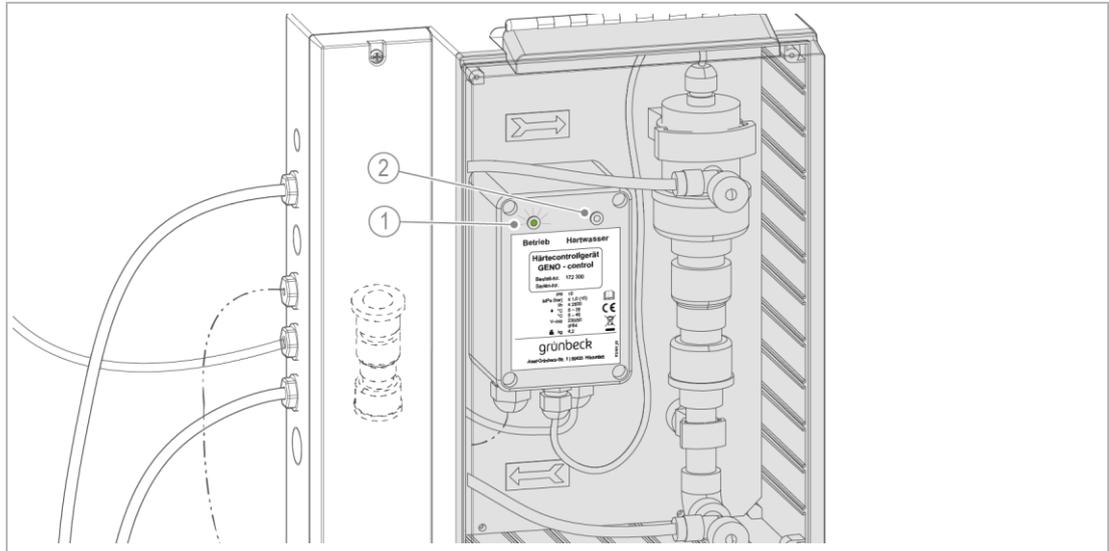
6.3.1 Disposal of packaging

- ▶ Dispose of packaging material as soon as it is no longer needed.

7 Operation/handling

The operation of the hardness control measuring device is automatic.

- ▶ Observe the release times (refer to Section 3.4).



Designation

5 "Hard water" display

Designation

6 "Operation" display

- ▶ Regularly check whether the visual indicator displays **Operation**.



If a voltage-free contact is connected for actuating a visual or acoustic signal or for switching off a reverse osmosis system, **Hard Water** is signalled.

- ▶ Eliminate the cause in the event of a fault message (refer to Chapter 9).

8 Maintenance and repair

Maintenance includes cleaning, inspection and servicing of the product.



The responsibility for inspection and maintenance is subject to local and national requirements. The owner/user is responsible for compliance with the prescribed maintenance work.



By concluding a maintenance contract you ensure that all maintenance work will be performed in due time.

- ▶ Only use genuine spare and wearing parts from Grünbeck.

8.1 Cleaning



Only allow cleaning work to be carried out by persons who have been instructed in the risks and dangers that can arise from the product.

NOTE

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

- These substances will damage 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 surfaces with a damp cloth.

8.2 Intervals



Faults can be detected in time by regular inspection and maintenance, and system failures can be avoided.

- ▶ As owner/operating company, determine which components have to be inspected and maintained at which intervals (load-dependent). This is subject to the actual conditions: Water condition, degree of impurities, environmental influences, consumption, etc.

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

Task	Interval	Activities
Inspection	2 months	<ul style="list-style-type: none"> • Visually check for function and leaks
Maintenance	6 months	<ul style="list-style-type: none"> • Leak test • Functional check • Replace sensor • Check the transmitter unit • Regenerate spare sensor
Repair	2 years	<ul style="list-style-type: none"> • Recommendation: Replace sensor

8.3 Inspection

You as owner/operating company may perform the regular inspections yourself. We recommend inspecting the product at shorter intervals initially and later on as required.

- ▶ Conduct an inspection at least every 2 months.
1. Check the housing and differential pressure transmitter for damage.
 2. Check all hose connections for leak tightness.
 3. Check the function of the device - **Operation** display must light up.

8.4 Maintenance

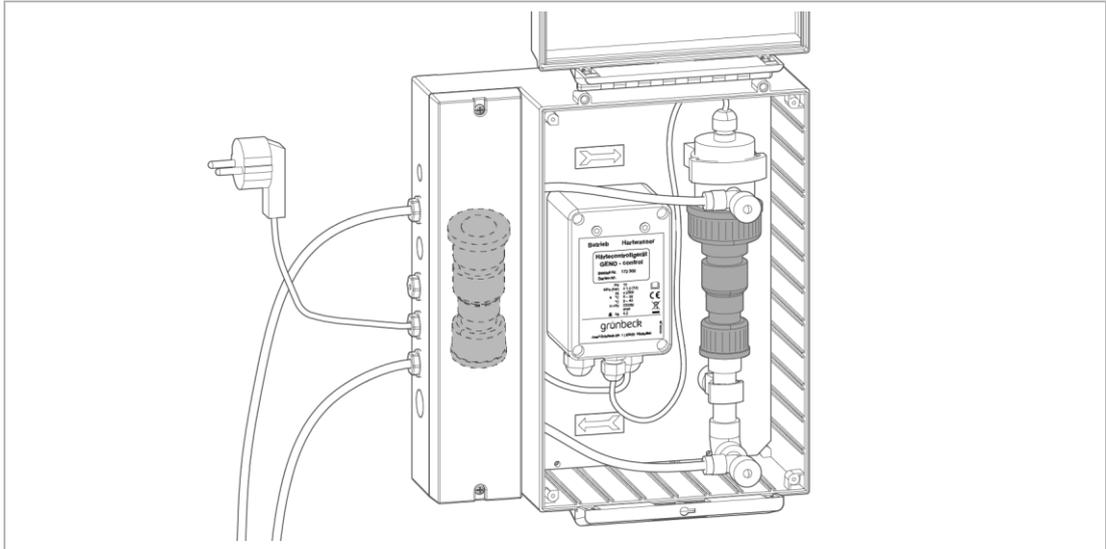
Regular work is necessary in order to ensure proper functioning of the product in the long term. DIN EN 806-5 recommends regular maintenance to ensure trouble-free and hygienic operation of the product.

8.4.1 Semi-annual maintenance



Annual maintenance work requires expert knowledge. The maintenance work may only be carried out by the technical service.

- ▶ Conduct maintenance at least every 6 months.
1. Disconnect the device from the power supply - remove the mains plug.
 2. Close the shut-off valves.
 - » The unit is de-energised and hydraulically shut off.



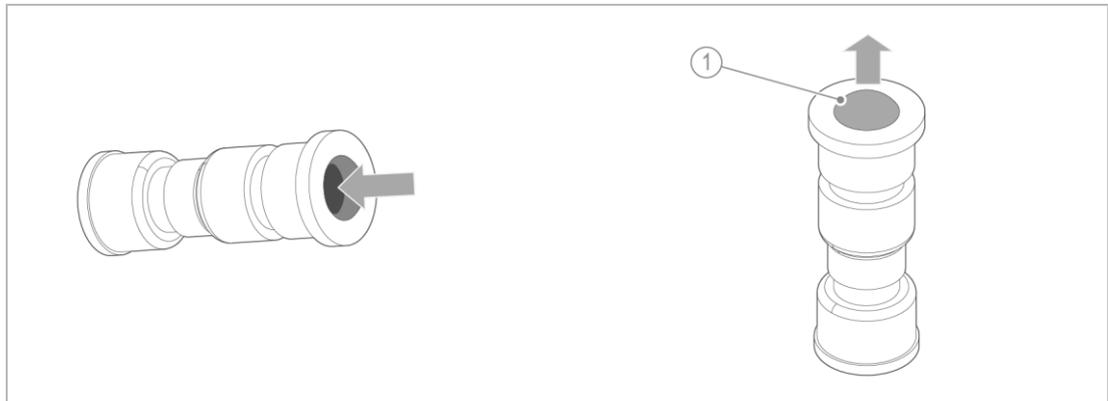
1. Remove the used sensor.
2. Test the function of the transmitter unit (with the sensor removed).
 - a Press the internal transmitter metal slightly upwards with your finger.
 - » The control unit must indicate **Operation** – the green indicator lights up.
 - » If the transmitter metal has fallen off, the control unit signals **Hard Water** – the red indicator lights up.
3. Regenerate the removed sensor (refer to Section 8.4.2).
4. Mount the spare sensor or regenerated sensor.
5. Complete the device and plug in the mains plug.
6. Check whether there is soft water.
7. Open the shut-off valves.
8. Check the function and leak tightness of the system.

8.4.2 Regenerating the sensor



The sensor must always be kept moist during storage.

When occupied with hardness, the sensor's transmitter resin bed is curved inwards.



Designation

1 Transmitter resin bed

1. Swivel the sensor in brine for approx. 1 minute - use brine from the brine tank.
 - » The curvature of the transmitter resin bed intensifies.
 2. Rinse the sensor thoroughly with permeate or soft water for approx. 2 minutes.
 - » The transmitter resin bed bulges outwards.
 - » The sensor is regenerated.
- Store the sensor in the PE bag until the next change.

8.5 Spare parts

You can find an overview of the spare parts in the spare parts catalogue at www.gruenbeck.com. You can obtain the spare parts from the Grünbeck representative responsible for your area.

8.6 Wearing parts



Wearing parts are only allowed to be changed out by a qualified specialist.

Wearing parts are listed below:

- Sensor

10 Shutdown

10.1 Temporary standstill

Should you wish to temporarily shut down your water supply due to a system standstill/conversion, proceed as follows:

1. De-energise the device.
2. Shut off the soft water supply - close the shut-off valves.

10.2 Restart

1. Change the sensor if required (refer to Section 8.4.1).
2. Perform a re-start if required (refer to Chapter 6).

11 Dismantling and disposal

11.1 Dismantling



The work described herein represents an intervention into your drinking water system.

- ▶ Have this work performed by qualified specialists only.
 1. Disconnect the device from the mains.
 2. Close the shut-off valves at the water pipe and the device.
 3. If necessary, disconnect the electrical connections (voltage-free contacts).
 4. Vent and drain the sampling lines.
 5. Dismantle the unit.
 6. Dismantle the differential pressure transmitter from the water pipe.
 7. Close the gap in the water pipe, e.g. by using an adjusting piece.

11.2 Disposal

- ▶ Comply with the applicable national regulations.

Packaging

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

Product



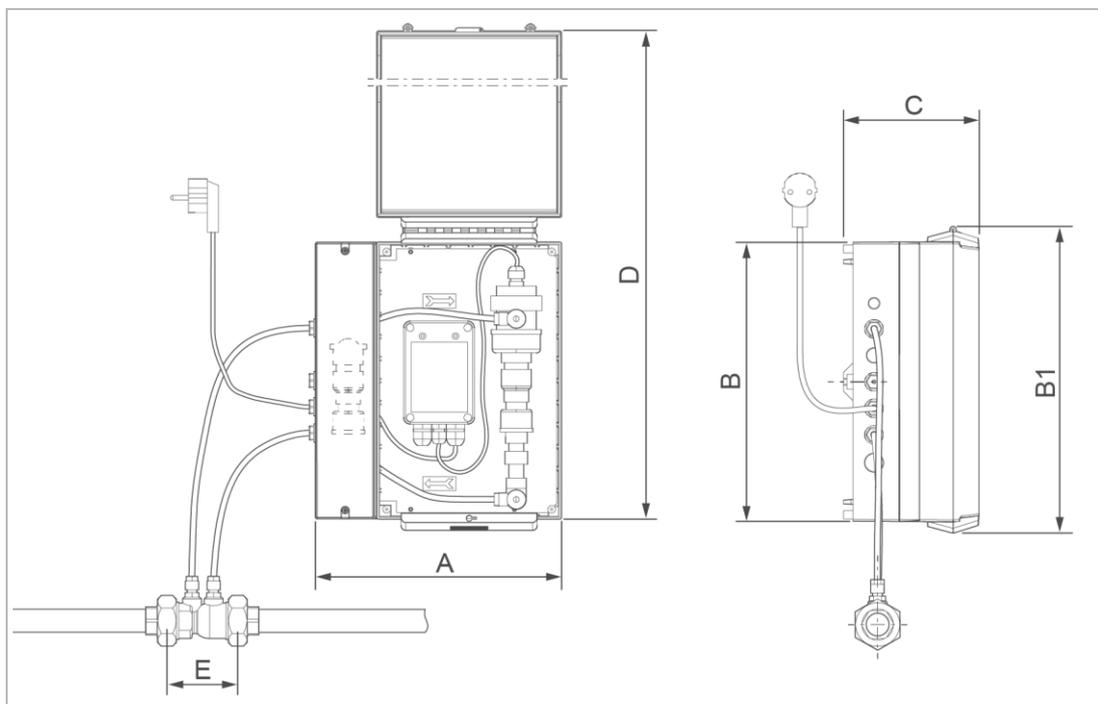
If this symbol (crossed-out wheeled bin) is on the product, this product or its electrical and electronic components must not be disposed of as household waste.

- ▶ Dispose of 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.

12 Technical specifications



Dimensions and weights		GENO-control			
A	Width	mm	260		
B	Height	mm	295		
B1	Height with closed lid	mm	322		
C	Depth	mm	142.5		
D	Height with open lid	mm	~ 622		
E	Retracted length	mm	72	95	125
	Differential pressure transmitter (without screw connection)		3/4"	1 1/4"	2"
Shipping weight without differential pressure transmitter approx.		kg	4.2		
Connection data					
Nominal connection diameter (bonded socket joint)		mm	Ø 25 / DN 20		
Sampling lines		mm	1000		
Mains connection		V~/Hz	230/50		
Electrical power input (operation)		VA	1.8		
Relay carrying capacity		[V/A]	250/5		
Protection			IP 54		

Performance data				
Nominal pressure	PN	10		
Operating pressure	MPa/bar	≤ 1.0/10		
Flow rate	l/h	≤ 2500		
Pressure loss	bar	0.2		
LED display		Operation/hard water		
General data				
Water temperature	°C	5 – 35		
Ambient temperature	°C	5 – 40		
Air humidity (non-condensing)	%	≤ 70		
Order no.		172 300		
Differential pressure sensor		¾"	1¼"	2"
Flow rate	m³/h	≤ 3.3	≤ 10.1	≤ 25.0
Kv value (Δp = 1.0 bar)	m³/h	8	28	65
Pressure loss	bar	≤ 0.2	≤ 0.2	≤ 0.2
Order no.		172 303	172 305	172 309

13 Operation log



- ▶ Document the initial start-up and all maintenance activities.
- ▶ Copy the maintenance report.

Hardness control measuring device GENO-control

Serial no.: _____

13.1 Start-up log

Customer					
Name:					
Address:					
Installation/Accessories					
Filter (make, type)					
Softening system (make, type):					
Reverse osmosis system (make, type)					
Operating values					
Water pressure	bar				
Water meter reading	m ³				
Hardness unit	°dH	°f	mol/m ³	°e	°ppm
Raw water hardness (measured)	<input type="checkbox"/>				
Remarks					
Start-up					
Company:					
Customer service technician:					
Work time certificate (no.):					
Date/signature:					

Maintenance no.: _____



Enter the measured values and operating data.
Confirm the tests with **OK** or record any repairs carried out.

Work performed

Inspection Maintenance Repair

Description

Execution confirmed

Company:

Name:

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 protection requirements of the applicable EU guidelines in terms of its design, construction and execution.

This certificate will become invalid if the system is modified in a way not approved by us.

Hardness control measuring device GENO-control

Serial no.: refer to type plate

Furthermore, we confirm compliance with the essential requirements of the EMC Directive 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 12100: 2011-03

Responsible for documentation:

Dipl.-Ing. (FH) Markus Pöpperl

Manufacturer

Grünbeck Wasseraufbereitung GmbH
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Höchstädt, 01.08.2016

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

p.p. Dipl.-Ing. (FH) Markus Pöpperl
Head of Technical Product Design

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