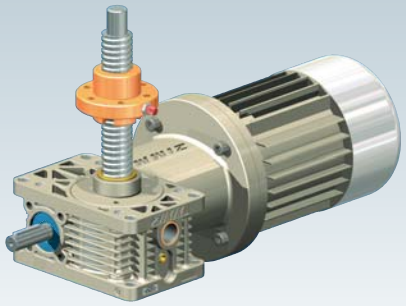

Determining the drive torque [M_G] of a single screw jack

Explanatory notes:

M_G	necessary drive torque [Nm] for a screw jack
F	Lifting load (dynamic) [kN]
$\eta_{gearbox}$	Efficiency of the screw jack (without screw)
η_{screw}	Efficiency of the screw
P	Screw pitch [mm]
i	Drive ratio of the screw jack
M_L	Idling torque [Nm]
P_M	Motor drive power

The following specifications serve to calculate the required drive torque.
For gearboxes with single-pitch trapezoidal screws the load can simply be multiplied by the factor stated on the corresponding gearbox page (Sections 2 + 3).

Use at least 10% of the gearbox rated load for the calculation, even if the effective load is less than this (i.e. for the Z-250 use at least 25 kN).

Formula:

1) Drive torque: $M_G = \dfrac{F\,[kN] \cdot P\,[mm]}{2 \cdot \pi \cdot \eta_{gearbox} \cdot \eta_{screw} \cdot i} + M_L\,[Nm]$

2) Motor power: $P_M[kW] = \dfrac{M_G\,[Nm] \cdot n\,[rpm]}{9550}$

3) We recommend multiplying the calculated value by a safety factor of 1.3 to 1.5 (up to 2 for small systems and for low speeds).

Example:

Z-25-SN
F = 12 kN (dynamic lift load)
$\eta_{gearbox}$ = 0.87 η_{screw} = 0.391
P = 6 i = 6

1) $M_G = \dfrac{12\ kN \cdot 6\ mm}{2 \cdot \pi \cdot 0.87 \cdot 0.391 \cdot 6} + 0.36\ Nm =$ **5.97 Nm**

2) $P_M = \dfrac{5.97\ Nm \cdot 1500\ rpm}{9550} =$ **0.938 kW**

3) Example: 0.938 kW · 1.5 = 1.407 kW ⟶ **motor 1.5 kW**

Efficiencies of the screw jack $\eta_{gearbox}$ (without screw)

i	rpm	GSZ-2	Z-5	Z-10	Z-25	Z-35	Z-50	Z-100	Z-150	Z-250	Z-350	Z-500	Z-750	Z-1000
N	3000	0.87	0.81	0.83	0.87	-	-	-	-	-	-	-	-	-
N	1500	0.87	0.82	0.84	0.87	0.87	0.87	0.88	0.89	0.91	-	-	-	-
N	1000	0.86	0.82	0.82	0.86	0.87	0.86	0.87	0.89	0.90	0.91	0.92	0.88	0.90
N	750	0.86	0.82	0.84	0.85	0.86	0.85	0.87	0.88	0.90	0.91	0.92	0.88	0.90
N	500	0.85	0.82	0.84	0.83	0.85	0.84	0.85	0.87	0.89	0.90	0.92	0.87	0.89
N	100	0.74	0.77	0.79	0.78	0.78	0.78	0.78	0.80	0.83	0.86	0.87	0.81	0.84
L	3000	0.78	0.74	0.78	0.76	-	-	-	-	-	-	-	-	-
L	1500	0.77	0.70	0.74	0.72	0.64	0.66	0.67	0.67	0.78	-	-	-	-
L	1000	0.75	0.67	0.72	0.70	0.64	0.66	0.65	0.66	0.77	0.78	0.76	0.67	0.76
L	750	0.74	0.65	0.70	0.68	0.64	0.66	0.65	0.65	0.76	0.78	0.75	0.66	0.76
L	500	0.71	0.62	0.67	0.65	0.63	0.65	0.65	0.63	0.75	0.77	0.73	0.65	0.75
L	100	0.54	0.53	0.59	0.54	0.52	0.55	0.57	0.53	0.65	0.67	0.61	0.58	0.66

Efficiencies of the screws η_{screw} calculated for coefficient of friction μ = 0.11

Tr screw, single-pitch	16x4	18x4	20x4	30x6	40x7	50x8	55x9	60x9	80x16	100x16	120x16	140x20	160x20	Ball screw
Efficiency	0.453	0.420	0.391	0.391	0.357	0.335	0.340	0.320	0.391	0.335	0.293	0.308	0.278	
Tr screw, double-pitch	16x8P4	18x8P4	20x8P4	30x12P6	40x14P7	50x16P8	55x18P9	60x18P9	80x32P16	100x32P16	120x32P16	140x40P20	160x40P20	0.9
Efficiency	0.623	0.591	0.563	0.563	0.526	0.502	0.508	0.484	0.563	0.502	0.453	0.471	0.436	

Idling torques M_L of screw jacks [Nm] (without screw, at 20°C - significantly higher at low temperatures)

Z	2	5	10	25	35	50	100	150	250	350	500	750	1000
N	0.08	0.10	0.26	0.36	0.56	0.76	1.68	1.90	2.64	3.24	3.96	7.28	9.70
L	0.06	0.08	0.16	0.26	0.40	0.54	1.02	1.20	1.94	2.20	2.84	4.42	5.90

These are indicative values for calculation. Series production models may vary!