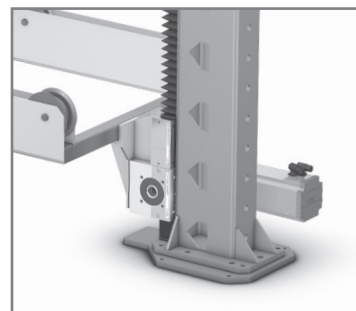
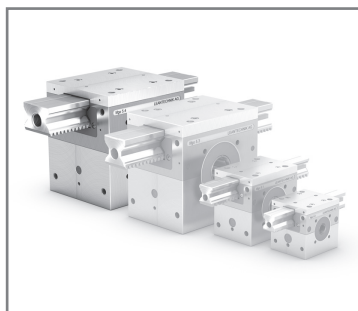
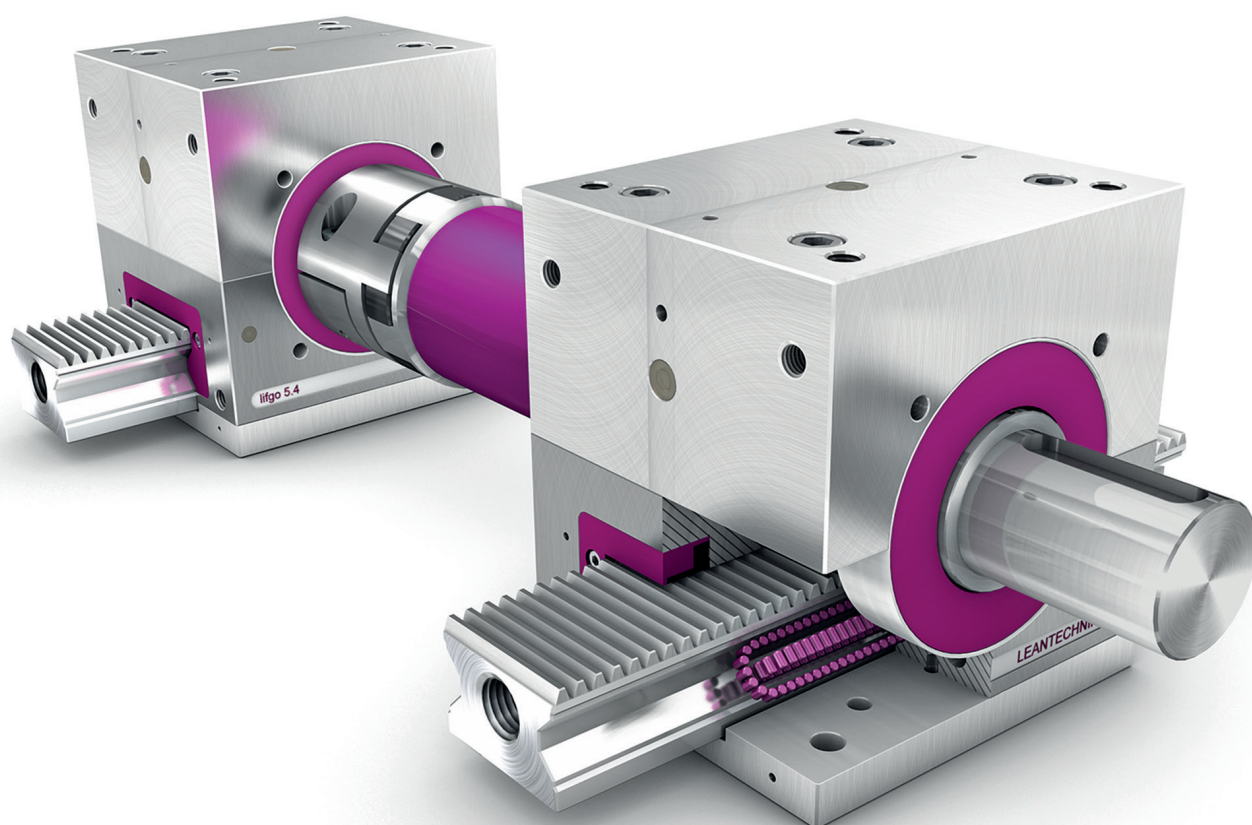




lifgo® 5.4

The special size variant for heavy loads and long strokes



LEANTECHNIK AG

www.leantechnik.com

lifgo®-series • Gear rack drives for precise, high-speed requirements

lifgo® 5 is a modular system of gear rack drives featuring a large number of variants and equipped with a 4-way roller guide as well as high-precision linear gear rack guides that can satisfy the most exacting demands in terms of lifting force, speed and positioning accuracy. Even when faced with heavy loads, the lifgo® 5 achieves speeds of up to 3 m/s and offers high transverse load capacities.

The basic principle behind all the drives lies in translating the rotary movement of the pinion into the linear motion of the gear rack. Operation in the opposite direction is also possible. The power connection of several drives or with the drive components is achieved using profile shafts. This simple basic mechanical principle guarantees the lifgo® 5's long, reliable, trouble-free service life.

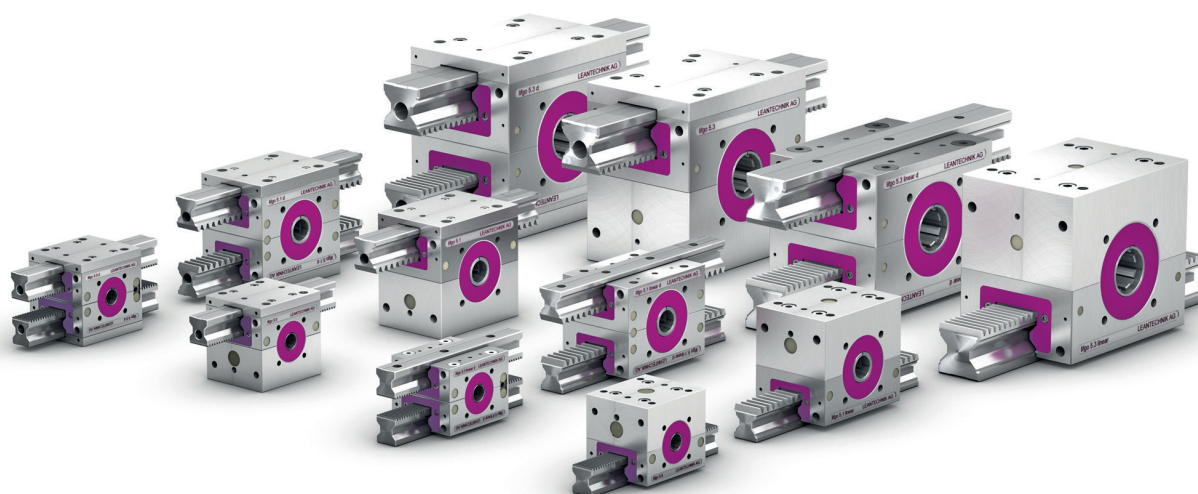
4 variants in 3 basic sizes

lifgo® 5 is available in four design variants:

- lifgo®
- lifgo® linear
- lifgo® double
- lifgo® linear double

These variants are available in the basic sizes 5.0, 5.1 and 5.3 and are also in some cases available as „eccentric“ versions and consequently form a series of 12 drives designed to cover a wide variety of applications.

Within any given size category, the variants are always designed around the same basic model with countless fixing and assembly capabilities and it is therefore possible to combine, exchange or extend systems without difficulty.



The lifgo®-series so far: 4 variants, 3 sizes

The fourth size • Specially designed for heavy loads

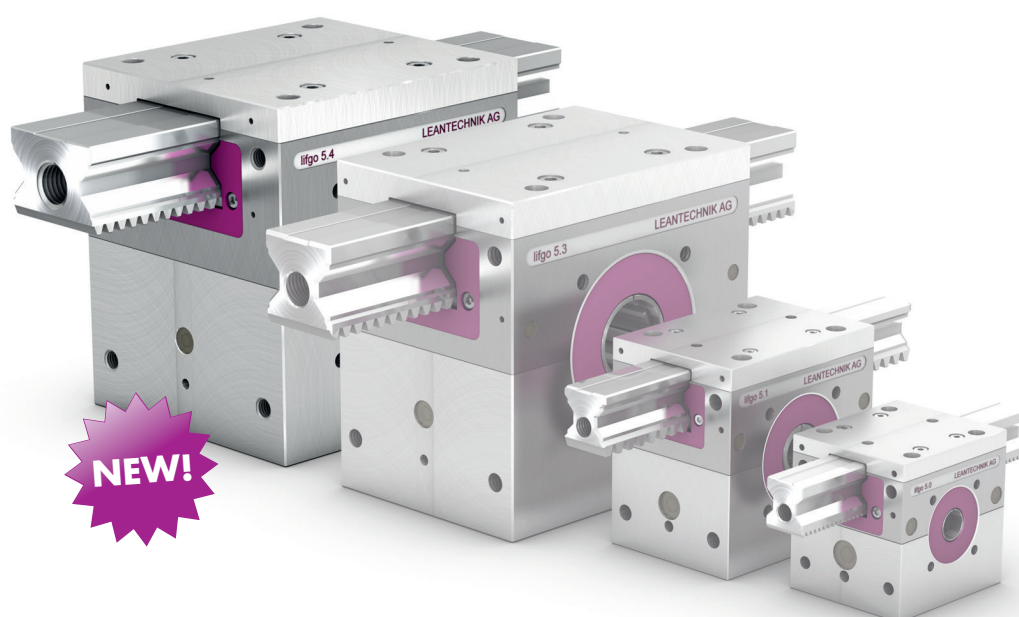
In addition to the previous three sizes, LEANTECHNIK AG has now developed a new lifgo® gear rack drive for use in heavy-duty applications: **Size 5.4.**

lifgo® 5.4 can lift **loads of up to 2,5 t** and therefore has a load-bearing capacity that is approximately **57 % greater** than lifgo® 5.3, the most powerful of the drives to date. Alongside the standard design, the lifgo® 5.4 is also available in the variants lifgo® eccentric, lifgo® linear and lifgo® linear eccentric.

The significant differences between the lifgo® 5.4 and lifgo® 5.3 are:

- 57 % higher load-bearing capacity
- Wider housing that is no longer square
- Increased pitch diameter of pinion
- 40 % wider gear rack
- No profile shaft version

This brochure represents an extension to the full catalog and does not therefore present the example applications that are contained in the catalog. All the example applications presented in the catalog are also possible using the different variants of the lifgo® 5.4. Chapter 3 of the catalog provides you with an overview of the possibilities. In addition, you will find an example application using the lifgo® 5.4 on the back page of this brochure.



New addition to the product portfolio: Size 5.4

lifgo® & lifgo® linear 5.4 • Pinion shaft ends

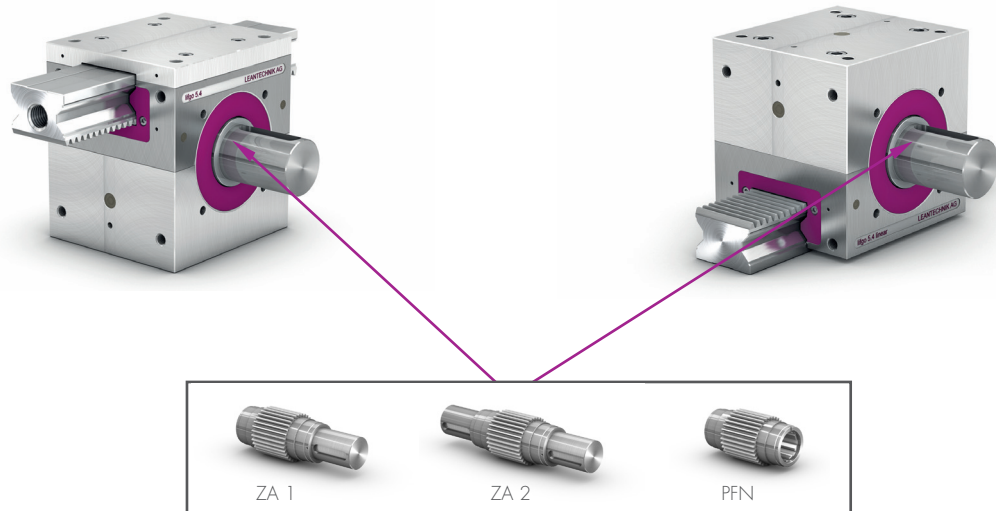
Three standardized pinion shaft ends are available for the lifgo® 5.4:

Pinion shafts with one pin (ZA 1)

Pinion shafts with two pins (ZA 2)

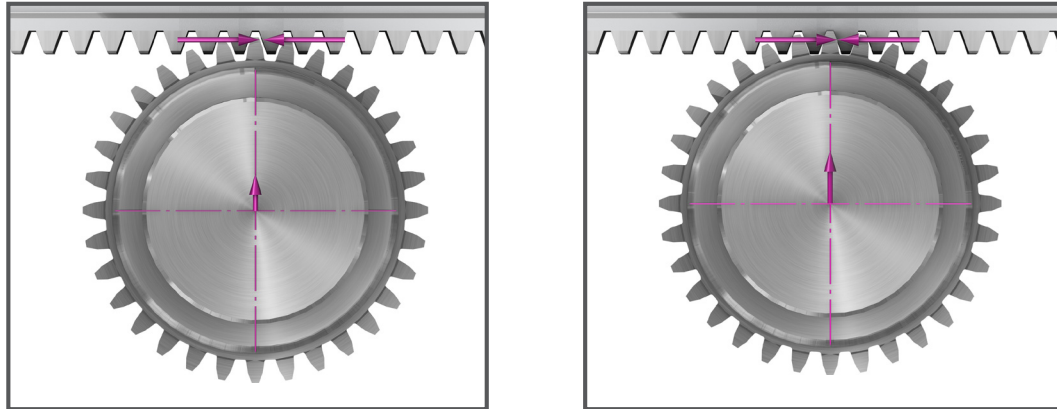
Hollow shaft with keyway (PFN)

The dimensions are the same for all variants of the same size. They can be found in the dimension sheets. The keyway and pin versions are particularly well suited for dynamic, low-clearance, and alternating load motions.



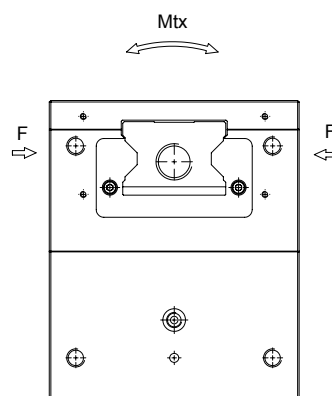
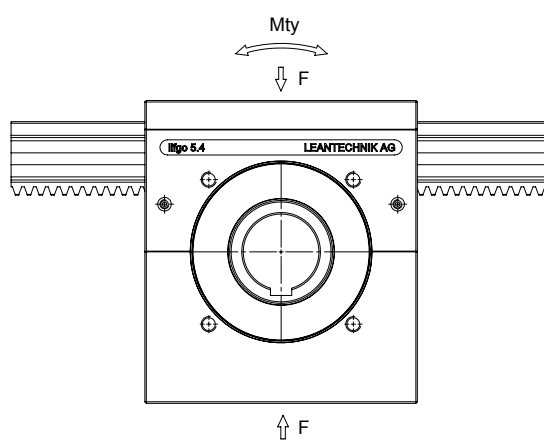
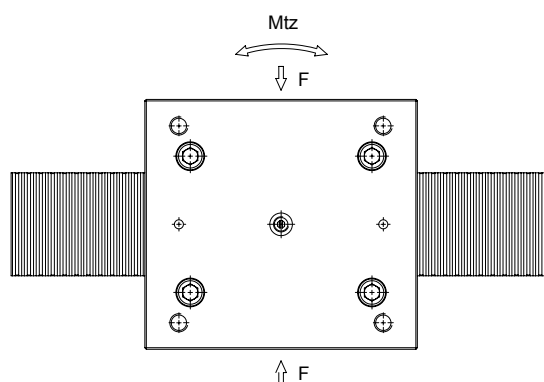
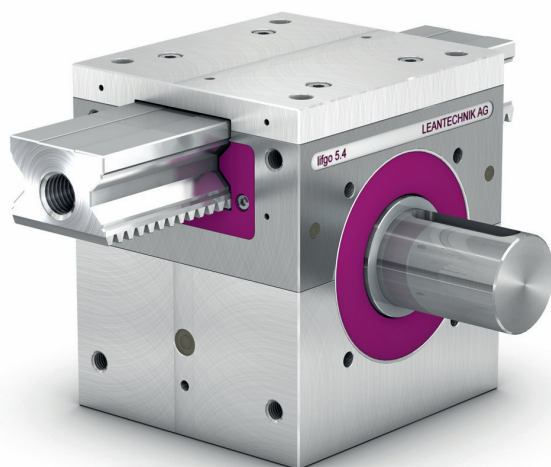
lifgo® eccentric • Adjustable tooth flank clearance

In the lifgo® "eccentric" version, the tooth flank clearance can be adjusted.
Please indicate the desired positioning accuracy in the project data.



See also the adjustment values on page 11.

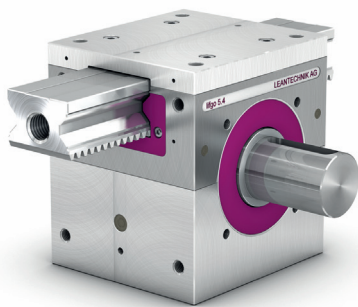
lifgo® 5.4 • Technical data



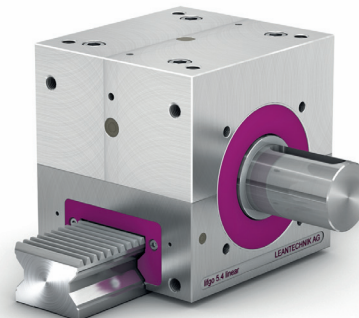
- ! The technical data on this page apply to all versions of the size lifgo® 5.4 (lifgo®, lifgo® linear, lifgo® eccentric and lifgo® linear eccentric).
- ! The breakaway force for new, unlubricated gear rack guides is 30 N per lifgo® unit. This value drops to near zero after the run-in phase.
- ! The breakaway force of hardened gear racks is approximately 80 N.
- ! The pretensioning of guide cars is 2 %.

lifgo® gearbox technical data		Unit	lifgo® 5.4
Lifting force	F_{max}	N	25000
Lifting speed	v_{max}	m/s	3
Acceleration	a_{max}	m/s ²	50
Torque	M_{max}	Nm	1000
Pitch diameter	$\varnothing T_k$	mm	80
Gear ratio stroke	Stroke	mm/360°	251,3274
Efficiency	η		0,92
Temperature resistance	t	°C	+80
Static torque	$M_{t, stat.}$	Nm	5500
Dynamic torque	$M_{t, dyn.}$	Nm	2800
	$M_{t, stat.}$	Nm	3300
	$M_{t, dyn.}$	Nm	1600
	$M_{t_2, stat.}$	Nm	3300
	$M_{t_2, dyn.}$	Nm	1600
Static load ratings	F stat.	N	161400
Dynamic load ratings	F dyn.	N	79600

lifgo® & lifgo® linear 5.4 • Dimension sheet



lifgo® 5.4



lifgo® linear 5.4



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



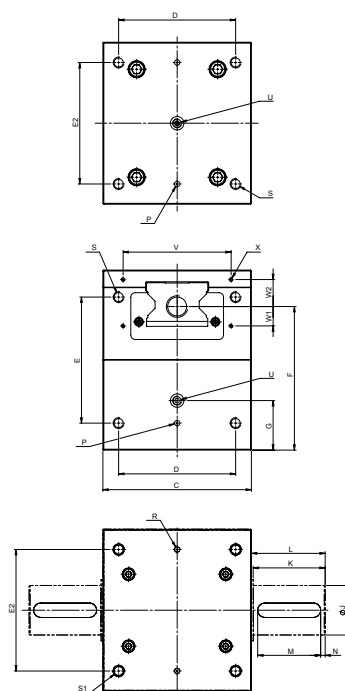
ZA 1



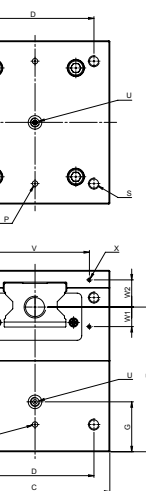
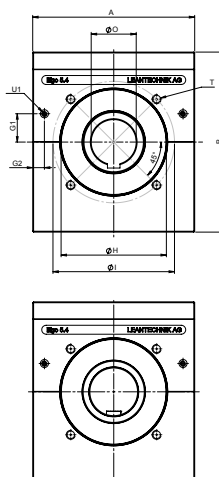
ZA 2



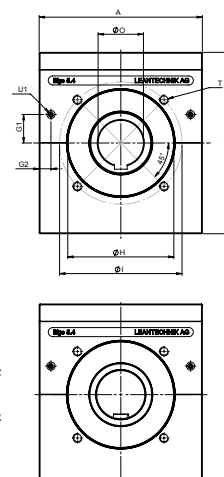
PFN



lifgo® 5.4



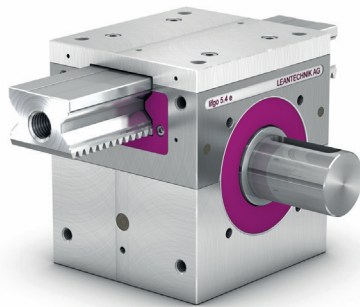
lifgo® linear 5.4



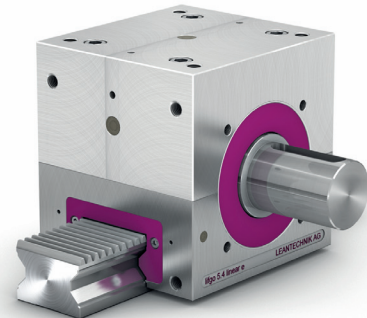
lifgo® gearbox		Unit	lifgo® 5.4	lifgo® linear 5.4
	A	mm	180	180
	B	mm	200	181
	B1	mm		100
	C	mm	165	165
	D	mm	130	130
	E	mm	140	140
	E1	mm		30
	E2	mm	135	135
	F	mm	159,5	5
	G	mm	55	55
	G1	mm	31,5	31,5
	G2	mm	13	13
Centering flange	H	mm	Ø 117 H7 ↓ 3	Ø 117 H7 ↓ 3
	I	mm	Ø 135	135
Key DIN 6885 P9	J	mm	Ø 55 h7	Ø 55 h7
	K	mm	80	80
	L	mm	82	82
	M	mm	70	70
Key DIN 6885 P9	N	mm	5	5
	O	mm	Ø 50 H7	Ø 50 H7
	P	mm	Ø 6 H7 ↓ 10	Ø 6 H7 ↓ 10
	R	mm	Ø 6 H7 ↓ 10	Ø 6 H7 ↓ 10
	S	mm	M12 ↓ 35 Ø 10,2 through	M12 ↓ 35 Ø 10,2 through
	S1	mm	□ Ø12,5 ↓ 19 M12 ↓ 35 Ø 10,2 through	
	T	mm	M10 ↓ 10	M10 ↓ 20
Lube hole	U	mm	M10 x 1 ↓ 10	M10 x 1 ↓ 10
Lube hole	U1	mm	M6 ↓ 5	M6 ↓ 5
	V	mm	120	120
	W	mm		43
	W1	mm	21,5	
	W2	mm	30	
	X	mm	M4 ↓ 8	M4 ↓ 8
Weight ZA 1		kg	25,3	24
Weight ZA 2		kg	26,8	25,5
Weight PFN		kg	21,2	19,9

Article number	lifgo® 5.4	lifgo® linear 5.4
lifgo® ZA 1	500 008	500 040
lifgo® ZA 2	500 012	500 044
lifgo® PFN	500 016	500 048

lifgo® eccentric & lifgo® linear eccentric 5.4 • Dimension sheet



lifgo® eccentric 5.4



lifgo® linear eccentric 5.4



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



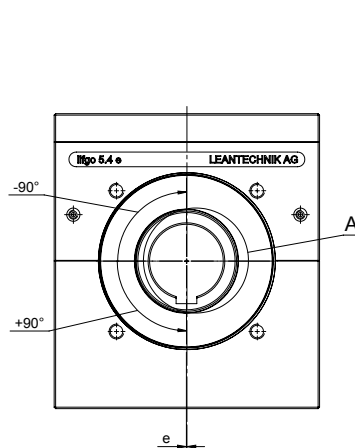
ZA 1



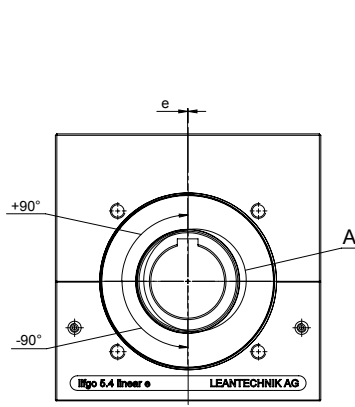
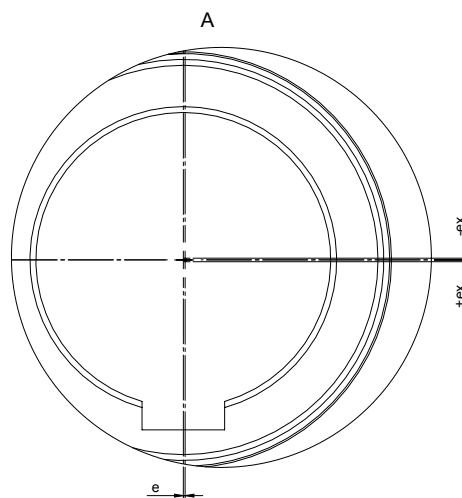
ZA 2



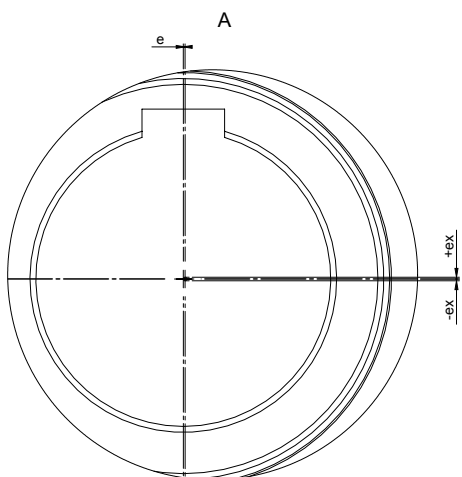
PFN



lifgo® eccentric



lifgo® linear eccentric



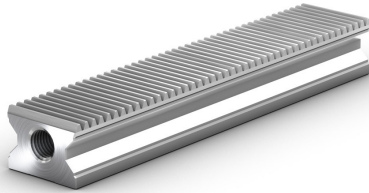
- ! The dimensions of the "eccentric" version are identical to those of the standard gearbox lifgo® 5.4. Please use the dimensions on page 6.
- ! In the "eccentric" version, the pinion shaft is adjusted relative to the gear rack, allowing the tooth flank clearance to be adjusted. It can be readjusted at a later time. Motor flanges, gearbox bell housings, etc. remain centered on the pinion during adjustment.
- ! Note that "eccentric" gearboxes cannot be combined with standard gearboxes (centered 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® eccentric reduced play		Unit	lifgo® eccentric 5.4	lifgo® linear eccentric 5.4
Adjustment range	e	mm	± 0,300	± 0,300
Adjusting steps	n	mm	± 6	± 6
Adjustment per step	e0	mm	0	0
	e1	mm	± 0,078	± 0,078
	e2	mm	± 0,150	± 0,150
	e3	mm	± 0,212	± 0,212
	e4	mm	± 0,260	± 0,260
	e5	mm	± 0,290	± 0,290
	e6	mm	± 0,300	± 0,300
Weight ZA 1		kg	24,8	23,5
Weight ZA 2		kg	26,4	25,1
Weight PFN		kg	20,8	19,5

Article number	lifgo® eccentric 5.4	lifgo® linear eccentric 5.4
lifgo® eccentric ZA 1	500 024	500 056
lifgo® eccentric ZA 2	500 028	500 060
lifgo® eccentric PFN	500 032	500 064

lifgo® & lifgo® linear 5.4 gear racks • Dimension sheet

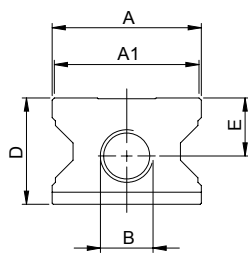
The gear rack bears guide loads. It is subjected to tensile, compressive, and transverse forces. Note the moments of inertia and the torque loads on the gearboxes (see page 7). The gear rack is symmetrical in construction. Reinforcement profiles and/or feed lines can be fixed and routed using the tapped holes at the rear.



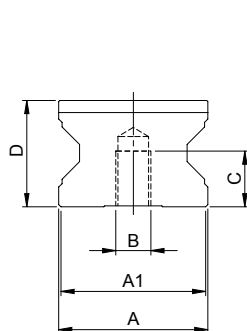
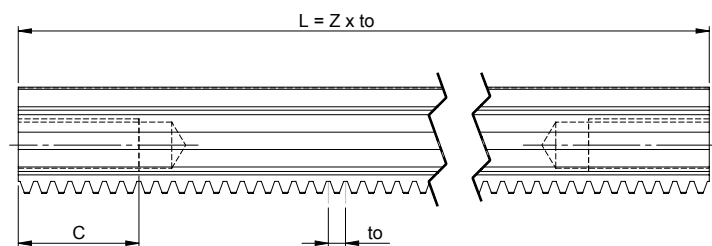
lifgo® gear rack



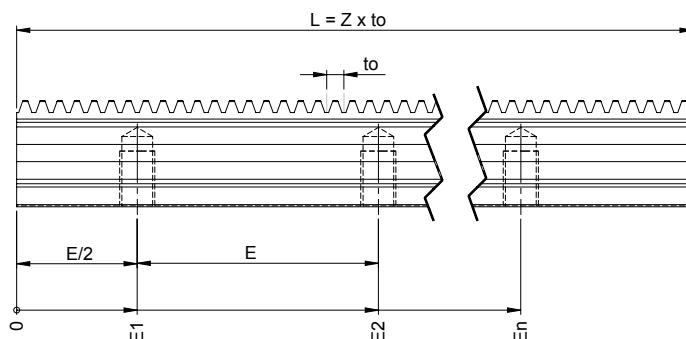
lifgo® linear gear rack



lifgo® gear rack



lifgo® linear gear rack



! 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 a suspended guide rail is used, take account of 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.

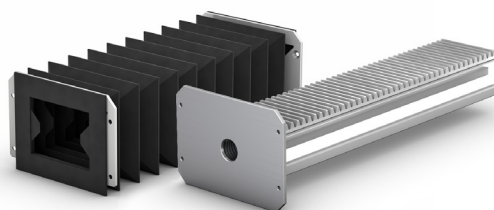
! Always add the number of teeth "Z = _ _ _" to the article number.

lifgo® / lifgo® linear gear rack		Unit	Gear rack standard	Gear rack linear
	A	mm	68	68
	A1	mm	66	66
	B	mm	M24	M16
	C	mm	55	25
	D	mm	48,5	48,5
(E = Ze x m x Pi)	E	mm	26,5	109,955743
(example result for lower calculation)	E1	mm		54,98
	E2	mm		164,93
	E3	mm		274,89
Hole spacing from front end	En	mm	En = Ze x m x Pi x (n-1/2)	
Gear rack length	L	mm	L = Z x to	
Max. number of holes	Nmax	each	whole number Nmax. = (Z - Ze/2 - 2) / Ze + 1	
Number of teeth	Z	each	as per customer data	
Number of teeth between two holes	Ze	each	14	
Module	m		2,5	
Tooth pitch	to	mm	to = m x Pi	
Moment of inertia	Ix	mm ⁴	428881	
Moment of inertia	Iy	mm ⁴	809895	
Polar moment of inertia	Ip	mm ⁴	1238776	
Weight		kg/m	21,61	

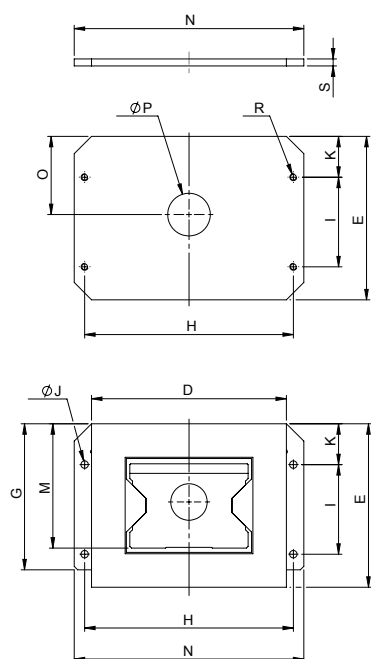
Article number		lifgo® 5.4	lifgo® linear 5.4
lifgo® gear rack		500 116	500 120
lifgo® gear rack	ground	500 637	500 638
lifgo® gear rack	hardened & ground	500 172	500176

lifgo® & lifgo® linear gear rack protection & end plate • Dimension sheet

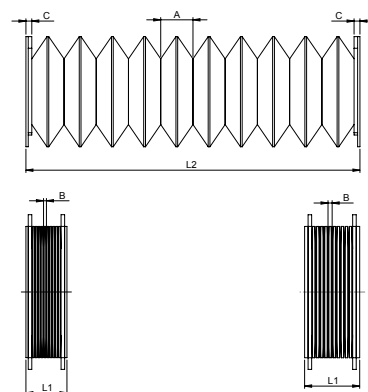
When choosing a gear rack protection, please note that the standard version is not suitable for use in welding areas. The version "SB" is suitable for use in welding areas. The end plate is used for mounting the gear rack protection on the lifgo® linear gear rack.



**Gear rack protection
& end plate lifgo®**



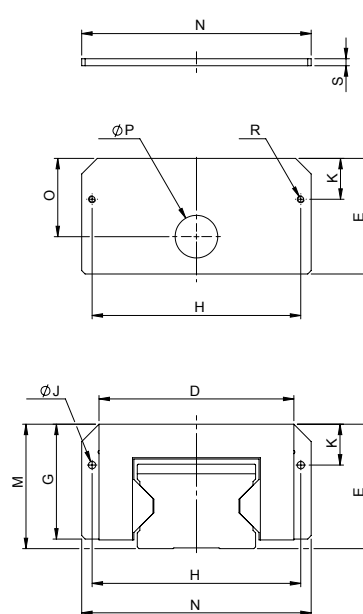
End plate lifgo®



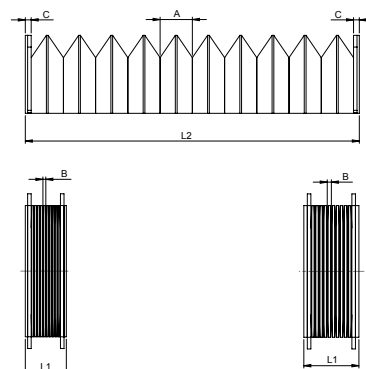
**Gear rack protection
lifgo®, lifgo® SB**



**Gear rack protection
& end plate lifgo® linear**



End plate lifgo® linear



**Gear rack protection
lifgo® linear, lifgo® linear SB**

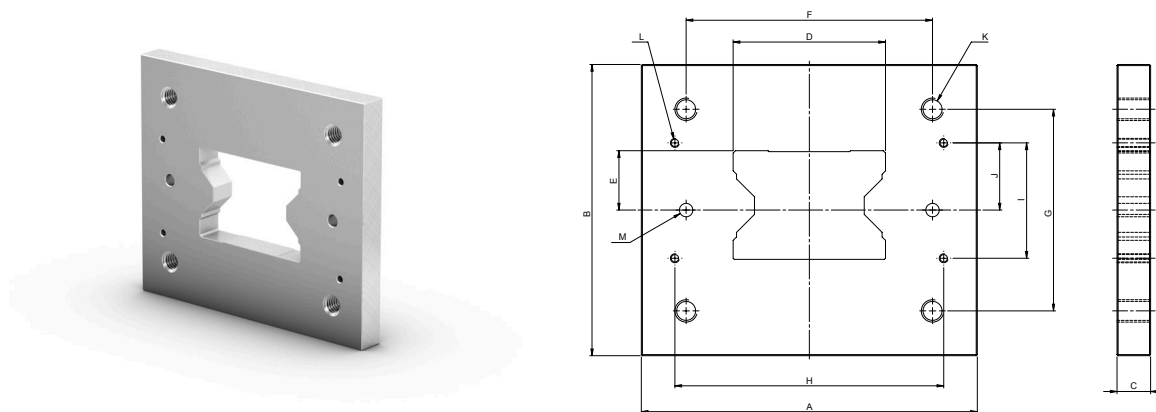
- ! Check whether the operating conditions require a gear rack protection.
- ! Note that in its retracted state, the "SB" version requires 1,0 mm more installation space per fold (dimensions A, B and C). The gear rack protection is shipped with retaining plates and screws.
- ! The gear rack protection is silicone-free.
- ! Always add the number of folds "F = _ _ _" to the article number.

lifgo® / lifgo® linear gear rack protection		Unit	lifgo®	lifgo® SB	lifgo® linear	lifgo® linear SB
Stroke per fold	A	mm	27,5	28,5	27,5	28,5
	B	mm	2,5	3,5	2,5	3,5
	(A – B)	mm	25	25	25	25
	C	mm	5	6	5	6
Number of folds	D	mm	112	112	112	112
	E	mm	94	94	66,5	66,5
	F	each	as per customer data			
	G	mm	84	84	66	66
Stroke	H	mm	120	120	120	120
	I	mm	51,5	51,5		
	J	mm	Ø 4,3 V8,5 x 90°	Ø 4,3 V8,5 x 90°	Ø 4,3 V8,5 x 90°	Ø 4,3 V8,5 x 90°
	K	mm	23,5	23,5	23,5	23,5
	L	mm	$L = L2 - L1 = F \times (A - B)$			
	L1	mm	$L1 = 2 \times C + F \times B$			
	L2	mm	$L2 = 2 \times C + F \times A$			
	M	mm	71,5	71,5	71,5	71,5
	N	mm	132	132	132	132
	O	mm	45	45	45	45
	P	mm	Ø 20,5	Ø 20,5	Ø 20,5	Ø 20,5
	R	mm	M4	M4	M4	M4
	S	mm	4	4	4	4

Article number	lifgo®	lifgo® SB	lifgo® linear	lifgo® linear SB
lifgo® rack protection	500 124	500 854	500 128	500 855
lifgo® end plate	500 881	500 881	500 882	500 882

lifgo® 5.4 gear rack retaining plate AZ • 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.



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

lifgo® 5.4

A	mm	150
B	mm	130
C	mm	15
D	mm	68
E	mm	26,5
F	mm	110
G	mm	90
H	mm	110
I	mm	51,5
J	mm	30
K	mm	M10
L	mm	M4
M	mm	Ø 6 H7
Weight	kg	1,9

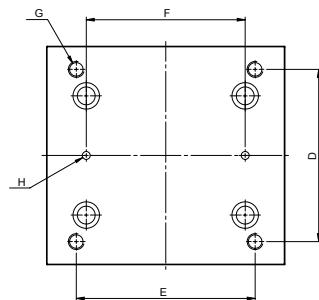
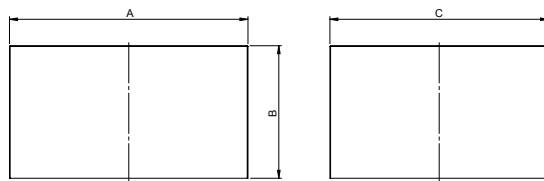
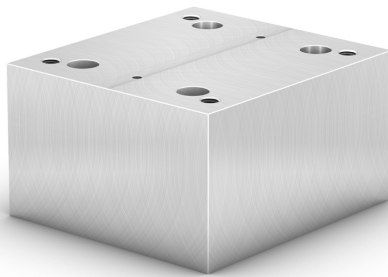
Article number

lifgo® 5.4

lifgo® gear rack retaining plate AZ	spark-eroded	500 184
-------------------------------------	--------------	---------

lifgo® 5.4 compensating block • Dimension sheet

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



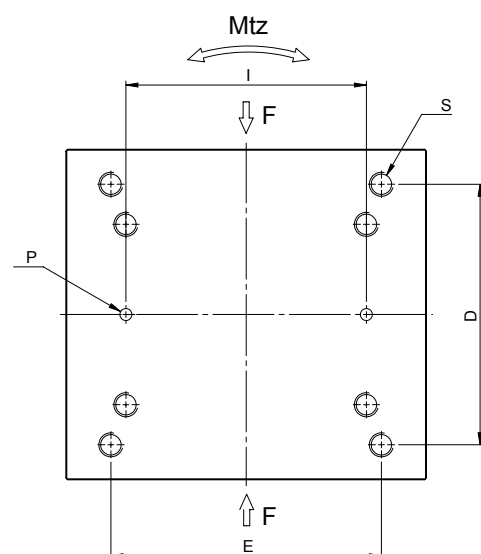
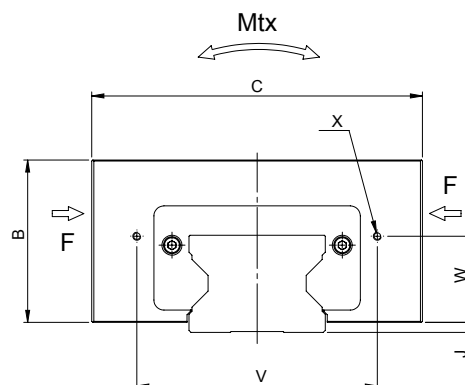
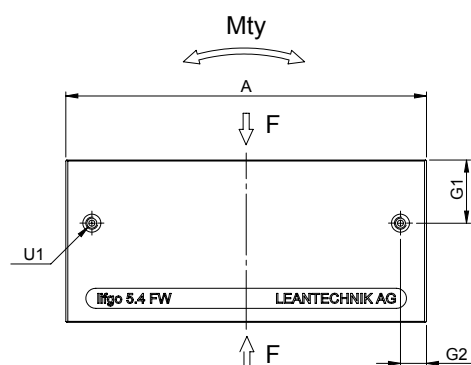
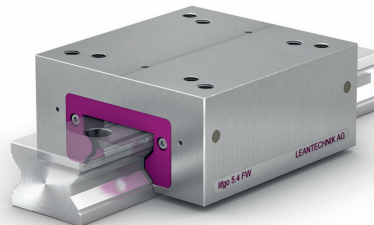
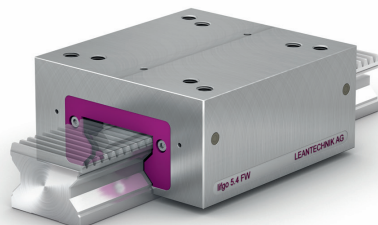
The compensating block is shipped with screws and dowel pins which are used for mounting it on the guide car.

lifgo® compensating block	Unit	lifgo® 5.4
A	mm	180
B	mm	100
C	mm	165
D	mm	130
E	mm	135
Dowel holes	mm	120
G	mm	M12 ↓ 35 Ø 10,2 through
H	mm	Ø 6H7 ↓ 10
Weight	kg	7,8

Article number	lifgo® 5.4
lifgo® compensating block	500 888

lifgo® 5.4 guide car • 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 those for the lifgo® gearboxes (see page 7).



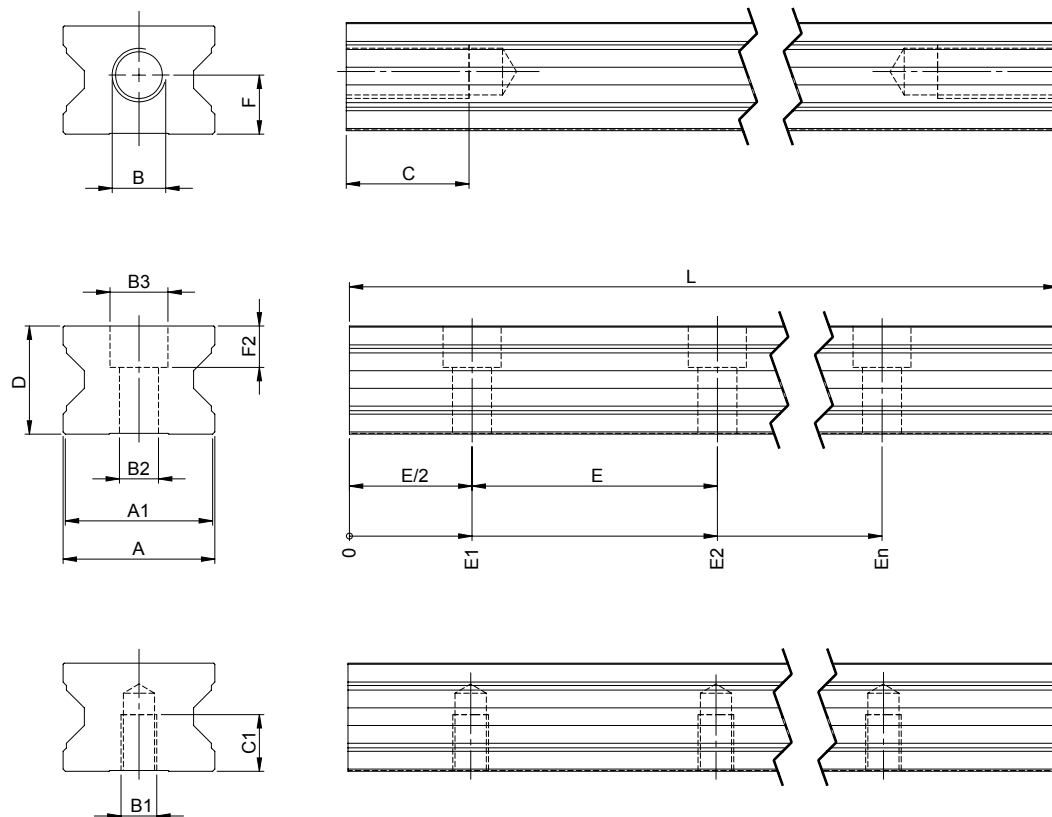
Ensure that the lube holes remain accessible after assembly.

lifgo® guide car		Unit	lifgo® 5.4
Dowel holes	A	mm	180
	B	mm	81
	C	mm	165
	D	mm	130
	E	mm	135
	G1	mm	31,5
	G2	mm	13
	I	mm	120
	J	mm	5
	P	mm	Ø 6 H7 ↓ 6
	S	mm	M12 ↓ 35 Ø 10,2 through
	U1	mm	M6 ↓ 5
	V	mm	120
	W	mm	43
	X	mm	M4 ↓ 8
Lifting speed	v_{max}	m/s	3
Acceleration	a_{max}	m/s ²	50
Static torque	M_{tx} stat.	Nm	5500
Dynamic torque	M_{tx} dyn.	Nm	2800
	M_{ty} stat.	Nm	3300
	M_{ty} dyn.	Nm	1600
	M_{tz} stat.	Nm	3300
	M_{tz} dyn.	Nm	1600
Static load ratings	F stat.	N	161400
Dynamic load ratings	F dyn.	N	79600
Weight		kg	13,5

Article number	lifgo® 5.4
lifgo® guide car	500 100

lifgo® 5.4 guide rails • Dimension sheet

Guide rails are available with or without holes for screw attachment from the "top" or the "bottom." The hole spacings correspond to those of the lifgo® linear gear racks. 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 page 14 can be used for these guide rails.



- ! 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.

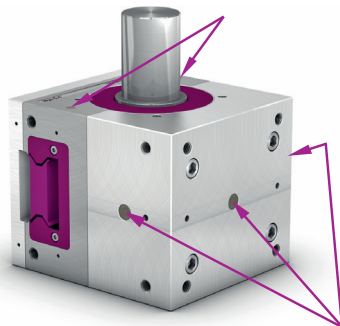
lifgo® guide rail		Unit	lifgo® 5.4
	A	mm	68
	A1	mm	66
	B	mm	M24
	B1	mm	M16
	B2	mm	Ø 17,5
	B3	mm	Ø 26
	C	mm	55
	C1	mm	25
	D	mm	48,5
(E = Ze x m x Pi)	E	mm	109,955743
(example result for lower calculation)	E1	mm	54,98
	E2	mm	164,93
	E3	mm	274,89
Hole spacing from front end	En	mm	$E_n = Z_e \times m \times \pi \times (n - 1/2)$
	F	mm	26,5
	F2	mm	18,6
Total length	L	mm	as per customer data
Number of teeth between two holes	Ze	each	14
Module	m	mm	2,5
Moment of inertia	Ix	mm ⁴	626515
Moment of inertia	Iy	mm ⁴	953723
Polar moment of inertia	Ip	mm ⁴	1580239
Weight Hole at front		kg/m	22,3
Screwed from above		kg/m	21,8
Screwed from below		kg/m	22,6

Article number		lifgo® 5.4
lifgo® guide rail	Hole at front	500 104
lifgo® guide rail	Screwed from above	500 108
lifgo® guide rail	Screwed from below	500 112

Initial & maintenance lubrication • Intervals

lifgo® gearboxes require initial lubrication at two locations (gear rack guide and housing, see lubrication point illustrations below). See also pages 117-118 in the catalog.

Possible lubrication points on lifgo® 5.4 guides (both sides)



Possible lubrication points on lifgo® 5.4 housings

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 drawings in the lifgo®; 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 – KP2K, 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 total quantity indicated in the table on page 23, above:

1. Grease the lifgo® guide car with a third of the total quantity indicated in the first table on page 23.
2. Perform three double strokes to move the lifgo® guide car or gear rack/guide rail backwards and forwards by at least three times the car length.
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® 5.4		lifgo® 5.4	
Grease quantities		Unit	
lifgo® guide car		cm ³ – grease	6,6
lifgo® housing		cm ³ – grease	130



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® 5.4		lifgo® 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	723



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 agent residue remains.

The 5.4 lift table:

High precision and speeds despite heavy loads

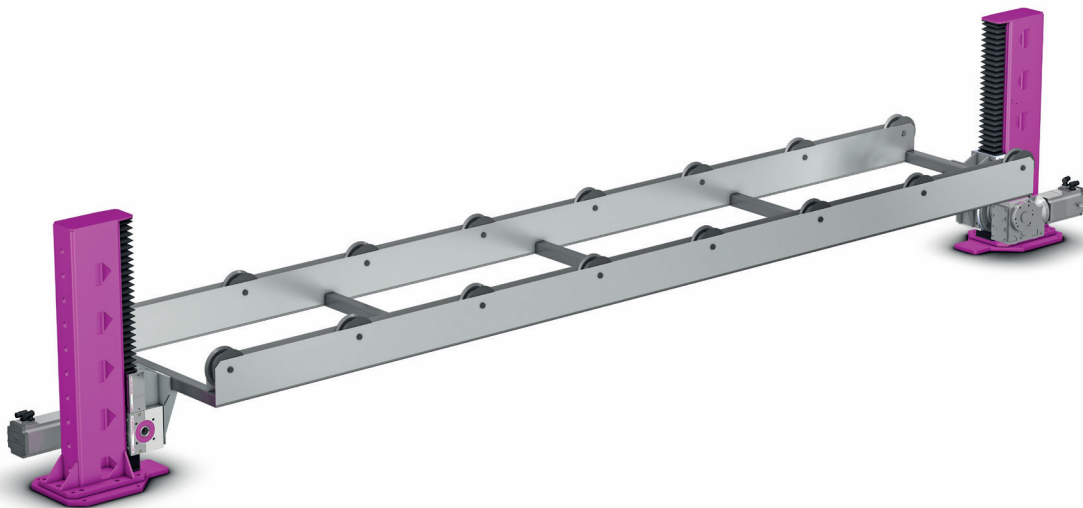
The figure below illustrates a lift table for use in a production line operated by a well-known automobile manufacturer.

Here, a gear rack drive driven by an electric motor is running at each of two identical lifting columns, each of which is equipped with gear racks. The electric motors are synchronized via an electronic shaft.

The advantage of this system: Even under heavy loads and at high speeds, it still operates to a vertical positioning accuracy of ± 0.01 mm.

Thanks to its wider pinion, the lifgo® 5.4 can move particularly heavy loads while still offering a long service life. Despite this, a total of only two drives are required for the lift table. This fact considerably reduces the associated assembly and maintenance work. The stroke length can be individually adapted to meet the customer's requirements. For example, the lift table illustrated here has a stroke of 600 mm, which is completed in 1.5 seconds, and is designed for a load of 2 t. Besides the roller conveyor depicted here, other pick-up capabilities such as belts or lifting frames can be used as desired.

Discuss your individual application with us. We will be delighted to advise you!



The complete technical data for the overall system can be found in our full catalog. We will be delighted to send this to you on request.

At www.leantechnik.com, you will find extensive additional information as well as a large range of **videos**. The Download section contains our catalog together with 2D/3D data in various CAD formats.

LEANTECHNIK AG

Im Lipperfeld 7c
46047 Oberhausen
Germany

Phone ..49 (0) 208 · 495 25 - 0

Fax ..49 (0) 208 · 495 25 -18

E-mail info@leantechnik.com

www.leantechnik.com

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