



Product Portfolio Mechanical Seals and Supply Systems





Contents

Overview of Seals

Introduction						
Technical Properties						
Mechanical seals to						
DIN EN 12756						
5A						
5B						

28
5A-OM
5HG-BM3
4EYS
5KSTSMA

Cartridge mechanical seals

5KSCB2S	22	Mee
5KSCB2SQ/5KSCB2T	24	4ED
5KSCB2D/5KSCB2DV	26	4ED
5A/5B Cartridge	28	4ED
5KSTRHMD	30	4ED
LAPIS	32	4ED

4

60

62

4RDQ

Pump-specific

cartridge mechanical seals

4CP
4CPD
4EB
4EDTMP
4ES
4ESD
4HDS
4HGS
4HLQ
4K Cartridge
4KC
4KDC
4M
4MC
40MQ

6	4RPQ	66
8	4RPS	68
	4Spider	70
	4STK	72
	4STQ up to 033/055	74
10	4STQ from 055/065	76
12	4UM	78
14	5HGTC	80
16	UNITAS S MCPK	82
18	UNITAS S Omega	84
20	4WKS	86
	4WKD	88
22	Mechanical seals to API 682	
24	4EDBM6S/4EDBM6Q	90
26	4EDBM6T/4EDBM6D	92
28	4EDTR6HS/4EDTR6HQ	94
30	4EDTR6HT/4EDTR6HD	96
32	4EDCB8S	98
	4EDCB8T/4EDCB8D	100
	Component mechanical seals	
34	4AP	102
36	4C/4CN	104
38	4HG	106
40	4HL	108
42	4К	110
44	4KBL	112
46	4KST	114
48	40M	116
50	4RD/4RDB	118
52	4STC	120
54		
56	Thermosyphon systems	
58	SDPN16	122

4HL	108	Supply
4K	110	Materi
4KBL	112	
4KST	114	
40M	116	
4RD/4RDB	118	
4STC	120	
Thermosyphon systems		
SDPN16	122	
KTS52	123	
KTS53A	124	

64

Quench system	
KWT51	125
Closed barrier fluid systems	
KTS53B	126
Heat exchanger	
RWT23	127
KWT23	128
Cyclone constator	
	120
Cyclone separator	129
Leakage monitoring	
Leakage sensor	130
Venting	132
Surface finish quality	133
Face run-out, shaft run-out,	
centre offset	133
Thread-locking agents	133
Calculation of friction power loss	134
Leakage	135
Lubricants and torques	136
Key to the	
seal code to API 682	137
Supply systems to API 682	138
Material code	142

								ridge															
	٩	в	A-OM	HG-BM3	EYS	KSTSMA	KSCB2	A/5B Carti	INITAS S	KSTRHMD	APIS	KSHPKS	G	CPD/4CPDF	EB	EDTMP	ES	ESD	HDS	HGS	НГО	K Cartridge	KC
Amacan	2	2	2	2	4	2	2	2		2		4	4	4	4	4	4	4	4	4	4	4	4
Amapron / Amagear																							
Amarex KRT																							
B Pump							•																
							-					•											
Сык	•	•				•	•	•		•		-		•									
СРКИ	•	•				•	•	•		•			•	•									
МедаСРК	•	•				•	•	•	•	•			•	•									
MegaCPK extended sizes	-	•				•	-	•	-	•			-	•									
Etanorm Etaline Etabloc	-	-				-	-	•	-	•													
Etanorm-R Etaline-R	-	-				-	-	-	-	•													
Etanorm extended sizes		-						•	-						-		•	-					
Etanorm-RSY	-						-	-	-												•		
Etanorm SYT Etaline SYT Etabloc SYT																					•		
Esticia					-		•																
HDA/HDB		•																	•				
HG	_	•		•				•											-	•			
HGM		•																					
HGM-RO																							
НРН																							
НРК		•																					
HPK-L		•																			•		
KWP	•					•				•												•	•
KWP-Bloc																							
GIW mining pumps											•												
Movitec																							
Multitec	•	•					•	•															
Omega	•		•						•														
RDLO																							
RHD												•											
RHMR								•															
RPH																•							
RPH-HW																							
RPH-RO																							
Sewatec / Sewabloc																							
UPA/UMA																							
WKL								٠	٠														
WKT								٠															
WKTb																							
Pump type series to API																							
Universal, also for non-KSB pump type series	٠	٠	•	•	•	•	٠	٠	•	•	٠	•											

4KDC	4M	4MC	40MQ	4RDQ	4RPQ	4RPS	4 Spider	4STK	45TQ from 055/065	45TQ up to 033/055	4UM	5HGTC	4WKD	4WKS	4EDBM6	4EDTR6H	4EDCB8	4AP	4C/4CN	4HD	4HG	4HL	4K	4KBL	4KST	40M	4RD/4RDB	4STC
																												•
																		•										
								-		-																		-
						_		_																				
						-													•									
								-											•									
	•																•											
	•																											
	•																											
																						٠						
																				•								
												•			-													
						_		_																				
																					•							
																									•			
																						•						
_																							•	•				
																								-				
		•																										
			•																							•		
				•																							•	
					•										•	•												
																									٠			
						٠																						
								•	•	•																		•
							•				•																	
														•														
													•															
															•	•												
															•	•	•											

KSB mechanical seals Joint success

High operating pressures, extreme temperatures and aggressive fluids place the highest and most diverse demands on a seal, thereby influencing the operating reliability of the pump and the entire system. We have taken on the task of developing and producing mechanical seals that can be installed in machinery anywhere in the world.

You benefit from our experience and engineering know-how based on which we can provide a range of mechanical seals that are perfectly matched to the pumps and applications. Mechanical seals are failure-critical components to which about a third of all pump failures can be attributed. Our mechanical seals significantly extend the pumps' service life and thus increase system availability. Rely on KSB's mechanical seals team for professional, comprehensive consulting and joint success. We are here to support you, from answering your enquiry right through to technical consultancy and commissioning.

This brochure covers all important information about KSB's current range of mechanical seals. For further details and comprehensive support in relation to enquiries and specific projects, please do not hesitate to contact us at any time.



We offer our customers all products and services from a single source

Whether it's pumps and valves, all-in systems or services and spare parts solutions, KSB offers a full range of products and services that cover the system's entire life cycle. One of the highlights of our comprehensive programme is the range of our own, wear-resistant mechanical seals which are perfectly matched to the pump, thus forming an optimised system. Our customers benefit from an extended service life and reduced maintenance costs thanks to high-quality and robust seal arrangements and an optimised overall pump system.

We provide comprehensive consultancy and devise a sealing concept optimally matched to the application.













Versatile in every respect: Standardised seals to DIN EN 12756

Designed for versatile use, perfectly fitted to standardised installation spaces. KSB's standardised mechanical seals are available in many material combinations as well as in many different designs, for example as a double mechanical seal or as a version with pumping ring.

Universal solutions – not only for KSB pumps: Cartridge seals

Easy to handle, versatile in use. KSB's cartridge seals are available in many different designs, matched to many pump types and the most diverse of applications.

Tailored quality that speaks for itself: Pump-specific cartridge seals

Pump-specific cartridge seals are specially matched to the corresponding KSB pump type series and are optimised for the installation space provided. Simplified installation and removal as well as application-specific designs are the focus of our development.

For use in extreme conditions: Mechanical seals to API 682

When combining these seals with KSB's API pumps and supply systems you have got a unit of perfectly matched components. Our mechanical seals withstand the extreme demands placed upon them by chemical and petrochemical applications and are also suitable for API pumps of other makes.

Powerful solutions for reliable operation: Component mechanical seals

Specially designed for use in KSB's pump type series and, with that, perfectly matched to the corresponding application range. KSB's component mechanical seals are characteristically robust, whether in dynamic or stationary design.

The complete package: KSB supply systems

KSB is able to provide the full range of seal auxiliary systems for all kinds of applications. KSB's thermosyphon systems, quench systems and heat exchangers supply the mechanical seals with clean and cool fluids in order to increase the seals' service life.

Technical description of mechanical seals

Single mechanical seal	Double mechanical seal	Component mechanical seal	Cartridge seal
	and the second second		
 Characteristic: The shaft is sealed by a single mechanical seal. 	 Characteristic: Two mechanical seals in back-to-back arrangement Different types of arrangement possible 	 Characteristic: Mechanical seals consisting of several parts, axial positioning on shaft required 	 Characteristic: Ready-to-install mechanical seal unit, does not need to be axially positioned on the shaft
 Applications: Normal, non-hazardous fluids Applications with no risk of dry running 	 Applications: For increased safety levels in view of failure or leaka- ge, e.g. with hazardous, sticky or cracking fluids Applications with a risk of 	 Benefits: In many cases less expensive Typical design of mechanical seals to DIN standard 	 Benefits: High-quality and easy-to-install single- piece mechanical seal unit Less susceptible to error

Stationary type



Characteristic:

 Spring-loaded primary ring is stationary

Benefits:

- Not susceptible to shaft deflection
- Spring assembly adapts to shaft deflection
- No alternating loads on springs

Dynamic type



Characteristic:

 Spring-loaded primary ring rotates with the shaft

Benefits:

- Less expensive
- Has been commonly used for decades

Characteristic:

Ratio of hydraulically loaded area to seal face area < 1

Benefits:

Can be used at low and high pressures

Characteristic:

Unbalanced type

 Ratio of hydraulically loaded area to seal face area > 1

Benefits:

Increased sealing effect at low pressures

A < A

Balanced type



- Less susceptible to errors during installation

 Applications with a risk of dry running



5A

5A – for all KSB pump type series with a standardised installation space to EN 12756



 ອີ່ວີ
5 A- RK



Technical description								
Arrangement	Single							
Design	Component seal							
Construction principle	Dynamic							
Balancing	Unbalanced							
Springs	Multi-spring arrangement							
Direction of rotation	Bi-directional*							

M	ato.	ria	le
IVIč	ite	ria	IS

Primary ring	SiC (Q1) / SiC porous (Q7) / resin-impregnated carbon (B) / antimony-impregnated carbon (A) / tungsten carbide (U)
Mating ring	/ SiC (Q1) / SiC porous (Q7) tungsten carbide (U)
Elastomers	EPDM (E) / FKM (V) / FFKM (K) / and many more
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4) / 2.4610 (M)

Further material combinations and certificates on request

Variants

5A-RA – Mating ring with seat lock
5A-RK – short Mating ring
5A-RS – short Mating ring with seat lock
5AF – with pumping ring
5AN – with spacer sleeve for installation dimension to I1N

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-50 °C to 220 °C
Permissible axial movement	±2.5 mm
Seal size (bearing bracket)	See dimensions table
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

5A – for all KSB pump type series with a standardised installation space to EN 12756

- The single unbalanced seal features a circlip which holds together the dynamic unit. This makes installation so much easier compared with similar competitor seals.
- Also for use with a quench system or as double mechanical seal in back-to-back arrangement or tandem arrangement.
- The seal is designed for universal use and fits perfectly into standardised installation spaces,
 e.g. of Multitec, MegaCPK and Etanorm pumps.

Nominal diameter	Max. diameter	d.	d_		d.				L.,. ¹⁾	¹⁾					I.		
d ₁	d₃	H11	H8	$\mathbf{d}_{_{8}}$	H8	d ₁₀	d	е	±0,5	±0,5	I ₃	I_4	I_5	I ₆	+0,5	۱ ₈	I ₉
28	42	37	43	3	48	M6	47	4	42,5	50	32,5	10	2	5	9	6	17,5
30	44	39	45	3	50	M6	49	4	42,5	50	32,5	10	2	5	9	6	17,5
32	46	42	48	3	53	M6	51	4	42,5	55	32,5	10	2	5	9	6	17,5
33	47	42	48	3	53	M6	51	4	42,5	55	32,5	10	2	5	9	6,5	17,5
35	49	44	50	3	60	M6	54	4	42,5	55	32,5	10	2	5	9	6,5	17,5
38	54	49	56	4	62	M6	59	6	45	55	34	11	2	6	9	6,5	18,5
40	56	51	58	4	65	M6	61	6	45	55	34	11	2	6	9	6,5	18,5
43	59	54	61	4	67	M6	65	6	45	60	34	11	2	6	9	6	18,5
45	61	56	63	4	70	M6	66	6	45	60	34	11	2	6	9	6	18,5
48	64	59	66	4	72	M6	69	6	45	60	34	11	2	6	9	6	18,5
50	66	62	70	4	75	M6	71	6	47,5	60	36	11,5	2,5	6	9	6	19
53	69	65	73	4	77	M6	75	6	47,5	70	36	11,5	2,5	6	9	6	19
55	71	67	75	4	86	M6	76	6	47,5	70	36	11,5	2,5	6	9	7,5	19
58	78	70	78	4	88	M6	83	6	52,5	70	41	11,5	2,5	6	9	6	19
60	80	72	80	4	91	M6	85	6	52,5	70	41	11,5	2,5	6	9	6	19
63	83	75	83	4	93	M6	88	6	52,5	70	41	11,5	2,5	6	9	8,5	19
65	85	77	85	4	96	M8	95	6	52,5	80	41	11,5	2,5	6	9	8,5	19
68	88	81	90	4	98	M8	93	6	52,5	80	40	12,5	2,5	7	9	8,5	20
70	90	83	92	4	103	M8	95	6	60	80	47,5	12,5	2,5	7	9	8,5	20
75	99	88	97	4	108	M8	105	6	60	80	47,5	12,5	2,5	7	9	10	20
80	104	95	105	4	120	M8	109	6	60	90	47	13	3	7	9	10	20,5
85	109	100	110	4	125	M8	114	6	60	90	47	13	3	7	9	10	20,5
90	114	105	115	4	130	M8	119	6	65	90	52	13	3	7	9	12	20,5
95	119	110	120	4	135	M8	124	6	65	90	52	13	3	7	9	12	20,5
100	124	115	125	4	140	M8	129	6	65	90	52	13	3	7	9	12	20,5
110	143	128,2	140,3	5	-	M10	148	-	67	-	52	15	2	10	12	12	24,5
130	163	146,2	158,3	5	-	M10	168	-	67	-	52	15	2	10	12	10,3	24,5

Dimensions for 5A (in mm)

1) In its standard design, the mechanical seal has got the dimension L_{1K} . A variant with dimension L_{1N} is also available (5AN) Further sizes available on request

5B

5B – for all KSB pump type series with a standardised installation space to EN 12756







Technical description								
Arrangement	Single							
Design	Component seal							
Construction principle	Dynamic							
Balancing	Balanced							
Springs	Multi-spring arrangement							
Direction of rotation	Bi-directional*							

Materials

Primary ring	SiC (Q1) / SiC porous (Q7) / resin-impregnated carbon (B) / antimony-impregnated carbon (A) / tungsten carbide (U)
Mating ring	/ SiC (Q1) / SiC porous (Q7) tungsten carbide (U)
Elastomers	EPDM (E) / FKM (V) / FFKM (K) / and many more
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4) / 2.4610 (M)

Further material combinations and certificates on request

Variants

5B-RC – cooled mating ring	
5BF – with pumping ring	
5BHP – with modified seal faces for high pressures (up to 60 bar dynamic)	

Technical data

Operating pressure	Up to 40 bar dynamic Up to 60 bar static						
Temperature	-50 °C to 220 °C						
Permissible axial movement	±2.5 mm						
Seal size (bearing bracket)	See dimensions table						
Sliding velocity	20 m/s						

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

5B – for all KSB pump type series with a standardised installation space to EN 12756

- The single balanced seal features a circlip which holds together the dynamic unit. This makes installation so much easier compared with similar competitor seals.
- Also for use with a quench system or as double mechanical seal in back-to-back arrangement or tandem arrangement.
- The seal is designed for universal use and fits perfectly into standardised installation spaces, e.g. of Multitec, MegaCPK and Etanorm pumps.

Dimensions for 5B (in mm)

Nomi-nal Max. dia- dia-

meter meter

d ₁	d ₂ h6	d ₃	d ₆ H11	d ₇ H8	d ₈	d , H8	d ₁₀	d ₂₁ +0,1	d ₂₂ -0,05	d _s	e	Ι _{1κ} 1) ±0,5	I _{1N} ¹⁾ ±0,5	I ₂	I ₃	I_4	I_5	I ₆	Ι ₇ +0,5	I ₈	I ₉	I ₁₀	I ₁₁	а	b ₁	b ₂	c	f
28	33	47	37	43	3	53	M6	44,65	50,57	51	4	50	65	20	40	10	2	5	9	6,5	17,5	11,5	8,5	24	6,6	22,6	8	9
30	35	49	39	45	3	60	M6	47,83	53,75	54	4	50	65	20	40	10	2	5	9	6,5	17,5	11,5	9	24	6,6	22,6	8	9
33	38	54	42	48	3	62	M6	47,83	53,75	59	4	50	65	20	40	10	2	5	9	6,5	17,5	11,5	9	24	6,6	22,6	8	9
35	40	56	44	50	3	65	M6	51	56,92	61	4	50	65	20	40	10	2	5	9	6,5	17,5	12,5	9	24	6,6	22,6	8	9
38	43	59	49	56	4	67	M6	54,18	60,1	65	6	52,5	75	23	41,5	11	2	6	9	6	18,5	12,5	11	24	6,6	22,6	8	9
40	45	61	51	58	4	70	M6	60,53	66,45	66	6	52,5	75	23	41,5	11	2	6	9	6	18,5	12,5	11	24	6,6	22,6	8	9
43	48	64	54	61	4	72	M6	63,7	69,62	69	6	52,5	75	23	41,5	11	2	6	9	6	18,5	12,5	11	24	6,6	22,6	8	9
45	50	66	56	63	4	75	M6	63,7	69,62	71	6	52,5	75	23	41,5	11	2	6	9	6	18,5	12,5	11	24	6,6	22,6	8	9
48	53	69	59	66	4	77	M6	66,88	72,8	75	6	52,5	85	23	41,5	11	2	6	9	6	18,5	12,5	11	24	6,6	22,6	8	9
50	55	71	62	70	4	86	M6	70,05	75,97	76	6	57,5	85	25	46	11,5	2,5	6	9	7,5	19	13	12,5	24	6,6	22,6	8	9
53	58	78	65	73	4	88	M6	76,4	82,32	83	6	57,5	85	25	46	11,5	2,5	6	9	6	19	13	12,5	24	6,6	22,6	8	9
55	60	80	67	75	4	91	M6	76,4	82,32	85	6	57,5	85	25	46	11,5	2,5	6	9	6	19	13	12,5	24	6,6	24,6	8	11
58	63	83	70	78	4	93	M6	79,58	85,5	88	6	62,5	85	25	51	11,5	2,5	6	9	8,5	19	13	12,5	26	6,6	24,6	8	11
60	65	85	72	80	4	96	M8	82,75	88,67	95	6	62,5	95	25	51	11,5	2,5	6	9	8,5	19	13	12,5	26	6,6	24,6	8	11
63	68	88	75	83	4	98	M8	85,93	91,85	93	6	62,5	95	25	51	11,5	2,5	6	9	8,5	19	13	12,5	26	6,6	24,6	8	11
65	70	90	77	85	4	103	M8	85,93	91,85	95	6	62,5	95	25	51	11,5	2,5	6	9	8,5	19	13	12,5	26	6,6	24,6	8	11
70	75	99	83	92	4	108	M8	89,1	95,02	105	6	70	95	28	57,5	12,5	2,5	7	9	10	20	14	14,5	26	6,6	24,6	8	11
75	80	104	88	97	4	120	M8	98,63	104,55	109	6	70	105	28	57,5	12,5	2,5	7	9	10	20	14	14,5	26	6,6	24,6	8	11
80	85	109	95	105	4	125	M8	101,8	107,72	114	6	70	105	28	57	13	3	7	9	10	20,5	14,5	14	26	6,6	24,6	8	11
85	90	114	100	110	4	130	M8	108,15	114,07	119	6	75	105	28	62	13	3	7	9	12	20,5	14,5	14	26	6,6	24,6	8	11
90	95	119	105	115	4	135	M8	114,5	120,42	124	6	75	105	28	62	13	3	7	9	12	20,5	14,5	14	26	6,6	24,6	8	11
95	100	124	110	120	4	140	M8	117,68	123,6	129	6	75	105	28	62	13	3	7	9	12	20,5	14,5	14	26	6,6	24,6	8	11
100	105	129	115	125	4	145	M8	124,03	129,95	134	6	75	105	28	62	13	3	7	9	12	20,5	14,5	14	26	6,6	24,6	8	11
110	120	153	128,2	140,3	5	-	M10	135,3	141,2	158	-	73	-	32	57	16	2	10	12	10,5	24,5	-	14,5	30	6,6	28,6	9,5	13

1) In its standard design, the mechanical seal has got the dimension L_{1K} . A variant with dimension L_{1N} is available on request. Further sizes available on request

5A-OM – for KSB's Omega pump type series

Applications: raw, clean and service water



Technical description	
Arrangement	Single
Design	Component seal
Construction principle	Dynamic
Balancing	Unbalanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-50 °C to 220 °C
Permissible axial movement	±2.5 mm
Seal size (bearing bracket)	See dimensions table
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.





- The single unbalanced seal features a circlip which holds together the dynamic unit. This makes installation so much easier compared with similar competitor seals.
- Dimensions to DIN EN 12756 but with special installation length.

Shaft unit	Nominal diameter	d ₁	d ₃	d ₆ H11	d ₇ H8	d ₁₀	Ι _{1s} ±0,5	I ₃	I_4	I _s	I ₆	I ₈	I ₁₀
SU040	050	50	66	62	70	M6	42	30,5	11,5	2,5	6	6	13
SU050	060	60	80	72	80	M6	48,5	37	11,5	2,5	6	6	13
SU060	070	70	90	83	92	M8	53,3	40,8	12,5	2,5	7	8,5	14
SU070	080	80	104	95	105	M8	53,8	40,8	13	3	7	10	14,5
SU080	090	90	114	105	115	M8	60,8	47,8	13	3	7	12	14,5
SU090	110	110	143	128,2	140,3	M10	67	51,9	15,1	2	10	12	24,5

Dimensions for 5A-OM (in mm)

5HG-BM3 – for KSB's HG pump type series

Applications: feed water and condensate in power stations



Technical description

-	
Arrangement	Single
Design	Component seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	Antimony-impregnated carbon (A)
Mating ring	SiC (Q1)
Elastomers	EPDM (E)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data	
Operating pressure	Up to 40 bar dynamic Up to 60 bar static
Temperature	-40 °C to 200 °C
Permissible axial movement	±3 mm
Seal size (bearing bracket)	060, 065, 085, 090, 095, 100
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants

5HG-BM3A – standard variant	
5HG-BM3C – variant with cooled mating ring	
5HG-BM3S – variant with special mating ring	



5HG-BM3 – for KSB's HG pump type series

Dimensions for 5HG-BM3 (in mm)

Variants	d ₁ -0,2	d₂ h6	$d_{_3}$	d ₅ H11	d ₇ H8	d ₁₀ ±0,05	d ₁₁ ±0,05	I _{1k}	I _{1c}	I _{1s}	I_2	I_3	I_4	I ₆	I_8
	60	65	85	72	80			62,5			25	49,5	13	6	
	65	70	90	77	85			62,5			25	49,5	13	6	
5HG-RM3A	85	90	114	100	110			75			28	59,5	15,5	7	
JIIG-BINISA	90	95	119	105	115			75			28	59,5	15,5	7	
	95	100	124	110	120			75			28	59,5	15,5	7	
	100	105	129	115	125			75			28	59,5	15,5	7	
	60	65	85			82,75	88,67		76			49,5			26,5
5HG-RM3C	85	90	114			108,15	114,07		87			59,5			27,5
SHG-BIVISC	90	95	119			114,50	120,42		87			59,5			27,5
	95	100	124			117,68	123,60		87			59,5			27,5
	60	65	85			82,75	88,67			76		49,5			26,5
5HG-BM3S	85	90	114			108,15	114,07			87		59,5			27,5
	90	95	119			114,50	120,42			87		59,5			27,5
	95	100	124			117,68	123,60			87		59,5			27,5

4EYS

4EYS – for KSB's Etanorm SYT, Etabloc SYT and Etaline SYT pump type series

Applications: heat transfer engineering and hot water recirculation



Technical description

Arrangement	Single*
Design	Component sea
Construction principle	Dynamic
Balancing	Unbalanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

* In tandem arrangement also for use as double mechanical seal

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-15 °C to 140 °C
Permissible axial movement	±2.5 mm
Seal size (bearing bracket)	Etabloc SYT, Etaline SYT: 028 (SU25) Etanorm SYT: 033 (SU25), 048 (SU35/55)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Materials

Primary ring	Antimony-impregnated carbon (A) / resin-impregnated carbon (B) / SiC (Q1), SiC porous (Q7)
Mating ring	SiC (Q1), SiC porous (Q7)
Elastomers	FKM (V7), EPDM (E)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Variants

4EYT - tandem arrangement



4EYS – for KSB's Etanorm SYT, Etabloc SYT and Etaline SYT pump type series

- In combination with the pump design of the Eta SYT type series, the seal can be used for fluid temperatures of up to 350 °C. The complete Etanorm SYT application range can thus reliably be covered with this mechanical seal.
- With the multi-spring arrangement the axial spring force is evenly distributed over the entire circumference of the primary ring. This minimises wear and contributes to a long seal life.
- The solid primary ring is designed to maintain an optimum lubricating film between the seal faces also at high pressures and temperatures.

Dimensions for 4EYS (in mm)

Bearing bracket size	Nominal diameter	d ₁ h6	d₃	d ₆ H11	d ₇ H8	d ₈	Ι	I _{1N}	I ₃	I_4	l₅ x20	I ₆	f
Etabloc SYT, Etaline SYT SU25	028	28	42	37	43	49	52,5	50	40	10	2	5	13
Etanorm SYT SU25	033	33	47	42	48	60	56,5	55	45	10	2	5	16
Etanorm SYT SU35/55	048	48	64	59	66	70	63,5	60	48,5	11,5	2	6	16,5

5KSTSMA – for KSB's MCPK pump type series

Applications: chemical and petrochemical industries



Technical description

Arrangement	Single
Design	Component sea
Construction principle	Metal bellows, rotating
Balancing	Balancec
Direction of rotation	Bi-directiona

Materials

Primary ring	Antimony-impregnated carbon (A) / resin-impregnated carbon (B) / SiC (Q1)
Mating ring	SiC (Q1)
Secondary sealing elements	FKM (V) / PTFE (T) / Statotherm [®] (G)
Metal bellows	2.4610 (M) / 2.4819 (M5) / AM 350® (T8)
Metallic components	1.4571 (G) / 2.4819 (M5) / 1.3917 (T4)

Further material combinations and certificates on request

Technical data	
Operating pressure	Up to 20 bar dynamic Up to 22 bar static
Temperature	-40 °C to 220 °C*
Permissible axial movement	±1 mm
Seal size (bearing bracket)	033 (CS40), 043 (CS50), 053 (CS60), 065 (CS80)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Variant 5KSTSHA: 400 °C

Variants

5KSTSHA - with secondary seals made of graphite for high temperatures



5KSTSMA – for KSB's MCPK pump type series



- Single metal-bellows seal to EN 12756.
- Particularly suitable for acidic and alkaline fluids.
- The secondary sealing elements are not subjected to any dynamic loads.
- Material variants available for fluid temperatures of up to 400 °C.

Bearing bracket size	d,	d₃	d_4	d ₆	d ₇	d ₈	I,	I ₃	I_4	I _s	I ₆
-	28	42,8	44	37	43	3	42,5	32,5	10	2	5
CS40	33	49,2	51	42	48	3	42,5	32,5	10	2	5
CS50	43	58,7	63	54	61	4	45	34	11	2	6
CS60	53	68,2	73	65	73	4	47,5	34,5	13	2,5	6
CS80	65	84,1	90	77	85	4	52,5	39,5	13	2,5	6

Dimensions for 5KSTSMA (in mm)

5KSCB2S – for KSB's CPK, CPKN and MegaCPK pump type series

Applications: chemical and petrochemical industries



Technical description

-	
Arrangement	Single
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	PTFE (U1) / FFKM (K) / EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G) / 1.4462 (G1) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-5 °C to 250 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	See dimensions table
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.



5KSCB2S – for KSB's CPK, CPKN and MegaCPK pump type series

- The single cartridge seal makes for easy installation without adjusting dimension.
- A positioning lug ensures optimum pre-loading of the cartridge.
- The standard cartridge seal is designed for universal use. It fits perfectly into the installation spaces standardised in the chemical industry, e.g. in MegaCPK and CPKN.

Nominal diameter	d 1 F7/h6	d ₂	d ₃ min	d₃ max	I,	I ₂	I ₃	I ₄	a,	d	S
28	28	46	47	52	64,5	40	24,5	25,5	63	98	14
33	33	50	51	57	64,5	40	24,5	25,5	67	106	14
35	35	53	54	61,5	65,5	40	25,5	25,5	72	106	14
43	43	61	62	70,5	65,5	40	25,5	25,5	81	116	14
45	45	63	64	73	65,5	40	25,5	25,5	81	127	14
53	53	73	74	87	65,5	40	25,5	25,5	95	137	14
55	55	73	79	91	65,5	40	25,5	25,5	95	137	14
65	65	83	84,5	98,5	66	40	26	25,5	112	163	18
75	75	98	100	113	66,5	43	23,5	28,5	130	185	18
95	95	121	124	132	78	47	31	28,5	150	208	22

Dimensions for 5KSCB2S (in mm)

5KSCB2SQ/5KSCB2T – for KSB's CPK, CPKN and MegaCPK pump type series

Applications: chemical and petrochemical industries



Technical description

-	
Arrangement	Single
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	PTFE (U1) / FFKM (K) / EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4462 (G1) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data	
Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-5 °C to 250 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	See dimensions table
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants

5KSCB2SQ – with shaft seal ring for connection of a liquid quench 5KSCB2T– with throttling bush for optional connection of a gas or steam quench



5KSCB2SQ/5KSCB2T – for KSB's CPK, CPKN and MegaCPK pump type series

- The single cartridge seal makes for easy installation without adjusting dimension.
- A positioning lug ensures optimum pre-loading of the cartridge.

SKSCB2T 0127 F

 The standard cartridge seal is designed for universal use. It fits perfectly into the installation spaces standardised in the chemical industry, e.g. in MegaCPK and CPKN.

Dimensions for 5KSCB2SQ (in mm)

Nominal diameter	d ₁ F7/h6	d ₂	d₃ min	d₃ max	I,	I_2	I ₃	I_4	a ₁	d	s
33	33	50	51	57	74,5	50	24,5	25,5	67	106	14
35	35	53	54	61,5	76,5	51	25,5	25,5	72	106	14
43	43	61	62	70,5	77,5	52	25,5	25,5	81	127	14
45	45	63	64	73	77,5	52	25,5	25,5	81	135	14
53	53	73	74	87	78,5	53	25,5	25,5	95	137	14
55	55	73	79	91	78,5	53	25,5	25,5	95	148	14
65	65	83	84,5	98,5	79,5	53,5	26	25,5	112	163	18

Dimensions for 5KSCB2T (in mm)

Nominal diameter	d₁ F7/h6	d_2	d₃ min	d ₃ max	I ₁	I_2	I ₃	I_4	a ₁	d _a	s
33	33	50	51	57	74,5	50	24,5	25,5	67	106	14
43	43	61	62	70,5	77,5	52	25,5	25,5	81	127	14
53	53	73	74	87	78,5	53	25,5	25,5	95	137	14
65	65	83	84,5	98,5	79,5	53,5	26	25,5	112	163	18

5KSCB2D/5KSCB2DV – for KSB's CPK, CPKN and MegaCPK pump type series

Applications: chemical and petrochemical industries



Technical description

Technical data

-	
Arrangement	Double
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	Inboard: resin-impregnated carbon (B) / SiC (Q1) Outboard: resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	PTFE (U1) / FFKM (K) / EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G) / 1.4462 (G1) / 1.4501 (G4)

Further material combinations and certificates on request

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-5 °C to 250 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	See dimensions table
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants

5KSCB2DV - variant for vertical pumps



5KSCB2D/5KSCB2DV – for KSB's CPK, CPKN and MegaCPK pump type series

- without adjusting dimension.
- A positioning lug ensures optimum pre-loading of the cartridge.
- The double cartridge seal makes for easy installation The standard cartridge seal is designed for universal use. It fits perfectly into the installation spaces standardised in the chemical industry, e.g. in MegaCPK and CPKN.
 - The double mechanical seal can be operated with either unpressurised buffer fluid or pressurised barrier fluid.

Nominal diameter	d₁ F7/h6	d ₂	d ₃ min	d₃ max	I ₁	I ₂	I ₃	I_4	a ₁	d _a	s
33	33	50	51	57	96	50	46	25,5	67	106	14
35	35	53	54	61,5	97	51	46	25,5	72	106	14
43	43	61	62	70,5	98	52	46	25,5	81	127	14
45	45	63	64	73	98	52	46	25,5	81	135	14
53	53	73	74	87	99	53	46	25,5	95	137	14
55	55	73	85	85	99	53	46	25,5	95	148	14
65	65	83	84,5	98,5	99,5	53,5	46	25,5	112	163	18
95	95	121	124	135	117,5	63,5	54	28,5	150	208	22

Dimensions for 5KSCB2D (in mm)

5A/5B Cartridge

Applications: universal use



Technical description

Arrangement	Single, double
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced, unbalanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*

Materials

Primary ring	SiC (Q1) / resin-impregnated carbon (B) / antimony-impregnated carbon (A) / tungsten carbide (U)
Mating ring	SiC (Q1) / tungsten carbide (U)
Elastomers	EPDM (E) / FKM (V) / FFKM (K) / and many more
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4) / 2.4610 (M)

Further material combinations and certificates on request

Variants (available on request)
5A/5B-S – single cartridge seal
5A/5B-TH – version with throttling bush
5A/5B-Q – version with shaft seal ring
5A/5B-TA – double mechanical seal in tandem arrangement
5A/5B-D – double mechanical seal in back-to-back arrangement
5A/5B-DH – double mechanical seal, combination of stationary and dynamic single seals

Technical data

Operating pressure	Up to 40 bar dynamic Up to 60 bar static			
Temperature	-40 °C to 220 °C			
Permissible axial movement	±2.5 mm			
Seal size (shaft unit)	028 – 130			
Sliding velocity	20 m/s			

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

5A/5B Cartridge



- The cartridge seal is available as a single or double mechanical seal. The design is adjusted to the installation space for each specific order.
- Variants with pumping ring, cooled mating ring or quench connection make the single seal version a highly versatile mechanical seal.
- The double seal version is available as a variant for Plan 52 (unpressurised) or Plan 53 (pressurised).

5KSTRHMD – for KSB's MCPK pump type series

Applications: chemical and petrochemical industries



Technical description

-	
Arrangement	Double
Design	Cartridge seal
Construction principle	Metal bellows, rotating
Balancing	Balanced
Direction of rotation	Bi-directional

Materials

Primary ring	/ (Antimony-impregnated carbon (A) SiC (Q1)
Mating ring	SiC (Q1)
Secondary sealing elements	FKM (V) / Statotherm [®] (G)
Metal bellows	2.4819 (M5) / 2.4668 (M6)
Metallic components	1.4571 (G) / 1.3917 (T4)

Further material combinations and certificates on request

Technical	data

Operating pressure	Up to 10 bar dynamic Up to 20 bar static
Temperature	-40 °C to 400 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	033 (CS40), 043 (CS50), 053 (CS60), 065 (CS80)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants

5KSTRHS - single mechanical seal

5KSTRHMD – for KSB's MCPK pump type series



• Double metal-bellows seal in cartridge design.

• Especially suitable for extreme temperature ranges.

Bearing bracket size	d ₁	d ₂	d ₃	d_4	d _s	d ₆	d ₇	d ₈	I,	I ₂	I ₃	I ₄	I ₅
CS40	30 F7/h6	-	90	118	20 F7/h6	33 h6	60 H7/f7	70 f7	59,8	60	39	53	13
CS50	40 H7/h6	max. 78	100	120	28 F7/h6	43 h6	70 H7/f7	80 f7	54,5	70	45	67	25
CS60	50 H7/h6	max. 93	115	138	38 F7/h6	53 h6	85 H7	95 f7	60,5	69,3	42	65	24
CS80	60 F7/h6	max. 112	140	178	47 F7/h6	65 h6	95 H7/f7	115 f7	58,3	78	53	77	25

Dimensions for 5KSTRHMD (in mm)

LAPIS

Applications: mining



Technical description

•	
Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / SiC-Si (Q2) / tungsten carbide (U2)
Mating ring	SiC (Q1) / SiC-Si (Q2) / tungsten carbide (U2)
Elastomers	FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4462 (G1) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 20 bar dynamic Up to 20 bar static
Temperature	-15 °C to 130 °C
Permissible axial movement	±2 mm
Seal size (bearing bracket)	040 – 253
Sliding velocity	15 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants (available on request)

With connection for periodic flushing
 With connection for grease quench with outboard

lip seal







Lapis with grease quench

- Single cartridge seal in stationary design.
- Robust and reliable, especially developed for solids-laden fluids in mining.

Lapis with flushing connection

• Large spaces between shaft sleeve and primary rings prevent premature clogging by deposits.

4CP

4CP – for KSB's MegaCPK and CPKN pump type series

Applications: chemical and petrochemical industries



Technical description

-	
Arrangement	Single
Design	Cartridge sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials Primary ring SiC (Q1) Mating ring SiC (Q1) / resin-impregnated carbon (B) Elastomers FKM (V) / EPDM (E) / FFKM (K) / FEP encapsulated (M1) Springs 1.4571 (G) / 2.4610 (M) Metallic components 1.4571 (G) / 1.4462 (G1) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-40 °C to 150 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	033 (UP02/CS40), 043 (UP03/CS50), 053 (UP04/CS60),065 (UP05/CS80)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.



4CP – for KSB's MegaCPK and CPKN pump type series

- Stationary, robust seal design.
- The large springs with high axial mobility are located outside the fluid handled and thus protected from contamination.
- The mechanical seal cover is centred on the pump cover and confines the PTFE gasket.

Bearing bracket size	Nominal diameter	d ₁	d₂	d ₃	d_4	d₅	d	d ₇	I	I ₁	I ₂	I ₃	g
CS40	033	33,1	59	61	95	119,5	85	110	79	22	32	28,5	M10
CS50	043	43,1	70	72	110	139	95	130	79	22	32	28,5	M12
CS60	053	53,1	84	82	125	158	110	145	81	23	31,9	29,6	M12
CS80	065	65,1	101	102	140	173	125	160	83	24	32	30,5	M12

Dimensions for 4CP (in mm)

4CPD/4CPDF – for KSB's MegaCPK and CPKN pump type series

Applications: chemical and petrochemical industries



Technical description

-	
Arrangement	Double
Design	Cartridge sea
Construction principle	Stationary (inboard) Dynamic (outboard)
Balancing	Double pressure balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*

Materials

Primary ring	Inboard: SiC (Q1) Outboard: antimony-impregnated carbon (A) / resin-impregnated carbon (B)
Mating ring	Inboard: SiC (Q1) / antimony-impregnated carbon (A) Outboard: resin-impregnated carbon (B) / SiC (Q1)
Elastomers	FKM (V) / EPDM (E) / FFKM (K)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-40 °C to 200 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	033 (UP02/CS40), 043 (UP03/CS50), 053 (UP04/CS60), 065 (UP05/CS80)
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

Variants

4CPDF – with pumping ring


4CPD/4CPDF – for KSB's MegaCPK and CPKN pump type series

- The double mechanical seal's cartridge can be operated with either unpressurised buffer fluid (quench) or pressurised barrier fluid.
- Assembly fixtures ensure optimum pre-loading of the cartridge.
- The mechanical seal cover is centred on the pump cover and confines the PTFE gasket.
- The pumping ring circulates the buffer/barrier fluid effectively. The circulation ensures optimum heat dissipation in the space between the two seals and thus increases the service life.

k	Bearing pracket size	Nominal diameter	d,	d₂	d3	d_4	d_{s}	$d_{_6}$	d ₇	d ₈	Ι	I,	I_2	I_3	I_4	I_5	I_6	g
	UP02/CS40	033	33,1	61	89	59	119,5	110	80	95	88	26,5	48	3,5	61,5	36	36	M10
	UP03/CS50	043	43,1	72	105	70	139	130	96	110	88	26,5	48	3,5	61,5	36	36	M12
	UP04/CS60	053	53,1	82	115	84	158	144	106	125	88	26,5	48	3,5	61,5	36	36	M12
	UP05/CS80	065	65,1	102	129	101	173	159	120	140	100	27,5	57	3,5	72,5	31	42	M12
	UP06	075	75,1	112	139	111	183	169	130	150,05	93	27,4	50,1	3,5	61,5	38	38	M12

Dimensions for 4CPD/ 4CPDF (in mm)

4EB

4EB – for KSB's Etanorm-R and Etaline-R pump type series

Applications: drinking water, service water and hot water



Technical description

-	
Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1) / resin-impregnated carbon (B) / antimony-impregnated carbon (A)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-40 °C to 140 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	065 (65)
Sliding velocity	16 m/s



4EB – for KSB's Etanorm-R and Etaline-R pump type series

- Single cartridge seal, bi-directional and balanced.
 Tailored to the seal installation space and pump requirements.
- Stationary design; multiple springs located outside the fluid handled.
- The seal design facilitates installation without assembly fixtures or adjusting dimension, ensuring optimal pre-loading of the mechanical seal and low wear.

4EDTMP – for KSB's RPH pump type series

Applications: feed water and condensate in power stations



Technical description

-	
Arrangement	Single
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Uni-directiona

Materials

Primary ring	Antimony-impregnated carbon (A)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FFKM (K)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 63 bar dynamic Up to 63 bar static
Temperature	-40 °C to 260 °C
Permissible axial movement	±2 mm
Seal size (bearing bracket)	050 (B02), 060 (B03), 079 (B05), 100 (B06), 120 (B07)
Sliding velocity	23 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants

4EDTHP - for pressures of up to 100 bar

4EDTMP - for KSB's RPH pump type series



- Single mechanical seal, specially developed for hot water applications, with hook sleeve and "thermal barrier".
- The cooled pump cover and cooler (Plan 23) ensure optimum operating conditions in the seal chamber.
- The mechanical seal comes with a floating throttling bush as standard for use with a gas or a steam quench.
- The special design with hook sleeve does away with the need for an axial adjusting dimension; the seal is always perfectly positioned on the pump shaft.

Bearing bracket size	Nominal diameter	d,	d₂ h6	d₃	d_4	d_{5}	I ₁	I_2	I ₃	I_4	I ₅	I ₆	I,	I ₈
B02S	50	24 j6	50	97	140	164	83	67	98	89,5	77,5	45	45	80
B02L	50	27 j6	50	97	140	164	72	64	98	89,5	77,5	45	45	80
B03	60	35 j6	60	117	160	188	92	87,5	86	77,5	65,5	31	31	66,5
B05S	79	50 j6	79	137	180	208	109,3	104,5	86,5	78	66	24	22	60
B05L	79	58 j6	79	137	180	208	109,3	104,5	86,5	78	66	24	22	60
B06S	100	70 m6	100	167	215	249	132	126	107,5	99	87	53	53	88
B06	100	85 m6	100	167	215	249	132	126	107,5	99	87	53	53	88
B07	120	100 m6	120	187	235	268	130	126	109	100,5	88,5	30	60	90

Dimensions for 4EDTMP (in mm)

4ES

4ES – for KSB's Etanorm-R pump type series

Applications: drinking water, service water and hot water



Technical description

Cartridge seal
Single
Stationary
Balanced
Multi-spring arrangement
Bi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	/ (Q1) / antimony-impregnated carbon (A) resin-impregnated carbon (B)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Metallic components	1.4122 (E)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static					
Temperature	-40 °C to 140 °C					
Permissible axial movement	±1.5 mm					
Seal size (bearing bracket)	065 (65)					
Sliding velocity	16 m/s					

4ES – for KSB's Etanorm-R pump type series



- Stationary, robust seal design.
- The large springs with high axial mobility are located outside the fluid handled and thus protected from contamination.
- The mechanical seal cover is centred on the pump cover and confines the PTFE gasket.

4ESD

4ESD – for KSB's Etanorm-R pump type series

Applications: drinking water, service water and hot water



Technical description

Arrangement	Double
Design	Cartridge sea
Construction principle	Stationary (inboard) Dynamic (outboard)
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	Inboard: SiC (Q1) Outboard: 1.4122 (S)
Mating ring	Inboard: SiC (Q1) Outboard: resin-impregnated carbon (B)
Elastomers	FKM (V) / EPDM (E) / FFKM (K) / FEP-encapsulated (M1)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static			
Temperature	-40 °C to 140 °C			
Permissible axial movement	±1.5 mm			
Seal size (bearing bracket)	065 (65)			
Sliding velocity	16 m/s			





- Inboard seal in stationary design, outboard seal in dynamic design. The double mechanical seal's cartridge can be operated with either unpressurised buffer fluid or pressurised barrier fluid.
- The springs are located outside the fluid handled.
- G ¼" barrier fluid inlet, outlet and drain connections.
- For increased safety levels and dry running protection when the pump is used in suction lift operation.

4HDS

4HDS – for KSB's HDA and HDB pump type series

Applications: feed water and condensate in power stations



Technical description

Arrangement	Single
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*

Materials

Primary ring	Antimony-impregnated carbon (A)
Mating ring	SiC (Q1), SiC-Si (Q2) / tungsten carbide (U2)
Elastomers	EPDM (E) / FKM (V) / FFKM (K)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 30 bar dynamic
 Temperature	-40 °C to 90 °C**
Permissible axial movement	±3.5 mm
Seal size (bearing bracket)	035, 050, 053, 064, 068, 070
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

** 4HDSS: up to 170 °C
 4HDSC: up to 130 °C, with jacket cooling up to 150 °C
 4HDSL: up to 220 °C

Variants

4HDSS – seal faces with lubricating grooves	
4HDSC – with cooled mating ring	
4HDSL – with pumping ring	



4HDSC



4HDSL

- High temperatures are accommodated by the 4HDSC seal with cooled mating ring. A variant with pumping ring for Plan 23 is also available.
- For all applications of these pumps KSB has a perfectly matching mechanical seal on offer.
- The 4HDS cartridge seal is available with a quench connection as standard.

Dimensions	for	4HDS	(in	mm)

Bearing bracket size	Nominal diameter	d ₁	d_2	d ₃	d_4	d_{5}	Ι	I,	I ₂	g ₁	g ₂
HDA/HDB 40, 50	035	35f7	35	65H7	75H8	119	88,7	46,3	19,5	M12	Rp1/4
HDA/HDB 65, 80	050	54F7/j6	50H7/f7	90H8	105f8/H7	149	98,5	63,5	35,8	M12	Rp1/4
HDA/HDB 100	053	58f7/H8	53f7/H8	95	110H7/f8	154	101,5	60	20,6	M12	Rp1/4
HDA 125	064	64 j6	57f7	105	120H7	187	111,5	80	22	M16	G1/2
HDB 125	068	68F7	65	115	182g6	189	114	72	16	M16	G1/2

4HGS

4HGS – for KSB's HG pump type series

Applications: feed water and condensate in power stations



Technical description

Arrangement	Single
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*

Materials

Primary ring	Antimony-impregnated carbon (A)
Mating ring	SiC (Q1) / SiC-Si (Q2) / tungsten carbide (U2)
Elastomers	EPDM (E) / FKM (V) / FFKM (K)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 30 bar dynamic Up to 40 bar static
Temperature	-40 °C to 100 °C**
Permissible axial movement	±3.5 mm
Seal size (bearing bracket)	050, 072, 080, 086
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

** 4HGSS: up to 170 °C
4HGSC: up to 130 °C, with jacket cooling up to 150 °C
4HGSL: up to 220 °C
4HGSCL: up to 220 °C

Variants

4HGSS – seal faces with lubricating grooves	
4HGSC – with cooled mating ring	
4HGSL – with pumping ring	
4HGSCL – with cooled mating ring and pumping ring	



- For all applications of these pumps KSB has a perfectly matching mechanical seal on offer.
- The 4HGS cartridge seal is available with a quench connection as standard.
- High temperatures are accommodated by the 4HGSC seal with cooled mating ring. A variant with pumping ring for Plan 23 is also available.

Bearing bracket size	Nominal diameter	d,	d_2	d₃	d_4	d_{5}	Ι	I ₁	I ₂	I ₃	I_4	g ₂	g ₃
HG 1,2	050	50H7/g6	-	90H8	100H8/f7	155	111	72	19	7	29	BSP 1/2	BSP 1/4
HG 3	072	75g6	72H8/g6	122H8	135H8/f7	193	127,5	68,7	20	7	20	BSP 1/2	BSP 1/4
HG 5	080	83H7/g6	80H8/g6	130H8	145H8/f7	208	128	76	27		27	BSP 1/2	BSP 1/2
HG 6	086	86F8/j6	86F8/j6	137H8	150H7/f7	215	143,5	82,5	27		27	BSP 1/2	BSP 1/2

Dimensions for 4HGS (in mm)

4HLQ – for KSB's HPK-L* pump type series

Applications: hot water and heat transfer fluids



Technical description

Arrangement	Single
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Unbalancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1)
Mating ring	Antimony-impregnated carbon (A)
Elastomers	FKM (V)
Springs	1.4571 (G)
Metallic components	1.4122 (E) / 1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static**
Temperature	-15 °C to 100 °C
Permissible axial movement	±0.5 mm
Seal size (bearing bracket)	028 (CS40), 038 (CS50), 048 (CS60), 060 (CS80), 070 (70)***
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

- * Mechanical seal in similar design also available for KSB pump type series Etanorm RSY
- ** Size 070: up to 40 bar dynamic, up to 60 bar static

*** For Etanorm RSY only

4HLQ – for KSB's HPK-L pump type series



- The mechanical seal is used with quench (unpressurised buffer fluid) for pumps handling hot water and thermal oils to prevent dry running or cracking of the thermal oil when in contact with atmospheric oxygen.
- Combined with a single KSB 4HL mechanical seal this is an optimum sealing solution for demanding fluids.
- The cartridge seal facilitates installation with no need for assembly fixtures or adjusting dimension.

Bearing bracket size	Nominal diameter	d ₁	d ₂ h10	d ₃ h11	d ₄ H11	d₅ H8	d₀ H7	d ₇ JS6	d ₈	I ₁	I_2	I ₃	I_4	I_5	I ₆	I ₇
CS40	028	28	30	32	37	43	74	80	59	64	39	18	46	29,3	24,7	7
CS50	038	38	39	40	49	56	74	80	72	68	39	21	48	32,4	27,7	8
CS60	048	48	50	52	59	66	94	100	84	67	43	16	50	35,3	29	8
CS80	060	60	65	68	72	80	135	140	89	94,4	66,3	20	52,5	36	56,1	8,5

Dimensions for 4HLQ (in mm)

52

4K Cartridge – for KSB's KWP (FGD) pump type series

Applications: waste water with a very high solids content (density of up to 1.4 kg/dm³), e.g. for flue gas desulphurisation



Technical description

Single
Cartridge seal
Stationary
Balanced
Multi-spring arrangement
Bi-directional

Materials

Primary ring	SiC (Q1) / SiC-Si (Q2)
Mating ring	SiC (Q1) / SiC-Si (Q2)
Elastomers	FKM (V)
Springs	2.4610 (M)
Metallic components	1.4462 (G1) / 1.4539 (G3)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 10 bar dynamic Up to 15 bar static -15 °C to 110 °C					
Temperature						
Permissible axial movement	±3 mm					
Seal size (bearing bracket)	160 (P16), 200 (P20), 253 (P20)					
Sliding velocity	10 m/s					



4K Cartridge – for KSB's KWP (FGD) pump type series

- Stationary design; multiple springs located outside the fluid handled. The springs are insensitive to contamination and ensure an optimal service life.
- A device for periodic flushing can be connected and the flushing liquid can be supplied directly through the mechanical seal into the fluid handled.
- Suitable for fluids with a very high solids content.

Bearing bracket size	Nominal diameter	d ₁	d₂	d₃	d_4	d_{5}	I	I ₁
P12	120	110	120	177	-	254	130	-
P16	160	164,9	157,9	230	298	349,95	155	81,9
P20	200	205,1	198,1	276	328	389,9	158	87,6
P20	253	253,5	198,1	276	328	389,9	201	127,5

Dimensions for 4K Cartridge (in mm)

4KC

4KC – for KSB's KWP pump type series

Applications: waste water containing stringy material and abrasive particles



Technical description

Arrangement	Single
Design	Cartridge sea
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	1.4571 (G)
Metallic components	1.4462 (G1)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static
Temperature	-40 °C to 200 °C
Permissible axial movement	±1.5 mm
Seal size* (bearing bracket)	040 (P03), 050 (P04), 060 (P05), 070 (P06), 080 (P08), 100 (P10), 120 (P12)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* From seal size 080 a special pump cover is required

4KC - for KSB's KWP pump type series



 This single cartridge seal includes the shaft protecting sleeve for the pump and can be fitted without adjusting dimension.

.

 Given the stationary design, the springs are located outside the fluid handled and thus protected from contamination.

Bearing bracket size	Nominal diameter	d ₁ h7	a₂ H7	d3	d_4	d₅ k6	I	I,	I ₂	g
P03	040	34	70	119,5	100	35	75	47	28	4xM12
P04	050	43	80	139	115	45	83	47	36	4xM12
P05	060	54	95	166	140	55	113	59,5	53,5	4xM16
P06	070	65	110	179	155	65	114	60,7	53,5	4xM16
P08	080	80	175	224	200	80	180,5	86,5	94	8xM12
P10	100	100	195	246	220	100	184,5	86,5	98	8xM12
P12	120	120	220	288	250	120	188	91,5	96,5	8xM16

Dimensions for 4KC (in mm)

4KDC

4KDC – for KSB's KWP pump type series

Applications: waste water containing stringy material and abrasive particles



Technical description

Arrangement	Double
Design	Cartridge sea
Construction principle	Stationary
Balancing	Double pressure balanced
Springs	Multi-spring arrangement
Direction of rotation	Uni-directional

Materials

Metallic components	1.4571 (G) / 1.4462 (G1) / 1.4539 (G3)
Springs	1.4571 (G)
Elastomers	EPDM (E) / FKM (V) / FFKM (K)
Mating ring	Inboard: SiC (Q1) Outboard: SiC (Q1)
Primary ring	Inboard: SiC (Q1) Outboard: resin-impregnated carbon (B)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static
Temperature	-40 °C to 200 °C
Permissible axial movement	±1.5 mm**
Seal size* (bearing bracket)	040 (P03), 050 (P04), 060 (P05), 070 (P06), 080 (P08), 100 (P10), 120 (P12)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* From seal size 080 a special pump cover is required.

** ±2 mm from nominal diameter 080



- This double cartridge seal includes the shaft protecting sleeve for the pump and can be fitted without adjusting dimension.
- The pumping ring circulates the buffer/barrier fluid effectively. The circulation ensures optimum heat dissipation in the space between the two seals and thus increases the service life.
- The double mechanical seal's cartridge can be operated with either unpressurised buffer fluid or pressurised barrier fluid. In the event of a sudden drop in the barrier fluid pressure, the double pressure balanced design ensures that 4KDC's seal faces will not detach.
- Given the stationary design, the springs are located outside the fluid handled and thus protected from contamination.

Bearing bracket size	Nominal diameter	d ₁ h7	d₂ k6	d ₃ H7	d4	d₅	Ι	I ₁	I_2	I ₃	I_4	g
P03	040	34	35	70	119,5	100	115,5	47	68,5	70	6,5	4xM12
P04	050	43	45	80	139	115	116,5	52,5	68	70,5	6,5	4xM12
P05	060	54	55	95	166	140	132	59,5	72,5	95,5	7,5	4xM16
P06	070	65	65	110	179	155	137,7	60,7	77	89	9	4xM16
P08	080	80	80	175	224	200	180,3	86,5	93,8	153	10,4	8xM12
P10	100	100	100	194,5	246	220	182,5	86,5	96	165,5	10,5	8xM12
P12	120	120	120	220	288	250	185,3	91,5	93,8	168	10,4	8xM16

Dimensions for 4KDC (in mm)

4M

4M – for KSB's Etanorm and MCPK pump type series

Applications: drinking water, service water and hot water



Technical description

•	
Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	Antimony-impregnated carbon (A)/ resin-impregnated carbon (B) / SiC (Q1)/ SiC porous (Q7) / tungsten carbide (U2)
Mating ring	/ SiC (Q1), SiC porous (Q7) tungsten carbide (U2)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-15 °C to 140 °C
Permissible axial movement	±2 mm
Seal size (bearing bracket)	065 (CA80/WA65), 070 (CA85/WA85)
Sliding velocity	20 m/s





- Single cartridge seal, bi-directional and balanced.
 Specially designed for the installation space of Etanorm and MCPK pumps.
- The seal design facilitates installation without assembly fixtures or adjusting dimension, ensuring optimal pre-loading of the mechanical seal and low wear.
- Stationary design; multiple springs located outside the fluid handled.

	Dir	nens	ions	for	4M	(in	mm)
--	-----	------	------	-----	-----------	-----	-----

Bearing bracket size	d ₁ - 0,1	d₂ j6	d ₃ H11	d₄ H8	d₅	d ₆	d ₇	d ₈	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆
065	59,9	47	77	85	102	97	60,5	54	68	50,5	15	3,5	2,5	1
070	64,9	55	83	91,5	102	97	65	59	69	50,5	15	3,5	2,5	1

4MC

4MC – for KSB's Movitec pump type series

Applications: hot water and cooling water recirculation, boiler feed application



Technical description

Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)		
Mating ring	Antimony-impregnated carbon (A) / resin-impregnated carbon (B) / SiC (Q1)		
Elastomers	EPDM (E) / FKM (V)		
Springs 1.4571			
Metallic components	1.4571 (G)		
Further material combination	ons and certificates on request		

Technical data

Operating pressure	Up to 40 bar dynamic Up to 45 bar static
Temperature	-40 °C to 200 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	012, 016, 022
Sliding velocity	12 m/s

4MC - for KSB's Movitec pump type series



- Single cartridge seal, stationary design.
- Designed for installation in vertical pumps for applications with high pressures and speeds.
- The stationary design ensures that the sealing clearance is positioned closer to the impellers.
 This lowers the risk of dry running in the event of a gas pocket forming in the seal chamber.

Dimensions for 4MC (in mm)

Bearing bracket size	d,	d₂	d ₃	I ₁	I ₂	I ₃	g
C012M0 – 4MC	12	49,7	61	56	43,5	4,3	4xM5
C016M0 – 4MC	16	49,7	61	59,8	47,3	4,3	4xM5
C022M0 – 4MC	22	70,2	93	66,7	50,4	8,5	4xM6

40MQ – for KSB's Omega pump type series

Applications: raw, clean and service water



Technical description

Arrangement	Double
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Unbalanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	/ Inboard: SiC (Q1) resin-impregnated carbon (B) Outboard: resin-impregnated carbon (B)
Mating ring	Inboard: SiC (Q1) Outboard: SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-40 °C to 150 °C
Permissible axial movement	±2.5 mm
Seal size (bearing bracket)	060 (SU50), 070 (SU60), 080 (SU70), 090 (SU80), 110 (SU90)
Sliding velocity	10 m/s

40MQ – for KSB's Omega pump type series



- Double cartridge seal especially designed for applications with negative suction pressure.
- The optimised flushing channel ensures that any solids are flushed away from the inboard side of the mechanical seal.

Bearing bracket size	Nominal diameter	d ₁ H7	d_2	d₃ f6	d_4	d_{5}	d ₆	d ₇	d ₈	d,	d ₁₀	Ι	I,	I_2	I ₃
SU50	060	50	70	116	140	180	17,5 (M16)	G 3/8	G 1/4	G 3/8	NPT 1/4	238	136	102	11,5
SU60	070	60	80	122	150	200	17,5 (M16)	G 3/8	G 1/4	G 3/8	NPT 1/4	256	149,5	106,5	11
SU70	080	70	90	136	160	210	21,5 (M20)	G 3/8	G 1/4	G 3/8	NPT 1/4	302	189	113	13,5
SU80	090	80	100	146	170	220	21,5 (M20)	G 3/8	G 1/4	G 3/8	NPT 1/4	339	220	119	13,5
SU90	110	90	120	180	210	265	21,5 (M20)	G 3/8	G 1/4	G 3/8	NPT 1/4	360	246	114	20

Dimensions for 40MQ (in mm)

4RDQ

4RDQ – for KSB's RDLO pump type series

Applications: raw, clean and service water



Technical description

Arrangement	Double
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	Inboard: SiC (Q1) /
Frinary ring	Outboard: resin-impregnated carbon (B)
Mating ring	Inboard: SiC (Q1) Outboard: SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static
Temperature	-15 °C to 130 °C
Permissible axial movement	±2,5 mm
Seal size (bearing bracket)	125 (110), 135 (125), 155 (140), 175 (160)
Sliding velocity	10 m/s

4RDQ – for KSB's RDLO pump type series



- Double cartridge seal especially designed for applications with negative suction pressure.
- The primary ring is shrink-fitted into the metal primary ring carrier. This ensures even contact, also under fluctuating pressure and temperature conditions.

Bearing bracket size	Nominal diameter	d ₁	d_2	d³	d_4	d_{5}	d_6	d ₇	d ₈	I ₁	I_2	I ₃	I ₄	I_{5}	I ₆	I ₇	I ₈
SU110	125	109	108	170	185	220	255	266	26	255,5	143,5	112	91	30	7	65	22,5
SU125	135	119	118	180	195	230	265	274	26	255,5	143,5	112	91	30	7	65	22
SU140	155	139	138	215	245	280	320	334	26	279	163,5	115,5	116,2	52,2	6	66,5	23
SU160	175	Available on request															

Dimensions for 4RDQ (in mm)

4RPQ

4RPQ – for KSB's RPH pump type series

Applications: non-API 682 applications in the chemical and petrochemical industries



Technical description

Arrangement	Single
Design	Cartridge sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1)
Mating ring	Resin-impregnated carbon (B)
Elastomers	EPDM (E)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 40 bar dynamic Up to 60 bar static*					
Temperature	-40 °C to 150 °C					
Permissible axial movement	±1 mm					
Seal size (bearing bracket)	050 (B02), 060 (B03), 079 (B05), 100 (B06)					
Sliding velocity	20 m/s					

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* 4RPQ100: Up to 25 bar dynamic, up to 40 bar static

4RPQ – for KSB's RPH pump type series



- The materials and design ensure a long service life.
 The mechanical seal features threaded connections for flushing out leakage at the atmospheric side.
- Easy installation; the assembly fixtures provide optimal spring pre-loading and pre-centring for transport and installation.
- An integrated, floating throttling ring provides additional safety in the event of leakage.
- Stationary design; multiple springs located outside the fluid handled.

Bearing	Nominal	a ₁		a										
bracket size	diameter	h6	d2	H7	d_{5}	d_6	d ₇	g	I	I,	I ₂	I ₃	I ₄	I_5
B02	050	50	84	100	75	140	164	M16	127	41,5	46	24,5	36	55
B03	060	60	98	120	92	160	188	M16	130	41,5	46	27,5	43	71,5
B05	079	79	118	140	112	180	208	M16	131	41,5	47	27,5	43	68,5
B06	100	100	143	170	136	215	255	M20	157,5	50	60	32,5	3,8	90,5

Dimensions for 4RPQ (in mm)

4RPS

4RPS – for KSB's RPH-RO pump type series

Applications: seawater



Technical description

Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	2.4610 (M)
Metallic components	1.4501 (G4) / 1.4462 (G1)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 70 bar dynamic Up to 100 bar static
Temperature	-15 °C to 100 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	047 (B03L), 073 (B05L)
Sliding velocity	20 m/s





- The single cartridge seal features threaded connections for flushing out leakage at the atmospheric side.
- Tailored to the seal installation space and RPH-RO pump type series requirements.
- An integrated, floating throttling ring provides additional safety.
- Stationary design; multiple springs located outside the fluid handled.

Bearing bracket size	Nominal diameter	d₁ h8	d₂ j6	d ₃ H7	d_4	d_{s}	I	I ₁	I ₂	I ₃	I_4	g	g ₁
B03L	047	47	35,2	120	160	189	149,5	78	65	130,5	19,9	4xM16	1/2NPT
B05L	073	73	58,2	140	180	209	147	75,4	65	128	19,9	4xM16	1/2NPT

Dimensions for 4RPS (in mm)

4Spider – for KSB's submersible motors

Applications: contaminated water, seawater



Technical description

Arrangement	Single
Design	Cartridge sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	2.4610 (M)
Metallic components	1.4501 (G4), 1.4462 (G1)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 20 bar dynamic Up to 30 bar static
Temperature	-15 °C to 110 °C
Permissible axial movement	-3 mm*
Seal size (bearing bracket)	056, 066, 076, 100, 135
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Seal size 135: +4 mm/-2 mm





- Easy installation and removal also under difficult operating conditions.
- For all operating conditions the submersible motor is approved for.
- Stationary design; the multi-spring arrangement provides uniform surface pressure across the seal faces; thus ensuring a long service life.
- The permissible spring travel accommodates for the technical requirements of the motor shaft and thrust bearing. Depending on the size, the sleeve of the mechanical seal also houses the connection between coupling and pump, thus keeping the shaft dry.

Nominal diameter	d,	d ₂	d ₃	d_4	d₅	I	I,	g
056	55F8	80	87e8	98	109,9	90,9	27,5	M6
066	65G8	80f8	120f9	135	151,5	102,5	23	M8
076	75G8	90f7	132f8	146	165	119,3	18	M8
100	100G8	120f8	170f8	190	204	123	27	M8
135	135F7	164,7	220f8	245	265	143,5	27,7	M12

Dimensions for 4Spider (in mm)

4STK

4STK – for KSB's Sewatec and Amarex KRT pump type series

Applications: contaminated waste water



Technical description

Arrangement	Double
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Uni-directional

Materials

Primary ring	Inboard: SiC (Q1) Outboard: resin-impregnated carbon (B)
Mating ring	Inboard: SiC (Q1) Outboard: SiC (Q1)
Elastomers	EPDM (E) / FKM (V) / NBR (P)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic* Up to 20 bar static*
Temperature	-40 °C to 100 °C
Permissible axial movement	±2 mm*
Seal size (bearing bracket)	033/033, 033/055, 055/65
Sliding velocity	10 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Size 055/065:

Operating pressure: dynamic 14 bar, static 18 bar Permissible axial movement: ±2.5 mm


4STK – for KSB's Sewatec and Amarex KRT pump type series

033/055

- Double cartridge seal, specially developed for dry-installed pumps of the Amarex KRT and Sewatec type series that are fitted with a cooling jacket with coolant circulation.
- An impeller integrated between the seal at the impeller end and the seal at the motor end ensures the best possible circulation of the cooling liquid.



033/033



055/065

- The special seal design facilitates installation without assembly fixtures or adjusting dimension, ensuring optimal pre-loading of the mechanical seal and low wear.
- The seal can be dismantled without the need to remove the seal cover.

Bearing bracket size	d ₁	d_2	d ₃	d_4	d_{5}	I	I,	I ₂
033/033	33	57	111,6	93	-	86,1	75,1	74,5
033/055	33	57	111,6	93	55	86,1	75,1	70,3
055/065	55	102	155	124	65	121	104	76,5

Dimensions for 4STK (in mm)

4STQ – for KSB's Sewatec, Sewabloc and Amarex KRT pump type series

Applications: contaminated waste water



Technical description

-	
Arrangement	Double
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
	Inboard: SiC (Q1)
Mating ring	Outboard: SiC (Q1) /
5 5	tungsten carbide (U2)
Elastomers	FKM (V)
Springs	2.4610 (M)
Metallic components	1.4122 (E)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 20 bar static
Temperature	-40 °C to 100 °C
Permissible axial movement	±2 mm*
Seal size (bearing bracket)	022/025 (S01), 033/033 (S02), 033/055 (S03)
Sliding velocity	10 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Size 022/025: ±1.5 mm



4STQ – for KSB's Sewatec, Sewabloc and Amarex KRT pump type series

033/055

- Double mechanical seal in tandem arrangement, can be installed as one unit, bi-directional and balanced.
- Stationary design; springs located outside the fluid handled in the oil reservoir. The springs are insensitive to contamination and provide uniform surface pressure across the seal faces, thus ensuring a long service life.



- Tailored to the seal installation space and pump requirements.
- The special seal design facilitates installation without assembly fixtures or adjusting dimension, ensuring optimal pre-loading of the mechanical seal and low wear.

Bearing bracket size	Nominal diameter	d	$d_{_2}$	d₃	d_4	d₅	D ₆	I	I ₁	I ₂	I ₃
B01/S01	022/025	22	48	51	32	38	25	70	64	6	39
B02/S02	033/033	33	57	59,5	42	48	33	88	81	7	47
B03/S03	033/055	33	55	89,5	66,5	75,4	55	110,5	96,5	8	55,2

Dimensions for 4STQ (in mm)

4STQ – for KSB's Sewatec and Sewabloc pump type series

Applications: contaminated waste water



Technical description

-	
Arrangement	Double
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
	Inboard: SiC (Q1)
Mating ring	Outboard: SiC (Q1) /
	tungsten carbide (U2)
Elastomers	FKM (V)
Springs	2.4610 (M)
Metallic components	1.4122 (E)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 10 bar dynamic Up to 16 bar static
Temperature	-15 °C to 100 °C
Permissible axial movement	±2.5 mm*
Seal size (bearing bracket)	055/065 (S05), 120/120 (S08), 150/150 (S09), 190/190 (S10)
Sliding velocity	10 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Size 120/120: ±2 mm, 190/190: ±3 mm



4STQ – for KSB's Sewatec and Sewabloc pump type series

- Double mechanical seal in tandem arrangement, can be installed as one unit, bi-directional and balanced.
- Stationary design; springs located outside the fluid handled in the oil reservoir. The springs are insensitive to contamination and provide uniform surface pressure across the seal faces, thus ensuring a long service life.
- Tailored to the seal installation space and pump requirements.
- The special seal design facilitates installation without assembly fixtures or adjusting dimension, ensuring optimal pre-loading of the mechanical seal and low wear.

Dimensions for 4STQ (in mm)

Bearing bracket size	Nominal diameter	d ₁	d₂	d ₃	d_4	d₅	d ₆	I ₁	I ₂	I ₃
S05 (4STQ)	055/065	65 k6	55 j6	85 H8	145 H8	102	102	124,5	20	42
S05 (4STQT)	055/065	65 k6	55 j6	85 H8	145 H8	102	102	91,5	49,5	9
S08	120	120 h8	110 j6	150 H8	190 F8	157	157	134,5	61	-3
S09	150	150 h8	140 j6	208,4 H7	255 F8	235	195	256,5	12	82
S10	190	190 h8	180 j6	339	254,6 H7	291 HB	254	261,8	25,7	79,8

4UM

4UM – for KSB's submersible motors

Applications: slightly contaminated water, seawater



Technical description

Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials Primary ring SiC (Q1) SiC (Q1) / SiC (Q1) / Mating ring antimony-impregnated carbon (A) / resin-impregnated carbon (B) Elastomers Elastomers EPDM (E) / FKM (V) / NBR (P) Springs 2.4610 (M) Metallic components 1.4462 (G1) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 20 bar dynamic Up to 30 bar static
Temperature	-15 °C to 110 °C
Permissible axial movement	-3 mm
Seal size (bearing bracket)	056, 057, 066, 076, 100
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.





- Easy installation and removal also under difficult operating conditions.
- For all operating conditions the submersible motor is approved for.
- Stationary design; the multi-spring arrangement provides uniform surface pressure across the seal faces; thus ensuring a long service life.
- The permissible spring travel accommodates for the technical requirements of the motor shaft and thrust bearing. Depending on the size, the sleeve of the mechanical seal also houses the connection between coupling and pump, thus keeping the shaft dry.

Nominal diameter	d₁ F8	d₂	d₃ f8	d_4	d₅ f8	I	I,	g
056	56	55F8	87e3	98	-	112,5	49,1	M6
057	57	55F8	115	135	70	179	49,1	M8
066	66	65G8	120	135	80	133	53,6	M8
076	76	75G8	132	146	90	154,8	53,6	M8
100	101,5G8	100G8	170	190	120	171	75	M8

Dimensions for 4UM (in mm)

5HGTC – for KSB's HG pump type series

Applications: descaling applications



Technical description

-	
Arrangement	Single
Design	Cartridge sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 10 bar dynamic Up to 16 bar static
Temperature	-40 °C to 200 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	075, 083, 085, 095
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation. 5HGTC – for KSB's HG pump type series



- The single balanced mechanical seal has been specially developed for applications with a high solids content.
- The shrink disc ensures reliable torque transmission to the mechanical seal.
- The multi-spring arrangement is located outside the fluid handled, protected against contamination.

Pump size	Nominal diameter	d,	d₂	d ₃	d_4	d₅	d ₆	I ₁	I ₂	I ₃	I ₄
HG4	75	72 H7/g6	75 H7/g6	135	148 H7/g6	175	198	92,5	58,5	24	130,5
HG5	83	80 H7/g6	83 H7/g6	135	148 H7/g6	175	198	91,5	57,5	22	131,5
HG4 heavy bearing	85	82 H7/g6	85 H7/g6	135	148 H7/g6	175	198	84,5	57,5	22	125
HG5 heavy bearing	95	92 g6	95 g6	157	162	200	235	81	67,3	27	-

Dimensions for 5HGTC (in mm)

UNITAS S – for KSB's MCPK pump type series

Applications: chemical and petrochemical industries



Technical description

-	
Arrangement	Single
Design	Cartridge sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-40 °C to 220 °C
Permissible axial movement	±1.5 mm
Seal size (shaft unit)	033 (CS40), 043 (CS50), 053 (CS60), 065 (CS80)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

Variants (available on request)

Unitas Q – with shaft seal ring for connection to a liquid quench
Unitas T – with throttling bush for optional connection
of a gas or steam guench





- The springs are located outside the fluid handled and therefore protected from contamination.
- A centring diameter at the seal cover of the mechanical seal ensures an optimum radial installation position.

Dimensions for UNITAS S (in mm)

Shaft unit	Nominal diameter	d₁ F8	d ₂	d ₃ H7	d₄ NPT	d ₅	$d_{_6}$	d ₇	d ₈	I	I,	I ₂	I ₃	I ₅	I ₆	w
CS040	033	33	49.8	70	1/4	52	90	112	13.5 (M12)	58.5	17.5	14	23.5	17.5	4.5	15°
CS050	043	43	60.5	80	3/8	62	100	133	13.5 (M12)	65.5	20.5	15.5	24	21	4.5	15°
CS060	053	53	72	95	3/8	75	115	148	13.5 (M12)	65	19	18	22.5	23.5	4.5	15°
CS080	065	65	85	115	3/8	89	140	168	17.5 (M16)	69	20,5	17	26	22.5	4.5	15°

UNITAS S – for KSB's Omega pump type series

Applications: raw, pure and service water as well as seawater



Technical description

-	
Arrangement	Single
Design	Cartridge seal
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-40 °C to 220 °C
Permissible axial movement	±1.5 mm
Seal size (shaft unit)	50 (40), 60 (50), 70 (60), 80 (70), 90 (80), 110 (90)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation. UNITAS S – for KSB's Omega Pump Type Series



- Optimally designed with one seal type covering all of the Omega pump's applications. The combination of a slightly conical seal cover with a flushing system helps flush out solids from the seal chamber.
- The springs are located outside the fluid handled and therefore protected from contamination.
- A centring diameter at the seal cover of the mechanical seal ensures an optimum radial installation position.
- Suitable for drinking water.

Dimensions for UNITAS S (in mm)

Shaft unit	Nominal diameter	d₁ F8	d ₂	d₃ E9	d_4	d ₅	d ₆	d,	d ₈	d,	I	I ₁	I ₂	I ₃	I ₅	w
SU040	050	50	68	135	3/8 NPT	69	105	148	M12	72	64.5	16.5	15.5	22.5	25.5	37.5°
SU050	060	60	78	160	3/8 NPT	82.8	120	168	M16	83	69.5	18.5	16.5	25	26.5	25°
SU060	070	70	91.6	185	3/8 NPT	94	130	198	M16	96	69	16.5	16.5	26	26.5	25°
SU070	080	80	105.4	220	3/8 NPT	116	160	228	M20	115	81.5	21	19.5	30	30.5	25°
SU080	090	90	116	220	3/8 NPT	128	170	233	M20	125	80	14.5	24.5	30	35.5	25°
SU090	110	110	138	250	3/8 NPT	146	210	268	M20	150	83	15.5	26.5	30	37.5	25°

4WKS – for KSB's WKT pump type series

Applications: condensate transport in power stations



Technical description

-	
Arrangement	Single
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	Antimony-impregnated carbon (A)
Mating ring	SiC (Q1)
Elastomers	EPDM (E)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 40 bar dynamic Up to 60 bar static
Temperature	-15 °C to 90 °C
Permissible axial movement	±2.5 mm
Seal size (shaft unit)	029 (40), 033 (50/65), 041 (80/100), 050 (125/150)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.





- The 4WKS balanced cartridge seal is available with a throttling bush for connection of a gas or steam quench as standard.
- Suitable for suction pressures up to -1 bar.

	d,			d₄							
Bearing bracket size	h6	d_2	d³	H7	d_{5}	d_6	I	I ₁	I_2	I ₃	I_4
WKT 40	29	61	71	80	100	119	115,1	45	30	56	14
WKT 50/65	33	61	74	82	100	119	114,1	42	27	58	14
WKT 80/100	41	71	83	94	110	139	118	42	27	60	14
WKT 125/150	50	83	94	105	125	149	124,2	42,5	27,5	66,5	14

Dimensions for 4WKS (in mm)

4WKD – for KSB's WKTB pump type series

Application: condensate transport in power stations and industrial plants



Technical description

Arrangement	Double
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*

Materials

Primary ring	Inboard: antimony-impregnated carbon (A) / resin-impregnated carbon (B) Outboard: antimony-impregnated carbon (A) resin-impregnated carbon (B)
Mating ring	Inboard: SiC (Q1) Outboard: SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data	
Operating pressure	Up to 40 bar dynamic Up to 60 bar static
Temperature	-15 °C to 160 °C
Permissible axial movement	±3,0 mm
Seal size	055 (WKTB 6), 076 (WKTB 7+8), 107 (WKTB 9)
Sliding velocity	10 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring



- Double cartridge seal especially designed for applications with negative suction pressure. Suitable for Plan 52.
- Return of fluid handled from the seal chamber to API Plan 13 or, alternatively, supply of clean liquid to the seal chamber to Plan 32 possible.

Nominal diameter	Pump size	d ₁	d ₂	d₃	d_4	d_{5}	d_6	d ₇	d ₈	I,	I ₂	I ₃	I_4	I_5	I ₆	I ₇
055	6	55	57	135	96	170	200	M16	G1/2	122	80	74	61,5	17	17	59,2
076	7+8	76	80	164	125	200	230	M16	G1/2	144	97	81	60	18	20	82,2
107	9		Further sizes available on request													

Dimensions for 4WKD (in mm)

4EDBM6S/4EDBM6Q – single mechanical seals to API 682, 4th edition

Applications: API 682 applications in the chemical and petrochemical industries



Technical description

Arrangement	Arrangement 1
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*
Category	ll or ll
Туре	A

Materials

Primary ring	Antimony-impregnated carbon (A) / SiC-Si (Q2)
Mating ring	SiC-Si (Q2)
Elastomers	FKM (V) / FFKM (K)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 40 bar dynamic Up to 40 bar static
Temperature	-10 °C to 200 °C
Permissible axial movement	±2 mm
Seal size (bearing bracket)	50 to 120 mm
Sliding velocity	23 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

Variants

4EDBM6S – with floating throttling bush for optional connection to a gas or steam quench

 $\ensuremath{\mathsf{4EDBM6Q}}\xspace$ – with segmented throttling bush for use with a quench liquid



4EDBM6S/4EDBM6Q - single mechanical seals to API 682, 4th edition

- The single cartridge seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 61 (62) and 23 + 61 (62). The seals are available for all of KSB's API pumps.
- The throttling bush enables connection to a gas, steam or liquid quench, depending on the seal variant. This prevents outboard incrustations at the seal.
- The API Plan combination 02 + 23 with highefficiency pumping ring is perfectly matched to applications with hot fluids.

Bea	ring bracket size	Nominal diameter	d ₁ h6	d₂ H7/f7	d3	d_4	d₅	I ₁ ¹⁾	_1 ²⁾	³⁾	I ₁ ⁴⁾
	B02	50	50	100	140	164	18 (M16)	101	108,5	101	108,5
	B03	60	60	120	160	188	18 (M16)	106,5	115,5	106,5	106,5
	B05	79	79	140	180	208	18 (M16)	110	119	110	100
	B06	100	100	170	215	249	22 (M20)	122,5	128	122,5	121
	B07	120	120	190	235	268	22 (M20)	127,5	132	127,5	122,5

Dimensions for 4EDBM6S / 4EDBM6Q (in mm)

- ¹⁾ Standard seal chamber
- ²⁾ Standard seal chamber, Plan 23 ³⁾ Cooled seal chamber
- ⁴⁾ Cooled seal chamber, Plan 23

4EDBM6T/4EDBM6D – double mechanical seals to API 682, 4th edition

Applications: API 682 applications in the chemical and petrochemical industries



Technical description

Arrangement	Arrangement 2, 3
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*
Category	ll or ll
Туре	A

Materials

Primary ring	/ (Q2) Inboard: SiC-Si antimony-impregnated carbon (A) Outboard: antimony-impregnated carbon (A)
Mating ring	SiC-Si (Q2)
Elastomers	Inboard: FKM (V) / FFKM (K) Outboard: FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 40 bar dynamic Up to 40 bar static				
Temperature	-10 °C to 200 °C				
Permissible axial movement	±1mm**				
Seal size (bearing bracket)	50 to 120 mm				
Sliding velocity	23 m/s				

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

** Sizes 079, 100: ±1.5 mm

Variants

4EDBM6T – Arrangement 2	
4EDBM6D – Arrangement 3	



4EDBM6T/4EDBM6D – double mechanical seals to API 682, 4th edition

- The double cartridge seal can be connected to all common API Plans, such as: 01, 02, 11, 31, 32 + 52, 53 (A, B, C) and 23 + 52, 53 (A, B, C). The seals are available for all of KSB's API pumps.
- The space between the two mechanical seals is flushed with a buffer or barrier fluid, depending on the application. This completely absorbs any leakage of the fluid pumped. In addition, the heat is transported away from this area.
- The double pressure balanced mechanical seal can be operated with pressurised barrier fluid or unpressurised buffer fluid.
- The API Plan combination 02 + 23 with highefficiency pumping ring is perfectly matched to applications with hot fluids.

ł	Bearing pracket size	Nominal diameter	d₁ h6	d₂ H7/f7	d ₃	d_4	d₅	I ₁ 1)	₁ 2)
	B02	50	50	100	140	164	18 (M16)	118	103
	B03	60	60	120	160	188	18 (M16)	122	103
	B05	79	79	140	180	208	18 (M16)	136	99
	B06	100	100	170	215	249	22 (M20)	152	113,5
	B07	120	120	190	235	268	22 (M20)	159,5	121

Dimensions for 4EDBM6T / 4EDBM6D (in mm)

4EDTR6HS/4EDTR6HQ – single mechanical seals with metal bellows, to API 682, 4th edition

Applications: API 682 applications in the chemical and petrochemical industries



Technical description

Arrangement	Arrangement 1
Design	Cartridge sea
Balancing	Balanced
Direction of rotation	Bi-directional*
Category	ll or ll
Туре	(

Materials

Primary ring	/ (A) Antimony-impregnated carbon (A) SiC-Si (Q2)
Mating ring	SiC-Si (Q2)
Secondary sealing elements	Statotherm [®] (G)
Metal bellows	Inconel [®] 718 (M6)
Metallic components	Carpenter [®] 42 (T4)
Eurther material combinations and	d certificates on request

Further material combinations and certificates on reques

Technical data

Operating pressure	Up to 20 bar dynamic Up to 20 bar static				
Temperature	-75 °C to 400 °C				
Permissible axial movement	±1 mm**				
Seal size (bearing bracket)	50 to 120 mm				
Sliding velocity	23 m/s				

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

** Sizes 079, 100: ±1.5 mm

Variants

 $\ensuremath{\mathsf{4EDTR6HS}}$ – with floating throttling bush for optional connection to a gas or steam quench

 $\ensuremath{\mathsf{4EDTR6HQ}}$ – with segmented throttling bush for use with a quench liquid



4EDTR6HS/4EDTR6HQ – single mechanical seals with metal bellows, to API 682, 4th edition

- The single metal-bellows seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 61 (62) and 23 + 61 (62). The seals are available for all of KSB's API pumps.
- The throttling bush enables connection to a gas, steam or liquid quench, depending on the seal version. This prevents outboard incrustations at the seal.
- The bellows made of Inconel®718 and the secondary sealing elements made of pure graphite have an excellent chemical resistance and are especially suited for applications with high temperatures.

Bearing bracket size	Nominal diameter	d ₁ h6	d ₂ H7/f7	d₃	d4	d₅	I ₁ 1)	2) 1	_ ³⁾	_ ⁴⁾
B02	50	50	100	140	164	18 (M16)	104,5	113,5	104,5	105,5
B03	60	60	120	160	188	18 (M16)	106	119,5	106	106
B05	79	79	140	180	208	18 (M16)	110	121	110	102
B06	100	100	170	215	249	22 (M20)	117	139	117	117

Dimensions for 4EDTR6HS / 4EDTR6HQ (in mm)

¹⁾ Standard seal chamber

²⁾ Standard seal chamber, Plan 23

³⁾ Cooled seal chamber

⁴⁾ Cooled seal chamber, Plan 23

4EDTR6HT/4EDTR6HD – double mechanical seals with metal bellows, to API 682, 4th edition

Applications: API 682 applications in the chemical and petrochemical industries



Technical description

Arrangement	Arrangement 2, 3
Design	Cartridge sea
Balancing	Balanced
Direction of rotation	Bi-directional ³
Category	ll or ll
Туре	(

Materials

	Inboard:
	antimony-impregnated carbon (A) /
Primary ring	SiC-Si (Q2)
	Outboard:
	antimony-impregnated carbon (A)
Mating ring	SiC-Si (Q2)
Secondary sealing elements	Statotherm [®] (G)
Metal bellows	Inconel [®] 718 (M6)
Metallic components	Carpenter [®] 42 (T4)

Further material combinations and certificates on request

Technical data	
Operating pressure	Up to 20 bar dynamic Up to 20 bar static
Temperature	-75 °C to 400 °C
Permissible axial movement	±1 mm**
Seal size (bearing bracket)	50 to 120 mm

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

** Sizes 079, 100: ±1.5 mm

Sliding velocity

Variants

23 m/s

4EDTR6HT – Arrangement 2	
4EDTR6HD – Arrangement 3	



4EDTR6HT/4EDTR6HD – double mechanical seals with metal bellows, to API 682, 4th edition

- The double seal with metal bellows can be connected to all common API Plans, such as: 01, 02, 11, 31, 32 + 52, 53 (A, B, C) and 23 + 52, 53 (A, B, C). The seals are available for all of KSB's API pumps.
- The space between the two mechanical seals is flushed with a buffer or barrier fluid, depending on the application. This completely absorbs any leakage of the fluid pumped. In addition, the heat is transported away from this area.
- The double pressure balanced mechanical seal can be operated with pressurised barrier fluid or unpressurised buffer fluid.
- The bellows made of Inconel®718 and the secondary sealing elements made of pure graphite have an excellent chemical resistance and are especially suited for applications with high temperatures.

size	diameter	u₁ h6	u₂ H7/f7	d₃	d_4	d₅	¹⁾	_ ²⁾
B02	50	50	100	140	164	18 (M16)	122,5	107,5
B03	60	60	120	160	188	18 (M16)	126,5	107,5
B05	79	79	140	180	208	18 (M16)	139,5	102,5
B06	100	100	170	215	249	22 (M20)	155,5	117

Dimensions for 4EDTR6HT / 4EDTR6HD (in mm)

4EDCB8S – single mechanical seal to API 682, MCPK pump type series

Applications: chemical and petrochemical industries



Technical description

Arrangement	Arrangement 1
Design	Cartridge sea
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*
Category	
Туре	A

Materials

Primary ring	Antimony-impregnated carbon (A) / SiC-Si (Q2)
Mating ring	SiC-Si (Q2)
Elastomers	FKM (V) / FFKM (K)
Springs	2.4610 (M)
Metallic components	1.4571 (G)
Further meterial combination	a and contificator on variant

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 20 bar dynamic Up to 20 bar static
Temperature	-10 °C to 200 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	033 (CS40), 043 (CS50), 053 (CS60), 065 (CS80)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring



4EDCB8S – single mechanical seal to API 682, 4th edition for KSB's MCPK pump type series



- The single cartridge seal is especially designed for use in the standardised installation spaces of the non-API pump MCPK (CPKN + CPK possible).
- The mechanical seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 61 (62) and 23 + 61 (62).
- Floating throttling bush for optional connection of a gas or steam quench. This prevents outboard incrustations at the seal.

Bearing bracket	d,		d³	d₄													
size	F7/h6	d_2	H7	H7/f7	d ₅	$d_{_6}$	I	I,	I_2	I3	I_4	I ₅	\mathbf{g}_1	g ₂	w ₁	W_2	W ₃
CS040	33	56	60	70	110	90	78,5	18,5	46,5	22	32	18	3/8-NPT	1/4-NPT	15°	45°	22,5°
CS050	43	66	70	80	127	100	81,5	13,5	52,5	28	37	23	3/8-NPT	1/4-NPT	15°	45°	22,5°
CS060	53	78	85	95	138	115	80,5	13,5	51,5	27	37	28	3/8-NPT	1/4-NPT	15°	45°	22,5°
CS080	65	92	95	115	168	140	80,5	13,5	51,5	29	37	34,5	3/8-NPT	1/4-NPT	15°	45°	22,5°

Dimensions for 4EDCB8S (in mm)

4EDCB8T/4EDCB8D – double mechanical seals to API 682, MCPK pump type series

Applications: chemical and petrochemical industries



Technical description

Technical data

Arrangement	Arrangement 2, 3
Design	Cartridge seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional*
Category	
Туре	A

Materials

Primary ring	Inboard: antimony-impregnated carbon (A) / SiC-Si (Q2) Outboard: antimony-impregnated carbon (A)
 Mating ring	SiC-Si (Q2)
Elastomers	Inboard: FKM (V) / FFKM (K) Outboard: FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G)

Further material combinations and certificates on request

Operating pressure	Up to 20 bar dynamic Up to 20 bar static
Temperature	-10 °C to 200 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	033 (CS40), 043 (CS50), 053 (CS60), 065 (CS80)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* Only applies to variants without pumping ring

Variants

4EDCB8T – Arrangement 2	
4EDCB8D – Arrangement 3	



4EDCB8T/4EDCB8D - double mechanical seals to API 682, 4th edition (KSB's MCPK pump type series)

- The double cartridge seal is especially designed for use in the standardised installation spaces of the non-API pump MCPK (CPKN + CPK possible).
- The double cartridge seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 52, 53 (A, B).
- The space between the two mechanical seals is flushed with a buffer or barrier fluid, depending on the application. This completely absorbs any leakage of the fluid pumped. In addition, the heat is transported away from this area. The double pressure balanced mechanical seal can be operated with pressurised barrier fluid or unpressurised buffer fluid.

size	F7/h6	d₂	u₃ H7	u₄ H7/f7	d_{s}	d_6	I	I,	I ₂	I ₃	g ₁	W ₁	w ₂
CS040	33	56	60	70	110	90	97	37	46,5	35	3/8-NPT	15°	22,5°
CS050	43	66	70	80	127	100	99	31	52,5	39	3/8-NPT	15°	22,5°
CS060	53	78	85	95	138	115	100,25	33,25	51,75	36,5	1/2-NPT	15°	22,5°
CS080	65	92	95	115	168	140	101,5	23,5	62,5	49	1/2-NPT	15°	22,5°

Dimensions for 4EDCB8T/4EDCB8D (in mm)

4

4AP

4AP – for KSB's Amaprop submersible mixer

Applications: Fluids containing long fibres and stringy particles



Technical description

Single
Component sea
Stationary
Balancec
Multi-spring arrangement
Bi-directiona

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	1.4571 (G)
Metallic components	1.4122 (E)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 1.2 bar dynamic Up to 1.2 bar static
Temperature	-15 °C to 120 °C
Permissible axial movement	±2 mm
Seal size (bearing bracket)	055 (055)
Sliding velocity	10 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

4AP – for KSB's Amaprop submersible mixer



- Single mechanical seal, tailored to the installation space and the submersible mixer's requirements.
- Stationary design, balanced. The multi-spring arrangement is located outside the fluid handled in the oil reservoir. Thus, the springs are insensitive to contamination and provide uniform surface pressure across the seal faces, ensuring a long service life.
- Suitable for all fluids with high solids content and those containing long fibres.
- Easy to install, design provides for a fixed adjusting dimension.

4C/4CN – for KSB's CPK/CPKN pump type series

Applications: chemical and petrochemical industries



Technical description

Arrangement	Single
Design Component	nt sea
Construction principle Stat	ionary
Balancing Bal	anced
Springs Multi-spring arrange	ement
Direction of rotation Bi-direction	tiona

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V) / FFKM (K)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4462 (G1) / 1.4539 (G3) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-15 °C to 150 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	030 (P02), 040 (P03), 050 (P04), 060 (P05), 070 (P06), 080 (P08)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

4C/4CN - for KSB's CPK/CPKN pump type series



- Ideally adjusted to the conical seal installation space of the pump (A-type cover). Suitable for fluids with solids content.
- Stationary design; multiple springs located outside the fluid handled. The large springs are insensitive to contamination and ensure an optimal service life.
- Can optionally also be operated with unpressurised quench liquid.
- Easy to install, no adjusting dimension required.

Bearing bracket size	Pump type	Nominal diameter	d m6	\mathbf{d}_1	d₂ k5	$d_{_3}$	d_4	d_{5}	d_6	d ₇	I	I,	I_2	I ₃	I_4	I_5	I ₆	g
P02	СРК	030	20	25	25	51	30	42,5	60	73	120	17	41,8	23	12,5	4	20	3xM6
P03	СРК	040	27	32	35	62	40	52,6	70	83	129,5	20	38,8	22	17,5	7	20	4xM6
P04	СРК	050	35	42	45	74	50	63,7	80	93	140	23	47,8	22	19	8,5	20	6xM6
P05	СРК	060	47	54	55	88	60	77,7	95	108	165	25	54,8	24	19	7,5	20	8xM6
P06	СРК	070	55	65	65	102	70	91,7	110	123	167	29,5	59	30	20	7,5	20	10xM6
P06	CPKN	070	55	65	65	102	70	91,7	110	123	168	30,5	59	30	20	7,5	20	10xM6
P08	СРК	080	70	80,5	80	135	90	120,5	145	165	208	34	63	14	31,5	15,5	24	6xM10
P10	CPKN	100	85	101	100	156	110	140,5	165	185	195	40	68	10	31,5	15,5	25	8xM10
P12	СРК	120	100	120	120	177	130	160,6	190	210	240	40	71	18	34,5	16,5	25	10xM10

Dimensions for 4C and 4CN (in mm)

4HG

4HG – for KSB's HGM-RO pump type series

Applications: seawater



Technical descriptionArrangementSingleDesignComponent sealConstruction principleDynamicBalancingBalancedSpringsMulti-spring arrangementDirection of rotationBi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	2.4610 (M)
Metallic components	1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 6 bar dynamic Up to 25 bar static
Temperature	-40 °C to 220 °C
Permissible axial movement	±2 mm
Seal size (bearing bracket)	100 (R06), 120 (R08)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.





- Tailored to the seal installation space and pump requirements. The shaft protecting sleeve is integrated in the mechanical seal.
- Dynamic design with multi-spring arrangement, sturdy and practical seal design.
- The modular seal design facilitates installation without assembly fixtures or adjusting dimension, ensuring optimal pre-loading of the mechanical seal.

Bearing bracket size	Nominal diameter	d ₁	d ₂	d₃	d_4	d_{5}	$d_{_6}$	d ₇	d	G	I ₁	l _g	I ₃	I_4	I_{5}	I ₆	I,	I ₈	I ₉	I ₁₀
R06	100	86	92	128	120	95	115	125	140	M90 x 2,0 LH	111	151	100	11	3	7	9	13	50,5	101
R08	120	106	112	158	150	115	138	150	180	M110 x 2,0 LH	108	154	94	12	3	9	12	13	53,5	104

Dimensions for 4HG (in mm)

4HL

4HL – for KSB's HPK-L pump type series

Applications: hot water and heat transfer fluids



Technical description

Single
Component seal
Dynamic
Balanced
Multi-spring arrangement
Bi-directional

Materials

Primary ring	Antimony-impregnated carbon (A) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Metallic components	1.4122 (E)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 40 bar dynamic Up to 60 bar static
Temperature	-40 °C to 130 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	028 (CS40), 038 (CS50), 048 (CS60), 060 (CS80), 070 (70)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.




- Dynamic type, multi-spring arrangement, bi-directional and balanced. Sturdy and practical seal design.
- In combination with the pump design of the HPK-L type series, the seal can be used for fluid temperatures of up to 350 °C.
- Circumferential groove at the Primary ring carrier facilitates setting the axial pre-load of the mechanical seal.

Bearing	Nominal	d ₁			d_{6}	d ₇						I ₅			
bracket size	diameter	f7	d³	d_4	H11	H8	d ₈	I	I ₁	I ₃	I_4	x20	I ₆	f	а
CS40	028	28	48	64	37	43	49	72	68	58	10	2	5	5,5	3
CS50	038	38	57	82	49	56	60	74	70	59	11	2	6	5,5	3
CS60	048	48	67	95	59	66	70	73,5	69,5	58,5	11	2	6	5,5	3
CS80	060	60	79	117	72	80	84	84	79	68	11	2,5	6	5,5	4
70*	070	70	90	160	83	92	96	64,5	60	48	12	2,5	7	5	4

Dimensions for 4HL (in mm)

* Etanorm-RSY

4K

4K – for KSB's KWP pump type series

Applications: waste water containing stringy material and abrasive particles



Technical description

Arrangement	Single
Design	Component sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	SiC (Q1) / tungsten carbide (U1)
Mating ring	SiC (Q1) / tungsten carbide (U1)
Elastomers	EPDM (E) / FKM (V) / FFKM (K) / FEP-encapsulated (M1)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4462 (G1) / 1.4539 (G3) / 1.4501 (G4)
Further material combination	ns and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-15 °C to 150 °C
Permissible axial movement	±2 mm*
Seal size (bearing bracket)	040 (P03), 050 (P04), 060 (P05), 070 (P06), 080 (P08), 100 (P10), 120 (P12)
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* ±3 mm from nominal diameter 080

Variants

4KD – The double mechanical seal comprises an inboard stationary seal (similar to the 4K type) and an outboard uni-directional single mechanical seal. Designed for a maximum barrier fluid pressure of 10 bar.

4K - for KSB's KWP pump type series



- The seal is tailored to the seal installation space of the pump and therefore perfectly suitable for fluids with a high solids content.
- Stationary design; multiple springs located outside the fluid handled. The large springs are insensitive to contamination and provide uniform surface pressure across the seal faces, thus ensuring a long service life.
- Can optionally also be operated with unpressurised quench liquid.
- Easy to install, no adjusting dimension required.

Bearing bracket size	Nominal diameter	d m6	d ₁	d₂ k5	d₃	d_4	d_{5}	d_6	d ₇	I	I ₁	I_2	I_4	I_{5}	I ₆	g
P03	040	27	34	35	62	40	52,6	70	83	129,5	23,5	25,5	17,5	7	20	4xM6
P04	050	35	43	45	74	50	63,7	80	93	132,5	23,5	25,3	19	8,5	20	6xM6
P05	060	47	53,8	55	88	60	77,7	95	108	155	24	33,5	17	7,5	20	8xM6
P06	070	55	65	65	102	70	91,7	110	123	155	24	38,5	20	7,5	20	10xM6
P08	080	70	80	80	135	90	120,5	145	165	185	35	35,5	31,5	15,5	25	6xM10
P10	100	85	100	100	156	110	140,5	165	185	190	35	34,5	31,5	15,5	24	8xM10
P12	120	110	120	120	177	130	160,6	190	210	195	35	36,5	34,5	16,5	25	10xM10

Dimensions for 4K (in mm)

4KBL – for KSB's KWP-Bloc pump type series

Applications: waste water containing stringy material and abrasive particles



Technical description

-	
Arrangement	Single
Design	Component seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / tungsten carbide (U2) / shrink-fitted
Mating ring	SiC (Q1) / tungsten carbide (U2) / shrink-fitted
Elastomers	FKM (V) / FFKM (K) / FFKM/FKM / FEP-encapsulated (U2)
Springs	1.4571 (G)
Metallic components	1.4462 (G1)
Further restarial carebin	ations and contificates on request

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-15 °C to 100 °C
Permissible axial movement	±1.5 mm
Seal size (bearing bracket)	031 (P03), 038* (P04)
Sliding velocity	20 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

* For seal size 038, two versions are available:

"G" version = cast, "V" version = turned





• Easy to install, no adjusting dimension required.

The pump's shaft protecting sleeve is integrated in

• The single balanced mechanical seal is suitable for applications with a high solids content.

pressure across the seal faces, thus ensuring a

- the mechanical seal. Dynamic design; multiple springs located outside the fluid handled. The springs are insensitive to contamination and provide uniform surface
- Dimensions for 4KBL (in mm) Bearing Nominal $d_{_6}$ diameter **d**₁ \mathbf{d}_2 d_4 d_{5} d_7 d_smin I_2 I,

bracket size I_3 I_4 I_{5} \mathbf{I}_{6} ١, 31 27 42 70 22 41,6 13,4 2 6 P03 031 52 54 61 55 9 2 P04 038G 38 35 51 59 54 61 70 22 49,6 13,9 9 63,5 6 P04 038V 38 35 51 59 54 61 70 58,5 22 44,6 13,9 2 6 9

long service life.

4KST – for KSB's HPH / RPH-HW pump type series

Applications: hot water



Technical description

-	
Arrangement	Single
Design	Component sea
Construction principle	Stationary
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	Antimony-impregnated carbon (A)
Mating ring	SiC-Si (Q2)
Elastomers	EPDM (E)
Springs	1.4571 (G)
Metallic components	1.4122 (E)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 100 bar dynamic Up to 100 bar static
Temperature	-40 °C to 320 °C
Permissible axial movement	±1 mm
Seal size (bearing bracket)	See dimensions table
Sliding velocity	40 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.



4KST - for KSB's HPH / RPH-HW pump type series

- The perfect match for hot water applications. The design is tailored to the cooled pump cover.
- This robust seal is designed for operating conditions with extremely high pressures and temperatures.
- The solid seal faces abut the metal components and are thus axially secured. This prevents tilting of the seal faces. This ensures reliable sealing and low wear also in extreme conditions.
- The special design with hook sleeve does away with the need for an axial adjusting dimension; the seal is always perfectly positioned on the pump shaft.

Bearing bracket size	Nominal diameter	d ₁	d ₂	d₃	d_4	d₅	d	d ₇	d ₈	I,	I_2	I ₃	I ₄	I _s
HPH P03 Var 31	035	35	82	113	32	27	31,8	45	79	58	16	17,6	120,5	-
HPH P04 Var 41	045	45	93	123	42	35	41,8	55	90	58	16	20,6	118	-
HPH P06 Var 51	065	65	113	143	63,5	47	63	80	110	58	18	22	155,7	-
HPH P06 Var 52	065	65	113	143	63,5	47	63	80	110	58	18	22	144	-
HPH P06 Var 61	065	65	113	143	63,5	55	63	80	110	58	18	26,5	139	-
HPH B07 Var 71	085	85	150	190	83,5	70	83	100	147	85	15	30	224	-
HPH B07 Var 81	100	100	170	210	98,5	85	98	120	167	86	18	35	237	-
RPH B02S	035	35	82	113	34	20	33,8	45	79	57	16	-	165	14,8
RPH B02L	035	35	82	113	34	27	33,8	45	79	58	16	-	155	14,8
RPH B03	045	45	93	123	44	35	43,8	55	90	58	16	-	172	17,8
RPH B05S	065	65	113	143	64	47	63,8	80	110	62,6	18	-	180	19,2
RPH B05L	065	65	113	143	64	55	63,8	80	110	68,1	18	-	180	23,7

Dimensions for 4KST (in mm)

40M

40M – for KSB's Omega pump type series

Applications: raw, clean and service water



Technical description

-	
Arrangement	Single
Design	Component seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials Primary ring

Primary ring	SiC (Q1) / SiC-Si (Q2)
Mating ring	SiC (Q1), SiC-Si (Q2) / antimony-impregnated carbon (A) / resin-impregnated carbon (B)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static					
Temperature	-40 °C to 150 °C					
Permissible axial movement	±3 mm					
Seal size (bearing bracket)	50 (40), 60 (50), 70 (60), 80 (70), 90 (80), 110 (90)					
Sliding velocity	16 m/s					

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

40M – for KSB's Omega pump type series



- Single mechanical seal, tailored to the pump requirements. Sturdy and practical.
- The pump's spacer sleeve is integrated in the mechanical seal, so no adjusting dimension is required.
- The primary ring is kept in position in the torque-transmitting element for transport and installation.

Dimensions for 40M (in mm)

I	Bearing bracket size	Nominal diameter	d₁ h6	d_{2}	d ₃	d_4	$d_{_{5}}$	d ₆ H11	d ₇ H8	I ₁	I_2	I₃ ±3	$I_{_{5}}$	I ₆	I ₇	I ₈
	SU040	050	50	56	68	70	51	62	70	91,5	88,5	74	2,5	6	9	49
	SU050	060	60	66	83	85	61	72	80	103,5	100,5	85	2,5	6	9	55
	SU060	070	70	80	93	95	71	83	92	104	101,5	85,5	2,5	7	9	55,5
	SU070	080	80	90	106	112	81	95	105	124	120	101	3	7	9	71
	SU080	090	90	100	119	122	91	105	115	123,5	120	103,5	3	7	9	70,5
	SU090	110	110	120	148	150	111,5	128,2	140,3	166,5	162	141,5	3	9	12	96,5

4RD/4RDB – for KSB's RDLO pump type series

Applications: raw, clean and service water



Technical description	
Arrangement	Single
Design	Component seal
Construction principle	Dynamic
Balancing	Balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / antimony-impregnated carbon (A) / resin-impregnated carbon (B)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4)
Fronth an an attack of a loss as him	-tions and contificates an accurat

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static*
Temperature	-40 °C to 130 °C
Permissible axial movement	±2.5 mm
Seal size (shaft unit)	125 (110), 135 (125), 155 (140), 175 (160), 215 (200)
Sliding velocity	16 m/s

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.

** Size 215: up to 12 bar dynamic, up to 18 bar static

Variants

4RD – torque transmission by key	
4RDB – torque transmission by grubs screws	





- The Primary ring is shrink-fitted into the metal Primary ring carrier. This ensures even contact, also under fluctuating pressure and temperature conditions.
- Easy to install, no adjusting dimension required. Together with the shaft protecting sleeve and the seal cover, the mechanical seal can be installed like a cartridge.

Shaft unit	Nominal diameter	d,	d₂ h6	$d_{_3}$	d ₆ H11	d ₇ H8	I	I ₁	I ₂	I ₃	I_4	b	I ₅	t
SU 110	125	125	135	168	142,2	154,3	83	73	32	57	15	10	9	2,5
SU 125	135	135	145	178	152,2	164,3	83,2	73	32	57	15	10	9	2,5
SU 140	155	155	165	200	173,2	185,3	97	87	38	69	20	12	11	2,5
-	160	160	170	206	178,2	190,3	97,5	87	38	63,5	20	12	-	2,5
SU 160	175	175	185	222,3	193,2	205,3	97	87	38	69	20	12	11	2,5
SU 200	215	215	225	258	237,5	249,6	106	96	45	71	20	12	-	2,5

Dimensions for 4RD (in mm)

4STC – for KSB's Sewatec, Amarex KRT and Amacan pump type series

Applications: contaminated waste water



Technical description

•	
Arrangement	Single
Design	Component sea
Construction principle	Stationary
Balancing	Balancec
Springs	Multi-spring arrangement
Direction of rotation	Bi-directiona

Materials

Primary ring	Antimony-impregnated carbon (A) / SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Metallic components	1.4571 (G) / 1.4501 (G4)

Further material combinations and certificates on request

Technical data

Operating pressure	Up to 14 bar dynamic Up to 16 bar static					
Temperature	-40 °C to 200 °C					
Permissible axial movement	±2 mm					
Seal size (bearing bracket)	110, 120, 140, 160, 165					
Sliding velocity	10 m/s					

The temperature and pressure limits depend on the operating mode of the pump, the materials used and the type of fluid handled. Operation at the maximum limits is not possible for all operating parameters at the same time as the parameters influence each other during operation.



4STC – for KSB's Sewatec, Amarex KRT and Amacan pump type series



4STC – without seat lock

- 4STC-A with seat lock
- Single component seal, stationary design.
- The springs are located outside the fluid handled, protected against contamination.
- The primary ring of the seal has been secured against falling out, making it a safer fit for vertically installed pumps.

Dimensions for 4STC (in mm)

Seal size	d ₁	d_2	d ₃	d_4	d_{s}	d_6	Ι	g
4STC110-124	110	124	138,2	150,3	-	-	98,5	-
4STC110-124-A	110	124	138,2	150,3	167	181,9	97,5	4xM6
4STC120-124	120	124	138,2	150,3	-	-	84,3	-
4STC120-124-A	120	124	138,2	150,3	167	181,9	83,3	4xM6
4STC140-144-A	140	144	156,2	168,3	185	198	81,3	4xM6
4STC140-178-A	140	178	-	208	224,4	245,4	106,5	6xM6
4STC160-178-A	160	178	-	208	224,4	245,4	106,5	6xM6
4STC160-178-A1	160	178	-	208	224,4	245,4	107,6	6xM6
4STC165-178-A	165	178	-	208	224,4	245,4	107,6	6xM6

SDPN16 – thermosyphon system



Technology

Thermosyphon system for use with unpressurised buffer fluid or pressurised barrier fluid (Plan 52 and 53A). A cooling coil is integrated in the system and can be connected as an option. A large range of components can be configured in addition.

Safety

Used for applications where leakage of the fluid handled to atmosphere must be minimised, contained or completely ruled out.

Application

For double mechanical seals with pressurised barrier fluid or unpressurised buffer fluid. Depending on the application, the pressure of the buffer fluid or barrier fluid is lower or higher than the pressure in the pump's seal chamber.

Longer seal life

The system flushes the space between the seals with a clean buffer fluid or barrier fluid. This carries the heat away from this area, thus increasing the seal's service life.



Applications: Operating mode to API Plan 52 or 53A

Configurable components:

- A1 Pressure gauge connection
- A2 Level switch
- A3 Pressurised gas connection
- A4 Venting unit
- A5 Safety valve connection
- A6 Refill unit
- A7 Drain unit connection
- A8 Thermometer

Technical data

Pressure	Up to 16 bar
Temperature	-60 °C to 200 °C
Total volume	8 litres
Working volume	1.3 litres
Cooling capacity without cooling water	0.3 kW
Cooling capacity, natural circulation	1.2 kW
Cooling capacity, forced circulation	2.5 kW
Design to	PED 2014 / 68 / EU

KTS52 – thermosyphon system to API 682, 4th edition*





4 litres / 6.5 litres

ASME VIII-Div.1

PED 2014 / 68 / EU

EExd - IIC - T6 (ATEX EX II 1/2G)

perfectly matched.

Technology

Application

seal chamber.

Efficiency

API 682, 4th edition.

Longer seal life

The system flushes the space between the seals with a clean buffer fluid. This also carries the heat away from this area, thus increasing the seal's service life.

Thermosyphon system compliant with all requirements of

For double mechanical seals (arrangement 2). The buffer fluid pressure is lower than the pressure in the pump's

Circulation between the buffer fluid reservoir and the

integrated in the seal. The reservoir and the seal are

KSB mechanical seal is ensured via a circulation system

* System also available to API 682 3rd edition

Working volume

Design to

Explosion protection for

measuring instruments

KTS53A – thermosyphon system to API 682, 4th edition*



Technology

Thermosyphon system compliant with all requirements of API 682, 4th edition.

Application

For double mechanical seals (arrangement 3). The barrier fluid pressure is higher than the pressure in the pump's seal chamber.

Efficiency

Circulation between the barrier fluid reservoir and the KSB mechanical seal is ensured via a circulation system integrated in the seal. The system and the seal are perfectly matched.

Longer seal life

The pressure of the clean barrier fluid in the space between the two mechanical seals is higher than the process-fluid pressure. As a result, clean barrier fluid will always be available between the seal faces, minimising wear and carrying the heat away from this area. This markedly increases the mechanical seal life.



Process side	Up to 50 bar: -29 °C to 200 °C
Cooling water side	Up to 16 bar: -29 °C to 200 °C
Total volume	15 litres / 26 litres
Working volume	4 litres / 6.5 litres
Explosion protection for measuring instruments	EExd – IIC – T6 (ATEX EX II 1/2G)
Design to	ASME VIII-Div.1 PED 2014 / 68 / EU

* System also available to API 682 3rd edition



Technology

Quench system for supplying single mechanical seals in quench design or double mechanical seals in tandem arrangement (unpressurised).

Safety

Used for applications where leakage of the fluid handled to atmosphere must be contained or diluted. This ensures reliable functioning of the mechanical seal especially for leakage products that tend to stick, crystallise or freeze.

Application

The quench liquid pressure is lower than the pressure in the pump's seal chamber. The quench liquid prevents a reaction between the leakage products and atmospheric oxygen. It serves as dry running protection.



Technical data

Pressure	Unpressurised
Temperature	-40 °C to 120 °C
Total volume	3 litres

KTS53B – barrier fluid system to API 682,4th edition*



Technology

Closed barrier fluid system compliant with all requirements to API 682 4th edition.

Application

For double mechanical seals (arrangement 3). The barrier fluid pressure is higher than the pressure in the pump's seal chamber. The barrier fluid pressure is generated by a bladder accumulator upstream of the seal.

Safety

Pressurisation by the bladder accumulator prevents the pressurised gas from dissolving in the barrier fluid, especially at high pressures. An integrated cooler** ensures an optimum operating temperature in the space between the two seals.

Longer seal life

The pressure of the clean barrier fluid in the space between the two mechanical seals is higher than the process fluid pressure. As a result, clean barrier fluid will always be available between the seal faces, minimising wear and carrying the heat away from this area. This markedly increases the mechanical seal life.

) Pressure	transmitter
------------	-------------

Temperature transmitter

B1 To the mechanical seal
B2 Cooling water outlet
B3 Cooling water inlet
B4 From the mechanical seal
B5 Barrier fluid fill connection
B6 Vent (closed)
B7 Pressurised gas refill connection
B8 Drain (closed)

Applications:

Technical data

Process side	Up to 50 bar: -29 °C to 200 °C
Total volume	20 litres / 35 litres
Explosion protection of measuring instruments	EExd – IIC – T6 (ATEX EX II 1/2G)
Design to	ASME VIII-Div.1 PED 2014 / 68 / EU

* System also available to API 682 3rd edition

** Optionally available with water or air cooler

RWT23 – heat exchanger





Technology

Tube-in-tube heat exchanger for cooling single and double mechanical seals.

Application

Frequently used for hot water and boiler feed water as well as for many hydrocarbons requiring cooling to prevent the fluid at the mechanical seal from evaporating (observing the vapour pressure margin).

Efficiency

Circulation between the cooler and the KSB mechanical seal is ensured via a circulation system integrated in the seal. A throttling bush largely isolates the cooled fluid in the seal chamber from the hot fluid pumped.

Longer seal life

The heat exchanger cools the fluid upstream of the product-side mechanical seal and prevents vaporisation between the seal faces. This markedly increases the seal life. Applications: Operating mode to API Plan 23

- From the mechanical seal*
- 2 Cooling water outlet
- Cooling water vent (closed)
- 4 Cooling water inlet
- 5 Cooling water drain (closed)
- 6 To the mechanical seal*
- * Available in three different versions: flanged, screwed, welded

Technical data (welded version)

Process side	Up to 120 bar: -29 °C to 270 °C
Cooling water side	Up to 20 bar: -29 °C to 100 °C
Process fluid volume	0.5 litres
Cooling fluid volume	1 litre
Effective heat exchanger surface	0.12 m ²
Design to	ASME VIII-Div. 1

Higher application limits on request

KWT23 – heat exchanger to API 682, 4th edition*





Applications: API Plan 23

Technology

Heat exchanger compliant with all requirements of API 682, 3^{rd} and 4^{th} edition.

Application

For single or double mechanical seals (arrangements 1, 2 or 3). Frequently used for hot water and boiler feed water as well as for many hydrocarbons requiring cooling to prevent the fluid at the mechanical seal from evaporating (observing the vapour pressure margin).

Efficiency

Circulation between the cooler and the KSB mechanical seal is ensured via a circulation system integrated in the seal. A throttling bush largely isolates the cooled fluid in the seal chamber from the hot fluid pumped.

Longer seal life

The heat exchanger cools the fluid upstream of the product-side mechanical seal and prevents vaporisation between the seal faces. This markedly increases the seal life.

- B1 From the mechanical seal
- B2 To the mechanical seal
- B3 Cooling water inlet
- 64 Cooling water outlet
- Cooling water drain (closed)
- 6 Cooling water vent (closed)

Technical data

Process side	Up to 50 bar: -29 °C to 200 °C
Cooling water side	Up to 10 bar: -29 °C to 100 °C
Cooling water volume	16 litres
Process fluid volume	0.4 litres
Design to	ASME VIII-Div.1 PED 2014 / 68 / EU

* System also available to API 682 3rd edition

HyCone – cyclone separator





Technology

Cyclone separator for flushing mechanical seals with cleaned fluid handled.

Application

For use with pumps handling suspensions or contaminated fluids. For an optimum separation solids density should be at least twice the fluid density and the pressure difference between the cyclone inlet and the cyclone outlet should be as large as possible (1.7 bar minimum).

Efficiency

When using a cyclone separator the seal is continuously flushed with cleaned fluid handled. Solid particles are automatically returned to the suction nozzle of the pump.



"Dirty" outlet

Technical data

Max. static pressure	70 bar
Pressure difference	1.7 to 12 bar
Max. temperature	125 °C
Materials	Noribeam 316L, Noribeam Alloy 718

Further versions (e.g. flanged) available on request.

Size	d ₁	d_2	d ₃	I ₁	I_2	I_3
HyCone 018	G 1/2	G 1/2	G 1/2	150	61	32
HyCone 090	G 1	G 1	G 1	280	91	51

KSB Leakage Sensor – intelligent monitoring system for mechanical seal leakage



Intelligent supplement for all pump type series handling demanding fluids

The KSB Leakage Sensor is a monitoring system for measuring and displaying mechanical seal leakage on site, comprising a leakage rate measuring unit and an analysing and display unit.

Increased operating reliability

The KSB Leakage Sensor emits acoustic and light signals when the adjustable warning or alarm threshold is exceeded. This allows elevated leakage rates to be detected at an early stage, avoiding unplanned downtime.

Saving maintenance costs

Continuous leakage monitoring lengthens maintenance intervals and makes maintenance cycles more predictable. This prevents the need for unplanned downtime or additional spare parts and avoids possible consequential damage.

Highest flexibility

One leakage sensor is installed per pump. The system can therefore be used according to individual requirements and even retrofitted. This saves substantial investment costs compared to complex all-in solutions.

Simple data transmission

Performed via an integrated analog interface, the recorded data can be integrated into an existing process control system and managed centrally.

Materials

Flow meter	Noribeam [®] 316L
Inductive sensor (not in contact with the fluid handled)	Brass with white-bronze coating

Technical data

Available measuring ranges of the analog output	8 warning and alarm levels can be set via DIP switches
Ambient conditions	IP65 enclosure
Ambient temperature	-30 °C to 80 °C (transport, storage) -10 °C to 60 °C (operation)
Electrical data	Power supply: 24 V DC (±10 %)
Interfaces that can be used as an alternative	Leakage quantity 4 to 20 mA OPTO (open collector) signal for operation OPTO (open collector) signal for warning OPTO (open collector) signal for alarm
Electromagnetic compatibility	EN 61326-1 (interference immunity)



Venting

Venting is a necessary process which serves to release accumulations of air from the pump casing and pressurised water pipes.

Particularly significant is the venting of the mechanical seal's installation space. Having its seal faces continuously lubricated by a liquid film is pivotal for a mechanical seal to work properly. Any air entrapped would interrupt this lubricating film and lead to insufficient lubrication of the seal. The effect of centripetal force would further increase the problem as the rotating fluid forms an air cushion around the shaft – and, with that, around the seal faces. (During rotation the lowest

density gathers at the smallest diameter.) For these reasons the installation space of the mechanical seal has to be vented especially reliably to completely remove any air inclusions.

Venting of double mechanical seals:

Depending on the position of their auxiliary connections, double mechanical seals have to be vented to remove air from the space between the two seals. This is particularly critical in the case of a horizontal installation position, which only allows about half of the space to be self-vented. In such cases, the manufacturer's information on seal-specific requirements must be observed.

Surface quality

The surface roughness parameters may impair the sealing function. Especially dynamic sealing elements (e.g. axially moveable (dynamic) O-rings) require a high surface quality to work properly.

Depending on the position of the sealing element, chamfers have to be provided at the connecting components (see illustrations) for a radial or semi-axial installation of the sealing element. Together with a suitable lubricant they prevent damage to the sealing element during installation.

In any case, the connecting profile must be absolutely free from burr. When being serviced, the seal faces have to be checked for any corrosion damage and re-machined if required.





Surface quality

Secondary seal material	×/=	∠ _=
Elastomers*	Ra 2.5	Ra 0.8
Non-elastomers and/or optional use of elastomers and non-elastomers	Ra 1.6	Ra 0.20

* For a definition of the term elastomer see ISO 1382, for a rubbers and latices nomenclature see ISO 1629

Face run-out, shaft run-out, centre offset



Face run-out of the shaft in relation to the vertical connection surface of the casing:

For shaft speed \leq 750 rpm: 0.2 mm max.

For shaft speed > 750 rpm to 1000 rpm: 0.15 mm max. For shaft speed > 1000 rpm to 1500 rpm: 0.08 mm max. For shaft speed > 1500 rpm to 3000 rpm: 0.025 mm max.



Shaft run-out (ISO 5199):

For shaft diameter ≤ 50 mm: 0.05 mm max. For shaft diameter 50 to 100 mm: 0.08 mm max. For shaft diameter > 100 mm: 0.10 mm max.



Permissible centre offset between the pump casing and the shaft:

Max. 0.2 mm for seals without pumping ring Max. 0.1 mm for seals with pumping ring

Thread-locking agents

Bolts, grub screws, etc. for fastening the mechanical seal to the pump / machinery must be secured against loosening. Thread-locking agent LOCTITE® No. 243, for example, can be used for this purpose. For the grub screw tightening torques please refer to the table on the right.

Thread size	Tightening torques [Nm]
M5	4
M6	7
M8	15
M10	30
M12	40

134

Calculating the friction power loss

The movement of seal faces relative to each other creates a friction power loss P_{R} in the sealing clearance. The following formulas can be used to calculate it:

 $\mathbf{P}_{R} = \mathbf{p}_{g} \cdot \mathbf{A} \cdot \mathbf{f} \cdot \mathbf{v}_{g}$ $\mathbf{p}_{g} = \Delta \mathbf{p} \cdot (\mathbf{k} - \mathbf{k}_{1}) + \mathbf{p}_{f} \qquad \mathbf{v}_{g} = \mathbf{d}_{M} \cdot \pi \cdot \mathbf{n} \qquad \mathbf{d}_{M} = \frac{\mathbf{D} + \mathbf{d}}{2}$ $\mathbf{A} = \pi \cdot \frac{(\mathbf{D}^{2} - \mathbf{d}^{2})}{4} \qquad \mathbf{k} = \frac{\mathbf{A}_{H}}{\mathbf{A}} \qquad \mathbf{A}_{H} = \pi \cdot \frac{(\mathbf{D}^{2} - \mathbf{d}_{H}^{2})}{4}$

Key:

P_{R}	Friction power loss [W]	∆р	Pressure difference at the mechanical seal [N/m ²]	n	Speed [1/sec]
p _g	Sliding pressure [N/m ²]	k	Load factor	D	Outside diameter of seal face [m]
А	Seal face area [m ²]	k1	Pressure gradient factor	d	Inside diameter of seal face [m]
f	Friction coefficient	P _f	Specific spring force [N/m ²]	$A_{_{\!\!H}}$	Hydraulic area [m²]
Vg	Sliding velocity [m/s]	d _M	Average seal face diameter [m]	d _H	Hydraulic diameter [m]



For the purpose of the calculation the sealing clearance is assumed to be an ideal parallel clearance, which would have a pressure gradient factor of 0.5. The pressure P_f , caused by the spring forces, is also used for the calculation.

The variable that is hardest to determine is the friction coefficient f. It has got the largest fluctuations as it behaves differently depending on the friction condition in the sealing clearance. In practice, values in the vicinity of $f \approx 0.08$ have proven their worth in friction power loss calculations of product-lubricated mechanical seals.

Leakage – quantities and calculation

Some leakage is inherent in the design of mechanical seals as their seal faces always have to be covered in fluid. In optimum operation – designed for a typical seal service life – the condition between the seal faces is characterised by mixed friction and a specific share of hydrodynamic load carrying area. The larger the share of hydrodynamic load carrying area, the longer the service life (as wear is reduced) but also the higher the leakage rate. Conversely, a small share of hydrodynamic friction leads to a larger share of solid-to-solid friction, which reduces leakage but increases friction and, with that, shortens the mechanical seal life. Reliably lubricating the seal faces over their entire width is essential for safely operating a mechanical seal.

When application parameters such as pressure, speed and temperature are modified the total leakage volume changes as well.

In general, leakage is defined as both, invisible (evaporated) and visible (liquid) leakage at a mechanical seal. Whether leakage is mainly liquid or gaseous (evaporated) depends on the vapour pressure margin, ambient temperature and many other factors.

The theoretical leakage rate of a mechanical seal where pressure is applied at the outside diameter can be calculated using the following formula:

$$Q = \frac{h^3}{\eta \cdot \ln\left(\frac{D}{d}\right)} \left[1,885 \cdot 10^{-4} \cdot \Delta p - 7,752 \cdot 10^{-19} \cdot \varrho \cdot n^2 \cdot (D^2 - d^2) \right]$$

As the formula shows, the calculated leakage rate is influenced by several parameters, especially by the clearance width. And this value, too, depends on several factors. This means the calculated amount may deviate from the actual leakage rate.

Calculation example for KSB mechanical seal KB040M1-5B (Fluid: water at 25 °C):

h = 0.5 µm $\eta = 8.9 \cdot 10^{-4} \text{ Pa} \cdot \text{s}$ D = 50 mm d = 43 mm $\Delta p = 15 \text{ bar}$ q = 2,63 ml/hQ = 2,63 ml/h Q = 2,63 ml/h Q = Leakage rate [ml/h]

Factors influencing the leakage rate of a mechanical seal:

- Correct installation of the mechanical seal
- Fluid handled
- Surface quality of the seal faces
- Pump operating mode

Q	Leakage rate [ml/h]
h	Clearance width [µm]
η	Dynamic viscosity [Pa · s]
D	Outside diameter of seal face [mm]
d	Inside diameter of seal face [mm]
∆р	Pressure difference [bar]
Q	Density [kg/m³]
n	Rotational speed [rpm]

Lubricants and torques

For elastomer elements that do not serve to transmit the torque, permanent lubricants, such as non-mineral grease, are used. Examples are O-rings fitted at mating rings with anti-twist lock, or primary rings that move axially relative to the pump components.

Grease or other permanent lubricants must never be used for fitting torque-transmitting components of a mechanical seal. This applies especially to elastomer elements with both a sealing and a torque-transmitting function. Non-permanent lubricants must be used in this case, for example for a mating ring without anti-twist lock.

Prior to installing the seal, the seal faces must be checked for any damage and cleaned. Recommended cleaning agent for seal faces and grub screws: ethyl alcohol.



Key to the seal code to API 682, 4th edition

Seal				Design option	S		_	Shaft size Plans		
Category	Arrangement	Туре		Containment device	Gasket material	Seal face material		Shaft diameter in mm		Piping plan
I	1	А	-	Р	F	0	-	050	_	11

Sintered SiC / sintered SiC

Graphite-filled, reaction-bonded SiC /

Graphite-filled, sintered SiC / sintered SiC

Carbon / sintered SiC

reaction-bonded SiC

Not specified

Seal	
Categor	ies I, II or III
Arrange	ements 1, 2 or 3 (see below)
Types	A, B or C (see below)
Seal fac	e materials
Μ	Carbon / nickel-bonded tungsten carbide
N	Carbon / reaction-bonded SiC
0	Reaction-bonded SiC / nickel-bonded tungsten carbide
P	Reaction-bonded SiC / reaction-bonded SiC

Plain seal housing without throttling bush	Р
Floating throttling bush	L
Fixed throttling bush	F
Containment seal	С
Floating segmental throttling bush made of carbon	S
Not specified	Х

Containment devices

F	Gasket made of FKM
G	Gasket made of polytetrafluoroethylene (PTFE)
Н	Gasket made of nitrile
I	Gasket made of FFKM
R	Flexible graphite
х	Not specified

Plans

Q

R

S

т

Х

Definition of piping plans If several plans apply, they are separated by "/".

Shaft size

Shaft diameter in mm

Source: API Standard 682, fourth edition, May 2014

Cat	egories	Туј	pes	Ar	rangements
	Seals for non-API 610 pump seal chambers		Rotary pusher seal		Single mechanical seal
I	E.g. for pumps in the chemical and petrochemical industries	A	Balanced cartridge design, multi-spring arrangement, O-rings as secondary sealing elements	1	One mechanical seal per cartridge unit
	Seals for API 610 pump seal chambers		Rotary bellows seal (O-ring type)		Unpressurised double mechanical seal
II	E.g. for pumps in the oil and	В	Balanced cartridge design,		Two mechanical seals per cartridge unit
	gas industries		secondary sealing elements		Pressure between seals lower than pressure in the seal chamber
	Seals for API 610 pump seal chambers		Stationary bellows seal (flexible graphite secondaries type)		Pressurised double mechanical seal
111	Rigorously tested and documented seal design	с	Balanced cartridge design, metal bellows, flexible graphite		Two mechanical seals per cartridge unit
	For API pumps in the oil and gas industries		secondaries		External barrier fluid pressure higher than seal chamber pressure

138

Piping systems to API 682



Internal circulation from the discharge nozzle to the seal chamber for flushing the seal chamber and dissipating the heat generated at the seal faces.



Closed cylindrical seal chamber without circulation; mainly used for coolable or heatable pump casing covers.



Conical design of the seal chamber creating circulation at the seal faces and preventing the seal chamber from becoming clogged by solids.

External circulation from the discharge nozzle to the seal chamber for flushing the seal chamber. A strainer is fitted to remove individual solids.



External circulation from the discharge nozzle to the seal chamber for flushing the seal chamber and dissipating the heat generated at the seal faces.





Circulation from the seal chamber through an orifice and back to the suction side of the pump. Mainly used for vertical pumps, when the pressure in the seal chamber needs to be reduced.

13



Combination of Plans 11 and 13 to achieve even better flushing of the seal faces and control the pressure in the seal chamber.



Circulation from the discharge side via a cooler to the seal chamber for cooling down hot fluids handled. The cooler has to continuously cool the hot fluid handled.



Circulation from the discharge nozzle via a strainer and a cooler to the seal chamber. Like Plan 21 with a strainer added to protect the seals from solids.

Inboard Outboard Double seals Gas seals



Circulation from the seal chamber to the cooler and back. Very effective cooling plan as the cooled fluid in the seal chamber is separated from the hot fluid by a throttling bush.



Circulation from the discharge nozzle via a cyclone separator that supplies the seal chamber with clean fluid and returns solids to the suction side.



To protect the seal from aggressive or contaminated fluids the seal chamber is flushed with clean and cooled fluid from an external source.

32



Combination of Plans 21 and 31. Circulation from the discharge nozzle via a cyclone separator and a cooler to the seal chamber.



An external reservoir supplies single seals in arrangement 1 with quench fluid on the atmospheric side to prevent crystallisation or coking on the atmospheric side.



Plugged quench connection on the atmospheric side for the customer to connect a quench or leakage monitoring equipment.



The seal faces are supplied with an external quench fluid on the atmospheric side to prevent crystallisation or coking on the atmospheric side of the seal.



Collecting and monitoring system on the atmospheric side for leakage of condensing fluids. Leakage is restricted by an orifice downstream of the reservoir and monitored by a level transmitter that triggers an alarm.



Collecting and monitoring system on the atmospheric side for leakage of condensing fluids. Leakage is restricted by a closed valve downstream of the reservoir and monitored by a level transmitter that triggers an alarm.



The seal housing of seals in arrangement 1 is fitted with two throttling bushes. The first bush restricts leakage from the drain connection. A seal failure will be detected by a pressure transmitter connected to the seal.



An orifice in the drain connection from seals in arrangement 1 restricts leakage from the seal housing via the drain connection. A seal failure will be detected by a pressure transmitter connected to the seal.



External reservoir supplying double mechanical seals in arrangement 2 with unpressurised buffer fluid to reduce or contain leakages of the fluid handled to atmosphere.



External reservoir supplying double mechanical seals in arrangement 3 with pressurised barrier fluid when leakage to atmosphere has to be prevented. The seal faces are always lubricated with clean barrier fluid.



External reservoir supplying double mechanical seals in arrangement 3 with pressurised barrier fluid. The barrier fluid is pressurised by a bladder accumulator, which prevents pressurised gas from entering the barrier fluid.



External reservoir supplying double mechanical seals in arrangement 3 with pressurised barrier fluid. The barrier fluid is pressurised by a piston accumulator, which automatically adjusts the barrier pressure to any fluctuations in the seal chamber pressure.

Inboard
Outboard
Double seals
Gas seals



Double mechanical seals in arrangement 3 are supplied with a pressurised, clean and cool fluid from an external barrier fluid system or fully sitesupplied external source.



Double mechanical seals in arrangement 2 are supplied with an unpressurised, clean and cool fluid from an external buffer fluid system or a fully site-supplied external source.

71

Used for unpressurised double mechanical seals in arrangement 2 with dry outboard containment seal. No buffer gas is supplied but the seal can be operated with buffer gas if necessary.



Double mechanical seals in arrangement 2 are supplied with external buffer gas to dilute leakage.



Double mechanical seals in arrangement 3 are supplied with external barrier gas when hazardous fluids must not escape to atmosphere and barrier fluid must not enter the fluid handled.



Collecting system for condensing or mixed phase leakage from the seal chamber of the containment seal for seals in arrangement 2.



Drain connection at the space between the two seals for seals in arrangement 2 for draining and monitoring non-condensing leakage.

Material codes

Material code to DIN EN 12756	KSB designation	Description
Primary ring and mating ring (characters	1 and 2)	
Synthetic carbon		
<u>A*</u>	А	Carbon graphite, antimony-impregnated
<u>B*</u>	В	Carbon graphite, resin-impregnated
<u>B</u>	B3	Carbon graphite, resin-impregnated for gas seals
Metals		
S	S	Special cast chrome molybdenum steel
Tungsten carbides		
<u>U1</u>	U1	Tungsten carbide, Co-bonded
<u>U2</u>	U2	Tungsten carbide, Ni-bonded
Silicon carbides		
Q1*	Q1	SiC, sintered without pressure
Q2*	Q2	SiC-Si, reaction-bonded
Q3	Q3	SiC-C-Si, composite material
Q	Q7	SiC porous, sintered without pressure, without graphite
Q	Q15	SiC sintered without pressure, diamond-coated
Secondary seals (character 3)		
Elastomers, non-encapsulated		
E*	E	EPDM ethylene propylene rubber
<u>E</u>	E4	EPDM approved for drinking water (WRAS)
<u>E</u>	E5	EPDM approved for food applications (FDA)
<u>E</u>	E9	EPDM for special applications
<u>E</u>	E14	EPDM peroxide-cured for applications in nuclear power stations
<u>E</u>	E42	EPDM approved for drinking water (WRAS, UBA)
<u>E</u>	E52	EPDM approved for food applications (FDA, EC 1935/2004)
K	К	Perfluoroelastomer FFKM
K	К1	FFKM for low temperatures
K	К5	FFKM approved for food applications (FDA)
<u>к</u>	К9	FFKM for special applications
<u>к</u>	K23	FFKM DuPont™ Kalrez® Spectrum™ 6375
K	K36	FFKM DuPont™ Kalrez® Spectrum™ 7090
<u>K</u>	K52	FFKM approved for food applications (FDA, EC 1935/2004)
<u>K</u>	K55	FFKM approved for food applications (FDA, EC1935/2004)
P	Р	Nitrile rubber (NBR)
P	P4	NBR, approved for drinking water (WRAS)
<u>U</u>	U1	Combination of perfluoroelastomer FFKM + PTFE
<u>U</u>	U9	Combination of FFKM perfluoro rubber + PTFE for special applications
U	U152	Combination of FFKM perfluoro rubber + PTFE approved for food applications (FDA, EC 1935/2004)
V*	V	FKM fluoroelastomer (Viton®)
V	V1	FKM for low temperatures
V	V5	FKM approved for food applications (FDA)
V	V7	FKM, highly fluorinated
V	V9	FKM for special applications
V	V52	FKM approved for food applications (FDA, EC 1935/2004)
X	Х	Special O-rings
x	X4	HNBR

Material code to DIN EN 12756	KSB designation	Description
Elastomers, encapsulated		
M	M15	FKM, double PTFE-encapsulated / FKM, FEP-encapsulated, approved for food applications (FDA)
M	M25	EPDM, double PTFE-encapsulated / EPDM, FEP-encapsulated, approved for food applications (FDA)
M	M125	FKM, double PTFE-encapsulated / FKM, FEP-encapsulated, approved for food applications (FDA, EC 1935/2004)
M	M252	EPDM, double PTFE-encapsulated / FKM, FEP-encapsulated, approved for food applications (FDA, EC 1935/2004)
U	U2	FFKM / FKM, FEP-encapsulated
U	U5	FFKM / FKM, FEP-encapsulated approved for food applications (FDA)
U	U55	FFKM / FKM, FEP-encapsulated approved for food applications (FDA, EC 1935/2004)
Other secondary seals		
G	G	Statotherm [®] pure graphite
т	Т	PTFE polytetrafluoroethylene
т	T2	PTFE, glass fibre reinforced
Spring and bellows materials (charact	er 4)	
Stainless steels		
G	G	Spring steel (1.4571)
F	F	Spring steel (1.4310)
High-nickel alloys		
M	М	Hastelloy [®] C-4 (2.4610)
M	M5	Hastelloy [®] C-276 (2.4819)
M	M6	Inconel [®] 718 (2.4668)
Other materials		
T	Т	FST, unalloyed spring steel
T	Т8	AM 350 [®] (bellows)
Construction materials (character 5)		
Stainless steels		
G*	G	CrNiMo steel (1.4571)
G*	G	CrNiMo steel (1.4401)
G1	G1	CrNiMo duplex steel (1.4462)
G2	G2	CrNiMo steel (1.4439)
G3	G3	CrNiMo steel (1.4539)
G4	G4	Super duplex (1.4501)
E	E	Cr steel (1.4122) (1.4021)
F	F	1.4306 CrNi steel
High-nickel alloys		
M	М	Hastelloy [®] C-4 (2.4610)
M1	M1	Hastelloy® B-2 (2.4617)
Other construction materials		
Т	T4	Carpenter [®] 42 (1.3917)

* Preferred materials



One QR code for all your KSB contacts.



Simply scan the QR code and find your regional contact.



KSB SE & Co. KGaA Johann-Klein-Straße 9 67227 Frankenthal (Germany) www.ksb.com