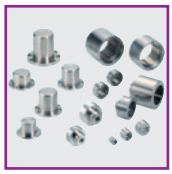
For advanced drive technology KTR



MINEX®-S
Permanent magnetic coupling

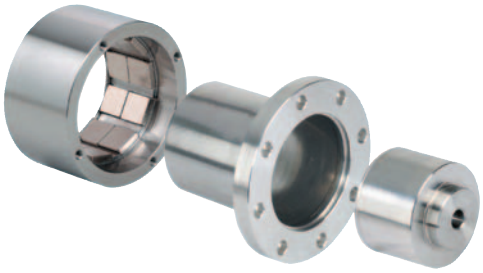
MINEX®-S
Permanent magnetic coupling
Coupling description

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 occuring.

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

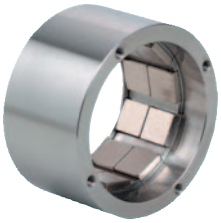
Torque transmission

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.

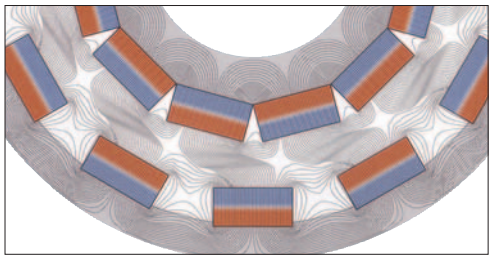
In their non-operative states the north and south poles of the rotors are opposite to each other and the magnetic field is completely symmetric.
It is only when the rotors are twisted that the magnetic field lines are moved, hence the torque is transmitted through the air gap. Then there is a synchronous 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, blokking 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 containment shroud and internal rotor are generally made from stainless steel 1.4571 or Hastelloy.
The magnets of the internal rotor are encapsulated to make them impervious to fluids and thus protected against external influences.

Since the containment shroud is a stationary component with a rotating magnetic field, it causes losses of eddy current. In order to keep these low, the containment shroud is also available in Hastelloy from size 75 upwards ensuring a higher electrical resistance than stainless steel. If eddy current losses can definitely be excluded, alternative materials like PEEK or ceramics may be chose.

Containment shroud

MINEX®-S
Permanent magnetic coupling
Coupling description

Explosion-protection use

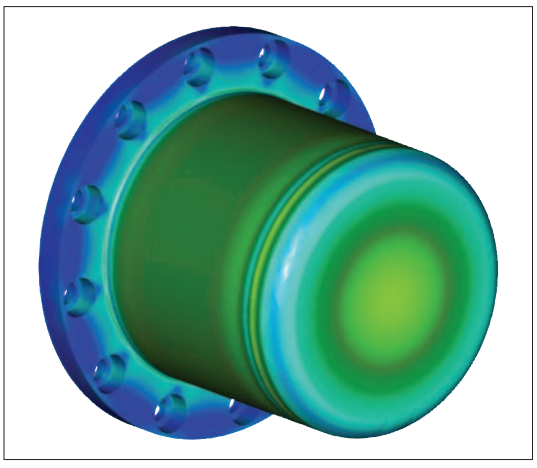
MINEX®-S couplings are suitable for the power transmission in drives that are used in hazardous areas. As a component of the device class II the couplings are assessed and confirmed for the use in explosive areas of category 2G according to the EU standards 94/9/EC (ATEX 95).

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

Technical data

Standard materials:

1. External rotor	hub made from steel 355J2G3 magnets made from Sm_2Co_{17} or NdFeB
2. Internal rotor	hub made from stainless steel 1.4571 magnets made from Sm_2Co_{17} (t_{max} = 250 °C) magnetic cover made from stainless steel 1.4571
3. Containment shroud	flange made from stainless steel 1.4571 containment shroud made from stainless steel 1.4571, from size 75 upwards also from Hastelloy Alternative materials: non-ferrous metallic fission pots from oxide ceramics (ZrO_2MgO), PEEK or CFK fission pots with PTFE inliner
Permissible operating pressure:	16 bar for containment shroud made from stainless steel 1.4571 25 bar for containment shroud made from Hastelloy Higher resistances to pressure are possible upon request.
Permissible operating temperature:	250 °C for magnet material samarium cobalt (Sm_2Co_{17}) 150 °C for magnet material neodymium iron boron (NdFeB)
Max. speed	3,600 rpm if you use containment shrouds made to KTR standard

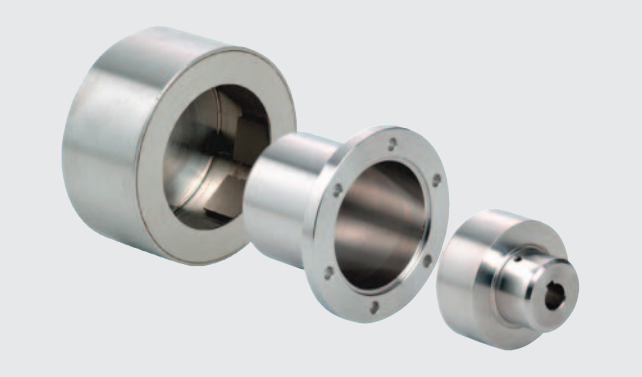


Use of FEM to optimise the geometry of the containment shroud

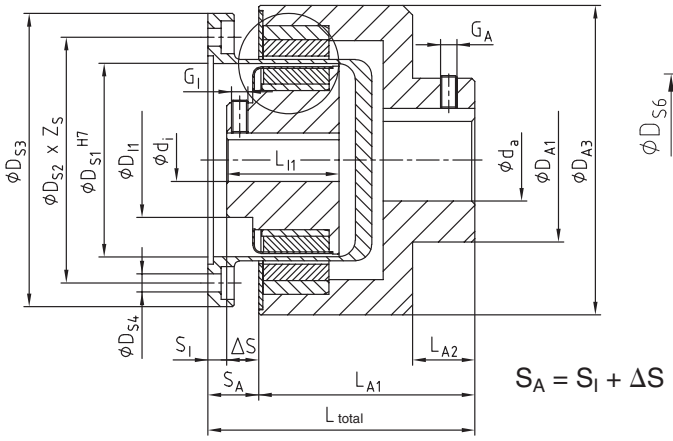
MINEX®-S

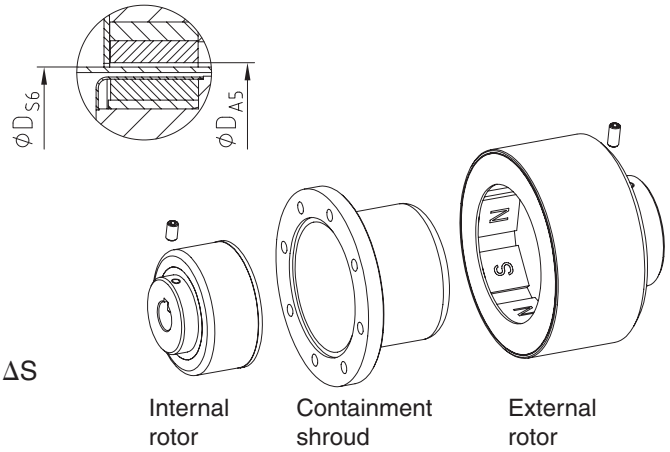
Permanent magnetic coupling

Sizes SA 22/4 to SB 60/8



- Contactless torque transmission
- Hermetic separation of drive and driven side
- 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
- Standard containment shroud made from stainless steel 1.4571
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)
- Mounting instructions available at www.ktr.com





MINEX®-S size	$T_{Kmax.}$ [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	66	78	4,5	8
SA 60/8	7	12	22	35	36	2,2	3,5	M5	59	75	89,5	5,5	8
SB 60/8	14				56	0,0	3,5						

MINEX®-S size	Dimensions [mm]											
	External rotor								General			
	Finish bore[1] d_a		D_{A1}	D_{A3}	L_{A1}	L_{A2}	ΔS	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	61,1	63,2	80	81,3
SB 60/8	9	38			93	15		M8	61,6	63,2	105	108

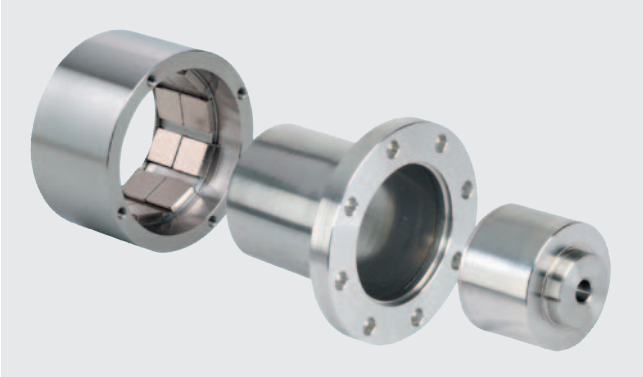
[1]Bore H7 with feather keyway DIN 6885 sheet 1 [JS9]

Order form:

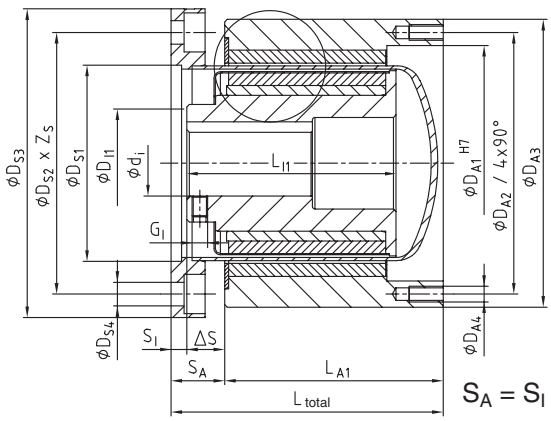
MINEX® SA 60/8	Design	d_i Ø 20 mm	d_a Ø 24 mm
Coupling size	NdFeB – $t_{max.}$ = 150 °C Sm_2Co_{17} – $t_{max.}$ = 250 °C	Finish bore H7; feather keyway DIN 6885 sheet 1 [JS9]	Finish bore H7; feather keyway DIN 6885 sheet 1 [JS9]

MINEX®-S

Permanent magnetic coupling
Sizes SA 75/10 to SE 200/30

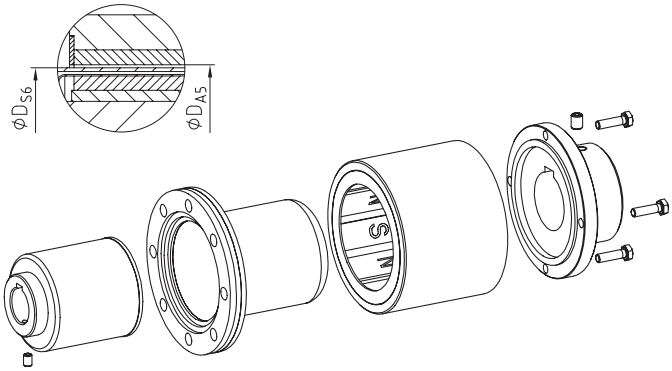


- Contactless torque transmission
- Hermetic separation of drive and driven side
- Two-part external rotor with flange hub that must be separately screwed, customer-specific variations are possible
- Available from stock with pilot bored internal rotor
- Finish bore possible to ISO H7, feather keyway to DIN 6885 sheet 1 - JS9
- Containment shroud also available from stainless steel or Hastelloy
- Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)



$S_A = S_I + \Delta S$

Internal rotor | Containment shroud | External rotor | Optional flange hub



MINEX®-S size	$T_{Kmax.}$ [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	20	12	28	40	48	4	26,5	M6	75	100	118	9	8
SC 75/10	30				80		6,0						
SA 110/16	24				50		51,0						
SB 110/16	50	14	55	72	70	4	31,0	M8	110	133	153	9	12
SC 110/16	80				90		11,0						
SB 135/20	80				70		46,5						
SC 135/20	125	20	70	90	90	4	26,5	M10	135	158	178	9	16
SD 135/20	168				110		7,0						
SB 165/24	120				70		66,5						
SC 165/24	185	24	90	110	90	6	46,5	M12	163,5	192	218	11	12
SD 165/24	250				110		24,0						
SE 165/24	315				130		14,0						
SD 200/30	400	38	90	130	135	6	18,0	M16	200	252	278	11	12
SE 200/30	510												

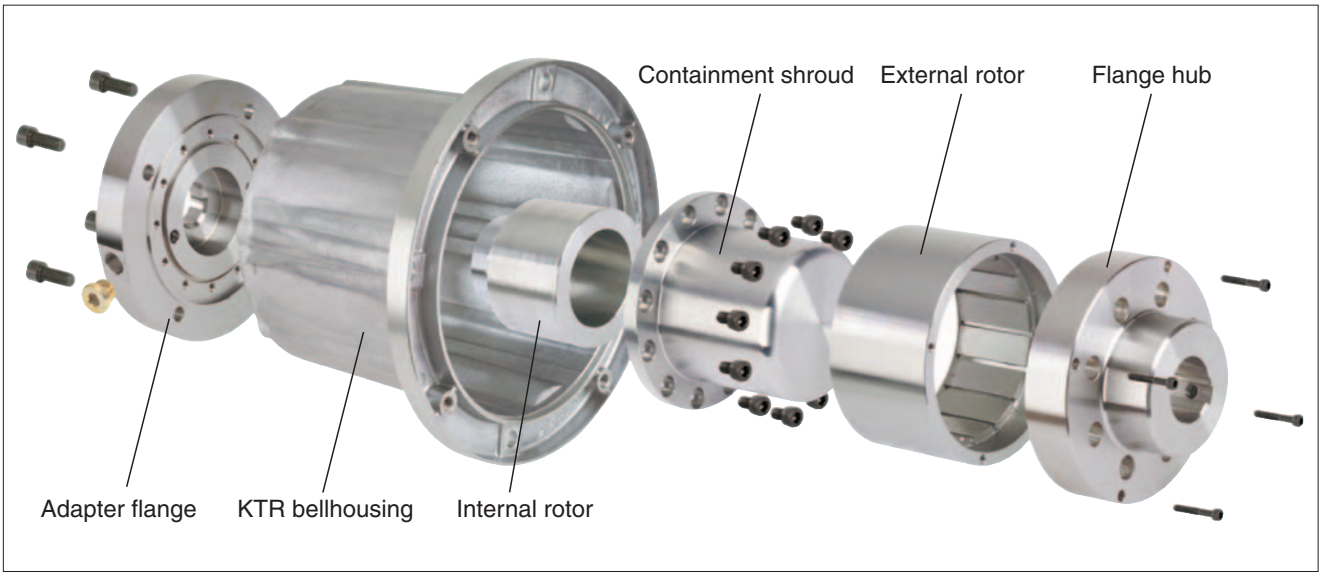
MINEX®-S size	Dimensions [mm]								
	External rotor						General		
	D_{A1}	D_{A2}	D_{A3}	D_{A4}	L_{A1}	ΔS	D_{S6}	D_{A5}	L_{total}
SA 75/10					41	12,5			
SB 75/10	90	100	110	M6	61		74,6	76,2	102
SC 75/10					83,5	14,5			
SA 110/16					41				
SB 110/16	126	135	145	M6	61	19,0	111,5	112,8	115
SC 110/16					81				
SB 135/20					70	18,5			
SC 135/20	150	160	170	M6	90		136,5	138,2	139
SD 135/20					110	22,0			
SB 165/24					70	18,5			
SC 165/24	180	188	198	M6	90		167,0	168,5	170
SD 165/24					110	21,0			
SE 165/24					130				
SD 200/30	212	222	232	M6	130	26,0	198	199,5	180
SE 200/30					130				

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

Order form:

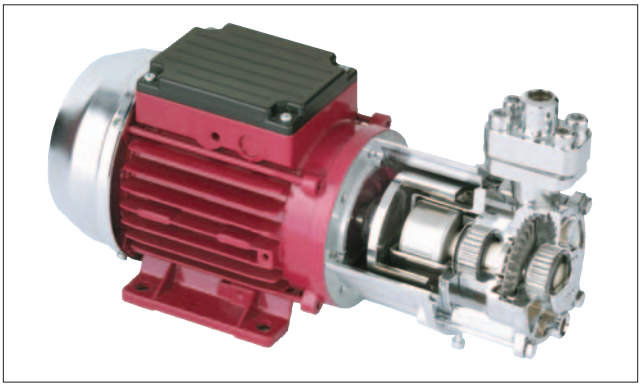
MINEX® SB 75/10	Design	d_i Ø 20 mm	d_a Ø 24 mm	Containment shroud type
Coupling size	NdFeB – $t_{max.}$ = 150 °C Sm_2Co_{17} – $t_{max.}$ = 250 °C	Finish bore H7; feather keyway DIN 6885 sheet 1 [JS9]		Stainless steel 1.4571 or Hastelloy

MINEX®-S
Permanent magnetic coupling
Customer-specific assemblies

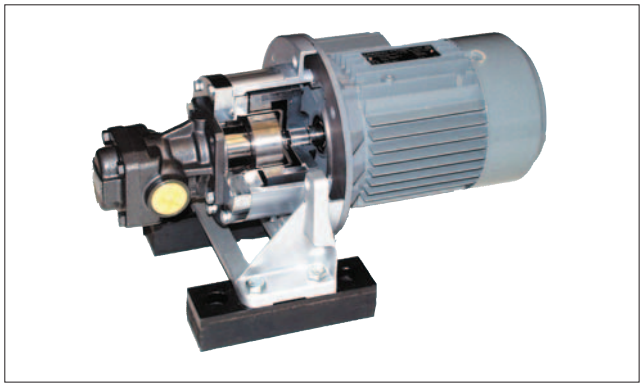


On request KTR can offer special customer-specific solutions in combination with hydraulic components from KTR, whereby existing systems can be easily retrofitted with the MINEX®-S (e. g. conversion kits for axial piston pumps type ROTARY POWER C-series and REXROTH A2VK).

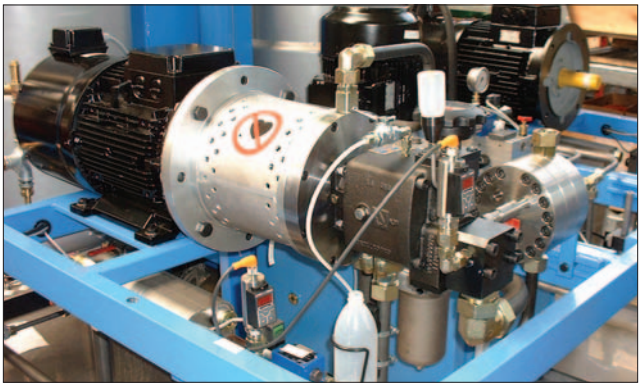
Examples of applications:



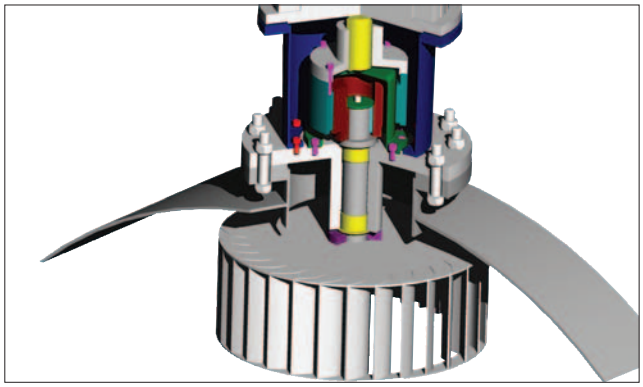
Use of the MINEX®-S in a small centrifugal pump



Retrofitting a gear pump with the MINEX® SA 75/10, bellhousing PK 200/30/..., foot flange and damping rod



Maintenance-free sealing of dosing pumps for polyole and isocyanate in high-pressure reaction casting machines



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