

MINEX®-S
Magnetic coupling

Made for Motion



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Coupling description

General description

The MINEX[®]-S is a permanent-magnetic synchronous coupling that transmits torque through magnetic forces between the internal and the external rotor.

It ensures a hermetic separation of the drive and the driven side in its main function as sealing element in pumps and agitators. For critical media like aggressive acids etc. it serves as a reliable seal and prevents serious leakages occurring.

On request KTR can manufacture special customer-specific types of the MINEX[®]-S in connection with KTR hydraulic components. Thus existing pumps with a conventional shaft seal can be easily retrofitted with the MINEX[®]-S.



Function/Design

Torque transmission

The coupling consists of an external and an internal rotor. The external rotor has high-quality, permanent magnets of changing polarity on the inner side and the internal rotor has them on the outside. The external rotor is normally fixed on the drive side and the magnets are glued in the keyways. The magnets of the driven-sided internal rotor are cylindrically ground to ensure a minimal air gap and encapsulated through a magnetic cover that is impervious to fluids.

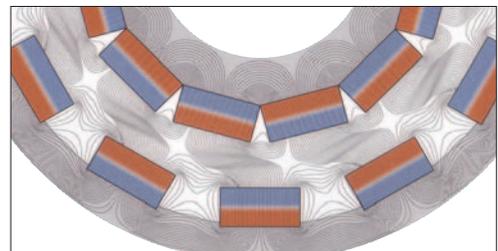
In their non-operative states the north and south poles of the rotors are opposite to each other and the magnetic field is completely symmetric. It is only when the rotors are twisted that the magnetic field lines are moved, hence the torque is transmitted through the air gap. Then there is a synchronous operation under a constant torsion angle.

If the maximum coupling torque and the maximum torsion angle are exceeded, the power transmission is interrupted. Thus the MINEX[®]-S offers an overload protection function of the drive train. After removing the cause of the overload (e. g. damage to the bearing, blocking of the internal rotor) both rotors can be synchronised again and operation is resumed.



Internal rotor

External rotor



Run of flux lines

Sealing function

The main component of the MINEX[®]-S is the containment shroud that is fixed to the driven-sided power unit and separates internal and external rotor from each other. It ensures a low-vibration torque transmission working without mechanical connection and guarantees a completely leak-proof separation of product and atmosphere. The sealing is achieved with a flat seal or an o-ring, thus eliminating the need to dynamically load the sealing elements.

The standard designs of MINEX[®]-S include metallic containment shrouds made of stainless steel or Hastelloy, respectively. Inside the rotating magnetic field they generally cause losses of eddy current which are converted into heat and which may require cooling measures. On applications with pumps the heat produced can basically be dissipated by the medium to be pumped.

If eddy current losses can be definitely excluded, the energy-efficient alternative materials PEEK and ceramics are available. PEEK is first class with rather low pressures and temperatures (depending on size up to 16 bar and 130 °C). For higher performances up to 25 bar and 300 °C we would recommend to use containment shrouds made of ceramics.



Containment shroud

Technical description

Explosion-protection use

MINEX®-S couplings are suitable for the power transmission in drives that are scheduled to be used in explosive areas. According to the EU standards 94/9/EC (ATEX 95) the types with metallic containment shrouds are assessed and confirmed as components of the device class II and suitable for the use in explosive areas of category 2G.



Please see our website www.ktr.com for advice, copies of certification and operating/mounting instructions.

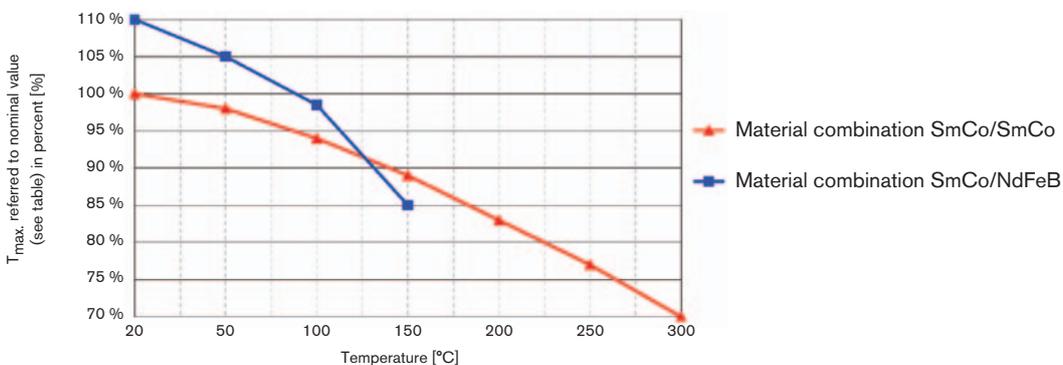
Technical data															
Size	Stat. tear torque T_K max. with 20 °C [Nm]	External rotor				Internal rotor				Containment shroud					
		Standard material		Max. operating-temperature t_{max} [°C]	Weight unbored [kg]	Mass moment of inertia with min. bore \varnothing [kgm ²]	Standard material		Max. operating-temperature t_{max} [°C]	Weight pilot bored [kg]	Mass moment of inertia with min. bore \varnothing [kgm ²]	Standard material ²⁾		Max. pressure resistance P_N/P_{max} ¹⁾ [bar]	Max. operational speed [rpm]
		Hub	Magnets				Hub	Magnets				Flange	Can		
SA 22/4	0,15		NdFeB	150	0,13	$30,01 \times 10^{-6}$	1.4462	NdFeB	150	0,04	$1,912 \times 10^{-6}$		Stainless steel 1.4571	60/90	3600 rpm using metal stationary cans as per KTR standard
SA 34/10	1		NdFeB	150	0,26	$117,4 \times 10^{-6}$			150	0,09	$12,1 \times 10^{-6}$		Stainless steel 1.4571	16/24	
SA 46/6	3		Samarium-cobalt (Sm_2Co_{17}) or neodymium-iron-boron (NdFeB)	300 °C (Sm_2Co_{17}) or 150 °C (NdFeB)	0,62	$458,6 \times 10^{-6}$				0,32	125×10^{-6}		Stainless steel 1.4571 or Hastelloy	40/60	
SA 60/8	7				1,75	2279×10^{-6}				0,56	221×10^{-6}				
SB 60/8	14				2,68	3759×10^{-6}				0,93	380×10^{-6}				
SA 75/10	10				1,36	3159×10^{-6}				0,94	539×10^{-6}				
SB 75/10	24				2,10	4829×10^{-6}				1,49	889×10^{-6}				
SC 75/10	40				2,89	6654×10^{-6}				1,89	1232×10^{-6}				
SA 110/16	25	Structural steel S355/J2G3			1,84	7356×10^{-6}				2,55	3264×10^{-6}				
SB 110/16	60				2,82	12111×10^{-6}				3,73	5229×10^{-6}				
SC 110/16	95				3,79	16238×10^{-6}				4,85	7137×10^{-6}				
SB 135/20	100				3,75	22878×10^{-6}				5,67	12333×10^{-6}				
SC 135/20	145		4,90	29874×10^{-6}				7,36	16768×10^{-6}						
SD 135/20	200		6,06	36870×10^{-6}				9,50	22387×10^{-6}						
SC 165/24	210		5,31	45480×10^{-6}				11,40	37917×10^{-6}						
SD 165/24	280		6,56	56170×10^{-6}				14,67	50633×10^{-6}						
SE 165/24	370		7,81	66860×10^{-6}				17,30	60855×10^{-6}						
SD 200/30	430		9,89	117296×10^{-6}				26,06	125915×10^{-6}						
SE 200/30	550		10,36	122342×10^{-6}				26,11	126405×10^{-6}						
SD 250/38	670		10,93	202540×10^{-6}				37,92	282795×10^{-6}						
SE 250/38	820		13,03	241273×10^{-6}				45,22	340420×10^{-6}						
SD 250/38	1000		15,13	280000×10^{-6}				52,50	397915×10^{-6}						

¹⁾ Resistances to higher pressures can be realized on request of the customer.
²⁾ Alternative materials of stationary cans like oxide ceramics (see page 179) and PEEK (see page 178) are available on request.

Description	Reference	Definition or explanation
Static tear torque of coupling	T_K max.	Max. transmittable torque, from which onwards the magnetic forces tear during the static test.

Description	Reference	Definition or explanation
Maximum operating temperature	t_{max}	Max. permissible temperature causing a temporary attenuation of the magnetic field. Exceeding irretrievable losses of magnetization.

Torque reduction with temperature increase



Temporary torque reduction with increased temperature for alternative material combinations [%]

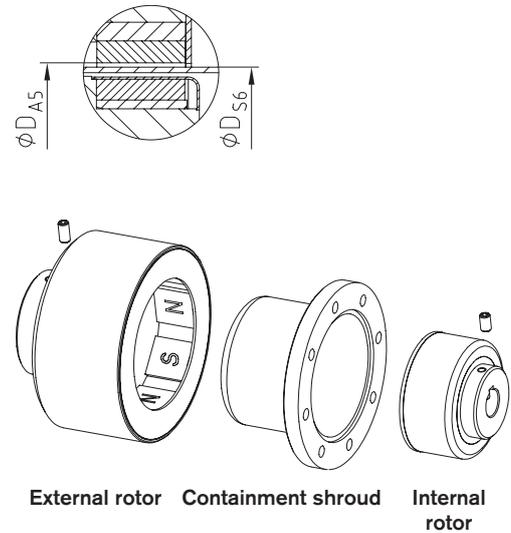
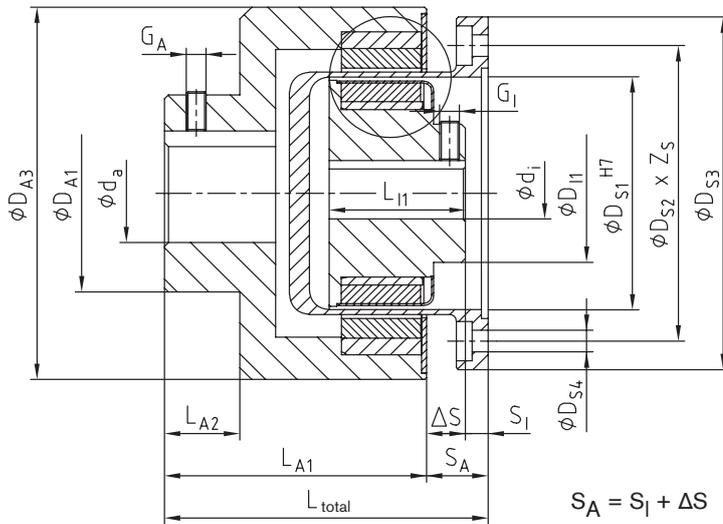
Please note:

KTR recommends to use NdFeB magnets for the external rotor, provided that the operating temperature falls below 150 °C.

Sizes SA 22/4 to SB 60/8 with containment shroud made of stainless steel



- Contactless torque transmission
- Hermetic separation of drive and driven side
- Containment shroud made of stainless steel 1.4571
- Available from stock with pilot bored internal rotor and unbored external rotor
- Finish bore possible to ISO H7, feather keyway to DIN 6885 sheet 1 - JS9
- Approved according to EC Standard 94/9/EC
- Mounting instructions available at www.ktr.com



Technical data – Internal rotor and containment shroud													
Size	TK max. [Nm] in case of ~ 20 °C	Dimensions [mm]											
		Internal rotor						Containment shroud					
		Finish bore ¹⁾ d _i		D _{I1}	L _{I1}	S _I		G _I	D _{S1}	D _{S2}	D _{S3}	D _{S4}	Z _S
min.	max.	min.	max.										
SA 22/4	0,15	5	9	20	20	2,0	2,0	M3	21,5	38	46	4,5	8
SA 34/10	1	5	12	20	22	2,0	5,5	M3	34	46	55	4,5	4
SA 46/6	3	8	16	28	33	6,5	7,0	M4	46	-	78	-	-
SA 60/8	7	12	22	36	36	2,2	3,5	M5	59	75	89,5	5,5	8
SB 60/8	14	12	22	36	56	0,0	3,5	M5	59	75	89,5	5,5	8

Technical data – External rotor and general														
Size	Dimensions [mm]													
	External rotor							General						
	Finish bore ¹⁾ d _a		D _{A1}	D _{A3}	L _{A1}	L _{A2}	delta S	G _A	D _{S6}	D _{A5}	L _{total}			
min.	max.	min.									max.			
SA 22/4	5	11	18	38	35	8,5	5,0	M4	23,5	24,8	42	42		
SA 34/10	5	14	22	53	38,5	10,5	5,5	M4	36,0	37,3	46	49,5		
SA 46/6	5	19	30	69,5	53	16	9,0	M5	48,5	49,4	68,5	69,5		
SA 60/8	9	28	50	94,5	66	19	12,0	M6	61,0	63,2	80	81,3		
SB 60/8	9	38	50	94,5	93	15	12,0	M8	61,5	63,2	105	108		

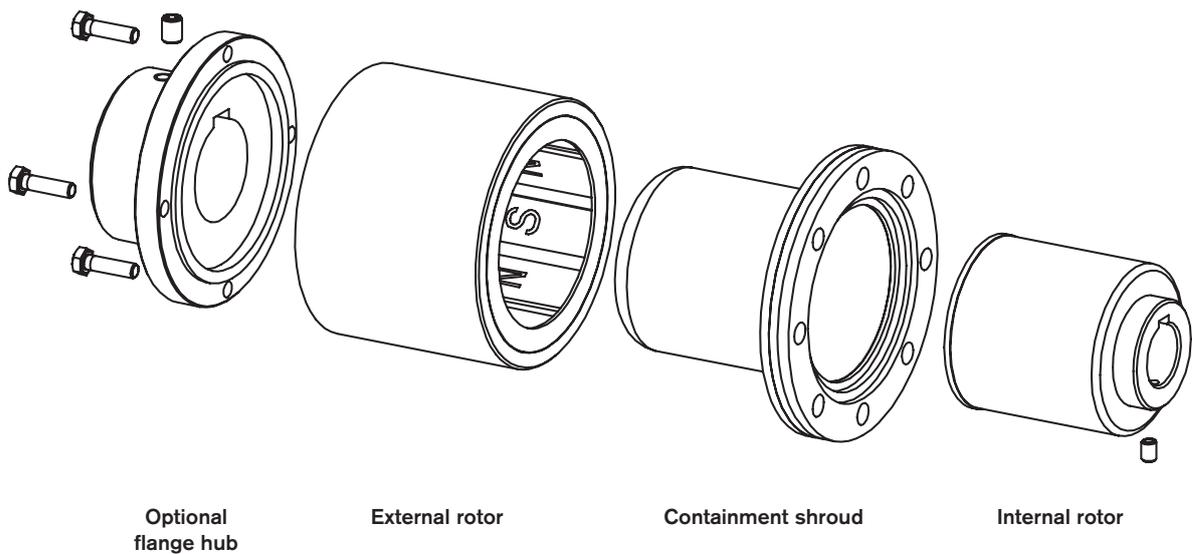
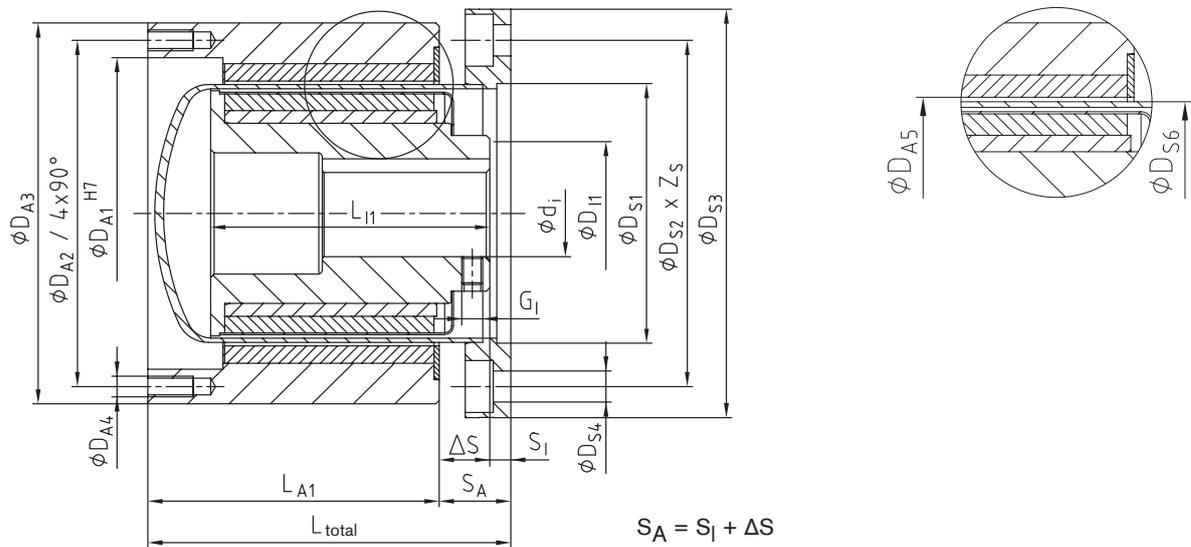
¹⁾ Bore H7 with feather keyway DIN 6885 sheet 1 [JS9]

Order form:	MINEX® SA 60/8	Design	d _i Ø 20 mm	d _a Ø 24 mm
	Coupling size	NdFeB – t _{max.} = 150 °C Sm ₂ Co ₁₇ – t _{max.} = 300 °C	Finish bore (H7) feather keyway DIN 6885 sheet 1 (JS9)	

Sizes SA 75/10 to SF 250/38 with containment shroud made of stainless steel or Hastelloy



- Contactless torque transmission
- Hermetic separation of drive and driven side
- As an alternative containment shroud made of stainless steel 1.4571 or Hastelloy
- Two-part external rotor with flange hub that must be separately screwed, customer-specific variations are possible
- Available from stock with pilot bored internal rotor
- Finish bore possible to ISO H7, feather keyway to DIN 6885 sheet 1 - JS9
- Approved according to EC Standard 94/9/EC



Order form:	MINEX® SB 75/10	Design	$d_i \text{ } \varnothing \text{ 20 mm}$	$d_a \text{ } \varnothing \text{ 24 mm}$	Containment shroud type
	Coupling size	NdFeB - $t_{max.} = 150 \text{ } ^\circ\text{C}$ Sm ₂ Co ₁₇ - $t_{max.} = 300 \text{ } ^\circ\text{C}$	Finish bore (H7), feather keyway DIN 6885 sheet 1 (JS9)		Stainless steel 1.4571 or Hastelloy

Technical data – Sizes SA 75/10 to SF 250/38

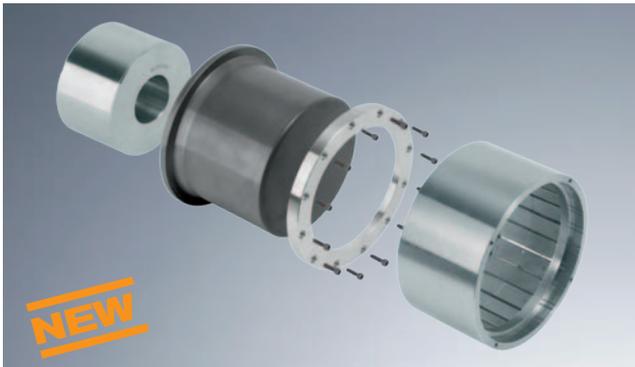
Technical data – Internal rotor and containment shroud													
Size	T _K max. [Nm] in case of ~ 20 °C	Dimensions [mm]											
		Internal rotor						Containment shroud					
		Finish bore ¹⁾ d _i		D _{I1}	L _{I1}	S _I		G _I	D _{S1}	D _{S2}	D _{S3}	D _{S4}	Z _S
		min.	max.			min.	max.						
SA 75/10	10				39,5		46,5						
SB 75/10	24	12	28	45	58	4	26,5	M6	75	100	118	9	8
SC 75/10	40				80		6,0						
SA 110/16	25				45		51,0						
SB 110/16	60	14	55	72	65	4	31,0	M8	110	133	153	9	12
SC 110/16	95				85		11,0						
SB 135/20	100				65		46,5						
SC 135/20	145	20	70	90	85	4	26,5	M10	135	158	178	9	16
SD 135/20	200				110		7,0						
SC 165/24	210				85		66,5						
SD 165/24	280	24	90	110	110	6	41,0	M12	163,5	192	218	11	12
SE 165/24	370				130		22,0						
SD 200/30	430				135								
SE 200/30	550	38	90	130		6	18,0	M16	200	252	278	11	12
SD 250/38	670				115		7,0						
SE 250/38	820	38	90	165	135	–	26,0	M16	255	285	315	13,5	12
SF 250/38	1000				155		46,0						

Technical data – External rotor and general									
Size	Dimensions [mm]								
	External rotor						General		
	D _{A1}	D _{A2}	D _{A3}	D _{A4}	L _{A1}	ΔS	D _{S6}	D _{A5}	L _{total}
SA 75/10					41				
SB 75/10	90	100	110	M6	61	12,5	74,6	76,4	102
SC 75/10					83,5	14,5			
SA 110/16					41				
SB 110/16	126	135	145	M6	61	19,0	111,5	113,1	115
SC 110/16					81				
SB 135/20					70				
SC 135/20	150	160	170	M6	90	18,5	136,5	138,5	139
SD 135/20					110	22,0			
SC 165/24					90	18,5			
SD 165/24	150	188	198	M6	110		167,0	169,2	170
SE 165/24					130	21,0			
SD 200/30									
SE 200/30	212	222	232	M6	130	26,0	198,0	199,5	180
SD 250/38					110				
SE 250/38	267	277	287	M6	130	26,0	253,0	255,0	183
SF 250/38					150				

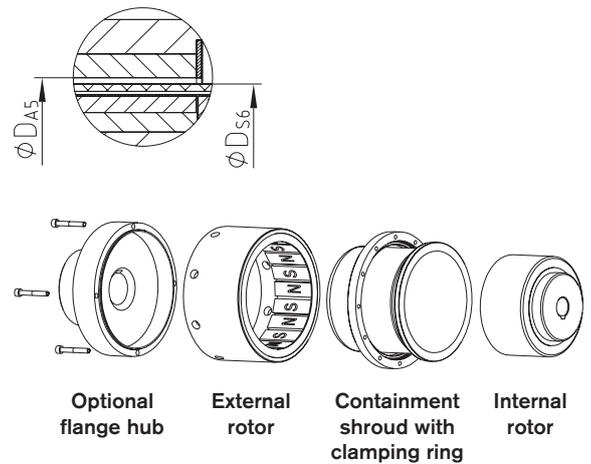
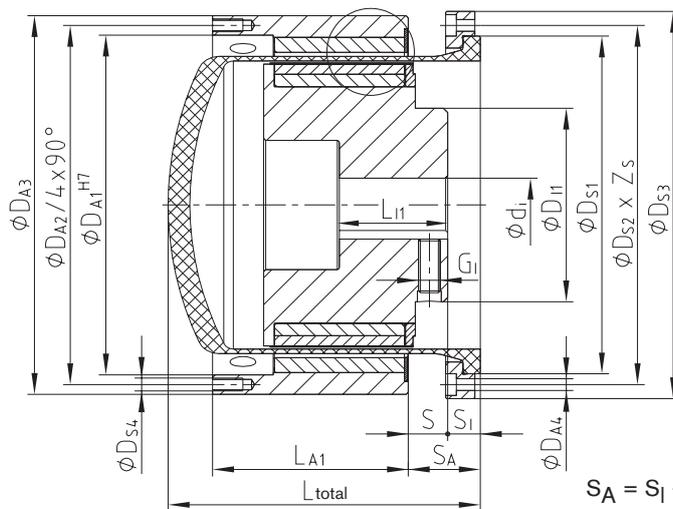
¹⁾ Bore H7 with feather keyway DIN 6885 sheet 1 [JS9]

Futher sizes on request.

Sizes SA 75/10 to SE 165/24 with containment shroud made of PEEK



- No eddy current losses and consequently no generation of heat in the coupling caused by the containment shroud
- Low susceptibility to fracture, low weight, easy handling
- Optimal solution with low demands on temperature and pressure resistance (up to 16 bar and 130 °C)
- Internal cooling measures are not required
- High energy efficiency and effectiveness
- The selection torque may be reduced by 10 - 15 %
- Suitable for dry-running drives like compressors and vacuum pumps, but also mixers, polyurethane plants, etc.



Technical data – Internal rotor and containment shroud

Size	TK max. [Nm] in case of ~ 20 °C	Dimensions [mm]												
		Internal rotor						Containment shroud						
		Finish bore ¹⁾ d ₁		D ₁₁	L ₁₁	S ₁		G ₁	D _{S1}	D _{S2}	D _{S3}	D _{S4}	D _{S5}	Z _S
min.	max.	min.	max.											
SA 75/10	10			45	39,5									
SB 75/10	24	12	28	45	58	7,5								
SC 75/10	40			80	80	5,5								
SA 110/16	30			80	45									
SB 110/16	70	14	55	80	65	4,0								
SC 110/16	100			80	85									
SB 135/20	110			90	65									
SC 135/20	155	20	70	90	85	4,0								
SD 135/20	210			110	110									
SC 165/24	220			110	85									
SD 165/24	300	24	90	110	110	4,0								
SE 165/24	390			130	130	0,0								

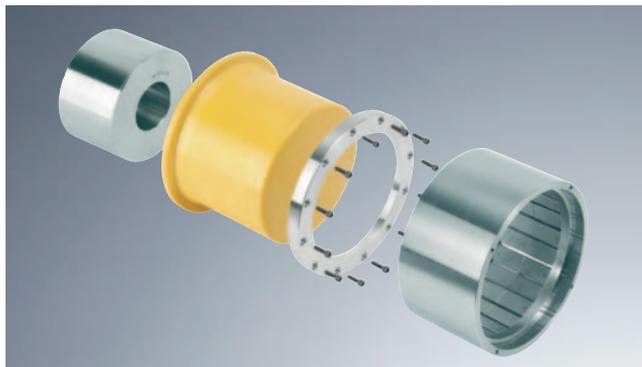
Technical data – External rotor and general

Size	Dimensions [mm]								
	External rotor						General		
	D _{A1}	D _{A2}	D _{A3}	D _{A4}	L _{A1}	ΔS	D _{S6}	D _{A5}	L _{total}
SA 75/10					41				
SB 75/10	90	100	110	M6	61	12,5	75,1	76,5	108
SC 75/10					83,5	14,5			
SA 110/16					41				
SB 110/16	130	138	150	M6	61	19	113,2	115,7	115
SC 110/16					81				
SB 135/20					70				
SC 135/20	158	167	176	M6	90	18,5	138,2	141,9	144
SD 135/20					110	21			
SC 165/24					90	18			
SD 165/24	186	195	204	M6	110		168,3	172,0	156
SE 165/24					130	21			160

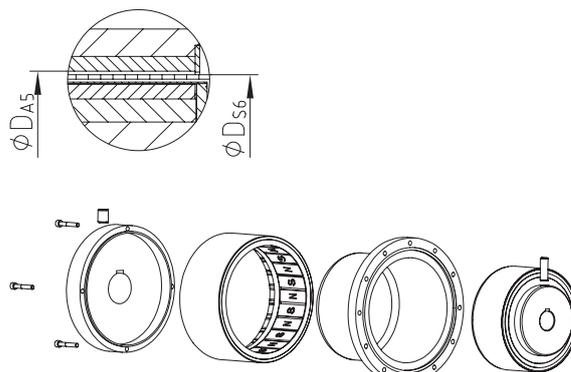
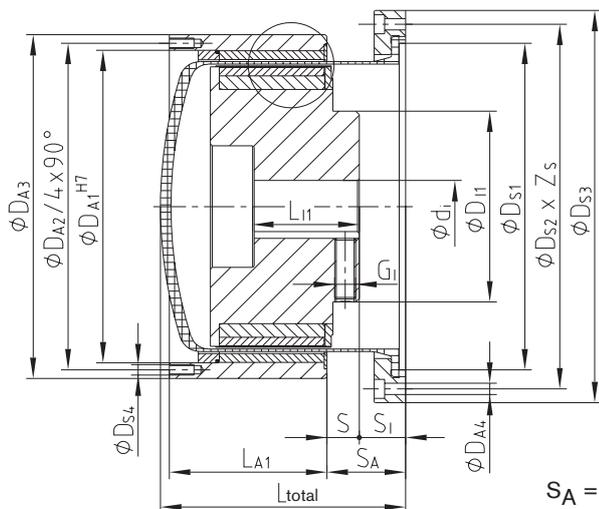
¹⁾ Bore H7 with feather keyway DIN 6885 sheet 1 [JS9]

Order form:	MINEX® SD 165/24	Design	d _i Ø 20 mm	d _a Ø 24 mm	Containment shroud type
	Coupling size	NdFeB – t _{max.} = 150 °C Sm ₂ Co ₁₇ – t _{max.} = 300 °C	Finish bore (H7), feather keyway DIN 6885 sheet 1 (JS9)		PEEK

Sizes SA 110/16 to SE 200/30 with containment shroud made of oxide ceramics



- No eddy current losses and consequently no generation of heat in the coupling caused by the containment shroud
- Suitable for higher demands on temperature and pressure resistance (up to 25 bar and 300 °C)
- Internal cooling measures are not required
- High energy efficiency and effectiveness
- The selection torque may be reduced by 10 - 15 %
- Suitable for dry-running drives like compressors and vacuum pumps, but also mixers, polyurethane plants, etc.
- Sizes SA 110/16 to SE 200/30 available from stock, other sizes on request
- Approved according to EC Standard 94/9/EC



Optional flange hub External rotor Containment shroud with clamping ring Internal rotor

$$S_A = S_1 + \Delta S$$

Technical data – Internal rotor and containment shroud

Size	T_K max. [Nm] in case of ~ 20 °C	Dimensions [mm]											
		Internal rotor					Containment shroud						
		Finish bore ¹⁾ d_i		D_{I1}	L_{I1}	S_I		G_I	D_{S1}	D_{S2}	D_{S3}	D_{S4}	Z_S
min.	max.	min.	max.										
SA 110/16	25				45		49,0						
SB 110/16	60	14	55	72	65	4,0	29,0	M8	119,5	148	162	5,5	12
SC 110/16	95				85		9,0						
SB 135/20	100				65		46,5						
SC 135/20	145	20	70	90	85	4,0	26,5	M10	145	173	187	5,5	12
SD 135/20	200				110		7,0						
SC 165/24	210				85	3,5	28,0						
SD 165/24	280	24	90	110	110	-	4,0	M12	188	210	226	6,6	12
SE 165/24	370				130	6,0	14,0						
SD 200/30	430				135		14,0	M16	242	272	294	9,0	12
SE 200/30	550	38	90	130	135	6,0	14,0	M16	242	272	294	9,0	12

Technical data – External rotor and general

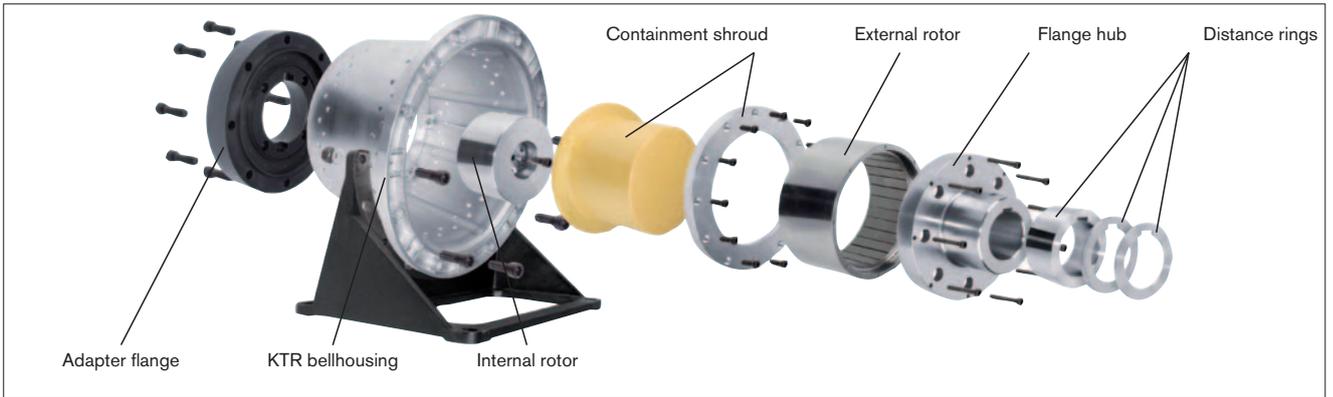
Size	Dimensions [mm]								
	External rotor					General			
	D_{A1}	D_{A2}	D_{A3}	D_{A4}	L_{A1}	ΔS	D_{S6}	D_{A5}	L_{total}
SA 110/16					41				
SB 110/16	126	135	145	M6	61	19,0	111,5	113,1	115
SC 110/16					81				
SB 135/20					70				
SC 135/20	150	160	170	M6	90	18,5	136,5	138,5	139
SD 135/20					110	22,0			
SC 165/24					90	18,5			
SD 165/24	180	188	198	M6	110		167,0	169,2	170
SE 165/24					130	21,0			
SD 200/30									
SE 200/30	212	222	232	M6	130	26,0	198,0	199,5	180

¹⁾ Bore H7 with feather keyway DIN 6885 sheet 1 [JS9]

Order form:

MINEX® SB 135/20	Design	d_i Ø 20 mm	Containment shroud type
Coupling size	NdFeB – $t_{max.} = 150$ °C Sm ₂ Co ₁₇ – $t_{max.} = 300$ °C	Finish bore (H7), feather keyway DIN 6885 sheet 1 (JS9)	Oxide ceramics ZrO ₂ MgO

Mounting sets and customized assemblies



On request KTR can offer special customer-specific solutions in combination with hydraulic components from KTR, whereby existing systems can be easily retrofitted with the MINEX®-S.

Redesigning sets for PUR foaming processes

Conveying and proportioning the media polyol and isocyanate in the processing plants for PUR, ambient air has to be prevented from penetrating into the process, since otherwise unwanted reactions may be produced.

For a reliable sealing of such drives KTR offers standard sets for retrofitting, among others for axial piston pumps types **REXROTH A2VK** and **ROTARY POWER C series** offering the following benefits:

- Maintenance-free operation
- Standstill periods are considerably reduced
- No more problems with sealing
- Better efficiency and process safety

The assemblies are available for all motor-pump-combinations and in various materials.



Axial piston pump REXROTH type A2VK

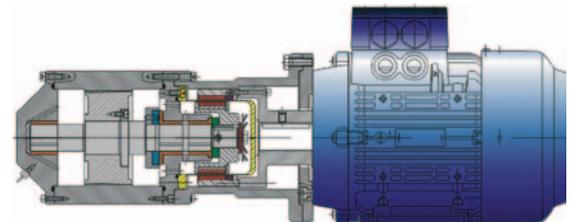


Maintenance-free sealing of dosing pump for polyde and isocyanate in high-pressure reaction casting machines

Examples of application



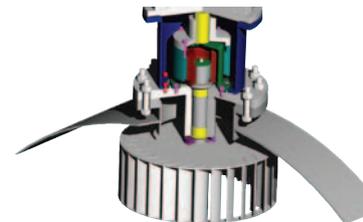
Use of the MINEX®-S in a small centrifugal pumps



MINEX®-S for sealing homogenizers for heavy oil processing in marine operation



Re-equipment of a gear pump with MINEX® SA 75/10, bellhousing PK 200/30, base flange and damping rod



MINEX®-S for the separation of autoclaves (T.B.M./STERICHEM) in laboratories and clinics

Technical data for coupling selection/selection of components

Motor type	_____	Pump type	_____
Power	_____ kW	Speed	_____ rpm
Pressure	_____ bar	Temperature	_____ °C
Viscosity of medium	_____ mm ² /s	Max. perm. dimensions	_____ ØDxL _{total}