

TR/3/ML/PTV

The TR/3/ML/PTV seal is a rotary shaft seal based on the TR/3/ML design with a rigid metal case inside the seal back.

The TR/3/ML/PTV is characterized by a particularly robust sealing lip with an exclusive antifriction band patented with the patent number PCT/EP2006/004962.

As the TR/3/M and TR/3/ML, it can be installed without a retainer plate and offers remarkable advantages over normal rotary shaft seals with stiff metal insert, avoiding any shrinkage over time.

Dimensions and tolerances are according to German Standard DIN 3760.

Lip flexibility and elasticity are identical to the other TR/3 styles.

Maximum pressure capability is 0,5 bar.

Exclusive features of TR/3/ML/PTV seals are:

- Antifriction material vulcanized during the process according to patent PCT/EP2006/004962
- Possibility of assembly without retainer plate
- Improved resistance to possible shaft misalignments
- Decreased radial force exerted on shaft
- Significantly reduced friction and temperature generated by friction
- Protected spring to avoid slipping/popping out from groove
- Reduced spring preload
- Absence of external metallic parts and consequent prevention of damages to housing bore

Possible size range for TR/3/ML seals: $\varnothing d_{\min} = 25 \text{ mm}$; $\varnothing D_{\max} = 1\,350 \text{ mm}$ (please also see the drawing at the next page)



Materials

The standard production is in nitril elastomer NBR added with PTFE, but for particular working conditions, TR/3/ML/PTV seals can be produced in HNBR (hydrogenated nitril elastomer), VMQ (silicon elastomer) or FKM (fluorocarbon elastomer). Other combinations are available upon request. The below shows working temperature ranges (minimum, maximum, peak (*)) applicable to each kind of compound. The standard metal case is made in carbon steel.

Material	Temperature		Standard spring	Special spring	Recommended circumferential shaft speed	Misalignment
	min	max				
	°C	°C (*)			m/s	
NBR	-30	+100 (+120)	Carbon steel	AISI 302	15	According to cross section
HNBR	-40	+150 (+175)	Carbon steel	AISI 302	23	
MVQ	-50	+200 (+250)	Carbon steel	AISI 302	30	
FKM	-20	+200 (+250)	AISI 302	AISI 316	30	

The PTFE compounds used for the TR/3/ML/PTV coating design may vary depending on the applications demand. The table below shows the most used ones with the relative coefficients of friction. For more details, please contact the TENUTE Technical Department / SKF Seals Application Engineering.

Material	Coefficient of friction
PTFE Virgin	0,06
PTV / MoS ₂ (1*)	0,08
PG (2*)	0,11
PB (3*)	0,13
PB / MoS ₂ (4*)	0,13

1* ... PTFE with glass and molybdenum bisulfide

2* ... PTFE with carbon and graphite

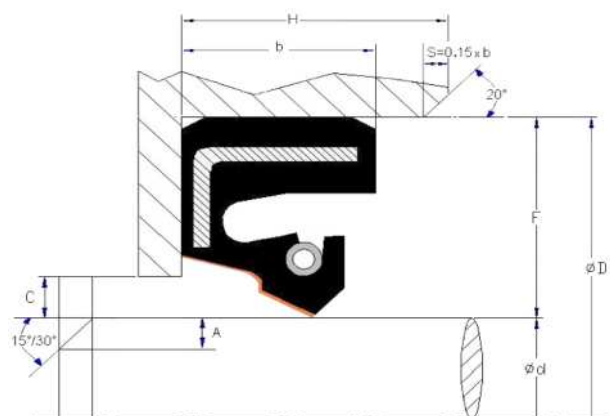
3* ... PTFE with bronze

4* ... PTFE with bronze and molybdenum bisulfide

Assembly of TR/3/ML/PTV seals

The drawing shows the details of the housing dimensions and the assembly of the TR/3/ML/PTV seal in applications without pressure.

Particular applications or requirements different from those details shall be agreed with the TENUTE Technical Department / SKF Seals Application Engineering.



$$C_{\text{maximum}} = 0,5 \times F$$

Shaft and housing diameter tolerance

Shaft diameter Ød		Tolerance	Housing diameter ØD		Tolerance
Over	Up to		Over	Up to	
mm	mm		mm	mm	
25	1 000	h11	45	1 350	H8
1 000	1 290	h10			

Housing height tolerance and chamfers

Housing height			Shaft chamfer			Housing chamfer
b	H	Tolerance	Ød		A minimum	S
mm	mm	mm	Over mm	Up to mm	mm	
Up to 10	b + 0,3	+0,2 / 0	25	50	1,5	S = 0,15 x b
Over 10	b + 0,4	+0,3 / 0	50	250	3	
			250	800	4,5	
			800	1 350	6	

Shaft and housing surface finishing

A roughness of Ra from 0,2 to 0,6 µm is recommended for the shaft in standard applications, while in case of high speeds, a finishing to Ra from 0,2 to 0,4 µm is recommended. Plunge grinding is required. For the housing bore a finish turning is sufficient.

Shaft hardness

Up to 15 m/s	Over 15 m/s
40 HRC	60 HRC and above
PTFE PG (2*)	PTFE PB (3*)

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