Explosion Protection

The ATEX Directive and the
KTR programme for applications with
potentially explosive atmospheres

Caution: Explosive atmospheres!

There are many things that have to be taken into account when you are designing drive systems for potentially explosive atmospheres. How does the ATEX Directive influence your choice of couplings and cooling systems or hydraulic components and clamping sets? For example, can a selected component be used for the temperature class stipulated? And how should couplings be protected in potentially explosive atmospheres? This brochure provides the answers.

The ATEX Products Directive 2014/34/EU has far-reaching consequences for the selection, installation, operation and maintenance of equipment in potentially explosive atmospheres. In this context, mechanical equipment and components, among other things, are considered and evaluated with regard to potential risk of explosion.

As a leading manufacturer of drive components for the mechanical and plant engineering sectors, we examined the requirements of the ATEX Directive early on and had relevant series from our overall product range inspected by an independent institute with regard to their usability in potentially explosive atmospheres.

A safe bet:
KTR's support for you

Not only do we provide you with information about the specifics of the ATEX Products Directive – we also provide products that allow you to safely plan, design and build your machines and plants.

KTR's comprehensive product range has been examined and evaluated as compliant with the ATEX Directive. It includes torsionally flexible jaw as well as pin and bush couplings, backlash-free servo couplings, gear, flange, steel laminae and magnetic couplings, and also oil/air coolers.

On the following pages we first of all set out the requirements of ATEX Directive 2014/34/EU, introduce the equipment categories and the zoning and show the standardised marking for components that are used in atmospheres potentially at risk of gas or dust explosions. We then present our products for potentially explosive atmospheres, with their key features and their explosion protection conformity marking.

In addition, we are happy to help you to conform with all other safety standards and advise you about all the required markings.
The relevant type examination certificates and assembly instructions can be found at www.ktr.com.

Explosion protection according to directive 2014/34/EU.

Specifications:

Appendix II of the European Products Directive 2014/34/EU, requires adherence to general safety and health specifications on those machines operating in potentially explosive atmospheres within the EU. These specifications have to be met during the development and production of the products by the manufacturer and be supported by the respective literature, e. g. operating and assembly instructions.

KTR manufactures and supplies a number of couplings and cooling systems that conform to the ATEX standard. However, a basic condition of their explosion-proof operation is the intended use of the products in accordance with the operating and assembly instructions.

Explosion hazard:

Only a few mechanisms are required for an explosion to occur: a flammable material such as gas, mist, vapour or dust in an ignitable concentration, sufficient oxygen and an ignition source such as sparks or a hot surface.

Thus, explosion protection measures are always necessary if
- flammable materials exist
- the distribution of the air may produce a hazardous mixture
- the production of a dangerous and hazardous atmosphere is possible.

Typical ignition sources:

Ignition hazard can be generated by sparks from impact, friction or grinding, by temperature increase or as a result of electrostatic charge and can initiate explosions.

Equipment groups and categories:

The equipment used in potentially explosive atmospheres is classified in groups I and II. Group I includes underground and surface mining and group II includes gas and dust explosion protection in every other application.

Equipment group	Category	Material group	Suitable zone
I (includes equipment intended for use in underground mines and their above-ground facilities)	**M1** (corresponds to very high safety)		
	M2 (corresponds to high safety)		
II (includes equipment intended for use in other areas)	**1** (corresponds to very high safety)	G (gases)	0, 1, 2
		D (dusts)	20, 21, 22
	2 (corresponds to high safety)	G (gases)	1, 2
		D (dusts)	21, 22
	3 (corresponds to safety with normal operation)	G (gases)	2
		D (dusts)	22

= Potential use of KTR components

Zones:

The classification of potentially explosive atmospheres into zones depends on the probability of how often and of how long a hazardous explosive atmosphere may occur. The zones are differentiated between flammable gases, mists, vapours and dusts.

Explosion range	Zone	Explosive atmosphere
Gas (G)	0	Permanent, long-term or frequent use
	1	Occasional use
	2	No or rare and if so only short-term use
Dust (D)	20	Permanent, long-term or frequent cloud of dust in the air (except for dust deposit: no zone 20)
	21	Occasionally, dust deposits exist in general
	22	Should not be expected with normal operation, if so, only short-term

= Potential use of KTR components

Equipment group:

EN ISO 80079-36 and IEC EN 60079-0 define permissible equipment groups and equipment protection levels (EPL) for gases and vapours as well as dusts. The first letter of the marking signifies the explosive atmosphere while the second letter defines the actual protection level.

Equipment group and equipment protection level (EPL) in accordance with EN 13463-1 et seq. and EN ISO 80079-36

Explosion range	Equipment group	Zone	Equipment protection level (EPL) marking
Mining	I	-	Ma
		-	Mb or Ma
Gases/vapours	II	**0**	**Ga**
		1	Gb or Ga
		2	Gc or Gb or Ga
Dusts	III	20	Da
		21	Db or Da
		22	Dc or Db or Da

Operating range	Marking	Equipment protection level
Underground mines susceptible to fire-damp	Ma	Equipment with high protection level that can be operated with an explosive atmosphere.
	Mb	Equipment with high protection level that has to be switched off with an explosive atmosphere.
Explosive gas atmospheres	Ga	Equipment with very high protection level
	Gb	Equipment with high protection level
	Gc	Equipment with normal protection level
Flammable dust atmosphere	Da	Equipment with very high protection level
	Db	Equipment with high protection level
	Dc	Equipment with normal protection level

= Potential use of KTR components

Explosion protection according to directive 2014/34/EU.

Protection principle: Ignition protection type

Ignition protection types for nonelectric equipment in potentially explosive atmospheres

Ignition protection type	Marking	Protection principle	Applications	Standards
General specifications	+	-	All applications	EN ISO 80079 EN IEC 60079-0
Designing safety	Ex h	The protection principle ensures that an ignition source cannot occur.	Coupling, belt drives, agitators, fans	EN ISO 80079-37
Monitoring of ignition source	Ex h	The protection principle prevents an ignition source from becoming operative.	Plain bearing, pump, agitators, centrifuge	EN ISO 80079-37
Liquid immersion	Ex h	The protection principle prevents the explosive atmosphere from arriving at the ignition source.	Gearbox	EN ISO 80079-37
Pressurized enclosure	Ex h	The protection principle prevents the explosive atmosphere from arriving at the ignition source.	Compressors, centrifuge, gear motors	EN ISO 80079-36
Protection by housing	Ex h	The protection principle prevents the explosive atmosphere (dusts) from arriving at the ignition source.	Grinders, gear motor, sophisticated subassemblies	EN ISO 80079-36
Pressurized encapsulation	Ex h	The protection principle prevents flame propagation by housing	Brakes	EN ISO 80079-36

Dust groups:

As with gas and vapours, dusts are classified into explosion groups. The classification depends on type and electrical conductivity

Explosion group (dust group)		
III A	IIIB	IIIC
Flammable lints and fibres	Non-conductive dust, e. g. carbon dust, grain dust	Conductive dust, e. g. flammable metal dust

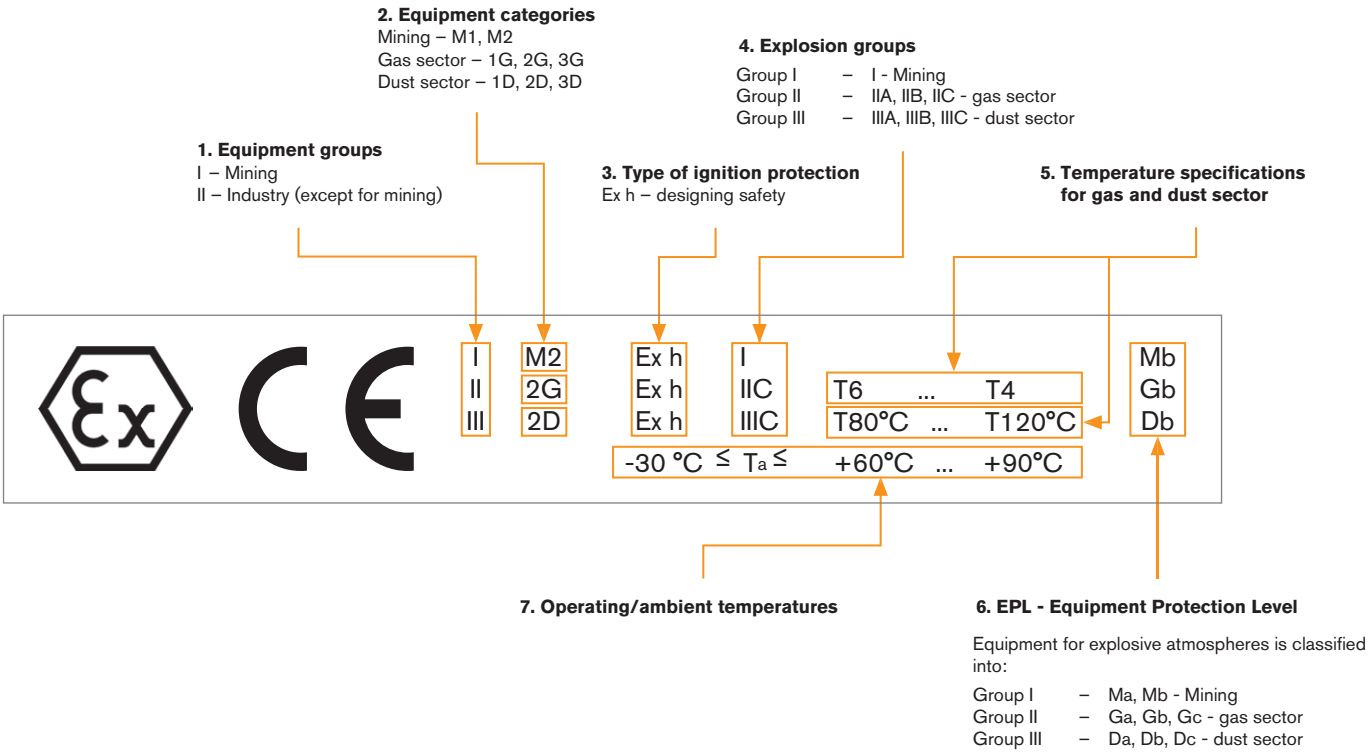
Explosion groups gases and vapours max. surface temperature and temperature classes:

Gases and vapours are classified into explosion groups depending on their ignitability. As an example, the permissible size of insulating surfaces depends on the explosion groups, with standards rising from IIA to IIC. The temperature class does not correspond to the operating temperature of the equpiment, for example of a coupling, as wrongly supposed sometimes, but the maximum permissible surface temperature on the equipment. The ignition temperature of the gases and vapours classified into temperature classes must exceed the maximum surface temperature.

Explosion group (gas group)			Temperature class	Max. surface temperature	Perm. temperature class
II A	IIB	IIC			
Methane, ethane, propane, ammonia	Town gas, acryl nitrite	Hydrogen	T1	450 °C	T1 to T6
Ethyl alcohol, jet fuel	Ethylene, ethylene oxid	Ethyne (acetylene)	T2	300 °C	T2 to T6
Petrols in general, jet fuel, n-hexane	Ethylene glycol, hydrogen sulfide		T3	200 °C	T3 to T6
Acetaldehyde	Ethyl ether		T4	135 °C	T4 to T6
			T5	100 °C	T5 to T6
		Carbon disulfide	T6	85 °C	T6

Please note:
Couplings that correspond to a higher temperature class, e. g. T6, are also permissible for those applications that require a lower temperature class, e. g. T2.

Explanation of the identification marking one would find on a ROTEX® coupling:



Component protection in potentially explosive atmospheres.

Covers:

If the products are used in areas subject to dust explosion and in mining the user must make sure that there is no accumulation of dust in a dangerous volume between the cover and the component. The component must not operate in an accumulation of dust.

For covers with unlocked openings on the top face no light metals should be used if the products are used as equipment of equipment group II (if possible, from stainless steel).

If the products are used in mining (equipment group I, category M2), the cover must not be made of light metal. In addition, it must be resistant to higher mechanical loads than with use as equipment of equipment group II.

The cover is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directive 2014/34/EU and must protect against

- access with a little finger
- falling down of solid foreign objects.

The cover may provide for openings intended for necessary heat dissipation. These openings have to comply with DIN EN ISO 13857.

The cover must be electrically conductive and included in the equipotential bonding.

Painting/ coating:

If coated (priming, paintings, etc.) components are used in potentially explosive atmospheres, the requirements on conductibility and coating thickness must be considered. In case of insulating paintings up to 200 µm electrostatic load does not have to be expected. Multiple coatings that are thicker than 200 µm are prohibited for explosion group IIC.

Maintenance:

The respective maintenance intervals of the equipment or components must be observed. During the operation of the machine, any changes to running noise of the coupling, or vibration that may arise, must be respected.

Design modifications:

Components with attachments which may produce heat, sparks and static load (e. g. combinations with brake drums or disks, overload systems such as torque limiters, fans, etc.) are not permitted for use in potentially explosive atmospheres. A separate inspection must be performed.

Shaft-hub-connection:

If used in potentially explosive atmospheres clamping ring hubs and clamping hubs without feather key must be selected such that there is a minimum safety factor of s = 2 between the peak torque of the machine including all operating parameters and the nominal torque and frictional locking torque of the coupling. Clamping hubs without feather key only permissible for use in category 3. The responsibility for the shaft-hub-connection is subject to the customer. Please review the connection carefully.

Component selection:

Select the components with sufficient service factor and choose suitable materials.

Screw connections:

Secure all screw connections using a screw lock solution and closely adhere to the recommended tightening torque of the screws.

ATEX marking:

KTR components bear an ATEX marking as follows:

Example of ATEX marking on the jaw coupling ROTEX®

The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined components and spare parts. KTR supplies unbored or pilot bored components and spare parts only upon explicit request of the customer. These parts are additionally marked with the symbol Ⓤ. KTR does not assume any warranty claims resulting from insufficient remachining. Mechanical remachining on components used in potentially explosive atmospheres must be coordinated with KTR.

KTR products for potentially explosive atmospheres

Product	ROTEX®	ROTEX® SP (Non Sparking)	POLY-NORM®
Description	Fail-safe, torsionally flexible jaw coupling	Fail-safe, torsionally flexible jaw coupling (maintenance-free in potentially explosive atmospheres)	Short, fail-safe, torsionally flexible jaw coupling
ATEX marking – Hubs/spacer without aluminium	type standard, AFN, BFN, CF, CFN, DF, DFN, DKM, AH, SH, ZS-DKM, ZS-DKM-H and TB with feather keyway I M2 Ex h I Mb II 2G Ex h IIC T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T110 °C Db -30 °C ≤ Ta ≤ +60 °C ... +90 °C	type GN, EN, GND, E4-DKM and ZS-DKM-C with feather keyway I M2 Ex h I Mb II 2G Ex h IIC T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T110 °C Db -30 °C ≤ Ta ≤ +60 °C ... +90 °C	type AR, ADR, ADR-K, AVR, AZR, AR/AZR, AZVR and AR with taper clamping sleeve I M2 Ex h I Mb II 2G Ex h IIC T6 ... T5 Gb II 2D Ex h IIIC T80 °C ... T95 °C Db -30 °C ≤ Ta ≤ +60 °C ... +75 °C
	type standard, AFN, BFN, CF, CFN, DKM, AH, SH, ZS-DKM and ZS-DKM-H without feather keyway I M2 Ex h I Mb II 3G Ex h IIC T6 ... T4 Gc II 3D Ex h IIIC T80 °C ... T110 °C Dc -30 °C ≤ Ta ≤ +60 °C ... +90 °C	type GN, EN, GND, E4-DKM and ZS-DKM-C without feather keyway I M2 Ex h I Mb II 3G Ex h IIC T6 ... T4 Gc II 3D Ex h IIIC T80 °C ... T110 °C Dc -30 °C ≤ Ta ≤ +60 °C ... +90 °C	
Hubs/spacer made of aluminium only	type standard, AFN, BFN, CF, CFN, DF, DFN, DKM, ZS-DKM and ZS-DKM-H with feather keyway (no ATEX approval with aluminium diecast) II 2G Ex h IIC T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T110 °C Db -30 °C ≤ Ta ≤ +60 °C ... +90 °C	type GN, EN, GND, E4-DKM and ZS-DKM-C with feather keyway (no ATEX approval with aluminium diecast) II 2G Ex h IIC T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T110 °C Db -30 °C ≤ Ta ≤ +60 °C ... +90 °C	
	type standard, AFN, BFN, CF, CFN, DKM, ZS-DKM and ZS-DKM-H without feather keyway (no ATEX approval with aluminium diecast) II 3G Ex h IIC T6 ... T4 Gc II 3D Ex h IIIC T80 °C ... T110 °C Dc -30 °C ≤ Ta ≤ +60 °C ... +90 °C	type GN, EN, GND, E4-DKM and ZS-DKM-C without feather keyway (no ATEX approval with aluminium diecast) II 3G Ex h IIC T6 ... T4 Gc II 3D Ex h IIIC T80 °C ... T110 °C Dc -30 °C ≤ Ta ≤ +60 °C ... +90 °C	
Marking	The ATEX marking of the ROTEX® coupling is applied on the outer sheath or on the front side. The flexible spider is excluded.		The ATEX marking of the POLY-NORM® coupling is applied on the outer sheath or on the front side. The elastomer ring is not marked.
Other	Products which do not allow for complete marking (§148 of the ATEX products directive 2014/34/EU) due to size or quality may reduce marking to Ex CE For complete marking refer to the operating/assembly instructions and/or the delivery note/package.		

(1) With the BoWex® coupling the demand for explosion protection is only ensured with the use of the electrically conductive polyamide sleeve type C. The coupling hubs made of steel correspond to the standard design and can be combined with various sleeve materials which do not generally comply with the ATEX standards. For that reason the explosion protection marking is only shown on the respective outer sleeve made of polyamide.

		
REVOLEX® KX /KX-D	**POLY**	**BoWex®**
Short, fail-safe, torsionally flexible pin & bush coupling	Shear type, torsionally flexible jaw coupling	Shear type curved-tooth gear coupling® in the material combination nylon/steel [1]
type KX and KX-D, KX-AB and KX-TB I M2 Ex h I Mb II 2G Ex h IIC T6 ... T5 Gb II 2D Ex h IIIC T80 °C ... T95 °C Db -30 °C ≤ Ta ≤ +60 °C ... +75 °C	type PKN, PKZ, PKD and PKA I M2 Ex h I Mb II 2G Ex h IIC T6 ... T5 Gb II 2D Ex h IIIC T80 °C ... T95 °C Db -30 °C ≤ Ta ≤ +60 °C ... +75 °C	▪ type M with standard sleeve (light), sizes M-14 and M-19 ▪ type M with conductive sleeve (black), sizes M-14C to M-80C ▪ type S..-St with standard sleeve (light), sizes S14-St to S24-St inclusive ▪ type GT I M2 Ex h I Mb II 2G Ex h IIC T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T120 °C Db -30 °C ≤ Ta ≤ +60 °C ... +100 °C
		▪ type M with standard sleeve (light), sizes M-24 to M-65 ▪ type S..-St with standard sleeve (light), sizes to S28-S inclusive ▪ type SSR with Seeger circlips with standard sleeve (light), sizes 24 SSR to 45 SS inclusive I M2 Ex h I Mb II 2G Ex h IIB T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T120 °C Db -30 °C ≤ Ta ≤ +60 °C ... +100 °C
The ATEX marking of the REVOLEX® KX / KX-D coupling is applied on the outer sheath or on the front side. The elastomers are not marked.	The ATEX marking of the POLY coupling is applied on the outer sheath or on the front side. The elastomers are not marked.	The ATEX marking of the BoWex® coupling is applied on the outer sheath or on the front side.

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KTR products for potentially explosive atmospheres

			
Product	**GEARex®**	**COUNTEX®**	**RIGIFLEX®-N**
Description	Gear coupling made of steel with grease lubrication type FA, FB and FAB as well as DA, DB and DAB	Short, shear type, backlash-free, torsionally stiff and double-cardanic shaft encoder coupling	Backlash-free, torsionally stiff steel laminae coupling (The coupling complies with the standards of API 610 and optionally API 671.)
ATEX marking	type FA, FB and FAB as well as DA, DB and DAB I M2 Ex h I Mb II 2G Ex h IIC T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T110 °C Db -30 °C ≤ Ta ≤ +60 °C ... +90 °C	Hubs without aluminium with feather keyway with hub type 1.0 and 1.3 I M2 Ex h I Mb -40 °C ≤ Ta ≤ +120 °C II 2G Ex h IIC T6 ... T3 Gb II 2D Ex h IIIC T80 °C ... T190 °C Db -40 °C ≤ Ta ≤ +50 °C ... +160 °C without feather keyway with hub type 1.1 and 1.2 I M2 Ex h I Mb -40 °C ≤ Ta ≤ +120 °C II 3G Ex h IIC T6 ... T3 Gc II 3D Ex h IIIC T80 °C ... T190 °C Dc -40 °C ≤ Ta ≤ +50 °C ... +160 °C Hubs made of aluminium only with feather keyway with hub type 1.0 and 1.3 II 2G Ex h IIC T6 ... T3 Gb II 2D Ex h IIIC T80 °C ... T190 °C Db -40 °C ≤ Ta ≤ +50 °C ... +160 °C without feather keyway with hub type 1.1 and 1.2 II 3G Ex h IIC T6 ... T3 Gc II 3D Ex h IIIC T80 °C ... T190 °C Dc -40 °C ≤ Ta ≤ +50 °C ... +160 °C	type A, A-J and A-H I M2 Ex h I Mb -40 °C ≤ Ta ≤ +130 °C II 2G Ex h IIC T6 ... T2 Gb II 2D Ex h IIIC T80 °C ... T250 °C Db -40 °C ≤ Ta ≤ +60 °C ... +230 °C
Marking	The ATEX marking of the GEARex® coupling is applied on the outer sheath or on the front side.	The ATEX marking of the COUNTEX® coupling is applied on the outer sheath or on the front side. The spacer is not marked.	The ATEX marking of the RIGIFLEX®-N coupling is applied on the outer sheath or on the front side. The laminae sets are not marked.
Other	Products which do not allow for complete marking (§148 of the ATEX products directive 2014/34/EU) due to size or quality may reduce marking to Ex CE For complete marking refer to the operating/assembly instructions and/or the delivery note/package.		

(1) For temperature classes T2 and T1 the max. permissible ambient and operating temperature is T_a = 280 °C. It is also the max. permissible permanent operation temperature. If necessary, all sizes of RADEX®-N can be designed complying with the standards of API 610 or API 671.

RADEX®-N

Fail-safe, backlash-free, torsionally stiff steel laminae coupling [1]

type NN, NANA 1 to 4, NENA 1 and 2, NENE 1, NNZ, NNW and MK each with flange hubs and each with laminae sets type with 8 pins and closed circular laminae as well as assembly with KTR clamping nuts.

Ex CE
I M2 Ex h I Mb -40 °C ≤ Ta ≤ +130 °C
II 2G Ex h IIC T6 ... T2 Gb
II 2D Ex h IIIC T80 °C ... T250 °C Db
-40 °C ≤ Ta ≤ +60 °C ... +230 °C

The ATEX marking of the RADEX®-N coupling is applied on the outer sheath or on the front side. The laminae sets are not marked.

ROTEX® GS / ROTEX® GS P

Fail-safe, torsionally flexible jaw coupling backlash-free under prestress

Hubs/spacer without aluminium

type standard and DKM with feather keyway

Ex CE
I M2 Ex h I Mb
II 2G Ex h IIC T6 ... T4 Gb
II 2D Ex h IIIC T80 °C ... T110 °C Db
-30 °C ≤ Ta ≤ +60 °C ... +90 °C

type standard and DKM without feather keyway

Ex CE
I M2 Ex h I Mb
II 3G Ex h IIC T6 ... T4 Gc
II 3D Ex h IIIC T80 °C ... T110 °C Dc
-30 °C ≤ Ta ≤ +60 °C ... +90 °C

Hubs/spacer made of aluminium only

type standard and DKM with feather keyway

Ex CE
II 2G Ex h IIC T6 ... T4 Gb
II 2D Ex h IIIC T80 °C ... T110 °C Db
-30 °C ≤ Ta ≤ +60 °C ... +90 °C

type standard and DKM without feather keyway

Ex CE
II 3G Ex h IIC T6 ... T4 Gc
II 3D Ex h IIIC T80 °C ... T110 °C Dc
-30 °C ≤ Ta ≤ +60 °C ... +90 °C

The ATEX marking of the ROTEX® GS coupling is applied on the outer sheath or on the front side. The spider is not marked.

RADEX®-NC

Shear type, backlash-free, torsionally stiff servo laminae coupling

Hubs/spacer without aluminium

type EK and DK with feather keyway

Ex CE
I M2 Ex h I Mb -30 °C ≤ Ta ≤ +130 °C
II 2G Ex h IIC T6 ... T3 Gb
II 2D Ex h IIIC T80 °C ... T195 °C Db
-30 °C ≤ Ta ≤ +60 °C ... +175 °C

type EK and DK without feather keyway

Ex CE
I M2 Ex h I Mb -30 °C ≤ Ta ≤ +130 °C
II 3G Ex h IIC T6 ... T3 Gc
II 3D Ex h IIIC T80 °C ... T195 °C Dc
-30 °C ≤ Ta ≤ +60 °C ... +175 °C

Hubs/spacer made of aluminium only

type EK and DK with feather keyway

Ex CE
II 2G Ex h IIC T6 ... T3 Gb
II 2D Ex h IIIC T80 °C ... T195 °C Db
-30 °C ≤ Ta ≤ +60 °C ... +175 °C

type EK and DK without feather keyway

Ex CE
II 3G Ex h IIC T6 ... T3 Gc
II 3D Ex h IIIC T80 °C ... T195 °C Dc
-30 °C ≤ Ta ≤ +60 °C ... +175 °C

The ATEX marking of the RADEX®-NC coupling is applied on the outer sheath or on the front side. The spacer is not marked.

KTR products for potentially explosive atmospheres

				
Product	**MINEX®-S**	**BoWex-ELASTIC®**	**OAC Oil/air cooler**	**OPC cooling-pump-unit**
Description	Permanent-magnetic synchronous coupling for contactless torque transmission by magnetic forces between internal and external rotor; sizes 22 to 165[1]	Highly flexible flange couplings type HE, HEW and HEW Compact	Oil/air cooler type OAC with electric or hydraulic drive motor	Cooling-pump-unit type OPC with electric drive motor and hydraulic pump
ATEX marking	with containment shroud made of stainless steel or Hastelloy® Magnet material: Sm2Co17 II 2G Ex h IIC T6 ... T2 Gb -40 °C ≤ Ta ≤ +60 °C ... +200 °C	type HE, HEW and HEW Compact II 2G Ex h IIB T6 ... T4 Gb II 2D Ex h IIIC T80 °C ... T115 °C Db -30 °C ≤ Ta ≤ +45 °C ... +80 °C	type OAC II 2G Ex h IIC T6 ... T3 Gb II 3D Ex h IIIC T68 °C ... T110 °C Dc -20 °C ≤ Ta ≤ +55 °C	type OPC II 2G Ex h IIC T6 ... T3 Gb II 3D Ex h IIIC T68 °C ... T110 °C Dc -20 °C ≤ Ta ≤ +55 °C
	with containment shroud made of stainless steel or Hastelloy® Magnet material: NdFeB II 2G Ex h IIC T6 ... T3 Gb -40 °C ≤ Ta ≤ +60 °C ... +150 °C			
	with containment shroud made of oxide ceramics II 2G Ex h IIC T6 ... T2 Gb -40 °C ≤ Ta ≤ +60 °C ... +200 °C			
	with containment shroud made of PEEK CFK II 2G Ex h IIC T6 ... T4 Gb -40 °C ≤ Ta ≤ +60 °C ... +110 °C			
Marking		The ATEX marking of the BoWex-ELASTIC® coupling is applied on the polyamide flange of the elastomer part.		
Other	Products which do not allow for complete marking (§148 of the ATEX products directive 2014/34/EU) due to size or quality may reduce marking to . For complete marking refer to the operating/assembly instructions and/or the delivery note/package.			

[1] For safe operation of MINEX®-S in potentially explosive atmospheres the temperature must be constantly monitored during operation Temperature monitoring must automatically switch off the drive before the respective maximum permissible surface temperature is reached. The heat generated on the MINEX®-S magnetic coupling, resulting from eddy current losses, must be permanently dissipated (e. g. by partial current of the pumping medium with pumps or sealing liquid).

Items that are not covered by directive 2014/34/EU.

The ATEX Products Directive applies for machines and protection systems. Driving components are not part of this directive.

Definition of equipment and components:

- Machines, operating equipment, stationary or mobile equipment, controlling and equipment parts, as well as warning and preventive systems serving to generate, transmit, store, measure, control or convert energy and process materials, either individually or in combination, which have an individual potential ignition source and, as a result, may cause an explosion, are described as “equipment”.
- Components that are necessary for safe operation of equipment, and protection systems with no independent function, are described as “components”.

CLAMPEX® clamping sets:

Use in potentially explosive atmospheres
The power transmission of CLAMPEX® clamping elements is based on the principle of two taper rings twisted into each other. An axial force generated on the rings (by means of several screws) generates surface pressure inside the shaft and outside the hub which allows for frictionally engaged transmission of the torque. Considering all operating data (intended use) a potential source of ignition does not exist. That is why clamping elements do not come within the scope of directive 2014/34/EU.
Due to the aforementioned design of CLAMPEX® clamping elements a failure of components does not have to be expected. A risk only arises if friction heat is generated with slipping of a clamping connection (improper assembly/tightening torques).

Selection of clamping ring hubs, clamping hubs and clamping sets:

If used in potentially explosive atmospheres, the type of clamping set, clamping ring hub (clamping hubs without feather keyway only for use in category 3) and size must be selected such that there is a minimum safety factor of s = 2 between the peak torque of the machine including all operating parameters and the nominal torque of the coupling.

Hydraulic components:

KTR bellhousings and foot flanges made of aluminium and cast iron, damping rings type D and DT made of aluminium NBR and damping rods made of steel NR are permissible as connection elements between pump and electric motor (bellhousing and tank). The magnesium share in aluminium is less than 7.5 %.

The user has to observe the following:

- All components have to be included in the equipotential bonding.
- The cover is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directive 2014/34/EU and must protect against
  – access with a little finger
  – falling down of solid foreign objects.
- The disassembly of the components is only permitted at standstill.
- The KTR mounting instructions for bellhousings (KTR standard 41010), damping rings (KTR standard 43010) and foot flanges (KTR standard 41110) have to be observed.
- For mining applications, cast iron or steel bellhousings must be used.
- For marine applications we also recommend cast iron or steel bellhousings.

Summary of literature

No matter if a perfect drive, a brake that takes effect, space-saving cooling or accurate hydraulics is required, if on land, by sea or at an airy height - KTR's product portfolio is just as manifold as its applications. The following catalogues and leaflets provide an overview. Available at **www.ktr.com**

Product catalogues

ATEX leaflet

Company leaflet


Made for Motion KTR
Hydraulik-Komponenten
Pumpenträger
Dämpfungselemente
Ölbehälter
www.ktr.com


Made for Motion KTR
Kühlsysteme
Für mobile Arbeitsmaschinen und die Stationärhydraulik
Customized Solutions oder Standard Design
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