

New market demands, the growth of light applications and a spirit of innovation and research have pushed UNIMEC to realize a new trapezoidal screw jack series with an high price-quality ratio: the Aleph series.

## aleph



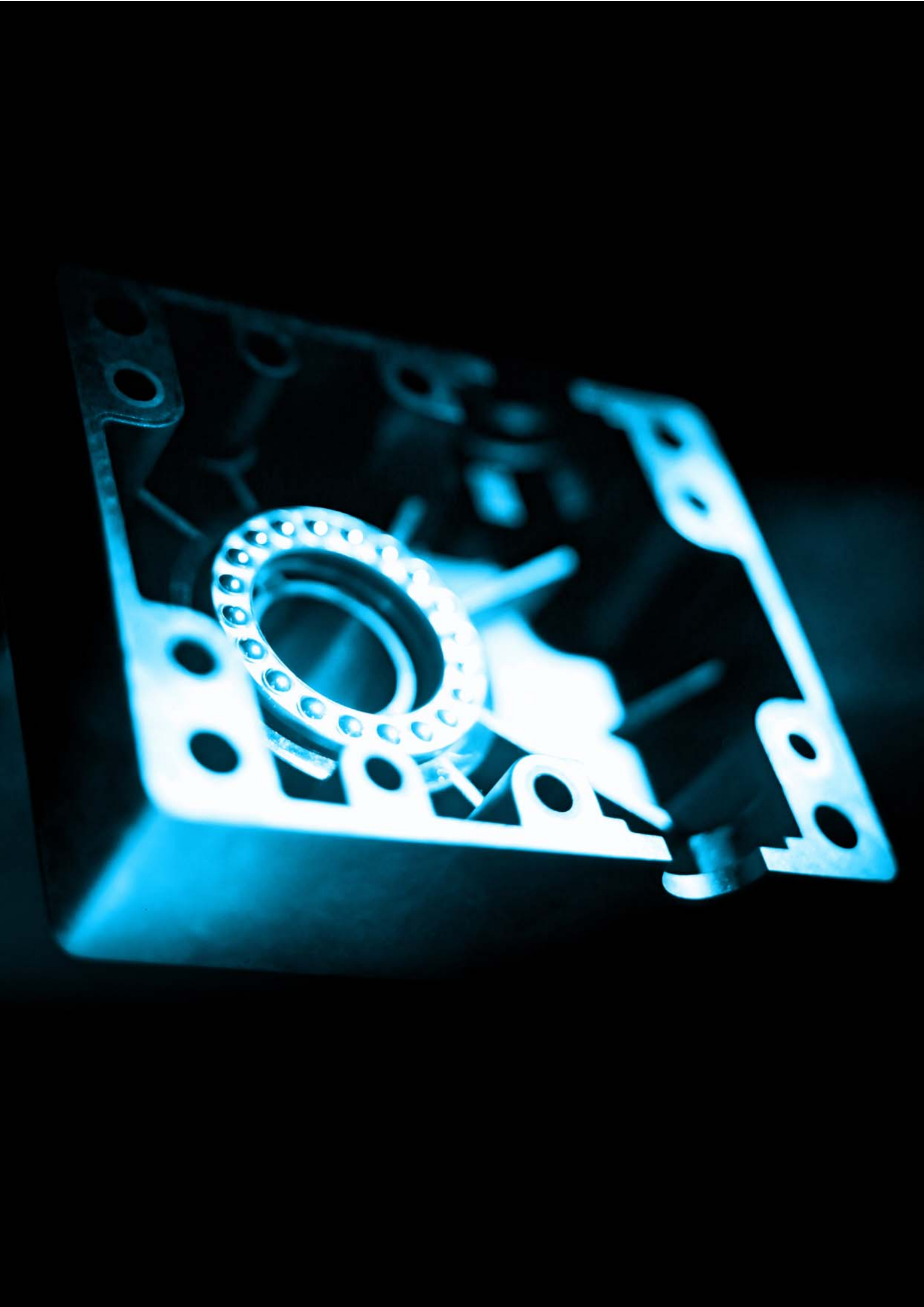
This new line includes two sizes and its peculiarity is that some components are made of a techno-polymer having very high mechanical features.

Having a structure quite similar to full metal screw jacks, Aleph series screw jacks have the same load handling functions and they also maintain the same IRREVERSIBILITY features.

The particular molding system of the gears and the peculiarity of the polyarilammide material employed, allow it to operate even without lubrication.

Aleph screw jacks can work singularly or in groups connected by means of joints, shafts and bevel gearboxes. At present, a direct motorization with flange is not possible.





# aleph

## Models

**TP MODEL:** threaded spindle with axial translation.

The input rotation of the worm screw is transformed in the axial translation of the threaded spindle by means of the worm wheel. THE LOAD IS APPLIED TO THE THREADED SPINDLE WHICH MUST HAVE A ROTATIONAL CONSTRAINT.

**TPR MODEL:** with rotating threaded spindle and external support nut (lead nut).

The input rotation of the worm screw causes the rotation of the threaded 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.

## End fittings

To meet the widest possible range of needs, various types of end fittings are available, which can be custom made upon request.

## Casings

Casings are made of two identical polymer half-shells. The two halves are connected by means of screws and nuts.

## Worm screws

Even for the Aleph 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 screws are available in three different reduction ratios: 1/5, 1/10, /30.

## Worm wheel and support nuts

The worm wheels and support nuts (lead nuts) are COMPLETELY made of polymer. This is very important because, obtaining the trapezoidal threading by molding, it is possible to keep the fibers integrity, ensuring better mechanical features. The trapezoidal threading geometry meets the requirements of the ISO 2901:1993 norm. The only machining is carried out for the worm wheel toothing; in this way it is possible to supply the three different ratios highlighted in the previous paragraph.

## Threaded spindles

The 20x4 and 30x6 threaded spindles reflect the same characteristics listed in the respective paragraphs for the trapezoidal screw jack chapter. They are mainly manufactured by rolling carbon steel C 45 grounded bars (according to the UNI EN 10083-2:1998). The trapezoidal threading geometry meets the requirements of the ISO 2901:1993 norm. Threaded spindles made of AISI 316 stainless steel or other materials can be manufactured upon request.

## Protections

Protections can also be applied in order to prevent dust and foreign matters from coming into contact with the coupling and causing damages to the threaded spindle and its support nut. For TP models, a steel rigid tube can be provided in the outer side, while the front side can be protected by nylon and PVC elastic bellows. In TPR models only elastic protections can be applied.

## Bearings and market materials

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

## LOAD ANALYSIS AND COMPOSITION

For the definition, analysis and characteristics of the various types of loads see the relative paragraph in the trapezoidal screw jack section, on page 28.

## BACKLASHES

For the definition, analysis and characteristics of the various types of backlashes see the relative paragraph in the trapezoidal screw jack section, on page 28.

Nevertheless it should be reminded that the axial backlash between the screw jack and its support nut CANNOT be reduced, being not possible to employ a contrast counter-lead nut system (RG).



## GLOSSARY

$C$	=	unit load to be handled [daN]
$C_e$	=	equivalent unit load [daN]
$C_t$	=	total load to be handled [daN]
DX	=	left hand spiral threading
$F_{rv}$	=	radial forces on the worm screw [daN]
$f_a$	=	ambient factor
$f_d$	=	duration factor
$f_s$	=	service factor
$f_t$	=	temperature factor
$f_u$	=	humidity factor
$f_v$	=	speed factor
$M_{tm}$	=	torque on the drive shaft [daNm]
$M_{tv}$	=	torque on the worm screw [daNm]
$N$	=	number of screw jacks and bevel gearboxes under a single handling
$n$	=	number of screw jacks under a single handling
$P$	=	mounting power requirement [kW]
$P_i$	=	input power to the single screw jack [kW]
$P_e$	=	equivalent power [kW]
$P_u$	=	output power to the single screw jack [kW]
rpm	=	rounds per minute
SX	=	left hand spiral threading
$v$	=	axial translation speed of the load [mm/min]
$\eta_m$	=	screw jack running efficiency
$\eta_c$	=	configuration running efficiency
$\eta_s$	=	structure running efficiency
$\omega_m$	=	motor angular speed [rpm]
$\omega_v$	=	worm screw angular speed [rpm]

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

## HANDLING

### Manual operation

The Aleph series can be manually operated. The following table determines the maximum load, expressed in [daN], that can be handled according to the reduction ratio of screw jacks, considering the application of a force of 5 daN on a handwheel having a radius of 250 mm. Obviously, greater loads can be manually handled by applying further reductions to the screw jack or by increasing the radius of the handwheel.

Size		420	630
fast ratio	[daN]	700	1000
normal ratio	[daN]	700	1000
slow ratio	[daN]	700	1000

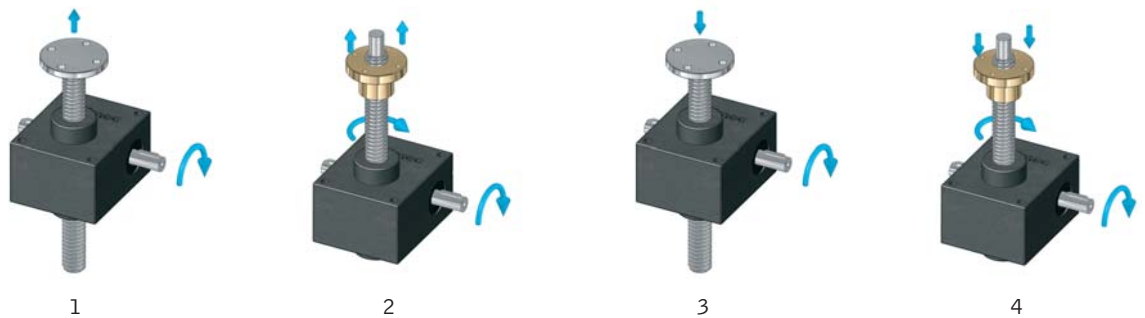
### Motorized operation

The Aleph series can be operated by any kind of motors. At present a direct motorization is not possible. 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, the ratio, the dynamic load and the linear speed.

### Rotation directions

The rotation directions and the respective linear movements are showed in the drawings below. In standard conditions, UNIMEC supplies screw jacks equipped with right-handed worm screw, to which the movements illustrated in drawings 1 and 2 correspond. Upon request it is possible to have a left-handed worm screw, to which the movements illustrated in drawings 3 and 4 correspond. The combinations between threaded spindles and left-handed or right-handed worm screw, lead to the four combinations listed in the table below.

Worm screw	Right	Right	Left	Left
Threaded spindle	Right	Left	Right	Left
Handling	1-2	3-4	3-4	1-2



### Emergency operation

In case of black-out, in order to be able to 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 firstly be released and then it is necessary to disassemble those components from the transmission as the reducer could also be irreversible. It is advisable to equip the emergency operation mechanism with a safety device to cut the electric circuit.



## LUBRICATION

### Inner lubrication

Thanks to particular solutions during the molding process, a film of pure polymer is formed on the molded components surfaces, which has high sliding properties. This factor, in synergy with light services, enables the Aleph series to work in absence of lubricant. Anyway the presence of a lubricant layer on the threaded spindle can extend the screw jacks life; for the lubricants choice make reference to what has been indicated in the correspondent paragraph in the screw jacks section (page 32).

It should be reminded that the Aleph series does not foresee any oil plug.

## INSTALLATION AND MAINTENANCE

### Installation

The screw jack must be installed in such a manner as not to create lateral loads on the threaded spindle. Great care must be taken to ensure that the threaded spindle is orthogonal to the mounting plane, and that the load and threaded spindle are 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 TP models and the lead nuts for TPR 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 on the worm screws.

It is advisable to use joints capable of absorbing alignment errors but having at the same time a rigid torsion necessary to keep the synchronization of the transmission. The assembly or disassembly of the joints or pulleys of worm screw must be carried out by means of tie rods or extractors, using, if necessary, the threaded hole on top of the worm screw; striking or hammering could damage the inner bearings.

For heat-shrinking joints or pulleys, we recommend a temperature between 80-100 °C. Installations environments with dust, water, vapors, etc. require precautions systems to protect the threaded spindle. This can be done by using elastic protections or rigid protections.

The above protections are also used in order to avoid any accidental human contact with the moving devices.

### Start-up

All ALEPH 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 threaded spindles (whether foreseen and if possible) 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 considered, which for vertical loads will be lower in ascent and greater in descent. It is advisable to start the machine with the minimum possible load and to make sure all components are working properly, before assuming regular operation. Especially at start-up, it is critical to follow the instructions given in the manual: continuous or hazardous testing maneuvers could lead to an abnormal overheating and cause irreparable damages.

ONE ONLY TEMPERATURE PEAK IS ENOUGH TO CAUSE PREMATURE WEAR OR BREAKDOWN OF THE ALEPH SCREW JACK.

### Routine maintenance

Screw jacks must be periodically inspected, depending on the use and working environment.

### 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 recommend to store Aleph screw jacks in a closed place, in order to avoid an excessive water absorption of the polymer. We also recommend to:

- Lubricate and protect the threaded spindle, the worm screw and the non varnished components
- Support the threaded spindle in case of horizontal storage.

### Warranty

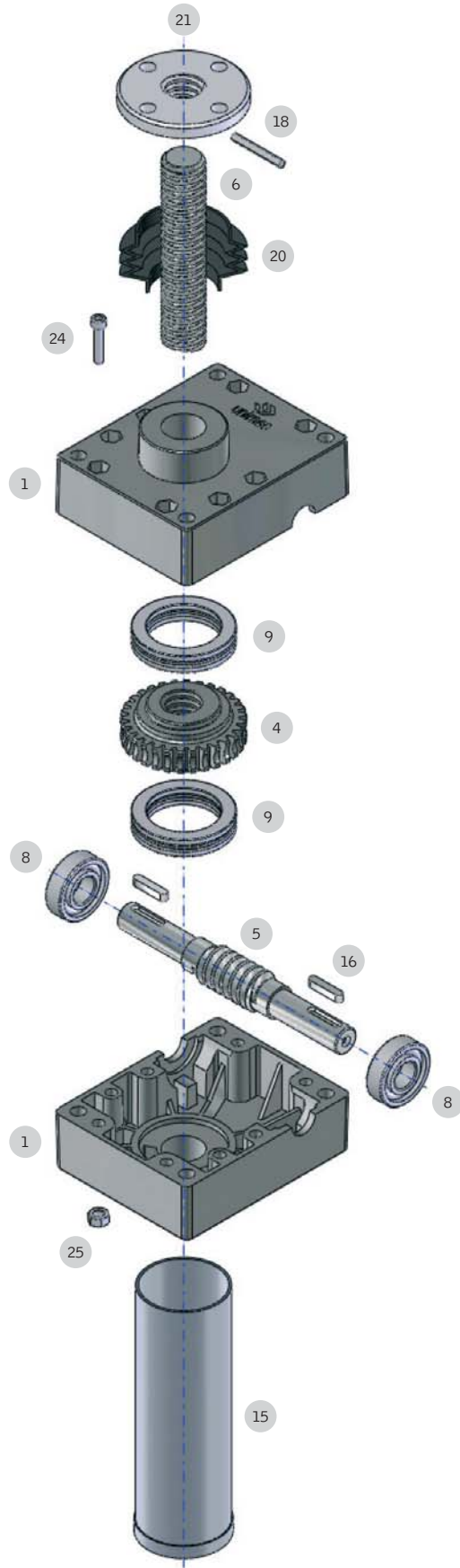
The warranty is valid only when the instructions contained in our manual are carefully followed.

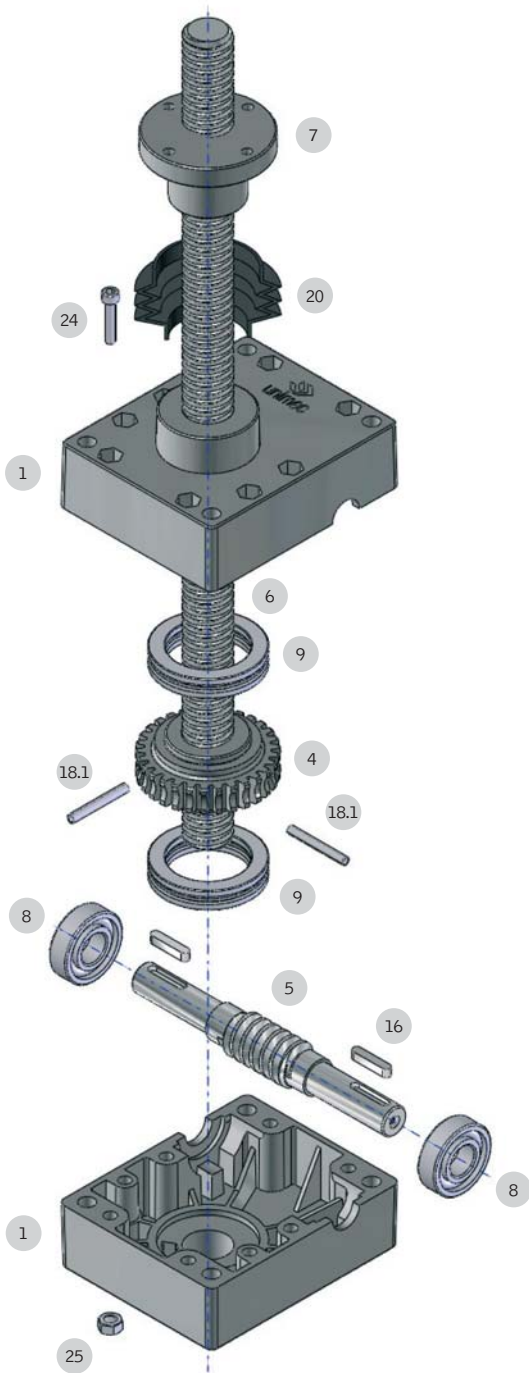
## ORDERING CODE

Follow the indications on page 35.

## TP MODEL

- 1 Casing (half-shell)
- 4 Worm wheel
- 5 Worm screw
- 6 Threaded spindle
- 8 Worm screw bearing
- 9 Worm wheel bearing
- 15 Rigid protection
- 16 Key
- 18 End fitting elastic fastening pin
- 20 Elastic protection
- 21 End fitting
- 24 Bolt
- 25 Nut





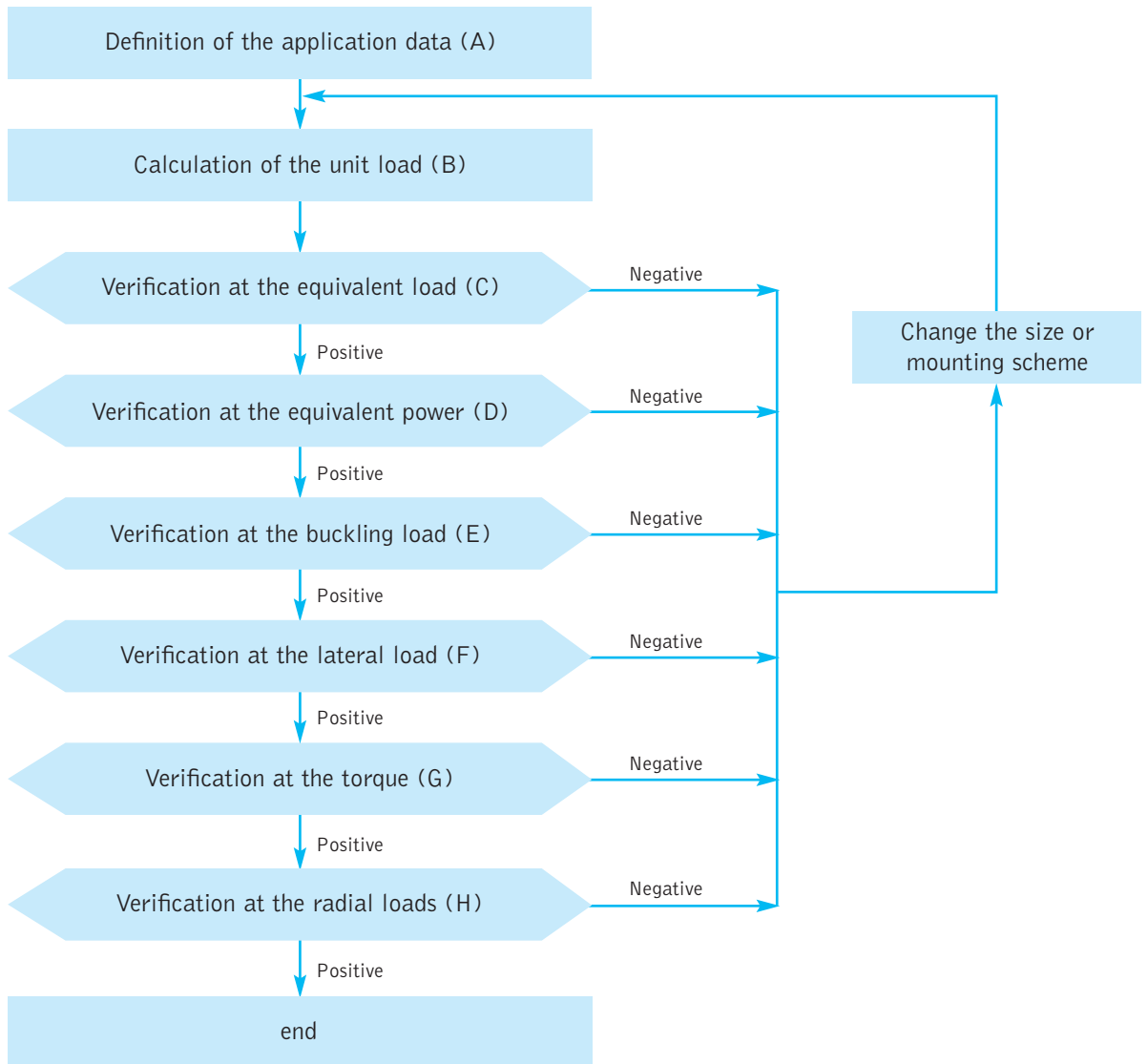
## TPR MODEL

Casing (half case)	1
Worm wheel	4
Worm screw	5
Threaded spindle	6
Lead nut	7
Worm screw bearing	8
Worm wheel bearing	9
Key	16
Worm wheel elastic fastening pin	18.1
Elastic protection	20
Bolt	24
Nut	25



## DIMENSIONING OF THE SCREW JACK

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



## DESCRIPTIVE TABLES

SIZE		420	630
Admissible load [daN]		700	1000
Trapezoidal spindle: diameter per pitch [mm]		20x4	30x6
Theoretical reduction ratio	fast	1/5	1/5
	Normal	1/10	1/10
	Slow	1/30	1/30
Real reduction ratio	fast	4/19	4/19
	Normal	2/21	3/29
	Slow	1/30	1/30
Spindle stroke for a turn of the worm wheel [mm]		4	6
Spindle stroke for a turn of the worm screw [mm]	fast	0,8	1,2
	Normal	0,4	0,6
	Slow	0,13	0,2
Running efficiency [%]	fast	31	30
	Normal	28	26
	Slow	20	18
Operation temperature [°C]		10/60 (for different conditions contact our Technical office)	
Weight of the trapezoidal screw for 100 mm [kg]		0,22	0,5
Weight of the screw jack (screw not included) [kg]		1	2,7



## 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 handling power. Wear phenomena and the life of the screw jack proportionally depend on the value of the translation speed. Therefore, it is advisable to limit the translation speed as much as possible. NEVER exceed 1500 rpm for the Aleph series.

**STROKE [mm]** = it is the linear measure used to handle a load. It may not always coincide with the total length of the threaded 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, lubrication quality and quantity etc.

**MOUNTING SCHEMES** = There are several ways of handling a load by means of screw jacks. The schemes on pages 84-85 will show some examples. Choosing a mounting scheme will condition the choice for the size and the power which is necessary for the application.

## B - THE UNIT LOAD AND THE DESCRIPTIVE TABLES

According to the n number of screw jacks contained in the mounting scheme, it is possible to calculate each screw jack's load by 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. According to that value, reading the descriptive tables, it is possible to effect a preliminary selection choosing between the sizes which present an admissible load value higher than the unit load.

## C - THE EQUIVALENT LOAD

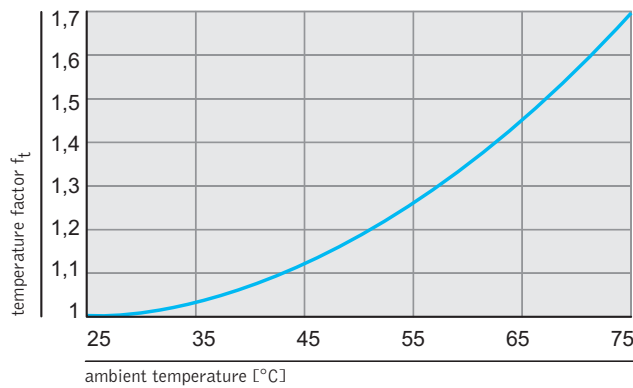
All the values listed in the catalogue refer to standard use conditions, i.e. a temperature of 20 °C, 50% humidity, foreseen lifetime 10000 cycles, manual handling without shocks and operation cycles equal to 12 minutes/hour (20%/60 min.). For different application conditions, the equivalent load should be calculated: it is 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

$$C_e = C \cdot f_t \cdot f_a \cdot f_s \cdot f_u \cdot f_d \cdot f_v$$

### The temperature factor $f_t$

By means of the following diagram an  $f_t$  factor can be calculated according to the ambient temperature. In case of temperatures higher than 75 °C we suggest contacting our technical office.



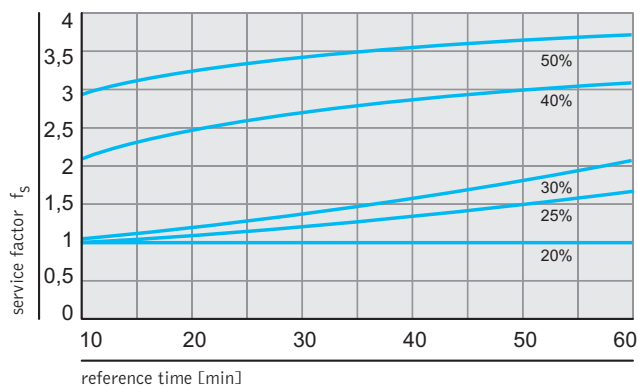
### The ambient factor $f_a$

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

Type of load	Ambient factor $f_a$
Light shocks, few insertions, regular movements	1
Medium shocks, frequent insertions, regular movements	1,2
High shocks, many insertions, irregular movements	1,8

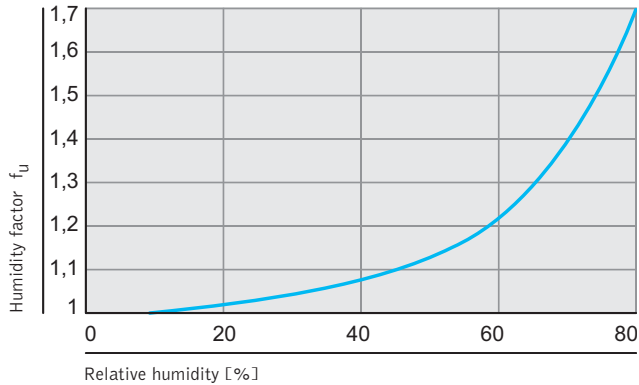
### The service factor $f_s$

The service factor  $f_s$  is obtained by evaluating the duty cycle and calculating the operation percentage on that interval. For example a working time of 10 minutes and non working time of 10 minutes correspond to 50%/20 min; similarly a working time of 5 minutes and a non working time of 20 minutes correspond to 20%/25 min. Based on the working data, choosing the cycle time and the service percentage it is possible to read the  $f_s$  value on the ordinate axis. For Aleph series it is recommended to limit the operation conditions to 50% as the plastic material is a bad heat conductor and it makes its dispersion in the environment slower.



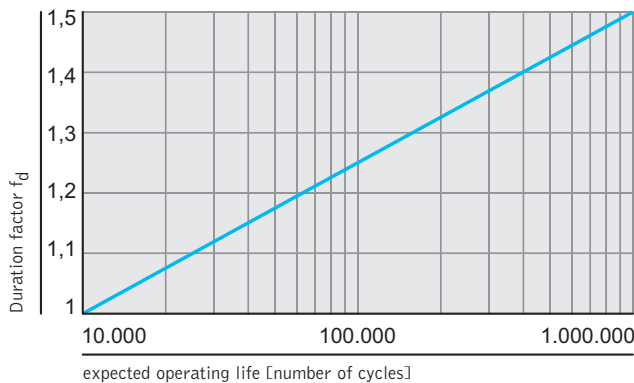
### The humidity factor $f_u$

By means of the following diagram, it is possible to calculate the  $f_u$  factor as a function of the relative ambient humidity. The water absorption of the polymer is translated in a reduction of the strength characteristics and an increase in the shocks strength (resiliency). For humidity higher than 80% it is necessary to contact the technical office.



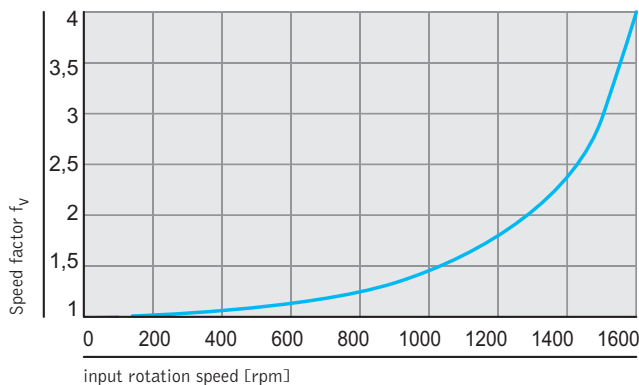
### The duration factor $f_d$

By means of the following diagram it is possible to calculate the  $f_d$  factor as a function of the expected operating life expressed in cycle numbers.



### The speed factor $f_v$

By means of the following diagram it is possible to calculate the  $f_v$  factor as a function of the input rotation speed on the worm screw expressed in [rpm]. Due to the polymer's physical characteristics, the 1500 rpm speed SHOULD NEVER be exceeded, otherwise this could cause very serious wear phenomena.



With the aid of the descriptive tables it is possible to check whether the previously chosen size is able to support an admissible dynamic load equal to the equivalent load. If not it is necessary to effect a second selection.

## D - THE POWER TABLES AND THE EQUIVALENT POWER

In the following pages it is possible to find the power tables. Choosing the tables referring to the size selected in paragraph C and putting the equivalent load values as well as the translation speed values in the table, it is possible to obtain the equivalent power  $P_e$  value. If the crossing values fall into the colored area, this means that the application conditions could cause negative phenomena such as overheating and strong wear. It is therefore necessary to reduce the translation speed or to increase the size.

N.B. the equivalent power is NOT the power requested by the single screw jack, unless the six correction factors  $f_t$ ,  $f_a$ ,  $f_s$ ,  $f_u$ ,  $f_d$ , and  $f_v$  have a unit value.

### SIZE 420

Ratio 1/5											
Load [daN]		700		400		300		200		100	
Worm screw rotation speed $\omega_v$ [rpm]	Threaded spindle rotation speed $v$ [mm/min]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]
1500	1200	0,38	0,25	0,26	0,17	0,19	0,13	0,13	0,09	0,07	0,05
1000	800	0,26	0,25	0,17	0,17	0,13	0,13	0,09	0,09	0,07	0,05
750	600	0,19	0,25	0,13	0,17	0,10	0,13	0,07	0,09	0,07	0,05
500	400	0,13	0,25	0,09	0,17	0,07	0,13	0,07	0,09	0,07	0,05
300	240	0,11	0,25	0,07	0,17	0,07	0,13	0,07	0,09	0,07	0,05
100	80	0,07	0,25	0,07	0,17	0,07	0,13	0,07	0,09	0,07	0,05
50	40	0,07	0,25	0,07	0,17	0,07	0,13	0,07	0,09	0,07	0,05

Ratio 1/10											
Load [daN]		700		400		300		200		100	
Worm screw rotation speed $\omega_v$ [rpm]	Threaded spindle rotation speed $v$ [mm/min]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]
1500	600	0,22	0,14	0,14	0,09	0,11	0,07	0,08	0,05	0,07	0,03
1000	400	0,14	0,14	0,09	0,09	0,07	0,07	0,07	0,05	0,07	0,03
750	300	0,11	0,14	0,07	0,09	0,07	0,07	0,07	0,05	0,07	0,03
500	200	0,07	0,14	0,07	0,09	0,07	0,07	0,07	0,05	0,07	0,03
300	120	0,07	0,14	0,07	0,09	0,07	0,07	0,07	0,05	0,07	0,03
100	40	0,07	0,14	0,07	0,09	0,07	0,07	0,07	0,05	0,07	0,03
50	20	0,07	0,14	0,07	0,09	0,07	0,07	0,07	0,05	0,07	0,03

Ratio 1/30											
Load [daN]		700		400		300		200		100	
Worm screw rotation speed $\omega_v$ [rpm]	Threaded spindle rotation speed $v$ [mm/min]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]
1500	200	0,11	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03
1000	133	0,07	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03
750	100	0,07	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03
500	67	0,07	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03
300	40	0,07	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03
100	13	0,07	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03
50	6,7	0,07	0,07	0,07	0,05	0,07	0,03	0,07	0,03	0,07	0,03



## Size 630

Ratio 1/5									
Load [daN]		1000		750		500		250	
Worm screw rotation speed $\omega_v$ [rpm]	Threaded spindle rotation speed $v$ [mm/min]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]
1500	1800	0,98	0,64	0,74	0,48	0,49	0,32	0,25	0,17
1000	1200	0,65	0,64	0,49	0,48	0,33	0,32	0,17	0,17
750	900	0,49	0,64	0,37	0,48	0,25	0,32	0,13	0,17
500	600	0,33	0,64	0,25	0,48	0,17	0,32	0,10	0,17
300	360	0,20	0,64	0,15	0,48	0,10	0,32	0,10	0,17
100	120	0,10	0,64	0,10	0,48	0,10	0,32	0,10	0,17
50	60	0,10	0,64	0,10	0,48	0,10	0,32	0,10	0,17

Ratio 1/10									
Load [daN]		1000		750		500		250	
Worm screw rotation speed $\omega_v$ [rpm]	Threaded spindle rotation speed $v$ [mm/min]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]
1500	900	0,57	0,37	0,43	0,28	0,29	0,19	0,16	0,10
1000	600	0,38	0,37	0,29	0,28	0,20	0,19	0,10	0,10
750	450	0,29	0,37	0,22	0,28	0,15	0,19	0,10	0,10
500	300	0,19	0,37	0,15	0,28	0,10	0,19	0,10	0,10
300	180	0,12	0,37	0,10	0,28	0,10	0,19	0,10	0,10
100	60	0,10	0,37	0,10	0,28	0,10	0,19	0,10	0,10
50	30	0,10	0,37	0,10	0,28	0,10	0,19	0,10	0,10

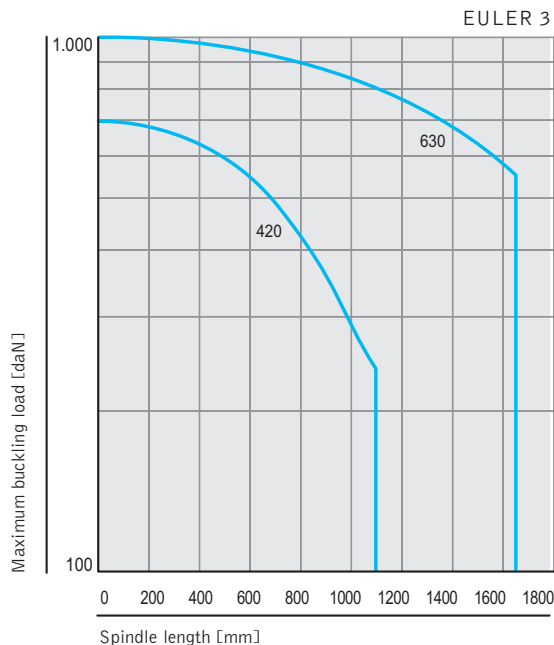
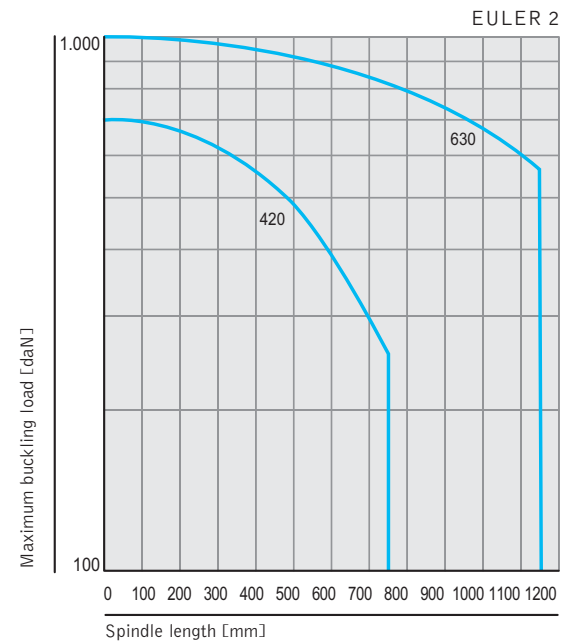
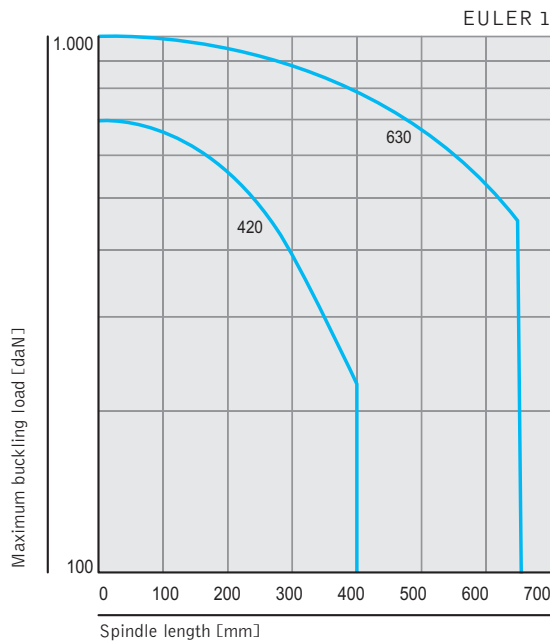
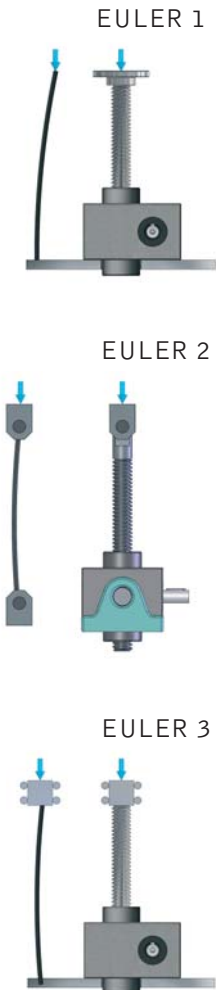
Ratio 1/30									
Load [daN]		1000		750		500		250	
Worm screw rotation speed $\omega_v$ [rpm]	Threaded spindle rotation speed $v$ [mm/min]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]	$P_i$ [kW]	$M_{tv}$ [daNm]
1500	300	0,28	0,18	0,22	0,14	0,14	0,09	0,07	0,05
1000	200	0,19	0,18	0,14	0,14	0,10	0,09	0,07	0,05
750	150	0,14	0,18	0,11	0,14	0,07	0,09	0,07	0,05
500	100	0,10	0,18	0,07	0,14	0,07	0,09	0,07	0,05
300	60	0,07	0,18	0,07	0,14	0,07	0,09	0,07	0,05
100	20	0,07	0,18	0,07	0,14	0,07	0,09	0,07	0,05
50	10	0,07	0,18	0,07	0,14	0,07	0,09	0,07	0,05

## E - BUCKLING

In case of compression load, even occasional, it is necessary to check the buckling structure. Firstly the two support constraints of the screw jack have to be determined: the first one is on the end fitting for the TP models and on the lead nut for the TPR models, while the second one is the way the casing is grounded. Most part of the real cases can be synthesized according to three models, as listed below:

	End fitting - lead nut	Screw jack
Euler I	Free	Fitted-in
Euler II	Hinge	Hinge
Euler III	Sleeve	Fitted-in

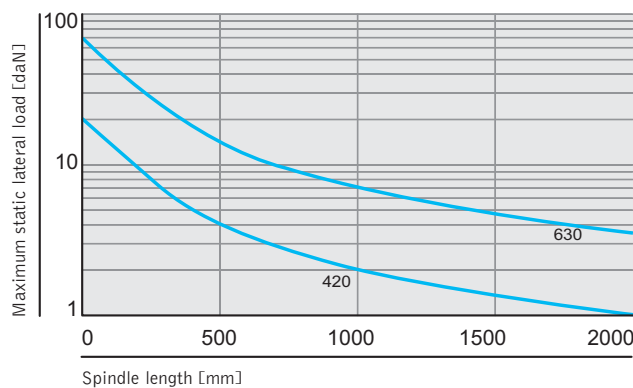
Once the Euler case has been determined which most fits to the current application, it is necessary to find in the corresponding diagram the point corresponding to the coordinates (length; load). The sizes suited to the application are those whose curves subtend the above point. In case the size chosen at paragraph D does not meet such requisites it is necessary to choose a higher size. The Euler-Gordon-Rankine curves have been calculated with a factor of safety equal to 4. For applications which can support factors of safety lower than 4 we suggest contacting our technical office.



## F - THE LATERAL LOAD

As stated in the previous paragraphs lateral loads are the main cause of failures. In addition to the misalignment of the threaded spindle and the load, they can be caused by inaccurate mountings which force the threaded spindle in an anomalous position. As a consequence the coupling between lead nut and threaded spindle for the TPR model and between the threaded spindle and the worm wheel for the TP model will be wrong. The application of double serial guides allow, for TP models, a partial correction of the anomalous position of the threaded spindle before contacting the worm wheel. The problem is transformed into an anomalous sliding of the threaded spindle on the guides themselves. In TPR model, it is the outer support nut which contacts the threaded spindle and it is therefore not possible to apply any corrections, unless particular mountings are applied as illustrated in the paragraph "lateral backlash in TPR models". Lateral loads can even derive from an horizontal mounting: the threaded spindle own weight causes a bending of the same becoming in this way a lateral load. The border value for the bending and the consequent lateral load depends on the screw jack size and on the threaded spindle length. It is advisable to contact our technical office in order to foresee the suitable supports.

The following diagrams, which are valid for static loads, show the admissible lateral load value, according to the size and the length of the threaded spindle. For dynamic applications it is necessary to ask to the technical office.



In case the dimension chosen in the previous paragraphs is not enough to support a particular lateral load a suitable size should be chosen.

## G - THE TORQUE

At this stage it is possible to calculate the power requested by the assembling scheme. The following formula will be used to calculate this value:

$$P = \frac{1}{1000} \cdot \frac{n \cdot C \cdot v}{6000 \cdot \eta_m \cdot \eta_c \cdot \eta_s}$$

where:

P = needed power [kW]

n = number of screw jacks

C = unit load [daN]

v = translation speed [mm/min]

$\eta_m$  = screw jack running efficiency (see descriptive tables)

$\eta_c$  = configuration running efficiency =  $1 - [(N-1) \cdot 0,05]$ , where N is the total number of screw jacks and gear boxes

$\eta_s$  = structure running efficiency (guides, belts, pulleys, shafts, joints, reducers)



In order to complete the calculation of the requested power, it is necessary to calculate the torque which should be transmitted by the drive shaft:

$$M_{tm} = \frac{955 \cdot P}{\omega_m}$$

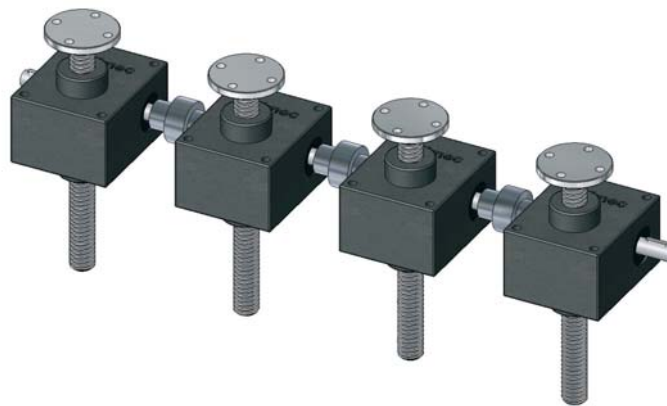
where:

$M_{tm}$  = is the torque on the drive shaft [daNm]

$P$  = is the motor power [kW]

$\omega_m$  = is the angular speed of the motor [rpm]

According to the applied mounting scheme it is necessary to check that the worm screw will be able to hold out under a possible combined torque. Therefore in the following table the admissible torque values are listed for the worm screws according to their size and expressed as [daNm].



Size		420	630
Fast ratio	[daNm]	5,43	6,90
Medium ratio	[daNm]	5,43	15,43
Slow ratio	[daNm]	4,18	18,31

In case the above values be exceeded, it will be necessary to choose a higher size, to change the mounting scheme or to increase the speed, in accordance to what has been indicated in the previous paragraphs.

## H – RADIAL LOADS

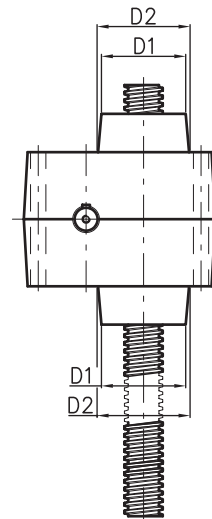
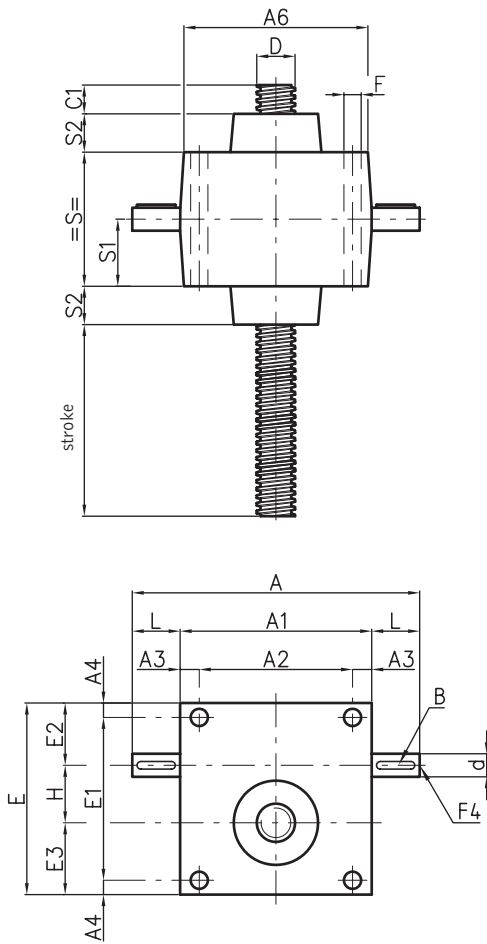
In the case of radial loads on the worm screw it is necessary to check their strength according to the following table:



Size		420	630
$F_{rv}$	[daN]	22	45

In case the above values be exceeded it will be necessary to choose a higher size, to change the mounting scheme or to increase the speed, in accordance to what has been indicated in the previous paragraphs.





Series construction models



B model



S model



D model

TP models		
Size	420	630
A	150	206
A1	100	126
A2	80	102
A3	10	12
A4	7,5	12
A6	99	125
B	4x4x20	6x6x30
C1	15	20
d Ø j6	12	20
D Ø	20x4	30x6
D1 Ø	44	60
D2 Ø	43	59
E	100	155
E1	85	131
E2	32,5	45
E3	37,5	60
F Ø	9	11
F4	M5x10	M6x12
H	30	50
L	25	40
S	70	90
S1	35	45
S2	20	25

**Series construction models**



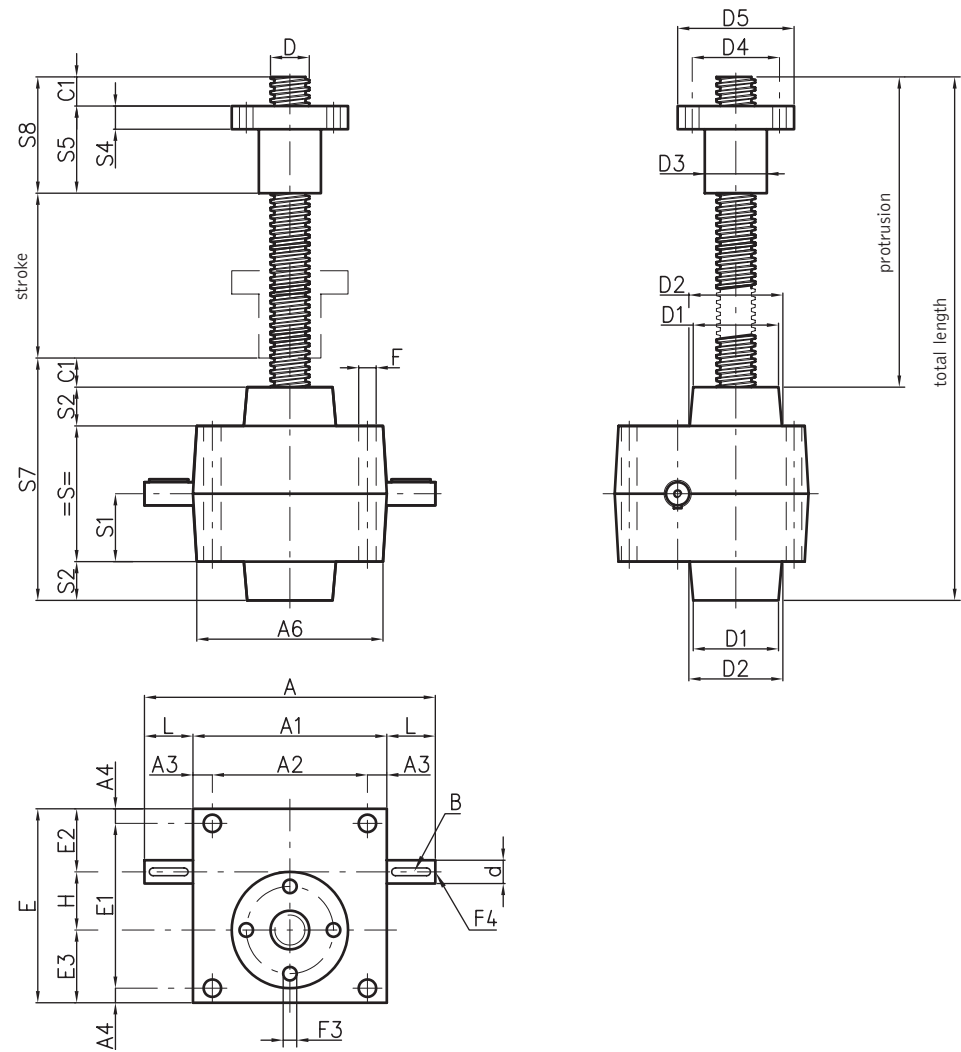
B model



S model



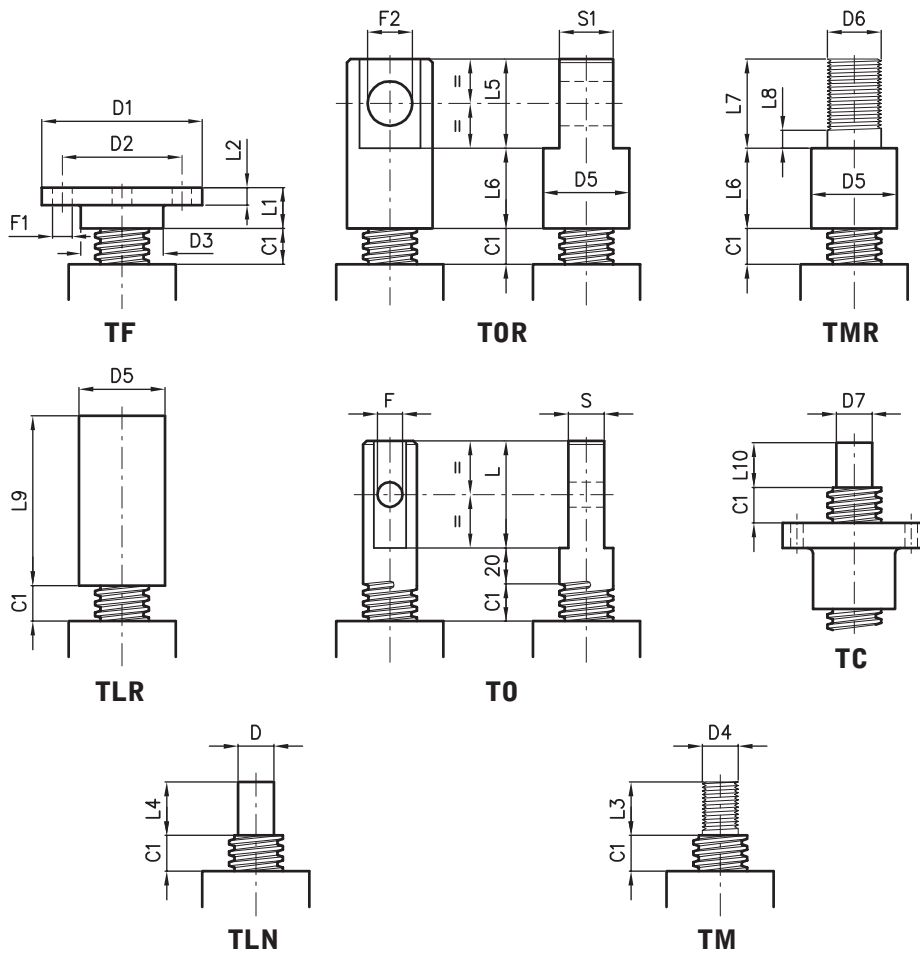
D model



**TPR models**

Size	420	630
A	150	206
A1	100	126
A2	80	102
A3	10	12
A4	7,5	12
A6	99	125
B	4x4x20	6x6x30
C1	15	20
d Ø j6	12	20
D Ø	20x4	30x6
D1 Ø	44	60
D2 Ø	43	59
D3 Ø	32	46
D4 Ø	45	64
D5 Ø	60	80
E	100	155
E1	85	131
E2	32,5	45
E3	37,5	60
F Ø	8	11
F3 (4 holes)	7	7
F4	M5x10	M6x12
H	30	50
L	25	40
S	70	90
S1	35	45
S2	20	25
S4	12	14
S5	45	48
S7	125	160
S8	60	68

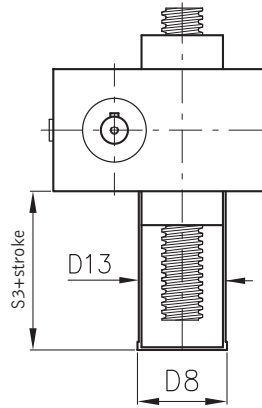




End fittings		
Size	420	630
C1	15	20
D Ø	15	20
D1 Ø	79	89
D2 Ø	60	67
D3 Ø	39	46
D4 Ø	14x2	20x2,5
D5 Ø	38	48
D6 Ø	20x1,5	30x2
D7 K6	15	20
F Ø	10	14
F1 (4 holes)	11	11
F2 Ø	20	25
L	50	60
L1	21	23
L2	8	10
L3	20	30
L4	25	30
L5	40	50
L6	35	45
L7	40	50
L8	10	10
L9	75	95
L10	20	25
S	14	20
S1	25	30

## 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 threaded spindle. The PR protection can only be applied to TP models. The overall dimensions are shown in the following table. **Incompatibility: TPR models.**



PR rigid protection		
Size	420	630
D8 Ø	48	65
D13 Ø	46	63
S3	50	60

For non quoted dimensions see to the relative tables on pages 103-104



## PE elastic protection

The purpose of the elastic protections is to protect the threaded spindle by following its own movement during stroke. Standard type protections are elastic bellows, made of PVC covered nylon and having collars at their ends, 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 closed conditions, the PE has an overall dimension equal to 1/8 of the stroke value. In case said value exceeds the C1 quote (which can be taken from the dimension tables) the total length of the threaded spindle should be fitted to said dimensions. In case of horizontal mounting (of which previous notice should be given) it is necessary to support the protection own weight in order to avoid that it leans on the threaded spindle; for this purpose special support rings are foreseen. The PE can be applied to TP and TPR models and in case of missing specifications they can be supplied with fabric collars and dimensions as shown in table 1.

**Incompatibility: none.**

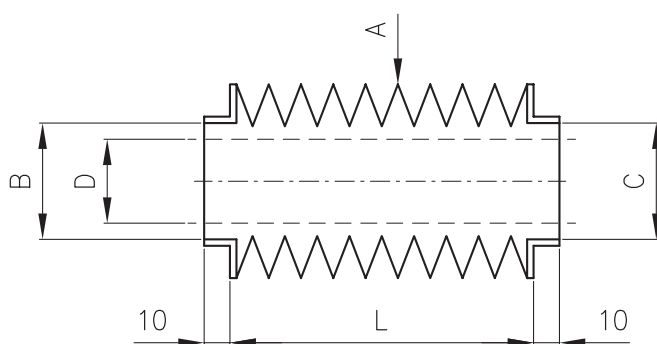


Table 1

PE elastic protection		
Size	420	630
A $\emptyset$	70	85
D $\emptyset$ vite	20	30
B $\emptyset$	44	60
C $\emptyset$	20	30
	32	46
	38	48
	39	-
L	1/8 of the stroke (completely closed)	

For non quoted dimensions see to the relative tables on pages 103-104

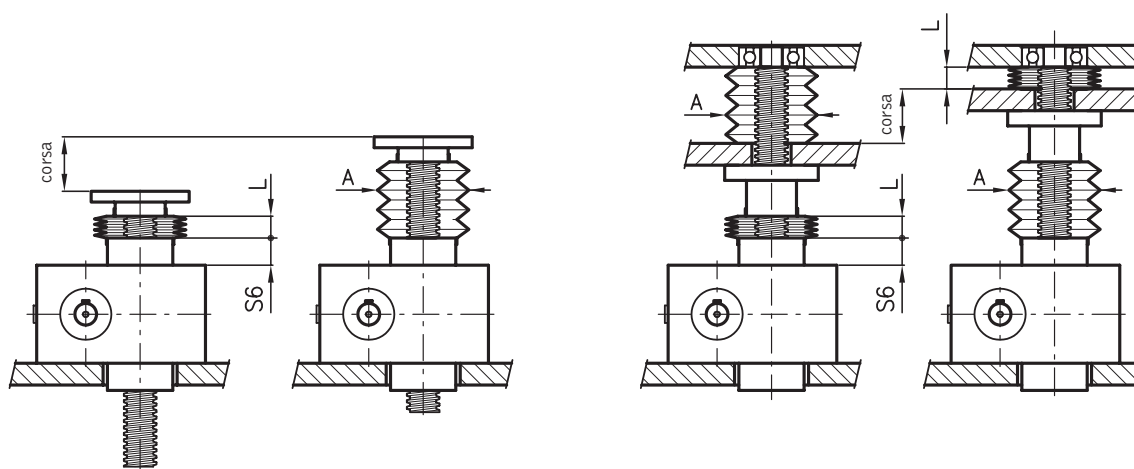


Table 2

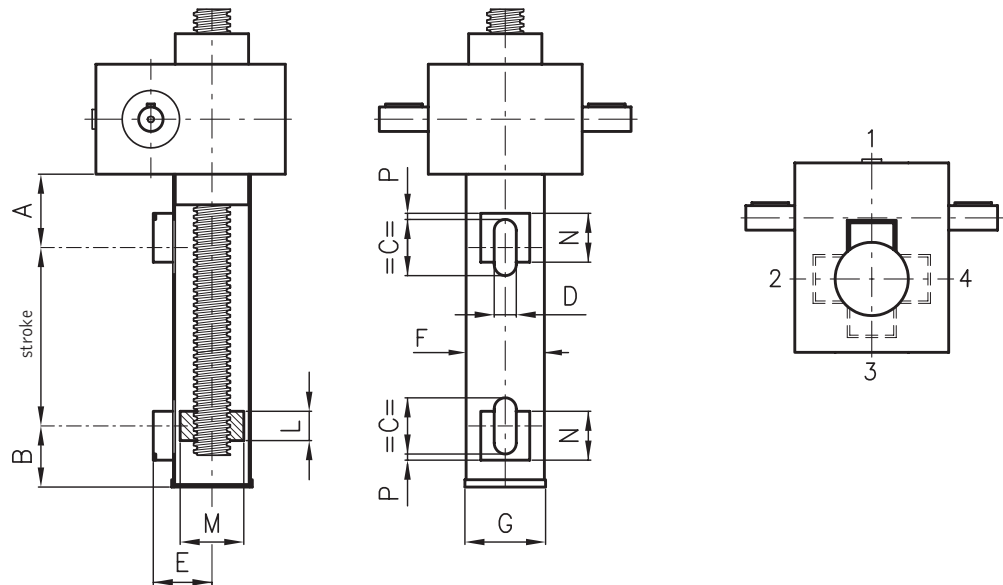
PE elastic protection		
Size	420	630
S6	20	25
A $\emptyset$	70	80
L	1/8 of the stroke (completely closed)	

For non quoted dimensions see the schemes on pages 103-104

## PRF stroke control

In order to meet the requirement of an electric stroke control it is possible to apply to a rigid protection suitable for 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 is 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 threaded spindle. More bushings can be mounted upon request. The PRF can only be applied to TP 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: TPR models



PRF stroke control		
Size	420	630
A	55	60
B	35	50
C	45	45
D	18	18
E	38	47
F $\emptyset$	46	63
G $\emptyset$	48	65
L	25	25
M $\emptyset$	38	48
N	40	40
P	5	5

For non quoted dimensions see to the schemes on pages 103-104

## **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 working parameters.

### **Food law regulations**

Polymer which is the constitutive material of the Aleph series is suited to the food industry applications. Upon customer's request it is possible to provide certifications according to the following norms:

NSF 51

BS 6920

90/128/CE DIRECTIVE

MIL-STD 810

### **Patent**

The Aleph series screw jacks are all patented.

### **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 is able to 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.