Drive selections
for linear drive units with 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	= Mass to be transported [kg]
M_{load}	= Moment resulting from the various loads [Nm]	a	= Acceleration [m/s²]
M_{idle}	= Idle torque [Nm]	p	= Screw pitch [mm]
M_{rot}	= Rotational acceleration moment [Nm]	P	= Power [kW]
M_{trans}	= Translational acceleration moment [Nm]	L	= WIESEL® length [mm]
F_x	= Feed force [N]	n_{max}	= Maximum rotational speed [rpm]
F_a	= Acceleration force [N]	μ	= Friction factor
g	= Acceleration due to gravity [m/s²]	j_{sp}	= Mass moment of inertia of the screw per meter [kgm²/m]
V_{max}	= Maximum linear speed [m/s]		

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

Type	Values for μ lubricated
WIESEL *POWERLine*® WM40	0.05
WIESEL *POWERLine*® WM60/80/120 WIESEL *VARIOLine*® WZ60/80 WIESEL *FORCELine*® MLSM60 KGT	0.1
WIESEL *DYNALine*®	Friction value of the external guide
WIESEL® W00/W02	0.3

Mass moment of inertia j_{sp}

Type	P [mm]	j_{sp}[kgm²/m]
WIESEL *POWERLine*® WM60 WIESEL *DYNALine*® WV60 WIESEL *VARIOLine*® WZ60 WIESEL® W02	5, 20, 50	$8.8 \cdot 10^{-5}$
WIESEL *POWERLine*® WM80 WIESEL *DYNALine*® WV80 WIESEL *VARIOLine*® WZ80 WIESEL *FORCELine*® MLSM60 KGT	5, 10, 20, 50	$2.25 \cdot 10^{-4}$
WIESEL *POWERLine*® WM120 WIESEL *DYNALine*® WV120	5 10, 20, 40	$6.41 \cdot 10^{-4}$ $6.28 \cdot 10^{-4}$
WIESEL *POWERLine*® W00/WM40	5	$1.13 \cdot 10^{-5}$