GOUDSMIT MAGNETICS

Installation and user manual

Hygienic magnetic filter, type SFH-CIP/SIP (Clean/Steam In Place)

Permanent magnetic filter for fluids and powders in pressure pipes.

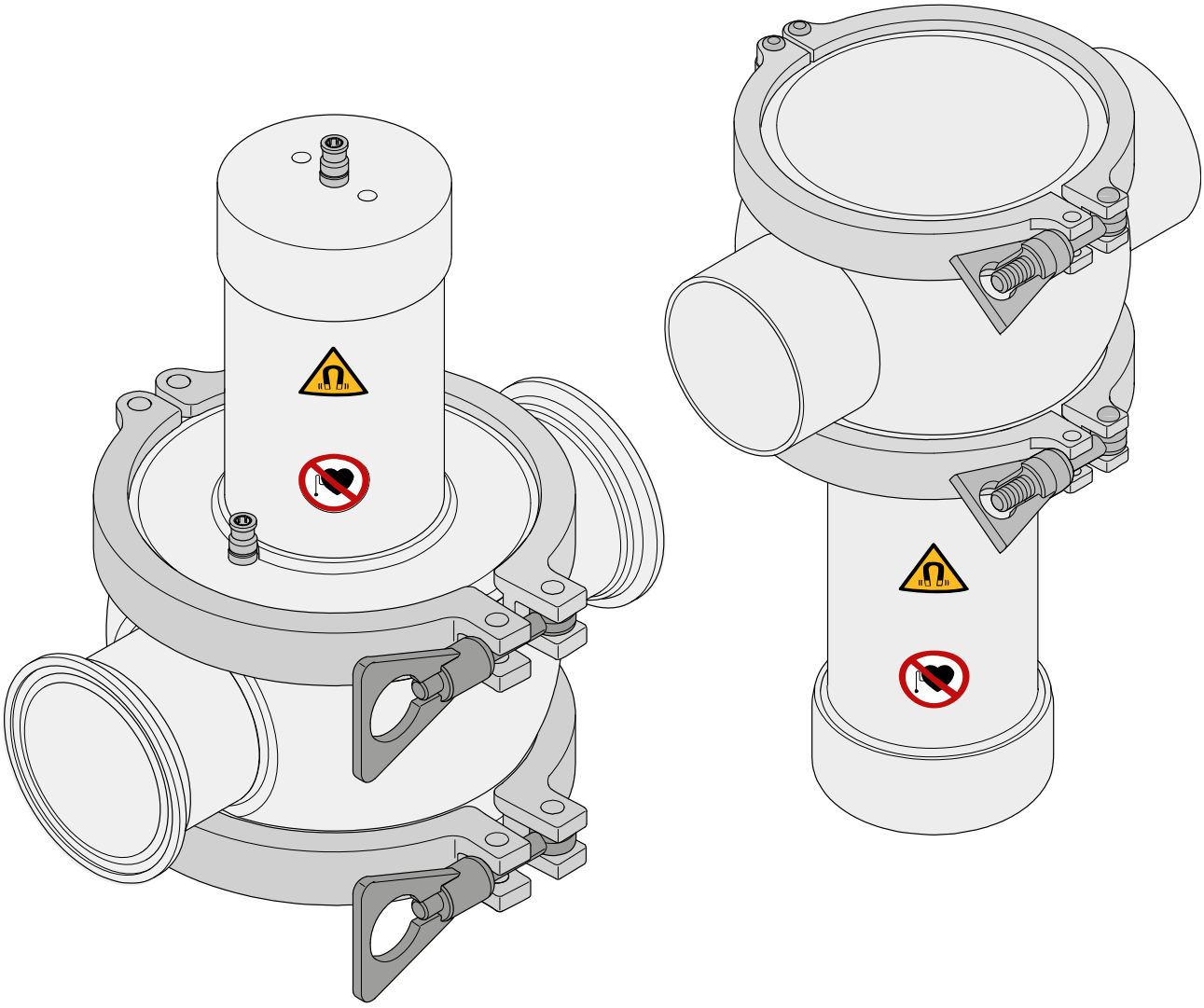

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Table of contents

1 Introduction 5

2 Safety 6

2.1 Safety risks 6
2.2 General safety instructions 6
2.3 Damage due to magnetic field 6
2.4 Other remarks/warnings 6

3 Standards and regulations 7

3.1 CE marking 7
3.2 Limit values for occupational and public exposure to permanent magnetic and electromagnetic fields 7

4 General information 9

4.1 Ferromagnetism 9
4.2 Warranty conditions 9
4.3 Other remarks/warnings 9

5 Specifications 10

5.1 Description of function 10
5.2 Application 10
5.3 Use in food product flows 10
5.4 Temperatures 10
5.5 Free space 10

6 Product information 11

6.1 Construction 11
6.2 Scope of delivery 11
6.3 Identification plate 12

7 Transport and installation 13

7.1 Transport 13
7.2 Installation 13
7.3 Air quality (compressed air) 14
7.4 Air pressure 14

8 Operating principle 15

8.1 General 15
8.2 Start-up 15
8.3 Cleaning process – discharge of ferromagnetic particles 15
8.4 Cleaning the magnetic bar 19

9 Maintenance and inspection 20

9.1 General guidelines 20
9.2 Frequency of maintenance 21
9.3 Cleaning instructions 21
9.4 Flux density measurement of the magnetic bar 22
9.5 Replacing seals 23
9.6 Replacing the magnet bundle / removing dents from the magnetic bar tube 24

10 Troubleshooting 25
10.1 Troubleshooting table 25
11 Service, storage and disassembly 26
11.1 Customer service 26
11.2 Spare parts 26
11.3 Storage and disposal 26

1 Introduction

This manual contains information about correct use and maintenance of the device. The manual contains instructions that should be followed to prevent injury and serious damage and to ensure safe and problem-free operation of the device. Read this manual thoroughly and ensure that you fully understand everything before using the device.

If you need more information or still have questions, please contact Goudsmit Magnetic Systems B.V.. The contact details are provided on the title page of this manual. Additional copies of the manual can be ordered by providing the device description and/or article number as well as the order number.

In this manual, the SFH-CIP/SIP hygienic magnetic filter is further referred to as ‘device’.

NOTICE

Read this manual carefully before installation and commissioning!

The descriptions and figures in this manual, provided for explanatory purposes, may differ from the descriptions and figures of your version.

NOTICE

This manual and manufacturer’s declaration(s) are to be considered part of the device.

Both documents must remain with this device if it is sold.

The manual must be available to all operating personnel, service technicians and others who work with the device throughout the life of the device.

2 Safety

2.1 Safety risks

This chapter describes the safety risks of the device. Where necessary, warning pictograms have been affixed to the device. These pictograms are explained later in this document.

NOTICE

Observe the following measures:

- ► Read the warning pictograms on the device carefully.
- ► Check that the pictograms on the device are present and legible at regular intervals.
- ► Keep the pictograms clean.
- ► Replace pictograms that have become illegible or that have been removed with new pictograms in the same locations.

2.2 General safety instructions

- The instructions in this manual must be complied with. If they are not, there is a risk of material damage, personal injury and even a danger of death.
- The device may only be used for magnetic filtering of fine ferromagnetic contaminants – such as stainless steel wear particles – from fluid and powder flows in pressure pipes with a pressure of max. 10 bar. Any other use is inconsistent with the regulations. Any resulting damage is not covered by the factory warranty.
- Ensure that people who work on the device or in its immediate vicinity wear adequate protective equipment.
- Impose additional safety measures and use additional warning pictograms if the device remains easily accessible to people. If this is not possible, ensure that clear instructions are provided for the entire system in which this device is integrated.
- Work on the device may only be carried out by qualified personnel. Ideally, maintenance work on the magnets should be carried out by Goudsmit Magnetic Systems B.V. personnel.
- Always take locally applicable safety and environmental regulations into account.

2.3 Damage due to magnetic field

The magnets generate a powerful magnetic field that attracts ferromagnetic particles. This also applies to ferrous materials that may be carried on the person, including keys, coins and tools. When working within the magnetic field, use non-ferromagnetic tools and workbenches with a wooden worktop and non-ferromagnetic base.

WARNING

Strong magnetic field

There is a risk of personal injury when carrying out work and measurement checks on the device. Do not place the fingers or other body parts between the magnetic components.

2.4 Other remarks/warnings

Rectify all faults before operating the device. If the device is used whilst exhibiting a fault, after having completed a risk assessment, warn operating and maintenance personnel of the fault and the potential risks associated with that fault.

3 Standards and regulations

3.1 CE marking

In terms of construction and operation, this device complies with European and national requirements.

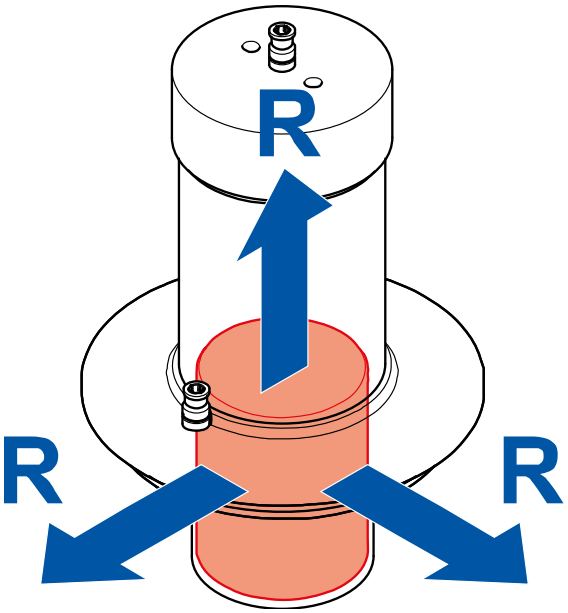
The CE marking confirms the conformity of the device with all applicable EU regulations associated with the application of this marking.

3.2 Limit values for occupational and public exposure to permanent magnetic and electromagnetic fields

The limit values and magnetic fields are defined in accordance with the EMC Directive 2013/35/EU as follows:

Directive 2013/35/EU *of the European Parliament and of the Council of* 26 June 2013 *on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).*

Observe the following measures in relation to exposure to magnetic fields in accordance with EN12198-1 (machine category = 0, no restrictions) of the device:



Life-threatening danger to people with implanted medical aids

People with an active implanted medical aid (e.g. pacemaker, defibrillator, insulin pump) may never be present within a radius ‘R’ of 0.25 metre(s) of the device.

Damage to products with sensitivity to magnets

Products that contain ferromagnetic parts, such as debit cards, credit or chip cards, keys and watches, may be rendered permanently damaged if they come within a radius ‘R’ of 0.15 metre(s) of the device.

Employees who are pregnant and the general public may not come within a radius ‘R’ of 0.03 metre(s) of the device.

WARNING

Projectile hazard

Ferromagnetic objects will be attracted if they come within a radius of 0.11 metre of the magnet.

Limit values for occupational exposure (general and for limbs) are not exceeded.

4 General information

4.1 Ferromagnetism

The device's principle of operation is based on ferromagnetism. Ferromagnetism is a property possessed by certain materials, such as iron, cobalt and nickel. These materials can become magnetized when exposed to an externally applied magnetic field. Materials that remain magnetized after the external magnetic field is removed are called permanent magnets or magnetically hard.

However, most magnetic materials lose their magnetism after the external magnetic field is removed. These are soft magnetic materials. Most alloys of iron, cobalt and nickel are magnetic.

However, some stainless steel alloys, such as AISI304 or AISI316, are only slightly magnetic.

4.2 Warranty conditions

The warranty on the device is void if:

- Service and maintenance are not performed in accordance with the operating instructions or are carried out by personnel not specially trained for this purpose. Goudsmit Magnetic Systems B.V. recommends having service and maintenance carried out by service technicians from Goudsmit Magnetic Systems B.V..
- Modifications to the device are carried out without our prior written consent.
- Parts of the device are replaced with non-OEM or non-identical parts.
- Parts of the device become damaged, because the device was put into production with a malfunction and/or a persistent malfunction.
- The device is used injudiciously, incorrectly, carelessly or in a manner not in keeping with its nature and/or intended use.

NOTICE

All parts subject to wear and tear are excluded from warranty.

4.3 Other remarks/warnings

- Do not use the device if it is damaged.
- Only use the device for the application for which it was designed.
- Ensure that the device is maintained correctly and in accordance with the instructions in this manual.
- Rectify all faults before operating the device.

5 Specifications

5.1 Description of function

The magnetic filter filters fine ferromagnetic contaminants of up to 30 µm – such as stainless steel wear particles – from fluid and powder flows. The product must not contain any ferromagnetic particles large or heavy enough to cause damage to the magnetic bars. Maximum particle size is 10-16 mm, depending on the type.

- If necessary, place a sieve before the product inlet of the device in your installation.

5.2 Application

This type of magnetic filter is designed to meet the highest hygiene requirements of the food and pharmaceutical industries. Fully automatic cleaning (CIP/SIP: Clean/Steam In Place).

The pressure drop depends on the physical properties of your product flow (viscosity) and its velocity. We can calculate the exact pressure drop for these filters in your situation for gaseous or liquid products using our FEM software.

5.3 Use in food product flows

The device is supplied in stainless steel with a polished finish as standard. This is suitable for food contact applications, where there is a low risk of bacterial growth. All contact materials are compliant with EU directive EC1935/2004.

5.4 Temperatures

The devices are suitable for the following ambient and product temperatures:

Applied magnet quality	Ambient temperature	Max. product temperature
N-42SH	-20 to +60 °C	140 °C

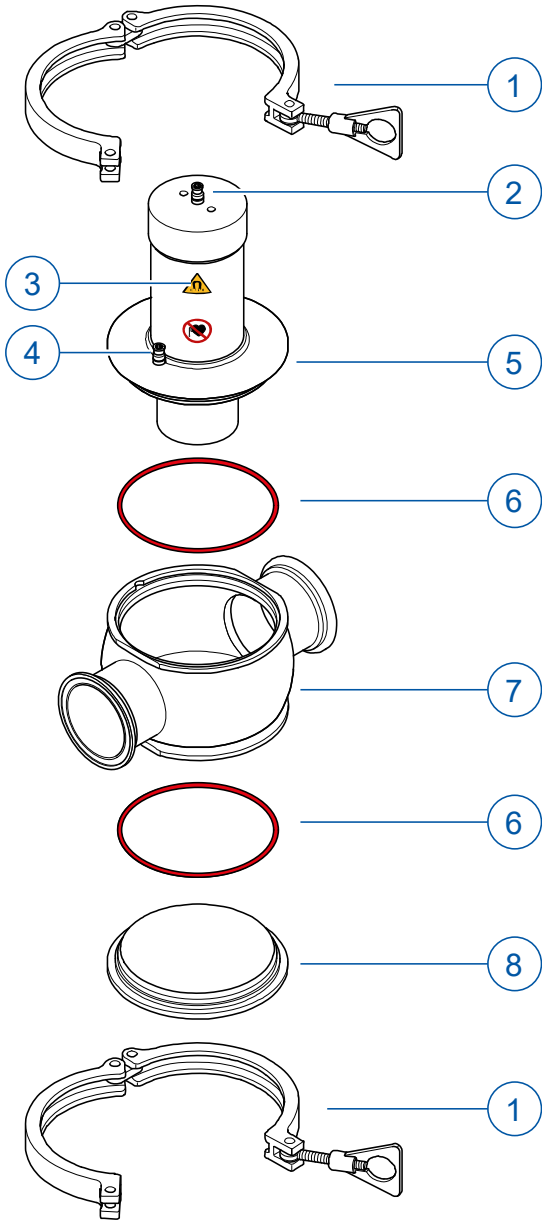
The magnetic material must be protected against higher temperatures than those specified on the data sheet as the magnet will permanently lose magnetic force if exposed to higher temperatures.

5.5 Free space

For installation, operation, and maintenance purposes, it is recommended to leave 0.5 metres of space around the device.

6 Product information

6.1 Construction



[1] Clamp
[2] Air connection ‘Magnet IN’
[3] Warning pictogram
[4] Air connection ‘Magnet OUT’
[5] Magnetic bar
[6] Seal
[7] Housing
[8] Bottom plate

6.2 Scope of delivery

Check the shipment immediately upon delivery for:

- Possible damage and/or shortcomings as a consequence of transport. In the event of damage, ask the carrier for a transport damage report.

- Completeness.

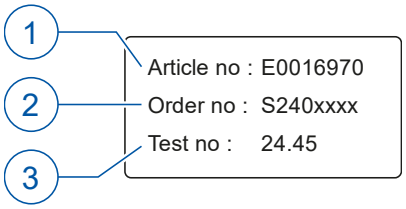
NOTICE

In the event of damage or incorrect shipment, contact Goudsmit Magnetics immediately. The contact details are provided on the title page of this manual.

6.3 Identification plate

The following identification data are shown on the device. The identification data are very important for maintenance of the device.

Always keep the identification data clean and legible. Always provide the article and order numbers when ordering spare parts, requesting service or reporting a malfunction.



[1] Article number

[2] Order number

[3] Pressure test number

7 Transport and installation

7.1 Transport

WARNING

Note

The device permanently emits a magnetic force.

Observe the safety instructions for transport in the Safety risks [▶ 6] section.

- During transport, avoid all impact in order to prevent damage, especially to the magnetic bar. If the magnetic bar tube is damaged, the magnet bundles may not move within the tubes or may do so with difficulty.

7.2 Installation

NOTICE

Take the following precautions:

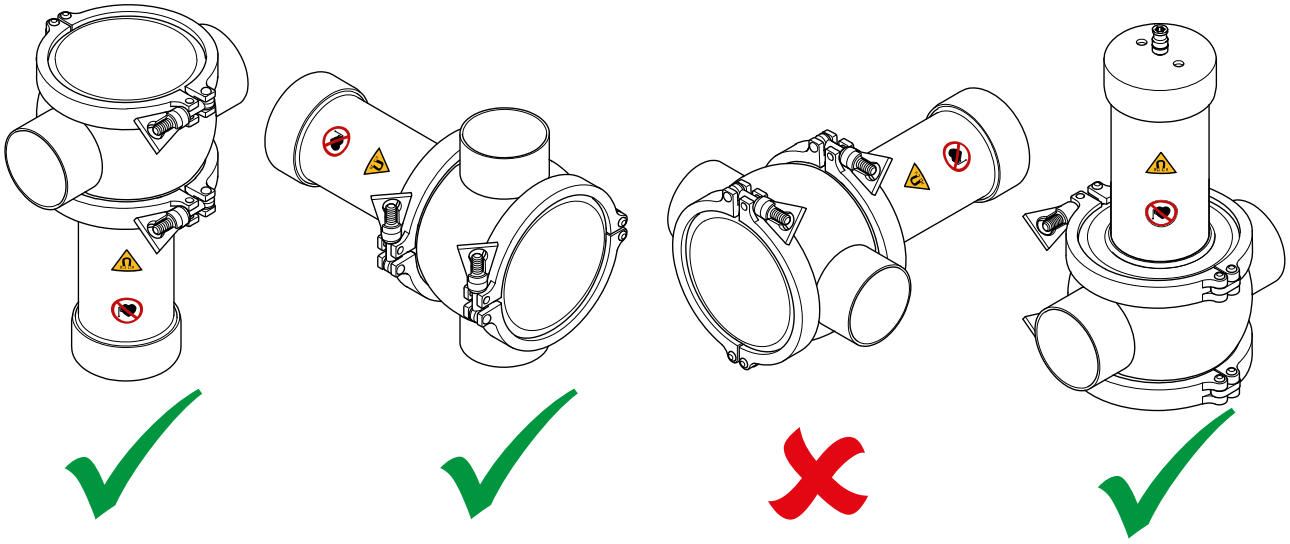
- ▶ Work safely, provide ample work space and use dependable scaffolding, ladders and other tools so the device can be installed without any risks.
- ▶ The device permanently emits a magnetic force. See the Safety risks [▶ 6] section for the precautions that must be taken when working on the device.
- ▶ Only qualified personnel should work on the device.
- ▶ Ensure that there is sufficient clearance around the installation to install the device in the installation/structure and for operation, inspection and maintenance work to be carried out.
- ▶ Ensure that no external vibration is transferred to the device, as this can cause permanent loss of magnetic force.
- ▶ Only non-magnetic structural parts are permitted within the range of the magnetic field in order to prevent a negative impact on the removal of ferrous particles. In simple terms, the magnetic field may not be ‘short circuited’.
- ▶ Only use lifting/hoisting tools that are in good condition, and do not exceed the lifting capacity of the tools.
- ▶ The supply and discharge channels and structure must be sufficiently strong to bear the weight of the device with the captured ferrous particles.

CAUTION

Risk of injury from edges and sharp corners

- ▶ Take extremely care when carrying out work near sharp edges and pointed corners.
- ▶ Wear protective gloves if you are unsure.

- Install the device free of mechanical stress and at the correct working height in your product channel for the operating personnel. Mechanical stress on the device can cause deformation and other problems.



NEVER install the device with both connections and the magnet unit positioned horizontally.

NOTICE

Installing the device in a manner other than specified may result in damage and hazards. During a production stop, (hot) residue may remain in the housing, which can flow out when the device is opened.

- The devices are available with various standardized flanges and couplings. Follow the installation instructions in accordance with the relevant standards for the flanges and couplings to install the device in your installation. Misalignment or loose mounting can cause leakage.
- Connect an air hose to both pneumatic fittings. Connect the air hoses to the central controller.
- Clean the device thoroughly before commissioning.

7.3 Air quality (compressed air)

Goudsmit Magnetics recommends using compressed air with a quality consistent with ISO 8573-1 (2:4:1) for the flow of food products.

It is your responsibility to choose the air quality that is appropriate for your product flow. There is no direct contact between the air and the product. The used air is ventilated outside the device. If an alternative setup is preferred, the exhaust air can be conveyed in a return circuit or to another space.

7.4 Air pressure

For the pneumatic connection(s), use an air pressure of 4 to 6 bar.

8 Operating principle

8.1 General

The device's function is to capture ferromagnetic contamination from the product flow.

The device is equipped with a thick, high-power neodymium magnetic bar in a tube located in the centre of the product channel. The magnetic bar can be pneumatically blown IN and OUT of the product channel.

The magnetic bar sits in the middle of the product flow. As the product contaminated with ferromagnetic particles flows through the filter, it passes the magnetic bar.

The magnetic bar attracts the passing ferromagnetic particles. The captured particles stick to the magnetic bar tube, while the cleaned product continues to flow.

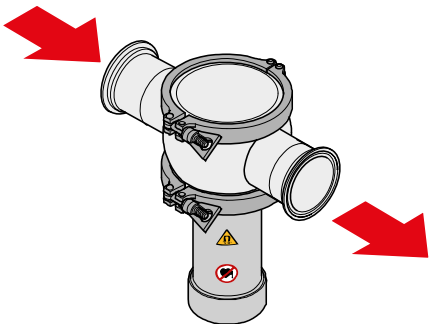
After the product flow has been stopped, the magnetic bar is pneumatically blown to the OUT position. This causes the ferromagnetic particles to drop from the magnetic bar tube onto the bottom plate. By cleaning the line via CIP/SIP, you flush the captured ferromagnetic particles away with the cleaning medium.

8.2 Start-up

Test the operation of the magnetic bar with a paperclip. When the magnet bundle inside the magnetic bar is shifted, the paperclip should be captured and then released, respectively.

8.3 Cleaning process – discharge of ferromagnetic particles

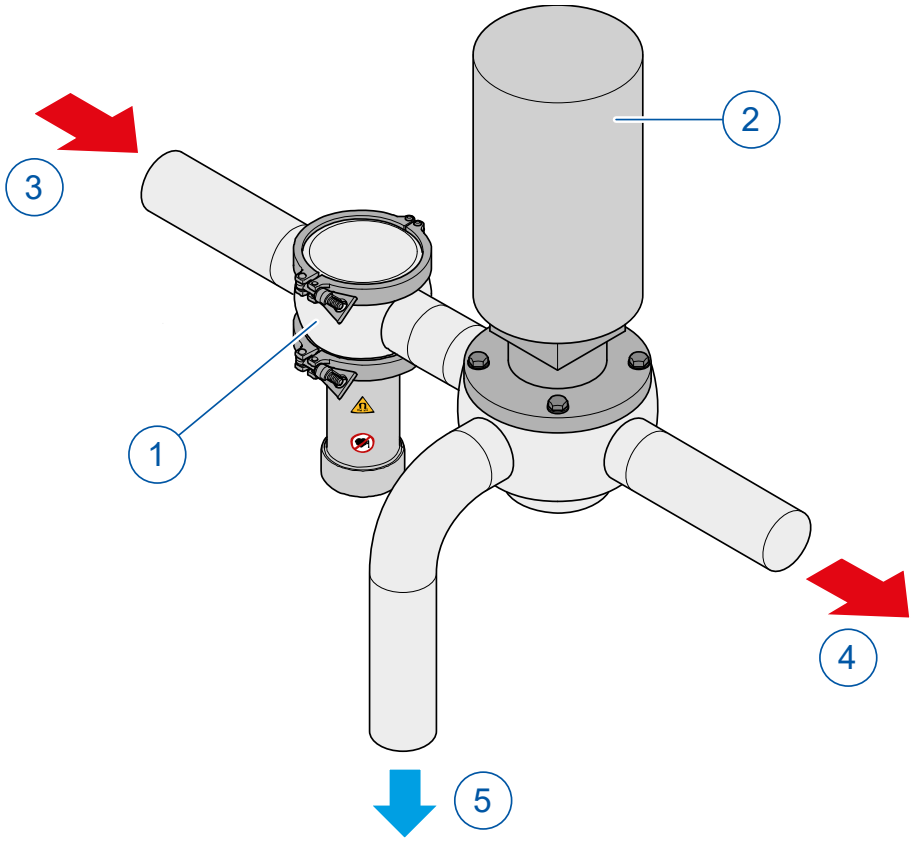
Version without cleaning valve



To clean, proceed as follows:

- Stop the product flow.
- Remove the ferromagnetic particles via another outlet in the installation.

Version with a single cleaning valve

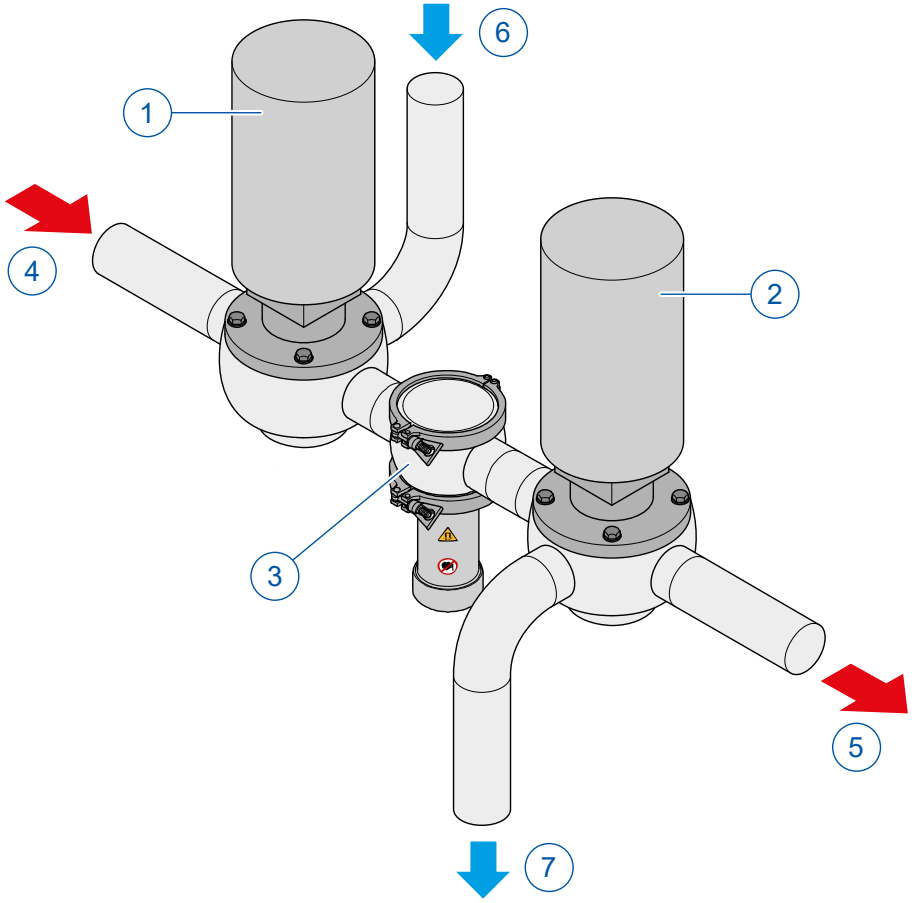


[1] Magnetic filter
[2] Cleaning valve
[3] Product flow [IN]
[4] Product flow [OUT]
[5] Discharge line [OUT]

To clean, proceed as follows:

- Stop the product flow.
- Ensure the clean product has been purged from the lines.
- Activate the cleaning valve.
- Pneumatically blow the magnetic bar out of the product channel. The ferromagnetic particles now fall from the tube to the bottom of the filter.
- CIP/SIP clean the line, including the magnetic filter.
- Allow sufficient time for the ferromagnetic particles to be removed. The cleaning line can also be used for sampling.
- Deactivate the cleaning valve.
- Pneumatically blow the magnetic bar back into the product channel.
- Production can be safely resumed.

Version with a double cleaning valve



[1] Cleaning valve [IN]
[2] Cleaning valve [OUT]
[3] Magnetic filter
[4] Product flow [IN]
[5] Product flow [OUT]
[6] Cleaning medium supply line [IN]
[7] Discharge line [OUT]

To clean, proceed as follows:

- Stop the product flow.
- Ensure the clean product has been purged from the lines.
- Activate the cleaning valves.
- Start the cleaning medium.
- Pneumatically blow the magnetic bar out of the product channel. The ferromagnetic particles now fall from the tube to the bottom of the filter.
- CIP/SIP clean the line, including the magnetic filter.
- Allow sufficient time for the ferromagnetic particles to be removed.
- The cleaning line can also be used for sampling.
- Stop the supply of cleaning medium through the cleaning line.
- Deactivate the cleaning valves.
- Pneumatically blow the magnetic bar back into the product channel.
- Production can be safely resumed.

NOTICE

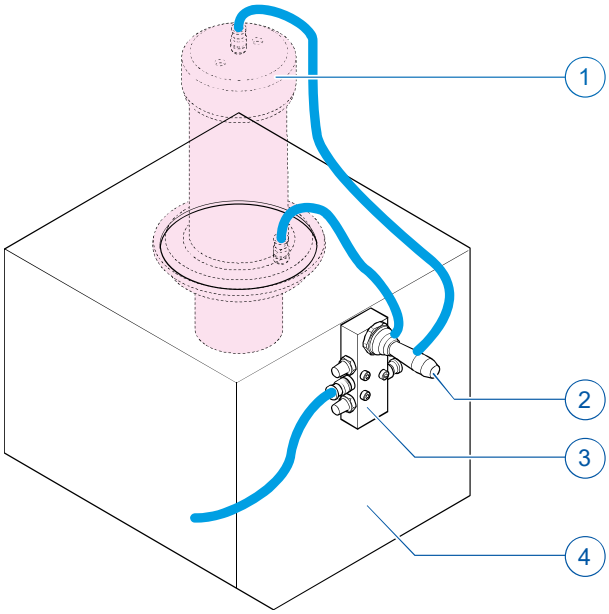
This manual does not describe the CIP/SIP procedure for the entire installation.

- Remove the ferromagnetic particles before the CIP/SIP process.

8.4 Cleaning the magnetic bar

Removing ferromagnetic particles using the cleaning aid (accessory)

The removal of ferromagnetic particles can also be carried out with a cleaning aid (accessory).



Proceed as follows to remove ferromagnetic particles from the magnetic bar:

- Place the magnetic bar in the cleaning aid.
- Connect Ø6 mm air hoses to the fittings on the magnetic bar tube [**1**] and the 5/3 valve [**3**].
- Use the lever [**2**] to switch the magnetic bar to the upper position. The captured ferromagnetic particles drop from the magnetic bar tube.
- Empty the collection tray [**4**].
- Use the lever [**2**] to switch the magnetic bar back to the lower position.
- Disconnect the air hoses.
- Remove the magnetic bar from the cleaning aid.

- **Advantages:**
  - Both hands free.
  - Captured ferromagnetic particles fall into the collection tray.
  - Enables investigation of separation efficiency.
  - Ferromagnetic particles are not re-attracted by the magnetic bar when the magnet bundle is positioned at the top of the magnetic bar tube (a risk with manual cleaning).
  - Ferromagnetic objects lying around the work area are not accidentally attracted.
  - Can be placed on a table or wall-mounted using the mounting holes.

9 Maintenance and inspection

9.1 General guidelines

WARNING

Risk of crushing

In view of the large magnetic forces, replacing the internal magnet components is extremely dangerous as they are difficult to handle. Replacement may ONLY be carried out by appropriately qualified personnel or (ideally) by Goudsmit Magnetics technicians.

If the replacement is carried out by unqualified personnel, the warranty will be void.

Goudsmit Magnetics cannot be held liable for any consequential damage to people and/or materials if this prohibition is ignored.

WARNING

Caution

- ► Perform all work on the device while the product flow is stopped and the compressed air is shut off via the central controller.
- ► Be careful with tools and ferrous objects. The magnetic force is permanently present.

Magnetic systems do not only attract ferromagnetic particles, but a small proportion of your product will also continue to ‘adhere’ to the magnets. Remove all captured particles from the magnets at regular intervals. A clean magnet is considerably more effective.

- Always inform operating personnel of scheduled inspections, maintenance, repairs and in the event of faults.
- Check regularly that all warning pictograms are still present in the correct locations on the device. If these are lost or damaged, replace them with new pictograms in the original locations immediately.
- Ensure that the device is externally clean. Remove dust, dirt and particles from the device as appropriate.
- Isolate the compressed-air supply while working on the device.

9.2 Frequency of maintenance

Action	Daily	Monthly	6 months
Clean magnetic bar tube (for maximum performance) (► Cleaning process – discharge of ferromagnetic particles [▷ 15]).	min. 2x [1)]		
Check the seal for wear and ageing.		•	
Measure flux density of magnetic bar (► Flux density measurement of the magnetic bar [▷ 22]).			•
Replace seals (► Replacing seals [▷ 23]).			•
Replace magnet bundle / remove dents from the magnetic bar tube (► Replacing the magnet bundle / removing dents from the magnetic bar tube [▷ 24]).			

[1)] The frequency of the cleaning process depends on the capacity of your product flow and the level of soiling.

NOTICE

Goudsmit Magnetics offers an annual maintenance inspection, including replacement of the seal(s) and an inspection report with certificate for the magnets.

9.3 Cleaning instructions

Wet or dry cleaning

If the use of fluids is prohibited in your installation, use disinfectant cloths that are suitable for contact with the processed product, if necessary.

The frequency of cleaning is dependent on the degree of cleanliness required for the processed product. The frequency of cleaning must be increased in applications where sensitive food products are processed. Perform a hygiene risk assessment to determine the requirements in your situation.

When used in food product flows

Cleaning and disinfectant methods and agents that are used for cleaning must be adapted to the specific type of soiling (carbohydrates, proteins, fats, etc.) and the degree of cleaning required for your application. The type of product that is processed thus determines to a large extent which combination of cleaning agents is suitable. Consult your cleaning agent supplier to select the correct cleaning agents for your specific situation.

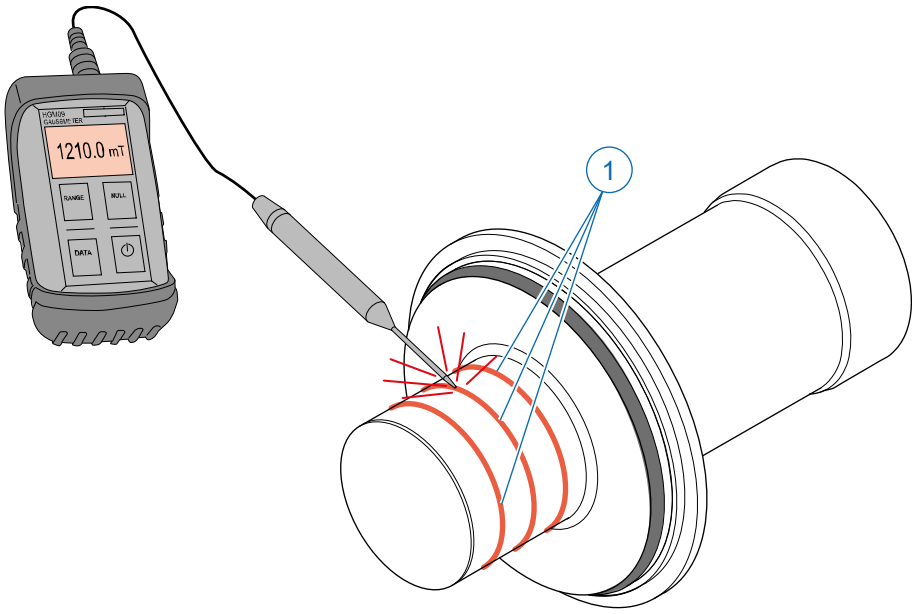
Check with your cleaning agent supplier whether the products are suitable for the material of the chosen seals (silicone, NBR or Viton).

The device is made of stainless steel or ‘food-grade stainless steel’ 1.4404/SAE 316L.

9.4 Flux density measurement of the magnetic bar

The magnetic bar must be measured at periodic intervals to check its magnetic flux density and to determine whether the magnetic force has decreased. Use a suitable gauss meter/tesla meter to measure the poles of the magnetic bar on the surface (the unit is tesla, gauss, kA/m or oersted).

Goudsmit Magnetics can perform magnet measurements on location, if desired. Proceed as follows:



- Stop the product flow.
- Ensure the magnetic bar is in the operating position (at the bottom of the magnetic bar tube).
- Deactivate the compressed air on the device.
- Disconnect the air hoses from the pneumatic fittings on the magnetic bar.
- Release the clamp and remove the magnetic bar from the housing.
- Place the magnetic bar on a non-ferromagnetic surface, for example wood or plastic.
- Clean the magnetic bar with a clean, lint-free cloth.
- Move the gauss meter/tesla meter probe [**1**] along the poles on the magnetic bar.

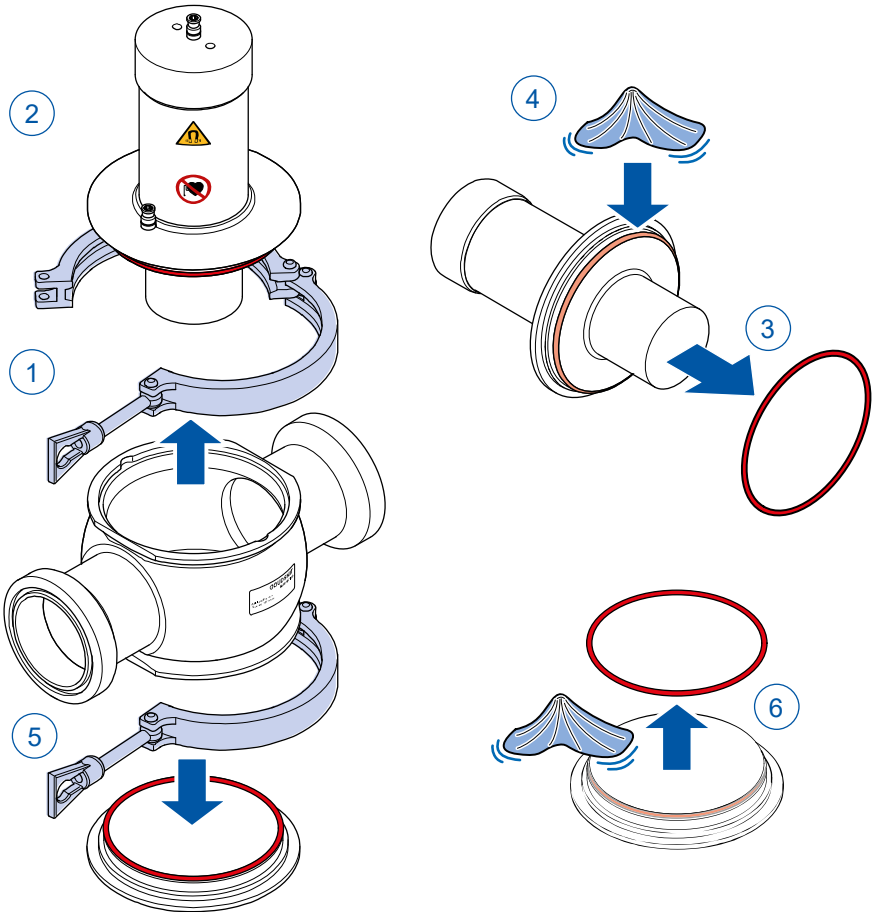
The measured values may fluctuate for various reasons, such as the position (angle) of the probe on the magnetic bar tube, the thickness of the probe and the reproducibility of the measurement. The temperature of the magnetic bar tube may be higher than 20-22°C due to the influence of the product flow.

- Record the highest measured value.
- Using the accompanying data sheet, check whether the measured value falls within the permitted range for the peak value. **Note:** The measured values on the data sheet are values measured at a measurement temperature of 20°C ± 2°C.
- Refit the magnetic bar in the housing and secure it with the clamp.
- Reconnect the air hoses to the pneumatic fittings on the magnetic bar.
- Activate the compressed air on the device.
- Production can now be safely resumed.

9.5 Replacing seals

We recommend replacing the seals at least once a year, or more frequently depending on wear.

To replace the seals, proceed as follows:



- Stop the product flow.
- Deactivate the compressed air on the device.
- Disconnect the air hoses from the pneumatic fittings on the magnetic bar.
- Release the clamp [**1**] and remove the magnetic bar from the housing [**2**].
- Place the magnetic bar on a non-ferromagnetic surface, for example wood or plastic.
- Clean the magnetic bar with a clean, lint-free cloth.
- Remove the old seal [**3**].
- Thoroughly clean the groove in which the seal was seated [**4**], and fit a new seal.
- Refit the magnetic bar in the housing and secure it with the clamp.
- Release the clamp from the bottom plate [**5**].
- Remove the old seal [**6**].
- Thoroughly clean the groove in which the seal was seated, and fit a new seal.
- Refit the bottom plate in the housing and secure it with the clamp.
- Reconnect the air hoses to the fittings.
- Activate the compressed air on the device.
- Production can now be safely resumed.

If the seals wear out too quickly, e.g. due to excessive temperature or an excessively abrasive product, enquire about alternative seals.

9.6 Replacing the magnet bundle / removing dents from the magnetic bar tube

WARNING

Risk of crushing

In view of the large magnetic forces, replacing the internal magnet components is extremely dangerous as they are difficult to handle. Replacement may ONLY be carried out by appropriately qualified personnel or (ideally) by Goudsmit Magnetics technicians.

If the replacement is carried out by unqualified personnel, the warranty will be void.

Goudsmit Magnetics cannot be held liable for any consequential damage to people and/or materials if this prohibition is ignored.

If you nonetheless decide to carry out maintenance on the magnetic bar/magnet bundle yourself, proceed as follows:

- Stop the product flow.
- Depressurize the installation.
- Deactivate the compressed air on the device.
- Disconnect the air hoses from the pneumatic fittings on the magnetic bar.
- Release the clamp and remove the magnetic bar from the housing.
- Place the magnetic bar on a non-ferromagnetic surface, for example wood or plastic.
- Clean the magnetic bar with a clean, lint-free cloth.
- Check the seal for defects (wear or ageing).
- Inspect the outside of the magnetic bar for dents.
- Risk of entrapment! Remove the cap from the magnetic bar and remove the magnet bundle from the tube.
- Inspect the inside of the magnetic bar tube for scratches.
- Clean all parts thoroughly. Check the magnet bundle for corrosion and damage.
- Check the O-ring of the magnetic bar tube for defects. Refit the O-ring with a little food-grade grease or oil.
- Check the seal on the magnet bundle for defects. Refit the seal with a little food-grade grease or oil.
- All parts that are in good condition may be reused. Order defective or damaged parts from Goudsmit Magnetic Systems B.V..
- Reinsert the magnet bundle into the magnetic bar tube with a little food-grade grease or oil.
- Refit the cap on the magnetic bar.
- Refit the magnetic bar in the housing and secure it with the clamp.
- Reconnect the air hoses to the fittings. The device is now fully reassembled.
- Activate the compressed air on the device.
- Pressurize the installation.
- If dents or scratches are present in the magnetic bar tube, test whether the magnetic bar still moves up and down freely in the tube. Replace, if necessary.
- Production can now be safely resumed.

10 Troubleshooting

10.1 Troubleshooting table

Use the following table to search for faults, determine the possible cause and find the remedy. In the event of a fault that is not in the table, contact Goudsmit Magnetics customer service.

Problem	Possible cause	Solution
The device does not separate ferromagnetic particles, or does so poorly.	The magnetic bar is overloaded with ferromagnetic particles.	• Remove the captured particles from the magnetic bar (more frequently).
	Iron parts near the magnets reduce the iron-removal capacity.	• Check the magnetic behaviour of the installed parts around the magnets by holding a ferrous object close to the magnets. If there are parts that react to the magnet, replace them with non-magnetic parts, such as those made from stainless steel.
Leakage of product material.	Sealing ring is not seated properly in the groove.	• Fit the sealing ring in the groove properly.
	Sealing ring is worn.	• Replace the sealing ring.
	Clamp connections not tightened sufficiently.	• Tighten the clamp connections.
Magnetic bar jams in magnetic bar tube.	Dents in the magnetic bar tube.	• Have the dents removed from the magnetic bar tube by qualified personnel. • Contact Goudsmit Magnetics.

11 Service, storage and disassembly

11.1 Customer service

Have the following information to hand when contacting customer service:

- Data from the identification plate.
- Type and scope of the problem.
- Presumed cause.

11.2 Spare parts

Spare parts are usually parts that are subject to wear. These include:

- seals

- magnetic bar tube

How quickly the sealing rings wear will depend on your product and how abrasive it is, as well as the capacity of your product flow. Several types of sealing rings are available for this device. See the data sheet for the precise specifications. Please get in touch with us for information on the availability of the sealing rings.

- When ordering, state the article and order numbers that appear on the identification plate.
- For further information, please contact us by +31 (040) 22 13 283 or consult our website.

11.3 Storage and disposal

Storage

If you do not intend to use the magnet product for an extended period of time, we recommend placing the device in a dry, safe place, and applying preservative to the vulnerable parts, if necessary.

Disposal/recycling

When dismantling and/or scrapping the magnet product, keep in mind the materials from which the individual parts are made (magnets, iron, aluminium, stainless steel, etc.). This should ideally be done by a specialized company. Always observe the local regulations and standards pertaining to industrial waste disposal.

Inform those disposing of the magnet material of the hazards of magnetism. To this end, see also the Safety risks [▶ 6] section.

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