magnetic

Heating Water Regulator - HWR 50/100 plus

Instructions for use

magnetic ...einfach besser

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magnetic
HWR 50/100 plus

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General

The Heating Water Regulator is used as a reaction vessel for the electrochemical treatment of heating water for chemical-free operation of heating systems. The electrochemical water treatment contributes to a water quality that will render damage caused by the formation of limestone and corrosion unlikely. The functional components are made from stainless steel, brass fittings, high potential magnesium alloy and high-quality plastic components. The reaction vessel is made of stainless steel. Elastomers, hemp and aramid fibres (KLINGERSIL C-4400) are used as sealing materials. High quality polyurethane foam or high quality non-woven fabrics with fire classification B1 are used as insulation materials. The materials used comply with generally accepted engineering standards.

The instructions in this operating manual allow you to operate this system in a proper, safe and efficient manner. It is particularly important to observe basic instructions for installation, operation and maintenance. Each person working with this system must read the operating manual in its entirety, take of the instructions stated in it and apply them. Besides the operating manual, observe current and locally applicable rules for accident prevention for safe, professional handling. In addition, the manufacturer recommends keeping a written record on site. The form at the end of this operating manual may be used for this purpose. This operating manual must always be available at the place of operation.

Area of application

The Heating Water Regulator is used for the electrochemical treatment of water as part of chemical-free corrosion protection within closed water-bearing systems, such as heating systems. It is used to attain effective corrosion protection through ideal water quality without additional chemicals, to remove existing circulating impurities and to prevent the formation of new corrosion products. In particular, heating water regulators are used in heating systems where there is an increased risk of corrosion due to constant oxygenation, such as is the case for floor heating with plastic piping which are permeable to diffusion. In addition, regulators are more commonly used in lower temperature systems (e.g. heat pumps) or within the context of so-called “low-salt” operation of heating systems, mostly to stabilise the pH value.

Corrosion in heating systems is caused by the interaction of several factors. The Heating Water Regulator is not a standalone corrosion protection device. We see it as a measure within the overall context of the system operation. The regulator makes a decisive contribution to chemical-free corrosion protection due to its positive effect on the heating water thanks to natural layer formation and passivation of the metals in the system.

Its core functions are:
- Attrition of dissolved oxygen through an electrochemical reaction
- Removal of circulating air bubbles
- Increasing the pH value >8.2 through electrochemically formed hydroxide
- Removal of circulating impurities from system water

Safety information

Please read this operating manual carefully before operating the device and follow the instructions. Please keep this operating manual accessible at all times. Damages to persons and property resulting from not complying with this operating manual are not covered by the Product Liability Act. The manufacturer shall not be liable for any other damages resulting from not complying with the instructions contained in this operating manual. Safety warnings warn against risks and help to prevent damage to persons and property. Compliance with the safety warnings included in this operating manual is absolutely necessary to ensure personal safety. Make sure that you comply with applicable national and international safety regulations. Each operator is personally responsible for complying with the applicable regulations and must endeavour to comply with the most recent regulations.

Safety regulations

The Heating Water Regulator may only be operating by specialist personnel. Please comply with the manufacturer's instructions in the maintenance or replacement of consumable parts. The warranty shall be void if modifications are made to the device. The manufacturer shall not be liable in the event of damage due to incorrect operation. In addition, this shall result in the warranty becoming null and void. The regulator may not be operated in potentially explosive atmospheres, or underneath a naked flame. The HWR plus may only be operated if it is in proper working condition and may only be used for the treatment of water in closed heating and cooling circuits. The treatment of drinking water, acids, lyes, etc. is not permissable. Prior to operation, check the system for possible damage. Ensure proper use within the stated performance range. Before carrying out repair work, it is absolutely necessary to separate the system from the water pressure or supply network. Damaged systems should be decommissioned immediately. Faulty or damaged reaction vessels should only be repaired by specialist personnel authorised by the manufacturer. This is in your own interest. This prevents inadequate repairs. Please pay attention to the relevant and binding standards.

Exclusion of liability

The use must be in exact accordance with the instructions provided in this manual. The manufacturer shall not be liable for any damage, including consequential damage resulting from the incorrect installation or incorrect use of this product.

Specific safety and handling instructions

The Heating Water Regulator is only suitable for water treatment for engineering applications. The treated circulation water is not suitable for human consumption. In order to prevent technical faults, it is necessary to rinse the regulator once a year using clear water, ideally with completely demineralised water. In addition, in order to ensure ideal function, the high-potential magnesium anode installed in the device should be replaced as a consumable at least every two years. If the Heating Water Regulator is operated using extremely hard water, then the increase of the pH value will result in lime scale along with the formation of lime sludge. In such a case, the reaction vessel should be cleaned twice a year. Heavy limescale on the interior walls of the vessel can be removed using a diluted natural acid, e.g. citric acid. The system is not resistant against strongly concentrated cleaning products. The system may not be opened or disassembled during operation. The reaction vessel may not be opened without prior pressure relief. The reaction container may contain hot water. Take appropriate precautions during maintenance work and protect yourself against burns due to high water temperatures. Protect the system against mechanical damage. Do not use near heat sources and naked flames. The installation of all parts should be carried out according to country-specific guidelines.

Specific operating instructions / Conformity declaration

The addition of chemical substances to the heating water may impair the function of the regulator. Therefore, do not add additional chemicals to the system during operation. Please pay attention to information on the filling water quality on the following pages of the user manual. Do not use treated soft water as filling water in combination with a Heating Water Regulator. This can result in malfunction or a strongly increased pH value. In case of high total hardness or electrical conductivity of drinking water >100 µS/cm, the filling water should always be treated by means of water demineralisation using an ion exchanger. Check if aluminium alloy is present in the system and whether this poses a limitation on the maximum pH value. When using a Heating Water Regulator, the pH value may increase to >9.

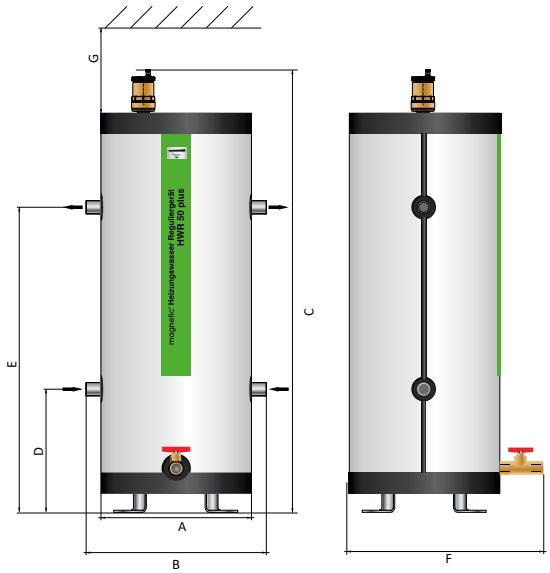
Regulators from magnetic® are pressurised containers which are subject to the scope of the Pressure Equipment Directive 97/23/EC Section 3, paragraph 3. CE labelling will not be granted. Magnetic regulators are constructed and manufactured according to good engineering practice. A leakage and original pressure inspection is carried out..

Data and dimensions

Boiler material: Chrome steel V4A

Dimensions in mm	HWR 50 plus	HWR 100 plus
A Diameter	370	370
B Width including connection pipe	403,5	403,5
C Total height	1060	1210
D Floor - Centre inflow	295,5	295,5
E Floor - Centre outflow	745,5	895,5
F Depth incl. ball valve	460	460
G Minimum distance	1000	1000
Inflow - below / outflow - top	1“	1“

Performance data		
System water content:	15.000 l	35.000 l
Flow rate:	max. 600l/h	max. 600l/h
Fitting dimension:	1“	1“
Operating pressure max.:	6 bar	6 bar
Temperature max.:	90°C	90°C



The device is connected in a bypass. The supply line is via a 1” pipe.
The interval between the inflow and outflow should be ~ 500mm

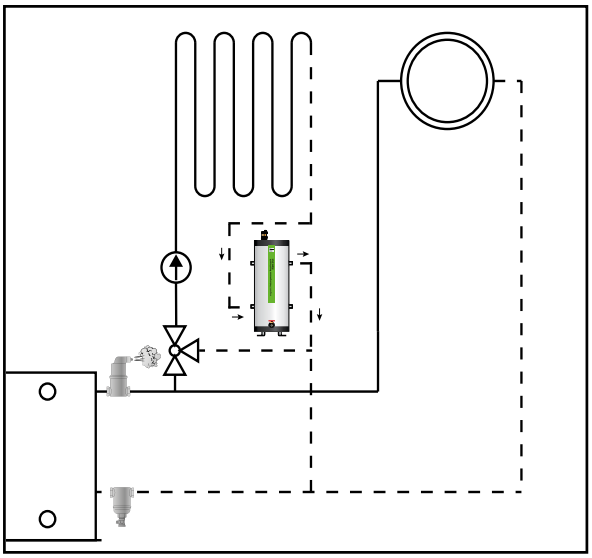
⚠ Welches Heizungswasser Reguliergerät kommt wo zum Einsatz?

The selection of the magnetic HWR plus depends on the system water content. The size selection is also dependent on the amount of oxygen ingress into the entire system, which especially occurs at screwed connections, plastic pipes, control elements, etc. The content volume of the tank or buffer tank made of steel is not taken into account because practically no oxygen diffusion takes place there. In borderline cases or in case of doubt, always choose the larger HWR.

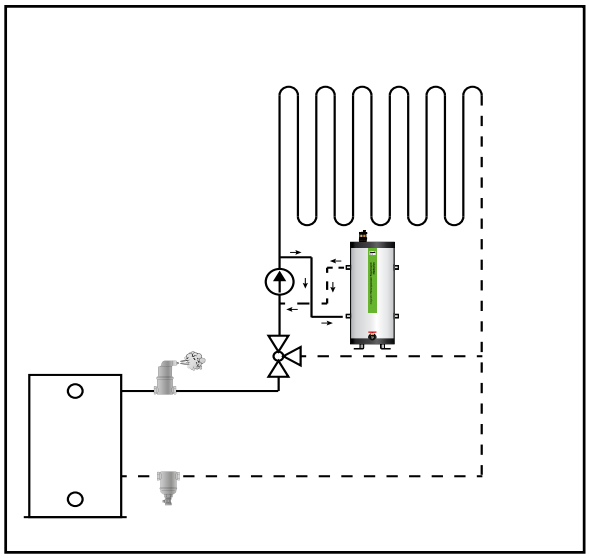
You calculate that with the following formula: Heating capacity of the system (kW) x 20 = System water content (l).

Location of installation

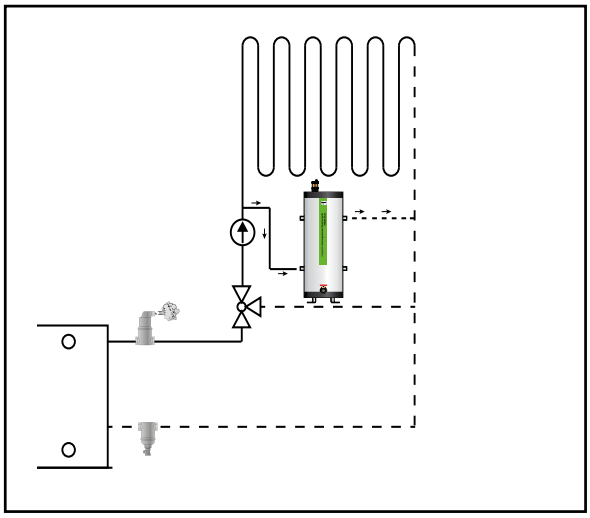
Main return flow system group floor heating
Preferred installation variants with several heating circuits dueto proximity to source of oxygen intake.



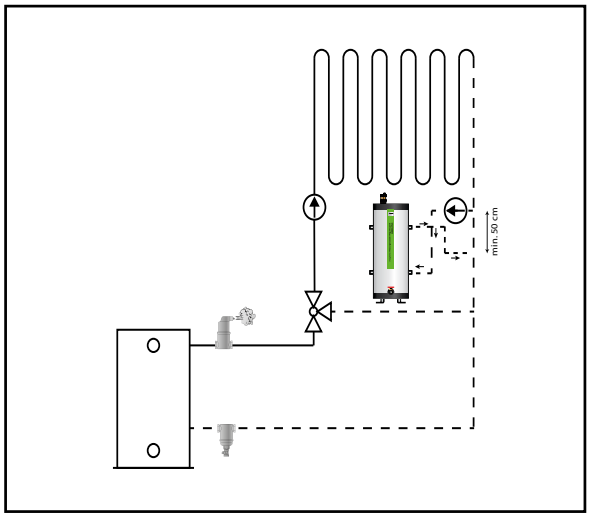
System group flow-flow
Bypass installation using the circulating pump.



System group flow-return flow
Classic bypass installation using the main circulating pump. The advantage is that the treated water ends up directly in other system parts too. Due to increasing the return flow temperature, it is not suitable for condensing boiler technology.

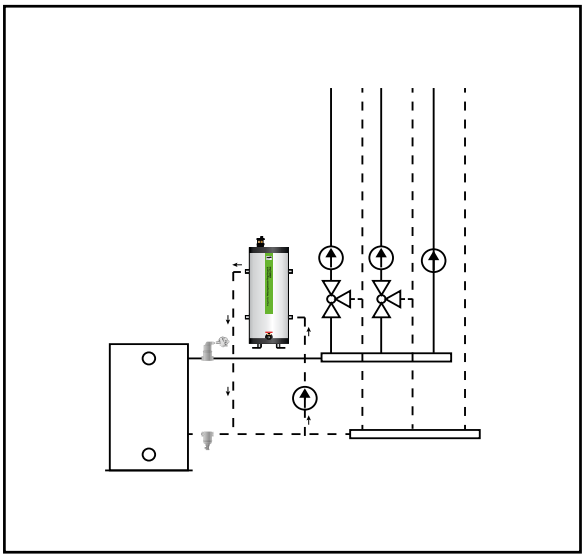


System group return flow-return flow
Tried and trusted bypass installation with dedicated feed pump which is synchronised with the main circulating pump. This is preferred for mixed installations of radiators and floor heating circuits due to the proximity to the source of the oxygen intake

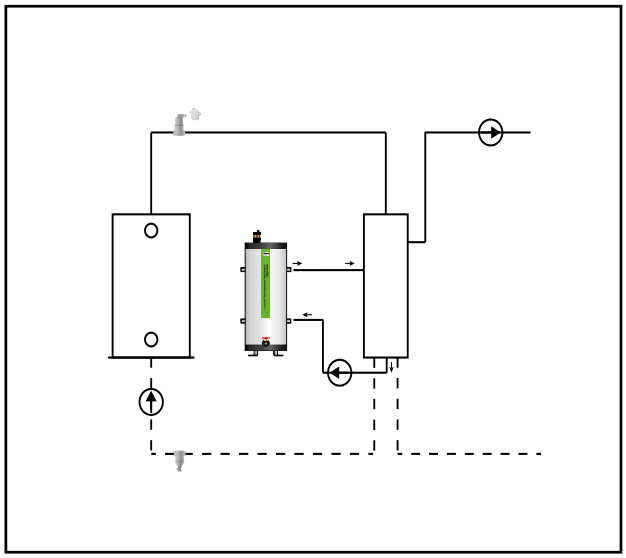


Location of installation

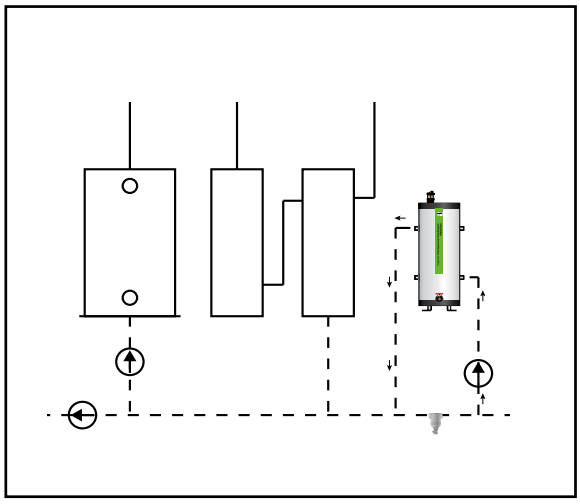
Bypass main return flow - main return flow
Installation option for systems with circulating impurities and high oxygen intake in several floor heating circuits.



Bypass buffer
Installation directly at the buffer tank. This installation option allows the effective treatment of the largest possible volume of water and prevents impurities being deposited in the buffer tank.



Bypass main return flow before buffer
Installation in main return flow before the buffer tanks, if oxygenation is likely or circulating impurities are present.



⚠ Notes on bypass installation

The HWR must be installed in a bypass, which is why one should ideally pay attention to the following points:

- Keep the supply lines as short as possible
- Spacer between inlet and outlet ~500 mm
- Supply line = nominal diameter of main line or 1”
- Connection from below with immersion pipe
- Connection from above or attached laterally
- Connection from below or laterally in case of large quantity of circulating impurities

Water quality for operating the HWR 50/100 plus

In general, a regulator is installed in heating systems where, due to the system design, increased oxygenation is likely or where a constant low pH value is measured in the heating water. In order to protect the heating system against corrosion and silt build-up, the general water quality is of extraordinary importance and should not be neglected when installing the Heating Water Regulator. In conjunction with installing an HWR, the water quality should be according to the following guide values, however with regards to the fulfilment of any guarantee conditions, please take note of the respective component manufacturer's provisions in the first place.

Treatment of filling and refill water	It is necessary to treat filling and make-up water if damages due to limescale formation or corrosion due to the water quality. are likely. Only use completely demineralised water for the Heating Water Regulator.
Addition of chemicals	When using the HWR, do not add any additional chemicals to the system, such as inhibitors, for example.
Chemical residue	Strongly contaminated old systems, in particular those which have been pre-treated using chemicals, must be rinsed completely prior to installing an HWR. For this purpose, we recommend using our cleaning and dispersing agent (**magnetic** cleaner for heating systems)
Silt build-up	In our experience, using the HWR reduces existing silt build-up over a longer period. However, in order to remove existing hydraulic problems the system should be rinsed using the **magnetic** cleaner for heating systems.
pH-value	The function of the regulators automatically sets the pH value of the heating water to >8.2 This mechanism can be disturbed due to atypical acid reactions, e.g. due to chemicals, which requires a case-by-case assessment.
Sodium	We recommend that the sodium value should be as low as possible (<20mg/l). Sodium has a negative impact on water conductivity and, in combination with hydroxide ions (OH-), can lead to undesirable high pH values.
Chlorides	Chlorides increase conductivity and can result in corrosion, even on stainless steel. A value of <30 mg/l is recommended.
Sulphate / nitrate	Sulphates and nitrates increase water conductivity and can contribute to pitting corrosion to copper. A value of <50 mg/l should be maintained.
Dissolved metals	Dissolved metals, such as iron or manganese should not be present in the water.
Dissolved gases	The content of dissolved gases, such as oxygen and carbon dioxide are reduced through the use of an HWR. In case of the presence of circulating bubbles, we recommend installing an additional microbubble deaerator.
TOC (organic carbon)	The TOC content is a measure for the organic contamination of the water. A value of < 30 mg/l is deemed acceptable. In case of a copper installation, the value should not exceed 1.5 mg/l.
Electrical conductivity	When using a Heating Water Regulator, the electrical conductivity of the systemwater should be at 10 - 100 µS/cm.
Appearance	The filling water in the heating should be clean and clear.

Necessity for treating the filling water

In heating systems with oxygen intake due to construction features, one should always endeavour to maintain low electrical conductivity in the heating water, as this can cut down corrosion processes. As a regulator is mostly used in systems with high oxygen intake, we recommend a reduction of electrical conductivity to a level of 10-100 µS/cm in conjunction with the installation. It might be necessary to treat the filling water due to requirements from other component manufacturers, as well as if it is necessary to fulfil a directive, such as VDI 2035.

Type of filling water treatment

If it is necessary to treat the filling water, then one should exclusively use water demineralisation to treat the filling water in conjunction with an HWR. A residual conductivity of 10 - 100 µS/cm must be retained. When using a heating water regulator, the filling water should not be softened using ion exchange.

Use of antifreeze agents

INo classic antifreeze agents should be used with heating water regulators from **magnetic**, as these agents often contain chemical inhibitors. These inhibitors can result in the device breaking down completely. If there is a risk that the pipes in the heating system could freeze, ethylene glycol that is labelled chemically pure may be used as an antifreeze additive. It should be noted that the aging of the ethylene glycol leads to the formation of acids which are bound by the HWR. In case of very high temperatures, the acid formation may exceed the degree of buffering which may result in a temporarily lower pH value. If you are using antifreeze agents, it is necessary to check the frost protection as well as the pH value of the water annually.

Influence of electrochemical water treatment on total hardness

In our experience, depending on the composition of the water, the overall hardness of the system water will sink if the pH value increases, and the related precipitation of calcium carbonate shall decrease slightly. In low temperature systems, it is possible that existing free carbon dioxide may be bound by the converted magnesium ion to form magnesium hydrogen carbonate. You don’t need to worry about an uncontrolled increase in hardness, as there will be no free carbon dioxide in the heating water over a pH value of 8.2. In contrast to calcium carbonate there is no additional risk of damage due to limescale formation due to the good solubility of magnesium carbonate.

Sucess monitoring

In order to guarantee the successful function of the regulator, one should pay particular attention to the following points:

System rinsing	If the hydraulic function of the system is impaired due to impurities or the system water is contaminated with chemicals, we recommend rinsing the system completely prior to installing the HWR. If this kind of disturbance is not present then rinsing is not necessary.
Previous damage	When renovating old systems, it is necessary to check for hidden corrosion damage prior to installation. This could be hidden by deposits (e.g. boiler return in horizontal area, rust bubbles on pipes and junctions). In the case of hidden corrosion damage, these deposits could be loosened and cause water leakage from the system. We do not accept liability for consequential damage due to hidden corrosion damages.
Maintenance	In accordance with our maintenance manual, the device must be desludged and rinsed 4 weeks after installation. During the construction phase, this maintenance process is repeated twice at intervals of 4 weeks. It is important that the pumps are turned on during the construction phase, and that the system water can circulate. The water should be clean during the final maintenance date. If this is not the case, the maintenance process must be repeated every 8 weeks until the water is clear. After that, the construction phase is concluded. After this, it is sufficient to service the device once a year.
Functional check	The magnetic regulators have a display device which displays the anode activity. This display must be checked regularly.
Professional use	In our understanding, professional use refers to: - the device is installed according to our instructions, so the system water flow through the device is guaranteed, - our instructions regarding the filling water have been taken into account, - during the construction phase, the device is maintained every 4-8 weeks according to our instructions, - during normal service, the device is serviced once a year, - regular anode function checks, - replacing anodes as soon as these are used up, however ideally every 2 years, - checking and documenting water chemistry with regards to pH values and conductivity during maintenance and consulting us if the values strongly deviate from our recommendations, - clear documentation of maintenance work, e.g. on our maintenance form,

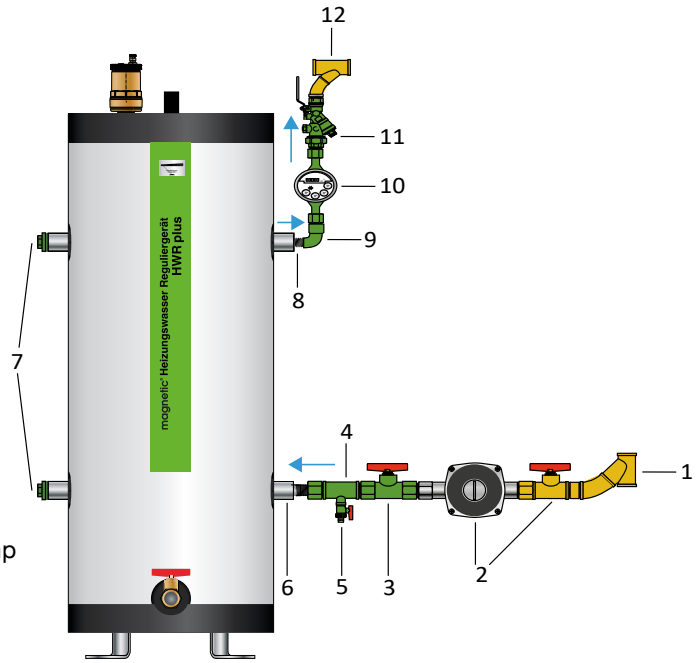
The success of electrochemical treatment can be measured. You should have the water checked once a year and record the following values: If you would like to check whether the HWR 50/100 plus is actually providing corrosion protection, you can check this by means of certain water parameters. Just have the heating water analysed once a year for pH value, conductivity, hardness and dissolved metals. This will provide you with a long-term statistic and you can determine the corrosion protection function by means of the improved values. The regular water analysis also serves as a warning system if problems occur.

Assembly of the connection set / Delivery contents

In general, the associated connection set should be used to connect the Heating Water Regulator to the system.

The connection set contains:
(3) Ball valve 1“
(4) T-piece 1“ x 1“ x 1/2“
(5) Drain valve 1/2“
(6) Double nipple 1“
(7) Blind plugs 1“
(8) Reduction 1“ x 3/4“
(9) Elbow piece 3/4“
(10) Water metre (rotatble) 3/4“ with screw joint
(11) Control valve with automatic flow regulation

To be provided by customer:
(1) Welding shoe or T-piece for upply line connection, where applicable 1”
(2) Feed pump with pump ball valve not speed regulated (e.g. Wilo Stratos PICO 25/1-4 with control type differential pressure constant), synchronised with heating circulation pump
(12) Welding shoe or T-piece for 3/4” supply line connection



When installing the **magnetic** HWR 50/100 plus as bypass, it is necessary to adjust the flow. It is possible to control and document flow by means of the water metre provided.

Maintenance

The even and constant throughflow of the HWR 50/100 plus is of fundamental importance. The flow should be at maximum 10l/min. Check and correct the water flow as part of maintenance.

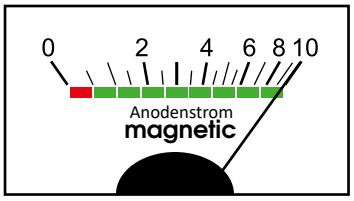
- The supply line to the device must be at least 1”. A smaller line cross section can lead to insufficient water throughflow as well as problems with impurities.
- The supply line must not be regulated, the control valves must be open.
- Is the flow regulated by means of a Y-type valve or is the control valve opened by means of a flow regulator?

If the water metre is not working or flow is not occurring despite taking the abovementioned points into account, it is necessary to rinse the HWR. If an automatic control valve is used for flow regulation, particles can impact its function. In this case, the valve must be opened and cleaned. Vertical installation of the water metre can help in order to protect against possible damages. In certain cases, it may be necessary to remove, clean or replace the water metre.

Functional check - Anode function

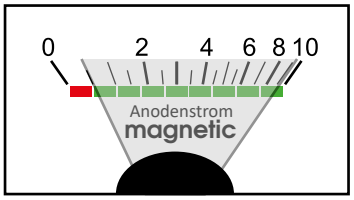
You can check the function of the electrochemical water treatment using the analogue display. The system is self-regulating. In case of water with high conductivity or a large quantity of dissolved oxygen, the electrochemical cells automatically works harder than with water which is no longer reacting. Here, the flow strength (milliamperes - mA) on the display signalises how hard the HWR is working.

The display allows the following interpretations:



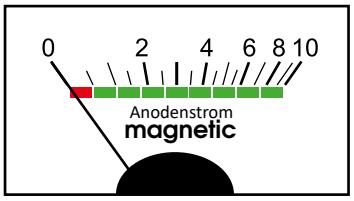
The display indicator is always on 10 mA

The anode is working hard. If the indicator stays in this position for more than one heating season, then the HWR may be too small or the water may contain too many aggressive substances.
Measures: Heating water analyses, speak to your consultant.



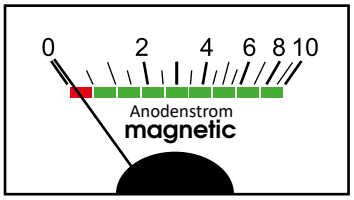
The display indicator is between 0,5 - 9 mA

This is the normal operating range. The lower the display, the less the anode has to work.



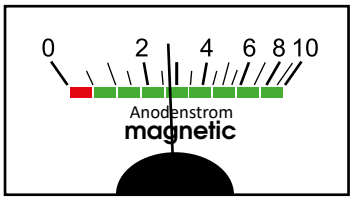
The display indicator is below 0,0 mA

The anode has been used up.
Measures: Open the device and replace the anode.



The display indicator is below 0,5 mA

Outside the heating season, this may occur when the water is no longer reacting.
Measures: Observe, heating water analysis where applicable



The display indicator shows an absolutely constant value (even when the HWR is emptied)

The function display is faulty.
Measures: Replace the functional display.

Backwashing, desludging, container cleaning

A specialist should carry out rinsing.

A specialist should carry out rinsing.
1. Stop the water flow.
2. Close the cut-off valves (1) in the inlet and outlet.
3. For rinsing, connect the water pipe to the drain valve (2). Open the drain valve (2). Demineralised water is ideal for rinsing.
4. Collect the rinsing water from the ball valve (3) using a bucket or use a hosepipe to dispose of the rinsing water in the drain.
5. Open the ball valve slowly (Figure 2 - ❶) and raise the magnet on the magnetic flux filter using the chain (Figure 2-❷).

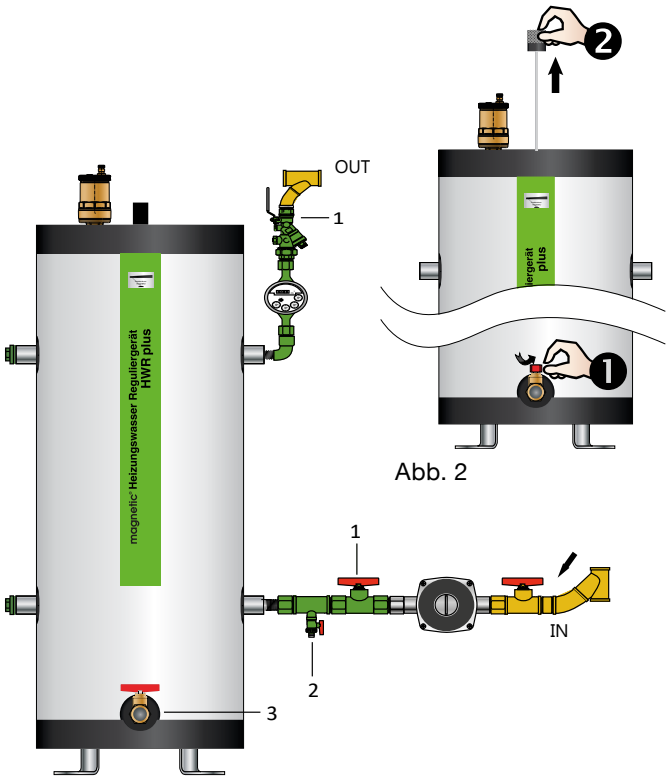


Abb. 2

If no water comes out, carefully stick a wire (e.g. a welding rod) through the ball valve (3) into the device in order to loosen impurities. If this is not successful, you will need to open the HWR, as described in the chapter on anode replacement. Then it is necessary to clean the vessel through the upper opening. In case of stubborn deposits on the walls, you can use a diluted acid such as e.g. citric acid in order to clean the container walls.

CAUTION!!! Always neutralise the container after cleaning using acid.

Rinse it until clean water runs out of the device. After the rinse process, close the ball valve (3) and fill the HWR with water.
6. After rinsing is concluded, lower the magnet on the chain again. Open the ball valve (1) on the supply line to the HWR again commission the pumps again. Where applicable, check the flow volume of a heating water regulator in bypass installation.
7. Enter the rinsing process and measuring values in the maintenance form for the regulator.

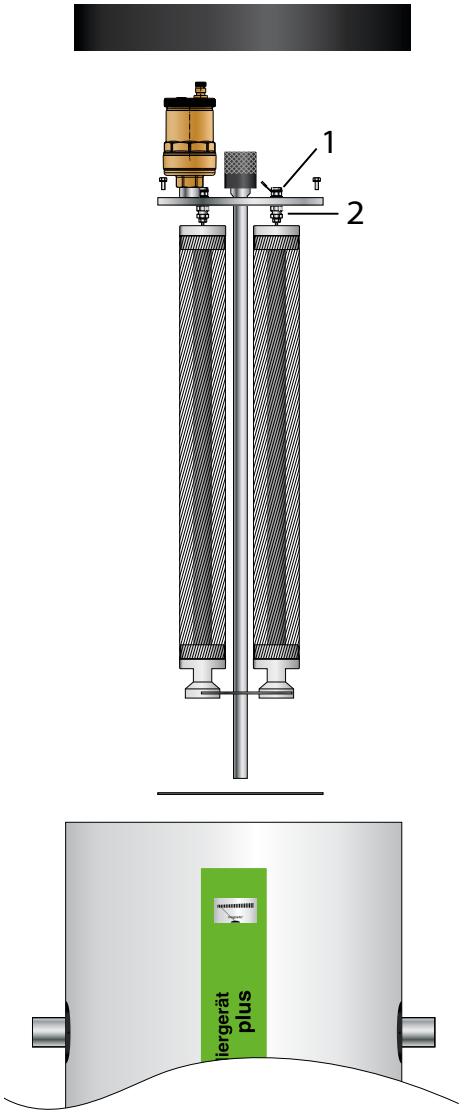
The following rinsing intervals should be maintained:
1. Rinsing 4 weeks after installing the HWR
2. Rinsing after another 4 weeks

As soon as the rinsing water is clean from the start, switch to rinsing annually. Otherwise rinse every 4-8 weeks. During normal operation, the device should be rinsed and checked once a year as part of heating maintenance. If the HWR is installed in a new system, you can skip the rinsing series following installation. In this case, it is sufficient to rinse once a year.

Maintenance

The pH value and electrical conductivity of the heating water must be documented as part of maintenance. In addition, we recommend a comprehensive water analysis from a laboratory.

Anode replacement



1. Opening the HWR reaction vessel to replace anodes

Once the display indicator of the regulator is on the left in the “0” range during the heating phase, you must check the installed anode and replace it where applicable. To do this, follow the steps below:

- Close the inlet and outlet on the HWR
- Place a bucket or other collecting vessel under the emptying valve
- If possible remove the bleeder, open the drain ball valve, and speed up the emptying process by pressing the cut-off valve.
- Carefully pull the polycover off in an upwards movement.
- Sever the orange connector on the cable of the functional display.
- Remove the insulation fleece and remove the plug from the plug-in flap.

The container is closed by means of a flange. Open the vessel and take the flangewith the anode bracket out and check it.

a) If the anode is completely used up and only the black wire is present, it is necessary to install a new anode
b) If the anode is still there and the display was showing “0” before this, an oxide layer is covering the anode, which is preventing it from working. Clean the anode with a wire brush, then it should function again. Otherwise check the display function using a 1.5V. If it doesn’t react, then the display device is faulty.

2. Installing the new anode

When the anodes are completely used up, install the new anodes as follows:

- The anodes are attached to a bushing screw (1), which is fed through the flange and sealed using PTFE seals. Do not remove this bushing screw!
- Do not remove the anode stabiliser.
- Often the anode bracket is strongly soiled and needs to be cleaned using a steel brush prior to removal.
- In order to remove the anode, hold the bushing screw (1) and loosen the anode screw (2).
- Hold the new anode by screwing the anode screw (2) into the bushing screw (1). The firm connection between the anode screw and bracket is important.
- After assembly the firm fit of the entire bushing screw on the flange must be checked and retightened where applicable.
- Replace the seal of the flange whenever you replace the anode
- Reattach the flange or brass plug on the HWR and pay attention that the cable connection is reattached to the functional display before you replace the plastic lid on the insulation.

Troubleshooting

What to do when...

...there are aluminium components in the system?
For aluminium components in water bearing systems, most manufacturers state a maximum pH value of 8.5. However, it is known that aluminium components can remain stable at higher pH values, as long as the concentration of the substance s in the water remain low. If a regulator is installed in a system containing aluminium components, the filling and make-up water of the system must be prepared using total water demineralisation. However, it may adjust to a pH value of >8.5. With regards to complying with any guarantee claims, we refer to the relevant manufacturer‘s specifications.

... the system water is still not clear after one year of operating the HWR?
If the throughflow is strongly limited due to individual system parts, causing insufficient circulation, the HWR’s cleaning function won’t work. All system parts must be fully opened as far as possible. If this is not possible, then all the parts must be rinsed properly.

...that no water leaks when rinsing the Heating Water Regulator?
If no water is coming out during rinsing, then the lower outlet is blocked. In this case, carefully pierce the opened outlet and loosen the blockage. CAUTION!! Here a large quantity of water may suddenly come out. Set up suitable collection vessels.

...water is leaking from the HWR?
If the water is dripping from the insulation, the automatic quick bleeder is faulty. In this case, it needs to be replaced.

...the water metre is not turning?
Check if the pumps are working and all the valves are open. If the water metre is still not turning, remove both the metre and the automatic control valve and clean them. If the water metre is still not working after this, then it needs to be replaced.

...the functional display is still not reacting even though a new anode has been installed?
Test the display using a 1.5V battery. If it does not show any reaction, install a new display. However if it reacts, then there may not be any water in the device or the anode is not installed properly, possibly there is an oxide layer on the anode. This will need to be cleaned using a brass wire brush.

...corrosion and silt build-up occur despite HWR use?
Please check if the regulator has been laid out according to our instructions and has been installed correctly so that water throughflow takes place. Has the maintenance been carried out as described above? Contact us and arrange a water analysis for troubleshooting.

Sucess monitoring

If you would like to check if the HWR plus is really providing corrosion protection, you can check this by means of certain water parameters. Simply have the heating water analysed once a year for pH value, conductivity, hardness and dissolved metals. This will provide you with a long-term statistic and you can determine the corrosion protection function by means of the improved values. The regular water analysis also serves as a warning system if problems occur.

Maintenance record

Installer:	Object:

Installation date:	
pH value at start-up:	
Conductivity at start-up:	
Serial number:	

Date	Colour of rinsing water	Water residue free jes/no	Metre reading, if avaible	Conductivity µS/cm	pH-value	mA-metre	Anode replacement yes/no	Excecutor

Note: Keep this document on the device and record properly. It serves as proof of maintenance

Notes

Notes

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