

magnetic

Heating water filter mobile

Instructions for use



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Preface

Please read these operating instructions before starting up the system. This will help you avoid errors during installation and operation as well as avoiding disturbances of the heating system.

Magnetic is constantly adapting its filter systems to the latest state of the art and therefore reserves the right to make changes to equipment, form and technology. Therefore, no claims can be made on the basis of the descriptions, illustrations and data in this technical documentation.

If you have further questions, please contact us directly.


Description

Automatic mobile heating filter system for flexible use on heating systems between approx. 10 kW and 2,500 kW total heating capacity, or air conditioning systems (chillers) of similar capacity.

The main parts of the filter container consist of the housing (pressure vessel), clamp closure system and filter insert + magnetite separator. The housing is provided with one each inlet and outlet connection as well as connections for differential pressure gauge. The closure is designed as a „Tri-Clamp“ or clamp quick-release fastener (cover) and is equipped with a manual venting valve.

The filter insert consists of a connection piece for a filter element (filter cartridge). The filter element is inserted into the fitting together with an O-ring seal and is prevented from slipping out by the sealing cover. In order to compensate for small length deviations, an elastomer buffer is glued onto each filter element. During operation, the flow through the filter elements is from the outside to the inside.

Other system parts:

- Differential pressure control device with magnetic piston, separating diaphragm chamber, electrical contact and analogue pressure gauge
- Filter charging pump
- Switch box for automatic operation 

Technical specifications

General operating data:

Filter medium:	Water in heating and cooling circuits	
Operating temperature:	Max. 95°C	
Flow rate:	Max. 8 m ³ /h	
Connection voltage:	1x 220V - 250 V 50 Hz	
Closure seal:	EPDM	
Supply limits:	a) Inlet filter pump	= ball valve 1"
	b) Outlet filter	= ball valve 1"

The device consists in particular of the following main parts:

Sturdy steel transport trolley

Dimensions: W x H x D = (approx.) 445 x 1,010 x 395 mm. Design in steel, powder-coated, with large PU wheels on roller bearings to hold the filter pump and the filter container.

Filter Charging Pump

Design as block pump, drive motor and pump forming one unit.

Permissible operating pressure:	6 bar max. at up to a max of 95°C
Flow rate:	up to 5 m ³ /h
Pressure:	up to 1.8 bar
Motor rating P ₂ :	0.3 kW
Protection class:	IP 54

Pipes and Fittings:

Version in stainless steel, DN25 between pump and filter tank and DN6 for differential pressure lines.

Electrical switch box

For the automatic control of the system: Signalling with switching off the filter pump at max. differential pressure fitted and wired to the system including 2m connection cable and plug 230 V Schuko



Fine filter:

Stainless steel housing and closure with manual venting valve. The closure is designed as a quick-release cover with a pre-adjustable clamp for easy filter element replacement. Permissible pressure drop in the soiled filter: 1.5 bar max.

Permissible operating pressure:	6 bar max. bei bis zu 95°C max
Filter surface area:	1 m ²
Pressure:	up to 1,8 bar
Filter element:	1 µm

Differential pressure gauge

With display scale 0 - 2.0 bar with membrane technology (insensitive to dirt), with contact maker, complete with connecting leads, mounted on the filter and electrically wired. Reed contact adjusted to 1.5 bar switching point.

Filter element extraction aid

Solid stainless steel version

Magnetite separator:

Material	Plating: Stainless steel 1.4301, Magnets: Neodymium high-temperature magnets
Dimensions	Length: 200mm, Ø 25mm
Surface magnetisation/remanence	10.000 Gs / ca. 1.25 Tesla
Max. working temperature	Up to 120°C



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Installation Instructions - General Instruction for the connection

The magnetic heating water filter mobile is set up vertically on a level surface. Care must be taken to ensure that the device stands securely and is safeguarded against falling over.

The hose/pipe to the filter pump inlet should be fitted in the flow direction of the heating water in the heating return in front of the pipe supply from the filter system outlet, at a distance of at least 400 mm. Please refer to the schematic installation instructions on the next but one page.

At the magnetic heating water filter mobile the shut-off devices are mounted on the filter; only the pipe connection to two valves in the heating return flow has to be made. The hoses/pipelines and all cables must be connected without any stresses and with a tension relief.

The piping system must be cleaned before connecting and commissioning. Coarse solid contaminants and residues may cause damage to the filter pump and the filter elements.



Important! The connection should be done in such a way that at no time can circuit water flow through the filter system contrary to the intended flow direction. If this is not guaranteed by the prevailing conditions in the heating system, a non-return valve must be installed in the pipe from the filter system outlet for re-entry into the heating return. Flow and pressurisation contrary to the intended direction of flow in the filter system can lead to expansion of the filter cartridges and even their destruction.

Operation (switching on the pump) may only be carried out with the filter system completely filled with (heating) water and vented, as the filter pump is **not** designed to be self-priming. **Attention!** Dry running of the filter pump inevitably leads to filter pump failure and loss of warranty.

The spent filter element can be disposed of with the normal household waste, provided that the initially filtered medium does not contain any substances/chemicals that can be classified as hazardous waste.

Operation/switching of the differential pressure control device, the filter pump and the switch box: see further chapters and attachments.

Installation Instructions - Special Instruction for the connection

The filter systems are always connected in bypass to the main flow circuit. The most sensible installation location for heating systems is the main return flow to the boiler or heat generator. The main flow of the liquid system must not be interrupted!

1. In the main return line, two connecting pieces each with shut-off valve (e.g. slide valve or ball valve) must be used, or if not available, they must be installed.
2. The two connections should have a minimum distance of at least approx. 0.4 m from each other. Greater distances are not a problem. No other system components should be fitted between the two connections!
3. If possible, the flow to the filter should be directed downwards from the pipe of the liquid system (main return of the heating system). It is preferable to use a 1¼" (DN 32) pipe, but 1" is sufficient in the EFH [detached house] sector for temporary installation and under observation, also ¾" or ½". However, the pipe cross-section on the suction side of the filter system must never be smaller than that on the pressure side.
4. The pipe runs on the suction side of the pump should not be longer than a maximum of approx. 2.5 m.
5. Mobile filter systems must be secured against toppling over.
6. There must be an easily accessible free space of at least 700 mm above the cover of the filter unit for maintenance purposes.
7. Installation of the filter system must be easily accessible in order to ensure problem-free maintenance and operation at all times.
8. The filter system should only be in operation when the main circuit of the liquid system is also being circulated.
9. All screw connections as well as the electrical circuits are to be checked for perfect functioning or leak tightness during commissioning; any faults are to be reported immediately so that remedial action can be taken without delay.
10. Mobile filter systems are usually connected to the fluid system via armoured hoses or corrugated stainless steel pipes and rapid-action couplings or screw fittings, but fixed piping is also possible.

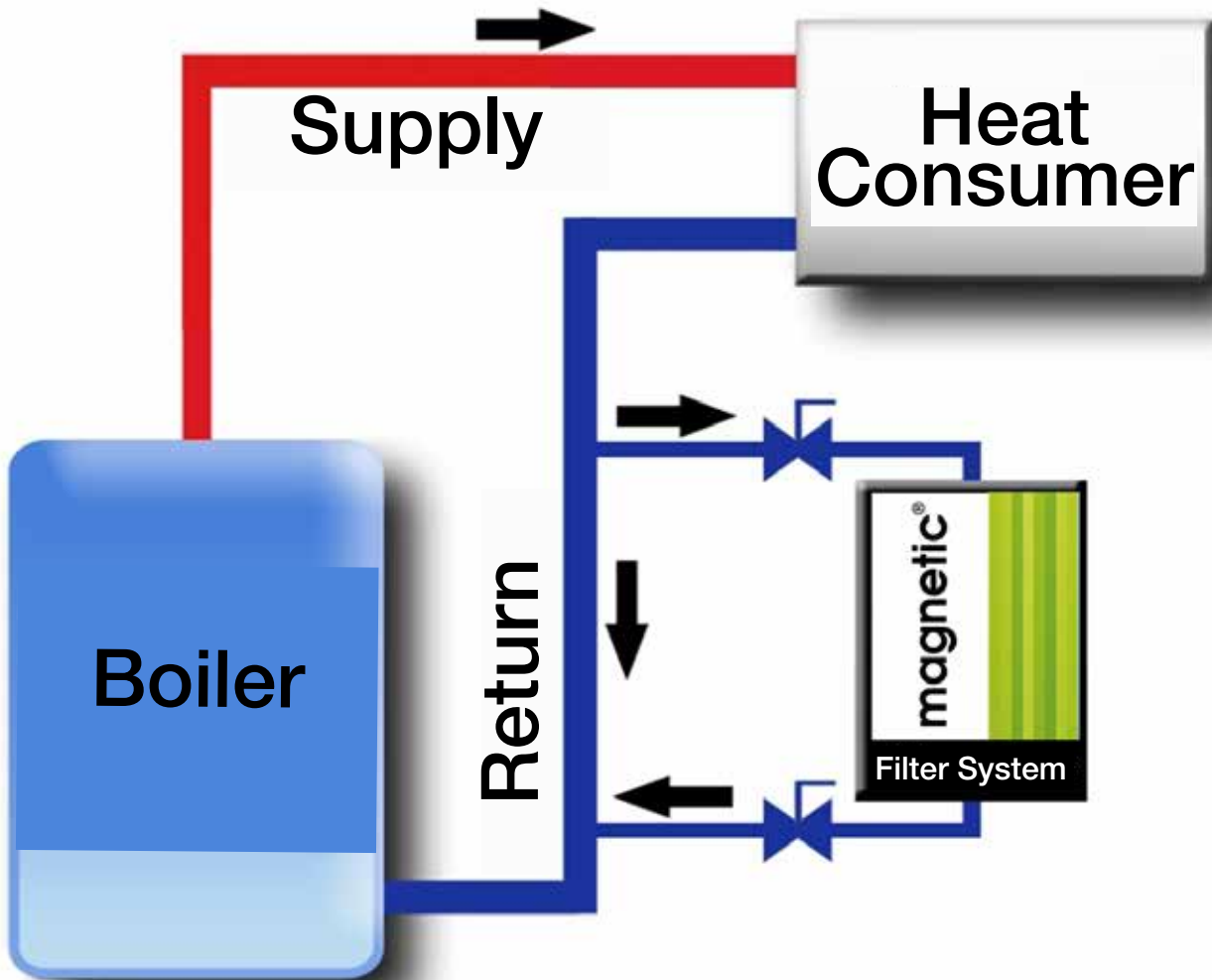


The system must be completely vented before every start-up, as the filter pump is not self-priming. **Attention!** Damage caused by dry running is not covered by the warranty!

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Integration of the system in the bypass to the main return

The **magnetic** heating water filter mobile is always connected in the bypass to the main fluid circuit. The most sensible installation location for heating systems is the main return to the boiler or heat generator. The main flow of the liquid system must not be interrupted!



Operating instructions

When the filter system is properly connected, with the slide valves at the inlet to the filter pump and outlet to the heating return, the vent screw must be opened until liquid emerges and then closed. Then the filter system can be switched on; the filter pump is running (visual check by means of a green operating light on the switch box of the filter system). The filter system is now working correctly.

The differential pressure control device must be monitored. When the maximum permissible differential pressure of 1.5 bar is reached, the filter pump switches off automatically. The red indicator light on the switch box of the filter system itself lights up.

The filter elements must be replaced at the latest at a differential pressure of 1.5 bar, or after a maximum service life of 12 months after the last filter element replacement. The closure must be opened to replace the filter elements.



Attention! Before opening the container, make sure that the filter pump is switched off and that the slide valves between the heating circuit and the inlet to the filter pump as well as between the filter system outlet and the heating return are completely closed!



Danger of scalding! The water temperature in the heating return can be 80°C and more! Wear appropriate protective clothing and take appropriate safety precautions. Now, before opening the closure cover, open the vent valve until the ambient pressure is reached, then close the vent valve.

It is not absolutely necessary to completely empty the pressure vessel in order to change the filter element. It is sufficient to drain the level of the container by means of the drain valve on the ball valve of the filter system outlet to a few cm below the brim. With the cover open, the filter element can be carefully withdrawn and replaced with a new one. The use of disposable gloves is recommended.

If necessary, use the filter element extractor to help remove the filter element from the housing! To do this, grip underneath the underside of the filter element with the filter element extractor and carefully pull it upwards or give it a jerk. Always take care not to damage the sealing surfaces of the pressure vessel!

Before inserting a new filter element, make sure that there are no coarse foreign bodies in the pressure vessel and that the connection piece for element location at the pressure vessel base sealing surface is free of impurities/foreign bodies.

Make sure that the new filter element is undamaged. Damaged or torn filter elements have poor or no filtering effect. The O-ring of the new filter element should be wetted/lightly greased before insertion

The seal between housing and cover must be inspected for damage before reassembly and replaced if necessary. Before closing the cover, make sure that there are no impurities on the sealing surface of the cover, on the sealing surface of the housing or on the seal itself!

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Replace the cover and place the clamp so that it covers the cover and the flange collar equally. Before doing so, take care not to tilt the cover but to position it exactly in the middle of the seal. The seal has a key at the top and bottom, the cover as well as the flange have a slot into which the key of the seal must be inserted. The pretension of the clamp can be changed if higher/lower contact pressure of the closure is required. After fitting the cover, the filter system is almost ready for operation again:

After mounting the cover, the filter unit is almost ready for operation again:

To put the filter system back into operation, first slowly open the slide valve between the heating circuit and the inlet to the filter pump until pressure equalisation is achieved (no more flow noise audible). Open the slide slowly so that the filter element cannot be damaged by the pressure shock that may occur. Only now should you fully open the slide valve between the filter system outlet and the heating return.

Now open the vent valve on the cover until the system is completely vented and liquid emerges. Now make sure that the pressure vessel is tightly closed. Now switch the filter pump on again.

The initial differential pressure in the uncontaminated state can be up to approx. 0.1 bar.

Operating times

The mobile filter unit is best suited for flexible use on many heating or cooling systems in succession. When used on such systems, care must be taken to ensure that the filter system is basically only in operation when the system to be cleaned is in operation, or at least the circulation in the circuit to be cleaned is in action. If, for example, a heating system is out of operation during summer time, the filter system should not be used either - even if this would not be to the disadvantage of the system to be cleaned. For successful use of the filter system, it must be ensured that the water to be cleaned is circulated in the main flow. For the temporary and fully monitored connection of the system directly in the main flow, it is essential to obtain advice from magnetic beforehand in order to rule out possible incorrect operation or other risks. In case of doubt, the system must be used exclusively for its intended purpose in accordance with the installation instructions: in the bypass flow to the main return flow with circulation running in the main circuit (see chapter 2.3. Installation instructions, schematic)

Filter result

The filter systems with the corresponding filter element, e.g. 1µm filter fineness, are exclusively designed to filter out solids from liquids. The filter elements have different filter properties according to their defined filter fineness. The number in the type designation identifies the initial filter fineness of a filter element.

The filter systems are - if not otherwise ordered - provided at the factory with 1µm filter elements. This means that with these filter elements in their new, uncontaminated state, the largest particle that can pass through the filter element without being retained has a maximum diameter of 1 µm.

As soon as the filter elements are in use and contaminated liquid flows through them, the pores of the element begin to clog with debris. As there are fewer and fewer free pores that can be flowed through, the differential pressure between the contaminated and clean side of the filter element increases. This is indicated by the differential pressure gauge on the filter.

During filtration, the differential pressure - depending on the contamination - usually increases more slowly at first than at the end of the filter element service life. So it is quite normal that sometimes at the beginning or even over a longer period of time there is hardly any visible deflection on the differential pressure gauge (then, at least for the moment, there is also little contamination in the circulating water).

Over time and depending on the quantity of contaminants in the water, a growing filter cake (layer of contaminants) builds up on the filter paper. This causes a continuous refinement of the filter fineness, so that even contamination with grain sizes down to less than $1\ \mu\text{m}$ ($<1/1000\ \text{mm!}$) is filtered out until the filter element is theoretically completely clogged and no longer allows any flow at all. At maximum permissible contamination, the filter system has reached a differential pressure of 1.5 bar and switches off automatically. Depending on the composition of the contamination in the filtered liquid, the filter element is now packed with up to several kilograms of fine contaminants.

Micro-particle impurities in the form of corrosion products or solid precipitates of other water components (e.g. limescale) are usually the cause of turbidity in heating or cooling water. These particles are reliably removed from the liquid with micro filters - until it appears to be crystal clear, provided that there are no completely dissolved impurities in the water that could cause residual coloration.



Attention! Completely dissolved or chemical components mixed (at atomic or molecular level) with the liquid cannot be filtered out. This also does not prevent intentionally added components such as additives or other chemical substances from being retained in the liquid. On the other hand, discolourations based on substances completely dissolved in the liquid re-main after the filtration. (cf. e.g. table salt, which dissolves down to its molecular components NaCl when mixed with water and cannot be separated from the water with micro filters). In addition, residual coloration is in principle harmless to the system, does not impede heat transfer or efficiency, and does not cause blockages.

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Magnetite separator

Mode of Operation:

The high-performance magnets are designed to retain effectively any magnetically reacting particles (especially rust particles and other iron compounds) that may still be present in the circulating water following the micro filter stage. The already micro-filtered installation water is fed past the magnetic rod inserts, and the very strong magnetic field attracts the particles, which are deposited on the surface of the magnetic rod. All parts of magnetic rods in contact with the medium are made of stainless steel and are therefore durable and resistant to the medium.

Maintenance:

The filter system must be positioned horizontally and/or on a horizontal surface. The magnetic rod can be inserted when the filter system is open and there is no filter element inside. To do this, the complete magnetic rod is held by the upper eyelet and inserted into the filter system with the stainless steel clasp in front, so that the foot of the magnetic rod slides exactly into the filter element holder at the bottom of the container of the filter system, thereby centering itself.

Finally, the magnetic rod stands vertically in the filter system and the filter element of choice can be inserted as usual. It is simply inserted over the standing magnetic rod, after which the filter system can be put into operation as usual.

If there is a certain amount of contamination in the water, over time several cakes of debris will form around the magnetic rod in a ring at the points where the magnetic field enters and leaves the rod. To remove the magnetic rod, the filter element is first removed, the magnetic rod then stands firmly in the pressure vessel of the filter system and can be removed by grasping the upper eyelet and pulling it out.

Any caked debris that may have formed on the magnetic rod can be removed periodically from the magnetic rod towards one of the two ends, e.g. during maintenance of the filter system. If there is still residual contamination on the magnet, this can be tolerated; due to the very strong magnetic force, this will not come off until the next maintenance.

Warnings about handling magnets

Exclusion of Liability

magnetic is not liable for damage caused by improper handling of the magnets and especially by disregarding the following warnings. By purchasing the magnets you confirm that you have noted and understood these warnings. Please pass on the printed warnings enclosed with each magnet delivery should you give away or resell strong permanent magnets

Damage Caused by Magnetically Fixed Objects Coming Loose

If you attach objects with magnets, which may cause personal injury or material damage should they fall, make sure that they have sufficient holding power and ensure that the attachment cannot be loosened by external force - or even unintentionally.

Danger for Children

Strong permanent magnets are not toys! There is a danger to life, especially for small children, if several small magnets are swallowed or magnets are inserted into a power socket. Children should never get their hands on larger magnets because of the danger of crushing.

Risk of Breakage and Fragmentation

Many magnets are pressed (sintered) from powdery materials under high pressure and provided with a protective metallic layer. As a result, the magnets are brittle and can break. This can happen especially when larger magnets collide. Splinters of the magnetic body or possibly the plating can also fly off and cause eye injuries. When handling larger magnets, it is therefore recommended to wear gloves and protective goggles.

Risk of Crushing

Larger permanent magnets develop an unexpectedly strong force of attraction when they are brought close to each other or to ferritic steel surfaces and are then difficult to control. Skin contusions and bruises can easily occur. Therefore, avoid intentional testing of the magnets on body parts such as the nose and ears etc.

Abrasion or Flaking of the Plating

The surface plating of magnets can wear away with use. Accelerated wear or chipping may occur when magnets collide. Ball magnets are subject to special loads due to the punctiform contact surface and should not be stored for long periods in direct contact with other magnets or metal or iron surfaces.

Mechanical Processing, Fire Hazard

Most permanent magnets are difficult to machine. They tend to break when being drilled or sawed. If you nevertheless want to try, use only suitable diamond or corundum tools and cool the workpiece with plenty of water or cooling lubricant. NdFeB and SmCo can ignite very easily! In addition, all magnets may lose their magnetisation if the maximum operating temperature is exceeded. Also note that neodymium magnets lack rust protection on the machined surfaces. It is therefore recommended to glue on magnets without fixing holes or to glue and/or press them into a recess to secure them.

Danger for Machinery

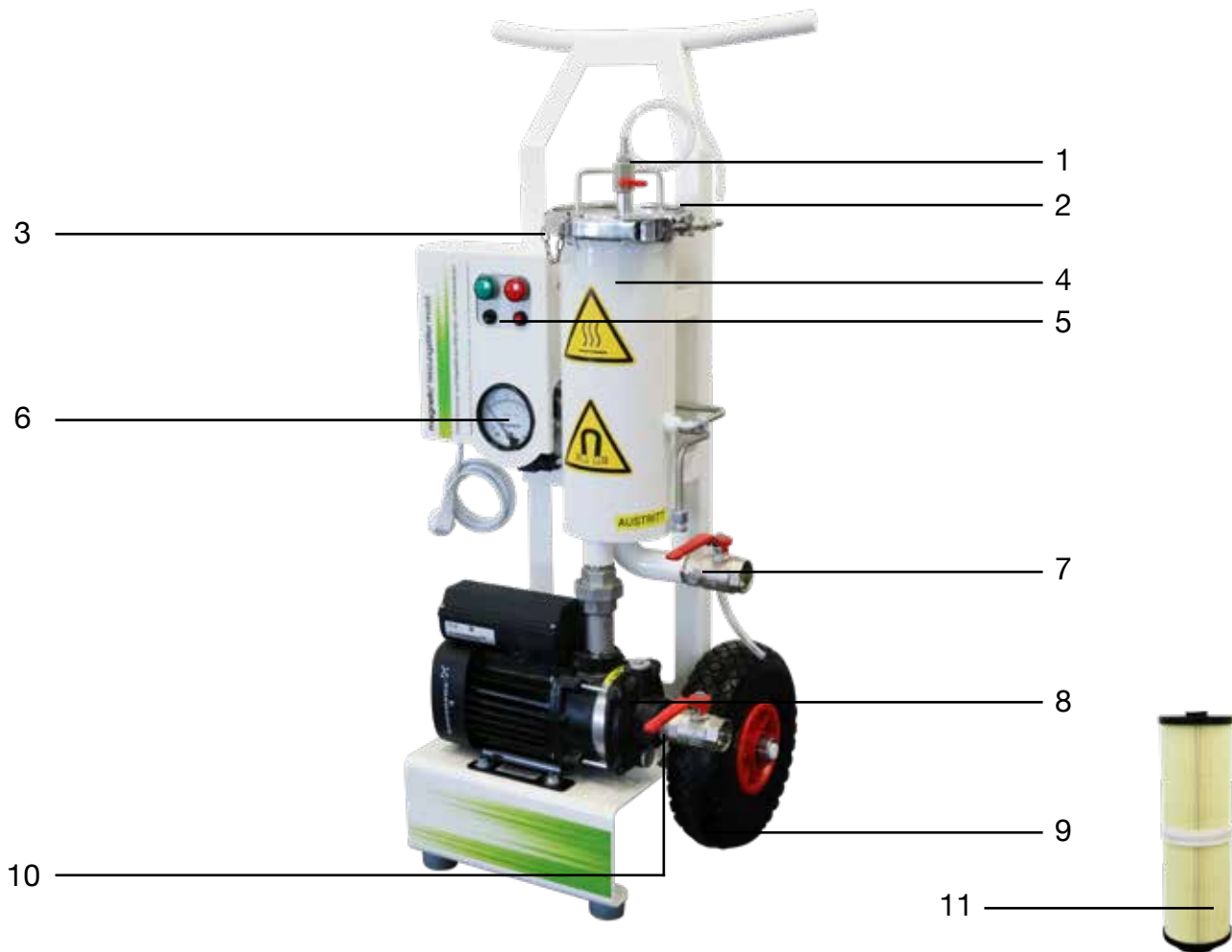
Strong permanent magnets can damage technical equipment and storage media. An appropriate safety distance should therefore be maintained to such objects. Among others, the following objects are at risk: mobile phones, computers, monitors, television sets, hard disks, floppy disks, magnetic tapes (including audio and video cassettes), USB sticks, credit and bank cards, watches, loudspeakers, microphones, electricity meters, hearing aids, pace-makers and RFID chips (animal chips, transponders) and others.

Health Dangers

Most neodymium magnets are provided with a nickel plating. Some people have an allergic reaction to nickel. However, prolonged contact with nickel can also lead to nickel allergy. According to widespread scientific opinion, static magnetic fields have no harmful influence on the human organism. There are even non-scientific healing methods based on the effects of magnetism. To be on the safe side, you should not permanently expose yourself to stronger magnetic fields.

Overview drawing

- 1 Venting valve
- 2 Clamp
- 3 Closure seal
- 4 Filter container
- 5 Electrical switching box
- 6 Differential pressure gauge
- 7 Ball valve outlet 1"
- 8 Filter charging pump
- 9 Ball valve inlet 1"
- 10 Tyres
- 11 In filter container: filter element (1 μ m)



Notes

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