Planning İnstallations With Screw Jack

For the application of screw jacks in installations with several units, the following criteria must be taken into account:

1. Define the number, position and orientation of the screw jacks.
2. Select the drag components (couplings, transmission shafts, supports, bevel gearboxes, motors, etc.) taking the following recommendations into account:

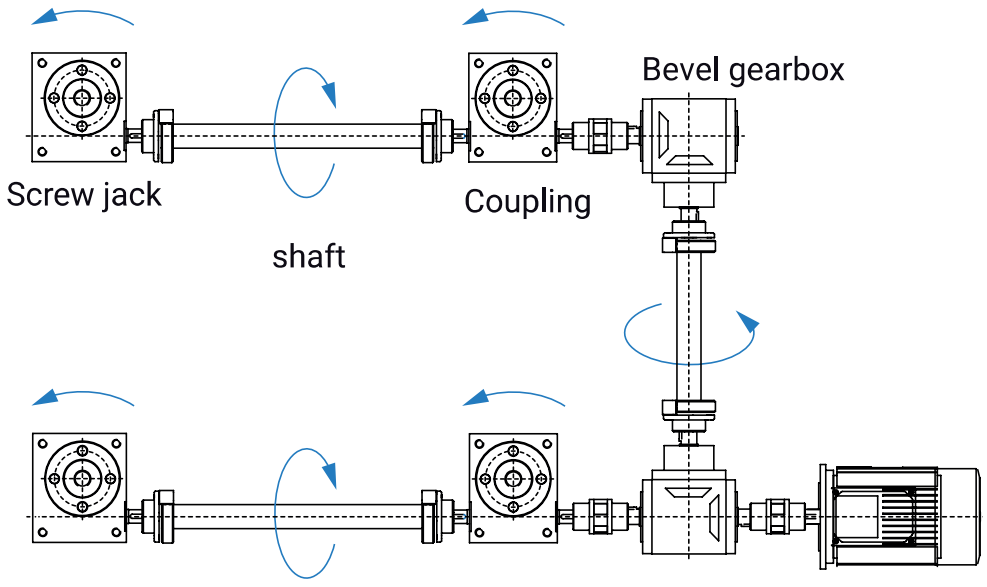
Ensure that the total load is distributed uniformly between all the installation's screw jacks.
The lowest possible number of transmission parts is recommended.
The transmission shafts should be as short as possible.
Try to protect the overall installation with a safety torque limiter.

3. If during the design of the installation a problem arises in defining the turning sense of the different elements, it is advised to apply the following method:

Indicate the orientation of the screw jack elements.
Mark the screw turning sense on each screw jack to "lift".
Show the position of the bevel gearboxes and the transmission shafts in a diagram.

Example:

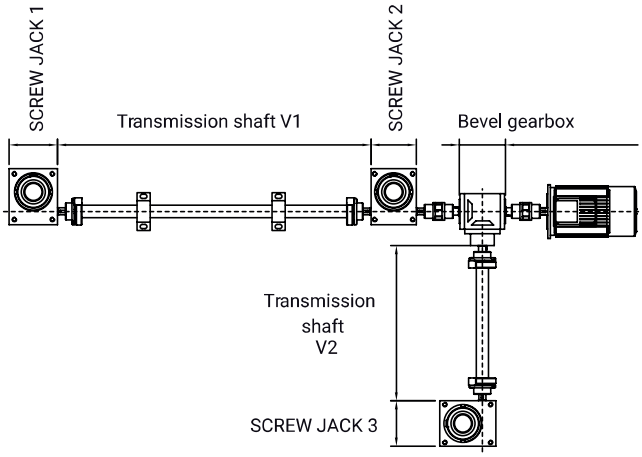
Elevation system with four screw jacks and two bevel gearboxes.



Drive Torque Of a Screw Jack System

The drive torque of a system made up of several screw jacks connected to each other depends on the torque required for the individual drive of each one and the efficiency of the transmission parts that connect them.

Example:



1. System drive torque

$$M_{DS}\ (Nm) = \frac{M_{D1}}{\eta_{v1}} + \frac{M_{D2}}{\eta_{v2}} + \frac{M_{D3}}{\eta_k} \times 1$$

M_{D1} / M_{D2} / M_{D3} Screw jack drive torque 1 / 2 / 3 (Nm)
η_{v1} / η_{v2} Gearbox efficiency V1 / V2 (0.90 - 0.95 approx.)
η_k Distribution gearbox efficiency (0.90 approx.)

Important

In general, it is advisable to multiply the value calculated for a safety coefficient of 1.3 to 1.5; or for small installations, a factor of 2.
When the load to move is lower than 10% of the elevator's nominal load, consider that value for the previous calculations.

To help the calculation, some frequent arrangements are shown for those for which the system's drive torque can be calculated approximately using the formula below.
It is assumed that the load distribution is uniform between all the units and that they are all the same size.

$$M_{DS}\ (Nm) = M_D \times f_S$$

M_D Independent screw jack drive torque
f_S Factor, depending on system (see figures next page)

2. System start-up torque

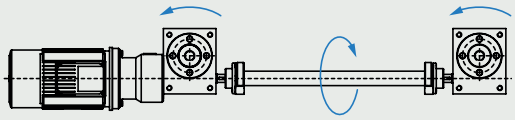
For loads by screw jack between 25% and 100% of the screw jack's nominal value, calculate the start-up torque with this formula: $MDS\ (Nm) = \frac{M_{DS}}{\eta_{SJ}}$

M_{DS} System drive torque (Nm)
η_{SJ} Elevator static efficiency

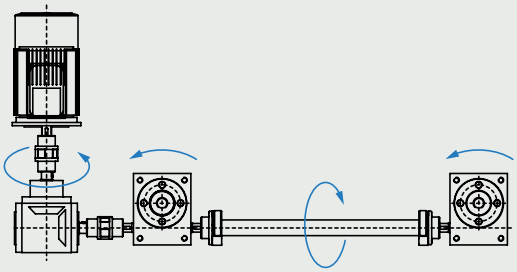
Important

For loads by elevator lower than 25% of its nominal value, multiply the system drive torque by 2.

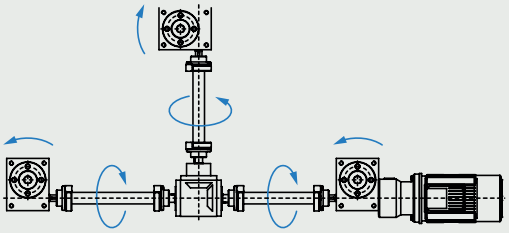
$f_s = 2,1$



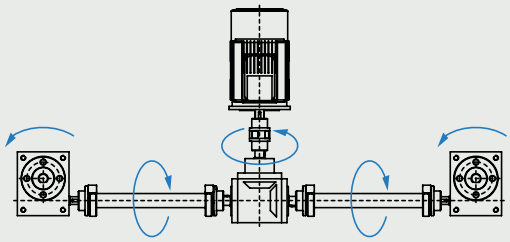
$f_s = 2,25$



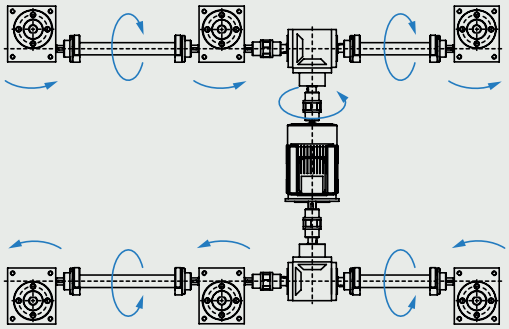
$f_s = 3,34$



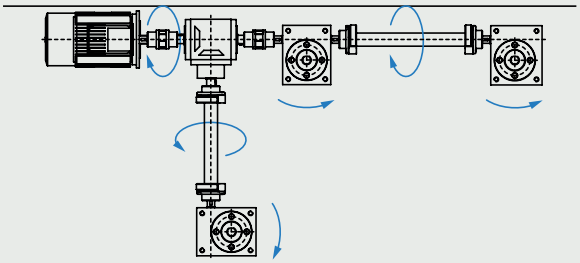
$f_s = 2,25$



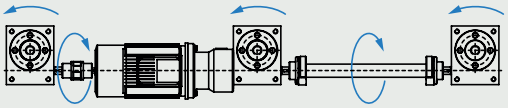
$f_s = 6,8$



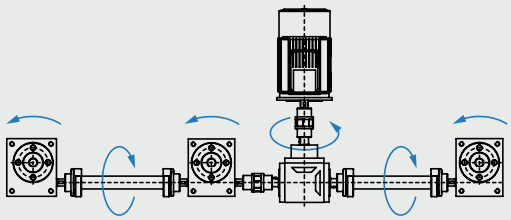
$f_s = 3,27$



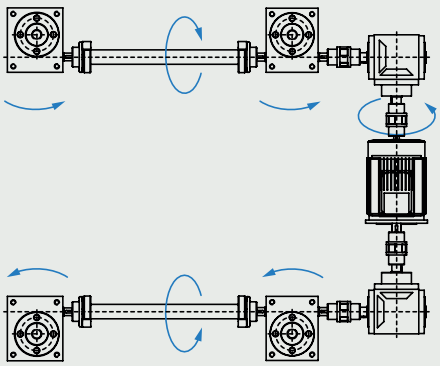
$f_s = 3,1$



$f_s = 3,35$



$f_s = 4,4$



$f_s = 4,6$