Table of contents

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Publisher’s information

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Josef-Grünbeck-Strasse 1, 89420 Hoechstädter/Deutschland
EC Declaration of Conformity

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.

Manufacturer: Grünbeck Wasseraufbereitung GmbH
Josef-Grünbeck-Str. 1
89420 Hoechstaedt/Germany

Responsible for documentation: Markus Pöpperl

System designation: Delta-p®

System type: 1", 1 ¼", 1 ½", 2"

Serial number: Refer to type designation plate

Applicable guidelines:
- Low Voltage (2014/35/EC)
- EMC (2014/30/EC)

Applied harmonized standards, in particular:
- DIN EN 61000-6-2:2006-03,
- DIN EN 61000-6-3:2011-09,
- DIN EN 60730-1:2014-07

Applied national standards and technical specifications, in particular:
- DIN 19 636-100:2008-08,
- DIN EN 14743:2007-09
- DIN 31000/VDE 1000:2011-05

City/date/signature: Hoechstaedt, 01/08/2016

M. Pöpperl
Dipl.-Ing. (FH)

Function of signatory: Head of Department Product Realisation and Product Launch
A  General

Table of contents

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1 | Preface

Thank you for opting for a Grünbeck product. Backed by decades of experience in the area of water treatment, we provide solutions for all kind of processes.

Drinking water is classified as food and requires particular care. Therefore, always ensure the required hygiene in operating and maintaining systems for drinking water treatment. This also applies to the treatment of water for industrial use if repercussions for the drinking water cannot completely be excluded.

All Grünbeck systems and devices are made of high-quality materials. This ensures reliable operation over many years, provided you treat your water treatment system with the required care. This operation manual assists you with important information. Therefore, carefully read the manual before installing, operating or maintaining your system.

Customer satisfaction is our prime objective and providing customers with qualified advice is crucial. If you have any questions concerning this system, possible extensions or general water and waste water treatment, our technical service staff, as well as the experts at our headquarters in Hoechstaedt, are available to help you.

Advice and assistance

For advice and assistance please contact your local representative (www.gruenbeck.com) or get in touch with our service centre which can be reached during office hours:

Tel.:     +49 9074 41-333
Fax:    +49 9074 41-120
Email:   service@gruenbeck.com

We can connect you with the appropriate expert more quickly if you provide the required system data. In order to have access to this data at all times, please fill in the data given on the type designation plate into the table on page C-1.
2 | How to use this operation manual

This operation manual is intended for the operators of our systems. It is divided into several chapters (a letter is assigned to each of them) which are listed in the “Table of contents” on page 1 in alphabetical order. In order to find the specific information you are looking for, check for the corresponding chapter on page 1.

The headers and page numbers with chapter information make it easier to find your way around in the manual. In case of larger chapters, first check out page 1 of said chapter (e.g. H-1) where you will find more information on the contents of this chapter.

3 | General safety information

3.1 Symbols and notes

Important notes in this operation manual are characterised by symbols. Please pay particular attention to these notes in order to ensure a danger-free, safe and productive system operation.

**Danger!** Failure to adhere to these notes will cause serious or life-threatening injury, extreme damage to property or inadmissible contamination of drinking water.

**Warning!** Failure to adhere to these notes may cause injury, damage to property or contamination of the drinking water.

**Attention!** Failure to adhere to these notes may result in damage to the system or other objects.

**Note:** This symbol characterises notes and tips to make your work easier.

Tasks with this symbol may only be performed by Grünbeck’s technical service or by persons expressly authorised by Grünbeck.

Tasks with this symbol may only be performed by qualified electrical experts according to the VDE guidelines or according to the guidelines of a similar local institution.

Tasks with this symbol may only be performed by water companies or approved installation companies. In Germany, the installation company must be registered in a water company installation directory as per §12(2) AVBWasserV (German Ordinance on General Conditions for the Supply of Water).
3.2 Operating personnel

Only persons who have read and understood this operation manual are permitted to work with the system. The safety guidelines are to be strictly adhered to.

3.3 Designated application

The system may only be used for the purpose outlined in the product description (chapter C). The guidelines in this operation manual as well as the applicable local guidelines concerning the drinking water protection, accident prevention and occupational safety must be adhered to.

In addition, appropriate application also implies that the system may only be operated when it is in proper working order. Any malfunctions must be repaired at once.

3.4 Protection from water damage

Warning! In order to properly protect the installation site from water damage:

a) a sufficient floor drain system must be available or
b) a water stop device (see chapter C Accessories) must be installed.

Warning! Floor drains that are discharged to the lifting system do not function in case of a power failure.

3.5 Indication of specific dangers

Danger due to electricity! → Do not touch electrical parts with wet hands! Disconnect the system from mains before starting work on electrical parts of the system. Have qualified experts replace damaged cables immediately.

Danger due to mechanical energy! System parts may be subject to overpressure. Danger of injury and damage to property due to escaping water and unexpected movement of system parts. → Check pressure pipes regularly. Depressurise the system before starting repair or maintenance work on the system.

Hazardous to health due to contaminated drinking water! → The system may only be installed by a qualified company. Strictly adhere to the operation manual! Ensure that there is sufficient flow. The pertinent guidelines must be followed for starting-up after long periods of standstill. Inspections and maintenance must be performed at the intervals specified!

Note: By concluding a maintenance contract, you ensure that all of the required tasks are performed on time. You may perform the interim inspections yourself.
4 | Shipping and storage

**Attention!** The system may be damaged by frost or high temperatures. In order to avoid damage of this kind:

Protect from frost during transportation and storage! Do not install or store system next to objects which radiate a lot of heat.

The system may only be transported and stored in its original packaging. Ensure that it is handled with care and placed the right side up (as indicated on the packing).

5 | Disposal of used parts and materials

Used parts and materials are to be disposed of, or made available for recycling purposes, according to the applicable local guidelines.

If a material is subject to specific regulations, adhere to the notes indicated on the packing.

If in doubt, contact your local waste disposal authority or the manufacturer for more information.
B  Basic information (water softeners)

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1 | Laws, regulations, standards ............................................. B-1
2 | Water, scaling, softening .................................................. B-1
3 | Ion exchange....................................................................... B-3

1 | Laws, regulations, standards

In the interest of good health, rules cannot be ignored when it comes to the processing of drinking water (raw water). This operation manual takes into consideration the current regulations and stipulates information that you will need for the safe operation of your water treatment system.

Among other things, the regulations stipulate that

- only approved companies are permitted to make major modifications to water supply facilities
- and that tests, inspections and maintenance on installed devices are to be performed at regular intervals.

2 | Water, scaling, softening

The water works provide us with pure water (raw water) that is suitable for drinking. However, this water is much more often used for washing machines, heating systems, water heaters, commercial devices, etc., where it can lead to problems if it is “hard”.

Hard water is generated if water containing carbon dioxide* flows through layers of calcium. It dissolves the calcium until the so-called calcium - carbon dioxide - equilibrium has been reached.

If this equilibrium is unsettled (e.g. by heating → CO₂ escapes) more calcium (CaCO₃) is precipitated (scaling).
**Hinweis:** Calcium ions and magnesium ions exist side by side in nature, e.g. in the mineral dolomite.

Hardness ranges according to the German Act on Environmental Sustainability of Detergents and Cleaning Agents (WMRG):

The total hardness of the water is the sum of the concentrations of calcium ions and magnesium ions.

From hardness range 3 on, it is advisable to soften the water for usage. Additional measures may be necessary depending on the original quality of the water and its intended use.

*CO₂ from the air dissolves in water, causing a low concentration of carbon dioxide.

<table>
<thead>
<tr>
<th>Hardness range</th>
<th>°dH</th>
<th>°f</th>
<th>mmol/l = mol/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (soft)</td>
<td>&lt; 8.4</td>
<td>&lt; 15.0</td>
<td>&lt; 1.50</td>
</tr>
<tr>
<td>2 (medium)</td>
<td>8.4 - 14.0</td>
<td>15.0 - 25.0</td>
<td>1.50 - 2.50</td>
</tr>
<tr>
<td>3 (hard)</td>
<td>&gt; 14.0</td>
<td>&gt; 25.0</td>
<td>&gt; 2.50</td>
</tr>
</tbody>
</table>
3 | Ion exchange

The exchange of calcium and magnesium ions for sodium ions causes the water to become soft.

**Principle**

The hard raw water flows through an exchanger tank. This tank is filled with a resin, to which sodium ions are bonded at certain positions (see fig. B-1).

Since these bonding positions prefer calcium and magnesium ions, these ions are retained while the resin discharges sodium ions into the water (exchange reaction). This way, all substances causing hardness remain in the exchanger tank. Soft water with sodium ions leaves the exchanger tank (fig. B-2). This process continues until a major part of the sodium ions is exhausted.

The exchange reaction can be reversed if a large amount of sodium ions (salt solution = brine) is added (fig. B-3). By their sheer number, the sodium ions displace the calcium and magnesium ions at the docking positions of the resin.

This process restores the initial state. The ion exchanger is regenerated and is again ready for softening.

**Drinking water (raw water)**

As protection against corrosion, we recommend a soft water hardness of at least 3 °dH (5.3 °f, 0.53 mmol/l). According to the German Drinking Water Ordinance, the limit value for sodium ions (200 mg/l) should not be exceeded. This hardness is achieved by adding untreated drinking water (raw water) which is also called blending.

**Note:** Many popular mineral waters contain significantly more sodium ions. Check for yourself by reading the analysis results on the labels.

**Warning!** Risk of infection due to germs in drinking water. Germs can reproduce in stagnant water to the point where they pose a threat. Work with drinking water systems requires special hygienic measures. Ensure that there is sufficient flow. Disinfect the systems if required.

**Single/Twin/Triple systems**

In case of a single system, no soft water is available during the regeneration phase.

Twin systems have two parallel ion exchangers that alternate operation. As a result, soft water is available at all times.

Triple water softeners consist of three exchanger units. Two exchangers are flown through in parallel while the third is being regenerated.

<table>
<thead>
<tr>
<th>Sodium ions</th>
<th>Calcium ions</th>
<th>Magnesium ions</th>
</tr>
</thead>
<tbody>
<tr>
<td>★</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C Product description (Delta-p®)

Content

1 | Type designation plate ................................................... C-1
2 | Technical specifications ................................................ C-1
3 | Designated application ................................................ C-3
4 | Application limits ........................................................ C-3
5 | Scope of delivery .......................................................... C-4
  5.1 Standard equipment ............................................ C-4
  5.2 Accessories ........................................................... C-5
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  5.4 Wearing parts .......................................................... C-7

1 | Type designation plate

The type designation plate is located at the control unit of the water softener. Please specify the data shown on the type designation plate when contacting Grünbeck to speed up the processing of your inquiries or orders. Simply copy the information to the table below in order to have it handy when necessary.

<table>
<thead>
<tr>
<th>Water softener</th>
<th>Delta-p®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial number:</td>
<td>/</td>
</tr>
<tr>
<td>Order number:</td>
<td></td>
</tr>
</tbody>
</table>

2 | Technical specifications

The Delta-p water softener is a triple system for the continuous supply of soft water. It is equipped with a central control valve for the three exchanger tanks and is volume-controlled. The regeneration is released when the exchanger tank to be regenerated next is exhausted or the exchanger tank to be regenerated the next but one is exhausted by 50%. The system uses raw water for regeneration.

All system data for the water softener is indicated in table C-1. The information given applies to the standard version of the water softener. Different data for special versions are supplied separately, if applicable.

**Warning!** During extended periods of standstill, germs may pollute the drinking water. The automatic regeneration counteracts this effect. Therefore, do not disconnect the system from the water and power supply when you are absent for longer periods of time.

**Attention!** Electrically operated valves. In case of power failures during regeneration, water may flow into the drain or the brine tank. In case of power failures, check the water softener and shut off the water supply, if necessary.
# Delta-p

---

## Table C-1: Technical specifications

<table>
<thead>
<tr>
<th>Water softener Delta-p</th>
<th>1&quot;</th>
<th>1 ¼&quot;</th>
<th>1 ½&quot;</th>
<th>2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal connection diameter</td>
<td>DN 25</td>
<td>(1&quot; male thr)</td>
<td>DN 32</td>
<td>(1 ¼&quot; male thr)</td>
</tr>
<tr>
<td>Min. drain connection</td>
<td>DN 70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>V/Hz</td>
<td>230/50-60 (operation of water softener with protective low voltage 24/50-60)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connected load</td>
<td>operation = max./standby</td>
<td>[VA]</td>
<td>26 / 19</td>
<td>32 / 19</td>
</tr>
<tr>
<td>Protection/Protection class</td>
<td>IP 54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Performance data

| Nominal pressure (PN) | 10 |
| Nominal flow | ** m³/h | 3.0 | 5.0 | 8.0 | 12.0 |
| Nominal flow soft water with blending (raw water hardness 20 °dH (35.6°f, 3.56 mmol/l), soft water hardness 8 °dH (14.2°f, 1.42 mmol/l), does not apply to Delta-p-I) | [m³/h] | 4.2 | 5.6 | 11.3 | 13.4 |
| Nominal capacity | [mol] | 8.2 | 13.2 | 27.8 | 38.6 |
| Capacity per kg of regeneration salt | [mol/kg] | 5.7 |

## Dimensions and weight

| A | Total height | [mm] | 1300 | 1640 | 1760 |
| B | Ø exchanger tank | [mm] | 210 | 257 | 369 | 406 |
| C | Ø brine tank | [mm] | 410 | 570/900 |
| D | Total height of brine tank | [mm] | 670 | 860/1250 |
| E | Height of safety overflow of brine tank | [mm] | 575 | 785/1100 |
| F | Connection height control valve (raw water) | [mm] | 860 | 1125 | 1245 |
| G | Connection height control valve (soft water) | [mm] | 1155 | 1485 | 1605 |
| H | Width of water softener | [mm] | 580 | 630 | 900 | 960 |
| I | Min. depth of foundation | [mm] | 920 | 1020 | 1400 | 1450 |
| J | Min. width of foundation | [mm] | 1240 | 1400 | 1780 | 1850 |
| Operating weight, approx. | [kg] | 235 | 285 | 630 | 750/1270 |

## Filling volumes and consumption data

| Resin amount (per exchanger tank) | [l] | 21 | 33 | 75 | 100 |
| Freeboard (resin in sodium form) | [mm] | 135 | 160 | 195 | 265 |
| Salt consumption per regeneration, approx. | [kg] | 1.5 | 2.5 | 5.2 | 7.2 |
| Max. supply of regeneration salt | [kg] | 75 | 200/570 |
| Salt consumption per m³ und °dH | [kg/m³ x °dH] | 0.03 |
| Salt consumption per m³ und °f | [kg/m³ x °f] | 0.018 |
| Salt consumption per m³ und mol | [kg/mol] | 0.18 |
| Max. rinsing water volume | [m³/h] | 0.6 | 0.9 | 1.9 | 2.0 |
| Total waste water volume per regeneration, approx. | [l] | 68 | 110 | 235 | 315 |
| Abwassermenge pro m³ und °dH | [l/m³ x °dH] | 1.42 |
| Abwassermenge pro m³ und °f | [l/m³ x °f] | 0.79 |
| Abwassermenge pro m³ und mol | [l/mol] | 7.8 |
| Operating water volume | [l] | 4.2 | 6.9 | 14.4 | 20.0 |

## Ambient data

| Max. water / ambient temperature | °C | 30/40 |

## Test mark / Certification mark

| DVGW-registration number (not for Delta-p®) | NW-9151BU0049 |
| SVGW-certificate number (not for Delta-p®) | NW-9151BU0049 |

## Control unit

| Data record in control unit | CA31 | CA32 | CA33 | CA34 |
| Order no. Delta-p® | 185100 | 185100 | 185100 | 185100 |
| Order no. Delta-p®, mounted on pedestal®, ready for connection | 185105 | 185115 | 185125 | 185135 |
| Order no. Delta-p®-I | 185200 | 185210 | 185220 | 185230 |
| Order no. Delta-p®-I, mounted on pedestal®, ready for connection | 185205 | 185215 | 185225 | 185235 |

---

1) All dimensions and weights are approximate!
2) In case of systems with pedestal, the height increases by 200 mm.
3) /… Version with brine tank 750 litres.

---

* With standard brine tank
** The max. continuous flow decreases in case of high raw water hardness (> 20 °dH (35.6°f, 3.56 mmol/l)), refer to fig. D-2, continuous flow.
3 | Designated application

The Delta-p water softeners are designed for the softening and partial softening of cold drinking and industrial water. As triple water softeners, they are suitable for the continuous soft water supply.

The raw water must be free of iron and manganese (less than 0.2 mg iron and 0.05 mg manganese per litre). The maximum water temperature is 30 °C. If the soft water is intended for human consumption in terms of the German Drinking Water Ordinance, the ambient temperature must not exceed 25 °C. In case of industrial applications, the ambient temperature must not exceed 40 °C.

The water softener is suitable for (partial) softening of well, process, boiler feed, cooling and air-conditioning water.

Regarding the softening of drinking water (raw water), the stipulations of the German Drinking Water Ordinance are compulsory (soft water hardness 3 °dH (5.31°f, 0.53 mmol/l) - 8°dH (14.2°f, 1.42 mmol/l) - 8 °dH, max. sodium concentration 200 mg/l (refer to chapter E, paragraph 2.1).

The water softener is adjusted to the soft water requirements to be expected at the installation site. It is not suitable for considerably differing performances. The nominal flow must not be exceeded.

In case of critical applications (e.g. boiler feed water), we recommend the installation of an Automatic water analysis system (e.g. GENO®-softwatch Komfort, order no. 172 500).

The water softener may only be operated if all components are properly installed. Safety devices and mechanisms must never be removed, bridged or tampered with.

Appropriate application of the system also implies that the information contained in this operation manual and all safety guidelines applying at the installation site be observed. Finally, the system must be maintained and inspected at the specified intervals.

4 | Application limits

The application limit is determined by the nominal flow according to table C-1. In case of very hard raw water (starting from 22 °dH (39.2°f, 3.92 mmol/l)), the nominal flow might be reduced.

Creeping water withdrawals
Delta-p® 1" and 1 ¼" < 70 l/h
Delta-p® 1 ½" and 2" < 180 l/h
are not registered by the system's control unit GENO®-IONO-matic3 and can result in capacity problems.

Note: The indicated minimum withdrawal volumes are 0 °dH (0°F, 0 mmol/l) flows. In case of systems featuring a blending valve, the minimum water withdrawal volumes increase according to the amount of water blended.
5 | Scope of delivery

5.1 Standard equipment

- Three exchanger tanks consisting of double-walled plastic tanks incl. a special distribution system for optimum salt recovery and water flow. Top-mounted tank adapters adjustable in height with integrated sampling valves for soft water and turbine water meters for the exact measuring of the flow.

- Food-compatible resin and glass support layer for water distribution without dead spots. Sizes 1” and 1 ¼” come completely filled.

- Central control valve made of dezincification-resistant brass consisting of:
  - Transfer valve to distribute the water to the exchanger tanks incl. non-return valve in raw water inlet.
  - Regeneration valve with integrated, low-wear ceramic disks to activate the regeneration steps. Add-on disinfection cell for disinfection during regeneration. Pressure reducer installed upstream for precise process function.
  - Electronically controlled blending valve for flow-independent proportional blending of raw water to soft water. Consisting of ceramic disk valves with actuator, turbine water meter. During start-up only the desired soft water hardness needs to be entered (does not apply for Delta-p–I).

- Brine tank made of PE incl. sieve bottom (separates salt storage chamber and brine chamber) and brine valve made of PP with safety float as well as brine buffer technology.

- Microprocessor controller featuring backlit LC display (controls all functions of the water softener, indicates operating states and errors). Control unit with transformer and shock-proof plug.

- Signal contact with separate fault signal contact (both voltage-free) and serial interface RS 485 (system data print).

- EXAcount interface for optional accessory EXADOS® dosing computer

- All data relevant for the water softener are stored in the captive data record of the system. The water softener comes completely wired.

- The water softener is screened and complies with the EMC regulations. With protective low voltage of 24 V.

- The entire water softener is protected against dirt by means of a protective cover.
5.2 Accessories

Note: It is possible to retrofit existing water softeners with optional components. Please contact your local Grünbeck representative or Grünbeck headquarters for details.

Pre-alarm salt supply
Infrared light sensor to register the minimum salt filling height in the brine tank. Signal via GENO®-IONO-matic controller

Pre-alarm salt supply 185 335

GENO-STOP® - maximum protection from water damage.
The new safety device GENO-STOP® offers reliable protection from water damage. The GENO-STOP® can be equipped with up to two wired and up to five wireless water sensors.

Further types on request
GENO-STOP® 1" 126 875

Connection set (for comfortable connection to the water supply facilities) compact valve block, built-in overflow valve (does not apply to Delta-p® - l) shut-off valves for hard and soft water, sampling valves for raw and soft water (only for 1" – 1 ¼"), 2 flexible pressure-resistant connection hoses.*

- Connection set 1" - 1 ¼" 185 800*
- Connection set 1" - 1 ¼" l 185 801*
- Connection set 1 ½" - 2" 185 823*
- Connection set 1 ½" - 2" l 185 824*

* Connection hoses are not included in the scope of delivery for Switzerland. Fixed piping on site must be provided.

Pedestal Delta-p® 1" - 1 ¼"
770x770x200 mm 185 820

Pedestal Delta-p® 1 ½" - 2"
880x880x200 mm 185 825
Product Description
Delta-p

M-Bus measuring transducer D-DAM, complete
To transmit the flow rate and the counter reading as well as statistical values of a turbine water meter by means of M-Bus (IEC 870).
Furthermore, flow-dependent pulse output, analogue
Dimensions: 160 x 240 x 160 mm.
M-Bus measuring transducer D-DAM cpl. 115 850

Parallel piping Delta-p®
Parallel piping (Tichelmann piping) of two or more triple water softeners with all connection pieces required, incl. connection sets

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel piping Delta-p® 2 x 1&quot; PVC</td>
<td>185 450</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 1 ¼&quot; PVC</td>
<td>185 455</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 1 ½&quot; PVC</td>
<td>185 460</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 2&quot; PVC</td>
<td>185 465</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 3 x 2&quot; PVC</td>
<td>185 470</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 1&quot; VA</td>
<td>185 400</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 1 ¼&quot; VA</td>
<td>185 405</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 1 ½&quot; VA</td>
<td>185 410</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 2 x 2&quot; VA</td>
<td>185 415</td>
</tr>
<tr>
<td>Parallel piping Delta-p® 3 x 2&quot; VA</td>
<td>185 420</td>
</tr>
</tbody>
</table>

Screw connections for connection block
Water meter screw connections with seals for preliminary installation of the connection block.

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta-p® 1&quot;</td>
<td>185 846</td>
</tr>
<tr>
<td>Delta-p® 1 ¼&quot;</td>
<td>185 847</td>
</tr>
<tr>
<td>Delta-p® 1 ½&quot;</td>
<td>185 848</td>
</tr>
<tr>
<td>Delta-p® 2&quot;</td>
<td>185 849</td>
</tr>
</tbody>
</table>
Disinfection set (for disinfection of the water softener, e. g. after an extremely long periods of stagnation or in case of contamination) GENO®-perox, canister, personal safety equipment

- Disinfection set Delta-p 1“ - 1 ¼” 185 830
- Disinfection set Delta-p 1 ½ “ - 2” 185 835
- Communication module DE200 Profibus 185 890
- Brine tank 750 litres 185 525

5.3 Consumables

In order to ensure the reliable operation of the water softener, only use genuine consumables.

- Regeneration salt (25 kg) 127 001
- Water test kit “total hardness”
  - 1 pc 170 145
  - 10 pcs 170 100

5.4 Wearing parts

In case of heavy use, seals are subject to a certain wear and tear. Wearing parts are listed below.

Note: Although these are wearing parts, we are prepared to grant a limited warranty period of 6 months. The same applies for electrical components.

a) Seals, injector, actuators, turbine water meters, transfer valves
b) Brine-, float- and closing valves
c) Chlorine cell and seals

Fig. C-1: Control valve
Fig. C-2: Brine valve cpl.
Fig. C-3: Disinfection unit
D Installation (Delta-p®)

Content

1 | General installation instructions ........................................... D-1
   1.1 Water installation .................................................. D-4
   1.2 Electrical installation .............................................. D-4
2 | Preliminary works .......................................................... D-4
   2.1 How to fill the exchanger tank .................................... D-5
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   4.2 How to connect the control unit ............................... D-15
5 | Chart of electrical power circuit .................................... D-19

1 | General installation instructions

The installation site must provide adequate space. A foundation of a sufficient size and load-carrying capacity must be provided. The required connections must be provided before the system is installed. Please refer to table D-1 for dimensions and connection data.

Table D-1: Connection data and dimensions

| Dimensions see Fig. D-1 | Excerpt from Table C-1

<table>
<thead>
<tr>
<th>Water softener Delta-p®</th>
<th>1”</th>
<th>1 ¼”</th>
<th>1 ½”</th>
<th>2”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal connection diameter</td>
<td>DN 25 (1” male thr)</td>
<td>DN 32 (1¼” male thr)</td>
<td>DN 40 (1½” male thr)</td>
<td>DN 50 (2” male thr)</td>
</tr>
<tr>
<td>Min. drain connection</td>
<td>DN 50</td>
<td>DN 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply [V]/[Hz]</td>
<td>230/50-60 (operation with protective low voltage 24/50-60)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connected load operation = max./standby [VA]</td>
<td>26 / 19</td>
<td>32 / 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection/Protection class</td>
<td>IP 54/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions and weight *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Total height [mm]</td>
<td>1300</td>
<td>1640</td>
<td>1760</td>
<td></td>
</tr>
<tr>
<td>B Ø Exchanger tank [mm]</td>
<td>210</td>
<td>257</td>
<td>369</td>
<td>406</td>
</tr>
<tr>
<td>C Ø Brine tank * [mm]</td>
<td>410</td>
<td>570/900²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Total height of brine tank * [mm]</td>
<td>670</td>
<td>860/1250³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E Height of safety overflow of brine tank * [mm]</td>
<td>575</td>
<td>785/1100³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F Connection height control valve (raw water) [mm]</td>
<td>860</td>
<td>1125</td>
<td>1245</td>
<td></td>
</tr>
<tr>
<td>G Connection height control valve (soft water) [mm]</td>
<td>1155</td>
<td>1485</td>
<td>1605</td>
<td></td>
</tr>
<tr>
<td>H Width of water softener [mm]</td>
<td>580</td>
<td>630</td>
<td>900</td>
<td>960</td>
</tr>
<tr>
<td>I Min. depth of foundation * [mm]</td>
<td>920</td>
<td>1020</td>
<td>1400</td>
<td>1450</td>
</tr>
<tr>
<td>J Min. width of foundation * [mm]</td>
<td>1240</td>
<td>1400</td>
<td>1770</td>
<td>1850</td>
</tr>
</tbody>
</table>

* With standard brine tank

¹ All dimensions and weights are approximate

² /… Version with brine tank 750 liters.

Note: Regarding the installation of water softeners with optional accessories (see chapter C, 5.2), also observe the operation manuals that come with these components.
Sampling valve

Sampling valve min. ½"

Fig. D-1 (a): Installation drawing of water softener Delta-p®

Fig. D-1 (b): Connections of water softener Delta-p®
Table D-2: Conversion table

<table>
<thead>
<tr>
<th>°dH</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>26</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>34</th>
</tr>
</thead>
<tbody>
<tr>
<td>°f</td>
<td>24.9</td>
<td>28.5</td>
<td>32.0</td>
<td>35.6</td>
<td>39.2</td>
<td>42.7</td>
<td>46.3</td>
<td>49.8</td>
<td>53.4</td>
<td>57.0</td>
<td>60.5</td>
</tr>
<tr>
<td>mmol/l</td>
<td>2.49</td>
<td>2.85</td>
<td>3.20</td>
<td>3.56</td>
<td>3.92</td>
<td>4.27</td>
<td>4.63</td>
<td>4.98</td>
<td>5.34</td>
<td>5.70</td>
<td>6.05</td>
</tr>
</tbody>
</table>

Fig. D-2: Continuous flow of Delta-p® (0 °dH (0 °f, 0 mmol/l))

Fig. D-3: Pressure loss curve for Delta-p® (0 °dH (0 °f, 0 mmol/l))
1.1 Water installation

When installing the Delta-p® water softener certain rules must absolutely be respected. Additional recommendations facilitate the work with the system. The installation instructions described here-with are illustrated in Fig. D-1.

**Binding rules**

- The installation of a water softener represents a major interference with the drinking water system. Only authorised experts may install such systems.
- Observe all local and general installation guidelines.
- The system must be preceded by a fine filter (e.g. BOXER® K).
- Use corrosion-resistant material for the soft water pipe OR dose an anti-corrosion agent downstream of the water softener.
- Provide a drain connection (at least DN 50 resp. DN 70) to discharge the regeneration water.

**Note:** If the regeneration water is removed by means of a lifting system, this system must be salt water-resistant.

- Take into consideration the liquid class according to DIN EN 1717 for processes downstream. If necessary, separate from drinking water supply downstream of fine filter (e.g. by means of the Euro system separator GENO® DK 2).

**Recommendations**

- Provide a sampling valve directly downstream of the water softener. This facilitates regular the hardness tests (functional checks) which are required.
- In case of critical applications (e.g. boiler feed water), we recommend the installation of an automatic water analysis system (e.g. GENO®-softwatch Komfort, order no. 172 500).

1.2 Electrical installation

An earthed socket is required for the electrical connection. It must correspond to the specifications indicated in table D-1 and may be no further from the water softener than 1.20 m. Constant voltage is required (do not couple with light switch!)

**Note:** The wiring diagram is located in the cover of the control unit.

2 | Preliminary works

1. Unpack all components of the water softener.
2. Check for completeness and soundness.

**Note:** A separate installation manual is enclosed with the connection block.
2.1 How to fill the exchanger tank

The works described below only apply to the larger water softeners (starting with Delta-p® 1 ½”). Smaller water softeners come with the exchanger tank completely filled.

**Warning!** Risk of bacterial growth due to stagnation! According to VDI 6023 the system must not be filled with drinking water (raw water) prior to the start of appropriate operation.

Therefore, gravel and resin must be filled in dryly into the exchanger tank.

Wet filling may only be done immediately prior to start-up. In case this is not possible, the water softener must be disinfected prior to start-up.

<table>
<thead>
<tr>
<th>Table D-3: Filling of gravel and resin (per exchanger tank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of glass (l)</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Amount of resin (l)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

1. Unscrew the tank adapter.
2. Centre the riser pipes in the exchanger tanks.
3. Put on filling adapter.
4. Fill in the glass into the exchanger tank by using the funnel the piece of pipe supplied.
5. The glass filling must be distributed equally!
6. Fill in the resin into the exchanger tanks by using the funnel supplied with the system.
7. Remove the filling adapter.
8. If necessary, remove excessive resin from the threads and the sealing surfaces of the exchanger tanks for the connection of the tank adapter.
9. Direct the exchanger tank adapter with the nozzle over the riser pipe and fasten by turning it to the right.
3 | Installation

**Note:** Threads and connection bores are closed by means of protective caps in order to protect them against pollution. Remove the caps prior to installation.

**Note:** The water softener comes with separate installation instructions. The following instructions are identical to those.

---

1. Break the template from the cardboard and put it into the designated installation site. The future water connection will be located between exchangers 2 and 3.

2. Bring the tank adapters in line horizontally by means of the threaded height adjustment at the tank adapters (to lower – turn to the right, to elevate – turn to the left).

3. Check whether the exchanger tanks are in an upright position. If necessary, tilt the exchanger tank to the side and bring it into a vertical and upright position by slightly hammering on the stand edge.
Mount the transfer valve for raw water to the lower connections of the tank adapter. Insert the seals while doing so. The connection for the regeneration valve must point between exchanger tanks 1 and 2.

Slightly tighten the union nuts by hand.

Remove the adhesive strips (transport security) from the flange coupling.
Mount the transfer valve for soft water to the upper connections of the tank adapters. Insert the seals while doing so. The connection for the regeneration valve must point between exchanger tanks 1 and 2.

Make sure that the flange coupling is in the correct position.

Check whether the red dots on the ball-type actuating shafts and the drive shaft are superimposed.

Tighten all union nuts.
Pull the clips at the connection of the regeneration valve. Plug in the regeneration valve and reinsert the clips.
Plug the pressure reducer including the turbine water meter into the regeneration valve. Insert the seal at the turbine water meter. Make sure the pressure reducer is in an upright position. Tighten the union nut.
Pull the clips at the connection of the blending valve. Plug in the blending valve and reinsert the clips.

**Note:** The blending unit is not included in the scope of supply for the Delta-P®-I (Industrial system).

Pull the clips at the connection of the blending valve. Insert the plug and reinsert the clips.
Position the brine tank.

Mount the white 8 mm and 9.5 mm hoses between the regeneration valve and the brine tank. Shorten them to the required length.

Mount the black 12 mm hose (drain hose) going from the regeneration valve to the drain connection. Shorten it to the required length. Make sure there is a free outlet (gap >= 20 mm) to the drain. Fasten the hose by appropriate means in order to avoid any lashing movements (regeneration waste water escapes under pressure).

Direct the overflow hose of the brine tank with a gradient to the drain. Make sure there is a free outlet.

**Note:** If required, the drain hose may be laid up to 1.0 m above the water softener. In case of a high drain connection, however, it is not possible to connect the overflow hose of the brine tank (this safety measure, however, is not absolutely necessary as a float valve is installed in the brine tank as initial safety measure).
Connect the system to the water supply but do not fill up yet.
Put on the hood.
4 | How to connect the water softener

4.1 Water connection

**Warning!** Risk of bacterial growth due to stagnation! According to VDI 6023 the system must not be filled with drinking water prior the start of appropriate operation.

Therefore the water softener may only be connected to the drinking water supply immediately before start-up.

Check for tightness by means of oil-free compressed air or inert gases (nitrogen). Max. admissible test pressure is 3 bar. The test may be performed with drinking water if appropriate operation follows immediately.

**Attention!** Dirt and corrosion particles may damage the water softener (control valve, resin) and therefore, the feed lines must be rinsed prior to start-up.
4.2 How to connect the control unit

The work described in the following may only be performed according to the guidelines of the VDE or a similar, local institution by personnel trained in electrical engineering.

Connect the control unit according to the overview of the power circuit given in chapter D-5.

1. Run the cable of the regeneration valve between the control unit and the regeneration valve and let it hang to the floor between exchanger tanks 1 and 2.
2. Let the Hall cable and the cable for the disinfection hang to the floor between the exchanger tanks 1 and 2, together with the cable of the regeneration valve.
3. Let the cable of the blending valve and transfer valve hang to the floor and direct it to the already existing bundle between the exchanger tanks 1 and 2.
4. Connect the cable of the disinfection to the chlorine measuring cell.

5. Insert the cables of the regeneration valve (R) and the transfer valve (T) into the control unit by going through the free holes at the backmost cable screw connection (together with the cable of the disinfection).

6. Run the Hall cable between control unit and regeneration valve and connect it to water meter 1.

7. Run the blending valve cable between control unit and regeneration valve as well and insert it into the control unit by going through the leftmost cable screw connection.
8. Connect Hall cable 4 to water meter 4 (regeneration valve).
9. Run Hall cable 2 between exchanger tanks 2 and 3 and connect to water meter 2.
10. Run Hall cable 3 between exchanger tanks 1 and 3 and connect to water meter 3.
11. Run Hall cable 5 between exchanger tanks 1 and 3 and connect to water meter 5 (blending valve) (not applicable for Delta-p®-I).
12. Combine all cables (5x water meter / regeneration, transfer valve, disinfection / blending valve) behind the control unit.

13. Insert the cables into the mounting tool.

14. Push the protective hose onto the mandrel of the mounting tool.

15. Hold the hose tight in your hand and pull the mounting tool through the juncture of the hose – thus inserting the cables into the hose.

16. Run the second hose also into the cable tree.

17. The cable tree can be fastened by means of a cable binder next to the transformer or behind the control unit, in the segment between the two hoses.

Now, the cable tree is properly laid at the system!

18. During maintenance work, the cable binder can be opened and the control unit including the cable tree can be deposited adjacent to the system.
5 | Overview of electrical power circuit (starting from serial no. 111100002)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function</th>
<th>Colour/number of litz wire</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 / 46</td>
<td>9 V~</td>
<td>3 / 4</td>
<td>Supply of control logic / chlorine cell Fuse F1 3,15 A delayed-action</td>
</tr>
<tr>
<td>47 / 48</td>
<td>24 V~</td>
<td>5 / 6</td>
<td>Transducer voltages 12 V= / 24 V= / 24 V~ Fuse F2 0.63 A delayed-action</td>
</tr>
<tr>
<td>49</td>
<td>PE</td>
<td>green-yellow</td>
<td>Earth conductor</td>
</tr>
<tr>
<td>37 / 38 / 39</td>
<td>Volt-free contacts</td>
<td></td>
<td>Max. contact rating 230 V~ / 1 A</td>
</tr>
<tr>
<td>39 / 40 / 41</td>
<td>Fault signal contact: NO, opens when error occurs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 / 43 / 44</td>
<td>Relay function programmable via extended installer level Code 113 (refer to chapter F-3.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Microswitch</td>
<td>green</td>
<td>+ 24 V = Transducer voltage</td>
</tr>
<tr>
<td>21</td>
<td>brown</td>
<td>Switch S3 (inner)</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>white</td>
<td>Switch S4 (centre)</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>yellow</td>
<td>Switch S5 (outer)</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Motor 24 V~</td>
<td>grey</td>
<td>Motor litz wire, black</td>
</tr>
<tr>
<td>25</td>
<td>blue</td>
<td>Motor litz wires, blue</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>pink</td>
<td>Motor litz wire, red</td>
<td></td>
</tr>
</tbody>
</table>

*Labeling on cable
## Installation

**Delta-p®**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function</th>
<th>Colour/number of litz wire</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>Microswitch</td>
<td>green</td>
<td>+ 24 V= Transducer voltage</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>white</td>
<td>Switch S1 (top)</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>yellow</td>
<td>Switch S2 (bottom)</td>
</tr>
<tr>
<td>34</td>
<td>Motor 24 V~</td>
<td>blue</td>
<td>Motor litz wires, blue</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>grey</td>
<td>Motor litz wires, black</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>pink</td>
<td>Motor litz wire, red</td>
</tr>
<tr>
<td></td>
<td>Disinfection unit</td>
<td></td>
<td>In case of system types 1 ½” and 2”, 2 chlorine cells are connected in parallel</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>blue</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>brown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Turbine water meter</td>
<td></td>
<td>Water meter 5 is not available in case of industrial systems</td>
</tr>
<tr>
<td>4 / 7 / 8</td>
<td>Transducer voltage</td>
<td>white</td>
<td></td>
</tr>
<tr>
<td>11 / 15 / 16</td>
<td>Masse</td>
<td>brown</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Water meter (1)*</td>
<td>green</td>
<td>Exchanger 1</td>
</tr>
<tr>
<td>13</td>
<td>Water meter (2)*</td>
<td>green</td>
<td>Exchanger 2</td>
</tr>
<tr>
<td>14</td>
<td>Water meter (3)*</td>
<td>green</td>
<td>Exchanger 3</td>
</tr>
<tr>
<td>5</td>
<td>Water meter (4)*</td>
<td>green</td>
<td>Regeneration valve</td>
</tr>
<tr>
<td>6</td>
<td>Water meter (5)*</td>
<td>green</td>
<td>Blending valve</td>
</tr>
<tr>
<td></td>
<td>Motor 24 V~ Blending valve (V)*</td>
<td></td>
<td>Blending valve is not available in industrial systems</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>grey</td>
<td>Motor litz wires, blue</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>black</td>
<td>Motor litz wire, black</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>brown</td>
<td>Motor litz wire, red</td>
</tr>
<tr>
<td></td>
<td>Optional pre-alarm low-on-salt, order no. 185 335</td>
<td></td>
<td>The infrared light sensor registers the salt filling height in the brine tank. If the orange LED at the light sensor is illuminated: An object is available and terminal 19 has + 24 V.</td>
</tr>
<tr>
<td>18</td>
<td>Transducer voltage +24 V=</td>
<td>brown</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Input</td>
<td>black</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground</td>
<td>blue</td>
<td></td>
</tr>
</tbody>
</table>

*Labelling on cable*
<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function</th>
<th>Colour/number of litz wire</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>28, 29</td>
<td>Input function programmable via extended installer level Code 113 (refer to chapter F-3.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Transducer voltage +24 V=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Pulse output for optional EXADOS\textsuperscript{®} dosing computer</td>
<td>white</td>
<td>In case of a two-wire connecting line to the EXADOS\textsuperscript{®} dosing system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green</td>
<td>In case of a three-wire connecting line to the EXADOS\textsuperscript{®} dosing system. the white wire is not in use.</td>
</tr>
<tr>
<td>27</td>
<td>Mass</td>
<td>brown</td>
<td></td>
</tr>
</tbody>
</table>
E  Start-up (Delta-p®)

Content

1 | How to fill the brine tank ............................................  E-1
2 | How to set the water softener .....................................  E-2
   2.1 Soft water with blending ......................................  E-2
   2.2 How to set the control unit ...................................  E-3
3 | How to start up the water softener .............................  E-3

The work described below may only be performed by trained experts. We recommend having Grünbeck's technical service/authorised service company start up the system.

1 | How to fill the brine tank

1. Remove the lid of the brine tank
2. Carefully fill the brine tank with raw water until the water level is approx. 30 mm above the sieve bottom.

⚠️ Attention! Impurities in the salt may cause malfunctions at the brine valve and the injector of the control valve. A defined salt quality is required for the reliable function of the system

Only use salt tablets complying with DIN EN 973 A.

3. Fill salt tablets into the brine tank. The brine tank may be filled completely.
4. Fill in the operating water volume (table E-1).

>Note: Raw water may be used for the operating water volume.

5. Close the lid of the brine tank.

Table E-1: How to fill the brine tank

<table>
<thead>
<tr>
<th>Max. regeneration salt supply*</th>
<th>1&quot;</th>
<th>1 ¼&quot;</th>
<th>1 ½&quot;</th>
<th>2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating water volume</td>
<td>[l]</td>
<td>4.2</td>
<td>6.9</td>
<td>14.4</td>
</tr>
</tbody>
</table>
| *in case of water softeners with standard brine tank

Water softener Delta-p®

Order no. 034 185 946-inter   Edited by: KONS-mpöp-mrie G:\BA-185946-INTER_E.DOCX

E-1
2 | How to set the water softener

2.1 Soft water with blending

The standard water softeners feature an electronically controlled blending valve (does not apply for Delta-p®-I).
The Delta-p®-I may be retrofitted with a blending valve.

If soft water at 0°dH (0°f, 0 mmol/l) as well as blended soft water is needed, we recommend the Delta-p®-I system in combination with an external blending valve (order no. 126 003 resp. 126 002). In case of water softeners featuring this kind of equipment, also observe the operation manual of the blending valve.

Attention! If the water softener is installed upstream of a reverse osmosis system, the feed pipe to the RO system must not be executed as soft water pipe with blending.

Note: When softening drinking water, the stipulations of the German Drinking Water Ordinance are compulsory:

Sodium concentration (max.): 200 mg/l. With regard to the soft water hardness, please take note of the following example!

Example

Softening of drinking water (raw water)

Raw water (22°dH (39.2°f, 3.92 mmol/l)) contains sodium (51.6 mg/l)
Possible sodium admixture during softening:
200 mg/l – 51.6 mg/l = 148.4 mg/l

This determines the maximum permitted degree of softening:

\[
\frac{148.4}{8.2} = 18°dH \ (32°f, 3.2 mmol/l)
\]

This means:
Soft water of at least 22 °dH - 18 °dH = 4°dH is required!
39.2 °f - 32 °f = 7.2°f
3.92 mmol/l - 3.2 mmol/l = 0.72 mmol/l

Sodium concentration

Your local waterworks will inform you about the sodium concentration of the raw water. When softening the water by 1°dH (1.78°f, 0.178 mmol/l), the sodium concentration increases by approx. 8.2 mg/l. If the stipulations of the German Drinking Water Ordinance must be observed, the water cannot be softened indefinitely. The permissible blending hardness results from the limit value for the sodium concentration and the raw water hardness.

200 mg/l (limit value acc. to Ger. Drinking Water Regulations)

\[
y = \frac{Z°dH \ (°f, \ mmol/l)}{8.2} (max. softening possible)
\]

The raw water may be softened by up to a maximum of Z °dH (°f, mmol/l). Depending on the sodium concentration of the raw water, a blending hardness must be chosen which is lower than the maximum value of 200 mg/l.

Recommendations for soft water with blending

| 3 [°dH] | Minimum value according to DIN 12502 corrosion protection |
| 5.3 [°f] | 0.53 [mmol/l] |
| 4 - 6 [°dH] | Optimum soft water (highest comfort) |
| 7.1 – 10.7 [°f] | 0.71 – 1.07 [mmol/l] |
2.2 How to set the controller

The Delta-p® water softeners are volume-controlled. The operating parameters are already stored in the control unit GENO®-IONO-matic3. During start-up all parameters need to be entered that are required for the automatic calculation of the regeneration interval. Furthermore, the factory-set data record needs to be checked.

**Note:** For more detailed information on the handling of the GENO®-IONO-matic3 control unit, refer to chapter F.

1. Set the time.
2. Set the raw water hardness.
3. Set the desired soft water hardness (in case of Delta-p®-I, set the soft water hardness to 0°dH (0°f, 0 mmol/l).

**Note:** If 0°dH (0°f, 0 mmol/l) is programmed for the soft water hardness, the blending valve will not be triggered.

4. Check the factory-set data record (operating parameters). To do so, activate code 290 and adjust the displayed value according to table E-2.

<table>
<thead>
<tr>
<th>Table E-2: Data record in Code 290</th>
<th>Water softener Delta-p®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data record in Code 290 / Index 1</td>
<td>CA31 CA32 CA33 CA34</td>
</tr>
</tbody>
</table>

### 3 | How to start up the water softener

**Warning!** Risk of bacterial growth due to stagnation! According to VDI 6023, it is not permissible to fill the system with drinking water prior to starting the designated operation.

Therefore, the water softener may only be connected to the drinking water supply immediately before start-up.

Should the water softener have already been filled with drinking water (raw water) for some time, 4 days at the most, however, it is sufficient to regenerate each exchanger tank during the start-up.

Should the water softener have been filled with drinking water (raw water) for more than 4 days prior to start-up, the water softener must be disinfected before it is started up.

**Note:** We recommend our disinfection kit (order no. 185 830 resp. 185 835, refer to accessories) for the disinfection.

1. Open the valve (provided by others on site) at the raw water inlet.
2. Release the triple manual regeneration (to do so, activate Code 290 / Index 9, refer to chapter F). Now, the three exchanger tanks will be regenerated successively.
Note: This first regeneration is simultaneously used for deaeration purposes. The regeneration steps may be aborted as soon as no air escapes any longer (refer to chapter F-2.4, table F-2.). If the current regeneration step is indicated in Index 9, the currently running regeneration step may be aborted by means of the key combination 🛡 + 🔊

However, regeneration must not be aborted if the water softener has already been filled with water for a longer period of time (see above).

3. After completion of the regeneration, open the valve (provided by others on site) at the soft water outlet.
4. Perform a visual check.
   Make sure no water leaks from the water softener anywhere.
5. 0°dH (0°F, 0 mmol/l) test (soft water test) at the withdrawal valve of each tank adapter.

Note: The 0°dH (0°F, 0 mmol/l) test may only be performed when the exchanger is in operation. In case of systems with blending valve, in addition to the sampling, soft water needs to be withdrawn downstream of the water softener in order to prevent any corruptions by back-flowing raw water.

6. Take a water sample at the withdrawal tap (provided by others on site) downstream of the water softener.
7. Determine the hardness by means of the water test kit „total hardness“.
8. Fill in the cover sheet and the checklist / column 1 of the operation log. Perform the corresponding measurements and tests.
F Operation (GENO®-IONO-matic3)

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   2.3 Soft water test ....................................................... F-6
   2.4 How to read the operating mode (info level) .......... F-6
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1 | Preamble

The water softener Delta-p® is volume and/or timer-controlled. It is
operated and monitored by means of the GENO®-IONO-matic3
control unit.

Warning! Incorrect operation and settings may lead to hazardous
operating conditions which cause injury, illness or damage to
property. Only make the settings described in this chapter!

All additional work on the control unit, in particular modifications
to the data records, may only be performed by Grünbeck’s tech-
nical service/authorised service company.
2 | How to operate the control unit

![Control unit display](image)

Fig. F-2: Displayed symbols and operating keys

### 2.1 Operating keys and display

<table>
<thead>
<tr>
<th>Key</th>
<th>In standard operation:</th>
<th>In the operator programming level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>- Switches to the operator programming level (press for &gt; 5 sec.)</td>
<td>- Acknowledges malfunctions</td>
</tr>
<tr>
<td></td>
<td>- Accesses parameters for editing (digital display is blinking)</td>
<td>- Saves and closes the parameter (digital display stops blinking)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>- Releases a manual regeneration (press for &gt; 5 sec.)</td>
<td>- Changes back to the previous parameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Decreases numerical values while the digital display is blinking</td>
</tr>
<tr>
<td>3</td>
<td>- Calls the info level and changes to the next Info value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>- Closes open parameters without saving (digital display stops blinking),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- the value set previously remains unchanged.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- To exit the operator programming level</td>
</tr>
</tbody>
</table>

**Keys simultaneously**: In operator programming level:
- Closes open parameters without saving (digital display stops blinking), the value set previously remains unchanged.
- To exit the operator programming level

### 4 Brine tank

Is indicated during the entire regeneration

Depending on the respective regeneration step, the corresponding arrow is displayed:
- ↑ Brine is drawn from the tank
- ↓ Raw water is fed into the brine tank

Optional pre-alarm salt supply (Order no. 185 335)
- ⚖ symbol appears, if salt needs to be refilled
5 Regeneration valve

Is indicated during the entire regeneration

**Regeneration step “Filling of brine tank”:**
- 🔄 Drop is blinking when there is a flow at turbine water meter 4

**Regeneration step “salting”:**
- ⚒ Symbol appears if electrolysis current for the generation of chlorine (disinfection of the exchanger tank) is ok
- Regeneration valve motor is running (M) to switch over to the next regeneration step; micro-switches (S3, S4, S5) are activated to detect when the next regeneration step is reached
- 🔄 Symbols indicate the current status

6 Directional arrow for the flow between regeneration and transfer valve

Depending on the respective regeneration step (no. of step in brackets), the arrow indicates the direction in which currently there is a flow:
- First filtrate (5): transfer valve >> regeneration valve (waste water to drain)
- Salting / slow rinsing (1 / 2): regeneration valve >> transfer valve (brine resp. water into the exchanger)
- Backwash (3): regeneration valve >> transfer valve (waste water to drain)
- Filling of brine tank (4): No water is flowing via this connection, therefore, there is no directional arrow

7 Exchanger tank

In standard operation:
The two exchanger tanks that are in operation are indicated together with their number (corresponding to turbine water meters no. 1, 2, 3) and their residual capacity:
- The eight segments of the circle stand for a residual capacity of 12.5 % each
  - 🔄 Residual capacity between 87 % and 75 %
  - 🔴 Residual capacity between 50 % and 37,5 %
  - 🔴 Exchanger is exhausted
- The number of the third exchanger tank will be blanked during regeneration

**Within the info level:**
- The residual capacity and flow of the digital display 9 refer to the exchanger whose number is shown.

8 Drop symbol

굼 The drop is blinking if there is a flow at the corresponding turbine water meters 1, 2 or 3

9 Digital display / indication of units

In standard operation:
- Indicates the time

In the info resp. operator programming level:
- Indicates the operating parameters and if available, the corresponding unit appears as well

In case of malfunctions/warnings:
- Indicates the malfunction currently pending or the warning „ER x”
Index

In the info level resp. the operator programming level:
- As guidance, indicates the consecutive number of the current value in the digital display.

Wrench

- symbol appears if maintenance interval has expired.

Transfer valve

Transfer valve motor is running (M) to switch over to the next exchanger pair; micro-switches (S1, S2) are activated to detect when this position has been reached. Symbols indicate the current status.

Blending valve

Symbol is blinking when water is withdrawn (raw water part). Blending motor is running (M), in order to keep the blending hardness constant in case of fluctuating withdrawal volumes.

without back-lit display

- Remains on until 10 minutes after a key was pressed for the last time.
- With each press of a key, first of all, the background illumination is activated.
- Is blinking during malfunctions / warnings.

Table F-1: Operating keys and display

2.2 How to set the operating parameters (operator programming level)

Note: Instructions in bold print are absolutely necessary to proceed with the work. All other steps may be omitted if the displayed value shall remain unchanged.

Basic setting (operator programming level)

When starting up the system, the basic settings must be adapted to the local conditions. In case of fluctuating raw water qualities, the value must be changed accordingly.

In the basic setting, the display indicates the time. First, call the operator programming level.

1. Keep key pressed for more than 2.5 seconds.

2. Press key. The displayed value for the hour starts blinking.

3. Set the actual time (hour). To do so:

Decrease the hour value by means of key .

OR

Increase the hour value by means of key .

4. Save the setting by pressing the key. The hour displayed stops blinking.

5. Press key in order to change to the next menu item.
The display indicates the minutes. If no modification is required, proceed with step 9.

6. Press \textbf{P} key to access the menu.

7. If the minutes displayed start blinking, increase or decrease the value by means of keys \textbf{A} and \textbf{v}.

8. As soon as the correct value is set, press the \textbf{P} key. The minutes displayed stop blinking.

9. Press \textbf{A} key to change to the next menu item.

The raw water hardness stored in the system is displayed. You must now enter the actual raw water hardness present at your installation site. You can determine this value by means of the water analysis kit “total hardness” or by inquiring at your local water works.

10. Enter the corresponding value. To do so, go through the steps described in 6 - 8.

11. Press \textbf{A} key to change to the next menu item.

\textbf{Note:} In case of changing raw water hardness, program the highest occurring value!

The display indicates the menu item “soft water hardness”.

\textbf{In case of water softeners without blending valve (Delta-p-I), the factory-set value of 0° dH (0 °f, 0 mmol/l) must not be modified.}

In other cases, the desired soft water hardness with blending must be set (between 1 °dH (1.78 °f, 0.178 mmol/l) and a max. value of approx. 50 % of the raw water hardness). If drinking water is softened (raw water), the stipulations of the German Drinking Water Ordinance (also refer to chapter E) must be adhered to.

12. Enter the correct value. To do so, go through the steps described in 6 - 8.

13. Press keys \textbf{A} and \textbf{v} simultaneously in order to change back to the basic display.

The display now indicates the current time.

\textbf{Note:} \(1 \text{ mmol/l} = 1 \text{ mol/m}^3\)
2.3 Soft water test

In order to perform the soft water test 0°dH (0°f, 0 mmol/l) on the exchangers in operation, soft water needs to be withdrawn (open one withdrawal point downstream of the system).

![Fig. F-3: Soft water test](image)

**Note:** Without flow, mixed water originating from exchanger* and exchanger** will be taken from the sampling valves (fig. F-8, pos. 1).

2.4 How to read the operating status (info level)

The display continuously provides information on the operating status of the water softener.

All exchangers are shown with their residual capacity. In fig. F-4 exchanger tank 2 still has a capacity of up to 100%, exchanger tank 1 still has a capacity of up to 50% and exchanger tank 3 is in regeneration or standby.

The water flow of turbine water meters 1, 2 and 3 is indicated by the drop alongside the exchanger tank (blinking at a frequency of 5 turbine water meter pulses).

The processes during a regeneration in progress, if so, can be read from the regeneration valve displayed (refer to fig. F-2 and table F-1).

Starting from the basic display “time”, additional parameters may be called at any time, to do so, press key.

The following system applies to the exchangers:

- **Exchanger** * is in operation and in general has the lower residual capacity. It will be the next one to be regenerated.
- **Exchanger** ** is in operation and in general has the higher residual capacity. It will be the next to one to be regenerated.
- **Exchanger** *** is exhausted and is currently being regenerated or has already been regenerated.
A regeneration based on the water consumption takes place, if:

- **exchanger * is exhausted or**
- **exchanger ** only has a residual capacity of 50%.

This is to ensure that a timely switch-over to the next pair of regeneration tanks takes place.

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter, unit</th>
<th>Display format</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Residual capacity of exchanger *</td>
<td>[m³] XXX.X</td>
<td>In operation</td>
</tr>
<tr>
<td>1</td>
<td>Residual capacity of exchanger **</td>
<td>[m³] XXX.X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Residual capacity of exchanger ***</td>
<td>[m³] XXX.X</td>
<td>In regeneration / standby</td>
</tr>
<tr>
<td>3</td>
<td>Flow of exchanger *</td>
<td>[m³/h] XX.XX</td>
<td>In operation</td>
</tr>
<tr>
<td>4</td>
<td>Flow of exchanger **</td>
<td>[m³/h] XX.XX</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Flow of exchanger ***</td>
<td>[m³/h] XX.XX</td>
<td>In regeneration / standby</td>
</tr>
<tr>
<td>6</td>
<td>Blending flow</td>
<td>[m³/h] XX.XX</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Actual value of soft water hardness</td>
<td>°dH [°f] [mol/m³]</td>
<td>XXX</td>
</tr>
<tr>
<td>8</td>
<td>Time since last regeneration</td>
<td>[h] XXXX</td>
<td>X: Regeneration step YY: Remaining step time [minutes], in step 4 flow [m³/h], fill brine tank</td>
</tr>
<tr>
<td>9</td>
<td>Current regeneration step</td>
<td>X≡:YY</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Time until service is due</td>
<td>[d] XXX</td>
<td></td>
</tr>
</tbody>
</table>

Table F-2: Operating parameters of info level

### 2.5 How to release a manual regeneration

Release a manual regeneration if

- the water softener is operated in operating mode b 1 and the max. soft water volume is reached before the set regeneration interval has come up.
- the water softener resumes operation after a longer period of standstill.
- maintenance or repair work has been done.

**Start of manual regeneration in the basic display indicating the time:**

Keep key pressed for at least 5 sec. The water softener starts the regeneration. Progress is indicated by depiction of the regeneration valve in the display.
3 | How to make deviating settings

The GENO®-IONO-matic 3 controls the operating and regeneration processes of the water softeners of the Delta-p series subject to the chosen operating mode, water consumption, daily interval and time. The various parameters of the water softener are stored in the programming levels and may be set via a menu navigation which is code-protected.

A programmable input, a programmable output and an input for the pre-alarm salt salt supply (optional, order no. 185 335) are available.

The parameters described in the following may only be modified by authorised experts as incorrect settings may result in the over-running of the exchangers or malfunctions.

3.1 Installer level 290

Precondition: The control unit must be in the basic setting indicating the time.

1. Press keys \( \text{P} \) and \( \text{V} \) simultaneously until the display changes.

The installer programming level is active. First, select the required menu. The figures (000) are blinking. Modify them, so that they indicate the code of the menu to be processed. The code for the level required in this case is 290.

2. Increase the value by means of key \( \text{A} \) until C.290 is displayed.

OR

Decrease the value by means of key \( \text{V} \) until C.290 is displayed.

By keeping key \( \text{A} \) resp. \( \text{V} \) pressed, you may scroll through the figures quickly and make the fine-tuning by pressing and releasing the keys.

3. Press \( \text{P} \) key to save Code 290.

Note: Contrary to the info level, within the installer level you may go back and forth between the individual parameters by means of keys \( \text{A} \) and \( \text{V} \).
<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter unit</th>
<th>Factory setting</th>
<th>Setting range</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unit of hardness value</td>
<td>0</td>
<td>0 = °dH 1 = °f 2 = mol/m³</td>
<td>Applies to raw water and soft water hardness as well as capacity figure</td>
</tr>
<tr>
<td>1</td>
<td>Data record of water softener</td>
<td>Depending on the water softener (nominal diameter)</td>
<td>CA31: Delta-p 1”  CA32: Delta-p 1 ¼”  CA33: Delta-p 1 ½”  CA34: Delta-p 2”</td>
<td><strong>Warning:</strong> Modifications may only be made by Grünbeck's technical service/authorised service company!</td>
</tr>
<tr>
<td>2</td>
<td>Capacity figure</td>
<td>Depending on the water softener (nominal diameter)</td>
<td>Display only</td>
<td>CA31: 48  CA32: 79  CA33: 165  CA34: 229</td>
</tr>
<tr>
<td>3</td>
<td>Turbine water meter constant of exchanger</td>
<td>Depending on the water softener (nominal diameter)</td>
<td>Display only</td>
<td>CA31: 0,0314  CA32: 0,0314  CA33: 0,0773  CA34: 0,0773</td>
</tr>
<tr>
<td>4</td>
<td>Turbine water meter constant of regeneration valve</td>
<td>Depending on the water softener (nominal diameter)</td>
<td>Display only</td>
<td>CA31: 0,0313  CA32: 0,0313  CA33: 0,0325  CA34: 0,0325</td>
</tr>
<tr>
<td>5</td>
<td>Turbine water meter constant of blending valve</td>
<td>Depending on the water softener (nominal diameter)</td>
<td>Display only</td>
<td>CA31: 0,0300  CA32: 0,0300  CA33: 0,0773  CA34: 0,0773</td>
</tr>
<tr>
<td>6</td>
<td>Release time</td>
<td>hh:mm</td>
<td>00: 00: ... 23: 00:</td>
<td>Applies to regeneration via daily interval</td>
</tr>
<tr>
<td>7</td>
<td>Release time</td>
<td>:mm</td>
<td>:00 :00 ... :59</td>
<td>Will be started by reprogramming to the value 1/2/3. <strong>Attention:</strong> Observe the instructions given for the disinfection chemical</td>
</tr>
<tr>
<td>8</td>
<td>Disinfection program</td>
<td>0</td>
<td>0 ... 1</td>
<td>Will be started by reprogramming to the value 1. <strong>Attention:</strong> Observing the instructions given for the disinfection chemical</td>
</tr>
<tr>
<td>9</td>
<td>Triple manual regeneration</td>
<td>0</td>
<td>0 ... 3</td>
<td>Will be started by reprogramming to the value 1. All 3 exchangers will be regenerated up to 3 x, once one after the other. In between a wait time of 15 min. has to elapse.</td>
</tr>
</tbody>
</table>

Table F-3: Parameters of installer level 290
3.2 Extended installer level 113

Precondition: The control unit must be in the basic setting indicating the time.

1. Press keys \( \uparrow \) and \( \downarrow \) simultaneously until the display changes.

The installer programming level is active. First, select the required menu. The figures (000) are blinking. Modify them, so that they indicate the code of the menu to be processed. The code for the level required in this case is 113.

2. Increase the value by means of key \( \uparrow \) until C.113 is displayed.

OR

Decrease the value by means of key \( \downarrow \) until C.113 is displayed.

By keeping key \( \uparrow \) resp. \( \downarrow \) pressed, you may scroll through the figures quickly and make the fine-tuning by pressing and releasing the keys.

3. Press \( \Box \) key to save Code 113.

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter, unit</th>
<th>Factory-setting</th>
<th>Setting range</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Function programmable input</td>
<td>0</td>
<td>0 ... 2</td>
<td>0 = no function 1 = external release of regeneration 2 = external lock of regeneration 3 = external release of triple regeneration 4 = reserved function</td>
</tr>
<tr>
<td>1</td>
<td>Function programmable output</td>
<td>0</td>
<td>0 ... 3/80/210</td>
<td>0 = no function 1 = closed during regeneration step 1: salting 2 = closed during the entire regeneration 3 = closed, if flow at exchanger * and exchanger** = 0 m³/h or in case of bottle changeover or malfunction 80/210 = reserved function</td>
</tr>
</tbody>
</table>
### Operation

#### GENO®-IONO-matic3

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter, unit</th>
<th>Factory-setting</th>
<th>Setting range</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Delay time for programmable output in case of setting = 3</td>
<td>0.1 ... 9.9</td>
<td>0.5</td>
<td>After completion of bottle changeover, the contact opens again time-delayed.</td>
</tr>
</tbody>
</table>
| 3     | Activation Pre-alarm salt supply | 0 | 0 ... 999/L | (optional, order no. 185 335) 0 = will not be analysed  
L = The infrared light sensor registers the salt filling height in the brine tank. If, within the adjustable switching distance, no presence of an object is detected for more than 5 minutes, the warning Er A symbol will appear. |
| 4     | Serial interface RS 485 | 0 | 0 ... 2 | 0 = deactivated  
1 = Optional module DE2000 Profibus (order no.: 185 890) present  
2 = Logging mode RTU for interconnection with reverse osmosis GENO®-OSMO-X |
| 5     | Pulse division for EXAcount pulse output 1: ... | 1 | 0/1/12/18/31 | For the pulse output, the input pulses of water meters AT*/AT**/blending are used.  
**Note:** Pulse division „0“ must not be used in combination with EXADOS®-dosing systems! Setting „0“ is reserved for Delta-p® cascade connection |

### Parameters of installer level 113

<table>
<thead>
<tr>
<th>DME 6</th>
<th>DME 10</th>
<th>DME 20</th>
<th>DME 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta-p® 1“</td>
<td>1:1</td>
<td>1:1</td>
<td>1:12</td>
</tr>
<tr>
<td>Delta-p® 1¼&quot;</td>
<td>1:1</td>
<td>1:31</td>
<td></td>
</tr>
<tr>
<td>Delta-p® 1½&quot;</td>
<td>1:12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delta-p® 2”</td>
<td>1:12</td>
<td>1:18</td>
<td></td>
</tr>
</tbody>
</table>

Table F-4: Parameters of the installer level 113
Note: The division factors in bold print are for the „reasonable combinations“ of water softener and dosing system. With the other division factors, the flow range of the water softener or the dosing system cannot be utilized entirely.

<table>
<thead>
<tr>
<th>Division factor</th>
<th>1:1</th>
<th>1:12</th>
<th>1:18</th>
<th>1:31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta-p® 1&quot;; 1 ¼&quot;</td>
<td>0.031</td>
<td>0.372</td>
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<td>0.961</td>
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<td>Delta-p® 1 ½&quot;; 2&quot;</td>
<td>0.077</td>
<td>0.924</td>
<td>1.386</td>
<td>2.387</td>
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</tbody>
</table>

Table F-4a: Resulting pulse sequence

Reasonable division factors for the respective system sizes have to be set in the control units. Use dosing systems GENODOS® DME as dosing system for the dosing of mineral-based agents.
## Troubleshooting (Delta-p®)

### 1| Preamble

Even carefully designed and manufactured technical systems that are operated properly, may experience malfunctions. Table G-1 provides an overview of possible problems that may occur during the operation of the water softener Delta-p® and indicates the causes and their elimination.

The water softener Delta-p® features an error detection and reporting system. If an error message is displayed:

1. Press \( P \) key (= acknowledge malfunction), except for Er 4 >> refer to table G-1.
2. Watch the display. If the signal reappears, compare with table G-1.
3. If necessary, notify Grünbeck’s technical service/authorised service company. When contacting the technical service, please indicate the system designation, serial and order number (refer to chapter C-1) and the error message displayed.

**Note:** Grünbeck’s technical service/authorised service company definitely must be notified in case of malfunctions that cannot be remedied with the information given in table G-1! When contacting the technical service, please provide the system designation, serial number and the error message displayed.

**Note:** The voltage-free signal contact (terminals 37-39) opens in case of service interval having expired and Er A.

In case of all other malfunctions, Er X opens the fault signal contact (terminals 39 - 41).

Both signals, signal contact and fault signal contact, are active.

<table>
<thead>
<tr>
<th>Table G-1: Troubleshooting</th>
<th>This is what you see</th>
<th>This is the cause</th>
<th>This is what to do</th>
</tr>
</thead>
</table>
| **a) Error messages displayed** | Er 0 | Power failure of > 5 minutes has occurred – in the factory-setting of the GENO®-IONOMatic, the error message indicating a power failure is **not activated**. | • Depending on whether the exchangers in operation were being used during the power failure, it might be necessary to regenerate them or one of them (refer to chapter F, paragraph 2.4 “How to release a manual regeneration”).
• After consultation with Grünbeck’s technical service/authorised service company, make a different parameter setting, if required. | |
| | Er 1 | Run time monitoring of regeneration valve motor was activated.
• Connecting cable regeneration valve / control unit defective or connected improperly
• Micro-switch S3 ... S5 defective
• Regeneration valve motor defective
• Control unit defective
• Fuse F2 was activated. | • Notify Grünbeck’s technical service/authorised service company
• Replace fuse by one of the same type (refer to chapter D, D-19, D-20). |
### Table G-1 (continued)

<table>
<thead>
<tr>
<th>This is what you see</th>
<th>This is the cause</th>
<th>This is what to do</th>
</tr>
</thead>
</table>
| **Er 2**             | Run time monitoring of transfer valve motor was activated.  
  - Connecting cable transfer valve / control unit defective or connected improperly  
  - Micro-switch S1 ... S2 defective  
  - Transfer valve motor defective  
  - Control unit defective | • Notify Grünbeck’s technical service/authorised service company |
|                      | • Fuse F2 was activated. | • Replace fuse by one of the same type (refer to chapter D, D-19, D-20). |
| **Er 3**             | Regeneration of exchanger (*) is due, however, regeneration of exchanger (**) has not yet been completed. Therefore, only blended water or raw water is available. In the factory-setting of the GENO®-IONO-matic, the so-called hard water error signal “Er 3” is not activated. | • Reduce water withdrawal.  
  • The error message will acknowledge itself as soon as 2 exchanger tanks with corresponding capacity are in operation again.  
  • After consultation with Grünbeck’s technical service/authorised service company, make a different parameter setting, if required. |
| **Er 4**             | The generation of chlorine for the disinfection of the exchanger during the regeneration has not been performed properly.  
  - Due to the brine concentration being too low, the electrolysis current is too low.  
  - Due to a short-circuit, the electrolysis current has been switched off to protect the control unit.  
  - The carbon electrodes are used up. | • Check connecting cable control unit / disinfection unit  
  • Check salt level in brine tank and refill salt tablets that comply with DIN EN 973. Wait for 5 minutes and then acknowledge the malfunction.  
  • Notify Grünbeck’s technical service/authorised service company  
  • Notify Grünbeck’s technical service/authorised service company  
  • Notify Grünbeck’s technical service/authorised service company |
| **Er 4**             | Short-circuit at the carbon electrodes | • Notify Grünbeck’s technical service/authorised service company |
| **Er 5**             | The water volume to refill the brine tank has not been reached in the set time. It might not be possible to generate enough brine for the next regeneration. | • Establish raw water supply.  
  • Eliminate bends.  
  • Notify Grünbeck’s technical service/authorised service company |
| **Er 6**             | • Raw water supply switched off?  
  • Laying of filling line to brine tank.  
  • Turbine water meter 4 – defective pulse cable.  
  • Defective turbine water meter 4.  
  • Defective control unit. | • Check whether all cables are connected to the turbine water meter of the proper exchanger resp. regeneration/transfer valve.  
  • Notify Grünbeck’s technical service/authorised service company |
| **Er 8**             | One of the exchangers’ water meters does not work. | • Establish raw water supply.  
  • Eliminate bends.  
  • Notify Grünbeck’s technical service/authorised service company |
<table>
<thead>
<tr>
<th>This is what you see</th>
<th>This is the cause</th>
<th>This is what to do</th>
</tr>
</thead>
</table>
| **Er 9**             | The control unit has detected an inadmissible position of the micro-switch at the regeneration or transfer valve.  
- Connecting cable of regeneration valve controller or transfer valve controller connected incorrectly or defective.  
- Micro-switch S1 ... S5 defective.  
- Control unit defective. | • Check connecting cables.  
• Check cabling.  
• Notify Grünbeck’s technical service/authorised service company |
| **Er A** and symbol simultaneously | Only possible, if accessory „Pre-alarm salt supply” (order no. 183 335) is available and Code 113, parameter index 3 = L is programmed. | • Check salt level in brine tank and refill salt tablets that comply with DIN EN 973 A.  
• Signal appears in spite of enough salt: Notify Grünbeck’s technical service/authorised service company |
| **Er C**             | Nominal flow of water softener exceeded – risk of damage to system components. Has not been activated by factory. | • Reduce flow via the water softener until nominal flow is no longer exceeded. |
| **Er d**             | Run time monitoring of blending valve motor was triggered.  
- Soft water hardness was programmed although no optional blending (order no. 185 023) valve is installed.  
- Soft water hardness set too high, compared to the raw water hardness.  
- Cabling between turbine water meter / blending valve motor defective.  
- Turbine water meter 5 – defective pulse cable.  
- Defective turbine water meter 5.  
- Defective control unit.  
- Defective blending valve. | • Program soft water hardness to 0°dH (°f, mol/m³) (thus deactivating it).  
• Set the soft water hardness at a lower value (max. approx. 50 % of raw water hardness possible).  
• Check cabling.  
• Notify Grünbeck’s technical service/authorised service company |
| **Er F**             | Communication with optional module DE200 is faulty. | • Re-establish connection  
• Re-establish power supply of optional module |
| **Maintenance interval has expired.** | • Maintenance recommended  
• Notify Grünbeck’s technical service/authorised service company |
<table>
<thead>
<tr>
<th><strong>This is what you see</strong></th>
<th><strong>This is the cause</strong></th>
<th><strong>This is what to do</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>b) other malfunctions</strong></td>
<td><strong>Increase of hardness in soft water</strong></td>
<td><strong>Water softener overrun</strong>&lt;br&gt;• Water softener does not carry continuous current (coupled with light switch)&lt;br&gt;• No turbine water meter pulses are transmitted to the control unit&lt;br&gt;• Control unit set incorrectly&lt;br&gt;• Water softener does not take in enough brine&lt;br&gt;• Too little water in brine tank</td>
</tr>
<tr>
<td><strong>Resin in drain pipe</strong></td>
<td><strong>Jet system defective</strong></td>
<td><strong>Notify Grünbeck’s technical service/authorised service company</strong></td>
</tr>
<tr>
<td><strong>Pressure loss too high</strong></td>
<td><strong>Resin polluted by undissolved substances</strong></td>
<td><strong>Notify Grünbeck’s technical service/authorised service company</strong></td>
</tr>
<tr>
<td><strong>Water softener does not take in brine</strong></td>
<td>• Water pressure too low&lt;br&gt;• Injector clogged&lt;br&gt;• Injector sieve clogged&lt;br&gt;• Brine valve clogged&lt;br&gt;• Transfer valve mounted incorrectly</td>
<td>• Increase flow pressure to at least 2.0 bar.&lt;br&gt;• Clean injector.&lt;br&gt;• Clean injector sieve.&lt;br&gt;• Dismantle brine valve and clean thoroughly.&lt;br&gt;• Check point-to-point installation.</td>
</tr>
<tr>
<td><strong>Brine tank full</strong></td>
<td>• see „water softener does not take in brine“</td>
<td>• See „water softener does not take in brine“</td>
</tr>
<tr>
<td><strong>Display does not indicate anything</strong></td>
<td>• Fuse F3 or transformer fuse was activated.</td>
<td>• Replace fuse by one of the same type (refer to chapter D, D-19, D-20).</td>
</tr>
</tbody>
</table>
H  Maintenance and care

Content

1 | General information .................................................. H-1
2 | Inspection (functional check) ...................................... H-1
   2.1 How to refill salt ................................................. H-2
3 | Minor maintenance .................................................. H-3
4 | Major maintenance .................................................. H-3
   4.1 Operation log .......................................................
5 | Spare parts ................................................................ H-6

1 | General information

In order to guarantee the reliable function of water softeners over a long period of time, some maintenance work has to be performed at regular intervals. This applies in particular to the softening of drinking water where the required measures are defined in the pertinent regulations and guidelines. All regulations and guidelines which apply to the installation site must be strictly adhered to.

DIN EN 806-5 stipulates:

- Inspection every two months.
- Minor maintenance every 6 month.
- Major maintenance annually.
  The major maintenance must be performed by Grünbeck’s technical service/authorised service company or by a specialised company.
- An operation log (refer to chapter H, paragraph 5) must be kept in order to record the maintenance work performed.

**Note:** A maintenance contract ensures that all the required maintenance work will be performed in due time.

The operation log is attached to this operation manual.

2 | Inspection (functional check)

You may perform the regular inspections yourself. We recommend inspecting the water softener at shorter intervals after installation, before switching over to the standard inspection cycle. However, an inspection is compulsory at least every two months.

Please refer to the following summary for the tasks to be performed within the framework of an inspection.
**Summary: Inspection work**

Determine the raw water hardness.
(water test kit „total hardness“)

Determine the soft water hardness (water test kit „total hardness“).

Check the salt level in the brine tank, observe the minimum filling level (refer to sticker). Refill salt tablets, if necessary.

---

**Attention!** If the salt level falls below the minimum filling level, hardness may break through.

Check control valve to drain for tightness (in operating mode without regeneration activity).

---

**2.1 How to refill salt**

**Warning!** Impurities in the brine tank may adversely affect the water quality. For hygienic reasons be very careful when refilling salt.

**Attention!** Insoluble impurities in the salt may cause malfunctions at the brine valve and at the injector of the control valve. A defined salt quality is required for the reliable function of the water softener.

Only use salt tablets as per DIN EN 973 type A.

A few precautionary measures ensure hygienically and technically perfect conditions:

- Only store the salt in dry and clean areas.
- Do not use salt from packages that are already open.
- Clean the outside of the packages before opening them.
- Fill the regeneration salt directly from the package into the brine tank.
- Close the brine tank immediately after filling.
3 | Minor maintenance

You may perform the minor maintenance work yourself.

- Read the water meter reading.
- Determine raw and soft water hardness (water test kit „Total hardness“)
- Check the setting of the control unit:
  a) Time
  b) Raw water hardness
- Check the salt level in the brine tank, comply with the minimum level for the salt filling (refer to the mark at the funnel of the brine tank). If necessary, refill salt tablets.
- Check the salt quality – the salt must not be clumped. If necessary, break up clumping by means of a suitable tool.
- Assess the salt consumption subject to the water volume consumed.

Note: Minor fluctuations are normal and cannot be prevented technically. In case of considerable deviations, however, notify Grünbeck’s technical service.

- Check system for tightness.
- Check tightness of control valve to drain (in operating mode without regeneration activity).
- Record all data and activities, including repair work in the operation log.

4 | Major maintenance

- Read water pressure, flow pressure and water meter reading.
- Determine hardness:
  Raw and soft water hardness, 0 °dH (0 °f, 0 mmol/l) test.
- If necessary, readjust blending valve and check soft water hardness again, program the desired soft water hardness in the control unit.
- Adjust the electronics settings subject to the measured hardness values.
- Check the programming at the control unit.
- Check brine control (salting, filling of brine tank).
- Check release of regeneration.
- Check start of turbine water meter.
- Check control valve for proper functioning and tightness, replace wearing seals, if necessary; check function of drive motors of control valve, clean injector and sieve.
- Determine hydraulic values
- Clean brine tank and brine valve.
- Check regeneration salt supply (volume and quality – no clumping).
Attention: Danger of water damage! Damaged or worn hose connections may tear. Therefore, check and replace connection hoses, if necessary.

- Check the non-return function of the safety fitting (e.g. system separator)
- Functional check of the disinfection unit (determine electric current, only possible via Code).
- If necessary, read regeneration counter, total quantity of soft water, error memory (system data print possible via serial interface).
- Reset maintenance interval.
- Enter all data and work performed, including repair work, in the operation log.
- Turn the system and the filled-in operation log over to the operator.

Warning! Risk of infection due to germ-infested drinking water. In stagnating water, the amount of germs may increase to an unacceptable level. Therefore, pay particular attention to hygiene when working on water softeners and disinfect the system, if necessary.

4.1 Operation log

The operation log is attached to this operation manual. At start-up of the water softener, make sure to enter all data on the cover sheet of the operation log and to fill in the first column of the check list.

The service technician will fill in another column of the check list whenever further maintenance is carried out. This document provides evidence of proper maintenance.

5 | Spare parts

For spare parts and consumables, please contact your local Grünbeck representative (refer to www.gruenbeck.com).

For detailed specifications regarding the wearing parts, please refer to chapter C.
### Operation Log

**Customer**

Name: ........................................................................
Address: .....................................................................
..................................................................................
..................................................................................

**Water softener Delta-p®**

(Please tick appropriate box)

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<thead>
<tr>
<th>Size</th>
<th>1”</th>
<th>1 ¼”</th>
<th>1 ½”</th>
<th>2”</th>
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<tbody>
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</tbody>
</table>

Serial number.........................................................
Installed by..............................................................
Filter: Make/Type.........................................................

**Connection data:**

- Drain connection DIN EN 1717
  - Yes
  - No

- Floor drain available
  - Yes
  - No

- Pipe downstream of water softener
  - Galvanized
  - Copper
  - Plastics
**Maintenance work on the water softener Delta-p®**

**Checklist**

Please enter measured values. Confirm checks with OK or enter repair work performed.

<table>
<thead>
<tr>
<th>Maintenance performed (date)</th>
<th>Start-up</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Measured values</th>
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<tbody>
<tr>
<td>Water pressure [bar]</td>
<td></td>
</tr>
<tr>
<td>Flow pressure [bar]</td>
<td></td>
</tr>
<tr>
<td>Water meter value [m³]</td>
<td></td>
</tr>
<tr>
<td>Raw water hardness (measured)</td>
<td>°dH, °f, mmol/l</td>
</tr>
<tr>
<td>Soft water hardness (measured)</td>
<td>°dH, °f, mmol/l</td>
</tr>
<tr>
<td>°dH (°f, mmol/l) test</td>
<td></td>
</tr>
</tbody>
</table>

**Inspections and checks of control unit and control valve**

- Controller settings checked
- Regeneration release checked
- Injector and sieve cleaned
- Control valve checked for tightness
- Function of transfer/regeneration valve motor checked
- Functional check of disinfection cell (read measured value mA 5 min. after salting)

**Work performed on brine tank and brine valve**

- Brine tank and brine valve cleaned
- Brine valve functions and settings checked

**Connections, hose connections, seals**

- Seals and hose connections checked
- Safety fitting (e.g. system separator) checked for non-return function

**Miscellaneous**

<table>
<thead>
<tr>
<th>Remarks (e.g. system data print)</th>
<th></th>
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<tbody>
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<th>Work time certificate (no.)</th>
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<tr>
<th>Date/Signature</th>
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</table>
# Maintenance work on the water softener Delta-p®

## Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

<table>
<thead>
<tr>
<th>Maintenance performed (date)</th>
<th>Start-up</th>
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<tbody>
<tr>
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### Measured values

<table>
<thead>
<tr>
<th>Water pressure [bar]</th>
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</thead>
<tbody>
<tr>
<td>Flow pressure [bar]</td>
<td></td>
</tr>
<tr>
<td>Water meter value [m³]</td>
<td></td>
</tr>
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<td>Raw water hardness (measured)</td>
<td>°dH °f mmol/l</td>
</tr>
<tr>
<td>Soft water hardness (measured)</td>
<td>°dH °f mmol/l</td>
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<td>°dH (°f, mmol/l) test</td>
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### Inspections and checks of control unit and control valve

- Controller settings checked
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- Functional check of disinfection cell (read measured value mA 5 min. after salting)

### Work performed on brine tank and brine valve

- Brine tank and brine valve cleaned
- Brine valve functions and settings checked

### Connections, hose connections, seals

- Seals and hose connections checked

### Miscellaneous

- Remarks (e. g. system data print)  
  - ……………………………………  
  - ……………………………………  
  - ……………………………………  

- Commissioning/Customer service technician  
  - ……………………………………  

- Company  
  - ……………………………………  

- Work time certificate (no.)  
  - ……………………………………  

- Date/Signature  
  - ……………………………………  

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Order no. 034 185 942-inter  Edited by: KONS-mpöp-mrie G:\BA-185942-INTER_BHB.DOCX
### Maintenance work on the water softener Delta-p®

#### Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

<table>
<thead>
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<th>Maintenance performed (date)</th>
<th>Start-up</th>
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#### Measured values

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<td>Water pressure</td>
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- Seals and hose connections checked
- Safety fitting (e.g. system separator) checked for non-return function

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<table>
<thead>
<tr>
<th>Remarks (e.g. system data print)</th>
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<p>| | |</p>
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<thead>
<tr>
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<th>Company</th>
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<thead>
<tr>
<th>Work time certificate (no.)</th>
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<th>Date/Signature</th>
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Order no. 034 185 942-inter  Edited by: KONS-mpö-mrie G:\BA-185942-INTER_BHB.DOCX
## Maintenance work on the water softener Delta-p®

### Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

**Maintenance performed (date):**

**Start-up:**

**Measured values**

<table>
<thead>
<tr>
<th>Water pressure [bar]</th>
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<tbody>
<tr>
<td>Flow pressure [bar]</td>
<td></td>
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<tr>
<td>Water meter value [m³]</td>
<td></td>
</tr>
<tr>
<td>Raw water hardness (measured)</td>
<td>□ °dH □ °F □ mmol/l</td>
</tr>
<tr>
<td>Soft water hardness (measured)</td>
<td>□ °dH □ °F □ mmol/l</td>
</tr>
<tr>
<td>°dH (°F, mmol/l) test</td>
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</table>

**Inspections and checks of control unit and control valve**

- Controller settings checked
- Regeneration release checked
- Injector and sieve cleaned
- Control valve checked for tightness
- Function of transfer/regeneration valve motor checked
- Functional check of disinfection cell (read measured value mA 5 min. after salting)

**Work performed on brine tank and brine valve**

- Brine tank and brine valve cleaned
- Brine valve functions and settings checked

**Connections, hose connections, seals**

- Seals and hose connections checked

**Miscellaneous**

- Remarks (e. g. system data print) .............. .............. ..............
- Commissioning/Customer service technician .............. .............. ..............
- Company ........................................... ........................................... ...........................................
- Work time certificate (no.) .............. .............. ..............
- Date/Signature ........................................... ........................................... ...........................................