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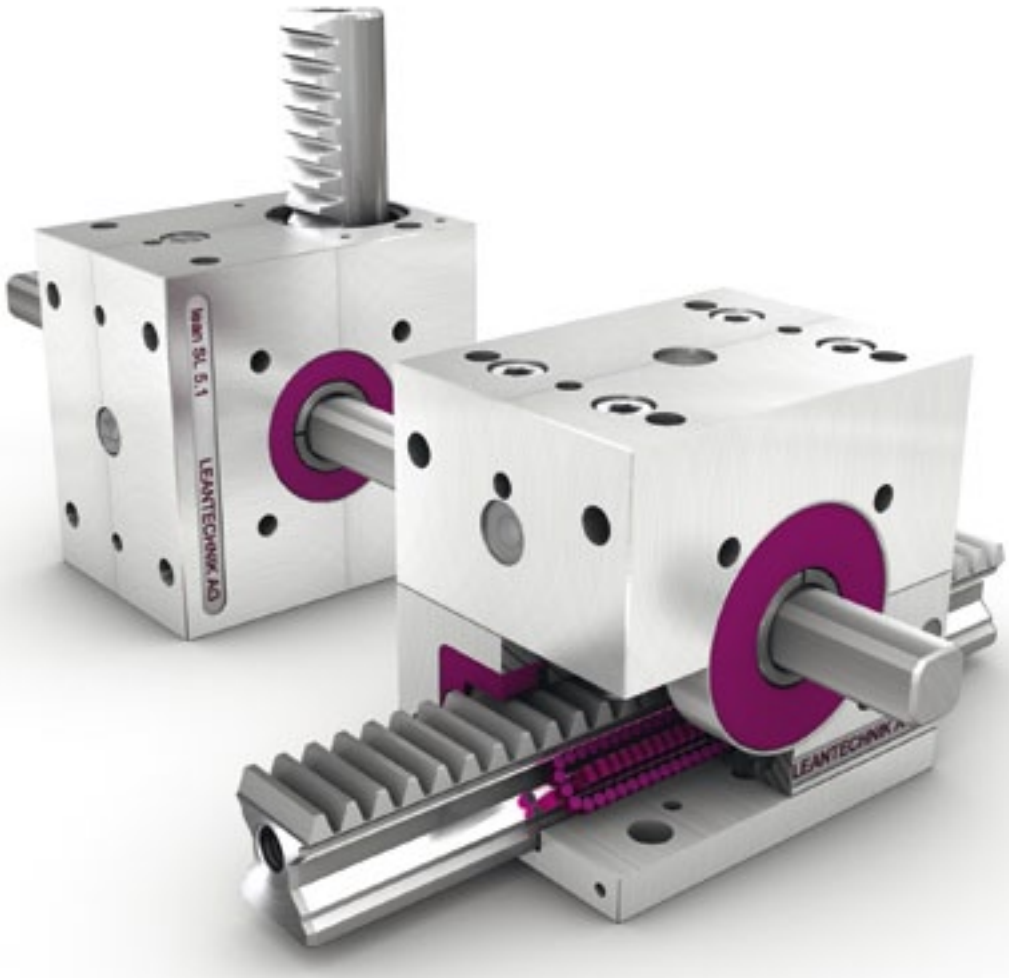
www.leantechnik.com

Complete catalogue lifgo® & lean SL® 5



Contents

Introduction

Dear reader or user,

Whenever synchronous, precise, fast, and high-performance motion is required, our lifgo®and lean SL®rack and pinion gear units are reliable, proven functional components in a variety of industry sectors.

Below, we present the product series and the new accessories available for our gear units: The various operating options and the increased number of available item combinations are just a few of the benefits offered by our modular system, which we intend to extend still further in the coming years.

In addition to our **lifgo® and lean SL®** series of gear units, we also provide functional units and partial and turnkey systems, which are sold in all variations under the **leantranspo®** name. Here, our individualized approach to manufacturing in combination with a modular system brings many advantages.

Get a picture of the multifaceted possibilities for applications and combinations. The modular construction of our products allows countless variants, which are presented here in excerpts and examples. This product overview has been extended to include a variety of technical data. Accessories such as the compensating block for guide cars and the mechanical arrest system have also been included in the product portfolio.

Do not hesitate to visit our website and look at our PDF catalogue to find further information on ways of solving a range of lifting and synchronisation tasks. You can find all the detailed information here:

www.leantechnik.com

Our website has videos showing our gear units in numerous applications. In addition to the application examples, you can also explore the function and installation of our products in animated pictures.

The "Download" area also has 3D data and models of the products for download in various file formats.

The LEANTECHNIK AG Team

Our team is ready to support you in implementing your ideas. Call us or make an appointment to discuss your individual lifting and transfer application with us.

We hope that you will find our product range of interest and look forward to hearing from you. Our catalogue will give you an initial overview of our products and services. We will be happy to assist you in any way in finding a solution for your individual lifting application.

Quality Management Certification in accordance with DIN EN ISO 9001
Registration no. 254883 QM ff.

lifgo® & lean SL® 5

Generation 5 combines two gear unit concepts: the proven lifgo® and lean SL® series are now compatible. Each series has its strengths, and combining them could yield the optimal result for your lifting application.

lifgo® with linear guided gear racks, for fast and precise requirements
lean SL® with round guided gear racks for easy lifting movements
leantranspo® is the name given to the partial and complete functional systems based on lifgo® and lean SL®

Thanks to the various possible combinations, countless types of system can be designed economically and efficiently. The logical, modular construction of the units results in a modular system that offers design engineers enormous flexibility and versatility in operation using just a few accessories. This modular system comprises all the components required for the construction of simple lifting systems through to complex transfer and shuttle solutions – in proven **LEANTECHNIK AG** quality.

lifgo® 5.0 to 5.4 • Unique features

One basic model – 4 variants
lifgo®, lifgo® linear, lifgo® double and lifgo® linear double share the same basic design, allowing replacement, expansion and flexible system design without a problem.

4-way roller guide for the gear rack on lifgo®
This design allows higher loads and lower operating noise levels.

Adjustable precision with eccentric configuration
You can adjust the tooth flank clearance and precision of the gearboxes yourself with the "eccentric" configuration.

High resisting torque for more transverse force bearing capacity
lifgo® 5 can support greater transverse loads, thanks to its higher resistance torque.

Four standard pinion shafts for creative system designs
Four standard pinion shafts – profile (PW), one or two pins (ZA 1/ZA 2), and a bore with keyway (FFN) – are available for all sizes of lifgo® and lean SL®.

Long service life for durable use
lifgo® 5 stands for quality and guarantees reliable functionality.

Gear rack protection – simple and flexible
Environments with high levels of contamination or dust call for the use of a gear rack protection with a simple, secure screw-type fixing mechanism that permits versatile use.

Simple installation with few accessories
Thanks to the modular system design, only a small number of accessories are required to install the lifgo® 5. This simultaneously reduces the cost to the user.

More options thanks to flexible mounting
lifgo® 5 has fixings on 4 sides. It can therefore be installed on all horizontal and vertical surfaces.

Compatibility for flexible design
lifgo® and lean SL® are compatible – the two gear unit series can be combined in one and the same system.

lifgo®

lean SL®

lean SL® 5.m to 5.5 • Unique features

Large diameter, wide tooth profile
With a large gear rack diameter and wide tooth profile, the lean SL® series is particularly resistant to bending in the guide areas and possesses a long service life.

Long service life for durable use
lean SL® is a robust gearbox that is characterized by its long service life.

Easy-to-install, versatile gear rack protection
The lean SL® gear rack protection is easy to use and suitable for practically all sectors of industry.

More options thanks to flexible mounting
lean SL® has fixings on 4 sides. It can therefore be installed on all vertical and horizontal surfaces.

leantranspo® partial and functioning complete systems• Unique features

Unlimited possibilities
The leantranspo production line includes the development and construction of partial and functioning complete systems from lifgo® and lean SL®. Whenever mounted parts, motors and steel constructions are used in addition to the two gearbox systems, then the supplied components form a leantranspo®system.

Professionalism and experience
Profit from our engineering team's
years of experience, which will be happy to advise you
regarding all your development and design requirements.

Custom solutions
leantranspo® means tailor-made solutions
that are designed specifically for you so that they
respond perfectly to your particular requirements.

To ensure clarity and ease of use, there are just a few graphic symbols and styles that will help you navigate through this manual:

1. Sign	Important assembly, safety and functional information as well as information on dimension sheets and tables.
2. Coloured type	Indicates important information in the text.

Applications, designs, and service

The applications and designs presented below are by way of example only.

Individual designs are created and calculated according to the technical requirements of the application. Countless applications are possible in principle, and not all of them can be presented. Give your imagination free rein. If you have questions or if we can assist you with your ideas, please call us.

Ask us to check the design of your application for you. The results of this verification can be incorporated in your design work to help you find the best possible solution.

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References (sample)

A
ABB Automation GmbH
ABB Engineering Shanghai Ltd.
ADAM OPEL AG
AP&S International GmbH
A-Tooling Ab, Sweden
AUDI AG

B
Benteler AG
BLEICHERT Automation GmbH & Co.KG
BMW AG/Group Ltd.
Braun GmbH

C
Carl Zeiss Jena GmbH
CMC S.r.l.
Continental Reifen Deutschland GmbH
ContiTech Techno-Chemie GmbH

D
Daimler AG
Dambach Lagersysteme GmbH
Dieffenbacher GmbH

E
EBZ Group
Eissmann Automotive Deutschland GmbH
Emil Bucher GmbH & Co.KG

F
Festo AG & Co.KG
FFT EDAG Produktionssysteme GmbH & Co. KG
FLABEG Deutschland GmbH
Ford of Europe GmbH
Ford Motor Company of Australia Limited
Ford Motor Company U.S.

G
Gehring Technologies GmbH
Goodyear Dunlop Tires Operations S.A.
GROB-Werke GmbH & Co.KG

H
Herrhammer GmbH
Hörmann Automotive Gustavsburg GmbH

I
Ideal-Werk C. + E. Jungeblodt GmbH + Co. KG
Illig Maschinenbau GmbH & Co. KG
Ilsemann Automation
Inductoheat Europe GmbH
IWM Automation GmbH

J
Johnson Controls Autobatterie GmbH & Co. KGaA
Julius Blum GmbH

K
Kolb Technology GmbH
KUKA Flexible Manufacturing Systems (Shanghai) Co., Ltd.
KUKA Roboter GmbH
KUKA Systems GmbH

L
Liebherr Group

M
Manz Automation AG
Miele + Cie. KG
Muhr & Bender KG
Müko Maschinenbau GmbH
Müller Weingarten AG

N
Neue Halberg-Guss GmbH

O
Olbrich GmbH
OPTIMA packaging group GmbH
Otto Bihler Maschinenfabrik GmbH & Co. KG

P
Papier-Mettler
Pintsch Bamag Antriebs- & Verkehrstechnik GmbH
Porsche AG PSE AG

R
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Robert Bosch GmbH

S
Saint-Gobain PAM Deutschland GmbH
Schaefer Förderanlagen- & Maschinenbau GmbH
Schuler Group
Siempelkamp GmbH & Co. KG
SK Hydroautomation GmbH
SLCR Lasertechnik GmbH
Sollich KG
Sturm Group

T
Thyssen Krupp Lasertechnik GmbH
Thyssen Krupp Steel AG
ThyssenKrupp System Engineering GmbH
TMS Transport- und Montagesysteme GmbH

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Voestalpine AG
Voith Industrial Services GmbH
Voith Paper GmbH & Co.KG
Voith Turbo GmbH & Co.KG
Volkswagen AG

W
Wafios AG
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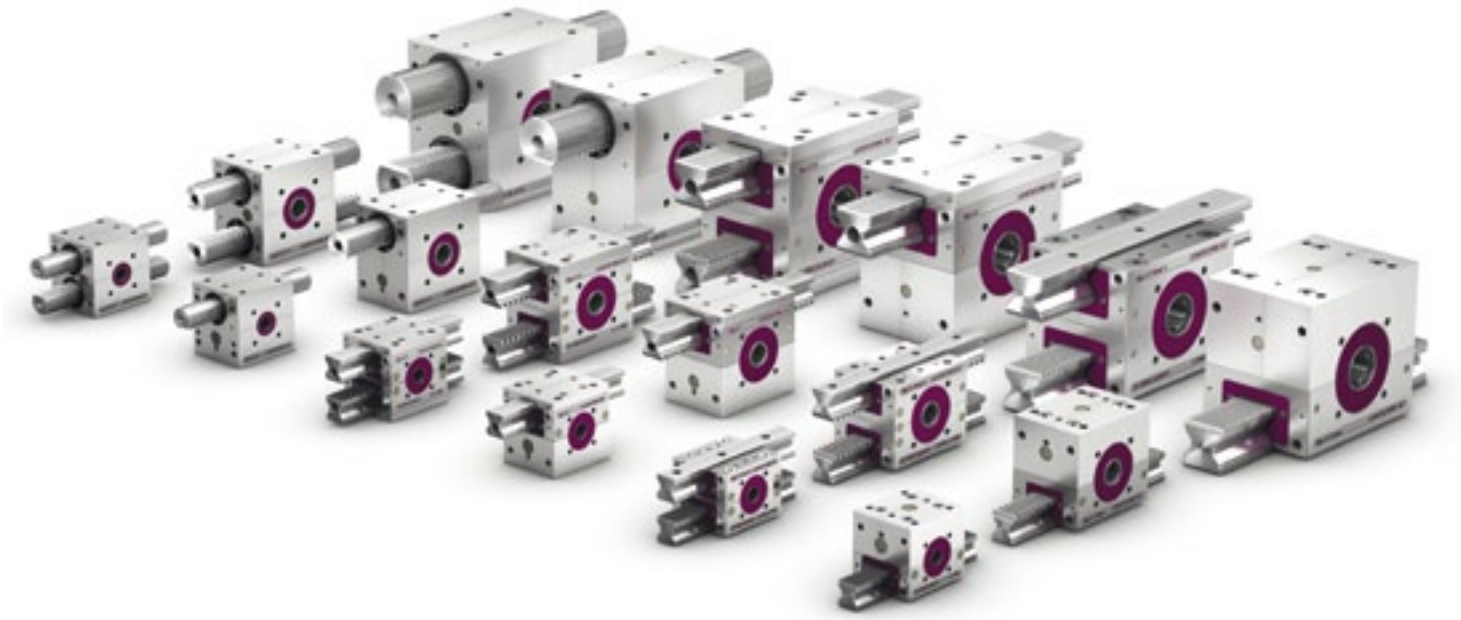
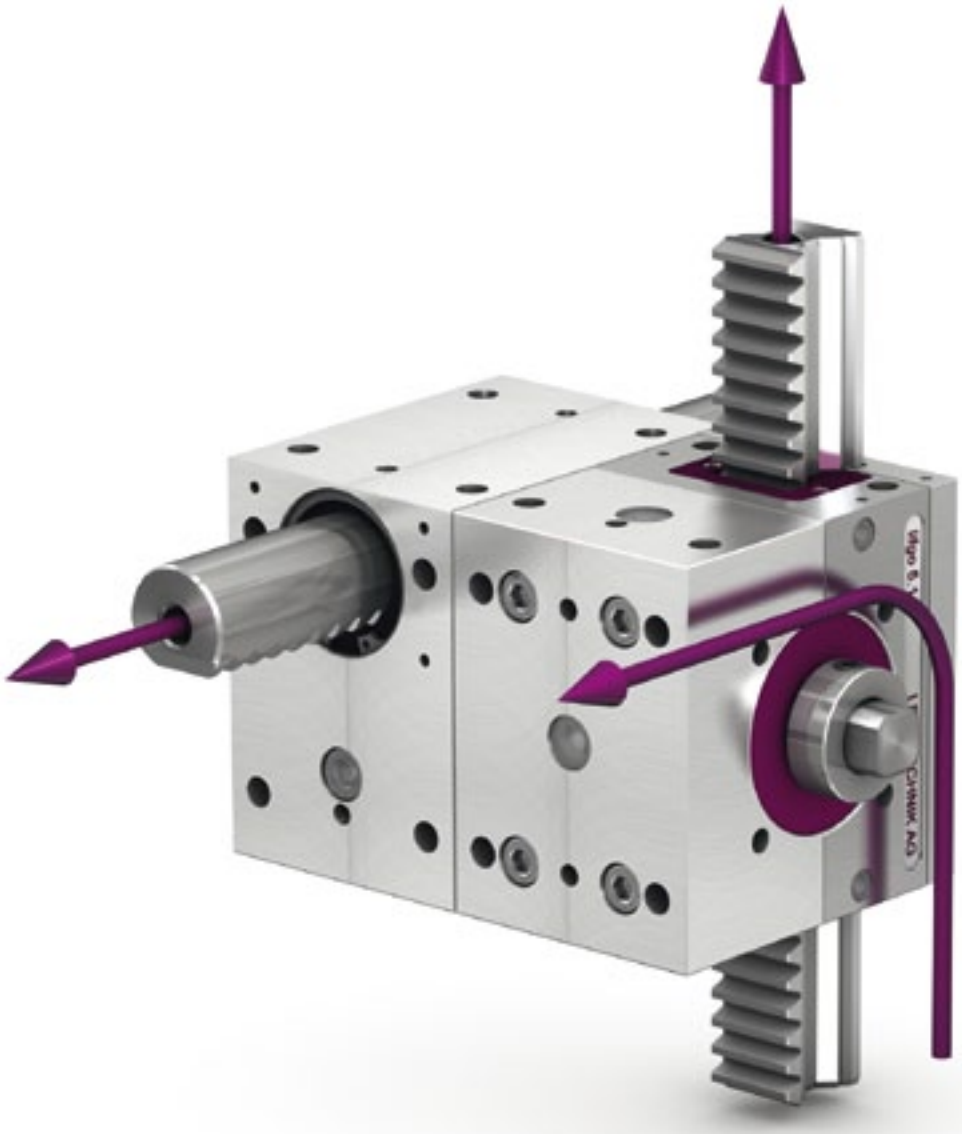
WICKERT Maschinenbau GmbH
Wieland-Werke AG

Z
Zasche Sitec handlings GmbH
ZF Lenksysteme GmbH



1 Function & combination



1 Function & combination

Introduction to functionality

lifgo® and lean SL® are two gear unit series offering different performance levels. They are both available in three different sizes.

lifgo® 5.0 – 5.4: Lifting, guiding and positioning. Fast, precise and strong
lean SL® 5.m – 5.5: Gearboxes for simple, cost-effective lifting devices

Both gear unit types can be combined with each other. They are compatible with one another and support each other's functions. The differences and similarities of the two series, lifgo® and lean SL®, are presented on the following pages.

lifgo® & lean SL® • Differences

lifgo®

lean SL®

The most important differences between lifgo® & lean SL®:

lifgo®	lean SL®
· 4 roller guides	· sliding guide bearings
· precise guides	· simple guiding
· high-precision positioning	· simplified precision positioning
· high lifting speed	· medium lifting speed
· also available as "linear", "double" and "helical"	· also available as "double"

lifgo® & lean SL® • Similarities

lifgo®

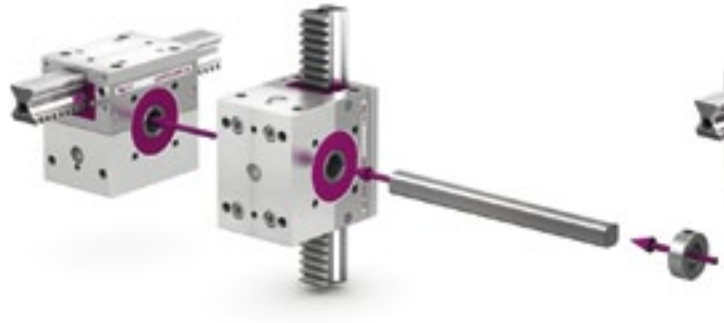
lean SL®

The most significant similarities between the lifgo® and lean SL® gear unit series:

- Identical connection dimensions and screw mounts for each size
- Identical tooth pitch (to)/module and pitch diameter for each size
- Identical pinion shaft designs for each series and size
- Screws can be threaded in directly and/or passed through
- Gear units can be installed on horizontal and vertical surfaces
- Mounting screw dimensions are the same in vertical and horizontal orientation

lifgo® & lean SL® • Rotationally fixed, interlocked connection with profile shafts (PW)

1



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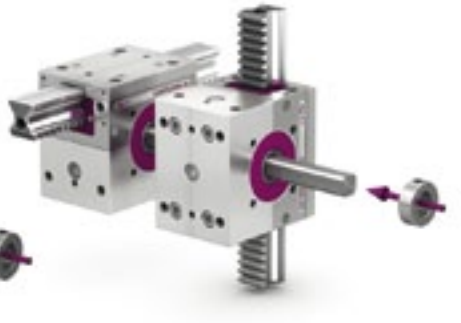

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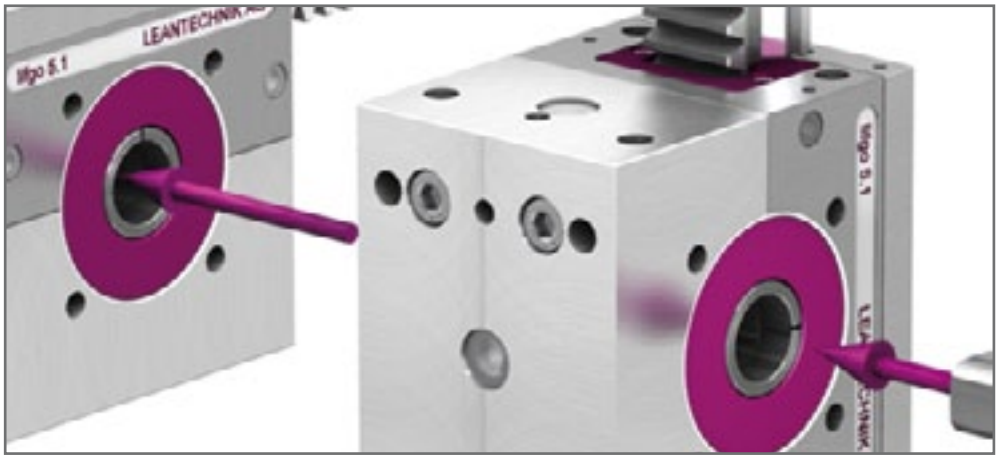


Our profile shafts create a rotationally fixed and interlocked connection between the pinion for the horizontal gear racks and the pinion that drives the vertical gear rack. Linear horizontal motion is therefore converted to a linear vertical motion in a 1:1 ratio. The ratio (mm/360°) is different for each gear unit size (Fig.1– 3).

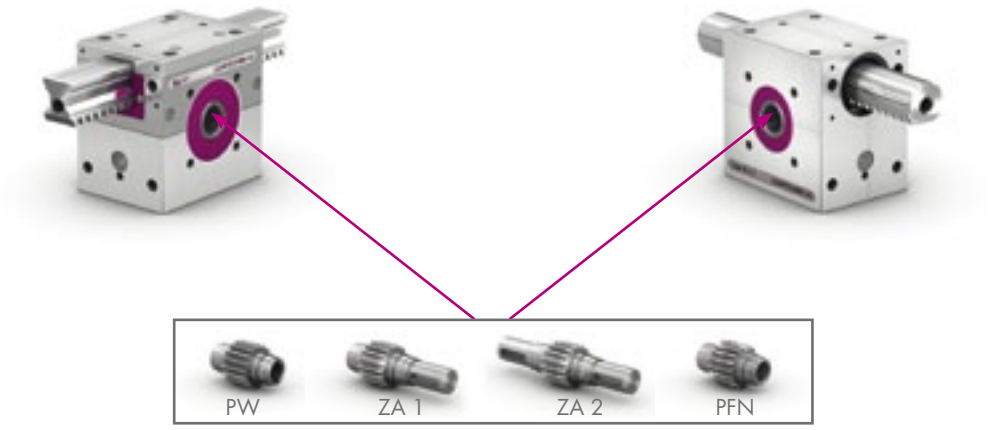
By sliding in the gear rack horizontally, the rotary motion is transmitted to the profile shaft by means of the pinion shaft (Fig. 4). The profile shaft synchronises the tooth position of the gear units in 90° steps. To do this, the gear unit must be positioned using the position markings on the pinion (image 5) and then the two must be connected with the profile shaft in this position. As a result, the gear rack positions are also synchronised (simultaneous engagement of the gear racks with the pinion shaft is a prerequisite.)

lifgo® & lean SL® • Pinion shaft ends

In addition to profile shafts (PW) as a rotationally fixed connection, the lifgo® & lean SL® modular system offers three more standardised pinion shaft ends.

These include the pinion shafts with pins and a keyway, in versions with one pin (ZA 1) or two pins (ZA 2). A hollow shaft with a keyway (PFN) has also been standardized. The dimensions are the same for all lifgo® and lean SL® versions, for each size. They can be found on the dimension sheets.

The keyway and pin versions are particularly well suited for dynamic, low-clearance, and alternating load motions.



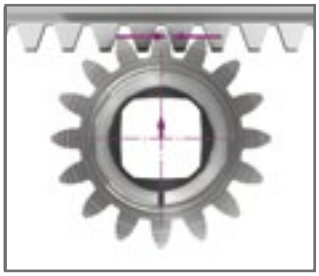
lifgo® double & lean SL® double• Gear units with two racks

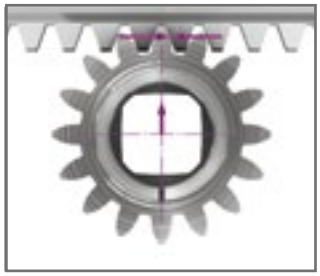
lifgo® double & lean SL® double with parallel rack guides in each size. For use in gripper devices and gripper shuttle systems, for example.

lifgo® • Special features

The lifgo® 5 gear unit series meets high standards, and has a few technical features and versions that the lean SL® and lean SL® double series do not provide.

lifgo® eccentric: Tooth backlash configurable (both for straight-cut and helical gears)
In the lifgo® "eccentric" version, the tooth backlash can be adjusted.
Indicate the desired positioning accuracy in the project data.





See also the adjustment values on pages 60/66.

lifgo® linear: long travel, any number of gear racks
lifgo® becomes lifgo® linear: By removing the adapter plate and making a few small adjustments, lifgo® can also be used as a "linear" module. It very simply becomes the right drive unit for long travel strokes.

Applications:
Horizontal & vertical stroke: long travel with any number of multi-part gear racks
Vertical stroke: addition of reinforcement profiles at the tapped holes in the gear rack, and addition of auxiliary devices (e.g., suction pads, grippers, functional unit) at the end of the gear rack

The four basic positions of the gear units

The sequence of pictures shows the basic assembly options in the horizontal and vertical direction. They are identical for lifgo® (top) and lean SL® (bottom). Note that both series can be combined with each other in all positions.

Combinations of the series

lifgo® + lean SL®

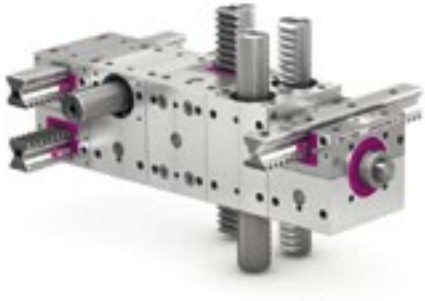
lifgo® linear + lean SL®

lifgo® linear + lifgo®

From high-precision to low-cost – compatibility between series reduces costs.

lifgo® double + lean SL® + lifgo® + lean SL® double + lifgo® linear

from right to left



The above illustration shows all conceivable lifgo® and lean SL® gear unit combinations at a glance.

Direction of rotation/operation

Gear unit combinations basically convert horizontal linear motion into rotation, and then into vertical linear motion. The drive motion can take place in any effective direction (arrow). Reverse operation is also possible.

Mechanical arrest system lifgo® & lean SL® (ASS)

The mechanical arrest system (ASS) is a mechanism that is mounted on the gearbox in order to prevent the uncontrolled descent of systems, system components or heavy weights and also to prevent the unwanted application of forces. It makes it possible to ensure that systems, machines or equipment do not descend suddenly or collapse during inspections or repair work. When used in combination with lifgo® or lean SL® gear units, the ASS can also be used as a positioning unit for a given value. Please ask us!

The secured force is 5 times greater than the nominal force of the associated lifgo® or lean SL®gearbox. It is not permitted to exceed these forces at any time. However, should this occur then it is essential to check the functioning of the ASS, the lifgo® or lean SL®gearbox and the gear rack. Other wise, correct functioning can no longer be guaranteed.

The direction of securing is opposite to the lifting direction and securing is possible in only one direction of movement (see images) and only provided that an electronic drive containing a service brake is used.

1

Mechanical arrest system locked

2

Mechanical arrest system unlocked

This protective device has a simple, robust method of operation. In normal operation, an air cylinder keeps
the DP open against a mechanical spring pressure. This is the "free-moving position".

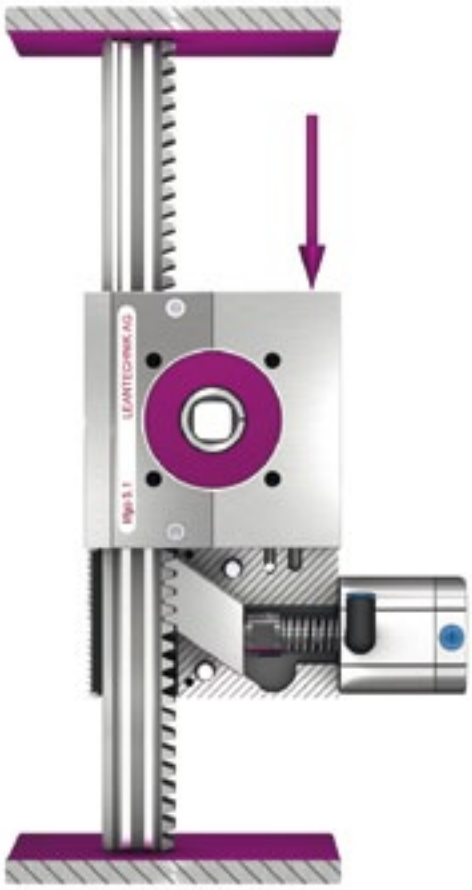
When it is necessary to apply the protective device, the system is first stopped. The air is drained from the ASS air cylinder and the spring pressure forces the toothed bar towards or into the gear rack. The inductive switch at the air cylinder indicates that the mechanism has left its free-moving position. The system is now descended at low speed until the spring pressure fully engages the toothed bar in the gear rack (see Fig. 1). When this locked position has been reached, a second inductive switch indicates this to the control unit. The downward movement is then stopped immediately. The system is now mechanically held in place by the interlocking components.

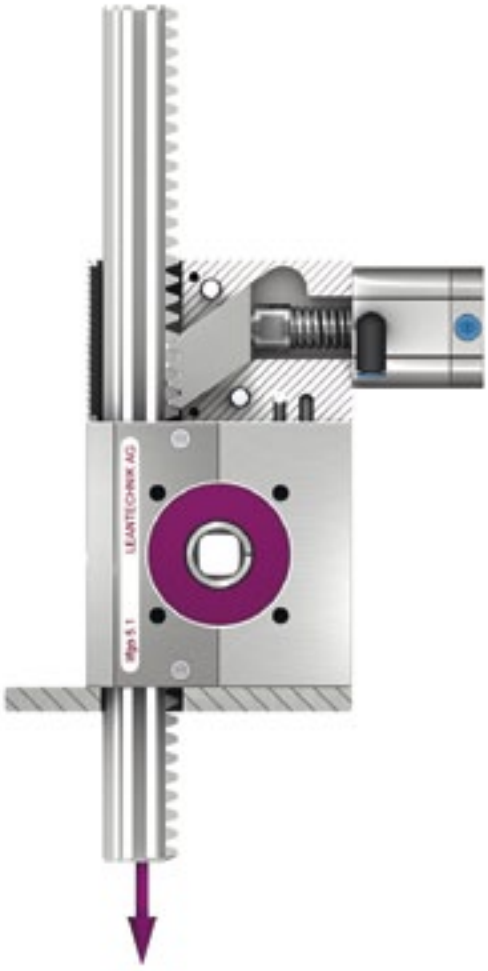
To unlock the system again, it is necessary to repressurize the air cylinder. Slightly afterwards,
the system is raised at low speed again (see Fig. 2). The toothed bar is released and pressed back by the pressure from the cylinder. The inductive switch first indicates that the locked position has been exited and then that the free-moving position has been reached. The system can now resume normal operation.

Mechanical arrest system lifgo® & lean SL® (ASS)

In the event of a power supply failure, the system's service brake must first be activated. Then the air cylinder is depressurised. The toothed bar moves towards the gear rack to just in front of the closest tooth. If the system does not descend any further then the ASS remains in this position. If, for whatever reason, the system continues to descend, the spring pressure forces the toothed bar into the next possible tooth space and the mechanical interlock halts the system.

In accordance with VDE and EU guidelines, all the functions must be wired in a suitable control unit as per DIN 60204.



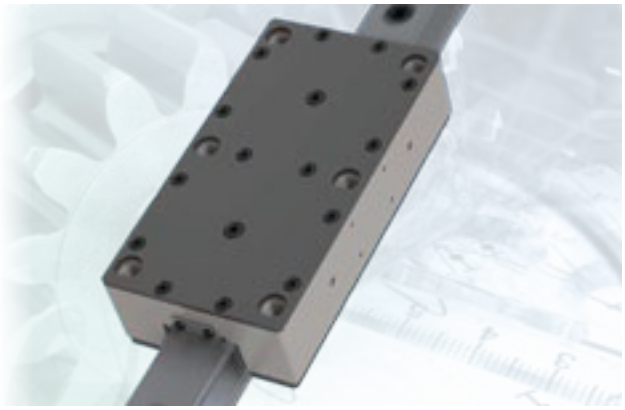


Gearbox moves the lift load

Gear rack moves the lift load

Aachen University tested and approved the ASS in November 2012.

Stepless holding brake (SHB)



The best functional safety

SHB safety brakes use the failsafe principle. Pre-tensioned cup springs press brake shoes onto the "waist" of the profile rail. The brake mechanism is designed for relatively large stroke and balances the profile rail manufacturing tolerances without losing braking force.

Mechanical clamping for safety

SHB safety brakes clamp very rigidly directly on the linear guide. This means they are directly applied to the mass that is being braked or held. Drive elements between the motor and masses to be moved, such as spindles, spindle nuts, shaft couplings or gear units therefore have no effect on safety.

Perfect for vertical axes

Direct clamping on the linear guide makes the SHB ideal for use in gravity-loaded axes where the risk to personnel needs to be minimised.

High rigidity

SHB safety brakes are more rigid than rod or band brakes by at least a factor of 3. Rotational motor brakes compare even less favourably. For one, they are usually subject to backlash, and for another, each element between the brake and the rail has a negative impact on rigidity.

Switch condition monitoring

An integrated proximity switch outputs a signal each time the brake's status changes.

Pressure booster for SHB high-pressure, pneumatic

HIGHLIGHTS AND SPECIAL FEATURES

In most cases, the pressure available in the compressed air system is not sufficient to operate the SHB at 20 bar. One possibility is increasing the overall system pressure, but this is a high-effort and expensive solution. Another solution is the use of a pressure booster in the system right where the higher pressure is needed.

The pressure booster increases the pressure in the system to the required operating pressure of the SHB by purely mechanical - pneumatic - means without introducing energy from outside.

- fast pressure boosting in front of the individual brakes
- no energy consumption after the output pressure is reached
- no electrical installation required
- simple, secure and economical operation
- no need to invest in your own high-pressure circuit or in a off-centre separate compressor system

Pressure booster on a plate

Pressure booster in a housing

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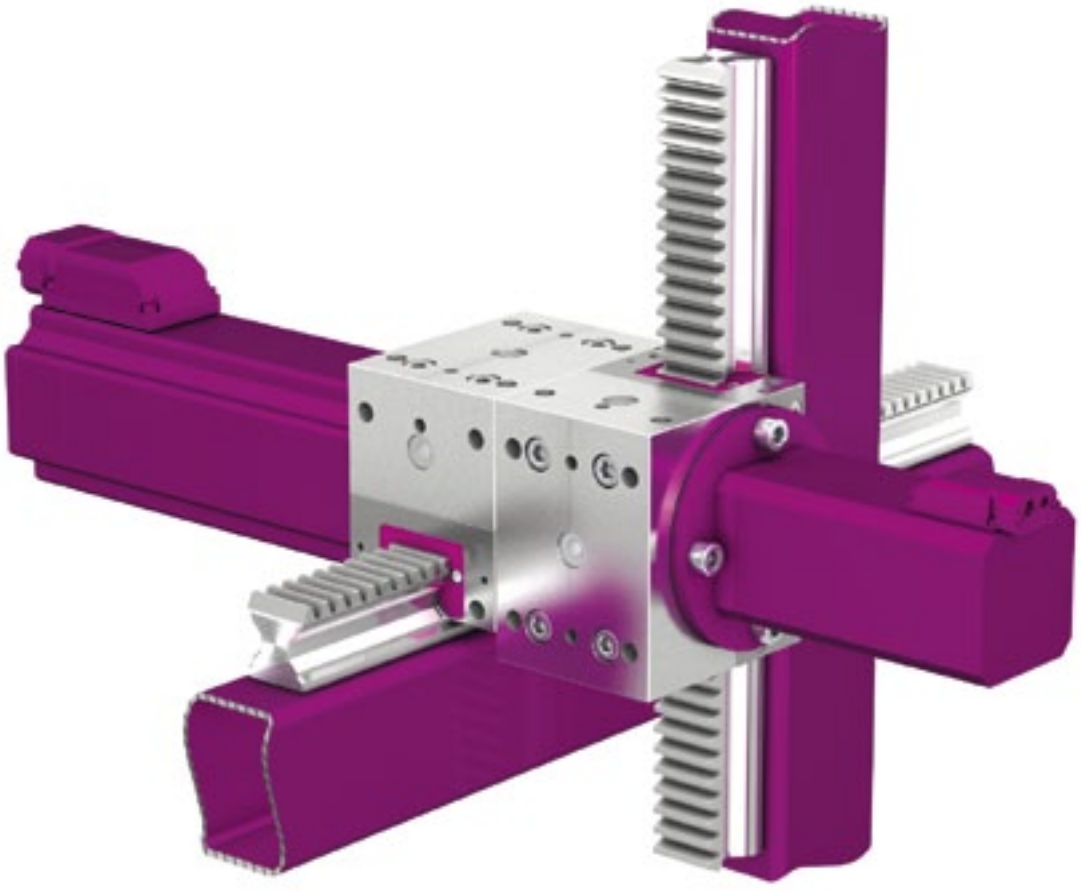
2 Applications & examples



Note on the presentation of the application examples

On the following pages, we present principal application and usage options for the lifgo® and lean SL® series.

In order to achieve a uniform view of the many different applications, the gear unit size 5.1 was used for all the presentations. All applications shown can, of course, also be implemented in all sizes – with lifgo®, lean SL®, or a combination of the two series.

The detailed depiction indicates which of the two series is used in each application. It is important, depending on the application. You can also trace the force flow and motion sequences. Operation in reverse is also often possible.

Explanation of the term "primary gear unit" P

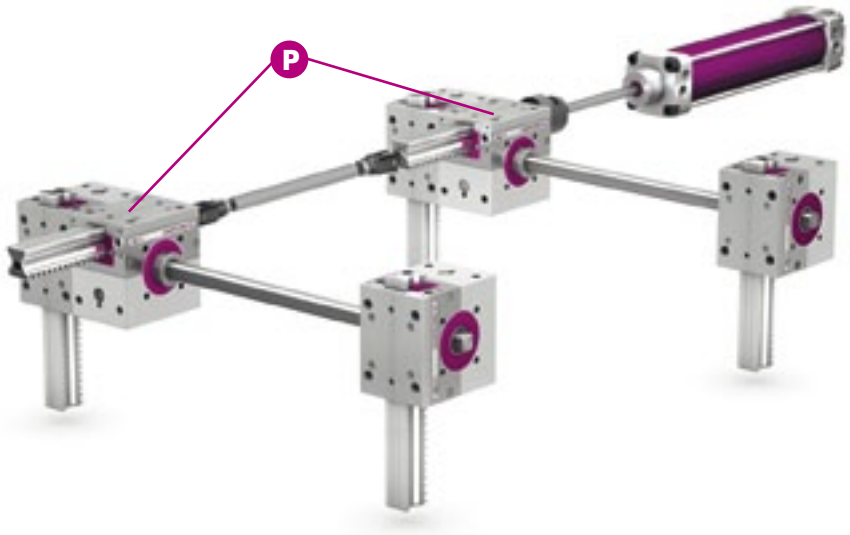
Note the role of the primary gear unit in the illustrations and applications. It distributes the drive forces acting on it within the lifting system, and does not perform any direct lifting, pushing, or positioning task itself.

The gear unit itself is no different from other gear units. The terminology refers solely to its location.

The maximum permissible force transmission = **nominal force, in Newtons (N)** of an individual gear unit must not be exceeded!

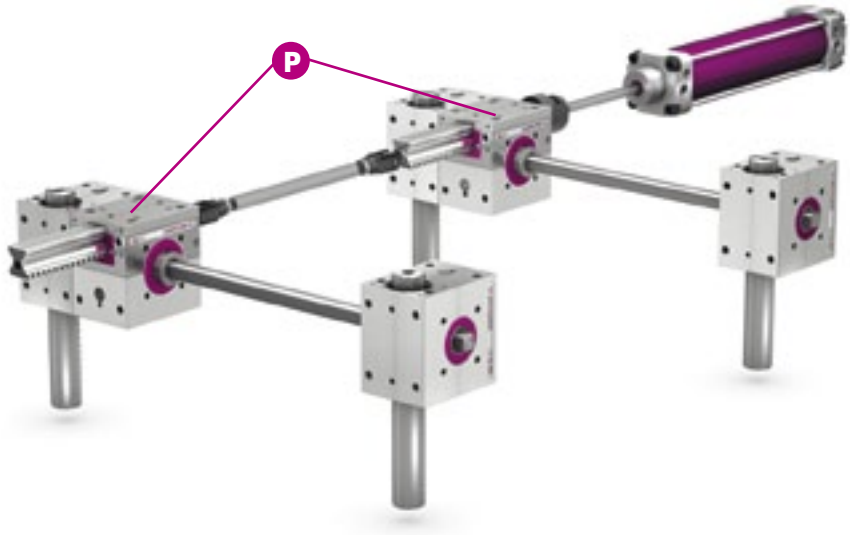
For the systems shown below in this chapter, all lengths and distances as well as the lifting speed and load capacity can be freely selected.

Standard lifting system with lifgo® and air cylinder drive



The two primary gear units from the lifgo® series each distribute half of the maximum potential force to the four gear units with vertical gear racks. The lifgo® gear racks bear supported loads, and can resist transverse forces.

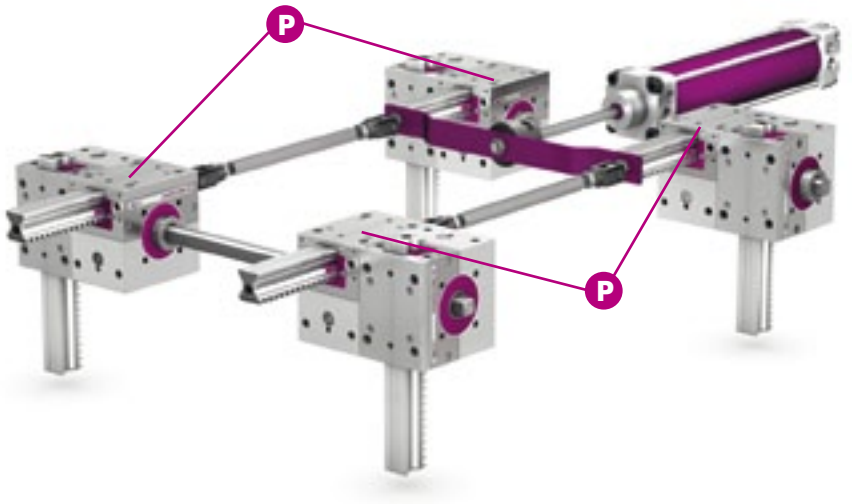
Standard lifting system with four lean SL® units as vertical gear units



A plate or device bolted to the end faces of the gear racks ensures the vertical orientation of the gear racks in the real-life application.

Transverse forces are not permitted in this application

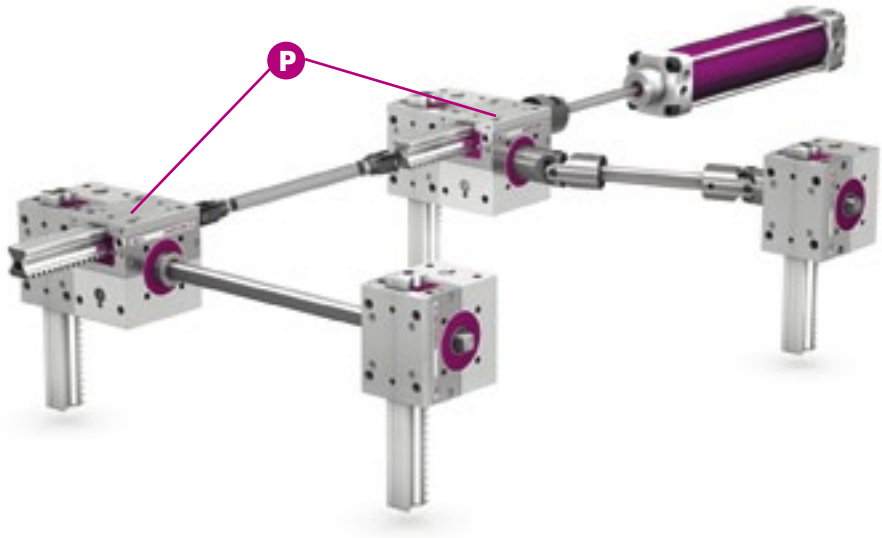
Lifting systems with four vertical and four primary gear units



This system provides fourfold force transmission (depending on the size) to the vertical stroke. Non-centred loads can be supported here because a closed mechanical polygon is installed.

The maximum load at any given lifting unit must not be exceeded.

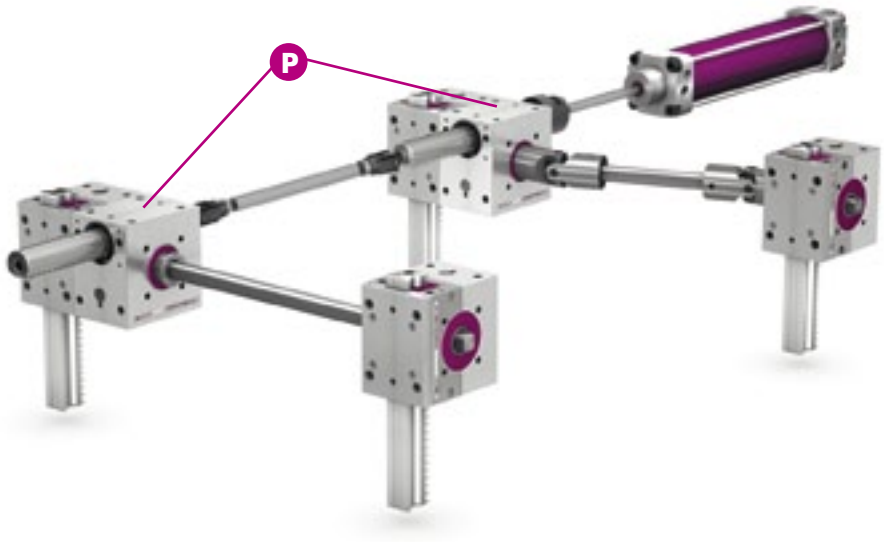
Lifting system with universal joints/primary gear unit®



Lifting systems with four vertical and two primary gear units. The position of the gear unit for the rear axis can be varied via the universal joint.

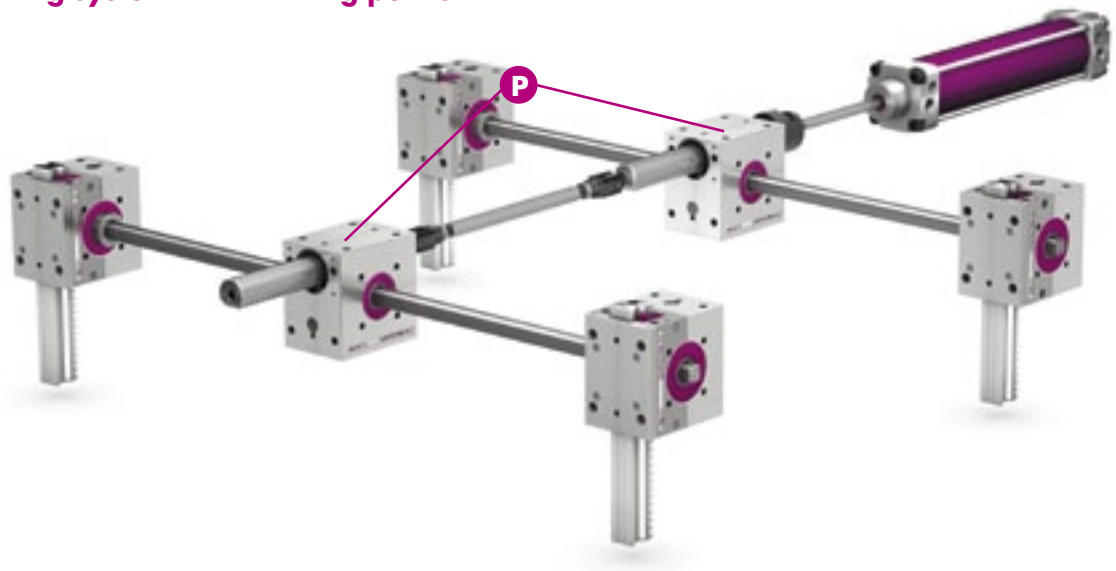
Please note that all the systems illustrated here are simply examples and that many other designs are possible.

Lifting system with universal joints/primary gear unit lean SL®



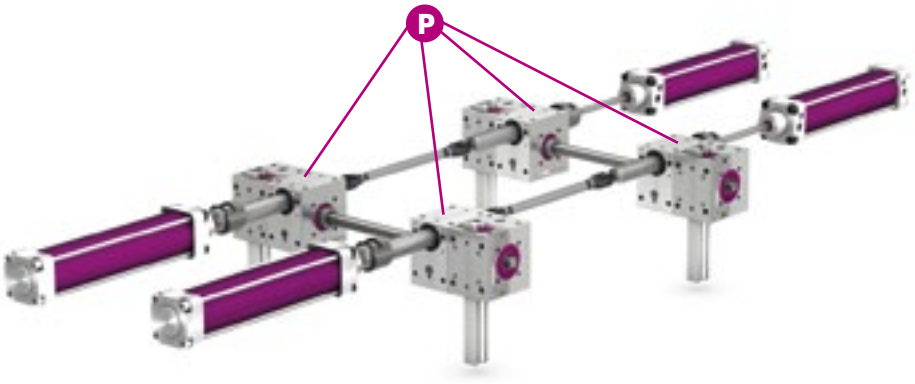
In this application, two lean SL® units are used as the primary gear unit. This results in a lower lifting force than in the previous application. Vertical guidance of the lift load is ensured by using the four lifgo® gear units.

Lifting system with 4 lifting points



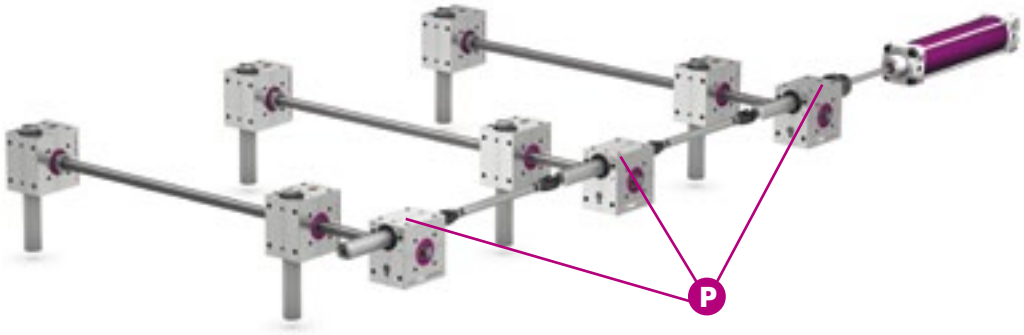
Combination of lean SL® primary gear unit and lifgo® gear unit. lean SL® works with lower lifting force than the same size lifgo® unit. This ensures high quality guidance and positioning with the vertical stroke implemented as a lifgo® unit, and low force transmission by the lean SL® unit.

Lifting systems with 4 vertical and primary gear units



One air cylinder is connected to each of the lean SL® series primary gear units. In this application, four times the maximum nominal force can be generated. The gear units of the lean SL® series synchronise the force and motion of the air cylinders.

Lifting system with 3 primary gear units in series



In this application, the horizontal gear racks of the lean SL® primary gear units function as "tie rods", as do the differential couplings.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

lifgo® with built-in drive

The lifgo® pinion shaft is equipped with pins and a keyway. For precise positioning (horizontal/vertical), the drive motor is directly connected to the lifgo® pinion using a form-fit coupling. Used as a positioning and adjusting drive, the drive unit can also be used, for example, for pouring and tilting devices.

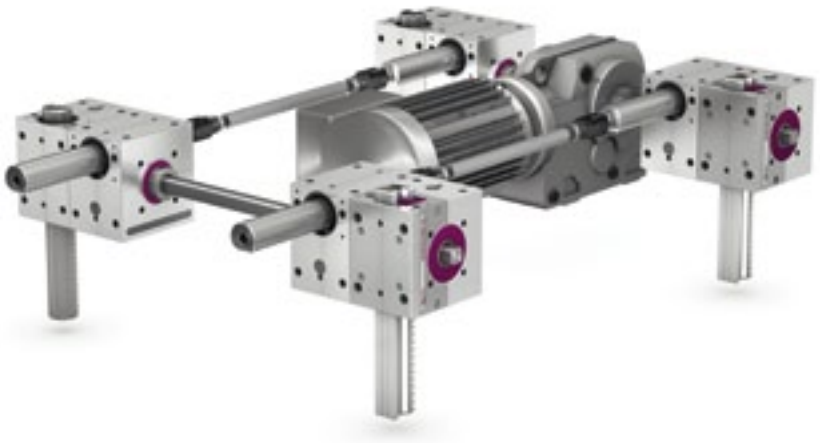
lifgo® pair with rotary reinforcement

Used in the same way as in the previous example. In this pair of lifgo® units, the rotational reinforcement transmits the rotary motion from the first to the second gear unit at the same position.

lifgo® lifting system in series

Lifting system and device for lifting long parts and profiles, for example. This application can also provide the vertical stroke in a single-row shuttle. See also page 40, bottom.

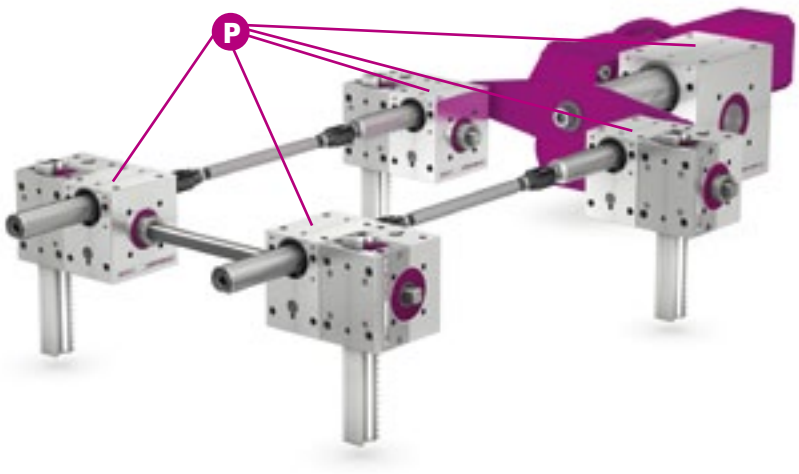
Lifting system construction with lifgo® and lean SL®



The left side vertical gear units are from the lifgo® series, and function as a guide and transverse force support for any mounting plate. If two lifgo® gear units are sufficient when low transverse forces need to be supported, then lean SL® gear units (here the vertical gear unit on the right-hand side) can be used for other tasks.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

Lifting system, standard configuration, large gear unit as tension drive



The large lifting unit used as a tension drive can come from the lifgo® series or lean SL®, depending on the force requirement (here lean SL®). Off-centre loads can be supported due to the closed force polygon and because maximum force and torque transmission are possible. The installation space in the centre remains available.

Lifting system with 2 distributor gear units and one gear motor

Force transmission to the gear units is at a maximum. The installation space under any mounting plates can be used freely. Combined use of the lifgo® and lean SL® series is also possible in this application.

Lifting system, U-shaped with 2 distributor gear units

In this U-shaped application, the installation space in the centre remains free. The maximum torque Mt^2 is the torque of the profile shaft on each side.

The maximum permissible rated force of a gear unit must not be exceeded!

Circular arrangement of lifgo® gear units

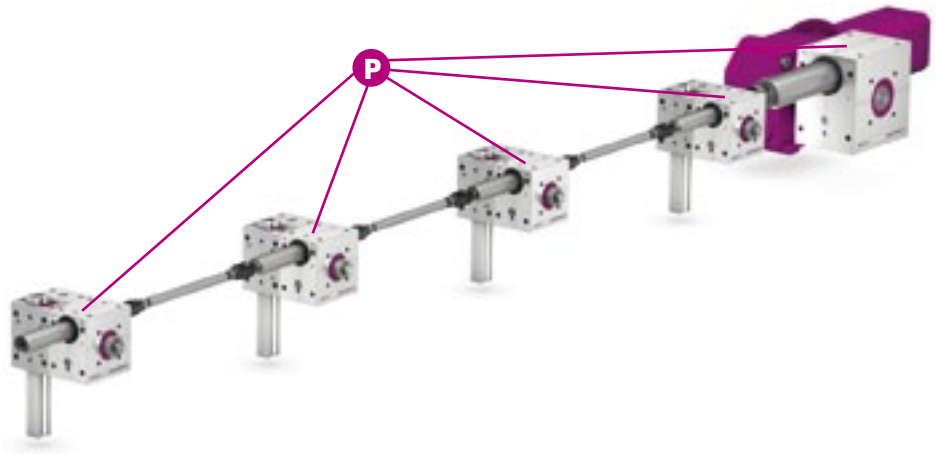
This lifgo® application can be used for clamping and/or centring round objects. The closure of round bodies (casings) is another potential application.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

Arrangement in a rectangle/square

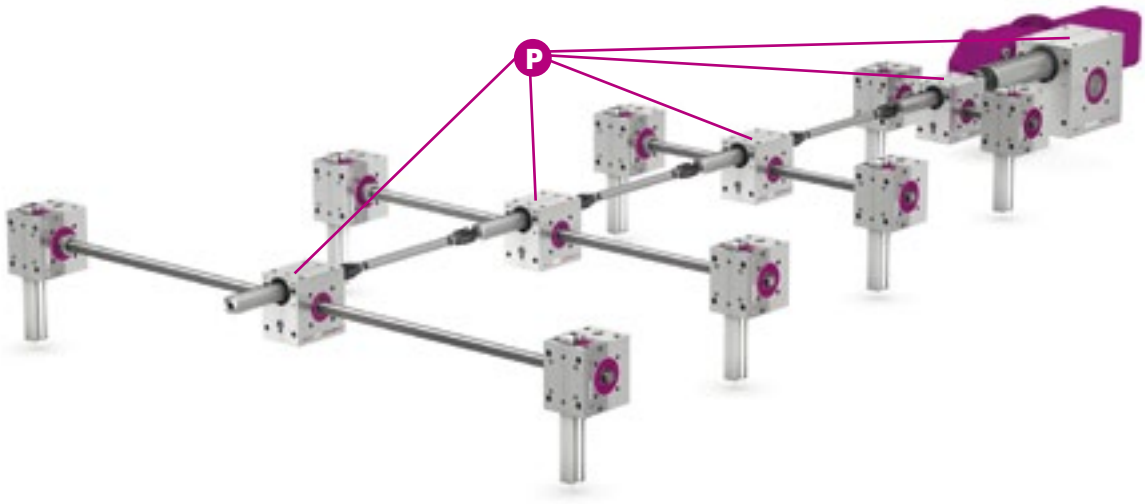
This application with lifgo® series gear units allows clamping and/or centring.

Serial arrangement of gear units



This construction is used to lift long, narrow mounting plates, for example when lifting production parts into machine tools. A large lean SL®series gear unit is used here as the tension drive. The vertically oriented lifgo® gear units guide the mounting plate.

Arrangement of gear units in 4 rows



Arrangement as in the serial arrangement of gear units. In addition to the lean SL® gear units, lifgo® lifting units are now set up on both sides, in order to lift wide, guided mounting plates, for example.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

For the systems shown below in this chapter, all lengths and distances as well as the lifting speed and load capacity can be freely selected.

Lift column as intermediate stacking unit with a lifgo® linear

This application with a lifgo® linear provides intermediate storage of flat products at various levels.

Lift column – lift device with two lifgo® linear units and auxiliary guides

Lifting forks are directly installed on the lifgo® linear unit. Various useful auxiliary elements can be installed. Our lift columns are also available with counterweights.

Lift columns with auxiliary guides

Precise guidance for lift operations with high, off-centre loads. The application allows high loads and a large transverse force capacity. It is suitable, for example, for precise lifting and positioning of loads and production devices.

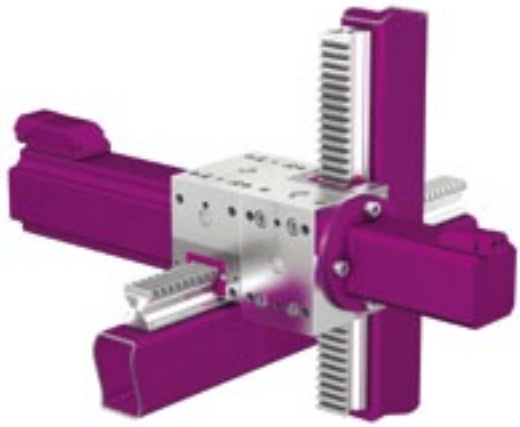
Lift column with reinforcement profiles on the lifgo® linear gear rack

Lift column with particularly rigid design, for lifting heavy parts/fixtures in assembly lines, such as for the final assembly of front axles with engine/transmission in the automotive industry. Large stroke heights, high transverse force capacity and positioning accuracy.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

For the systems shown below in this chapter, all lengths and distances as well as the lifting speed and load capacity can be freely selected.

Horizontal drive with attached vertical drive



Representation of a transfer function. For the horizontal drive (X or Y stroke), a lifgo® linear unit with linear gear rack is placed on the carrier. The drive "comes along". A lifgo® linear unit is mounted on it for the Z-stroke.

1-axis transfer, linear axis, horizontal/vertical

1-axis transfer with lifgo® linear. Very fast, large strokes, for transport from "A to B".

2-axis portal, variable

2-axis transfer with lifgo® linear for each axis. Grippers, clamps, vacuum devices, or other auxiliary devices can be installed at the ends of the gear racks.

Portal for single-side access

Compact 3-axis handling system with extendible support arm. Ideal for one-sided access. Compact, fast, precise, and low-vibration due to linear guide reinforcements.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

2-axis positioning table with auxiliary equipment on request

Standing 2-axis positioning table for high loads and fast travel speeds. A Z-axis or other accessories can be mounted. A suspended version is also possible.

3-axis positioning system (DAP) based on lifgo®

Flexible spatial movement thanks to lifgo® gear unit controlling 3 axes. Components are picked up and clamped at the top end of the Z-axis. The system is able to support transverse forces and process forces. It is suitable for use, for example, in production lines in the automotive industry. The DAP makes it possible to manufacture chassis frames of different sizes and shapes on one and the same production line. To do this, the distances between the pick-up points are adapted automatically for each chassis frame. For an illustration of the functioning of the system, you can also watch the video on our website.

AFP (Actuator Flexible Position) – NC locators

The LEANTECHNIK system construction kits

Our AFP axes are designed to flexibly position brackets, tensioners, centring devices and much more. They can be used to mount different components, such as chassis parts.
The system construction kits consist of a longitudinal axis, transverse axis, lifting axis and drive units.

freely selectable motor position

universal accessory selection

extremely compact design

2-axis portal with 2 vertical axes

Portal with two lifgo® linear units and an additional lifgo® guide. Two lifgo® units are installed on it for the Z-axis. Auxiliary devices are installed at the ends of the gear racks.

4-axis system with rotary head and suction pad

4-axis "pick & place" system with linear motion. The fifth axis is used as an off-centre rotary axis with a suction pad or magnet. This application is used for picking up area-optimized pre-cut parts (sheet metal, etc.) and for the accurately aligned stacking of the parts on the opposite pallet.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

2-axis transfer with gripper function

Standing 2-axis transfer part feeder. A horizontal stroke axis, a gripper or closing axis, synchronous on both sides toward the middle. Can be used as a stepped conveyor. Also available as a 3 axis transfer with horizontal and vertical stroke and synchronous closing axis.

For the systems shown below in this chapter, all lengths and distances as well as the lifting speed and load capacity can be freely selected.

1-rail shuttle, hanging, 2-axle drive

Suspended 1-arm shuttle. The gear rack and lifgo® linear unit are suspended below the beam for the horizontal drive. The assembly and second lifgo® for the Z-stroke are mounted on it. Grippers, suction pads, or other devices can be installed on the suspended standard aluminium profile.

1-rail shuttle, standing, 2-axle drive

lifgo® gear units are oriented vertically in the Z direction, connected and synchronised by means of the rotary axis. Rotary reinforcements ensure precise angular synchronicity. A lifgo® linear unit with an additional lifgo® guide car is mounted on it, in order to be able to move the profile beam reversibly in the X or Y direction. This creates a 2-axis reversing shuttle.

1-arm shuttle, suspended, 2-axis drive with 5 gripper stations

The horizontal stroke is suspended. In contrast to the previous example, the vertical stroke has been designed so that a second lifgo® lifting unit is installed in the horizontal direction next to each vertically oriented unit.

The gear units are each connected and synchronised by a profile shaft. In the horizontal direction, a tensile force acts on the gear racks and causes the pinion to rotate. This force is transferred to the vertical lifgo®, and the rotation is redirected again into a linear motion (vertical in this case).

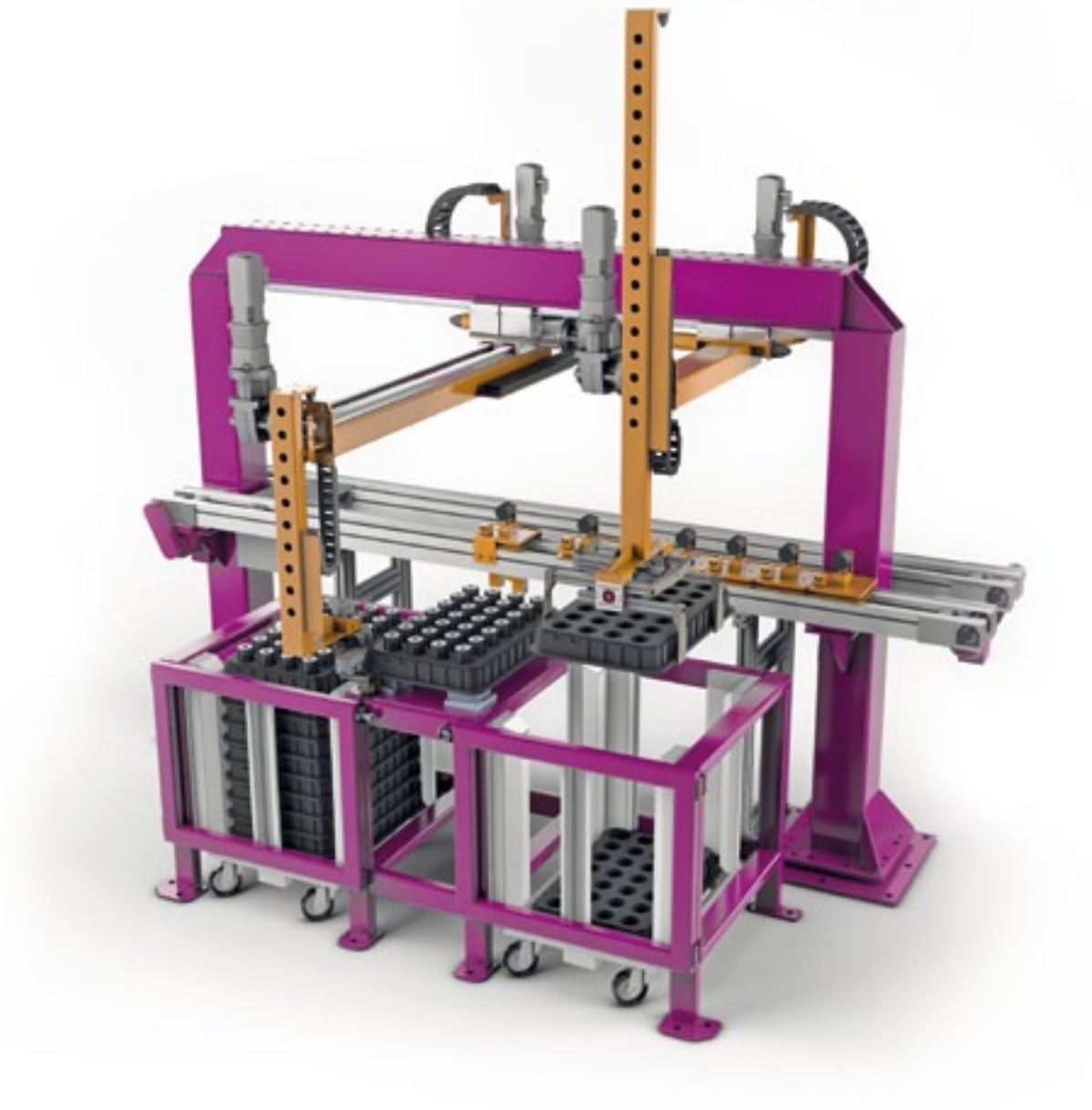
2-arm shuttle, standing, 2-axis external drive

Designed as a 2-axis transfer shuttle with externally mounted drives. The system can also be designed as a 3-axis transfer gripper shuttle.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

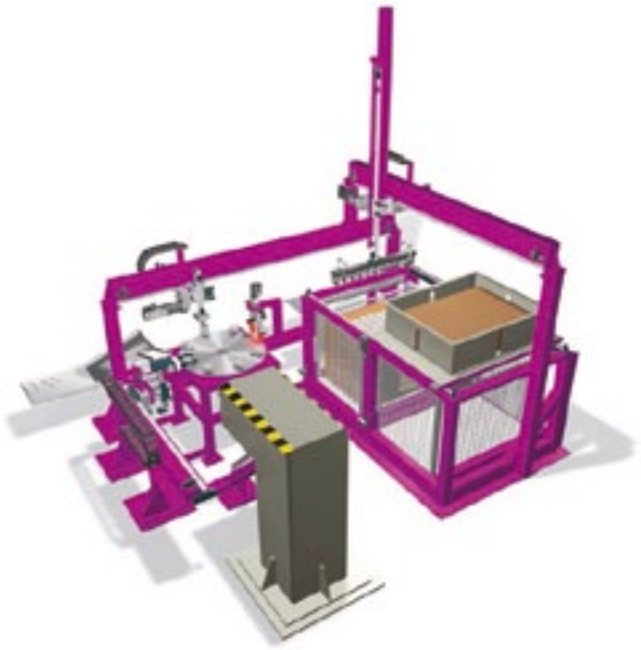
For the systems shown below in this chapter, all lengths and distances as well as the lifting speed and load capacity can be freely selected.

lifgo® portal system with 3-axis gripper arm and 2-axis palletiser



Complex combination of palletiser and feed mechanism. The movements of the two arms are harmonized with one another. The 3-axis gripper arm takes the blanks from the left-hand stack, places them on the conveyor and returns a finished part to the blister pack. The 2-axle palletiser moves the blister to the 3 different positions and has been designed with lifgo® double gear units and two lifgo® linear gear units. Gripper jaws are attached to the ends of the lifgo® double gear units and transform the gear units into gripper modules. The system was completely designed, built, and assembled.

Sorting system, complete



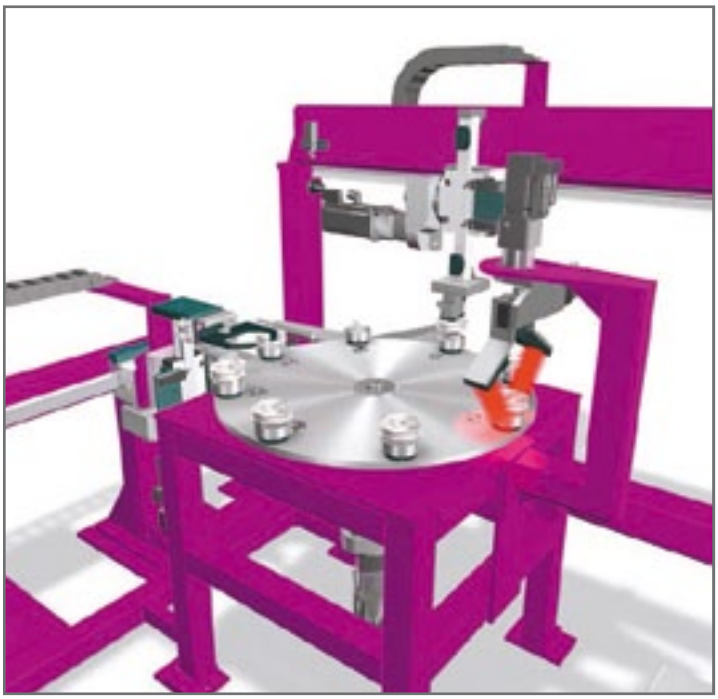
Complete system, including controls and integration in the full line for removing production parts – in this case, large industrial castings. The lifgo®series is used in various multi-axis portals and transfer systems. High cycle time. Precise guiding and positioning.

lifgo® linear 2-axis module, ready-to-install design

Modules with 1 or 2 axes are available. They can be provided as designed and assembled units. The level of completion can be determined individually. This is a 2-axis module, lifgo® linear (X-Z stroke) including end switches, end-of-stroke dampers, media chains and drives.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

Partial system with lifgo® and third-party components



Design and construction of a round measurement table with feeding and disposal, using lifgo® linear axes. All lifgo®elements of a single size from the modular system are used here.

Sorting system with lifgo® and third-party components

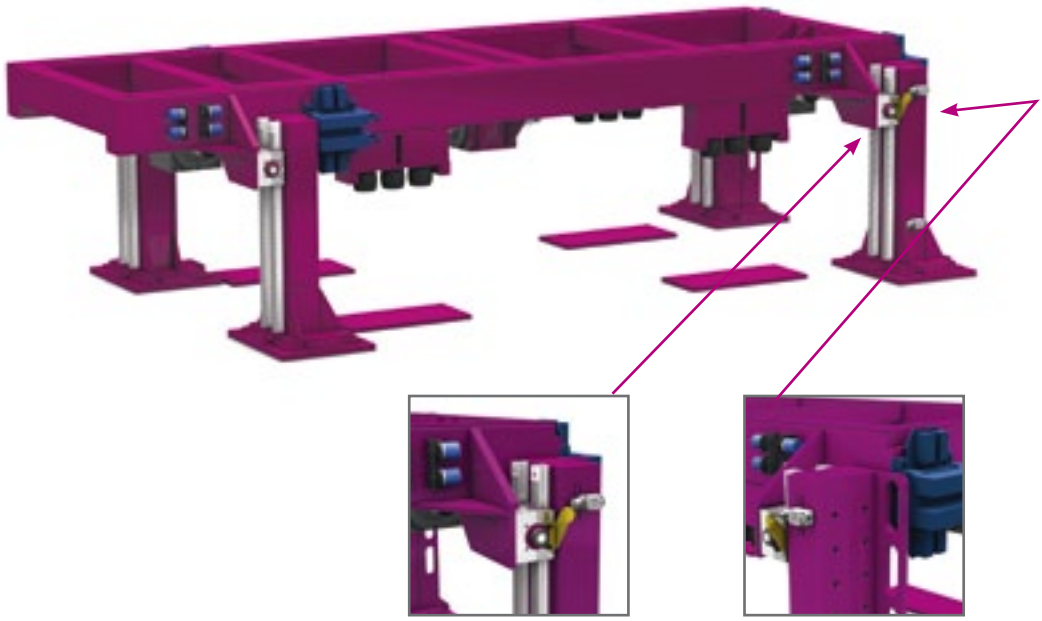
Complex sorting system ,including controls and logistics, for stacking sorting boxes in a storage area. The system was completely designed, built, and assembled.

lean SL® Lifting table

Lift table for high loads with high repeat accuracy. Loose guidance to prevent overdefinition, for example during centring tasks. A lift table consists of two double columns, each of which is equipped with two lean SL® gear units and, in the configuration illustrated here which uses size 5.3 gear units, is able to lift 1800 kg, for example.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

lifgo® Precision lifting table



Application for high loads with high positioning and repeat accuracy. Precise guidance and maintenance of position during the stroke are required. Safety pegs, central lubrication and damping are used as auxiliary equipment here. Synchronicity is maintained by a central drive.

lifgo® linear transfer – 17 meters, with gripper stations

Partial transfer system with lifgo® linear for the horizontal stroke. Scope includes steel construction, assembly, operational testing, and final installation. The grippers take parts from the transfer and dip them into process baths for further processing. Used in the chemical industry.

Please note that all the systems illustrated here are simply examples and that many other designs are possible.

Lifting-lowering conveyor (HSF)

Lifting table meets skid conveyor

To transport chassis as efficiently as possible, in the lifting-lowering conveyor, we combine a skid system with two of our lifting columns. The construction lowers, lifts and conveyor heavy loads – and not just in automotive construction.

HIGH PRECISION

The lifting-lowering conveyor works with very high precision and positions chassis with consistent accuracy.

HIGH LIFTING SPEED

With its compact design, the lifting-lowering conveyor moves components in seconds.

FLEXIBLE DESIGN

The slim steel construction of the lifting-lowering conveyor is designed to be flexible and save space.

Individual demands, precise solutions

LEANTECHNIK offers a multitude of different hoist gears for a wide range of applications. If your project cannot be implemented with the gear units in out standard portfolio, please contact us.

We will develop a gear unit tailored to your needs at a great price!

Since it was founded, LEANTECHNIK AG has designed tailored solutions for a range of customers.

Example situations for bespoke gear units:

- **Extreme loads**
- **Specific materials**
- **Specialised finishes**
- **Special dimensions**
- **Unusual environmental conditions**

Some solutions meet demands that we have never encountered at LEANTECHNIK, but are suitable for the needs of a new, wider customer base. Developments like these find their way into the LEANTECHNIK AG's standard range.

Your ideas are our challenges!

Microchips and kettle chips

LEANTECHNIK AG's gear units have always been moved by a wide range of components and products. This flexibility allows us to address customers from both the semiconductor and the food industry, for example. This has led to the development of the extra-small lean SL® 5.m. In an environment requiring the highest precision and the highest level of purity, it runs permanently and reliably with the lowest possible particle emissions.

Different dimensions, the same precision

Our lean SL® 5.5 was first designed for the extreme environment of a nuclear reactor. The requirements brought to us were therefore extraordinary in all respects. The so developped lean SL® 5.5 has since then served not only in the combustion chamber of a nuclear facility, but has taken on many other heavy-duty tasks in the industry as well.

Does your project have very special requirements?

Are you unsure whether you can use gear units from LEANTECHNIK AG?

Our engineers will find a way to develop and build gear units or a 'partial system', which we call leantranspo®, to meet your requirements.

lean SL® 5.5

lean SL® 5.m

Do you already have a specific project in mind?

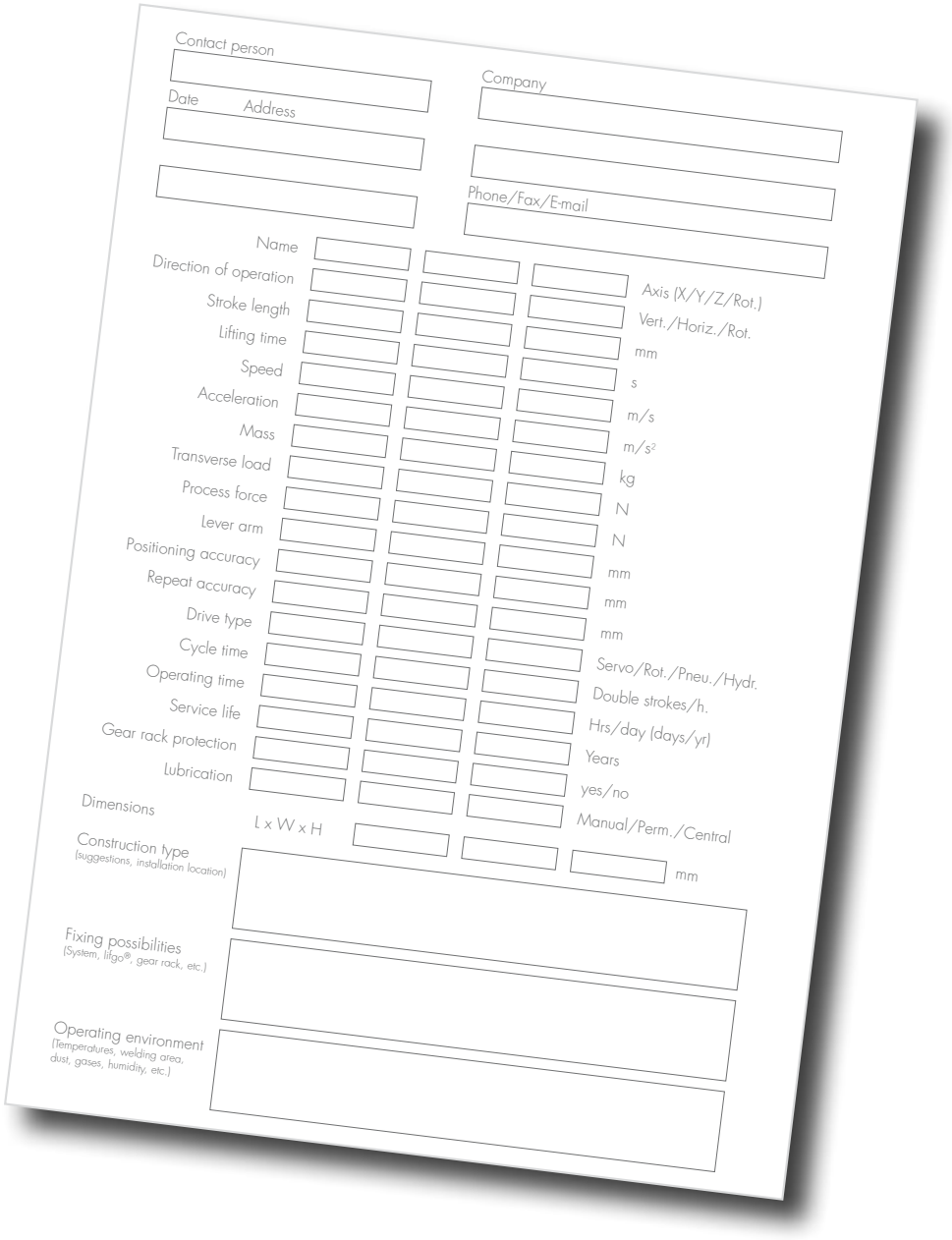
On our website at: www.leantechnik.com/kontakt/projektfragebogen you will find a project questionnaire.

Using this questionnaire, we can find out some important information from you ahead of time.

If you already have a project with some key data, we can use this project questionnaire to more quickly help you find a solution and offer you a product to meet your needs.

We look forward to hearing from you.

Your ideas are our challenges!



LEANTECHNIK MOVEMENT our PASSION

lifgo® & lean SL®

Technical data & dimension sheets

www.leantechnik.com

General

Technical data and dimension sheets for all gearbox types and the associated variants are listed below. Please observe the important notes on the use of lifgo® and lean SL® gear units on this page. They apply to all types of gear units and accessories.

Specific notes on the individual gear units or accessory components, and their associated technical data and illustrations, are found on the corresponding page.

- lifgo® & lean SL® can be combines or used as replacements for each other.
- The lifgo®/lean SL® pinion connections are identical. Force transmission is unequal!
- lifgo® & lean SL® have the same accessories, and identical interfaces and dimensions.
- All gear units have centring points for installing adapter discs for mounting gear unit motors.
- We carry profile shafts as accessories for synchronisation and rotationally rigid connection. For the pin (ZA 1/ZA 2) and keyway (PFN) versions, couplings and connectors must be configured on a project-specific basis.
- The total lifting force is made up of the weight and acceleration force.
- In the case of vertically oriented gear racks, their own weight plus that of the mounted parts must be taken into consideration.
- Note the maximum permissible transverse force moments of the lifgo®gear unit.
- lean SL® gear units cannot support any transverse forces.
- The lifting force and torque transfer of the primary gear unit must not be exceeded.
- Make sure that the system documentation addresses the initial and maintenance lubrication of the gear units and that lubrication at the site is ensured.
- Only one plug may be removed for lube holes U, U1; all others remain installed to prevent grease from escaping.
- One grease nipple is threaded into each tapped hole U, U1, and tightened.
- Ensure that all lube holes remain accessible after installation.
- Note that the lifgo® gear rack guide and the pinion housing must be lubricated separately; in the case of lean SL®, they must be lubricated together.
- Make sure that the correct pinion shaft version is specified when ordering.
- Observe the maximum transmitted forces of the accessory components in the gear unit system.
- Observe the general rules of physics and mechanical engineering (VDMA) when configuring the system.
- All dimensions are shown in millimetres (mm).
- The tolerance for the location of dowel holes is ± 0.02 mm for all gear units.
- For safety reasons, request the theoretical service life of your application.

You can access the relevant CAD data using the individual item numbers.

lifgo® Series • Technical Data

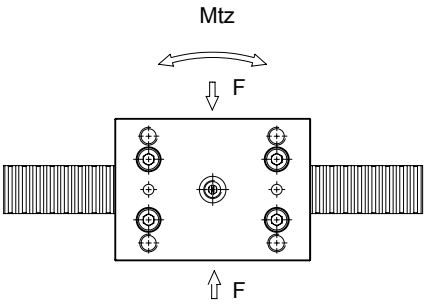
lifgo®

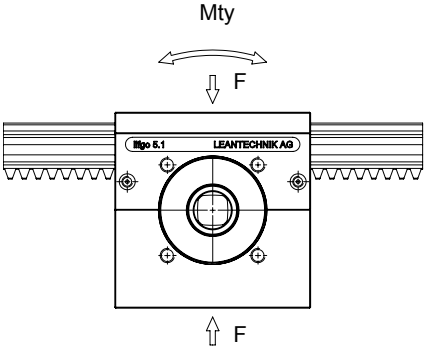
lifgo® linear

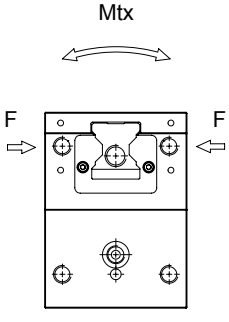
lifgo® double

lifgo® linear double

Make sure that the article number refers to the correct pinion shaft version.





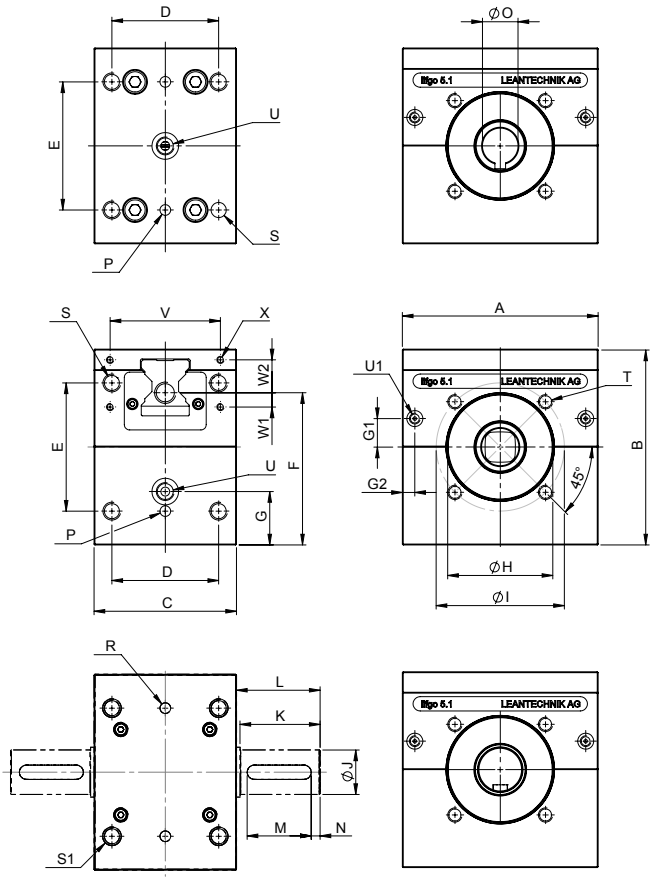


- The technical data on this page apply to all versions of the lifgo®series (lifgo®, lifgo® linear, lifgo® double, lifgo® linear double).
- Breakaway force for new, unlubricated gear rack guides is 30N per lifgo® unit. This value drops to near zero after the run-in phase.
- The breakaway force of hardened gear racks is approximately 80N.
- The pretensioning of guide cars is 2%.

lifgo® series technical data		Unit	5.0	5.1	5.3	5.4
Lifting power	F_{max}	N	2000	3800	15900	25000
Lifting speed	v_{max}	m/s	3	3	3	3
Acceleration	a_{max}	m/s^2	50	50	50	50
Torque	M_{max}	Nm	20	76	477	1000
Pitch diameter	Ø pt.	mm	20	40	60	80
Lifting gear ratio	mm/360°	62.8318	125.6637	188.4955	251.3274	
Efficiency	h		0.92	0.92	0.92	0.92
Temperature resistance	t	°C	-10 to +80	-10 to +80	-10 to +80	+80
Static torque	Mt_x stat.	Nm	570	760	4400	5500
Dynamic torque	Mt_x stat.	Nm	280	390	2200	2800
	Mt_y stat.	Nm	380	650	3300	3300
	Mt_y dyn.	Nm	180	330	1600	1600
	Mt_z stat.	Nm	380	650	3300	3300
	Mt_z dyn.	Nm	180	330	1600	1600
Static load rating	F stat.	N	38400	51200	161400	161400
Dynamic load rating	F dyn.	N	19100	25900	79600	79600

lifgo® 5.0 - 5.4 • Dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

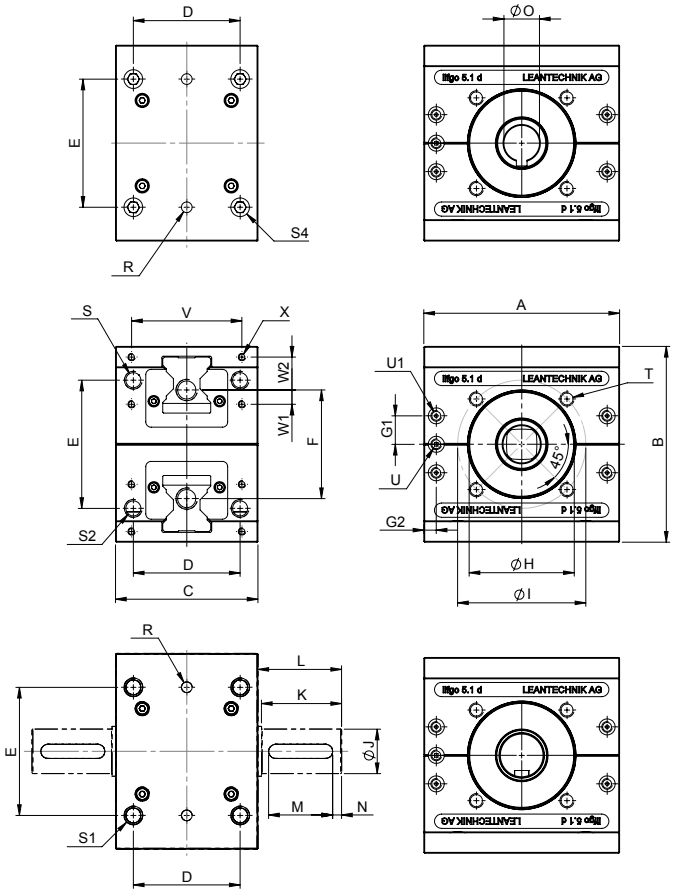
This standard lifgo® is compatible and can be combined with lean SL®gearboxes of the same size.

lifgo® gearbox		Unit	5.0	5.1	5.3	5.4
	A	mm	80	110	180	180
	B	mm	80	110	180	200
	C	mm	70	80	130	165
	D	mm	55	60	105	130
	E	mm	50	72	120	140
	E2					135
	F	mm	59	85,5	139,5	159,5
	G	mm	26	30	55	55
	G1	mm	7,5	16	21,5	31,5
	G2	mm	7	7	13	13
Locating flange	H	mm	⌀ 38.5 H7 ↧ 2	⌀ 59 H7 ↧ 3	⌀ 92 H7 ↧ 3	⌀ 117 H7 ↧ 3
(remove sealed plate, when in use)	I	mm	⌀ 48	⌀ 72	⌀ 110	⌀ 135
Key DIN 6885 P9	J	mm	⌀ 14 h7	⌀ 25 h7	⌀ 42 h7	⌀ 55 h7
	K	mm	30	45	60	80
	L	mm	32	47	62	82
	M	mm	25	36	50	70
	N	mm	2	5	5	5
Key DIN 6885 P9	O	mm	⌀ 10 H7	⌀ 20 H7	⌀ 35 H7	⌀ 50 H7
	P	mm	⌀ 6 H7 ↧ 10	⌀ 6 H7 ↧ 10	⌀ 6 H7 ↧ 10	⌀ 6 H7 ↧ 10
	R	mm	⌀ 6 H7 ↧ 2.5	⌀ 6 H7 ↧ 3.5	⌀ 6 H7 ↧ 10	⌀ 6 H7 ↧ 10
	S	mm	M8 ↧ 25	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			⌀ 6.8 through	⌀ 8.5 through	⌀ 10.2 through	⌀ 10.2 through
	S1	mm	⌴ ⌀ 8.5 ↧ 8.5	⌴ ⌀ 10.5 ↧ 11.5	⌴ ⌀ 12.5 ↧ 19	⌴ ⌀ 12.5 ↧ 19
			M8 ↧ 25	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			⌀ 6.8 through	⌀ 8.5 through	⌀ 10.2 through	⌀ 10.2 through
	T	mm	M6 ↧ 8	M8 ↧ 10	M10 ↧ 20	M10 ↧ 10
Lube hole	U	mm	M10 x 1 ↧ 10	M10 x 1 ↧ 10	M10 x 1 ↧ 10	M10 x 1 ↧ 10
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	58	62	100	120
	W1	mm	5.5	8	21.5	21.5
	W2	mm	15.5	18.5	30	30
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	2,25	5,10	14.30	25.3
Weight ZA1		kg	2,36	5,45	16.15	26.8
Weight ZA2		kg	2,40	5,62	16.81	26.8
Weight PFN		kg	2,28	5,07	14.51	21.2

Article number		5.0	5.1	5.3	5.4
lifgo® PW		500 001	500 002	500 003	500 004
lifgo® ZA 1		500 005	500 006	500 007	500 008
lifgo® ZA 2		500 009	500 010	500 011	500 012
lifgo® PFN		500 013	500 014	500 015	500 016

lifgo® double 5.0 - 5.4 • Dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

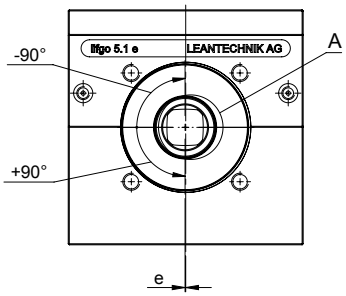
lifgo® double is suitable for "feeding to centre" or "stroke to centre", and for gripping and closing motions.

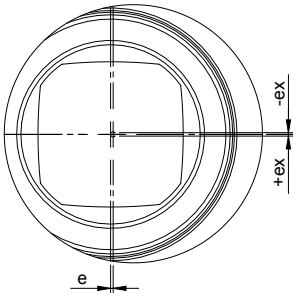
lifgo® double		Unit	5.0	5.1	5.3	5.4
	A	mm	80	110	180	180
	B	mm	80	110	180	200
	C	mm	70	80	130	165
	D	mm	55	60	105	130
	E	mm	50	72	120	140
	E2	mm	50	72	120	135
	F	mm	38	61	99	119
	G1	mm	7,5	16	21,5	31,5
	G2	mm	7	7	13	13
Locating flange (remove sealing plate when in use) ø 135	H	mm	ø 38,5 H7 ↧ 2	ø 59 H7 ↧ 3	ø 92 H7 ↧ 3	ø 117 H7 ↧ 3
	I	mm			ø 48	ø 72 ø 110
Key DIN 6885 P9	J	mm	ø 14 h7	ø 25 h7	ø 42 h7	ø 55 h7
	K	mm	30	45	60	80
	L	mm	32	47	62	82
	M	mm	25	36	50	70
	N	mm	2	5	5	5
Key DIN 6885 P9	O	mm	ø 10 H7	ø 20 H7	ø 35 H7	ø 50 H7
	R	mm	ø 6 H7 ↧ 2.5	ø 6 H7 ↧ 3.5	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10
	S	mm	M8 ↧ 25	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			ø 6.8 through	ø 8.5 through	ø 10.2 through	ø 10.2 through
	S1	mm	⌴ ø 8.5 ↧ 8.5	⌴ ø 10.5 ↧ 11.5	⌴ ø 12.5 ↧ 19	⌴ ø 12.5 ↧ 19
			M8 ↧ 25	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
	S2	mm	M8 ↧ 11	M10 ↧ 14	M12 ↧ 24	M12 ↧ 16.5
	S4	mm	⌴ ø 8.5 ↧ 8.5	⌴ ø 10.5 ↧ 11.5	⌴ ø 12.5 ↧ 19	⌴ ø 12.5 ↧ 19
	T	mm	M6 ↧ 8	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	58	62	100	120
	W1	mm	5,5	8	21,5	21,5
	W2	mm	15.5	18.5	30	30
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	1.55	3.75	16.10	23.10
Weight ZA1		kg	1.66	4.10	17.95	27.10
Weight ZA2		kg	1.70	4.27	18.61	28.60
Weight PFN		kg	1.58	3.72	16.31	23.00

Article number	5.0	5.1	5.3	5.4
lifgo® double PW	500 065	500 066	500 067	500 068
lifgo® double ZA 1	500 069	500 070	500 071	500 072
Lifgo®double®double ZA 2	500 073	500 074	500 075	500 076
lifgo® double PFN	500 077	500 078	500 079	500 080

lifgo® Excentre 5.0 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.





Video Functioning

Video gear rack installation

Installation instructions

CAD Data

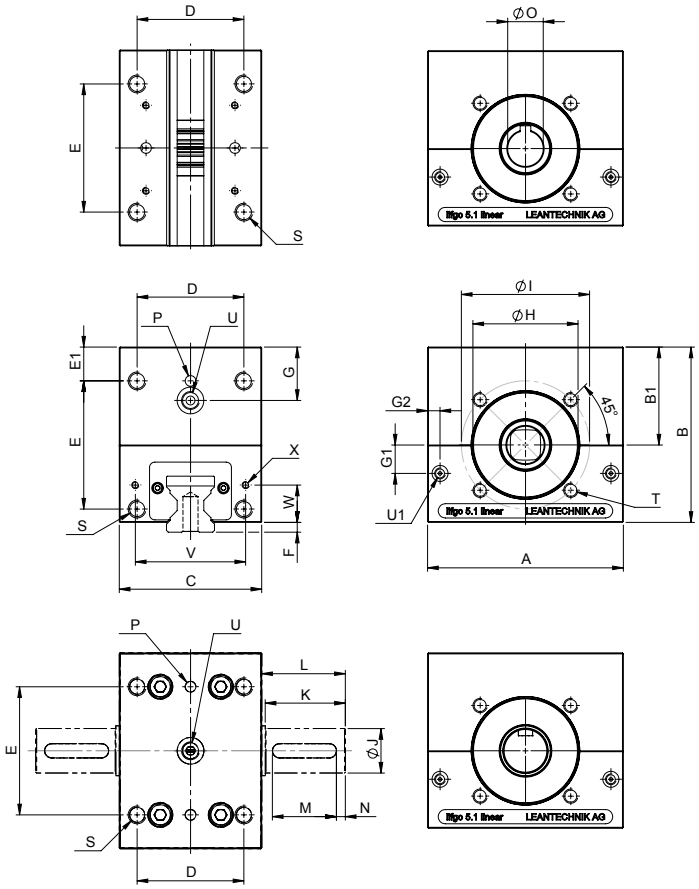
- The dimensions of the "eccentric" version are identical to those of the standard lifgo®. Please use the dimensions on page 56.
- In the "eccentric" version, the pinion shaft is adjusted relative to the gear rack, allowing the tooth flank clearance to be adjusted. It can be readjusted at a later time. Motor flanges, gearbox bell housings, etc. remain centred on the pinion during adjustment.
- Note that "eccentric" gearboxes cannot be combined with standard gearboxes (centred bearings). The pinion shafts are not aligned. (Max. lateral error 0.3 mm).
- Follow the instructions for use, available as a separate PDF. A printed copy is included with the gearboxes.

Lifgo®® Excentre reduced play		unit	5.0	5.1	5.3	5.4
Adjustment range	e	mm	± 0.200	± 0.300	± 0.300	± 0.300
Adjustment steps	n	mm	± 4	± 6	± 6	± 6
Adjustment per step	e0	mm	0	0	0	0
	e1	mm	± 0.076	± 0.078	± 0.078	± 0.078
	e2	mm	± 0.141	± 0.150	± 0.150	± 0.150
	e3	mm	± 0.185	± 0.212	± 0.212	± 0.212
	e4	mm	± 0.200	± 0.260	± 0.260	± 0.260
	e5	mm		± 0.290	± 0.290	± 0.290
	e6	mm	± 0.300	± 0.300	± 0.300	
Weight ZA 1		kg				24.8
Weight ZA 2		kg				26.4
Weight PFN		kg				20.8

Article number		5.0	5.1	5.3	5.4
lifgo® double PW		500 065	500 066	500 067	500 068
lifgo® double ZA 1		500 069	500 070	500 071	500 072
lifgo® double ZA 2		500 073	500 074	500 075	500 076
lifgo® double PFN		500 077	500 078	500 079	500 080

lifgo® linear 5.0 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

lifgo® linear is used for long stroke lengths, with a fixed gear rack.

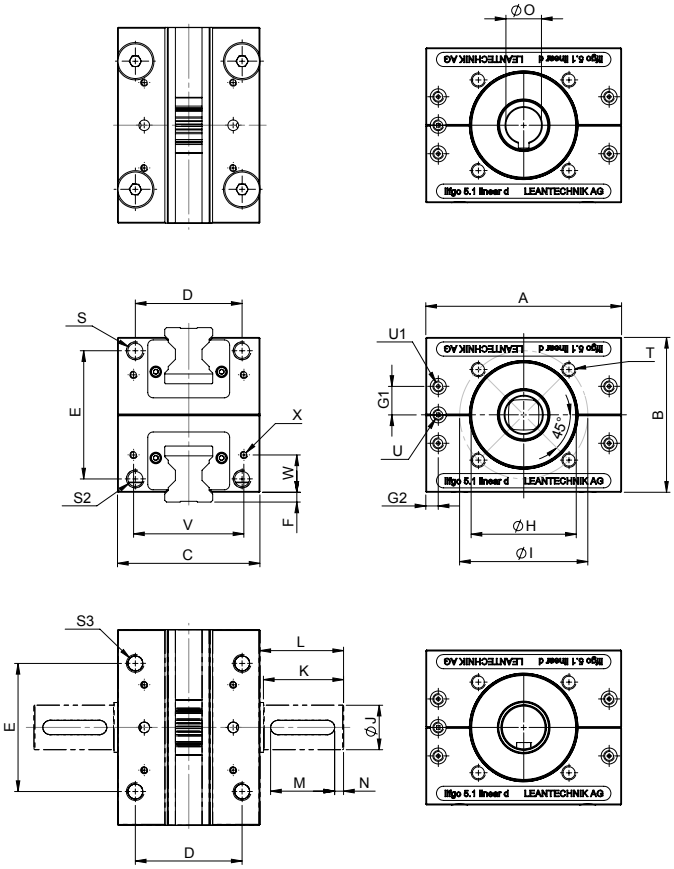
If the gearbox is fixed and the gear rack is freely moveable, then it can be reinforced with profiles.

lifgo®® linear		unit	5.0	5.1	5.3	5.4
	A	mm	80	110	180	180
	B	mm	71.5	98.5	161	181
	B1	mm	40	55	90	100
	C	mm	70	80	130	165
	D	mm	55	60	105	130
	E	mm	50	72	120	140
	E1	mm	15	19	30	30
	E2					135
	F	mm	3.5	5.5	5	5
	G	mm	26	30	55	55
	G1	mm	7,5	16	21.5	31.5
	G2	mm	7	7	13	13
Locating flange	H	mm	ø 38.5 H7 ↧ 2	ø 59 H7 ↧ 3	ø 92 H7 ↧ 3	ø 117 H7 ↧ 3
(remove sealed plate, when in use)	I	mm	ø 48	ø 72	ø 110	ø 110
Key DIN 6885 P9	J	mm	ø 14 h7	ø 25 h7	ø 42 h7	ø 55 h7
	K	mm	30	45	60	80
	L	mm	32	47	62	82
	M	mm	25	36	50	70
	N	mm	2	5	5	5
Key DIN 6885 P9	O	mm	ø 10 H7	ø 20 H7	ø 35 H7	ø 50 H7
	P	mm	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10
	R					ø 6 H7 ↧ 10
	S	mm	M8 ↧ 25 ø 6.8 through	M10 ↧ 25 ø 8.5 through	M12 ↧ 35 ø 10.2 through	M12 ↧ 35 ø 10.2 through
	T	mm	M6 ↧ 5	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M10 x 1 ↧ 10	M10 x 1 ↧ 10	M10 x 1 ↧ 10	M10 x 1 ↧ 10
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	58	62	100	120
	W	mm	18	21	43	43
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	2,15	4,85	13.25	20
Weight ZA1		kg	2,26	5,20	15.10	24
Weight ZA2		kg	2,30	5,37	15.76	25.5
Weight PFN		kg	2,20	4,82	13.46	19.9

Article number	5.0	5.1	5.3	5.4
lifgo® linear PW	500 033	500 034	500 035	500 036
lifgo® linear ZA 1	500 037	500 038	500 039	500 040
lifgo® linear ZA 2	500 041	500 042	500 043	500 044
lifgo® linear PFN	500 045	500 046	500 047	500 048

lifgo® linear double 5.0 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

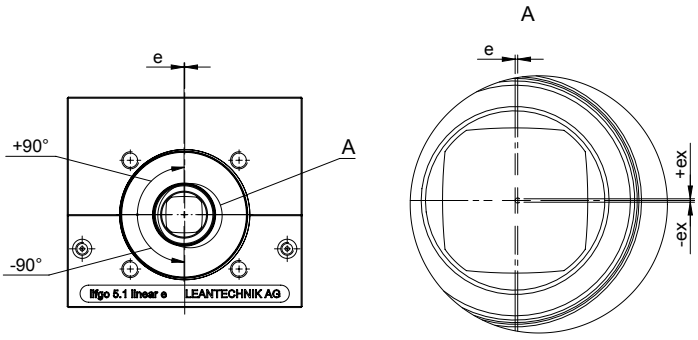
For the lifgo® linear double version, reinforcements or infeeds can be mounted on the gear racks.

lifgo®® linear double		unit	5.0	5.1	5.3	5.4
	A	mm	80	110	180	180
	B	mm	63	87	142	162
	C	mm	70	80	130	165
	D	mm	55	60	105	130
	E	mm	50	72	120	140
	E2	mm				135
	F	mm	3.5	5.5	5	5
	G	mm				55
	G1	mm	7,5	16	21.5	31.5
	G2	mm	7	7	13	13
Locating flange	H	mm	ø 38.5 H7 ↧ 2	ø 59 H7 ↧ 3	ø 92 H7 ↧ 3	ø 117 H7 ↧ 3
(remove sealed plate, when in use)	I	mm	ø 48	ø 72	ø 110	ø 135
Key DIN 6885 P9	J	mm	ø 14 h7	ø 25 h7	ø 42 h7	ø 55 h7
	K	mm	30	45	60	80
	L	mm	32	47	62	82
	M	mm	25	36	50	70
	N	mm	2	5	5	5
Key DIN 6885 P9	O	mm	ø 10 H7	ø 20 H7	ø 35 H7	ø 50 H7
	P	mm				ø 6 H7 ↧ 10
	R	mm				ø 6 H7 ↧ 10
	S	mm	M8 ↧ 25	M10 ↧ 25	M12 ↧ 30	M12 ↧ 35
			ø 6.8 through	ø 8.5 through	ø 10.2 through	ø 10.2 through
	S2	mm	M8 ↧ 11	M10 ↧ 14	M12 ↧ 24	M12 ↧ 16.5
	S3	mm	M8 ↧ 15	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
	T	mm	M6 ↧ 8	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M10 x 1 ↧ 10
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	58	62	100	120
	W	mm	18	21	43	43
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	1.35	3.35	14.80	20.50
Weight ZA1		kg	1.46	3.70	16.65	24.50
Weight ZA2		kg	1.50	3.82	17.31	26.00
Weight PFN		kg	1.38	3.32	15.01	20.40

Article number	5.0	5.1	5.3	5.4
lifgo® linear double PW	500 081	500 082	500 083	500 084
lifgo® linear double ZA 1	500 085	500 086	500 087	500 088
lifgo® linear double ZA 2	500 089	500 090	500 091	500 092
lifgo® linear double PFN	500 093	500 094	500 095	500 096

lifgo® linear excentre 5.0 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

- The dimensions of the "eccentric" version are identical to those of the lifgo® linear. Please use the dimensions on page 62.
- In the "eccentric" version, the pinion shaft is adjusted relative to the gear rack, allowing the tooth flank clearance to be adjusted. It can be readjusted at a later time. Motor flanges, gearbox bell housings, etc. remain centred on the pinion during adjustment.
- Note that "eccentric" gearboxes cannot be combined with standard gearboxes (centred bearings). The pinion shafts are not aligned. (Max. lateral error 0.3 mm).
- Follow the instructions for use, available as a separate PDF. A printed copy is included with the gearboxes

lifgo®® linear excentre reduced play		unit	5.0	5.1	5.3	5.4
Adjustment range	e	mm	± 0.200	± 0.300	± 0.300	± 0.300
Adjustment steps	n	mm	± 4	± 6	± 6	± 6
Adjustment per step	e0	mm	0	0	0	0
	e1	mm	± 0.076	± 0.078	± 0.078	± 0.078
	e2	mm	± 0.141	± 0.150	± 0.150	± 0.150
	e3	mm	± 0.185	± 0.212	± 0.212	± 0.212
	e4	mm	± 0.200	± 0.260	± 0.260	± 0.260
	e5	mm		± 0.290	± 0.290	± 0.290
	e6	mm	± 0.300	± 0.300	± 0.300	
Weight ZA 1		kg				23.5
Weight ZA 2		kg				25.1
Weight PFN		kg				19.5

Article number		5.0	5.1	5.3	5.4
lifgo® linear Excentre PW		500 049	500 050	500 051	
lifgo® linear Excentre ZA 1		500 053	500 054	500 055	500 056
lifgo® linear Excentre ZA 2		500 057	500 058	500 059	500 060
lifgo® linear Excentre PFN		500 061	500 062	500 063	500 064

lifgo® SVZ (helical gearing) Series • technical data

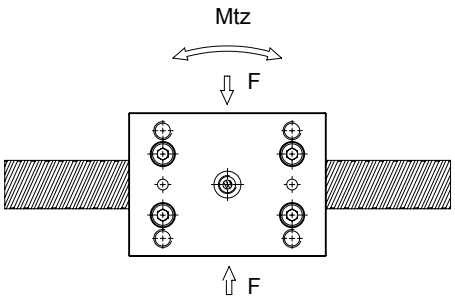
lifgo® SVZ

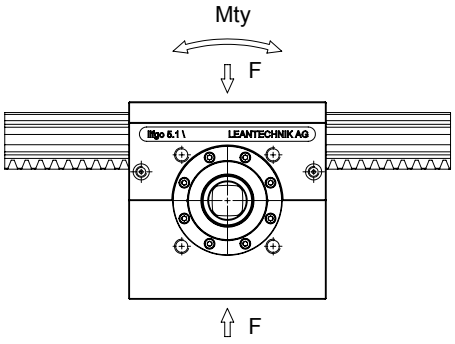
lifgo® linear SVZ

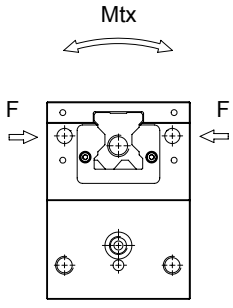
lifgo® double SVZ

lifgo® linear double SVZ

Make sure that the article number refers to the correct pinion shaft version.







Video Functioning

Video gear rack installation

Installation instructions

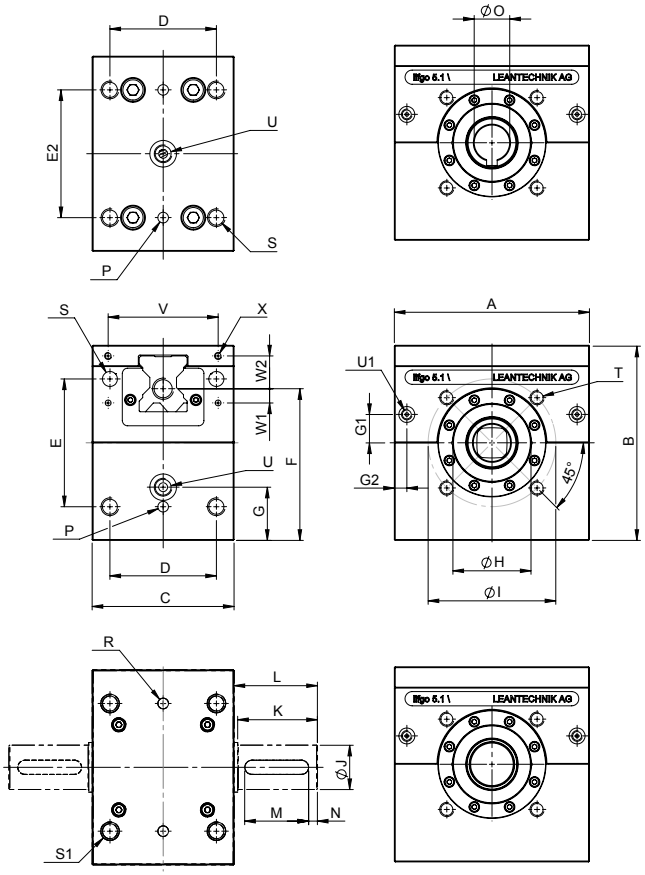
CAD Data

- The technical data on this page apply to all versions of the lifgo® SVZ series (lifgo® SVZ, lifgo® linear SVZ, lifgo® double SVZ, lifgo® linear double SVZ).
- Breakaway force for new, unlubricated gear rack guides is 30N per lifgo® unit. This value drops to near zero after the run-in phase.
- The breakaway force of hardened gear racks is approximately 80N.
- The pretensioning of guide cars is 2%.

lifgo® SVZ Series technical data		Unit	5.1	5.3	5.4
Lifting power	F_{max}	N	3400	14400	22600
Lifting speed	v_{max}	m/s	3	3	3
Acceleration	a_{max}	m/s^2	50	50	50
Torque	M_{max}	Nm	67.15	428.40	898.35
Pitch diameter	Ø pt.	mm	39.5	59.5	79.5
Lifting gear ratio	mm/360°	124.0929	186.9248	249.7566	
Efficiency	h		0.92	0.92	0.92
Temperature resistance	t	°C	+80	+80	+80
Static torque	M_{tx} stat.	Nm	760	4400	5500
Dynamic torque	M_{tx} stat.	Nm	390	2200	2800
	M_{ty} stat.	Nm	650	3300	3300
	M_{ty} dyn.	Nm	330	1600	1600
	M_{tz} stat.	Nm	650	3300	3300
	M_{tz} dyn.	Nm	330	1600	1600
Static load rating	F stat.	N	51200	161400	161400
Dynamic load rating	F dyn.	N	25900	79600	79600

lifgo® SVZ 5.1 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

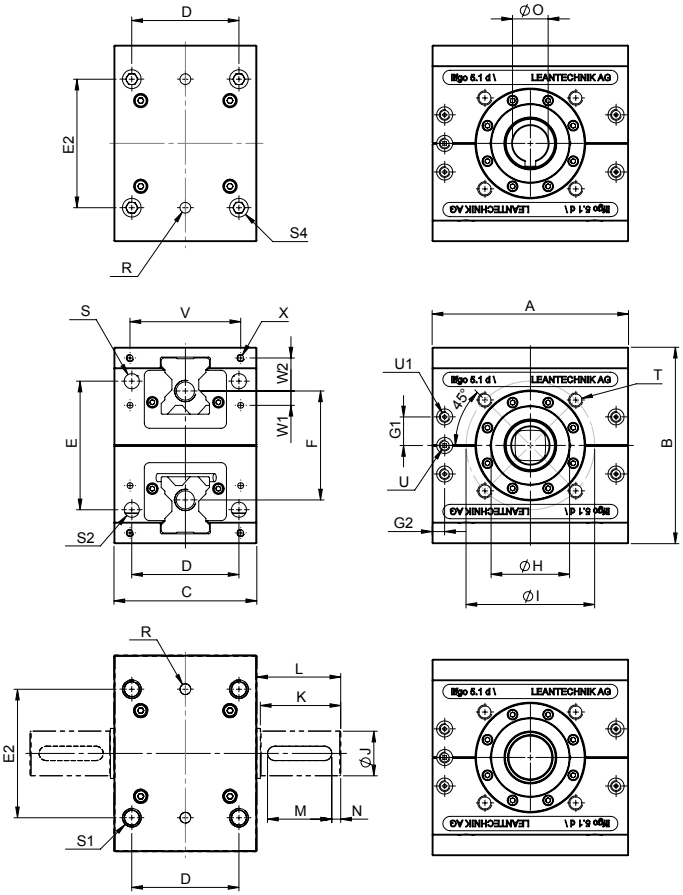
CAD Data

lifgo® SVZ gear units		Unit	5.1	5.3	5.4
	A	mm	110	180	180
	B	mm	110	180	200
	C	mm	80	130	165
	D	mm	60	105	130
	E	mm	72	120	140
	E2		72	120	135
	F	mm	85.5	139.5	159.5
	G	mm	30	55	55
	G1	mm	16	21.5	31.5
	G2	mm	7	13	13
Locating flange	H	mm	ø 44 H7 ↧ 3	ø 70 H7 ↧ 3	ø 95 H7 ↧ 3
(remove sealed plate, when in use)	I	mm	ø 72	ø 110	ø 135
Key DIN 6885 P9	J	mm	ø 25 h7	ø 42 h7	ø 55 h7
	K	mm	45	60	80
	L	mm	47	62	82
	M	mm	36	50	70
	N	mm	5	5	5
Key DIN 6885 P9	O	mm	ø 20 H7	ø 35 H7	ø 50 H7
	P	mm	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10
	R	mm	ø 6 H7 ↧ 3.5	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10
	S	mm	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			ø 8.5 through	ø 10.2 through	ø 10.2 through
	S1	mm	⌴ ø 10.5 ↧ 11.5	⌴ ø 12.5 ↧ 19	⌴ ø 12.5 ↧ 19
			M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			ø 8.5 through	ø 10.2 through	ø 10.2 through
	T	mm	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M10 x 1 ↧ 10	M10 x 1 ↧ 10	M10 x 1 ↧ 10
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	62	100	120
	W1	mm	8	21.5	21.5
	W2	mm	18.5	30	30
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	5,10	14.30	21.30
Weight ZA1		kg	5,45	16.15	25.30
Weight ZA2		kg	5,62	16.81	26.80
Weight PFN		kg	5,07	14.51	21.20

Article number	5.1	5.3	5.4
lifgo® PW	501 002	501 003	501 004
lifgo® ZA 1	501 006	501 007	501 008
lifgo® ZA 2	501 010	501 011	501 012
lifgo® PFN	501 014	501 015	501 016

lifgo® double SVZ 5.1 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

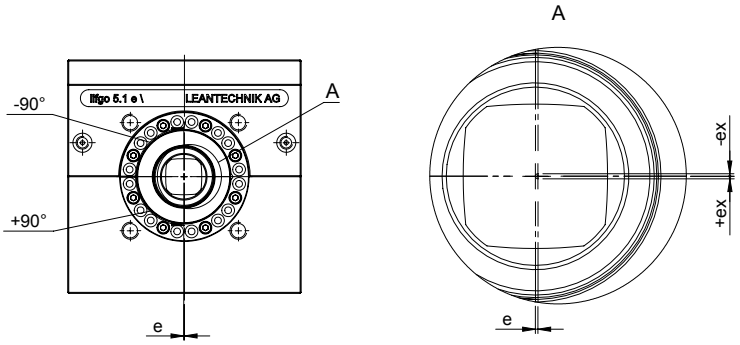
lifgo® double is suitable for "feeding to centre" or "stroke to centre", and for gripping and closing motions.

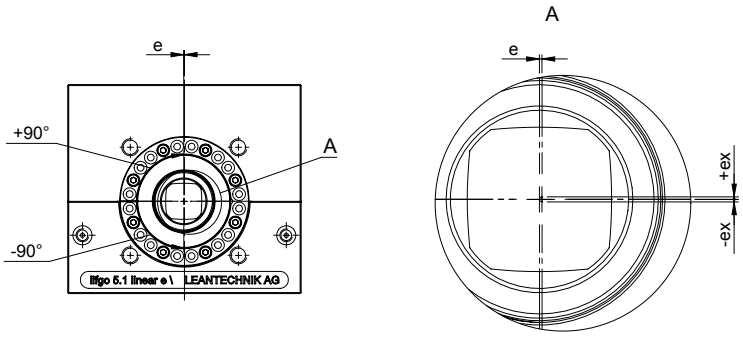
lifgo® double SVZ		Unit	5.1	5.3	5.4
	A	mm	110	180	180
	B	mm	110	180	200
	C	mm	80	130	165
	D	mm	60	105	130
	E	mm	72	120	140
	E2	mm	72	120	135
	F	mm	61	99	119
	G1	mm	16	21.5	31.5
	G2	mm	7	13	13
Locating flange	H	mm	ø 44 H7 ↧ 3	ø70 H7 ↧ 3	ø 92 H7 ↧ 3
(remove sealed plate, when in use)	I	mm	ø 72	ø 110	ø 135
Key DIN 6885 P9	J	mm		ø 25 h7	ø 42 h7 ø 55 h7
	K	mm	45	60	80
	L	mm	47	62	82
	M	mm	36	50	70
	N	mm	5	5	5
Key DIN 6885 P9	O	mm	ø 20 H7	ø 35 H7	ø 50 H7
	R	mm	ø 6 H7 ↧ 3.5	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10
	S	mm	M10 ↧ 25 ø 8.5 through	M12 ↧ 35 ø 10.2 through	M12 ↧ 35 ø 10.2 through
	S1	mm	⌴ ø 10.5 ↧ 11.5 M10 ↧ 25	⌴ ø 12.5 ↧ 19 M12 ↧ 35	⌴ ø 12.5 ↧ 19 M12 ↧ 35
	S2	mm	M10 ↧ 14	M12 ↧ 24	M12 ↧ 16.5
	S4	mm	⌴ ø 10.5 ↧ 11.5	⌴ ø 12.5 ↧ 19	⌴ ø 12.5 ↧ 19
	T	mm	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	62	100	120
	W1	mm	8	21.5	21.5
	W2	mm	18.5	30	30
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	3.75	16.10	23.10
Weight ZA1		kg	4.10	17.95	27.10
Weight ZA2		kg	4.27	18.61	28.60
Weight PFN		kg	3.72	16.31	23.00

Article number	5.1	5.3	5.4
lifgo® double PW	501 066	501 067	501 068
lifgo® double ZA 1	501 070	501 071	501 072
lifgo® double ZA 2	501 074	501 075	501 076
lifgo® double PFN	501 078	501 079	501 080

lifgo® Excentre SVZ 5.1 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.





Video Functioning

Video gear rack installation

Installation instructions

CAD Data

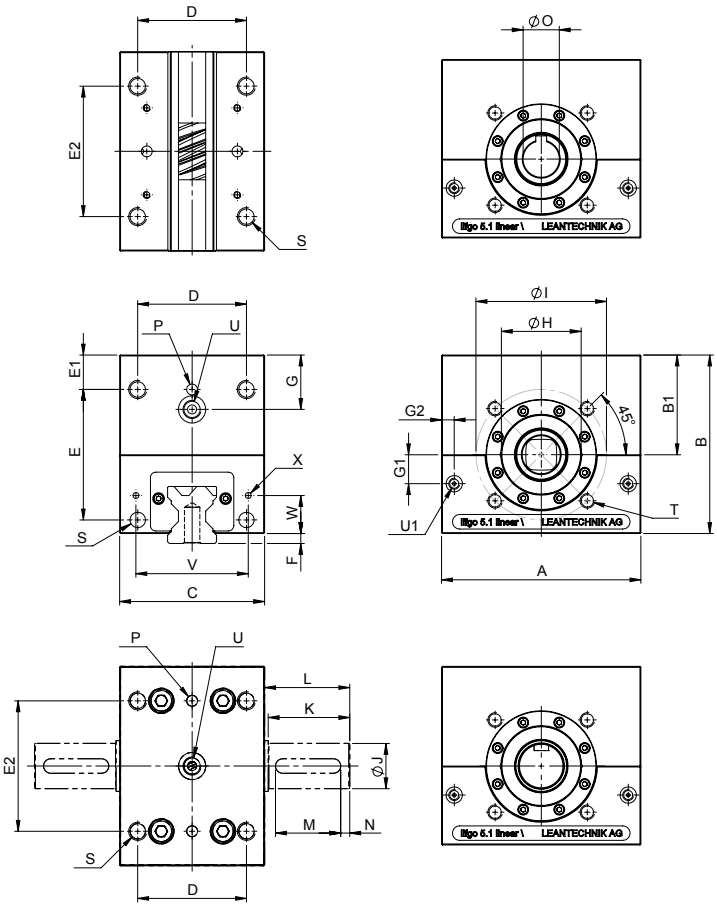
- The dimensions of the "eccentric" version are identical to those of the standard lifgo®. Please use the dimensions on page 70.
- In the "eccentric" version, the pinion shaft is adjusted relative to the gear rack, allowing the tooth flank clearance to be adjusted. It can be readjusted at a later time. Motor flanges, gearbox bell housings, etc. remain centred on the pinion during adjustment.
- Note that "eccentric" gearboxes cannot be combined with standard gearboxes (centred bearings). The pinion shafts are not aligned. (Max. lateral error 0.3 mm).
- Follow the instructions for use, available as a separate PDF. A printed copy is included with the gearboxes.

lifgo® Excentre SVZ reduced play		Unit	5.1	5.3	5.4
Adjustment range	e	mm	± 0.300	± 0.300	± 0.300
Adjustment steps	n	mm	± 6	± 6	± 6
Adjustment per step	e0	mm	0	0	0
	e1	mm	± 0.078	± 0.078	± 0.078
	e2	mm	± 0.150	± 0.150	± 0.150
	e3	mm	± 0.212	± 0.212	± 0.212
	e4	mm	± 0.260	± 0.260	± 0.260
	e5	mm	± 0.290	± 0.290	± 0.290
	e6	mm	± 0.300	± 0.300	± 0.300

Article number	5.1	5.3	5.4
lifgo® Excentre ZA 1	501 022	501 023	501 024
lifgo® Excentre ZA 2	501 026	501 027	501 028
lifgo® Excentre PFN	501 030	501 031	501 032

lifgo® linear SVZ 5.1 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

lifgo® linear is used for long stroke lengths, with a fixed gear rack.

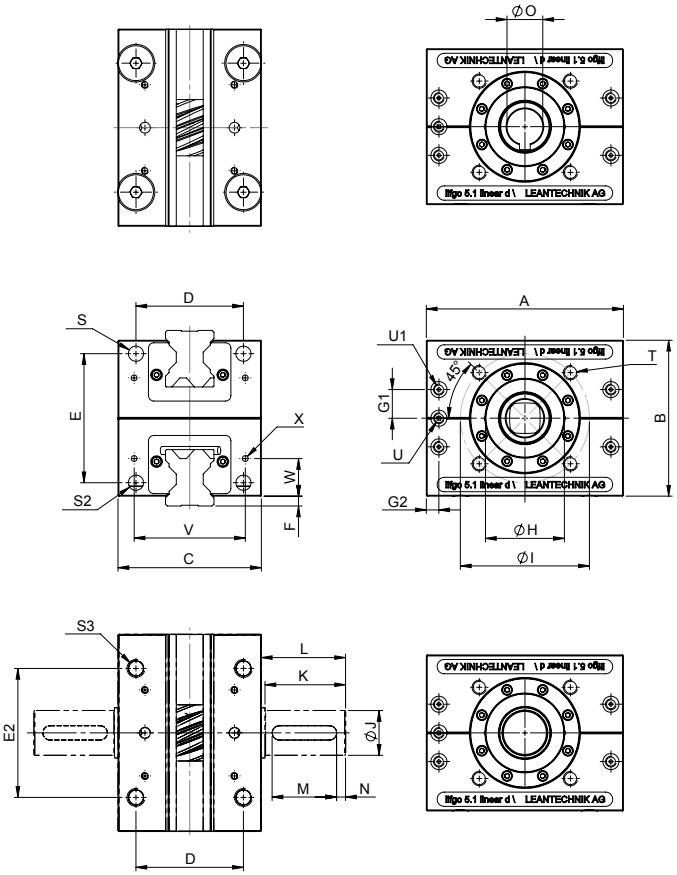
If the gearbox is fixed and the gear rack is freely moveable, then it can be reinforced with profiles.

lifgo® linear SVZ		Unit	5.1	5.3	5.4
	A	mm	110	180	180
	B	mm	98.5	161	181
	B1	mm	55	90	100
	C	mm	80	130	165
	D	mm	60	105	130
	E	mm	72	120	140
	E1	mm	19	30	30
	E2	mm	72	120	135
	F	mm	5.5	5	5
	G	mm	30	55	55
	G1	mm	16	21.5	31.5
	G2	mm	7	13	13
Locating flange	H	mm	ø 44 H7 ↧ 3	ø 70 H7 ↧ 3	ø 95 H7 ↧ 3
(remove sealed plate, when in use)	I	mm	ø 72	ø 110	ø 135
Key DIN 6885 P9	J	mm	ø 25 h7	ø 42 h7	ø 55 h7
	K	mm	45	60	80
	L	mm	47	62	82
	M	mm	36	50	70
	N	mm	5	5	5
Key DIN 6885 P9	O	mm	ø 20 H7	ø 35 H7	ø 50 H7
	P	mm	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10
	R				ø 6 H7 ↧ 10
	S	mm	M10 ↧ 25 ø 8.5 through	M12 ↧ 35 ø 10.2 through	M12 ↧ 35 ø 10.2 through
	T	mm	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M10 x 1 ↧ 10	M10 x 1 ↧ 10	M10 x 1 ↧ 10
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	62	100	120
	W	mm	21	43	43
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	4,85	13.25	20.00
Weight ZA1		kg	5,20	15.10	24.00
Weight ZA2		kg	5,37	15.76	25.50
Weight PFN		kg	4,82	13.46	19.90

Article number	5.1	5.3	5.4
lifgo® linear PW	501 034	501 035	501 036
lifgo® linear ZA 1	501 038	501 039	501 040
lifgo® linear ZA 2	501 042	501 043	501 044
lifgo® linear PFN	501 046	501 047	501 048

lifgo® linear double SVZ 5.1 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

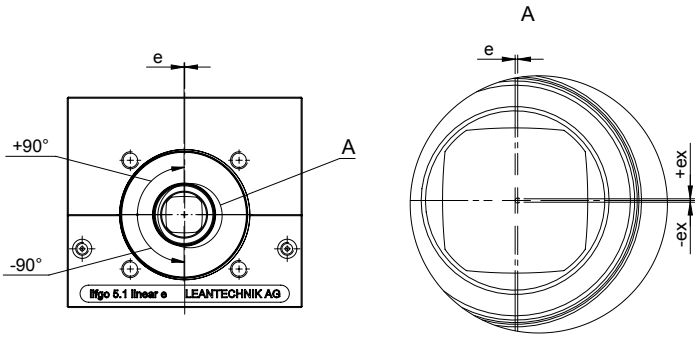
For the lifgo® linear double version, reinforcements or infeeds can be mounted on the gear racks.

lifgo® linear double SVZ		Unit	5.1	5.3	5.4
	A	mm	110	180	180
	B	mm	87	142	162
	C	mm	80	130	165
	D	mm	60	105	130
	E	mm	72	120	140
	E2	mm	72	120	135
	F	mm	5.5	5	5
	G1	mm	16	21.5	31.5
	G2	mm	7	13	13
Locating flange	H	mm	ø 44 H7 ↧ 3	ø 70 H7 ↧ 3	ø 95H7 ↧ 3
(remove sealed plate, when in use)	I	mm	ø 72	ø 110	ø 135
Key DIN 6885 P9	J	mm	ø 25 h7	ø 42 h7	ø 55 h7
	K	mm	45	60	80
	L	mm	47	62	82
	M	mm	36	50	70
	N	mm	5	5	5
Key DIN 6885 P9	O	mm	ø 20 H7	ø 35 H7	ø 50 H7
	S	mm	M10 ↧ 25 ø 8.5 through	M12 ↧ 30 ø 10.2 through	M12 ↧ 35 ø 10.2 through
	S2	mm	M10 ↧ 14	M12 ↧ 24	M12 ↧ 16.5
	S3	mm	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
	T	mm	M8 ↧ 10	M10 ↧ 20	M10 ↧ 20
Lube hole	U	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
Lube hole	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	62	100	120
	W	mm	21	43	43
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Weight PW		kg	3.35	14.80	20.50
Weight ZA1		kg	3.70	16.65	24.50
Weight ZA2		kg	3.82	17.31	26.00
Weight PFN		kg	3.32	15.01	20.40

Article number	5.1	5.3	5.4
lifgo® linear double PW	501 082	501 083	501 084
lifgo® linear double ZA 1	501 086	501 087	501 088
lifgo® linear double ZA 2	501 090	501 091	501 092
lifgo® linear double PFN	501 094	501 095	501 096

lifgo® linear Excentre SVZ 5.1 - 5.4 • dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

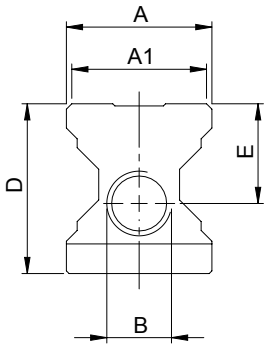
- The dimensions of the "eccentric" version are identical to those of the lifgo® linear. Please use the dimensions on page 76.
- In the "eccentric" version, the pinion shaft is adjusted relative to the gear rack, allowing the tooth flank clearance to be adjusted. It can be readjusted at a later time. Motor flanges, gearbox bell housings, etc. remain centred on the pinion during adjustment.
- Note that "eccentric" gearboxes cannot be combined with standard gearboxes (centred bearings). The pinion shafts are not aligned. (Max. lateral error 0.3 mm).
- Follow the instructions for use, available as a separate PDF. A printed copy is included with the gearboxes

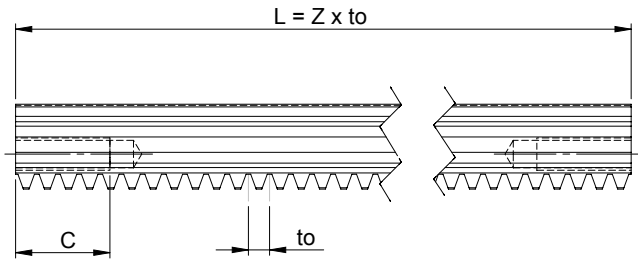
lifgo® linear Excentre SVZ reduced play		Unit	5.1	5.3	5.4
Adjustment range	e	mm	± 0.300	± 0.300	± 0.300
Adjustment steps	n	mm	± 6	± 6	± 6
Adjustment per step	e0	mm	0	0	0
	e1	mm	± 0.078	± 0.078	± 0.078
	e2	mm	± 0.150	± 0.150	± 0.150
	e3	mm	± 0.212	± 0.212	± 0.212
	e4	mm	± 0.260	± 0.260	± 0.260
	e5	mm	± 0.290	± 0.290	± 0.290
	e6	mm	± 0.300	± 0.300	± 0.300
Weight ZA 1		kg			23.5
Weight ZA 2		kg			25.1
Weight PFN		kg			19.5

Article number		5.1	5.3	5.4
lifgo® linear Excentre ZA 1		501 054	501 055	501 056
lifgo® linear Excentre ZA 2		501 058	501 059	501 060
lifgo® linear Excentre PFN		501 062	501 063	501 064

lifgo® gear racks 5.0 - 5.4 • dimension sheet

The gear rack bears guide loads. It is subjected to tensile, compressive, and transverse forces. Note the moments of inertia and the torque loads on the gearboxes (see Page 54.) The gear rack is symmetrical in construction.





When a gear rack protection is used, the gear rack length increases by the installed length of the protection. **For heavy loads, we recommend the use of hardened & ground gear racks.** Have the theoretical lifespan calculated.

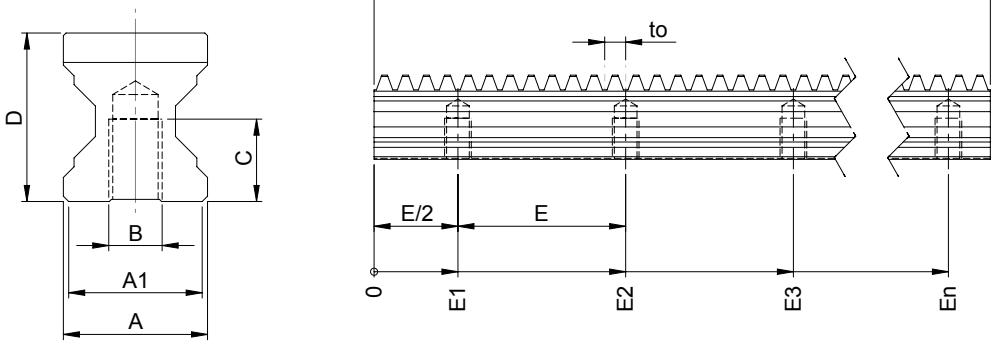
Always add the number of teeth "Z = _ _ _" to the article number.

Lifgo®® gear racks		unit	5.0	5.1	5.3	5.4
	A	mm	23	27	48	68
	A1	mm	21	25	46	66
	B	mm	M10	M12	M20	M24
	C	mm	30	35	50	55
	D	mm	26	31.5	48.5	48.5
	E	mm	16	18.5	26.5	26.5
Gear rack length	L	mm	L = Z x to	L = Z x to	L = Z x to	L = Z x to
Number of teeth	Z		as per customer data	as per customer data	as per customer data	as per customer data
Module	m		1.0	2.5	2.5	2.5
Tooth pitch	to	mm	to = m x Pi	to = m x Pi	to = m x Pi	to = m x Pi
Moment of inertia	Ix	mm^4	16411	22961	253179	428881
Moment of inertia	Iy	mm^4	24216	35018	297984	809895
Polar moment of inertia	Ip	mm^4	40628	57979	551164	1238776
Weight		kg/m	3.82	4.84	14.45	21.61

Article number		5.0	5.1	5.3	5.4
Lifgo®® gear rack		500 113	500 114	500 115	500 116
Lifgo®® gear rack	ground	500 504	500 505	500 506	500 637
Lifgo®® gear rack	hardened&ground	500 169	500 170	500 171	500 172

lifgo® gear racks SVZ 5.1 - 5.4 • dimension sheet

The gear rack bears guide loads. It is subjected to tensile, compressive, and transverse forces. Note the moments of inertia and the torque loads on the gearboxes (see Page 68.) The gear rack is symmetrical in construction. Reinforcement profiles and/or feed lines can be fixed and routed using the tapped holes at the rear.



When a gear rack protection is used, the gear rack length increases by the installed length of the protection. **For heavy loads, we recommend the use of ground or hardened & ground gear racks.** When using the guide rail in a suspended configuration, consider the load capacity of the screws. Have the theoretical lifespan calculated.

The gear rack mounting screws must be checked and a calculation performed according to the load.

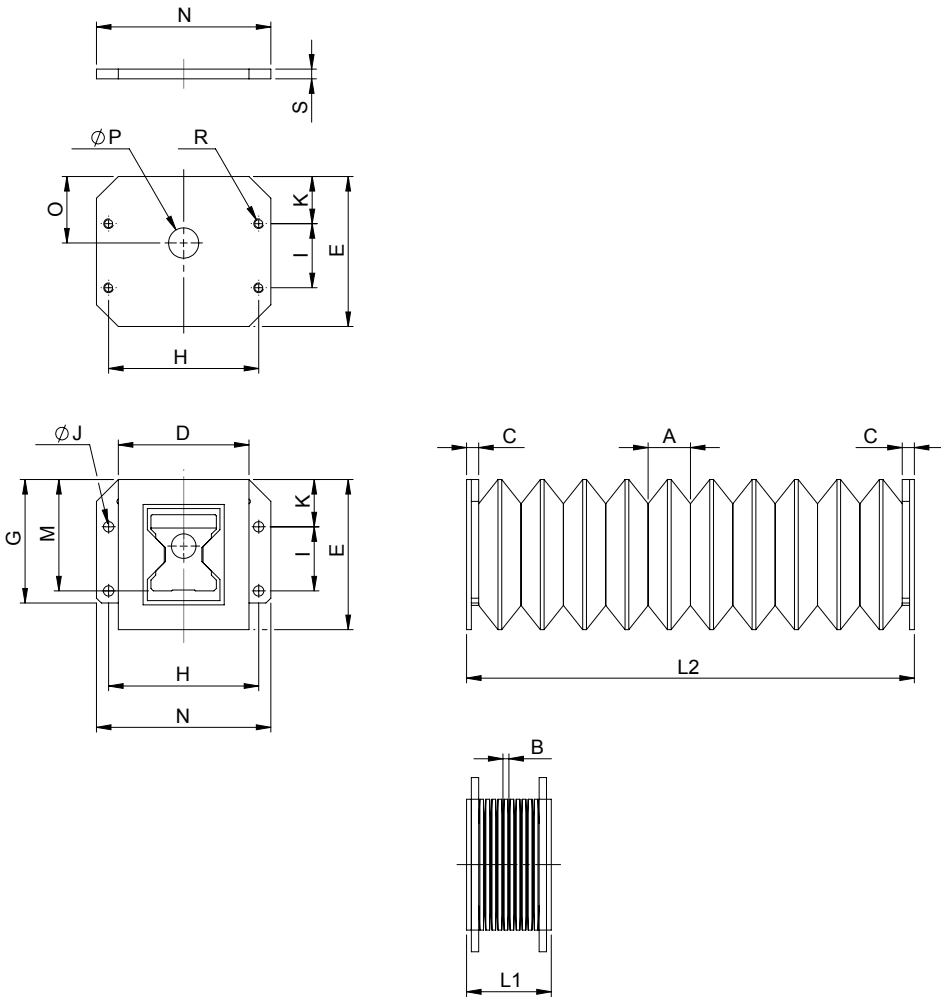
Always add the number of teeth "Z = _ _ _" to the article number.

lifgo® Gear rack SVZ		unit	5.1	5.3	5.4
	A	mm	27	48	68
	A1	mm	25	46	66
	B	mm	M12	M20	M24
	C	mm	35	50	55
	D	mm	31.5	48.5	48.5
(E = Ze x m x Pi)	E	mm	18.5	26.5	26.5
Gear rack length	L	mm		L = Z x tt	
Number of teeth	Z	units		as per customer data	
Module	mt		2.46875	2.47917	2.48438
Tooth pitch	tt	mm		tt = mt x Pi	
Moment of inertia	Ix	mm^4	22961	253179	428881
Moment of inertia	Iy	mm^4	35018	297984	809895
Polar moment of inertia	Ip	mm^4	57979	551164	1238776
Weight		kg/m	4.84	14.45	21.61

Article number		5.1	5.3	5.4
lifgo®® gear rack SVZ		501 106	501 107	501 108
Lifgo®® gear rack SVZ	ground	501 114	501 115	501 116
lifgo®® gear rack SVZ	hardened&ground	501 122	501 123	501 124

lifgo® gear rack protection & end plates 5.0 - 5.4 • dimension sheet

This gear rack protection is not suitable for use in welding areas. The end plate is used for mounting the gear rack protection on the lifgo® gear rack.



lifgo® gear rack protection & end plates 5.0 - 5.4

Check whether the operating conditions require a gear rack protection. This gear rack protection is **not suitable for use in welding areas**. It is shipped with retaining plates and screws.

The gear rack protection is silicone-free.

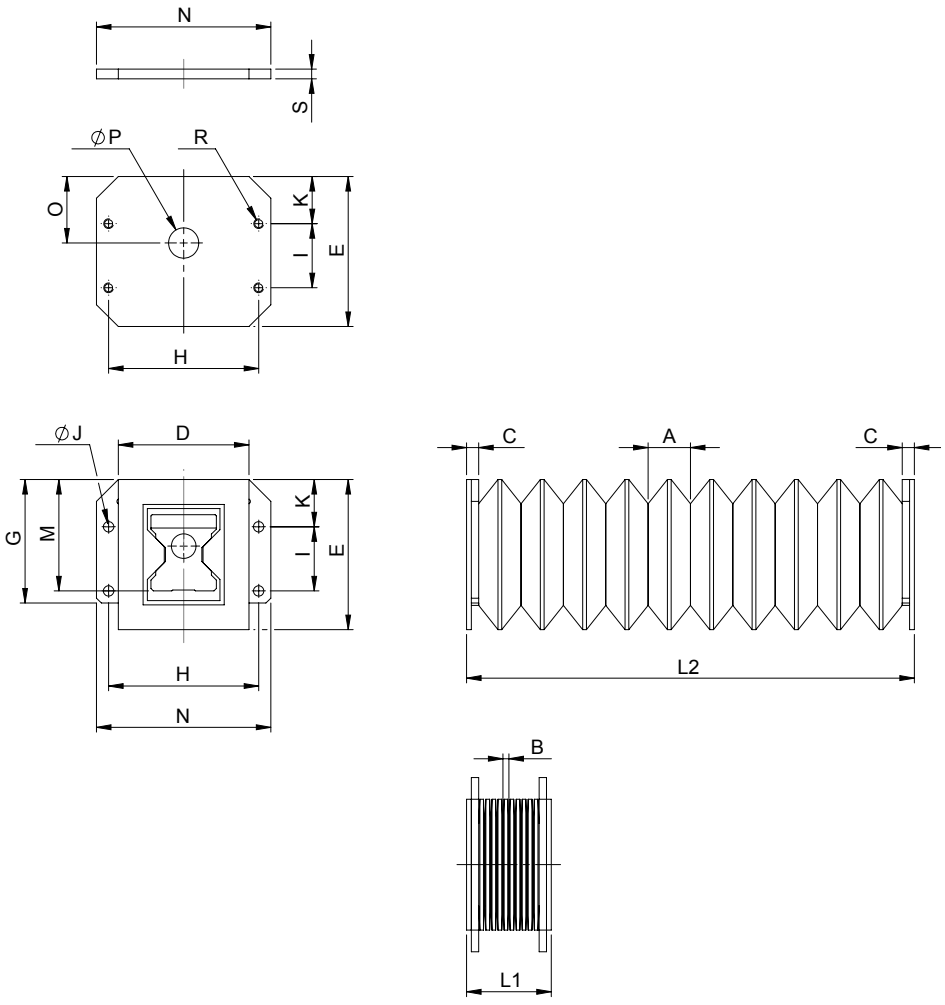
Always add the number of folds "F = _ _ _" to the article number.

lifgo® gear rack protection		unit	5.0	5.1	5.3	5.4
	A	mm	17.5	17.5	27.5	27.5
	B	mm	2.5	2.5	2.5	2.5
Stroke per fold	(A - B)	mm	15	15	25	25
	C	mm	5	5	5	5
	D	mm	50	54	92	112
	E	mm	54	62	94	94
Number of folds	F	units	as per customer data	as per customer data	as per customer data	as per customer data
	G	mm	44.5	51	84	84
	H	mm	58	62	100	120
	I	mm	21	26.5	51.5	51.5
	J	mm	ø 4.3	ø 4.3	ø 4.3	ø 4.3
			V8.5 x 90°	V8.5 x 90°	V8.5 x 90°	V8.5 x 90°
	K	mm	18.5	19.5	23.5	23.5
Stroke	L	mm	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)
	L1	mm	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B
	L2	mm	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L2 = 2 x C + F x A
	M	mm	40	46	71.5	71.5
	N	mm	68	72	112	132
	O	mm	24	27.5	45	45
	P	mm	ø 10.5	ø 12.5	ø 20.5	ø 20.5
	R	mm	M4	M4	M4	M4
	S	mm	4	M4	4	4

Article number		5.0	5.1	5.3	5.4
lifgo® gear rack protection		500 121	500 122	500 123	500 124
lifgo® end plate		500 539	500 541	500 543	500 881

lifgo® gear rack protection & end plates SB 5.0 - 5.4 • dimension sheet

This gear rack protection is suitable for use in welding areas (SB). The end plate is used for mounting the gear rack protection on the lifgo® gear rack.



lifgo® gear rack protection & end plates SB 5.0 - 5.4

Check whether the operating conditions require a gear rack protection. This gear rack protection is **suitable for use in welding areas**. It is shipped with retaining plates and screws.

Note that in its retracted state, the "SB" version requires 1.0 mm more installation space per fold (dimensions A, B and C).

The gear rack protection is silicone-free.

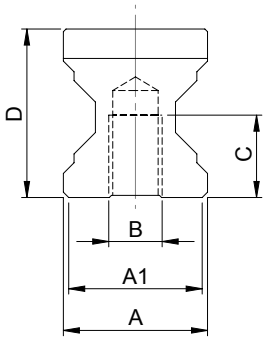
Always add the number of folds "F = _ _ _" to the article number.

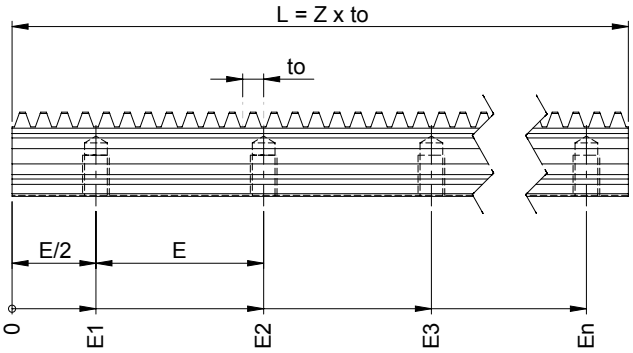
lifgo®® Gear rack protection SB		unit	5.0	5.1	5.3	5.4
	A	mm	18.5	18.5	28.5	28.5
	B	mm	3.5	3.5	3.5	3.5
Stroke per fold	(A - B)	mm	15	15	25	25
	C	mm	6	6	6	6
	D	mm	50	54	92	112
	E	mm	54	62	94	94
Number of folds	F	units	as per customer data	as per customer data	as per customer data	as per customer data
	G	mm	44.5	51	84	84
	H	mm	58	62	100	120
	I	mm	21	26.5	51.5	51.5
	J	mm	ø 4.3	ø 4.3	ø 4.3	ø 4.3
			V8.5 x 90°	V8.5 x 90°	V8.5 x 90°	V8.5 x 90°
	K	mm	18.5	19.5	23.5	23.5
Stroke	L	mm	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)
	L1	mm	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B
	L2	mm	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L2 = 2 x C + F x A
	M	mm	40	46	71.5	71.5
	N	mm	68	72	112	132
	O	mm	24	27.5	45	45
	P	mm	ø 10.5	ø 12.5	ø 20.5	ø 20.5
	R	mm	M4	M4	M4	M4
	S	mm	4	4	4	4

Article number		5.0	5.1	5.3	5.4
lifgo® gear rack protection SB		500 510	500 511	500 512	500 854
lifgo® end plate		500 539	500 541	500 543	500 881

lifgo® linear racks 5.0 - 5.4 • Dimension sheet

The gear rack bears guide loads. It is subjected to tensile, compressive, and transverse forces. Note the moments of inertia and the torque loads on the gearboxes (see Page 54.) The gear rack is symmetrical in construction. Reinforcement profiles and/or feed lines can be fixed and routed using the tapped holes at the rear.





When a gear rack protection is used, the gear rack length increases by the installed length of the protection. **For heavy loads, we recommend the use of ground or hardened & ground gear racks.** When using the guide rail in a suspended configuration, consider the load capacity of the screws. Have the theoretical lifespan calculated.

The gear rack mounting screws must be checked and a calculation performed according to the load.

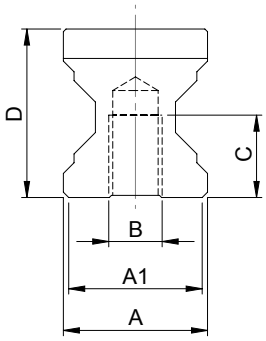
Always add the number of teeth "Z = _ _ _" to the article number.

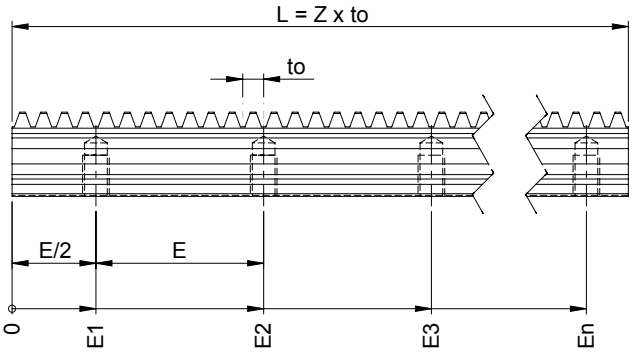
lifgo® linear Gear rack		Unit	5.0	5.1	5.3	5.4
	A	mm	23	27	48	68
	A1	mm	21	25	46	66
	B	mm	M10	M10	M12	M16
	C	mm	15	15	20	25
	D	mm	26	31.5	48.5	48.5
(E = Ze x m x Pi)	E	mm	62.831853	62.831853	109.955743	109.955743
	E1	mm	31.42	31.42	54.98	54.98
	E2	mm	94.25	94.25	164.93	164.93
	E3	mm	157.08	157.08	274.89	274.89
Hole distance from front side	En	mm	En = Ze x m x Pi x (n –1/2)			
Rack length	L	mm	L = Z x to			
Max. number of holes	Nmax.	Units	Whole number Nmax. = (Z – Ze/2 – 2) / Ze + 1			
Number of teeth	Z	units	as per customer data			
Number of teeth between two holes	Ze	Units	20	8	14	14
Module	m		1.0	2.5	2.5	2.5
Tooth pitch	to	mm	to = m x Pi			
Moments of inertia	Ix, Iy, Ip	mm^4	see lifgo® rack			
Weight		kg/m	3.82	4.84	14.45	21.61

Article number		5.0	5.1	5.3	5.4
lifgo® linear rack		500 117	500 118	500 119	500 120
lifgo® linear rack	ground	500 507	500 508	500 509	500 638
lifgo® linear rack	hardened&ground	500 173	500 174	500 175	500 176

lifgo® linear racks SVZ 5.1 - 5.4 • Dimension sheet

The gear rack bears guide loads. It is subjected to tensile, compressive, and transverse forces. Note the moments of inertia and the torque loads on the gearboxes (see Page 68.) The gear rack is symmetrical in construction. Reinforcement profiles and/or feed lines can be fixed and routed using the tapped holes at the rear.





When a gear rack protection is used, the gear rack length increases by the installed length of the protection. **For heavy loads, we recommend the use of ground or hardened & ground gear racks.** When using the guide rail in a suspended configuration, consider the load capacity of the screws. Have the theoretical lifespan calculated.

The gear rack mounting screws must be checked and a calculation performed according to the load.

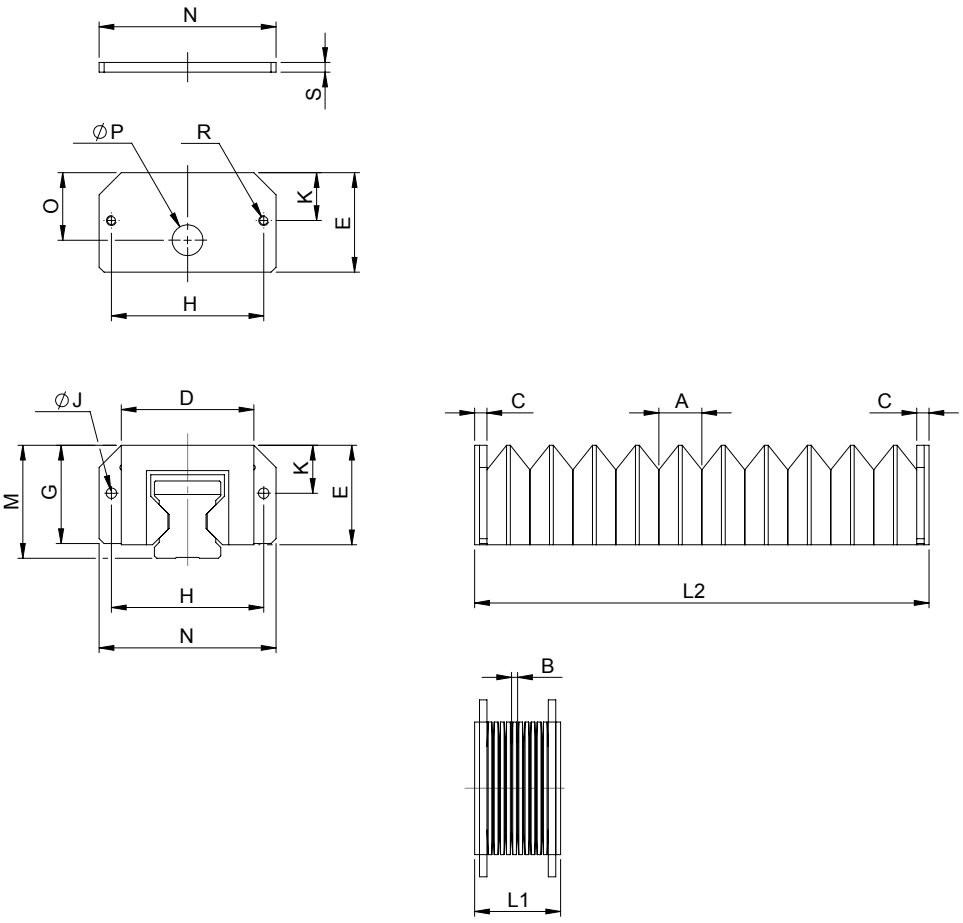
Always add the number of teeth "Z = _ _ _" to the article number.

lifgo® linear Gear rack SVZ		Unit	5.1	5.3	5.4
	A	mm	27	48	68
	A1	mm	25	46	66
	B	mm	M10	M12	M16
	C	mm	15	20	25
	D	mm	31.5	48.5	48.5
(E = Ze x m x Pi)	E	mm	62.046455	109.039445	109.268519
	E1	mm	31.02	54.52	54.63
	E2	mm	93.07	163.56	163.90
	E3	mm		155.11	272.60 273.17
Hole distance from front side	En	mm		En = Ze x m x Pi x (n –1/2)	
Gear rack length	L	mm		L = Z x tt	
Max. number of holes	Nmax.	Units		Whole number Nmax. = (Z – Ze/2 – 2) / Ze + 1	
Number of teeth	Z	units		as per customer data	
Number of teeth between two holes	Ze	Units	8	14	14
Module	mt		2.46875	2.47917	2.48438
Tooth pitch	tt	mm		tt = mt x Pi	
Moments of inertia	Ix, Iy, Ip	mm^4		see lifgo® rack	
Weight		kg/m	4.84	14.45	21.61

Article number		5.1	5.3	5.4
lifgo® linear rack SVZ		501 110	501 111	501 112
lifgo® linear rack SVZ	ground	501 518	501 119	501 120
lifgo® linear rack SVZ	hardened&ground	501 126	501 127	501 120

lifgo® Linear rack protection and end plates 5.0 - 5.4 • Dimension sheet

This gear rack protection is not suitable for use in welding areas. The end plate is used for mounting the gear rack protection on the lifgo® linear gear rack.



lifgo® Linear rack protection and end plates 5.0 - 5.4

Check whether the operating conditions require a gear rack protection. This gear rack protection is **not suitable for use in welding areas**. It is shipped with two retaining plates and screws.

The gear rack protection is silicone-free.

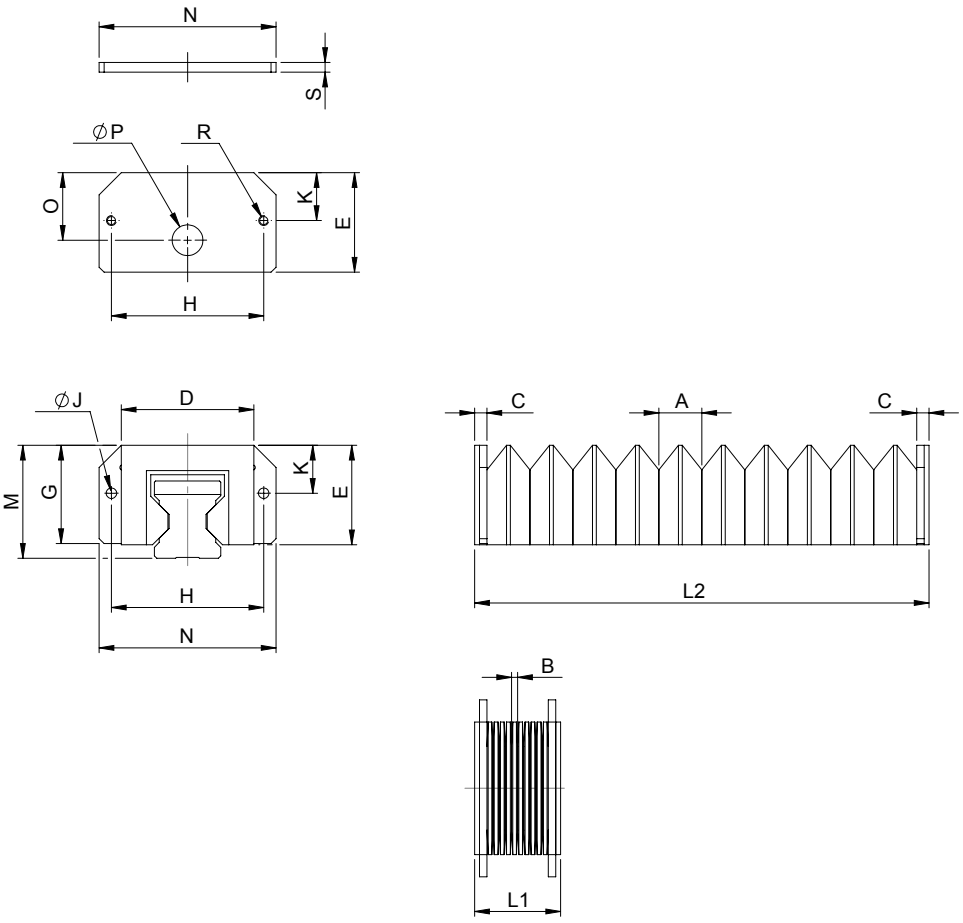
Always add the number of folds "F = _ _ _" to the article number.

lifgo® linear Gear rack protection		Unit	5.0	5.1	5.3	5.4
	A	mm	17.5	17.5	27.5	27.5
	B	mm	2.5	2.5	2.5	2.5
Stroke per fold	(A - B)	mm	15	15	25	25
	C	mm	5	5	5	5
	D	mm	50	54	92	112
	E	mm		36.5	40.5	66.5 66.5
Number of folds	F	units	as per customer data	as per customer data	as per customer data	as per customer data
	G	mm	36	40	66	66
	H	mm	58	62	100	120
	J	mm	ø 4.3 V 8.5 x 90°	ø 4.3 V 8.5 x 90°	ø 4.3 V 8.5 x 90°	ø 4.3 V 8.5 x 90°
	K	mm	18.5	19.5	23.5	23.5
Stroke	L	mm	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)
	L1	mm	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B
	L2	mm	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L2 = 2 x C + F x A
	M	mm	40	46	71.5	71.5
	N	mm	68	72	112	132
	O	mm	24	27.5	45	45
	P	mm	ø 10.5	ø 12.5	ø 20.5	ø 20.5
	R	mm	M4	M4	M4	M4
	S	mm	4	4	4	4

Article number	5.0	5.1	5.3	5.4
lifgo® linear gear rack protection	500 125	500 126	500 127	500 128
lifgo® linear end plates	500 540	500 542	500 544	500 882

lifgo® Linear rack protection SB and end plates 5.0 - 5.4 • Dimension sheet

This gear rack protection is suitable for use in welding areas (SB). The end plate is used for mounting the gear rack protection on the lifgo® linear gear rack.



lifgo® Linear rack protection SB and end plates 5.0 - 5.4

Check whether the operating conditions require a gear rack protection. This gear rack protection is **suitable for use in welding areas**. It is shipped with retaining plates and screws.

Note that in its retracted state, the "SB" version requires 1.0 mm more installation space per fold (dimensions A, B and C).

The gear rack protection is silicone-free.

Always add the number of folds "F = _ _ _" to the article number.

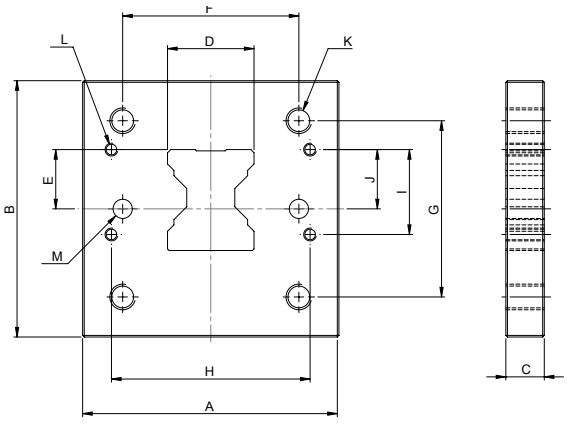
lifgo® linear Gear rack protection SB		Unit	5.0	5.1	5.3	5.4
	A	mm	18.5	18.5	28.5	28.5
	B	mm	3.5	3.5	3.5	3.5
Stroke per fold	(A - B)	mm	15	15	25	25
	C	mm	6	6	6	6
	D	mm	50	54	92	112
	E	mm		36.5	40.5	66.5 66.5
Number of folds	F	Units	as per customer data	as per customer data	as per customer data	as per customer data
	G	mm	36	40	66	66
	H	mm	58	62	100	120
	J	mm	ø 4.3 V 8.5 x 90°	ø 4.3 V 8.5 x 90°	ø 4.3 V 8.5 x 90°	ø 4.3 V 8.5 x 90°
	K	mm	18.5	19.5	23.5	23.5
Stroke	L	mm	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)	L = L2 – L1 = F x (A – B)
	L1	mm	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B	L1 = 2 x C + F x B
	L2	mm	L2 = 2 x C + F x A	L2 = 2 x C + F x A	L1 = 2 x C + F x B	L1 = 2 x C + F x B
	M	mm	40	46	71.5	71.5
	N	mm	68	72	112	132
	O	mm	24	27.5	45	45
	P	mm	ø 10.5	ø 12.5	ø 20.5	ø 20.5
	R	mm	M4	M4	M4	M4
	S	mm	4	4	4	4

Article number		5.0	5.1	5.3	5.4
lifgo® linear Gear rack protection SB		500 516	500 517	500 518	500 855
lifgo® linear end plates		500 540	500 542	500 544	500 882

lifgo® linear rack retaining plate AZ 5.0 - 5.4 • Dimension sheet

The gear rack retaining plate provides a rigid connection between the mounted parts and the gear rack. To this end, the retaining plate is pressed onto the gear rack in the guide direction. The tapped holes "K" can be used to mount additional components for the customer .

The gear rack retaining plate is only intended to take up torque. It cannot therefore transfer forces in the gear rack guide direction. The retaining plate is mounted flush with the front surface of the gear rack using a shrinkage process.



lifgo® Rack retaining plate AZ 5.0 - 5.4

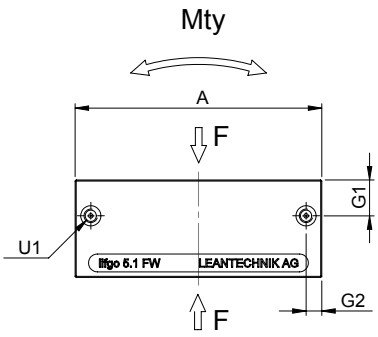
Be sure to indicate precisely which gear rack will be used with the AZ plate when ordering a gear rack retaining plate.

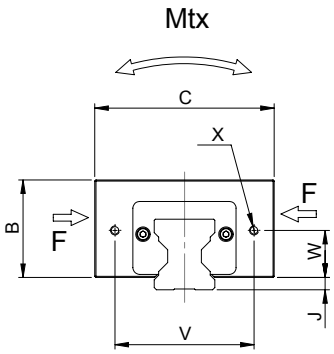
lifgo®® Gear rack retaining plate AZ		unit	5.0	5.1	5.3	5.4
	A	mm	70	80	130	150
	B	mm	70	80	130	130
	C	mm	10	12	15	15
	D	mm	23	27	48	68
	E	mm	16	18.5	26.5	26.5
	F	mm	50	55	90	110
	G	mm	50	55	90	90
	H	mm	58	62	100	110
	I	mm	21	26.5	51.5	51.5
	J	mm	15.5	18.5	30	30
	K	mm	M6	M8	M10	M10
	L	mm	M4	M4	M4	M4
	M	mm	ø 6 H7	ø 6 H7	ø 6 H7	ø 6 H7
Weight		kg	0.33	0.51	1.70	1.9

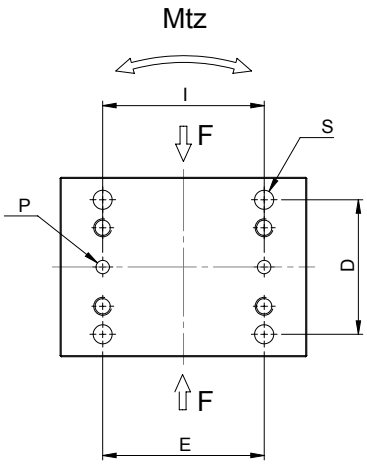
Article number lifgo ® Gear rack retaining plate AZ		5.0	5.1	5.3	5.4
	eroded	500 181	500 182	500 183	500 184

lifgo® Guide carriages 5.0 - 5.4 • Dimension sheet

Guide cars provide support and guidance, and fit on both guide rails and gear rack rails within a size category.







Note the static and dynamic load ratings when configuring the components. They are identical to the lifgo®gear rack (see page 54).

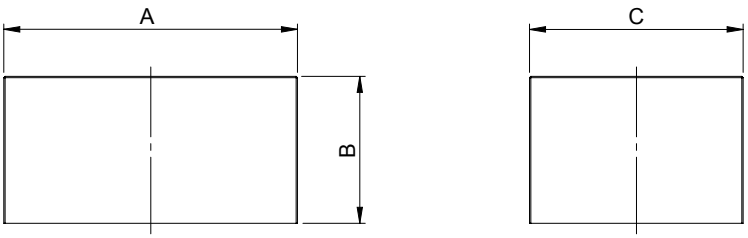
Ensure that the lube holes remain accessible after assembly.

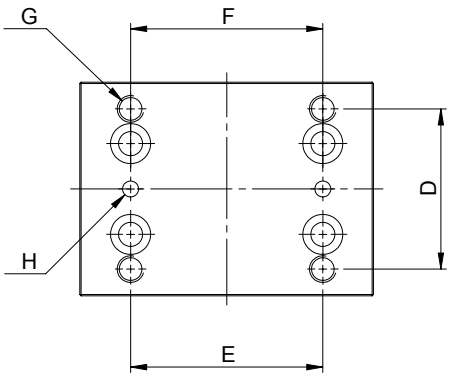
lifgo® Guide carriages		Unit	5.0	5.1	5.3	5.4
	A	mm	80	110	180	180
	B	mm	31.5	43.5	71	81
	C	mm	70	80	130	165
	D	mm	55	60	105	130
	E	mm	50	72	120	135
	G1	mm	7.5	16	21.5	31.5
	G2	mm	77	13	13	
Dowel holes	I	mm	44	72	120	120
	J	mm	3.5	5.5	2	5
	P	mm	ø 6 H7 ↧ 4	ø 6 H7 ↧ 4	ø 6 H7 ↧ 6	ø 6 H7 ↧ 6
	S	mm	M8 ↧ 20	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			ø 6.8 through	ø 8.5 through	ø 10.2 through	ø 10.2 through
	U1	mm	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5	M6 ↧ 5
	V	mm	58	62	100	120
	W	mm	18	21	43	43
	X	mm	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8	M4 ↧ 8
Lifting speed	v_{max}	m/s	33	3	3	
Acceleration	a_{max}	m/s^2	50	50	50	50
Static torque	Mt_x stat.	Nm	570	760	4400	5500
Dynamic torque	Mt_x stat.	Nm	280	390	2200	2800
	Mt_y stat.	Nm	380	650	3300	3300
	Mt_y dyn.	Nm	180	330	1600	1600
	Mt_z stat.	Nm	380	650	3300	3300
	Mt_z dyn.	Nm	180	330	1600	1600
Static load rating	F stat.	N	38400	51200	161400	161400
Dynamic load rating	F dyn.	N	19100	25900	79600	79600
Weight		kg	0.80	2.10	9.10	13.5

Article number lifgo® guide carriages		5.0 500 097	5.1 500 098	5.3 500 099	5.4 500 100

lifgo® Compensator block 5.0 - 5.4 • Dimension sheet

If necessary, the compensating block compensates for the height of the missing lifgo®housing.





lifgo® Compensator block 5.0 – 5.4

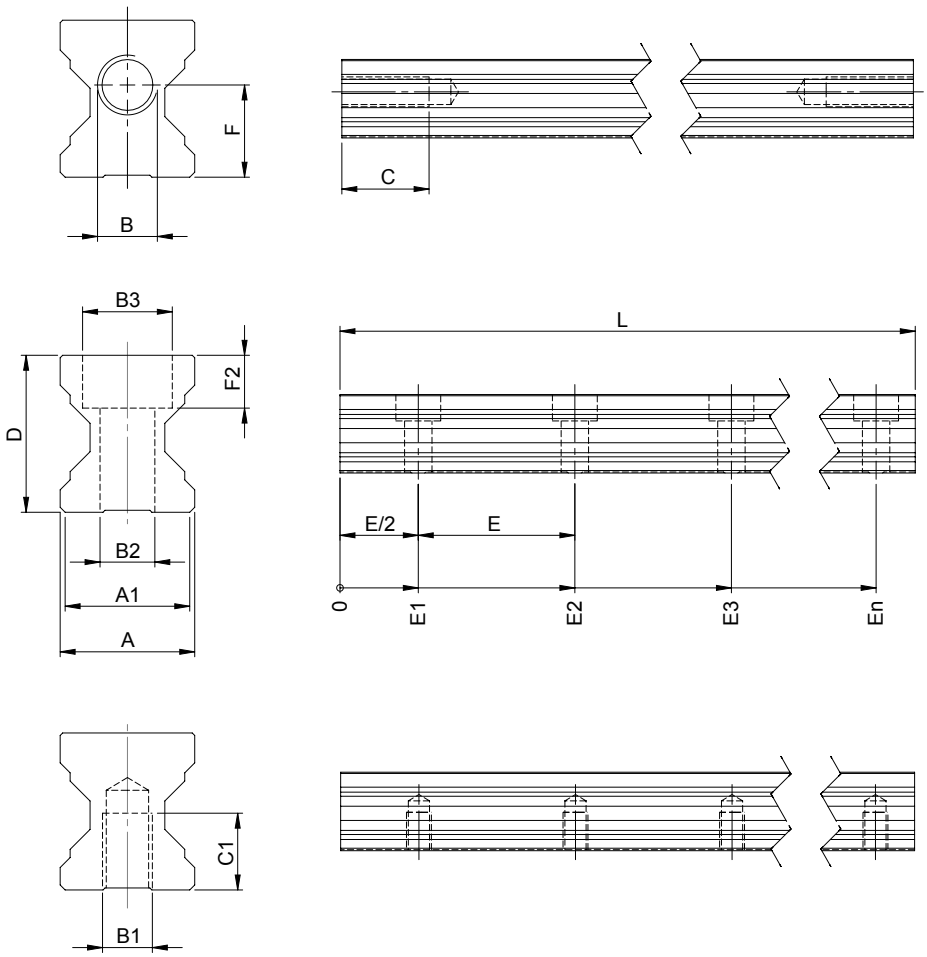
The compensator block is supplied with screws and dowel pins for attachment to the guide carriage.

lifgo® Compensator block		Unit	5.0	5.1	5.3	5.4
	A	mm	80	110	180	180
	B	mm	40	55	90	100
	C	mm	70	80	130	165
	D	mm	55	60	105	130
	E	mm	50	72	120	135
Dowel holes	F	mm	50	72	120	120
	G	mm	M8 ↧ 20	M10 ↧ 25	M12 ↧ 35	M12 ↧ 35
			⌀ 6.8 through	⌀ 8.5 through	⌀ 10.2 through	⌀ 10.2 through
	H	mm	⌀ 6H7 ↧ 10	⌀ 6H7 ↧ 10	⌀ 6H7 ↧ 10	⌀ 6H7 ↧ 10
Weight		kg	0.60	1.25	5.50	7.8

Article number lifgo® compensator block	5.0 500 883	5.1 500 884	5.3 500 885	5.4 500 888

lifgo® Guide carriages 5.0 - 5.4 • Dimension sheet

Guide rails are available with or without holes for screw attachment from the "top" or the "bottom". Hole spacing corresponds to that of the "lifgo® linear gear rack". The guide rails, with guide cars, are used in parallel with lifgo® or lifgo® linear. Multiple guide rails can be laid end-to-end. The gear rack protection on Pages 93 and 95 can be used for these guide rails.



lifgo® Guide carriages 5.0 – 5.4

For multi-part guide rails, the "E2" dimensions must be maintained at both ends of the rail **(Symmetry!)**.

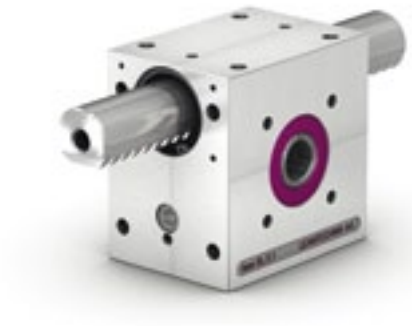
For multi-part guide rails, the parting joints of the rail and the substructure must not be in line.

When using the guide rail, consider the load capacity of the screws.

lifgo® Guide carriages		Unit	5.0	5.1	5.3	5.4
	A	mm	23	27	48	68
	A1	mm	21	25	46	66
	B	mm	M10	M12	M20	M24
	B1	mm	M10	M10	M12	M16
	B2	mm	ø 9	ø 11	ø 13,5	ø 17,5
	B3	mm	ø 15	ø 18	ø 20	ø 26
	C	mm	30	35	50	55
	C1	mm	15	15	20	25
	D	mm	26	31.5	48.5	48.5
(E = Ze x m x Pi)	E	mm	62.831853	62.831853	109.955743	109.955743
(Result example for the	E1	mm	31.42	31.42	54.98	54.98
lower calculation)	E2	mm	94.25	94.25	164.93	164.93
	E3	mm		157.08	157.08	274.89
274.89						
Hole distance	En	mm		En = Ze x m x Pi x (n –1/2)		
from the front end						
	F	mm	16	18.5	26.5	26.5
	F2		8.6	10.6	12.6	18.6
Total length	L	mm		as per customer data		
Number of teeth	Ze	Units	20	8	14	14
between two holes						
Module	m		1.0	2.5	2.5	2.5
Moment of inertia	Ix	mm^4	18660	31938	303725	626515
Moment of inertia	Iy	mm^4	32149	65956	438696	953723
Polar moment of inertia	Ip	mm^4	50810	97895	742422	1580239
Weight Bore at the front		kg/m	4.02	5.40	15.43	22.3
bolt from above		kg/m	3.70	4.82	14.80	21.8
bolt from below		kg/m	3.90	5.25	14.26	22.6

Article number		5.0	5.1	5.3	5.4
lifgo® Guide carriages	Bore at the front	500 101	500 102	500 103	500 104
lifgo® Guide carriages	bolt from above	500 105	500 106	500 107	500 108
lifgo® Guide carriages	bolt from below	500 109	500 110	500 111	500 112

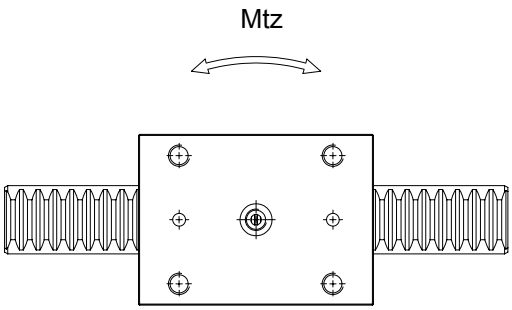
lean SL® Series • Technical data

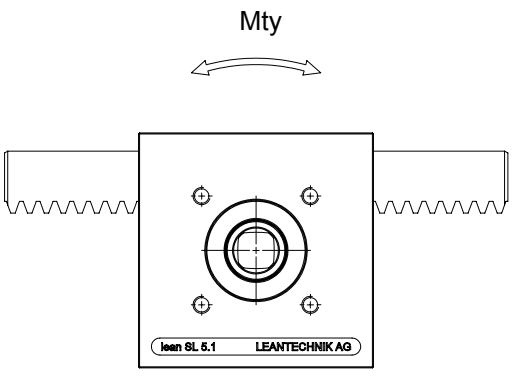


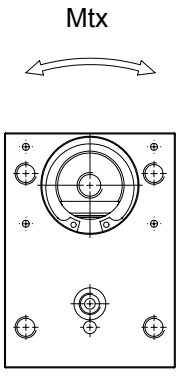
lean SL®

lean SL® double

Make sure that the article number refers to the correct pinion shaft version.







Video Functioning

Video gear rack installation

Installation instructions

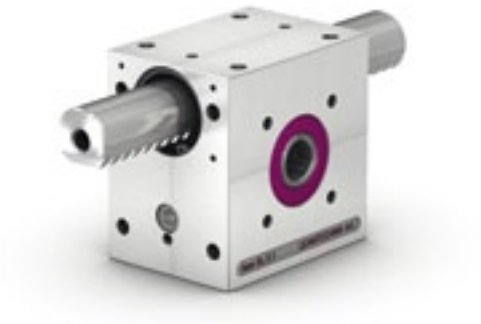
CAD Data

The performance data listed apply to both the lean SL® and lean SL® versions of each size.

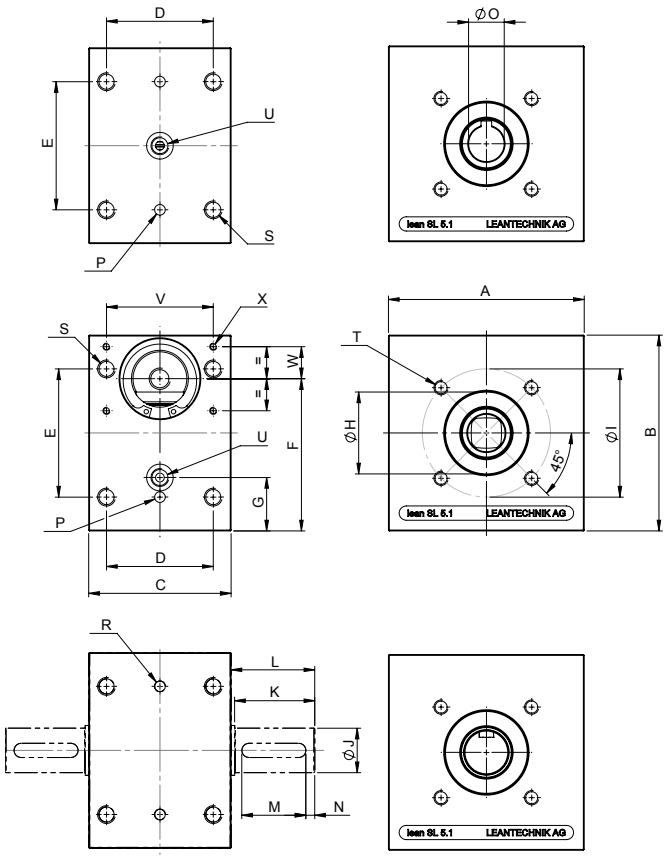
The frictional forces in the bushings increase due to torques. This leads to reduced efficiency and increased wear of the bushings (sliding bearings). Please note that this means that a greater driving torque will be required.

lean SL® Series technical data		Unit	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL5.5
Lifting power	F_{max}	N	300	800	2000	8000	25000
Lifting speed	v_{max}	m/s	0.6	0.6	0.6	0.6	0.6
Acceleration	a_{max}	m/s^2	30	30	30	30	30
Torque	M_{max}	Nm	3	8	40	240	1200
Pitch diameter	⌀ Tk	mm	12	20	40	60	96
Lifting gear ratio	mm/360°		37.6991	62.8318	125.6637	188.4955	301.5929
Efficiency	η		0.8	0.8	0.8	0.8	0.8
Temperature resistance	t	°C	+100	-10 to +100	-10 to +100	-10 to +100	+100
Static torque	Mt_x stat.	Nm	0	0	0	0	0
Dynamic torque	Mt_x dyn.	Nm	0	0	0	0	0
	Mt_y stat.	Nm	100	200	400	2000	7000
	Mt_y dyn.	Nm	9	18	22	150	800
	Mt_z stat.	Nm	250	500	1000	4000	15000
	Mt_z dyn.	Nm	25	50	110	700	4500

lean SL® 5.m - 5.5 • Dimension sheet



Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

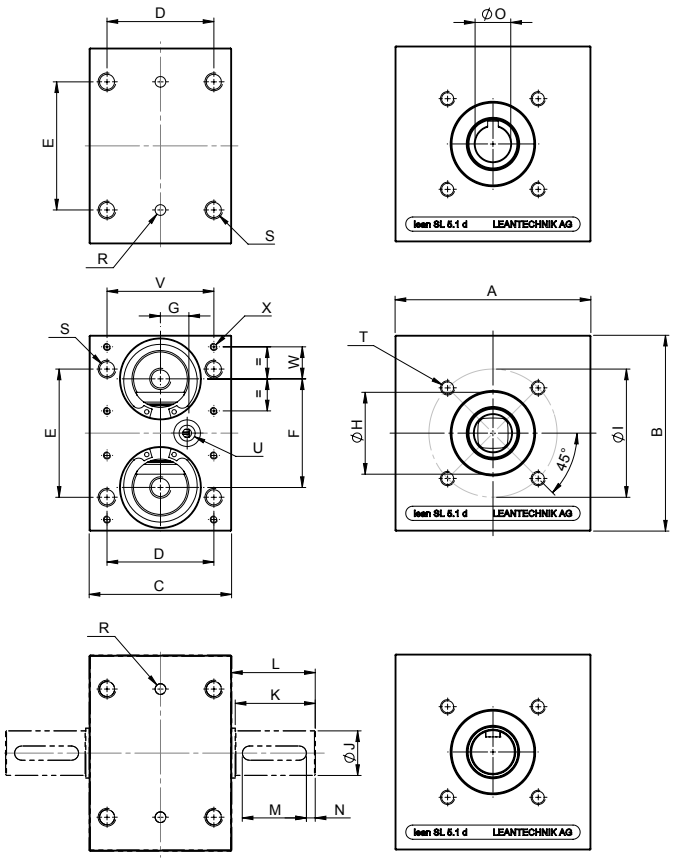
CAD Data

lean SL® Gear units		Unit	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
	A	mm	60	80	110	180	305
	B	mm	60	80	110	180	305
	C	mm	47	70	80	130	200
	D	mm	36	55	60	105	160
	E	mm	40	50	72	120	210
	F	mm	44	59	85.5	139.5	231.5
	G	mm	20	26	30	55	90
Locating flange (remove	H	mm	ø 19 K6 ↧ 3	ø 26 K6 ↧ 3	ø 47 K6 ↧ 4	ø 72 K6 ↧ 4	ø 125 K6 ↧ 5
sealing plate when in use)	I	mm	ø 35	ø 48	ø 72	ø 110	ø 200
	J	mm	ø 9.5 h7	ø 14 h7	ø 25 h7	ø 42 h7	ø 65 h7
	K	mm	22	30	46	60	90
	L	mm	22	32	47	62	92
	M	mm	14	25	35	50	80
	N	mm	2.5	2	5	5	5
Ker DIN 6885 P9	O	mm	ø 6 H7	ø 10 H7	ø 20 H7	ø 35 H7	ø 55 H7
	P	mm	ø 4 H7 ↧ 6	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10	ø 6 H7 ↧ 10	ø 10 H7 ↧ 12
	R	mm	ø 4 H7 ↧ 3	ø 6 H7 ↧ 5	ø 6 H7 ↧ 3	ø 6 H7 ↧ 5	ø 10 H7 ↧ 12
	S	mm	M6 ↧ 15	M8 ↧ 16	M10 ↧ 20	M12 ↧ 27	M20 ↧ 45
			ø 5.0 through	ø 6.8 through	ø 8,5 through	ø 10.2 through	ø 17.5 through
	T	mm	M5 ↧ 7	M6 ↧ 12	M8 ↧ 12	M10 ↧ 20	M12↧ 25
Lube hole	U	mm	M6 ↧ 5	M10x1 ↧ 10	M10x1 ↧ 10	M10x1 ↧ 10	M10x1 ↧ 10
	V	mm	40	52	60	100	145
	W	mm	12	15	18	35	60
Gear rack protection	X	mm	M3 ↧ 4	M4 ↧ 6	M4 ↧ 8	M4 ↧ 8	M5 ↧ 10
Weight PW		kg	0.36	1.00	2.35	9.70	44.1
Weight ZA 1		kg	0.39	1.11	2.70	11.55	49.6
Weight ZA 2		kg	0.40	1.15	2.87	12.21	51.9
Weight PFN		kg	0.37	1.03	2.32	9.91	43.5

Article nummer	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
lean SL® PW	500 664	500 129	500 130	500 131	500 132
lean SL® ZA 1	500 665	500 133	500 134	500 135	500 136
lean SL® ZA 2	500 666	500 137	500 138	500 139	500 140
lean SL® PFN	500 667	500 141	500 142	500 143	500 144

lean SL® double 5.m - 5.5 • Dimension sheet

Make sure that the article number refers to the correct pinion shaft version.



Video Functioning

Video gear rack installation

Installation instructions

CAD Data

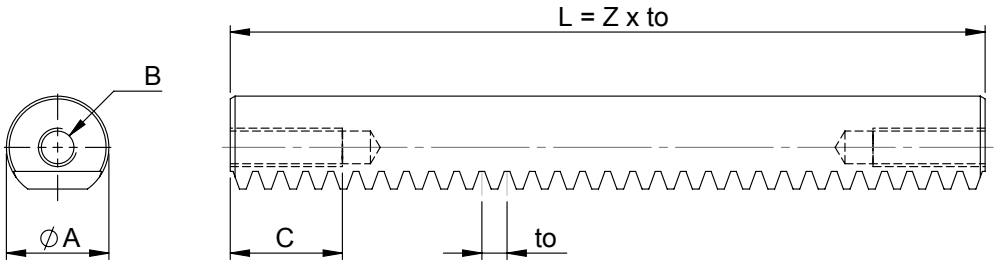
In the "double" version, the maximum transmitted torque is the same as for the individual gearbox.

lean SL® double		Unit	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
	A	mm	60	80	110	180	305
	B	mm	60	80	110	180	305
	C	mm	47	70	80	130	200
	D	mm	36	55	60	105	160
	E	mm	40	50	72	120	210
	F	mm	28	38	61	99	158
	G	mm	13	20	15	15	20
Locating flange (remove	H	mm	ø 19 K6 ↧ 3	ø 26 K6 ↧ 3	ø 47 K6 ↧ 4	ø 72 K6 ↧ 4	ø 125 K6 ↧ 5
sealing plate when in use)	I	mm	ø 35	ø 48	ø 72	ø 110	ø 200
	J	mm	ø 9.5 h7	ø 14 h7	ø 25 h7	ø 42 h7	ø 65 h7
	K	mm	22	30	45	60	90
	L	mm	22	32	47	62	90
	M	mm	14	25	36	50	80
	N	mm	2.5	2	5	5	5
Ker DIN 6885 P9	O	mm	ø 6 H7	ø 10 H7	ø 20 H7	ø 35 H7	ø 55 H7
	R	mm	ø 4 H7 ↧ 3	ø 6 H7 ↧ 5	ø 6 H7 ↧ 3	ø 6 H7 ↧ 5	ø 10 H7 ↧ 12
	S	mm	M6 ↧ 15	M8 ↧ 16	M10 ↧ 20	M12 ↧ 27	M20 ↧ 45
			ø 5.0 through	ø 6.8 through	ø 8,5 through	ø 10.2 through	ø 17.5 through
	T	mm	M5 ↧ 7	M6 ↧ 12	M8 ↧ 12	M10 ↧ 20	M12 ↧ 25
Lube hole	U	mm	M6 ↧ 5	M10x1 ↧ 10	M10x1 ↧ 10	M10x1 ↧ 10	M10x1 ↧ 10
	V	mm	40	52	60	100	145
	W	mm	12	15	18	35	60
Gear rack protection	X	mm	M3 ↧ 4	M4 ↧ 6	M4 ↧ 8	M4 ↧ 8	M5 ↧ 10
Weight PW		kg	0.31	0.90	2.10	8.29	37.8
Weight ZA 1		kg	0.34	1.01	2.45	10.14	43.3
Weight ZA 2		kg	0.35	1.05	2.62	10.80	45.6
Weight PFN		kg	0.32	0.93	2.07	8.50	37.3

Article nummer	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
lean SL® double PW	500 668	500 145	500 146	500 147	500 148
lean SL® double ZA 1	500 669	500 149	500 150	500 151	500 152
lean SL® double ZA 2	500 670	500 153	500 154	500 155	500 156
lean SL® double PFN	500 671	500 157	500 158	500 159	500 160

lean SL® Racks 5.m - 5.5 • Dimension sheet

lean SL® series gear racks are supported in sliding bushings. They are designed to transfer tensile and compressive forces. They cannot bear transverse forces. See the technical data on Page 112.



The gear rack is symmetrical in construction. When a gear rack protection is used, the gear rack length increases accordingly. Have the theoretical lifespan calculated.

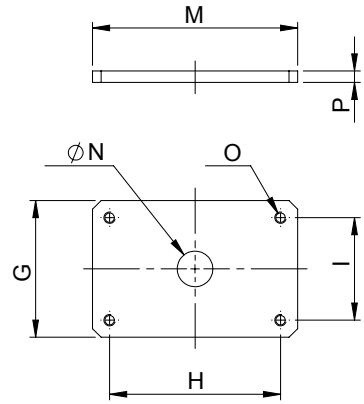
Always add the number of teeth "Z = _ _ _" to the article number.

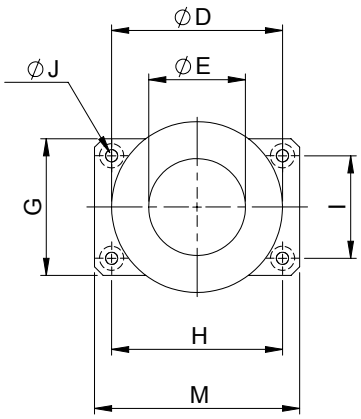
lean SL® Rack		Unit	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL5.5
	A	mm	⌀ 20 h6	⌀ 25 h6	⌀ 32 h6	⌀ 60 h6	⌀ 100 h6
	B	mm	M8	M10	M12	M20	M24
	C	mm	25	30	35	50	55
Teeth number	Z	mm	as per customer data				
Module	m		0.75	1.0	2.5	2.5	4.0
Tooth pitch	to	mm	2.3562	3.1416	7.8540	7.8540	12.56637
Moment of inertia	Ix	mm^4	5677	12054	24330	352513	2569015
Moment of inertia	Iy	mm^4	7552	17856	44042	572284	4340400
Polar moment of inertia	Ip	mm^4	13230	29910	68372	924797	6909416
Weight		kg/m	2.30	3.50	5.45	19.10	52.20

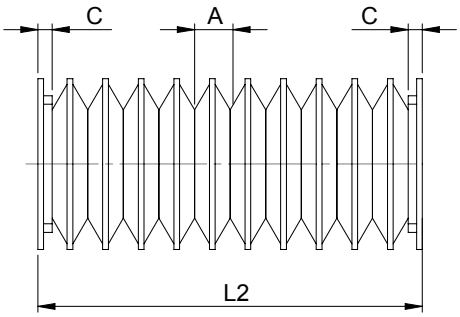
Article nummer lean SL® Rack	SL 5.m 500 672	SL 5.0 500 161	SL 5.1 500 162	SL 5.3 500 163	SL 5.5 500 164

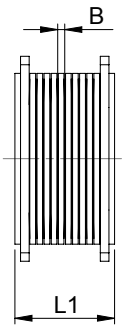
lean SL® Rack protection and end plates 5.m - 5.5 • Dimension sheet

This gear rack protection is suitable for use in welding areas (SB). The end plate is used for mounting the gear rack protection on the lean SL®gear rack.









lean SL® Rack protection and end plates 5.m - 5.5

Check whether the operating conditions require a gear rack protection. This gear rack protection is **suitable for use in welding areas**. It is shipped with two retaining plates and screws.

The gear rack protection is silicone-free.

Always add the number of folds "F = _ _ _" to the article number.

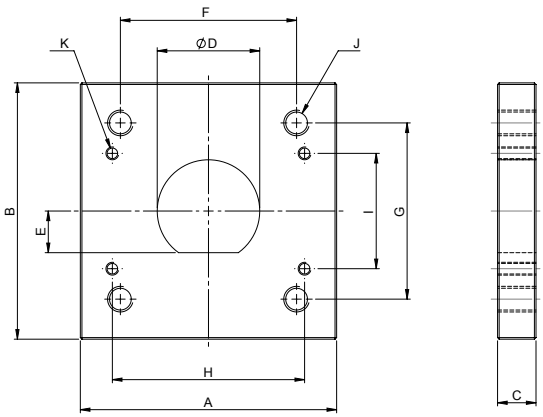
lean SL® Gear rack protection		Unit	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
	A	mm	10	12.5	12.5	27.5	37.5
	B	mm	2	2.5	2.5	2.5	2.5
Stroke per fold	(A-B)	mm	8	10	10	25	35
	C	mm	4.5	5	5	5	6
	D	mm	ø 40	ø 50	ø 60	ø 110	ø 170
	E	mm	ø 21	ø 26	ø 34	ø 60	ø 100
Number of folds	F	Unit	as per customer data				
	G	mm	32	41	48	80	145
	H	mm	40	52	60	100	145
	I	mm	24	30	36	70	120
	J	mm	ø 3.2	ø 4.3	ø 4.3	ø 4.3	ø 5.5
			V 6.5 x 90°	V 8.5 x 90°	V 8.5 x 90°	V 8.5 x 90°	V 11 x 90°
Lift	L	mm	L = L2 – L1 = F x (A – B)				
	L1	mm	L1 = 2 x C + F x B				
	L2	mm	L2 = 2 x C + F x A				
	M	mm	47	63	72	110	170
	N	mm	ø 8.2	ø 10.5	ø 12.5	ø 20.5	ø 24.5
	O	mm	M3	M4	M4	M4	M5
	P	mm	4	4	4	4	5

Article nummer	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
lean SL® Gear rack protection	501 354	500 177	500 178	500 179	500 180
lean SL® End plates	501 357	500 548	500 549	500 550	501 201

lean SL® Rack retaining plate AZ 5.m - 5.5 • Dimension sheet

The gear rack retaining plate provides a rigid connection between the mounted parts and the gear rack. To this end, the retaining plate is pressed onto the gear rack in the guide direction. The "J" thread and the end face thread can be used for mounting.

The gear rack retaining plate is only intended to take up torque. It cannot therefore transfer forces in the gear rack guide direction. The retaining plate is mounted flush with the front surface of the gear rack using a shrinkage process.



lean SL® Rack retaining plate AZ 5.m - 5.5

Be sure to indicate precisely which gear rack will be used with the AZ plate when ordering a gear rack retaining plate.

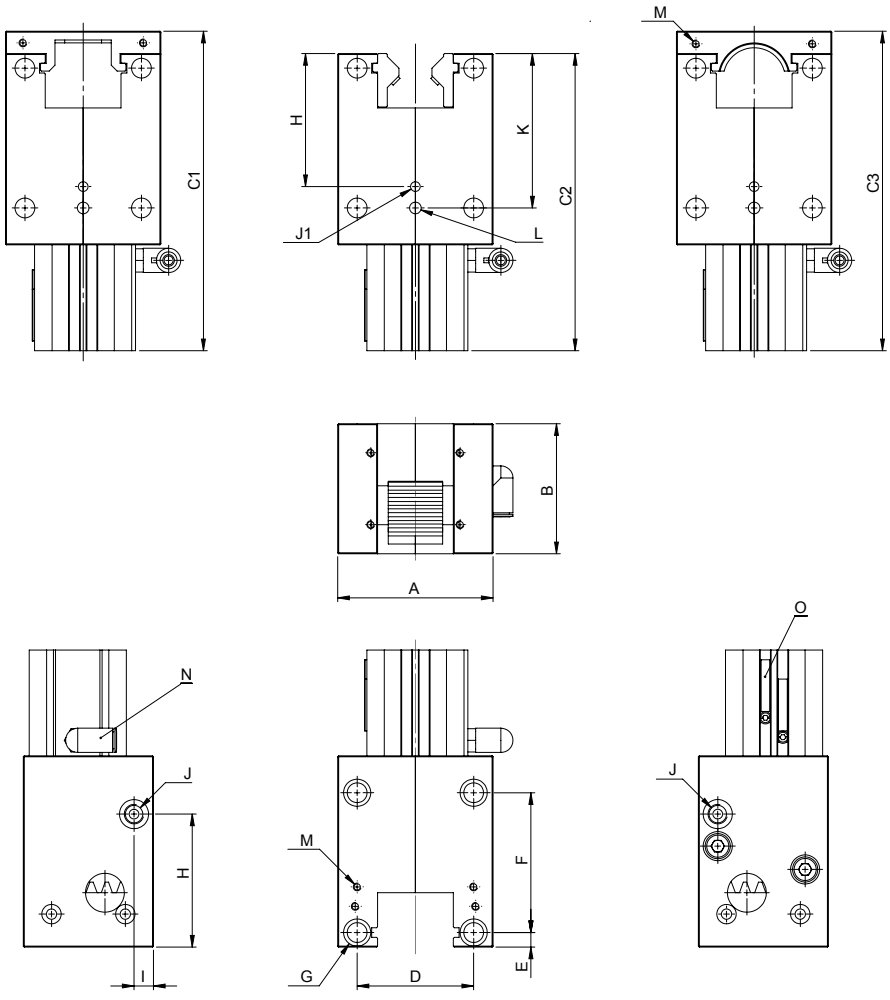
lean SL® Gear rack retaining plate AZ		Unit	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
	A	mm	47	70	80	130	180
	B	mm	47	70	80	130	180
	C	mm	7	10	12	15	20
	D	mm	ø 20 P7	ø 25 P7	ø 32 P7	ø 60 P7	ø 100 P7
	E	mm	8.75	10	13	22	35
	F	mm	36	50	55	90	150
	G	mm	36	50	55	90	150
	H	mm	40	52	60	100	145
	I	mm	24	30	36	70	120
	J	mm	M5	M6	M8	M10	M12
	K	mm	M3	M4	M4	M4	M5
Weight		kg	0.10	0.34	0.51	1.64	3.90

Article nummer lean SL® Gear rack retaining plate AZ	SL 5.m	SL 5.0	SL 5.1	SL 5.3	SL 5.5
	500 358	500 185	500 186	500 187	500 188

Mechanical arrest system (ASS) 5.0 - 5.4 • Dimension sheet

The mechanical arrest system (ASS) is mounted on the gearbox and ensures that systems, machines and equipment do not descend suddenly or collapse.

A detailed description of its functioning can be found on page 18.



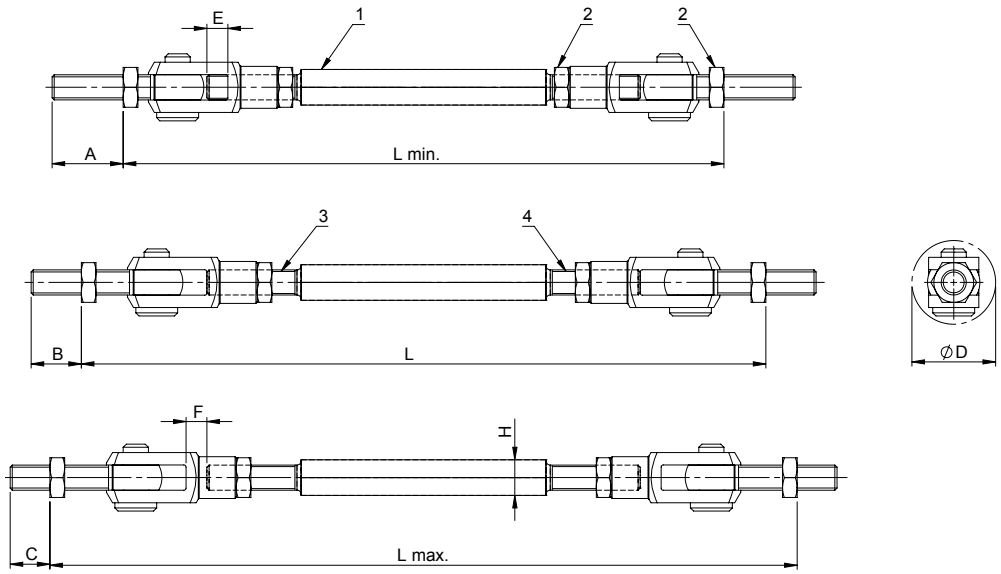
Mechanical arrest system (ASS) 5.0 - 5.4

Mechanical arrest system (ASS) for lifgo® & lean SL®			Unit	5.0	5.1	5.3 5.4
	A	mm	70	80	130	165
	B	mm	55	67	90	90
	C1	mm	124,5	164,5	216,5	236,5
	C2	mm	116	153	197,5	217,5
	C3	mm	124,5	164,5	216,5	
	D	mm	55	60	105	130
	E	mm	6.5	7.5	11	11
	F	mm	50	72	120	140
	G	mm	ø 8.2 through ⌴ ø 12 ↧ 8.6	ø 10.2 through ⌴ ø 14 ↧ 10.6	ø 13 through ⌴ ø 20 ↧ 12.6	ø 13 through ⌴ ø 20 ↧ 12.6
	H	mm	45.5	68.5	106	126
	I	mm	10	10	10	10
Lube hole for	J	mm	M6 ↧ 6	M10x1 ↧ 10	M10x1 ↧ 10	M10x1 ↧ 10
Pinion/gear rack	J1	mm	ø 5	ø 5	ø 5	ø 5
	K	mm	56.5	79.5	131	151
Dowel hole	L	mm	ø 6F7 ↧ 10	ø 6F7 ↧ 10	ø 6F7 ↧ 10	ø 6F7 ↧ 10
For gear rack protection	M	mm	M4	M4	M4	M4
Plug connector for air hose	N	mm	ø 6	ø 6	ø 6	ø 6
Proximity switch	O		SME-8M-DS-24V-K-0,3-M8D - Festo			
Weight lifgo®		kg	1.9	3.5	11.4	16.6
Weight lifgo® linear		kg	1.8	3.3	10.5	15.9
Weight lean SL®		kg	2.0	3.6	11.5	

Article number lifgo® & lean SL®	5.0	5.1	5.3	5.4
lifgo® mechanical arrest system	500 600	500 601	500 602	500 640
lifgo® linear mechanical arrest system	500 604	500 605	500 606	500 641
lean SL® Mechanical arrest system	500 608	500 609	500 610	

Differential coupling 5.0 - 5.3 • Dimension sheet

The differential coupling is an adjustable tie rod. It is installed horizontally or vertically as a connector between two gear racks. Follow the installation and usage instructions shown in the sample pictures starting on page 23.



Differential coupling 5.0 - 5.3

Differential couplings must be axially flush when installed, and may be used only as draw bars. Please also follow our installation tips and the installation videos on the Internet.

The minimum screw-in depth "C" (eyebolt/gear rack) must be maintained.

Always add the length "L = _ _ _ _" to the article number.

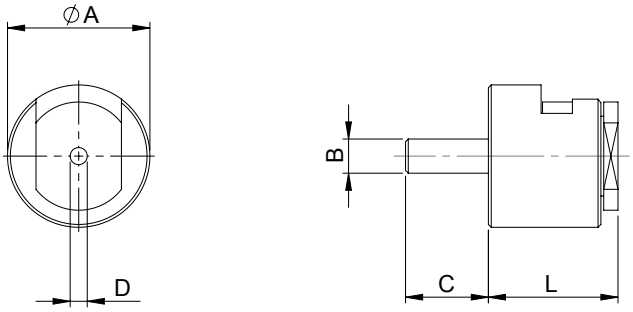
Differential coupling for lifgo® & lean SL®		Unit	5.0	5.1	5.3
	A	mm	30	34	50
	B	mm	21	24	37
Screw depth min.	C	mm	15	19	25
Opening	D	mm	ø 35	ø 40	ø 65
	E	mm	- 8	- 10	- 15
	F	mm	+ 8	+ 10	+ 15
Adjustment range over coupling rod	G	mm	± 16	± 20	± 30
1 coupling rod	H	mm	SW 14	SW 17	SW 27
	L	mm	as per customer data		
Adjustment range	L min.	mm	L min. = L – 2xE – 2x (A – B)		
	L max.	mm	L max. = L + 2xF + 2x (B – C)		
Installation length of	from	mm	180	230	360
	to	mm	1500	1700	2000
Dynamic tensile force	F_{max} dyn.	N	8700	12600	36700
Static tensile force	F_{max} stat.	N	11600	16800	49000
2 lock nut		mm	SW 17	SW 19	SW 30
3 left-hand thread		mm	M10x1.25	M12x1.25	M20x1.5
4 right-hand thread		mm	M10x1.25	M12x1.25	M20x1.5
Weight		kg/m	1.15+0.27 kg	2.01+0.50 kg	3.64+2.20 kg

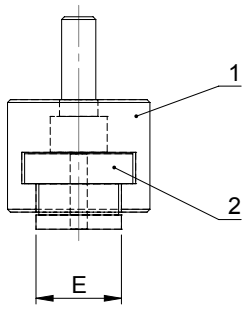
Article number	lifgo® & lean SL®	5.0	5.1	5.3
Differential coupling	all lengths	500 189	500 190	500 191

Coupling unit 5.0 - 5.3 • Dimension sheet

The coupling unit is a coupling for tension and compression, and connects the gear rack to an air or electric cylinder. The unit consists of two parts:

The coupling sleeve (1) is screwed to the gear rack, and the coupling nut (2) is threaded onto the piston rod of the cylinder. Various thread sizes are available to match the mating threads.





Coupling nuts with special threads are available. They are not included in the table.

Always add the thread size "M = _ _ x _._ _" to the article number.

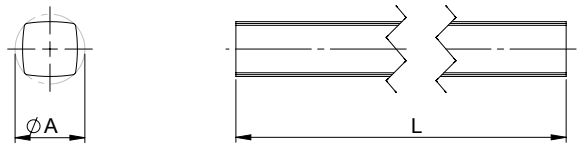
Coupling unit for lifgo® & lean SL®		Unit	5.0	5.1	5.3	
	A	mm	ø 50	ø 50	ø 65	
	B	mm	M10	M12	M20	
	C	mm	27	29	33.5	
Thread	D	mm	as per customer data			
Spanner width	E	mm	SW 30	SW 30	SW 36	
	L	mm	45.5	45.5	78	
Dynamic tensile force	F_{max} dyn.	KN		10	12	40
Static tensile force	F_{max} stat.	KN		16	18	63
Weight		kg/m	0.58	0.58	1.65	

Article number	lifgo® & lean SL®	5.0	5.1	5.3
Coupling unit		500 193	500 194	500 195
	Thread	M10 x 1.25	M10 x 1.25	M20 x 1.50
	Thread	M12 x 1.25	M12 x 1.25	M22 x 1.50
	Thread	M16 x 1.50	M16 x 1.50	M27 x 2.00
	Thread	M20 x 1.50	M20 x 1.50	M30 x 2.00

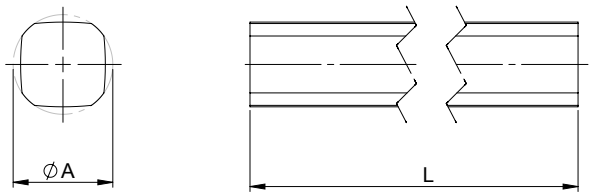
Profile shafts 5.0 - 5.4 • Dimension sheet

Profile shafts provide rotationally rigid connections between several gearboxes (PW version).They are inserted through the pinion shafts of the gearboxes to be connected. At the same time, the profile shaft ensures the synchronicity and alignment of the pinions of connected gearboxes.

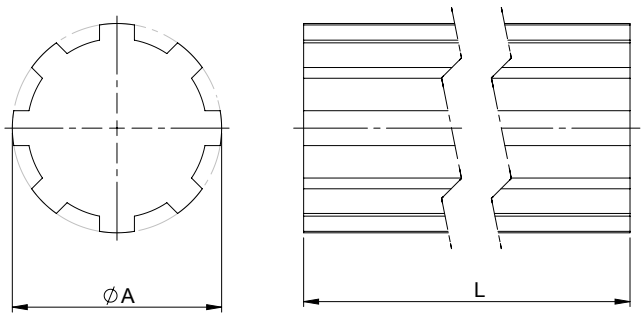
PG 14



PG 20



KW 42



The pinion positions of two gearboxes remain synchronized for a gear rack position from 0° for "gearbox 1" to 90° for "gearbox 2".

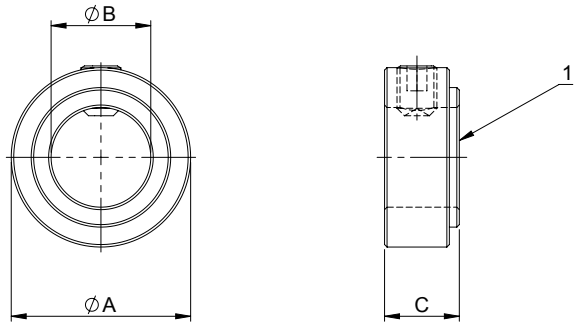
Always add the length "L = _ _ _ _" to the article number.

Profile shaft for lifgo® & lean SL®		Unit	5.0	5.1	5.3	5.4
			Polygon	polygon	splined shaft	splined shaft
	A	mm	ø 14	ø 20	ø 42	ø 54
	L	mm		as per customer data		
Max. dynamic torque	Mt	Nm	40	152	954	2000
Twist angle		°/m	1	1	1	1
Rectitude		mm/m	0.3	0.3	0.3	0.3
Polar moment of inertia	Ip	mm^4	2140.29	11563.94	229252.02	620943.76
Main moment of inertia	Ix, Iy	mm^4	1071.14	5781.97	114626.01	310471.88
Weight		kg/m	0.90	2.10	9.30	15.20

Article number	lifgo® & lean SL®	5.0	5.1	5.3	5.4
Profile shaft		100 130	100 166	100 198	105 668

Adjusting collar 5.0 - 5.4

Adjusting collars secure profile shafts in the axial direction. They are secured with compression ring screws.



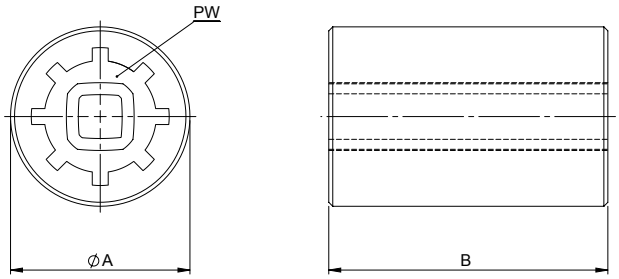
Two adjusting collars are needed per profile shaft in order to secure both directions. Make sure that the adjusting collar is installed with the correct side (1) facing the gearbox housing (see drawing).

Adjusting collar for lifgo® & lean SL®		unit	5.0	5.1	5.3	5.4
	A	mm	ø 30	ø 36	ø 70	ø 80
	B	mm	ø 14	ø 20	ø 42	ø 54
	C	mm	15	15	20	22
Weight		kg	0.06	0.07	0.35	0.44

Article number	lifgo® & lean SL®	5.0	5.1	5.3	5.4
Adjusting collar		500 463	500 464	500 465	500 466

Sliding sleeves 5.0 - 5.3

Sliding sleeves can be used for installing lifgo®or lean SL® in gearboxes with hollow shafts / shrink discs. Profile shafts with sliding sleeves create an interlocking, rotationally rigid connection between gearboxes and gearmotors.



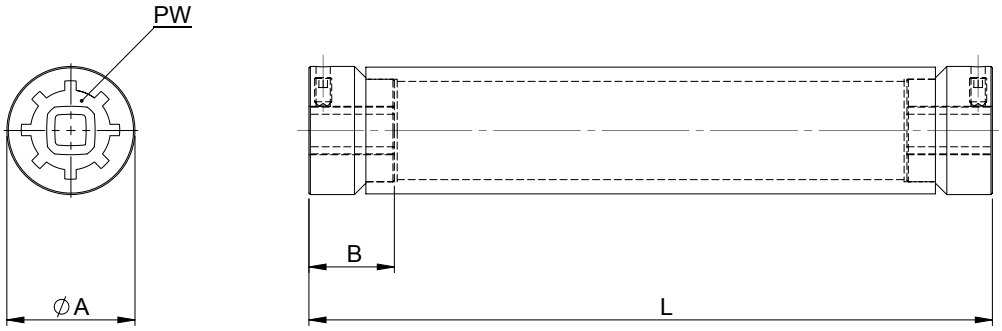
When a sliding sleeve and profile shaft are used, mechanical synchronicity of the system is maintained.

Sliding sleeves for lifgo® & lean SL®		unit	5.0	5.1	5.3
	A	mm	ø 35 h7	ø 45 h7	ø 90 h7
	B	mm	60	70	90
Profile shaft	PW		PG 14	PG 20	KW 42
Weight		kg	0.40	0.72	3.63

Article number	lifgo® & lean SL®	5.0	5.1	5.3
Sliding sleeve		500 439	500 440	500 441

Rotary reinforcement 5.0 - 5.3 • Dimension sheet

We recommend the use our rotational reinforcement in cases of large axis spacing or high torsional forces. They prevent asynchronous behaviour in the lifting system due to twisting or torsion of the profile shafts.



Rotary reinforcement 5.0 - 5.3

The profile shafts and rotational reinforcements are secured axially by compression ring screws. Please use short profile shafts as much as possible, always taking the insertion depth "B" into consideration.

Always add the length "L = _ _ _ _" to the article number.

Rotational reinforcement for lifgo® & lean SL®		Unit	5.0	5.1	5.3
	A	mm	ø 30	ø 45	ø 89
Insertion depth	B	mm	25	30	90
	L	mm	as per customer data		
Max. torque	Mt	Nm	see profile shaft		
Polar moment of inertia	Ip	mm^4	45850	245897	2804721
Main moment of inertia	Ix, Iy	mm^4	22925	122948	1402360
Profile shaft	PW		PG 14	PG 20	KW 42
Weight		kg/m	1.86+0.20	4.63+0.51	11.90+5.53

Article number Rotary reinforcement	lifgo® & lean SL®	5.0 500 478	5.1 500 479	5.3 500 480

Shaft adapter 1 and 2 & profile shaft adapter 5.0 - 5.4 • dimension sheet

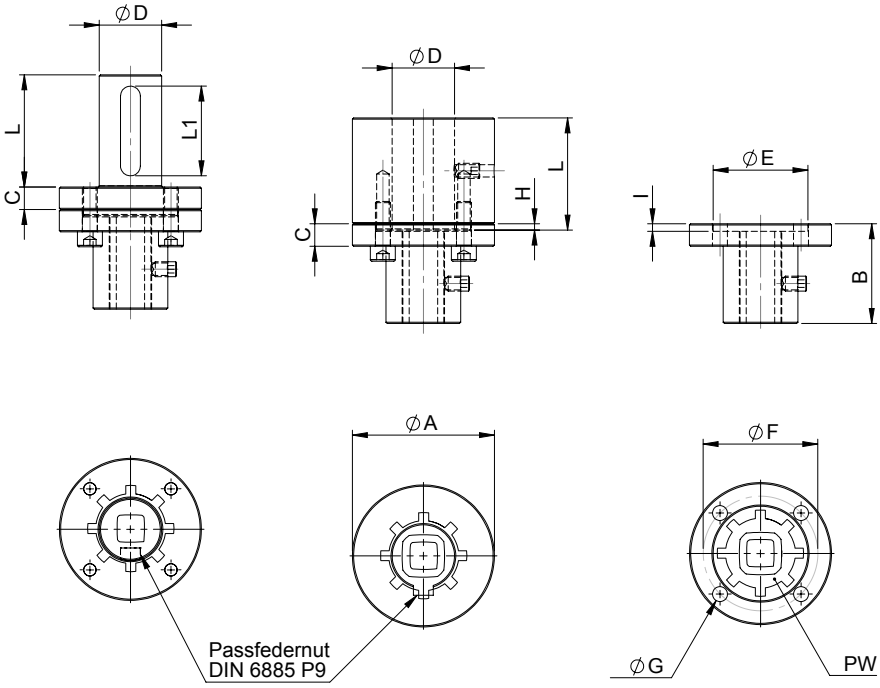
Shaft adapter variants 1 and 2 act as rotationally rigid connectors between the gearbox and the profile shaft / gearbox.

The profile shaft adapter is also available individually if the gearbox connection is to be established by the customer.

Shaft adapter Variant 1

shaft adapter Variant 2

profile shaft adapter



Shaft adapter 1 and 2 & profile shaft adapter 5.0 - 5.4

The dimensions "D" and "L" and the variant, 1 or 2, are configured or selected by the customer.

Always add the dimensions "D = ∅ _ _ _ _ x L _ _L1" in mm and the variant V _ to the article number.

Shaft adapter/ Profile shaft adapter for lifgo® & lean SL®		unit	5.0	5.1	5.3	5.4
	A	mm	ø 45	ø 57	ø 90	ø 90
	B	mm	28	40	65	70
	C	mm	8	9	16	16
	D	mm	as per customer data			
	E	mm	ø 28 H7 ↧ 2.5	ø 38 H7 ↧ 3	ø 58 H7 ↧ 4	ø 74 H7 ↧ 4
	F	mm	ø 35	ø 46	ø 72	ø 88
	G	mm	ø 5.3	ø 6.2	ø 10.5	ø 10.5
	H	mm	2	2.5	3.5	3.5
	I	mm	2.5	3	4	4
	L	mm	as per customer data			
	L1	mm	as per customer data			
Max. dynamic torque	Mt	Nm	40	152	954	2000
Profile shaft	PW		PG 14	PG 20	KW 42	KW 54
Weight variant 1		kg	0.27	0.63	2.56	4.28
Weight variant 2		kg	0.45	0.94	3.25	5.44
Weight PWA		kg	0.12	0.24	1.10	1.66

Article number	lifgo® & lean SL®	5.0	5.1	5.3	5.4
Shaft adapter variant 1	secured	500 455	500 456	500 457	500 458
Shaft adapter variant 2	secured	500 487	500 488	500 489	500 490
Profile shaft adapter	secured	500 483	500 484	500 485	500 486

Universal joint single/double & drive shaft 5.0 - 5.1 • Dimension sheet

The universal joints (DIN 808-G) and drive shafts are designed for rigid torque transmission in case of differences in height and alignment errors.

Our universal joints are designed for sizes 5.0 and 5.1, and our drive shaft is designed for size 5.3. You should also pay attention to the notes on the following page.

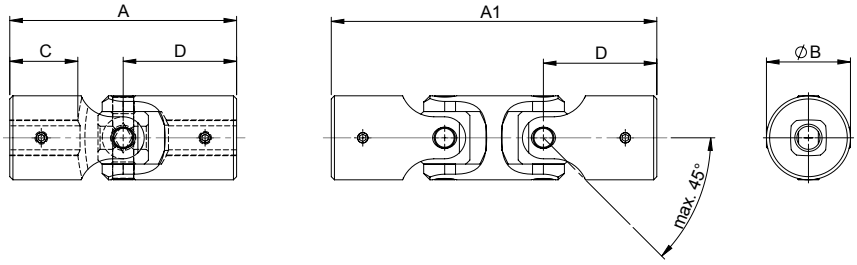
Single universal joint

Double universal joint

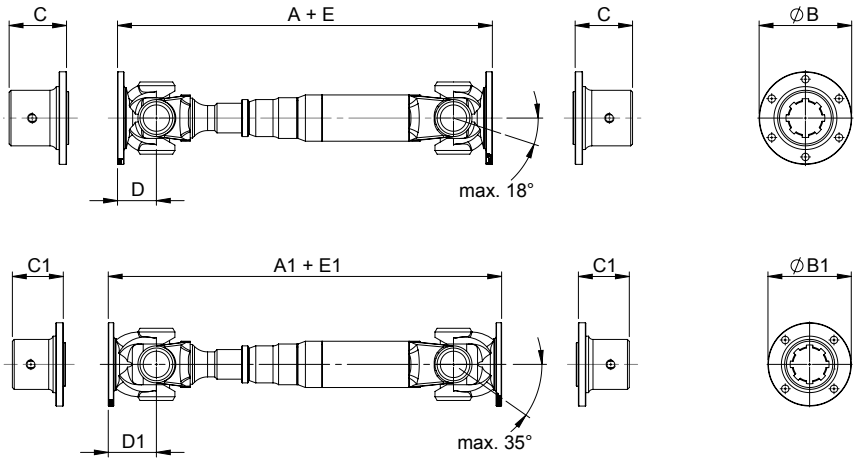
Drive shaft

Two universal joints with a profile shaft as a connector

Universal joint



Drive shaft



Universal joint single/double & drive shaft 5.0 - 5.1

Ensure proper fork placement when using two universal joints. They must be aligned. The angle of bend at both forks and the connection plane must be identical. The maximum bend angle "ß" must not be exceeded. The maximum transmitted torque depends on the bend angle "ß".

Take note of the "gimbal error" if the joint is to be used for positioning.

Drive shafts are designed for each project individually.

Universal joint for lifgo® & lean SL®		Unit	5.0	5.1
	A	mm	108	108
	A1	mm	155	155
	B	mm	ø 40	ø 40
	C	mm	30	30
	D	mm	54	54
	ß		45°	45°
Weight, single		kg	0.82	0.74
Weight, double		kg	1.10	1.02

Article number	lifgo® & lean SL®	5.0	5.1
Universal joint, single		103 489	103 487
Universal joint, double		103 490	103 488

Couplings, Gearmotors & Air Cylinders

We also provide and calculate the required couplings, gearbox bells, motors, gearboxes, and/or air cylinders and other purchased or accessory parts for our lifting, transfer, and synchronized systems.

The parts shown below are examples, and are available in a wide variety of versions. If you prefer a certain manufacturer or model series when selecting, please let us know before technical design has begun.

On request, we can also assemble these components into functional units. Discuss your application case with us.

Gearbox flange

Gearbox bell

Coupling

Drive shaft

Distributor gearbox

Drives & motors

Notes

4 Installation & commissioning

Installation & Commissioning

Installation and use of our lifgo®and lean SL®gear unit series is highly customised. For this reason, it is impossible to produce generally applicable assembly instructions that cover all applications and installation options.

We refer you to our "installation videos", which are available for both lifgo®and for lean SL®. We will also be happy to send them to you on a CD. They are also available on our website.

Individual installation instructions are included with each delivery depending on the shipped articles. If you would like this documentation in advance, we will be happy to send it by e-mail as a PDF file. Please ask us!

- Before assembling the gearbox, synchronize the drive pinion positions relative to each other by rotating the marks on all the pinions to the same position. This step will be easier if you place all the gearboxes next to each other and slide a profile shaft through all the gearboxes. The pinion positions relative to each other are the same, even for a 90° angle. For pinion shaft versions ZA 1/ZA 2 and PFN, you can use the location of the keyway as a guide. When doing this, do not remove the shipping lock (for lifgo® gearboxes).

- Position the gearbox as required and bolt from the top or the bottom. Tighten the screws only slightly. Use the supplied dowel pins.

- If present, assemble the profile shafts using universal joints as shown in the drawing (rotational connection). Each individual profile shaft requires two adjusting collars to prevent sideways drift. Gearboxes are automatically synchronized with each other by the profile shafts. Slide the adjusting collars against the housing and tighten their retaining screws. The profile shafts are now installed with no axial play. Connect all gearboxes with rotational connections in this way.

- Remove the shipping locks from the gear rack guides (located inside) for lifgo®and lifgo®linear by sliding in the gear rack. See the illustrations in the "Installation & Commissioning lifgo® 5" manual (available as a PDF file).

- Insert gear racks into those gearboxes that are connected by profile shafts. Gear racks slide in until just before the pinion shaft, so that the first tooth of the gear rack can engage with the pinion shaft. Rotate the profile shaft to draw in the gear racks and move them to the final position. All gear racks (horizontal/vertical) must move in at the same time. Put on the gear rack protection (if used).

- Establish the power connection between the drive (air cylinder/gear motor) by means of the coupling unit or gearbox adapter. Position the first gearbox behind the drive. All gearboxes connected by the profile shaft are adjusted together. Adjust the gear racks to the same height as the first gear rack behind the drive, by rotating the profile shaft.

- The differential coupling (DK) is installed as a tension device between the gear racks and can be adjusted. The dimension "L" is determined by the design, and is preset. The DK functions as a turnbuckle. For specifics about the installation, please see our lifgo®/lean SL®installation video, where the adjustment and alignment are shown in detail. A description is found in the "Installation & Commissioning lifgo® 5/lean SL®" manual (available as a PDF file).

- Check that the system runs easily, and tighten all screws completely.

- Place any accessories on the vertical gear racks and secure in place. Check again for smooth operation. Assembly is complete.

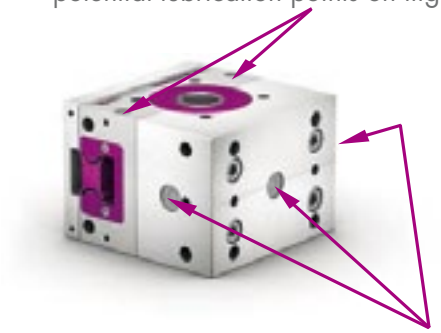
- Put the entire system in place first and then tighten all screws.

  Insert the gear racks immediately in order to ensure synchronization.

  Check the setting of the differential coupling, and make sure that all screws and nuts are tightened securely.

lifgo® gearboxes require initial lubrication at two locations (gear rack guide and housing), and lean SL® gearboxes require lubrication at one location (housing) (see lubrication point illustrations below.) Make sure that only one plug is removed in order to thread in the grease nipple (included in scope of delivery).

potential lubrication points on lifgo®guides (both sides)



potential lubrication points on lifgo® housing

potential lubrication points on lean SL® housing

Dirt can be deposited on and stick to exposed gear racks and guide rails, in particular. In order to maintain the functionality of seals and cover strips, this type of contamination must be removed regularly.

- Only one plug may be removed from a lubrication hole (see lifgo® or lean SL®drawings and dimension sheets; U, U1). All other plugs must remain in place in order to prevent grease from escaping.
- Ensure that the basic lubrication is adequate prior to commissioning. Follow the instructions of the lubricant manufacturer and pay particular attention to any indications of incompatibility.

We recommend greases compliant with DIN 51825 as lubricants.
Select according to load:

Pinion/gear rack (housing)
Lubricant – K2K, DIN 51825 for normal loads
Lubricant – K2K, DIN 51818 for higher loads

Guide cars
Low-viscosity grease – DIN 51826 NLGI 00 or NLGI 000

- Greases with a solid lubricant component (such as graphite or MoS2) must not be used.

All gearboxes have a light preliminary lubrication ex works. This is sufficient for a test run of 10 strokes. Initial lubrication must be performed prior to commissioning or a test run. This is performed in three stages, each using a third of the quantity indicated in the table on page 118, above.

1. Grease lifgo® guide car with a third of the quantity specified in the first table on page 118.
2. Move the lifgo® guide car or gear rack/guide rail back and forth with three double strokes each at least three times the length of the car.
3. Repeat steps 1 and 2 twice.
4. Check whether a film of lubricant is visible on the gear rack/guide rail.

- Caution: When lubricating the guide car by hand, do not apply more than one third of the specified grease quantity during initial lubrication.

Commissioning lubrication

lifgo® & lean SL®		5.0
Grease quantities	Unit	
lifgo® guide car	cm^3–grease	1.9
lifgo® housing	cm^3–grease	7.5
lifgo SL® housing	cm^3–grease	11.4

Perform a test run of 100 strokes with no load. Then perform a maintenance lubrication.

Maintenance lubrication

The specifications presented here assume typical operating periods for servo drives, interrupted by rest periods, and continuous lubrication. The values for daily and monthly lubrication cannot be determined by calculation. They are merely recommendations intended to emphasize the importance of good lubrication. Proven solutions for continuous lubrication include automatic lubricating bushings and central lubrication systems.

When units are exposed to environmental conditions such as contamination, the use of lubricating coolants, vibration, or impact loads, we recommend shorter lubrication intervals, and longer intervals for lighter loads. Maintenance lubrication quantities and intervals are shown in the following table:

Maintenance lubrication quantities and intervals for gearboxes

lifgo® & lean SL®		5.0
Grease quantities	Unit	
lifgo®® guide car	cm^3/km	0.0025
Lubrication cartridge 60 cm^3		
L – range	km	24000
lifgo® housing	cm^3/km	0.0540
Lubrication cartridge 125 cm^3		
L – range	km	2320
lifgo SL® housing	cm^3/km	0.06
Lubrication cartridge 125 cm^3		
L – range	km	2080

Due to unknown local conditions, it is not possible to give a definite recommendation for grease quantities and intervals. Maintenance personnel must pay closer attention to the state of the lubrication at the start of system operation and react accordingly.

An obvious film of lubricant should be visible on gear racks and guide rails, but no larger quantities should ooze out of the gearbox or the guide car. The quantity of grease must be increased or reduced based on individual experience. This also applies when grease dispensers and central lubrication systems are used.

When cleaning agents are used, care must be taken prior to recommissioning to ensure that the amount of lubricant meets the manufacturer's recommendations
and that no cleaning residue remains.

Commissioning lubrication

lifgo® & lean SL®		5.1
Grease quantities	Unit	
lifgo® guide car	cm^3–grease	2,2
lifgo® housing	cm^3–grease	26.6
lifgo SL® housing	cm^3–grease	26.6

Perform a test run of 100 strokes with no load. Then perform a maintenance lubrication.

Maintenance lubrication

The specifications presented here assume typical operating periods for servo drives, interrupted by rest periods, and continuous lubrication. The values for daily and monthly lubrication cannot be determined by calculation. They are merely recommendations intended to emphasize the importance of good lubrication. Proven solutions for continuous lubrication include automatic lubricating bushings and central lubrication systems.

When units are exposed to environmental conditions such as contamination, the use of lubricating coolants, vibration, or impact loads, we recommend shorter lubrication intervals, and longer intervals for lighter loads. Maintenance lubrication quantities and intervals are shown in the following table:

Maintenance lubrication quantities and intervals for gearboxes

lifgo® & lean SL®		5.1
Grease quantities	Unit	
lifgo®® guide car	cm^3/km	0.0030
Lubrication cartridge 60 cm^3		
L – range	km	20000
lifgo® housing	cm^3/km	0.0625
Lubrication cartridge 125 cm^3		
L – range	km	2000
lifgo SL® housing	cm^3/km	0.07
Lubrication cartridge 125 cm^3		
L – range	km	1780

Due to unknown local conditions, it is not possible to give a definite recommendation for grease quantities and intervals. Maintenance personnel must pay closer attention to the state of the lubrication at the start of system operation and react accordingly.

An obvious film of lubricant should be visible on gear racks and guide rails, but no larger quantities should ooze out of the gearbox or the guide car. The quantity of grease must be increased or reduced based on individual experience. This also applies when grease dispensers and central lubrication systems are used.

When cleaning agents are used, care must be taken prior to recommissioning to ensure that the amount of lubricant meets the manufacturer's recommendations
and that no cleaning residue remains.

Commissioning lubrication

lifgo® & lean SL®		5.3
Grease quantities	Unit	
lifgo® guide car	cm^3–grease	6,6
lifgo® housing	cm^3–grease	71.2
lifgo SL® housing	cm^3–grease	121.4

Perform a test run of 100 strokes with no load. Then perform a maintenance lubrication.

Maintenance lubrication

The specifications presented here assume typical operating periods for servo drives, interrupted by rest periods, and continuous lubrication. The values for daily and monthly lubrication cannot be determined by calculation. They are merely recommendations intended to emphasize the importance of good lubrication. Proven solutions for continuous lubrication include automatic lubricating bushings and central lubrication systems.

When units are exposed to environmental conditions such as contamination, the use of lubricating coolants, vibration, or impact loads, we recommend shorter lubrication intervals, and longer intervals for lighter loads. Maintenance lubrication quantities and intervals are shown in the following table:

Maintenance lubrication quantities and intervals for gearboxes

lifgo® & lean SL®		5.3
Grease quantities	Unit	
lifgo®® guide car	cm^3/km	0.0325
Lubrication cartridge 60 cm^3		
L – range	km	1850
lifgo® housing	cm^3/km	0.1223
Lubrication cartridge 125 cm^3		
L – range	km	1020
lifgo SL® housing	cm^3/km	0.125
Lubrication cartridge 125 cm^3		
L – range	km	1000

Due to unknown local conditions, it is not possible to give a definite recommendation for grease quantities and intervals. Maintenance personnel must pay closer attention to the state of the lubrication at the start of system operation and react accordingly.

An obvious film of lubricant should be visible on gear racks and guide rails, but no larger quantities should ooze out of the gearbox or the guide car. The quantity of grease must be increased or reduced based on individual experience. This also applies when grease dispensers and central lubrication systems are used.

When cleaning agents are used, care must be taken prior to recommissioning to ensure that the amount of lubricant meets the manufacturer's recommendations
and that no cleaning residue remains.

Commissioning lubrication

lifgo® & lean SL®		5.4
Grease quantities	Unit	
lifgo® guide car	cm^3–grease	6,6
lifgo® housing	cm^3–grease	130
lifgo SL® housing	cm^3–grease	

Perform a test run of 100 strokes with no load. Then perform a maintenance lubrication.

Maintenance lubrication

The specifications presented here assume typical operating periods for servo drives, interrupted by rest periods, and continuous lubrication. The values for daily and monthly lubrication cannot be determined by calculation. They are merely recommendations intended to emphasize the importance of good lubrication. Proven solutions for continuous lubrication include automatic lubricating bushings and central lubrication systems.

When units are exposed to environmental conditions such as contamination, the use of lubricating coolants, vibration, or impact loads, we recommend shorter lubrication intervals, and longer intervals for lighter loads. Maintenance lubrication quantities and intervals are shown in the following table:

Maintenance lubrication quantities and intervals for gearboxes

lifgo® & lean SL®		5.4
Grease quantities	Unit	
lifgo®® guide car	cm^3/km	0.0325
Lubrication cartridge 60 cm^3		
L – range	km	1850
lifgo® housing	cm^3/km	0.173
Lubrication cartridge 125 cm^3		
L – range	km	
lifgo SL® housing	cm^3/km	
Lubrication cartridge 125 cm^3		
L – range	km	

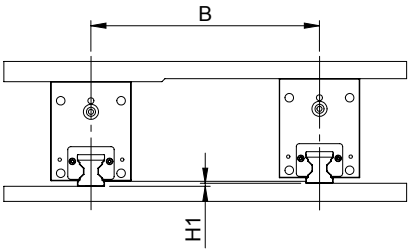
Due to unknown local conditions, it is not possible to give a definite recommendation for grease quantities and intervals. Maintenance personnel must pay closer attention to the state of the lubrication at the start of system operation and react accordingly.

An obvious film of lubricant should be visible on gear racks and guide rails, but no larger quantities should ooze out of the gearbox or the guide car. The quantity of grease must be increased or reduced based on individual experience. This also applies when grease dispensers and central lubrication systems are used.

When cleaning agents are used, care must be taken prior to recommissioning to ensure that the amount of lubricant meets the manufacturer's recommendations
and that no cleaning residue remains.

Dimensional and position accuracy of connecting surfaces

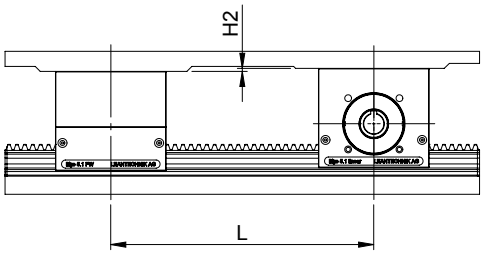
Height deviation permitted in transverse direction



The tolerance for the H dimension is to be subtracted from the height deviation Δ H1 permitted according to the accuracy classes 10 table.

$\Delta H1 = X \cdot b \cdot 10^{-4}$

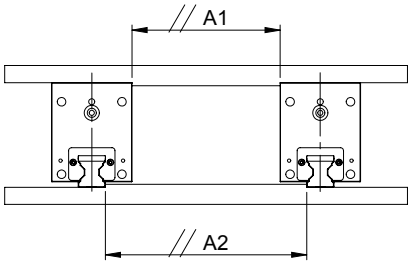
Height deviation permitted in longitudinal direction



If there are multiple guide cars, the tolerance for the H dimension is to be subtracted from the height deviation Δ H2 permitted according to the accuracy class table.

$\Delta H2 = Y \cdot l$

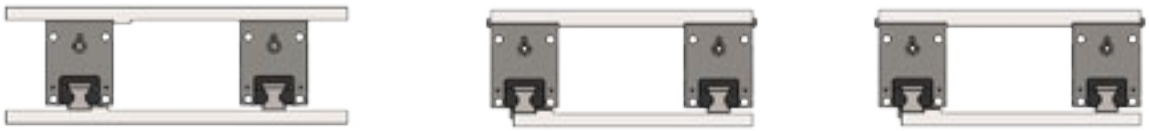
Parallelism of stop surfaces



The specified tolerances also apply to guide rails and cars that are mounted without stop surfaces on the side. If the values in the table are adhered to, impact on service life is generally negligible.

Dimensional and positional accuracy of joint planes		unit	5.0	5.1	5.3
Parallelism of stop surfaces	Δ A	mm	0.005	0.008	0.009
Permitted height deviation in transverse direction	Δ H1	mm	1.2 x B x 10^-4	1.2 x B x 10^-4	1.2 x B x 10^-4
Permitted height deviation in longitudinal direction	Δ H2	mm	3.5 x L x 10^-4	3.5 x L x 10^-4	3.5 x L x 10^-4

Assembly examples



GUIDE RAIL

The guide rail stop surfaces on the side are not marked. Each guide can be mounted either left or right on a stop edge.

GUIDE CARS

The ground stop surface on the side is the reference plane for adjacent construction.

We offer all the products in this brochure and many other products in our CAD catalogue for download from our website www.leantechnik.com.

CAD product catalogue from LEANTECHNIK – free download

In our configurator, we offer CAD models for many LEANTECHNIK products to download for free.

The download portal is based on the PARTcommunity technology from the software manufacturer CADENAS GmbH.

The models have all the relevant information you need to incorporate our gear units into your plans.

Simple handling and easy integration into your system

With just a few clicks, download the CAD models you want in any common CAD format directly from the LEANTECHNIK product catalogue, import it into your CAD system and then integrate it into your design.

We will support you from the planning phase

The reduction of process times is a central concern for us. Our intention to enable you to find the right gear unit for your purposes.

Service is number 1

If there are any problems when using the system or if you have any questions, do not hesitate to contact us.

https://leantechnik.com/service/cad-daten/

Delivery and payment (for products and services) are carried out on the basis of our general terms and conditions of sale and delivery. Our service conditions apply to the services we provide. All documents can be found at www.leantechnik.com. We are happy to send you the documents at your request.

Sales and Delivery conditions

1. General validity

The conditions listed below are the basis for all business transactions, exclusive of any other conditions and agreements not approved by us in writing, even if the wording below is not specifically included for each individual subsequent transaction. We accept the purchasing conditions of the buyer or purchaser only to the extent that they do not deviate from our contractual conditions, including the case that the former contain contradictory stipulations. Any individual clause of these contractual conditions that is legally invalid does not affect the legal validity of the remaining clauses. Contractual conditions that deviate herefrom are expressly declined.

2. Proposals and proposal documents

Cost estimates and proposals are binding for a period of 90 calendar days. Documents associated with the proposal, such as illustrations, drawings, weights, and dimensions are only approximate, unless they are expressly designated as binding. The supplier retains ownership and copyrights of all cost estimates, drawings, and other documents. Orders are considered accepted only when they have been confirmed by us in writing. Until then, our proposal is non-binding. Additional agreements, extensions, or changes made by telephone, telegraph, or orally, require written confirmation in order to be valid. For prices that are not expressly designated as firm in our proposals and order confirmations, we reserve the right to adjust prices accordingly if the cost factor (material, personnel costs, energy, and general costs, tariffs, shipping costs, etc.) increases significantly after the contract is concluded and prior to delivery. We are not bound to maintain previous pricing for follow-up orders. The minimum invoice amount is 100.00 Euro. Amounts up to 100.00 Euro can be paid in cash, with no discount, if the order is picked up. Excess or short deliveries of 10% are considered to be agreed to.

3. Prices

Prices are ex works, exclusive of packaging, plus legally mandated value-added tax.

4. Delivery lead time

Delivery times are estimated, even if this is not expressly stated. Every partial delivery is an independent order. Delivery lead times generally start after complete written agreement to the conditions of the contract, including the availability of any data, drawings, test samples, etc. to be provided by the buyer or purchaser at no cost and in the requested quantities and final versions. Delivery lead time is considered to be met when readiness to ship is reported on time, if shipment is not possible through no fault of our own. If we are unable to make timely delivery, the buyer or purchaser must provide an appropriate extension of time. The buyer or purchaser may not refuse partial deliveries. Liquidated damages due to non-fulfillment or late fulfillment are declined.

5. Prevented delivery

Operational interruptions of any kind, force majeure events, work stoppages, lockouts, etc. at our facilities or those of our suppliers, as well as any other causes or events that prevent receipt, generation, or shipment, release us from compliance with any delivery obligations throughout their duration, including any resulting events, and entitle us, if the details of the conditions require, to completely or partially cancel the delivery obligations without the buyer/purchaser being entitled to withdraw from the contract in such cases.

6. Shipment

Shipment is ex works, and is always at the cost and risk of the buyer or purchaser. Risk, including the risk of confiscation, transfers to the buyer or purchaser upon transfer of the goods to the carrier or freight forwarder, but no later than upon their departure from the factory. If no special instructions are provided, the means and route of shipment will be selected according to our best discretion but no liability will be accepted for selection of the least expensive or fastest shipment. If goods reported as ready for shipment are not picked up immediately, or if shipment is permanently or temporarily impossible, the purchase price is nevertheless due. We are then entitled to store the goods at the cost and risk of the buyer at our discretion. The supplier has no liability for weather damage during shipment or storage of the ordered goods.

7. Packaging

If no other express agreement has been made, and acknowledged by us in writing, we will package according to our best discretion. Packaging will be invoiced at cost price and will not be taken back. Insurance against breakage and damage due to shipping or fire is the responsibility of the buyer or purchaser.

8. Claims and rights in case of defects

Deviations of dimensions, weights and goods are permissible according to DIN standards. Any claims must be presented to us immediately in writing within 8 days of receipt of the goods in respect of visible defects, including all necessary details, such as the article, invoice, and delivery note numbers and the type of damage. The buyer initially has the right to supplementary performance for any existing defects. If the supplementary performance is not successful, the buyer can demand a reduction in the purchase price, or, at his option, withdraw from the contract. Any further damage claims will be declined, such as liability for damage by the supplied goods to the customer's legal goods (damage to other items), subsequent damages, loss of earnings, etc. These limitations on claims for damages do not apply in the case of gross negligence by the seller, or by intentional or grossly negligent breach of duty on the part of a legal representative or assignee of the seller. This limitation also does not apply to liability for damages arising from injury to life, body, or health due to a breach of duty by the seller, or intentional or negligent breach of duty by a legal representative or assignee of the seller. The term of expiry for claims and rights due to defects in the supplied goods and services – for any legal reasons whatsoever – and for claims of damages is 1 year. Claims and rights due to defects do not refer to merely minor defects, nor to natural wear; this applies in particular to seals and other wear parts. Such claims and rights are also excluded if they are based on improper use, operation, or unsuitable equipment, insufficient maintenance or repair, improper installation or modifications by the buyer/purchaser or third parties.

If the claim of defect is determined to be unjustified, then the buyer/purchaser must repay any expenditures that have been incurred. The above provisions apply accordingly if other goods are provided in place of those contractually agreed upon, as long as agreement to the change or deviation is reasonable for the buyer/purchaser, taking our interests into consideration.

9. Replacement delivery

Replacement delivery or credit can be issued only after complete determination of a duty of replacement, by detailed analysis at our factory. For this purpose, the goods forming the object of the claim must be sent to us at no cost to us. In cases of dire need, replacement will be provided against an invoice for the current price, and a credit issued after a duty of replacement has been established. In the case of subcontracted operations, we guarantee only that your parts will be processed correctly. Further claims for damages, such as replacement material, are not valid. Reference is made to the prescribed non-liability clause of the German Federal Cartel Office. If changes or repair work are performed by the buyer or purchaser or third parties without our prior authorization, our liability no longer applies. Further claims by the buyer or purchaser, and in particular claims for compensation for damages that do not affect the delivered goods themselves, are not valid.

10. Acceptance and testing

If a functional test of the goods to be provided is prescribed or agreed to, then it will take place at our factory immediately after readiness to ship, at the cost of the buyer or purchaser. If the Customer fails to perform such a test, the goods are considered to be delivered fully accepted upon leaving our factory.

11. Payment conditions

If no other payment conditions are set forth in our proposal, payment is due within 30 days of the invoice date with no discount. Discountable exchange is accepted as payment only after express agreement. Credit for exchange or checks is always provisional of receipt, and irrespective of earlier due date of the purchase price in case of delay by the buyer/purchaser, it occurs on the validation date on which we can make use of the equivalent value. In the event of failure to comply with the target date, interest of 8% above the base interest rate will be charged. Failure to comply with payment conditions
or conditions that are made known to us after closing and that may affect the creditworthiness of the buyer/purchaser, result in all payments becoming due immediately, without regard for the maturity of any accepted exchange. They also entitle us to make pending deliveries only upon prepayment or provision of security, and to withdraw from the agreement after a suitable extension of time, or to demand payment of damages due to non-fulfilment, without regard to the right of retraction of the goods provided under retention of title, at the cost of the buyer/purchaser. The buyer/purchaser is entitled to retention and offset only if undisputed or legally enforceable claims thereto are made valid.

12. Retention of title

1. Goods delivered or processed by us remain our property as security for all of our claims, including conditional claims and claims of limited duration, arising from the entire business relationship until such goods have been paid for in full. The buyer or purchaser is, however, entitled to use the goods during the normal course of business.

2. Retention of title also covers the full value of the results of processing, combining or conflating our goods, for which we are considered the manufacturer. If the right to title of third parties persists after processing, combination, or connection to the goods of third parties, then we obtain co-ownership at the ratio of the billed value of these processed goods.

3. Receivables from third parties arising from resale are transferred to us as security with immediate effect, in whole or to the extent of our co-ownership, by the buyer. The buyer is empowered to obtain said receivables for our account until revocation or cessation of his payments to us. The buyer or purchaser is not authorized to assign the receivables, even for purposes of collecting the receivables by means of factoring, unless the factor is simultaneously obligated to secure consideration in the amount of our share of the receivables directly to us for as long as we have outstanding receivables from the buyer or purchaser.

4. We must be informed by the buyer or purchaser immediately by registered mail of access by third parties to the goods and receivables belonging to us.

5. Exercise of the retention of title does not imply withdrawal from the contract.

6. The goods, and receivables taking their place, may not be promised to third parties or transferred or used as security prior to payment of our receivable amount in full.

7. If the value of the security that can be realized is greater than our receivable by more than 10%, then we will release securities of our choice to that extent upon request by the buyer or purchaser.

13. Place of fulfilment and jurisdiction

Place of fulfilment and jurisdiction for deliveries and payments, claims from checks and exchanges, and all other rights and obligations arising from the transaction, is our corporate headquarters in Oberhausen, for both parties.

14. Data storage

Upon initiation of the business relationship, we will commence data storage according to the provisions of the German Federal Privacy Law.

LEANTECHNIK AG · 46047 Oberhausen