Pressure-Reducing Regulator Flow Curves

Technical Bulletin

Scope

Selecting a regulator for an application first requires review of its performance capabilities and their alignment with the application's requirements. The best starting point is the regulator's flow curve provided by the manufacturer, because it illustrates the regulator's range of capabilities at one glance. The curve represents the range of pressures that a regulator will maintain given certain flow rates in a system.

This technical bulletin provides an overview of how to read regulator flow curves for pressure-reducing regulators. It describes some of the complexities, including droop, seat-load drop or lockup, choked flow, hysteresis, and supply pressure effect (SPE), also known as dependency.

In addition, SPE values and flow curves for many Swagelok® KPR, KCY, KLF, KHF, KCP, KPP, KPF, and KHP series pressure-reducing regulators are provided for the full line of maximum inlet pressure ranges and flow coefficients available.

The Basics

A regulator's main purpose is to maintain a constant pressure on one side of the regulator even though there is a different pressure or fluctuating pressure on the other side. In the case of a pressure-reducing regulator, pressure is controlled downstream of the regulator.

A flow curve illustrates a regulator's performance in terms of outlet pressure (Y axis) and flow rate (X axis). Flow is not controlled by the regulator. It is controlled downstream by a valve or flow meter. The curve shows how a regulator will respond as flow in the system changes.

Let us examine how to read a flow curve. Examine the top curve in Fig. 1. The curve starts at 400 psig (27.5 bar), but drops slightly as flow increases across most of the graph.

When reading a flow curve, identify the range of flows that are seen in the system. Then, mark them on the graph to see what the corresponding changes in outlet pressure will be. Is that range of pressures acceptable? If not, a different regulator is needed.

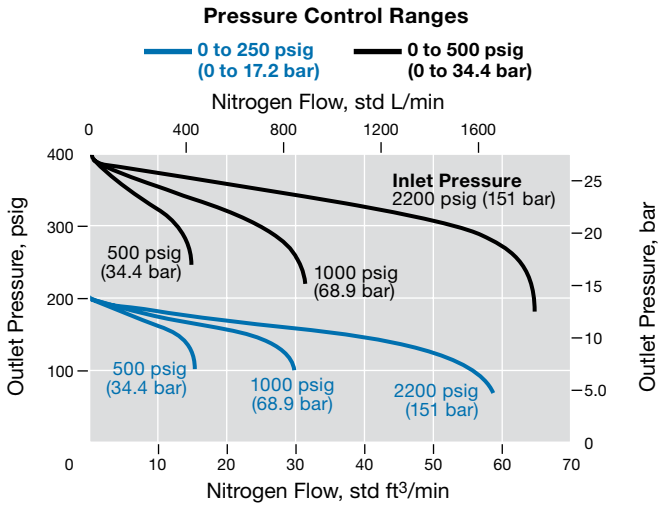

Fig. 1. Manufacturers often provide multiple flow curves for the same regulator at different inlet pressures to provide a range of the regulator's operating capabilities.

Ideally, a regulator operates best on the flattest part of the curve, and will maintain relatively constant pressures, even with significant changes in flow. At the extreme ends of the curve, however, there are steep drops where pressures change dramatically with even the slightest change in flow. The regulator will not operate at the highest level of efficiency at these locations.

For every set pressure, there is a different curve. In Fig. 1, there are two main sets of curves: one based on a set pressure of 400 psig (27.5 bar) with a control range of 0 to 500 psig (34.4 bar) and one on a set pressure of 200 psig (13.7 bar) with a control range of 0 to 250 psig (17.2 bar). The control ranges represent two separate regulators and the curves must be used separately. If the desired set pressure or inlet pressure is not shown on the graph, one can interpolate within a control range, but not between different control ranges.

There is one additional variable that affects the shape of a curve—the inlet pressure (i.e., pressure going into a pressure-reducing regulator on the upstream side). Note that for each of the two sets of curves in Fig. 1, there are three curves representing a range of inlet pressures.

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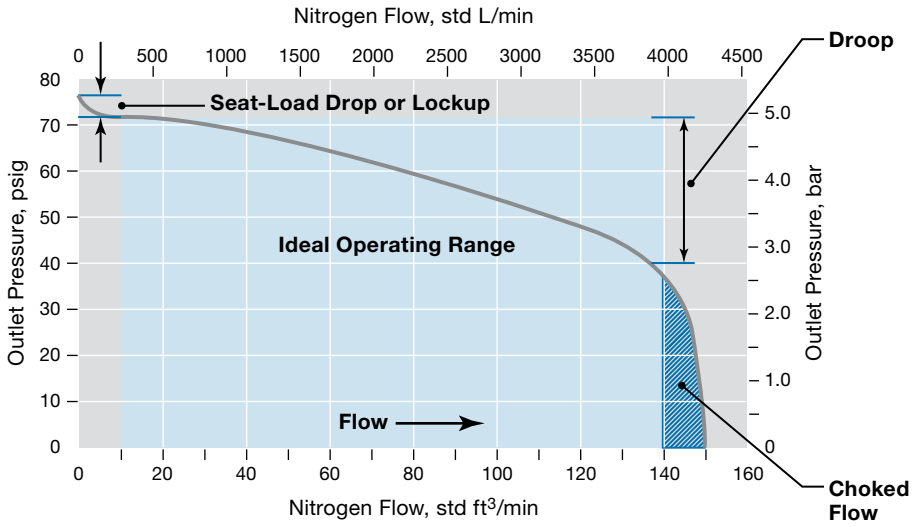


Fig. 2. This typical flow curve for a pressure-reducing regulator illustrates several phenomena, including the ideal operating range, droop, choked flow, and seat-load drop or lockup.

Droop, Seat-Load Drop, Choked Flow, Supply-Pressure Effect, and Hysteresis

As mentioned, it is best to operate a regulator along the flattest—or most horizontal—part of a flow curve. Indeed, an ideal flow curve would be a flat line. However, no regulator can produce a perfectly flat line over its full range of pressures because its internal components have limitations.

Typically, a flow curve consists of three parts (Fig. 2.):

- The ideal operating range, a relatively flat part in the middle
- A steep drop on the far left, which shows seat-load drop or lockup
- A steep drop on the far right, which shows the choked-flow area.

Droop

The flat part in the middle is not perfectly flat. Usually, it slopes downward. This is called droop. As flow increases, outlet pressure will drop some—or a lot, depending on the regulator design. While droop is relatively modest along the flat part of the curve, it is quite steep at the far ends of the curve.

Supplying a regulator with pressures substantially lower than the inlet pressure rating results in a flow curve with more droop than flow curves for regulators whose inlet pressure rating closely matches actual system pressure (Fig. 3). In addition, selecting a regulator that closely matches inlet pressure requirements provides the best handle resolution (smaller amount of pressure change per turn of the handle) and control, enabling a broader ideal operating range.

Seat-Load Drop or Lockup

Seat-load drop occurs on the far left of the regulator curve (Fig. 2), where there is initially a steep drop in pressure. If reading the curve from left to right, imagine that the system is in a no-flow state. The regulator is set to a certain pressure, but there is no flow. Then, imagine that an operator slowly opens a downstream valve to initiate flow. Immediately, there is a sharp drop in pressure because it is difficult for a regulator to maintain pressure at this location. A regulator operating along this steep drop in the curve may emit chattering or pulsating sounds as it fluctuates between flow and no-flow conditions.

Now read the curve from right to left. Imagine that the system is operating along the flat part of the curve. Then, imagine that an operator slowly closes a downstream valve, reducing flow to near zero. We are moving up the curve. As the no-flow

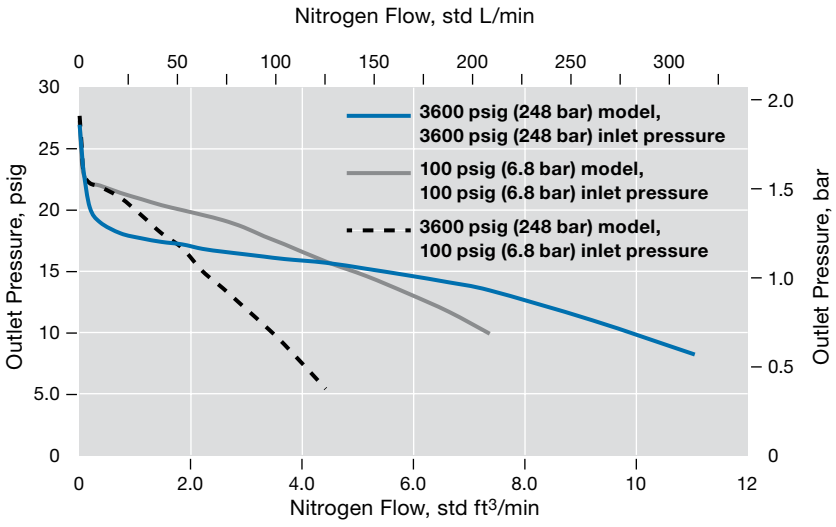


Fig. 3. Flow curves for regulators whose inlet pressure rating closely matches actual system pressure show less droop and a broader ideal operating range than the curve for a regulator whose inlet pressure rating is much higher than the actual system pressure.

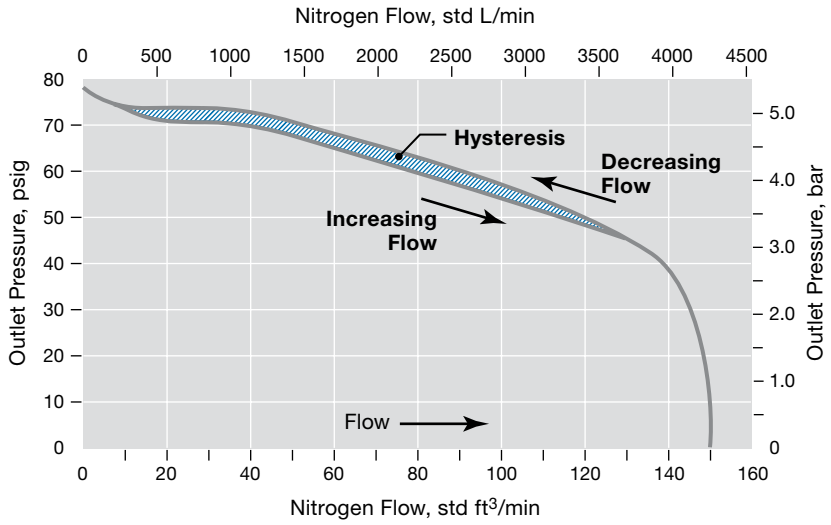


Fig. 4. The phenomenon of hysteresis reveals that at the same flow volume, outlet pressure is higher with decreasing flow than with increasing flow. *Hysteresis is shown larger than normal for illustration purposes.*

state nears, the regulator has difficulty maintaining the set pressure. Again, the regulator may emit a chattering sound. Eventually, the regulator snaps shut, stopping flow. This is called lockup.

The terms seat-load drop and lockup are essentially interchangeable. Sometimes, lockup is used to describe both conditions. It is not advisable to operate a regulator under these conditions.

Choked Flow

Choked flow occurs on the far right of a curve. See the choked-flow area in Fig. 2, where pressure begins to droop sharply at 140 std ft^3/min (3960 std L/min). At this point, the flow demand has exceeded the pressure-controlling capabilities of the regulator. Here, the regulator is wide open and is no longer regulating pressure. Essentially, it has changed from a pressure-controlling device to an open orifice. Increasing downstream flow to this point or beyond renders the regulator ineffective. It is not advisable to operate a regulator in the choked-flow area due to the sharp pressure drop.

Note that C_v is measured at the regulator's fully open position, and that is why it cannot describe the overall performance of the regulator.

In fact, selecting a regulator based solely on its flow coefficient (C_v) can result in unsatisfactory performance. If the system flow is within range of the regulator's C_v, one may believe that the regulator is the right "size." But that is not necessarily true. The C_v represents the regulator's maximum flow capacity. At maximum flow, a regulator can no longer control pressure.

Hysteresis

See Fig. 4, above. When reading left to right, flow is increasing. And the reverse is true when reading right to left. Depending on whether flow is increasing or decreasing, the curve differs slightly. Outlet pressure does not follow the same "droop line" or end at the original set pressure. This phenomenon is called hysteresis.

Hysteresis results from dynamic friction forces within the regulator, but is usually not an issue when evaluating the performance of a regulator. However, it can be a point of confusion during system operation. Suppose an operator sets up a system to deliver an outlet pressure of 50 psig (3.4 bar) at 110 std ft^3/min (3115 std L/min). The next day, the pressure is now 50.5 psig (3.48 bar), but the flow is still 110 std ft^3/min (3115 std L/min). It is likely that something in the system temporarily created more flow demand downstream. Moving from left to right on the curve, the temporary flow increase slightly reduced the outlet pressure. Then, as the flow demand returned to 110 std ft^3/min (3115 std L/min), hysteresis caused the outlet pressure to return to a point slightly higher than the initial set point.

It is recommended to approach set pressure from a lower pressure. Another best practice is to employ pressure gauges in the system to help fine tune regulator settings to achieve desired operating pressures.

Supply-Pressure Effect

Supply-pressure effect (SPE) or dependency is a ratio describing the change in outlet pressure per 100 psi (6.8 bar) change in inlet pressure. In other words, for every 100 psi (6.8 bar) drop in inlet pressure, the outlet pressure will increase by *X* psi. *X* is the SPE. For standard pressure-reducing regulators, the outlet pressure increases as supply pressure decreases. The opposite is true as supply pressure increases. This effect can also be realized on system startup or shutdown.

The regulator should be set to the "off" position before turning the supply pressure on or off to prevent overpressurization of regulator diaphragms, outlet pressure gauges, or other equipment downstream. When selecting an antitamper model, it is important to make sure that SPE will not cause excessive overpressurization on opening and closing of the supply pressure.

Flow Considerations

Flow curves are dependent on the media flowing through the system. Depending on the fluid's specific gravity (density), viscosity, and physical phase (gas or liquid), the amount of droop and where choked flow occurs will change. Higher specific gravities will cause greater droop (steeper flow curves) than lower specific gravities because the regulator is forced to open wider to maintain an equivalent flow rate. Further, a regulator's maximum flow rate will be lower for a fluid with higher specific gravity, resulting in a lower flow rate for the choked-flow range.

For spring-loaded models, handles are factory set to avoid overcompressing the spring, thereby limiting maximum outlet pressure. This setting is made at the no-flow condition. Use the flow curve to interpolate what the no-flow outlet pressure will be to ensure the pressure control range selected can achieve the pressure/flow setting required. Relief valve settings downstream of the regulator must also be considered with regard to pressure rise as the flow is terminated.

Gas Flow

Manufacturers usually create gas flow curves using air or nitrogen. If the system media is a different fluid, it may be necessary to adjust the flow scale to account for the difference between the specific gravity of the actual system fluid (G_{actual}) and that of the fluid used to create the curve (G_{ref}). The effect of specific gravity changes the flow rate by a factor (F_G):

$$F_G = \sqrt{\frac{G_{ref}}{G_{actual}}}$$

Nitrogen has a specific gravity of 0.97, so the correction factor can be calculated by:

$$F_G = \sqrt{\frac{0.97}{G_{actual}}}$$

where G_{actual} is the specific gravity of your system fluid.

For convenience, below is a list of specific gravity correction factors calculated with this equation to adjust a flow scale from nitrogen to several other gases.

Gas	Specific Gravity Correction Factor (F_G from Nitrogen)
Air	0.98
Ammonia	1.28
Argon	0.84
Arsine	0.60
Carbon dioxide	0.80
Helium	2.65
Hydrogen	3.72
Hydrogen chloride	0.87
Oxygen	0.94
Silane	0.93

For example, the correction factor for carbon dioxide is 0.80. Therefore, the point on a flow curve showing a nitrogen flow volume of 100 std ft^3/min (2831 std L/min) indicates a comparable carbon dioxide flow of 80 std ft^3/min (2265 std L/min). The curve is the same, but the flow scale changes.

In a similar way, adjustments may be needed to account for an actual temperature different from the temperature used for the test. Below is a list of correction factors that can be used to account for differences from a test temperature of 70°F (20°C).

Temperature °F	Temperature °C	Temperature Correction Factor
–40	–40	1.12
–20	–28	1.10
0	–17	1.07
20	–6	1.05
70	20	1.00
100	37	0.97
150	65	0.93
212	100	0.89
250	121	0.86
300	148	0.84
350	176	0.81
400	204	0.78

For example, if the actual system temperature is 100°F (37°C), the point on a flow curve showing a flow volume of 100 std ft^3/min (2831 std L/min) would adjust to 97 std ft^3/min (2747 std L/min).

Liquid Flow

The same regulator will produce flow curves with substantial differences between gas and liquid fluids—flow curves for liquid media will show steeper droop rates and lower maximum flow. Avoid using flow curves generated with gas flow when selecting a regulator for a liquid flow application, as the differences between the curve and the regulator's performance in a liquid system will be significant.

Also keep in mind that not all regulators are suitable for liquid service. The higher forces on the poppet from liquid flows can cause extreme chatter, resulting in damage within the regulator. Be sure the regulator model and pressure range have been tested for liquid applications to ensure a positive performance.

Another consideration is to understand fully the effects of pressure drop on the liquid, given the application parameters. In applications where the liquid is close to its bubble point, it is likely that the pressure drop within the regulator will create bubbles or even start to vaporize the liquid. A two-phase mixture can cause component failure, fluid sample distortion, or clogging of lines. Be sure that the pressure drop will consistently maintain a liquid phase throughout a wide temperature range, or install the regulator in a location that minimizes the risk of bubble creation.

Finally, as is the case with gases, you may need to adjust the flow scale based on the difference in specific gravity between the liquid used to generate the flow curve (typically hydraulic oil or water) and the liquid to be used in your system. The liquid flow curves in this document were generated from flow tests using hydraulic oil with a specific gravity of 0.86.

For convenience, below is a list of specific gravity correction factors calculated to adjust a flow scale from hydraulic oil to several other liquids.

Liquid	Specific Gravity Correction Factor (F_G from Hydraulic Oil)
Ethyl alcohol	1.04
Gasoline	1.07
Kerosene	1.02
Pentane	1.18
Water	0.93

For example, the correction factor for water is 0.93. Therefore, the point on a flow curve showing a hydraulic oil flow volume of 10 U.S. gal/min (37.8 L/min) indicates a comparable water flow of 9.3 U.S. gal/min 35.2 L/min).

A safety concern can arise when using a positive displacement pump in a liquid system. The pump can cause impulses through the regulator that can fatigue and eventually cause failure in a metal diaphragm. Also, without proper relief mechanisms, the pump may cause excessive pressure rises that rupture components within the fluid system, even with a properly operating regulator. Always ensure proper relief devices are installed to protect components from burst failure.

Flow Curve Checklist

When selecting a regulator, consult the flow curve in addition to the C_v value.

- Identify the range of flows expected. Given that range, the curve will indicate what pressures the regulator can be expected to maintain.
  - A regulator operates best along the relatively flat part of its curve. Make sure the control range selected can accommodate the droop to meet the pressure requirement at the desired flow rate.
  - Avoid operating a regulator at the far ends of the curve where undesirable conditions like lockup and choked flow occur.
- Does it reflect the required pressure, set pressure, and inlet pressure range?
- For gas regulators, will supply-pressure effect be an issue when the system is shut down or restarted?
- Do you need to calculate any specific gravity or temperature adjustments?
- Finally, make sure all measurement units agree. Pressure readings are provided most commonly in psig or bar. Flow rate units of measure depend on the system media, so be sure to note whether the regulator is rated for liquid or gas service. Liquid flow is typically expressed as gallons per minute (U.S. gal/min) or liters per minute (L/min), while gas flow is conveyed as standard cubic feet per minute (std ft^3/min) or standard liters per minute (std L/min).

If a flow curve is not available or if you need additional help in selecting a regulator, contact your authorized Swagelok sales and service representative for guidance on properly sizing a regulator for an application.

Flow Curves

KPR Series

- Flow coefficients of 0.02, 0.06, 0.20, and 0.50
- Pressure control ranges from 0 to 10 psig (0 to 0.68 bar) through 0 to 500 psig (0 to 34.4 bar)
- Maximum inlet pressures from 100 to 6000 psig (6.8 to 413 bar)

KCY Series

- Flow coefficients of 0.06, 0.20, and 0.50
- Pressure control ranges from 0 to 10 psig (0 to 0.68 bar) through 0 to 500 psig (0 to 34.4 bar)
- Maximum inlet pressures from 3000 to 6000 psig (206 to 413 bar)

KLF Series

- Flow coefficients of 0.02, 0.06, 0.20, and 0.50
- Pressure control ranges from 0 to 2.0 psig (0 to 0.13 bar) through 0 to 250 psig (0 to 17.2 bar)
- Maximum inlet pressures from 15 to 3600 psig (1.0 to 248 bar)

KHF Series

- Flow coefficient of 1.0
- Pressure control ranges from 0 to 10 psig (0.68 bar) through 0 to 250 psig (17.2 bar)
- Maximum inlet pressures from 100 to 3600 psig (6.8 to 248 bar)

KCP Series

- Flow coefficients of 0.02, 0.06, 0.20, and 0.50
- Pressure control ranges from 0 to 10 psig (0.68 bar) through 0 to 1500 psig (103 bar)
- Maximum inlet pressures from 100 to 3600 psig (6.8 to 248 bar)

KPP Series

- Flow coefficients of 0.02 and 0.06
- Pressure control ranges from 0 to 1000 psig (68.9 bar) through 0 to 3600 psig (248 bar)
- Maximum inlet pressures from 2000 to 6000 psig (137 to 413 bar)

KPF Series

- Flow coefficient of 1.0
- Pressure control ranges from 0 to 1000 psig (68.9 bar) through 0 to 4000 psig (275 bar)
- Maximum inlet pressure of 6000 psig (413 bar)

KHP Series and KHR Series

- Flow coefficients of 0.06 and 0.25
- Pressure control ranges from 0 to 500 psig (34.4 bar) through 100 to 10 000 psig (6.8 to 689 bar)
- Maximum inlet pressure of 10 000 psig (689 bar)

KPR Series Pressure-Reducing Regulators Gas Flow

The KPR series is a compact regulator with excellent accuracy, sensitivity, and set-point pressure stability.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 100 psig (6.8 bar)	250 psig (17.2 bar) and Higher
	Supply Pressure Effect, %	
0.02	0.3	0.5
0.06	1.0	1.5
0.20	1.7	2.5
0.50	2.3	3.3

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

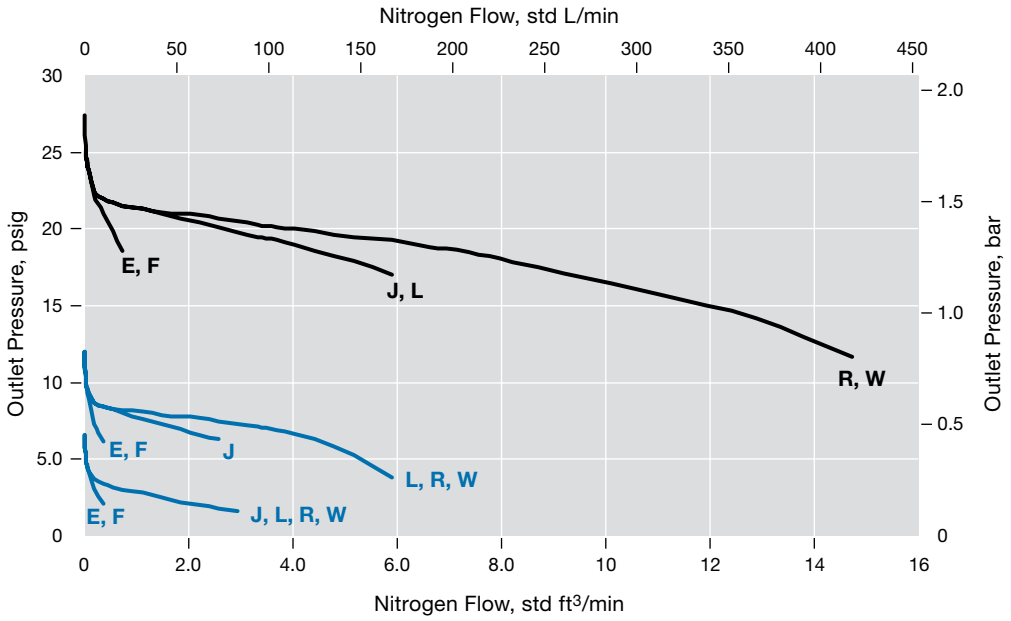
Flow Coefficient 0.02, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

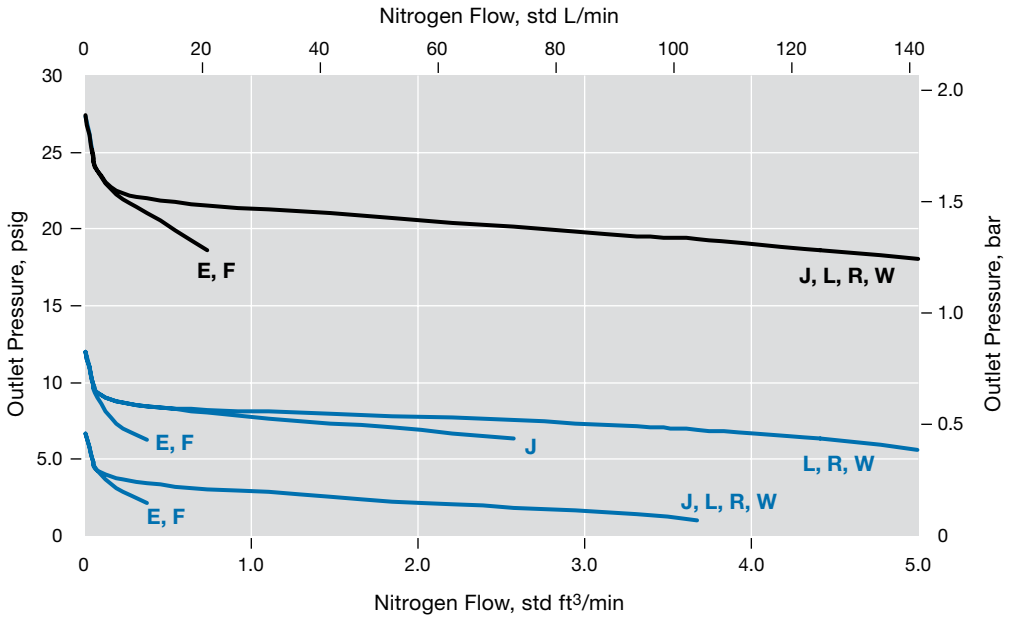
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

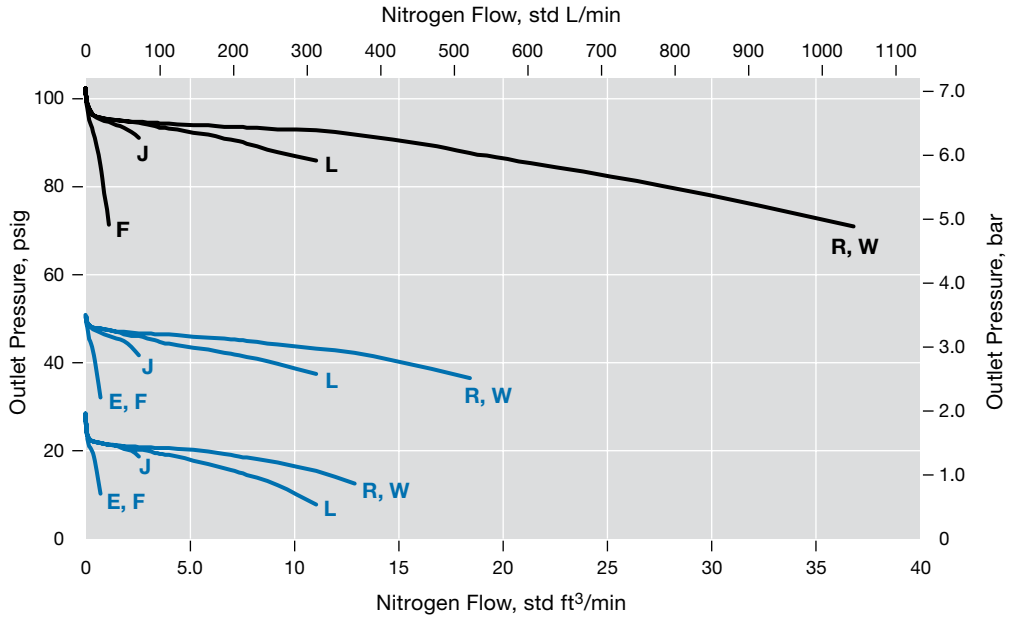
Flow Coefficient 0.02, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

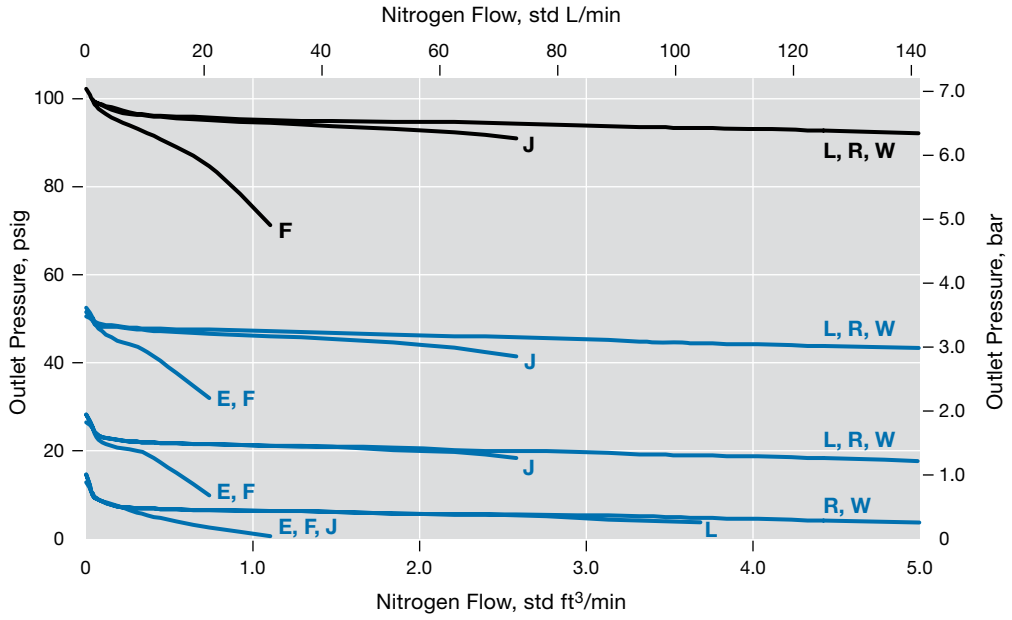
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

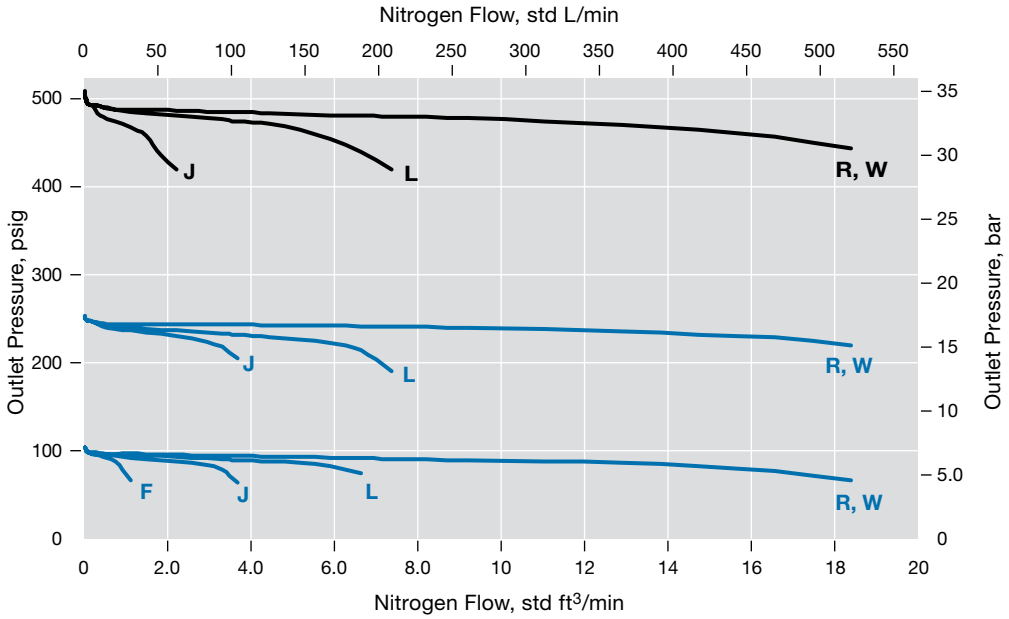
Flow Coefficient 0.02, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

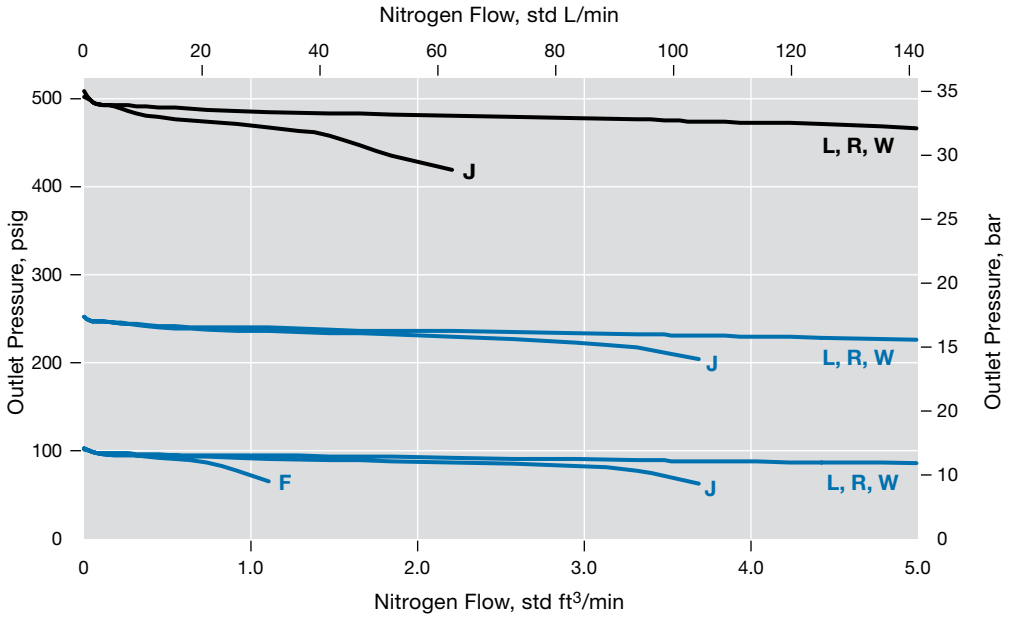
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

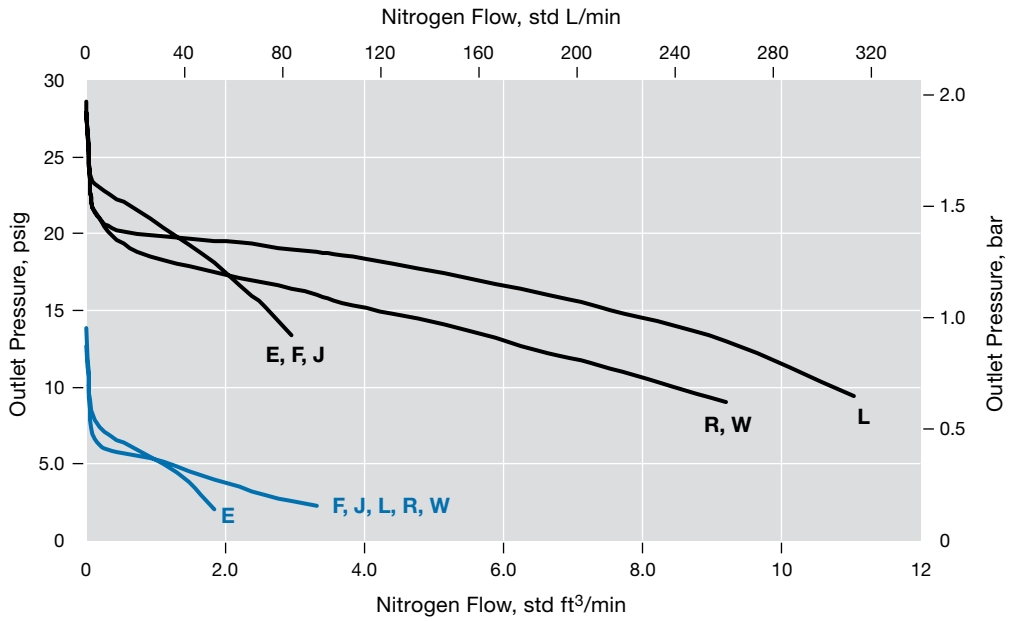
Flow Coefficient 0.06, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

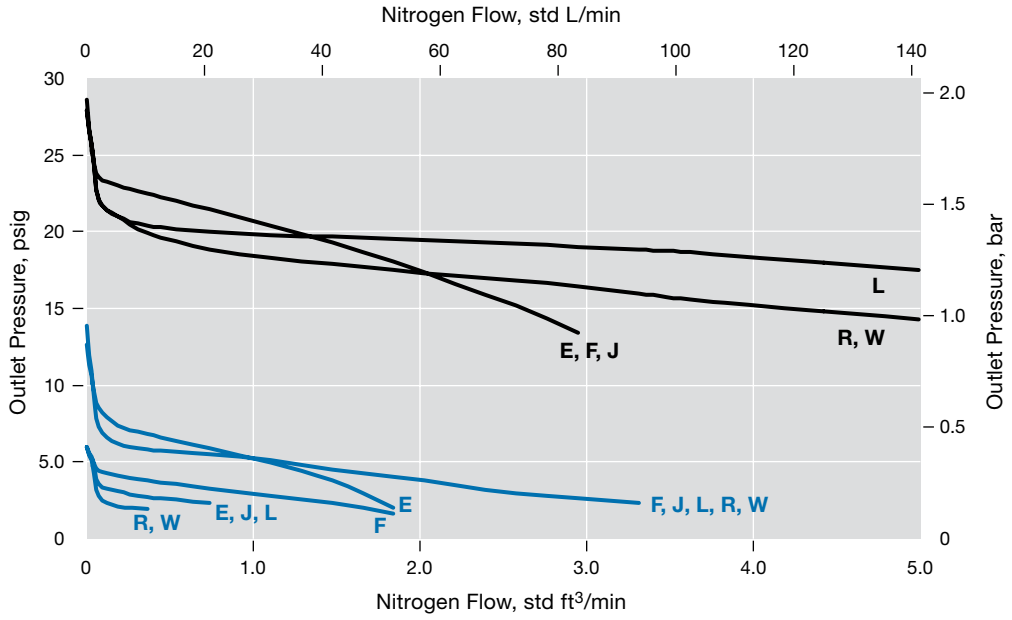
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
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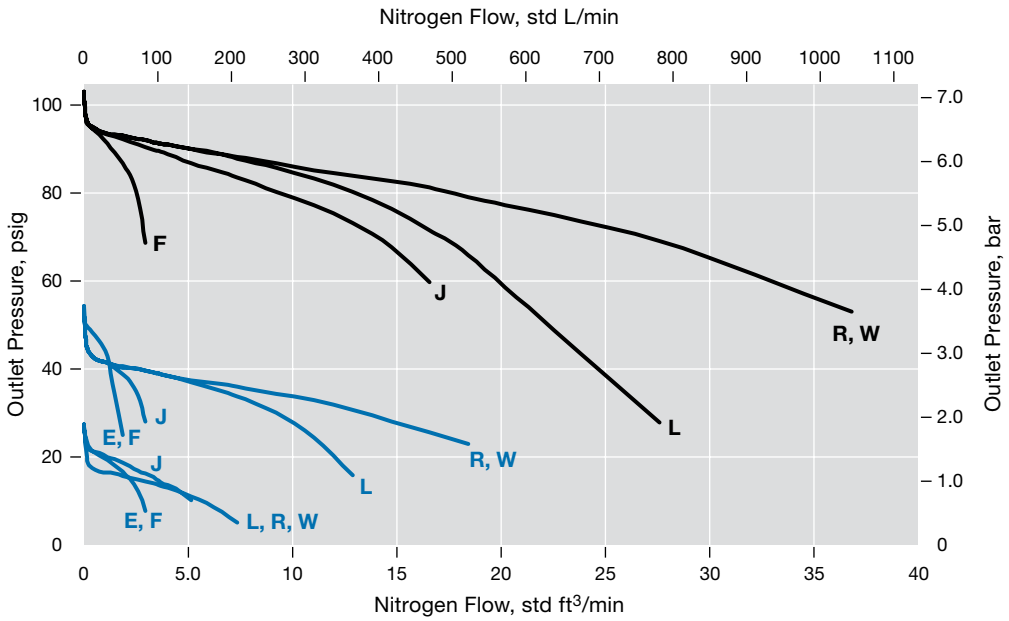
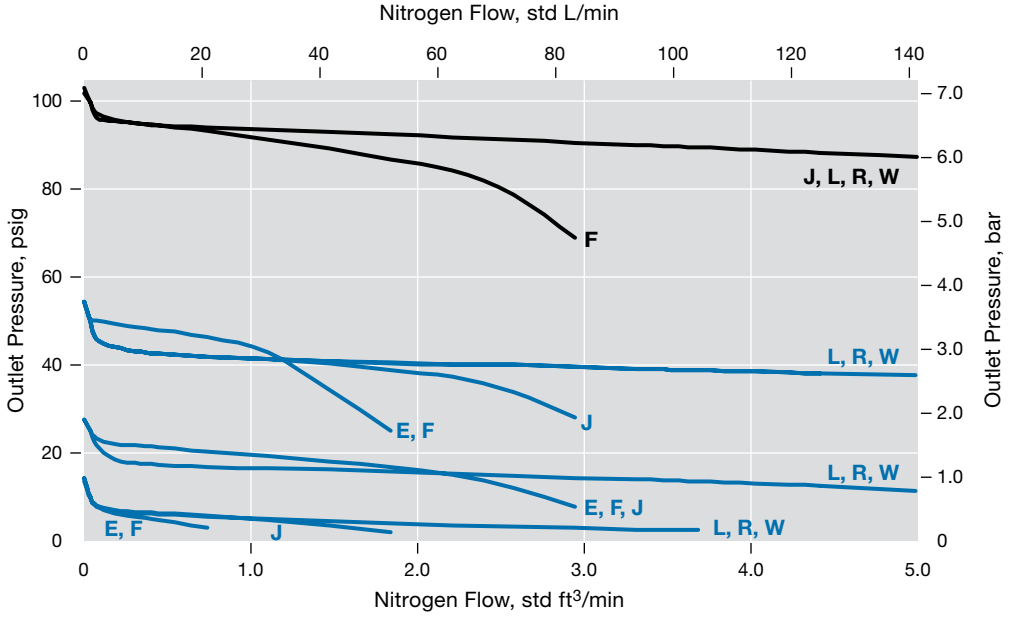




KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

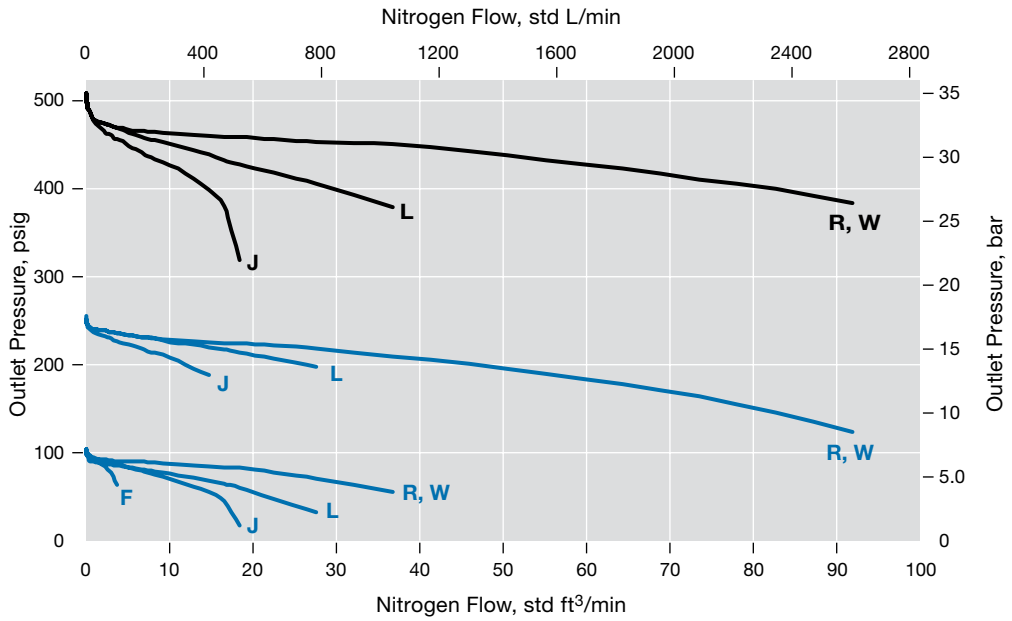
Flow Coefficient 0.06, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

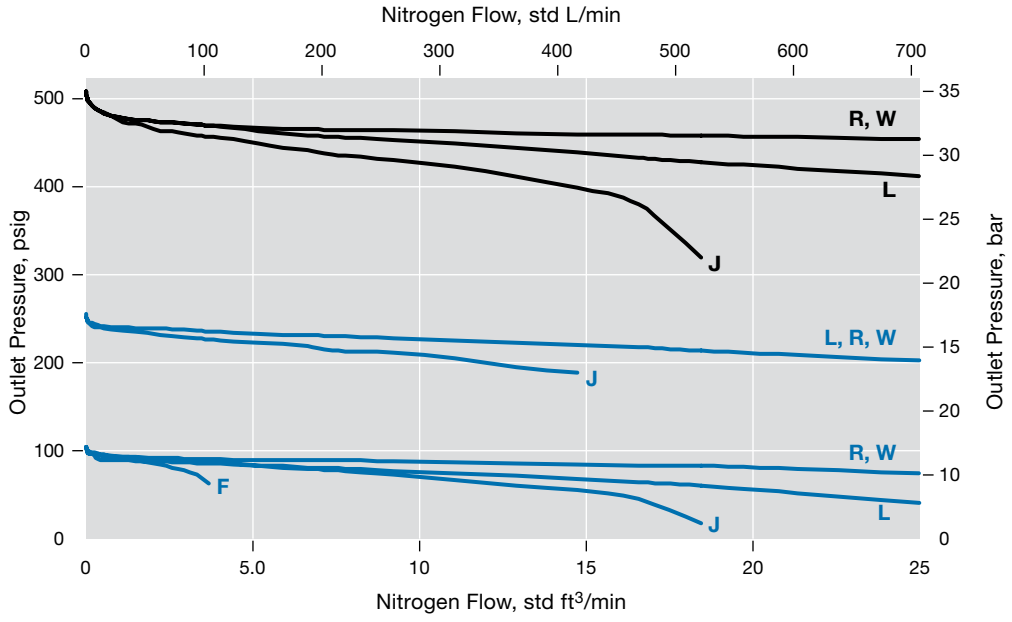
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

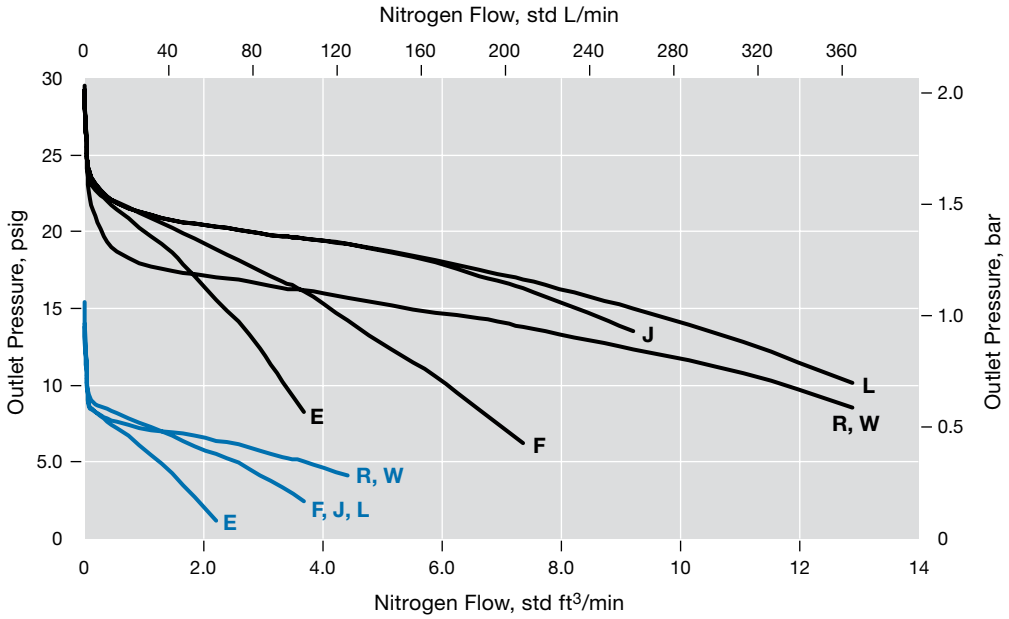
Flow Coefficient 0.20, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

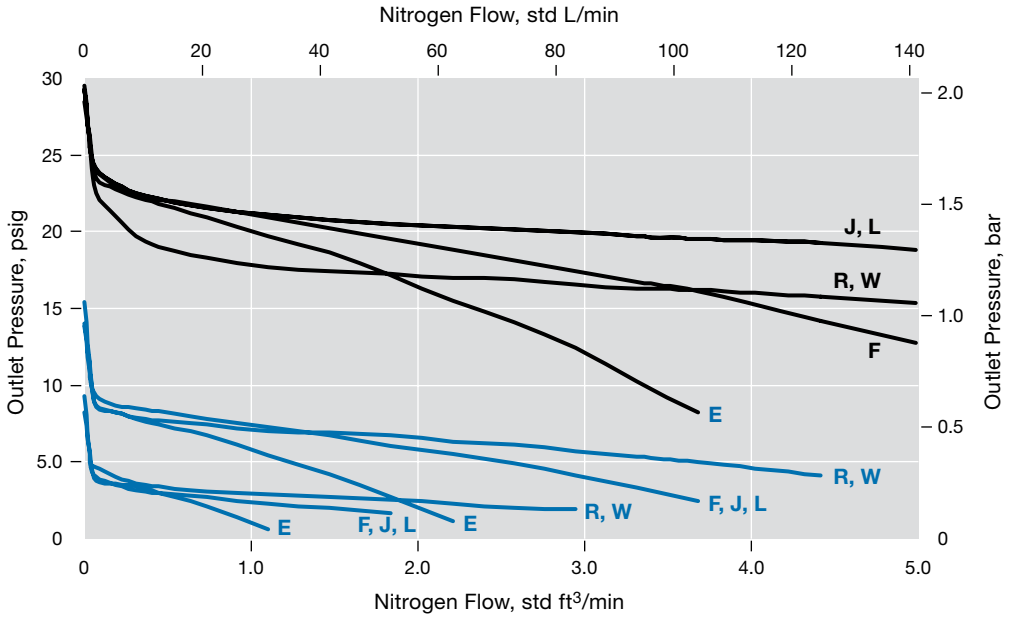
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

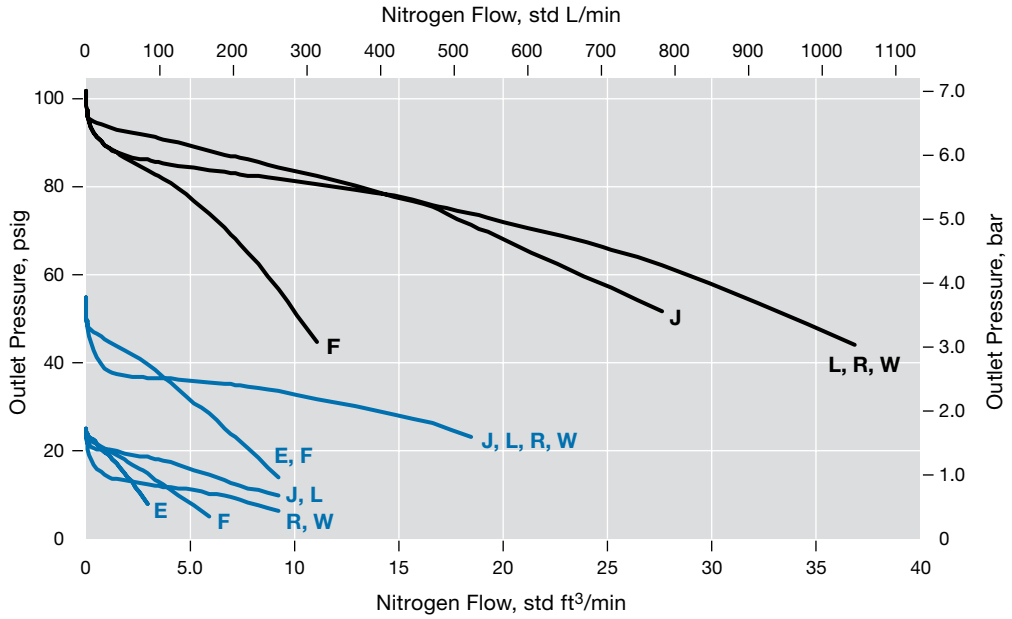
Flow Coefficient 0.20, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

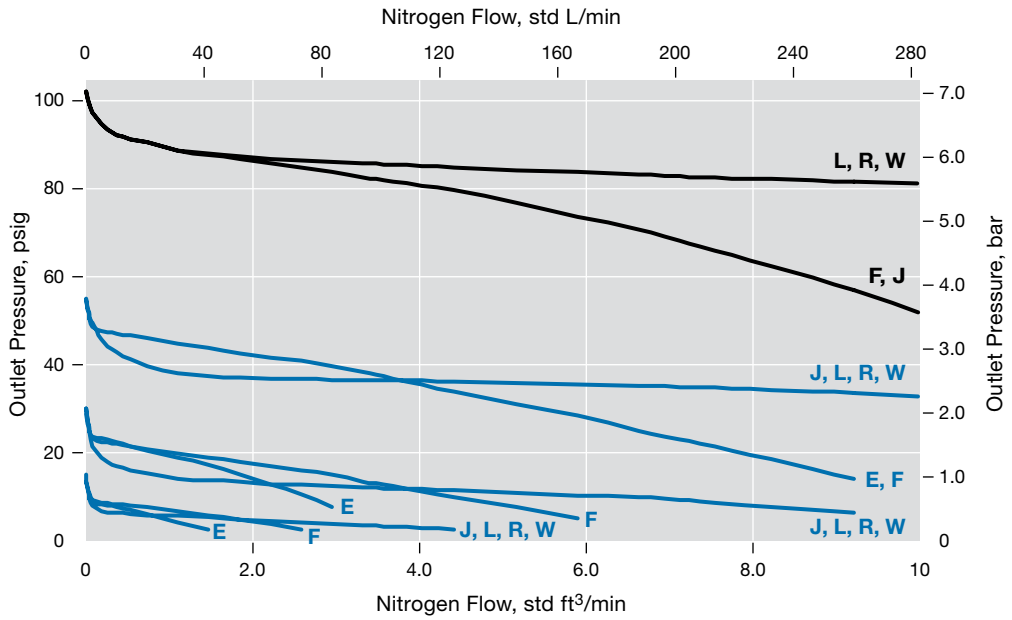
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

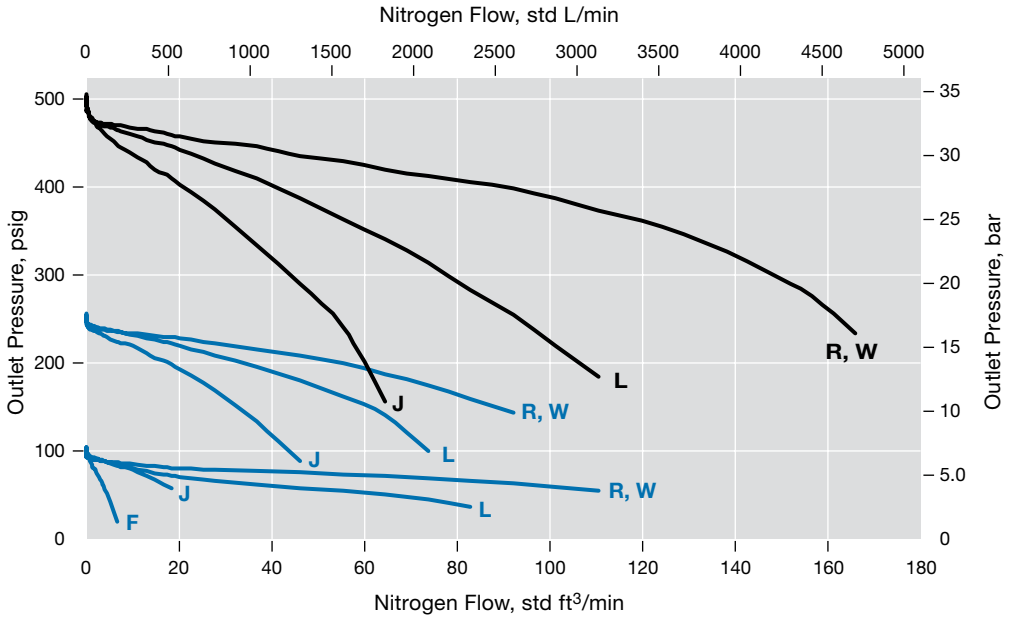
Flow Coefficient 0.20, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

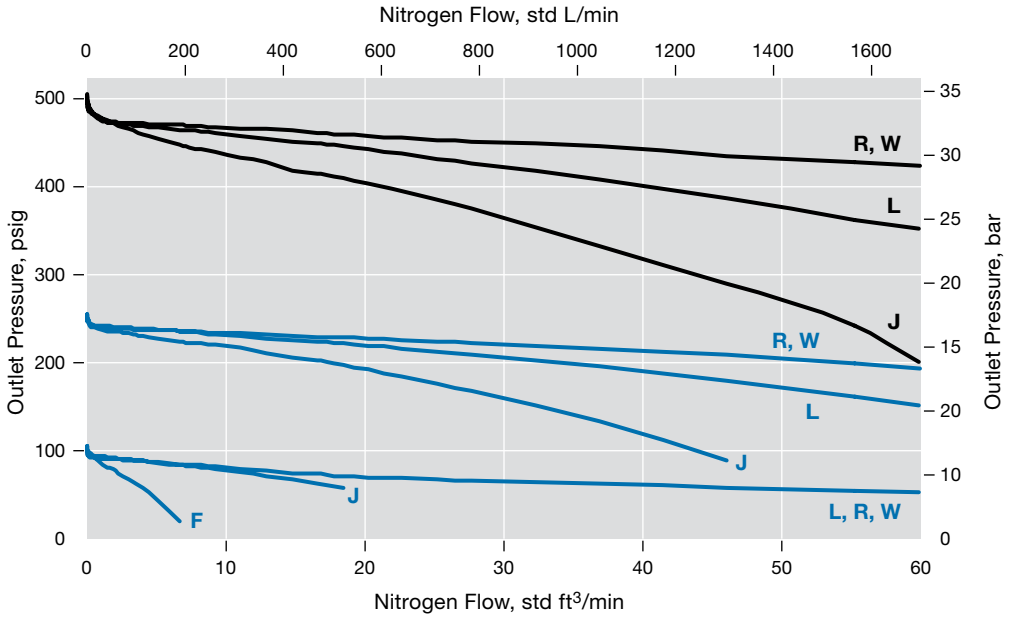
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

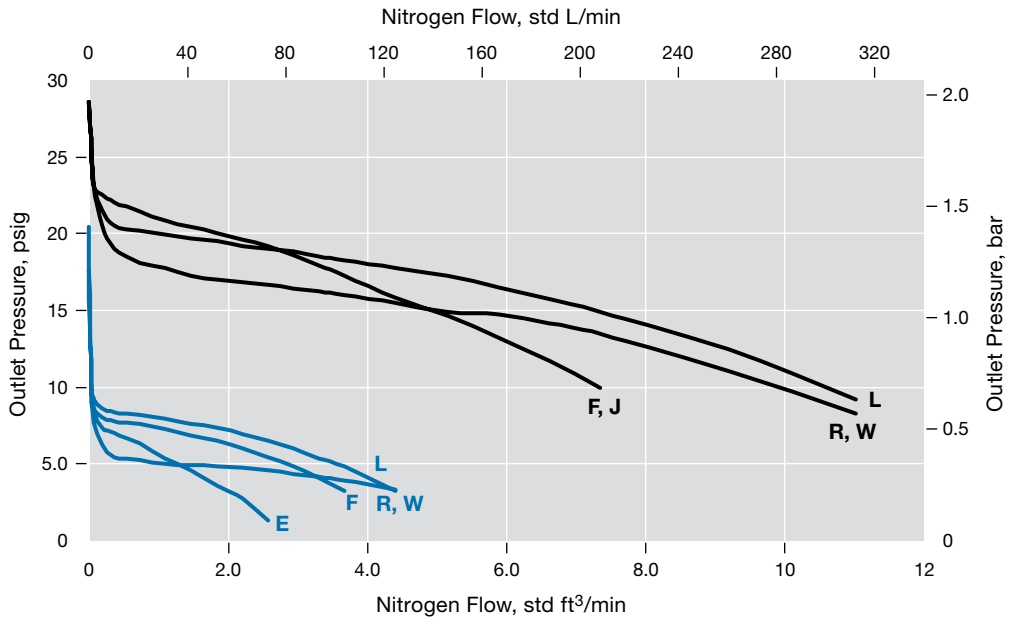
Flow Coefficient 0.50, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

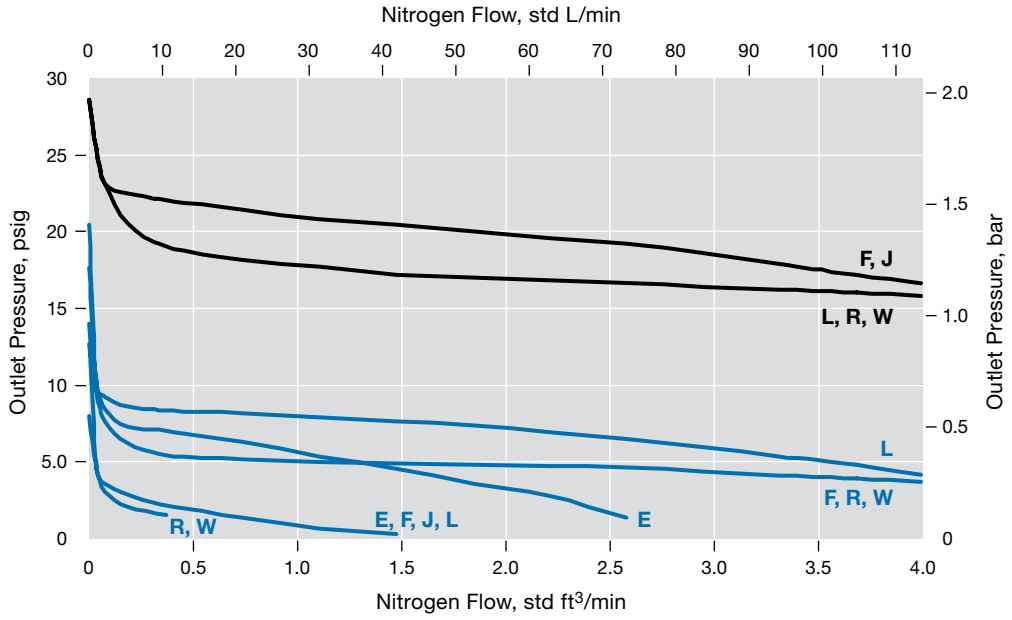
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

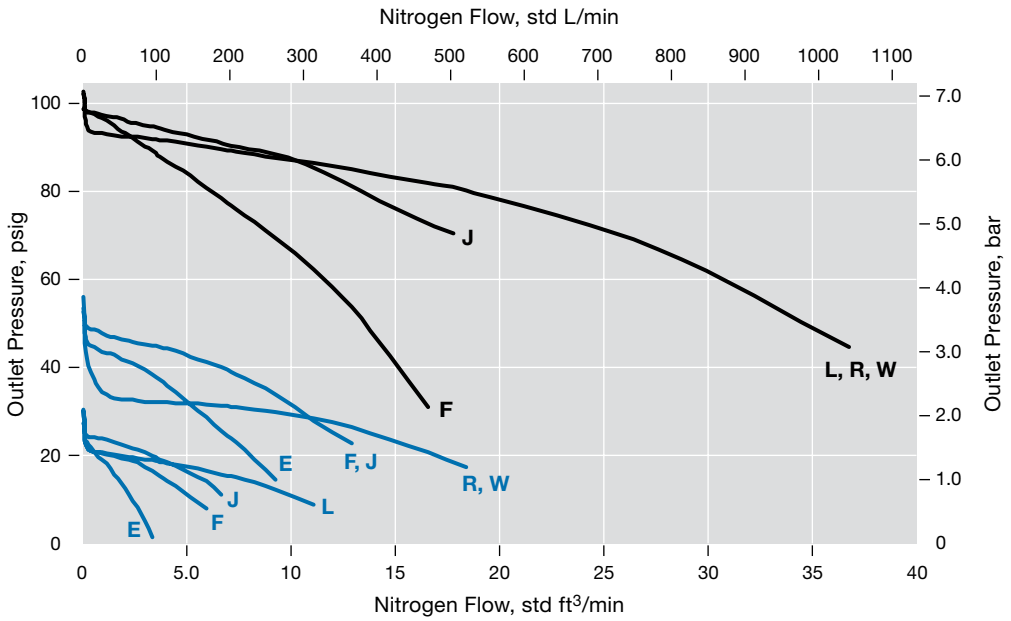
Flow Coefficient 0.50, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

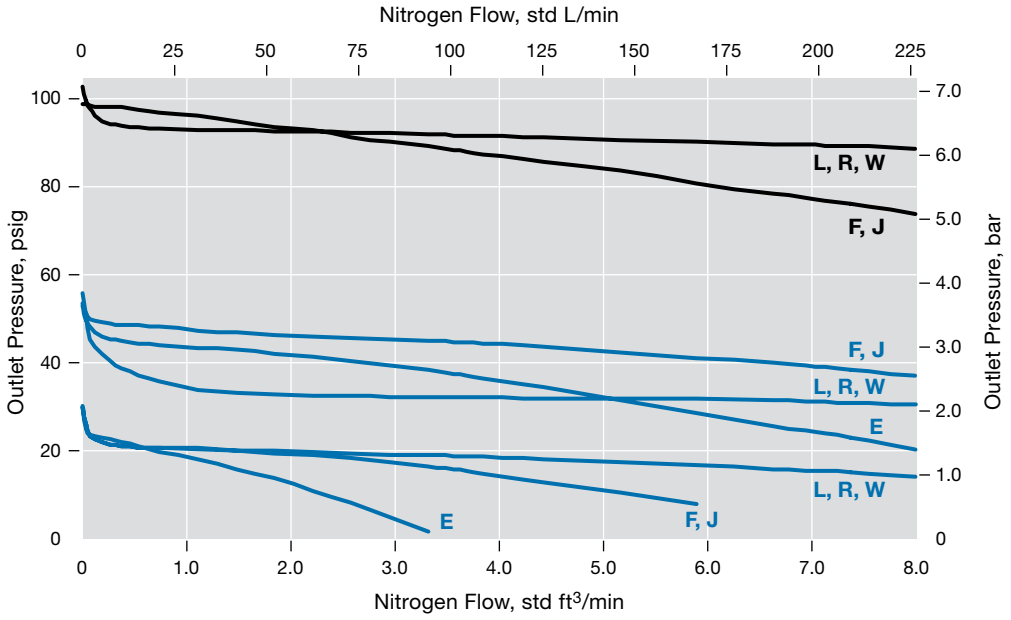
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPR Series Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

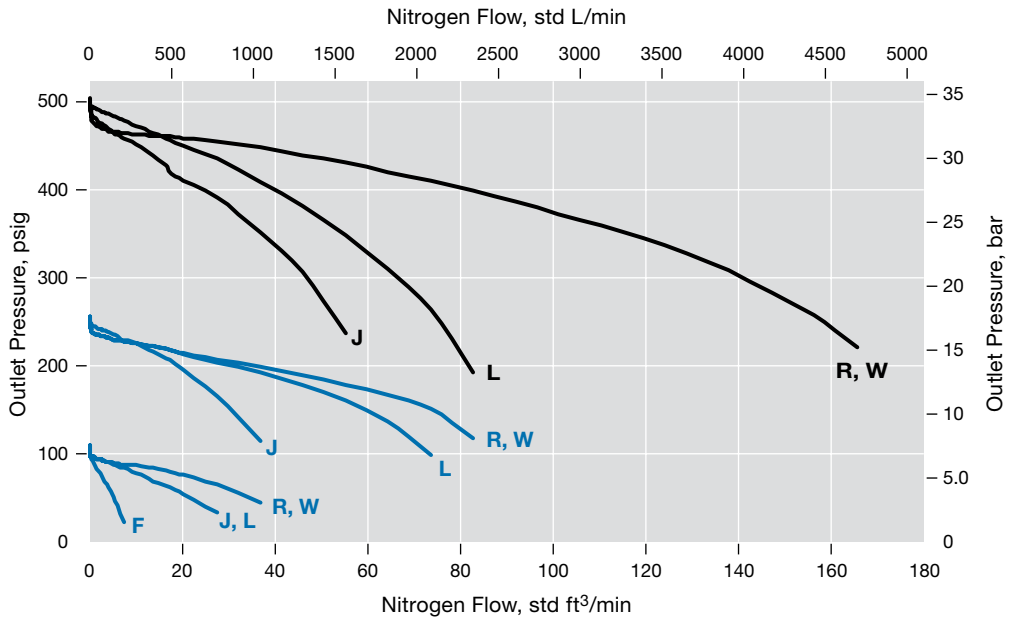
Flow Coefficient 0.50, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

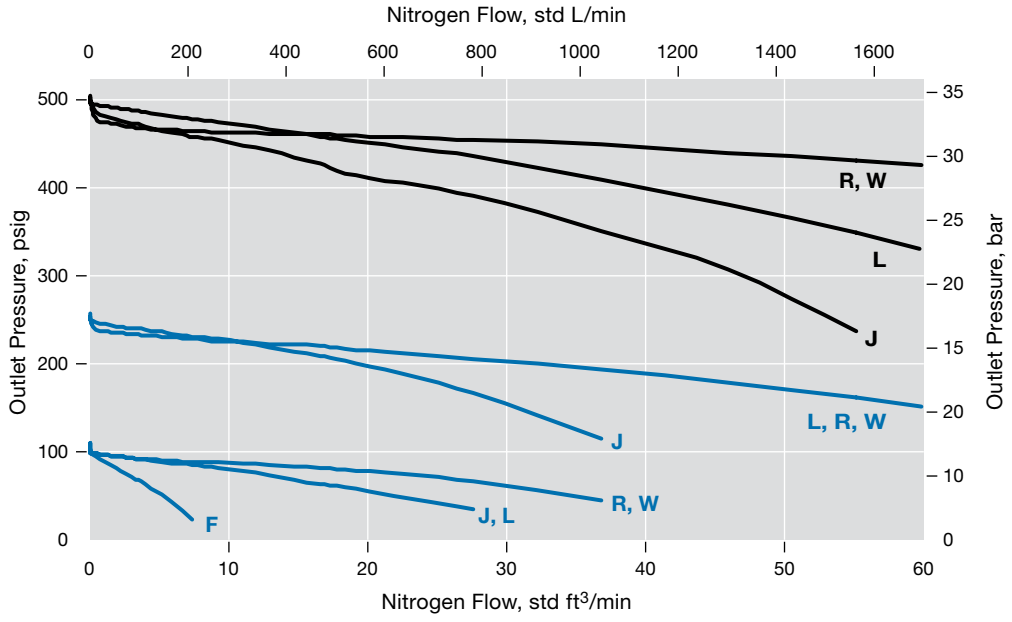
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

The KCY series is designed for use in applications requiring constant outlet pressure even with wide variations in inlet pressure. This two-stage regulator is comparable to two single-stage regulators connected in series. The first stage is factory set to reduce the inlet pressure to 500 psig (34.4 bar). The second stage can be adjusted with the handle to achieve the required outlet pressure.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 100 psig (6.8 bar)	250 psig (17.2 bar) and Higher
	Supply Pressure Effect, %	
0.06	0.01	0.02
0.20	0.02	0.06
0.50	0.05	0.13

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

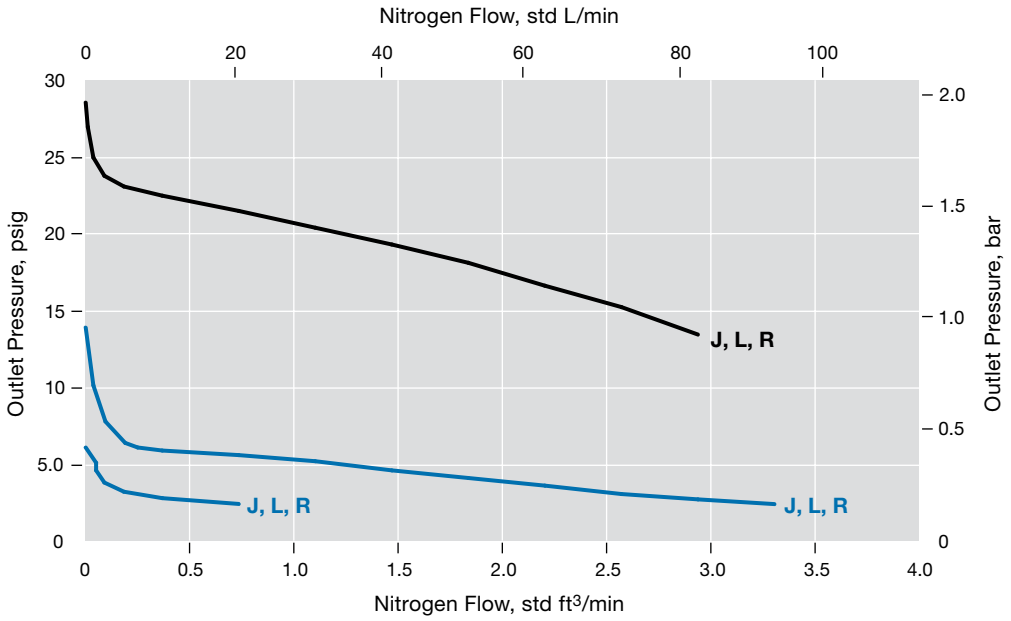
Flow Coefficient 0.06, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

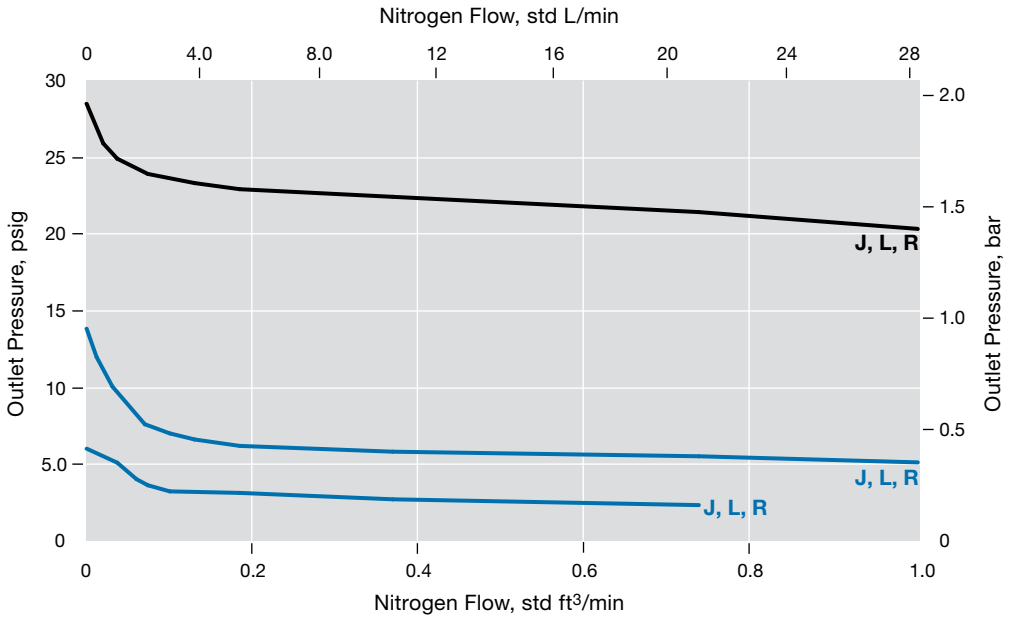
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

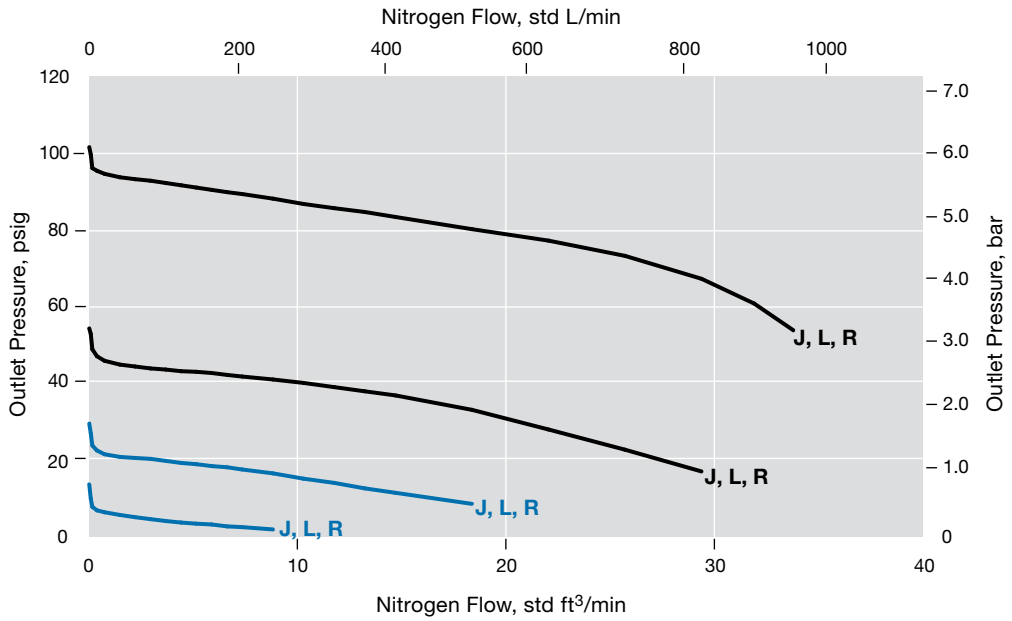
Flow Coefficient 0.06, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

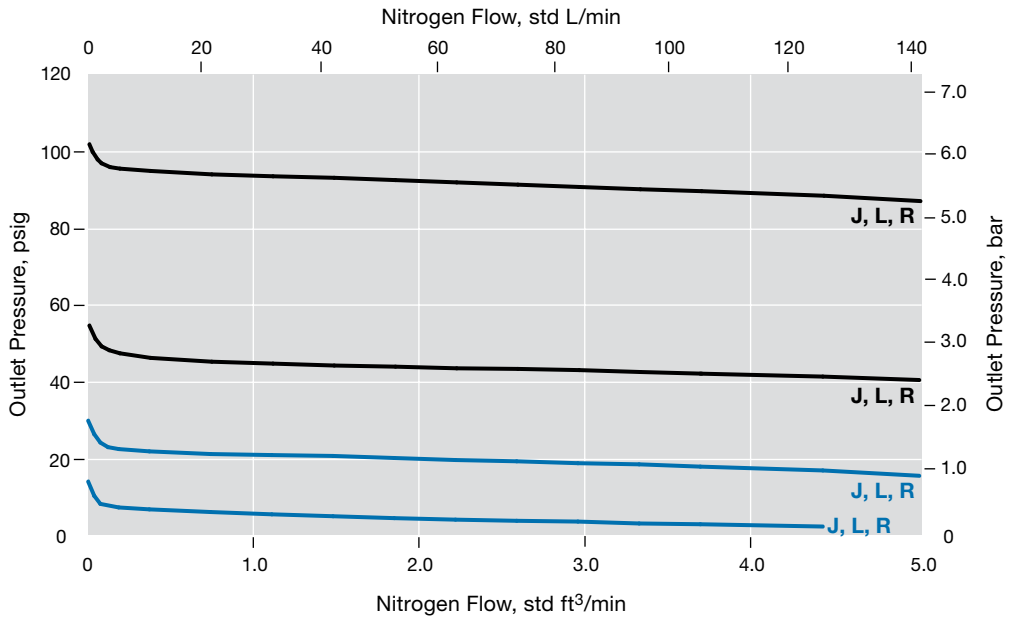
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

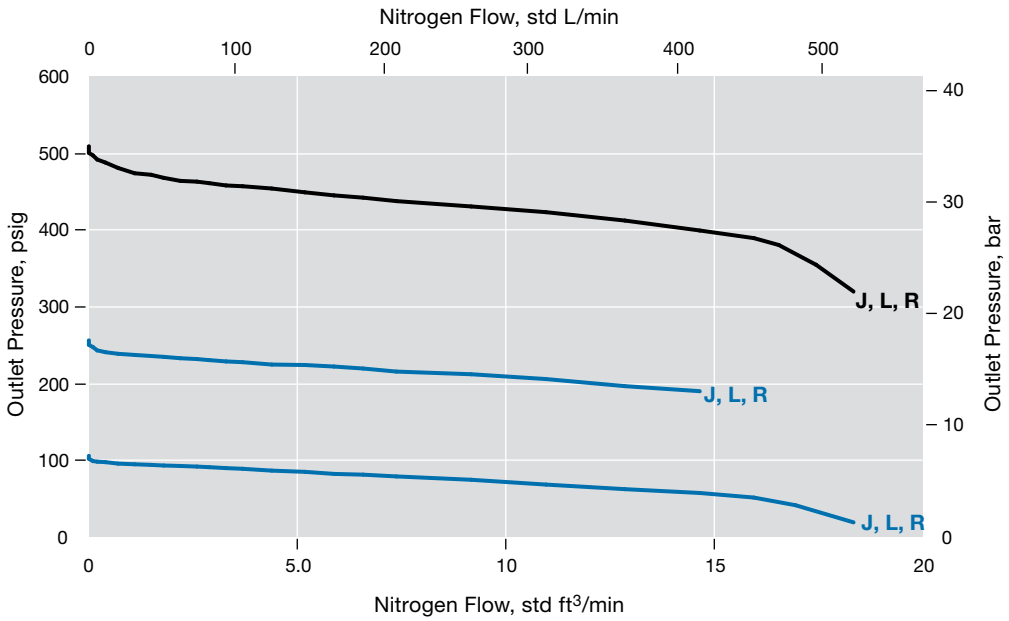
Flow Coefficient 0.06, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

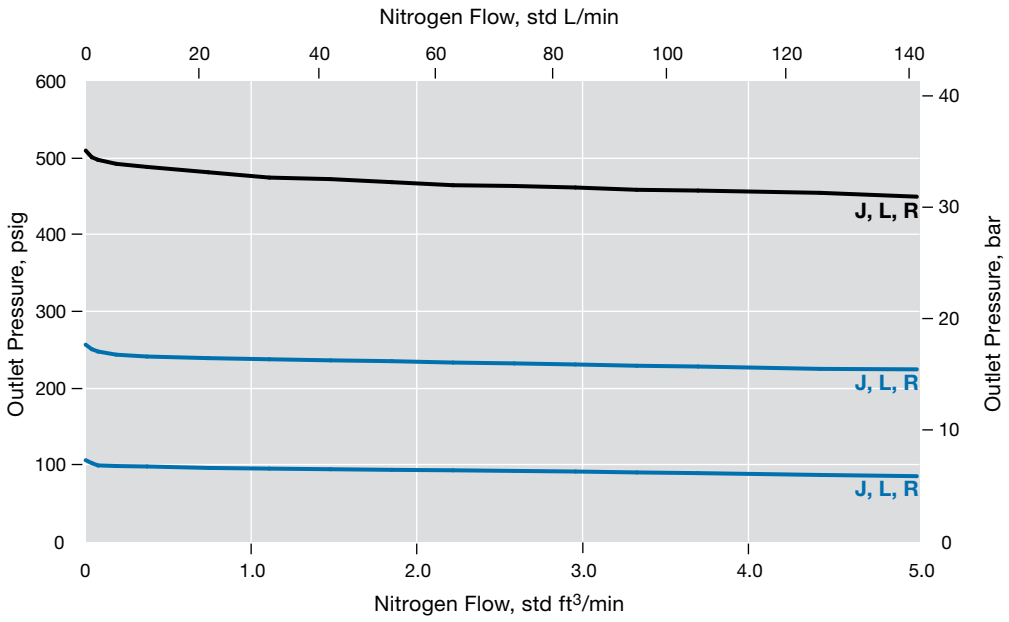
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

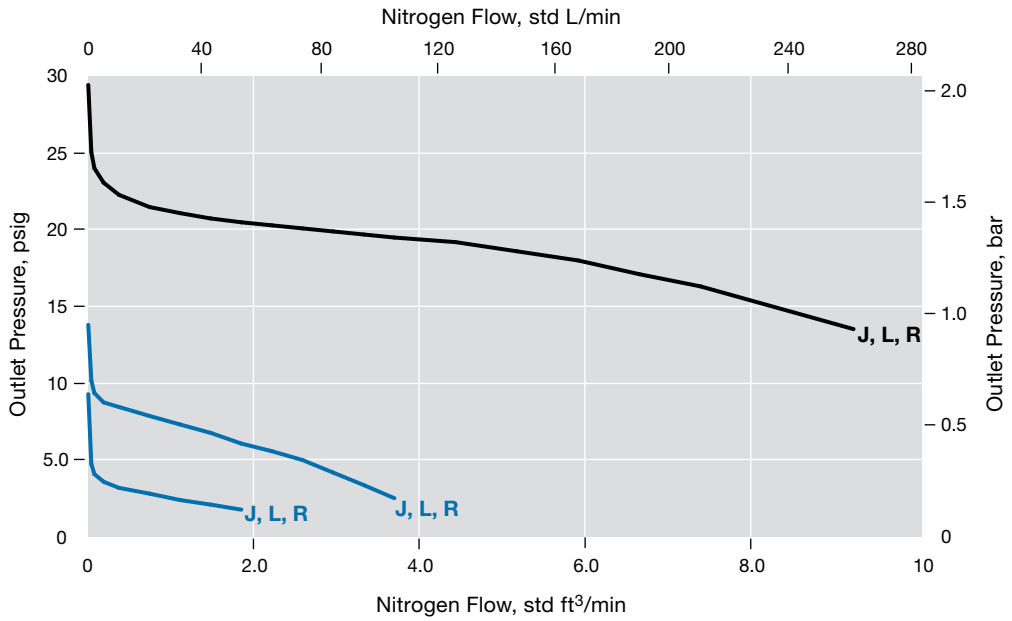
Flow Coefficient 0.20, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

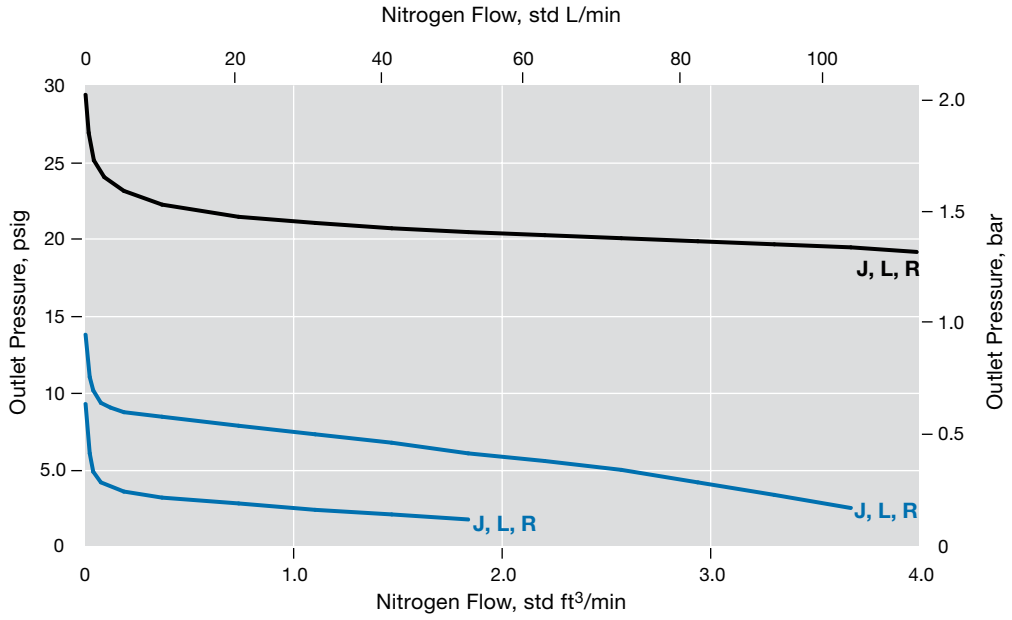
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar))

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

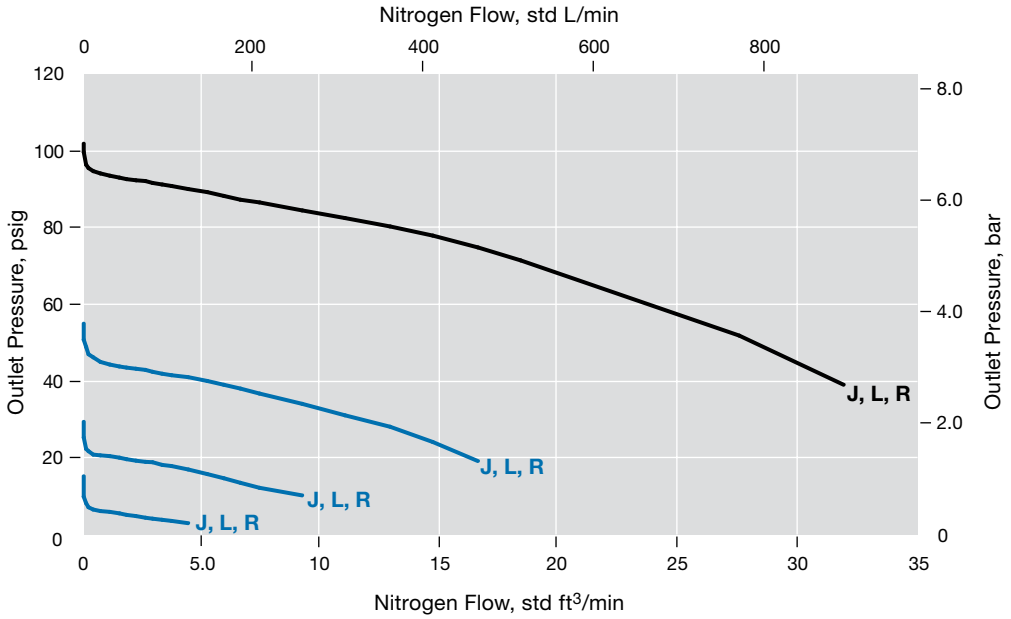
Flow Coefficient 0.20, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

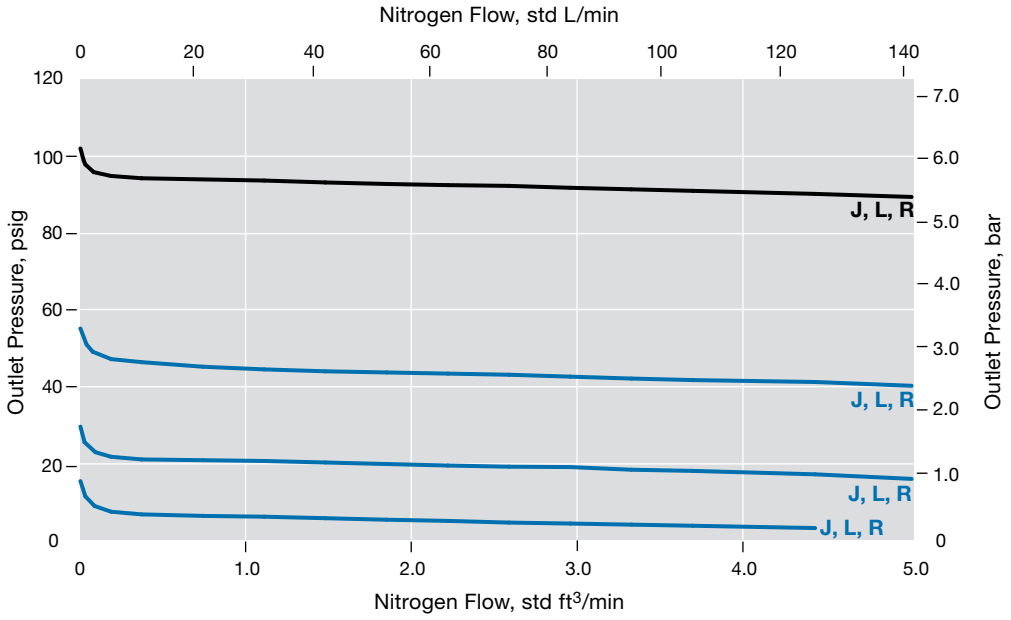
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

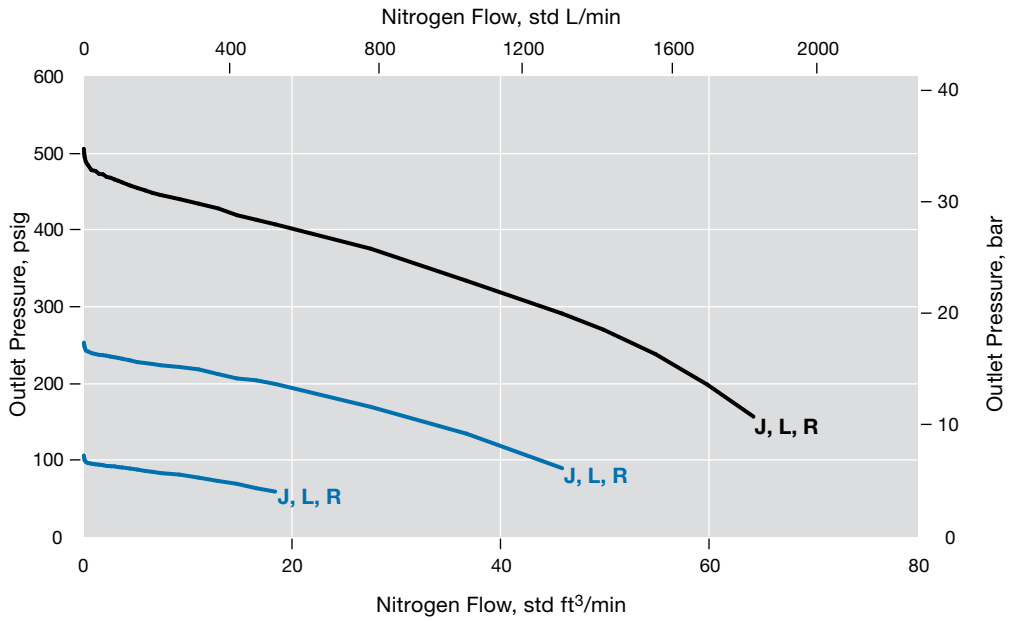
Flow Coefficient 0.20, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

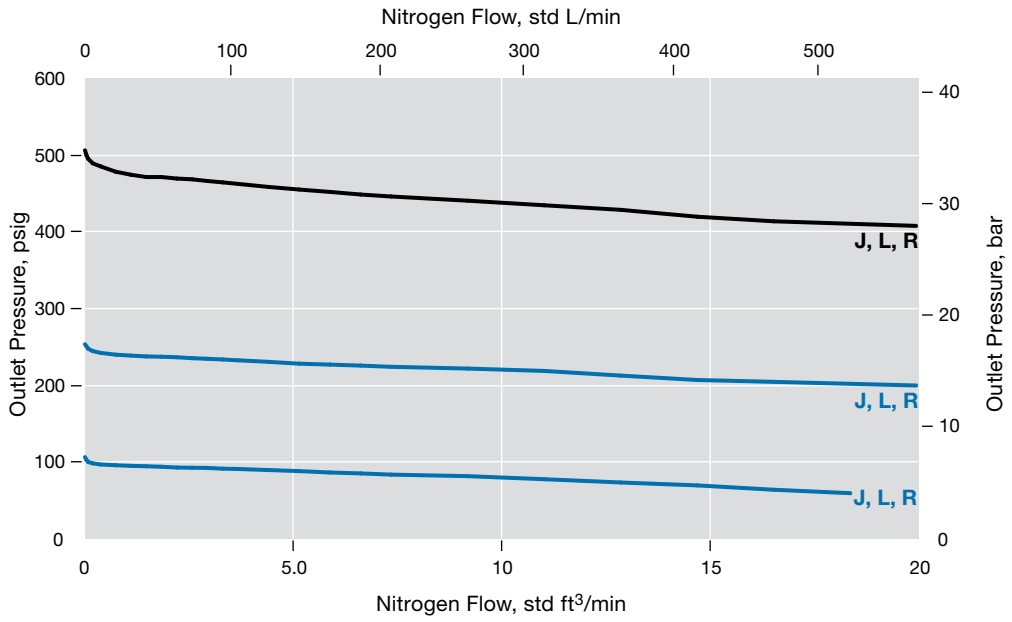
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

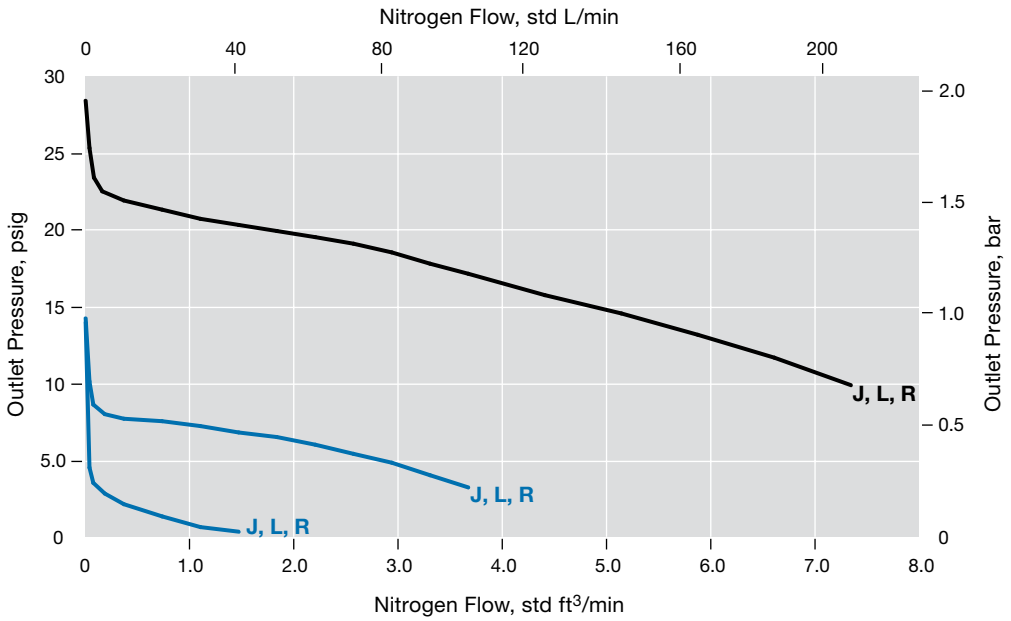
Flow Coefficient 0.50, Pressure Control Ranges 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

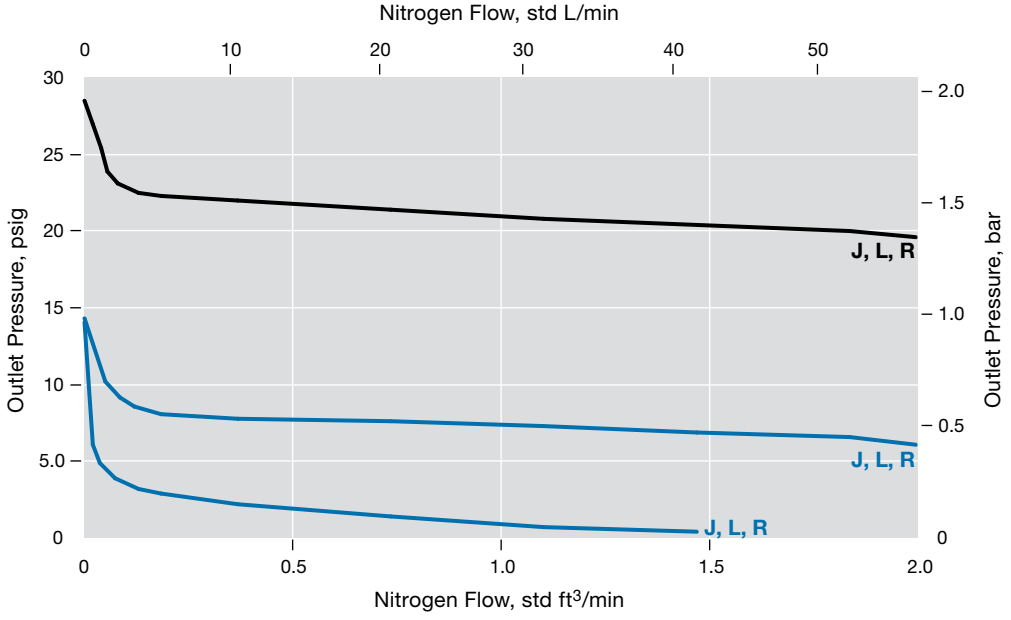
Pressure Control Range

- 0 to 10 psig (0 to 6.8 bar)
- 0 to 25 psig (0 to 1.7 bar))

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

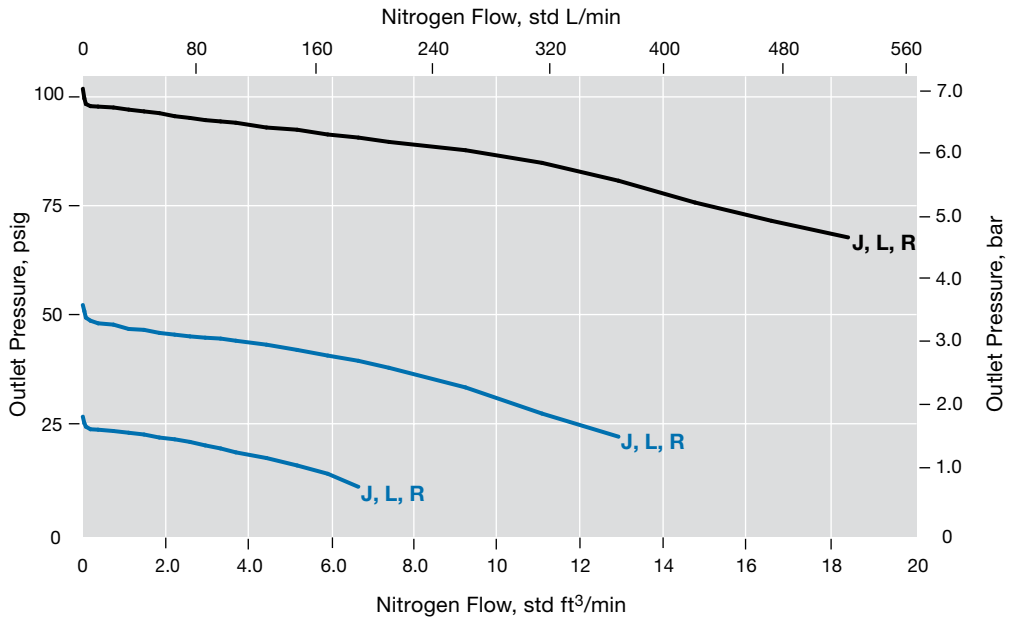
Flow Coefficient 0.50, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

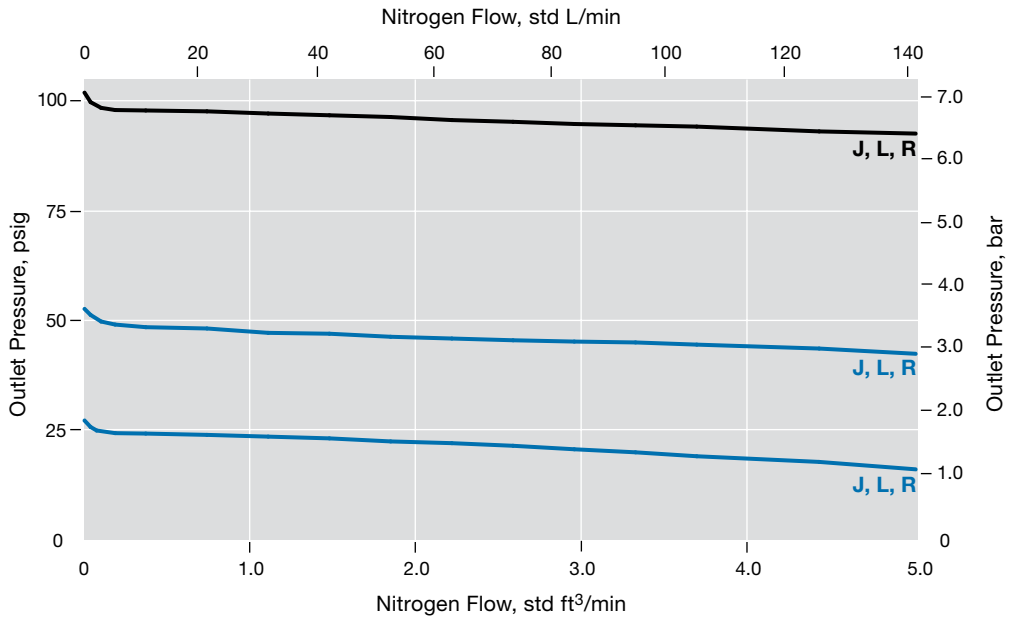
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

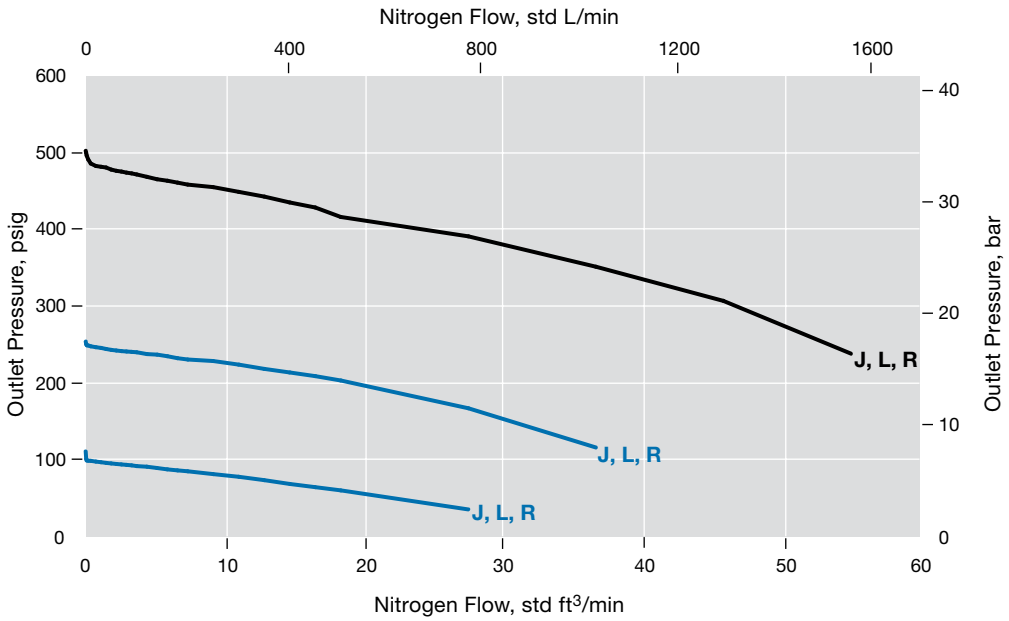
Flow Coefficient 0.50, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

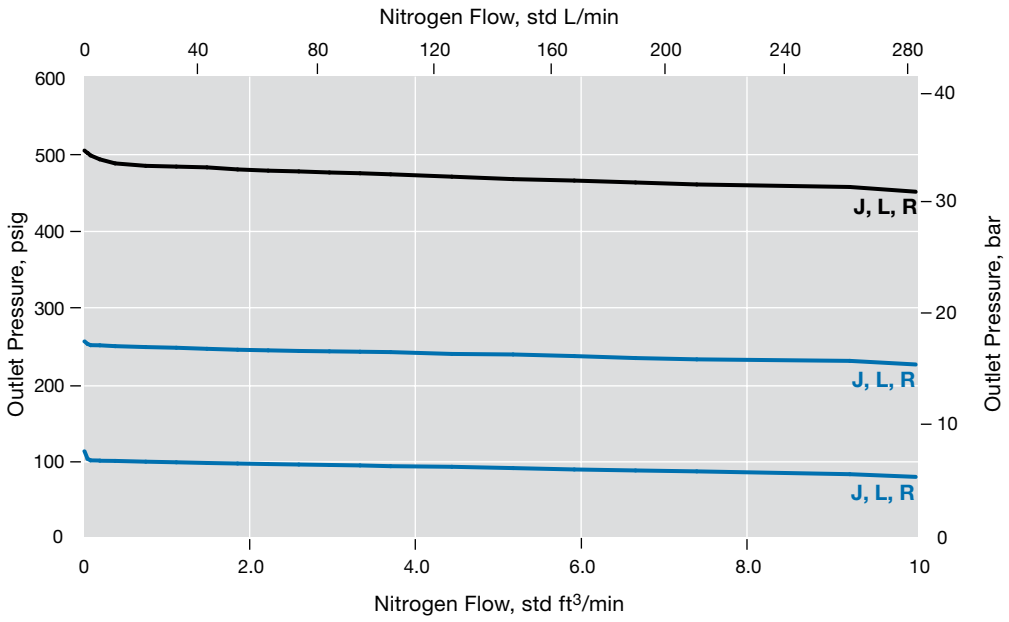
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

The KLF series provides high-sensitivity pressure control of gases or liquids with minimum droop in both low-flow and low-pressure applications.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 10 psig (0.68 bar)	25 psig (1.7 bar) and Higher
	Supply Pressure Effect, %	
0.02	0.1	0.2
0.06	0.4	0.6
0.20	0.7	0.9
0.50	1.0	1.4

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

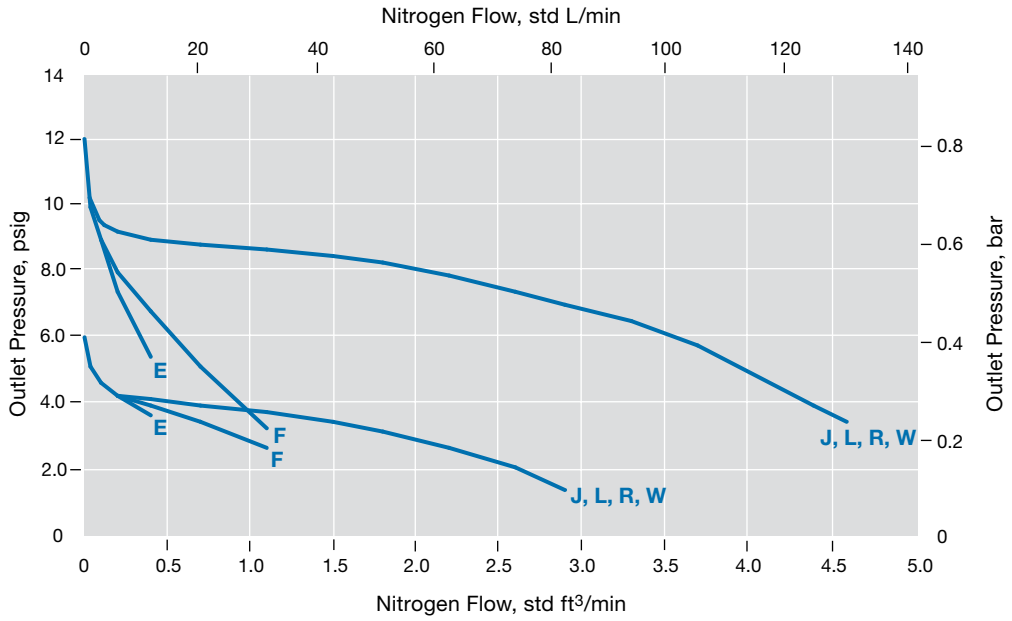
Flow Coefficient 0.02, Pressure Control Range 0 to 10 psig (0 to 0.68 bar)

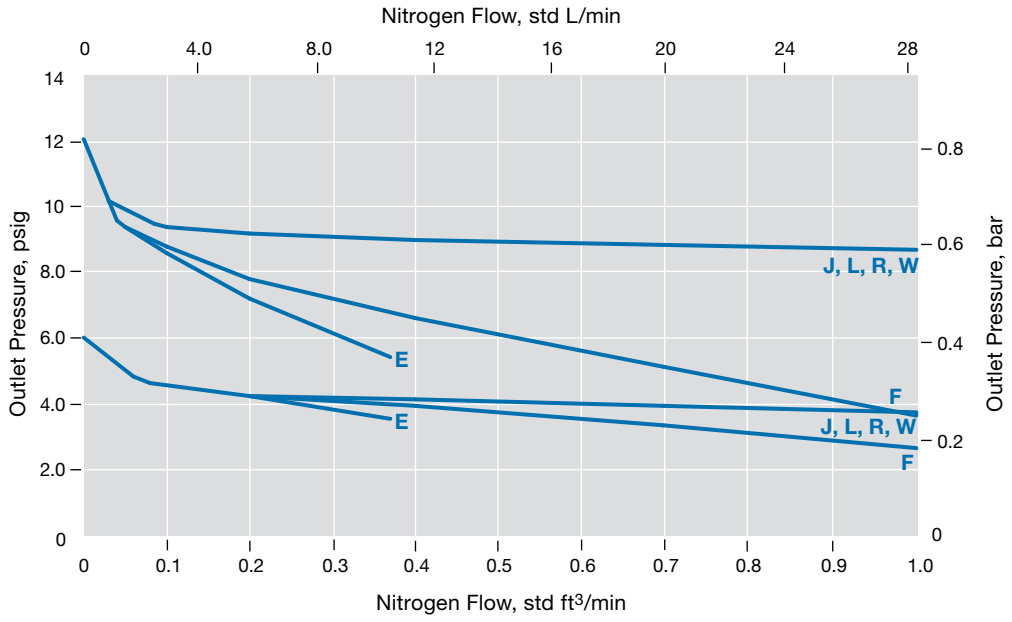
Pressure Control Range

— 0 to 10 psig (0 to 0.68 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

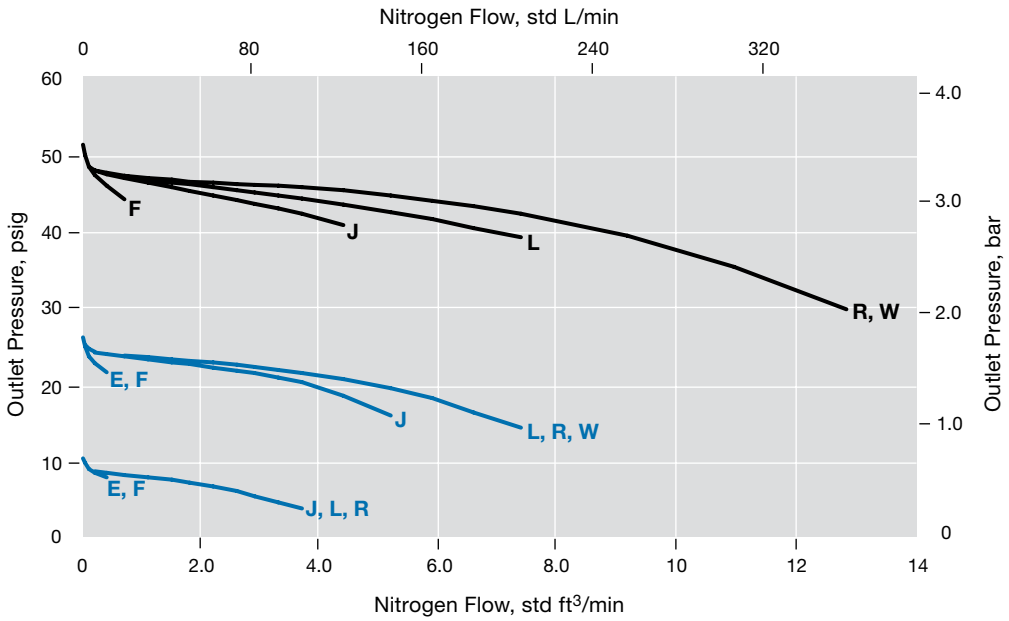
Flow Coefficient 0.02, Pressure Control Range 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

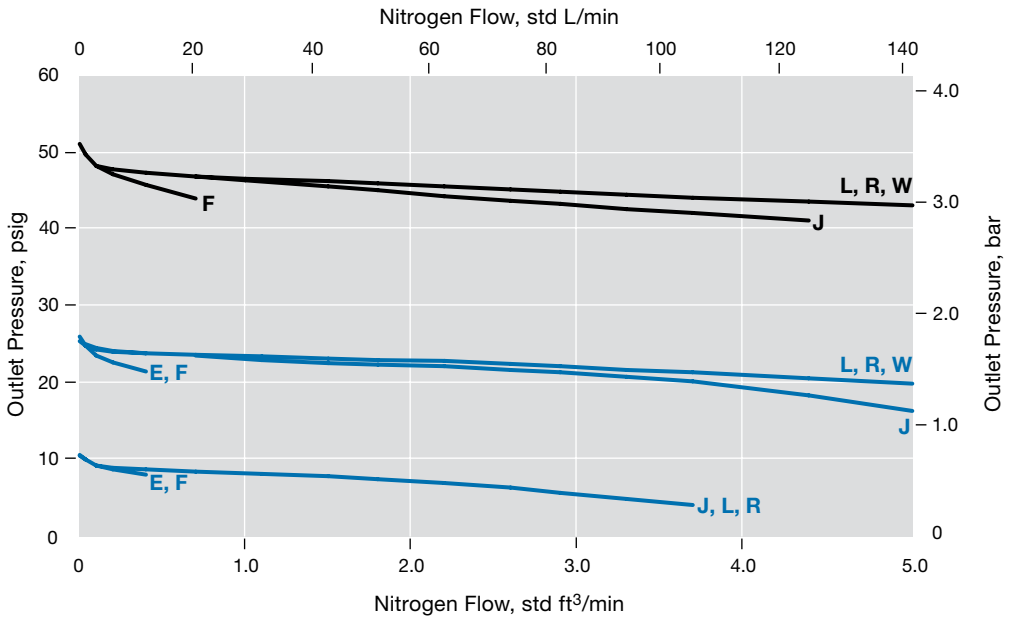
Pressure Control Range

- 0 to 25 psig (0 to 1.7 bar)
- 0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

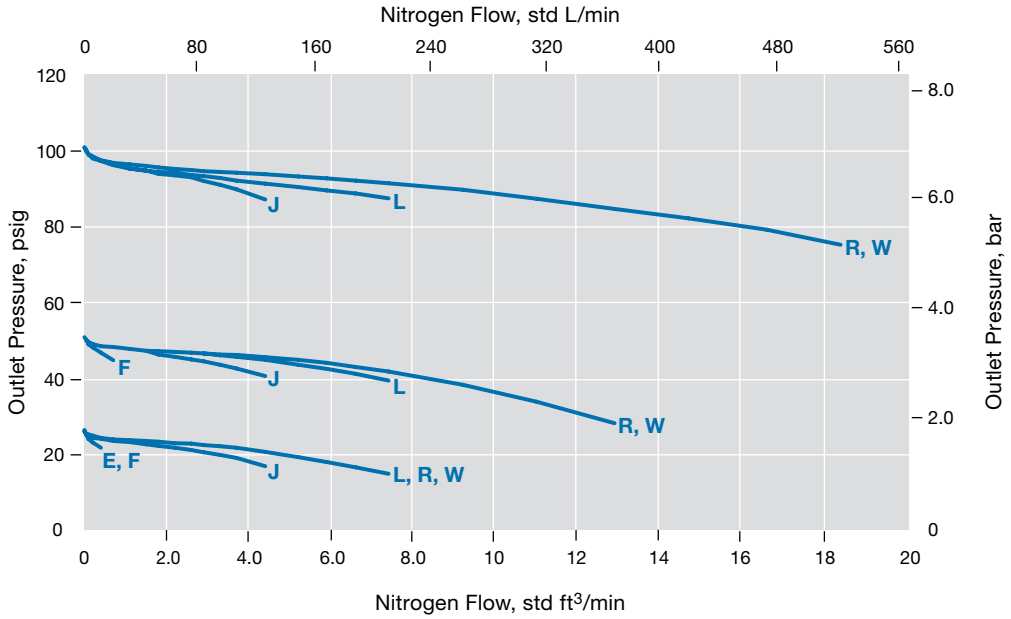
Flow Coefficient 0.02, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

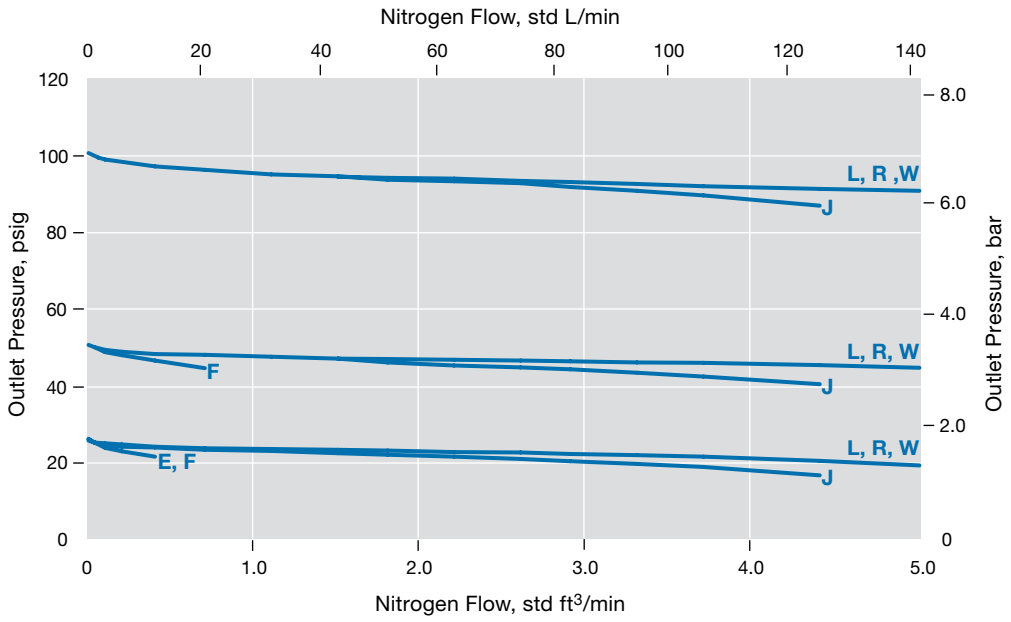
Pressure Control Range

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

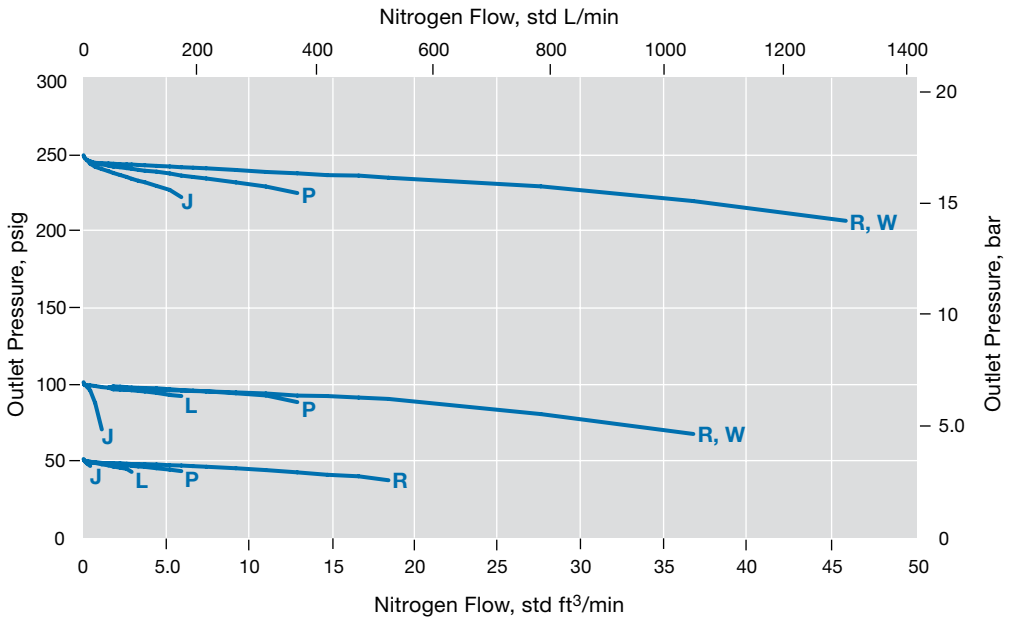
Flow Coefficient 0.02, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

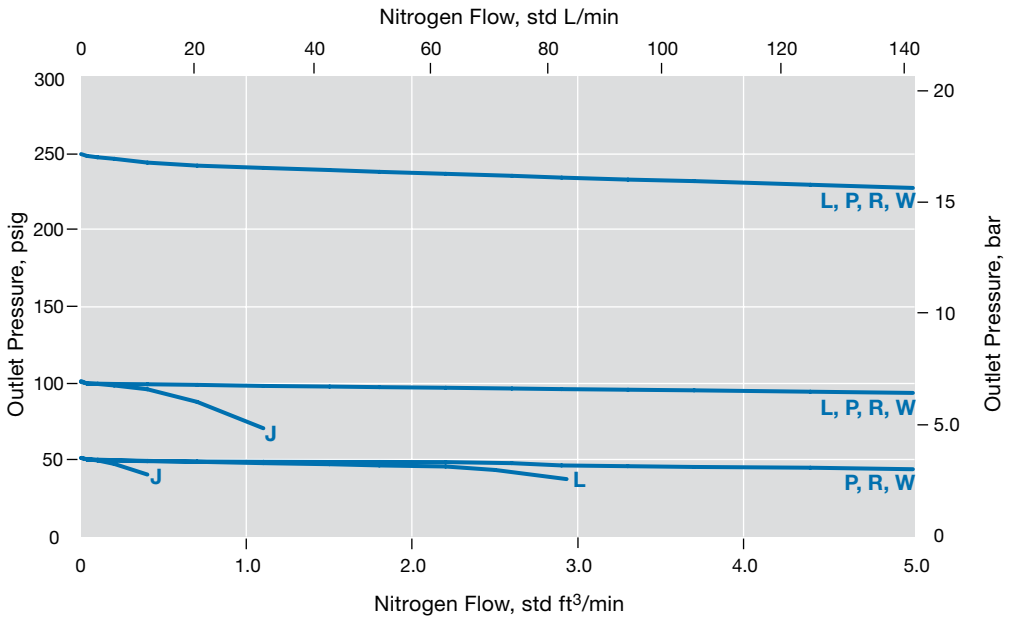
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

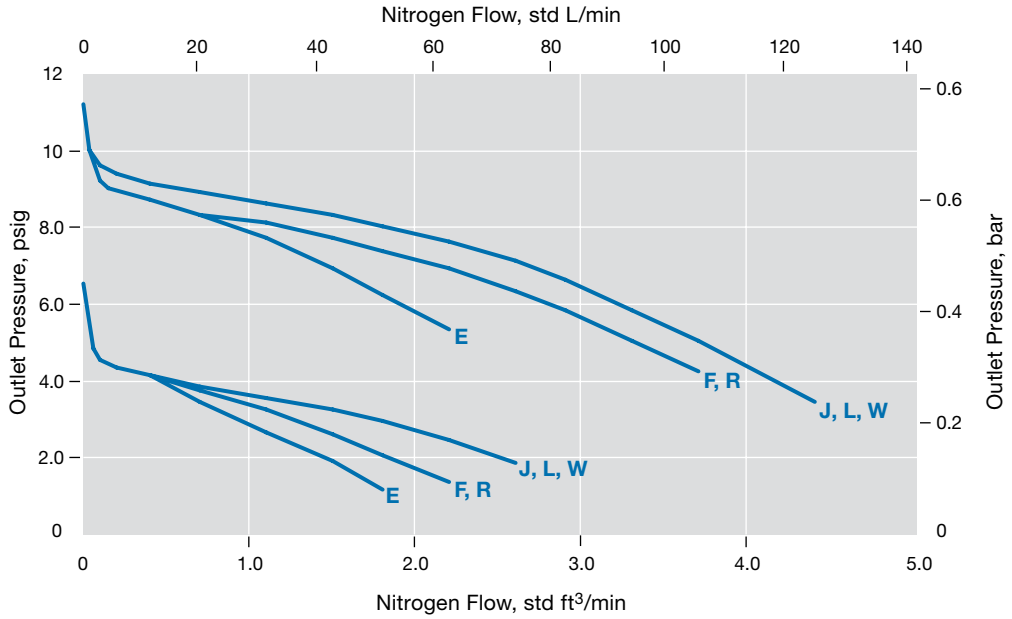
Flow Coefficient 0.06, Pressure Control Range 0 to 10 psig (0 to 0.68 bar)

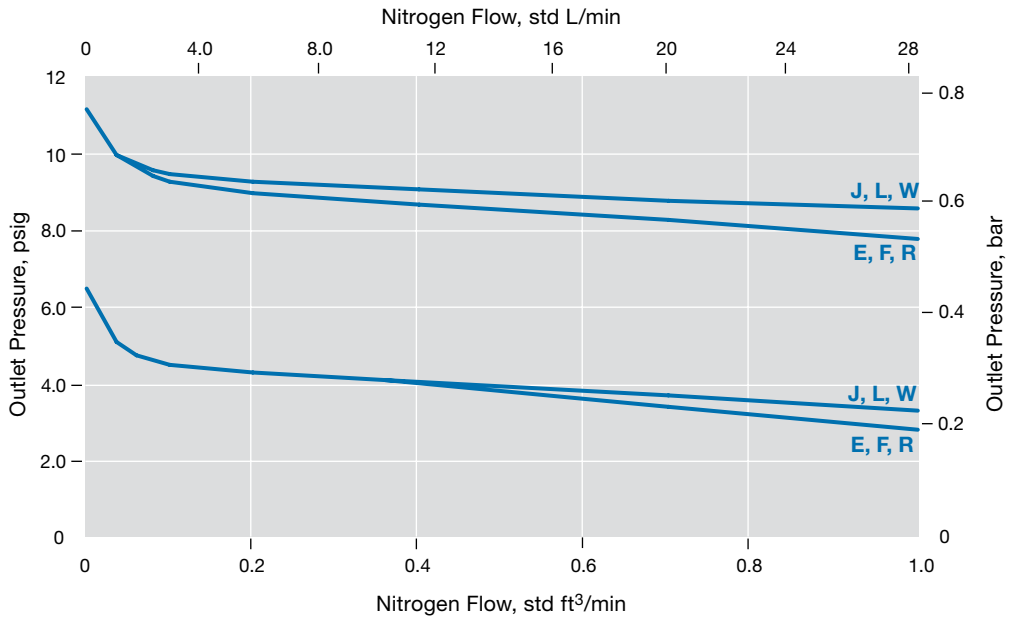
Pressure Control Range

0 to 10 psig (0 to 0.68 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

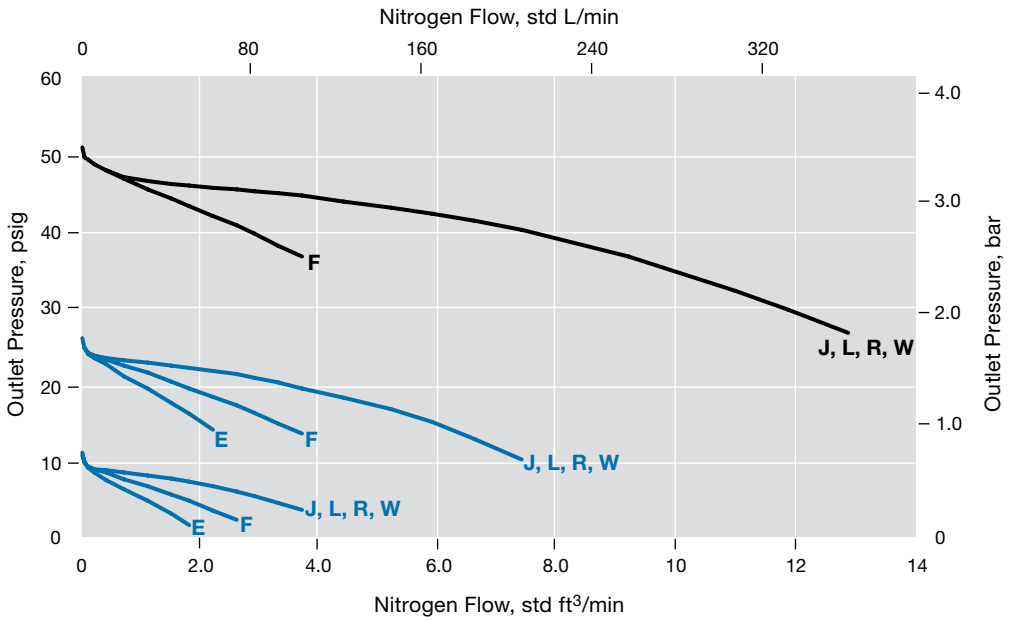
Flow Coefficient 0.06, Pressure Control Range 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

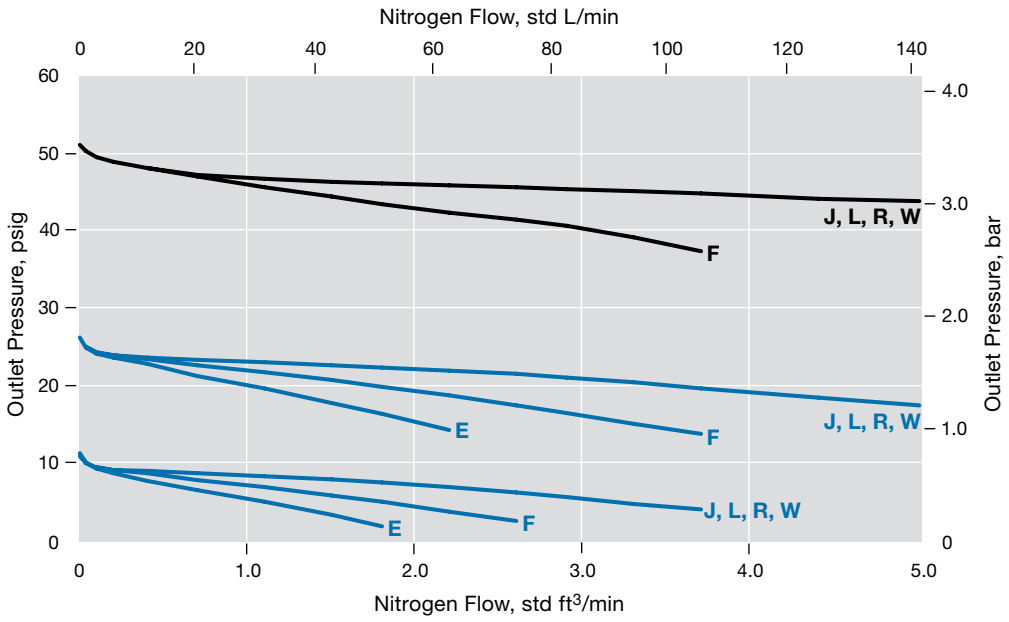
Pressure Control Range

- 0 to 25 psig (0 to 1.7 bar)
- 0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

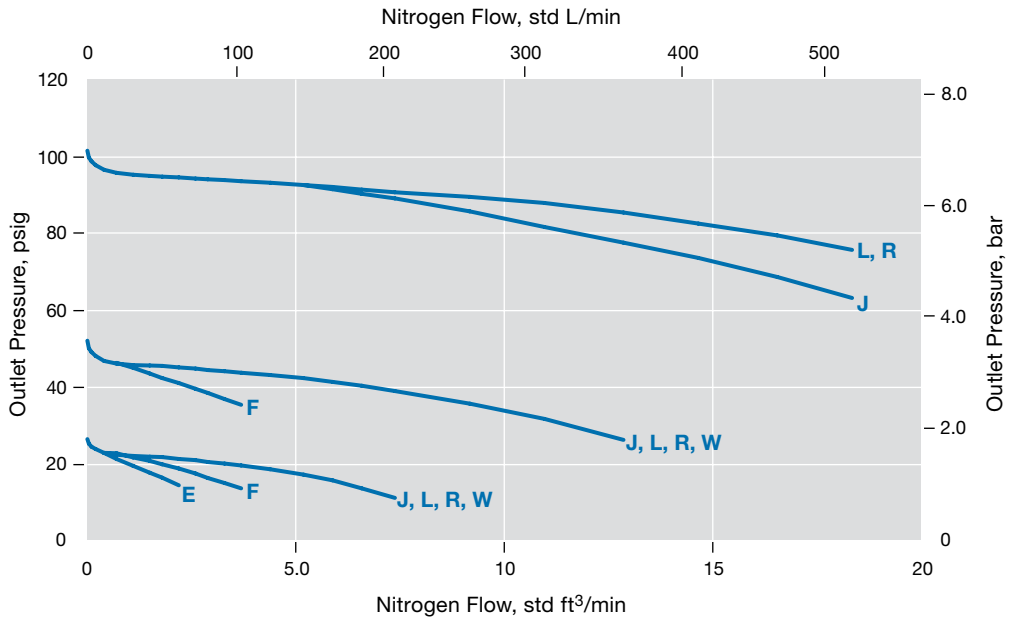
Flow Coefficient 0.06, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

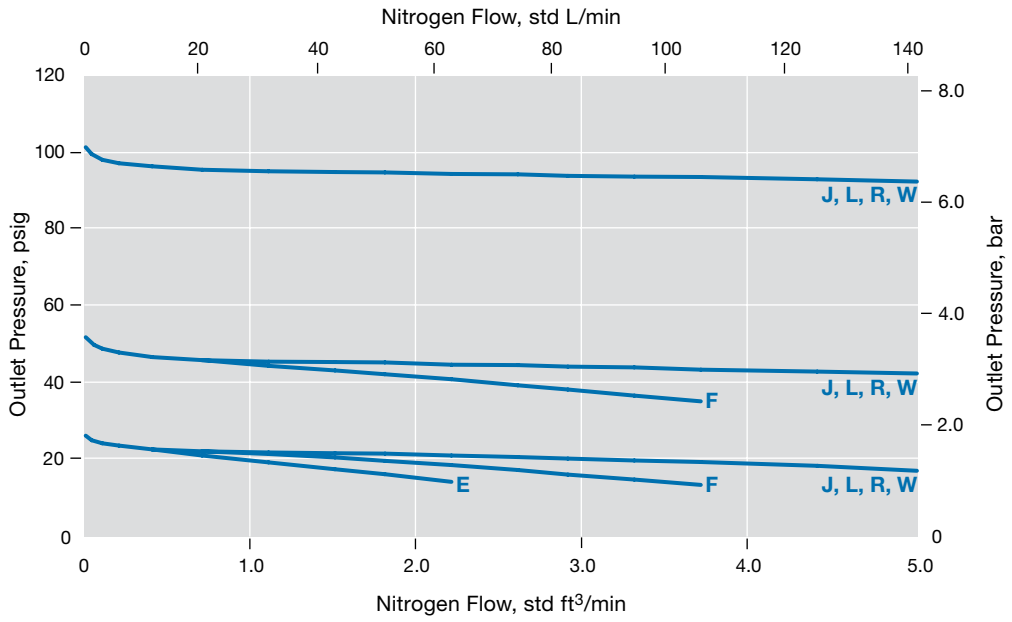
Pressure Control Range

— 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

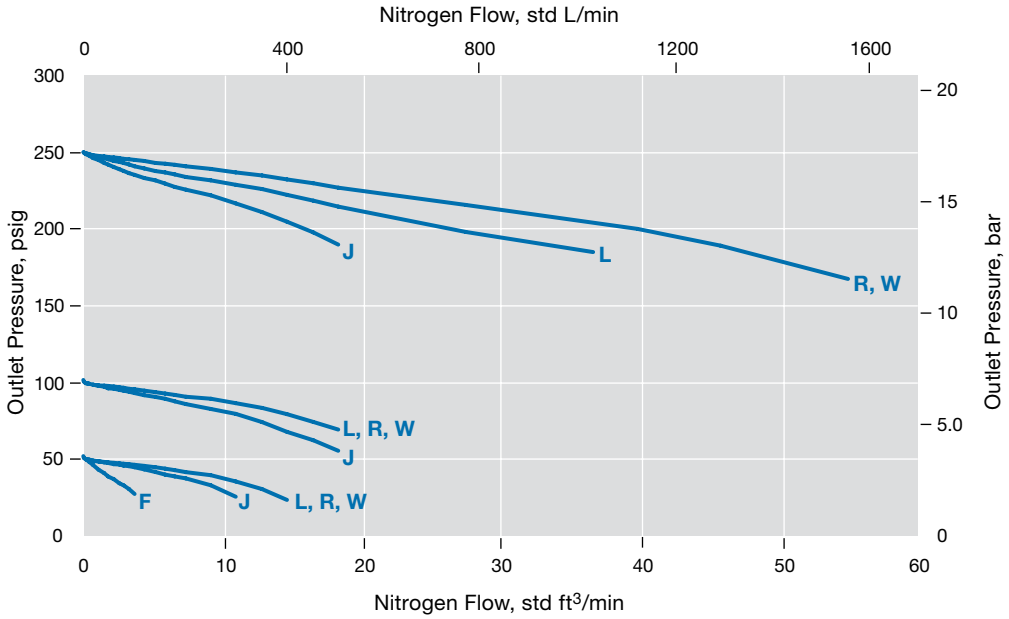
Flow Coefficient 0.06, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

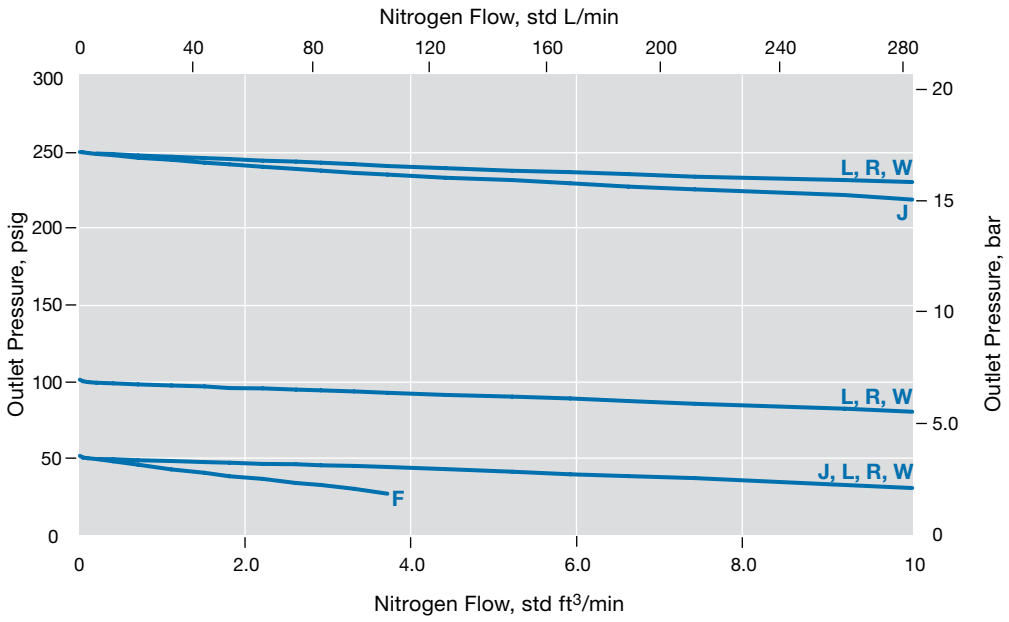
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
R 3600 psig (248 bar)
W 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

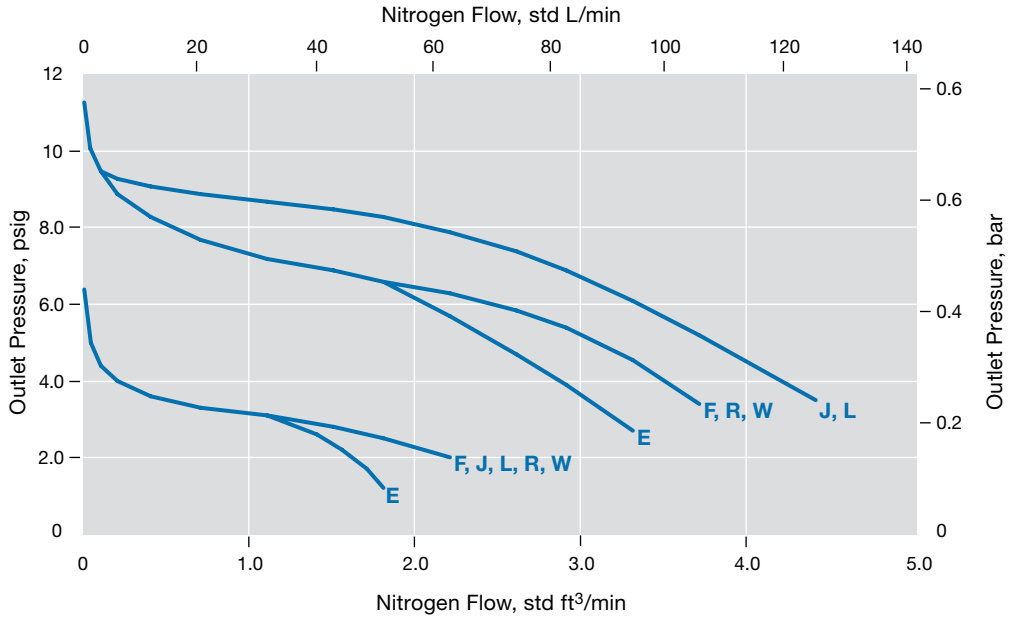
Flow Coefficient 0.20, Pressure Control Range 0 to 10 psig (0 to 0.68 bar)

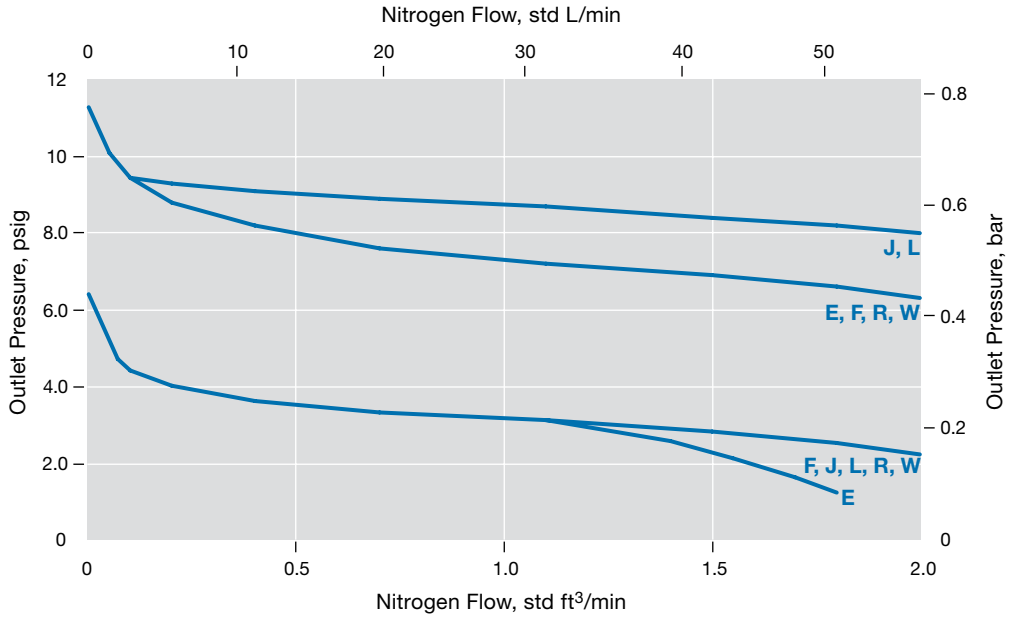
Pressure Control Range

0 to 10 psig (0 to 0.68 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

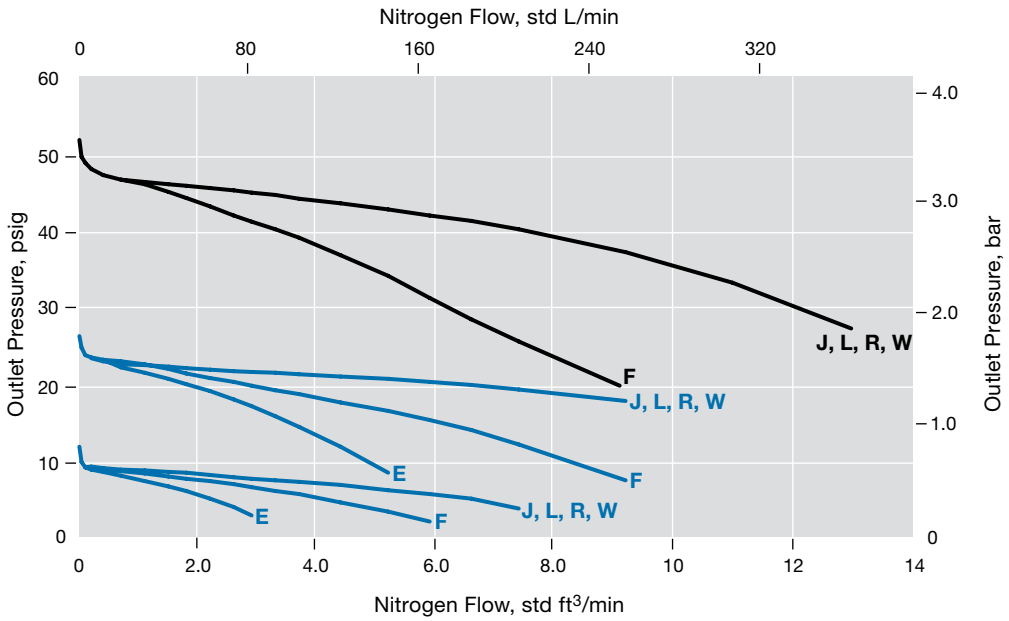
Flow Coefficient 0.20, Pressure Control Range 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

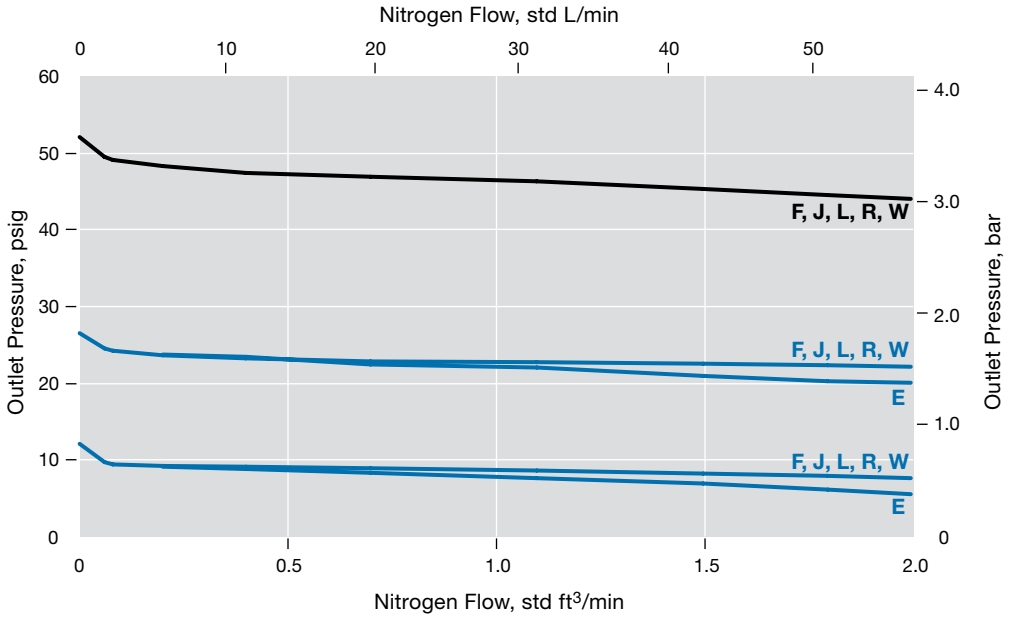
Pressure Control Range

- 0 to 25 psig (0 to 1.7 bar)
- 0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

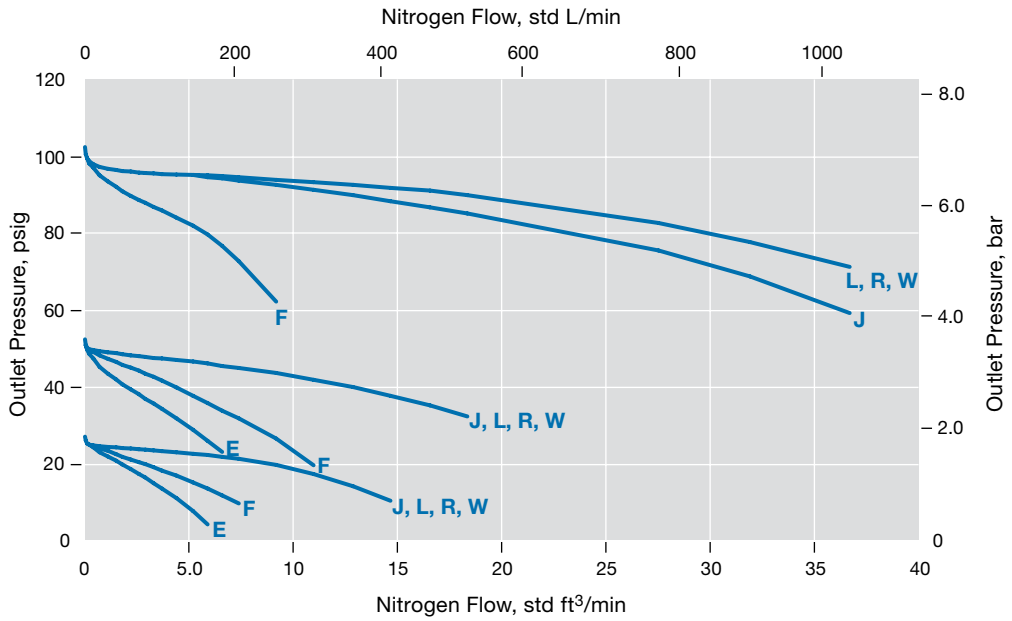
Flow Coefficient 0.20, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

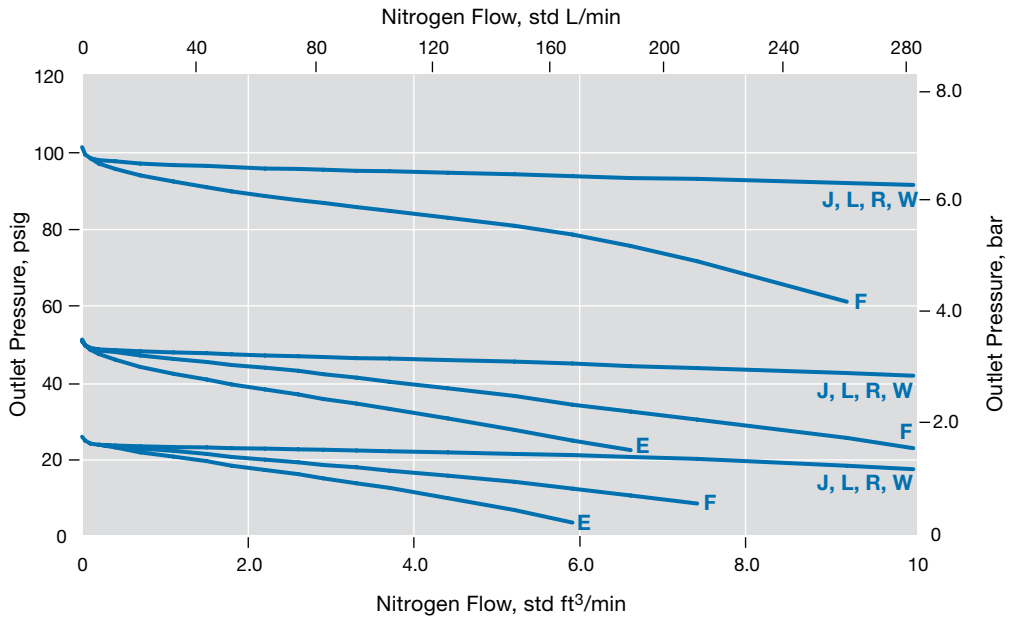
Pressure Control Range

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

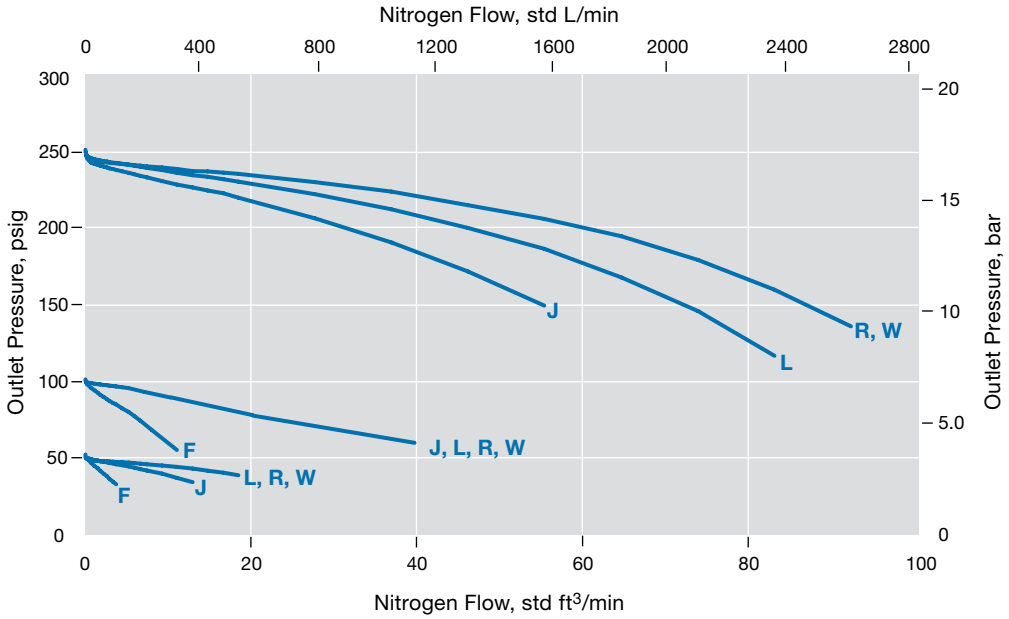
Flow Coefficient 0.20, Pressure Control Range Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

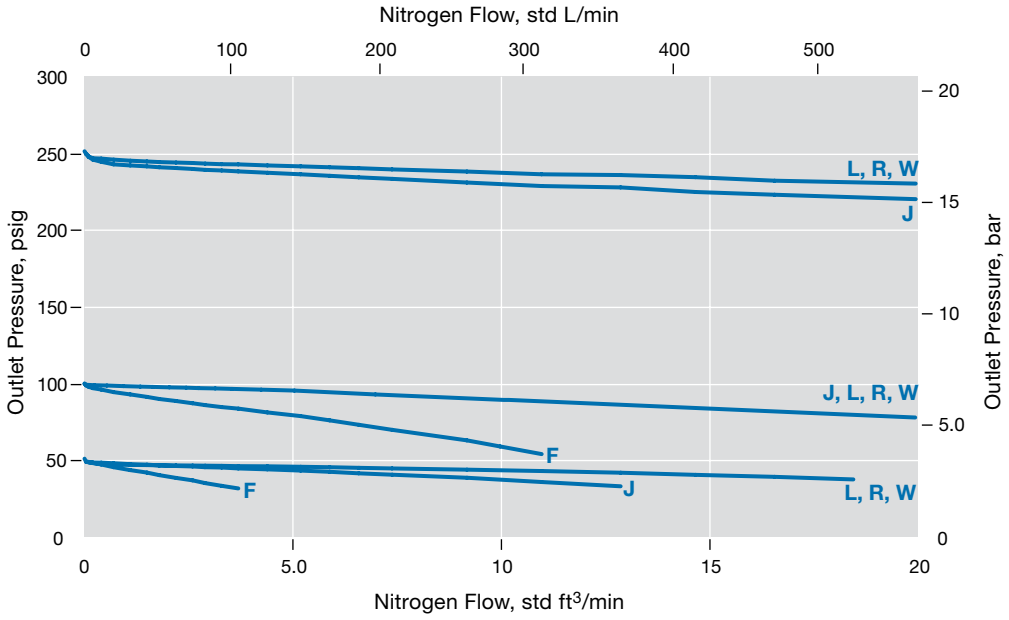
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
R 3600 psig (248 bar)
W 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

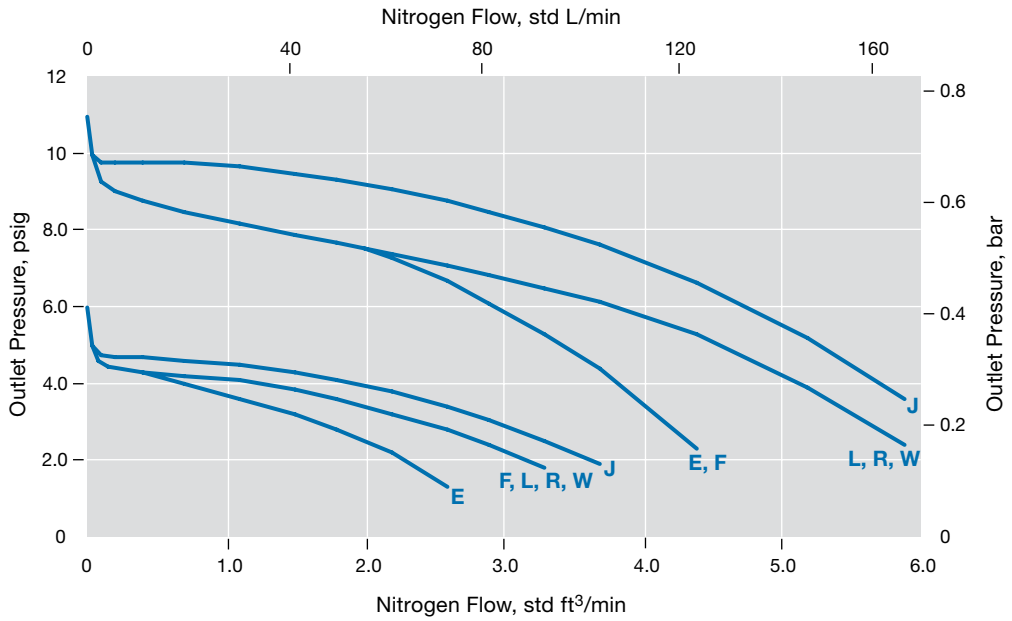
Flow Coefficient 0.50, Pressure Control Range 0 to 10 psig (0 to 0.68 bar)

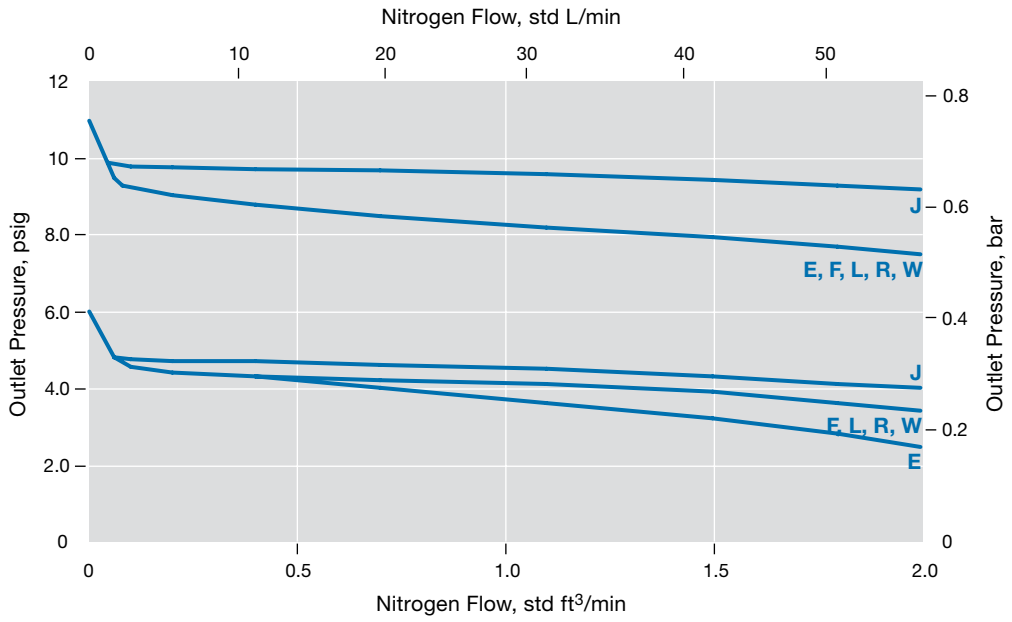
Pressure Control Range

0 to 10 psig (0 to 0.68 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

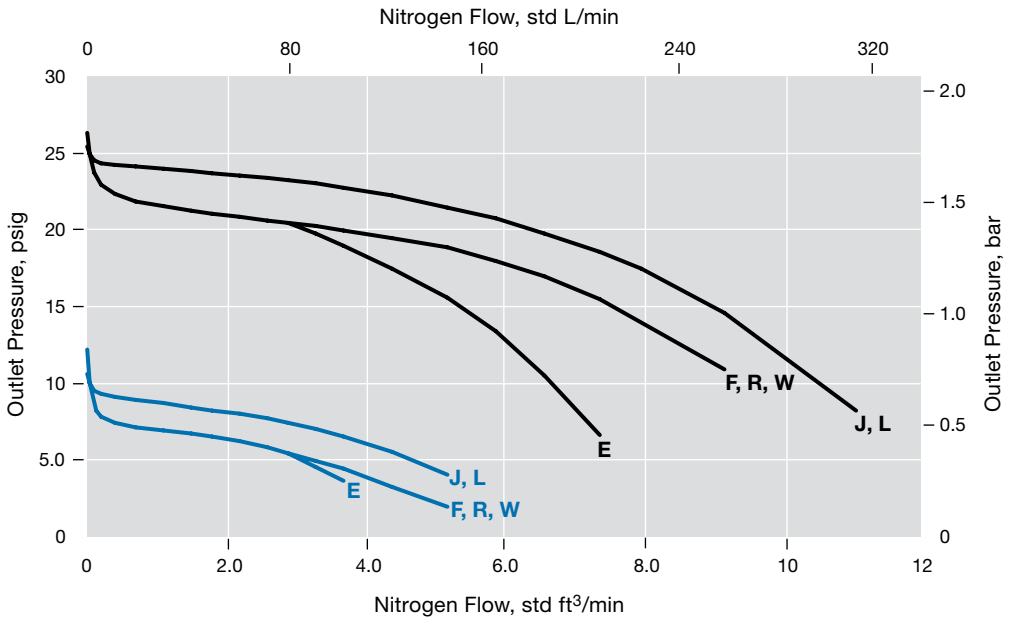
Flow Coefficient 0.50, Pressure Control Range 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

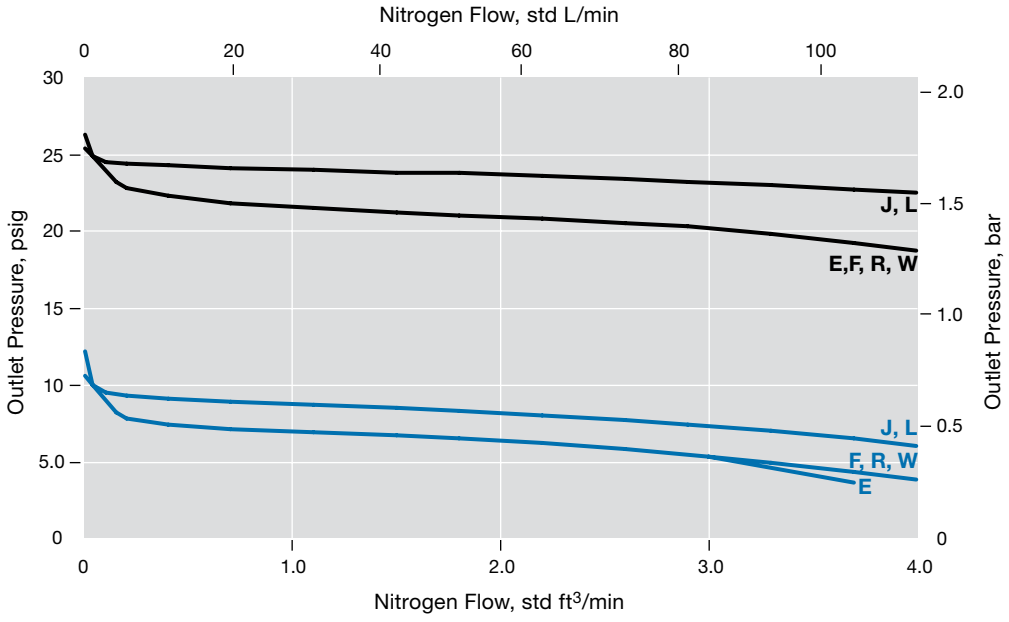
Pressure Control Range

- 0 to 25 psig (0 to 1.7 bar)
- 0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

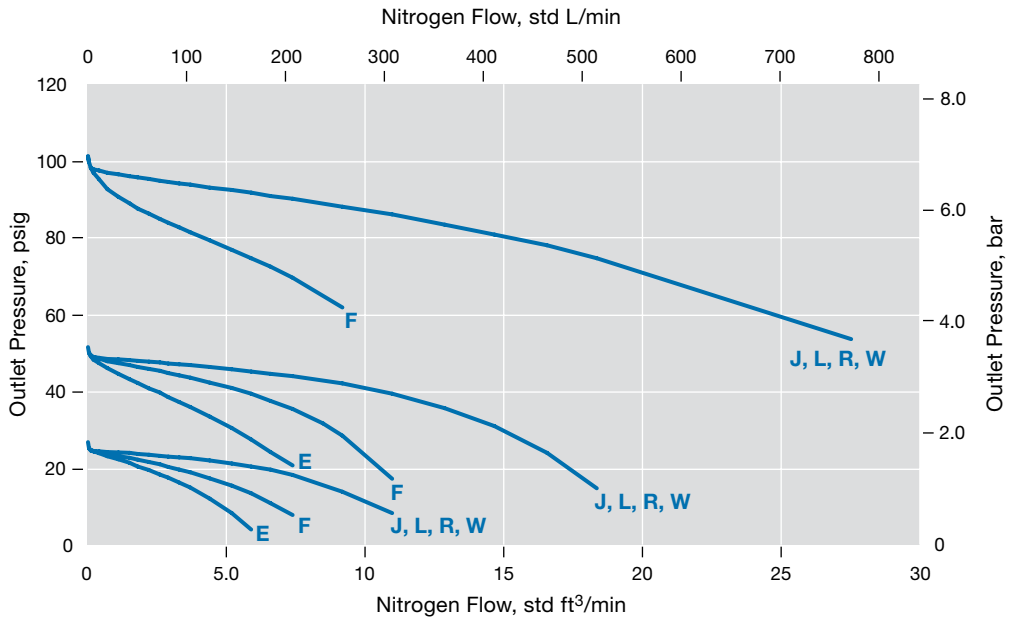
Flow Coefficient 0.50, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

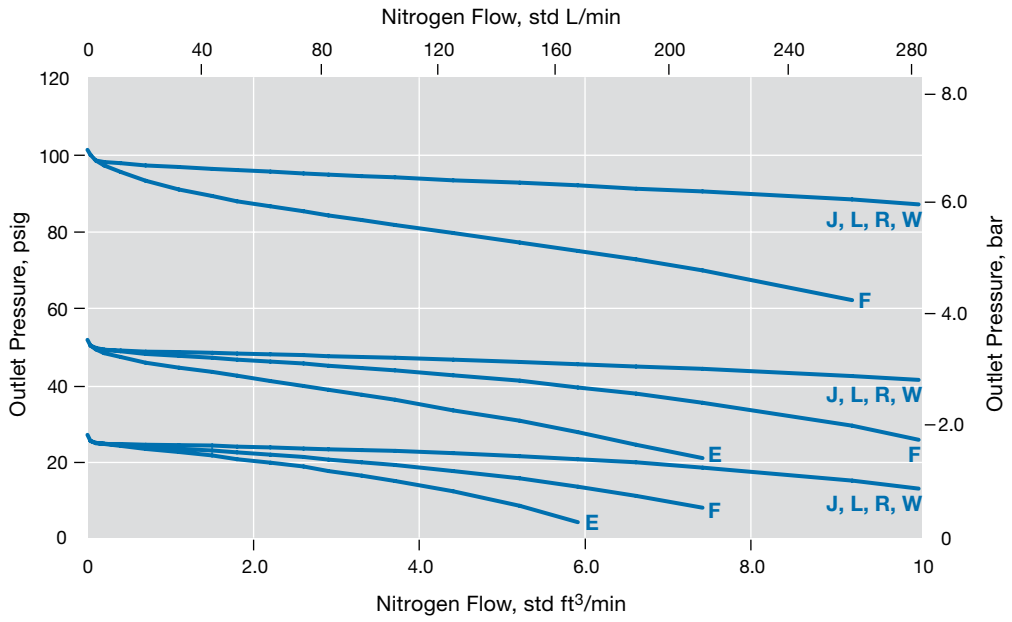
Pressure Control Range

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

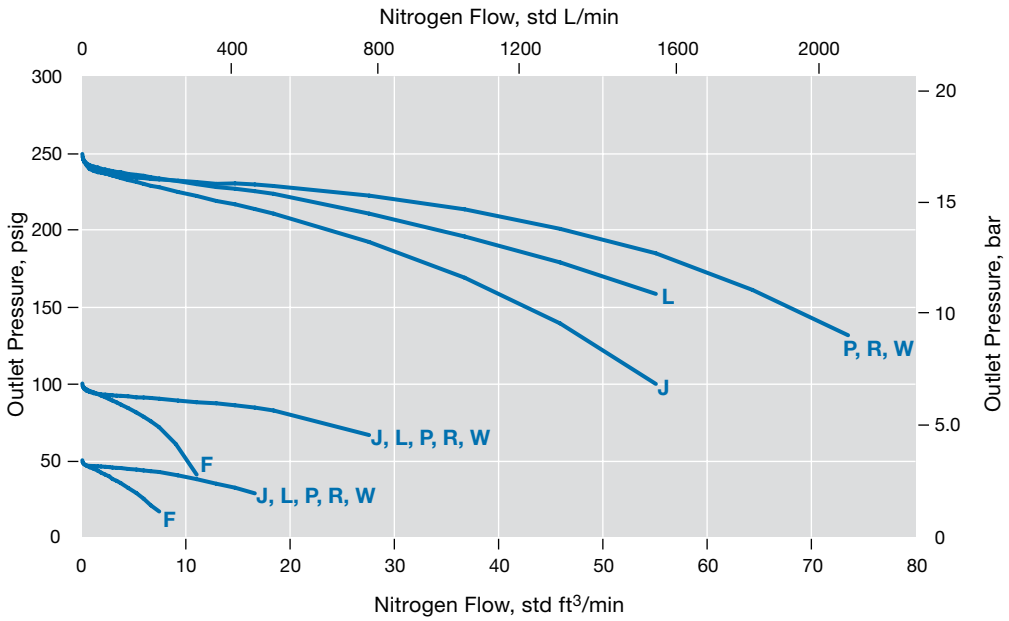
Flow Coefficient 0.50, Pressure Control Range Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

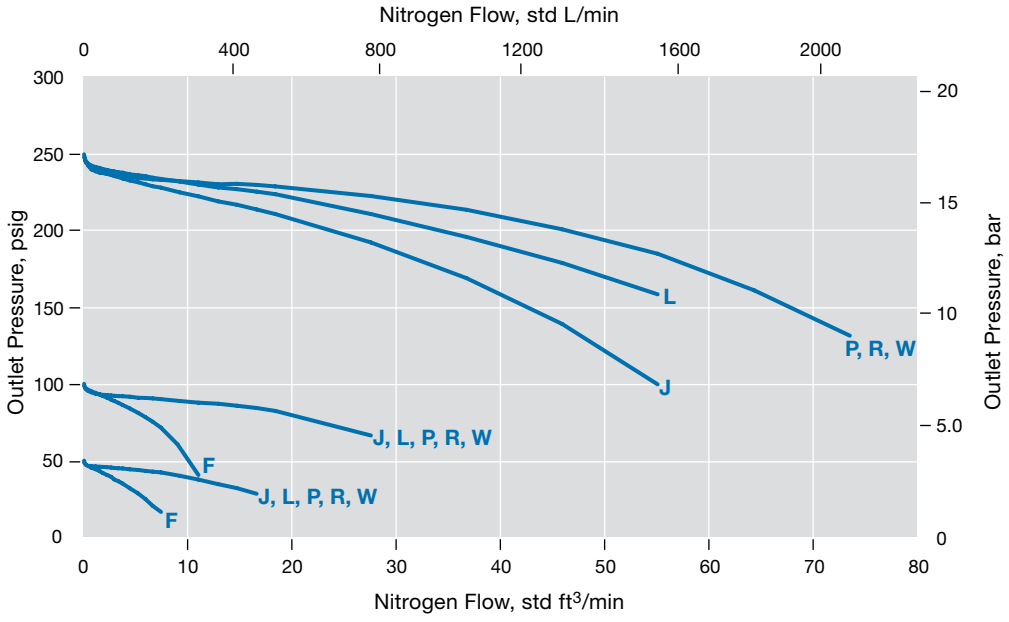
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KHF Series High-Flow, High-Sensitivity Pressure-Reducing Regulators Gas Flow

The KHF series combines the high-flow capabilities—1.0 C_v—of a bulk distribution regulator with the high sensitivity and accuracy of a point-of-use regulator.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 50 psig (3.4 bar)	100 psig (6.8 bar) and Higher
	Supply Pressure Effect, %	
1.0	0.3	0.4

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

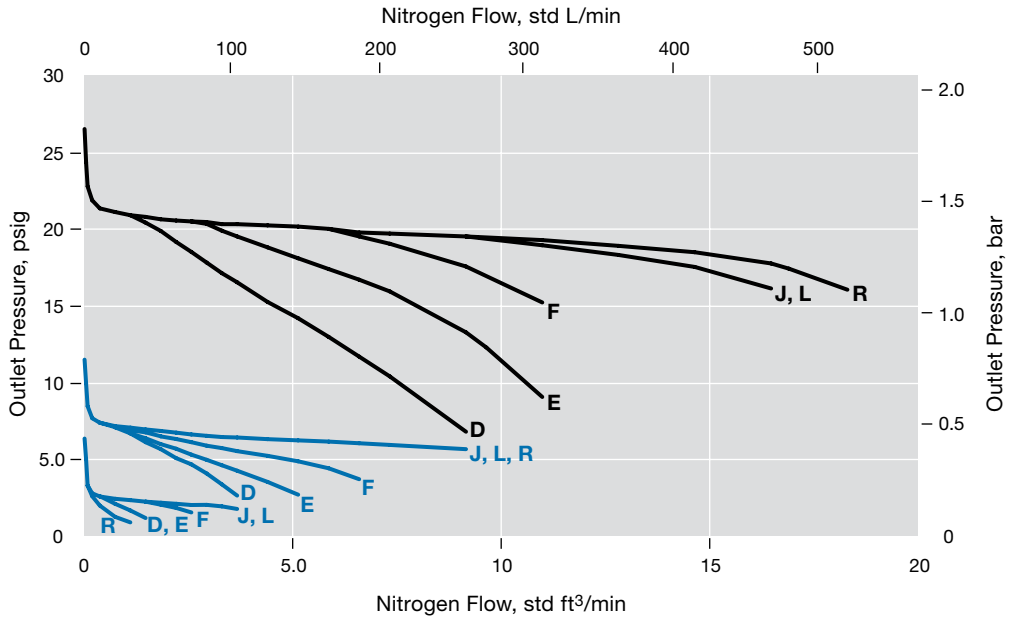
Flow Coefficient 1.0, Pressure Control Range 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

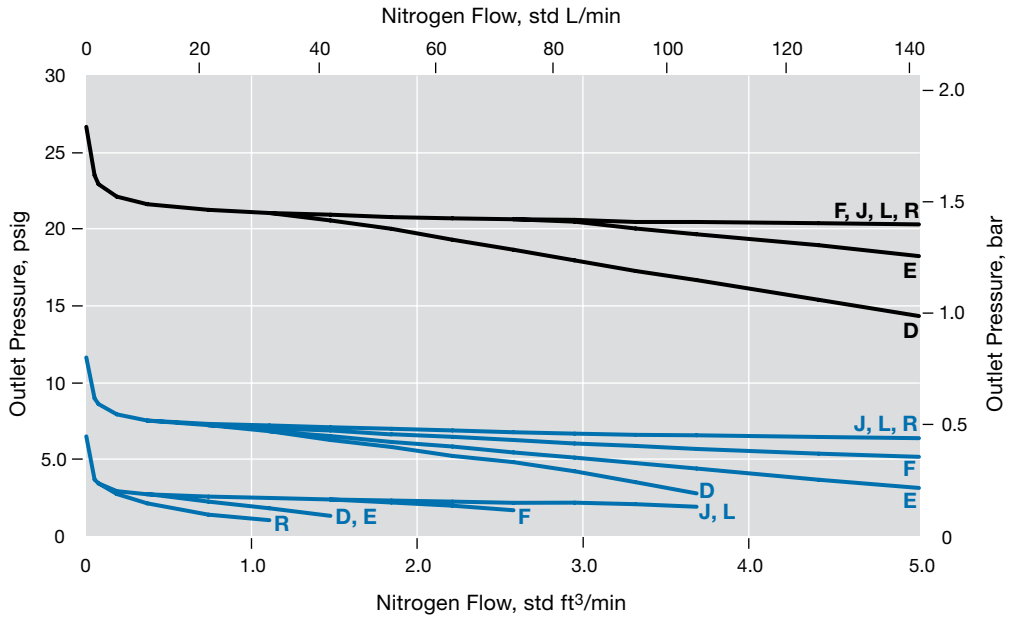
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **D** 25 psig (1.7 bar)
- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KHF Series High-Flow, High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

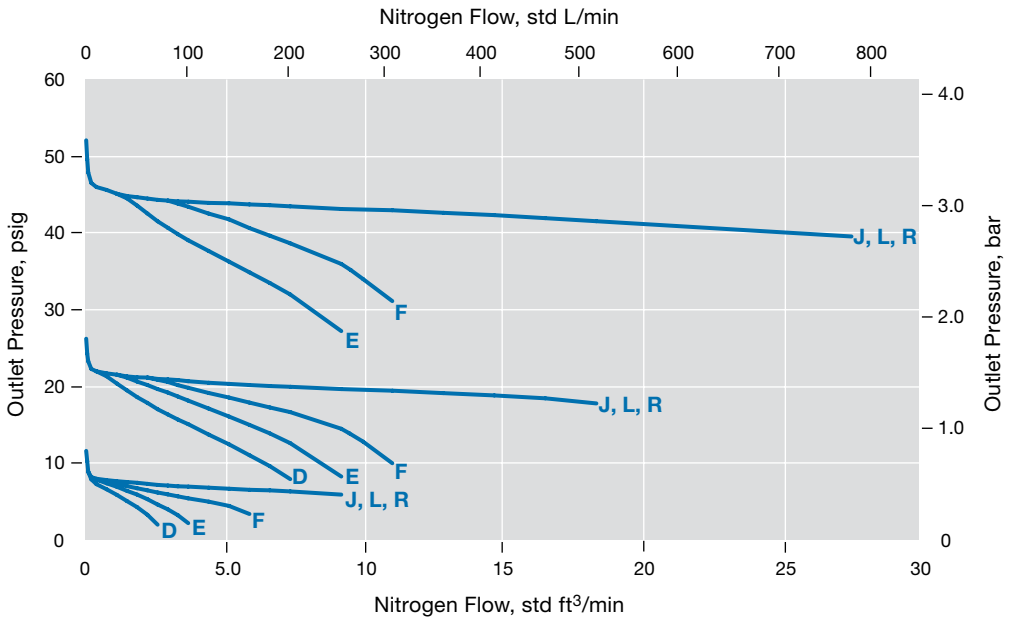
Flow Coefficient 1.0, Pressure Control Range 0 to 50 psig (0 to 3.4 bar)

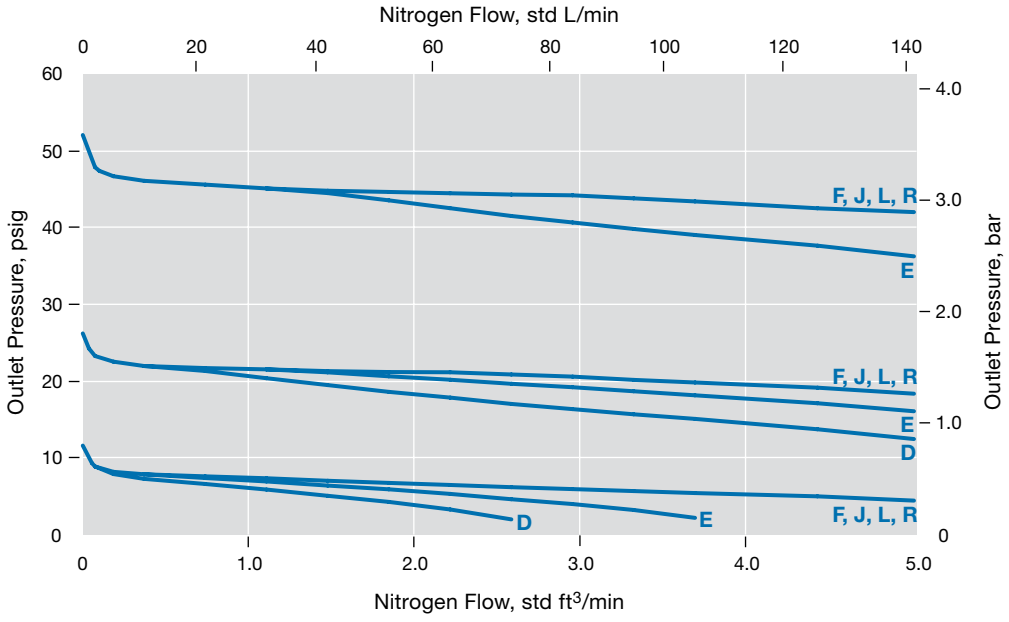
Pressure Control Range

0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **D** 25 psig (1.7 bar)
- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KHF Series High-Flow, High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

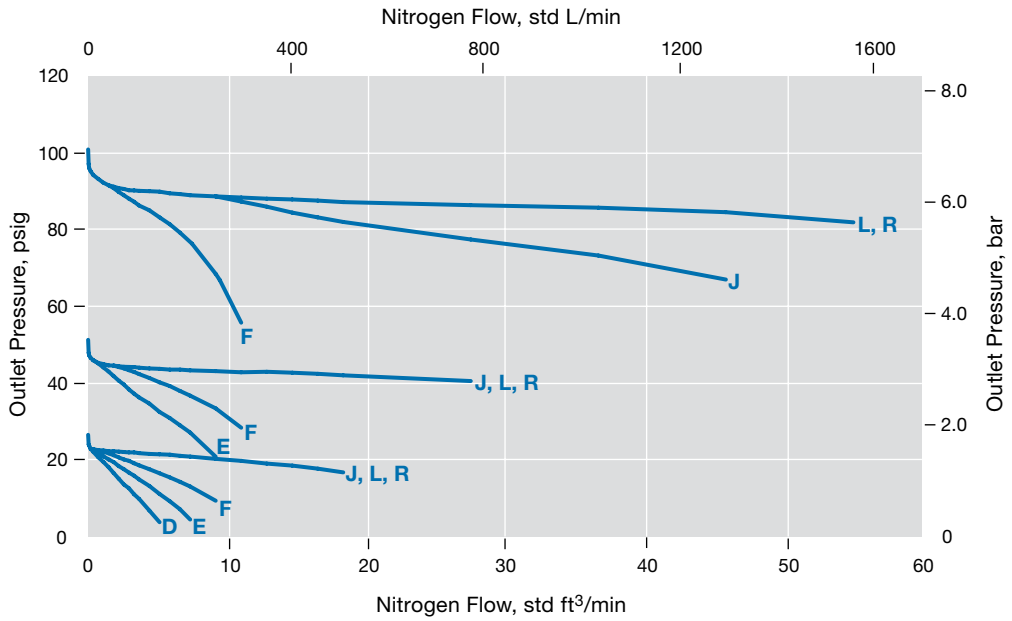
Flow Coefficient 1.0, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

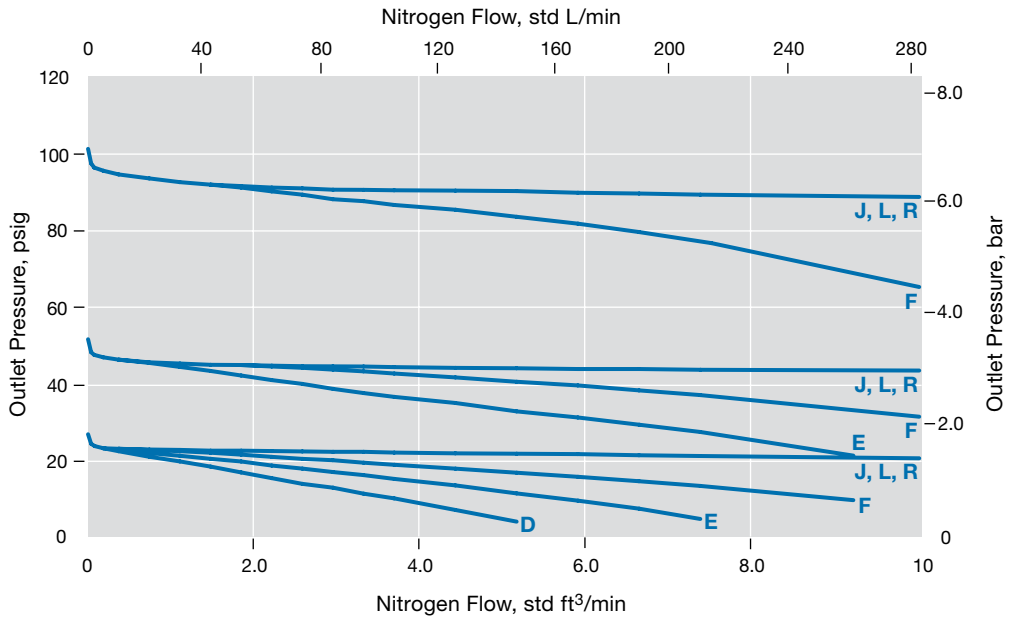
Pressure Control Range

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **D** 25 psig (1.7 bar)
- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KHF Series High-Flow, High-Sensitivity Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

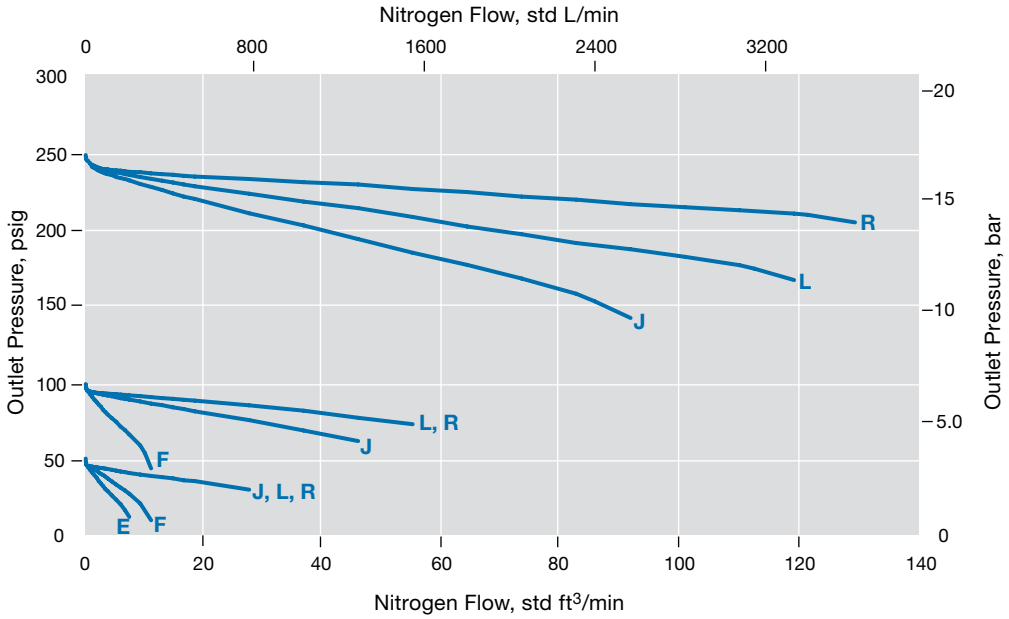
Flow Coefficient 1.0, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

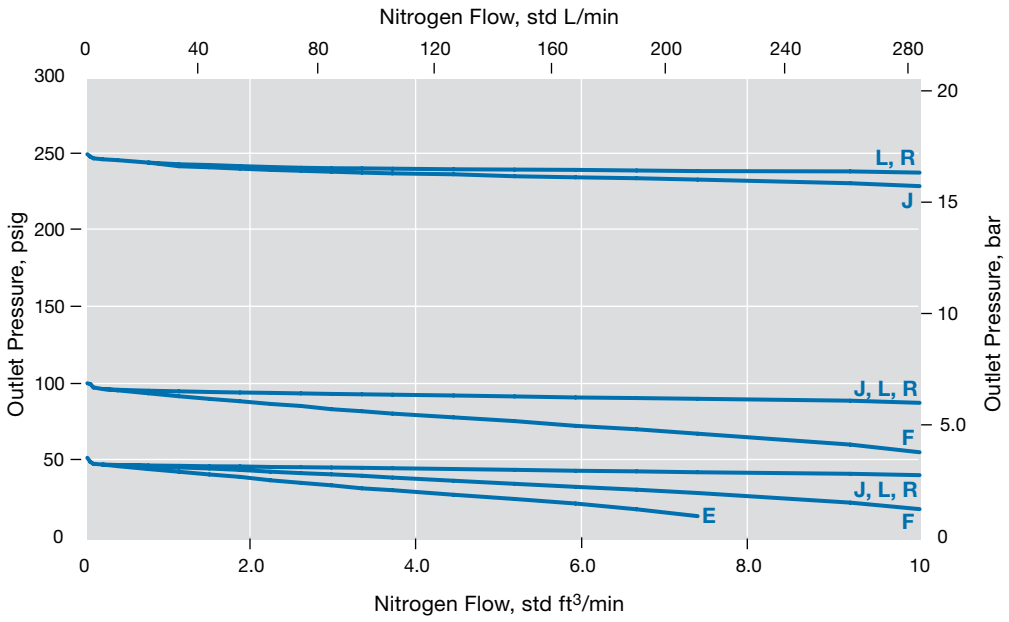
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

The KCP series is a compact, piston-sensing pressure regulator with a short stroke to minimize wear in high-cycling applications.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 250 psig (17.2 bar)	500 psig (34.4 bar) and Higher
	Supply Pressure Effect, %	
0.02	0.4	2.6
0.06	1.3	8.6
0.20	2.1	14.5
0.50	3.0	22.6

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

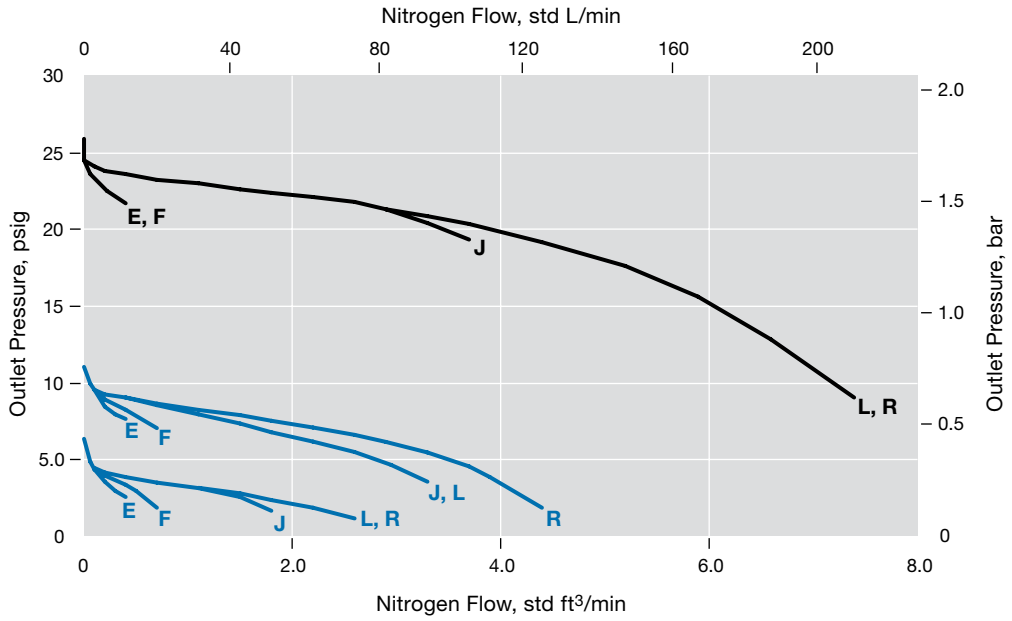
Flow Coefficient 0.02, Pressure Control Range 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

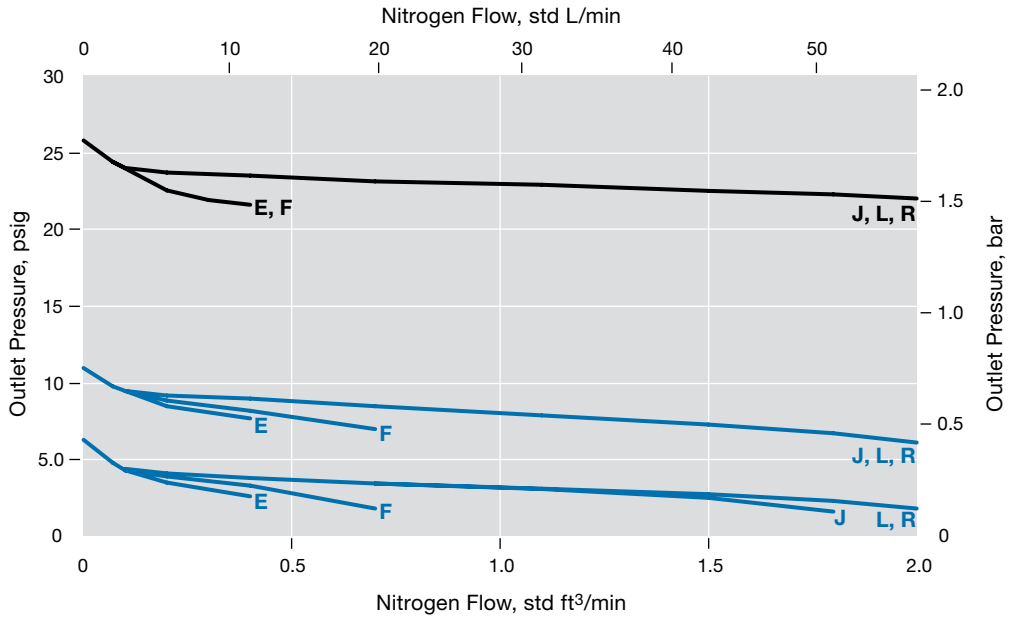
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

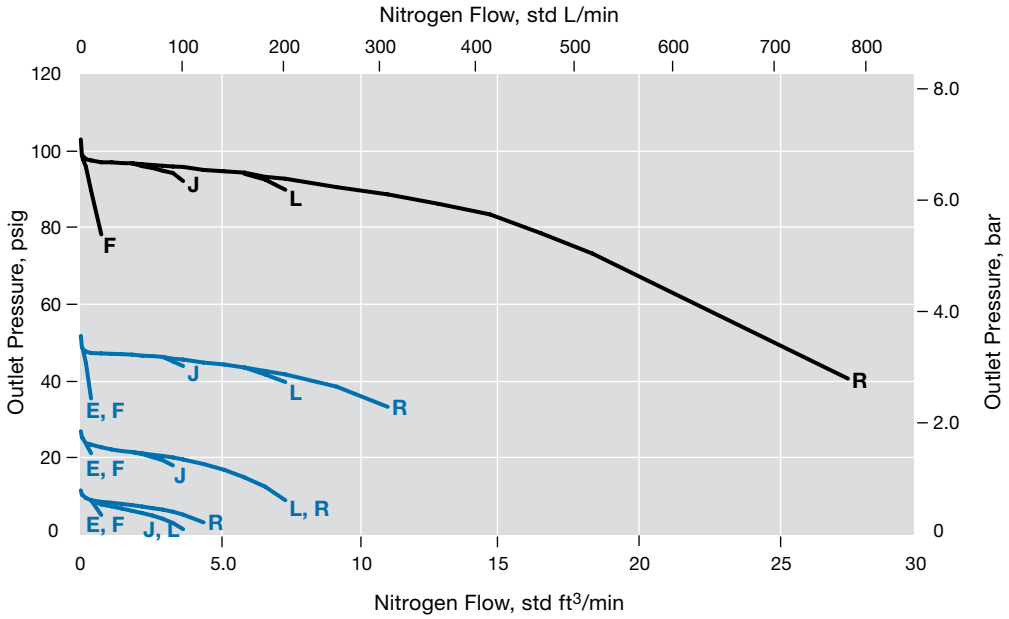
Flow Coefficient 0.02, Pressure Control Range 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

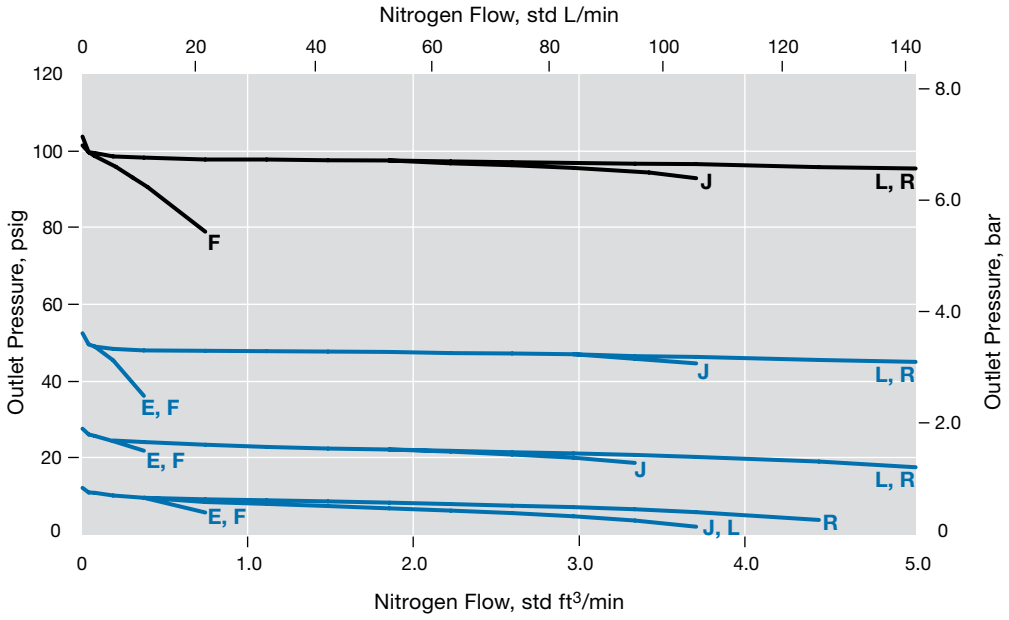
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

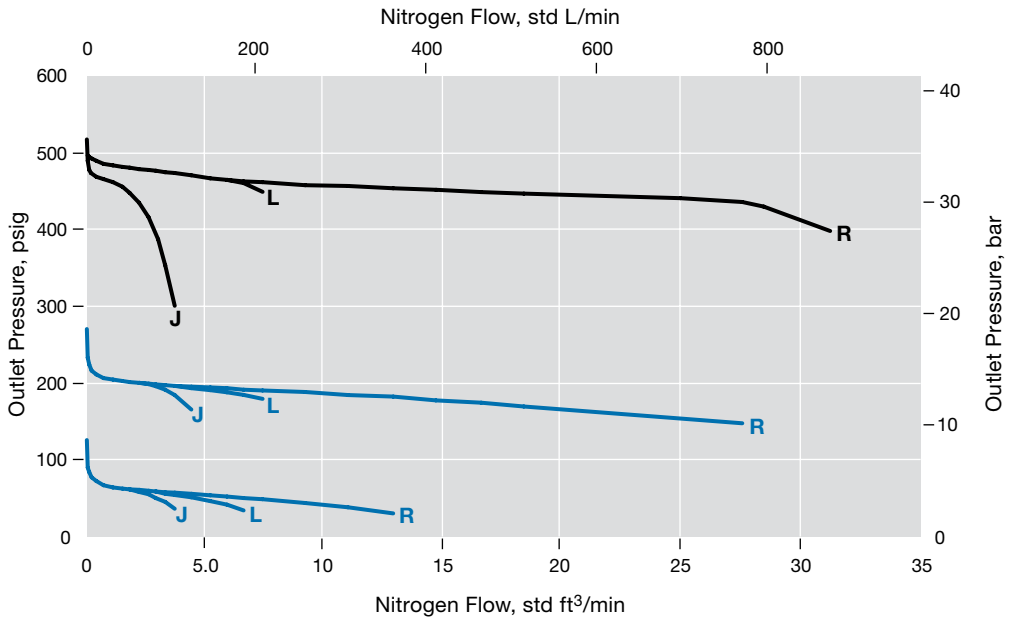
Flow Coefficient 0.02, Pressure Control Range 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

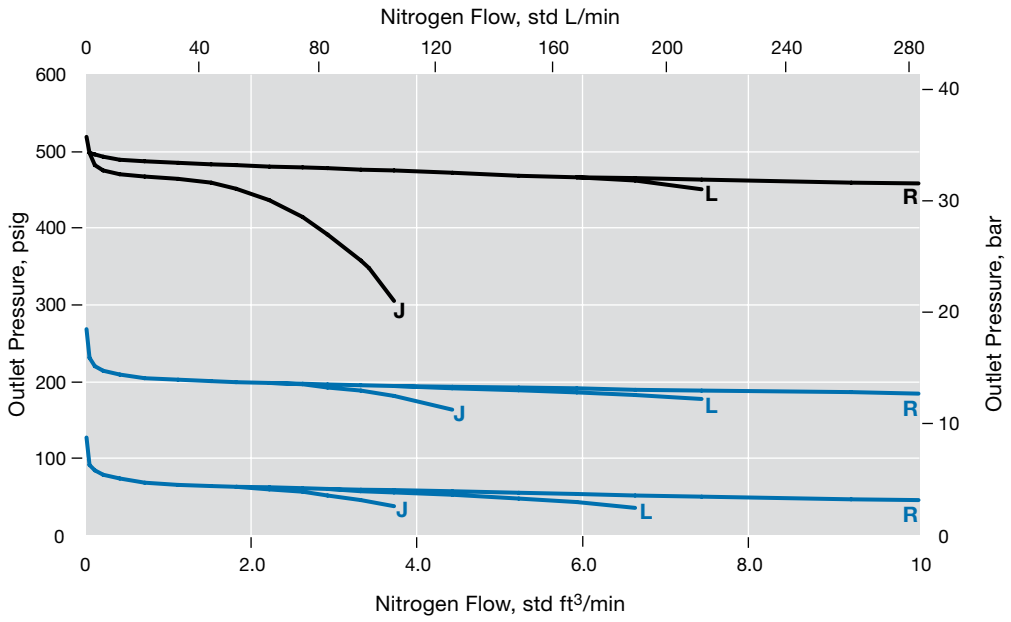
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

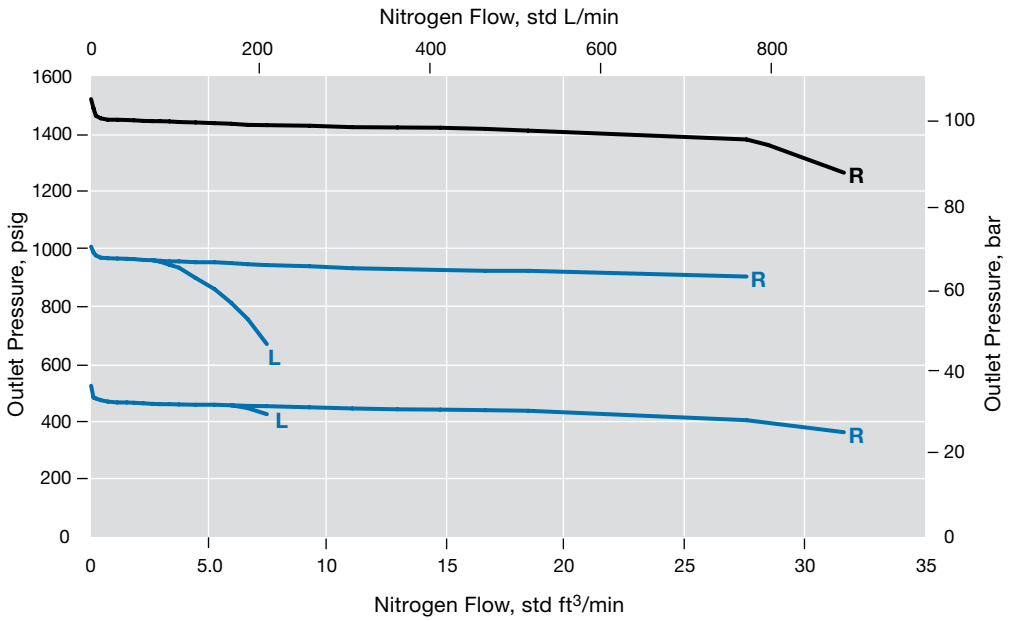
Flow Coefficient 0.02, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar) and 0 to 1500 psig (0 to 103 bar)

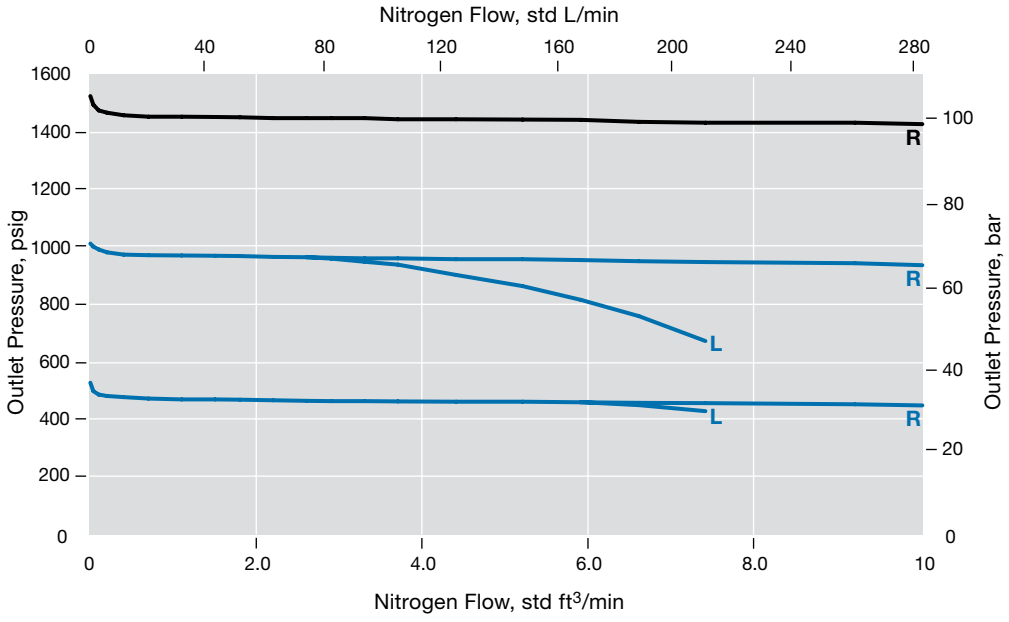
Pressure Control Range

- 0 to 1000 psig (0 to 68.9 bar)
- 0 to 1500 psig (0 to 103 bar)

Inlet Pressure

- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

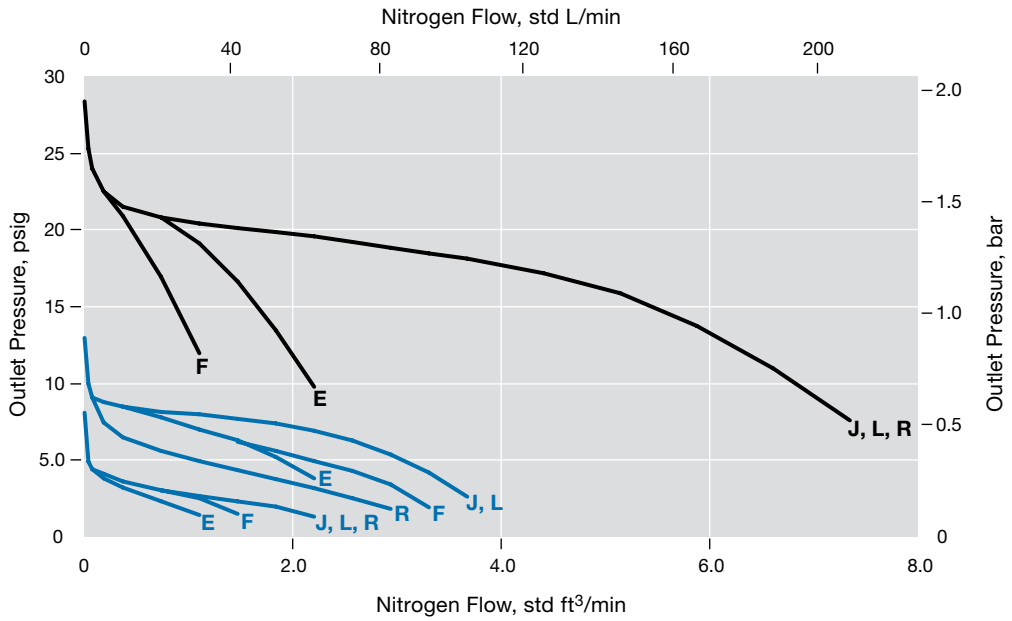
Flow Coefficient 0.06, Pressure Control Range 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

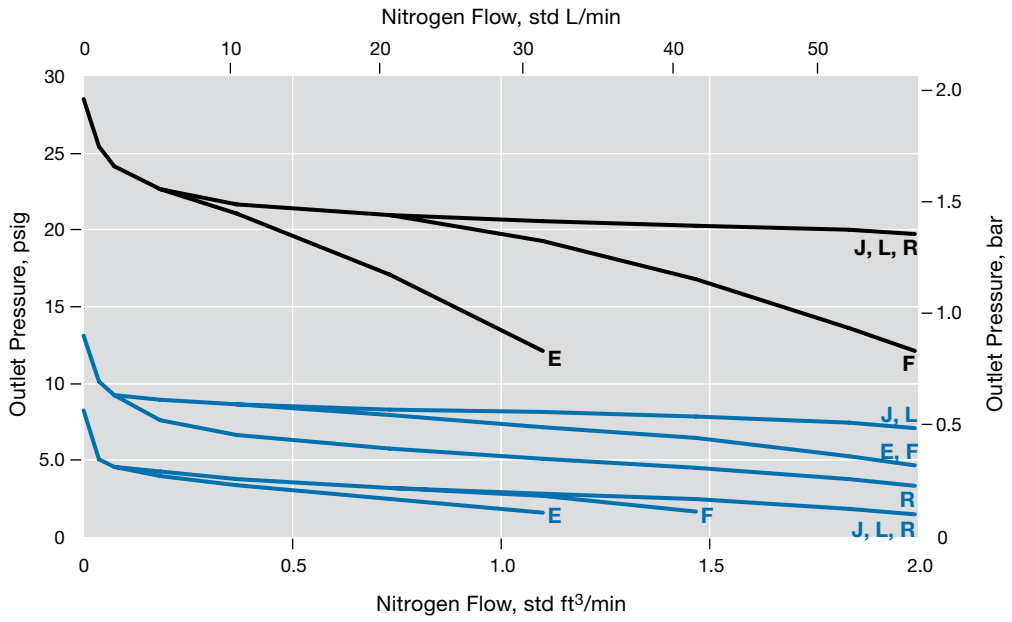
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

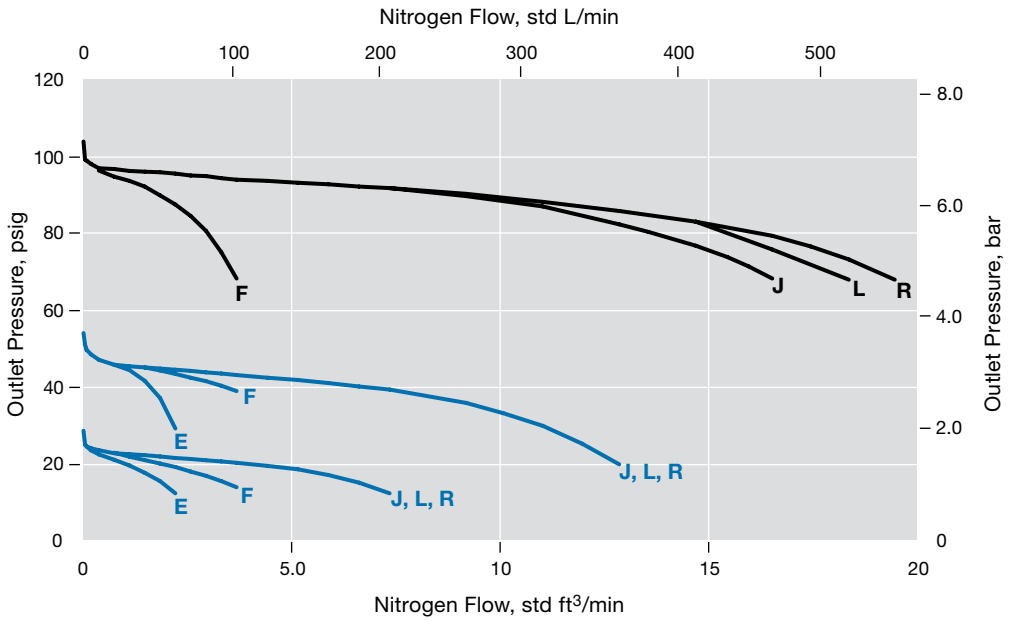
Flow Coefficient 0.06, Pressure Control Range 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

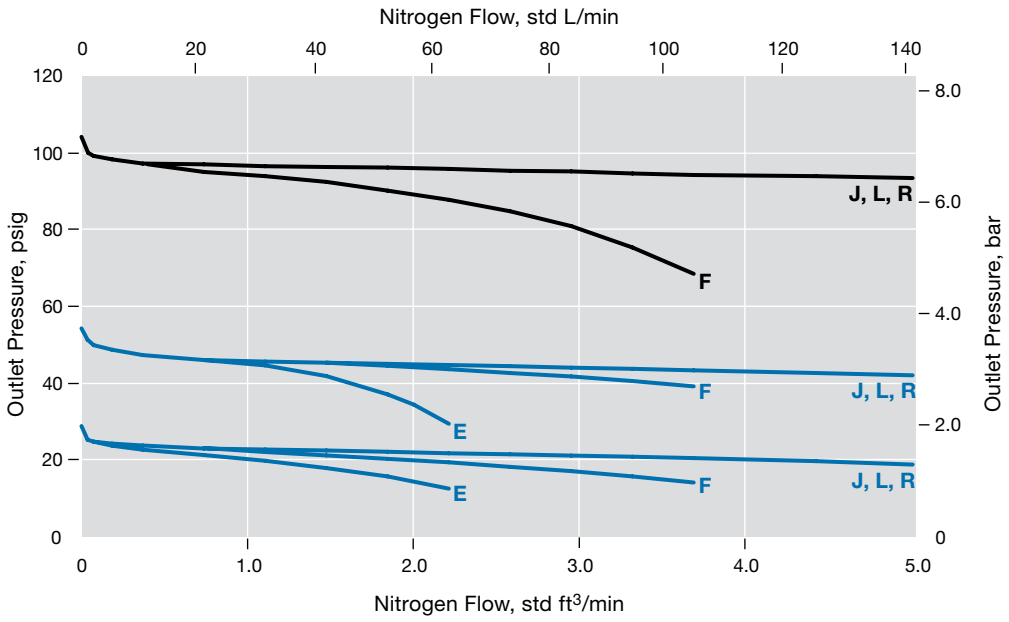
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

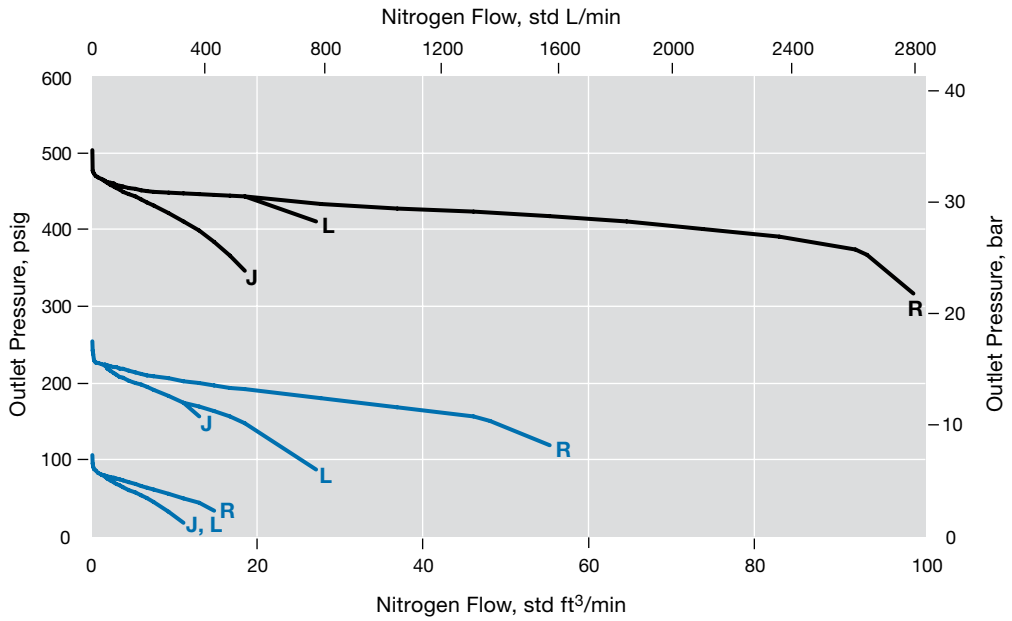
Flow Coefficient 0.06, Pressure Control Range 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

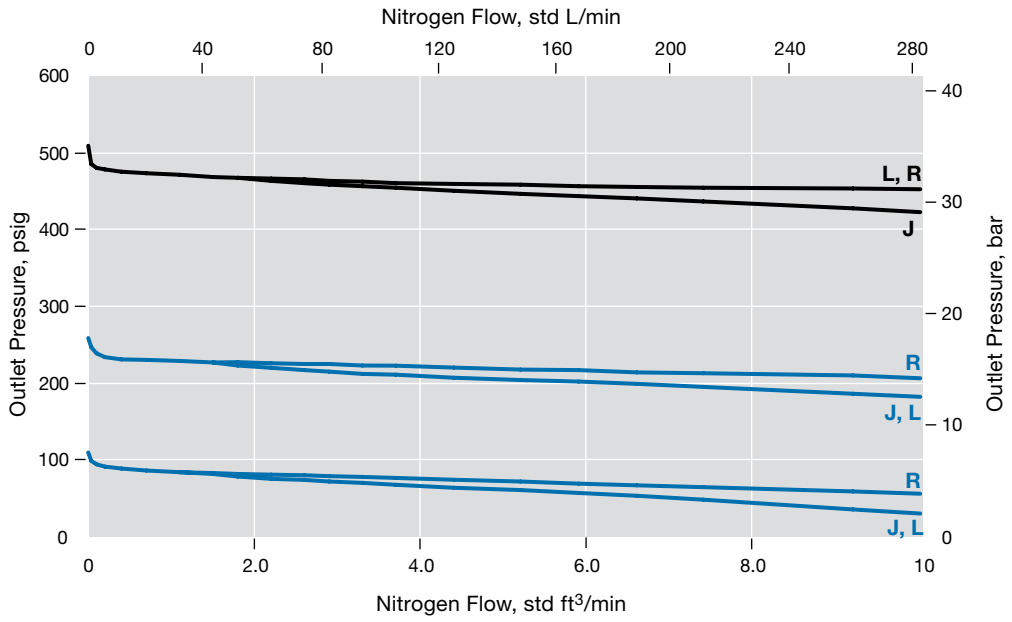
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

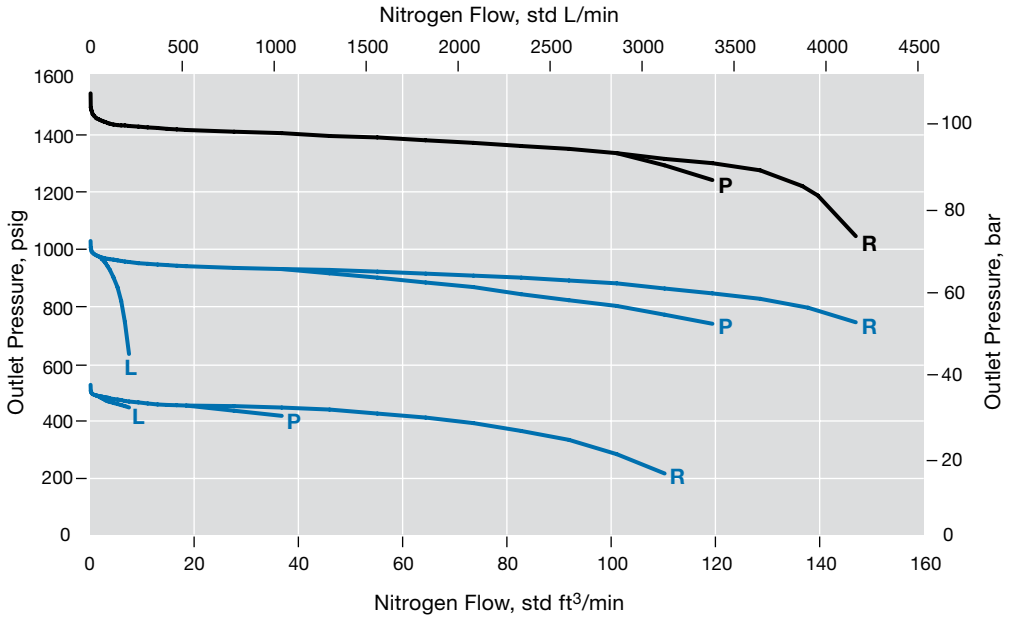
Flow Coefficient 0.06, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar) and 0 to 1500 psig (0 to 103 bar)

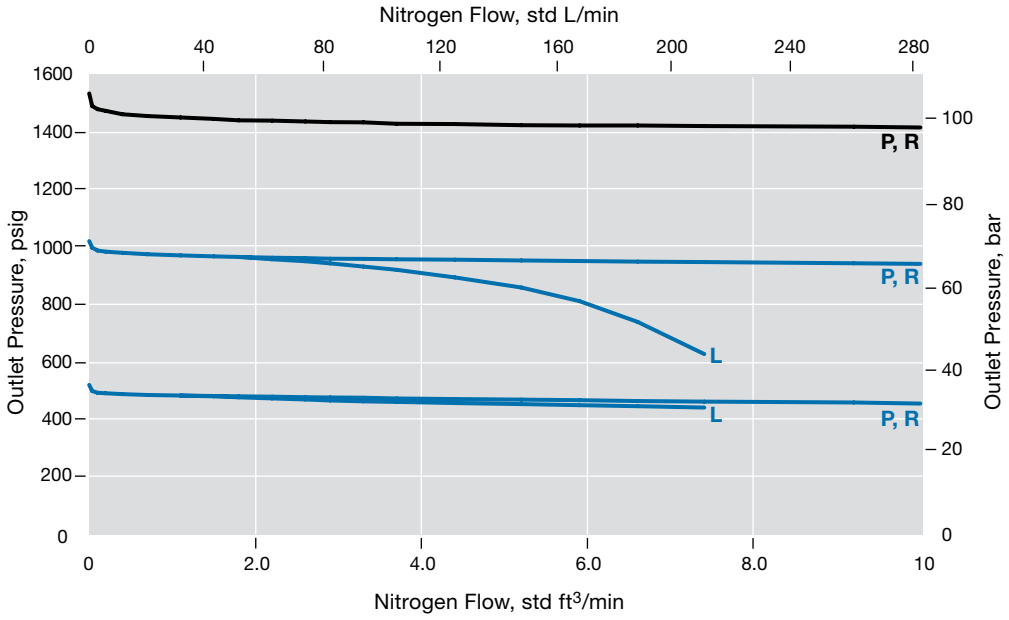
Pressure Control Range

- 0 to 1000 psig (0 to 68.9 bar)
- 0 to 1500 psig (0 to 103 bar)

Inlet Pressure

- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

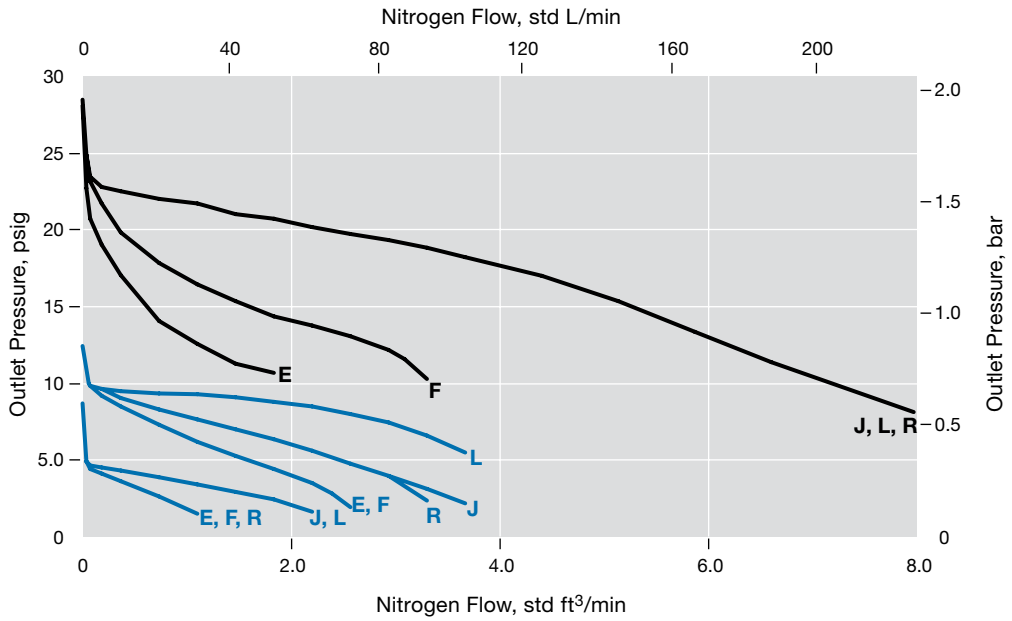
Flow Coefficient 0.20, Pressure Control Range 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

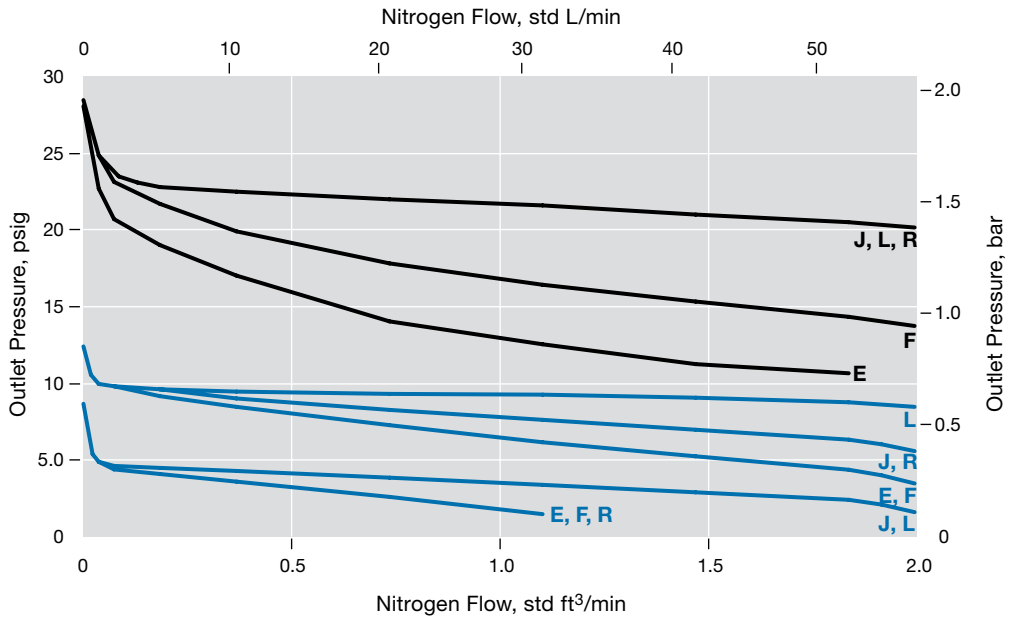
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

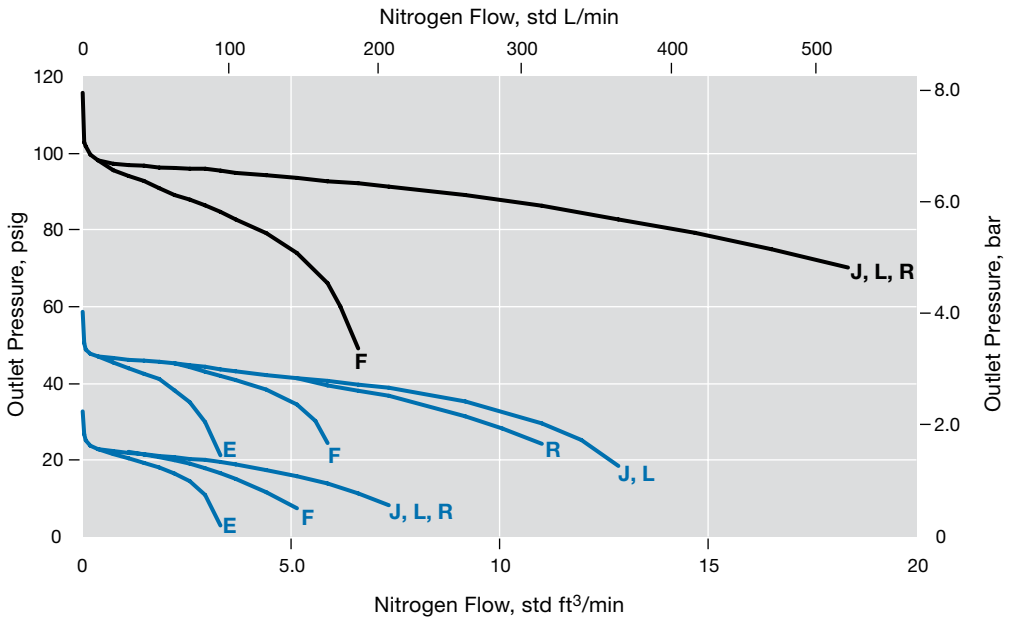
Flow Coefficient 0.20, Pressure Control Range 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

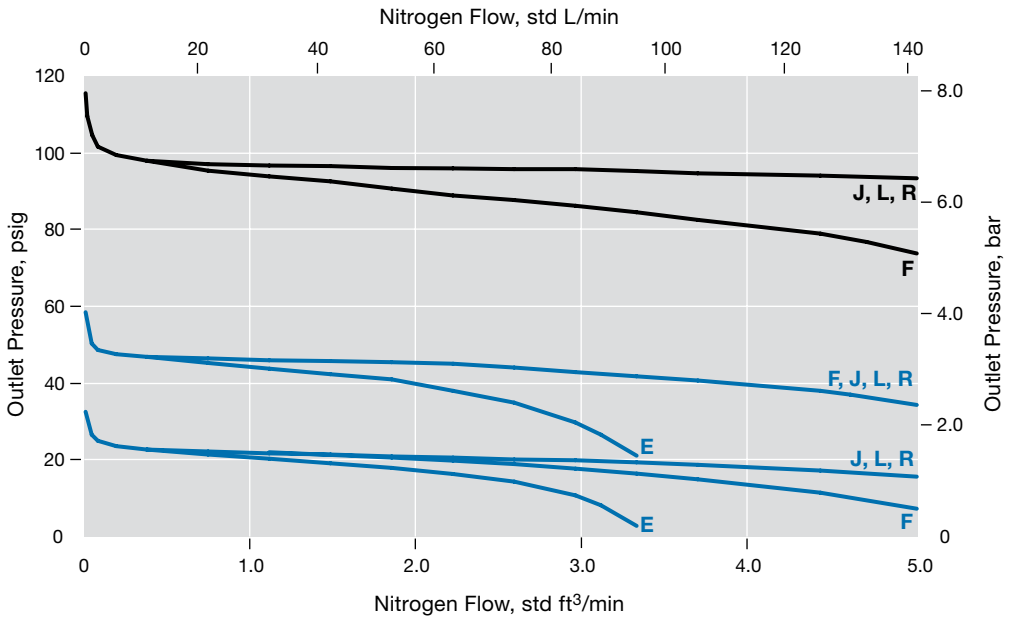
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

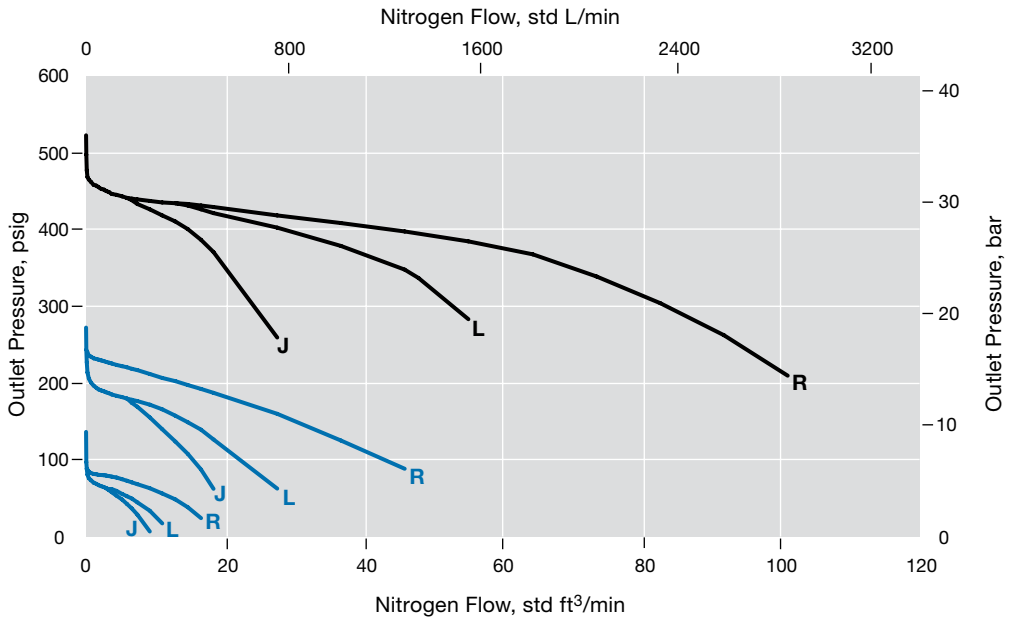
Flow Coefficient 0.20, Pressure Control Range 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

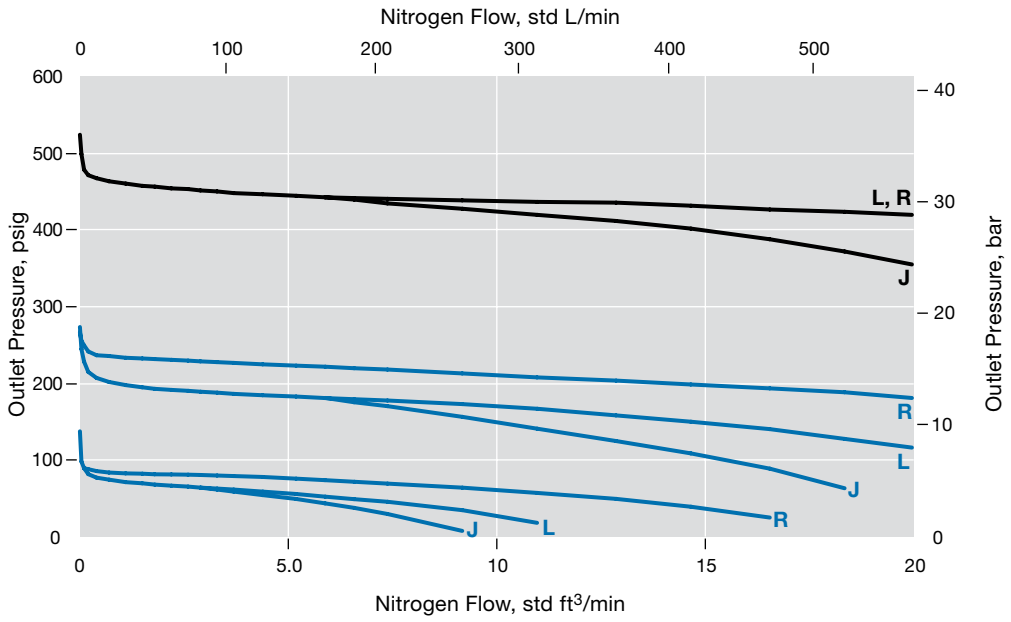
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

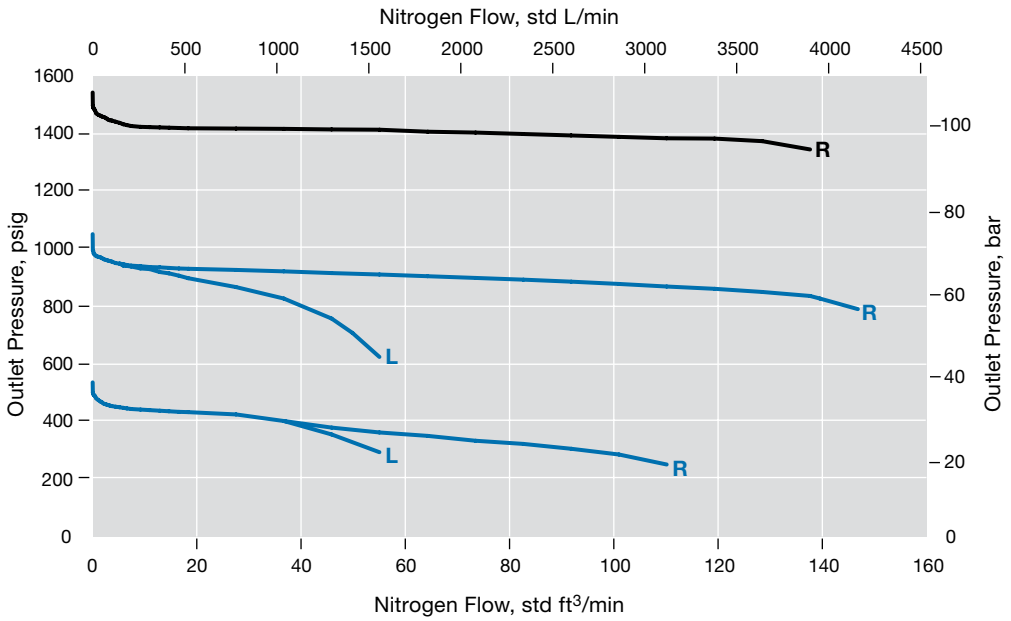
Flow Coefficient 0.20, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar) and 0 to 1500 psig (0 to 103 bar)

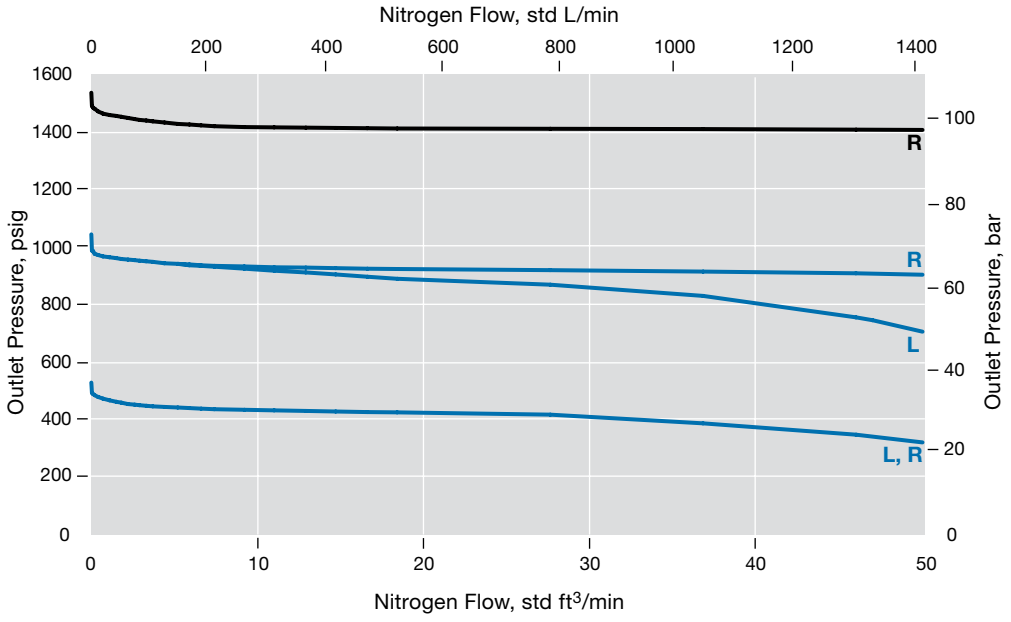
Pressure Control Range

- 0 to 1000 psig (0 to 68.9 bar)
- 0 to 1500 psig (0 to 103 bar)

Inlet Pressure

- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

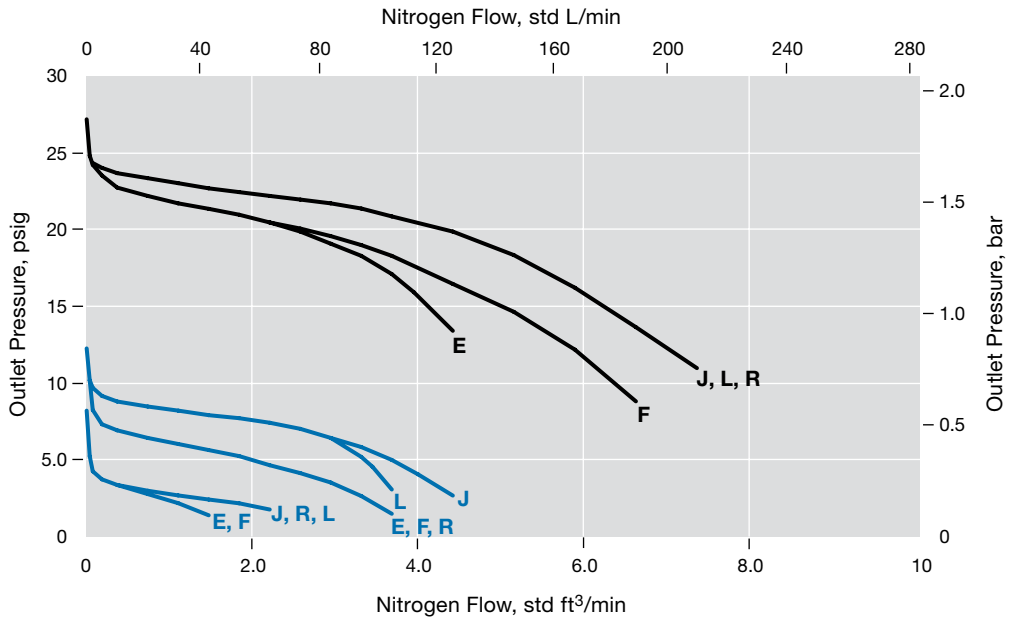
Flow Coefficient 0.50, Pressure Control Range 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)

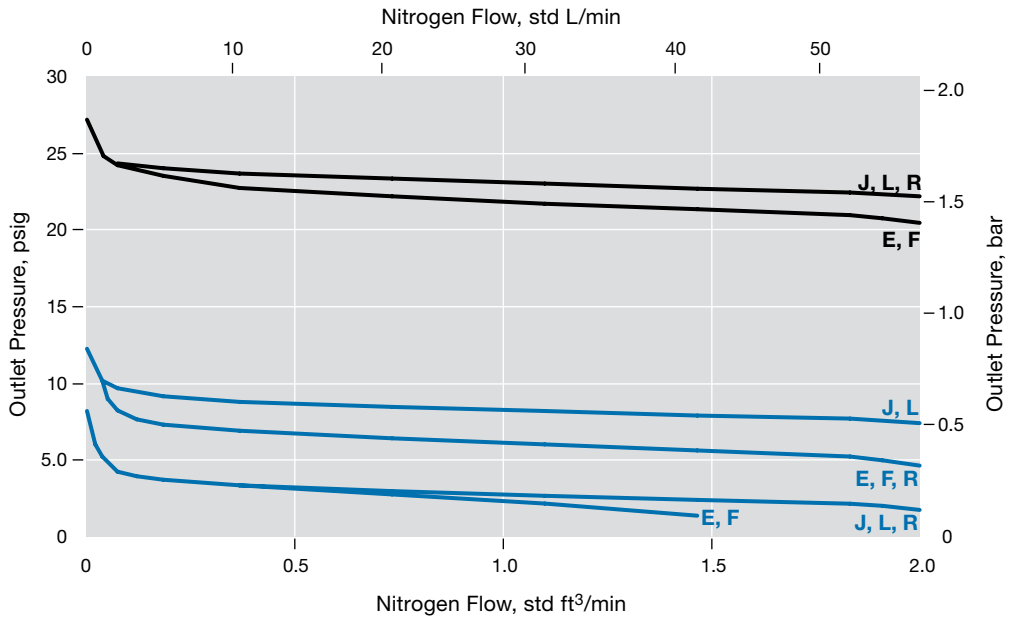
Pressure Control Range

- 0 to 10 psig (0 to 0.68 bar)
- 0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

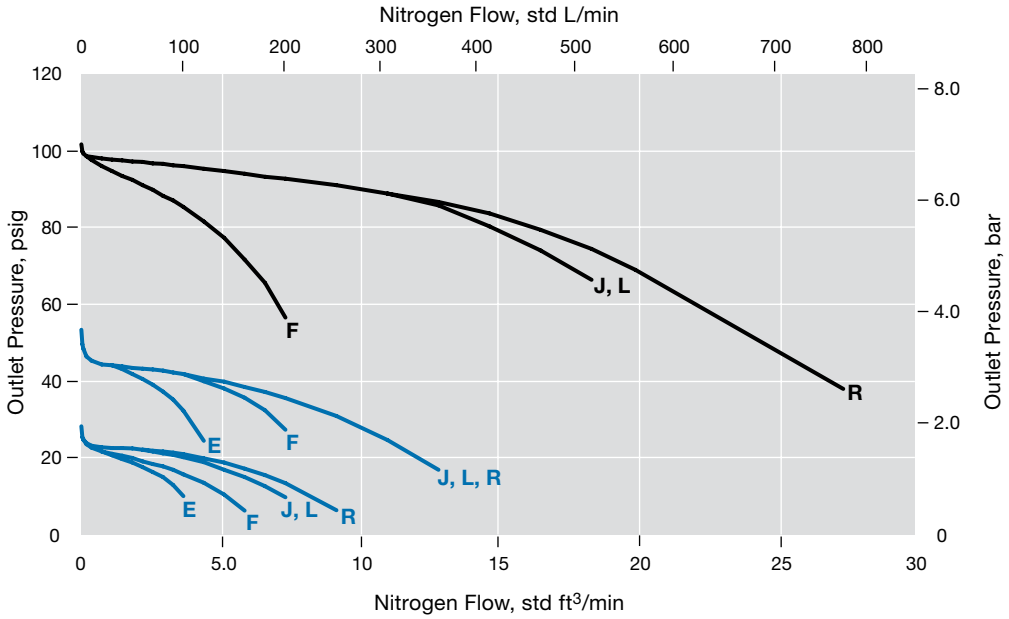
Flow Coefficient 0.50, Pressure Control Range 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

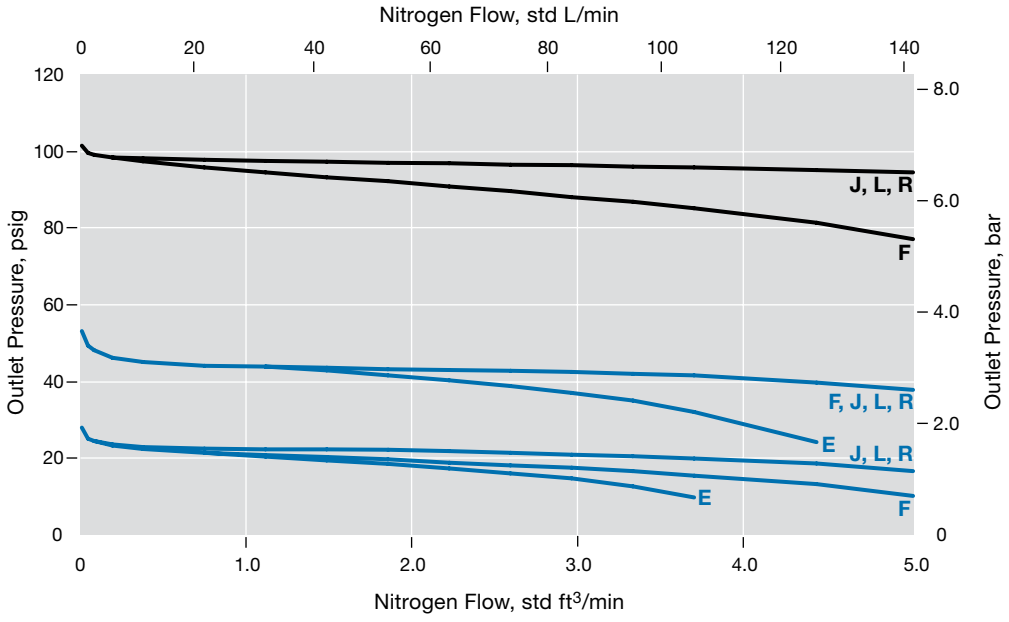
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **E** 50 psig (3.4 bar)
- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

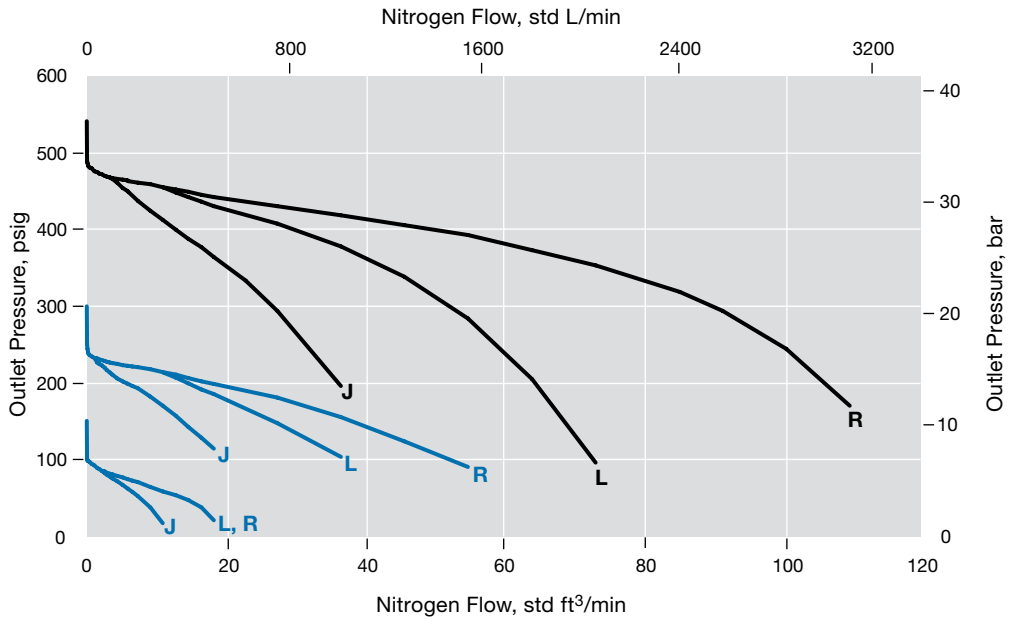
Flow Coefficient 0.50, Pressure Control Range 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

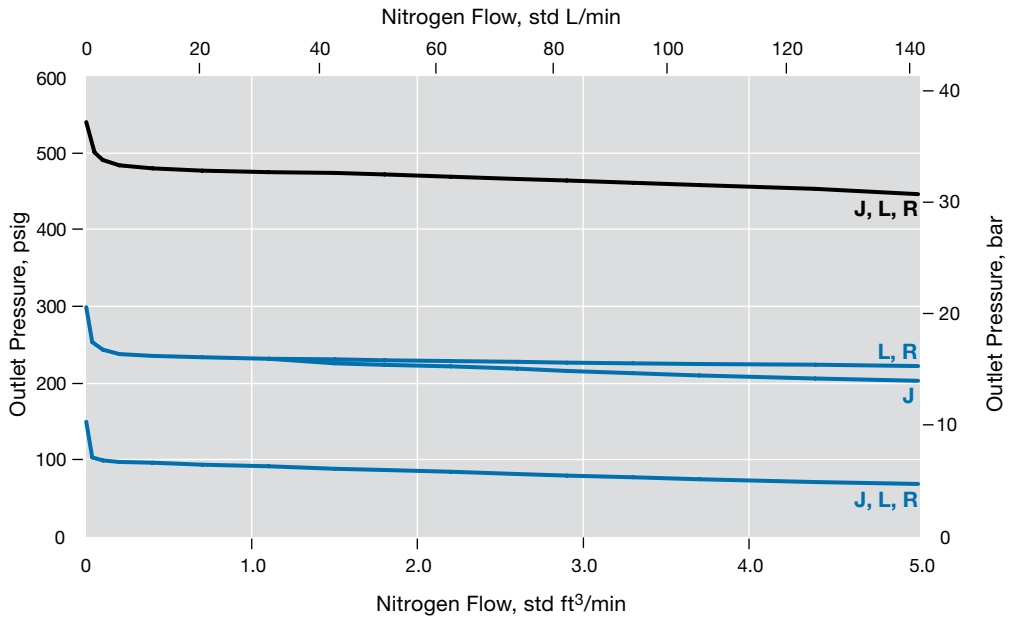
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KCP Series Compact Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

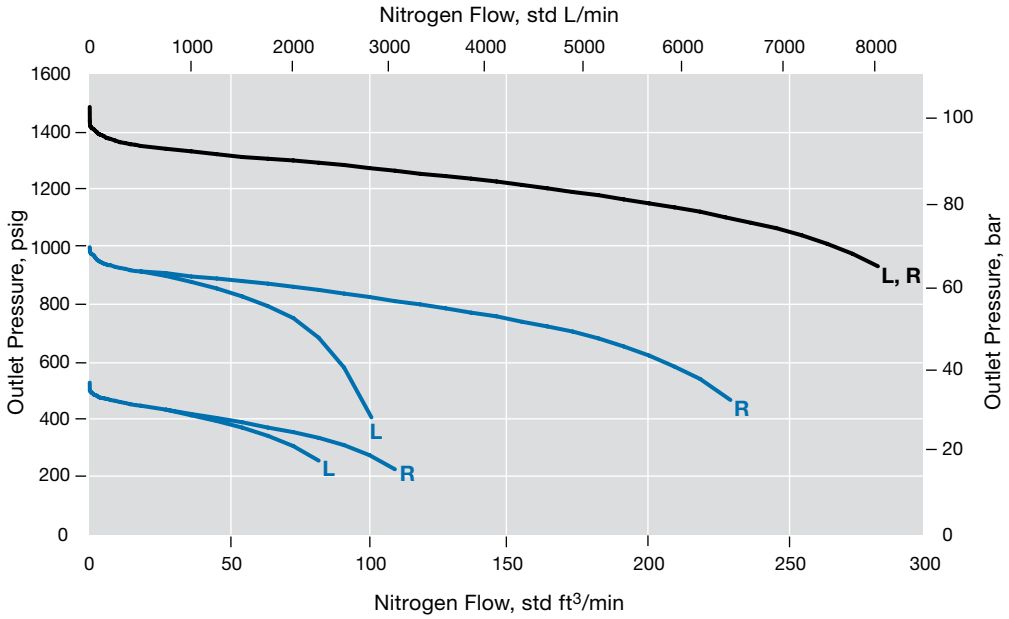
Flow Coefficient 0.50, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar) and 0 to 1500 psig (0 to 103 bar)

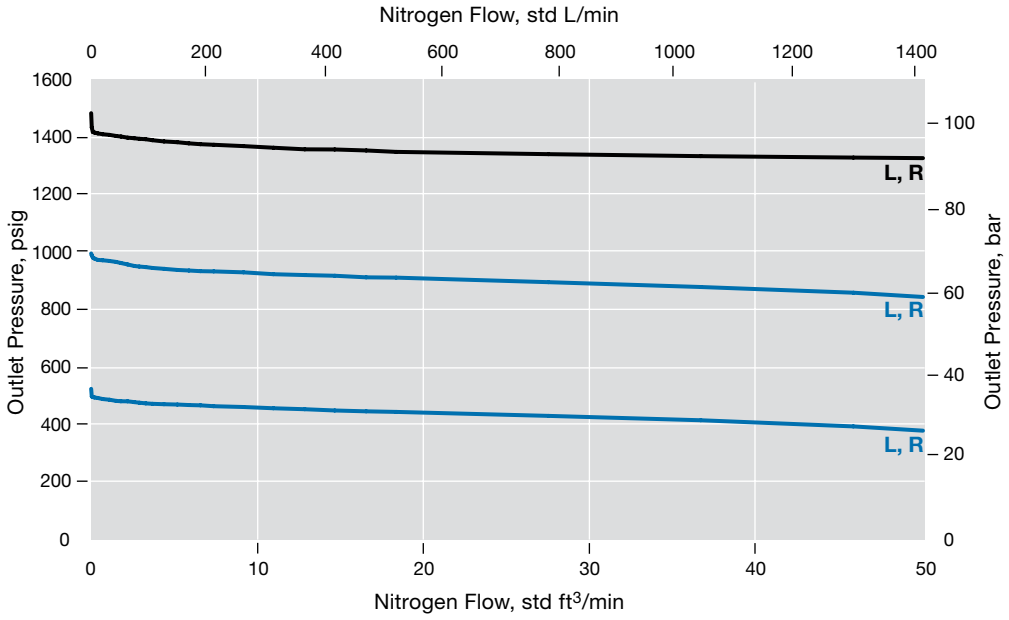
Pressure Control Range

- 0 to 1000 psig (0 to 68.9 bar)
- 0 to 1500 psig (0 to 103 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

The KPP series meets the demands of a wide range of gas or liquid applications in a lightweight, compact installation footprint. These features make the KPP pressure regulator an ideal pressure control solution within high-density OEM equipment.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Supply Pressure Effect, %
0.02	2.2
0.06	7.2

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

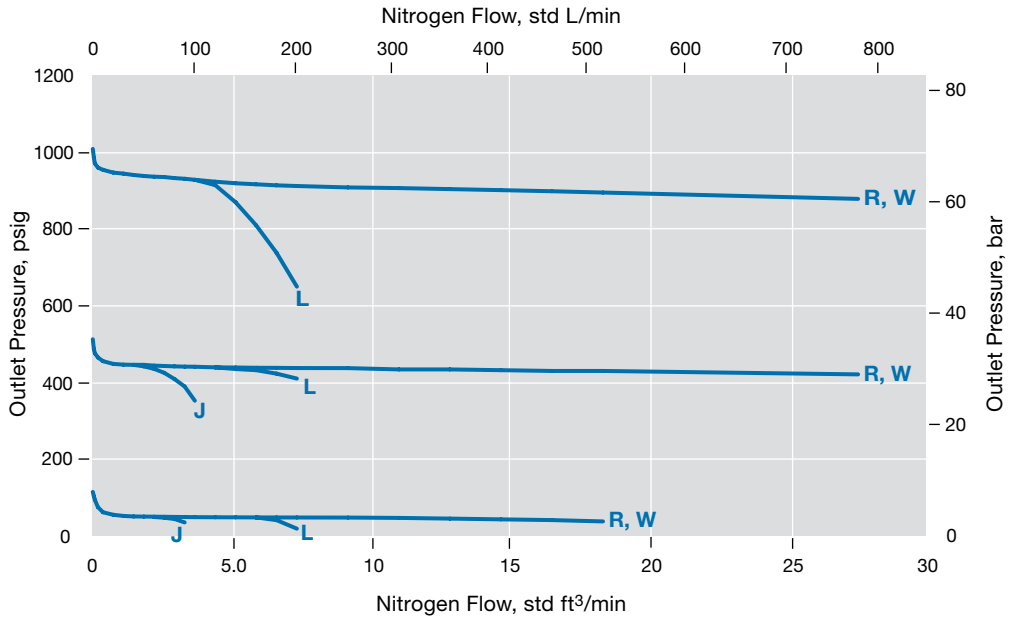
Flow Coefficient 0.02, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar)

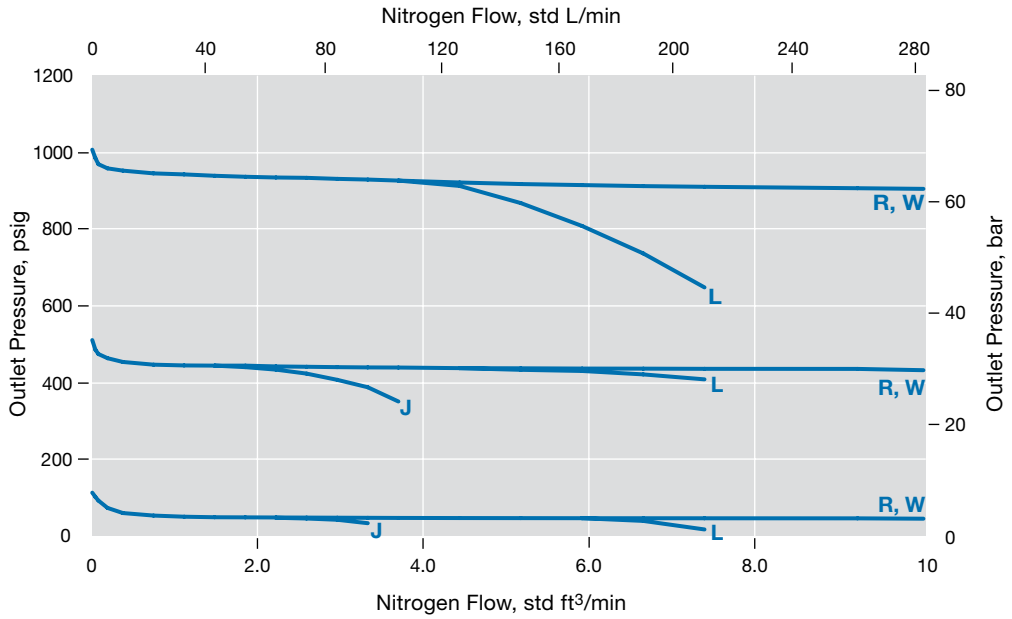
Pressure Control Range

0 to 1000 psig (0 to 68.9 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

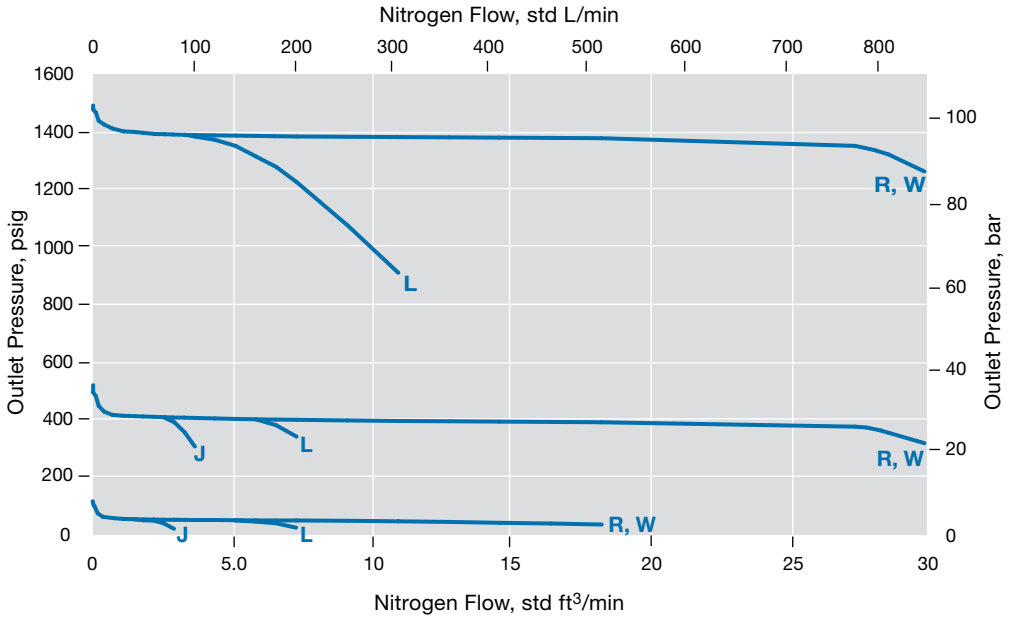
Flow Coefficient 0.02, Pressure Control Range 0 to 1500 psig (0 to 103 bar)

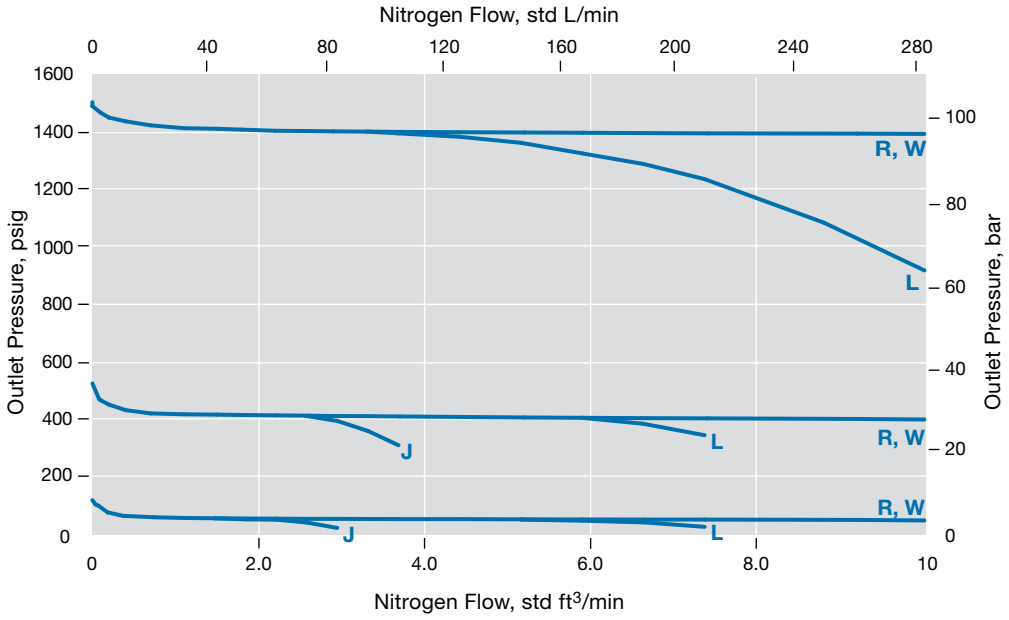
Pressure Control Range

0 to 1500 psig (0 to 103 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

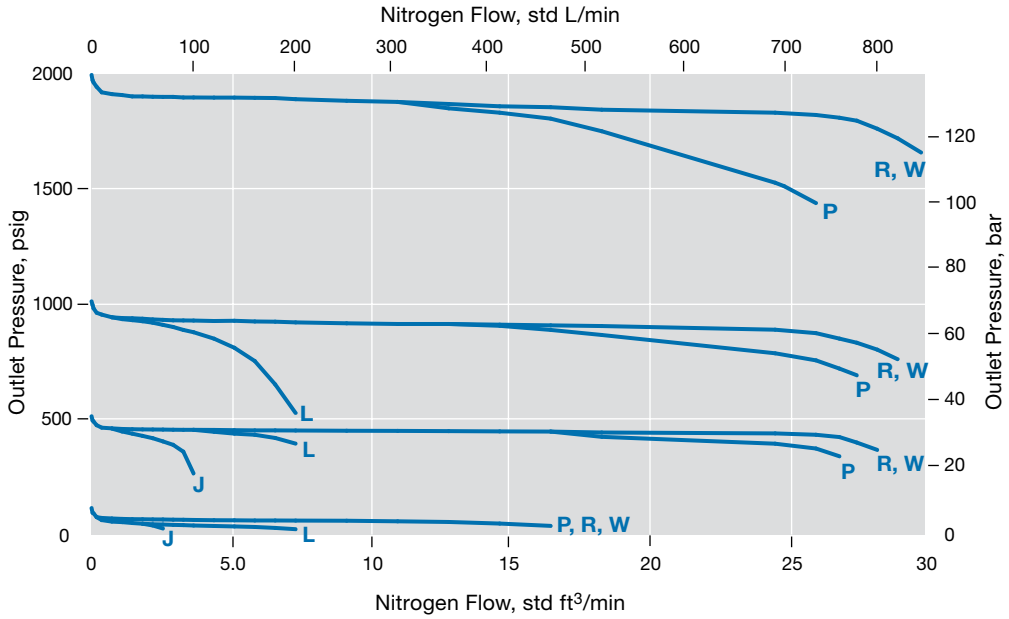
Flow Coefficient 0.02, Pressure Control Range 0 to 2000 psig (0 to 137 bar)

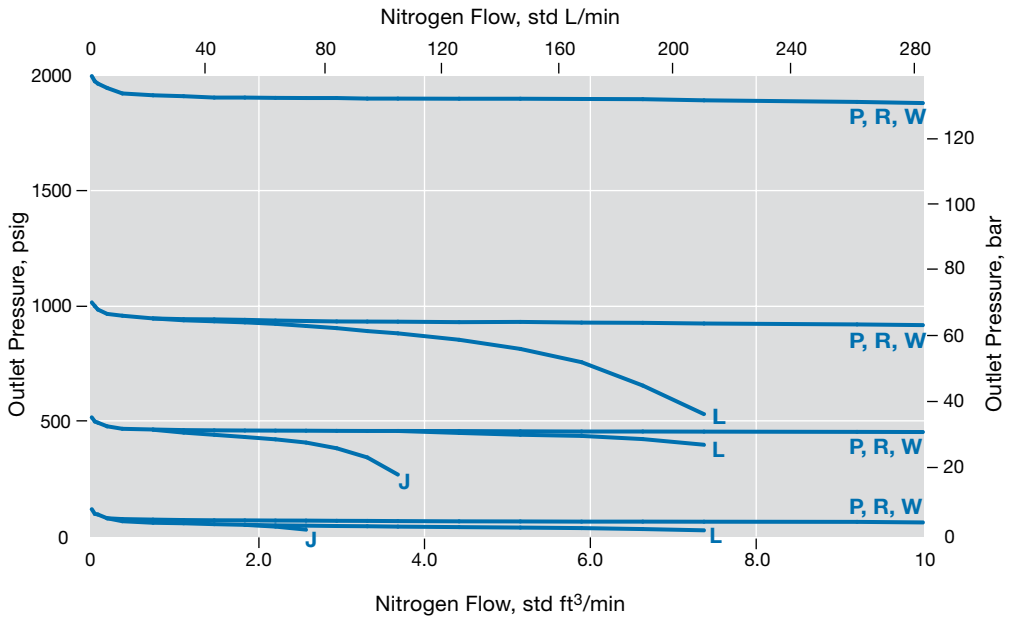
Pressure Control Range

0 to 2000 psig (0 to 137 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

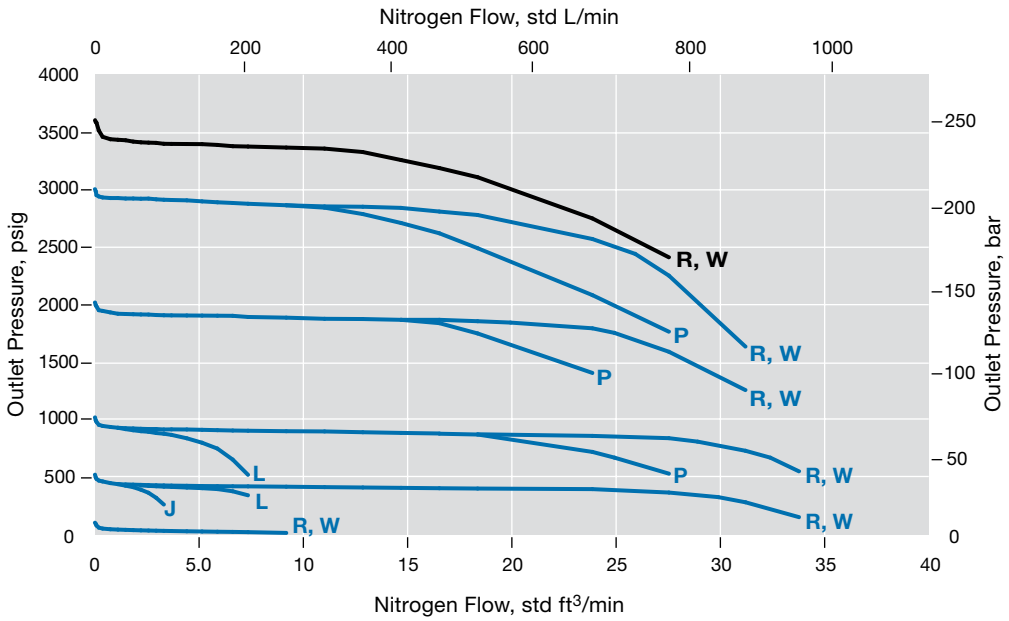
Flow Coefficient 0.02, Pressure Control Range 0 to 3000 psig (0 to 206 bar) and 0 to 3600 psig (0 to 248 bar)

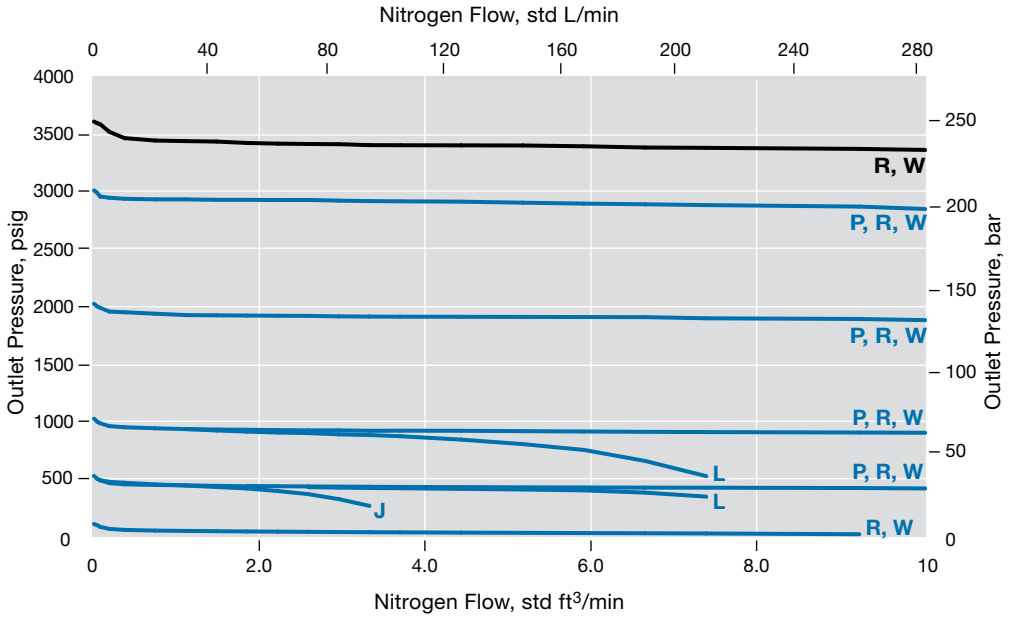
Pressure Control Range

- 0 to 3000 psig (0 to 206 bar)
- 0 to 3600 psig (0 to 248 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

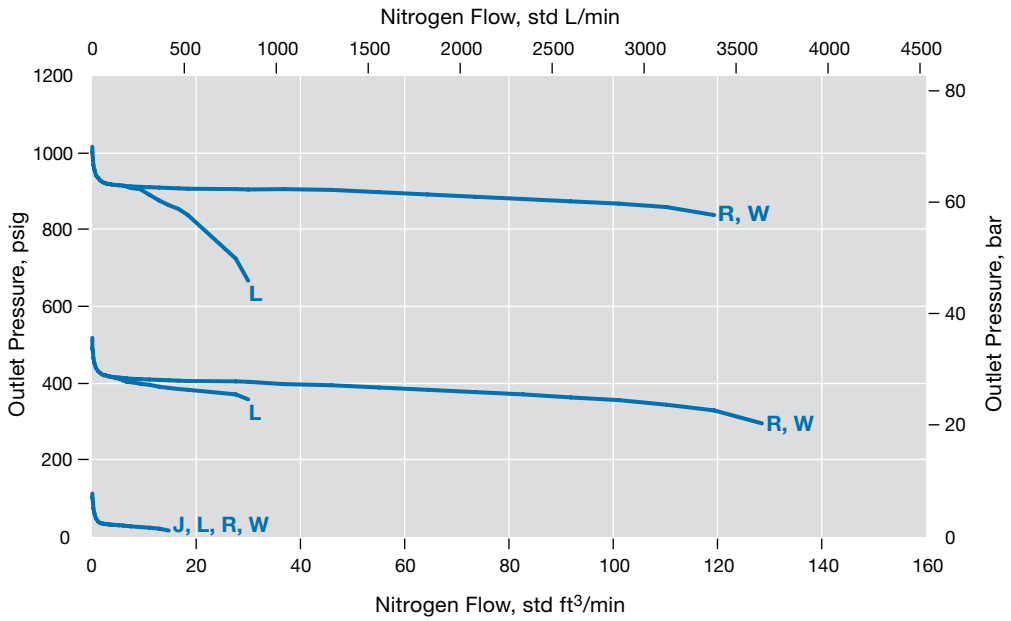
Flow Coefficient 0.06, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar)

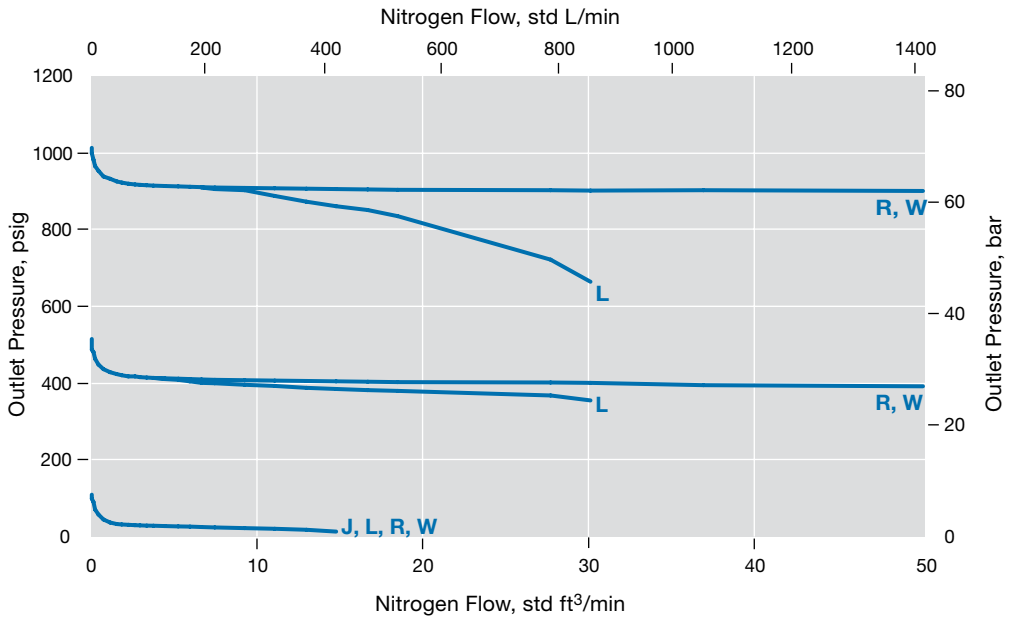
Pressure Control Range

0 to 1000 psig (0 to 68.9 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

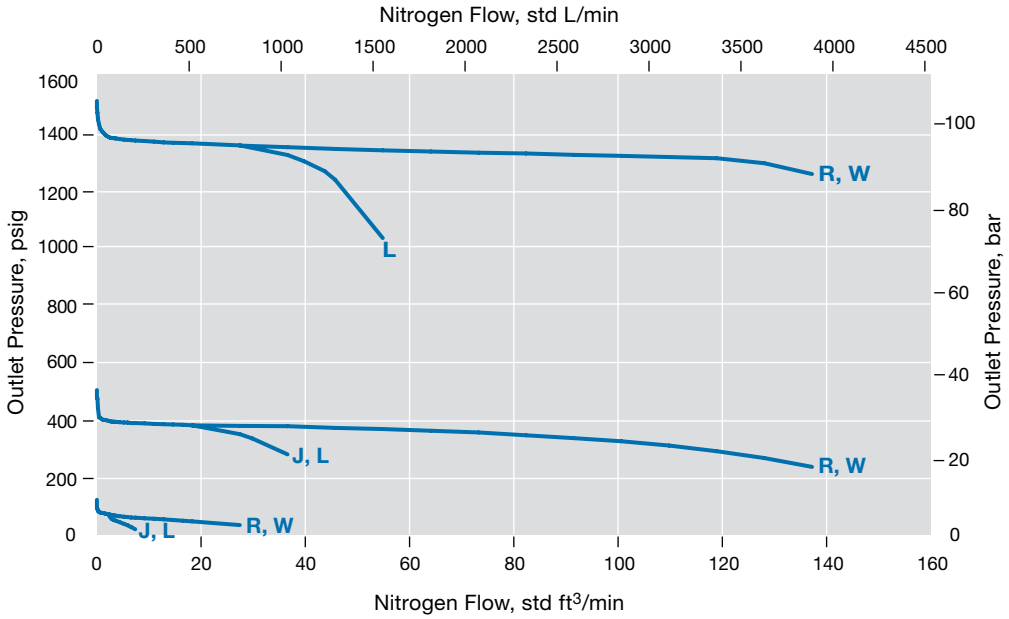
Flow Coefficient 0.06, Pressure Control Range 0 to 1500 psig (0 to 103 bar)

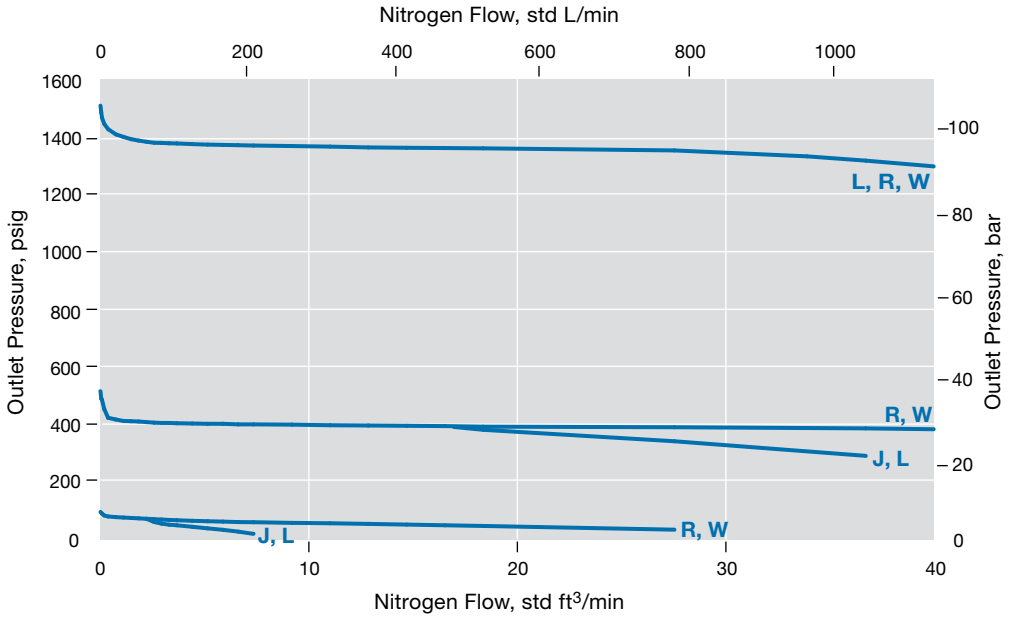
Pressure Control Range

0 to 1500 psig (0 to 103 bar)

Inlet Pressure

J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
R 3600 psig (248 bar)
W 6000 psig (413 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

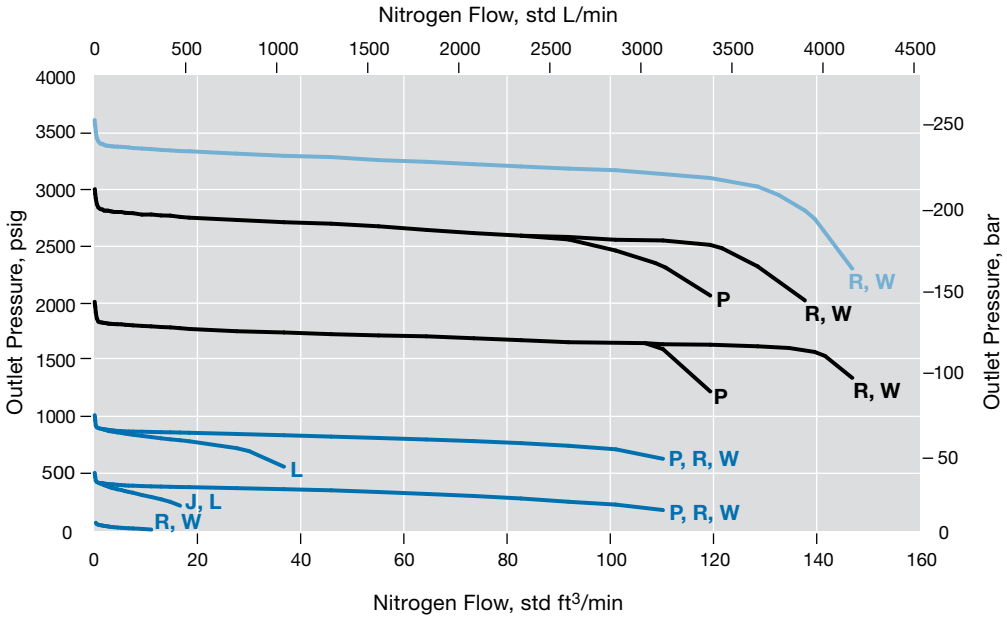
Flow Coefficient 0.06, Pressure Control Range 0 to 2000 psig (0 to 137 bar), 0 to 3000 psig (0 to 206 bar), and 0 to 3600 psig (0 to 248 bar)

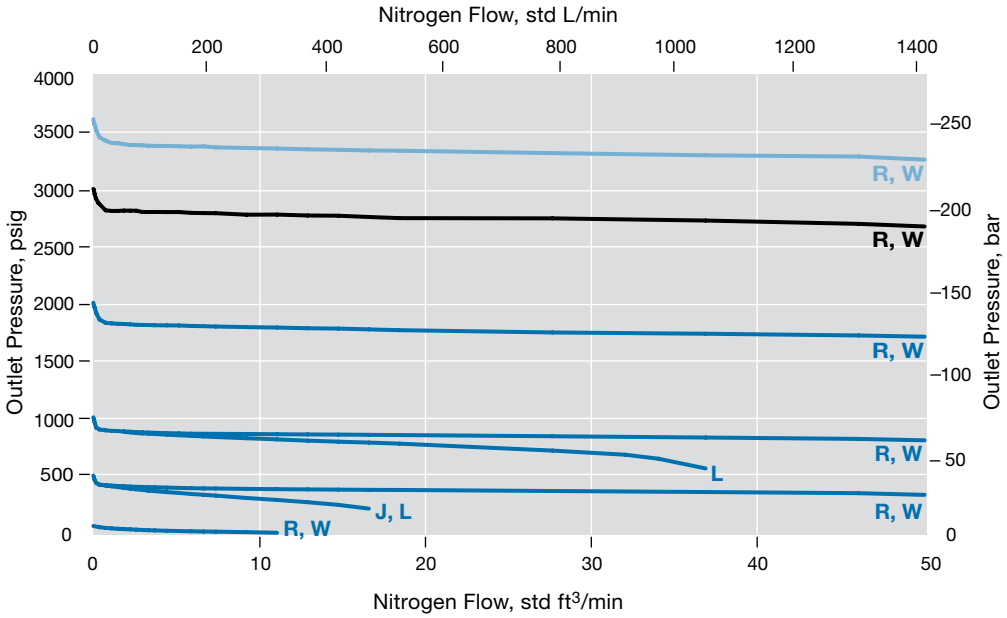
Pressure Control Range

- 0 to 2000 psig (0 to 137 bar)
- 0 to 3000 psig (0 to 206 bar)
- 0 to 3600 psig (0 to 248 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPF Series High-Flow Pressure-Reducing Regulators Gas Flow

The KPF series provides minimum droop across the flow range with high accuracy of outlet pressure.)

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Supply Pressure Effect, %
1.0	5.3

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

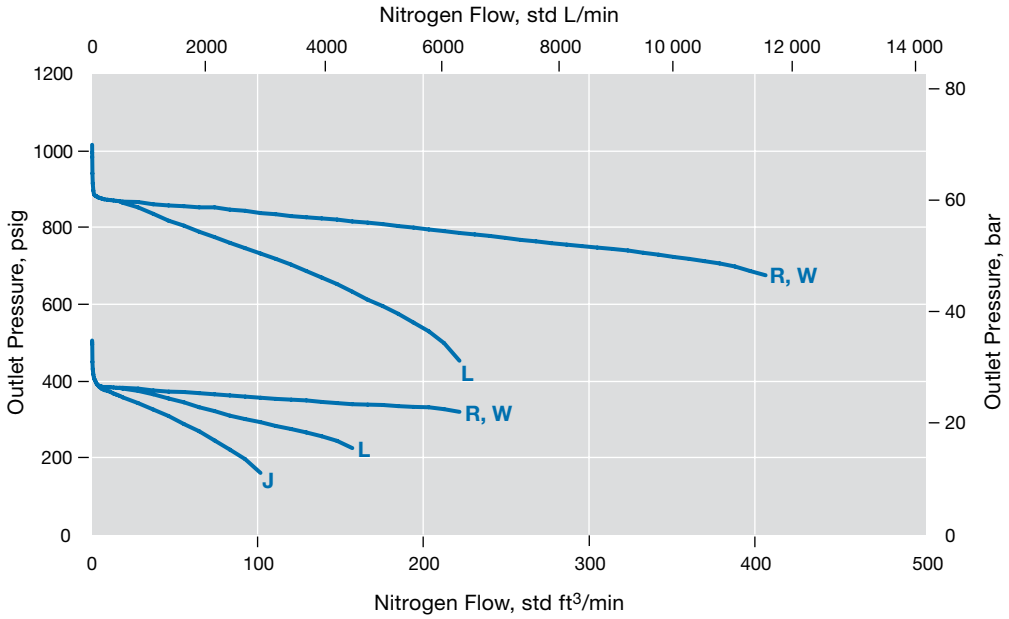
Flow Coefficient 1.0, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar)

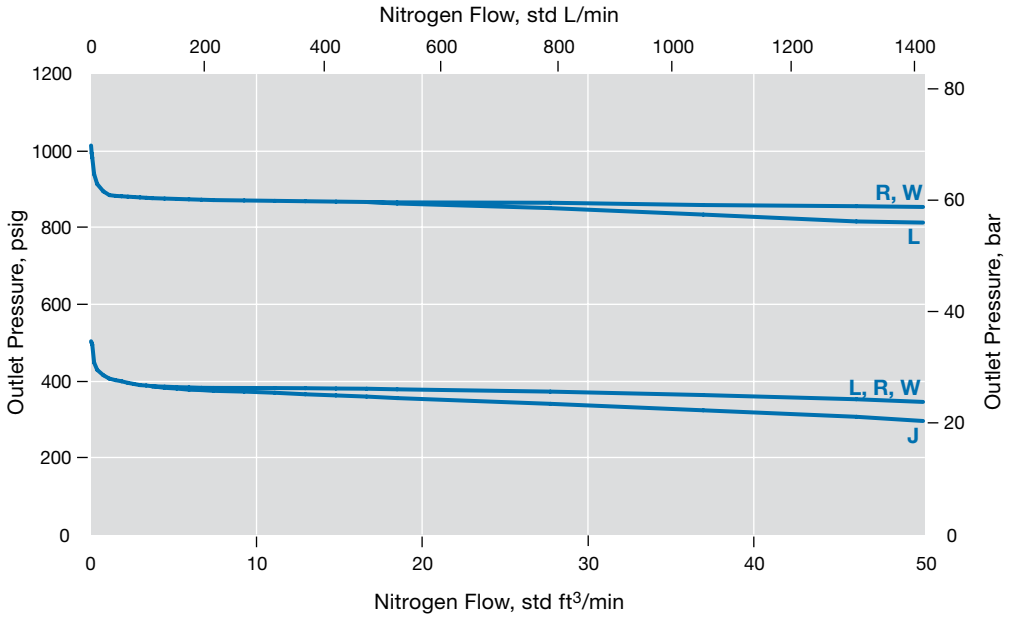
Pressure Control Range

0 to 1000 psig (0 to 68.9 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPF Series High-Flow Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

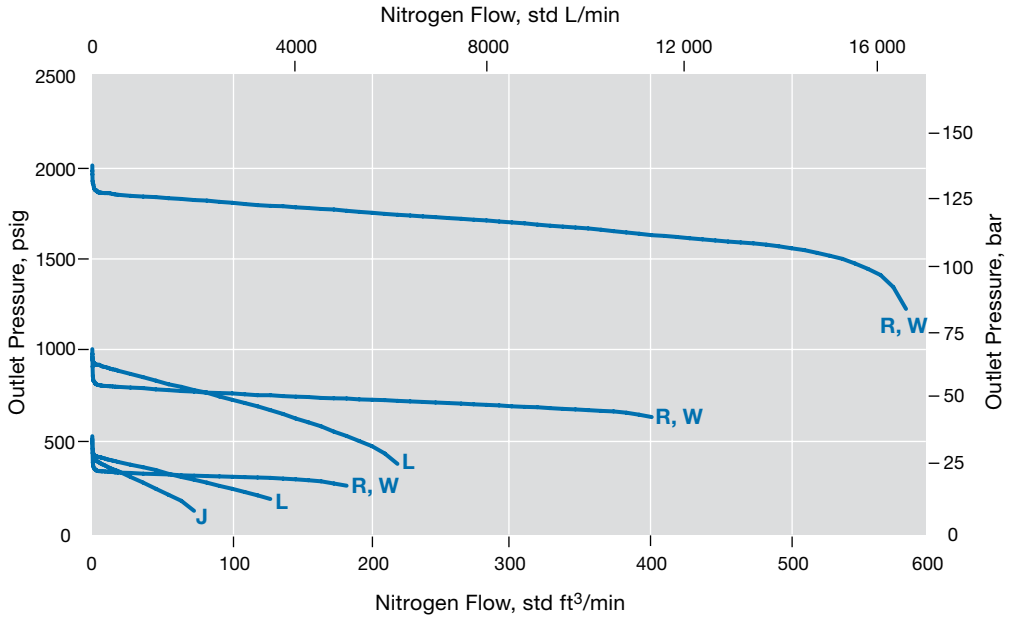
Flow Coefficient 1.0, Pressure Control Range 0 to 2000 psig (0 to 137 bar)

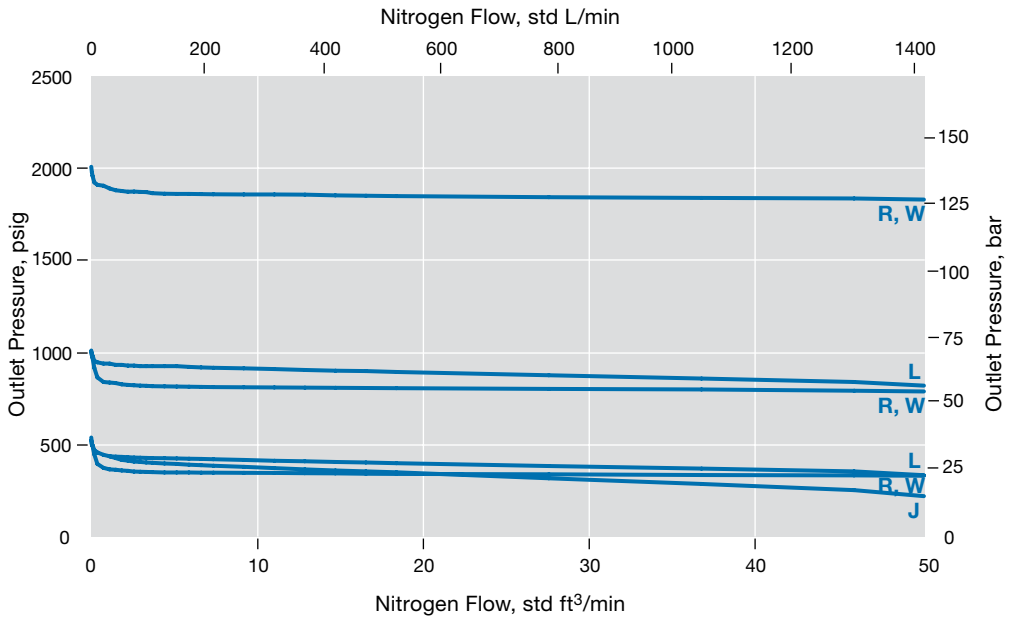
Pressure Control Range

0 to 2000 psig (0 to 137 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KPF Series High-Flow Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

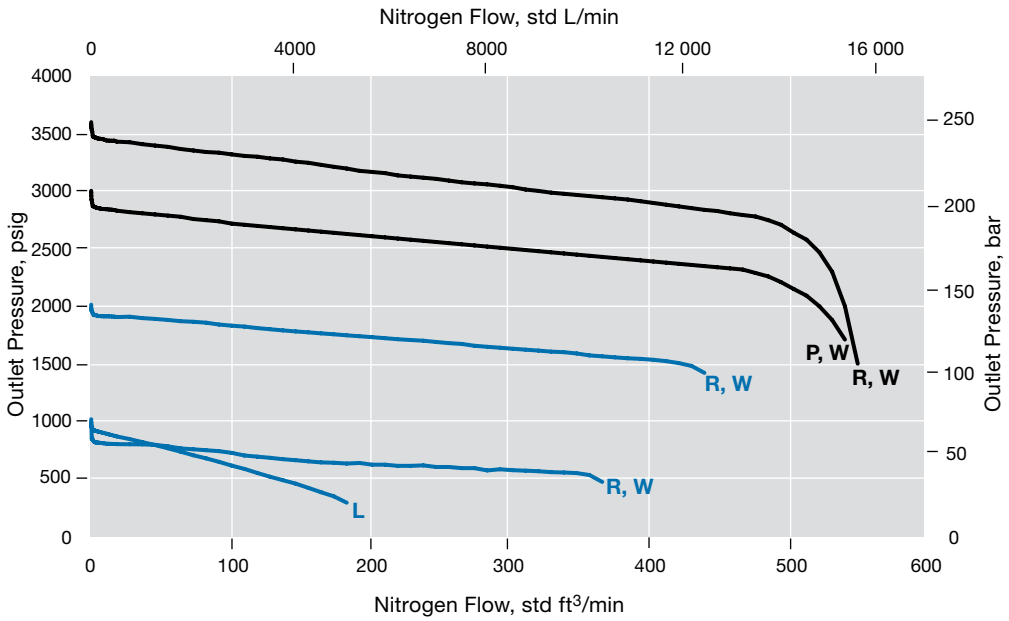
Flow Coefficient 1.0, Pressure Control Range 0 to 3000 psig (0 to 206 bar) and 0 to 4000 psig (0 to 275 bar)

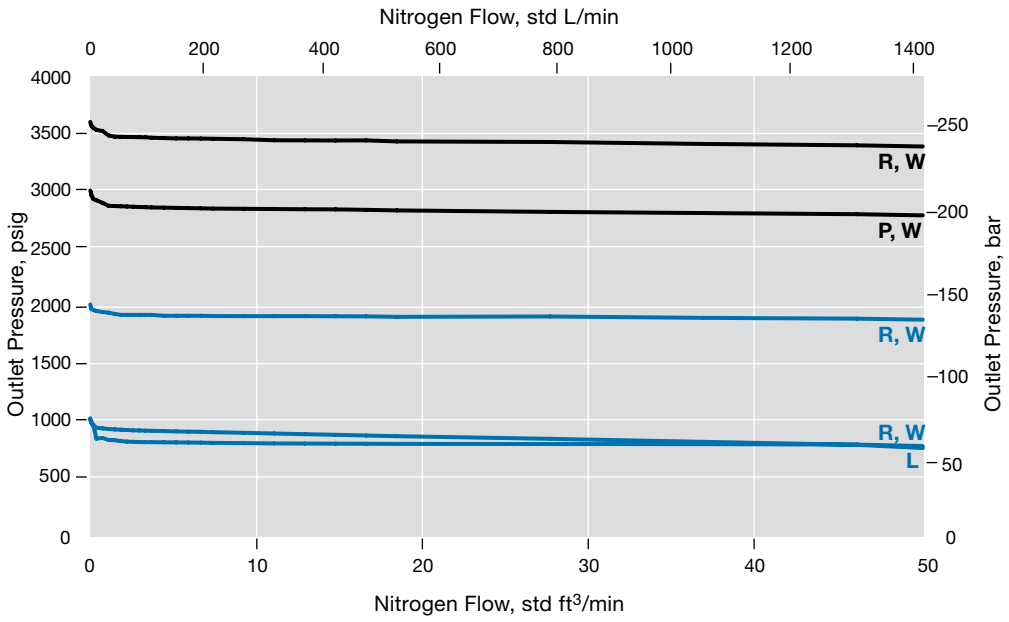
Pressure Control Range

- 0 to 3000 psig (0 to 206 bar)
- 0 to 4000 psig (0 to 275 bar)

Inlet Pressure

- **L** 1000 psig (68.9 bar)
- **P** 3000 psig (206 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

The KHP series provides control of supply pressures up to 10 000 psig (689 bar). The self-venting capability enables downstream pressure reduction in closed-loop systems.)

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range		
	Up to 2500 psig (172 bar)	3600 and 6000 psig (248 and 413 bar)	10 000 psig (689 bar)
	Supply Pressure Effect, %		
0.06	1.0	2.6	4.2
0.25	3.3	8.5	14.6

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

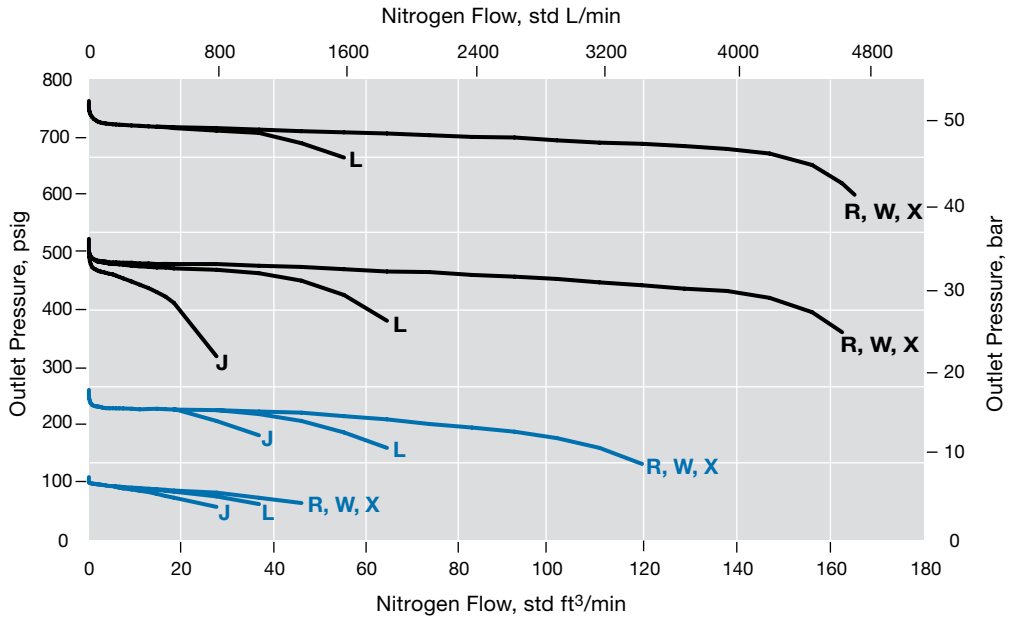
Flow Coefficient 0.06, Pressure Control Range 0 to 500 psig (0 to 34.4 bar) and 0 to 750 psig (0 to 51.6 bar)

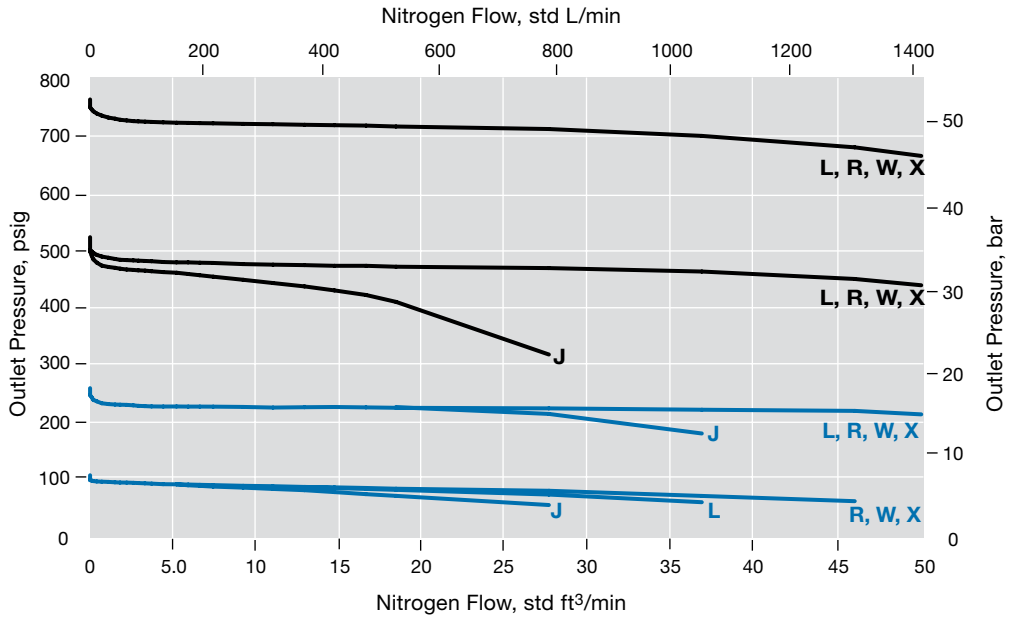
Pressure Control Range

- 0 to 500 psig (0 to 34.4 bar)
- 0 to 750 psig (0 to 51.6 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)
- **X** 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

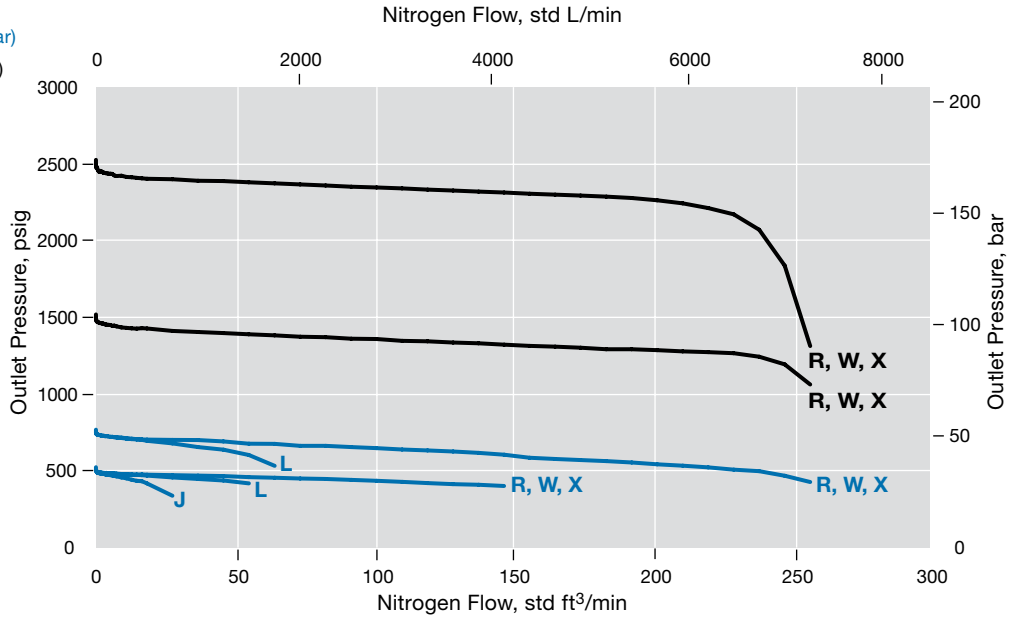
Flow Coefficient 0.06, Pressure Control Range 10 to 1500 psig (0.68 to 103 bar) and 15 to 2500 psig (1.0 to 172 bar)

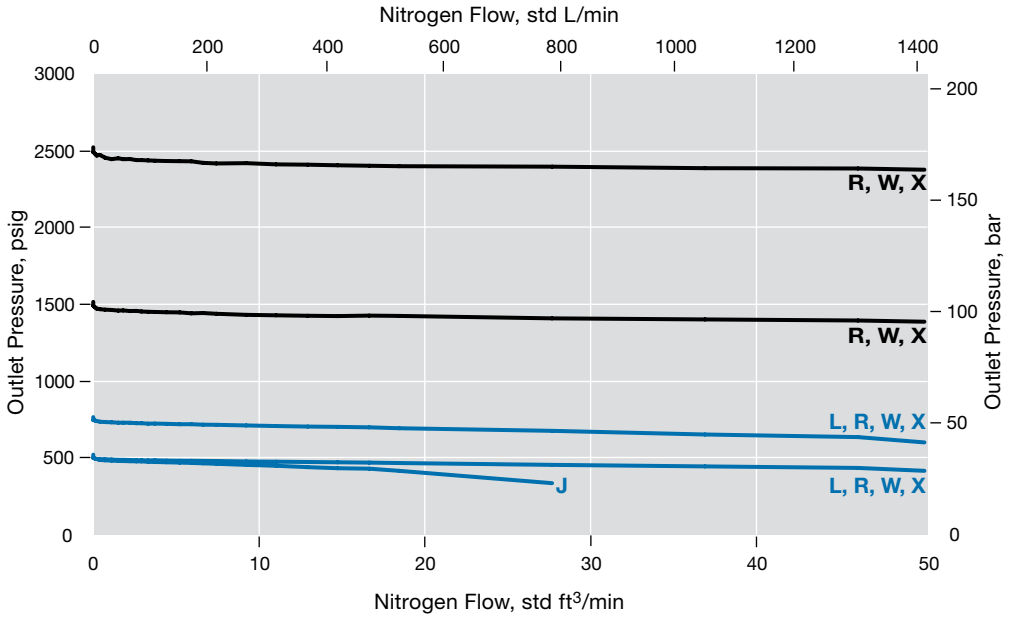
Pressure Control Range

- 10 to 1500 psig (0.68 to 103 bar)
- 15 to 2500 psig (1.0 to 172 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)
- **X** 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

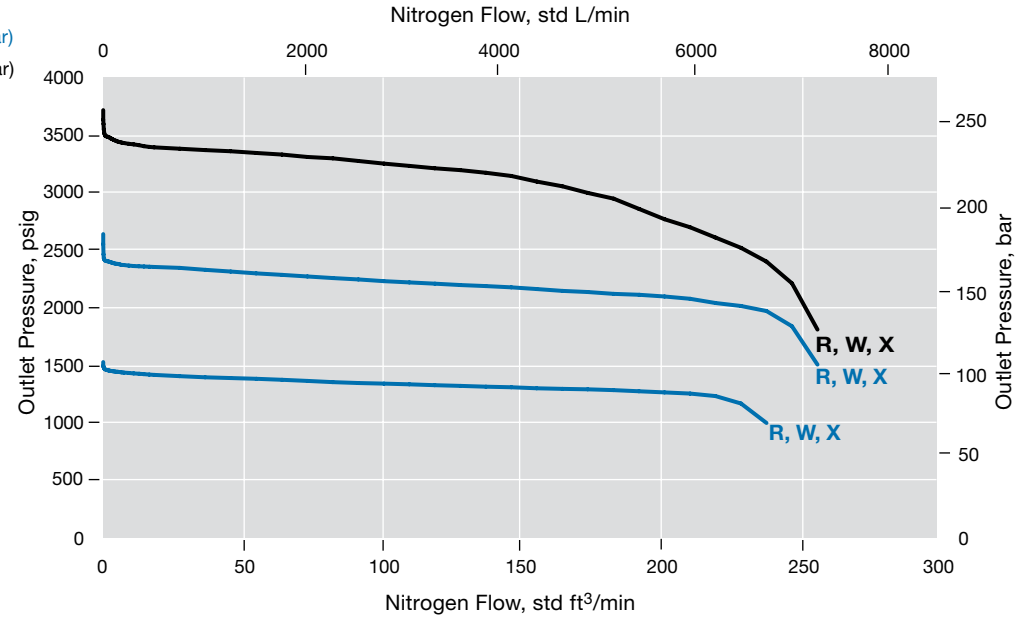
Flow Coefficient 0.06, Pressure Control Range 25 to 3600 psig (1.7 to 248 bar) and 50 to 6000 psig (3.4 to 413 bar)

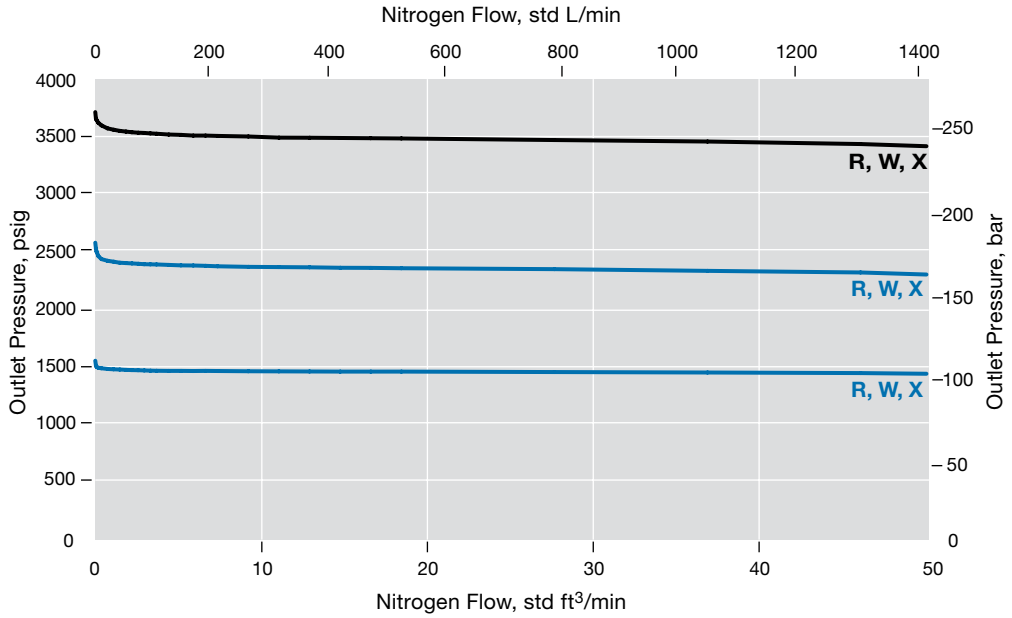
Pressure Control Range

- 25 to 3600 psig (1.7 to 248 bar)
- 50 to 6000 psig (3.4 to 413 bar)

Inlet Pressure

- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)
- **X** 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

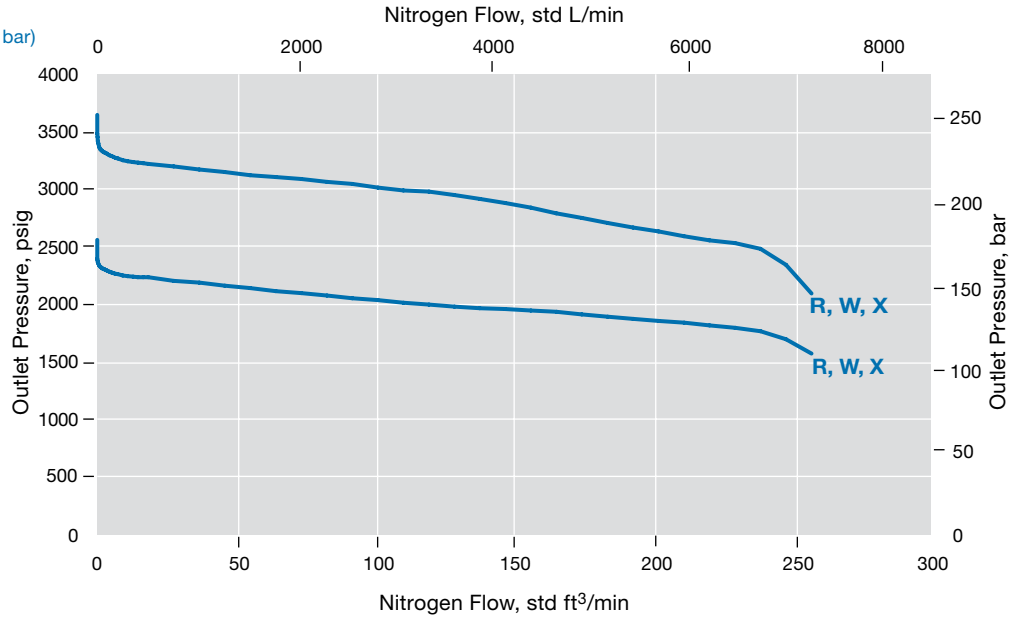
Flow Coefficient 0.06, Pressure Control Range 100 to 10 000 psig (6.8 to 689 bar)

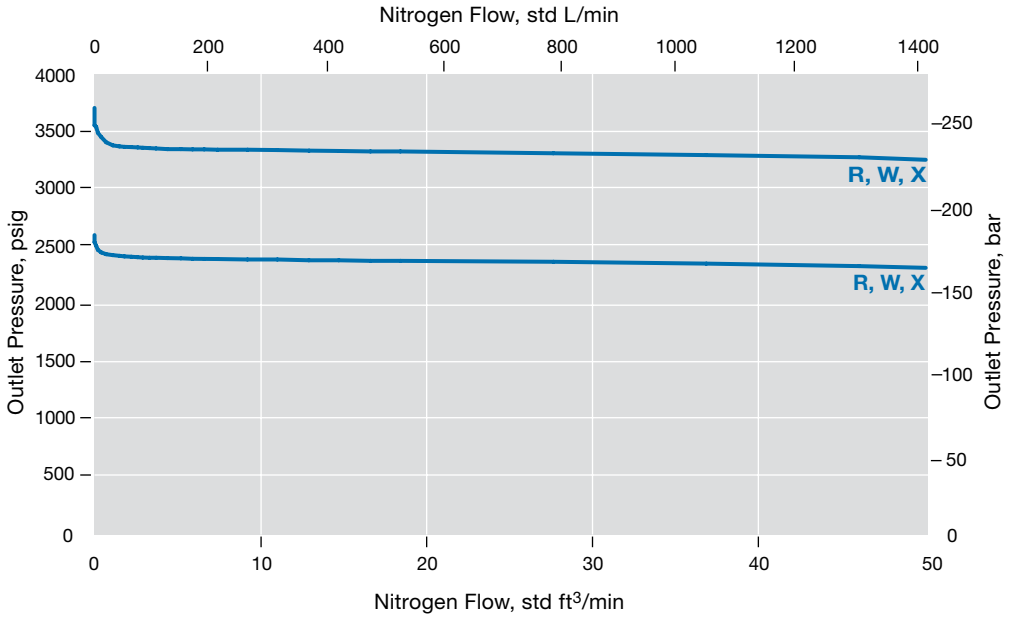
Pressure Control Range

100 to 10 000 psig (6.8 to 689 bar)

Inlet Pressure

R 3600 psig (248 bar)
W 6000 psig (413 bar)
X 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

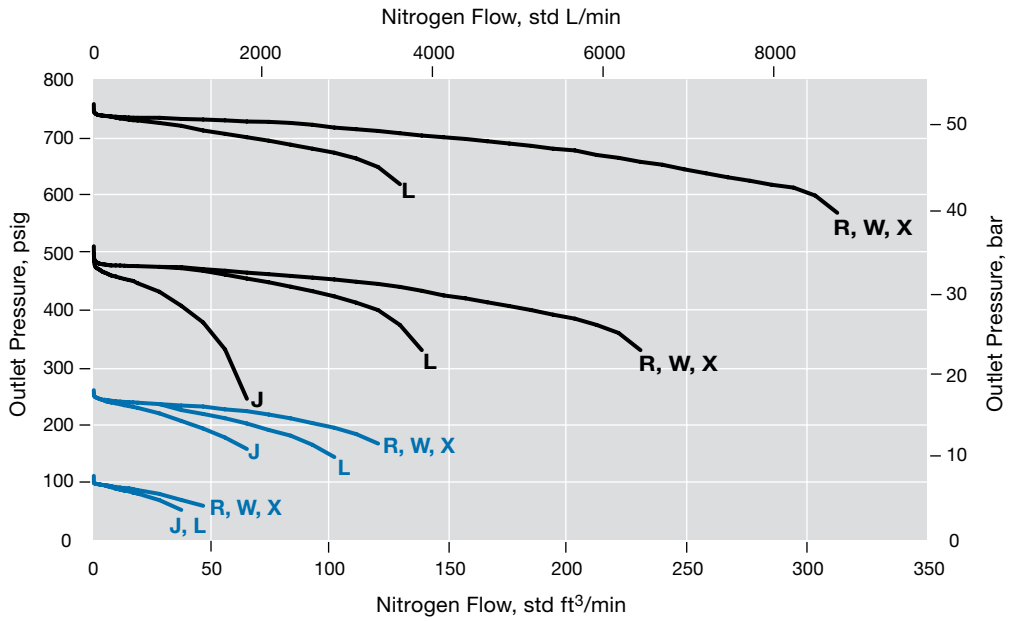
Flow Coefficient 0.25, Pressure Control Range 0 to 500 psig (0 to 34.4 bar) and 0 to 750 psig (0 to 51.6 bar)

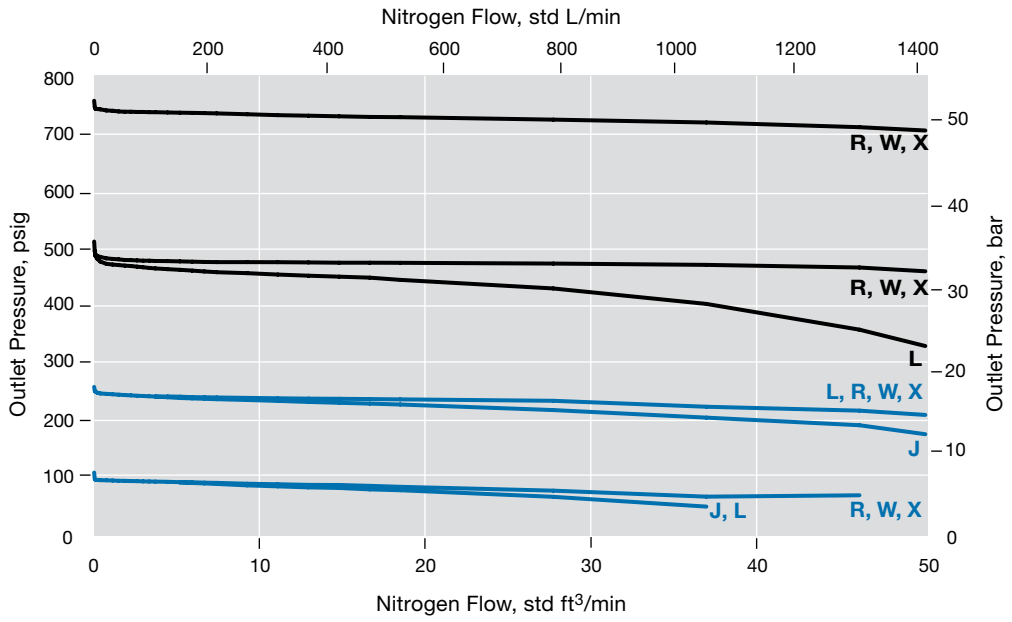
Pressure Control Range

- 0 to 500 psig (0 to 34.4 bar)
- 0 to 750 psig (0 to 51.6 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)
- **X** 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

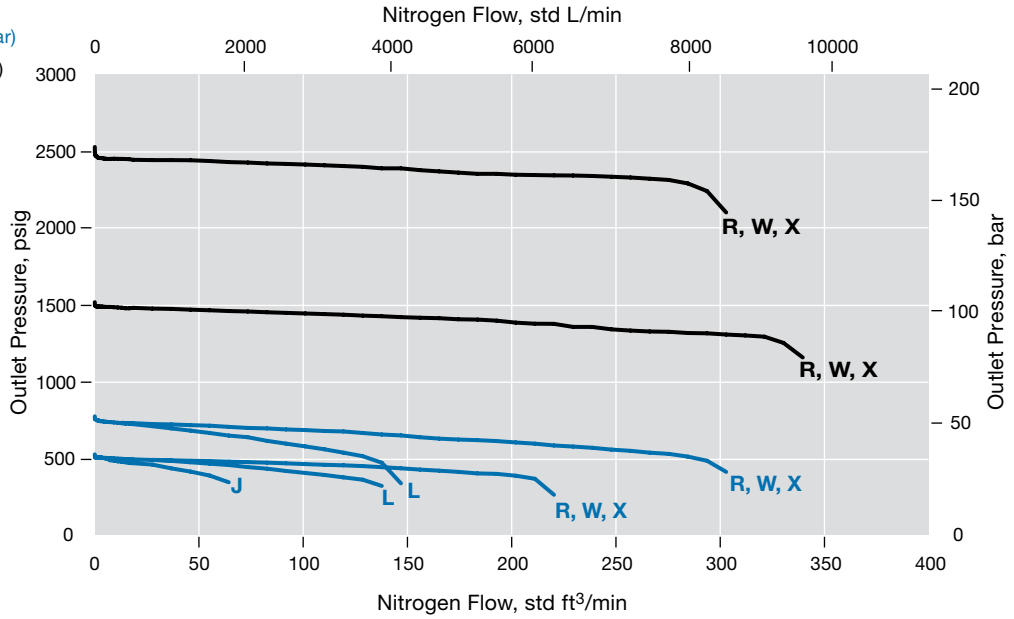
Flow Coefficient 0.25, Pressure Control Range 10 to 1500 psig (0.68 to 103 bar) and 15 to 2500 psig (1.0 to 172 bar)

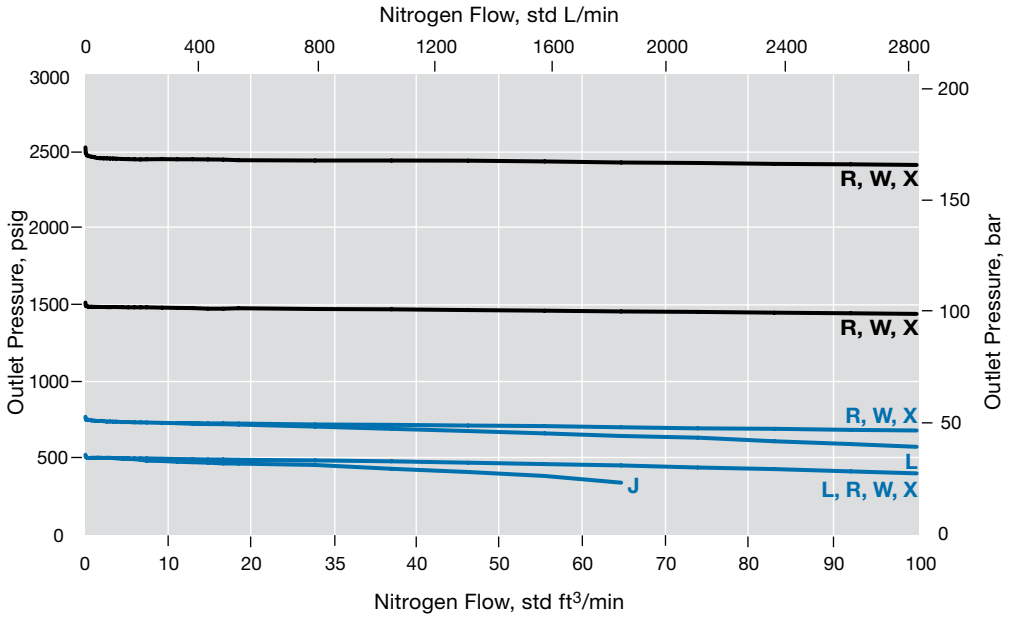
Pressure Control Range

- 10 to 1500 psig (0.68 to 103 bar)
- 15 to 2500 psig (1.0 to 172 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)
- **X** 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

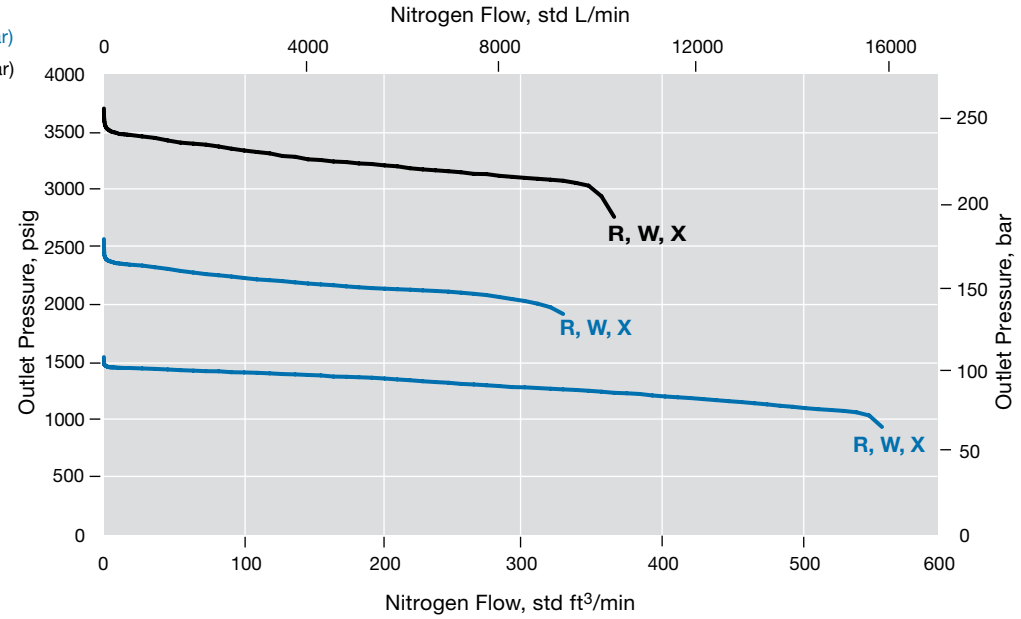
Flow Coefficient 0.25, Pressure Control Range 25 to 3600 psig (1.7 to 248 bar) and 50 to 6000 psig (3.4 to 413 bar)

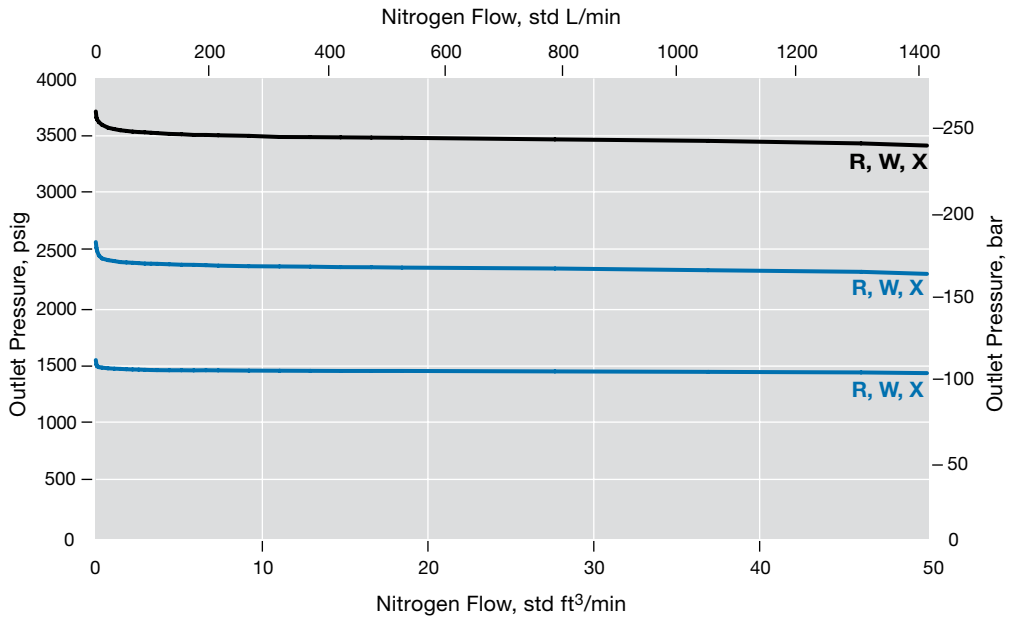
Pressure Control Range

- 25 to 3600 psig (1.7 to 248 bar)
- 50 to 6000 psig (3.4 to 413 bar)

Inlet Pressure

- **R** 3600 psig (248 bar)
- **W** 6000 psig (413 bar)
- **X** 10 000 psig (689 bar)





KHP Series High-Pressure Pressure-Reducing Regulators Gas Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.035 std ft³/min (1 std L/min) and an initial temperature of 70°F (20°C).

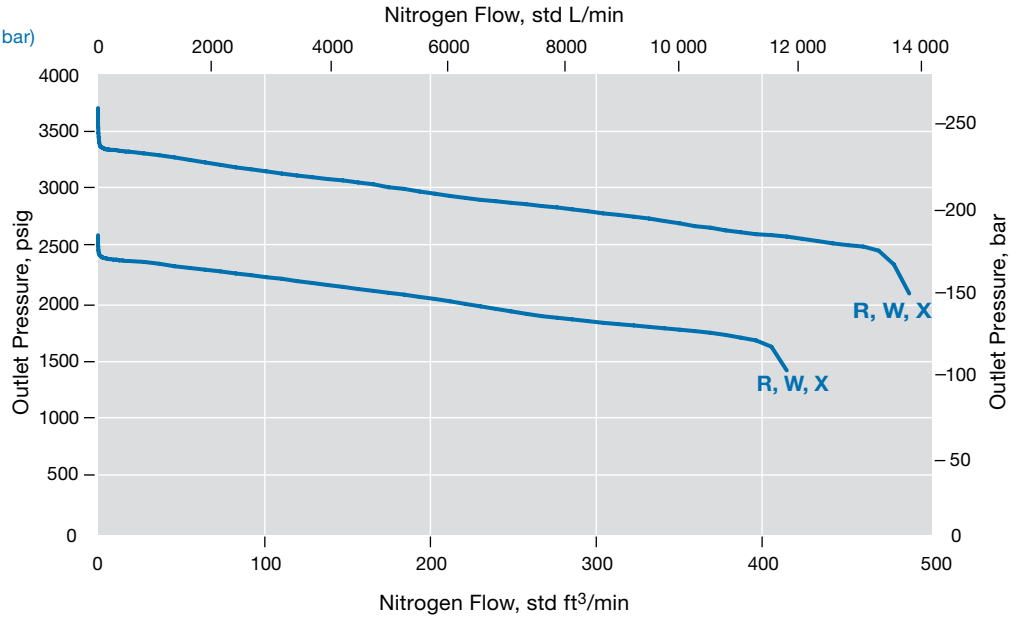
Flow Coefficient 0.25, Pressure Control Range 10 to 10 000 psig (0.68 to 689 bar)

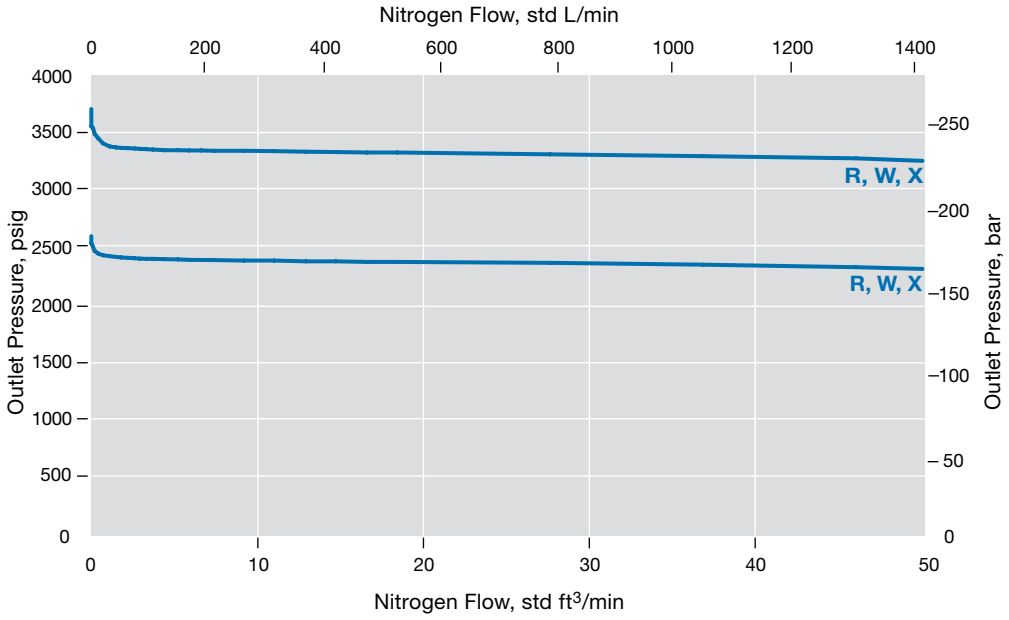
Pressure Control Range

10 to 10 000 psig (0.68 to 689 bar)

Inlet Pressure

R 3600 psig (248 bar)
W 6000 psig (413 bar)
X 10 000 psig (689 bar)





KPR Series Pressure-Reducing Regulators Liquid Flow

The KPR series is a compact regulator with excellent accuracy, sensitivity, and set-point pressure stability.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

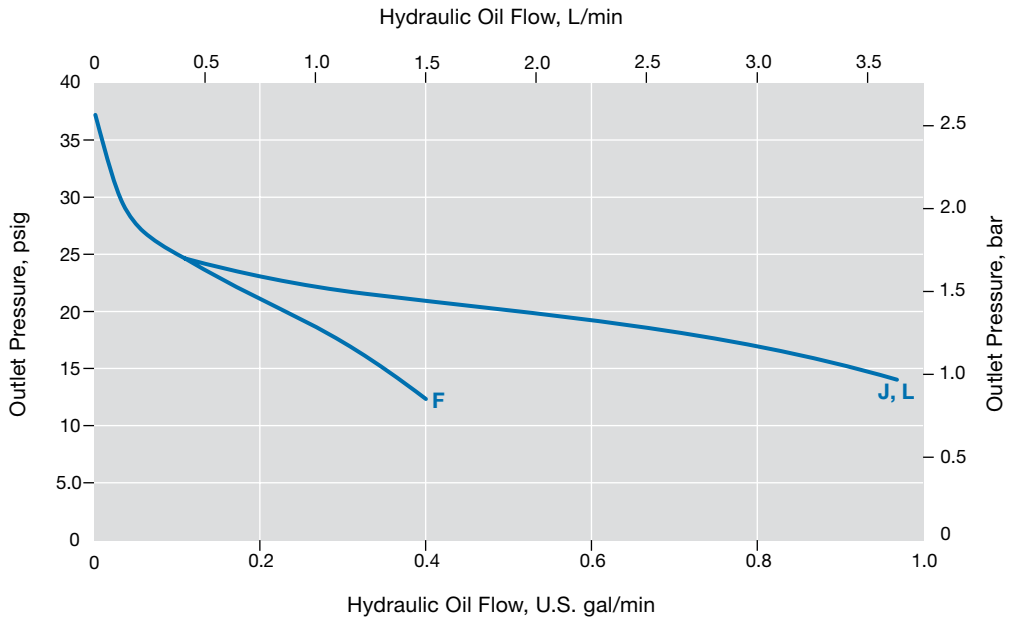
Flow Coefficient 0.06, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



KPR Series Pressure-Reducing Regulators Liquid Flow Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

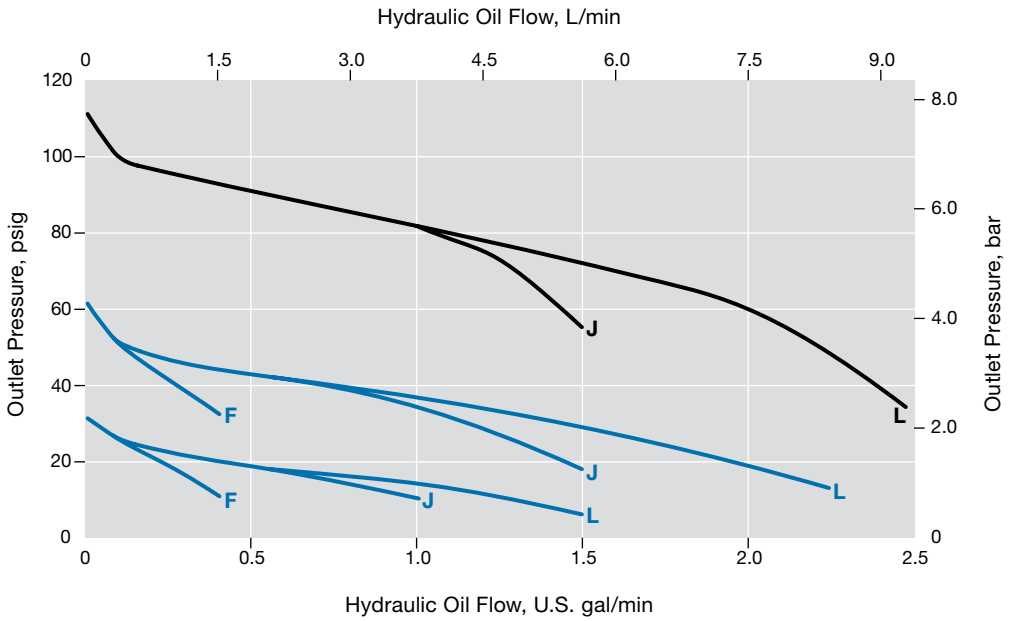
Flow Coefficient 0.06, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

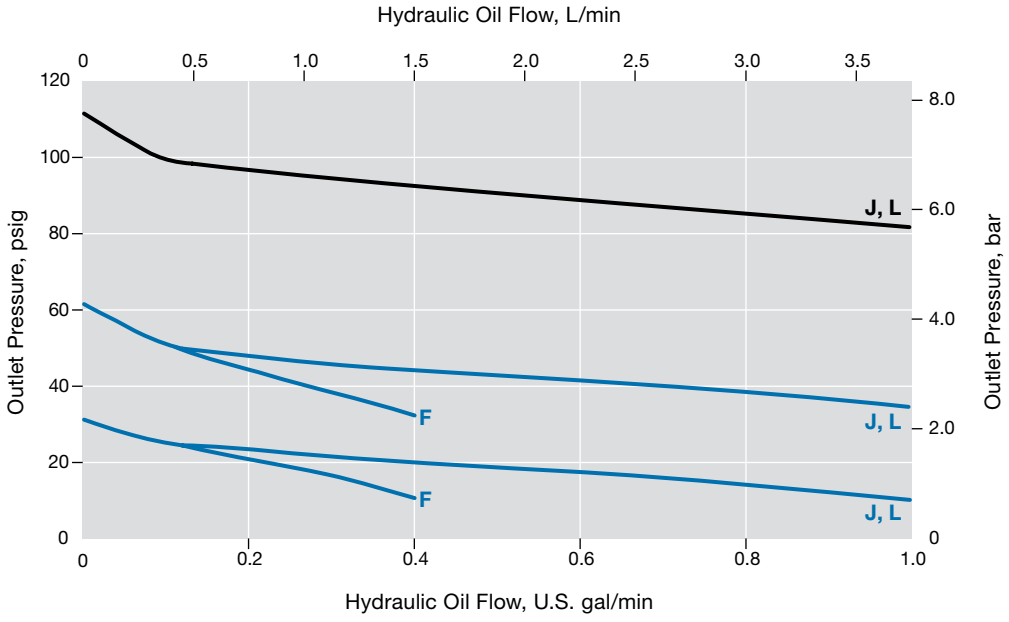
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar)
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

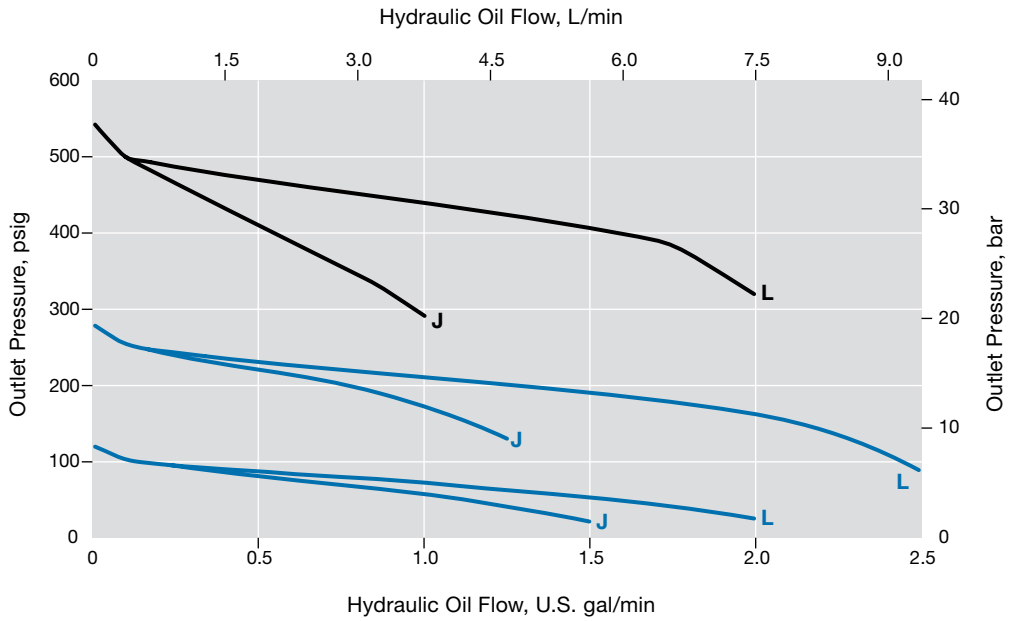
Flow Coefficient 0.06, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

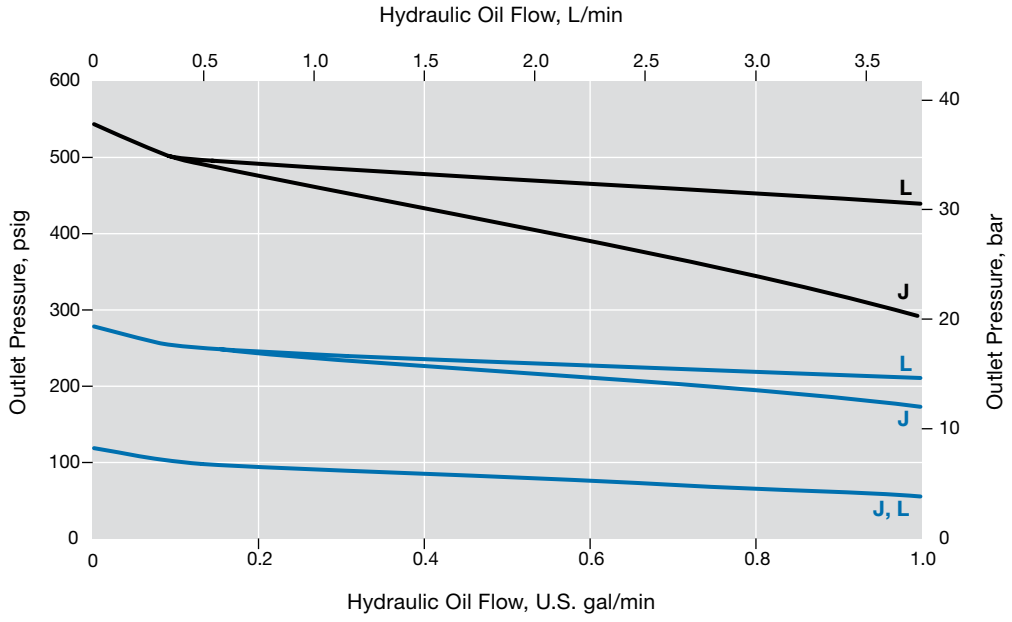
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

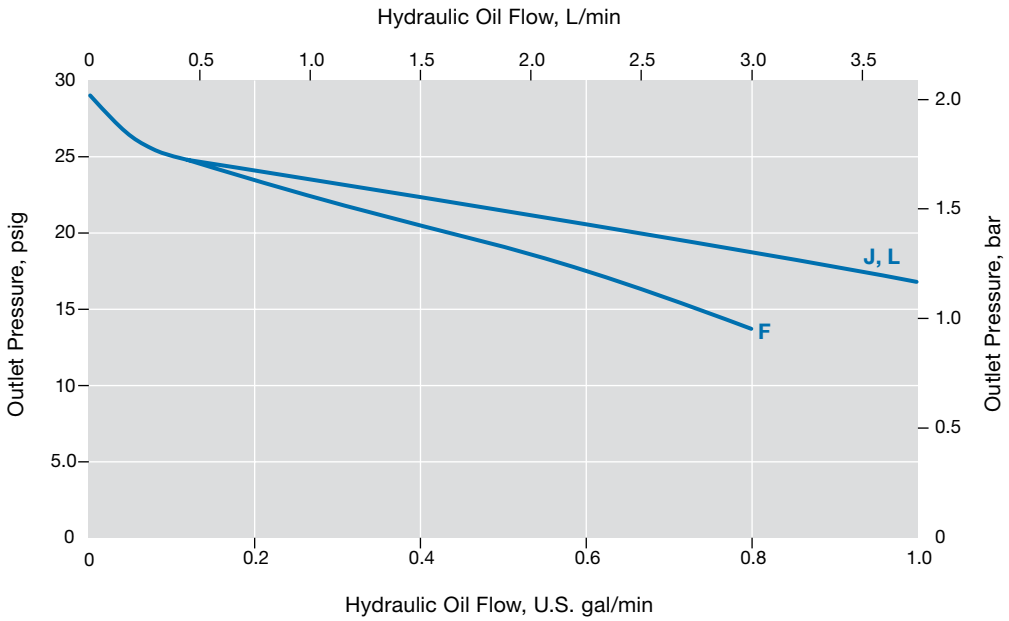
Flow Coefficient 0.20, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)



KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

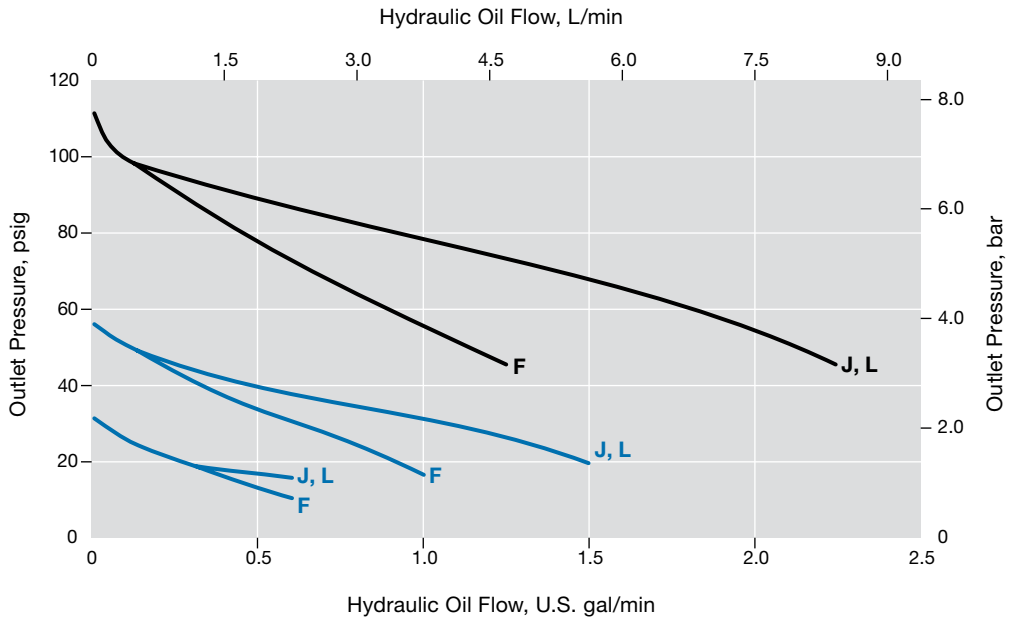
Flow Coefficient 0.20, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

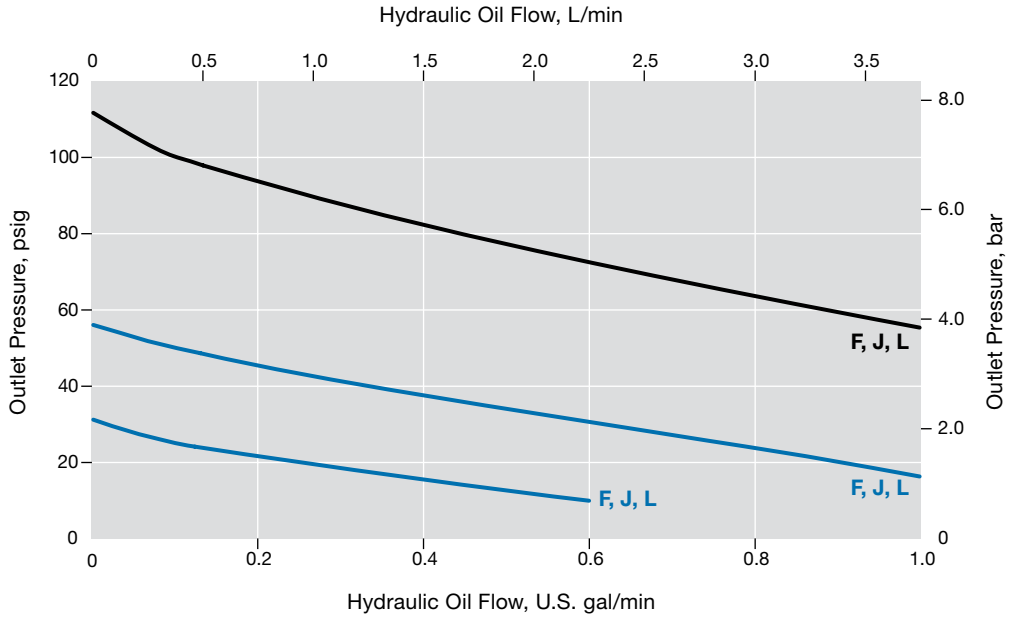
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar))
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

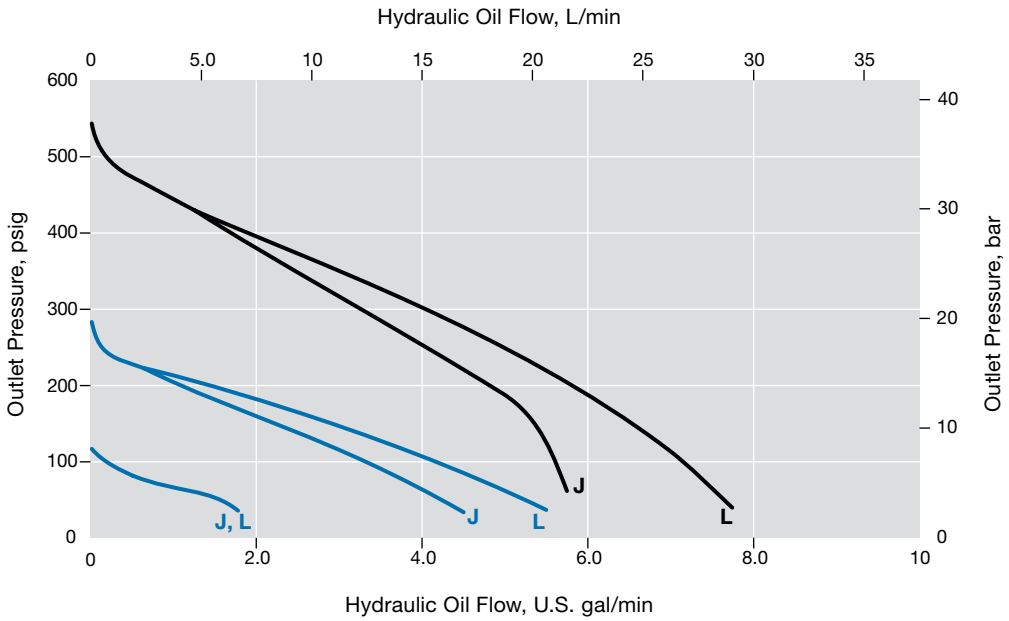
Flow Coefficient 0.20, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

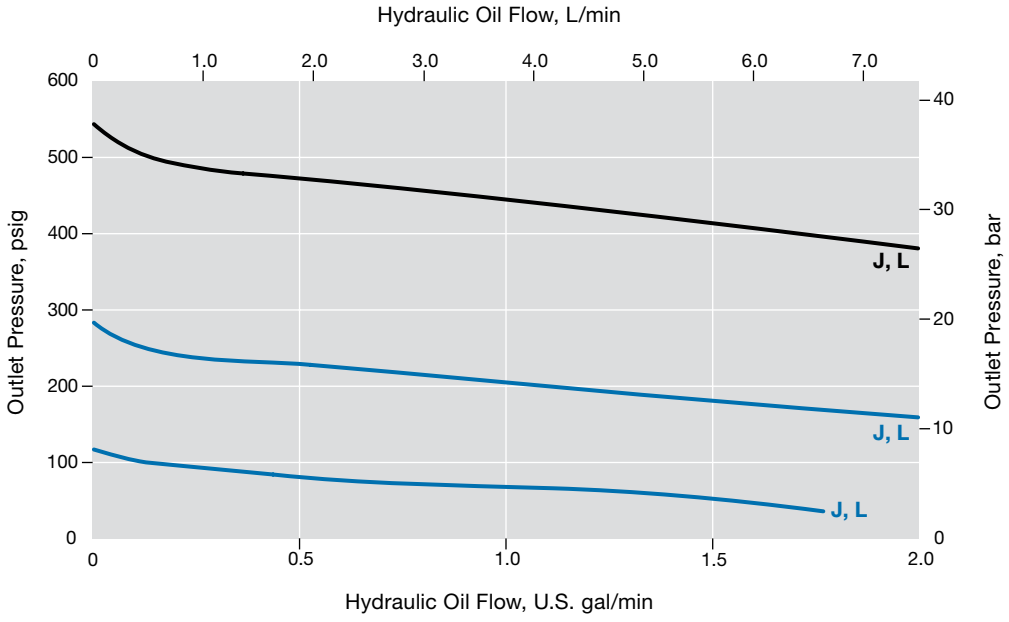
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

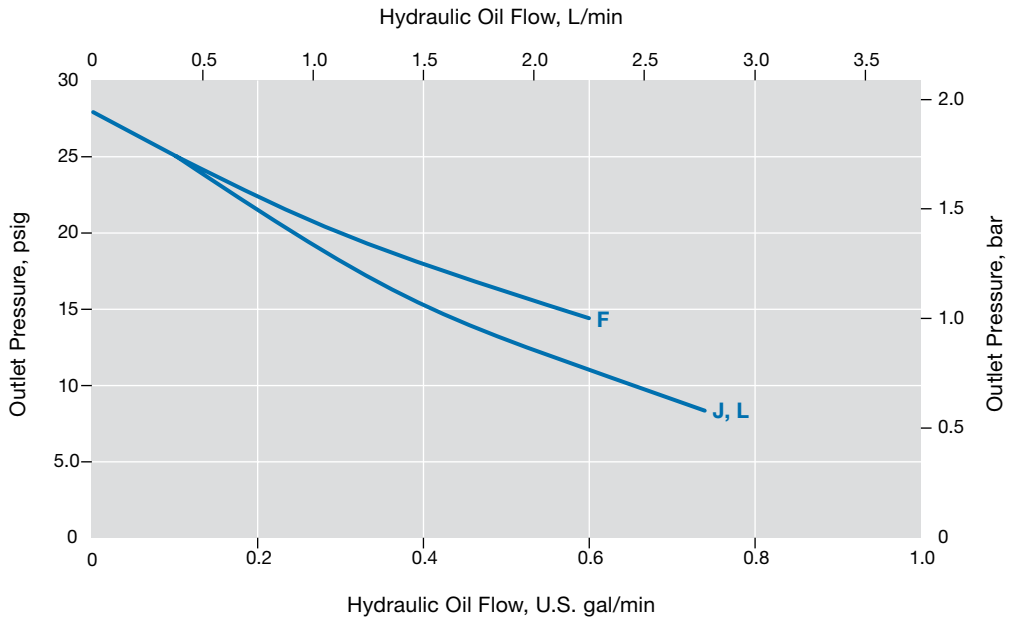
Flow Coefficient 0.50, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)



KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

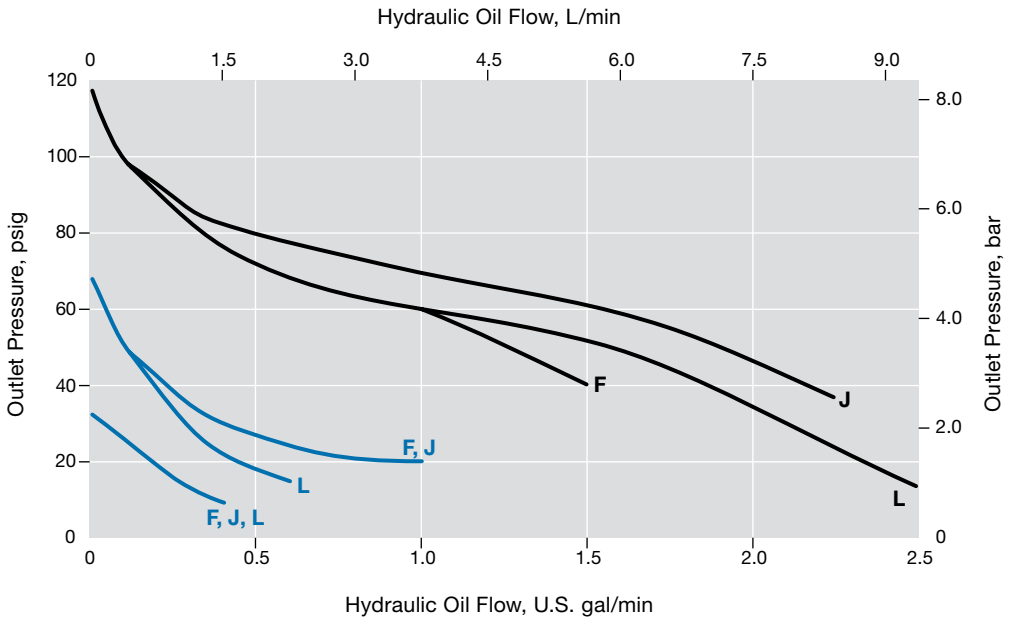
Flow Coefficient 0.50, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

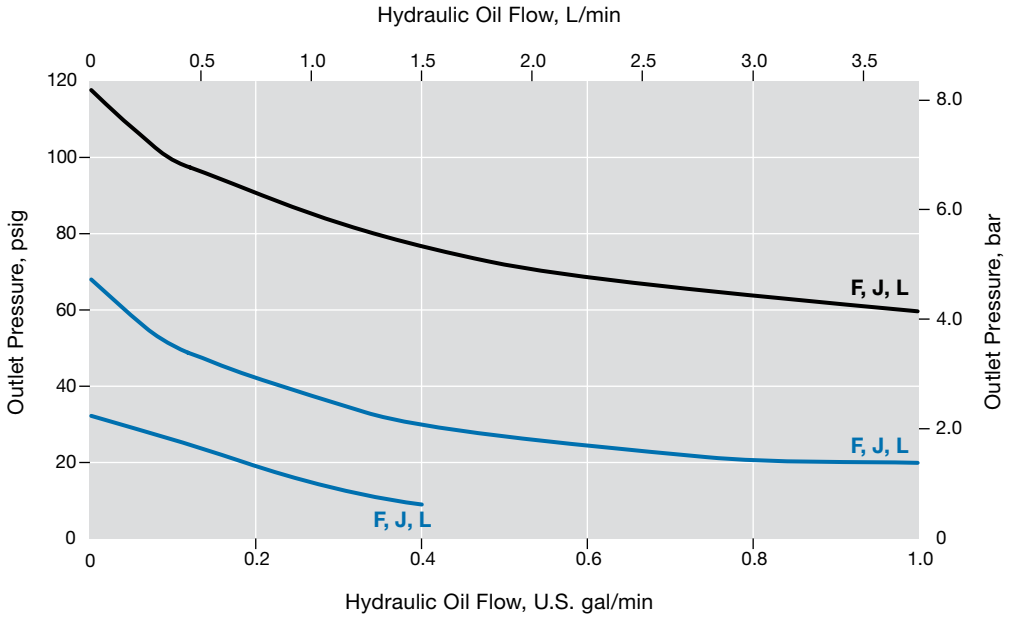
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar))
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KPR Series Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

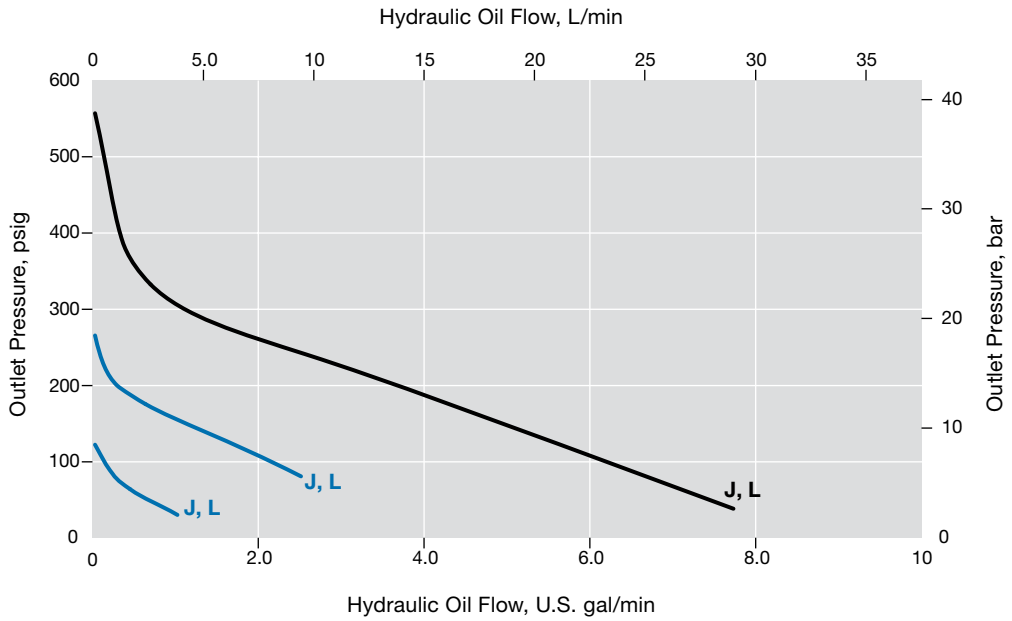
Flow Coefficient 0.50, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

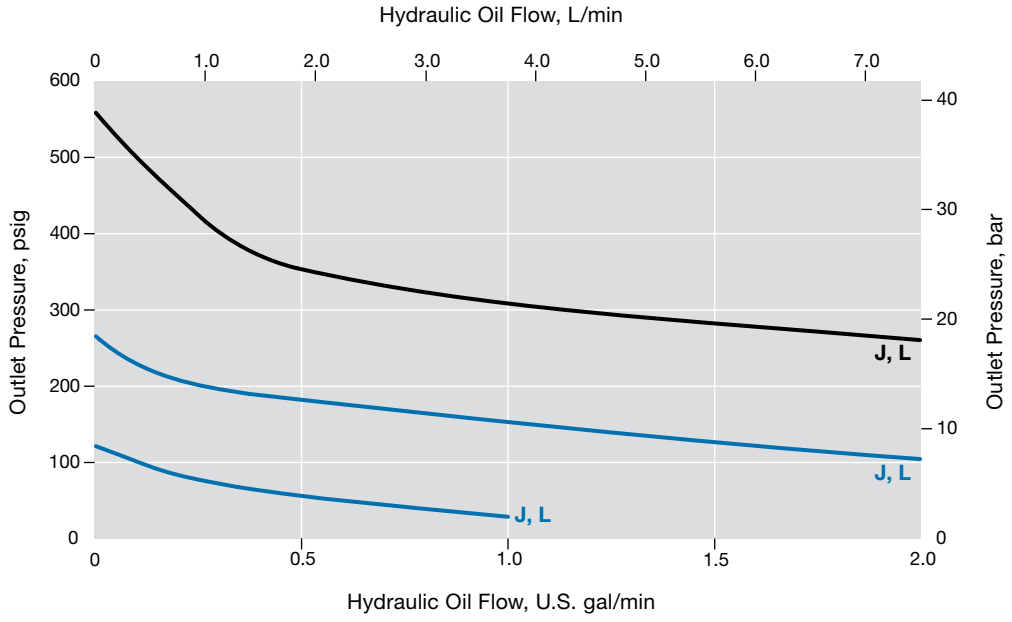
Pressure Control Range

- 0 to 250 psig (0 to 17.2 bar)
- 0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Liquid Flow

The KCY series is designed for use in applications requiring constant outlet pressure even with wide variations in inlet pressure. This two-stage regulator is comparable to two single-stage regulators connected in series. The first stage is factory set to reduce the inlet pressure to 500 psig (34.4 bar). The second stage can be adjusted with the handle to achieve the required outlet pressure.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

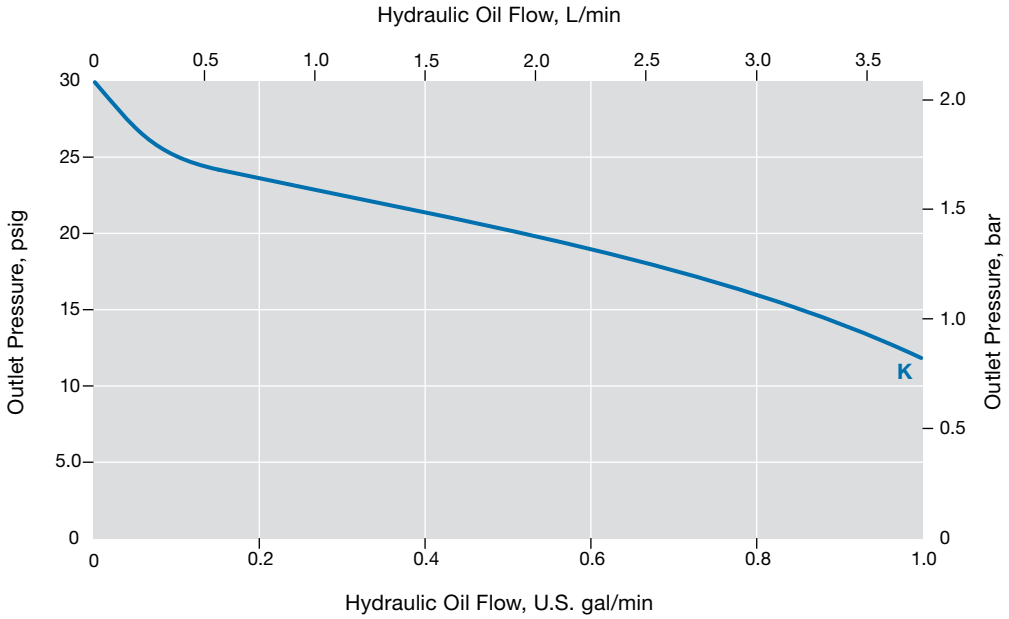
Flow Coefficient 0.06, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

K 750 psig (51.6 bar)



Flow Coefficient 0.06, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

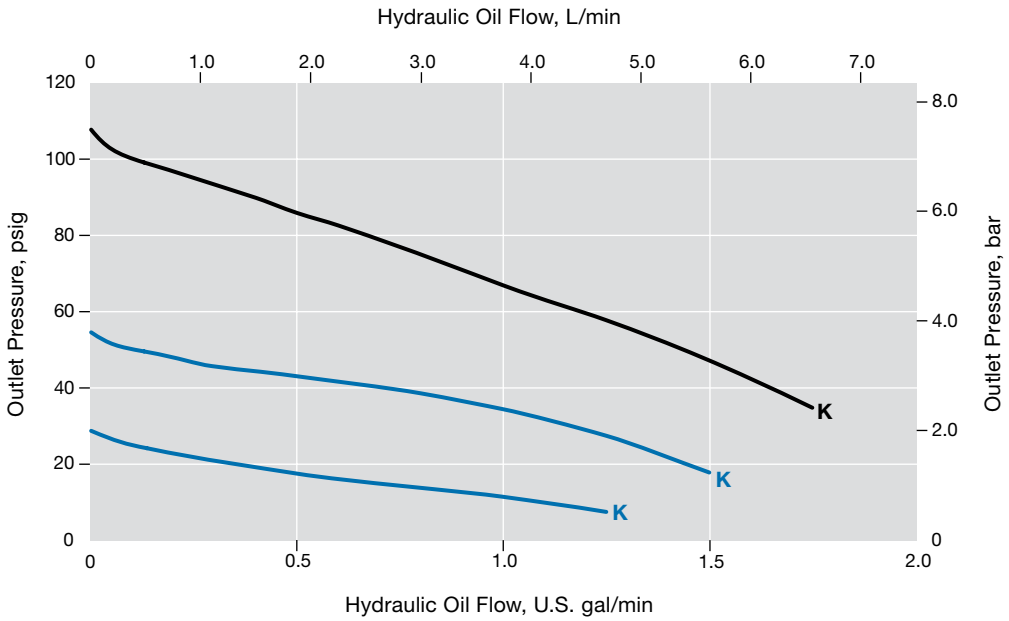
Pressure Control Range

0 to 50 psig (0 to 3.4 bar))

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

K 750 psig (51.6 bar)



KCY Series Two-Stage Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

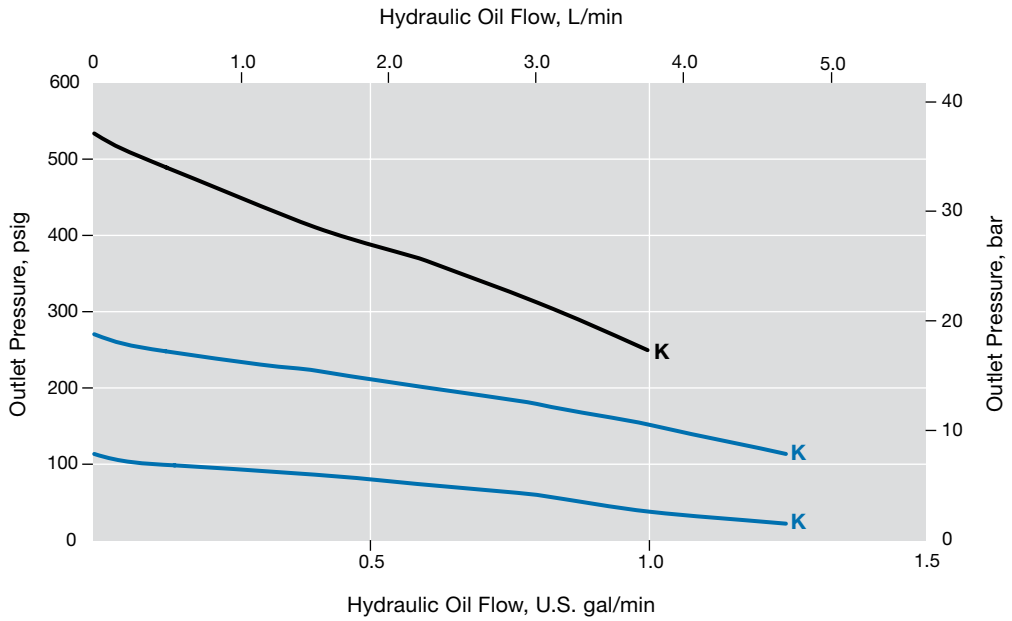
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

K 750 psig (51.6 bar)



KCY Series Two-Stage Pressure-Reducing Regulators

Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

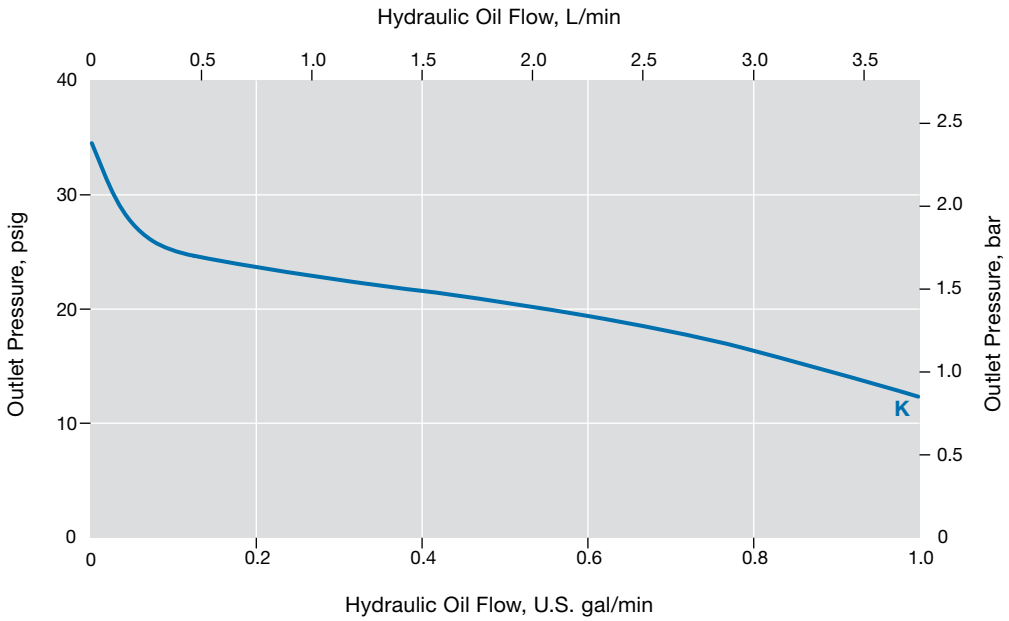
Flow Coefficient 0.20, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

K 750 psig (51.6 bar)



KCY Series Two-Stage Pressure-Reducing Regulators

Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.20, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

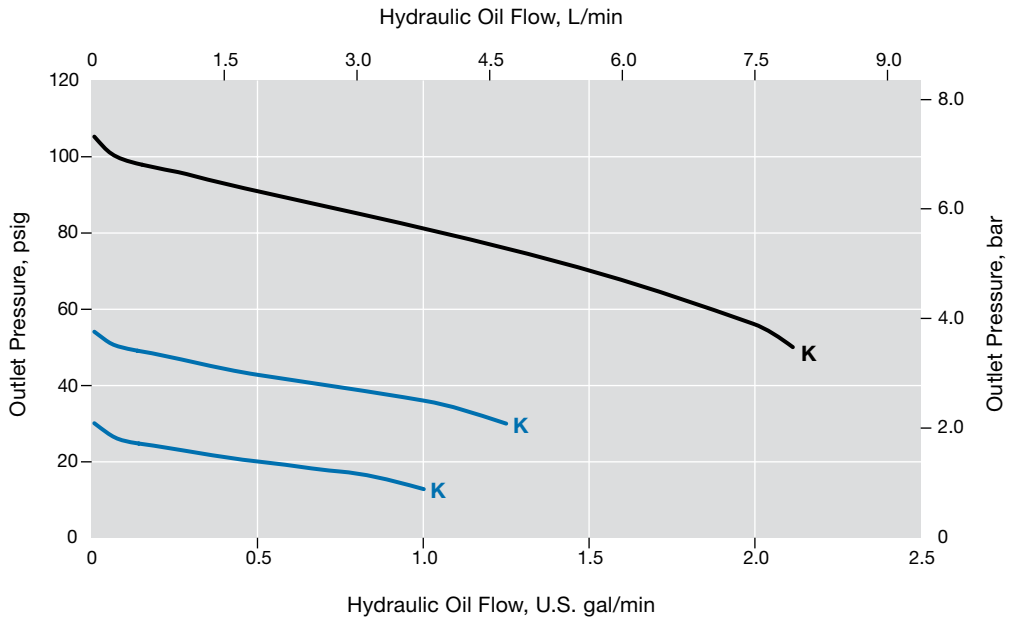
Pressure Control Range

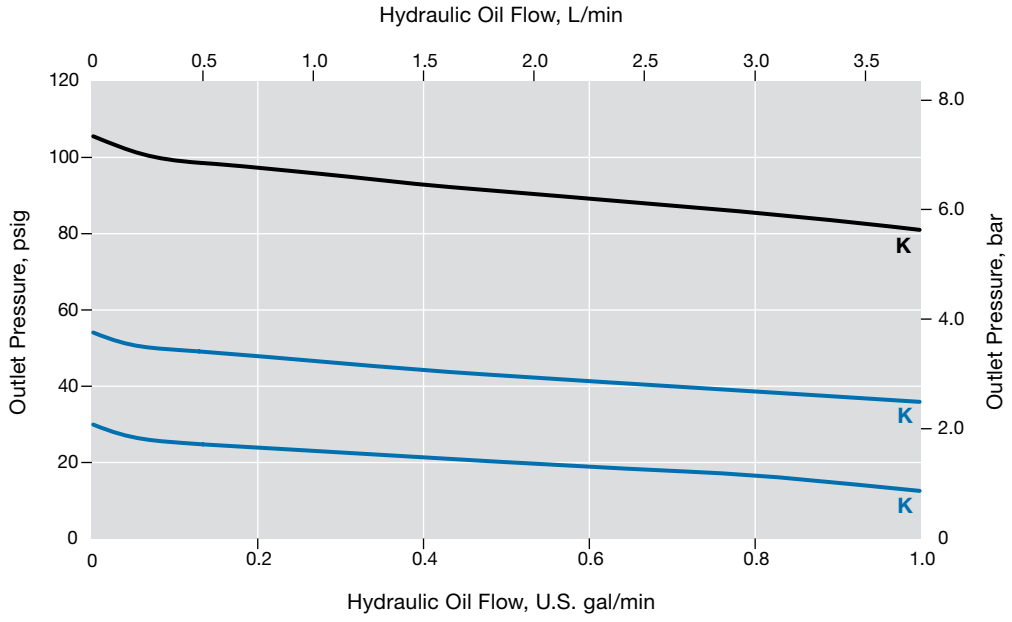
0 to 50 psig (0 to 3.4 bar)

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

K 750 psig (51.6 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.20, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

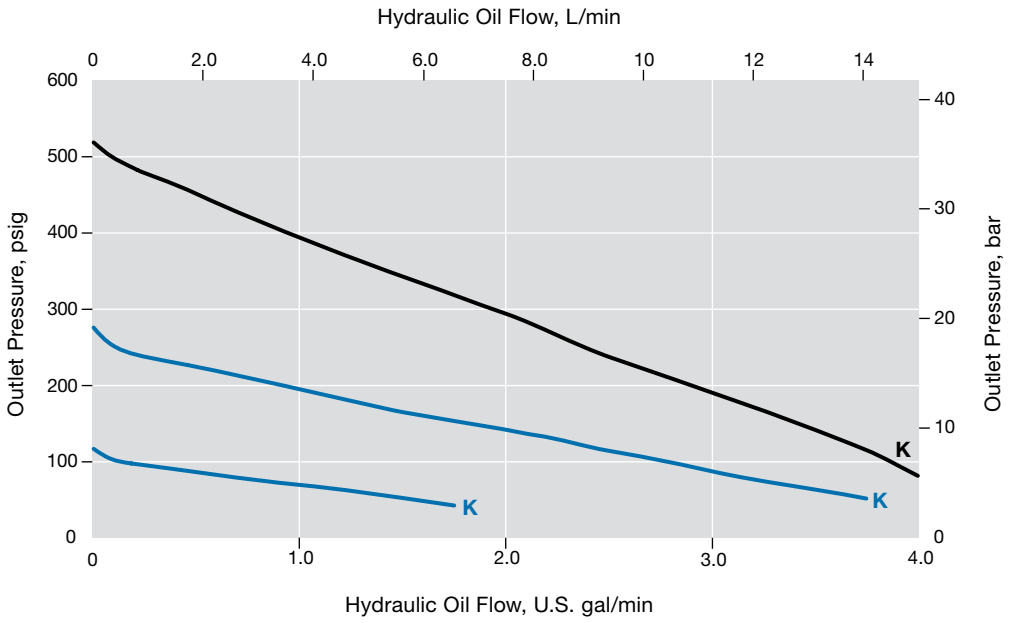
Pressure Control Range

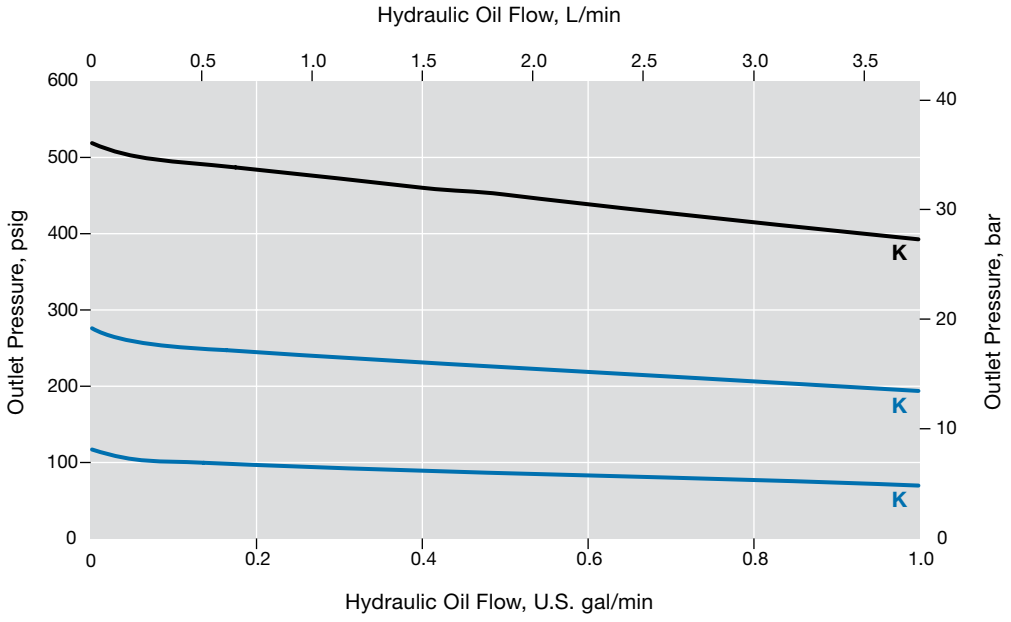
0 to 250 psig (0 to 17.2 bar)

0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

K 750 psig (51.6 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

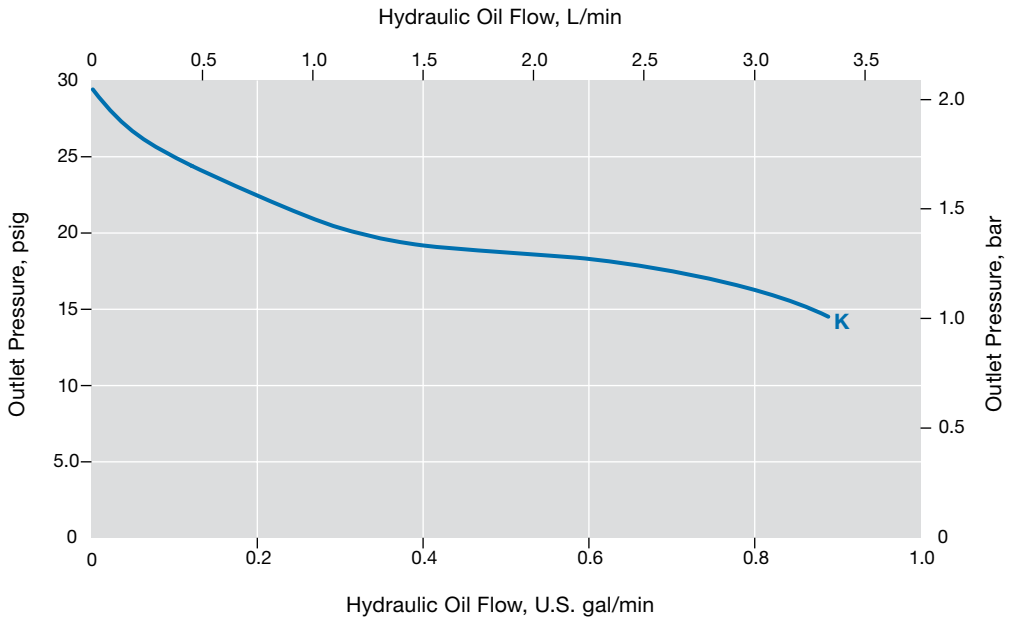
Flow Coefficient 0.50, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

K 750 psig (51.6 bar)



KCY Series Two-Stage Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.50, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

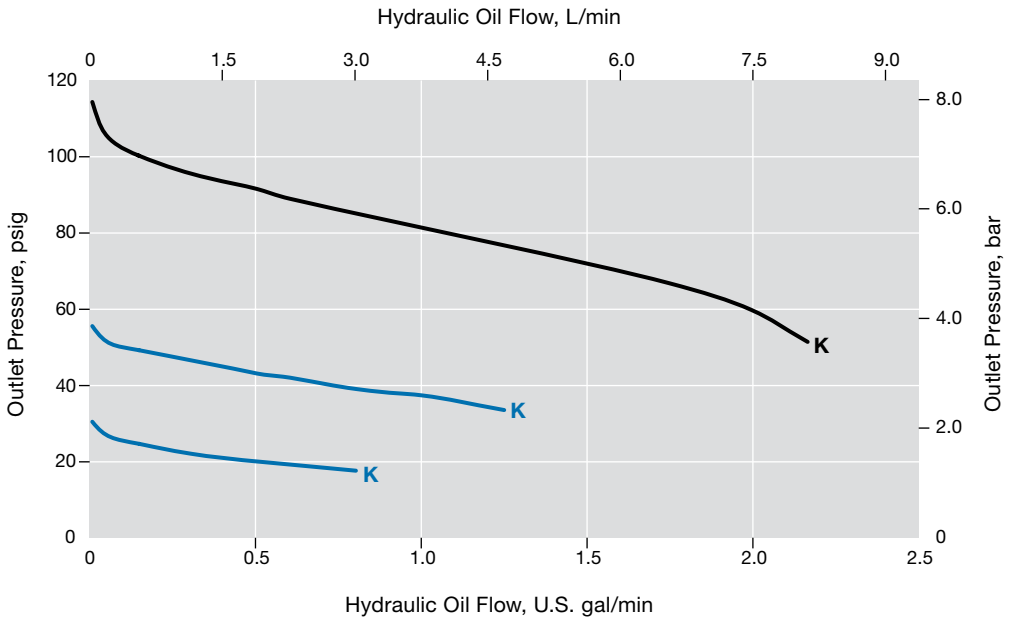
Pressure Control Range

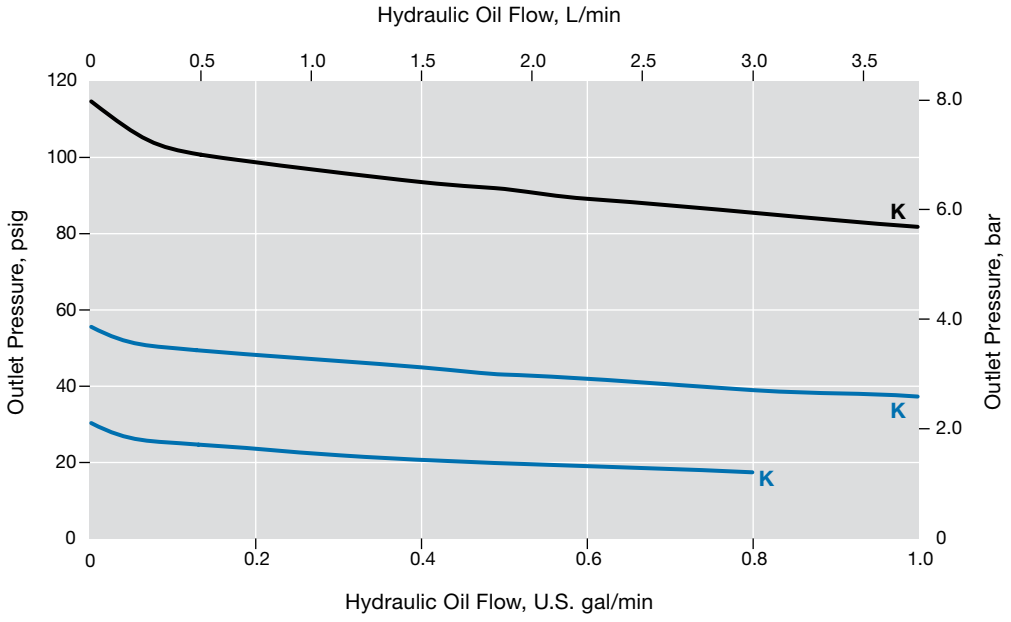
0 to 50 psig (0 to 3.4 bar)

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

K 750 psig (51.6 bar)





KCY Series Two-Stage Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.50, Pressure Control Ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

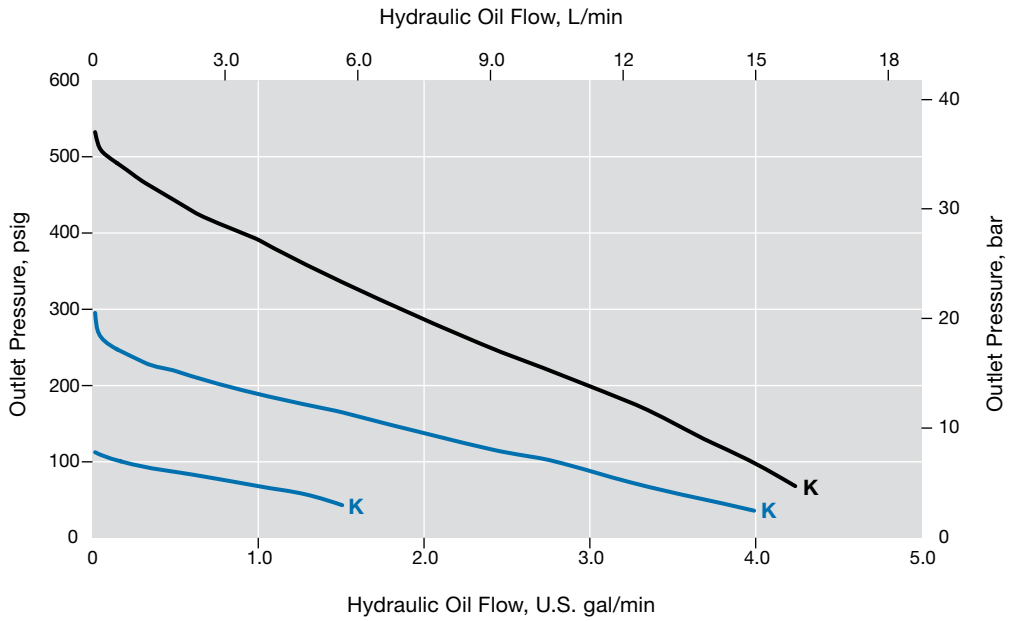
Pressure Control Range

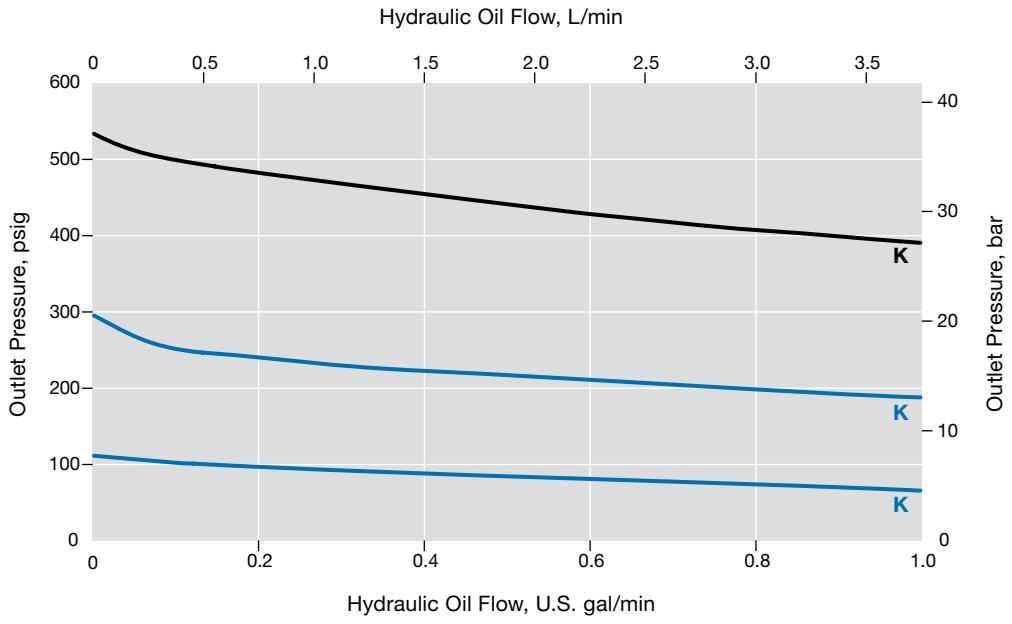
0 to 250 psig (0 to 17.2 bar)

0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

K 750 psig (51.6 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

The KLF series provides high-sensitivity pressure control of gases or liquids with minimum droop in both low-flow and low-pressure applications.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

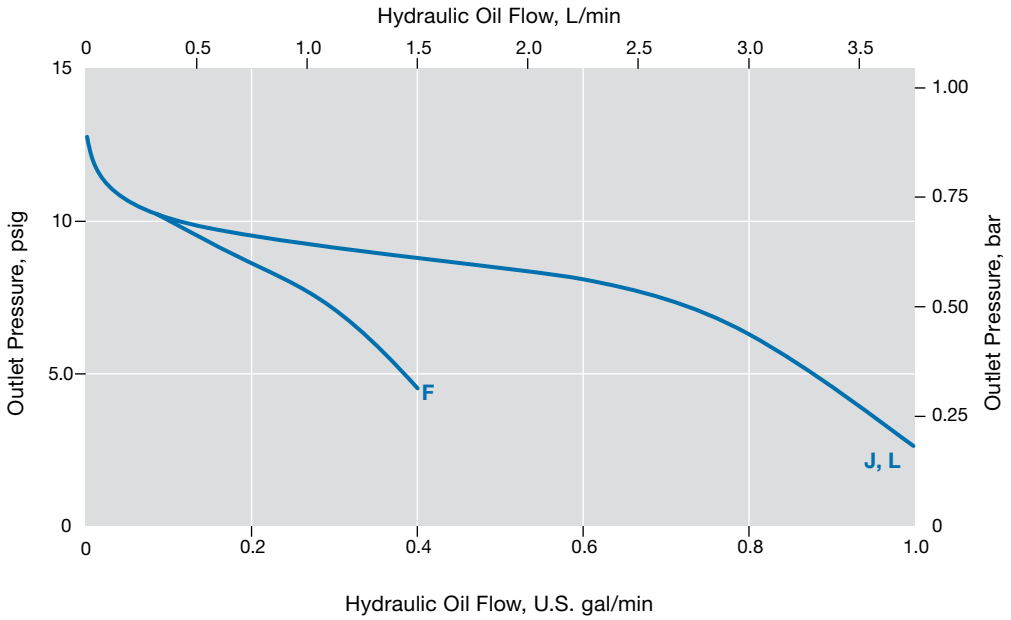
Flow Coefficient 0.06, Pressure Control Range 0 to 10 psig (0 to 0.68 bar)

Pressure Control Range

0 to 10 psig (0 to 0.68 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



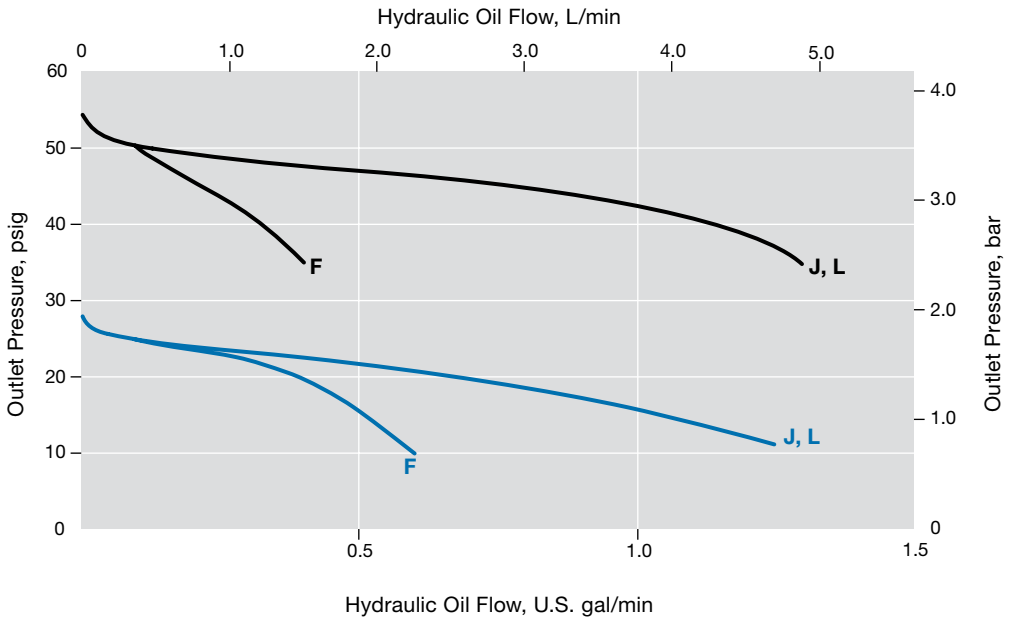
Flow Coefficient 0.06, Pressure Control Ranges 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)
0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

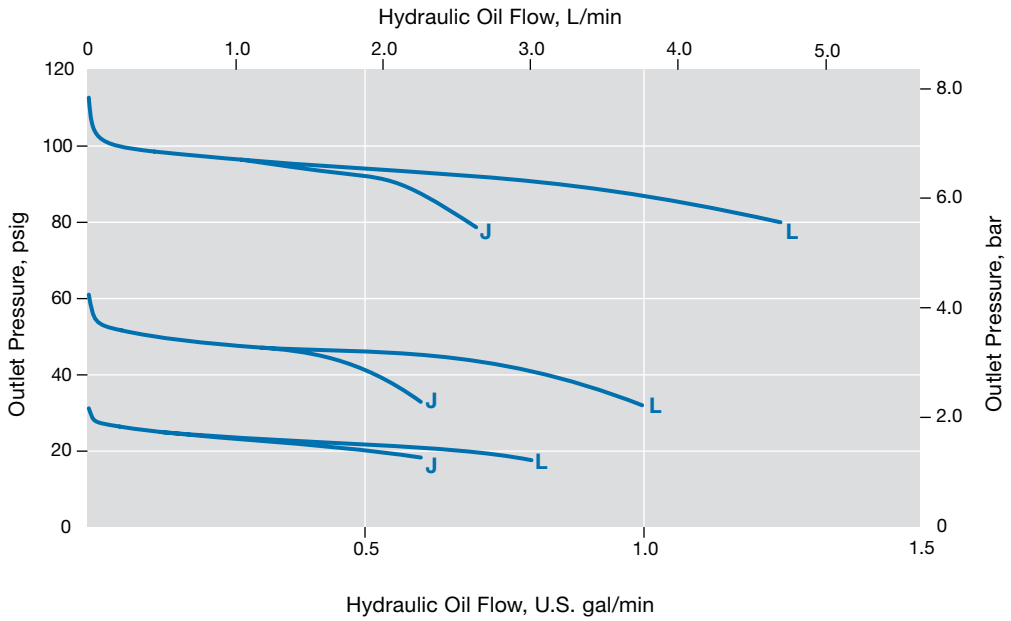
Pressure Control Range

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)



Flow Coefficient 0.06, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

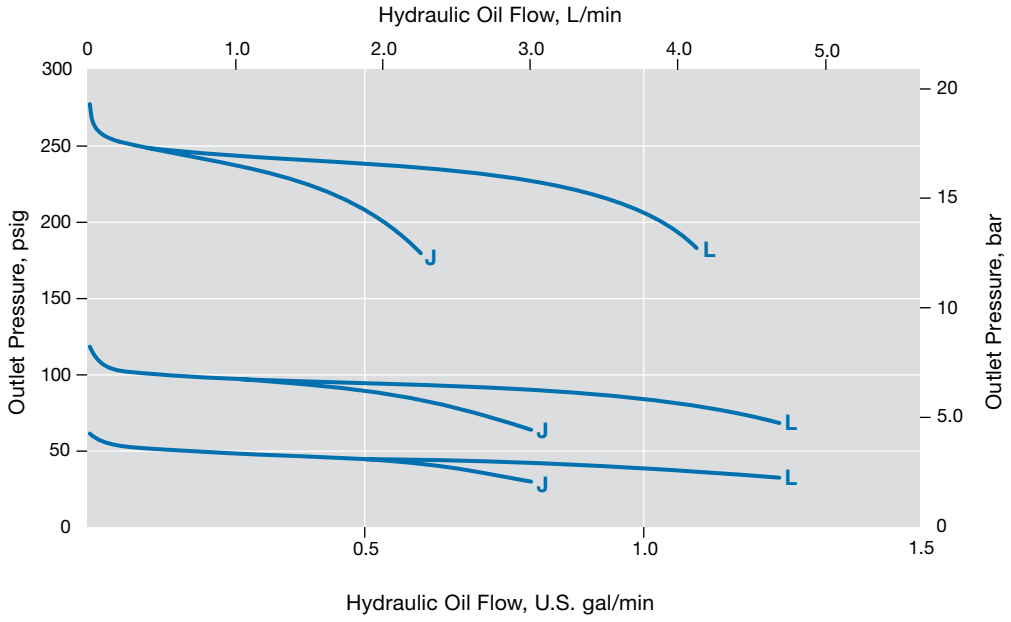
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)



KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

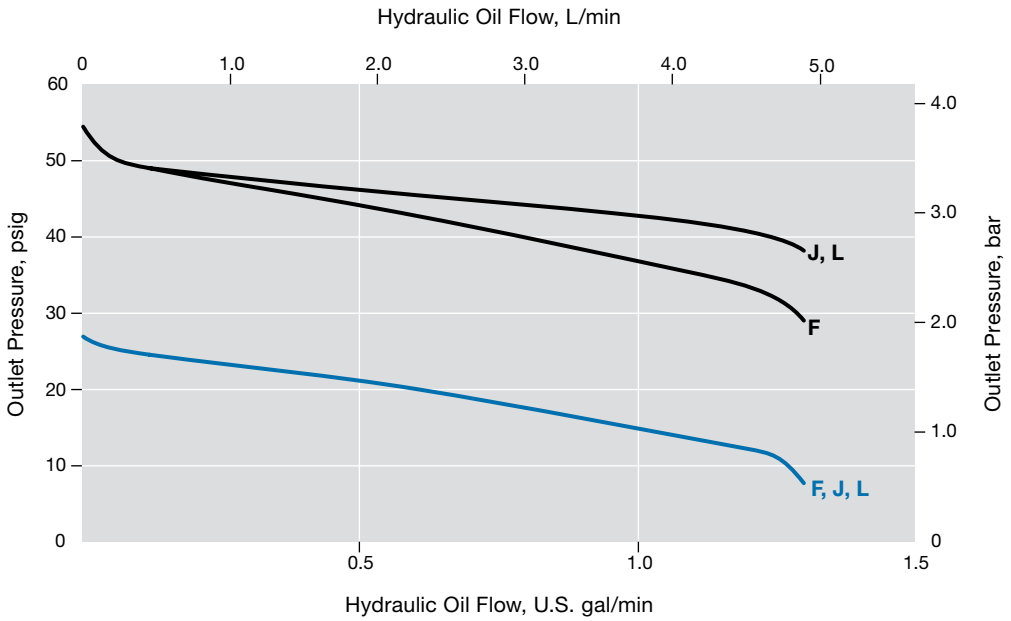
Flow Coefficient 0.20, Pressure Control Ranges 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

Pressure Control Range

- 0 to 25 psig (0 to 1.7 bar)
- 0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)



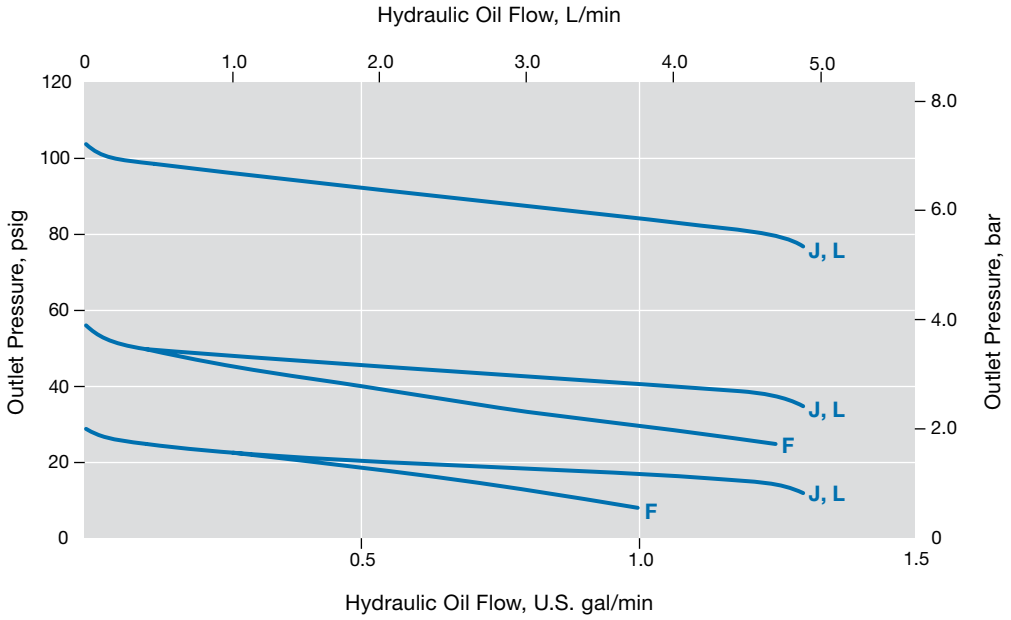
Flow Coefficient 0.20, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

Pressure Control Range

- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)



KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

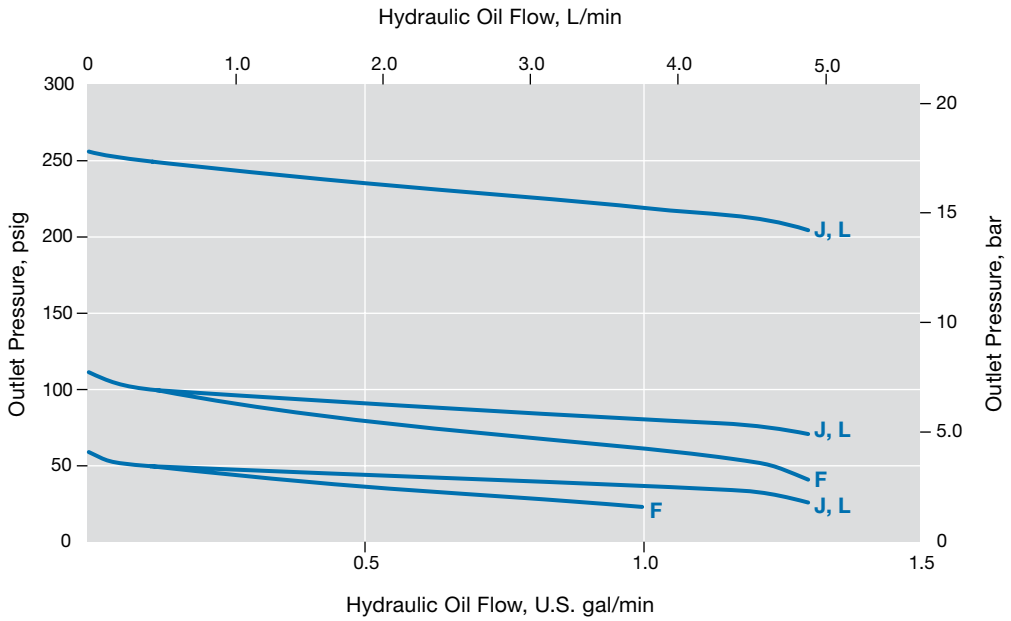
Flow Coefficient 0.20, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



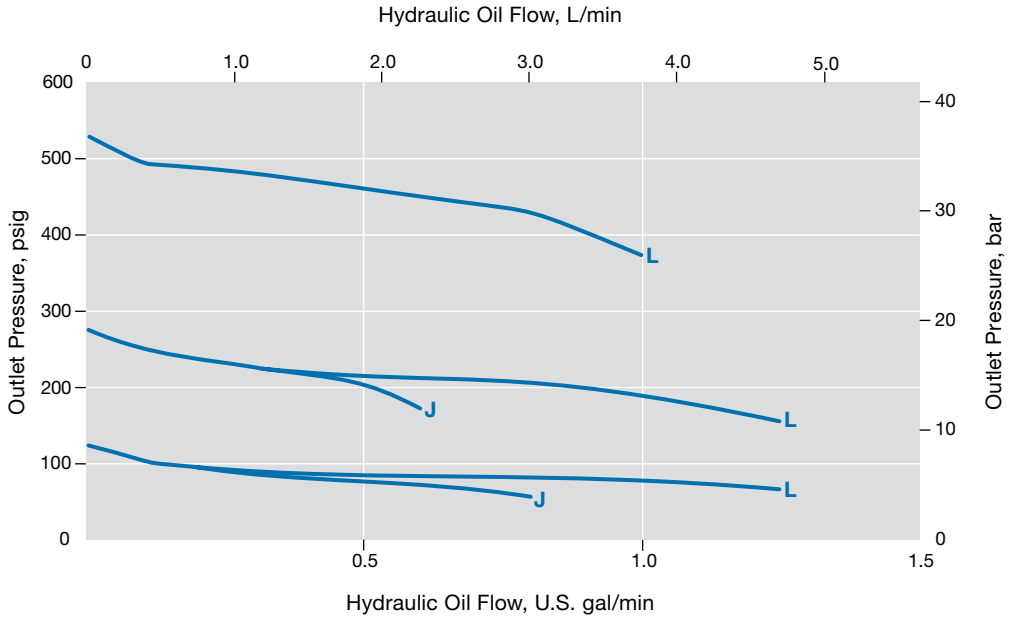
Flow Coefficient 0.20, Pressure Control Range 0 to 500 psig (0 to 34.4 bar)

Pressure Control Range

0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

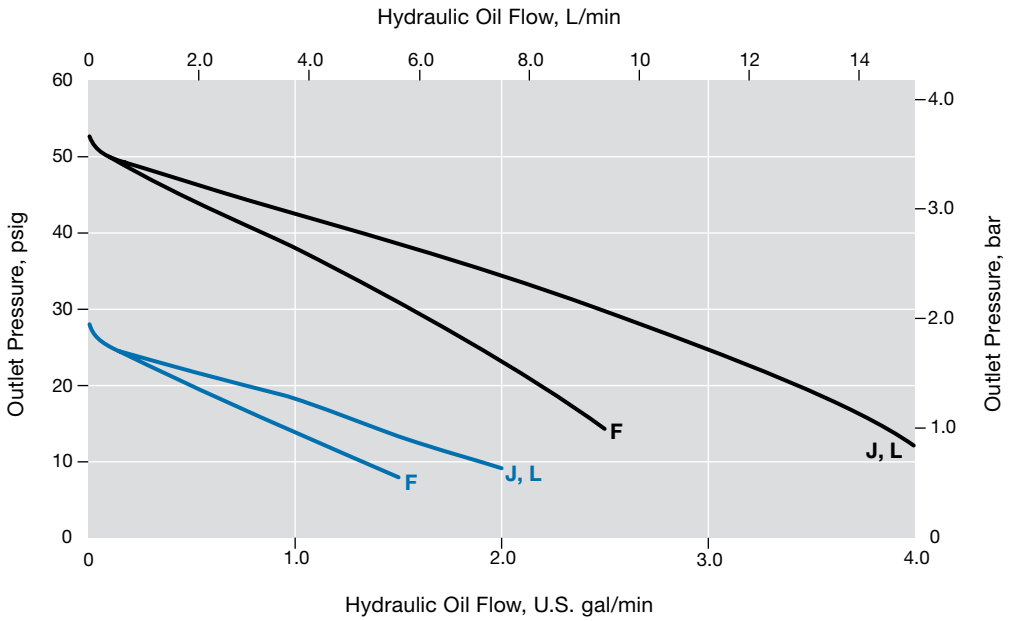
Flow Coefficient 0.50, Pressure Control Ranges 0 to 25 psig (0 to 1.7 bar) and 0 to 50 psig (0 to 3.4 bar)

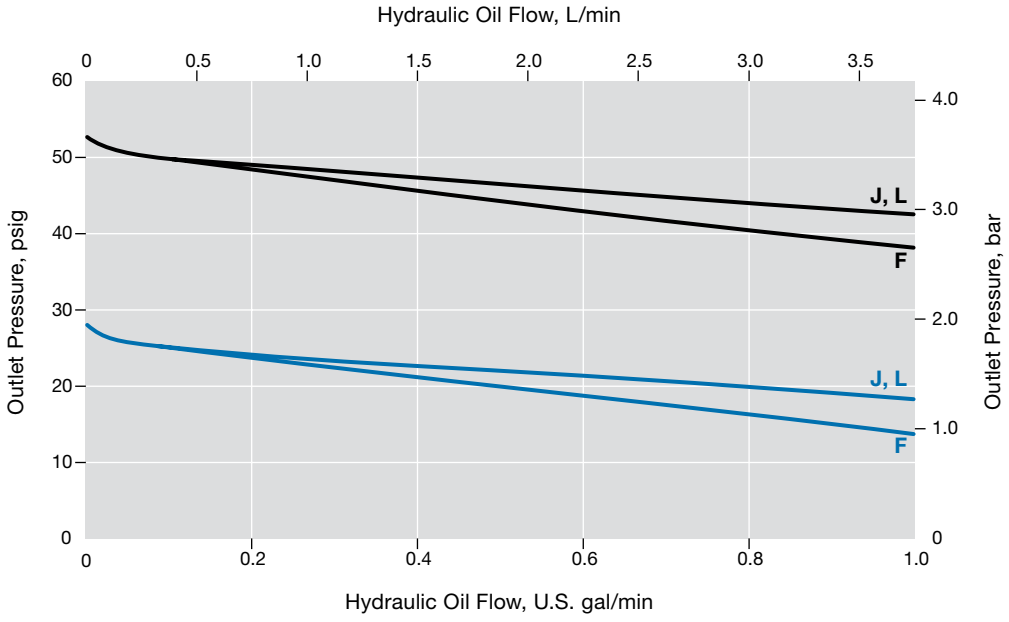
Pressure Control Range

- 0 to 25 psig (0 to 1.7 bar)
- 0 to 50 psig (0 to 3.4 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

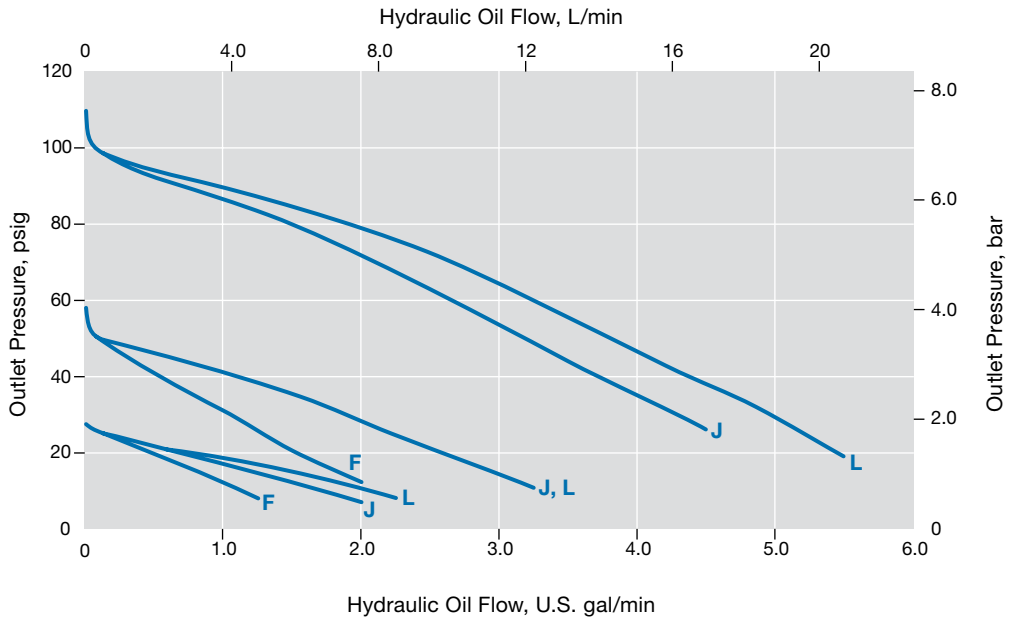
Flow Coefficient 0.50, Pressure Control Range 0 to 100 psig (0 to 6.8 bar)

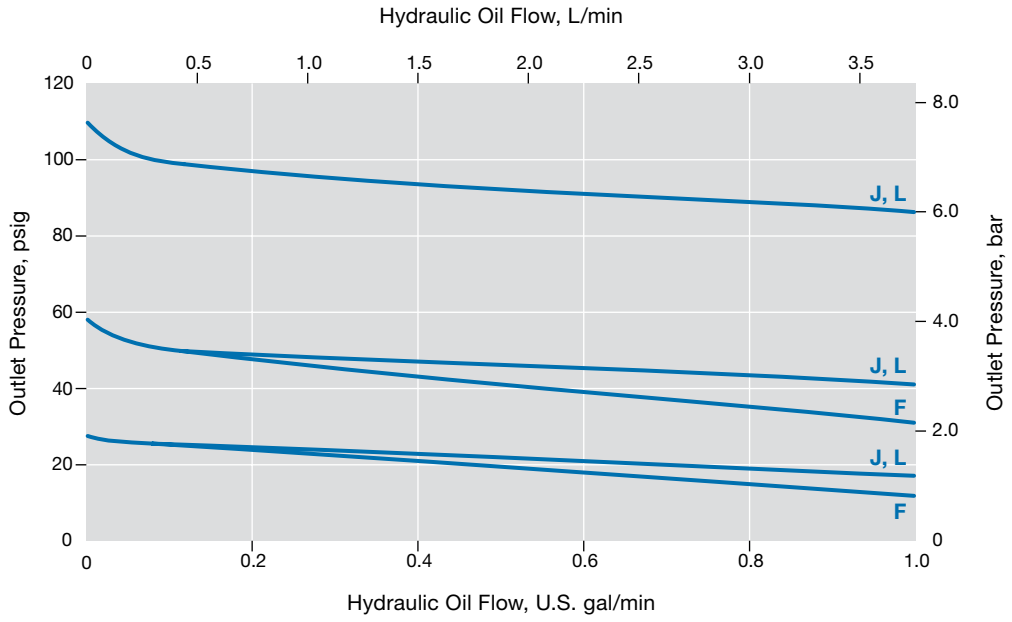
Pressure Control Range

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KLF Series High-Sensitivity Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

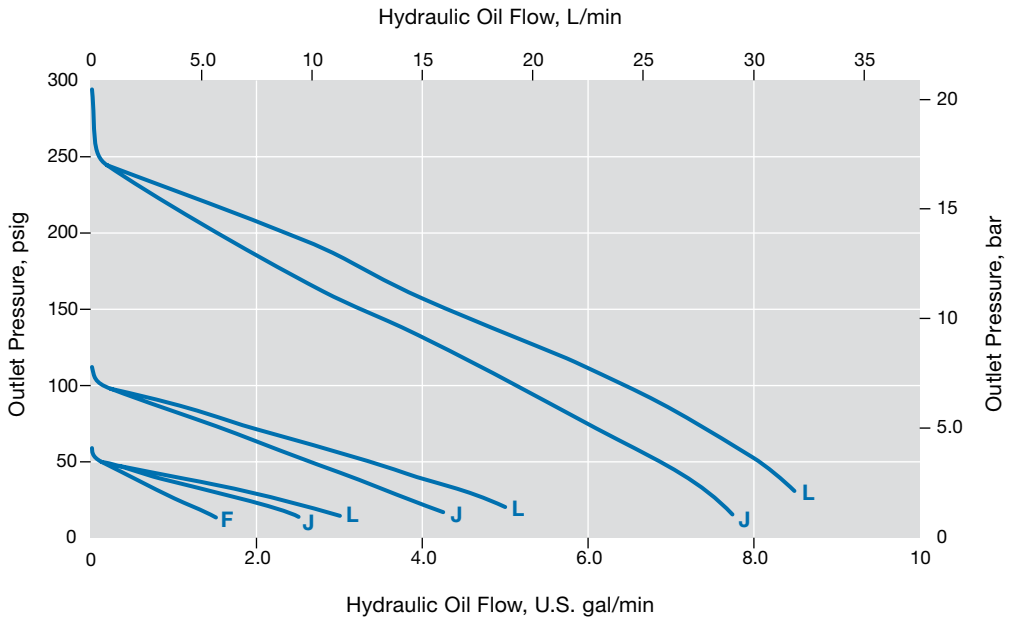
Flow Coefficient 0.50, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

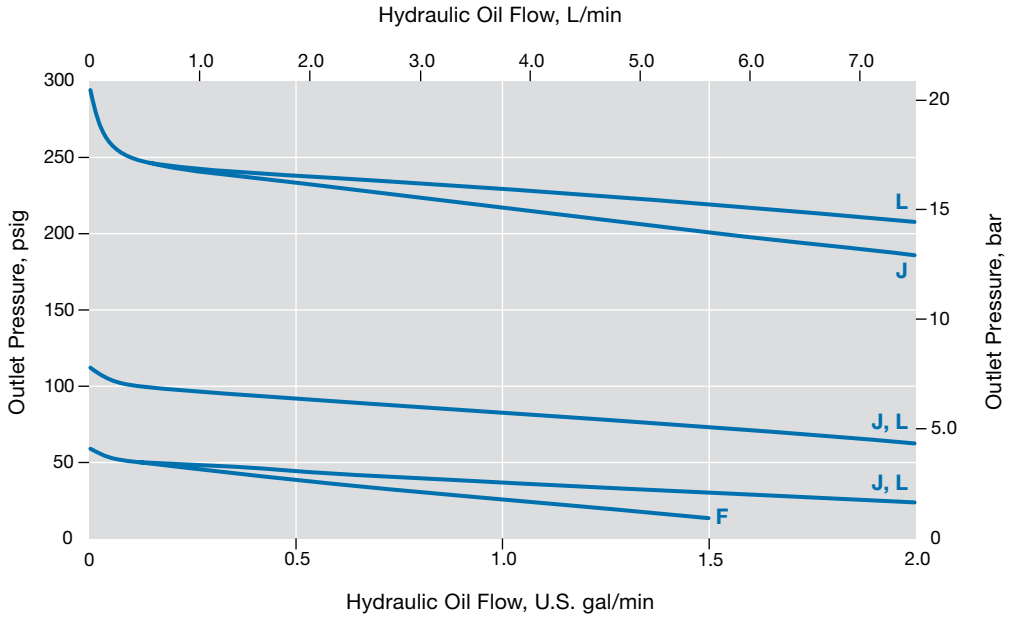
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)





KCP Series Compact Pressure-Reducing Regulators Liquid Flow

The KCP series is a compact, piston-sensing pressure regulator with a short stroke to minimize wear in high-cycling applications.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

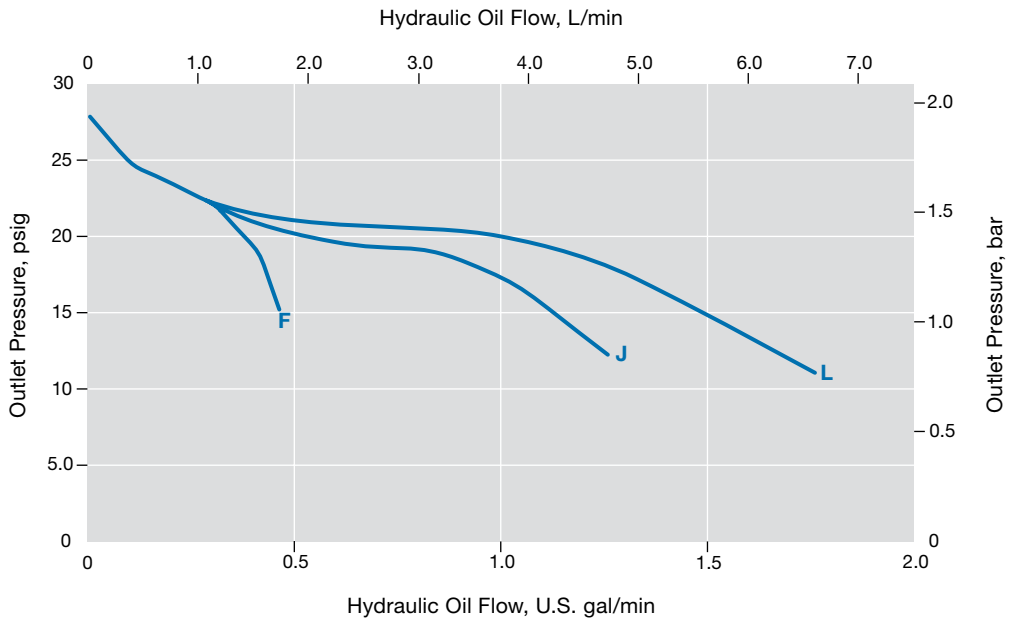
Flow Coefficient 0.06, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)



Flow Coefficient 0.06, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

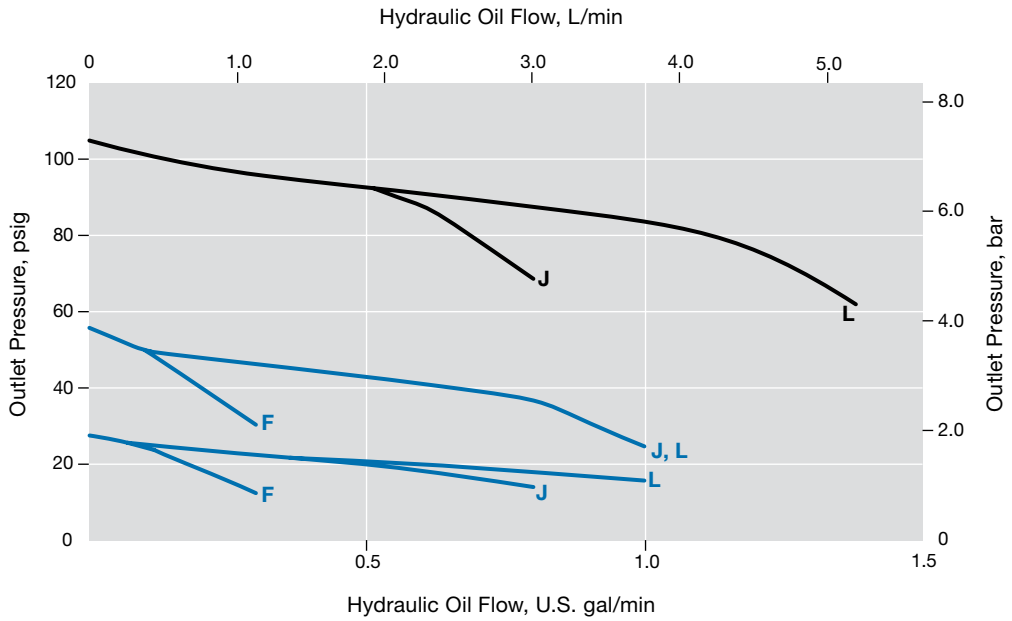
Pressure Control Range

0 to 50 psig (0 to 3.4 bar))

0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)



KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

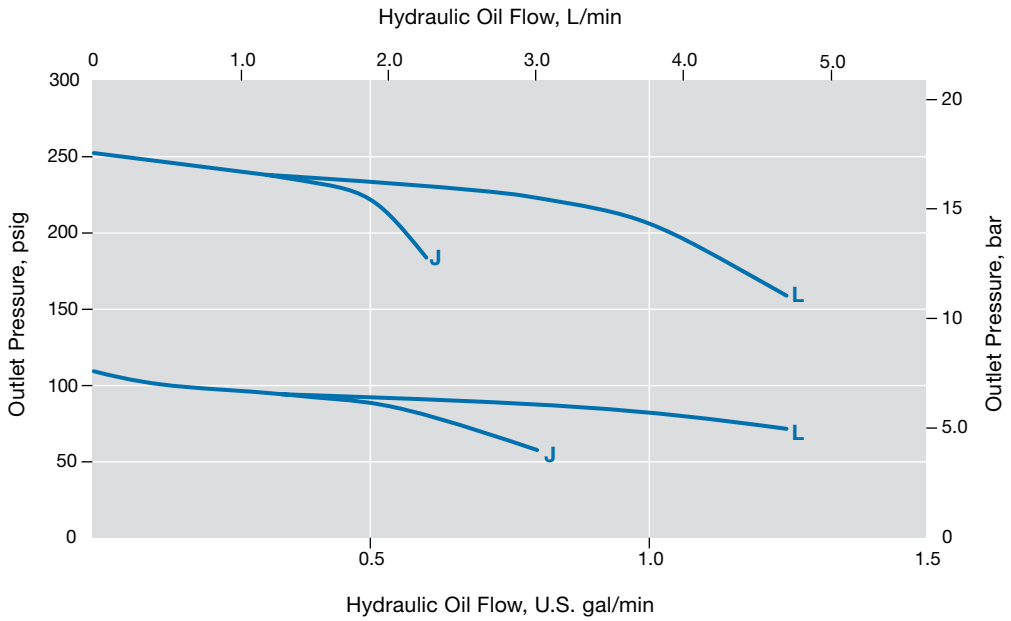
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)



Flow Coefficient 0.06, Pressure Control Range 0 to 500 psig (0 to 34.4 bar)

Pressure Control Range

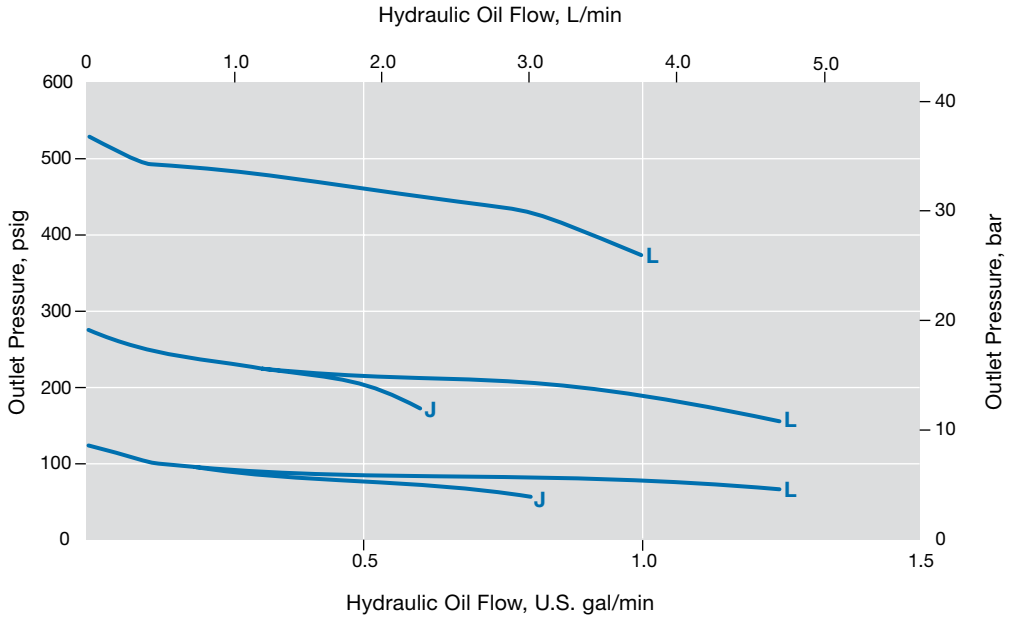
0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

F 100 psig (6.8 bar)

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)



KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

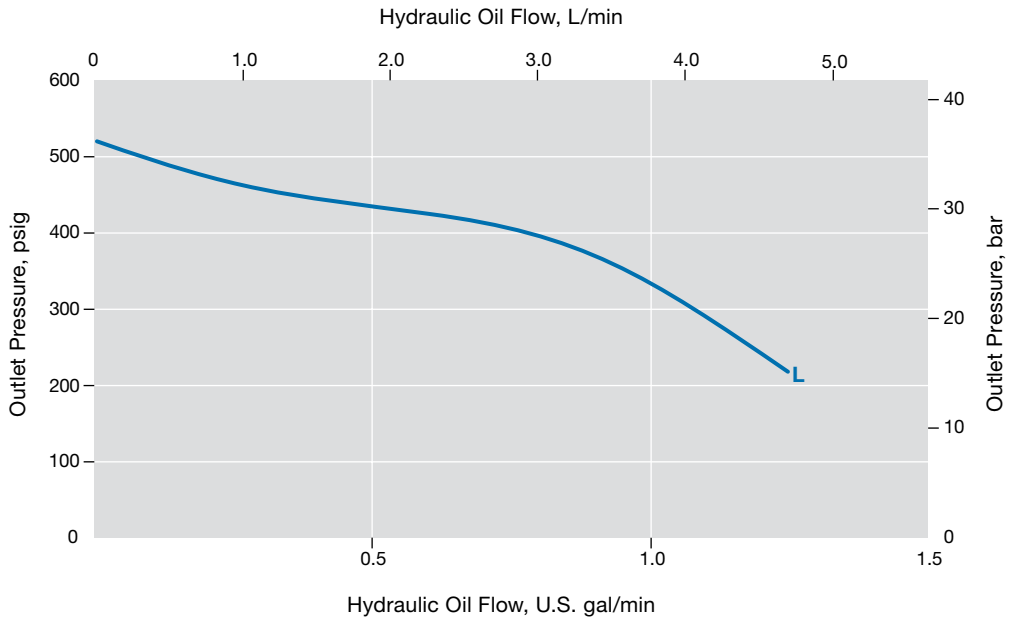
Flow Coefficient 0.06, Pressure Control Range 0 to 1000 psig (0 to 68.8 bar)

Pressure Control Range

0 to 1000 psig (0 to 68.8 bar)

Inlet Pressure

L 1000 psig (68.9 bar)



KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

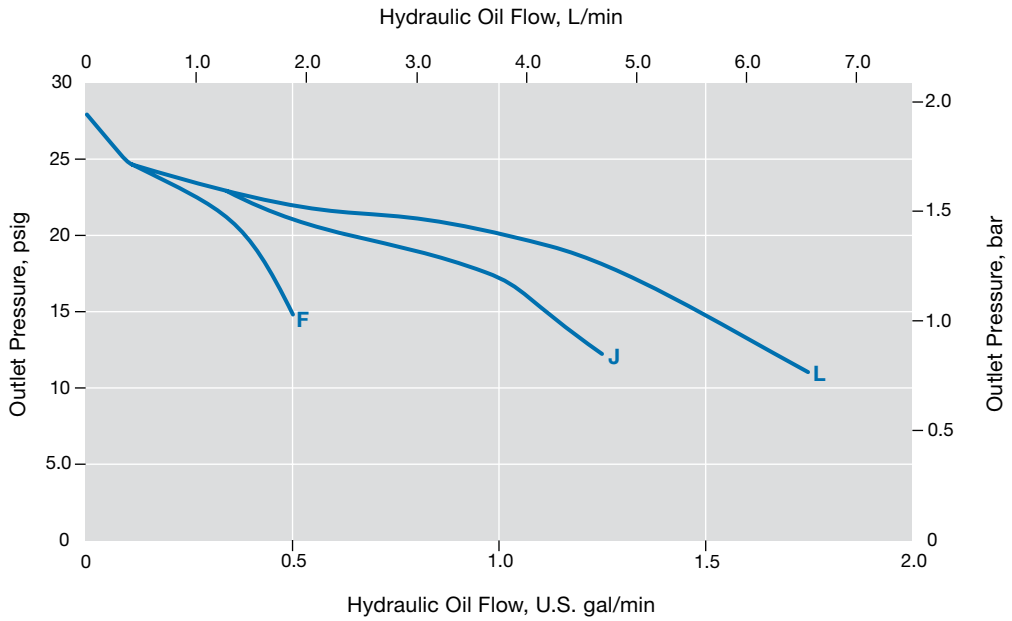
Flow Coefficient 0.20, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



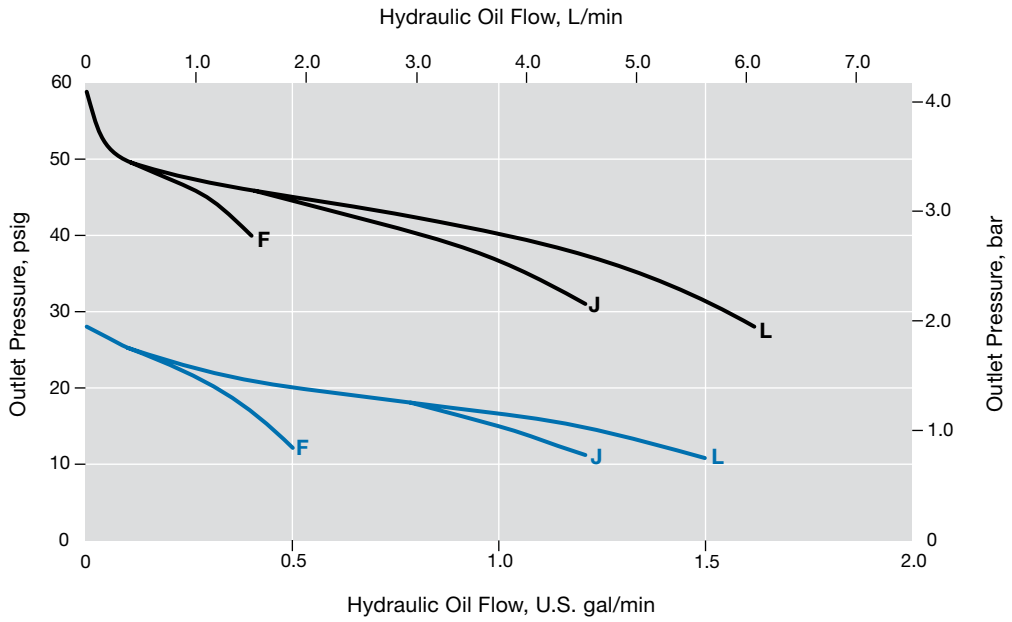
Flow Coefficient 0.20, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

Pressure Control Range

0 to 50 psig (0 to 3.4 bar))
0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

F 100 psig (6.8 bar)
J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)



KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.20, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

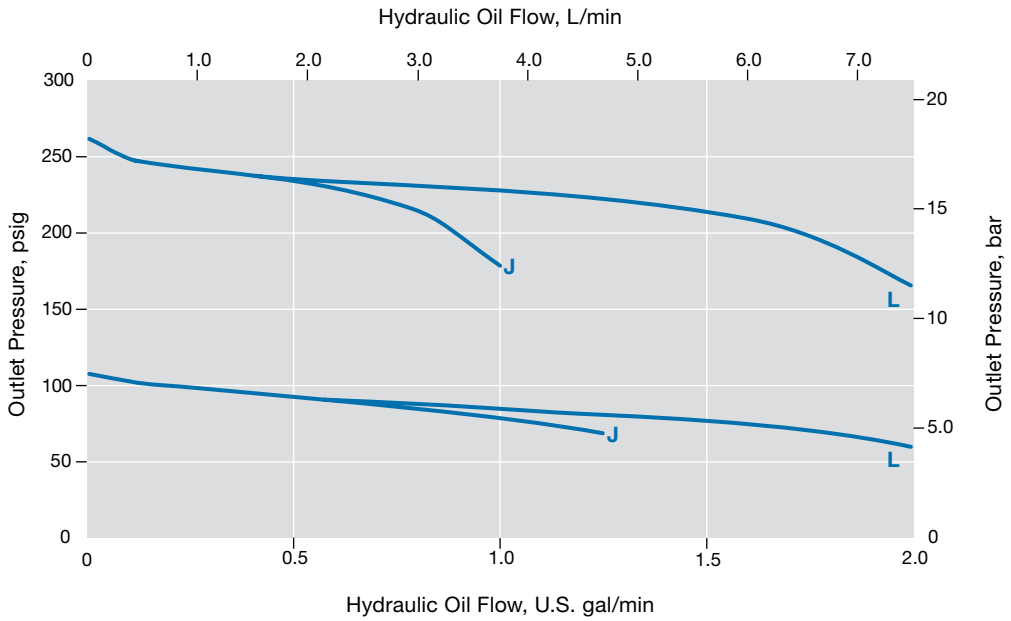
Pressure Control Range

0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)



Flow Coefficient 0.20, Pressure Control Range 0 to 500 psig (0 to 34.4 bar)

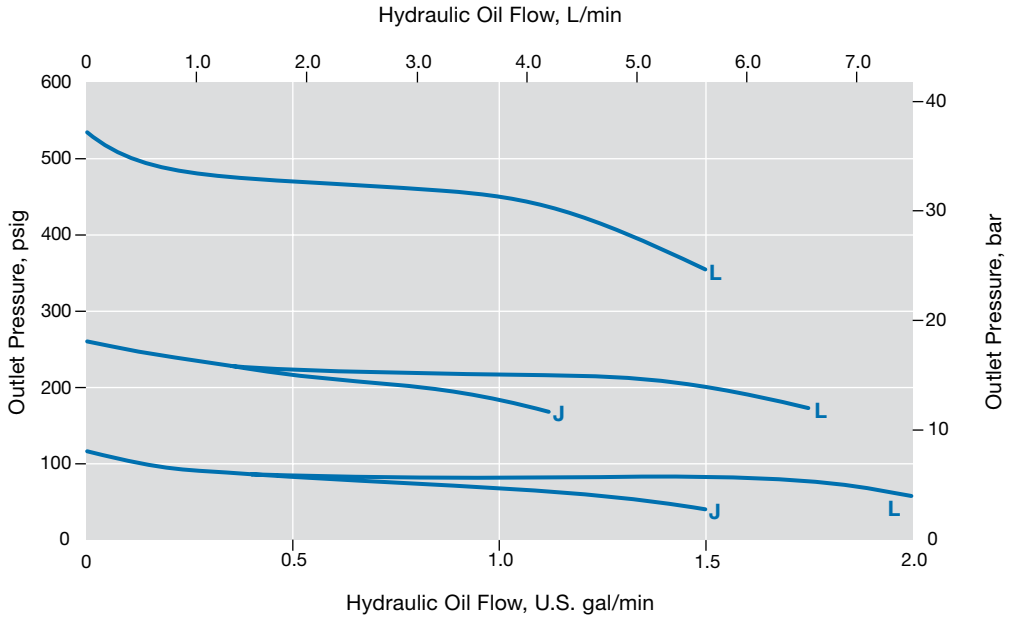
Pressure Control Range

0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)



KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

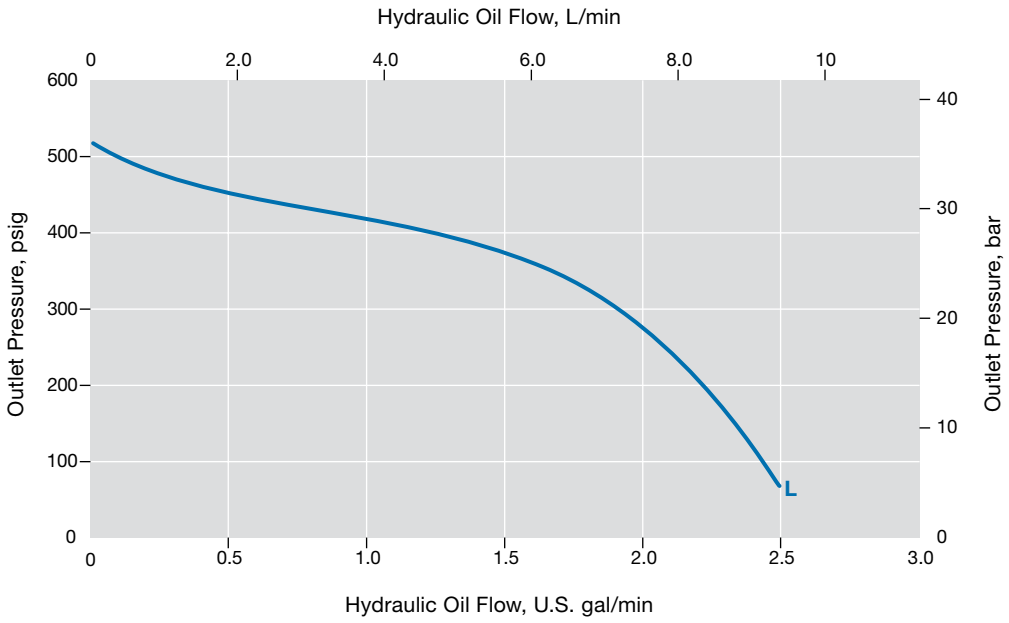
Flow Coefficient 0.20, Pressure Control Range 0 to 1000 psig (0 to 68.8 bar)

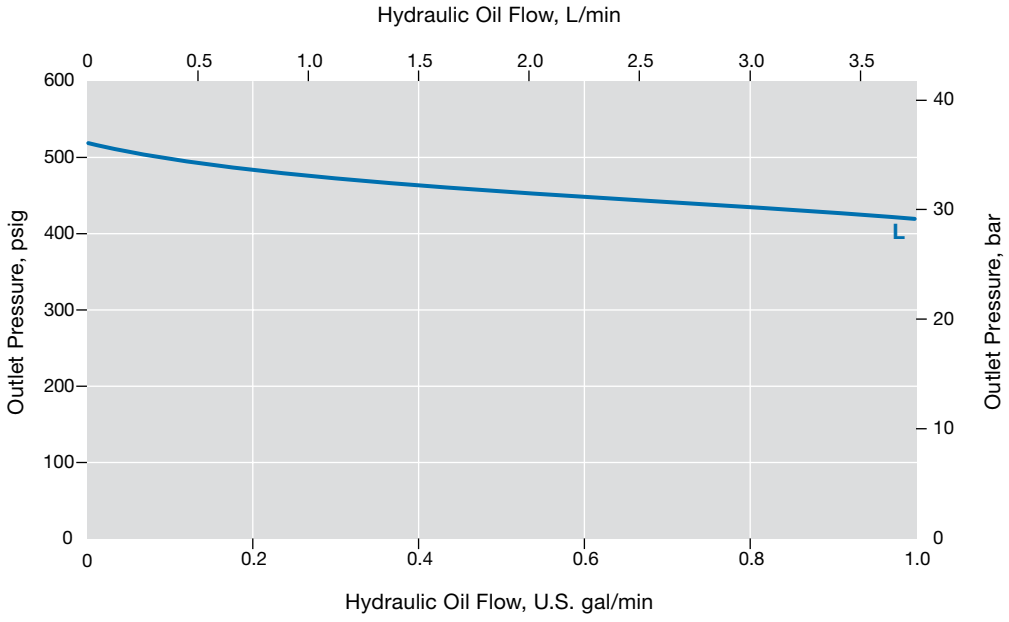
Pressure Control Range

0 to 1000 psig (0 to 68.8 bar)

Inlet Pressure

L 1000 psig (68.9 bar)





KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

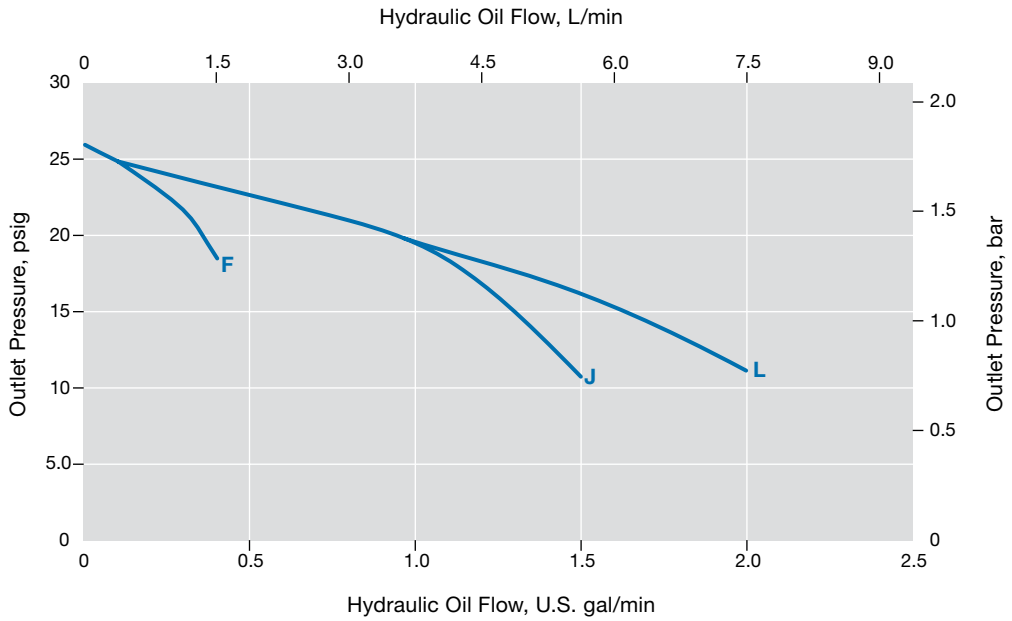
Flow Coefficient 0.50, Pressure Control Range 0 to 25 psig (0 to 1.7 bar)

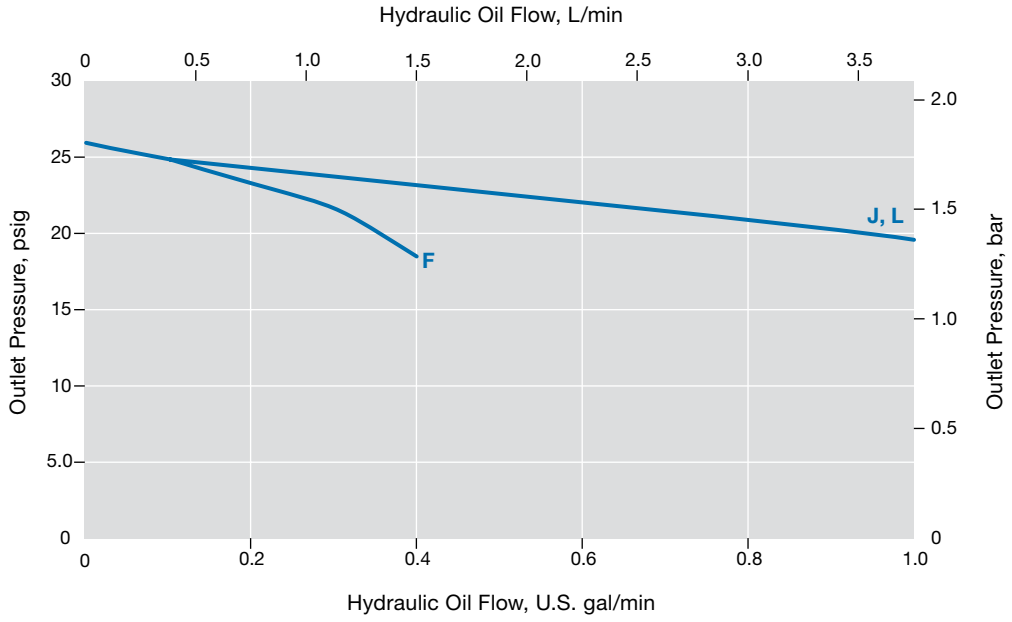
Pressure Control Range

0 to 25 psig (0 to 1.7 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

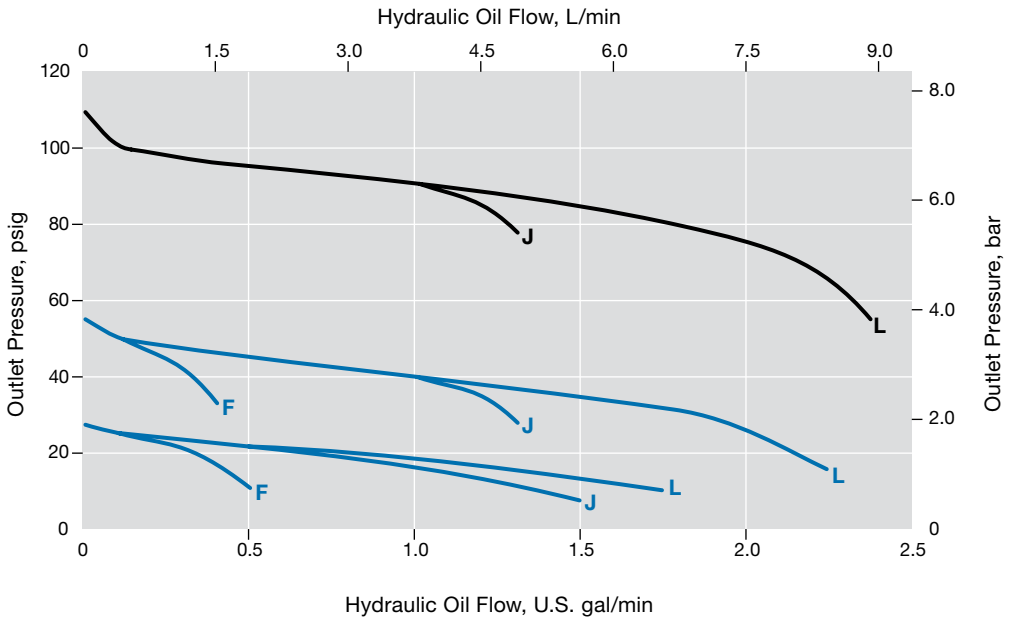
Flow Coefficient 0.50, Pressure Control Ranges 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)

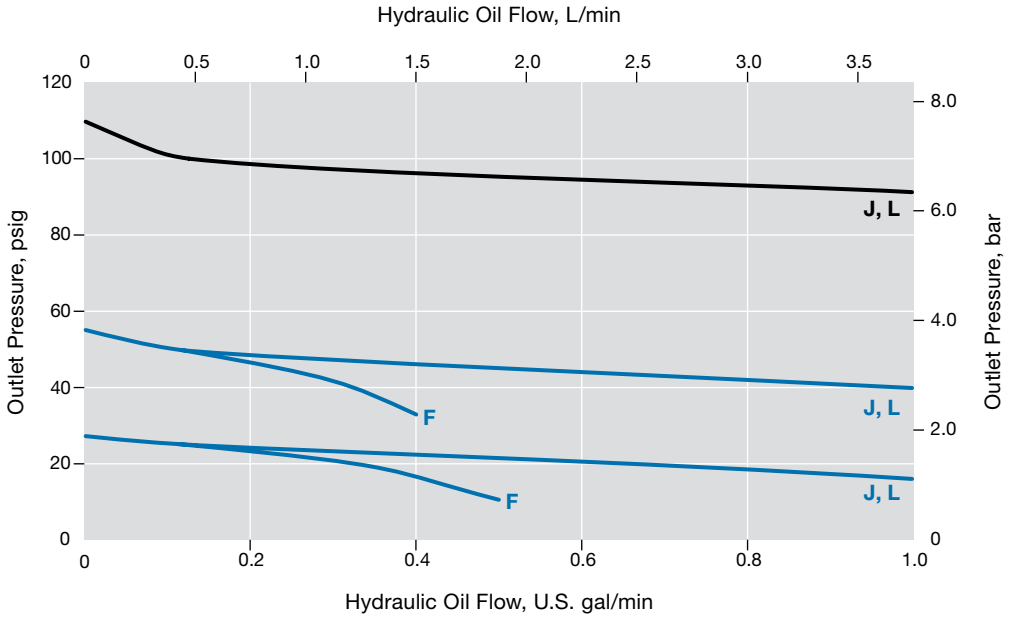
Pressure Control Range

- 0 to 50 psig (0 to 3.4 bar))
- 0 to 100 psig (0 to 6.8 bar)

Inlet Pressure

- **F** 100 psig (6.8 bar)
- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)





KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.50, Pressure Control Range 0 to 250 psig (0 to 17.2 bar)

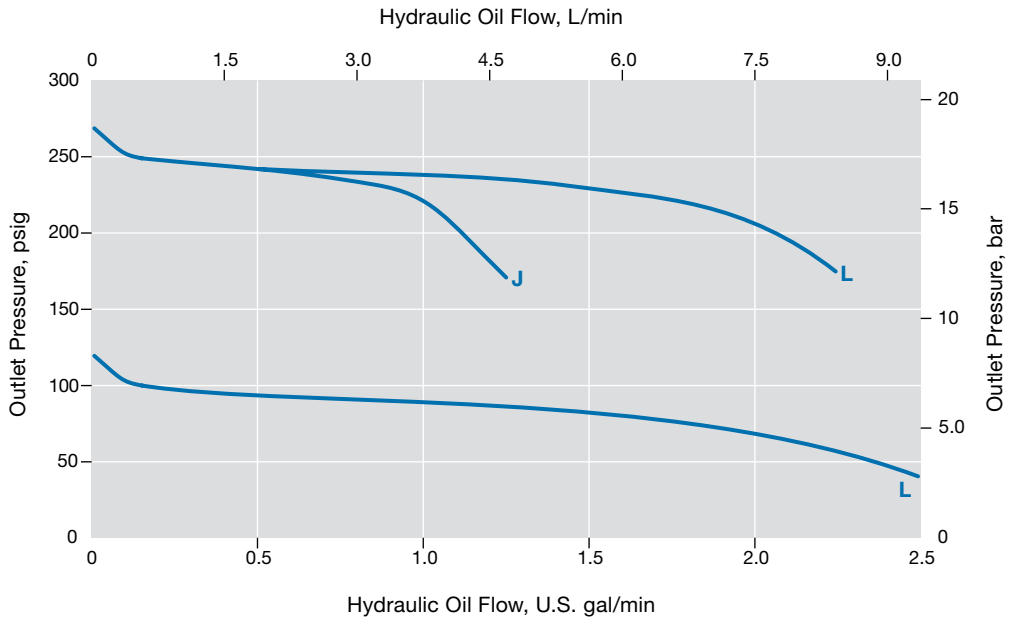
Pressure Control Range

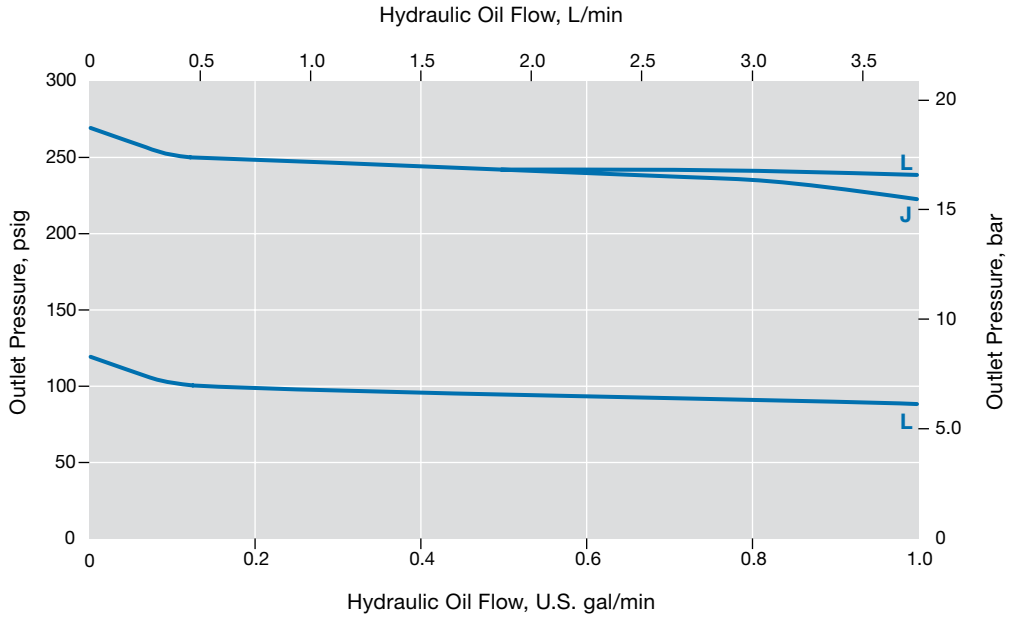
0 to 250 psig (0 to 17.2 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)





KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.50, Pressure Control Range 0 to 500 psig (0 to 34.4 bar)

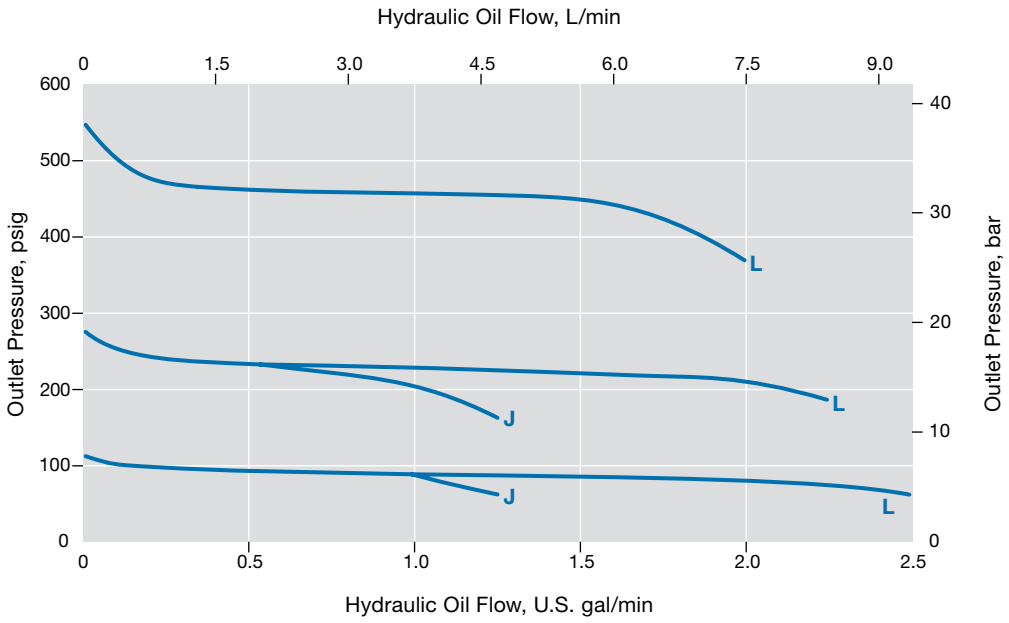
Pressure Control Range

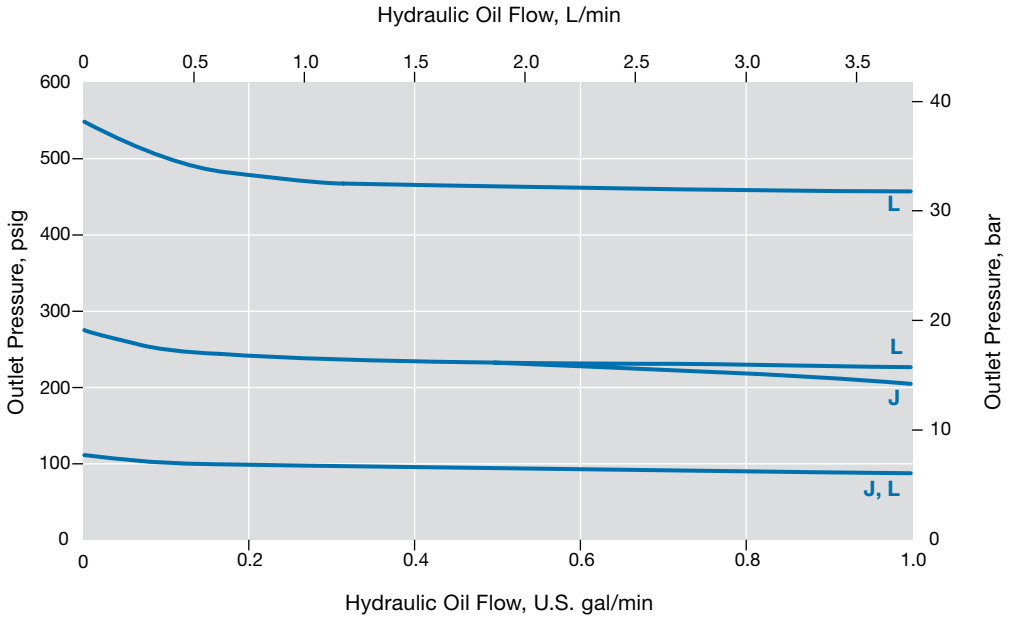
0 to 500 psig (0 to 34.4 bar)

Inlet Pressure

J 500 psig (34.4 bar)

L 1000 psig (68.9 bar)





KCP Series Compact Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

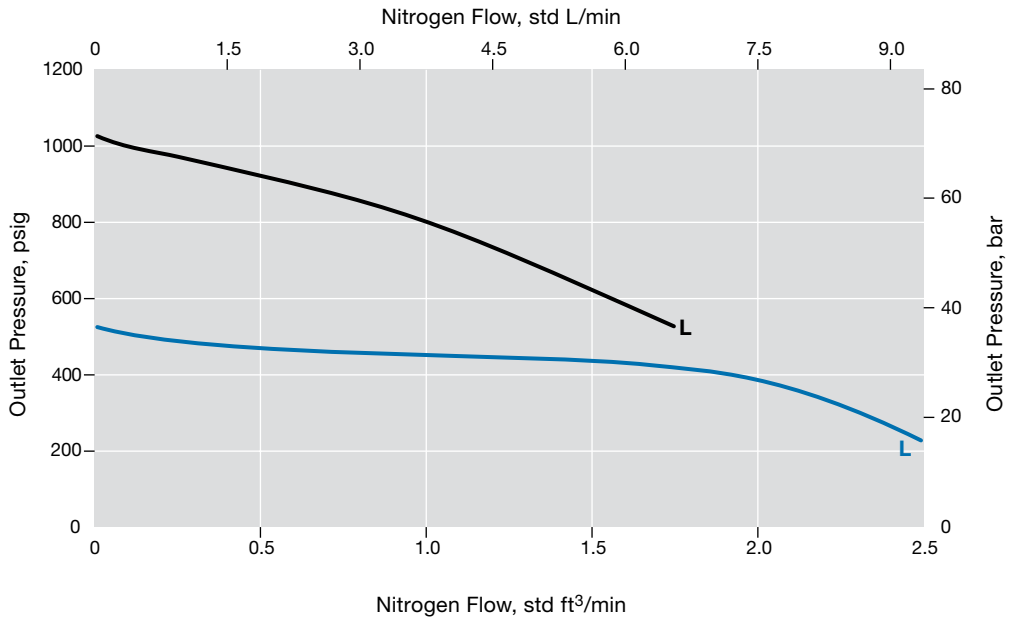
Flow Coefficient 0.50, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar) and 0 to 1500 psig (0 to 103 bar)

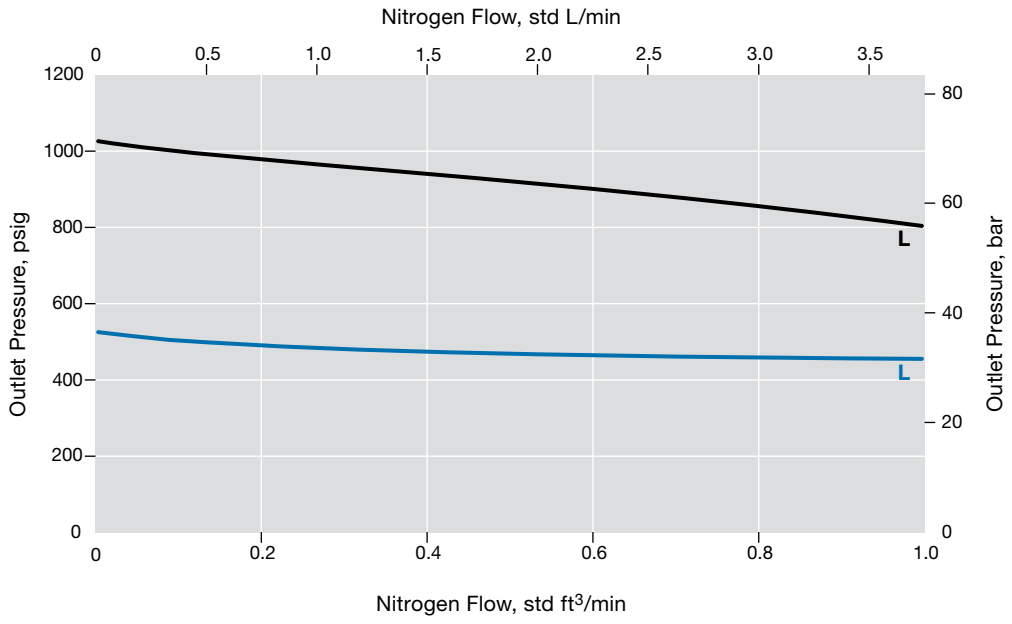
Pressure Control Range

- 0 to 1000 psig (0 to 68.9 bar)
- 0 to 1500 psig (0 to 103 bar)

Inlet Pressure

L 1000 psig (68.9 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Liquid Flow

The KPP series meets the demands of a wide range of gas or liquid applications in a lightweight, compact installation footprint. These features make the KPP pressure regulator an ideal pressure control solution within high-density OEM equipment.

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

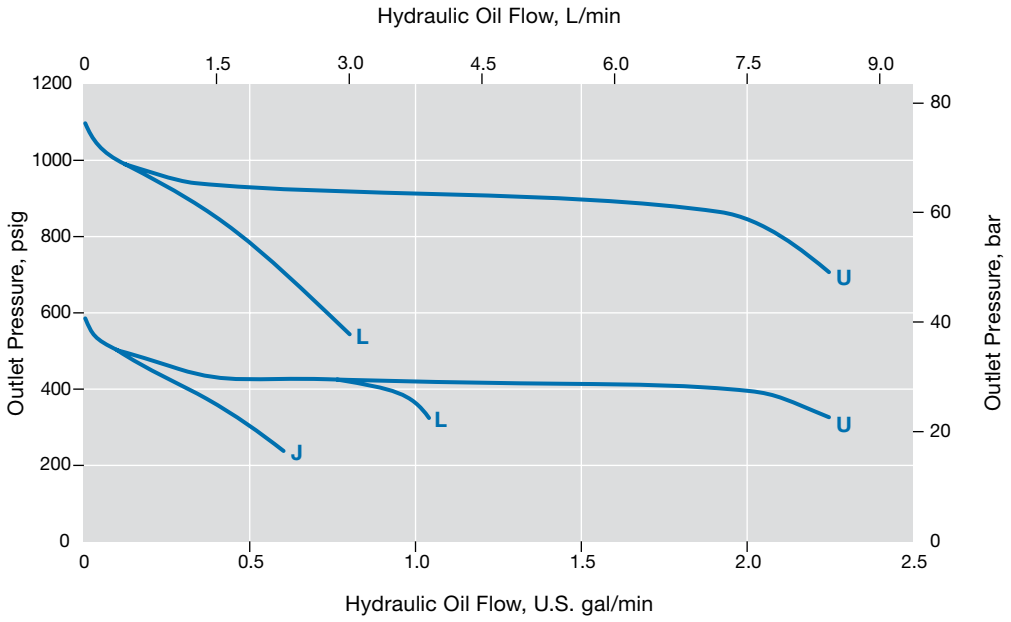
Flow Coefficient 0.06, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar)

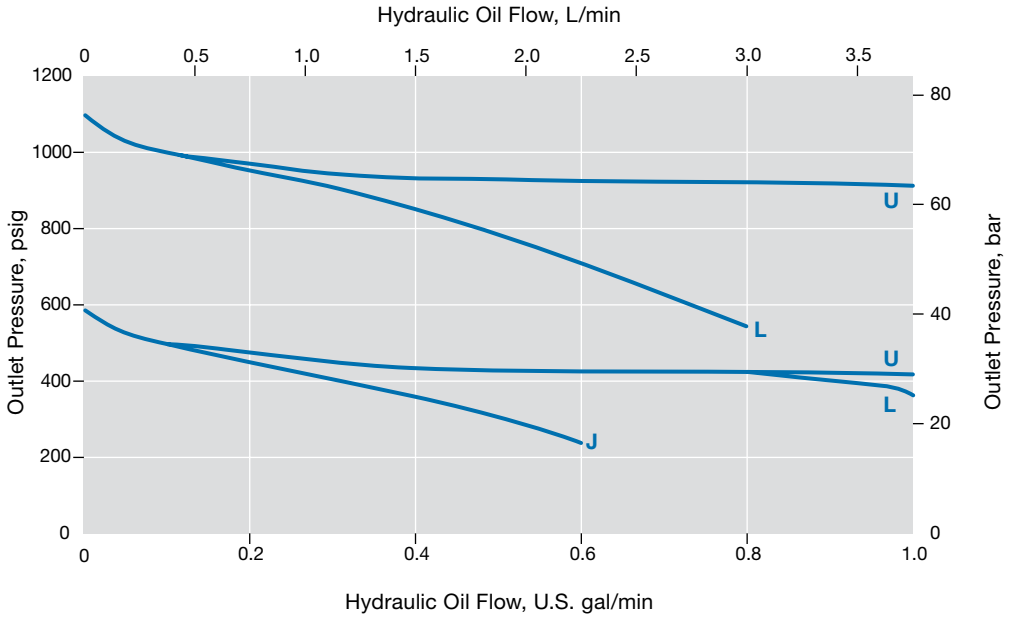
Pressure Control Range

0 to 1000 psig (0 to 68.9 bar)

Inlet Pressure

J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
U 2500 psig (172 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Range 0 to 1500 psig (0 to 103 bar)

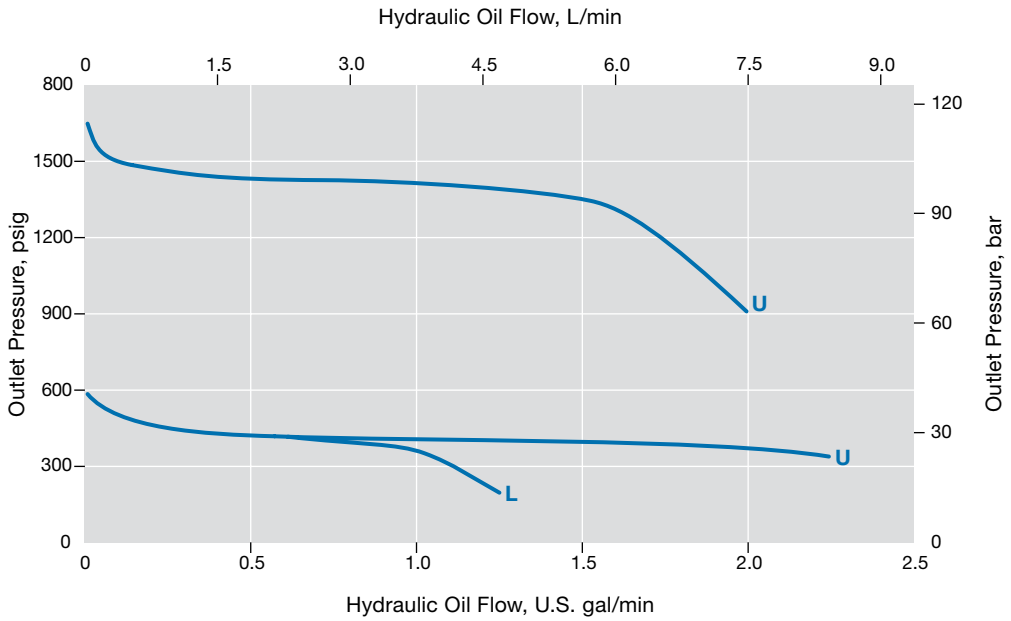
Pressure Control Range

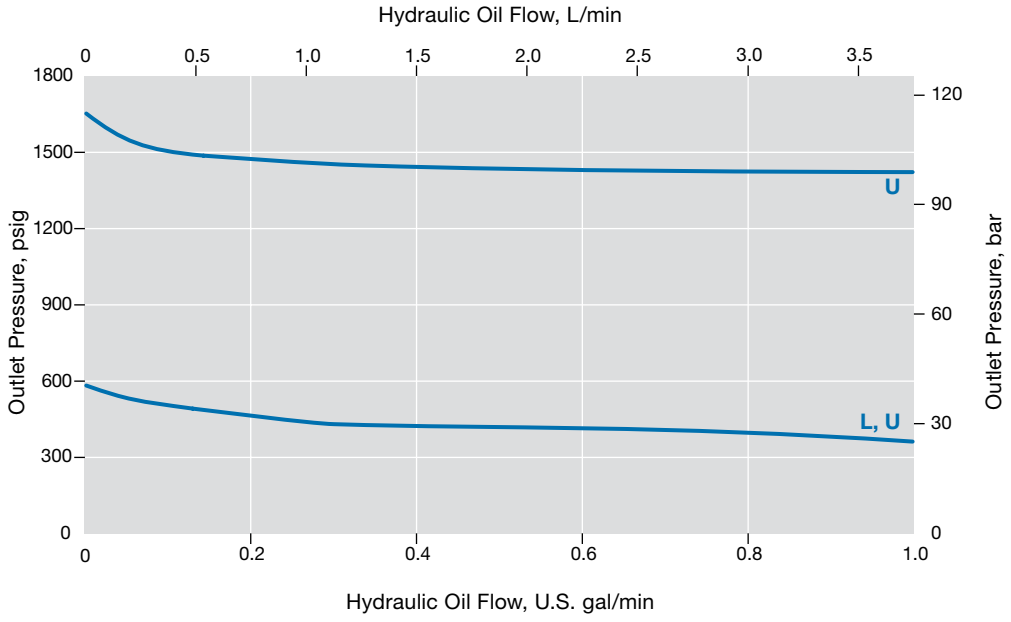
0 to 1500 psig (0 to 103 bar)

Inlet Pressure

L 1000 psig (68.9 bar)

U 2500 psig (172 bar)





KPP Series Medium- to High-Pressure Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

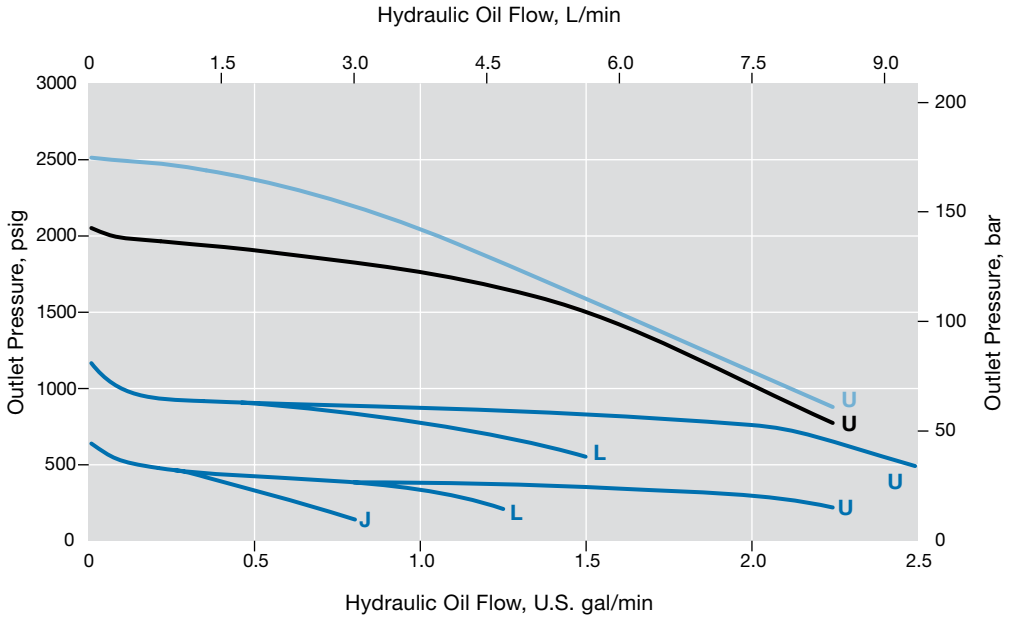
Flow Coefficient 0.06, Pressure Control Ranges 0 to 2000 psig (0 to 137 bar), 0 to 3000 psig (0 to 206 bar), and 0 to 3600 psig (0 to 248 bar)

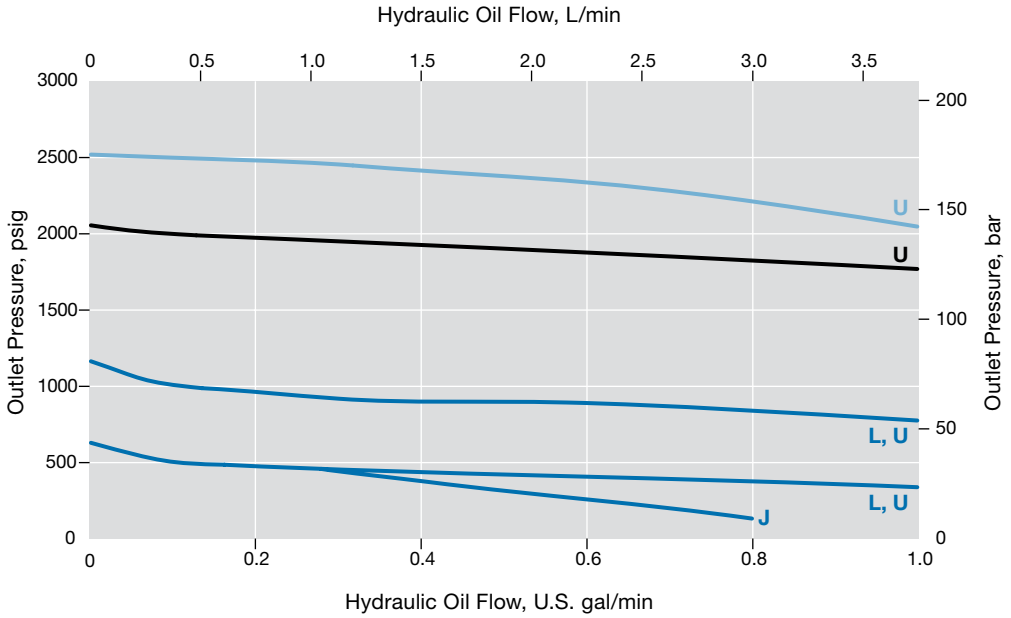
Pressure Control Range

- 0 to 2000 psig (0 to 137 bar)
- 0 to 3000 psig (0 to 206 bar)
- 0 to 3600 psig (0 to 248 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **U** 2500 psig (172 bar)





KPF Series High-Flow Pressure-Reducing Regulators Liquid Flow

The KPF series provides minimum droop across the flow range with high accuracy of outlet pressure.)

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

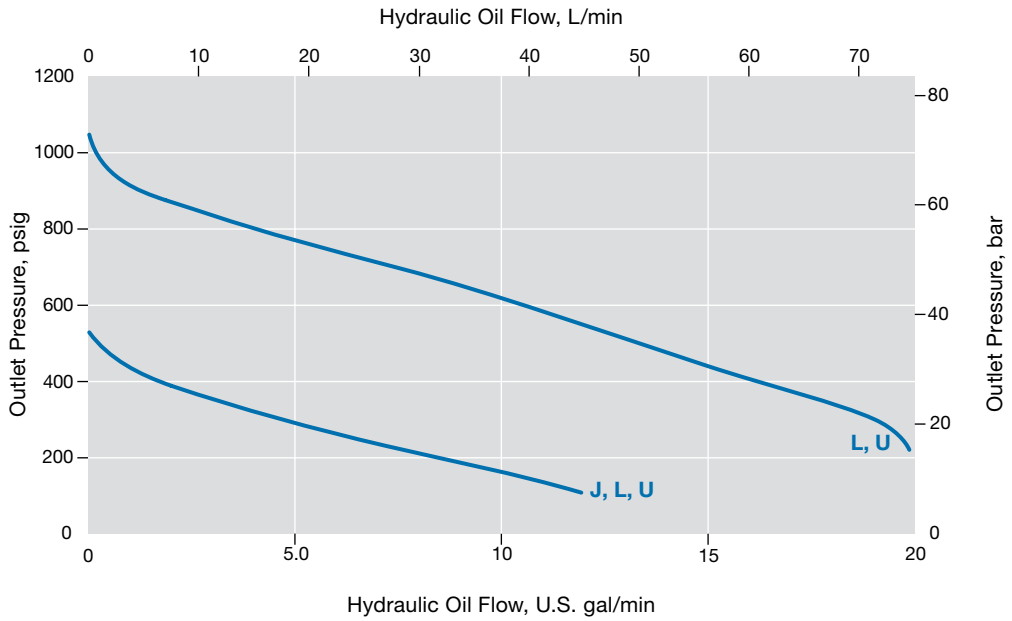
Flow Coefficient 0.06, Pressure Control Range 0 to 1000 psig (0 to 68.9 bar)

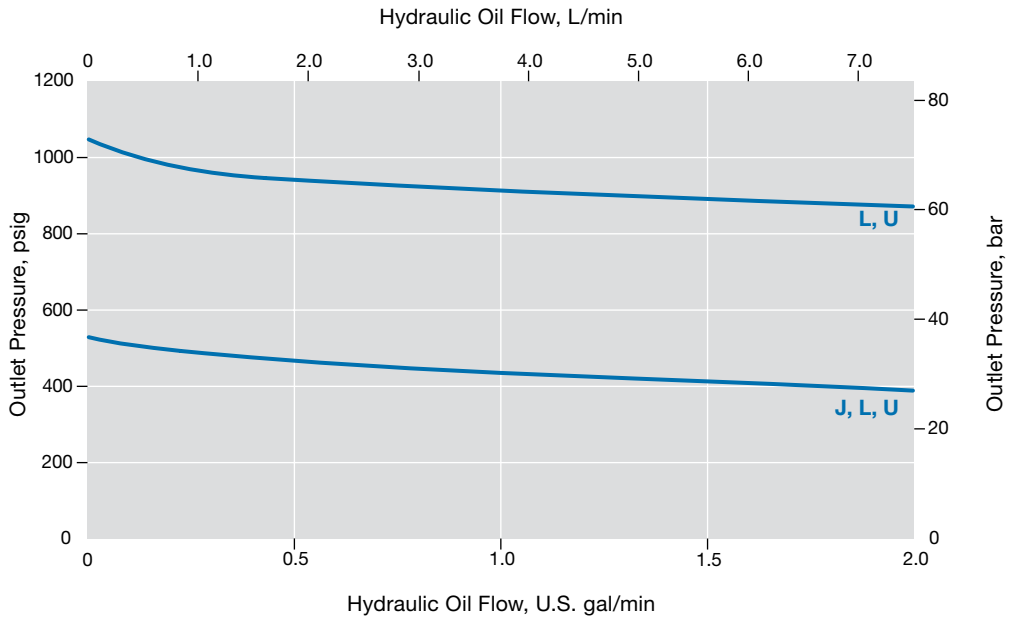
Pressure Control Range

— 0 to 1000 psig (0 to 68.9 bar)

Inlet Pressure

J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
U 2500 psig (172 bar)





KPF Series High-Flow Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

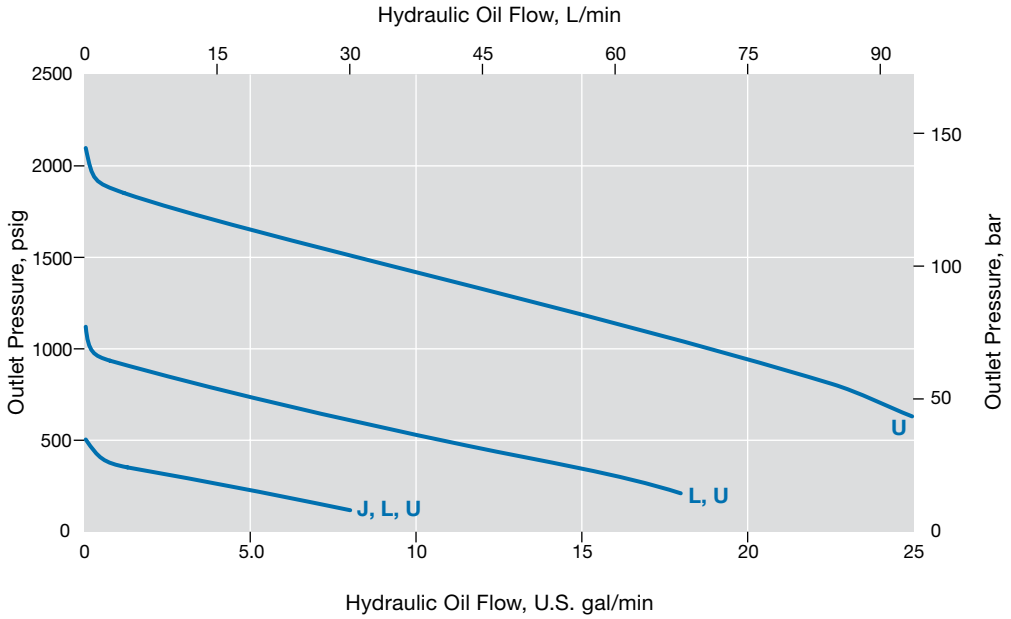
Flow Coefficient 1.0, Pressure Control Range 0 to 2000 psig (0 to 137 bar)

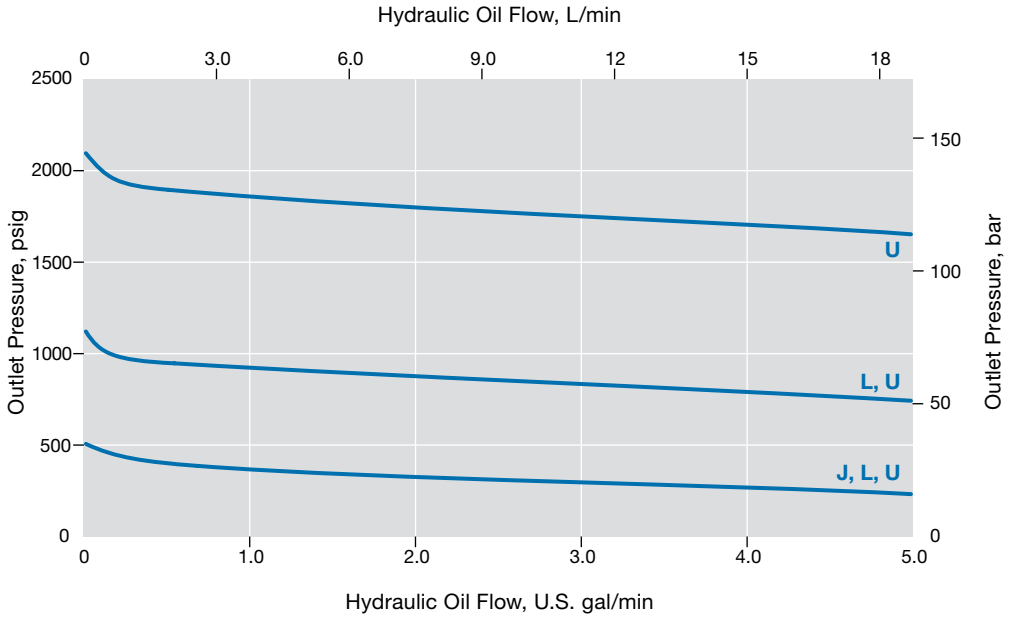
Pressure Control Range

0 to 2000 psig (0 to 137 bar)

Inlet Pressure

J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
U 2500 psig (172 bar)





KPF Series High-Flow Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

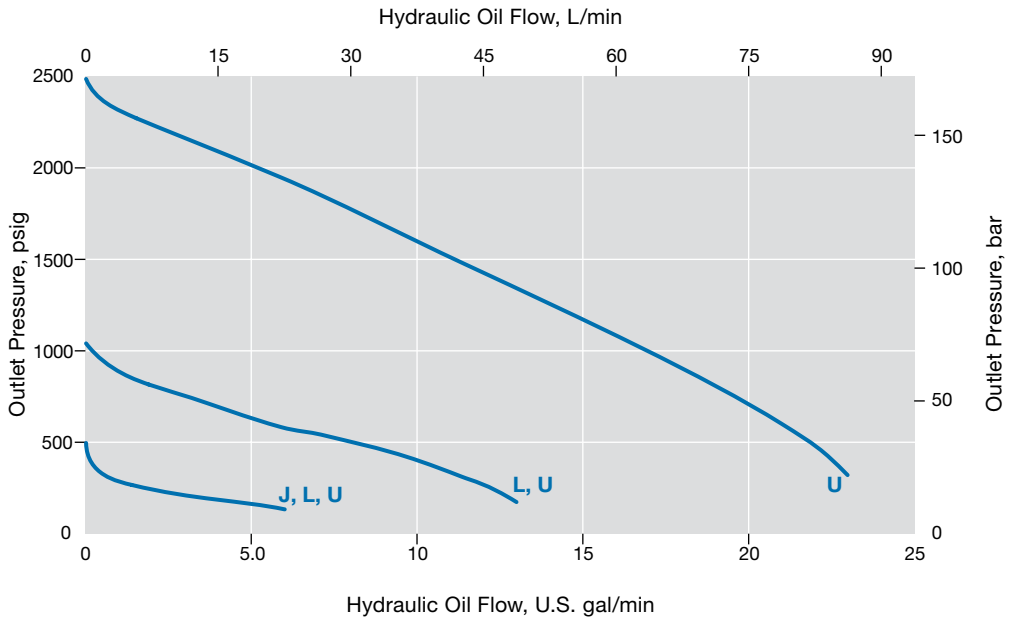
Flow Coefficient 1.0, Pressure Control Range 0 to 3000 psig (0 to 206 bar)

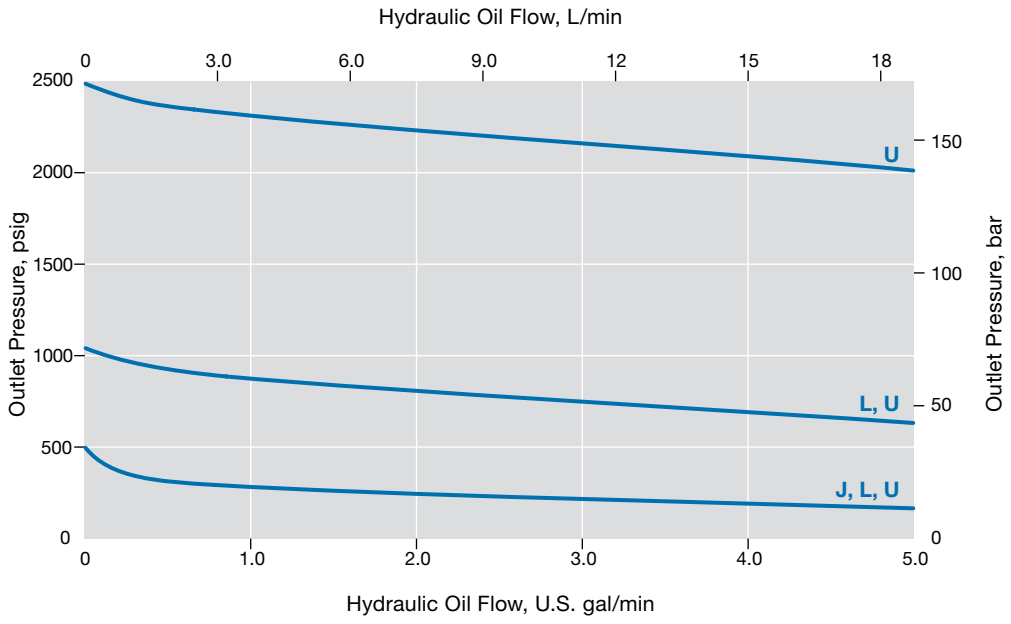
Pressure Control Range

0 to 3000 psig (0 to 206 bar)

Inlet Pressure

J 500 psig (34.4 bar)
L 1000 psig (68.9 bar)
U 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

The KHP series provides control of supply pressures up to 10 000 psig (689 bar). The self-venting capability enables downstream pressure reduction in closed-loop systems.)

For features, additional technical data, materials of construction, and ordering information, see the Swagelok *Pressure Regulators* catalog, MS-02-230.

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

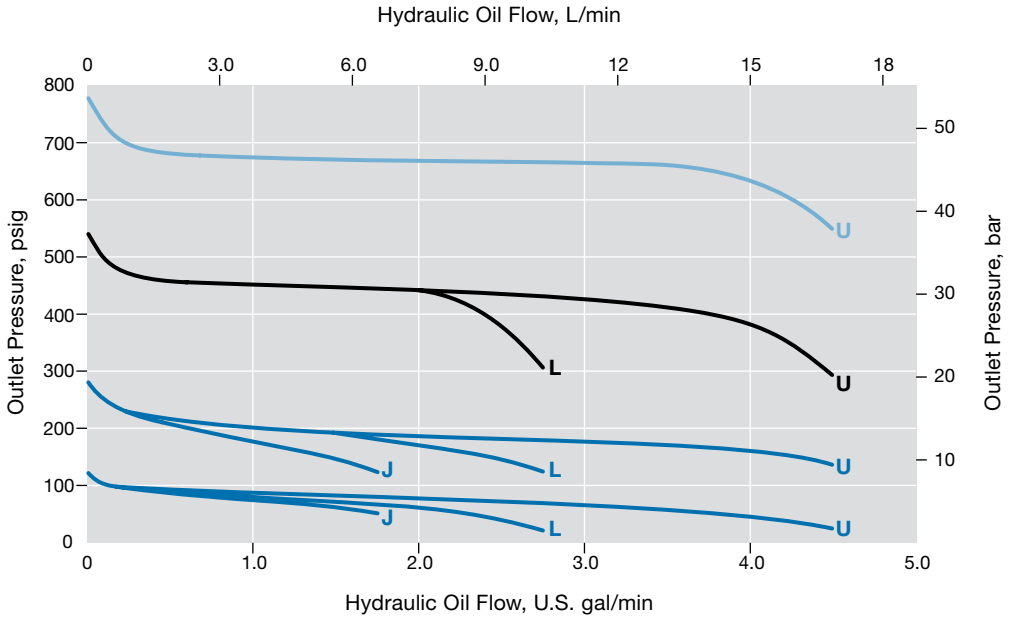
Flow Coefficient 0.06, Pressure Control Ranges 0 to 250 psig (0 to 17.5 bar), 0 to 500 psig (0 to 34.4 bar), and 0 to 750 psig (0 to 51.6 bar)

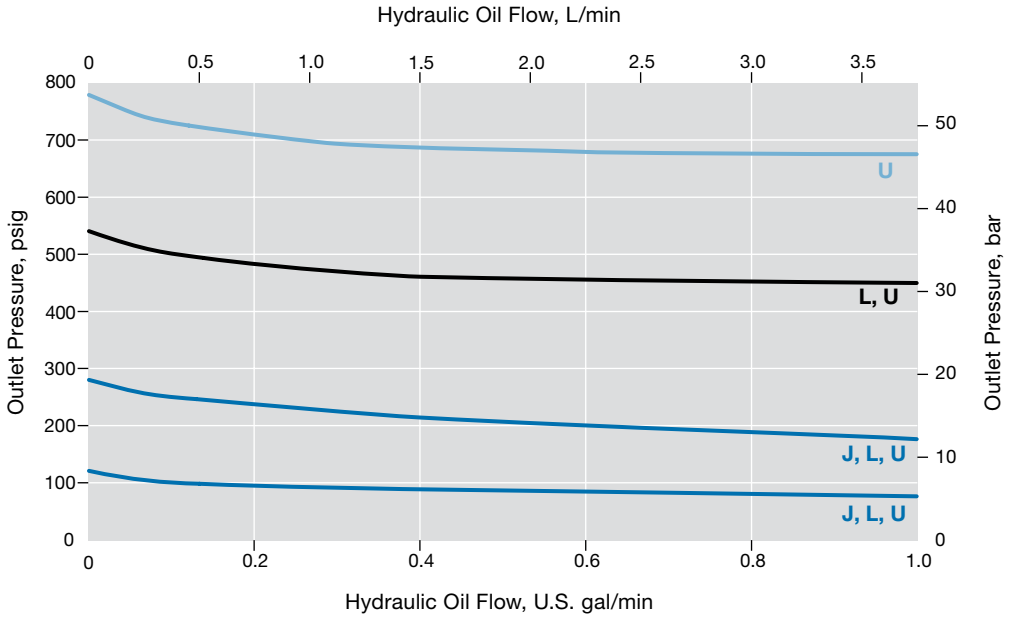
Pressure Control Range

- 0 to 250 psig (0 to 17.5 bar)
- 0 to 500 psig (0 to 34.4 bar)
- 0 to 750 psig (0 to 51.6 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **U** 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

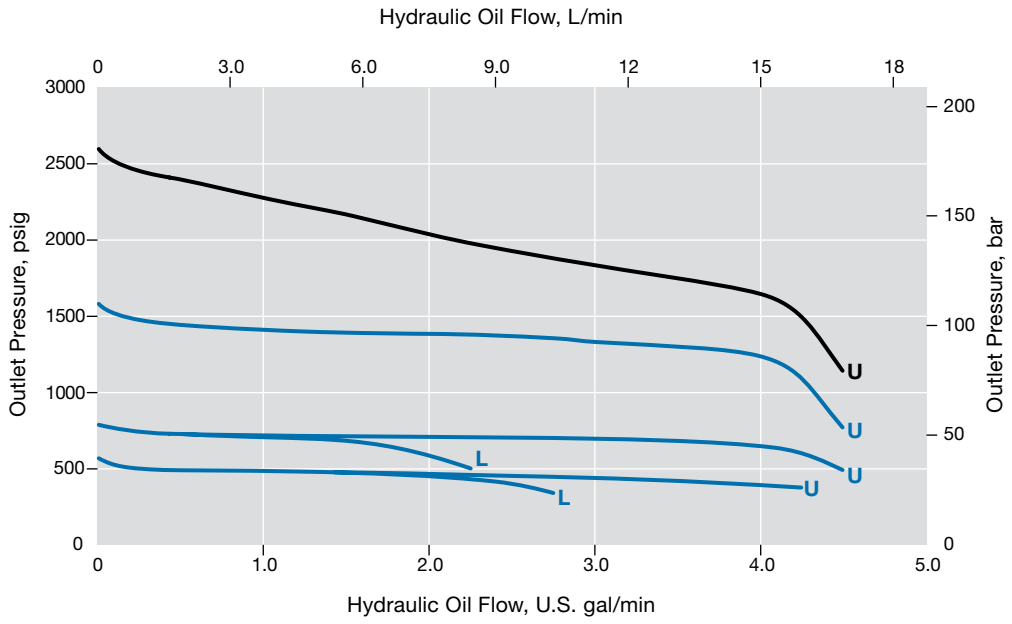
Flow Coefficient 0.06, Pressure Control Ranges 0 to 1500 psig (0 to 103 bar) and 0 to 2500 psig (0 to 172 bar)

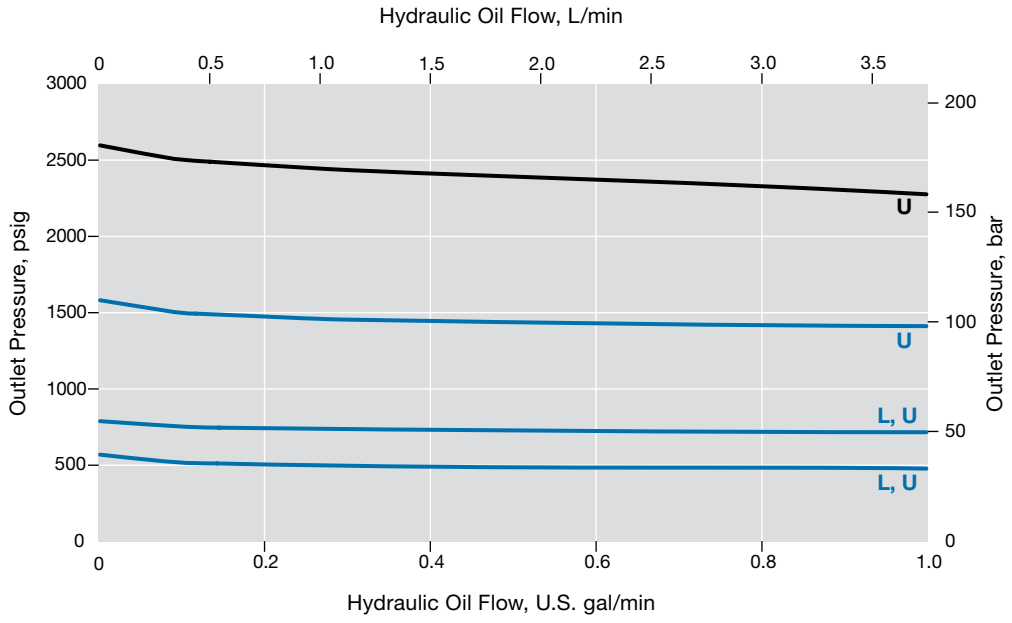
Pressure Control Range

- 0 to 1500 psig (0 to 103 bar)
- 0 to 2500 psig (0 to 172 bar)

Inlet Pressure

- **L** 1000 psig (68.9 bar)
- **U** 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Ranges 0 to 3600 psig (0 to 248 bar) and 0 to 6000 psig (0 to 413 bar)

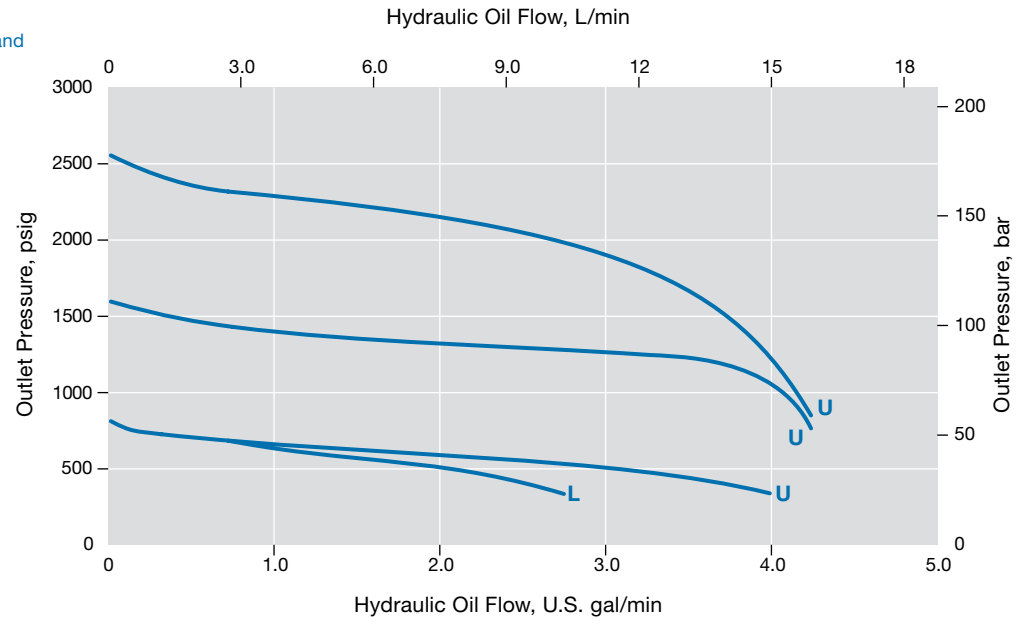
Pressure Control Range

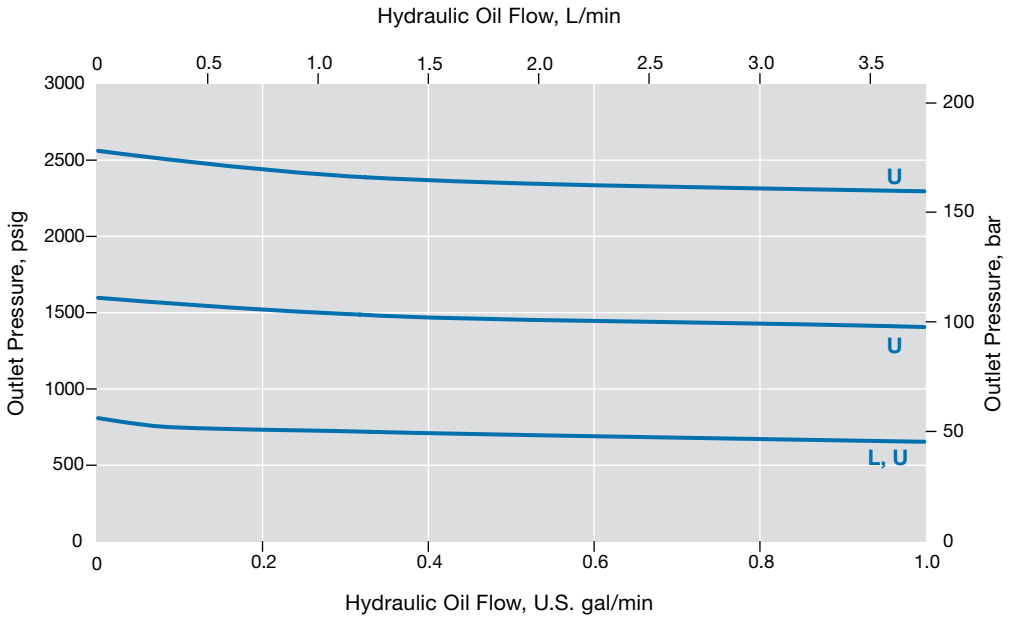
0 to 3600 psig (0 to 248 bar) and 0 to 6000 psig (0 to 413 bar)

Inlet Pressure

L 1000 psig (68.9 bar)

U 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.06, Pressure Control Range 0 to 10 000 psig (0 to 689 bar)

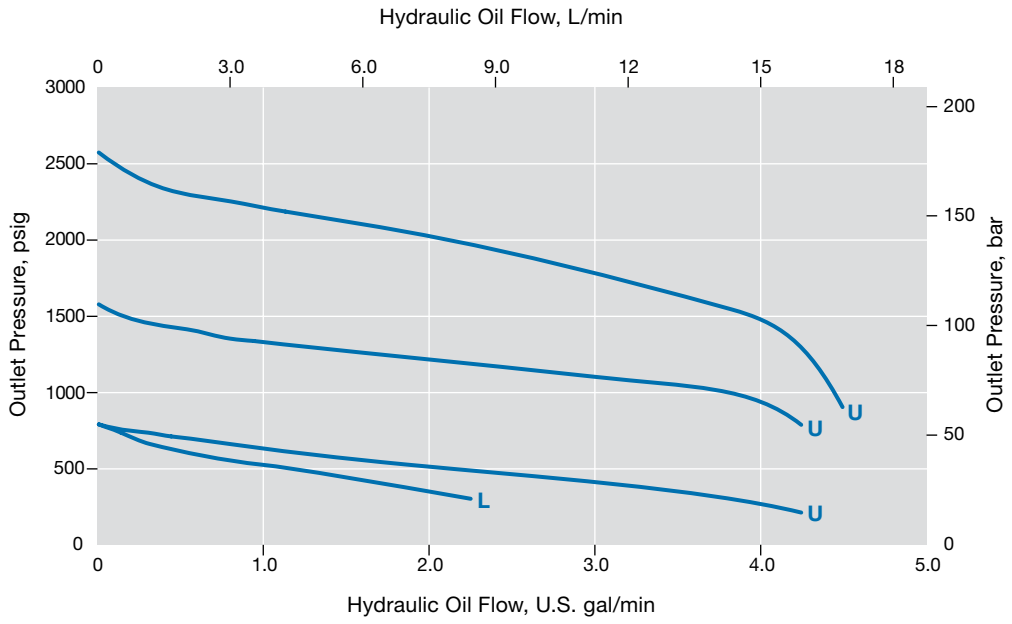
Pressure Control Range

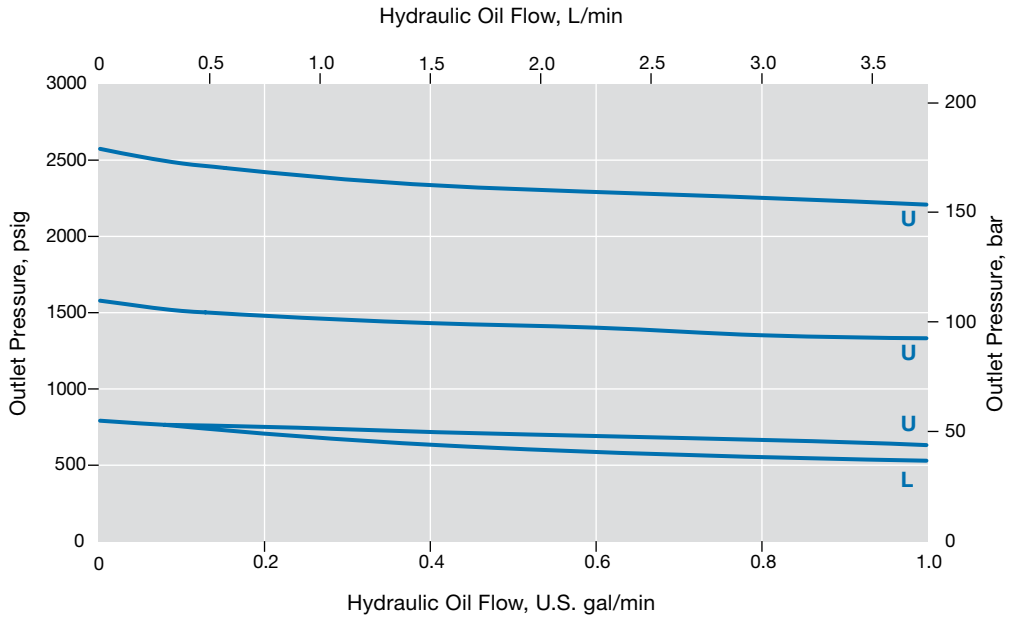
0 to 10 000 psig (0 to 689 bar)

Inlet Pressure

L 1000 psig (68.9 bar)

U 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

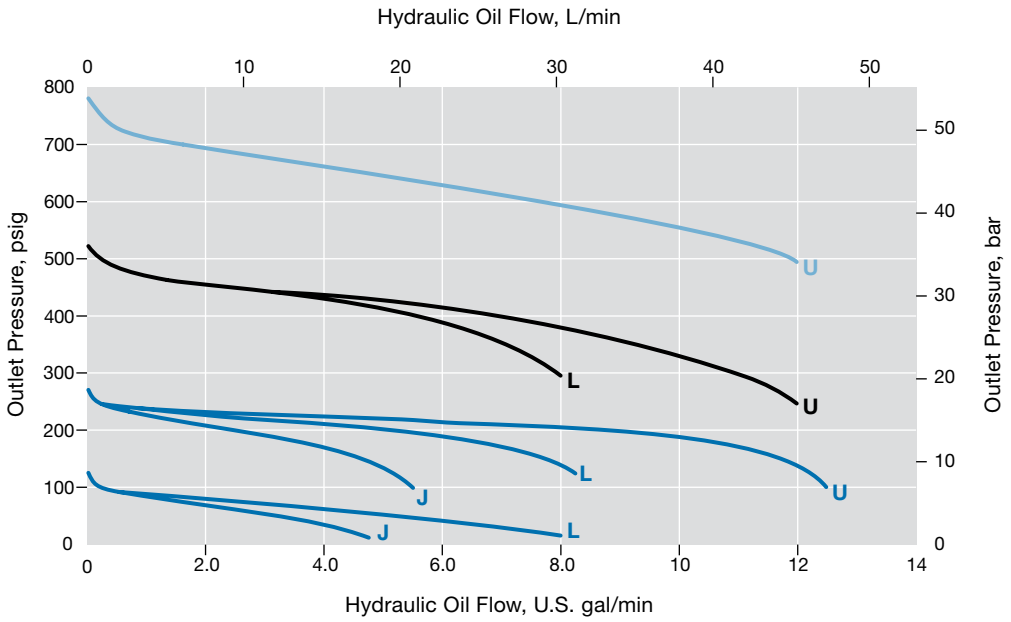
Flow Coefficient 0.25, Pressure Control Ranges 0 to 250 psig (0 to 17.5 bar), 0 to 500 psig (0 to 34.4 bar), and 0 to 750 psig (0 to 51.6 bar)

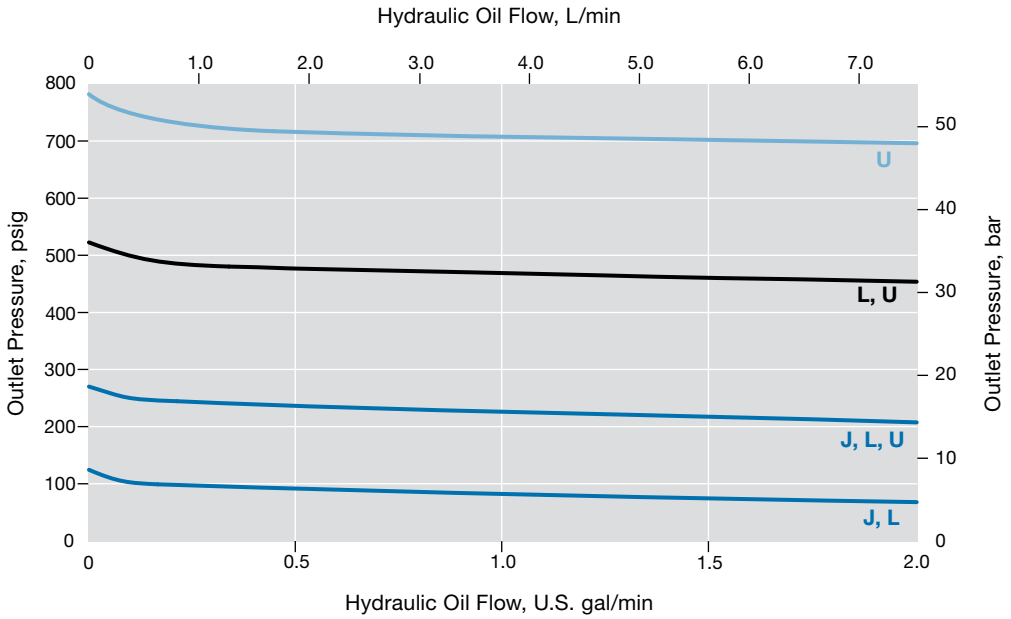
Pressure Control Range

- 0 to 250 psig (0 to 17.5 bar)
- 0 to 500 psig (0 to 34.4 bar)
- 0 to 750 psig (0 to 51.6 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **U** 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

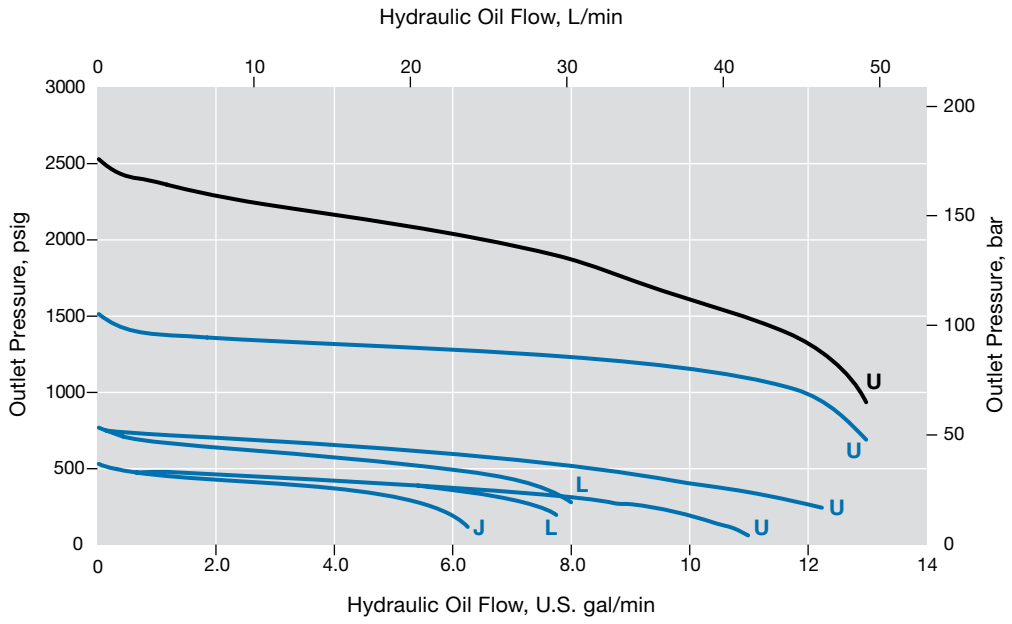
Flow Coefficient 0.25, Pressure Control Ranges 0 to 1500 psig (0 to 103 bar) and 0 to 2500 psig (0 to 172 bar)

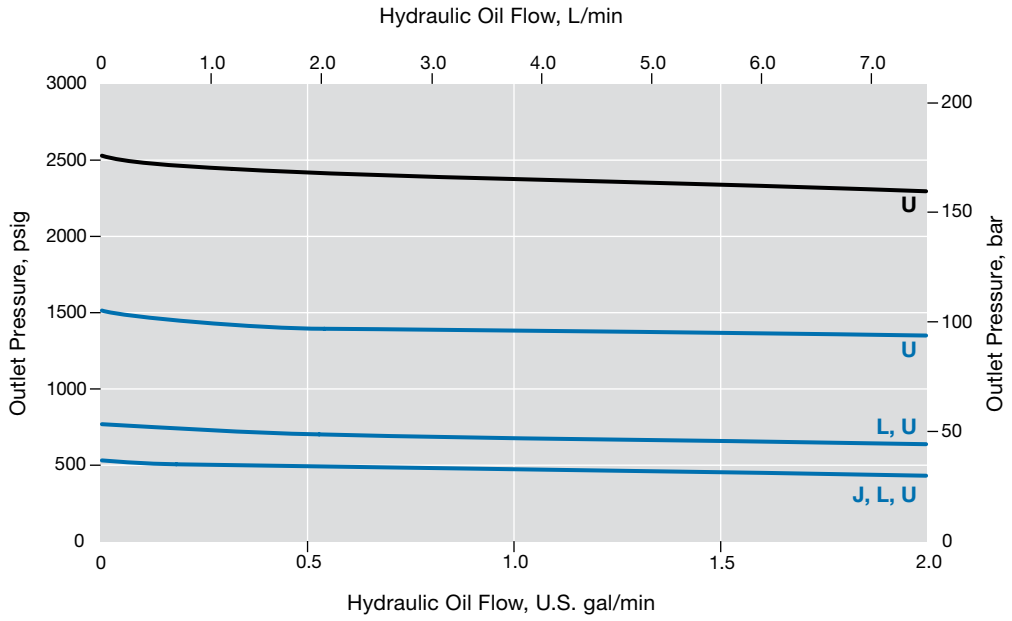
Pressure Control Range

- 0 to 1500 psig (0 to 103 bar)
- 0 to 2500 psig (0 to 172 bar)

Inlet Pressure

- **J** 500 psig (34.4 bar)
- **L** 1000 psig (68.9 bar)
- **U** 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.25, Pressure Control Ranges 0 to 3600 psig (0 to 248 bar) and 0 to 6000 psig (0 to 413 bar)

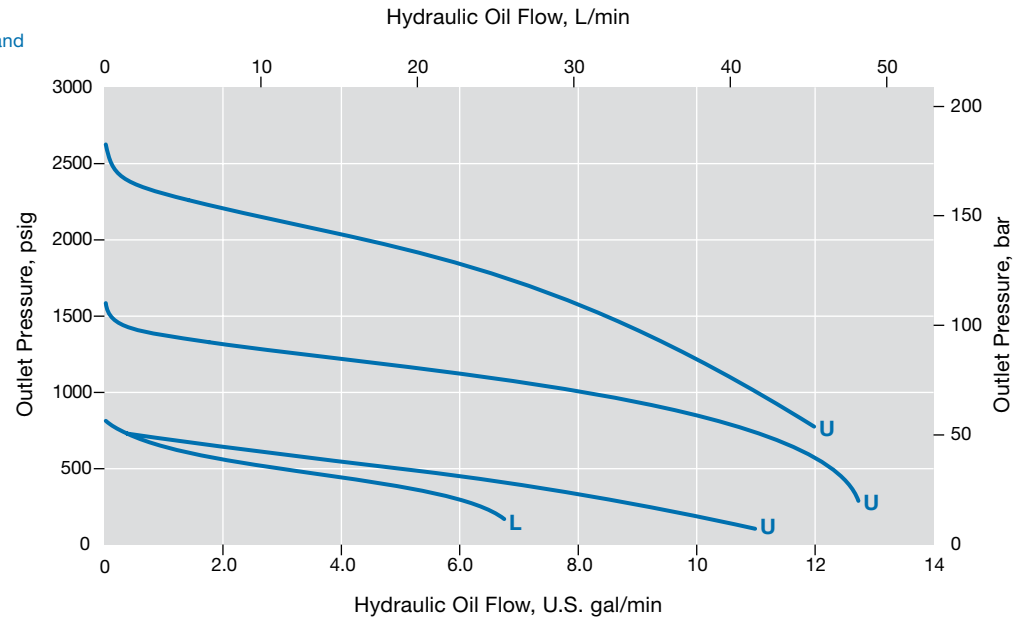
Pressure Control Range

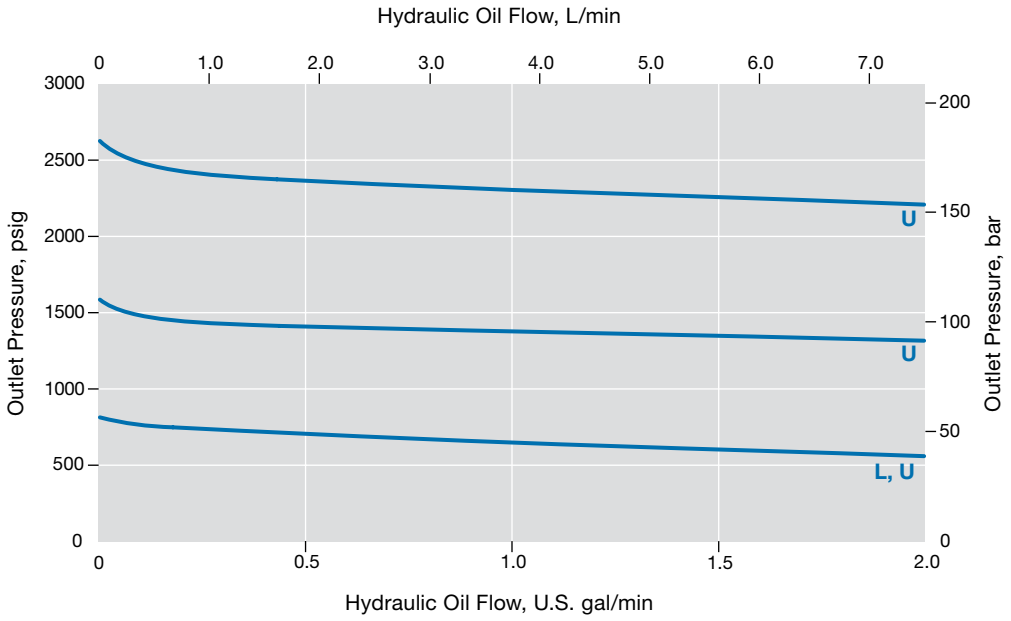
0 to 3600 psig (0 to 248 bar) and 0 to 6000 psig (0 to 413 bar)

Inlet Pressure

L 1000 psig (68.9 bar)

U 2500 psig (172 bar)





KHR Series High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators Liquid Flow

Flow Curves

The flow curves assume an initial set flow rate of 0.1 U.S. gal/min (3.78 L/min) and an initial temperature of 70°F (20°C).

Flow Coefficient 0.25, Pressure Control Range 0 to 10 000 psig (0 to 689 bar)

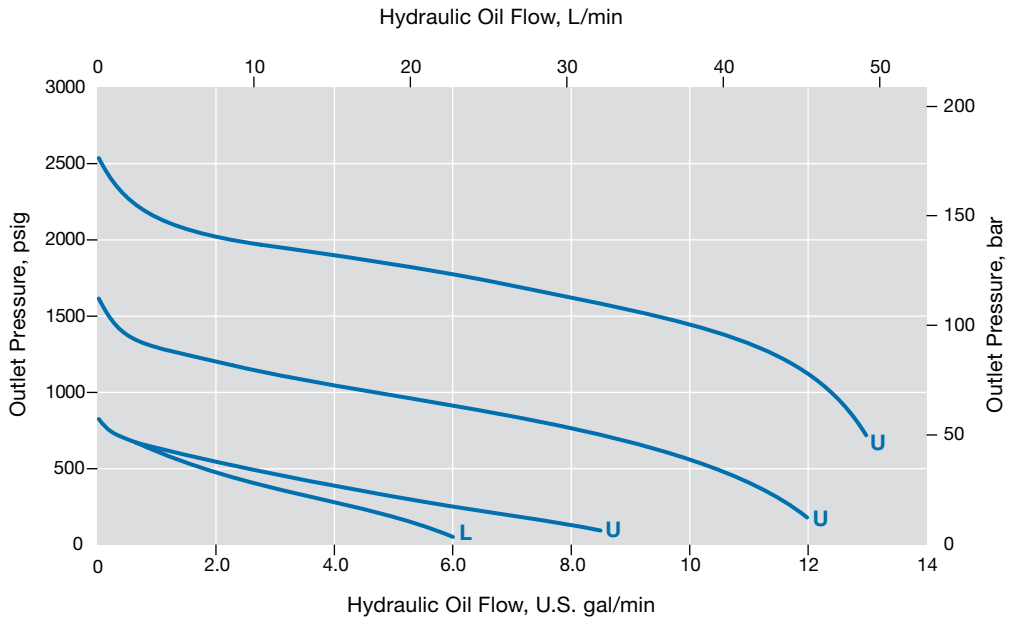
Pressure Control Range

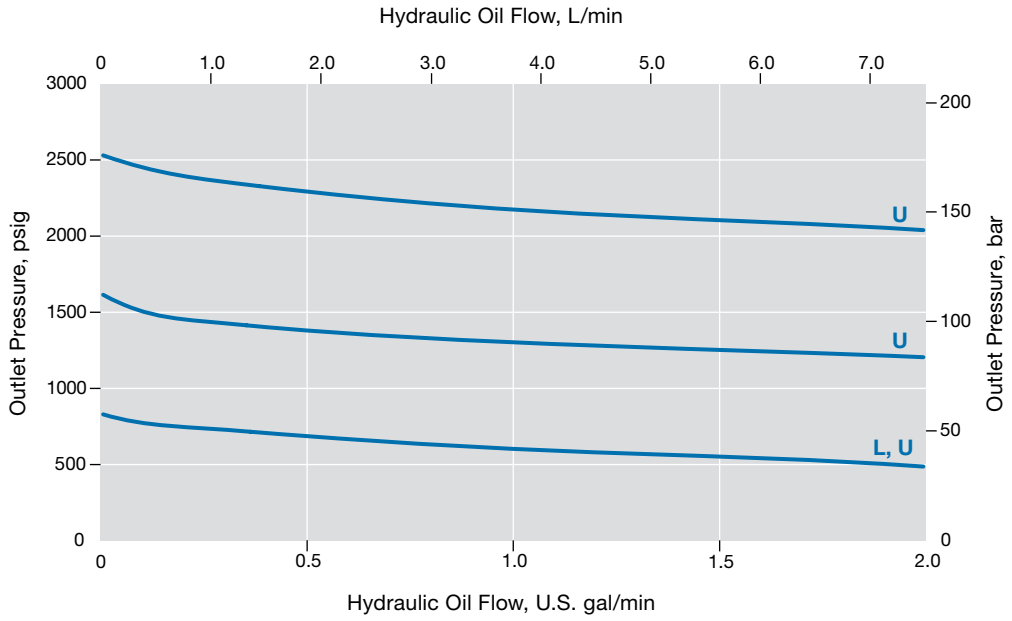
0 to 10 000 psig (0 to 689 bar)

Inlet Pressure

L 1000 psig (68.9 bar)

U 2500 psig (172 bar)





Safe Product Selection
When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

Caution: Do not mix or interchange parts with those of other manufacturers.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

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