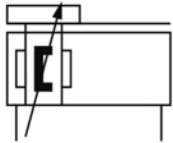
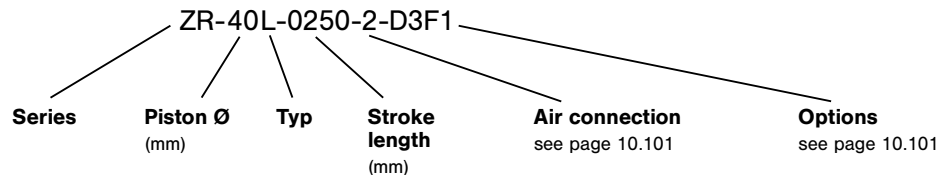


Rodless toothed belt cylinders series ZR-40L

with roller guide
G1/4 • piston Ø 40 mm



Order code



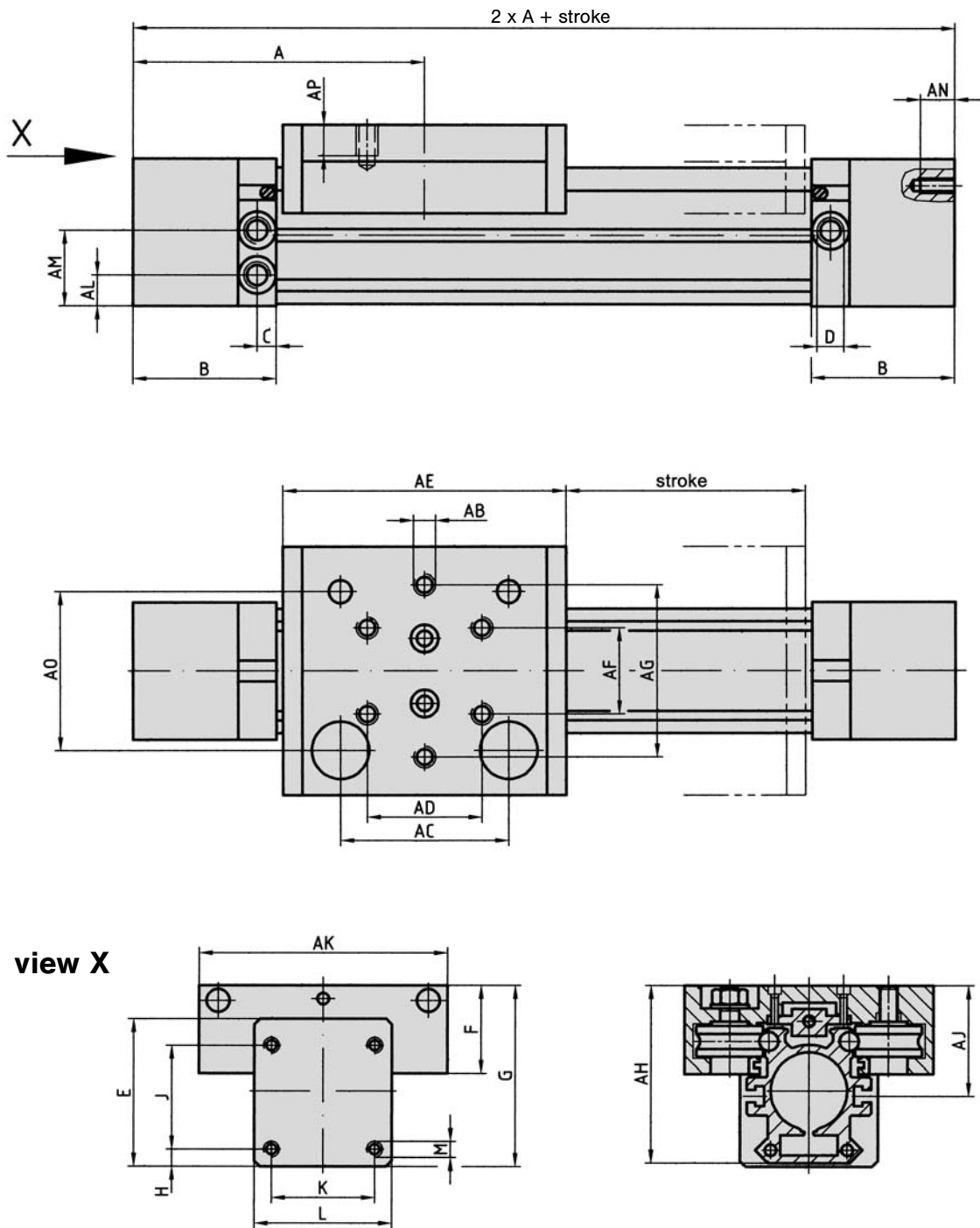
Design and function

Double acting rod less toothed belt cylinder with adjustable cushions and magnet for proximity sensors. The toothed belt is driven by the piston in a closed profile tube. The piston actuates a slide with a pre-set roller guide.

Order number Please complete according to order code.	ZR-40L-...
Piston Ø (mm)	40
Connection	G1/4
Cushioning length (mm)	32 mm (1 1/4 in)
Operating pressure	1 ... 8 bar (14.5 ... 116 psi)
Temperature range	- 15 °C ... + 70 °C (+ 5 °F ... + 158 °F)
Medium	Compressed air in accordance with ISO 8573-1: 2010, Class 7:2:4 – and free of aggressive additives. If speeds exceed 1 m/s (3.3 ft/s) lubricated air is recommended.
Stroke length	arbitrary up to 4500 mm (177 in)
Materials	Outer parts: hardened steel, Al-profile (anodized), plastic Seals: NBR, PA, PDF

Rodless toothed belt cylinders series ZR-40L

with roller guide
G1/4 • piston Ø 40 mm



Magnetic piston is a standard feature.

Mass at 0 mm stroke 4.84 kg (10.670 lbs.)

Mass for 100 mm (4 in) stroke extension 0.70 kg (1.543 lbs.)

Max. stroke length 4.500 mm (177 in).

Cylinder Ø	A	B	C	D	E	F	G	H	J	K	L	M
40	150	75	10	G1/4	76.8	46.1	94.4	9	54	54	72	M6

Cylinder Ø	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	AN	AP
40	M 8	88	60	148	45	90	93.4	57.7	130	16	39.5	12	15

Rodless toothed belt cylinders Design – series ZR



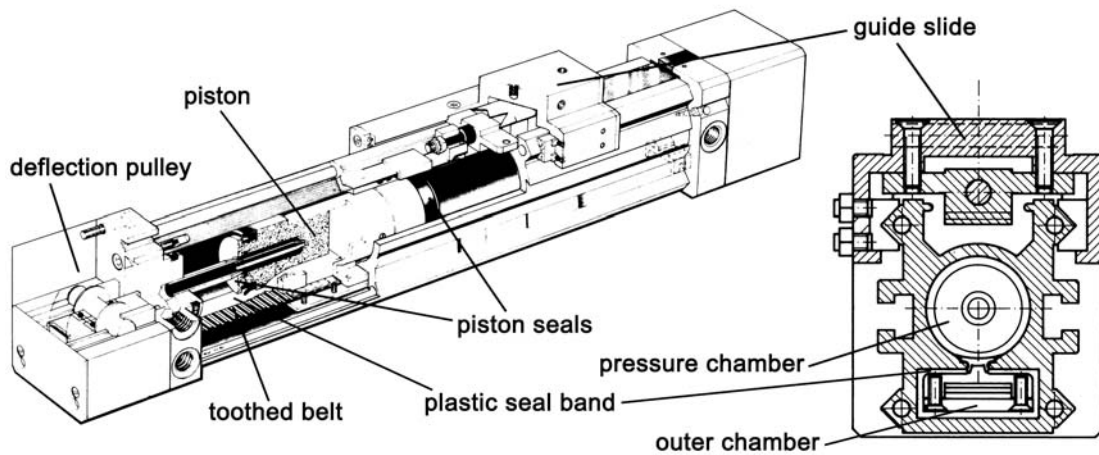
● Design and function

The toothed belt cylinder consists of an extruded cylinder tube with two chambers. They are connected to each other over the entire length of the cylinder. The pressure chamber is sealed towards the outside by a soft plastic band. Between the two piston seals a pressure-free space is created. In this space the seal band is lifted to the inside and is passed through the piston.

Simultaneously, a driver (piston bracket) grasps through the slot into the outer chamber.

Since the outer chamber encloses the longitudinal slot, it does not expand under pressure. This results in minimal leakage and better flexural and torsional stiffness.

● High operational safety through closed profile



● Contamination insensitive also in harsh environments

In the outer chamber, the piston bracket grips the toothed belt, which leads to a tension lock at the opposite side via the deflection pulley. Inside the slide, the cover belt is lifted from the slot, and the slide is connected to the tension lock.

By this principle, dirt is kept away from the sealing strip enabling use under rough operating conditions.

The force is transmitted, free of slip, to a shaft via the toothed belt pulley. As a result, several cylinders can be

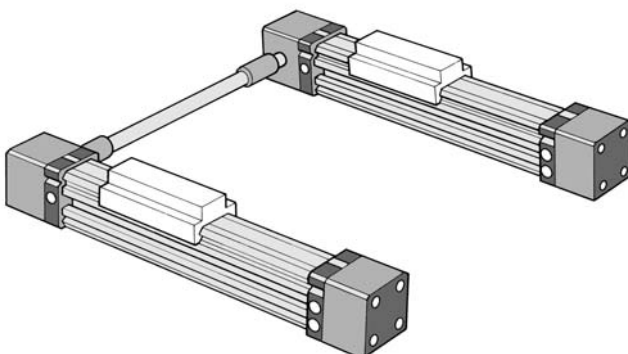
linked and operated synchronously, enabling torques from the off-center application forces.

The cylinder can also be supplied with a brake mounted on the driven shaft without the use of an additional energy transmission chain. A cylinder supplied with a **brake** and encoder results in an inexpensive **positioning system**.

Since the slide or roller guide is already integrated into the slide, a complete linear drive is available with this cylinder.

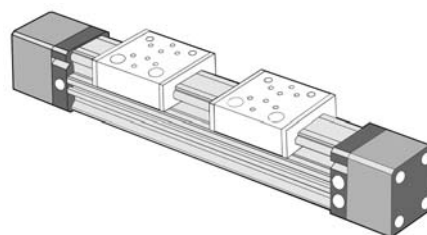
Applications

Synchronous running



Since the force is transmitted to the shaft free of slip, a positioning system can be set up with the aid of an encoder.

With 2 slides

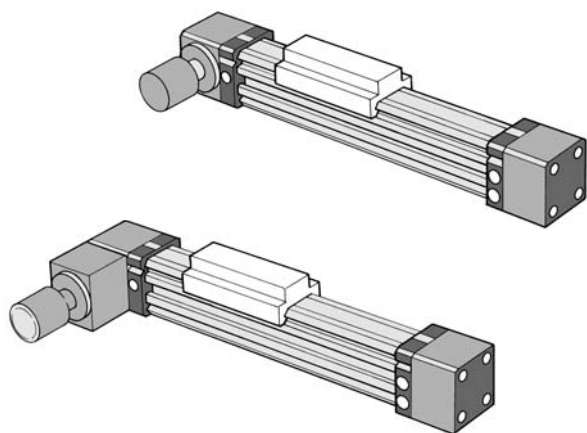


By mounting a second toothed belt and using a slide in tangential feed, a central clamping long stroke gripper is created.

Rodless toothed belt cylinders

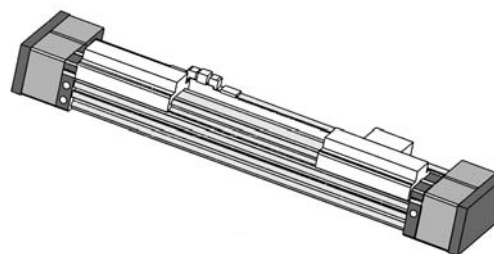
Applications

With brake



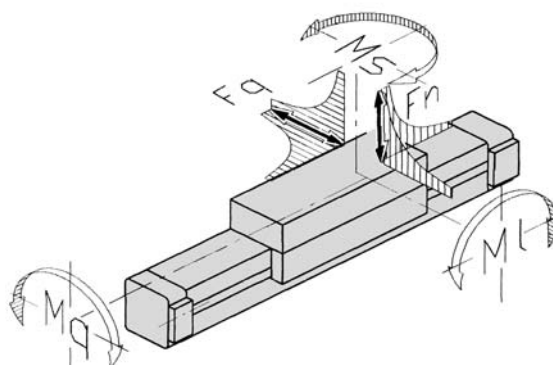
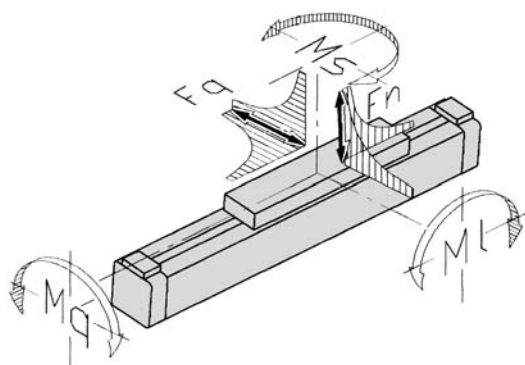
Since the force is transmitted to the shaft free of slip, a positioning system can be set up with the aid of an encoder.

As a gripping cylinder



By mounting a second toothed belt and using a slide in tangential feed, a central clamping long stroke gripper is created.

Loads, forces and torques



Order number	Operating force*	Braking force*	Fn + Fq	MI	Mq	Ms
ZR-25	250 N (56.2 lbf)	–	400 N (89.9 lbf)	40 Nm (29.5 ft. lbf.)	20 Nm (14.7 ft. lbf.)	30 Nm (22.1 ft. lbf.)
ZR-25-BR	250 N (56.2 lbf)	380 N (85.4 lbf)	400 N (89.9 lbf)	40 Nm (29.5 ft. lbf.)	20 Nm (14.7 ft. lbf.)	30 Nm (22.1 ft. lbf.)
ZR-25S	250 N (56.2 lbf)	–	400 N (89.9 lbf)	80 Nm (58.9 ft. lbf.)	40 Nm (29.4 ft. lbf.)	60 Nm (44.2 ft. lbf.)
ZR-25S-BR	250 N (56.2 lbf)	380 N (85.4 lbf)	400 N (89.9 lbf)	80 Nm (58.9 ft. lbf.)	40 Nm (29.4 ft. lbf.)	60 Nm (44.2 ft. lbf.)
ZR-40	640 N (143.9 lbf)	–	800 N (179.8 lbf)	75 Nm (55.2 ft. lbf.)	30 Nm (22.1 ft. lbf.)	50 Nm (36.8 ft. lbf.)
ZR-40-BR	640 N (143.9 lbf)	750 N (168.6 lbf)	800 N (179.8 lbf)	75 Nm (55.2 ft. lbf.)	30 Nm (22.1 ft. lbf.)	50 Nm (36.8 ft. lbf.)
ZR-40S	640 N (143.9 lbf)	–	800 N (179.8 lbf)	150 Nm (110.4 ft. lbf.)	60 Nm (44.2 ft. lbf.)	100 Nm (73.6 ft. lbf.)
ZR-40S-BR	640 N (143.9 lbf)	750 N (168.6 lbf)	800 N (179.8 lbf)	150 Nm (110.4 ft. lbf.)	60 Nm (44.2 ft. lbf.)	100 Nm (73.6 ft. lbf.)
ZR-40L	640 N (143.9 lbf)	–	1200 N (269.8 lbf)	95 Nm (69.9 ft. lbf.)	45 Nm (33.1 ft. lbf.)	95 Nm (69.9 ft. lbf.)
ZR-40L-BR	640 N (143.9 lbf)	750 N (168.6 lbf)	1200 N (269.8 lbf)	95 Nm (69.9 ft. lbf.)	45 Nm (33.1 ft. lbf.)	95 Nm (69.9 ft. lbf.)

* Operating force at 6 bar (87 psi), braking force at 6 bar (87 psi) static.

Force and torque data are based on the speed of the slide guideways of ≤ 0.2 m/s (0.656 ft./s), in case of roller guides of ≤ 2 m/s (6.562 ft./s).

If speed exceeds 0.2 m/s (0.656 ft./s), the permissible values of the slide guideways must be multiplied by the factors from the table below. For roller or ball guide types is no factor required.

Load coefficient

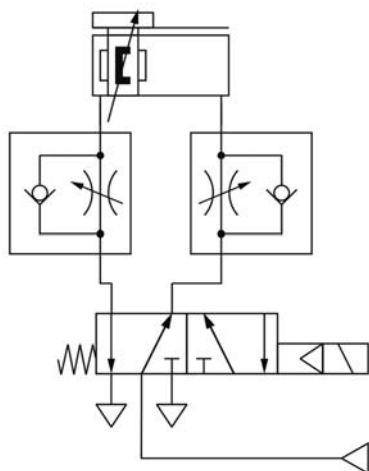
V in m/s	V in ft./s	Factor
0.2	0.656	1
0.3	0.984	0.75
0.4	1.312	0.5
0.5	1.640	0.4
0.75	2.460	0.27
1	3.281	0.2

Rodless toothed belt cylinders

Circuit examples

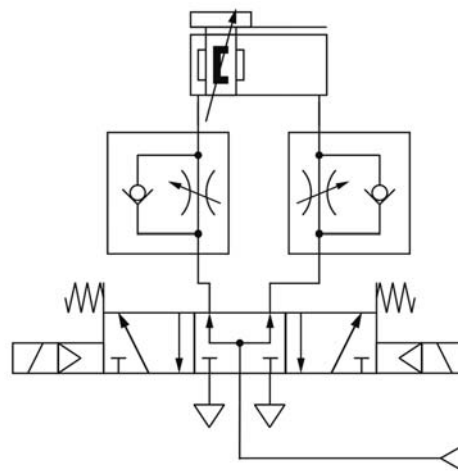
Control 1

Simple system for controlling the slide from end to end. A flow control valve can be used to adjust the cylinder speed.



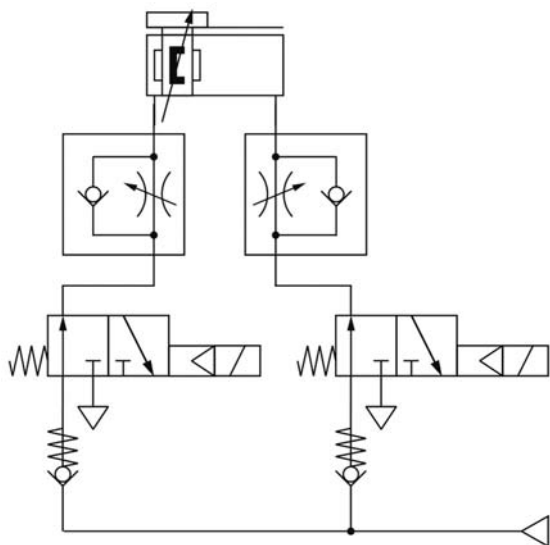
Control 2

System to stop the cylinder on intermediate position with higher tolerances.



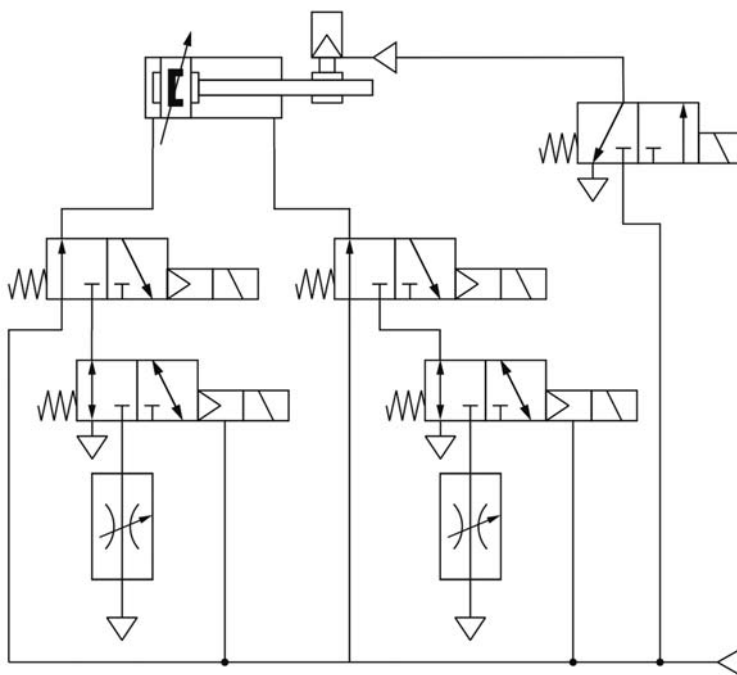
Control 3

This control circuit improves the positioning accuracy. The use of check valves reduces the stopping distance and also increases the load stiffness.



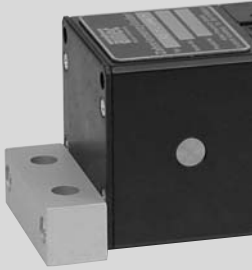
Control 4

This circuit example permits the selection of different speeds (rapid or inching) for either forward or reverse motion. The brake is activated by a 3/2 solenoid valve.



For longer strokes a safety start-up valve is recommended.

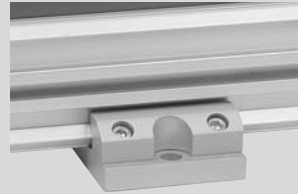
Cylinder mountings



Head mounting
ZK-252, ZK-402
page 10.103



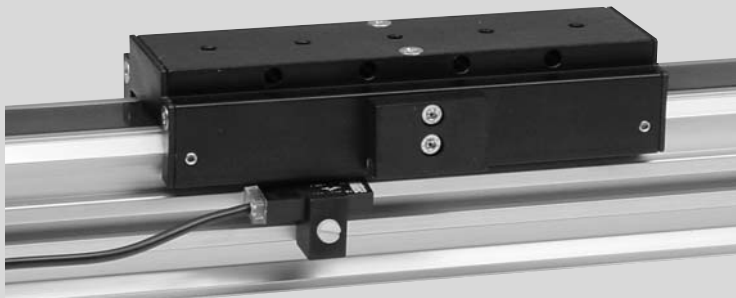
Head mounting tall
ZK-253, ZK-403
page 10.103



Center mounting
ZK-251, ZK-401
page 10.103

Nut M4
ZRM

Reed switch



Switch
ZS-100.1
page 10.105

Bracket
ZR-4007
page 10.104

Magnet
ZR-4006
page 10.104

Adapter for encoder



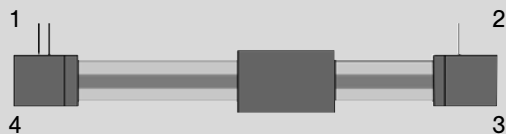
Direct attachment to housing
ZA-37
page 10.105



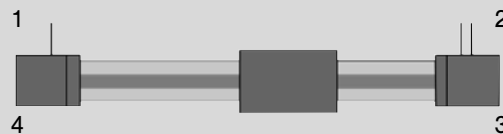
Attachment to brake
ZA-36
page 10.105

Air connections

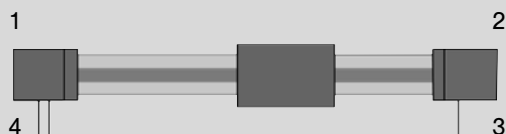
The cylinder is supplied with three air connections. Two connections are necessary for operation, while the third is closed by a plug (included in the scope of delivery). The desired position of the double connection has to be specified in the order code after the stroke length by choosing the adequate number.



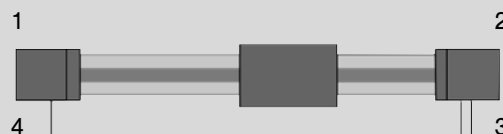
Option - 1



Option - 2



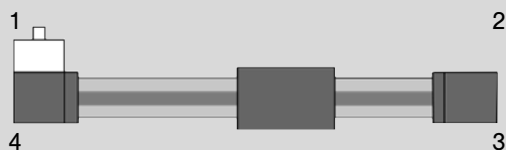
Option - 4



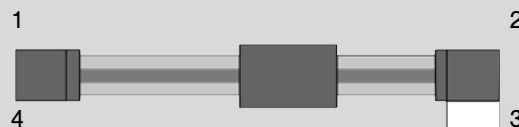
Option - 3

Brake

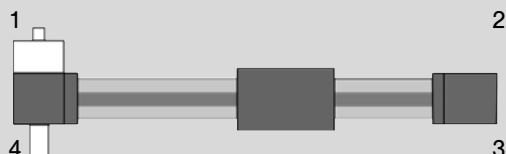
Dimensions of brakes see page 10.106



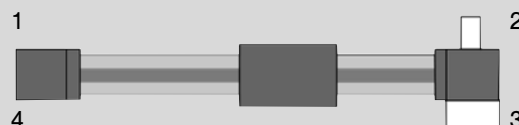
Brake with encoder connection mounted at 1
Option: A1 (BR-25-1, BR-40-1)



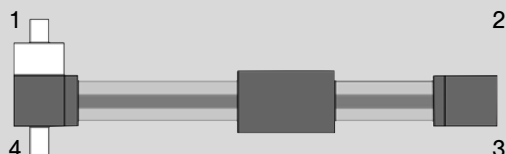
Brake with encoder connection mounted at 3
Option: A3 (BR-25-3, BR-40-3)



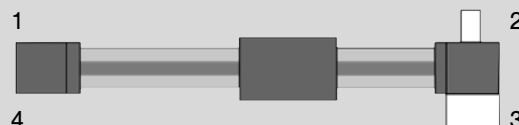
Brake at 1 with extended shaft for synchronization at 4
Option: B1 (BR-251-1, BR-401-1)



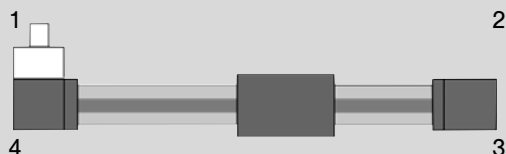
Brake at 3 with extended shaft for synchronization at 2
Option: B3 (BR-251-3, BR-401-3)



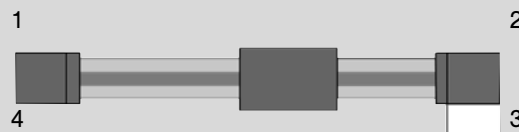
Brake at 1 with shaft for synchronization at 1 and 4
Option: C1 (BR-252-1, BR-402-1)



Brake at 3 with shaft for synchronization at 2 and 3
Option: C3 (BR-252-3, BR-402-3)



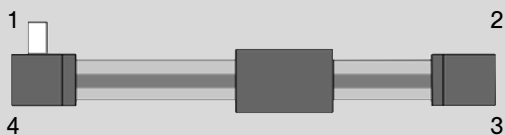
Brake at 1 with extended shaft for synchronization at 1
Option: D1 (BR-253-1, BR-403-1)



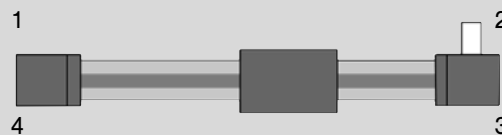
Brake at 3 with extended shaft for synchronization at 3
Option: D3 (BR-253-3, BR-403-3)

Dimensions of driven shafts see page 10.106

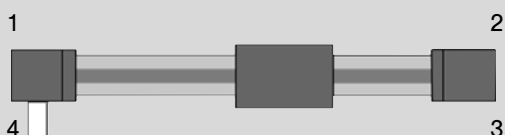
Driven shafts



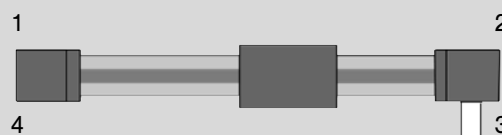
Shaft for synchronization at 1
Option: F1 (ZK-254-1 ϕ 25, ZK-404-1 ϕ 40)



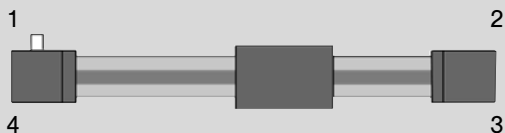
Shaft for synchronization at 2
Option: F2 (ZK-254-2 ϕ 25, ZK-404-2 ϕ 40)



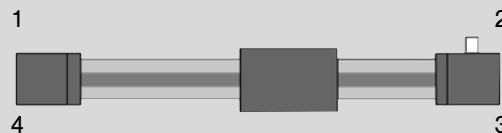
Shaft for synchronization at 4
Option: F4 (ZK-254-4 ϕ 25, ZK-404-4 ϕ 40)



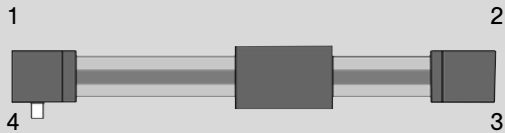
Shaft for synchronization at 3
Option: F3 (ZK-254-3 ϕ 25, ZK-404-3 ϕ 40)



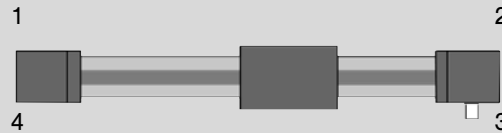
Shaft for encoder connection at 1
Option: G1 (ZK-255-1 ϕ 25, ZK-405-1 ϕ 40)



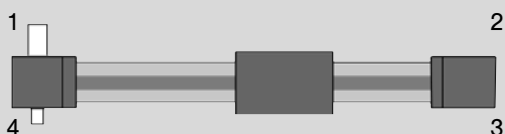
Shaft for encoder connection at 2
Option: G2 (ZK-255-2 ϕ 25, ZK-405-2 ϕ 40)



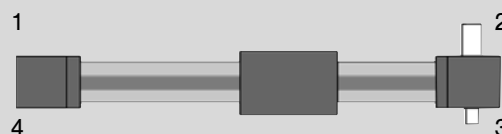
Shaft for encoder connection at 4
Option: G4 (ZK-255-4 ϕ 25, ZK-405-4 ϕ 40)



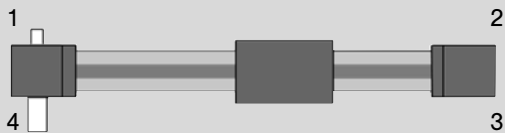
Shaft for encoder connection at 3
Option: G3 (ZK-255-3 ϕ 25, ZK-405-3 ϕ 40)



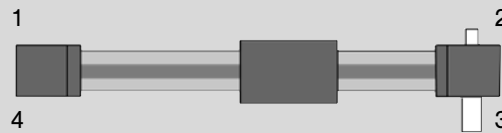
Shaft for encoder connection at 4 and synchronization at 1
Option: H1 (ZK-256-1 ϕ 25, ZK-406-1 ϕ 40)



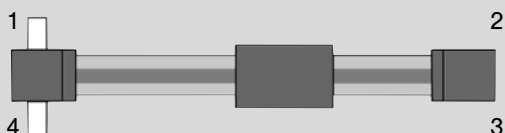
Shaft for encoder connection at 3 and synchronization at 2
Option: H2 (ZK-256-2 ϕ 25, ZK-406-2 ϕ 40)



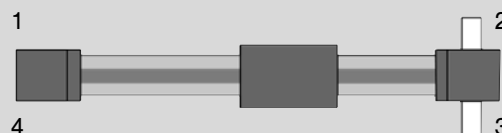
Shaft for encoder connection at 1 and synchronization at 4
Option: H4 (ZK-256-4 ϕ 25, ZK-406-4 ϕ 40)



Shaft for encoder connection at 2 and synchronization at 3
Option: H3 (ZK-256-3 ϕ 25, ZK-406-3 ϕ 40)

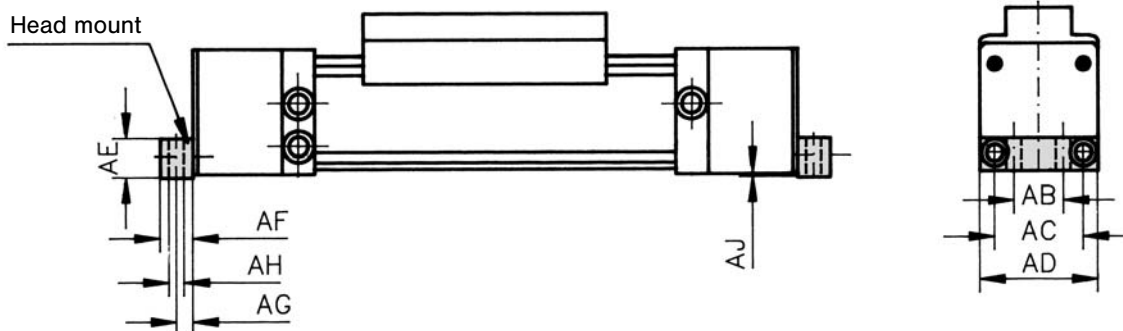


Shaft for synchronization on two sides
Option: J1 (ZK-257-1 ϕ 25, ZK-407-1 ϕ 40)



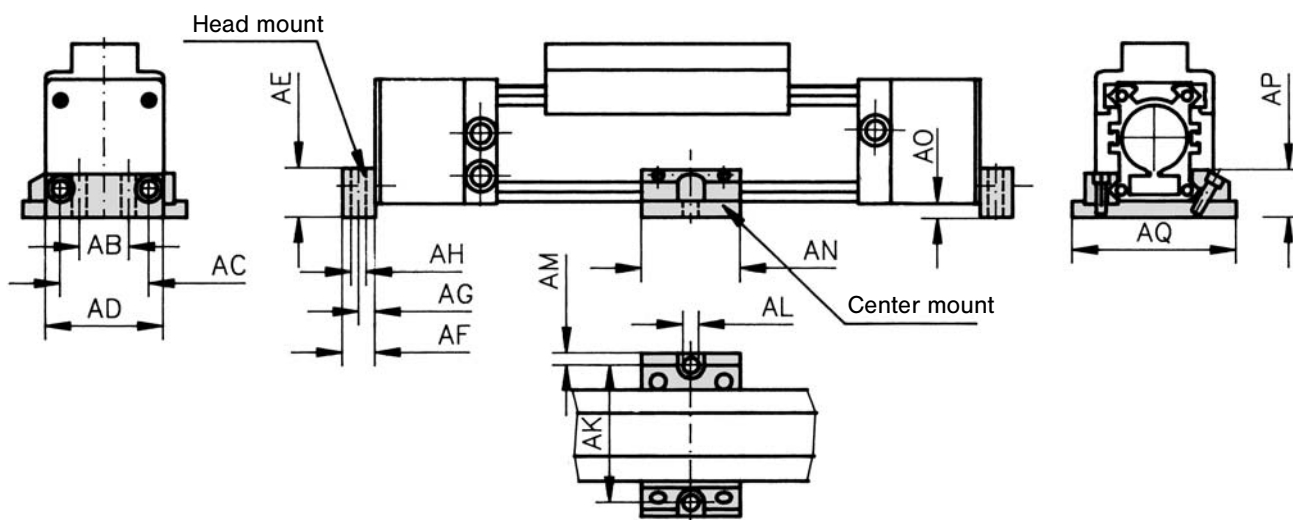
Shaft for synchronization on two sides
Option: J2 (ZK-257-2 ϕ 25, ZK-407-2 ϕ 40)

Head mount



Head mount		Cyl.-Ø	AB	AC	AD	AE	AF	AG	AH	AJ
Order number										
ZK-252		25	30	50	60	20	20	10	9	1
ZK-402		40	30	54	71	20	20	10	9	1

Center mount with tall head mount



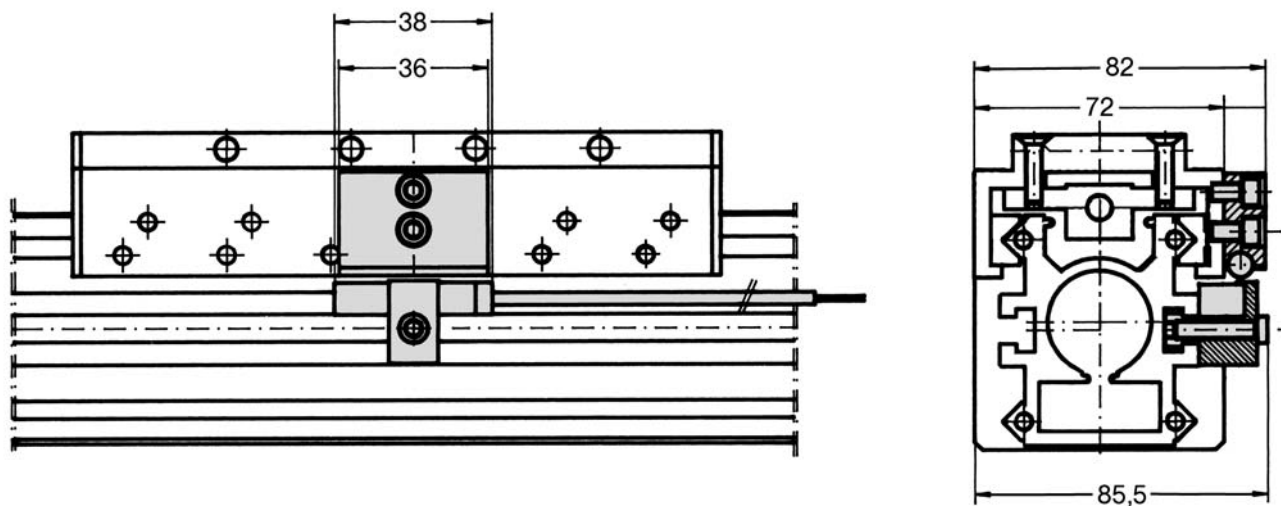
Head mount tall	Center mount	Cyl.-Ø	AB	AC	AD	AE	AF	AG	AH	AK	AL	AM	AN	AO	AP	AQ
Order number	Order number															
ZK-253	ZK-251	25	30	50	60	30	20	10	9	75	9	7.5	60	9	25	90
ZK-403	ZK-401	40	30	54	71	30	20	10	9	84	9	8	60	9	30	100

For series ZR-25 / ZR-40 / ZR-25S / ZR-40S / ZR-25R

Magnet is not included.

Order number for magnet **ZR-4006**.

Order number for sensor mounting bracket **ZR-4007**.

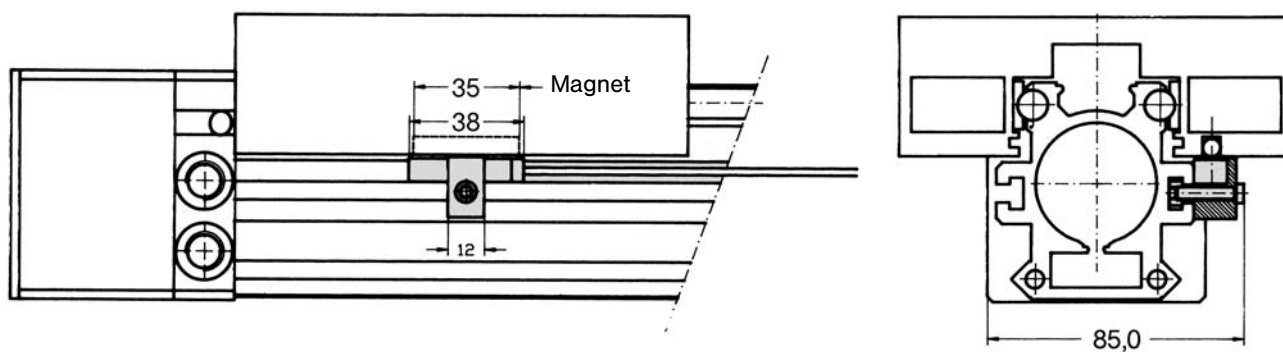


Sensors see page 10.105.

For series ZR-40L

Magnetic slide is a standard feature.

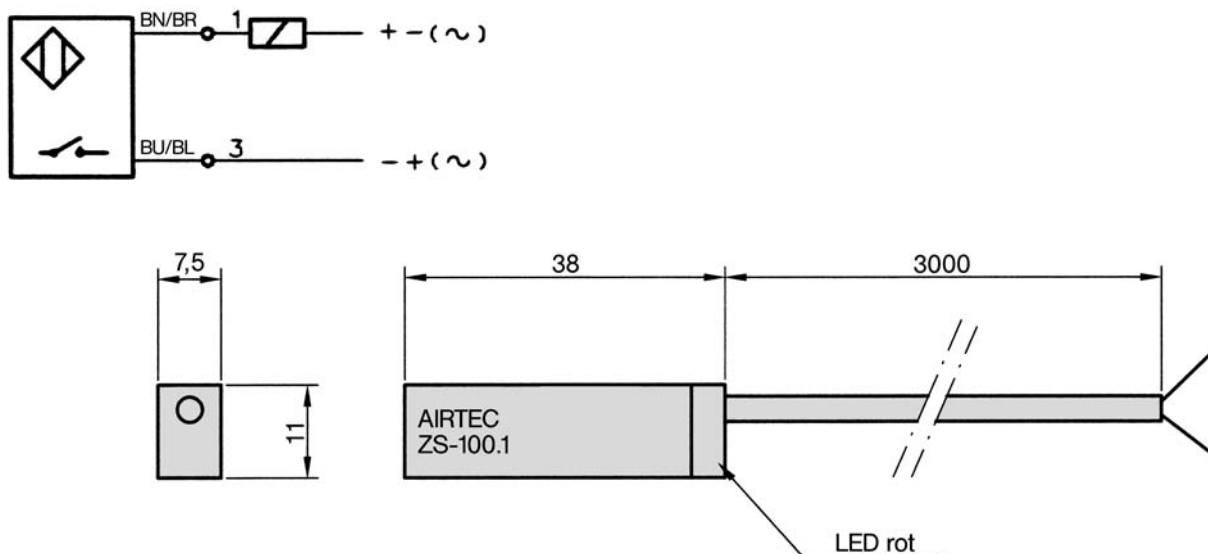
Order number for sensor mounting bracket **ZR-4007**.



Sensors see page 10.105.

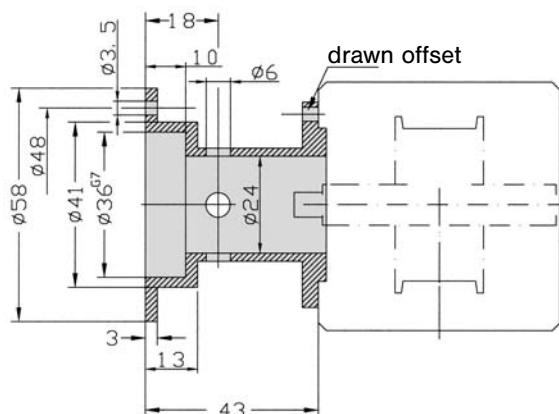
Accessories for rodless toothed belt cylinders ZR

Reed switch



Order number	ZS 100.1
Weight	30 g
Length of cable	3 m
Temperature range	- 30 ... + 80 °C (- 22 °F ... + 176 °F)
Degree of protection	IP 67
Response time	≤ 0.1 ms
Switching time	≤ 2 ms
Electrical life (resistive load)	10 ⁷
Repeatability	± 0.1 mm
Contact function	NO
Shock resistance	50 g
Vibration resistance	50 ... 1000 Hz
Max. current at 25 °C (resistive load)	1 A
Max. Power DC/AC	50 W / 50 VA
Operating voltages (DC or AC)	3 ... 250 V
Max. voltage drop	3 ΔV
Wire gauge	0.34 mm ²

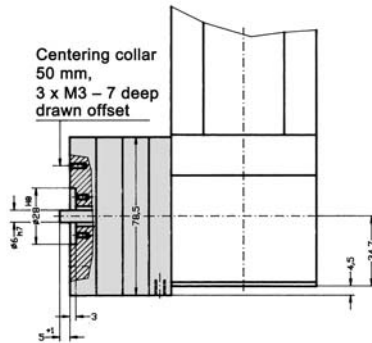
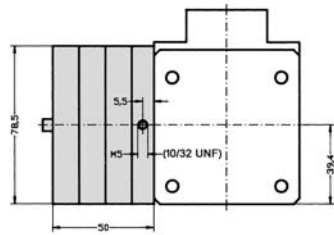
Adapter for encoder



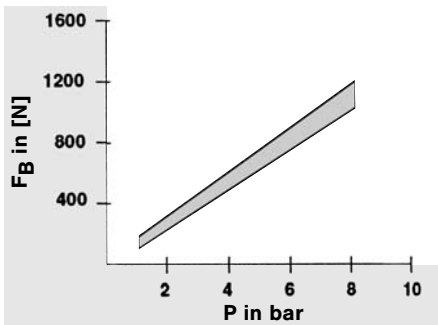
The adapters can be mounted on all cylinders of series ZR and will fit all encoders with a 36 mm centering collar.

Order number	ZA-36	ZA-37
Description	Attachment to brake	Direct attachment to housing

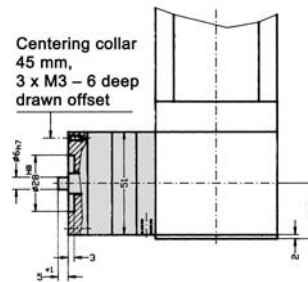
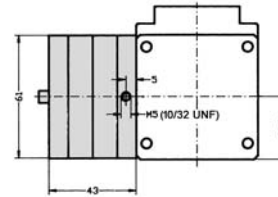
Option A for Ø 40



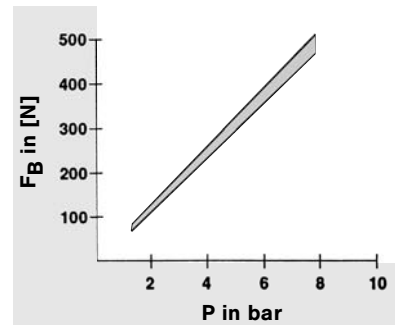
Braking force static



Option A for Ø 25

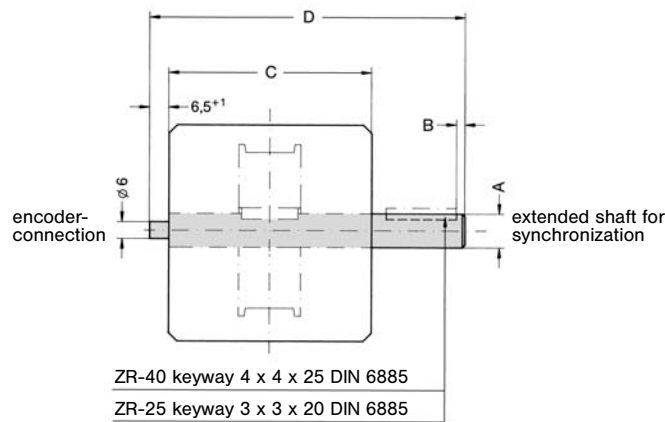


Braking force static



The brake is designed to hold the position. Do not use to stop the cylinder.

Extended shaft for series ZR

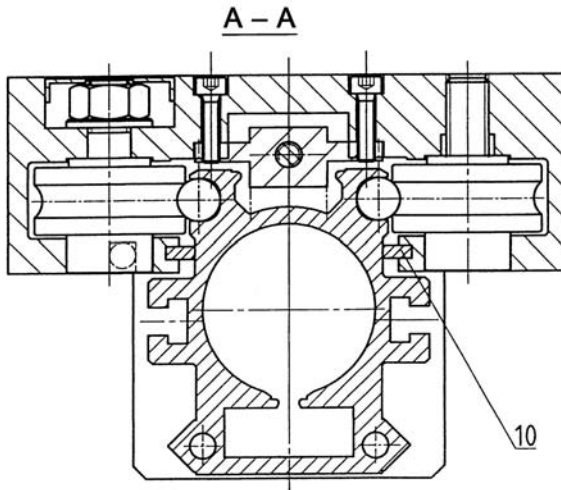
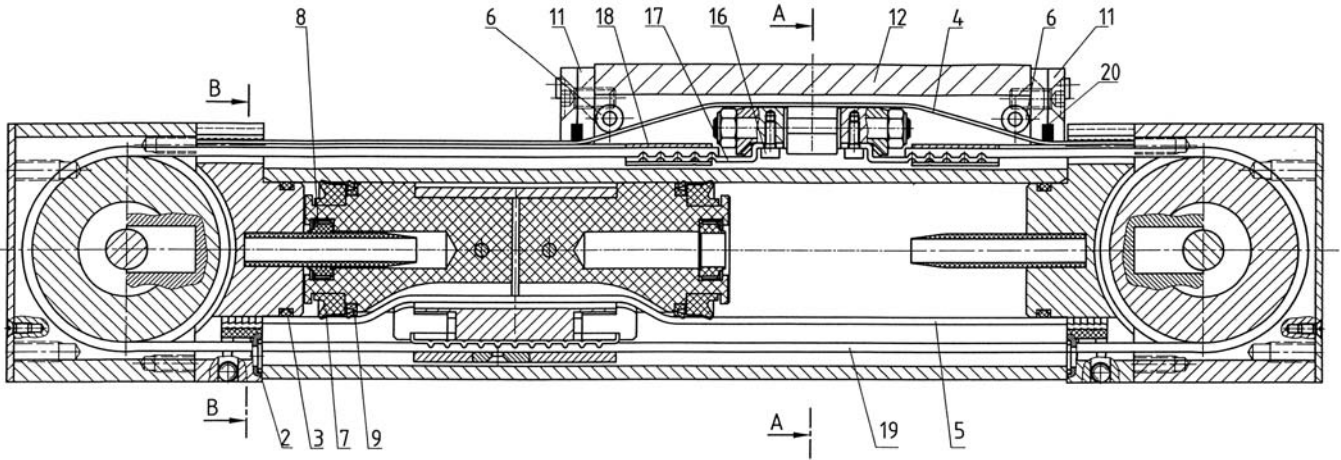


The slide travels 135 mm (Ø 25) per one rotation of the shaft.
The slide travels 185 mm (Ø 40) per one rotation of the shaft.

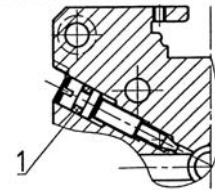
Cylinder Ø	A	B	C	D
25	10 _{h7}	2	60	93
40	12 _{h7}	3	72	112

Rodless toothed belt cylinders

Seal kits for series ZR-40L



sectional view B - B



Seal kit for ZR-40L

Order number: **VS-ZR-40L-Stroke length (for example 0500)**

- 0500 = stroke lengths from 0 to 500 mm
- 1000 = stroke lengths from 501 to 1000 mm
- 1500 = stroke lengths from 1001 to 1500 mm
- 2000 = stroke lengths from 1501 to 2000 mm
- 3000 = stroke lengths from 2001 to 3000 mm
- 4500 = stroke lengths from 3001 to 4500 mm

Pos.	Description	Quantity
1	O-Ring	2
2	O-Ring	2
3	O-Ring	2
4	Cover band	200 mm + stroke
5	Sealing band	400 mm + stroke
6	Roller	2
7	Piston seal	2
8	Cushion seal	2
9	Piston seal	2
10	Wiper	2
20	Wiper	2
	Grease	30 ml

Cover for ZR-40L

Order number: **VS-ZR-40L-AD**

Pos.	Description	Quantity
11	Cover for wiper	2
10	Wiper	2
	Flat-head screw M6	4

Roller slide complete for ZR-40L

Order number: **31-40-115-52**

Toothed belt for ZR-40L

Order number: **VS-ZR-40-ZR-stroke**

Pos.	Description	Quantity
16	Screw	4
17	Toothed plate	2
18	Clamp	2
19	Toothed belt	2 x (290 mm + stroke)