Handling

MANUAL AND MOTORIZED OPERATION

The K series only presents one ratio for all three sizes: an exact 1/5. This allows a great deal of precision in the couplings. All the K series can be manually or motor operated. As a standard production, for the IEC unified motors, it is possible to connect them directly to screw jacks. Special flanges can be made for hydraulic motors, pneumatic motors, brushless motors, as well as for direct current motors, permanent magnet motors, stepper motors and other special motors. In the case where it is not possible to motorize a screw jack directly, a connection by means of an housing and a joint can be foreseen. The power curves determine, in case of unit service factors and for every single screw jack, the moving power and the input torque according to the size and the requested output torque.

ROTATION DIRECTIONS

In standard conditions UNIMEC supplies K series screw jacks equipped with right-handed worm screw, to which correspond the movements illustrated in the drawings below.

Lubrication

The lubrication of the inner transmission devices to the casing is made, in the series production, using a synthetic oil having marked tribologic characteristics: UNIMEC ATIR SH150.

The technical specifications and the application field for the lubricant inside the casing are shown below.

Lubricant	Application field	Operating temperature [°C]*	Technical specifications
UNIMEC ATIR SH150 (not compatible with PAO based mineral and synthetic oils)	standard	-20 : + 200	DIN 51517-3: CLP NF ISO 6743-6: CKD
Total Nevastane SY 320 (not compatible with PAO based mineral and synthetic oils)	food industry	-20 : + 250	NSF-USDA: H1

* for operating temperatures between 80°C and 150°C Viton® seals should be used;
for temperatures higher than 150°C and lower than -20°C it is advisable to contact our technical office.

BALL SPINDLE

The end user is responsible for the lubrication of the ball spindle which must be carried out using a lubricant suggested by the manufacturer.Lubricating the ball spindle is an important and determining factor for the proper functioning of the screw jack. It must be carried out at regular intervals that can assure a constantcoat of clean lubricant between the contact parts.

Insufficient lubrication, or an improper lubrication can lead to abnormal overheating and consequent wear phenomena, which naturally reduce the operating life of the screw jacks. In case the screw jacks are not visible or the ball spindles are covered by protections it is necessary to periodically verify the lubrication conditions.

Backlash

BACKLASH ON THE WORM SCREW

The worm screw – worm wheel coupling has a small degree backlash. Under the effect of the reduction ratio and of the transformation from the rotation movement to the translation movement, this backlash becomes an error in the linear positioning of a few hundredths of a millimetre, according to the diameter and pitch of the ball spindle. For all other backlashes (lateral and axial) between the spindle and the lead nut it is necessary to refer to the ball spindle manufacturers catalogues.

Installation and maintenance

INSTALLATION

When arranging the ball screw jack and coupling it to machines, pay attention to the axis alignment. Failing an exact alignment, the bearings would be subjected to a greater overloading and anomalous overheating as well as to a greater wear, with a consequent reduction of their operating life.It is important to check that the spindle and the casing mounting plane be orthogonal and that the load and the spindle be on the same axis. Employing multiple screw jacks to handle the same load (see the mounting schemes section) requires further verifications: it is critical that the load support points, (the end fittings for KT models and the lead nuts for KR models), be perfectly aligned in order that the load can be uniformly distributed; otherwise the misaligned screw jacks would act as brake or counter-load. Whenever several jacks have to be connected by means of transmission shafts, it is recommended that they be perfectly aligned in order to avoid overloading the worm screws. It is advisable to use joints capable of absorbing alignment errors without loosing the torsion strength necessary to keep the synchronization of the transmission. It is necessary to mount the transmission in a way to avoid any displacement or vibrations, keeping attention to the fixing by means of bolts or tie rods. Before assembling the connection parts it is necessary to properly clean the contact surfaces in order to avoid any seizing and oxidizing problems. Assembly or disassembly shall occur by means of tie rods or extractors, using the threaded hole on the shaft end. In case of forced couplings, a shrink-fitting is recommended with a temperature up to 80-100 °C.
Installations environments with dust, water, vapors, etc. require precautions to protect the ball spindle, such as elastic protections (bellows) and rigid protections. The above protections are also used in order to avoid any accidental human contact with the moving devices. For civil applications it is always advisable to use the safety components.

PREPARING FOR SERVICE

All UNIMEC's screw jacks are supplied filled with long lasting lubricant which ensures a perfect lubrication of the worm gear/ worm wheel group and all the inner parts. All K series screw jacks are equipped with a lubricant filling cap, a drain cap and an oil level indicator in order to allow the filling-up of the lubricant as necessary. As clearly explained on the relative paragraph, lubrication of the ball spindle is a user's responsibility and it must be carried out periodically depending on the service conditions and the operating environment. Special sealing systems allow to hold the screw jacks in any position without creating leakage problems. The application of some accessories can limit these assembly possibilities: the various solutions to be adopted will be explained in the relevant paragraphs. Some screw jacks are equipped with an "add oil" label.
The installer shall carry out the necessary oil filling when gears are not working. Fillings should not be excessive in order to avoid any overheating, noise, inner pressure increase and power loss problems.

START-UP

All screw jacks undergo a careful quality examination before being delivered to the client, and are dynamically tested load-free. When starting-up a machine where screw jacks are installed, it is critical to check for the lubrication of the ball spindles and for the absence of foreign material. During the calibration of the electrical end-of-stroke systems, the inertia of the moving masses should be taken into account, which for vertical loads will be lower in ascent and greater in descent. Some hours of operation at full load are necessary before the screw jack reaches its maximum running efficiency. The screw jacks can be placed under a full load immediately if necessary. If some circumstances, it is nonetheless advisable to operate the screw jack under increasing loads, reaching maximum load after 20-30 hours of operation. It is likewise recommended to take due precautions to avoid overloads in the initial stages of operation.There may be a higher temperature during these initial stages but this will be reduced once the screw jacks is completely run in.

ROUTINE MAINTENANCE

Screw jacks must be periodically inspected, depending on the level of use and work conditions. It is advisable to check for losses of lubricant from the casing, and if this occurs, it is necessary to find and eliminate the cause and fill the lubricant up the correct level.
The lubrication conditions of the ball spindle must be periodically inspected (and restored if necessary) as well as the presence of any foreign material. All safety devices should be verified according to the normative in force.

STORAGE

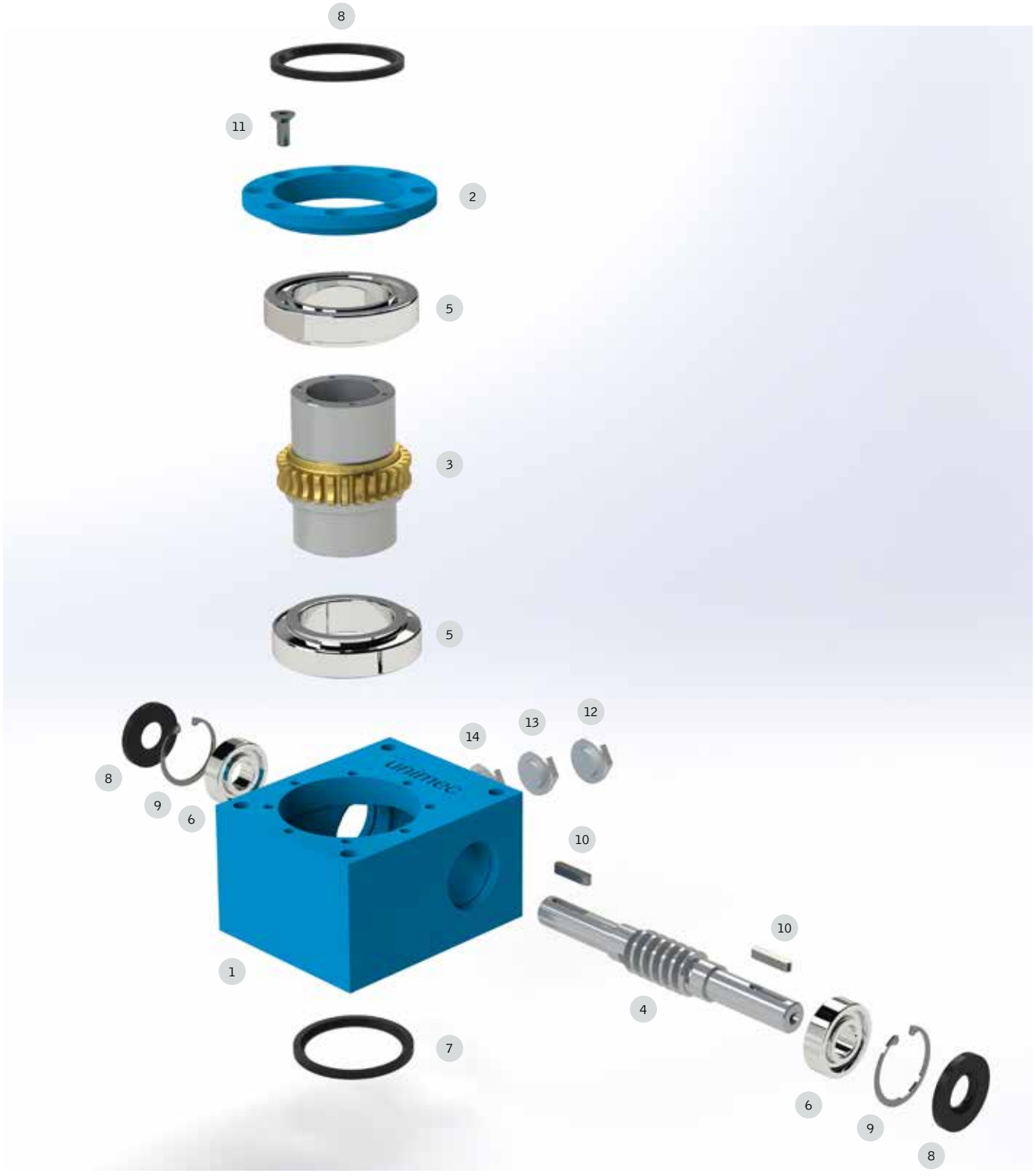
The screw jacks must be protected from deposits of dust and foreign matter during storage. Particular attention must be paid to saline or corrosive atmospheres.
We also recommend to:

- periodically rotate the worm screw to ensure proper lubrication of inner parts and avoid that the seals dry up, therefore causing lubricant losses.
- lubricate and protect the threaded spindle, the worm screw and the non varnished components
- support the ball spindle in case of horizontal storage.

WARRANTY

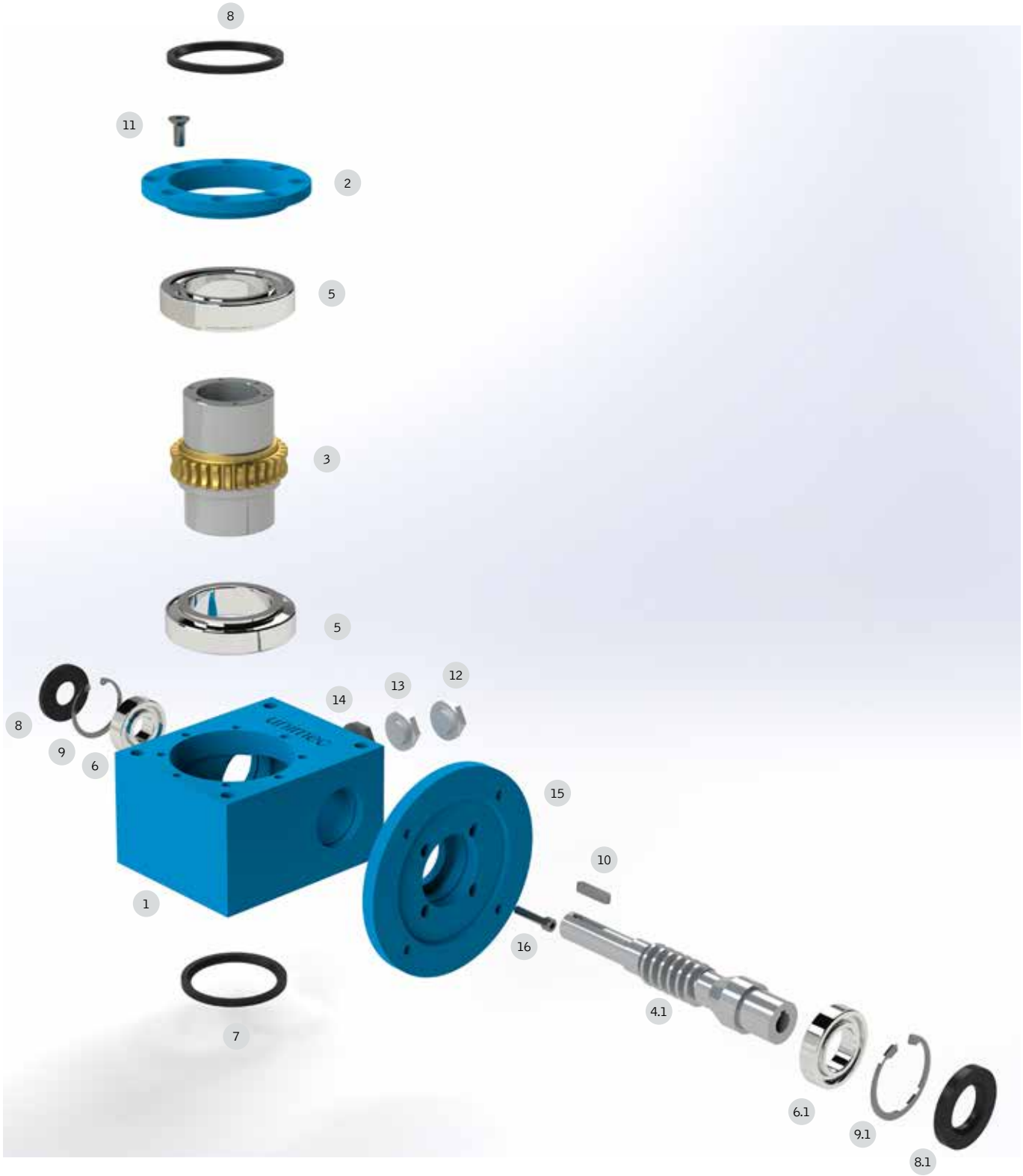
The warranty is valid only if the instructions contained in our manual are carefully followed.

K Model



1 Casing	5 Worm wheel bearing	9 Snap ring	13 Oil level indicator
2 Cover	6 Worm screw bearing	10 Key	14 Drain cap
3 Worm wheel	7 Seal	11 Bolt	
4 Worm screw	8 Seal	12 Filling cap	

MK Model



1	Casing	6	Worm screw bearing	9	Snap ring	13	Oil level indicator
2	Cover	6.1	Motori worm screw bearing	9.1	Snap ring for motoring	14	Drain cap
3	Worm wheel	7	Seal	10	Key	15	Motor flange
4.1	Motor worm screw	8	Seal	11	Bolt	16	Bolt
5	Worm wheel bearing	8.1	Seal for motoring	12	Filling cap		

Size 59

K Model

KT Model

KR Model

› Materials

	Material	Norms	Specs	Indications
Worm	16NiCr4	EN 10084:2008	Casehardening alloy steel	Casehardened and ground on teeth and holds
Carter	GJL 250	EN 1561:2011	Grey cast iron	Completely machined on 6 faces
Worm wheel	Bronze CuSn12 and grey cast iron GJL250	EN 10084:2008 and EN 1561:2011	Wheel casted in bi-metal	
Lubricant	Unimec Atir SH150		Synthetic oil	0,3 lt

› General features

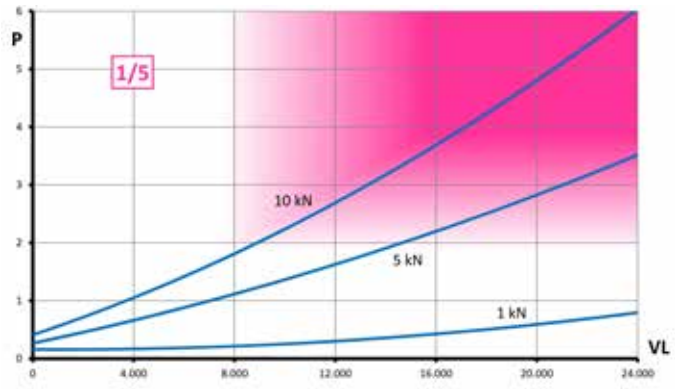
Efficiency	85 %
Operating temperature	-10 °C / 80 °C
Max input speed	3000 rpm
Main Gearbox Weight	15 kg
Max admissible lateral loads	0 N
Center-to-center distance	59 mm
Max radial Load on worm Screw	450 N
Standard Working Conditions	25 °C - regular work - 10.000 hours of expected life

› Specific features

	Nominal Ratios 1/5
Real ratio	1/5
Worm screw maximum torque	315 Nm
Inertia moment	4060 kg-mm^2

› Power curves

The magenta zone indicates a potential heating risk. Working cycles must be carefully analized.
VR = Worm rotational speed [rpm]
VL = Spindle translation speed [mm/min]
P = Requested input power [kW]



› Motor Models

IEC	Worm screw bore diameter	Centering diameter	Nominal power (4 poles motor)
IEC 71 B5 / B14	14 mm	110 mm / 70 mm	0,55 kW
IEC 80 B5 / B14	19 mm	130 mm / 80 mm	1,1 kW

› Construction Forms


Form B


Form D


Form S


Form MBD


Form MD


Form MS


Form MBS

Size 88

K Model

KT Model

KR Model

› Materials

	Material	Norms	Specs	Indications
Worm	16NiCr4	EN 10084:2008	Casehardening alloy steel	Casehardened and ground on teeth and holds
Carter	GJL 250	EN 1561:2011	Grey cast iron	Completely machined on 6 faces
Worm wheel	Bronze CuSn12 and grey cast iron GJL250	EN 10084:2008 and EN 1561:2011	Wheel casted in bi-metal	
Lubricant	Unimec Atir SH150		Synthetic oil	0,8 lt

› General features

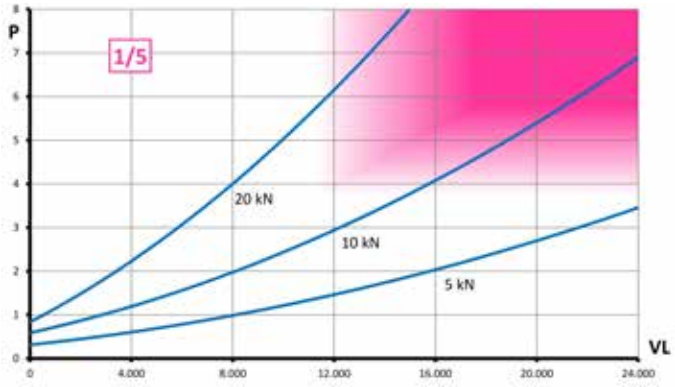
Efficiency	85 %
Operating temperature	-10 °C / 80 °C
Max input speed	3000 rpm
Main Gearbox Weight	40 kg
Max admissible lateral loads	0 N
Center-to-center distance	88 mm
Max radial Load on worm Screw	600 N
Standard Working Conditions	25 °C - regular work - 10.000 hours of expected life

› Specific features

	Nominal Ratios 1/5
Real ratio	1/5
Worm screw maximum torque	610 Nm
Inertia moment	25500 kg-mm^2

› Power curves

The magenta zone indicates a potential heating risk. Working cycles must be carefully analized.
VR = Worm rotational speed [rpm]
VL = Spindle translation speed [mm/min]
P = Requested input power [kW]



› Motor Models

IEC	Worm screw bore diameter	Centering diameter	Nominal power (4 poles motor)
IEC 80 B5 / B14	19 mm	130 mm / 80 mm	1,1 kW
IEC 90 B5 / B14	24 mm	130 mm / 95 mm	1,9 kW
IEC 100-112 B5 / B14	28 mm	180 mm / 110 mm	5 kW

› Construction Forms


Form B


Form D


Form S


Form MBD


Form MD


Form MS


Form MBS

Size 117

K Model

KT Model

KR Model

› Materials

	Material	Norms	Specs	Indications
Worm	16NiCr4	EN 10084:2008	Casehardening alloy steel	Casehardened and ground on teeth and holds
Carter	GJL 250	EN 1561:2011	Grey cast iron	Completely machined on 6 faces
Worm wheel	Bronze CuSn12 and grey cast iron GJL250	EN 10084:2008 and EN 1561:2011	Wheel casted in bi-metal	
Lubricant	Unimec Atir SH150		Synthetic oil	1,2 lt

› General features

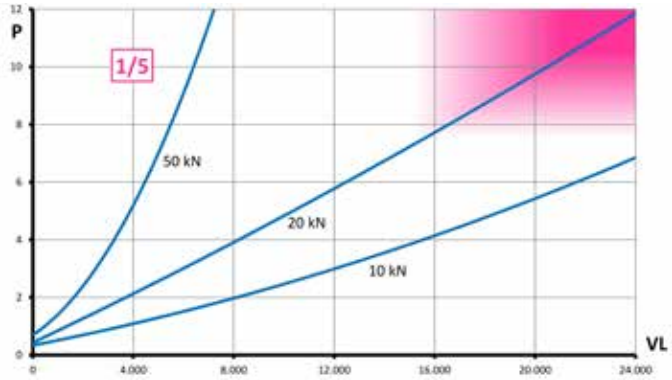
Efficiency	85 %
Operating temperature	-10 °C / 80 °C
Max input speed	3000 rpm
Main Gearbox Weight	64 kg
Max admissible lateral loads	0 N
Center-to-center distance	117 mm
Max radial Load on worm Screw	900 N
Standard Working Conditions	25 °C - regular work - 10.000 hours of expected life

› Specific features

	Nominal Ratios 1/5
Real ratio	1/5
Worm screw maximum torque	1050 Nm
Inertia moment	80000 kg-mm^2

› Power curves

The magenta zone indicates a potential heating risk. Working cycles must be carefully analized.
VR = Worm rotational speed [rpm]
VL = Spindle translation speed [mm/min]
P = Requested input power [kW]



› Motor Models

	IEC	Worm screw bore diameter	Centering diameter	Nominal power (4 poles motor)
	IEC 132 B5 / B14	38 mm	230 mm / 130 mm	9,2 kW

› Construction Forms


Form B


Form D


Form S


Form MBD


Form MD


Form MS


Form MBS

BU Anti-Disengagement Bushing

› Specifications

The BU Anti-Disengagement Bushing is a safety device preventing the translating ball screw from disengaging from the screw jack in the event of an accidental overstroke. The BU Anti-Disengagement Bushing features a trapezoidal thread which guarantees the full load support during the attempted overstroke. The BU Anti-Disengagement Bushing can only be installed in models with translating spindle. If the PRF Stroke Control accessory is also installed on the Screw Jack, the BU Anti-Disengagement Bushing will work as an additional end-stroke safety device. Please keep in mind that even a single overstroke accident (with consequent impact of the BU Anti-Disengagement Bushing with the main body of the unit) can irreparably damage the internal gearing.

CAPP Worm Screw Protection Cover

› Specifications

The CAPP Worm Screw Protection Cover is a rigid plastic protection that covers one of the worm screw extremities protecting it from accidental collisions, dust and debris. It also works as a safety device protecting live operators from moving parts.

The CAPP Worm Screw Protection Cover can only be installed on Screw Jacks in the B Construction Form.

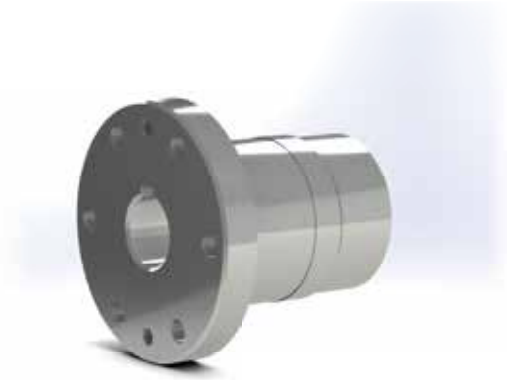
CT Temperature Control

› Specifications

The CT Temperature Control option is based on a temperature measuring probe, installed directly on the body of the unit and capable of measuring temperature variations between -40 ° C (-40 ° F) and 90 ° C (194 ° F). As power transmissions, screw jacks tend to dissipate a significant amount of input power in the form of heat; the CT Temperature Control is recommended in all those applications where temperature monitoring is a critical factor.

It is recommended to never exceed the upper limit of 80 ° C (176° F); when the system reaches this critical limit, it is necessary to stop the transmission and wait until the system returns to room temperature. Failure to do so may cause premature wear and/or catastrophic failure.

CVR Rotating Spindle Sleeve



› Specifications

In order to assemble rotating ball spindes into the main body of the jack, it's necessary that their end fitting diameter will be minor than the hollow shaft ones (particulary 48, 72 and 105 mm for sizes 59, 88 and 117). A special sleeve between spindels and the hollow shaft connects both components.

FDR Reduction Flange

› Specifications

Reduction flange is an accessory that allow the assembling of a ball nut into the jack worm wheel. By this accessory it's possible to assemble different sizes of ball spindels in one only jack model: this is the reason why K series is an universal one.

P Lateral Pins

› Specifications

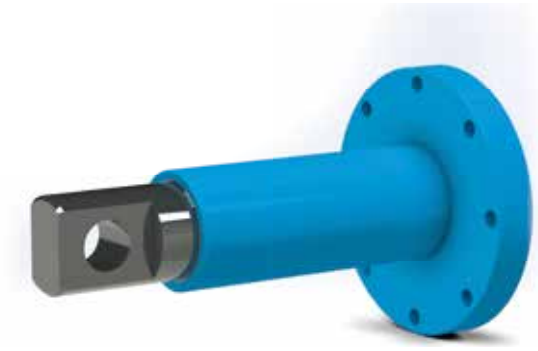
The P Lateral Pins option is used for oscillating, piston-rod configurations. Two protruding pins are mounted directly on two sides of the Screw Jack, becoming the pivotal point in the system. For this reason, this option may be preferable to the PO Oscillating Rigid Protection as it offers a more advantagous factor in the 2nd Euler's Law: in fact, when using the formualae, the center-to-center distance from the pin to rod-end is exactly half compared to the center-to-center distance between the PO eyelet and the rod-end. Please keep in mind that the use of the P Lateral Pins and a rod-end, does not eliminate lateral loads.

PE Elastic Bellow Protection

› Specifications

The PE Elastic Bellow Protection protects the ball screw from dust and debris. Standard bellows are made of PVC-coated Polyester and can be equipped with flange end-fittings (available both in plastic or metal). The standard PVC-coated Polyester bellows are rated for temperatures between -30 °C and 70 °C (-20 °F /160 °F). Optional bellow materials such as Neoprene® and Hypalon® (sea water resistant), Kevlar® (cut and abrasion resistant), Fiberglass (for extreme temperatures, from -50 °C to 250 °C (-60 °F / 480 °F)) and Aluminized Carbon Fiber (self-estinguishing material for use in applications with open fires and melted metals) are also available. If a waterproof seal is required, special bellows with thermo-sealed seals (vs. sewn) are available. Please note that this option does not eliminate the risk of internal condensation. Finally, special bellow materials such as metal bellows or other materials for extreme applications are available upon request. In case of particularly long strokes, the PE Elastic Bellow Protection can be equipped with anti-stretching rings to allow a uniform opening and closing process. Please keep in mind that, in order to accommodate the fully retracted bellow, each PE Elastic Bellow Protection requires that the total ball screw length be increased by 1/8 of the stroke. In case of horizontal applications the PE Elastic Bellow Protection must be equipped with anti-collapsing rings. Please always specify the direction of the application.

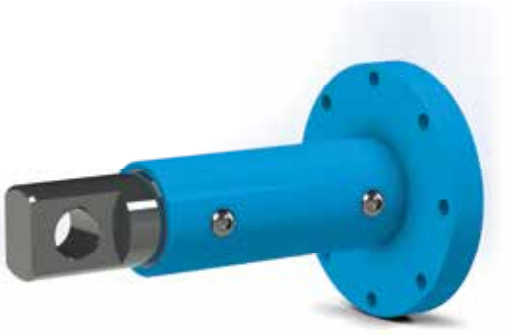
PO Oscillating Rigid Protection



› Specifications

The PO Oscillating Rigid Protection is a special rigid protection with an eyelet in the lower extremity used in oscillating, piston-rod configurations. Please be aware that in this particular configuration, the payload is supported by the Rigid Protection tube and the lower eyelet; therefore, due to the risk of deflection, it is advisable to use caution with particularly long strokes. Please keep in mind that the use of the PO Oscillating Rigid Protection and a rod-end, does not eliminate lateral loads. When working with compression loads, it is necessary to verify the load capacity under the 2nd Euler's Law: when using the formualae please consider the center-to-center distance between the eyelet and the rod-end. A motor can be installed directly on the screw jack.

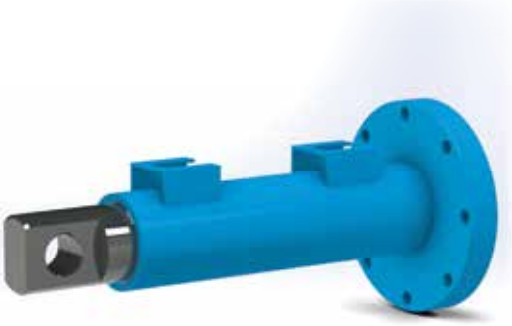
PO-A Dual-Guide Anti-Rotation and Oscillating Rigid Protection



› Specifications

The PO-A Dual-Guide Anti-Rotation and Oscillating Rigid Protection is the combination of our PO Oscillating Rigid Protection and the Dual-Guide Anti-Rotation system and it is used in those oscillating, piston-rod applications where the user needs to contrast the inherent tendency to rotate that every screw jack presents. The PO-A Dual-Guide Anti-Rotation and Oscillating Rigid Protection, applicable on the KT Series, is a special Oscillating Rigid Protection (PO) with an eyelet in the lower extremity and two embedded linear guides with a no-friction Keniflon-treated bushing connected to the trapezoidal screw. In cases of longer strokes it is necessary to verify that torsional forces may not pose the risk of damaging the bushing. Because the anti-rotation system locks the screw and the end-fitting in a specific position, it is always necessary to specify the exact position of special holes or asymmetrical/non-centered details in the ball screw. Please keep in mind that the use of the PO-A and a rod-end, does not eliminate lateral loads. When working with compression loads, it is necessary to verify the load capacity under the 2nd Euler's Law: when using the formualae please consider the center-to-center distance between the eyelet and the rod-end. A motor can be installed directly on the screw jack.

PO-F Oscillating Rigid Protection with Stroke Control



› Specifications

The PO-F Oscillating Rigid Protection with Stroke Control is the combination of our PO Oscillating Rigid Protection and our Electronic Stroke Control and it is used in oscillating, piston-rod applications requiring a stroke control. The PO-F Oscillating Rigid Protection with Stroke Control, applicable on KT models, is a special PO Oscillating Rigid Protection with two milled areas to allow the installation of proximity switches. Proximity switches are included on demand. It is possible to have more than two milled areas for multiple proximity switches. Please be aware that in this particular configuration, the payload is supported by the Rigid Protection tube and the lower eyelet; therefore, due to the risk of deflection, it is advisable to use caution with particularly long strokes. Please keep in mind that the use of the PO-F and a rod-end, does not eliminate lateral loads. When working with compression loads, it is necessary to verify the load capacity under the 2nd Euler's Law: when using the formualae please consider the center to center distance between the eyelet and the rod-end. A motor can be installed directly on the Screw Jack. A BU Anti-Disengagement bushing is also required on the ball screw. Multiple BU Anti-Disengagement bushings can also be installed upon request.

PR Rigid Protection

› Specifications

A PR Rigid Protection, installed on the lower end of the Screw Jack, is the ideal way to protect the translating ball screw from dust and debris. The PR Rigid Protection can only be installed in Screw Jacks in the KT Series. The protection is fixed to the main body by a flange.

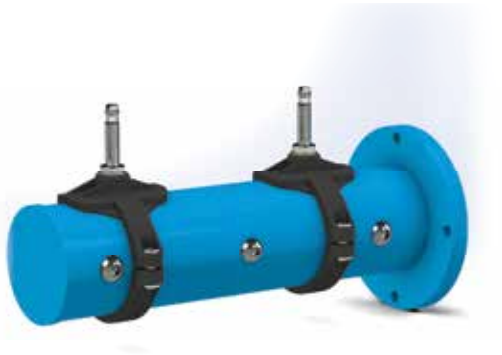
PR-A Dual Guide Anti Rotation System

› Specifications

The PR-A Dual Guide Anti Rotation System is used when it's difficult to create an external contrast to the inherent tendency to rotate that every screw jack presents. The PR-A Dual Guide Anti Rotation System, applicable on the KT Series, is based on two linear guides embedded in the PR Rigid Protection and a no-friction Keniflon-treated bushing connected to the ball screw.

In cases of longer strokes it is necessary to verify that torsional forces may not pose the risk of damaging the bushing. Finally, because the anti-rotation system locks the screw and the end-fitting in a specific position, it is always necessary to specify the exact position of special holes or asymmetrical/non-centered details in the ball screw.

PR-A-F Dual-Guide Anti-Rotation System with Stroke Control

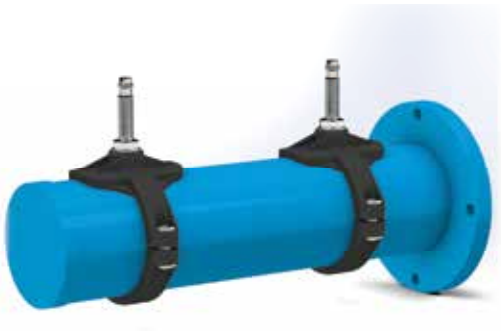


› Specifications

The PR-A-F Dual-Guide Anti-Rotation System is used to control the stroke and contrast the inherent tendency to rotate that every screw jack presents. The PR-A-F Dual-Guide Anti-Rotation System with Stroke Control, is based on two linear guides embedded in the PR Rigid Protection and a no-friction Keniflon-treated bushing connected to the ball screw. In cases of longer strokes it is necessary to verify that torsional forces may not pose the risk of damaging the bushing. Finally, because the anti-rotation system locks the screw and the end-fitting in a specific position, it is always necessary to specify the exact position of special holes or asymmetrical/non-centered details in the ball screw.

The system consists of a special PR Rigid Protection with two milled areas to allow the installation of proximity switches. Proximity switches are included and embedded in custom supports, specifically designed to be installed on the PR Rigid Protection. The special supports are made of two half-rings allowing ideal positioning and fine tuning of the proximity switches. The presence of O-Rings guarantees protection against dust, debris and moisture. It is possible to have more than two milled areas for multiple proximity switches. A BU Anti-Disengagement bushing is also required on the trapezoidal screw. Multiple BU Anti-Disengagement bushings can also be installed upon request.

PR-F Electronic Stroke Control



› Specifications

The PR-F Electronic Stroke Control accessory is available for all Screw Jacks in the KT Series. The standard system consists of a special PR Rigid Protection with two milled areas to allow the installation of proximity switches. Proximity switches are included and embedded in custom supports, specifically designed to be installed on the PR Rigid Protection. The special supports are made of two half-rings allowing the ideal positioning and fine tuning of the proximity switches. The presence of O-Rings guarantees protection against dust, debris and moisture. It is possible to have more than two milled areas for multiple proximity switches. A BU Anti-Disengagement bushing is also required on the trapezoidal screw. Multiple BU Anti-Disengagement bushings can also be installed upon request.

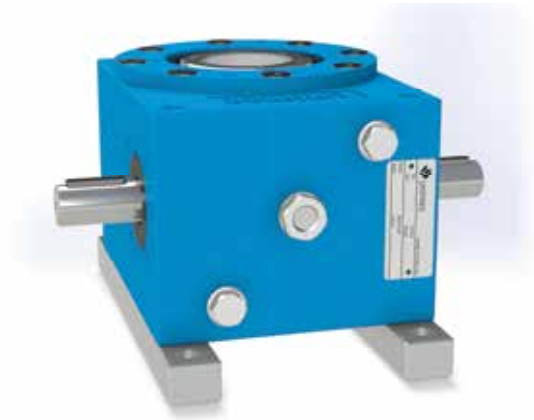
PR-O Oil Bath Rigid Protection

› Specifications

The PR-O Oil Bath Rigid Protection option has a dual function: protection of the ball screw from dust and debris and semi-automatic lubrication. During installation the PR-O Oil Bath Rigid Protection must be filled with the recommended lubricant (depending on the application). Every time the translating ball screw recedes in the PR-O Oil Bath Rigid Protection, it receives a coat of lubricant. In order to guarantee adequate adherence, it is recommended to use high-viscosity gear oils (1,000 mm^2/s) with high-pressure PE Additives.

Unimec offers a wide selection of proprietary and recommended lubricants. A lubrication port is installed directly on the body of the unit while a drain plug is installed on the bottom of the PR-O Rigid Protection. For applications with particularly long strokes it is recommended to add the TRO option: an oil-recirculation tube allowing the lubricant to flow from the gearbox to the rigid protection and compensate the pumping effect.

SP Mounting Plates



› Specifications

The SP Mounting Plates option is useful in those applications that do not allow the use of the pre-existing mounting holes on the body of the Screw Jack. Custom configurations with special hole patterns are available upon request.