

Design advice

Design and specification

Selection and dimensioning is the customer's responsibility, because we are not familiar with the design criteria such as installation location and type of application. On request we can provide support during selection and specification and make proposals with subassembly drawings and calculations based on your application parameters. You can then examine and approve these drawings and their parts lists.

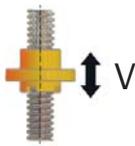
These then serve as basis for production and preassembly and assist your employees during installation and fitting. We guarantee the quality of the machine elements as described in the catalogue. The gearboxes are designed for industrial use at the loads and duty cycles specified in the catalogue.

If your requirements are not covered by our catalogue descriptions, please contact our project technicians. We generally deliver according to our current Terms of Sales and Delivery (Section 10).

Lifting speed

Lifting speed $v = \frac{\text{Screw pitch } P}{\text{Gear ratio } i} \times \text{motor speed } n$

m/min



There are several parameters which affect the lifting speed:

Faster:

- double-pitch screw (not generally held in stock): This doubles the lifting speed (CAUTION: max. input torque, not self-locking – brake required!)
- increased screw for the R version (next larger size of gearbox): depending on the screw jack size, this will give a somewhat greater pitch / lifting speed
- Ball screw: Various pitches are available (CAUTION: not self-locking– brake required!)

- Frequency converter serves to increase the motor speed to more than 1500 rpm. Please note the maximum gearbox speed.

Slower:

- Motors with more poles/lower speed (6, 8, 10 or 12 poles)
- Frequency converter (CAUTION: if the motor is to be operated for extended periods at frequencies less than 25 Hz, adequate cooling must be assured, e.g.: separately driven fan)
- Geared motor (CAUTION: do not exceed the maximum input torque)
- Bevel gearbox with gear reduction (only suitable for certain applications)

Temperature and duty cycle

Screw jacks are generally not designed for continuous operation.

Refer to the diagram on the gearbox pages (Sections 2 + 3) for the maximum duty cycles (ED).

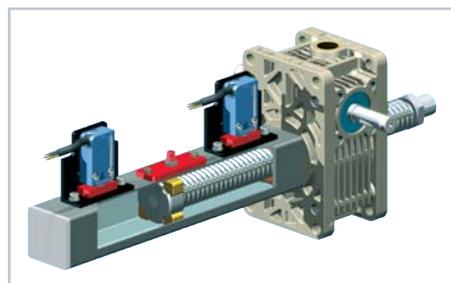
These are reference values but vary according to usage conditions. In borderline cases, select a larger screw jack or contact our project technicians.

Operating temperatures must not exceed 60°C (gearbox) or 80°C (screw) (higher values on request).

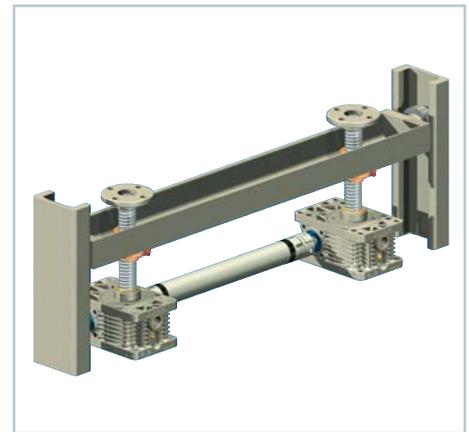
Rotation protection

On the version S₁, the translating screw is free running within the gearbox (worm wheel).

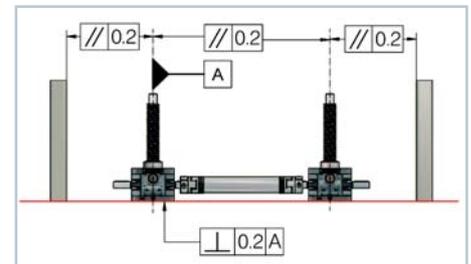
The screw must be protected against rotation – otherwise it would rotate due to the friction in the worm wheel. This can be achieved by fixing the screw to an external guidance system or by using our rotation protection (VS) (in the protective tube).



Parallelism and angular relationships

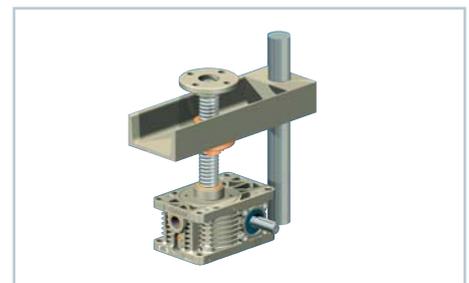


Attention must be paid to the parallelism and correct angular relationships of mounting surfaces, gears, nuts and guides to each other. The same applies for exact alignment of gears, pedestal bearings, connecting shafts and motors to each other.



Guides

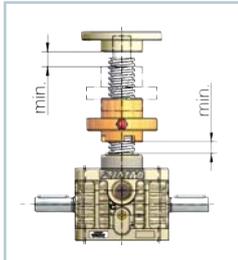
Guide bush play in the screw jack gearbox can be between 0.2 mm and 0.6 mm depending on the size. This is just a secondary support and does not replace a guide system specifically provided to cater for lateral forces.



Design advice

Safety distance

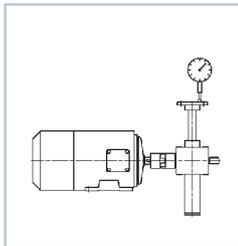
Safety distances between moving and stationary components must be maintained otherwise there is the risk of the screw jack reaching a blocked position (see Gearbox Dimension Sheets).



Accuracy

The repetition accuracy of the gearbox can be up to 0.05 mm when moving to the same position again under the same load conditions.

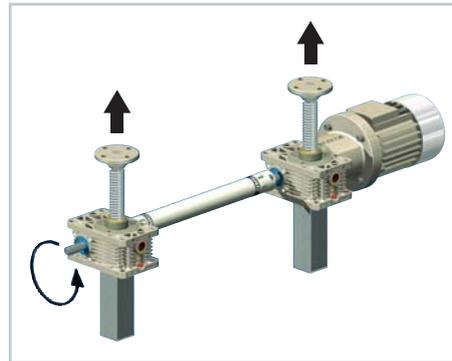
This requires measures on the drive side, such as a 3-phase AC motor with a brake in conjunction with a frequency converter, a rotary pulse encoder or a servomotor with encoder, etc.



The pitch accuracy for trapezoidal screws is 0.2 mm over a 300 mm screw length, and 0.05 mm for ball screws over a 300 mm screw length.

Under alternating loads, axial play can be up to 0.4 mm on trapezoidal screws and 0.08 mm on ball screws (when new).

Direction of rotation and movement



Check the direction of rotation required for the system and record this on the drawing or select one of our standard system layouts (Checklists). With T bevel gearboxes, the direction of rotation can be changed simply by turning the gearbox around.

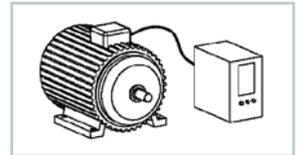
Self-locking / overrunning

Screw jacks with a single-pitch trapezoidal screw have a limited self-locking capability which cannot always be relied upon, especially where impact loads or vibrations are present (brake recommended).

The overrun after the motor has been switched off varies depending on the application. To minimize overrun, we recommend using a braked motor or a spring pressure brake FDB. A braked motor is essential for double-pitch screws or ball screws, because these are not self-locking.

Drive

We recommend the use of a frequency converter to achieve smooth start-up and brake ramps. This minimizes start-up noise and extends the service life of the gearbox.



Trial runs!

Trial runs without load and under load in normal operating conditions are necessary to ensure reliable operation. Do not exceed system duty cycle when loaded. These on-site trial runs are necessary to achieve system alignment and to eliminate any factors which may impair operation.

Spare parts

To protect against loss of production caused by high duty cycles or high loads, we recommend keeping a set of screw jack spare parts (including screws, accessories and with assembly drawings) at your location or at your customer's location.

Theatre stage design

We supply lifting equipment which satisfies the current regulations on theatre stage design.

Land vehicles, aircraft and water craft

Our extended warranty terms generally do not apply to machine elements used in any land vehicles, aircraft and water craft. Special individual terms may be agreed on inquiry.

Ambient conditions

Please specify any ambient conditions that are outside normal industrial environmental conditions (Checklists - Section 7).



Design advice

Lubrication

Adequate lubrication is determine for the service life of a screw jack. Therefore ensure adequate lubrication of screws, gearboxes and rotation protection. The red lubrication strip for rotation protection can be mounted in alternative positions to meet your requirements (please specify).

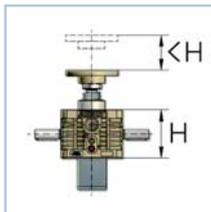


Please also refer to our lubricator and our Instruction manual.

Lubrication for short stroke applications

S version:

For short stroke applications (stroke < gearbox height), take particular care to ensure lubrication of the trapezoidal screw. The simplest tactic is to specify the screw jack with a longer stroke than the gearbox height, and occasionally perform a lubrication stroke. Otherwise, contact our Engineering Department for a suitable solution.



R version:

If stroke length < nut height, use a nut with lubrication capability (such as a duplex nut DM).



Instruction manual

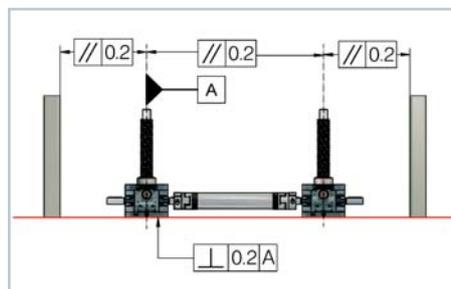
Please refer to our Instruction manual during the design phase (www.zimm.eu).

Design advice for steel and plant construction:

Hardly any assembly problems arise when screw jacks are used in machine tools, because the relevant surfaces are machined faces.

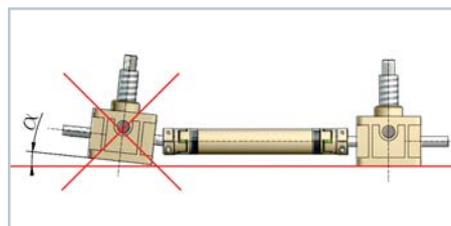
In steel and plant construction however, frequent geometric errors can occur in welded structures, despite accurate fabrication work. The interaction between different components can also cause alignment issues. Attention must be paid to the following:

Parallelism / angular relationships:

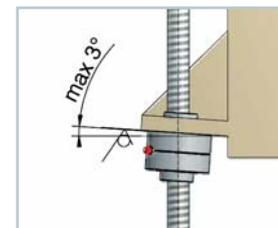
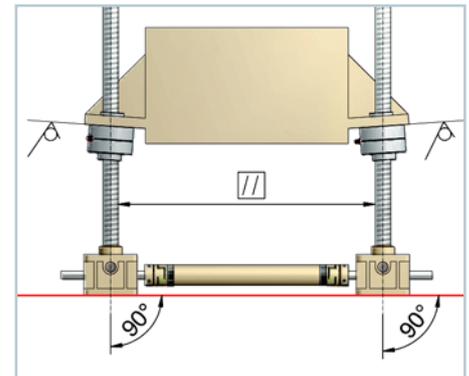


Screws and guides must be parallel to each other, otherwise the equipment can seize up during operation. All mounting surfaces for the gearboxes must be exactly at right angles to the guides, jamming may occur, leading to rapid wear and/or serious damage.

Squeaking noises can also occur on R versions. The mounting surfaces for the nuts must also be at right angles.



ZIMM has developed the self-aligning nut PM (see Section 4) to save time and costs here.

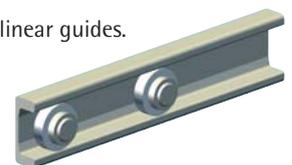


Additional features where alignment may be a problem are the integrated pivot bushings in the gearbox or the pivot bearing plate KAR (see Section 4).

For steel and plant construction:

We supply standard heavy-duty linear guides including bearings. Their stability, long service life, avoidance of geometric errors and ability to accept lateral side forces are decisive arguments for using such guides.

See Section 6 for linear guides.



 Printing errors, dimensional mistakes etc. and also technical changes and improvements are excepted. Drawings are valid only when they have been checked and approved by both partners in accordance with the order acknowledgement.