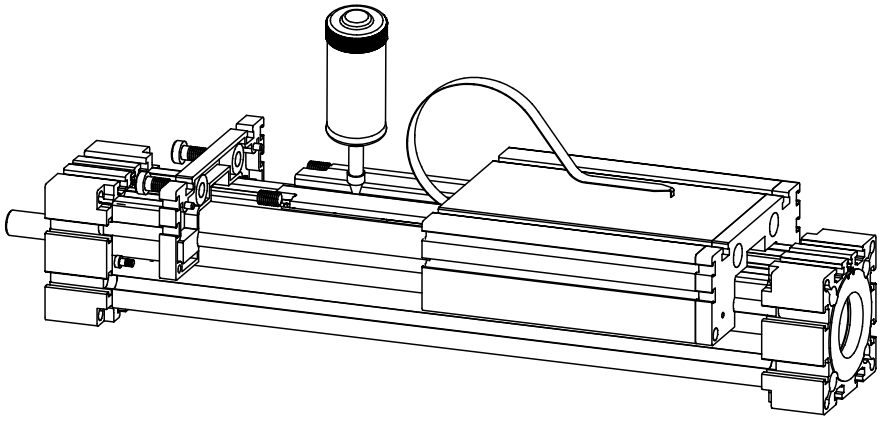

Specifications
Service Manuals

NOOK INDUSTRIES™
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Calculation of max. acceleration

$$a = \frac{F}{m}$$

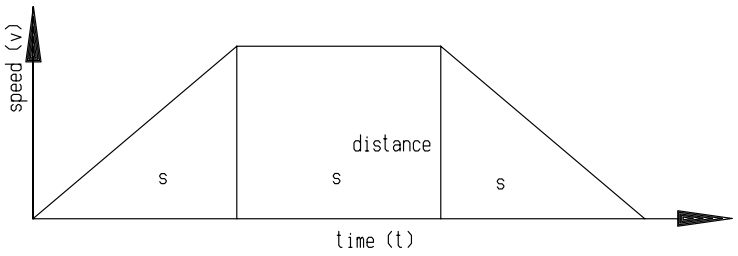
Calculation of max. acceleration distance

$$s = \frac{v \times t}{2}$$

Calculation of max. acceleration time

$$t = \frac{v}{a}$$

F=	belt tension	(N)
a=	acceleration	(m/s^2)
m=	mass	(kg)
v=	velocity	(m/s)
s=	distance	(m)
t=	time	(s)

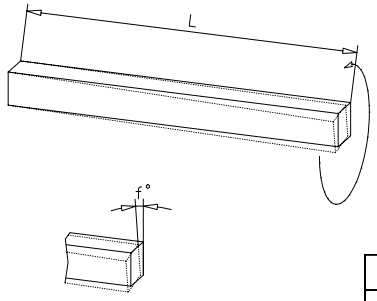


Type	t_a > 0,2 s		t_a < 0,2 s		Minimum length strength (N)	Belt size
	F_{max} (N)	safty factor 1,5 (N)	F_{max} (N)	safty factor 1,5 (N)		
ELZ 30	200	133	280	187		3 M 12
ELZZ 60	298	199	333	222	3690	5 M 09
ELZ, ELZT, ELSD, ELZU, ELZG 40, ELSZ 30/40	390	266	480	320	6478	5 M 15
ELZ, ELZT, ELSZ, ELSD, ELZU, ELZG 60, ELHZ, ELVZ 60 /80 DLZ 120 QLZ, QSZ 80 / QLSZ, QSSZ 80	894	596	1000	666	12013	5 M 25
ELZZ 80	679	452	746	498	3888	8 M 12
ELZZ 100	1210	801	1331	887	9700	8 M 20
ELZ, ELZT, ELSZ, ELSD, ELZU, ELZG 80, DLZ, DSZ 160 / DLZT, DSZT, DLSZ 120 QLZ, QSZ 80	1900	1266	2090	1393	15400	8 M 30
ELHZ, ELVZ, ELZW 100	3840	2559	4128	2751	25632	8 M 48
ELZ, ELZT, ELSZ, ELSD, ELZG 100, QLZ, QSZ 100 DLZ 200 / DLSZ, DSSZ 160	4000	2666	4300	2866	26700	8 M 50
ELZ 125	5900	3933	6350	4233	37380	8 M 70

Weights

Sizes	Guide-body profile	Internal profile	guide rod	Belt	per pulley	Toothed rack	Standard carriage	Carriage profile	Coupling
30	1,07 kg/m	-	0,15 kg/m	0,037 kg/m	0,06 kg	-	0,176 kg	1,78 kg/m	0,007 kg
40	1,89 kg/m	-	0,22 kg/m	0,074 kg/m	0,14 kg	0,70 kg/m	0,520 kg	3,49 kg/m	0,010 kg
60	3,83 kg/m	-	0,61 kg/m	0,123 Kg/m	0,39 kg	0,81 kg/m	1,565 kg	7,49 kg/m	0,040 kg
80	7,40 kg/m	-	0,88 kg/m	0,256 kg/m	1,04 kg	1,13 kg/m	2,644 kg	12,79 kg/m	0,085 kg
80S	7,40 kg/m	-	0,88 kg/m	0,256 kg/m	1,04 kg	1,13 kg/m	3,520 kg	13,95 kg/m	0,085 kg
100	11,3 kg/m	-	1,58 kg/m	0,355 Kg/m	0,48 kg	2,75 kg/m	6,550 kg	19,98 kg/m	0,200 kg
125	15,54 kg/m	-	2,47 kg/m	0,480 kg/m	1,62 kg	-	12,100 kg	28,05 kg/m	0,395 kg
DL 120	5,61 kg/m	1,52 kg/m	0,22 kg/m	0,123 Kg/m	0,39 kg	-	1,100 kg	4,15 kg/m	0,040 kg
DL 160	10,34 kg/m	3,73 kg/m	0,61 kg/m	0,256 kg/m	0,86 kg	-	3,280 kg	7,99 kg/m	0,085 kg
DL 200	19,55 kg/m	3,48 kg/m	0,61 kg/m	0,355 Kg/m	0,688 kg	-	4,950 kg	10,99 kg/m	0,200 kg
DS 160	10,52 kg/m	3,48 kg/m	1,40 kg/m	0,256 kg/m	0,86 kg	-	2,250 kg	7,99 kg/m	0,085 kg
QL 60	3,29 kg/m	-	0,22 kg/m	0,123 Kg/m	0,39 kg	-	0,456 kg	2,05 kg/m	0,040 kg
QL 80	7,05 kg/m	-	0,61 kg/m	0,256 kg/m	1,04 kg	-	1,229 kg	3,85 kg/m	0,085 kg
QL 100	10,45 kg/m	-	0,61 kg/m	0,355 Kg/m	0,688 kg	-	2,920 kg	5,49 kg/m	0,200 kg
QS 60	3,79 kg/m	-	1,40 kg/m	0,123 Kg/m	0,39 kg	-	0,860 Kg	2,05 kg/m	0,040 kg
QS 80	6,82 kg/m	-	2,40 kg/m	0,256 kg/m	1,04 kg	-	2,339 kg	3,85 kg/m	0,085 kg
QS 100	10,55 kg/m	-	3,20 kg/m	0,355 Kg/m	0,688 kg	-	4,320 kg	5,49 kg/m	0,200 kg

Calculation of torsional twist



$$f° = L \times M_{t\,max.} \times I_p \qquad \left[\frac{° \times Nm \times m}{Nm \times m}\right]$$

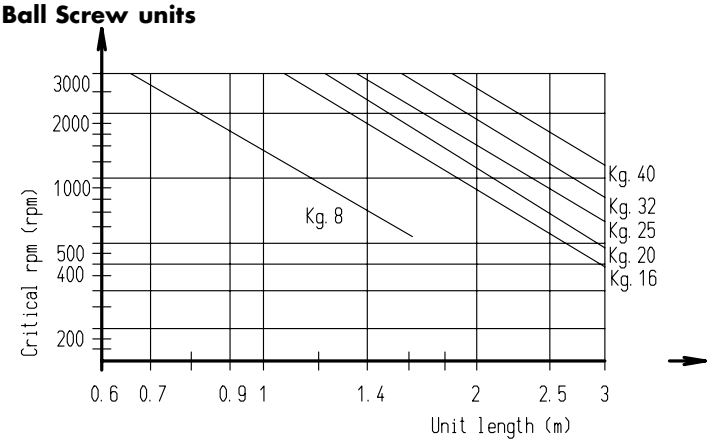
f° = max. twisting angle (°)
L = unit length
$M_{t\,max}$ = max. torque (Nm)
I_p = see table (°/Nm²)

Aluminium profiles
Stiffness F25 (250 N/mm²)
Thickness of anodizing coat20 to 30 mm

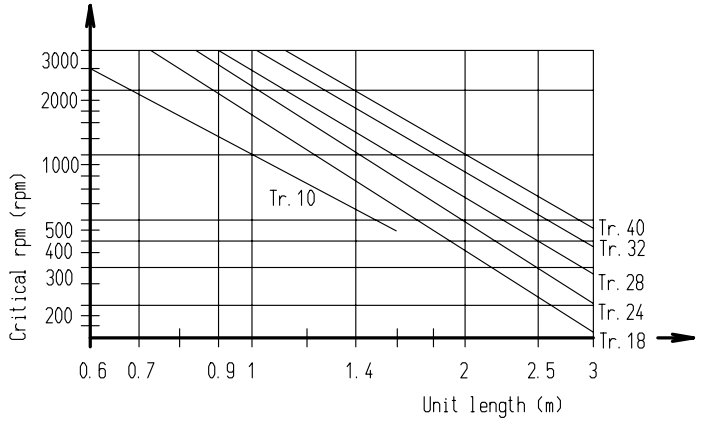
Size	I_p Faktor	Size	I_p Faktor	Size	I_p Faktor
EL 30	0,49000 °/Nm x m	DL 120	0,03282 °/Nm x m	QL 60	0,02995 °/Nm x m
EL 40	0,18000 °/Nm x m	DL 160	0,01286 °/Nm x m	QL 80	0,01257 °/Nm x m
EG 40	0,14000 °/Nm x m	DL 200	0,00787 °/Nm x m	QL 100	0,00705 °/Nm x m
EL 60	0,05765 °/Nm x m	DS 160	0,01336 °/Nm x m	QS 60	0,03797 °/Nm x m
EG 60	0,04387 °/Nm x m			QS 80	0,01563 °/Nm x m
EL 80	0,01463 °/Nm x m			QS 100	0,00644 °/Nm x m
EG 80	0,01511 °/Nm x m				
EL 100	0,00492 °/Nm x m				
EL 125	0,00616 °/Nm x m				

Diagram for maximum rpm of screw units

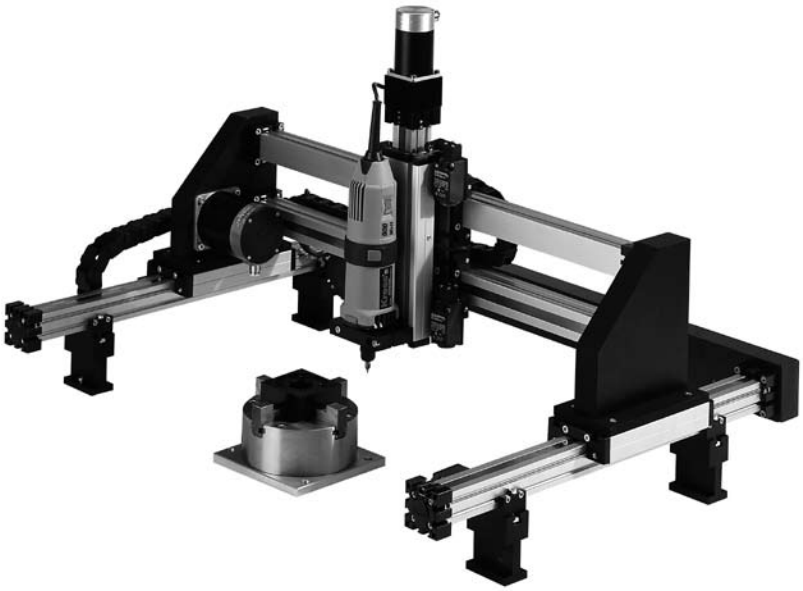
Ball Screw units



Acme Screw units

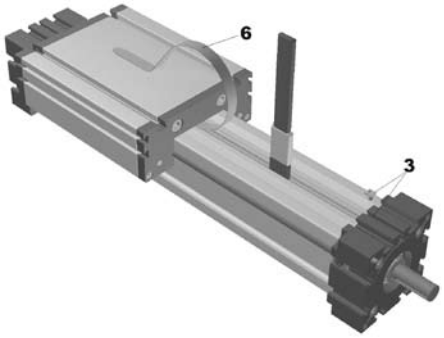


$n_{max.}$ = table value x 0,8



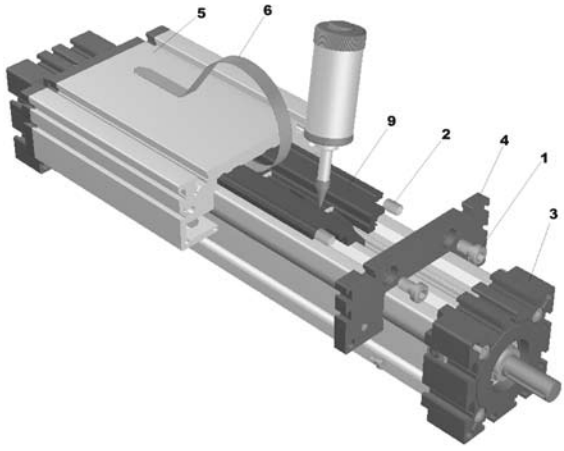
Service Manual for EL Units

Acme Screw, sizes EG / EL 30, 40



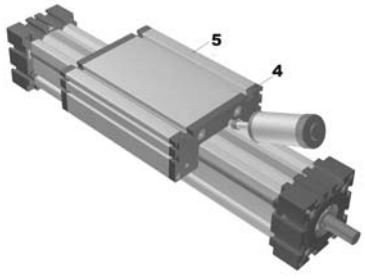
- Drive the carriage to one side
- To reach screw, unscrew set screw (3)
- Lift the coverband (6)
- Now grease screw with a slim brush.

Ball Screw, sizes EG / EL 30, 40



- Unscrew the cylindric screws (1) and push the wiper end plate (4) to the side.
- Unbend screws (2), push slide (5) to other side
- Unscrew the grub screws (3) and lift the coverband (6).
- Grease can be filled now with grease gun. For mass of greasing look at table below.

Screw, sizes EG 60, 80 / EL 60-125



Look at wiper end plate (4) of carriage (5) for greaser nipple.
The ball screw nut can be filled with grease gun.
For mass of greasing look at table below.

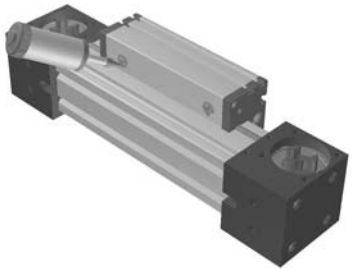
Screw greasing every 500-1000 working hours.

Type	Pitch	Regreasing	Type	Pitch	Regreasing
30	Kg 08 x 2,5	0,01 g	**60**	Kg 20 x 05	3,00 g
40	Kg 16 x 05	1,33 g	**80**	Kg 25 x 25	3,00 g
40	Kg 16 x 10	0,84 g	**80 / 100**	Kg 32 x 05	3,00 g
60	Kg 25 x 05	2,00 g	**80 / 100**	Kg 32 x 10	4,00 g
60	Kg 25 x 10	3,00 g	**100**	Kg 32 x 32	4,00 g
60	Kg 20 x 20	3,00 g	**125**	Kg 40 x 10	4,00 g

Guiding rods EL

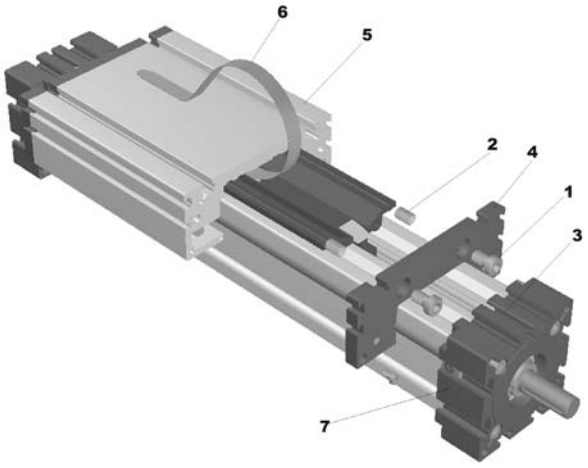
Rods will be greased by the strippers of carriage. There are 2 oil nipples in each wiper end plate (4), where the tanks for the strippers can be filled with an oil gun. Viscosity of oil: 200 mm^2/s, T= 40° C. Interval of greasing depends on environmental conditions, min. once a month. Minimum stroke must be same than length of slide.

EL 100, 125



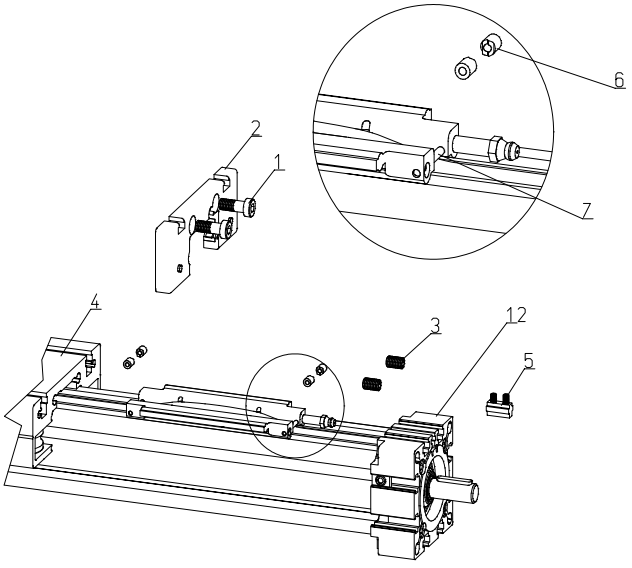
Rollers should be greased each 1.000 working hours or each 6 months with a grease gun. For greaser nipple look at the eccentric at carriage bottom. Use roller grease.

Changing cover band EL 100, 125



- Unscrew cylindric screws (1), push plastic wiper endplate (4) to one bearing-block (7),
- Unbend grub screws (2), push carriage (5) to other side
- Unscrew screws (3) and pull out the coverband (6), size 100/125 units have an additional cover-band leader(9),which is the guide for the cover-band.
- Mount the new coverband, fix the screws (3) at one side, tense the band with a pointed pliers and fix the screws (3),
- Fix the carriage by the grub screws (2) and mount the wiper end plate (4).

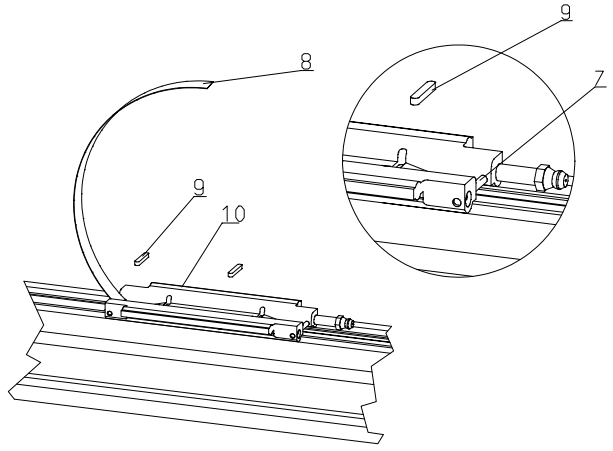
Changing cover-band and plastic guide roller against new slider system ELT / ELK 60, 80



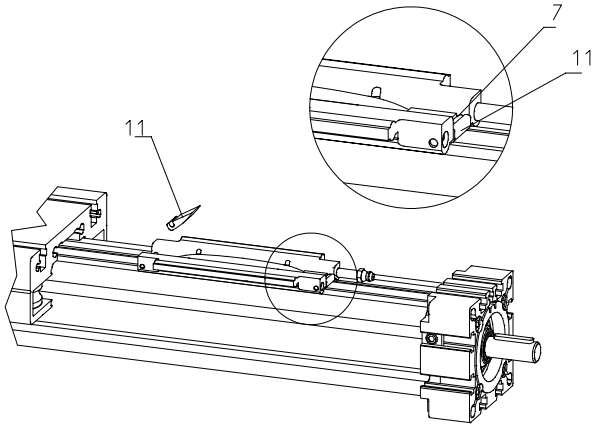
- Unscrew cylindric screws (1) and dismount cover cap (2) on one side of the carriage (4).
- Unscrew grub screws (3) on one side of the carriage (4).
- Destroy the plastic guide roller (6) with a cutting nipper.
- Be careful, don't destroy the hardened straight pin (7)

!!!Attention!!!! Plastic guide roller can crack!!!!

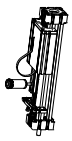
- Be sure that no fragments fall into the guiding-profile.



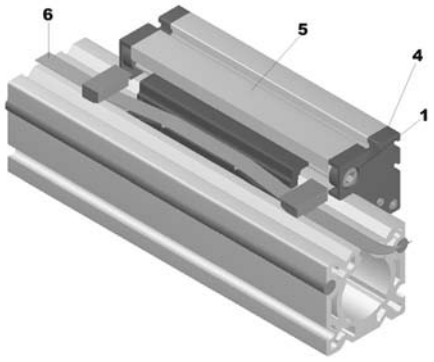
- Pull out cover-band (8) out of the leading-nut receiver (10).
- Dismount the plastic keys (9).
- Mount and push in the cover-band (8) again like before (under the hardened straight pins (7).



- Hook the plastic slider (11) under the straight pin (7) with the flat side to the middle of the carriage.
- Fix the cover-band (8) on one side with the grub screw clamping (5) at the bearing block (12).
- Tension the cover-band (8) from the opposite side of the unit and fix it with the grub screw clamping, too.

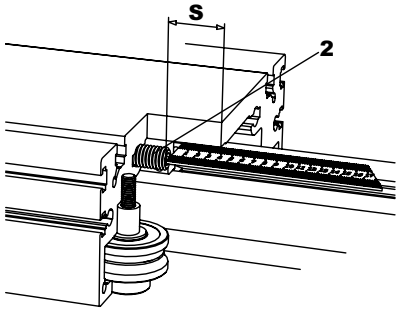


Changing cover band size EL / EG 30, 40



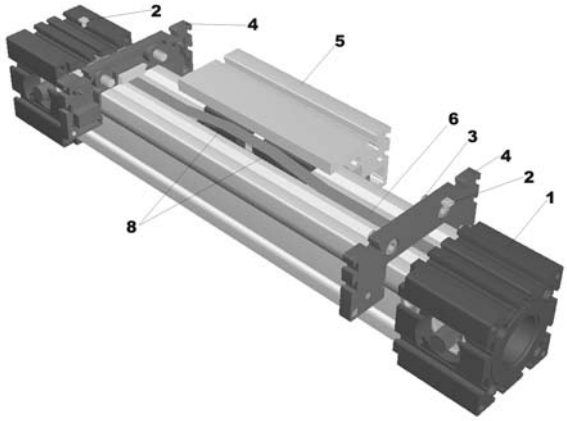
- Unscrew cylindric screws (1), push plastic wiper endplate (4) to the side,
- Unscrew screws (3) and pull out the coverband (6),
- Mount the new coverband, fix the screws (3) at one side, tense the band with a pointed pliers and fix the screws (3),
- Mount the wiper end plate (4).

Changing cover band ELVZ / ELHZ 100, 125



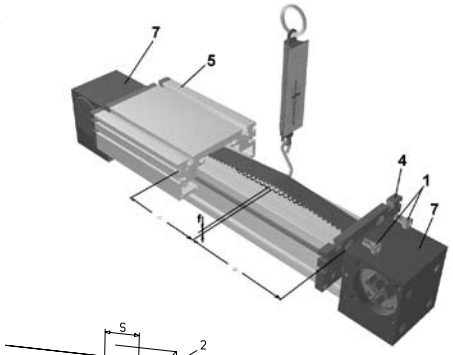
Same mounting as ELT/ELK. Important: Measure the distance "s" between the corner of carriage and the head of the grub screw for belt-tension!

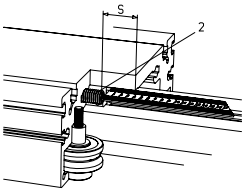
Changing cover band ELHZ / ELVZ 60, 80



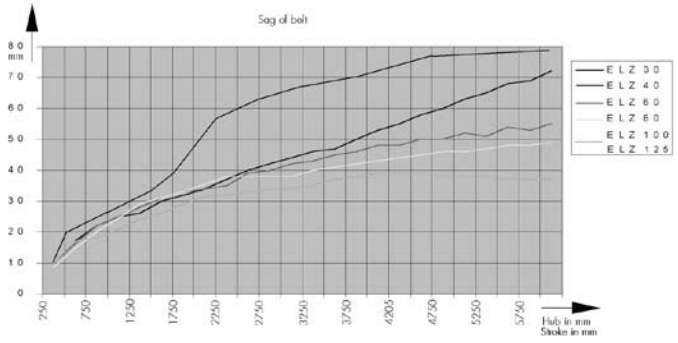
- Unscrew cylindric screws (1) on both sides of carriage (5)
- Push the wiper end plates (4) to the side,
- Unscrew the grub screwes (2) and pull out the old coverband (6),
- Push the new coverband under both sliding block (8) in the carriage (5) and wiper end plates (4) into the bearing block (1)
- Fix the grub screw (3) on one side,
- Tense the coverband with a pointed pliers and fix the screws (3) on the opposite side.

Belt tension ELZ



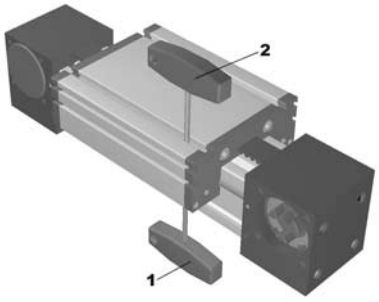


- Push the carriage (5) close to one bearing-block (7).
- Unscrew grub screws (2) of the wiper endplate (4) and push it to the other bearing-block (7).
- Pull the spring balance with force of table and measure the sag (f) of the belt. Compare the measured value with the table.
- Tense or release the belt by the grub screws (2).
- Both grub screws (2) must have the same distance between the corner of the carriage (5) and the head of the grub screw (2).
- The grub screws (2) have to be secured by bonding.
- Measure the distance (s) with a metal rule.
- Mount the wiper endplate (4).



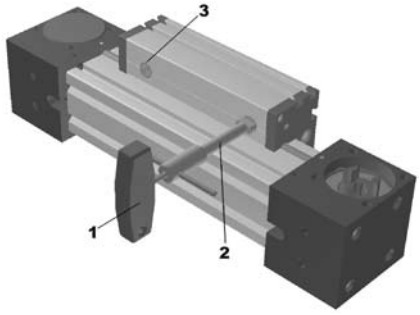
Size	Force
30	20 N
40	20 N
60	30 N
80	50 N
100	50 N
125	50 N

Adjusting the rollers, sizes EL 40, 60



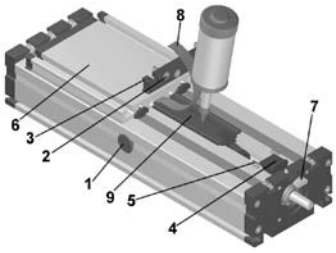
- Fasten eccentric bolt with screw key (1)
- Unscrew screw with hexagon socket screw key (2) as far as eccentric bolt can be turned, upper surface is stamped, broken line of stamp (3) must coincide with drawing groove of slide
- Adjust at other side without initial tension
- Stamps must be in same position and eccentric bolt must be adjusted into right direction.

Adjusting the rollers, sizes EL 30, 80, 100, 125



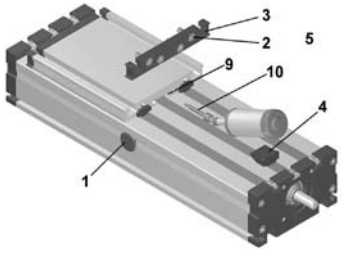
Service Manual
for D and Q Units

Leading-nut, size DLT/DLK 120, 200



- Drive the carriage to the service position (1).
- Remove the fillister head screws (2) and dismount cover cap (3).
- Remove the middle slider (4).
- Insert the regreasing adapter (10) into the lubrication hole of the leading-nut receptacle (9).
- Regrease now with grease gun. For the quantity of grease see table below.

Leading-nut, size DLT/DLK / DST/DSK 160

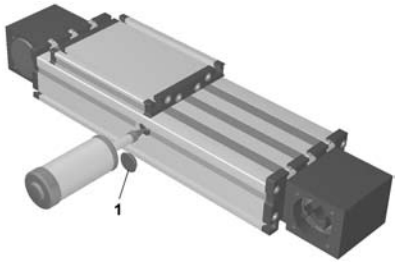


- Drive the carriage to the service position (1).
- Remove the fillister head screws (2) and dismount cover cap (3).
- Remove the middle slider (4) and unscrew set screws (5).
- Push carriage (6) to the side.
- Release the set screw (7) and remove it using the sliding nut.
- Pull out and lift the cover band (8), now the lubrication hole is visible in the leading-nut receptacle (9).
- Regrease with grease gun. For the quantity of grease see table below.

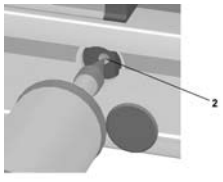
Screw greasing every 500 - 1000 working hours.

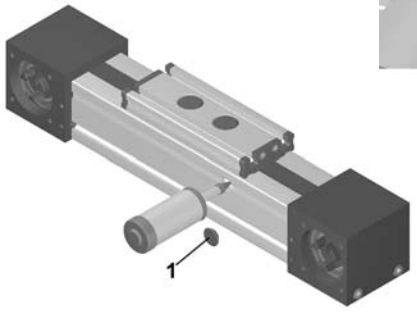
Type	Pitch	Regreasing	Type	Pitch	Regreasing
120	Kg 16 x 05	1,33 g	**120/160**	Kg 25 x 25	3,00 g
120	Kg 16 x 10	0,84 g	**200**	Kg 32 x 05	3,00 g
120	Kg 16 x 16	1,00 g	**200**	Kg 32 x 10	4,00 g
120/160	Kg 20 x 20	3,00 g	**200**	Kg 32 x 20	4,00 g
120/160	Kg 25 x 05	2,00 g	**200**	Kg 32 x 32	4,00 g
120/160	Kg 25 x 10	3,00 g			

Guiding rods DL 120, 160, 200
Runner blocks DS 160



Guiding rods QL 60, 80, 100
Runner blocks QS 60, 80, 100

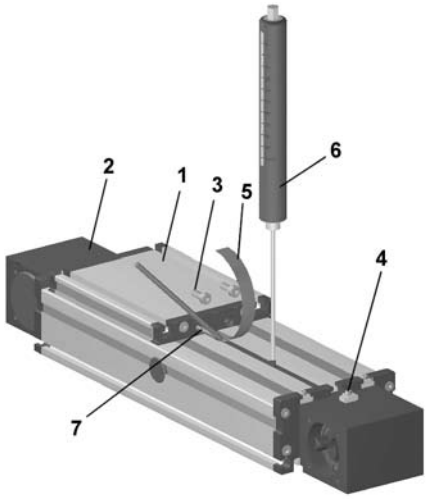


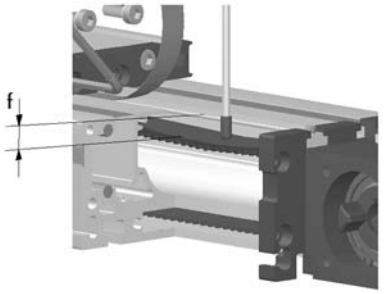


Greasing is carried out through an oiled felt insert. The felt can be regreased through lubrication nipples attached laterally to the ends of the roller packs.
- Dismount cover cap (1)
- Drive the carriage through the service position until you can see the first lubricating nipple (2) in the lubrication hole.
- Regrease felt now with an oil gun.
- Move the carriage to the second lubricating nipple and regrease here as well.

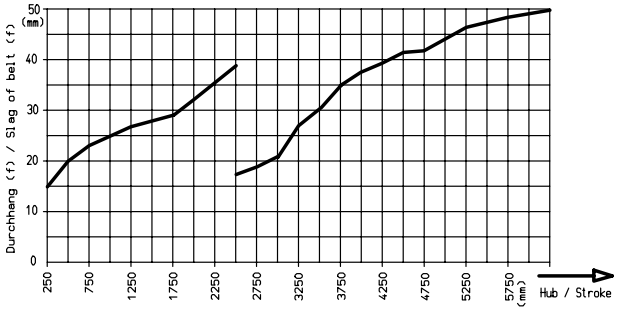
Oils with a viscosity of approx. 200 mm²/s at T=40°C are recommended. The required regreasing intervals depend on environmental conditions, the standard recommendation is once per month. To ensure a sufficient lubrication, the minimum stroke must equal the carriage length, so that sufficient greasing is achieved also in the final positions.

Belt tension adjustment DLZ 120, 160, 200 / DSZ 160



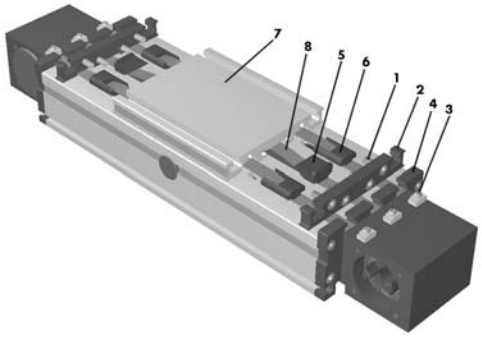


- Push the carriage (1) close to one bearing block (2).
- Remove fillister head screws (3).
- Unscrew set screws (4) for middle cover band (5) at the opposite bearing block.
- Pull cover band out of bearing block and turn it to the side.
- Use springe balance (6) to exert the applicable amount of force (see table) on the center of the belt and measure the sag (f).
- Compare the measured value with the diagram below, and tense or release belt as required by tightening or unscrewing the set screws (7).
- The set screws (7) must be bonded in place with screw locking device.
- Both screws (7) must be screwed in to exactly the same level. Check with sliding caliper.



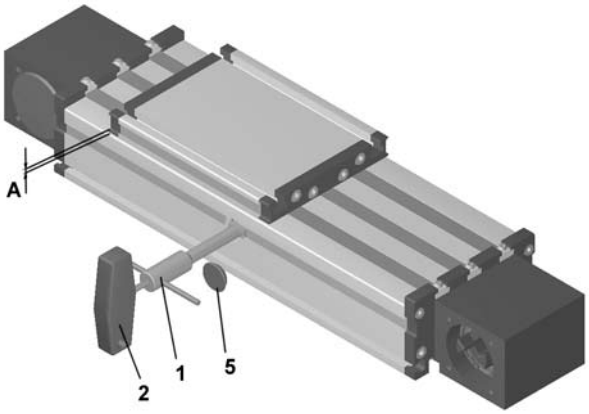
Baugröße / Size	Hub / Stroke (mm)	Kraft / Force (N)
120	< 2500 2500 - 6000	20 10
160	< 2500 2500 - 6000	20 10
200	< 2500 2500 - 6000	40 20

Changing cover band DLZ 120, 160, 200 / DSZ 160



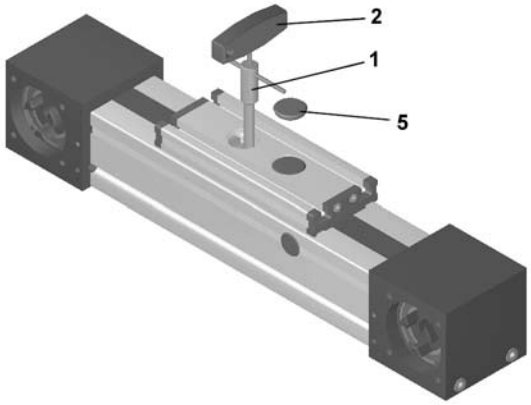
- Drive the carriage to servicing position
- Remove fillister head screws (1) and wiper end plate (2)
- Size 160: Unscrew set screws (3) at both bearing-block plates (4) and pull the cover band out of the bearing block
- Size 120: Unscrew set screws and remove them with T-nut
- Remove sliders (5) and (6) from both sides of the carriage (7)
- Pull the cover bands (8) out of the carriage
- Insert the new cover bands into the carriage (7)
- Thread the lateral sliders (6) onto the cover band and insert it into the carriage with middle slider (5)
- Size 160: Tighten cover bands on one side of the bearing block with set screws (3), tense cover band (8) at the other bearing block using pliers and tighten with set screws (3)
- Size 120: Insert T-nut together with set screw into the bearing block and tighten cover band with set screw.

Adjusting the rollers size DL 120, 160, 200

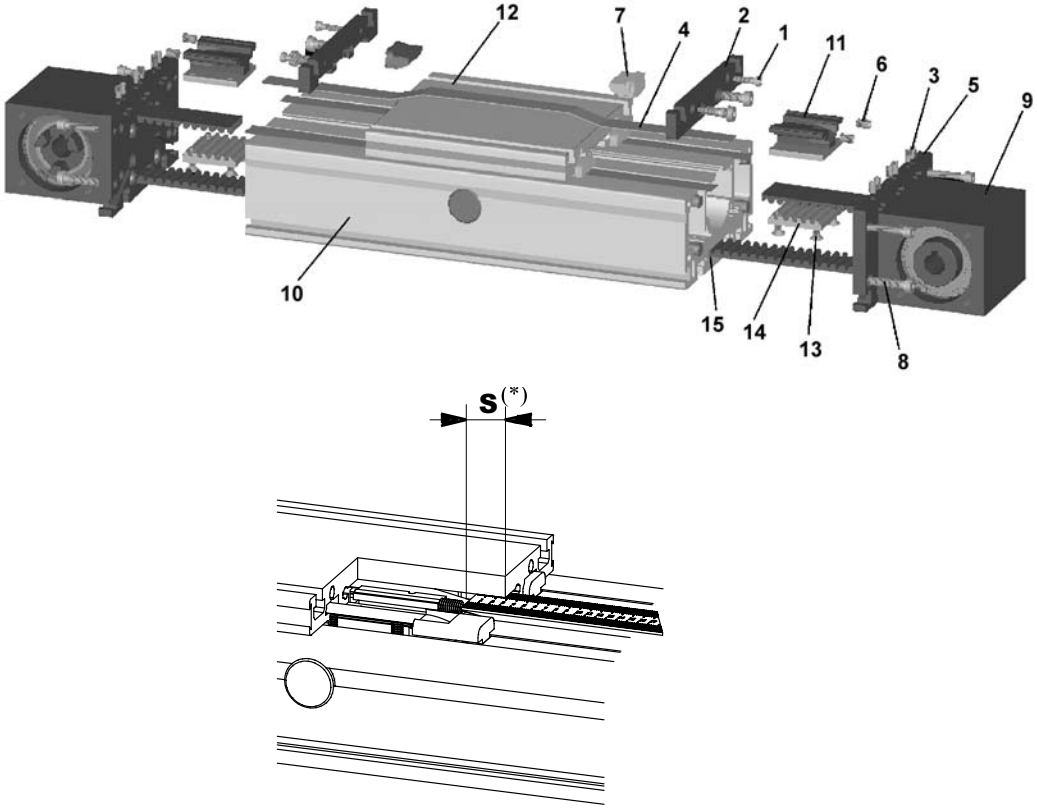


- Dismount cover cap (5) from servicing hole
- Fasten eccentric bolt with screw key (1)
- Release screws with hexagon socket screw key (2) until the eccentric bolt can be turned.
- Adjust the gap dimension (A) between carriage and guide body profile by turning the eccentric bolts (3). Turning towards + will increase the gap dimension.
  (DL120 approx. 1.8 mm, DL160 approx. 2.8 mm, DL120 approx. 3.0 mm).
- Turn the eccentric bolts (4) to adjust the carriage free of play by the touch (without initial tension)
- Ensure that the eccentric bolts are adjusted to the right.

Adjusting the rollers size QL 60, 80, 100



- Dismount cover cap (5) from servicing hole
- Fasten eccentric bolt with screw key (1)
- Release screws with hexagon socket screw key (2) until the eccentric bolt can be turned.
- Turn the eccentric bolts to adjust the carriage free of play (without initial tension)
- Ensure that the eccentric bolts are adjusted to the right.

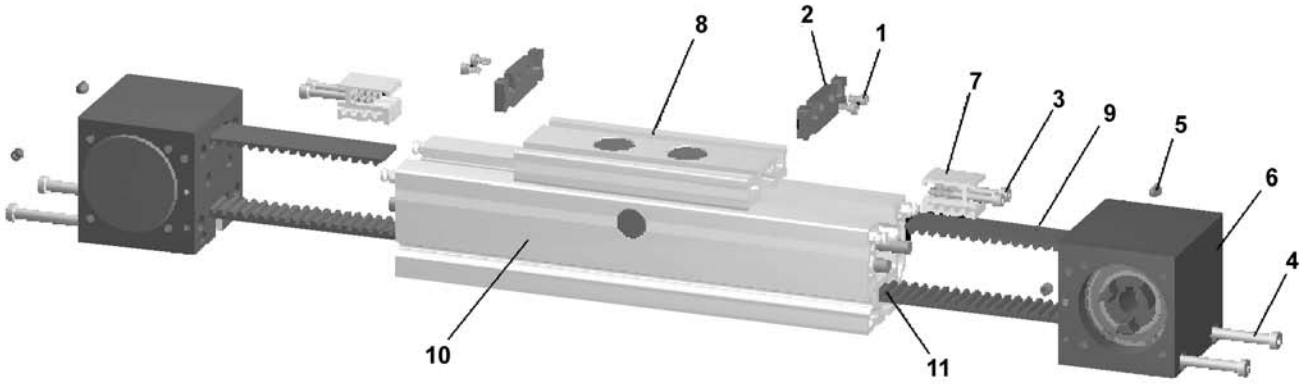


Changing belt of DL / DS 120, 160, 200

- Unscrew cylindric screws (1) and dismount cover caps (2) on both sides of the carriage.
- Unscrew grub screws (3) on both sides of the unit and pull out the only the middle cover band (4) of the bearing-block plate (5).
- Measure the reach of grub screws"S" (look at drawing) and make note of this value.
- Unscrew grub crews (6) on both sides of the carriage.
- Pull only the middle sliding blocks (7) out of the carriage.
- Unscrew cylindric screws (8) at the bearing-block plates (5) and dismount them completely with the bearing-blocks (9) at both ends of the unit.
- Pull out the belt-adjusters (11) completely with the belt out of the carriage (12) and the guiding-profile (10).
- Unscrew the countersunk head screws (13) and dismount the belt-adjuster (11,14).

Reconstruction of the unit in opposed order

- Shorten the new belt to the length of the old one.
- Push the belt with teeth side up to the carriage (10) into the slot of the guiding-profile (15) and push it with the ends through each bearing-block (8,9).
- Mount the belt-adjusters (11,14) by the countersunk head screws (13) and lock them again with glue.
- Push them again together with the belt into the guiding-profile (10) and then into the carriage (12).
- Mount the bearing-block plates (8) again together with the bearing-blocks (9) at the ends of the unit.
- Mount both belt-adjusters (11,14) with consideration of the reach of the grub-screws „S" and lock the grub screws (6) with glue.
- Pull the middle cover-band (4) through the carriage.
- Pull in the middle sliding blocks (7) into slot of the carriage.
- Mount the grub screws (3) on one side of the unit and tension the 3 cover-bands from the other side and fix them too by the grub-screws (3).



Changing belt of QL/QS 60,80,100

- Unscrew cylindric screws (1) and dismount cover caps (2) on both sides of the carriage.
- Unscrew cylindric screws (3) on both sides of the carriage (8).
- Unscrew cylindric screws (4) and the grub screws (5) at the bearing-block (6) and dismount them completely at both ends of the unit.
- Pull out the belt-adjusters (7) completely with the belt out of the carriage (12) and the guiding-profile (10).
- Press the belt sideways out of both belt-adjusters (7).
- Pull the belt completely out of the bearing-blocks (6).

Reconstruction of the unit in opposed order

- Shorten the new belt to the length of the old one.
- Push the belt with teeth side up to the carriage (8) into the slot of the guiding-profile (11) and push it with the ends through each bearing-block (6).
- Press the belt again into the belt-adjusters (7).
- Push them again together with the belt into the guiding-profile (10) and then into the carriage (8).
- Mount the bearing-blocks (6) again.
- Mount both belt-adjusters (7) and lock the cylindric screws (6) with glue. You have to tension the belt with dosed force and test the soft running of the pulleys by turning them.
- Mount the cover caps (2) again.

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