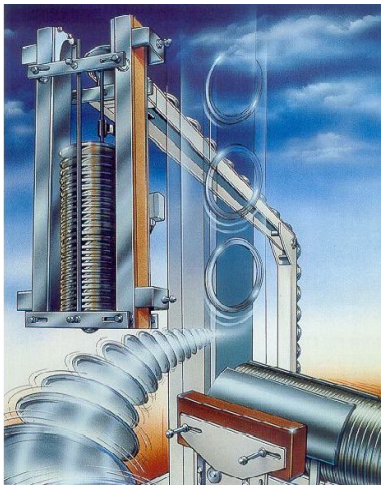
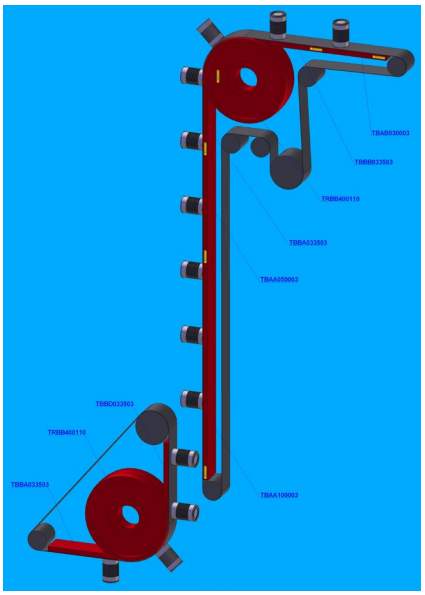
GOUDSMIT MAGNETICS

User Manual

Magnetic conveyors, series TCMO…

Suited for transportation of ferromagnetic sheets / lids / nails, etc.





The descriptions and pictures in this manual, used for explanation, may differ from your execution.
We have enclosed the as-built drawing of the delivered article.

GOUDSMIT Magnetic Systems B.V.
P.O. Box 18 5580 AA Waalre
Petunialaan 19 5582 HA Waalre
The Netherlands
Tel. (+31) (0)40 2213283
Internet www.goudsmitmagnets.com
E-mail info@goudsmitmagnets.com

CE

Version 2.3 – November 2022

Versions overview of standard manual

Version	Date	Description
1.0	12-2008	First version of the English version of the user manual, derived of the German version 2.2.
2.0	10-2009	- Specifications sheet and Declaration by the manufacturer deleted from user manual - Can and lid conveyor both in manual
2.1	02-2010	Nail conveyor added to manual
2.2	10-2019	New logo + small text corrections
2.3	11-2022	Instructions for tensioning the Timing belt added

Introduction

Read this manual and make sure that you fully understand its contents before commissioning and operating the machine.

If you have any queries or require further explanation regarding any subject related to the machine, please do not hesitate to contact **GOUDSMIT Magnetic Systems B.V.**

All technical information contained in this manual, together with any relevant drawings and technical descriptions we supply, remain our property. It may not be duplicated or disclosed without our prior written permission.

The user manual can be ordered together with the device description and/or the article number as well as the order number.

- This manual and the declaration by the manufacturer are part of the machine.
- They must remain with the machine, even if it is sold.
- The manual must be made available to all operators, service technicians, and others who work with the machine throughout its life cycle.

List of contents

General

This manual contains information for the correct operation and maintenance of your device. It also contains instructions for avoiding possible injury and serious damage and it allows a safe and as trouble-free functioning of the product as possible. Read this manual thoroughly before putting the device into operation, familiarise yourself with the operation and control of the device and follow all instructions precisely.

- *The data published in this manual is based on the available information at the time of delivery. This is issued subject to later amendment.*
- *We retain the right to amend or modify the construction and/or model of our products at any time whatsoever without any obligation to modify any previously supplied products accordingly.*

Ferromagnetism

The working principle of the device rests on (Ferro)magnetism.

Ferromagnetism is the basic mechanism by which certain materials such as iron cobalt and nickel can get magnetized when exposed to an externally applied magnetic field. Materials that remain magnetized after the external magnetic field is removed, are called permanent magnets. Most magnetic materials lose their magnetism after the external magnetic field is removed. Most alloys of iron, cobalt and nickel are magnetic. However, some stainless steel alloys like AISI304 or AISI316 are only slightly magnetic.

Because in most cases it will be Fe parts that will be Ferro-magnetically influenced, we will use the term ‘Fe’ in this user manual when we mean ferromagnetic material

Conditions of supply and guarantee

The conditions of supply are the **"General Conditions for the supply and erection of mechanical, electrical and electronic products" (SE01)**, published by ***Orgalime***, in Brussels.
These conditions can also- if desired – be requested by writing to Goudsmit Magnetic Systems B.V., as also mentioned in our written quotation.

The guarantee prescriptions are mentioned in these conditions.

The guarantee on your equipment will be void if:

- Service and maintenance are not performed in accordance with the instruction manual or by servicemen who are not especially trained to do the work. We strongly recommend that specific magnetic service and maintenance be carried out by Goudsmit personnel).
- Modifications are made to the equipment without our prior written permission.
- Non-original parts or non 100% exchangeable parts are used.
- Lubrication products other than those prescribed are used.
- The equipment is used injudiciously, incorrectly, negligently or not in accordance with its intent and/or purpose (see chapter "Intended use / user instructions").

All parts that are subject to wear are excluded from the guarantee.

Remaining remarks / warnings

- Use the device only for the application for which it has been designed (see chapter *"Intended use / user instructions"*).
- Use the device only when it is in technically perfect condition, and ensure that all protective hoods or inspection covers, including all safety circuits, have been fitted and installed in the correct manner.
- Ensure that device maintenance is appropriate and in accordance with the instructions provided in this user manual.
- Any eventual faults, in particular those that may influence safety, should be attended to immediately and remedied before renewed operation. Should you, after estimating the risks of an unsolved fault, still think it is safe to keep the device into operation, then warn the operators and maintenance staff of these faults and the danger(s) caused by these faults.

Delivery

General

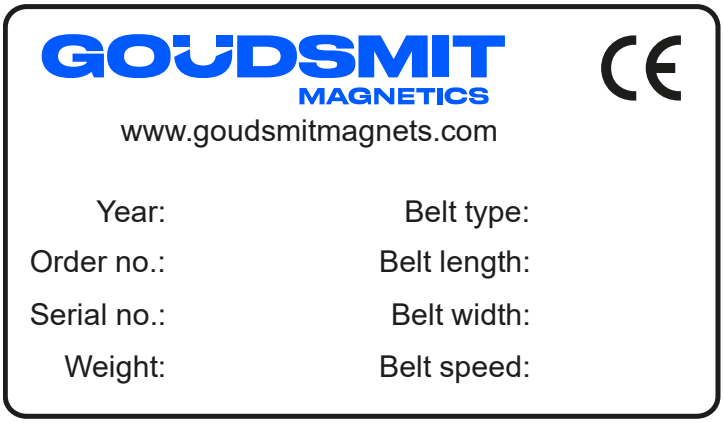
Check the shipment immediately on delivery for:

- Possible damage and/or shortcomings as a result of transport. If so, ask the transporter to draw up a transport damage report.
- Completeness of the delivery/deliveries, the absence of anything (additionally) ordered.

Always immediately contact **GOUDSMIT magnetic systems** in the event of any damage and/or mistaken delivery.

Identification plate

On the device you will find an identification plate as pictured below. **Information on this plate is of great importance in case of service**. That is why we advise to maintain this plate on the device at all times. Ensure that it is always legible by cleaning regularly.



Don't forget to mention the order number and serial number in case of malfunction and/or delivery of spare parts.
If your plate is damaged, please contact us as soon as possible so that we can send you a new one.

Safety

This chapter describes the safety risks of your device. Where necessary, warning pictograms are attached to the device. This chapter clarifies the meaning of these pictograms.

Know your pictograms !

! *Regularly check that all warning pictograms are still present and legible, and clean if necessary. Make sure that new pictograms are applied at their correct locations if they have been lost or damaged. Before installing the device, record where the pictograms were originally placed.*

General

The device is provided with safeguards where necessary. Make sure every person who comes in contact with the device, wears adequate personal protection (overalls, safety glasses, hearing protectors, helmet, steel-toed safety shoes etc.).
Areas of the device considered dangerous are marked with warning pictograms.
If the device remains easily accessible to persons, then extra safety precautions (e.g. fencing) must be installed. When safeguards are not possible, make sure clear instructions are given to people using the device.

Danger of magnetic field

The magnets generate a powerful magnetic field that strongly attracts ferromagnetic (Fe) materials. Always take into account that these materials may suddenly be very powerfully drawn towards the magnet. Make use of non-magnetic tools and workbenches fitted with a wooden worktop and preferably a non-Fe frame (for instance stainless steel).

! Always be aware that Ferromagnetic parts will be attracted if you are closer than 1 meter to a magnet.

Danger - strong magnetic field!

! People fitted with pacemakers should on no account enter the magnetic field (within a radius of at least 2 meter).

Prohibited for people with pacemakers!

! Do not bring ferromagnetic objects, e.g. tools, watches, jewellery within a distance of 1 meter from the device. Sudden traction could result in injury and or the magnetic field could result in damage to sensitive devices.

Attraction and projectile risk!

*ferromagnetic: see page 5 Chapter General/Ferromagnetism

Danger of being caught by moving parts

The openings between the timing belt / conveyor belt or conveyor chain and the rollers cannot always be fully safeguarded because of their function. Although the ends of the rollers are equipped with guards (yellow in colour) or sealed as best as possible, we cannot always make this system 100% safe!

! Under no circumstances should you stick your hands between the rollers or belt of the device and its housing parts while the belt is running.

Danger - being caught by moving parts

Danger of high voltage

When installing and electrically connecting the device, make sure the activities are performed by qualified personnel.

! *Switch off the electrical power supply before performing activities to the device!*

Danger – Risk of an electric shock!

Always use the main power switch (on the control box) to switch off the installation in the event of a dangerous situation.
Do not restore power until the dangerous situation has been resolved!

Device description

Intended use / user indications

Intended use

The magnetic conveyor line is intended for transporting sufficient ferromagnetic* products, like steel or iron sheets, lids, empty cans, filled cans, etc. Dimensions, capacity and transporting speed are mentioned in the order, the added data sheet and or on the added drawings.

Temperatures

Suited for outside temperatures of -20 °C to +40 °C and product temperatures up to xxx °C, dependant of the used magnet material. See specifications overview for exact values.

The magnet is to be protected against higher temperatures than prescribed, because the magnet might **lose magnetic force permanently** when exposed to high temperatures

Free space

Make sure that there is enough free space around the device to perform and ease the inspection and maintenance operation.

Noise level

The noise level of the device is less than 70 dB at delivery. Should it become higher, then the device has to be checked on failures immediately.

Vibrations

The magnets are to be protected against strong vibrations, because they might **lose magnetic force permanently** and or the brittle ceramic magnet material might break.

The vibrations caused by the magnetic conveyor can be caught up by the frame or other mounting system. These vibrations have to be damped out further by the ground. If the vibrations caused by the installation should rise in time, then the device has to be checked on failures immediately.

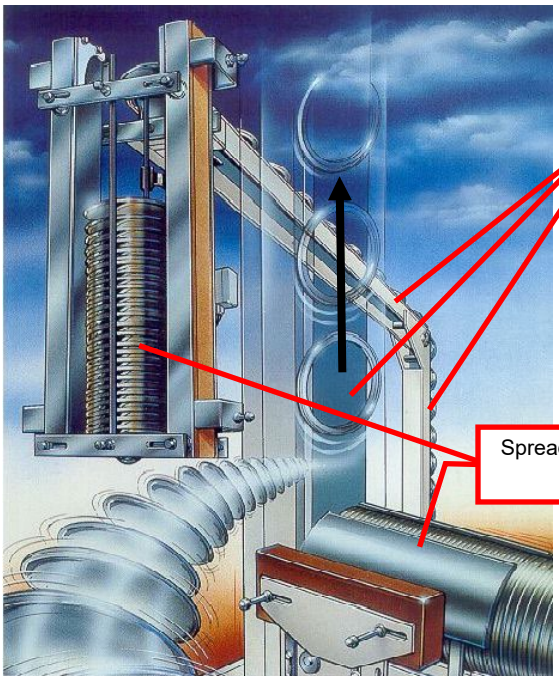
Cleaning

Regular cleaning of the device is advised, while magnets attract ferromagnetic particles and dust and the problems that can be caused by that: Therefore always clean more often than thought necessary. See also chapter Maintenance

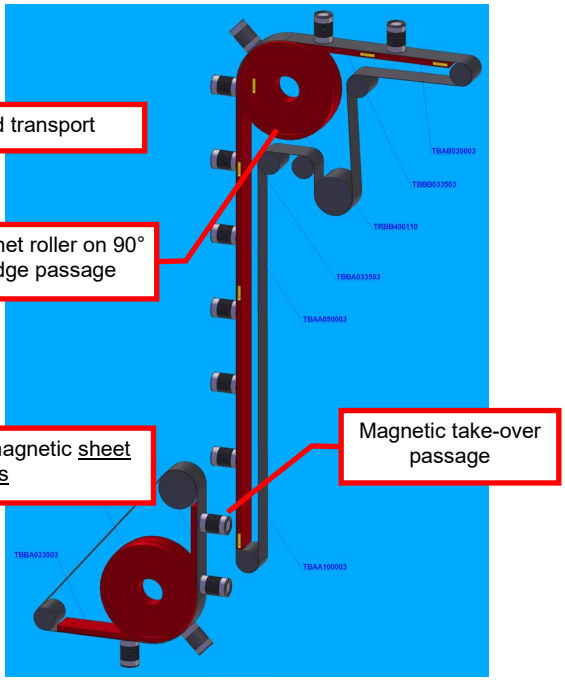
*ferromagnetic: see chapter GENERAL/Ferromagnetism

Working principle

Lid Conveyor & Can Conveyor



Drawing: magnetic lid conveyor installation



Drawing: magnetic can conveyor installation

The magnetic belt conveyors for lids and cans work as follows:

Under a (thin) stainless steel slide plate, magnet plates are mounted. A thin belt moves over the SS plate, so also over the magnet plates underneath. The transported ferromagnetic plates, lids, cans or other products will be pulled tightly onto the belt by the magnet plates. At the beginning and end of the belt and at passages, the magnetic field is 'weakened' to be sure that the product will be smoothly taken over or loosened.

The magnetic power of the permanent magnets underneath the timing belt will "suck" the ferromagnetic product onto the timing belt, which will make sure that:

- it can be transported horizontal, under an edge or vertical, staying positioned exactly.
- it can be better processed during transport.

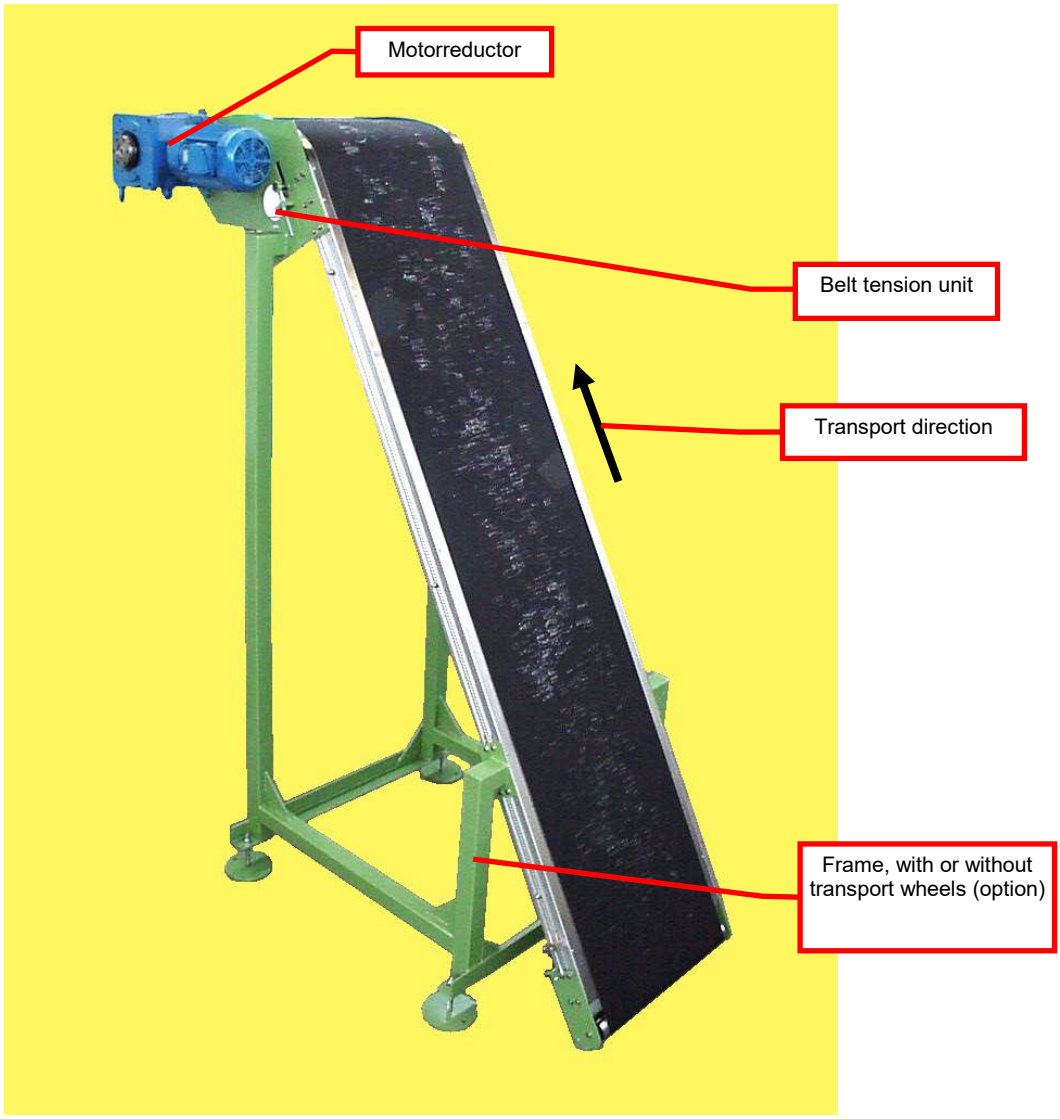
Sheet separators can force magnetic separation of supplied stacks with sheets or lids. Because the sheets or lids get magnetised equally North or South, they will be magnetically 'pushed' away from each other, even when they are oiled or metallically stick to one another. The sheet separators will make sure that the sheets or lids will come on the belt in single order, assuring that no damage can be done by double sheets or lids.

The magnetic force stays constant over thousands of years when not opposed to high temperatures and or (too) severe vibrations. See below:

Nail inclining conveyors

For transport during manufacturing and packaging of ferromagnetic nails, bolts and other fastening means, or other ferromagnetic metal parts.

Magnetic inclining conveyors can transport products to almost perpendicularly, as a result of which the line will remain compact. By default, these inclining conveyors are supplied with a …. mm width and a variable length. The drive mechanism consists of a SEW motor reductor that can be controlled at one's own discretion by means of a frequency control.



Drawing: magnetic lid conveyor installation

Installation

Placing, transporting or moving the magnet

- Use sound ratchets and or raise with a sound lifting device for lifting the unit / installation. Make sure to use protection corners between the ratchets and the unit to prevent damage to the paint and or other device parts.
- Use only lifting/hoisting and transport equipment that is in good condition and never exceed the safe working load of the equipment being used. Make sure to protect painted surfaces from getting damaged.
- The weight of the device is stated on the *identification plate / sticker*.
- Take the position of the centre of gravity into account. This is probably *not* in the middle / centre of the installation, caused by the magnet roller(s) and or motor(s).
- Work safely, ensure sufficient working space and use stable and reliable scaffolding, ladders and other auxiliary equipment to ensure that the device can be installed without risk.
- Make sure no persons are under the device / installation during transport.
- All auxiliary equipment used for transport purposes, must be dismounted and removed before putting the device into operation.

Construction parts

Do not use ferromagnetic materials for rollers and/or construction parts of your system within the magnet field of the magnetic conveyor unit. These parts can get magnetised and as a consequence influence the magnetic conveying negatively. This is also true for constructions that one makes for discharging the separated parts.

Use for instance stainless steel, aluminium, wood or plastic.

In order to allow the removal of separate ferromagnetic parts, it is essential to create a non-ferromagnetic outlet (e.g. non-ferromagnetic stainless steel). The outlet must also be safe and not freely accessible to persons.

Conveyor belt

The devices / installations from Goudsmit magnetic systems B.V. are delivered with the conveyor belt aligned and correctly adjusted belt tensions whilst no product is on. Always check them before operating the device whilst product is on!

Why check belt alignment and belt tension?

- If belt tension is too high extra stress is placed on the belt, the axle journals and the bearings in the driving and other rollers, increasing the risk of a belt or axle break, or bearing wear.
- A non-aligned belt can get damaged and can cause extra wear to roller and product

In the chapter **MAINTENANCE** we describe how belt alignment and belt tension should be and how to change them if necessary.

When an electro motor is in the delivery

Electrical connections general

Make sure that the electrical power supply is switched off while you work on the device and can't be re-enabled without your knowledge.

Make sure that all electrical connections are made by qualified personnel and conform to all the applicable standards. Check that the device is suitable for connection.

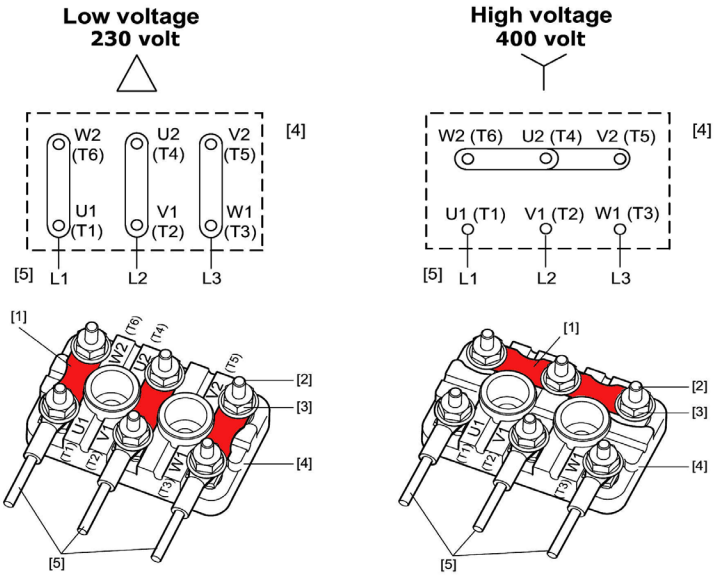
The electrical connection values are indicated on the nameplate and/or on the supplied electrical drawings. Before connection, check the supplied devices for the locally valid connected loads and ensure that the appropriate connection cables are designed for the electrical power to be drawn.

Ensure that all electrical connections are checked/tightened after delivery and regularly thereafter (e.g. once a year).

The connection details of the control box supplied (if present) can be found in the enclosed diagrams.

Electrical motor installation (only if applicable)

Check that the rotation direction of the driving motor is correct:
This can be checked by briefly switching the motor ON.
If the direction of rotation is incorrect, reverse 2 of 3 phases (U - V):
(*It makes no difference whether you have a **Y** or a **Δ** circuit!)*



Also remember to connect the Earth wire.

Gasket material / grounding

To prevent the build-up of static electricity, make sure there is metal bridge between the magnetic device / product channel and the installation. The completed installation must also be grounded.

Start-up

Checks before and during start-up

Before start-up, make sure that:

- The device or the installation has no damages or malfunctions.
- All connections (electrical, mechanical, pneumatically) have been made properly.
- The device or the installation is placed and located correctly.
- All protective covers (if applied) have been fitted correctly.
- There are no other sources of danger.

During operation, make sure that:

- The device or the installation has no damages or malfunctions.
- The motor is running correctly (no overload, no speed fluctuation, no loud noises, etc.).
- The motor rotates in the correct/wanted direction.

Maintenance

Magnetic systems attract Ferromagnetic particles. Regular cleaning is essential.
A clean magnet functions considerably better.

- All parts are best cleaned with pressurized air and/or a soft cloth. It's also possible to deep clean with special cleaning fluids that do not harm the material. Ensure that these fluids do not contaminate the product
- Regularly check that all warning pictograms and the identification plate are present at the correct locations on the device. If warning pictograms or the identification plate should get lost or damaged, immediately apply new ones to the original locations.
- Always inform operating personnel regarding planned inspections, maintenance, repairs or if attending to breakdowns.

Bearing systems with open, greased bearings

Regularly check whether the bearings make more noise than usual or whether they are warmer than normal. If this is the case, find out what the cause is and solve the problem(s). After that, it might be necessary to replace the grease and/or to replace the bearing(s).

For bearing **replacement intervals**, combine own experience data of bearings in similar applications with the recommended and/or estimated interval periods, as indicated in the maintenance tables and/or formulas of the bearing manufacturer.

Greasing (relubrication)

The bearing systems applied by **GOUDSMIT magnetic systems** all contain **grease-lubricated bearings**, which are properly sealed against dirt and humidity. They, however, basically still need maintenance, for example when the bearings are used in dirty and/or humid environments and/or at high temperatures and/or when they have a longer operating life than the operating life of the grease. The way and frequency of replacing bearing grease (relubrication) depends on the application and the employed grease (higher-quality grease requires less frequent maintenance). It is desirable to use grease that is equal to the originally filled. Different greases should not be mixed because it can cause a poor lubrication performance.

When **relubricating**, completely replace the old grease by fresh grease at a moment that the state of the grease still is sufficient. Preferably supply the grease during operation, in order to avoid excessive greasing level. Inject the fresh grease from the grease supply fitting.

Continuous lubrication is only recommended at low revolutions and/or when the calculated greasing interval is very short and/or other greasing methods do not comply and/or access to the bearing is very difficult.

Table below provides a **general indication for greasing (relubrication) intervals**. For more precise greasing intervals, combine experience data of bearings in similar applications with the recommended and/or estimated interval periods, as indicated in the maintenance tables and/or formulas of the bearing manufacturer.

Table: General indication of greasing intervals

Operating temp. of bearing		Greasing intervals - Environmental condition		
°C	°F	Clean	Dirty	Very dirty / Heavily humid
50	122	3 years	6 months	3 months
70	158	1 year	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

Consult the (maintenance) manual from the bearing manufacturer for more specific maintenance instructions, like greases to be used and grease replacement intervals.

When a motor reductor is mounted:

Motor reductor

De-energise the motor and make sure it cannot be switched back on without your knowledge.
Wait until it has cooled down – **DANGER FOR BURNING!**

Regularly check if the motor produces more noise than normal, or if it generates more heat than normal. If that is the case, find out what the cause is and solve the problem(s) as soon as possible to prevent (further) damage.

In the table below, general inspection and maintenance intervals are shown as an indication of the inspection and maintenance that is needed.

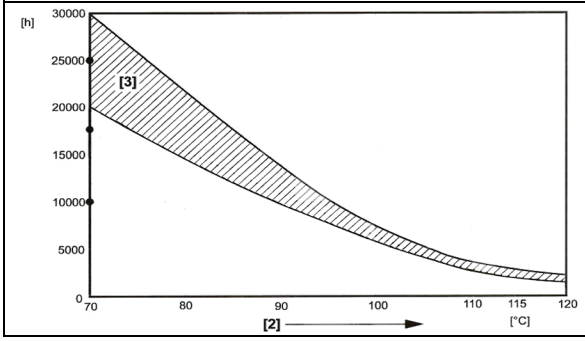
REDUCTOR	
Frequency	**What to do?**
• Every 3000 machine hours, at least every 6 months.	• Check oil and oil level. • Check the seals visually for leakage. • For gear units with a torque arm: Check the rubber buffer and change it, if necessary.
• Depending on the operating conditions (see chart below), every 3 years at the latest. • According to oil temperature.	• Change oil. • Replace anti-friction bearing grease (recommendation). • Replace oil seal (do not install it in the same track).
• Depending on the operating conditions (see chart below), every 5 years at the latest. • According to oil temperature.	• Change synthetic oil. • Replace anti-friction bearing grease (recommendation). • Replace oil seal (do not install it in the same track).
• Some gear units (like SEW R07, R17, R27, F27 and Spiroplan®) have lubrication for life and are therefore maintenance-free.	
• Varying (depending on external factors).	• Touch up or renew the surface/anticorrosion coating.
MOTOR	
Frequency	**What to do?**
• Every 10.000 hours of operation.	Inspect the motor: • Check ball bearings and change if necessary. • Change the oil seal. • Clean the cooling air passages.
	[1] Operating hours. [2] Sustained oil bath temperature. Average value per oil type at 70°C [3] Most of our gearboxes use SEW GearOil Poly 460 H1 E1 oil [4] Replacement interval is dependent on temperature

Table: general motor gear inspection and maintenance intervals

When replacing oil, use **SEW GearOil Poly 460 H1 E1** which is approved for incidental contact in the Food and Pharmaceutical industry.

Conveyor belt

Ensure that the conveyor belt and rollers are cleaned regularly.

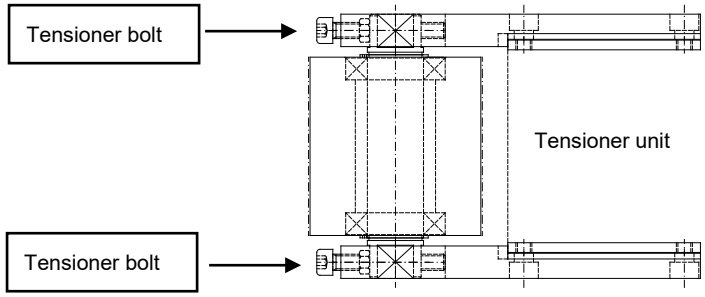
Contamination can cause extra wear to the belt and/or misalignment of the belt.

Belt alignment

Check belt alignment regularly - at least once a day - whilst device is operative.

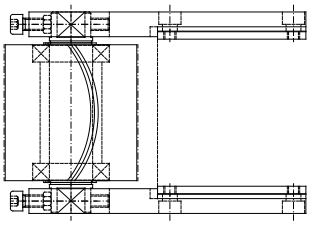
If the belt alignment is not correct this may cause excessive wear to the belt as well as to the rollers/sprockets.

If the conveyor belt has the tendency to run out of alignment (out of roller middle) it has to be adjusted, using the transport sprocket, when possible. The tensioner unit often has – for instance - tensioner bolts at both sides and can be re-aligned by turning 1 side a bit further than the other:

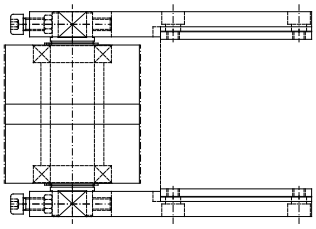


The transport roller/sprocket exerts a self-steering effect on the conveyor belt when specially designed for this purpose. There are different ways that the transport rollers of your transport belt unit may be equipped with steering parts:

- With bellow shape grooves (newest):
- With straight grooves and un-teethed middle guiding strip on belt and un-grooved middle guiding sleeve on roller



Bellow shape grooves



Straight grooves with middle guiding sleeve in sprocket

Belt tension

Check the belt tension to be correct.

If the belt tension is too high extra stress is placed on the axle journals and bearings in the driving and end roller and belt, increasing the risk of an axle or belt break or bearing wear.

These belt conveyors do not require high belt tensions, as they are normally only lightly loaded.
For optimum performance, however, belts should be installed with a pre-tension suitable for the envisaged drive duty, derived from the formulae below.
An example method to calculate the correct belt tension is given below:

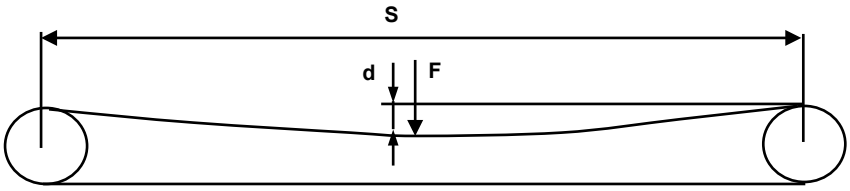
Where a range is indicated, the lower value will be suitable for lightly loaded, smooth running drives, whereas drives subject to high shock loads and/or frequent starts should be tensioned to the higher level. Belt pre-tension is usually achieved by drive centre distance extension and checked by applying a setting force F (N) at mid belt span sufficient to deflect the belt a distance d (mm) related to the length of the span S (metres).

It is necessary to ensure that the force is applied at right angles to the belt span, and evenly across the belt width.
A Belt Tension Indicator may be used, in conjunction with a piece of rigid bar laid across the face of the belt at mid-span.
Electronic, sonic tension indicators are also available.

Deflection **d** may be 20 mm/metre span length **S**
Calculate the Force F from the formulae below:

$$F_{max} = \frac{kW \times 955{,}000}{d \times n} \qquad F_{min} = \frac{kW \times 477{,}500}{d \times n} \ (N)$$

Where kW = Motor power, or absorbed power if known
d = Pitch diameter of either pulley (mm)
n = Rev/min of same pulley

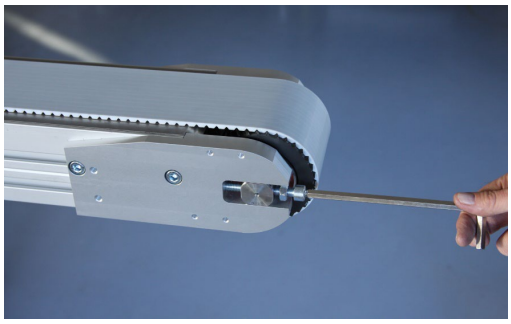


In almost all cases, however, our belt conveyors do not allow the belt to be pressed in, because a stainless steel plate and magnets are fitted under the belt. The belt tension or % stretch is then measured.

The recommended belt tension depends on the operating conditions. For lightly loaded installations (usually the case with these belt conveyors), the belt is usually tensioned at 0.5% to 1.0% elongation.
Only in fully loaded installations are the conveyors tensioned to their maximum, if necessary.

- One method of measuring belt tension / toothed belt tension is with electronic, sonic tension gauges.
- Another method is mechanical measurement.

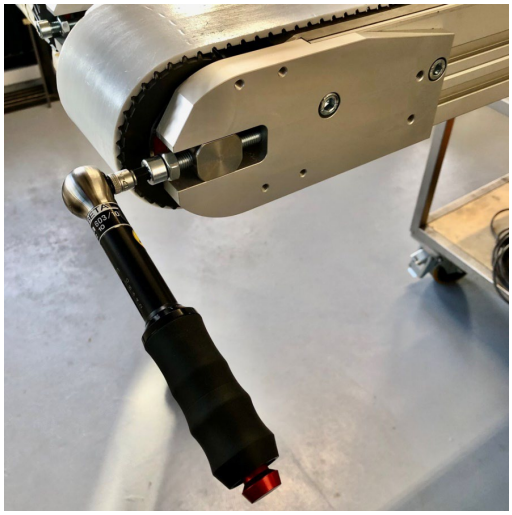
Instructions for tensioning the timing belt



Bring the timing belt to preload by hand tightening the left and right tension bolts with an Allen wrench.

Measure left and right axle-to-frame distance and make sure it is equal.

Run the conveyor belt for a few minutes before proceeding to tension the belt.



Now tension the timing belt with a torque wrench.
Tighten the left and right tensioning bolts with equal strokes each time.

Conveyor belts of 1.5 to 4 meters length: tightening torque = 5 Nm

Conveyor belts from 4 to 8 meters in length: tightening torque = 5.5 Nm

Now secure the tensioning bolt by tightening the lock nut with a ring wrench.

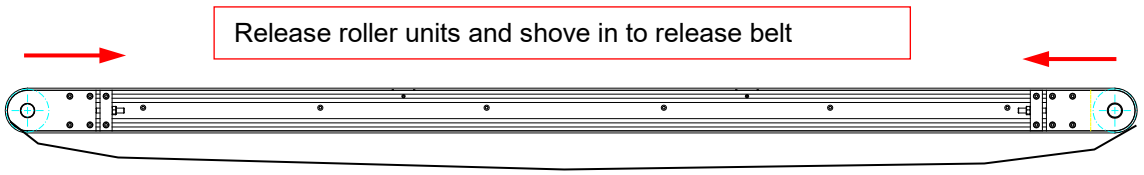
Exchange of conveyor belt

Check your conveyor belt regularly - at least once a day - on excessive wear.

Mount a new belt when excessive wear appears, so your device will be prevented from further damage.

Exchange of conveyor belt:

1. Dismount frame support and possible connecting axles at non-motor side;
2. Release the roller tension unit(s) enough to release belt;
3. Take off conveyor belt at non-motor side and remove it;
   clean parts that possibly have become reachable now
4. Mount new belt in opposite order.
5. Mount frame supports and possible connecting axles back



Malfunctions/Service

CAUTION!

- Improper handling of the magnet device may lead to damages.
- Potential damage to body and or property!
- Any repair to GOUDSMIT magnet devices may be performed by qualified personnel only.
- Be aware that permanent magnets attract ferromagnetic material with great force when it gets in reach of the magnetic field ➔ danger of getting jammed**!**
- Consult GOUDSMIT MAGNETIC SYSTEMS service.

Malfunctions

In case of malfunctions, consult the following table in order to determine the cause of the malfunction and its possible remedy. In case a specific malfunction can't be found in the table, consult the GOUDSMIT Magnetic Systems service.

Malfunction	Possible cause	Possible remedy
Belt alignment is incorrect.	Some object(s), which is (are) stuck in device, cause(s) belt to 'walk away'.	Remove object(s).
	Roller alignment is incorrect.	Re-align tensioner roller and belt.
Motor makes excessive noise and / or has an excessive high nominal Current [A].	Conveyor belt tension is too high.	Reduce belt tension.
	The slide plate(s), over which the belt is/are running, is/are broken or have become rough.	Repair or replace slide plate(s).
Bearings make excessive noise.	Conveyor belt tension is too high.	Reduce belt tension.
	Bearings have excessive wear.	Replace bearings.

Customer service

Please have the following information available if you require customer service assistance:

- Identification plate (complete)
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause

Spare parts

As a result of the robustness and quality of **GOUDSMIT Magnetic Systems** products the device possesses high operational reliability.

When however a specific component requires replacement, the correct component can be ordered by quoting the type number stated on the *identification plate* or on one of the drawing(s) added to this user manual in the added data sheet.

The spare parts are mostly wear parts, such as:

- conveyor belt
- motor
- bearings
- drive roller
- tensioner roller
- other rollers
- fixed castor
- castor
- on/off switch

Following mutual consultation Goudsmit magnetic systems will arrange rapid and correct delivery.

Storage and Dismantling

Storage

If the device will not be used for a long period of time, we advise to store the device in a dry, safe place and to conserve fragile and/or sensitive parts.

Dismantling / scrapping

On scrapping and/or disposal of the device's parts separately, take into account the different nature and dangers of the components (magnets, iron, aluminium, electrical parts, insulating materials, etc.) and ensure safe disposal. Preferably entrust the task to a specialised company, and always observe the local regulations in regard to disposal of industrial waste.