



## Drive Components for Marine Technology

Full speed ahead!

For a safe and reliable arrival.

Made for Motion



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



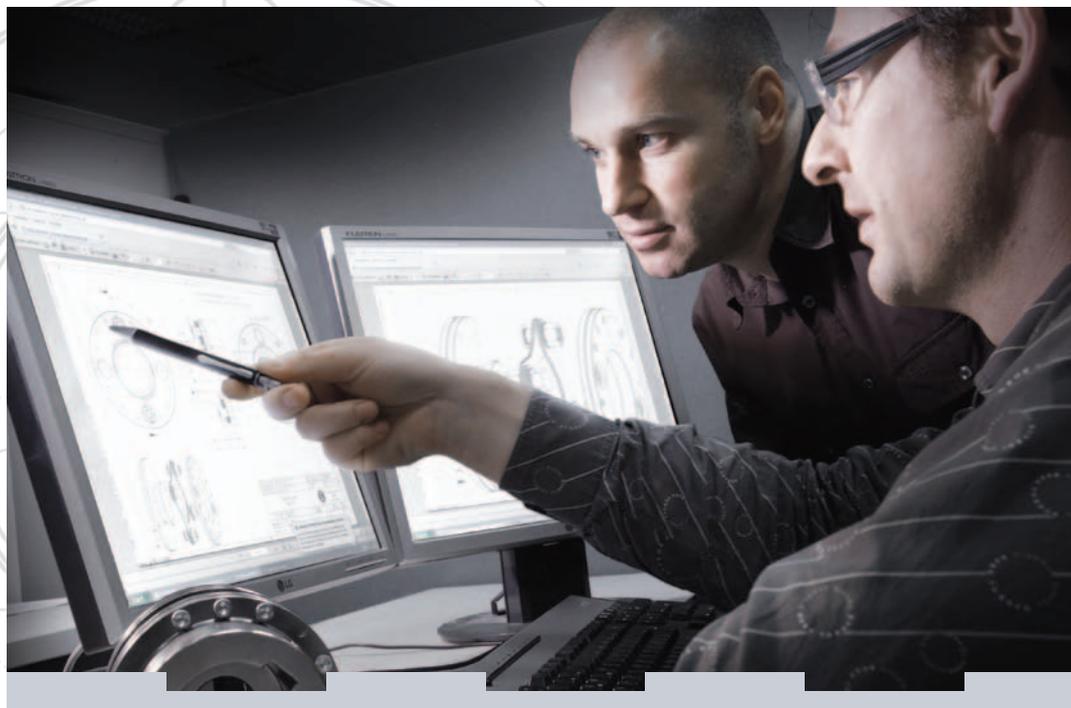
## If you want to set things in motion: KTR

### Competence meets creativity

As a leading manufacturer of high-quality drive and brake components, KTR supplies mechanical couplings, clamping sets, torque limiters, measuring systems, hydraulic components and high-power brakes 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 0,1 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 or brake 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 you with the uppermost satisfaction.

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. For standard applications 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 KTR 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)



# When the sea gets stormy you can rely on our couplings and brakes

Imagine the scenario – gale force winds, huge waves, storm and rain – there's little fun being out on the 50th parallel. Man and machine have to operate reliably. Any fault will cost money or even worse, create danger for the vessel, freight, crew and passengers. A ship is only as good as its smallest component and this is where couplings and brakes come into their own where marine technology is concerned. They not only have to render a maximum in power, but also withstand the most demanding loads – be this on or below deck, in a harbour or on high seas.

## Used in all waters

KTR couplings are found on all the seven seas and used in every type of marine technology application, including main and auxiliary drives as well as every kind of deck equipment, such as ballast pumps, windlasses and high-load cranes. And when heavy loads transmitted, one has to be able to rely on brakes. The new KTR-STOP® brake systems manage this with ease in comparison to conventional disc brakes. KTR-STOP® brakes safely halt everything they come into contact with – be it a ship's propulsion, a crane or deck and operating winches.

## Starting in the right waters

It is not easy to call in at dry dock on high seas when a defective part needs changing! This means the demands that are made on quality in marine technology are particularly high. This also holds true for couplings and brakes where the highest reliability and safety are required as well as being maintenance-free and easy to assemble. To comply with these requirements, all KTR components are subject to the most rigorous tests before they go on a long voyage. Our couplings come with a choice of inspection certificates – either 3.1 or 3.2 according to DIN EN 10204. The 3.2 certificate is required for propulsion systems needed for manoeuvring and those delivering more than 375 kW.

## Rating: highly 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. 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.

## Moving into new waters

Apart from standard applications, KTR is continuing to develop new applications in marine technology. The new KTR-STOP® brake systems are a good example. If you would like to commission us to develop further components relating to your needs, please contact us. And before you set sail, do not hesitate to get in touch for any coupling or brake you need!





## 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: speedboats, high-speed ferries, coastal life-boats, police, customs, coast-guard 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

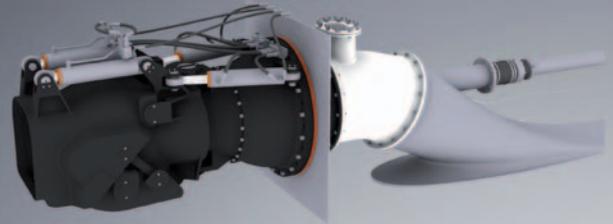
In most instances the biggest challenge to a water jet coupling is to bridge the long distance between driving shaft and impeller. Here the RADEX®-N Composite coupling has a special feature: the CFK spacer. It bridges even longer distances without any additional bearing. The carbon fibre reinforced tubes 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

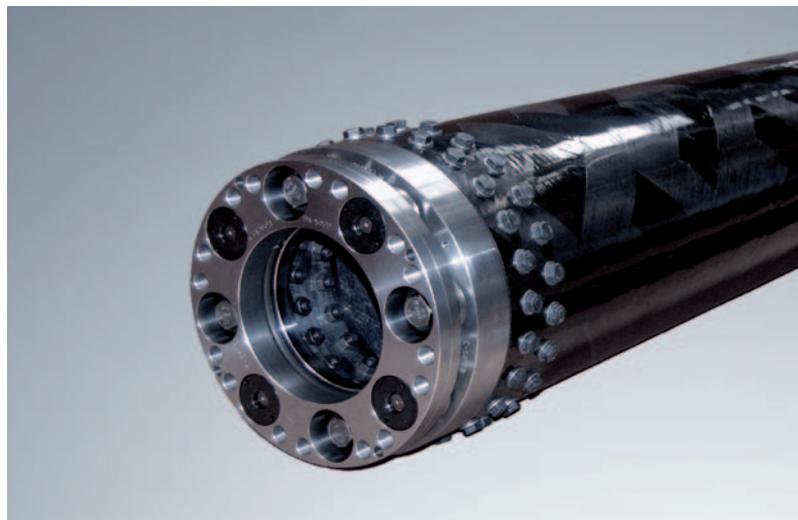
For the selection of Composite couplings the resonance frequency is critical. That is why it is important that we select the coupling for your water jet drive, if necessary. For that reason we only need to know the parameters of your drive. Simply request our special leaflet “RADEX®-N Composite couplings”,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



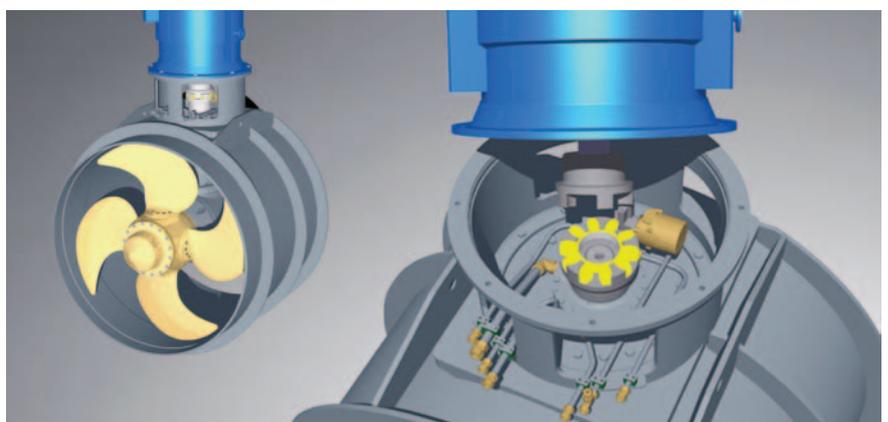


## Navigating, manoeuvring, traversing – Couplings for bow thrusters

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.

### KTR couplings change 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. KTR couplings of the ROTEX® and GEARex® lines have proven their worth.





### **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 positivelocking. 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 new T-PUR®-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.

### **Driving power becoming higher**

The thruster drives show a clear trend towards power becoming permanently higher. Since the ROTEX® coupling reaches its limits subject to its design, KTR have further developed the well-approved REVOLEX® KX-D series for the use in marine technology for such high power ranges. REVOLEX® KX-D is a flexible fail-safe pin & bush coupling. It can be plugged in axially and is characterized by a short design. There is no problem with this type of coupling to disassemble the elastomer rings including the pins without removing the coupling.



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

Subject to 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 to operate.

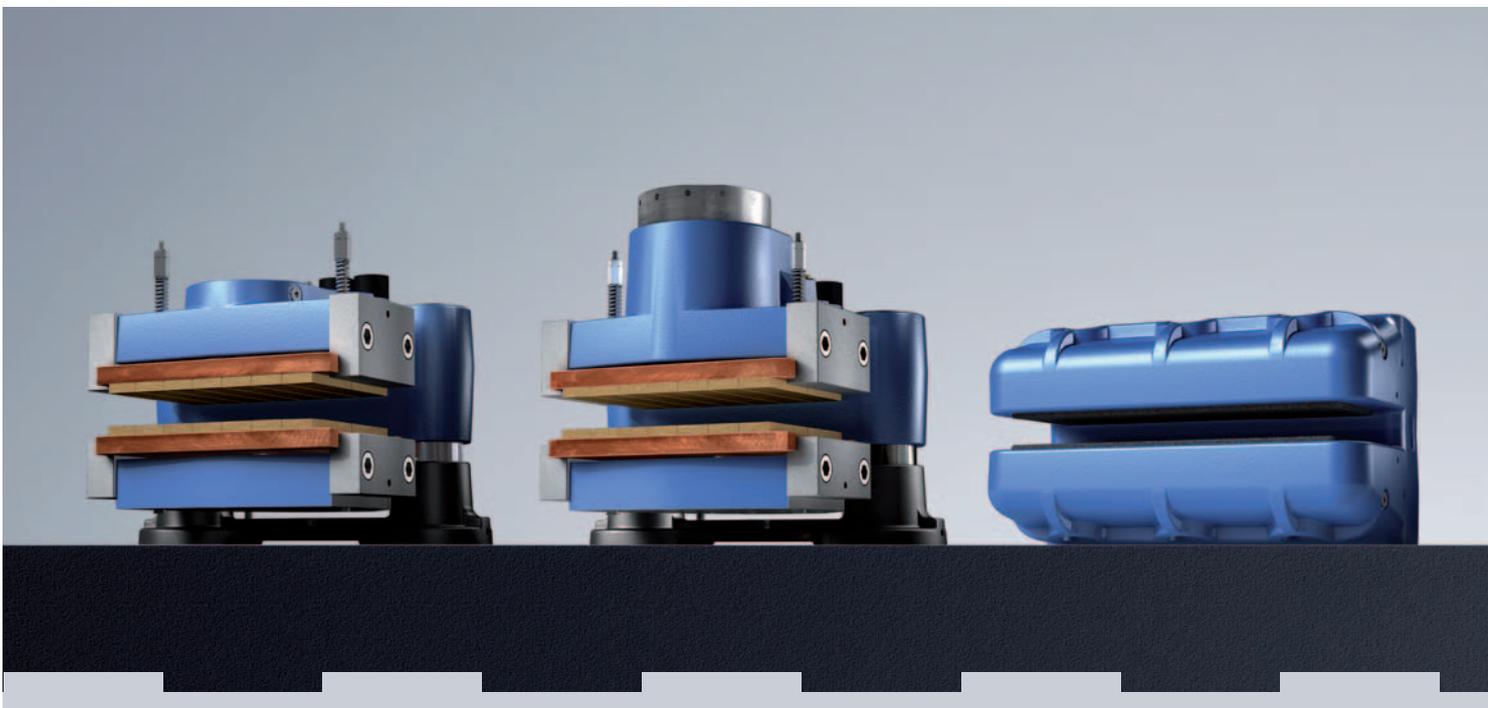
### Does not go off course: the CLAMPEX® clamping set

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, either zinc plated or with a special Q coating, which makes it resistant to aggressive media such as seawater.





## Stop all engines! The new KTR-STOP® brake systems

For those wanting to successfully forge ahead, it is also imperative to come to a halt at the key moment. Our new KTR-STOP® brake systems place the control needed in the hands of the marine engineer. This leading technology has been specially developed for use in rough and aggressive environmental conditions and guarantees utmost seaworthiness at low operating costs.

### The rougher it is, the smarter they are

In contrast to conventional disk brakes, KTR-STOP® brakes offer many constructional advantages:

- Better protection against climatic conditions through complete encapsulation of the glide shafts
- Less wear and tear through special wear rings
- Increased power density through lower weight and more compact construction
- Maximum brake-pad material utilization
- Longer maintenance intervals and extended service life.

### Active brakes for marine propulsion systems

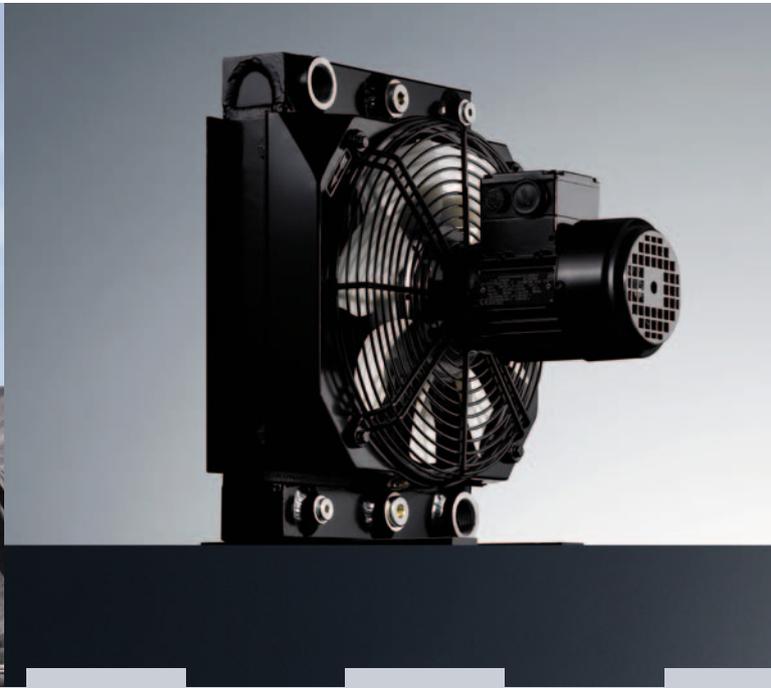
Enormous energy is exerted on marine shafts resulting in the necessity for regular servicing. So as to protect main-

tenance crews and shaft bearings alike during checks, each shaft has to be kept in a safe position. This is why we recommend active brakes that are locked by direct activation, such as KTR-STOP® YAW M or YAW L or S or M sized KTR-STOP® (active). Passive brakes are not suitable for such purposes because should there be a drop in the hydraulic pressure, they would lock against the running engines causing transmission average.

### Passive brakes for winches and cranes

When it comes to shipboard cranes, deck and operating winches, passive brakes come into their own. The brakes need to grip securely should the hydraulics fail or the power supply be interrupted. To avoid risk, it is best to use passive KTR-STOP® safety brakes which are mounted directly onto the drum, spring-operated and hydraulically ventilated. Likewise for conventional winch operations, we recommend passive brake systems from the S, M and L series which feature sufficiently high torque.

A special form of operating winch – the brace – issues a unique challenge to brakes since braces work with extremely high redundancies and necessitate specific control. This is where the ‘floater’ type spring-operated KTR-STOP® brake comes into play. Another preferential choice is the drum-mounted emergency stop brake KTR-STOP® L.



## 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 drives

Everything from one single source – KTR do not only have the suitable coupling for the numerous hydraulic power packs on boats, but they furthermore supply the following, if requested:

- Bellhousings from aluminium and cast iron (for applications on deck)
- Damping elements
- Oil tanks from aluminium, steel and stainless steel
- Oil-water coolers in a saltwater-proof design
- Oil-air coolers in a marine design

Moreover, we are the only manufacturer of couplings offering an extensive online selection program for hydraulics.

One of our classical products has proven its worth in hydraulic power packs having an I. C.-engine: the BoWex® curved-tooth gear coupling, in this case the highly flexible BoWex-ELASTIC® or torsionally rigid BoWex® FLE-PA flange coupling. Both couplings can be plugged in axially and are consequently easy to assemble. In addition, BoWex® FLE-PA is maintenance-free subject to its material combination.



## 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

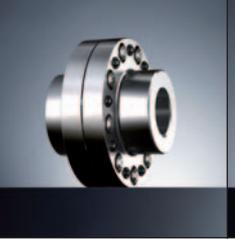
On marine compressors couplings are necessary which are compact in design and which are characterised by a high resistance to media and temperature. Here the torsionally flexible ROTEX® or the highly flexible flange coupling BoWex-ELASTIC® are good options. Our brochure "Couplings for pumps and compressors"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

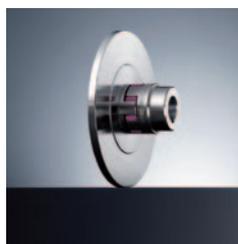
## Generators

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.

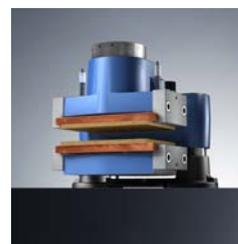
To summarize: KTR products can become a key member of your crew.

# KTR Products for Marine Technology

					
Product	ROTEX®	POLY-NORM®	RIGIFLEX®-N RADEX®-CFK	REVOLEX® KX-D	GEARex®
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	●				



**ROTEX®**  
with disk brake



**Hydraulic Brakes**  
**KTR-STOP®**

					
BoWex® FLE-PA BoWex-ELASTIC®	CLAMPEX®	KTR-SI	Hydraulic components	OAC / OPC <sup>1)</sup> Oil-Air Cooler	Oil-Water Cooler <sup>2)</sup>
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<sup>1)</sup> in a marine design

<sup>2)</sup> in a saltwater-proof design



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