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Pumps ▪ Valves ▪ Service

IRAN Seal KSB

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Information folder
Only for internal use

The perfect fit: KSB mechanical seals for excellent reliability

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Key technical properties of mechanical seals at a glance

Single mechanical seal

Characteristic:
- A single seal is used to seal the shaft.

Applications:
- Normal, non-hazardous fluids
- Applications with no risk of dry running

Double mechanical seal

Characteristic:
- Two mechanical seals arranged one after another
- Different types of arrangement possible

Applications:
- When increased safety levels are required in view of failure or leakage, e.g. with hazardous, sticky or cracking fluids
- Applications with risk of dry running

Component-mechanical-seal

Characteristic:
- Mechanical seals consisting of several parts, axial positioning on shaft required

Benefits:
- In many cases less expensive
- Typical design of mechanical seals to DIN standard

Cartridge seal

Characteristic:
- Ready-to-install mechanical seal unit, does not need to be axially positioned on the shaft

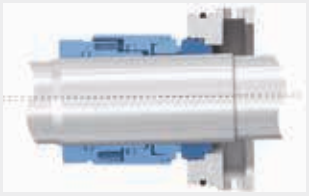
Benefits:
- High-quality and easy-to-install single-piece mechanical seal unit
- Less susceptible to errors during installation

Stationary type

Characteristic:
- Spring-loaded stationary primary ring

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
- More common for decades

Balanced type

Characteristic:
- Ratio of hydraulically unbalanced area and seal face area <1

Benefits:
- Can be used at low and high pressures

Unbalanced type

Characteristic:
- Ratio of hydraulically unbalanced area and seal face area >1

Benefits:
- Increased sealing effect at low pressures

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Excerpt: overview of API 682, 4th edition

Seal				Design options				Size		Plans
Category	Arrangement	Type		Containment device	Gasket material	Face material		Shaft size mm		Piping plan
I	1	A	–	P	F	O	–	050	–	11

Seal	
Categories	I, II or III
Arrangements	1, 2 or 3 (see below)
Types	A, B or C (see below)

Contact face materials	
M	Carbon/nickel-bound tungsten carbide
N	Carbon/reaction-bonded SiC
O	Reaction-bonded SiC/nickel-bound tungsten carbide
P	Reaction-bonded SiC/reaction-bonded SiC
Q	Sintered SiC/sintered SiC
R	Carbon/sintered SiC
S	Graphite-loaded, reaction-bonded SiC/reaction-bonded SiC
T	Graphite-loaded, sintered SiC/sintered SiC
X	Unspecified

Containment device	
P	Plain gland with no bushing
L	Floating throttle bushing
F	Fixed throttle bushing
C	Containment seal
S	Floating segmented carbon bushing
X	Unspecified

Gasket material	
F	FKM gasket
G	Polytetraflouroethylene (PTFE) gasket
H	Nitrile gasket
I	FFKM gasket
R	Flexible graphite
X	Unspecified

Shaft size
Shaft diameter in mm

Plans
Definition of the piping plans
Multiple plans are separated by "/"

Source: API Standard 682, Fourth Edition, May 2014

Categories	
I	**Seals for non API 610 pump seal chambers**
	E.g. chemical and petrochemical pumps
II	**Seals for API 610 pump seal chambers**
	E.g. oil and gas industry pumps
III	**Seals for API 610 pump seal chambers**
	Most rigorously tested and documented seal design
	API pumps in the oil and gas industries

Types	
A	**Rotary pusher seal**
	Balanced, cartridge design, multiple springs, secondary sealing elements are O-rings
B	**Rotary bellows seal (O-ring type)**
	Balanced, cartridge design, metal bellow, secondary sealing elements are O-rings
C	**Stationary bellows seal (flexible graphite type)**
	Balanced, cartridge design, metal bellow, secondary sealing elements are flexible graphite

Arrangements	
1	**Single seal**
	One seal per cartridge assembly
2	**Unpressurised dual (tandem)**
	Two seals per cartridge assembly
	Space between the seals at a pressure less than the seal chamber pressure
3	**Pressurized dual (double)**
	Two seals per cartridge assembly
	External supplied barrier fluid at a pressure greater than the seal chamber pressure

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

Whether it's pumps and valves, all-in system solutions 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.

KSB direct retrofit seals:
Competitor seals can be replaced with KSB direct retrofit mechanical seals without the need for modification. With their compact design and more favourable prices, KSB direct retrofit seals are highly competitive. The mechanical seals listed can be selected in KSB EasySelect and in the Web-Shop.

KSB engineered seals:
Competitor seals can be replaced with KSB seals of higher engineering quality after minor pump modifications. These KSB mechanical seals are optimally matched to the installation space, thus providing a longer service life and higher system availability. For modifications, consulting with the specialist department is generally recommended.

API 682 seals:
For chemical and petrochemical applications, KSB has mechanical seals and systems on offer that meet the requirements of API 682 and form a perfectly matched system together with the pump.

Our products have been tested to the requirements as per API 682; they have proven themselves under extreme conditions, and they provide a long service life. With this range, KSB is able to offer tailored solutions from a single source.

Fluids handled

	Amaprop	Amarex KRT	CPK / CPKN / MegaCPK								Etaline-R	Etanorm	Etanorm-R		
	4AP	4STQ	4C [1]	4CN [2]	4CP	4CPD	5A	5B	5KSCB2	4EDCB8	4EB	5A	4EB	4ES	4ESD
Waste water with faeces	■	■													
Waste water without faeces	■	■													
Aggressive liquids			■	■	■	■	■	■	■	■					
Inorganic liquids			■	■	■	■	■	■	■	■					
Activated sludge	■	■													
Brackish water			■	■	■	■	■	■	■	■		■	■	■	■
Service water			■	■	■	■	■	■	■	■	■	■	■	■	■
Distillate			■	■	■	■	■	■	■	■	■		■	■	■
Slurries															
Explosive liquids			■*	■*	■*	■	■*	■*	■*	■*					
Digested sludge		■													
Solids (ore, sand, gravel, ash)															
Flammable liquids			■*	■*	■*	■	■*	■*	■*	■*					
River, lake and groundwater		■									■	■	■	■	■
Liquefied gas															
Gas-containing liquids			■	■	■	■	■	■	■	■		■			
Filtered water											■	■	■	■	■
Harmful liquids			■	■	■	■	■	■	■	■					
Hot water from 140 °C															
Hot water up to 140 °C											■	■	■	■	■
Highly aggressive liquids			■	■	■	■	■	■	■	■					
Industrial service water		■	■	■	■	■	■	■	■	■	■	■	■	■	■
Condensate													■	■	■
Corrosive liquids			■	■	■	■	■	■	■	■					
Fuels			■	■	■	■	■	■	■	■					
Coolants											■		■	■	■
Cooling lubricants															
Cooling water											■	■	■	■	■
Food and beverage production															
Volatile liquids			■	■	■	■	■	■	■	■					
Fire-fighting water											■	■	■	■	■
Seawater			■	■	■	■	■	■	■	■					
Oils			■	■	■	■	■	■	■	■		■			
Organic liquids			■	■	■	■	■	■	■	■					
Pharmaceutical fluids															
Polymerising liquids			■	■	■	■	■	■	■	■					
Cleaning agents			■	■	■	■	■	■	■	■					
Raw sludge															
Lubricants		■	■	■	■	■	■	■	■	■					
Grey water		■													
Brine			■	■	■	■	■	■	■	■		■	■	■	■
Feed water															
Dipping paints															
Drinking water			■	■	■		■	■	■	■	■	■	■	■	■
Thermal oils															
Hot water											■	■	■	■	■

* On request 1) For CPK only 2) For CPKN only

Fluids handled

	Etanorm RSY	Etanorm SYT	HG	HGM-RO	HPH	HPK-L		KWP			KWP-Bloc		KWP / REA	Multitec
	4HLQ	4EY	5HG-BM3A	4HG	4KST	4HL	4HLQ	4K	4KD	4KDC	4KBL	4KTM	4K Cartridge	5B
Waste water with faeces								■	■	■	■			
Waste water without faeces								■	■	■	■			
Aggressive liquids								■	■	■	■		■	
Inorganic liquids								■	■	■	■		■	
Activated sludge								■	■	■	■			
Brackish water				■				■	■	■	■	■		■
Service water								■	■	■	■			■
Distillate					■	■	■							■
Slurries								■	■	■	■		■	
Explosive liquids														
Digested sludge								■	■	■				
Solids (ore, sand, gravel, ash)								■	■	■	■		■	
Flammable liquids														
River, lake and groundwater														■
Liquefied gas														
Gas-containing liquids													■	■
Filtered water														■
Harmful liquids														
Hot water from 140 °C	■	■	■		■	■	■							■
Hot water up to 140 °C		■	■		■									■
Highly aggressive liquids		■												
Industrial service water								■	■	■	■			■
Condensate	■		■			■	■							■
Corrosive liquids								■	■	■	■		■	
Fuels														■
Coolants											■			■
Cooling lubricants								■	■	■	■			■
Cooling water					■	■	■				■			■
Food and beverage production														
Volatile liquids														
Fire-fighting water														■
Seawater				■								■		■
Oils	■	■				■	■							
Organic liquids						■	■							
Pharmaceutical fluids														
Polymerising liquids								■	■	■				
Cleaning agents		■												■
Raw sludge								■	■	■				
Lubricants														■
Grey water								■	■	■	■		■	■
Brine		■		■				■	■	■	■	■		
Feed water			■		■	■	■							■
Dipping paints														
Drinking water														■
Thermal oils	■	■				■	■							
Hot water	■	■			■	■	■							■

* On request

Fluids handled

	Omega	RDLO	RPH		RPH-RO	Sewabloc	Sewatec	UPA/UMA		all KSB API pumps		
	4OM	4RD	4EDTMP	4RPQ	4RPS	4STQ	4STQ	4Spider	4UM	4KSBM6	4EDBM6	4EDTR6H
Waste water with faeces						■	■					
Waste water without faeces						■	■					
Aggressive liquids			■	■						■	■	■
Inorganic liquids			■	■						■	■	■
Activated sludge						■	■					
Brackish water	■	■	■	■	■			■	■	■	■	■
Service water	■	■	■	■				■	■	■	■	■
Distillate												
Slurries												
Explosive liquids			■	■						■	■	■
Digested sludge						■	■					
Solids (ore, sand, gravel, ash)												
Flammable liquids			■	■						■	■	■
River, lake and groundwater	■	■				■	■	■	■			
Liquefied gas									■	■	■	■
Gas-containing liquids												
Filtered water	■	■							■			
Harmful liquids			■	■						■	■	■
Hot water from 140 °C			■							■	■	■
Hot water up to 140 °C	■	■	■	■						■	■	■
Highly aggressive liquids			■	■						■	■	■
Industrial service water	■	■				■	■	■	■			
Condensate	■	■								■	■	■
Corrosive liquids			■	■						■	■	■
Fuels			■	■						■	■	■
Coolants												
Cooling lubricants												
Cooling water	■	■										
Food and beverage production												
Volatile liquids			■	■						■	■	■
Fire-fighting water	■	■										
Seawater	■	■			■			■	■			
Oils			■	■						■	■	■
Organic liquids			■	■						■	■	■
Pharmaceutical fluids												
Polymerising liquids												
Cleaning agents			■	■						■	■	■
Raw sludge												
Lubricants			■	■		■	■			■	■	■
Grey water						■	■					
Brine	■				■			■	■			
Feed water	■									■	■	■
Dipping paints												
Drinking water	■	■							■			
Thermal oils			■	■						■	■	■
Hot water	■	■										

* On request

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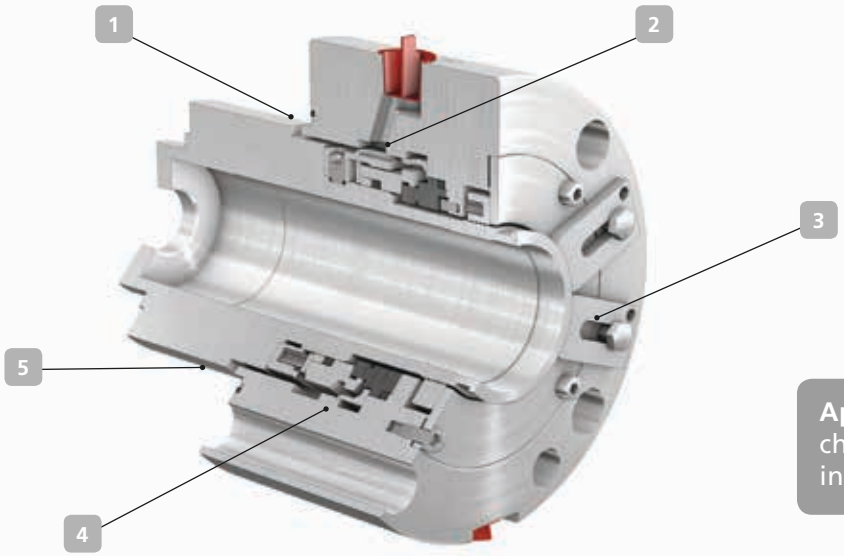
4EDTMP – for KSB's RPH pump type series



Applications:
chemical and petrochemical industry

1 Robust
Single mechanical seal, specially developed for hot water applications, with hook sleeve and "thermal barrier".

2 Reliable
The cooled pump cover and cooler (Plan 23) ensure optimum operating conditions in the seal chamber.

3 Versatile
The mechanical seal comes with a floating throttling bush as standard for use with a gas or a steam quench.

4 Dependable
In material variant AQ1KMG the seal can be used for fluids of up to 260 °C and an operating pressure of up to 63 bar/g.

5 Safe
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.

Technical description	
Design	Single cartridge seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Uni-directional
Bearing bracket (seal size)	B02 (050), B03 (060), B05 (079), B06 (100), B07 (120)

Materials	
Primary ring	"A" carbon (A)
Mating ring	SiC (Q1)
Elastomers	EPDM (E), FFKM (K)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Technical data	Variant TMP	Variant THP
Operating pressure	Up to 63 bar	Up to 100 bar
Temperature	Up to 260°C	Up to 260°C
Business type	Standard (KSB Easy Select)	Engineered

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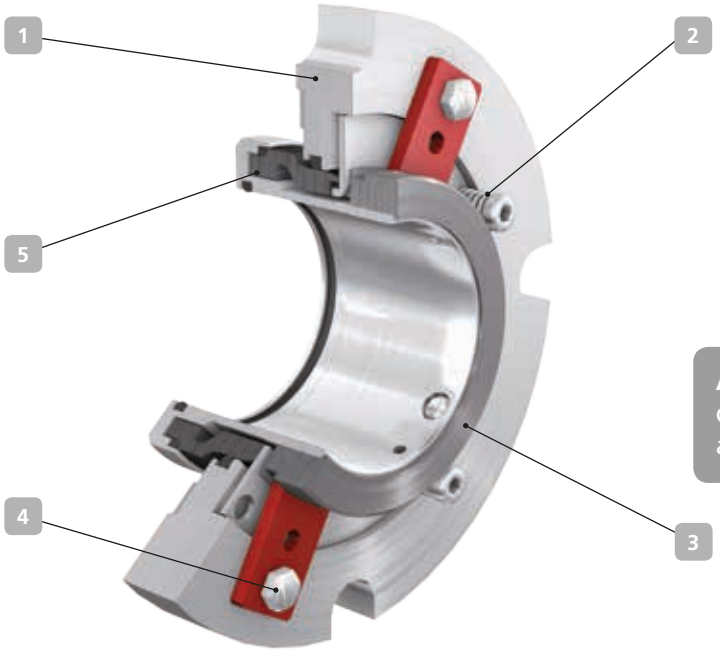
4ES – for KSB's Etanorm-R pump type series



Applications:
drinking water, service water and hot water

1 Compact
Single cartridge seal, bi-directional and balanced.

2 Dependable
Stationary design, multiple springs located outside the fluid handled.

3 Versatile
For all operating conditions the pump is approved for.

4 Service-friendly
Tailored to the seal installation space and requirements of the pump, easy installation, no adjusting dimension. Assembly fixtures ensure optimal pre-loading of the cartridge. The mechanical seal cover is centred on the pump cover.

5 Different material variants
Mating ring made of silicon carbide, "A" carbon (hot water) or "B" carbon. Elastomers in EPDM (also for drinking water ACS / WRAS) or FKM.

Technical description

Design	Single cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-rotational
Additional information	Approved for drinking water (WRAS)

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1) / "A" carbon (A) / "B" carbon (B)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Other Components	1.4122 (E)

Other material combinations on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static
Temperature	-30 °C to 140 °C
Bearing bracket (seal size)	65 (065)
Business type	Engineered

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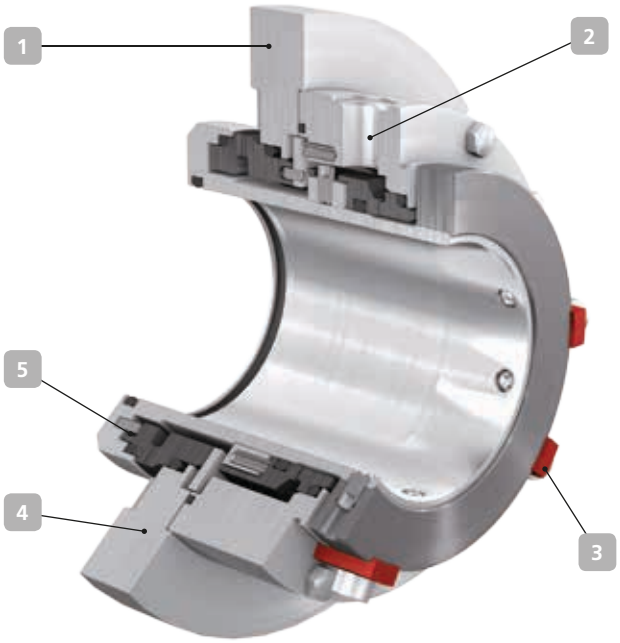
4ESD – for KSB's Etanorm-R pump type series



Applications:
drinking, service and hot water

1 Compact

Double cartridge seal, bi-directional and balanced. Tailored to the seal installation space and pump requirements.

2 Connections

G ¼" barrier/buffer fluid inlet, outlet and drain connections.

3 Service-friendly

The cartridge makes for easy installation, ensuring optimal pre-loading of the mechanical seal and low wear.

4 Applications

For increased safety levels and dry running protection when the pump is used in suction lift operation.

5 Dependable

Stationary: inboard, dynamic: outboard. The double mechanical seal's cartridge can be operated with either unpressurised buffer fluid (quench) or pressurised barrier fluid.

Technical description

Design	Double cartridge seal
Type	Stationary (inboard), Dynamic (outboard) , Double pressure balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Specially suited for low inlet pressures

Materials

Inboard	Primary and mating ring SiC (Q1)
Outboard	Primary ring 1.4122 (S) Mating ring "B" carbon (B)
Elastomers	FKM (V) / EPDM (E) / FFKM (K) / FEP-encapsulated (M1)
Springs	1.4571 (G)
Other Components	1.4571 (G)

Other material combinations on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static
Temperatur	-30 °C to 140 °C
Bearing bracket (seal size)	65 (065)
Business type	Engineered

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4EY – for KSB's Etanorm SYT pump type series

Applications:
heat transfer engineering and hot water recirculation

1 Interchangeable

The single seal can replace other standard seals, such as Burgmann M32N69, without any modifications.

2 Optimised force distribution

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.

3 Increased safety

The optimised seal design and conical seat of the mating ring prevent outboard deposits at the mechanical seal. This ensures axial movablity also in the long term.

4 Robust

The solid primary ring is designed to maintain an optimum lubricating film between the seal faces also at high pressures and temperatures.

5 Versatile

If combined with a suitable pump design, the seal is suitable for fluid temperatures of up to 350 °C. The complete Etanorm SYT application range can thus reliably be covered with this mechanical seal.

Technical description

Design	Single mechanical seal*
Type	Dynamic, unbalanced
Springs	Single spring
Direction of rotation	Clockwise

*In tandem arrangement also for use as double mechanical seal

Materials

Primary ring	SiC (Q1)
Mating ring	"A" carbon (A)
Elastomere	FKM (V)
Springs	1.4571 (G)

Other material combinations on request

Technical data

Operating pressure	Up to 16 bar dynamic Up to 24 bar static
Temperatur	Up to 350 °C
Bearing bracket (seal size)	BG25 (033), BG35/55 (048)
Business type	Standard (KSB EasySelect)

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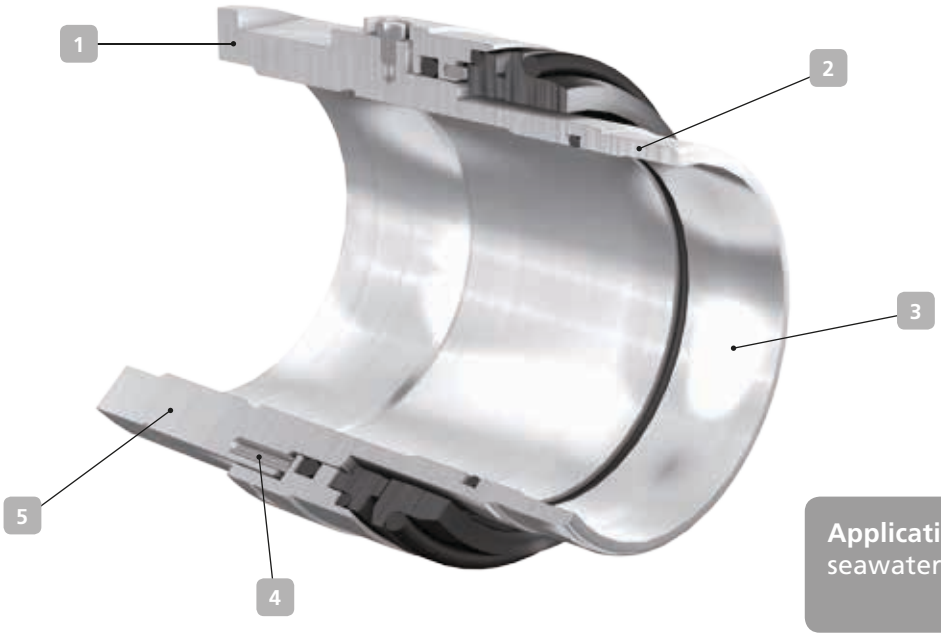
4HG – for KSB's HGM-RO type series



Applications:
seawater

1 Compact
Single mechanical seal, bi-directional and balanced. Tailored to the seal installation space and pump requirements. The shaft protecting sleeve is integrated in the mechanical seal.

2 Applications
The materials selected are optimally suited to seawater applications. Springs made of Hastelloy, all metal components made of super duplex stainless steel.

3 Versatile
For all operating conditions the pump is approved for.

4 Reliable
Dynamic design with multi-spring arrangement. Sturdy and practical seal design.

5 Service-friendly
The modular design facilitates installation without assembly fixtures or adjusting dimensions, ensuring optimal pre-loading of the mechanical seal and low wear.

Technical description	
Design	Single mechanical seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Various wear part kits available, see ZN3302

Materials	
Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	2.4610 (M)
Other Components	1.4501 (G4)

Other material combinations on request

Technical data	
Operating pressure	Up to 6 bar, dynamic Up to 25 bar, static
Temperature	0 °C to 70 °C
Bearing bracket (seal size)	R06 (100), R08 (120)
Business type	Engineered

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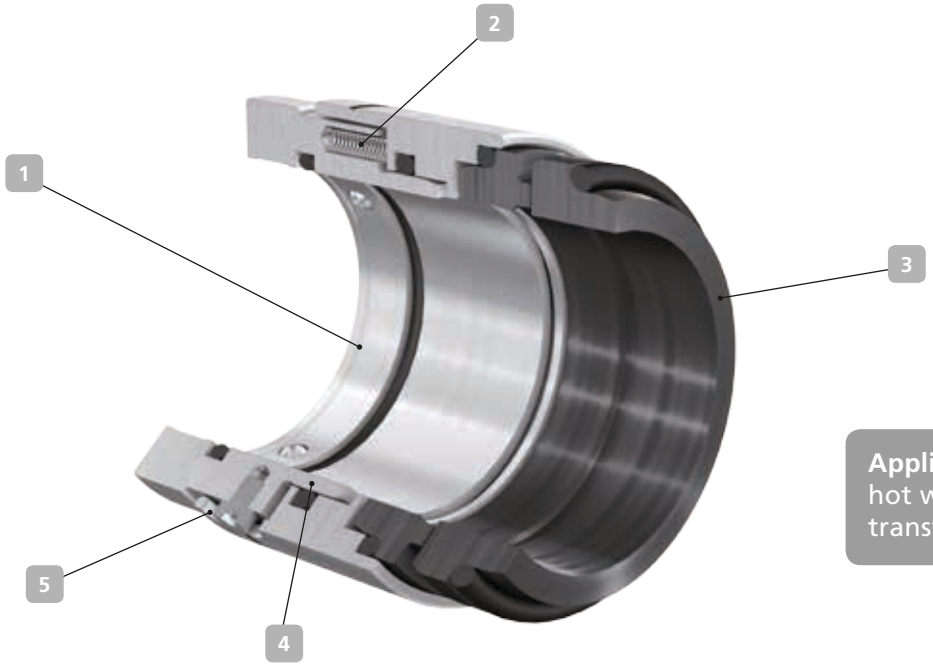
4HL – for KSB's HPK-L type series



Applications:
hot water and heat transfer fluids

1 Compact
Single mechanical seal, tailored to the seal installation space and pump requirements.

2 Dependable
Dynamic type, multi-spring arrangement, bi-directional and balanced. Sturdy and practical seal design.

3 Versatile
If combined with a suitable pump design, the seal is suitable for fluid temperatures of up to 350 °C.

4 Easy to install I
Standard mechanical seals to EN 12756 would additionally require a shaft sleeve for balancing. This component is already integrated in mechanical seal type 4HL, resulting in various advantages, also for seal installation.

5 Easy to install II
Circumferential groove at the primary ring carrier facilitates setting the axial pre-load of the mechanical seal.

Technical description	
Design	Single mechanical seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Approved for drinking water (WRAS) Various wear part kits available, see ZN3302

Materials	
Primary ring	"A" carbon (A) / "B" carbon (B)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Other Components	1.4122 (E)

Other material combinations on request

Technical data	
Operating pressure	Up to 40 bar, dynamic Up to 60 bar, static
Temperature	-10 °C to 130 °C
Bearing bracket (seal size)	LP02 (028), LP03 (038), LP04 (048), LP05 (060), LP06 (070)
Business type	Standard (KSB EasySelect)

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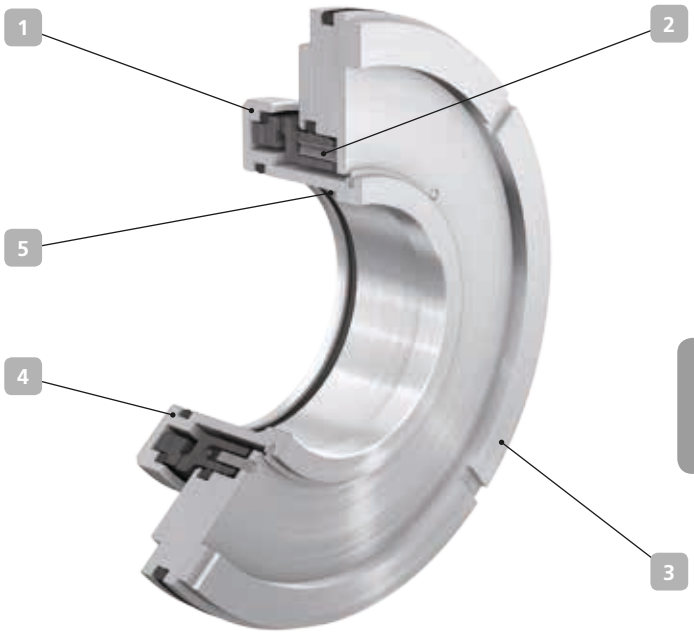
4HLQ – for KSB's Etanorm RSY type series



Applications:
hot water and heat transfer fluids

1 Compact
This single cartridge seal is perfectly matched to the pump's operating conditions.

2 Dependable
Dynamic design with multi-spring arrangement. Sturdy and practical seal design.

3 Applications
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.

4 Versatile
Combined with a single KSB 4HL mechanical seal this is an optimum sealing solution for demanding fluids.

5 Easy to install
The modular design facilitates installation with no need for assembly fixtures or adjusting dimensions.

Technical description

Design	Single mechanical seal
Type	Dynamic, unbalanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	"A" carbon (A)
Elastomers	FKM (V)
Springs	1.4571 (G)
Other Components	1.4571 (G)

Other material combinations on request

Technical data

Operating pressure	0 bar dynamic, for continuous operation For short periods up to 16 bar in the event of an inboard seal failure 24 bar static
Temperature	0 °C to 100 °C
Bearing bracket (seal size)	P02 (028), LP03 (038), LP04 (048), LP05 (060), LP06 (070)**
Business type	Standard (KSB EasySelect)

*Mechanical seal in similar design also available for KSB pump type series Etanorm RSY
** For Etanorm RSY only

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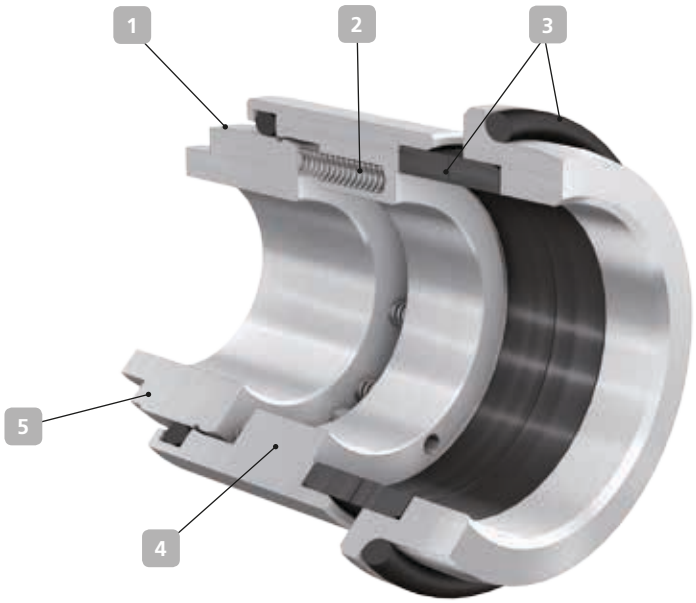
4KBL – for KSB's KWP Bloc type series



Applications:
waste water containing stringy material and abrasive particles

1 Robust

Single mechanical seal, bi-directional and balanced. Tailored to the seal installation space of the pump, suitable for fluids with high solids content.

2 Dependable

Dynamic design, multiple springs located outside the fluid handled. The springs are insensitive to contamination and provide uniform surface pressure across the seal faces, thus ensuring a long service life.

3 Different material variants

The mating ring can be made of tungsten carbide or, alternatively, silicon carbide. Elastomers are available in FKM or, alternatively, perfluoroelastomer (FFKM).

4 Service-friendly

Easy to install, no adjusting dimension required

5 Compact

The pump's shaft protecting sleeve is integrated in the mechanical seal.

Technical description

Design	Single mechanical seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1) / tungsten carbide (U), shrink-fitted
Mating ring	SiC (Q1) / tungsten carbide (U), shrink-fitted
Elastomers	FKM (V) / FFKM (K)
Springs	1.4571 (G)
Other Components	1.4462 (G1)

Other material combinations on request

Technical data

Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	0 °C to 100 °C
Bearing bracket (seal size)	P03 (031), P04 (038)*
Business type	Standard (KSB EasySelect)

*For seal size 038, two versions are available: "G" version = cast, "V" version = turned

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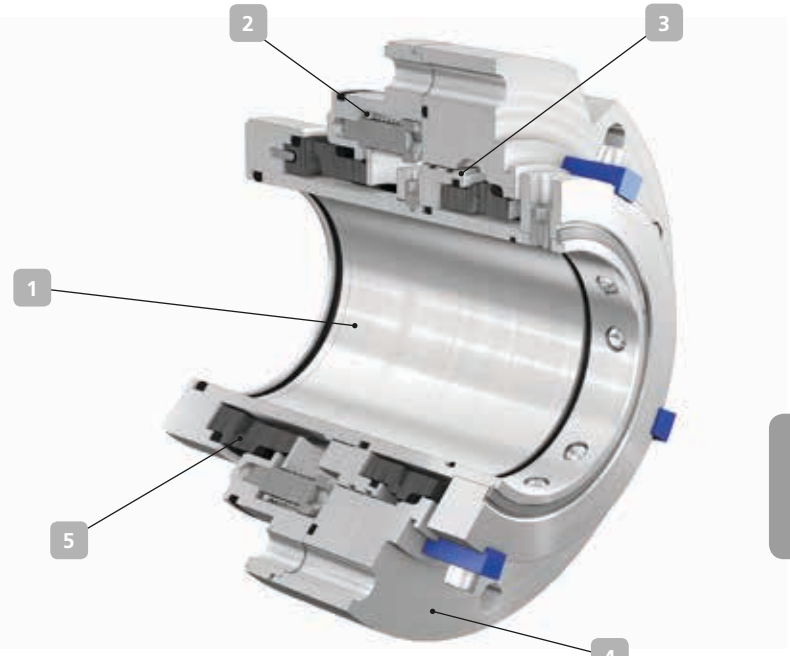
4KDC – for KSB's KWP pump type series



Applications:
waste water containing stringy material and abrasive particles

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

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

3 Robust
The pumping screw 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.

4 Versatile
The double mechanical seal's cartridge can be operated with either unpressurised buffer fluid (quench) or pressurised barrier fluid.

5 Safe
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.

Technical description

Design	Double cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Inboard	Primary and mating ring SiC (Q1)
Outboard	Primary ring: "B" carbon (B) Mating ring: SiC (Q1)
Elastomers	EPDM (E), FKM (V)
Springs	1.4571 (G)
Other Components	1.4571 (G) / 1.4462 (G1) / 1.4539 (G3)

Other material combinations on request

Technical data

Operating pressure	25 to 37.5 bar, depending on the size
Temperatur	- 5°C to 160°C
Bearing bracket (seal size)*	P03ax (040), P04ax (050), P05ax (060), P06x (070), P08sx (080), P10ax (100), P12sx (120)
Business type	Standard (KSB EasySelect)

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

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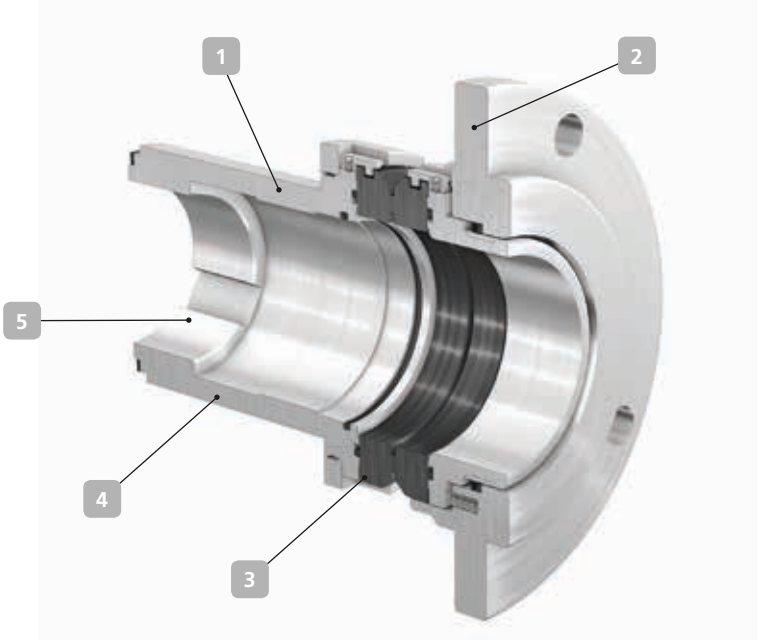
4KST – for KSB's HPH pump type series



Applications:
hot water

1 Compact
The perfect match for HPH hot water pumps. The design is tailored to the cooled pump cover.

2 Robust
This robust seal is designed for operating conditions with extremely high pressures and temperatures.

3 Safe
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.

4 Dependable
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.

5 Durable
This high-quality sealing solution ensures reliable pump operation and a long service life.

Technical description	
Design	Single mechanical seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials	
Primary ring	"A" carbon (A)
Mating ring	SiC-Si (Q2)
Elastomere	EPDM (E)
Springs	1.4571 (G)
Other Components	1.4122 (E)

Technical data	
Operating pressure	Up to 110 bar
Temperature	Up to 320° C
Bearing bracket (shaft diameter)	P03 (035), P04 (045), P06 (065), B07 (085), B07 (100)
Business type	Standard

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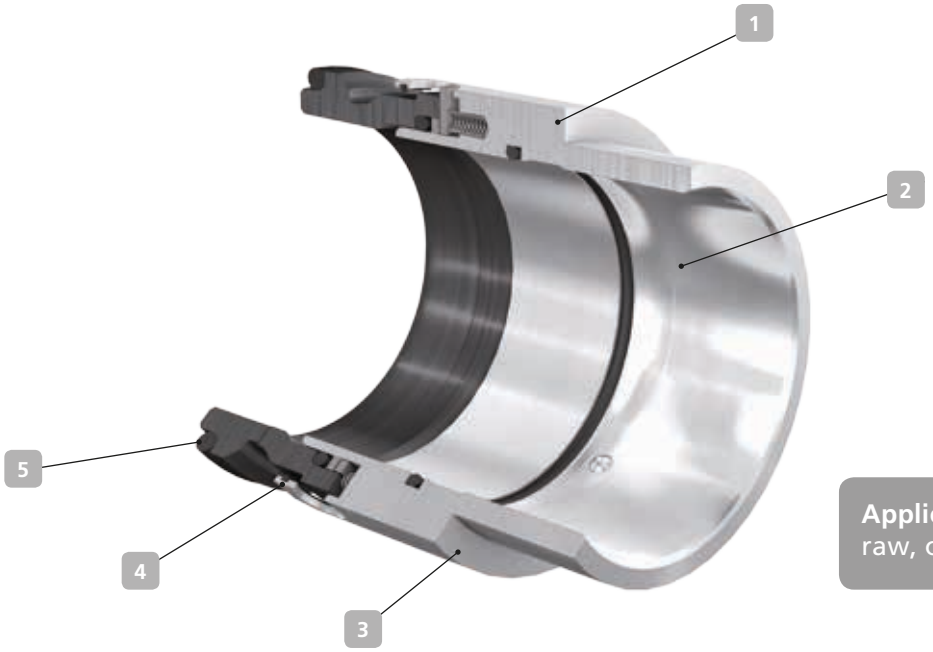
4OM – for KSB's Omega type series



Applications:
raw, clean and service water

1 Dependable
Single mechanical seal, tailored to the pump requirements. Robust and practical.

2 Compact
The pump's spacer sleeve is integrated in the mechanical seal.

3 Versatile
Optimally designed with one seal type covering all of Omega's applications.

4 Easy to install
No adjusting dimension required for installing the mechanical seal. The primary ring is kept in position in the torque-transmitting element for transport and installation.

5 Different material variants
Elastomers made of EPDM or FKM. Metal parts available in super duplex stainless steel (1.4501) for seawater applications.

Technical description

Design	Single mechanical seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Approved for drinking water (WRAS) Various wear part kits available, see ZN3302

Materials

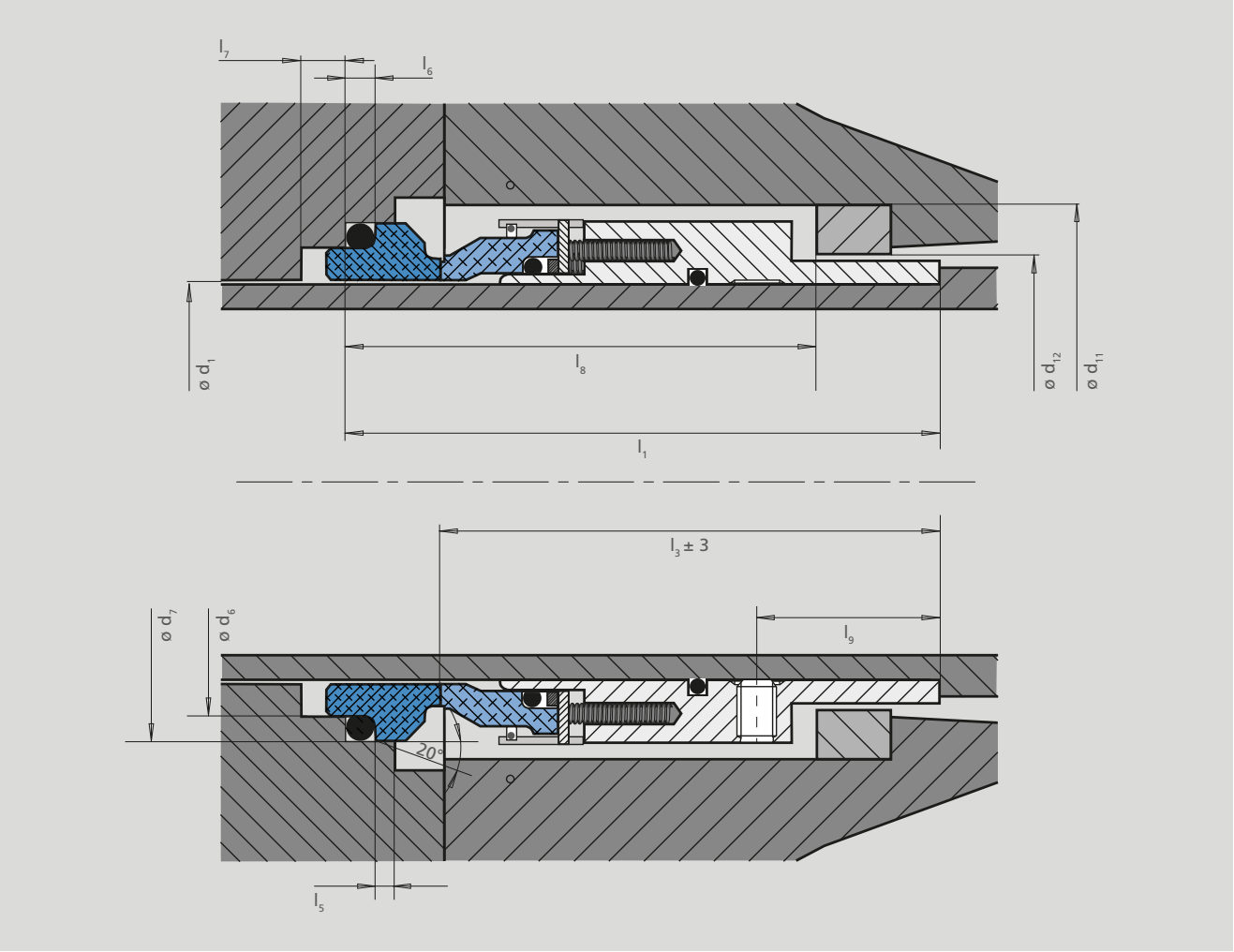
Primary ring	SiC (Q1) / SiC-Si (Q2)
Mating ring	SiC-Si (Q2) / "A" carbon (A) / "B" carbon (B)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Other Components	1.4571 (G) / 1.4501 (G4)

Other material combinations on request

Technical data

Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	-10 °C to 140 °C
Shaft unit (seal size)	40 (50), 50 (60), 60 (70), 70 (80), 80 (90), 90 (110)
Business type	Standard (KSB EasySelect)

4OM – for KSB's Omega type series



Dimensions for 4OM (in mm)

Shaft unit	4OM	d_1	d_6	d_7	d_{11}	d_{12}	l_1	l_3	l_5	l_6	l_7	l_8	l_9
DW40	050	50	62	70	70	60	88.5	74	2,5	6	9	66.5	30
DW50	060	60	72	80	85	75	100.5	85	2,5	6	9	78.5	35
DW60	070	70	83	92	95	85	101.5	85.5	2,5	7	9	76.5	35
DW70	080	80	95	105	112	95	120	101	3	7	9	95	37
DW80	090	90	105	115	122	110	120	103.5	2	7	9	95	40
DW90	110	110	128.2	140.3	150	125	162	141.5	3	7	12	127	55

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4RD – for KSB's RDLO type series

Applications:
raw, clean and service water

1 Dependable

Dynamic type, multi-spring arrangement, bi-directional and balanced. Sturdy and practical seal design.

2 Robust

The primary ring is shrink-fitted into the metal primary ring carrier. This ensures even contact, also under fluctuating pressure and temperature conditions.

3 Different material variants

Elastomers made of EPDM also available with WRAS approval. Metal parts available in super duplex stainless steel (1.4501) for seawater applications.

4 Service-friendly

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.

5 Compact

The primary ring is kept in position in the torque-transmitting element for transport and installation.

Technical description

Design	Single mechanical seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Various wear part kits available, see ZN3302

Materials

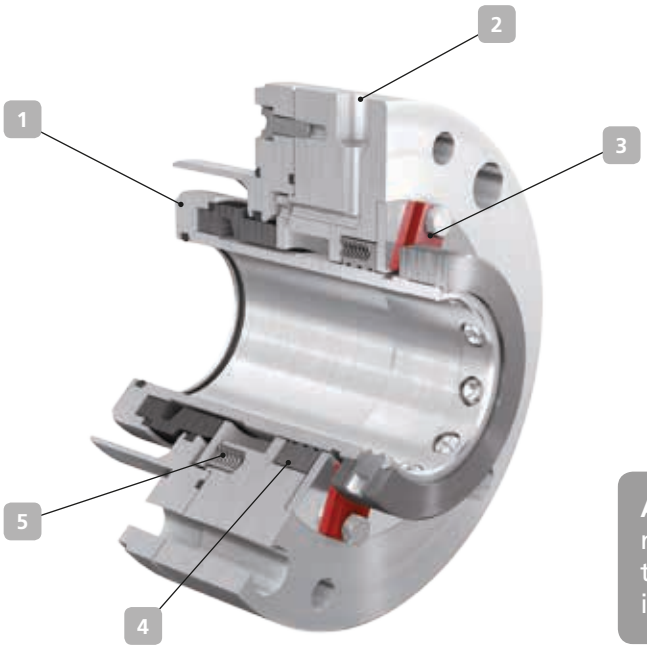
Primary ring	SiC (Q1)
Mating ring	SiC (Q1) / "A" carbon (A) / "B" carbon (B)
Elastomers	EPDM (E) / FKM (V)
Springs	2.4610 (M)
Other Components	1.4571 (G) / 1.4501 (G4)

Other material combinations on request

Technical data

Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	0 °C to 140 °C
Shaft unit (seal size)	110 (125), 125 (135), 140 (155), 160 (175)
Business type	Standard (KSB EasySelect)

4RPQ – for KSB's RPH type series



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

1 Compact
Single cartridge seal, bi-directional and balanced.

2 Robust
The materials and design ensure a long service life. The mechanical seal features threaded connections for flushing out leakage at the atmospheric side.

3 Service-friendly
Tailored to the seal installation space and requirements of the pump. Easy installation; the assembly fixtures provide optimal spring pre-loading and pre-centring for transport and installation.

4 Increased safety
An integrated, floating throttling ring provides additional safety in the event of leakage.

5 Dependable
Stationary design, multiple springs located outside the fluid handled.

Technical description	
Design	Single cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials	
Primary ring	SiC (Q1)
Mating ring	"B" carbon (B)
Elastomers	EPDM (E)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Other material combinations on request

Technical data	
Operating pressure	Up to 40 bar, dynamic Up to 60 bar, static
Temperature	-20 °C to 80 °C
Bearing bracket (seal size)	B02L (050), B03L (060), B05L (079), B06L (100)
Business type	Standard (KSB EasySelect)

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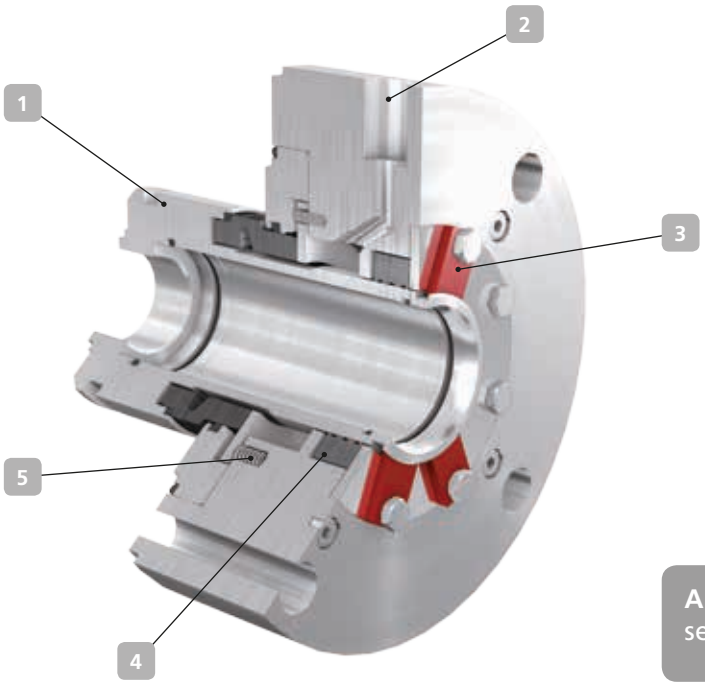
4RPS – for KSB's RPH-RO type series



Applications:
seawater

1 Compact
Single cartridge seal, bi-directional and balanced.

2 Robust
The materials and design ensure a long service life. The mechanical seal features threaded connections for flushing out leakage at the atmospheric side.

3 Service-friendly
Tailored to the seal installation space and pump requirements. Easy installation; the assembly fixtures provide for safe transport and pre-centring for installation.

4 Increased safety
An integrated, floating throttling ring provides additional safety in the event of leakage.

5 Dependable
Stationary design, multiple springs located outside the fluid handled

Technical description

Design	Single cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

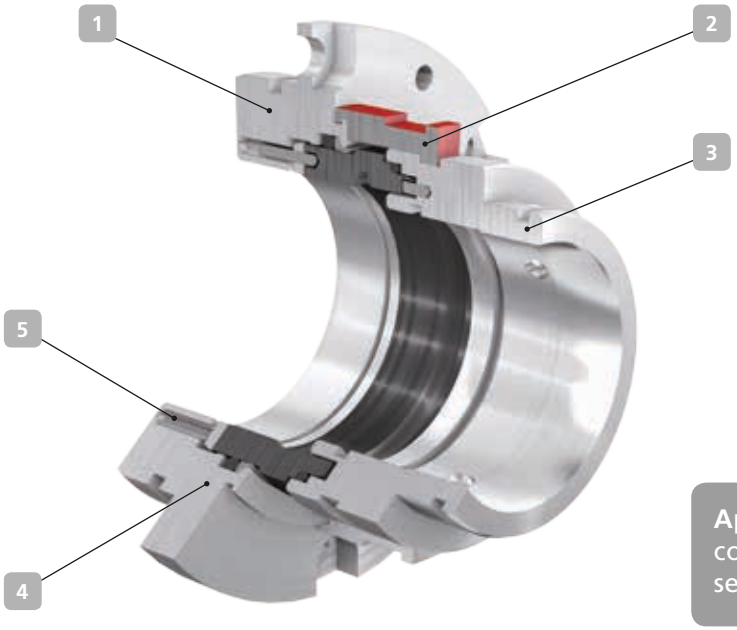
Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	2.4610 (M)
Other Components	1.4501 (G4) / 1.4462 (G1)

Other material combinations on request

Technical data

Operating pressure	Up to 70 bar, dynamic Up to 100 bar, static
Temperature	0 °C to 80 °C
Bearing bracket (seal size)	B03L (047), B05L (073)
Business type	Standard (KSB EasySelect)

4Spider – for KSB's submersible motors



Applications:
contaminated water, seawater

1 Compact
Single, balanced cartridge seal, bi-directional, tailored to the seal installation space.

2 Service-friendly
Easy to install, no adjusting dimension required Easy installation and removal also under difficult operating conditions.

3 Versatile
For all operating conditions the submersible motor is approved for.

4 Tailored
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.

5 Dependable
Stationary design; the multi-spring arrangement provides uniform surface pressure across the seal faces, thus ensuring a long service life.

Technical description	
Design	Single cartridge seal
Type	Stationary, 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)
Other Components	1.4501 (G4), 1.4462 (G1)

Other material combinations on request

Technical data	
Operating pressure	Up to 20 bar, dynamic Up to 30 bar, static
Temperature	0 °C to 80 °C
Seal size	056 / 066 / 076 / 100
Business type	Standard

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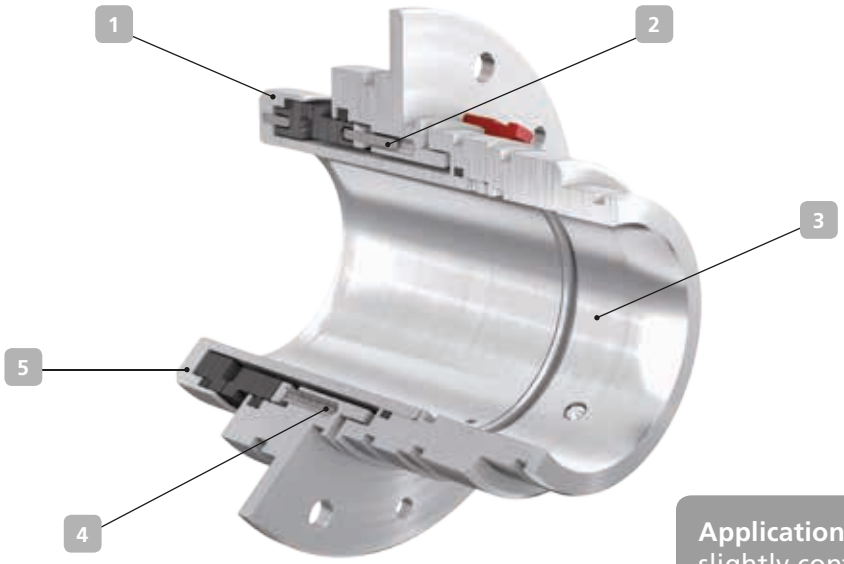
4UM – for KSB's submersible motors



Applications:
slightly contaminated water, seawater

1 Compact

Single cartridge seal, bi-directional, tailored to the seal installation space.

2 Tailored

The 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.

3 Service-friendly

No adjusting dimension required for installation. Installation and removal also possible under difficult operating conditions.

4 Dependable

Stationary design, balanced; the multi-spring arrangement provides uniform surface pressure across the seal faces, thus ensuring a long service life.

5 Versatile

For all operating conditions the submersible motor is approved for.

Technical description

Design	Single cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1) / "A" carbon (A) / "B" carbon (B)
Elastomers	EPDM (E) / FKM (V) / NBR (P)
Springs	2.4610 (M)
Other Components	1.4462 (G1) / 1.4501 (G4)

Other material combinations on request

Technical data

Operating pressure	Up to 20 bar, dynamic Up to 30 bar, static
Temperature	0 °C to 110 °C
Seal size	056, 057, 066, 076, 100
Business type	Standard

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

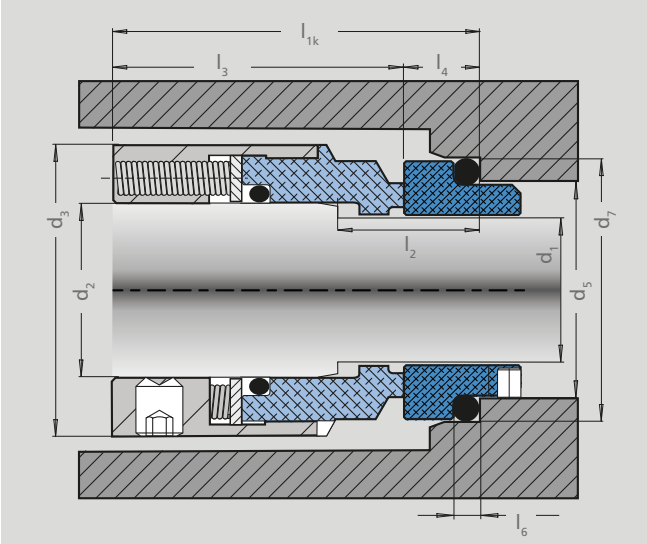
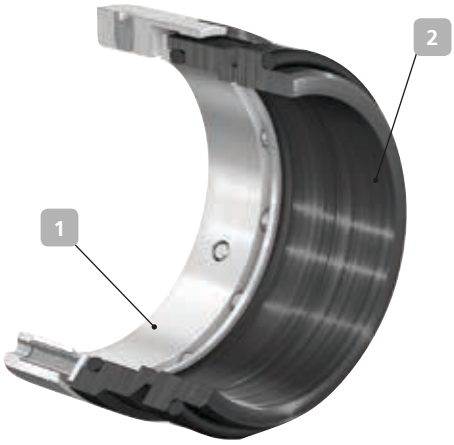


Fig. 1: Standard variant, dimensions see table on the next page



Applications:
feed water and condensate in power stations

1 Flexible

The single mechanical seal can be fitted in the pump in different versions and arrangements, depending on the application. This means that the seal is always optimally matched to the operating conditions.

2 Durable

Perfectly matched to the application range of the pump, this high-quality mechanical seal has a very long seal life and ensures reliable pump operation.

Materials	
Primary ring	"A" carbon (A)
Mating ring	SiC (Q1)
Elastomers	EPDM (E)
Springs	1.4571 (G)
Other Components	1.4571 (G)

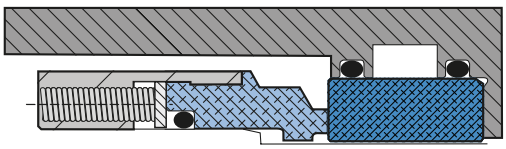
Technical description	
Design	Single mechanical seal
Type	Dynamic or stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

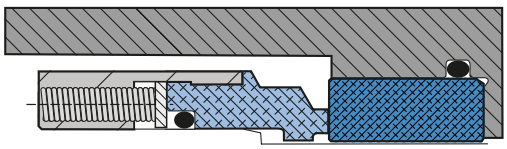
Variants

Application limits BM3A	
Operating pressure	Up to 40 barg
Temperature	Up to 200 °C
Seal size	060, 065, 085, 090, 095, 100
Spring travel	± 3 mm

Application limits BM3C	
Operating pressure	Up to 40 barg
Temperature	Up to 170 °C
Seal size	060, 085, 090, 095
Spring travel	± 3 mm

Application limits BM3S	
Operating pressure	Up to 40 barg
Temperature	Up t 200 °C
Seal size	060, 085, 090, 095
Spring travel	± 3 mm





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

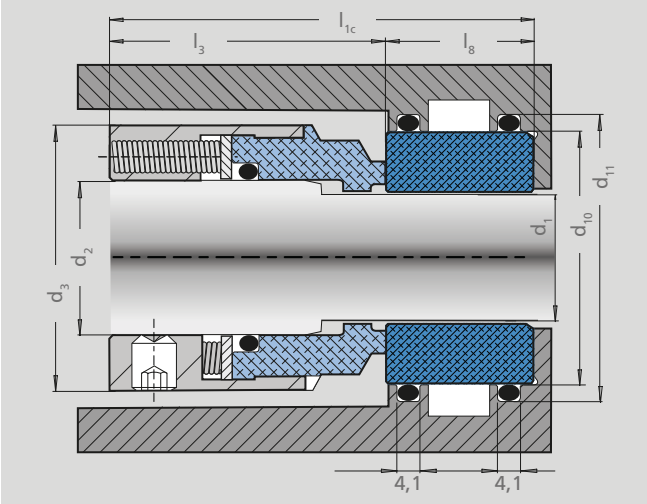


Fig. 2: Variant 5HG-BM3C, dimensions see table below

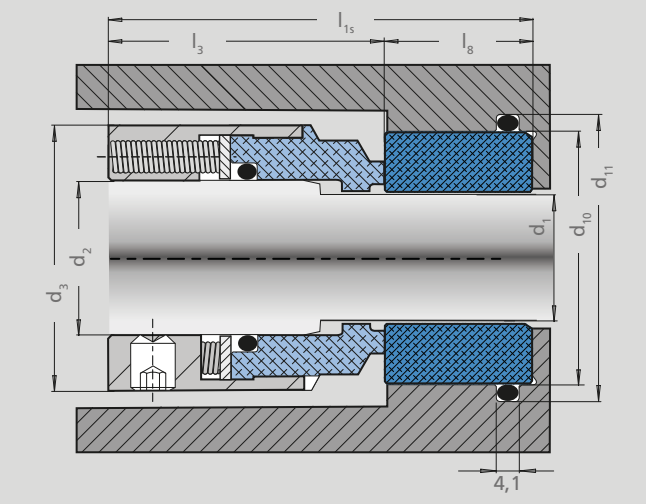


Fig. 3: Variant 5HG-BM3S, dimensions see table below

Dimensions for 5HG-BM3 (in mm)

Variants	d_1 -0,2	d_2 h6	d_3	d_5 H11	d_7 H8	d_{10} ± 0.05	d_{11} ± 0.05	l_{1k}	l_{1c}	l_{1s}	l_2	l_3	l_4	l_6	l_8
5HG-BM3A	60	65	85	72	80			62.5			25	49.5	13	6	
	65	70	90	77	85			62.5			25	49.5	13	6	
	85	90	114	100	110			75			28	59.5	15.5	7	
	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	
5HG-BM3C	60	65	85			82.75	88.67		76			49.5			26.5
	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
5HG-BM3S	60	65	85			82.75	88.67			76		49.5			26.5
	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

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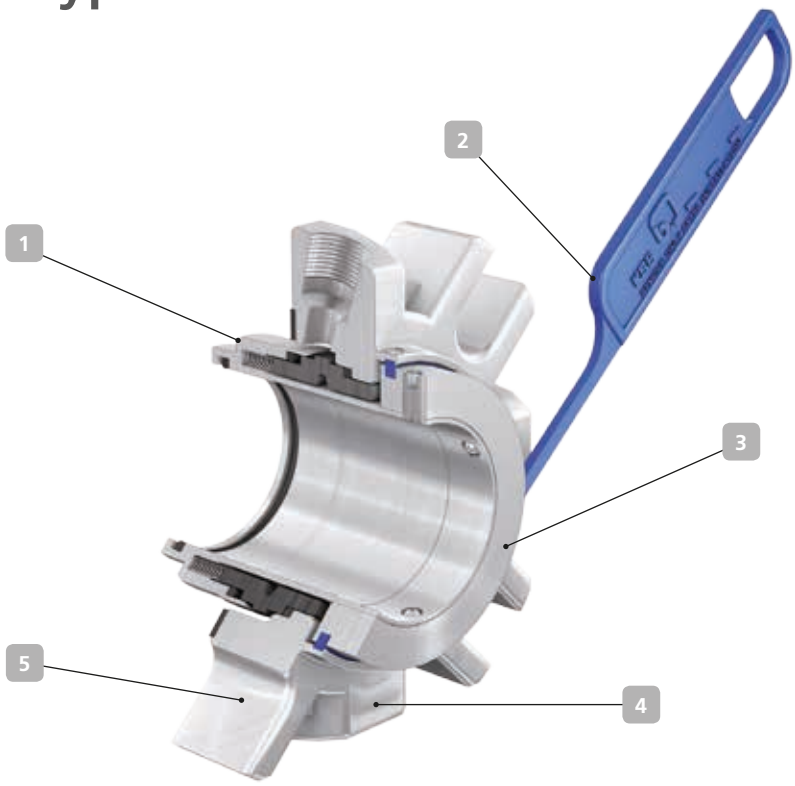
5KSCB2S – for KSB's CPK / CPKN / MegaCPK pump type series



Applications:
chemical and petrochemical industries

1 Compact
The single cartridge seal makes for easy installation without adjusting dimensions.

2 Service-friendly
A positioning lug ensures optimum pre-loading of the cartridge.

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

4 Versatile
Suitable for all operating conditions the pump is approved for. Available in many material combinations.

5 Interchangeable
The seal can replace other standard cartridge seals such as Burgmann Cartex SN without any modifications.

Technical description	
Design	Single cartridge seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials	
Primary ring	SiC (Q1) / "B" carbon (B)
Mating ring	SiC (Q1)
Elastomers	PTFE (U1) / FFKM (K)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Technical data	
Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-5 °C to 250 °C
Spring travel	+/- 1 mm
Bearing bracket (seal size	CS40 (033), CS50 (043), CS60 (053), CS80 (065)
Business type	Standard (KSB EasySelect)

Higher application limits on request

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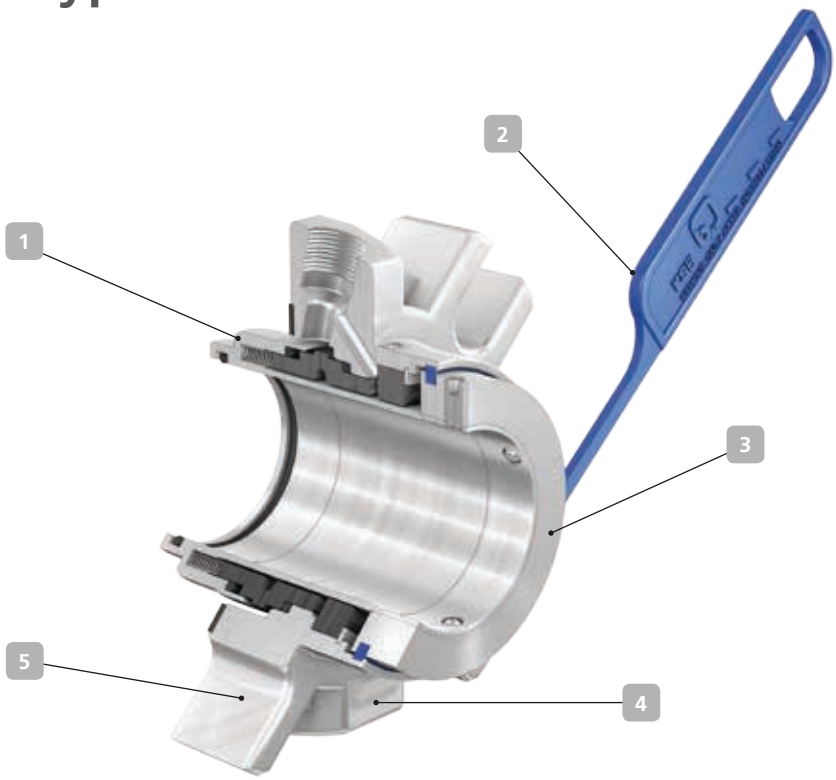
5KSCB2T – for KSB's CPK / CPKN / MegaCPK pump type series



Applications:
chemical and petrochemical industry

1 Compact
The single cartridge seal in quench design makes for easy installation without adjusting dimensions.

2 Service-friendly
A positioning lug ensures optimum pre-loading of the cartridge.

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

4 Versatile
Suitable for all operating conditions the pump is approved for. Available in many material combinations.

5 Interchangeable
The seal can replace other standard cartridge seals such as Burgmann Cartex TN without any modifications.

Technical description

Design	Single cartridge seal with quench (throttling bush)
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Primary ring	SiC (Q1), "B" carbon (B)
Mating ring	SiC (Q1)
Elastomers	PTFE (U1), FFKM (K)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-5 °C to 250 °C
Spring travel	+/- 1 mm
Bearing bracket (seal size)	CS40 (033), CS50 (043), CS60 (053), CS80 (065)
Business type	Standard (KSB EasySelect)

Higher application limits on request

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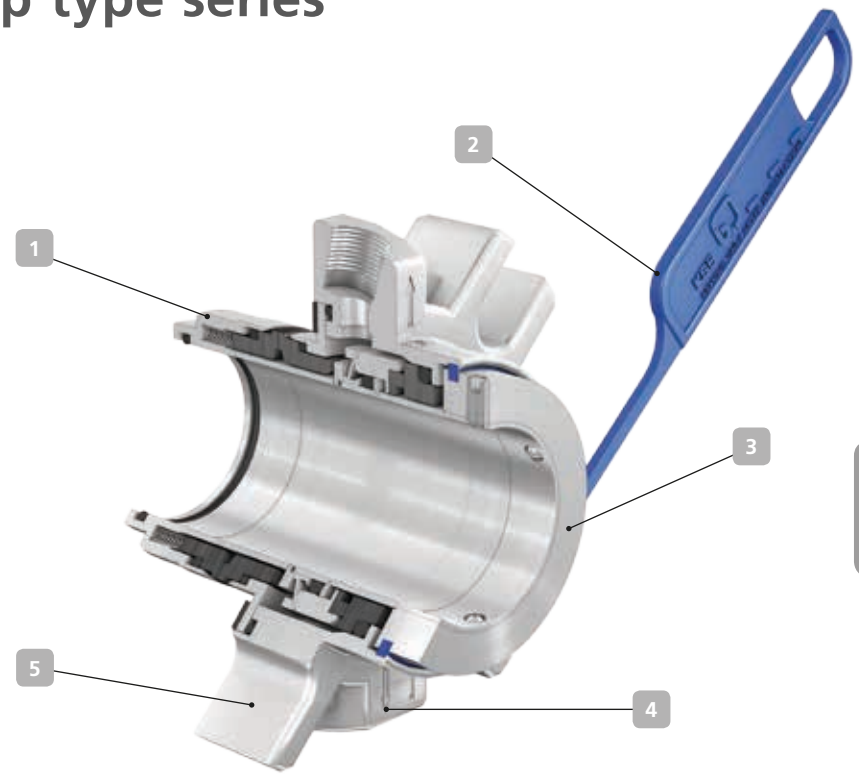
5KSCB2D – for KSB's CPK / CPKN / MegaCPK pump type series



Applications:
chemical and petrochemical industry

1 Compact
The double cartridge seal makes for easy installation without adjusting dimensions.

2 Service-friendly
A positioning lug ensures optimum pre-loading of the cartridge.

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

4 Versatile
Suitable for all operating conditions the pump is approved for. Available in many material combinations.

5 Interchangeability
The seal can replace other standard cartridge seals such as Burgmann Cartex DN without any modifications.

Technical description

Design	Double cartridge seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Inboard	Primary ring: "B" carbon (B), SiC (Q1) Mating ring: SiC (Q1)
Outboard	Primary ring: "B" carbon (B) Mating ring: SiC (Q1)
Elastomers	PTFE (U1), FFKM (K), EPDM (E), FKM (V)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Technical data

Operating pressure	Up to 25 bar dynamic Up to 37.5 bar static
Temperature	-5 °C to 250 °C
Spring travel	+/- 1 mm
Bearing bracket (seal size)	CS40 (033), CS50 (043), CS60 (053), CS80 (065)
Business type	Standard (KSB EasySelect)

Higher application limits on request

IRAN Seal
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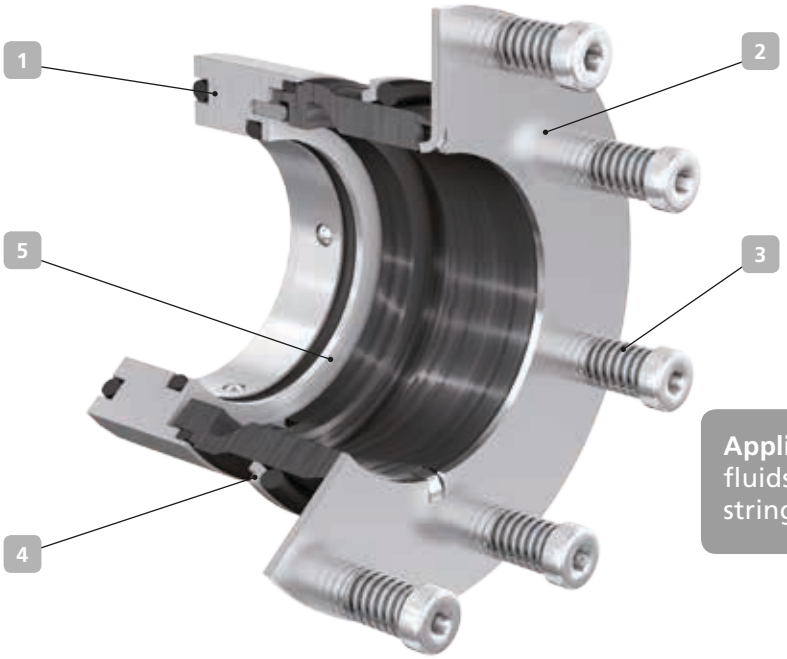
4AP – for KSB's Amaprop submersible mixer



Applications:
fluids containing long fibres and stringy particles

1 Compact
Single mechanical seal, bi-directional, tailored to the seal installation space and the submersible mixer's requirements.

2 Versatile
For all operating conditions the submersible mixer is approved for.

3 Dependable
Stationary design, balanced, multiple springs 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.

4 Robust
Suitable for all fluids with high solids content and those containing long fibres.

5 Service-friendly
Easy to install, design provides for a fixed adjusting dimension.

Technical description

Design	Single mechanical seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Amaprop's shaft is sealed with two mechanical seals in tandem arrangement. Only the inboard seal is replaced with KSB's seal 4AP Various wear part kits available, see ZN3302

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V)
Springs	1.4571 (G)
Other Components	1.4122 (E)

Other material combinations on request

Technical data

Operating pressure	Up to 1.2 bar, dynamic Up to 1.2 bar, static
Temperature	-10 °C to 65 °C
Bearing bracket (seal size)	055
Business type	Standard

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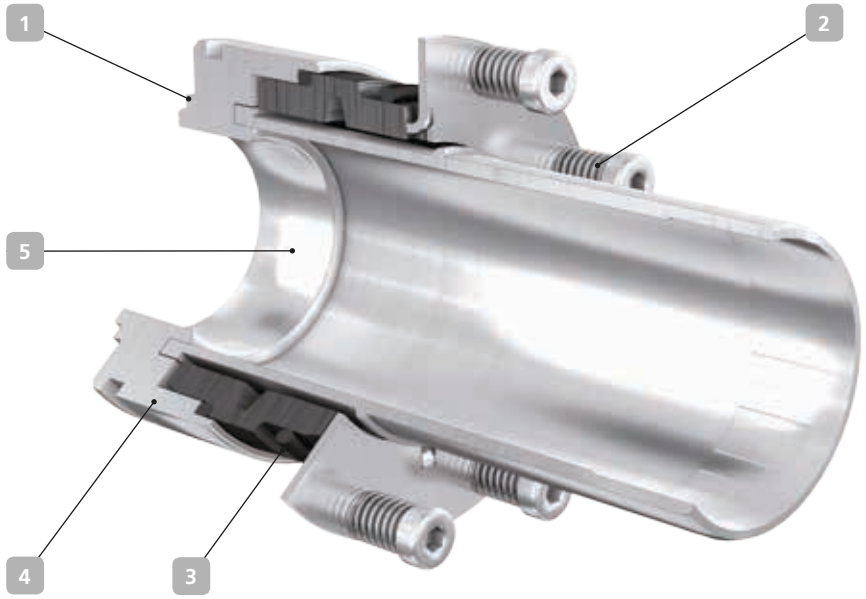
4C and 4CN – for KSB's CPK and CPKN pump type series



Applications:
chemical and petrochemical industries

1 Robust
Tailored to the conical installation space of the pump (A-type cover). Suitable for solids-laden fluids.

2 Dependable
Stationary design, multiple springs located outside the fluid handled The large springs are insensitive to contamination and ensure an optimal service life.

3 Different material variants
Elastomers made of EPDM/FKM or, alternatively, perfluoroelastomer (FFKM) Springs made of 1.4310 or, alternatively, Hastelloy.

4 Versatile
Can optionally also be operated with unpressurised quench liquid.

5 Service-friendly
Easy to install, no adjustments required when installing.

Technical description	
Design	Single mechanical seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Various wear part kits available, see ZN3302

Materials	
Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	EPDM (E) / FKM (V) / FFKM (K)
Springs	1.4571 (G) / 2.4610 (M)
Other Components	1.4462 (G1) / 2.4610 (M)

Other material combinations on request

Technical data	
Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	20 °C to 150 °C
Bearing bracket (seal size)	P02 (030), P03 (040), P04 (050), P05 (060), P06 (070), P08 (080)
Business type	Engineered

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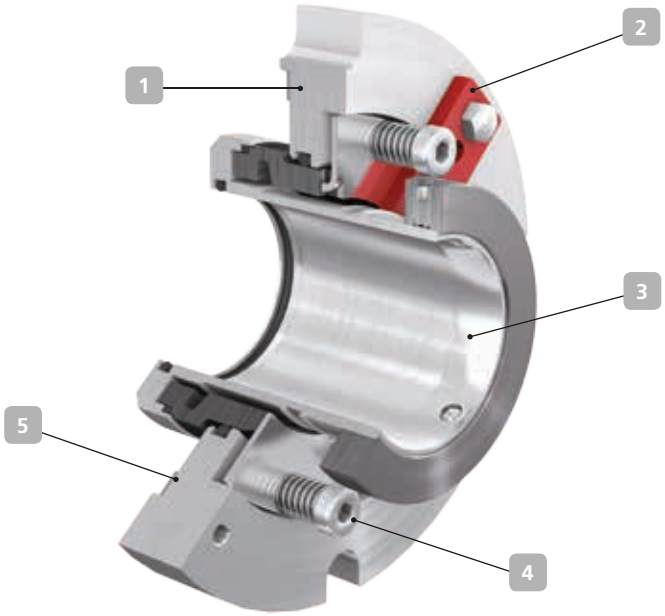
4CP – for KSB's MegaCPK / CPKN type series



Applications:
chemical and petrochemical industries

1 Compact
Tailored to the cartridge installation space (DIN24960-C). Easy installation, no adjustments required when installing.

2 Service-friendly
Assembly fixtures ensure optimum pre-loading of the cartridge.

3 Versatile
For all operating conditions the pump is approved for.

4 Dependable
Stationary; the large springs with high axial mobility are located outside the fluid handled and thus insensitive to contamination.

5 Reliable
The mechanical seal cover is centred on the pump cover and confines the PTFE gasket.

Technical description	
Design	Single cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

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

Other material combinations on request

Technical data	
Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	-20 °C to 150 °C
Bearing bracket (seal size)	P02/UP02/CS40 (033), P03/UP03/CS50 (043), P04/UP04/CS60 (053), P05/UP05/CS80 (065)
Business type	Engineered

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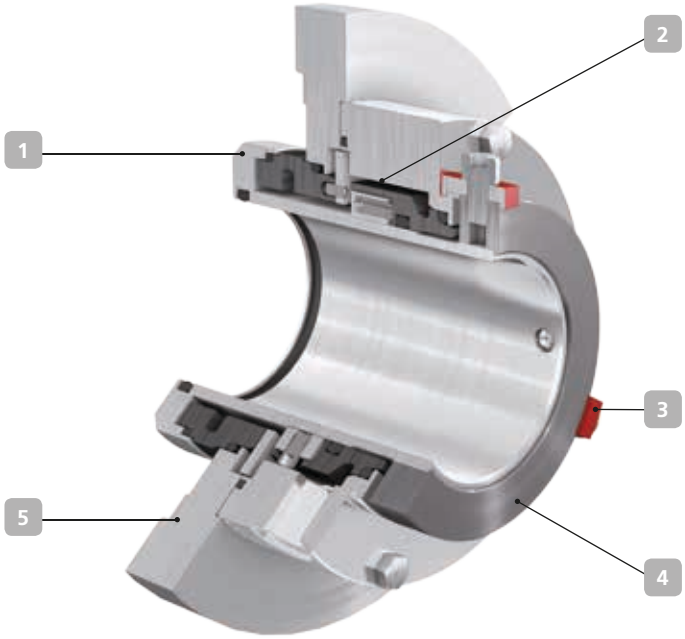
4CPD – for KSB's MegaCPK / CPKN type series



Applications:
chemical and petrochemical industries

1 Compact
Tailored to the cartridge installation space (DIN24960-C). Easy installation, no adjustments required when installing.

2 Dependable
Dynamic design; the double mechanical seal's cartridge can be operated both with unpressurised quench liquid and with pressurised barrier fluid.

3 Service-friendly
Assembly fixtures ensure optimum pre-loading of the cartridge.

4 Versatile
For all operating conditions the pump is approved for.

5 Robust
The mechanical seal cover is centred on the pump cover and confines the PTFE gasket.

Technical description

Design	Double cartridge seal
Type	Stationary (inboard) Dynamic (outboard) Double pressure balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Inboard	Primary and mating ring SiC (Q1)
Outboard	Primary ring: 1.4122 (S) Mating ring: "B" carbon (B)
Elastomers	FKM (V) / EPDM (E) / FFKM (K) / FEP-encapsulated (M1
Springs	1.4571 (G)
Other Components	1.4571 (G)

Other material combinations on request

Technical data

Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	-20 °C to 150 °C
Bearing bracket (seal size)	P02/UP02/CS40 (033), P03/UP03/CS50 (043), P04/UP04/CS60 (053), P05/UP05/CS80 (065)
Business type	Engineered

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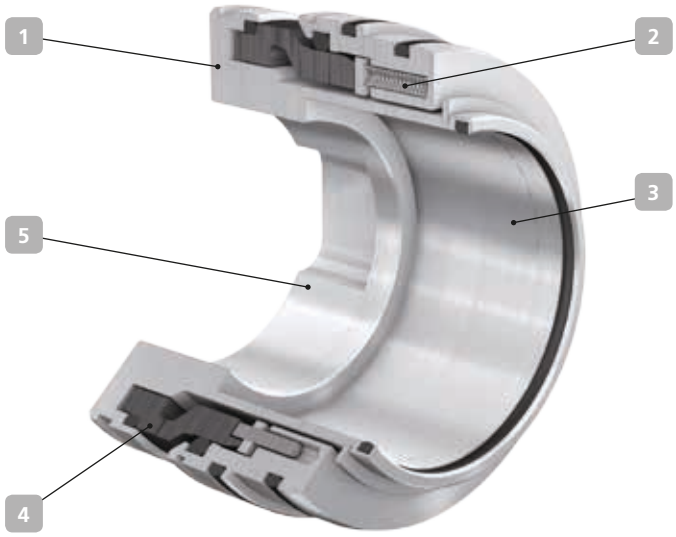
4EB – for KSB's Etanorm-R / Etaline-R type series



Applications:
drinking, service and hot water

1 Compact
Single modular mechanical seal, bi-directional and balanced. Tailored to the seal installation space and pump requirements.

2 Dependable
Stationary design, multiple springs located outside the fluid handled.

3 Versatile
For all operating conditions the pump is approved for.

4 Different material variants
Mating ring made of silicon carbide, "A" carbon (hot water) or "B" carbon Elastomers made of EPDM (also approved for drinking water to ACS/WRAS) or of FKM.

5 Service-friendly
The modular design facilitates installation with no need for assembly fixtures or adjusting dimensions, ensuring optimal pre-loading of the mechanical seal and low wear.

Technical description

Design	Single mechanical seal in modular design
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Approved for drinking water (WRAS)

Materials

Primary ring	SiC (Q1)
Mating ring	SiC (Q1) / "B" carbon (B) / "A" carbon (A)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G)
Other Components	1.4122 (E)

Other material combinations on request

Technical data

Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	-30 °C to 140 °C
Bearing bracket (seal size)	65 (065)
Business type	Standard (KSB EasySelect)

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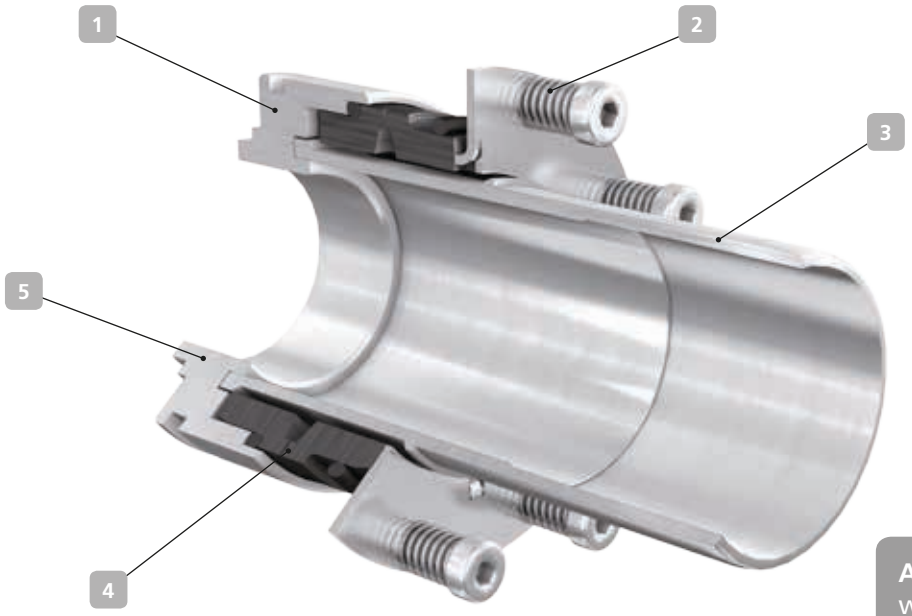
4K – for KSB's KWP type series



Applications:
waste water containing stringy material and abrasive particles

1 Robust

Single mechanical seal, bi-directional, tailored to the seal installation space of the pump. Suitable for fluids with high solids content.

2 Dependable

Stationary design, balanced, 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.

3 Versatile

Can optionally also be operated with unpressurised quench liquid.

4 Different material variants

Primary and mating rings made of silicon carbide or, as special variant, tungsten carbide springs made of 1.4310, alternatively available made of Hastelloy as special variant.

5 Service-friendly

Easy to install, no adjustments required when installing.

Technical description

Design	Single mechanical seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Various wear part kits available, see ZN3302

Materials

Primary ring	SiC (Q1) / U as special variant
Mating ring	SiC (Q1) / U as special variant
Elastomers	EPDM (E) / FKM (V) / FFKM (K) / FEP-coated (M1)
Springs	1.4571 (G) / 2.4610 (M)
Other Components	1.4462 (G1) / 1.4539 (G3) / 1.4501 (G4)

Other material combinations on request

Technical data

Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	-20 °C to 150 °C
Bearing bracket (seal size)	P03ax (040), P04ax (050), P05ax (060), P06x (070), P08sx (080), P10ax (100), P12sx (120)
Business type	Standard (KSB EasySelect)

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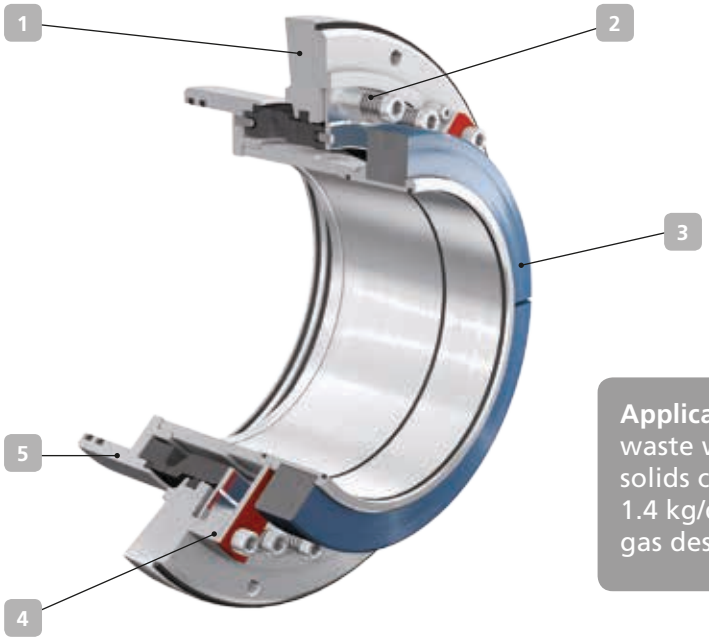
4K Cartridge – for KSB's KWP (REA) type series



Applications:
waste water with very high solids content up to a density of 1.4 kg/dm³, for example, in flue gas desulphurisation

1 Compact
Single cartridge seal, bi-directional and balanced.

2 Dependable
Stationary design, multiple springs located outside the fluid handled. The springs are insensitive to contamination and ensure an optimal service life.

3 Robust
Suitable for fluids with very high solids content.

4 Service-friendly
Tailored to the seal installation space of the pump, easy installation, no adjusting dimension. Assembly fixtures ensure optimum pre-loading of the cartridge.

5 Flushing
A device for periodic flushing can be connected. In addition, there is a variant available which supplies the flushing liquid directly through the mechanical seal into the fluid handled.

Technical description	
Design	Single cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	A device for periodic flushing can be connected. Various wear part kits available, see ZN3303

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

Other material combinations on request

Technical data	
Operating pressure	Up to 10 bar, dynamic Up to 15 bar, static
Temperature	-10 °C to 110 °C
Bearing bracket (seal size)	P12sx (120), P16ax (160), P20sx (200), P20sx (253)
Business type	Standard (KSB EasySelect)

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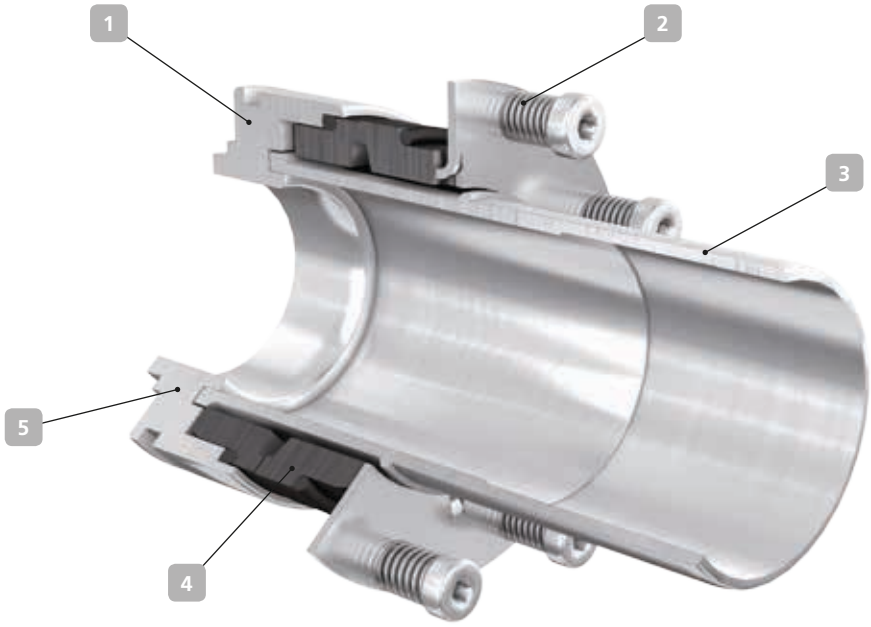
4KD – for KSB's KWP type series



Applications:
waste water containing stringy material and abrasive particles

1 Barrier fluid pressure

Mechanical seal especially designed for operation at barrier fluid pressure (in this case, a second, outboard seal is required).

2 Dependable

Stationary design, balanced, 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.

3 Robust

Tailored to the seal installation space of the pump, suitable for fluids with high solids content.

4 Safe

In the event of a sudden drop in the barrier fluid pressure, the double pressure balanced design ensures that 4KD's seal faces will not detach.

5 Compact

No adjusting dimensions necessary.

Technical description

Design	Double mechanical seal
Type	Stationary and balanced (inboard) Dynamic and unbalanced (outboard) Double pressure balanced
Springs	Multi-spring arrangement
Direction of rotation	Uni-directional
Additional information	The double mechanical seal comprises an inboard KSB seal (similar to the 4K type) and an outboard uni-directional single mechanical seal. Various wear part kits available, see ZN3302

Materials

Primary ring	SiC (Q1) / U as special variant
Mating ring	SiC (Q1) / U as special variant
Elastomers	EPDM (E) / FKM (V) / FFKM (K)
Springs	1.4571 (G) / 2.4610 (M)
Other Components	1.4462 (G1) / 1.4539 (G3)

Other material combinations on request

Technical data

Barrier fluid pressure	8 to 16 bar, depending on size
Temperature	-20 °C to 120 °C
Bearing bracket (seal size)	P03ax (040), P04ax (050), P05ax (060), P06x (070), P08sx (080), P10ax (100), P12sx (120)
Business type	Standard (KSB EasySelect)

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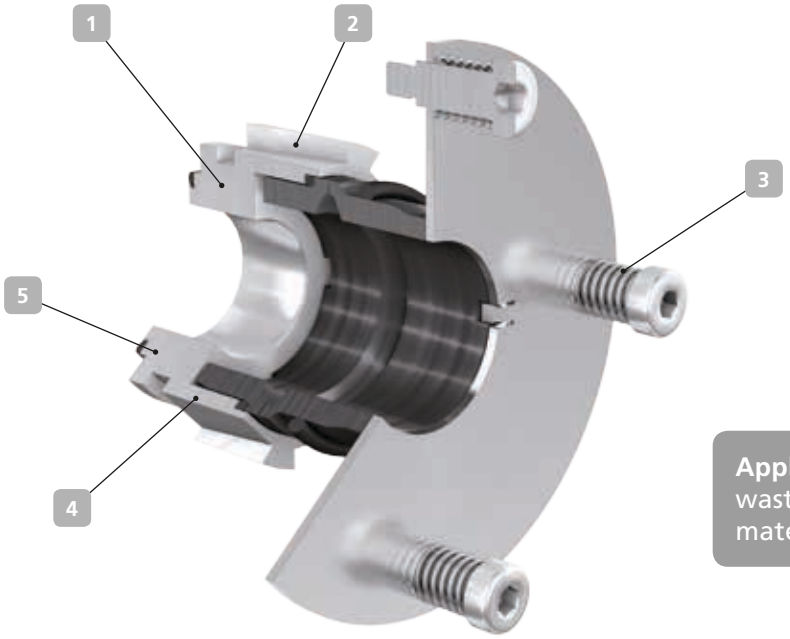
4KTM – for KSB's KWP Bloc type series



Applications:
waste water containing stringy material and abrasive particles

1 Special design

Special single mechanical seal for seawater applications, bi-directional, tailored to the seal installation space of the pump.

2 Circulation

The ribs on the shaft sleeve support circulation of the fluid handled in the clearance between the impeller and the pump casing.

3 Dependable

Stationary design, balanced, multiple springs located outside the fluid handled. The springs are insensitive to contamination and provide uniform surface pressure across the seal faces, thus ensuring a long service life.

4 Compact

The pump's shaft sleeve is integrated in the mechanical seal.

5 Service-friendly

Easy to install, no adjusting dimension required.

Technical description	
Design	Single mechanical seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Various wear part kits available, see ZN3302

Materials	
Primary ring	SiC (Q1)
Mating ring	SiC (Q1)
Elastomers	FKM (V) / FFKM (K)
Springs	2.4610 (M)
Other Components	1.4462 (G1)

Other material combinations on request

Technical data	
Operating pressure	Up to 25 bar, dynamic Up to 37.5 bar, static
Temperature	0 °C to 130 °C
Bearing bracket (seal size)	P03 (031)
Business type	Engineered

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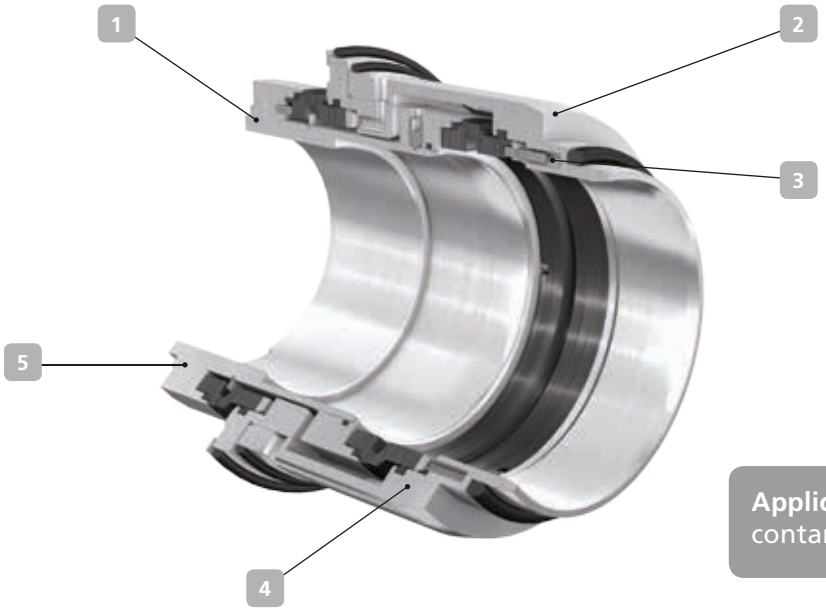
4STQ – for KSB's Sewatec / Sewabloc / Amarex KRT* pump type series



Applications:
contaminated waste water

1 Compact
Double mechanical seal in tandem arrangement, can be installed as one unit, bi-directional and balanced.

2 Versatile
For all operating conditions the pump is approved for.

3 Dependable
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.

4 Robust
Tailored to the seal installation space and pump requirements.

5 Service-friendly
The modular design facilitates installation without assembly fixtures or adjusting dimensions, ensuring optimal pre-loading of the mechanical seal and low wear.

Technical description

Design	Double cartridge seal
Type	Stationary, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional

Materials

Inboard	Primary and mating ring SiC (Q1)
Outboard	Primary ring: SiC (Q1) Mating ring: SiC (Q1) / tungsten carbide (U2)
Elastomers	FKM (V)
Springs	2.4610 (M)
Other Components	1.4122 (E)

Other material combinations on request

Technical data

Operating pressure	Up to 10 bar, dynamic Up to 16 bar, static
Temperature	0 °C to 70 °C
Bearing bracket** (seal size)	S01 (022/025), S02 (033/033), S03 (033/055), S05 (065/065), S08 (120/120), S09 (150/150)
Business type	Engineered/Standard (KSB EasySelect)*

* Only for seal sizes 022/025, 033/033, 033/055
** It should always be checked if the seal size is compatible with the relevant bearing bracket or locating fit.

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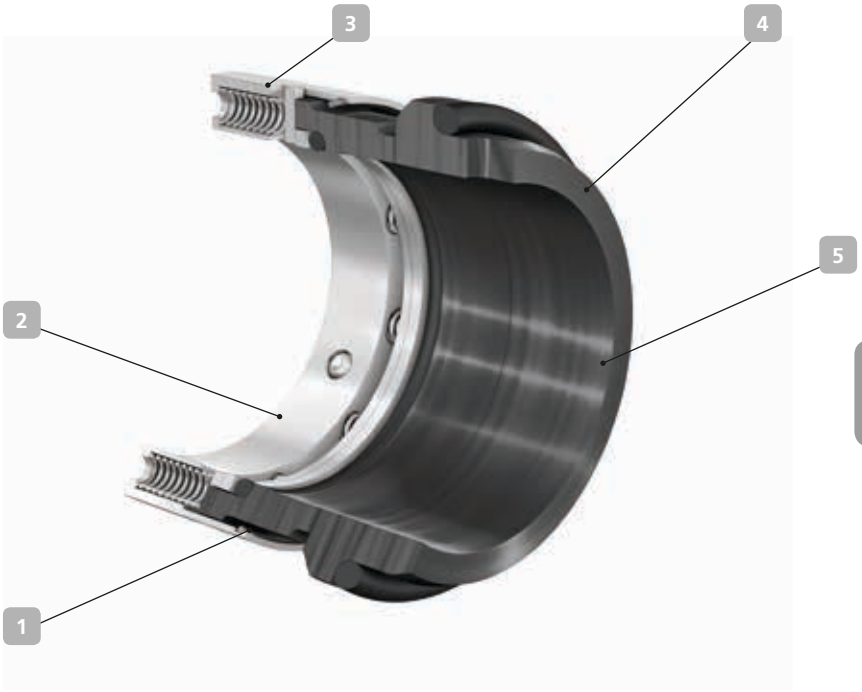
5A – for all KSB type series with a standardised seal to EN 12756



Applications:
universal

1 Easy to install

The single seal features a circlip which holds together the dynamic unit. This makes installation so much easier compared with similar competitor seals.

2 Versatile

Also for use with a quench system or as double mechanical seal in back-to-back arrangement or tandem arrangement.

3 Universal

The seal is designed for universal use and fits perfectly into standardised installation spaces, e.g. of Multitec, MegaCPK and Etanorm pumps.

4 Dependable

Suitable for all pumps with standardised seals. Many material combinations available.

5 Interchangeable

The seal can replace other seals with standardised installation dimension, such as Burgmann M7N or Crane 58U, without any modifications.

Technical description

Design	Single mechanical seal
Type	Dynamic, unbalanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	Approved for drinking water (WRAS)

Materials

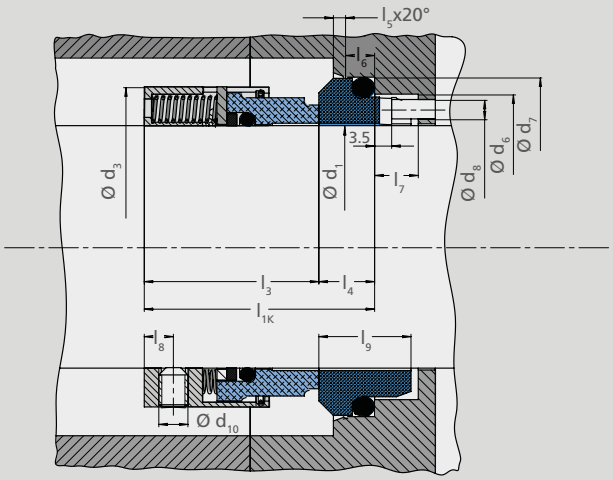
Primary ring	SiC (Q1) / "B" carbon (B) / "A" carbon (A), tungsten carbide (U)
Mating ring	SiC (Q1) / tungsten carbide (U)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Other Components	1.4571 (G)

Technical data

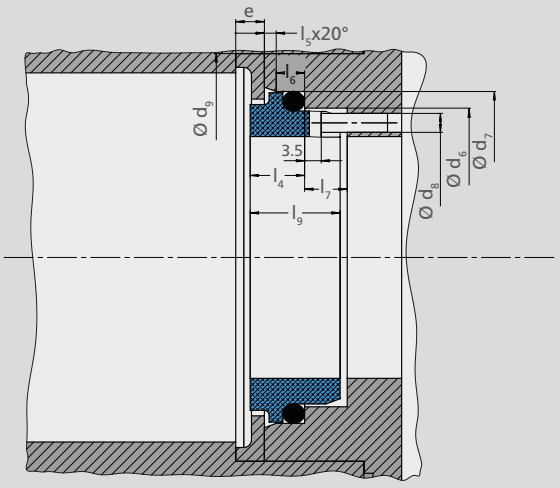
Operating pressure	Up to 16 bar dynamic up to 37.5 bar static
Temperature	-30 °C to 220 °C
Spring travel	+/- 3 mm
Seal size	See standardised seal selection chart on the next page
Business type	Standard (KSB EasySelect)

Higher application limits on request

5A – for all KSB type series with a standardised seal to EN 12756



Mating ring without seat lock



Mating ring with seat lock

Dimensions for 5A (in mm)

Nominal diameter d_1 h6	Maximum d_3 [1]	d_6 H11	d_7 H8	d_8	d_9 H8	d_{10}	e	l_1K [2] ± 0.5	l_3	l_4	l_5	l_6	l_7 +0.5	l_8	l_9
28	42	37	43		48	M5x6			32.5	10					
30	44	39	45		50	M5x6			32.5	10				6	
32	46	42	48	3	53	M5x6	4	42.5	32.5	10		5			17.5
33	47	42	48		53	M6x6			32.5	10					
35	49	44	50		60	M6x6			32.5	10					
38	54	49	56		62	M6x8			34	11	2			6.5	
40	56	51	58		65	M6x8			34	11					
43	59	54	61		67	M6x8		45	34	11					18.5
45	61	56	63		70	M6x8			34	11					
48	64	59	66		72	M6x8			34	11				6	
50	66	62	70		75	M6x8			36	11.5		6			
53	69	65	73		77	M6x8		47.5	36	11.5					
55	71	67	75		86	M6x8			36	11.5			9	7.5	
58	78	70	78		88	M6x10			41	11.5					19
60	80	72	80	4	91	M6x10	6		41	11.5	2.5			6	
63	83	75	83		93	M6x10		52.5	41	11.5					
65	85	77	85		96	M8x10			41	11.5				8.5	
68	88	81	90		98	M8x10			40	12.5		7			
70	90	83	92		103	M8x10			47.5	12.5					20
75	99	88	97		108	M8x12		60	47.5	12.5					
80	104	95	105		120	M8x12			47	13				10	
85	109	100	110		125	M8x12			47	13					
90	114	105	115		130	M8x12			52	13	3				20.5
95	119	110	120		135	M8x12		65	52	13				12	
100	124	115	125		140	M8x12			52	13					

[1] To determine the safety distance between rotating and stationary components the dimensions d_3 are recommended as maximum dimensions.
[2] The mechanical seal manufacturer may supply a mechanical seal shorter than l_1. Any differences in length should be compensated by means of a spacer which should also be supplied by the manufacturer of the mechanical seal.
The blue marking indicates that the KSB seal is on stock.

IRAN Seal
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5B – for all KSB type series with a standardised seal to EN 12756

Applications:
universal

1 Easy to install
The single seal features a circlip which holds together the dynamic unit. This makes installation so much easier.

2 Versatile
Also for use with a quench system or as double seal in back-to-back arrangement or tandem arrangement.

3 Universal
The seal is designed for universal use and fits perfectly into standardised installation spaces, e.g. of Multitec and MegaCPK pumps.

4 Dependable
Suitable for all pumps with standardised seals. Many material combinations available.

5 Interchangeable
The seal can replace other seals with standardised installation dimensions such as Burgmann H7N or Crane 58B without any modifications.

Technical description

Design	Single mechanical seal
Type	Dynamic, balanced
Springs	Multi-spring arrangement
Direction of rotation	Bi-directional
Additional information	WRAS drinking water approval

Materials

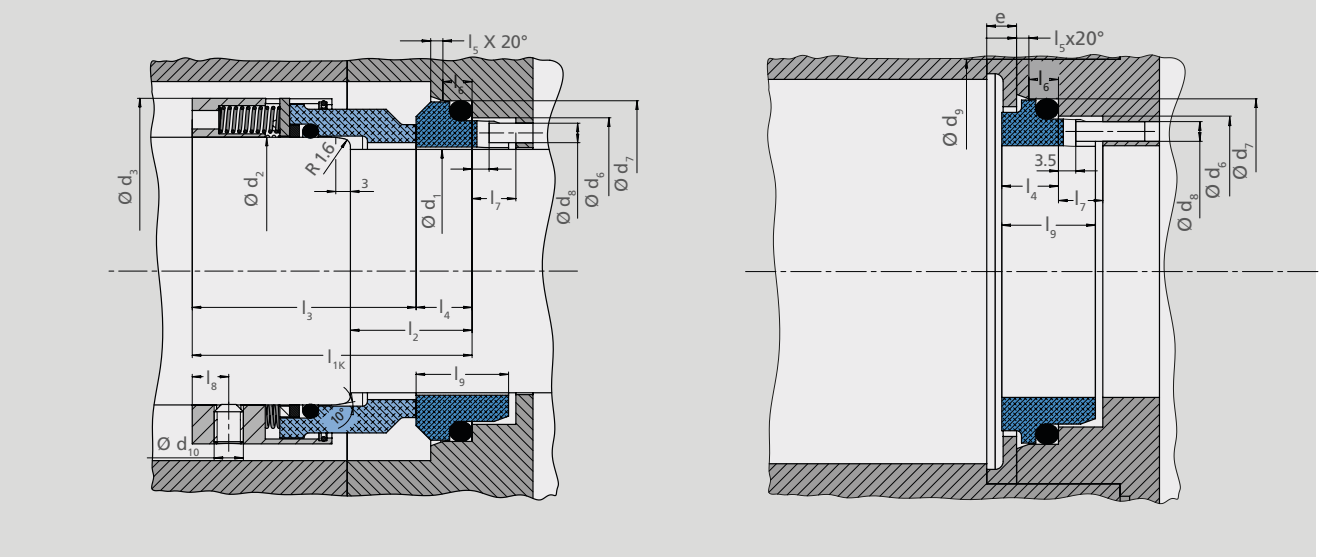
Primary ring	SiC (Q1) / "B" carbon (B) / "A" carbon (A), tungsten carbide (U)
Mating ring	SiC (Q1) / tungsten carbide (U)
Elastomers	EPDM (E) / FKM (V)
Springs	1.4571 (G) / 2.4610 (M)
Other Components	1.4571 (G)

Technical data

Operating pressure	Up to 25 bar dynamic up to 37.5 bar static
Temperature	-30 °C to 220 °C
Spring travel	+/- 3 mm
Seal size	See standardised seal selection chart on the next page
Business type	Standard (KSB EasySelect)

Higher application limits on request

5B – for all KSB type series with a standardised seal to EN 12756



Dimensions for 5B (in mm)

Nominal diameter d_1 h6	d_2 h6	Maximum d_3 [1]	d_6 H11	d_7 H8	d_8	d_9 H8	d_{10}	e	l_1K [2] ± 0.5	l_2 ± 0.5	l_3	l_4	l_5	l_6	l_7 +0.5	l_8	l_9
28	33	47	37	43	3	53	M6x6	4	50	20	40	10	2	5	9	6.5	17.5
30	35	49	39	45		60	M6x6				40	10					
33	38	54	42	48		62	M6x8				40	10					
35	40	56	44	50		65	M6x8				40	10					
38	43	59	49	56	4	67	M6x8	6	52.5	23	41.5	11		6		6	18.5
40	45	61	51	58		70	M6x8				41.5	11					
43	48	64	54	61		72	M6x8				41.5	11					
45	50	66	56	63		75	M6x8				41.5	11					
48	53	69	59	66		77	M6x8				41.5	11					
50	55	71	62	70		86	M6x8		57.5	25	46	11.5	2,5			7.5	19
53	58	78	65	73		88	M6x10				46	11.5				6	
55	60	80	67	75		91	M6x10				46	11.5					
58	63	83	70	78		93	M6x10		62.5		51	11.5				8.5	
60	65	85	72	80		96	M8x10				51	11.5					
63	68	88	75	83		98	M8x10				51	11.5					
65	70	90	77	85		103	M8x10				51	11.5					
70	75	99	83	92		108	M8x12		70	28	57.5	12.5		7		10	20
75	80	104	88	97		120	M8x12				57.5	12.5					
80	85	109	95	105		125	M8x12				57	13	3			12	20.5
85	90	114	100	110		130	M8x12		75		62	13					
90	95	119	105	115		135	M8x12				62	13					
95	100	124	110	120		140	M8x12				62	13					
100	105	129	115	125		145	M8x12				62	13					

[1] To determine the safety distance between rotating and stationary components the dimensions d_3 are recommended as maximum dimensions.
[2] The mechanical seal manufacturer may supply a mechanical seal shorter than l_1. Any differences in length should be compensated by means of a spacer which should also be supplied by the manufacturer of the mechanical seal.
The blue marking indicates that the KSB seal is on stock.

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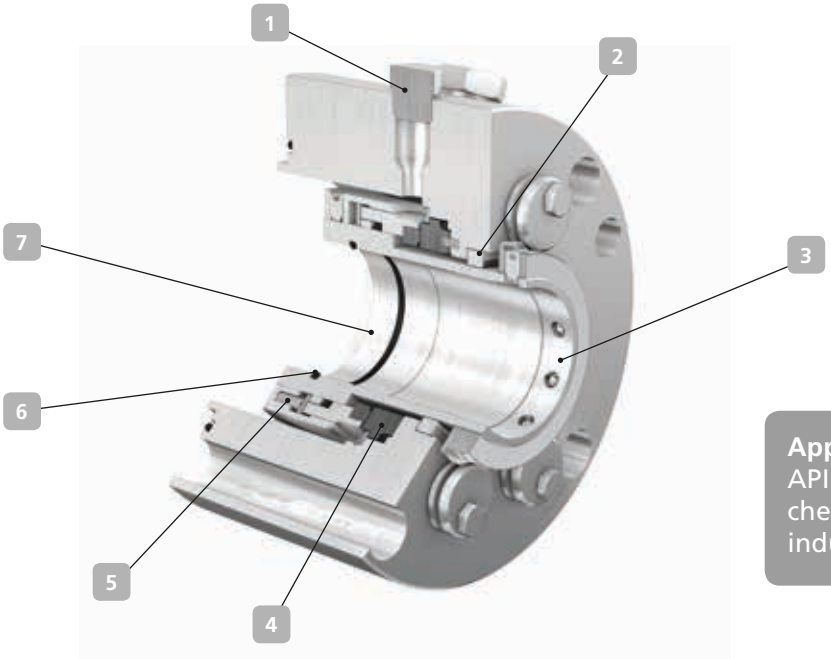
4KSBM6S – mechanical seals to API 682, 3rd Edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangement 1
Contacting, single, product-lubricated and balanced cartridge seal

1 Configurable flange connections
For API Plans 11, 12, 21, 22, 31, 32, 41 + 61 (62) and 23 + 61 (62).

2 Fixed throttling bush
Optionally floating.

3 Three strong torque transmitting elements
For transmitting the rotation and for vibration damping.

4 Seal face material
Combination of hard and soft materials, e.g. silicon carbide and carbon graphite, which is highly resistant to blistering.

5 Multi-spring arrangement
Made of C276 alloy.

6 Rotating flexible elements
With O-ring as secondary seal.

7 Optional cooled gland packing chamber
(Plan 02) and connections for Plan 23 with high-efficiency pumping ring.

Technical description

Category	II or III
Type	A
Arrangement	1
Design	Cartridge
Additional information	Various wear part kits available, see ZN3307

Technical data

Shaft diameter	Up to 110 mm
Pressure	Up to 42 bar
Temperature	-10 to 176 °C
Bearing bracket (seal size)	B02 (050), B03 (060), B05 (079), B06 (100)
Sliding velocity	Up to 23 m/s

Materials

Standard	AQ2VMG or AQ2KMG
	Other material combinations on request

The indicated limit conditions are not absolute limits, but should be considered when calculating P*V. Other conditions than specified above can be approved on request.

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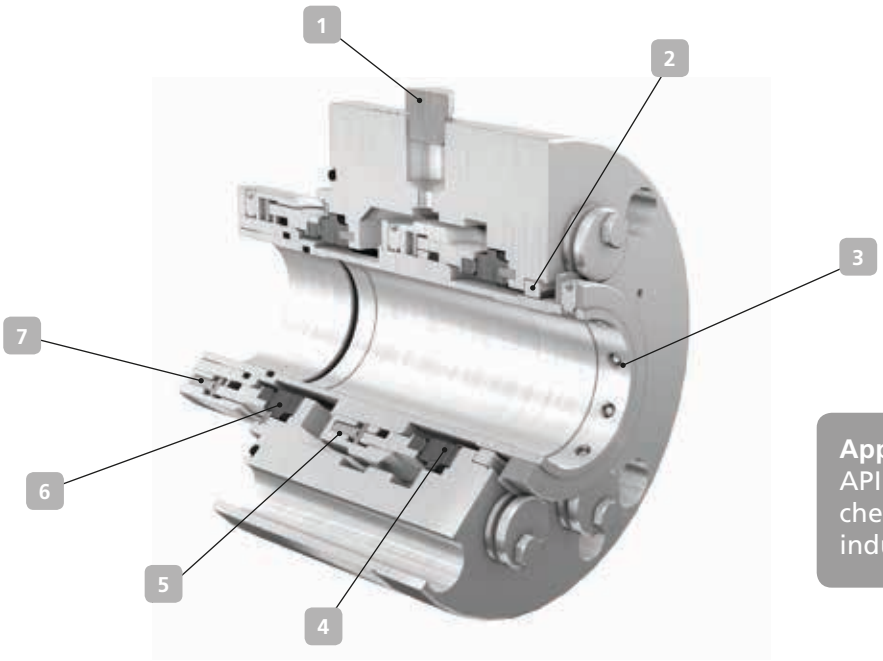
www.Iranseal.com

4KSBM6T – mechanical seals to API 682, 3rd Edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangement 2
Contacting, double, product-lubricated and balanced cartridge mechanical seal

1 Configurable flange connections
For API Plans 11, 12, 21, 22, 31, 32, 41 + 52, + 61 (62).

2 Fixed throttling bush
Optionally floating.

3 Three strong torque transmitting elements
For transmitting the rotation and for vibration damping.

4 Seal face material
Combination of hard and soft materials, e.g. silicon carbide and carbon graphite, which is highly resistant to blistering.

5 Multi-spring arrangement
Made of C276 alloy.

6 Rotating flexible elements
With O-ring as secondary seal.

7 Optional cooled gland packing chamber
(Plan 02) and connections for Plan 23 with high-efficiency pumping ring.

Technical description

Category	II or III
Type	A
Arrangement	2
Design	Cartridge
Additional information	Various wear part kits available, see ZN3307

Materials

Standard	AQ2VMG-AQ2V or AQ2KMG-AQ2V
	Other material combinations on request

Technical data

Shaft diameter	Up to 110 mm
Pressure	Up to 42 bar
Temperature	-10 to 176 °C
Bearing bracket (seal size)	B02 (050), B03 (060), B05 (079), B06 (100)
Sliding velocity	Up to 23 m/s

The indicated limit conditions are not absolute limits, but should be considered when calculating P*V. Other conditions than specified above can be approved on request.

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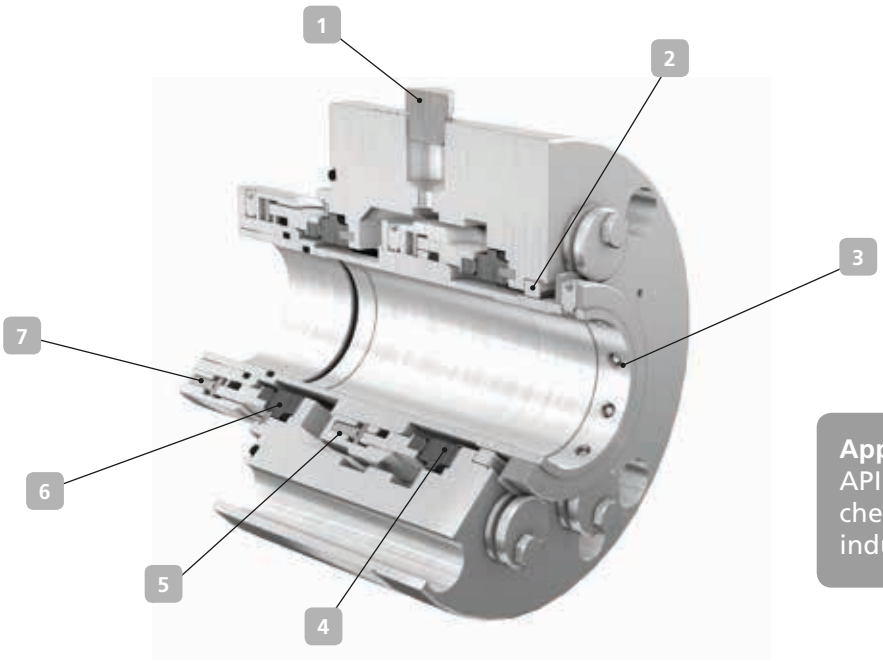
4KSBM6D – mechanical seals to API 682, 3rd Edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangement 3
Contacting, double, product-lubricated and balanced cartridge mechanical seal

1 Configurable flange connections
For API Plans 11, 12, 21, 22, 23, 31, 32, 41, +53 (A, B, C), +54, +61 (62).

2 Fixed throttling bush
Optionally floating.

3 Three strong torque transmitting elements
For transmitting the rotation and for vibration damping.

4 Seal face material
Combination of hard and soft materials, e.g. silicon carbide (versus carbon graphite), highly resistant to blistering.

5 Multi-spring arrangement
Made of C276 alloy.

6 Rotating flexible elements
With O-ring as secondary seal.

7 Optional cooled gland packing chamber
(Plan 02) and connections for Plan 23 with high-efficiency pumping ring.

Technical description

Category	II or III
Type	A
Arrangement	3
Design	Cartridge
Additional information	Various wear part kits available, see ZN3307

Technical data

Shaft diameter	Up to 110 mm
Pressure	Up to 42 bar
Temperature	-10 to 176 °C
Bearing bracket (seal size)	B02 (050), B03 (060), B05 (079), B06 (100)
Sliding velocity	Up to 23 m/s

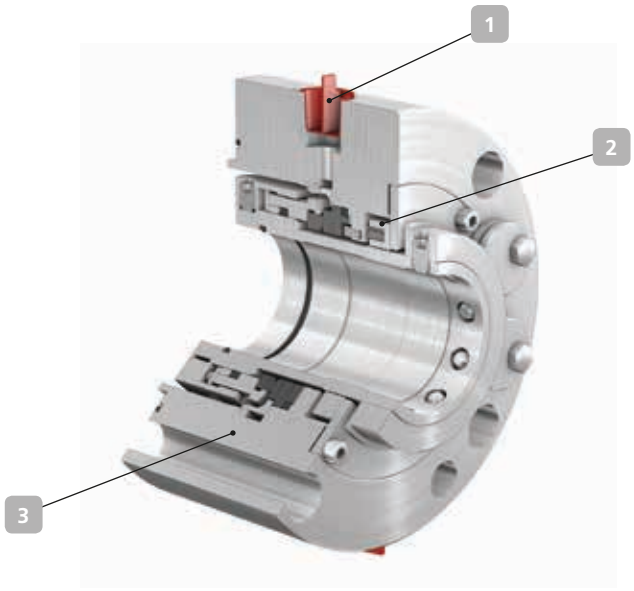
Materials

Standard	AQ2VMG-AQ2V or AQ2KMG-AQ2V
	Other material combinations on request

The indicated limit conditions are not absolute limits, but should be considered when calculating P*V. Other conditions than specified above can be approved on request.

IRAN Seal
www.Iranseal.com

4EDBM6S & Q – single mechanical seals to API 682, 4th edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangement 1
Contacting, single, product-lubricated and balanced cartridge seal

1 Flexible
The single cartridge seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 51, 61 (62) and 23 + 51, 61 (62). The seals are available for all of KSB's API pumps.

2 Dependable
The throttling bush enables connection to a gas, steam or liquid quench , depending on the seal variant. This prevents outboard incrustations at the seal.

3 Efficient
The API Plan combination 02 + 23 with high-efficiency pumping ring is perfectly matched to applications with hot fluids.

Variants

Variants 4EDBM6S
Single mechanical seal with floating throttling bush for optional connection to a gas or steam quench.

Variant 4EDBM6Q
Single mechanical seal with segmented throttling bush for use with a liquid quench.

Technical description	
Category	II or III
Type	A
Arrangement	1
Design	Cartridge
Additional information	Various wear part kits available on request

Materials	
Primary ring	"A" carbon (A) / SiC-Si (Q2)
Mating ring	SiC-Si (Q2)
Elastomers	FKM (V) / FFKM (K)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Other material combinations on request

Technical data	
Shaft diameter	50 to 120 mm
Pressure	Up to 40 bar
Temperature	-10 to 200 °C

Higher application limits on request

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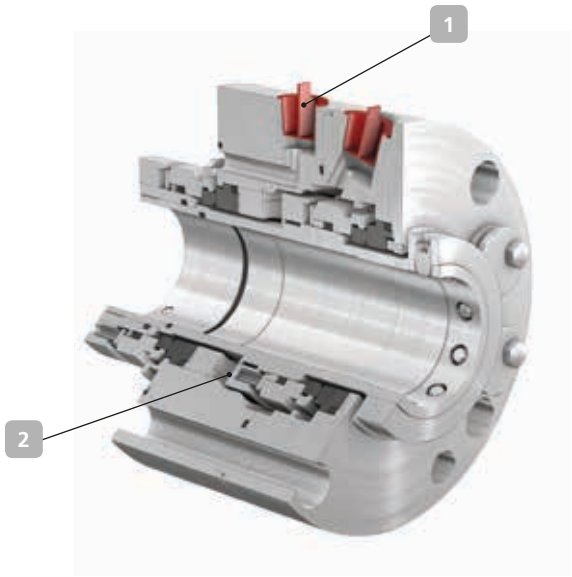
4EDBM6T & D – double mechanical seals to API 682, 4th edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangements 2 or 3
Contacting, double, product-lubricated and balanced cartridge seal

1 Flexible

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.

2 Safe

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.

Variants

Variant 4EDBM6T

Double mechanical seal for use with unpressurised buffer fluid (API Plan 52).

Variant 4EDBM6D

Double mechanical seal for use with pressurised barrier fluid (API Plan 53).

Materials	
Inboard	Primary ring "A" carbon (A) / SiC-Si (Q2) Mating ring SiC-Si (Q2)) Elastomers FKM (V) / FFKM (K)
Outboard	Primary ring "A" carbon (A) Mating ring SiC-Si (Q2 Elastomers FKM (V)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Other material combinations on request

Technical description	
Category	II or III
Type	A
Arrangements	2 or3
Design	Cartridge
Additional information	Various wear part kits available on request

Technical data	
Shaft diameter	50 to 120 mm
Pressure	Up to 40 bar
Temperature	-10 to 200 °C

Higher application limits on request

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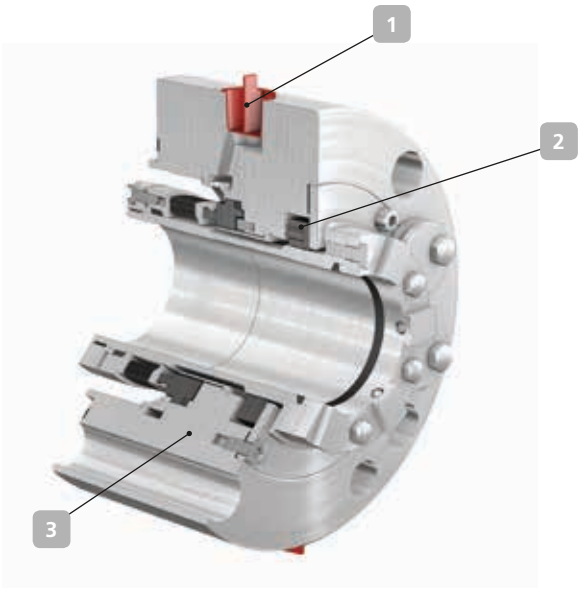
4EDTR6HS & Q – Single metal-bellows mechanical seals to API 682, 4th edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangement 1
Contacting, single, product-lubricated and balanced metal-bellows cartridge seal

1 Flexible

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.

2 Dependable

The throttling bush enables connection to a gas, steam or liquid quench , depending on the seal variant. This prevents outboard incrustations at the seal.

3 Materials

The mechanical seal is available in a hard-soft combination of silicon carbide and carbon graphite, or in a hard-hard combination of silicon carbide and silicon carbide. 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.

Technical data

Shaft diameter	50 to 120 mm
Pressure	Up to 20 bar
Temperature	-75 to 400 °C

Higher application limits on request

Variants

Variant 4EDTR6HS

Single metal-bellows seal with floating throttling bush for optional connection to a gas or steam quench.

Variant 4EDTR6HQ

Single metal-bellows seal with segmented throttling bush for use with a liquid quench.

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Materials

Primary ring	"A" carbon (A) / SiC-Si (Q2)
Mating ring	SiC-Si (Q2)
Secondary sealing elements	Statotherm® (G)
Metal bellows	Inconel® 718 (M6)
Other Components	Carpenter® 42 (T4)

Other material combinations on request

Technical description

Category	II or III
Type	C
Arrangement	1
Design	Cartridge
Additional information	Various wear part kits available on request

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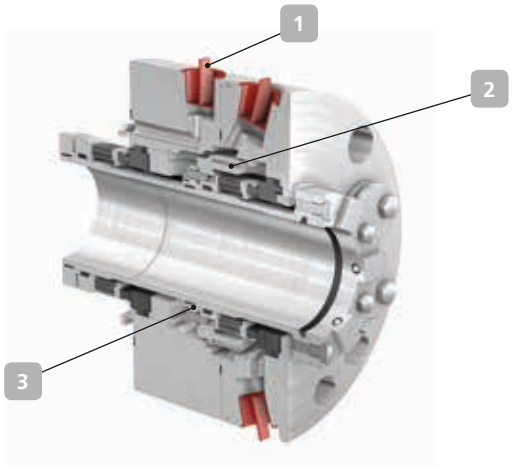
4EDTR6HT & D – double metal-bellows mechanical seals to API 682, 4th edition



Applications:
API 682 applications in the chemical and petrochemical industries

Arrangements 2 or 3
Contacting, double, product-lubricated and balanced metal-bellows cartridge seal

1 Flexible

The double metal-bellows 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.

2 Safe

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.

3 Materials

The mechanical seal is available in a hard-soft combination of silicon carbide and carbon graphite, or in a hard-hard combination of silicon carbide and silicon carbide. 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.

Variants

Variant 4EDTR6HT

Double metal-bellows seal for use with unpressurised buffer fluid in the space between the two seals (API Plan 52).

Variant 4EDTR6HD

Double metal-bellows seal for use with pressurised barrier fluid in the space between the two seals (API Plan 53).

Technical data

Shaft diameter	50 to 120 mm
Pressure	Up to 20 bar
Temperature	-75 to 400 °C

Higher application limits on request

Materials

Inboard	Primary ring "A" carbon (A) / SiC-Si (Q2) Mating ring SiC-Si (Q2)
Outboard	Primary ring "A" carbon (A) Mating ring SiC-Si (Q2)
Secondary sealing elements	Statotherm® (G)
Metal bellows	Inconel® 718 (M6)
Other Components	Carpenter® 42 (T4)

Other material combinations on request

Technical description

Category	II or III
Type	C
Arrangement	2 or 3
Design	Cartridge
Additional information	Various wear part kits available on request

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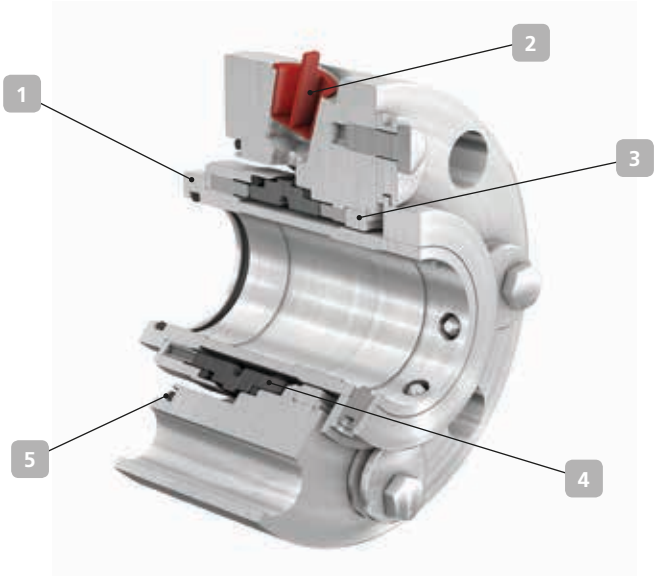
4EDCB8S – single mechanical seals to API 682, 4th edition (category 1)

For KSB's MCPK pump type series



Applications:
chemical and petrochemical industries

Arrangement 1
Contacting, single, product-lubricated and balanced cartridge seal

1 Compact
The single cartridge seal is especially designed for use in the standardised installation spaces of the non-API pump MCPK (CPKN + CPK possible).

2 Flexible
The mechanical seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 61 (62) and 23 + 61 (62).

3 Dependable
Floating throttling bush for optional connection of a gas or steam quench. This prevents outboard incrustations at the seal.

4 Robust
The mechanical seal is available in a hard-soft combination of silicon carbide and carbon graphite, or in a hard-hard combination of silicon carbide and silicon carbide.

5 Materials
The seal contains O-rings as secondary sealing elements. They are available in different material variants.

Technical description

Category	I
Type	A
Arrangement	1
Design	Cartridge
Additional information	Various wear part kits available on request

Materials

Primary ring	"A" carbon (A) / SiC-Si (Q2)
Mating ring	SiC-Si (Q2)
Elastomers	FKM (V) / FFKM (K)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Other material combinations on request

Technical data

Pressure	Up to 20 bar
Temperature	-10 to 200 °C
Bearing bracket (seal size)	CS40 (033), CS50 (043), CS60 (053), CS80 (065)
Business type	Standard (KSB EasySelect)

Higher application limits on request

IRAN Seal
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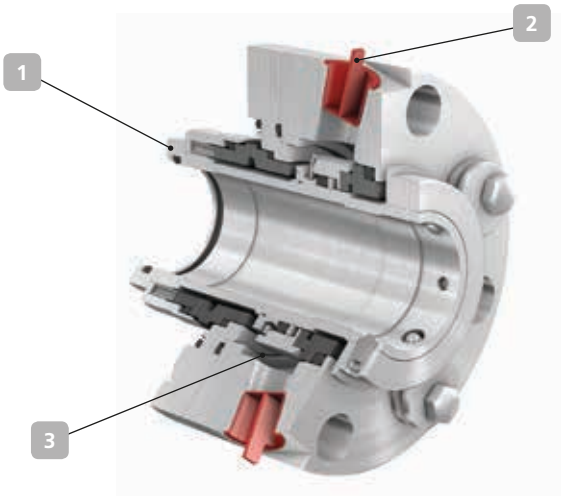
4EDCB8T & D – double mechanical seals to API 682, 4th edition (category 1)

For KSB's MCPK pump type series



Applications:
chemical and petrochemical industries

Arrangements 2 or 3
Contacting, double, product-lubricated and balanced cartridge seal

1 Compact

The double cartridge seal is especially designed for use in the standardised installation spaces of the non-API pump MCPK (CPKN + CPK possible).

2 Flexible

The double cartridge seal can be connected to all common API Plans, such as 01, 02, 11, 31, 32 + 52, 53 (A, B).

3 Safe

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.

Variants

Variant 4EDCB8T

Double mechanical seal for use with unpressurised buffer fluid (API Plan 52).

Variant 4EDCB8D

Double mechanical seal for use with pressurised barrier fluid (API Plan 53).

Materials

Inboard	Primary ring "A" carbon (A) / SiC-Si (Q2) Mating ring SiC-Si (Q2) Elastomers FKM (V) / FFKM (K)
Outboard	Primary ring "A" carbon (A)) Mating ring SiC-Si (Q2)) Elastomers FKM (V)
Springs	2.4610 (M)
Other Components	1.4571 (G)

Other material combinations on request

Technical description

Category	I
Type	A
Arrangement	2 or 3
Design	Cartridge
Additional information	Various wear part kits available on request

Technical data

Pressure	Up to 20 bar
Temperature	-10 to 200 °C
Bearing bracket (seal size)	CS40 (033), CS50 (043), CS60 (053), CS80 (065)
Business type	Standard (KSB EasySelect)

Higher application limits on request

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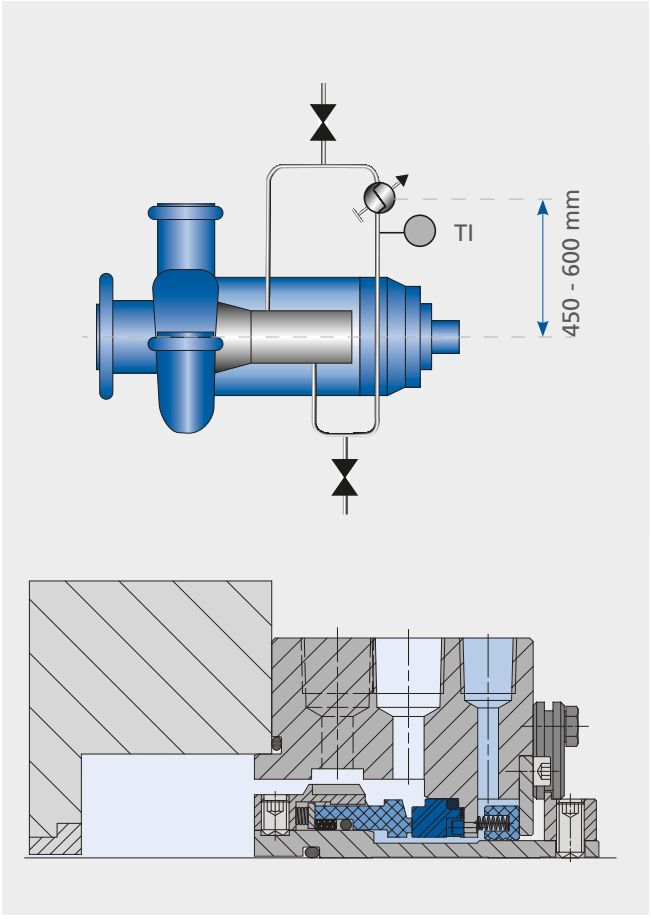
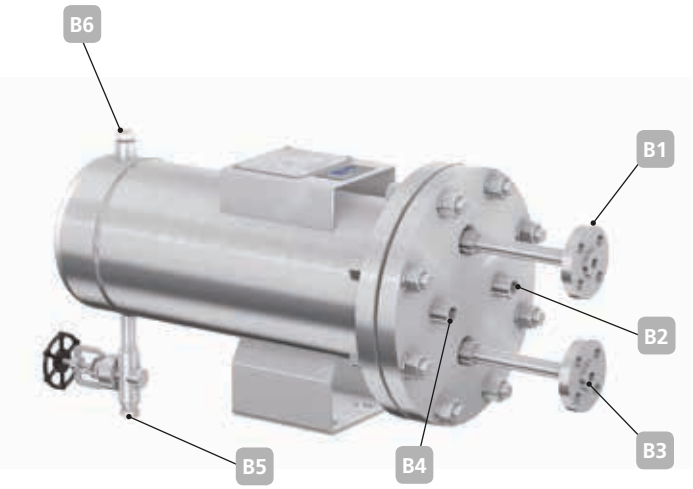
KWT23 – heat exchanger to API 682, 3rd edition*





Application:
API Plan 23

1 General description

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

2 Use

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).

3 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.

4 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 mechanical seal
- B2 Cooling water inlet
- B3 To mechanical seal
- B4 Cooling water outlet
- B5 Cooling water drain (closed)
- B6 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
Business type	Standard (KSB EasySelect)

*System to API 682, 3rd edition, also available

IRAN Seal
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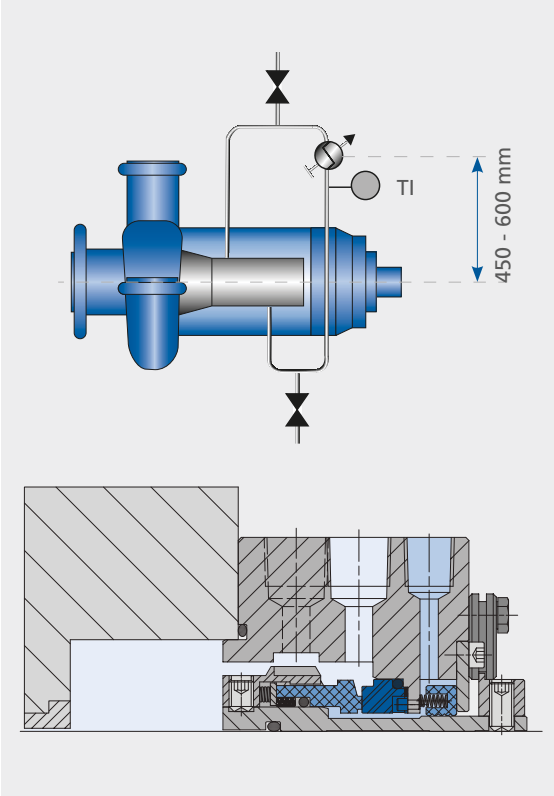
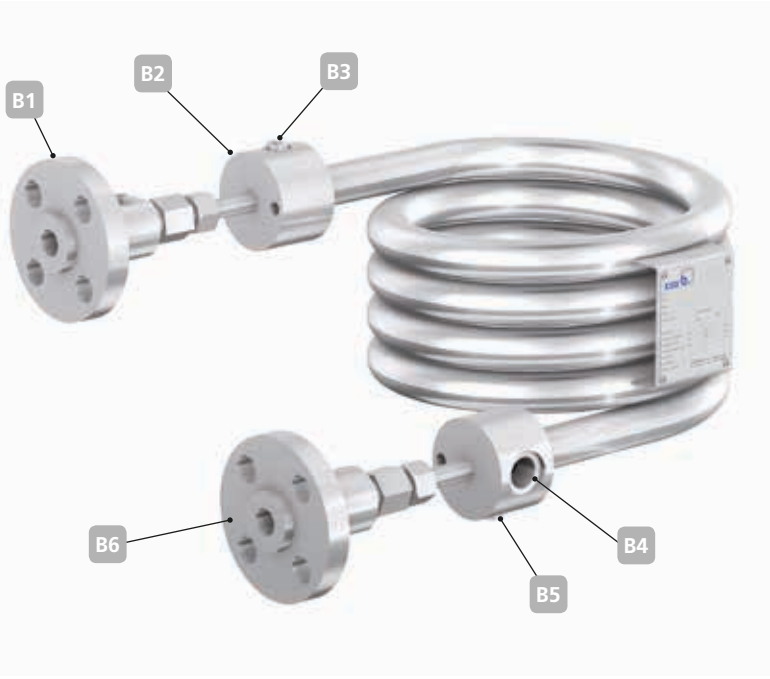
RWT23 – heat exchanger





Application:
mode of operation
to API Plan 23

1 General description

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

2 Use

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).

3 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.

4 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 mechanical seal*
- B2 Cooling water outlet
- B3 Cooling water vent (closed)
- B4 Cooling water inlet
- B5 Cooling water drain (closed)
- B6 To mechanical seal*

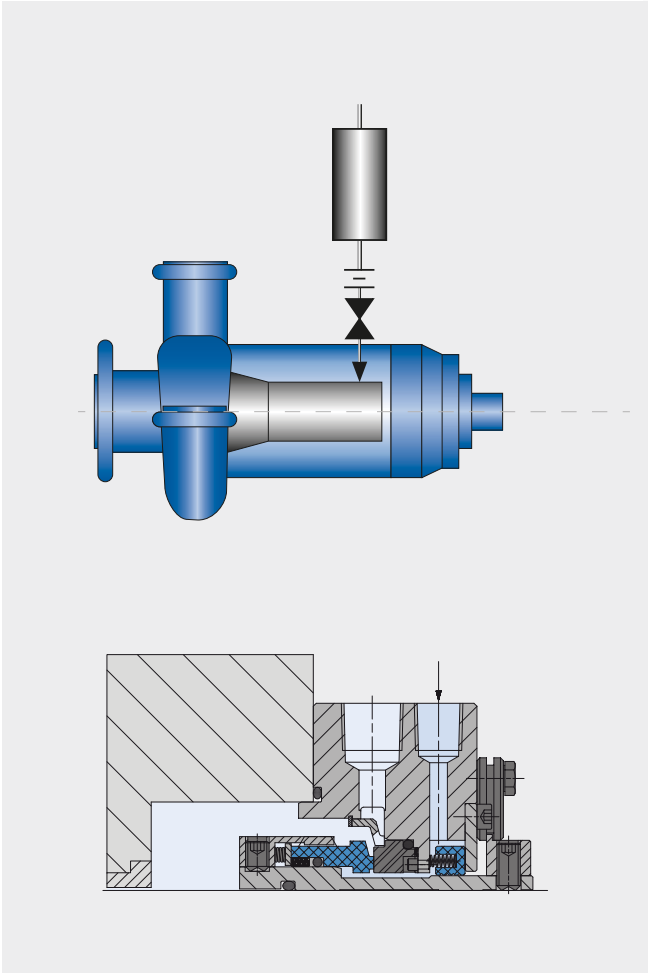
* Available in 3 different designs: flanged, screwed, welded.

Technical data

Process side	Up to 50 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 m²
Design to	ASME VIII-Div. 1
Business type	Engineered

Higher application limits on request

KWT51 – quench system



Application:
mode of operation
to API Plan 51 or 52

1 General description

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

2 Safety

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

3 Use

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.

A1	Sight glass	B1	Fill connection
A2	Vent	B2	From mechanical seal
		B3	To mechanical seal

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

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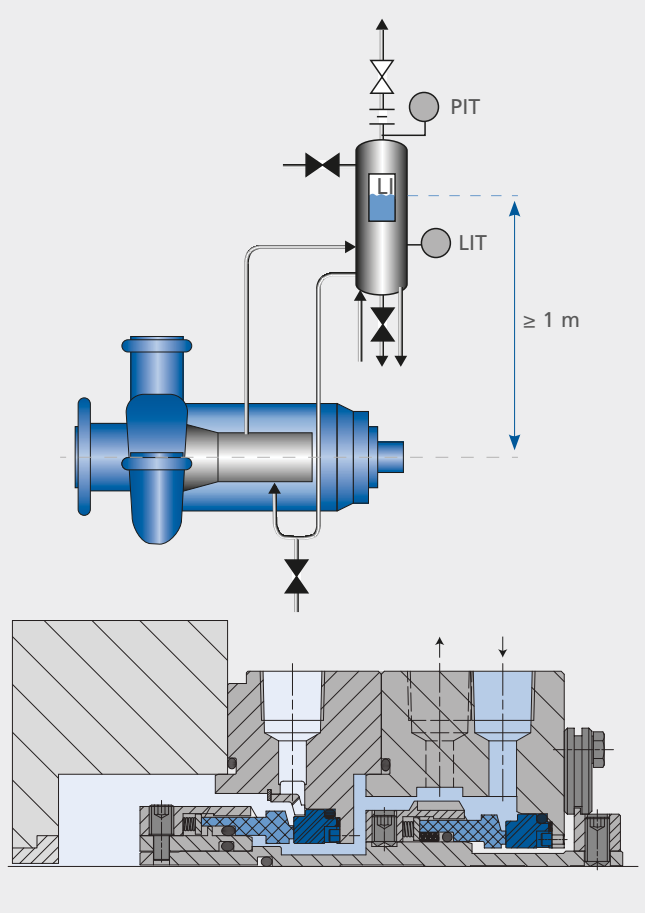
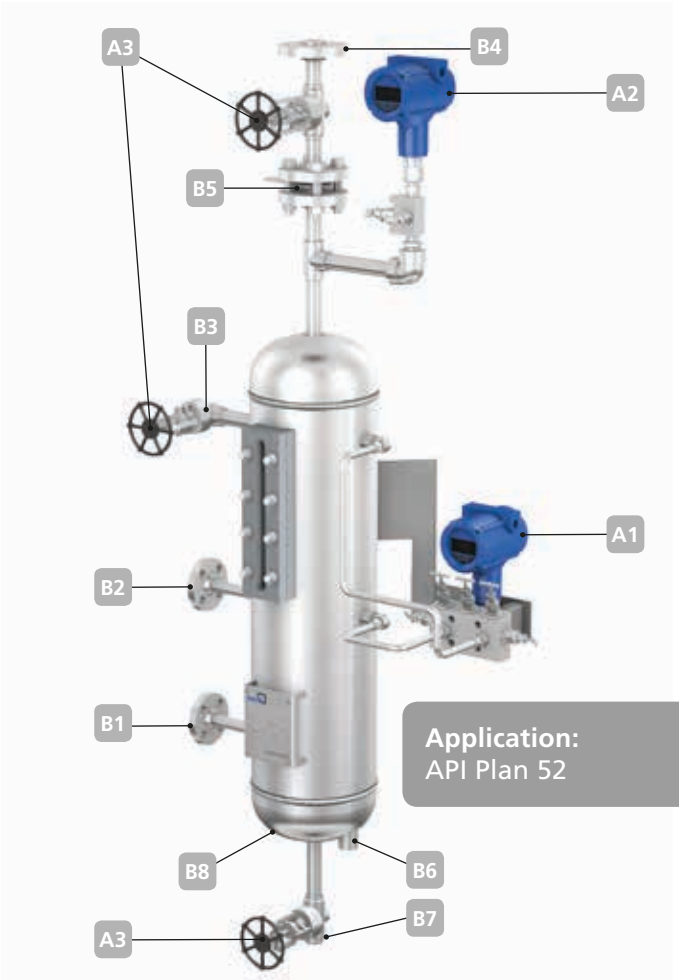
KTS52 – thermosyphon system to API 682, 4th edition*





Application:
API Plan 52

1 General description

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

2 Use

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

3 Efficiency

Circulation between the buffer fluid reservoir and the KSB mechanical seal 4EDBM6T is ensured via a circulation system integrated in the seal. The reservoir and the seal are perfectly matched.

4 Longer seal life

The system flushes the space between the seals with a clean buffer fluid. This also ensures that the heat in the area is removed, increasing the seal's service life.

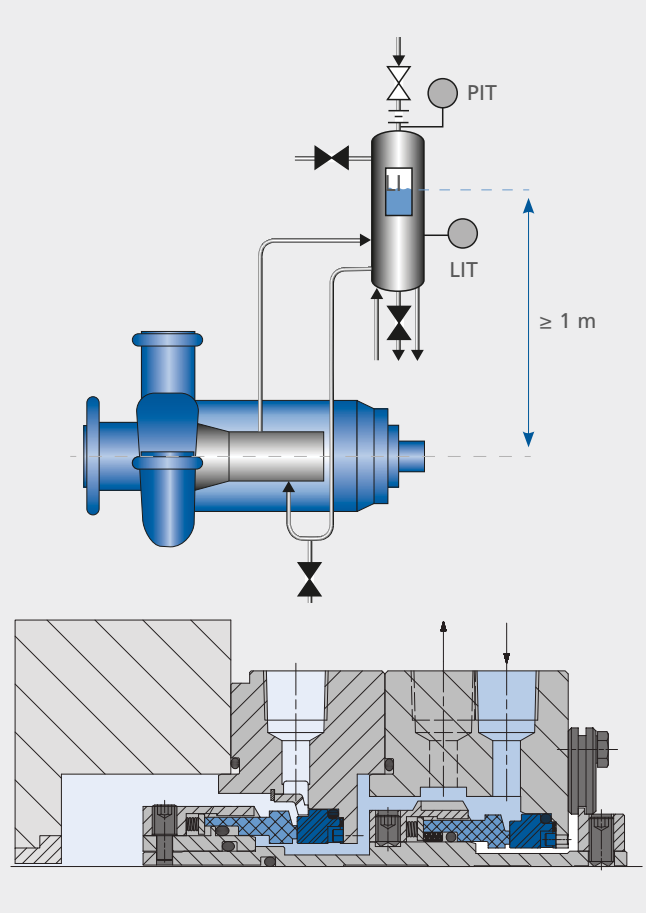
- A1 Level transmitter
- A3 Pressure transmitter
- A3 Shut-off valve
- B1 To mechanical seal
- B2 From mechanical seal
- B3 Fill connection
- B4 Connection to flare
- B5 Orifice plate
- B6 Cooling water outlet (closed))
- B7 Drain
- B8 Cooling water inlet (closed)

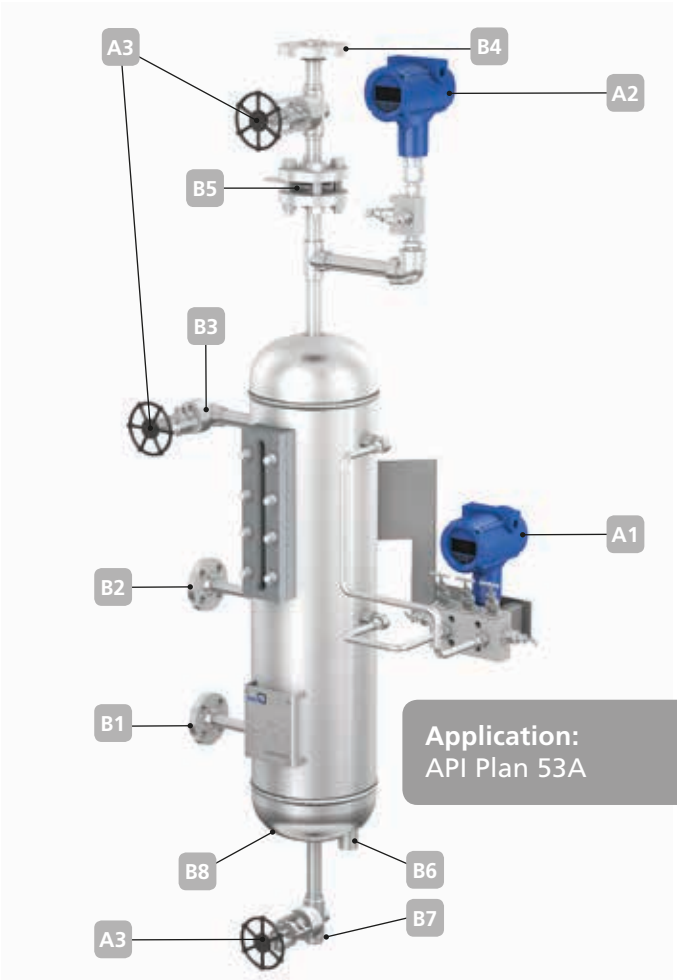
Technical data

Process side	Up to 50 bar: -29 °C to 200 °C
Cooling water side	Up to 16 bar: -29 °C to 99 °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
Business type	Standard (KSB Easy Select)

*System to API 682, 3rd edition, also available

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





Application:
API Plan 53A

1 General description

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

2 Use

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

3 Efficiency

Circulation between the barrier fluid tank and the KSB mechanical seal 4KSBM6D is ensured via a circulation system integrated in the seal. The system and the seal are perfectly matched.

4 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.

A1	Level transmitter	B1	To mechanical seal
A2	Pressure transmitter	B2	From mechanical seal
A3	Shut-off valve	B3	Fill connection
		B4	Connection to flare
		B5	Orifice plate
		B6	Cooling water outlet (closed)
		B7	Drain
		B8	Cooling water inlet (closed)

Technical data

Process side	Up to 50 bar: -29 °C to 200 °C
Cooling water side	Up to 16 bar: -29 °C to 99 °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
Business type	Standard (KSB EasySelect)

*System to API 682, 3rd edition, also available

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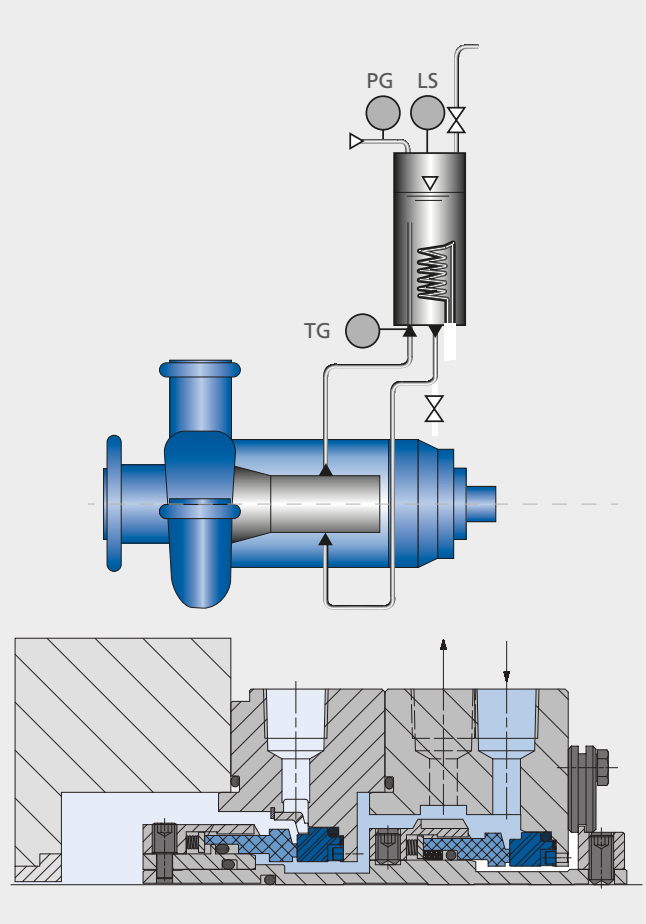
SDPN16 – thermosyphon system



Application:
mode of operation
to API Plan 52 or 53A

1 General description

Thermosyphon system for use with pressurised barrier fluid or unpressurised buffer fluid (Plan 53A and 52). 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.

2 Safety

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

3 Use

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

4 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.

Configurable components:

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

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
Business type	Standard (KSB EasySelect)

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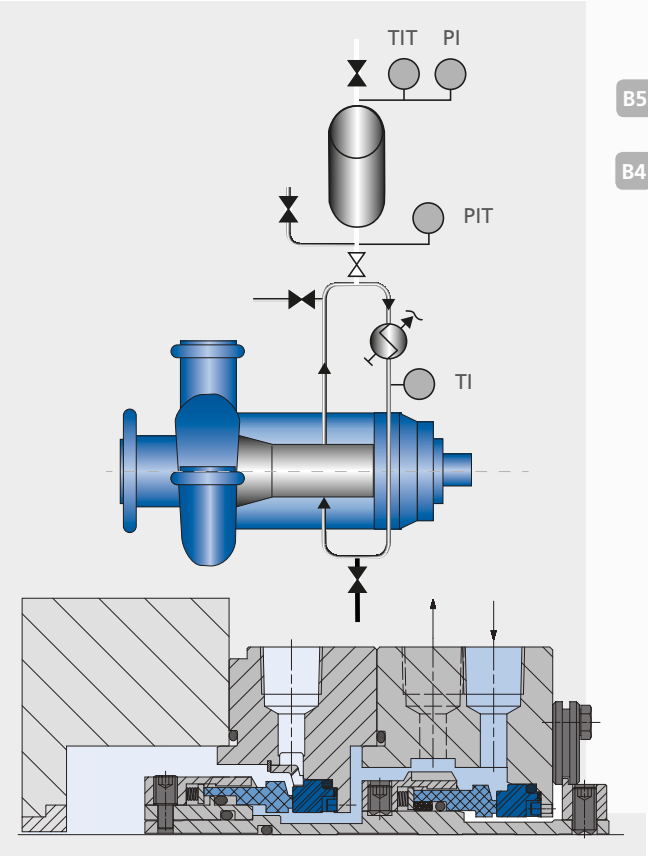
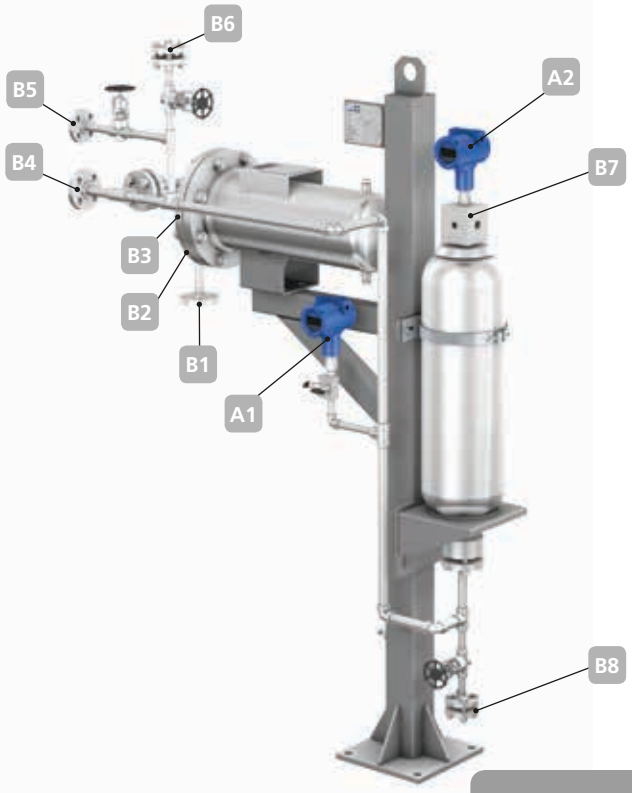
KTS53B – pressurised barrier fluid system to API 682, 4th edition*





Application:
API Plan 53B

1 General description

Closed pressurised barrier fluid system compliant with all requirements of API 682, 4th edition.

2 Use

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

3 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.

4 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.

A1	Pressure transmitter	B1	To mechanical seal
A2	Temperature transmitter	B2	Cooling water outlet
		B3	Cooling water inlet
		B4	From mechanical seal
		B5	Barrier fluid fill connection
		B6	Vent (closed)
		B7	Pressurised gas refill connection
		B8	Drain (closed)

Technical data

Process side	Up to 50 bar: -29 °C to 200 °C
Explosion protection for measuring instruments	EExd – IIC – T6 (ATEX EX II 1/2G)
Design to	ASME VIII-Div.1 PED 2014 / 68 / EU
Business type	Standard (KSB Easy Select)

*System to API 682, 3rd edition, also available
** Optionally available with water or air cooler

Material codes

Material code to DIN EN 12756	KSB designation	Description
Primary and mating rings (characters 1 and 2)		
Synthetic carbon		
A*	A	Carbon graphite, antimony-impregnated
B*	B	Carbon graphite, resin-impregnated
Metals		
S	S	Special cast chrome molybdenum steel
U carbide = tungsten carbide		
U1	U1	Tungsten carbide, Co-bonded
U2	U2	Tungsten carbide, Ni-bonded
Q = silicon carbide		
Q1*	Q1	SiC, sintered without pressure
Q2*	Q2	SiC-Si, reaction-bonded
Secondary seals (character 3)		
Elastomers, uncoated		
E*	E	Ethylene propylene rubber (EPDM), peroxide-cured
E	E3	EPDM approved for drinking water (WRAS)
E	E5	EPDM approved for drinking water (FDA)
E	E9	EPDM for special applications
K	K	Perfluoroelastomer FFKM
P	P	Nitrile rubber (NBR)
U	U1	Combination of perfluoroelastomer FFKM and PTFE
V*	V	Fluoroelastomer FKM (Viton®)
V1	V1	FKM, low-temperature-resistant
X	X	Special O-rings
X	X4	HNBR
Elastomers, encapsulated		
M5	M1	FKM, FEP-encapsulated
Other secondary seals		
G	G	Statotherm® pure graphite
Spring and bellows materials (character 4)		
Stainless steels		
G	G	1.4571 spring steel
F	F	1.4310 spring steel
High-nickel alloys		
M	M	2.4610 Hastelloy® C-4
M	M6	Inconel® 718
Other materials		
T	T	FST, unalloyed spring steel
Construction materials (character 5)		
Stainless steels		
G*	G	1.4571 CrNiMo steel
G*	G	1.4401 CrNiMo steel
G1	G1	1.4462 CrNiMo duplex steel
G2	G2	1.4439 CrNiMo steel
G3	G3	1.4539 CrNiMo steel
G4	G4	1.4501 super duplex stainless steel
E	E	1.4122 (1.4021) Cr steel
High-nickel alloys		
M	M	2.4610 Hastelloy® C-4
M1	M1	2.4617 Hastelloy® B-2
Other materials		
T	T4	Carpenter® 42

* Preferred materials