# magnetic
# Heating Water Regulator - HWR compact plus
# **Instructions for use**

**magnetic** ...einfach besser

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# HWR compact 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.

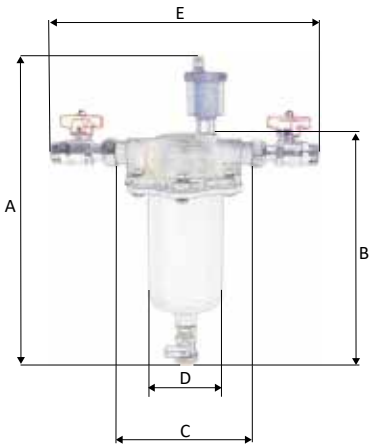
## Specific safety and handling instructions

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

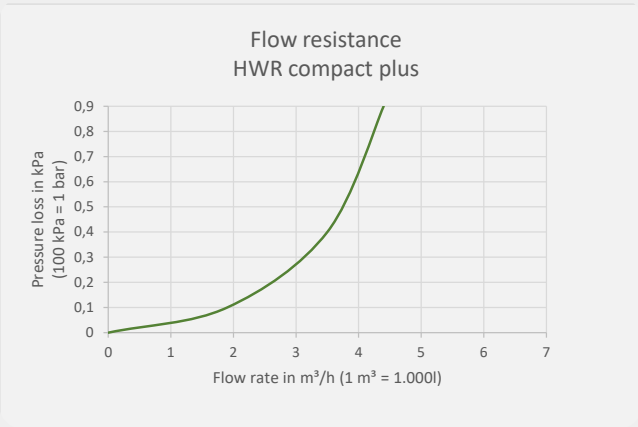
**Dimension in mm**

| | | |
|---|---|---|
| A | Total height incl. vent | 365 mm |
| B | Height w/o vent | 248 mm |
| C | Width w/o ball valve | 170 mm |
| D | Reaction vessel diameter | 85 mm |
| E | Installation length incl. ball valve | 290 mm |
| | **Minimum distance to top** (necessary for anode change) | **80 mm** |

| **Performance data** | |
|---|---|
| System water content* | < 500 l |
| Flow rate | < 3 m³/h |
| Coupling size | ¾“ |
| Max. operating pressure | < 6 bar |
| Max. temperature | < 90° C |

**Scope of supply**

- Brass head
- Reaction vessel, stainless steel
- Insulation with high-power magnet
- 2x ball valves with screw coupling ¾“
- Flushing tap ½“




## How to select the correct Heating Water Regulator?

**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.

The magnetic HWR compact plus is the compact solution for all diffusion-tight systems with a system water content of up to 500 litres.

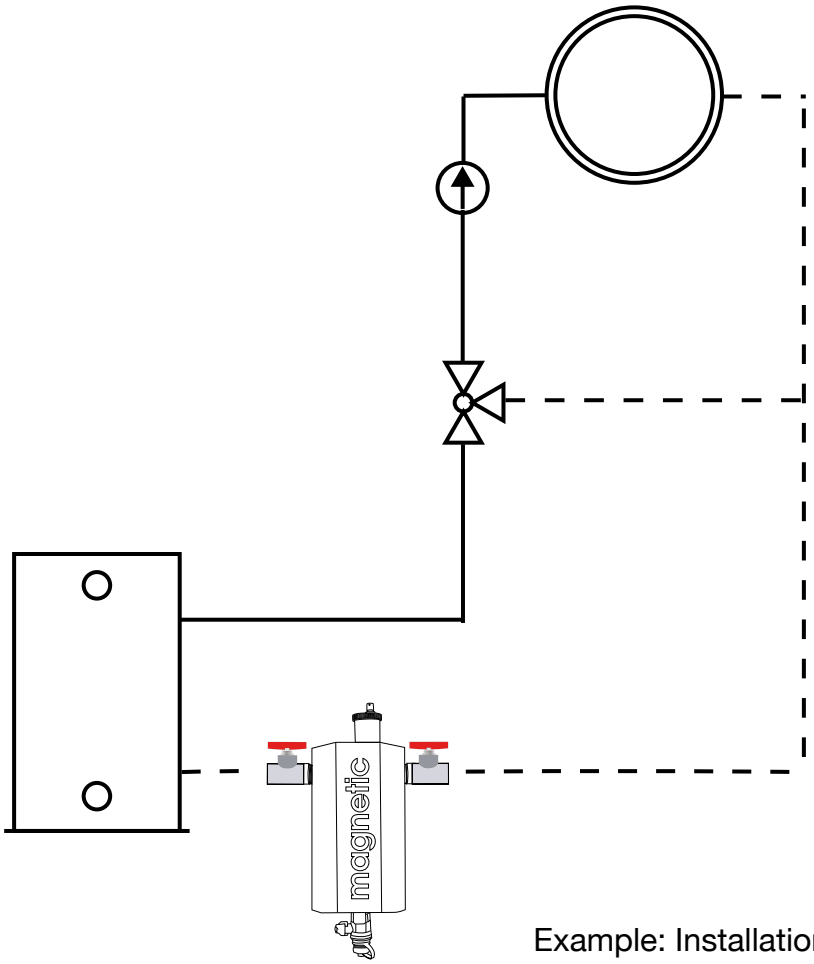
You calculate that with the following formula: **Heating capacity of the system (kW) x 20 = System water content (l)**

## The correct installation

The heating water regulator HWR plus can be installed in either the main flow or the main return. Experience has shown that the highest concentration of dissolved oxygen is present in the main return.

To optimise the pH value and the consumption of dissolved oxygen by means of electrochemical devices, installation in the main return is preferable. For low temperatures, the installation location is flexible.

In widely branched networks, the entire system volume can be divided among several HWRs. These are installed throughout the system in order to ensure ideal water treatment in the entire system. For example, an HWR can be connected directly to a buffer storage tank in the heating centre and further HWRs can be installed in the sub-distribution stations of the heating systems.




Example: Installation in the main return

## Water quality for operating

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 pretreated 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. |

## 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

No 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.

## Sludge removal

If the HWR plus is installed in „full flow“, switch off the circulation pump for sludge removal

1. Remove the insulation with the high-power magnet
2. Close the ball valve on the inlet
3. Close the ball valve on the outlet
4. Screw off the vent
5. Remove the lid on the flushing tap
6. Hold a bucket close under the HWR compact plus and-then open the flushing tap
7. In the case of a blockage, clear the blockage with a screwdriver
8. Release the vacuum with pressure on the air valve
9. Connect the filling hose to the flushing tap
10. Hold the air valve pressed or screw on the vent
11. Fill the HWR compact plus with fresh water and repeat steps 6-8 until the HWR is clean. Then proceed with a filled HWR.
12. Close the flushing tap and the lid
13. Screw on the vent
14. Open the ball valve on the inlet
15. Open the ball valve on the outlet
16. Install the insulation with the high-power magnet

## How often should the sludge removal be done?

Corrosion residues that are carried along with the water flow settle in the HWR plus and must be removed in the maintenance phase.
A too frequent sludge removal is undesired because it promotes the oxygen corrosion.
Fresh water contains about 100 times more oxygen than that permissible in the heating system for proper operation.

You should therefore note the amount of collected sludge and adjust the sludge removal intervals accordingly. A sludge removal from the HWR plus should not be done more than twice per heating period and should not be done less often than once every 2 years

## Anode replacement

1. Close both ball valves
2. Remove the insulation
3. Screw off the reaction vessel
4. Screw the protective anode out of the fastener
5. Screw in the new protective anode
6. Install a new seal
7. Screw on the reaction vessel
8. Open the ball valve on the inlet
9. Open the ball valve on the outlet
10. Install the insulation

# Troubleshooting

| Before installation | Solution |
|---|---|
| Chemical contamination | We recommend a complete system rinsing before the installation of the HWR plus if the system water is contaminated with chemicals. |
| Prior damage due to corrosion | Before the installation, old heating systems must be checked for hidden corrosion damage, which can be hidden by deposits (boiler return flow in the horizontal area, rust bubbles on pipes and distributors). The loosening of deposits by the HWR plus can result in water escaping from the system in the case of hidden corrosion damage. |
| **After installation** | |
| High oxygen ingress is occurring | Check that the expansion vessel is OK. |
| System water is not clear after one year | Check if a circulation through all system parts is taking place. All system parts must be flushed if that is not possible. |
| Corrosion and sludge formation are occurring | Check if the HWR plus model was selected in accordance with our recommendations and is correctly installed. Has the maintenance taken place? Contact us to arrange a water analysis for fault correction. |
| Water is escaping from the HWR plus | The quick-action vent is usually defective if water drips out of the insulation. It must then be replaced. |

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