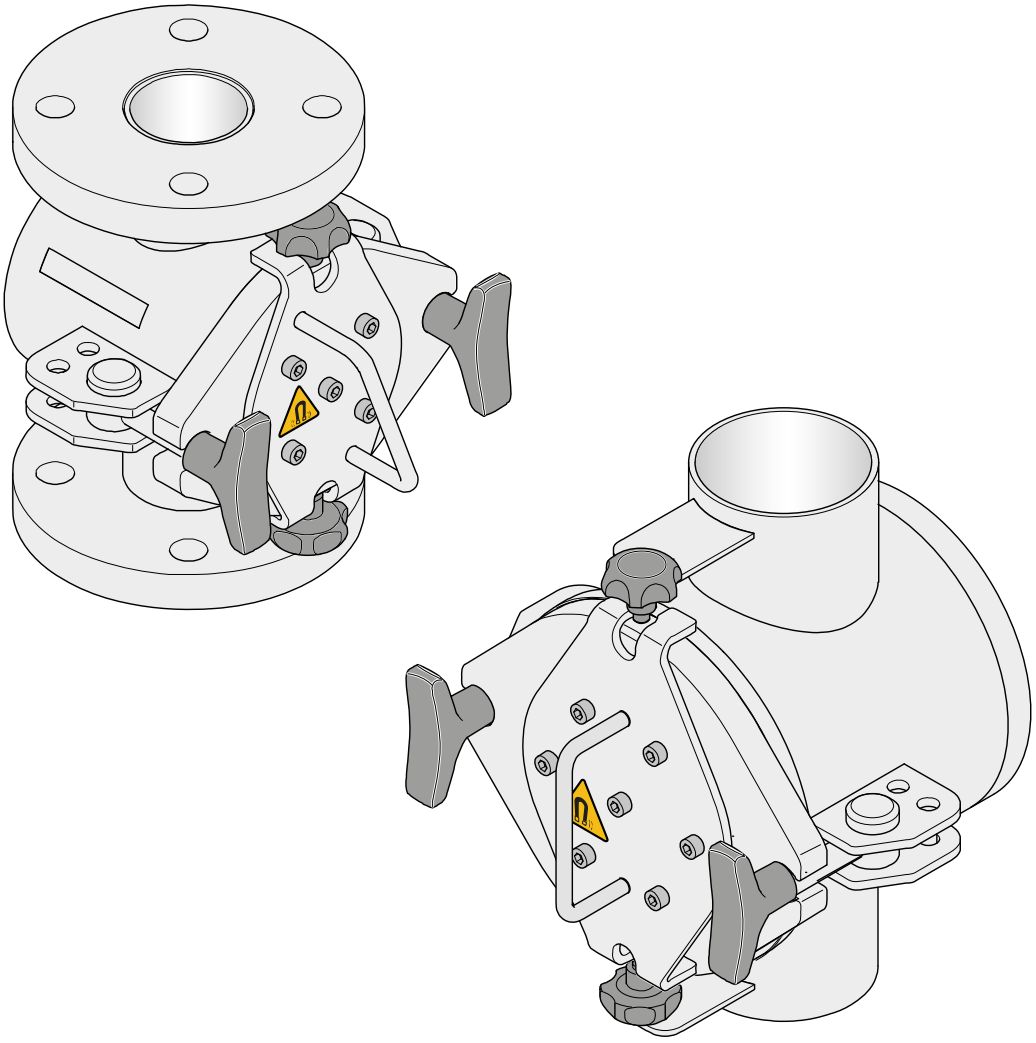
Installation and User manual

Industrial magnetic filters, series SFI

Permanent magnetic filter for liquid and powder flows in pressure pipes



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Preface

This manual contains information for the correct use and maintenance of the device. This manual contains instructions on how to avoid possible injuries or damage and provides a safe and trouble free operation of the device. Read this manual carefully and make sure you understand the content before you operate the device.

For more information, please contact **GOUDSMIT Magnetic Systems B.V.**. All contact information is on the title page of this manual. Please refer to the order number, the name of the device and/or article number to re-order the manual.

Descriptions and drawings in this manual are used for explanation purposes and can differ from your version.

In this manual, the SFI Industrial magnetic filter is referred to as “device”.

- This manual and the statement(s) of the manufacturer must be regarded as a part of the device.
- The manual has to remain with the device if the device is sold.
- The manual must be available to operating personnel, service technicians and others operating the device for the service life of the device.

Table of contents

Safety

This chapter describes the safety risks of the device. Warning decals can be found on the device where applicable. This chapter explains the meaning of these decals.

Know your decals

- Carefully read the warnings and instructions on the decals of the device.
- Regularly check if the decals on the device are still present, intact and clearly legible.
- Keep the decals clean.
- Replace missing or illegible decals with new ones and make sure to put them in the same place.

General safety instructions

- The instructions in this manual must be followed. If not, material damage, physical harm or life threatening situations may occur.
- The device may only be used for filtering powders and liquids. Any other use is not in accordance with the regulations. Any damage resulting from such use is not covered by the manufacturer's warranty.
- Make sure all personnel working with or in the direct vicinity of the device are wearing sufficient safety equipment.
- Take extra safety precautions when the device is still easily accessible for personnel. If this is not possible, make sure clear instructions are given about the installation if which the device is a part.
- All work on the device must only be done by qualified personnel. Maintenance work should preferably be done by Goudsmit personnel.
- Always apply local safely and environmental regulations.

Damage by magnetic field

The magnets create a strong magnetic field that attracts ferromagnetic parts. Always use none ferromagnetic tools and work benches with a wooden counter top and a none ferromagnetic base. Do not bring any other ferromagnetic items, such as keys, coins and tools, into the magnetic field as they can be forcefully attracted by the magnet, which can cause serious damage.

Strong magnetic field

During maintenance and measuring checks of the magnet components of the magnetic bars, injuries can occur. Make sure your fingers can not get caught between the components.

Other remarks/warnings

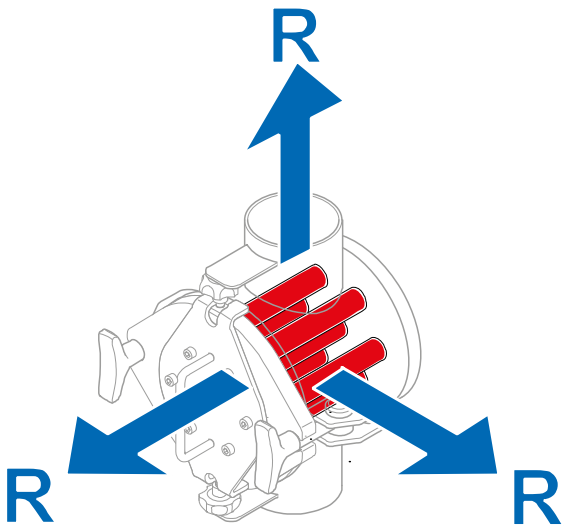
Eliminate any malfunction before using the device. If the device is put into operation with the malfunction, after you have carried out a risk assessment, then warn the operating and maintenance personnel of this malfunction and the possible risks it may pose.

Occupational and public exposure limit values for (electro) magnetic fields

The limit values of magnetic fields are defined as follows according to the EMF Directive 2013/35/EU:

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

Observe the following measures regarding exposure to magnetic fields according to EN12198-1 (machine category = 0, no restrictions) of the device:



Life danger for persons with implanted medical devices

Persons with active implanted medical devices (i.e. pacemaker, defibrillator, insulin pump) must not enter within a radius "R" of **25 cm** from the device.

Damage to magnet sensitive objects

Objects which contain ferromagnetic parts, such as bank, credit or chip cards, keys and watches can be irreparably damaged when they come within a radius "R" of **10 cm** from the device.

Pregnant personnel should keep a minimal distance “R” of **4 cm** from the magnetic bars.

Occupational exposure limit values (general and for limbs) are not exceeded.

Specifications

Scope of application

The device is suitable for many industrial applications where liquid mixtures and powders are transported in pressure lines up to 10 bar. The design and grit-blasted finish are intended for use in applications without risk of bacterial growth.

Function description

The device filters fine ferromagnetic contaminants of 30 µm and larger - such as stainless steel wear particles - from liquid and powder streams. The product must not contain any ferromagnetic particles that are large or heavy enough to cause damage to the magnetic bars. Maximum particle size is 10 mm.

- ▶ Preferably place a sieve in front of the product inlet of the device in your installation.

Flow rate

The recommended flow rate of the product material is 1 m/s. Maximum recommended flow rate is 2 m/s.
A higher flow rate reduces the separation efficiency, resulting in less ferromagnetic particles being removed from the product material.

Food contact application

As standard, the device is delivered in stainless steel with a 3 µm ceramic-blasted finish. This finish is suitable for normal food contact applications. All contact materials comply with EU regulation EC1935/2004.
Higher quality finishes are available for applications with higher requirements. Refer to the data sheet for specifications.

Temperatures

The device is equipped with standard neodymium magnets (NdFeB) suitable for the following ambient and product temperatures:

Applied magnet quality	Ambient temperatures	Max. product temperatures
GSN-42SH	-5 °C to +40 °C	140 °C
GSN-52	-5 °C to +40 °C	60 °C

Table 1

The device must be protected against higher temperatures than those indicated in table 1, because the magnet will permanently lose magnetic force when exposed to higher temperatures.

Free space

Make sure there is sufficient space around the device for operation and inspection and maintenance work.

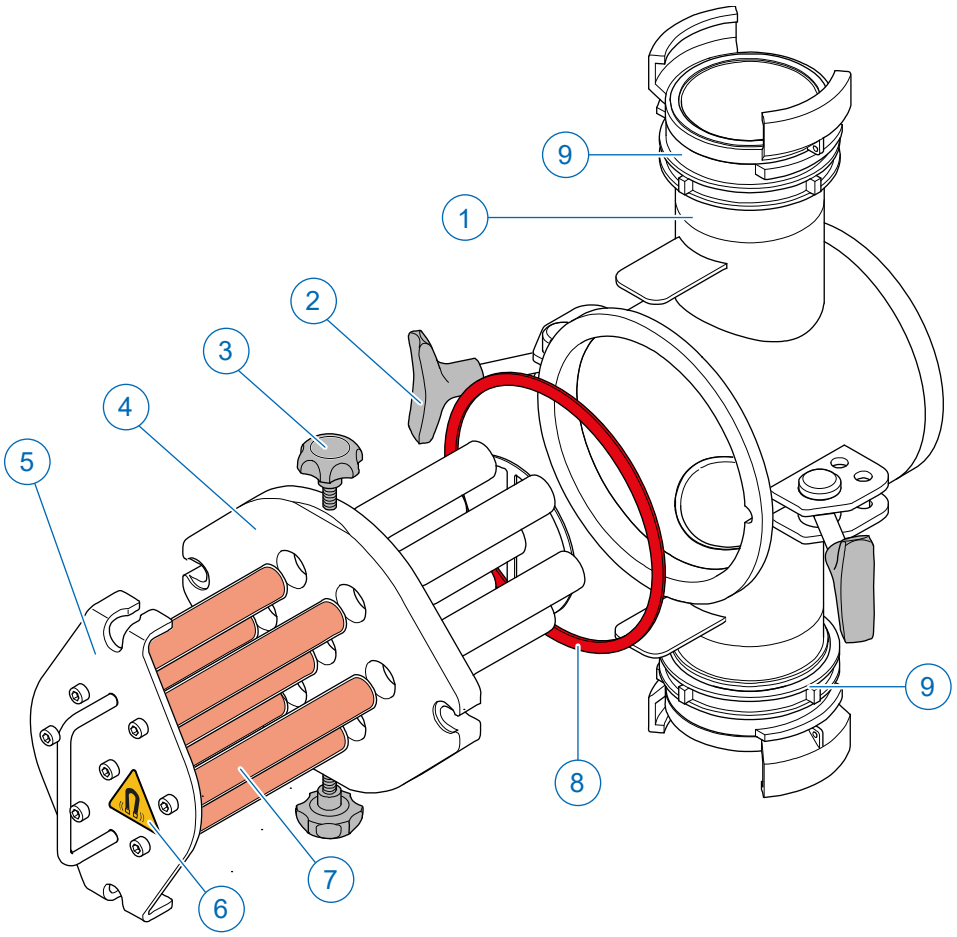
Supply voltage

Supply voltage for the optional door and detection sensors is 24 V_{DC}.

ATEX (if applicable)

The mechanical part of the device is free of own ignition sources and therefore falls outside the scope of the ATEX Directive 2014/34/EU. The full explanation is described in the ATEX Exclusion Declaration.

Device overview



1.	SFI housing	4.	Extractor element	7.	Magnetic bar
2.	Toggle	5.	Magnet unit	8.	Sealing ring
3.	Screw knob	6.	Warning pictogram	9.	Coupling

Scope of delivery

Check the shipment immediately upon delivery for:

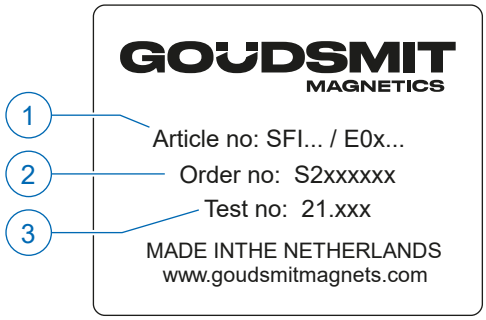
- possible damage and/or shortcomings due to transport. If damaged, ask the transporter for a damage report.
- completeness of the delivery. Check if all the ordered accessories are delivered.

In case of damage or wrong delivery, immediately contact Goudsmit Magnetics.
The contact details are on the title page of this manual.

Type plate

The device has a type plate with identification data as shown below.
The identification data is very important for the maintenance of the device.

- ► Always keep the type plate clean and legible.



1. Article number
2. Order number
3. Test number pressure test

Always mention the article [1] and order number [2] when ordering spare parts, requesting service or in case of failure.

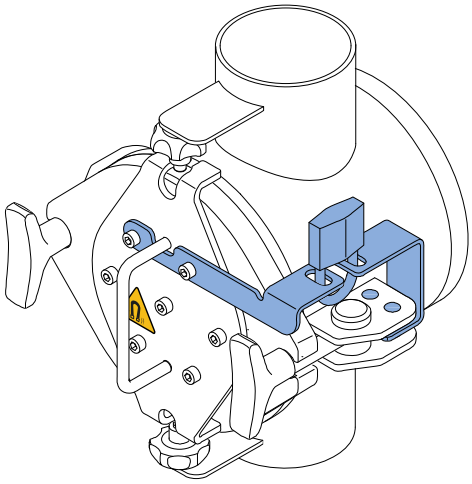
Pressure test

All devices with a coupling or flange are pressure tested before delivery. If the device has passed the pressure test, a test number [3] is stated on the type plate. Refer to the data sheet for the prescribed pressure test.

Devices with only welding ends DO NOT get a pressure test.

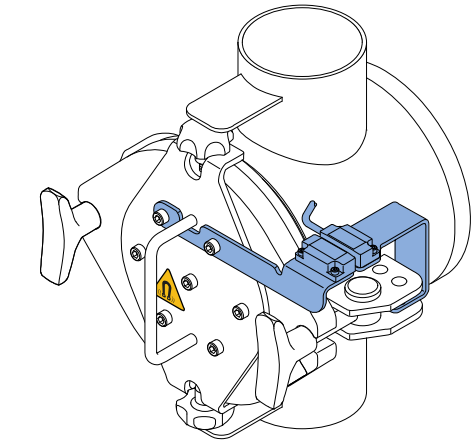
Accessories

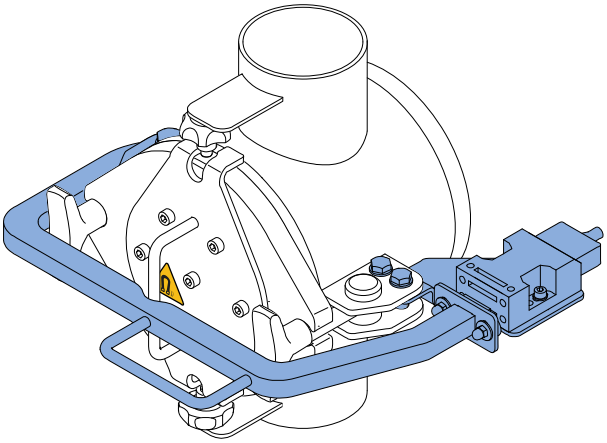
Locking device



The device can be equipped with a lock. This prevents unauthorised removal of the magnet unit from the housing.

Door sensor





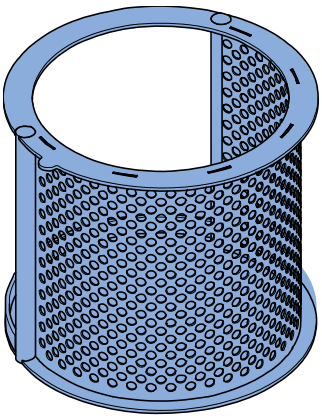
Optionally, a door sensor can be fitted which detects when the magnet unit is in the **open** (pulled out) or **closed** position (in the housing).

As the function of this sensor is signalling, and it is not a safety-related function, it is not necessary to connect it to a special safety relay for non-contact sensors, which are additionally equipped with current limitation and short-circuit detection.

This ensures that the product flow stops when the bracket is unlocked. This prevents unnecessary loss and contamination of product material.

See the website for all available sensors for this device.

Sieve



The sieves are not only suitable for the capture of non-magnetic particles, but also for all other types of particles.

If larger product particles are created in the (liquid) product flow, for example due to cooling in the pipeline system, it is advisable to install an additional sieve in the device.

Sieves are available with a hole size of 2 - 5 mm.

A complete overview of the available accessories for this device can be found on the website.

Transport and installation

Transport

Caution

Permanent magnetic force is present on the device.

See chapter “Safety” for the precautions to take before transport.

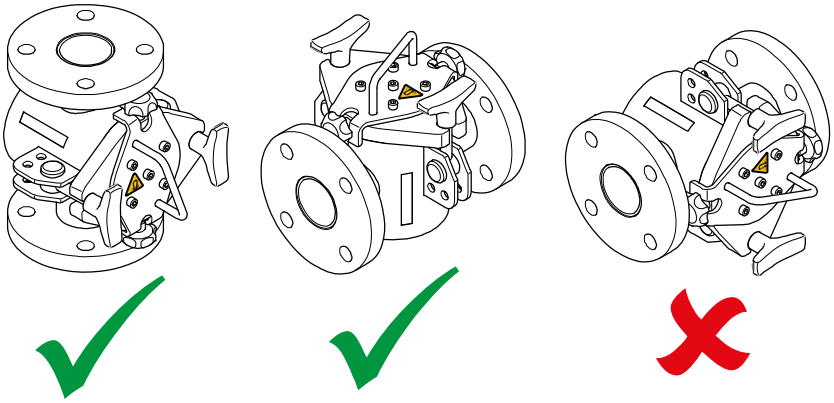
- ▶ Avoid any impact during transport to prevent damage, especially to the magnetic bars. If the tubes are damaged, the magnetic packages may not be able to move or move badly in the tubes.

Installation of the device

Take the following precautions:

- Only allow qualified personnel to work on the installation.
- The product channels must be strong enough to carry the combined weight of the device and the raw product.
- Make sure there is at least 1 meter of free space around the installation to be able to place the device in the installation.
- Permanent magnetic force is present on the device. See chapter "Safety" for the precautions to take when working on the device.

- ▶ Install the device free of mechanical tension at a proper working height for the operating personnel in your product channel. Mechanical tension on the device may cause deformation and other malfunctions.
- ▶ Install the device in the vertical position or in the horizontal position with the lid at the top. If this is not possible, take into account when opening the lid that residue runs out during maintenance work (see illustration).



- ▶ Use lifting equipment that supports the weight of the device.
- ▶ The devices are available with different flanges according to EN1092-1 and couplings. Observe the installation instructions in accordance with the relevant standards of the flanges and couplings when installing the device in your installation. Incorrect alignment or loose fitting can cause leakage.
- ▶ Remove the lifting equipment after the device is completely installed in the product channel.
- ▶ After installation and before commissioning, the device must be thoroughly cleaned (see section "Cleaning instructions").

Preventing electrostatic discharge (earthing)

To prevent electrostatic discharge, make provisions to prevent potential differences between the installation and the device. This can be done by attaching a connecting cable to the installation. The electrical resistance must be less than 25 Ω.

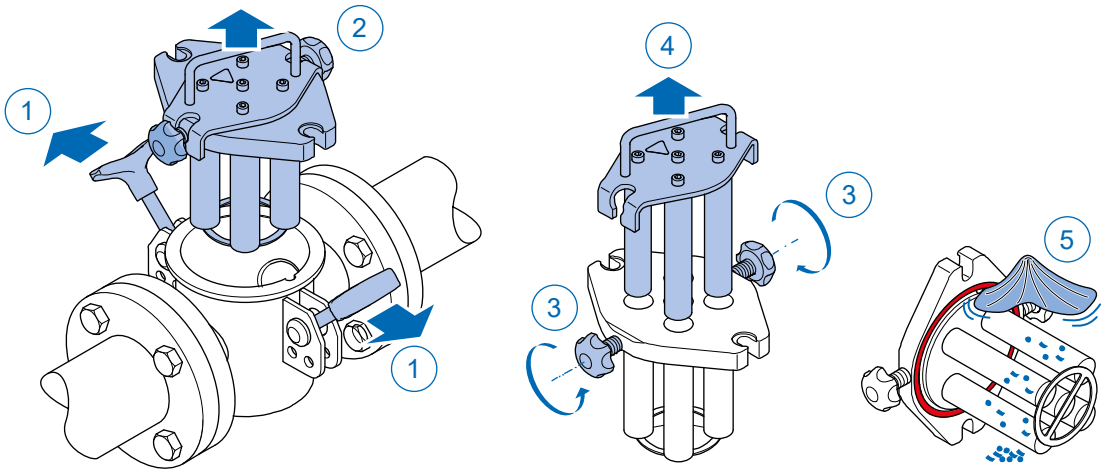
Working principle

The magnet unit with very strong neodymium magnetic bars is positioned in the middle of the product flow. The product with ferrous impurities passes several magnetic bars while flowing through the filter.

The magnets attract passing ferromagnetic contaminants. The captured particles stick to the magnets, while the purified product flows further.

Cleaning process – iron discharging sequence

Once the product flow is stopped, you take the entire magnetic grid unit out of the product channel. Then pull the magnetic bars out of the extractor tubes, causing the ferrous particles to fall off the extractor tubes.



For a cleaning process, proceed as follows:

- Stop the product flow.
- Loosen the toggles [1].
- Lift the complete magnet unit assembly [2] out of the housing and place it on a clean wooden or plastic surface.
- Loosen the screw knobs [3] and take the magnet unit [4] out of the extractor element.
- Place the magnet unit away from the extractor element on a clean wooden or plastic surface.
- Catch the ferrous particles that now will fall off the tubes and dispose them.
- Wipe clean all parts with a soft cloth [5] and - if necessary - a suitable cleaning fluid.
- Put all parts back together in reverse order.
- Place the complete magnet unit assembly [2] back into the housing.
- Re-tighten the toggles [1].
- Production can now safely be resumed.

Maintenance and inspection

Clamping / crushing hazard

Due to the extremely strong magnetic force on the magnetic bars, it is very dangerous to replace the magnetic bars and/or the magnetic packages. Replacing the bars and/or packages should ONLY be done by qualified personnel or (preferably) by mechanics from Goudsmit Magnetics.

If replacement is done by none-qualified personnel, the warranty is cancelled.

Goudsmit Magnetics is not liable for any consequential damage to persons or materials in the event of failure to comply with this prohibition.

Caution

- Do all work on the device while the product flow is stopped and the compressed air is switched off.
- Be careful with tools. Even when the power is off, the magnetic force is still present.

Magnetic systems not only attract ferromagnetic particles, but a small part of your product also sticks to the magnets. Regularly remove all captured particles on the magnets. A clean magnet works considerably better!

- ▶ Always inform the operating personnel of planned inspections, maintenance, repairs or in the event of malfunctions.
- ▶ Regularly check that all warning decals are in the correct place on the device. If the warning decals are lost or damaged, apply new decals to the original location immediately.
- ▶ Make sure that the outside of the device is clean. Remove dust, dirt and parts on the device that do not belong there.

Maintenance interval

Action	Daily	Monthly	6 Months	Yearly
Clean the magnetic bar tubes (for maximum performance) (see section "Cleaning instructions")	**at least 2x** [1)]	●	●	●
Check the sealing ring for wear and presence	●	●	●	●
Measure the flux density of the magnetic bars (see section "Flux density measurement of the magnetic bars")		●	●	●
Check the magnetic bar tubes for wear		●	●	●
Install a new sealing ring (see section "Replacing the sealing ring").			●	●

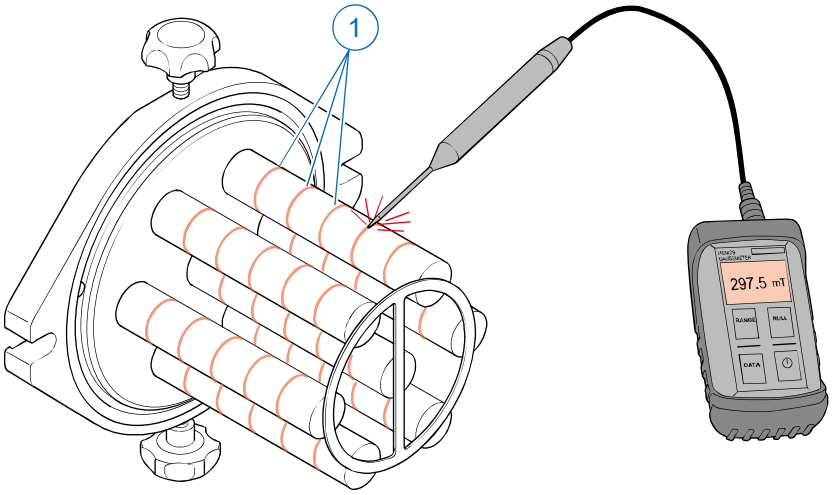
Table 2 – Maintenance table

[1)] *The frequency of the cleaning process depends on the capacity of your product flow and the contamination with ferromagnetic parts.*

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

Flux density measurement of the magnetic bars

The flux density of the magnetic bars must be periodically measured to check whether the magnetic force has decreased. Use a suitable Gaussmeter/teslameter to measure the poles of the magnetic bars on the surface of the magnetic bar tubes (unit is tesla, gauss, kA/m or oersted). Goudsmit Magnetics can carry out magnetic measurements on location on request. Proceed as follows for a flux density measurement:

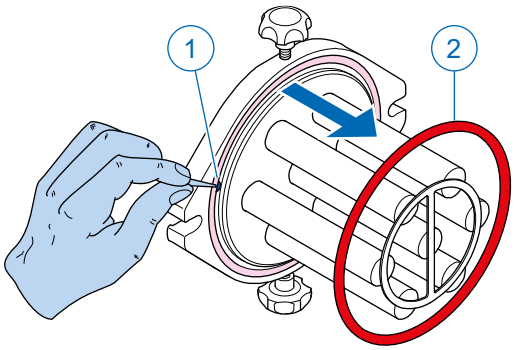


- Stop the product flow.
- Loosen the toggles.
- Lift the complete magnet unit assembly out of the housing and place it on a clean wooden or plastic surface.
- Loosen the screw knobs and take the magnet unit out of the extractor element.
- Place the extractor element away from the magnet unit.
- Wipe clean the magnet unit with a soft cloth and - if necessary - a suitable cleaning fluid.
- Move the Gaussmeter/teslameter along the poles [1] of the magnetic bars.

  The measured values can fluctuate due to several factors, such as the position (angle) of the probe on the magnetic bar tube, the thickness of the probe and the reproducibility of the measurement.
- Write down the highest measured value.
- Check with the corresponding data sheet whether the measured values are within the permissible values specified on the data sheet.
- Put all parts back together in reverse order.
- Place the complete magnet unit assembly back into the housing.
- Re-tighten the toggles.
- Production can now safely be resumed.

Replacing the sealing ring

We recommend to replace the sealing ring at least every six months or more often depending on wear and tear. Proceed as follows to replace the sealing ring:



- Stop the product flow.
- Loosen the toggles.
- Lift the complete magnet unit assembly out of the housing.
- Loosen the screw knobs.
- Take the magnet unit out of the extractor element and place it on a clean wooden or plastic surface.
- Remove the old sealing ring from the extractor element. Use the notch in the groove [1].
- Thoroughly clean the groove in which the sealing ring was located and insert a new sealing ring [2].
- Reassemble the magnet unit assembly.
- Place the complete magnet unit assembly back into the housing.
- Re-tighten the toggles.
- Production can now safely be resumed.

If the sealing rings wear out too quickly, e.g. due to too high temperature or abrasive product, please enquire about alternative sealing rings.

Cleaning instructions

The cleaning and disinfection methods and agents used for cleaning must be adapted to the specific type of pollution encountered (carbohydrates, proteins, fats, etc.) and the degree of cleanliness required for your application. The type of product being processed therefore determines to a large extent which combination of cleaning agents is suitable. Consult your cleaning agent supplier to select the right cleaning agents for your specific situation.

The building materials of the device are stainless steel 1.4301/SAE 304L and 1.4404/SAE 316L. Check with your cleaning agent supplier whether they are suitable for the material of the selected seals (Silicone, NBR or VITON).

Wet or dry cleaning

If the use of liquids in your installation is not permitted, use, if necessary, disinfectant wipes without rinsing that are suitable for contact with the processed product.

The frequency of cleaning depends on the degree of cleanliness required for the processed product.
In applications where sensitive foodstuffs are processed, the cleaning frequency should be increased.
Carry out a hygiene risk assessment to determine the requirements in your case.

Malfunctions

Use the table below to find the malfunctions, determine the possible cause and find the remedy. In the event of a malfunction that is not listed in the table, please contact the Goudsmit Magnetic Systems B.V. customer service.

Malfunction	Possible cause	Remedy
Magnet does not separate ferromagnetic particles or separates them poorly.	Magnetic bar is overloaded with ferromagnetic parts.	• Clean the magnetic bar more frequently.
		• Use a permanent magnet to check if the to be separated parts are ferromagnetic.
	Non-attracted objects are not ferromagnetic enough.	• Check the magnetic behaviour of the installed parts by holding an iron part close to the magnets. If there are parts that react to the magnet, replace them with non-magnetic parts, such as those made of stainless steel.
Product material leakage.	Sealing ring not seated properly in the groove.	• Place the sealing ring correctly in the groove.
	Sealing ring worn.	• Replace the sealing ring.
Magnet unit clamps into extractor element.	Dents in the extractor tubes.	• Remove the dents from the extractor tubes. • Contact Goudsmit Magnetics.

Service, storage and disassembly

Customer service

Please have the following information at hand when contacting customer service:

- All the details on the type plate.
- Type and extent of the problem.
- Assumed cause.

Spare parts

Due to the quality of the products of Goudsmit Magnetics the device has a high operational reliability. Spare parts are usually parts that are subject to wear and tear:

- sealing rings (various types can be ordered)
  It is recommended to replace the sealing ring every 6 months.
- magnetic bars.
- extractor element.

Depending on your (abrasive) product and the capacity of your product flow, the sealing rings will wear out accordingly. Several types of sealing rings are available for this device. See the data sheet for the exact specifications. Please contact us for the availability of the sealing rings.

▶ When ordering, please state the article and order number on the type plate.

▶ Please contact us for more information (+31 (0)40 22 13 283) or check the website.

Storage and disassembly

The device must be disposed of correctly at the end of its service life in accordance with local regulations.