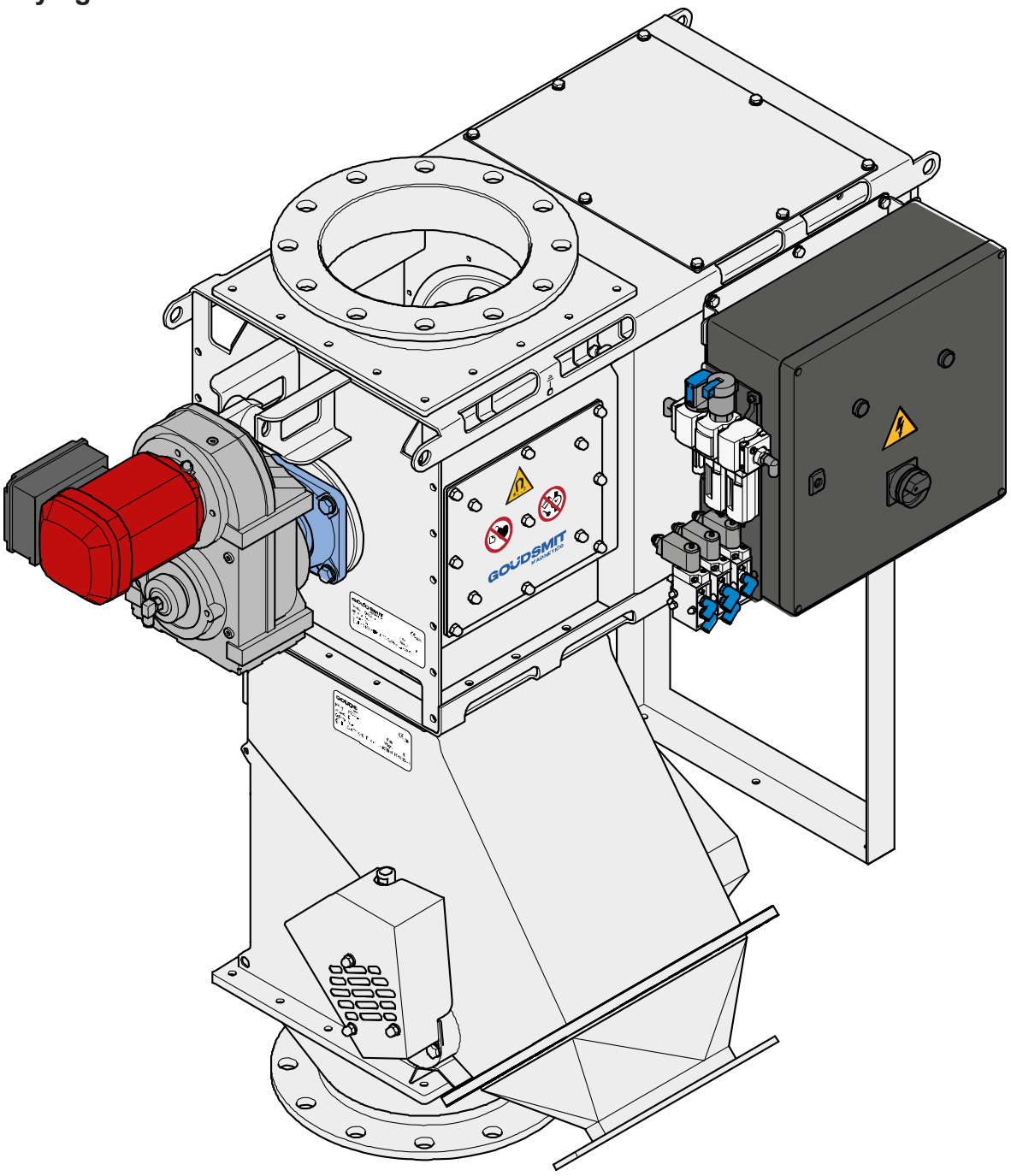
Installation and user manual

Dust-tight rotating Cleanflow magnetic filter – automatic discontinuous cleaning, type SRCD

Permanent magnetic filter for filtering ferrous contamination and weakly magnetic stainless steel particles from dusty and poorly flowing (greasy) powders in free-fall conveying lines.



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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.

The details published in this manual are based on the information available at the time of delivery.

We reserve the right to change or modify the construction and/or design of our products at any time, without any obligation to make the same changes to previously supplied products.

In this manual, the SRCD Cleanflow magnetic filter is further referred to as ‘device’.

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.

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.

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 filtration of small amounts of ferrous contaminants and weakly magnetic stainless steel particles from dusty or poorly flowing – such as greasy – powders in free-fall conveying lines. 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 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.
- The device may only be operated remotely when all covers are in place and moving parts are inaccessible.

WARNING

Risk of entrapment!

Do not carry out any cleaning or maintenance work inside the device while it is still in operation, even with the cover plate or inspection covers removed.

- 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 Emergencies

WARNING

Switching off in case of emergency

The device is equipped with a safety switch (main switch) on the control box.

2.4 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.

2.5 Lock Out – Tag Out (LOTO)

Lock Out – Tag Out, or LOTO, is a safety procedure in which the energy supply to industrial machinery or equipment is cut off during maintenance or repair work. The use of LOTO is intended to protect people from unexpected releases of energy and the dangers of machinery in operation. Power sources are often isolated and locked by padlocks that are labelled with the name of the worker who placed the padlock and the reason for the LOTO.

The employee then has the key to the padlock, so only they can remove the lock and start the equipment. This prevents accidental start-up of equipment while it is in a hazardous state or while a worker is in direct contact with it.

In the off position, the main switch has two holes in its housing that are intended for LOTO.

2.6 Remarks

- Do not use the device if it is damaged.
- Only use the device for the application for which it was designed.
- Check that all protection covers (including all safety circuits) are correctly fitted and installed.
- Ensure that the device is maintained correctly and in accordance with the instructions in this manual.
- Rectify all faults before operating the device. If the device is used while the fault is present, 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 directives

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 Directives

The standard version of this device conforms to the requirements of the following European directives:

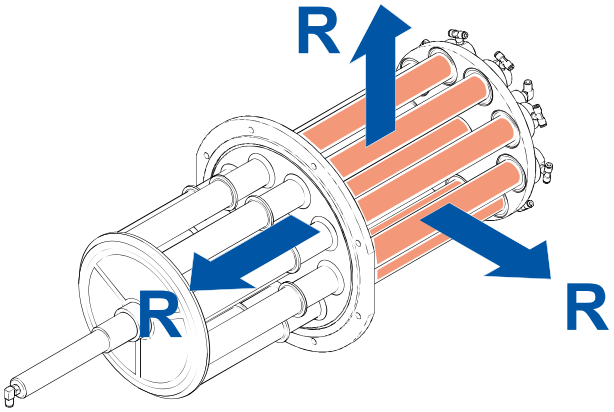
- Machinery directive 2006/42/EC
- EMC directive 2014/30/EU
- ATEX directive 2014/34/EU (if applicable)

3.3 Limit values for occupational and public exposure to electromagnetic and permanent magnetic 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 0.1 metre(s) of the device.

Employees who are pregnant and the general public may not come within a radius ‘R’ of 0.07 metre(s) of the device.

WARNING

Projectile hazard

Ferromagnetic objects will be attracted if they come within a radius of 0.1 metre of the magnet.

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

NOTICE

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

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.
- Lubricants other than those prescribed for this device are used.
- 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.
- Check that all protection covers (including all safety circuits) are correctly fitted and installed.
- Ensure that the device is maintained correctly and in accordance with the instructions in this manual.
- 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.

5 Specifications

5.1 Description of function

The device has been developed to magnetically filter small quantities of ferromagnetic contaminants of 30 µm and larger – such as stainless steel wear particles – from powder flows. Maximum particle size is 10 mm.

The rotating function of the magnet rotor and the grit blasted housing prevent bridging and blockages.

The product must not contain any particles large or heavy enough to cause damage to the magnetic bars.

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

5.2 Range of application

The device is suitable for poorly flowing powders – such as greasy powders – in free-fall conveying lines up to 10 metres long. The automatic cleaning function also makes it suitable for situations where access for operation and maintenance is limited or impossible.

5.3 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 of ferromagnetic particles from the product material. In addition, the product channel may fill up with product material, which can cause blockages.

5.4 Use in food product flows

The device is supplied as a stainless steel model as standard, with a 3 µm ceramic-blasted finish.

This finish is suitable for normal food contact applications. All contact materials are compliant with EU directive EC1935/2004. Higher-quality finishes are available for applications with more stringent requirements. See data sheet for the specifications.

5.5 Temperatures

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

Applied magnet quality	Ambient temp.	Max. product temp.	Max. product temp. (ATEX)
N-42	-5 to +40 °C	60 °C	40 °C
N-42SH	-5 to +40 °C	140 °C	60 °C
N-52	-5 to +40 °C	60 °C	40 °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.

5.6 Free space

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

Adhere to the following minimum distances:

- All around: 0.5 metres
- On control box side: 0.75 metres
- Replacement of magnetic bar (non-motor side): 1 metre.

5.7 Connection voltage

- Connection voltage for standard motor is 400 VDC, 50 Hz.
- Connection voltage for PLC control is 230 VDC, 50 Hz.
- Connection voltage for solenoid valves, rotation sensors and detection sensors is 24 VDC.

5.8 Air pressure for control

For the pneumatic connection of the air preparation unit, use an air pressure of approximately 6-10 bar.

5.9 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.

5.10 Warranty

The equipment is covered by a 12-month warranty from the date of delivery, in accordance with the quotation. The warranty terms can be requested in writing from Goudsmit Magnetic Systems B.V. or downloaded from our website.

The warranty on the device is void if:

- Service and maintenance are not performed in accordance with the instructions and/or are not performed by service engineers specially trained to do so. Ideally, maintenance and service work should be carried out by service engineers from Goudsmit Magnetics.
- Fundamental changes have been made to the device without our written permission.
- Non-original or non-100% interchangeable parts are used.
- Lubricants other than those prescribed are used.
- The device is used injudiciously, incorrectly, carelessly or in a manner not in keeping with its nature and/or intended use.

6 ATEX

6.1 Markings

If the equipment is suitable for use in a potentially explosive atmosphere (ATEX), the identification plate includes an Ex marking that indicates the environment for which the equipment is suitable, the specific equipment category and other criteria the equipment meets.

Example Ex marking:  II 3D Ex h T120°C Dc Ta = -5 to +40 °C

Explanation:

II → explosion group (I is underground mining, II is other)

3 → Equipment category
(ignition protection level: 1= very high, 2= high, 3= normal)

D → type ATEX environment D(ust)

Equipment category for dust	3D
Suitable for ATEX zone(s)	22

h → Type of Ex protection:
h = non-electrical equipment
(protection method not specified)

T120 °C → Maximum surface temperature for dust atmosphere

Dc → Equipment Protection Level (EPL)

EPL (for dust)	Dc
Suitable for ATEX zone(s)	22

Ta → Ambient temperature range – shown only if the range differs from the standard temperature range for ATEX (-20 to +40 °C).

If the device is externally certified, the ATEX certificate number is included on the identification plate. Next to the CE marking is the identification number of the notified body that certified our ATEX quality assurance system.

6.2 Description of ATEX options

The ATEX marking is only issued for the assembled magnetic filter with flap box.

The magnetic filter itself is not certified.

Product key at assembled equipment level:

SRCD - XXXX - XXX - XX - XXX - X - X - X - X - X - X3

The Ex item in the product key indicates the following ATEX options:

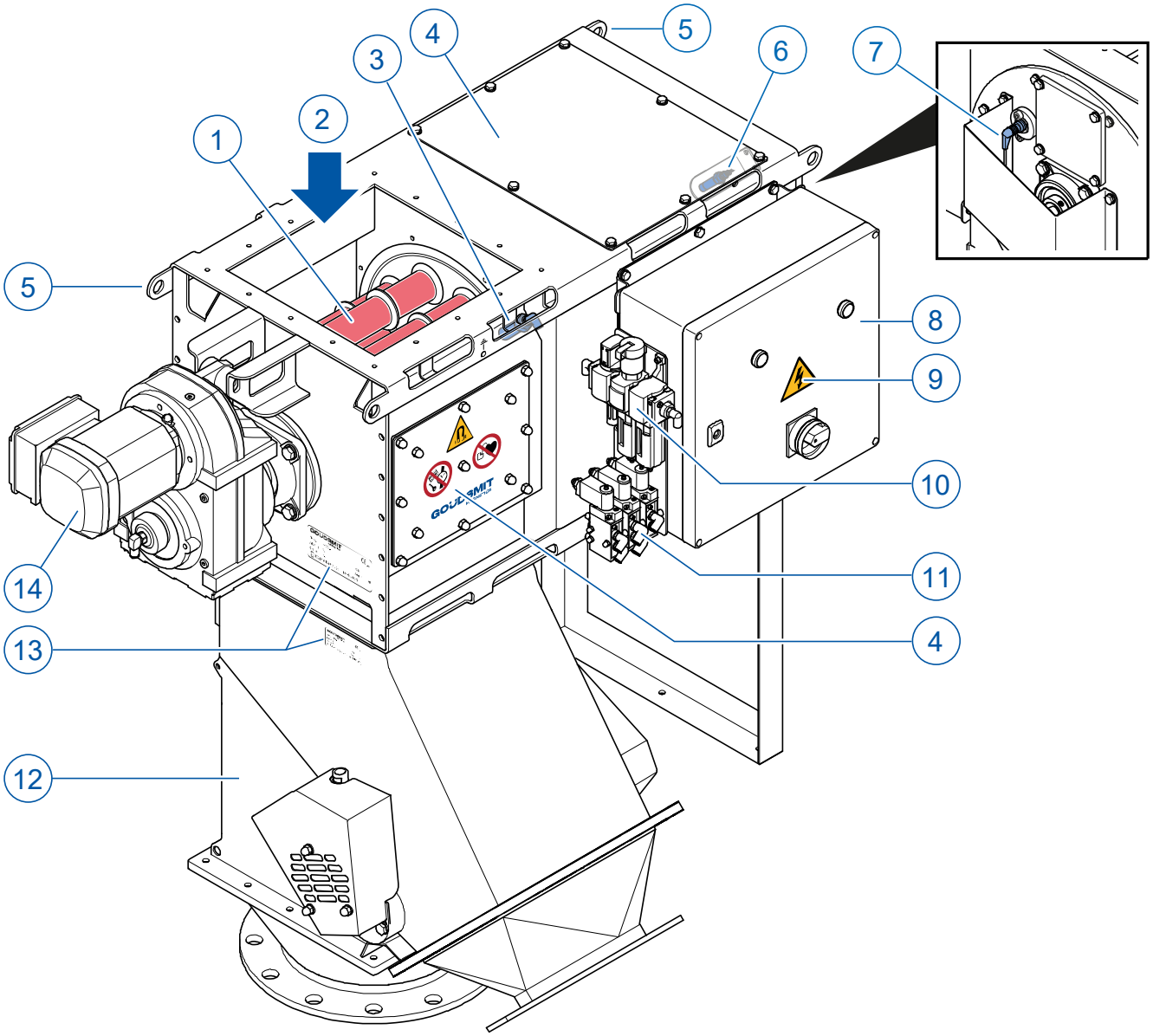
Value	Explanation Ex marking
NA	Not an ATEX version
X3	 II 1/3D Ex h T120°C Dc Ta = -5 to +40 °C

6.3 ATEX measures

- The temperature of the product must not exceed 60 °C.
- For ATEX dust environment:
  - The ignition temperature of the dust must exceed 180 °C.
  - The smouldering temperature of a dust layer must exceed 195 °C.
  - Dust layers thicker than 5 mm must not accumulate on the equipment.
- Ensure that no particles >10 mm are present in the product flow. These can damage the magnets or extractor bars or cause sparks.
- If necessary, fit a mechanical filter (sieve) upstream of the separation system!
- The free-fall height above the equipment must not exceed 10 metres.
- If the device is placed in storage or will not be used for longer periods, make sure it is emptied and cleaned.
- The device must be earthed. The electrical resistance to earth must be less than 1 MΩ. If a gasket is used between the device and the larger installation, provide a way to equalize potential electrostatic charges with a maximum electrical resistance for the installation of 25 Ω. This can be done by fitting a braided bonding cable or other means.
- No paint or coatings may be applied to the internal surface of the product channel.
- No insulating paints or coatings with a thickness of more than 2 mm may be applied to the outside of the equipment.
- All screw connections inside the device must be secured against loosening.
- Prevent ignition sources such as glowing particles, flames or hot gases from entering the device. Substances that are susceptible to accumulating an electric charge can be an ignition source for gases, mists, and vapours (e.g., static-chargeable plastic granulates with solvent vapours).

7 Product information

7.1 Construction



[1]	Pneumatic magnetic bar	[6]	Proximity sensor	[11]	Solenoid valve
[2]	Product channel	[7]	Rotation sensor	[12]	Flap box
[3]	Air blower	[8]	Control box	[13]	Identification plate
[4]	Inspection door of service compartment	[9]	Warning pictogram	[14]	Reductor motor
[5]	Lifting/transport point	[10]	Air preparation unit		

7.2 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.

7.3 Identification plate

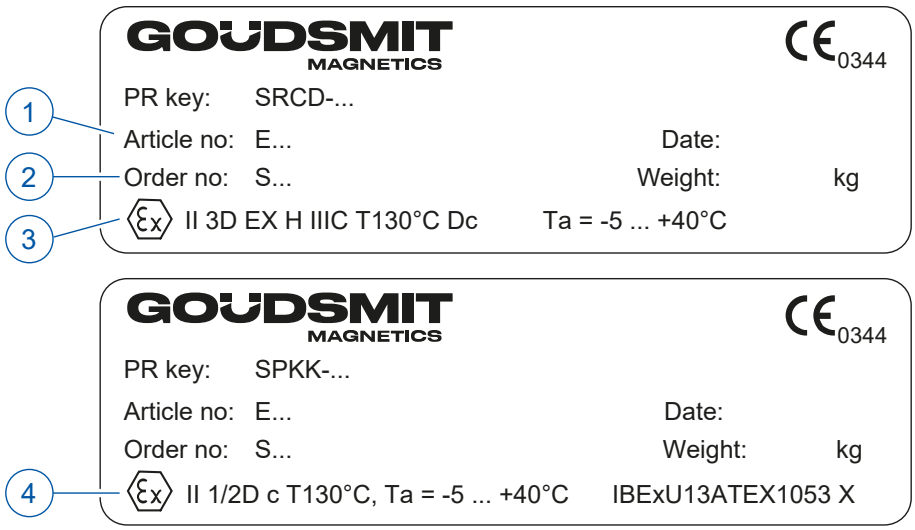
The identification plates shown below, bearing the identification data, are affixed to the standard device (magnetic filter with flap box). The identification data are important for maintenance and for ordering spare parts for the equipment.

Always keep the identification data clean and legible.

SRCD (with and without flap box)

[1] Article number
[2] Order number

SRCD



[1] Article number
[2] Order number
[3] ATEX marking for assembly (only valid with flap box)

Flap box

[4] ATEX marking

NOTICE

Always provide the article and order numbers when ordering spare parts, requesting service or reporting a malfunction.

7.4 Accessories

On the website you will find a complete overview of available accessories for this device.

- See the first page of this document for the web address.

8 Transport and installation

8.1 Transport

WARNING

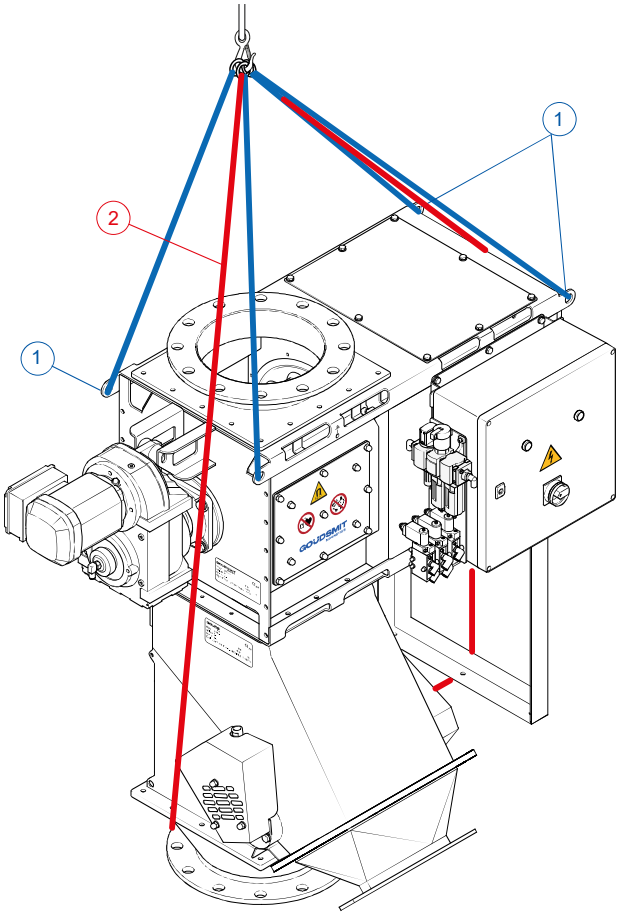
Note!

- ► Lift the device at the lifting/transport point. Keep in mind the centre of gravity.
- ► **Risk of entrapment:** Do not place your hands inside the crate during lifting. Maintain a distance of at least one metre.
- ► During transport, make sure the area around the device is clear.
- ► During transport, avoid all impact in order to prevent damage, especially to the magnetic bars. If the tubes are damaged, the magnet bundles may not move within the tubes or may do so with difficulty.

WARNING

Make sure that no one is under the load during lifting and transport.

- If the device has been delivered in separate parts (magnetic filter, flap box and/or adapters), first assemble all components. The flap box can be mounted in four orientations. For adapters with an outlet for round product channels, take into account ASME/ANSI or EN 1092-1 flanges.



- Use the transport points [**1**] to move the device. If necessary, use an additional lifting strap [**2**] for support.

8.2 Installation

DANGER

Danger of electrical voltage

Have all work related to the installation and electrical connection of the device performed by electricians or qualified personnel who are trained to do such tasks.

- ► Always ensure that the electrical voltage is switched off when performing electrical work on the device, as voltage may be present on some parts.

NOTICE

Observe the following measures to avoid problems during installation:

- ► Preferably install the device in a vertical product channel. The product channel must be strong enough to support the weight of the device and the raw product.
- ► Do not install the device directly below a silo or hopper with a valve above the device. Otherwise, there is no falling movement of the product material, resulting in too much product material above the device at the opening. Make sure there is a straight section of the product channel at least 0.5 metre long both above and below the device.
- ► Install the device free of mechanical stress and at the correct working height for the operating personnel. Mechanical stress on the device can cause deformation and other problems.
- ► Use a suitable lifting/hoisting arrangement that supports the weight of the device. **Note:** The device's centre of gravity is not in the middle.
- ► The connection to the product channel at the bottom of the device must be of the same diameter. A smaller diameter (constriction) in the product channel directly below the device may cause accumulation of product material, which may eventually lead to malfunctions or damage.
- ► Connect a discharge channel to the ferrous discharge opening of the flap box for further removal, or implement another solution to ensure it is no longer freely accessible.
- ► The device must be cleaned thoroughly after installation and before commissioning.

The best separation result is achieved when the product material flows through the device at low speed.

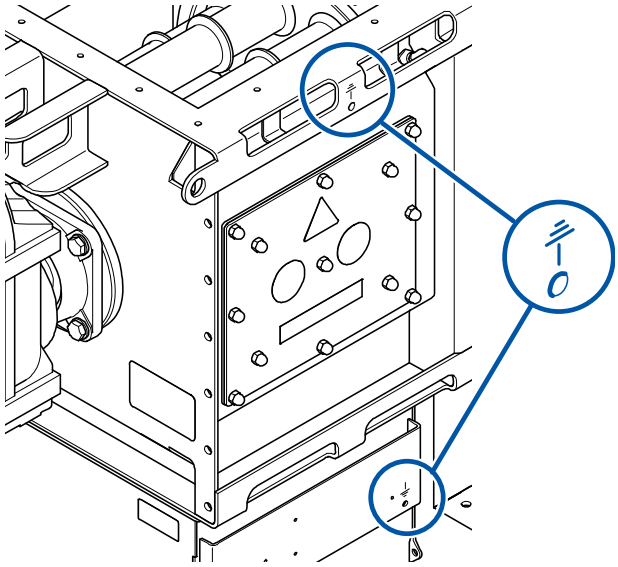
8.3 Vibrations

The construction of the channel in which the device is mounted must not cause vibrations that could damage or cause wear to the device, as exposure to intense vibrations results in permanent reduction of magnetic force.

The only vibrations in the device are caused by the moving and rotating magnet unit.

The product channel in which the device is mounted must be thick enough to absorb the (relatively low) forces of the rotating magnet unit.

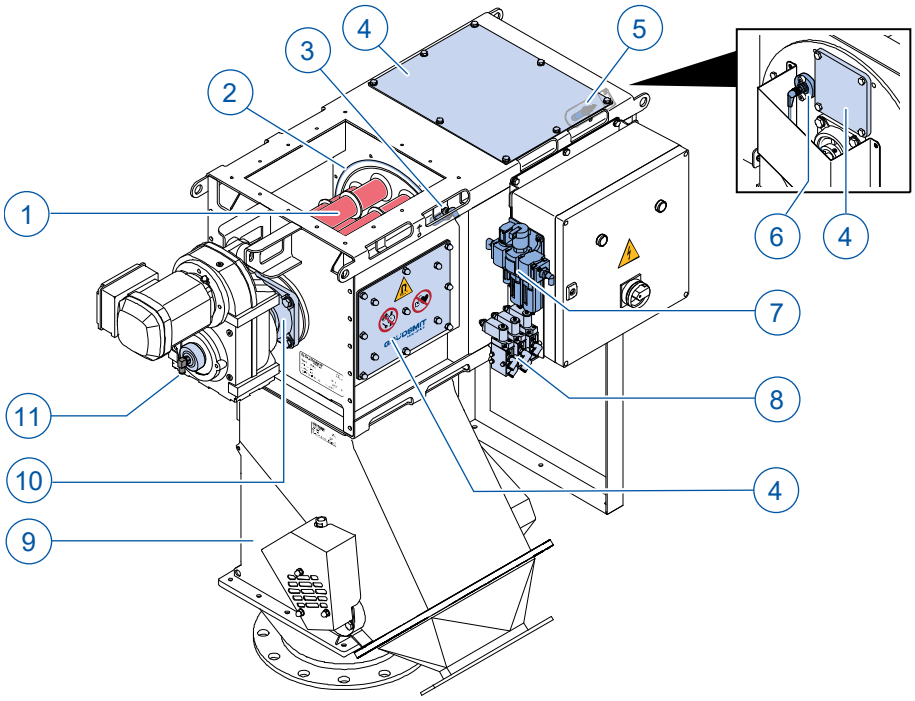
8.4 Preventing electrostatic discharges (earthing)



To prevent electrostatic charging, a provision must be made to prevent potential differences between the installation and the device.

This can be done by installing a connection cable to the installation. The device is equipped with provisions for establishing earthing (see drawing).

9 Construction



- The device is fitted with a magnet rotor containing pneumatically operated magnetic bars [**1**] for filtering ferrous contamination from a product flow.
- The magnetic bars are pneumatically actuated cylinders with a magnet bundle mounted on the piston rod. Externally, the bars are enclosed in a thin-walled stainless steel tube with separation rings. During a cleaning cycle, these rings help distribute the captured ferrous particles more evenly along the bar so that there is no accumulation at one end, which would impair the free-fall process.
- The air supply for operating the magnetic bars is routed centrally through the shaft by means of two bearing-mounted rotary air inlets [**11**]. The air inlets within the rotor shaft are protected from external influences by the housing.
- The magnet rotor is mounted on a shaft and secured to the housing by means of two flange bearings [**10**].
- One or two rotor seals [**2**] are installed between the product channel and service compartment, providing dust-tight separation between the two channels.
- An air nozzle [**3**] is mounted in the product channel. During the cleaning cycle, the air nozzle blows off as much product material as possible from the magnetic bars to prevent material bridging and minimize potential wear of the seals.
- The service compartment contains a rotation sensor [**6**] that monitors whether the rotor is turning correctly and a proximity sensor [**5**] that verifies that all magnetic bars are fully withdrawn from the product channel and positioned in the service compartment.
- A mounting plate with three solenoid valves [**8**] is installed on the housing. These control the magnetic bars, the pneumatic cylinder for the flap box and the air nozzle.
- Also mounted on this plate is the air preparation unit [**7**]. The conditioned air is routed from here to the solenoid valves and then to the magnetic bars, the air nozzle and the pneumatic cylinders.
- The housing is fitted with several inspection/service doors [**4**], all secured with bolts to prevent unauthorized opening.
- A flap box [**9**] is mounted beneath the device to separate the filtered ferrous particles. During the demagnetization cycle, the flap moves into the demagnetization position, directing the ferrous particles towards the ferrous discharge. Sensors monitor the position of the flap.

9.1 Magnetic bars and magnetic bar tubes

The magnet rotor consists of fragile stainless steel magnetic bar tubes (extractor tubes) in which the magnetic bars move back and forth. The thin wall thickness of the tubes ensures excellent separation performance for ferrous particles. However, larger or heavier ferrous and other particles in the product flow may dent the fragile magnetic bar tubes.

Ensure that heavy or non-magnetic particles are filtered out of the product flow beforehand. For prevention, install a mechanical sieve upstream of the device.

Once there are dents in the magnetic bar tubes, it may be difficult to remove the magnetic bars of the magnet rotor from the extractor. Always replace damaged magnetic bar tubes immediately to prevent further damage to the magnetic bars.

If the magnetic bars become stuck inside the tubes, this must be remedied immediately. Have the magnetic bar tubes replaced or reconditioned. In the event of persistent malfunction, we recommend ordering a new rotor to prevent further damage to the rotor.

Damage to the magnetic bar tubes and/or damage caused by damaged magnetic bar tubes is not covered under warranty.

Wear due to sticking

Because of the low speed of the magnetic bars and the relatively small number of movements, the pneumatic components inside the bars are only subject to limited mechanical stress. However, normal wear and tear may still occur.

Applying a coating—such as tungsten carbide—to the magnetic bar tubes can reduce wear caused by abrasive products. For more information, contact Goudsmit Magnetics.

Over time, depending on the application and operating conditions, the pneumatic components in the magnetic bars may begin to stick, resulting in an increased air pressure requirement to move the bars effectively. In such cases, the magnetic bars should be reconditioned. Reconditioning includes replacing the pneumatic components and, if necessary, cleaning the interior of the magnetic bar.

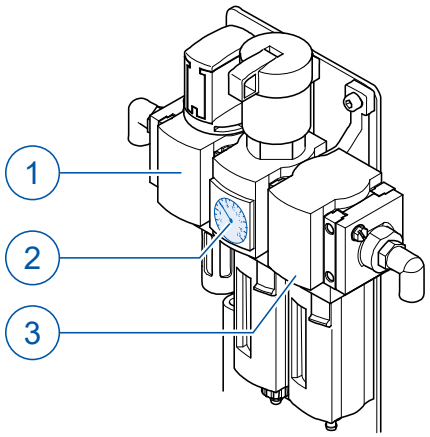
9.2 Compressed air connection

The air supply (6 – 10 bar) is connected to the on/off valve of the air preparation unit. The regulation valve reduces the air pressure to 4 – 6 bar. This is the working pressure for the 5/2 solenoid valves.

Over time, the pneumatic components inside the magnetic bars may show signs of wear, depending on the conditions. As a result, the magnetic bars may require increased air pressure to move the magnets through the tubes. If more than 6 to 7 bar is required, it is advisable to have the magnetic bars reconditioned. Reconditioning is preferably carried out by Goudsmit Magnetics.

Air preparation unit

The air preparation unit controls the flap in the flap box, the movement of the magnetic bars, and the air nozzle. The standard components of the air supply unit are:



[1] On/off valve, lockable with pilot lock-out (vented in closed position)

[2] Regulation valve / pressure gauge / standard filter

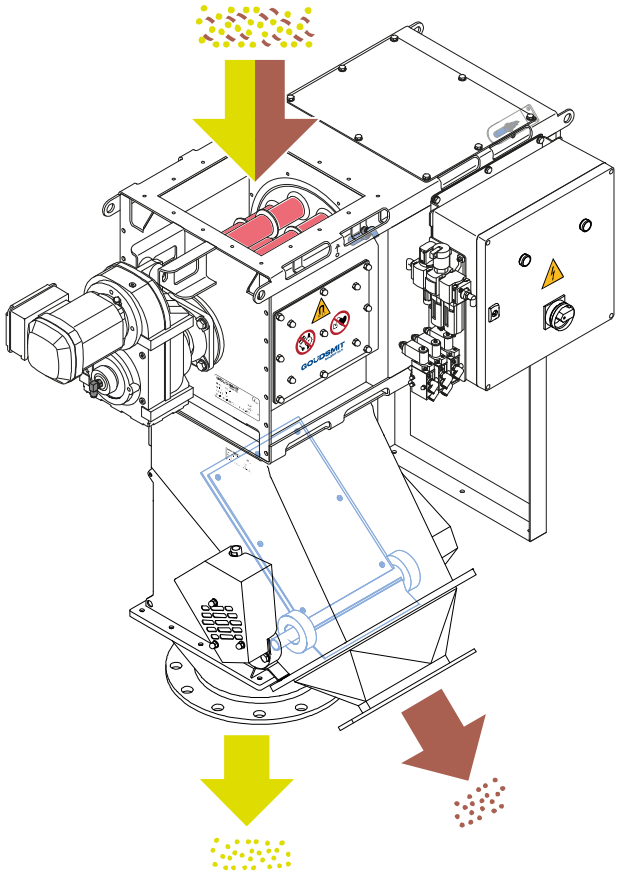
[3] Fine filter / microfilter

An oil mist lubricator can be added as an option.

- Close/open the supply air with the on/off valve of the air preparation unit.
- The conditioned supply air is already connected to the 5/2 solenoid valves of the fine filter.
- Make sure the air pressure remains below 6 bar. If the magnetic bars are functioning normally, the magnet bundles will move effortlessly in the tubes (at 4 bar normal pressure), but they will not all move at the same time because of the ‘slip/stick’ effect of the bars.
- Over time, depending on the application and conditions, the pneumatic components in the magnetic bars may wear. This means that more compressed air is required to move the bars.
- Magnetic bar overhaul: Replace the sealing components of the magnetic bars and clean the inside of the bars if necessary. See also Frequency of maintenance [▸ 28].

10 Operating principle

10.1 General



The magnet rotor, fitted with multiple pneumatically operated neodymium magnetic bars, is positioned directly in the product flow.

Each magnetic bar contains a magnet bundle that moves pneumatically inside a closed tube. The magnets attract passing ferromagnetic contaminants from the product flow. The captured particles stick to the magnets, while the purified product flows on.

During a cleaning cycle, compressed air moves the magnets out of the product channel. As they move, the magnets drag the captured ferrous particles along the tube surface. Halfway along the tube length, the ferrous particles are blocked by the side wall of the housing. Once the magnets have moved far enough into the service compartment, the trapped ferrous particles drop into the product channel, after which the flap box provides for further discharge.

10.2 Cleaning process – discharge of ferromagnetic particles

- Stop the product flow.
- Send a start signal to the magnet control unit.
  - First, the flap in the flap box will automatically be set to the ferrous discharge position.
  - Next, the magnets in the pneumatic tubes will automatically be moved out of the product channel. At the same time, the air nozzle will begin to blow pulsating air across the magnetic bars.
  - As the magnets move, the filtered metal particles are pulled along but are retained in the product channel by rings on the tubes of the magnetic bars. Once the magnets have moved out of range (into the service compartment), the ferrous particles automatically drop from the tubes into the flap box, where they are further discharged.
  - After at least one full rotation, the magnets inside the pneumatic tubes will automatically return to the product channel.
  - Once the magnets are back in place, the flap will also automatically return to its production position (at this point, the captured ferrous particles have been removed from the product channel).
  - When both the magnets and the flap have returned to the production position, the control unit will issue a ‘ready for production’ signal.
- Production can now be safely restarted.

CAUTION

Optionally install your own extraction system (e.g. a vacuum system) at the ferrous discharge outlet of the flap box to improve removal of the ferrous particles.

11 PLC control

11.1 Siemens LOGO!

The LOGO! is a simple PLC module from Siemens. The LOGO! program activates, among other things, the air nozzle and the solenoid valves that control the movements of the flap actuator and the magnetic bars. The unit consists of a Siemens LOGO! with power supply unit (Siemens Power 1.3) in a plastic Legrand box.

The program is stored in the LOGO! and on the provided microSD card.

The parameters of the PLC program for the Siemens LOGO! can be changed.

NOTICE

We recommend not making changes to the LOGO! program yourself but rather having Goudsmit Magnetics do so. No warranty cover is provided for damage to the device due to incorrect changes in the PLC program.

If it is necessary to make changes to the LOGO! control program, please contact Goudsmit Magnetics with the request and we will send you a microSD card with the correct LOGO! program. The new program can then be loaded as follows:

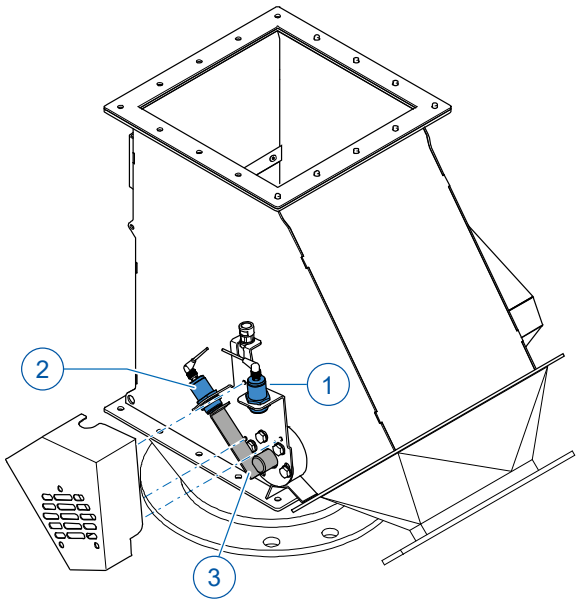
- Switch off the power to the LOGO!
- Remove the old microSD card.
- Insert the new pre-programmed microSD card.
- Switch on the power to the LOGO! The new program now loads automatically.

If you choose to change the LOGO! parameters independently, contrary to our recommendation, please contact the service department of Goudsmit Magnetic Systems B.V. for more information.

11.2 Automatic cleaning cycle with LOGO! PLC program

Procedure:

- Stop the product flow.
- Start the ferrous discharge cycle with a pulse signal to LOGO! input **i8** (see electrical diagram).
- The flap in the flap box is moved by a pneumatic cylinder from the production position (**i1**) to the ferrous discharge position (**i2**).Once the flap is fully in the ferrous discharge position, the magnetic bars are pneumatically pushed out of the product channel inside the stainless steel tubes.



[1] Sensor 1 – Production position
[2] Sensor 2 – Ferrous discharge position
[3] Metal plate for sensor activation

- Once the flap is fully in the ferrous discharge position, the magnetic bars are pneumatically pushed out of the product channel inside the stainless steel tubes.

- During production, the trapped ferrous particles are carried along with the magnets into the service compartment, but are blocked by an end plate, causing them to fall off once the magnets are no longer inside the product channel.
- Over the course of several rotations, each magnetic bar receives a burst of air, further aiding in the release of the ferrous particles, which are then discharged via the flap box.
- The magnets are then pneumatically moved back into the product channel.
- The flap in the flap box is moved back from the ferrous discharge position (**i2**) to the production position (**i1**).
- The product flow may be resumed once the control unit gives the 'IN PROCESS' signal (LOGO! output **Q6** 'high').

11.2.1 Alarm / signalling

The controller generates a 'high' alarm signal at output **Q4** of the LOGO! unit if any of the following alarm conditions occurs. The corresponding alarm message appears on the LOGO! display:

FAILURE FLAP IN	Flap in the flap box does not return to the production position quickly enough or fails to return entirely.
FAILURE FLAP OUT	Flap in the flap box does not move to the ferrous discharge position quickly enough or fails to do so entirely.
FAILURE MAGNETS IN	One or more magnetic bars return to the production position too slowly or fail to return.
FAILURE MOTOR STOP	Motor does not run.
FAILURE MAGNETS OUT	One or more magnetic bars move to the ferrous discharge position too slowly or fail to do so.
FAILURE NO START	Ferrous discharge cycle does not start after the start signal is given.

The device's ferrous discharge cycle is not continuous. This means that during this cycle no magnets are present in the product channel. During the ferrous discharge cycle, the product flow must be interrupted because no ferrous particles can be captured during this phase.

- Benefits of intermittent cleaning:
  - Little or no product loss during the cleaning cycle;
  - Improved hygienic properties for use in the food industry (such as FDA, HACCP, EHEDG).
- Drawback of intermittent cleaning:
  - The product flow must be interrupted during the cleaning and ferrous discharge cycles.

12 Maintenance and inspection

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

The product flow must be stopped when work is being carried out on the device.

Exercise caution with tools. The magnetic force is permanent.

Magnetic systems do not only attract ferromagnetic particles, but a small proportion of your product will also continue to ‘adhere’ to the magnet. Remove all captured particles from the magnet 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.

12.1 Frequency of maintenance

Action	Daily	Monthly	6 months	Annually	5 years
Clean magnetic bar tubes (cleaning cycle) (► Cleaning instructions [▷ 28])	min. 2x [1]				
Clean magnetic bar tubes (manually) (► Cleaning instructions [▷ 28])		•			
Lubricate bearings (► Lubrication instructions [▷ 29])		•			
Check magnetic bar tubes for wear / replace if necessary (► Replacing magnetic bar tube [▷ 32])		•			
Check/maintain reductor motor (► Reductor motor [▷ 31])			•		
Measure flux density of magnetic bars (► Flux density measurement of the magnetic bars [▷ 29])			•		
Replace sealing ring (► Replacing sealing ring [▷ 35])				•	
Replace oil seal with bearings (► Replacing oil seal and bearings [▷ 36])					•

[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.

12.2 Cleaning instructions

NOTICE

For cleaning the inside of the product channel, the customer must make a provision to allow access to the inside of the product channel.

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.

The device is made of stainless steel or 'food-grade stainless steel' 1.4301/SAE 304L and 1.4404/SAE 316L.

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

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.

12.3 Bearing systems

To determine the bearing replacement interval, combine your own experience with bearings in similar applications with the recommended and estimated intervals. If necessary, contact Goudsmit Magnetics for advice.

12.3.1 Lubrication instructions

The bearing systems used by Goudsmit Magnetics all contain grease-lubricated bearings that are protected against dirt and moisture. Use only SKF LGMT2 grease to lubricate the bearings.

The bearings require more frequent maintenance if they are used in dusty, humid environments, are subjected to high temperatures or have a longer service life than that of the grease.

- Regularly check whether the bearings produce more noise or are hotter than normal. If so, determine the cause and correct the problem(s). For lubrication, see the table below. If the bearings remain too noisy or too warm, replace all the grease or have the bearings replaced by Goudsmit Magnetics.
- For replacement intervals, combine historical data for bearings used in similar applications with the recommended and/or estimated intervals indicated in the bearing manufacturer's tables.

The table below provides a general indication of the recommended lubrication intervals.

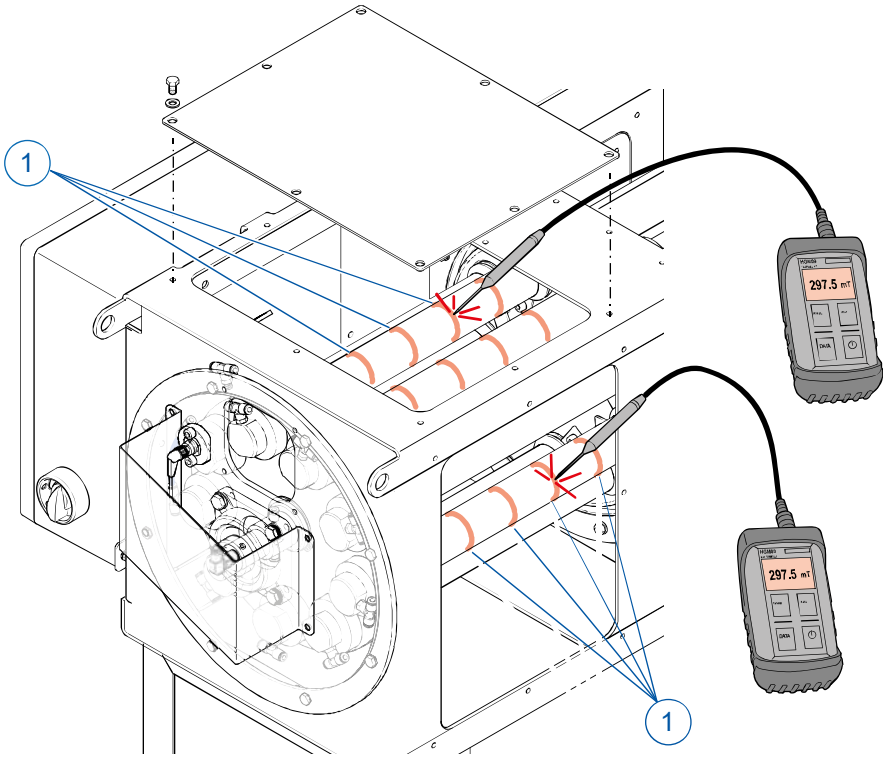
Bearing operating temperature		Lubrication interval at environmental condition		
Celsius [°C]	Fahrenheit [°F]	Clean	Dirty	Very dirty / very humid
50	122	3 years	6 months	3 months
70	158	1 years	2 months	1 month
100	212	3 months	2 weeks	1 week
120	248	6 weeks	1 week	3 days
150	302	2 weeks	3 days	daily

- For more accurate calculation of the intervals, you should combine your own historical data from similar applications with the recommendations and the estimated intervals from the maintenance tables and formulas from the bearing manufacturer.

12.4 Flux density measurement of the magnetic bars

The magnetic bars must be measured at periodic intervals to check their magnetic flux density and to determine whether the magnetic force has reduced. 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.
- Run a cleaning cycle.
- Disconnect power to the device.
- Remove the service door.
- Clean the magnetic bar tube with a soft, clean cloth and, if necessary, a suitable cleaning agent.
- Move the gauss meter/tesla meter probe [**1**] along the poles of 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 ±2 °C.

With the exception of the front and rear poles, all poles must have a value within 10% of the highest measured value.

- Manually rotate the rotor to the next magnetic bar.
- Clean the magnetic bar tube and measure the poles using the gauss meter/tesla meter. Record the highest measured value.
- Do this operation for each magnetic bar.
- Re-fit the service door.
- Reconnect power to the device.
- Production can now be safely resumed.

12.5 Reductor motor

WARNING

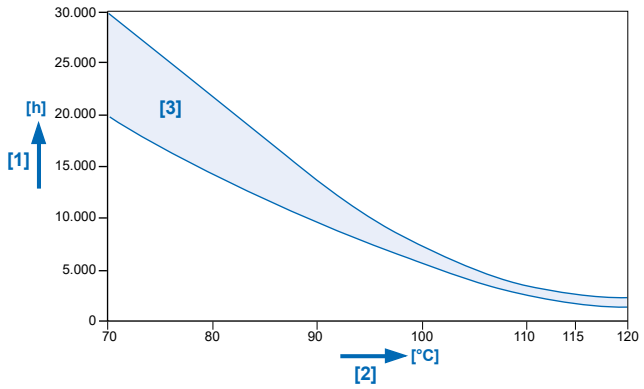
Disconnect the motor's power supply and ensure that it cannot be switched on without your knowledge. Wait for it to cool down.

- Regularly check whether the motor makes more noise than usual or is hotter than usual. If so, determine the cause and correct the problem as quickly as possible to prevent further damage.

The table below shows the manufacturer's general recommendations for inspection and maintenance intervals under normal environmental conditions.

Reductor motor	
Interval	**Work**
Every 3,000 operating hours, at least every 6 months.	• Check the oil and oil level. • Check the running sound for possible bearing damage. • Check the seals visually for leaks. • For reductor motors with a torque arm: Check the rubber buffer and replace if necessary.
Depending on operating conditions (see chart below), at least every 3 years. Depending on the oil temperature.	• Change the mineral oil (see reductor motor data sheet for oil type and quantity). • Change the grease in the frictionless roller bearings (recommended). • Replace the oil seal (do not fit it in the same groove).
Depending on operating conditions (see chart below), at least every 5 years. Depending on the oil temperature.	• Change the synthetic oil (see reductor motor data sheet for oil type and quantity). • Change the grease in the frictionless roller bearings (recommended). • Replace the oil seal (do not fit it in the same groove).
Some reductor motors (such as the SEW R07, R17, R27, F27 and Spiroplan®) are lubricated for life and are therefore maintenance-free.	
Various (depending on external factors).	• Touch-up or reapply surface/anti-rust coating. Check with the motor manufacturer for more information on the coating.

Motor	
Interval	**Work**
Every 10000 operating hours.	Inspect the motor: - check the ball bearings and replace them if necessary - replace the oil seal - clean the cooling air vents

Motor Interval	Work
	[1] Operating hours [2] Exposure temperature of oil bath. Average value per oil type at 70 °C. [3] Most of our gear units use 0.4 litres of type CLP PG NSF H1 KLUBERSYNTH UH1 6-460 oil. The replacement interval depends on the temperature.

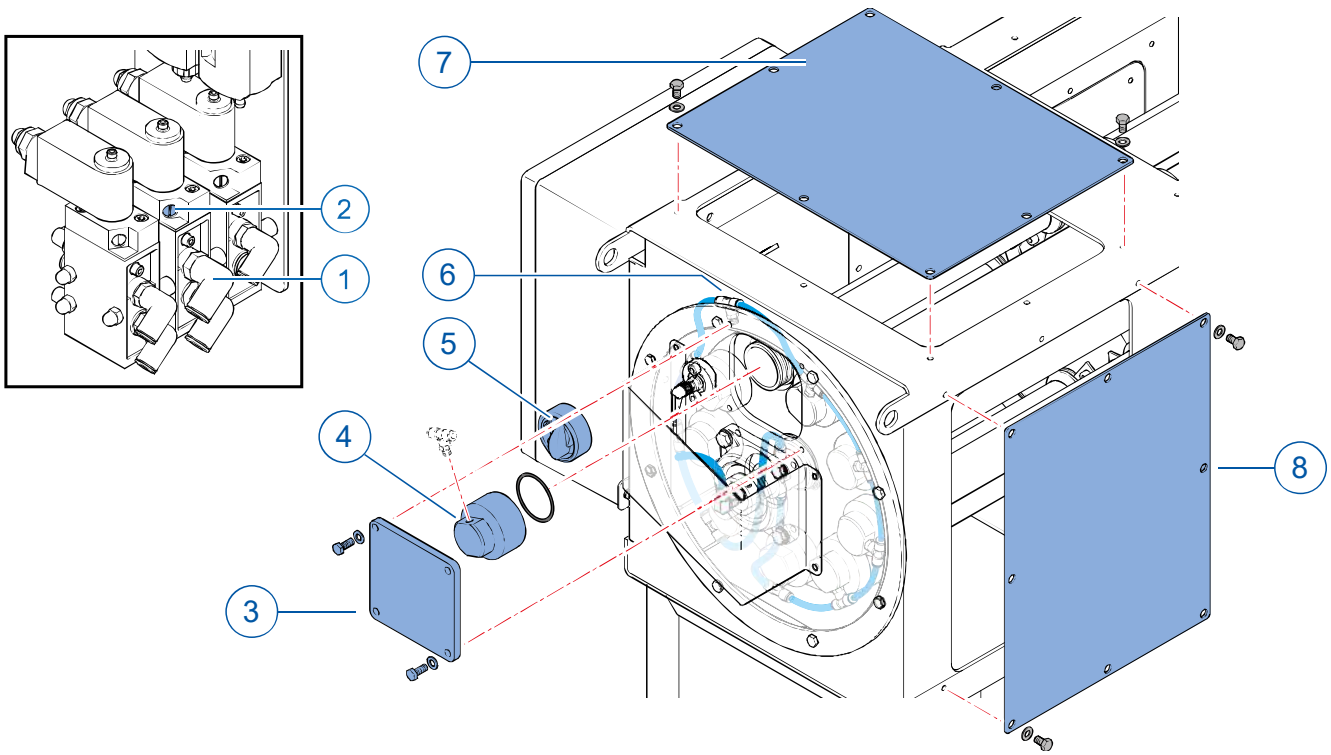
NOTICE

When changing the oil, use CLP PG NSF H1 KLUBERSYNTH UH1 6-460 which is approved for incidental contact in the food and pharmaceutical industries.

Note! CLP PG NSF H1 KLUBERSYNTH UH1 6-460 cannot be mixed with other mineral or synthetic oils.

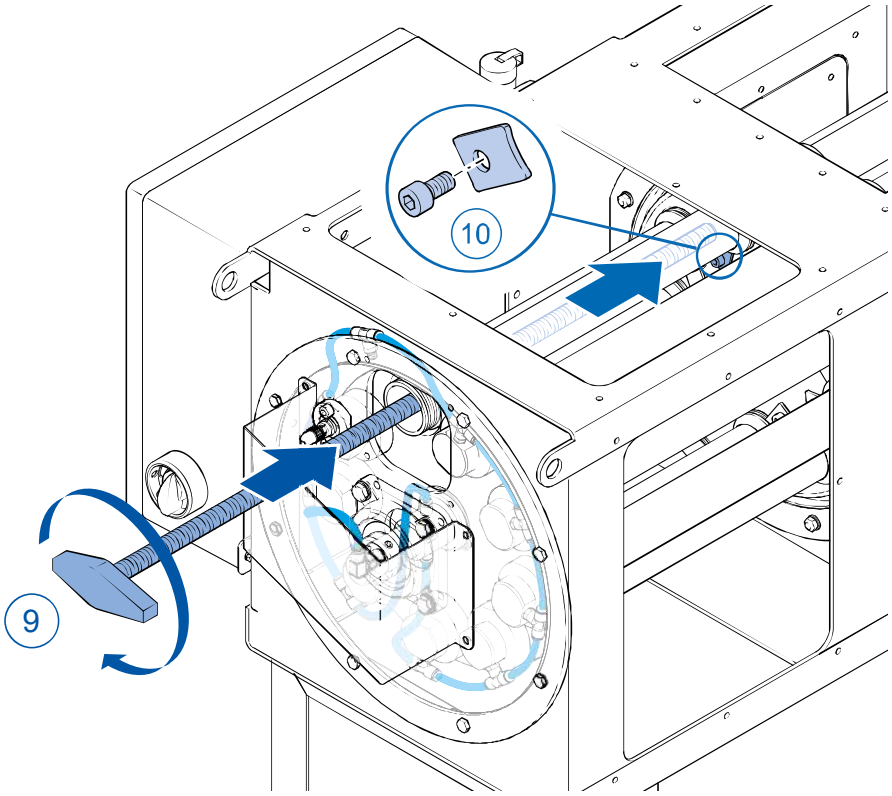
12.6 Replacing magnetic bar tube

- Stop the product flow.
- Run a cleaning cycle.
- Switch off the device using the main switch [**5**] on the control box.
- Use the screw [**2**] on the solenoid valve [**1**] to pneumatically move the magnetic bar tubes to the service compartment.

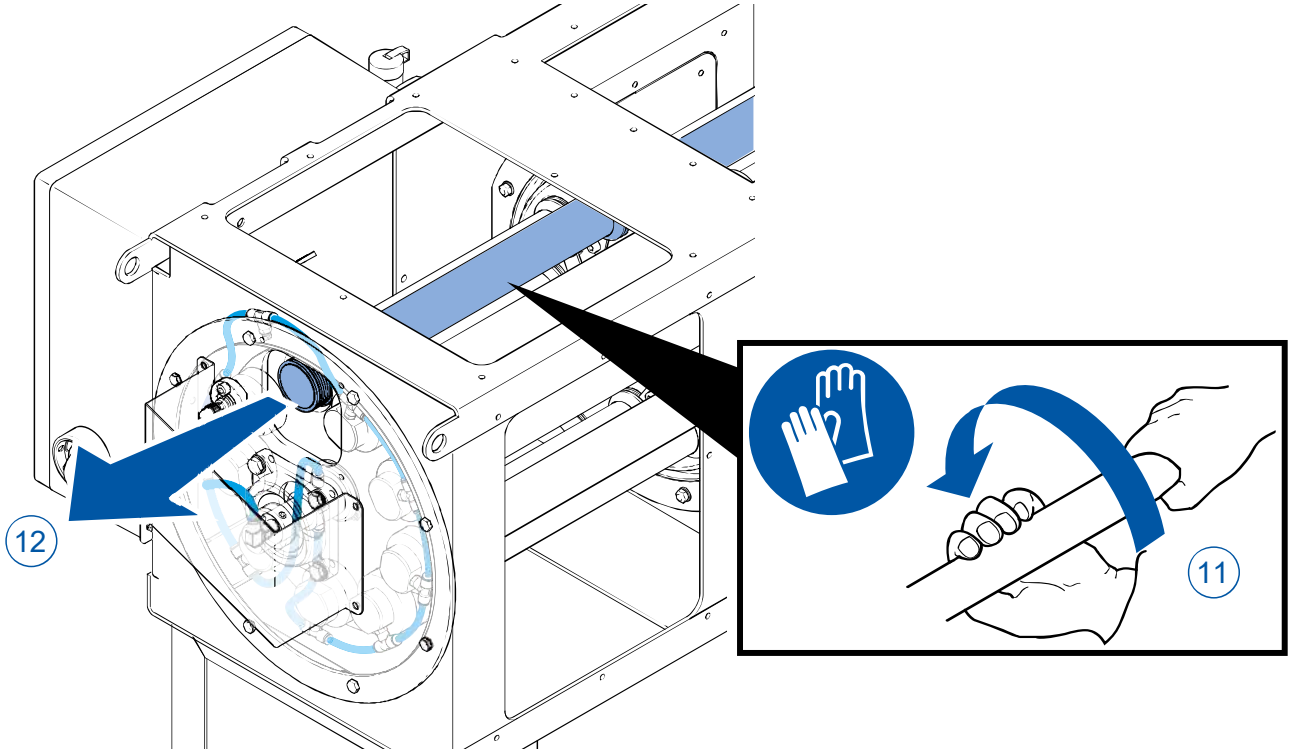


- Remove the service door [**3**] at the rear and the other service doors [**7+8**].

- Rotate the magnet rotor manually or electrically until the desired magnetic bar tube is aligned with the service door [**3**].
- Disconnect the air coupling [**6**] from the end stop [**4**] of the magnetic bar tube.
- Remove the end stop [**4**].



- Insert a long M6 threaded rod [**9**] into the tube and screw it into the magnetic bar.
- Pull the magnetic bar out of the tube and place it on a clean wooden or plastic surface.
- Remove the retainer [**10**].

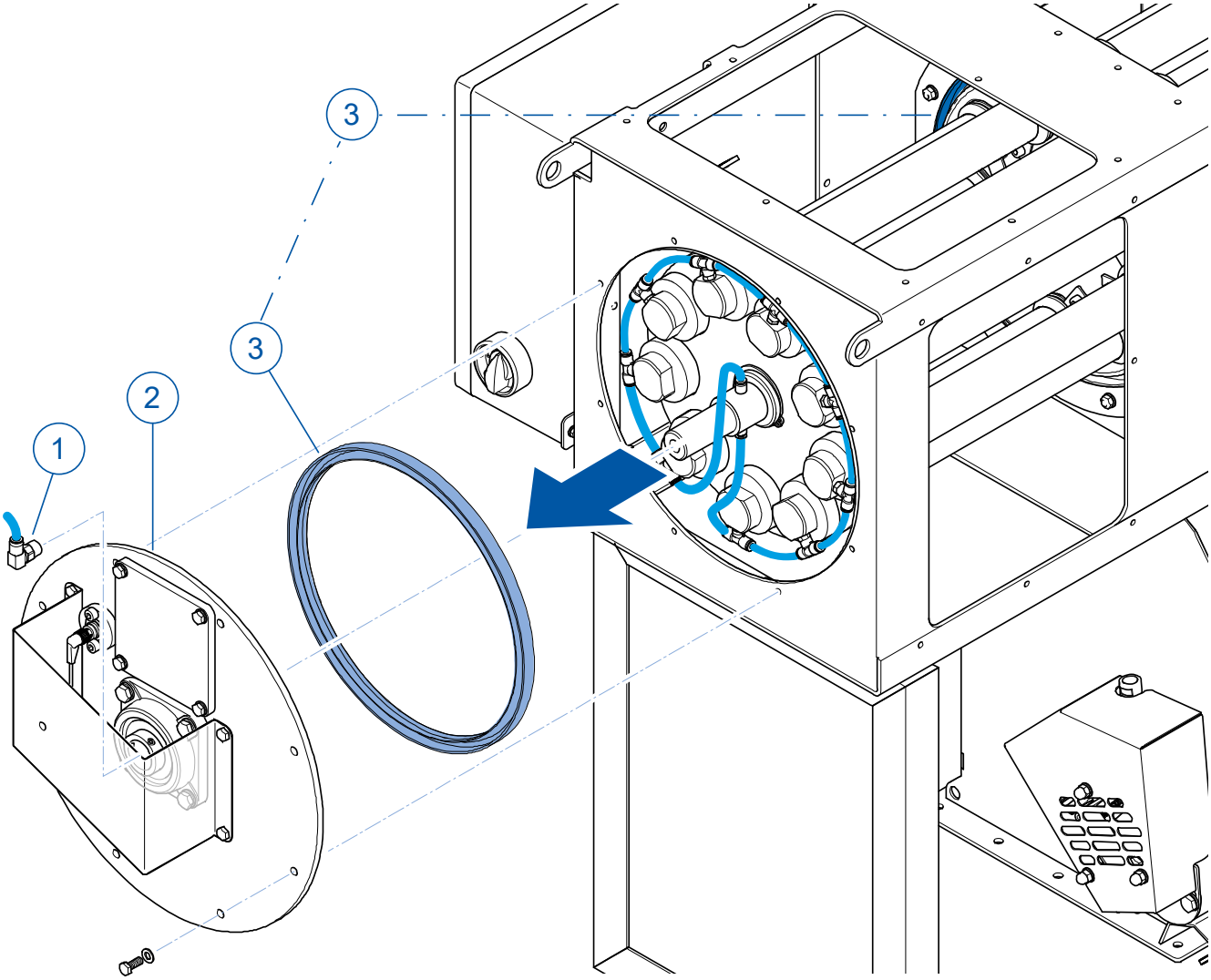


- Unscrew the tube from the rotor disc [**11**] using both hands (wear gloves).

- Remove the old tube through the service door [**12**] and insert a new tube with the retainer [**10**] into the rotor disc.
- Refit the magnetic bar, the end stop (with seal), and the air coupling onto the magnetic bar tube.
- Rotate the magnet rotor to access the next tube for replacement.
- Repeat all the preceding operations for each magnetic bar tube to be replaced.
- Before commissioning, check that the screw on the solenoid valve concerned is back in the correct position. Otherwise, the device will not start.
- Reconnect power to the device.
- Production can now be safely resumed.

12.7 Replacing sealing ring

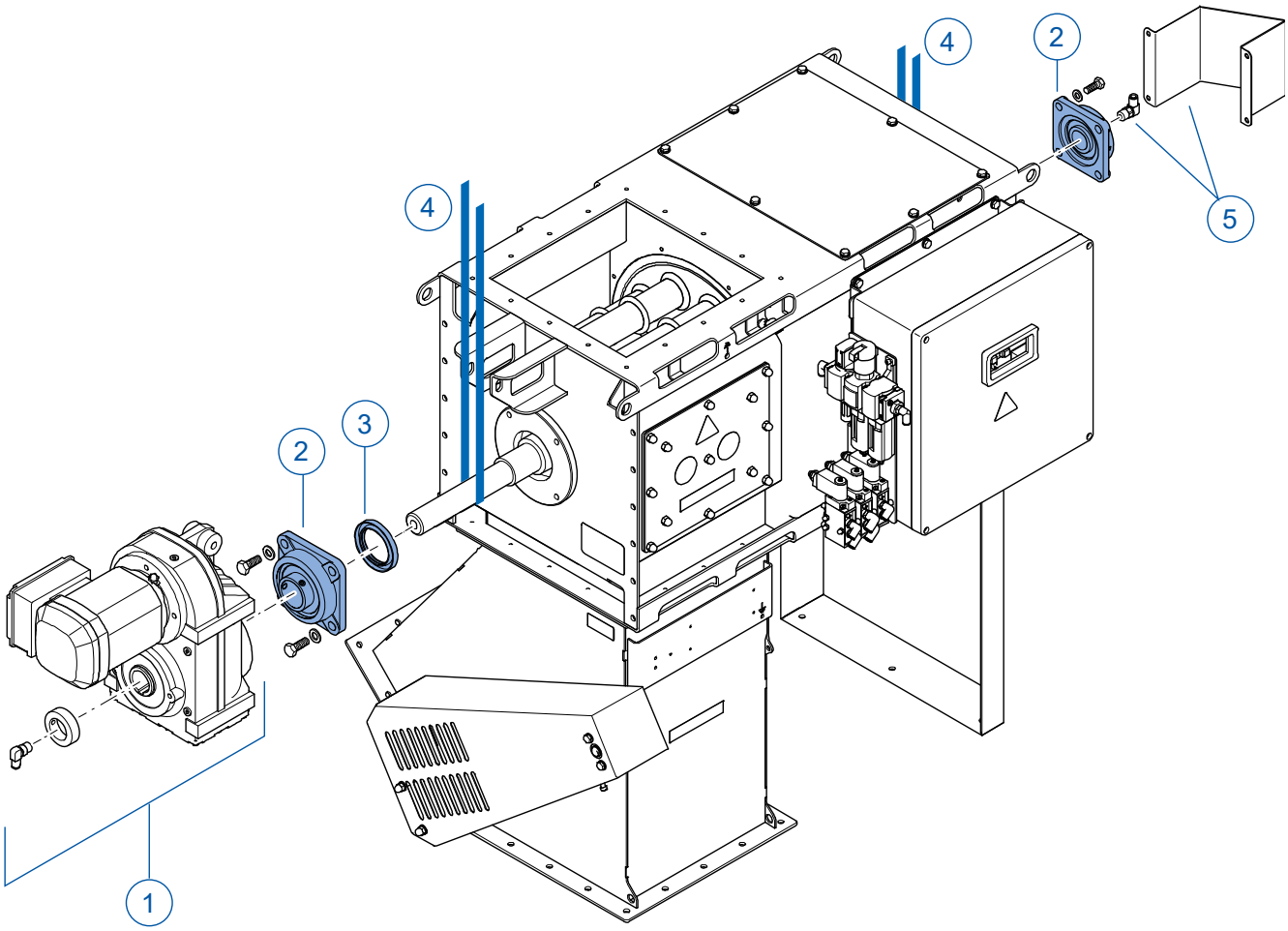
We recommend replacing the sealing ring at least each year or more frequently, depending on the level of wear. Proceed as follows:



- Stop the product flow.
- Run a cleaning cycle.
- Disconnect the device from the power supply.
- Detach the air coupling [**1**] on the rotor shaft.
- Loosen the retaining screw on the bearing.
- Remove the large disc on the service compartment [**2**], supporting the loose rotor shaft.
- Remove the old sealing ring [**3**].
- Clean the groove with a clean cloth.
- Fit a new sealing ring.
- Reassemble everything in reverse order.
- Reconnect power to the device.
- Production can now be safely resumed.

12.8 Replacing oil seal and bearings

We recommend replacing the oil seal and both bearings at least every five years or more frequently, depending on the level of wear.



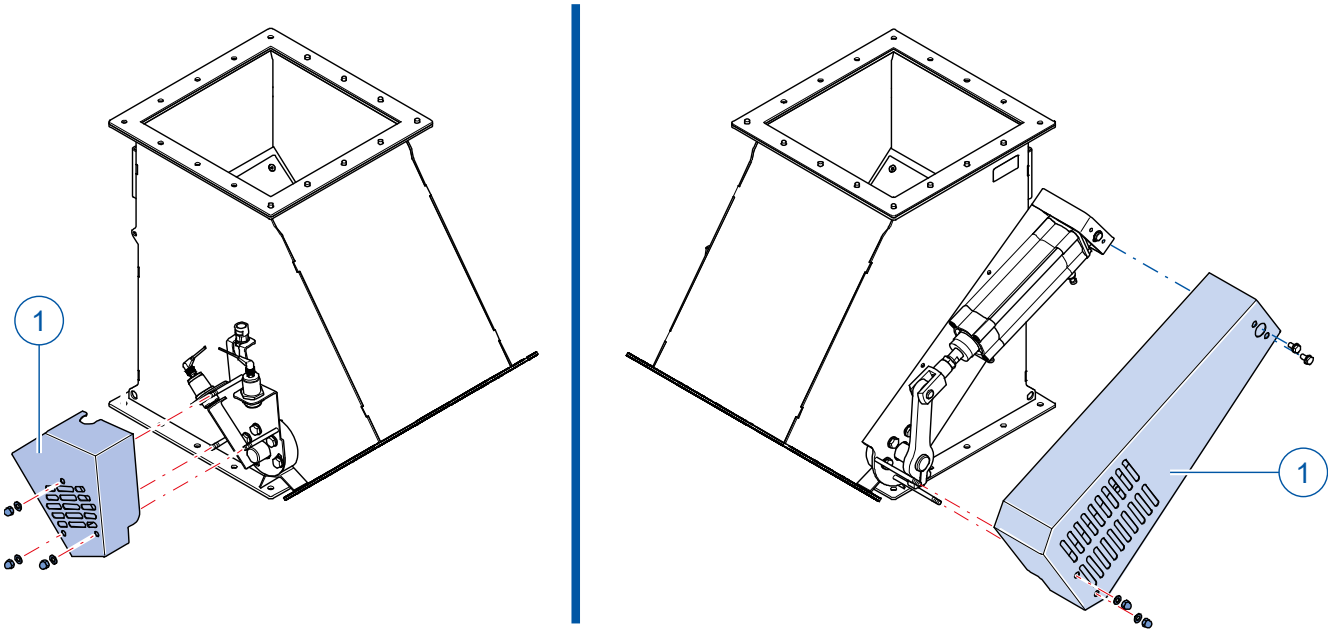
Proceed as follows:

- Stop the product flow.
- Run a cleaning cycle.
- Disconnect power to the device.
- Remove the magnet rotor together with the washer and air coupling [**1**].
- Stabilize the unsupported rotor shaft using lifting straps [**4**] or a similar method.
- At the opposite end, remove the cover plate with air coupling [**5**].
- Replace both bearings [**2**] and the oil seal [**3**].
- Reassemble all parts in reverse order.
- Reconnect power to the device.
- Production can now be safely resumed.

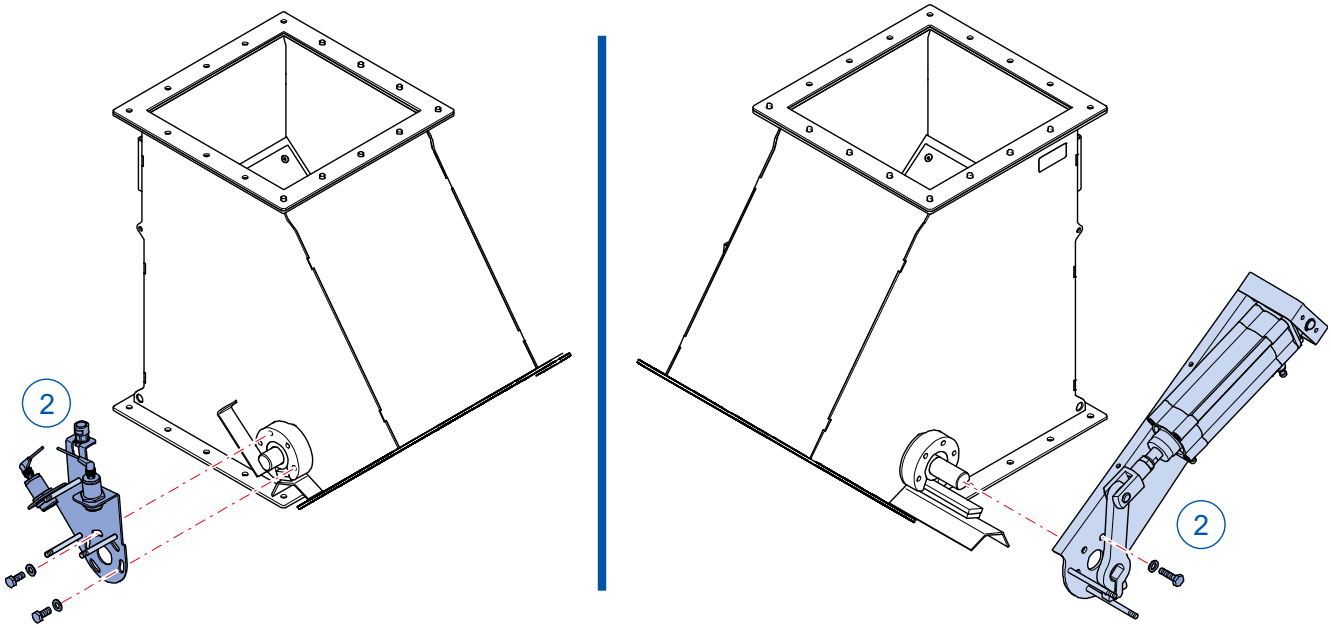
12.9 Replacing the plate seal in the flap box

Due to normal wear, it may become necessary to replace the plate seal in the flap box. Goudsmit can replace the plate seal for you. If you choose to carry out this maintenance yourself, ensure that it is performed by qualified personnel.

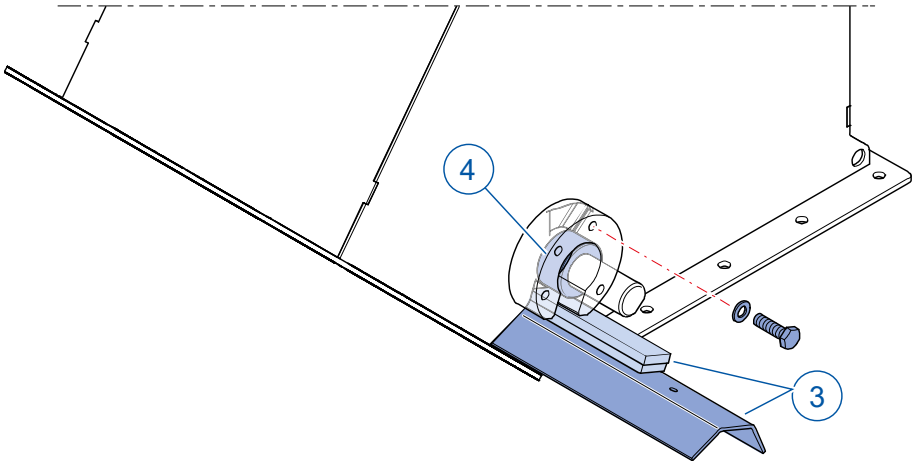
It may be necessary to remove the flap box from the channel assembly if there is no access to both sides or to the space between the ferrous outlet and product outlet.



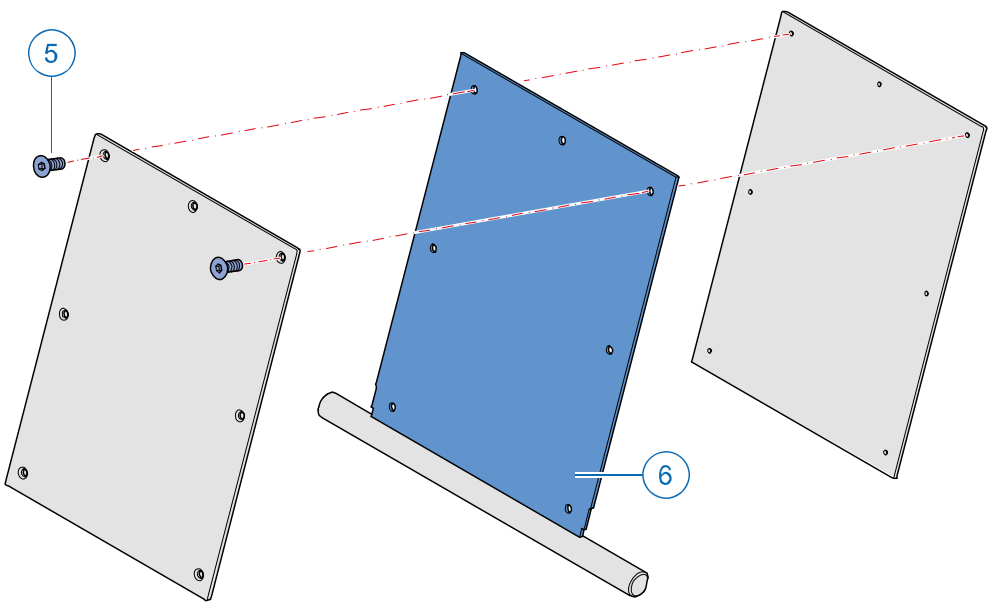
- Remove both covers [**1**] on either side of the flap box.

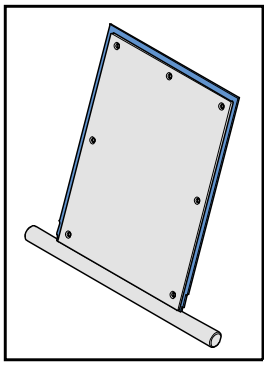


- Remove the assemblies [**2**] on both sides that are connected to the flap box shaft.
- In the space between the ferrous outlet and the product outlet, remove the screws holding the angled plate in place.



- Slide out the profile, including the strip with its associated seal [**3**].
- Remove the bearing sleeve with shaft seal [**4**] on both sides by sliding it outwards along the shaft. There is a space underneath to allow for removal of the bearing sleeve – take care not to damage it.





- Remove the entire flap by sliding it downward.
- Loosen the screws [**5**] and remove the plate seal [**6**] located between the two metal plates.
- Fit a new plate seal.
- Ensure the plate seal is not fitted too tightly inside the flap and check its dimensions.
- Reassemble all parts in reverse order.

NOTICE

Goudsmit Magnetics accepts no liability for damage resulting from incorrect replacement of the plate seal or the flap assembly.

► For best results, have the plate seal replaced by service engineers from Goudsmit Magnetics.

13 Troubleshooting

13.1 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 bars are too saturated.	• This one time, perform a cleaning at a higher air pressure, and clean the bars more frequently in future.
	Particles that are not attracted are not sufficiently ferromagnetic. Ferromagnetic parts near the magnet reduce the ferrous separation capacity.	• Use a permanent magnet to check whether the particles to be separated are magnetic. • 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.
Poorly moving or non-moving magnetic bars (magnetic cores inside the tubes).	The air supply is not connected.	• Connect the air supply.
	One or more magnetic bar tubes have dents.	• Find the cause and eliminate it. Send the magnetic bar tubes to Goudsmit Magnetics for overhaul.
	Air supply couplings are broken or loose.	• Replace the couplings or retighten them.
	The seals of the pneumatic magnetic bar are leaking.	• Have the magnetic bar(s) replaced or overhauled.
Motor is making more noise than normal or has a higher nominal current draw [A].	Motor malfunction.	• Repair or replace the motor.
	An object is jammed between the rotor and housing.	• Remove the object from the system, and replace the sealing ring if necessary.
Rotor does not turn.	Electrical connection has not been made correctly.	• Check and repair the electrical connection.
	Pneumatic control or solenoid valve is not active.	• Check the air supply. • Turn the screw of the solenoid valve back to its original (vertical) position.
Flap of flap box ‘leaking’.	Plate seal is worn.	• Have the plate seal replaced.
Magnetic filter ‘leaking’.	Seal between product channel and service compartment is defective.	• Have the seal repaired by qualified personnel.
Flap moves poorly or not at all.	There is an object jammed between the flap and flap box.	• Remove the object, and have the flexible plate replaced if necessary.
	Air pressure is too low.	• Set the air pressure higher (max. 6 bar).
	Air coupling is loose.	• Tighten the air coupling.
	Plate seal is worn or damaged.	• Have the plate seal replaced.
	Flap box cylinder(s) defective.	• Repair or replace cylinder(s).

14 Service, storage and disassembly

14.1 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.

14.2 Spare parts

Due to the robust construction and quality of Goudsmit Magnetics products, the device has a high operational reliability.

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

- sealing ring
- plate seal of flap box
- seals of magnetic bars
- oil seal
- bearings
- motor

We recommend keeping one or more pneumatic magnetic bars in stock as spare parts.

Apply oil directly if an oil mist lubricator (optional) is installed instead of the lifetime grease inside the magnetic bars.

- 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.

14.3 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.

Notes

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