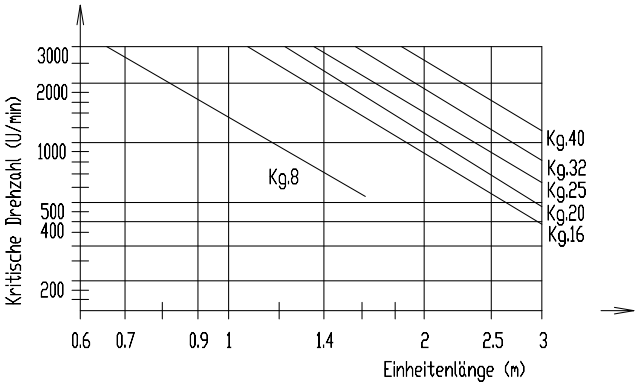
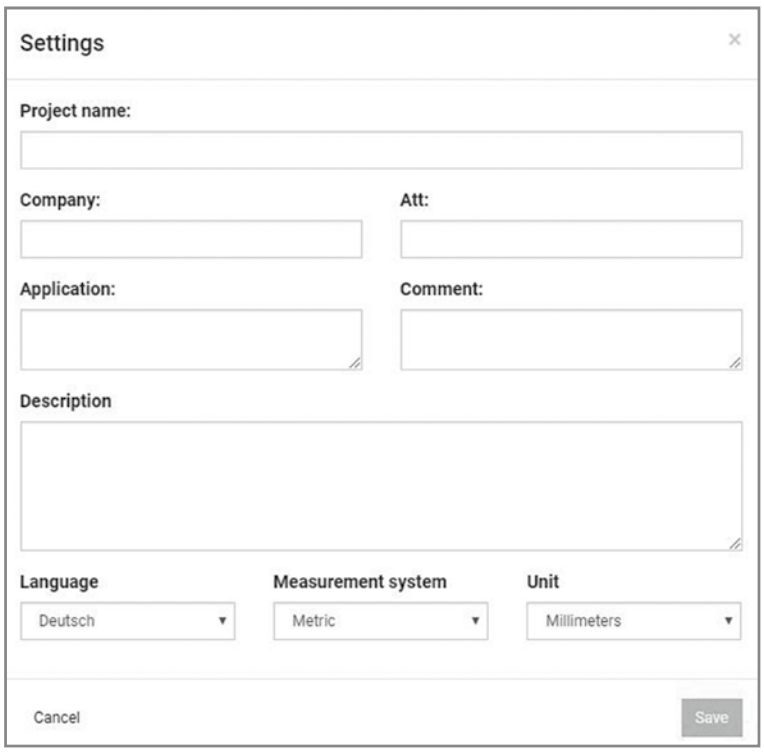


Specifications

Calculation of toothed belt

Calculation of the max. acceleration

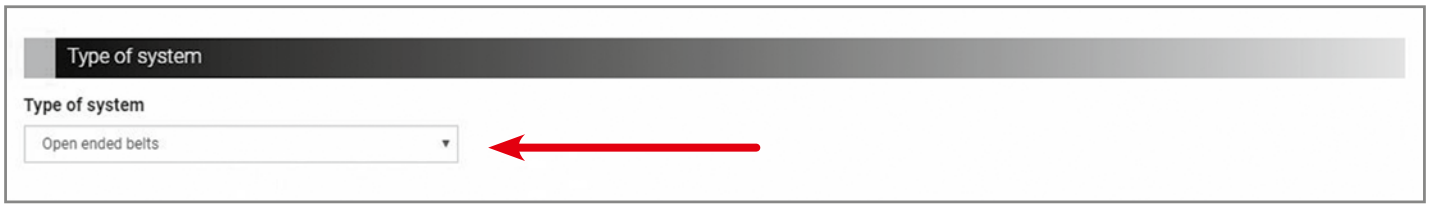


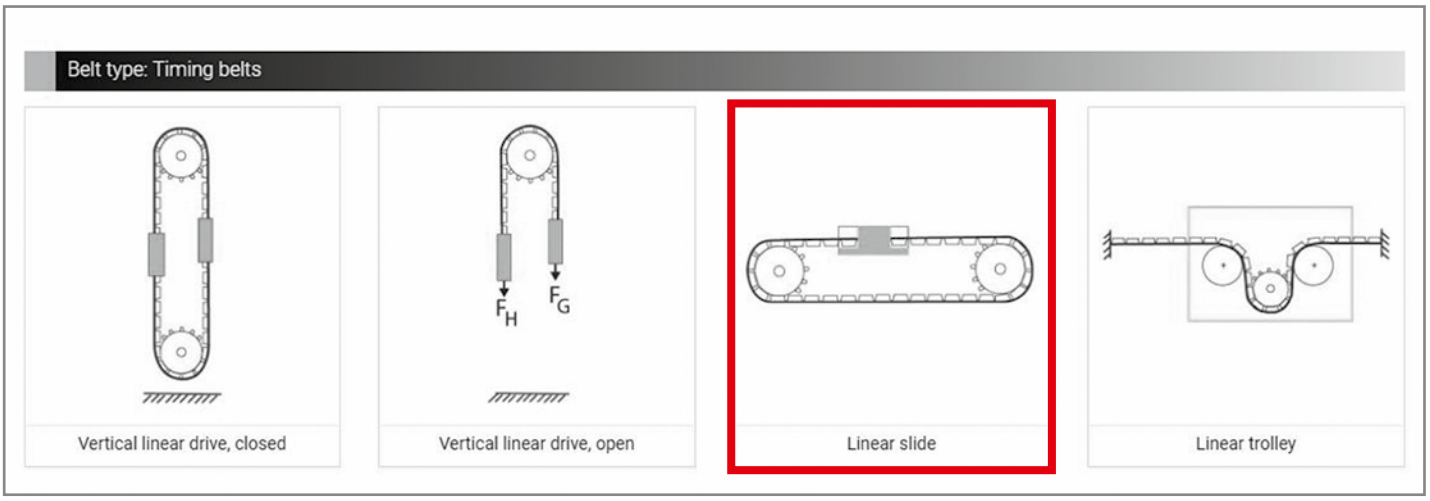
To calculate your load data, please use the timing belt calculation of Continental:

www.conti-professional.com

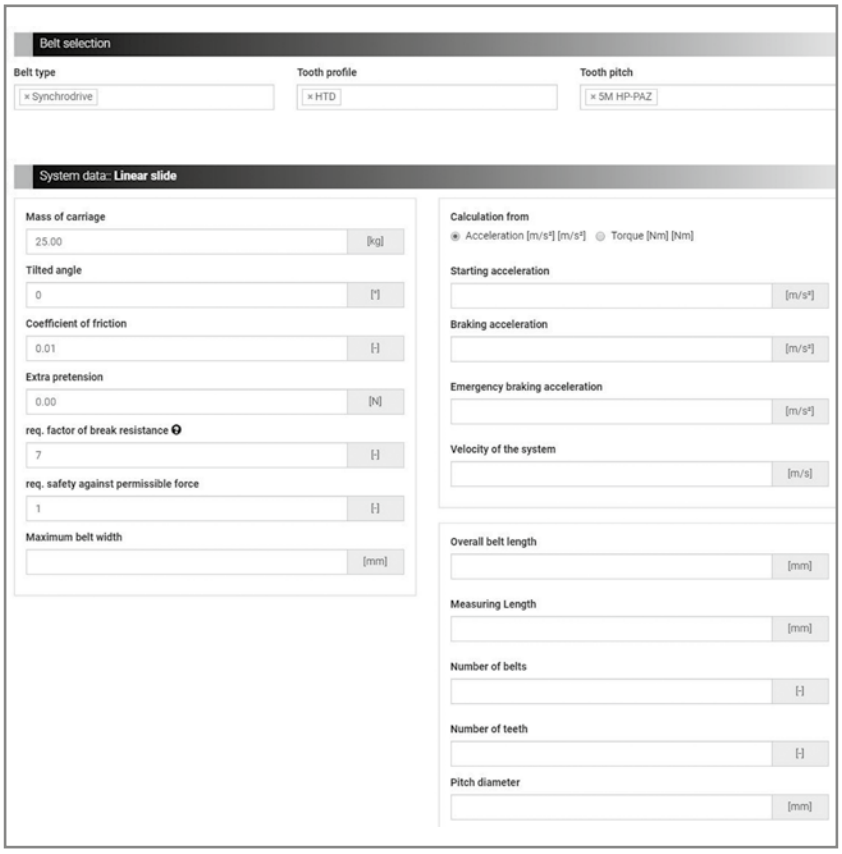
Act as follows:

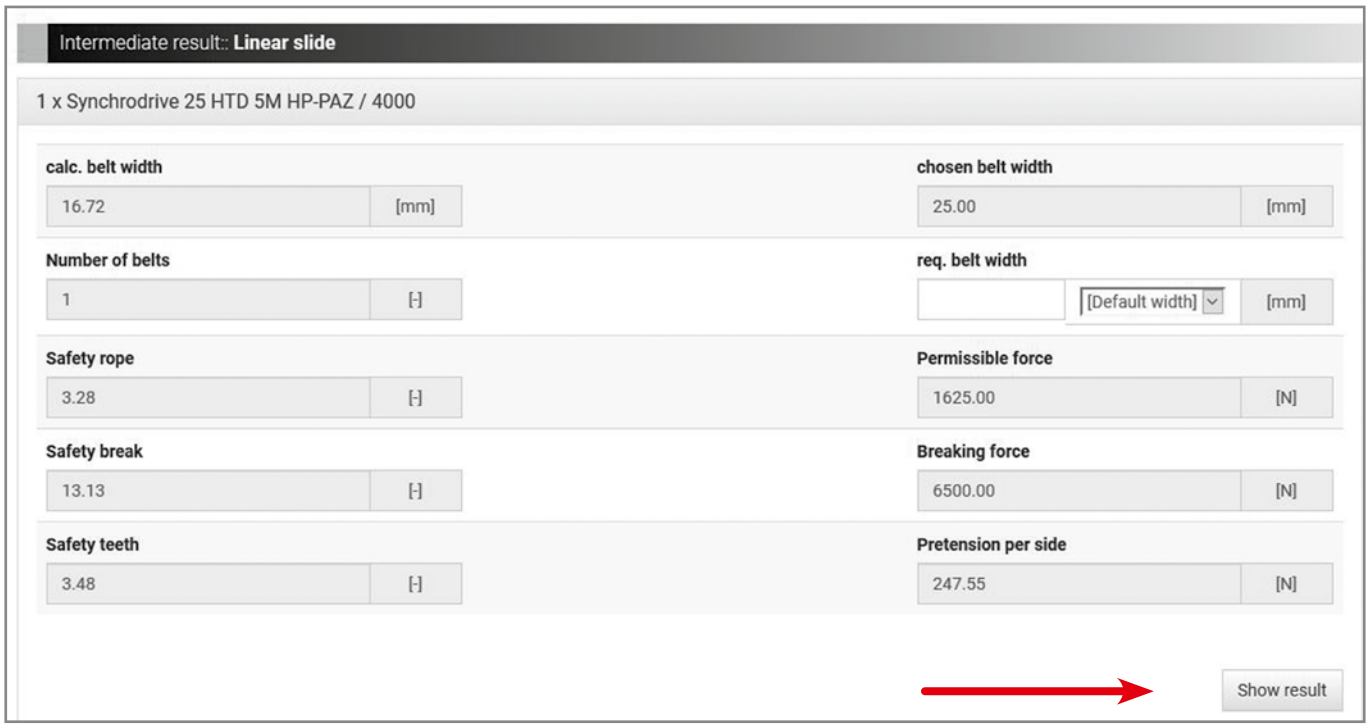
- Register an account
- Create a new project
- Select "Open ended belts" in the project editor
- Select drive type "Linear slide"
- Enter tooth belt type and parameters
- Calculate





Calculation of toothed belt





Calculation of toothed belt

Resulting report:: **Vertical linear drive, closed**

Given data

Mass of carriage	MH	25.00	[kg]
Mass of counterweight	MG		[kg]
Number of teeth	z	26	[-]
Overall belt length	LB	4000.00	[m]
req. factor of break resistance	sgefb	7	[-]
req. safety against permissible force	sgefzul	1	[-]

Carriage downwards - emergency stop

Acceleration force of carriage	FHbes	212.50	[N]
Weight force of carriage	FHgew	245.25	[N]
Acceleration force of counterweight	FGbes	0.00	[N]
Weight force of counterweight	FGgew	0.00	[N]
Force at motor shaft	Fmot	457.75	[N]
Braking torque	Mmot	9.47	[Nm]
Maximum load	Fmax	370.25	[N]

Load values

Force during start	Fanf.	370.25	[N]
Force during braking	Fbrems	457.75	[N]
Required pretension	FV	457.75	[N/Tr.]
Measuring Length below mass	L_p	1300.00	[mm]
Set-Frequency	f_{stat}	25.83	[Hz]
Bearing load in motor shaft	FLmot	1373.25	[N]
Bearing load idler	FLuml	1743.50	[N]
Belt force 1/1	Ftr	686.63	[N]
Maximum belt force	Ftr max	915.50	[N]
Safety rope	Sr	1.77	[-]
Safety break	St	7.10	[-]
Safety teeth	Sz	1.88	[-]
Permissible force	Fzul	1625.00	[N]

Carriage upwards

Acceleration force of carriage	FH_{bes}	-125.00	[N]
Weight force of carriage	FH_{gew}	245.25	[N]
Acceleration force of counterweight	FG_{bes}	0.00	[N]
Weight force of counterweight	FG_{gew}	0.00	[N]
Force at motor shaft	F_{mot}	457.75	[N]
Motor torque	M_{mot}	7.66	[Nm]
Maximum load	F_{max}	457.75	[N]

Kinematic values

Velocity	v	2.00	[m/s]
Relative starting acceleration	aan r	5.00	[m/s²]
Absolute starting acceleration	aan a	14.81	[m/s²]
Relative braking acceleration	abr r	8.50	[m/s²]
Absolute braking acceleration	abr a	18.31	[m/s²]
Braking distance	sbr	0.24	[m]
Braking time	tbr	0.24	[s]
R.P.M.	n	923.08	[1/min]

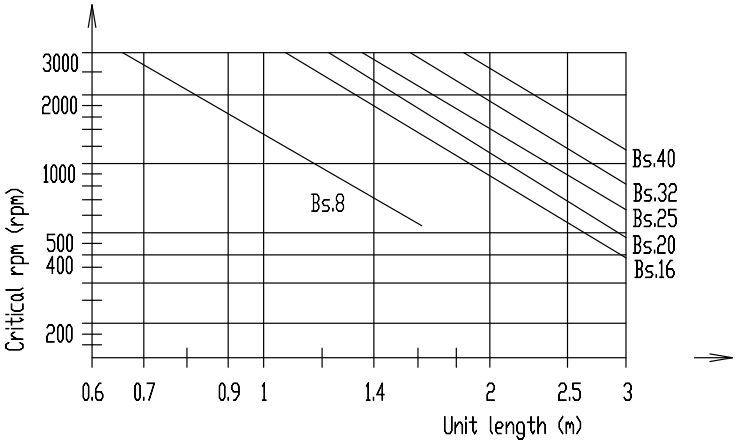
Specifications

Weights

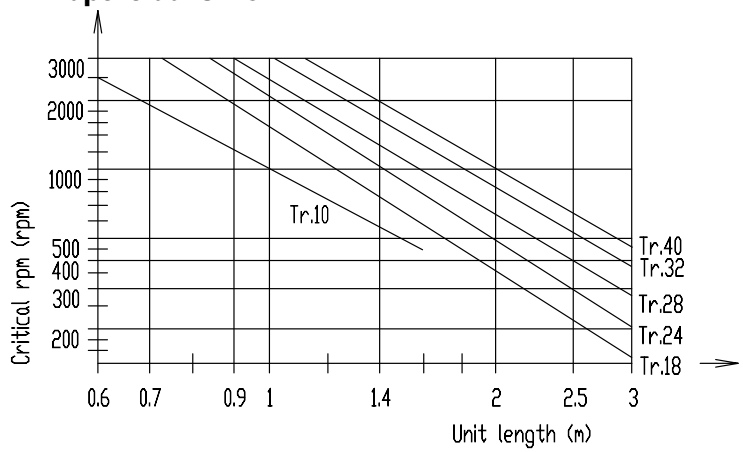
Sizes	Guide body profile	Internal profile	guide rod	Belt	per pulley	Toothed rack	Standard carriage	Carriage profile	Coupling
30	1,08 kg/m	-	0,15 kg/m	0,037 kg/m	0,06 kg	-	0,176 kg	1,78 kg/m	0,007 kg
40	1,92 kg/m	-	0,22 kg/m	0,074 kg/m	0,14 kg	0,70 kg/m	0,520 kg	3,42 kg/m	0,010 kg
60	3,86 kg/m	-	0,61 kg/m	0,123 kg/m	0,39 kg	4,30 kg/m	1,565 kg	7,66 kg/m	0,040 kg
60S	3,86 kg/m	-	0,61 kg/m	0,123 kg/m	0,39 kg	4,30 kg/m	2,420 kg	8,60 kg/m	0,040 kg
80	7,41 kg/m	-	0,88 kg/m	0,256 kg/m	1,04 kg	6,20 kg/m	2,644 kg	12,96 kg/m	0,085 kg
80S	7,41 kg/m	-	0,88 kg/m	0,256 kg/m	1,04 kg	6,20 kg/m	3,520 kg	13,80 kg/m	0,085 kg
100	11,1 kg/m	-	1,58 kg/m	0,355 kg/m	0,81 kg	6,20 kg/m	6,550 kg	19,40 kg/m	0,200 kg
125	15,91 kg/m	-	2,45 kg/m	0,480 kg/m	1,54 kg	-	12,100 kg	26,63 kg/m	0,395 kg
DL 120	5,50 kg/m	1,52 kg/m	0,22 kg/m	0,123 kg/m	0,39 kg	-	1,100 kg	4,19 kg/m	0,040 kg
DL 160	10,33 kg/m	2,66 kg/m	0,61 kg/m	0,256 kg/m	0,90 kg	-	3,280 kg	7,99 kg/m	0,085 kg
DL 200	16,08 kg/m	3,48 kg/m	0,61 kg/m	0,355 kg/m	0,688 kg	-	4,950 kg	11,05 kg/m	0,200 kg
DS 120	5,06 kg/m	1,52 kg/m	0,65 kg/m	0,123 kg/m	0,39 kg	-	0,920 kg	5,57 kg/m	0,040 kg
DS 160	10,52 kg/m	2,66 kg/m	2,21 kg/m	0,256 kg/m	0,86 kg	-	2,250 kg	10,01 kg/m	0,085 kg
DS 200	14,16 kg/m	3,48 kg/m	3,21 kg/m	0,355 kg/m	1,83 kg	-	5,345 kg	15,01 kg/m	0,200 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	0,90 kg	-	1,229 kg	3,85 kg/m	0,085 kg
QL 100	10,48 kg/m	-	0,61 kg/m	0,355 kg/m	1,83 kg	-	2,920 kg	5,49 kg/m	0,200 kg
QS 60	3,74 kg/m	-	1,45 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	-	2,21 kg/m	0,256 kg/m	0,90 kg	-	2,339 kg	3,85 kg/m	0,085 kg
QS 100	10,56 kg/m	-	3,21 kg/m	0,355 kg/m	1,83 kg	-	4,320 kg	5,49 kg/m	0,200 kg
QS 125	16,08 kg/m	-	4,47 kg/m	0,480 kg/m	0,60 kg	-	5,544 kg	10,03 kg/m	0,395 kg
ALL	27,45 kg/m	-							
QST/K 60	2,77 kg/m		1,45 kg/m					3,39 kg/m	
QST/K 80	5,47 kg/m		2,21 kg/m					5,88 kg/m	
QST/K 100	8,48 kg/m		3,21 kg/m					9,54 kg/m	

Diagram for maximum rpm of spindle units

ballscrew units



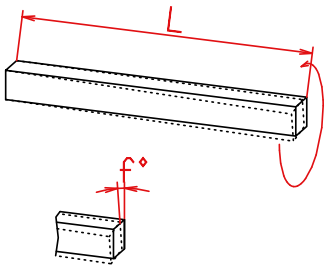
trapezoidal units



$n_{max.}$ = table value x 0,8

Specifications

Calculation of torsional twist



$$f° = L \times M_{t\,max.} \times I_p \qquad \left[\frac{° \times Nm \times m}{Nm \times m}\right]$$

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

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

4.2

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