SERAPID
RIGID CHAIN TECHNOLOGY

LIFT SYSTEMS

Linear telescopic lifting columns

www.motiontech.com.au

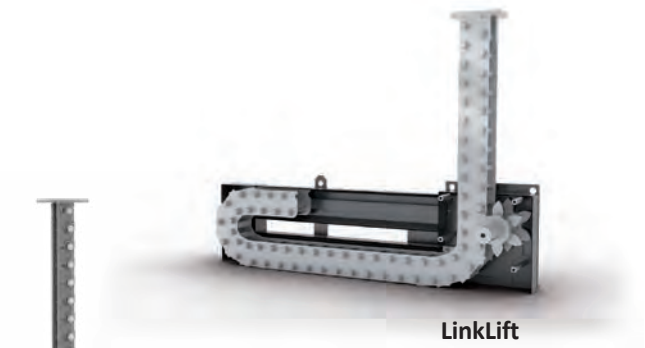
SERAPID
RIGID CHAIN TECHNOLOGY

LINEAR TELESCOPIC LIFTING COLUMNS FOR INDUSTRIAL APPLICATIONS

For 45 years, SERAPID has been designing, manufacturing and distributing a wide range of telescopic and linear actuators. Its field of application is focused on the moving of loads, linear transfers and lifting systems, in all areas of industrial activity.

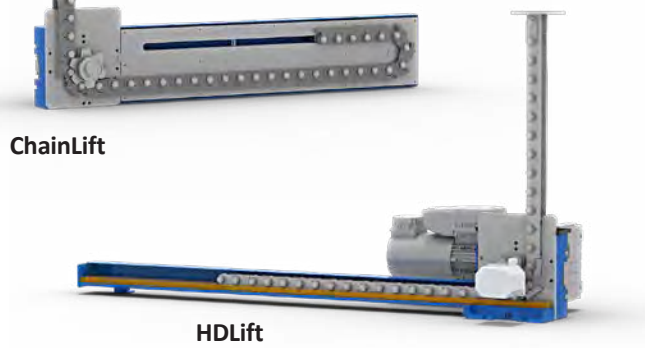
These telescopic actuators are designed on the simple mechanical principle of the Rigid Chain, which allows the transfer of loads from a few kilograms to several hundred tonnes. This technology is based on the locking and unlocking of connected, linked elements. When lifting a load, the specially shaped chain links interlock with each other, forming a rigid bar or column. When lowered, the links unlock, allowing it to bend to store into a compact package.

Whatever your challenge, our teams are at your service to offer you the precise solution adapted to your needs and to accompany you throughout your project.



LinkLift

ChainLift

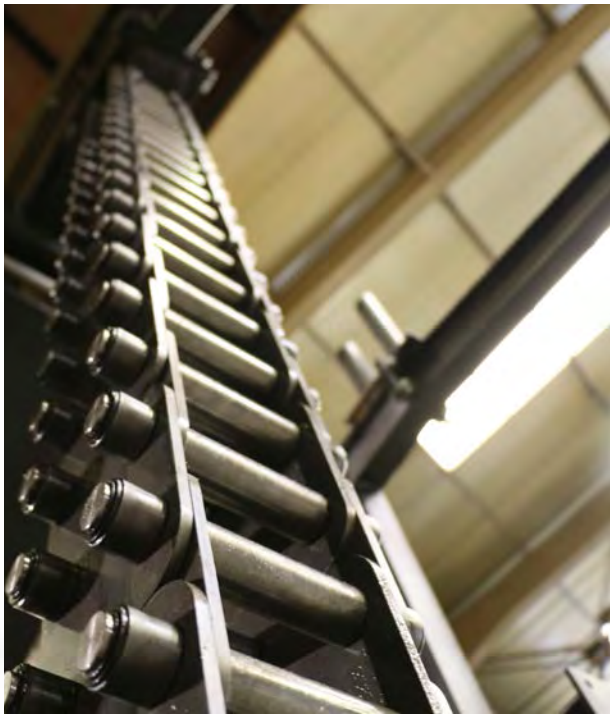


HDLift

Advantages of SERAPID's range

Our rigid-chain technology combines the strengths of other transfer methods, such as hydraulics, belts or spindle screws, and at the same time it eliminates their weaknesses:

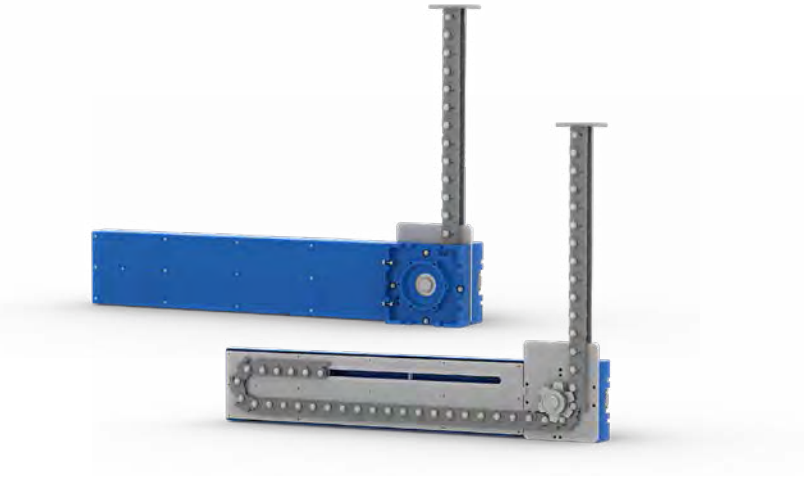
- high speeds with permanent lubrication in oil bath (HD Lift version)
- a robust design allowing a long service life and the use in harsh environments: clean-room conditions, dust, temperature, humidity, radiation
- repeatable positioning in the millimetre range, even at high speed
- designed for low vibration and noise
- low maintenance
- ATEX certified, category II 2GD c T4
- maintains position with no drift
- specific applications on request: stainless steel, suitable surface treatment, specific heat treatment
- options and accessories : limit switch, encoder, protective bellow, interface, special hub, output shaft



CHAINLIFT lifting chain

Proven reliability

The ChainLift is designed for applications with an average frequency of use, between 5 and 15 cycles per hour. It will be suitable, for example, for a workbench lift in automotive manufacturing. The nominal lifetime is **250,000 cycles**. Lubrication maintenance is required every 13,000 cycles in the first year and then every 50,000 cycles (or every year). For requirements outside of our specifications, please contact us.



ChainLift (standard model range)

	ChainLift 40	ChainLift 60
dyn / stat capacity (kN)	7,5	20
max. stroke (m)	1	2
max. speed (mm/s)	200	200
pitch of link (mm)	40	60
primitive radius (mm)	40	60
weight of chain (kg/m)*	7,8	15,3
weight of drive housing (kg)*	18,2	39,7
weight of double-return magazine (kg/m)*	11,7	17,2

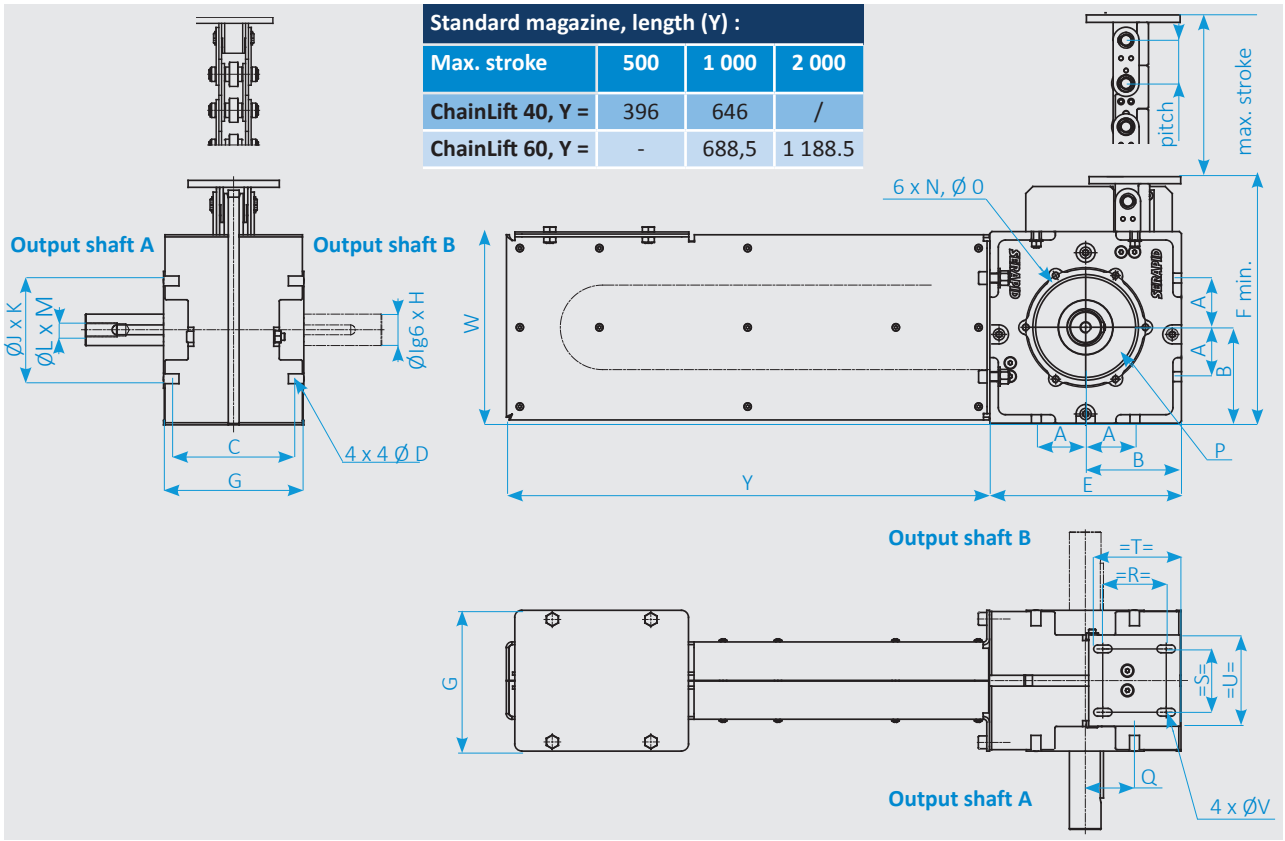
Lifting system for automotive industry: ChainLift with bellow cover

*approximate weight

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
ChainLift 40	60	101	140	10	202	255	168	59	25	110	5	M10	20	M8	130	R40	49	70	70	100	100	10	198
ChainLift 60	70	136	170	14	272	350	200	95	45	150	6	M16	32	M10	170	R60	70	90	90	130	130	11	271

All dimensions in mm.

Standard magazine, length (Y) :			
Max. stroke	**500**	**1 000**	**2 000**
ChainLift 40, Y =	396	646	/
ChainLift 60, Y =	-	688,5	1 188.5



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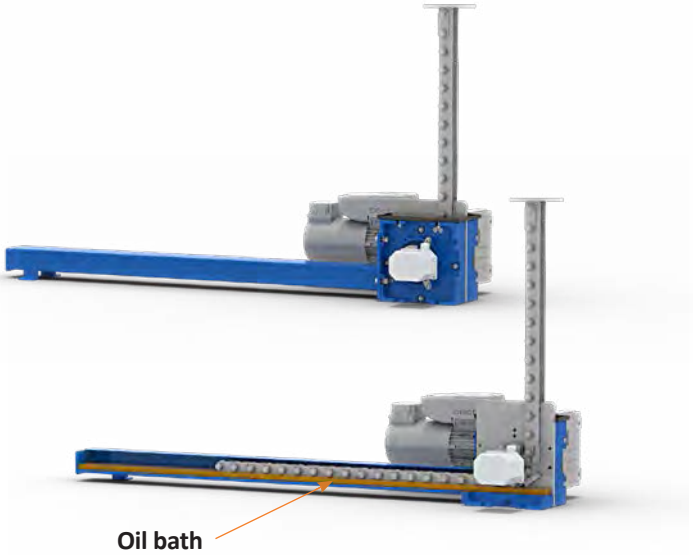
HD LIFT lifting chain

Strength and endurance

The systems in our Heavy-Duty line are designed for high operating cycles (> 15 cycles / hour). The guaranteed minimum lifetime is **one million cycles** under maximum load. The HD Lift is a sealed system and includes a splash lubrication system, with oil-proof drive housing and chain magazine. For maintenance, just an oil change once in a year. Bellows covers are available.

The product range includes five standard systems, covering dynamic loads up to 50 kN and strokes up to 2.5 m. For requirements outside of our specifications, please contact us.



HDLift (standard model range)

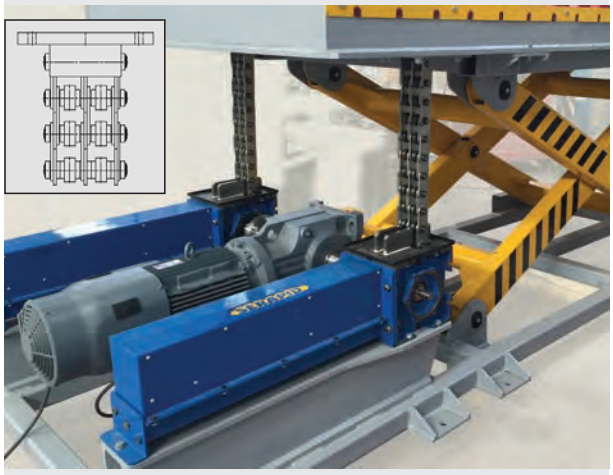
	HD Lift 40	HD Lift 60S	HD Lift 60D	HD Lift 90S	HD Lift 90D
dyn / stat capacity (kN)	6,5	12,5	19	40	50
max. stroke (m)	1	1,5	1,5	2	2,5
max. speed (mm/s)*	300	300	300	300	300
pitch of link (mm)	40	60	60	90	90
primitive radius (mm)	40	60	60	90	90
weight of chain (kg/m)**	7,8	11,7	18,3	34,5	55,5
weight of drive housing (kg)**	18,2	39,2	54	120	160
weight of single-return magazine (kg/m)*	13	17,5	25	48	57

* possibility to increase the speed to 500 mm/s maximum on request

** approximate weight

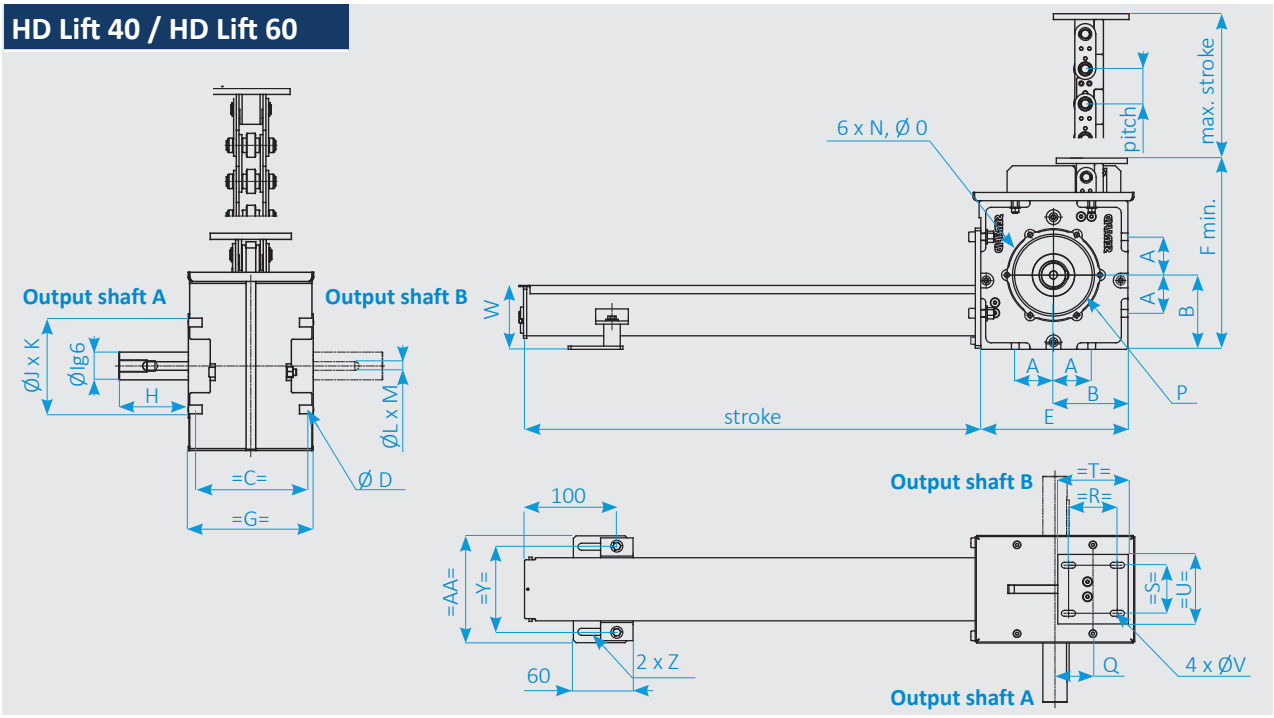
Lifting platform for automotive industry : HD Lift 60S lifting chain.

HD LIFT Duplex chain



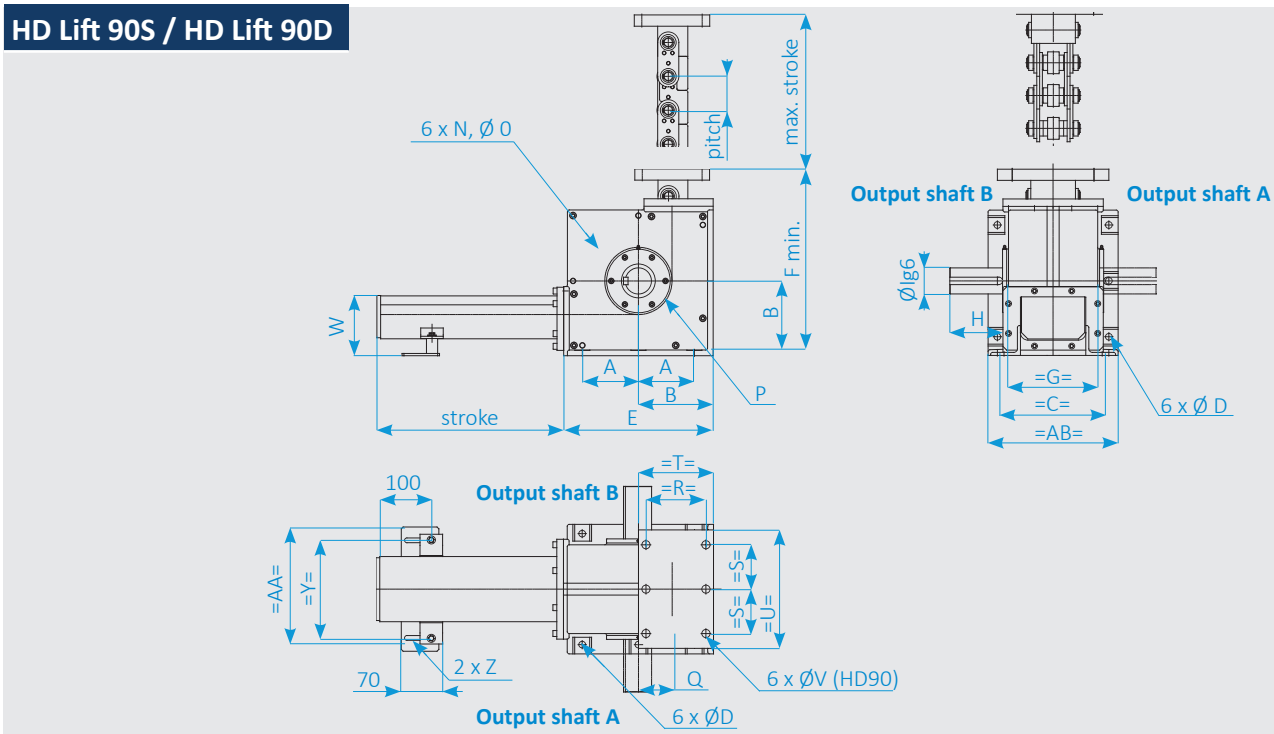
The models HD Lift 60D and 90D use our duplex-type chain, which features 3 rows of links, 2 rows of central rollers, and provides a higher load capacity.

HD Lift 40 / HD Lift 60



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y	Z	AA
HD Lift 40	60	101	140	10	199	255	168	59	25	110	5	M10	20	M8	130	R40	49	70	70	100	100	10	80	127	13x48	170
HD Lift 60S	70	136	170	14	269	350	200	95	45	150	6	M16	32	M10	170	R60	70	90	90	130	130	11	117	159	13x48	200
HD Lift 60D	70	136	220	14	269	350	246	72,5	60	150	6	M20	39	M10	170	R60	78,5	170	2x120	220	320	18	117	191	13x48	224

HD Lift 90S / HD Lift 90D



Model	A	B	C	D	E	F	G	H	I	L	M	P	Q	R	S	T	U	V	W	Y	Z	AA	AB
HD Lift 90S	150	200	300	18	400	500	272	142	70	M20	39	R90	110	180	120	220	320	18	162	264	13x48	320	350
HD Lift 90D	150	200	388	18	400	500	360	162	100	M24	48	R90	110	180	160	220	450	22	162	344	13x48	400	438

All dimensions in mm.

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LINKLIFT lifting chain

For heavy loads and important strokes

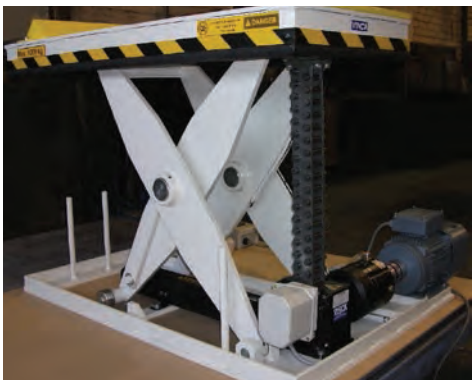
The LinkLift was specifically developed for the needs of the theatrical industry, but it has proven to be equally well-suited for industrial applications.

It is suitable for low frequency applications (< 5 cycles/hour), for example, lifting manufacturing work platforms. The lifetime is **50,000 cycles** (standard) or **250,000 cycles** (MD - Medium Duty version) with a maintenance of lubrication that is required every 2,000 cycles (standard) and 13,000 cycles (MD) the first year; then every 10,000 cycles (standard), 50,000 cycles (MD) or every year.

For requirements outside of our specifications, please contact us.

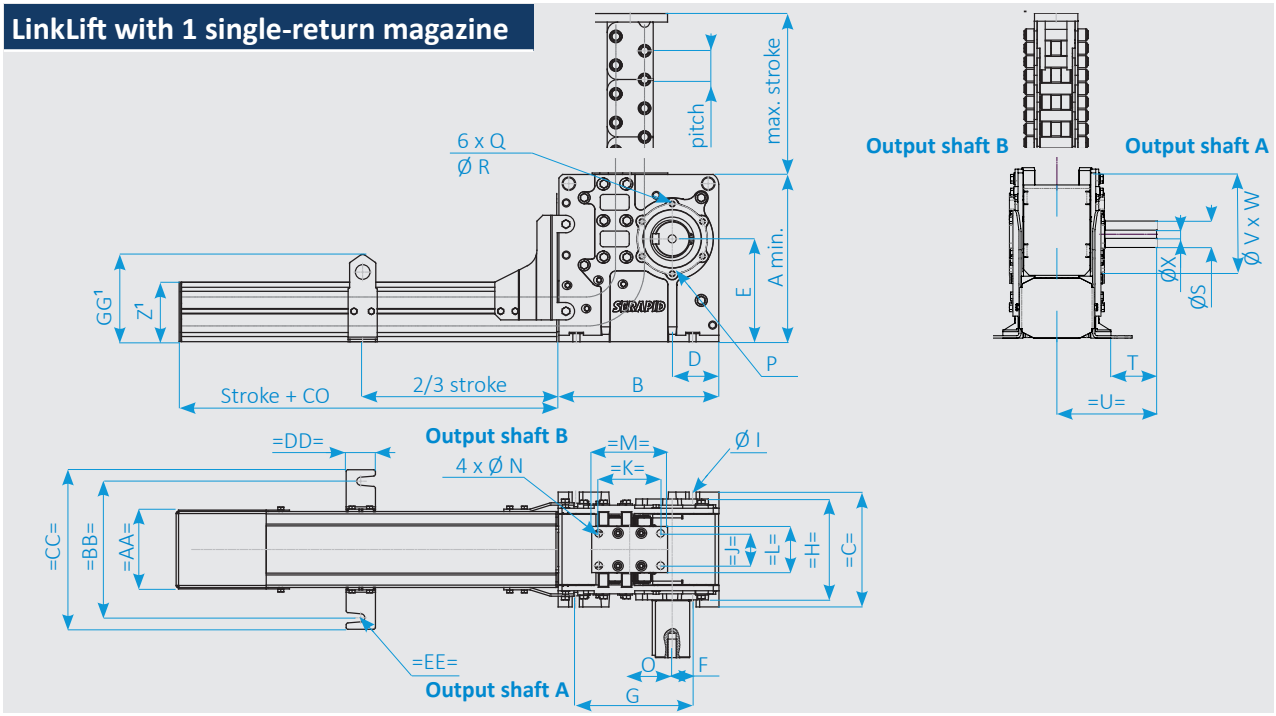
LinkLift (standard model & MD ranges)	LL 30	LL 50	LL 50R	LL 80	LL 80R	LL 100	LL 100R
Static capacity per lifting column							
max. load (kN): stroke limit (m)	**20** : 1,9	**50** : 2	**70** : 1	**100** : 3,5	**125** : 2	**130** : 6	**200** : 3,5
load limit (kN): **max. stroke (m)**	20 : **1,9**	10 : **4**	10 : **4**	40 : **6,4**	40 : **6,4**	70 : **8**	70 : **8**
Dynamic capacity per lifting column							
max. load (kN): stroke limit (m)	**10** : 1,9	**15** : 3,5	**30** : 3	**50** : 6	**90** : 4	**75** : 7,5	**150** : 5
load limit (kN): **max. stroke (m)**	10 : **1,9**	10 : **4**	10 : **4**	40 : **6,4**	40 : **6,4**	70 : **8**	70 : **8**
Other specifications							
nominal speed, up to (mm/s)	200	200	200	200	200	200	200
system efficiency rate (%)	80	80	80	80	80	80	80
chain pitch (mm)	30	50	50	80	80	100	100
primitive radius (mm)	30	50	50	80	80	100	100
minimum height (mm)	190	290,5	290,5	460	460	572	572
weight of chain (kg/m)*	15	21	22	46	50	67	70
weight of drive housing (kg)*	8	29	33	80	90	192	213
weight of single-return magazine (kg/m)*	2,4	5	5	10	10	15,5	15,5

* approximate weight



- Note: load capacity and stroke are given relative to each other - a lower stroke allows a higher load and vice versa.
For example: “50: 2” means the maximum load is 50 kN up to a stroke limit of 2 m ; “10: 4” means the maximum stroke is 4 m up to a load limit of 10 kN.
Please note maximum speed cannot be combined with maximum load or stroke.
- RWTÜV certified

LinkLift with 1 single-return magazine



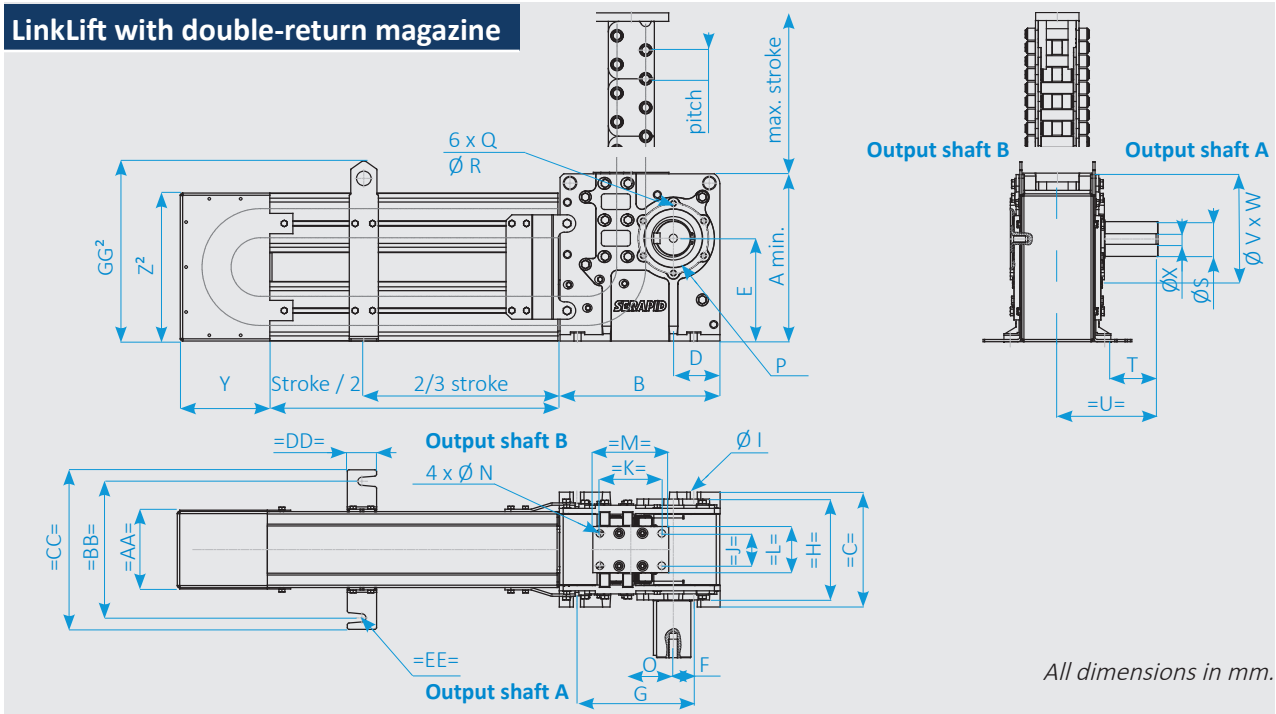
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	CO
LinkLift 30	190	165	134	45	115	30	135	142	4xØ9	40	80	55	100	Ø9	46.5	30	M8x20	50
LinkLift 50/50R MD	290,5	270	199	70	177	35	200	173	4xØ12	56	106	80	130	Ø13	75	50	M8x25	200
LinkLift 80/80R MD	460	424	306	112	280	60	320	270	4xØ18	80	180	120	220	Ø18	120	80	M12x25	200
LinkLift 100/100R MD	572	530	387	140	348	75	200+200	347	6xØ18	110	220	150	280	Ø21	150	100	M12x30	200

Model	R	S	T	U	V	W	X	Y	Z¹	Z²	AA	BB	CC	DD	EE	GG¹	GG²
LinkLift 30	80	Ø30	62	133	70	2,5	M10x20	114	78	170	99	155	195	35	Ø11	130	210
LinkLift 50/50R MD	120	Ø45[1]	100	175	100	4	M16x32	154	102,5	255	137	237	277	50	Ø14	150	310
LinkLift 80/80R MD	220	Ø70[2]	130[2]	290	200	5	M20x40	209	166,4	402	205	304	344	75	Ø14	225	460
LinkLift 100/100R MD	250	Ø80[3]	163[3]	368	220	6	M20x40	272	198,3	497	255	335	395	100	Ø18	260	570

[1] LL50R : S=Ø60
[2] LL80R : S= B 80x74 e9
[3] LL100R : S= B 80x74 e9

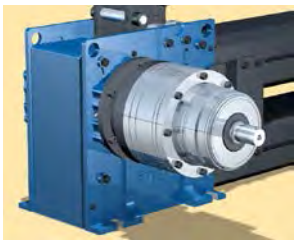
DIN 5482

LinkLift with double-return magazine



All dimensions in mm.

Main LINKLIFT options



Positioning control using a CAM switch

A CAM switch can be connected to the drive shaft with an appropriate mounting bracket. The switch is available with 2 to 6 positions which can be set independently of each other.

Positioning control using an encoder

An encoder can be connected to the drive shaft with an appropriate mounting bracket. With a resolution of 1 024 points per travel, the positioning accuracy obtained at the end of the column is 0.5 mm.

Modular magazine

Our standard dual-line magazines consist of two parallel aluminum tubes with a 180° curve piece connecting them at one end; the tubes can be cut to any size. This allows the magazines to be fitted exactly to the length of the lifting column. In installed lift systems, if the stroke is to be extended, additional storage space can be obtained by simply replacing the tubes (according to prior analyse from SERAPID).

Load monitoring

The LinkLift load cell allows load monitoring at the top of the lift column, the point where the force is applied. The deformation body contains a force transducer with a thin film sensor for high accuracy.

Planetary gearbox

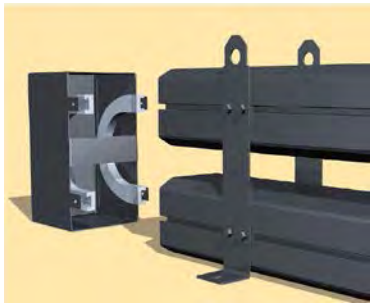
All LinkLift models can be delivered with a planetary gearbox to reduce the drive torque. The gearbox is selected according to the torque used. The gearbox comes pre-mounted with the appropriate flanges on the drive housing.

CAM switch

Encoder

Long guides

The drive housings can be fitted with standard or long guides. The long guides are required in the following two cases:
1. to reduce deflection when the stroke is long (see the load / stroke performance curves on page 10).
2. to stabilise the chain when exiting or entering the drive housing at speeds above 200 mm/s.

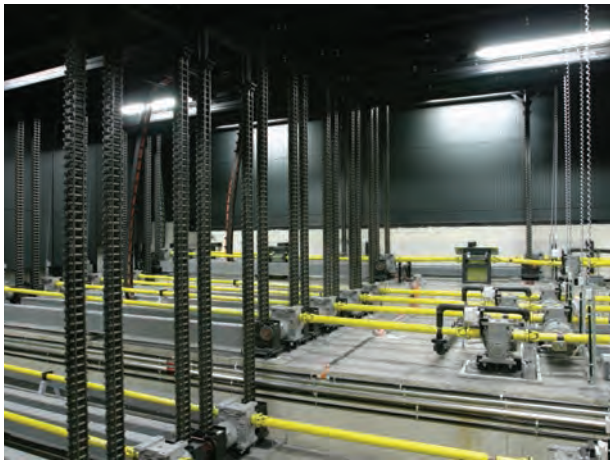


Modular magazine

Load monitoring

Other LINKLIFT options

- special forms for drive shaft output
- mounting flange for gear reducer
- cardan / U-joint shafts and couplings
- low-profile, single-line magazine or multi-line magazine; special magazine designs on demand
- intermediary pick-up frame allowing lifting heights above standard
- end-of-stroke sensor
- special paint or coating
- design support, custom project study, assistance in configuration of lift systems



Important hints

- Apply local specifications pertaining to motion systems. The reference loads required by DIN 56950-1 are already included in our stated specifications
- Consider the cumulated efficiency values of each part
- Use planetary gear reducers mounted on the LinkLift to reduce the transmission torque
- Systematically incorporate a safety brake or a double motor brake
- Account for the uneven distribution of loads on the columns and rigidity of the platform
- Use torsion-stiff shafts and couplings
- Power the motor using a frequency converter to avoid generating shock during start-up and shut-down
- Consider the forces generated by a shut-down due to a power loss, particularly with speeds above 100 mm/s

Lengths and weights of LinkLift standard magazines

The total length of the magazine (M) is composed of the basic length, which depends on the model for a stroke of 500 or 1 000 mm, and the length of the double-return magazine that is also required. This is measured in standardised steps, where the base is extended by 50 mm per 100 mm stroke (no intermediate dimensions). In the basis length, the 180 ° deflection, the brackets, the housing connection and two links contain a storage reserve.

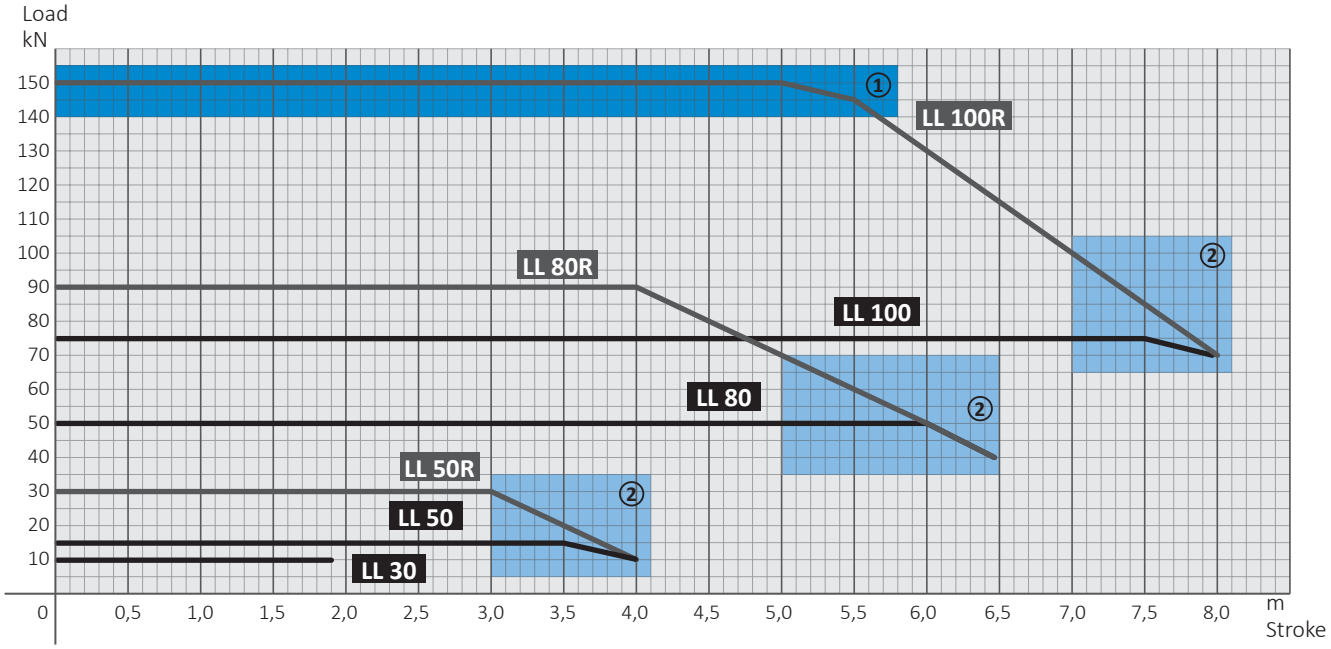
Values are given for all LinkLift models in the table below.

The weight of the magazine consists of the weight of the base and the weight of the double-return magazine, depending on the stroke (in m). The corresponding values can also be found in the table below.

Lengths and weights of magazines

Model	LinkLift 30	LinkLift 50/50R	LinkLift 80/80R	LinkLift 100/100R
Length of standard magazines				
at 500 mm stroke (mm)	493	-	-	-
at 1 000 mm stoke (mm)	-	826	939	1 103
Weight of the double-return magazine				
basis (kg)	2	5	16	27
magazine - brackets, return (kg/m)	2,5	4,5	10	16

Static & dynamic capacities LINKLIFT



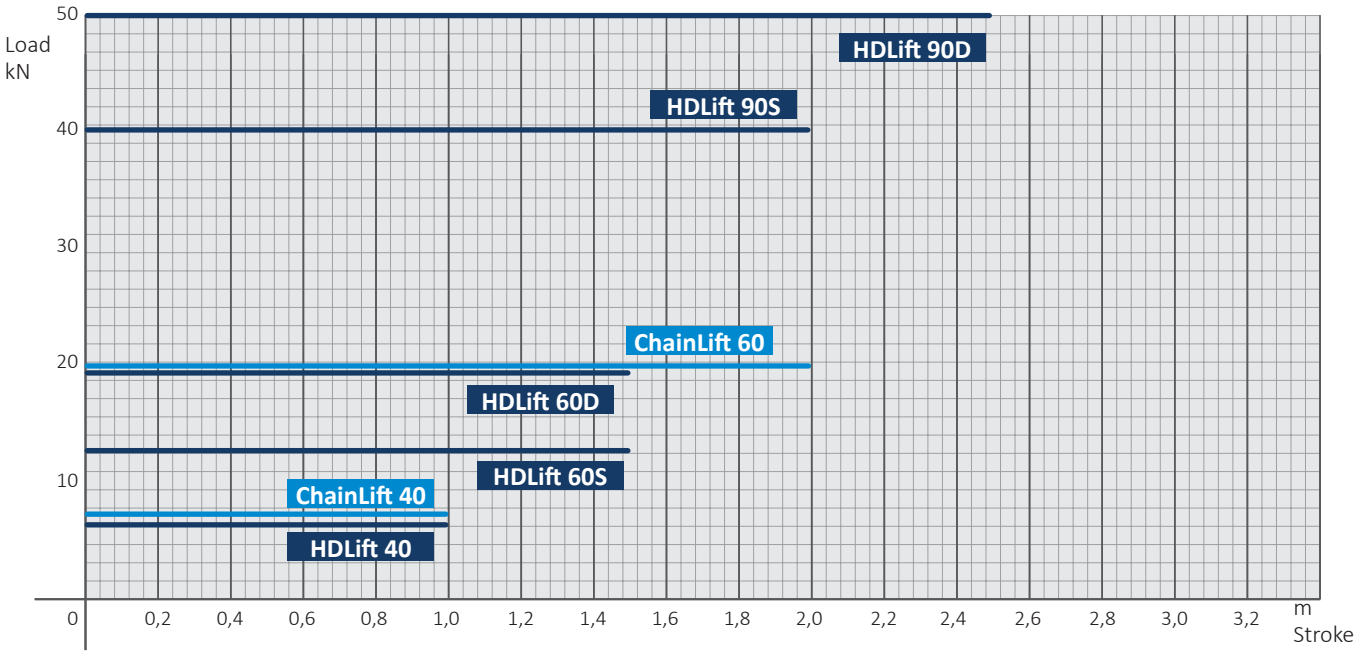
To ensure stability in the upper portions of the operating ranges, the LinkLift's drive system uses special components, in particular a double-key or splined shaft and longer drive guides.

① For loads above this limit, the drive system is equipped with a double-key or splined drive shaft.
② For strokes above this limit, the drive system is fitted with long drive guides.

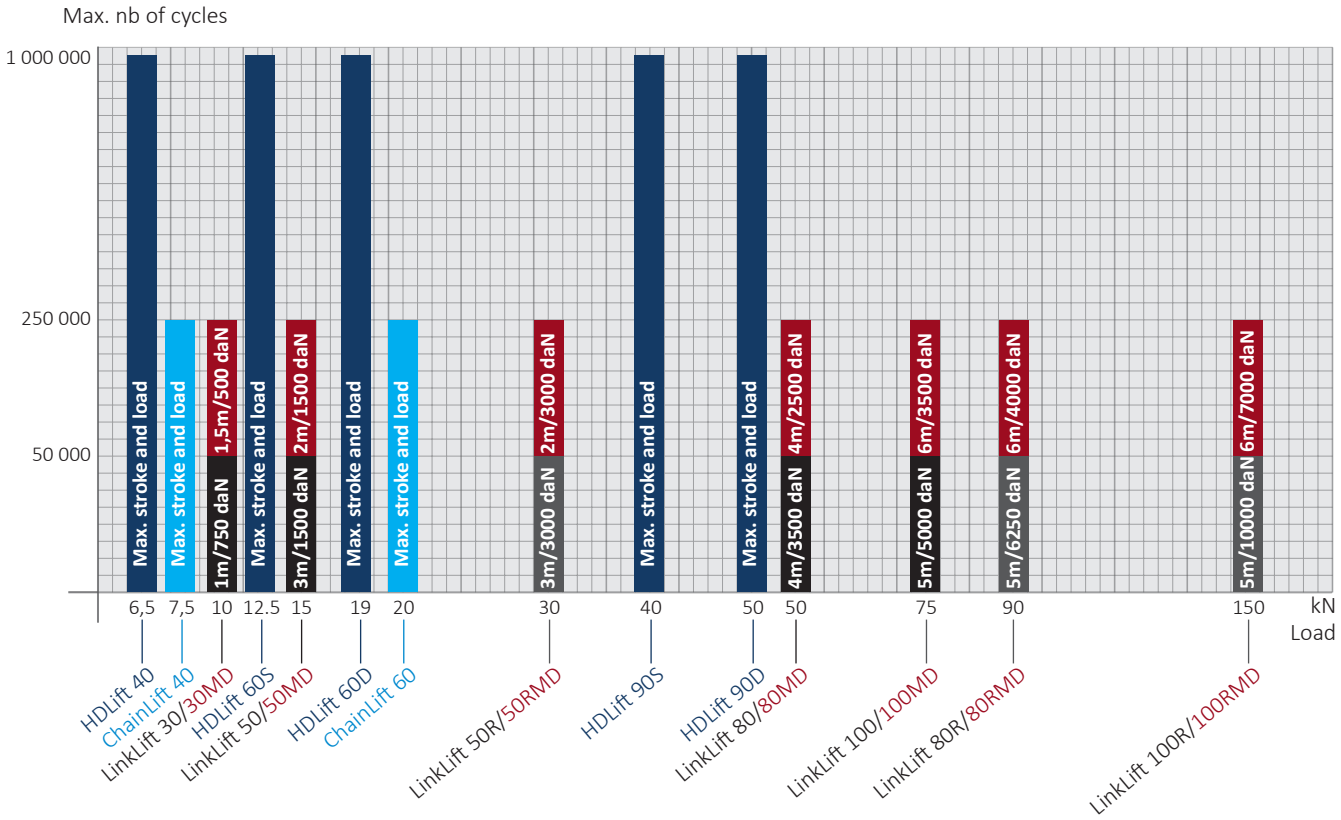
Long guides increase the lowest possible position of the platform above the nominal closed height of the LinkLift as follows:

- LinkLift 50 / 50R: 366 mm (②: + 75.5 mm)
- LinkLift 80 / 80R : 580 mm (②: + 120 mm)
- LinkLift 100 / 100R: 722 mm (②: + 150 mm)

Dynamic capacity CHAINLIFT / HD LIFT



The number of cycles in relation to the capacity



Motorisation

The following basic formulae are used to calculate the torque, speed and power required.

The maximum torque (M) per column is calculated from the total static (Fs) or dynamic load (Fd), whichever is the higher. This value is divided by the number of columns.
The weight of the chain is then added. Friction forces occurring in the guides are insignificant. Forces of inertia must be added if the system does not include a speed variation control.

$$Fs = \frac{S \times Fu_s + Ps}{Nc} \text{ [N]}$$

$$Fd = \frac{S \times Fu_d + Ps}{Nc} \text{ [N]}$$

$$Pc = Ct \times m \text{ [N]}$$

$$M = \frac{(\max(Fs;Fd) + Pc) \times p \times 10^{-3}}{\eta} \text{ [Nm]}$$

The rotation speed of the drive shaft (N) is calculated from the chain pitch (p) and the lifting speed (V).

We generally recommend a frequency converter to minimise shock; other-wise, the speed must not exceed 30 mm/s.

$$N = \frac{V}{2\pi \times p \times 10^{-3}} \text{ [U/min]}$$

The output power (P) required per column is calculated from the torque (M) and the shaft rotation speed (N):

$$P = \frac{M \times N \times \pi \times 10^{-3}}{30} \text{ [kW]}$$

Fs : total static load [N]	*Ct* : total stroke [m]
Fd : total dynamic load [N]	*m* : mass of chain [N/m]
S : platform area [m²]	*M* : maximum torque [Nm]
Fu_s : static payload [N/m²]	*p* : chain pitch [mm]
Fu_d : dynamic payload [N/m²]	*η* : system efficiency (= 0,8)
Ps : weight of platform [N]	*N* : shaft rotation speed [tr/min]
Nc : number of lifting columns	*V* : lifting speed [m/min]
Pc : weight of chain [N]	*P* : output power [kW]

TRANSFER SOLUTIONS

Harsh environment? Need a long stroke and have limited installation space? Rigid Chain Technology is the solution.

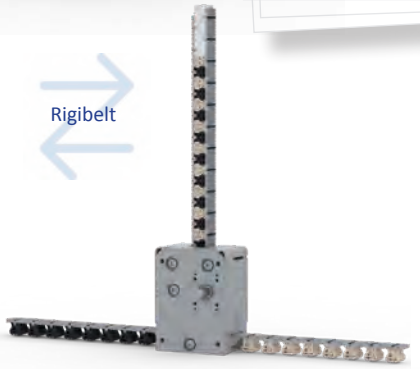
SERAPID offers with its Rigid Chain products a compact, telescopic, easy-to-install and environmentally friendly transfer solution.

SERAPID linear actuators bring reliability and high operation capability to your material handling and production processes, along with low maintenance needs and increased safety at work.

Our applications integrate into **SMED solutions** (Single Minute Exchange of Die) as well as **Lean Manufacturing solutions**.

RollBeam vertical configuration

Rigibelt



LinearBeam

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