GOUDSMIT MAGNETICS

User manual

Automatic cleaning rotating Cleanflow magnet, SRCC series

Permanent magnetic filter for separating ferrous contamination and weakly magnetic SS particles from poorly flowing (greasy) powders in free-fall conveying lines.

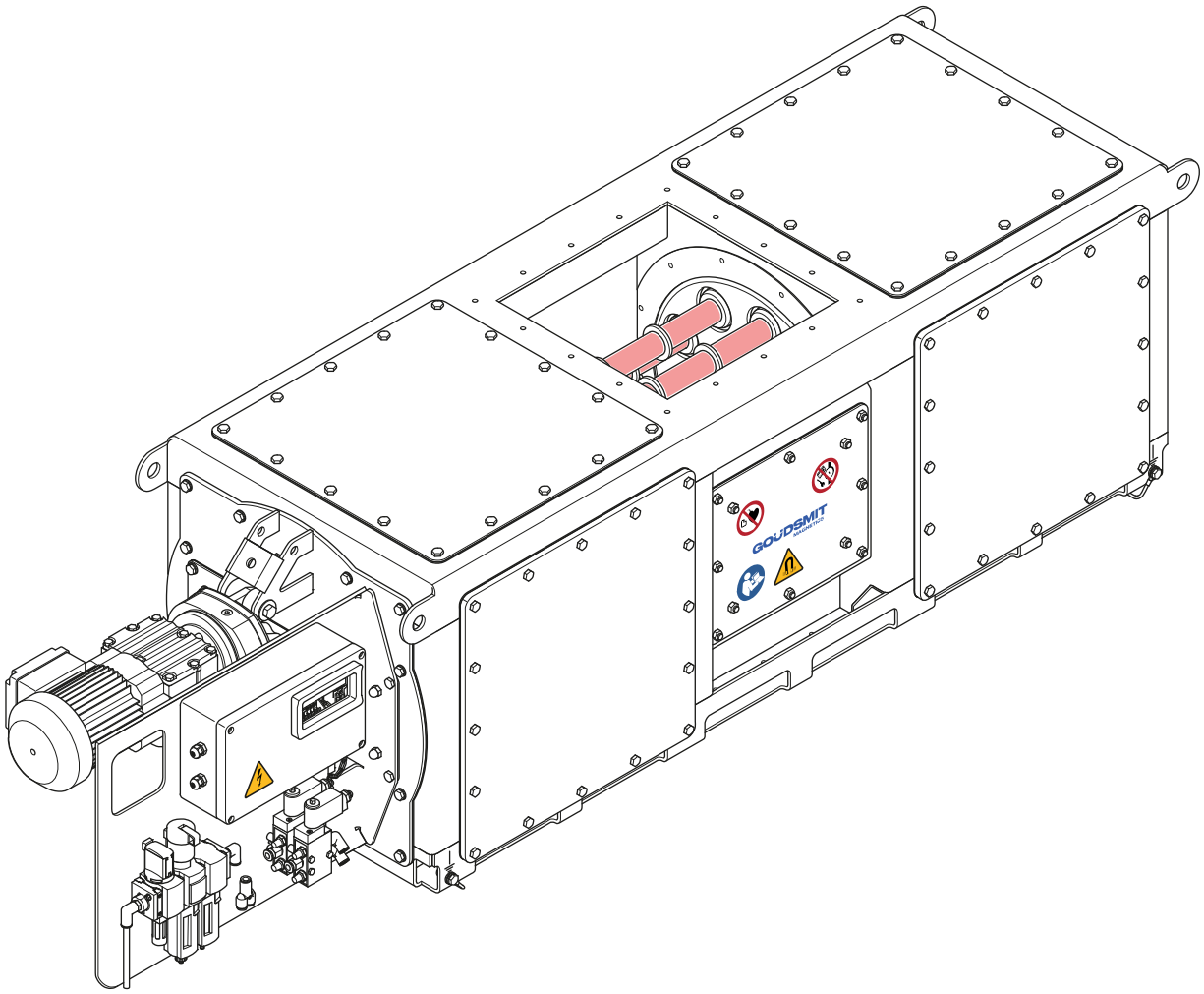

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Table of contents

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 SRCC automatic cleaning, rotating 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 to filter good or poorly flowing – such as greasy – powders (grain size 0.2 to 10 mm) in free fall conveying lines. Any other use is inconsistent with the regulations. Any resulting damage is not covered by the factory warranty.
- The device is equipped with safety provisions and safety guards. Ensure that people who work on the device or in its immediate vicinity wear adequate protection equipment. Always leave all safety and shielding provisions in place if it is not necessary to remove them.
- 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.

- 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 does NOT have an emergency stop provision. It is very important that your installation includes a provision for shutting off the power and air supply to the device in an emergency.

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 Dust explosion hazard

If the supplied device is an ATEX version for use in environments where there is a risk of potential dust explosions, the ATEX equipment category will be indicated on the identification plate.

Make sure the device meets the correct Ex category for the zone in which it will be used.

See chapter ATEX [▶ 13] for a full description.

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:

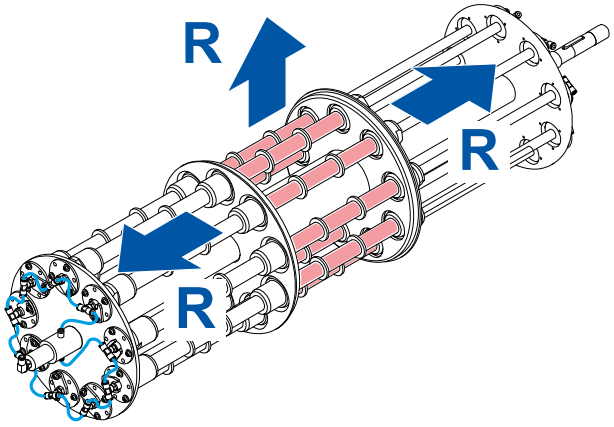
- Machinery directive 2006/42/EC
- EMC directive 2014/30/EU
- ATEX directive 2014/34/EU (if applicable)

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

Employees who are pregnant and the general public may not come within a radius ‘R’ of 0.1 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.

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.

5 Specifications

5.1 Description of function

The device filters ferrous contamination with a minimum grain size of 0.03 mm from product flows with grain sizes ranging from 0.2 to 10 mm. The product flow 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 mainly suitable for poorly flowing powders – such as greasy powders – with relatively high levels of ferrous contamination, in free fall conveying lines up to 2 metres. The automatic control and operation make them suitable for hard-to-reach situations and/or centralized control.

The device is **not suitable** when product loss is unacceptable. During a cleaning cycle, a small amount of product may flow out of the product channel along with the captured ferrous particles.

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.

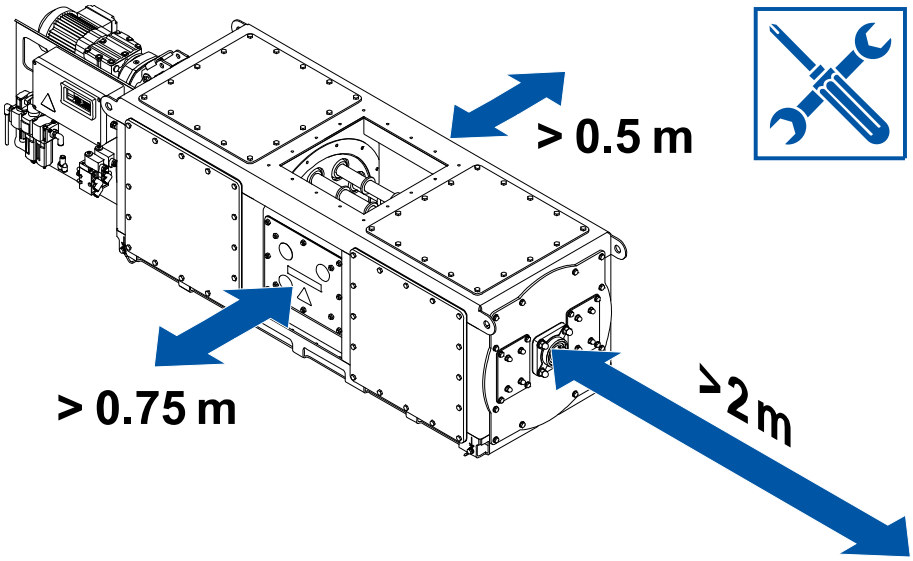
5.4 Temperatures

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

Applied magnet quality	Max. ambient temp. (ATEX)	Max. product temp.	Max. product temp. (ATEX dust environment)
N-42	-5 to +40 °C	60°C	60°C
N-42SH	-5 to +40 °C	130°C	100°C
N-52	-5 to +40 °C	60°C	60°C
N52-SH	-5 to +40 °C	130°C	100°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 the purposes of installation and maintenance, it is recommended to leave 0.5 metres of space around the installed device.

When replacing the magnetic bar, take into account a required space of >2 metres for removal/installation of the magnetic bar.

The recommended space on the connection box side is 0.75 metres.

5.6 Connection voltage

- Connection voltage for standard motor is 400 VDC, 50 Hz.
- Connection voltage for PLC control is 230 VDC, 50/60 Hz.
- Connection voltage for optional detection sensors is 24 VDC.

5.7 Air pressure for control

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

For the pneumatic magnetic bars, use an air pressure of 4-6 bar.

5.8 Air quality

The device is equipped with a single compressed air connection to the pneumatic system as standard. Take into account the difference in air quality of the air blower in the product channel and the compressed air used to operate the magnetic bars.

5.9 Compressed air

The compressed air used to operate the magnetic bars does not come into direct contact with the product. This air may have a lower purity and be supplied separately from the purge air for the sealing ring. Depending on whether the extracted air is released into the food production area or not, it may be of the same quality available in typical compressed air networks [7:7:4]. Where air is discharged into the food production area itself, air purity requirements must be established by the equipment operator.

6 ATEX

If the device is ordered for use in an Ex zone, the device is manufactured to conform to the correct IP class and to ensure that the surface temperature does not exceed that which is permitted for ATEX.

The ATEX marking on the engraved identification plate only applies to the product produced by Goudsmit Magnetics.

Furthermore, the parts purchased for or used in connection with the ATEX magnets (or partially ATEX magnets), such as control box, connection box(es), switch(es), sensor(s) and pneumatic parts, are also ATEX versions.

NOTICE

The purchased ATEX parts have their own ATEX marking.

The overall ATEX classification of the assembled device may be lower than indicated by the ATEX marking on the Goudsmit Magnetics identification plate if the additional parts with their own ATEX marking have a lower rating.

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 (gas or dust), the specific equipment category and other criteria the equipment meets.

Example
Ex marking:  II 1/2D c T120°C Da/Db

Explanation:

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

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

	Dust		
Equipment category	1D	2D	3D
Suitable for ATEX zone(s)	20 (21 & 22)	21 (22)	22

[1D inside device / 2D outside device]

c → Type of Ex protection
c = constructional safety
t = protection by enclosure
h = non-electrical equipment
(protection method not specified)

T120°C → Maximum surface temperature for dust atmosphere

Da/Db → Equipment Protection Level (EPL)

	Dust		
EPL	Da	Db	Dc
Suitable for ATEX zone(s)	20 (21 & 22)	21 (22)	22

[inside device / outside device]

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.

If the equipment does not have 'its own potential sources of ignition' and therefore does not fall under the ATEX directive, it will not receive Ex marking and will be supplied with a declaration of exclusion. This document states where the equipment can be safely used and also specifies the applicable Ex zones.

6.2 Description of ATEX options

Product key at equipment level:

SRCC – xxxx – xxx – xx – **EX** – xxx – x – x – x

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

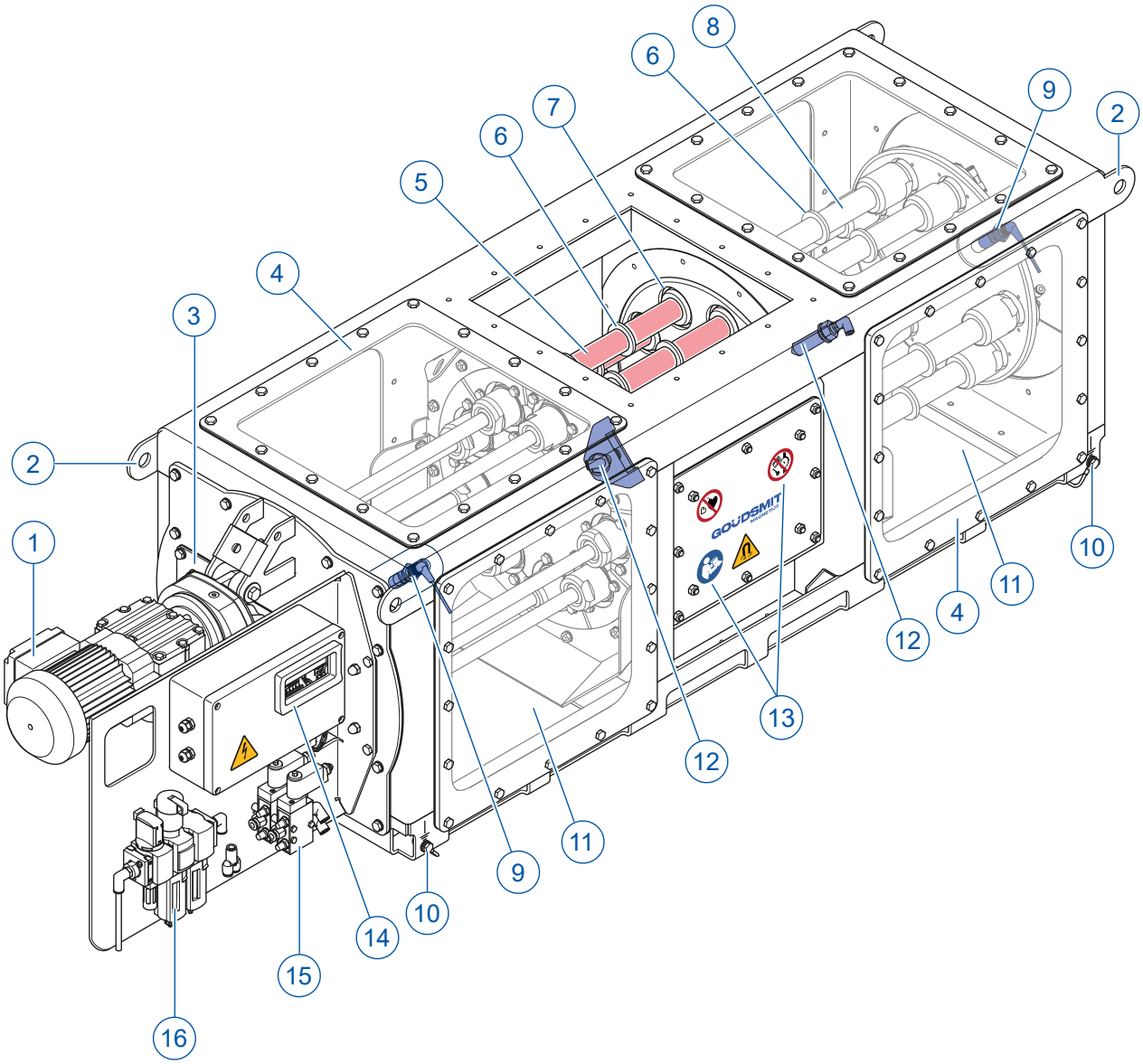
Value	Explanation of Ex marking	
NA	Not an ATEX version	
EX		II 1/2D c T120°C Da/Db
X4		II 1/3D Ex h IIIC T120°C Da/Dc

6.3 ATEX measures

- The temperature of the product must not exceed 60 °C (N-42, N-52) or 100 °C (N-42SH, N-52-SH).
- 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 magnetic bars or cause sparks.
- If necessary, fit a mechanical filter (sieve) for 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.
- Periodically (at least once a year), the resistance between the individual magnetic bars and the housing must be measured. If the measured electrical resistance exceeds 25 Ω, repairs must be carried out to prevent electrostatic discharges.
- No paint or coatings may be applied to the internal surface of the product channel.
- Clean the device regularly. Make sure that dust layers do not accumulate on the device. Dust layers pose a risk due to their insulating properties, which can lead to dangerous temperature increases. Secondly, the swirling of dust deposits caused by a minor initial dust explosion can lead to larger subsequent explosions.
- 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).
- Modifications to the device and installation of additional components by the customer are not permitted without the explicit written consent of Goudsmit Magnetics. Replacement of ATEX-certified components must always be carried out using identical parts. When in doubt, contact Goudsmit Magnetics.
- The maximum rotor speed of 5 rpm must never be exceeded.

7 Product information

7.1 Construction



[1]	Reductor motor	[9]	Sensor
[2]	Lifting point	[10]	Earthing point
[3]	Service door for replacing magnetic bar	[11]	Discharge chute/discharge channel
[4]	Inspection hatch	[12]	Air blower
[5]	Magnetic bar	[13]	Warning pictogram
[6]	Scraper ring	[14]	Junction box
[7]	Sealing ring	[15]	Solenoid valve
[8]	Magnetic bar tube	[16]	Air preparation unit

The device consists of a product channel, with a discharge channel [**11**] for ferrous contamination on the left and right sides. In the product channel is a magnet rotor consisting of pneumatic magnetic bars [**5**] with multiple scraper rings [**6**] on the magnetic bar tube (extractor tube) [**8**].

Sealing rings [**7**] are fitted between the product channel and discharge channels for low-dust separation between the product channel and discharge channels.

Mounted on the housing is the controller, consisting of the air preparation unit [**16**], solenoid valves [**15**] and connection box [**14**].

From the air preparation unit [**16**], the air passes to the solenoid valves and then to the magnetic bars.

During a cleaning cycle, the scraper rings evenly distribute captured ferrous particles along the entire length of the bar. This prevents the particles from accumulating at one end, which could reduce the effectiveness of the falling process.

The housing is fitted with several inspection/service doors [**3+4**], all secured with bolts to prevent unauthorized opening. There is also a lifting eye [**2**] on each corner of the device for transport and installation.

7.2 Magnetic bar tube

The fragile magnetic bar tubes have a very small wall thickness. This results in excellent separation of ferrous particles. Larger, heavy particles in the product flow can hit the magnetic bar in such a way as to cause dents in the magnetic bar tube, preventing movement of the magnetic bar.

The rate at which the magnetic bar tubes will wear out depends on the abrasiveness of the product and the level of ferrous contamination present. To reduce wear caused by abrasive products, the magnetic bar tubes can be coated with a durable material such as tungsten carbide. Contact Goudsmit Magnetics for advice.

The slow speed of the magnetic bars and minimal movement result in negligible internal wear of the bar tubes. At some point, depending on circumstances, the pneumatic components of the internal bars will nevertheless have to be replaced.

The time interval between overhauls depends on the amount of movement of the magnetic bars per unit of time, the product, etc. A rise in the air pressure needed to move the magnetic bars indicates that an overhaul is necessary. If it takes more than 8 bar to move the magnetic bars, they are due for an overhaul. Have the pneumatic components replaced by qualified personnel or service engineers from Goudsmit Magnetics, and clean the magnetic bar tube internally.

If a magnetic bar begins to bind in its enclosing tube, it must be overhauled or replaced promptly to prevent further damage.

7.3 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

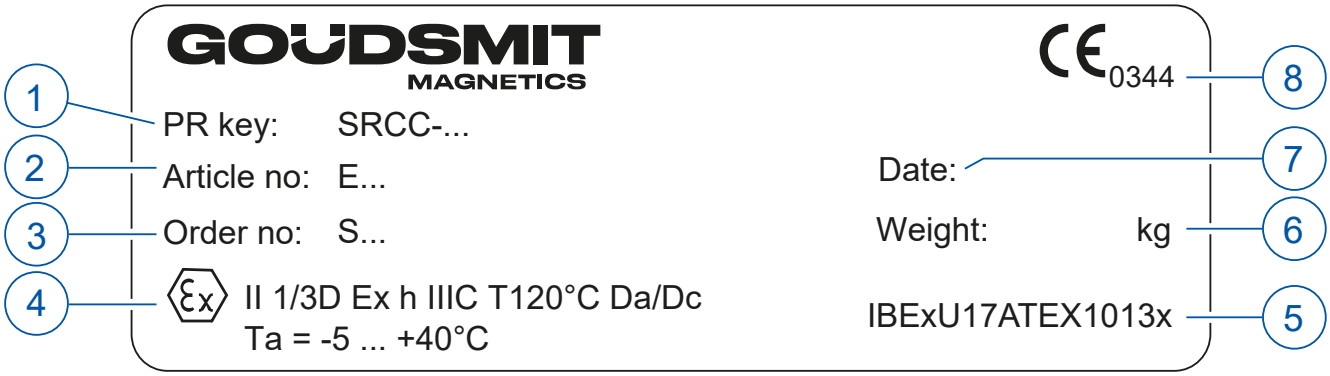
In the event of damage or incorrect shipment, contact Goudsmit Magnetics immediately. The contact details are provided on the title page of this manual.

7.4 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.

Never remove the identification plate!



[1]	Product key	[5]	ATEX certification number
[2]	Article number	[6]	Weight
[3]	Order number	[7]	Date of manufacture
[4]	ATEX marking (if applicable)	[8]	Notified body number (if applicable)

8 Transport and installation

8.1 Transport

WARNING

Note!

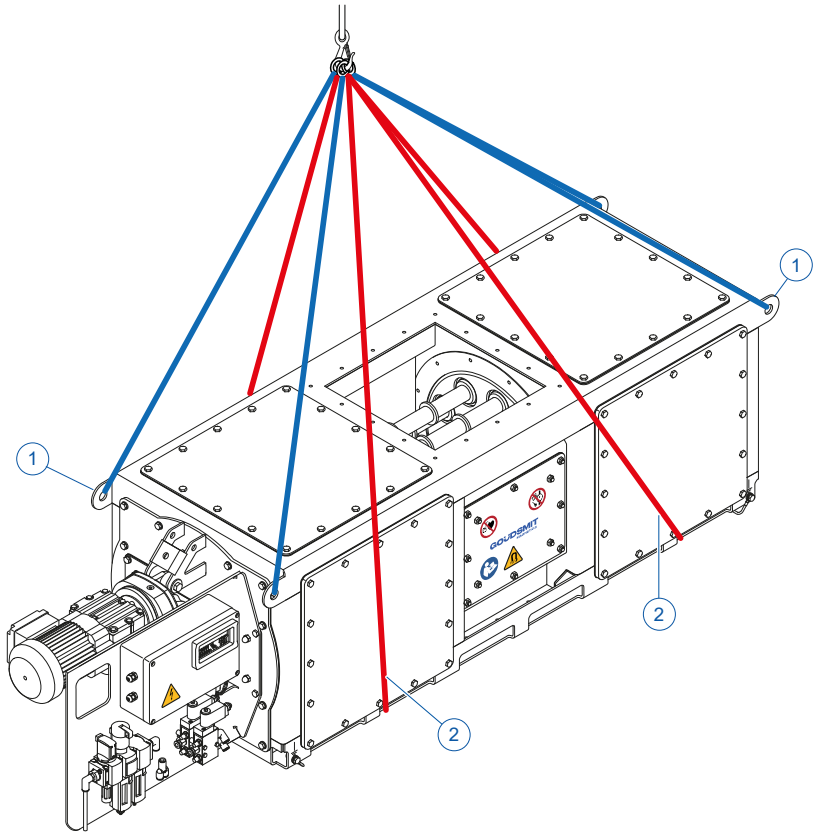
- ► Lift the device by lifting eyes. Keep in mind the centre of gravity.
- ► **Risk of entrapment:** Do not place your hands inside the crate during lifting. Maintain a distance of at least one metre.
- ► During transport, make sure the area around the device is clear.
- ► During transport, avoid all impact in order to prevent damage, especially to the magnetic bars. In the event of damage to the tubes, the magnet packs may not move in the tubes, or only move with difficulty.

WARNING

Only use lifting/hoisting tools that are in good condition, and do not exceed the lifting capacity of the tools.

WARNING

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



- The device is delivered in a wooden crate. Open the crate and remove all transport aids.

- Attach lifting straps and lifting chains to the four lifting eyes [**1**]. Use supporting lifting straps [**2**] if necessary.
- Lift the device out of the crate evenly. Use a suitable lifting/hoisting arrangement that supports the weight of the device (see identification plate).
- During transport, avoid all impact in order to prevent damage, especially to the magnetic bars. In the event of damage to the tubes, the magnet packs may not move in the tubes, or only move with difficulty.

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.

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.

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.

▶ When installing the device, ensure that the free-fall height of your product is a **maximum of 2 metres**. A higher free-fall height will increase the speed of the product, resulting in poorer separation.

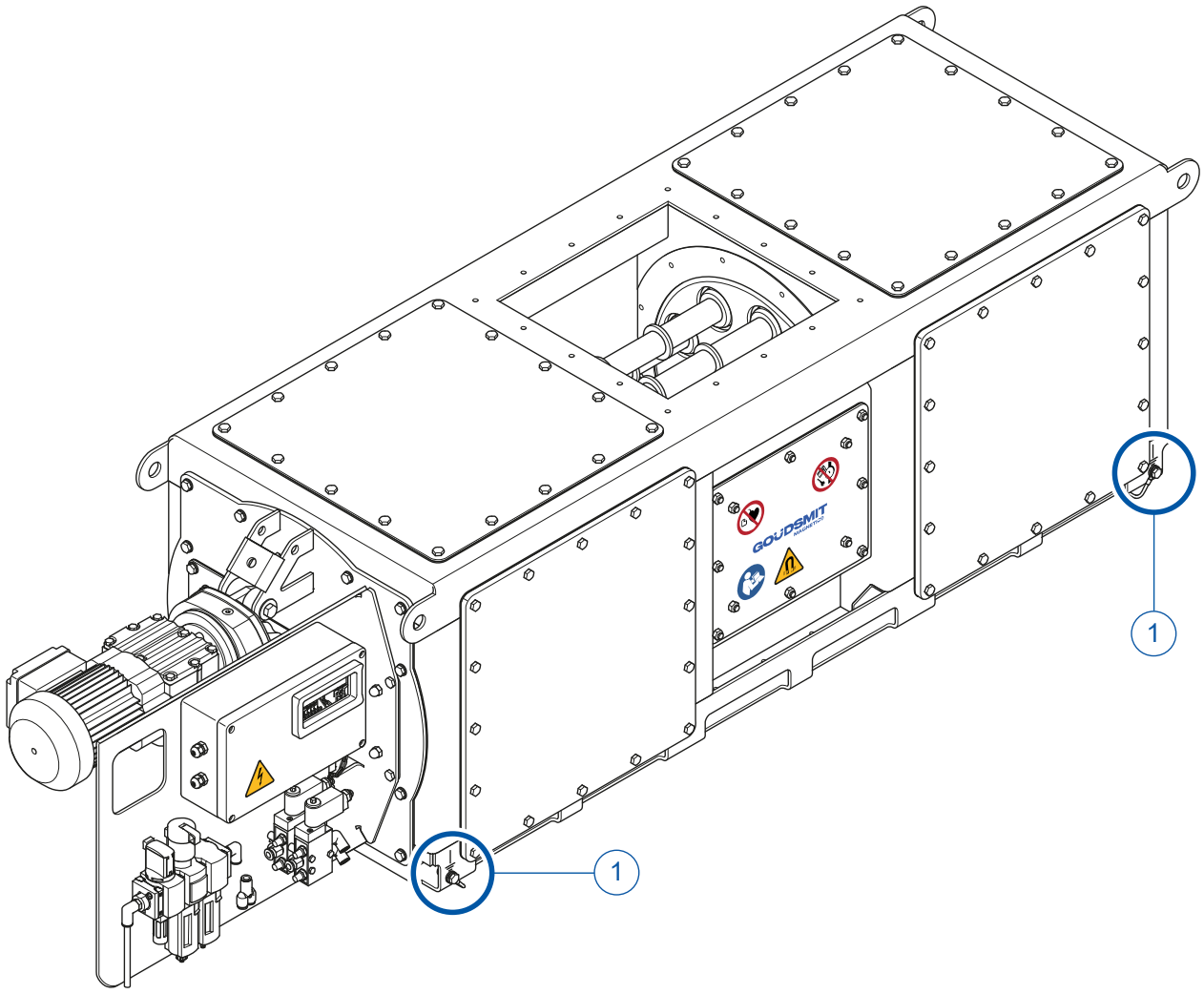
Observe the following measures to avoid problems during installation:

- Install the device in a vertical product channel. The product channel and construction must be sufficiently strong to bear the weight of the device with the captured ferrous particles.

- 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 metres long both above and below the device.
- 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.
- 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.

8.3 Preventing electrostatic discharges (earthing)

To prevent build-up of electrostatic charge, a provision must be made to prevent potential differences between the installation/construction and the device. This can be done by installing a connection cable to the installation.



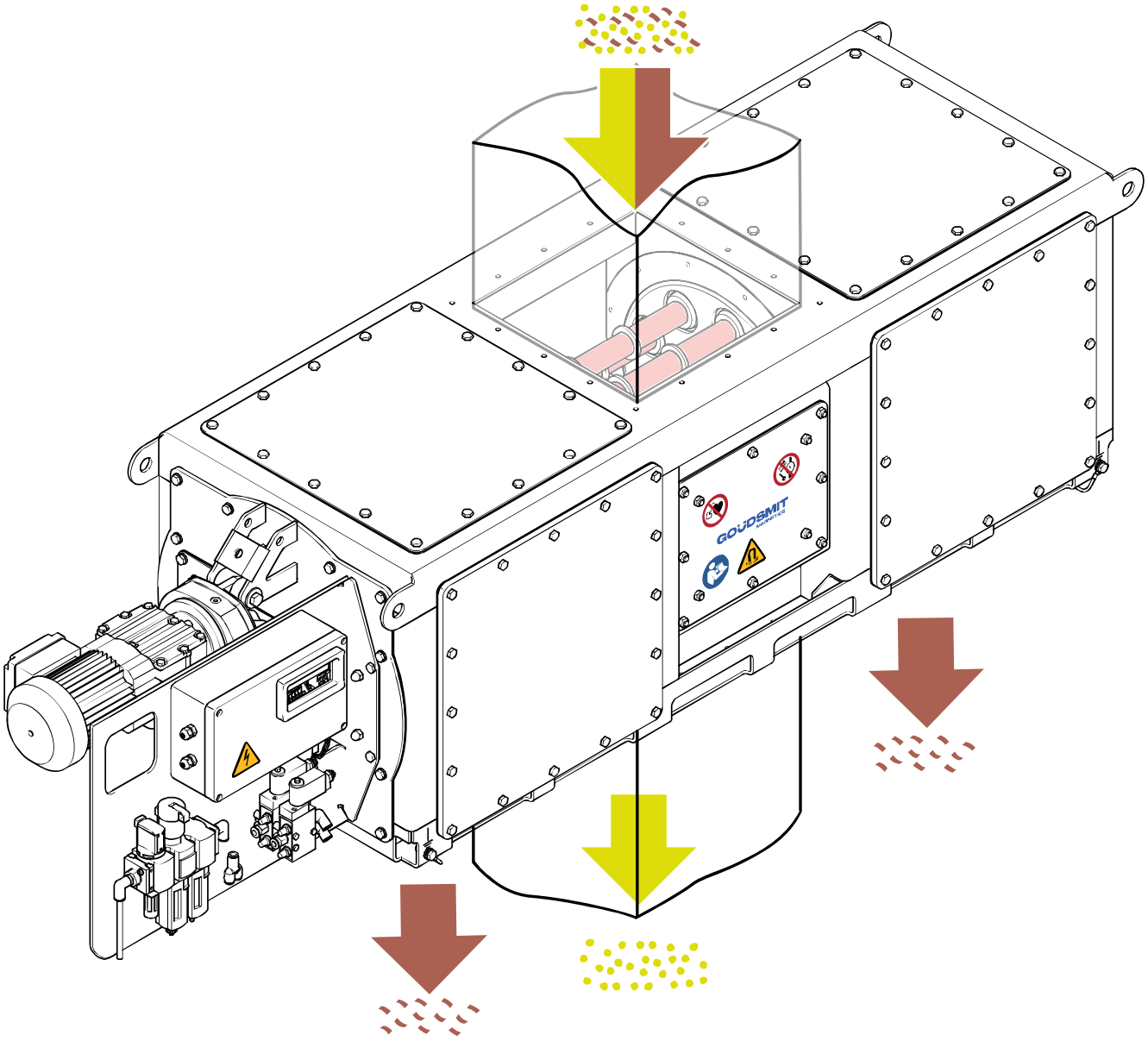
There are various connection points on the device for earthing [**1**].

8.4 Electrical connections & ATEX

If the device is used in an Ex zone, any changes or additions to the electrical installation must meet the requirements for the applicable dust zone.

9 Operating principle

9.1 General



The device is designed to separate ferromagnetic contamination from a product flow, without stopping the product flow. The PLC control system controls the automatic cleaning cycle.

The magnet rotor with very strong neodymium magnetic bars is located in the centre of the product flow. These magnetic bars are pneumatic cylinders with a magnet bundle inside. The stainless steel magnetic bar tubes are alternately ‘blown’ over the cylinder rod to the left and right discharge channels. As such, the magnet bundle always remains in the product channel.

The magnets attract passing ferromagnetic contaminants. The captured particles stick to the magnetic bar tubes, while the purified product flows on.

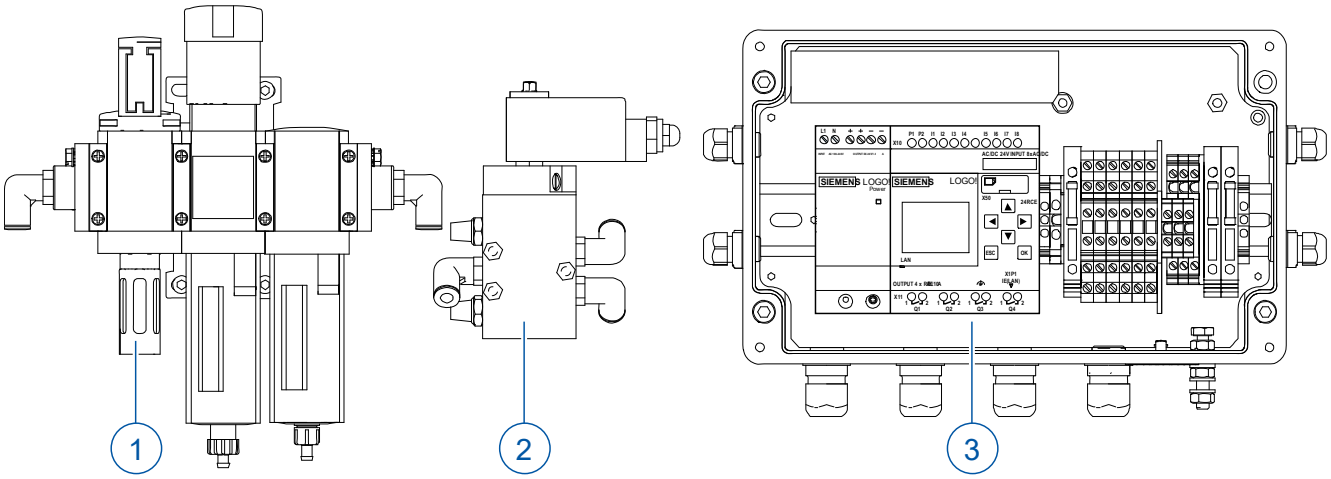
To the left and right of the product channel are the discharge channels to discharge the ‘captured’ ferrous contamination. Cleaning is done by ‘blowing’ the magnetic bar tubes to the left or right discharge channel. There, magnets are no longer present in the tubes, so the ferrous contamination carried along by the scraper rings falls off the tubes and can be collected and/or disposed of via a discharge channel.

Cleaning of captured ferrous contamination is automatically performed by the PLC control system every 4 hours as standard.

Even distribution of product flow throughout the channel improves the effectiveness of ferrous particle removal.

9.2 Automatic cleaning cycle (continuous cleaning)

The device is equipped with a local control unit, with an integrated Siemens LOGO! control module for controlling the magnetic bar movements.



[1] Air preparation unit [2] Solenoid valve [3] Control box

When voltage is supplied to the controller, the controller starts its cleaning program. There is no isolating switch; one can be added externally.

During the cleaning cycle the PLC controller also carries out discharge of the ferrous contamination, while the filter continues to operate.

Every 4 hours (cycle time depends on the level of ferromagnetic contamination in the product flow), the magnetic bar tubes will move to the left or right discharge channel.

The magnetic bar tubes carry the captured ferrous contamination out of the product channel to the discharge channels. In the discharge channel the ferrous contamination will automatically fall off, as it is out of the magnetic field and therefore no longer attracted by it.

The device's cleaning cycle is continuous. This means that magnets always remain in the product channel during the cleaning cycle.

Advantages of continuous cleaning

During the discharge of ferrous contamination, the product flow does not have to be stopped. This also makes it easier to perform cleaning cycles regularly, which improves separation. This is because a clean magnet functions significantly better than one heavily contaminated with ferrous particles.

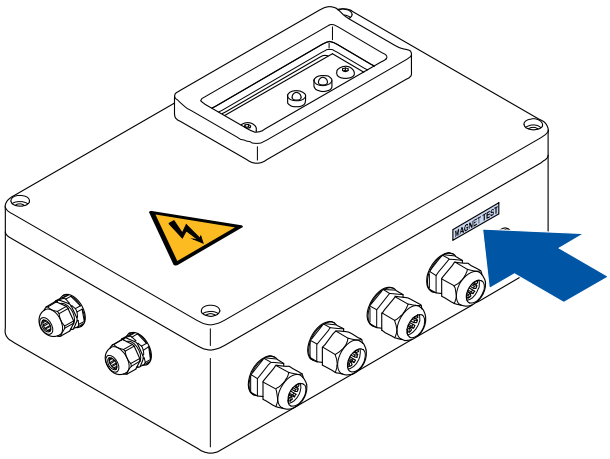
Disadvantages of continuous cleaning

Some product loss from the flowing product is possible, especially during the movement of the magnetic bar tubes to the discharge channel. This is because there is a very small gap between the housing (sealing rings) and the magnetic bar tubes.

9.3 Cleaning cycle testing

The device's cleaning cycle can be tested in two ways:

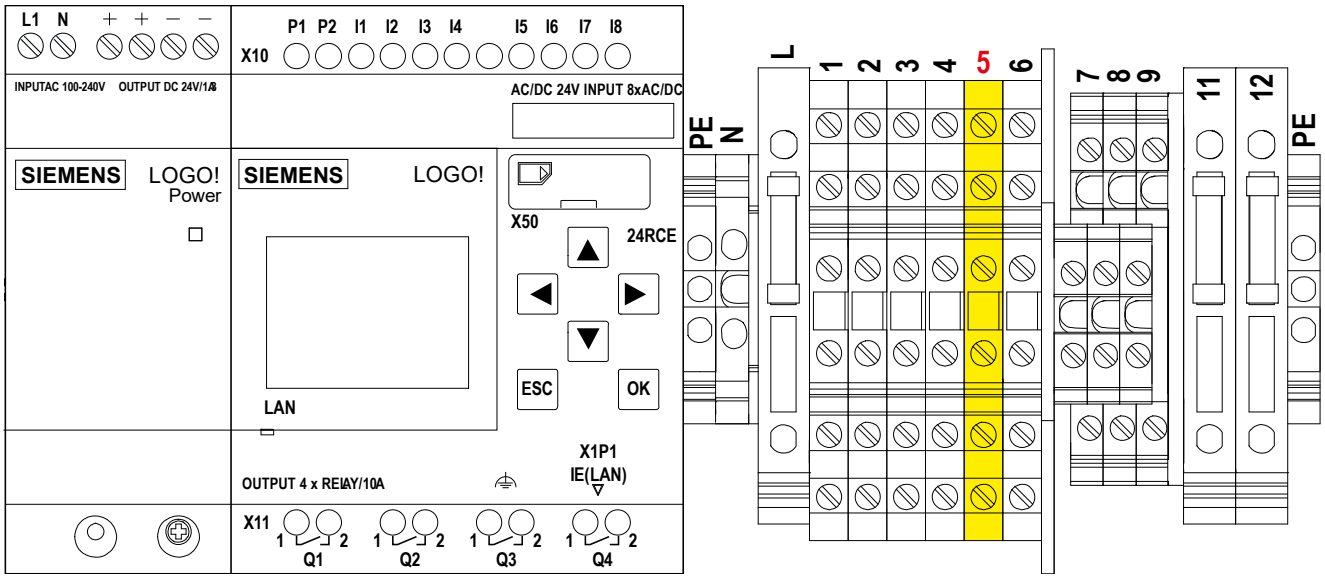
- Using a magnet:



The control box contains a proximity switch activated by a magnet. On the underside of the control box, a label is affixed between the earth terminal and the cable gland (see drawing). Hold a magnet near the label. The cleaning cycle is activated.

On old versions of the device, there is a push button on the control box to test the cleaning cycle.

- A pulse on input i5 can be used to force the bars to move in the opposite direction for additional cleaning or testing.



Make a 24V connection between terminal 5 and the central (external) controller.

10 Control of the device

10.1 Connecting control box to a central control system

NOTICE

Refer to the provided electrical and pneumatic diagrams to properly connect the device.

The pneumatic and electrical controls can be fully configured and controlled by your central control system. The box pictured is the device's standard control box.

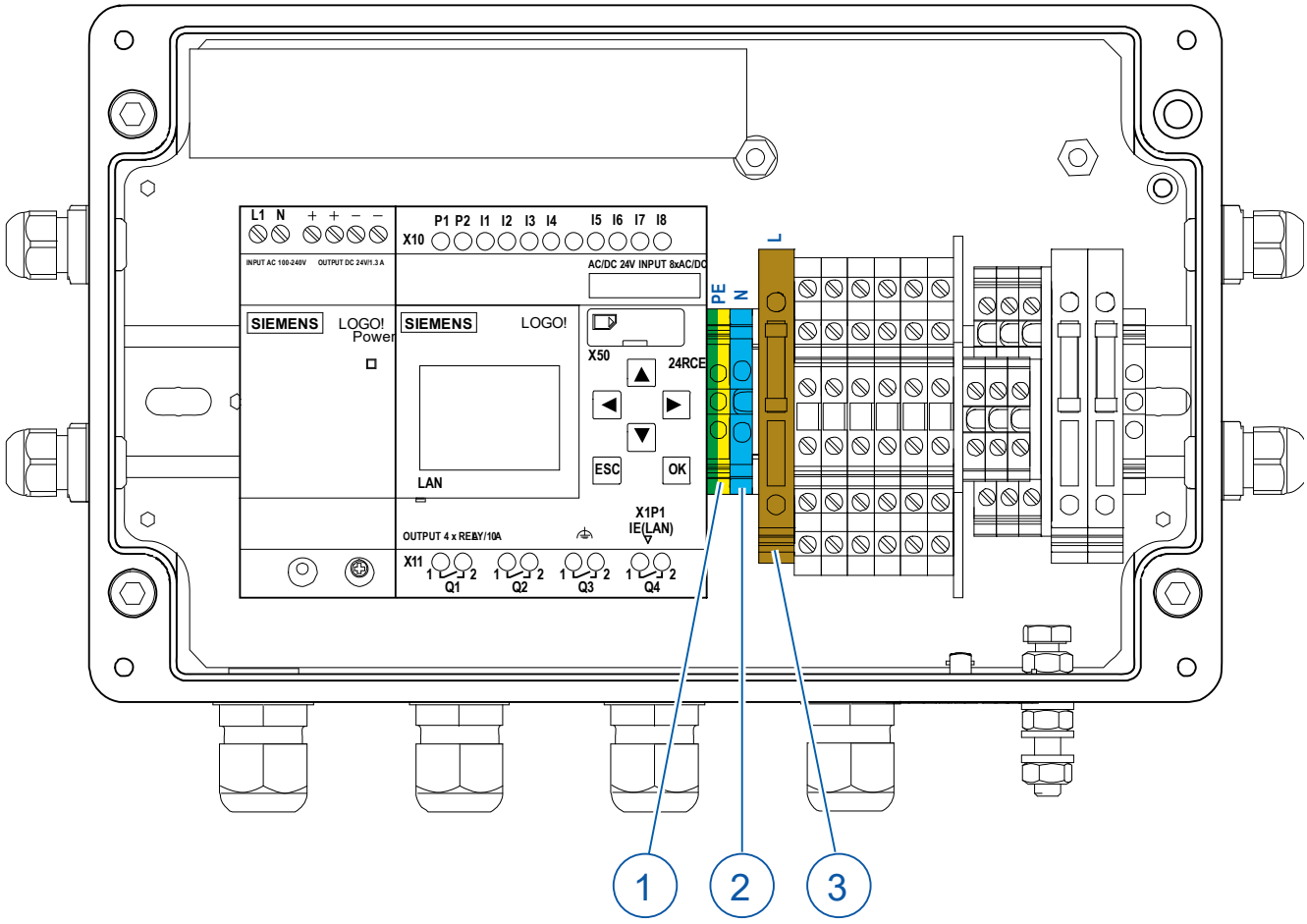
Control of the device can be connected to a central control system. The device can then be operated and controlled from your control room or another designated control area.

The solenoids on the pneumatic valves can be connected via the terminal strip in the control box. For specifications, see the supplied electrical diagram.

10.2 Connection procedures

After the device is installed, the compressed air and power supply must be connected to the device in order to put it into operation.

10.3 Electrical connection



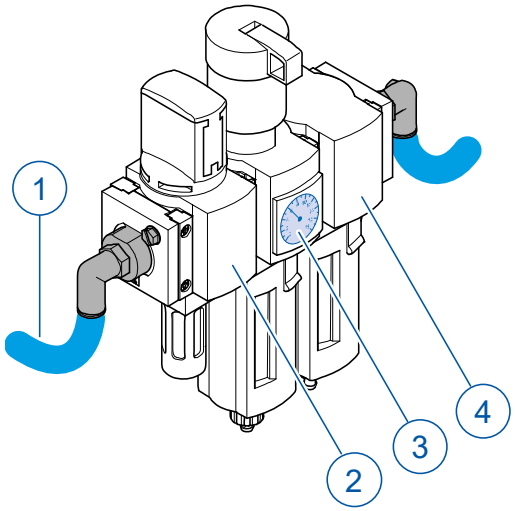
- Connect the electrical components to the central controller and the control box in accordance with the provided electrical diagram.
- Connect your 24 VDC supply voltage to terminals X1-L [**3**], X1-N [**2**] and earth (PE) [**1**] in the connection box.

- Connect the sensor signals to the central controller via terminals **X10-I1 T/M I4**.
- Connect the control of the solenoid valves for the magnetic grids to **X11-Q1 to Q4**.

10.4 Air supply 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 operating pressure to the 5/2 solenoid valves.

The air preparation unit controls the movement of the magnetic bars. The air preparation unit consists of:



[1] Air supply hose

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

[3] Control valve / pressure gauge / standard filter

[4] Fine filter / microfilter

- 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 8 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 begin to wear. As a result, more compressed air will be needed to move the bars or air will leak from the left compressed air chamber to the right compressed air chamber.
- We recommend overhauling the magnetic bars periodically (±2 years). Preferably, have the magnetic bars overhauled by engineers from Goudsmit Magnetic Systems B.V.. See also Overhauling magnetic bar [▸ 42].

11 PLC controller - Siemens LOGO!

The LOGO! is a simple PLC module from Siemens. Among other things, the LOGO! program activates the solenoid valves that control the movement of the magnetic bars and the discharge of ferrous contamination. 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.

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

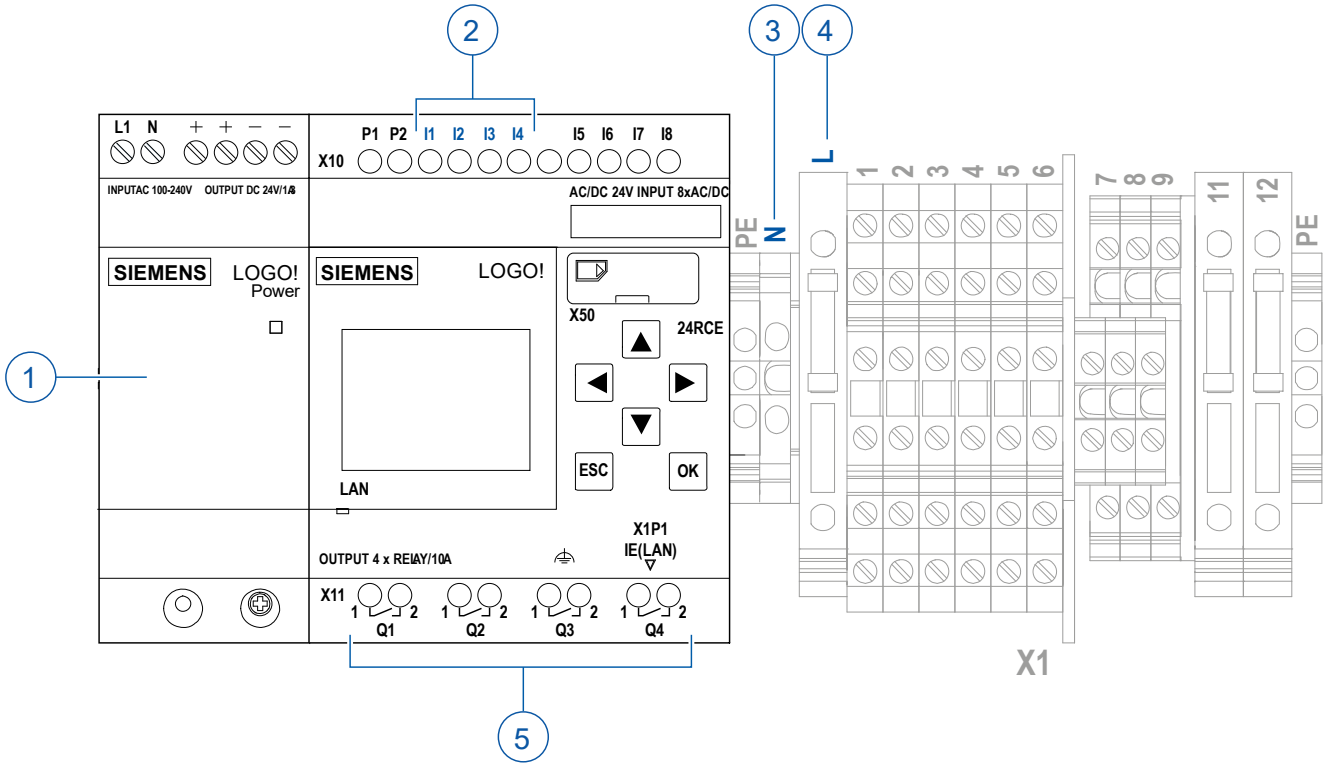
If it is necessary to make changes to the LOGO! control program, please contact Goudsmit Magnetic Systems B.V. with the request and we will send you a microSD card with the correct LOGO! program. The new program can then be loaded as follows:

- 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 Magnetics for more information.

11.1 LOGO! connections

If a 24 VDC supply voltage is not available locally but 120/230V 50/60Hz is, use the power supply (Power 1.3) [**1**] mounted next to the LOGO! It can convert the supply voltage to 24 VDC. To do this, connect the line to X1-L [**4**] and the neutral to X1-N [**3**] on the terminal strip.



Inputs: the inputs (i1 to i4) [2] are not used, as standard.

Options (if limit switches are used for the magnetic bars):

- i1 to i4 = end position detection for the magnetic bars.
- i5 = start asynchronous cleaning.

- i6 = reset fault signal on Q4.

Outputs Q1 to Q4 [5]:

- Output Q1 controls the valve that ……?.
- Output Q2 controls the valve that ……?.
- Output Q3 gives STATUS OK => all magnetic bars are still moving properly.
- Output Q4 gives a fault signal if the magnetic bars do not move properly.

NOTICE

The description above applies for the standard connections, which are subject to change. See the annexes for the latest specifications.

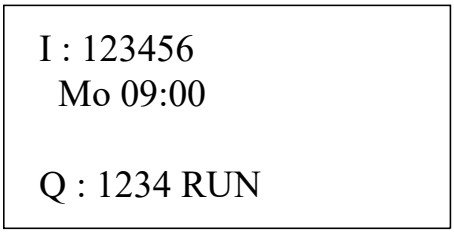
11.2 Changing LOGO! switching times

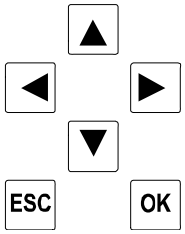
To change the switching times between the back and forth movement of the magnet rotor four parameters can be changed in the LOGO! program. These parameters are:

1. Time between switching back and forth of the upper magnetic grid (B1)
2. Time between switching back and forth of the lower magnetic grid (B2)
3. Time before starting the lower magnetic grid (B3)
4. Time before starting the upper magnetic grid (B4)

** The parameter can be changed while the program continues to run!*

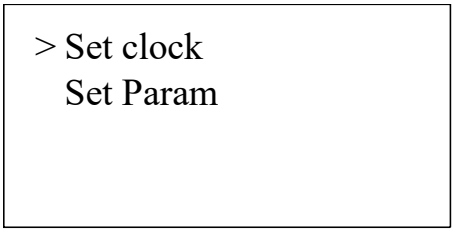
Changing parameters is done in ‘Parameters’ mode. To set the LOGO! to this mode, proceed as follows from the home screen:



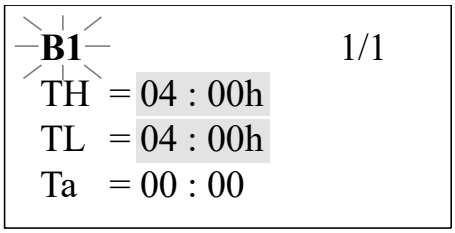


If a fault or status message is shown on the screen, press the ▼ key to exit the message.

1. Then press the ‘ESC’ key to enter the main menu. LOGO! switches to the main menu.
2. Select ‘Program’ using the arrow key and press ‘OK’.
3. Use the arrow key to select ‘Set Parameter’ and press ‘OK’.



4. Use the ▼ key to scroll to the appropriate timer (B1, B2, B3 or B4). Then press ‘OK’ to confirm this selection. The following lines will now appear on the screen:



By default, ‘T’ is set to four hours.

- Block number with parameter (TH/TL)
- Set value of this parameter (TH/TL) with its unit (hours:minutes)
- The current value of this parameter in the running program (Ta)

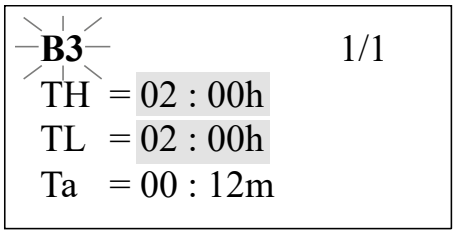
5. Press ‘OK’ to change the parameters. The cursor flashes below the B of block B1. The cursor jumps to T=04:00h.

6. The parameters can be changed using the ▼ and ▲ keys. Use the ► and ◄ keys to scroll to the next parameter and back again.

7. Do steps 5 and 6 for parameter TL too.

8. Pressing ‘OK’ confirms the changes.

9. Use the ▼ key to move to the next time block (B3). The following lines will now appear on the screen:



‘T’ set to two hours.

10. Do steps 5 to 8 for the time too (set to half value of TH and TL).

11. Do steps 5 to 10 for time blocks B2 and B4 too.

12. ‘Esc’ exits parameter entry, and ‘Esc’ again exits the ‘Parameters’ mode.

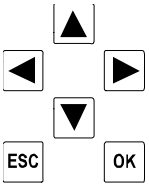
You are now back on the standby screen, and the times have changed in the LOGO!

The newly set time parameters have NOT yet been saved on the SD card. See the next section to save these new parameters on the SD card.

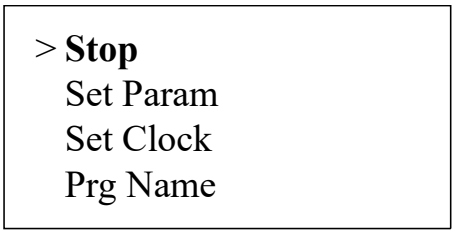
11.3 Copying the new interval times from the LOGO! to the SD card

The new interval times can only be changed in the LOGO! To save the changes program on the SD card too, the following actions must be done:

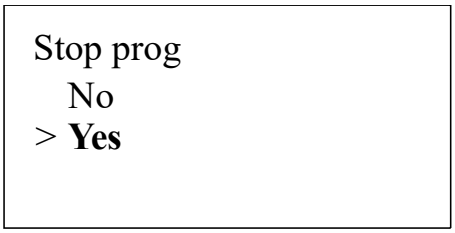
If a fault or status message is shown on the screen, press the ▼ key to exit the message. Then press the 'ESC' key to enter the main menu.



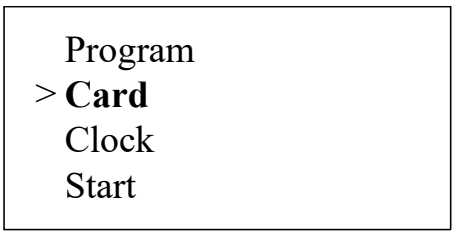
Use the arrow keys to scroll to 'Stop' and press 'OK'.



Use the arrow keys to scroll to 'Yes' and press 'OK'.



Use the arrow keys to scroll to 'Card' and press 'OK'.



Use the arrow keys to scroll to Save 'Prog -> Card' and press 'OK'.

To read the complete description of features of the Siemens LOGO!, you can find the manual (in several languages) on the Siemens web page:

► https://new.siemens.com/global/en/products/automation/systems/industrial/plc/logo.html

The LOGO! program was stopped during the first step. It must therefore be restarted.

12 Maintenance and inspection

12.1 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 on/off valve.
- ► Be careful with tools and ferrous objects. The magnetic force is permanently present.

CAUTION

Risk of burns from hot flow product

Contact with hot flow product may cause burns.

- ► Always wear protective work clothing and safety gloves when carrying out work near hot liquids.
- ► Make sure the flow product has cooled down to ambient temperature before carrying out any work.

The device is equipped with safety provisions and safety guards. Ensure that persons working on or in the immediate vicinity of the device wear adequate protection equipment, such as eye and hearing protection, overalls, gloves, safety glasses, helmet and steel-toed shoes.




Magnetic systems attract dust and ferromagnetic particles. Regular cleaning is therefore necessary. A clean magnet separates ferromagnetic parts significantly better than a contaminated magnet.

- Provide operating personnel with timely notice concerning planned inspections, maintenance and repairs, as well as troubleshooting. If necessary, designate someone who is responsible for the proper supervision.
- Check regularly that all warning pictograms and the identification plate are still present in the correct location on the device. Affix new ones in the original location(s) if they are lost or damaged.
- The best way to clean all parts is with compressed air and/or a soft cloth. It is also possible to clean more thoroughly with special cleaning fluids that do not damage the materials.

12.2 Frequency of maintenance

Action	Monthly	6 months	Annually	5 years
Manually clean magnetic bar tubes (► Manually cleaning magnetic bar tubes and checking for wear [▷ 32])	● [1)]			

Action	Monthly	6 months	Annually	5 years
Check magnetic bar tubes for dents and wear (► Manually cleaning magnetic bar tubes and checking for wear [▷ 32])		•		
Replace magnetic bar or magnetic bar tube (► Replacing magnetic bar or magnetic bar tube [▷ 34])	Poor operation / damage			
Check/maintain reductor motor		•		
Measure flux density of magnetic bars (► Measuring magnetic flux density of magnetic bar [▷ 38]).			•	
Replace sealing rings (► Replacing sealing rings [▷ 40])				•
Overhaul magnetic bar (► Overhauling magnetic bar [▷ 42]	Poor operation / damage			
Maintain/replace bearings				•

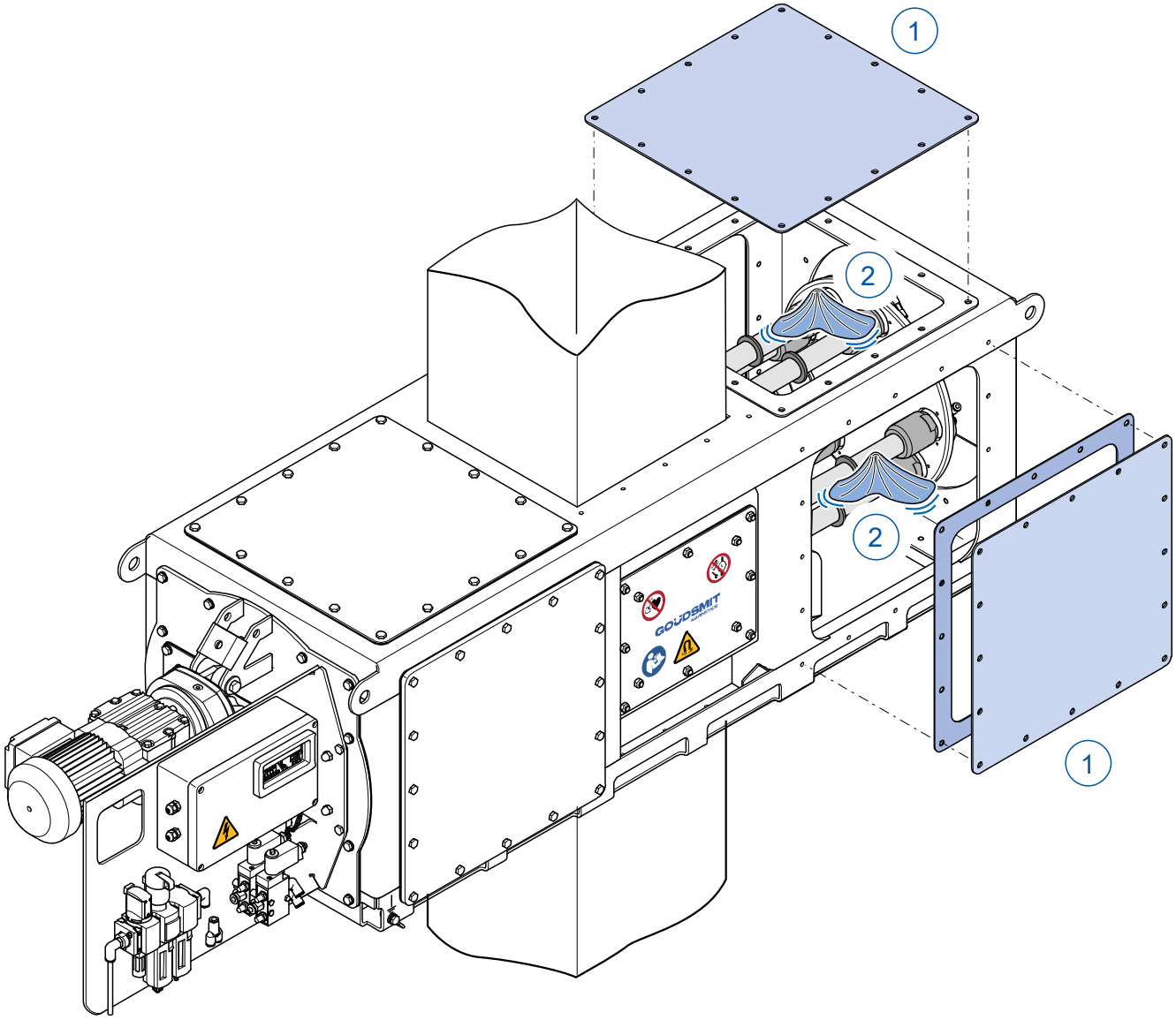
[1] The frequency of the cleaning process depends on the capacity of your product flow and the level of soiling.

NOTICE

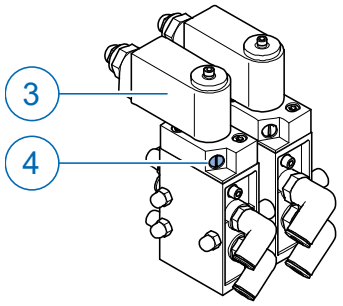
Goudsmit Magnetics offers an annual inspection, including replacement of the sealing rings and an inspection report with certificate for the magnets.

12.3 Manually cleaning magnetic bar tubes and checking for wear

- Stop the product flow.
- Disconnect power to the device.



- Remove the inspection hatches [**1**].
- Clean the magnetic bar tubes with compressed air or a vacuum cleaner fitted with a soft plastic nozzle. Use a brush for hard-to-reach areas. Avoid dust clouds, especially in ATEX environments.
- Finally, clean all parts with a soft, clean cloth [**2**] and – if necessary – with a suitable cleaning agent.
- Visually inspect the magnetic bar tubes for dents and wear.
- Use the screw [**4**] on the solenoid valve [**3**] to pneumatically move the magnetic bar tubes to the other discharge channel.



WARNING

Risk of injury to limbs by moving parts

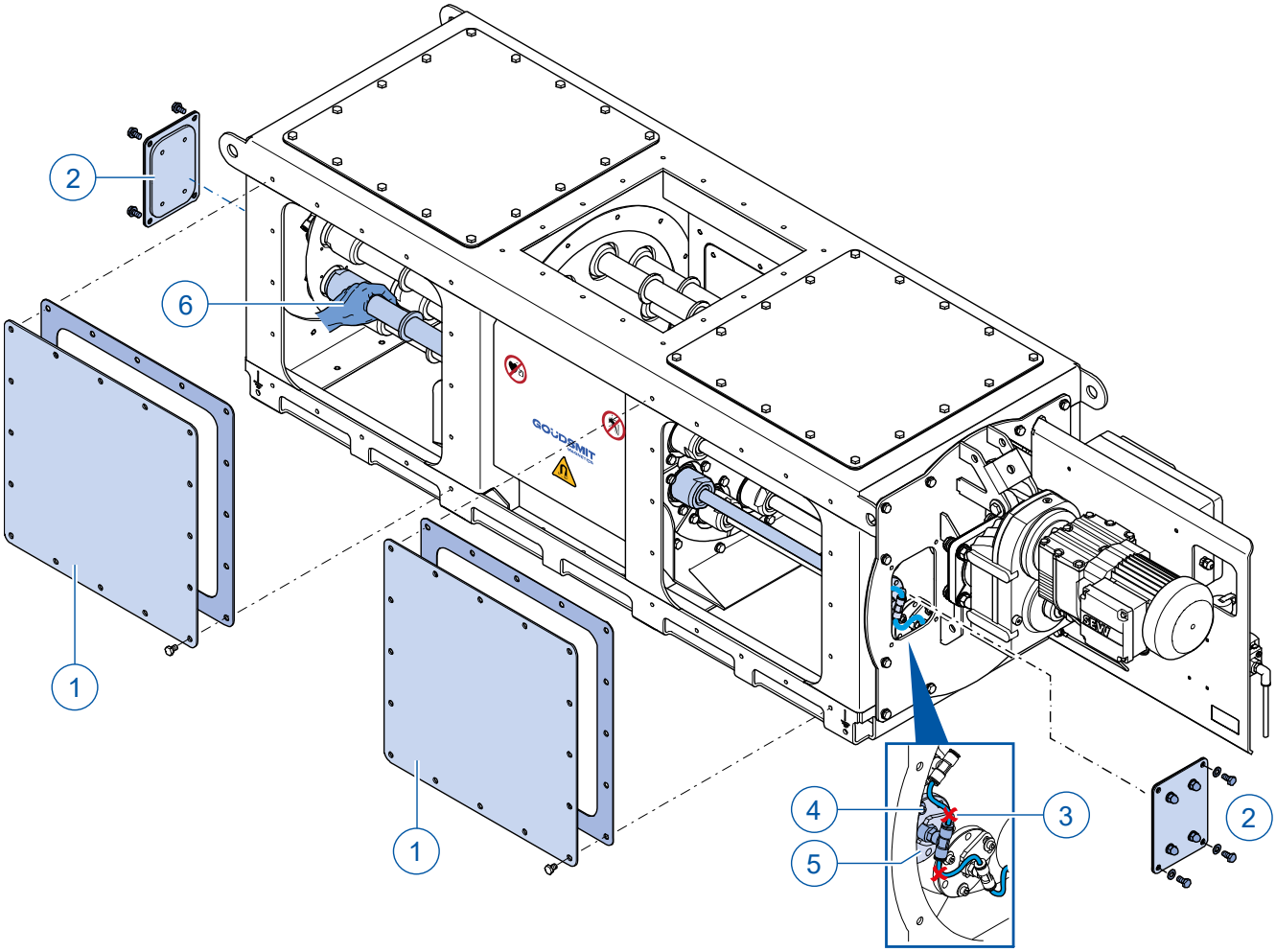
- ► Only allow trained personnel to carry out the cleaning.
- ► Make sure that no limbs or other objects are in the discharge channel before the magnetic bars are moved pneumatically.

- Remove the inspection hatches, and clean the magnetic bar tubes.
- Refit all inspection hatches.
- Reconnect power to the device.
- Production can now be safely resumed.

12.4 Replacing magnetic bar or magnetic bar tube

To replace a magnetic bar, proceed as follows:

- Run a cleaning cycle.
- Stop the product flow.
- Disconnect power to the device.
- Switch off the compressed air.



- Remove both inspection hatches [**1**].
- Remove the service doors [**2**] form both sides of the housing.
- On both sides, disconnect the air hoses from the respective magnetic bar [**3**].
- Remove the bolts [**4**] from the flange [**5**] on both sides.
- On one side, unscrew the flange from the magnetic bar.
- Carefully remove the magnetic bar on the other side.
- Fit a new magnetic bar, or replace the magnetic bar tube.
- Tighten both flanges on the magnetic bar to tension them and prevent sagging.
- Reassemble everything in reverse order.
- Switch on the compressed air.
- Reconnect power to the device.
- Production can now be safely resumed.

Depending on the situation, it is also possible to use a magnetic bar via the service doors on the opposite side of the housing. In that case, the control unit with mounting plate must first be removed.

NOTICE

A different procedure applies for replacing all the magnetic bars at the same time. When fitting the new bars, previously fitted magnetic bars may become loose again due to the most recently fitted magnetic bar being fitted tighter. For more information, contact the service department of Goudsmit Magnetics.

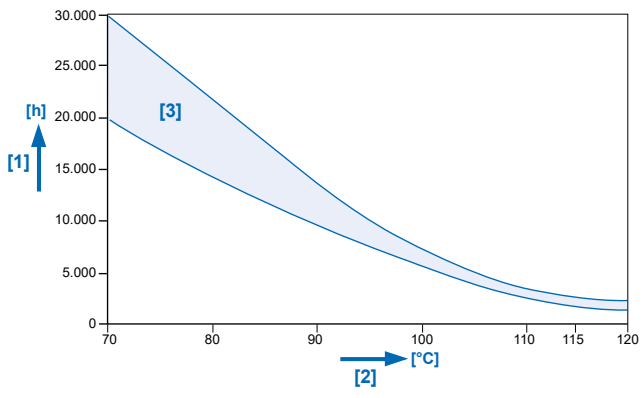
12.5 Reductor motor

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.
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
	[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.

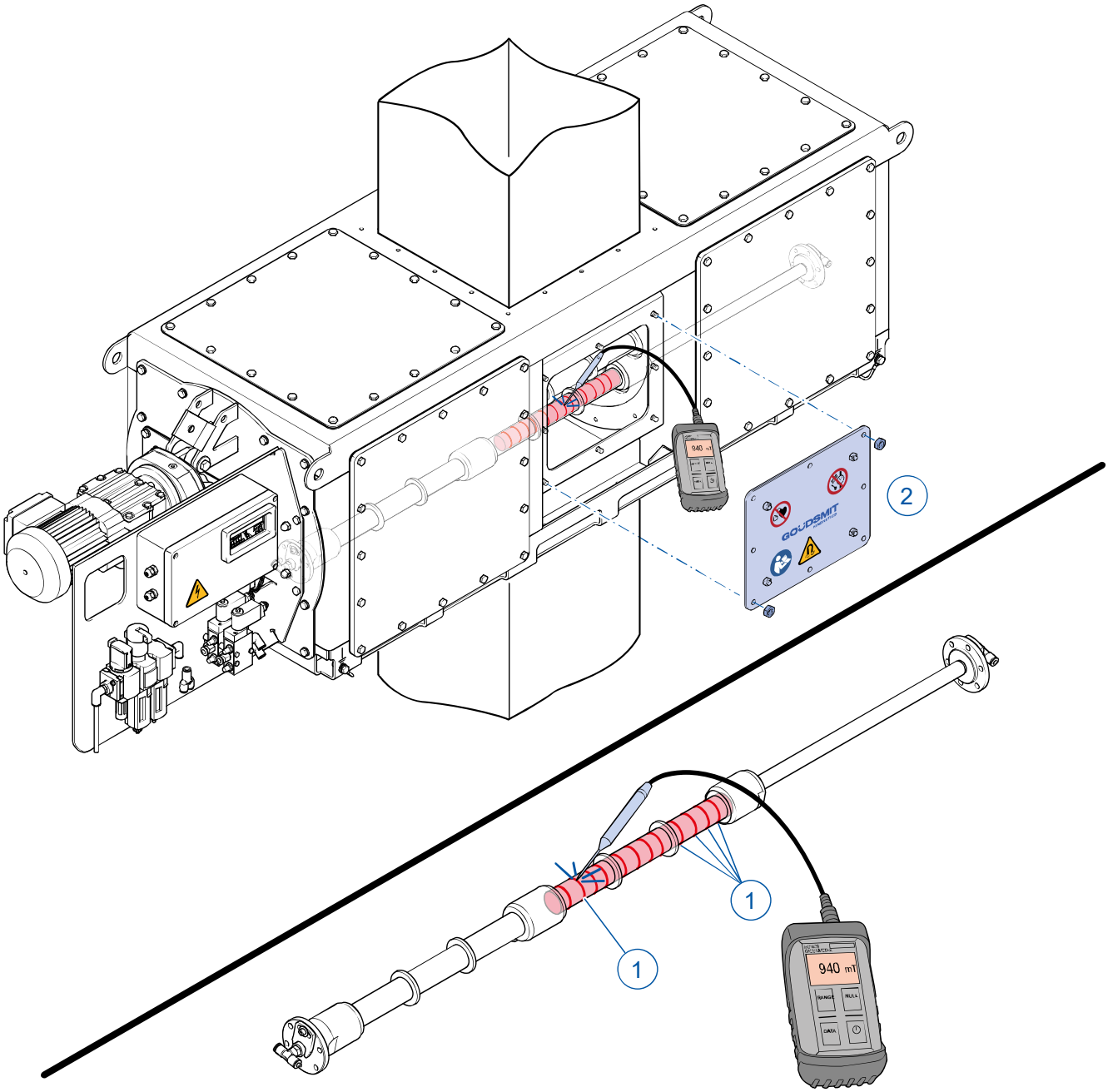
NOTICE

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 Measuring magnetic flux density of magnetic bar

The magnetic bars must be measured at periodic intervals to check their 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 bars on the surface (the unit is tesla, gauss, kA/m or oersted). Goudsmit Magnetic Systems B.V. can perform magnet measurements on location, if desired. To perform a flux density measurement, proceed as follows:



- Stop the product flow.
- Run a cleaning cycle.
- Disconnect power to the device.
- Open the service door [**2**].
- 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 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.

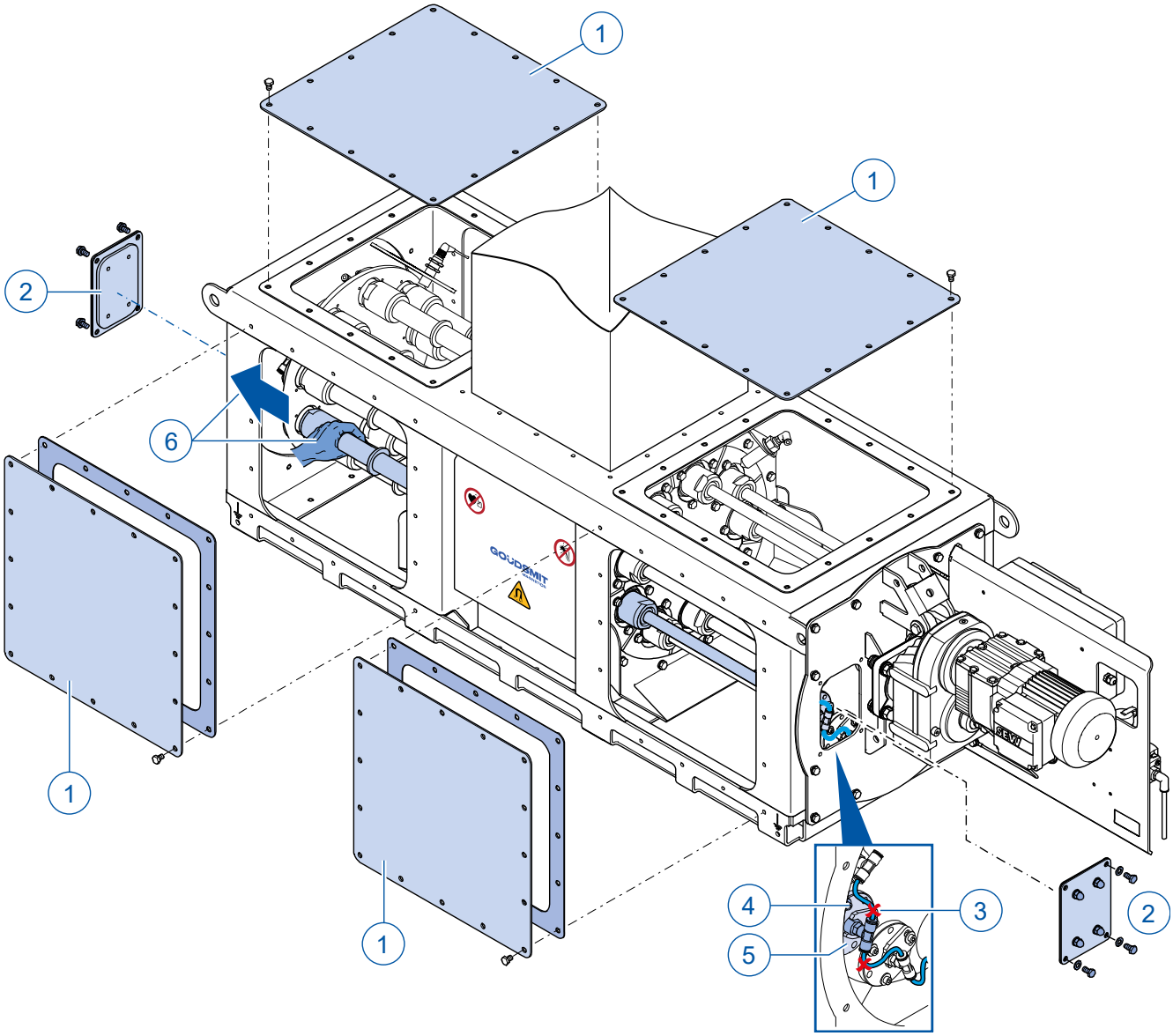
With the exception of the front and rear poles, all poles must have a value within 10% of the highest measured value.

- Do this operation for each magnetic bar.
- Re-fit the service door.
- Reconnect power to the device.
- Production can now be safely resumed.

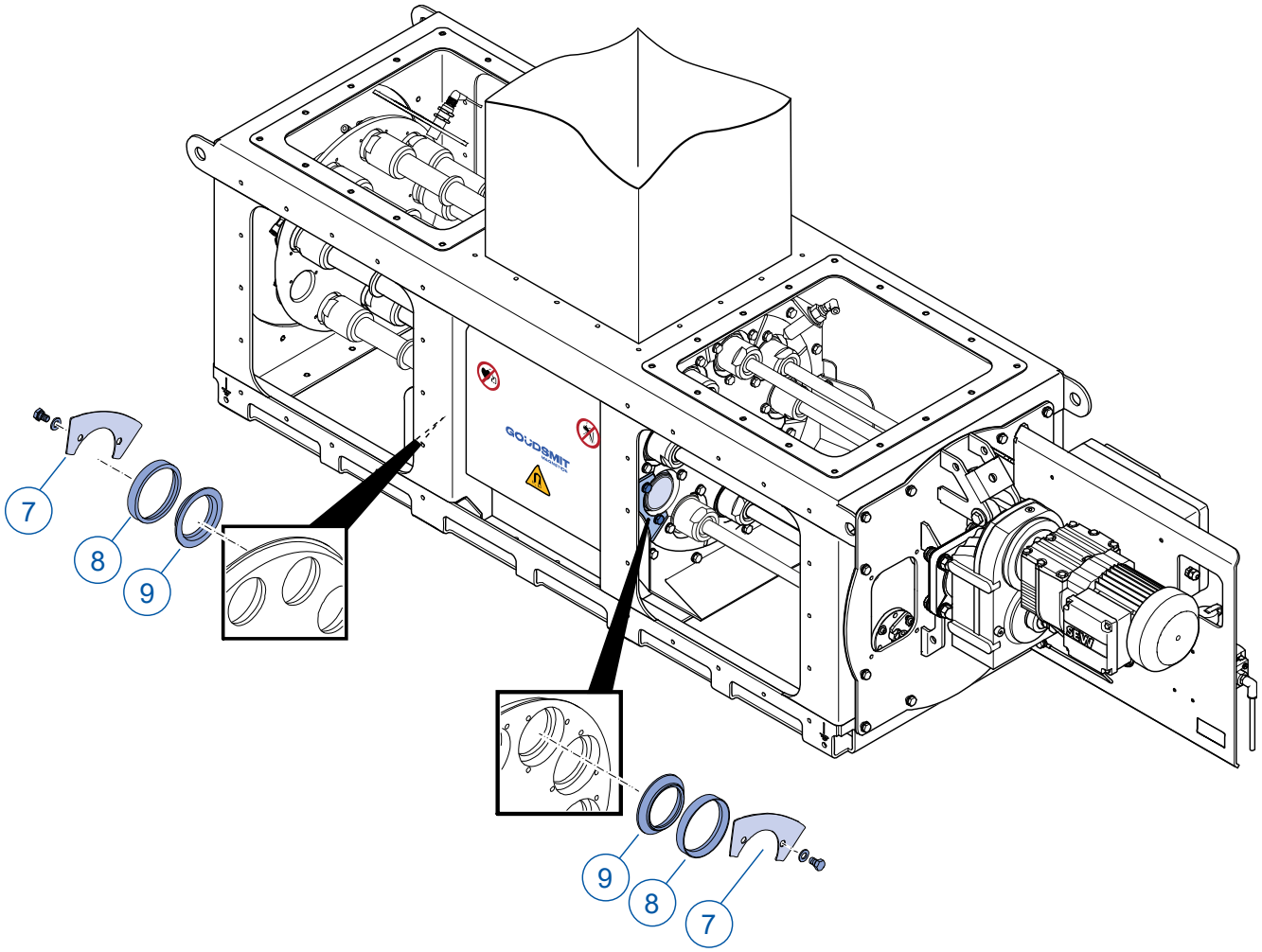
12.7 Replacing sealing rings

We recommend replacing the sealing rings at least every three years or more frequently, depending on the level of wear. Proceed as follows:

- Stop the product flow.
- Disconnect power to the device.
- Switch off the compressed air.



- Remove inspection hatches [**1**].
- Remove the service doors [**2**] form both sides of the housing.
- On both sides, disconnect the air hoses from the respective magnetic bar [**3**].
- Remove the bolts [**4**] from the flange [**5**] on both sides.
- On one side, unscrew the flange from the magnetic bar.
- Carefully remove the magnetic bar [**6**] on the other side.



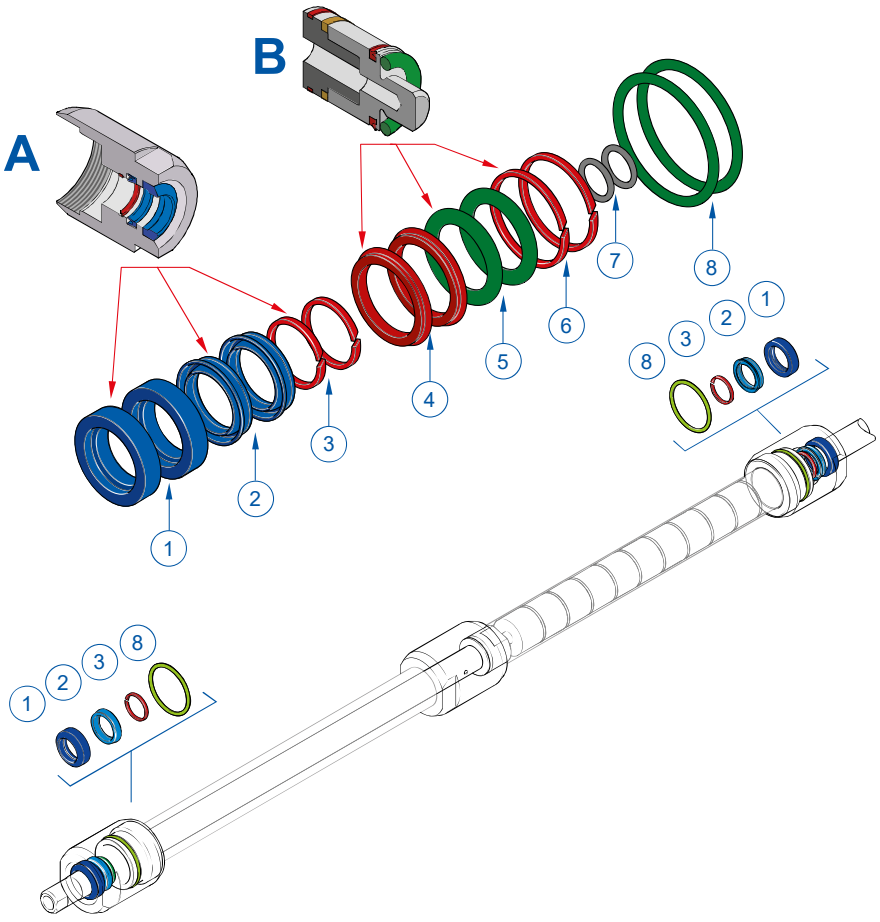
- Remove the strip [**7**], sealing ring [**8**], and housing cuff [**9**] on both sides.
- Clean the notches in the rotor flanges.
- On both sides, re-fit the housing cuff, a new sealing ring and the strip.
- Reassemble everything in reverse order.
- Repeat all the preceding operations for each sealing ring to be replaced.
- Switch on the compressed air.
- Reconnect power to the device.
- Production can now be safely resumed.

12.8 Overhauling magnetic bar

NOTICE

When replacing the magnetic bar or magnetic bar tube, we recommend also replacing the sealing rings as a preventive measure (► Replacing sealing rings [▷ 40]).

The seal kit for one magnetic bar contains the following parts:



A	Parts for cylinder head
[1]	Oil seal
[2]	Seal
[3]	Guide ring

B	Parts for piston
[1]	Seal
[2]	O-ring
[3]	Guide ring
[4]	O-ring
[5]	O-ring

Remove all seals and O-rings from the cylinder head and piston.

NOTICE

Before assembly, clean all parts and grooves thoroughly. Coat the parts with **KLUBER-FOOD NH1 74-401**, and fit all the seals and rings.

12.9 Maintain/replace bearings

12.9.1 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 or Shell Alvania S3 for lubricating 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 than normal or are hotter than normal. If either occurs, determine the cause. For lubrication, see the ‘Lubrication interval’ table. If this does not eliminate the problem, replace all the grease or replace the bearings. Replace the bearings at least once every 5 years.

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 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.

12.10 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.

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 not do so properly.	Magnet bars are too saturated with ferrous contamination.	Clean the magnetic bars more often by reducing the set cycle times.
		Check a non-separated ferrous particle with a permanent magnet to determine whether it is actually a ferromagnetic particle.
	Objects that are not attracted are non-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.
	Iron parts near the magnets reduce the iron-removal capacity.	
Poorly moving or non-moving magnetic bars.	Air pressure is too low.	Connect the air supply.
	One or more magnetic bar tubes have dents.	Find the cause and solve the problem. Contact Goudsmit Magnetics.
	Air connection or air hose is broken or loose.	Replace the part or reconnect properly.
	Bar seals are worn and/or the bar is saturated with contamination.	Have the magnetic bar(s) overhauled/replaced.
	Excessively large iron particles prevent the pneumatic movement.	Find the cause and solve the problem. If necessary, place a mechanical sieve in the product channel upstream of the device.
	Too many ferrous particles remain stuck to the magnetic bar tubes.	Set a higher air pressure as a one-time solution and clean more frequently in the future.
It is difficult or impossible to move the magnets out of the rotor during cleaning.	Dent(s) in one or more extractor tubes.	Find the cause and solve the problem. Remove the dents to the extent possible and/or order a new rotor.
Magnetic filter ‘leaking’.	Overpressure in product channel.	Use a different type of Cleanflow magnetic separator (SECA or SRCD).
	Grain size <0.2 mm.	
	Motor malfunction/failure.	Repair or replace the motor.
Motor is making more noise than normal or has a higher nominal current draw [A].	An object is ‘stuck’ between the rotor and housing.	Remove the object and replace the sealing ring if necessary.
	Rotor seal ring between the product and discharge channels is broken or worn.	Have the sealing ring replaced by qualified personnel or Goudsmit Magnetics.
	Rotor turns in wrong direction, causing increased wear to the laminations on the rotor.	Check whether the rotor is turning in the correct direction and replace worn laminations.
	Rotor bearings become too hot or are worn.	Replace the bearings or replace them.
Rotor does not turn.	Problem with electrical connection.	Check the connection.
	Motor malfunction/failure.	Repair or replace the motor.
	Rotor seal is broken or there is an object/contamination between rotor and housing.	Remove the object or contamination. Replace the seal if necessary.

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

- 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.

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:

- seal kit, pneumatic magnetic bar
- pneumatic magnetic bar
- magnetic bar tube
- sealing ring
- housing cuff
- rotor brush segment

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

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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