

## Wind Power technology



Into the wind or down the wind, but always accompanied by KTR

Sow the wind and reap the current – provided that you are in a position to control the wind's power. Since it does not only produce energy, but also cold and moisture, gusts and turbulence, thus continuous and extreme loads. It is good to see that KTR couplings ensure highest efficiency even with rough conditions – and an efficient operation in every place of the world.

Made in Germany – For the whole world

There is a lot of movement in the international market of wind energy. But never without KTR! When we designed the first coupling for the use between gearbox and generator in 1988, we did not actually expect to become the world's market leader for this industry. Anyway, meanwhile more than 25,000-off KTR couplings are used on wind power stations around the world. Every year more than 10,000-off new applications are added.

Germany is the world champion for wind power: the biggest user of wind energy and at the same time the biggest exporter of know-how and plant engineering. German engineers' work combined with German quality are welcome everywhere. A minor, but important part of this state of the art technology is the mechanical coupling which does not only transmit the torque between gearbox and generator, but also protects the drive system of the wind power station which means a decisive influence on its service life.

Made by KTR – For highest power

Shaft couplings produced by KTR are used in wind power stations with a rated power from 250 kW to 6 MW throughout Europe, Asia and America. As a partner in development of some leading manufacturers we supplement our programme permanently by some new types for higher power. This allows us to offer tailor-made coupling systems for the latest generation of plants, too.

We do not only design suitable couplings, but multifunctional sets consisting of coupling, electric separation, brake, sensor disk and overload system – based on individual components which we have developed specifically for the use on wind power stations. It goes without saying that the latest special generators having low speeds and which are flanged directly to the gearbox do not require any conventional coupling. However, the more important is a particularly powerful overload system to protect against extremely high torque peaks. KTR overload systems provide for the necessary safety on such drives.

Make use of the wind's enormous potential!

Wind power stations are systems which do not know any rest at all. Swinging and vibrations are pervasive. The permanent alternating loads with difficult environmental conditions make the metals fatigue at an early stage and make the drives suffer from wear. In spite of that the expectations in efficiency increase continuously: The towers grow into the sky, the wind farms are expanding. Of course, the expectations in the service life are growing along with it. If you want to exhaust the wind's potential completely, you need a partner who knows all about: KTR.

Based on our 20 years of experience with wind energy plants throughout the world, permanent innovations and re-designs, we will certainly succeed in finding the right solution for your projects. Since the wind does not give us a minute's rest.

Components to control the power, designed by KTR

Efficiency even with turbulence

Normally gearbox and generator of wind power stations are mounted on flexible dampers. In this way relative movements are produced which may cause very high displacements in the drive train. There are not many couplings which are able to compensate for such misalignments reliably in long term.

We have developed the steel lamina coupling RADEX-N specifically for wind power stations: The backlash-free, maintenance-free all-steel coupling with laminas from highly stiff spring steel allows to compensate for high displacements with at the same time low restoring forces subject to its extremely high torsional stiffness.

Between the coupling set on the gearbox and generator side a GFK spacer is mounted serving for electric insulation. In this way potential leakage currents cannot get from the generator to the gearbox where they might damage the bearings and splines. One pleasing side effect is that the total weight is reduced and the ease of servicing is increased.

Stiff laminas for a strong breeze

The heart of RADEX-N are the surface-treated special laminas which are connected to hub and spacer alternately by means of high-strength shoulder bolts. Apart from the ability to absorb high misalignments, this combination of frictional engagement and positive locking serves for increasing the power density.

We have developed the steel lamina packages on the basis of our FEM calculations. Our aim was to realize the optimum design with regard to torque transmission and torsional rigidity, taking into account the necessary options of displacement. The result is a fitted shape – for a tight-fitting lamina.

No problem with overload

Part of the supply of our couplings for wind power technology is mostly a brake disk integrated on the gearbox side having a diameter of up to 1.500 mm and a sensor disk for speed monitoring. An overload system ensuring an accurate speed limitation even with unfavourable conditions is indispensable.

Our torque limiter RUFLEX is perfectly suitable for this task, since thanks to special friction linings it operates free from stick-slip, thus very smoothly and with a high resistance to wear. It is calibrated as per the manufacturer's configuration and integrated into the coupling spacer in a space-saving way. As soon as the slipping torque which is set accurately is reached, the power flow is limited so that your plant is protected against load peaks on the generator side. RUFLEX is able to reproduce the slipping torque up to 1.000 times. The gearbox is protected against stress – in this way the service expenses are considerably reduced.

The KTR coupling system for wind power stations

- Clamping set on gearbox shaft
- Brake disk with lamina set
- GFK spacer
- Generator flange with lamina set
- Clamping set on generator shaft

The way from an initial outline to efficient energy production by KTR

Defined, designed, optimised

Our know-how is growing along with the number of innovations – and vice versa. So, if you intend to re-design the drive train of your wind power station completely, we are pleased to invent a new coupling to suit. But even with well-known designs the coupling has to suit perfectly. That is why you cannot buy off the peg.

Based on our various experiences we have developed a kit system to adapt the components individually and which reduces the period between the order and the shipment considerably.

We support you with your selection, among others, by means of computer-aided torsional vibration analysis, FEM calculations and tests in our laboratories. Our product specialists deliver their know-how to any place you require.

Produced, calibrated, tested

The production of your customised coupling is done with highest accuracy in our up-to-date in-

house machining centre. Thanks to our flexible automation we are in a position to complete such kind of individual product in short term. Immediately afterwards the torque is set accurately in our test centre which is certainly computer-aided. This makes sure that the customer does not need to adapt the coupling during the assembly process.

On one of our mechanical test benches we perform tests of service life and load. To simulate the environmental conditions to be expected we make use, among others, of our climatic chamber. We verify the dimensional accuracy of your coupling by means of 3D coordinate measuring machines. For the torque limiter we perform an individual quality control to make sure that the power generation does not only work without any problems, but also over a long period.

Verified, documented, certified

Thanks to a complete documentation of our test results we are in a position to trace back the settings and balancing qualities of your coupling for 100 %. It goes without saying that KTR couplings for the use on wind power stations are certified, e. g. by Germanischer Lloyd. Beforehand the components transmitting the torque have been inspected with regard to stiffness and service life and extensive fracture and service life tests have been performed for the GFK spacers. You can be sure!

Easily assembled and well-informed

We make the assembly of a coupling in a narrow space of a pod particularly easy for you. In contrast to the usual huge pins requiring large tools and much force you only require a conventional dynamometric screwdriver for RADEX-N. From a thread size M24 we use special clamping nuts, i. e. the necessary prestress of the screws is achieved by the combination of several small screws. The disassembly is just as easy again.

We support you with the maintenance of your wind power station, too. Our technical sales engineers are pleased to assist you at every time, and our closed service network offers you competent advisory service in every place of the world. The global linking of our locations allows us to react to your questions and requests quickly and flexibly. Everything moves with KTR.