

Hydraulic and Pneumatic ACTUATORS

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afc
actuator Fluid control



Company Profile

AFC is an Italian company founded at the beginning of 2013, specialized in manufacturing of HYDRAULIC & PNEUMATIC ACTUATORS for valve automation.

AFC plant is located in Cuggiono (MI), a town in the North of Italy, very close to the International airport of Milano Malpensa, and a few minutes from one of the main Italian highway (A4 Torino-Trieste). This geographical area is historically tied up with the Italian energy market and related industrial technologies and valve manufacturers.

The management team is made up by young and skilled people with a solid background in project engineering, production and executive responsibilities. Coming from some of the most important Italian actuators companies, these people have worked for years behind the scenes of some of the largest worldwide projects.

AFC was born with the intention of producing the best and compact actuators for all applications and different requirements in order to always guarantee the best product to the end user. The cornerstones of our business are an extraordinarily wide range of products, the commitment to excellence in our field, and the will to face new challenges.

Design

Due to the ability of highly qualified engineers, to the competence acquired over years and the most advanced design techniques, our team is able to internally develop innovative products in the field of flow control.

All the main parts are designed using 3D CAD software, optimized and revised by Finite Elements Analysis to guarantee product integrity in the most critical conditions and applications. This approach enables us to produce the most compact actuators in the world.

A very strong knowledge and competence in the design of large springs permits us to optimize the spring pack reducing dimensions and weights.

Our extensive know-how and experience in the field of actuators permits us to manufacture Scotch-Yoke, Rack & Pinion, Helical Slot & Helical Spline, Rod & Crank actuators; standard and extremely compact linear actuators in both hydraulic and pneumatic execution.

We are able to provide a complete design activity according to the customer requests, producing tailor-made solution.

Our engineering activity is made according to the most known design codes.

Particular attention is paid to the testing of new projects during the engineering phase: cycle load test and simulation tests are accurately realized on our test bench equipped with appropriate measurement instruments.

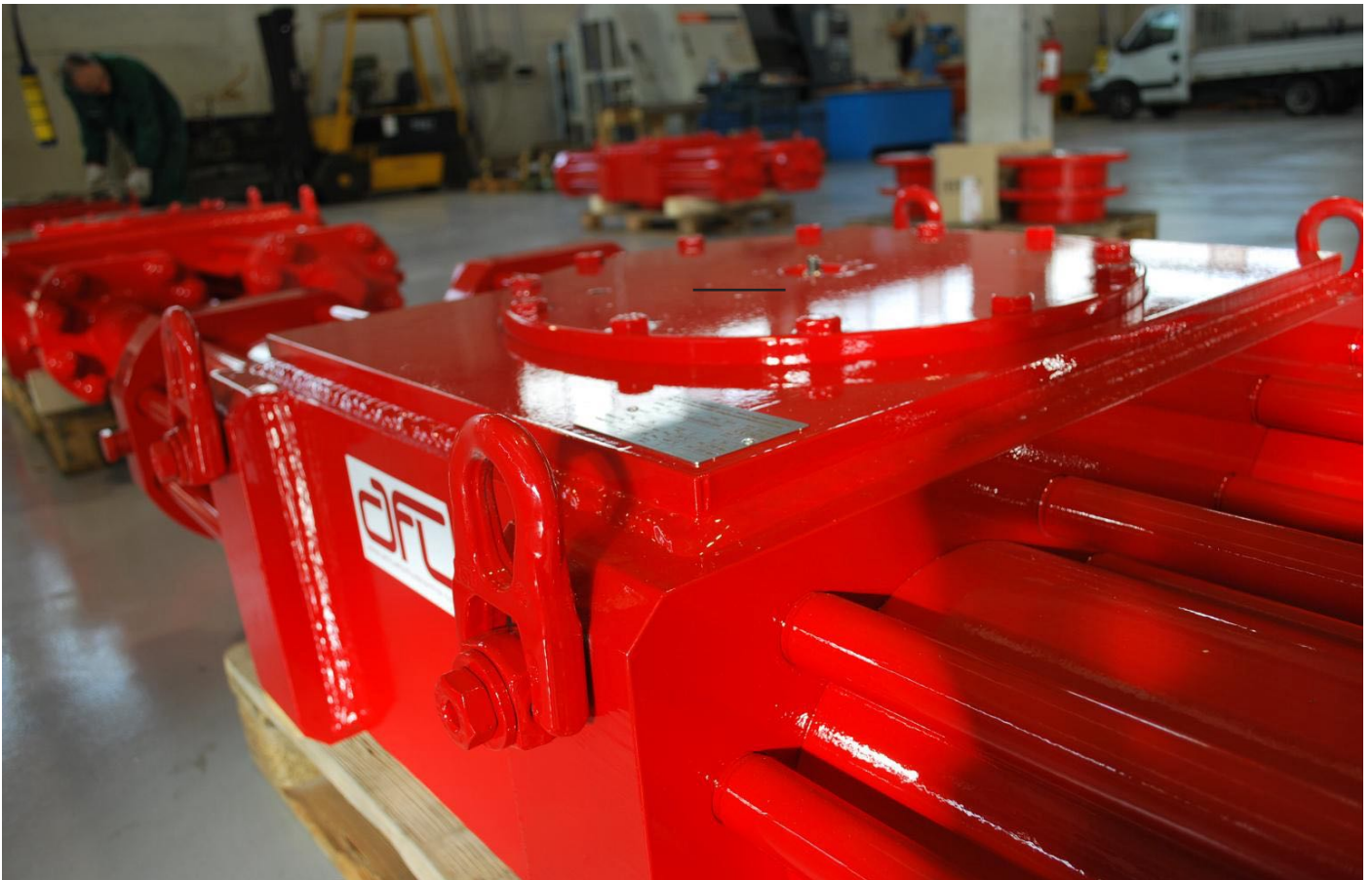


Manufacturing

Suppliers are a decisive component of a company system. For this reason, the partnership with the suppliers has to guarantee mutual respect, a common point of view, the interaction of management processes and technologies and the exchange of knowledge and information. It is also from the supplier that depends the quality of the product.

This is why AFC chooses its suppliers according to specific evaluation criteria in order to:

- **Establish partnerships** for the common development and improvement
- **Set long lasting relationships** of mutual benefit
- **Inspire, encourage** and recognize its suppliers' improvements
- **Exchange experience and resources**
- **Simplify communication** and information
- **Identify and choose key suppliers** exchange



Testing



The Fat Test

For each assembled actuator, AFC performs an accurate Factory Acceptance Test to evaluate all the principal parameters of the machinery:

- Dimensional check on the actuator in compliance with the approved G.A. drawings;
- Actuator to valve interface compliance with applicable valve top mounting;
- Hydrostatic Test at 1,5 times the maximum working pressure;
- Cylinder Leakage tests checked with gas leakage detector after pressurization.

Static Performance Test

The static performance test permits to measure actuator performances (torque/thrust) locking the test bench in defined angular/linear stroke position and visualize /record performance value to a fixed input pressure.

A very accurate oleodynamic test bench connected to a PC through a PLC permits a real time performances check.

Dynamic Performance Test

The dynamic performance test consists of measuring actuator performances during all complete angular/linear stroke, maintaining the pressure at a set value (typically min. and max. working pressure).

This test allows to evaluate the complete stroke and analyze possible discontinuity point in the performance graph.

Valve Simulation Test

The simulation test allows to simulate the valve resistance torque point by point during the complete angular/linear stroke: the automatic test bench modulates the inlet pressure and the brake force to simulate the real valve presence.

A complete Test Report is automatically filled in during the test by the computerized control systems, all the main data are recorded (inlet pressure, torque, thrust, temperature).

After Sales

The reliability and high productivity are fundamental values in the life of a machine. AFC engineering staff is at the customer's disposal, to provide quick and efficient technical support.

Spare parts

The availability of spare parts is an essential element to reduce production standstill and to support the preventive maintenance.

AFC ensures the supply and delivery of the spares in a short time, and the possibility to have a dedicated stock of spares on demand.

Assistance

In case the problem on the machine cannot be solved through on-line support, AFC engineers are ready to intervene in person at the customer's plant in order to provide the necessary assistance to restore the machine fully functioning. Trained personnel can support the customer in equipment installation, problems detection, operation and maintenance aspects directly on site, providing the required experience.

Quality and Certifications

AFC has been awarded with the quality system certification due to its full compliance to Quality standard ISO9001. The ISO 9001:2008 is a globally recognized standard for quality management systems and processes, that ensures consistency in the quality of the services delivered to the clients.

Our actuators have been designed and built to guarantee safety and maximum life under the heaviest possible conditions. Every detail is designed, verified and checked during all production process steps, then all finished products are tested and certified with care according the severe criteria required by the UNI EN ISO 9001-08 quality standard.

Our quality policy is to supply our customer with professional services which are perfectly able to fulfill the expectations and fully comply with the agreed requirements.

Scotch Yoke Actuators

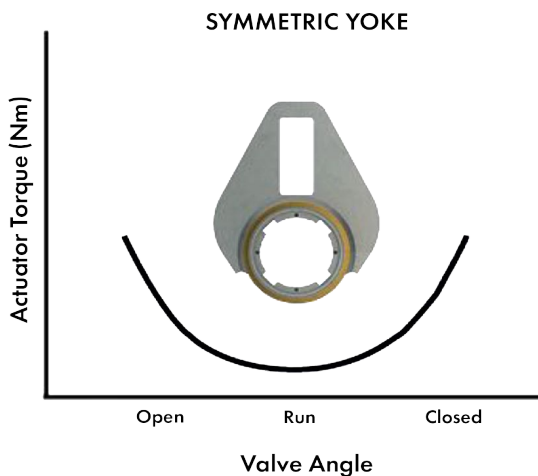


The actuators have been designed by using finite elements calculation methods, the bodies have very high stiffness values to reduce misalignment and friction thus increasing efficiency and the actuator's working life itself.

A wide range of variants will meet the different requirements of each plant and environmental use. Thanks to AFC expertise and flexibility, other solutions and certifications may be arranged and designed according to the customer specific needs.

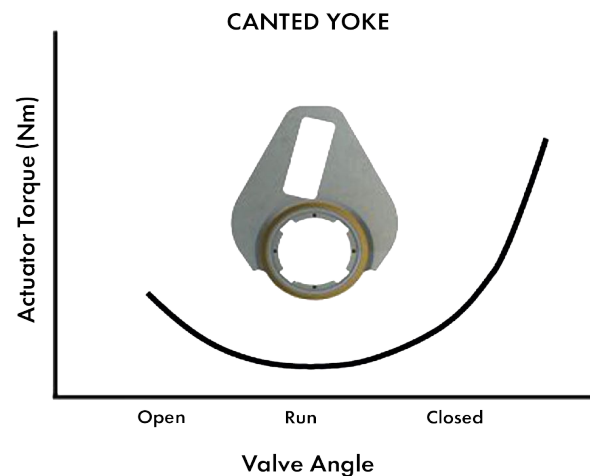
The Scotch Yoke mechanism is a device that employs a sliding pin in a yoke such that the effective moment arm is constantly changing. The moment arm is longest at the start and end of the turning moment.

The Scotch Yoke actuators series YS (Yoke Symmetric) and YC (Yoke Canted) have been designed to act rotary valves up to 1.700.000 Nm. Thanks to the torque curve of this mechanism, this series is particularly suited to move ball or butterfly valves, both ON/OFF and modulation ones.



The Symmetric Yoke allows an equal torque at both start and end positions.

This is the best choice in applications where the torque requirements at the break to open and break to close are similar.



The Canted Yoke mechanism delivers more torque at one extremity of stroke.

The use of canted torque arms can reduce costs, weight and size of the actuator where the valve torque demand is highest at one end of stroke.

This is the smallest Scotch Yoke actuators series designed for torques from 500 Nm to 10.000 Nm. It is extremely compact and flexible, it extends only in one side direction and it is particularly suitable for ball and butterfly valves, both ON/OFF than modulation ones.

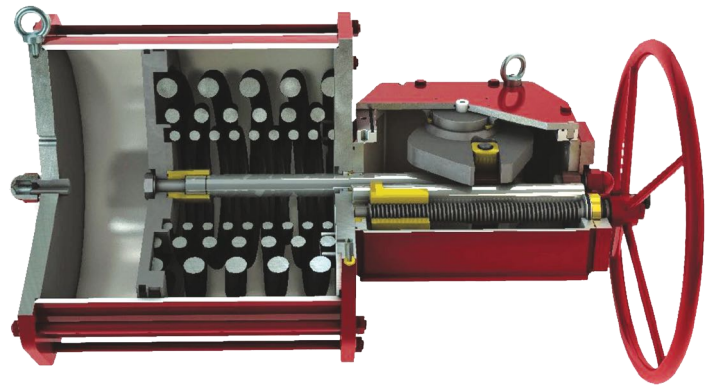
The welded body is equipped with in-slot gaskets for each coupling zone in order to ensure direct contact between metal parts and avoid reciprocal movements which often cause uncontrolled wear, considerable performance decrease or screws loosening.

This type of actuator can house up to 3 concentric springs, for a total of 7 spring pack configurations covering the widest range of valves. Considering the two typologies of yoke (symmetric and canted) the possible configurations amount to 14.

An innovative engageable handwheel manual control, which is perfectly integrated in the body, is directly acting on the guide block ensuring the handling in all conditions. This system is equipped with a security lock to avoid accidental handling.

The actuator is easily and quickly disassembled with standard tools. All the maintenance and control operations can be easily and quickly carried out thanks to the actuator design which is been expressly studied to facilitate these operations.

YC/YS 003-006-009



Up to 10.000 Nm in less than 1 meter length



from 500 to 10.000



+200 (392°F)
-60 (-76°F)



12 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic

Hydraulic double acting with manual override



Pneumatic double acting with manual reductor



Pneumatic single acting with manual override



Hydraulic single acting with manual override



Hydraulic double acting with double cylinder



Pneumatic double acting



Hydraulic double acting with manual reductor



Main features

Guide bar to absorb lateral load and guarantee extended life

Extremely compact design that extends on only one side

Easily visible local position indicator with Namur interface

Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Canted or Symmetric design to best adapt to the valve torque

Modulation and ON/OFF design to operate in all conditions

Multiple spring design, increased reliability and std. configurations

Suitable for high frequency and high speed operation (<0.2s)

In line external travel stop 90°±4° to eliminate asymmetrical loads

Compliant to PED 97/23/EC. ATEX

YC 015 030 060 120 220 360 550 900



This scotch yoke series covers torque values up to 900.000 Nm and it is been studied in detail to ensure high performance and long lasting quality.

Different sets of concentric springs have been designed to reduce dimensions; the spring pack can be separately assembled using screws which are easily accessible from the outside and without the aid of special tools.

With a basic and sturdy design, it takes up a minimal amount of space considering the torque it produces.

A wide range of variants will meet the different requirements of each plant and environmental use. Thanks to AFC expertise and flexibility, other solutions and certifications may be arranged and designed according to the customer-specific needs.



from 15.000
to 900.000



+200 (392°F)
-60 (-76°F)



12 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic

Main features

Guide bar to absorb lateral load and guarantee extended life

In line external travel stop $90^{\circ} \pm 4^{\circ}$ to eliminate asymmetrical loads

Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

Multiple spring design, increased reliability and std. configurations

Modulation and ON/OFF design to operate in all conditions

Canted or Symmetric design to best adapt to the valve torque

Easily visible local position indicator with Namur interface

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Suitable for high frequency and high speed operation (< 0.2s)

Compliant to PED 2014/68/UE and ATEX 2014/34/UE

Hydraulic double acting with double cylinder



Hydraulic single acting with manual gear



Hydraulic double acting



Pneumatic double acting with manual dump



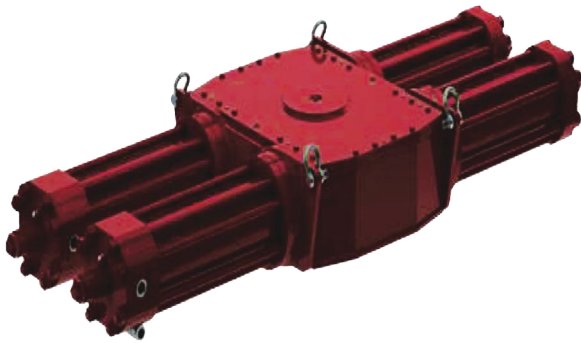
Pneumatic single acting with manual gear



Pneumatic double acting



YC/YS K10/K18



This is the most powerful actuator series manufactured by AFC. Thanks to the double scotch yoke configuration the actuator is perfectly balanced and easy to move and match to the valve. It is available only in the hydraulic version, it can develop torques up to 1.700.000 Nm and reach less than 4 seconds operating time including time for braking.

A particular Hydraulic damper system guarantees a rapid and controlled deceleration without sudden shocks thus avoiding water hammer and the resulting excessive pressurization of the cylinder.

It is possible to set the damper's efficacy and point of insertion during the braking. The hydraulic communication allows the braking to be simultaneous and perfectly balanced in the two cylinders, reducing shock and vibrations.



from 1.000.000
to 1.800.000



+200 (392°F)
-60 (-76°F)



350 bar (5.000 psig)
only hydraulic execution

Main features

Double scotch yoke guarantees the balance of all the internal forces

In line external travel stop $90^\circ \pm 4^\circ$ to eliminate asymmetrical loads

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Compact size, balanced weight and symmetrical extension

High strength materials for internal parts

Double guide bar to absorb lateral load and guarantee extended life

Redundant piston sealing arrangement

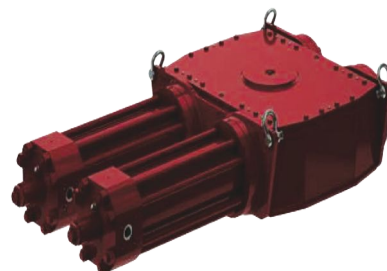
Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

Canted or Symmetric design to best adapt to the valve torque

Easily visible local position indicator with Namur interface



Hydraulic single acting
in one side execution



Hydraulic double acting
in one side execution

Rack and pinion actuators RP series



The rack and pinion actuators often represent the cheapest solution for rotary small dimension valves or valves that need a constant torque during the entire stroke. They are particularly suited for modulation valves and can reach high torques up to 1.100.000 Nm.

For this type of actuator it is extremely important to efficiently support the rack that is subject to heavy forces due to the inclination of the gear tooth. AFC specifically studied an extremely rigid body to easily support the rack during the entire stroke.

The racks slide on composite dry sliding bushing guides ensuring maximum performance and fluidity of movement in each situation of load.

The actuators have been designed by using finite elements calculation methods, the bodies have very high stiffness values to reduce misalignment and friction thus increasing efficiency and the actuator's working life itself.

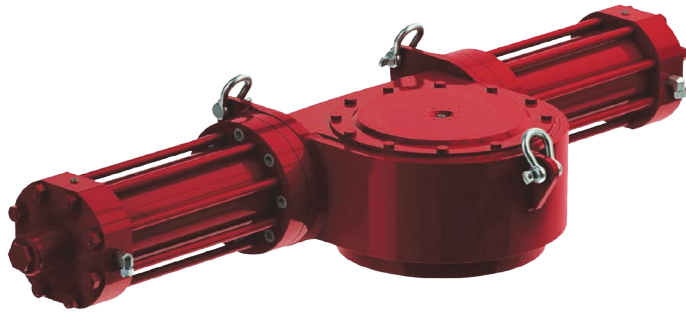
A wide range of variants will meet the different requirements of each plant and environmental use. Thanks to AFC expertise and flexibility, other solutions and certifications may be arranged and designed according to the customer specific needs.



Extremely rigid body thanks to the welded pipes design.

Perfect support of the racks due to the non-stick guide positioned along the whole body length.

RP 015 030 060 120 220 360 550 900



This is the medium-size rack and pinion series for torques up to 900.000 Nm. Its design is very flexible, there can be many possible configurations thanks to the modular components and to the design specifically studied to satisfy different dimensional and torque needs.

The interface is developed and optimized to allow the interchange of cylinders and spring packs of the corresponding scotch yoke actuators. By doing so, productivity is optimized and it is possible to reduce costs and delivery time. The pneumatic version employs tandem and triple cylinders up to a diameter of 935 mm in order to ensure a great dimensional versatility and a wide range of pressure to be used.



from 12.000
to 900.000



+200 (392°F)
-60 (-76°F)



12 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic

Main features

Rack completely supported to absorb lateral forces

Extremely compact body with rigid design

Easily visible local position indicator with Namur interface

Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Multiple spring design, increased reliability and std. configurations

Suitable for high frequency and high speed operation (< 0.2s)

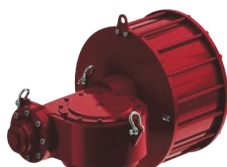
Modulation and ON/OFF design to operate in all conditions

Compliant to PED 2014/68/UE and ATEX 2014/34/UE

In line travel stop 90° ±4° to eliminate asymmetrical loads



Hydraulic single acting with manual gear



Pneumatic double acting



Hydraulic single acting



Hydraulic double acting with manual gear



Hydraulic double acting



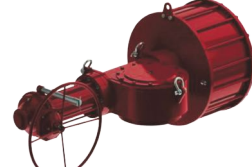
Pneumatic single acting with manual gear



Pneumatic double acting with two cylinders



Pneumatic double acting with manual pump

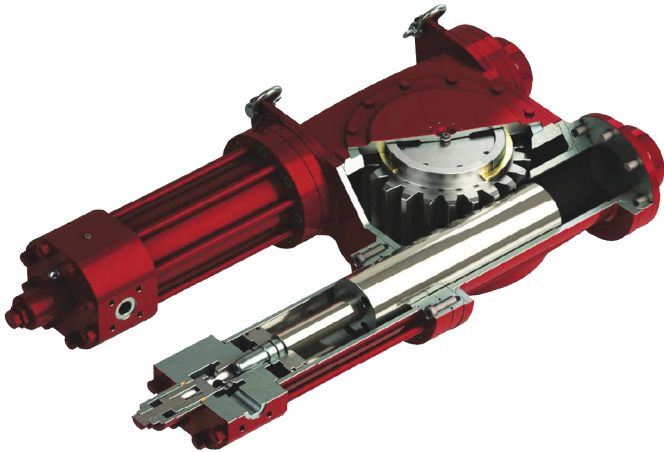


Pneumatic double acting with manual gear



Pneumatic single acting

RP K10 K80



The biggest rack and pinion series has two opposing racks so that the stress on the gear tooth is halved and this allows to obtain a balanced torque on the pinnon.

There can be many possible configurations thanks to the modular components and to the design specifically studied to satisfy different dimensional and torque needs.

Special configurations that extends in only one side for all the situation with particular installation problems.

A particular Hydraulic dumper system guarantees a rapid and controlled deceleration without sudden shocks thus avoiding water hammer and the resulting excessive pressurization of the cylinder.

It is possible to set the dumper's efficacy and point of insertion during the braking. The hydraulic communication allows the braking to be simultaneous and perfectly balanced in the two cylinders, reducing shock and vibrations.



from 300.000
to 1.100.000



+200 (392°F)
-60 (-76°F)



350 bar (5.000 psig)
only hydraulic execution

Main features

Rack completed supported to absorb lateral forces

Extremely compact body with rigid design

Easily visible local position indicator with Namur interface

Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Multiple spring design, increased reliability and std. configurations

Suitable for high frequency and high speed operation (< 0.2s)

Modulation and ON/OFF design to operate in all conditions

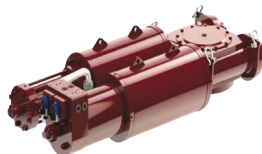
Compliant to PED 2014/68/UE and ATEX 2014/34/UE

In line travel stop 90° ±4° to eliminate asymmetrical loads

Helical or Belleville springs for greater reliability



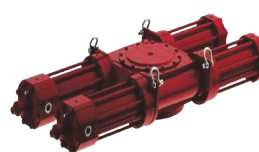
Hydraulic single acting



Hydraulic single acting fast acting one side execution



Hydraulic single acting fast acting one side execution



Hydraulic double acting with four cylinder for low pressure



Hydraulic double acting in one side execution

HELICAL SLOT actuators HS series



In the helical slot (HS) actuators the linear movement of the piston is turned into rotary movement thanks to a cam specifically machined through a CAD-CAM system. The profile is studied point by point for each 90 degree of angular stroke to obtain the required torque. The absence of sliding elements and the highest flexibility in the gear ratio make this type of actuator particularly suitable for modulation.

This is a very flexible series, the external dimensions (height per diameter ratio) and the torque curve can be modified almost at will.

The actuator is cylindrical and very compact, it can achieve up to 600.000 Nm torque in the standard configuration, it can be equipped with helical or Belleville springs which ensure greater reliability.



from 10.000
to 600.000



+200 (392°F)
-60 (-76°F)



12 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic



Extremely compact design and balanced weight

Single spring, multiple spring or Belleville spring

Easily visible local position indicator with Namur interface

Pneumatic or hydraulic execution

Torque curve can be customized according to valve

Strong materials for internal parts

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Fast acting execution (< 0.2 sec)

Design particularly suitable for offshore applications

Adjustable travel stop $90^\circ \pm 4^\circ$ of angular extra-stroke

Redundant piston sealing arrangement

Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

LINEAR STANDARD actuators LS Series



The linear standard actuators (LS) with a stroke up to 65 mm is used to act linear valves up to 2" with a thrust of 150.000 N.

The design is very compact due to the use of concentric coil springs always available in stock.

The spring preload system is situated internally while outside there are only stay bolts: this system avoids corrosion phenomenon on the safety parts.

These actuators can be equipped with extremely effective pneumatic dumpers which guarantee a soft braking in case of rapid operation (time < 0.2 sec.)



from 5.000
to 150.000



+200 (392°F)
-60 (-76°F)



12 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic

Pneumatic fail close with manual override



Pneumatic fail open with hand pump or damper



Pneumatic fail open with manual override



Pneumatic double acting with hand pump or damper



Pneumatic double acting



Pneumatic fail open



Main features

Chromium plated carbon steel shaft and cylinder

Spring preload system simple and safe

Easy to be disassembled with standard tools

Compact and modular design

Adjustable travel stop (on request)

Compliant to PED 2014/68/UE and ATEX 2014/34/UE

Std. design pressure 12 bar

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Multiple spring design, increased reliability and std. configurations

Suitable for high frequency and high speed operation (<0.2s)

Modulation and ON/OFF design to operate in all conditions

Std. temperatures (-30°+100°); low (-60°) & high (+200°) on request



Our linear standard actuator series (LS series) is available with a stroke up to 1600mm and can be used to move linear valves up to 60" with a thrust up to 1.500.000n. The LS series can be supplied in a hydraulic or a pneumatic execution.

The design of the LS series is very compact due to the use of concentric coil springs and all actuators can be equipped with extremely effective pneumatic dumpers which guarantee a soft braking in case of rapid operation (stroke time < 0.2 sec.).

The wide range of variants will meet the different requirements of each plant and their environmental use. Thanks to A.F.C. expertise and flexibility, other solutions may be arranged and designed according to the customer specific needs.

Hydraulic fail open with manual gear



Pneumatic fail close



Pneumatic double acting with manual gear



Double acting with manual pump



Hydraulic double acting



Pneumatic fail open



Hydraulic fail close/open



Pneumatic fail open with manual gear



Pneumatic fail close with manual gear



Pneumatic double acting



Main features

Compact design and modular

Extremely compact body with rigid design

Suitable for high frequency and high speed operation (< 0.2s)

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Multiple spring design, increased reliability and std. configurations

Compliant to PED 97/23/EC. and ATEX



from 100.000 to 1.500.000



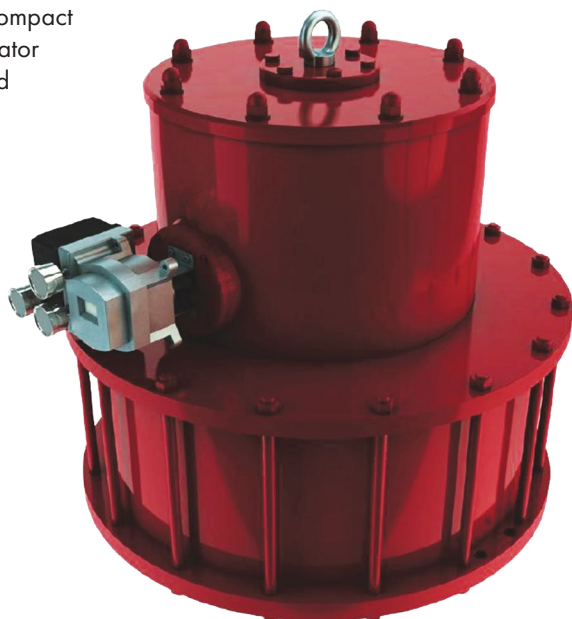
+200 (392°F)
-60 (-76°F)



12 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic

LC Series

The most compact linear actuator in the world



The linear compact actuator series (LC) is been specifically studied for those cases where there is limited space and it is absolutely necessary to reduce the overall dimensions.

AFC faced the problem by designing an actuator that couples directly to the valve without any kind of spool or bracket. During the stroke the valve shaft runs inside the actuator's body.

The connection to the valve is extremely simple and fast, the position indicator is proportional to the stroke and easily visible thanks to its lateral position, the shaft is perfectly guided in two points to guarantee a fluid movement.

Thanks to the direct connection to the valve, the outer insulation of the actuator is particularly effective as all moving parts are situated inside, protected by external environmental conditions.

Main features

Extremely compact design to reduce the space

Direct and very easy valve coupling system

High protection degree and insulation

All moving parts are located internally

Chromium plated carbon steel shaft and cylinder

Spring preload system simple and safe

Easy to disassemble with standard tools

Easily visible local position indicator with Namur interface

Std. temperatures (-30° +100°); low (-60°) and high (+200°) on request

Totally enclosed IP 66 construction; IP 67 and IP 68 on request

Multiple spring design, increased reliability and std. configurations

Suitable for high frequency and high speed operation (<0.2s)



from 100.000 to 1.500.000



+200 (392°F)
-60 (-76°F)



10 bar (175 psig) pneumatic
350 bar (5.000 psig) hydraulic



Hydraulic fail close (compact execution)



Hydraulic fail open (compact execution)



Pneumatic fail close (compact execution)



Pneumatic fail open (compact execution)

Position Indicator and Switch Boxes

Rotary limit switch boxes provide a visual and remote electrical indication of quarter turn valve/actuator position.

Benefits

- explosion proof CE Atex for gases and powders
- 3D two colors visual indicator
- heavy duty metal housing
- twin shaft design
- up to 3 threaded cable entries
- extra terminals for solenoid valve connection (double solenoid)
- ISO F05 and Namur shaft mounting pattern
- high resolution, easy-set, independently adjustable splined cams without tools
- low temperature execution up to -40°C available on request

Class and Materials

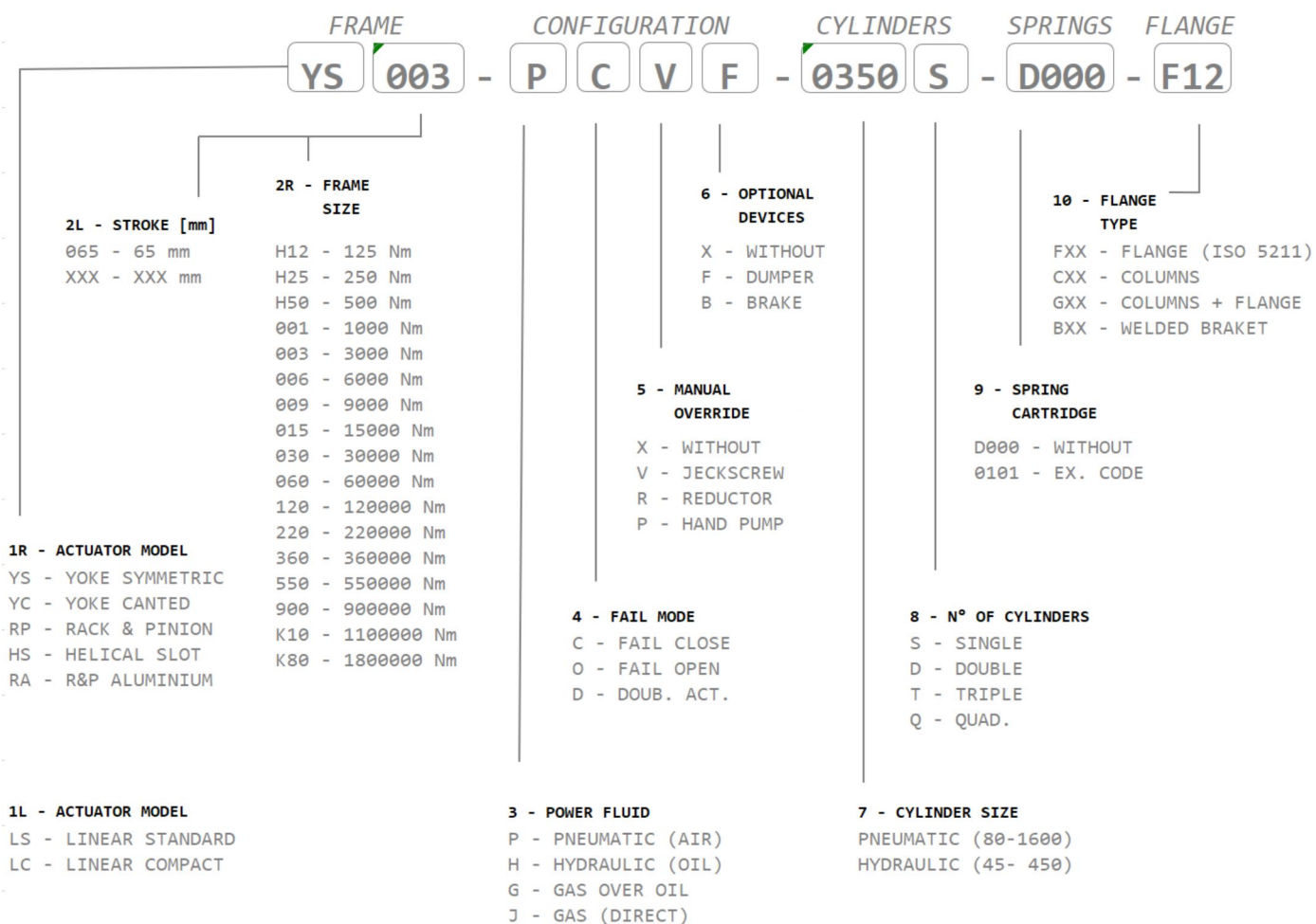
- explosion proof Ex II 2 GD EEx d IIB T4/T5/T6
- waterproof IP67 (IP 68 on request)
- aluminium body and cover die chromium plated and polyester powder coated
- stainless steel body and cover (AISI 316L) on request
- stainless steel shafts

Switch Options

- el.mechanical SPDT or DPDT silver or gold plated contacts sealed or not (up to 4)
- magnetic proximity SPST, SPDT or DPDT inert gas hermetically sealed (up to 4)
- Namur (EEx ia), PNP 3 wire or 2 wire amplified inductive proximity
- 4-20 mA position transmitter
- AS-I interface



Ordering Code





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