seal-mart

seal application limit

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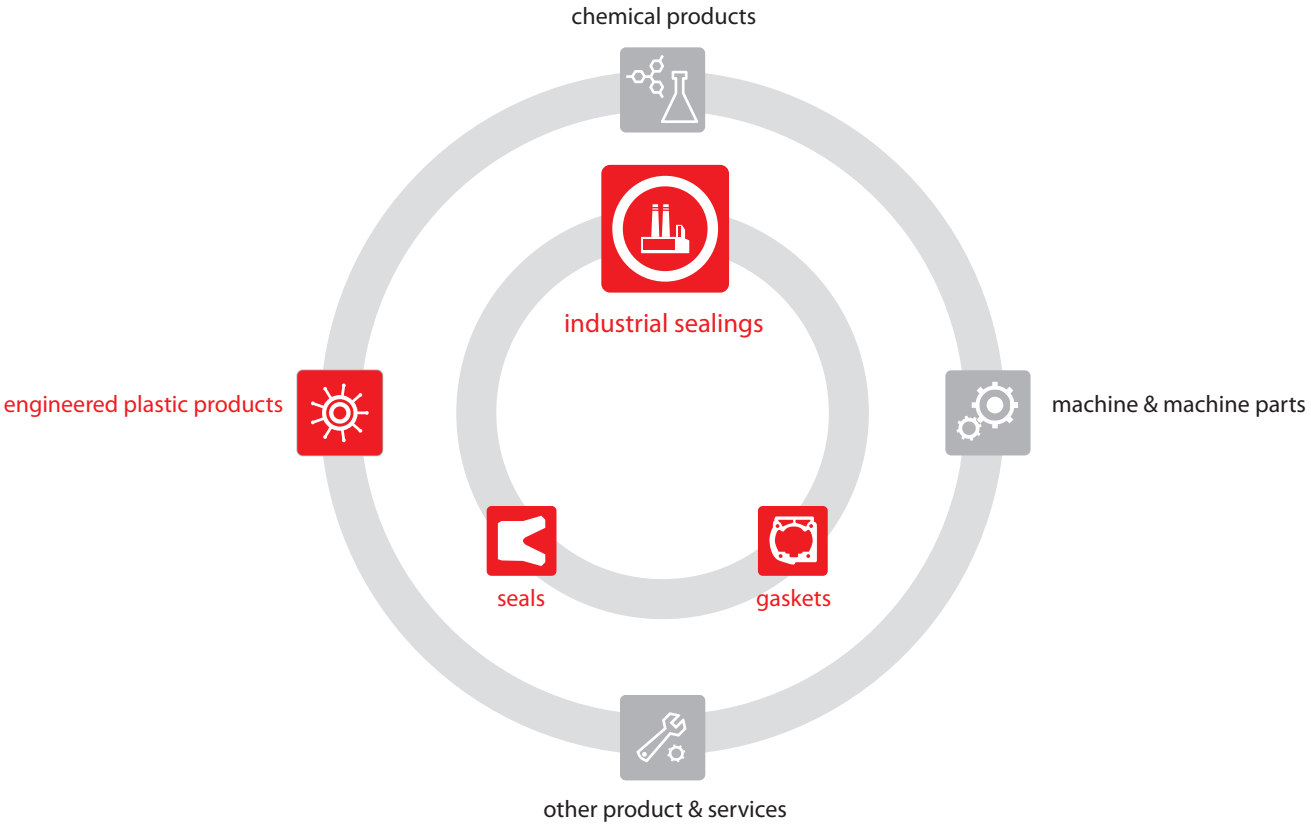
introduction

at seal-mart, we offer :

- sealing solutions tailored to your specifications
- partnership from the design phase to serial production
- just-in-time manufacturing of seals and components up to 4.000 mm diameter
- production of gaskets in miscellaneous materials
- production of Advanced Engineering Plastics Products (AEPP)



superior manufacturing concept

at seal-mart we know that only state-of-the-art technology can provide us with an edge on our competitors. a rapidly changing environment demands new production concepts that surpass our customers' requirements, such as:

- delivery on demand with short cycle times
- no mould or tooling limitations
- no stock requirements for our customers
- seal engineering to customer specification

to face this challenge, we developed special CNC technologies for seals and gaskets to satisfy the very specific needs of every customer, in every industry.

material availability restrictions

- thermoplastic elastomers (PU) up to ø 4.000 mm
- rubber materials or elastomers up to ø 1.500 mm
- plastomers & PTFE materials up to ø 2.000 mm

large diameter seals

polyurethane materials:
please note, that seals with a diameter of more than 600 mm are made of casted TPU (as a substitute for PU or HPU).

rubber materials:
the whole elastomer material range (NBR, FKM, EPDM, HNBR, MVQ) can be offered now with outer diameters up to 1500 mm.

important guideline for application limits

the stated operating parameters represent general conditions. it is recommended NOT to use all maximum values simultaneously. the specified pressure limits apply for use in mineral oil with a maximum temperature of 60°C and a maximum metal extrusion gap of 0,25 mm. the speed limits apply for adequate lubrication and running surface finish as recommended.
for severe applications we recommend that material / media compatibility and sealing function will be tested under actual field conditions. depending on application details, higher pressures and speed limits can be attained in most cases. if any of the indicated limits do not meet specific requirements please contact the next seal-mart branch or subsidiary.
this brochure is for information purposes only and cannot substitute individual consultation. the information is based on many years of experience, on FEA-calculations and test results. as far as we can assess, this information is the most updated and according to the technical standard currently available. however, seal-mart can not guarantee and/or take any responsibility, obligation or liability whatsoever in connection with this information. In particular, seal-mart is not liable for damages or losses that occur in connection with the use or implementation of this information. warranties for special features, certain aim and utility are subject to a separate agreement.

legends

 linear moving  rotating  oscillating  spiral moving  static

not bolded symbols: please consult our technical department. for application limitations

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

material data

standard materials specification / properties	standard	unit	polyurethanes								
			s-mart PU standard polyurethane	s-mart HPU hydrolisys-resistant polyurethane	s-mart GPU polyurethane for giant seals and big cross sections	s-mart LTPU low-temperature polyurethane	s-mart HTPU high-temperature polyurethane	s-mart SPU self-lubricated polyurethane	s-mart XPU hard polyurethane	s-mart XHPU hard hydrolysis resistant polyurethane	s-mart XSPU hard self-lubricated polyurethane
colour			green	red	red	blue	white	grey/ black	dark green	dark red/ yellow	dark grey
hardness	DIN 53505 / ISO 868	Shore A	$95^{\pm2}$	$95^{\pm2}$	$95^{\pm2}$	$95^{\pm2}$	$96^{\pm2}$*	$95^{\pm2}$			
hardness	DIN 53505 / ISO 868	Shore D	$48^{\pm3}$	$48^{\pm3}$	$47^{\pm3}$	$48^{\pm3}$	$50^{\pm3}$*	$48^{\pm3}$	$57^{\pm3}$	$60^{\pm3}$	$57^{\pm3}$
ball indentation hardness	DIN 53456 H 135/30	N/mm^2									
density	DIN 53479 / ISO 1183	g/cm^3	1,20	1,20	1,20	1,17	1,17*	1,24	1,21	1,22	1,26
100% modulus	DIN 53504	N/mm^2	≥12	≥13	≥11	≥12	11	17	≥18	≥20	24
tensile strength / yield stress	DIN 53504[53455] ASTM D 4745-79	N/mm^2	≥40	≥50	≥45	≥50	45	50	≥50	≥50	45
compressive strength	DIN 53455	N/mm^2									
elongation at break	DIN 53504[53455] ASTM D 4745-79	%	≥430	≥330	≥280	≥450	500	380	≥400	≥350	350
modulus of elasticity - tensile test	DIN 53457	N/mm^2									
compression set 70°C/24h 20% Def		%	≤30	≤27	≤30	≤27		25	24	26	24
100°C/24h 20% Def		%	≤35	≤33	≤40	≤33		30	29	30	30
100°C /22h	DIN 53517	%									
175°C /24h	DIN 53517	%									
rebound resilience	DIN 52512	%	42	29	43	50					
tear strength	DIN 53515	N/mm	≥100	≥100	≥40	≥80	80	120	≥140	170	160
abrasion	DIN 53516	mm^3	18	17	25	15	15	17	18	20	20
minimum service temperature		°C	-30	-20	-30	-50	-35	-20	-30	-20	-20
maximum service temperature		°C	+110	+110	+110	+110	+135	+110	+110	+110	+110
mineral oil based resistance		RT	+	+	+	+		+	+	+	+
		60°C	+	+	+	+		+	+	+	+
HFA-E water +oil emuls. resistance		RT	0	+	+	0		+	0	+	+
		60°C	-	+	0	-		+	-	+	+
water resistance		RT	+	+	+	+		+	+	+	+
		60°C	-	+	0	-		+	-	+	+

legend;
+ suitable
- not recommended
0 unknown data or limited resistance
RT room temperature (20°C)
* ISO standard
** ASTM standard

rubber elastomers						thermoplastics									
s-mart NBR acrylonitrile-butadiene-rubber	**s-mart HNBR** hydrogenated acrylonitrile-butadiene rubber	**s-mart FKM** VITON® / fluorocarbon rubber	**s-mart EPDM** ethylene propylene diene rubber	**s-mart MVQ** vinyl methyl silicone rubber	**s-mart TFE/P - AFLAS** tetrafluoroethylene propylene rubber (AFLAS)	**s-mart PTFE virgin** polytetrafluoro ethylene	**s-mart PTFE glass** polytetrafluoro ethylene filled with 15% Glass Fibre + 5% MoS_2	**s-mart PTFE bronze** polytetrafluoro ethylene filled with 40% Bronze	**s-mart PTFE carbon** polytetrafluoro ethylene filled with 25% Carbon	**s-mart PTFE graphite** polytetrafluoro ethylene filled with 15% Graphite	**s-mart PTFE ekonol** polytetrafluoro ethylene filled with 10% Ekonol	**s-mart POM** polyoxymethelene (polyacetal)	**s-mart PA** polyamide	**s-mart PAEK** polyaryletherketone	**s-mart UHMWPE** ultra high molecular weight polyethylene
black	black/ green	brown	black	reddish brown/blue	black	white	grey	bronze (brown)	black	dark grey	cream	white/ black	natural/ black	cream	natural/ white
85±5	85±5	83±5	85±5	85±5	83±5										
						57	60	64	65	60±3*	56±3*	82	77	86	61±3*
										26±5	28±5				36
1,31	1,22	2,30	1,22	1,52	1,60	2,17	2,25	3,00	2,10	2,13	2,04	1,41	1,15	1,32	0,93
≥11	≥10	≥5	≥9	≥5	8										
≥16	≥18	≥8	≥12	≥7	13	27	18	22	15	16**	20**	62	65	97	40**
											11				88
≥130	≥180	≥200	≥110	≥130	200	300	200	280	180	140**	250**	40	120	≥50	50**
												2600	1800	3600	680
≤22	≤22		≤15												
		≤20		≤15	29										
28	29	7	38	44											
21	20	15	21		19										
90	90	150	120		110										
-30	-25	-20	-50	-60	-10	-200	-200	-200	-200	-200	-200	-50	-40		-200
+100	+150	+200	+150	+200	+200	+260	+260	+260	+260	+260	+260	+100	+100	+260	+80
+	+	+	-	+/0	+	+	+	+	+			+	+	+	+
+	+	+	-	+/0	+	+	+	+	+			+	+	+	+
+	+	+	-	0	+	+	+	+	+			+	+	+	+
+	+	0	-	0	+	+	+	+	+			+	+	+	+
+	+	+	+	+	+	+	+	+	+			+	0	+	+
+	+	+	+	+	+	+	+	+	+			+	0	+	+


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

product range seal

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material	
KO1-P	**hydraulic, single acting**					
 (0,1,3)	asymmetric piston seal for standard applications. design provides stable fit in the housing, ultimate sealing effect over a wide temperature range. avoids extensive drag pressure. back-to-back arrangement with guide ring in between or for double acting pistons or to separate different fluids.	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	
		-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	
		-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	
		-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	
KO1-R	**hydraulic, single acting**					
 (0,1,3)	as profile K01-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM	
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM	
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	
		-60 °C ... +200 °C	-	-	s-mart MVQ	
KO2-P	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0,1)	asymmetric piston seal for standard applications as K01-P, but due to design with active back-up ring suitable for higher pressure range or larger extrusion gaps. K02-P for standard housing design.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart POM/PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart POM/PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart POM/PA*
		-40 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart POM/PA*
KO2-PD	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0)	asymmetric piston seal for standard applications as K01-P, but due to design with active back-up ring suitable for higher pressure range or larger extrusion gaps. K02-PD for short housings.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart POM/PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart POM/PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart POM/PA*
		-40 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart POM/PA*
KO2-R	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0,1)	as profile K02-P, but more adaptation possibilities to diverse temperatures and media by selection of suitable seal material. K02-R for standard housing design.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
		-50 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass
KO2-RD	**hydraulic, single acting**				**seal part**	**back-up ring**
(0)	as profile K02-P, but more adaptation possibilities to diverse temperatures and media by selection of suitable seal material. K02-RD for short housings.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
		-50 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass
KO2-SA	**hydraulic, single acting**				**seal part**	**back-up ring**
 (2)	asymmetrical profile of the sealing lips, fabric reinforcement on the dynamic sealing side and back-up ring as a gap sealing component.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR fabric impregnated	s-mart POM/PA*

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material		
KO3-P	**hydraulic, single acting**				**seal part**	**back-up ring**	
 (0)	o-ring activated, asymmetrical piston seal. interference fit on inside diameter maintains stable fit in the housing. design provides ultimate sealing effect. especially suitable for short stroke applications (e.g. spindle seals, coupling actuators…)	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	
		-50 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart MVQ	
KO3-F	**PTFE-piston seal, single acting**				**seal part**	**o-ring**	
 (0)	o-ring activated, asymmetrical PTFE piston seal, low friction and no stick-slip effect. good adaptation possibilities for diverse temperatures and media by selection of suitable o-ring material, almost no dead spots as required for applications in food and pharma industry.	-20 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart FKM	
		-20 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart FKM	
		-25 °C ... +150 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart HNBR	
		-25 °C ... +150 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart HNBR	
		-60 °C ... + 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	s-mart MVQ	
		-60 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart MVQ	
		-60 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart MVQ	
KO3-S	**PTFE-piston seal, single acting**				**seal part**	**spring**	
 (0)	helicoil spring activated, asymmetrical PTFE piston seal, low friction and no stickslip effect, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry or for valves.	-200 °C ...+260 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE	1.4310	
		-200 °C ...+260 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310	
		-200 °C ...+ 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	1.4310	
KO4-P	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
 (0)	asymmetric piston seal for standard applications as K03-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure. K04-P for standard housing design	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR 70	s-mart POM/PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR 70	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR 70	s-mart POM/PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR 70	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR 70	s-mart POM/PA*
KO4-PD	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
 (0)	asymmetric piston seal for standard applications as K03-P, but due to design with active back-up ring suitable for larger extrusion gaps. K04-PD for short housings.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR 70	s-mart POM/PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR 70	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR 70	s-mart POM/PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR 70	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR 70	s-mart POM/PA*
KO5-P	**pneumatic, single acting**				**seal part**		
 (0,1)	asymmetric piston seal, extremely wear resistant, for use in lubricated or dry pneumatic applications. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart PU		
		-20 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart HPU		
		-20 °C ... +110 °C	2,0 m/s	25 bar (360 psi)	s-mart SPU		
		-50 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart LTPU		
		-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart GPU		
KO5-R	**pneumatic, single acting**				**seal part**		
 (0,1,3)	asymmetric piston seal, good wear resistant, for use in lubricated or dry pneumatic applications. good adaptation possibilities for diverse temperatures and media by selection of suitable seal material. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... + 80 °C	1,0 m/s	25 bar (360 psi)	s-mart NBR		
		-20 °C ... +200 °C	1,0 m/s	25 bar (360 psi)	s-mart FKM		
		-50 °C ... +150 °C	1,0 m/s	25 bar (360 psi)	s-mart EPDM**		
		-25 °C ... +150 °C	1,0 m/s	25 bar (360 psi)	s-mart HNBR		
KO5-SA	**pneumatic, single acting**						
 (1,3)	a dynamic lip with no sharp edges which facilitates sliding. increased depth within the U profile to increase flexibility. the use of a urethane resin instead of rubber to increase seal life and facilitate the use of non-lubricated air.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart PU		

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
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2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material	seal part	o-ring
KO5-SB	**pneumatic, single acting**						
 (1,3)	the seal type K05-SB has been specifically designed for use on single acting stroke cylinders with spring return, having a good guiding system. it has the same profile as the K05-SA type, but has lower pre-load on the external diameter, which reduces both the friction and break-out pressure.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart PU		
KO5-SE	**pneumatic, single acting**						
 (1,3)	u-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip. the asymmetrical profile with the longer and thicker static sealing lip ensure secure press fit in the bottom of the groove. the special sealing edge ensures zero leakage with low friction and maintains an effective lubrication film.	- 5 °C ... + 200 °C	1,0 m/s	12 bar (174 psi)	s-mart FKM		
		-25 °C ... + 100 °C	1,0 m/s	12 bar (174 psi)	s-mart NBR		
		-35 °C ... + 80 °C	1,0 m/s	12 bar (174 psi)	s-mart PU		
KO6-P	**hydraulic, single acting**						
 (0,1,3)	symmetric piston seal for simple standard applications, not recommended for new designs (profile K01-P preferred). also for larger cross section, easier to install.	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU		
		-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU		
		-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU		
		-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU		
		-50 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU		
K06-R	**hydraulic, single acting**						
 (0,1,3)	as profile K06-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. also for larger cross section, easier to install.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
		-60 °C .. +200 °C	-	-	s-mart MVQ		
K06-SA	**hydraulic , single acting**						
 (1,3)	u-ring with symmetrical profile for piston and/ or rods.	-30 °C ... +100 °C	0,5 m/s	100 bar (1450 psi)	s-mart NBR		
		-20 °C ... +110 °C	0,5 m/s	200 bar (2900 psi)	s-mart PU		
KO7-P	**hydraulic, single acting**					**seal part**	**o-ring**
 (0)	o-ring activated symmetric piston seal for simple standard applications, not recommended for new designs (profile K03-P preferred).	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)		s-mart PU	s-mart NBR
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)		s-mart HPU	s-mart NBR
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)		s-mart SPU	s-mart NBR
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)		s-mart LTPU	s-mart NBR
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)		s-mart GPU	s-mart NBR
KO8-E	**hydraulic, single acting**					**glide ring**	**o-ring**
 (0,1,3)	o-ring activated asymmetric PTFE piston seal, low friction. for low or high speed. suitable for positioning functions.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)			s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart FPM/FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)			s-mart EPDM**
		-60 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)			s-mart MVQ
		-60 °C ... + 80 °C	10,0 m/s	400 bar (5800 psi)	s-mart UHMWPE		s-mart MVQ
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU		s-mart NBR
KO8-D	**hydraulic, double acting**					**glide ring**	**o-ring**
 (0,1,3)	o-ring activated symmetric PTFE piston seal, low friction. for low or high speed, suitable for positioning functions. for mobile hydraulics, machine tools, injection moulding machines, heavy hydraulics.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)			s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart FPM/FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)			s-mart EPDM**
		-60 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)			s-mart MVQ
		-60 °C ... + 80 °C	10,0 m/s	400 bar (5800 psi)	s-mart UHMWPE		s-mart MVQ
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU		s-mart NBR

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material	
KO8-P	**hydraulic, double acting**				**glide ring**	**o-ring**
 (1)	o-ring activated symmetric PU piston seal with excellent static and dynamic sealing capacity, extremely wear resistant.	-30 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart PU	s-mart NBR
		-20 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart HPU	s-mart NBR
		-20 °C ... +100 °C	1,4 m/s	250 bar (3600 psi)	s-mart SPU	s-mart NBR
		-30 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart LTPU	s-mart NBR
KO8-ES	**hydraulic, single acting**				**glide ring**	**energizer**
 (0,1,3)	profile ring-activated asymmetric PTFE piston seal, similar to K08-E, but special heavy duty design. for heavy industry hydraulics or for special housing dimensions.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart FPM/FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart EPDM**
		-25 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart HNBR
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR
KO8-DS	**hydraulic, double acting**				**glide ring**	**energizer**
 (0,1,3)	profile ring-activated symmetric PTFE piston seal, similar to S09-D, but special heavy duty design. for heavy industry hydraulics or for special housing dimensions.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart FPM/FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart EPDM**
		-25 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart HNBR
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR
KO8-SA	**hydraulic, double acting**				**seal part**	**energizer**
 (1,3)	K08-SA is a further technical development of the K08-D seal. it is fully interchangeable with the earlier K08 seals in all new applications. the benefits of this seal concept are provided by the innovative functional principle of the trapezoidal profile cross-section.	-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart NBR
		-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart FKM
		-30 °C ... +100 °C	15,0 m/s	250 bar (3626 psi)	PTFE+high carbon fibre	s-mart NBR
		-10 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	PTFE+high carbon fibre	s-mart FKM
		-45 °C ... +145 °C	15,0 m/s	250 bar (3626 psi)	PTFE+high carbon fibre	s-mart EPDM**
		-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	s-mart PU	s-mart NBR
KO8-SB	**hydraulic, double acting**				**seal part**	**energizer**
 (1,3)	the K08-SB is a rubber energised PTFE seal. the seal is designed to improve the service life of a simple o-ring sealing system and does fit in o-ring grooves. K08-SB combines the flexibility and response of o-rings with the wear and friction characteristics of PTFE in dynamic applications. the double acting performance of the seal results from the symmetrical cross section.	-30 °C ... +100 °C	15,0 m/s	350 bar (5076 psi)	s-mart PTFE bronze	s-mart NBR
		-10 °C ... +200 °C	15,0 m/s	350 bar (5076 psi)	s-mart PTFE bronze	s-mart FKM
		-30 °C ... +100 °C	15,0 m/s	250 bar (3626 psi)	s-mart PTFE carbon	s-mart NBR
		-10 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	s-mart PTFE carbon	s-mart FKM
		-45 °C ... +145 °C	15,0 m/s	250 bar (3626 psi)	s-mart PTFE carbon	s-mart EPDM**
KO8-SC	**hydraulic, double acting**				**seal part**	**energizer**
 (1,3)	the K08-SC is a double-acting seal consisting of a special polyurethane seal ring and an o-ring as energizing element. the two external seal edges act as primary seal for pressures from both sides and prevent any build-up of hydrodynamic pressure over the seal profile and the risk of the blow-by effect. the central back-up and sealing bulge increases the sealing effect.	-35 °C ... +110 °C	0,5 m/s	250 bar (3626 psi)	s-mart XPU	s-mart NBR
KO8-SD	**hydraulic, double acting**				**seal part**	**energizer**
 (1)	profile K08-SD complements the product range of double-acting piston seals (K08-D, K08-SE) for installation housings according to ISO 7425/1 by a product which is preferably used in the pressure range up to a maximum of 300 bar. the seal components are a slide ring consisting of a newly developed polyurethane with improved sliding qualities and an especially high module and a leader element with rectangular cross-section made of an NBR-elastomere.	-35 °C ... +110 °C	0,5 m/s	300 bar (4351 psi)	s-mart XPU	s-mart NBR

linear moving rotating oscillating spiral moving static

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material		
KO8-SE	**hydraulic, double acting**				**seal part**	**energizer**	
 (2,3)	the K08-SE piston seal is primarily designed for heavy hydraulic duty applications and is preferably fitted in double-acting pistons. the sealing set is suitable for working pressures up to 500 bar.	-30 °C ... +110 °C	1,0 m/s	500 bar (7251 psi)	thermoplastic	s-mart NBR	
KO8-SF	**hydraulic, double acting**				**seal part**	**energizer**	
 (1,3)	K08-SF is a double-acting piston seal for the lower pressure range with the properties of low friction & low housing height.	-30 °C ... +100 °C	2,0 m/s	160 bar (2320 psi)	s-mart PTFE carbon	s-mart NBR	
		-30 °C ... +100 °C	2,0 m/s	160 bar (2320 psi)	s-mart PTFE bronze	s-mart NBR	
KO8-SG	**hydraulic, single acting**				**seal part**	**energizer**	
 (1,3)	the K08-SG is a single-acting seal element consisting of a seal ring of high-grade PTFE series or PU materials and an o-ring as energizing element.	-30 °C ... +100 °C	15,0 m/s	700 bar (10152 psi)	s-mart PTFE bronze	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	700 bar (10152 psi)	s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	PTFE + high bronze	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	800 bar (11603 psi)	PTFE + high bronze	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	300 bar (4351 psi)	PTFE + carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	300 bar (4351 psi)	PTFE + carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	300 bar (4351 psi)	PTFE + carbon fibre	s-mart EPDM**	
		-30 °C ... +100 °C	15,0 m/s	700 bar (10152 psi)	PTFE+high carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	700 bar (10152 psi)	PTFE+high carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	700 bar (10152 psi)	PTFE+high carbon fibre	s-mart EPDM**	
		-30 °C ... +100 °C	15,0 m/s	400 bar (5800 psi)	s-mart PTFE glass	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	400 bar (5800 psi)	s-mart PTFE glass	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	700 bar (10152 psi)	PTFE+carbon graphite	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	700 bar (10152 psi)	PTFE+carbon graphite	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	700 bar (10152 psi)	PTFE+carbon graphite	s-mart EPDM**	
		-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	s-mart PU	s-mart NBR	
KO9-N	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (0)	profile ring-activated compact piston seal with integrated guiding elements. excellent static sealing capacity. commonly used in standard cylinders.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
KO9-D	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (0)	profile ring-activated compact piston seal with integrated guiding elements. excellent static and dynamic sealing capacity.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-25 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
KO9-H	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (0)	profile ring-activated compact piston seal with integrated guiding elements. design for high pressure range, excellent static sealing capacity. mainly used in mining / tunneling industry.	-20 °C ... +100 °C	3 m/s	1500 bar (21700 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	3 m/s	1500 bar (21700 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material		
K09-SA	**hydraulic, double acting**				**seal part**	**back-up ring**	**guide ring**
 (2,3)	this type is characterized by the straight, long-sided L profiles of the guide rings. compared with K09-SB, it exhibits a smaller groove depth with the same cylinder diameter.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	polyester elastomer	s-mart POM
KO9-SB	**hydraulic, double acting**				**seal part**	**back-up ring**	**guide ring**
 (2,3)	the K09-SB is a double-acting seal and guide element consisting of an elastomeric profile seal ring, two back-up rings and two guide rings. the design provides a compact seal and guide combination for a closed or split installation groove. the profile of the seal ring is more rigid than that of K09-SA.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	polyester elastomer	s-mart POM
K09-SC	**hydraulic, double acting**				**seal part**	**energizer**	**guide ring**
 (2)	the K09-SC is double-acting piston seals with integrated guide rings. the combination of the elastomer energiser and the polyurethane special shaped sealing element provides excellent sealing effect and service life. back-up rings are not necessary due to the high extrusion resistance of the polyurethane material.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM
K09-SD	**hydraulic, double acting**				**seal part**	**energizer**	**guide ring**
 (2)	the K09-SD is a double-acting piston seals with integrated guide rings. the combination of the elastomer energiser and the polyurethane special shaped sealing element provide excellent sealing effect and service life. the K09-SD design includes T-shaped back-up/guide rings and a combination of seal ring and energizer.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
KO9-SE	**hydraulic, double acting**				**seal part**	**energizer**	**guide ring**
 (3)	the K09-SE profile has been designed for installation in closed grooves. the radial dimension of the profile has been reduced to the minimum to allow the necessary deformation during installation. the seal-part can be provided in NBR fabric.	-30 °C ... +130 °C	0,5 m/s	350 bar (5076 psi)	NBR fabric	NBR	s-mart POM
KO9-SF	**hydraulic, double acting**				**seal part**	**energizer**	**guide ring**
 (3)	double acting piston seal with integrated guide rings for higher pressure level. it optional in NBR fabric available.	-30 °C ... +100 °C	0,5 m/s	700 bar (10150 psi)	NBR fabric	NBR	s-mart POM
KO9-SJ	**hydraulic, double acting**				**seal part energizer**	**back-up ring**	**guide ring**
 (2,3)	five-piece piston compact seal consisting of one profile ring, two back-up rings and two angled bushes. the K09-SJ is used for sealing pistons with pressure on both sides. the angled rings guide the piston on the cylinder bore. no extrusion into the radial sealing gap, suitable for rapid pressure change.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	polyester elastomer	thermoplast

linear moving rotating oscillating spiral moving static

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3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material		
K1012-T	**hydraulic, single acting**				**K 10-A**	**K 11-T**	**K 12-T**
 (0)	chevron sealing set, machined surface design. in back-to-back arrangement. more intermediate chevrons possible for heavy industry hydraulics.	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart NBR	s-mart PTFE glass
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart FKM	s-mart PTFE glass
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart HNBR	s-mart PTFE glass
K1012-M	**hydraulic, single acting**				**K 10-A**	**K 11-M**	**K 12-M**
 (0,3)	chevron sealing set, split design. in back-to-back arrangement. more intermediate chevrons possible for heavy industry hydraulics.	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart NBR	s-mart PTFE glass
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart FKM	s-mart PTFE glass
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart HNBR	s-mart PTFE glass
K1012-SA	**hydraulic, single acting**				**seal part**	**back-up ring**	**guide ring**
 (3)	chevron packing optional with back up ring at the retainer. most common are vee-rings in rubber textile. in case of PU, not more than 3 vee-rins are recommended. in standard version they are made in cotton fabric reinforced NBR and pure NBR. the energizer ring ensures uniform loading of pressure on the other rings.	-30 °C ... +130 °C	0,5 m/s	400 bar (5800 psi)	NBR fabric	NBR fabric	s-mart POM
		-20 °C ... +150 °C	0,5 m/s	400 bar (5800 psi)	FKM fabric	FKM fabric	s-mart POM
		-20 °C ... +200 °C	0,5 m/s	400 bar (5800 psi)	FKM fabric	FKM aramid fibre	s-mart PTFE
K1315-T	**hydraulic, single acting**				**K13-T**	**K14-T**	**K15-T**
 (0)	chevron sealing set, design with flexible sealing lips, good sealing ability in higher pressure range. for heavy industry hydraulics, water hydraulic systems.	-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
K16-A	**hydraulic/pneumatic, single acting**						
 (0,1,3)	simple cup seal, usually fixed on the piston by means of a clamping plate. mainly used for replacement in old hydraulic and pneumatic cylinders. also used for food filling / portioning equipment.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
		-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
		-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
		-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart GPU		
		-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
K16-B	**hydraulic/pneumatic, single acting**						
 (0)	cup seal in slightly different design compared to K16-A. usually fixed on the piston by means of a clamping plate. mainly used for replacement in old hydraulic and pneumatic cylinders. also used for food filling / portioning equipment.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
		-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
		-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
		-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart GPU		
		-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		

 linear moving  rotating  oscillating  spiral moving  static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
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3 molded or traded product
0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material	
K16-SA	**hydraulic, single acting**				**seal part**	**energizer**
 (1)	lips seal, optional spring-loaded, clamping flange is required for axial fixing in the housing	-30 °C ... +100 °C	0,5 m/s	10 bar (145 psi)	NBR fabric	spring
K17-P	**hydraulic, double acting**				**seal part**	**back-up ring**
 (0,1)	compact piston seal with integrated guiding elements. excellent static sealing capacity, suitable for small housings.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	250 bar (3600 psi)	s-mart SPU	s-mart POM / PA*
K17-R	**hydraulic, double acting**				**seal part**	**back-up ring**
 (0)	sthe rubber version of K-17P.. suitable for small housings with FKM high temperature and media resistance.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM
		-20 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
		-20 °C ... +100 °C	0,7 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PAEK
K19-F	**PTFE-piston seal, single acting**				**seal part**	**spring**
 (0,1,3)	finger-spring activated, asymmetrical PTFE piston seal, low friction and good dry running properties, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C	15 m/s	100 bar (1450 psi)	s-mart PTFE virgin	1.4310
		-200 °C ... +260 °C	15 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310
		-200 °C ... +260 °C	15 m/s	160 bar (2300 psi)	s-mart PTFE bronze	1.4310
		-200 °C ... +80 °C	15 m/s	200 bar (2900 psi)	s-mart UHMWPE	1.4310
K20-R	**hydraulic, double acting**				**seal part**	**back-up ring**
 (0)	space saving, compact piston seal, suitable for standard o-ring housings. advantage compared to o-ring: integrated active back-up rings for high pressure, design with interference fit on outside diameter prevents twisting in dynamic applications.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart NBR	s-mart POM / PA*
		-25 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HNBR	s-mart POM / PA*
		-20 °C ... +200 °C	0,5 m/s	700 bar (10.000 psi)	s-mart FKM	s-mart PAEK
		-25 °C ... +150 °C	0,7 m/s	700 bar (10.000 psi)	s-mart HNBR	s-mart PTFE
K21-P	**hydraulic, single acting**				**seal part**	**o-ring**
 (0)	o-ring activated symmetric rod seal with sharp-edged sealing lips, good sealing effect at zero pressure. recommended for high viscosity fluids, not recommended for new designs (profile S03-P preferred).	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR
K22-P	**hydraulic, single acting**				**seal part**	**support ring**
 (0)	symmetric piston seal with support ring for simple applications to serve repair purpose, not recommended for new designs (profile K01-P preferred).	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart POM / PA*
K22-R	**hydraulic, single acting**				**seal part**	**support ring**
 (0)	the rubber version of K22-P. higher media and temperature resistance with FKM compared to K22-P.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	s-mart POM
		-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	s-mart PA
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM	s-mart PTFE glass
		-50 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	s-mart POM
		-40 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	s-mart PA
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	s-mart POM
		-25 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	s-mart PA
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	s-mart PTFE glass

linear moving rotating oscillating spiral moving static

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0 machined product

application & profile	description	temperature	max. speed	max. pressure	material		
K23-N	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (0,1)	profile ring-activated compact piston seal with integrated back-up rings, excellent static sealing capacity. external guiding elements required.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
K23-D	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (0)	profile ring-activated compact piston seal with integrated back-up rings. excellent static and dynamic sealing capacity. external guiding elements required.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
K23-H	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (1)	profile ring-activated compact piston seal with integrated back-up rings. design for high pressure range, excellent static sealing capacity. mainly used in mining / tunneling industry. external guiding elements required.	-20 °C ... +100 °C	0,3 m/s	1500 bar (21000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,3 m/s	1500 bar (21000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
K23-F	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
 (0,1)	profile ring-activated compact PTFE piston seal with integrated back-up rings. low friction, good chemical and thermal resistance. external guiding elements required.	-30 °C ... +100 °C	1,5 m/s	500 bar (7200 psi)	s-mart PTFE glass	s-mart NBR	s-mart POM
		-30 °C ... +100 °C	1,5 m/s	500 bar (7200 psi)	s-mart PTFE glass	s-mart NBR	s-mart PA
		-20 °C ... +200 °C	1,5 m/s	400 bar (5800 psi)	s-mart PTFE glass	s-mart FKM	s-mart PEEK
		-20 °C ... +200 °C	1,5 m/s	400 bar (5800 psi)	s-mart PTFE glass	s-mart FKM	s-mart PTFE carbon
		-20 °C ... +200 °C	1,5 m/s	400 bar (5800 psi)	s-mart PTFE carbon	s-mart FKM	s-mart PTFE carbon
K23-SA	**hydraulic, double acting**				**seal part**	**back-up ring**	**guide ring**
 (1)	the K23-SA is a high-pressure heavy-duty piston compact seal with excellent leakage control and high extrusion and wear resistance.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
K23-SB	**hydraulic, double acting**				**seal part energizer**	**guide ring**	
 (3)	three-piece piston compact seal with rubber or rubber fabric sealing element and POM back up.	-35 °C ... +110 °C	0,5 m/s	500 bar (7251 psi)	NBR fabric & NBR	s-mart POM	
K24-P	**hydraulic, single acting**						
 (0)	chevron ring with flexible lip design. replacement part for standard commercial housings (male and female adapter mainly made of metal).	-30 °C ... +110 °C	0,5 m/s	500 bar (7200 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	500 bar (7200 psi)	s-mart HPU		
		-50 °C ... +110 °C	0,5 m/s	500 bar (7200 psi)	s-mart LTPU		
		-20 °C ... +110 °C	0,7 m/s	500 bar (7200 psi)	s-mart SPU		
		-30 °C ... +110 °C	0,5 m/s	500 bar (7200 psi)	s-mart GPU		
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR		
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**		
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR		

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
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0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material		
K32-P	**hydraulic, single acting**				**seal part**	**collar**	**guide-ring**
 (0)	chevron sealing set, design with extremely flexible sealing lips for difficult operating conditions like bad guiding, large tolerance range. available as total chevron sealing set as well as intermediate chevrons only (in case of metal male and female adapters).	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart PU	s-mart POM / PA*	s-mart POM/PA*
		-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart HPU	s-mart POM / PA*	s-mart POM/PA*
		-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart LTPU	s-mart POM / PA*	s-mart POM/PA*
		-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart SPU	s-mart POM / PA*	s-mart POM/PA*
		-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart GPU	s-mart POM / PA*	s-mart POM/PA*
K35-P	**hydraulic, double acting**						
 (0,1,3)	compact piston seal with almost no dead spots as required for applications in food and pharma industry, also commonly used as o-ring replacement, because design with interference fit on outside diameter maintains non-twisting in dynamic applications.	-30 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart PU		
		-20 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart HPU		
		-50 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart LTPU		
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU		
		-30 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart GPU		
K60	**hydraulic, double acting**				**seal part**	**energizer**	
 (1,3)	the seal part consist of a PTFE base and an x-ring. the PTFE provides the media and temperature resistance. the x-ring provides a defined sealing lip to the PTFE sealing part.	-30 °C ... +100 °C	3,0 m/s	600 bar (8700 psi)	s-mart PTFE bronze	s-mart NBR	
		-10 °C ... +200 °C	3,0 m/s	600 bar (8700 psi)	s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	3,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	3,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	3,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart EPDM**	
		-30 °C ... +100 °C	3,0 m/s	600 bar (8700 psi)	PTFE+carbon graphite	s-mart NBR	
		-10 °C ... +200 °C	3,0 m/s	600 bar (8700 psi)	PTFE+carbon graphite	s-mart FKM	
		-45 °C ... +145 °C	3,0 m/s	600 bar (8700 psi)	PTFE+carbon graphite	s-mart EPDM**	
K61	**hydraulic, double acting**				**seal part**	**energizer**	
 (1,3)	K60 with just one energizing o-ring for smaller housings.	-30 °C ... +100 °C	2,0 m/s	400 bar (5800 psi)	s-mart PTFE bronze	s-mart NBR	
		-45 °C ... + 80 °C	2,0 m/s	400 bar (5800 psi)	s-mart PTFE bronze	s-mart NBR	
		-10 °C ... +200 °C	2,0 m/s	400 bar (5800 psi)	s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	2,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart NBR	
		-45 °C ... + 80 °C	2,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	2,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	2,0 m/s	250 bar (3620 psi)	PTFE + carbon fibre	s-mart EPDM**	
		-30 °C ... +100 °C	2,0 m/s	400 bar (5800 psi)	PTFE + carbon graphite	s-mart NBR	
		-45 °C ... + 80 °C	2,0 m/s	400 bar (5800 psi)	PTFE + carbon graphite	s-mart NBR	
		-10 °C ... +200 °C	2,0 m/s	400 bar (5800 psi)	PTFE + carbon graphite	s-mart FKM	
		-45 °C ... +145 °C	2,0 m/s	400 bar (5800 psi)	PTFE + carbon graphite	s-mart EPDM**	
K62	**hydraulic, double acting**				**seal part**	**support ring**	**guide ring**
 (2,3)	the piston seal K62 range has been designed to meet the needs of hydraulic equipments operating at high pressures and subjected to severe loading and vibration conditions. K62 can tolerate vibrations and severe misalignment.	-40 °C ... +130 °C	0,5 m/s	700 bar (10152 psi)	s-mart NBR	NBR fabric	s-mart POM
K64	**pneumatic, single or double acting**						
 (3)	for pneumatic cylinders, with short stroke, single or double acting, optional with magnetic ring. the magnet is housed in a groove between the two opposite seals.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart PU		
K65	**hydraulic, single acting**						
 (2,3)	the profile K65 cylinder sealing set is manufactured in two parts and consists of a fabric reinforced symmetrical lip ring and a back-up ring made of fabric reinforced hard rubber.	-40 °C ... +100 °C	1,0 m/s	500 bar (7251 psi)	NBR with fabric reinforced		

linear moving rotating oscillating spiral moving static

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0 machined product

hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material	
K66  (2,3)	**hydraulic** for double-acting pistons with low housing height.	-40 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	**seal part** s-mart NBR fabric	**back-up ring** s-mart NBR / POM
K67  (3)	**hydraulic, double acting** piston seal with a steel base and vulcanised, springloaded sealing lips.	-30 °C ... +100 °C	0,5 m/s	60 bar (870 psi)	**seal part** s-mart NBR	**back-up ring** spring steel wire
K68  (3)	**pneumatic, double acting** piston seal with steel base and vulcanised sealing lips with special pneumatic sealing edges.	-30 °C ... +100 °C -30 °C ... + 80 °C	1,0 m/s 1,0 m/s	12 bar (174 psi) 12 bar (174 psi)	**seal part** s-mart NBR s-mart PU	**base plate** metal (mild steel) metal (mild steel)
K69  (3)	**pneumatic, single acting** compact pneumatic piston with a cup seal and a vulcanized metal disc support with sealing and guiding function in one.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart NBR	**base plate** metal (mild steel)
K70  (3)	**pneumatic, double acting** piston seal with steel base plate, vulcanised buffers and sealing lips with special pneumatic sealing edges. sealing and guiding function in one. for double acting applications.	-20 °C ... + 100 °C	1,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**base plate** metal (mild steel)
K71  (3)	**pneumatic, single acting** compact pneumatic piston with a cup seal, vulcanized metal disc support and buffer. sealing, guiding and cushioning in one.	-30 °C ... + 100 °C	1,0 m/s	12 bar (174 psi)	**seal part** s-mart NBR	**base plate** metal (mild steel)
K72  (3)	**pneumatic, double acting** piston seal with light alloy/ polyamide body, snap-action seal and integrated guide.	-20 °C ... + 100 °C	1,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**base plate & guide ring** s-mart POM & PA
K73  (3)	**pneumatic, double acting** pneumatic piston seal with double u-ring and integrated guiding. for double-acting applications.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart NBR	

linear moving rotating oscillating spiral moving static

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hydraulics & pneumatics : piston seals

application & profile	description	temperature	max. speed	max. pressure	material		
K74	**pneumatic, single acting**						
 (3)	single acting pneumatic piston seal with integrated guiding.	-30 °C ... +800 °C	1,0 m/s	16 bar (232 psi)	s-mart NBR		
K75	**pneumatic, double acting**						
 (1)	for double acting pneumatic cylinders and valves. this profile requires only small housing dimensions. low friction seal with two micro sealing lips and grease deposit in between.	-20 °C ... +100 °C	1,0 m/s	12 bar (174 psi)	s-mart NBR		
K76	**pneumatic, double acting**						
 (1)	versus K75 single lip and grooves on both front sides for pressure activation.	-20 °C ... +100 °C	1,0 m/s	12 bar (174 psi)	s-mart NBR		
K77	**pneumatic, double acting**						
 (1)	double acting pneumatic seal with grooves on the front side for pressure activation.	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR		
K78	**hydraulic, single acting**				**seal part**	**back-up ring**	**guide-ring**
 (2,3)	single acting hydraulic piston seal with a rubber fabric reinforced seal base, rubber seal and POM backup.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	NBR fabric	s-mart POM
K80	**hydraulic, single acting**				**seal part**	**back-up ring**	**guide-ring**
 (2)	identical to K79 with integrated retainer ring.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	NBR fabric	s-mart POM
K82	**hydraulic, single acting**				**seal part**	**back-up ring**	**guide-ring**
 (2,3)	the K82 series give general characteristics that are suitable for piston application in double-acting cylinders. composed of three elements: main sealing element in reinforced rubber fabric (our type FUCA 77), a NBR energizer that ensures that the sealing lips of the main element are working even in cases of low pressure, and to prevent extrusion, an acetal resin anti-extrusion ring in POM has been incorporated into the main element.	-30 °C ... +100 °C	0,5 m/s	700 bar (10152 psi)	NBR fabric	s-mart NBR	s-mart POM
K86	**hydraulic, single acting**						
 (1)	the K86 u-ring has a compact design which functions well in low pressure areas and attains a particularly long service life. The compact seal K86 has a symmetrical design which allows it to be used as a piston seal and as a rod seal.	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		

linear moving rotating oscillating spiral moving static

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hydraulics & pneumatics : piston seal

application & profile	description	temperature	max. speed	max. pressure	material
K88  (2)	**pneumatic, double acting** mainly for the sealing of spool valves. also to be used for mini-clamping and short stroke cylinders.	-30 °C ... +110 °C	1,0 m/s	10 bar (145 psi)	s-smart NBR

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-smart POM up to ø260 mm, s-smart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material	
S01-P	**hydraulic, single acting**					
 (0,1)	asymmetric rod seal for standard applications. interference fit on outside diameter maintains stable fit in the housing. design provides ultimate sealing effect over a wide temperature range and good back pumping ability. also used as secondary seal in combination with PTFE-seal type S09	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	
		-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	
		-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	
		-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	
S01-R	**hydraulic, single acting**					
 (0,1,3)	similar to profile S01-P, but for rubber material with more adaptation possibilities to meet temperature and media resistance.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM	
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	
		-60 °C ... +200 °C	-	-	s-mart MVQ	
S01-SC	**pneumatic, single acting**					
 (1,3)	the profile S01-SC rod seal is a lip seal specially developed for use in pneumatics.	-20 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart NBR	
S02-P	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0)	asymmetric rod seal for standard applications as S01-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart POM / PA*
S02-PD	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0)	asymmetric rod seal for standard applications ; but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart POM / PA*
S02-R	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0,1)	similar to S02-P, but design for rubber materials to meet higher temperature resistance.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM*
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
		-50 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM*
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA*
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM*
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass
S02-RD	**hydraulic, single acting**				**seal part**	**back-up ring**
 (0)	similar to S02-PD, but designed for rubber materials for higher temperature resistance and certain media resistance.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM*
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
		-50 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM*
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA*
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM*
		-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass

linear moving rotating oscillating spiral moving static

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
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1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material		
S02-S	**hydraulic, single acting**				**seal part**	**back-up ring**	
 (0,1)	asymmetric rod seal, for special housings (DIN/ ISO 7425 part 2) and for the use as primary rod seal in sealing systems. due to design with active back-up ring suitable for high pressure peaks or larger extrusion gaps.	-30 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*	
		-20 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart HPU	s-mart POM / PA*	
		-40 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart SPU	s-mart POM / PA*	
		-20 °C ... +100 °C	7,0 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart POM / PA*	
		-30 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart GPU	s-mart POM / PA*	
S02-SA	**hydraulic, single acting**				**seal part**	**back-up ring**	
 (2)	u-ring with asymmetrical profile of the sealing lips, fabric reinforcement on the dynamic sealing side and back-up ring for higher extrusion resistance.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	s-mart POM*	
S03-P	**hydraulic, single acting**				**seal part**	**o-ring**	
 (0)	o-ring activated, asymmetrical rod seal. interference fit on outside diameter maintains stable fit in the housing. especially suitable for short stroke applications (e.g. spindle seals, coupling actuators).	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	
S03-F	**hydraulic, single acting**				**seal part**	**o-ring**	
 (0)	o-ring activated, asymmetrical PTFE rod seal, low friction: good dry running properties; good temperature and media resistance with the right choice of o-ring (i.e. viton); almost no dead spots there therefore applied in food & pharma industry.	-20 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart FKM	
		-20 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart FKM	
		-25 °C ... +150 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart HNBR	
		-25 °C ... +150 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart HNBR	
		-60 °C ... + 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	s-mart MVQ	
		-60 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart MVQ	
		-60 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart MVQ	
S03-S	**hydraulic, single acting**				**seal part**	**spring**	
 (0)	asymmetrical PTFE rod seal, helicoil spring activated; low friction and good dry running properties, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry.	-200 °C ...+260 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	1.4310	
		-200 °C ...+260 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310	
		-200 °C ...+ 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	1.4310	
S04-P	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
 (0)	related to S03-P in the basic design, but due to the additional back-up ring suitable for larger extrusion gaps or higher pressure range.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
S04-PD	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
 (0)	identical to S04-P; triangular back-up ring instead of a rectangular one.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
S05-P	**pneumatic, single acting**						
 (0,1)	asymmetric rod seal with special lip design for pneumatics; extremely wear resistant, for use in lubricated or dry pneumatic applications. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart PU		
		-20 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart HPU		
		-20 °C ... +110 °C	2,0 m/s	25 bar (360 psi)	s-mart SPU		
		-50 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart LTPU		
		-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart GPU		

linear moving rotating oscillating spiral moving static

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
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1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material	
S05-R	**pneumatic, single acting**					
 (0,1,3)	identical to S05-P, just slightly different design for rubber materials;	-30 °C ... + 80 °C	1,0 m/s	25 bar (360 psi)	s-mart NBR	
		-20 °C ... +200 °C	1,0 m/s	25 bar (360 psi)	s-mart FKM	
		-50 °C ... +150 °C	1,0 m/s	25 bar (360 psi)	s-mart EPDM**	
		-25 °C ... +150 °C	1,0 m/s	25 bar (360 psi)	s-mart HNBR	
S06-P	**hydraulic, single acting**					
 (0,1,3)	symmetric rod seal for standard applications, not recommended for new designs (profile S01-P should be preferred).	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	
		-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	
		-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	
		-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	
S06-R	**hydraulic, single acting**					
 (0,1,3)	similar to S06-P, but designed for rubber materials as listed.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM	
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	
		-60 °C ... +200 °C	-	-	s-mart MVQ	
S06-SA	**hydraulic, single acting**					
 (1,3)	old fashioned u-ring desgn; symmetrical profile for pistons as well as rods, applicable only for rubber materials.	-30 °C ... +100 °C	0,5 m/s	100 bar (1450 psi)	s-mart NBR	
S07-P	**hydraulic, single acting**				**seal part**	**o-ring**
 (0,1)	o-ring activated symmetric rod seal for standard applications, not recommended for new designs (profile S03-P preferred).	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR
S08-P	**hydraulic, double acting**					
 (0)	asymmetric compact rod seal with stable fit in the housing. compact design mainly used for high viscose fluids or for extreme small housings, not suitable for high speed applications.	-30 °C ... +110 °C	0,3 m/s	400 bar (5800 psi)	s-mart PU	
		-20 °C ... +110 °C	0,3 m/s	400 bar (5800 psi)	s-mart HPU	
		-20 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart SPU	
		-50 °C ... +110 °C	0,3 m/s	400 bar (5800 psi)	s-mart LTPU	
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	
S08-PE	**hydraulic, double acting**					
 (0)	based on the S08-P design, but with groove; with small groove.	-30 °C ... +110 °C	0,3 m/s	400 bar (5800 psi)	s-mart PU	
		-20 °C ... +110 °C	0,3 m/s	400 bar (5800 psi)	s-mart HPU	
		-20 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart SPU	
		-50 °C ... +110 °C	0,3 m/s	400 bar (5800 psi)	s-mart LTPU	
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	
S08-R	**hydraulic, single acting**					
 (0)	based on the S08-P design, but for rubber materials;	-30 °C ... +100 °C	0,3 m/s	160 bar (2300 psi)	s-mart NBR	
		-20 °C ... +200 °C	0,3 m/s	160 bar (2300 psi)	s-mart FKM	
		-50 °C ... +150 °C	0,3 m/s	160 bar (2300 psi)	s-mart EPDM**	
		-25 °C ... +150 °C	0,3 m/s	160 bar (2300 psi)	s-mart HNBR	

 linear moving  rotating  oscillating  spiral moving  static

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1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material	
S08-SA	**pneumatic, single acting**					
 (1)	the S08-SA u-ring has a compact design which functions well in low pressure areas and attains a particularly long service life. the compact seal S08-SA has a symmetrical design which allows it to be used as a piston seal and as a rod seal.	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
S08-SB	**hydraulic, single acting**					
 (1)	double lip seal in a compact design for small grooves. good sealing effect at low system pressures. due to the incorporation of an oil trap between the two sealing lips, friction at pressures above approx. 10 MPa is reduced.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
S09-E	**hydraulic, single acting**				**glide ring**	**o-ring**
 (0,1,3)	o-ring activated asymmetric PTFE rod seal, with low friction; called "stepseal" because of the design;. in tandem design together with double acting wipers for extreme low or high speed or positioning functions. as primary seal in combination with secondary S01-P seal with good resistance to pressure shocks used in mobile hydraulics, machine tools, injection moulding machines, heavy hydraulics.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart EPDM **
		-60 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart MVQ
		-60 °C ... +80 °C	10,0 m/s	400 bar (5800 psi)	s-mart UHMWPE	s-mart MVQ
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR
S09-D	**hydraulic, double acting**				**glide ring**	**o-ring**
 (0,1,3)	is an S09-E for double acting applications;	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart EPDM **
		-60 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart MVQ
		-60 °C ... +80 °C	10,0 m/s	400 bar (5800 psi)	s-mart UHMWPE	s-mart MVQ
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR
S09-P	**hydraulic, single acting**				**glide ring**	**o-ring**
 (0)	identical to S09-E, but the glide ring in PU; less speed and less extrusion resistance compared to S09-E;	-30 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart PU	s-mart NBR
		-20 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart HPU	s-mart NBR
		-30 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart LTPU	s-mart NBR
		-20 °C ... +100 °C	1,4 m/s	250 bar (3600 psi)	s-mart SPU	s-mart NBR
		-30 °C ... +100 °C	1,0 m/s	250 bar (3600 psi)	s-mart GPU	s-mart NBR
S09-ES	**hydraulic, single acting, rectangular energizer**				**glide ring**	**energizer**
 (0)	similar to S09-E, but with rectangular energizer; special heavy duty design for heavy industry hydraulics or for special housing dimensions.	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart EPDM**
		-25 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart HNBR
		-30 °C ... +110 °C	5,0 m/s	400 bar (5800 psi)	s-mart XPU	s-mart NBR
S09-DS	**hydraulic, double acting, rectangular energizer**				**glide ring**	**energizer**
 (0,1,3)	is an S09-ES for double acting applications;	-30 °C ... +100 °C	10,0 m/s	400 bar (5800 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	400 bar (5800 psi)		s-mart FKM
		-50 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart EPDM**
		-25 °C ... +150 °C	10,0 m/s	400 bar (5800 psi)		s-mart HNBR
		-30 °C ... +110 °C	5,0 m/s	400 bar (5800 psi)	s-mart XPU	s-mart NBR
S09-SA	**hydraulic, double acting**				**seal part**	**energizer**
 (1,3)	special version of S09-D for double acting applications; both lateral profile flanks are inclined so that the seal profile tapers towards the seal surface to achieve a pressure-related maximum compression. the edge angle created by the special S09-SA cross sectional form permits an additional degree of freedom and enables a slight tilting movement of the seal.	-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart NBR
		-50 °C ... +150 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart FKM
		-25 °C ... +150 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart NBR
		-20 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart FKM
		-50 °C ... +150 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart EPDM**
		-25 °C ... +150 °C	15,0 m/s	800 bar (11603 psi)	s-mart PU	s-mart NBR

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

application & profile	description	temperature	max. speed	max. pressure	material		
S09-SB	**hydraulic, double acting**				**seal part**	**energizer**	
 (1,3)	he rod seal S09-SB, consisting of a PTFE rod sealing ring and an o-ring, is a system for sealing rods and plungers in hydraulic cylinders. the sealing set S09-SB is appropriate for dynamic applications as an alternative to an o-ring, for situations where sealing performance and friction have to be optimized.	-30 °C ... +100 °C	15,0 m/s	350 bar (5076 psi)	s-mart PTFE bronze	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	350 bar (5076 psi)	s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart EPDM**	
S09-SD	**hydraulic, double acting**				**seal part**	**energizer**	
 (1)	identical to S09-SB, just simplified with a rectangular PTFE ring;	-30 °C ... +100 °C	2,0 m/s	160 bar (2320 psi)	s-mart PTFE bronze	s-mart NBR	
S09-SF	**hydraulic, single acting**				**seal part**	**energizer**	
 (1,3)	in order to achieve a contact pressure curve which enhances the sealing effect, the seal has a chamfer on the low pressure side. when under pressure and exposed to friction against the piston rod, this chamfer causes the seal to tilt slightly so that the seal ring is forced against the side of the groove. this creates an area of maximum pressure at the edge of the seal.	-45 °C ... +100 °C	5,0 m/s	600 bar (8702 psi)	s-mart PU	s-mart NBR	
S09-SG	**hydraulic, single acting**				**seal part**	**energizer**	
 (1,3)	special step seal design; the S09-SG possesses superior extrusion resistance under all service conditions and allows hardware clearance to be significantly increased.	-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	PTFE + high bronze	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	800 bar (11603 psi)	PTFE + high bronze	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart EPDM**	
		-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	PTFE + high carbon fibre	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	PTFE + high carbon fibre	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	600 bar (8702 psi)	PTFE + high carbon fibre	s-mart EPDM**	
		-30 °C ... +100 °C	15,0 m/s	300 bar (4351 psi)	s-mart PTFE glass	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	300 bar (4351 psi)	s-mart PTFE glass	s-mart FKM	
		-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	PTFE + carbon graphite	s-mart NBR	
		-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	PTFE + carbon graphite	s-mart FKM	
		-45 °C ... +145 °C	15,0 m/s	600 bar (8702 psi)	PTFE + carbon graphite	s-mart EPDM**	
		-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	s-mart PU	s-mart NBR	
S1012-M	**hydraulic, single acting**				**S10-A**	**S11-M**	**S12-M**
 (0,3)	chevron or V packing for heavy hydraulics; parting surface design.	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart NBR	s-mart PTFE glass
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart FKM	s-mart PTFE glass
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart EPDM	s-mart PTFE glass
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart HNBR	s-mart PTFE glass
S1012-SA	**hydraulic, single acting**				**seal part**	**back-up ring**	**guide ring**
 (2,3)	the chevrons or vees	-30 °C ... +130 °C	0,5 m/s	400 bar (5800 psi)	NBR fabric	NBR fabric	s-mart POM
		-20 °C ... +150 °C	0,5 m/s	400 bar (5800 psi)	FKM fabric	FKM fabric	s-mart POM
		-20 °C ... +200 °C	0,5 m/s	400 bar (5800 psi)	FKM fabric	FKM fabric	s-mart PTFE

linear moving rotating oscillating spiral moving static

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material		
S1012-T	**hydraulic, single acting**				**S10-A**	**S11-T**	**S12-T**
 (0)	chevron or V packing for heavy hydraulics; design for CNC machining;	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart NBR	s-mart PTFE glass
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart FKM	s-mart PTFE glass
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart EPDM	s-mart PTFE glass
		-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass	s-mart HNBR	s-mart PTFE glass
S1315-T	**hydraulic, single acting**				**S13-T**	**S14-T**	**S15-T**
 (0)	chevron sealing set, design with flexible sealing lips, good sealing ability in higher pressure range. for heavy industry hydraulics, water hydraulic systems	-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart GPU	s-mart POM / PA*
S16-A	**hydraulic/pneumatic, single acting**						
 (0,1,3)	simple hat seal, usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
		-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
		-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
		-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
S16-B	**hydraulic/pneumatic, single acting**						
 (0)	simple hat seal, usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
		-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
		-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
		-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
S16-SB	**hydraulic/pneumatic, single acting**				**seal part**	**energizer**	
 (1)	lip seal, spring-loaded in some cases. clamping flange for fixing in the housing.	-30 °C ... +100 °C	0,5 m/s	10 bar (145 psi)	s-mart NBR	spring	
S17-P	**hydraulic, single acting**						
 (0,1,3)	asymmetric rod seal with additional sealing-respectively stabilizing lip. interference fit on outside diameter maintains stable fit in the housing. design mainly used for telescopic cylinders, mobile hydraulic or for special housing dimensions.	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU		
		-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU		
		-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU		
		-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU		
S17-R	**hydraulic, single acting**						
 (0)	as profile S17-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
		-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		

linear moving rotating oscillating spiral moving static

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

application & profile	description	temperature	max. speed	max. pressure	material	
S17-SA (1)	**hydraulic, single acting** the rod seal S17-SA with asymmetrical profile, inner lip set back, additional support edge and sealing edge as well as press fit at the outside diameter.	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
S17-SB (1)	**hydraulic, single acting** the rod seal S17-SB with asymmetrical profile, inner lip set back, grooved contact surface on the inside diameter as well as press fit at the outside diameter.	-30 °C ... +110 °C	0,6 m/s	320 bar (4641 psi)	s-mart PU	
S18-P (0,1)	**hydraulic/pneumatic, single acting** asymmetric rod seal as S17-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range.				**seal part**	**back-up ring**
		-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart HPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	600 bar (8700 psi)	s-mart SPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart LTPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart GPU	s-mart POM / PA*
S18-R (0)	**hydraulic/pneumatic, single acting** asymmetric rod seal with additional sealing- respectively stabilizing lip and back ring. good adaptation possibilities for diverse temperatures and media by selection of suitable seal material, due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range.				**seal part**	**back-up ring**
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM
		-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA
		-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM
		-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA
		-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
		-20 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM
		-20 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA
		-20 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass
S19-F (0,1,3)	**PTFE-rodseal, single acting** finger spring activated, asymmetrical PTFE rod seal, low friction and good dry running properties, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry.				**seal part**	**spring**
		-200 °C ... +260 °C	15,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	1.4310
		-200 °C ... +260 °C	15,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310
		-200 °C ... +260 °C	15,0 m/s	160 bar (2300 psi)	s-mart PTFE Bronze	1.4310
		-200 °C ... + 80 °C	15,0 m/s	200 bar (2900 psi)	s-mart PE	1.4310
S20-R (0)	**hydraulic, double acting** space saving, compact rod seal,fits standard o-ring housings. advantage compared to o-ring : integrated active back-up rings for high pressure, design with interference fit on outside diameter maintains non-twisting in dynamic applications.				**seal part**	**back-up ring**
		-30 °C ... +100 °C	0,5 m/s	700 bar (10000 psi)	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10000 psi)	s-mart HNBR	s-mart POM / PA*
		-20 °C ... +200 °C	0,5 m/s	700 bar (10000 psi)	s-mart FKM	s-mart PAEK / PTFE
		-25 °C ... +150 °C	0,5 m/s	700 bar (10000 psi)	s-mart HNBR	s-mart PAEK / PTFE
S21-P (0)	**hydraulic, single acting** o-ring activated symmetric rod seal with sharp-edged sealing lips, good sealing effect for high viscosity fluids, not recommended for new designs (profile S03-P preferred).				**seal part**	**o-ring**
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR 70
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR 70
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR 70
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR 70
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR 70
S22-P (0)	**hydraulic, single acting** symmetric rod seal with support ring for simple applications to serve repair purpose, not recommended for new designs (profile S01-P preferred). retainer ring in angled design possible.				**seal part**	**support ring**
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart POM / PA*

linear moving rotating oscillating spiral moving static

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material		
S22-R	**hydraulic, single acting**				**seal part**	**support ring**	
 (0)	symmetric rod seal as S22-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. retainer ring in angled design possible.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	s-mart POM	
		-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	s-mart PA	
		-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM	s-mart PTFE glass	
		-50 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	s-mart POM	
		-40 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	s-mart PA	
		-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	s-mart PTFE glass	
		-25 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	s-mart POM	
		-25 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	s-mart PA	
		-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	s-mart PTFE glass	
S24-P	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
 (0,1)	o-ring activated rod seal with additional stabilizing lips and integrated active back ring for larger extrusion gaps, mainly used in mining industry.	-30 °C ... +100 °C	0,5 m/s	700 bar (10000 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	700 bar (10000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10000 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	700 bar (10000 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	700 bar (10000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
S2527-F	**PTFE chevron set, single acting**				**S25-F**	**S26-F**	**S27-F**
 (0)	optimized for low pressure, unequal angled chevron design results in good contact pressure even in low pressure range. external spring pretension necessary. mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C	1,5 m/s	100 bar (1450 psi)	s-mart PTFE glass	s-mart PTFE virgin	s-mart PTFE glass
S2931-F	**PTFE chevron set, single acting**				**S29-F**	**S30-F**	**S31-F**
 (0)	optimized for high pressure, equal angled chevron design suitable for high pressure range. external spring pretension necessary. mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C	1,5 m/s	315 bar (4500 psi)	s-mart PTFE glass	s-mart PTFE virgin	s-mart PTFE glass
S32-P	**hydraulic, single acting**				**seal part**	**collar**	**back-up ring**
 (0)	chevron set, design with extremely flexiblesealing lips for difficult operating conditions(bad guiding, large tolerance range). availa-ble as total chevron set as well as intermediate chevrons only (in case of metal maleand female adaptors)	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart PU	s-mart POM / PA*	s-mart POM / PA*
		-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart HPU	s-mart POM / PA*	s-mart POM / PA*
		-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart SPU	s-mart POM / PA*	s-mart POM / PA*
		-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart LTPU	s-mart POM / PA*	s-mart POM / PA*
		-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart GPU	s-mart POM / PA*	s-mart POM / PA*
S35-P	**hydraulic, double acting**						
 (0,1,3)	compact rod seal with almost no dead spots as required for applications in food and pharma industry, also commonly used as o-ring replacement, because design with interference fit on outside diameter maintains non-twisting in dynamic applications.	-30 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart PU		
		-20 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart HPU		
		-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU		
		-50 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart SPU		
		-30 °C ... +110 °C	0,4 m/s	400 bar (5800 psi)	s-mart GPU		
S60	**hydraulic, single acting**				**seal part**	**energizer**	**back-up ring**
 (2,3)	the rod seal range has been designed to meet the needs of hydraulic equipments operating at high pressures and subjected to severe loading and vibration conditions. the main sealing element is manufactured in a highly compression set resistant nitrile. the most important quality of this element is the design of the multiple sealing lips for maximum sealing efficiency and end face configuration, which ensures that the S60 can tolerate vibrations and severe misalignment. the support ring is made in cotton fabric reinforced nitrile elastomer; the "U" shape is energised when pressure is applied. the last element is the anti-extrusion ring manufactured in POM.	-40 °C ... +130 °C	0,5 m/s	700 bar (10152 psi)	s-mart NBR	NBR fabric	s-mart POM / PA*

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

application & profile	description	temperature	max. speed	max. pressure	material		
S61	**hydraulic, single acting**				**seal part energizer**	**support ring**	
 (1)	S61 with second sealing edge on the dunamic and static sealing side as well as fabric reinforcement on the dynamic sealing side and back-up ring as a gap sealing component.	-20 °C ... +110 °C	0,5 m/s	500 bar (7251 psi)	s-mart NBR	s-mart POM / PA*	
S62	**hydraulic, single acting**				**seal part energizer**	**support ring**	
 (2,3)	the S62 rod seal consisting of an elastomeric sealing element and an integrated fabric reinforced base. due to the radial pre-load an excellent sealing performance will be achieved even at low pressures. the fabric reinforced base prevents the seal from extrusion.	-30 °C ... +130 °C	0,5 m/s	250 bar (3625 psi)	s-mart NBR	NBR fabric	
S63	**hydraulic, single acting**				**seal part**	**energizer**	**back-up ring**
 (2,3)	the S63 rod seal consisting of an elastomeric sealing element and an integrated fabric reinforced base. due to the radial pre-load an excellent sealing performance will be achieved even at low pressures. the fabric reinforced base prevents the seal from extrusion. where extrusion gaps are greater than those specified or for higher pressure conditions the serie S63 with incorporated anti-extrusion ring shall be selected.	-30 °C ... +130 °C	0,5 m/s	400 bar (5800 psi	s-mart NBR	NBR fabric	s-mart POM
S64	**hydraulic, single acting**						
 (1)	the S64 rod seal is a single acting polyurethane rod seal with a unique design offering a hydrodynamic backpumping ability over the complete working pressure range. the pressure-independent, hydrodynamic sealing ability of this new sealing element requires no lubrication reservoir in the sealing area and ensures a constant and controlled pressure distribution over a wide pressure range.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		
S65	**hydraulic, single acting**				**seal part energizer**	**guide ring**	
 (1)	S65 with integrated back-up ring, additional support edge and sealing edge, components for axial fixing in the housing and press fit at the outside diameter.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM /PA*	
S67	**hydraulic, single acting**						
 (1)	the profile S67 glide seal for piston rods consists of an elastomer part and a special sliding ring. it has exceptionally good sliding properties and high tightness.	-30 °C ... +100 °C	1,0 m/s	315 bar (4568 psi)	s-mart PU		
S68	**hydraulic, single acting**						
 (2,3)	the profile S68 rod seal is a compact seal consisting of a fabric reinforced u-ring with an integral rubber sealing part. the sealing edges at the rubber part wipes off the film of liquid on the rod surface due to their radial preload. therefore an excellent sealing performance will be achieved, even at low pressures or in case of zero pressure movements of the rod. higher pressures will be transferred to the fabric reinforced u-ring, which, due to its stability, will prevent extrusion.	-30 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	NBR fabric & NBR		

linear moving rotating oscillating spiral moving static

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hydraulics & pneumatics : rod seals

application & profile	description	temperature	max. speed	max. pressure	material	
S69	**hydraulic, single acting**				**seal part**	**guide ring**
 (1)	the profile S69 rod seal is a sealing element of compact design with a special anti-extrusion ring. the main advantages of this combination are smooth running, excellent sealing performance and high wear resistance, even under exceptionally hard working conditions. these rod seals guarantee a leakfree performance even at low pressures or when rod movement occurs without pressure.	-30 °C ... +100 °C	0,5 m/s	315 bar (4568 psi)	s-mart NBR	s-mart PTFE
S70	**hydraulic, single acting**					
 (2,3)	single-piece rod seal with a rubber head set in the fabric part.	-30 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	s-mart NBR	
S73	**pneumatic, double acting**					
 (1)	single-piece rod seal with a rubber head set in the fabric part.	-20 °C ... +100 °C	1,0 m/s	12 bar (174 psi)	s-mart NBR	
S75	**hydraulic, single acting**				**seal part**	**guide ring**
 (2)	the rod seal S75 with symmetrical sealing lips which are cut at an angle of less than 45°. the lip segment made of elastomer and the fabric block at the back are vulcanized together to form a single unit. a support ring is integrated on the outer diameter of the seal unit.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR + NBR (fabric)	s-mart POM
S76	**hydraulic, single acting**				**seal part**	**guide ring**
 (1)	the rod seal S76 is designed for small grooves. it is thus particularly suitable for use in space-saving designs. for large gaps and high prssure peaks, the rod seal S76 has an integrated back up ring. this seal has two sealing lips in the dynamic sealing zone. this shape with two sealing lips provides an improvement in the leakage behaviour at low system pessures. due to the incorporation of an oil trap between the two sealing lips, friction at pressures above approx. 10 Mpa is reduced. furthermore, the second sealing lip prevent the entry of dirt from the atmosphere side.	-30 °C ... + 80 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*
S78	**pneumatic, single acting**					
 (3)	single-piece rod seal with a rubber head set in the fabric part.	-30 °C ... + 80 °C	1,0 m/s	16 MPa (232 psi)	s-mart NBR	

linear moving rotating oscillating spiral moving static

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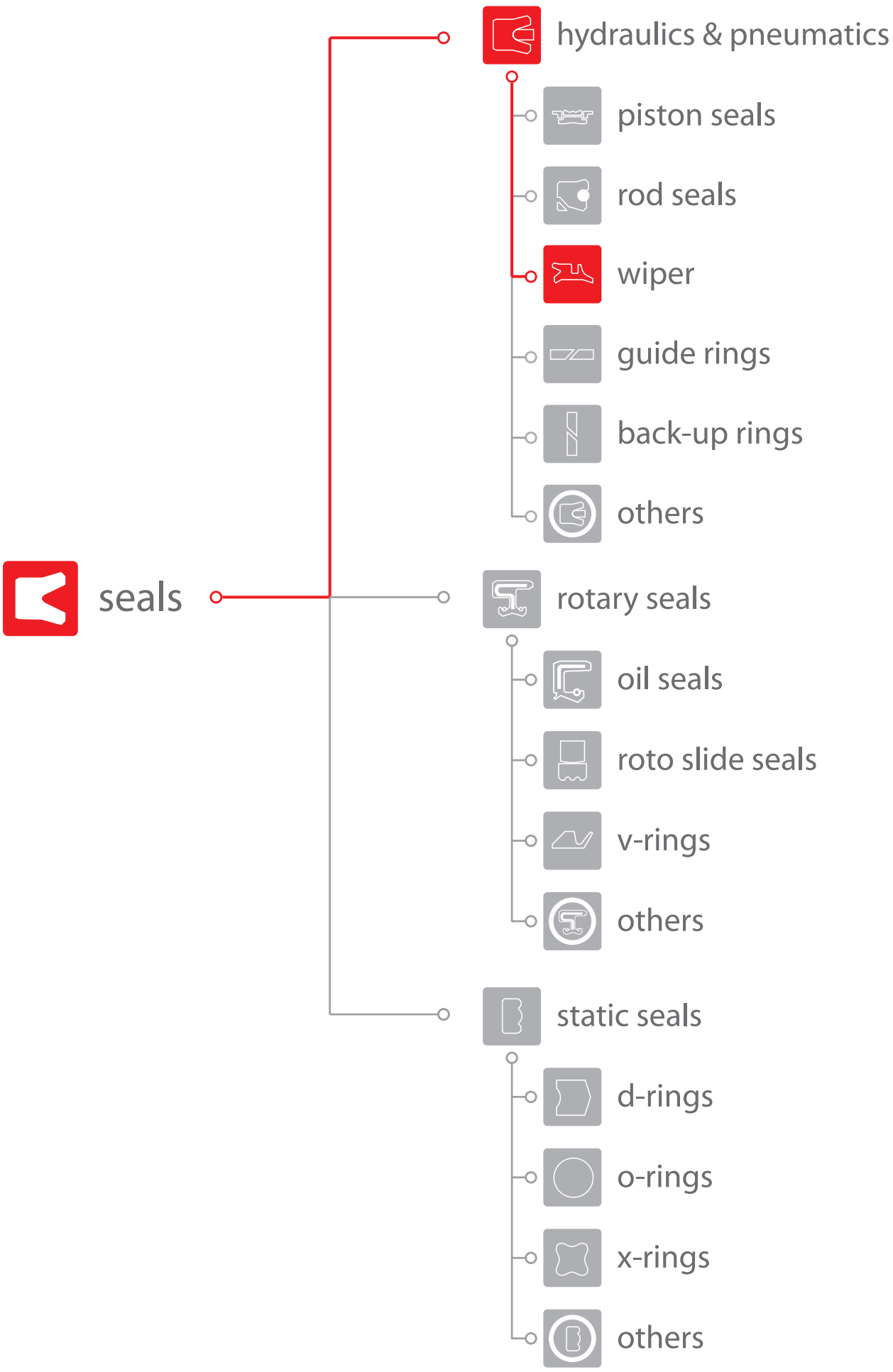
seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	material
A01-A	**hydraulic, single acting**			
 (0,1,3)	wiper with interference fit on outside diameter, providing a technically accurate closure at the cylinder. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film. back support area prevents tilting of wiper. for housings according ISO 6195-Type A	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**
A01-B	**hydraulic, single acting**			
 (0,1)	as profile A01-A, but without back support area. for housings according ISO 6195-Type A	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**
A02-A	**hydraulic, single acting**			
 (0,1,3)	wiper with interference fit on outside diameter. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film. back support area prevents tilting of wiper.	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**
A02-B	**hydraulic, single acting**			
 (0,1,3)	wiper with interference fit on outside diameter. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film.	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**
A02-I	**hydraulic, single acting**			
 (0)	as profile A02-A, but without back support area. special housing design according ISO 6195-Type C	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**

linear moving rotating oscillating spiral moving static

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0 machined product

hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	material		
A02-SA	**hydraulic, single acting**					
 (1,3)	these scrapers are manufactured in polyurethane. the static sealing lip ensures against the intrusion of dirt and fluids over the outer diameter. the scraper A02-SA has no interference at the outside diameter and can have a radial movement due rod deviations.	-35 °C ... + 80 °C	1,0 m/s	s-mart PU		
A02-SB	**hydraulic, single acting**					
 (1)	these scrapers are manufactured in polyurethane. the static sealing lip ensures against the intrusion of dirt and fluids over the outer diameter. the A02-SB has an interference to the groove outside diameter.	-35 °C ... + 80 °C	1,0 m/s	s-mart PU		
A03-A	**hydraulic, single acting**			**wiping part**	**housing**	
 (0)	wiper with mounting cage for press-fit installation into axially open housings. wiping edge assures a reliable protection against penetration of dust and dirt, the use of plastic mounting cages avoids corrosion in the press-fit. for housings according ISO 6195-Type B	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU	s-mart POM / PA*	
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU	s-mart POM / PA*	
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU	s-mart POM / PA*	
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU	s-mart POM / PA*	
		-30 °C ... +110 °C	4,0 m/s	smart GPU	s-mart POM / PA*	
		-30 °C ... +100 °C	4,0 m/s	smart NBR	s-mart POM / PA*	
		-25 °C ... +150 °C	4,0 m/s	smart HNBR	s-mart POM / PA*	
		-20 °C ... +200 °C	4,0 m/s	smart FKM	s-mart PAEK	
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**	s-mart PAEK	
A03-SA	**hydraulic, single acting**			**wiping part**	**housing**	
 (2,3)	the A03-SA is a mould-vulcanised single-acting elastomer wiper, with integral metal reinforcement for open groove assembly. in conjunction with the wiper oversize, an exact fit is obtained in the housing.	-30 °C ... +110 °C	2,0 m/s	s-mart PU	metal	
		-20 °C ... +110 °C	1,0 m/s	s-mart NBR	metal	
A03-SC	**hydraulic, single acting**			**wiping part**	**housing**	
 (2,3)	the A03-SC is a single-acting wiper. Because it is pressed against the rod, dirt is wiped from the surface by the action of the rod as it retracts. on the outer diameter, a metal caged ring is vulcanised onto the s-mart PU or NBR body.	-30 °C ... +110 °C	2,0 m/s	s-mart PU	metal	
		-20 °C ... +110 °C	1,0 m/s	s-mart NBR	metal	
A03-SD	**hydraulic, single acting**			**wiping part**	**housing**	
 (2,3)	the A03-SD wiper can be installed in an axially accessible housing. the advantage lies in the simple design of the installation housing and practical easy installation, in particular with smaller diameters. please note that the installation housing has to be designed with light chamfering.	-30 °C ... +110 °C	2,0 m/s	s-mart PU	metal	
		-20 °C ... +110 °C	2,0 m/s	s-mart NBR	metal	
A04-A	**pneumatic, single acting**					
 (0)	wiper with interference fit on outside diameter, providing a technically accurate closure at the cylinder. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film. back support area prevents tilting of wiper. for housings according ISO 6195-Type A	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU		
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU		
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU		
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU		
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU		
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR		
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**		

 linear moving  rotating  oscillating  spiral moving  static

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0 machined product

hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	material	wiping part	housing
A04-B	**pneumatic, single acting**					
 (0,1)	as profile A04-A, but without back support area. for housings according ISO 6195-Type A	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU		
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU		
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU		
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU		
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU		
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR		
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**		
A05-A	**pneumatic, single acting**					
 (0)	wiper with interference fit on outside diameter. special design of wiping lip allows retention of initial lubricating film. back support area prevents tilting of wiper.	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU		
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU		
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU		
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU		
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU		
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR		
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**		
A05-B	**pneumatic, single acting**					
 (0)	wiper with interference fit on outside diameter. special design of wiping lip allows retention of initial lubricating film.	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU		
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU		
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU		
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU		
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU		
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR		
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**		
A05-I	**pneumatic, single acting**					
 (0)	wiper with interference fit on outside diameter. special design of wiping lip allows retention of initial lubricating film.	-30 °C ... +110 °C	4,0 m/s	s-mart PU / s-mart XPU		
		-20 °C ... +110 °C	4,0 m/s	s-mart HPU/ s-mart XHPU		
		-50 °C ... +110 °C	4,0 m/s	s-mart LTPU		
		-20 °C ... +110 °C	5,0 m/s	s-mart SPU/ s-mart XSPU		
		-30 °C ... +110 °C	4,0 m/s	s-mart GPU		
		-30 °C ... +100 °C	4,0 m/s	s-mart NBR		
		-25 °C ... +150 °C	4,0 m/s	s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s	s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s	s-mart EPDM**		
A06-A	**pneumatic, single acting**				**wiping part**	**housing**
 (0)	wiper with mounting cage for press-fit installation into axially open housings. special design of wiping lip allows retention of initial lubricating film, the use of plastic mounting cages avoids corrosion at the press-fit. for housings according ISO 6195-Type B	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU	s-mart POM / PA*	
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU	s-mart POM / PA*	
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU	s-mart POM / PA*	
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU	s-mart POM / PA*	
		-30 °C ... +110 °C	4,0 m/s	smart GPU	s-mart POM / PA*	
		-30 °C ... +100 °C	4,0 m/s	smart NBR	s-mart POM / PA*	
		-25 °C ... +150 °C	4,0 m/s	smart HNBR	s-mart POM / PA*	
		-20 °C ... +200 °C	4,0 m/s	smart FKM	s-mart PAEK	
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**	s-mart PAEK	

 linear moving  rotating  oscillating  spiral moving  static

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hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	material
A07-A	**pneumatic, single acting**			
 (0)	wiper to fit in angled housings (30°angle). design mainly used in british equipment, in inch as well as metric dimensions.	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU
		-30 °C ... +110 °C	4,0 m/s	smart GPU
		-30 °C ... +100 °C	4,0 m/s	smart NBR
		-25 °C ... +150 °C	4,0 m/s	smart HNBR
		-20 °C ... +200 °C	4,0 m/s	smart FKM
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**
A08-A	**hydraulic/pneumatic, single acting**			
 (0)	wiper usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU
		-30 °C ... +110 °C	4,0 m/s	smart GPU
		-30 °C ... +100 °C	4,0 m/s	smart NBR
		-25 °C ... +150 °C	4,0 m/s	smart HNBR
		-20 °C ... +200 °C	4,0 m/s	smart FKM
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**
A08-B	**hydraulic/pneumatic, single acting**			
 (0)	wiper usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU
		-30 °C ... +110 °C	4,0 m/s	smart GPU
		-30 °C ... +100 °C	4,0 m/s	smart NBR
		-25 °C ... +150 °C	4,0 m/s	smart HNBR
		-20 °C ... +200 °C	4,0 m/s	smart FKM
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**
A09-A	**hydraulic, single acting**			
 (0)	wiper with dimensioning according to common types used in USA. for housings according AN 6231, ANSI/B93.35	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU
		-30 °C ... +110 °C	4,0 m/s	smart GPU
		-30 °C ... +100 °C	4,0 m/s	smart NBR
		-25 °C ... +150 °C	4,0 m/s	smart HNBR
		-20 °C ... +200 °C	4,0 m/s	smart FKM
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**
A10-A	**hydraulic, single acting**			
 (0)	wiper with dimensioning according to common types used in USA. fixed relation between cross-section and height of wiper. for housings according AN 6231, ANSI/B93.35	-30 °C ... +110 °C	4,0 m/s	smart PU / smart XPU
		-20 °C ... +110 °C	4,0 m/s	smart HPU/ smart XHPU
		-50 °C ... +110 °C	4,0 m/s	smart LLTPU
		-20 °C ... +110 °C	5,0 m/s	smart SPU/ smart XSPU
		-30 °C ... +110 °C	4,0 m/s	smart GPU
		-30 °C ... +100 °C	4,0 m/s	smart NBR
		-25 °C ... +150 °C	4,0 m/s	smart HNBR
		-20 °C ... +200 °C	4,0 m/s	smart FKM
		-50 °C ... +150 °C	4,0 m/s	smart EPDM**

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* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
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0 machined product

hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	max. pressure	material	wiping part	housing
A11-A	**hydraulic/pneumatic, double acting**						
 (0,1,3)	wiper including additional sealing lip. used in combination with o-ring activated PTFE seals (tandem) to reduce residual oil film. also used as complete solution for pneumatic applications in small diameter range. max. allowed pressure load: 16 bar (230 psi)	-30 °C ... +110 °C	4,0 m/s		s-mart PU		
		-20 °C ... +110 °C	4,0 m/s		s-mart NBR		
		-50 °C ... +110 °C	4,0 m/s		s-mart HPU		
		-20 °C ... +110 °C	5,0 m/s		s-mart SPU		
		-30 °C ... +110 °C	4,0 m/s		s-mart LTPU		
		-30 °C ... +100 °C	4,0 m/s		s-mart GPU		
		-25 °C ... +150 °C	4,0 m/s		s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s		s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**		
A11-I	**hydraulic/pneumatic, double acting**						
 (0)	wiper usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	4,0 m/s		s-mart PU		
		-20 °C ... +110 °C	4,0 m/s		s-mart NBR		
		-50 °C ... +110 °C	4,0 m/s		s-mart HPU		
		-20 °C ... +110 °C	5,0 m/s		s-mart SPU		
		-30 °C ... +110 °C	4,0 m/s		s-mart LTPU		
		-30 °C ... +100 °C	4,0 m/s		s-mart GPU		
		-25 °C ... +150 °C	4,0 m/s		s-mart HNBR		
		-20 °C ... +200 °C	4,0 m/s		s-mart FKM		
		-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**		
A11-SC	**hydraulic & pneumatic, double acting**						
 (1,3)	for hydraulic, A11-SC is a moulded double-acting elastomer scraper. It has two geometrically different scraper lips. for pneumatic the A11-SC type is also designed as a combination asymmetric lip seal with an integral wiper.	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR		
		-30 °C ... + 90 °C	1,0 m/s	10 bar (145 psi)	s-mart PU		
A11-SF	**hydraulic, double acting**					**wiping part**	**housing**
 (2,3)	the A11-SF is a double-acting wiper. it provides a double function wiping the dirt from the rod and retaining the residue oil film with the second lip. the retained oil can be returned to the system through a leakage bore hole. on the outer circumference, a metal caged ring is vulcanised onto the s-mart PU body.	-40 °C ... +100 °C	1,0 m/s			s-mart PU	metal
A11-SG	**hydraulic, double acting**					**wiping part**	**housing**
 (2,3)	wiper seal for hydraulic with metal reinforced.	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR		metal
A11-SJ	**pneumatic, double acting**					**wiping part**	**housing**
 (2,3)	combination wiper seal with metal reinforcement and special pneumatic sealing edge.	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR		metal
		-10 °C ... +200 °C	1,0 m/s	10 bar (145 psi)	s-mart FKM		metal
A11-SK	**pneumatic, double acting**						
 (1,3)	the profile design of the profile A11-SK rod seal/ wiper combines the profile geometry of our trie and proven profile A11-SC with the requirements of mini pneumatics, i.e. the dimensions of profile A11-SK are considerably smaller and friction values are even lower	-35 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart PU		

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0 machined product

hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	max. pressure	material	glide ring	energizer
A11-SL	**pneumatic, double acting**						
 (1)	the scraper A11-SL is a double- acting scraper of polyurethane for severe operating conditions and heavy attack of dirt. the special design of the inward-facing sealing lip contributes to an optimum contact pressure resulting in a very high scraper effect of the residual oil film. the outward-facing scraper lip leans against the housing. this ensures an optimum sealing force and further it prevents the penetration of dirt and water across the groove bottom. also at heavy attacks of dirt and side steering of the piston rod the scraper effect remains stable. the material polyurethane ensures a high service life, also at heavy requirements	-35 °C ... + 80 °C	0,5 m/s	50 bar (725 psi)	s-mart PU		
A12-A	**hydraulic, single acting**						
 (0)	wiper with secondary lip, the technically accurate closure at the cylinder is providing reliable protection, even for heavy contamination.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU		
		-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU		
		-50 °C ... +110 °C	4,0 m/s		s-mart LLTPU		
		-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU		
		-30 °C ... +110 °C	4,0 m/s		s-mart GPU		
A12-B	**hydraulic, double acting**						
 (0)	wiper including additional sealing lip and secondary lip. used in combination with tandem seal systems to reduce residual oil film, also used as complete solution for pneumatic applications in small diameter range (max. 16 bar or 230 psi). the technically accurate closure at the cylinder is providing reliable protection, even for heavy contamination.	-30 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart PU		
		-20 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart HPU		
		-50 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart LTPU		
		-20 °C ... +110 °C	5,0 m/s	16 bar (230 psi)	s-mart SPU		
		-30 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart GPU		
A13-A	**hydraulic/pneumatic, single acting**						
 (0)	scraper ring, mainly used in combination with wiper A02 or A01. firmly clinging dirt and extremely heavy soiling (mud, tar, ice) is wiped off, following elastomeric wiper is protected from damage. recommended materials provide good dry running properties, high stiffness and breaking strenght.	-50 °C ... + 80 °C	1,0 m/s		s-mart POM		
		-40 °C ... + 80 °C	1,0 m/s		s-mart PA*		
		-50 °C ... +260 °C	1,0 m/s		s-mart PEEK		
A25-F	**hydraulic/pneumatic, single acting**					**glide ring**	**energizer**
 (0,1,3)	PTFE or s-mart XPU with o-ring as preloading element. PTFE part takes over wiping function, o-ring maintains equal contact pressure. good dry running roperties, no "stick-slip". excellent chemical and thermal resistance (depends on o-ring).	-30 °C ... +100 °C	10,0 m/s		s-mart PTFE glass	s-mart NBR	
		-20 °C ... +200 °C	10,0 m/s		s-mart PTFE glass	s-mart FKM	
		-30 °C ... +100 °C	10,0 m/s		s-mart PTFE bronze	s-mart NBR	
		-20 °C ... +200 °C	10,0 m/s		s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	10,0 m/s		s-mart PTFE carbon	s-mart NBR	
		-20 °C ... +200 °C	10,0 m/s		s-mart PTFE carbon	s-mart FKM	
		-30 °C ... +110 °C	5,0 m/s		s-mart XPU	s-mart NBR	
A26-F	**hydraulic/pneumatic, double acting**					**glide ring**	**energizer**
 (0,1,3)	PTFE or s-mart XPU double wiper with two o-rings as preloading elements. wiping edge assures a reliable protection against penetration of dust and dirt. additional sealing lip for reduction of residual oil film if used in combination with o-ring activated PTFE seals type S09 (tandem). excellent chemical and thermal resistance (depends on o-ring).	-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart NBR	
		-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart FKM	
		-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart NBR	
		-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart FKM	
		-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart NBR	
		-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart FKM	
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR	

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0 machined product

hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	max. pressure	material	
A27-F	**hydraulic/pneumatic, double acting**				**glide ring**	**energizer**
 (0,1)	PTFE or s-mart XPU double wiper with two o-rings as preloading elements. wiping edge assures a reliable protection against penetration of dust and dirt. additional sealing lip for reduction of residual oil film if used in combination with o-ring activated PTFE seals type S09 (tandem). excellent chemical and thermal resistance (depends on o-ring).	-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart FKM
		-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart FKM
		-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart FKM
		-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR
A27-SA	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
 (1,3)	the function of wiper rings is to prevent dust, dirt, grains of sand and metal swarf from penetrating into axially moving rods and plungers. thus the development of scratches is largely prevented, guiding elements are protected and the working life of seals is extended. profile A27-SA consists of a PTFE wiper ring and an o-ring as pretensioning element.	30 °C ... +100 °C	4,0 m/s		s-mart PTFE bronze	s-mart NBR
A27-SB	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
 (1,3)	the A27-SB is a double-acting wiper made of a PTFE-bronze compound with an o-ring made of NBR as an energising element. it provides a double function wiping the dirt from the rod and retaining the residue oil film with the second lip. the retained oil can be returned to the system through a leakage bore hole.	-30 °C ... +100 °C	15,0 m/s		s-mart PTFE bronze	s-mart NBR
A27-SC	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
 (1,3)	the A27-SC is a double-acting scraper with two geometrically different scraper lips which are installed back-to-back. A27-SC is always installed together with an elastic o-ring in one groove. the scraper function is performed by the A27-SC. the o-ring maintains the pressure of the scraper lips against the sliding surface and can compensate any deflections of the piston rod.	-30 °C ... +100 °C	15,0 m/s		s-mart PTFE bronze	s-mart NBR
		-10 °C ... +200 °C	15,0 m/s		s-mart PTFE bronze	s-mart FKM
		-30 °C ... +100 °C	15,0 m/s		PTFE + carbon fibre	s-mart NBR
		-10 °C ... +200 °C	15,0 m/s		PTFE + carbon fibre	s-mart FKM
		-45 °C ... +145 °C	15,0 m/s		PTFE + carbon fibre	s-mart EPDM
		-30 °C ... +100 °C	2,0 m/s		s-mart PU	s-mart NBR
A27-SD	**hydraulic, double acting**				**glide ring**	**energizer**
 (1)	A27-SD is a patented double-acting scraper. it has an identical design and function as that of the A27-SC and is fully interchangeable with this scraper. it is more flexible and thus easy to install, but cannot withstand such high speeds and temperatures as A27-SC. A27-SD is injection moulded from high-grade wear-resistant polyurethane. it is suitable as an inexpensive scraper element where large quantities are required. it is preferably used in conjunction with our rod seal S09 with hydrodynamic backpumping function.	-30 °C ... +80 °C	1,0 m/s		s-mart PU	s-mart NBR
A62-A	**hydraulic, single acting**				**wiping part**	**housing**
 (3)	A62-A are polyurethane manufactured lipped wipers with integrated metal reinforcement for open groove assembly. these are typically used in severe applications where there is abrasion due to solid matter on rod surface.	-35 °C ... +100 °C	1,0 m/s		s-mart PU	s-mart POM / PA* / Metal

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hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	max. pressure	material		
A62-C	**hydraulic, single acting**				**wiping part**	**housing**	
 (3)	the profile A62-C wiper ring serves the purpose of preventing the penetration of dust, dirt, sand, and metal swarf at the spherical bearings of a hydraulic cylinder rod end. this reduces the danger of scuffing on the swivel bolt as a result of contamination from external sources. the excellent wiping effect is achieved by the special design of the wiper lip. furthermore, the wiper lip opens up during lubrication allowing excess lubricant to escape. the proven PU stands for high abrasion resistance, minor permanent deformation, and robustness vis-a-vis external mechanical impact. by means of a press fit of the metal scan vis-a-vis the external diameter of the seal housing, the wiper is securely held in place in the axially open installation housing.	-35 °C ... +100 °C	1,0 m/s		s-mart PU	s-mart POM / PA* / Metal	
A63	**hydraulic, single acting**						
 (1)	dirt wiper with additional static sealing lip and bearing segments; sealing edge of wiper lip slightly rounded.	-30 °C ... +110 °C	2,0 m/s		s-mart PU		
A64	**hydraulic, single acting**				**inner scraper**	**metal housing**	**outer scraper**
 (3)	the A64 is a special scraper with two different scraper lips - a thin metallic lip and a elastomer lip. the two scraper lips are arranged in tandem behind one another in a compact metal housing. the A64 lip is designed to remove firmly adhering soiling and ice particles. the secondary lip of elastomer material enhances the overall scraping effect, i.e. fine sand grains, water and similar foreign matter are reliably scraped off. both scraper lips have a smaller diameter than the nominal diameter of the piston rod, thus ensuring a tight fit of the scraper lips. the metallic lip is guided flexibly in radial direction and can easily follow any possible deflections of the piston rod.	-40 °C ... +120 °C	1,0 m/s	400 bar (5800 psi)	s-mart NBR	sheet metal	brass
A65	**pneumatic, double acting**						
 (2)	combination wiper seal without metal reinforcement with special pneumatic sealing edge.	-30 °C ... +110 °C	1,0 m/s		s-mart PU		
A66	**pneumatic, double acting**						
 (3)	the self-retaining pneumatic rod seal/wiper set profile A66 for piston rods in pneumatic cylinders combines three functions sealing, wiping, fixing.	-30 °C ... +110 °C	1,0 m/s	16 bar (232 psi)	s-mart PU		
A67	**pneumatic, double acting**				**seal part**	**housing**	
 (2)	the profile A67 pneumatic rod seal, wiper and guidance system is used for rods in pneumatic cylinders. it combines the following functional features: sealing, wiping, fixing.	-35 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart PU	alumunium	

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hydraulics & pneumatics : wiper

application & profile	description	temperature	max. speed	max. pressure	material	
A68	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
 (1,3)	A68 double wiper consisting of one profile ring made from PTFE with a sealing edge and a wiper edge, as well as two o-rings as sealing and pre-load components.	-30 °C ... +100 °C	5,0 m/s		s-mart PTFE bronze	s-mart NBR
		-10 °C ... +200 °C	5,0 m/s		s-mart PTFE bronze	s-mart FKM
A69	**cushioning seal for pneumatic, single acting**					
 (1)	the cushioning seal has been designed specifically for use in braking systems at the end stroke of the piston, in pneumatic cylinders. the profile eliminates the limitations in this particular application that some seal types, like o-rings and lip seals have. the inlet chamfer on the sealing lip and the groove on the sealing border at the bottom makes the cushioning very effective. another advantage is the utilisation of polyurethane, which with its high impact and abrasion resistance gives the part a very long life.	-30 °C ... + 80 °C	1,0 m/s	16 bar (230 psi)	s-mart PU	
A70	**cushioning seal for pneumatic, single acting**					
 (1)	the cushioning seal type A70 provides cushioning at the end of the stroke in pneumatic cylinders and is designed for a smaller groove than type A69. as can be seen in the dimensions list, this profile for a cushioning seal can substitute a standard o-ring. this permits to a reduction in the dimensions of the cylinder head.	-30 °C ... + 80 °C	1,0 m/s	16 bar (230 psi)	s-mart PU	
A71	**cushioning seal for pneumatic, single acting**					
 (1,3)	the profile A71 pneumatic cushioning seal is specially designed for cushioning spears in pneumatic cylinders	-30 °C ... + 80 °C	1,0 m/s	16 bar (230 psi)	s-mart PU	
A72	**cushioning seal for pneumatic, single acting**					
 (1)	the profile A72 pneumatic cushioning seal is specially designed for cushioning spears in pneumatic cylinders.	-30 °C ... + 80 °C	1,0 m/s	16 bar (230 psi)	s-mart PU	
A73	**cushioning seal for pneumatic, single acting**					
 (1)	damper Seal A73 with spacer lug and flow passages.	-30 °C ... + 80 °C	1,0 m/s	16 bar (230 psi)	s-mart PU	
A74	**cushioning seal for pneumatic, single acting**					
 (1)	damper seal A74 with spacer lug and flow passages. Integrated nonreturn valve function due to axial seal, spacer lugs and flow passages.	-30 °C ... + 80 °C	1,0 m/s	25 bar (362 psi)	s-mart PU	

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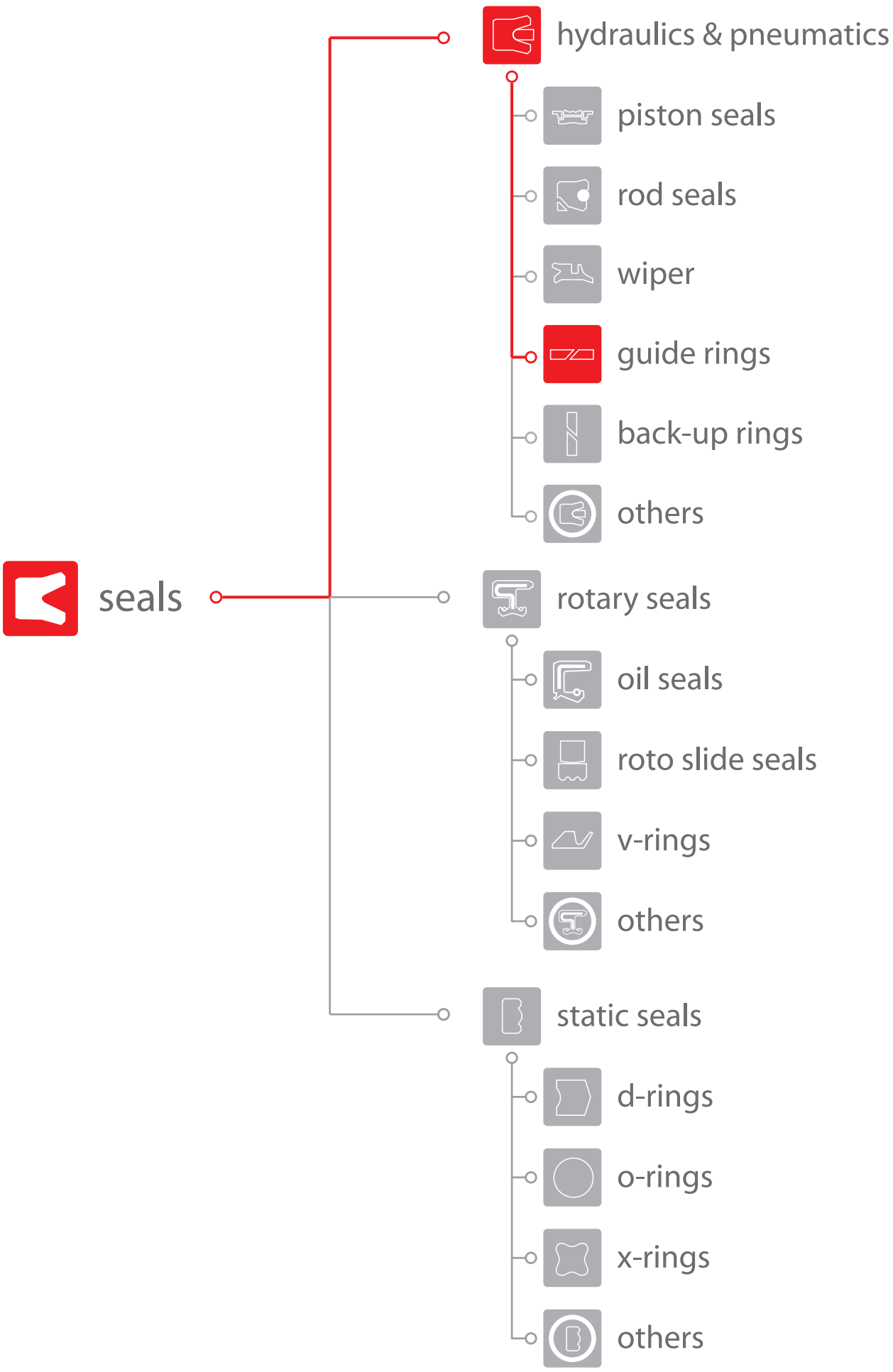

seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

hydraulics & pneumatics : guide ring

application & profile	description	temperature	max. speed	max. specific load	material
F01	**guide ring**				
 (0,1,3)	most common guide ring for rod or piston application. used in many standard cylinders, majority of applications require split version for installation into closed housing, non split design available (bushings)	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F02	**guide ring**				
 (0)	for rod or piston application, split and non split design available. not only used as guidering, also as plain washer or spacer.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F03	**guide ring**				
 (0)	for piston application. angled design combines guide ring and back-up ring function. split and non split design available.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F04	**guide ring**				
 (0)	as profile F03 but for rod application.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F05	**guide ring**				
 (0,1)	with integrated collar on inside diameter, for piston application. split and non split design available.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F06	**guide ring**				
 (0)	with integrated collar on outside diameter, for rod application. split and non split design available.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F07	**guide ring**				
 (0)	with groove on inside diameter, for piston application. split and non split design available.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX
F08	**guide ring**				
 (0)	with groove on outside diameter, for rod application. split and non split design available.	- 50 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart POM
		- 40 °C ... +100 °C	4,0 m/s	25 N/mm²	s-mart PA*
		-200 °C ... +200 °C	4,0 m/s	3 N/mm²	s-mart PTFE glass
		-200 °C ... +200 °C	5,0 m/s	4,5 N/mm²	s-mart bronze
		- 40 °C ... +130 °C	1,0 m/s	90 N/mm²	s-mart TEX

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

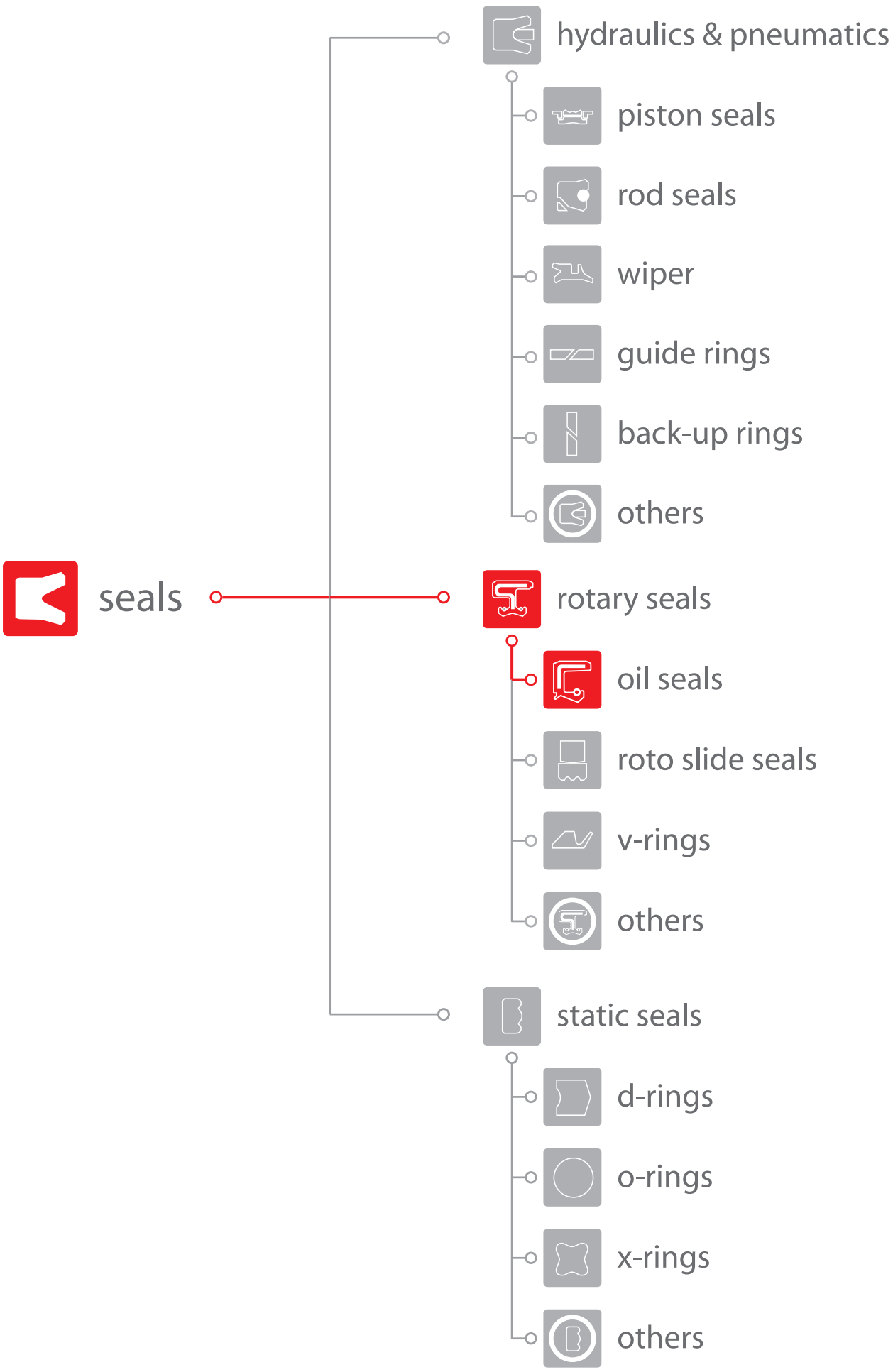
application & profile	description	temperature	max. speed	max. pressure	material	
ST08	**back-up ring**					
 (0,1,3)	common inactive back-up ring, mainly used with o-ring to avoid gap extrusion. split and non split design available.	- 50 °C ... +100 °C			s-mart POM	
		- 40 °C ... +100 °C			s-mart PA*	
		-200 °C ... +260 °C			s-mart PTFE	
		-200 °C ... +260 °C			s-mart PTFE glass	
		- 30 °C ... +110 °C			s-mart PU	
		- 20 °C ... +110 °C			s-mart HPU	
		- 50 °C ... +110 °C			s-mart LTPU	
		- 30 °C ... +110 °C			s-mart GPU	
ST09	**back-up ring**					
 (0,1,3)	common inactive back-up ring especially for o-ring to avoid gap extrusion. split and non split design available.	-200 °C ... +260 °C			s-mart PTFE	
		- 30 °C ... +110 °C			s-mart PU	
		- 20 °C ... +110 °C			s-mart HPU	
		- 50 °C ... +110 °C			s-mart LTPU	
		- 30 °C ... +110 °C			s-mart GPU	
ST10	**back-up ring**					
 (0)	standard active back-up ring for piston seal type PD. normally already included in PD-type seal profiles, designed for automatic pressure activation. split and non split design available.	- 50 °C ... +100 °C			s-mart POM	
		- 40 °C ... +100 °C			s-mart PA*	
		-200 °C ... +260 °C			s-mart PTFE glass	
ST11	**back-up ring**					
 (0)	standard active back-up ring for rod seal type PD. normally already included in PD type seal profiles, designed for automatic pressure activation. split and non split design available.	- 50 °C ... +100 °C			s-mart POM	
		- 40 °C ... +100 °C			s-mart PA*	
		-200 °C ... +260 °C			s-mart PTFE glass	
ST12	**back-up ring**					
 (0)	triangular back-up ring for rod applications, fits in special shaped housings (see seal data sheets). also used as integrated active back-up ring in special high pressure or low friction seal profiles. split and non split design available.	- 50 °C ... +100 °C			s-mart POM	
		- 40 °C ... +100 °C			s-mart PA*	
		-200 °C ... +260 °C			s-mart PTFE glass	
ST13	**back-up ring**					
 (0)	triangular back-up ring for piston applications, fits in special shaped housings (see seal data sheets). also used as integrated active back-up ring in special high pressure or low friction seal profiles. split and non split design available.	- 50 °C ... +100 °C			s-mart POM	
		- 40 °C ... +100 °C			s-mart PA*	
		-200 °C ... +260 °C			s-mart PTFE glass	
ST60	**back-up ring**					
 (3)	spiral-shaped split bearing component with rectangular cross section.	-200 °C ... +260 °C	2,0 m/s	2500 bar (36259 psi)	s-mart PTFE virgin	static applications
		-200 °C ... +260 °C	2,0 m/s	400 bar (5801 psi)	s-mart PTFE virgin	dynamic applications
		-200 °C ... +260 °C	2,0 m/s	150 bar (2175 psi)	s-mart PTFE virgin	oscillating

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

product range seal

rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material	
R01-P	**single acting rotary shaft seal**				**seal part**	**energizer**
 (0)	spring loaded lip seal with retainer ring for press-fit installation into axially open housings. wide range of applications in every sector of industry, mainly as protecting element for bearings.	-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	s-mart POM / PA*
		-40 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +80 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	s-mart POM / PA*
		-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	s-mart POM / PA*
R01-R	**single acting rotary shaft seal**				**seal part**	**energizer**
 (0)	spring loaded lip seal with retainer ring for press-fit installation into axially open housings. good adaptation possibilities for diverse temperatures and media by selection of suitable seal material. wide range of applications in every sector of industry, mainly as protecting element for bearings.	-30 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	s-mart POM / PA*
		-25 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	s-mart POM / PA*
		-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	metal
		-50 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	s-mart POM
		-50 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	metal
		-50 °C ... + 80 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	s-mart POM
		-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	metal
R01-AF	**single acting rotary shaft seal**					
 (0)	spring loaded lip seal with solid outer section for axially open housings with clamping plate fixation. mainly used for rolling mills, large gear mechanisms in heavy duty machinery, for shipbuilding industry and civil engineering.	-30 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	
		-20 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	
		-50 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	
		-20 °C ... +110 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	
		-30 °C ... +100 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	
		-30 °C ... +100 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	
		-25 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	
		-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	
		-50 °C ... +150 °C	10,0 m/s	0,2 bar (3 psi)	s-mart EPDM**	
		-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	
R01-AS	**single acting rotary shaft seal**					
 (0)	split version of a spring loaded lip seal with solid outer section for axially open housings with clamping plate fixation. mainly used for repair purpose on rolling mills, large gear machanisms in heavy duty machinery, for shipbuilding industry and civil engineering.	-30 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	
		-20 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	
		-50 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	
		-20 °C ... +110 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	
		-30 °C ... +100 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	
		-30 °C ... +100 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	
		-25 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	
		-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	
		-50 °C ... +150 °C	10,0 m/s	0,2 bar (3 psi)	s-mart EPDM**	
		-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	
R01-F	**single acting**				**glide ring**	**energizer**
 (0,1)	spring loaded lip seal with retainer ring for press-fit installation into axially open housings. wide range of applications in every sector of industry, mainly as protecting element for bearings.	-30 °C ... +100 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE glass	s-mart NBR
		-30 °C ... +100 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE bronze	s-mart NBR
		-30 °C ... +100 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE carbon	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE glass	s-mart FKM
		-20 °C ... +200 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE bronze	s-mart FKM
		-20 °C ... +200 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE carbon	s-mart FKM
R02-P	**single acting rotary shaft seal**				**seal part**	**energizer**
 (0)	as profile R01-P, but with additional dust lip to avoid ingress of dust and dirt.	-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	s-mart POM / PA*
		-40 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +80 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	s-mart POM / PA*
		-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	s-mart POM / PA*

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material		
R02-R	**single acting rotary shaft seal**				**seal part**	**energizer**	
 (0)	as profile R01-P, but with additional dust lip to avoid ingress of dust and dirt.	-30 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	s-mart POM / PA*	
		-25 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	s-mart POM / PA*	
		-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	metal	
		-50 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	s-mart POM	
		-50 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	metal	
		-50 °C ... + 80 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	s-mart POM	
		-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	metal	
R60-A	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (2,3)	the R60-A is a single action rotary shaft seal for rotating on the side facing away from the medium, against dirt accumulation from the outside. the elastomer outer sheath provides good static sealing, good thermal expansion balance e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-20 °C ... +200 °C	30,0 m/s	0,5 bar (7 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R60-C	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (3)	oil seal with helix internal conical lip surface. usually used in the automotive industry, particularly for driving shafts. the right, left or bidirectional helix limits the use of the seals to one-way rotary shafts	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R60-D	**high pressure oil seals**				**seal part**	**metal insert**	**energized spring**
 (2)	the R60-D is high pressure oil seals to withstand pressures over 1 bar: guaranteed up to 10 bar, although in some applications this limit has been greatly exceeded.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R60-Y	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (2)	the shorter, thicker, spring-energised sealing lip enables pressure application of up to 10 bar (depending on the rotational speed). the elastomer outer sheath provides good static sealing, good thermal expansion balance, e.g. in light-metal housing, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media	-40 °C ... +100 °C	10,0 m/s	10 bar (145 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-30 °C ... +170 °C	35,0 m/s	10 bar (145 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R61-A	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (2,3)	based on the R60-A design, but with a protective lip on the air side.	-30 °C ... +100 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-20 °C ... +200 °C	30,0 m/s	0,5 bar (7 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R61-C	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (3)	based on the R60-C design, but with a protective lip on the air side.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel

 linear moving  rotating  oscillating  spiral moving  static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material		
R61-D	**high pressure oil seals**				**seal part**	**metal insert**	**energized spring**
 (2)	based on the R60-D design, but with a protective lip on the air side.	-20 °C ... +120 °C	12,0 m/s	10 bar (145 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	10 bar (145 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R61-F	**high pressure oil seals**				**seal part**	**metal insert**	**energized spring**
 (2)	R61-F is medium - high pressure oil seals with completely rubber covered outer diameter. this type of seal is designed for pressures up to 10 bar In order to avoid a "pop-out" of the seal, we suggest to fit an axial retainer (e.g. circlip, shoulder, etc.) the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-30 °C ... +100 °C	5,0 m/s	10 bar (145 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-30 °C ... +140 °C	30,0 m/s	10 bar (145 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R61-Y	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (2)	based on the R60-Y design, but with a protective lip on the air side.	-40 °C ... +100 °C	10,0 m/s	10 bar (145 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-30 °C ... +170 °C	35,0 m/s	10 bar (145 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R62-A	**rotary shaft seal**				**seal part**	**metal housing**	**energized spring**
 (2,3)	tight and accurate fitting is achieved by the metal outer surface. the R62-A model has limited sealing action with thin fluid or gaseous media and with split housings.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-20 °C ... +200 °C	30,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R62-C	**rotary shaft seal**				**seal part**	**metal housing**	**energized spring**
 (3)	oil seal with helix internal conical lip surface. usually used in the automotive industry, particularly for driving shafts. the right, left or bidirectional helix limits the use of the seals to one-way rotary shafts	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R62-D	**high pressure oil seals**				**seal part**	**metal housing**	**energized spring**
 (2)	the R62-D with a metal outer surface is high pressure oil seals to withstand pressures over 1 bar: guaranteed up to 10 bar, although in some applications this limit has been greatly exceeded.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R62-E	**special oil seals**				**seal part**	**metal housing**	**energized spring**
 (2,3)	oil seals with external metal casing ground to DIN 3760. the sealing lip is vulcanized directly onto the metal case. this oil seal is used when the difference between the shaft and the housing is very small	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material		
R63-A	**rotary shaft seal**				**seal part**	**metal housing**	**energized spring**
 (2)	based on the R62-A design, but with a protective lip on the air side.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-20 °C ... +200 °C	30,0 m/s	0,5 bar (7 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R63-E	**special oil seals**				**seal part**	**metal insert**	**energized spring**
 (2,3)	based on the R62-E design, but with a protective lip on the air side.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R63-C	**rotary shaft seal**				**seal part**	**metal housing**	**energized spring**
 (2)	based on the R62-C design, but with a protective lip on the air side.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R63-D	**high pressure seals**				**seal part**	**metal housing**	**energized spring**
 (2)	based on the R62-D design, but with a protective lip on the air side.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R64	**rotary shaft seal**				**seal part**	**metal housing**	**energized spring**
 (2,3)	the additional metal insert gives the rotary shaft seal more rigidity and the metal outer casing guarantees tight and accurate fitting. the R64 model has limited sealing action with thin fluid or gaseous media and with split housings. to guarantee a high degree of static sealing on the outer surface, better surface treatment of the housing bore is required or an additional coat of paint should be applied to the metal outer casing.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-20 °C ... +200 °C	30,0 m/s	0,5 bar (7 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R65	**rotary shaft seal**				**seal part**	**metal housing**	**energized spring**
 (2,3)	based on the R64 design, but with a protective lip on the air side.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7 psi)	s-mart NBR	metal	non-alloy steel
		-20 °C ... +200 °C	30,0 m/s	0,5 bar (7 psi)	s-mart FKM	metal	non-alloy steel
R66-A	**special oil seals**				**seal part**	**metal housing**	**energized spring**
 (3)	strong construction shaft oil seal presenting a stiffening ring in Fe37 with ground external diameter according to DIN 3760. this seal is usable on large diameter rolls.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel with steel filler ring	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel with steel filler ring	non-alloy steel

linear moving rotating oscillating spiral moving static

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0 machined product

rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material				
R67	**special oil seals**				**seal part**	**metal housing**	**energized spring**	**spring carrier**	**filler ring**
 (3)	the rotary shaft seal R67 has been developed specifically for the severe operating conditions encountered in the rolls of paper making machines hot and cold rolling mills, heavy industries and where high speed and misalignment are encountered.the R67 is designed with steel outer ring with a finish surface, steel filler ring providing the rigidity required ensuring an accurate assembly of the seal in the groove, stainless steel spring carrier is designed to ensure the spring retention during the assembly, energized spring to provide a regulated loading on the sealing lip and enable the sealing element to follow shaft deflections, sealing element is available in the elastomers and is bonded to the steel outer ring.	-20 °C ... +120 °C	25,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		-20 °C ... +220 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		- 60 °C ... +180 °C	25,0 m/s	0,5 bar (7 psi)	s-mart MVQ	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
R68	**special oil seals**				**seal part**	**metal housing**	**energized spring**	**spring carrier**	**filler ring**
 (3)	based on the R67 design, but with a protective lip on the air side.	-20 °C ... +120 °C	25,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		-20 °C ... +220 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		- 60 °C ... +180 °C	25,0 m/s	0,5 bar (7 psi)	s-mart MVQ	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
R69	**special oil seals**				**seal part**	**metal housing**	**energized spring**	**spring carrier**	**filler ring**
 (3)	based on the R67 design, but with metal inner ring for small band.	-20 °C ... +120 °C	25,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		-20 °C ... +220 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		- 60 °C ... +180 °C	25,0 m/s	0,5 bar (7 psi)	s-mart MVQ	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
R70	**special oil seals**				**seal part**	**metal housing**	**energized spring**	**spring carrier**	**filler ring**
 (3)	based on the R69 design, but with a protective lip on the air side.	-20 °C ... +120 °C	25,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		-20 °C ... +220 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		- 60 °C ... +180 °C	25,0 m/s	0,5 bar (7 psi)	s-mart MVQ	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
R71-A	**rotary shaft seal**				**seal part**	**metal insert**		**energized spring**	
 (3)	the R71 is combined seal rubber at backface with partially rubber covered outer diameter. these seals are designed to assure a high assembly stiffness and a good static sealing together with a good heat transfer. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants, therefore these types are recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-20 °C ... +120 °C	12,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	non-alloy steel		non-alloy steel	
		-18 °C ... +220 °C	30,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	non-alloy steel		non-alloy steel	
R72-A	**rotary shaft seal**				**seal part**	**metal insert**		**energized spring**	
 (2,3)	the grooved outer sheath provides improved static sealing for housings with greater thermal expansion because it has a higher degree of press fitting. It also prevents permanent skew of the rotary shaft seal. in addition, installation is facilitated because less press-fit force is required.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	non-alloy steel		non-alloy steel	
		-30 °C ...+200 °C	35,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	non-alloy steel		non-alloy steel	
R73-A	**rotary shaft seal**				**seal part**	**metal insert**		**energized spring**	
 (2,3)	based on the R72-A design, but with a protective lip on the air side.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	non-alloy steel		non-alloy steel	
		-30 °C ...+200 °C	35,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	non-alloy steel		non-alloy steel	

linear moving rotating oscillating spiral moving static

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rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material		
R73-C	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (3)	based on the R73-A design, but the right, left or bidirectional helix limits the use of the seals to one-way rotary shafts	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R74-A	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (3)	rubber covered, sealing lip with spring + flange.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R74-B	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (3)	rubber covered, sealing lip with spring + flange + dust lip	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R75	**rotary shaft seal**				**seal part**	**metal insert**	**energized spring**
 (3)	based on the R60-A design, but with double protective lip on the air side.	-20 °C ... +120 °C	12,0 m/s	1 bar (14,5 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-18 °C ... +220 °C	40,0 m/s	1 bar (14,5 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R80-A	**grease sealing, low friction**				**seal part**	**metal insert**	
 (2,3)	the R80-A is a single action rotary shaft seal for rotating or pivoting shafts. the sealing lip design without a spring produces less friction. as a result the sealing action in comparison to rotary shaft seals with energized springs is reduced. the elastomer outer sheath provides good static sealing, good thermal expansion balance e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media.	-40 °C ... +100 °C	6,0 m/s	without pressure	s-mart NBR	non-alloy steel	
		-18 °C ... +200 °C	10,0 m/s	without pressure	s-mart FKM	non-alloy steel	
R81-A	**grease sealing, low friction**				**seal part**	**metal insert**	
 (2,3)	based on the R80-A design, but with a protective lip on the air side.	-40 °C ... +100 °C	6,0 m/s	without pressure	s-mart NBR	non-alloy steel	
		-18 °C ... +200 °C	10,0 m/s	without pressure	s-mart FKM	non-alloy steel	
R82-A	**grease sealing, low friction**				**seal part**	**metal insert**	
 (2,3)	based on the R80-A function, but with tight and accurate fitting is achieved by the metal outer casing. the R82-A model has limited sealing action with thin fluid or gaseous media and in split housings. to guarantee a high level of static sealing on the outer surface, better surface treatment of the housing bore is necessary.	-40 °C ... +100 °C	6,0 m/s	without pressure	s-mart NBR	non-alloy steel	
		-18 °C ... +200 °C	10,0 m/s	without pressure	s-mart FKM	non-alloy steel	
R83	**rotary shaft seal**				**seal part**	**finger spring**	
 (3)	rubber fabric oil seals with finger spring	-20 °C ... +120 °C	6,0 m/s	0,5 bar (7,25 psi)	s-mart NBR cotton fabric impregnated	non-alloy steel	
		-18 °C ... +220 °C	6,0 m/s	0,5 bar (7,25 psi)	s-mart FKM cotton fabric impregnated	non-alloy steel	

linear moving rotating oscillating spiral moving static

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rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material			
R84	**special oil seals**				**seal part**	**finger spring**		
 (3)	type R84 is a split oil seal with a vulcanized stainless steel finger spring. extremely suitable for difficult mounting conditions and seal changes at site. preferably used in applications with grease lubrication and high contamination. in endless form suitable as wiper in hydraulic applications.	-40 °C ... +100 °C	10,0 m/s		s-mart NBR	non-alloy steel		
		-18 °C ... +200 °C	10,0 m/s		s-mart FKM	non-alloy steel		
R85	**specials oil seals**				**seal part**	**metal housing**	**finger spring**	
 (3)	R85 is a special grease retainer for severe working conditions : moulded-in stainless steel finger spring to avoid spring dumping and corrosion, endless and machined outer metal ring for a perfect contact with housing bore, inner metal ring vulcanised for a perfect concentricity, outside diameter from 140 to 1640 mm.	-20 °C ... +120 °C	6,0 m/s	0,2 bar (2,9 psi)	s-mart NBR	non-alloy steel	non-alloy steel	
		-18 °C ... +220 °C	6,0 m/s	0,2 bar (2,9 psi)	s-mart FKM	non-alloy steel	non-alloy steel	
R86	**specials oil seals**				**seal part**	**metal housing**	**spring carier**	**filler ring**
 (3)	these special shaft oil seals are similar to the R86 shaft oil seals and have been developed especially for small diameters rolls starting from 70 mm. the construction of the R86 is made by: steel outer case, machine finished to DIN 3760 standard, onto which is bonded the sealing element. steel filler ring to provide the required rigidity to the seal. stainless steel finger spring to ensure the correct sealing performance even when shock loads arise.	-20 °C ... +120 °C	15,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	Fe37
		-18 °C ... +220 °C	25,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	Fe37
R87	**specials oil seals**				**seal part**	**metal housing**	**spring carier**	**filler ring**
 (3)	based on the R86 design, but with metal inner ring for small band	-20 °C ... +120 °C	15,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	Fe37
		-18 °C ... +220 °C	25,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	Fe37
R88	**specials oil seals**				**seal part**	**metal housing**	**spring carier**	**filler ring**
 (3)	based on the R86 design, but with a protective lip on the air side.	-20 °C ... +120 °C	15,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	Fe37
		-18 °C ... +220 °C	25,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	Fe37
R89	**cassette seals**				**seal part**	**metal case**	**energized spring**	
 (3)	the combined rotary shaft lip seal is an assembly which includes a supplementary protection of the radial sealing members with an axial rotary sealing lip integrated into a wear sleeve. the rubberised wear sleeve and radial seal are designed to satisfy either customer's and DIN 3760 (3761) specifications.	-30 °C ... +100 °C	5,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	carbon steel	carbon steel	
		-20 °C ... +200 °C	10,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	carbon steel	carbon steel	
R90	**cassette seals**				**seal part**	**metal case**	**energized spring**	
 (3)	R90, the original unitized wheel hub seal for heavy-duty vehicles, is designed for rotating hubs. the inner section of the R90 is secured against the shaft. the outer section, press fitted into the wheel hub, rotates together with the hub around the inner section, creating a completely enclosed seal. dirt and water, the major enemies of hub seals, are effectively kept at distance, whilst the lubrication of the rubber lip remains intact. this decreases friction and increases seal life accordingly.	-40 °C ... + 80 °C	10,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	carbon steel	carbon steel	
		-30 °C ... +120 °C	10,0 m/s	0,5 bar (7,25 psi)	s-mart HNBR	carbon steel	carbon steel	
		-30 °C ... +150 °C	10,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	carbon steel	carbon steel	

linear moving rotating oscillating spiral moving static

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rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material		
R91	**cassette seals**				**seal part**	**metal case**	**compression spring**
 (3)	R91 is specifically designed for rotating hubs on off-road machines in heavy duty applications, i.e. wet rice fields. the design offers significant improvements in providing improved ability to exclude water, dirt and dust for much longer time. its ability to sustain eccentricities, over-pressure and shaft misalignments are equal to radial seals. the R91, while based on R90, features two sealing lips, equipped with compression springs, to provide excellent sealing performance and an additional dust lip.	-40 °C ... + 80 °C	4,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	carbon steel	carbon steel
		-30 °C ... +120 °C	4,0 m/s	0,5 bar (7,25 psi)	s-mart HNBR	carbon steel	carbon steel
		-30 °C ... +150 °C	4,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	carbon steel	carbon steel
R92	**cassette seals**				**seal part**	**metal case**	**compression spring**
 (3)	the R92 is, like R90 and R91, a fully enclosed seal however designed for rotating shafts. the sealing element is fixed in the stationary housing and the casing components rotates with the shaft. the R92 is used to prevent oil from leaking out of a bearing housing, i.e. a differential pinion housing for rear axles on trucks, and at the same time preventing road dirt, salt and water splash to enter. the design is compact and integrates the necessary shaft counterface as well as the dirt exclusion. the dirt exclusion function consists of two rubber lips, one axial and one radial, the space between these filled with grease, and the rotating seal case, which acts as an effective deflector due to the centrifugal force.	-40 °C ... + 80 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	carbon steel	carbon steel
		-30 °C ... +120 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart HNBR	carbon steel	carbon steel
		-30 °C ... +150 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	carbon steel	carbon steel
R93	**modular sealing**				**seal part**	**metal insert**	**spring**
 (3)	outer casing: elastomer (smooth), spring-loaded sealing lip and sealing lip with helix edge without spring, additional dust lip, modern sealing lip profile, friction-optimised primary seal lip 1 made from fluoro rubber FKM, secondary seal lip with additional dust lip 2, grease filling with special lubricant.	-25 °C ... +100 °C	6,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	unalloyed steel	spring steel
		-25 °C ... +160 °C	6,0 m/s	0,5 bar (7,25 psi)	s-mart FKM	unalloyed steel	spring steel
R99	**rotary shaft seal**				**seal part**	**elastomer ring**	**metal cages**
 (3)	rotary shaft seal with a PTFE sealing lip and an elastomer pre-tension ring which is clamped between two metal cages. non mould production.	-90 °C ... +250 °C	40,0 m/s	25 bar (352 psi)	s-mart PTFE glass	s-mart FKM	steel 1.4404
R100	**rotary shaft seal**				**seal part**	**energized spring**	**metal cages**
 (3)	rotary shaft seal with a spring energized elastomer sealing lip clamped between two metal cages. non mould production.	-40 °C ... +100 °C	12,0 m/s	10 bar (145 psi)	s-mart NBR	non-alloy steel	steel 1.4404
		-30 °C ... +200 °C	15,0 m/s	10 bar (145 psi)	s-mart FKM	non-alloy steel	steel 1.4404
R102	**rotary shaft seal**				**seal part**	**o-ring**	**metal housing**
 (3)	seal made of PTFE carbon-filled, highly wear-resistant, low friction, clamped between two metal housings, accurately centred to the outer diameter, with O-Ring for static sealing.	-80 °C ... +200 °C	30,0 m/s	10 bar (145 psi)	s-mart PTFE carbon	s-mart FKM	stainless steel

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rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material		
R103-A	**fabric reinforced rotary shaft seal**				**seal part**	**energized spring**	
 (2,3)	rotary shaft standard seals style in endless and split form made of elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring. on request with additional dust lip.	-30 °C ... +100 °C	20,0 m/s	0,5 bar (7,25 psi)	s-mart NBR cotton fabric impregnated	rust and acid resistant steel 1.4301	
		-20 °C ... +180 °C	25,0 m/s	0,5 bar (7,25 psi)	s-mart FKM cotton fabric impregnated	rust and acid resistant steel 1.4301	
R103-B	**fabric reinforced rotary shaft seal**				**seal part**	**energized spring**	
 (3)	based on the R103-A design, but its different forms of sealing.	-30 °C ... +100 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart NBR cotton fabric impregnated	rust and acid resistant steel 1.4301	
		-18 °C ... +220 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart FKM cotton fabric impregnated	rust and acid resistant steel 1.4301	
R104-A	**fabric reinforced rotary shaft seal**				**seal part**	**energized spring**	
 (2,3)	based on the R103-A design, but has a groove running vertically to the axle. The R104-A types are applied back to back in pairs wherever re-lubrication from the outside is necessary, e.g. when separating of media or protecting against the invasion of dust, dirt and water spray. on request with additional dust lip.	-30 °C ... +100 °C	20,0 m/s	0,5 bar (7,25 psi)	s-mart NBR cotton fabric impregnated	rust and acid resistant steel 1.4301	
		-20 °C ... +180 °C	25,0 m/s	0,5 bar (7,25 psi)	s-mart FKM cotton fabric impregnated	rust and acid resistant steel 1.4301	
R105-A	**fabric reinforced rotary shaft seal**				**seal part**	**energized spring**	
 (2,3)	based on the R103-A design, but has a circular groove on the outside diameter in addition to the vertically running groove as in the R104-A. The R105-A types are applied back to back in pairs wherever re-lubrication from the outside is necessary, e.g. when separating of media or protecting against the invasion of dust, dirt and water spray. on request with additional dust lip.	-30 °C ... +100 °C	20,0 m/s	0,5 bar (7,25 psi)	s-mart NBR cotton fabric impregnated	rust and acid resistant steel 1.4301	
		-20 °C ... +180 °C	25,0 m/s	0,5 bar (7,25 psi)	s-mart FKM cotton fabric impregnated	rust and acid resistant steel 1.4301	
R105-B	**rotary shaft seal**				**seal part**	**energized spring**	
 (3)	based on the R105-A design, but its different forms of sealing.	-30 °C ... +100 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart NBR cotton fabric impregnated	rust and acid resistant steel 1.4301	
		-20 °C ... +180 °C	15,0 m/s	0,5 bar (7,25 psi)	s-mart FKM cotton fabric impregnated	rust and acid resistant steel 1.4301	
R108	**rotary shaft seal**				**seal part**	**energized spring**	**metal insert**
 (3)	alternative movement and radial sealing lip with spring and dust lip.	-40 °C ... +100 °C	12,0 m/s	0,5 bar (7 psi)	s-mart NBR	non-alloy steel	non-alloy steel
		-30 °C ... +200 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	non-alloy steel	non-alloy steel
R109	**fabric reinforced rotary shaft seal**						
 (3)	oil seal used when the rotary motion is by the housing rather than by the shaft and has an inner casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring	-30 °C ... +100 °C	6,0 m/s	0,2 bar (2,90 psi)	s-mart NBR cotton fabric impregnated		
		-18 °C ... +220 °C	6,0 m/s	0,2 bar (2,90 psi)	s-mart FKM cotton fabric impregnated		

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rotary seals : oil seal

application & profile	description	temperature	max. speed	max. pressure	material				
R110	**rotary shaft seal**				**seal part**	**energized spring**		**metal insert**	
 (3)	the R110 rotary shaft seal is a special type with the sealing lip on the outside (exterior sealing). it consists of a metal insert with an elastomer inner sheath as well as a spring-energized sealing lip facing outwards.	-40 °C ... +100 °C	10,0 m/s	0,5 bar (7,25 psi)	s-mart NBR	non-alloy steel		non-alloy steel	
R111	**special oil seals**				**seal part**	**metal housing**	**energized spring**	**spring carrier**	**filler ring**
 (3)	based on the R67 design, but oil seal used when the rotary motion is by the housing rather than by the shaft, stands for external lip. the ideal solution for paper machine bending compensation rolls with stationary axis and rotating shell.	-20 °C ... +120 °C	25,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		-20 °C ... +220 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		- 60 °C ... +180 °C	25,0 m/s	0,5 bar (7 psi)	s-mart MVQ	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
R112	**special oil seals**				**seal part**	**metal housing**	**energized spring**	**spring carrier**	**filler ring**
 (3)	based on the R111 design, but with a protective lip on the air side.	-20 °C ... +120 °C	25,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		-20 °C ... +220 °C	35,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
		- 60 °C ... +180 °C	25,0 m/s	0,5 bar (7 psi)	s-mart MVQ	Fe-PO3	AISI 316	BS1 301 S 01	Fe37
R113	**specials oil seals**				**seal part**	**metal housing**		**spring carier**	**filler ring**
 (3)	based on the R86 design, but stands for external lips	-20 °C ... +120 °C	15,0 m/s	0,5 bar (7 psi)	s-mart NBR	Fe-PO3		AISI 316	Fe37
		-18 °C ... +220 °C	25,0 m/s	0,5 bar (7 psi)	s-mart FKM	Fe-PO3		AISI 316	Fe37
R114-A	**double acting rotary shaft seal**				**seal part**	**energizer spring**		**metal insert**	
 (3)	the R104-A rotary shaft seal is used for the separation of two media or extreme dirt accumulation from the outside for rotating or pivoting shafts. rotary shaft seal with an elastomer outer sheath and a metal insert as well as two spring-energised, back-to-back sealing lips. The R104-A is a double action rotary shaft ring for rotating or pivoting shafts.	-20 °C ... +120 °C	6,0 m/s	0,3 bar (4,35 psi)	s-mart NBR	non-alloy steel		non-alloy steel	
		-18 °C ... +220 °C	6,0 m/s	0,3 bar (4,35 psi)	s-mart FKM	non-alloy steel		non-alloy steel	
R115	**double acting rotary shaft seal**				**seal part**	**spring**		**metal housing**	
 (3)	based on the R86 design, but with a metal outer surface. tight and accurate fitting is achieved by the metal outer casing. the R115 model has limited sealing action with thin fluid or gaseous media and in split housings.	-20 °C ... +120 °C	6,0 m/s	0,3 bar (4,35 psi)	s-mart NBR	non-alloy steel		non-alloy steel	
		-18 °C ... +220 °C	6,0 m/s	0,3 bar (4,35 psi)	s-mart FKM	non-alloy steel		non-alloy steel	
R116	**double acting grease sealing rotary shaft seal**				**seal part**	**metal housing**			
 (3)	double lipped oil seal without springs with external metal casing, ground or coined to as per DIN 3760.	-20 °C ... +120 °C	6,0 m/s	without pressure	s-mart NBR	non-alloy steel			
		-18 °C ... +220 °C	10,0 m/s	without pressure	s-mart FKM	non-alloy steel			
R117	**double acting grease sealing rotary shaft seal**				**seal part**	**metal insert**			
 (3)	R117 is seals with completely rubber covered outer diameter. two sealing lips.	-20 °C ... +120 °C	6,0 m/s	without pressure	s-mart NBR	non-alloy steel			
		-18 °C ... +220 °C	10,0 m/s	without pressure	s-mart FKM	non-alloy steel			

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

rotary seals : roto slide seal

application & profile	description	temperature	max. speed	max. pressure	material	
R03-P	**double acting rotary shaft seal**				**seal part**	**back-up ring**
  (0)	rotary seal with integrated backup rings for pivoting motion in hydraulic systems. interference fit on outside diameter maintains stable fit in the housing, backup rings permit larger extrusion gap / higher pressure. mainly used for rotary pivots on excavators, grabs	-30 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*
		-20 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart HPU	s-mart POM / PA*
		-40 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart POM / PA*
		-20 °C ... +100 °C	0,3 m/s	400 bar (5800 psi)	s-mart SPU	s-mart POM / PA*
		-30 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart GPU	s-mart POM / PA*
R03-R	**double acting rotary shaft seal**				**seal part**	**back-up ring**
  (0)	as profile R03-P but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM
		-20 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA
		-40 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM
		-20 °C ... +100 °C	0,3 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
		-30 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE
R04-A	**double acting rotary shaft seal**					
  (0)	space saving rotary seal for pivoting motion in hydraulic systems. interference fit on outside diameter maintains stable fit in the housing, dynamic sealing lips on inside diameter.	-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart PU	
		-20 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart HPU	
		-50 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart LTPU	
		-20 °C ... +110 °C	0,3 m/s	160 bar (2300 psi)	s-mart SPU	
		-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart GPU	
		-30 °C ... +100 °C	0,2 m/s	100 bar (1450 psi)	s-mart NBR	
		-25 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart HNBR	
		-20 °C ... +200 °C	0,2 m/s	100 bar (1450 psi)	s-mart FKM	
		-50 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart EPDM**	
R05-A	**double acting rotary shaft seal**					
  (0)	space saving rotary seal for pivoting motion in hydraulic systems. interference fit on inside diameter maintains stable fit in the housing, dynamic sealing lips on outside diameter.	-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart PU	
		-20 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart HPU	
		-50 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart LTPU	
		-20 °C ... +110 °C	0,3 m/s	160 bar (2300 psi)	s-mart SPU	
		-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart GPU	
		-30 °C ... +100 °C	0,2 m/s	100 bar (1450 psi)	s-mart NBR	
		-25 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart HNBR	
		-20 °C ... +200 °C	0,2 m/s	100 bar (1450 psi)	s-mart FKM	
		-50 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart EPDM**	
R09-F	**double acting rotary shaft seal**				**glide ring**	**energizer**
  (0,1,3)	o-ring activated, low friction PTFE rotary seal. mainly used in applications with alternating pressure from one side of the seal to the other, such as hose reels, swivel joints, rotating track rings and machine tool hydraulics. good chemical and thermal resistance achievable by selection of suitable o-ring material.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
		-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
R09-FS	**double acting rotary shaft seal**				**glide ring**	**energizer**
  (0)	as profile R09-F, but with a profile ring energizer instead of the o-ring. for heavy duty applications and non standard housings.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
		-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
R10-F	**double acting rotary shaft seal**				**glide ring**	**energizer**
  (0,1,3)	o-ring activated, low friction PTFE rotary seal. mainly used in applications with alternating pressure from one side of the seal to the other, such as hose reels, swivel joints, rotating track rings and machine tool hydraulics. good chemical and thermal resistance achievable by selection of suitable o-ring material.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
		-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR

 linear moving  rotating  oscillating  spiral moving  static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

rotary seals : roto slide seal

application & profile	description	temperature	max. speed	max. pressure	material	
R10-FS	**double acting rotary shaft seal**				**glide ring**	**energizer**
  (0)	as profile R10-F, but with a profile ring energizer instead of the o-ring. for heavy duty applications and non standard housings.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
		-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
		-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
R19-F	**single acting PTFE rotary seal**				**seal part**	**spring**
  (0,1,3)	fingerspring activated PTFE seal with integrated clamping flange on the back of seal for clamping fixation, acting as anti-twist device. excellent chemical and thermal resistance. suitable for relatively high pressure and high speed, however, allowable pressure and speed depend on each other.	-200°C ... +260°C	15,0 m/s	150 bar (2100 psi)	s-mart PTFE glass	1.4310
		-200°C ... +260°C	15,0 m/s	150 bar (2100 psi)	s-mart PTFE bronze	1.4310
		-200°C ... +260°C	15,0 m/s	150 bar (2100 psi)	s-mart PTFE carbon	1.4310
		upon application			all material possible	1.4310

 linear moving  rotating  oscillating  spiral moving  static

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1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

rotary seals : v-ring

application & profile	description	temperature	max. speed	material
R06-P	**axially acting rotary seal**			
 (0)	elastic, excellent wear resistant v-ring with interference fit on the shaft, rotates with the shaft, sealing axially against shaft collars, thrust blocks or the outer race of roller bearings, protecting the bearing against dust, dirt, oil splash, water splash and similar media. acting as a seal and slinger ring.	-30 °C ... +110 °C	25,0 m/s	s-mart PU
		-20 °C ... +110 °C	25,0 m/s	s-mart HPU
		-50 °C ... +110 °C	25,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	25,0 m/s	s-mart SPU
		-30 °C ... +110 °C	25,0 m/s	s-mart GPU
R06-R	**axially acting rotary seal**			
 (1,3)	elastic, good wear resistant v-ring as profile R06-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +110 °C	25,0 m/s	s-mart NBR
		-20 °C ... +110 °C	25,0 m/s	s-mart FKM
		-50 °C ... +110 °C	25,0 m/s	s-mart EPDM**
		-20 °C ... +110 °C	25,0 m/s	s-mart HNBR
R06-SA	**axially acting rotary seal**			
 (1,3)	v-ring with narrow axial cross section suitable for compact arrangements.	-30 °C ... +100 °C	10,0 m/s	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	s-mart FKM
R06-SB	**axially acting rotary seal**			
 (1,3)	v-rings large diameter rigid lip.	-30 °C ... +100 °C	10,0 m/s	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	s-mart FKM
R06-SC	**axially acting rotary seal**			
 (1,3)	v-ring with special lip profile for a better sealing.	-30 °C ... +100 °C	10,0 m/s	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	s-mart FKM
R06-SD	**axially acting rotary seal**			
 (1,3)	v-ring with longer lip for heavy duty application.	-30 °C ... +100 °C	10,0 m/s	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	s-mart FKM
R06-SE	**axially acting rotary seal**			
 (3)	v-ring standard with clamping band, extended body.	-30 °C ... +100 °C	10,0 m/s	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	s-mart FKM
R06-SF	**axially acting rotary seal**			
 (3)	v-ring with built-in housing for a radial retention metal band.	-30 °C ... +100 °C	10,0 m/s	s-mart NBR
		-20 °C ... +200 °C	10,0 m/s	s-mart FKM

 linear moving  rotating  oscillating  spiral moving  static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

rotary seals : v-ring

application & profile	description	temperature	max. speed	material
R07-P	**axially acting rotary seal**			
 (0)	elastic, excellent wear resistant v-ring with interference fit on the shaft, rotates with the shaft, sealing axially against shaft collars, thrust blocks or the outer race of roller bearings, protecting the bearing against dust, dirt, oils plash, water splash and similar media. acting as a seal and slinger ring.	-30 °C ... +110 °C	25,0 m/s	s-mart PU
		-20 °C ... +110 °C	25,0 m/s	s-mart HPU
		-50 °C ... +110 °C	25,0 m/s	s-mart LTPU
		-20 °C ... +110 °C	25,0 m/s	s-mart SPU
		-30 °C ... +110 °C	25,0 m/s	s-mart GPU
R07-R	**axially acting rotary seal**			
 (1,3)	elastic, good wear resistant v-ring as profile R07-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +110 °C	25,0 m/s	s-mart NBR
		-20 °C ... +110 °C	25,0 m/s	s-mart FKM
		-50 °C ... +110 °C	25,0 m/s	s-mart EPDM**
		-20 °C ... +110 °C	25,0 m/s	s-mart HNBR

linear moving rotating oscillating spiral moving static

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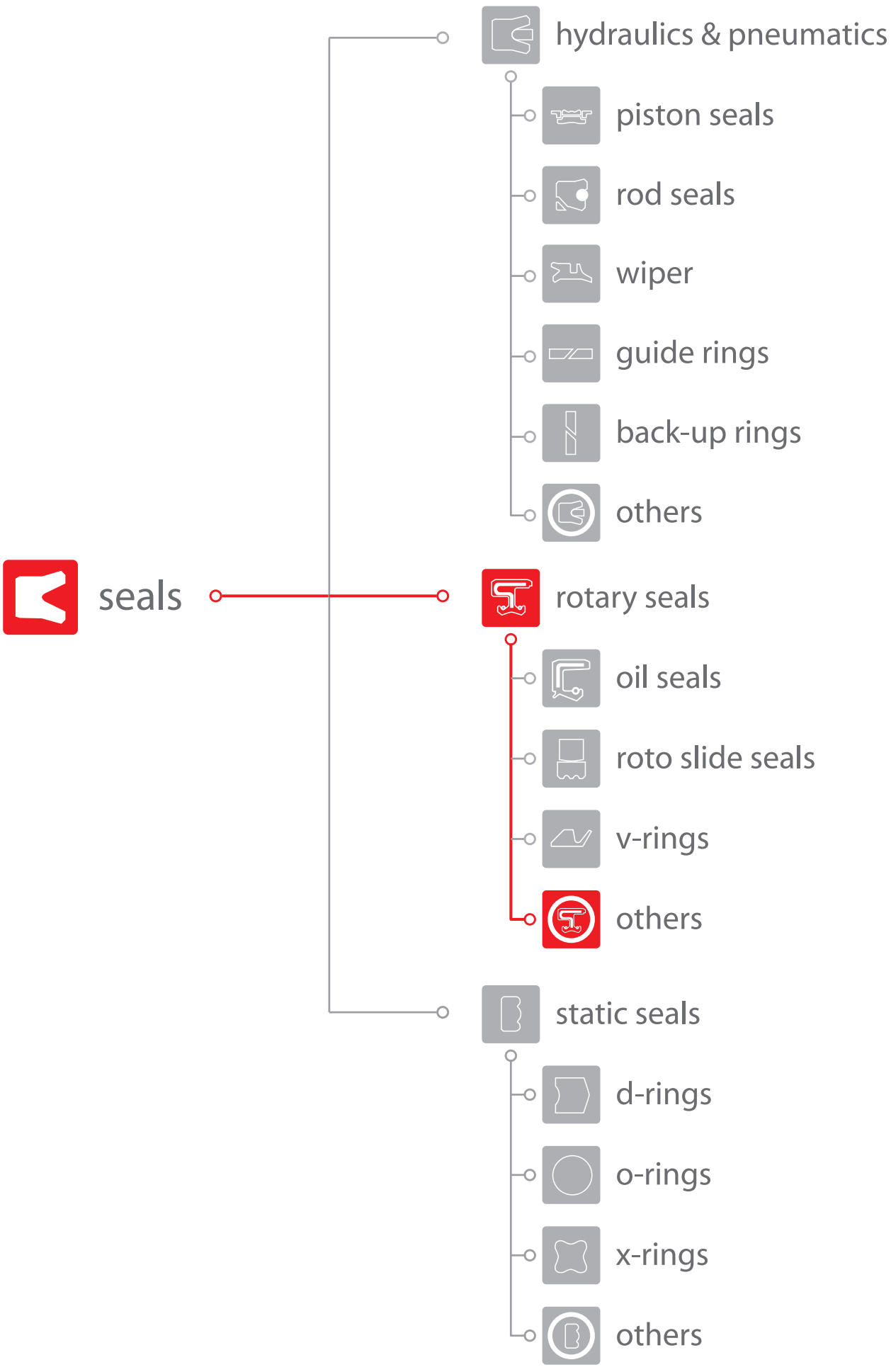
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

rotary seals : other

application & profile	description	temperature	max. speed	max. pressure	material		
R08-A	**single acting rotary seal**						
 (0)	springless rotary lip seal with arbitrary preload on inside and outside diameter in order to design the seal to different specific needs.	upon application			all material possible		
R11-F	**single acting PTFE rotary seal**						
 (0)	space saving rotary seal, deformed sealing lip acts selfadjusting on increasing temperature. for axially openhousings with clamping plate fixation, elastic secondary seal or integrated o-ring necessary for static sealing in the housing. excellent chemical and thermal resistance, suitable for high speed applications.	-200°C ... +260°C	20,0 m/s	5 bar (70 psi)	s-mart PTFE glass		
		-200°C ... +260°C	20,0 m/s	5 bar (70 psi)	s-mart PTFE bronze		
		-200°C ... +260°C	20,0 m/s	5 bar (70 psi)	s-mart PTFE carbon		
R94-A	**axial shaft seal**				**seal part**	**metal ring**	
 (3)	the R94-A is axial seal consisting of two sections, one coated metal ring and one mould vulcanised elastomer sealing element. the metal ring protects the elastomer seal against damage, serves as a stand and support for the elastomer seal and simultaneously acts as a flinger. The elastomer seal is not firmly bonded to but stretched over the metal ring and is additionally held by the axial flange.	-40°C ... +100°C	12,0 m/s	without pressure	s-mart NBR	yellow chromate, deep-drawn steel sheet as corrosion protection	
		-30°C ... +180°C	12,0 m/s	without pressure	s-mart FKM	yellow chromate, deep-drawn steel sheet as corrosion protection	
R95-A	**axial shaft seal**				**seal part**	**metal ring**	
 (3)	based on the R67 design, but with the metal ring is extended in an axial direction on the outer sheath. Additional labyrinth sealing is created in combination with the circulating groove in the sliding surface	-40°C ... +100°C	12,0 m/s	without pressure	s-mart NBR	yellow chromate, deep-drawn steel sheet as corrosion protection	
		-30°C ... +180°C	12,0 m/s	without pressure	s-mart FKM	yellow chromate, deep-drawn steel sheet as corrosion protection	
R96	**axial shaft seal**				**seal part**	**metal part**	**spider spring**
 (3)	the R96 with internal sealing lip, primarily for sealing of fluids. the seal is generally pressfitted in the housing with the sealing lip against the rotating shaft. the seal should always be installed so that the sealing lip is flushed by the fluid. dry running must be avoided.	-30°C ... +120°C	20,0 m/s	0,1 bar (1,45 psi)	s-mart NBR	steel 1.0338/St 14.03	steel 1.0605/C75
		-25°C ... +250°C	30,0 m/s	0,1 bar (1,45 psi)	s-mart FKM	steel 1.0338/St 14.03	steel 1.0605/C75
R97	**axial shaft seal**				**seal part**	**metal part**	**spider spring**
 (3)	the R97 with external sealing lip for sealing against grease. at low speeds and with a very good, preferably ground or lapped contact surface, it can also be used for sealing against fluids.	-30°C ... +120°C	10,0 m/s	0,1 bar (1,45 psi)	s-mart NBR	steel 1.0338/St 14.03	steel 1.0605/C75
		-25°C ... +250°C	15,0 m/s	0,1 bar (1,45 psi)	s-mart FKM	steel 1.0338/St 14.03	steel 1.0605/C75
R118	**cover seals**				**seal part**	**metal insert**	
 (3)	R118 are components to be fitted in the housing bores where no input/output shaft is located. moreover they are used to plug and seal service bores. standard end covers are manufactured in accordance with bore tolerances recommended by DIN 3760 and ISO 6194/1 for radial oil seals.	-30°C ... +100°C		0,5 bar (7,25 psi)	s-mart NBR	unalloyed steel	
		-20°C ... +200°C		0,5 bar (7,25 psi)	s-mart FKM	unalloyed steel	
R119	**cover seals**				**seal part**	**metal insert**	
 (3)	based on the R118 design, but with a half outer cover between rubber coated & metal.	-30°C ... +100°C		0,5 bar (7,25 psi)	s-mart NBR	unalloyed steel	
		-20°C ... +200°C		0,5 bar (7,25 psi)	s-mart FKM	unalloyed steel	

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

rotary seals : other

application & profile	description	temperature	max. speed	max. pressure	material	
R120	**cover seals**				**seal part**	**metal insert**
 (3)	based on the R118 design, but has a bent shape profile.	-20°C ... +120°C		0,5 bar (7,25 psi)	s-mart NBR	unalloyed steel
		-50°C ... +170°C		0,5 bar (7,25 psi)	s-mart FKM	unalloyed steel
R121	**shaft repair sleeves**				**seal part**	
 (3)	The R121 serves as a running surface for rotary shaft lip seals. it consists of a thin-walled cylindrical tube with a mounting flange. the flange has a design breaking point and can be removed. the shaft repair kit has a wall thickness of approx. 0.254 mm and a spiral free ground surface. it is ideally suited as a counter face for rotary shaft lip seals.				stainless steel ANSI 304 (1.4301)	

 linear moving  rotating  oscillating  spiral moving  static

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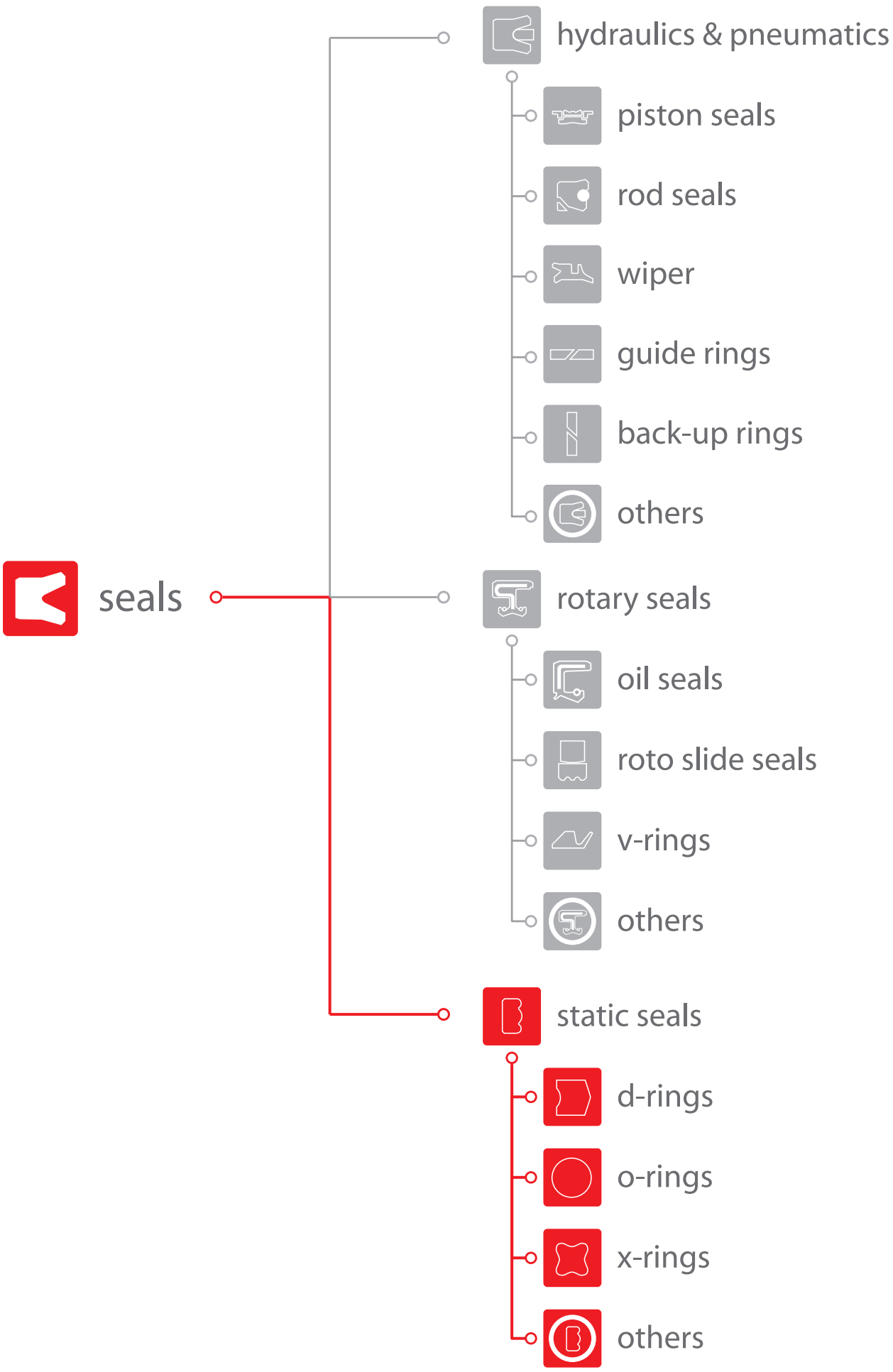
1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product


seals
hydraulics & pneumatics
piston seals
rod seals
wiper
guide rings
back-up rings
others
rotary seals
oil seals
roto slide seals
v-rings
others
static seals
d-rings
o-rings
x-rings
others

product range seal

static seal : d-ring, o-ring, x-ring, others

application & profile	description	temperature	max. speed	max. pressure	material

static seal : d-ring

R35-A — **single acting flange seal**

(0)

flange seal for static applications, suitable for high pressure range. direction of pressurization (from inside or outside) must be indicated when ordering the seal.

temperature	max. speed	max. pressure	material
-30 °C ... +110 °C		800 bar (11600 psi)	s-mart PU
-20 °C ... +110 °C		800 bar (11600 psi)	s-mart HPU
-50 °C ... +110 °C		800 bar (11600 psi)	s-mart LTPU
-20 °C ... +110 °C		800 bar (11600 psi)	s-mart SPU
-30 °C ... +110 °C		800 bar (11600 psi)	s-mart GPU
-30 °C ... +100 °C		250 bar (3600 psi)	s-mart NBR
-20 °C ... +200 °C		250 bar (3600 psi)	s-mart FKM
-50 °C ... +150 °C		250 bar (3600 psi)	s-mart EPDM**
-25 °C ... +150 °C		250 bar (3600 psi)	s-mart HNBR
-200 °C ...+260 °C		250 bar (3600 psi)	s-mart PTFE virgin

static seal : o-ring

R13 — **o-ring**

(0,1,3)

well known, simple o-ring with proven reliability in multiple applications in every sector of industry. excellent adaptation possibilities for diverse temperatures and media by selection of suitable seal material. mainly used as static seal or as preloading element for PTFE-seals. for most dynamic applications we recommend to prefer profiles like S20/K20 or S35/K35.

temperature	max. speed	max. pressure	material
-30 °C ... +110 °C		600 bar (8700 psi)	s-mart PU
-20 °C ... +110 °C		600 bar (8700 psi)	s-mart HPU
-50 °C ... +110 °C		600 bar (8700 psi)	s-mart LTPU
-20 °C ... +110 °C		600 bar (8700 psi)	s-mart SPU
-30 °C ... +110 °C		600 bar (8700 psi)	s-mart GPU
-30 °C ... +100 °C		160 bar (2300 psi)	s-mart NBR
-20 °C ... +200 °C		160 bar (2300 psi)	s-mart FKM
-50 °C ... +150 °C		160 bar (2300 psi)	s-mart EPDM**
-25 °C ... +150 °C		160 bar (2300 psi)	s-mart HNBR
-200 °C ...+260 °C		160 bar (2300 psi)	s-mart PTFE virgin

static seal : x-ring

R16-R — **double acting**

(0,1,3)

for static and dynamic applications as an o-ring replacement in radial and axial grooves

temperature	max. speed	max. pressure	material
-30 °C ... +110 °C	0,5 m/s	50 bar (3600 psi)	s-mart NBR
-20 °C ... +200 °C	0,5 m/s	50 bar (3600 psi)	s-mart FKM
-50 °C ... +150 °C	0,5 m/s	50 bar (3600 psi)	s-mart EPDM
-25 °C ... +150 °C	0,5 m/s	50 bar (3600 psi)	s-mart HNBR
-60 °C ... +200 °C	0,5 m/s	50 bar (3600 psi)	s-mart MVQ

static seal : others

R12-F — **single acting PTFE flange seal**

(0,1)

finger spring activated flange seal, excellent chemical and thermal resistance, mainly used on flanges, fittings or pivoting joints in chemical industry.

temperature	max. speed	max. pressure	seal part	spring
-200°C ... +260°C	15,0 m/s	300 bar (4300 psi)	smart PTFE glass smart PTFE bronze smart PTFE carbon	1.4310

ST61 — **flange**

(1)

good abrasion resistance
- usable for rough surface finish
- the sealing edge offers a very good sealing function
- very high resistance to extrusion
- low compression set

temperature	max. speed	max. pressure	material
-20 °C ... +80 °C		420 bar (6090 psi)	s-mart PU

linear moving · rotating · oscillating · spiral moving · static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

product range seal

static seal : others

application & profile	description	temperature	max. speed	max. pressure	material		
ST62	**axial static seal**						
 (1)	this elastomeric seal is used as an axial static seal for threaded ports and stud ends in hydraulic fluid power applications in accordance with DIN 3869, ISO 11926, ISO 9974 and ISO 1179. The cross-section remains practically constant even under high pressure.	-25 °C ... +100 °C		630 bar (61370 psi)	s-mart NBR		
		-18 °C ... +200 °C		630 bar (61370 psi)	s-mart FKM		
ST63	**axial (face) applications**				**seal part**	**spring**	
 (1)	this is the standard seal for axial (face) applications. the seal has the same high sealing load and is available for internal pressure. the use of the heavy helical spring makes it the best choice for vacuum, gas, and low temperature flange and cover applications.	-200°C ... +260°C		800 bar (11603 psi)	s-mart PTFE	stainless steel 1.4310	
ST64	**axial (face) applications**				**seal part**	**spring**	
 (1)	based on the ST63 design, but for external pressure.	-200°C ... +260°C		800 bar (11603 psi)	s-mart PTFE	stainless steel 1.4310	
R14	**square ring**						
 (0,1,3)	well known, simple square ring, mainly used for static applications or as gaskets. excellent adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	upon application			all material possible		
R15-P	**double acting**						
 (0,1,3)	for static applications as an o-ring replacement to avoid drilling in the housing, simple installation and higher extrusion resistance.	-30 °C ... +110 °C		400 bar (5800 psi)	s-mart PU		
		-20 °C ... +110 °C		400 bar (5800 psi)	s-mart HPU		
		-50 °C ... +110 °C		400 bar (5800 psi)	s-mart LTPU		
		-20 °C ... +110 °C		400 bar (5800 psi)	s-mart SPU		
		-30 °C ... +110 °C		400 bar (5800 psi)	s-mart GPU		
R20-P	**single acting flange seal**						
 (0)	flange seal for static applications, suitable for high pressure range. direction of pressurization (from inside or outside) must be indicated when ordering the seal.	-30 °C ... +110 °C		800 bar (11600 psi)	s-mart PU		
		-20 °C ... +110 °C		800 bar (11600 psi)	s-mart HPU		
		-50 °C ... +110 °C		800 bar (11600 psi)	s-mart LTPU		
		-20 °C ... +110 °C		800 bar (11600 psi)	s-mart SPU		
		-30 °C ... +110 °C		800 bar (11600 psi)	s-mart GPU		
R30-A	**valve stem seal with PTFE jacket**				**seal**	**cover**	**back-up**
 (0)	for low friction, rubber energizer automatically increases preload as it senses leakage. mainly used as valve seal in oil industry/offshore applications.	-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart FKM	s-mart PTFE	s-mart POM
		-25 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart HNBR	s-mart PTFE	s-mart POM
		-20 °C ... +200 °C	0,5 m/s	1000 bar (14500 psi)	s-mart FKM	s-mart PTFE	s-mart PAEK
		-25 °C ... +200 °C	0,5 m/s	1000 bar (14500 psi)	s-mart HNBR	s-mart PTFE	s-mart PAEK

linear moving rotating oscillating spiral moving static

please consult our application department for the not bold movement symbols!

* s-mart POM up to ø260 mm, s-mart PA above ø260 mm
** attention: not suitable for mineral oils !

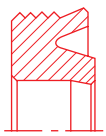
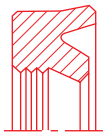
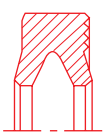
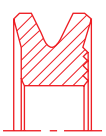
1 machined or molded or traded product
2 molded or traded product; machined with minor design change
3 molded or traded product
0 machined product

beside the conventional o-rings and square-rings sealjet indonesia offers special seals for static applications. most of below listed profiles fit in standard o-ring-grooves (housings) and can be substituted easily without any rework of housing dimensions.

application	static	profile			
universal		**R13**	**R14**	**R16-R**	**universal type** most common and simple seal profiles with proven reliability in multiple applications in every sector of industry.
					
inside sealing		**S20-R**	**S35-P**	**R15-P**	**inside sealing type** interference fit on outside diameter assures stable fit in the housing and reliable performance at all pressures.
					
outside sealing		**K20-R**	**K35-P**	**R15-P**	**outside sealing type** interference fit on inside diameter assures stable fit in the housing and reliable performance at all pressures.
					
axial sealing		**R35-A**	**R20-P**	**R12-F**	**axial sealing type** robust profiles mainly used as flange seals, inside or outside pressurization possible. direction of pressurization (from inside or outside) must be indicated when ordering the seal.
					

for material data, temperature and pressure limitations please refer the the respective entries in the profile description

in addition to our standard range of static seals we certainly do offer special tailormade static seal profiles to satisfy the very specific needs of every customers, in every industry.

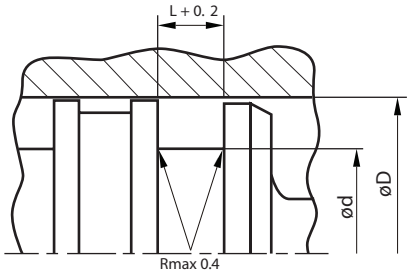
application	static	profile	
tailormade solutions		   	these special profiles are examples for our wide and flexible product range.

housing details and recommendations

piston seals housing details and recommendations

indicated dimensions
are required to process an order

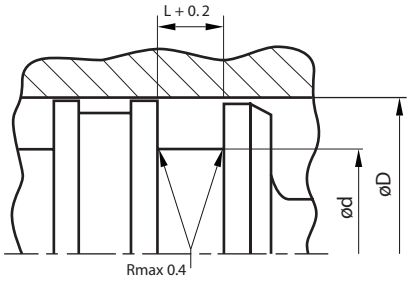
øD . . . . . outside diameter
ød . . . . . inside diameter
L . . . . . groove length



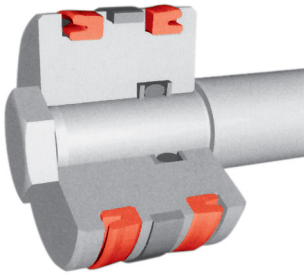
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø d	h10
Ø D	H9

easy ordering procedure	K01-P	s-mart HPU	160 x 140 x 12
	profile	material	nominal housing dimensions



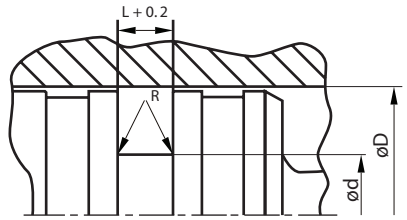
K01 **K21**
K02 **K35**
K03
K04
K05
K06
K07
K20



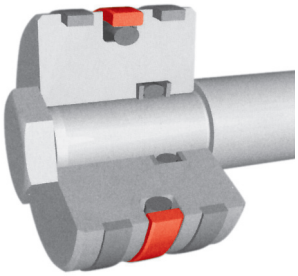
main application:
support and retaining cylinders
standard cylinders

advantages:
stable fit in the housing,
ultimate sealing effect,
wide temperature range

standard materials:
s-mart PU or s-mart [NBR, FKM, EPDM, HNBR & MVQ]



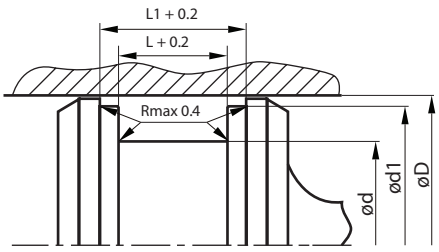
K08
K23



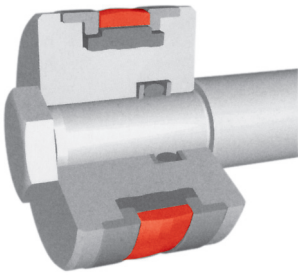
main application:
standard cylinders for positioning
functions, mobile hydraulics, etc.

advantages:
low friction, no stick-slip, excellent
resistance against pressure shocks

standard materials:
s-mart PTFE series + s-mart NBR
s-mart PTFE series + s-mart FKM
s-mart XPU + s-mart NBR



K09
K17



main application:
support and retaining cylinders
standard cylinders

advantages:
excellent static and dynamic sealing
capacity, integrated guide rings

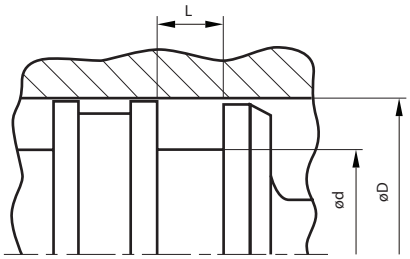
standard materials:
s-mart PU + s-mart [NBR, FKM, MVQ, EPDM, HNBR] + s-mart POM

housing recommendations

single acting piston seals

lip type (u-cup) seals

compact seals



the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

K01 K02 K03

K04 K05 K06

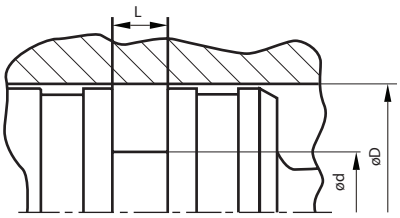
K07 K21

øD	ød	L	(øD-ød)/2
5 - 24,9	øD-8	6	4
25 - 49,9	øD-10	7	5
50 - 74,9	øD-12	8	6
75 - 149,9	øD-16	10	8
150 - 299,9	øD-20	12	10
300 - 500	øD-24	18	12
500 - 750	øD-30	20	15
> 750	øD-40	26	20

housing recommendations

single/double acting piston seals

o-ring activated PTFE (PU) seals



the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

K08-E K08-D K08-P

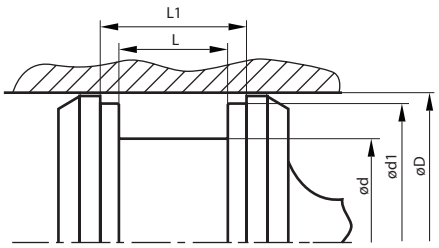
øD	ød	L	(øD-ød)/2
8-14,9	øD-4,9	2,2	2,45
15-39,9	øD-7,5	3,2	3,75
40-79,9	øD-11	4,2	5,5
80-132,9	øD-15,5	6,3	7,75
133 - 329,9	øD-21	8,1	10,5
330 - 669,9	øD-24,5	8,1	12,25
670 - 1.000	øD-28	9,5	14*
> 1.000	øD-28	9,5	14*

* only profiles K08-D and K08-E, not for profile K08-P

housing recommendations

double acting piston seals

compact type



the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

K09-N

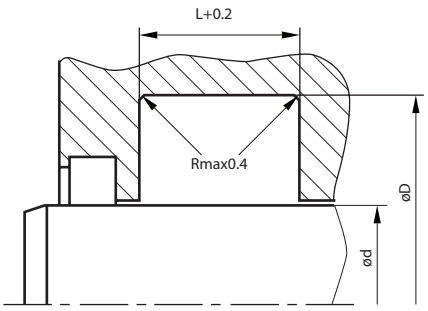
øD	ød	ød1	L*	L1*
20 - 49,9	øD-10	øD-3	12,5	20,5
50 - 79,9	øD-15	øD-4	20	28
80 - 149,9	øD-20	øD-5	25	36
150 - 399,9	øD-25	øD-6	32	46
400 - 750	øD-30	øD-8	36	50
>750	øD-40	øD-8	40	54

* not valid for profile K09-H

rod seals housing details and recommendations

indicated dimensions
are required to process an order

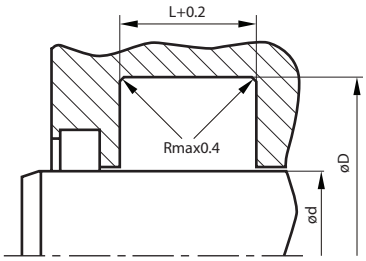
øD ..... outside diameter
ød ..... inside diameter
L ..... groove length



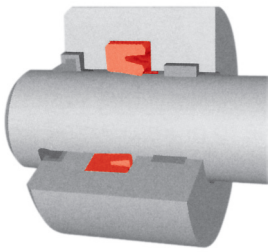
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø d	f8
Ø D	H10

easy ordering procedure	S01-P	s-smart PU	60 x 75 x 10
	profile	material	nominal housing dimensions



S01 **S17**
S02 **S18**
S03 **S19**
S04 **S35**
S05
S06
S07
S08

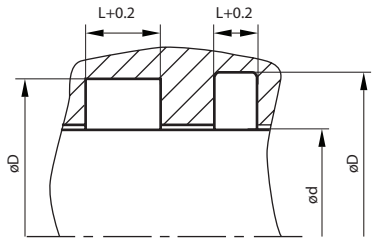


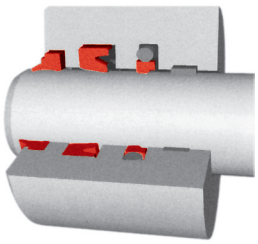
main application:
standard cylinders
light & standard hydraulic applications

advantages:
stable fit in the housing, ultimate sealing effect, wide temperature range, good backpumping ability

standard materials:
s-mart PU or s-mart [NBR, FKM, EPDM, HNBR & MVQ]

S09



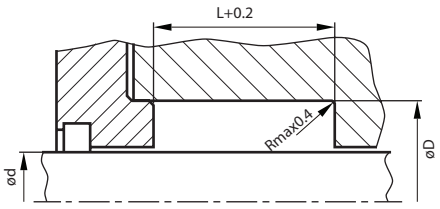


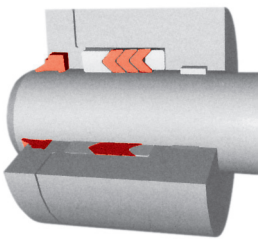
main application:
earth moving equipment,
heavy hydraulics

advantages:
excellent resistance against pressure shocks, long lifetime

standard materials:
S09: s-mart PTFE series + s-mart NBR
s-mart PTFE series + s-mart FKM
s-mart XPU + s-mart NBR
S01: s-mart PU or s-mart [NBR, FKM, EPDM, HNBR & MVQ]

S1012
S1315
S32





main application:
heavy industry hydraulics, presses

advantages:
suitable for old,worn rods,
splitted version for easy installation available

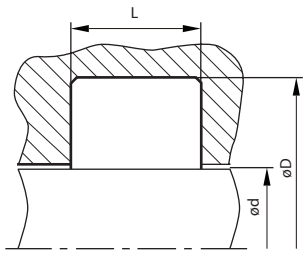
standard materials:
s-mart PU + s-mart POM

housing recommendations

single acting piston seals

lip type (u-cup) seals

compact seals



the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

S01 S02 S03

S04 S05 S06

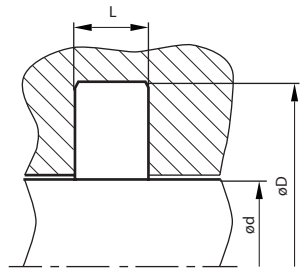
S07 S08 S24

ød	øD	L	(øD-ød)/2
5 - 24,9 *	ød+8	6,3	4
25 - 49,9	ød+10	8	5
50 - 149,9	ød+15	10	7,5
150 - 299,9	ød+20	14	10
300 - 499,9	ød+25	17	12,5
500 - 699,9	ød+30	25	15
700 - 1.000	ød+40	32	20
> 1.000	ød+40	32	20

housing recommendations

single/double acting piston seals

o-ring activated PTFE (PU) seals



the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

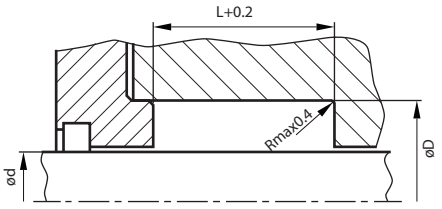
S09-E S09-D S09-P

ød	øD	L	(øD-ød)/2
5 - 7,9	ød+4,9	2,2	2,45
8 - 18,9	ød+7,3	3,2	3,65
19 - 37,9	ød+10,7	4,2	5,35
38 - 199,9	ød+15,1	6,3	7,75
200 - 255,9	ød+20,5	8,1	10,25
256 - 649,9	ød+24	8,1	12
650 - 1.000	ød+27,3	9,5	13,65
> 1.000	ød+27,3	9,5	13,65

housing recommendations

single acting rod seals

chevron packings



the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

S1012 S1315

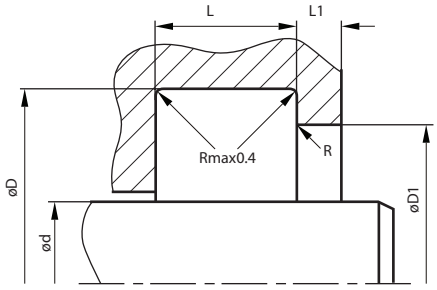
ød	øD	L	(øD-ød)/2
10 - 39,9	ød+10	16	5
40 - 74,9	ød+15	25	7,5
75 - 149,9	ød+20	32	10
150 - 199,9	ød+25	40	12,5
200 - 300	ød+30	50	15
> 300	ød+40	63	20

* restrictions in minimum diameter for profiles with back-up rings.

wiper housing details and recommendations

indicated dimensions
are required to process an order

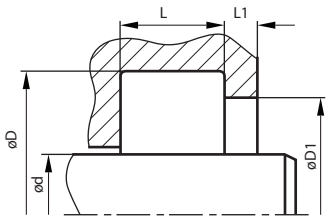
øD . . . . . outside diameter
ød . . . . . inside diameter (rod)
L . . . . . groove length
H. . . . . total wiper height



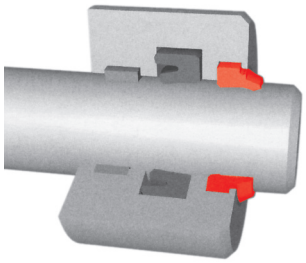
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø D1 H11	L<10 mm +0,2
Ø D H11	L>10 mm +0,3

easy ordering procedure	A01	SPU	60 x 68 x 4/7
	profile	material	nominal housing dimensions/total wiper height



A01
A04



main application:

standard wiper for hydraulic

advantages:

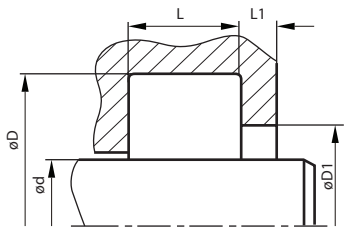
easy installation (snap-in)

excellent wear resistance,

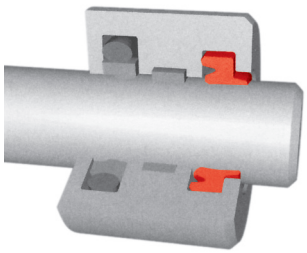
technically accurate closure

standard materials:

s-mart PU [s-mart XPU] or s-mart [NBR, FKM, EPDM, HNBR & MVQ]



A11
A02
A05
A12



main application:

in combination with o-ring activated

PTFE rod seals (S09)

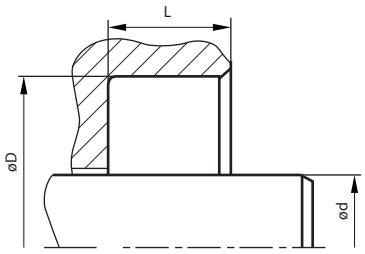
advantages:

excellent wear resistance,

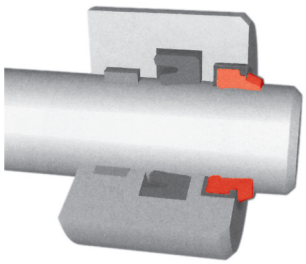
double acting function

standard materials:

s-mart PU [s-mart XPU] or s-mart [NBR, FKM, EPDM, HNBR & MVQ]



A03
A06



main application:

standard hydraulic applications,

pressfit for axially open housings

advantages:

excellent wear resistance,

plastic retainer ring, no oxidation problem

between retainer and housing

standard materials:

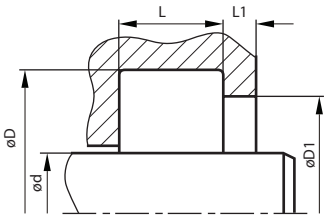
s-mart PU [s-mart XPU] + smart POM or

s-mart [NBR, FKM, EPDM, HNBR & MVQ] + s-mart POM

housing recommendations

single acting wipers

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.



A01 A04

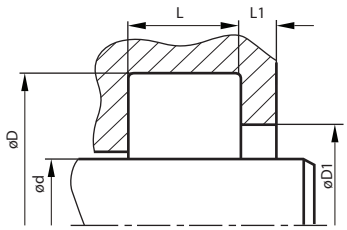
ød	øD	øD1	L	L1	H*
6 - 100	ød+8	ød+6	4	5	7
100,1 - 149,9	ød+12	ød+9	5,5	1,5	10
≥150	ød+15	ød+11	6,5	2	13

* H = total wiper height

housing recommendations

single/double acting wipers

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.



A02 A05 A11

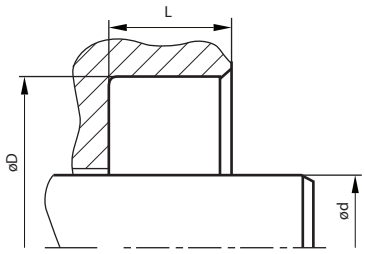
ød	øD	øD1	L	L1	H*
6 - 49,9	ød+8	ød+4	5	min. 2	8
50 - 99,9	ød+10	ød+5	6	min. 2	9,7
≥100	ød+15	ød+7,5	8,5	min. 2	13

* H = total wiper height

housing recommendations

single acting wipers

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.



A03 A06

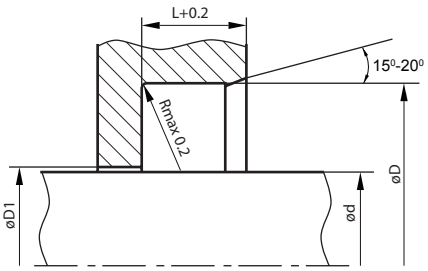
ød	øD	L	H*
6 - 9,9	ød+8	5	8
10 - 99,9	ød+10	7	10
100 - 200	ød+15	9	12
> 200	ød+20	12	16

* H = total wiper height

rotary seals housing details and recommendations

indicated dimensions
are required to process an order

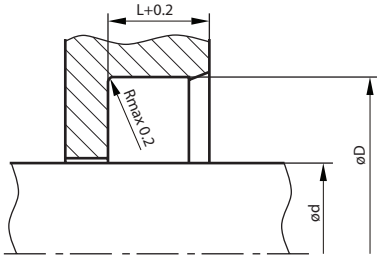
øD ..... outside diameter
ød ..... inside diameter (shaft)
L ..... groove length



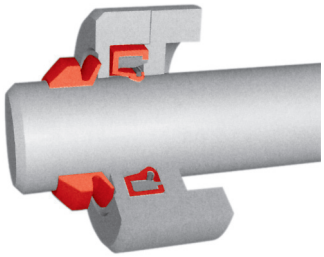
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø d	f8
Ø D	H8

easy ordering procedure	R01	NBR/POM	60 x 80 x 10
	profile	material	nominal housing dimensions



R01
R02

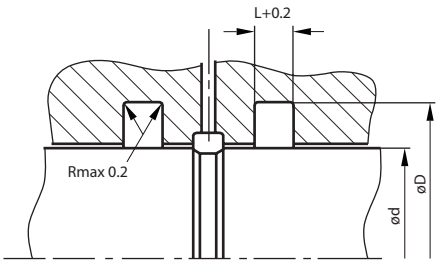


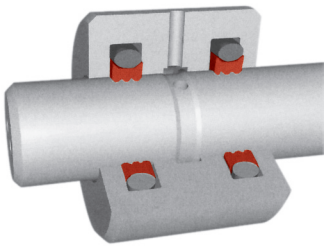
main application:
bearing protection

advantages:
good adaptation possibilities for diverse temperatures and media

standard materials:
s-mart [PU, NBR, FKM] + s-mart POM [alumunium]

R09



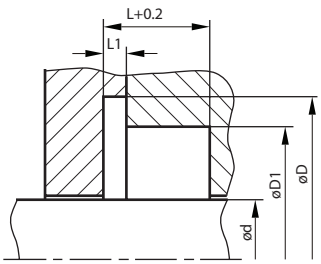


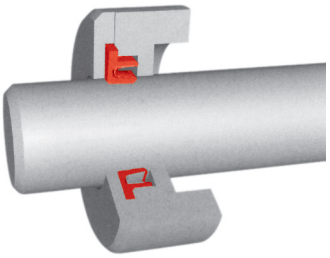
main application:
rotary pivots

advantages:
for high pressure

standard materials:
s-mart PTFE [glass, bronze, carbon] + s-mart [NBR, FKM]

R19





main application:
bearing protection for chemical and pharma industries

advantages:
low friction, good chemical and thermal resistance, suitable for high speed

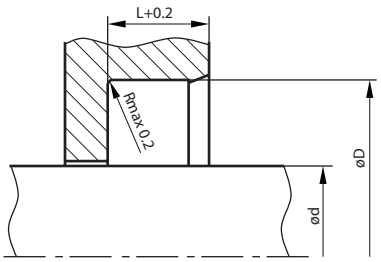
standard materials:
s-mart PTFE [glass, bronze, carbon] + stainless steel spring

housing recommendations

single acting rotary seals

oil seals / radial shaft seals

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.



R01

R02

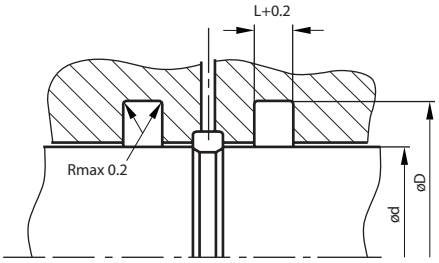
ød	øD	L	(øD-ød)/2
6 - 59,9	ød+12	7	6
60 - 139,9	ød+15	8	7,5
140 - 299,9	ød+20	10	10
300 - 499,9	ød+30	12	15
500 - 800	ød+40	20	20
> 800	ød+50	22	25

housing recommendations

double acting rotary seals

o-ring activated PTFE seals

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.



R09

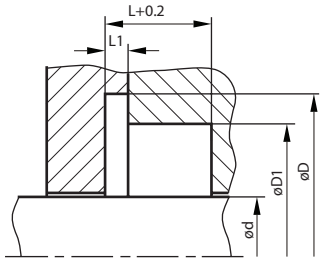
ød	øD	L	(øD-ød)/2
6 - 18,9	ød+4,9	2,2	2,45
19 - 37,9	ød+7,5	3,2	3,75
38 - 199,9	ød+11	4,2	5,5
200 - 255,9	ød+15,5	6,3	7,75
256 - 649,9	ød+21	8,1	10,5
>650	ød+28	9,5	14

housing recommendations

single acting rotary seals

spring activated PTFE seals

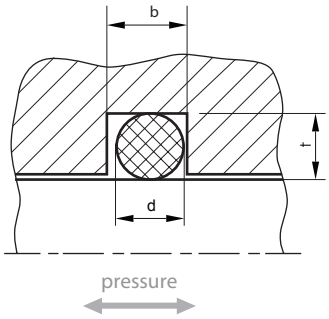
the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

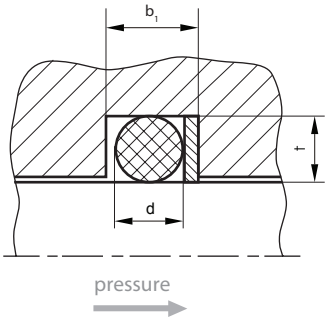


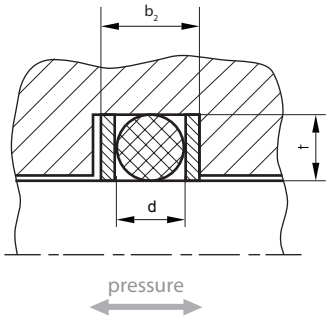
R19

ød	øD	øD1	L	L1
5 - 19,9	ød+9	ød+5	3,6	0,85
20 - 39,9	ød+12,5	ød+7	4,8	1,35
40 - 399,9	ød+17,5	ød+10,5	7,1	1,8
≥400	ød+22	ød+14	9,5	2,8

o-ring seals housing details and recommendations for static application

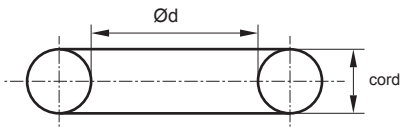


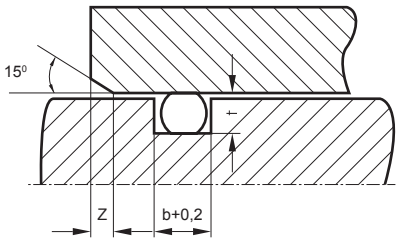


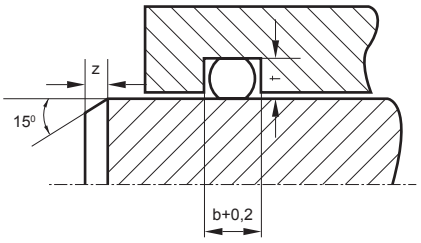


cord diameter (mm)	groove depth (mm)	without back-up ring (mm)	one back-up ring (mm)	2 back-up ring (mm)	recommended back-up ring width (mm)
Ød	t ± 0,05	b + 0,25	b1 + 0,25	b2 + 0,25	
1,50	1,10	2,1	3,1	4,1	1,0
1,78	1,35	2,5	3,5	4,5	1,0
2,00	1,56	2,7	4,2	5,7	1,5
2,50	2,05	3,3	4,8	6,3	1,5
2,62	2,18	3,5	5,0	6,5	1,5
3,00	2,52	3,9	5,4	6,9	1,5
3,50	3,00	4,4	5,9	7,4	1,5
3,53	3,00	4,4	5,9	7,4	1,5
4,00	3,40	5,0	6,7	8,4	1,7
5,00	4,25	6,3	8,0	9,7	1,7
5,33	4,53	6,7	8,4	10,1	1,7
5,70	4,85	7,1	9,1	11,1	2,0
6,00	5,10	7,5	9,5	11,5	2,0
6,99	5,94	8,8	10,8	12,8	2,0
7,00	5,95	8,8	10,8	12,8	2,0
8,00	6,80	10,0	12,5	15,0	2,5
10,00	8,50	12,5	15,0	17,5	2,5

o-ring seals housing details and recommendations for dynamic application







cord diameter (mm)	groove depth t (mm)	groove depth b (mm)	chamfer 15⁰ (z mm)
1,50	1,3 ±0,03	1,50	1,50
1,78	1,5 ±0,04	1,78	1,78
2,00	1,7 ±0,04	2,00	2,00
2,62	2,3 ±0,05	2,62	2,62
3,00	2,6 ±0,06	3,00	3,00
3,50	3,1 ±0,07	3,50	3,50
3,53	3,1 ±0,07	3,53	3,53
4,00	3,5 ±0,08	4,00	4,00
5,00	4,4 ±0,10	5,00	5,00
5,33	4,7 ±0,11	5,33	5,33
5,70	5,0 ±0,11	5,70	5,70
6,99	6,2 ±0,14	6,99	6,99
7,00	6,2 ±0,14	7,00	7,00
8,00	7,1 ±0,16	8,00	8,00
10,00	8,8 ±0,20	10,00	10,00

guide ring seals housing details and recommendations for dynamic applications

our standard guide rings are available in 45°-splitted versions.

those can be ordered as well as endless -90°-splitted versions on yard ware.

seal housing tolerances	
Ø d	f8
Ø D	H8
L+0,2	

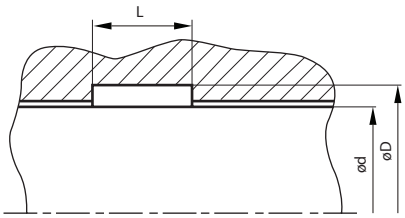
housing recommendations

guide rings

rod

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

F01



ød	øD	L	c/s
6 - 29,9	ød+3	4	1,5
30 - 49,9	ød+3	5,6	1,5
50 - 99,9	ød+5	9,7	2,5
100 - 799,9	ød+5	15	2,5
800 - 1.000	ød+8	25	4
> 1.000	ød+8	25	4

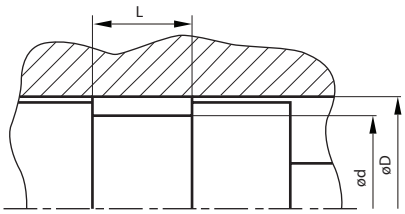
housing recommendations

guide rings

piston

the listing below is our suggestion for standard housing dimensions. please note that we are able to produce those profiles to your specific need or any non standard housing.

F01



ød	øD	L	c/s
6 - 29,9	ød+3	4	1,5
30 - 49,9	ød+3	5,6	1,5
50 - 99,9	ød+5	9,7	2,5
100 - 799,9	ød+5	15	2,5
800 - 1.000	ød+8	25	4
> 1.000	ød+8	25	4

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