



CIRCOR
Power Products

CIRCOR
FLOW TECHNOLOGIES





Proven, integrated solutions that satisfy complex fluid management application demands.

As part of CIRCOR International Inc. (NYSE: CIR), CIRCOR Flow Technologies is a global enterprise comprised of market leading brands that collectively offer a broad range of flow control capabilities for difficult applications including high- and low pressure steam, cryogenic, corrosive media, ultra pure fluid and many other media handling.

Some of our highly engineered, often mission critical systems and products are brands that have been serving the market for decades or even a century. Our products are built to last and to make our customers life easier.

Install it - and forget it

Key to our growth has been – and will always be – our unequalled ability to optimally match technology to customer need, delivering solutions that combine the superior capabilities of our individual brands into fully integrated solutions which precisely measure, control and manage the safe and efficient use of fluids. Customers consistently choose to partner with us because we are:

- **Innovative**
leveraging technology to provide economic solutions
- **Responsive**
exhibiting passion, speed and agility
- **Customer Focused**
driving quality, reliability and continuous improvement

From our manufacturing facilities located in the United States, Canada, Great Britain, France, Germany, Italy, Netherlands, Morocco, India, Brazil and the Peoples Republic of China, together with our 3000+ peers we are serving thousands of customers in more than 100 countries around the world.

We are quite sure to have a solution for you as well!

Leslie Controls is known worldwide as the premier provider of reliable engineered pressure and temperature control solutions focusing on energy savings to drive process efficiency in the power, commercial-industrial, and process markets. The combination of a strong and knowledgeable sales force, resourceful engineering personnel and highly motivated customer service department has earned Leslie Controls the reputation of unmatched reliability in the industry worldwide.

ZERO-LEAK CONTROL VALVES - AEROFLOW

- Balanced or unbalanced plug, globe or angle style for steam, gases, water and other liquids; ideal for severe service
- Diaphragm, pneumatic piston or electric actuator
- Custom characterized trim options
- C3 Combo - High rangeability, cavitation protection, low noise
- Mini P Multi Stage - For low flow, high DP, cavitating service with tight shutoff
- Micro Taper - For very fine control in low flow, high DP service
- Les-Sonic Cage - Up to 25 dBA noise reduction
- Les-Cav Cage - Anti cavitation, multi stage for pressure drops to 4000 PSI
- Zero leakage metal to metal seat exceeds ANSI/ISA 70-2 Class VI shutoff
- Carbon Steel, Stainless Steel, Chrome Moly - ANSI/ASME 150 to 4500 Flanged/Buttweld/Socketweld 1" to 16"

ROTARY CONTROL VALVES – K-MAX

- Eccentric plug rotary style for steam, gases, water and other liquids (especially corrosive, dirty and erosive/abrasive slurry)
- Pneumatic or electric actuator
- 100:1 rangeability
- Self aligning orbital seat
- Bi-directional flow
- Shaft access plug standard
- Triple bearing shaft support
- Plug cam action increases trim life
- Selection of trim sizes/materials
- Metal seat meets ANSI/ISA 70-2 Class IV (or optional Class V) shutoff; Metal/PTFE seat meets ANSI/ISA 70-2 Class VI shutoff
- Cast Steel, Stainless Steel - ANSI/ASME 150/300/600 Flangeless or Flanged 1" to 8"; ANSI/ASME 150/300 Separable Flanged 1" to 6"
- DIN and JIS Flanges also available

ON-OFF CONTROL VALVES

The Leslie (Laurence) 2500 Series 2-way, globe-type, rotary shaft valves are electrically actuated and FM approved for safety shut-off of fuel oils and gases. Solenoid actuators are Type 4 (IP66) enclosures and are FM, FMC, IECEx, and ATEX explosion-proof approved. Direct, semi-direct, and pilot operated valve piston options make these valves ideal for use with viscous, dirty or clean fluids as well as light liquids and gases.

Also available:

- 2800 Series Heat Actuated, 2-Way Firec-Cide® Valves, FM Approved Emergency Shut-Off Valves
- Pneumatic Cylinder Operated Two-way On-Off Valves
- Air Extraction Valves for Industrial Gas Turbines
- Three-Way Solenoid and Cylinder Operated Valves for Pilot Control, Diverting, and Selecting Service

REGULATORS

GPKP – For steam and gases; ideal integral mount pilot operated valve when high rangeability is desired

GPK/GPS – (Cast Iron/Cast Steel) - For steam and gases; high rangeability air loaded valve ideal for poor quality steam and/or intermittent operation



AEROFLOW

Aeroflow control valves from Leslie Controls are the world's only true Zero leak control valve. With the ability to be customized to application and with best in class pilot balanced trim design, Aeroflow control valves offer proven reliability and deliver significant operating cost savings.

Industry

Power
Oil & Gas

Applications

- Feedwater Control Valve
- Boiler Feedpump Recirculation Valve
- Attemperator Spray Control Valves
- Gland Seal Steam Control Valve
- Turbine Bypass Valve
- Auxiliary Steam Pressure Reduction
- Turbine & Heater Drain Valves
- Heater Drain Valve
- Condensate Recirculation



ON-OFF CONTROL VALVES

Leslie Controls offers the rugged and dependable Laurence line of FM and CE approved, solenoid actuated, rotary shaft on-off control valves. Laurence quick-acting on-off control valves offer low maintenance, greater pressure and temperature range, fail-safe shutoff – a trusted OEM supplier for 45 years – thousands of units installed.

Industry

Power
Oil & Gas

Application

- Dirty, viscous or unclean liquids
- Fuel oils, gasoline, lube oils, fuel gases
- All waters including seawater
- Solvents, ammonia, Halon, CO₂
- Air vacuum, inert gases, hydrogen, oxygen, helium

REGULATORS

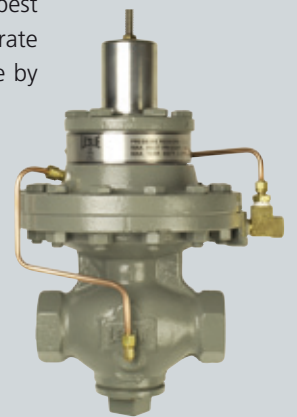
Leslie's wide range of pressure regulators ensure the best fit for your application; from small flow to highly accurate regulators that perform many tasks traditionally done by control valves—without typical control valve problems.

Industry

Commercial Industrial

Application

- Steam Pressure Control Systems
- Pilot Gas Pressure Control
- Temperature Control
- HVAC Systems
- Packaged OEM Systems for Heat Exchangers, Metal Cleaning, Vaporizers



K-MAX

Rotary control valves frequently outperform other valves handling dirty, erosive or corrosive fluids or slurry. Leslie's K-Max, originally introduced by Kieley & Mueller, has become an industry standard.

Industry

Power

Applications

- High and Low Pressure Steam
- Clean, Dirty and Corrosive Liquids
- Clean, Dirty and Corrosive Gas
- Erosive and Abrasive Slurries



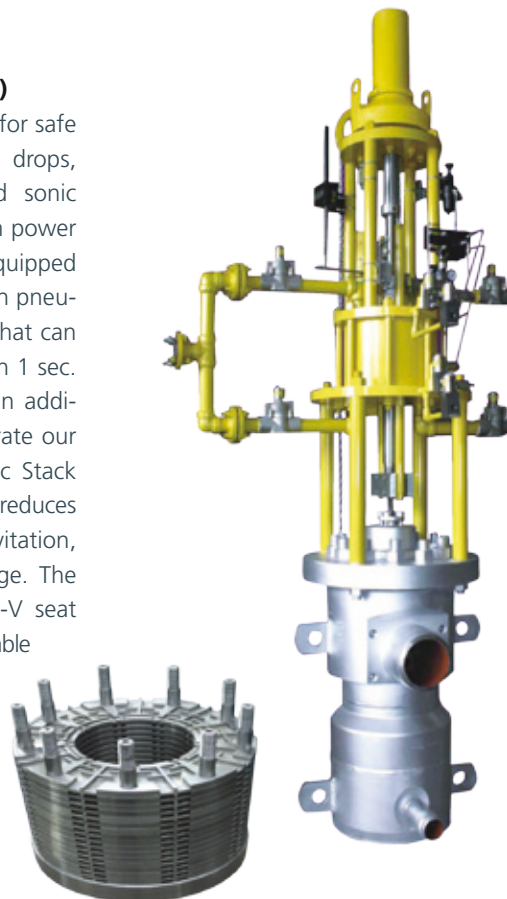
Circor Flow Technologies India's Ahmedabad facility (previously known as Mazda Limited) is a provider of flow control and steam conditioning solutions to the Power Industry. Established in 1977, we design and manufacture a range of general service control valves, severe service control valves and steam conditioning products. Our expertise is in providing custom solutions that are designed to suit a variety of applications in the Power industry. Our products are installed around the world in all types of power plants. Our broad range of products include Turbine bypass valves, severe service control valves, steam conditioning valves and systems, general service control valves, and Quick Closing Non-Return Valves & Gland Sealing Systems for turbine applications.

PRODUCT RANGE

- Turbine By-Pass Valve
- De-superheaters (Multi Nozzle type & Venturi type))
- Pressure Reducing De-superheating Stations (PRDS)
- Steam Conditioning Valve
- 300 Series Control Valve
- Quick Closing Non-Return Valve
- Pressure Reducing Valve
- Dump Tube

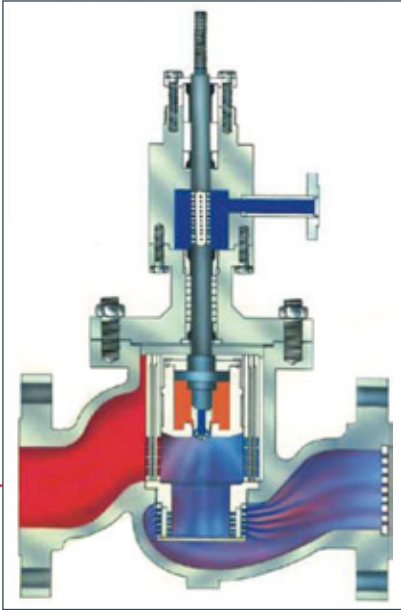
Turbine By-Pass Valve (LP/HP)

These Valves are primarily used for safe handling of massive pressure drops, reduction in temperature and sonic velocities associated with steam power generations. Bypass valve are equipped with double acting spring return pneumatic cylinder piston actuator that can quickly open and close less than 1 sec. as per the plant requirement. In addition to this, the valves incorporate our state-of-the-art "Zick Twist Disc Stack Trim" design which dramatically reduces Noise, Erosion, Velocity, Cavitation, Abrasion, Vibration and Leakage. The valves are supplied with Class-V seat leakage as standard and are available in 4500# rating / special class. Turbine Bypass Valves are available in A182 F11, A182 F22 & A182 F91 material of construction as per the requirement.



Quick Closing Non Return Valve (QCNRV):

These valves are deployed in the extraction line of the turbine. The prime function is to prevent any back pressure going back to the last stage of the turbine. These valves are normally open and have a minimum pressure drop across it. They are supposed to quickly close typically within 1 to 1.5 seconds to protect the turbine from the increased back pressure in case of emergency operation. QCNRV's are available in carbon steel material of construction up to 600# rating. These valves are pneumatically operated instead of hydraulic actuators. They have a spring in it for achieving fail safe position. The valves are maintenance friendly and less messy as compared to hydraulic ones.

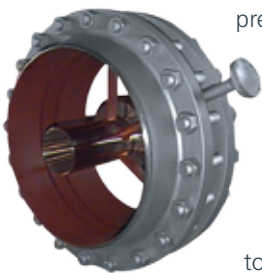


Steam Conditioning Valve (SCV)

This is a combined pressure and temperature reduction valve which reduces the steam pressure and temperature. It is used in power plant, process steam and co-generation of plants. This valve is ideal for severe service applications since it eliminates costly alloy steel piping and two separate components – control valve and DSH and only one component is required. Straight length in the downstream piping is also reduced. They are available in carbon steel material with 2500# rating.

Venturi Desuperheater (DSH)

This unit has a “De-Laval” nozzle and the unique feature is that it can work even if the spray water pressure is the same as the steam pressure. The DSH has no moving parts and virtually maintenance free. It has a negligible pressure drop and has a distinct advantage over any other DSH. The Venturi DSH will perform even if spray water pressure is same as steam operating pressure. This DSH is available in Carbon Steel A335 P11, A335 P22, A335 P91 material of construction and rating up to 2500#.



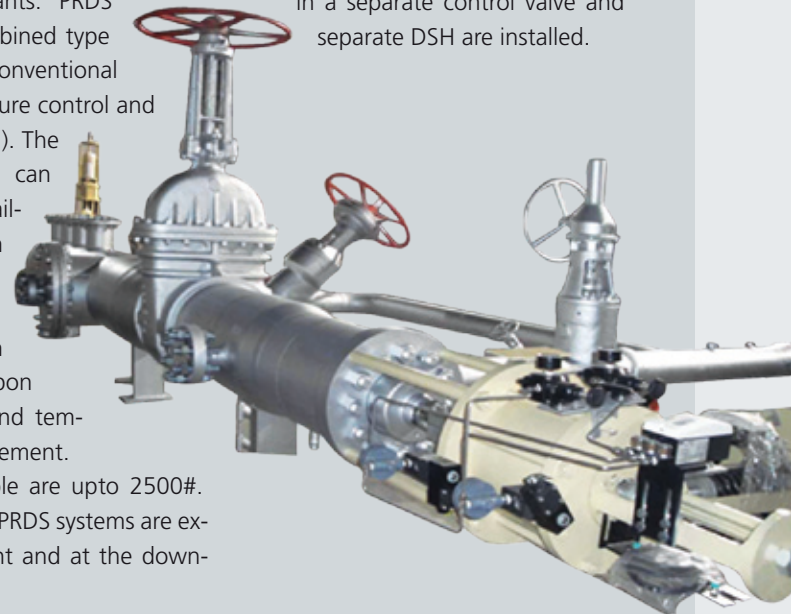
Multi-nozzle Desuperheater:

The principle function of the desuperheater is to ensure that steady temperature of steam is reached within the shortest distance from the point of injection at various load conditions. Desuperheaters are deployed for steam temperature reduction in Power Plant, Process steam, boiler superheaters, extraction/ exhaust to steam turbines and co-generation of plants. This unit is a multinozzle orifice with an integral spray control device. This DSH incorporates our double acting spring return pneumatic cylinder piston actuator that has various advantages over its counterpart Spring & diaphragm namely High performance, Fast response, Higher thrust, Less hysteresis & linearity, is Compact & has Longer strokes. This DSH is available in Carbon Steel A335 P11, A335 P22, material of construction and rating upto 2500#.

Pressure Reducing Cum De-superheating Stations (PRDS)

These units are used for reducing the pressure and temperature of live steam. Applications are in Power plant, Process steam and Co-generation plants. PRDS can be of combined type as well as conventional (separate pressure control and a separate DSH). The PRDS systems can be made available in carbon steel and alloy steel material of construction depending upon the pressure and temperature requirement. Ratings available are upto 2500#. Our combined PRDS systems are extremely efficient and at the down-

stream do not require alloy steel piping thereby drastically reducing the overall cost of system as compared to conventional PRDS wherein a separate control valve and separate DSH are installed.





PIBIVIESSE was established in 1981 by three partners, combining the forgemaster expertise with the experience in valve design, manufacturing and marketing. Their vision of the future was to design and manufacture state-of-the-art valves “designed to perform – built to last” for the most demanding applications. Their commitment was to follow a “total quality” concept, from quotation to field service, without any compromise. A second generation of proprietary technology valves was developed in 2000, called CAGEBALL™. These revolutionary control valves, designed for extremely severe working conditions, did set a step change not only in PIBIVIESSE but also in the flow control market, allowing combinations of valves sizes and flow conditions well beyond industry standards”

PRODUCT RANGE

PIBIVIESSE designs and manufactures a wide range of high performance manually operable, automated ON-OFF and Control Ball Valves for any kind of fluid handled in the oil, gas, water, steam and power generating industry. The basic ball valve design is of bolted construction style which simplifies field service and maintenance. Our product line is then completed with our top entry ball valves that can be easily serviced without removing the valve from the line and with our fully welded line that is typically used for pipeline/buried application or for sub-sea lines .

Trunnion mounted balls permit ease of operation, minimizing the operating torque and reducing seat seal wear. All our products are available in a wide selection of materials ranging as High Temperature Carbon Steel up to Inconel 625, and more.

APPLICATIONS

- Steam dump to condenser
- Turbine By-pass to condenser
- Cooling water
- Steam venting
- Geothermal applications
- Main Steam Pipe Drain Valve
- Cond. pump recirculation valves
- Deareator level control valve
- Feedpump Recirculation Valves
- Start-up Feedwater Control Valves
- Feedwater Heater Drains
- Boiler Start-up Drum Control Valves
- Flow Balancing control valve

INNOVATIVE TECHNOLOGY FOR TOTAL CONTROL

High differential pressure (ΔP) applications have historically been controlled by the vertical rising operation of a globe valve. As process power plants have increased throughput, operating pressures and temperatures, many linear globe valves have become unreliable and unstable.

Problems such as high friction, shaft wind-up, erosion and vibration have been associated with linear globe control valves. The continuous vertical movement of the stem leads to a deterioration of stem packing and may cause dangerous stem leaks. Stem packing integrity is essential to reduce emissions of volatile organic compounds or gases. A rotary control ball valve is inherently the best choice with its quarter-turn radial operation, straight-through conduit bore and tight shut-off. The rotary action

versus the linear operation is not prone to stem wear and is suitable for a high number of cycles.

Using a quarter-turn ball provides a quick and/or easily maintained response time. The Pibiviesse technology expands the standard strengths of the ball valves adding the capabilities of precise modulation, exceptionally high rangeability and characterization.

FLOW LAB

With the aim of testing the experimental characterization of control valves, a test facility, named TestOne, has been installed at Pibiviesse. It is a flow loop, projected following the ISARP75.23-1995 normative, that allows Pibiviesse to make experimental measurements on valves.

This facility has been projected with the cooperation of the Politecnico di Milano University. The loop is made by a tank containing water and glycol (about 30%), a centrifugal pump with variable frequency of rotation (from 20 Hz up to 45 Hz) and a drain valve (a full bore type) situated immediately upstream the tank and downstream the tested valve. Varying both, the frequency of rotation of the pump, and the travel rate of the drain valve, it is possible to change the boundary conditions of the tests. Following the same philosophy, in the PIBIVIESSE factory, we are performing a new facility, named Air Lab, useful to study the behavior of valves with gas flows.



Hyper Cage Model

DN ISO÷1500 – 6"÷60"

ASME CLASS 150÷2500#

- High range of process conditions
- Negligible ΔP at full stroke
- Piggable
- Patented model



CageBall Model

DN 150÷1500 – 6"÷60"

ASME CLASS 150÷2500#

Depressurizing and blow-down service

- Cavitation control
- Noise reduction
- High rangeability

MAIN FEATURES

- Smaller envelope
- Less weight
- Greater installation flexibility
- Reduce material and infrastructure costs
- Piggable version
- Longer stem seal life
- Large rangeability
- Bi-Directional Fluid
- Metal to Metal tight Shut-Off



Unicage Model

DN 25÷200 – 1"÷8"

ASME CLASS 150÷2500#

- Antisurge application
- Hp/lp/Lp drain and vent application



HyperSilent Model

DN 150÷1500 – 6"÷60"

ASME CLASS 150÷2500#

- High capacity of noise control
- High flow capacity control
- Patented model

Reliable Solutions for

Control Related Problems in Industrial and Power Market Applications

Regeltechnik Kornwestheim (RTK) has more than 35 years experience in the manufacture and sales of control valves and is a leading European manufacturer of industrial valves. With highly motivated employees, a state-of-the-art production environment and a strong commitment to continuous improvement, RTK delivers innovative products and services that improve thermal efficiency and system safety for all heating and refrigeration processes. RTK has engineering expertise in control valves, electric and pneumatic actuators, sensors and controllers. RTK also engineers solutions for thermal control applications in general industry, as well as auxiliary boiler and water treatment applications in power generation.

APPLICATIONS

Steam Boilers:

RTK offers multiple control solutions around startup boilers for power plants and industrial steam boiler applications such as:

- Control valves for fuel regulation of burners
- Feed water control valves with spillback or emergency closing devices
- Continuous and intermittent blow down valves
- Drum overflow valves
- Startup valves for superheaters
- Temperature control for economizers and superheaters
- Soot blower shut-off valves
- Preheating valves for soot blower lines
- Level control for boilers

Water Treatment:

RTK control valves help to save energy and chemicals in all water treatment processes to provide boiler feed water of an excellent quality, like:

- Control valves for membrane systems and ion exchange processes
- Deaerator steam control valves
- Feed water tank control valves
- Dionate feed valves
- Control valves for condensate systems
- Exhaust vapor control valves for deaerating
- Level control for feed water tank

Anti Icing Control:

The air compressor of a gas turbine has on the suction side a filter system to purify the air. To prevent the risk of ice damaging the air compressor at high humidity and cold temperatures, the anti icing control valve protects the filter by feeding hot air at around 400°C.

Special Applications:

- Steam converting (process steam and turbine bypass)
- Control valves for drain/recirculation of turbine condensers
- Injection valves for superheaters and reheaters

PRODUCT PORTFOLIO

Valve types:

- two- and three way control valves
- ANSI and DIN

Sizes:

- DN 15 – DN 400
- 1" – 12"

Pressure rating:

- PN 16 – PN 160
- class #150 – #900

Material:

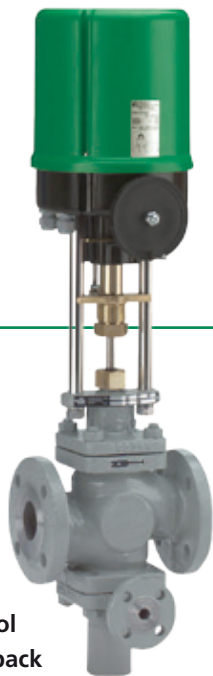
Cast iron, ductile cast iron, cast steel, creep resistant cast steel, stainless steel

Actuators:

- Electric actuators
- Pneumatic actuators
- Positioners

Controllers & Sensors:

- Temperature
- Pressure
- Level



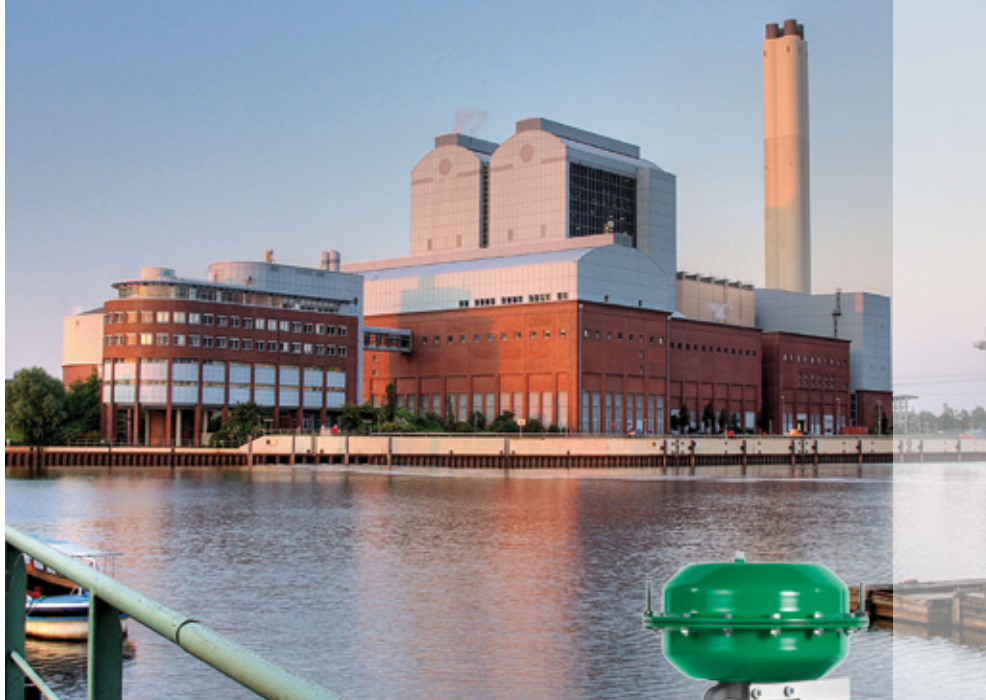
Feed-water control valves with spill back

Series: MV 5291, 5391

Feed water control valve with boiler feed pump protection at low water consumption

Size: DN 25 – DN 80,

Nominal pressure: PN 16 – PN 40



Pneumatic control valves

Series: PV 6200, 6300, 6400

Two- and three way pneumatic control valves for throttling, mixing and diverting of liquids and gases

Size: DN 15 – DN 400, 1" – 12",

Nominal pressure: PN 16 – PN 160, class 150 – 900



Control valves with emergency closing device

Hydraulic emergency closing device for two- and three way electric control valves

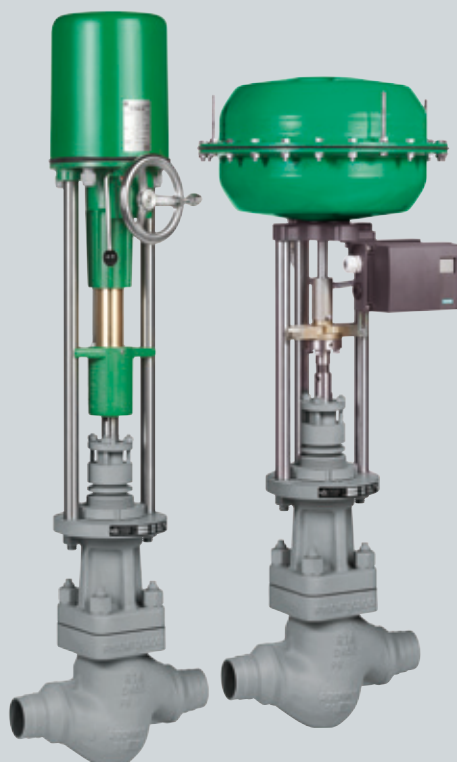
Size: DN 25 – DN 300,

1" – 12", Nominal

pressure:

PN 16 – PN 160,

class 150 – 900



Electric and pneumatic control valves with butt weld ends

Series: MV 5200, 5300, 5400, PV 6200, 6300, 6400

Two- way electric and pneumatic control valves for throttling of liquids and gases

Size: DN 15 – DN 250, 1" – 10",

Nominal pressure:

PN 40 – PN 160, class 150 – 900



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Mazda



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