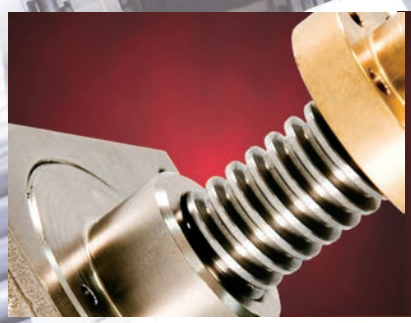
Precision Technology USA

ENGINEERED ACTUATORS

ACTUATOR CATALOG



www.pt-usa.net

A member of the PT GROUP

THE POWER BEHIND PERFORMANCE

Precision Technology offers a comprehensive range of rodless and rod-style linear actuators, screw jacks, linear tables, and modified linear products.

Based in a 50,000 square-foot-facility in Roanoke, Virginia, Precision Technology prides itself on being an innovative, responsive, solution-based manufacturer and supplier of industrial linear motion actuators for an extensive range of automation, machinery, material handling and positioning applications. At the core of our product range is the renowned and patent protected WIESEL™ linear actuators which are making a difference in automation environments across the continent with faster speeds at longer strokes.

No matter what your problem may be, our sales applications engineers, certified technicians and master assemblers are available to assist in integrating our products into your system. All of our engineers have technical degrees and are experts in our industry. Precision Technology offers expertise in engineering complete mechanical linear systems packages.

PT GROUP
THE POWER BEHIND PERFORMANCE

American Actuators, Inc.
www.americanactuators.com

Hypac
www.hypac.com.au

Precision Technology USA ENGINEERED ACTUATORS
www.pt-usa.net

SP
www.seawaypowell.com

Precision Technology is part of a worldwide group of businesses involved in marine machinery and general automation with facilities in North America , Britain, and Australia.

Other businesses within the group include:

Hypac, a manufacturer of unique lightweight deck machinery for fast vessels, both commercial and military. Hypac also produces basket presses used in making the highest quality wines, together with a growing range of other premium wine making equipment.

Seaway Powell Marine, a designer and manufacturer of sophisticated deck equipment for super yachts and other vessels, both commercial and military.

American Actuators, a business focused on developing new innovative automation products and solutions for original equipment manufacturers.

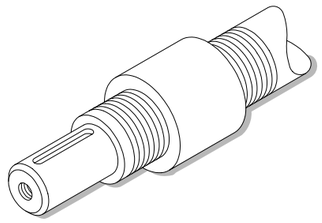
Table of Contents

Selection of linear drive units

The best solution for every application

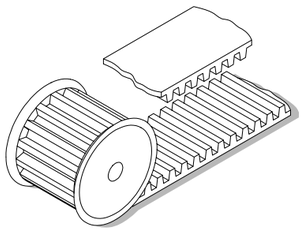
Drive

Ball screw



Fx	up to		12 kN	[1]	(2698 lbf)
Rep.	up to	±	0.01 mm	[1]	(0.0004 in)
v	up to		2.5 m/s	[1]	(8.2 ft/s)
a	up to		20 m/s²	[1]	(65 ft/s²)

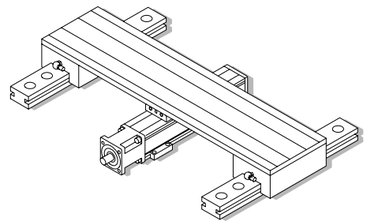
Toothed belt drive



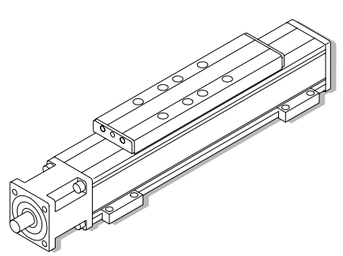
Fx	up to		5 kN	[1]	(1124 lbf)
Rep.	up to	±	0.05 mm	[1]	(0.002 in)
v	up to		10 m/s	[1]	(33 ft/s)
a	up to		40 m/s²	[1]	(131 ft/s²)

Guide system/load

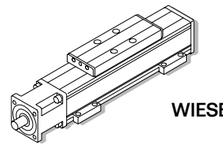
External



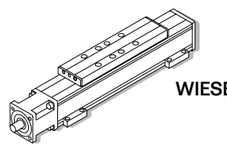
Internal



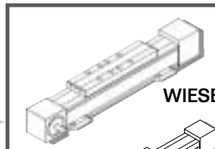
Series/size



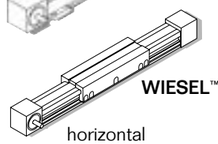
WIESEL™ *DYNALine*®



WIESEL™ *SPEEDLine*®



WIESEL™ *POWERLineZRT*®



WIESEL™ *SPEEDLine*®

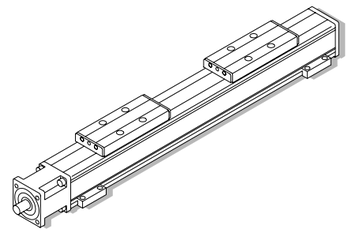
horizontal

vertical
Z-axis

Additional support for larger loads

Without

Additional power bridge



Notes: Fx -Feed force
Rep. -Repeatability
v -Linear speed
a -Acceleration

[1] The performance values of the respective sizes can be found on page 4.

Summary of performance data, additional options and accessories

Summary of performance data

Type	Profile-cross-section [mm]	Drive element[1]	Lead [mm] Stroke per revolution [mm/rev.]	Feed force Fx [N]	Repea-tability[4] [mm]	Linear speed [m/s]	Load[2] Fz [N]	Other loads and moments Fy [N]	Mx [Nm]	My[3] [Nm]	Mz[3] [Nm]
WH40	40x40	ZRT[1] 10 AT5	100	315	± 0.05	3.0	600	450	10	30	30
WH50	50x50	ZRT[1] 16 ATL5	120	670	± 0.05	6.5	730	415	16	87	50
WH80	80x80	ZRT[1] 32 ATL10	200	2700	± 0.05	10	2100	882	75	230	100
WH120	120x110	ZRT[1] 50 ATL10	260	5000	± 0.05	10	9300	4980	500	930	500
WHZ50	50x50	ZRT[1] 16 ATL5	120	670	± 0.05	6.5	730	415	16	87	50
WHZ80	80x80	ZRT[1] 32 ATL5	200	1480	± 0.05	10	2100	882	75	230	100
WM40	40x40	KGT[1] ø 12 mm	5	1000	± 0.01	0.25	600	450	10	30	30
WM60-370 ZRT	60x60	ZRT[1] 20 ATL5	120	850	± 0.05	2.5	1400	1400	50	100	100
WM60-370	60x60	KGT[1] ø 20 mm	5/20/50	2800	± 0.02	2.5	1400	1400	50	100	100
WM60	60x60	KGT[1] ø 20 mm	5/20/50	4000	± 0.01	2.5	2000	2000	100	200	200
WM60-500	60x60	KGT[1] ø 20 mm	5/20/50	4000	± 0.01	2.5	2000	2000	100	200	200
WM80-370 ZRT	80x80	ZRT[1] 25 AT10	170	1470	± 0.05	2.5	2100	2100	150	180	180
WM80 ZRT	80x80	ZRT[1] 25 AT10	170	1470	± 0.05	2.5	3000	3000	300	300	300
WM80-370	80x80	KGT[1] ø 25 mm	5/10/20/50	3500	± 0.02	2.5	2100	2100	150	180	180
WM80	80x80	KGT[1] ø 25 mm	5/10/20/50	5000	± 0.01	2.5	3000	3000	350	300	300
WM120	120x120	KGT[1] ø 32 mm	5/10/20/40	12000[5]	± 0.01	2.0	6000	6000	500	600	600
WV60	60x60	KGT[1] ø 20 mm	5/20/50	4000	± 0.01	2.5	–	–	–	–	–
WV80	80x80	KGT[1] ø 25 mm	5/10/20/50	5000	± 0.01	2.5	–	–	–	–	–
WV120	120x120	KGT[1] ø 32 mm	5/10/20/40	12000[5]	± 0.01	2.0	–	–	–	–	–

[1] KGT = Ball screw
ZRT = Toothed belt drive
[2] All maximum forces and moments given refer to the center/top of the power bridge.
[3] Increase of admissible values possible by long or additional power bridge.
[4] Refers to the average positioning variation according to VDI/DGQ 3441.
[5] At 40 mm lead max 8000 N.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Mechanical linear drive units

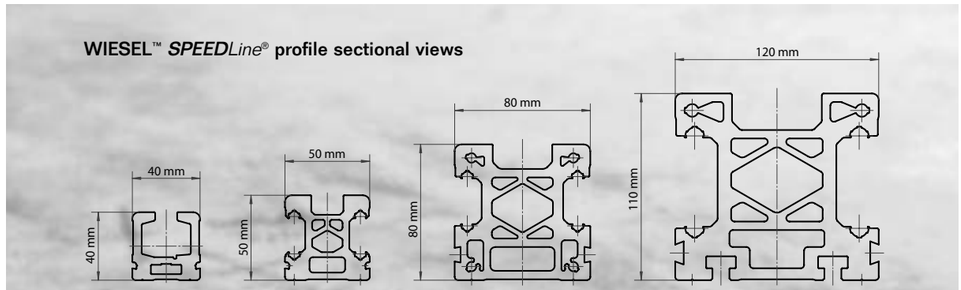
WIESEL™ *SPEEDLine*®

WIESEL™ *SPEEDLine*® WH40
- Completely integrated miniaturized drive unit with linear guide and toothed belt drive.

WIESEL™ *SPEEDLine*® WH50/80/120
- Completely integrated linear axis with roller guideway and toothed belt drive.

WIESEL™ *SPEEDLine*® Z-axis
- Especially developed for vertical movements.
- Reduction in dead weight together with the short design allows high dynamics.

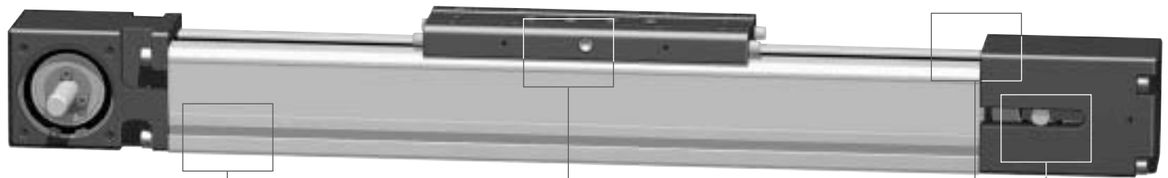
WIESEL™ *SPEEDLine*® profile sectional views

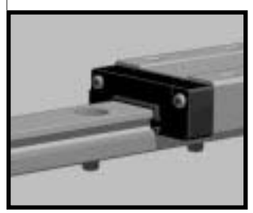


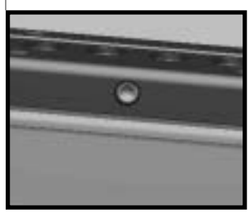
WIESEL™ *SPEEDLine*®

New technology right to the center.

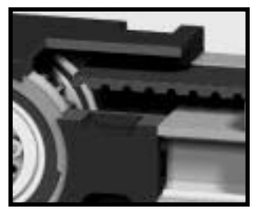
WIESEL™ *SPEEDLine*® WH40
A linear drive unit for dynamic miniaturized applications. High performance with extremely small dimensions.

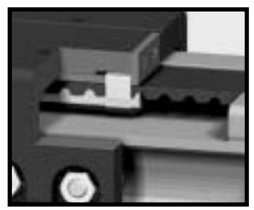


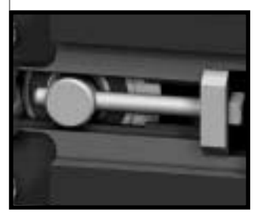


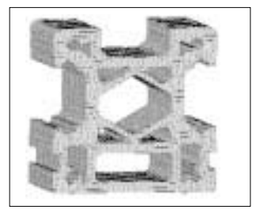


Powered by ATL belt









Linear guides
Precise positioning is made possible by a polished linear guide with a high degree of guide accuracy. A smaller motor can be added thanks to the low coefficient of friction. Rubber wipers protect the mechanism from dirt, thus increasing service life.

Central lubrication
The linear guide system is conveniently relubricated from a central point. Whether by hand or automatically, maintenance is now a simple matter.

AT toothed belt
A proven drive element:
- high loading
- wear resistance
- high efficiency
- exact spacing
- low mass

Completely new arrangement of the roller guideway
The H-Type arrangement of guidance allows high forces and moments and thereby the choice of a smaller size. Your benefit: lighter and more economical constructions.

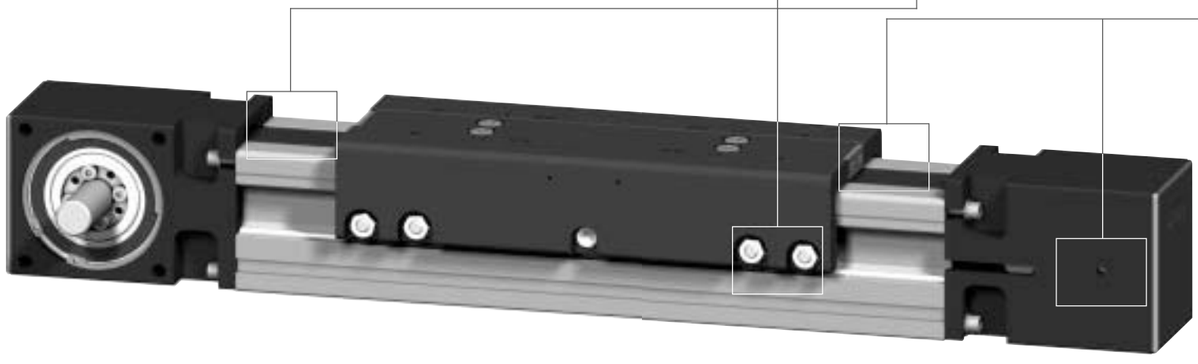
ATL toothed belt
- with steel reinforcement especially suitable for linear drive units
- higher performance
- repeatability of ± 0.05 mm even at high feed forces

Tension and exchange of toothed belt
The toothed belt can be retensioned and exchanged comfortably without dismounting the load (only WH50/80/120), thus reducing your service costs.

FEA optimized design
FEA analysis helps model and optimize the profile and the whole linear axis. The result: highest performance and reliability.

WIESEL™ *SPEEDLine*® WH50, WH80, WH120, WHZ50, WHZ80
With the WIESEL™ *SPEEDLine*® single-axle solutions can be realized as well as two- and three-dimensional handling systems.

The WIESEL™ ***SPEEDLine***® Z-axis is especially suitable for vertical movements. The reduced mass to be moved together with the short design allow higher dynamics and loads.



General technical data

WIESEL™ *SPEEDLine*®

Speeds
The linear speed achieved by a linear drive unit depends on the lead of the mechanical drive element and on the input rotational speed. The various linear speeds which can be achieved by the individual sizes are listed in the following table:

Size	Lead [mm/rev.]	n_{max} [rpm]	v_{max} [m/s]
WH40	100	1800	3
WH50/WHZ50	120	3250	6.5
WH80/WHZ80	200	3000	10
WH120	260	2308	10

Installed position
The linear drive units can basically be installed in any position, provided that all the forces and moments occurring remain below the maximum values for the axis concerned.

Security advice
All sizes are generally *not self-locking*. It is therefore advisable to install suitable motors with holding brakes, particularly if the linear drive unit is installed vertically.

In case of a break of the toothed belt the load is released by toothed belt driven linear units. Therefore safety precautions have to be taken for applications which are critical with regard to security.

Loading
All specified maximum forces and moments refer to the center/top of the power bridge. Load overlay at several coordinates: If compound loads occur, with force and moment components in more than one direction, the maximum permissible loads must be reduced to 60% of the specified maximum values. When forces and moments are overlaid in two or three coordinates, it is necessary to reduce the maximum permissible load to 60% of the maximum value.

Load ratings
See page 96

Operating hours
The toothed belt as well as the roller guideway allow continuous operation up to 100%. Extremely high loads, combined with long operating hours, may reduce the lifetime.

Temperatures
All series are designed for continuous operation at ambient temperatures up to 80°C (176°F). Temperatures up to 100°C (212°F) are also permitted for brief periods. The linear drive units are not suitable for operation at subzero temperatures.

Idle torque
The indicated values for the idle torque are mean values determined in a rank. In individual cases these values can deviate.

Straightness/torsion
The aluminum profiles are extruded sections which may display deviations in straightness and torsion due to their manufacturing process. The tolerance of these deviations is defined in DIN 17615. The deviations found in Precision Technology USA, Inc. linear drive units correspond to these limits at least, but are normally well below. In order to obtain the required guide accuracy, the linear drive unit must be aligned with the aid of levelling plates or clamped from a mounting surface machined with sufficient accuracy. This ensures that tolerances of at least 0.1 mm/1000 mm are achieved.

Guide tube
A guide tube contains all elements of a linear drive unit except the mechanical drive element. It serves mainly as a support and holding device for higher loads and moments. For this purpose it is either mounted on the backside of a driven WIESEL™ or installed parallel to it. All WIESEL™ models are also available as guide tubes with guide.

Stroke lengths
The stroke length specified in the order code represents the maximum possible linear displacement. Acceleration and deceleration paths must be taken into account when designing the system, as well as any required over-run.

Repeatability
The repeatability is definded as the capability of a linear drive to get back to an actual position which was reached under the same conditions within the given tolerances. It refers to the average position variation according to VDI/DGQ 3441. The repeatability among others is influenced by:
- Load
- Speed
- Deceleration/acceleration
- Direction of travel
- Temperature

Aggressive working conditions
Because of their tough design WIESEL™ *SPEEDLine*® units can be used even in rough surroundings without additional covering. As a protection against coarse dirt optional wipers can be used. In case of extreme dirt, or fine dust/filings, a protective bellow is recommended and provided on request.

Maintenance
Lubrication WH40
The linear guide must be lubricated via the grease nipple on the power bridge with the aid of a grease gun after 400 hours of operation or at least every 3 months. Grease: rolling bearing grease (original grease: Fuchs Lubritech URETHYN E/M2).

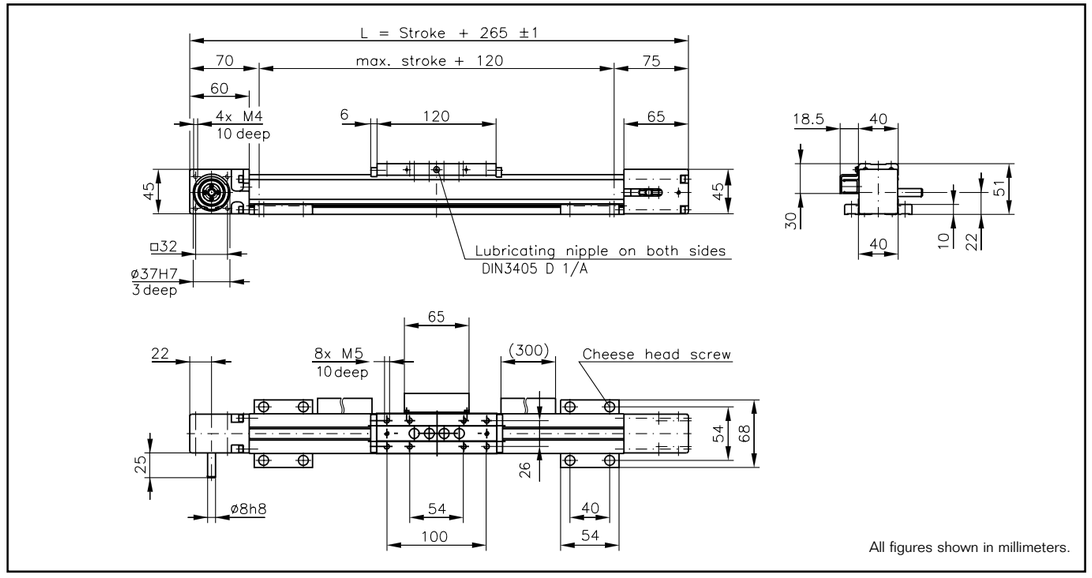
Lubrication WH50/80/120
To maximize the life of the guide system, the two guides should be permanently covered with a thin oil film. The two lubrication points which are arranged at the sides of the power bridge serve for lubrication.

Tensioning of toothed belt
The tension of the toothed belt can be adjusted with the aid of the tensioning screws on the guide casing which are intended for this. The linear units are delivered with optimal tension values in order to guarantee security in function. Changes in this adjustment must only be carried out in service cases and by Precision Technology USA, Inc. service engineers.

Pretensioning of the guide system
The WIESEL™ units leave the factory with optimal preloading values which guarantee optimum traveling characteristics as well as the necessary capacity in forces and moments. Changes in the preloading of the rollers must only be carried out after prior consultation with Precision Technology USA, Inc. service engineers.

WIESEL™ *SPEEDLine*® WH40

with linear guide and AT toothed belt



Note: The use of a long power bridge increases the total length.

Technical data

Linear speed:	max. 3.0 m/s
Repeatability:	± 0.05 mm
Acceleration:	max. 40 m/s²
Drive element:	Toothed belt 10AT5
Diameter:	31.83 mm
Stroke per revolution:	100 mm
Stroke length:	up to 2000 mm
Length of power bridge:	120 or 210 mm see page 28
Geometrical moment of inertia:	ly 12.6 x 10⁴ mm⁴ lz 15.3 x 10⁴ mm⁴

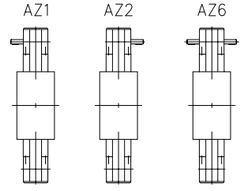
Weights

Basic unit with zero stroke:	1.19 kg
100 mm stroke:	0.15 kg
Power bridge with rollers:	0.28 kg
Provided:	4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	0.1
900	0.3
1800	0.6

Execution of drive shafts
(Detailed description see pg 55)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

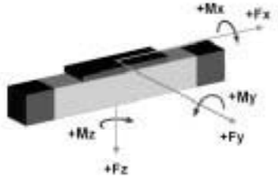
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10¹² mm⁴=2.4025 x 10⁶ in⁴

Mass moment of inertia:
1 kg • m²=10⁴ kg • cm²=0.738 lb • ft • s²

Mass:
1 kg=2.2 lb

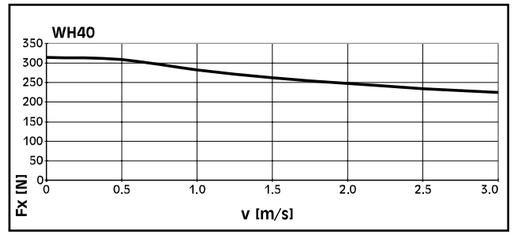
Loads and load moments



Load	dynam. [N]
Fx drive[1]	max. 315
Fy	450
±Fz	600
Load moment	**dynam. [Nm]**
Mx	10
My[2]	30
Mz[2]	30

Order Code see page 99

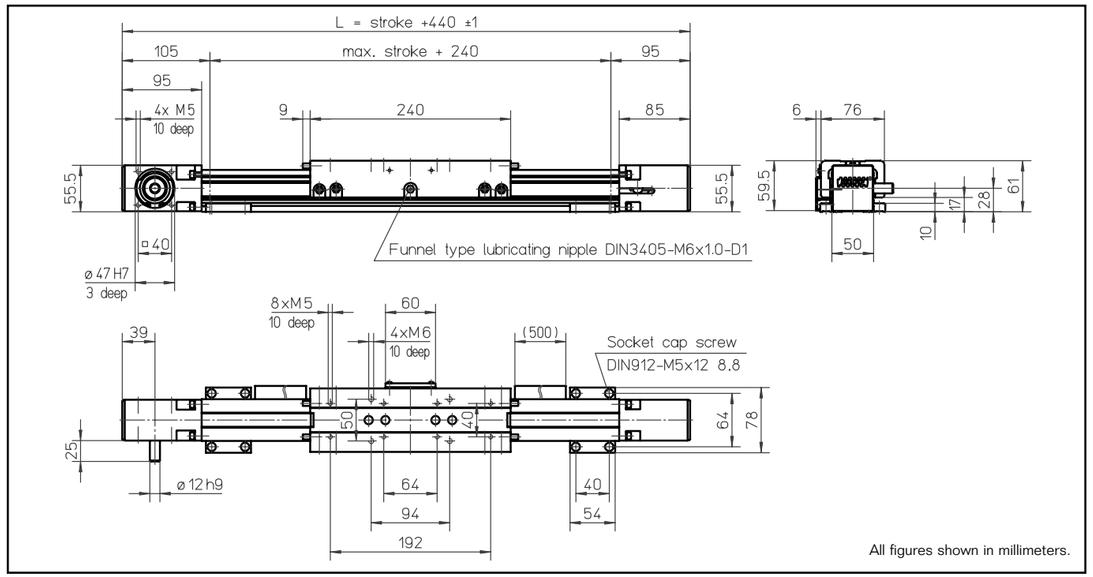
Fx depending on the linear speed



[1] Depending on the speed, see respective chart.
[2] Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 28 and 29).

WIESEL™ *SPEED*Line® WH50

with roller guideway and AT toothed belt



Note: In the section of the rail for the initiators the WIESEL™ cannot be fixed by means of KAO mounting brackets. Mounting kit for the lateral assembly of the initiators at the sides of the axis on request. Mounted wipers on request. The use of a long power bridge increases the total length.

Technical data

Linear speed: . . . . . .max. 6.5 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 40 m/s²
Drive element: . . . . . .Toothed belt 16ATL5
Diameter: . . . . . .38.20 mm
Stroke per revolution: . . . . . .120 mm
Stroke length: . . . . . .up to 3000 mm
Length of power bridge: . . . . . .240 or 400 mm
see page 28
Geometrical moment of inertia: . . .ly 3.30 x 10^5 mm⁴
Iz 2.65 x 10^5 mm⁴

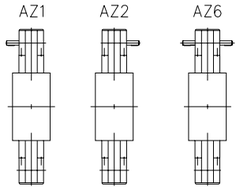
Weights
Basic unit with zero stroke: . . . . .3.50 kg
100 mm stroke: . . . . . .0.44 kg
Power bridge with rollers: . . . . . .0.90 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	1.7
1500	2.4
3250	3.8

Execution of drive shafts

(Detailed description see pg 55)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

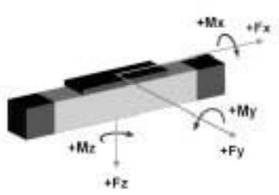
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10^{12} mm⁴=2.4025 x 10^6 in⁴

Mass moment of inertia:
1 kg • m²=10^4 kg • cm²=0.738 lb • ft • s²

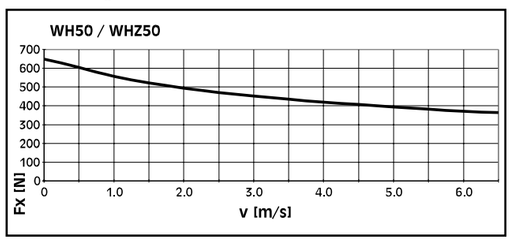
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive[1]	max. 670
Fy	415
±Fz	730
Load moment	**dynam. [Nm]**
Mx	16
My[2]	87
Mz[2]	50

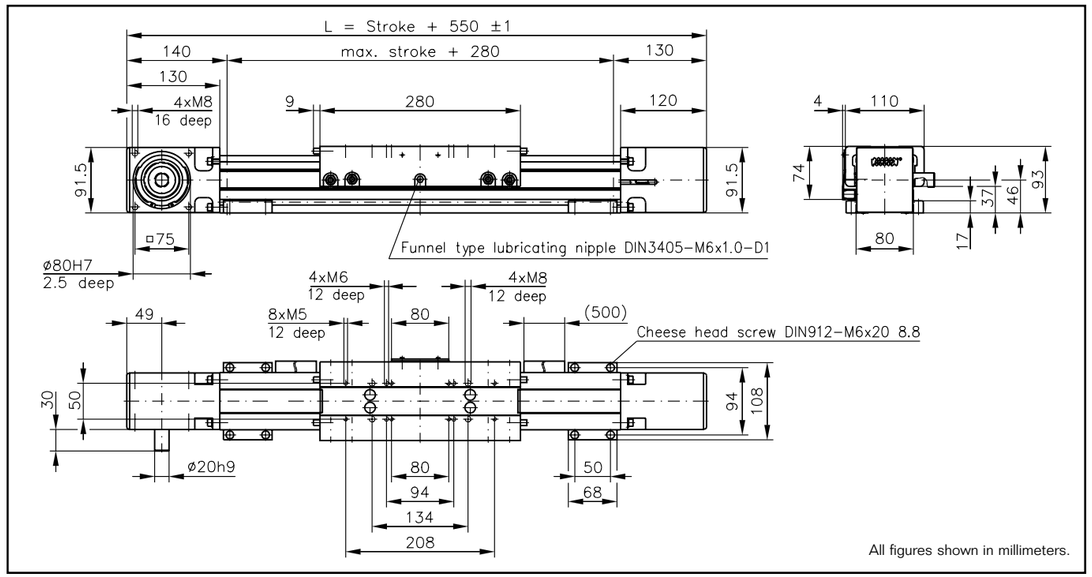
Fx depending on the linear speed



1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 28 and 29).

WIESEL™ *SPEED*Line® WH80

with roller guideway and AT toothed belt



Note: Mounted wipers on request. The use of a long power bridge increases the total length.

Technical data

Linear speed: . . . . . .max. 10 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 40 m/s²
Drive element: . . . . . .Toothed belt 32ATL10
Diameter: . . . . . .63.66 mm
Stroke per revolution: . . . . . .200 mm
Stroke length: . . . . . .up to 11000 mm
Length of power bridge: . . . . . .280 or 450 mm
see page 28
Geometrical moment of inertia: . . .ly 1.93 x 10^6 mm⁴
Iz 1.80 x 10^6 mm⁴

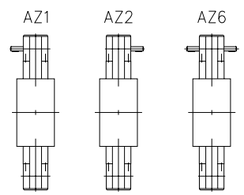
Weights
Basic unit with zero stroke: . . . . .8.63 kg
100 mm stroke: . . . . . .0.93 kg
Power bridge with carriage: . . . . .2.75 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	2.4
1500	3.5
3000	5.0

Execution of drive shafts

(Detailed description see pg 55)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

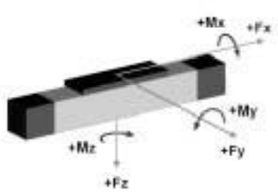
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10^{12} mm⁴=2.4025 x 10^6 in⁴

Mass moment of inertia:
1 kg • m²=10^4 kg • cm²=0.738 lb • ft • s²

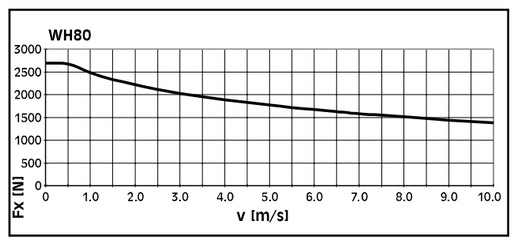
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive[1]	max. 2700
Fy	882
±Fz	2100
Load moment	**dynam. [Nm]**
Mx	75
My[2]	230
Mz[2]	100

Fx depending on the linear speed

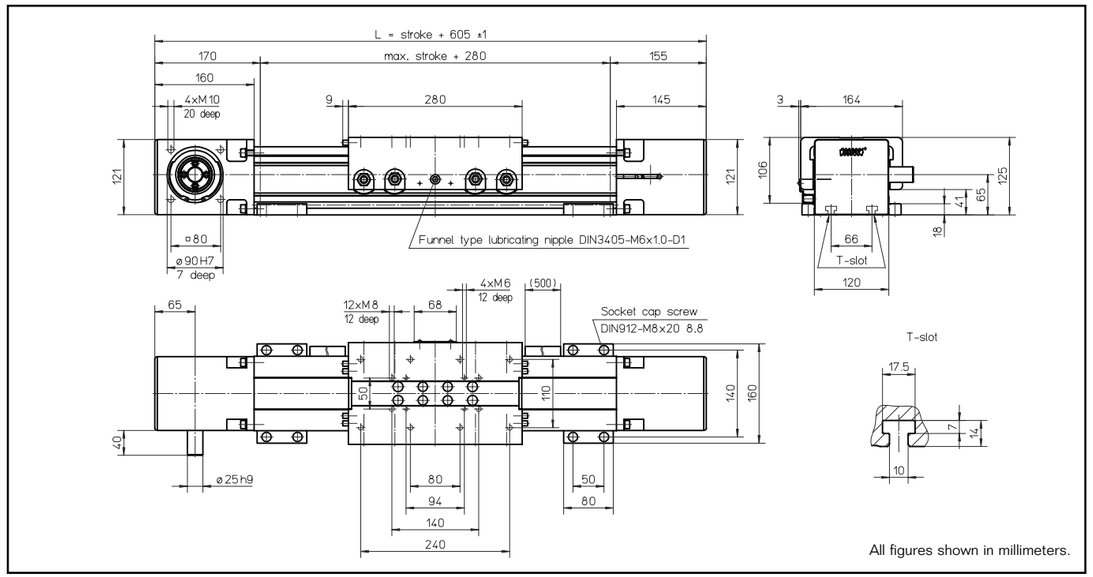


1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 28 and 29).

Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer's wishes.

WIESEL™ *SPEED*Line® WH120

with roller guideway and AT toothed belt



Note: Mounted wipers on request. The use of a long power bridge increases the total length.

Technical data

Linear speed: . . . . . .max. 10 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 40 m/s²
Drive element: . . . . . .Toothed belt 50ATL10
Diameter: . . . . . .82.76 mm
Stroke per revolution: . . . . . .260 mm
Stroke length: . . . . . .up to 11000 mm
Length of power bridge: . . . . . .280 or 520 mm
see page 28
Geometrical moment of inertia: . . .ly 6.69 x 10^6 mm⁴
Iz 6.88 x 10^6 mm⁴

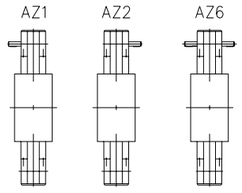
Weights
Basic unit with zero stroke: . . . . .17.00 kg
100 mm stroke: . . . . . .1.64 kg
Power bridge with carriage: . . . . .5.50 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	4.8
1500	7.0
3250	10.0

Execution of drive shafts

(Detailed description see pg 55)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

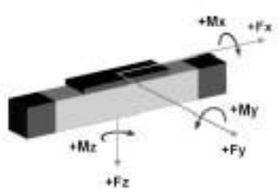
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10^{12} mm⁴=2.4025 x 10^6 in⁴

Mass moment of inertia:
1 kg • m²=10^4 kg • cm²=0.738 lb • ft • s²

Mass:
1 kg=2.2 lb

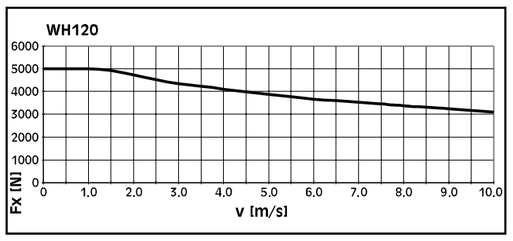
Loads and load moments



Load	dynam. [N]
Fx drive[1]	max. 5000
Fy	4980
±Fz	9300
Load moment	**dynam. [Nm]**
Mx	500
My[2]	930
Mz[2]	500

1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 28 and 29).

Fx depending on the linear speed

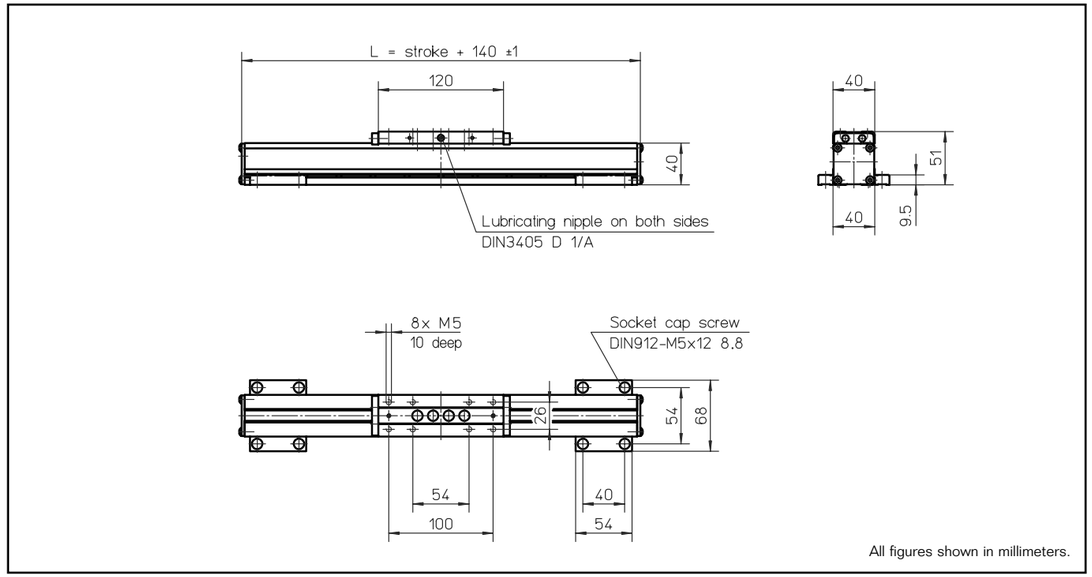


Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer's wishes.

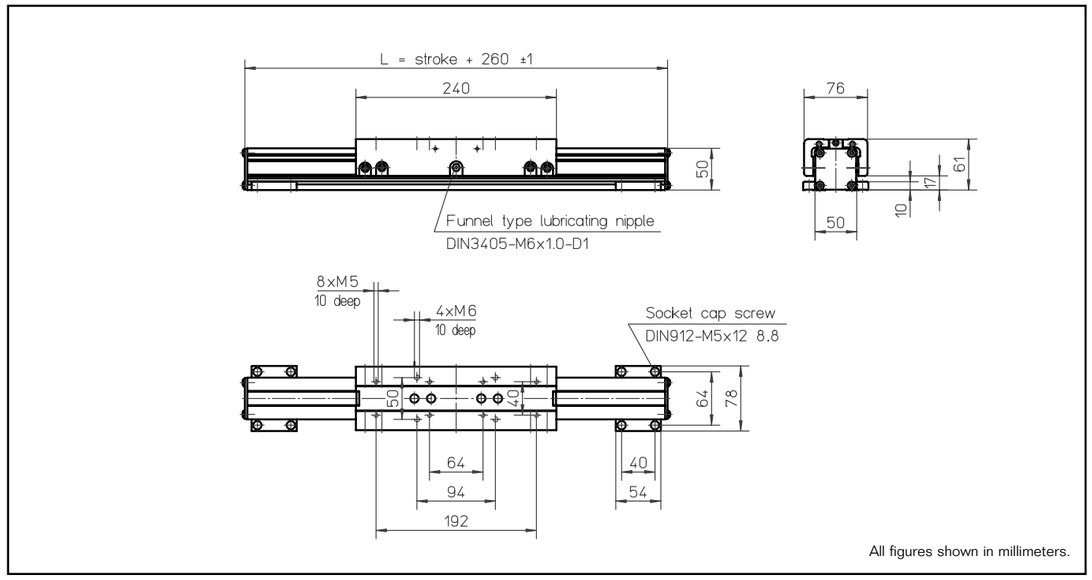
WIESEL™ *SPEED*Line®

Guide tube

WH40-190



WH50-190



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10^{12} mm⁴=2.4025 x 10^6 in⁴

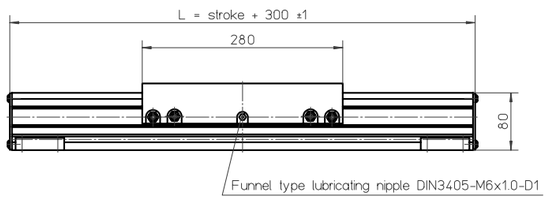
Mass moment of inertia:
1 kg • m²=10^4 kg • cm²=0.738 lb • ft • s²

Mass:
1 kg=2.2 lb

WIESEL™ *SPEED*Line®

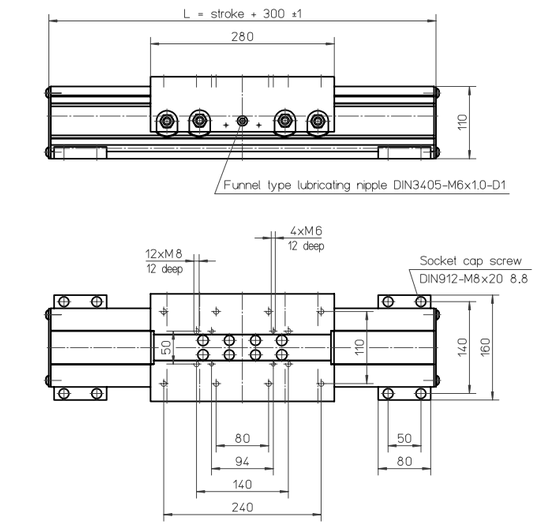
Guide tube

WH80-190



All figures shown in millimeters.

WH120-190



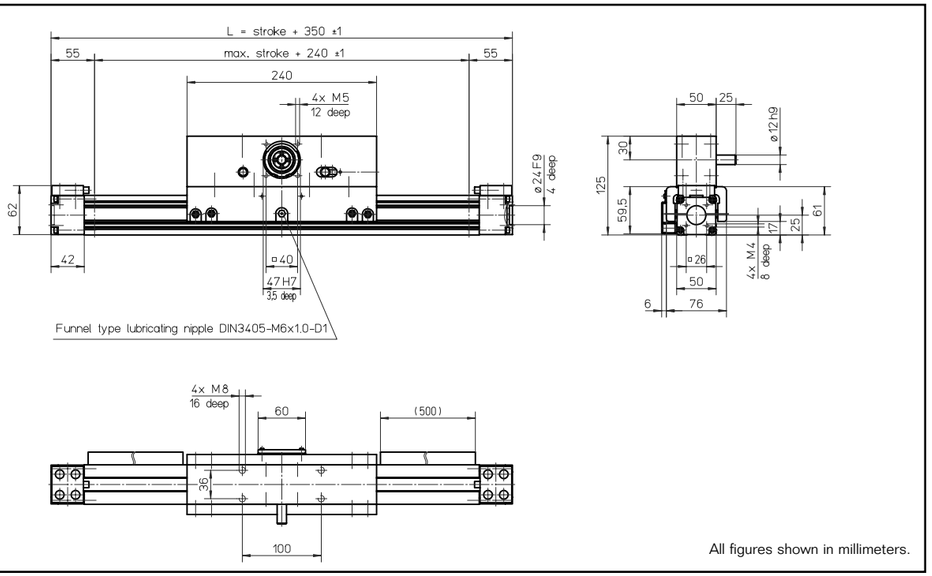
All figures shown in millimeters.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ mm^4=2.4025 x 10^6 in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • cm^2=0.738 lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

WIESEL™ *SPEED*Line® WHZ50

with roller guideway and AT toothed belt



All figures shown in millimeters.

Note: Mounted wipers on request. The use of a long power bridge increases the total length.

Technical data

Linear speed: . . . . . .max. 6.5 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 40 m/s²
Drive element: . . . . . .Toothed belt 16ATL5
Diameter: . . . . . .38.20 mm
Stroke per revolution: . . . . . .120 mm
Stroke length: . . . . . .up to 1500 mm
Length of power bridge: . . . . . .240 or 400 mm
see page 28
Geometrical moment of inertia: . . .ly 3.30 x 10^5 mm^4
Iz 2.65 x 10^5 mm^4

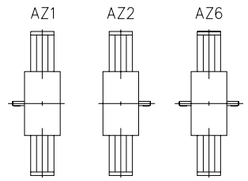
Weights
Basic unit with zero stroke: . . . . .4.50 kg
100 mm stroke: . . . . . .0.42 kg
Power bridge with carriage: . . . . .2.90 kg

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	1.7
1500	2.4
3250	3.8

Execution of drive shafts

(Detailed description see pg 99)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

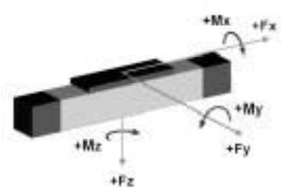
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 $m^4=10^{12}$ mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • $m^2=10^4$ kg • cm^2=0.738 lb • ft • s^2

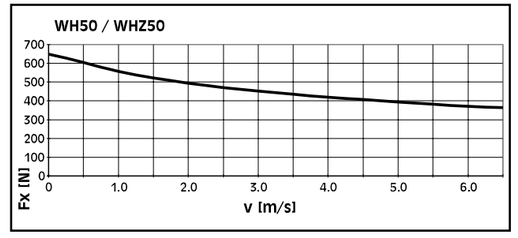
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive[1)]	max. 670
Fy	415
±Fz	730
Load moment	**dynam. [Nm]**
Mx	16
My[2)]	87
Mz[2)]	50

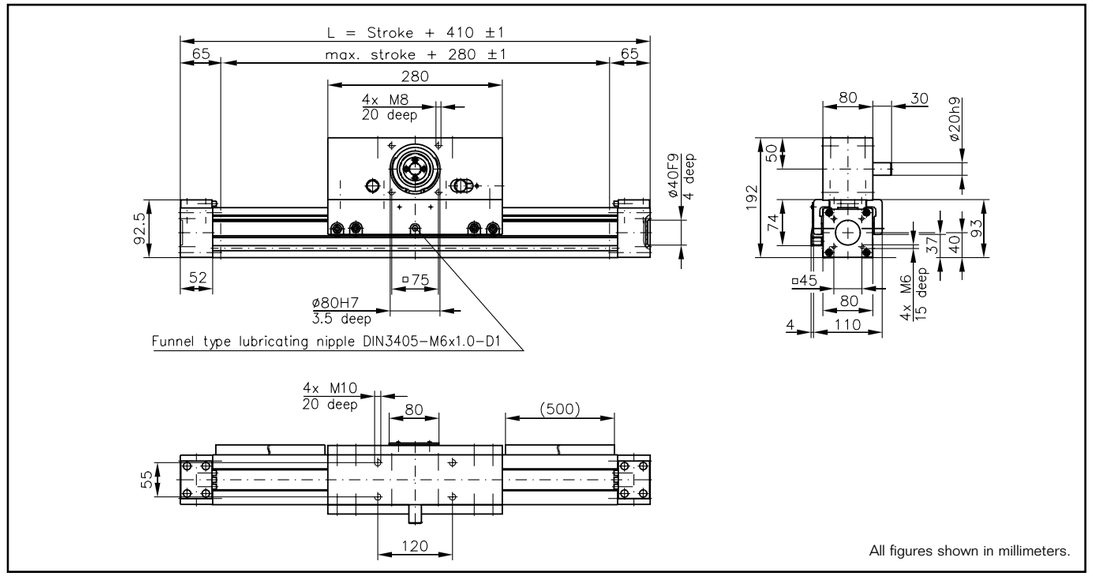
Fx depending on the linear speed



1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 28 and 29).

WIESEL™ *SPEED*Line® WHZ80

with roller guideway and AT toothed belt



Note: Mounted wipers on request. The use of a long power bridge increases the total length.

Technical data

Linear speed: . . . . . .max. 10 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 40 m/s²
Drive element: . . . . . .Toothed belt 32ATL5
Diameter: . . . . . .63.66 mm
Stroke per revolution: . . . . . .200 mm
Stroke length: . . . . . .up to 3000 mm
Length of power bridge: . . . . . .280 or 450 mm
see page 28
Geometrical moment of inertia: . . .Iy 1.93 x 10^6 mm^4
Iz 1.80 x 10^6 mm^4

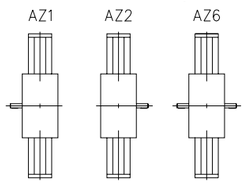
Weights
Basic unit with zero stroke: . . . . .11.20 kg
100 mm stroke: . . . . . .0.91 kg
Power bridge with carriage: . . . . .6.65 kg

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	2.4
1500	3.5
3000	5.0

Execution of drive shafts

(Detailed description see pg 99)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

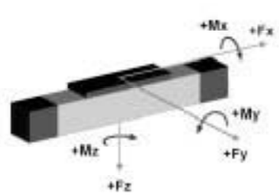
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

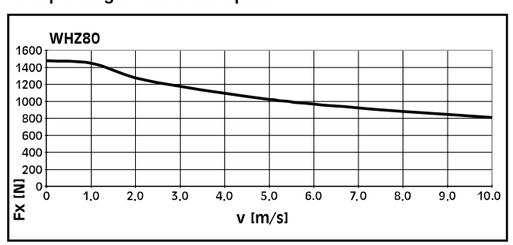
Loads and load moments



Load	dynam. [N]
Fx drive[1)]	max. 1480
Fy	882
±Fz	2100
Load moment	**dynam. [Nm]**
Mx	75
My[2)]	230
Mz[2)]	100

1) Depending on the speed, see respective chart.

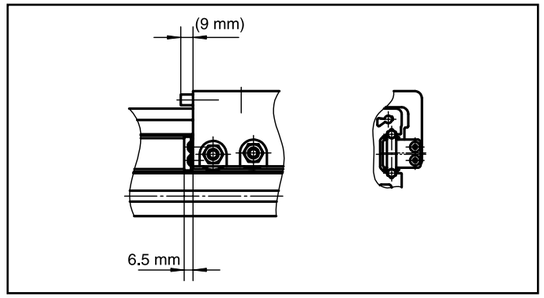
Fx depending on the linear speed



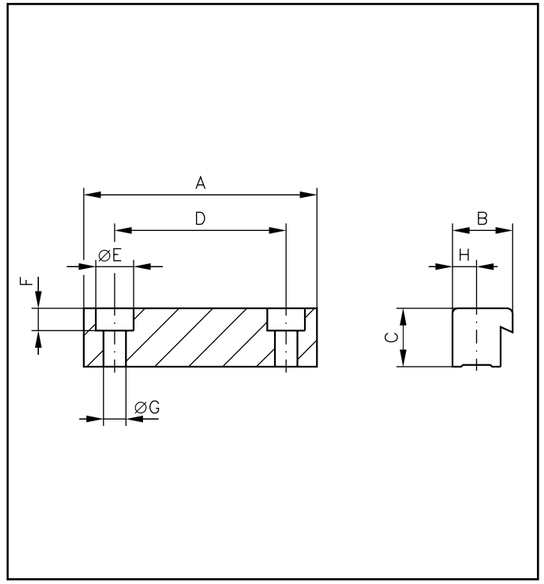
).

Accessories for WIESEL™ *SPEED*Line®

Felt wipers/Mounting brackets



Felt wipers FA for WH50/80/120
The felt wipers are positioned directly in front of each of the rollers at the front next to the power bridge, so that they wipe coarse dirt off the guide shaft. This prevents dirt from being trapped between the roller and the guide rail. This means that the WIESEL™ *SPEEDLine*® units can also be used in environments in which the guide shafts are exposed to excessive dirt. Installing the felt wipers may increase the driving torque slightly. There is no loss of stroke length and no additional external interference contour. As a result, the felt wipers can also be fitted to existing systems as an optional extra.



Mounting brackets KAO
The mounting brackets KAO secure the WIESEL™ unit to a mounting surface. They are inserted in the grooves provided in the sides of the tubular aluminum profile and screwed onto the mounting surface with the aid of cheese head screws. The number of mounting brackets required depends on the load and overall length of the WIESEL™ unit. Increasing side forces reduces the admissible distance between the brackets.
4 pieces of mounting brackets are delivered with each unit.

System brackets KAO
Only needed for WH40. With multi-coordinate arrangements of several WIESEL™ units, this can be used to screw a WIESEL™ unit directly to the power bridge of a unit positioned immediately below it.

Moment of tightening screws

Size	Moment [Nm]
WH40	7.3–12
WH50	7.3–12
WH80	7.3–12
WH120	17–30

Note: It is advisable to secure the linear drive unit at intervals of at least 750 mm. This ensures that all the permissible loads can be absorbed without significantly deforming the tubular aluminum profile.

	Dimension [mm]							
Size	A	B	C	D	ø E	F	ø G	H
WH40	54	16	10	40	10	5.7	5.5	7
WH50	54	16	10	40	10	5.7	5.5	7
WH80	68	17.5	17	50	11	6.5	6.6	7
WH120	80	25	18	50	15	8.5	9	10
WH40 System KAO	40	16	10	26	10	5.7	5.5	7

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

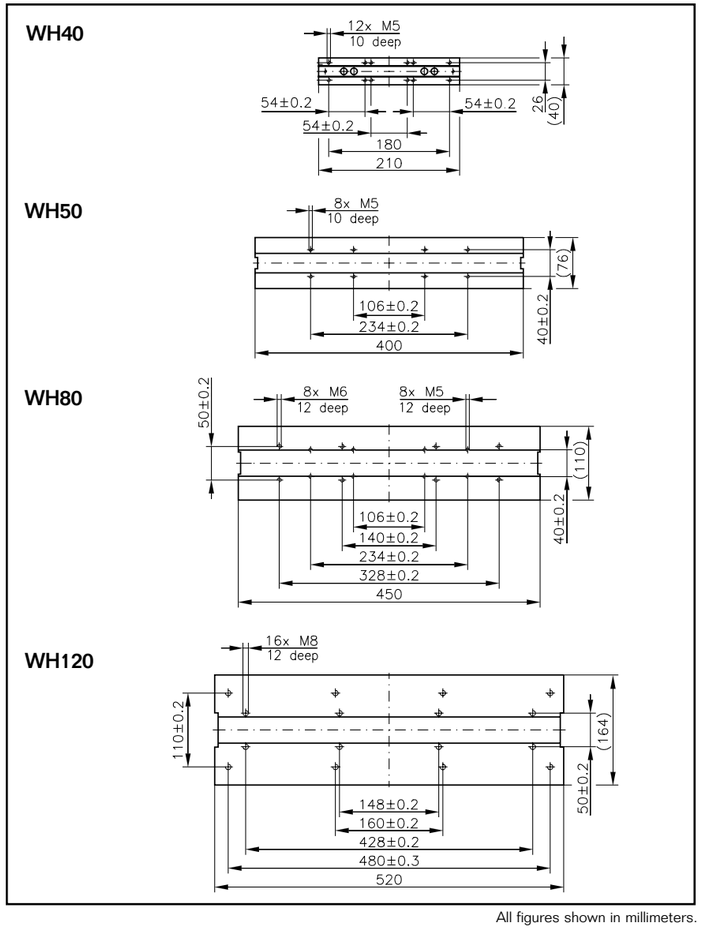
Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

Accessories for WIESEL™ *SPEED*Line®

Long power bridge



All figures shown in millimeters.

Long power bridge LKB
The long power bridge increases the maximum permissible load moments My and Mz of a WIESEL™ unit without requiring a step up in size. The difference in length between the long power bridge and the standard power bridge must be taken into account when calculating the overall length of the WIESEL™ unit.

Overall length of the WIESEL™ unit:

$$L_{tot} = \text{stroke} + L_C + \Delta Kb$$

L_{tot} = Overall length WIESEL™ [mm]
L_C = Specific additional length [mm] (see technical data of the respective WIESEL™)
Stroke = Required stroke [mm]
ΔKb = Difference in length between long and standard power bridge

Size	Length of power bridge [mm]	My [Nm]	Mz [Nm]
WH40	210	50	50
WH50	400	130	75
WH80	450	345	150
WH120	520	1395	750
WHZ50	400	130	75
WHZ80	450	345	150

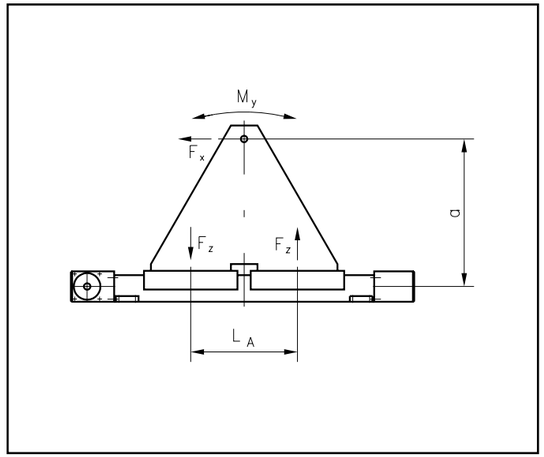
Note: All other limit values are comparable to those of versions with standard power bridge. High load moments lead to major deformation of the tubular aluminum profile. The distance between supports should be reduced in order to minimize this deformation.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Accessories for WIESEL™ *SPEED*Line®

Additional free-sliding power bridge



Additional free-sliding power bridge OKB
The additional free-sliding power bridge provides:
- Individual increase of the load moments My and Mz of a WIESEL™ unit. Load moment My is limited by force ± Fz, Mz is limited by force ±Fy.
- Longer and therefore improved guidance.
- Particularly suitable as a vertical guide and lifting module.

The required center distance between the driven and the free-sliding power bridge is calculated as follows:

$$L_A = \frac{M}{F_{max}}$$

L_A = Center distance between driven and free-sliding power bridge [mm]
M = Load moment My or Mz [Nm]
F_{max} = Maximum force Fz or Fy of the WIESEL™ unit concerned [N]

The center distance between the two power bridges must be taken into account when calculating the overall length of the WIESEL™ unit.

Overall length of WIESEL™ unit:

$$L_{tot} = \text{Stroke} + L_C + L_A$$

L_C = Specific additional length between long and standard power bridge [mm]. (see technical data of the respective WIESEL™)

Minimum center distance L_A between driven and free-sliding power bridge (given for standard power bridge).

Size	L_A [mm]
WH40	130
WH50/WHZ50	250
WH80/WHZ80	290
WH120	290

The force required for moving the additional free-sliding power bridge must be taken into account when selecting the drive.

Size	F [N]
WH40	2
WH50/WHZ50	16
WH80/WHZ80	20
WH120	30

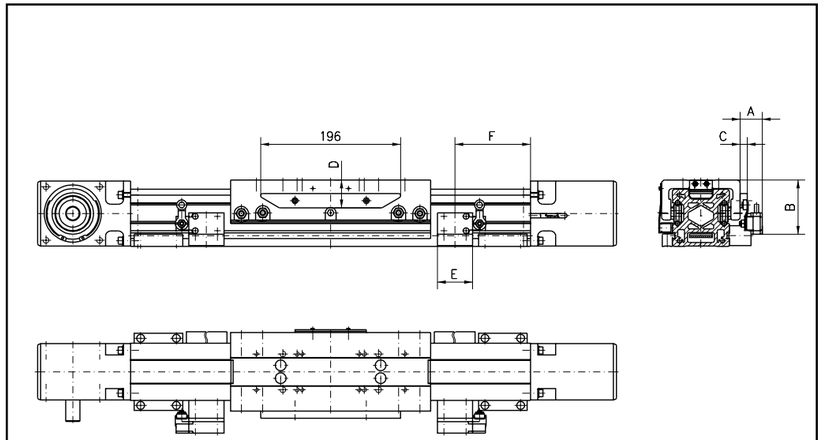
Note: High load moments lead to major deformation of the tubular aluminum profile. The distance between supports should be reduced in order to minimize this deformation.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Accessories for WIESEL™ *SPEED*Line®

Mechanical limit switches



All figures shown in millimeters.

Mechanical limit switches ES
Mechanical limit switches must be used wherever people may be jeopardized if the electric drive does not cut out. They are fitted in the groove which also accommodates the KAO mounting brackets in the aluminum profile.

Technical data
Cam-actuated mechanical limit switch XCM-B516 with roller lever

Dual-circuit NC + NO

NC contact forcibly opened in accordance with DIN EN 60 204
Type of protection: IP67
Max. perm. starting speed: 1.5 m/s

Size	Dimensions [mm]					
	A	B	C	D	E	F
WH50	34	61	10	26	49	83
WH80	31	76	10	39	49	103
WH120	34	88	10	51	49	103
WHZ50	47	125	23	90	49	83
WHZ80	46	175	25	138	49	103

Note: The linear unit cannot be fixed by means of the mounting brackets KAO in the range of the fixing plates for the mechanical limit switches. Security limit switches ensure energy is cutoff from the drive. Whenever they are run against at high speeds, they cannot avoid driving over the admissible drive section. It is necessary to ensure by means of other drive and control measures that the limit areas are only approached with low speeds.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Mechanical linear drive units

WIESEL™ *POWER*Line®, WIESEL™ *DYNA*Line®, WIESEL™ *VARIO*Line™

WIESEL™ *POWER*Line® WM40
- Fully integrated miniaturized linear drive unit with linear ball guide, ball screw drive and sealing strip.

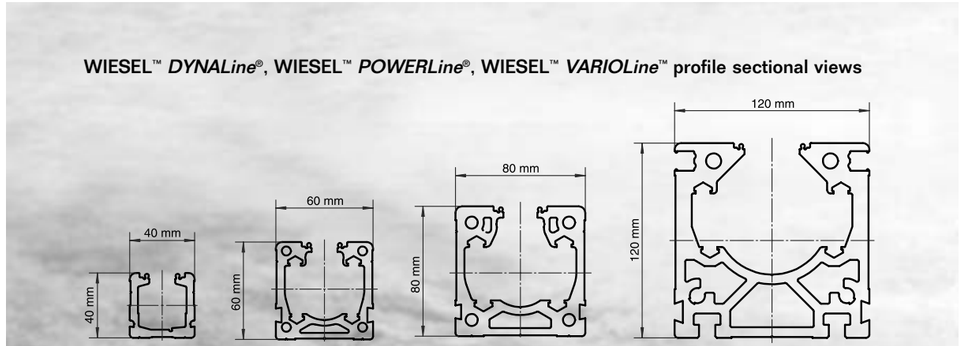
WIESEL™ *POWER*Line® WM60/80 ZRT
- Fully integrated drive unit with tooth belt drive and linear bearing guide.
- Transmission of the feed force and handling of loads and load moments.

WIESEL™ *VARIO*Line™
- Fully integrated linear drive unit with ball screw and linear ball bearing guide and sealing strip.
- Transmission of the feed force and handling of loads through ram type piston.

WIESEL™ *POWER*Line® WM60/80/120
- Fully integrated linear drive unit with ball screw and linear ball bearing guide and sealing strip.
- Transmission of the feed force and handling of loads and load moments.
- Size WM60/80-370 with short guide system.

WIESEL™ *DYNA*Line® WV60/80/120
- Fully integrated feed axis with ball screw.
- Transmission of the feed force.
- Used in combination with external linear guides.

WIESEL™ *DYNA*Line®, WIESEL™ *POWER*Line®, WIESEL™ *VARIO*Line™ profile sectional views



Tolerances of outer dimensions according to DIN 17615 part 3

General technical data

WIESEL™ *POWER*Line®, *DYNA*Line®, *VARIO*Line™

Linear speeds
The linear speed achieved by a linear drive unit depends on the lead of the mechanical drive element and on the input rotational speed. The various linear speeds which can be achieved by the individual sizes are listed in the following table:

Drive element	Lead [mm]	n_{max} [rpm]	v_{max} [m/s]
TGT[1]	4	1500	0.1
	8	1500	0.2
	12	1500	0.3
	16	1500	0.4
KGT[2]	4	3000	0.2
	5	3000	0.25
	10	3000	0.5
	20	3000	1
	40	3000	2
	50	3000	2.5
VARIOLine™		3000	1.5
ZRT[3]20ATL5	120	1250	2.5
ZRT[3]25ATL10	170	882	2.5

1) TGT: Trapezoidal screw drive
2) KGT: Ball screw drive
3) ZRT: Toothed belt drive

Installed position
The linear drive units can be installed in almost any position, provided that all the forces and moments occurring remain below the maximum values for the axis concerned.

Security advice
The ball screw drives in all three sizes are generally *not self-locking*. It is therefore advisable to install suitable motors with holding brake, particularly if the linear drive unit is installed vertically. If the toothed belt breaks, the load is released. Therefore safety precautions have to be taken for applications which are critical with regard to security.

Maximum forces
All maximum forces and moments provided refer to the center/top of the power bridge. Load overlay at several coordinates: If compound loads occur, with force and moment components in more than one direction, the maximum permissible loads must be reduced to 60% of the specified maximum values. When forces and moments are overlaid in two or three coordinates, it is necessary to reduce the maximum permissible load to 60% of the maximum value.

Duty cycle
In practice, the following values have been proven.

Drive element:
For a trapezoidal screw the upper limit should be ≤ 30% per hour, linear ball guides allow duty cycles up to 100%. Extremely high loads in combination with high duty cycles can reduce the life.

Guidance element:
For a sliding guide the upper limit should be ≤ 30% per hour, linear ball guides allow duty cycles up to 100%.

Temperature
All series are designed for continuous operation at ambient temperatures up to 80° C (176° F). Temperatures up to 100° C (212° F) are also permitted for brief periods. The linear drive units are not suitable for operation at subzero temperatures.

Idle torques
The given values are means from a series of measurements. The effective values may differ in individual cases.

Straightness/torsion
The aluminum profiles are extruded sections which may display deviations in straightness and torsion due to their manufacturing process. The tolerance of these deviations is defined in DIN 17 615. The deviations found in Precision Technology USA, Inc. linear drive units corresponding to these limits are worst case, but are normally well below. In order to obtain the required guide accuracy, the linear drive unit must be aligned with the aid of leveling plates or clamped from a mounting surface machined with sufficient accuracy. This ensures that tolerances of at least 0.1 mm/1000 mm are achieved.

Cover strip
for WIESEL™ *POWERLine*®
WIESEL™ *DYNALine*®
WIESEL™ *VARIOLine*™
™

Material: Polyamide 12

Characteristics:
- Resistant to alkaline solutions
- Conditionally resistant to acids
- Tough/rigid
- Abrasion-proof
- Little absorption of humidity
- Light resistant

Guide tube
All the components of a linear drive unit except the mechanical drive element are accommodated in a guide tube which is mounted either to the bottom of a driven WIESEL™ or is installed parallel to a driven WIESEL™. It takes higher loads and load moments. All WIESEL™ models are also available as guide tube (except WIESEL™ *DYNALine*®, *VARIOLine*™).

Stroke length
The stroke length specified in the order code represents the maximum possible linear displacement. Acceleration and deceleration paths must be taken into account when designing the system, together with any overrun required. Entering the safety zone leads to mechanical collisions and must be prevented with suitable safety measures (safety limit switch, software queries, etc.)

Repeatability
The repeatability is defined as the capability of a linear drive unit to repeatedly reach an actual position it has reached before under the same conditions. It refers to the average position variation according to VDI/DGQ 3441. The repeatability is influenced, among other things, by:
- Load
- Speed
- Deceleration/acceleration
- Direction of travel
- Temperature

Aggressive working environments
The mechanical drive and the guidance of the WIESEL™ are well protected against dirt by means of the patented cover strip. In cases of heavy dirt and dust particles, an additional bellow is recommended. Available upon request.

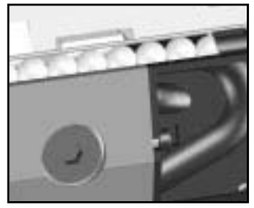
Maintenance
The mechanical components (ball screw drive and linear ball bearing guide) must be lubricated via the grease nipple on the power bridge with the aid of a grease gun after 400 hours of operation or at least every three months. On the WM40, one lubrication nipple is used to lubricate the linear guideway, while the second lubrication point supplies the ball screw drive with grease. The cover strip should also be lubricated at the same time in order to prevent premature wear. Grease: rolling bearing grease (original grease Fuchs Lubritec URETHYN E/M1).

Tensioning of the toothed belt
The tensioning of the toothed belt can be adjusted with the aid of the tensioning screws on the guide casing which are intended for this. The linear units are delivered with optimal tension values in order to guarantee security and functionality. Changes in this adjustment must be carried out in service cases and by Precision Technology USA, Inc. service engineers.

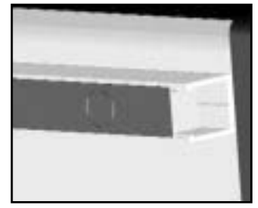
New: WIESEL™ *VARIO*Line™

Here's how to get to grips with things

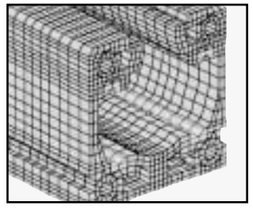
The new WIESEL™ *VARIO*Line™ really makes your decision for a handling unit with increased lateral forces easy. Precision Technology USA, Inc. has already integrated many functions perfectly in this ready-to-install solution. Ideal for changing workpieces, gripping or inserting – for all of these uses, the high screw leads now make it possible to combine high speed and high precision. This not only saves you in-house design effort, it also saves valuable space. So if you are looking for a particularly efficient way of feeding workpieces into a workspace, here is your chance.



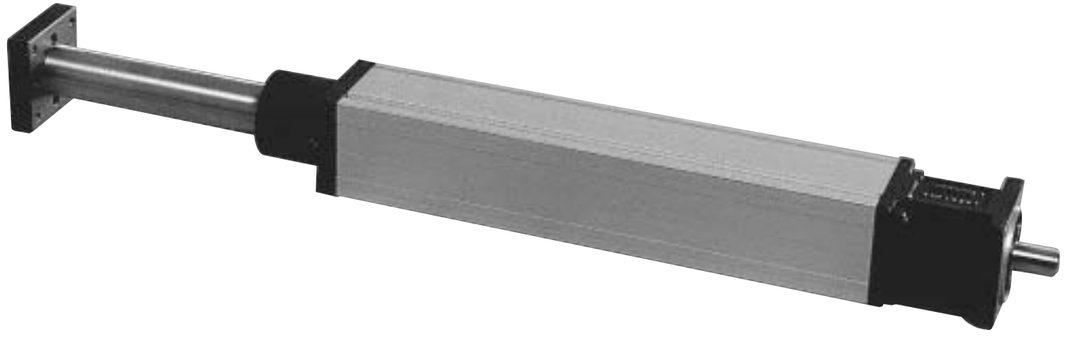
Integrated guidance system
The integrated Precision Technology USA, Inc. linear ball bearing guidance system in the tubular section and the robust ball sleeve on the piston rod absorb high forces and moments.



Integrated design
Adjustable limit switches are already installed.

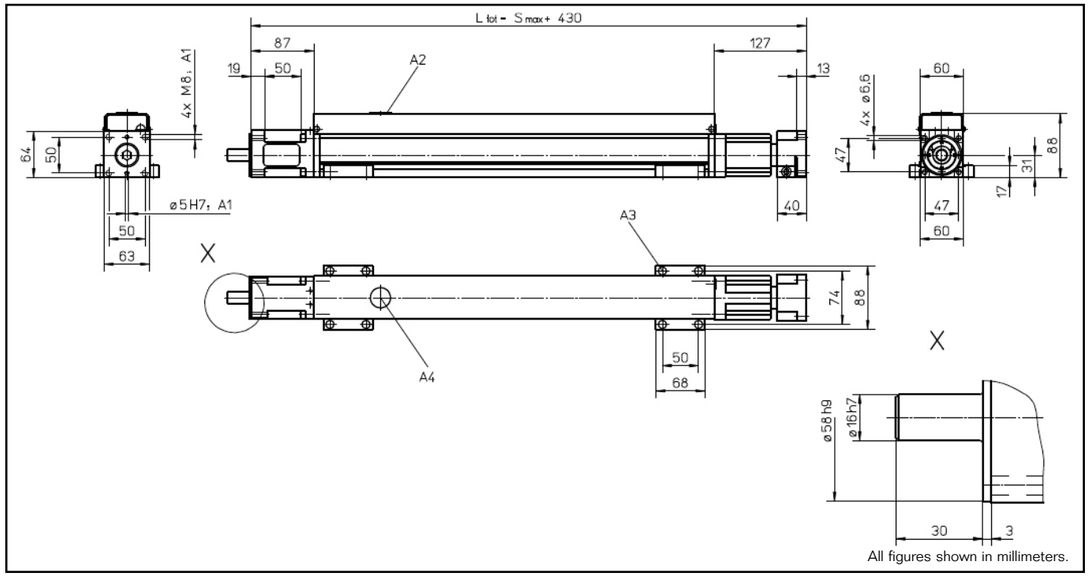


FEM optimized design
Maximum power density through FEM optimized design.



WIESEL™ *VARIO*Line™ WZ60

with ball screw drive and integrated linear ball bearing drive



All figures shown in millimeters.

Technical data

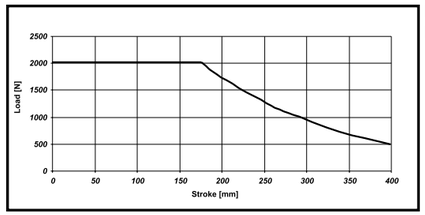
Linear speed: . . . . . .max. 1.5 m/s
Repeatability: . . . . . .± 0.02 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .3000 rpm
Drive element: . . . . . .ball screw with backlash free single nut
Diameter: . . . . . .20 mm
Lead: . . . . . .5, 20, 50 mm
Stroke length: . . . . . .max 400 mm
Geometrical moment of inertia: . . . . . .Iy 5.8 x 10⁵ mm⁴
Iz 5.9 x 10⁵ mm⁴

Weights
Basic unit with zero stroke: . . . . . .4.5 kg
100 mm stroke: . . . . . .0.77 kg
Mass to be moved without stroke: . . . . .1.8 kg
Mass to be moved per 100 mm stroke: .0.26 kg
Provided: . . . . . .4 pieces KAO mounting brackets

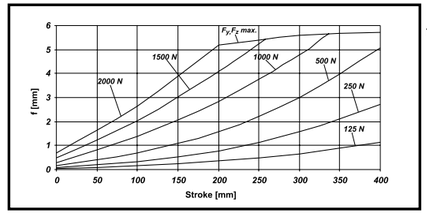
Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	20	50
150	0.5	0.9	1.2
1500	0.9	1.4	1.8
3000	1.3	1.6	2.0

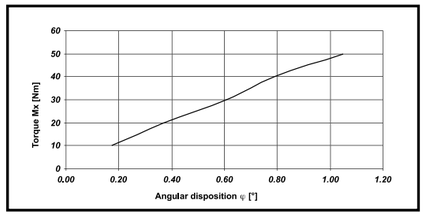
Max side load Fy, Fz



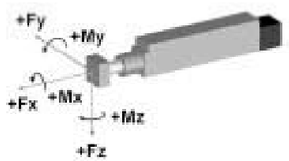
Deflection due to Fy, Fz



Torsion



Loads and load moments



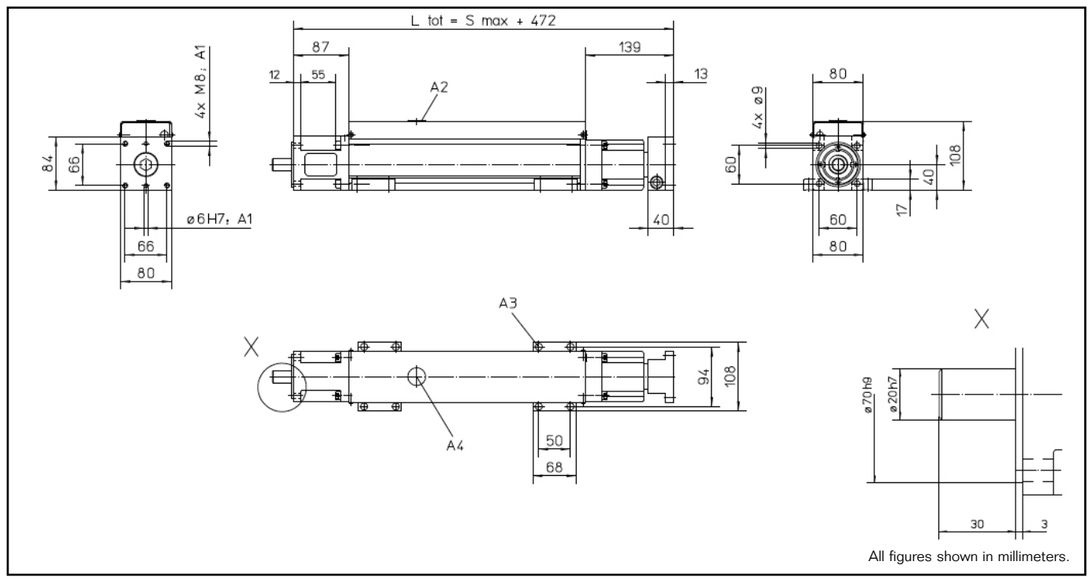
Load	dynam. [N]
Fx drive	2800
Fy	see diagram
±Fz	see diagram
Load moment	**dynam. [Nm]**
Mx	50

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm
Force:	1 N=0.225 lbf 1 lbf=4.45 N
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm

WIESEL™ *VARIO*Line™ WZ80

with ball screw drive and integrated linear ball bearing drive



All figures shown in millimeters.

Technical data

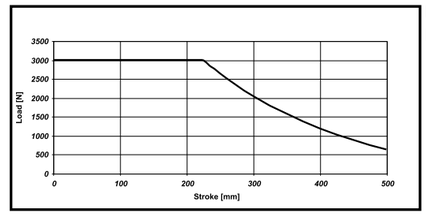
Linear speed: . . . . . .max. 1.5 m/s
Repeatability: . . . . . .± 0.02 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .3000 rpm
Drive element: . . . . . .ball screw with backlash free single nut
Diameter: . . . . . .25 mm
Lead: . . . . . .5, 10, 20, 50 mm
Stroke length: . . . . . .max 500 mm
Geometrical moment of inertia: . . . . . .Iy 1.9 x 10⁶ mm⁴
Iz 1.9 x 10⁶ mm⁴

Weights
Basic unit with zero stroke: . . . . . .7.5 kg
100 mm stroke: . . . . . .1.35 kg
Mass to be moved without stroke: . . . . .3.0 kg
Mass to be moved per 100 mm stroke: .0.5 kg
Provided: . . . . . .4 pieces KAO mounting brackets

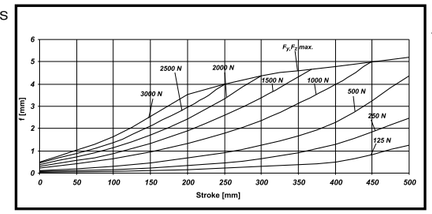
Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	10	20	50
150	0.6	1.1	1.3	1.8
1500	1.1	1.5	1.6	2.2
3000	1.4	1.8	1.8	2.7

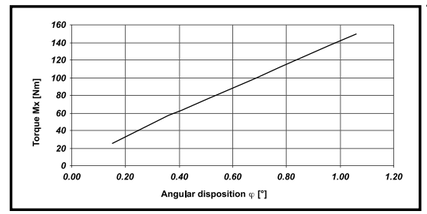
Max side load Fy, Fz



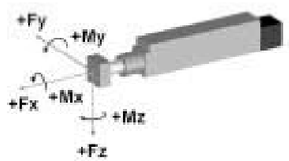
Deflection due to Fy, Fz



Torsion



Loads and load moments



Load	dynam. [N]
Fx drive	3500
Fy	see diagram
±Fz	see diagram
Load moment	**dynam. [Nm]**
Mx	150

Unit conversions

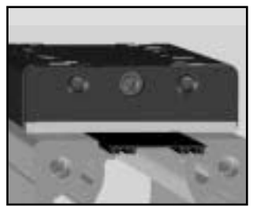
Geometrical moment of inertia:	1 m⁴=10¹² mm⁴=2.4025 x 10⁶ in⁴
Mass moment of inertia:	1 kg • m²=10⁴ kg • cm²=0.738 lb • ft • s²
Mass:	1 kg=2.2 lb

WIESEL™ *POWER*Line®
with toothed belt drive

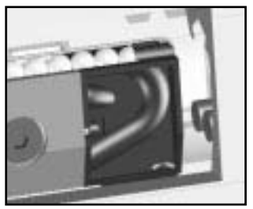
The best ideas make it simple for you.

The new WIESEL™ *POWER*Line® ZRT combines the high dynamics of the toothed belt drive with the powerful, fully integrated ball bearing guide of the *POWERLine*® system. The patented cover strip protects the guide system safely against dirt. The version 370 offers an attractive price reduction with its shorter guide system and the reduced length of the power bridge. So the *POWERLine*® ZRT brings higher dynamics to the tasks of engineering and handling.

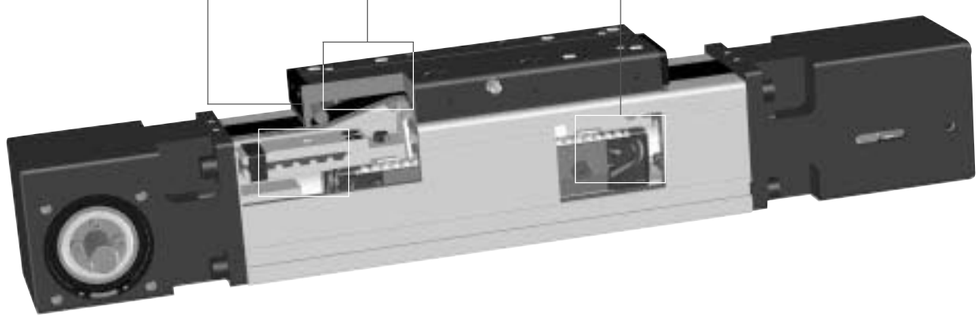
Toothed belt
The integrated toothed belt allows high dynamics and precision.



Patented cover strip
The patented, self-adjusting cover strip is a reliable protection from dirt.

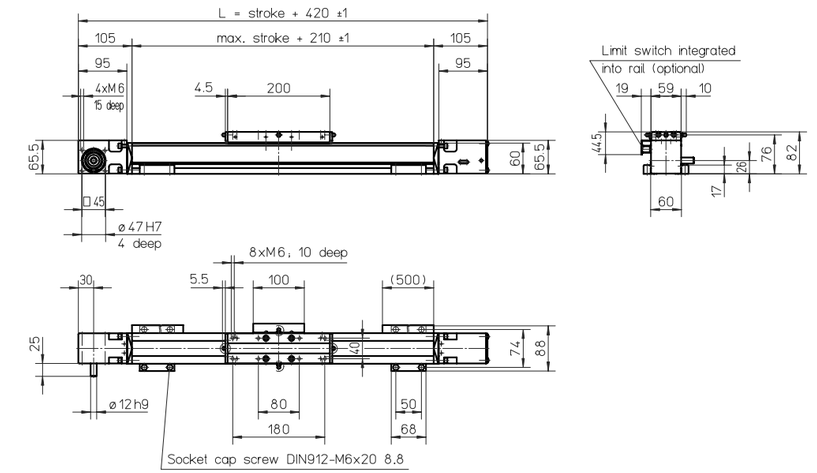


Integrated guide system
The integrated ball-bearing guide absorbs heavy forces and moments.



WIESEL™ *POWER*Line® WM60 – 370 ZRT

with toothed belt drive and integrated linear short ball-bearing guide system



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed:	max. 2.5 m/s
Repeatability:	± 0.05 mm
Acceleration:	max. 20 m/s²
Drive element:	Toothed belt 20ATL5
Diameter:	38.20 mm
Stroke per revolution:	120 mm
Stroke length:	4000 mm
Length of power bridge:	200 mm
Geometrical moment of inertia:	ly 5.62 x 10⁵ mm⁴
	lz 5.94 x 10⁵ mm⁴

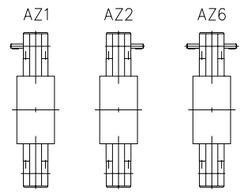
Weights

Basic unit with zero stroke:	4.30 kg
100 mm stroke:	0.45 kg
Power bridge with carriage:	1.25 kg
Provided:	4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	1.6
600	2.5
1250	3.0

Execution of drive shafts
(Detailed description see pg 100)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

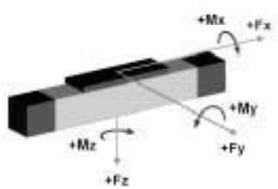
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10¹² mm⁴=2.4025 x 10⁶ in⁴

Mass moment of inertia:
1 kg • m²=10⁴ kg • cm²=0.738 lb • ft • s²

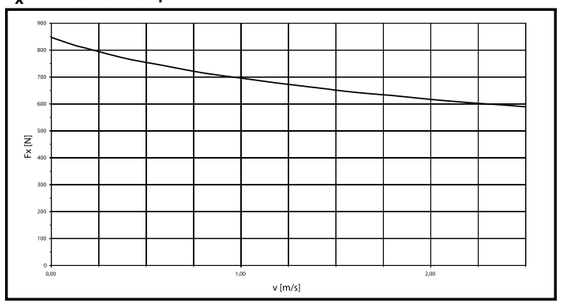
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive[1]	850
Fy	1400
+/- Fz	1400
Load moment	**dynam. [Nm]**
Mx	25
My[2]	50
Mz[2]	50

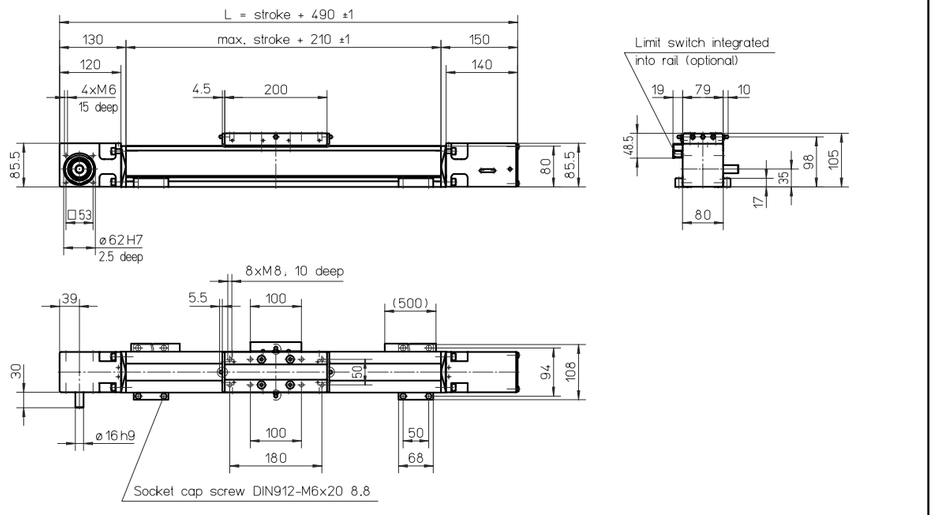
F_X over the linear speed



1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 62 and 63).

WIESEL™ *POWER*Line® WM80 – 370 ZRT

with toothed belt drive and integrated linear short ball-bearing guide system



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 20 m/s²
Drive element: . . . . . .Toothed belt 25AT10
Diameter: . . . . . .54.11 mm
Stroke per revolution: . . . . . .170 mm
Stroke length: . . . . . .5500 mm
Length of power bridge: . . . . . .200 mm
Geometrical moment of inertia: . . .ly 1.89 x 10^6 mm⁴
lz 1.97 x 10^6 mm⁴

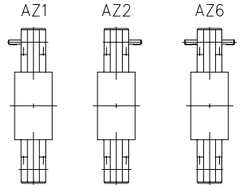
Weights
Basic unit with zero stroke: . . . .9.20 kg
100 mm stroke: . . . . . .0.80 kg
Power bridge with carriage: . . . .2.10 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	4.0
450	5.4
885	6.2

Execution of drive shafts

(Detailed description see pg 100)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

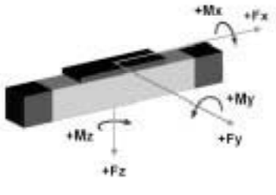
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

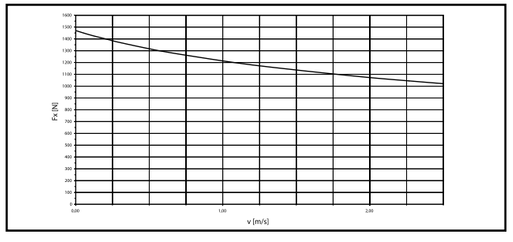
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive[1]	1470
Fy	2100
+/- Fz	2100
Load moment	**dynam. [Nm]**
Mx	68
My[2]	135
Mz[2]	135

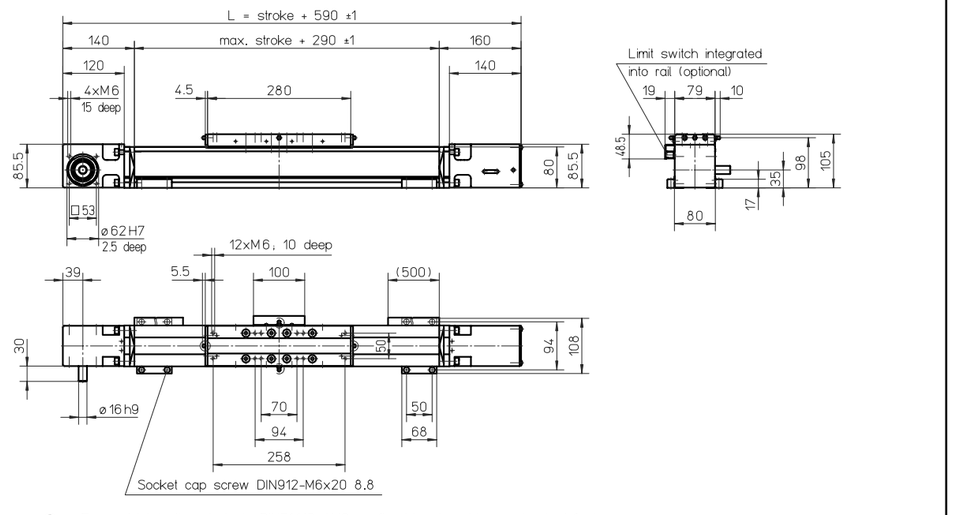
F_x over the linear speed



1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 62 and 63).

WIESEL™ *POWER*Line® WM80 ZRT

with toothed belt drive and integrated linear ball-bearing guide



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.05 mm
Acceleration: . . . . . .max. 20 m/s²
Drive element: . . . . . .Toothed belt 25AT10
Diameter: . . . . . .54.11 mm
Stroke per revolution: . . . . . .170 mm
Stroke length: . . . . . .5400 mm
Length of power bridge: . . . . . .280 or 450 mm
Geometrical moment of inertia: . . .ly 1.89 x 10^6 mm⁴
lz 1.97 x 10^6 mm⁴

Weights
Basic unit with zero stroke: . . . .11.20 kg
100 mm stroke: . . . . . .0.80 kg
Power bridge with carriage: . . . .3.40 kg
Provided: . . . . . .4 pieces KAO mounting brackets

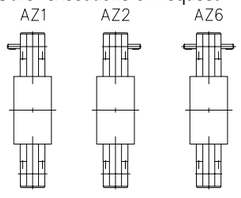
Idle torques [Nm]

Rotational speed [rpm]	M_{idle} [Nm]
150	*)
450	*)
885	*)

*) values in determination

Execution of drive shafts

(Detailed description see pg 100)
Other executions on request.



Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

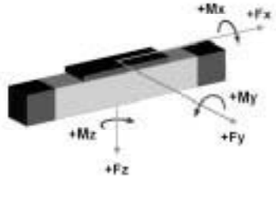
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

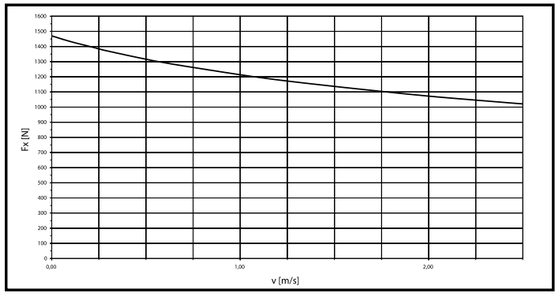
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive[1]	1470
Fy	3000
+/- Fz	3000
Load moment	**dynam. [Nm]**
Mx	150
My[2]	300
Mz[2]	300

F_x over the linear speed

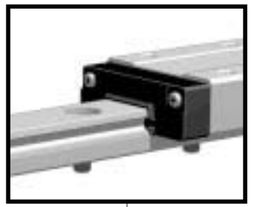


1) Depending on the speed, see respective chart.
2) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 62 and 63).

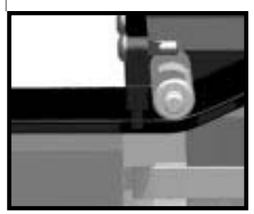
WIESEL™ *POWER*Line® and WIESEL™ *DYNA*Line® with ball screw drive

Innovative solutions, down to the very last detail.

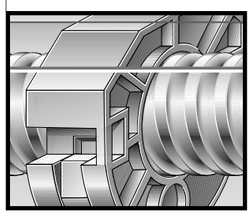
WIESEL™ *POWER*Line® WM40
The linear drive unit for miniaturized applications. High performance with extremely small dimensions. The Precision Technology USA, Inc. ball screw drive in combination with the high precision linear guide allows precise positioning.



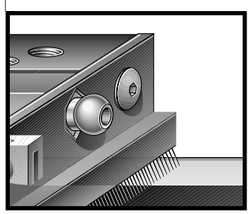
Linear guides
Precise positioning is made possible by a polished linear guide with a high degree of guide accuracy. A small motor can be added thanks to the low coefficient of friction. Rubber wipers protect the mechanism from dirt, thus increasing service life.



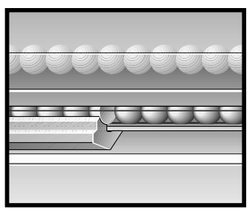
Patented sealing strip
The patented sealing strip protects the mechanism effectively from dirt. The friction for the deviation of the sealing strip is reduced to a minimum.



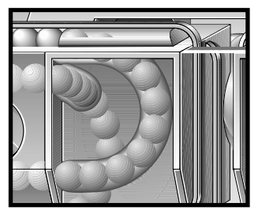
Screw support
The patented screw support system permits high speeds (max. input speed) at long strokes.



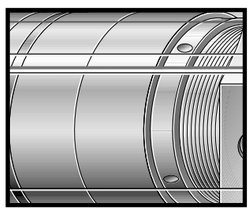
Central lubrication
A standard feature. The drive and guide systems are conveniently relubricated from a central point on the power bridge. Whether by hand or automatically, maintenance is now a simple matter.



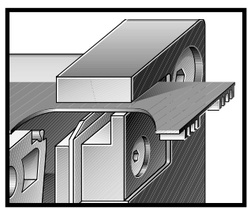
Well proven and patented guide system
The high-performance linear ball-bearing guide with hardened steel running tracks has been integrated into the aluminum profile. Optimum introduction of forces permits maximum force and torque, as well as optimizing the tensile stresses.



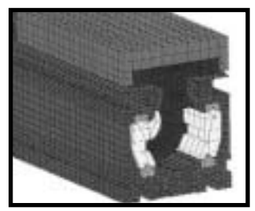
Ball cage
The ball bearings of the linear guides are protected by a ball cage. They can be replaced quickly and safely.



Optimized ball screw
The pre-tensioning of the nut unit can be adjusted by the Precision Technology USA, Inc. service team. This increases the lifetime of the axis.

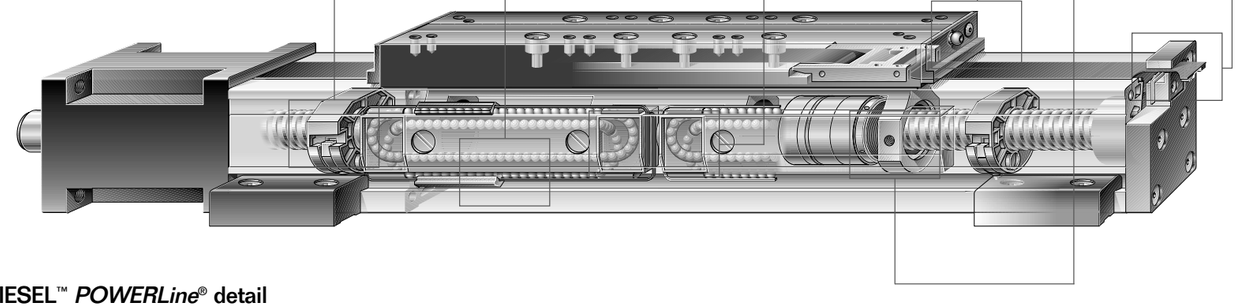


Self-adjusting third-generation cover strip
The patented sealing strip reliably protects the mechanical parts against excessive dirt and is retensioned automatically. Result: the maintenance effort is reduced to virtually zero.

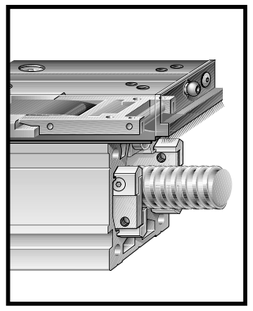


FEA optimized design
Both the profile and the entire linear drive unit have been modeled and optimized by finite element analysis (FEA). Result: maximum performance density and reliability.

WIESEL™ *POWER*Line® WM60, WM80, WM120
The WIESEL™ *POWERLine*® is an extremely powerful linear drive unit with ball screw drive and integrated ball-bearing guide. It allows high feed forces and load moments in all directions.



WIESEL™ *POWERLine*® detail



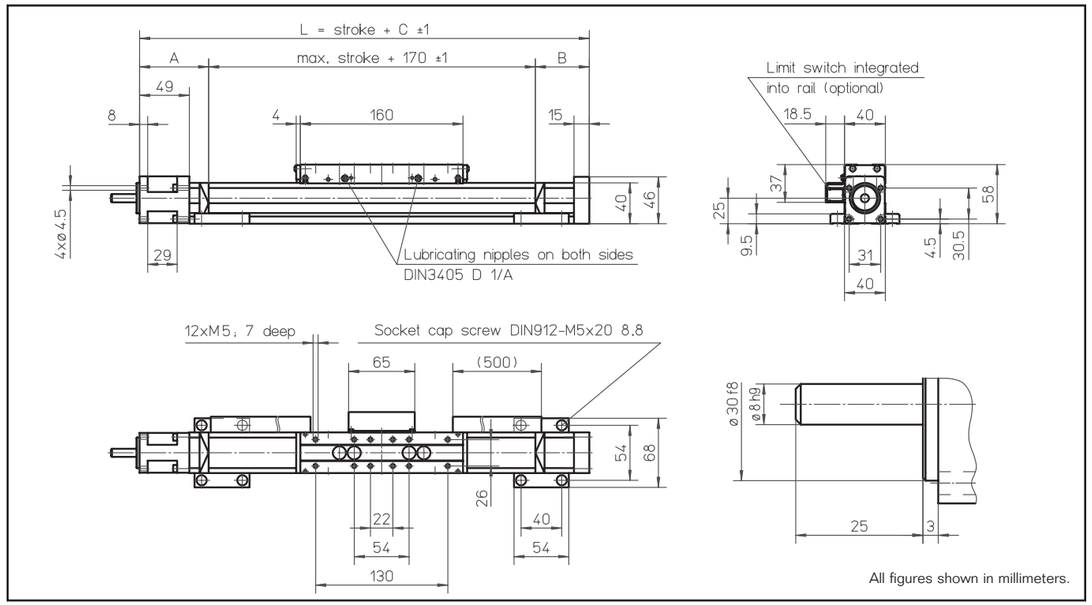
WIESEL™ *DYNA*Line® WV60, WV80, WV120
WIESEL™ *DYNALine*® permits high feed forces, even in combination with long stroke lengths and high speeds. The supported, covered ball screw must be used in combination with external linear guides.

WIESEL™ *DYNA*Line® detail

***only applies to WIESEL™ *POWER*Line® series**

WIESEL™ *POWER*Line® WM40

with ball screw drive and integrated linear guide



All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 0.25 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Ball screw
Diameter: . . . . . .12 mm
Lead: . . . . . .5 mm
Stroke length: . . . . . .up to 1950 mm
Power bridge: . . . . . .160 or 210 mm long
see page 62
Geometrical moment of inertia: . . .ly 10.8 x 10⁴ mm⁴
lz 13.4 x 10⁴ mm⁴

Weights
Basic unit with zero stroke: . . . . .1.5 kg
100 mm stroke: . . . . . .0.3 kg
Power bridge with carriage: . . . . .0.36 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5
150	0.3
1500	0.5
3000	0.8

Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length [mm]
0-500	65	35	270
501-1100	65	45	280
1101-2000	70	60	300

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

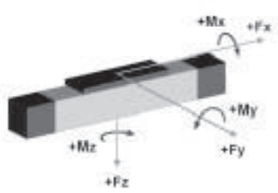
Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10¹² mm⁴=2.4025 x 10⁶ in⁴

Mass moment of inertia:
1 kg • m²=10⁴ kg • cm²=0.738 lb • ft • s²

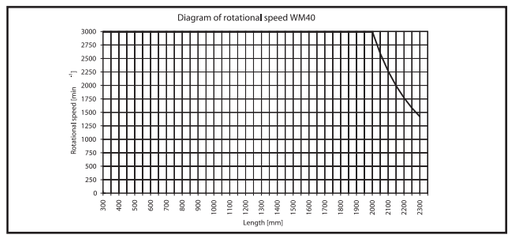
Mass:
1 kg=2.2 lb

Loads and load moments



Load	dynam. [N]
Fx drive	1000
Fy	450
+/- Fz	600
Load moment	**dynam. [Nm]**
Mx	10
My[1)]	30
Mz[1)]	30

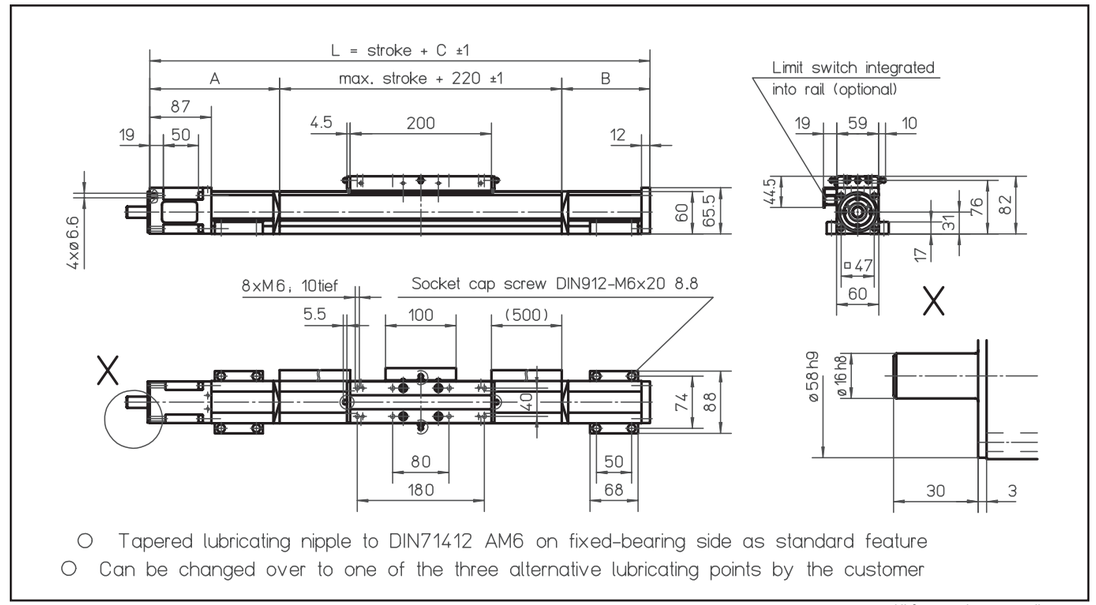
Rotational speed of the screw as a function of the total length



1) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 62 and 63).

WIESEL™ *POWER*Line® WM60 – 370

with ball screw drive and integrated linear ball-bearing guide



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.03 mm
Acceleration: . . . . . .max. 10 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive with single nut, no backlash
Diameter: . . . . . .20 mm
Lead: . . . . . .5, 20, 50 mm
Stroke length: . . . . . .up to 5000 mm
Power bridge: . . . . . .200 mm long
Geometrical moment of inertia: . . .ly 5.8 x 10⁵ mm⁴
lz 5.9 x 10⁵ mm⁴

Weights
Basic unit with zero stroke: . . . . .3.8 kg
100 mm stroke: . . . . . .0.65 kg
Power bridge with carriage: . . . . .1.00 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10¹² mm⁴=2.4025 x 10⁶ in⁴

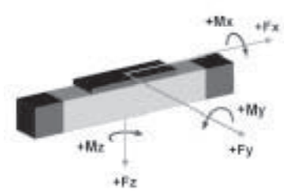
Mass moment of inertia:
1 kg • m²=10⁴ kg • cm²=0.738 lb • ft • s²

Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	20	50
150	0.5	0.9	1.2
1500	0.9	1.4	1.8
3000	1.3	1.6	2

Loads and load moments



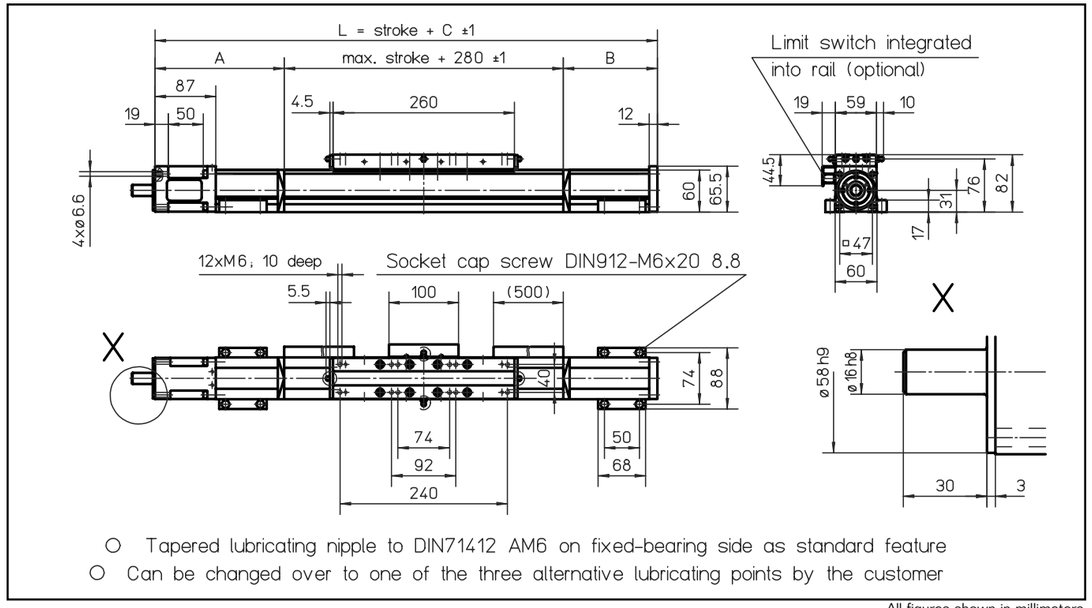
Load	dynam. [N]
Fx drive	2800
Fy	1400
± Fz	1400
Load moment	**dynam. [Nm]**
Mx	50
My	100
Mz	100

Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–580	95	20	335
581-1140	110	60	390
1141-1805	130	80	430
1806-2460	155	105	480
2461-3125	175	125	520
3126-3780	200	150	570
3781-4445	220	170	610
4446-5000	240	190	650

WIESEL™ *POWER*Line® WM60

with ball screw drive and integrated linear ball-bearing guide



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive
Diameter: . . . . . .20 mm
Lead: . . . . . .5, 20, 50 mm
Stroke length: . . . . . .up to 11.000 mm
with lead 50 mm
max. 5000 mm
Power bridge: . . . . . .260 or 450 mm long
see page 62
Geometrical moment of inertia: . . .ly 5.8 x 10^5 mm⁴
lz 5.9 x 10^5 mm⁴

Weights
Basic unit with zero stroke: . . . . .6.16 kg
100 mm stroke: . . . . . .0.64 kg
Power bridge with carriage: . . . . .1.99 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10^{12} mm⁴=2.4025 x 10^6 in⁴

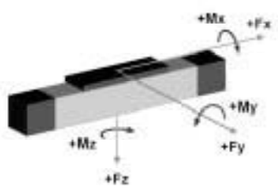
Mass moment of inertia:
1 kg • m²=10^4 kg • cm²=0.738 lb • ft • s²

Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	20	50
150	0.6	1.1	1.5
1500	1.1	1.8	2.3
3000	1.6	2.0	2.5

Loads and load moments



Load	dynam. [N]
Fx drive	4000
Fy	2000
± Fz	2000
Load moment	**dynam. [Nm]**
Mx	100
My[1)]	200
Mz[1)]	200

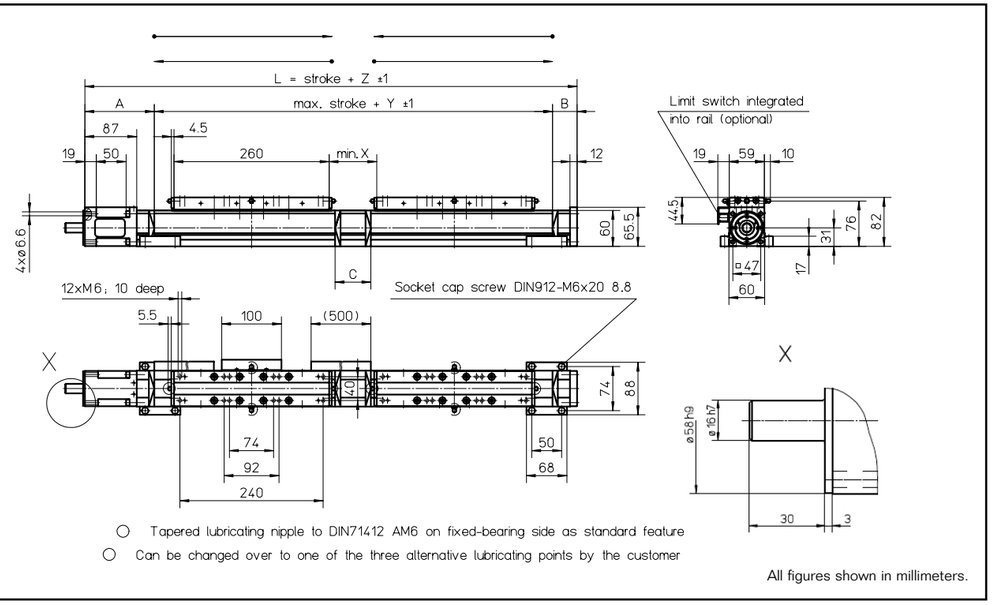
1) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 62 and 63).

Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–695	115	65	460
696-1335	165	115	560
1336-2075	185	135	600
2076-2780	210	160	650
2781-3545	230	180	690
3546-4285	250	200	730
4286-5015	275	225	780

WIESEL™ *POWER*Line® WM60 – 500

with ball screw drive and integrated linear ball-bearing guide in right/left execution



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive
Diameter: . . . . . .20 mm
Lead: . . . . . .5 mm
Stroke length: . . . . . .up to 10340 mm referred to both power bridges. max. 5000 mm
Power bridge: . . . . . .260 or 450 mm long
see page 62
Geometrical moment of inertia: . . .ly 5.8 x 10^5 mm⁴
lz 5.9 x 10^5 mm⁴

Weights
Basic unit with zero stroke: . . . . .10.33 kg
100 mm stroke: . . . . . .0.64 kg
Power bridge with carriage: . . . . .1.99 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m⁴=10^{12} mm⁴=2.4025 x 10^6 in⁴

Mass moment of inertia:
1 kg • m²=10^4 kg • cm²=0.738 lb • ft • s²

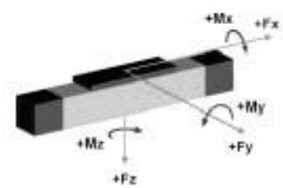
Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5
150	1.2
1500	2.2
3000	3.2

Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer´s wishes. For screw leads > 20 mm, excess lengths cannot be implemented.

Loads and load moments



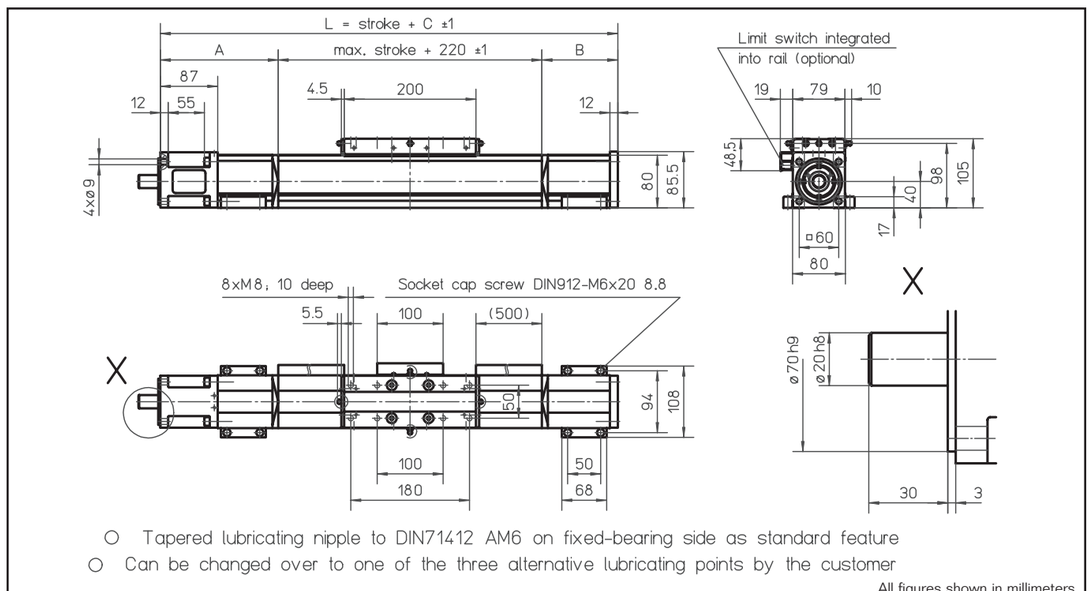
Load	dynam. [N]
Fx drive	4000
Fy	2000
± Fz	2000
Load moment	**dynam. [Nm]**
Mx	100
My	200
Mz	200

Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	C [mm]	X	Y	Z
0–1390	115	65	60	80	600	800
1391-2670	165	115	210	230	750	1050
2671-4150	185	135	250	270	790	1130
4151-5560	210	160	300	320	840	1230

WIESEL™ *POWER*Line® WM80 – 370

with ball screw drive and integrated linear ball-bearing guide and short guide system



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.03 mm
Acceleration: . . . . . .max. 10 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: Pretensioned ball screw with single nut, no backlash
Diameter: . . . . . .25 mm
Lead: . . . . . .5, 10, 20, 50 mm
Stroke length: . . . . . .up to 5000 mm
Power bridge: . . . . . .200 mm long
Geometrical moment of inertia: . . .ly 1.9 x 10^6 mm⁴
lz 1.9 x 10^6 mm⁴

Weights
Basic unit with zero stroke: . . . . .7.00 kg
100 mm stroke: . . . . . .1.10 kg
Power bridge with carriage: . . . . .1.60 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

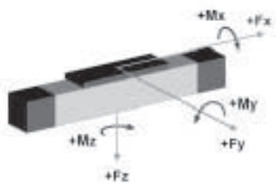
Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	10	20	50
150	0.6	1.1	1.3	2.8
1500	1.1	1.5	1.6	2.2
3000	1.4	1.8	1.8	2.7

Loads and load moments



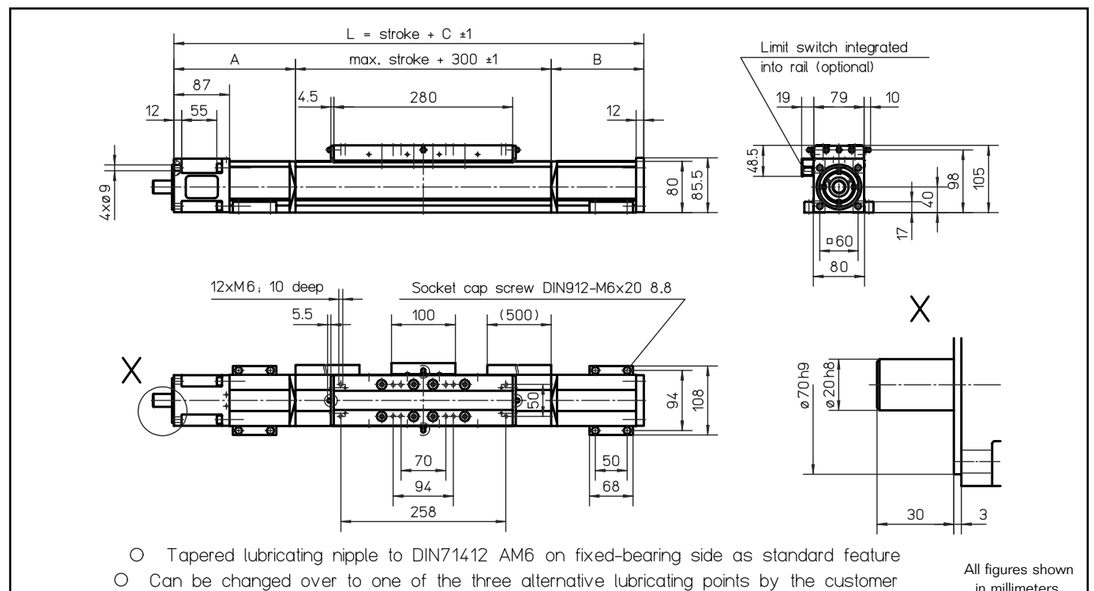
Load	dynam. [N]
Fx drive	3500
Fy	2100
± Fz	2100
Load moment	**dynam. [Nm]**
Mx	150
My	180
Mz	180

Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–680	95	35	350
681-1310	125	80	425
1311-2065	150	105	475
2066-2830	170	125	515
2831-3590	195	150	565
3591-4355	215	170	605
4356-5000	235	190	645

WIESEL™ *POWER*Line® WM80

with ball screw drive and integrated linear ball-bearing guide



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive
Diameter: . . . . . .25 mm
Lead: . . . . . .5, 10, 20, 50 mm
Stroke length: . . . . . .up to 11.000 mm with lead 50 mm max. 5000 mm
Power bridge: . . . . . .280 or 450 mm long see page 62
Geometrical moment of inertia: . . .ly 1.9 x 10^6 mm⁴
lz 1.9 x 10^6 mm⁴

Weights
Basic unit with zero stroke: . . . . .11.57 kg
100 mm stroke: . . . . . .1.08 kg
Power bridge with carriage: . . . . .4.26 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

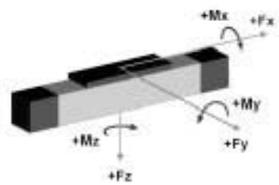
Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	10	20	50
150	0.8	1.4	1.6	2.3
1500	1.4	1.9	2.0	2.8
3000	1.8	2.3	2.3	3.4

Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer's wishes. For screw leads > 20 mm, excess lengths cannot be implemented.

Loads and load moments



Load	dynam. [N]
Fx drive	5000
Fy	3000
± Fz	3000
Load moment	**dynam. [Nm]**
Mx	350
My[1)]	300
Mz[1)]	300

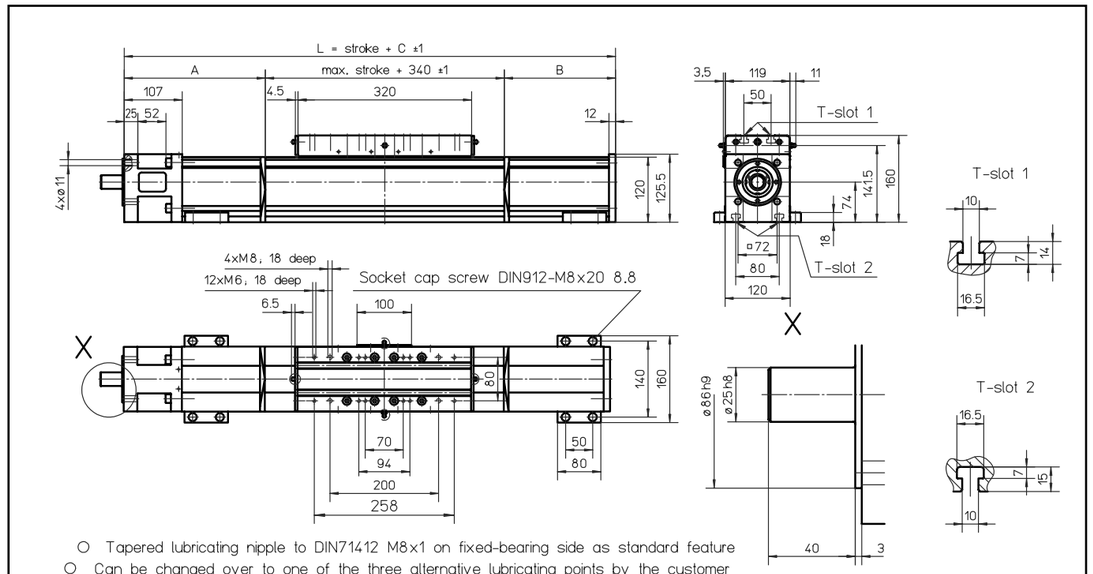
1) Increase of the admissible values by the use of a long power bridge or additional free-sliding power bridge (pages 62 and 63).

Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–780	120	80	500
781-1535	170	125	595
1536-2375	190	145	635
2376-3205	215	170	685
3206-4045	235	190	725
4046-4885	255	210	765
4886-5000	280	235	815

WIESEL™ *POWER*Line® WM120

with ball screw drive and integrated linear ball-bearing guide



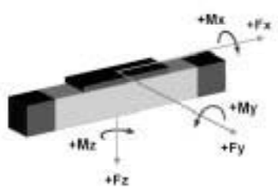
All figures shown in millimeters.

Technical data

Linear speed: . . . . . .max. 2.0 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive
Diameter: . . . . . .32 mm
Lead: . . . . . .5, 10, 20, 40 mm
Stroke length: . . . . . .up to 11.000 mm
with lead 40 mm
max. 5000 mm
Power bridge: . . . . . .320 or 500 mm long
see page 62
Geometrical moment of inertia: . . .ly 7.7 x 10^6 mm⁴
lz 9.4 x 10^6 mm⁴

Weights
Basic unit with zero stroke: . . . . .25.91 kg
100 mm stroke: . . . . . .1.93 kg
Power bridge with carriage: . . . . .9.25 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Loads and load moments



Load	dynam. [N]
Fx drive	12000
Fx drive 3240	8000
Fy	6000
± Fz	6000
Load moment	**dynam. [Nm]**
Mx	500
My	600
Mz	600

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	10	20	40
150	1.2	2.1	1.8	2.4
1500	2.3	3.0	2.8	3.6
3000	2.8	3.8	3.5	4.0

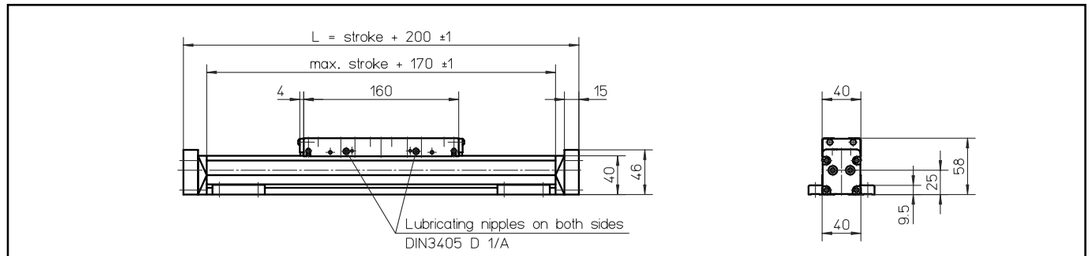
Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–890	155	100	595
891-1695	225	170	735
1696-2625	260	205	805
2626-3555	295	240	875
3556-4485	330	275	945
4486-5000	365	310	1015

WIESEL™ *POWER*Line®

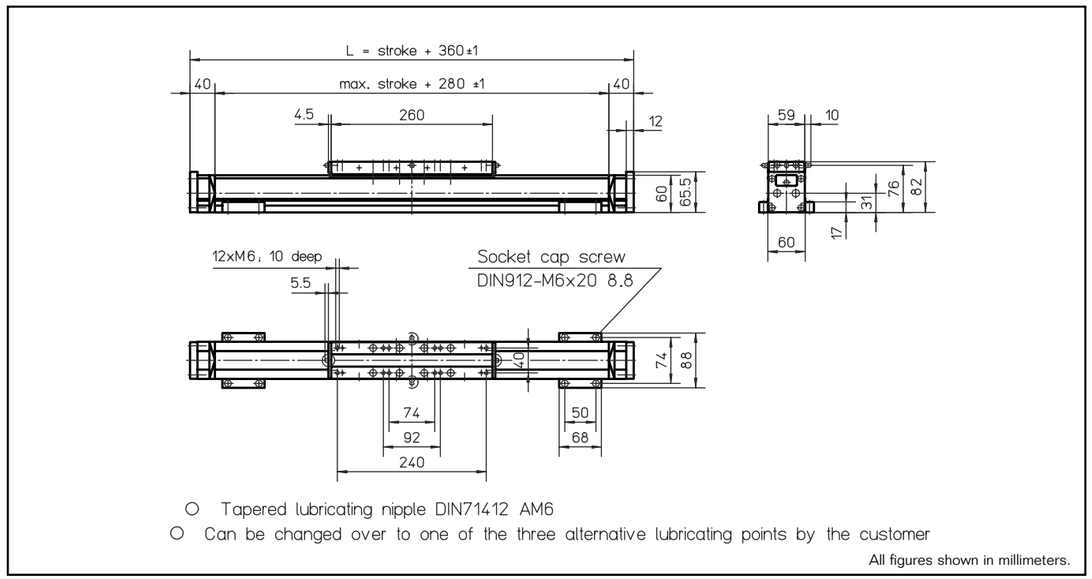
Guide tube

WM40-190



All figures shown in millimeters.

WM60-190



All figures shown in millimeters.

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

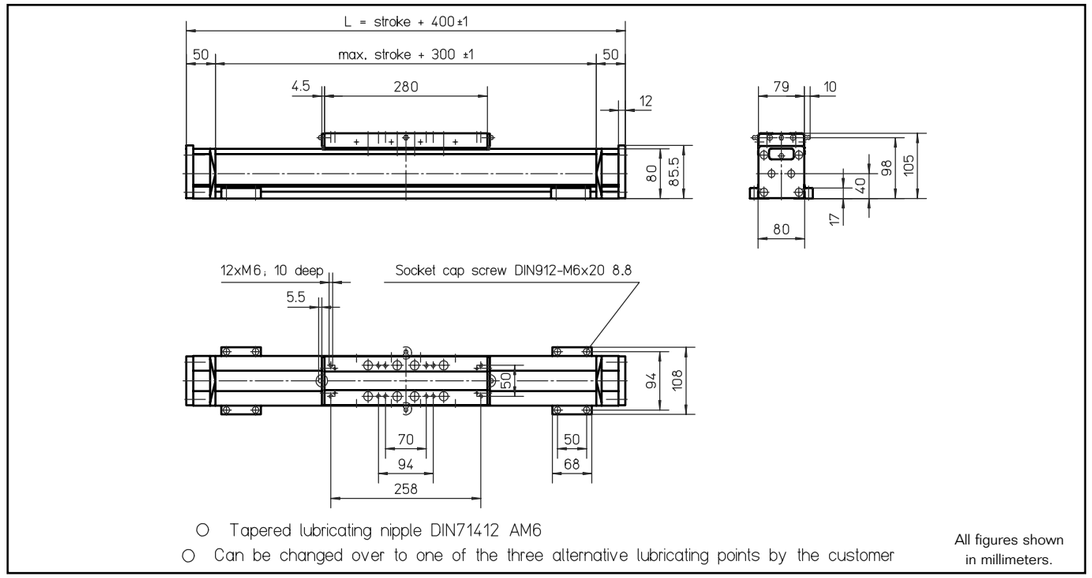
Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

WIESEL™ *POWER*Line®

Guide tube

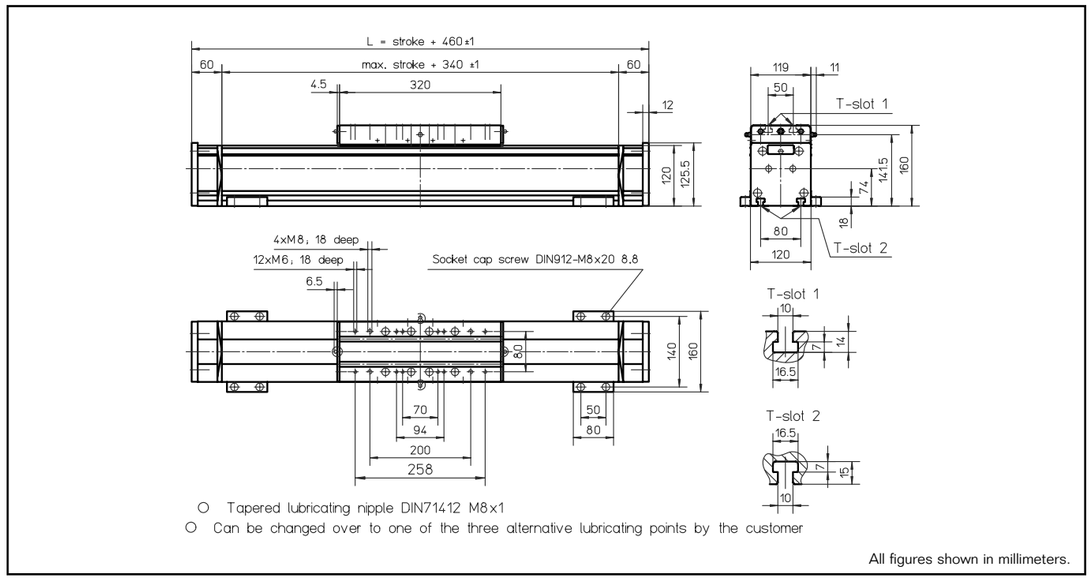
WM80-190



○ Tapered lubricating nipple DIN71412 AM6
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

WM120-190



○ Tapered lubricating nipple DIN71412 M8x1
○ Can be changed over to one of the three alternative lubricating points by the customer

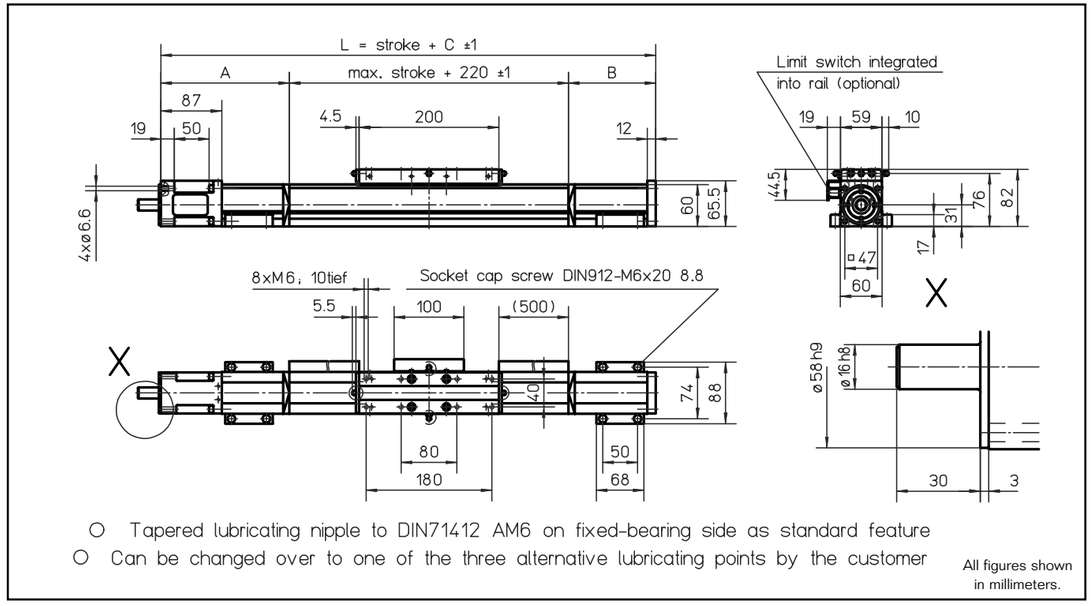
All figures shown in millimeters.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

WIESEL™ *DYNA*Line® WV60

with ball screw drive



○ Tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
○ Can be changed over to one of the three alternative lubricating points by the customer

All figures shown in millimeters.

Technical data

Linear speed:	max. 2.5 m/s
Repeatability:	± 0.01 mm
Acceleration:	max. 20 m/s²
Rotational speed:	max. 3000 rpm
Drive element:	Pretensioned ball screw drive
Diameter:	20 mm
Lead:	5, 20, 50 mm
Stroke length:	up to 11.000 mm with lead 50 mm max. 5000 mm
Power bridge:	200 mm long
Geometrical moment of inertia:	ly 5.8 x 10^5 mm^4 lz 5.9 x 10^5 mm^4

Weights

Basic unit with zero stroke:	4.72 kg
100 mm stroke:	0.55 kg
Power bridge with carriage:	1.42 kg
Provided:	4 pieces KAO mounting brackets

Feed force

Maximum feed force Fx:
4000 N

Note: All loads and load moments must be absorbed by external guides

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	20	50
150	0.6	0.7	0.8
1500	1.1	1.2	1.3
3000	1.5	1.7	1.9

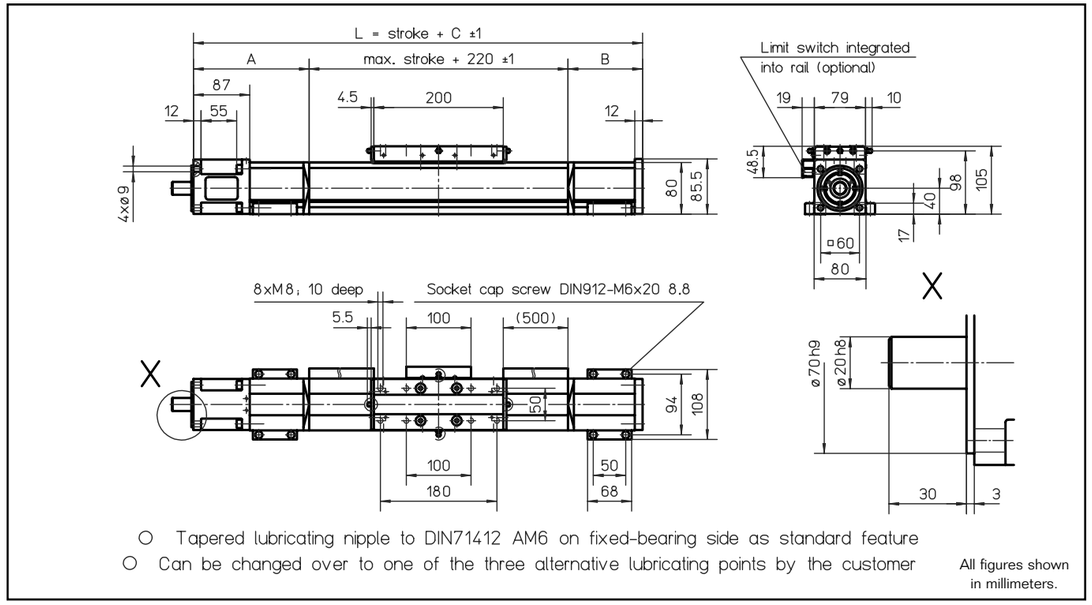
Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–690	130	80	430
691-1415	155	105	480
1416-2155	175	125	520
2156-2885	200	150	570
2886-3625	220	170	610
3626-4355	245	195	660
4356-5095	265	215	700

Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer´s wishes. For screw leads > 20 mm, excess lengths cannot be implemented.

WIESEL™ *DYNA*Line® WV80

with ball screw drive



Technical data

Linear speed: . . . . . .max. 2.5 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive
Diameter: . . . . . .25 mm
Lead: . . . . . .5, 10, 20, 50 mm
Stroke length: . . . . . .up to 11000 mm
with lead 50 mm
max. 5000 mm
Power bridge: . . . . . .200 mm long
Geometrical moment of inertia: . . .ly 1.9 x 10^6 mm^4
lz 1.9 x 10^6 mm^4

Weights
Basic unit with zero stroke: . . . . .7.95 kg
100 mm stroke: . . . . . .0.99 kg
Power bridge with carriage: . . . . .2.25 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Feed force

Maximum feed force Fx:
5000 N

Note: All loads and load moments must be absorbed by external guides

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	10	20	50
150	1.0	1.0	1.1	1.2
1500	1.7	1.8	1.9	2.0
3000	2.2	2.3	2.4	2.6

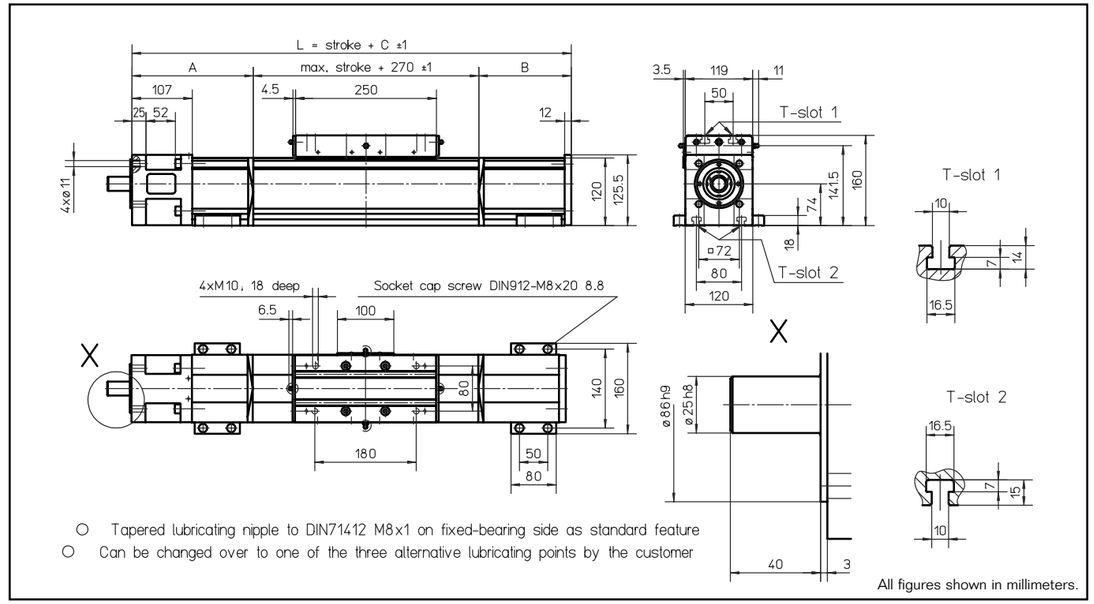
Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–775	125	50	395
776-1670	145	95	460
1671-2505	170	115	505
2506-3340	190	140	550
3341-4175	210	160	590
4176-5015	235	180	635

Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer´s wishes. For screw leads > 20 mm, excess lengths cannot be implemented.

WIESEL™ *DYNA*Line® WV120

with ball screw drive



Technical data

Linear speed: . . . . . .max. 2.0 m/s
Repeatability: . . . . . .± 0.01 mm
Acceleration: . . . . . .max. 20 m/s²
Rotational speed: . . . . . .max. 3000 rpm
Drive element: . . . . . .Pretensioned ball screw drive
Diameter: . . . . . .32 mm
Lead: . . . . . .5, 10, 20, 40 mm
Stroke length: . . . . . .up to 11.000 mm
with lead 40 mm
max. 5000 mm
Power bridge: . . . . . .250 mm long
Geometrical moment of inertia: . . .ly 7.7 x 10^6 mm^4
lz 9.4 x 10^6 mm^4

Weights
Basic unit with zero stroke: . . . . .18.1 kg
100 mm stroke: . . . . . .1.94 kg
Power bridge with carriage: . . . . .4.75 kg
Provided: . . . . . .4 pieces KAO mounting brackets

Feed force

Maximum feed force Fx:
12000 N
8000 N with ball screw drive 3240

Note: All loads and load moments must be absorbed by external guides

Unit conversions

Length:
1 m=1000 mm=39.37 inches
1 inch=25.4 mm

Force:
1 N=0.225 lbf
1 lbf=4.45 N

Moment of Force:
1 Nm=0.738 lb • ft=8.85 lb • inches
1 lb • ft=1.36 Nm

Geometrical moment of inertia:
1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4

Mass moment of inertia:
1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2

Mass:
1 kg=2.2 lb

Idle torques [Nm]

Rotational speed [rpm]	Lead P [mm] 5	10	20	40
150	1.0	1.0	1.1	1.2
1500	2.1	2.2	2.3	2.5
3000	2.4	2.6	2.7	3.0

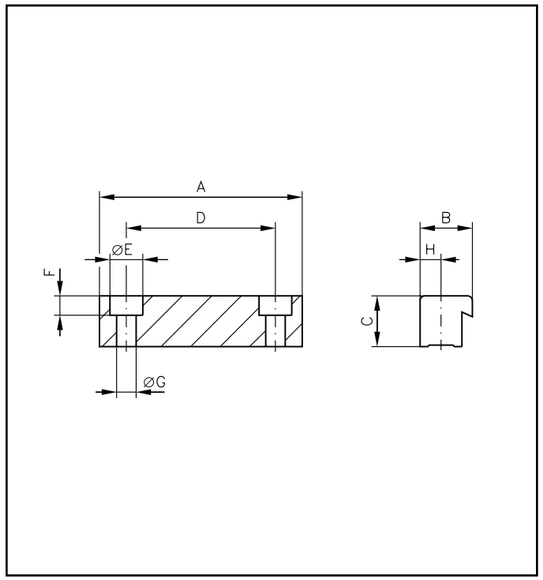
Additional lengths as a function of the stroke

Stroke length [mm]	A [mm]	B [mm]	Additional length C [mm]
0–940	145	50	465
941-1860	180	120	570
1861-2790	215	155	640
2791-3720	250	190	710
3721-4650	285	225	780
4651-5000	320	255	845

Note: For tube lengths of 5400 mm and over, the tubular profile is composed of two parts. The joint must be adequately supported. It may be possible to position the joint according to customer´s wishes. For screw leads > 20 mm, excess lengths cannot be implemented.

Accessories for WIESEL™ *POWER*Line®

Mounting brackets



KAO Mounting brackets
The WIESEL™ unit is secured to mounting surface by means of the KAO mounting brackets which are inserted in the grooves provided in the sides of the tubular aluminum profile and screwed onto the mounting surface with the aid of socket head cap screws. The number of mounting brackets required depends on the load and overall length of the WIESEL™ unit. This is shown in the diagrams. Increasing side forces reduces the distance between supports. **Each unit is provided with 4 pieces KAO Mounting brackets.**

Maximum torque of mounting screws

Size	Moment [Nm]
WM40	7.3–12
WM/WV60	7.3–12
WM/WV80	7.3–12
WM/WV120	17–30

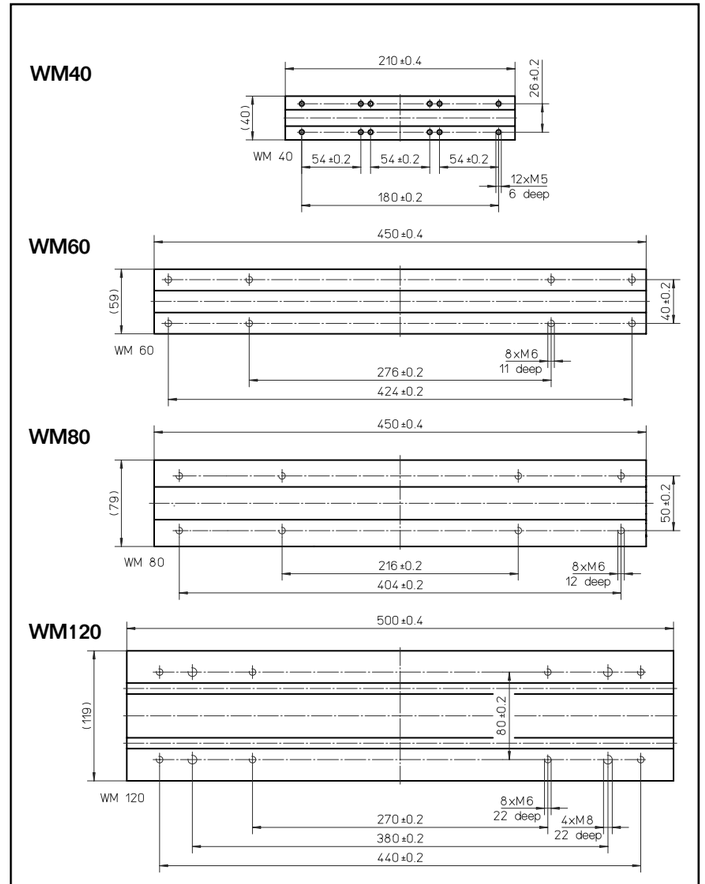
KAO System brackets
Only needed for WH40. With multi-coordinate arrangements of several WIESEL™ units, this can be used to mount a WIESEL™ directly to the power bridge of a unit positioned immediately below.

	Dimension [mm]							
Size	A	B	C	D	ø E	F	ø G	H
WM40	54	16	10	40	10	5.7	5.5	7
WM/WV60	54	17.5	17	50	11	6.5	6.6	7
WM/WV80	68	17.5	17	50	11	6.5	6.6	7
WM/WV120	80	25	18	50	15	8.5	9	10
WM40 System KAO	40	16	10	26	10	5.7	5.5	7
WM60 System KAO	58	17.5	17	40	11	6.5	6.6	7

Note: It is advisable to secure the linear drive unit at intervals of at least 750 mm.
This ensures that all the permissible loads can be absorbed without significantly deforming the tubular aluminum profile.

Accessories for WIESEL™ *POWER*Line®

Long power bridge



All figures shown in millimeters.

LKB Long power bridge
The long power bridge increases the maximum permissible load moments My and Mz of a WIESEL™ unit without requiring to step up a size. The difference in length between the long power bridge and the standard power bridge must be taken into account when calculating the overall length of the WIESEL™ unit.

Overall length of the WIESEL™ unit:

$$L_{tot} = \text{Stroke} + C + \Delta Kb$$

C* = Specific additional length
L_{tot} = Overall length WIESEL™ unit
Stroke = Required stroke length
ΔKb = Difference in length between long and standard power bridge

* Calculation in depency of stroke and ΔKb. The dimension C is shown in the charts of technical data of the corresponding actuator.

Size	Length of power bridge [mm]	My [Nm]	Mz [Nm]
WM40-000	210	50	50
WM60-000	450	500	500
WM80-000	450	750	750
WM120-000	500	1500	1500

Note: All other limit values are comparable to those of versions with standard power bridge. High load moments lead to major deformation of the tubular aluminum profile. The distance between supports should be reduced on order to minimize this deformation.

Note: All other limit values according to executions with standard power bridge.

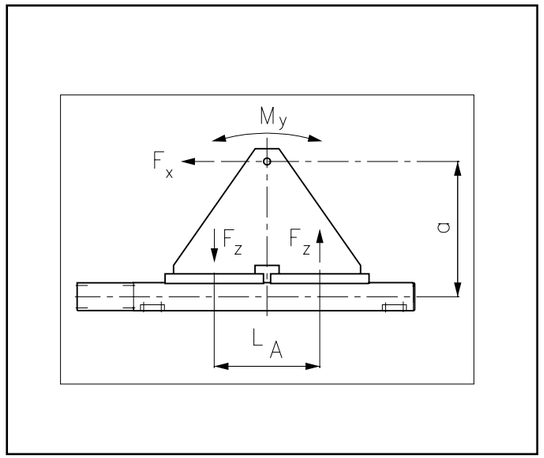
Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

POWERLine

Accessories for WIESEL™ *POWER*Line®

Additional free-sliding power bridge



OKB Additional free-sliding power bridge
The additional free-sliding power bridge provides:

- Individual increase of the load moments My and Mz of a WIESEL™ unit. Load moment My is limited by force ± Fz; Mz is limited by force ±Fy.
- Longer and therefore improved guidance.
- Particularly suitable as a vertical guide and lifting module.

The required center distance between the driven and the free-sliding power bridge is calculated as follows:

$$L_A = \frac{M}{F_{max}}$$

L_A = Distance between center of driven power bridge and center of free-sliding power bridge [mm]
M = Load moment My or Mz [mm]
F_{max} = Maximum force Fz or Fy of the WIESEL™ unit concerned [N]

The center distance between the two power bridges must be taken into account when calculating the overall length of the WIESEL™ unit.

Overall length of WIESEL™ unit
L_{tot} = **Stroke** + L_C + L_A

L_C = Specific additional length [mm] between long and standard power bridge. (see technical data of the respective WIESEL™)

Minimum center distance between driven and free-sliding power bridge (given for standard power bridge).

Size	L_A [mm]
WM40*	min 175 max 600
WM60	335
WM80	360
WM120	450

*For stroke lengths of more than 1700 mm please contact our product specialists for the maximum screw rotational speed.

The required force to move the additional free sliding power bridge must be taken into account when selecting the drive.

Size	F [N]
WM40	40
WM60	200
WM80	250
WM120	300

Note: High load moments lead to major deformation of the tubular aluminum profile. In order to minimize this deformation, the distance between the fixing points should be reduced.

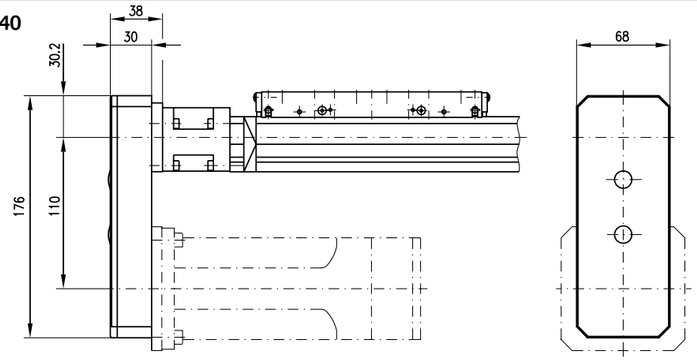
Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Accessories for WIESEL™ *POWER*Line®, *DYNA*Line®

Timing belt drive

RT40



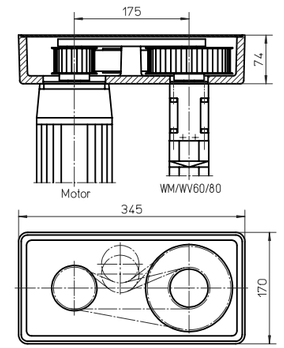
RT Belt drive
The RT 40/60/80 belt drive is a transmission designed to minimize the overall length. The RT housing (which is both belt guard and motor support) can be mounted in positions offset by 90°. The drive is provided via standard tooth belt drives.

Transmission ratios of i = 1 : 1 and i = 2 : 1 are possible. (RT 40 only i = 1:1)

Technical data

Size	M_{max} [Nm]	$n_{max\ input}$ [rpm]	M_{idle} [Nm]	Efficiency η	Mass inertia J [kgcm²] 1 : 1	Weight [kg] 1 : 1
RT40	1.75	3000	app. 0.3	0.8	0.25	0.62

RT60/80



Technical data

Size	M_{max} [Nm]	$n_{max\ input}$ [rpm]	M_{idle} [Nm]	Efficiency η	Mass inertia J [kgcm²] 1 : 1	Mass inertia J [kgcm²] 2 : 1	Weight [kg] 1 : 1	Weight [kg] 2 : 1
RT60	15	3000	app. 0.7	0.85	4.38	10.11	5.6	7.1
RT80	30	3000	app. 0.7	0.85	4.65	10.38	5.5	7.0

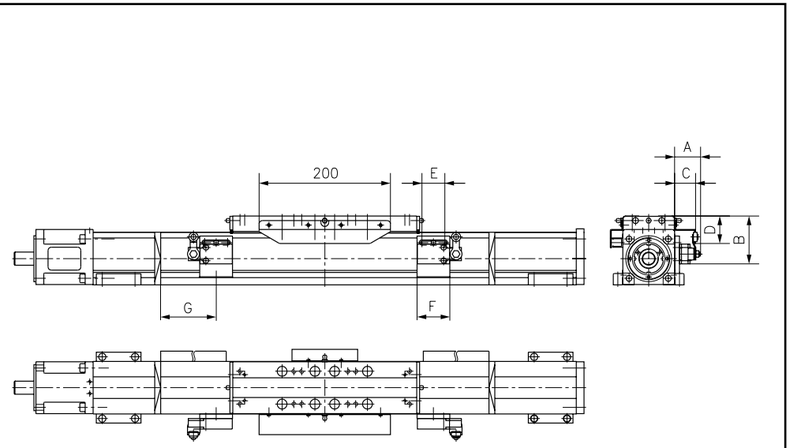
M_{max} = Maximum torque at the output shaft [Nm]
n_{max} = Maximum input speed [rpm]
M_{idle} = Idle torque [Nm]
J = Mass inertia referred to input shaft [kgcm²]

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 m^4=10^{12} mm^4=2.4025 x 10^6 in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • m^2=10^4 kg • cm^2=0.738 lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Accessories for WIESEL™ *POWERLine*®, *DYNALine*®

Mechanical limit switches



All figures shown in millimeters.

ES Mechanical limit switches
Mechanical limit switches must be used wherever people may be jeopardized if the electric drive does not cut out. They are fitted in the groove which also accommodates the KAO mounting brackets in the aluminum profile and can be adjusted by means of the oblong hole provided.

Technical data
CAM-actuated mechanical limit switch XCM-B516 with roller lever.

Dual-circuit NC + NO

NC contact forcibly opened in accordance with DIN EN 60 204
Type of protection: IP 67
Max. perm. starting speed: 1.5 m/s

Size	Dimensions [mm]							
	A	B	C	D	E	F	G for WM	G for WV
WM/WV60	40	70	32	38	35	50	94	64
WM/WV80	40	73	32	42	35	50	104	64
WM/WV120	40	90	32	58	35	50	119	84

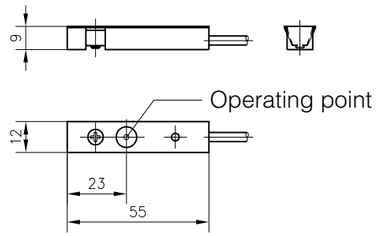
Note: Fixing of the linear unit by means of the KAO mounting brackets is not possible in the area of the base plates of the mechanical limit switches.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

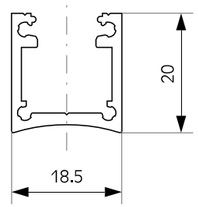
General accessories

Inductive proximity switch

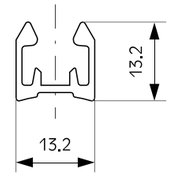


All figures shown in millimeters.

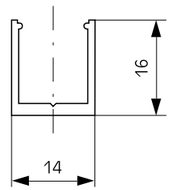
ENT 18.5x20



ENT 13.2x13.2



ENT 14x16



All figures shown in millimeters.

EN inductive proximity switch
Inductive proximity switches are used to shut down the electric drive before the mechanical limit position has been reached.

The braking path depends on the linear speed and time-lag. This path must at least be allowed between the operating point of the proximity switch and the actual mechanical limit position. Inductive proximity switches are also used to identify reference points or to signal operating points to the control system. Normally-closed versions are used for limit positions and normally-open versions for operating points.

The proximity switches can be infinitely adjusted in the guide rails.

Technical data
Contactless inductive proximity switch with LED display in plastic housing.
Operating distance: 2 mm
Type of protection: IP 67
Power supply: 10–30 V DC
Max. load current: 200 mA
Screened connection cable, length 2 m or 10 m.

Size	Type	Cable length [m]	Weight [kg]
EN2	O-normally closed	2	0.04
EN2	S-normally open	2	0.04
EN2	O-normally closed	10	0.19
EN2	S-normally open	10	0.19

ENT limit switch bracket
A support profile for mounting and adjusting inductive proximity switch EN. The hollow provides space to route cables for the cable harness of a proximity switch and can be concealed with cover tape.

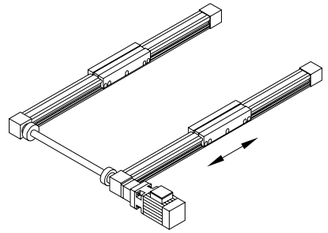
Size	Type
WH40/50/80/120	ENT 14x16
WHZ50/80	ENT 14x16
WM40/60/80/120	ENT 14x16
WV60/80	ENT 14x16

Unit conversions

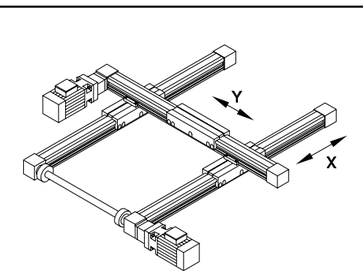
Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Precision Technology USA, Inc. WIESEL™ modular system

Examples

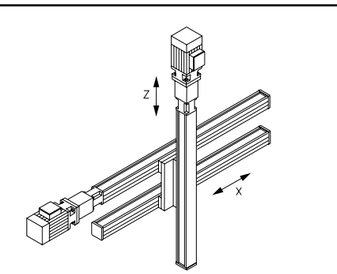


Parallel arrangement:
2 WIESEL™ *SPEEDLine®*
1 Universal joint shaft
1 Drive package



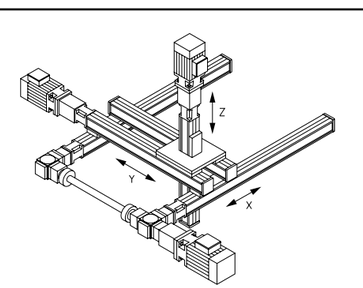
2-axis arrangement:
X-axis:
2 WIESEL™ *SPEEDLine®*
1 Universal joint shaft
1 Drive package

Y-axis:
1 WIESEL™ *SPEEDLine®*
1 Drive package



2-axis arrangement:
X-axis:
1 WIESEL™ *POWERLine®*
1 WIESEL™ *POWERLine®* as guide tube
1 Drive package

Z-axis:
1 WIESEL™ *POWERLine®*
1 Drive package



3-axis arrangement:
X-axis:
2 WIESEL™ *POWERLine®* with bevel gearbox
1 Universal joint shaft
1 Drive package

Y-axis:
1 WIESEL™ *POWERLine®*
1 WIESEL™ *POWERLine®* as guide tube
1 Drive package

Z-axis:
1 WIESEL™ *POWERLine®*
1 Drive package

Load ratings WIESEL™

Dynamic load ratings
With the help of dynamic load ratings, it is possible to calculate the approximate lifetime, dependent on load. The figures shown are for the KGT, according to DIN 69051, Part 4, Draft 1989, and for the guide, according to DIN 636.

Type	C_{KGM} P=4 [N]	C_{KGM} P=5 [N]	C_{KGM} P=10 [N]	C_{KGM} P=20 [N]	C_{KGM} P=40 [N]	C_{KGM} P=50 [N]	C_{FS} Y [N]	C_{FS} Z [N]	L_{FS} X [mm]	L_{FS} Y [mm]
WH40	–	–	–	–	–	–	(2x) 2786	(2x) 3397	72	–
WH50	–	–	–	–	–	–	–	(4x) 1270	198	39
WH80	–	–	–	–	–	–	–	(4x) 3670	220	65
WH120	–	–	–	–	–	–	–	(4x) 16200	180	97
WHZ50	–	–	–	–	–	–	–	(4x) 1270	198	39
WHZ80	–	–	–	–	–	–	–	(4x) 3670	220	65
WM40	–	2393	–	–	–	–	(2x) 2786	(2x) 3397	87	–
WM60-370 ZRT	–	–	–	–	–	–	(2x) 12964	(2x) 11934	–	35
WM60-370	–	7552	–	8312	–	4677	(2x) 12964	(2x) 11934	–	35
WM60	–	7552	–	8312	–	4677	(4x) 11495	(4x) 10581	141.7	35
WM60-500	–	7552	–	8312	–	4677	(4x) 11495	(4x) 10581	141.7	35
WM80-370 ZRT	–	–	–	–	–	–	(2x) 18723	(2x) 17919	–	49.75
WM80 ZRT	–	–	–	–	–	–	(4x) 14356	(4x) 13739	153	49.75
WM80-370	–	8804	9311	9365	–	8572	(2x) 18723	(2x) 17919	–	49.75
WM80	–	8804	9311	9365	–	8572	(4x) 14356	(4x) 13739	154	49.75
WM120	–	15429	24049	20667	8341	–	(4x) 18723	(4x) 17919	186	80.75
WV60	–	7552	–	8312	–	4677	–	–	–	–
WV80	–	8804	9311	9365	–	8572	–	–	–	–
WV120	–	15429	24049	20667	8341	–	–	–	–	–

Important note: The permissible force and moment threshold values for the respective linear unit must not be exceeded at any time.

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Drive selection

for linear drive units with toothed belt drive

Feed force
F_x [N]

$$F_x = m \cdot g \cdot \mu$$

Acceleration force
F_a [N]

$$F_a = m \cdot a$$

In vertical applications, the mass acceleration **a** must be added to the acceleration due to gravity **g** [9.81 m/s²].

Power from torque and rotational speed
[kW]

$$P = \frac{M_A \cdot n_{max} \cdot 2 \cdot \pi}{60 \cdot 1000}$$

Definitions

M_A = Required drive moment [Nm]
M_{load} = Moment resulting from the various loads [Nm]
M_{idle} = Idle torque [Nm]
M_{rot} = Rotational acceleration moment [Nm]
M_{trans} = Translational acceleration moment [Nm]
F_x = Feed force [N]
F_a = Acceleration force [N]
g = Acceleration due to gravity [m/s²]
V_{max} = Maximum linear speed [m/s]

m = Mass to be transported [kg][1)]
a = Acceleration [m/s²]
d_o = Effective diam. of pulley [mm][2)]
P = Power [kW]
L = WIESEL™ length [mm]
J_{syn} = Idle torque of pulley [kgm²]
n_{max} = Maximum rotational speed [rpm]
μ = Friction factor

Calculating the drive moment M_A [Nm]

The required drive moment is composed of the “load moment”, the “acceleration moment” and the “idle torque”.

$M_A = M_{load} + M_{trans} + M_{rot} + M_{idle}$

The value for the respective idle torque can be found with the corresponding mechanical linear drive units.

$$M_{rot} = J_{syn} \cdot \frac{2 \cdot \pi \cdot n_{max}}{60} \cdot \frac{a}{V_{max}}$$

$$M_{trans} = \frac{F_a \cdot d_o}{1000 \cdot 2}$$

$$M_{load} = \frac{F_x \cdot d_o}{1000 \cdot 2}$$

M_A Total =

Type	μ	J_{syn} [kgm²]	Spec. weight tooth belt [kg/m]
WH40	0.05	8.800 E-06	0.032
WH50	0.1	1.928 E-05	0.055
WH80	0.1	2.473 E-04	0.210
WH120	0.1	1.004 E-03	0.340

Type	μ	J_{syn} [kgm²]	Spec. weight tooth belt [kg/m]
WHZ50	0.1	6.906 E-05	0.055
WHZ80	0.1	5.026 E-04	0.114

1) Total weight m = weight to be moved + weight of power bridge [3)] + weight of toothed belt
Weight of toothed belt = spec. weight of tooth belt [kg/m] · 2 [4)] · $\frac{\text{WIESEL™- length [mm]}}{1000}$

2) Values for the respective effective diameters, see at corresponding mechanical linear units.
3) For Z-axis moved dead weight to be taken into account.
4) To replace by 1 at Z-Axis

Drive selections

for linear drive units with ball screw drive

Feed force
F_x [N]

$$F_x = m \cdot g \cdot \mu$$

Acceleration force
F_a [N]

$$F_a = m \cdot a$$

In vertical applications, the mass acceleration **a** must be added to the acceleration due to gravity **g** [9.81 m/s²].

Power from torque and rotational speed
[kW]

$$P = \frac{M_A \cdot n_{max} \cdot 2 \cdot \pi}{60 \cdot 1000}$$

Definitions

M_A = Required drive moment [Nm]
M_{load} = Moment resulting from the various loads [Nm]
M_{idle} = Idle torque [Nm]
M_{rot} = Rotational acceleration moment [Nm]
M_{trans} = Translational acceleration moment [Nm]
F_x = Feed force [N]
F_a = Acceleration force [N]
g = Acceleration due to gravity [m/s²]
V_{max} = Maximum linear speed [m/s]

m = Mass to be transported [kg]
a = Acceleration [m/s²]
p = Screw pitch [mm]
P = Power [kW]
L = WIESEL™ length [mm]
n_{max} = Maximum rotational speed [rpm]
μ = Friction factor
j_{sp} = Mass moment of inertia of the screw per meter [kgm²/m]

Calculating the drive moment M_A [Nm]

The required drive moment is composed of the “load moment”, the “acceleration moment” and the “idle torque”.

$M_A = M_{load} + M_{trans} + M_{rot} + M_{idle}$

The value for the respective idle torque can be found with the corresponding mechanical linear drive units.

$$M_{rot} = \frac{j_{sp} \cdot L \cdot n_{max} \cdot a \cdot 2 \cdot \pi}{V_{max} \cdot 60 \cdot 1000}$$

$$M_{trans} = \frac{F_a \cdot p}{2 \cdot \pi \cdot 1000}$$

$$M_{load} = \frac{F_x \cdot p}{2 \cdot \pi \cdot 1000}$$

M_A Total =

Friction factor μ

Values for μ	lubricated
WIESEL™ *POWERLine*®WM40	0.05
WIESEL™*POWERLine*®WM60/80/120	0.1
WIESEL™*DYNALine*®	Friction value of the external guide

Mass moment of inertia j_{sp}

Type	P [mm]	j_{sp}[kgm²/m]
WIESEL™ WM/WV 60	5	8.46×10^{-5}
	20	8.83×10^{-5}
	50	8.45×10^{-5}
WIESEL ™*POWERLine*®/*DYNALine*®80	5, 10, 20, 50	2.25×10^{-4}
WIESEL ™*POWERLine*®/ *DYNALine*®120	5	6.41×10^{-4}
	10, 20, 40	6.28×10^{-4}
WIESEL™ WM40	4,5	1.13×10^{-5}

Order information

WIESEL™ *SPEEDLine*®

Structure of the order code:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
WH	50	000	ZR	120	1500	1940	AZ1/0	3EN/A	0

1. Product
WH = Standard axis
WHZ= Z-axis

2. Size
40, 50, 80 and 120[1)]

3. Design model
000 = Standard
190 = Guide tube

4. Drive type
ZR = toothed belt drive

5. Lead
Size 40 = 100 mm
Size 50 = 120 mm
Size 80 = 200 mm
Size 120= 260 mm

6. Maximum stroke
[mm]

7. Total length
[mm]

8. Execution of drive shaft
Standard: AZ1, AZ2 and AZ6
(varieties see below)

9. Mounted accessories
EN = Inductive proximity switches[2)]
ES = Mechanical limit switches[3)]
OKB= Additional free-sliding power bridge
LKB = Long power bridge
ADG= Mounted shaft encoder (specify number of pulses and version)
MGK= Mounted motor adapter flange and coupling
FA = Felt wipers[3)]
RT = Belt drive

10. Special execution
0 = No
1 = Yes, description in words

1) Size 40 and 120 not available as Z-axis
2) Size 50
EN/A = Limit switches mounted on axis
EN/L = Loose kit, enclosed to delivery
3) Not possible for WIESEL™ WH40

Ordering example:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
WH	50	000	ZR	120	1500	1940	AZ1/0	3EN/A	0

1. Product
WIESEL™ *SPEEDLine*® Standard

2. Size
50

3. Design model standard
Standard

4. Drive type
Toothed belt drive

5. Lead
120 mm/revolution

6. Max. stroke
1500 mm

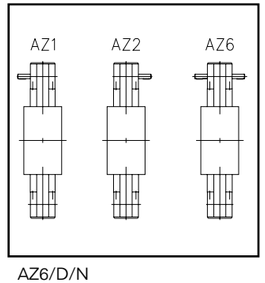
7. Total length
1940 mm

8. Execution of drive shaft
AZ1/plain

9. Mounted Accessories
3 pieces inductive proximity switches (normally 2 NC and 1 NO) mounted on WIESEL™

10. Special execution
No special execution

Definition of the drive shaft within the order code
Drive shaft execution



Execution varieties of the drive shaft:
0 = plain
N = with keyway
D = shaft end prepared for mounting of a shaft encoder

Definition of the drive shaft within the order code

Drive shaft execution AZ1
Drive shaft execution AZ2

Example:
AZ6/D/N
Drive shaft execution AZ6, side AZ1 prepared for mounting of a shaft encoder, side AZ2 with keyway.

Order information

WIESEL™ *POWERLine*®, WIESEL™ *DYNALine*®, WIESEL™ *VARIOLine*™

Structure of the order code:

1.	2.	3.	4.	5.	6.	7.	8.	9.
WV/WM/WZ	40/60/80/120	000/190/370	M/MM/ZR	5/10/20/40/50	60/80	120	EN/ES/OKB/LKB/KRG/RT/ADG/MGK/PRT	0/1

1. Product
WV = WIESEL™ *DYNALine*®
WM = WIESEL™ *POWERLine*®
WZ = WIESEL™ *VARIOLine*™

2. Size
40, 60, 80 and 120

3. Design model
000 = Standard
190 = Guide tube (only WM)
370 = Short guidance system

4. Drive type
M = Single nut (only for WM40, WM60/80-370)
MM = Ball screw drive with pretensioned nut unit
ZR = Belt drive

5. Lead
5, 10, 20, 40 or 50 mm
Size 60 = 120 mm
Size 80 = 170 mm

6. Max. linear travel
[mm]

7. Total length
[mm]

8. Mounted accessories
EN = Inductive proximity switches
ES = Mechanical limit switches (Not for WM40)
OKB = Additional power bridge (specify center distance to the driven power bridge)
LKB = Long power bridge
KRG = Mounted bevel gearbox (specify type and transmission ratio)
RT = Belt drive (specify transmission ratio)
ADG = Mounted shaft encoder (specify number of pulses and version)
MGK = Mounted motor adapter
PRT = Parallel belt drive system (only for WM 40)

9. Special model
0 = No
1 = briefly described in words

Ordering example:

1.	2.	3.	4.	5.	6.	7.	8.	9.
WM/	60	000	MM	20	700	1260	3EN-KRG	1

1. Product
POWERLine®

2. Size
60

3. Design model
Standard

4. Drive type
Pretensioned nut unit
MM

5. Lead
20 mm

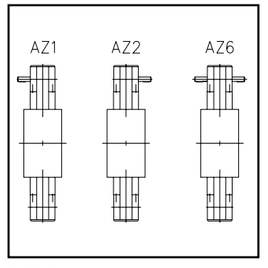
6. Max. linear travel
700 mm

7. Total length
1260 mm

8. Mounted accessories
3 inductive proximity switches (normally 2 NC and 1 NO), mounted bevel gearbox

9. Special model
1 = mounted bevel gearbox VL1Ba40, transmission i = 1 : 1

Definition of the drive shaft within the order code
Drive shaft execution



Execution varieties of the drive shaft:
0 = plain
N = with keyway
D = shaft end prepared for mounting of a shaft encoder

Definition of the drive shaft within the order code

Drive shaft execution AZ1
Drive shaft execution AZ2

AZ6/D/N

Example: Drive shaft execution AZ6, side AZ1 prepared for mounting of a shaft encoder, side AZ2 with keyway.

Inquiry data
Ask our specialists!

Precision Technology USA
ENGINEERED ACTUATORS

Date: _____

Company: _____ Contact: _____

Street: _____ Department: _____

City/State: _____ Zip code: _____ Telephone: _____ Fax: _____

Your requirements

Path

Linear displacement [mm]: _____

Kinematics

Cycle time [s]: _____

or Velocity [m/s]: _____ Acceleration [m/s²]: _____

Duty cycle

DC [%]: _____

or number of cycles/h: _____

Accuracy

Required repeatability [± mm]: _____

Loads

a) Load

Mass [m] to be transported [kg]: _____

b) Additional load

[N]: _____

c) Installed position

❑ Horizontal ❑ Vertical

or angle of installation [degrees]: _____

d) Design model (only for WIESEL™ *SPEEDLine*®)

❑ Standard axis ❑ Z-axis

e) External guide

❑ No ❑ Yes

Friction value of the guide μ: _____

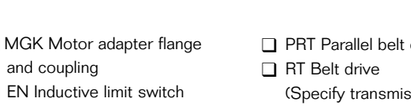
Forces and moments

Position of power bridge

❑ Top ❑ Bottom ❑ At side

Center of gravitiy:

Lx [mm]: _____ Ly [mm]: _____ Lz [mm]: _____



Ambient conditions

❑ Dust ❑ Chips Humidity [%]: _____

Temperature [degrees]: _____

Drive systems

❑ AC Servo ❑ DC Servo ❑ Step motor

❑ Three-phase synchronous motor and converter

Control system

Requirements: _____

Additional information on application

_____

_____

_____

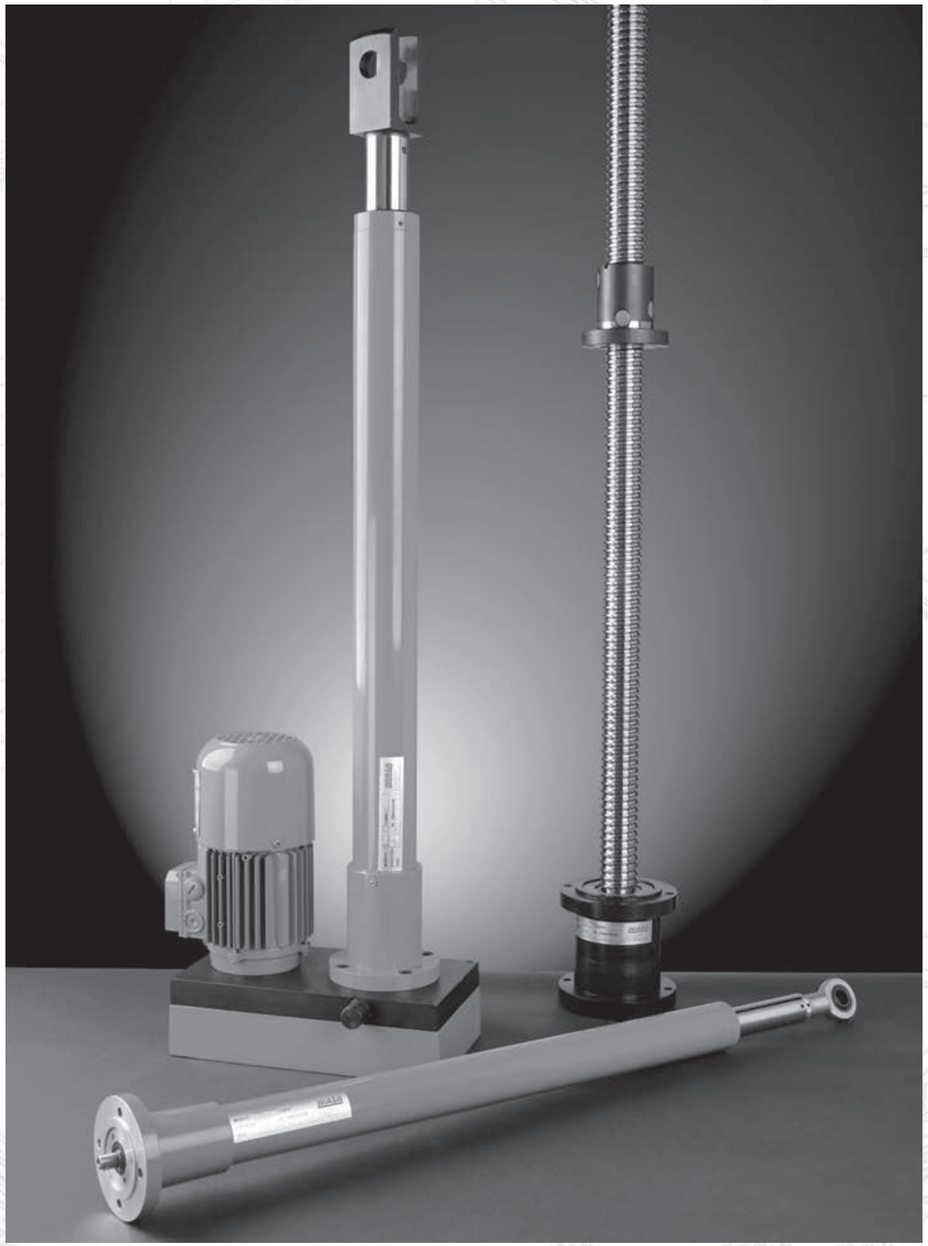
_____

_____

_____

Accessories (please mark)

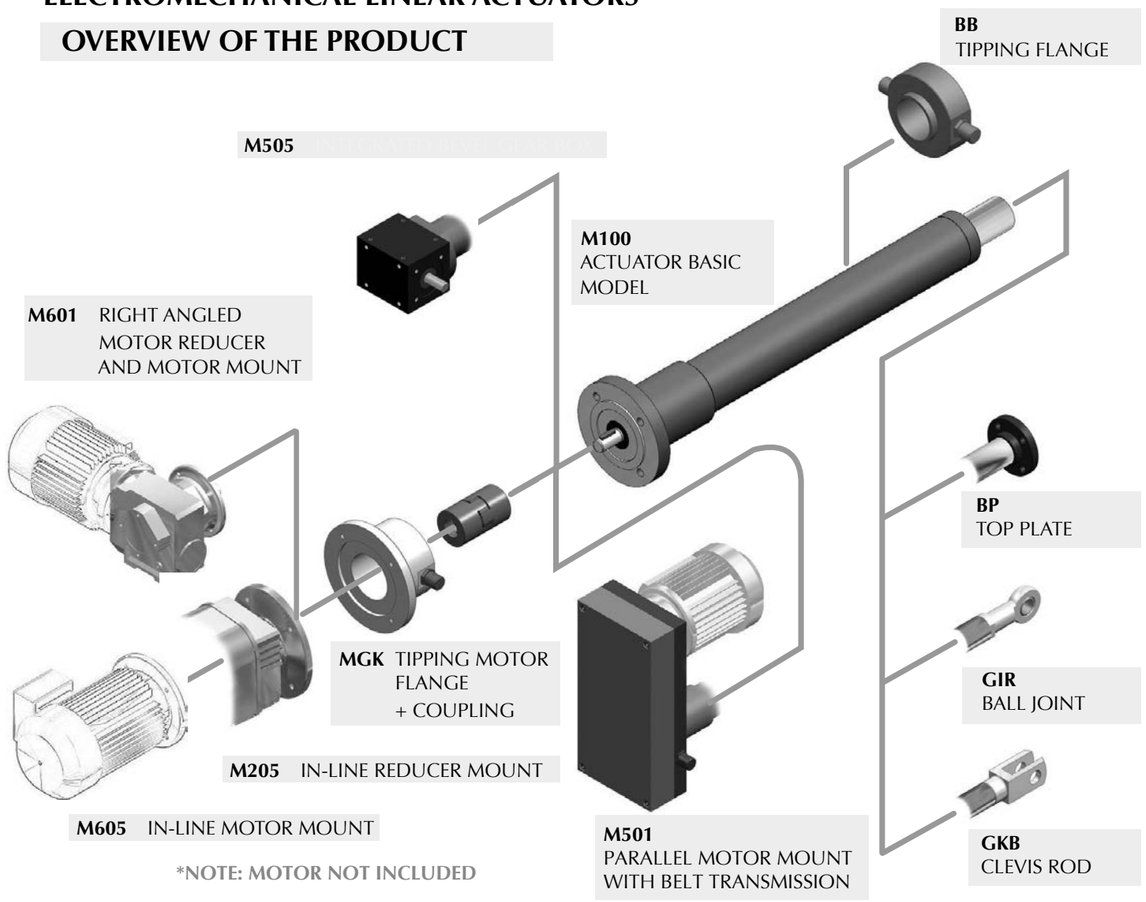
❑ FA Felt wipers (only for WH50/80/120)
❑ ABS Wipers (only for WH40)
❑ KAO Mounting brackets
❑ LKB Long power bridge
❑ OKB Additional free-sliding power bridge
❑ KRG Bevel gearbox (Specify type and transmission ratio)
❑ GX Universal joint shaft (specify center distance)
❑ MGK Motor adapter flange and coupling
❑ EN Inductive limit switch (specify number and version)
❑ PRT Parallel belt drive system
❑ RT Belt drive (Specify transmission ratio)
❑ ES Mechanical limit switch
❑ ADG Shaft encode attachment (specify number of pulses and version)



VERSARAM ELECTROMECHANICAL LINEAR ACTUATORS AND SCREW SUPPORTS

Precision Technology USA
ENGINEERED ACTUATORS

OVERVIEW OF THE PRODUCT



*NOTE: MOTOR NOT INCLUDED

ORDER CODE

1.	-	2.	-	3.	-	4.	-	5.	-	6.	-	7.
☐☐☐	-	☐☐☐	-	☐☐☐	-	☐☐☐	-	☐☐☐	-	☐☐☐	-	☐

1. Model
- M100 - Basic model
- M205 - In line reducer mount
- M501 - Parallel motor mount
- M505 - Integrated bevel gear box
- M601 - Right angle gear box and mount
- M605 - In-line motor mount

2. Size
- F16 - 16 mm dia. screw
- F20 - 20 mm dia. screw
- F30 - 30 mm dia. screw
- F40 - 40 mm dia screw
- F50 - 50 mm dia screw

3. Screw
- KGT - Ballscrew x Pitch
- TR - Trapezoidal x Pitch

4. Stroke
- (mm) - specials upon request

5. Accessories
- SA - Without any
- BP - Top plate
- GKB/GK - Clevis rod
- GIR - Ball joint

6. Other
- MGK - Tipping motor flange + coupling
- BB - Tipping flange (confirm position)
- SB - Tipping supports

7. Special
- 0 - None
- S - Special

GENERAL TECHNICAL DATA

LIFE DEFINITION

The life of an actuator is dependant on the life of the screw. It is the number of complete cycles in time that an actuator can perform. It is represented by Lc.

DEFINITION OF THE AVERAGE LOAD

It is the load that corresponds to the average of the different loads during one cycle. It is represented by Cm.

AVERAGE LOAD ESTIMATE

The load C can vary during the cycle and the distance the load is applied for varies (S). In order to calculate the average load the following formula is used:

$$Cm = \sqrt[3]{\frac{C1^3 \times S1 + C2^3 \times S2 + \ldots}{S1 + S2 + \ldots}}$$

Where: C1, C2, ... = Constant load in N, for travel S1, S2, ...

S = Travel in mm.

LIFE ESTIMATES

The life of a screw in complete cycles, i.e. both directions, will be primarily determined by the screw's pitch, the travel, the dynamic load and the average load.

The life of a ball-screw can be calculated from the dynamic load and the travel.

$$Lc = \frac{500.000 \times P}{S} \times \left(\frac{C}{Cm}\right)^3$$

Where: Lc = Life in complete cycles (one cycle is defined as movement in both directions)
P = Screw pitch in mm.
S = Travel in mm.
C = Dynamic load of the screw in N.
(Actuator size: F-15 = 3.000N; F-20 = 14.000N;
F-30 = 24.000N; F-40 = 42.000N; F-50 = 78.000N)
Cm = Constant average load in N.

EXAMPLES OF LIFE CALCULATION

An M501 F-20 with a stroke of 300 mm a pitch of 5 mm and a load of 3.000N in one direction and of 2.000N in the other.

We calculate the average load that will be applied during one cycle and then the life of the screw in cycles.

These calculations use the following average load formula:

$$Cm = \sqrt[3]{\frac{C1^3 \times S1 + C2^3 \times S2 + \ldots}{S1 + S2 + \ldots}} \qquad Cm = \sqrt[3]{\frac{2.000^3 \times 300 + 3.000^3 \times 300}{300 + 300}} = 2.597N$$

Knowing the average load the life can be calculated, using the following formula:

$$Lc = \frac{500.000 \times P}{S} \times \left(\frac{C}{Cm}\right)^3 \qquad Lc = \frac{500.000 \times 5}{3.000} \times \left(\frac{14.000}{2.597}\right)^3 = 1.300.000 \text{ cycles}$$

LUBRICATION OF THE ACTUATORS

The electromechanical linear actuators require a similar lubrication to that used for ball bearings. In normal working conditions, the actuators should be greased between 800 and 2.000 operating hours (factors such as the load, the number of cycles and the screws revolutions must be taken into account).

The unit is delivered lubricated with KLUBER ISOFLEX TOPAS NLGI grease type 2, (DIN 51818). When using the unit at high speeds choose type 1, and for heavy loads type 3.

Continuous lubrication is not advised because the alternating motion deposits too much grease on the screw filling the spindle tube and reducing the available stroke together. There will also be an increase in temperature.

GENERAL TECHNICAL DATA

COMMENTS

This general data is applicable to all the electromechanical actuators, specific technical data is shown for each model.

DUTY CYCLE

The duty cycle can be defined as the relation between the running time, under load, and the total cycle time.

$$Fc = \text{Duty cycle} = \frac{T}{T + R} \times 100$$

Where: T = On-time with load.
R = Idle time.
T + R = Total cycle time.

MAXIMUN LOAD ALLOWABLE

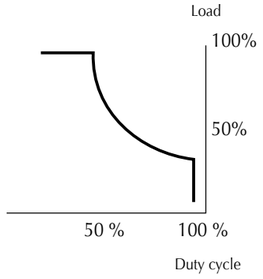
The maximun load allowable is defined as the load advised by the manufacturer. It should not be exceeded as the life of the units will be adversly effected.

BASIC ELEMENT OF MODEL

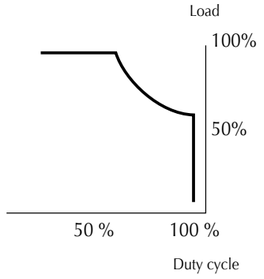
The screw is the basic drive element and can be either ball-screw or trapezoidal. Depending on the load applied the following graphs show the maximum duty cycle.

DUTY CYCLE DIAGRAM

TRAPEZOIDAL SCREW



BALL-SCREW



RELATIONSHIP BETWEEN LOAD AND DUTY CYCLE

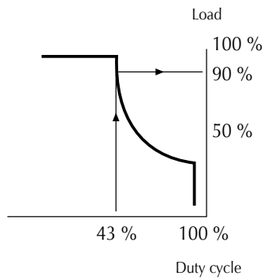
The maximum allowable load depends on the duty cycle. The load should be reduced when the duty cycles increases. If the advised duty is exceeded the actuator can be damaged.

GENERAL TECHNICAL DATA

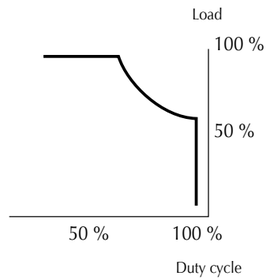
EXAMPLE

An M205 actuator with a trapezoidal screw moves for 15 seconds stops for 20 seconds then repeats this cycle.

TRAPEZOIDAL SCREW



BALL-SCREW



$$Fc = \text{Duty cycle} = \frac{T}{T + R} \times 100$$

$$\frac{15}{15 + 20} \times 100 = 43\ \%$$

If we enter a duty cycle of 43% on the trapezoidal screw graph we obtain a maximum allowable load of 90%.
For this load we apply the appropriate percentage to the maximum dynamic load.
If we utilise the basic actuator F-30, we have a maximum dynamic load of 10.000N.

Maximum load = 10.000N, (each basic model has a specific maximum load see page 11)

Therefore the maximum allowable load is 0.9 x 10.000N = 9.000N

DEFINITION OF THE REQUIRED TORQUE

The required torque is defined as the force required in order to move actuator under load.

THE REQUIRED TORQUE CALCULATION

In order to calculate the required torque the following formula will be used:

$$\text{Torque} = \frac{P \times F}{2.000 \times \pi \times C}$$

P = The screw's pitch in mm.
F = Force required in N.
C = The efficiency constant; 0.8 for the ball-screw and 0.2 for the trapezoidal screw.

EXAMPLE OF A TORQUE CALCULATION

An electromechanical actuator F-30 with a ball screw having a pitch of 5 has to move a load of 250 Kg. in a vertical plane. What would be the required torque?.

$$\text{Force} = M \times g = 250 \times 9.81 = 2.500N$$

$$\text{Torque} = \frac{2.500 \times 5}{2.000 \times \pi \times 0.8} = 2.486\ \text{Nm}$$ (C = 0.8 because it is a ball screw)

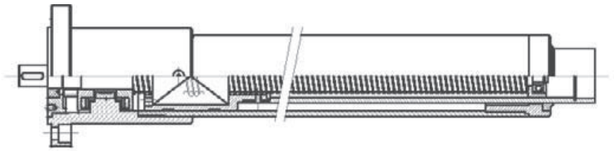
SELECTION CRITERIA

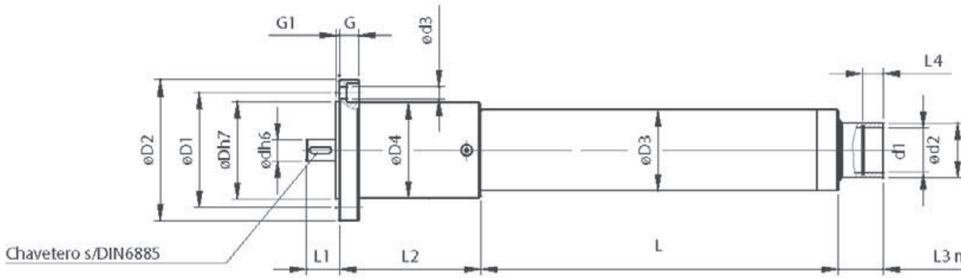
We must take into account the fact that with the same actuator, for example with a screw actuator of ø 32, several different speeds can be achieved dependant on the screw's pitch (in this case it could be of 5, 10 or 40 mm/revolution).
Equally the gear ratio of the gear box affects the achievable travel speed.

SPECIFIC MODELS

M100 BASIC MODEL ACTUATOR

The basic model actuator has been designed to easily attach several types of drive i.e. manual, electrical, mechanical, etc.
The linear speed is determined by the RPM of the motor and the pitch of the screw.
The thrust depends on the screw pitch and motor power.





Technical features

Model	Screw-pitch	ø	Load kN
M100-F16	KGT 5	16	2,5
	Tr 4	16	2,5
M100-F20	KGT 5	20	5
	KGT 20	20	5
	Tr 5	24	5

Model	Screw-pitch	ø	Load kN
M100-F30	KGT 5	32	10
	KGT 10	32	15
	KGT 40	32	10
	Tr 6	36	10

Model	Screw-pitch	ø	Load kN
M100-F40	KGT 10	40	25
	KGT 20	40	25
	KGT 40	40	20
	Tr 7	44	25

Model	Screw-pitch	ø	Load kN
M100-F50	KGT 10	50	65
	KGT 20	50	70
	Tr 9	60	70

Dimensions

Model	d	d_1	d_2	d_3	D	D_1	D_2	D_3	D_4	G	G_1	L*	Standard strokes	L_1	L_2	L_3	L_4
M100-F16	11	M26 x 1,5	32	7(4x)	48	56	75	40	45	12	2	79 + Stroke	100, 200, 300, 400	15	61	41	20
M100-F20	14	M27 x 2	35	9(4x)	72	84	110	55	66	15	2	108 + Stroke	100, 200, 300, 500	30	100	36	26
M100-F30	19	M42 x 2	50	11(4x)	90	106	130	75	88	18	3	124 + Stroke	200, 400, 600, 1000	35	130	37	30
M100-F40	24	M60 x 2	70	11(6x)	110	130	150	90	110	20	4	155 + Stroke	250, 500, 750, 1000	40	150	67	35
M100-F50	35	M80 x 2	90	13(6x)	200	225	250	150	200	30	5	185 + Stroke	300, 600, 1000, 1500	70	300	95	40

NOTE: Effective November 2010, VERSARam Actuators have 40mm extra length, to provide a default over-travel safety of 20mm at each end of travel. Please consult the factory if you require a substitute or duplicate actuator to one purchased prior to that date.

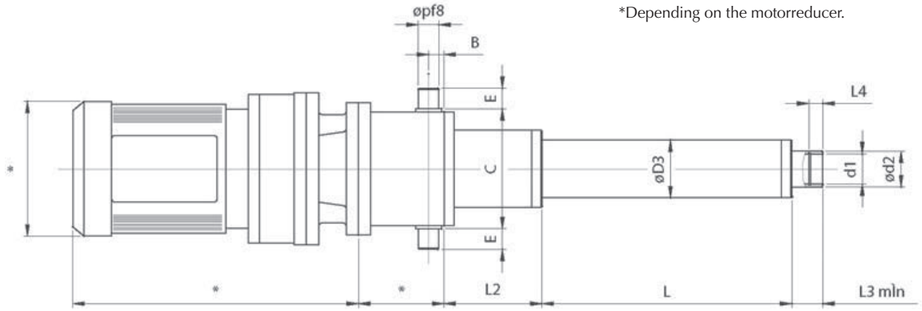
SPECIFIC MODELS

M205 ACTUATOR WITH IN LINE GEARBOX AND A.C. MOTOR DRIVE

The M205 actuator has been designed for handling high loads with low to medium speeds.

Components of the actuator
- Actuator: Basic model.
- Fixing: Trunnion mount.
- Drive: Geared motor with a wide range of gear ratios. Supply voltage 220/380 V A.C.
- Braked motor (optional).

*Depending on the motorreducer.



Technical features

Model	Screw-pitch	ø	Load kN
M205-F20	KGT 5	20	5
	KGT 20	20	5
	Tr 5	24	5

Model	Screw-pitch	ø	Load kN
M205-F30	KGT 5	32	10
	KGT 10	32	15
	KGT 40	32	10
	Tr 6	36	10

Model	Screw-pitch	ø	Load kN
M205-F40	KGT 10	40	25
	KGT 20	40	25
	KGT 40	40	20
	Tr 7	44	25

Model	Screw-pitch	ø	Load kN
M205-F50	KGT 10	50	65
	KGT 20	50	70
	Tr 9	60	70

Dimensions

Model	d_1	d_2	D_3	L*	Standard strokes	L_2	L_3	L_4	B	C	E	p
M205-F20	M27 x 2	35	55	108 + Stroke	100, 200, 300, 500	100	36	25	15	116	20	20
M205-F30	M42 x 2	50	75	124 + Stroke	200, 400, 600, 1000	130	37	30	20	138	25	25
M205-F40	M60 x 2	70	90	155 + Stroke	250, 500, 750, 1000	150	67	35	30	160	35	35
M205-F50	M80 x 2	90	150	185 + Stroke	300, 600, 1000, 1500	300	95	40	40	260	45	45

NOTE: Effective November 2010, VERSARam Actuators have 40mm extra length, to provide a default over-travel safety of 20mm at each end of travel. Please consult the factory if you require a substitute or duplicate actuator to one purchased prior to that date.

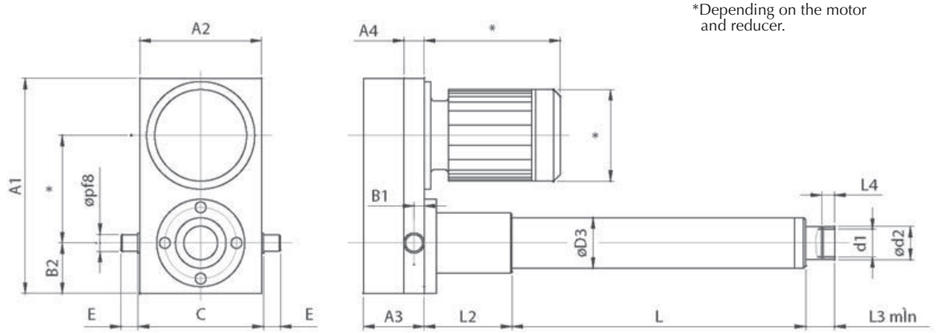
SPECIFIC MODELS

M501 ACTUATOR WITH RIGHT ANGLED BELT DRIVE AND PARALLEL MOTORS

This actuator has been designed for medium loads and a wide range of speeds.
It needs to be mounted with a motor or motor gearbox combination and a toothed belt drive. A braked motor can be supplied if needed.

Components of the actuator
- Actuator: Basic model.
- Fixing: Trunnion / clevis mount.
- Driving: Any kind of motor and toothed belt drive.
- Braked motor (optional).

*Depending on the motor and reducer.



Technical features

Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN
M501-F16	KGT 5	16	1,8	**M501-F30**	KGT 5	32	9	**M501-F40**	KGT 10	40	25	**M501-F50**	KGT 10	50	30
	Tr 4	16	1		KGT 10	32	4,5		KGT 20	40	15		KGT 20	50	15
	KGT 5	20	5		KGT 40	32	1,2		KGT 40	40	7		Tr 9	60	8
M501-F20	KGT 20	20	1,3		Tr 6	36	2		Tr 7	44	10				
	Tr 5	24	1,2												

Dimensions

Model	d_1	d_2	D_3	L*	Standard strokes	L_2	L_3	L_4	A_1	A_2	A_3	A_4	B_1	B_2	C	E	p
M501-F16	M26 x 1,5	32	40	79 + Stroke	100, 200, 300, 400	61	41	20	245	130	70	20	10	50	138	18	12
M501-F20	M27 x 2	35	55	108 + Stroke	100, 200, 300, 500	100	36	25	300	150	85	25	12,5	65	160	20	20
M501-F30	M42 x 2	50	75	124 + Stroke	200, 400, 600, 1000	130	37	30	320	180	90	30	15	90	192	25	25
M501-F40	M60 x 2	70	90	155 + Stroke	250, 500, 750, 1000	150	67	35	490	250	135	40	20	135	270	35	35
M501-F50	M80 x 2	90	150	185 + Stroke	300, 600, 1000, 1500	300	95	40	600	300	182	50	25	135	320	45	45

NOTE: Effective November 2010, VERSARam Actuators have 40mm extra length, to provide a default over-travel safety of 20mm at each end of travel. Please consult the factory if you require a substitute or duplicate actuator to one purchased prior to that date.

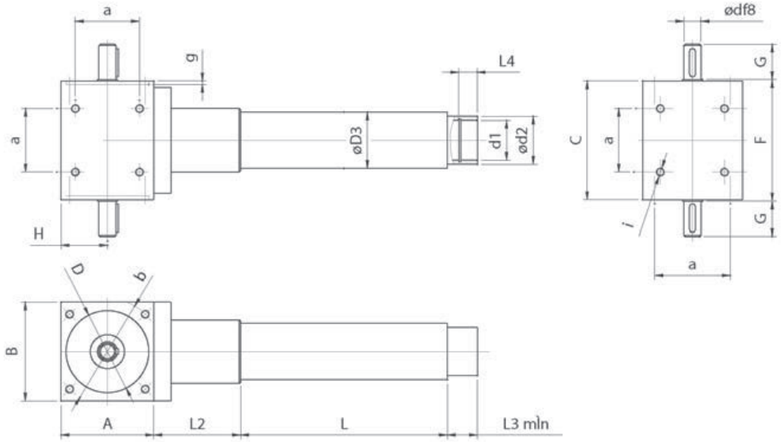
ELECTROMECHANICAL LINEAR ACTUATORS

SPECIFIC MODELS

M505 ACTUATOR WITH INTEGRATED RIGHT ANGLED BEVEL GEAR BOX

The M505 actuator has been designed for mounting several units in parallel and the drive to be at 90°.

*For sizes F40 & F50 get in touch with Precision Technology.



Technical features

Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN
M505-F16	KGT 5	16	2,5	**M505-F20**	KGT 5	20	5	**M505-F30**	KGT 5	32	10
	Tr 4	16	2,5		KGT 20	20	5		KGT 10	32	15
					Tr 5	24	5		KGT 40	32	10
									Tr 6	36	10

Dimensions

Model	d	d_1	d_2	D_3	L	Standard strokes	L_2	L_3	L_4	A	B	C	D	F	G	H	a	b	g	i
M505-F16	14	M26 x 1,5	32	40	79 + Stroke	100, 200, 300, 400	61	41	20	65	70	84	58	86	25	32,5	45	75	2	M6 x 10
M505-F20	16	M27 x 2	35	55	108 + Stroke	100, 200, 300, 500	100	36	26	90	90	110	62	112	34	45	70	75	3	M10 x 18
M505-F30	19	M42 x 2	50	75	124 + Stroke	200, 400, 600, 1000	130	37	30	120	120	154	75	158	40	60	100	100	5	M10 x 18

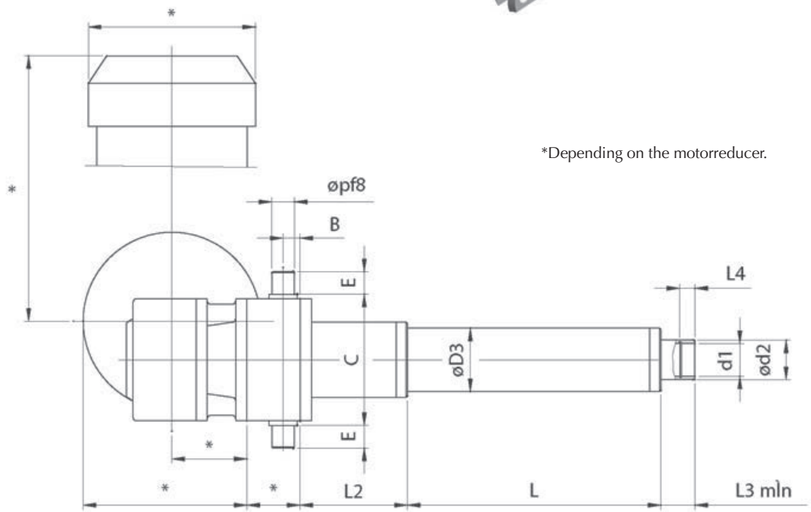
NOTE: Effective November 2010, VERSARam Actuators have 40mm extra length, to provide a default over-travel safety of 20mm at each end of travel. Please consult the factory if you require a substitute or duplicate actuator to one purchased prior to that date.

M601 ACTUATOR WITH A.C. MOTOR AND RIGHT ANGLED GEAR DRIVE

The M601 actuator has been designed for loads up to 750.000N and speeds ranging from 1 and 200 mm/sec.

Components of the actuator
- Actuator: Basic model.
- Fixing: Via motor housing.
- Driving: Low profile gearbox. Wide range of gear ratios.
- Brake-motor (optional).

*Depending on the motorreducer.



Technical features

Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN
	KGT 5	20	5		KGT 5	32	10		KGT 10	40	25		KGT 10	50	65
M601-F20	KGT 20	20	5	**M601-F30**	KGT 10	32	15	**M601-F40**	KGT 20	40	25	**M601-F50**	KGT 20	50	70
	Tr 5	24	5		KGT 40	32	10		KGT 40	40	20		Tr 9	60	70
					Tr 6	36	10		Tr 7	44	25				

Dimensions

Model	d_1	d_2	D_3	L	Standard strokes	L_2	L_3	L_4	B	C	E	p
M601-F20	M27 x 2	35	55	108 + Stroke	100, 200, 300, 500	100	36	26	15	116	20	20
M601-F30	M42 x 2	50	75	124 + Stroke	200, 400, 600, 1000	130	37	30	20	138	25	25
M601-F40	M60 x 2	70	90	155 + Stroke	250, 500, 750, 1000	150	67	35	30	160	35	35
M601-F50	M80 x 2	90	150	185 + Stroke	300, 600, 1000, 1500	300	95	40	40	260	45	45

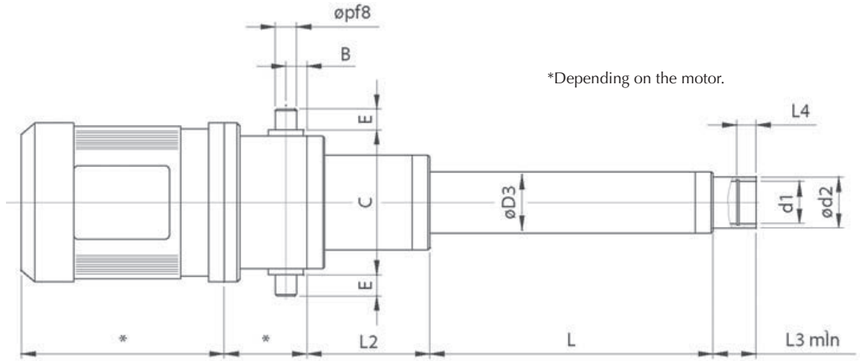
NOTE: Effective November 2010, VERSARam Actuators have 40mm extra length, to provide a default over-travel safety of 20mm at each end of travel. Please consult the factory if you require a substitute or duplicate actuator to one purchased prior to that date.

M605 ACTUATOR WITH A.C. MOTOR DRIVE AND IN-LINE ARRANGEMENT

The M605 actuator has been designed to work at high travel speed with low-medium loads.

Components of the actuator
- Actuator: Basic model.
- Fixing: Trunnion mount.
- Drive: A.C. motor.
- Brake motor (optional).

*Depending on the motor.



Technical features

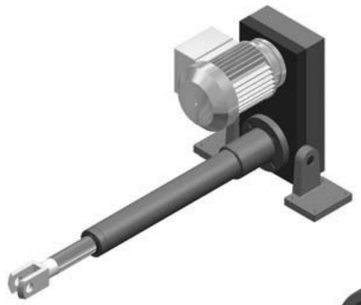
Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN	Model	Screw-pitch	ø	Load kN
M605-F16	KGT 5	16	2,5	**M605-F30**	KGT 5	32	10	**M605-F40**	KGT 10	40	25	**M605-F50**	KGT 10	50	65
	Tr 4	16	2,5		KGT 10	32	15		KGT 20	40	25		KGT 20	50	70
	KGT 5	20	5		KGT 40	32	10		KGT 40	40	20		Tr 9	60	70
M605-F20	KGT 20	20	5		Tr 6	36	10		Tr 7	44	25				
	Tr 5	24	5												

Dimensions

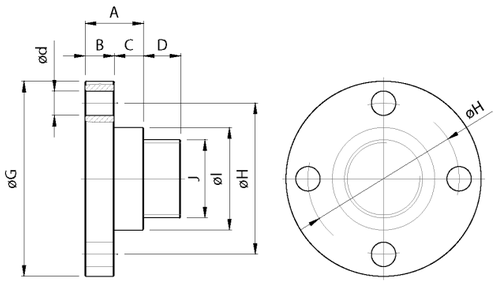
Model	d_1	d_2	D_3	L	Standard strokes	L_2	L_3	L_4	B	C	E	p
M605-F16	M26 x 1,5	32	40	79 + Stroke	100, 200, 300, 400	61	41	20	12	82	18	12
M605-F20	M27 x 2	35	55	108 + Stroke	100, 200, 300, 500	100	36	26	15	116	20	20
M605-F30	M42 x 2	50	75	124 + Stroke	200, 400, 600, 1000	130	37	30	20	138	25	25
M605-F40	M60 x 2	70	90	155 + Stroke	250, 500, 750, 1000	150	67	35	30	160	35	35
M605-F50	M80 x 2	90	150	185 + Stroke	300, 600, 1000, 1500	300	95	40	40	260	45	45

NOTE: Effective November 2010, VERSARam Actuators have 40mm extra length, to provide a default over-travel safety of 20mm at each end of travel. Please consult the factory if you require a substitute or duplicate actuator to one purchased prior to that date.

ACCESSORIES



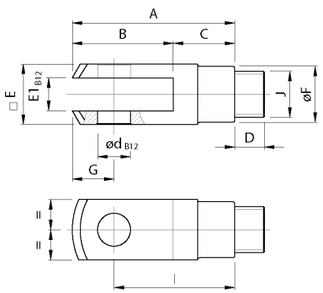
BP TOP PLATES

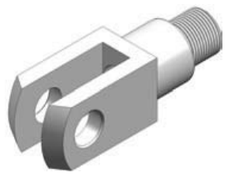


Dimensions in mm.

Size	A	B	C	D	d	G	H	I	J
BP-16	21	8	13	18	11	80	60	38,7	M26 x 1,5
BP-20	23	10	13	23	11	90	67	46	M27 x 2
BP-30	30	15	15	27	13	110	85	60	M42 x 2
BP-40	50	20	30	33	17	150	117	85	M60 x 2
BP-50	60	30	30	38	25	200	155	105	M80 x 2

GKB CLEVIS ROD

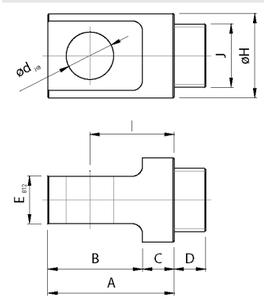




Dimensions in mm.

Size	A	B	C	D	E	E_1	F	d	G	I	J
GKB-16	83	51	32	18	32	16	30	16	19	64	M26x1,5
GKB-20	105	65	40	23	40	20	37	20	25	80	M27x2
GKB-30	148	92	56	27	55	30	51	30	38	110	M42x2

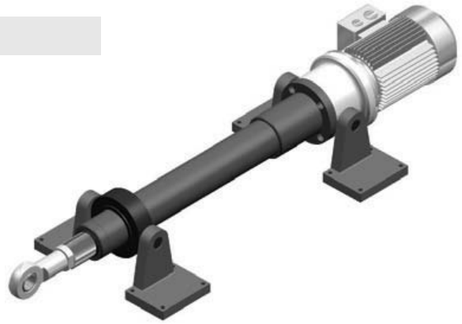
GK CLEVIS ROD



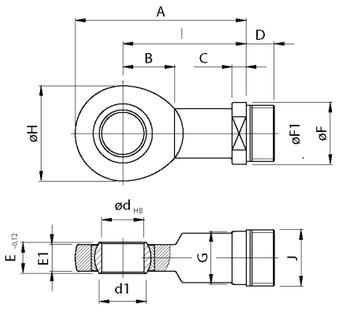
Dimensions in mm.

Size	A	B	C	D	E	H	d	I	J
GK-40	120	90	30	33	60	80	45	80	M60 x 2
GK-50	150	110	40	38	70	100	60	100	M80 x 2

ACCESSORIES

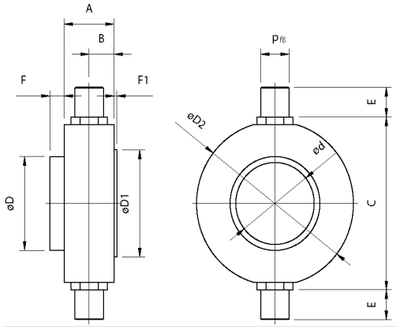


GIR BALL JOINTS



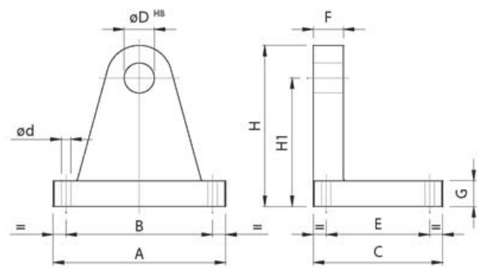
Size	A	B	C	D	E	E_1	F	F_1	G	H	d	d_1	I	J
GIR-16	81	20	8	18	12	10	26	21	22	40	15	18,4	61	M26 x 1,5
GIR-20	103,5	27	10	23	16	13	35	27,5	32	53	20	24,1	77	M27 x 2
GIR-30	146,5	37	15	27	22	19	50	40	41	73	30	34,2	110	M42 x 2
GIR-40	196	52	20	33	32	27	70	58	60	102	45	50,7	145	M60 x 2
GIR-50	242,5	75	20	38	44	38	88	70	75	135	60	66,8	175	M80 x 2

BB TRUNNION MOUNT

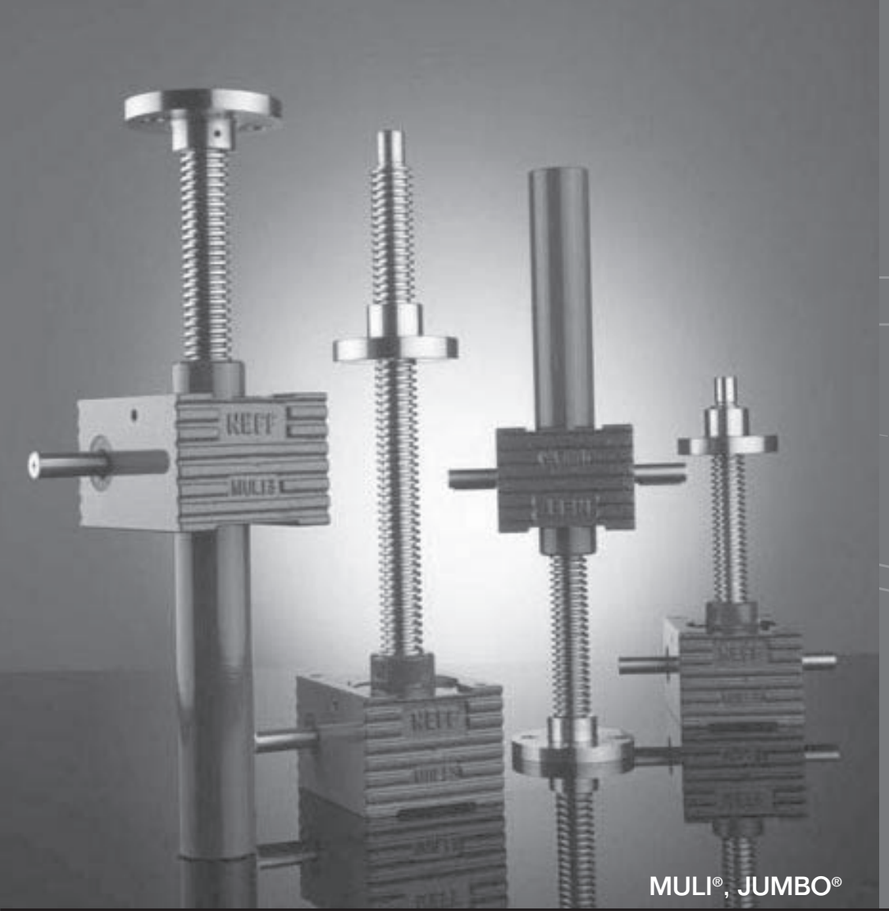


Size	A	B	C	d	D	D_1	D_2	E	F	F_1	p
BB-16	30	15	82	40	48	48	75	18	10	2	12
BB-20	35	17,5	116	55	63	72	110	20	10	2	20
BB-30	40	20	138	75	85	90	130	25	12	3	25
BB-40	50	25	160	90	102	110	150	35	14	4	35
BB-50	60	30	260	150	170	200	250	45	20	5	45

SB TIP SUPPORT



Size	A	B	C	D	E	F	G	H	H_1	d
SB-16	80	60	65	12	45	18	12	80	65	7
SB-20	100	80	80	20	60	20	15	107	85	9
SB-30	130	110	100	25	80	25	20	137	110	9
SB-40	200	170	150	35	120	35	30	188	150	11
SB-50	240	210	180	45	150	45	35	222	175	13



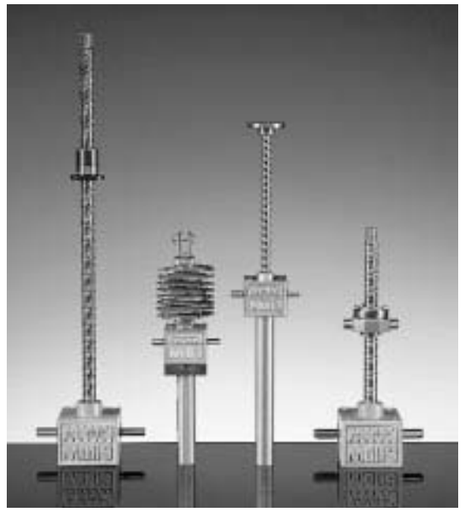
Lifting >> Tilting >> Lowering >> Feeding

Precision Technology USA **Screw Jacks**

Superior performance. Superior design.

Precision Technology USA
ENGINEERED ACTUATORS

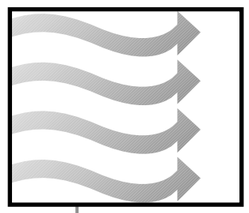
Redefining the performance limits with a new class of screw jacks



The range of Precision Technology USA, Inc. worm gear screw jacks is comprised of ten models with lifting capacities from 5 kN to 500 kN (5.6 to 56 tons). All versions are designed for both tensile and compressive loads and will operate in any orientation or mounting position.

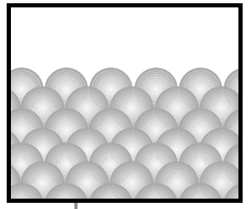
They meet the most demanding technical standards:

- Wide range of load capacities
- High and low speeds
- Cubic shape of the housing with predrilled flange bores allows ideal attachment of a motor, gearbox or rotary encoder
- Standard mounting parts and end fittings
- Easy synchronization of several worm gear screw jack units
- Ball screw or trapezoidal screw, as required for the application concerned
- Extensive variations can accommodate special requirements (e.g. safety nut)
- Complete range of accessories



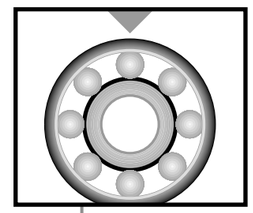
The design

The cubic shape with integrated cooling fins permits a longer duty cycle, as the heat is dissipated more effectively, thus extending the service life of the lubricant. The surface coating also protects the jack against corrosion.



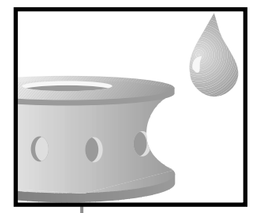
The housing material

The mechanical strength of the housing has been improved, particularly at high temperature, through the use of spheroidal graphite iron instead of the former cast iron. This ensures greater reliability, even in tough service conditions.



The bearings

Taper roller bearings on the worm shaft and heavy-duty ball bearings as the main thrust bearings make it possible to move higher loads, increase the safety reserve and extend the service life.



The lubrication

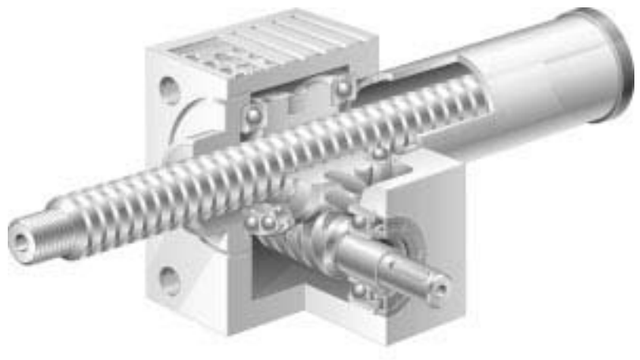
The trapezoidal screw (version N) is greased by radial lubrication holes on the worm wheel. This lowers friction and temperature and extends the service life, particularly when operating with longer stroke lengths.

Cubic face screw jacks

Design versions

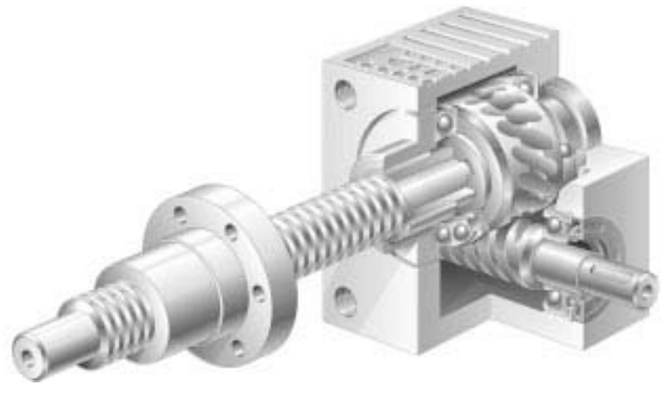
MULI® 1 to MULI® 5
5 to 100 kN (0.56 to 11.2 tons)

Axially translating screw—version N or V
The rotary motion of precision worm gearing (worm shaft and internally threaded worm wheel) is converted into axial linear motion of the screw, which travels/translates through the gearbox housing. The load is attached to the end of the screw.



JUMBO® 1 to JUMBO® 5
150 to 500 kN (16.8 to 56 tons)

Rotating screw—version R
Driven by a precision worm gearing (screw keyed to the worm wheel), the rotary motion of the screw is translated into linear motion of the traveling nut on the screw.



Version N

Rotation of the screw is prevented by its permanent attachment to the guide load.

Version V

Version V with anti-rotation device is recommended if the screw cannot be secured externally to prevent rotation.

Version R

Note:
The travelling nut must be ordered separately.

Gear ratio H

One full turn of the worm shaft produces a stroke of 1 mm (see pg. 14)

Gear ratio L

One full turn of the worm shaft produces a stroke of 0.25 mm (see pg. 14)

Trapezoidal screw

For tough conditions
Good price/performance ratio

Ball screw

For longer duty cycles
Higher efficiency
High positional accuracy

Technical data

Cubic face screw jacks

The range includes a total of ten worm gear screw jack models in two series: MULI® 1 to MULI® 5 with lifting capacities up to 100 kN (11 tons) and JUMBO® 1 to JUMBO® 5 with lifting capacities from 150 kN (16 tons) to 500 kN (56 tons) statically.

Speed of travel

Gear ratio H (high speed)
For worm gear screw jacks fitted with standard trapezoidal screws, one full turn of the worm shaft produces a stroke of 1 mm and a linear speed of 1500 mm/minute at 1500 rpm. The figures for units fitted with ball screws range from 1071 mm/minute to 2142 mm/minute depending on size and pitch.

Gear ratio L (low speed)
For worm gear screw jacks fitted with standard trapezoidal screws, one full turn of the worm shaft produces a stroke of 0.25 mm and a linear speed of 375 mm/minute at 1500 rpm. The figures for units fitted with ball screws range from 312 mm/minute to 535 mm/minute depending on size and pitch.

Please note that higher speeds of travel can be achieved with larger screw pitches or multiple start screws.

Tolerances and backlash

- The gearbox housings are machined on the four mounting sides. The tolerances conform to DIN ISO 2768-mH. The sides that are not machined (the cooling ribs) conform to DIN 1685, GTB 18.
- The axial backlash of the jack screw under alternating load is as follows:
  -Trapezoidal screws: up to 0.4 mm
  -Ball screws: 0.08 mm
- The lateral play between the outside diameter of the screw and the guide diameter is 0.2 mm.
- The backlash in the worm gears is ±4° of the input shaft. A predetermined axial float is built into the input shaft bearing assembly of all models from MULI® 4 upwards to accommodate thermal expansion during operation.
- Trapezoidal screws are manufactured to a straightness of 0.3-1.5 mm/meter, ball screws to a straightness of 0.08 mm/meter over a length of 1000 mm and to the following pitch accuracies:
  MULI® 1–MULI® 5:
  0.05 mm/300 mm length
  JUMBO® 1–JUMBO® 5:
  0.2 mm/300 mm length

Lateral forces on the jack screw
Any lateral forces that may occur should be taken by an external guide rail.

Stop collar A
Prevents the screw from being removed from the jack gearbox. Fitted as standard on ball screw versions N and V. Optionally available for screw jacks with trapezoidal screws. The stop collar cannot be used as a fixed stop.

Self-locking
The self-locking function depends on a variety of parameters:

- Large pitches
- Different gear ratios
- Lubrication
- Friction parameters
- Ambient influences, such as high or low temperatures, vibrations, etc.
- The mounting position

Versions with ball screw and large pitches are consequently not self-locking. Suitable brakes or braking motors must therefore be considered in such cases. Limited self-locking is available for smaller pitches (single-start).

Special versions
In addition to the extensive standard range, Precision Technology USA, Inc. can also supply anti-clockwise, multi-start and special material worm gear screw jacks on request.

Technical data

Trapezoidal screws and ball screws

Trapezoidal screws

		MULI 1	MULI 2	MULI 3	MULI 4	MULI 5	JUMBO 1	JUMBO 2	JUMBO 3	JUMBO 4	JUMBO 5
Maximum lifting capacity [kN][2]		5	10	25	50	100	150	200	250	350	500
Maximum lifting capacity [tons]		0.6	1.1	2.8	5.6	11.2	16.8	22.4	28.0	39.2	56.0
Screw diameter and pitch [mm]		18 x 4	20 x 4	30 x 6	40 x 7	55 x 9	60 x 9	70 x 10	80 x 10	100 x 10	120 x 14
Stroke in mm per full turn	Ratio H[1]	1	1	1	1	1	1	1	1	1	1
of the worm shaft	Ratio L[1]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Gear ratio	Ratio H[1]	4:1	4:1	6:1	7:1	9:1	9:1	10:1	10:1	10:1	14:1
	Ratio L[1]	16:1	16:1	24:1	28:1	36:1	36:1	40:1	40:1	40:1	56:1
Efficiency [%][3]	Ratio H[1]	31	29	29	26	24	23	22	20	19	19
	Ratio L[1]	25	23	23	21	19	18	17	15	15	15
Weight [kg] (zero stroke)		1.2	2.1	6.0	17.0	32.0	41.0	57.0	57.0	85.0	160.0
Weight [kg per 100 mm stroke]		0.26	0.42	1.14	1.67	3.04	3.1	4.45	6.13	7.9	11.5
Idling torque [Nm]	H	0.04	0.11	0.15	0.35	0.84	0.88	1.28	1.32	1.62	1.98
	L	0.03	0.10	0.12	0.25	0.51	0.57	0.92	0.97	1.10	1.42

Ball screws

		MULI 1	MULI 2	MULI 3	MULI 4		MULI 5	JUMBO 3
Maximum lifting capacity [kN][2]		5	10	12.5	22	42	65	78
Maximum lifting capacity [tons]		0.6	1.1	1.4	2.5	4.7	7.3	8.7
Screw diameter and pitch [mm]		1605	2005	2505	4005	4010	5010	8010
Stroke in mm per full turn	Ratio H[1]	1.25	1.25	0.83	0.71	1.43	1.1	1
of the worm shaft	Ratio L[1]	0.31	0.31	0.21	0.18	0.36	0.28	0.25
Gear ratio	Ratio H[1]	4:1	4:1	6:1	7:1		9:1	10:1
	Ratio L[1]	16:1	16:1	24:1	28:1		36:1	40:1
Efficiency [%][3]	Ratio H[1]	57	56	55	53	56	47	45
	Ratio L[1]	46	44	43	43	45	37	34
Weight [kg] (zero stroke)		1.3	2.3	7.0	19.0		35.0	63.0
Weight [kg per 100 mm stroke]		0.26	0.42	1.14	1.37		3.04	6.13
Idling torque [Nm]	H	0.04	0.11	0.15	0.35		0.84	1.32
	L	0.03	0.10	0.12	0.25		0.51	0.97

1) H = High speed, L = Low speed
2) Depending on speed of travel, operating hours, etc.
3) The specified efficiencies are average values

Unit conversions

Length:	1 m=1000 mm=39.37 inches 1 inch=25.4 mm	**Geometrical moment of inertia:**	1 $m^4=10^{12}$ $mm^4=2.4025 \times 10^6$ in^4
Force:	1 N=0.225 lbf 1 lbf=4.45 N	**Mass moment of inertia:**	1 kg • $m^2=10^4$ kg • $cm^2=0.738$ lb • ft • s^2
Moment of Force:	1 Nm=0.738 lb • ft=8.85 lb • inches 1 lb • ft=1.36 Nm	**Mass:**	1 kg=2.2 lb

Technical data

Assembly and maintenance

Assembly of worm gear screw jack systems

Direction of rotation: Before starting assembly work, the direction of rotation of all worm gear screw jacks, bevel gearboxes and the drive motor must be checked with regard to the feed direction of each individual worm gear screw jack.

Alignment errors: All components must be carefully aligned during assembly. Alignment errors and stresses increase power consumption and lead to overheating and premature wear. Before a drive unit is attached, each worm gear screw jack should be turned through its entire length by hand without load. Variations in the amount of force required and/or axial marks on the outside diameter of the screw indicate alignment errors between the worm gear screw jack and its additional guides. In this case, the relevant mounting bolts must be loosened and the worm gear screw jack turned through by hand again. If the amount of force required is now constant throughout, the appropriate components are aligned.

If not, the alignment error must be localized by loosening additional mounting bolts.

Test run: The direction of rotation of the complete system and correct operation of the limit switches must be checked again before attaching the drive motor. In the case of version N (translating screw jack), check that the screw is lubricated with grease from the interior of the gearbox and lubricate if necessary. In the case of version R (rotating screw jack), the jack screw should be coated with suitable grease to provide lubrication for lifting operation. The first test runs can then be carried out without load. A maximum operating time of 30% must not be exceeded at trial runs under weight for worm gear screw jacks with trapezoidal screws.

Operation: The loads, speeds and operating conditions specified for the worm gear screw jacks and transmission components must not be exceeded even briefly. Failure to observe this condition will invalidate all claims under guarantee.

Maintenance of worm gear screw jacks

Safety: All mounting bolts must be tightened after a short period of operation. The wear of the screw nut (worm gear) must be checked by measuring the thread backlash after approximately 200 hours of operation or sooner if operating conditions are harsh. The screw nut (worm gear) must be replaced if the axial backlash with a single-start thread is more than one-quarter of the thread pitch.

Lubrication: The worm gear screw jacks are lubricated by the manufacturer and are ready for operation on delivery. The versions N and V must be lubricated via their grease nipples with one of the greases specified below at intervals of 30 - 50 operating hours. The screw should be cleaned and greased at the same time. The service life of screw and screw nut can be extended by applying screw spray, particularly before being greased for the first time. We recommend that the gearbox be cleaned to remove old grease and refilled with fresh grease after approximately 700 operating hours or 18 months. The worm gear screw jacks can be dismantled relatively easily:

- Unscrew the two threaded pins securing the bearing cover.
- Unscrew the screw and remove the screw protection if necessary.
- Unscrew the bearing cover with the aid of an open-ended spanner.

Proceed as follows to refit the bearing cover: fit the bearing cover firmly (using approximately ten times the force shown in the table "Guideline values for fitting bearing cover"). Then release it and refit it with the guideline value from the table, checking the axial backlash and smoothness.

Standard grease:
Lithogrease G 421

Recommended or equivalent greases:
Castrol Spheerol BM2
Mobil Mobilgrease XHP
Shell retinax HD2

Guideline values for fitting bearing cover

Size	Torque [Nm]
MULI® 1	5
MULI® 2	9
MULI® 3	13
MULI® 4	32
MULI® 5	60
JUMBO® 1	70
JUMBO® 2	150
JUMBO® 3	150
JUMBO® 4	220
JUMBO® 5	300

Application design considerations

Examples: direction of rotation

Fig. 1

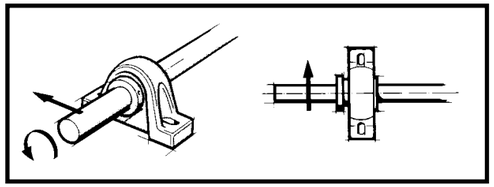


Fig. 1:
Illustration of direction of rotation

Fig. 2

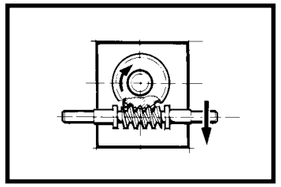


Fig. 2:
Direction of rotation of a worm gear screw jack for lifting motion, top view.

Fig. 3

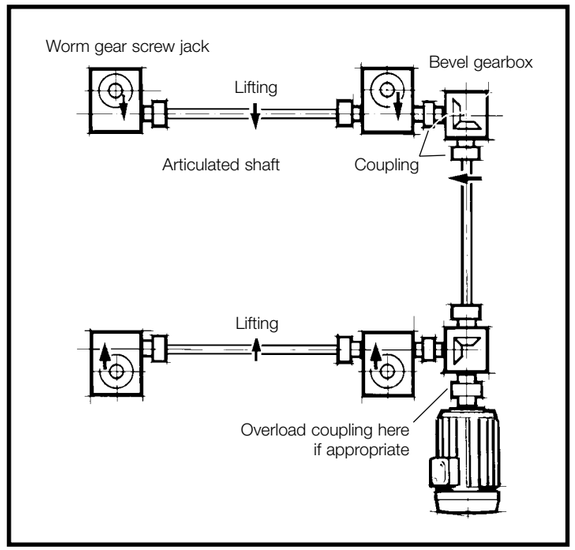


Fig. 3:
Jack system with four worm gear screw jacks and two bevel gearboxes

Fig. 4 (left)
Fig. 5 (right)

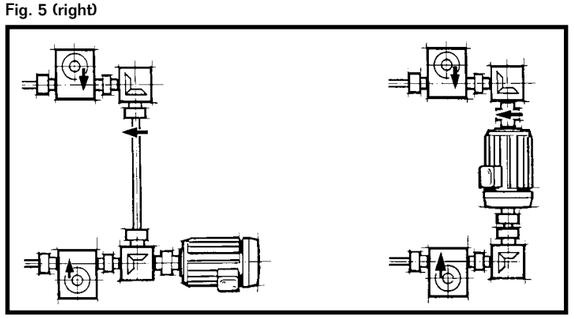


Fig. 4:
Jack system, variant 1:
Different position of drive motor, but only ratio 1:1 possible.
Overload coupling also possible.

Fig. 5:
Jack system, variant 2:
Very economical, but overload coupling not possible.

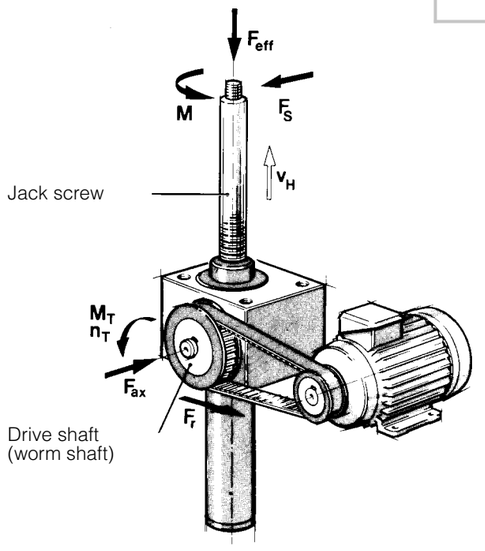
Selection and calculation

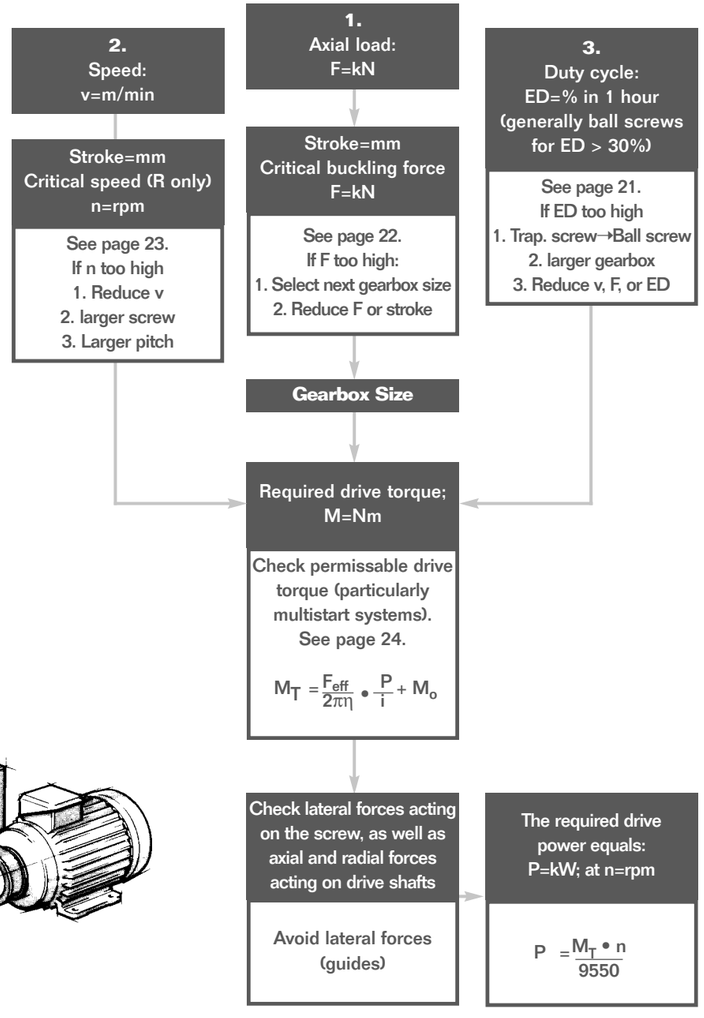
Selection of a worm gear screw jack and corresponding drive unit

After selecting the drive unit, it is important to check whether the worm gear screw jack or any transmission components may be overloaded by the drive unit (see page 25).

The following points should also be established:

1. On which side is the motor to be mounted
2. Direction of rotation of the jack systems





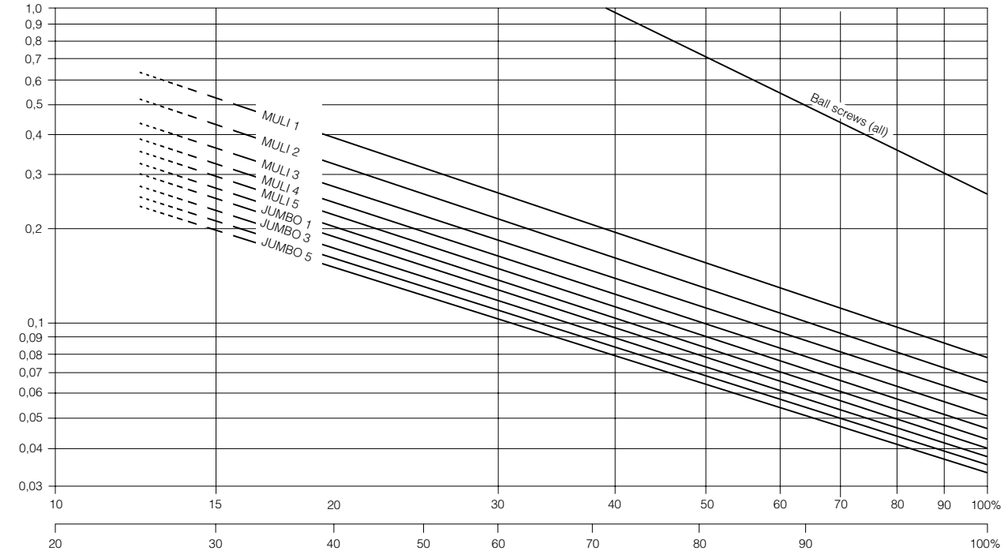
Forces and torque values acting on the worm gear screw jack (See figure above)

Note: Forces and torque values can only be estimated by making simplified assumptions. The coefficients of friction of sliding pairs. the heat which these generate and the resultant service life depend on load. speed. temperature and lubrication conditions. Critical speeds and buckling lengths depend on the rigidity and mass of the clamping systems. machine frames. etc. The results of calculations should therefore be examined critically with regard to the assumptions made. Please contact us if in doubt.

F_{eff} = Axial force acting on the jack screw
F_S = Result of all lateral forces acting on the jack screw
M = Torque of the jack screw or nut (not applicable in the case of version V)
V_H = Lifting speed
F_{ax} = Axial force acting on drive shaft
F_r = Radial force acting on drive shaft
M_T = Drive torque
n_T = Drive speed

Selection and calculation

f_t for version N; the values may be doubled for version L



A: Relative duty cycle based on 1 hour
B: Relative duty cycle based on 10 minutes

Duty cycle and drive power

In order to limit the heat generated by friction within a worm gear screw jack, the lifting force and lifting speed are limited as a function of the relative duty cycle. The maximum permissible lifting force and lifting speed can be estimated with the aid of the following method.

$$F_{eff} \cdot V_H \leq F_{stroke\ max} \cdot V_{H\ max} \cdot f_t$$

F_{eff} Actual axial force acting on the jack screw in kN.

V_H Lifting speed in mm/min.

$F_{stroke\ max}$ Maximum permissible lifting force in kN (see table on page 14).

$V_{H\ max}$ Maximum permissible lifting speed in mm/min. It is calculated from the maximum permissible speed of the worm shaft of 1500 rpm (higher speeds on request) and the transmission ratio of the worm gear screw jack.

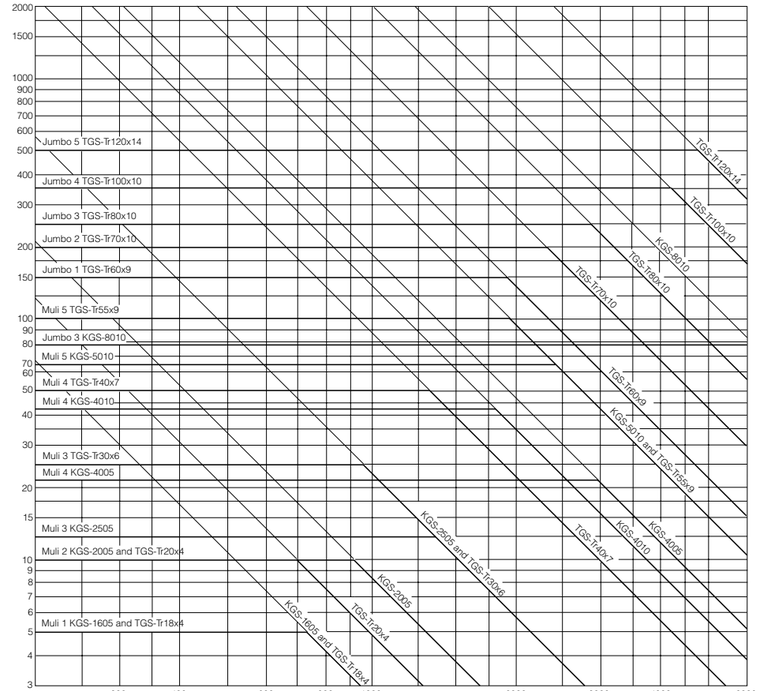
f_t Temperature factor which is dependent on the relative duty factor based on a period of 10 or 60 minutes at 20 °C.

The values determined here do not apply for very short reciprocating strokes. Please consult us in such cases. f_t can be extrapolated to the left-hand edge of the graph in the case of very low relative duty cycles (less than 10 minutes – for occasional positioning operations, adjustments of levels, etc.). This yields the following approximate drive power values in kW with allowance for the efficiency in each case.

	MULI 1	MULI 2	MULI 3	MULI 4	MULI 5	JUMBO 1	JUMBO 2	JUMBO 3	JUMBO 4	JUMBO 5
Ratio H (Trapezoidal)	0.3	0.55	1.18	2.3	4.7	6.5	8.4	10.9	14.7	19
Ratio L (Trapezoidal)	0.19	0.35	0.75	1.4	3	4.2	5.4	7.3	9.3	12
Ball screws	0.3	0.56	0.95	1.7/3.2	5.9	-	-	13.9	-	-

These values are not a criterion for selecting the drive motor; it should be selected on the basis of torque, speed and operating conditions.

Critical buckling force F_{crit} in kN



TGS = Trapezoidal screw
KGS = Ball screw

Critical buckling force of a screw jack under compressive loads

Thin lifting screws may buckle sideways when subjected to compressive loads. Before the permissible compressive force is defined for the screw, allowances must be made for safety factors as appropriate to the installation.

$$F_{eff} \leq f_k \cdot F_{crit} \cdot 1/S_k$$

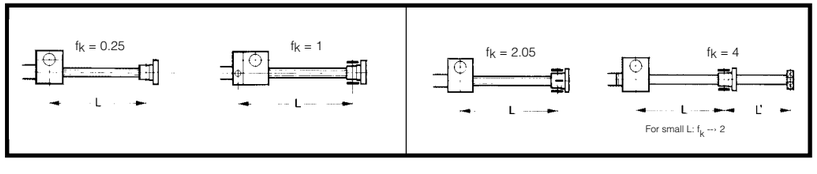
F_{eff} Actual axial force (compressive force) acting on the jack screw in kN.

f_k Correction factor which makes allowance for the type of screw bearing. Sufficiently rigid mounting of the worm gear screw jack is required for cases 2, 3 and 4.

F_{crit} Critical buckling force as a function of the unsupported length L.

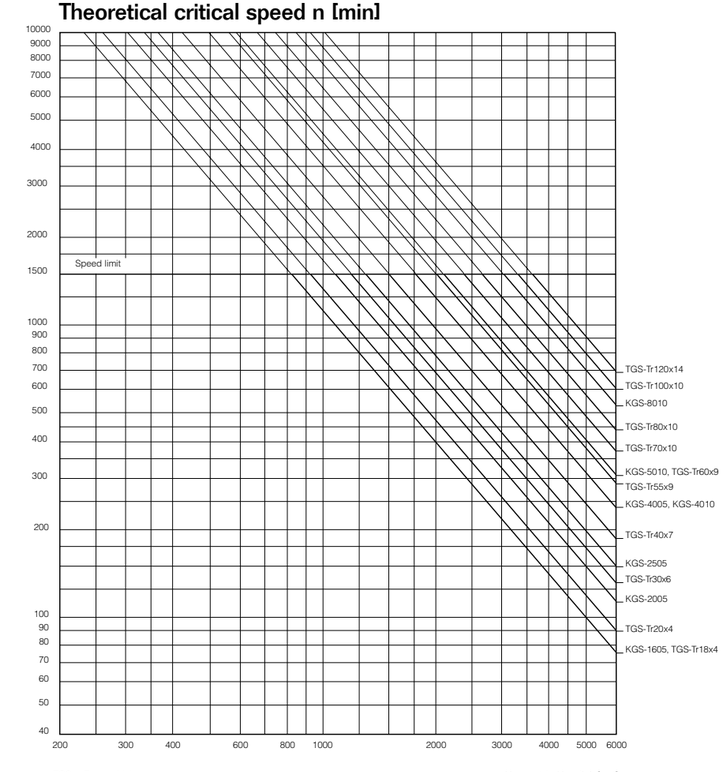
S_k Safety factor that depends on the application in question. Values between 3 and 6 are customary in general mechanical engineering.

Case 1 **Case 2** **Case 3** **Case 4**



Selection and calculation

Theoretical critical speed n [min]



TGS = Trapezoidal screw
KGS = Ball screw

Critical speed of jack screws (version R only)

Resonant bending vibration may develop with thin screws rotating at high speed. Assuming a sufficiently rigid assembly, the resonant frequency can be estimated with the aid of the following method.

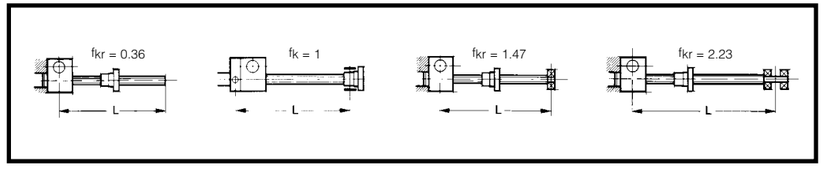
$$n_{perm} = f_{kr} \cdot n_{crit} \cdot 0.8$$

n_{perm} Maximum permissible screw speed in rpm.

f_{kr} Correction factor which makes allowance for the type of screw bearing. Sufficiently rigid mounting of the worm gear screw jack and bearing is required for cases 2, 3 and 4.

n_{crit} Critical screw speed. Corresponds to the basic bending vibration of the screw and leads to resonance effects.

Case 1 **Case 2** **Case 3** **Case 4**



Worm gear screw jacks with multi-start screws are also available for applications with high lifting speeds. These versions run at a considerably lower screw speed with better efficiency for the same lifting speed. They are generally not self-locking.

Screw Jacks

Selection and calculation

Required drive torque for a worm gear screw jack

The required drive torque for a worm gear screw jack is governed by the axial load acting on the jack screw, the transmission ratio and the efficiency. It should be noted that the breakaway torque may be considerably higher than the torque required for continuous running. This applies in particular to worm gear screw jacks with low efficiency after a long standstill period. The acceleration torque should be checked if necessary in cases with large screw pitches and very short run-up times.

$$M_T = \frac{F_{eff}}{2 \cdot \pi \cdot \eta} \cdot \frac{P}{i} + M_o$$

M_T Required drive torque of the worm gear screw drive at the worm shaft in Nm.

F_{eff} Actual force acting on the jack screw in kN.

$\frac{P}{i}$ Transmission ratio of the worm gear screw drive in mm stroke length per revolution of the worm shaft.

η Efficiency of the worm gear screw jack in decimal notation. e.g. 0.32 instead of 32% (for values, see table on page 75). η is an average value determined by measurement.

M_o Idle torque of the worm gear screw drive in Nm. M_O is determined by measurements undertaken after a brief running-in period with liquid grease lubrication at room temperature. It represents an average value which may vary to a greater or lesser extent, depending on the running-in state, lubricant and temperature. For values, see table on page 75.

Required drive torque for a worm gear screw jack system

The required drive torque for a worm gear screw jack system is governed by the drive torque values for the individual jacks, with allowance for the static and dynamic frictional losses in transmission components (coupling, connecting shafts, pedestal bearings, angle gearboxes, etc.). It is useful to draw a diagram illustrating the flow of forces.

$M_{T\,SHG1}$ The required drive torque for the worm gear screw jack SHG 1. It should be noted that the start-up torque (breakaway torque and possibly acceleration torque) may be considerably higher than the torque required for continuous running. This applies in particular to worm gear screw jacks with low efficiency after a long standstill period.

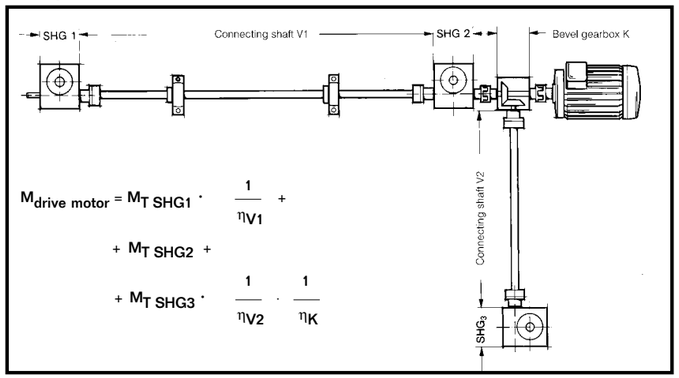
η_{v1} The efficiency of connecting shaft V1.

η_{v2} (V2) includes the static and dynamic frictional losses in the pedestal bearings and couplings.

η_v 0.75...0.95 depending on the length of the shaft and number of pedestal bearings.

η_K The efficiency of the bevel gearbox (only for the force flow via the toothing, i.e. between connecting shaft V2 and the drive motor). η_K = 0.90

Example



Selection and calculation

Maximum drive torque

If the worm gear screw jack jams as a result of the screw coming into contact with an obstacle, the teeth can still absorb the following maximum torque values M_T at the drive shaft.

In the case of screw jacks connected in series, the screw jack closest to the drive can absorb this torque at its drive shaft.

Size	M_T max [Nm]
MULI® 1	3.4
MULI® 2	7.1
MULI® 3	18
MULI® 4	38
MULI® 5	93
JUMBO® 1	148
JUMBO® 2	178
JUMBO® 3	240
JUMBO® 4	340
JUMBO® 5	570

Forces and torque values acting on the drive shaft

If worm gear screw jacks are not driven free of lateral forces by means of a coupling connected to the motor shaft, but are instead driven by chains or belts, care must be taken to ensure that the radial force acting on the drive shaft does not become excessive. The values are specified in the following table.

In the worst case, the worm shaft will bend under radial force F_R and lift off the worm gear. This must be avoided, since it impairs the engagement between worm shaft and worm gear and leads to higher wear.

Size	F_R max [kN]
MULI® 1	0.1
MULI® 2	0.2
MULI® 3	0.3
MULI® 4	0.5
MULI® 5	0.8
JUMBO® 1	0.8
JUMBO® 2	1.3
JUMBO® 3	1.3
JUMBO® 4	2.1
JUMBO® 5	3.1

Selection of drive motor

A suitable drive motor can be selected when the required drive torque and drive speed are known. After selecting a drive motor, check that it will not overload any of the worm gear screw jacks or transmission components. This risk may occur, in particular, in installations with several screw jacks if they are loaded unevenly. It will generally be necessary to install limit switches or torque-limiting couplings to protect the installation against impacting against end positions and obstacles.

Forces and torque values on the motor shaft

Toothed-belt or chain drives may exert considerable radial forces on the motor shaft if a very small sprocket is used. Please consult the motor manufacturer in cases of doubt.

Selection of a bevel gearbox

Selection of a bevel gearbox is governed by the following factors:

- Drive torque
- Drive speed (see dimensional tables)
- Duty cycle and drive power
- Forces and torque values acting on the ends of the shaft (please consult us in cases of doubt)

Required drive speed

The required drive speed is governed by the desired lifting speed, the transmission ratio of the jack and the transmission ratio of the other transmission components. A particular lifting speed can normally be achieved in several ways. Correct selection depends on the following criteria:

- Favorable efficiency
- Minimum load on transmission components in order to achieve compact, low-cost design
- Avoiding critical speeds for jack screws and connecting shafts

Jack screw nut torques

The nut torque (M) of the jack screw is the torque that the jack screw exerts on the mounting plate (all N versions except V), or the torque that the screw applies to the travelling nut (R version). It is not to be confused with the dirve torque (M_T) of the screw jack gears on the worm shaft.

$$M\ [Nm] = F_{eff}\ [kN] \cdot f_M$$

(applicable in the areas of moderate and high loads)

M The jack screw nut torque in Nm for the “lift under load“ movement.

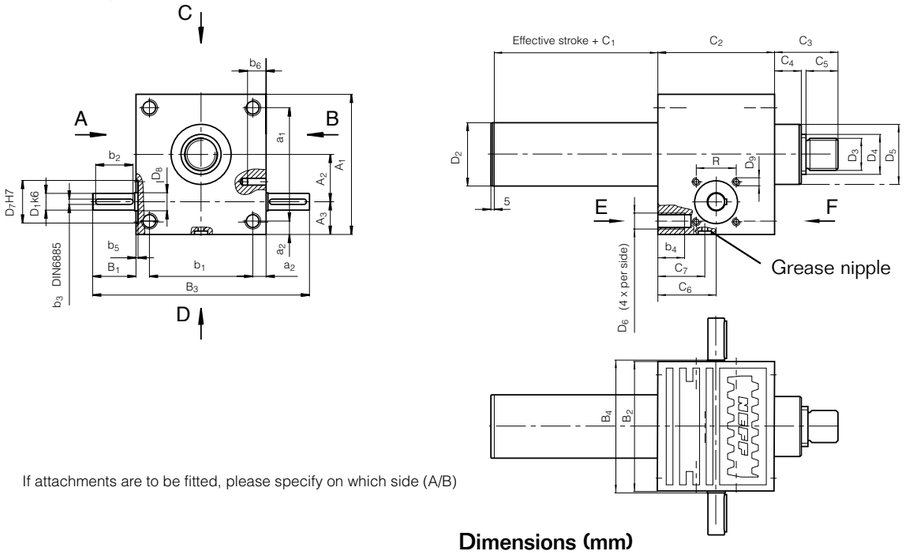
F_{eff} The actual supported axial force in kN.

f_M A conversion factor that accounts for screw geometry and friction. The value is applicable under normal lubrication conditions. The higher value should be applied in the case of dry and static friction. In the case of ball screw drives, f_M is practically constant.

Size	f_M [Nm] Trapezoidal	f_M [Nm] Ball Screw
MULI® 1	1.6	1.6
MULI® 2	1.8	1.6
MULI® 3	2.7	1.6
MULI® 4	3.4	1.6/3.2
MULI® 5	4.6	3.2
JUMBO® 1	5.5	-
JUMBO® 2	6.4	-
JUMBO® 3	7.2	3.2
JUMBO® 4	8	-
JUMBO® 5	10.6	-

Outline drawing and table of dimensions

Versions N, V



If attachments are to be fitted, please specify on which side (A/B)

Size — **Dimensions (mm)**

	A_1 5) Metric	A_2 Metric	A_3 Metric	a_1 Metric	a_2 Metric	B_1 Metric	B_2 Metric	B_3 Metric	B_4 Metric	b_1 Metric	b_2 Metric	b_3 Metric	b_4 Metric	b_5 Metric	C_1 Metric	C_2 Metric	C_3 1) Metric
MULI® 1	80	25	24	60	10	24	72	120	77	52	18	3	13	1.5	20	62	35(46)
MULI® 2	100	32	28	78	11	27.5	85	140	90	63	20	5	15	1.5	30	75	45(48.5)
MULI® 3	130	45	31	106	12	45	105	195	110	81	36	5	15	2	30	82	50
MULI® 4	180	63	39	150	15	47.5	145	240	150	115	36	6	16	2	45	117	65
MULI® 5	200	71	46	166	17	67.5	165	300	170	131	56	8	30	2.5	55	160	95
JUMBO® 1	210	71	49	170	20	65	195	325	200	155	56	8	40	8	55	175	95
JUMBO® 2	240	80	60	190	25	67.5	220	355	225	170	56	8	45	8	55	165	110
JUMBO® 3	240	80	60	190	25	67.5	220	355	225	170	56	8	45	8	55	165	110
JUMBO® 4	290	100	65	230	30	65	250	380	255	190	56	10	54	8	65	220	140
JUMBO® 5	360	135	75	290	35	100	300	500	305	230	90	14	80	8	90	266	200

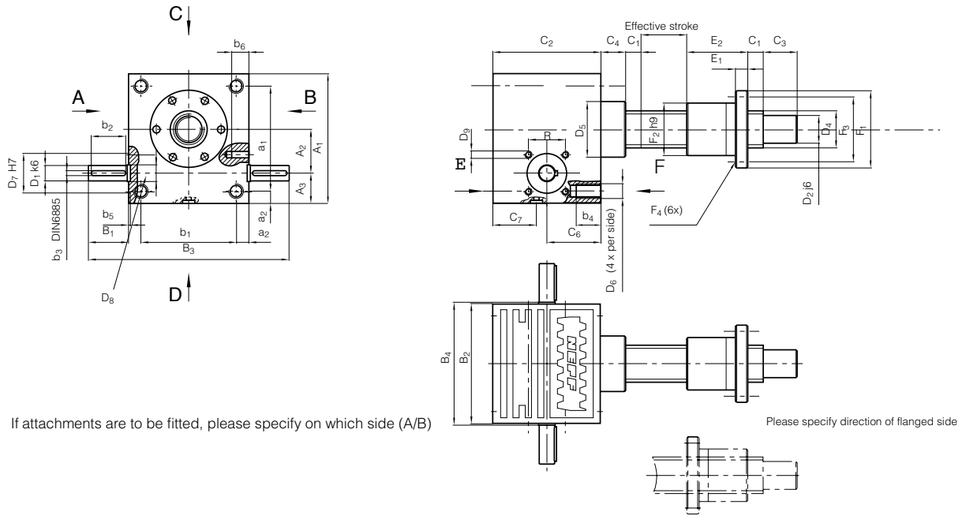
Size — **Dimensions (mm)**

	C_4 2) Metric	C_5 Metric	C_6 Metric	C_7 Metric	D_{1k6} 4) Metric	D_2 3) Metric	D_3 6) Metric	D_4Tr Metric	D_4KGT Metric	D_5 2) Metric	D_6 Metric	D_7H7 Metric	D_8 Metric	D9Xb6 7) Metric	R(TK) 7) Metric	V-KGT Metric
MULI® 1	12(23)	19	31	22	10 X 21.5	33	M12 X 1.75	Tr18 x 4	1605	29.6(48)	M8	28	12	M5 x 10	32(45.25)	30 x 30
MULI® 2	18(21.5)	20	37.5	27	14 X 25	40	M14 X 2.0	Tr20 x 4	2005	38.7(61)	M8	35	15	M6 x 12	35(49.5)	40 x 40
MULI® 3	23	22	41	29	16 X 42.5	50	M20 X 2.5	Tr30 x 6	2505	46	M10	35	17	M8 x 12	44(62.2)	50 x 50
MULI® 4	32	29	58.5	42.5	20 X 45	60	M30 X 3.5	Tr40 x 7	4005/4010	60	M12	52	25	M10 x 15	55(77.8)	60 x 60
MULI® 5	40	48	80	53	25 X 65	82	M36 X 4	Tr55 x 9	5010	85	M20	52	28	M12 x 18	60(84.85)	80 x 80
JUMBO® 1	40	48	87.5	60	25 X 62.5	90	M48 X 2	Tr60 x 9	-	90	M24	52	28	M12 x 18	60(84.85)	-
JUMBO® 2	40	58	82.5	60	30 X 65	115	M56 X 2	Tr70 x 10	-	105	M30	58	32	M12 x 18	(80)	-
JUMBO® 3	40	58	82.5	60	30 X 65	115	M64 X 3	Tr80 x 10	8010	120	M30	58	32	M12 x 18	(80)	120 x 120
JUMBO® 4	50	78	110	86	35 X 62.5	133	M72 X 3	Tr100 x 10	-	145	M36	72	40	M16 x 30	(100)	-
JUMBO® 5	60	118	133	109	48 X 97.5	153	M100 X 3	Tr120 x 14	-	170	M42	80	50	M16 x 40	(115)	-

1) This dimension refers to the closed height and represents a minimum. It must be increased if bellows are used (see page 34).
2) The values in brackets refer to version with ball screw.
3) Square tube for version with ball screw and anti-rotation device.
4) Diameter and length to shoulder.
5) Dimension A_1 in accordance to DIN 1685 GTB 18.
6) In accordance to DIN 13 screw thread: MULI®. In accordance to DIN 13 fine pitch thread: JUMBO®.
7) JUMBO® 2 – JUMBO® 5, only 3 holes are present.

Outline drawing and table of dimensions

Version R



If attachments are to be fitted, please specify on which side (A/B)

Please specify direction of flanged side

Size — **Dimensions (mm)**

	A_1 Metric	A_2 Metric	A_3 Metric	a_1 Metric	a_2 Metric	B_1 Metric	B_2 Metric	B_3 Metric	B_4 Metric	b_1 Metric	b_2 Metric	b_3 Metric	b_4 Metric	b_5 Metric	C_1 Metric	C_2 Metric	C_3 Metric	C_4 Metric	C_6 Metric	C_7 Metric
MULI® 1	80	25	24	60	10	24	72	120	77	52	18	3	13	1.5	12	62	15	12	31	22
MULI®2	100	32	28	78	11	27.5	85	140	90	63	20	5	15	1.5	15	75	20	18	37.5	27
MULI® 3	130	45	31	106	12	45	105	195	110	81	36	5	15	2	20	82	25	23	41	29
MULI® 4	180	63	39	150	15	47.5	145	240	150	115	36	6	16	2	25	117	30	32	58.5	42.5
MULI® 5	200	71	46	166	17	67.5	165	300	170	131	56	8	30	2.5	25	160	45	40	80	53
JUMBO® 1	210	71	49	170	20	65	195	325	200	155	56	8	40	8	25	175	55	40	87.5	60
JUMBO® 2	240	80	60	190	25	67.5	220	355	225	170	56	8	45	8	25	165	70	40	82.5	60
JUMBO® 3	240	80	60	190	25	67.5	220	355	225	170	56	8	45	8	25	165	75	40	82.5	60
JUMBO® 4	290	100	65	230	30	65	250	380	255	190	56	10	54	8	25	220	100	50	110	86
JUMBO® 5	360	135	75	290	35	100	300	500	305	230	90	14	80	8	30	266	120	60	133	109

Size — **Dimensions (mm)**

	D_{1k6} 3) Metric	D_2 Metric	D_4TR Metric	D_4KGT Metric	D_5 2) Metric	D_6 Metric	D_7H7 Metric	D_8 Metric	D_{9xb6} Metric	R(TK) Metric	E_1 1) Metric	E_2 1) Metric	F_1 1)2) Metric	F_2 1)2) Metric	F_3 1)2) Metric	F_4 1)2) Metric
MULI® 1	10 x 21.5	12	Tr18 x 4	1605	29.6/48	M8	28	12	M5x10	32(45.25)	12/12	44/44	48/48	28/28	38/38	6/5.5
MULI® 2	14 x 25	15	Tr20 x 4	2005	38.7/61	M8	35	15	M6x12	35(49.5)	12/12	44/44	55/55	32/32	45/45	7/7
MULI® 3	16 x 42.5	20	Tr30 x 6	2505	46	M10	35	17	M8x12	44(62.2)	14/14	46/46	62/62	38/38	50/50	7/7
MULI® 4	20 x 45	25	Tr40 x 7	4005/4010	60	M12	52	25	M10x15	55(77.8)	16/16	73/59	95/80	63/53	78/68	7/9
MULI® 5	25 x 65	40	Tr55 x 9	5010	85	M20	52	28	M12x18	60(84.85)	18/18	97/97	110/110	72/72	90/90	11/11
JUMBO® 1	25 x 62.5	45	Tr60 x 9	---	90	M24	52	28	M12x18	60(84.85)	20	99	125	85	105	11
JUMBO® 2	30 x 65	55	Tr70 x 10	---	105	M30	58	32	M12x18	(80)	30	100	180	95	140	17
JUMBO® 3	30 x 65	60	Tr80 x 10	8010	120	M30	58	32	M12x18	(80)	30/22	110/101	190/145	105/105	150/125	17/14
JUMBO® 4	35 x 62.5	80	Tr100 x 10	---	145	M36	72	40	M16x30	(100)	35	130	240	130	185	25
JUMBO® 5	48 x 97.5	95	Tr120 x 14	---	170	M42	80	50	M16x40	(115)	40	160	300	160	230	28

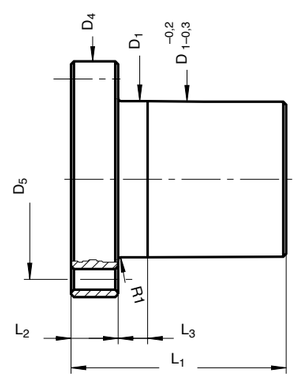
1) The first values in the table apply to the trapezoidal screw nut EFM. For dimension 4010 the first values in the table are valid.
2) The second values in the table apply to the ball screw nut KGF.
3) Diameter and length to shoulder.
4) Dimension A1 in accordance with DIN 1685 GTB 18.

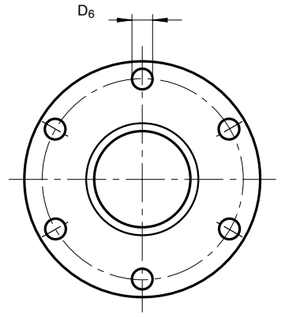
Accessories

Trapezoidal screw nuts

Preassembled bronze nut EFM

For drive units in continuous operation with particularly good wear properties. Can be used as safety nut and are sea water resistant in combination with stainless screws. EFM nuts have the same dimensions as ball screw nuts KGF-N and can be fitted together with the nut mountings KON-N and KAR-N (see accessories).



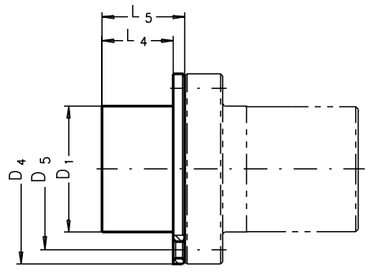


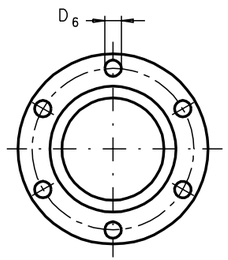
Size **Product / Size** **Dimensions (mm)**

		D_1 Metric	D_4 Metric	D_5 Metric	6xD_6 Metric	L_1 Metric	L_2 Metric	L_3 Metric	L_4 Metric	L_5 Metric
MULI® 1	EFM Tr 18 x 4	28	48	38	6	44	12	8	15	22
MULI® 2	EFM Tr 20 x 4	32	55	45	7	44	12	8	15	25
MULI® 3	EFM Tr 30 x 6	38	62	50	7	46	14	8	20	25
MULI® 4	EFM Tr 40 x 7	63	95	78	9	73	16	10	20	35
MULI® 5	EFM Tr 55 x 9	72	110	90	11	97	18	10	20	40
JUMBO® 1	EFM Tr 60 x 9	85	125	105	11	99	20	10	20	40
JUMBO® 2	EFM Tr 70 x 10	95	180	140	17	100	30	16	20	40
JUMBO® 3	EFM Tr 80 x 10	105	190	150	17	110	30	16	20	40
JUMBO® 4	EFM Tr 100 x 10	130	240	185	25	130	35	16	20	50
JUMBO® 5	EFM Tr 120 x 14	160	300	230	28	160	40	20	20	55

Adapter for attachment of the second bellows

Version R only





Accessories

Ball screw nuts

Flanged ball screw nut KGF

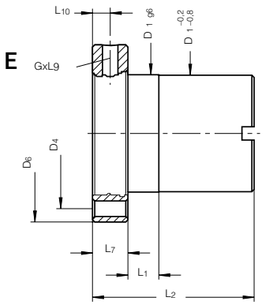
Flanged ball screw nut with mounting and lubrication holes and with profiled gaskets (reduces lubricant leakage and prevents ingress of dirt particles) for ball screw KGS.

Zero-backlash units KGT-FF/KGT-MM/KGT-FM

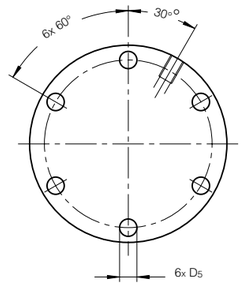
Factory adjusted and assembled combinations of two cylindrical nuts (MM), two flanged nuts (FF) or one flanged and one cylindrical nut (FM).

Only available as screw mechanism, i.e. nut preassembled on the corresponding ball screw.

Form E



Type 3



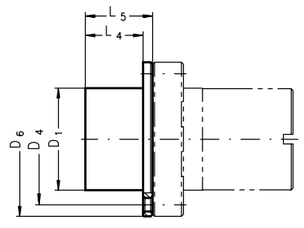
Size **Product / Size** **Dimensions (mm)**

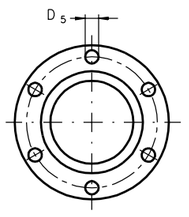
		D_1 Metric	D_4 Metric	D_5 Metric	D_6 Metric	L_1 Metric	L_2 Metric	L_4 Metric	L_5 Metric	L_7 Metric	L_9 Metric	L_{10} Metric	G Metric	Max. Axial Backlash	Number of Reversals	$C^{2)}$ kN	$C^{3)}$ kN	$C_0 = C_{0a}$ kN
MULI® 1	KGF 1605 RH-EE(4)	28	38	5.5	48	8	44	15	22	12	8	6	M6	0.08	3	12.0	7.0	12.7
MULI® 2	KGF 2005 RH-EE(4)	32	45	7	55	8	44	15	25	12	8	6	M6	0.08	3	14.0	8.0	17.0
MULI® 3	KGF 2505 RH-EE(4)	38	50	7	62	8	46	20	25	14	8	7	M6	0.08	3	15.0	9.5	22.4
MULI® 4	KGF 4005 RH-EE(4)	53	68	7	80	10	59	20	35	16	8	8	M6	0.08	5	26.0	19.0	63.5
MULI® 4	KGF 4010 RH-EE(4)	63	78	9	95	10	73	20	35	16	8	8	M8x1	0.08	3	50.0	30.0	70.0
MULI® 5	KGF 5010 RH-EE(4)	72	90	11	110	10	97	20	40	18	8	9	M8x1	0.08	5	78.0	55.0	153.0
JUMBO® 3	KGF 8010 RH-EE(4)	105	125	14	145	10	101	20	40	22	8	11	M8x1	0.08	5	93.0	69.0	260.0

1) Only 75% of the specified values are permitted for a pitch accuracy of 200 µm/300 mm screw length.
2) Dynamic load rating to DIN 69051 Part 4, draft version 1978.
3) Dynamic load rating to DIN 69051 Part 4, draft version 1989.
4) EE = rubber wiper

Adapter for attachment of the second bellows

Version R only

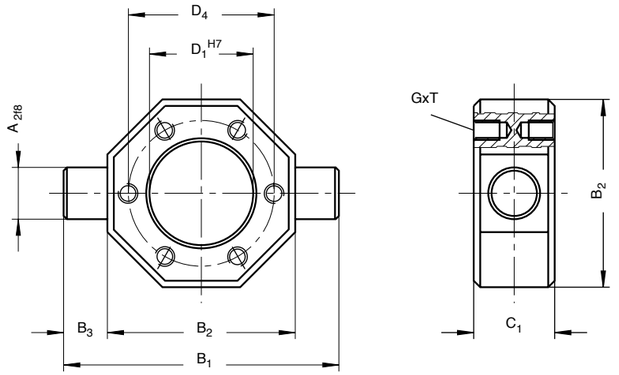




Accessories

Trunnion nut mountings KAR

Trunnion nut mounting for trunnion mounting of the flanged ball screw nut KGF and flanged trapezoidal screw nut EFM.

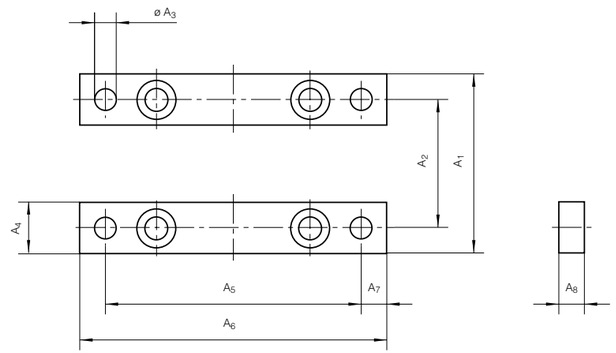


Size **Type** **Dimensions (mm)**

	for KGF	for EFM	A_2	B_1	B_2	B_3	C_1	D_1	D_4	G x T	Weight [kg]
KAR MULI® 1	KAR 1605	Tr 16x4/Tr 18x4	12	70	50	10	20	28	38	M 5x10	0.2
KAR MULI® 2	KAR 2005	Tr 20x4/Tr 24x4	16	85	58	13.5	25	32	45	M 6x12	0.3
KAR MULI® 3	KAR 2505	Tr 30x6	18	95	65	15	25	38	50	M 6x12	0.5
KAR MULI® 4	KAR 4005		25	125	85	20	30	53	68	M 6x12	1.2
	KAR 4010	Tr 40x7	30	140	100	20	40	63	78	M 8x14	2.5
KAR MULI® 5	KAR 5010	Tr 55x9	40	165	115	25	50	72	90	M10x16	2.8
KAR JUMBO® 1	KAR 6310	Tr 60x9	40	180	130	25	50	85	105	M10x16	3.3
KAR JUMBO® 3	KAR 8010		50	200	150	25	60	105	125	M12x18	4.8

Mounting feet L

Supplied loose with mounting bolts for jack.

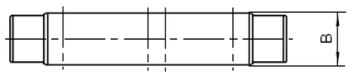


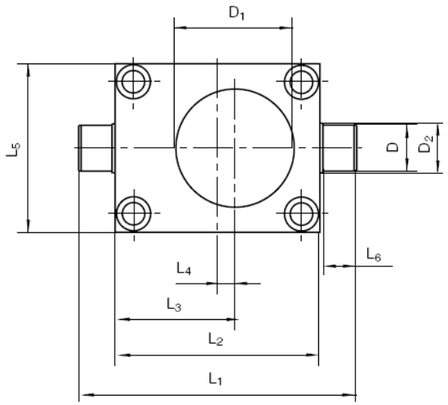
Size **Dimensions (mm)**

	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	Weight [kg]
L MULI® 1	72	52	8.5	20	100	120	10	10	0.3
L MULI® 2	85	63	8.5	20	120	140	10	10	0.4
L MULI® 3	105	81	11	24	150	170	10	12	0.8
L MULI® 4	145	115	13.5	30	204	230	13	16	1.7
L MULI® 5	171	131	22	40	236	270	17	25	3.9
L JUMBO® 1	205	155	26	50	250	290	20	30	5.8
L JUMBO® 2	230	170	32	65	290	340	25	40	10
L JUMBO® 3	230	170	32	65	290	340	25	40	10
L JUMBO® 4	270	190	39	80	350	410	30	50	20.8
L JUMBO® 5	330	230	45	100	430	500	35	60	34.4

Trunnion mountings K

Supplied loose with mounting bolts for jack.



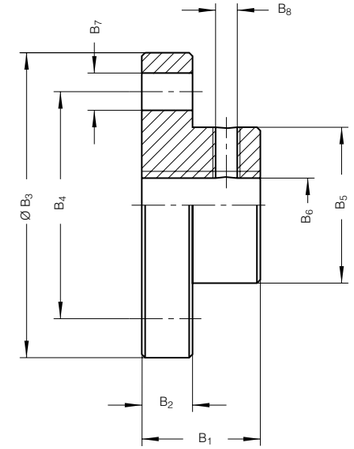


Size **Dimensions (mm)**

	L_1	L_2	L_3	L_4	L_5	L_6	D_{f8}	D_1	D_2	B	Weight [kg]
K MULI® 1	110	80	49	9	72	13	15	44	18	20	0.76
K MULI® 2	140	100	60	10	85	18	20	58	23	25	1.44
K MULI® 3	170	130	76	11	105	18	25	72	28	30	2.8
K MULI® 4	240	180	102	12	145	28	35	86	38	40	7.4
K MULI® 5	270	200	117	17	165	33	45	115	48	50	10.72
K JUMBO® 1	290	210	120	15	195	38	50	130	56	60	11.8
K JUMBO® 2	330	240	140	20	220	43	70	170	76	80	26.1
K JUMBO® 3	330	240	140	20	220	43	70	170	76	80	26.1
K JUMBO® 4	410	290	165	20	250	58	80	160	88	90	40.2
K JUMBO® 5	520	360	210	30	300	78	90	175	96	100	67.7

Top plate BP

Screwed onto the mounting thread of the jack screw and protected against rotation.

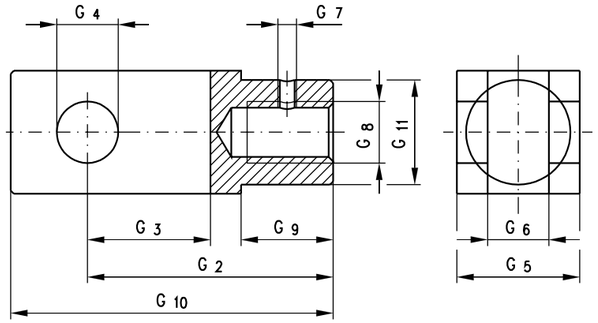


Size **Dimensions (mm)**

	B_1	B_2	ØB3	B_4	B_5	B_6	B_{7x4}	B_8	Weight [kg]
BP MULI® 1	20	7	65	48	29.3	M12	9	M5	0.2
BP MULI® 2	21	8	80	60	38.7	M14	11	M6	0.3
BP MULI® 3	23	10	90	67	46	M20	11	M8	0.6
BP MULI® 4	30	15	110	85	60	M30	13	M8	1.2
BP MULI® 5	50	20	150	117	85	M36	17	M10	4.8
BP JUMBO® 1	50	25	170	130	90	M48x2	21	M10	5
BP JUMBO® 2	60	30	200	155	105	M56x2	25	M12	7.7
BP JUMBO® 3	60	30	220	170	120	M64x3	25	M12	9.8
BP JUMBO® 4	80	40	260	205	145	M72x3	32	M12	18.4
BP JUMBO® 5	120	40	310	240	170	M100x3	38	M12	29.6

Fork end GA

Screwed onto the mounting thread of the jack screw and protected against rotation. Supplied with split pins and collar pins. Galvanized.

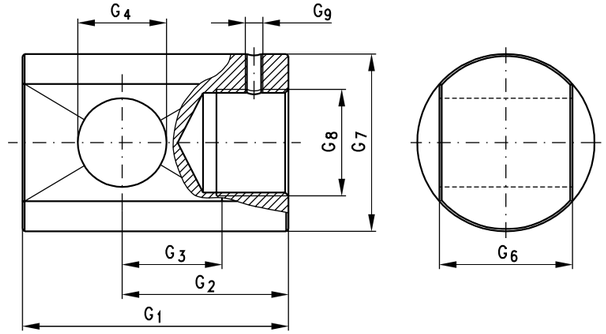


Size **Dimensions (mm)**

	G_2	G_3	G_4 (h9 tolerance)	G_5	G_6 (h12 tolerance)	G_7	G_8	G_9	G_{10}	G_{11}	Weight [kg]
GA MULI® 1	48	24	12	24	12	115	M12	18	62	20	0.15
GA MULI® 2	56	28	14	28	14	116	M14	22	72	24.5	0.2
GA MULI® 3	80	40	20	40	20	118	M20	30	105	34	0.8
GA MULI® 4	120	60	30	60	30	118	M30	43	160	52	2.5
GA MULI® 5	144	72	35	70	35	1110	M36	40	188	60	3.8

Clevis end GK

Screwed onto the mounting thread of the jack screw and protected against rotation.



Size **Dimensions (mm)**

	G_1	G_2	G_3	G_4 (h8 tolerance)	G_6 (h10 tolerance)	G_7	G_8	G_9	Weight [kg]
GK MULI® 1	55	40	15	10	15	30	M12	115	0.2
GK MULI® 2	63	45	18	12	20	39	M14	116	0.3
GK MULI® 3	78	53	20	16	30	45	M20	118	0.6
GK MULI® 4	100	70	30	20	35	60	M30	118	1.2
GK MULI® 5	130	97	33	22	40	85	M36	1110	2.5
GK JUMBO® 1	120	75	45	40	60	90	M48x2	1110	4.8
GK JUMBO® 2	130	90	50	50	70	105	M56x2	1112	4.8
GK JUMBO® 3	155	105	60	60	80	120	M64x3	1112	8
GK JUMBO® 4	220	135	85	80	110	145	M72x3	1112	22.5
GK JUMBO® 5	300	200	100	90	120	170	M100x3	1112	31.5

Accessories

Attachments

Bellows F

Length: For each 150 mm of open length up to 1.80 m, allow 8 mm when calculating the closed length. Allow 10 mm for each 150 mm over 1.80 m. The calculated length is added to value C3 (see page 26) as screw extension.

Diameter F2 may differ on the opposite side, depending on the attachment fitted.

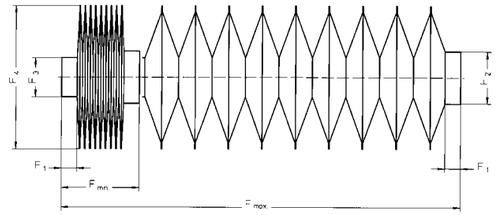
Important: The installation position must be specified, as internal support rings must be fitted when the jack is operated in a horizontal position. When installed vertically, bellows over 2 meters have textile tapes.

The same information is also required for the second bellows when ordering version R (rotating screw).

Material: PVC-coated polyester, stitched construction. Temperature range -30 °C to 70 °C. Secured in position by clamping rings. Special versions on request.

Flat spiral spring covers SF

Available on request (refer also to the catalog: Screw drives GT, KOKON®).



Size **Dimensions (mm)**

	Jack Type	F_1	F_2	F_3	F_4
F MULI® 1	N/V TGS(1)	12	30	30	101
	N/V KGS(1)	12	48	30	101
	R	12	30	28	101
F MULI® 2	N/V TGS(1)	12	39	39	113
	N/V KGS(1)	12	61	39	113
	R	12	39	32	113
F MULI® 3	N/V	20	46	46	127
	R	20	46	38	127
F MULI® 4	N/V	20	60	60	140
	R TGS/KGS-4010(1)	20	60	63	140
	R KGS-4005(1)	20	60	53	140
F MULI® 5	N/V	20	85	85	152
	R	20	85	72	152
F JUMBO® 1	N/V	20	90	90	165
	R	20	90	85	165
F JUMBO® 2	N/V	20	105	105	175
	R	20	105	95	175
F JUMBO® 3	N/V	20	120	120	191
	R	20	120	105	191
F JUMBO® 4	N/V	20	145	145	201
	R	20	145	130	201
F JUMBO® 5	N/V	20	170	170	245
	R	20	170	160	245

1) TGS = Trapezoidal screw
KGS = Ball screw

Accessories

Protection

Limit switches with roller lever

Particularly suitable for end-position shutoff (also available in explosion-proof design).

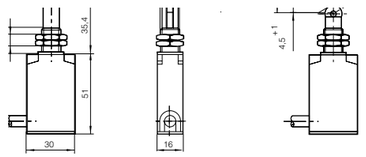
Actuating cam 30° in accordance with DIN 69 639:

A (Minimum actuating stroke):
2.6 ± 0.5 mm

B (Differential stroke):
0.85 ± 0.25 mm

FO (Minimum switch-on force):
1 N

Ve (Approach velocity):
0.001 to 0.1 m/s

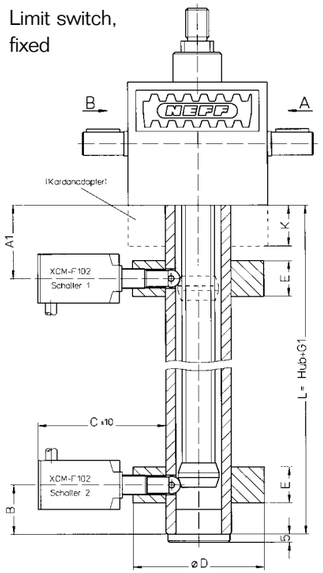


Connection:
5-core cable with PVC sheath,1m long
Conductor cross-section
0.75 mm2
Brown/blue: NO contact
Black/black: NC contact
Green/yellow: PE conductor

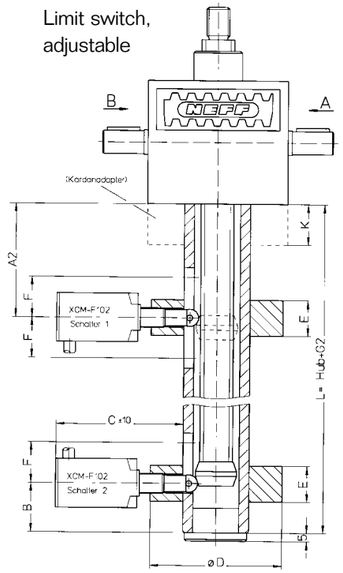
Switching capacity: NF C 63 146
(IEC 947-5-1)
Ident No. 92203259

Limit switch installation position

Limit switch, fixed



Limit switch, adjustable



Size **Dimensions (mm)**

	A_1	A_2	B	C	ØD	E	F	G_1	G_2	K
MULI® 1	40	65	30	80	80	20	25	82	107	20
MULI® 2	45	70	30	80	80	20	25	87	112	25
MULI® 3	50	75	30	80	90	20	25	92	117	30
MULI® 4	60	85	30	80	100	20	25	102	127	40
MULI® 5	70	95	30	80	120	20	25	112	137	50
JUMBO® 1	80	105	30	80	140	20	25	122	147	60
JUMBO® 2	100	125	30	80	160	20	25	142	167	80
JUMBO® 3	100	125	30	80	160	20	25	142	167	80
JUMBO® 4	110	135	30	80	170	20	25	152	177	90
JUMBO® 5	120	145	30	80	190	20	25	162	187	100

Accessories

Safety nuts

Safety nuts SFM-TGS/KGS(1)

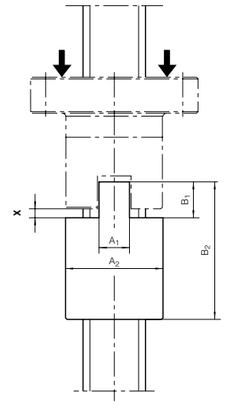
For version R: The safety nut is positioned below the travelling nut without axial load and is therefore not subjected to wear. The functioning of the safety nuts is guaranteed only when installation and applied forces are as shown in the illustration (see below). As the travelling nut wears, the distance “x” between the two nuts decreases, which provides a visual check of wear without the need for dismantling.

The travelling nut must be replaced when the axial play on a single-thread screw is more than 25% of the lead of the thread (dimension X). Otherwise, safety cannot be guaranteed.

Wear greater than 25% of the lead of the thread can endanger persons and property. Dimension X must be checked regularly.

The safety nut supports the load if the thread form of the travelling nut fails as a result of excessive wear (dirt, lubrication starvation, overheating, etc.). The safety nut can only be ordered together with the flanged nut (we reserve the right to make design changes).

For version N: The design is similar to that for version R. A visual check for wear is also possible in this case. Please specify the load direction when ordering.



Size **Dimensions (mm)**

	A_1	A_2 (-0.5)	B_1	B_2	X	Weight [kg]
SFM MULI® 1	10	28	10	44	1	0.45
SFM MULI® 2	10	32	10	44	1	0.55
SFM MULI® 3	12	38	10	46	1.5	0.7
SFM MULI® 4	16	63	15	73	1.75	3.1
SFM MULI® 5	20	72	16	97	2.25	4.3
SFM JUMBO® 1	20	85	16	99	2.25	5.7
SFM JUMBO® 2	25	95	20	100	2.5	11.3
SFM JUMBO® 3	25	105	20	110	2.5	13.7
SFM JUMBO® 4	30	130	25	130	2.5	23.3
SFM JUMBO® 5	40	160	25	160	3.5	45.7

1) KGS on request.

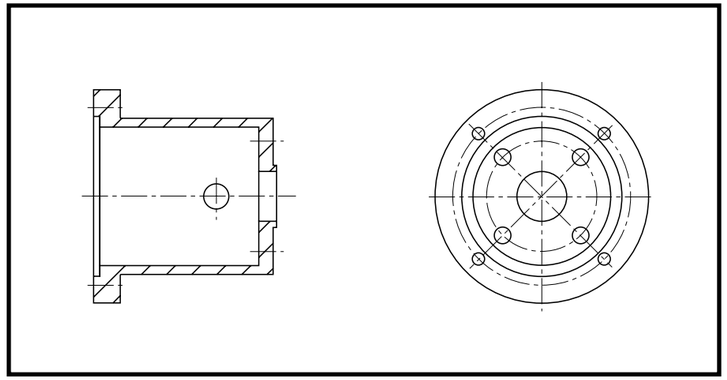
Cubic face screw jacks

Screw jack accessories

These and other accessories are available upon request. Please ask any of our technical sales representatives.

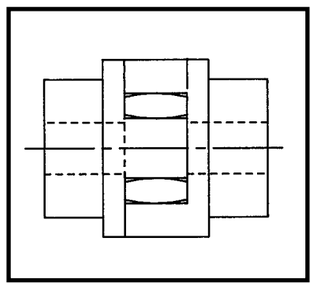
Motor adaptor flanges MG

Motor adapter flanges are used to mount motors to worm gear screw jacks and house the coupling for connecting the motor to the drive shaft.

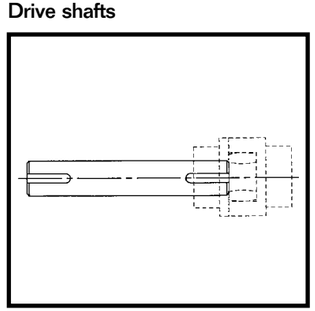


Flexible couplings

Flexible couplings provide impact proof transmission of torque and compensate for axial offset and displacements and for angular alignment errors.

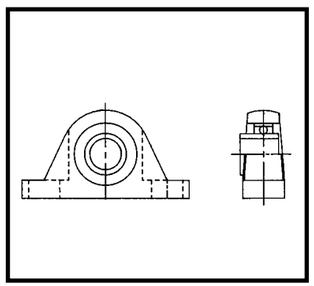


Drive shafts



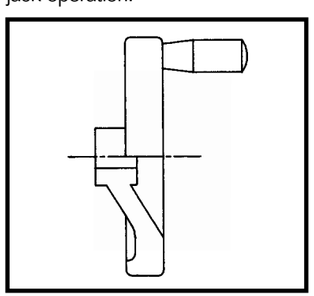
Pillow blocks

Pillow blocks are used to support drive shafts, where required.



Handwheels

Handwheels allow manual screw jack operation.



Application checklist

MULI®, JUMBO® cubic screw jacks

Contact		Job Title		Date	
Company				Ref.	
Address				Tel.	
				Fax.	
Company sector of activity					

Details of application

PERFORMANCE REQUIREMENTS

Load :

	Dynamic (kN)(ton)	Static (kN)(ton)
Compression		
Tension		

Load (kN)(ton) on : Jack ☐ Jack ☐ Jack ☐ Jack ☐

Load type : Constant ☐ Oscillating ☐ Reversing ☐

Shock ☐ Vibration ☐

Jack duty :

Jack operating time (mins) ☐

Elapsed cycle time (mins) ☐

No. of cycles per day ☐

No. of working days per year ☐

No. of years ☐

Other :

Linear speed (mm/min)(in/min) ☐

Stroke length (mm)(in) ☐

Positional accuracy (mm)(in) ☐

Mounting : Vertical ☐ Horizontal ☐

Operating environment :

Ambient temperature (°C)(°F) ☐

Check if applicable : High Humidity ☐ Dusty ☐ Wet ☐ Corrosive ☐ Radioactive ☐

Other please specify ☐

BASIC JACK VERSION

Upright ☐ Translating ☐ Keyed feature ☐

Inverted ☐ Rotating ☐ Anti-backlash feature ☐

JACK ACCESSORIES

Top plate ☐ Trunnion mounting ☐ Fixed limit switches ☐

Clevis end ☐ Bellow (PVC) ☐ Adjustable limit switches ☐

Fork end ☐ Bellow (heat resistant) ☐

DRIVES AND DRIVE COMPONENTS

AC motor ☐ Motor adaptor flange ☐ Drive shaft ☐

DC motor ☐ Bevel gearbox ☐ Pillow block ☐

Specify ____V/__Ph/___Hz/IP___ coupling Handwheel ☐

Other motor type ☐

Please complete and fax, along with a sketch of the installation, to Precision Technology USA, Inc. at (540) 857-9876

How to order
MULI®/JUMBO®

Configuration of the order code:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
☐☐	- ☐	- ☐	- ☐☐	- ☐☐☐☐	- ☐	- ☐☐	- ☐	- ☐	- ☐	- ☐☐	- ☐

1. Size
M1 – M5
J1 – J5

2. Version
N
R
V

3. Gear ratio
H
L

4. Screw type
TGS (trapezoidal screw)
KGS (ball screw)

5. Stroke
[mm]

6. Stroke end
G = Standard screw D3
Z = With cylindrical end D_{2j6}
0 = No end machining
S = Special end (as specified by customer)

7. End fitting
0 = Without
BP = Top plate
GA = Fork end
GK = Clevis end

8. Bellows
0 = Without
F = With bellows

9. Nut
0 = Without
1 = EFM (trapezoidal)
2 = KGF (flanged ball screw nut)
3 = KGM (cylindrical ball screw nut)

10. Stop collar
0 = Without
A = With

11. Special features
0 = Without
Z = Standard accessories as per catalog, for direct mounting on the gears (attachment strips, motor, motor adapter flange with coupling)
S = Special accessories, or accessories for constructional alterations to the standard version (special screw, special screw end) alignment GK/GA in V Version

12. Screw dimensions MULI® 4-KGS
0 = for all sizes except MULI® 4-KGS
1 = 4005
2 = 4010

Example order code:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
M3	- N	- H	- KGS	- 0425	- G	- BP	- F	- 0	- A	- 00	- 0

1. Size
MULI® 3

2. Version
N

3. Gear ratio
H

4. Screw type
KGS

5. Stroke
425 mm

6. Screw end
Standard thread D3

7. End fitting
BP = Top plate

8. Bellows
With bellows

9. Nut
Without

10. Stop collar
With

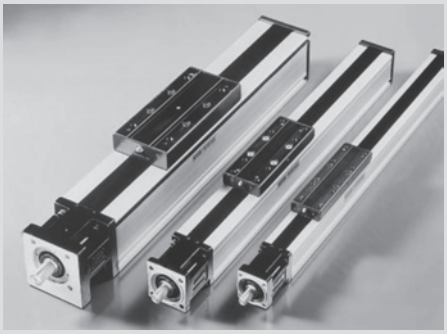
11. Special features
Without

12. Screw dimensions MULI® 4-KGS
0 = for all sizes except MULI® 4-KGS

Precision Technology USA

ENGINEERED ACTUATORS

Screw-Driven Rodless

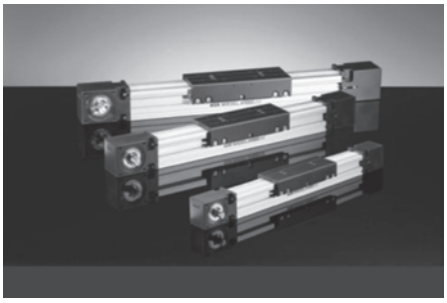


The superior design of our screw-driven Rodless Actuators is highlighted by three results:

- Our capability and willingness to do long stroke lengths (36 feet!).
- No reduction in ballscrew speeds as actuators grow longer, due to the unique screw support system.
- Better sealing than most competing products.

- **Lengths to 36 ft , no screw whip**
- **Speeds to 8.2 ft/s** (7.6 ft/s over 16 ft)
- Feed forces to 2,700 lb
- Accelerations to 2g
- Repeatability ±0.0004 in
- Leads 5 to 50 mm/rev. (0.2 to 1.97 in/rev)
- Supports moments to 443 lb-ft
- Supports pay loads to 1,350 lb
- Standard dual carriage LH/RH screw models
- Easily configured into cartesian systems

Belt-Driven Rodless



Our belt-driven Rodless Actuators have the following distinguishing features:

- Our capability and willingness to do long stroke lengths (36 feet!)
- Belts are replaceable without removing payload & carriage
- Easily reversible drive shaft
- Maximum guide bearing spacing for higher moment loads

- **Lengths to 36 ft**
- **Speeds to 32.8 ft/s**
- Feed forces up to 1124 lbs
- Repeatability ±0.002 in.
- Central lubrication point
- Easy tension adjustment
- Easily configured into cartesian systems

Ram-Style

We have the widest force range of any ram style actuator manufacturer. This is also our largest area of product development to serve industrial, commercial, and defense applications. We can address most harsh environments and airborne particulates.

Standard Product Range:

- Ballscrew or trapezoidal screw driven
- Stroke lengths up to 6 ft.
- Dynamic load capacity up to 8.4 tons
- Inline, parallel belt, and right-angle gear motor mounting options
- Flexible mounting and rod end options

Capabilities:

- To 250 tons of force

Screw Jacks

Our worm gear Screw Jacks offer an unparalleled thrust-per-dollar solution wherever powerful lifting, lowering, tilting and feed movements are required. The cubic design provides two standard mounting surfaces. Multiple units are easily synchronized with drive shafts.

- Axially translating Screw
- Rotating Screw / Translating Nut
- Upright/Inverted
- Trap. Screw range: to 56 tons (500 kN)
- Ball Screw range: to 8.7 tons lb (78 kN)
- Slow to medium speeds
- Ideal for positioning
- A cost effective work horse
- Motor direct mount to all sizes

Custom Actuators

We recognize that each application is unique, and welcome opportunities that require modifications to our standard products, or in some cases complete custom designs. Whether your application requires special environmental considerations, or there is just no standard product that adequately suits your needs, we look forward to reviewing the details.

From clean rooms to oil rigs, from packaging machines to steel mills, we have optimized actuator solutions for the most demanding challenges.

- **Fast Engineering Support**
- **Superior Performance, Quality, and Durability**
- **Fast Quotes**
- **Fast Turnaround**
- **Exactly What You Need**

RODLESS • RAM-STYLE
SCREW JACKS • CUSTOM

For additional information about how Precision Technology USA, Inc. can help you with innovative engineering solutions, please contact us at:

Precision Technology USA, Inc.
225 Glade View Drive
Roanoke, VA 24012

Phone: (540) 857-9871

Email: sales@pt-usa.net

www.pt-usa.net

ISO 9001:2008