

The ball screw jacks proposed in the K series are born from UNIMEC's experience in trapezoidal screw jacks.

They can be employed for lifting, pulling, moving, aligning any kind of load with a perfect synchronism, which is difficult to obtain by means of other handling devices. The K series screw jacks are suitable for high services as well as for a very rapid, quick and precise positioning. As compared to trapezoidal screw jacks, the K series presents a transmission REVERSIBILITY: it is therefore advisable to provide for brakes, blockings or contrast torques in order to avoid a direction reversal. Screw jacks can be applied singularly or in groups properly connected with shafts, joints, and/or bevel gearboxes.

They can be driven by different motors: electrical, with either alternating or direct current, as well as hydraulic or pneumatic motors. Also they can be driven manually or with any other kinds of transmission. UNIMEC ball screw jacks are designed and manufactured using innovative technology so to supply a product which identifies itself with the state of the art in the transmission devices.

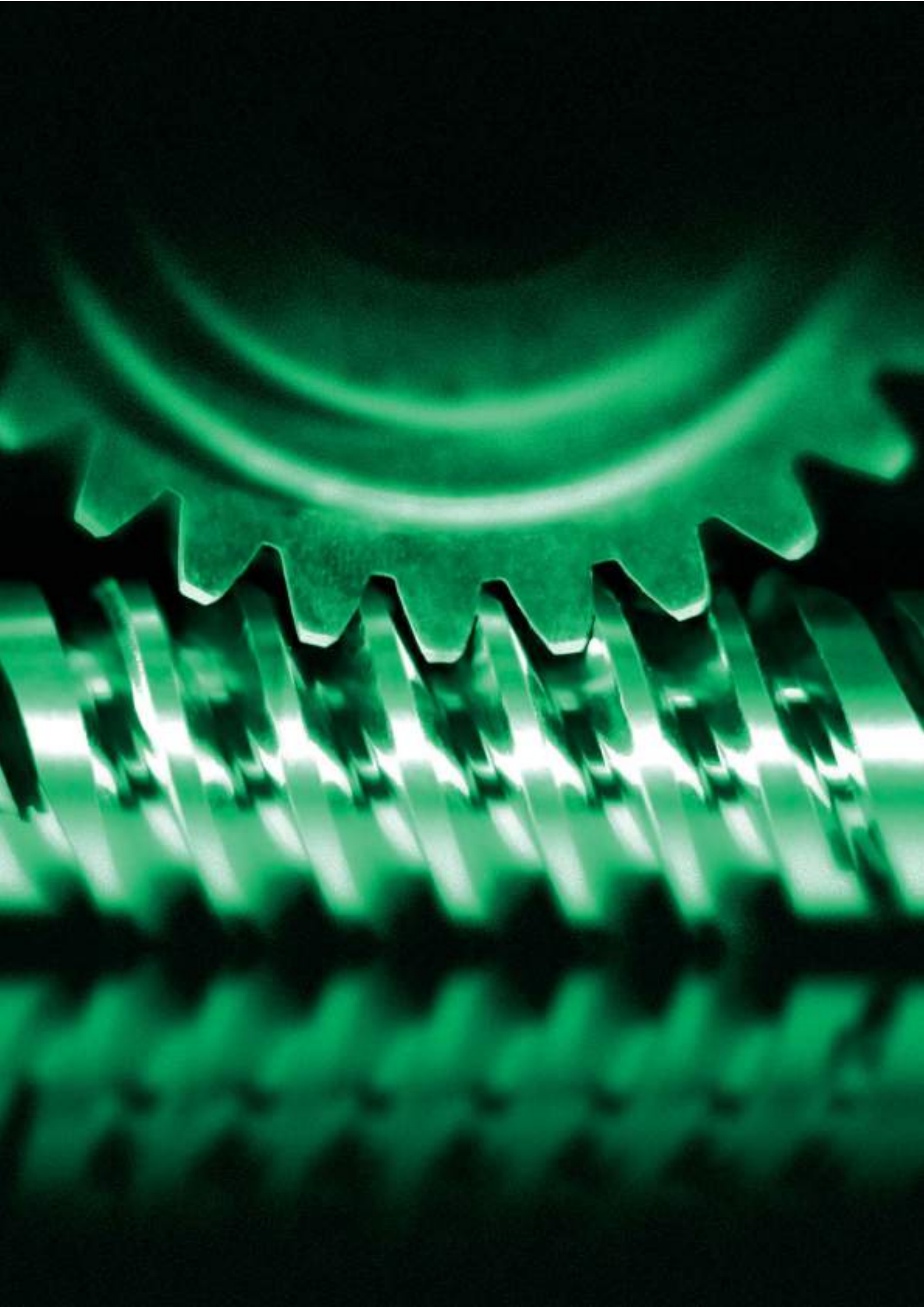
## Ball screw jacks

The highest quality and a 25 years long experience are able to meet the most demanding and sophisticated requirements.

The special hollow shaft mounting allows to assemble any kind of ball spindles available on the market, making the K series really UNIVERSAL. The outer surfaces are completely machine finished and the parts are assembled with special care, in order to allow the application of supports, flanges, pins, or any other components a mounting may require. Special sealing systems enable the inner gears to operate in a bath of lubricant, which guarantees them a long lasting life.

Moreover the following models, UNIMEC can realize any special transmission a design may require.







### 139 K

Screw jack suitable for mounting various ball spindles.



### 140 MK

Screw jack suitable for mounting various kinds of ball spindles. Arranged for direct coupling to single phase, three-phase, self-braking, direct current, hydraulic, pneumatic motors, etc.



### 133 KT

Screw jack with axial translation of ball spindle. The rotation of the worm screw is transformed in the axial movement of the ball spindle which must have a rotational constraint.



### 140 MKT

Screw jack with axial translation of ball screw, arranged for direct coupling to single phase, three-phase, self-braking, direct current, hydraulic, pneumatic motors, etc.



### 138 KR

Screw jack with rotating ball spindle. The rotation of the worm screw is transformed in the axial movement of the ball spindle. The load shifting is carried out by the support nut which must have a rotational constraint.



### 140 MKR

Screw jack with axial translation of ball spindle, arranged for direct coupling to single phase, three-phase, self-braking, direct current, hydraulic, pneumatic motors, etc.



### CK

Screw jack suitable for application to various kinds of ball spindles, arranged for direct coupling to single phase, three-phase, self-braking, direct current, hydraulic, pneumatic motors, etc. by means of housing and joint.



### CKT

Screw jack with axial translation of ball spindle arranged for direct coupling to single phase, three-phase, self-braking, direct current, hydraulic, pneumatic motors, etc. by means of housing and joint.



### CKR

Screw jack with rotating ball spindle, arranged for direct coupling to single phase, three-phase, self-braking, direct current, hydraulic, pneumatic motors, etc. by means of housing and joint.



### GR 141

KT model screw jack with rotating guide



### GSI 142

KT model screw jack with lower static guide.



### GSS 143

KT model screw jack with upper static guide.





**144 PR**  
KT model screw jack with rigid protection.



**146 PE**  
KR model screw jack with elastic protection.



**145 PRO**  
KT model screw jack with oil bath rigid protection.



**147 PRF**  
KT model screw jack with rigid protection and stroke control.



**146 PE**  
KT model screw jack with elastic protection.



**148 PRA**  
KT model screw jack with dual guide anti-rotation rigid protection.



**CR 149**

K model screw jack with worm wheel rotation monitoring.



**CT 149**

K model screw jack with casing temperature control.



**SP 150**

K model screw jack with additional mounting plates.



**P0 151**

KT model screw jack with rigid rocking protection.



**P 152**

K model screw jack with lateral pins.



**VARIOUS END FITTINGS**



## Models

**KT MODEL:** ball spindle with axial translation.

The input rotation of the worm screw is transformed in the axial translation of the ballspindle by means of the worm wheel.

The load is applied on the ball spindle, which must have a rotational constraint.

# Ball screw jacks

**KR MODEL** for rotating ball spindle with external support nut (lead nut).

The input rotation of the worm screw causes the rotation of the ball spindle which is attached to the worm wheel.

The load is applied to an external support nut (lead nut) which must have a rotational constraint.

## Casings

Casings are made of grey cast iron EN-GJL-250 (according to the UNI EN 1561: 1998 requirements), they have a parallelepiped form, with six completely end finished faces, and having a varnished inner part.

## Worm screws

For the entire K series, worm screws are made of a special steel 16NiCr4 (according to the UNI EN 10084:2000 requirements). They undergo thermal treatments like case-hardening and carburizing before being thoroughly ground on both the threads and the tangs.

## Worm wheel

Worm wheels are made of bronze type AlSn12 (according to the UNI EN 1982:2000 requirements). They have high mechanical features for non-stop running and high performances. The profile of the worm wheels toothing has been designed especially for our screw jacks and can easily support heavy duties.

## Hollow shaft

The hollow shaft is made of a special steel 16NiCr4 (according to the UNI EN 10084:2000 requirements), and it undergoes thermal treatments like case-hardening and carburizing before being thoroughly ground on all its parts.

## Ball spindles

All ball spindles available in the market can be mounted on the K series. The mounting system versatility allows to only use three screw jack sizes to cover a range of ball spindles from the 16x5 to the 80x20 one. UNIMEC is able to supply screw jacks equipped with ball spindles of any kind of supplier.

## Protections

Protection can also be applied in order to prevent dust and foreign matters from coming into contact with the coupling and causing damages to the ball spindle and its support nut. For KT models, a steel rigid pipe can be provided on the back side, while the front side can be protected by nylon and PVC elastic bellows. In KR models only elastic protections can be applied.

## Bearings and market materials

Top-quality bearings and market materials are used for the whole line.

## Weight

(as referred to the basic models)

Size	59	88	117
weight [kg]	15	41	64





## GLOSSARY

A	=	maximum angular speed of the worm screw [rpm]
B	=	load cycle frequency [Hz]
C	=	unit load to be handled [daN]
$C_e$	=	equivalent unit load [daN]
$F_{rv}$	=	radial forces on the worm screw [daN]
$f_a$	=	ambient factor
$f_d$	=	duration factor
$f_g$	=	usage factor
J	=	total inertia [kgm <sup>2</sup> ]
$J_k$	=	screw jack inertia [kgm <sup>2</sup> ]
$J_v$	=	inertia downstream of the screw jack [kgm <sup>2</sup> ]
$M_{fv}$	=	braking torque on the worm screw [daNm]
$M_{tc}$	=	hollow shaft torque [daNm]
$M_{tv}$	=	torque on the worm screw [daNm]
n	=	number of screw jacks under a single handling
$P_i$	=	input power to the single screw jack [kW]
$P_e$	=	equivalent power [kW]
$P_{ei}$	=	input equivalent power to the single screw jack [kW]
$P_J$	=	inertia power [kW]
PTC	=	adjustment factor on thermal power
T	=	tangential component of the contact forces between the worm wheel and the worm screw (with reference to the worm wheel), [daN]
rpm	=	rounds per minute
v	=	axial translation speed of the load [mm/min]
$\eta_a$	=	ball spindle running efficiency
$\eta_k$	=	K screw jack running efficiency
$\omega_c$	=	hollow shaft angular speed [rpm]
$\omega_v$	=	worm screw angular speed [rpm]
$\alpha_v$	=	worm screw angular acceleration [rad/s <sup>2</sup> ]

Unless otherwise specified all dimension tables show linear measurements expressed in [mm].  
All the reduction ratios are expressed in the form of a fraction, unless otherwise specified.



## LOAD ANALYSIS AND COMPOSITION

For the definition, the analysis and the features of the different load types, see the relative paragraph in the trapezoidal screw jack section, on page 28.

## 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.

## RUNNING EFFICIENCY

As a ball screw jack is used to handle loads having high percentage of service, it is necessary that its running efficiency be the maximum possible, in order to minimize the losses of the energy transformed into heat. The meshes precision allows to have a couplings running efficiency higher than 90%. The total running efficiency of the transmission, due to the lubrication splash and to the sliding of the rotating parts, like bearings and shafts, reaches values towards 85%.

## 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 tables 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.



### Emergency operation

In case of black-out, in order to be able to manually operate the single screw jacks or the complete structures by means of a crank, a free end on the screw jack worm screw or on the transmission is to be foreseen. In case of self-braking motors or worm screw motor reducers, the brake must be firstly released and then it is necessary to disassemble those components from the transmission as the reducer could also be irreversible. Attention: it is advisable to equip the emergency operation mechanism with a safety device to cut the electric circuit.



## LUBRICATION

### Inner 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: TOTAL CARTER SY 320. The technical specifications and the application field for the lubricant inside the casing are shown below.

Lubricant	Application field	Operating temperature [°C]*	Technical specifications
Total Carter SY 320 (not compatible with PAO based mineral and synthetic oils)	standard	-33 : 220	DIN 51517-3: CLP NF ISO 6743-6: CKS/CKT
Total Nevastane SY 320 (not compatible with PAO based mineral and synthetic oils)	food industry	-30 : 275	NSF-USDA: H1

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

The application field is included between the sliding point and the flammability point.

A filling cap, a drain cap and an oil level indicator are foreseen for all sizes. Those three caps are diagonally arranged on one face of the casing. The intermediate cap is the level indicator, while the upper one is the filling cap and the lower one is the drain cap, as showed in the drawing below. The quantity of lubricant contained in the K series screw jacks is indicated in the following table.



Size	K 59	K88	K117
Inner lubricant quantity [Litres]	0,3	0,8	1,2

### 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 constant coat 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.

### Semi - automatic lubrication

Many different systems of automatic lubrication are feasible, like for example an oil bath rigid protection (with a recirculation option) on KT model screw jacks with vertical mounting (see page 145).

### Centralized lubrication

Many automatic lubrication systems with a central pump and various distribution points are also possible. The quantity of lubricant required depends on the service and work environment. A centralized dosing system does not exclude a periodic check of the lubrication conditions in the ball spindle.

## 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 losing 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. In 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

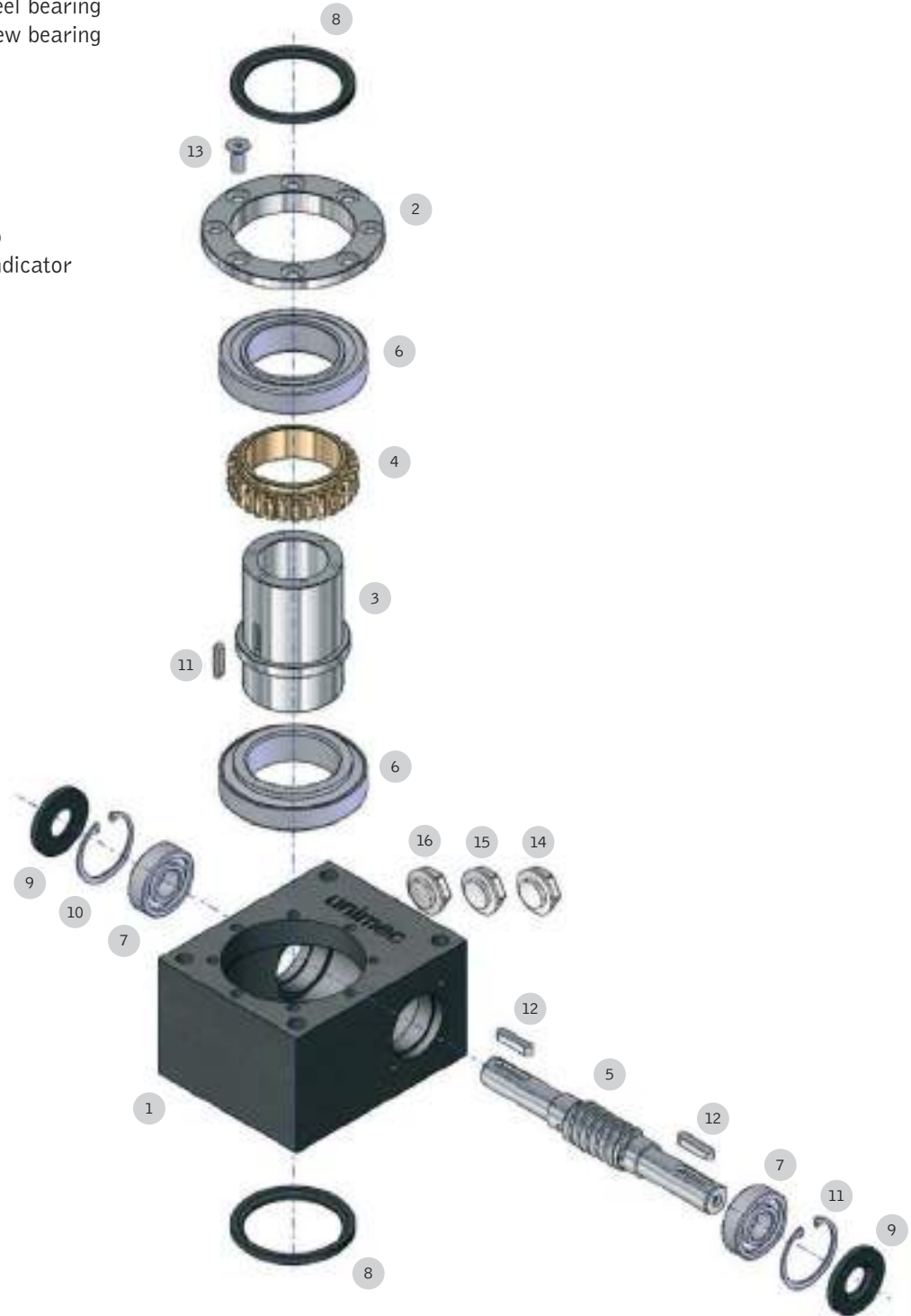
The warranty is valid only if the instructions contained in our manual are carefully followed.

## ORDERING CODES

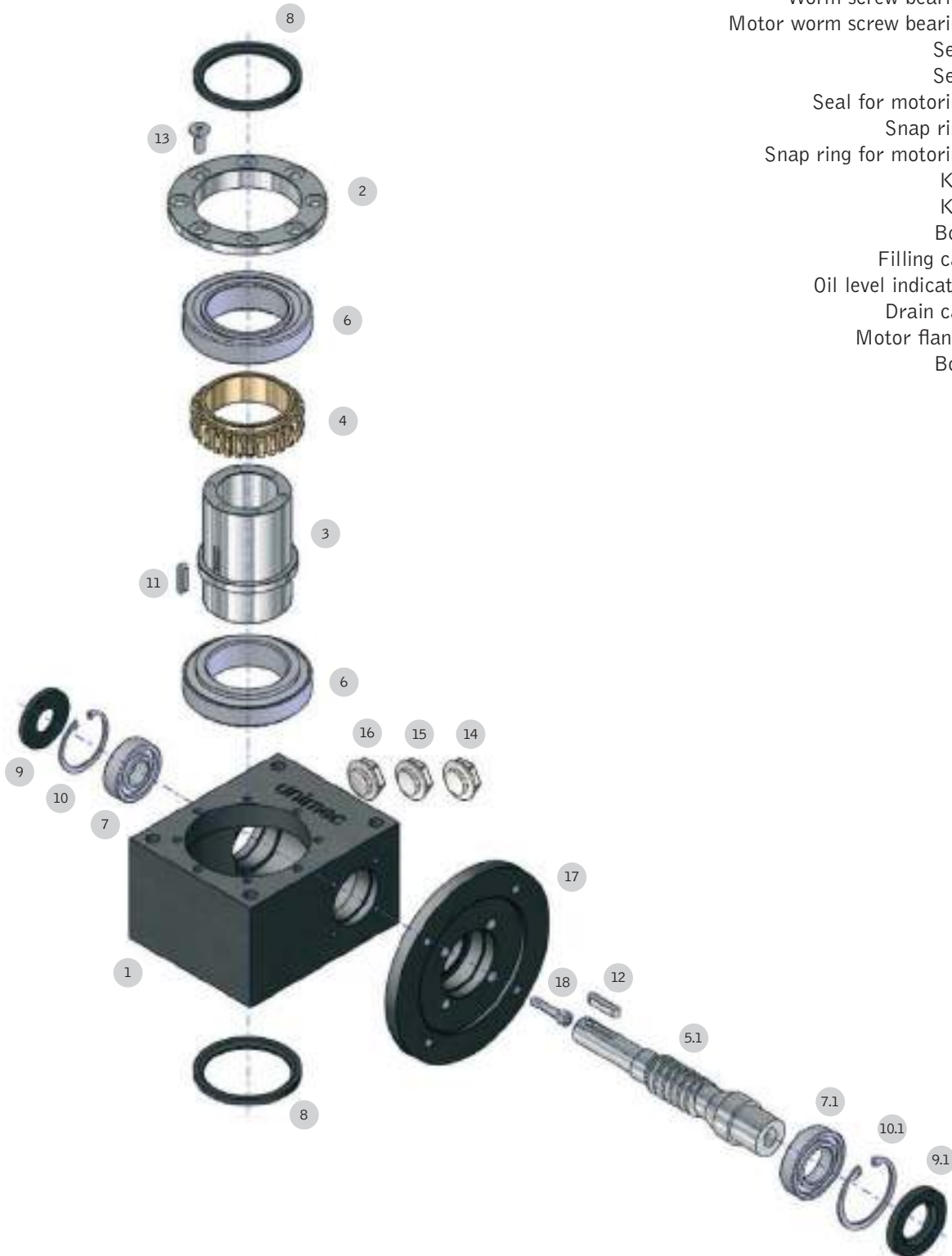
<b>K</b>	<b>59</b>	<b>1/5</b>	<b>B</b>	<b>IEC 90B5</b>	<b>PR</b>
model	size	ratio	construction model	motor flange	accessories

## K MODEL

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



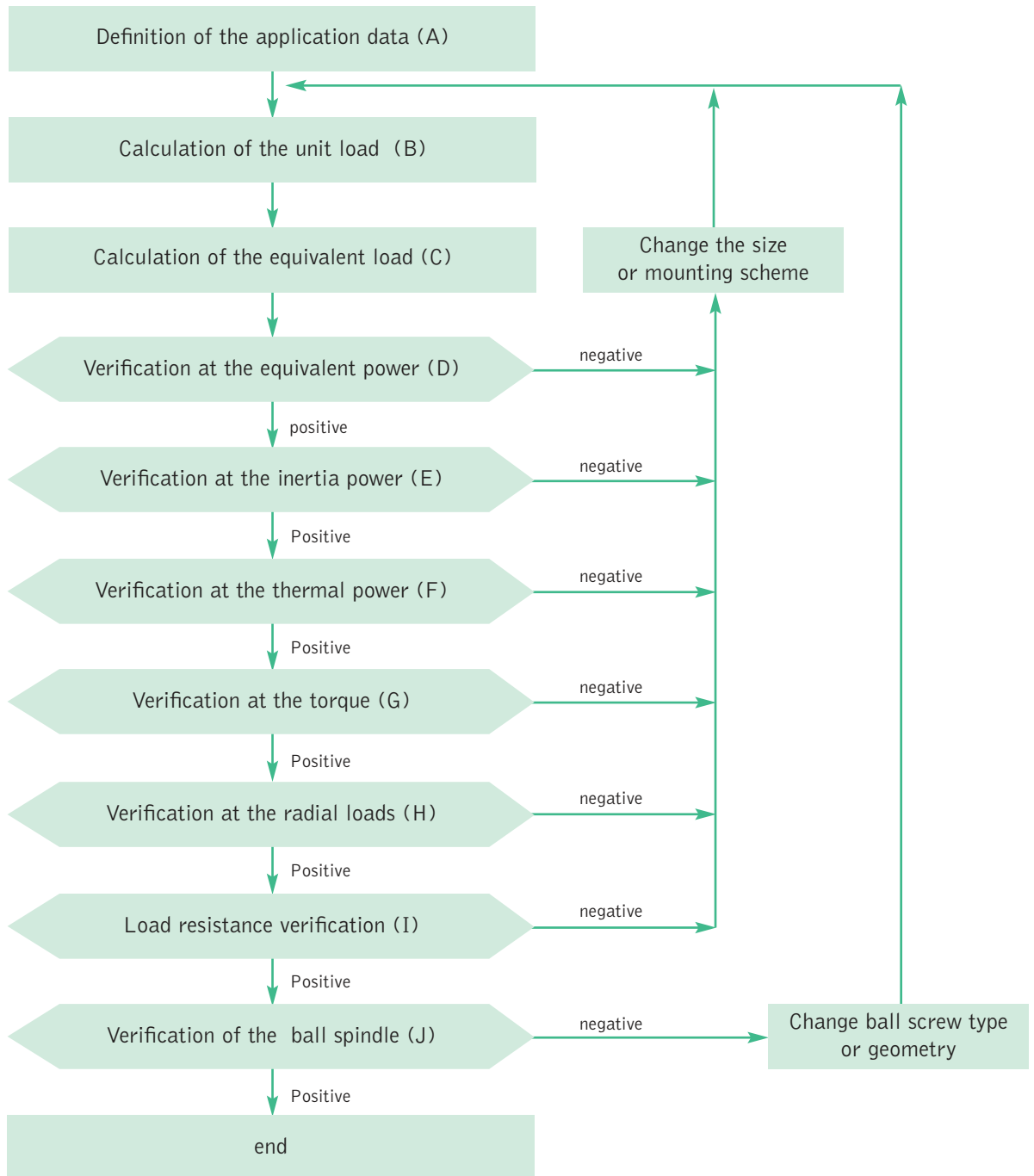
## MK MODEL



Casing	1
Cover	2
Hollow shaft	3
Worm wheel	4
Motor worm screw	5.1
Worm wheel bearing	6
Worm screw bearing	7
Motor worm screw bearing	7.1
Seal	8
Seal	9
Seal for motoring	9.1
Snap ring	10
Snap ring for motoring	10.1
Key	11
Key	12
Bolt	13
Filling cap	14
Oil level indicator	15
Drain cap	16
Motor flange	17
Bolt	18

## DIMENSIONING OF THE BALL SCREW JACK

For a correct dimensioning of the ball screw jack it is necessary to observe the following steps:





## A - THE APPLICATION DATA

For a right dimensioning of the screw jacks it is necessary to identify the application data:

**LOAD [daN]** = the load is identified with the force applied to the translating device of a screw jack. Normally the dimensioning is calculated considering the maximum applicable load (worst case). It is important to consider the load as a vector, which is defined by a modulus, a direction and a sense, the modulus quantifies the force, the direction orients spatially and gives indications on the eccentricity or on possible lateral loads, the sense identifies the traction or compression load.

**TRANSLATION SPEED [mm/min]** = the translation speed is the load handling speed. From this speed it is possible to calculate the rotation speed of the rotating devices and the necessary power for the movement. Wear phenomena and the life of the screw jack proportionally depend on the value of the translation speed.

**STROKE [mm]** = it is the linear measure used to handle a load. It does not always coincide with the total length of the ball spindle.

**AMBIENT VARIABLES** = these values identify the environment and the operating conditions of the screw jack. Among them: temperature, oxidizing and corrosive factors, working and non-working periods, vibrations, maintenance and cleaning, insertion frequency, foreseen operating life etc.

**MOUNTING SCHEMES** = There are several ways of handling a load by means of screw jacks. The schemes on pages 154-155 will show you some examples. Choosing a mounting scheme will condition the choice of the size and the power which is necessary for the application.

## B - THE UNIT LOAD

According to the  $n$  number of screw jacks contained in the mounting scheme it is possible to calculate each screw jack's load dividing the total load by  $n$ . In case the load is not fairly distributed in all screw jacks, it is recommended to consider the transmission having the heaviest load, by virtue of a dimensioning based on the worst case.

## C - THE EQUIVALENT LOAD

All the values listed in the catalogue refer to a standard use conditions, i.e. under a temperature of 20° and a regular daily operation of 8 hours without shocks. Using the screw jack under the above conditions you can foresee a 10.000 hours lifetime.

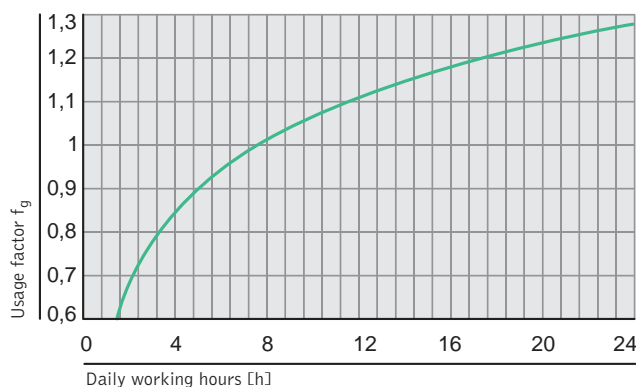
For different application conditions the equivalent load should be calculated: it refers to the load which would be applied in standard conditions in order to have the same thermal exchange and wear effects, which the real load achieves in the real conditions of use.

It is therefore advisable to calculate the equivalent load according to the following formula:

$$C_e = C \cdot f_g \cdot f_a \cdot f_d$$

### The usage factor $f_g$

By means of the following diagram the  $f_u$  use factor can be calculated according to the daily working hours.



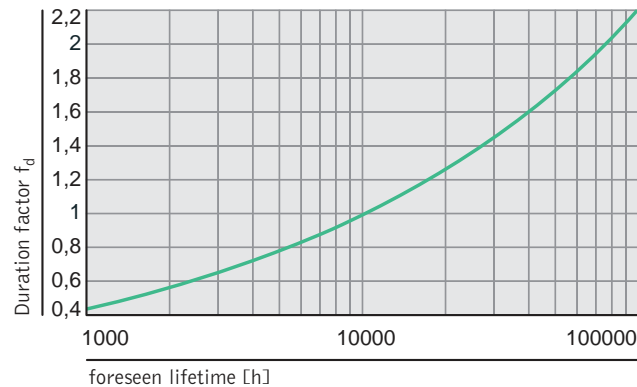
## The ambient factor $f_a$

By means of the following table it is possible to calculate the  $f_a$  factor according to the operation conditions.

Type of load	Daily working hours [h]	3	8	24
Light shocks, few insertions, regular movements		0,8	1	1,2
Medium shocks, frequent insertions, regular movements		1	1,2	1,5
High shocks, many insertions, irregular movements		1,2	1,8	2,4

## The duration factor $f_d$

The duration factor  $f_d$  is calculated as a function of the theoretical foreseen lifetime (expressed in hours)



## D – THE POWER TABLES AND THE EQUIVALENT POWER

Once the equivalent load  $C_{er}$  has been calculated, it is possible to calculate the equivalent output power necessary for the screw jack-ball spindle system as  $P_e = C_{er} \cdot v$ , where  $v$  is the load's linear translation speed. Dividing the equivalent power by the running efficiency  $\eta_a$  of the ball spindle (which can be taken from the manufacturer catalogue) and by the screw jack running efficiency  $\eta_k$  the screw jack input equivalent power  $P_{ei}$  can be obtained. The preliminary choice of the K series screw jack is effected by means of the table powers (on page 132), by choosing the size which, upon a certain rotation speed (input or output) shows an input power higher than the  $P_{ei}$ .

Attention: the equivalent power is NOT the power requested by the single screw jack, unless the three correction factors  $f_g$ ,  $f_d$  e  $f_a$  have a unit value.

## E – THE INERTIA POWER

In case of high accelerations and decelerations it is necessary to calculate the inertia power  $P_J$ . It is the power necessary to support the inertia forces and torques opposed by the system in presence of a speed change. First the designer should calculate the system inertia downstream of the screw jack  $J_v$  by reducing them to the hollow shaft. The  $J_v$  inertias are the system inertias (typically masses) as well as the ball spindle and lead nut inertias.

After that, it is necessary to add the inertia of the screw jack  $J_k$ , obtainable from the tables below, in order to have the value of the total inertia  $J$ . We remind that inertia is expressed by  $[\text{kg} \cdot \text{m}^2]$ .

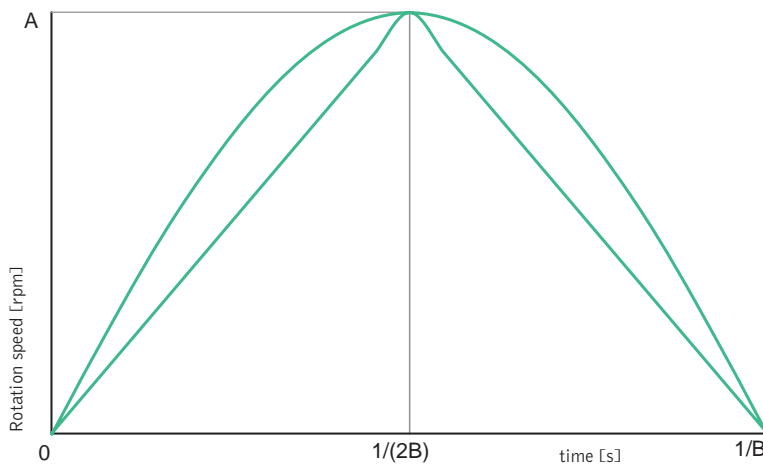
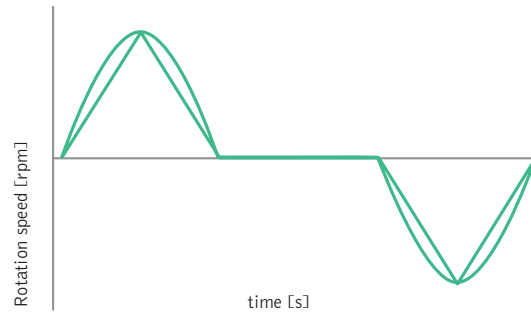
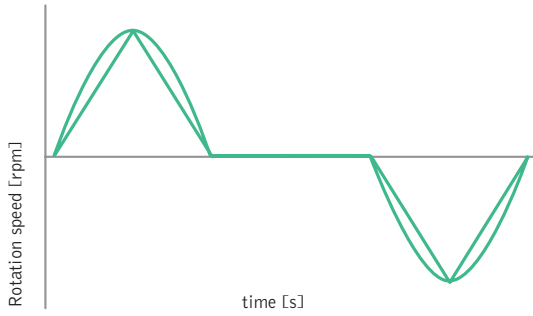
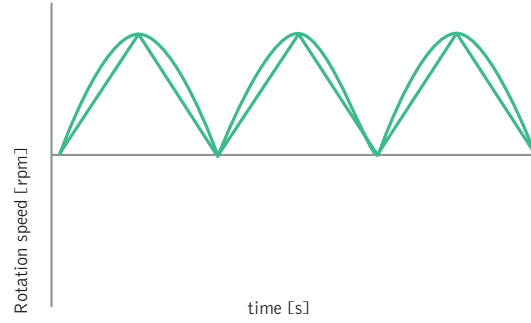
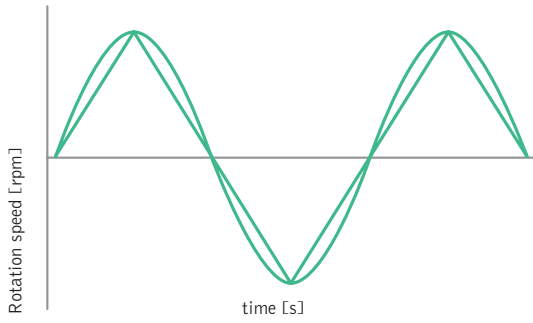
Sizes	K 59	K88	K117
$J_k$ screw jack inertia $[\text{Kgm}^2]$	0,0040608	0,0254982	0,0798326

Given  $\omega_v$  the input rotation speed and  $\alpha_v$  the input angular speed the inertia torque applied is equal to  $J \cdot \omega_v$  and the respective inertia power  $P_J$  is equal to  $J \cdot \omega_v \cdot \alpha_v$ . If the time changes of the input speed  $\omega_v$  can be referred to one of the linear or sinusoidal schemes below, where  $A$  is the maximum speed in  $[\text{rpm}]$  and  $B$  is the cycle frequency in  $[\text{Hz}]$ , it is possible to simplify the inertia power calculation in  $[\text{kW}]$ , by identifying  $A$  and  $B$  parameters and by calculating:

$$P_J = \frac{2 \cdot J \cdot A^2 \cdot B}{91188}$$

The power  $P_J$  is to be added to the equivalent power  $P_{ei}$  and a verification on the correctness of the chosen size must be carried out by means of the descriptive tables. In case the size is not correct it is necessary to change it and to effect new verifications.



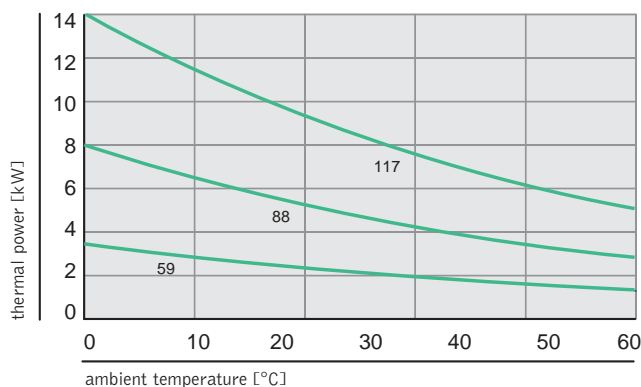


The input power to the screw jack can be calculated by the following formula:

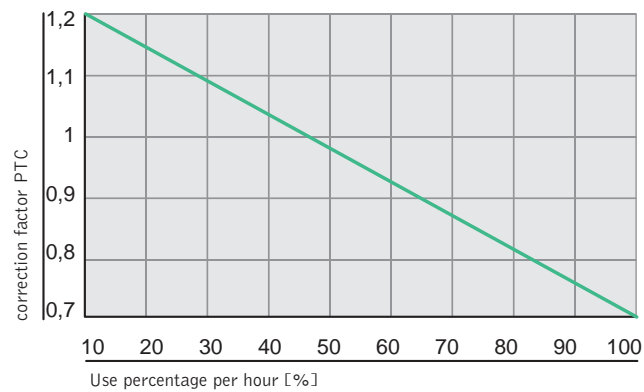
$$P_i = \frac{C \cdot v}{\eta_a \cdot \eta_k} + P_J$$

## F – THE THERMAL POWER

When the input speed values in the power tables cross a coloured area, this means that it is necessary to check the thermal power. This dimension, which is a function of the screw jack size and of the ambient temperature, indicates the input power establishing a thermal equilibrium with the environment with the screw jack surface temperature of 90 °C. The following graphs show the thermal power curves for the three sizes of the K series.



In case of non-working times of the screw jack, the thermal power can be increased of a PTC factor obtainable from the graph below, where the abscissa is the percentage of use as referred to the hour.



If thermal power was lower than the requested power  $P_i$ , it would be necessary to change the screw jack size.

## G – THE TORQUE

When screw jacks are serially assembled, as shown in the drawings below, it is necessary to check that the torque moment referred to the common axis does not exceed the value indicated in the following table.

Size	K 59	K88	K117
Maximum torque moment $M_{tv}$ [daNm]	31,4	61,3	106



## H – RADIAL LOADS

In the case of radial loads on the worm screw it is necessary to check its strength according to the following table. In case the above values be exceeded it will be necessary to choose a higher size:

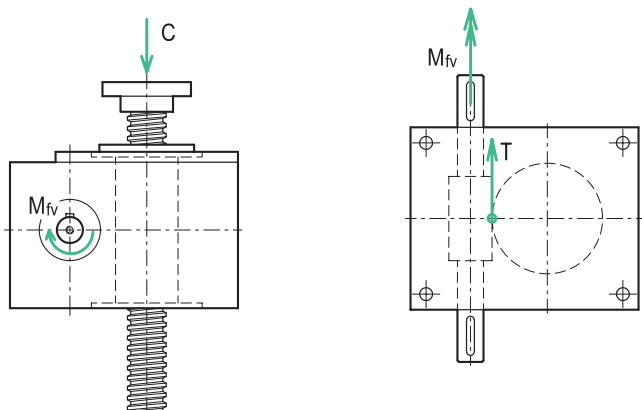


Size	K 59	K88	K117
$F_{rv}$ [daN]	45	60	90



## I – LOAD STRENGTH

As a last step in order to verify the body of the ball screw jack, is to check the gears and the inner bearings strength. The following tables supply, according to the applied static load  $C$ , to the size and the ball spindle geometry (diameter and pitch), the value of the braking moment  $M_{fv}$  to be applied to the worm screw (we remind that the K screw jack is a reversible transmission), in order to maintain the load in its position and the value of the  $T$  force transmitted from the worm screw to the worm wheel. The  $T$  border values only depend on the size and have been calculated with a safety coefficient of 1,5 on the yield load and of 2,5 of the breaking load;  $T$  numerical values are listed below:



$T_{K59}$	=	400 daN
$T_{K88}$	=	900 daN
$T_{K117}$	=	1600 daN

On the contrary, the load  $C$  is limited by the capacity of the conical bearings which support the hollow shaft according to the following:

$C_{K59}$	=	15300 daN
$C_{K88}$	=	33500 daN
$C_{K117}$	=	40000 daN

In case the size, spindle geometry and  $C$  load combination crosses a coloured area, this means that the above limits have been exceeded, and the yield point is near. It is therefore necessary to change to an higher size. ATTENTION: the fact that a K series screw jack body and gears are able to support a certain load  $C$  does not mean that said load is automatically supported by the ball spindle. A strength calculation is necessary according to the manufacturer's specifications.

		Static Load C [N]									
Ball screw type (diameter per pitch)	Size	15000	12500	10000	7500	5000	3000	1000	750	500	
Ø 16x5	T [N]	59	209	174	140	105	70	43	15	11	8
	T [N]	88	142	118	95	71	48	29	10	8	6
	T [N]	117	108	90	72	54	36	22	8	6	4
	$M_{fv}$ [Nm]		1,92	1,6	1,28	0,96	0,64	0,39	0,13	0,10	0,07
Ø 16x16	T [N]	59	691	575	460	346	231	139	47	35	24
	T [N]	88	467	389	312	234	156	94	32	24	17
	T [N]	117	357	298	238	179	120	72	25	18	13
	$M_{fv}$ [Nm]		6,35	5,29	4,23	3,18	2,12	1,27	0,43	0,32	0,22

		Static Load C [N]									
Ball screw type (diameter per pitch)	Size	20000	15000	10000	7500	5000	3000	1000	750	500	
Ø 20x5	T [N]	59	278	209	140	105	70	43	15	11	8
	T [N]	88	188	142	95	71	48	29	10	8	6
	T [N]	117	144	108	72	54	36	22	8	6	4
	$M_{fv}$ [Nm]		2,55	1,92	1,28	0,96	0,64	0,39	0,13	0,10	0,07
Ø 20x20	T [N]	59	1165	873	583	437	292	175	59	45	30
	T [N]	88	788	591	395	296	198	119	40	31	20
	T [N]	117	602	542	302	226	151	91	31	24	16
	$M_{fv}$ [Nm]		10,71	8,03	5,36	4,02	2,68	1,61	0,54	0,41	0,27

Static Load C [N]											
Ball screw type (diameter per pitch)	Size	50000	40000	30000	20000	10000	5500	3000	1000	500	
Ø 25x5	T [N]	59	684	548	411	274	137	69	42	15	8
	T [N]	88	463	371	278	186	93	47	28	10	6
	T [N]	117	384	354	213	142	71	36	22	8	4
	M <sub>fv</sub> [Nm]		6,29	5,04	3,78	2,52	1,26	0,63	0,38	0,13	0,07
Ø 25x10	T [N]	59	1420	1136	853	569	285	143	86	30	16
	T [N]	88	961	769	577	385	193	97	59	20	11
	T [N]	117	734	588	441	294	148	74	45	16	8
	M <sub>fv</sub> [Nm]		13,06	10,45	7,84	5,23	2,62	1,31	0,79	0,27	0,14
Ø 25x20	T [N]	59	2909	2328	1746	1165	583	292	175	59	30
	T [N]	88	1968	1575	1181	788	395	198	119	40	20
	T [N]	117	1504	1203	903	602	302	151	91	31	16
	M <sub>fv</sub> [Nm]		26,76	21,41	16,06	10,71	5,36	2,68	1,61	0,54	0,27
Ø 25x25	T [N]	59	3635	2909	2182	1455	728	365	219	73	37
	T [N]	88	2459	1968	1476	984	492	247	148	50	25
	T [N]	117	1879	1504	1128	752	376	189	113	38	20
	M <sub>fv</sub> [Nm]		33,44	26,76	20,07	13,38	6,69	3,35	2,01	0,67	0,34

Static Load C [N]											
Ball screw type (diameter per pitch)	Size	60000	50000	40000	30000	20000	10000	5000	3000	1000	
Ø 32x5	T [N]	59	800	668	534	400	268	134	68	41	15
	T [N]	88	542	452	362	271	181	91	46	28	10
	T [N]	117	414	345	276	207	139	70	35	21	8
	M <sub>fv</sub> [Nm]		7,36	6,14	4,91	3,68	2,46	1,23	0,62	0,37	0,13
Ø 32x10	T [N]	59	1683	1403	1122	842	561	281	141	85	29
	T [N]	88	1139	949	759	570	380	190	95	58	20
	T [N]	117	870	725	580	435	290	145	73	44	15
	M <sub>fv</sub> [Nm]		15,48	12,90	10,32	7,74	5,16	2,58	1,29	0,78	0,26
Ø 32x20	T [N]	59	3491	2909	2328	1746	1165	583	292	175	59
	T [N]	88	2362	1968	1575	1181	788	395	198	119	40
	T [N]	117	1804	1504	1203	903	602	302	151	91	31
	M <sub>fv</sub> [Nm]		32,11	26,76	21,41	16,06	10,71	5,36	2,68	1,61	0,54
Ø 32x32	T [N]	59	5584	4654	3723	2723	1893	932	467	280	94
	T [N]	88	3778	3148	2519	1889	1260	631	316	189	64
	T [N]	117	2886	2406	1925	1444	963	482	242	145	49
	M <sub>fv</sub> [Nm]		51,37	42,81	34,25	25,69	17,13	8,57	4,29	2,57	0,86

Static Load C [N]											
Ball screw type (diameter per pitch)	Size	100000	80000	60000	40000	30000	20000	10000	5000	3000	
Ø 40x5	T [N]	59	1282	1025	770	514	385	257	129	65	40
	T [N]	88	867	694	521	348	261	174	87	44	27
	T [N]	117	663	530	398	266	199	133	67	34	21
	M <sub>fv</sub> [Nm]		11,79	9,43	7,08	4,72	3,54	2,36	1,18	0,59	0,36
Ø 40x10	T [N]	59	2770	2217	1662	1109	832	555	278	140	84
	T [N]	88	1874	1500	1125	750	563	375	188	95	57
	T [N]	117	1432	1146	859	574	430	287	144	72	44
	M <sub>fv</sub> [Nm]		25,48	20,39	15,29	10,20	7,65	5,10	2,55	1,28	0,77
Ø 40x20	T [N]	59	5678	4543	3407	2272	1704	1136	569	285	171
	T [N]	88	3841	3073	2305	1537	1153	769	385	193	116
	T [N]	117	2935	2348	1761	1175	881	588	294	148	89
	M <sub>fv</sub> [Nm]		52,23	41,79	31,34	20,90	15,67	10,45	5,23	2,62	1,57
Ø 40x40	T [N]	59	-	-	-	4654	3491	2328	1165	583	350
	T [N]	88	7868	6295	4722	3148	2362	1575	788	395	237
	T [N]	117	6012	4810	3608	2406	1804	1203	602	302	181
	M <sub>fv</sub> [Nm]		107	85,61	64,21	42,81	32,11	21,41	10,71	5,36	3,22



		Static Load C [N]									
Ball screw type (diameter per pitch)	Size	150000	125000	100000	75000	50000	30000	20000	10000	5000	
Ø 50x5	T [N]	59	1870	1558	1247	935	624	374	250	125	64
	T [N]	88	1265	1054	844	633	423	253	170	85	43
	T [N]	117	967	806	645	484	323	194	130	65	33
	M <sub>fV</sub> [Nm]		17,2	14,33	11,47	8,60	5,74	3,44	2,30	1,15	0,58
Ø 50x10	T [N]	59	4050	3375	2700	2027	1350	811	541	271	136
	T [N]	88	2740	2284	1827	1371	914	549	366	184	92
	T [N]	117	2094	1745	1396	1048	698	420	280	140	71
	M <sub>fV</sub> [Nm]		37,26	31,05	24,84	18,64	12,42	7,46	4,97	2,49	1,25
Ø 50x20	T [N]	59	-	-	5609	4207	2805	1683	1122	561	281
	T [N]	88	5691	4742	3795	2846	1898	1139	759	380	190
	T [N]	117	4348	3642	2899	2175	1450	870	580	290	145
	M <sub>fV</sub> [Nm]		77,39	64,49	51,6	38,7	25,8	15,48	10,32	5,16	2,58
Ø 50x40	T [N]	59	-	-	-	-	5678	3407	2272	1136	569
	T [N]	88	11522	9602	7681	5762	3841	2305	1537	769	385
	T [N]	117	8803	7336	5869	4402	2935	1761	1175	588	294
	M <sub>fV</sub> [Nm]		156,69	130,58	104,46	78,35	52,23	31,34	20,90	10,45	5,23
Ø 50x50	T [N]	59	-	-	-	-	4310	2874	1437	719	
	T [N]	88	-	12148	9719	7289	4860	2916	1945	973	487
	T [N]	117	11138	9282	7426	5570	3713	2228	1486	743	372
	M <sub>fV</sub> [Nm]		198,25	165,21	132,17	99,13	66,09	39,65	26,44	13,22	6,61

		Static Load C [N]									
Ball screw type (diameter per pitch)	Size	200000	150000	125000	100000	75000	50000	30000	20000	10000	
Ø 63x10	T [N]	59	-	4000	3333	2667	2000	1334	800	534	268
	T [N]	88	3607	2706	2255	1804	1353	903	542	362	181
	T [N]	117	2756	2067	1723	1379	1034	690	414	276	139
	M <sub>fV</sub> [Nm]		49,05	36,79	30,66	24,53	18,40	12,27	7,36	4,91	2,46
Ø 63x20	T [N]	59	-	-	-	5609	4207	2805	1693	1122	561
	T [N]	88	7588	5691	4743	3795	2846	1898	1139	759	380
	T [N]	117	5798	4348	3624	2899	2175	1450	870	580	290
	M <sub>fV</sub> [Nm]		103,19	77,39	64,50	51,60	38,70	25,80	15,48	10,32	5,16
Ø 63x40	T [N]	59	-	-	-	-	5747	3448	2299	1150	
	T [N]	88	-	11662	9719	7775	5831	3888	2333	1556	778
	T [N]	117	11881	8911	7426	5941	4456	2971	1783	1189	595
	M <sub>fV</sub> [Nm]		211,47	158,6	132,17	105,74	79,30	52,87	31,72	21,15	10,58

		Static Load C [N]								
Ball screw type (diameter per pitch)	Size	400000	300000	200000	100000	50000	30000	20000	10000	
Ø 80x10	T [N]	59	-	-	-	2597	1299	780	520	260
	T [N]	88	-	5270	3514	1757	879	528	353	176
	T [N]	117	5368	4026	2685	1343	672	403	269	135
	M <sub>fV</sub> [Nm]		95,55	71,66	47,78	23,89	11,95	7,17	4,78	2,79
Ø 80x20	T [N]	59	-	-	-	5540	2770	1662	1109	555
	T [N]	88	-	11241	7495	3748	1874	1125	750	375
	T [N]	117	11452	8589	5726	2863	1432	859	574	287
	M <sub>fV</sub> [Nm]		203,83	152,87	101,92	50,96	25,48	15,29	10,20	5,10

## J – VERIFICATION OF THE BALL SPINDLE

The final step for the ball screw jack dimensioning is to check the chosen spindle. All the above described steps refer to a single screw jack capacity. According to the geometry, the construction characteristics, the used materials and the ball spindle manufacturer specifications it is necessary to check for this component to resist to the static and dynamic load, to successfully undergo the Euler verifications, to be able to support lateral loads, to be able to complete the requested duty cycles without overheating or having difficulties, and to check anything else the project may require.



## POWER TABLES

Size K 59											
Worm screw rotation speed $\omega_v$	[rpm]	3000	2500	2000	1500	1000	800	600	400	200	100
Hollow shaft rotation speed $\omega_c$	[rpm]	600	500	400	300	200	160	120	80	40	20
Input torque moment $M_{tv}$	[Nm]	11,08	11,73	12,32	13,37	13,85	14,81	16,66	17,19	18,51	21,11
Output torque moment $M_{tc}$	[Nm]	47,23	49,91	51,74	56,15	58,16	61,56	68,8	70,82	74,87	83,32
Input power	[kW]	3,40	3,07	2,50	2,05	1,42	1,21	1,02	0,71	0,38	0,22

Size K 88											
Worm screw rotation speed $\omega_v$	[rpm]	3000	2500	2000	1500	1000	800	600	400	200	100
Hollow shaft rotation speed $\omega_c$	[rpm]	600	500	400	300	200	160	120	80	40	20
Input torque moment $M_{tv}$	[Nm]	30,82	33,19	37,94	45,05	47,75	49,43	52,37	55,61	61,80	70,44
Output torque moment $M_{tc}$	[Nm]	132	141,9	161,7	191,2	200,6	207,6	219,9	230,4	251,8	276,4
Input power	[kW]	9,47	8,50	7,77	6,92	4,87	4,05	3,23	2,28	1,26	0,72

Size K 117											
Worm screw rotation speed $\omega_v$	[rpm]	3000	2500	2000	1500	1000	800	600	400	200	100
Hollow shaft rotation speed $\omega_c$	[rpm]	600	500	400	300	200	160	120	80	40	20
Input torque moment $M_{tv}$	[Nm]	64,74	67,92	78,37	88,82	109,7	114,9	125,4	131,0	145,5	165,9
Output torque moment $M_{tc}$	[Nm]	278	291	334,6	378,1	463,6	484,2	525,9	541,5	591,5	665,8
Input power	[kW]	19,89	17,37	16,05	13,64	11,24	9,41	7,70	5,38	2,98	1,70



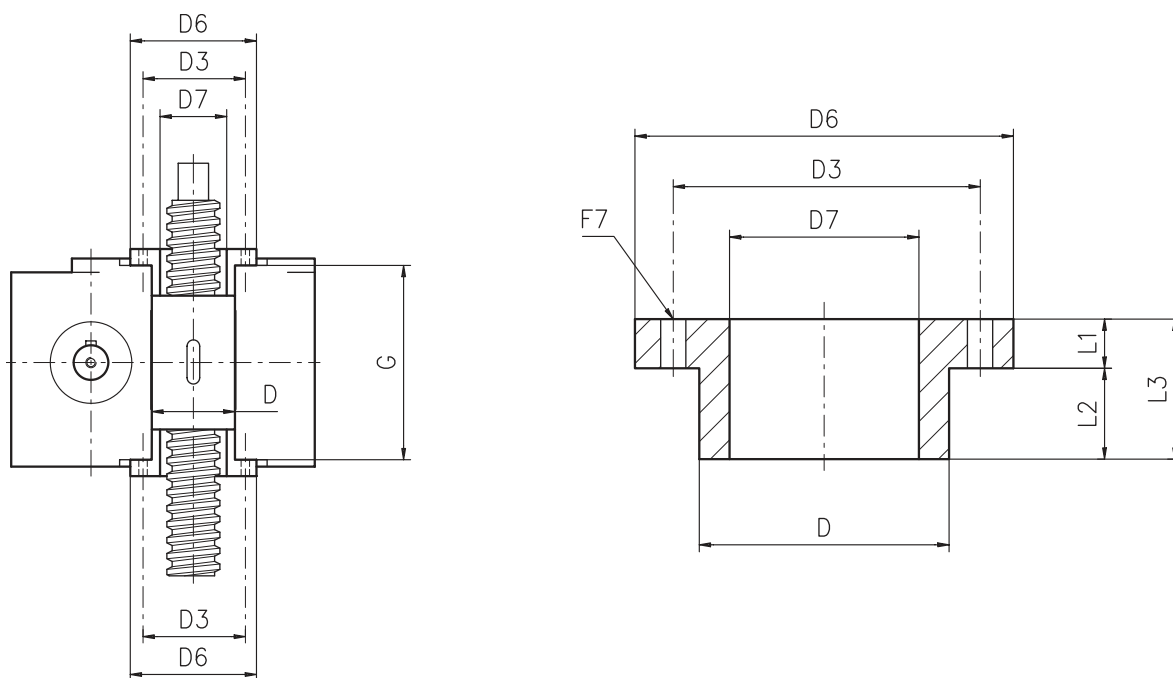
## BALL LEAD NUTS MOUNTING

### KT Models

Mounting the ball lead nuts on the KT models depends on their geometry (cylindrical or with flanges) and on their diameter (whether smaller, equal or greater than the hollow shaft diameter  $D$ , in detail 48, 72 and 105 mm, respectively for sizes 59, 88 and 117).

#### a) CYLINDRICAL LEAD NUT WITH DIAMETER = $D$

Once inserted the lead nut must be blocked by means of shoulder flanges, as per drawing below.

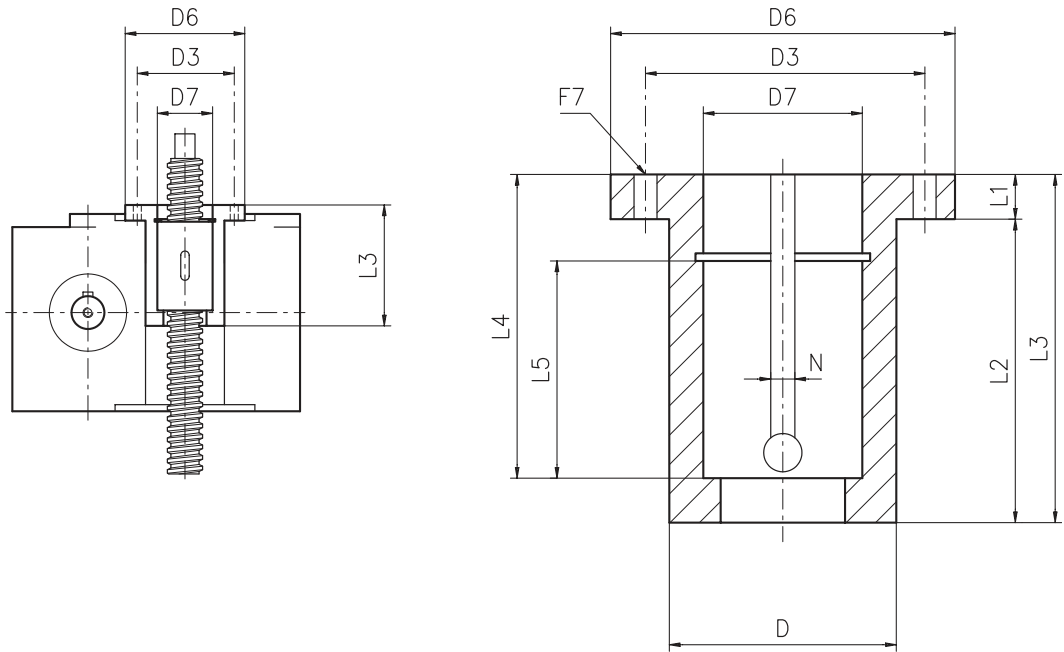


Size	59	88	117
D $\varnothing$ g6	48	72	105
D3 $\varnothing$	59	90	124
D6 $\varnothing$	72	110	150
F7 $\varnothing$ (6 holes)	7	11	13
G	118	148	174
D7	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L2	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

**b) CYLINDRICAL LEAD NUT WITH DIAMETER < D**

The nut must be inserted into a reduction sleeve and blocked by means of a snap ring. The sleeve passes through the hollow shaft. The drawing below will show the mounting geometry.



Size	59	88	117
D $\varnothing$ g6	48	72	105
D3 $\varnothing$	59	90	124
D6 $\varnothing$	72	110	150
F7 $\varnothing$ (6 holes)	7	11	13
D7	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L2	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		
L4	Dimension function of the lead nut to be applied		
L5	Dimension function of the lead nut to be applied		
N	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

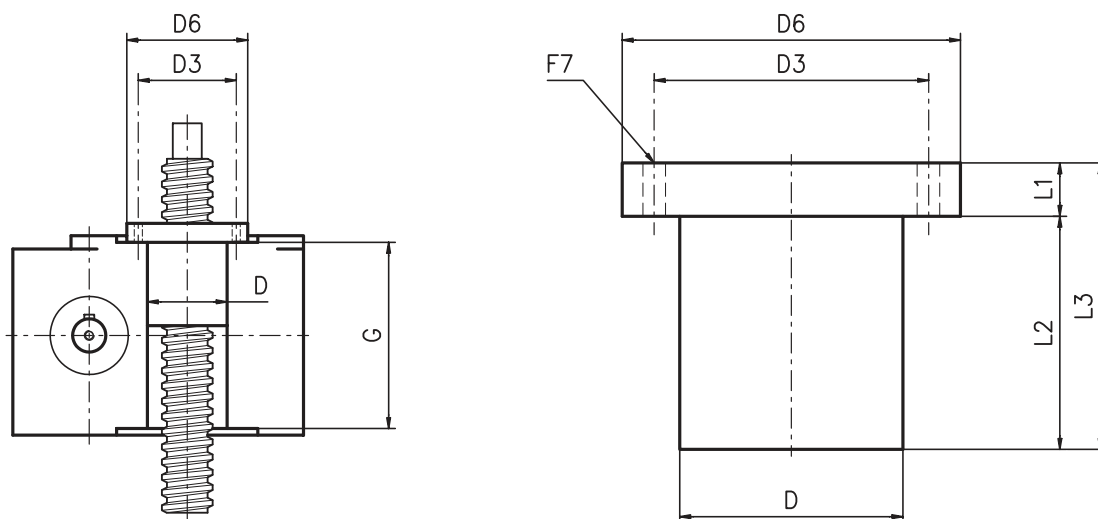
**c) CYLINDRICAL LEAD NUT WITH DIAMETER > D**

Mounting: not possible.



#### d) FLANGED LEAD NUT WITH DIAMETER = D

The lead nut can be directly mounted on the hollow shaft if the holes position coincide. The drawing below will show the mounting geometry.

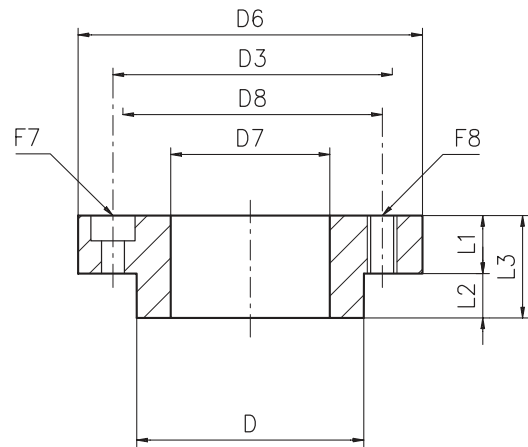
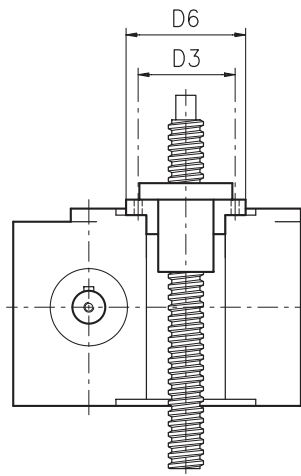


Size	59	88	117
D $\emptyset$	48	72	105
D3 $\emptyset$	59	90	124
G	118	148	174
F7 $\emptyset$ (6 holes)	Dimension function of the lead nut to be applied		
D6 $\emptyset$	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L2	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

e) **FLANGED LEAD NUT WITH DIAMETER < D**

The lead nut must be mounted on a reduction flange connected to the hollow shaft. The drawing below will show the mounting geometry.



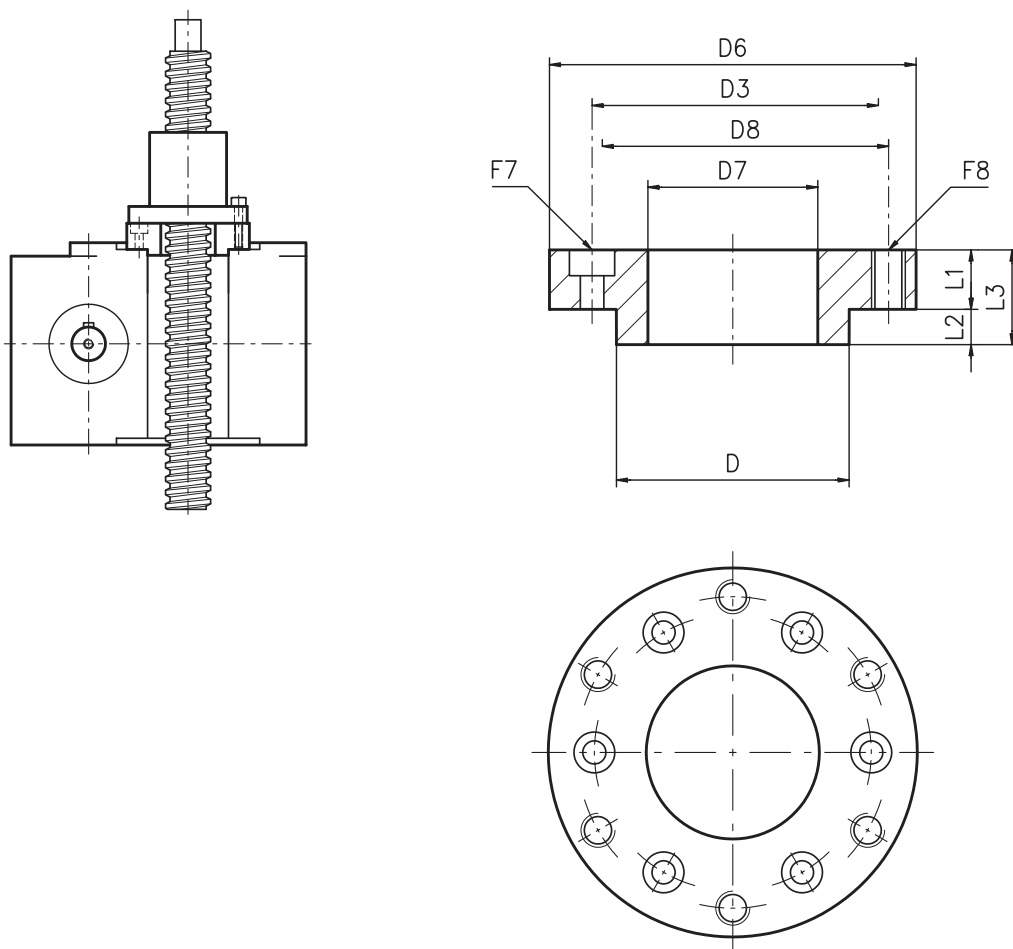
Size	59	88	117
D Ø g6	48	72	105
D3 Ø	59	90	124
D6 Ø	75	115	150
F7 Ø (6 holes)	M6	M10	M12
D7	Dimension function of the lead nut to be applied		
D8	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L2	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		
F8	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.



f) **FLANGED LEAD NUT WITH DIAMETER > D**

The lead nut must be mounted on a reduction flange which completely protrudes from the casing, as shown in the drawing below.

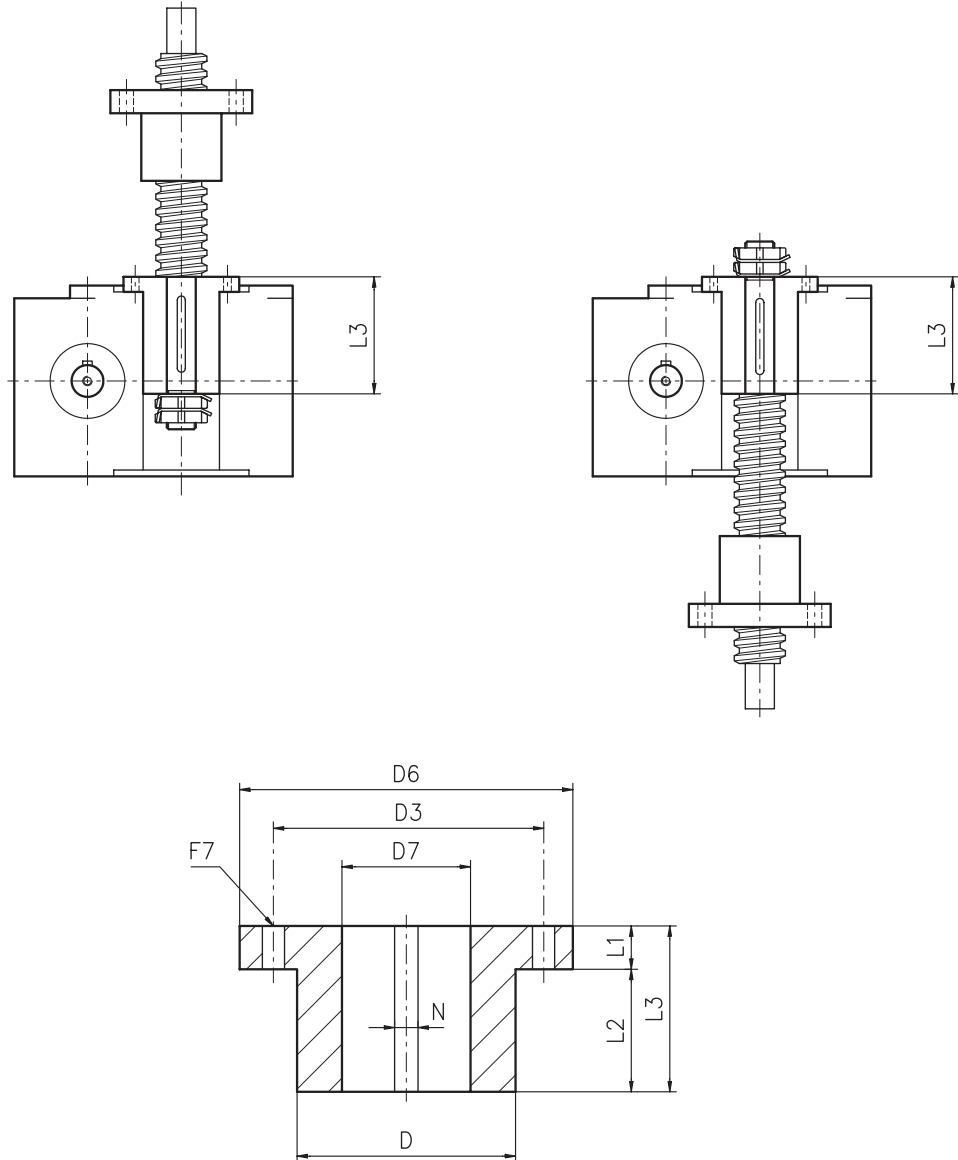


Size	59	88	117
D Ø g6	48	72	105
D3 Ø	59	90	124
L2	6	8	10
F7 Ø (6 holes)	M6	M10	M12
D6	Dimension function of the lead nut to be applied		
D7	Dimension function of the lead nut to be applied		
D8	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		
F8	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

## KR MODELS

Mounting the ball spindles and lead nuts in the KR models depends on the spindle diameter. This diameter must be smaller than the hollow shaft diameter  $D$  (in detail 48, 72 and 105 mm, respectively for sizes 59, 88 and 117) in order to allow mounting a sleeve for rotating screw as highlighted in the drawing below.



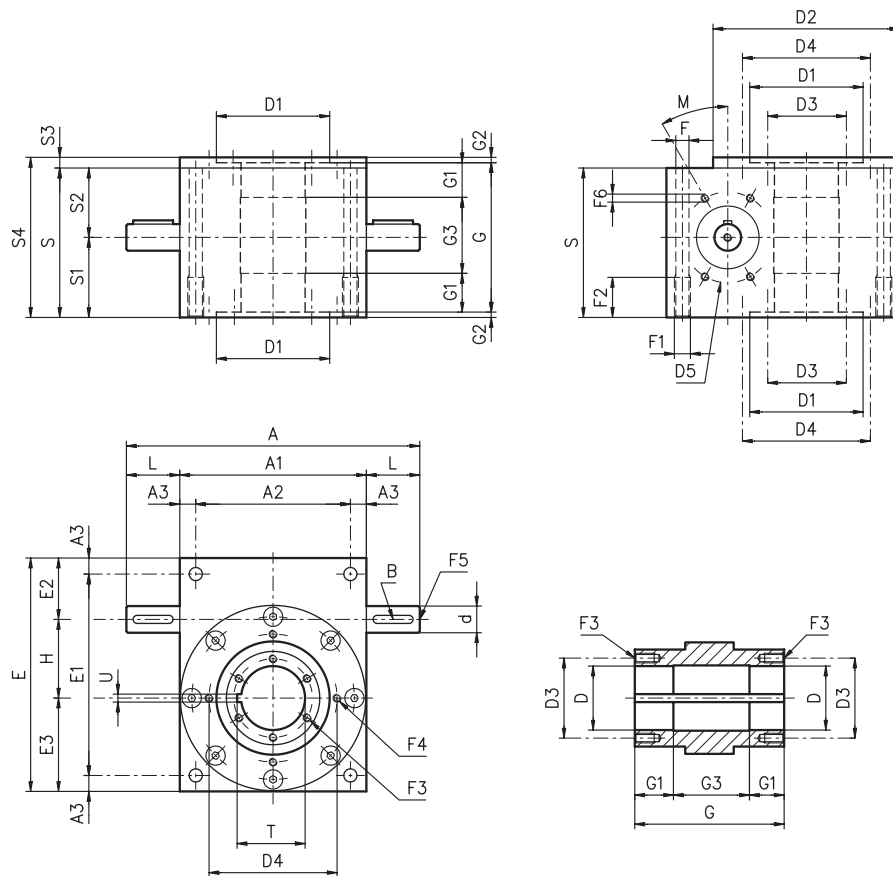
**KR models**

Size	59	88	117
$D \varnothing g6$	48	72	105
$D3 \varnothing$	59	90	124
$D6 \varnothing$	72	110	150
$F7 \varnothing$ (6 holes)	7	11	13
$D7 \varnothing$	Dimension function of the lead nut to be applied		
$L1$	Dimension function of the lead nut to be applied		
$L2$	Dimension function of the lead nut to be applied		
$L3$	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.







**Series construction models**



B model



S model



D model

**K model**

Size	59	88	117
A	220	300	360
A1	140	200	240
A2	116	174	200
A3	12	13	20
B	6x6x30	8x7x40	8x7x40
d Ø h7	20	25	30
D Ø H7	48	72	105
D1 Ø	85	130	170
D2 Ø	140	200	239
D3 Ø	59	90	124
D4 Ø	96	143	182
D5 Ø	68	86	100
E	175	238	310
E1	151	212	270
E2	46	50	73
E3	70	100	120
F Ø	10,25	12	17,5
F1	M12	M14	M20
F2	30	40	40
F3 (6 holes)	M6x14	M10x25	M12x25
F4 (4 holes)	M6x9	M6x10	M6x10
F5	M6x12	M8x15	M10x18
F6 (6 holes)	M6x12	M8x16	M10x18
G	118	148	174
G1	40	50	55
G2	1	1	3
G3	38	48	64
H	59	88	117
L	40	50	60
M [°]	45	30	45
S	112	138	165
S1	60	75	90
S2	52	63	75
S3	8	12	15
S4	120	150	180
T	50,3	74,3	107,8
U	5	5	6

## Series construction models



MBD model



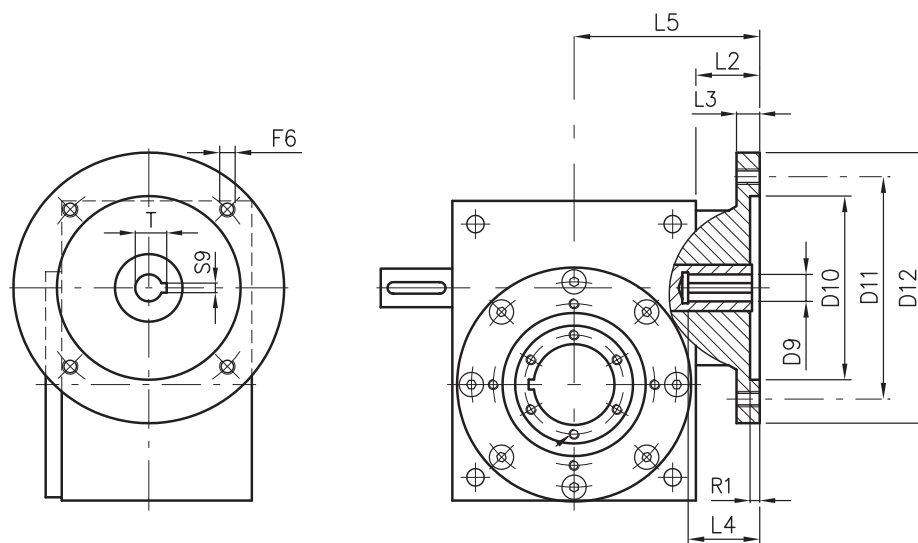
MBS model



MD model



MS model



### MK model

Size	IEC flange	D9 H7	D10 H7	D11	D12	F6	L2	L3	L4	L5	R1	S9	T
59	63 B5	11	95	115	140	M8	33	13	23	96	4	4	12,8
	71 B5	14	110	130	160	M8	33	13	30	96	5	5	16,3
	80 B5	19	130	165	200	M10	33	13	40	96	5	6	21,8
88	80 B14	19	80	100	120	7	33	13	40	96	5	6	21,8
	71 B5	14	110	130	160	9	40	15	30	120	5	5	16,3
	80 B5	19	130	165	200	M10	40	15	40	120	5	6	21,8
	80 B14	19	80	100	120	7	40	15	40	120	5	6	21,8
	90 B5	24	130	165	200	M10	40	15	50	120	5	8	27,3
	90 B14	24	95	115	140	9	40	15	50	120	5	8	27,3
	100-112 B5	28	180	215	250	M12	40	15	60	120	6	8	31,3
100-112 B14	28	110	130	160	9	40	15	60	120	6	8	31,3	
117	100-112 B5	28	180	215	250	13	75	20	60	170	6	8	31,3
	132 B5	38	230	265	300	M12	75	20	80	170	6	10	41,3
	132 B14	38	130	165	200	11	75	20	80	170	6	10	41,3
	160 B5	42	250	300	350	M16	75	20	110	170	6	12	45,8
	160 B14	42	180	215	250	13	75	20	110	170	6	12	45,8

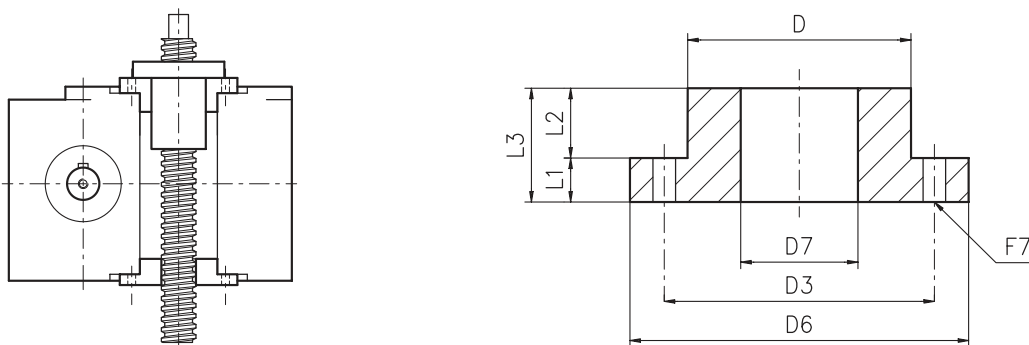
For not quoted dimensions see the schemes on page 139.



## GR rotating guide

The rotating guide is a bronze flange applied, for KT models, on the hollow shaft on the opposite side to the lead nut. The guide rotates together with the hollow shaft and gives a valid support in the absorption of lateral loads and in maintaining the spindle translation in the same axis as the worm wheel. The GR can be applied only to KT models. The overall dimensions are indicated in the table below.

Incompatibility: KR models



**GR rotating guide**

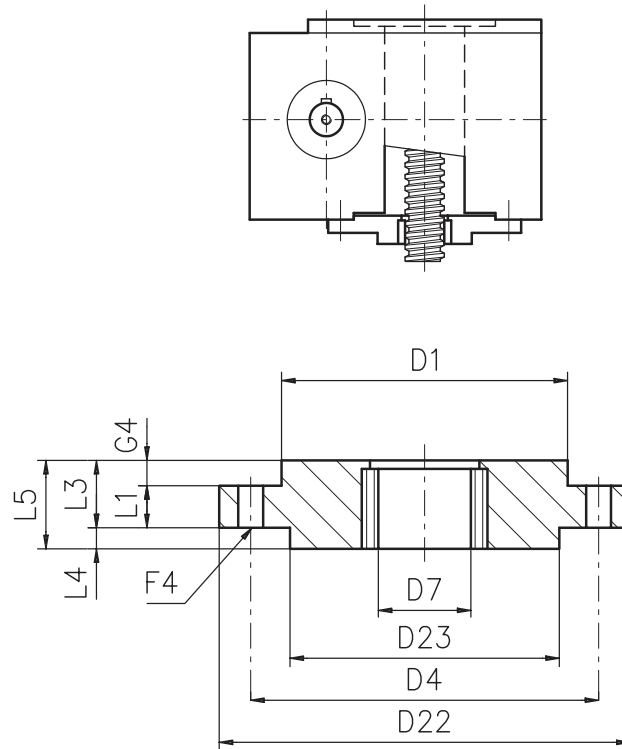
Size	59	88	117
D Ø g6	48	72	105
D3 Ø	59	90	124
D6 Ø	75	115	150
F7 Ø (6 holes)	7	11	13
D7	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L2	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

## GSI lower static guide

The lower static guide is a bronze and steel flange applied, for KT models, on the casing in the lower part of the screw jack. Being connected with the casing, the guide is static and gives a valid support in the absorption of lateral loads and in maintaining the spindle translation in the same axis as the worm wheel. The GSI can be applied only to KT models. The overall dimensions are indicated in the table below.

Incompatibility: KR models



**GSI lower static guide**

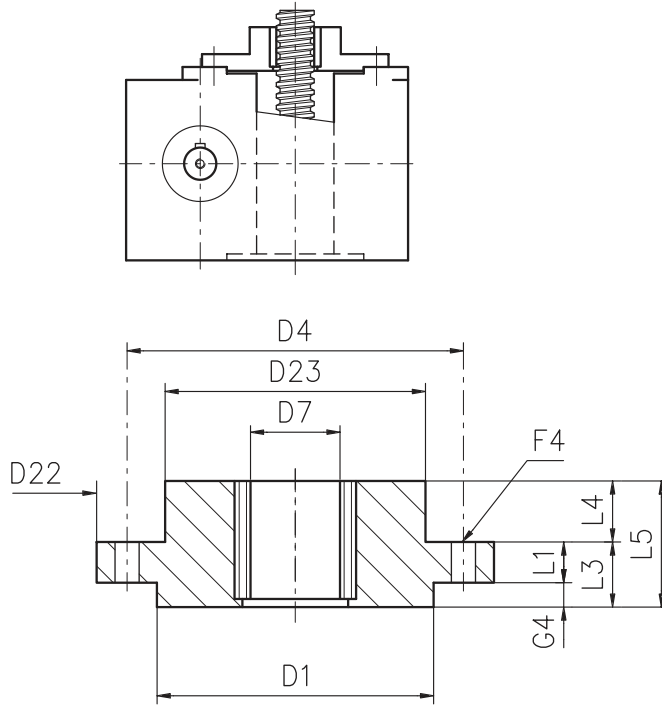
Size	59	88	117
D1 Ø g6	85	130	170
D4 Ø	96	143	182
D22 Ø	110	160	200
F4 Ø (4 holes)	7	7	7
G4	3	3	3
D7 Ø	Dimension function of the lead nut to be applied		
D23 Ø	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		
L4	Dimension function of the lead nut to be applied		
L5	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

## GSS upper static guide

The upper static guide is a bronze and steel flange applied, for KT models, on the casing in the upper part of the screw jack. Being connected with the casing, the guide is static and gives a valid support in the absorption of lateral loads and in maintaining the spindle translation in the same axis as the worm wheel. The GSS can be applied only to KT models. The overall dimensions are indicated in the table below.

Incompatibility: KR models – KT model – type f)



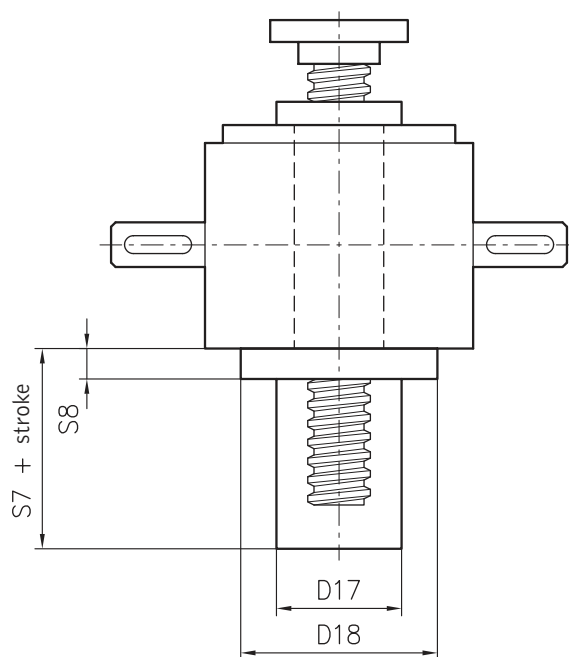
**GSS upper static guide**

Size	59	88	117
D1 Ø g6	85	130	170
D4 Ø	96	143	182
D22 Ø	110	160	200
F4 Ø (4 holes)	7	7	7
G4	3	3	3
D7	Dimension function of the lead nut to be applied		
D23 Ø	Dimension function of the lead nut to be applied		
L1	Dimension function of the lead nut to be applied		
L3	Dimension function of the lead nut to be applied		
L4	Dimension function of the lead nut to be applied		
L5	Dimension function of the lead nut to be applied		
L6	Dimension function of the lead nut to be applied		

For not quoted dimensions see the schemes on page 139.

## PR rigid protection

The application of a rigid protection in the back side of the screw jack is the ideal solution in order to prevent dust and foreign matters from coming into contact with the coupling and causing damages to the ball spindle. The PR protection can only be applied to KT models. In the following table the overall dimensions are shown.  
**Incompatibility: KR models**



**PR rigid protection**

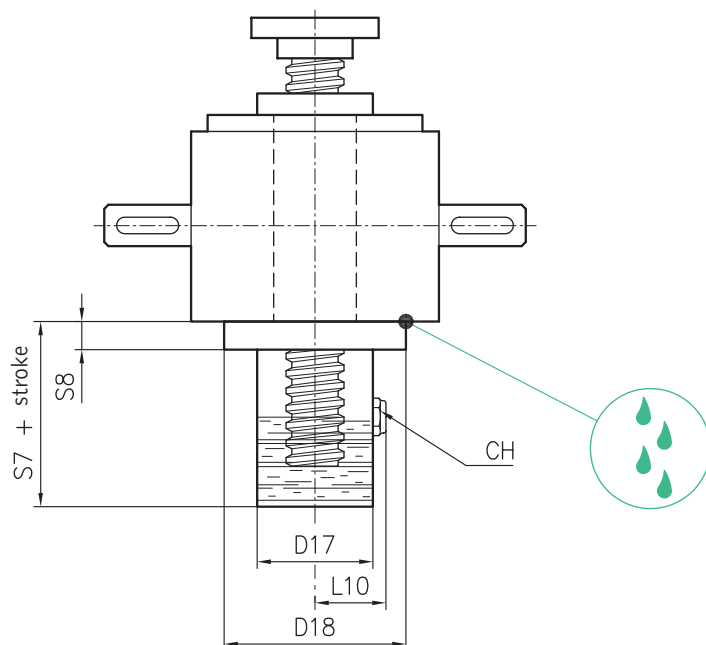
Size	59	88	117
D17 Ø	63	95	125
D18 Ø	110	160	200
S7	30	40	40
S8	10	10	10

For not quoted dimensions see the schemes on page 139.

## PRO oil bath rigid protection

The application of an oil bath rigid protection, apart from representing a rigid protection, also allows to have the advantages of a semi-automatic lubrication. The lubricant must be added when mounting with the jack completely closed, using the oil fill cap. Upon manoeuvring, the ball spindle will be soaked with lubricant. In case the spindle is left out of the protection for a long period, it could dry up so to make the PRO protection useless. For long strokes, in order to compensate the pump effect, it is necessary to mount an oil recirculation pipe allowing lubricant to flow back inside the protection from the casing. Alternatively, it is possible to assemble the casing and the protection in a single chamber. We remind you that the area indicated in the drawing could present lubricant drops: a VERTICAL MOUNTING will therefore avoid any leakage problems. The PRO protection can only be applied to KT models. In the following table the overall dimensions are shown.

Incompatibility: KR models



**PRO oil bath rigid protection**

Size	59	88	117
D17 Ø	63	95	125
D18 Ø	110	160	200
S7	30	40	40
S8	10	10	10
L10	41	57	72
CH	17	22	22

For not quoted dimensions see the schemes on page 139.

## PE elastic protection

The purpose of the elastic protections is to protect the ball spindle by following its own movement during stroke. Standard type protections are elastic bellows, made of PVC covered nylon and ending with a flange from the screw jack side and with a collar from the end fitting side, whose dimensions are shown in table 1 below. Special implementations are available upon request, as well as a fixing by means of iron or PVC support plates. Besides further implementations made of special materials fire-resistant, cold-resistant and suited for aggressive oxidizing environments can be supplied. The application of elastic protections on the screw jacks may implicate some dimensioning amendments due to the PE own sizes, as shown in table n.2. Further, in completely close conditions, the PE has an overall dimension equal to 1/8 of the stroke value. In case of horizontal mounting (of which previous notice should be given) it is necessary to support the protection weight in order to avoid that it leans on the ball spindle; for this purpose special support rings are foreseen. The PE can be applied to KT and KR models and in case of missing specifications they can be supplied with a fabric collar at the end fitting and the dimensions shown in table 1.

Incompatibility: none

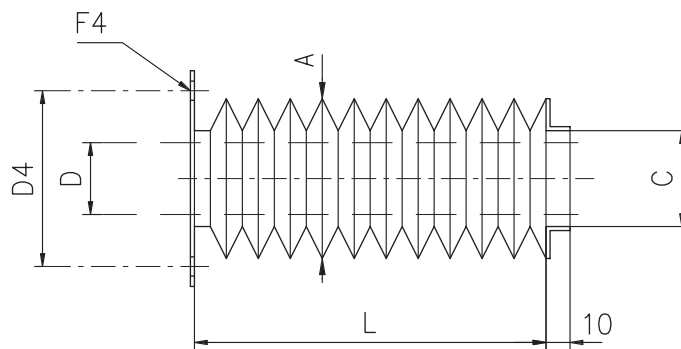


Table 1

PE elastic protection				
<b>Size</b>		<b>59</b>	<b>88</b>	<b>117</b>
A Ø		85	120	140
D screw Ø		Dimension function of the spindle to be applied		
D4 Ø		96	143	182
F4 Ø (4 holes)		7	7	7
C Ø		To be defined with the technical staff		
L		1/8 of the stroke (all closed)		

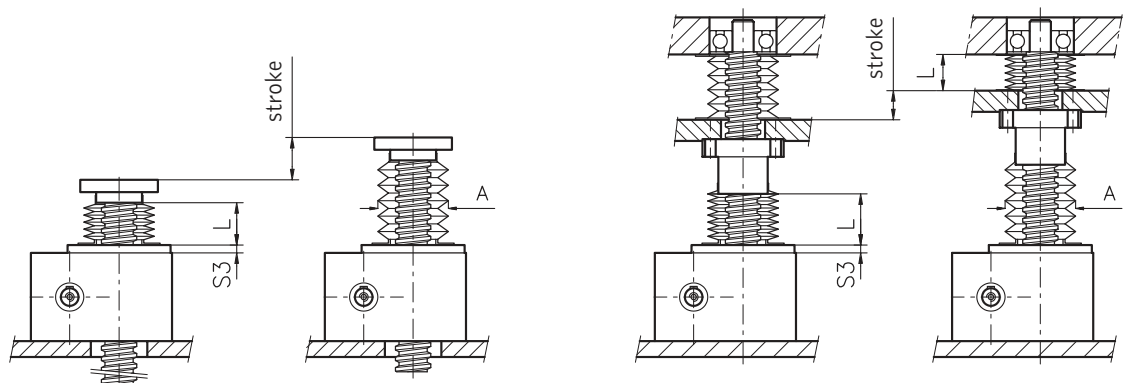


Table 2

PE elastic protection				
<b>Size</b>		<b>59</b>	<b>88</b>	<b>117</b>
S3		8	12	15
D1 f		85	120	140
L1		1/8 of the stroke (all closed)		

For not quoted dimensions see the schemes on page 139.

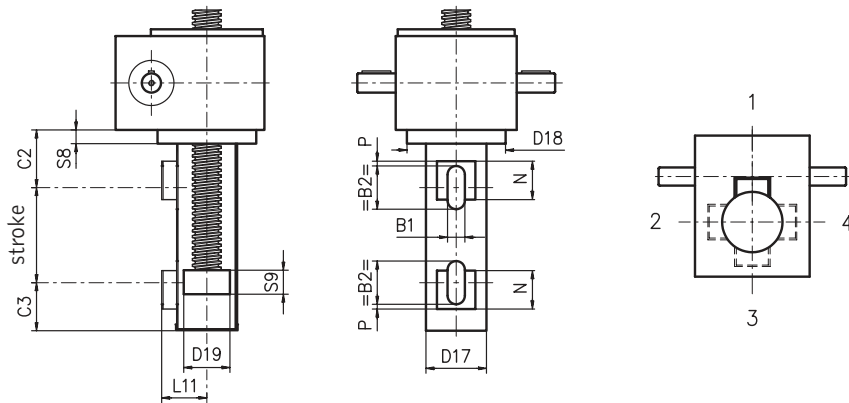




## PRF stroke control

In order to meet the requirement of an electric stroke control, it is possible to apply to a rigid protection suitable end-of-stroke supports. In the standard version these supports are of two types and they are placed at the ends of the stroke. They are carried out in such a way as to allow a small adjustment. In case more than one end-of-stroke are needed, it is possible to provide intermediate supports or a continuous support for the requested length. In order to enable the end-of-stroke to operate, a steel bushing is mounted on the ball spindle. More bushings can be mounted upon request. The PRF can only be applied to KT models and in case of missing specifications it will be supplied with the supports mounted according to position 1. The overall dimensions are shown in the table below.

Incompatibility: KR – PRO models



**PRF stroke control**

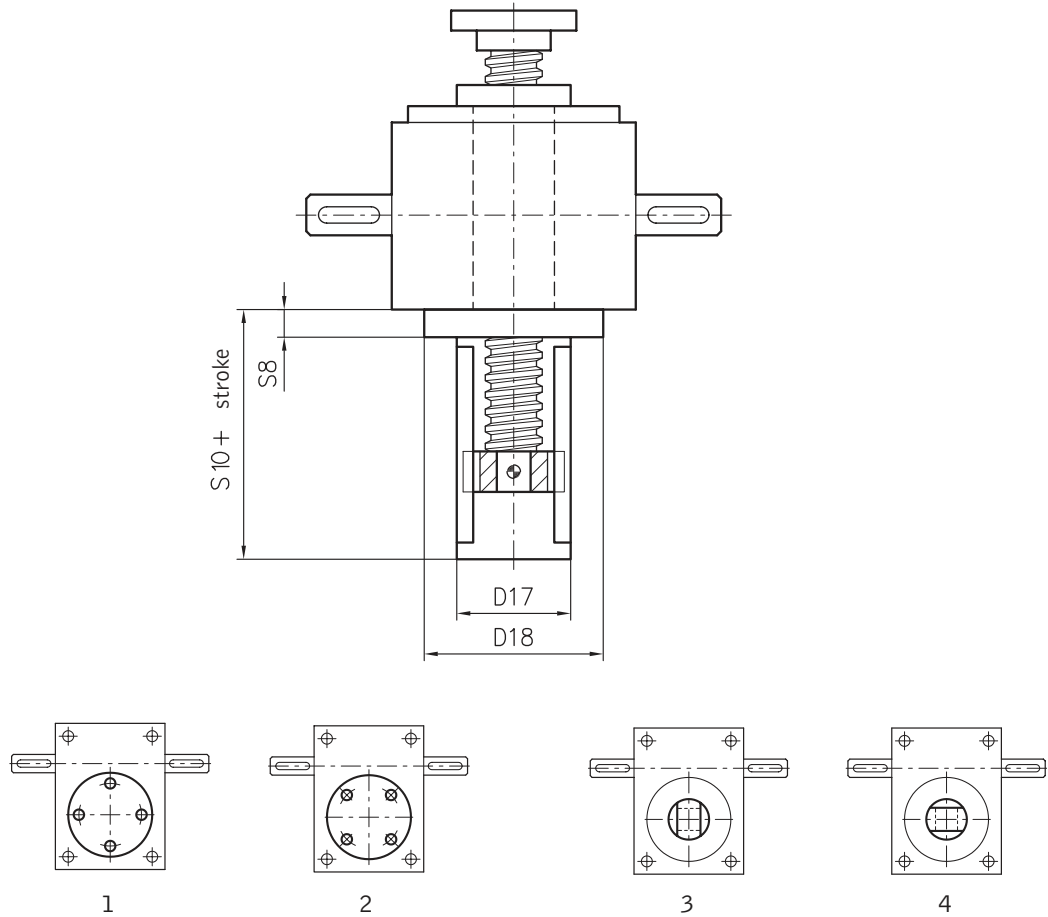
Size	59	88	117
B1	18	18	18
B2	45	45	45
C2	60	60	60
C3	40	40	40
D17 Ø	63	95	125
D18 Ø	110	160	200
D19 Ø	48	78	98
L11	47	63	78
S8	10	10	10
S9	20	20	20
N	40	40	40
P	5	5	5

For not quoted dimensions see the schemes on page 139.

## PRA double guide anti rotation

As all screw jacks must have an anti-rotation, in case such constraint cannot be realized externally, it is possible, for KT models, to have an inner anti-rotation system inside the screw jack. Two guides are mounted on the rigid protection where a bronze bushing, which is attached to the ball spindle can slide. In case of very long strokes, it should be checked that the torsional sliding is not such as to force the fixing screws in the guides. As the inner anti-rotation constraints the ball spindle and its end fitting, in case of presence of holes, their position should be notified, as indicated in the drawings below. Unless otherwise stated all screw jacks will be delivered in position 1 or 3. The overall dimensions are shown in the table below.

Incompatibility: KR models



**PRA double guide anti-rotation**

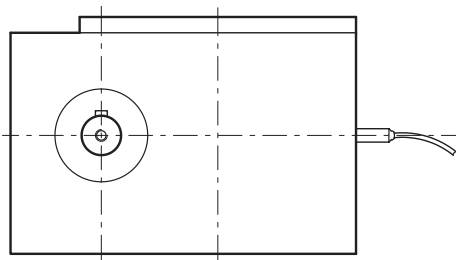
Size	59	88	117
D17 Ø	63	95	125
D18 Ø	110	160	200
S10	60	80	100
S8	10	10	10

For not quoted dimensions see the schemes on page 139.

### CR rotation control

In some cases it can be necessary to check the operation conditions of the screw jack monitoring the worm wheel rotation, both in KT models and in KR models. A milling is carried out on the worm wheel and a suitable proximity switch supplies an electric impulse for each turn. No impulse means that the transmission is stopped.

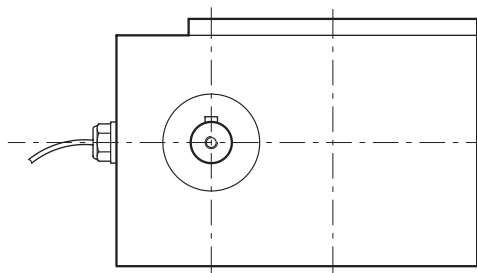
Incompatibility: None



### CT- Temperature control

It is possible to control the casing temperature by means of a thermal probe emitting an electric impulse when the preset temperature of 80 °C is reached.

Incompatibility: none

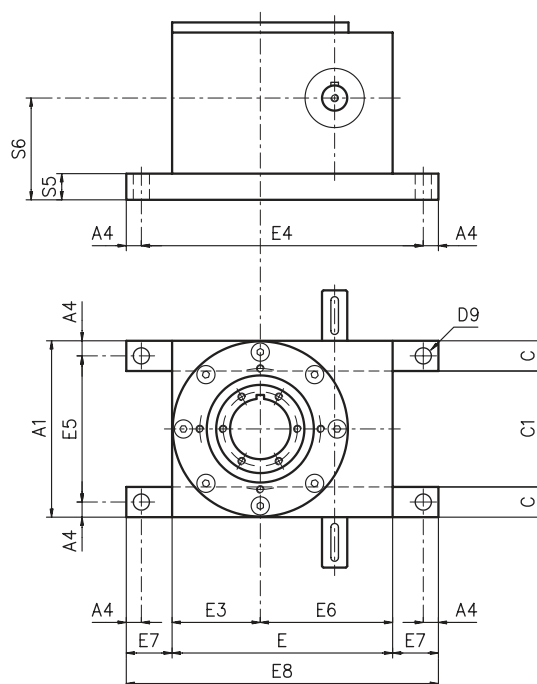


For not quoted dimensions reference should be made to the schemes on pages 60-63.

## SP additional mounting plates

If for project requirements it is necessary to fix the screw jacks on holes which do not coincide with the casing holes, steel mounting plates can be supplied. The overall dimensions for the standard version are shown in the table below, but different fixing holes can be realized upon request.

Incompatibility: P – P0



SP additional mounting plates

Size	59	88	117
A1	140	200	240
A4	12,5	15	25
C	25	35	50
C1	90	130	140
D9 Ø	11	15	25
E	175	238	310
E3	70	100	120
E4	200	268	360
E5	115	170	190
E6	105	138	190
E7	25	30	50
E8	225	298	410
S5	20	25	45
S6	80	100	135

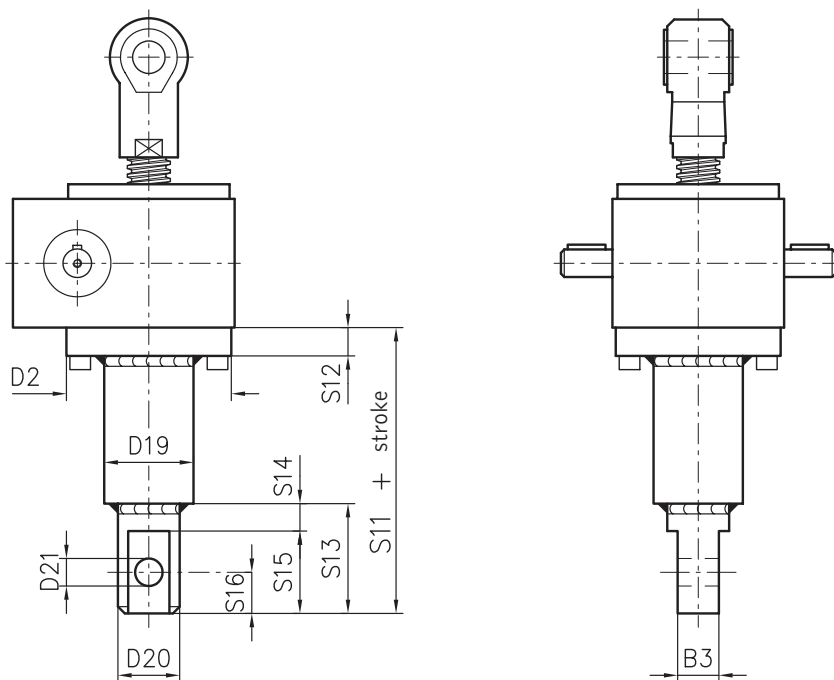
For not quoted dimensions see the schemes on page 139.



## PO rigid rocking protection

When it is necessary to apply a rocking mounting, UNIMEC is able to offer, for KT models, a special rigid reinforced protection which has an eyelet at its end. This protection very often supports the load, and it is therefore advisable that this protection be not too long in order to avoid an anomalous bending of PO. Further it should be reminded that mounting a PO in combination with an end fitting having an eyelet does not automatically give to the screw jack the status of a connecting rod (absence of lateral loads). Motors can directly be assembled to the screw jack. In the following table the overall dimensions are shown.

Incompatibility: KR - P- PR – PRO – SP



**PO rigid rocking protection**

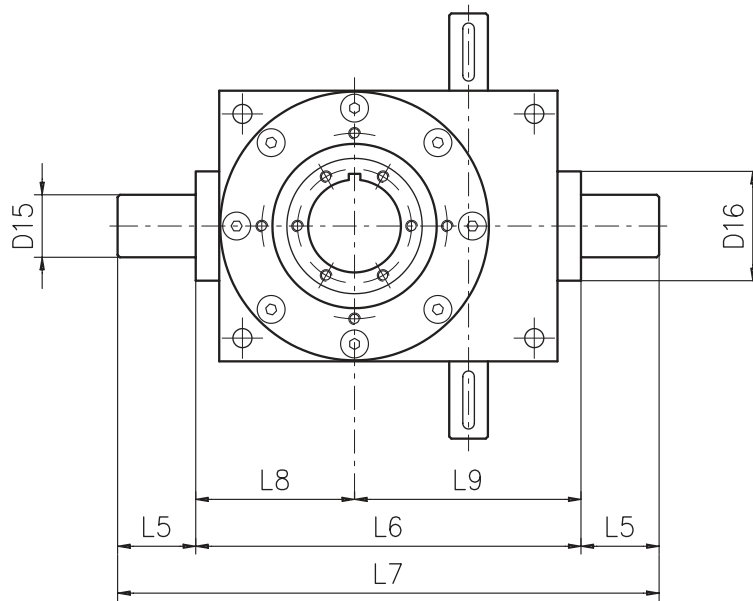
Size	59	88	117
B3	30	60	80
D2 Ø	140	200	239
D19 Ø	60	105	133
D20 Ø	48	88	118
D21 Ø	25	50	65
S11	140	210	240
S12	20	20	25
S13	70	140	175
S14	20	40	45
S15	50	100	130
S16	25	50	65

For not quoted dimensions see the schemes on page 139.

## P Lateral pins

The purpose of this solution is very similar to the P0 one: two lateral pins are fixed on the screw jack body in order to allow a rocking mounting. Under some aspects this solution can be preferred to the rocking protection because, in the slender rod scheme, the distance between the two hinges is exactly half. Further we remind you that mounting lateral pins combined with an end fitting having an eyelet does not automatically give to the screw jack the status of a connecting rod (absence of lateral loads). Motors can directly be assembled to the screw jack. In the following table the overall dimensions are shown.

Incompatibility: P0 – SP



### P lateral pins

Size	59	88	117
D15 Ø	30	40	55
D16 Ø	60	70	95
L5	35	45	60
L6	200	268	340
L7	270	358	460
L8	82,5	115	135
L9	117,5	153	205

For not quoted dimensions see the schemes on page 139.

## NIPLLOY treatment

For applications in oxidizing environments, it is possible to protect some screw jack components which do not undergo any sliding, by means of a chemical nickel treatment, the so-called Niploy. It creates a NON permanent surface coating on casings, covers, bushings, end fittings, and on the protruding shafts of the worm screw. The ball spindle cannot undergo this treatment.



## **NORMS**

### **Machinery directive (98/37/CE)**

The 98/37/CE directive, better known as the "Machinery directive", has been acknowledged in Italy by DPR 459/96. UNIMEC's components are included in the products categories which do not need to affix the CE mark, as they are "intended to be incorporated or assembled with other machinery" (art.4 par.2). Upon end user's request a manufacturer declaration can be supplied in accordance to what is foreseen at Annex II, point B.

### **ATEX directive (94/9/CE)**

The 94/9/CE directive, better known as the "ATEX directive" has been acknowledged in Italy by DPR 126/98. All UNIMEC's products may be classified as "components" according to the definition quoted in art.1 par.3 c), and therefore they do not require an ATEX mark. A conformity declaration in accordance to what stated in art.8 par.3 can be supplied upon end user's request, subject to the filling up of a questionnaire with the indication of the operating parameters.

### **ROHS directive (02/95/CE)**

The 02/95/CE directive, better known as the "ROHS directive" has been acknowledged in Italy by D.Ig. 25/7/05 n.151. All UNIMEC's suppliers of electromechanical equipments have issued a conformity certification to the above norms for their products. A copy of said certificates can be supplied upon final user's request.

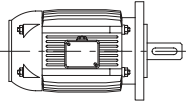
### **UNI ES ISO 9001:2000 norm**

UNIMEC has always considered the company's quality system management as a very important subject. That is why, since the year 1996, UNIMEC can show its UNI EN ISO 9001 certification, at the beginning in accordance to the 1994 norms and now meeting the requirements of the version published in the year 2000. 10 years of company's quality, certified by UKAS the world's most accredited certification body, take shape into an organization which is efficient at each stage of the working process.

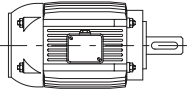
### **Painting**

Our products are all painted in colour RAL 5015 blue. An oven-dry system enables the products to have a perfect adhesivity. Different colours as well as epoxidic paints are available.

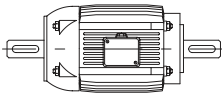
## MOUNTING SCHEMES



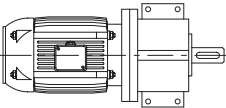
B5 form motor



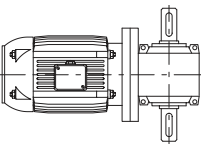
B3 form motor



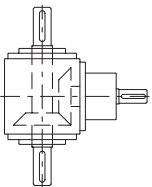
B3 form motor:  
double extension



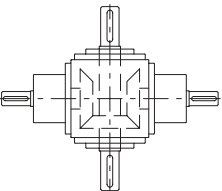
Coaxial motor reducer



Worm screw motor  
reducer

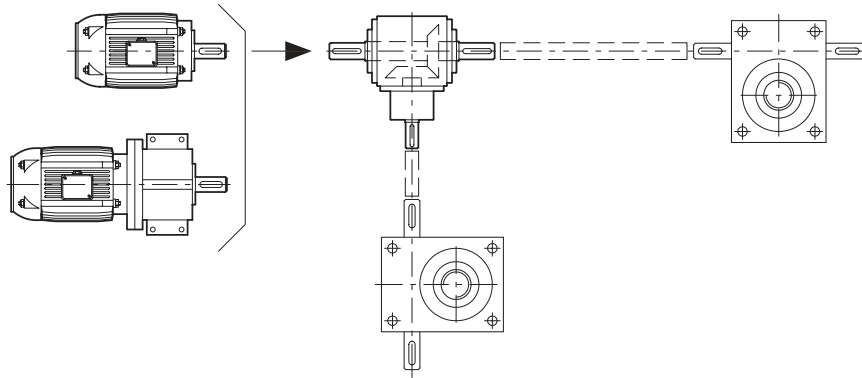


Bevel gear box

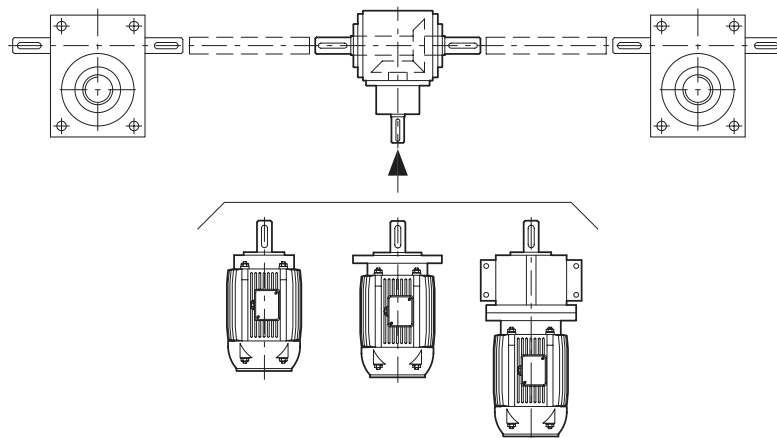


Four-way bevel gear box

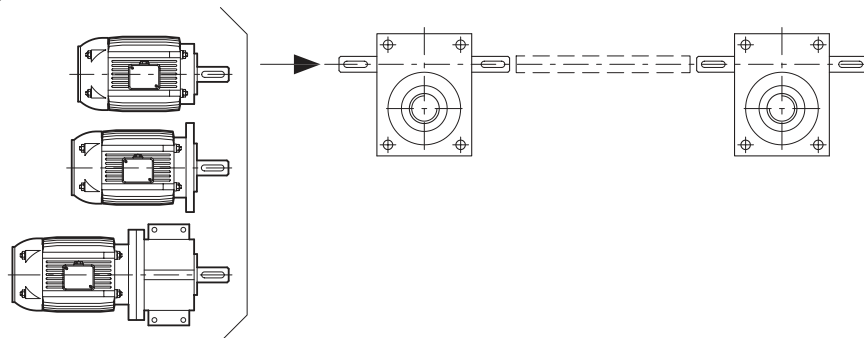
Scheme 1



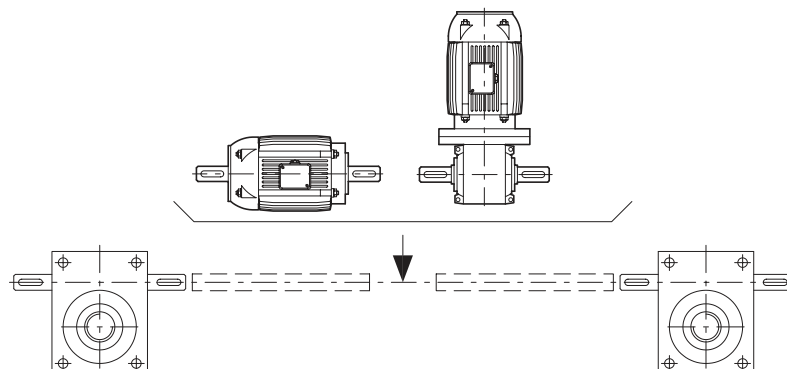
Scheme 2



Scheme 3

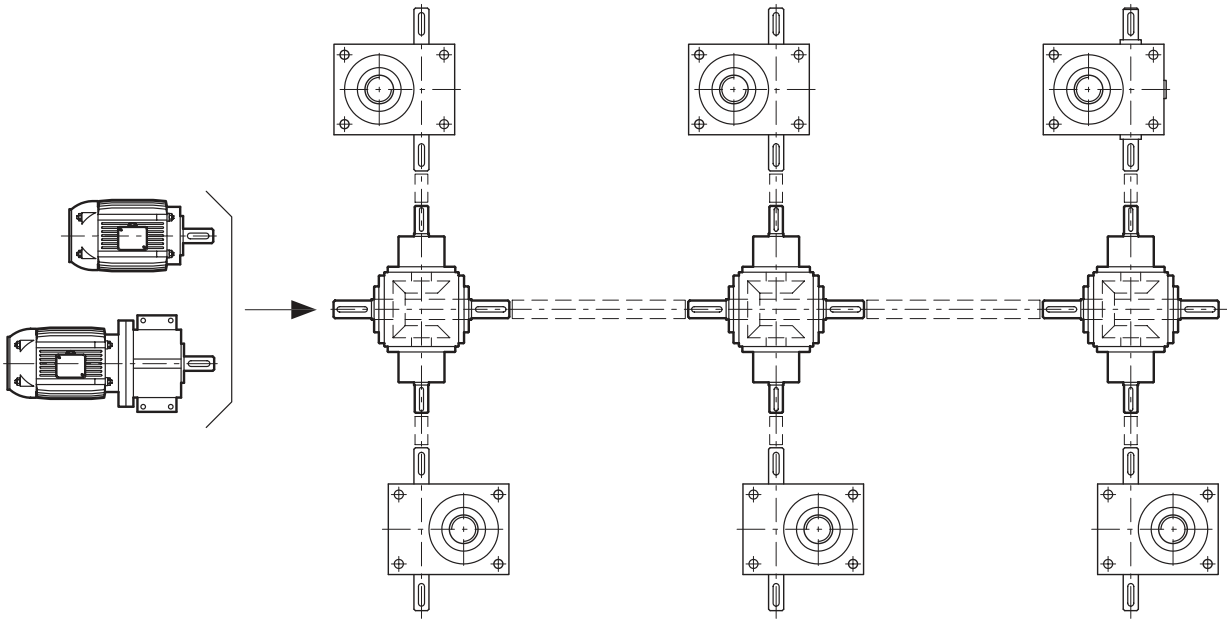


Scheme 4

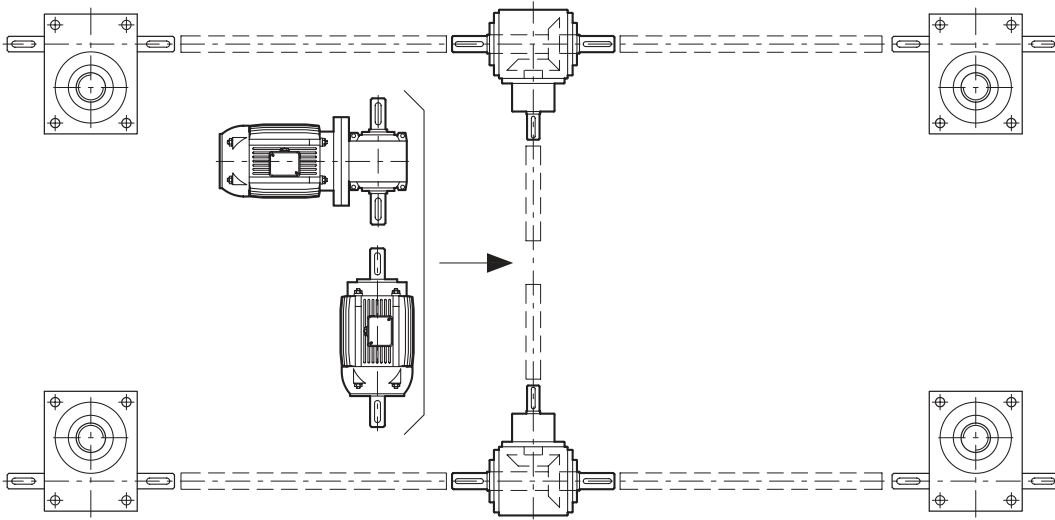




Scheme 5



Scheme 6



Scheme 7

