

Belt & Screw Critical Speeds & Application Specifications



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Calculation of max. acceleration

$$a = \frac{F}{m}$$

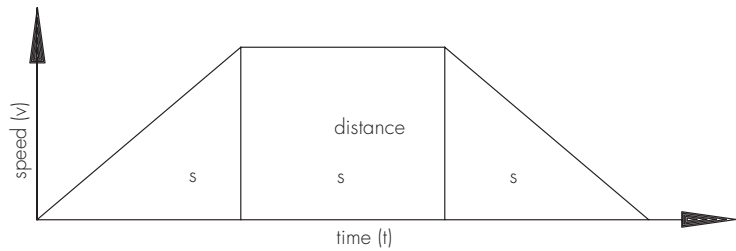
Calculation of max. acceleration distance

$$s = \frac{v \times t}{2}$$

Calculation of max. acceleration time

$$t = \frac{v}{a}$$

F= belt tension (N)
 a= acceleration (m/s²)
 m= mass (kg)
 v= velocity (m/s)
 s= distance (m)
 t= time (s)



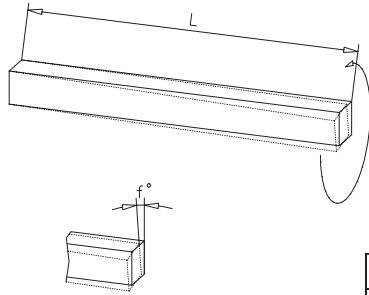
| Type | $t_c > 0,2 \text{ s}$ | | $t_c < 0,2 \text{ s}$ | | Minimum length strength (N) | Belt size |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------------|-----------|
| | F_{max} (N) | safety factor 1,5 (N) | F_{max} (N) | safety factor 1,5 (N) | | |
| ELZ 30 | 200 | 133 | 280 | 187 | | 3 M 12 |
| ELZZ 60 | 298 | 199 | 333 | 222 | 3690 | 5 M 09 |
| ELZ, ELZT, ELSZ, ELZU, ELZG 40, ELSZ 30/40 | 390 | 266 | 480 | 320 | 6478 | 5 M 15 |
| ELZ, ELZT, ELSZ, ELSZ, ELZU, ELZG 60, ELHZ, ELVZ 60 /80 DLZ 120 QLZ, QSZ 80 / QLSZ, QSSZ 80 | 894 | 596 | 1000 | 666 | 12013 | 5 M 25 |
| ELZZ 80 | 679 | 452 | 746 | 498 | 3888 | 8 M 12 |
| ELZZ 100 | 1210 | 801 | 1331 | 887 | 9700 | 8 M 20 |
| ELZ, ELZT, ELSZ, ELSZ, ELZU, ELZG 80, DLZ, DSZ 160 / DLZT, DSZT, DLSZ 120 QLZ, QSZ 80 | 1900 | 1266 | 2090 | 1393 | 15400 | 8 M 30 |
| ELHZ, ELVZ, ELZW 100 | 3840 | 2559 | 4128 | 2751 | 25632 | 8 M 48 |
| ELZ, ELZT, ELSZ, ELSZ, ELZG 100, QLZ, QSZ 100 DLZ 200 / DLSZ, DSSZ 160 | 4000 | 2666 | 4300 | 2866 | 26700 | 8 M 50 |
| ELZ 125 | 5900 | 3933 | 6350 | 4233 | 37380 | 8 M 70 |

Weights

| Sizes | Guide-body profile | Internal profile | guide rod | Belt | per pulley | Toothed rack | Standard carriage | Carriage profile | Coupling |
|--------|--------------------|------------------|-----------|------------|------------|--------------|-------------------|------------------|----------|
| 30 | 1,07 kg/m | - | 0,15 kg/m | 0,037 kg/m | 0,06 kg | - | 0,176 kg | 1,78 kg/m | 0,007 kg |
| 40 | 1,89 kg/m | - | 0,22 kg/m | 0,074 kg/m | 0,14 kg | 0,70 kg/m | 0,520 kg | 3,49 kg/m | 0,010 kg |
| 60 | 3,83 kg/m | - | 0,61 kg/m | 0,123 Kg/m | 0,39 kg | 0,81 kg/m | 1,565 kg | 7,49 kg/m | 0,040 kg |
| 80 | 7,40 kg/m | - | 0,88 kg/m | 0,256 kg/m | 1,04 kg | 1,13 kg/m | 2,644 kg | 12,79 kg/m | 0,085 kg |
| 80S | 7,40 kg/m | - | 0,88 kg/m | 0,256 kg/m | 1,04 kg | 1,13 kg/m | 3,520 kg | 13,95 kg/m | 0,085 kg |
| 100 | 11,3 kg/m | - | 1,58 kg/m | 0,355 Kg/m | 0,48 kg | 2,75 kg/m | 6,550 kg | 19,98 kg/m | 0,200 kg |
| 125 | 15,54 kg/m | - | 2,47 kg/m | 0,480 kg/m | 1,62 kg | - | 12,100 kg | 28,05 kg/m | 0,395 kg |
| DL 120 | 5,61 kg/m | 1,52 kg/m | 0,22 kg/m | 0,123 Kg/m | 0,39 kg | - | 1,100 kg | 4,15 kg/m | 0,040 kg |
| DL 160 | 10,34 kg/m | 3,73 kg/m | 0,61 kg/m | 0,256 kg/m | 0,86 kg | - | 3,280 kg | 7,99 kg/m | 0,085 kg |
| DL 200 | 19,55 kg/m | 3,48 kg/m | 0,61 kg/m | 0,355 Kg/m | 0,688 kg | - | 4,950 kg | 10,99 kg/m | 0,200 kg |
| DS 160 | 10,52 kg/m | 3,48 kg/m | 1,40 kg/m | 0,256 kg/m | 0,86 kg | - | 2,250 kg | 7,99 kg/m | 0,085 kg |
| QL 60 | 3,29 kg/m | - | 0,22 kg/m | 0,123 Kg/m | 0,39 kg | - | 0,456 kg | 2,05 kg/m | 0,040 kg |
| QL 80 | 7,05 kg/m | - | 0,61 kg/m | 0,256 kg/m | 1,04 kg | - | 1,229 kg | 3,85 kg/m | 0,085 kg |
| QL 100 | 10,45 kg/m | - | 0,61 kg/m | 0,355 Kg/m | 0,688 kg | - | 2,920 kg | 5,49 kg/m | 0,200 kg |
| QS 60 | 3,79 kg/m | - | 1,40 kg/m | 0,123 Kg/m | 0,39 kg | - | 0,860 Kg | 2,05 kg/m | 0,040 kg |
| QS 80 | 6,82 kg/m | - | 2,40 kg/m | 0,256 kg/m | 1,04 kg | - | 2,339 kg | 3,85 kg/m | 0,085 kg |
| QS 100 | 10,55 kg/m | - | 3,20 kg/m | 0,355 Kg/m | 0,688 kg | - | 4,320 kg | 5,49 kg/m | 0,200 kg |



Calculation of torsional twist



$$f^\circ = L \times M_{t,max} \times I_p \quad \left[\frac{^\circ \times Nm \times m}{Nm \times m} \right]$$

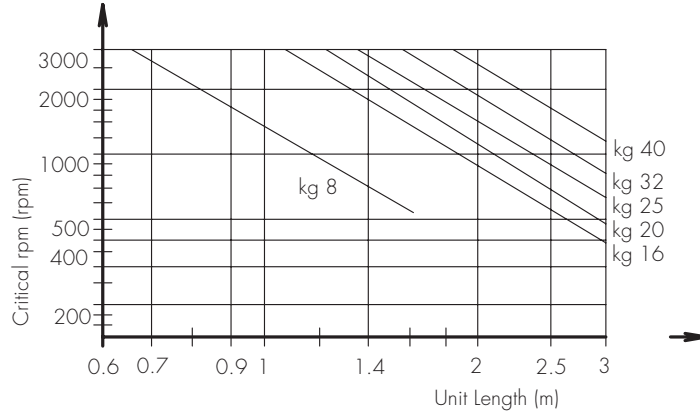
f° = max. twisting angle (°)
 L = unit length
 $M_{t,max}$ = max. torque (Nm)
 I_p = see table (°/Nm²)

Aluminium profiles
 Stiffness F25 (250 N/mm²)
 Thickness of anodizing coat 20 to 30 mm

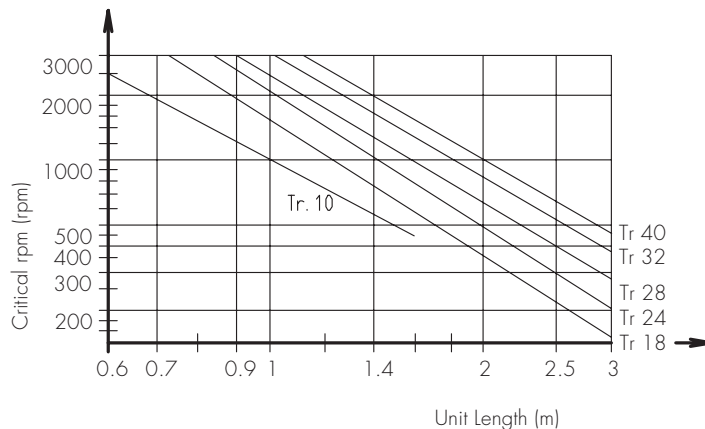
| Size | I _p Faktor | Size | I _p Faktor | Size | I _p Faktor |
|--------|-----------------------|--------|-----------------------|--------|-----------------------|
| EL 30 | 0,49000 °/Nm x m | DL 120 | 0,03282 °/Nm x m | QL 60 | 0,02995 °/Nm x m |
| EL 40 | 0,18000 °/Nm x m | DL 160 | 0,01286 °/Nm x m | QL 80 | 0,01257 °/Nm x m |
| EG 40 | 0,14000 °/Nm x m | DL 200 | 0,00787 °/Nm x m | QL 100 | 0,00705 °/Nm x m |
| EL 60 | 0,05765 °/Nm x m | DS 160 | 0,01336 °/Nm x m | QS 60 | 0,03797 °/Nm x m |
| EG 60 | 0,04387 °/Nm x m | | | QS 80 | 0,01563 °/Nm x m |
| EL 80 | 0,01463 °/Nm x m | | | QS 100 | 0,00644 °/Nm x m |
| EG 80 | 0,01511 °/Nm x m | | | | |
| EL 100 | 0,00492 °/Nm x m | | | | |
| EL 125 | 0,00616 °/Nm x m | | | | |

Diagram for maximum rpm of screw units

Ball Screw units



Acme Screw units



$n_{max} = \text{table value} \times 0,8$



