

PART OF EXCELLENCE

Strong components for renewable energy

Components for Wind Power



Made for Motion





KTR Systems – Solutions across industries for a global market.

As a progressive and innovative knowledge partner for our customers, we actively shape the technological future. By consciously responding to the needs of our customers and having a deep understanding of their technology, it is possible for us to develop cross-industry solutions. In doing so, we always strive for excellence and optimise existing approaches. And this has been the case since 1959.

PART OF EXCELLENCE

Our philosophy of PART OF EXCELLENCE is reflected in every single component and service we provide. With our expertise and innovation, we achieve top performance together with our customers. KTR is at home in industrial markets on all continents with more than 500 employees at its headquarters in Rheine, more than 1,200 employees worldwide, 24 subsidiaries and over 90 sales partners. As a **leading manufacturer of high-quality drive technology, braking and cooling systems and hydraulic components** KTR is a reliable partner for all companies that want to keep moving. As a leading expert in these fields, we take pride in offering our versatile solutions in the following industry:

→ Wind power

KTR worldwide – Our locations for quality and service.

- Headquarters (Rheine / Germany)
- 24 subsidiaries
- 90 sales partners
- More than 1,200 employees worldwide



Our components for Wind power

For more than 35 years KTR has developed and manufactured drive components and systems for more than 150,000 wind power plants. The product portfolio comprises couplings with and without overload protection and torque measurement as well as rotor and yaw brakes.

Even if the wind power industry is still a growth sector, the manufacturers are under fierce competitive and cost pressure. The index of “Cost of energy” is decisive, i. e. the ratio of operating expenses to energy yield.

This calculation includes the level of efficiency of the plants, availability and maintenance effort. This means for the manufacturers: efficiency, quality and reliability of the machines have to comply with highest standards. The drive train is essential here. This applies for all application fields of wind turbines (onshore, offshore, repowering, weak wind regions).

Another trend is the increasingly higher performance of plants specifically in the offshore field. Currently plants having a power of 12 MW and rotor diameters of 230 metres are built. Here mainly those projects are concerned on which our engineers cooperate closely with the design engineers of the plant manufacturers.

Our products are primarily used in the following sectors:

Applications:

- Wind Turbine
- Wind Turbine Gearless
- Local Power Grid

DRIVE COMPONENTS

Page 06

1

RADEX-N (WEA)
Steel laminae coupling



Page 08

2

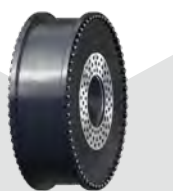
RADEX*-N Multi Disc
Steel laminae coupling



Page 09

3

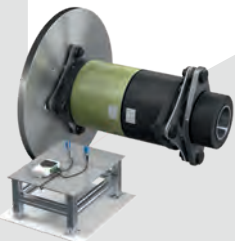
RADEX*-N Mega
Diaphragm coupling



Page 09

4

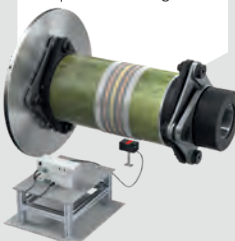
RADEX*-N with KTR slipping control



Page 09

5

DATAFLEX* High Torque
Torque measuring shaft



COOLING SYSTEMS

Page 11

10

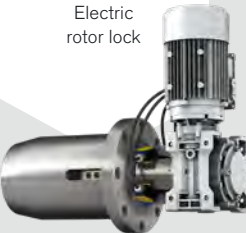
KTR-STOP* RL
Hydraulic rotor lock



Page 11

11

EMB-STOP RL
Electric rotor lock



Page 07

12

OAC
Oil/air cooler



BRAKE SYSTEMS

Page 10

6

KTR-STOP* M-D
Active, hydraulic fixed caliper brake



Page 10

7

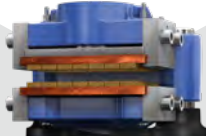
KTR-STOP* YAW
Yaw brake



Page 10

8

KTR-STOP*
Active, hydraulic floating caliper brake



Page 11

9

EMB-STOP L-A-XXX-F
Active, electrical floating caliper brake



KTR SYSTEMS

You can also find more components in our comprehensive four product catalogues in the download area:
↓
www.ktr.com



You can find more information on our website www.ktr.com/en/industries

Sustainability at KTR Systems in focus



↓
Living cultures, Promote sustainability

→ In our **sustainability report**, we shed light on how sustainable thinking and practices are firmly anchored in our corporate culture. In the area of environmental and climate protection, we show how we contribute to conserving resources and reducing emissions through product development and packaging. On the subject of social responsibility, we show how we support our employees and take on social responsibility. We also explain how we establish and monitor rules and processes along the value chain in order to make our corporate governance sustainable and transparent.

Our key sustainability activities:

01

Environmental & Climate protection

Introduction of net-zero emission targets for the company and the supply chain; reduction of carbon footprint; increase in the use of renewable energies

02

Social Responsibility

Ensuring a safe, healthy, attractive working environment for all employees; strengthening the well-being of employees; promoting human rights

03

Corporate governance

Strengthening of governance and risk management; Promoting a culture of awareness for sustainability; Promoting sustainability in the supply chain

Wind power at KTR Systems:

1988

the first coupling for the wind power industry was delivered.

2007

the first brake system for the wind power industry was delivered.

150.000

couplings delivered in total.



You can find more information in our current sustainability report at www.ktr.com/de/en/company/sustainability

◊ **Availability, reliability, long service life and service friendliness** – our broad product portfolio for **wind power** fulfils all of these requirements and thus paves the way for long-term and trusting partnerships. The focus is on you and your challenges. We make our contribution with passion and creativity, true to our motto **PART OF EXCELLENCE**.

DRIVE TECHNOLOGY
AND SHAFT CONNECTIONS

One of the crucial components in the drive train of a wind turbine is the coupling. The requirements imposed on this component are particularly high. Our comprehensive range of shaft connections covers all essential needs and includes a wide range of couplings, torque limiters, clamping sets and precision joints. We also offer all these components as customised versions, tailored precisely to the respective technical requirements. Our products are designed to withstand the high loads and demanding operating conditions in wind turbines.

→ On Page 8
you can find more drive components

At the heart of the **RADEX®-N** are special high-strength spring steel laminas that compensate for extreme misalignments between the gearbox and generator. The intermediate piece with GRP tube ensures reliable electrical insulation in the drive train and an integrated slipping unit limits the transmittable torque and protects against overload.

Wind power coupling

Backlash-free all-steel coupling / laminae coupling

Laminas made of high-strength spring steel

Compensating for high displacements

Coupling can be combined with our brake systems



BRAKE SYSTEMS

KTR-STOP®
Floating caliper brake



Whoever talks about driving must be able to slow down – KTR is a manufacturer of brakes. The “Competence Center for Brake Systems” is located in Schloß-Holte-Stukenbrock in Eastern Westphalia and the headquarters of KTR Brake Systems GmbH. Being one of the few manufacturers worldwide KTR provides two different brake systems: the hydraulic KTR-STOP® and the electromechanical EMB-STOP system.

→ On Page 10
you can find more brake systems



COOLING SYSTEMS

KTR Systems is a manufacturer of high-quality cooling systems based in Rheine. Whether as a customised or standard solution, we offer multi-medium cooler's oil/air coolers or oil/water cooler for mobile machines or stationary hydraulics. Our products are designed to withstand the high loads and demanding operating conditions in wind turbines.

Compact and high-performance oil cooler type OAC standard. Standard consisting of 230 / 400 V motor, 12 V / 24 V fan and hydraulic fan drive. In addition available with electric motor and 60 Hz frequency. Besides the “marine” and “ATEX” versions, this series is available in combination with thermal or pressure bypass valves as well.



Easy to service and good options of cleaning

Low sound pressure level

CE marking

Painting for salty environment / near the coast (CDP + powder painting)

Pressure bypass 4 and 6 bars



KTR FOCUS

Why KTR is a master in the field of customised components.

KTR offers you engineering and production from a single source, which guarantees a seamless process for your project. Our expert evaluation of your requirements enables us to offer customised solutions that are precisely tailored to your needs. By being personally available, we ensure that you receive support and up-to-date information at all times. Professional project management rounds off our services and ensures efficient and

timely implementation. This combination of expertise and customer orientation makes KTR a leader in the field of customised components.

- Engineering and production from a single source
- Competent evaluation of your requirements
- Personal availability
- Professional project management

DRIVE COMPONENTS

The **Multi Disc** is an advanced further development of the proven RADEX®-N coupling for wind turbines. The newly developed slipping unit can reliably handle significantly more and longer overload and slipping processes. Innovative technology ensures greater robustness and endurance in operation, resulting in increased efficiency and longevity in demanding wind power applications.

- Further development of the RADEX®-N coupling
- Newly developed slip system
- Significantly more and longer slipping processes possible



You can find more information on our www.ktr.com/de/en/industries/wind-power

RADEX®-N Mega is a diaphragm coupling that connects the main shaft or rotor to the gearbox of the wind turbine. It is designed for high torque ranges and enables precise compensation of misalignments between the main shaft and gearbox. Ideal for demanding applications in wind power technology, it ensures efficient torque transmission.

- Diaphragm coupling
- Specially designed for high torque ranges
- Precise compensation of displacements



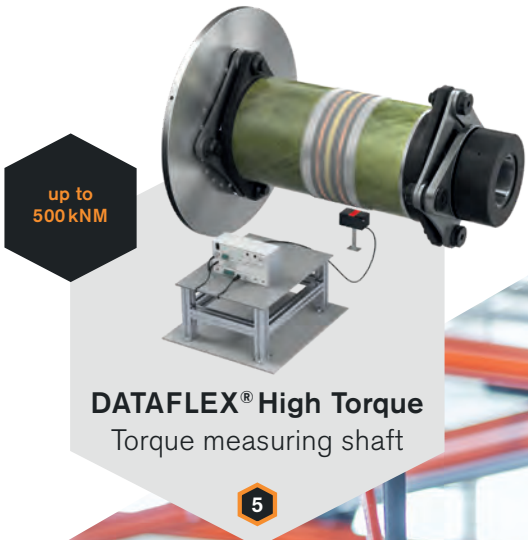
RADEX®-N with KTR slipping control

Load-holding safety couplings prevent torque peaks from exceeding a critical limit. The **KTR slipping control** logs every slipping process of the drive, saves the data such as time, slipping angle and speed of the events in a box and transmits it to your smartphone via an app.

- Simple set-up
- Contactless measurement
- Saves angles and timing of sliding events
- Data are transferred to smartphone

If requested, we manufacture customised torque sensors and **torque measuring shafts** for large measuring ranges from 20 kNm to 500 kNm. In this context key parameters such as measuring range, size, length and kind of connection can be adjusted to the specifications. The torque is measured contactlessly so that bearings are not required. Apart from customised torque sensors KTR provides special solutions, for example with couplings equipped with torque measuring technology which require no or only few amendments of the customer setup.

- Customised complete solution
- Measuring ranges up to 500 kNm
- Without bearing
- Contactless power and data transmission
- Inaccuracy down to 0.1 %
- Output signal $\pm 10\text{ V} / 4 - 20\text{ mA}$
- Calibration up to 500 kNm



DATAFLEX® High Torque Torque measuring shaft



RADEX®-N Multi Disc Steel laminae coupling



For more than 35 years KTR has developed and manufactured drive components and systems for more than 150,000 wind power plants.

BRAKE SYSTEMS

6

Clamping forces up to 203 kN

KTR-STOP® M-D

Service brake with adjustment of air gap

The service brake **KTR-STOP® M-D** is designed as a fixed caliper brake. The active fixed caliper brake can be provided with adjustment of the air gap keeping the air gap and consequently the response time of the brake constant. The option to wear off the pads almost completely allows for long maintenance intervals.

- High power density
- Low maintenance effort
- Easy brake pad replacement
- Leakage oil connections on the back of the brake
- Disk brake

KTR-STOP® brakes are yaw brakes and protect wind turbines effectively against windsweeping and pulsating loads. Our yaw brakes develop their strength when aligning and stopping a wind turbine. In the version with pull-back springs they can also be used as an operating brake.

YAW brake

- Applicable as a holding brake or service brake
- Protection of the wind turbine against windsweeping and pulsating loads
- Clamping forces up to 542 kN
- High power density

7

Clamping forces up to 542 kN

KTR-STOP® YAW

Yaw brake

8

Clamping forces up to 130 kN

KTR-STOP®

Active hydraulic floating caliper brake

Floating caliper brakes as a compact type are executed as a one-sided actuator design. They serve for generating a brake force on a brake disk in order to decelerate a plant's movement resp. stop it or keep it at standstill. Floating caliper brakes operate free from axial forces. They prevent damages on the drive train reliably, even if there is an incorrect setting or an error in the installation.

- Use in cryogenic temperature range
- Optimum corrosion protection of one-piece brake calipers
- Optimised floating caliper design
- Pressure connections on the rear side
- Reinforced centering system for optimised floating behaviour

The active floating caliper brake **EMB-STOP® L-A-xxx-F** is an electrical brake system for high performance ranges. It is a solid disk brake mainly used as a holding brake and parking brake. The active, electrically actuated shaft brake is in a position to keep the plant without energy with numerous applications.

- Mechanical manual actuation possible
- Suitable for rough ambient conditions
- Variable clamping force setting ex works
- Common mechanical interfaces available
- Easy replacement of pads

9

Clamping forces up to 71 kN

EMB-STOP® L-A-xxx-F

Active, electrical floating caliper brake

10

Transverse forces up to 4,000 kN

KTR-STOP® RL

Hydraulic rotor lock

The **rotor lock** (locking bolt) is a locking system (rotor lock) that is used to lock the rotors of wind turbines mechanically in case of inspections. Rotor locks in wind turbines are important safety components. The hydraulically or electromechanically moved bolt with position monitoring serves as a locking mechanism for locking rotors. The locking function is monitored with sensors.

- Hydraulic locking systems
- Rotor lock for wind turbines
- Locking function monitoring by sensors
- Size S for use in smaller wind turbines

11

EMB-STOP RL

Electric rotor lock

Electric locking systems

Signal generation via safety limit switch

Suitable for rough ambient conditions

Electrical interface per industrial connector

Mechanical limit position detection

You can find more information on our www.ktr.com/de/en/industries/wind-power



KTR FOCUS

Why sustainability has top priority at KTR.

With the Sustainable Development Goals (SDG), the United Nations has adopted the political framework for action until 2030. The 17 SDGs form the basis for global, economic progress in harmony with social justice and within the earth's ecological limits.

No matter what we do at KTR: **With our entrepreneurship, we always touch the United Nations Sustainable Development Goals.** KTR's sustainability strategy is aligned along these goals; it forms the basis for our actions and long-term corporate success by taking responsibility for our environment, our employees, our supply chains and our products.

Our comprehension of trendsetting sustainability is based on the principles of economic success, fairness, respect & responsibility and includes the dimensions of society, ecology & economy. We comprehend sustainable action in terms of the definition of the Brundtland report and the definitions of the German "Rat für Nachhaltige Entwicklung" (Council for Sustainable Development).

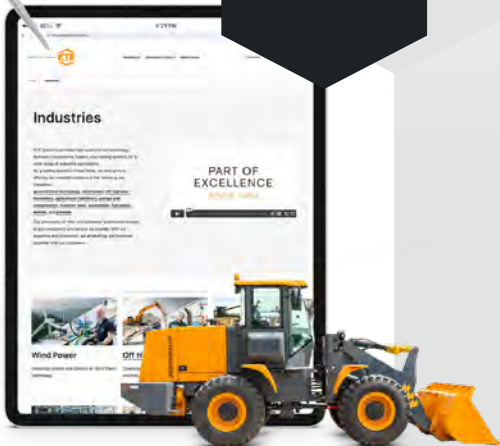
Sustainability at KTR

Find out more in our news:



www.ktr.com/de/en/company/sustainability

↓
www.ktr.com/industries



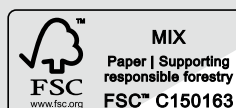
Solutions across all industries on our KTR website.

KTR Systems supplies high-quality products for a wide range of industrial applications. We are proud to be able to offer versatile solutions across all key industries with our drive technology, hydraulic components, brakes and cooling systems.

No matter what industry you need components for, we look forward to supporting you with our expertise and innovative strength to meet your challenges. Achieve peak performance with us! Find out more about the diversity of our portfolio on our website:

www.ktr.com

Headquarters
KTR Systems GmbH
Carl-Zeiss-Straße 25
48432 Rheine, Germany
P: +49 5971 798-0
F: +49 5971 798-698 or 798-450
mail@ktr.com, www.ktr.com



Made for Motion

