A221, A222, A223
A221G, A222G, A223G

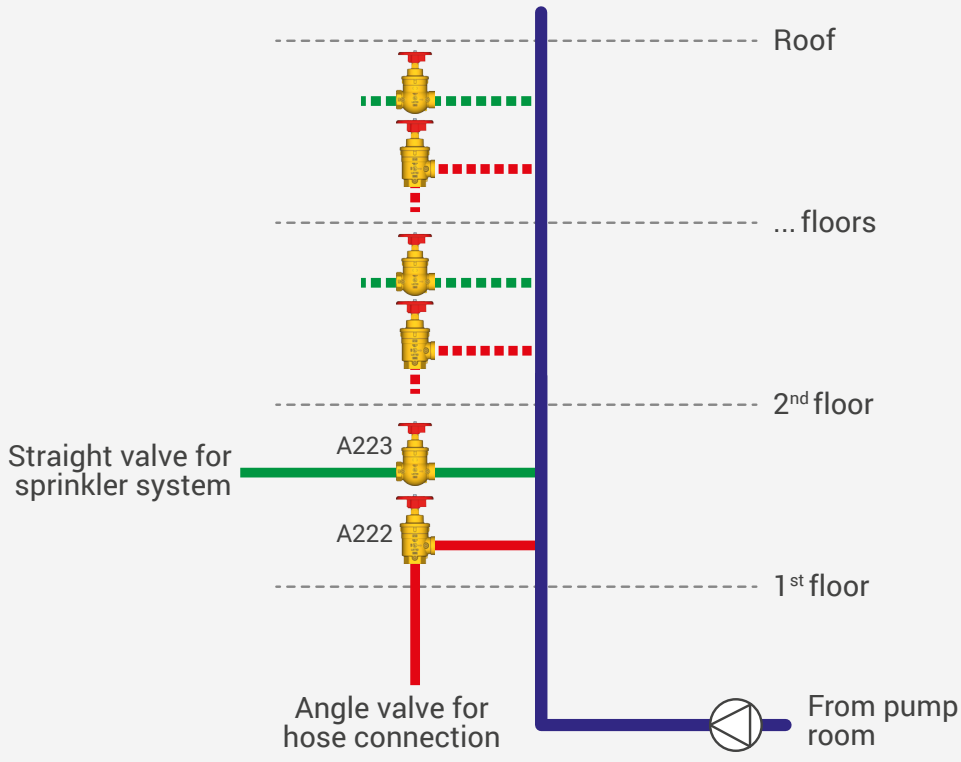
Fire Protection

Factory set
Pressure Reducing Valve

Datasheet/Manual
1070EN 02/2025
047U59588

A221 A221G A222 A222G A223 A223G

Factory Set Direct Acting Pressure Reducing Valves range for installations where pressure, static and residual, must be controlled at different floors, either for standpipe or sprinkler systems.
To better understand need and installation of the Pressure Reducing Valves, refer to the following drawing.
These UL listed Pressure Reducing Valves are intended for use in stand pipe systems or in the supply piping for automatic sprinkler systems.



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The design of sprinkler and standpipe systems for high-rise buildings often faces, at some levels of the building, static pressures that exceed 175 Psi.
For standpipe systems, as stated by NFPA 14, the maximum allowed static pressure is 175 Psi.
As stated by NFPA 13 ,also sprinklers systems need lesser pressure.

The straight (globe) valves (A223) have the inlet and outlet in a straight line; the outlet is indicated by an arrow.
These valves are UL listed only.

The angle valves (A221, A222) have the outlet indicated by an arrow. The outlet is with a 90° angle.
These valves are UL and cUL listed.

These valves are available with threaded or grooved connections (see the following table) according to the requested use.
All valves have also four (two each side) 1/4" side ports for upstream and downstream pressure gauges.

Versions and product codes

SERIES	SIZE	TYPE
A221	2-1/2" x 2-1/2"	Double female NPT - Angle
A221G	2-1/2" x 2-1/2"	Double groove - Angle
A222	2-1/2" x 2-1/2"	Female NPT x Male hose thread – Angle
A222G	2-1/2" x 2-1/2"	Groove x Male hose thread - Angle
A223	2-1/2" x 2-1/2"	Double female NPT - Straight
A223G	2-1/2" x 2-1/2"	Double groove - Straight

NOTE. Available hose threads: NST - NYFD - CSA - BCT - CST
For availability of other threads, check with your contact person.

Operating

A221, A222, A223 series Factory Set Direct Acting Pressure Reducing Valves are available with 8 bonnets to provide a wide range of the outlet pressures and flowrates.

Advantages

No error in the installation, as every valve has been supplied as designed for specific flowrates and pressure reductions.
Valves must be installed by qualified personnel only.

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Technical data

- Maximum inlet pressure: see table on the right
- Maximum flow rate: 500 gpm
- Outlet pressure range: 50÷175 psi

Materials

- Body: forged brass CW617N as per EN12165 (C37700 as per ASTM B124)
- Handwheel: aluminum
- Stem and internal components: forged brass CW617N as per EN12165 (C37700 as per ASTM B124)
- Gasket: NBR rubber

Approvals: A221, A221G, A222, A222G, A223, A223G

c UL us LISTED

UL rated pressure

BONNET	MAX FLOW [gpm]	BONNET **UL** RATED PRESSURE
C	500	210
E	500	220
G	500	230
H	500	265
I	500	300
L	500	320
M	500	360
P	500	400

Determining the proper outlet pressure

1) A valve intended for standpipe system outlets shall be constructed to incorporate a referenced setting or settings to provide static outlet pressures not exceeding 175 psig (1210 kPa) for 2-1/2" NPS outlets and residual outlet pressures at the flows specified in Table 10.1 of the abovementioned standard.
That means the following: for 2-1/2" valves in standpipe systems with residual inlet pressure > 175 psi, residual outlet pressure ≥ 100 psi and ≤ 175 psi with flowrates ≥ 250 gpm.

2) For sprinkler systems, the valve must be selected to achieve the required outlet pressure at the design water flow.
The minimum residual pressure for a valve intended for use in sprinkler system "shall have a minimum residual pressure of 50 psi (354 kPa) for the ranges specified in the installation instructions".

3) To determine the pressures at the hose nozzle or sprinkler, refer to the hydraulic calculation information provided in NFPA 13 and NFPA 14 and the NFPA Fire Protection Handbook should be followed.
In any case, the design flow demand required by hose nozzle and/or sprinklers shall not exceed the flow range specified in the following performance charts.

4) The valves are designed to reduce inlet pressures of up to 400 psig to an outlet pressure range from 50 to 175 psig. Authorities having jurisdiction should be consulted to confirm that the outlet pressures and flowrates are acceptable.

5) To determine the proper valve bonnet selection to achieve the desired residual outlet pressure, use the chart for the design flowrate and appropriate to the valve type (angle or straight).
On that chart, identify on the vertical axis the inlet residual pressure to the valve inlet (inlet residual psi) and track a horizontal line from there; then on the horizontal axis identify the required outlet residual pressure (outlet residual psi) and track a vertical line from there. The cross point between vertical and horizontal lines is the design working point.
Select the closest bonnet and the cross point between horizontal line and bonnet curve (diagonal lines) will be the actual working point (read the actual residual outlet pressure on the horizontal axis).
For example, if an angle valve is used for a 250 gpm flow requirement, and the inlet residual pressure is 250 psi, a valve with bonnet type "H" will produce an outlet residual pressure of 124 psi. In the same conditions a valve with bonnet type "G" will produce an outlet residual pressure of 141 psi.

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Installation of 2-1/2" valve size

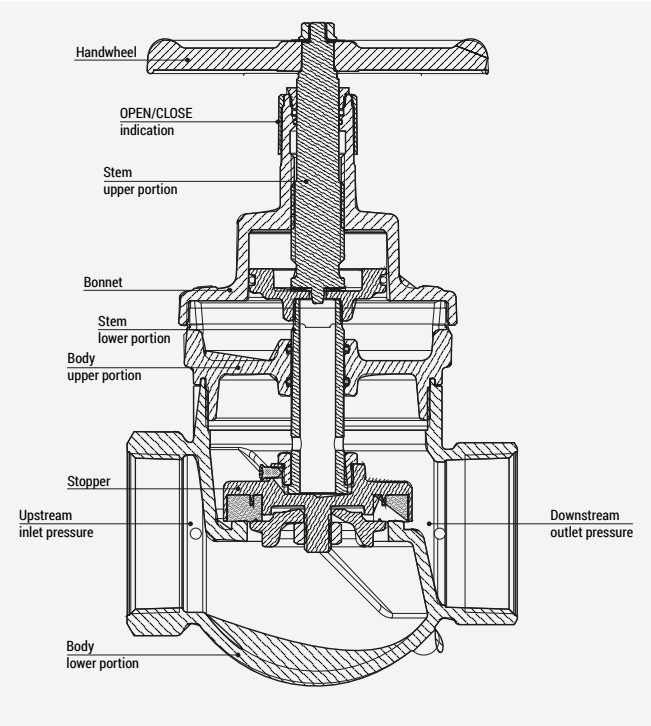
For installation requirements refer to NFPA 13 for sprinkler systems and to NFPA 14 for Standpipe and hose systems.
These valves are to be selected with the proper bonnet to provide required outlet pressures and flowrates and tested after installation in accordance with NFPA 13 and NFPA 14 whichever is applicable and re-tested periodically in accordance with NFPA 25.

1) Pipe unions or rubber-gasketed fittings have to be installed immediately upstream and downstream of the valve to permit easy replacement.
2) When a Pressure Reducing Valve of this nature is installed, pressure can be trapped on the downstream side of the valve. In accordance with NFPA 13, when the valve is used in a sprinkler system, a Pressure Relief Valve of not less than 1/2" inch size has to be installed downstream the Pressure Reducing Valve and pressure gauge have to be installed on the inlet and outlet sides of each Pressure Reducing Valve.
3) Connect the valve to the piping, paying attention to follow the arrows that are embossed on the valve which indicate the direction of flow.
4) Prior the installation, check that the valve is the appropriate bonnet type; bonnets are identified by letters (C-E-G-I-H-L-M-P) and the bonnet types are embossed on the bodies, below the handwheel.
5) Remember that those valves are Factory Set, then no adjustment/setting is required.
6) As the valve is automatic, the system must be flushed thoroughly to insure that all debris and impurities are removed.
7) Upon completion of the hydrostatic test on the system, it is important that the system be slowly filled with water in order to prevent water hammer.
8) After installation the valve should be flow tested to determine that the desired residual pressure and flow are provided at the valve outlet. Such testing is required by NFPA 14, Section 8-5.

✎ **NOTE.** Flow testing at the hydraulically most remote location of the standpipe system will not permit calculation of residual outlet pressures for valves at less remote locations equipped with other pressure reducing valves.

Function of the valves

The side indicated by an arrow is the outlet and is connected to the downstream flow. The water passing through the seat creates a reduction in downstream pressure.
The same seat is a check valve which does not allow a reverse flow from downstream to upstream; when the downstream pressure exceeds the upstream pressure, the valve automatically closes. The downstream pressure passes through a duct and reaches the upper circular chamber, and through the differential pressure it acting on the lower part of the stem and pushes the stopper (disc) downwards.
The pressure ratio, between upstream and downstream pressures, is controlled by the size of the bonnet; changing bonnet type modifies the ratio: having the same inlet pressure and flowrate, the larger is the bonnet, the lower is the outlet pressure. Bonnet sizes are in growing order: C – E – G – H – I -L – M – P (P is the larger bonnet, C is the smallest).



Maintenance

For inspection, testing and maintenance requirements of Water-Based Fire Protection Systems refer to NFPA 25.

1) It is recommended to conduct at least yearly a flow test to allow the valve to open and reset itself.
After the flow test has been run, it is important all pressure gauges be monitored to assure that the downstream pressure does not creep upward.
2) In the event the pressure does not hold, the test valve should be opened again to flush the valve.
3) The valve should be inspected for damage or corrosion and is not designed to accept replacement parts other than the hand wheel or few other non-functional components.
4) The valve should be operated by hand, never using a torque bar or other device to exert pressure.
Excess torque may damage the seat and/or stem, shutter and other working parts.
5) If the valve fails to perform as intended, the valve should be replaced.

⚠ **WARNING.** Direction of water flow is shown by the arrow on the valve body. Bonnet type is embossed on the upper part of the bonnet, below the hand wheel. Each valve is dispatched in conformity with the quality system after a complete test has been carried out.

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Technical features

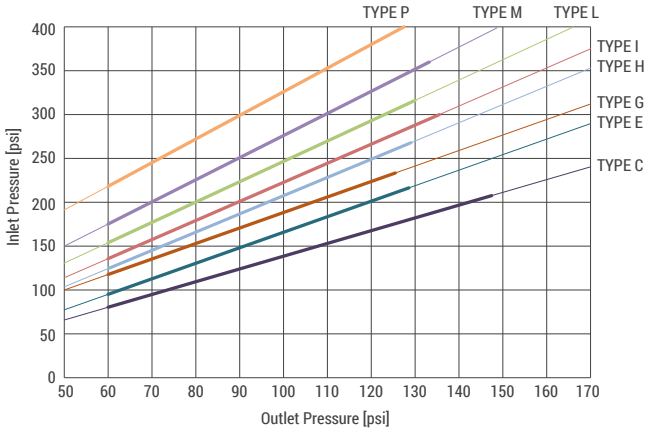
The A221, A222, A223 series valves are designed and Listed to reduce inlet pressures of up to 400 psig to the range from 50 to 175 psig. The valves also act as checking device.*

NOTE. * Note. Valves intended for use in sprinkler systems shall have a minimum residual pressure of 50 psi for the flow ranges specified in this datasheet.

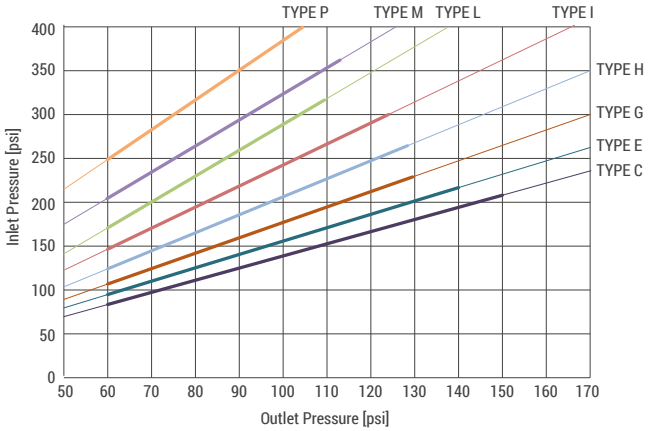
NOTE. Valves intended for standpipe system outlets shall provide residual outlet pressures equal or higher than 100 psi (but not exceeding 175 psi) for flows equal or higher than 250 gpm.

NOTE. Bold lines indicate the UL approved pressure range.

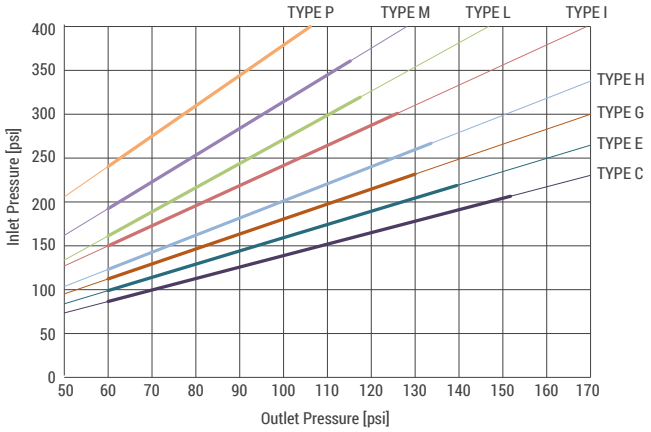
A221/A222 - 100 GPM



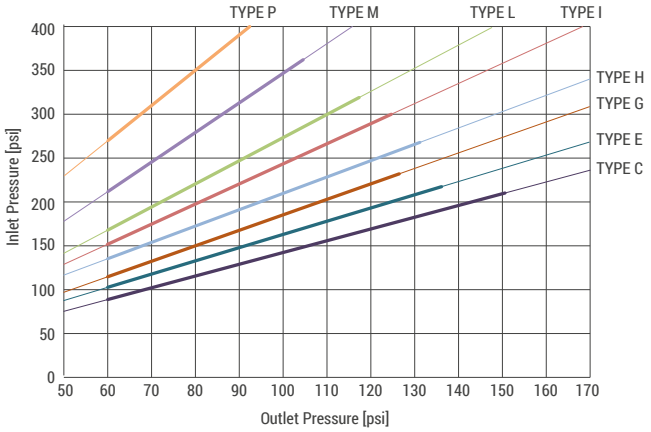
A221/A222 - 200 GPM



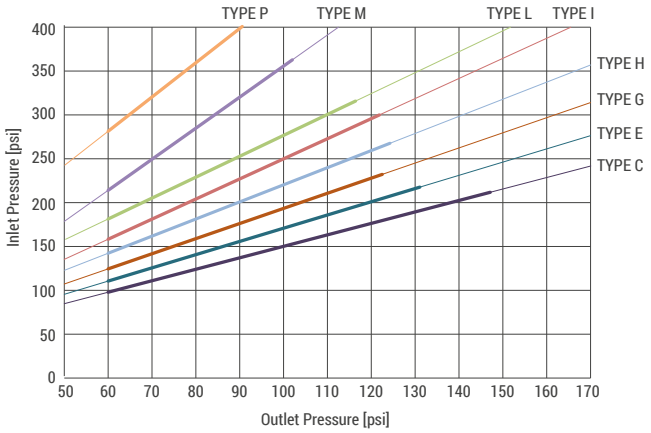
A221/A222 - 250 GPM



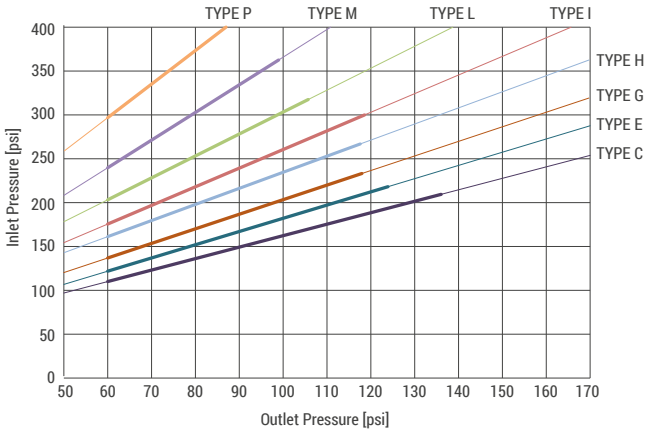
A221/A222 - 300 GPM



A221/A222 - 400 GPM



A221/A222 - 500 GPM



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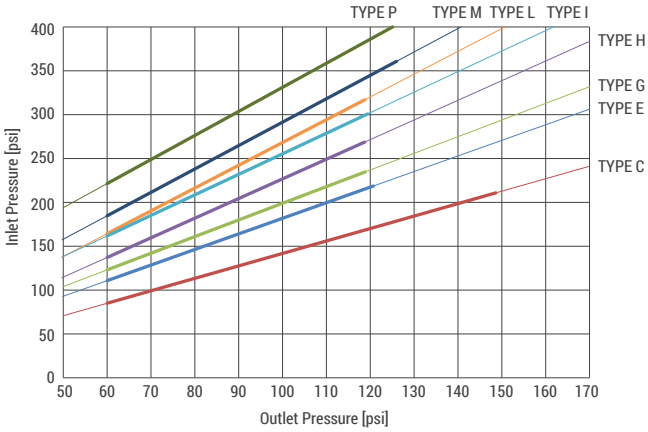
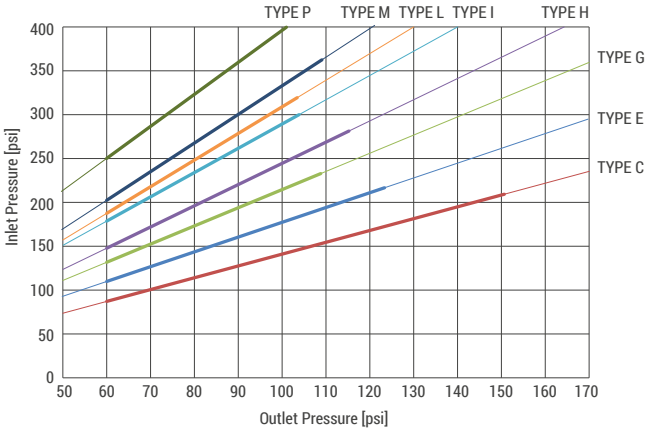
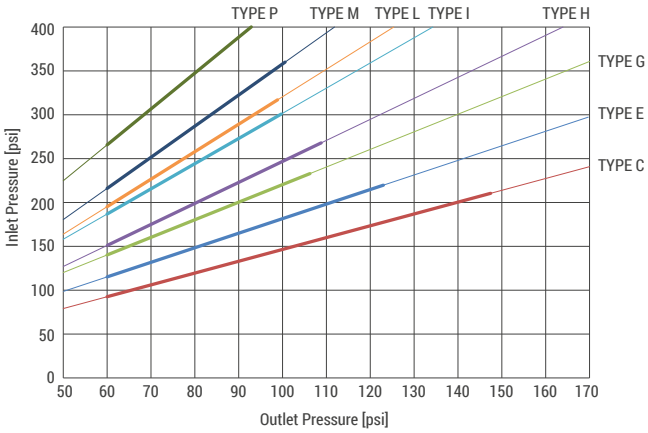
A223 - 100 GPM



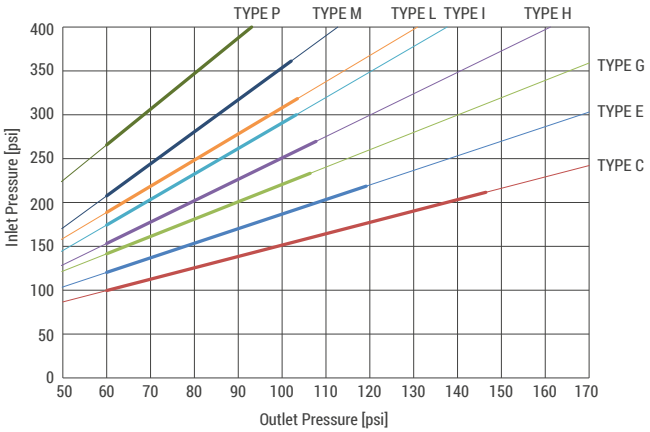
A223 - 200 GPM



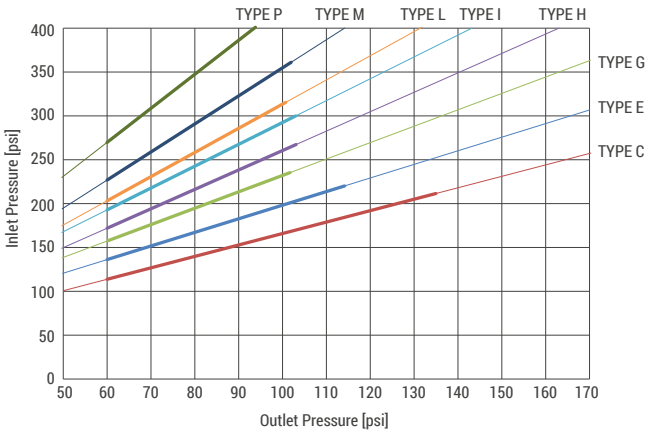
A223 - 250 GPM



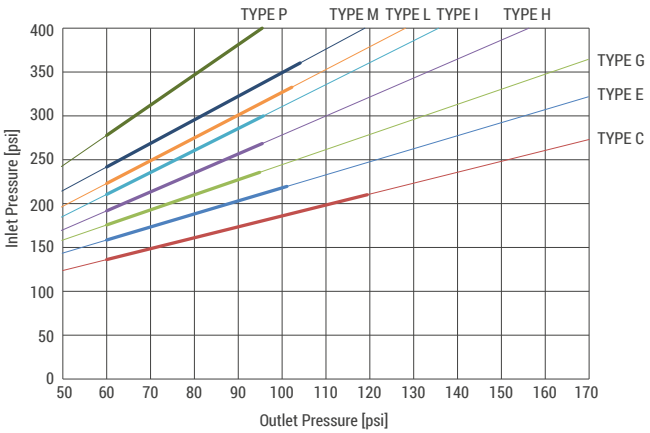
A223 - 300 GPM



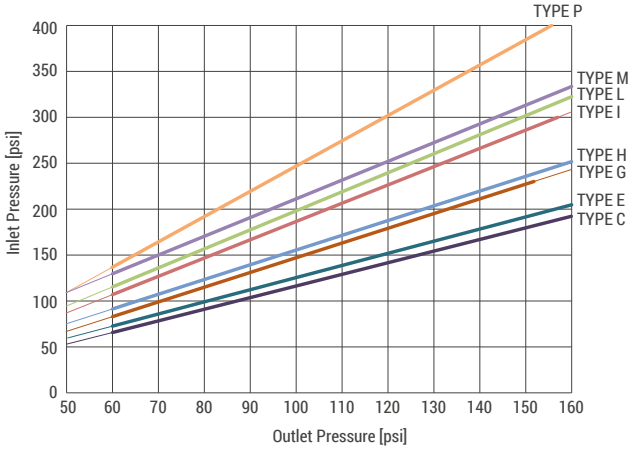
A223 - 400 GPM



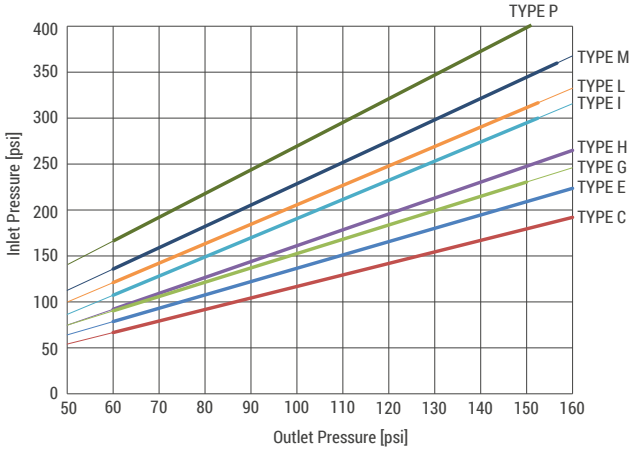
A223 - 500 GPM



A221/A222 - STATIC OUTLET

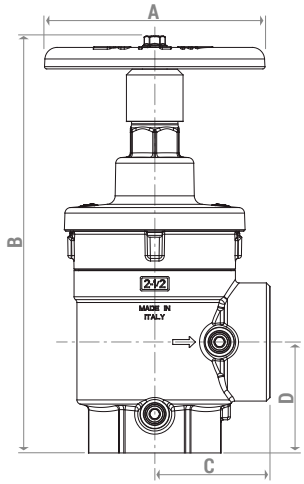


A223 - STATIC OUTLET

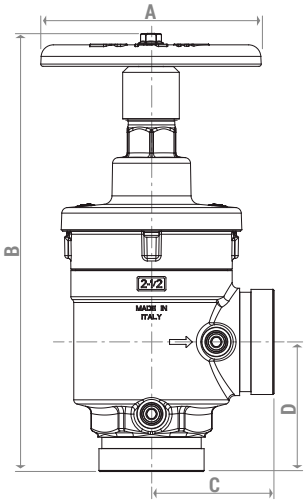


Dimensions

A221

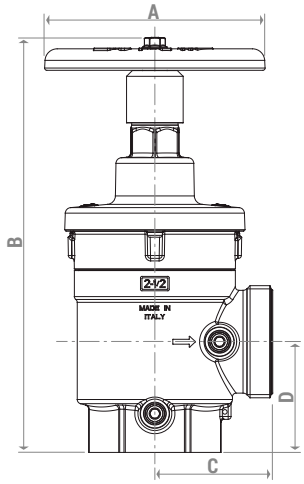


A221G

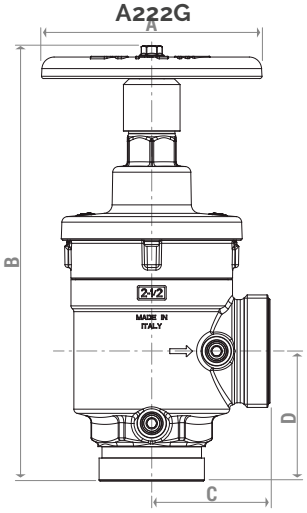


SIZE	TYPE	A	B	C	D
2-1/2" x 2-1/2"	Double female NPT Angle	6,02"	11,42"	3,17"	3,03"
	Double groove Angle	6,02"	12,88"	3,35"	3,54"

A222

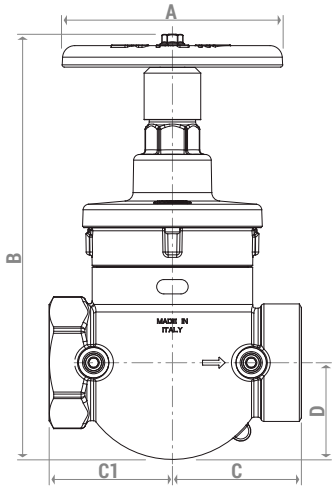


A222G

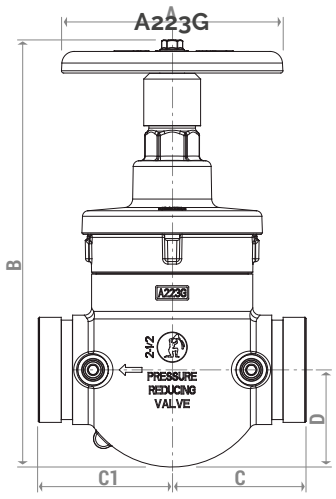


SIZE	TYPE	A	B	C	D
2-1/2" x 2-1/2"	Female NPT x Male hose thread Angle	6,02"	11,42"	3,23"	3,03"
	Groove x Male hose thread Angle	6,02"	12,80"	3,23"	3,54"

A223



A223G



SIZE	TYPE	A	B	C	C1	D
2-1/2" x 2-1/2"	Double female NPT Straight	6,02"	11,69"	3,54"	3,38"	2,66"
	Double groove Straight	6,02"	11,69"	3,66"	3,66"	2,66"

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Product specifications

A221, A221G

Factory Set Direct Acting Pressure Reducing Angle Valve used as a zone control valve for in-line application to regulate high-pressure sprinkler, stand pipe and combined fire protection systems. The body is made of forged brass with 2-1/2" female NPT threads or groove inlet and outlet. The handwheel is made of red painted aluminum. Four side ports 1/4" NPT are intended for pressure gauges. An internal checking device improves the backflow preventer feature. The valve is used to regulate inlet pressure up to 400 psi to a downstream pressure range of 50÷175 psi; the valve is UL and ULC listed up to 400 psi. An indicator bonnet shows whether valve is opened or closed.

A222, A222G

Factory Set Direct Acting Pressure Reducing Angle Valve used as a zone control valve for in-line application to regulate high-pressure sprinkler, stand pipe and combined fire protection systems. The body is made of forged brass with 2-1/2" female NPT threads or groove inlet and 2-1/2" male hose threaded outlet. The handwheel is made of red painted aluminum. Four side ports 1/4" NPT are intended for pressure gauges. An internal checking device improves the backflow preventer feature. The valve is used to regulate inlet pressure up to 400 psi to a downstream pressure range of 50÷175 psi; the valve is UL and ULC listed up to 400 psi. An indicator bonnet shows whether valve is opened or closed.

A223, A223G

Factory Set Direct Acting Pressure Reducing Globe (Straight) Valve used as a zone control valve for in-line application to regulate high-pressure sprinkler, stand pipe and combined fire protection systems. The body is made of forged brass with 2-1/2" female NPT threads or groove inlet and outlet The handwheel is made of red painted aluminum. Four side ports 1/4" NPT are intended for pressure gauges. An internal checking device improves the backflow preventer feature. The valve is used to regulate inlet pressure up to 400 psi to a downstream pressure range of 50÷175 psi; the valve is UL listed up to 400 psi. An indicator bonnet shows whether valve is opened or closed.

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