

Made for Motion



KTR for Wind Power Technology

Drive Technology

Brake Systems

Cooling Systems

www.ktr.com

KTR – when you want to aim high with wind turbines.

We set things in motion ... even if we need to take to the air to do so – up to 150 metres to be precise! KTR systems are designed to reliably perform their tasks under extreme loads during continuous operation in wind turbines. Our systems manage this so well that we are now world leaders in the manufacture of couplings and braking systems in the wind energy sector. KTR products run at top speed in over 70,000 wind turbines and, while you have been reading this, even more have been installed – and this number is set to increase!



Setting things in motion for over 50 years.

Experience and commitment

KTR products are more than just a driving force in wind turbines. We have been involved in the development of drive components for mechanical and plant engineering across a range of industries for over 50 years. Throughout this time, as a leading manufacturer of high-grade power transmission technology, hydraulic components and braking and cooling systems, KTR has been a dependable partner to any company wishing to keep things moving forward.

Everything started with the further development of the tried-and-tested curved tooth coupling® – KTR is always seeking to develop and improve. The result was revolutionary: a maintenance-free coupling which combined plastic and steel for the very first time. Its name: BoWex®. This was shortly followed by the ROTEX®, which went on to be the first brand coupling to become a DIN standard. Since then, KTR has built up a virtually unlimited product range, or, to quote a few figures, KTR provides well over 20,000 different couplings and other power transmission component groups. This range is complemented by powerful braking systems and high-performance cooling systems that, alongside couplings, form an integral operation unit in wind turbines. If what you are looking for does not happen to be in the standard range, KTR develops more than 20,000 new products and product variants every year on behalf of our clients. We see ourselves not only as a supplier but also as a problem solver, including finding the optimum, most cost-effective solutions for customer applications.

Planning and service

KTR is also at your service when you are planning your wind turbine. If required, our trained sales staff and application engineers will provide you with support right from the planning stage. And at www.KTR.com, a CAD library, assembly instructions and a wealth of information about our products is just a click away.

If your wind turbine happens to need one of our 3,500 standard products in the hydraulics range you can count on us for top quality, but also for exceptionally rapid delivery: orders are delivered on the same day within Germany if placed before 2 p.m. Furthermore, our data hub allows direct communication with other systems, ensuring speedy order processing. After all, we don't want your rotor blades to come to a standstill.



Extensive experience in controlling the force of the wind.

Clean, powerful and inexhaustible – wind is a natural source of energy with enormous potential. But that's also where the challenges lie: nature is unpredictable. Extreme cold and heat, wet, strong winds, squalls, storms and turbulence – anyone who makes great demands on the weather will also be stretched to the limit themselves. That's why KTR components are also designed in such a way that they withstand extremely high loads even under the toughest conditions while producing optimum results.

A driving force in wind energy

A breath of fresh air in energy supply - the international wind energy market has been growing for years and KTR has been a driving force within the industry since the beginning. To be more precise, in 1988 the design of the first coupling for

use between the gears and the generator was developed. More than 25 years later, we are the world market leader in this area, a development which speaks for the quality of our components and the satisfaction of our customers.

In this respect, Germany is somewhat of a pioneer when it comes to wind energy technology. As the largest user of wind energy and the largest exporter of expertise and systems engineering, Germany is where development is decisively advanced and passed on to other parts of the world.

A critical part of this cutting-edge technology is mechanical couplings, which not only transmit the torque between the gears and generator; they also protect the power transmission system in the wind turbine with the aid of an integrated torque limiter, thus having a decisive effect on its service life.





Clean performance worldwide

There are many winds throughout the world which could drive a wind turbine: a monsoon, chinook, mistral, foehn, bora, ghibli, sharqi or zonda. The likelihood that they also cause a KTR coupling to rotate as they blow is high as KTR shaft couplings are used in wind turbines with nominal outputs between 250 kW and 8 MW across Europe, Asia and America.

And what if a little more power is needed? No problem: as a development partner for leading manufacturers, we are continually extending our range to include new models with greater power ranges. That's also why we are always able to offer tailored couplings for the latest turbine generations.

And what if you'd like quality not just in individual, customised items, but also in a full range? Here you are. All individual components in our multifunctional assembly groups – consisting of couplings, electrical decoupling, brakes, including sensor discs, and safety clutch – have been specially developed for use in wind turbines.

Even if you don't need a conventional coupling, you can still rely on KTR components: KTR braking systems, for example, provide a powerful grip on wind turbines via the classic hydraulic brake KTR-STOP® and our electromechanical EMB-STOP. Or, perhaps, you require one of our highly effective overload protection systems to safeguard against extreme peaks in torque, as frequently used in special modern generators with low speeds which are flange mounted directly onto the gears.

Partnership-based support

In a world where standards are constantly increasing, expectations are also rising when it comes to performance. Bigger, more efficient, and longer service life – these are just three of the requirements demanded of modern wind turbines. Anyone who truly wishes to exploit the potential of wind needs a partner who is familiar with the sector – such as KTR. Because we take the wind out of the sails of many problems, thanks to our years of experience with wind turbines, we can help you channel the wind so that it efficiently drives your projects forward.



High-quality work from the outset.

Flexible design

Motion brings constant advancement. Naturally, this also applies to all components in your wind turbine. What happens if you continue to develop or completely redesign the drivetrain, for example? Well, we can help you find just the right coupling. All components and systems for wind turbines are developed and tested in the Power Transmission Center, a modern research-and-development centre with a multifunctional assembly hall. 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. We take an ice-cold approach in the environmental chamber, where anticipated environmental conditions are simulated with temperatures down to -50 degrees. With 3D coordinate measuring machines, we can meticulously check the dimensional stability of couplings. And we also perform an individual quality control check on the sliding hub, thus ensuring that power generation is not only problem-free, but also guaranteed to function for a long time.

Precise production

Your wind turbine deserves the best. That's why each tailored component is manufactured with the highest precision. Precise down to thousandth of a percentage point, machines can be flexibly configured so that even customised orders can be completed quickly and precisely.

After manufacture, we also provide the right configuration and make the exact torque settings for the torque limiter – using a computer, of course. No adjustments are then needed when components are installed at a later stage and your coupling can spring into action immediately.

Detailed documentation

Trust is good, but control is better. This also applies to our products. That's why we have introduced complete documentation for all test results, enabling us to fully retrace settings and balance quality for coupling components. And, for further reassurance of quality, KTR couplings and brakes are not only specified for use in wind turbines, they are also certified by organisations such as Germanischer Lloyd and other certification providers. To achieve this, the components transmitting torque have been inspected to verify their resistance and long service life, while exhaustive breakage and durability tests are carried out on the GRP spacers for the couplings.

Problem-free installation

The wrench used for installation of couplings in the confined installation space in a nacelle is a completely ordinary torque wrench. This is sufficient to easily install a RADEX[®]-N securely. The times when giant bolts needed to be fitted with a large tool and even greater force are now a thing of the past as we now use special clamping nuts for thread sizes M2 and larger. 'Less is more' is our motto in this case: we simply combine several small screws to achieve the required pre-tension in the threaded bolt. Furthermore, what is easy to install is also easy to disassemble. Thus, you save on two levels: both in terms of time and strain on your nerves.

Even if your wind turbine is already up and running, KTR will remain a reliable partner. On request, we can assist you with advice and support for maintenance of your wind turbine. Our industry and product experts are at your service at all times and as we have built up a dense service network worldwide, we can respond with great speed and flexibility to your questions and requests. Give us a try!







What drives wind turbines. And brakes them. And cools them.

1



Cooling system

5



DATAFLEX® torque measurement system

2



Oil-pump-and-filtration unit

6



KTR-STOP® YAW azimuth braking system

3



RADEX®-N steel lamina coupling

7



KTR-STOP® RL hydraulic rotor lock

or

4



KTR-STOP® braking system for peak periods



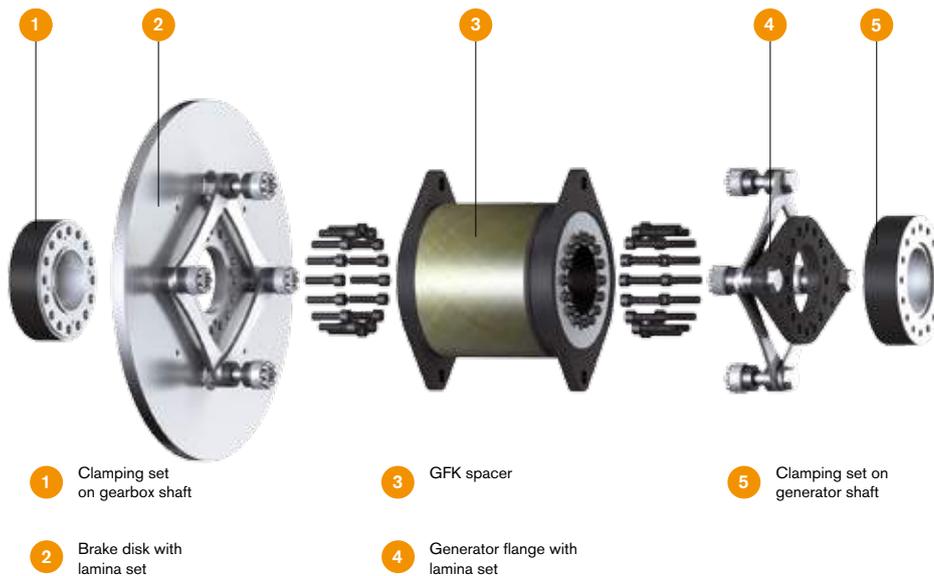
EMB-STOP RL electromechanical rotor lock

or



EMB-STOP braking system for peak periods

The KTR coupling system for wind turbines



Resistant to the extreme, compensate for the extreme.

KTR designed the steel lamina coupling RADEX®-N specifically to be the best in wind turbines. This means that the backlash-free, all-steel coupling, with laminae made of high-strength spring steel, needs to compensate for high displacement despite its torsional rigidity. Regarding wind turbines, this is the great challenge everyone faces. Gears and generators are normally mounted on elastic dampers, meaning relative movements occur, which may lead to very high displacement in the drivetrain. Accordingly, the RADEX®-N can compensate for such shaft displacement on a consistent basis.

Another advantage of the RADEX®-N is the GRP spacer, which provides electrical insulation by blocking any leakage current and preventing it from spreading from the generator to the gears, where it would damage bearings and teeth.

Laminae in top form

The key element in the RADEX®-N is the specially treated unique laminae. Alternately interlinked with hubs and spacers, they are fastened in place with highly resistant fitting screws to ensure optimum displacement and an increase in power densities.

The laminae sets were developed at KTR using FEM calculations. The result: the characteristic fitted shape, which allows torque transmission, torsional rigidity and the required displacement potential, is ideally combined.

System overload prevention

A wind power coupling is rarely supplied on its own. In most cases at KTR couplings are ordered alongside a brake disc up to 1,600 mm in diameter and a sensor disc for monitoring speed - a wise decision because an overload system also ensures precise torque limitation, even under highly unfavourable conditions.

The RUFLEX® sliding hub is ideal for this task. It is fitted with special friction pads, which are stick-slip-free and extremely resistant to wear when in use. The sliding hub is ready-calibrated in the factory and then disappears into the coupling spacer, thus saving space.

As soon as the precise, preset slide moment is reached, the flux of force is restricted and your system is protected against load peaks in the generator. And what's more, this slide moment can be reproduced by the RUFLEX® up to 1000 times, thus protecting systems from stress and significantly reducing the servicing required.

Braking with power – KTR braking systems.

Secure grip

When the brakes grip in a wind turbine, they must live up to their promise and you can completely rely on the quality of a KTR braking system. KTR has not only revolutionised hydraulic brakes, but has also tripled the power spectrum of electromechanical brakes making KTR one of the few manufacturers able to offer its clients two different braking systems which function in completely different ways yet still deliver excellent results.

Hydraulic force

The system in the KTR-STOP® rotor brake is a conventional disc brake with a floating caliper. It reliably performs its function even in storms, freezing cold and, on request, in salty sea air. KTR-STOP® produces braking forces between 1 and 1,200 kN and thanks to additional guide systems and optimum utilisation of materials, our braking systems require only a very few short intervals for maintenance before being ready for use again.

Electro-mechanical pressure

The EMB-STOP produces its braking force using a purely electromagnetic system. No hydraulics also means no maintenance tasks such as oil change and disposal – making EMB-STOP virtually maintenance-free. A second advantage is its strong contact pressure, between 2.5 kN and 1,600 kN, which can be gently increased in a controlled fashion thus protecting the material and, ultimately, your wallet.

Complete range

KTR products are also state of the art. When the nacelle needs to be held in position or the rotor needs to be firmly secured, even a large wind turbine comes to a complete stop thanks to the azimuth brakes and rotor lock.





Cooling with care – KTR cooling systems.

Increase in standards

Wind turbines are becoming more and more powerful – and requirements for thermal management in the nacelle are also increasing. The heat produced from generators, frequency inverters and gears needs to be dissipated in a specific way. KTR also offers different solutions for heat dissipation to ensure that your wind turbine remains functional by avoiding a need to stop due to overheating.

Compact dimensions

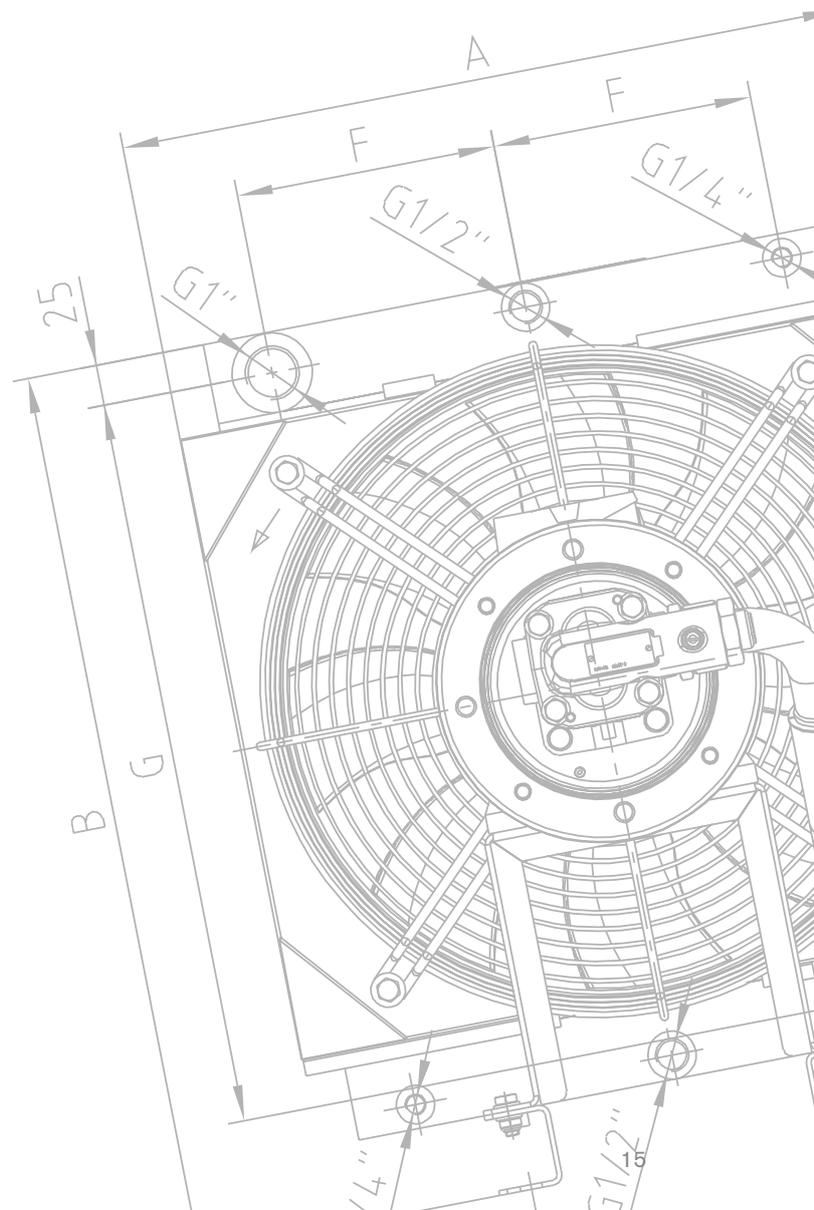
Space is calculated to the centimetre in a nacelle. That's why KTR cooling units also produce their maximum outputs from such a tiny space. KTR offers tailor-made water-glycol cooling units for individual cooling requirements for generators and inverters and integrated or separate oil-air coolers for cooling transmission fluid. All coolers come fully equipped with electric motors, fans and optional bypass systems. The cooling elements are made of weight-saving aluminium, and the fan guard and frame from tough stainless steel.

Protective covering

Wind turbines must be equipped to withstand all weather conditions. If they then also enter service as an offshore system, they must also incorporate protection against salty sea air. That's why we apply a special cathodic dip coating to these KTR coolers, guaranteeing optimum corrosion resistance. The motors in the fan drivers feature twice the protection: thanks to their design with an IP 56 protection rating and a special coating for offshore use. This coating protects the heat exchanger fully in each lamina and has no unfavourable effect on heat transmission.

A breath of fresh air

The MMC eco is a fresh face among our coolers. And what's more, it is also highly intelligent because it only produces as much cooling air as it actually needs at any given moment. A sensor determines the temperature and rate of change, and conveys this information to a control unit. This unit then anticipates and informs the fan how hard – or how little – it needs to work. This ingenious communication not only reduces noise emissions significantly, but operating costs are also so low that the MMC eco cooler pays for itself in a short time. Clearly a solution for cool calculators!



PRODUCT OVERVIEW FOR WIND TURBINES

						
Product		ROTEX®	RADEX®-N	CLAMPEX®	RUFLEX®	KTR-SI
Transmission	Gear input			■		
	Generator drive		■	■	■	
Rotor	Locking mechanism					
	Pitch drive	■				■
Cooling	Gear cooling					
	Hydraulics cooling					
	Generator cooling					
Nacelle adjustment	Azimuth brakes					
	Azimuth drive	■				■



DATAFLEX®

KTR-STOP®

EMB-STOP

KTR-STOP® RL

EMB-STOP RL

Cooler
OAC eco

Cooler
MMC eco

DATAFLEX®	KTR-STOP®	EMB-STOP	KTR-STOP® RL	EMB-STOP RL	Cooler OAC eco	Cooler MMC eco
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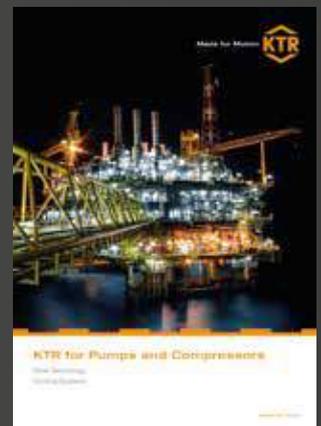
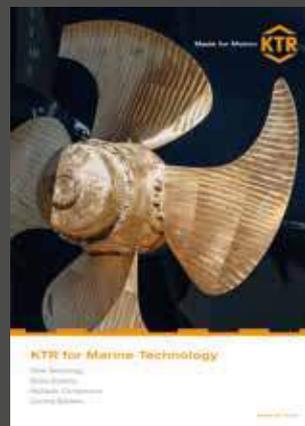
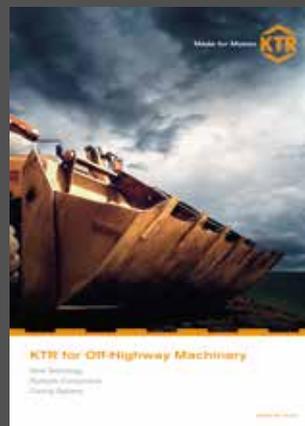
Overview of literature

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





Headquarter:

KTR Kupplungstechnik GmbH
 Postfach 1763
 D-48407 Rheine
 Phone: +49 5971 798-0
 Fax: +49 5971 798-698
 and 798-450
 E-Mail: mail@ktr.com
 Internet: www.ktr.com

KTR Brake Systems GmbH
Competence Center for Brake Systems
 Zur Brinke 14
 D-33758 Schloß Holte-Stukenbrock
 Phone: +49 5207 99161-0
 Mobile: +49 175 2650033
 Fax: +49 5207 99161-11

KTR worldwide:

Algeria

KTR Alger
 Algeria Business Center –
 Pins Maritimes
 DZ-16130 Alger Mohammadia
 Phone: +213 661 92 24 00
 E-Mail: ktr-dz@ktr.com

Belgium/Luxemburg

KTR Benelux B. V. (Bureau Belgien)
 Blancefloerlaan 167/22
 B-2050 Antwerpen
 Phone: +32 3 2110567
 Fax: +32 3 2110568
 E-Mail: ktr-be@ktr.com

Brazil

KTR do Brasil Ltda.
 Rua Jandaia do Sul 471 –
 Bairro Emiliano Perneta
 Pinhais – PR – Cep: 83324-040
 Phone: +55 41 36 69 57 13
 Fax: +55 41 36 69 57 13
 E-Mail: ktr-br@ktr.com

China

KTR Power Transmission Technology
 (Shanghai) Co. Ltd.
 Building 1005, ZOBON Business Park
 999 Wangqiao Road
 Pudong
 Shanghai 201201
 Phone: +86 21 58 38 18 00
 Fax: +86 21 58 38 19 00
 E-Mail: ktr-cn@ktr.com

Czech Republic

KTR CR, spol. s. r. o.
 Olomoucká 226
 CZ-569 43 Jevicko
 Phone: +420 461 325 162
 Fax: +420 461 325 162
 E-Mail: ktr-cz@ktr.com

Finland

KTR Finland OY
 Tiistinniityntie 4
 SF-02230 Espoo
 PL 23
 SF-02231 Espoo
 Phone: +358 2 07 41 46 10
 Fax: +358 2 07 41 46 19
 E-Mail: ktr-fi@ktr.com

France

KTR France S.A.R.L.
 46-48 Chemin de la Bruyère
 F-69570 Dardilly
 Phone: +33 478 64 54 66
 Fax: +33 478 64 54 31
 E-Mail: ktr-fr@ktr.com

Great Britain

KTR Couplings Ltd.
 Robert House
 Unit 7, Acorn Business Park
 Woodseats Close
 Sheffield
 England, S8 0TB
 Phone: +44 11 42 58 77 57
 Fax: +44 11 42 58 77 40
 E-Mail: ktr-uk@ktr.com

India

KTR Couplings (India) Pvt. Ltd.,
 T-36 / 37 / 38, MIDC Bhosari
 Pune 411026
 Phone: +91 20 27 12 73 22
 Fax: +91 20 27 12 73 23
 E-Mail: ktr-in@ktr.com

Italy

KTR Kupplungstechnik GmbH
 Sede Secondaria Italia
 Via Giovanni Brodolini, 8
 I – 40133 Bologna (BO)
 Phone: +39 051 613 32 32
 Fax: +39 02 700 37 570
 E-Mail: ktr-it@ktr.com

Japan

KTR Japan Co., Ltd.
 3-1-23 Daikaidori
 Hyogo-ku, Kobe-shi
 652-0803 Japan
 Phone: +81 7 85 74 03 13
 Fax: +81 7 85 74 03 10
 E-Mail: ktr-jp@ktr.com

KTR Japan – Tokyo Office

1-11-6, Higashi-Ueno, Taito-Ku,
 Tokyo 110-0015 Japan
 (Takeno-building, 5F)
 Japan
 Phone: +81 3 58 18 32 07
 Fax: +81 3 58 18 32 08

Korea

KTR Korea Ltd.
 # 101, 978-10, Topyung-Dong
 Guri-City, Gyeonggi-Do
 471-060 Korea
 Phone: +82 3 15 69 45 10
 Fax: +82 3 15 69 45 25
 E-Mail: ktr-kr@ktr.com

Netherlands

KTR Benelux B. V.
 Postbus 87
 NL-7550 AB Hengelo (O)
 Adam Smithstraat 37
 NL-7559 SW Hengelo (O)
 Tel.: +31 74 2553680
 Fax: +31 74 2553689
 E-Mail: ktr-nl@ktr.com

Norway

KTR Kupplungstechnik Norge AS
 Fjellbovegen 13
 N-2016 Frogner
 Phone: +47 64 83 54 90
 Fax: +47 64 83 54 95
 E-Mail: ktr-no@ktr.com

Poland

KTR Polska SP. Z. O. O.
 ul. Czerwone Maki 65
 PL-30-392 Kraków
 Phone: +48 12 267 28 83
 Fax: +48 12 267 07 66
 E-Mail: ktr-pl@ktr.com

Russia

KTR Privodnaya tehnika, LLC
 6 Verhniy Pereulok 12
 Litera A, Office 229
 194292 St. Petersburg
 Phone: +7 812 383 51 20
 Fax: +7 812 383 51 25
 E-Mail: ktr-ru@ktr.com
 Internet: www.ktr.ru

South Africa

KTR Couplings South Africa (Pty) Ltd.
 28 Spartan Road, Kempton Park,
 Gauteng/Spartan Ext. 21
 Phone: +27 11 281 3801
 Fax: +27 11 281 3812
 E-Mail: ktr-za@ktr.com

Spain

KTR Kupplungstechnik GmbH
 Estartetxe, nº 5–Oficina 218
 E-48940 Leioa (Vizcaya)
 Phone: +34 9 44 80 39 09
 Fax: +34 9 44 31 68 07
 E-Mail: ktr-es@ktr.com

Sweden

KTR Sverige AB
 Box 742
 S-191 27 Sollentuna
 Phone: +46 86 25 02 90
 Fax: +46 86 25 02 99
 E-Mail: info.se@ktr.com

Switzerland

KTR Kupplungstechnik AG
 Bahnstr. 60
 CH-8105 Regensdorf
 Phone: +41 4 33 11 15 55
 Fax: +41 4 33 11 15 56
 E-Mail: ktr-ch@ktr.com

Taiwan

KTR Taiwan Ltd.
 1 F, No.: 17, Industry 38 Road
 Taichung Industry Zone
 Taichung, R. O. C.
 Phone: +886 4 23 59 32 78
 Fax: +886 4 23 59 75 78
 E-Mail: ktr-tw@ktr.com

Turkey

KTR Turkey
 Güç Aktarma Sistemleri
 San. ve Tic. Ltd. Sti.
 Kayışdağı Cad. No: 117/2
 34758 Atasehir –Istanbul
 Phone: +90 216 574 37 80
 Fax: +90 216 574 34 45
 E-Mail: ktr-tr@ktr.com

USA

KTR Corporation
 122 Anchor Road
 Michigan City, Indiana 46360
 Phone: +1 2 19 8 72 91 00
 Fax: +1 2 19 8 72 91 50
 E-Mail: ktr-us@ktr.com

Headquarter

KTR Kupplungstechnik GmbH

Postfach 17 63

D-48407 Rheine

Phone: +49 5971 798-0

Fax: +49 5971 798-698/798-450

E-Mail: mail@ktr.com

Internet: www.ktr.com

