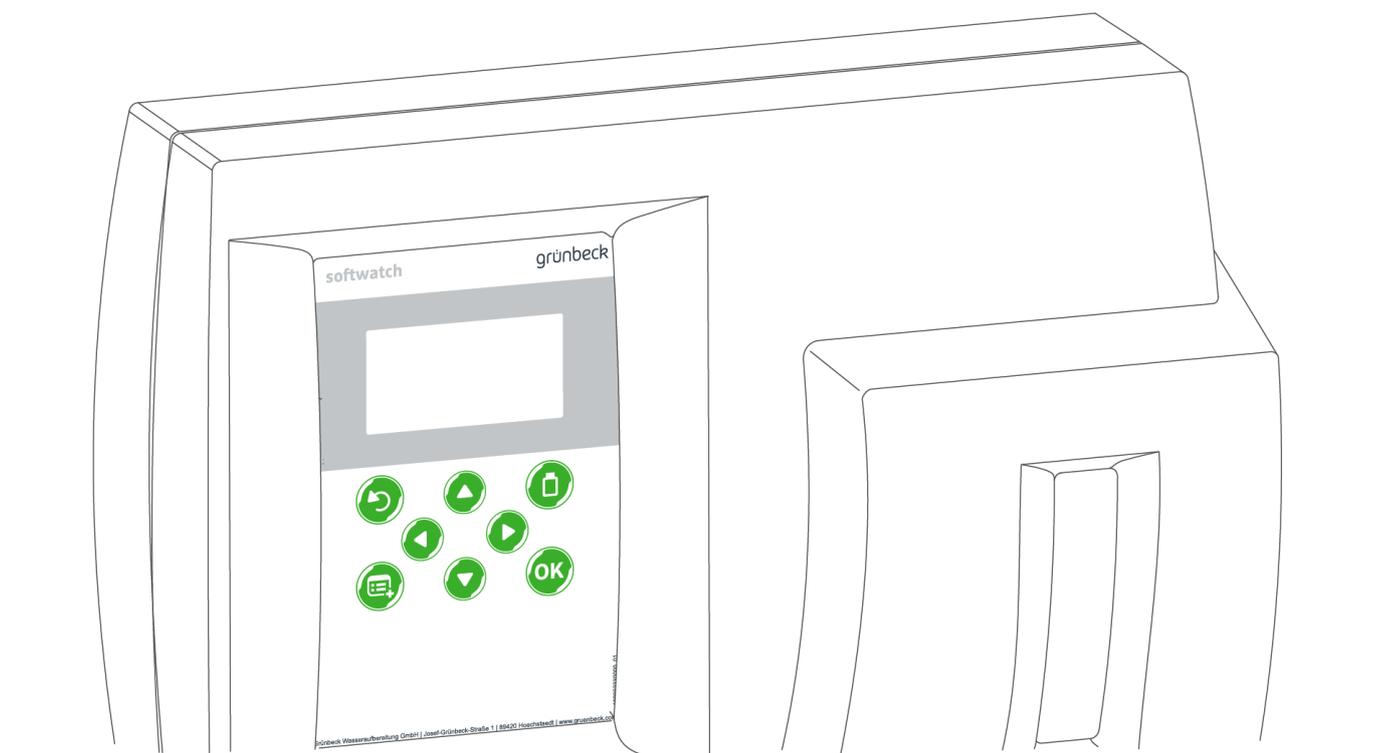


We understand water.



Hardness control measuring device | softwatch

Operation manual

grünbeck

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1 Introduction

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

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

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

1.1 Validity of the manual

This manual applies to the product below:

- Hardness control measuring device softwatch

1.2 Other applicable documents

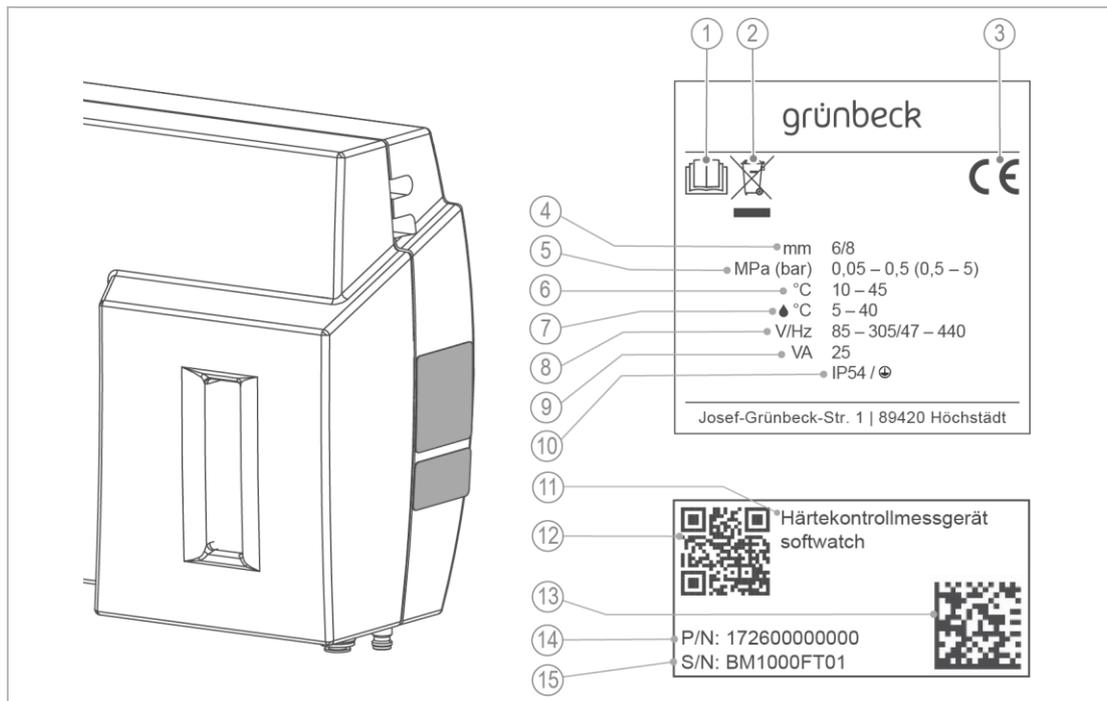
- Safety data sheets of the indicators used.

1.3 Product identification

You can identify your product based on the product designation and the order number shown on the type plate.

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

The type plate is located on the right side of the housing.



Designation	
1	Obeys the operation manual
2	Disposal information
3	CE mark
4	Nominal connection diameter
5	Operating pressure
6	Ambient temperature
7	Water temperature
8	Rated voltage range/frequency

Designation	
9	Rated load
10	Protection/protection class
11	Product designation
12	QR code
13	Data matrix code
14	Order no.
15	Serial no.

1.4 Symbols used

Symbol	Meaning
	Danger and risk
	Important information or requirement
	Useful information or tip
	Written documentation required
	Reference to further documents

Symbol	Meaning
	Work that must be carried out by qualified specialists only
	Work that must be carried out by qualified electricians only
	Work that must be carried out by technical service personnel only

1.5 Depiction of warnings

This manual contains information and instructions that you must obey for your personal safety. The information and instructions are highlighted by a warning symbol and are structured as shown below:



SIGNAL WORD Type and source of hazard

- Possible consequences
- ▶ Preventive measures

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

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

1.6 Demands on personnel

During the individual life cycle phases of the product, different people carry out work on the product. This work requires different qualifications.

1.6.1 Qualification of personnel

Personnel	Requirements
Operator/user	<ul style="list-style-type: none"> • No special expertise required • Knowledge of the tasks assigned • Knowledge of possible dangers in case of incorrect behaviour • Knowledge of the required protective equipment and protective measures

Personnel	Requirements
Owner/operating company	<ul style="list-style-type: none"> • Knowledge of residual risks • Product-specific expertise • Knowledge of statutory regulations on work safety and accident prevention
Qualified specialist Electrical engineering Sanitary engineering (plumbing and HVAC) Transport	<ul style="list-style-type: none"> • Professional training • Knowledge of relevant standards and regulations • Knowledge of detection and prevention of potential hazards • Knowledge of statutory regulations on accident prevention
Technical service (Grünbeck's technical service/ authorised service company)	<ul style="list-style-type: none"> • Extended product-specific expertise • Trained by Grünbeck

1.6.2 Authorisations of personnel

The table below describes which tasks may be carried out by whom.

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

1.6.3 Personal protective equipment

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

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



Protective gloves



Protective goggles

2 Safety

2.1 Safety measures

- Only operate your product if all components are installed properly.
- Obey the local regulations on drinking water protection, accident prevention and occupational safety.
- Do not make any changes, alterations, extensions or program changes on your product.
- Only use genuine spare parts for maintenance or repair.
- Keep the premises locked against unauthorised access to protect imperilled or untrained groups of persons from residual risks.
- Comply with the maintenance intervals (refer to chapter 8.2). Failure to comply can result in the microbiological contamination of your drinking water system.

2.1.1 Mechanical hazards

- You must never remove, bridge, or otherwise tamper with safety equipment.

2.1.2 Pressure-related hazards

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

2.1.3 Electrical hazards

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

- Only have qualified electricians carry out electrical work on the product.
- In case of damage to live components, switch off the voltage supply immediately and arrange for repair.
- Switch off the supply voltage before working on electrical components. Discharge residual voltage.
- Never bridge electrical fuses. Do not disable fuses. Use the correct current ratings when replacing fuses.
- Keep moisture away from live parts. Moisture can cause short-circuits.

2.1.4 Danger due to chemicals

- Chemicals can be hazardous to health and environment. They can cause skin and eye burns as well as irritation of the respiratory tract or allergic reactions.
- Avoid any skin/eye contact with chemicals.
- Use personal protective equipment.
- Read the safety data sheet before handling chemicals. Always obey the instructions for different activities/situations.
- Current safety data sheets for chemicals are available for download at **www.gruenbeck.de/en/info-centre/safety-data-sheets**.
- Obey in-house instructions when handling chemicals. Make sure that protective and emergency equipment such as emergency showers and eyewash are available where required, and functional.

Mixing and residual amounts of chemicals

- Do not mix chemicals. Unforeseeable chemical reactions posing a lethal danger can occur.
- Dispose of residual amounts of chemicals in accordance with local regulations and/or in-house instructions.
- Residual amounts from used containers should not be transferred into containers with fresh chemicals in order not to impair the effectiveness of the chemicals.

Labelling/Minimum shelf life/Storage of chemicals

- Check the labelling of the chemicals - labels must not be removed or rendered illegible.
- Do not use any unknown chemicals.
- Comply with the use-by date (minimum shelf life) stated on the label.
- If stored incorrectly, chemicals could change their state of matter, crystallize, outgas, or lose their effectiveness. Store and use the chemicals at the specified temperatures only.

Cleaning/Disposal

- Immediately absorb spilled chemicals with suitable binding agents.
- Collect and dispose of chemicals in such a way that they cannot pose any risks to people, animals, or the environment.

2.1.5 Groups of persons requiring protection

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

3 Product description

3.1 Intended use

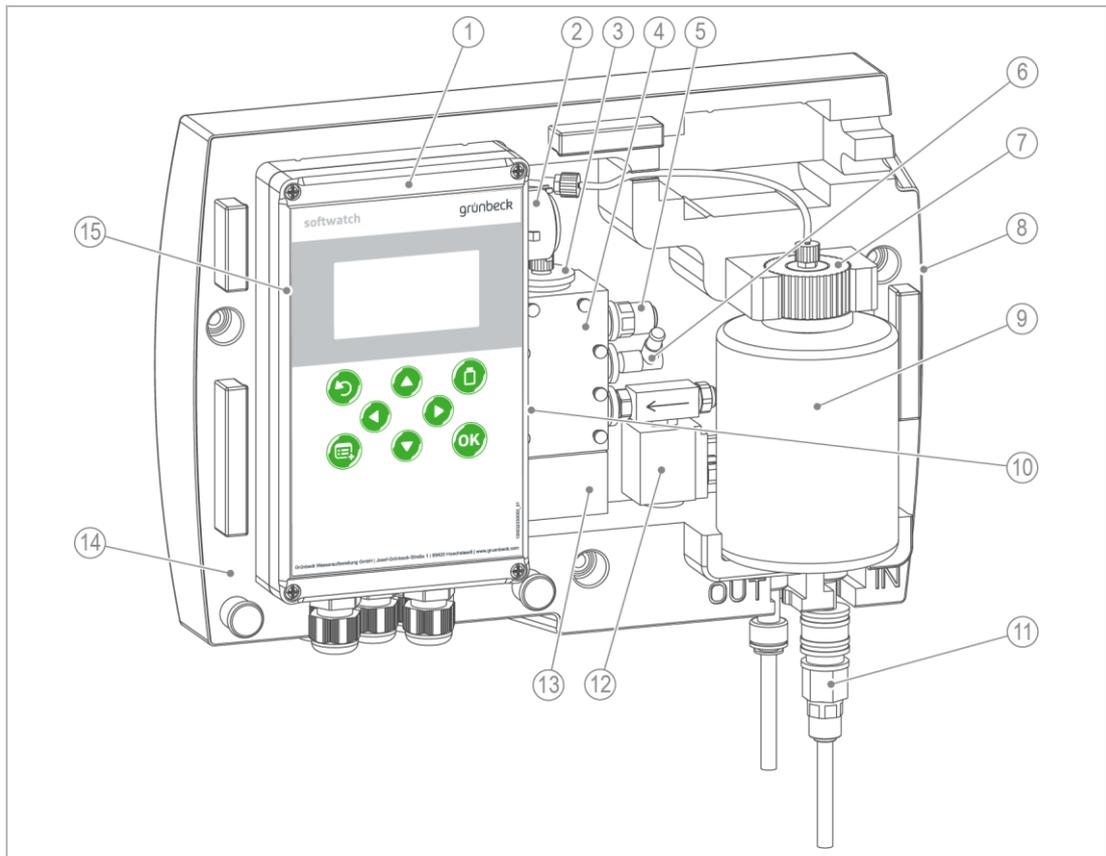
- The hardness control measuring device softwatch is designed to monitor the total hardness of drinking water. The choice of the indicator determines the limit value.
- The hardness control measuring device softwatch is for exclusive use in the industrial and commercial sector.
- The hardness control measuring device softwatch is designed to monitor one single soft water line.
- The hardness control measuring device softwatch is suitable for operation without constant supervision for monitoring steam boiler systems.

Application limits

Certain substances contained in the water can interfere with or falsify the colour reaction. Therefore, comply with the limit values below:

Substance contained in the water		Limit value
pH value		4 – 10
Acid capacity $K_{S4.3}$	mmol/l	< 5
Iron (Fe)	mg/l	< 3
Copper (Cu)	mg/l	< 0.2
Aluminium (Al)	mg/l	< 0.1
Manganese (Mn)	mg/l	< 0.2
Carbon dioxide	mg/l	< 100

3.2 Product components



Designation	
1	Control unit
2	Hose pump cartridge
3	Indicator plug
4	Measuring chamber
5	Outlet plug
6	Actuator plug
7	Bottle connection
8	Type plate

Designation	
9	Indicator bottle
10	Mains switch
11	Quick coupling
12	Solenoid valve
13	Magnetic agitator
14	Housing
15	SD card (inside, behind the display)

3.3 Functional description

The hardness control measuring device softwatch determines the water hardness by way of the colorimetric limit method. By adding an indicator to the water sample, a colour reaction is achieved. Measuring the changed transmission properties allows for conclusions to be drawn about the limit value.

In automatic mode, the hardness control measuring device softwatch can start measurements (Menu>Automatic) time-dependent, volume-dependent via a water meter or flow-dependent via a flow switch.

In manual operation, functions such as Start measurement, Pump indicator or Manual flushing can be controlled. Furthermore, manual operation also features a diagnostics function to test individual components.

In automatic operation, measurements are carried out at the programmed interval or by External start. After switch-on, the automatic mode is active. The first measurement is started after 1 minute. All subsequent measurements taken at the programmed interval.

3.4 Possible applications

The hardness control measuring device can be used to monitor the total hardness between a water softener and a reverse osmosis system as well as to monitor the feed water of steam boiler systems.

In conjunction with external switches (e.g. flow switch, water meter or water softener), target-oriented operation is possible. As soon as water flows, measurements are taken.

The hardness control measuring device softwatch is designed for discrete-time (not continuous-time) measurement at adjustable intervals.

The hardness control measuring device softwatch cannot prevent hardness from breaking through.

3.5 Sequence of a measurement

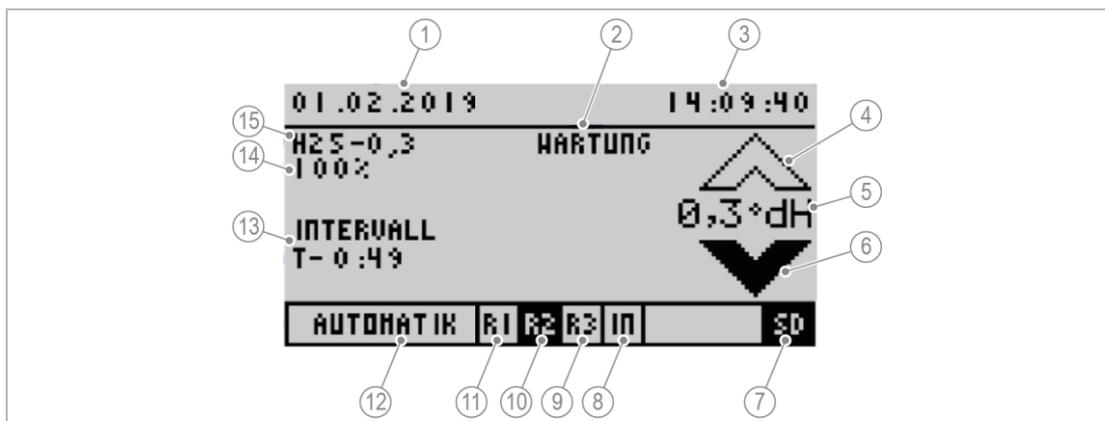
A measurement takes 3 minutes plus the set flushing time and is divided into the steps below:

Step	Sequence / description
1	Start time or volume interval / external or manual triggering
	Parameter: Interval time 5 - 360 minutes Interval volume 1 – 9999 litres The interval starts and counts down.
2	Delay (optional)
	Parameter: Delay time 0 – 1800 seconds The delay time starts (if activated) after the interval has elapsed. When measuring process solutions that have a temperature > 40 °C (> 104 °F), the sample must be cooled down. Relay 3 switches the cooling water valve/the sample water cooler on as soon as the delay time starts. The relay remains activated until the end of the measurement.
3	Pre-flushing and cleaning
	Parameter: Flushing time 15 – 1800 seconds The inlet solenoid valve is opened. The measuring chamber and the supply lines are flushed to make sure that only fresh process water from the soft water line is located in the measuring chamber. The flushing time can be adapted (in relation to the length of the inlet line). In this step, the agitator is rotating in order to discharge possible deposits into the flushing flow.
4	Sampling – Zero sample
	Prior to the proper measurement, a zero sample is analysed. The zero sample is used to determine and compensate for influencing disturbance variables (e.g. sample turbidity, contamination of the optical sensor, influence of extraneous light). The zero sample is carried out with the solenoid valve open, and the high-performance LED switched on. No indicator is dosed yet.

Step	Sequence / description
5	<p>Sampling – Sample</p> <p>After analysing the zero sample, the measuring chamber is filled with sample water. The solenoid valve closes, and the dosing pump injects the indicator solution into the measuring chamber via a dosing nozzle.</p>
6	<p>Reaction phase of the indicator</p> <p>The addition of the indicator triggers a colour change subject to the water hardness. The agitator blade ensures mixing and homogenisation of the solution. If the sample turns green (good measurement), it is below the limit value. If the sample turns red (bad measurement), the water hardness exceeds the limit value.</p>
7	<p>Measurement and evaluation</p> <p>The agitator blade stops during the measurement, the high-performance LED is switched on and illuminates the measuring chamber. After a short settling period, the photometric sensor measures the transmission properties and the colour of the sample. Afterwards, the evaluation is shown on the display.</p> <p>If the limit value is exceeded, an alarm can be emitted. In case of improper values (e.g. no indicator added), a malfunction is signalled.</p>
8	<p>Flushing out</p> <p>The solenoid valve is opened, and the sample is discharged to the drain. After flushing and cleaning, the measuring chamber remains filled with process water until the next measurement.</p>

Indication on the display

During a measurement, the display indicates the respective step.



Designation
1 Date
2 Status (cleaning/maintenance)
3 Time
4 Limit value exceeded
5 Limit value including unit
6 Limit value undershot (fields with a black background are active)
7 SD card available
8 Digital input (IN) inactive

Designation
9 Relay 3 de-energised
10 Relay 2 energised (fields with a black background are active)
11 Relay 1 de-energised
12 Manual operation or automatic operation
13 Measuring step (T – 0:49 Time remaining in minutes:seconds until the next measurement)
14 Indicator filling level in %
15 Selected indicator

3.6 Accessories

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

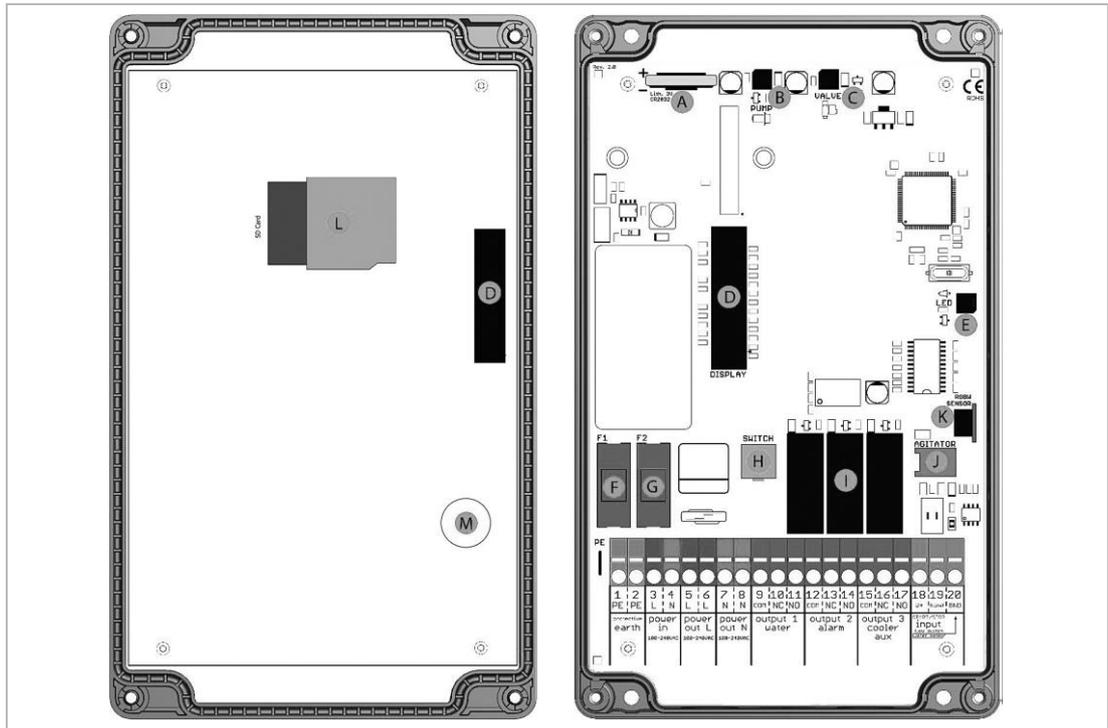
Illustration	Product	Order no.
	Pressure reducer for softwatch To protect the product from damage in case of an operating pressure > 5 bar.	172 860
	Water sample cooler for hot water To protect the product from damage in case of hot water.	160 460

3.7 Admissible indicators

The hardness control measuring device softwatch must only be operated with the indicators below:

	Unit	Indicator SWK – 0.1	Indicator SWK – 0.3	Indicator SWK – 0.5	Indicator SWK – 10
Limit value	°dH	0.1	0.3	0.5	10
	°f	0.178	0.534	0.89	17.8
	ppm CaCO ₃	1.78	5.35	8.9	178
	mmol/l	0.0178	0.053	0.089	1.783
Content	ml	500	500	500	500
Order no.		172 201	172 202	172 203	172 204

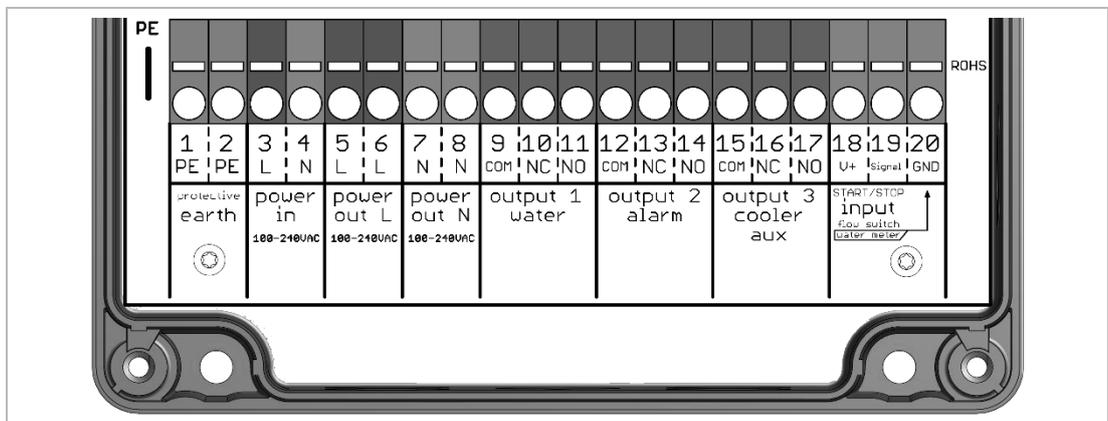
3.8 Inputs and outputs of the control unit



Designation	
A	Battery holder with battery (CR2032)
B	Connection of dosing pump
E	Connection of high-performance LED
F	Micro-fuse (2 A, slow-blow, 5 x 20 mm)
C	Connection of solenoid valve
D	Connection of display
G	Micro-fuse (400 mA, slow-blow, 5 x 20 mm)

Designation	
H	Connection of main switch
I	3x Relay
J	Connection of magnetic agitator
K	RGB colour sensor
L	SD card slot
M	Sound generator

3.9 Terminal plan



3.9.1 Supply voltage

Terminal	Designation	Description
1	Input terminal Protective earth conductor PE	Protective earth
2	Distributor terminal Protective earth conductor PE	Protective earth
3	Input terminal Outer conductor L power in	Supply voltage
4	Input terminal Neutral conductor N power in	
5	Distributor terminal Outer conductor L power out	Distributor terminal Supply voltage
6	Distributor terminal Outer conductor L power out	
7	Distributor terminal Neutral conductor N power out	
8	Distributor terminal Neutral conductor N power out	

The maximum connected load of all consumers must not exceed 250 VAC/1 A.

3.9.2 Relay outputs

Relay 1: Indication of water hardness

Terminal	Designation	Description
9	Relay 1 (water) Basic contact COM	Relay 1 COM common connection
10	Relay 1 (water) Switching contact Normally closed contact NC	Relay 1 NC normally closed
11	Relay 1 (water) Switching contact Normally open contact NO	Relay 1 NO normally open

Relay 2: Indication of device errors

Terminal	Designation	Description
12	Relay 2 (alarm): Basic contact COM	Relay 2 COM common connection
13	Relay 2 (alarm) Switching contact Normally closed contact NC	Relay 2 NC normally closed
14	Relay 2 (alarm) Switching contact Normally open contact NO	Relay 2 NO normally open

Relay 3: Indication of indicator filling level or actuation of accessories (measurement delay)

Terminal	Designation	Description
15	Relay 3 (cooler): Basic contact COM	Relay 3 COM common connection
16	Relay 3 (cooler): Switching contact Normally closed contact NC	Relay 3 NC normally closed
17	Relay 3 (cooler): Switching contact Normally open contact NO	Relay 3 NO normally open

3.9.3 Relay inputs

Input – Start / Stop (voltage-free)

Terminal	Designation	Description
18	+24 VDC auxiliary voltage	
19	Signal – Signal input	Signal input for voltage-free switch
20	GND – ground	Ground connection for water meter

3.10 Factory settings

Menu	Submenu	Setting
General	Language	German
Analysis	Unit	°dH
	Indicator	SWK-0.3
	Flushing time	120 seconds
	Auto. interval Time	5 minutes
	Auto. interval Volume	No
	Measurement stop	No
	Control measurement	No repetition
	Calibration factor	100 %
Input	Input	Start measurement
	Flow switch	Off
Outputs	Relay 1	Limit value as permanent contact
	Relay 2	Signalling of faults
	Relay 3	Lack of indicator

3.11 SD card

The hardness control measuring device features an SD card. On this memory card, the following information is stored:

Information	File name.file format
Measured values	trend.csv
	Measured values in tabular form Date YYYY.MM.DD, tab, time hh.mm, tab, measured value x.xxx, tab, unit, conductivity (depending on the unit set)
Error messages	error.csv
	Error messages in tabular form Date YYYY.MM.DD, tab, time hh.mm, tab, error code, conductivity
Analysis results	history.dat
	Time-stamped results loaded into internal memory at start-up
Device configuration	setting.dat
	The settings can be stored via Menu>Parameters>General>Export settings. Importing is done via Menu>Parameters>General>Import settings.
System files	logfile.dat
	Date, time stamp, device start for internal functions
Device firmware	LA26xxx.bin
	Must only be present on the SD card when a software update takes place. Afterwards, the file must be deleted from the SD card (refer to chapter 3.11).

The data is stored on the SD card as .csv files. For further processing, these files can be opened with an editor or a spreadsheet program (e.g. MS Excel, OO Calc).

The product is fully functional without an SD card. The internal memory is limited to 100 measured values (or results). The indicator filling level is stored on the SD card. If the product is switched off and on again without SD card, the product will not be able to read an indicator filling level from the SD card. The hardness control measuring device software outputs an "operation without constant supervision" message (indicator filling level below 10 %).

The SD card used must be formatted as follows:

Designation	Description
Storage capacity	max. 2.0 GB
File system	FAT16
Size of allocation files	32 kB

4 Transport and storage

4.1 Shipping/Delivery/Packaging

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

4.2 Transport

- ▶ Transport the product in its original packaging only.

4.3 Storage

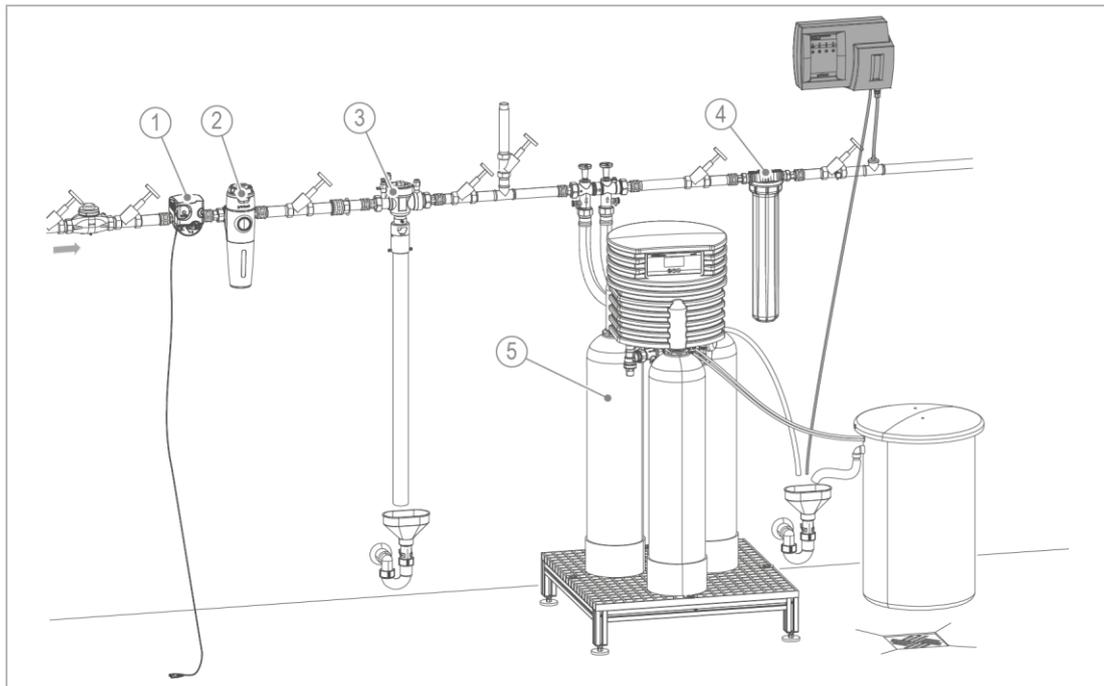
- ▶ Protect the product from the impacts below when storing it:
 - Dampness, moisture
 - Environmental impacts such as wind, rain, snow, etc.
 - Frost, direct sunlight, severe heat exposure
 - Chemicals, dyes, solvents and their vapours

5 Installation



The installation of a hardness control measuring device represents a major intervention into the drinking water system and must be performed by a qualified specialist only.

Installation example



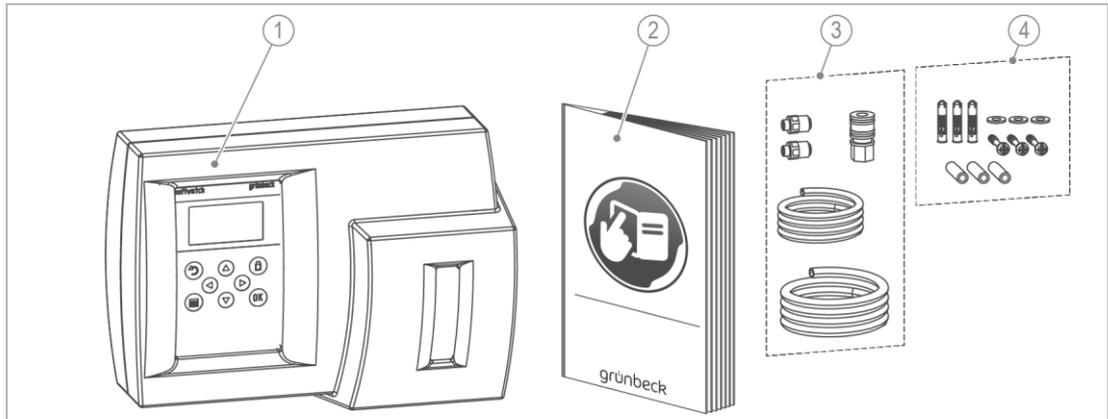
Designation		Designation	
16	Safety device protectliQ	19	Activated carbon filter AKF
17	Drinking water filter pureliQ	20	Water softener Delta-p
18	System separator GENO DK 2		

5.1 Requirements for the installation site

Obey the local installation directives, general guidelines and technical specifications.

- The installation site must be frost-proof and protect the product from chemicals, dyes, solvents and their vapours.
- A drinking water filter and, if required, a pressure reducer (e.g. fine filter pureliQ:KD) must be installed upstream of the product.
- A permanent power supply, which must not be coupled with light switches, heating emergency switches or the like, is required for electrical connection.
- A drain connection (DN 50) must be available to discharge the sampling water.
- In case of inlet pressures > 5 bar, a pressure reducer must be installed (refer to chapter0).

5.2 Checking the scope of supply



Designation	
1	Completely assembled hardness control measuring device
2	Operation manual
Connection kit:	
	2 Screw-in connectors 1/4" to 6 mm
3	1 Quick coupling
	2 m Inlet hose, 6 mm
	2 m Outlet hose, 8 mm

Designation	
Fastening material:	
	3 Spacer pipes
4	3 Pan head screws
	3 Washers
	3 Dowels



The T-piece and the reducer to 1/4" for the sampling point are not included in the scope of supply.

The indicator is not included in the scope of supply.

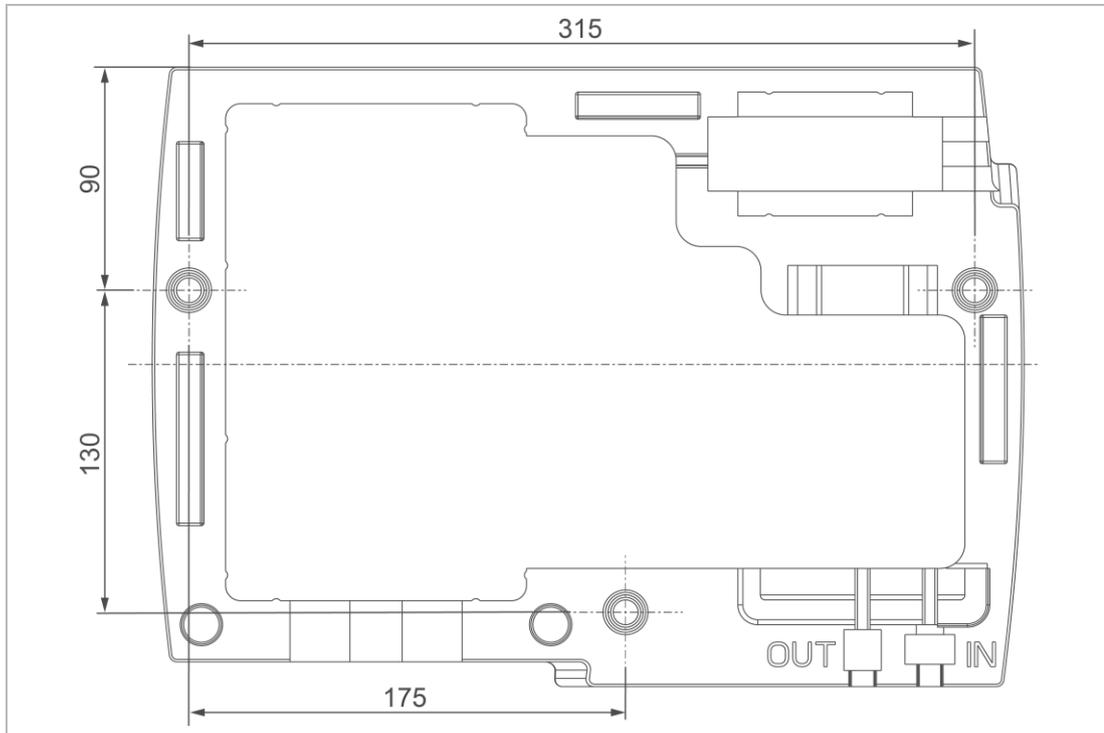
- ▶ Check the scope of supply for completeness and damage.

5.3 Installing the product

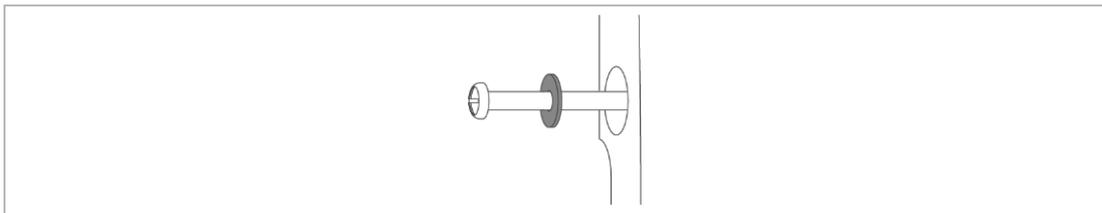
- ▶ Install the product at a dry, easily accessible, and highly visible place.

5.3.1 Installing the housing

- ▶ The housing must be placed above the sampling point.
(The connecting line must be routed vertically to the connection to prevent any carry-over of dirt particles from the water pipe.)



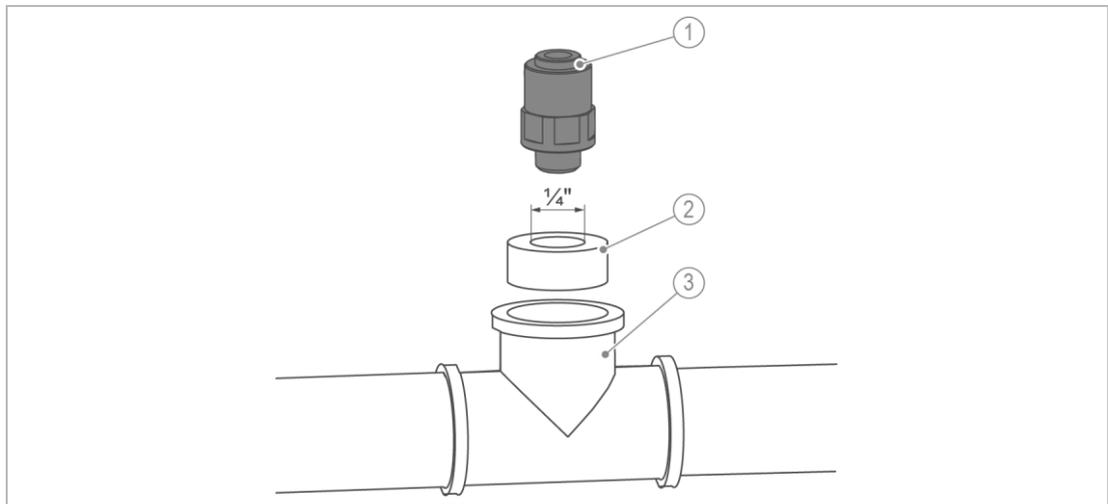
- ▶ Mount the hardness control measuring device softwatch on a level wall surface or on a system rack.



- ▶ Put the washer between the screw head and the carrier housing.

5.3.2 Installing the sampling point

Sampling must take place immediately downstream of a water softer to prevent a time-delayed response of the protection device or a falsified measuring value.



Designation	Designation
1 Screw-in connector	3 T-piece (not included in scope of supply)
2 Reducer (not included in scope of supply)	

1. Install the sampling point in the pipe.
Make sure that the sampling point is facing upwards and is not further from the hardness control measuring device softwatch than 2 m.
2. Screw the reducer into the T-piece.
3. Screw the screw-in connector (1/4" to 6 mm) into the reducer using no more than 1.5 Nm.
» The sampling point is installed.

5.3.3 Installing the connection hose

1. Screw the screw-in connector into the quick coupling.
2. Plug the quick coupling onto the "IN" nipple (marked on the housing).
3. Plug the inlet hose (Ø 6 mm) into the connector of the quick coupling.
4. Cut the hose to length to the sampling point.
5. Plug the hose into the connector.

5.3.4 Establishing the waste water connection as per DIN EN 1717.

NOTE Backup due to kinked hoses.

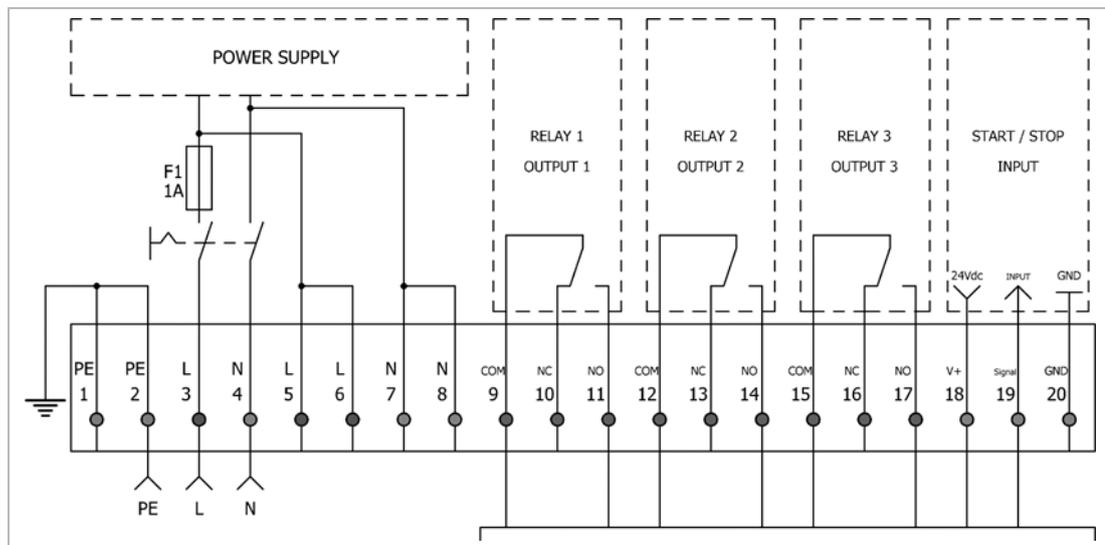
- Faulty measurements or damage to the product
 - ▶ Run the flushing water hose to the drain with a downward slope and without any kinks.
1. Plug the flushing water hose (Ø 8 mm) into the “OUT” connector (marked on the housing).
 2. Run the flushing water hose to the drain with a downward slope.
 3. Make sure that there is a free outlet to the drain.

5.3.5 Establishing the power supply



The work below must be carried out by qualified electricians only.

The total connected load at output terminals 5 – 8 must not exceed 250 VA. The voltage supply of the product as well as the output terminals are routed via the mains switch and protected by the product’s micro-fuse.



1. Open the lid of the control unit by loosening the four cross-head screws.
2. Connect the supply line to terminals 2 PE, 3 L and 4 N.
 - » The product is ready for operation.

5.4 Connecting external components

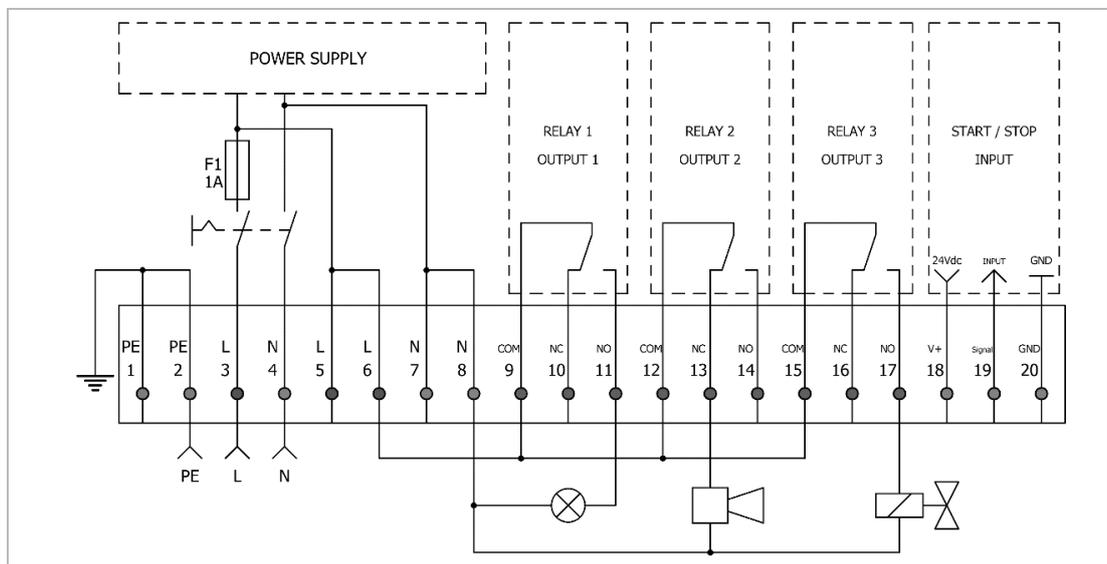
5.4.1 Signal outputs – Relay outputs

The relays are designed as changeover contacts and can be connected both as NO and NC. In addition, the contact can be connected as permanent contact or impulse contact. As impulse contact, the relay switches for a programmed period of time.

In order to switch external components, the internal mains voltage can be tapped, or an external supply voltage can be used.

The display highlights energised relays with a back background and de-energised relays with a white background.

Wiring example



Designation	
11	Signal lamp to relay 1 (NO)
13	Horn to relay 2 (NC)

Designation	
17	Solenoid valve Sample cooler to relay 3 (NO)

Relay 1 – Limit value exceeded

In case of good measurements, the limit value is undershot and the relay is de-energised.

In case of bad measurements, the limit value is exceeded and the relay is energised.

If control measurements are activated, the relay is only energised when the limit value has been exceeded in all of the subsequent control measurements.

Relay 2 – Device malfunction

In normal operation, the relay is energised.

The relay is de-energised in the event of the faults below:

- Internal faults
 - Lack of indicator
 - Lack of water
 - Measuring chamber dirty
 - Sample turbidity
- External faults
 - Line break
 - Power failure
- Product defective

Relay 3 – Status monitoring

The relay is energised as soon as a measurement starts, or the indicator filling level is undershot.

If analysis monitoring is selected, the relay is energised as soon as a measurement starts.

It is possible to set a delay time in order to switch on accessories (e.g. sample cooler) prior to the measurement. The relay remains energised for the entire duration.

If indicator monitoring is selected, the relay is energised as soon as the indicator filling level falls below 10 % (in case of volume interval, external triggering) or 5 % – 18 % (depending on the time interval). Relay 3 is for operation without constant supervision (refer to chapter 7.11).

5.4.2 Signal inputs – Voltage-free input contact

The display highlights active inputs in black as IN.

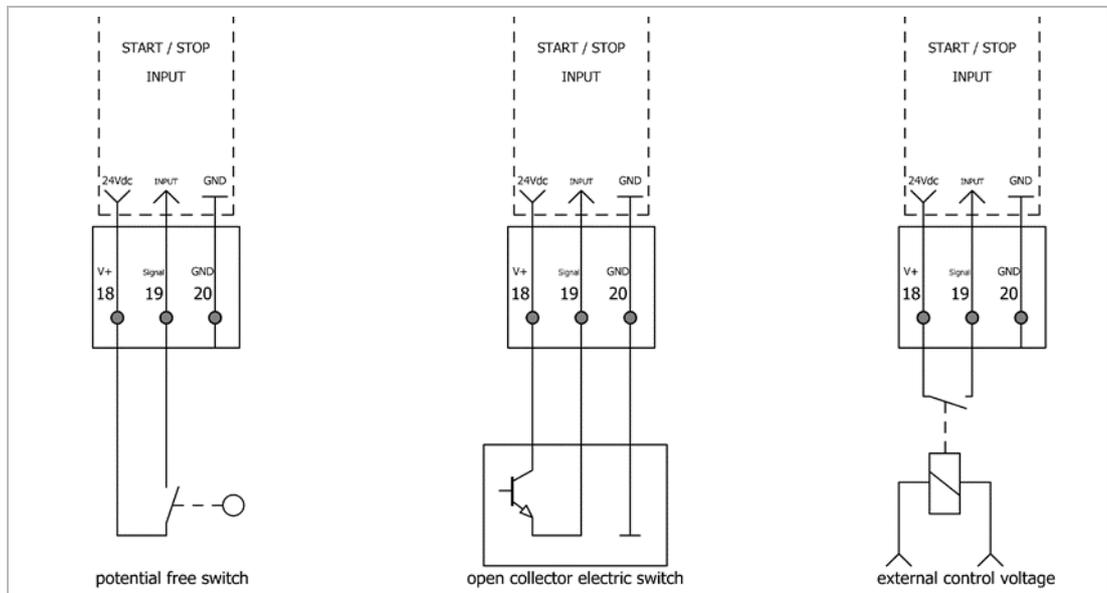
NOTE Problems due to externally connected voltage sources

- Control failure
- ▶ Do not connect any external voltage sources to the voltage-free input contact of the control unit.

Wiring example

Voltage-free switches (e.g. flow switch, water meter with Reed switch) or electronic switches (e.g. water meter with Hall switch) can be connected to the input contacts.

Connect voltage-free switches to pin 18 and pin 19. Electronic switches additionally require pin 20 as GND.



Parameterisation

The input contact offers the parameterisations below:

- Deactivated
- Start measurement
- Interval reset
- Water meter
- Flow switch
- ▶ Switch to `Menu>Parameters>Input` and select the desired parameterisation.

The input contact is only activated in automatic mode.

Configuring the external start of the measurement

A measurement is started as soon as pin 18 and pin 19 are closed by a voltage-free switch.

A permanently closed input contact continuously triggers measurements.

Configuring the interval reset

As soon as Pin 18 and pin 19 are closed/opened by a voltage-free switch, the running interval is reset, and an active measurement is stopped. As long as the switch is activated, the interval is paused. This function is recommended if the hardness control measuring device is controlled by a reverse osmosis system with the function "Enable residual hardness monitoring".

- NO
The measurement is stopped by a closed contact.
- NC
The measurement is stopped by an open contact.

If the interval is enabled after an interval reset, the first measurement starts after 1 minute. Afterwards, the programmed interval starts.

Configuring the water meter

Volume-controlled triggering using a water meter with a Hall or Reed switch is an alternative to time-controlled triggering.

1. Switch to `Menu>Parameters>Input>Water meter`.
2. Follow the instructions on the display.
3. Set the switching type and the pulse ratio (refer to the data sheet of the water meter).
 - » The volume interval is reset with the start of the measurement.
 - » Pulses are also registered during measurements and are included in the volume interval.

Configuring the flow switch

The evaluation of a flow switch or a timer can be useful if the system to be monitored is not in continuous operation. This makes it possible to reduce indicator consumption and start monitoring in the time window in which the system requires water. Measurements are only taken if a signal is present at the input contact.

1. Switch to `Menu>Parameters>Input>Flow switch`.
2. Make sure that the automatic mode is active.

NOTE Mix-up of **Start analysis** and **Flow switch**

- Continuous measurement
- ▶ Make sure that the configuration in `Menu>Parameters>Input>Flow switch` is correct.

5.5 Connection examples

5.5.1 Voltage-free input contact

In practice, a modular system frequently consists of water softener, residual hardness monitoring and reverse osmosis.

In this constellation, it is possible to connect the hardness control measuring device at the voltage-free contact of the water softener or at the voltage-free contact of the reverse osmosis system. We recommend linking the safety device (softwatch) directly with the system component to be monitored (reverse osmosis).

Input	Connection/Parameterisation	Terminal/Parameter
softwatch	Terminal strip	18 (+24 VDC)
		19 (digital input)
	Menu > Parameters> Input	Interval reset = NO



No external voltages must be applied to the digital input. The signal voltage of terminal 18 must be switched to the digital input on terminal 19 via a voltage-free switch (e.g. relay, optocoupler).

Output	Connection/Parameterisation	Terminal/Parameter
OSMO-HLX	High-pressure pump Relay K1	K1 13/14
OSMO-X	Terminal strip	14/15
	Code 113, output logic Enable NX1	-
RO AVRO 125	High-pressure pump Relay K1	K1 31/34
softliQ:MD12i	Additional power board	X2 3/4
	Code 005, programmable output	Enable residual hardness monitoring
Iono-matic ³ Delta-p	Terminal strip	42/44
	Code 113, Index 1, programmable output	3 = Closed if there is no flow
WE-X WE-OSMO-X	Terminal strip	30/31
	Code 113, programmable output	2 = Enable hardness control measuring device

5.5.2 Fault signal output

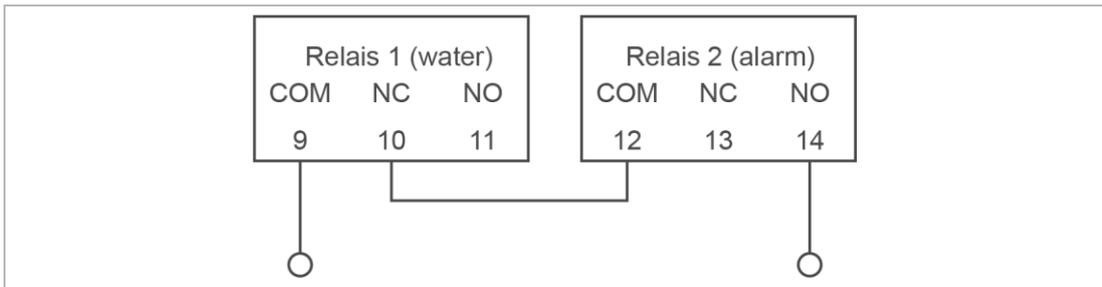
Input	Connection/Parameterisation	Terminal/Parameter
softwatch	Terminal strip/collective fault (limit value exceeded + device malfunction)	9/14 + jumper 10/12
	Terminal strip/limit value exceeded (triggering regeneration)	9/11
	Terminal strip/status monitoring	15/17
	Menu>Outputs>Relays 1/2/3	-

5.5.3 Collective fault signal for limit value exceeded and device error on a reverse osmosis system (NC logic):

Fault signal contacts are usually designed as normally closed contacts to ensure wire break safety. In standard operation, the signal is looped via COM 9, NC 10, COM 12, NO 14 and not interrupted as both relays are switched through according to the logic table below. As soon as either relay 1 or relay 2 switches to fault mode, the signal loop is interrupted.

Logic table

Terminal		Standard operation	Failure	Function
9	COM			Relay 1 Limit value exceeded
10	NC			
11	NO	0		
12	COM			Relay 2 Device malfunction
13	NC			
14	NO		0	
15	COM			Relay 3 Lack of indicator < 10 % or sample cooler
16	NC			
17	NO	0		



5.5.4 Parameterisation

For the connection diagram to function correctly, the receiver must be parameterised as normally closed contact (NC).

Output	Connection/Parameterisation	Terminal/Parameter
OSMO-HLX	Terminal strip	X1 21/29
	Code 113, ECL	1 = Normally closed contact
OSMO-X	Terminal strip	66/67
	Code 339, registration Residual hardness	Komfort
	Code 113, input logic Residual hardness NX1CQ	Normally closed contact
RO AVRO 125	Terminal strip	X8 22/23
	Code 113, ECL	1 = Normally closed contact
softliQ:MD12i	Additional data board	X5, lower 2 pins
	Code 005, programmable input	?
Iono-matic ³ Delta-p	Terminal strip	28/29
	Code 113, Index 1, programmable input	1 = External triggering of regeneration; normally open contact
WE-X WE-OSMO-X	Terminal strip	15/16
	Code 113, programmable input	1 = External triggering of regeneration; normally open contact

6 Start-up/Commissioning

6.1 Starting up the product

The start-up program assists you in starting up the product. You are guided through the start-up procedure step-by-step.

As an alternative, manual configuration is possible as well.

- ▶ Have a suitable indicator bottle ready.
- ▶ Check that all locking pins of the measuring chamber are pressed.
- ▶ Switch on the product via the mains switch.

6.1.1 Starting the start-up program

1. Start the wizard via `Menu>Wizard`.
2. Follow the instructions on the display.
 - Use , ,  and  to navigate through the program.
 - Press  to go to the previous menu level.
 - With , you confirm the selection and move to the next menu level.

Sequence of the start-up program

Step	Display text	Remarks
Automatic operation	Do you want to terminate automatic operation?	No – Closes the wizard. Yes – Starts the wizard.
Language selection	Choose your language. • German • English • Français • Italiano • Español • Русский • Dutch • Dansk	
Wizard	Do you want to start the configuration wizard?	Yes – Starts the wizard. No – Closes the wizard.
Factory settings	Do you want to reset the device to factory settings?	No – Retains all previous user settings.
Date	Today is: TT.MM.JJ – hh:mm Do you want to set the date and time?	No – Retains the date/time shown.
Maintenance counter	Are you performing maintenance/initial installation?	Yes – The maintenance counter is set to 30,000 measurements and the maintenance date is set to 24 months (viewable in <code>Menu>Info</code> ; the counter readings cannot be edited subsequently). No – Retains the previous data.

Step	Display text	Remarks
Parameters	Do you want to measure the total or carbonate hardness (alkalinity)?	Only total hardness is possible.
Indicator	<ul style="list-style-type: none"> • SWK – 0.1 • SWK – 0.3 • SWK – 0.5 • SWK – 10 	
	Insert a new indicator bottle and confirm with OK.	
	Pump indicator X sec	Confirm with OK as soon as the indicator is pumped into the measuring chamber without any bubbles (there must be no more air in the suction hose).
	Did you insert a full indicator bottle?	Yes – The indicator filling level is reset to 100 %. No – Retains the indicator filling level to date in %.
Unit	Choose the hardness unit required.	
	<ul style="list-style-type: none"> • °dH • °f • ppmCaCO3 • mmol/l • °e • mval/l 	
Flushing	Press OK to flush the supply line and the measuring chamber.	When using a sample cooler, make sure that the cooling works properly before flushing.
Flushing	Flushing X sec	The solenoid valve opens and the measuring chamber is flushed until confirmed with OK Abort . Make sure that the sampling water is clear and does not contain any bubbles. Note the time until the measuring chamber has been flushed without any residue remaining for the next step.
Flushing time	Set the flushing time in the following mask.	The flushing time starts prior to each measurement and flushes fresh sampling water into the measuring chamber.
	<ul style="list-style-type: none"> • Currently: 120 sec • Minimum: 15 sec • Maximum: 1800 sec 	
Auto. interval Time	Do you want the analyses to be carried out at a time interval?	Yes – Measurements are taken at the automatic time interval. No – No measurements are taken at the automatic time interval.
	<ul style="list-style-type: none"> • Currently: 5 min • Minimum: 5 min • Maximum: 360 min 	
Control measurement	Set the number of verification loops to take place after a bad measurement	The control measurements are carried out at intervals of 3 minutes to avoid false alarms (e.g. caused by the counter ion effect)
	<ul style="list-style-type: none"> • No repetition • Repeat once • Repeat twice • Repeat three times 	Limit value exceeded will only be output at relay 1 as soon as all of the control measurements have been faulty. If a good measurement is taken, the remaining attempts are no longer carried out.

Step	Display text	Remarks	
Analysis stop	Stop auto. interval if the limit value is exceeded?	<p>Yes – The auto. interval is paused if the limit value is exceeded, the automatic mode must be reactivated manually.</p> <p>No – Measurements continue to be carried out.</p>	
Input	Choose the function of the input.		
	Deactivated		
	Start analysis	<p>The measurement is started as soon as the voltage-free input contact is closed.</p> <p>A permanently closed contact continuously triggers measurements. Input provided for pulse-type triggering.</p>	
	Water meter	Enter the litres/pulses of the water meter.	<p>Pay attention to the unit in the data sheet (e.g. pulse/l or l/pulse). You require the data in l/pulse.</p> <p>The measurement is started as soon as the pre-set water volume has been captured.</p>
		Litres/pulse <ul style="list-style-type: none"> • Currently: 10000 l/pulse • Minimum: 0.01 l/pulse • Maximum: 1000 l/pulse 	
		Contact type: Choose the output type of your water meter. <ul style="list-style-type: none"> • Reed • Hall 	Refer to the data sheet of the water meter for the respective data.
		Auto. interval Volume: Set the water volume between two analyses.	
		Unit: <ul style="list-style-type: none"> • l • hl • m³ • gal (US) • gal (GB) 	
	Auto. interval Volume: <ul style="list-style-type: none"> • Currently: 100 l/pulse • Minimum: 1 l • Maximum: 9999 l 		
Flow switch	Is the type of the flow switch an NO or NC?	<p>NO, interval pauses: Next start of the measurement waits for a closed input contact.</p> <p>NC, interval pauses: Next start of the measurement waits for an open input contact.</p>	

Step	Display text		Remarks
	Interval reset (enables residual hardness)	Is the input switch an NC or NO contact?	<p>NO, interval active: Interval is stopped by a closed input contact and the time is reset.</p> <p>NC, interval active: Interval is stopped by an open input contact.</p> <p>Measurements are stopped immediately and paused as long as the input contact remains closed/open. The first measurement after the opening/closing of the contact is started after 1 minute. Afterwards, the regular interval starts (automatic mode must be activated).</p>
Relay 1	Do you need a permanent or an impulse contact at relay 1 / limit value?		<p>Permanent contact, in the event that the limit value is exceeded, the relay switches to permanent contact until a good measurement takes place.</p> <p>Pulse contact, the relay switches for a set pulse time.</p>
	Impulse contact	Pulse duration: <ul style="list-style-type: none"> • Currently: 10 sec • Minimum: 2 sec • Maximum: 3600 sec 	
Relay 2	Relay 2 is used to indicate a device error.		<p>In normal operation, relay 2 is energised and thus ensures wire-break safety.</p> <p>COM – NO: Normal operation (energised)</p> <p>COM – NC: Device error (energised)</p>
Relay 3	Choose the switching function for relay 3.		<p>Analysis, the relay switches for the duration of the measurement.</p> <p>Indicator, the relay switches if the indicator filling level of 10 % is undershot.</p> <p>Yes – The start of the measurement is delayed. The relay switches for the set delay time + the duration of the measurement from COM to NO, in order to be able to trigger the cooling water valves of the sample cooler or pumps. After the delay time has elapsed, the solenoid valve opens and the measurement starts. The relay remains switched for the duration of measurement.</p> <p>No – The relay only switches from COM to NO for the duration of the measurement (no delay time).</p> <p>Enter the delay time in seconds to wait before a measurement.</p>
	Analysis	Analysis delay: Should there be a wait time before opening the solenoid valve?	
		Analysis delay:	
Wizard	Configuration is complete. The wizard is being closed.		Start-up is completed.

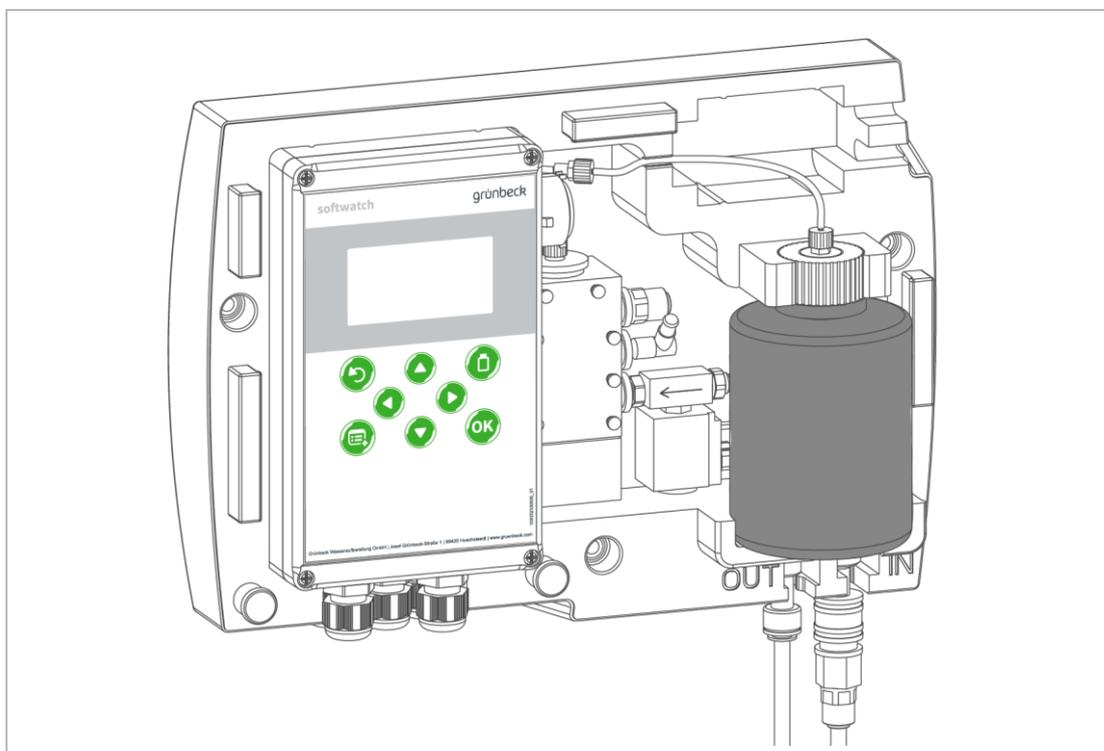
6.1.2 Without start-up program

The parameters can be changed in `Menu>Parameters`.

6.2 Inserting the indicator bottle

The product does not feature a measurement of the indicator filling level.

- ▶ Insert full indicator bottles only.
- ▶ Reset the counter (otherwise the range will be calculated incorrectly).
- ▶ Use safety goggles and protective gloves.



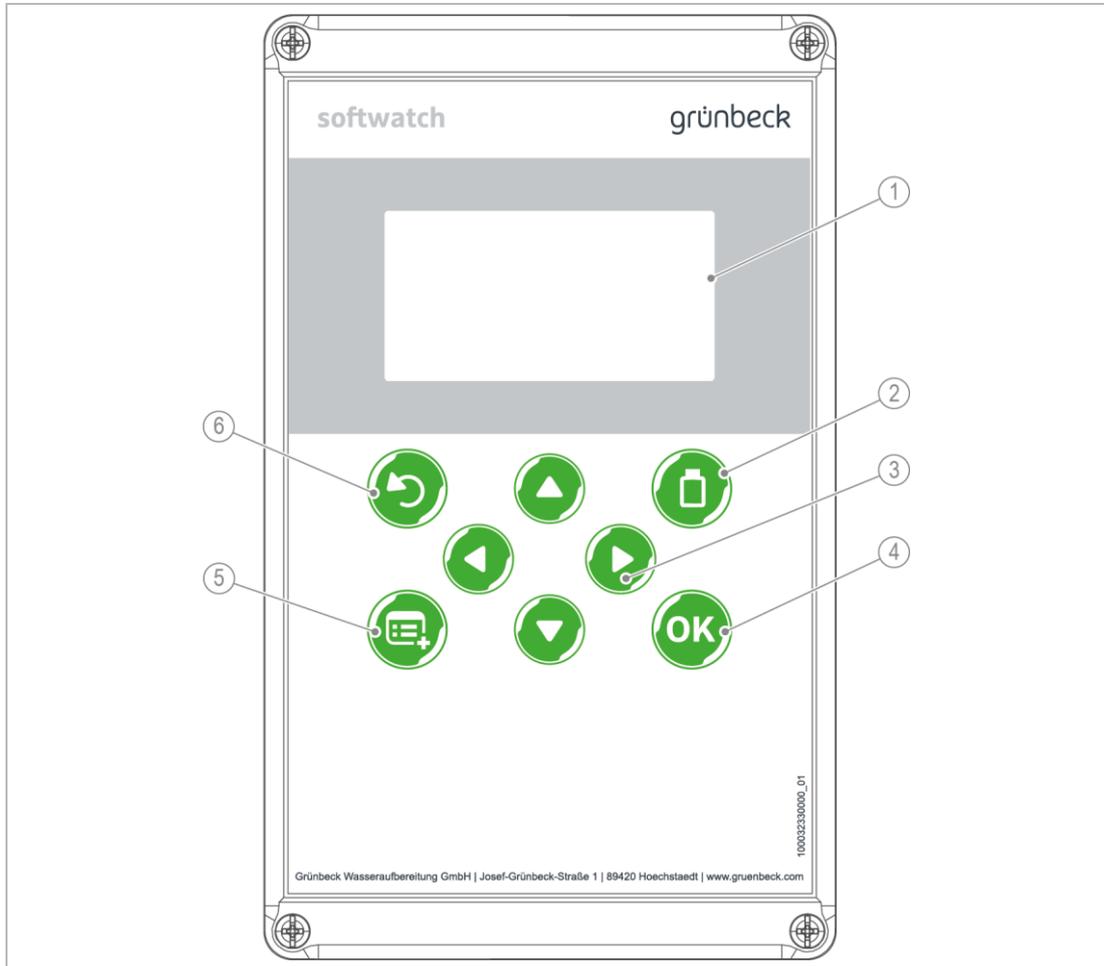
1. Remove the lid of the indicator bottle.
2. Insert the suction hose into the indicator bottle.
3. Tighten the bottle connection.
4. Clamp the indicator bottle into the holder.
 - » The indicator bottle is inserted.

6.3 Handing over the product to the owner/operating company

- ▶ Explain to the owner/operating company how the product works.
- ▶ Use the manual to brief the owner/operating company and answer any questions.
- ▶ Inform the owner/operating company about the need for inspections and maintenance.
- ▶ Inform the owner/operating company about the influence of the indicator on the measurement.
- ▶ Hand over all documents to the owner/operating company for keeping.

7 Operation/handling

7.1 Display and operating elements



Designation	Function
1 Display	Background colour: White – proper operation Background colour: Red – limit value exceeded or device error
2 Indicator	Resetting the indicator filling level
3 Navigation	Navigating in the menu level
4 OK	Confirming entries Starting a measurement
5 Menu	Opening a menu level Switching between main menu and measurement display
6 Back	Switching to the next higher menu level (e.g. main menu), discarding values during the entry process

7.2 Menu level

► Press  to switch to the menu.

In the menu, you have the selections below:

Menu	Description
Automatic	Switching over between manual operation and automatic operation
Service	Submenu for troubleshooting and manual measurement
Parameters	Submenu to set all device parameters
Wizard	Help for initial start-up or new parameterisation
Info	Submenu for viewing meter readings, versions and measurement data
History	Submenu with charts/illustrations of the last 100 measurement data

7.2.1 Service

Display	Path/description
Start analysis	Starts a manual measurement.
Pump indicator	Manually pumps indicator into the measuring chamber for deaeration after the indicator bottle has been replaced.
Manual flushing	Opens the solenoid valve and flushes until  is pressed.
Acknowledge maintenance	Acknowledges pending maintenance and resets the counter to 30,000
Maintenance counter: Are you performing maintenance/initial installation?	<p>Service life of the hose pump cartridge: Maintenance is required every 24 months or every 30,000 measurements. The maintenance counter must be reset after maintenance.</p> <p>► Using  or , select Yes or No.</p> <p>► Confirm with OK.</p> <p>Yes – The counter is reset to 24 months or 30,000 measurements.</p> <p>No – Retains the current counter readings.</p>
Good and bad counter	<p>The results are categorised into good and bad measurements. Thus, the performance of at soft water line can be evaluated.</p> <p>The results can be viewed in <code>Menu>Info</code>.</p> <p>Exceeding the limit value increases the bad counter, undershooting the limit value increases the good counter.</p>
Reset good and bad counter?	<p>► Using  or , select Yes or No.</p> <p>► Confirm with .</p>
Diagnostics program	<p>Opens an additional submenu.</p> <p>Press  to test the basic functions. Pressing  again switches off the function.</p> <p>Display – Lights up in changing colours</p> <p>Sensor – LED is switched on, sensor is activated (colour measurement test)</p> <p>Solenoid valve – Opens the valve</p> <p>Indicator pump – Controls the pump for 2 seconds</p> <p>Agitator blade – The speed of the agitator increases to the maximum</p> <p>Relays 1 - 3 – Switches the respective relay</p> <p>Input – Switches the voltage-free input</p>

7.2.2 Wizard (start-up program)

During the start-up program (wizard), all parameters are addressed (refer to chapter 6.1.1).

7.2.3 Info

In the menu item Info in the main menu, additional information on the product is shown.

Information	Description
Hardware version	Version of the hardware used
Software version	Software version installed
Analyses counter	Number of measurements performed since start-up or maintenance
Maintenance counter	Number of measurements remaining Service life of hose pump cartridge: starts at 30,000 measurements and counts down
Maintenance date	Expiry date of the hose pump cartridge used: starts at 2 years and counts down
Good measurements	Number of measurements where the limit value has not been exceeded (can be reset in Menu>Service>Good-Bad counter)
Bad measurements	Number of measurements where the limit value has been exceeded (can be reset in Menu>Service>Good-Bad counter)

7.2.4 History

In the history, the 100 most recent measurements can be displayed, including date and time. The measuring result is shown as limit exceeded or undershot. The measurement data is stored on the SD card.



For evaluation in a spreadsheet program, a trend.csv file is created on the SD card.

7.3 Menu structure

Menu	Menu item	Values/settings	
Automatic	Automatic ON		
	Automatic OFF		
Service	Start analysis		
	Pump indicator		
	Manual flushing		
	Acknowledge maintenance		
	Good-Bad counter		
	Diagnostics program	Display	
		Sensor	
		Solenoid valve	
		Indicator pump	
		Agitator blade	
Relay 1			
Relay 2			
Relay 3			
	Input		

Menu	Menu item	Values/settings
Parameters	General	Language
		Date/time
		Import settings
		Export settings
		Factory settings
	Measurement	Unit
		Indicator
		Flushing time
		Auto. interval Volume
		Analysis stop
		Control measurement
		Calibration factor
	Input	Deactivated
		Start measurement
		Water meter
		Flow switch
		Interval reset
	Outputs	Relay 1
		Relay 2
Relay 3		Measurement
		Indicator
Wizard		
Info		
History		

7.4 Replacing the indicator bottle

NOTE Contamination of the indicator solution

- Malfunction
- ▶ Replace a used-up indicator bottle by a full indicator bottle containing identical indicator solution.
- ▶ Pay attention to hygiene.
- ▶ Do not mix residual amounts.

Replace the indicator if at least one of the points below applies:

- The shelf life has expired.
- The indicator bottle has been open for more than 6 (recommended) or 12 months.
- The indicator solution has been used up completely.

Proceed as follows to replace the indicator bottle:

1. Make sure that no measurement takes place while you replace the indicator bottle.
2. Switch off the mains switch.
3. Remove the used-up indicator bottle from the holder.
4. Loosen the bottle connection.
5. Use a paper towel to pull the suction line from the indicator bottle.
6. Open the new indicator bottle.
7. Insert the suction hose into the indicator bottle.
8. Tighten the bottle connection.
9. Clamp the indicator bottle into the holder.
10. Close the used-up indicator bottle with the screw cap of the new indicator bottle.
11. Switch on the mains switch.
12. Deaerate the suction hose until the indicator arrives in the measuring chamber without any bubbles: `Menu>Service>Pump indicator`.
13. Confirm with that a full bottle has been inserted.
(Otherwise, the previous filling level is retained.)
14. Flush the measuring chamber. `Menu>Service>Manual flushing`
15. Press for 3 seconds to perform a test measurement.
 - » The hardness control measuring device is ready for operation.

7.5 Initiating a measurement

- ▶ Press and hold **OK** for 3 seconds.

Initiation condition	Setting/action
Automatic	Initiated by the control program
	Individual configuration:
	• 5 to 360 minutes Menu>Analysis>Auto. interval Time
	• 1 to 9999 litres/hl/m ³ /gal(US)/gal(GB): Menu>Analysis>Auto. interval Volume
	3 minutes after switching on the product
Externally	3 minutes after a limit value is exceeded with the control measurement activated
	1 minute after activation of automatic mode
	1 minute after a signal was received in parameter Interval reset (e.g. from a water softener)
	Immediately, by way of a signal from a superordinate control unit.
Manually	Immediately, by way of enabling via a flow switch or a water meter in the respective mode
	Immediately by manual operation
	Menu>Service>Start analysis
	Press and hold the key OK for 3 seconds
	Abort – Press the key BACK

7.6 Replacing the battery

If the display does not show the time after switching off and on again, the battery must be replaced.

1. Disconnect the product from mains.
2. Open the housing of the control unit.
3. Remove the flat battery from the battery holder.
4. Insert a new battery (type CR2032).
5. Close the housing of the control unit.
 - » The battery is replaced.

7.7 Activating the automatic mode

Automatic ON	Time or volume-dependant measurement is initiated automatically. Input contact is activated After activating the automatic mode, the first measurement starts after 1 minute. Then, the interval-controlled triggering starts.
Automatic OFF	Start manual measurement, service functions, parameter settings

7.8 Resetting the factory settings

In `Menu>Parameters>General>Factory settings` the control unit can be reset to the factory settings.

7.9 Behaviour in the event of a power failure

All settings of the product are saved on the SD card or in the internal memory. After a power failure, the settings are available again. If the device previously was in automatic mode, the hardness control measuring device – after a short wait time – automatically restarts with a measurement according to the set interval times. Relay 2 (operational readiness/error) is energised after the product is switched on (connection COM to NO).

7.10 Replacement of the product

Before replacing the product, the settings on the SD card can be saved:
`Menu>Parameters>General>Export settings`

After inserting the SD card into the new device, the settings can be imported:
`Menu>Parameters>General>Import settings`

The new device will continue the measurement log on the SD card.

7.11 Operation without constant supervision

NOTE Incorrect range of indicator

- System damage
- ▶ Set the indicator filling level to 100 % after each replacement of the indicator bottle.

The operating mode “service without constant supervision” is required for steam boiler systems according to TRD 604 (“Technical Rules for Steam Boilers”, published by the TÜV). Measuring equipment that is subject to this requirement must guarantee unattended operation for at least 72 hours.

For the hardness control measuring device softwatch, this means a sufficient supply of indicator solution over a period of 72 hours. This is achieved by the control unit calculating the consumption in advance. The control unit counts every measurement and calculates the indicator filling level. If the amount of indicator is no longer sufficient to guarantee operation without constant supervision, the “lack of indicator” alarm is triggered (relay output 3) and a message appears on the display.

Interval, min	Alarm from a minimum filling level in %
5	18
10	9
20	5

In order to ensure operation without constant supervision, the indicator filling level must be set to 100 % when replacing the indicator bottle. There are two options to do so:

- Menu>Service>Pump indicator
- Press , until the message appears



In the operating mode **Volume interval** or **External analysis start**, a projection is not possible and it is not suitable for operation without constant supervision. The indicator alarm is triggered when the indicator filling level reaches 10 %.

8 Maintenance and repair

Maintenance and repair includes cleaning, inspection and maintenance of the product.



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



By concluding a maintenance contract, you make sure that all maintenance work is done on time.

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

8.1 Cleaning



Have the cleaning work only carried out by persons who have been instructed on the risks and dangers that can arise from the product.

- ▶ Only clean the outside of the product.
- ▶ Do not use any strong or abrasive cleaning agents.
- ▶ Wipe the housing with a damp cloth.

8.2 Intervals



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

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

The interval table below shows the minimum intervals for the activities to be carried out.

Task	Interval	Execution
Inspection	2 months	<ul style="list-style-type: none"> • Leak test • Functional check • Check indicator solution (indicator filling level, shelf life)
Maintenance	6 months	<ul style="list-style-type: none"> • Clean the measuring chamber (in case of high ambient and water temperatures or in case of water carrying a high organic load, the cleaning intervals might have to be shortened, if necessary). • Check software update
	24 months or 30,000 measurements	<ul style="list-style-type: none"> • Replace the hose pump cartridge
Maintenance and repair	5 years	Recommendation: Replace wearing parts, replace the battery

8.3 Inspection

You as owner/operating company can do the regular inspections yourself. Initially, we recommend inspecting the product at shorter intervals and later on as required.

- ▶ Carry out an inspection at least every 2 months.

To carry out an inspection, proceed as follows:

1. Open the housing to be able to view all components
2. Check the housing for damage.
3. Check the hoses and connections for leaks.
4. Check the measuring chamber impurities.
5. Check the indicator filling level.
6. Check the function of the components via the diagnostics program (refer to chapter 7.2.1).

8.4 Maintenance

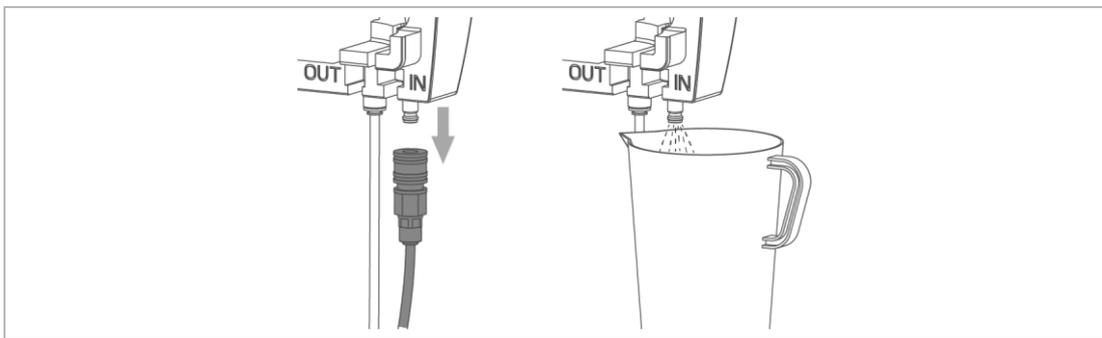


Carrying out maintenance work requires specialist knowledge. This maintenance work must be carried out by the technical service or by qualified specialists trained by Grünbeck.

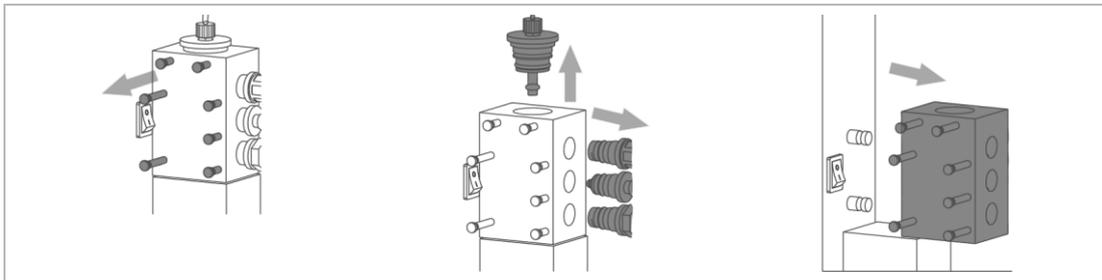
Some regular work is necessary to ensure the proper functioning of the product in the long term. DIN EN 806-5 recommends regular maintenance to ensure trouble-free and hygienic operation of the product.

8.4.1 Semi-annual maintenance

Cleaning the measuring chamber



1. Switch off the product and shut off the supply line.
2. Pull off the connection coupling at the device inlet.
3. Collect water flowing out with a container.



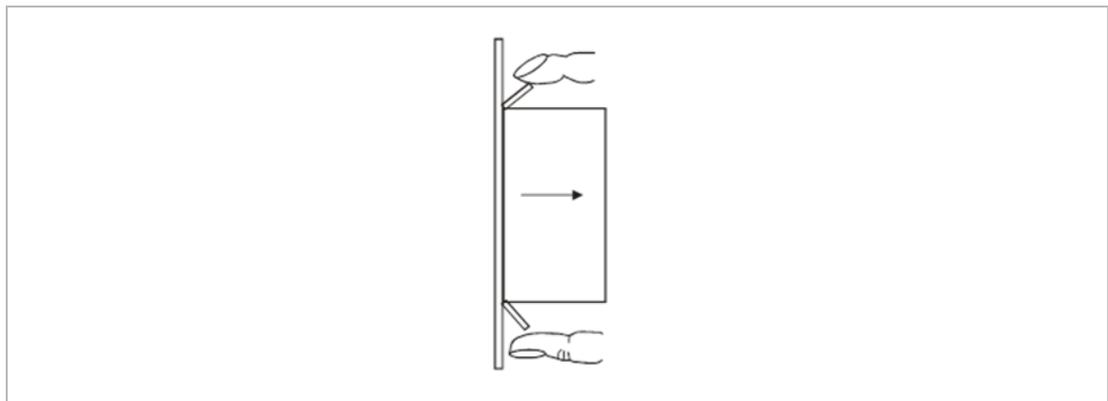
4. Pull the hose pump cartridge from the holder by unlocking the clips at the top and the bottom.
5. Loosen the connection to the indicator plug and to the indicator bottle.
6. Pull out the locking pins up to the stop.
7. Pull the drain plug, actuator plug and inlet from the measuring chamber.
8. Pull the measuring chamber towards the right off the retaining bolts at the control unit housing.
9. Remove the agitator blade.
10. Use a slotted screwdriver to lever the indicator plug out upwards.

11. Carefully clean the measuring chamber and the plugs under running water using a soft cleaning brush.
12. Re-install the measuring chamber into the product in reverse order.
13. Grease the O-rings of the connections with technical Vaseline. The blue O-ring on the dosing head must not be greased.
14. Flush the measuring chamber. `Menu>Service>Manual flushing`
15. Pump indicator into the measuring chamber until it arrives without any bubbles:
`Menu>Service>Pump indicator`
 - » The measuring chamber is cleaned.

8.4.2 Two-yearly maintenance

Replacing the hose pump cartridge

- Replace the hose pump cartridge after 30,000 measurements or 24 months at the latest.



1. Switch off the product.
2. Loosen the Luer connections and wipe off escaping indicator solution with a paper towel.
3. Press the locking tabs and pull the pump cartridge off the motor shaft.
4. Place the new cartridge on the shaft and clip it onto the holder.
5. Re-establish the Luer connections.
6. Switch on the product.
7. Acknowledge the maintenance counter. `Menu>Service>Acknowledge maintenance`
8. Pump indicator into the measuring chamber until it arrives without any bubbles:
`Menu>Service>Pump indicator`
 - » The pump cartridge is replaced.

8.5 Software update

Proceed as follows to update the software:

1. Download the software update from:
<http://www.gruenbeck.de/> > Produkte & Branchen > Sicherheits- und Sicherungseinrichtungen > Härtekontrollmessgerät **softwatch**.
2. Switch off the product.
3. Remove the SD card.
4. Transfer the downloaded file (LA26xxx.bin) to the SD card.
For a successful installation, only one firmware file must be present on the SD card and the file name must start with LA26.
5. Insert the SD card.
6. Press and hold **OK**.
7. Switch on the product.
8. Release **OK** as soon as **Software update** appears on the display.
 - » The product updates the software and afterwards starts the measuring operation.
9. Switch off the product.
10. Remove the SD card.
11. Delete the firmware file from the SD card.
12. Insert the SD card.
13. Switch on the product.
14. Perform a test measurement.
 - » The software is updated.

8.6 Consumables

Product	Order no.:
Indicator SWK – 0.1 (500 ml)	172 201
Indicator SWK – 0.3 (500 ml)	172 202
Indicator SWK – 0.5 (500 ml)	172 203
Indicator SWK – 10 (500 ml)	172 204
Battery (type CR2032)	

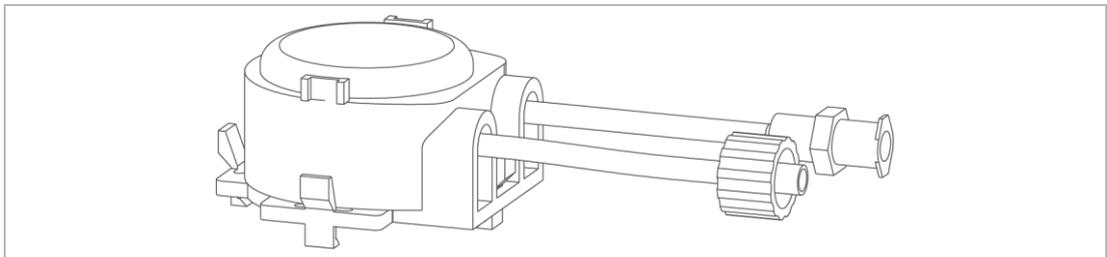
8.7 Spare parts

For an overview of the spare parts, refer to our spare parts catalogue at www.grünbeck.com. You can obtain the spare parts from your local Grünbeck representative.

8.8 Wearing parts

Wearing parts are listed below:

- Hose dosing pump/pump cartridge



- O-rings of measuring chamber/plugs

9 Troubleshooting

9.1 Measurement does not start

- ▶ Check that the flow switch is configured and connected.
- ▶ Check that an interval time has been entered.
- ▶ Check that a water meter is fully configured and connected.
- ▶ Check the connection of an external control unit to the device.

9.2 Display messages



If an error occurs during the measurement, the display message appears.

1. Check the components displayed.
2. Acknowledge the display message with **Rectify**.
 - » The product restarts.
3. Perform diagnostics if the display message reappears.
4. Contact the technical service if you cannot rectify the fault.

9.3 Error codes

Code	Display	Error	Log file entry	Possible cause
E11	Indicator	No darkening of the sample detected.	Indicator missing	<ul style="list-style-type: none"> • Indicator empty or frozen • Pump or motor defective, not plugged in or plugged in incorrectly • Indicator hose or plug clogged • Inlet and outlet hose mixed up or clogged (measuring chamber empty) • Agitator blade missing • Dosing hose not deaerated • Solenoid valve does not close
E12	Water inlet	After termination of measurement, sample is not flushed out.	Water flow	<ul style="list-style-type: none"> • Solenoid valve defective • Sieve in inlet clogged • No water pressure • Outlet clogged • Inlet or outlet hose kinked

Code	Display	Error	Log file entry	Possible cause
E13	Optical sensor	Colour sensor does not detect any difference between LED ON and OFF.	Optical sensor – not enough light	<ul style="list-style-type: none"> • LED defective, not plugged in or plugged in incorrectly • Measuring chamber dirty • Colour sensor defective
E14	Titration	Dosing volume out of spec (similar to E11).	Titration disturbed	<ul style="list-style-type: none"> • Indicator empty or frozen • Pump or motor defective, not plugged in or plugged in incorrectly • Indicator hose or plug clogged • Inlet and outlet hose mixed up (measuring chamber empty) • Dosing hose not deaerated • Solenoid valve does not close

9.4 Diagnostics functions

With the diagnostics functions, occurring errors can be narrowed down:

Menu>Service>Diagnosis program

- ▶ Press **OK** to terminate the respective diagnosis functions.

Diagnostics	Explanation	Remedy
The display changes colour between red, green and blue.	The display does not light up or does not light up correctly.	▶ Check the plug-in connection of the display.
Colour measurement test: R: OK G: OK B: OK	The LED in the measuring chamber is switched on and does not light up.	▶ Check the plug-in connections of the LED. The error persists: LED defective
	The LED lights up, but the sensor does not indicate anything.	▶ Replace the control unit.
Solenoid valve test Valve closed.	Solenoid valve cannot be opened with OK .	<ul style="list-style-type: none"> ▶ Check the plug-in connections of the valve. ▶ Check the supply voltage of 24 VDC in the switched state. <ul style="list-style-type: none"> • Voltage is present, valve does not switch: Solenoid valve defective • Voltage is missing: Control unit defective
Test dosing pump for 2 seconds: Pump is OFF.	Pump movement not visible, motor not audible.	▶ Check the plug-in connections. The error persists: Motor or circuit board defective.
	Pump movement not visible, motor audible.	Pump cartridge defective or worn.
Drive of agitator blade rotates.	The agitator blade slowly increases its speed up to the maximum speed. The agitator blade does not rotate.	<ul style="list-style-type: none"> ▶ Check the plug-in connections of the agitator. ▶ Check whether the drive pulley of the agitator is rubbing against the housing. The error persists: Agitator motor defective

Diagnosics	Explanation	Remedy
Relay 1: Contacts COM(9) and NC(10) closed.	The relay is closed, but the continuity check with a multimeter still does not show any continuity.	Control board defective
Relay 2: Contacts COM(12) and NC(14) closed.		
Relay 3: Contacts COM(15) and NC(16) closed.		
Input 1: Contact between terminals 18 and 19 open.	The input is closed; the continuity check (measurement: COM on 18, V on 19) by means of a multimeter does not indicate any continuity, however.	Control board defective

9.5 Other observations

Observation	Remedy
Measurement does not start	<ul style="list-style-type: none"> ▶ Check that a flow switch is configured and connected. ▶ Check that an interval time has been entered. ▶ Check that a water meter is fully configured and connected. ▶ If necessary, check the connection from an external control unit to the device.
Zero sample is faulty	<ul style="list-style-type: none"> ▶ Check that water is in the measuring chamber and that the water inlet line and discharge line are connected properly. ▶ Check the measuring chamber for impurities, gas bubbles or foreign matter. ▶ Check the water inlet for function and pressure (1 – 2 bar recommended). ▶ Check that the water outlet is free, and no foreign matter has settled in the solenoid valve. ▶ In the event that a pump is used to deliver the samples, check that the pump is connected properly. ▶ Check the sensor as well as the solenoid valve using the diagnostics menu.
The measurement is not carried out correctly	<ul style="list-style-type: none"> ▶ Check that there is still enough indicator in the indicator bottle. ▶ Check the connecting hose between the indicator bottle and the hose pump for air bubbles. If necessary, pump indicator until the hose is completely filled with indicator. ▶ Check that the blue O-ring is located on the indicator plug. ▶ Check that there is water in the measuring chamber. ▶ Check that the agitator blade is located in the measuring chamber. ▶ Check indicator pump, the sensor and the agitator blade in the diagnostics menu. ▶ Check that the flushing time is sufficient to ensure fresh sampling water.

10 Decommissioning

10.1 Temporary shutdown

NOTE

The hardness control measuring device helps protecting your system from hardness breaking through.

- Consequential damage due to hardness breaking through
- ▶ Make sure that a temporary shutdown cannot cause any consequential damage.

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

1. Open the housing and switch the mains switch to **OFF**.
2. Keep your product permanently connected to the supply networks.
 - » The product remains in an operating state which is considered to be safe with regard to hygiene and which is admissible according to DIN EN 19636-100.

10.2 Restart/recommissioning

In order to put your product back into operation again, proceed as follows:

1. Open the housing and switch the mains switch to **ON**.
2. Check the measuring chamber for deposits or impurities.
3. Carry out a new start-up, if necessary.

11 Dismantling and disposal

11.1 Dismantling



The work described herein represents an intervention into your drinking water system. Have this work carried out by qualified specialists only.

1. Close the shut-off valves of the water pipe in which the sampling point is installed.
2. Depressurise the supply line and the measuring chamber by opening the inlet solenoid valve.
Menu>Service>Manual flushing
 - » The pressure in the product and the pipe network is relieved.
3. Disconnect the product from mains.
4. Disconnect the product from the water connection.



Keep a collecting container (e.g. a bucket) handy to catch escaping water.

5. Remove the screw-in connectors.
6. Close the gap in your drinking water system, e.g. by using an adjusting piece or a plug at the sampling point.

11.2 Disposal

- Obey the applicable national regulations.

Packaging

- Dispose of the packaging in an environmentally sound manner.

Product



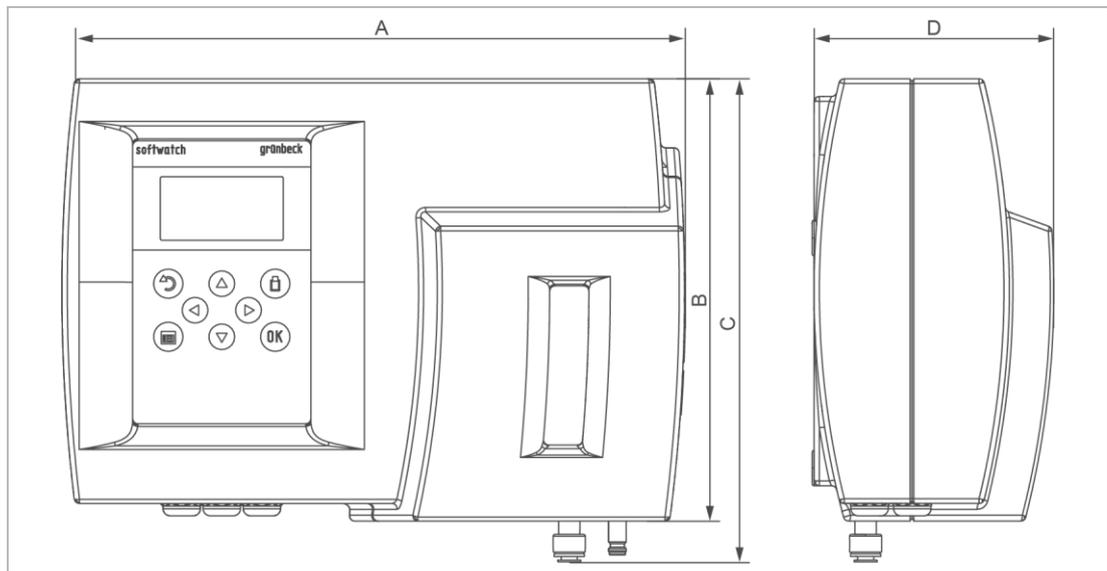
If this symbol (crossed-out wheeled bin) is on the product, it means that this product or its electrical and electronic components must not be disposed of as household waste.

- Find out about the local regulations on the separate collection of electrical and electronic products.
- Make use of the collection points available to you for the disposal of your product.



For information on collection points for your product contact your municipality, the public waste management authority, an authorised body for the disposal of electrical and electronic products or your waste disposal service.

12 Technical specifications



Dimensions and weights

A Width	mm	350
B Height	mm	250
C Height with connections	mm	270
D Depth	mm	140
Operating weight, approx.	kg	2

Connection data

Nominal connection diameter inlet/outlet	mm	6/8
Drain outlet		DN 50
Rated voltage range	V	85 – 305
Rated frequency	Hz	47 – 440
Power input (standby)	W	< 3.5
Power input (operation = max)	VA	25
Protection/protection class		IP54/⚡

Performance data

Operating pressure (recommended)	bar	0.5 – 5 (1 – 2)
Load rating of relays at internal/external power supply	A	1/2.5
Load rating of the relays VAC/VDC	W	250/250

Consumption data

Indicator consumption/measurement	ml	< 0.1
Number of measurements/500 ml indicator bottle		> 4000
Water consumption/measurement (at 2 bar)	ml	1000

General data

Measuring water temperature	°C	5 – 40
Storage temperature	°C	5 – 45
Ambient temperature	°C	10 – 45
Max. humidity (non-condensing)	%	20 – 90

Order no. 172600000000

Measuring properties

Inlet water quality	clear, colourless, free of solids, without gas bubbles	
Measurement duration	sec	approx. 300

Measuring properties		
pH value		4 – 10
Iron	ppm	< 3
Copper	ppm	< 0.2
Aluminium	ppm	< 0.1
Manganese	ppm	< 0.2
Acid capacity (K _{S 4,3})	mmol/l	< 5
Measuring method		Titration with colour change
Measuring range	°dH	0.02 – 10
	°f	0.04 – 20
	ppm CaCO ₃	0.4 – 200
	mmol/l	0.004 – 1.78
	°e	0.028 – 14
	Ж	0.008 – 4
Measuring accuracy of the respective indicator	%	≤ 10

13 Operation log



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

Hardness control measuring device softwatch

Serial no.: _____

Start-up/Commissioning log

Customer					
Name:					
Address:					
Installation/Accessories					
Drinking water filter (make/type):					
Pressure reducer	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
Drain connection acc. to DIN EN 1717	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
Floor drain available	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
Safety device	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
Indicator					
Operating values					
Water pressure	bar				
Water meter reading	m ³				
Hardness unit	°dH	°f	mol/m ³	°e	°ppm
Soft water hardness (measured)	<input type="checkbox"/>				
Software version					
Remarks					
Start-up/Commissioning					
Company:					
Service technician:					
Work time certificate (no.):					
Date/signature:					

Maintenance no.: _____



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

Operating values		
Operating pressure		bar
Total measurements		
Good measurements		
Bad measurements		
Indicator filling level approx.		%

Reading out error memory (SD card)		
Error	Date	Time
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Maintenance work	
Measuring chamber cleaned	<input type="checkbox"/>
Hose pump cartridge replaced	<input type="checkbox"/>
Software updated	<input type="checkbox"/>
Maintenance interval reset	<input type="checkbox"/>
Indicator bottle replaced	<input type="checkbox"/>
Indicator filling level reset	<input type="checkbox"/>

Remarks

Carried out by	
Company	_____
Service technician	_____
Date	_____

EU Declaration of Conformity

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



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

This certificate becomes void if the system is modified in any way not approved by us.

Hardness control measuring device softwatch

Serial no.: Refer to type plate

Furthermore, we confirm compliance with the essential requirements of the EMC Directive 2014/30/EU.

The following harmonised standards have been applied:

- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN 61326-1:2013

Responsible for documentation:

Mirjam Müller

Manufacturer:

Grünbeck Wasseraufbereitung GmbH
Josef-Grünbeck-Str. 1
89420 Hoechstädt/Germany

Hoechstädt/Germany, 17.03.2021

A handwritten signature in blue ink, appearing to be 'DL'.

ppa. Dietmar Ladenburger
Technical Director
Member of the Executive Board

Notes

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