

PRECISION IN MOTION



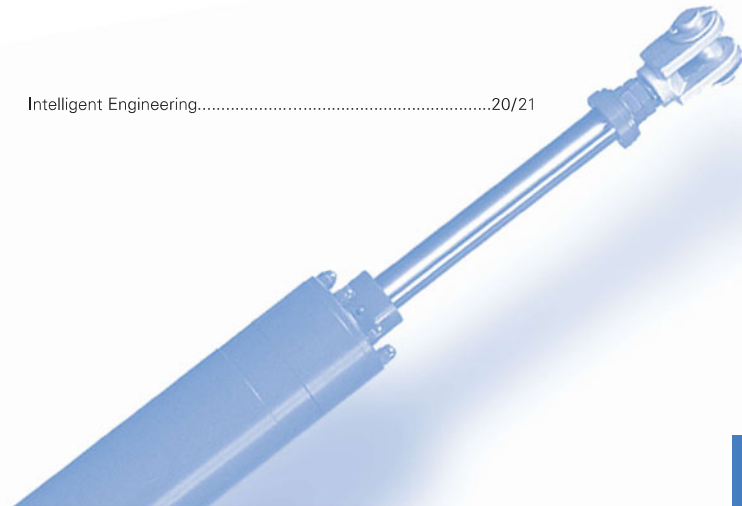


Innovation is our tradition

Wherever you need precision in motion, that's where the name RACO stands for a solution. These solutions are the product of innovative thinking coupled with unconditional reliability. Customers all over the world use our electric mechanical actuation components in many applications for fast and accurate positioning. RACO's highly precise and extremely robust actuators form the basis for these specific task oriented solutions – mainly the RACO electric actuator and linear actuators. These products have established RACO's reputation for over 50 years. Innovation has a long tradition at RACO. Numerous patents and innovations are the result of intense development work, beyond the fulfillment of current orders, which results in a long term investment. We are preparing ourselves today for the challenges we will be faced with tomorrow. After all the future starts with each day.

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PERFECTION



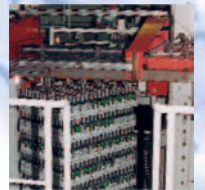
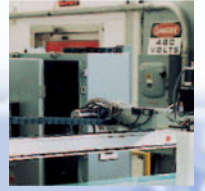
Top-Quality presented world wide

RACO's concepts and products are being applied all around the world, even under the most stringent environmental conditions. RACO's electric actuator, linear actuators, spring loaded brake systems and components such as ball screws have shown what they can do in countless applications spanning the entire range from heavy mining operations to ultra fast precision positioning in automatic production machinery.

M A D E B Y R A C O

Our products are always the result of intensive communication with our customers. This hands on practical communication from one engineer to the other overcoming the linguistic barriers creates quality solutions, which are also economically sound, because they're precisely targeted to the job.

RACO's headquarters in Schwelm, located in Germany's state of North Rhine Westphalia for over 50 years, and RACO International, Inc. located in Pittsburgh, Pennsylvania in the United States for over 40 years has been the pivot of our inter-national activities. At both locations you will find direct access to knowledgeable and competent application engineers, no matter how challenging your application may be.





Everything fits together with RACO

Design and production under one roof - that's RACO. Whatever you have to position, you can be sure with RACO that the concepts and products fit together, an important aspect. With complex sequences of motion such as positioning of a work piece in a multiple-axis environment, it's essential that hardware and software work together without a hitch. With our leading edge technology and production quality, you can be sure that your process will perform as expect.

We have the solution to your problem

Inherent to standardizations are limitations, in technical as well as economical aspect. RACO puts its emphasis on application specific solutions. The results are: greater reliability with a long service life and low operating costs. Based on a modular system of pre-fabricated individual components, we develop and manufacture our products to fit precisely to your specified characteristics and properties. Made to order for your specific application.

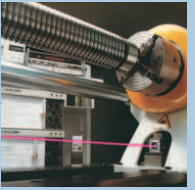


Our principle is to give you maximum quality

The name RACO stands for maximum quality of engineered positioning and material handling equipment. And there's a good reason for it. We manufacture all of the essential components for our products in our own facility. This means we can incorporate the technical aspects of the application for the electric actuator early in the manufacturing process of the spindle. Our experience in the manufacturing of ACME and Ball Screw spindles guarantees a maximum of operating reliability. We check every product leaving our production line right down to the last screw.

Precise - and still robust

RACO's electric actuator, spring loaded brake systems and ball screws are workhorses for continuous duty even under the toughest conditions. Our products show their strengths wherever there is a need for a precision component that is robust. Examples of this are installations in mining, steel mills, rolling mills and public transportation equipment. That's where the long life expectancy of our actuators brings you economic benefits.





RACO gets things moving

RACO's products are an example of application diversity. It ranges from single leaf bascule bridges to parabolic observatory antennas and from automatic window ventilation system in botanic gardens to letter and parcel sorting applications. If it has to move, our electro-mechanical actuator systems get it moving with precision, speed and durability. We're constantly discovering new applications for RACO's multi-talented actuators all around the world.



A highly specialized job

A typical order: A customer needs an electric actuator that will work reliably under harsh conditions. The real challenge might be that there is no regular power supply at the operating location and perhaps even a danger of explosive atmosphere. In addition, the environment is extremely dirty. No problem for RACO, we always have a solution.

There's no such thing as 'you can't do that'

RACO's electric actuators are very proficient at adapting to their environment. An actuator system specially engineered for the stage animation of a Broadway Theater functions precisely, reliably and most important quietly. As in this case, our solutions are often the product of targeted development work. You can always put us to the ultimate test.

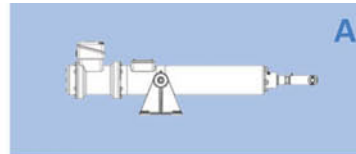




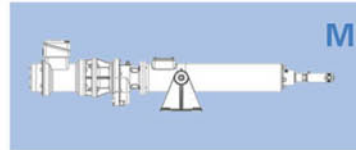
The intelligent drive strategy

Wherever loads have to be positioned fast and accurately, RACO's electric actuator stand the test of time as extremely durable and reliable units. They consist of very economical components. The core of all electric actuator is the high-precision ACME or ball screw from our own manufacturing facility. The RACO spindle deployed in the actuator is the component that lets you utilize the optimal benefits of electro-mechanical actuation devices.

In contrast to pneumatic or hydraulic systems, the RACO spindle does not use any power to maintain position. No power conversion is required. There are no problems with fluid losses or with freezing as in other types of actuators. That clearly minimizes service expense, making electric actuator your best choice, economically and ecologically.



Type A Design:
Electric Actuator with a RACO Motor



Type M Design:
Electric Actuator with a RACO parallel Gear Motor



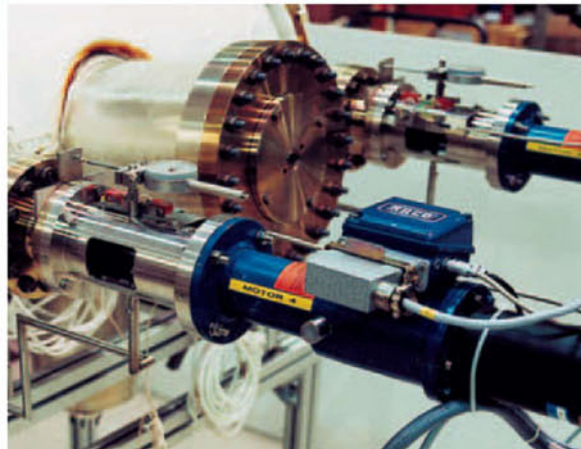
Type T Design:
Electric Actuator with a RACO Worm Gear Motor



Type C Design:
Electric Actuator with a RACO Motor and C Drive Housing



Type N Design:
Electric Actuator with a RACO parallel Gear Motor and C Drive Housing



RACO's electric actuator used in scientific applications
Pic. DESY, Hamburg, Ger.

A wide range of applications

RACO electric actuator cover a broad range of applications. Our modular system of subassemblies includes five basic design types with eleven sizes for performance ranging from 0.3 kN (70 lbs.) to 600 kN (135,000 lbs.) of thrust. Our standard linear speeds range from 5 mm/per second (0.2") to 750 mm/per second (30") and standard strokes span from 100 mm (3.9") to 2000 mm (78.8"). Thanks to their technical specifications, RACO's electric actuators can be applied in a wide variety of applications from precision positioning to heavy load movement.

A variable system

The five basic design types of RACO electric actuator represent a variety of application options for the design of actuators. For the application, specific motor gearbox combinations will be selected. For example; the RACO motor units will provide high starting torque with a higher breakaway force and a soft RPM torque characteristic for smooth mass acceleration, or standard 3 phase squirrel cage induction motors, DC, stepper and servo motors will be utilized as required. This means that RACO's electric actuators are equipped right out of the box for your exact need.

Small, but strong: RACO COMPACT

Our compact actuators are known for their small size and high actuation forces. Just like its big brother the MA, the compact electric actuator functions purely electric mechanically while providing a long service free life. Its space saving, cost effective construction makes the RACO Compact ideal for its use in tight quarters. It can be applied for forces ranging between 2 kN (450 lbs.) to 40 kN (9,000 lbs.)





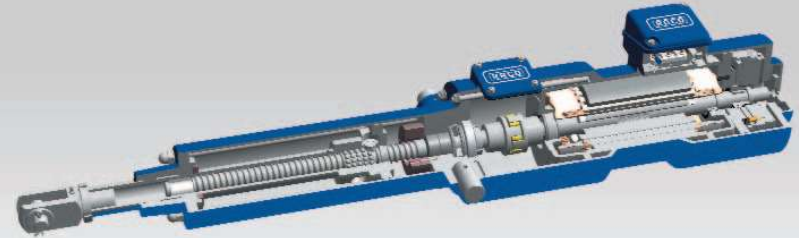
Precision mechanics

You should be able to measure achievement. RACO's electric actuators with ball screws give performance that you can measure in service life. It's not uncommon for them to be cycled more than 1 million times even under harsh conditions. Its robust design is the result of many years of design and development of an almost frictionless actuator. At an efficiency of 95 percent, RACO ball screw actuators attain life cycles upwards of several decades.

Superior electronics

We offer RACO electric actuator complete with a digital control unit. Our built-in control module encompasses control, regulating and monitoring functions. A remote positioning control is also available for difficult to reach places and a speed monitoring system with automatic shut-off when critical speed limits are reached. This function allows monitoring of synchronous operation when several actuators are running in parallel.

For complex motion profiles, the intelligent positioning actuator can index to any point with variable speeds and accelerations. It is programmed via an RS232 interface or a Profibus connection, ideal for system integrators.



Applications for tough jobs

RACO electric actuator with ball screws are particularly suitable for very demanding, fast and stiff positioning applications as utilized on hexapods in stamping plants for automotive body parts. Our backlash free electro mechanical precision screws gives you extraordinary positioning accuracy with a maximum of dynamic motion. You can use a single electric actuator or combine them to multiple axis systems to solve flexible sophisticated material handling application demands, such as automatic loading and unloading of work cells and machines. It's excellent positioning and control characteristics enables high production cycle rates even in continuous operations.

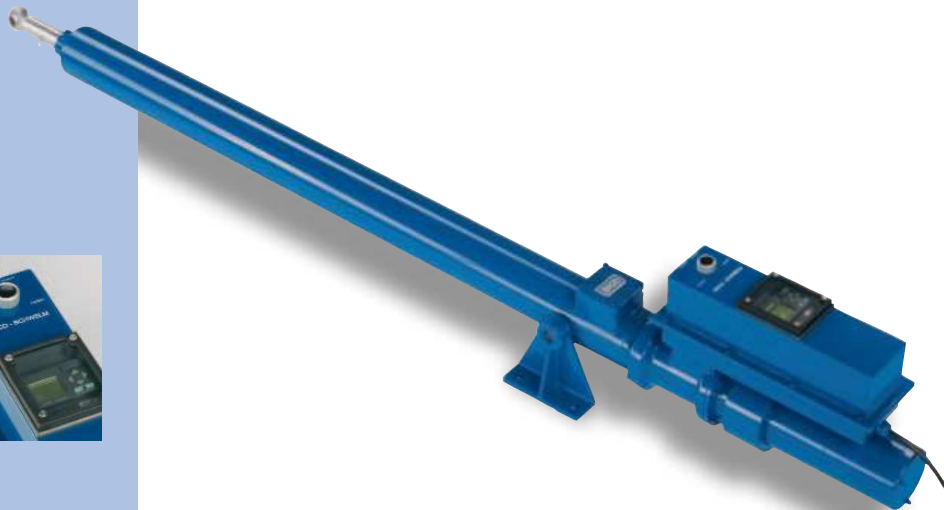


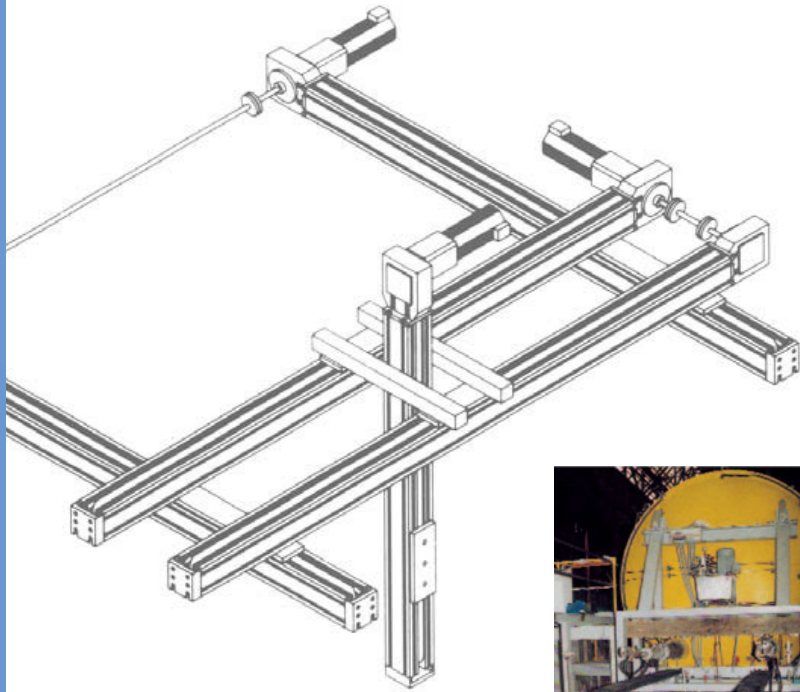
Moving heavy loads with reliability

Two different spindle systems are available for the RACO electric actuator, ball screw or ACME screw. The ACME screw actuator with its sliding friction provides the actuator with a self locking capability, which means brakes usually are not required to hold a position even at high static loads. Some applications require the selection of an optional thread pitch for the ACME screw in order for the best fit for that equipment. They are especially suitable for low frequency switching operations. Of course, our ACME screw electric actuator have all of the characteristics RACO is famous for – precision, robust and a long service life.



Positioning: backlash free with high precision and lightning fast: RACO electric actuator used on hexapod.





Fast, precise and robust

The domain of RACO linear actuators is to move loads with positioning accuracy in linear direction. The robust and stiff design of the aluminum extrusion actuator housing gives them their excellent motion characteristics. The design spectrum of RACO's linear drives up to 20 kN (up to 4,400 lbs.) can be applied to a wide variety of industrial applications even under extreme conditions. Typical applications span from spray painting of lumber to packaging of diapers, track switching for mass transportation to positioning of machine tools, work pieces and measurement equipment. Multiple-axis systems for pick and place applications, parts testing, cutting and gluing can be easily designed and assembled. RACO linear actuators can even be combined with our rode type electric actuator from our subassembly systems for special applications.

LM3 and LM4 linear actuators – the fast ones

RACO is known for its versatility, and that can also be said of our linear actuators. We developed the LM3 and LM4 linear actuators for ultra fast and precise positioning. Their design guarantees that the linear motion of the carriage is precisely guided by a series of ball-bearing rollers, which are lubricated for life. Power from the motor is transmitted via a steel reinforced timing belt to the carriage. The series LM3 and LM4 linear actuators can be applied to single-and multiple-axes fast motion profiles as in X-Y-Z systems.

2060 linear actuator – the power packs

For high linear forces up to 20 kN (4,400 lbs.) RACO built the 2060 series actuators. The units will be equipped, depending upon the application, either with an ACME screw, a ball screw, or a timing belt.

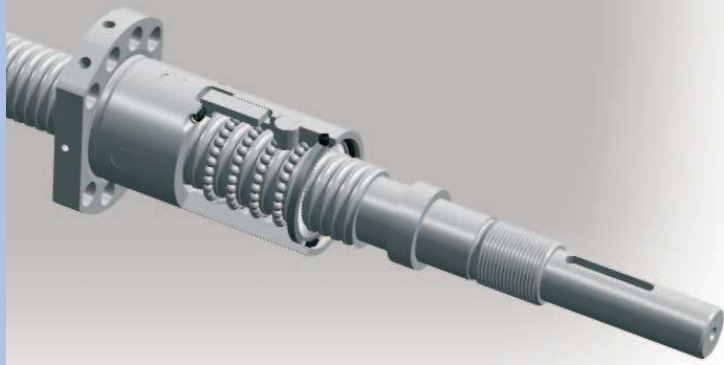


The self locking ACME screw actuator presents itself for the handling of larger loads that can be mounted in any position without additional braking mechanisms regardless of the position. As an option the non self locking multi thread ACME screw actuator provides a higher actuation speed with improved systems efficiency. Wherever higher cycling frequencies are expected and greater actuating speeds are demanded, that's where ball screw actuators with RACO's patented spindle nut design are used. High positioning accuracy and efficiencies exceeding 95 percent are characterizing these positioning systems.

Integrated applications

RACO is a system house. Therefore, we develop complete application specific linear motion systems based upon our product portfolio, including servo and stepper motors as well as the associated amplifiers and control units. For example, such systems are employed in fully automated post and package sorting systems. Naturally we also supply our customers with individual modules that can be integrated into existing systems.





Precision as a Program

Today, we can not imagine modern machine tools and industrial equipment without ball screws. When high position accuracy at a high operating frequency is required in material handling applications, these kinds of drive elements will be deployed. Good example would be a robot system. The achieved precision of RACO ball screws is the result of decade long engineering developments and the extreme care and attention given during the production process.

The ball nut makes all the difference

The core of the RACO ball screw is the multi-circuit ball nut with its single circuit straight ball return. For this design a world-wide patent has been granted, whereby the balls in the ball nut will be returned from its load carrying task in the shortest pass. The advantages are: a higher load carrying capability with smallest outside ball nut dimensions resulting in higher efficiency and a longer ball screw life expectancy. RACO ball screws with single or double ball nut assemblies can be precisely preloaded for backlash free operations. This allows reproducible position accuracy under varying linear forces and changing directions.



A strong profile

Both the RACO spindle and the matching ball nut are ground in an air conditioned manufacturing environment. We engage in these efforts, since the accuracy, as we guarantee it, can only be achieved by precision grinding. The geometrical contouring accuracy of our ball nut and spindle profile are crucial for the considerably longer service life of our ball screws, as compared with the products manufactured under conventional techniques. Beyond this, our inductive hardening technique with its considerable penetration depth creates the prerequisite that each spindle can be re-ground, so that it will become reliable once again for half of a human life span. This translates into lower costs and shorter downtime in the event of damage.

Another favorable feature of the RACO ball screws is the special geometry of the profile and the option to freely choose the ball diameter and the number of balls depending on the required stiffness of the ball screw assembly. RACO has a strict quality control program, mandating to monitor the entire production process carefully, so that the requirements concerning the profile geometry can be achieved every time. Moreover, the dimensional accuracy of all RACO ball screws and the quality of the material used are constantly checked throughout the production process and the results are recorded and properly documented. In matters of quality we do not make any compromises.

Whatever you like

The product range of available RACO ball screws leaves hardly anything to be desired. Our standard delivery program includes spindles with diameters from 6 mm (0.236") to 200 mm (7.874") and lengths ranging from 450 mm (17.7") to 8000 mm (315")—each of them with different profiles and in different classes of accuracy. It is typical for RACO to accept special orders. In line with our customer's demands we manufacture high precision ball screws with length of up to 12m (472") and with almost any profile required.





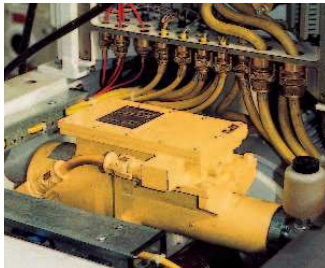
The safe solution

RACO's spring energy loaded brake systems account for a maximum security. These units are working simply as an electric mechanical device and, therefore, are particularly suitable for the use in light rail vehicles. The brake operation is absolutely smooth without any jerking. Environmental conditions such as freezing or ice up of the brake system can not occur based on the electric mechanical design. Spring energy loaded brake systems from RACO are used for final deceleration, parking, emergency and as auxiliary or secondary safety brakes. The inherent fail safe design will activate the brake and stop the vehicle even if the electrical power supply fails. Spring energy loaded brake systems are based on the principle of the RACO electric actuator. A set of springs is kept energized via a thrust rod. As soon as the power circuit is interrupted the stored energy of the spring package is gradually released to build up braking forces at the brake pads. Spring energy loaded brake systems from RACO – for safety on the track.

The superior system

Electro mechanical spring energy loaded braking systems are superior to pneumatically or hydraulically operated brake systems in many aspects. The advantages in the overview:

- Easy installation
- Smooth braking operation without jerking
- Low operating and maintenance cost
- No icing up or freezing at low temperatures
- No problems caused by leaky pipes
- No annoyance caused by noise emission
- Particularly environmentally friendly as no media needed to be disposed of



Tried and tested all over the world

Spring energy loaded brake systems from RACO are used everywhere in the world, even in Canada's arctic areas under the most extreme weather conditions. Our equipment has proven itself day after day in moderate climate zones: in light rail street cars, trams, passenger trains and elevated rail systems. An explosion proof design of the system is available for mine locomotives. Our standard supply program includes five different brake device types with brake forces ranging from 3.6 kN (810 lbs.) to 36 kN (8,100 lbs.). Custom built equipment can be manufactured at any time.

Turning and swiveling

RACO gets things moving. We have developed the DM IV rotary, swivel, or turret actuator especially for gate and butterfly valves, shutters, louvers and flaps. Designed on the basis of the modular electro-actuator components, the equipment is extremely flexible and can be adjusted to numerous applications that will fit into your budget. The DM IV rotary actuator consists of three basic components: gearbox, motor and auxiliary electrical equipment. The flat gearbox ensures a high efficiency at a low noise levels. It is filled with a permanent lubricant and can be equipped either with a solid or with hollow shaft.



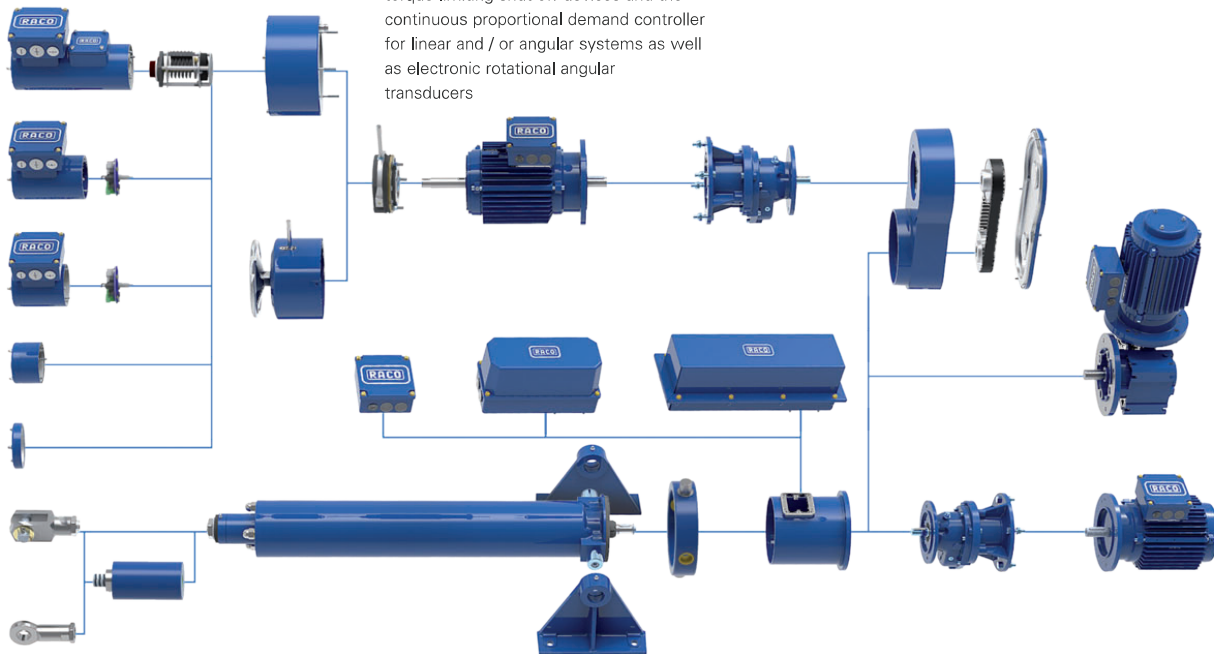
The flange mounted die cast and metal clad RACO motor is a three phase NEMA D motor with a high locked rotor torque and soft speed behavior for the jerk free mass acceleration. The motor is able to cope with a high number of starts and stops. The equipment can be optionally equipped with an electro magnetic brake and / or a manual hand wheel. The DM IV rotary actuator can be easily integrated into existing control applications with its proven electrical auxiliary equipment. This includes limit switches, potentiometers and angular rotation transducers as well as digital position sensors / transmitters and electronic overload limiters.



From components to systems

RACO sees itself as a supplier of entire systems, therefore you can obtain integrated solutions tailor-made for your applications. We can supply a complete system or adapt our units to your control scheme.

From control elements to entire electrical enclosures, RACO will offer optional the required electrical components or the entire package. Among the important electronic components is the adjustable torque limiting shut off devices and the continuous proportional demand controller for linear and / or angular systems as well as electronic rotational angular transducers



Innovative engineering

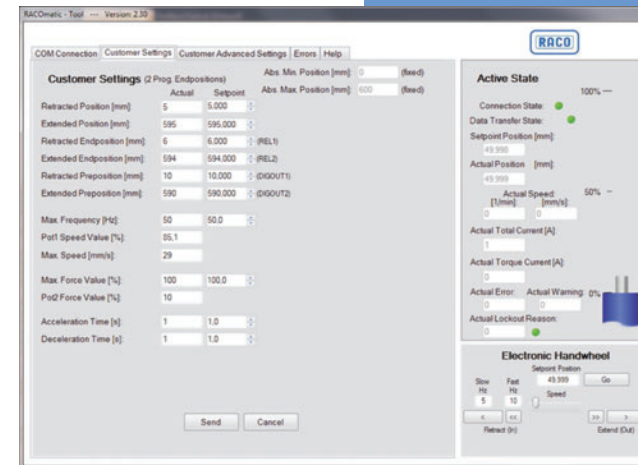
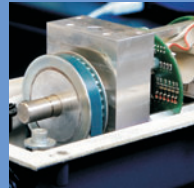
Modern systems need innovative engineering. Based on your conceptual design our sales engineers will develop a solution that will be distinguished by the highest reliability and maximum productivity. We integrate actuation devices, control elements and electronic components to create application specific systems.

We can fall back on numerous past engineering projects for the development of our systems applications. It's this wealth of experience out of the motion technology combined with next generation technology that qualify us to tackle even highly complex jobs, such as developing multiple-axis positioning and material feed systems. You tell us what you need and we'll supply the right intelligent turnkey solution.



Intelligent solutions

The intelligent, state of the art, product generation comprises of fully integrated electronic control circuits, precision sensor mechanisms and imbedded microprocessor electronics. The unit can be interfaced and connected to PC systems via multiple bus systems. RACO's electric actuators perform precision metering applications, where a constant mass flow is required regardless of the changing consistency of the aggregate. They make sure that large mold parts are pressed with a constant rate of force while multiple-component bonders harden. They can be applied both to complex motion profile actuating jobs and machine control applications. In parallel kinematics systems they are fulfilling precise and rapid movements. We are talking about high performance, intelligent electric actuator with integrated electronic control circuitry suited for the industry. That is what RACO is all about.



Service that makes you strong

At RACO, the emphasis is on service. We offer our repair service for all of our products, no matter when they were built. We rebuild all components in our workshop, even those that have been in service for decades. We produce and supply original parts even after half a century, beyond any legal requirements. We achieve this by documenting and archiving every step of the way in the planning, procurement and production process for each individual unit.

That is the kind of investment reliability you've been looking for

Give us a call and we will put you in contact immediately with an expert to discuss every aspect of your application.

