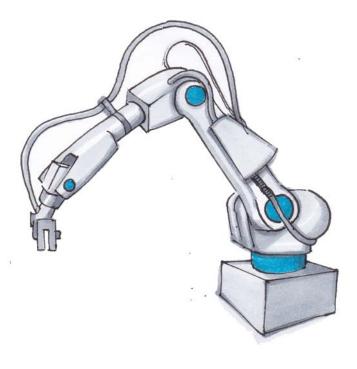


# **Robotics and Automation**









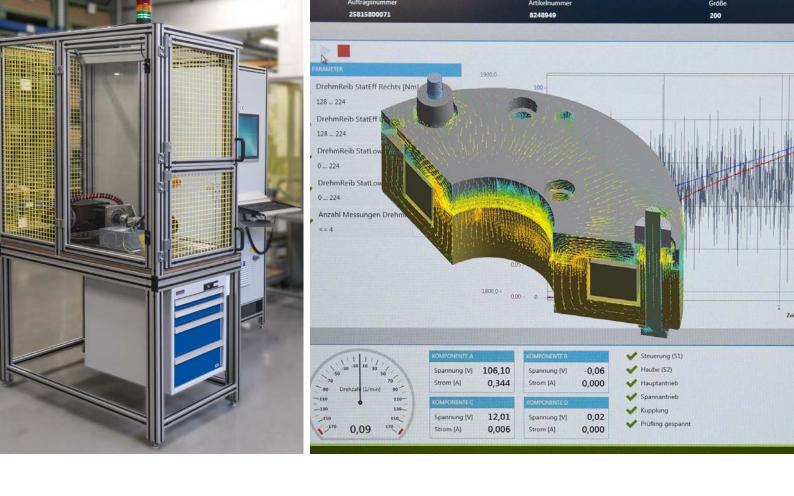
# Brake technology that inspires

For more than 100 years, the company *mayr*® power transmission has stood for innovations and premium quality. The family-run company from the Allgäu region can rely on decades of experience in development, manufacture and application, and still has a major influence on power transmission today with its path-breaking products.

In the field of robotics and automation, <code>mayr®-power</code> transmission has developed high-performance safety brakes which are perfectly tailored to the demands of robots. They permanently ensure the reliable protection of people and materials, and prove themselves every day in numerous robotics applications worldwide. Irrespective of whether in industrial robots which collaborate with people in production lines, in medical engineering or in fairground attractions in theme parks – safety does not allow for compromises.

Besides brakes, the clutches/couplings by <code>mayr</code>® 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 shafts. These proven torque limiters stand for permanently reliable overload protection – for the highest operating safety and productivity.





# 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 years of experience and countless tests at the Development and Testing Department at the Mauerstetten Headquarters form the basis of conscientious lifetime dimensioning.

The values upheld by our traditional, family-run company also include long-term stability, 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 and clutches/couplings are subject to meticulous quality inspections. These include quality assurance measures during the construction process as well as a comprehensive final inspection. Only the best, tested quality leaves our factory. All products are rigorously tested on test stands, and adjusted precisely to the requested values. An electronic database in which the measurement 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 9001:2008 confirms the quality-consciousness of our colleagues at every level of the company.





# Specialists for power transmission for more than a century

mayr® power transmission is one of the most traditional and yet most innovative companies in the field of power transmission. From modest beginnings in the year 1897, the family enterprise has developed to become the world market leader. Worldwide, the company employs more than 1000 people.

#### Unsurpassed - our standard range

mayr® power transmission offers an extensive variety of torque limiters, safety brakes, backlash-free shaft misalignment compensation couplings and high-quality DC drives. Numerous renowned machine manufacturers trust in solutions by mayr®-power transmission.

#### Available worldwide

With eight subsidiaries in Germany, sales offices in the USA, France, Great Britain, Italy, Singapore and Switzerland as well as 36 additional country representatives, *mayr*<sup>®</sup> is available in all important industrial areas, guaranteeing optimum customer service around the globe.

# Never compromise on safety

We make no compromises where safety is concerned. Only top products of a perfect quality guarantee that no people are injured or machines damaged in case of malfunctions, collisions and other hazardous situations. The safety of your employees and machines is our motivation to always provide the best and most reliable clutches, couplings or brakes.

mayr®-power transmission holds numerous ground-breaking patents, and is the global market or technological leader for

- application-optimised safety brakes, for example for passenger elevators, stage technology and gravity loaded axes
- torque limiters to protect against expensive overload damage and production losses and
- backlash-free servo couplings.

#### Strongly positioned

mayr® sets standards in power transmission with economically viable solutions. For maximum competitiveness of your machines and systems, we always aim for the best possible cost efficiency, starting with the development of your clutch/coupling or brake, right up to delivery of the finished and inspected product. For cost-efficient production, our factories in Poland and China represent the perfect supplement to the headquarters in Germany.



mayr®-headquarters in Mauerstetten



Subsidiary with production department — mayr®-China



Subsidiary with production department — mayr®-Poland



# ROBA®-servostop® safety brakes

### Robust lightweight construction brakes for demanding applications

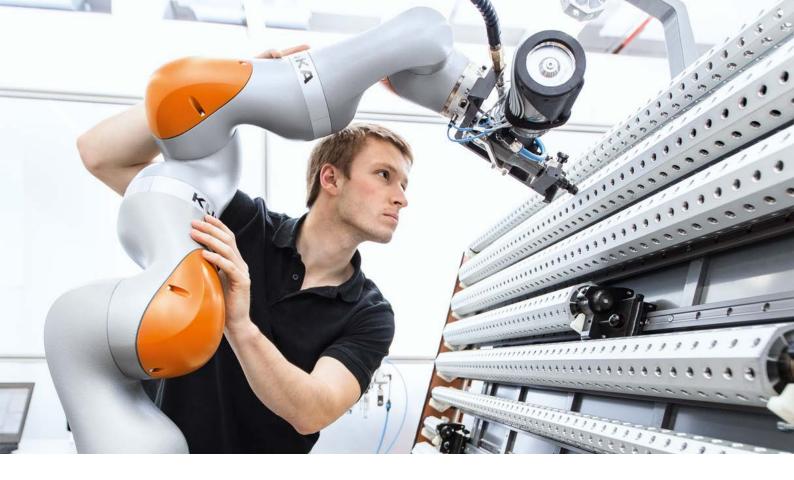
For the development of lightweight construction brakes, <code>mayr®-power</code> transmission can call on many years of cooperation with the Deutschen Zentrum für Luft- und Raumfahrt (German Aerospace Centre). The lightweight construction brakes, the development of which began almost 20 years ago during the course of the research project LBR II, have established themselves today as a marketable standard solution and prove themselves every day in numerous robotics applications worldwide. Today's challenge lies in effectively catering for diverse installation situations through an expedient modular construction.

The ROBA®-servostop® safety brakes are specially designed for the high demands of robotics and ensure reliable, constant holding torques throughout their entire service life. 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 characterised through high permissible friction work during dynamic braking: 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 reliable 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.





# High flexibility and performance density

The ROBA®-servostop® safety brakes are tailored to robotic requirements with their extremely thin construction shape and low weight, and can therefore easily cope in demanding operating conditions.

- Extremely thin and lightweight construction shape
- High performance density in spite of low energy intake
- Adapted geometry for very different installation situations
- Extremely short switching times
- Can be used up to 120 °C
- Ready for installation
- Inspected unit
- Can be produced with a large inner diameter, for example for use in hollow shaft motors



Whether in industrial robots which collaborate with people in production lines or in medical engineering – the safety brakes by  $mayr^{\circ}$  power transmission ensure reliable protection for people and materials.

## **Product Catalogue**

The detailed Product Catalogue **P.898000.V**\_ \_.\_ with all constructional designs, technical data and dimensions is available for download on our website **www.mayr.com**.

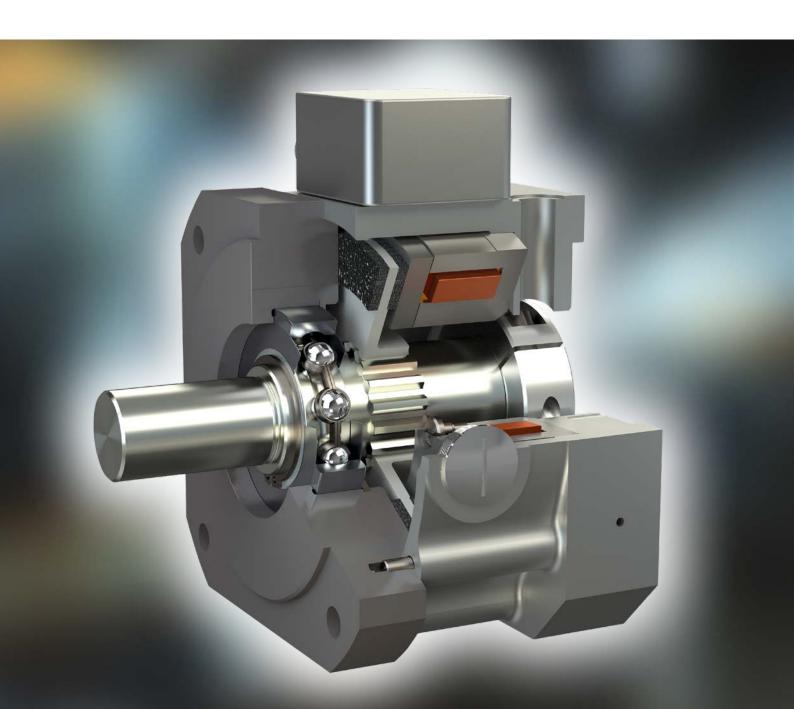


# **ROBA®-topstop® safety brakes**

### Modular braking systems for servo motor installation

ROBA®-topstop® brake systems by mayr® power transmission have proven themselves for decades as reliable vertical axis brakes. Thanks to the adapted flange dimensions, they can easily be integrated into existing constructions between the servo motor and counterflange. As an independent module, they hold the vertical axis reliably in any position, even in case of a deinstalled servo motor, for example during machine maintenance or transportation. Additional measures for supporting the axis are not required in this case. This ensures significant time and cost savings,

for example, for changing the drive motor, and reduces the downtimes during repairs. In critical situations, too, such as EMERGENCY STOPS or power failures, the braking systems quickly and reliably bring the loads to a standstill. *mayr®*-power transmission has voluntarily subjected the ROBA®-topstop® safety brake to a type examination by the Deutsche Gesetzliche Unfallversicherung (DGUV) (German Statutory Accident Insurance). This acknowledges the brake equipment as a "bewährtes Bauteil" (proven component) in terms of Category 1 according to DIN EN ISO 13849-1.





# The top system on the market for rotary drives

The ROBA®-topstop® has quickly developed into the leading brake system on the market for vertical axes with rotary drives thanks to its design features and proven safety. They ensure:

- The axis is held safely in any position, even with a dismantled servomotor, e.g. during machine maintenance
- Safe braking on EMERGENCY STOP and power failure
- Long lifetime even after frequent EMERGENCY STOP brakings
- Maximum reliability due to decades of experience and a mayr<sup>®</sup> construction which has been tried and tested millions of times
- Indication of the operating condition (open/closed) via an integrated condition monitoring
- Short, compact design
- Low rotatory moments of inertia
  Low self-induced heat production even at 100 % duty cycle
- Design with Protection IP65 available



Type 200/899.012.22

For the ROBA®-topstop® single circuit brake Type 899.012.22, Size 200, a voluntary prototype inspection was carried out. The "DGUV Test Prüf- und Zertifizierungsstelle Maschinen und Fertigungsautomation" (translation: "DGUV Testing and Certification Body, Machines and Manufacturing Automation") confirms that this braking equipment can be considered a "tried and tested component" in terms of category 1 acc. DIN EN ISO 13849-1.

### **Product Catalogue**

The detailed Product Catalogue **K.899.V**\_ \_.\_ \_ with all constructional designs, technical data and dimensions is available for download on our website **www.mayr.com**.



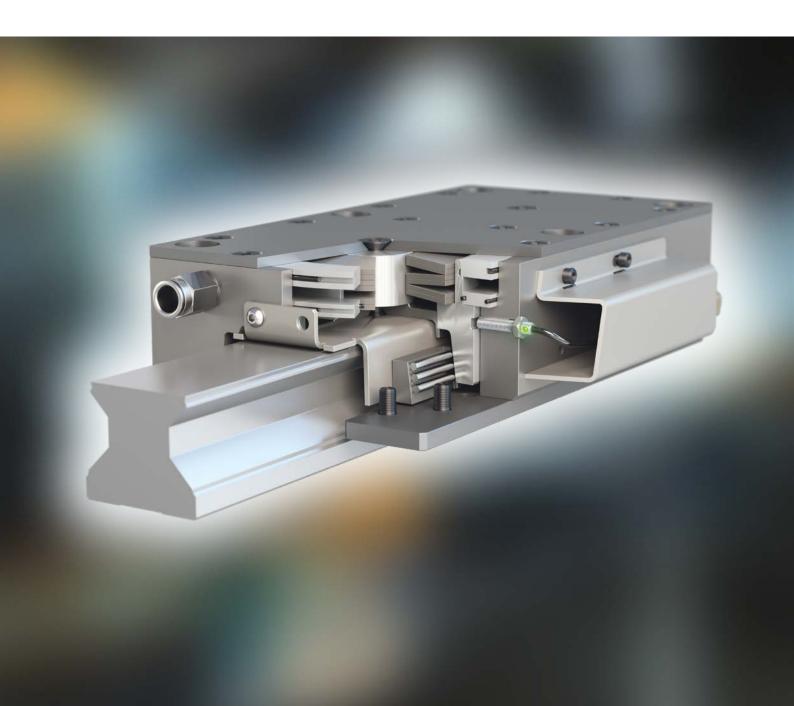
## ROBA®-guidestop profiled rail brake

## Decelerate reliably and safety - Clamp rigidly and backlash-free

The ROBA®-guidestop safety brakes act directly on to the linear guide with extremely high rigidity. This means that they are attached directly to the masses which should be held. In particular in the case of gravity-loaded axes, this provides a decisive advantage if the hazard risk to people should be minimised: Drive elements between the motor and the moved mass, such as for example spindles, spindle nuts, shaft couplings or gears, can thus have no influence on safety.

The backlash-free clamping by the ROBA®-guidestop directly on the profiled rail provides yet more advantages: For example, when used in machine tools, the additional rigidity of the NC axis improves process accuracy, increases

machining performance and can provide further technological advantages for heavy-duty machining, for example. The processing is more vibration resistant and therefore the surface quality of the workpiece is positively influenced. In case of a stationary axis, the brake can take on the load during processing, for example. As a result, it is possible to switch the drive motor off during this phase and disengage it from the control system. This eliminates the regulating movements and is thus gentle on the ball screw spindle. The closed brake adsorbs the axial forces. The lifetimes and maintenance intervals for the drive components are therefore increased.





### Real power packs

ROBA®-guidestop profiled rail brakes provide a suitable solution for every application: As a result, users can rely on hydraulically-released ROBA®-guidestop safety brakes for machines in which a hydraulic system already exists. However, in cases where a hydraulic system would first have to be installed in order to operate the brake with high holding forces, or if several brakes are necessary in order to achieve the corresponding forces, then the pneumatically-released ROBA®-guidestop safety brakes can be used. They clamp the profiled rail just as accurately and backlash-free, and achieve the same high holding forces as the hydraulic designs of this brake.

- Maximum safety due to fail-safe principle
- Hydraulically opening (with 70 90 bar)
- Pneumatically opening (with 4 8 bar or 20 30 bar/ pressure booster)
- Five construction sizes from 1 to 34 kN
- Type 3840, 3850/3852, power pack with two brake circuits for double holding force or a redundant design
- Type 3841, 3851/3853, cost-efficient solution for limited installation space
- High degree of rigidity up to the full nominal holding force
- Extremely high holding forces
- Designed for standard linear guides
- With switching condition monitoring



The pneumatic ROBA®-guidestop (type 3852/3853) opens with compressed air at 20 to 30 bar. In order to achieve the necessary operating pressure, a compact pressure booster is used together with the brake, which increases the normal system pressure of 4 to 6 bar in the pneumatic network purely mechanically, without external energy. This innovative concept enables a position-selective pressure increase directly prior to the brake, and therefore short high pressure lines suffice.

### **Product Catalogue**

The detailed Product Catalogue **P.380000.V**\_\_.\_ with all constructional designs, technical data and dimensions is available for download on our website **www.mayr.com**.



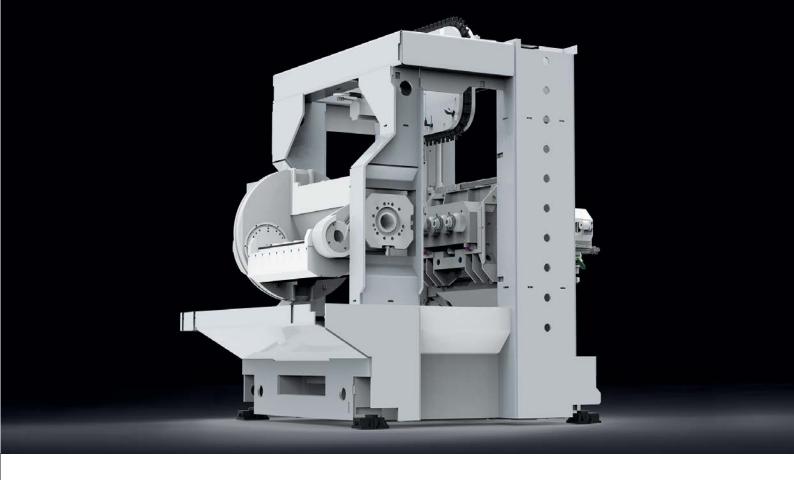
## **ROBA®-linearstop**

### The perfect safety brake for linear-moving axes

With the ROBA®-linearstop, *mayr®* power transmission provides a further safety brake to decelerate and hold linearly-moved masses. It acts on the piston rod independently of the drive unit. The ROBA®-linearstop also works according to the fail-safe principle and generates the braking force via thrust springs. Depending on the design, it is hydraulically, pneumatically or electromagnetically released and is available as a complete brake for dynamic braking or as a clamping unit. The pneumatic version of the ROBA®-linearstop safety brake (type 381.1\_) is tested and acknowledged by TÜV Süd as a complete dynamic braking device. It easily fulfils the testing principle for emergency

braking with a holding function for linear movements (GS-MF-28) of the Berufsgenossenschaftlichen Instituts für Arbeitsschutz (BIA) (German Institute for Occupational Safety). This testing principle defines 1 million switching operations, both with and without load assumption, and an additional 1000 dynamic brakings. The pneumatic clamping unit is also certified by TÜV Süd (Technical Inspectorate South): In addition to the required test criteria for holding brakes, 100 dynamic brakings were executed during the test — the brake also fulfilled these requirements without any problems.

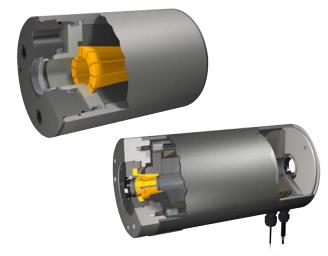




# Versatile — as a safety brake or a clamping unit

ROBA®-linearstop safety brakes are more than just clamping units. They are designed so that they hold the load reliably, and furthermore are suitable for emergency braking. Prior to a brake leaving the premises of *mayr®*-power transmission in Mauerstetten, the required force is set with the appropriate safety. This value is checked and documented, and therefore every serial number is traceably assigned.

- Safety brake system according to the fail-safe principle
- Hydraulically, pneumatically or electromagnetically opening
- Backlash-free force transmission having an effect on both sides
- No self-reinforcement during clamping
- Clearing the clamping device is not necessary
- Maximum performance density
- Suitable for EMERGENCY STOP braking actions
- Suitable for dynamic braking actions
- Minimum reaction times
- Integrated switching condition monitoring possible
- Long service lifetime
- Can easily be integrated into existing constructions



The ROBA®-linearstop is available in a hydraulic, pneumatic or electromagnetic design.

### **Product Catalogue**

The detailed Product Catalogue **K.381.V**\_ \_.\_ with all constructional designs, technical data and dimensions is available for download on our website **www.mayr.com**.



## ROBA-stop®-M

### The robust, cost-effective safety brake

ROBA-stop®-M safety brakes are designed for installation at the free shaft end. They ensure reliable holding and can decelerate moving masses or loads in motion. In case of power failure, a fault or malfunction of the servo brake in the drive motor, ROBA-stop®-M brakes hold the axis in any position and therefore prevent an uncontrolled fall or crash. This not only protects the employees against injury, but also the drive, tools and the workpieces to be processed against damage.

- Simple installation
- Completely enclosed brake housing acc. Protection IP54 or IP65
- Maintenance-free over the entire service lifetime of the rotor
- Class of insulation F
- Can be used for 100 % duty cycle
- Short switching times





### **Product Catalogue**

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



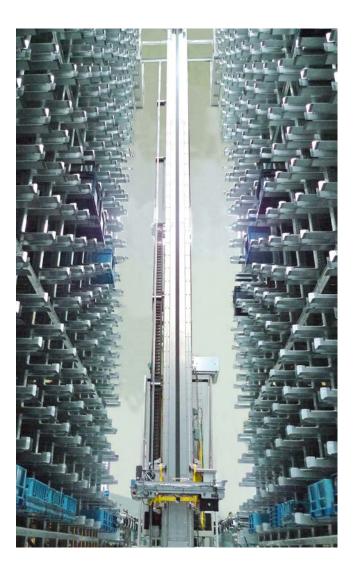
## **ROBA®-pinionstop**

#### The safe rack and pinion brake

The ROBA®-pinionstop offers an additional braking system for axes with a rack and pinion drive. A pinion shaft is integrated into this brake. It directly locks into the toothed rack at any required position and therefore operates independently of the drive motor.

- Safe holding of the axis via ready-to-install brake module with pinion shaft
- Independent, electromagnetically releasing spring applied brake system

- Integrated release monitoring
- Sealed brake housing
- Individual dimensioning and design possibilities of the brake configuration
- Simple installation
- Simple realisation of a redundant, flexible braking system through the installation of a second ROBA®-pinionstop brake or through the use of an additional brake at the servo motor





#### **Product Catalogue**

The basis for the ROBA®-pinionstop is mainly the construction series ROBA-stop®-M (catalogue **K.891.V**\_\_.\_\_). Depending on the installation situation, the toothed rack profile and the technical requirements, we create the appropriate brake for you with an integrated pinion.



## Servo couplings

#### Solutions for all drive constellations

In robotics and automated applications, the production accuracy, feed speed or service life significantly depend on the quality of the servo axes and their components. The shaft couplings in these axes have the basic function of transmitting the motor power from one shaft to another and compensating for any shaft misalignment occurring. In servo technology, steel bellows, elastomers and disk pack couplings are generally used; these are amongst the most common and most attractive backlash-free shaft couplings. However, each drive has its own special features and places very different demands on the coupling. Therefore,

mayr® power transmission provides an extremely wide and sophisticated product range for various drive constellations. Customers benefit from the competence of a the leading company worldwide in mechanical power transmission. You receive complete solutions from one source and therefore can save if applicable on additional suppliers and costs. Servo couplings by mayr® power transmission convince not only through favourable prices and short lead times, but are also easy to handle and simple to select via the product configurator on the website, for example.





#### ROBA®-DS servo couplings

#### Wear and maintenance-free disk pack couplings

Extremely compact construction series made of steel and high-strength aluminium alloys.

Torque range: 35 to 150 Nm

#### smartflex®

#### Modular and adaptable steel bellows couplings

smartflex® couplings convince customers with almost triple the misalignment compensation capability than in standard steel bellows couplings with radial shaft misalignment, and are therefore particularly reliable in operation.

Torque range: 16 to 700 Nm

#### primeflex®

Backlash-free, plug-in type steel bellows couplings primeflex® couplings can be de-installed even after longer operating periods without damaging the steel bellows.

Torque range: 24 to 120 Nm

#### **ROBA®-ES**

#### Backlash-free elastomer couplings

 $\ensuremath{\mathsf{ROBA}}^{\ensuremath{\mathsf{g}}}\text{-}\ensuremath{\mathsf{ES}}$  elastomer couplings transmit the torque backlash-free and damp critical vibrations.

Torque range: 4 to 1,250 Nm



### **Product Catalogues**

You can find an overview of our wide portfolio of servo couplings in the Catalogue IMG.900.V\_ \_.\_

A detailed product catalogue is available for each construction series, with all constructional designs, technical data and dimensions.

All the catalogues are available to download on our website **www.mayr.com**.



## **Torque limiters**

### The airbag for your machine

Torque limiters by *mayr*®-power transmission reliably protect machines and systems from expensive overload damage. They save costs and increase productivity. As the global market leader, the company possesses the widest product range, and provides tailored solutions for very different applications.

In the area of robotics and automation, for example in feed and travel units, couplings by  $mayr^{\circ}$ -power transmission ensure smooth operation. They stand for safety and absolute reliability.

mayr®-torque limiters are subdivided according to their functional principle into load holding and load disconnecting clutches.

Load holding clutches limit the torque to the specified value, but do not interrupt the torque transmission during overload. This is particularly important for vertical masses or masses moved in an inclined position, which must not fall uncontrollably.

**Load disconnecting clutches** transmit the torque using positive locking. They disconnect the input and output on overload, meaning that they interrupt the torque or the transmission of force.





# Load disconnecting torque limiters

Automatically engaging EAS®-torque limiters

Torque range: 0.65 to 2,400 Nm

**Disengaging EAS®-torque limiters** 

Torque range: 5 to 440,000 Nm

Switchable and controllable torque limiters

Torque range: 4 to 2,500 Nm

# **Axial force-limiting torque limiters**

EAS®-axial

Force range: 75 to 300,000 Nm

#### **Product Catalogues**

You can find an overview of our wide portfolio of torque limiters in the Catalogue **IMG.402.V**\_\_.\_

A detailed product catalogue is available for each construction series, with all constructional designs, technical data and dimensions.

All the catalogues are available to download on our website **www.mayr.com**.

We are also happy to send you printed catalogues.

#### **Load-holding torque limiters**

Frictionally locking clutches

ROBA®-slip hubs

torque range: 2 to 50,000 Nm

Continuous slip clutches with magnetic hysteresis principle

**ROBA®-contitorque** 

torque range: 0.1 to 12 Nm







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You can find the complete address for the representative responsible for your area under www.mayr.com in the internet. 😇