



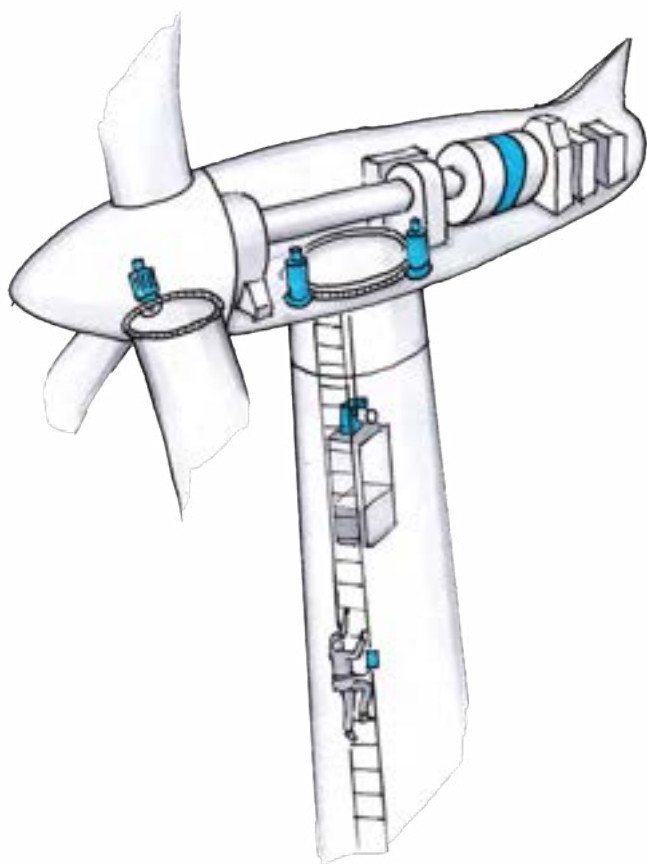
Wind energy

Safety brakes
Torque limiters
Shaft couplings



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We make clean energy generation safe and efficient

For more than 125 years, the company mayr® power transmission has stood for innovation and premium quality. mayr® power transmission bundles its know-how and decades of experience in the offshore sector in safety brakes for pitch and azimuth drives. The safety brakes for wind power plants deliver maximum fail-safe function, minimum downtimes, and constructional design diversity, while also reducing operating costs. With the new ROBA-stop M® pitch brake, the company sets new standards.

A wide range of torque limiters is also available. They extend from overload systems for wind turbine gearboxes to torque limiters for climbing aid drives in the tower and switchable clutches for the drives of maintenance and installation platforms, right up to high-performance large clutches for gearbox test stands.

The products of mayr® power transmission—shown in blue in the adjacent diagram—are used in a wide variety of applications in wind turbines (see the overview on page 23).



Expert know-how in development and design

As the technological leader, mayr® power transmission focuses on continuous further development. Today, highly qualified engineers and technicians work on tomorrow's innovations using the most up-to-date tools. The many years of experience and countless trials carried out by the Research and Development department at the headquarters in Mauerstetten form the basis for a conscientiously-planned service lifetime, taking into account realistic and verified braking torque tolerances.

The values upheld by our traditional, family-run company also include long-term stability and independence as well as a good reputation and satisfied customers.

Therefore, we place emphasis on:

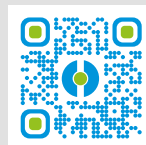
- Tested product quality,
- Optimum customer service,
- Comprehensive know-how,
- Global presence,
- Successful innovations and
- Effective cost management

Tested quality and reliability

mayr® brakes are subject to meticulous quality inspections. These include quality assurance measures during the design process as well as a comprehensive final inspection. Only the best, tested quality leaves our place of manufacture. All products are rigorously tested on calibrated test stands, and adjusted precisely to the requested values. An electronic database in which the measured values are archived together with the associated serial numbers guarantees 100 % traceability. On request, we confirm the product characteristics with a test protocol.

The certification of our quality management according to DIN EN ISO 9001:2015 confirms the quality-consciousness of our colleagues at every level of the company.

What to take into consideration when selecting wind power brakes



We have summarized further information on the topic of safe brakes on our website. Simply scan the QR code to go straight to the information.

Allgäu roots, global reach

mayr® power transmission has its roots in Mauerstetten in the Allgäu, Germany. Production at the headquarters is strengthened by plants in India, China, and Poland. At our Halol plant in India, we manufacture safety brakes for the local market, just as we do at our Zhangjiagang facility in China. Advantages include local value creation, cost-effective production, fast worldwide support, and direct

market access. Our formula is: many locations, one quality. This means that by using the same test benches in all our plants, we can guarantee high quality standards locally. Because when safety is at stake, we don't compromise. Highly trained and motivated employees are just as key to our success as our innovative production and testing methods.



mayr® headquarters in Mauerstetten



Subsidiary with production — mayr® Poland



Subsidiary with production — mayr® China



Subsidiary with production — mayr® India

Signed and sealed

Our brakes are safe, reliable, and innovative—and you don't just have to take our word for it. We have had branch-specific brakes, couplings, and clutches tested and certified for safety-critical and unusual applications by independent institutes. They confirm our claims as to quality and reliability.

All our ROBA-stop® safety brakes are certified according to the North American standards of the CSA. UL certification can be provided upon request.



World market leader for electromagnetic pitch brakes

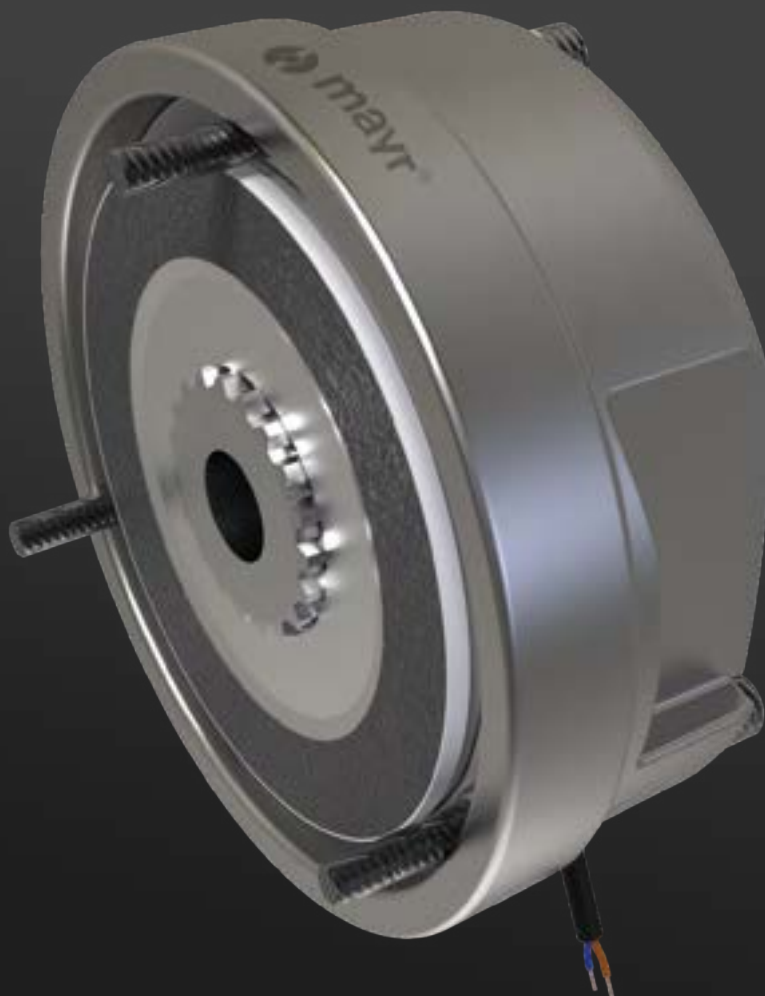
ROBA-stop M® safety brakes

mayr® power transmission as an internationally leading manufacturer offers safety brakes especially developed and tested for pitch drives with the ROBA-stop M® brakes. In the pitch drives, the brakes have the important task of securing the rotor blades against twisting after angular positioning through the gear motors.

The ROBA-stop M® brake is available in all sizes and many different versions. The special requests of the customers are standard for us.

The power-dense variant „ROBA-stop M® pitch brake“, on the other hand, concentrates essentially on the basic functionality of a pitch brake (see page 8).

Many years of experience from over 30 years of use in the field are the reliable basis for the design of all ROBA-stop® and ROBA-stop M® brakes for wind power.

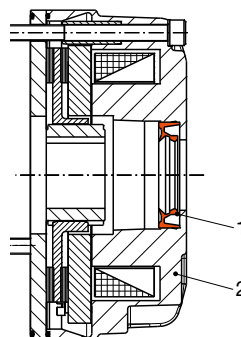




Your special requirements for pitch and yaw brakes represent our standard

We offer a wide range of supplements and options for our ROBA-stop M® safety brakes. These facilitate the adaptation of the brakes to the requirements of your applications. The most frequently-requested "special equipment" includes:

- Mounting preparation for encoders
- Damped rotor
- Extended corrosion protection
- UL-approved
- Microswitch for condition monitoring
- Hand release
- Continuous shaft
- IP66

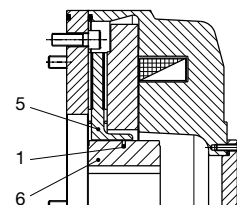


Continuous shaft:

The enclosed design (IP65) is equipped with a sealing plug or cover as standard. A radial shaft sealing ring (1) is installed in the coil carrier (2) on continuous shafts.

Damped rotor:

If vibrations in the drive line cannot be avoided, an O-ring (1) is used to damp the alternating load between the toothed hub (6) and the rotor (5).



Product Catalog

The detailed Product Catalog **K.891.V** with all constructional designs, technical data and dimensions is available for download on our website **www.mayr.com**.

We are also happy to send you a printed catalog.

Pitch brake with high performance density for demanding requirements

ROBA-stop M® for servomotors and regulated AC drives

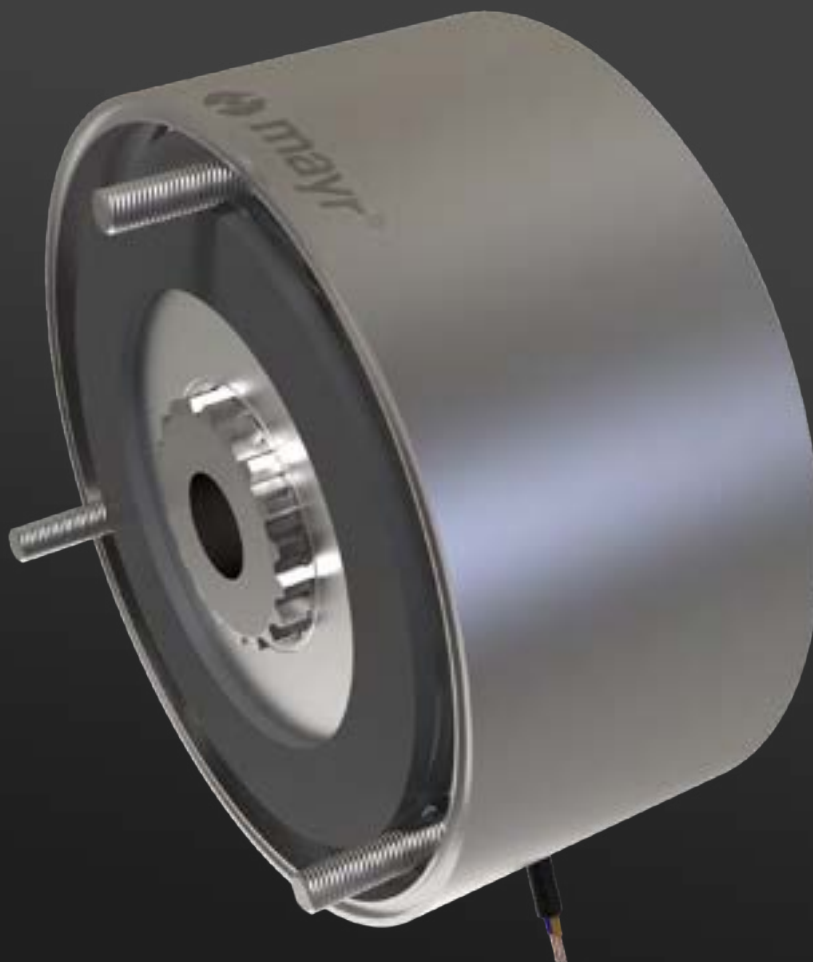
mayr® power transmission has developed a new application-optimized version of the ROBA-stop M® safety brakes especially for pitch drives, which place very high demands on performance density and temperatures. Suitable for applications with ambient temperatures up to +90 °C and temperatures at the mounting flange up to max. +120 °C.

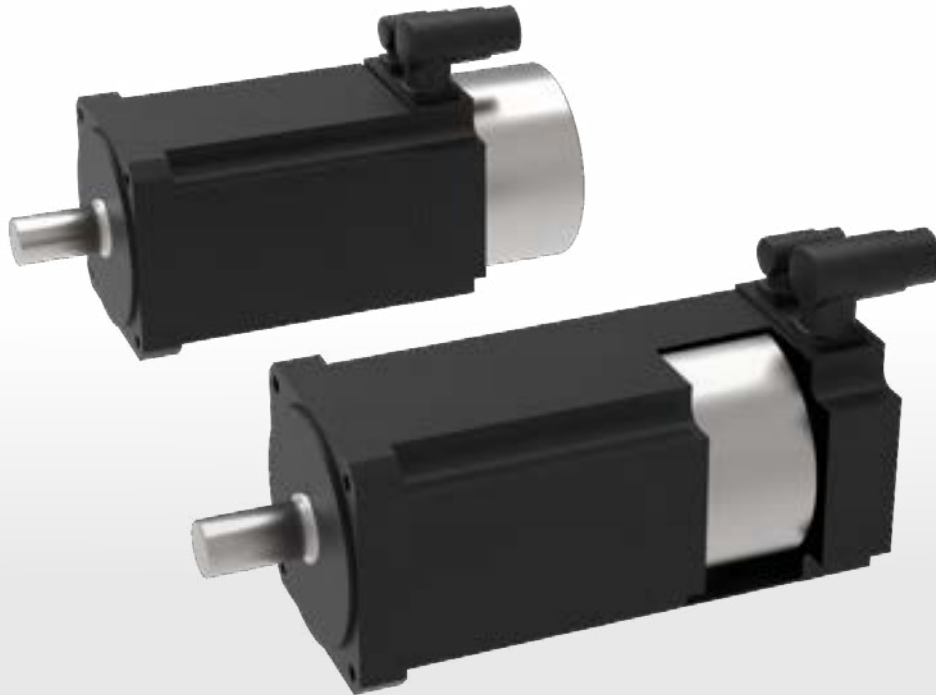
During emergency stops, brakes can face high demands with regards to friction work. These brakes are perfectly designed for use in pitch servomotors as well as in controlled AC drives.

Due to their open construction, classic servo brakes are integrated in the motor housing, preferably on the A-bearing

side of the motor. The ROBA-stop M® safety brakes can be placed inside and outside the housing. Thanks to their enclosed construction, they already have IP54 protection in the standard version. With appropriate additional sealing, they even achieve protection class IP66. This also makes open, B-bearing side attachment possible.

The performance-optimized ROBA-stop M® pitch brakes don't require microswitches or contactless sensors such as proximity switches to work and to monitor wear and tear. This task can be taken over by the ROBA® brake-checker® module, which continuously provides all information about the status of the brake without sensors by monitoring and evaluating coil current and coil voltage.





High level of protection thanks to enclosed construction

Due to the enclosed construction of the application-optimized ROBA-stop M[®] pitch brake, it can also easily be installed outside the motor housing, in contrast to servo brakes.

Protections:

- IP54 in the standard version
- IP66 with additional sealing



Advantages of the ROBA-stop M[®] pitch brake type 891.100.5

- High level of protection IP54 in standard or IP66 available on request
- High performance density
- Wide temperature range
- Versatile mounting options
- High permissible friction work for emergency stops

Product Brochure

For detailed information including technical specifications and dimensions, see the brochure **P.8911005.____**, which we are happy to provide as a PDF upon request.

We are also happy to send you a printed version.

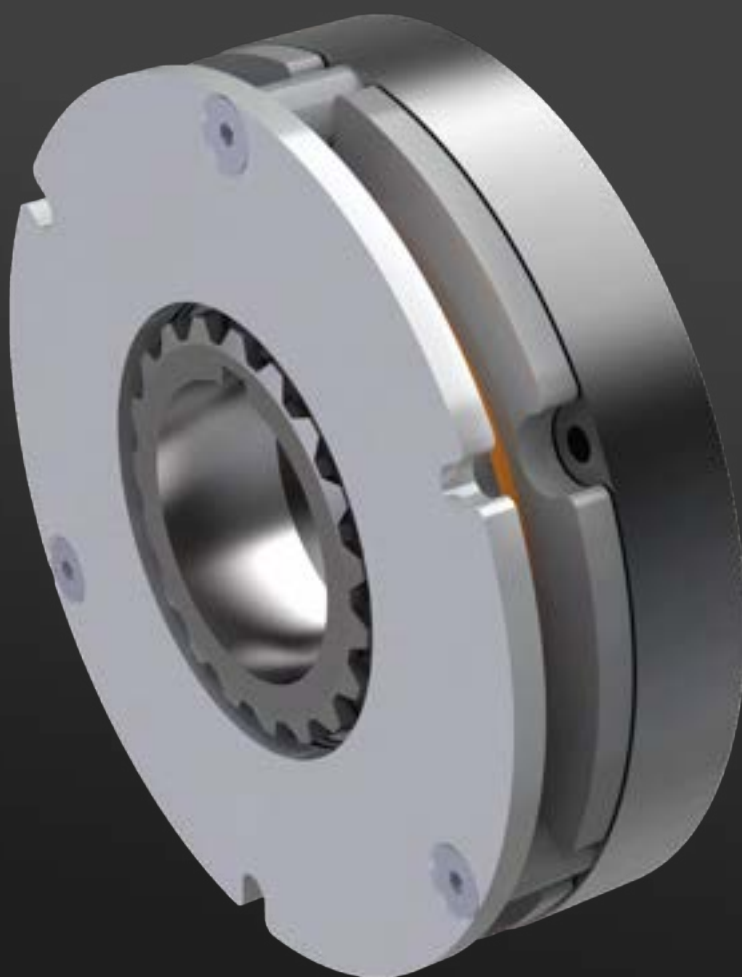
Perfect variety for servo pitch drives

ROBA® servostop® safety brakes

The ROBA® servostop® safety brakes ensure reliable, constant holding torques throughout the entire service lifetime. They feature high performance density, are wear-resistant and can also be used in challenging application conditions, such as temperatures of up to 120 °C within the motor. Furthermore, the brakes are characterized by high permitted friction work during dynamic braking: For servo drives, normally load mass ratios (load/motor) of 3:1 or smaller are selected for the benefit of good control characteristics and high dynamics. With ROBA® servostop®

brakes, load mass ratios of 30:1 and more are possible thanks to the high permitted friction work and friction power.

The simple and robust construction of these safety brakes allows simple, quick and reliable installation: The operating air gap is factory-specified. In contrast to permanent magnetic brakes, exact axial positioning on the motor shaft is not necessary. The ROBA® servostop® brakes always work exactly and reliably; the magnetic air gap is not influenced by the mechanical installation situation.





The suitable solution for every application

Servomotors are increasingly being used in the pitch sector. However, conventional brakes for servomotors cannot always cope with the high requirements placed on them by pitch applications. mayr® power transmission, on the other hand, offers a multitude of solutions here:

Integrated motor brakes

ROBA® servostop®
ROBA-stop M® Pitch

A-side flanged housing construction designs

ROBA® topstop®
ROBA® alphastop®

B-side installed brakes

ROBA-stop M®
ROBA-stop M® Pitch

Product Catalogs

The detailed Product Catalogs **P.898000.V** (ROBA® servostop®), **K.899.V** (ROBA® topstop®), **P.897.V** (ROBA® alphastop®) and **K.891.V** (ROBA-stop M®) with all constructional designs, technical data and dimensions are available for download on our website www.mayr.com.

We are also happy to send you the printed catalogs.

Servomotor with ROBA® topstop®



Servomotor with ROBA® alphastop®



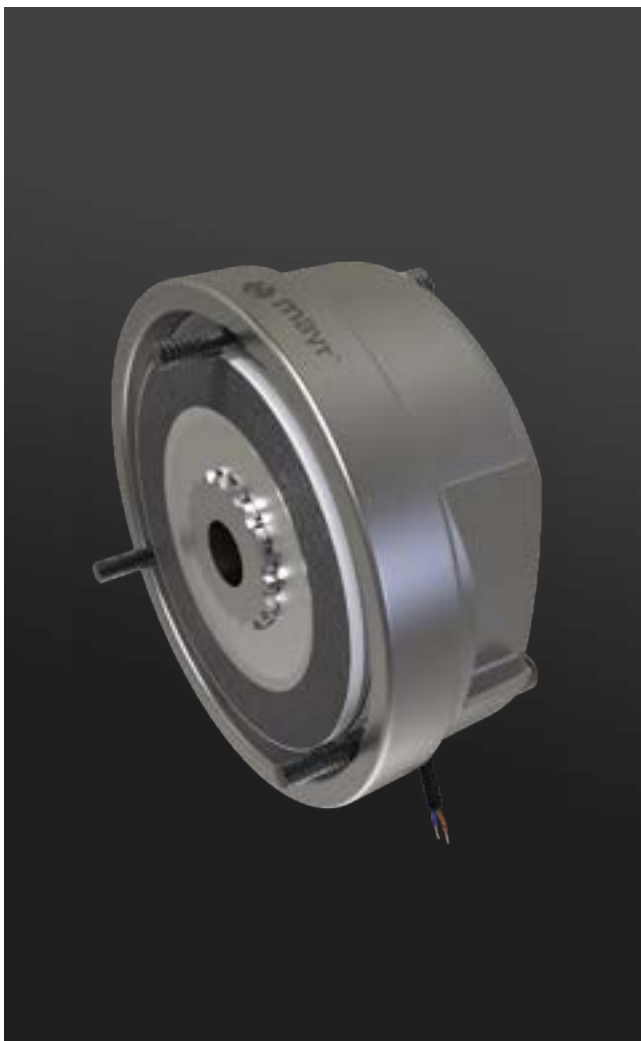
Safety brakes for yaw drives

ROBA-stop M[®] safety brakes

With the ROBA-stop M[®] brakes, mayr[®] power transmission as the international leading manufacturer of wind power brakes not only offers safety brakes developed and tested for pitch drives, but also for yaw drives.

- Protection IP54 and IP65
- Various configuration possibilities such as hand release, release monitoring, temperature monitoring
- Combinable with ROBA[®] brake-checker[®] for sensorless, continuous brake monitoring

- Maximized fail-safe function
- Minimum downtimes
- Improved competitive ability
- Low procurement costs
- Reduction of operating expenses
- Constructional freedom of design
- No air gap adjustment required
- Braking torque cannot be manipulated



Product Catalog

The detailed Product Catalog **K.891.V_...** with all constructional designs, technical data and dimensions is available for download on our website **www.mayr.com**.

We are also happy to send you a printed catalog.

Full commitment to climate and environment

Generating renewable energy and saving resources

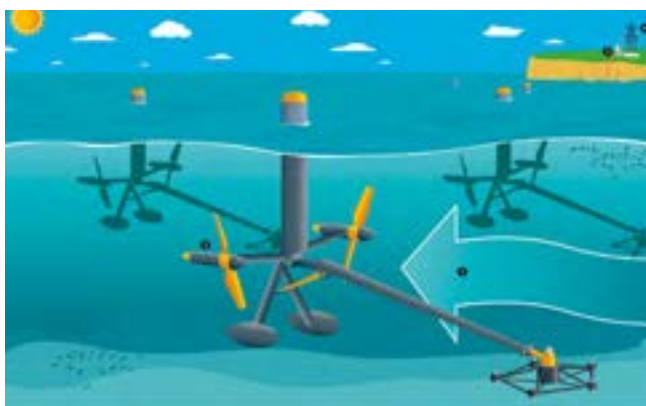
Safety brakes and clutches from mayr® power transmission are not only used in pitch and yaw systems of wind turbines, but also prove themselves in numerous other applications in the generation of renewable energies.

Power-density clutches and brakes made of recyclable materials and control modules, which can reduce the energy consumption of safety brakes by up to 90 % during opera-

tion, make a sustainable contribution to saving resources and energy.

The certification as a climate-neutral company underlines how deeply the responsibility for climate and environmental protection is rooted in the company philosophy of mayr® power transmission.

Reliable even under water



In the pitch drives of underwater turbines, ROBA-stop M® brakes in protection class IP66 with completely enclosed brake housing are used. They ensure the safe positioning of the turbine blades.

The brakes are monitored by the ROBA® brake-checker®.

Towards the sun



Active, electric tracking systems align the solar panels with the path of the sun to achieve the highest possible energy yield and effectiveness. ROBA-stop® brakes hold the tracking systems securely in position.

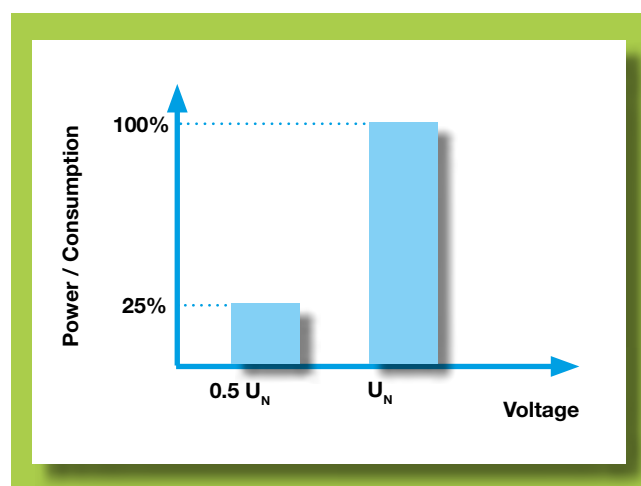
Lowest energy consumption due to voltage reduction

Electromagnetic safety brakes require nominal voltage or overexcitation voltage to be released. If the brake is released, a significantly lower voltage is sufficient to keep the brake in the released state. Lowering the voltage offers enormous savings potential. For example, if the voltage is reduced to half the nominal coil voltage after the brake is released, the power consumption drops to 25% of the nominal power.

Product Catalog

The detailed Product Catalog **K.001.V** with all DC voltage modules, technical data and dimensions is available for download on our website **www.mayr.com**.

We are also happy to send you a printed catalog.



Permanent brake monitoring

ROBA® brake-checker® — always retaining an overview of the brake

In the wind power sector, the monitoring of electromagnetic brakes is meanwhile one of the standard requirements. Therefore, mayr® power transmission with its intelligent monitoring modules sets new standards for yaw and pitch brakes. The ROBA® brake-checker® module works without sensors. Instead, it detects the movement of the armature disk through the analysis of current and voltage and knows at all times in which condition the brake currently is. In addition to the switching condition, temperature and wear, it monitors the pull-in distance or tensile force reserve, i.e. whether the magnet is still able to attract the armature disk. With the new module, substantially more processes

are thus depicted than with microswitches and sensors. On reaching the tensile force reserve, the ROBA® brake-checker® sends out a warning signal early on enough so that a certain operating time for the brake is still possible. During this time, the wind power plant operator or manufacturer can undertake maintenance in a targeted manner, aligned to their working process. In a further development stage, the module simultaneously also takes over the control of the brake and thus replaces the rectifier. In this way, the switching condition monitoring and the brake control are combined in one device.

Under continuous supervision – without additional sensors

The ROBA® brake-checker® is the perfect activation and control module for pitch and yaw brakes. All the important functions for the monitoring and supply of safety brakes are integrated.

- Release monitoring
- Wear monitoring
- Monitoring of critical coil temperatures
- Integrated overexcitation and drop in voltage

For pitch brakes, the following are preferred modules

ROBA® brake-checker® DC (Type 058.600.2) and
ROBA® brake-checker® plus DC (Type 028.600.2 / 028.700.2) are used.



For yaw brakes, the following modules are the most suitable

ROBA® brake-checker® AC (Type 059.500.2) and
ROBA® brake-checker® plus AC (Type 029.700.2)





More data für more safety

In combination with the ROBA® gateway module, the solution becomes network-compatible: The two modules are connected via an IrDA interface, enabling the brake data to be retrieved continuously via an Ethernet connection. Via this interface, data on the switching time, current, voltage, resistance, performance und relative attraction current can be provided.

This means that processes can also be evaluated and visually displayed, for example via a dashboard. Anomalies in the process can be detected quickly and conclusions can be drawn from complex interrelationships. Furthermore, integration into remote maintenance systems is also possible. The supply monitoring module operates from the control cabinet, i.e. in a protected environment. Dust and dirt do not impair reliable operation.





We raise you safely to your destination

Brakes and clutches for tower elevators and climbing aids

The elevator is considered the safest means of transportation in the world. The EN 81 standard and the ASME code specify redundant brake systems in terms of as high a level of personal safety as possible. In accordance with the current status, however, tower elevators and service elevators in wind power plants are still excluded from these standards. These are subject to the Machinery Directive. mayr® power transmission — the world market leader for elevator brakes — provides, in addition to the single circuit brakes still permitted today for winches, a wide range of redundant safety brakes. This technology will also facilitate the fulfilment of international standards worldwide in future.

And if the wind power plant has no elevator at all, then the service technician must ascend the tower in an arduous and strenuous process in full gear via a ladder. Supporting climbing aids facilitate the ascent. These pull permanently upwards with a defined force. If the service technician has to stop briefly or if they are unable to keep up with the speed of the ascent, the drive does not switch off the climbing aid immediately. In such cases, an integrated torque limitation, for example a frictionally-locking ROBA® slip hub or a positive locking EAS-compact® torque limiter, bridges the fault.

Safety brakes for tower elevators and service lifts

ROBA-stop M®

Reliable single circuit brake for winches

ROBA-stop® silenzio®

Tried and tested redundant dual circuit brake — certified in accordance with EN 81 for all passenger elevators



ROBA-stop M®



ROBA-stop® silenzio®

Torque limiters for climbing aids

ROBA® slip hub

The load-holding, frictionally-locking torque limiter

EAS-compact®

The load-separating, positive locking torque limiter



ROBA® slip hub



EAS-compact®



ROBA-stop M®



ROBA® quick



ROBATIC®

Safe and efficient work sky-high

Installation and maintenance platforms greatly facilitate work on wind power plants and are becoming increasingly sophisticated in technical terms. With their assistance, it is possible to build new wind farms quickly, efficiently and safely. Here, too, ROBA-stop® brakes ensure the safety of assembly and service technicians. The electromagnetic “energize to engage” clutches and brakes ROBATIC® and ROBA® quick are used in auxiliary drive fields of application.

ROBA-stop®

Spring applied torque limiters
in accordance with the fail-safe principle

ROBATIC®

Energized-to-engage electromagnetic clutches

ROBA® quick

Energized-to-engage electromagnetic brakes



Brakes and couplings in an offshore hardness test

Installation and maintenance ships must stand safely before it is possible to start work on wind power plants. To do this, mainstays with so-called jack-ups are driven into the sea floor. Once the correct position has been achieved, special brakes ensure a secure hold. ROBA-stop® safety brakes are the best choice here. They are available as ROBA-stop S® seawater brake in IP67 or as ROBA-stop M® in IP66. Due to a special corrosion protection, they are able to withstand the adverse conditions at sea.

In addition to safety brakes, special couplings are also used here with appropriate certifications such as ABS or DNV GL.

ROBA-stop S®

Sealed and corrosion-resistant safety brake in Protection IP67

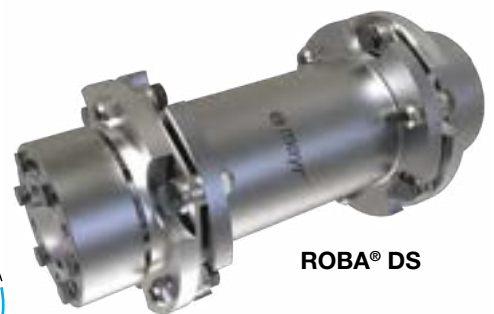
ROBA® DS

Robust, backlash-free all-steel disk pack coupling with DNV GL certification



ROBA-stop M®

ROBA-stop S®



ROBA® DS





Overload protection for the main drive

Wind power plants are not safe against overloads in the main drive which are introduced from the generator side or which are caused through the uncontrollable behavior of the wind. In order to protect against expensive component damages, load-holding overload systems are integrated between the generator and gears on conventional gear drives and on so-called semidrive systems. These absorb unpermittedly high torque peaks.

ROBA® slip hub

Frictionally-locking torque limiter
with a torque of over 100,000 Nm





Reliable small wind turbines as per IEC DIN EN 61400-2

The electromagnetic caliper brakes ROBA® disk-stop® are suitable for the main drive of small wind power plants with and without a pitch system. Through the assembly of several calipers on a disk or through enlargement of the disk diameter, remarkably high braking torques can be realized.

As very high levels of friction work may occur, above all on plants without a pitch system, due to the permanent wind load, conventional friction linings frequently prove insufficient. mayr® power transmission's Research and Development Department has produced special sinter linings specifically for this purpose.

Reliable brake dimensioning is essential here. Please request our questionnaire on brakes for small wind power plants.

ROBA® diskstop®

Safety brake systems for brake disks



Application in test stand technology

High-precision couplings for accurate measuring results

Whether for gears or bearing test stands, for torque measurements or load tests on rotor blades — mayr® power transmission develops solutions for test stand technology which grow with the increasingly complex concepts.

High-speed torque limiters

The high-speed torque limiters, which protect expensive test objects and sensitive measuring units against overload damage, have been especially tailored to the requirements of test stand technology and work reliably and accurately also at very high speeds. If the torque exceeds the limit value set on the torque limiter, the clutch disengages and separates the input and output within seconds. After an overload

occurrence, the measurement shaft therefore has to be recalibrated at worst, any further expensive damage to the drive line or test piece, however, is prevented reliably by the torque limiter.

High-precision shaft couplings

One essential accessory part — not only for measurement flanges — is the high-precision shaft coupling, which compensates for any occurring misalignments. It protects the bearings installed in the shaft train against unwanted loads, and therefore against unnecessary downtimes and costs, and ensures reliable and accurate measurement results.

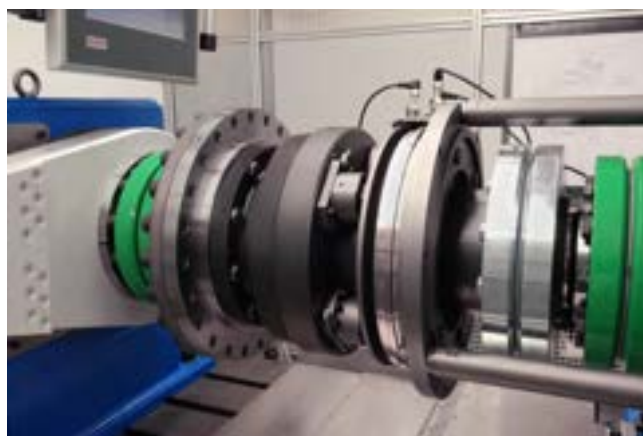


**ROBA® DS shaft coupling
for high torques**



**ROBA® DS shaft coupling
for torque transducer**

For the combination of shaft coupling and torque limiter, mayr® power transmission offers complete solutions from a single source.



**EAS® HT safety clutch for rolling bearing test rig with
300,000 Nm torque**



EAS® HT torque limiter

Specialist for power transmission

Tried and tested solutions for production and manufacturing lines

In the field of handling and automation, mayr® power transmission has developed high-performance safety brakes which are perfectly tailored to the high demands. Here the spectrum ranges from robust lightweight construction brakes via modular brake systems for attachment to servo-motors, right up to profiled rail brakes and linear brakes. The safety brakes permanently guarantee the reliable protection of people and material, and prove their worth daily in countless robot and handling applications worldwide.

Your reliable partner

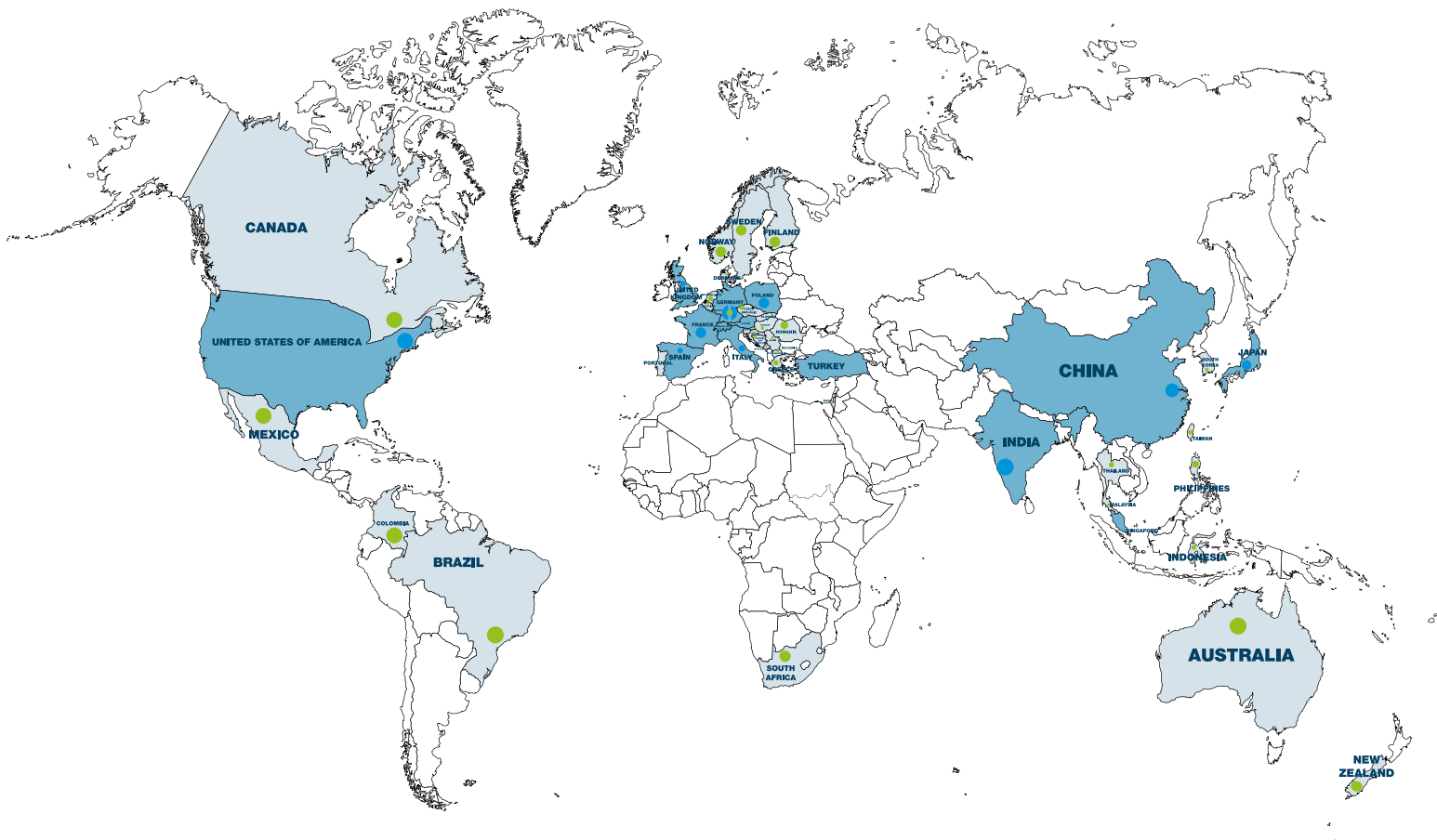
Besides brakes, the clutches/couplings by mayr® power transmission also render reliable services in robotics and automated solutions. A wide spectrum of backlash-free, high-performance servo couplings ensures a reliable connection between the shafts. The proven torque limiters stand for permanently reliable overload protection – for maximum operating safety and productivity.

At a glance

mayr® products in operation in wind power technology

mayr®	Electromagn. brakes	Overload clutches	Shaft couplings	Electromagn. clutches
Pitch drive	x		x	
Yaw drive	x	x		
Main drive		x	x	
Service elevators	x			
Hoisting devices	x	x		
Climbing aids		x		
Installation platforms	x	x		x
Test stands	x	x	x	x
Assembly lines	x	x	x	x
Small wind turbines	x	x	x	

**MANY
LOCATIONS
ONE
QUALITY**



 Headquarters  Branch offices  Representatives

mayr® power transmission
Eichenstraße 1
87665 Mauerstetten



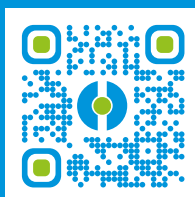
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