

Made for Motion



KTR for Marine Technology

Drive Technology

Brake Systems

Hydraulic Components

Cooling Systems

www.ktr.com

At home on the Seven Seas.

One thing is for sure: KTR's roots lie on the plains of Germany's Westphalia region. But that hasn't stopped us from successfully developing products suitable for the open seas. KTR has tremendous experience in building offshore wind parks and tidal power stations and, as a result, we know exactly how couplings, brakes, hydraulic components and cooling systems can be effectively protected against the corrosiveness of seawater.

KTR also knows the ropes when it comes to shipbuilding – and it has all hands on deck. For example, our couplings help in the complex electric motor–gear combinations of bow and transverse thrusters when it comes to making reverse-direction manoeuvres. KTR has in its range a spe-

cial RADEX®-N design specifically developed for water jet drives. Meanwhile on deck, KTR couplings and brakes are present in winches and cranes, lending a hand when cargo is unloaded or nets are hauled in.

KTR components can also be used in shipbuilding worldwide thanks to a large number of different international certificates. You should not forgo such expertise when laying down the keel of your next ship!





On land, sea or in the air – KTR keeps things moving.

KTR provides the best connections – continuing a tradition of more than 50 years. We are a driving force when it comes to developing and producing high-grade power transmission technology, braking and cooling systems or hydraulic components – and a reliable partner for anyone in marine technology looking for cost-effective and durable propulsion systems.

Every company starts small. KTR started small and smart – resulting in extremely successful growth. In 1959 our engineers combined the tried-and-tested curved-tooth gear coupling with plastic as a material to create the maintenance-free BoWex® coupling, a triumphant success in the world of propulsion systems. The ROTEX® followed a short time later. From that point on, the path was mapped out and today KTR offers a virtually unlimited product range – you'll find we offer well over 20,000 different components. Whether you decide to take on board our power transmission technology, braking systems, hydraulic components or cooling systems, and whether you prefer to use individual components or a perfectly matched combination, you can rest assured that your equipment will be completely resistant to wind and water.

If you are unable to find what you are looking for, simply let us know your specifications. We see ourselves not only as a supplier, but also as a problem solver. This means we find the optimal cost-effective solution for each specific customer application. To express this in numbers, we develop more than 20,000 new products and product variants every year on behalf of our clients. This figure could include the coupling you want to use in marine technology – naturally with

maritime certification from authorities such as Germanischer Lloyd (GL) or the American Bureau of Shipping (ABS) so that the same coupling can be fitted in ship construction at a global level.

Our Power Transmission Center, a modern R & D centre with a multifunctional assembly hall, plays a major role in such developments. In this centre alone, engineers have more than 25 hydraulic and electric test benches at their disposal on which extensive durability and load tests are carried out. As a result, you can be absolutely certain that a KTR coupling will do what you expect it to.

If you so wish, your collaboration with KTR can begin well in advance of an order being placed. Our trained sales staff and application engineers will provide you with support right from the planning stage. In addition, a wealth of information about our products, a CAD library, assembly instructions and much more are freely available at www.KTR.com.

If you need standard products for marine technology, it is also worth taking a look at our website. Simply use the calculation program to determine which component is right for your application, then place your order for the desired date. Once the items are on their way, you are still in control of everything: the track-and-trace system allows you to check the delivery status at any time.



KTR couplings: because heavy seas are no walk in the park.



Travelling on the high seas places great demands on materials. As soon as the coast is out of sight, people and machines have to work reliably. Any failure means a financial loss – to say nothing of the potential risk to ship, crew and passengers. For that reason, all the components used in marine technology must be able to withstand the toughest conditions and the most severe strains.

Used above and below water

KTR couplings are used all over the seven seas. Underwater, they ensure reliable propulsion in main or auxiliary drive systems, while on deck they work tirelessly in the ballast pump, windlass and high-load crane. Moreover, given that large loads also have to be slowed down after they have been moved, more and more KTR-STOP® and EMB-STOP braking systems can be found on board. Whether they feature in ship propulsion systems, cranes, deck winches or operating winches, they deliver powerful forces and bring everything safely to a halt.

Quality to withstand wind and water

Once out to sea, equipment has to deliver what it promises. Naturally, this also applies to all KTR components. Maximum reliability, ultimate safety, greatest ease of installation and zero maintenance are properties that you can take on board with a KTR coupling or brake – practically as a complete package. We can guarantee this because all KTR components are subject to stringent tests before being fitted to the ship. Our couplings come with a choice of inspection certificates – either 3.1 or 3.2 according to the guidelines of DIN EN 10204. Incidentally, the material used to produce ROTEX® couplings for inspection certificate 3.2 is kept in stock. This means there is nothing to prevent supply at short notice.

International standards as standard

Anyone who wants to use their equipment across borders must also comply with international standards. No problem: our couplings have been type-approved and certified according to the exacting requirements of Germanischer Lloyd (GL), the American Bureau of Shipping (ABS), Det Norske Veritas and Bureau Veritas – and they can be used in the shipbuilding industry worldwide.



You will find the approved components and sizes on the certificates themselves. Detailed information about the certificates can be found on our website. Individual approval for other products and sizes is possible by prior arrangement – also through other inspection companies. If a coupling happens not to have certification, we would be pleased to obtain this.



Crossing the water with water – couplings for water jet propulsion systems.

Water jet – when speed is of the essence

Overcoming the inertia of water with the power of water – it's a brilliant idea. The solution is so convincing that water jet or jet stream drives are being used more and more frequently. This is not surprising given the many advantages offered by such systems in comparison to conventional propeller drives: a lower draught, greater manoeuvrability near the coast, higher agility at low speeds, better mechanical protection, less vibration and smoother running. And, of course, a faster speed even in heavy seas. With such a long list of good arguments, it's no wonder that the list of vessels powered by water jet propulsion is growing rapidly and includes: speedboats, high-speed ferries, coastal lifeboats, vessels for the police, customs and coastguard, jet skis and even sailing boats.

The RADEX®-N Composite – delivers and resists powerful forces

A wide range of applications calls for a coupling solution that is just as flexible, if not more so. Our preference is the double-cardanic RADEX®-N Composite, which can turn at a very high speed thanks to its lightweight design, thus experiencing fewer problems with resonance frequency. The composite is a special version of the proven RADEX®-N steel lamina coupling which has been used thousands of times in mechanical engineering. Its extremely stiff laminae are made from stainless spring steel and allow the coupling to compensate for high displacements with low restoring forces. The shape of the laminae has been optimised using the finite element method, providing the ideal combination of torque transmission and torsional stiffness. High-strength shoulder bolts fitted in alternate directions combine frictional engagement with positive locking, thus further increasing power density.



The CFRP spacer – closes the gap

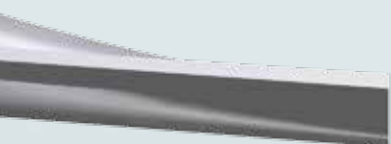
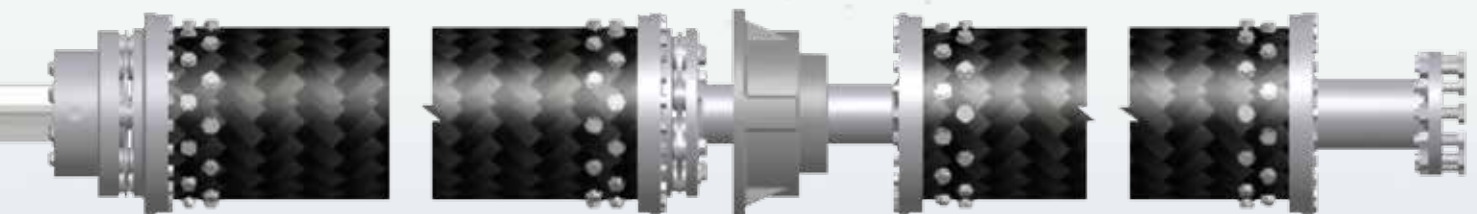
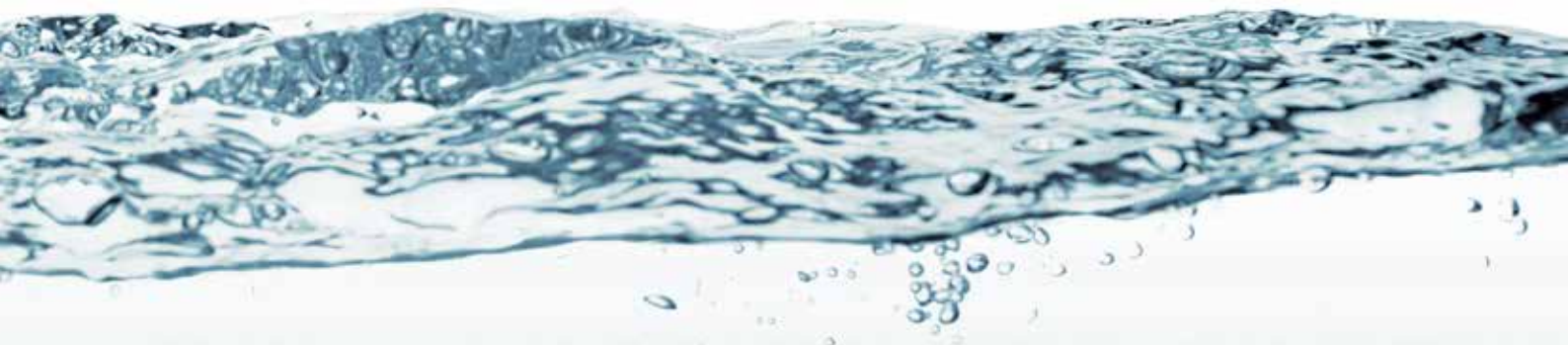
However powerful and reliable a water jet coupling is in operation, one issue in particular reveals its true quality: how successfully does it bridge the long distance between the drive shaft and the impeller? The RADEX®-N Composite works together with a congenial partner in this respect: a CFRP spacer that connects large distances without need for an intermediate bearing. The carbon-fibre-reinforced polymer tubes allow for considerably greater shaft distance dimensions than conventional shaft steel tubes – without bending. Given that double the strength is twice as good, the tubes are bonded to stainless steel flanges and radially bolted to ensure maximum operational reliability. The advantages are high corrosion resistance, significantly lower weight than steel, extreme durability and zero maintenance.

Composite couplings – an optimal design

The design of a composite coupling depends on its resonance frequency. Since we are experts in this area, if required, we would be pleased to manage all stages of coupling design for your water jet propulsion. All we need for this is the parameters of your drive system. All you have to do is complete the questionnaire included in our special brochure for the RADEX®-N Composite. We will start the selection process right away.

How a water jet propulsion system works.

The water jet propulsion system sucks in water from the bottom and compresses it through a pump unit to create a high-pressure jet stream. This is released through a flexible nozzle, which is also used to steer the vessel. If the ship is manoeuvred astern, thrust-reversing butterfly valves switch the direction of flow.





Staying on course – couplings for bow thrusters.

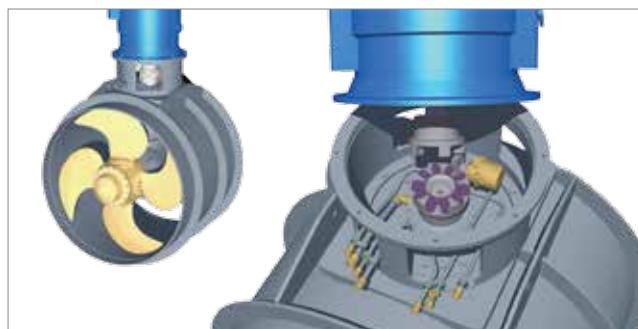
Support for complex manoeuvres

Ships are at home on endless expanses of sea. But what happens in narrow docks and shallow waters? Here, one thing matters above all else: maximum manoeuvrability with absolute precision. When the object to be controlled weighs thousands of tonnes, this places high demands on the technology and the helmsman – as well as the couplings used in the drive system.

Most cargo and passenger ships, as well as a growing number of yachts, use bow and transverse thrusters to manoeuvre through narrow harbours. Many modern ferries and new cargo ships are also fitted with stern thrusters so that they can move sideways (traversing). Generally speaking, transverse thrusters are driven by a complex motor–gear combination, which is an ideal area of application for ROTEX® and GEARex® couplings from KTR.

The ROTEX® – a small coupling with a big effect

The ROTEX® ensures an optimum connection between the engine and transmission. Its short design makes it easy to assemble and disassemble. It is also completely maintenance-free, which is a big advantage when working below deck in areas which can be difficult to access. In this situation the ROTEX® acts as a driving force, but also a calming influence. It also reduces noise thanks to the elastic decoupling in the drive system, which effectively dampens disruptive shocks and vibrations. Furthermore, it reliably compensates for axial, radial and angular displacements, thus extending the service life of all drive components.





The T-PUR® – one material, many advantages

You can decide how strong – or weak – the damping behaviour of the ROTEX® should be. Both hub components are positively connected to each other by a crowned elastomer spider. The shore hardness of the elastomer spider determines the properties of the coupling: a hard elastomer for higher torques, a soft elastomer for greater damping. Whichever level of damping you decide on, our all new T-PUR® spiders are extremely durable and offer high wear resistance for a wide range of pressures, speeds and temperatures.



The REVOLEX® KX-D – for higher power ranges

As convinced as we are by the ROTEX®, there are some applications where even this coupling reaches its limitations due to the design. One example is thruster drives delivering increasing levels of power. For such cases, KTR has developed the proven REVOLEX® KX-D series especially for use in marine technology.

The REVOLEX® KX-D is an elastic, fail-safe bolt coupling that is connected axially and stands out due to its compact design. Furthermore, it is easy to remove the elastomer rings together with the pins without having to disassemble the coupling.



Manoeuvring – with couplings for azimuth drives.

Reversing, docking, turning – each of these manoeuvres can be carried out with a bow thruster but only if the weather is good and the speed is not too high. Otherwise, such thrusters can become practically useless due to hydrodynamic effects. For this reason, vessels that need to remain flexible on the rough open sea – such as harbour tugs, supply boats and offshore boats – often use an azimuth drive. In these instances, KTR couplings and torque limiters are also on board.

The azimuth drive – three benefits in one

What makes an azimuth drive so special is that the entire propeller unit can pivot, which makes the ship extremely manoeuvrable. KTR-SI safety clutches are used together with a KTR shaft coupling, protecting the drive system from damage by flotsam. At the same time, azimuth drives also stand out for the small amount of space they require on board as well as for an impressive level of manoeuvrability.

The CLAMPEX® clamping set – keeping steering gear on course

Setting large steering gear in the right direction means having to perform reliably even under the toughest conditions. The KTR 400 series CLAMPEX® clamping sets do precisely this. Even when faced with extremely high loads, strong alternating torque and powerful torsional forces, our CLAMPEX® more than hold their own. The non-positive shaft-hub connection has been designed for large shaft diameters, up to 600 mm, allowing a zero-play, non-positive connection between cylindrical, ungrooved shafts and hub bores. Integrated screws brace the clamping elements and also serve to allow the non-destructive release of these elements.

CLAMPEX® clamping sets experience high levels of strain. They are mostly self-centring – the minimum tolerances resulting from the clamping system are automatically and optimally compensated. Even on the rare occasion that you should have to intervene, it will only take an instant: the clamping set is easy to mount and can be removed at any time. Additionally, an optional corrosion-resistant surface coating makes the component extremely resistant to aggressive environmental factors such as seawater.



KTR – making braking a safe manoeuvre.

Powerful thrust is one thing, but stopping at the crucial moment is quite another matter. KTR offers valuable support on both fronts. Just like KTR drive couplings, braking systems from KTR are designed specifically for use in harsh, aggressive environments and guarantee maximum seaworthiness together with low operating costs.

The KTR-STOP® – a new generation of disc brake

When it comes to braking, KTR also provides ideal solutions that are tailored to individual needs. Take the KTR-STOP® for example, which offers many design advantages compared to conventional disc brakes:

- Greater protection against weathering thanks to complete encapsulation of the glide shafts
- Reduced wear thanks to special wear rings
- Higher power density due to a lower weight and a more compact design
- Maximum use of brake pad material
- Longer maintenance intervals and an extended service life

Active brakes for ship propulsion systems

Ship drive shafts require regular maintenance. To protect service technicians, as well as the shaft bearing, the shaft must be held securely. Active brakes are used in these cases – locked by direct activation, such as the KTR-STOP® YAW or KTR-STOP® (active).



Passive brakes for winches and cranes

Passive KTR-STOP® safety brakes fully engage even if the hydraulics fail or the power supply is interrupted – an essential requirement when working with deck winches, op-

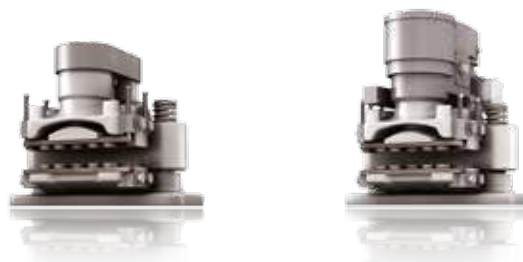
erating winches and ship cranes. These passive brakes are spring-operated and hydraulically released. In regular winch operation, passive brake systems from the S, M and L series offer high power and reliability.

Even braces, a special type of operating winch, can be held securely thanks to KTR. Such systems are capable of delivering extreme power, so they require a special design: the spring-operated KTR-STOP® floating caliper brake demonstrates that it is up to the job. When mounted directly on the drum, the KTR-STOP® L emergency stop brake is the preferred model of choice.



The EMB-STOP – easy, energetic, unique

The EMB-STOP from KTR is a practical alternative to the hydraulically operated KTR-STOP®. The EMB-STOP generates braking force using only an electromechanical system and, just like its hydraulically operated counterpart, stands out in all areas of maritime technology as an active or passive braking system. Given that it can dispense with the hydraulic system, it has the advantage of requiring only a small amount of space on board. Additionally, there is no need for maintenance work such as oil changes and oil disposal, making the EMB-STOP almost maintenance-free. Its large contact force, ranging from 2.5 kN to 1,600 kN, can be applied in a soft and controlled manner – a sort of stop-and-go system that is extremely gentle on materials.



All couplings on deck!

The deck of a ship is a hive of activity. Loading containers, weighing anchor, hoisting trawl nets, suspending lifeboats – whatever the crew does, products from KTR have a part to play. That is why you can find our couplings and braking systems not only in a range of drive systems, but also in all kinds of deck equipment.

Winches and cranes

The ROTEX® shaft coupling demonstrates what it is capable of in ship winches and cranes. It is a pretty impressive component: in addition to powerful torque transmission, it has the ability to limit forces safely. For instance, if a log is caught in the winch or a trawl net is stuck on the sea floor, it works in combination with the overload system to ensure that no damage is done to the power transmission system.

Hydraulic drives

A perfectly coordinated ensemble: for the various hydraulic power units that are put to use on board a ship, KTR provides not only the right coupling, but also:

- Pump brackets made from aluminium (below deck) and cast iron (on deck)
- Damping elements
- Oil tanks made from aluminium, steel and stainless steel
- Oil and water coolers in a saltwater-proof design
- Oil and air coolers in a marine design

Incidentally, you can also count on our support during the planning stage. KTR is the only coupling manufacturer to offer a comprehensive online design program for hydraulic systems.

Hydraulic power units with internal combustion engines are driven by a real KTR classic: the BoWex® curved-tooth gear coupling®. The highly flexible BoWex-ELASTIC® and torsionally rigid BoWex® FLE-PA flange couplings can be connected axially, which makes them easy to assemble. Furthermore, the BoWex® FLE-PA and the BoWex-ELASTIC® are maintenance-free due to their material composition.

Further applications

KTR products do a first-rate job in many other areas of application on board, such as:

- Ballast pumps
- Fire extinguisher pumps
- Cooling compressors
- Air compressors

Compressors

Couplings used in a marine compressor have to adapt to very tough operating conditions. Components have to take up very little space and demonstrate the necessary torsional rigidity. In other words, an excellent job for the torsionally flexible ROTEX® with constant-speed compressors, the BoWex® HEW Compact with variable-speed compressors or the highly flexible BoWex-ELASTIC® flange coupling with diesel-powered compressors.

Generators

You need power wherever the current is heading! Powerful marine generators with a fail-safe coupling ensure there is always energy on board. The BoWex-ELASTIC® is the coupling of choice: compact and highly flexible with strong torque and a vibration-damping effect. But first and foremost, it is absolutely reliable.





PRODUCT OVERVIEW FOR MARINE TECHNOLOGY

						
Product	ROTEX®	BoWex®	POLY-NORM®	REVOLEX® KX-D	GEARex®	RADEX®-N
Bow thrusters	■			■	■	■
Azimuth drives	■			■	■	■
Steering gear						
Hydraulic winches	■			■	■	■
Mechanical winches	■			■	■	■
Fire extinguisher pumps	■	■	■			



CLAMPEX®

KTR-SI

KTR-SI FRE

KTR-STOP®

EMB-STOP

Hydraulic components

Oil tanks



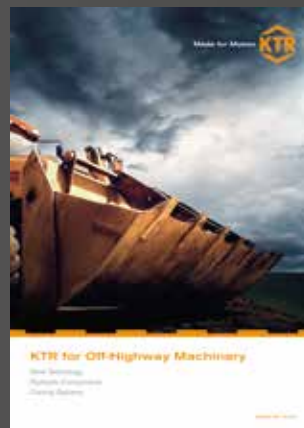
Overview of literature

The KTR product portfolio is as varied as its areas of use, whether you require the perfect power transmission system, effective brakes, space-saving cooling systems or precision hydraulics on land, water or high in the air. These catalogues and brochures offer an overview. Available at www.ktr.com

Product catalogues



Individual sector brochures





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