ACTUATION

PRODUCT CATALOG

HABONIM
Industrial Valves & Actuators

PERFORMING IN DEMANDING APPLICATIONS

PERFORMING IN DEMANDING APPLICATIONS

Ball Valves & Actuators for the most demanding, challenging and hazardous applications is our passion and profession for the last 70 years. We believe in designing, manufacturing and supplying control and shutoff components and solutions that improves the overall safety, integrity and sustainability of the systems they are installed in.

Designed, manufactured and tested according to the highest standards, our products allow us to partner within systems that flows and control varied gases and liquids in divers markets especially where extreme temperatures and pressures are involved, hazardous materials are used and system performances are critical.

We are leading in cryogenic ball valve-based control solutions, emergency shutoff ,High Pressure and Severe Service and specially designed solutions. Believing that supplying and developing the most effective, safe and reliable products for the global leaders in the Gas distribution Severe Service and BioTech markets continually challenges us to improve our capabilities and products. Best coping with our prestigious customers' most challenging requirements technically, operationally and commercially is the outcome and our contribution to the development of these high end markets.

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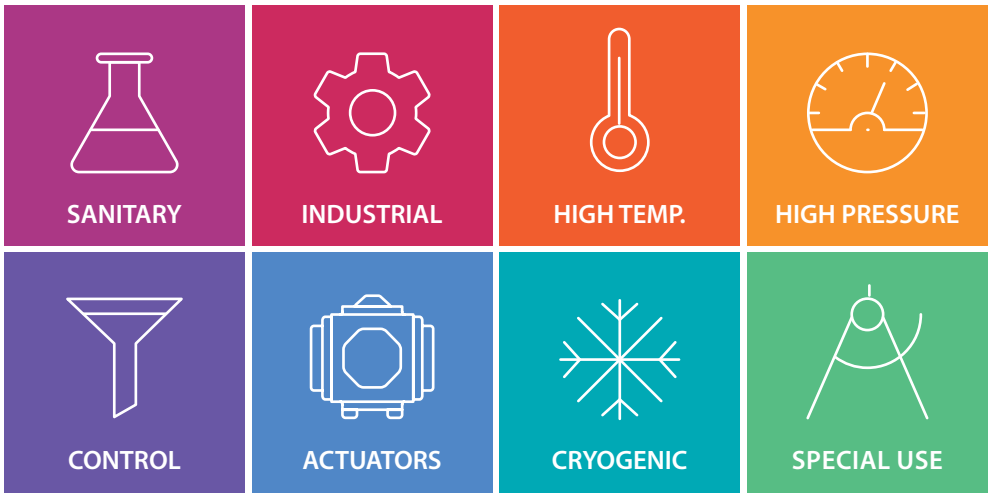


HOW TO USE THIS CATALOGUE

This catalogue provides information in a hierarchical structure starting from Habonim company general information, product families, product lines, product series and to a single product data.

When using information of any level, the aggregate information of the levels above would apply and should be taken into consideration where applicable.

Online Version

A live and up-to-date electronic version of this catalog is available for online use and download on Habonim: www.habonim.com

In the case of discrepancies between the print and electronic versions, we recommend to use the latest version (the version date is printed on the back cover).

Proprietary Note

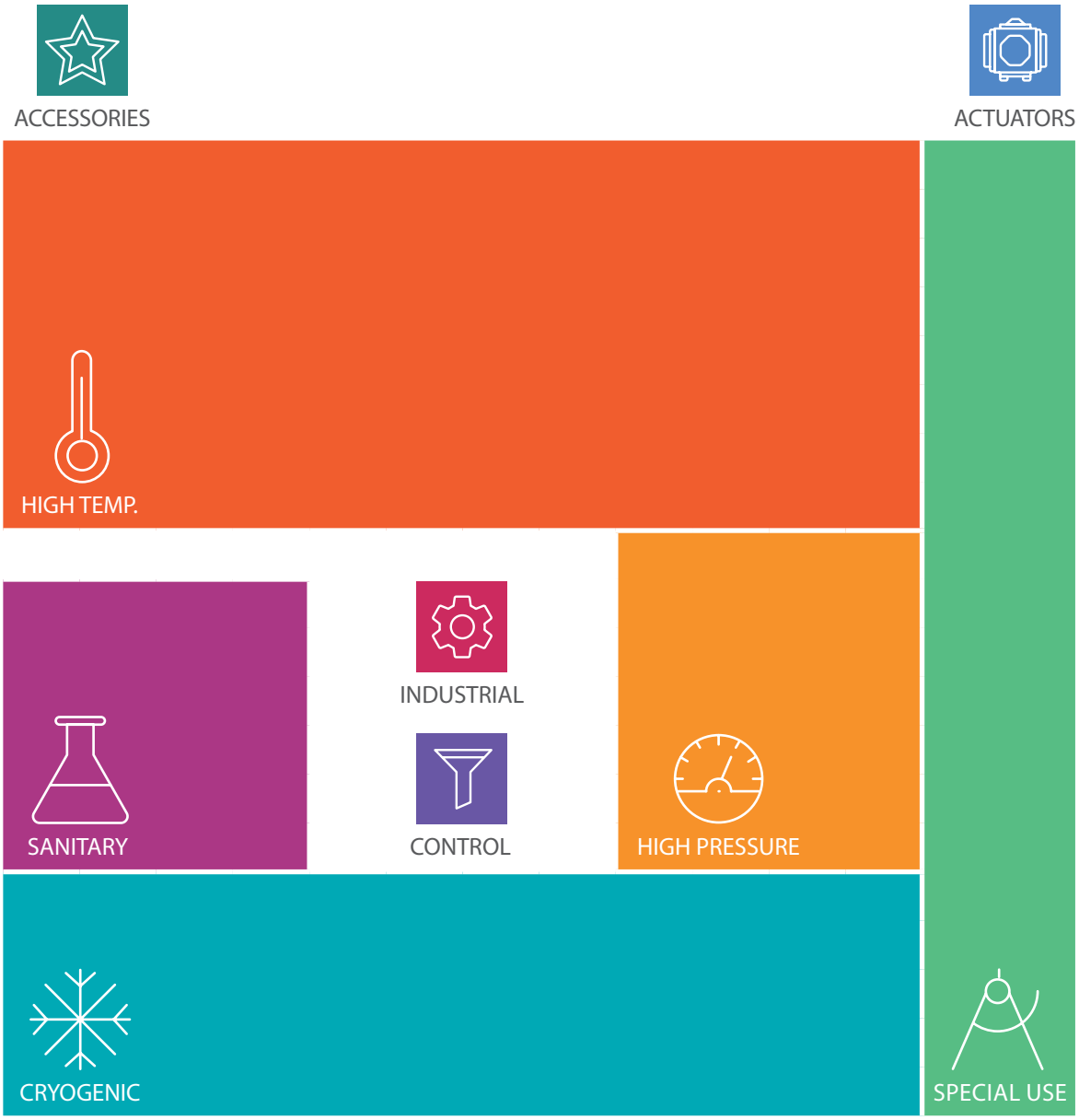
Disclaimer

The products and datasheets in this catalog reflect current Habonim standard production specifications. Habonim Industrial Valves and Actuators Ltd. Reserves the right to modify products and materials, including modifications undertaken to comply with specific customer requests and technical specifications without further notice.

It is always the system designer and the end-user responsibility to verify all equipment use in their system is properly selected to ensure safety and integrity of their systems. Habonim offers only general information based on common market knowledge and standard market adaptations for its valves. For each system and use, the system designer and end-user must consider the particular operations conditions, media parameters and any other implication of their system for the proper selection of valves to be used on their solely responsibility.

PRODUCT FAMILIES

Temperature	
°C	°F
650	1200
600	1100
550	1000
500	900
450	800
400	750
350	650
300	550
250	480
200	390
150	300
100	200
50	120
0	32
-50	-58
-100	-148
-160	-260
-185	-300
-196	-321
-269	-450



ASME Class				150		300	600	900		1500		2500		6000	
Pressure Bar	-1	0	16	20	40	50	100	150	200	250	350	420	700	1000	
Pressure Psi	-14	0	230	290	580	750	1500	2250	3000	3750	5000	6000	10000	15000	

ABOUT HABONIM

Sustainability, Safety and Health

Habonim management and employees around the world are dedicated to promoting, in every aspect of their work, the following principles and guidelines:

Sustainability

Habonim management pledges to comply with the relevant laws, standards, and regulations to preserve the environment and promote sustainability at company premises and in our products.

Safety & Health

Habonim aspires to a safe and healthy work environment, aiming for zero work accidents and promoting our employee's wellbeing. Management and the entire workforce comply with the relevant laws and regulations necessary to achieve this goal.

Operations

Habonim operates a global infrastructure to best support customers and projects by supplying our catalog standard products, specially adjusted catalog products and custom-made products and sub-systems. Ball valves, actuators and control packages are our core deliveries.

Standard Delivery

With the goal of offering our high-end products as well as our general-use products with best availability, best quality, cost-effectiveness and with simple communication, handling and operation, we mark selected items designated as Standard Offer in most of our product lines with the Green "Standard Delivery" mark in order to provide best availability and supply readiness.

Materials

Habonim uses and stocks metallic, polymeric and other materials used in our products, all sourced from well-recognized manufacturers with the required testing, certifications and documentation.

Heat numbers and materials certificates are managed throughout the manufacturing and assembling process to enable full backtracking for our product components.

Available Certifications, some supply as standard and some per request:

- Materials certificates per EN10204 type 2.2/3.1/3.2
- FDA / USP Class VI compliant for polymers, elastomers, and lubricants where applicable
- CE1935:2004 compliant for polymers, elastomers, and lubricants where applicable

Tagging, Traceability

Each product is tagged for traceability. For product identification, a stainless steel nameplate is placed on the product body.

Traceability of assembly and testing procedures, heat codes, and foundry identification as per B16.34 stipulations where applicable.

ABOUT HABONIM

Cleaning, Assembling and Packing

Habonim manages different levels of cleaning, assembling and packing lines to meet different levels of end product and use requirements:

Commercial Service

Excessive hydrocarbon films, water, rust or mill scale, shop dirt, filings, chips or loose weld spatter is removed from the valve parts.

- Accessible surfaces are inspected for cleanliness by the naked eye under bright white light.
- Inaccessible surfaces are inspected and cleaned indirectly by wiping.
- A sticker on the package indicates the cleaning grade of the product.

Oxygen

A meticulous cleaning and assembly procedure eliminate the ignition hazards that can be caused by the presence of hydrocarbon oil, grease, and metal chips.

Our process of cleaning, assembling and packing refers to international standards in partial or in full:

- ASTM A380 • CGA G 4.1 • EN 12300

Habonim uses an environment friendly, alkaline-based degreasing process with controlled parameters. Valves are assembled in an oil-free restricted area by personnel who are specially equipped and trained to perform this task. The assembling area, work surfaces, equipment and tools are specially maintained to ensure cleanliness requirements are met.

- Valves are capped ends and plastic bagged
- A sticker on the plastic bag indicating "oxygen use"

High Purity Service

Habonim offers as an option high purity ball valves for gas and water distribution, as well as chemical handling processes. Such valves are cleaned in accordance with CGA G4.1:

- Cleaning, drying and packaging under Class 100,000 conditions
- Assembly under Class 10,000 conditions
- No lubricants used
- 100% helium leak tested
- Capped ends and plastic bagged

Quality

Habonim strives to deliver quality products that meet and exceed customer expectations, providing complete and total satisfaction and to operate, instruct and train employees globally in light of standards such as:

- ISO 9001:2015
- CE PED 2014/68/EU (Module H)
- ATEX 2014/34/EU
- API SPEC Q1: 2013
- TPED 2010/35/EU – for specific product lines
- IEC 61508-2:2010 (SIL 2 / 3) – for specific product lines
- SIL IEC 61508-1,2, 2010/35/ EU – for specific product lines

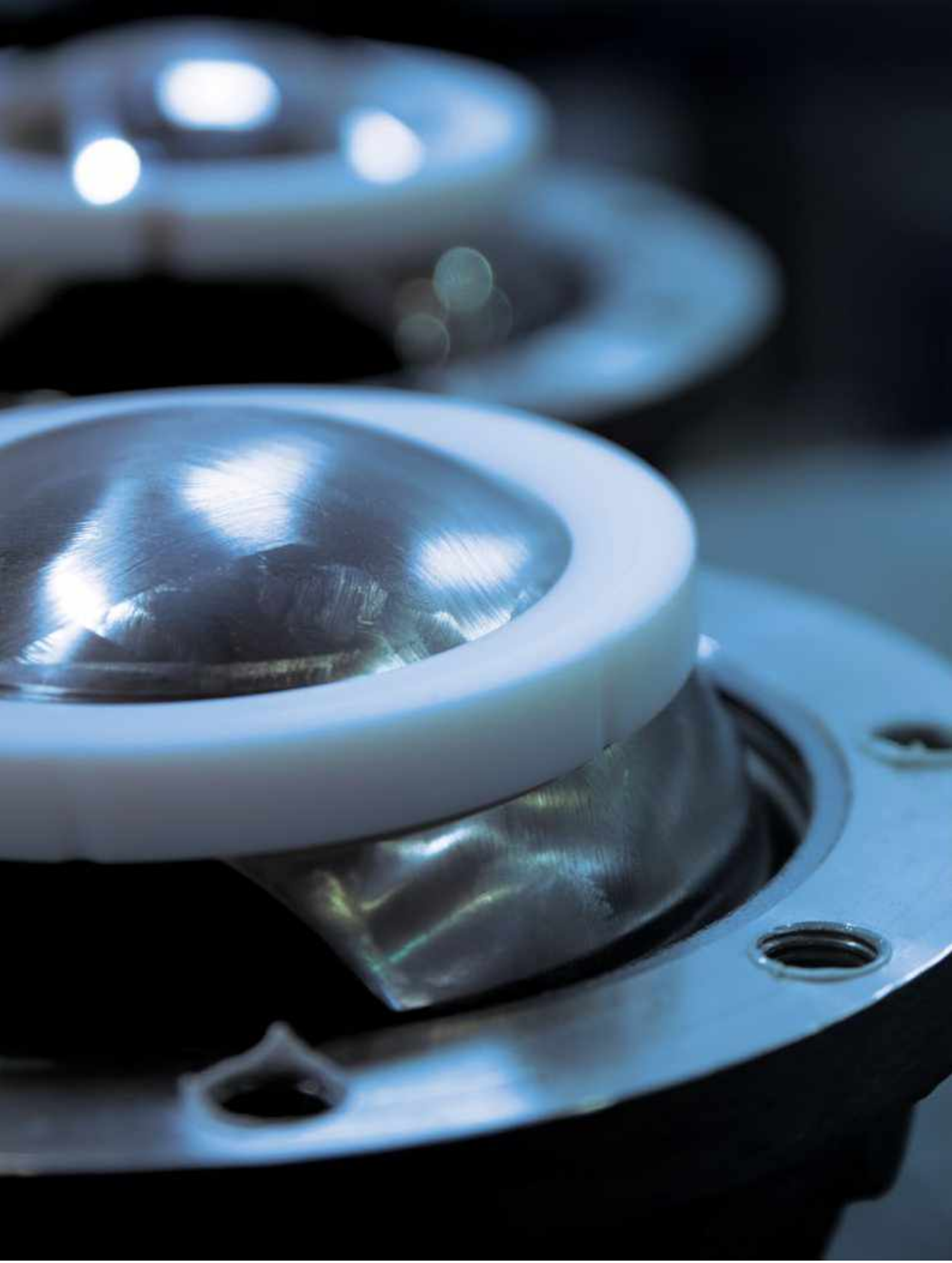
Habonim's management diligently monitors goals and objectives and continually enhances processes and products as well as the safety and environmental practices in light of the above.

Testing and Laboratories

Habonim operates a wide range of testing laboratories and equipment for ongoing and R&D needs and certifies products for cryogenic, high pressure, aggressive or clean, industrial use and more.

Habonim carries out external and internal testing and certification of products per customers' requests and market trends on a regular basis and offer a wide range of certified products for diverse certification bodies as but not limited to:

ABS · Lloyd's Register · KR Korean Register · DNV · LCIE · CCS · EAC · Korea Gas Safety Corporation · P&V · CSA Group



VALVES

HABONIM BALL VALVES

General

Habonim develops, designs, manufactures, tests, supplies and service ball valves for the global market and is globally leading in some segments of ball valve usage. With high-end products, uncompromised quality, serviceability and innovation to create solutions for the most demanding applications Habonim has gained a long track record of proven success. Habonim's ball valve product line supports extreme cold to extreme heat systems, industrial use up to very high pressures, and meets the specific needs and regulations of a wide range of industries.

Habonim ball valve product lines are subject to the company's regulation, methodologies and certification – for more information, see Habonim Introduction chapter.

Design and Engineering

Habonim designs its valves with accordance to international standards and guidelines in full, partial or with reference to. For some an external certification is available:

- API 6D (number 6D-1278)
- ASME VIII Div I
- API608
- ASME B16.34
- ISO 14313
- ISO 17292
- ASME BPE (48SER)
- ISO 15848-1, API641
- Fire safe design per API 607, ISO 10497, API6FA
- Antistatic design per ISO 17292

For relevant valves, Habonim complies or use as guidelines market leading standards such as, but not limited to:

- NACE MR-0175
- NDT/DT (according to ASME B16.34)
- MSS SP-55
- Polymers per TSE/BSE, BAM, FDA, USP, CE1935:2004

Testing

Habonim refers to the international standards for valve testing:

- API 598
- ISO 15848-2
- API6D
- EN 12266-½
- ISO 5208
- BS 6364

Strength/Valve shell leak test:

- Tested per quality system procedures
- By usage of compressed air, nitrogen or water

In-Line Leak Test:

- 100% of valves are tested
- By compressed air, nitrogen or helium
- At 5-7 bar pressure
- Pass criteria:

  - Rate A result (bubble tight shutoff) for soft seated valves

Functional Test:

- 100% of valves are tested
- Torque is tested to design limits

Packing

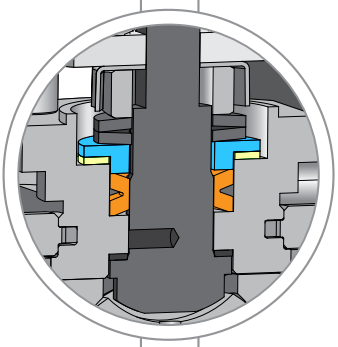
Habonim valves are delivered as a standard as:

- Valve in open position
- Actuated valves are delivered in fail-safe position
- Ends are capped
- A firm, clean package packed by soft, clean, shock-absorbing material for transportation protection.

HABONIM BALL VALVES

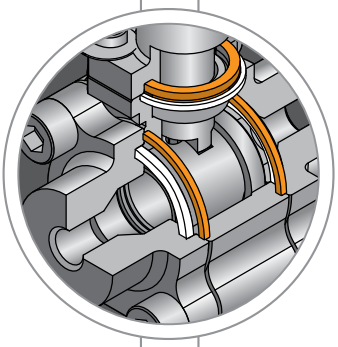
Total Hermetix™

As a standard, most of HABONIM valves are equipped with the Total HermetiX integrity package comprised of three main elements and a superior inline sealing mechanisms in some of them:



Zero fugitive-emission no maintenance stem sealing

- Patented HermetiX™ stem sealing design with zero fugitive emission sealing capability.
- Tested or certified according to ISO 15848-1 and API641 standards.
- Up to 500,000 cycles of operation.
- Field proven for millions of cycles continuous operation.

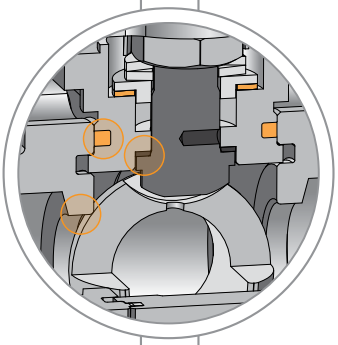


Double body sealing

- Body-to-ends & body-to-bonnet double sealing for superior sealing.
- Selection of sealing materials for diverse applications.
- Fugitive emission prevention.

Fire safe

- According to API 607 & ISO 10497 - where applicable.
- Type-tested and certified by leading certification bodies for marine service – for some valve series.
- Clean fire-safe construction guarantees no graphite contamination of the media flow.



Superior In-line sealing

A variety of implemented mechanism provides extended in-line sealing capabilities such as:

- Bidirectional sealing
- High pressure full Δp sealing
- High & low pressure sealing
- others

Quarter Turn Valves - Introduction

Quarter-Turn Ball Valves design styles

HABONIM offers ball valves in a variety of design styles and technologies that is most effectively supports a wide range of applications and use cases. We offer Floating ball style valves and Trunnion-mounted ball style valves with several construction methods.

Floating Ball Valves design

The floating ball valve is the legacy style for ball valves, the most used and best fit for many industrial applications. The design places the valve ball between seats that holds it in place but without a firm connection to the valve body, hence, it "floats" inside the valve. Assuring a tight seal between the seats and the ball as well as the between the seats and the valve body guaranties the valve in-line sealing by a simple structure with minimal parts. As a rule of thumb, a floating ball valve should be considered as first choice wherever applicable.

Trunnion-Mounted Ball Valves

In a trunnion-mounted valve, the ball rotates only around its vertical axis while being mechanically anchored to the top and bottom of the valve body. This construction balances the torques of the rotating ball and keeps it in a lower range than with similar sized floating ball valves by tolerating the heavy loads applied to the valve trim as a result of large sizes, high pressures and dynamic temperature cycles. The seats are compressed against the ball sphere by the force of the springs and by the line pressure, providing "double block" or "double isolation" capability to the valve. Trunnion-mounted ball valves are often used for larger sizes, higher pressure ratings and dynamic temperatures.

HABONIM BALL VALVES

Habonim Floating Ball Valve Designs

One-piece design

The standard-port, one-piece, solid-cast body and flange design ensures minimum leak paths. The valve complies with ASME B16.5 for flange dimension and ASME B16.10 for Face-to-Face dimensions. In the standard design, the valve flange raised face is serrated per ASME B16.11. The body includes an ISO 5211 integral mounting pad for easy automation. To facilitate easy assembly and maintenance, the valve is designed with one flange with a side entry that allows all inner parts to be positioned easily, and with a threaded plug that sets all parts under a precise preload with high repeatability. The result is optimum operating torque and bubble tight shut-off. It is possible to modify the ASME-standard flange connections by drilling the flanges to the EN1092 PN16 and PN40 standard. It is also possible to change one flange to a weld-end connection. A thermal jacket (steam jacket) over a one-piece design is the most efficient solution in applications where heating up the valve's outer surface (and the media inside) is mandatory to maintain media flow.

31 series | Vacuum 10^{-6} Tor; ASME B16.34 class 150 | Size ½"-8" (DN15-DN200)
32 series | Vacuum 10^{-6} Tor; ASME B16.34 class 300 | Size ½"-8" (DN15-DN200)

Two-piece design

This unique full-port two-piece solid-cast body and flanged end design supports high flow capacity. The Habonim two-piece design is available in ASME B16.10 for Face-to-Face dimensions and ASME B16.5 class 150 and ASME class 300 flange dimensions and also in EN 1092 PN16 and PN40. In the standard design, the valve flange raised face is serrated per ASME B16.11. The body includes an ISO 5211 integral mounting pad for easy automation. The valve is designed as a split construction which facilitates easy assembly and maintenance with standard tools. Tightening the end connector to the valve body via the body bolts preloads the complete ball-seat set, ensuring low operating valve torque, repeatability, and bubble tight shut off.

73 series | Vacuum 10^{-6} Tor; ASME B16.34 class 150 | Size ½"-8" (DN15-DN200)
74 series | Vacuum 10^{-6} Tor; ASME B16.34 class 300 | Size ½"-8" (DN15-DN200)
77 series | Vacuum 10^{-6} Tor; EN 1092 flanged PN16 | Size 3"-6" (DN80-DN150)
78 series | Vacuum 10^{-6} Tor; EN 1092 flanged PN40 | Size ½"-2 ½" (DN15-DN65)

Three-piece design

The forged, cast, or rolled bar 3-piece design is comprised of a body (center section) and a variety of end connectors (thread, weld, flange) to facilitate a wide range of construction configurations. The swing-out design of the center section allows the end connector to remain a fixed part of the pipe work while the valve itself can be maintained by swinging out the center section only.

26 series
| Full port, solid cast | Vacuum 10 $^{-6}$ Tor
| In full compliance with ASME B16.34 class 600 | Size 2"-8" (DN50-DN200)

27 series
| Standard and full port, forged or rolled bar | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 2500 (wall thickness) | Size ¼"-2" (DN8-DN50)
| ASME B16.34 class 1500 (wall thickness) | Size 2½"-8" (DN65-DN200)
| Hybrid seats technology as an option

28 series
| Standard & full port, forged or rolled bar, robust design, with Hybrid seats technology | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 2500 (wall thickness) | Size ¼"-8" (DN8-DN200)

47 series
| Standard or full port design, forged, cast or rolled bar | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 900 (wall thickness) | Size ¼"-2" (DN8-DN50)
| ASME B16.34 class 400 (wall thickness) | Size 2 ½"-6" (DN65-DN150)

48 series
| ASME BPE Floating Ball 3 Piece | Tube Size design, forged, cast or rolled bar
| Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 300 | Size ½"- 1½" (DN15- DN40)
| ASME B16.34 class 300 | Size 2"- 6" (DN50- DN150)

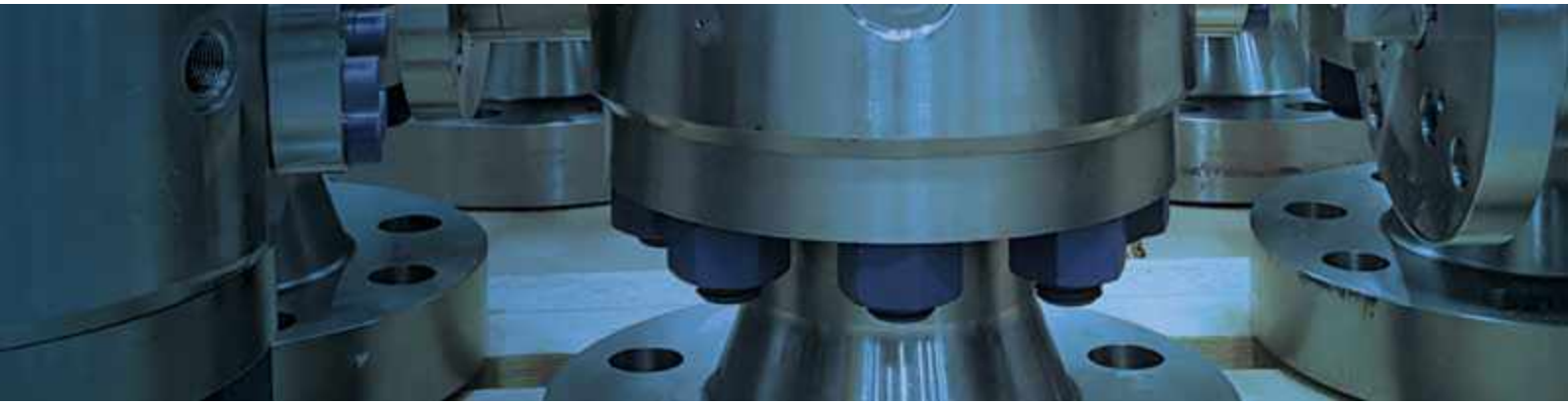
Three-piece Threaded-Body design

The forged, cast, or rolled bar 3-piece threaded-body design is comprised of a body (center section) and a variety of end connectors (thread, Coned & Threaded) to facilitate a wide range of construction configurations. The no-bolts design of the valve is suitable for high and very-high pressures.

24 series
| Standard and full port, Floating ball design, forged or rolled bar
| Vacuum 10 $^{-6}$ Tor | In full compliance with ASME B16.34 class 2,500
| Size ¼"-1½" (DN8-DN40)

29 series
| Forged or rolled bar | Floating ball design | Vacuum 10 $^{-6}$ Tor
| In full compliance with ASME B16.34 for 1,000bar (15,000psi)
| Size ¼"-1" (DN8-DN25)

99 series
| Forged or rolled bar | Trunnion ball design |Vacuum 10 $^{-6}$ Tor
| In full compliance with ASME B16.34 for 1,000bar (15,000psi)
| Size ¼"-1" (DN8-DN25)



HABONIM BALL VALVES

Habonim Floating Ball Valve Designs

Multiport valves

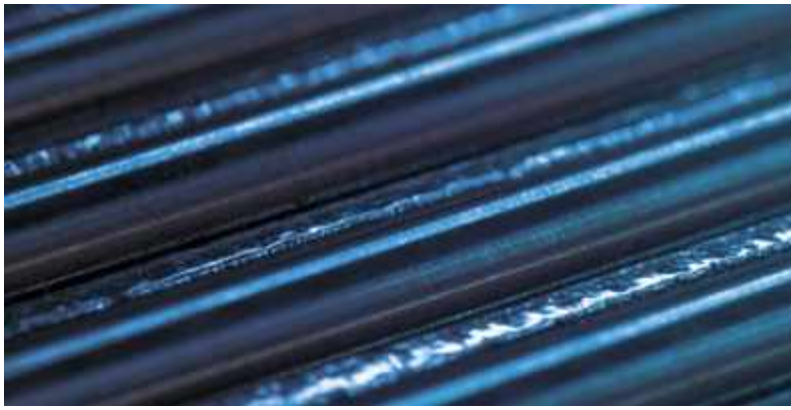
Multiport valves are primarily used to simplify pipe and valve systems by replacing multiple two-way valves with a single multiport valve. They minimize dead legs, optimize drainability, simplify system validation and have a reduced envelope profile for easier installation. Multiport valves allow piping and machine engineers to design a simpler system that saves space and has fewer flow elements and leak paths. One multiport valve can replace multiple two-way valves and automation devices, and provides safe and easy changeover and flow shutoff, all within a confined space. Reducing the quantity of piping and fittings also means faster and more cost-effective construction. Available in a variety of flow patterns and directions and in both automatic and manual configurations, the design possibilities offered by the multiport valve are virtually unlimited.

61 series

| Multiport with three horizontal ports
| Additional bottom port available
| Standard or full port design, forged or cast
| Vacuum 10^{-6} Tor
| ASME B16.34 class 600 (wall thickness) | Size ¼"-1½" (DN8-DN40)
| ASME B16.34 class 300 | Size 2"-4" (DN50-DN100)

62 series

| Multiport with four horizontal ports
| Additional bottom port available
| Standard or full port design, forged or cast
| Vacuum 10^{-6} Tor
| ASME B16.34 class 600 (wall thickness) | Size ¼"-1½" (DN8-DN40)
| ASME B16.34 class 300 | Size 2"-4" (DN50-DN100)



Diverter valves

Diverter valves are primarily used to split or combine process flows, or to switch medium among different pieces of process equipment such as pumps, filters, or whole pipelines Diverter valves provide reliable high flow rates in the most severe operating conditions, including vacuum conditions. They can also handle highly viscous media without the need for constant back-flushing. The diverter valves are available with different ball designs to accommodate a wide range of flow patterns. These flexible flow combinations reduce the number of valves in a system, thereby saving costs and facilitating easier control. Because all of the diverter valves have the same body Face-to-Face dimensions, they can be used with all standard end connections.

D31 series | Bottom entry diverter
| Standard port design, cast | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 150 (wall thickness) | Size ½"-8" (DN15-DN200)

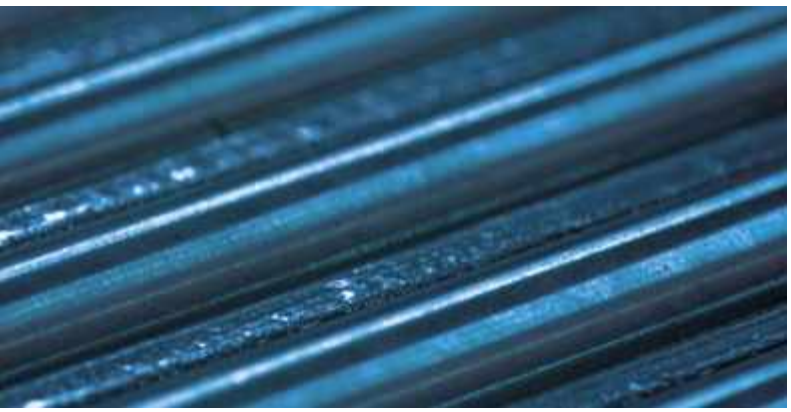
S31 series | Side entry diverter
| Standard port design, cast | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 150 (wall thickness) | Size ½"-8" (DN15-DN200)

D32 series | Bottom entry diverter
| Standard port design, cast | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 300 (wall thickness) | Size ½"-8" (DN15-DN200)

S32 series | Side entry diverter
| Standard port design, cast | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 300 (wall thickness) | Size ½"-8" (DN15-DN200)

D47 series | Bottom entry diverter
| Standard or full port design, forged or cast | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 600 (wall thickness) | Size ½"-2" (DN15-DN50)
| ASME B16.34 class 300 (wall thickness) | Size 2½"-6" (DN65-DN150)

S47 series | Side entry diverter
| Standard or full port design, forged or cast | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 600 (wall thickness) | Size ½"-2" (DN15-DN50)
| ASME B16.34 class 300 (wall thickness) | Size 2½"-6" (DN65-DN150)



HABONIM BALL VALVES

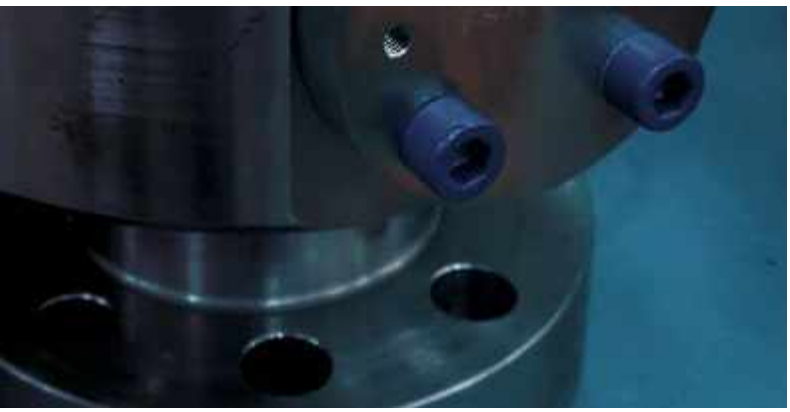
Habonim Trunnion-Mounted Ball Valve Designs

Features:

- Specially designed to endure the harsh conditions of the oil & gas, petrochemical and other demanding applications
- Underground, Above ground, Offshore and Onshore installation
- Full differential pressure (Δp) per the valve pressure rating
- Manually applies a maximum operating force of 360N (80 lbf)
- Double block & bleed single valve capability
- Seats preloaded by helical springs
- Antistatic grounding between ball, stem & body as standard
- Bi-directional flow
- Double Piston Effect (DPE) and Single Piston Effect (SPE) designs are both available
- Optional additions for 8" valve size and above:
  - Injection fittings for emergency stem or seat sealant & lubrication maintenance
  - Equipped with lifting lugs
  - Manually operated via gearbox
- Buttweld end valves may be supplied with extended spool pieces (PUPS) to avoid any risk of seat and seal damage during welding and post weld heat treatment operations

External finishing:

- Austenitic stainless steel valves are delivered in their natural finish
- Carbon steel valves are sandblasted and externally coated with paint
- Other painting systems are available upon request



Two-Piece Design

The 2-piece cast trunnion-mounted ball valve designs are cost effectively support pressure ratings up to ASME Class 600, serving as the first choice where applicable with ANSI flange ends.

81 series | Full Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 150 (wall thickness) | Size 2"-16" (DN50-DN400)

82 series | Full Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 300 (wall thickness) | Size 2"-16" (DN50-DN400)

83 series | Full Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 600 (wall thickness) | Size 2"-16" (DN50-DN400)

Three-Piece Design

The 3-piece forged body and end design is a robust heavy-duty design for pressure ratings up to ASME Class 2500 With ANSI flange, DIN flange or weld ends.

91 series | Full & Standard Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 150 (wall thickness) | Size 2"-16" (DN50-DN400)

92 series | Full & Standard Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 300 (wall thickness) | Size 2"-16" (DN50-DN400)

93 series | Full & Standard Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 600 (wall thickness) | Size 2"-16" (DN50-DN400)

94 series | Full & Standard Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 900 (wall thickness) | Size 2"-16" (DN50-DN400)

95 series | Full & Standard Port | Vacuum 10 $^{-6}$ Tor
| ASME B16.34 class 1500 (wall thickness) | Size 2"-12" (DN50-DN300)

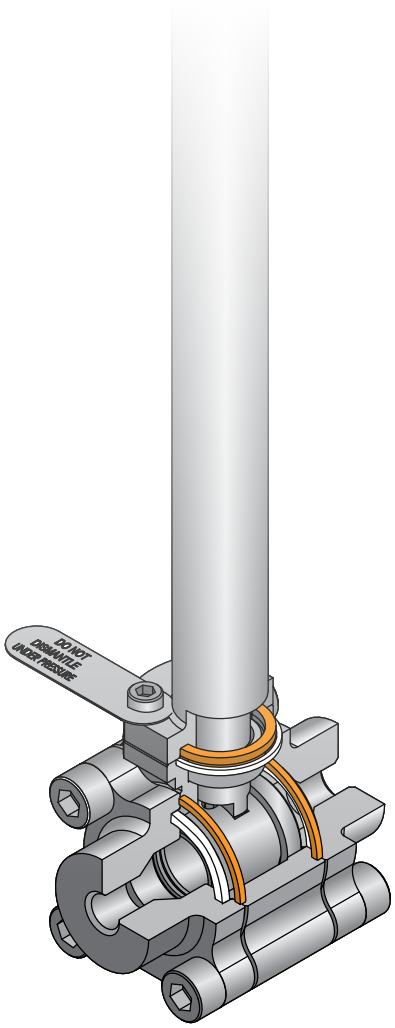
96 series | Full & Standard Port | Vacuum 10 $^{-6}$ Tor0
| ASME B16.34 class 2500 (wall thickness) | Size 2"-12" (DN50-DN300)

VALVE FEATURES

Fire Safe Design

Valves to be used in explosive or fire-hazard areas need to be (according to some standards and regulations) be designed to prevent in-line leaks for at least 30 minutes when exposed to flames and/or temperatures between 900 - 1000°C. In addition, after cooling down, a fire-safe valve has to be able to be cycled once and seal at an acceptable level of in-line leakage

Habonim fire-safe valves include body seals fabricated from graphite, which is well-known as a fire-retardant material. In the event of fire, the valve's soft seats melt and the ball is pressed against a metallic fire lip on the downstream end connector thus preventing in-line leakage. The fire also burns off the stem's thrust seal, causing the stem, which has a machined chamfer at its root, to be pushed up and form a metal-to-metal seal with the valve body and prevent leakage. For stem sealing Habonim is using the patented HermetiX seal, a unique polymer-based graphite-free stem seal that, even after its polymer materials have melted, allows the stem to stay aligned and fully operable after cool-down. During normal operation, our polymer-based stem seal allows 500,000 operation cycles without maintenance, making it remarkably more durable than porous graphite seals, which have to undergo maintenance every 5,000 cycles without refurbishment. This design has been tested and certified to API 607 and ISO 10497 standards.



Tongue & groove body seal design

A 'tongue' machined on one side of the valve body and a matching 'groove' machined on the opposite side provides a perfect interlock system that precisely aligns the body and ends along the valve's center axis, thus increasing accuracy and repeatability during valve assembly and maintenance. The tongue & groove design is used most of our fire valves so that the expanded body seal is fully encapsulated and compressed in the event of a fire. The tongue & groove design forces fluid emissions to flow in a labyrinth pattern, thus ensuring zero leakage into the atmosphere.

Body bolts

Instead of long through-way bolts and nuts, all of our 3-piece fire-safe valves use double the number of one-size-up short bolts threaded into the body. In the event of fire these bolts minimize thermal expansion and prevent external leakage.

Ball Configurations

Our mirror-polished solid balls ensure tight shutoff and long service life. All balls come with specially rounded leading edges to eliminate excessive seat wear during rotation. Our balls technology can supports verity of metals (some are available only upon request) such as Stainless Steel 316 (CF8M), Alloy-C276, Alloy-C22, Monel 400, 254SMO, Duplex, Super Duplex, Inconel 625, Titanium and more. Ball materials other than Stainless Steel 316 (CF8M), are marked for clear identification.

There are different styles related to the ball port itself:

- Standard port ball (also known as reduced port) - The flow through the ball is one size smaller than the pipe's size resulting in a flow area smaller than the pipe's area. The reduced flow area increases the flow velocity (assuming a constant flow discharge) and the head-loss over the valve.
- Full port ball - Has an over-sized ball so that the ball's port is the same as the pipe's inner diameter, thus reducing friction loss. Flow is unrestricted but the valve is larger so full-port balls are typically used where free flow is particularly important such as in pipelines that require pigging.
- Tube size ball (also known as true port) has a port which is identical to the tube's inside diameter. This configuration is used mainly in the pharmaceutical industry where dead legs and pockets of contamination are unacceptable.

Pressure equalizing hole

Balls typically have a hole in the stem slot to equalize the pressure over the ball sphere. The pressure inside the ball port and the pressure in the valve cavity are identical and hence no stress is applied to the ball sphere. The pressure equalizing hole is eliminated in the following cases:

- High surface finish requirements, mechanically polished or electro-polished
- Diverter valves
- Valves with cavity filler seats
- Double block and bleed valves
- Pharmaceutical or other applications with very high sanitary requirements

Minimum stress on the ball by adding a pressure equalizing hole

VALVE FEATURES

Ball Configurations

Cavity pressure relief

This safety feature is for valve applications where a trapped cavity must be avoided a 3 mm hole is included in the upstream ball sphere so that any pressure that builds up in the valve cavity will be released into the upstream pipeline. The use of a cavity pressure relief hole feature is mandatory when using ammonia, chlorine or any other liquid media that is at risk of transforming into a gas and thus elevating the pressure within the valve cavity in an uncontrolled manner. A valve which includes the 'P250' code will always be unidirectional, and will include an arrow flow plate attached to the valve body. Improper installation in the opposite direction will cause an in-line leak.

3 mm relief hole face the upstream

'C' Ball

Habonim offers a two-way ball with its upstream sphere completely machined through the ball port and thus has a C shape. This feature is mainly used where media tends to crystalize on the upstream ball sphere such as, for example, molten sugar or baked ground coffee. When a standard valve is in the closed position and a solid layer has adhered to the ball's upstream sphere, subsequent valve operation will erode the upstream soft seat, loosen the pre-load of the ball seats set, and rapidly degrade the valve's functionality. With a 'C' ball media solidification is impossible as there is no surface area on which the media can accumulate. The upstream seat withstands the media unscratched; the pre-load of the ball seat set as well as the functionality of the valve remain intact for a longer period of time.

Upstream sphere completely machined in a 'C' ball

Multiport and diverter ball

Multiport and diverter ball designs are used primarily to split or combine process flows or to switch medium between alternative pieces of process equipment. The diverter ball configuration can be either bottom entry or side entry. The diverter ball has the same sphere diameter as standard 2-way balls so the same soft parts can be used. Multiport balls have numerous flow configurations, which are described in detail in the Multiport chapter of this catalog. The multiport ball has a larger sphere diameter than a diverter ball, allowing a firm grip of four seats vs. two seats in the diverter configuration.

Diverter ball with isometric T port construction

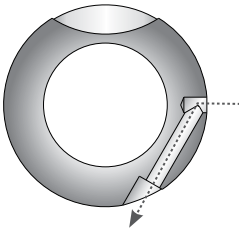
V-Ball

The V ball is used in control valve solution for less demanding applications, such as clear liquid at a maximum pressure drop of 6 bar (87 psi), or clean gas at a maximum pressure drop of 10 bar (145 psi), and maximum temperatures of 120 °C (248 °F) for both. The V ball design is comprised of a floating characterized ball, mounted between two seats, which maintain a trim preload and bubble-tight shut-off and low torque demand. V-Balls come in a variety of 'V' and 'slot' shapes, and can be custom designed to meet any control requirement. The V-Ball is available in a wide range of high-alloy materials and coatings for highly corrosive applications.

Characterized ball for flow control applications

Downstream pressure relief ball

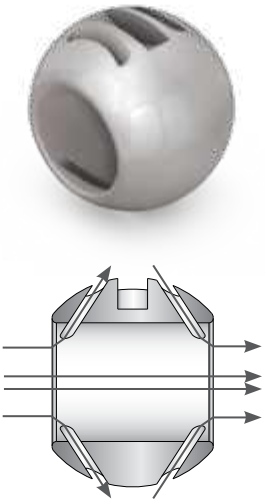
Habonim ball downstream pressure relief is designed with a diagonal hole in the downstream sphere toward the bottom of the ball. In the open position the flow runs smoothly through the valve. When the valve is closed the downstream pressure is vented through the diagonal tunnel and out via a third port incorporated into the valve body so that the relieved pressure can be diverted safely to a secured area. This feature is mainly used for pressure gauges and instrumentation service. This design eliminates the need to install an additional downstream pressure vent valve.



Special diagonal tunnel vents downstream pressure when the valve is closed.

CIP/SIP

Habonim 'CIP' ball code is mainly used in sanitary and biopharm applications. in clean applications the main ball valve problem is contamination caused by impurities trapped in the cavity between the ball's outer sphere and the valve body's inside diameter. To overcome this problem Habonim has designed a special ball that allows the stream to clean the valve cavity thoroughly during the CIP/SIP process, with the valve in the full open position. The bottom line: Bidirectional and streamlined flow with a high Cv, and self-cleaning of hidden cavities.



With the valve in the open position, special tunnels flush the valve cavity constantly

VALVE FEATURES

Seat Configurations

Standard seat

A flexible, precision-machined seat that provides the highest seal capabilities (EN12567 Rate A) in high pressure and vacuum conditions. Its unique design reduces valve torque, facilitating a more compact, lower-weight automated package. The design also reduces wear, thus extending the life of the seat. The seat perimeter has pressure-equalizing slots to allow pressure to penetrate into the body cavity for better sealing and for avoiding upstream seat collapse into the valve cavity while turning the valve ball from the open to closed position under high differential pressure.

Standard seat

Self-Relieving-Seat (SRS)

The Self Relieving Seat (SRS) is used mainly in syltherm and dowtherm services in the chemical and biopharm industries. Both syltherm and dowtherm have a high thermal expansion coefficient and in trapped cavities (such as when the valve ball is in its closed position) even a moderate temperature increase will cause dramatic pressure build-up that can cause cessation of valve operation, seat swelling, and even valve shell failure. The SRS is designed to flex and allow the trapped pressure to escape into the pipeline, while shutting off as soon as the peak pressure is relieved. The pressure relief is achieved by a special internal groove that is machined into the seat radii facing the ball. Additional radial grooves enable the pressure to bypass the ball and access the internal groove. The seat sealing surface is in the central internal section and provides tight shutoff. The outer section of the seat above the internal groove gives the support needed to the ball when higher line pressure pushes the ball toward the downstream seat, thus preventing "crushing" of the seat.

Self-Relieving-Seat (SRS)

Seat-seal

In some use cases valve must seal the pressure at the upstream side, which contradicts the traditional floating ball mode of operation (where sealing is typically done on the downstream seat only). Habonim's solid one-piece seat-seal design blocks the flow through the back of the seat, generating an upstream seal. Seat-seal can be used with differential pressure up to ASME Class300. For higher differential pressures use either a valve with hybrid seats, or a dual floating ball valve integrated into a one block or trunnion mounted valve.

Seat-seal

Hybrid seat

When a soft seated floating ball valve is held even momentarily at mid position, the upstream seat is only partially supported by the ball and can be pushed towards the valve cavity by the force of the stream. This deformation is amplified with increased media density, high differential pressure and/or high velocity. Under these extreme conditions the deformation can: cause the ball to grip the unsupported area of the soft seat and jam the valve; slice the seat by the port edge of the ball; or trigger stem twisting (caused by excessive torque applied by the operator trying to close the valve). Habonim's line of Hybrid seats were developed especially to overcome the problems posed by high differential pressure applications. The combination of a metallic housing and polymer insert offers the stiffness of a metal seat with the bubble tight shutoff leakage rate and operating torque of a soft seat. Different hybrid seat designs were developed to meet the needs of different applications, and are designated by the metallic housing design.

Hybrid seat

Seat Configurations

Cavity filler seat

The cavity filler seat design minimizes crevices and gaps between the ball and the valve body, thus reducing the risk of trapped contaminants. Because the valve body is specially machined with a larger bore diameter to fit the special cavity filler seat dimensions, they cannot be retrofit into a standard valve body. The cavity filler seat is a one piece seat-seal design and is therefore suitable for use with the Habonim 3-piece product line.

Note: A valve with a cavity filler seat cannot be used in fire-safe service.

Cavity filler seat

Metal seat

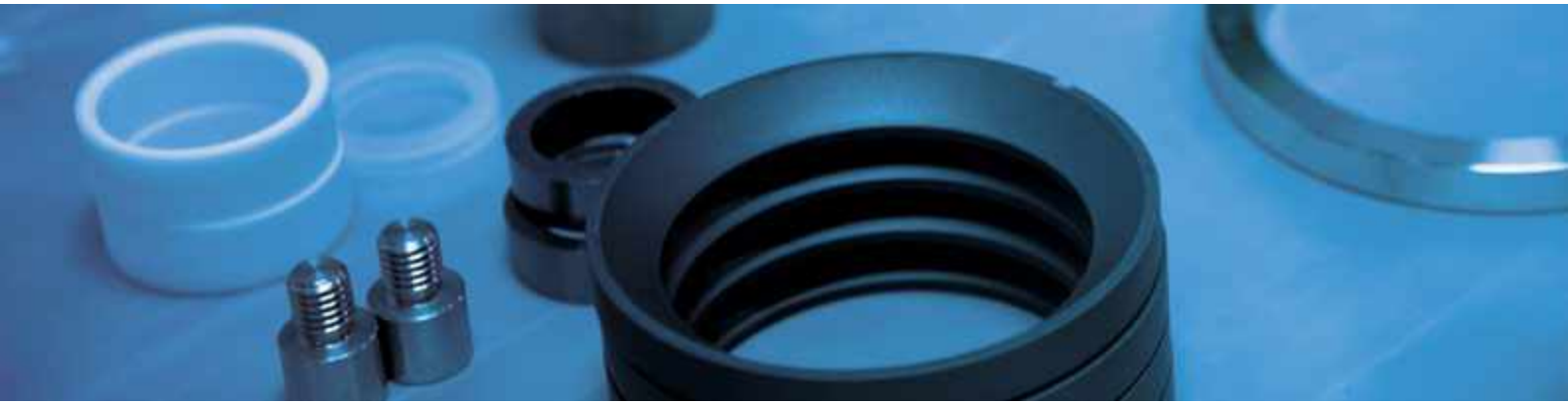
Habonim metal seats are used for extreme service applications where high temperature, abrasion and/or corrosion restrict the use of soft seats. The metal seats are mate lapped with the ball for enhanced engagement and sealing. A variety of surface treatments and coatings can be applied to the seat's outer surface to withstand corrosion, galling and other forms of wear.

Metal seat

V-port seat

Superior control performance and accuracy is designed into the geometry of the downstream V-port. The precision wire cut 'V' shape of a metal seat, enables equal percentage flow characteristics, while S-port design ('Slot') provides linear flow characteristics. V-Port valve assembly, comprised of a ball and wire cut metal seat, lapped together into a single seamless component. V-port design provides the high rangeability and precision throttling required for clean or dirty liquids and gases, as well as fibrous suspension applications. The streamlined flow passage allows for high recovery, maximum efficiency and excellent erosion resistance.

V-port seat



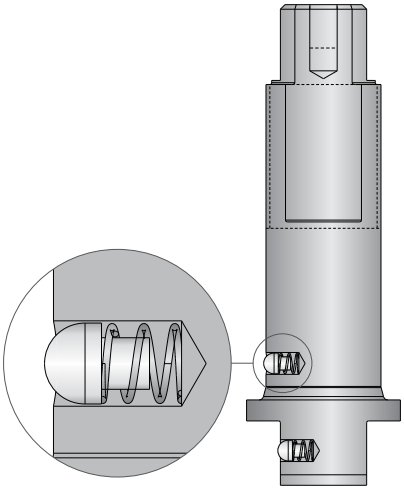
VALVE FEATURES

Stem Design

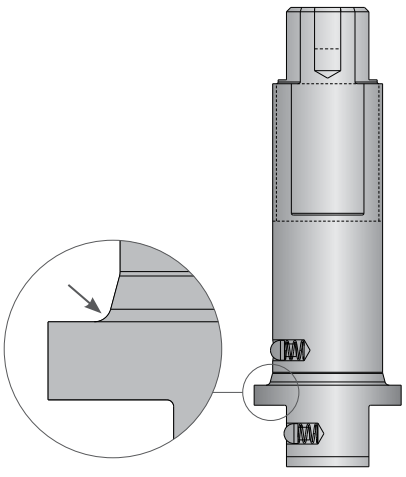
A crucial component in a quarter-turn ball valve is the stem, which transfers the torque from the operator to rotate the ball and control its movement. The stem geometry and surface finish is crucial to minimize stem leak and maximize ease of operation. The stem is a dynamic element and, in most cases, is the only element that protrudes from the pressure vessel and is thus subject to safety issues as well. Habonim's robust stem design complies with ASME B16.34 and API 6D and can endure at least twice the valve's nominal torque. To solve a major safety issue, the stem is designed to be "blowout-proof". Because it is inserted into the valve body from within, the stem will not release under pressure. All Habonim stems are, by default, fire-safe design. A special chamfer is machined at the root of the stem so that, in the event of fire, the stem is pushed upwards and seals against the valve body - metal to metal engagement. Various stem materials are available, from austenitic stainless steel to nickel alloys, to titanium for light and moderate torque requirements, and for high cycle applications or high torque demands. The stem top planes for valve sizes ½" (DN15) up to 2½" (DN65) are typically a Double-D shape, while 3" (DN80) stems and above typically have a square shaft (although a Double-D stem can be provided upon request by adding the 'WR' suffix to the valve description).

Anti-Static Design

An anti-static device provides for electrical continuity between the body, ball and shaft of the valve and is used to discharge static electricity buildup on electrically isolated balls. According to the EN ISO 17292 standard, all valves with a size up to 2" (DN ≤ 50) require a stem/body contact, while larger valve sizes also require a ball/stem contact. The anti-static feature shall have electrical continuity across the discharge path with a resistance not exceeding 10 Ω from a power source not exceeding 12 VDC when type tested on a new, dry, as- built valve after pressure testing and cycling of the valve at least five times. The Habonim anti-static device, in which contact is made via a spring loaded stainless steel element, complies with EN ISO 17292 and is, in fact, built-in to all Habonim valve product lines, without exception.



Anti-static design



Stem design

Stem Seals

The valve trim - and the valve stem seal design in particular - determine the quality of a valve. The stem seal must perform two tasks: keep the media within the boundaries of the pressure vessel, and allow uninterrupted leak-free continuous open/closed quarter-turn rotation.

Unlike the valve body's static seal, the stem seal is subject to dynamic operation of the valve, as well as to side loads resulting from actuator misalignment or from the operator forcing the handle incorrectly. The valve trim typically comprises two Belleville springs assembled Face-to-Face, which preload the stem seal. This self- adjusting mechanism compensates for wear and pressure/temperature differentials - ensuring a leak-tight seal and extended service life. Habonim's trim design for heavy-duty service, such as high cycle applications, uses four or even six sets of Belleville springs so as to maintain preload over a longer operational cycle life. The Belleville springs are compressed by the stem nut, which is locked to prevent unintentional release during cycles.

Habonim's stem seal design, consisting of a live-loaded thrust bearing and anti-abrasion ring combined with a stem seal, significantly increases valve cycle life over conventional ball valves and extends the time between adjustments.

VALVE FEATURES

Stem Seals

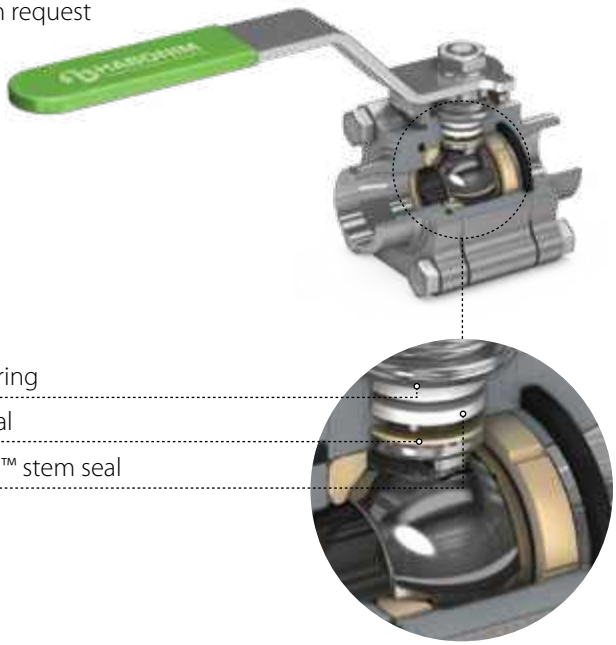
Graphite-free fire safe HermetiX™ stem seal

The patented HermetiX™ stem seal is named for its distinctive "X"-shaped design. The flexible "X" shape creates a dynamic sealing arrangement so that, in the event of pressure buildup or side load, the HermetiX™ adjusts dynamically to prevent fugitive emissions. The result is a superior stem seal design compared with the conventional flat stem seals currently available on the market.

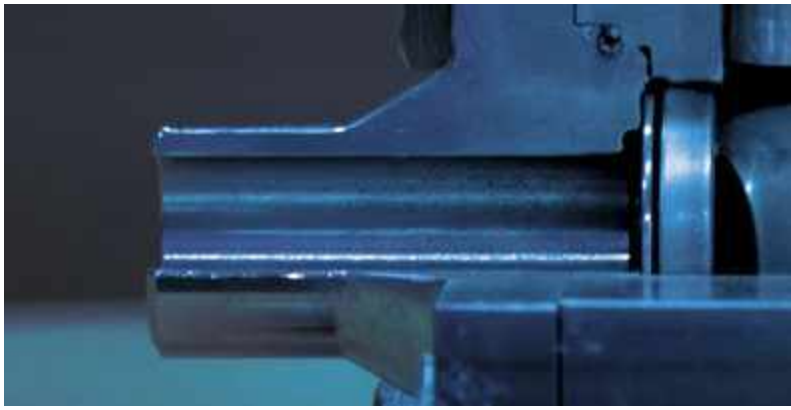
The HermetiX™ Fire-safe. This patented design includes a polymer based stem seal and a unique fire safe certified construction. The graphite-free stem seal, suitable for use in hazardous industries such as chemical, petrochemical, oil & gas, Food & Beverages is designed to operate for 500,000 cycles without refurbishment. The HermetiX™ fire safe valve offers the ultimate solution - an exclusive graphite free stem seal that eliminates the risk of graphite disintegration after prolonged valve cycles, protecting both line materials and air quality. The HermetiX™ fire safe valve meets the requirements of fire-safe API 607 / ISO 10497 standards, as well as the stringent ISO 15848-1 standard.

Features

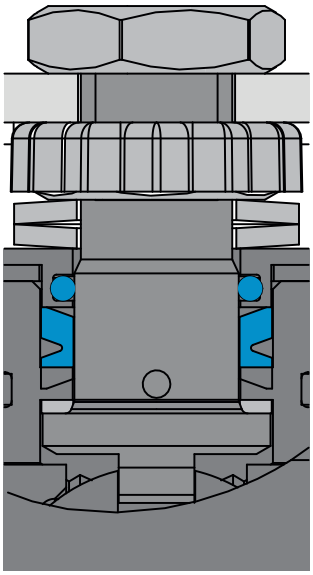
- Prevents media contamination from graphite particles
- FDA, CE1935:2004 approved polymer or other materials is available upon request
- Fugitive emission certified to ISO 15848-1 and API 641
- Habonim patented design
- Designed to operate for 500,000 cycles without refurbishment
- Prevents media contamination from graphite particles
- Ensures uninterrupted production
- Increases site safety
- Anti-static as standard



No pressure Pressure build-up Side load



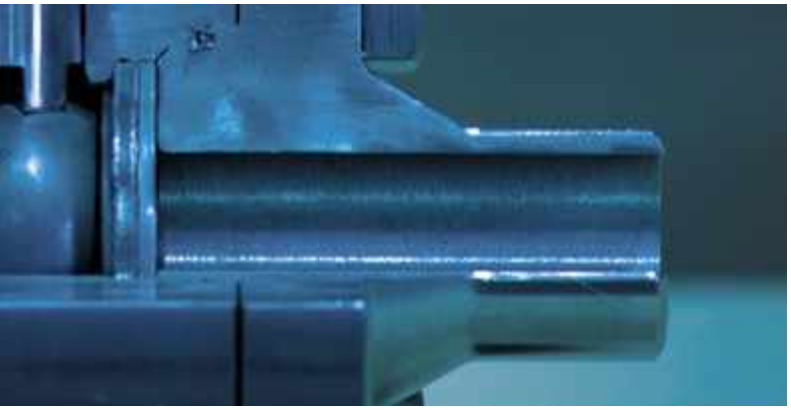
High Cycle (HC) Stem seal



High cycle service is defined by Habonim engineering as continuous operation for more than one hour at a frequency greater than 1 cycle / 180 seconds.

When designing a valve for high cycle service parameters, such as heat dissipation due to friction of metallic and plastic parts, resistance to fatigue stress, and mean time between maintenance activities must be taken into consideration.

For high cycle applications Habonim recommends the use of valve stems made of high tensile material. The stem will be polished for a high degree of surface roughness. The stem thrust seal will always be made from highly wear-resistant plastic material. A Viton O-ring is inserted into a customized follower. The complete trim assembly is preloaded by a double or even triple Belleville spring stack. All of these design features give the valve a particularly long service life.



VALVE FEATURES

End Connections

Habonim offers a variety of end connections for its 3-piece valves, supporting the industry standard connections for piping in diverse applications and geographies.

TC/TCI/TCD

Tri-Clamp end - designed to ASME BPE (TC) standard, allows fast connection or removal of the valve from the line. Mainly used in the pharmaceutical and food & beverage industries.

BW

Buttweld end for various pipe schedule - designed to ASME B16.25, EN12627-4, BW code stands for buttweld schedule 40, for different pipe schedule BW should be followed by the relevant schedule number (5,10,80,160)

SW

Socket-weld end one piece solid cast designed to ASME B16.11 and EN 12760. Leaving a 1 mm gap (average) between the pipe end and the socket inner plan is a common welding practice to avoid internal stress due to thermal expansion during the welding process

XBW

Extended buttweld end for various pipe schedule - one piece solid cast - special design for in-line welding save labor cost and keep the integrity of the product factory tested.

XSW

Extended Socket-weld end one piece solid cast - special design for in-line welding save labor cost and keep the integrity of the product 'factory tested'

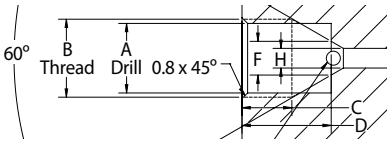
BWO / BWI / BWD

Buttweld end for various tube standards - designed to ASME BPE (BWO), ISO 1127 (BWI) and DIN 11850 (BWD). The length of this end doesn't allow the use of orbital welding.

ETO / ETI / ETD

Extended buttweld end for various tube standards - designed to ASME BPE (ETO), ISO 1127 (ETI) and DIN 11850 (ETD). One piece solid cast with sufficient length to allow the use of orbital welding.
Habonim ETD end connections are designed in accordance to EN10357 – Series A.
Habonim ETI end connections are designed in accordance to EN10357 – Series C.
Dimensions of the end-connections tube ends are suitable to be welded on tubes that meet this standard.
For other tube sized ends please contact a Habonim representative.

Size	Dimensions - mm (inches)					
	A	B	C	D	F	H
02	9.9(25/64)	7/16-20	7.1(.28)	12.7(.28)	4.8(.19)	2.8(.109)
03	13.1(33/64)	9/16-18	9.6(.38)	9.6(.38)	7.9(.31)	5.2(.203)
06	19.1(3/4)	13/16-16	11.1(.44)	11.1(.44)	12.7(.50)	9.1(.359)
07	32.9(1.19/64)	3/4-14	12.7(.50)	12.7(.50)	16 (.63)	11.1(.438)
10	45.47(1.79)	1 3/8-12	20.6(.81)	20.6(.81)	22.4(.88)	14.3(.562)



CTM

Coned and Threaded type female connection to be used with Coned & Threaded medium-pressure tubing and connection components.
Female connection geometry and sizes per the above.

Flanged			
150	ASME B16.5 #150 RF	PN16	EN1092 PN16 RF
300	ASME B16.5 #300 RF	PN40	EN1092 PN40 RF
600	ASME B16.5 #600 RF	PN63	EN1092 PN63 RF
900	ASME B16.5 #900 RF	PN100	EN1092 PN100 RF
		PN160	EN1092 PN160 RF

150/300/600/900 | PN16/40/63/100/160

Raised Face flange ends designed to ASME B16.5 or EN1092 for a variety of pressure classes.
Valve Face To Face sizes are per Habonim catalog data only.

NPT / BSPT / DIN2999 / DIN3852

Female thread end designed to ASME B1.20.1 NPT
EN 10226-1 BSPT/DIN2999/DIN3852 and more

MNPT / MBSPT

Male thread end designed to ASME B1.20.1 NPT
EN 10226-1 BSPT/DIN2999/DIN3852 and more

LL / LM

Compression ends for metric (code LM followed by the tube OD in mm) or imperial (code LL) tube dimensions. mainly used in instrumentation services, with sizes up to 1" (DN25)

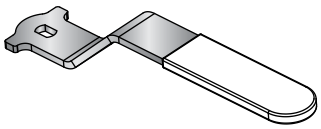
Grayloc©

Grayloc© compatible hub designed to fit an opposite hub for an easy low or high pressure connection Using a self-energized seal (Grayloc© is a registered trademark of Grayloc Products, L.L.C.)

VALVE FEATURES

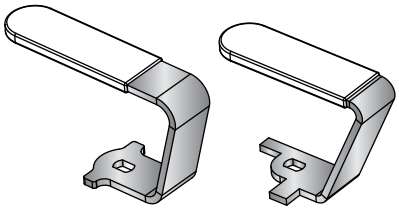
Handles

A valve handle is the interface between the operator's hand and the valve trim. Habonim's handles are designed for safe operation, with a firm and comfortable grip. To facilitate ease of operation, the handle length ensures that the maximum force required at the handle-end to apply the breakaway torque will never exceed 360 N (80 lbf). The handles are manufactured in a variety of technologies: casting, forging, punching, and laser cut and welding. The standard materials are zinc plated carbon steel and stainless steel. Habonim's range of handle designs addresses the diverse needs of multiple applications.



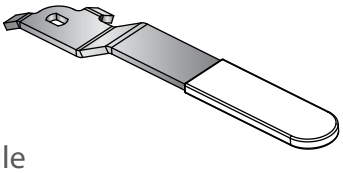
The 'SHARK' handle

Habonim's standard handle for valves with an ISO 5211 top pad.



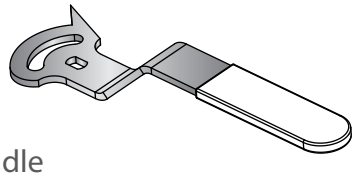
The 'SCORPION' handle

Habonim's special handle for confined spaces. There are two types to accommodate valves with or without an ISO 5211 top pad. To specify a valve with the SCORPION handle add the '-SCRP' suffix to the valve code.



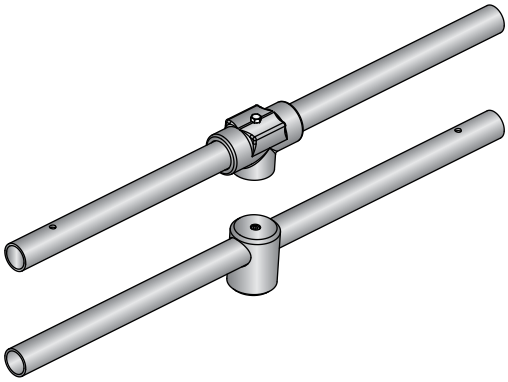
The 'POINTER' handle

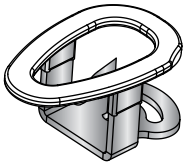
Habonim's standard handle for valves without an ISO5211 top pad.



The 'ADJUSTABLE' handle

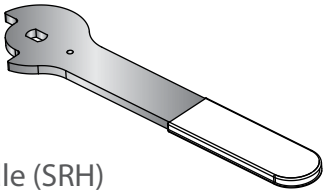
Habonim's special handle for manually controlled valves. It is supplied as part of a kit that includes a lock-in-place mechanism and a mirror-polished scale for clear identification of the valve's angular position. To specify a valve with the ADJUSTABLE handle add the '-ADJ' suffix to the valve code.





The 'OVAL' handle

Habonim's special handle designed to avoid unintentional movement of the valve handle. It is also used in confined spaces where the handle must not protrude beyond the valve's Face-to-Face plate. To specify a valve with the OVAL handle add the '-OVL' suffix to the valve code.



The Spring Return Handle (SRH)

An extra thick handle design to withstand the severe impact during valve closing. This handle is part of the SRH unit.

Habonim's standard handle for large valves (2½" and above)

Habonim's standard handle for large (2½" and above) cryogenic, high pressure and metal-seated valves, and for large (3" and above) standard valves. It provides a firm grip and smooth operation. The maximum force required at the handle-end to apply the breakaway torque shall not exceed 360 N (80 lbf). Habonim supplies valves with 2½" standard port and above for manual operation with handles attached to or packed with the valve. (with the exemption of 47 series which is for 3" standard port and above). If the valve is to be automatically actuated, Habonim removes the handle and prepares the valve stem seal accordingly. To specify a valve prepared for automated actuation, add the '-BS' (bare shaft) suffix to the valve code. The '-BS' suffix does not apply to valves size up to and including 2.


COMPACT
PNEUMATIC ACTUATOR

ACTUATION

HABONIM ACTUATORS

General

Habonim's unique quarter-turn COMPACT actuators have been proven for more than 30 years to have superior performance of double the torque per size, much longer cycling before any maintenance, high opening and closing speed and extraordinary durability in the most demanding industrial environments.

Our COMPACT actuators are successfully used to supply control packages in diverse industries and applications that are superior in overall smaller size, with less weight, less compressed-air consumption, much more reliable especially in high cyclic applications and with a very short acting times.

Habonim quarter-turn actuation offering includes:

- Double acting actuators (Air-air operated)
- Single acting actuators (air-Spring operated) as normally open/close options
- Shutoff valve and actuation packages
- Control valve and actuation packages
- Emergency Shut Down (ESD) and Fire Block Valve (FBV) packages

Habonim actuators product line is subject to the company's regulation, methodologies and certification – for more information, see Habonim Introduction chapter.

Design and Engineering

Habonim designs its actuators with accordance to international standards and guidelines in full, partial or with reference to. For some an external certification is available:

- ISO 5211:2017 - Industrial valves - part-turn actuator attachments
- VDI/VDE 3845:2010 (NAMUR) - Industrial process control - pneumatic control valves - Interfaces of valves and auxiliary equipment
- IEC 61508-2:2010 SIL2/3 - Safety integrity level - functional safety of electrical/ electronic/ programmable electronic safety-related systems (optional)

Testing

External shell and internal leak test

- 100% of actuators are tested
- Functional testing

Packing

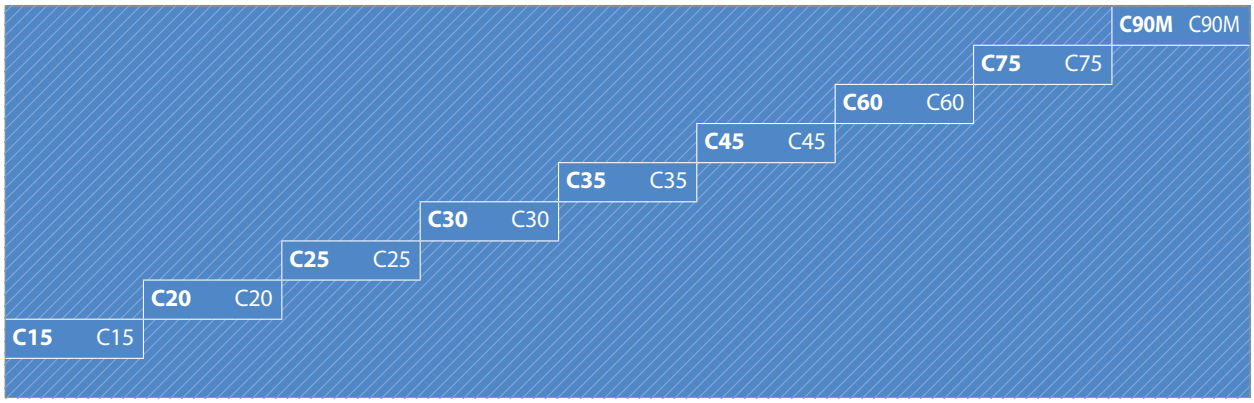
Habonim actuators are delivered as a standard:

- Air inlet and outlets are capped
- Each actuator is packed in a firm, clean package.

Quick Selection Table

Double Acting - Torque

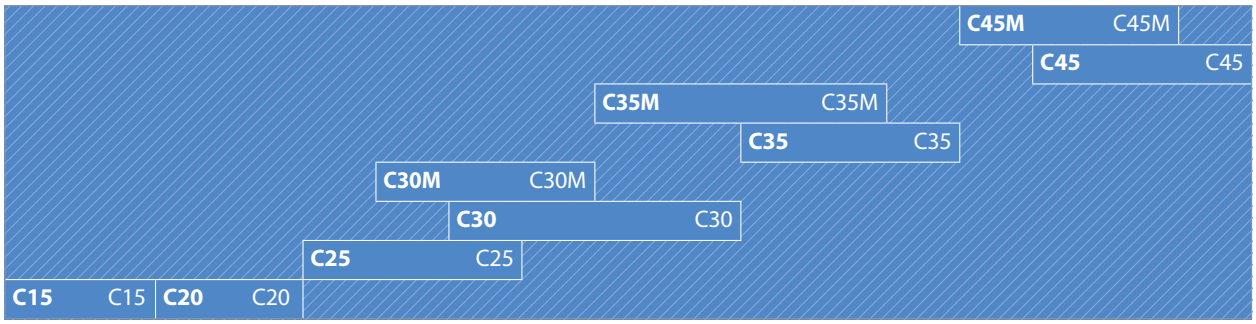
5.5 bar (80psi) X X 8.0 bar (120psi)



Stroke Time																	
3.0 Sec.																	
2.5 Sec.																	
1.5 Sec.																	
0.75 Sec.																	
0.4 Sec.																	
0.24 Sec.																	
0.2 Sec.																	
0.13 Sec.																	
0.1 Sec.																	
0 Sec.																	
Torque NM	19	27	35	51	72	105	119	176	208	304	408	593	967	1406	1768	2596	3268	4754
Torque in/lb	172	244	311	468	639	961	1052	1611	1848	2780	3622	5429	8585	12872	15856	23767	28922	42073

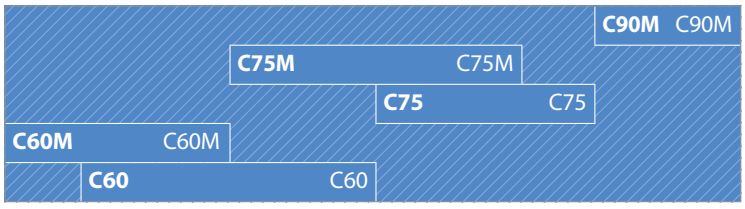
Spring Return - Start Torque

5.5 bar (80psi) X X 8.0 bar (120psi)



Stroke Time																	
0.8 Sec.																	
0.77 Sec.																	
0.5 Sec.																	
0.48 Sec.																	
0.28 Sec.																	
0.28 Sec.																	
0.23 Sec.																	
0.15 Sec.																	
Torque NM	12	18	22	30	45	59	73	102	103	120	133	176	211	215	260	357	414
Torque in/lb	106	165	195	275	398	522	668	912	934	1099	1177	1611	1903	1932	2301	3268	3790

5.5 bar (80psi) X X 8.0 bar (120psi)



Stroke Time										
3.1 Sec.										
2.9 Sec.										
2.9 Sec.										
1.6 Sec.										
1.6 Sec.										
Torque NM	495	635	835	953	1003	1184	1575	1867	1869	3006
Torque in/lb	4381	5620	7645	8434	9183	10478	14419	17093	16541	22709

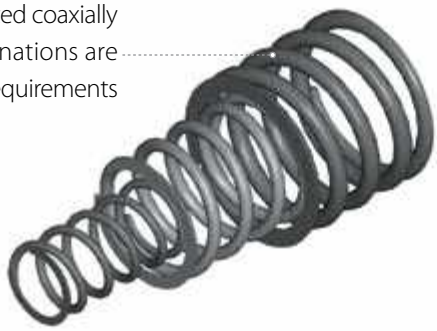
HABONIM ACTUATORS

COMPACT Actuator Features

NAMUR output drive for limit switches and positioners

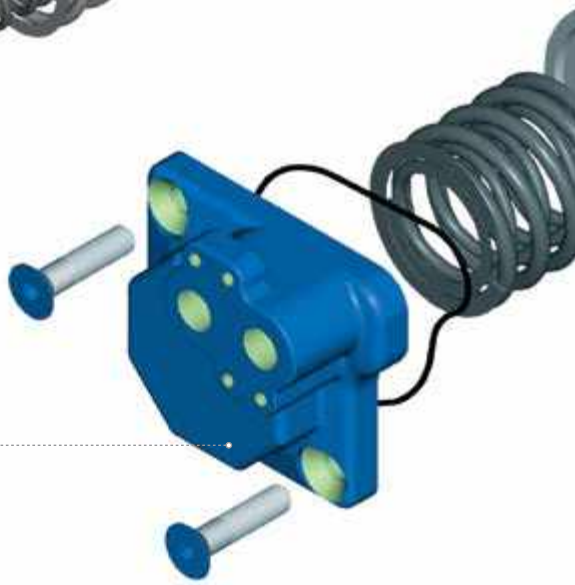
NAMUR VDI/VDE 3845 connection to limit switches

Springs painted for protection and fitted coaxially in a chamber. Various spring combinations are available to suit varying air pressure requirements



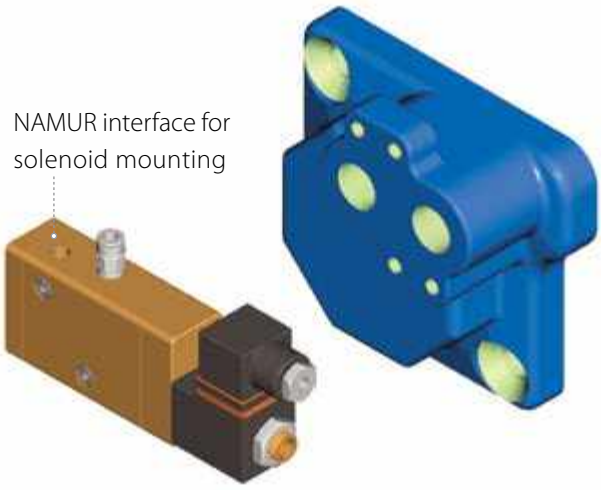
Smaller in the overall size compared to double piston actuators

Spring cartridge: The modified spring set design improves the torque characteristics of the COMPACT actuator



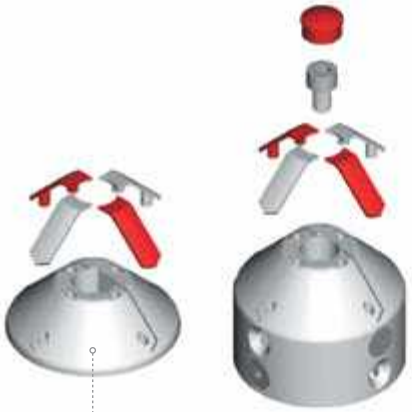
Spring return covers with extended screws for safe relief of springs

NAMUR interface for solenoid mounting



Limit stop for open-close and intermediate positions

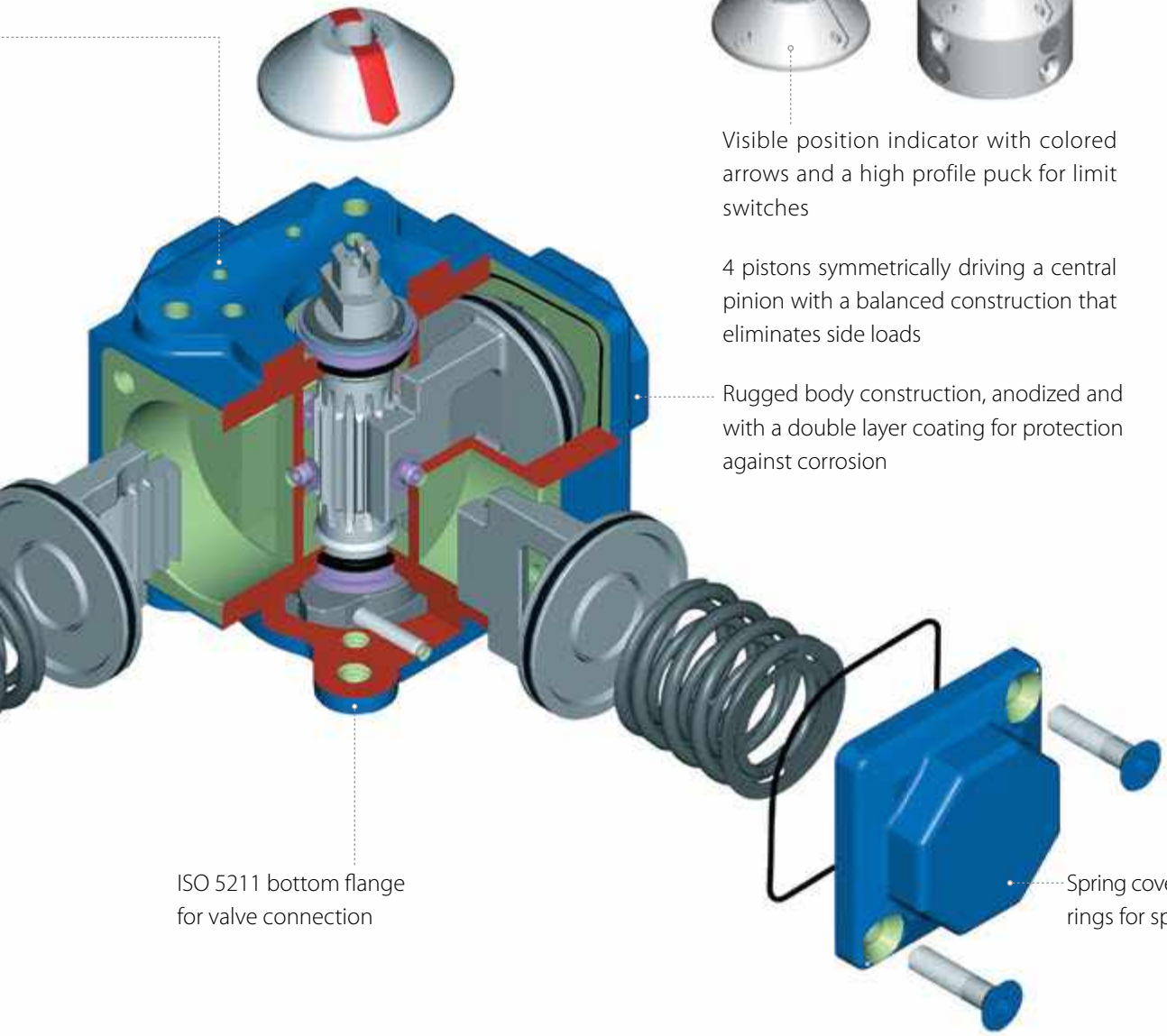
COMPACT Actuator Features



Visible position indicator with colored arrows and a high profile puck for limit switches

4 pistons symmetrically driving a central pinion with a balanced construction that eliminates side loads

Rugged body construction, anodized and with a double layer coating for protection against corrosion

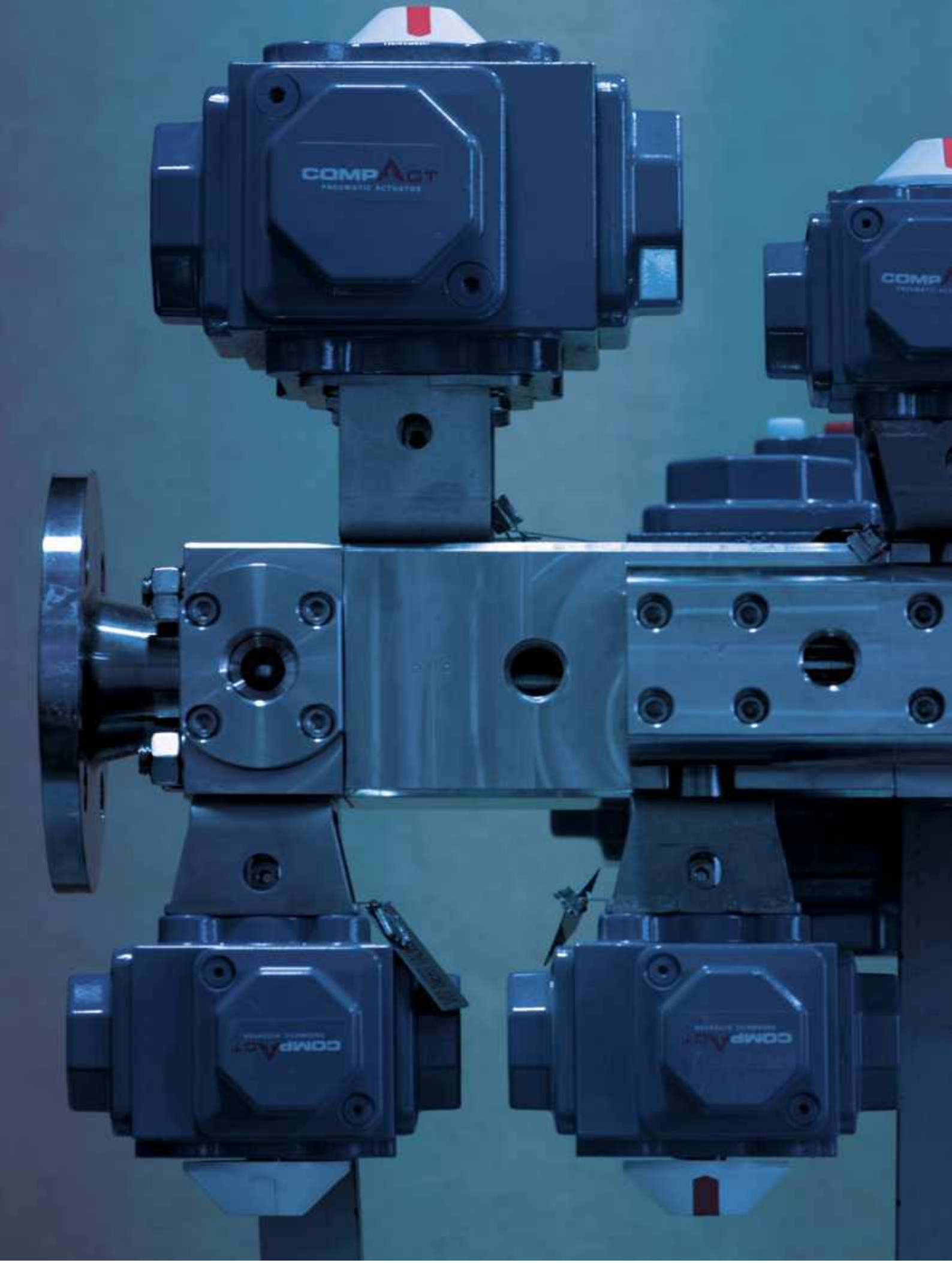


ISO 5211 bottom flange for valve connection

Spring covers with centering rings for spring alignment

Patented 4-piston actuator provides double the torque output of a double piston actuator

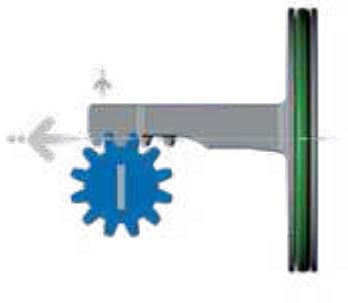
Compact size with flat covers for double acting applications and minimum air consumption


COMPACT

HABONIM ACTUATORS

COMPACT Actuator Features

Balanced forces



The cube-shaped configuration positions the pistons in a way that allows each piston to develop thrust along its own axis with zero side load. This efficient design eliminates the use of guide rods and thrust bearings. The result is less stress on the seals than off-axis piston thrust, which is caused by the piston side loading that is inherent in the geometry of traditional actuator configurations.

Less wear

The COMPACT's unique 4-piston design achieves a more uniform load distribution than standard single-or double-piston actuators, therefore greatly reducing the wear on gears at the points of contact between rack and pinion.

The force-balanced, shorter-stroke piston prevents uneven wear of O-rings, gears and pistons. This design eliminates the need for bearings and guiding rods and reduces the number of soft parts, thereby resulting in longer maintenance schedules and lower cost of repair kits.

The surface of the four cylinders is hardened by an anodizing treatment, which protects their high surface finish.

Superior corrosion resistance

The body and covers are anodized internally and externally to protect against corrosive atmospheres tested to more than 336 hours of life in a salt spray bath. An external epoxy base layer and a second layer of polyurethane paint provide additional protection against aggressive environments.

Less air consumption

Fast action is one of the most attractive features of the COMPACT 4-piston actuator. The distinctive four-piston design allows for a smaller diameter actuator pinion that significantly shortens piston travel and response time.

Fast action

Fast action is one of the most attractive features offered by the COMPACT 4-piston actuator. The unique four-piston design allows for a smaller diameter actuator pinion that significantly shortens piston travel, resulting in a shorter response time.

HABONIM ACTUATORS

COMPACT Actuator Features

Pinion

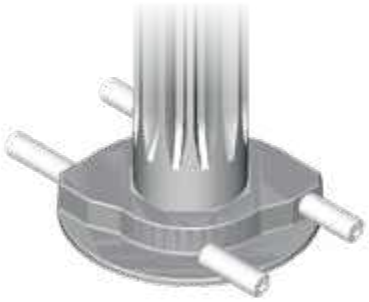
The pinion has a double-square female drive on its bottom plane that complies with ISO 5211 standard. The top plane has the NAMUR slot for attachment to switches or positioners. There is a machined flat below the NAMUR interface to enable manual operation of the actuator with a wrench.

Indicator & puck

A highly visible indicator with flow direction arrows is snapped on to the pinion, to provide easy identification of the valve position. These indicator arrows allow true positioning of any type of valve porting. The modular design makes it easy to change the indicator to match various flow pattern.

Safety features

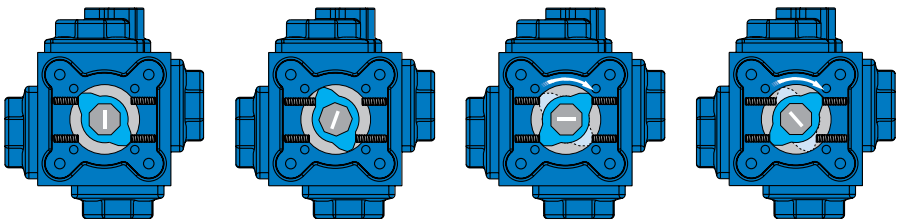
The COMPACT's built-in safety features ensure secure and safe operation. Assembly and dismantling of the actuator are simple tasks. Long cover-bolts for spring return actuators relieve the spring load before they disengage from their threads. Before the pistons can be removed, the stop screw must be released and the pinion removed thus ensuring that any trapped and potentially hazardous pressure in the body will escape.



Limit stop

The pinion and stop rotation can be adjusted by four large-diameter, diametrically-opposed adjustable set-screws that are threaded into the actuator body. Each opposing pair of screws exerts simultaneous and equal force on opposite sides of the stop when the rotation limit is reached, thus preventing the generation of off-center forces.

The stop screws allow for +/-5° rotation adjustment in both directions of travel. Larger span can be achieved with a longer set of stop screws. This feature is built into the actuator stop mechanism and eliminates the need for additional plates and screws. The stop material is stainless steel for better wear and corrosion resistance.



Close | Partially closed | Open | Partially open

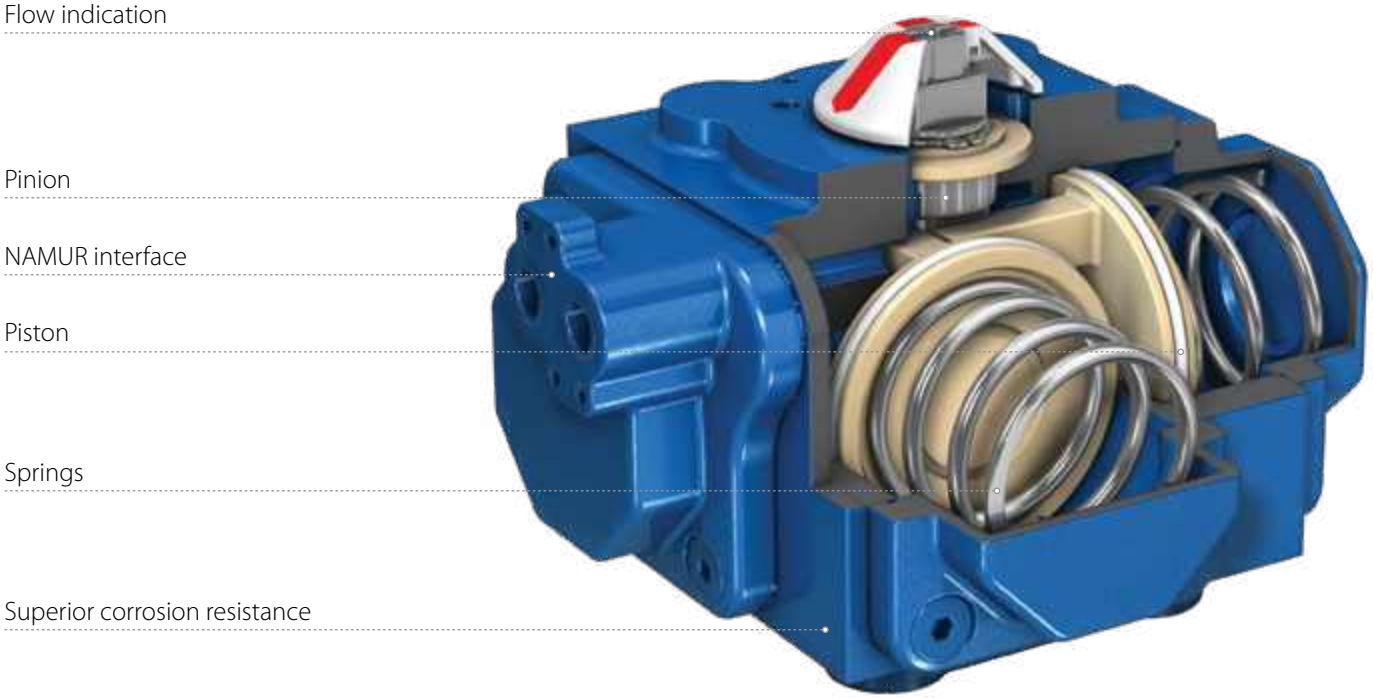
COMPACT Actuator Features

Nested springs

The COMPACT can be used with up to three different spring sizes for the spring that, in each of the four cylinders, is nested between the cover and the piston and aligned by a centering ring. Each spring is wound in the opposite direction to its neighbor to avoid entanglement. All the springs act at the piston center axis so that no side load will occur if one spring fails to operate. By virtue of the four-cylinder design, there are many more spring combination possibilities than with double piston actuators, providing superior solutions for any air supply pressure required. Special painting of the springs provides higher corrosion resistance to the environment, resulting in more than 250 hours of life in a salt spray bath.

Spring cartridge - Only available in CxxM COMPACT items

Using a modified spring set in a cartridge improves the torque characteristics of the COMPACT actuator. Modifications include deeper covers to allow sufficient volume for the spring cartridge, thereby increasing the overall dimensions of the actuator. The spring cartridge is comprised of a shaped tube in which the extended springs have been preloaded and are held safely in place by two rigid discs. Changing a spring set configuration in this design requires changing the complete cartridge.



HABONIM ACTUATORS

COMPACT Actuator Features

NAMUR & ISO interface

An extensive range of accessories such as solenoids, positioners and limit switches are available for direct mounting to the COMPACT actuator. Any accessory whose connections comply with ISO 5211 and VDI/VDE 3845 (NAMUR) mounting can be connected to the actuator.

NAMUR VDI/VDE 3845

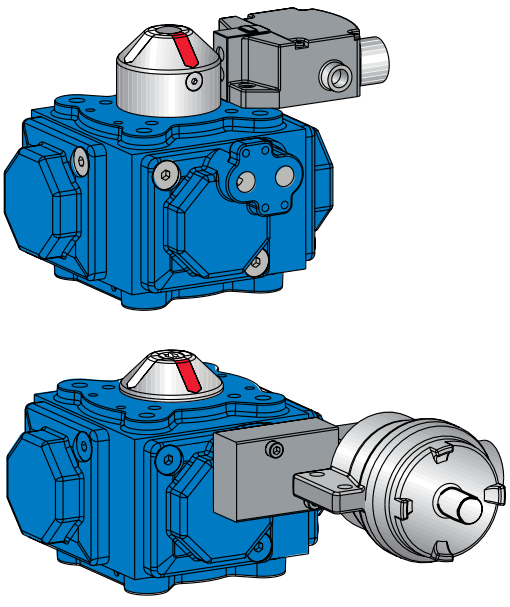
This standard provides for a range of accessories such as limit switches, pucks, indicators and positioners with a VDI/VDE interface so that they can be easily mounted onto the actuator top face.

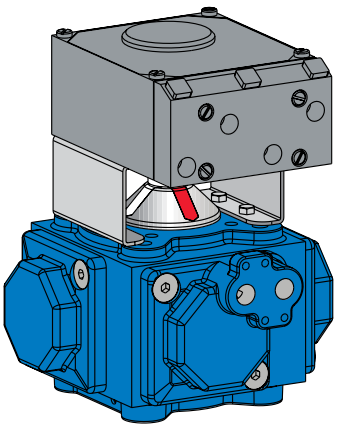
NAMUR solenoid mounting

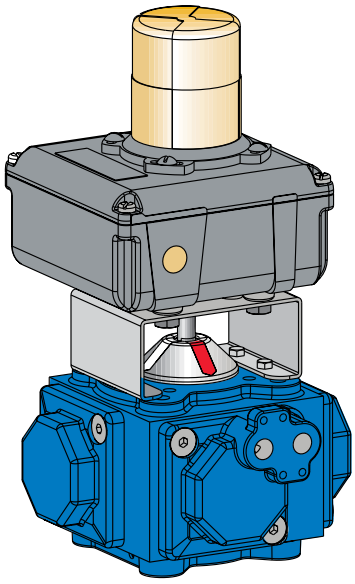
One of the four available actuator covers incorporates a pad for solenoid mounting according to the NAMUR international standard. Any solenoid that conforms to the NAMUR interface can be directly mounted to the actuators, thus simplifying the installation of solenoids and eliminating additional piping. It also allows quick actuation response as pressurized air supply is available at the port entrance.

ISO 5211

The actuator bottom flange is in accordance with the ISO 5211 international standard and incorporates a star-shaped female drive to flexibly fit a variety of valve output shafts. The valve can be attached by a bracket or mounted directly onto the actuator, using one of the various ISO hole patterns.





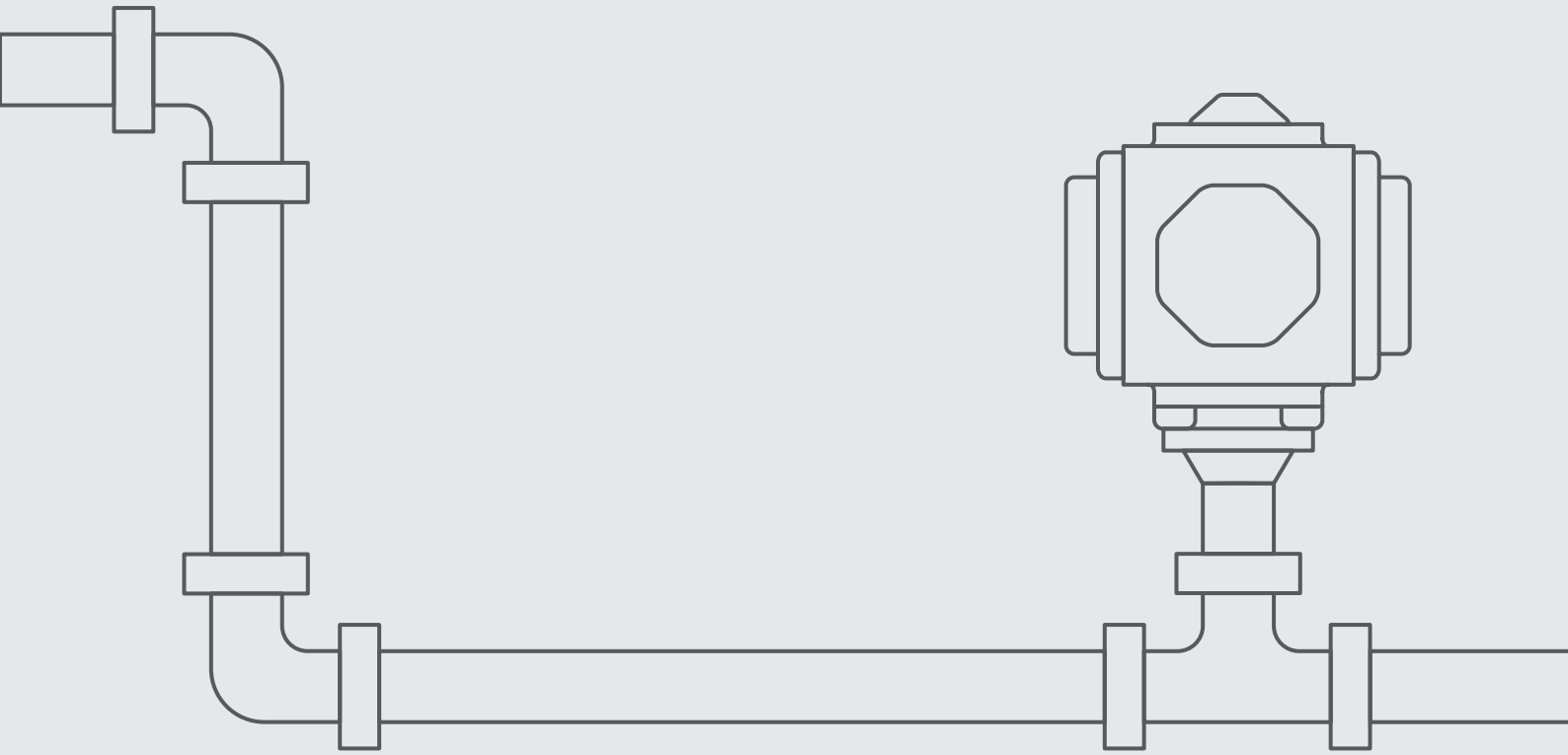


C15-C90M

Actuation

PNEUMATIC ACTUATOR

COMPACT
4 PISTONS



C15-C90M

COMPACT 4 Pistons Pneumatic Actuator

Type	Working temperature C° (F°)	Working Pressure Air, Nitrogen, CO2, Natural gas [sweet] Bar (psi)	Application	Ordering code
Standard	-20 to 80 (-4 to 176)	3.0 (44) to 8.0 (116)	General	Blank
Low Temperatures	-40 to 100 (-40 to 213)		General	LT
High Temperatures	-20 to 120 (-4 to 250)		General	HT
High Cycle	-20 to 80 (-4 to 176)		Above 1 cycle/minute	HC
Nuclear	-40 to 80 (-40 to 176)		Nuclear use	NU

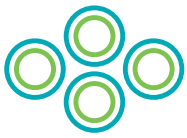
Spring combinations

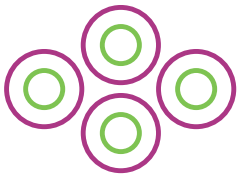
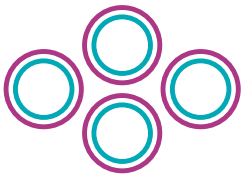
C15 only

Code	Spring combinations
1A	
1B	

Code	Spring combinations
1B2	
2	

C20 -C90M0

Code	Spring combinations
2AB	
2A	
2A2B	

Code	Spring combinations
2B	
2A3	
2C	

Code	Spring combinations
2C3	
3	

Sizing a spring return actuator requires that the torque output at the start and end of both the spring and air drive strokes is greater than the valve torque at that position.

COMPACT Actuators Configurations

The actuator can be configured for either spring return or double-action operation. In both cases the air supply to drive the pistons flows into Port A of the NAMUR cover. Port A is connected to the center chamber, and Port B is connected to the four outside chambers.

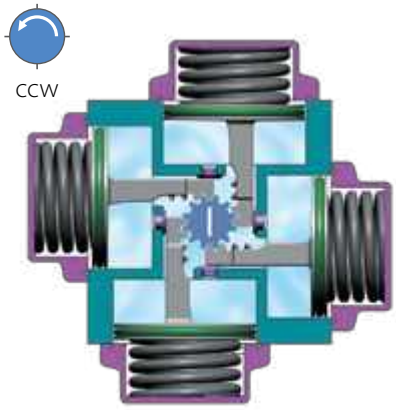
Spring return (fail-safe)

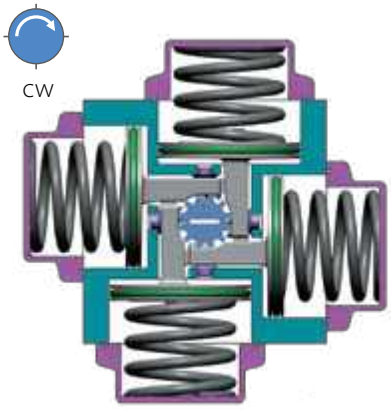
Pressure entering Port A to open:

- Center chamber is pressurized and pistons move outward
- Springs are compressed
- Pinion rotates counterclockwise

Pressure exiting Port A to close:

- Air released from center chamber
- Springs drive pistons inward
- Pinion rotates clockwise





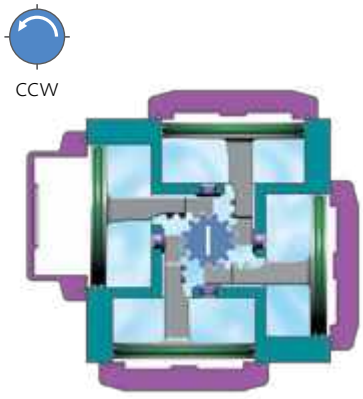
Double action (increased torque)

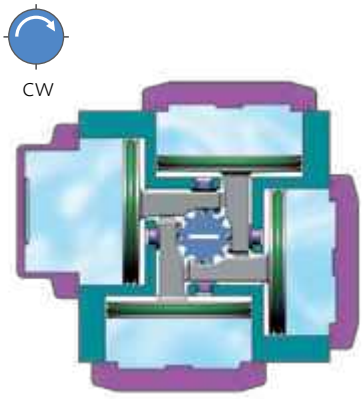
Pressure entering Port A to open:

- Center chamber is pressurized
- Pistons move outward
- Pinion rotates counterclockwise

Pressure entering Port B to close:

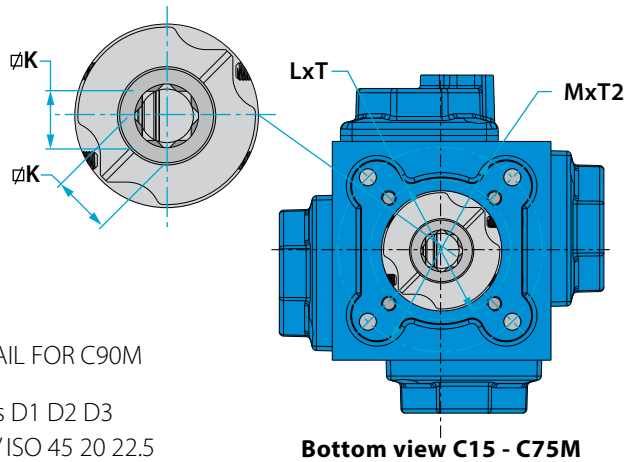
- Outside chambers are pressurized
- Pistons move inward
- Pinion rotates clockwise





C15-C90M

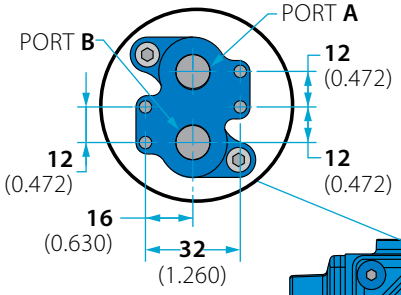
COMPACT 4 Pistons Pneumatic Actuator

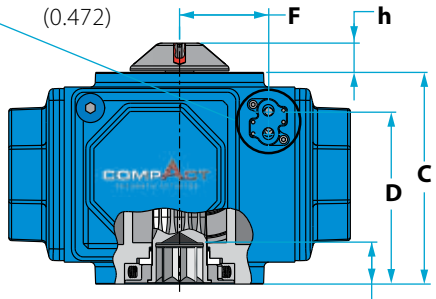


Bottom view C15 - C75M

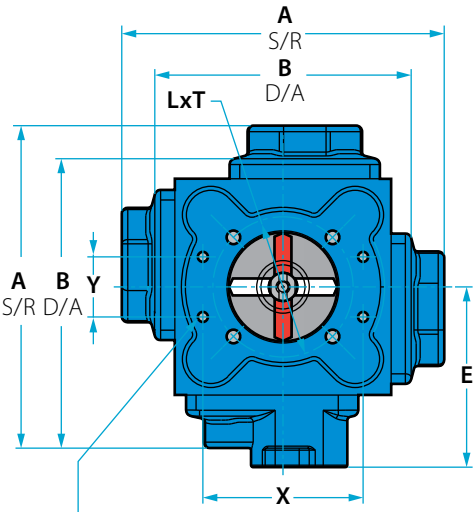
DETAIL FOR C90M

Ports D1 D2 D3
G-½" ISO 45 20 22.5
½" NPT 0.79 1.57 0.886



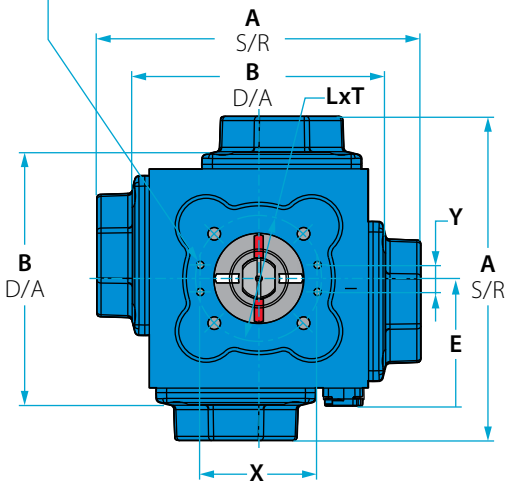


Side view C60 - C75M

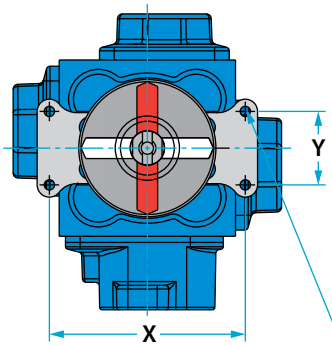


Top view C15 - C45M

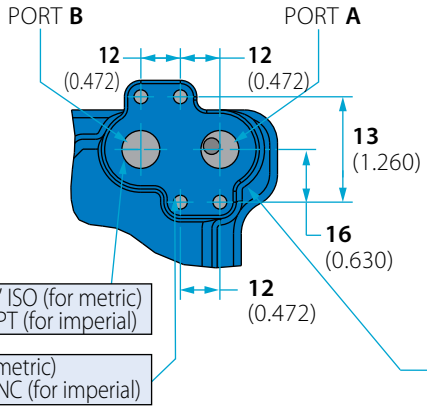
M5 (for metric)
10/24 UNC
(for imperial)

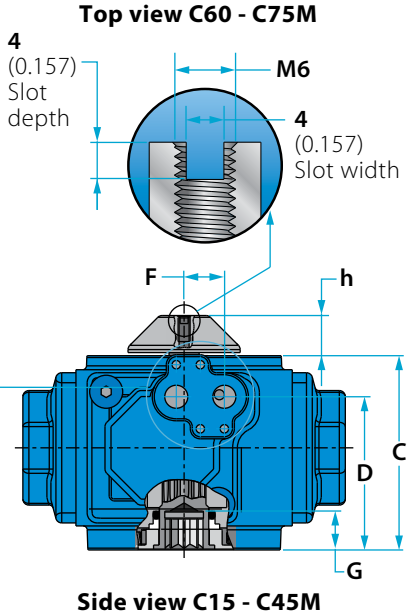


Top view C60 - C75M



Top view C15 only
VDI/VDE brackets on request





Side view C15 - C45M

VDI / VDE 3845	
Sizes	**X x Y x h**
C15 - C45M	80 x 30 x 20
C60 - C90M	130 x 30 x 30

Port **A** is connected to the center chamber
Port **B** is connected to the outside chambers

C15-C90M

Actuator Dimensions

Size	A S/R		B D/A		B1 D/A		C		D		E		F		G		⌀k		L PCD		T Thread		M PCD (2)		T2	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
C15	110	4.31	86	3.39	97.8	3.85	68.8	2.71	50.8	2.00	66.0	2.60	16.0	0.63	13.5	0.53	9	0.35	50 (F05)	1.97 (F05)	M6x8	1/4"X0.314	-	-	-	-
C20	131	5.17	102	4.03	117.0	4.6	80.5	3.17	61.5	2.42	77.2	3.04	16.5	0.65	15.0	0.59	11	0.43	50 (F05)	1.97 (F05)	M6x8	1/4"X0.314	70 (F07)	2.76 (F07)	M8x11	5/16"X0.43
C25	161	6.34	132	5.24	147.0	5.79	97.0	3.82	76.5	3.01	90.0	3.54	20.0	0.79	19.5	0.77	14	0.55	70 (F07)	2.76 (F07)	M8x9	5/16"X0.354	102 (F10)	4.02 (F10)	M10X11	3/8"X0.43
C30	186	7.33	151	5.94	169.0	6.64	116.0	4.58	93.4	3.68	105.0	4.15	22.3	0.88	22.0	0.87	17	0.67	70 (F07)	2.76 (F07)	M8x11	5/16"X0.43	102 (F10)	4.02 (F10)	M10X12	3/8"X0.47
C30M	216	8.50	-	-	-	-	116.0	4.58	93.4	3.68	120.0	4.72	22.3	0.88	22.0	0.87	17	0.67	70 (F07)	2.76 (F07)	M8x11	5/16"X0.43	102 (F10)	4.02 (F10)	M10X12	3/8"X0.47
C35	222	8.74	182	7.15	202.0	7.94	135.0	5.31	102.0	4.02	114.0	4.48	22.5	0.89	26.0	1.02	22	0.87	102 (F10)	4.02 (F10)	M10x13	3/8"X0.51	-	-	-	-
C35M	256	10.07	-	-	-	-	135.0	5.31	102.0	4.02	131.0	5.15	22.5	0.89	26.0	1.02	22	0.87	102 (F10)	4.02 (F10)	M10x13	3/8"X0.51	-	-	-	-
C45	269	10.59	221	8.70	245.0	9.65	164.0	6.46	127.0	5.00	147.0	5.79	31.0	1.22	33.0	1.30	27	1.06	125 (F12)	4.92 (F12)	M12x15	1/2"X0.59	102* (F10)	4.02* (F10)	M10X15	3/8"X0.59
C45M	303	11.93	-	-	-	-	164.0	6.46	127.0	5.00	164.0	6.45	31.0	1.22	33.0	1.30	27	1.06	125 (F12)	4.92 (F12)	M12x15	1/2"X0.59	102* (F10)	4.02* (F10)	M10X15	3/8"X0.59
C60	360	14.17	285	11.22	-	-	218.0	8.58	180.0	7.09	141.0	5.57	94.0	3.70	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5/8"X0.71	-	-	-	-
C60M	390	15.35	-	-	-	-	218.0	8.58	180.0	7.09	141.0	5.57	94.0	3.70	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5/8"X0.71	-	-	-	-
C75	437	17.20	342	13.46	-	-	270.0	10.63	223.0	8.76	166.0	6.54	110.0	4.33	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5/8"X0.71	-	-	-	-
C75M	467	18.38	-	-	-	-	270.0	10.63	223.0	8.76	166.0	6.54	110.0	4.33	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5/8"X0.71	-	-	-	-
C90M	570	22.42	369	14.52	-	-	317.0	12.48	264.0	10.37	196.0	7.71	128.0	5.04	52.0	2.05	46	1.81	165 (F16)	6.5 (F16)	M20x30	3/4"X1.18	-	-	-	-

* The C45 bottom PCD can be either F12 or F10, but not both. The standard is F12. When ordering C45 with F10, you must add it to the code.

Technical Data

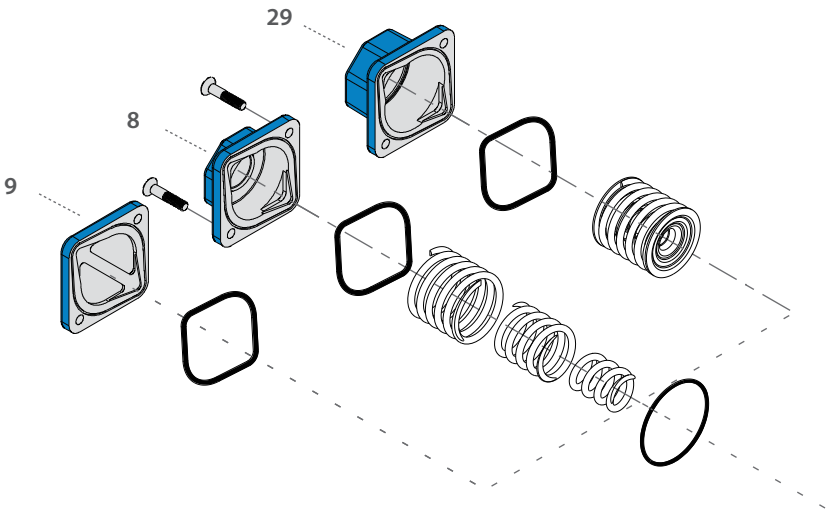
Actuator size		Unit	C15	C20	C25	C30	C30M	C35	C35M	C45	C45M	C60	C60M	C75	C75M	C90M
Weight Spring return		kg	1.10	1.90	3.50	5.00	6.10	9.00	10.40	15.00	16.70	35.00	39.40	64.00	72.00	160.00
		lb	2.40	4.20	7.70	11.00	13.40	19.80	22.00	33.10	37.40	77.20	86.00	141.10	158.00	353.00
Weight Double acting		kg	0.90	1.50	2.60	4.40	-	7.10	-	11.00	-	26.00	-	51.00	-	92.00
		lb	1.98	3.30	5.72	9.70	-	15.70	-	24.30	-	57.30	-	112.40	-	203.00
Air consumption per stroke actual volume	CCW	liter	0.07	0.12	0.25	0.44	0.44	0.74	0.74	1.33	1.33	3.20	3.2	5.76	5.76	12.00
	CW		0.09	0.15	0.33	0.54	-	0.80	-	1.33	-	3.20	-	5.76	-	-
	Total		0.16	0.27	0.58	0.98	-	1.54	-	2.66	-	6.40	-	11.52	-	-
Air consumption per stroke actual volume	CCW	in^3	4.30	7.30	15.00	27.00	27.00	45.00	45.00	81.00	81.00	195.00	195	351.00	351.00	726.00
	CW		5.50	9.20	20.00	33.00	-	49.00	-	81.00	-	195.00	-	351.00	-	-
	Total		9.80	16.50	35.00	60.00	-	94.00	-	162.00	-	391.00	-	703.00	-	-
Stroke time with S.V. with 0.9 Cv at 80 psi	D/A	sec.	0.10	0.13	0.20	0.24	-	0.40	-	0.75	-	1.50	-	2.50	-	3.00
	S/R Open		0.10	0.15	0.23	0.29	0.30	0.54	0.60	1.00	1.10	2.20	2.4	3.70	4.00	4.80
	S/R Close		0.15	0.15	0.23	0.28	0.28	0.48	0.50	0.77	0.80	1.60	1.6	2.90	2.90	3.10

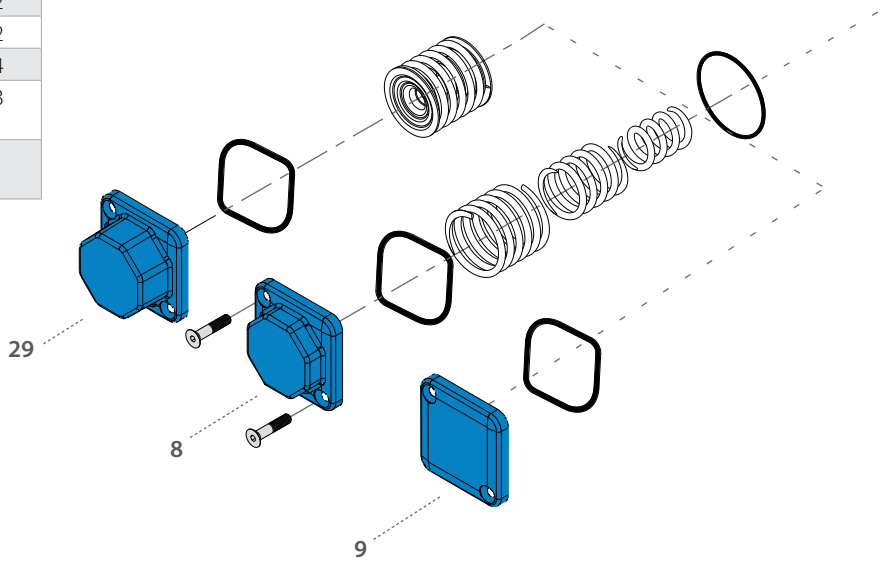
C15-C90M

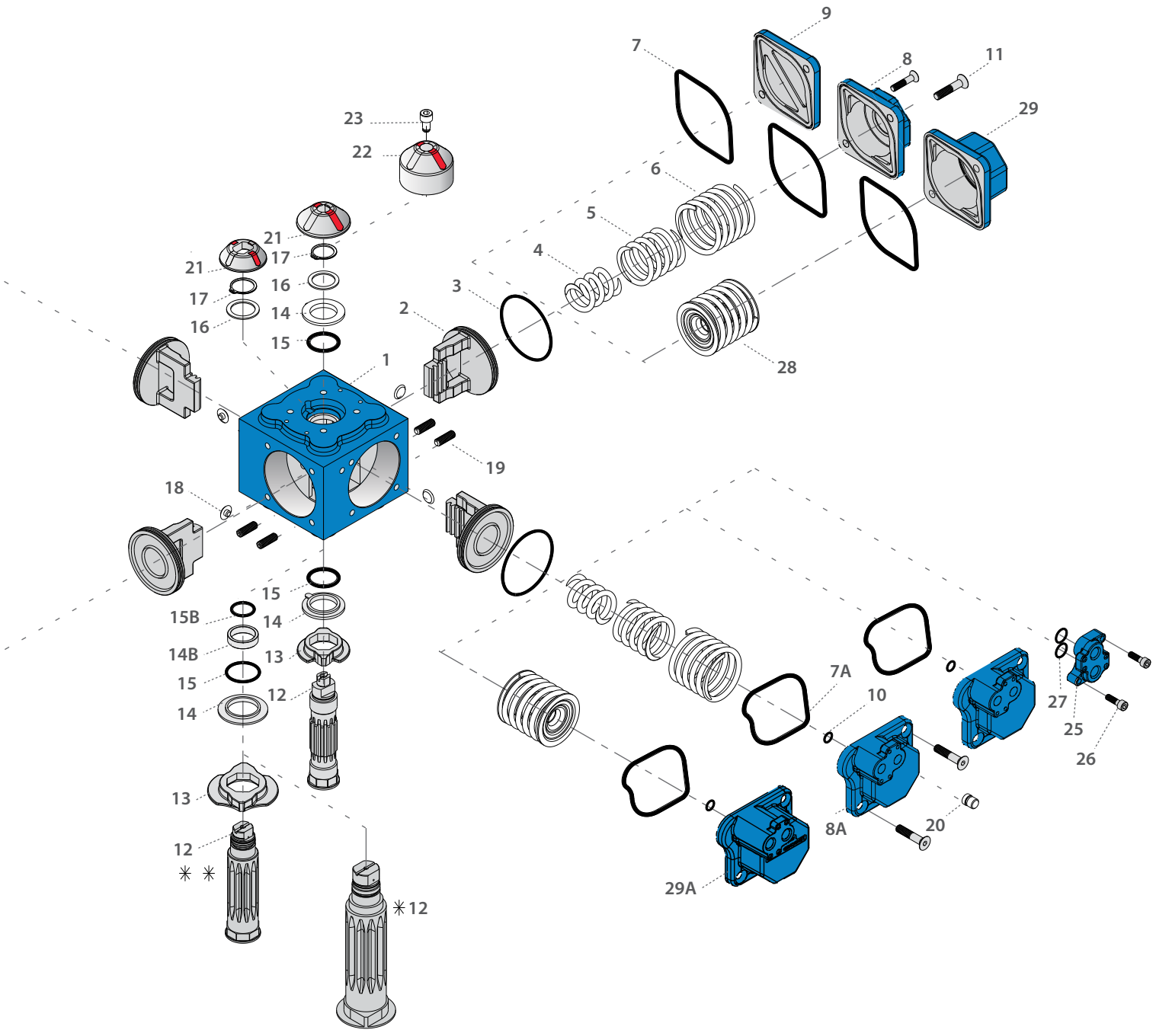
COMPACT 4 Pistons Pneumatic Actuator

Item	Description	Material specifications	Qty.
1	Body	Acc. Ordering Code	1
2	Piston	Acc. Ordering Code	4
3	Piston O-ring	Acc. Ordering Code	4
4	Inner spring	Spring steel, painted	4
5	Middle spring	Spring steel, painted	4
6	Outer spring	Spring steel, painted	4
7	Cover O-ring	Acc. Ordering Code	3
7a	NAMUR cover O-ring	Acc. Ordering Code	1
8	Spring return cover	Acc. Ordering Code	3
8a	NAMUR cover	Acc. Ordering Code	1
9	Double acting cover	Acc. Ordering Code	3
10	Air supply O-ring	Acc. Ordering Code	1
11	Cover screw	Stainless Steel	16
12	Pinion	Acc. Ordering Code	1
13	Stop plate	Stainless Steel	1
14	Thrust washer	Acc. Ordering Code	2
14B	Bearing	Acc. Ordering Code	1
15	Pinion O-ring	Acc. Ordering Code	2
15B	Top pinion O-ring	Acc. Ordering Code	1
16	Disc bearing	Stainless Steel / Delrin	1
17	Circlip	Stainless Steel, spring steel zinc plated	1
18	Pad	Acc. Ordering Code	4
19	Stroke adjustment screw	Stainless Steel	4
20	Exhaust plug (silencer)	Delrin, brass	1
21	Indicator	Plastic ABS, red & white	1
22	Puck	Plastic ABS, red & white	1
23	Indicator screw	Stainless Steel	1
24	Tag (not shown)	Stainless Steel	4
25	NAMUR insert	AL 380	1
26	Insert screw	Stainless Steel	2
27	NAMUR insert O-ring	Acc. Ordering Code	2
28	Spring cassette	Spring steel, painted	4
29	Spring return cover for M series	Acc. Ordering Code	3
29A	NAMUR cover for M series	AL 380	1

* C75 & C90M Pinion (12) and stop (13) are one piece
** pinion assembly for actuators C35 and above



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C15-C90M

COMPACT 4 Pistons Pneumatic Actuator

Torque Chart (Nm)

Spring return single acting

Size	Spring set	Air pressure - bar (psi)														Spring torque	
		3.0 (44)		4 (58)		5 (73)		5.5 (80)		6 (87)		7 (102)		8 (116)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C15	1A	**7**	**4**	10	7	13	11	15	12	17	14	20	17	24	21	6	3
	1B			**8**	**4**	**12**	**8**	13	10	15	11	18	14	22	18	9	5
	1B2					10	5	**12**	**7**	**13**	**9**	16	11	20	15	12	7
	2									11	6	**14**	**8.5**	**18**	**12**	15	9
C20	2A			**16**	**10**	22	16	26	19	29	22	35	29	41	35	15	9
	2A2B			14	7	**20**	**13**	24	16	27	19	33	26	39	32	18	11
	2B					18	10	**22**	**13**	**25**	**17**	31	23	38	29	21	13
	2C							19	10	22	13	**28**	**19**	35	25	25	16
	3									19	9	24	15	**30**	**21**	29	19
C25	2A	**23**	**11**	36	23	49	36	55	42	62	49	75	62	88	74	28	16
	2A2B			**33**	**19**	46	32	53	39	60	45	73	58	86	70	32	18
	2B					**43**	**27**	50	34	57	41	70	53	83	66	36	21
	2C					38	18	**45**	**24**	**52**	**31**	64	44	77	56	47	27
	3									47	21	**60**	**34**	**73**	**46**	57	31
C30	2A	**36**	**19**	57	40	80	62	91	73	102	84	125	107	148	129	42	26
	2A2B			**52**	**30**	75	52	86	63	98	74	120	96	143	118	53	31
	2B			48	18	**70**	**43**	81	54	93	65	115	87	138	109	62	36
	2C					64	25	**73**	**39**	**85**	**50**	107	72	130	94	78	44
	3									75	33	**98**	**55**	**120**	**77**	96	54
C30M	2A	**27**	**19**	48	40	70	62	81	73	92	84	113	106	135	128	42	34
	2A2B	21	12	**42**	**33**	64	55	75	67	85	77	107	99	129	121	49	40
	2B			36	26	**57**	**48**	69	60	79	70	101	92	123	114	56	46
	2C					48	36	**59**	**47**	**69**	**58**	91	80	113	102	69	57
	3									58	44	**80**	**66**	**102**	**88**	83	68
C35	2A	**75**	**39**	111	74	150	112	168	129	186	147	224	184	262	221	74	38
	2A2B	64	26	**100**	**62**	139	99	157	117	175	134	213	171	251	208	87	49
	2B			92	44	**130**	**82**	148	99	166	117	204	154	242	191	105	58
	2C							**133**	**68**	**151**	**86**	189	123	227	160	137	73
	3									135	63	**173**	**100**	**211**	**137**	161	89
C35M	2A	**54**	**42**	89	77	126	114	143	131	160	148	197	185	234	223	70	57
	2A2B	43	28	**78**	**63**	115	110	132	117	149	134	186	171	223	209	85	69
	2B			67	49	**104**	**86**	121	103	139	120	176	157	213	195	99	80
	2C					86	65	**103**	**82**	**120**	**99**	157	136	194	173	122	100
	3									102	76	**139**	**114**	**176**	**151**	146	119
C45	2A	**134**	**60**	208	132	280	203	317	239	353	275	426	346	499	417	159	86
	2A2B			**197**	**113**	269	184	306	219	342	255	415	326	488	397	179	97
	2B			179	82	**252**	**153**	288	188	325	224	398	295	471	366	212	115
	2C					223	102	**260**	**137**	**296**	**173**	369	244	442	315	265	144
	3									268	122	**341**	**193**	**414**	**264**	318	173
C45M	2A	**90**	**60**	162	131	232	201	267	236	302	271	373	342	443	412	134	107
	2A2B	110	83	**181**	**154**	251	225	286	260	321	295	392	365	462	436	160	127
	2B			142	107	**213**	**177**	248	213	283	248	353	318	424	388	184	147
	2C					180	136	**215**	**171**	**250**	**206**	321	277	391	347	228	182
	3									216	163	**286**	**234**	**357**	**304**	273	218

COMPACT 4 Pistons Pneumatic Actuator

Torque Chart (Nm)

Spring return single acting

Size	Spring set	Air pressure - bar (psi)														Spring torque	
		3.0 (44)		4 (58)		5 (73)		5.5 (80)		6 (87)		7 (102)		8 (116)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C60	2A	**328**	**160**	501	329	675	498	762	583	848	667	1021	835	1194	1004	360	194
	2A2B			**478**	**285**	651	454	738	538	824	623	997	791	1170	960	406	218
	2B			442	221	**615**	**390**	702	475	789	559	961	727	1134	896	473	254
	2C					548	268	**635**	**352**	**721**	**437**	894	605	1067	774	600	323
	3									657	322	**830**	**490**	**1003**	**659**	720	388
C60M	2A	**212**	**148**	379	315	546	483	630	566	714	650	880	816	1047	983	371	304
	2A2B	259	203	**426**	**370**	593	537	677	621	760	704	927	871	1094	1038	314	255
	2B			333	261	**500**	**428**	583	512	667	595	833	762	1000	929	429	353
	2C					411	321	**495**	**404**	**578**	**488**	744	654	912	821	542	447
	3									502	393	**668**	**559**	**835**	**726**	642	527
C75	2A	**614**	**345**	935	657	1255	969	1414	1124	1574	1280	1894	1592	2212	1902	615	350
	2A2B			**891**	**582**	1211	894	1370	1049	1530	1205	1850	1517	2168	1827	693	395
	2B			820	461	**1140**	**773**	1299	928	1459	1084	1779	1396	2097	1706	819	467
	2C					1025	576	**1184**	**632**	**1344**	**887**	1664	1199	1982	1509	1024	584
	3									1229	691	**1549**	**1003**	**1867**	**1313**	1229	700
C75M	2A	**480**	**360**	789	668	1098	977	1252	1131	1406	1285	1714	1594	2021	1900	596	468
	2A2B	406	269	**715**	**578**	1024	887	1177	1041	1331	1195	1640	1503	1947	1810	691	547
	2B			641	488	**949**	**797**	1103	951	1257	1104	1566	1413	1873	1720	786	624
	2C					799	606	**953**	**760**	**1107**	**913**	1415	1222	1722	1529	986	7 83
	3									959	726	**1268**	**1035**	**1575**	**1342**	1184	938
C90M	2A2B	734	467	**1328**	**1061**	1922	1655	2219	1952	2516	2249	3111	2844	3705	3438	1315	1048
	2B			1155	846	**1749**	**1440**	2046	1737	2343	2034	2938	2629	3532	3223	1530	1221
	2C					1571	1224	**1868**	**1521**	**2165**	**1818**	2760	2413	3354	3007	1746	1399
	3									1817	1376	**2411**	**1971**	**3005**	**2565**	2188	1748

Double acting

Size	Operating pressure (bar)						
	3.0	4.0	5.0	5.5	6.0	7.0	8.0
C15	10	14	17	19	21	24	27
C20	18	25	32	35	38	45	51
C25	39	52	65	72	79	92	105
C30	62	84	107	119	130	153	176
C35	114	151	190	208	226	265	304
C45	222	297	371	408	445	519	593
C60	527	703	879	967	1,055	1,230	1,406
C75	974	1,299	1,624	1,786	1,948	2,273	2,596
C90	1,783	2,377	2,971	3,268	3,565	4,160	4,754

C15-C90M

COMPACT 4 Pistons Pneumatic Actuator

Torque Chart (in-lb)

Spring return single acting

Size	Spring set	Air pressure - psi (bar)														Spring torque	
		40 (2.8)		60 (4.1)		70 (4.8)		80 (5.5)		90 (6.2)		100 (6.9)		120 (8.3)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C15	1A	**56**	**32**	92	64	110	93	133	106	156	128	174	148	220	192	53	27
	1B			**73**	**37**	**102**	**68**	115	89	137	101	156	121	201	165	80	44
	1B2					85	42	**106**	**62**	**119**	**82**	139	95	183	137	106	62
	2									101	55	**121**	**74**	**165**	**110**	133	80
C20	2A			**146**	**92**	187	136	230	168	266	201	304	252	375	320	133	80
	2A2B			128	64	**170**	**110**	212	142	247	174	286	226	357	293	159	97
	2B					153	85	**195**	**115**	**229**	**156**	269	200	348	266	186	115
	2C							168	89	201	119	**243**	**165**	320	229	221	142
	3									174	82	208	130	**275**	**192**	257	168
C25	2A	**185**	**89**	330	211	416	306	487	372	568	449	651	538	806	677	248	142
	2A2B			**302**	**174**	390	272	469	345	549	412	633	503	787	641	283	159
	2B					**365**	**229**	443	301	522	375	607	460	760	604	319	186
	2C					322	153	**398**	**212**	**476**	**284**	555	382	705	513	416	239
	3									430	192	**521**	**295**	**668**	**421**	504	274
C30	2A	**290**	**153**	522	366	679	526	805	646	934	769	1085	928	1355	1181	372	230
	2A2B			**476**	**275**	636	441	761	558	897	677	1041	833	1309	1080	469	274
	2B			439	165	**594**	**365**	717	478	851	595	998	755	1263	998	549	319
	2C					543	212	**646**	**345**	**778**	**458**	928	625	1190	861	690	389
	3									687	302	**850**	**477**	**1099**	**705**	850	478
C30M	2A	**217**	**153**	439	366	594	526	717	646	842	769	980	920	1236	1172	372	301
	2A2B	169	97	**385**	**302**	543	467	664	593	778	705	928	859	1181	1108	434	354
	2B			330	238	**484**	**407**	611	531	723	641	876	798	1126	1044	496	407
	2C					407	306	**522**	**416**	**632**	**531**	790	694	1035	934	611	504
	3									531	403	**694**	**573**	**934**	**806**	735	602
C35	2A	**603**	**314**	1016	677	1273	950	1487	1142	1703	1346	1944	1596	2399	2023	655	336
	2A2B	515	209	**916**	**568**	1180	840	1389	1035	1602	1227	1848	1484	2298	1904	770	434
	2B			842	403	**1103**	**696**	1310	876	1520	1071	1770	1336	2216	1749	929	513
	2C							**1177**	**602**	**1382**	**787**	1640	1067	2078	1465	1212	646
	3									1236	577	**1501**	**868**	**1932**	**1254**	1425	788
C35M	2A	**434**	**338**	815	705	1069	967	1266	1159	1465	1355	1709	1605	2142	2042	620	504
	2A2B	346	225	**714**	**577**	976	933	1168	1035	1364	1227	1614	1484	2042	1913	752	611
	2B			613	449	**883**	**730**	1071	912	1273	1099	1527	1362	1950	1785	876	708
	2C					730	552	**912**	**726**	**1099**	**906**	1362	1180	1776	1584	1080	885
	3									934	696	**1206**	**989**	**1611**	**1382**	1292	1053
C45	2A	**1078**	**483**	1904	1208	2376	1723	2805	2115	3232	2518	3696	3002	4568	3818	1407	761
	2A2B			**1804**	**1035**	2283	1561	2708	1938	3131	2335	3601	2829	4468	3635	1584	858
	2B			1639	751	**2139**	**1298**	2549	1664	2975	2051	3453	2560	4312	3351	1876	1018
	2C					1892	866	**2301**	**1212**	**2710**	**1584**	3202	2117	4047	2884	2345	1274
	3									2454	1117	**2959**	**1675**	**3790**	**2417**	2814	1531
C45M	2A	**724**	**483**	1483	1199	1969	1706	2363	2089	2765	2481	3236	2967	4056	3772	1186	947
	2A2B	885	668	**1657**	**1410**	2130	1909	2531	2301	2939	2701	3401	3167	4230	3992	1416	1124
	2B			1300	980	**1808**	**1502**	2195	1885	2591	2270	3063	2759	3882	3552	1628	1301
	2C					1528	1154	**1903**	**1513**	**2289**	**1886**	2785	2403	3580	3177	2018	1611
	3									1978	1492	**2481**	**2030**	**3268**	**2783**	2416	1929

COMPACT 4 Pistons Pneumatic Actuator

Torque Chart (in-lb)

Spring return single acting

Size	Spring set	Air pressure - psi (bar)														Spring torque	
		40 (2.8)		60 (4.1)		70 (4.8)		80 (5.5)		90 (6.2)		100 (6.9)		120 (8.3)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C60	2A	**2639**	**1287**	4587	3012	5728	4226	6744	5160	7764	6107	8859	7245	10931	9192	3186	1717
	2A2B			**4376**	**2609**	5525	3853	6531	4761	7544	5704	8650	6863	10712	8789	3593	1929
	2B			4047	2023	**5219**	**3310**	6213	4204	7223	5118	8338	6308	10382	8203	4186	2248
	2C					4650	2274	**5620**	**3115**	**6601**	**4001**	7757	5249	9769	7086	5310	2859
	3									6015	2948	**7201**	**4251**	**9183**	**6033**	6372	3434
C60M	2A	**1706**	**1191**	3470	2884	4634	4099	5576	5009	6537	5951	7635	7080	9585	9000	3283	2690
	2A2B	2084	1633	**3900**	**3387**	5032	4557	5991	5496	6958	6445	8043	7557	10016	9503	2779	2257
	2B			3049	2390	**4243**	**3632**	5160	4531	6107	5447	7228	6611	9155	8505	3797	3124
	2C					3488	2724	**4381**	**3575**	**5292**	**4468**	6455	5674	8350	7516	4797	3956
	3									4596	3598	**5796**	**4850**	**7645**	**6647**	5682	4664
C75	2A	**4940**	**2776**	8560	6015	10650	8223	12514	9947	14410	11719	16433	13813	20251	17413	5443	3098
	2A2B			**8157**	**5328**	10277	7587	12125	9284	14007	11032	16051	13162	19848	16727	6133	3496
	2B			7507	4221	**9674**	**6560**	11496	8213	13357	9924	15435	12112	19198	15619	7248	4133
	2C					8698	4888	**10478**	**5593**	**12305**	**8121**	14438	10403	18146	13815	9062	5168
	3									11252	6326	**13440**	**8703**	**17093**	**12021**	10877	6195
C75M	2A	**3862**	**2896**	7223	6116	9318	8291	11080	10009	12872	11764	14871	13830	18503	17395	5275	4142
	2A2B	3266	2164	**6546**	**5292**	8690	7527	10416	9213	12186	10940	14229	13041	17825	16571	6115	4841
	2B			5868	4468	**8054**	**6764**	9762	8416	11508	10107	13587	12260	17148	15747	6956	5522
	2C					6781	5143	**8434**	**6726**	**10135**	**8359**	12277	10603	15765	13998	8726	6930
	3									8780	6647	**11002**	**8980**	**14419**	**12286**	10478	8301
C90M	2A2B	5945	3789	**11856**	**9473**	16846	14506	20088	17671	22524	20134	26832	24530	33482	31069	11639	9276
	2B			10312	7553	**15329**	**12621**	18522	15724	20975	18209	25340	22675	31919	29126	13542	10807
	2C					13769	10728	**16910**	**13769**	**19382**	**16275**	23805	20812	30310	27174	15453	12382
	3									16257	12318	**20795**	**17000**	**27156**	**23180**	19365	15471

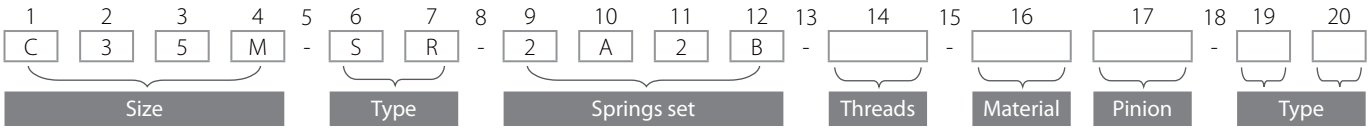
Double acting

Size	Operating pressure (psi)						
	40	60	70	80	90	100	120
C15	81	125	149	172	188	207	244
C20	146	229	271	311	351	390	468
C25	317	476	555	639	723	802	961
C30	505	769	914	1,052	1,190	1,334	1,611
C35	928	1,382	1,624	1,848	2,073	2,311	2,780
C45	1,807	2,719	3,170	3,622	4,074	4,525	5,429
C60	4,289	6,436	7,511	8,585	9,659	10,725	12,872
C75	7,926	11,893	13,877	15,856	17,834	19,819	23,767
C90	14,442	21,222	26,040	29,584	31,915	35,880	42,962

C15-C90M

COMPACT 4 Pistons Pneumatic Actuator - Ordering Code System

"Standard offer" options are marked with light green background



Size (1-4)	
C15	Actuator sizes
C20	
C25	
C30	
C30M	
C35	
C35M	
C45	
C45M	
C60	
C60M	
C75	
C75M	
C90M	

Type (6-7)	
SR	Spring return
DA	Double acting

Springs set (9-12)	
1A	See spring set combinations in page 434
1B	
1B2	
2	
2AB	
2A	
2A2B	
2B	
2A3	
2C	
2C3	
3	

Threads (14)	
Blank	Metric
I	Imperial

Material / Coating (16)	
Blank	Aluminum
N	Electroless nickel plating
6	S.ST *

* For selected sizes only - consult factory

Pinion (17)	
Blank	C.st
6	S.ST

Type (19-20)	
Blank	Standard
LT	Low temp
HT	High Temp
HC	High cycle
NU	Nuclear

EMERGENCY SHUT-DOWN SYSTEM (ESD)

Short response time

A short response time is essential for valves operating in Emergency Shut Down (ESD) systems such as in refineries, power stations, mining and other applications where safety regulations call for such.

The values in the table below indicate the closing time (seconds) of an unloaded actuator and a loaded actuator with torque values simulating real-life situations. The stroke time measures the actual movement of the actuator without a solenoid or any other accessory delay.

COMPACT actuator stroking time (sec.)

¼" NAMUR solenoid valve

Compact actuator closing time (sec.)					
Compact Actuator for Emergency Shut-Down (ESD) Systems		Normal		Improved	Fast
		¼" Namur solenoid valve Cv = 0.9		¼" Namur solenoid valve Cv = 0.9, & Breather Block	¼" Non-Namur Solenoid valve Cv = 1, & ¼" quick exhaust
Size	Load	3/2	5/2	3/2	3/2
C20-2C	0	0.09	0.08	0.05	0.05
	10 Nm / 89 lbf-in	0.14	0.09	0.07	0.07
C25-2C	0	0.17	0.12	0.07	0.06
	22 Nm / 195 lbf-in	0.35	0.15	0.17	0.15
C30-2C	0	0.26	0.20	0.12	0.10
	36 Nm / 319 lbf-in	0.49	0.23	0.25	0.20
C35-2C	0	0.39	0.29	0.26	0.17
	60 Nm / 531 lbf-in	0.58	0.35	0.41	0.27
C45-2C	0	0.71	0.52	0.43	0.30
	116 Nm / 1027 lbf-in	1.23	0.64	0.76	0.57
C60-2C	0	1.79	1.30	1.21	0.73
	260 Nm / 2300 lbf-in	2.36	1.38	1.73	1.13
C75-2C	0	2.78	2.00	1.86	1.08
	460 Nm / 4071 lbf-in	3.90	2.42	2.91	1.75

Compact actuator closing time (sec.)				
Compact Actuator for Emergency Shut-Down (ESD) Systems		Normal		Fast
		½" Namur solenoid valve Cv = 3.5		½" Non-Namur Solenoid valve Cv = 3.5, & ½" quick exhaust
Size	Load	3/2	5/2	3/2
C60-2C	0	0.71	0.49	0.53
	260 Nm / 2300 lbf-in	1.22	0.60	0.80
C75-2C	0	1.12	-	1.04
	460 Nm / 4071 lbf-in	1.79	-	1.52
C90-2C	0	1.4	-	1.2
	770 Nm / 6815 lbf-in	2.7	-	2.4

MOUNTING KITS

Mounting kits play a major role in the proper functioning of an automated unit. A rigid bracket must connect the actuator to the valve so they become a single unit with zero movement between the three components. The coupler is an element that transfers the torque from the actuator to the valve shaft. It must fit tightly and accurately so as to minimize hysteresis and to turn the valve shaft on its center axis without side loading. The mounting kit is designed for safe installation and operation of the complete unit, having rigid construction and no sharp corners. This well-engineered product provides a wide range of movement for the spanner, allowing for easy installation and maintenance, as well as maximum worker safety. Whether pairing Habonim valves with the Habonim Compact™ actuators, customizing a mounting kit to pair the Habonim Compact™ actuator with other valve brands or mounting Habonim valves on a wide variety of other actuator brands; Habonim is a one stop shop, offering valve automation linkage hardware for a wide range of applications.

Cast brackets

Habonim's rigid cast bracket, has a unique shape and precise construction with dual ISO 5211 standard hole patterns on both the top and bottom. The cast bracket is designed for installation on all Habonim valves, and the Compact™ pneumatic actuator which conform to ISO 5211 standard. An aesthetic shape and rounded corners, allow clear visibility of the valve stem and coupler from all directions. This well-engineered product provides a wide range of movement for the spanner, allowing for easy installation and maintenance, as well as maximum worker safety. The cast bracket is made from cast grade CF8 (AISI304) stainless steel for better corrosion resistance. Each pad is marked with the relevant ISO "F" number for clear identification. The coupler is made from stainless steel 303 as standard, and the fasteners are from stainless steel 304. Other materials are available upon special request.

Sample MK code description 'MK47C-25-C35'

'Closed box' mounting kit

The 'closed box' mounting kit design is used mainly for Non-ISO 5211 compliant top pads, platforms larger than ISO 5211 F14 PCD, or for unique applications which are not covered by the cast bracket. A 'closed box' bracket is comprised of a top and bottom element connected by a precisely welded tongue and groove construction. This configuration delivers the load from the actuator to the valve mainly through this latch mechanism and less is applied through the welding seam. The Closed box bracket is made from stainless steel sheet AISI 304, however, for off-shore applications, desalination plants and applications exposed to corrosive environments stainless steel 316/316L is used. An epoxy painted carbon steel bracket is used to connect large scotch-yoke actuators to large high pressure valves or trunnion mounted valves. As standard the coupler is made from stainless steel 303, and the fasteners are made from stainless steel 304. Other materials are also available upon special request.

Sample MK code description 'MK47-25-C35'

Control Zero Backlash Mounting Kit

Habonim's Zero Backlash Mounting Kit design is based on the inherent flexibility of stainless steel. Two grooves allow the Mounting Kit to clamp the valve stem on one side, while locking the actuator gear in place on the other side. The Mounting Kit ensures repeatability, zero backlash, and virtually no hysteresis for the complete control unit.

'Lock Pin' mounting kit

To enhance site safety by preventing unintentional remote operation of an automated valve, Habonim provides a special lockable mounting kit. The '-LP' mounting kit consists of a special bracket and coupler. A concentric hole drilled through the coupler and bracket allows a rigid stainless steel pin to be slid through both elements, blocking the valve stem and actuator pinion. The '-LP' mounting kit does not include the lock pin itself, only the preparation to fit the lock pin as lock pins are normally part of maintenance toolbox.

Sample MK code description 'MK47-25-C35-LP'

Sample Lock pin kit codes:

- LOCK PIN KIT C15/C30
- LOCK PIN KIT C35/C45
- LOCK PIN KIT C60/C75

'IFM' mounting kit

When a small footprint automated valve is required, Habonim provides a special mounting kit to allow easy installation of a barrel type proximity switch between the valve and actuator. The '-IFM' mounting kit consist of a special bracket drilled to match the proximity switch OD, and a unique coupler with two ferromagnetic pin targets connected to it. The targets are aligned with the proximity switch unit so that when the actuator turns the valve to the open or closed position, the proximity switch signals the valve's position. This solution is an ideal non-contact detection of metal targets in position sensing applications, combined with smaller footprint allows for reduced space on the plant floor, but also minimizes the mounting space for sensors used for position control.

Sample MK code description 'MK47-10/12-C25-IFM12'

IFM shows the proximity switch type, followed by a number (8, 12, 18 or 30 mm) which indicates the outside diameter of the proximity switch cylinder.

'MOL' mounting kit

Manual operation of an automated valve is necessary during commissioning of a plant when an energy source is not stable, in case of an emergency, when there is a power outage and the valve must remain in the open or closed position, or due to an actuator malfunction. Normally a declutchable gear would be used to integrate human intervention in an automated loop, however for small size valves up to 1½" (DN40), Habonim recommends a cost effective mounting kit that allows the operator to turn the valve manually. The 'MOL' mounting kit consists of a unique coupler with milled flats, and a drilled hole in its center. The 'MOL' closed box bracket is designed with an additional groove that allows a full quarter turn of a spanner. The kit also includes a lock pin and 19 mm spanner chained to the bracket. To rotate the pneumatically automated valve, disconnect the air pressure from the actuator. Hold the coupler flats with the spanner, and turn the drive train to its counter position, slide the lock pin all the way through the bracket and coupler to hold the valve and actuator in the new position.

Sample MK code description 'MK47-10/12-C25-MOL'

47 31 32 1¼", 2½", 4" FB ARE EXCLUDED

Mounting Kits Selection Guide*

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15		MK47C-10/12-C15		-	
C20		MK47C-05/07-C20		MK47C-10/12-C20		MK47C-15/20-C20	
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25	
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	
C45 / C45M		-		-		MK47-15/20-C45	
C60 / C60M / C75 / C75M		-		-		-	
C90M		-		-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	4" FB	6"	8"
	mm	DN65	DN80	DN100	DN100	DN150	DN200
C15		-	-			-	
C20		-	-			-	
C25		MK47C-25-C25	-			-	
C30 / C30M		MK47C-25-C30	MK47C-30/40-C30			-	
C35 / C35M		MK47C-25-C35	MK47C-30/40-C35			-	
C45 / C45M		MK47C-25-C45	MK47C-30/40-C45			MK47-60/80-C45	
C60 / C60M / C75 / C75M		-	MK47C-30/40-C60/C75			MK47-60/80-C60/C75	
C90M		-	-			MK47-60/80-C90	

* For Control Zero Backlash Mounting Kits, use MK47V-XXX-XXX for all options

73 74 77 78 APPLICABLE FOR SIZES ½" - 2"

Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1½"	2"
	mm	DN15	DN20	DN25	DN40	DN50
C15		MK47C-05/07-C15	MK47C-10/12-C15		-	-
C20		MK47C-05/07-C20	MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47-05/07-C25	MK47C-10/12-C25		MK47C-15/20-C25	MK47C-25-C25
C30 / C30M		MK47-05/07-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK47C-25-C30
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK47C-25-C35
C45 / C45M		-	-		MK47-15/20-C45	MK47C-25-C45
C60 / C60M / C75 / C75M		-	-		-	-
C90M		-	-		-	-

Valve Size Standard port / Actuator size	inch	3"	4"	6"	8"
	mm	DN80	DN100	DN150	DN200
C15		-		-	-
C20		-		-	-
C25		-		-	-
C30 / C30M		MK47C-30/40-C30		-	-
C35 / C35M		MK47C-30/40-C35		-	-
C45 / C45M		MK47C-30/40-C45		MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75		MK47-60/80-C60/C75	MK47-A0-C60/C75
C90M		-		MK47-60/80-C90	MK47-A0-C90

* For Control Zero Backlash Mounting Kits, use MK47V-XXX-XXX for all options

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Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15		MK47C-10/12-C15		-	-
C20		MK47C-05/07-C20		MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-		-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-		-		-	-
C90M		-		-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"
	mm	DN65	DN80	DN100	DN150
C15		-			-
C20		-			-
C25		-			-
C30 / C30M		MK47C-30/40-C30			-
C35 / C35M		MK47C-30/40-C35			-
C45 / C45M		MK47C-30/40-C45			MK47-60/80-C45
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75			MK47-60/80-C60/C75
C90M		-			-

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Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½" Full port	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-10/12-C15		-		-	-
C20		MK47C-10/12-C20		MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47C-10/12-C25		MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47C-10/12-C30		MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-		-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-		-		-	-
C90M		-		-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"
	mm	DN65	DN80	DN100
C15		-	-	-
C20		-	-	-
C25		-	-	-
C30 / C30M		MK48C-20-C30	MK47C-30/40-C30	-
C35 / C35M		MK48C-20-C35	MK47C-30/40-C35	-
C45 / C45M		MK48C-20-C45	MK47C-30/40-C45	MK47-60/80-C45
C60 / C60M / C75 / C75M		MK48-20-C60/C75	MK47C-30/40-C60/C75	MK47-60/80-C60/C75
C90M		-	-	-

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Mounting Kits Selection Guide

Standard

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"
	mm	DN15	DN20	DN25	DN32	DN40
C15		MK24-05-C15	MK24-07-C15	-	-	-
C20		MK24-05-C20	MK24-07-C20	MK24-10-C20	MK24-12-C20	MK24-15-C20
C25		MK24-05-C25	MK24-07-C25	MK24-10-C25	MK24-12-C25	MK24-15-C25
C30 / C30M		-	-	MK24-10-C30	MK24-12-C30	MK24-15-C30
C35 / C35M		-	-	-	-	MK24-15-C35

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Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK27-05-C15	MK27-07-C15	-		-	-
C20		MK27-05-C20	MK27-07-C20	MK27-10/12-C20		MK27-15-C20	-
C25		MK27-05-C25	MK27-07-C25	MK27-10/12-C25		MK27-15-C25	MK27-20-C25
C30 / C30M		MK27-05-C30	MK27-07-C30	MK27-10/12-C30		MK27-15-C30	MK27-20-C30
C35 / C35M		-	-	MK27-10/12-C35		MK27-15-C35	MK27-20-C35
C45 / C45M		-	-	-		MK27-15-C45	MK27-20-C45
C60 / C60M / C75 / C75M		-	-	-		-	-
C90M		-	-	-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"
	mm	DN65	DN80	DN100	DN150	DN200
C15		-	-	-	-	-
C20		-	-	-	-	-
C25		-	-	-	-	-
C30 / C30M		MK27-25-C30	MK27-30-C30	MK27-40-C30	-	-
C35 / C35M		MK27-25-C35	MK27-30-C35	MK27-40-C35	-	-
C45 / C45M		MK27-25-C45	MK27-30-C45	MK27-40-C45	MK27-60-C45	-
C60 / C60M / C75 / C75M		-	MK27-30-C60/C75	MK27-40-C60/C75	MK27-60-C60/C75	MK27-A0-C60/C75
C90M		-	-	-	MK27-60-C90	MK27-A0-C90

28

Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-	-	-	-	-
C20		MK47C-05-C20	MK47C-10/12-C20	-	-	-	-
C25		MK47C-05-C25	MK47C-10/12-C25	MK28C-10-C25	MK28C-12-C25	-	-
C30 / C30M		MK47-05-C30	MK47C-10/12-C30	MK28C-10-C30	MK28C-12-C30	MK48-20-C30	MK28C-15/20-C30
C35 / C35M		-	MK47-10/12-C35	MK28-10-C35	MK28-12-C35	MK48-20-C35	MK28C-15/20-C35
C45 / C45M		-	-	MK28-10-C45	MK28-12-C45	MK48-20-C45	MK28-15/20-C45
C60 / C60M / C75 / C75M		-	-	-	-	-	-
C90M		-	-	-	-	-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"
	mm	DN65	DN80	DN100	DN150	DN200
C15		-	-	-	-	-
C20		-	-	-	-	-
C25		-	-	-	-	-
C30 / C30M		-	-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK28-30-C35	-	-	-
C45 / C45M		MK47C-30/40-C45	MK28-30-C45	MK28-40-C45	-	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK28-30-C60/C75	MK28-40-C60/C75	MK28-60-C60/C75	MK28-80-C60/C75
C90M		-	-	-	MK28-60-C90	MK28-80-C90

26

Mounting Kits Selection Guide

Series in range: 26, 26X, 26W

Valve Size Standard port / Actuator size	inch	2"	3"	4"	6"	8"
	mm	DN50	DN80	DN100	DN150	DN200
C15		-	-		-	-
C20		-	-		-	-
C25		-	-		-	-
C30 / C30M		MK47C-30/40-C30	-		-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35		-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45		MK47-A0-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75		MK47-A0-C60/C75	MK26-80-C60/C75
C90M		-	-		MK47-A0-C90	MK26-80-F16

C47 C31 C32 1¼", 2½", 4" FB ARE EXCLUDED

Mounting Kits Selection Guide

Cryogenic

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1 1/4"	1 1/2"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15		MK47C-10/12-C15		-	
C20		MK47C-05/07-C20		MK47C-10/12-C20		MK47C-15/20-C20	
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25	
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	
C45 / C45M		-		-		MK47-15/20-C45	
C60 / C60M / C75 / C75M		-		-		-	
C90M		-		-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	4" FB	6"	8"
	mm	DN65	DN80	DN100	DN100	DN150	DN200
C15		-	-			-	
C20		-	-			-	
C25		MK48C-20-C25	-			-	
C30 / C30M		MK48C-20C30	MK47C-30/40-C30			-	
C35 / C35M		MK48C-20-C35	MK47C-30/40-C35			-	
C45 / C45M		MK48C-20-C45	MK47C-30/40-C45			MK47-60/80-C45	
C60 / C60M / C75 / C75M		-	MK47C-30/40-C60/C75			MK47-60/80-C60/C75	
C90M		-	-			MK47-60/80-C90	

C73 C74 C77 C78 APPLICABLE FOR SIZES 3" - 6", ½" - 2"

Mounting Kits Selection Guide

Series in range: C73C, C73W, C74C, C74W, C77C, C77W (Applicable for sizes 3" - 6"), C78C, C78W (Applicable for sizes ½" - 2")

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1½"	2"
	mm	DN15	DN20	DN25	DN40	DN50
C15		MK47C-05/07-C15	MK47C-10/12-C15		-	-
C20		MK47C-05/07-C20	MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47-05/07-C25	MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47-05/07-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-	-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-	-		-	-
C90M		-	-		-	-

Valve Size Standard port / Actuator size	inch	3"	4"	6"	8"
	mm	DN80	DN100	DN150	DN200
C15		-		-	-
C20		-		-	-
C25		-		-	-
C30 / C30M		MK47C-30/40-C30		-	-
C35 / C35M		MK47C-30/40-C35		-	-
C45 / C45M		MK47C-30/40-C45		MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75		MK47-60/80-C60/C75	MK47-A0-C60/C75
C90M		-		MK47-60/80-C90	MK47-A0-C90

C26C C26W

Valve Size Standard port / Actuator size	inch	2"	3"	4"	6"	8"
	mm	DN50	DN80	DN100	DN150	DN200
C15		-	-		-	-
C20		-	-		-	-
C25		-	-		-	-
C30 / C30M		MK47C-30/40-C30	-		-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35		-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45		MK47-A0-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75		MK47-A0-C60/C75	MK26-80-C60/C75
C90M		-	-		MK47-A0-C90	MK26-80-F16

C61 C62

Valve Size Standard port / Actuator size	inch	½" Full port	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-10/12-C15		-		-	-
C20		MK47C-10/12-C20		MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47C-10/12-C25		MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47C-10/12-C30		MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-		-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-		-		-	-
C90M		-		-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"
	mm	DN65	DN80	DN100
C15		-	-	-
C20		-	-	-
C25		-	-	-
C30 / C30M		MK47C-30/40-C30	-	-
C35 / C35M		MK47C-30/40-C35	-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45	MK47-60/80-C45
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75	MK47-60/80-C60/C75	MK47-60/80-C60/C75
C90M		-	-	-

C28

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-		-	-	
C20		MK47C-05-C20	MK47C-10/12-C20		-	-	
C25		MK47C-05-C25	MK47C-10/12-C25		MK47C-15/20-C25	-	
C30 / C30M		MK47-05-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK48-20-C30	
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK48-20-C35	
C45 / C45M		-	-		MK47-15/20-C45	MK48-20-C45	
C60 / C60M / C75 / C75M		-	-		-	MK48-20-C60/C75	
C90M		-	-		-	-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"
	mm	DN65	DN80	DN100	DN150	DN200
C15		-	-	-	-	-
C20		-	-	-	-	-
C25		-	-	-	-	-
C30 / C30M		-	-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35	-	-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45	MK47-60/80-C45	-	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75	MK47-60/80-C60/C75	MK28-60-C60/C75	MK28-A0-C60/C75
C90M		-	-	-	MK28-60-C90	MK28-A0-C90

Z47 Z47T

Mounting Kits Selection Guide

High Temperature

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15 *		-		-	
C20		MK47C-05/07-C20		MK47C-10/12-C20 (DA ONLY)		-	
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25 (DA ONLY)	
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	
C45 / C45M		-		-		MK47-15/20-C45	
C60 / C60M / C75 / C75M		-		-		-	
C90M		-		-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"	8" FB
	mm	DN65	DN80	DN100	DN150	DN200	DN200
C15		-		-		-	-
C20		-		-		-	-
C25		-		-		-	-
C30 / C30M		MK47C-30/40-C30 (DA ONLY)		-		-	-
C35 / C35M		MK47C-30/40-C35		-		-	-
C45 / C45M		MK47C-30/40-C45		MK47-60/80-C45		-	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75		MK47-60/80-C60/C75		MK47-A0-C60/C75	MK26-80-C60/C75
C90M		-		-		MK47-A0-C90	MK26-80-F16

* (DA ONLY)

Z73 Z73T Z74 Z74T Z78 Z78Z Z77 Z77T

Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1½"	2"
	mm	DN15	DN20	DN25	DN40	DN50
C15		MK47C-05/07-C15 *	-		-	-
C20		MK47C-05/07-C20	MK47C-10/12-C20 *		-	-
C25		MK47-05/07-C25	MK47C-10/12-C25		MK47C-15/20-C25 *	-
C30 / C30M		MK47-05/07-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30 *
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-	-		MK47-15/20-C45	MK48C-20-C30
C60 / C60M / C75 / C75M		-	-		-	-
C90M		-	-		-	-

Valve Size Standard port / Actuator size	inch	3"	4"	6"	8"
	mm	DN80	DN100	DN150	DN200
C15		-	-	-	-
C20		-	-	-	-
C25		-	-	-	-
C30 / C30M		-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK47C-30/40-C30 *	-	-
C45 / C45M		MK47C-30/40-C45	MK47Z-40-C45	MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75	MK47Z-40-C60/C75	MK47-60/80-C60/C75	MK47-A0-C60/C75
C90M		-	-	-	MK47-A0-C90

* (DA ONLY)

Z28

Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-	-	-	-	-
C20		MK47C-05-C20	MK47C-10/12-C20	-	-	-	-
C25		MK47C-05-C25	MK47C-10/12-C25	MK28C-10-C25	MK28C-12-C25	-	-
C30 / C30M		MK47-05-C30	MK47C-10/12-C30	MK28C-10-C30	MK28C-12-C30	MK48-20-C30	MK28C-15/20-C30
C35 / C35M		-	MK47-10/12-C35	MK28-10-C35	MK28-12-C35	MK48-20-C35	MK28C-15/20-C35
C45 / C45M		-	-	MK28-10-C45	MK28-12-C45	MK48-20-C45	MK28-15/20-C45
C60 / C60M / C75 / C75M		-	-	-	-	-	-
C90M		-	-	-	-	-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"
	mm	DN65	DN80	DN100	DN150
C15		-	-	-	-
C20		-	-	-	-
C25		-	-	-	-
C30 / C30M		-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK28-30-C35	-	-
C45 / C45M		MK47C-30/40-C45	MK28-30-C45	MK28-40-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK28-30-C60/C75	MK28-40-C60/C75	MK28-60-C60/C75
C90M		-	-	-	MK28-60-C90

Z28T

Mounting Kits Selection Guide

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-	-		-	
C20		MK47C-05-C20	MK47C-10/12-C20	-		-	
C25		MK47C-05-C25	MK47C-10/12-C25	MK47C-15/20-C25		-	
C30 / C30M		MK47-05-C30	MK47C-10/12-C30	MK47C-15/20-C30		MK48-20-C30	
C35 / C35M		-	MK47-10/12-C35	MK47-15/20-C35		MK48-20-C35	
C45 / C45M		-	-	MK47-15/20-C45		MK48-20-C45	
C60 / C60M / C75 / C75M		-	-	-		MK48-20-C60/C75	
C90M		-	-	-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"
	mm	DN65	DN80	DN100	DN150
C15		-	-	-	-
C20		-	-	-	-
C25		-	-	-	-
C30 / C30M		-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35	-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45	MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75	MK47-60/80-C60/C75	MK28-60-C60/C75
C90M		-	-	-	MK28-60-C90

ACCESSORIES

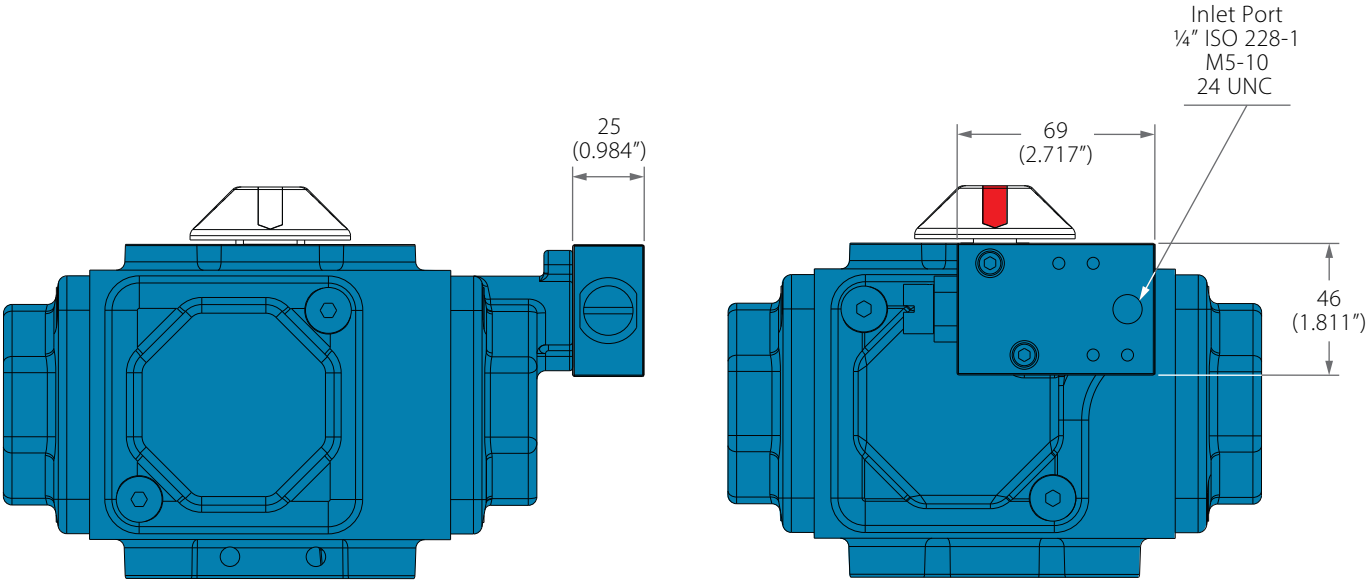
Breather Block

In applications that use a fail-safe actuator, the spring chambers are exposed to the surrounding environment. Every stroke generated by the force of the springs introduces air from the surroundings into the actuator's inner parts. In the case of corrosive and/or abrasive working environments, the springs and the interior of the spring chamber become prone to damage that could cause the product to malfunction.

The Breather Block isolates the actuator's internal parts from the corrosive/abrasive surroundings by allowing only dry and filtered instrument air to flow into the spring chamber during the actuator's spring stroke. The Breather Block's exhaust port only allows air to flow out of the spring chamber and prevents outside air from flowing in.

Features

- Fits directly onto any actuator with a Namur interface
- Interface for direct mounting of Namur solenoids
- When using remote solenoids, air supply tubes can be connected to the inlet port with a ¼" NPT (Imperial) or M5-10/24 UNC (Metric) connector
- Aluminum anodized coating and external paint layer for extreme protection
- Optional metallic construction materials are available. The O-ring and membrane are made from Buna-N
- Operating limits: pressures up to 10 bar (150 psi) and temperature range of -20º C to +85º C (-4º F to +185º F)
- One unit fits all actuator sizes



IMPACT™ - Spring Assist

IMPACT
SPRING ASSIST

In a failsafe actuator compressed air inside the actuator preloads the springs. During normal operation, each time the solenoid valve is tripped the compressed air is released into the atmosphere through the solenoid valve's exhaust port.

The patented IMPACT™ unit diverts part of this energy to the spring chamber in order to boost the torque of the actuator by at least 50%.

The IMPACT™ also functions as a Breather Block that isolates the spring chamber from the atmosphere, and as a check valve that ensures that the temporary reduction of the compressed air pressure does not trigger movement of the valve and actuator to the mid-position.

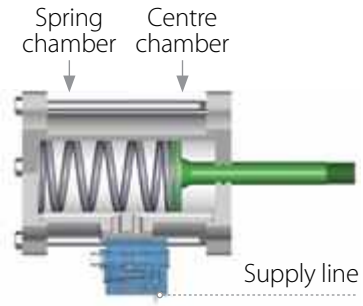
The IMPACT™ is used for on/off systems only, and cannot be used for control applications.

Features

- Boosts the torque of any spring return actuator
- One size down actuator for the same functionality
- Increases system reliability
- Internal Breather Block
- No external energy required
- NAMUR interface
- Single mechanical unit

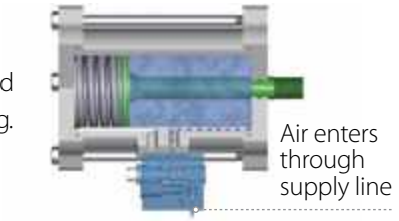
ACCESSORIES

IMPACT™ Cycle Of Operation



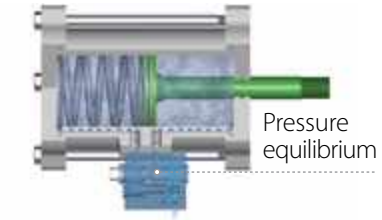
1. Starting Point

The IMPACT™ full cycle of operation is illustrated below on a single-piston spring return actuator. In the initial startup the spring chamber and the centre chamber are not pressurized.



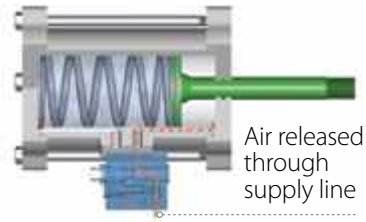
2. "ON" command to the actuator

At the ON command air pressure from the supply line is applied through the IMPACT™ and into the centre chamber of the actuator causing the piston to retract and compress the spring. The centre chamber stays pressurized until the OFF command is given.



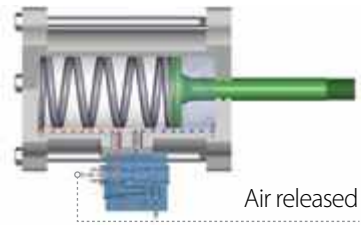
3. "OFF" command to the actuator

At the OFF command air pressure is directed from the centre chamber to the spring chamber as the spring pushes the piston back. The air pressure in the spring chamber and the centre chamber reach equilibrium.



4. Spring End Position

As equilibrium is reached, the air in the centre chamber is released through the supply line it contributes additional force to the spring closing motion. Pressurized air is trapped until the next ON command.



5. Next "ON" command

At the next ON command air pressure from the supply line is applied through the IMPACT™ and into the centre chamber and at the same time exhausting the trapped air from the spring chamber.

IMPACT™

Applications

The IMPACT™ can be utilized directly on site where operating conditions may occur that cause functional disorders or become a safety issue. Some typical examples are given here:

1. Actuators that are not achieving their published torque output can have the IMPACT™ field mounted to improve their reliability without having to replace them or stop the process.
2. In situations where unexpected pressure drops occur, such as at beginning of a days work or when additional accessories are added to a system, the IMPACT™ will keep the pressure level at its maximum and prevent the actuators from shifting from their position.
3. In many cases it is possible to substitute a smaller actuator with the IMPACT™ and achieve the torque output of a larger actuator.
4. The IMPACT™ will increase the reliability and safety margin of existing actuators. The additional torque provided to existing actuators extend their life and reduce maintenance.
5. The IMPACT™ is ideal for critical applications where quick-closing actuators are required.
6. The IMPACT™ will help "self opening" valves keep their shut-off position.

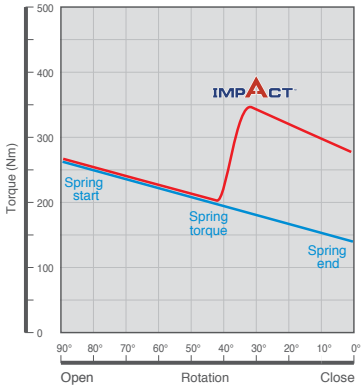
Features

Adds 50% more torque

Redirecting the air pressure into the spring chamber increases the spring end torque by 50% and more.

The torque generated depends on the type of valves in service and the operating conditions. The additional torque can be above 200%.

The IMPACT™ typical behavioral reaction to a spring return stroke is shown in the graph below. It is evident that the actual spring end torque is significantly higher with the IMPACT™.

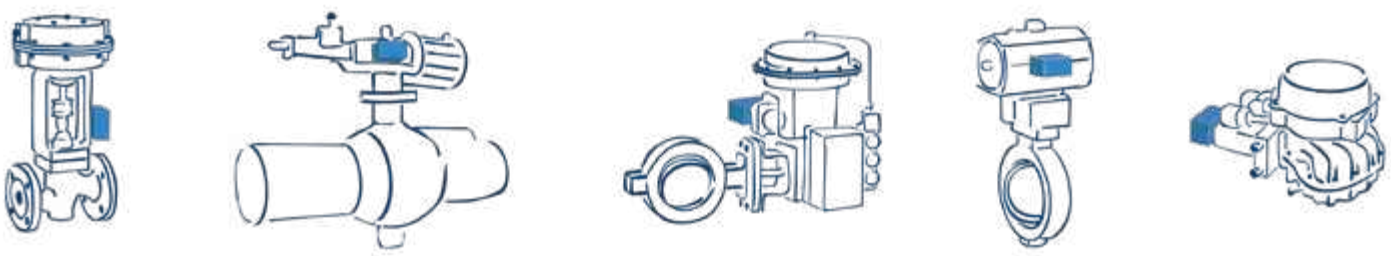


One size

The IMPACT™ comes in one size only which fits all size actuators making it a simple and easy solution for all the actuators on site or in inventory.

Used with any actuator

The IMPACT™ can be used with any type of spring return actuator, be it linear or rotary such as: rack and pinion (single piston, double piston, four piston), Scotch-Yoke, Spring-Diaphragm, Vane type and Worm gear.



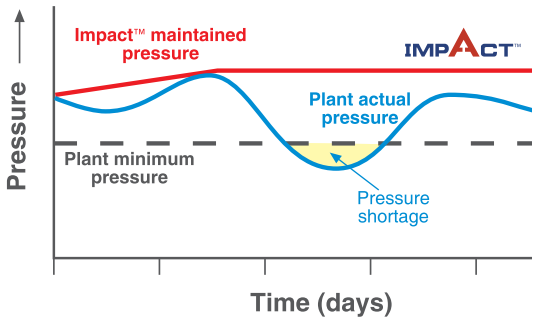
ACCESSORIES

IMPACT™

Safety and reliability

1. Pressure fluctuations

The IMPACT™ has a built-in non-return valve that will hold the maximum air pressure in the centre chamber so that any pressure fluctuations in the system will not cause spring return actuators to start closing and trigger alarms.



2. Emergency cutoff

Under emergency situations the IMPACT™ will operate and react to any air supply cutoff. Unlike many other devices, the IMPACT™ is not dependant on an alternative air source.

3. No electrical hazard

The IMPACT™ does not operate on electric or electronic commands and therefore is not considered an electrical hazard.

Energy saving

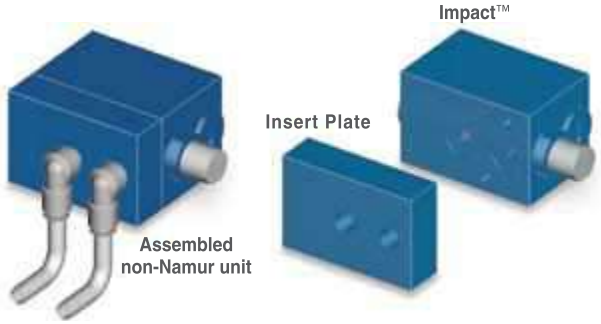
The IMPACT™ does not operate on any form of external energy and is therefore a significant energy saver for its user.

Namur interface

The IMPACT™ direct mounts to any actuator with Namur interface and has direct mounting for Namur solenoids. Only solenoids type 3/2 are required.

Non-Namur interface

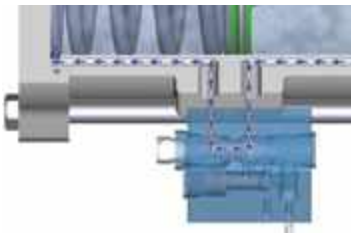
By using a special insert plate the IMPACT™ can be used with any actuator that has standard threaded air connections.



IMPACT™

No additional air

The IMPACT™ does not need an additional source of air supply and does not require a safety backup system. The air used comes from the air already supplied to the centre chamber.



Built-in Breather Block

The IMPACT™ has a built-in Breather Block that prevents suction of external air into the spring chamber (refer to Habonim Namur Breather Block catalog).

Compact size

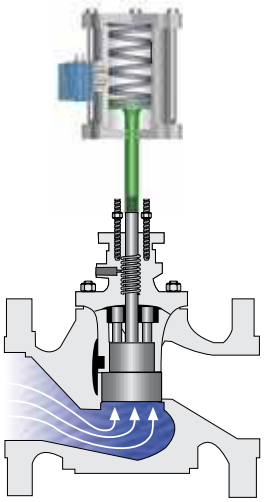
The physical footprint of the IMPACT™ is slightly larger then a matchbox. The actual dimensions are 69 x 46 x 46 mm (2.716" x 1.811" x 1.811").

Quick shutoff

In cases where there is a requirement for increased closing speed for fail safe operations, the IMPACT™ provides faster closing due to the additional air pressure assisting the springs.

Patented

The IMPACT™ is patented.



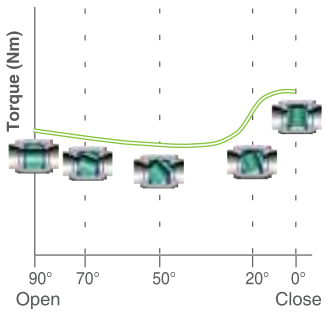
Dynamic response

The IMPACT™ unique design dynamically responds to valve torque increases and provides the extra air pressure to the actuator when it is required. Every valve type has its typical torque profile and spring action of the actuator is required to provide enough torque through the full stroke. The IMPACT™ responds to the actual conditions to give the additional torque. The IMPACT™ will also respond to situations where unexpected conditions can cause the valves to seize.

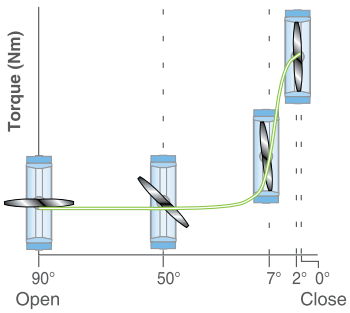
Reduce maintenance & inventory

Being only one size makes the IMPACT™ a great staff tool for the maintenance personnel on site and an economical solution for procurement.

Ball valve torque



Butterfly valve torque

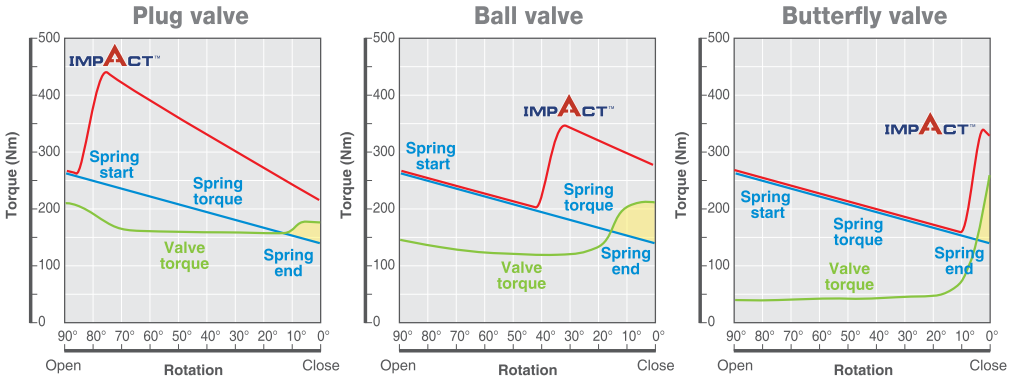


ACCESSORIES

IMPACT™

Self opening

When the actuator has closed the valve the IMPACT™ maintains the air pressure on the springs until the next operation. This gives the actuator a higher spring end torque which is ideal for "self-opening" valves. Because high pressure fluid loads the entire valve port it creates a force that acts against the actuator springs.



How to calculate additional spring closing torque

The following steps will help you understand how to calculate the additional torque the IMPACT™ Air Assist will give your Spring Return actuator. The IMPACT™ will work with any type actuator, and you should use the torque tables provided by your actuator of preference:

Step 1: Calculate Torque difference

In the Double acting Torque table find the actuator model and size that you are working with. Calculate the torque difference of 1 bar at any pressure.

Example shown The Spring Return actuator model size is C30 and the ΔP of 1 bar calculated is between 5.0 bar (73 psi) and 6.0 bar (87 psi). The additional torque will be: 130-107=23[Nm] (1,150-947=203in-lb).

Step 2: Calculate Spring Torque

In the Spring Return torque tables find the actuator model and size with the spring combination that you are working with. Locate the Spring End torque and add the additional torque as above.

Example shown The Spring Return actuator model size is C30 with 2C spring combination. The Spring End torque is 44[Nm] (389in-lb). The new Spring End torque will be: 44+23=67[Nm] (389+203=592in-lb).

Double acting table — ΔP = 1 bar

Model	Operating pressure (bar)					
	3.0	4.0	5.0	6.0	7.0	8.0
C15	10	14	17	21	24	27
C20	18	25	32	38	45	51
C25	39	52	65	79	92	105
C30	62	84	**107**	**130**	153	176

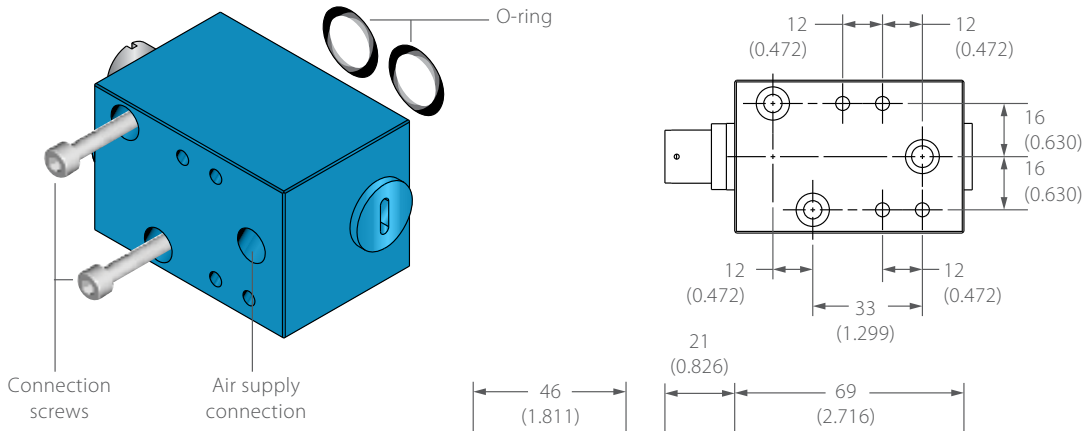
Spring return table

Size	Spring set	Air pressure - bar (psi)						Spring torque	
		3.0 (44)		7 (102)		8 (116)			
		Start	End	Start	End	Start	End	Start	End
C30	2A	**36**	**19**	125	107	148	129	42	26
	2A2B			120	96	143	118	53	31
	2B			115	87	138	109	62	36
	2C			107	72	130	94	78	**44**

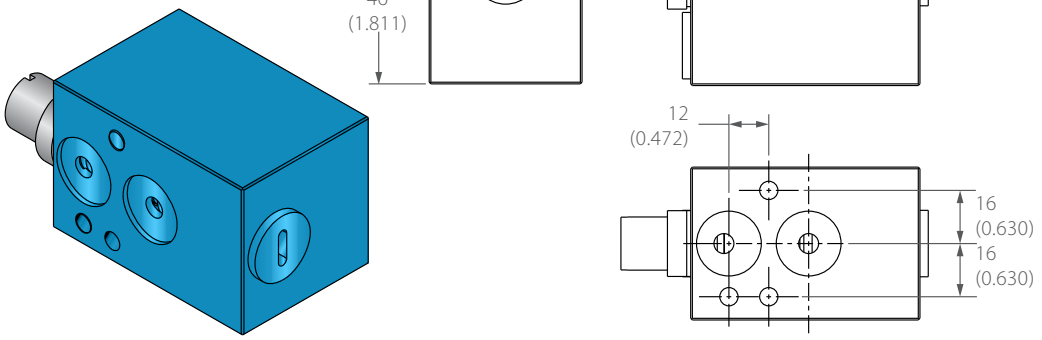
IMPACT™

Dimensions

Solenoid interface side



Actuator interface side



Specifications

- The IMPACT™ is environmentally protected by a hard anodized coating that is applied to all the parts both internally and externally.
- The temperature limits are -20°C to +80°C (-4°F to +176°F).
- The air supply pressure range is 3 to 8 bar (45 to 120 psi).
- The IMPACT™ will not operate at pressures below 3 bar (45 psi).
- The IMPACT™ is not affected by humidity, moisture, wetness or magnetic surroundings.
- Use only filtered air to 30 microns.

Ordering Information

Please provide all the information specified below:

Namur interface actuators:

- IMPACT™ - I: Imperial connecting screws thread type 10/24 UNC and air supply connection type 1/4" NPT.
- IMPACT™ - M: Metric connecting screws thread type M5 and air supply connection type G-1/4" ISO.

Non-Namur actuators: As above but add the letter "X"

- IMPACT™ - I-X: for Imperial / IMPACT™ - M-X: for Metric
- All the IMPACT™ units are provided with the two
- connecting screws and two O-rings.

About Habonim

Ball Valves & Actuators for the most demanding, challenging and hazardous applications are our passion and profession for the last 70 years.

We believe in designing, manufacturing and supplying control and shutoff components and solutions that improves the overall safety, integrity and sustainability of the systems they are installed in.

Designed, manufactured and tested according to the highest standards, our products allow us to partner within systems that flow and control varied gases and liquids in diverse markets especially where extreme temperatures and pressures are involved, hazardous materials are used and system performances are critical.

We are leading in cryogenic ball valve-based control solutions, emergency shutoff and specially designed solutions.

Believing that supplying and developing the most effective, safe and reliable products for the global leaders in the LNG and Gas distribution market continually challenges us to improve our capabilities and products.

Best coping with our prestigious customers' most challenging requirements technically, operationally and commercially is our promise fulfilled for decades.

Performing in Demanding Applications

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