



## Couplings for Marine Technology

Full speed ahead!

[www.ktr.com](http://www.ktr.com)

Made for Motion





## If you want to set things in motion: KTR

### Competence meets creativity

As a leading manufacturer of high-quality drive components, KTR supplies mechanical couplings, clamping sets, torque limiters, torque measuring systems and hydraulic components all over the world. With more than 50 years experience in power transmission we are trendsetters in the development of coupling technology and offer customised solutions to all industries. The KTR trademark characterises quality and innovation, speed, reliability, flexibility and a close working relationship with customers.

Having started with the curved-tooth gear coupling® BoWex® and the torsionally flexible jaw coupling ROTEX®, KTR has built up an extensive product portfolio covering torques from 0,15 to over 750.000 Nm. The production by KTR's in-house, up-to-date machinery ensures that the couplings are made to the utmost accuracy. The couplings having a unit weight of up to 2 tons. Flexible automation ensures a quick and low-cost production even if the product has to be customised to meet customers individual specifications. KTR produce several million couplings a year.

Even though KTR's standard product portfolio is quite extensive, it only represents a fraction of the different options available. KTR is not only a subcontractor but also a solution provider.

The knowledge gained from thousands of applications in the field allows us to find optimum, low-cost solutions for customised applications. We will consult you during the planning stage providing drawings and prototypes or arranging for local discussions if required. Every year KTR produces more than 10.000 new products ordered by customers. This trend increases year on year. This leads to many special products becoming standard items: We permanently give vital ideas to the Power Transmission technology – in cooperation with our customers.



## Accuracy meets speed

KTR products are evidence of well-designed, quality components resulting in improved characteristics of the drive system and as a consequence, a longer service life. It is our aim to continually improve the quality of our products and services. We can analyse the stiffness of components by utilising FEM (Finite Element Method) system and we can also perform torsional vibration calculations for entire drive systems. In our in-house Research and Development Centre we test our products on accurate test benches in realistic operating conditions. Our main objective is to provide the uppermost satisfaction to our customers.

Our technical sales engineers and our well-trained sales staff will be pleased to give you advice. KTR provides you with extensive services online, too: At [www.ktr.com](http://www.ktr.com) you can request information, including our product catalogue, 3D-CAD-models and assembly instructions. Depending on your application you can select your drive component from of more than 3.500 standard products. Having selected which one is the right component for your application by using our online calculation

program, you are now in a position to order the products by contacting your nearest KTR company. Alternatively our Euro shop is open 24 hours a day.

Our latest scheduling system SAP ERP ensures an optimum networking with our customers and allows for a quick and reliable delivery service. A selection of 3.500 couplings and hydraulic components are permanently available from stock. For orders placed by 2:00pm we guarantee the despatch of orders the same day! In the KTR Logistics Centre the overall flow of goods is supervised by radio-controlled barcode scanning. Leading distribution partners ensure delivery on time. Our tracking and tracing system allows you to follow the progress of your order at all times. KTR supplies to every location in the world.

For further details about us and our products:  
**[www.ktr.com](http://www.ktr.com)**



# We do not make waves, but we provide the correct coupling!

Imagine to scene, Gail force winds, huge waves, storm and rain – no more fun on the 50th parallel. Man and machine have to operate reliably. Every failure costs money or, even worse, danger for the vessel, freight, crew and passengers. The vessel is only as good as its smallest component. A coupling used in marine technology has an important task. Not only does it have to operate at maximum power, but it has to withstand high loads. On deck, below deck, in the harbour or on the high seas.

## Used in all waters

KTR couplings are on the high all seas all over the world and are in various applications for marine technology. In main and auxiliary drives and every kind of deck equipment – including ballast pumps, windlasses and high-load cranes.

## Knowing every trick in the book

Water and floors are a bad mix, one makes the other very slippery. The quality standards involving shipping are particularly strict – the same stringent standards apply to couplings as well. High reliability and maximum safety are pre-requisites. Easy assembly and maintenance-free operation is paramount. It is not possible to call at a shipyard in order to replace major machine components whilst the vessel is at sea. For this reason all our couplings are subject to a number of tests and inspection before they are sent to our customers. KTR couplings are either accompanied by an inspection certificate 3.1 or 3.2 in accordance to DIN EN 10204. Inspection certificate 3.2 is necessary for drives exceeding 375 kW and for manoeuvring drives.

## Rating: Specifically seaworthy!

In order to stay ahead of the competition in global shipping, ships and their technology have to correspond to a number of international standards. All our couplings are type-approved and certified in accordance with the strict standards of Germanischer Lloyd (GL), American Bureau of Shipping (ABS), Det Norske Veritas and Bureau Veritas. This allows us to use them in shipbuilding throughout the world.

## Head in a new direction

Apart from standard applications KTR continues to develop new couplings for the marine industry. The following pages introduce a range of couplings developed for the marine industry. If there is a special project that you are working on that you need our assistance with we will be pleased to discuss your requirements with you. Simply ask us before you put to sea. We will design and build the correct coupling for you!





## Full thrust in future direction – Couplings for water jet drives

### **Becoming popular: Water jet drives**

Is there anything more innovative than overcoming the water's inertia by utilising the water's own force? This is exactly what the water jet or jet stream drive does. This offers many benefits over conventional propeller drives: low draught, greater manoeuvrability near the coast, higher manoeuvrability at slow speed, higher speed in heavy seas, the threat of injuries to swimmers and marine life is reduced, better machine protection (no damage to drives when getting dry), less vibrations and smoother running. This is the reason why the number of boats using the water jet principle is steadily increasing: speed-boats, high-speed ferries, coastal life-boats, police, customs, coastguard boats, jet skis and even sailing ships.

## Being tough: RADEX®-N

KTR has a coupling solution suitable for multiple applications: the double-cardanic RADEX®-N Composite which is a special type of the RADEX®-N steel laminae coupling that has proven its importance in mechanical engineering. Its extremely stiff laminae made from stainless spring steel allow the coupling to compensate for high displacements with low restoring forces. The lamina that has been designed using FEM offers the ideal combination of torque transmission and torsional stiffness. High tolerance special shoulder bolts that are mounted alternately combine frictional engagement with positive locking – in this way increasing the power density again.

## Ideally suitable for connecting: the CFK spacer

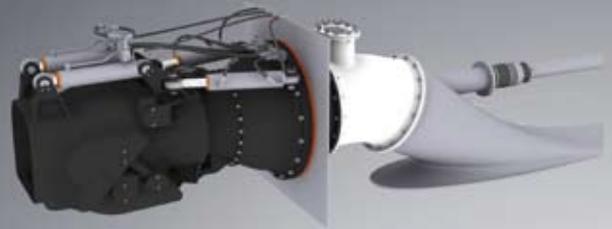
In most instances the biggest challenge to a water jet coupling is to bridge the long distance between driving shaft and impeller. Here the RADEX®-N Composite coupling has a special feature: the CFK spacer. It bridges even longer distances without any additional bearing. The carbon fibre reinforced tubes allow for considerably higher shaft lengths than usual steel tubes – resulting in no bending. The tubes are attached with stainless steel flanges and bolted radially in order to assure the maximum operational safety. The benefits are obvious: it ensures corrosion resistance, considerably lower in weight than steel, extremely high loading capacity and are maintenance free.

## Composite couplings require selection

For the selection of Composite couplings the resonance frequency is critical. That is why it is important that we select the coupling for your water jet drive, if necessary. For that reason we only need to know the parameters of your drive. Simply request our special leaflet “RADEX®-N Composite couplings”, fill in the corresponding questionnaire and then we will start the selection process straight away.



## The operation of the water jet drive



The water jet drive sucks in water from the bottom, compresses it to become a high-pressure jet stream via a pump unit and releases it again through a flexible nozzle. Steering is produced via the flexible nozzle. Thrust reversing butterfly valves reverse the direction of flow produced, allowing the boat to steer astern.



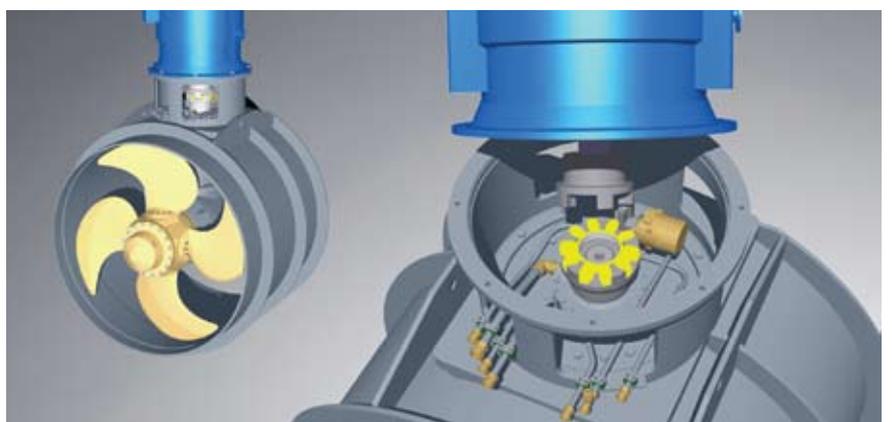


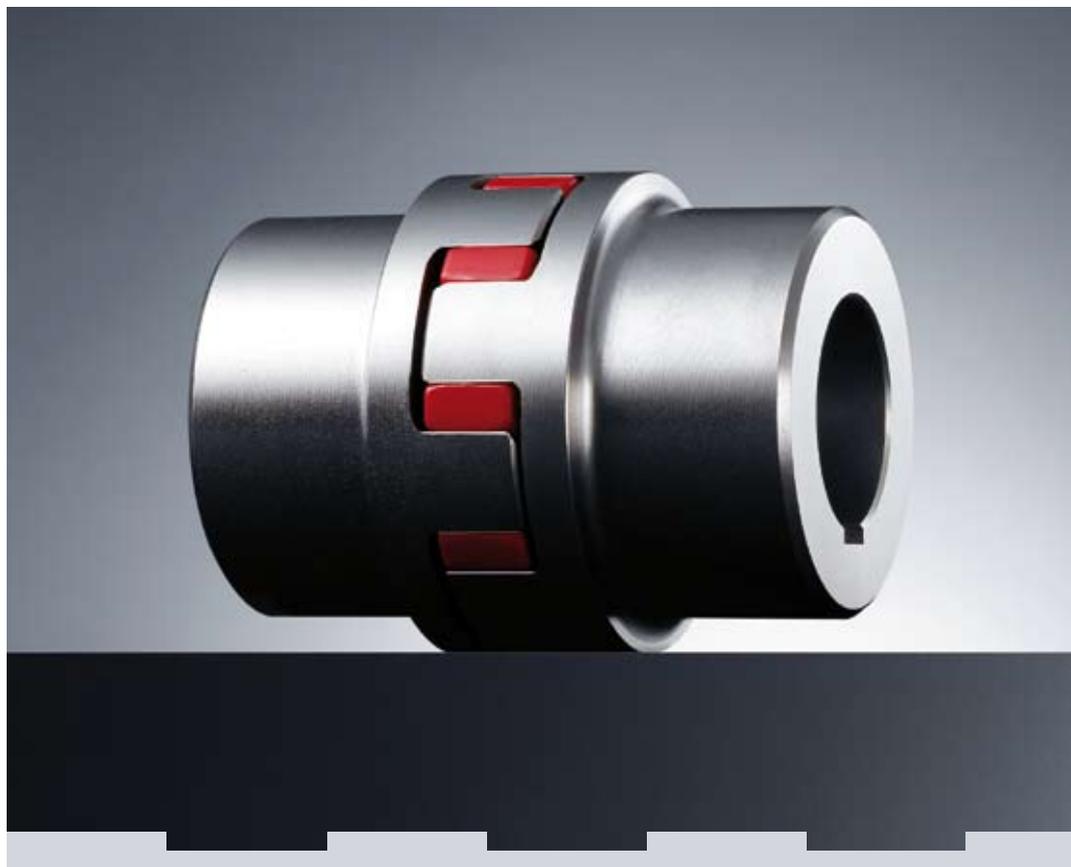
## Navigating, manoeuvring, traversing – Couplings for bow thrusters

In modern shipping it is not only speed that counts, but also manoeuvrability. The shallower the water, the narrower the harbour, the more complicated the manoeuvre, the more accurate a ship needs to navigate. With a weight of thousands of tons and the water-typical inertia this is a high demand on the technology and the couplings.

### ROTEX® changes course

The majority of freight and passenger vessels as well as an increasing number of yachts are equipped with bow thrusters or transverse rudders for better manoeuvrability in harbours. Apart from that many of the latest ferries and freight vessels have rear rudders as well that allow for lateral ship movements (traversing). Transverse rudders are usually driven by a complex combination of electric motors and angular gears. The ROTEX® couplings damping torsional vibrations have proven their worth on such applications.





### **Small, light-weight, long-life**

The ROTEX® coupling is mounted accurately between motor and gearbox. Due to its short design it is quite easy to assemble and disassemble. It is also totally maintenance-free which is a big advantage if you are below deck. Here the ROTEX® dampens all shocks and vibrations that result from the operation of the rudder to reduce them. ROTEX® couplings also compensate for axial, radial and angular displacements reliably which results in a longer service life of all of the drive components.

### **The correct Shore hardness for your offshore manoeuvre**

The damping characteristics of ROTEX® may be varied individually, since both hub components are combined with each other by an axially crowned involute spider operating with positive locking. The Shore hardness of the elastomer spider determines the degree of loading capacity of the coupling: a hard elastomer for higher torques, a soft elastomer for higher damping. The spider elastomers are characterised by their excellent resistance to wear over a wide range of pressure, speed and temperature. They are resistant to hydrolysis and chemicals and have very good dry running properties. This ensures that your vessel will remain maintenance free for longer periods.



## Steering, landing, heaving to – Couplings for azimuth drives

Subject to the hydrodynamic effects bow thrusters can only be used with normal weather conditions and low driving speeds. With higher speeds they can become almost ineffectual. Boats which require manoeuvrability even in stormy seas, such as harbour tugs, supply or offshore boats would rather use azimuth drives. KTR couplings are the first choice here.

### Extremely movable: the azimuth drive

The entire propeller unit of an azimuth drive has a pivoted bearing which makes the boat particularly mobile. Apart from being considerably more manoeuvrable the azimuth drives are also more fuel efficient. They also require a relatively small mounting space in which they operate.

### Extremely flexible: the ROTEX® coupling

For the propeller unit in the azimuth drive driven by an electric motor, the use of a ROTEX® coupling in combination with a KTR-SI overload system is recommended. This combination protects the gearbox of the propeller unit against high torque shocks and increases the service life of the drive system, in particular, if the steering unit collides with the sea bed. An example of this is when the vessel is manoeuvring in shallow water.

As an alternative the backlash-free ROTEX® GS coupling in combination with the KTR-SI Compact overload system is used on Azimuth drives. This type of drive is not only used successfully on boats, but also for manoeuvring of offshore platforms on the high sea.





## To port – Clamping sets on steering gears

If a container vessel driving at a speed of 20 knots changes its course and has a rudder which is larger than 10 m<sup>2</sup>, enormous forces become effective on the rudder immediately. While expensive oil pressure connections were used on the shaft-hub-connection of such drives with high loads previously, clamping sets tolerating high loads are used more and more frequently today.

### **Does not go off course: the CLAMPEX® clamping set**

Using the CLAMPEX® clamping sets type KTR 400 and 402 will help keep you on course reliably. These products have been developed, in particular, for high loads, high alternating torques and high torsional forces. The non-positive shaft-hub-connection has been designed for large shaft diameters up to 400 mm and is able to transmit much higher torques and axial forces than a positive-locking connection: on the sea up to 500.000 Nm, on industrial applications on the land even more.

### **Self-centering – quick assembly!**

Even with their high loading capacity CLAMPEX® clamping sets are self-centering. The minimum tolerances that are produced by the clamping principle are absorbed in an optimum way. The CLAMPEX® clamping set can be assembled quickly and easily and can also be disassembled easily every time. This is due to its corrosion resistant coating, which can be specified at the time of order, with either zinc plated or with a special Q coating, which makes it resistant to aggressive media such as seawater.



## Weighing, loading, unloading – Couplings for deck equipment

Loading containers, weighing the anchor, hoisting the draw nets, launching the life-boats – wherever there is anything to move up or down on the sea, KTR couplings are involved. That is why you do not only find us in various driving systems, but also on every type of deck equipment.

### **Winches and cranes**

On deck winches and cranes our torsionally flexible universal product, the ROTEX® shaft coupling, is often used. It is not only important to transmit the torques powerfully, but also to use them as a safety limitation, for example if a log gets caught in the winch or a draw net is caught on the sea bed. The KTR-SI overload system in combination with the ROTEX® coupling has proven its worth in cases such as these.

### **Hydraulic components**

The ROTEX® is also used in numerous electric power packs in marine hydraulics. Our BoWex® coupling is proven on hydraulic power packs in combination with I. C.-engines, using the BoWex® curved-tooth gear coupling as a highly flexible BoWex-ELASTIC® or torsionally rigid BoWex® FLE-PA flange coupling. Both couplings can be plugged in axially and are therefore easy to disassemble. Due to its material combination the BoWex® FLE-PA is maintenance-free. If requested, we can supply suitable hydraulic components along with the couplings – including bellhousings and oil tanks as well as controls. Everything is available from one sole source. We are the only coupling manufacturer offering an extensive online selection programme for hydraulics components. Our brochure “Hydraulic components” has details of all of our standard stocked products.

## Pumps

Nothing is working without pumps in the water: bilge or ballast pumps to free the bow, fire extinguisher pumps, cooling water pumps, service water pumps, sewage pumps, charge pumps, feed pumps, oil pumps and many more. For the various range of pumps used on sea vessels we can offer a large range of couplings to suit such as the torsionally flexible jaw couplings ROTEX® and POLY-NORM® or the torsionally stiff steel laminae couplings RADEX®-N and RIGIFLEX®-N.

On oil pumps for large homogenizers, bulk material or liquid products, we prefer to use our permanent-magnetic synchronous coupling MINEX®-S. Its specifically designed containment shroud ensures a hermetic separation of product space and atmosphere. Thus, the coupling serves as a reliable seal with critical media like oils and acids avoiding serious leakages. We will be pleased to develop customised special designs on request.

## Compressors

On marine compressors couplings are necessary which are compact in design and which are characterised by a high resistance to media and temperature. Here the torsionally flexible ROTEX® or the highly flexible flange coupling BoWex-ELASTIC® are good options. Our brochure "Couplings for pumps and compressors" shows you which coupling is most suitable for your application.

## Generators

Sometimes a separate power source is required on board ship. This is not a problem with a powerful marine generator and a fail-safe coupling. ROTEX® and BoWex-ELASTIC® are again first choice: compact, flexible, transmitting high torques and damping vibrations.

To summarize: KTR couplings can become a key member of your crew.



# KTR Products for Marine Technology

				
Product	ROTEX®	POLY- NORM®	RIGIFLEX®-N RADEX®-CFK	REVOLEX® KX
Water jet drives			●	
Main drives	●			
Azimuth drives	●			
Bow thrusters	●			●
Steering gears	●			
Hydraulic winches	●			
Hydraulic power packs with I. C.-engines	●			
Electric hydraulic power packs	●			
Deck cranes	●		●	
Fire extinction pumps	●	●	●	
Ballast pumps	●	●	●	
Sewage pumps	●			
Compressors	●			
Generator drives	●			

				
<b>GEAREX</b> 	<b>BoWex® FLE-PA</b> <b>BoWex-ELASTIC®</b>	<b>CLAMPEX®</b>	<b>KTR-SI</b>	<b>Hydraulic components</b>
●		●		
	●			
●		●	●	●
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	●			
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