Cylinder Pressure Regulators

Line Pressure Regulators





Point-of-use Panels



Pressure Control Panels



Purge Assemblies







Gas Control Equipment





Contents

| General Introduction | A-03 |
|---|------|
| Cylinder Pressure Regulators | |
| FCR-1 Series General Diaphragm Regulators | A-08 |
| FCR-1S Series Sensitive Diaphragm Regulators | A-11 |
| FCR-2 Series High Pressure Piston Regulators | A-14 |
| FCR-1D Series Dual-stage Diaphragm Regulators | A-17 |
| Line Pressure Regulators | |
| FLR-1 Series Compact Diaphragm Regulators | A-20 |
| FLR-2 Series Piston Regulators | A-23 |
| FLR-3 Series Medium Flow Diaphragm Regulators | A-26 |
| FLR-5 Series High Flow Diaphragm Regulators | A-29 |
| FBR-1 Series Miniature Piston Regulators | A-32 |
| HPR-10 Series High Pressure Piston Regulator | A-35 |
| HPL-06 Series High Pressure High Flow Regulators | A-38 |
| Pressure Control Panels | |
| FSR-1 Series Pressure Control Panels for Single Cylinder | A-41 |
| FSR-2 Series High Pressure Control Panels for Single Cylinder | A-44 |
| Changeover Systems | |
| FDR-1 Series Manual Changeover System (up to 500 psig) | A-47 |
| FDR-2 Series Manual Changeover System (up to 2500 psig) | A-50 |
| FDR-1L Series Automatic Changeover System without Line Pressure Regulator | A-53 |
| FDR-1T Series Automatic Changeover System with Line Pressure Regulator | A-57 |
| Point-of-use Panels | |
| FPR-1 Series Compact Regulators for Low Pressure | A-61 |
| FPR-1S Series Sensitive Regulators for Low Pressure | A-64 |
| Back Pressure Reglators | |
| BPR-1 Series Back Pressure Diaphragm Regulators | A-67 |
| BPR-2 Series Back Pressure Piston Regulators | A-70 |
| BPR-3 Series Back Pressure Piston Regulators | A-74 |

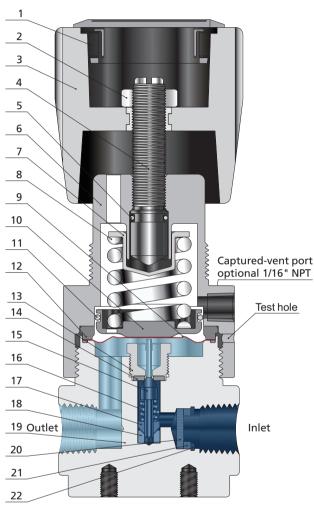


General Introduction

Typical Construction

Diaphragm Regulators

A pressure reducing regulator is positioned where the high pressure of a medium needs to be reduced and maintained to a lower and stable level. By turning the adjustment handle, the tension of range spring would be changed so as to control the outlet pressure of the regulator.



| | Component | Material/Specification | | | | | | | |
|----|-----------------|----------------------------|--|--|--|--|--|--|--|
| 1 | Hole Plug | ABS | | | | | | | |
| 2 | Stem Nut | C36000/ASTM B16 | | | | | | | |
| 3 | Knob Handle | ABS | | | | | | | |
| 4 | Stem | C36000/ASTM B16 | | | | | | | |
| 5 | O-ring | Buna-N | | | | | | | |
| 6 | Bonnet | 304 SS/ASTM A479 or Brass | | | | | | | |
| 7 | Spring Button | 304 SS/ASTM A276 | | | | | | | |
| 8 | Range Spring | Alloy | | | | | | | |
| 9 | Diaphragm | Hastelloy | | | | | | | |
| 10 | Spring Plate | Aluminium alloy | | | | | | | |
| 11 | O-ring | Buna-N | | | | | | | |
| 12 | Seal Ring | 304 SS/ASTM A479 | | | | | | | |
| 13 | Seat Retainer | 316L SS/ASTM A276 | | | | | | | |
| 14 | Seat | PCTFE/ASTM D1430 | | | | | | | |
| 15 | Lift Poppet | 316L SS/ASTM A276 | | | | | | | |
| 16 | Poppet Spring | Alloy X-750 | | | | | | | |
| 17 | Poppet Damper | PTFE/ASTM D1710 | | | | | | | |
| 18 | Friction Sleeve | 316L SS/ASTM A276 | | | | | | | |
| 19 | Body | 316L SS/ASTM A479 or Brass | | | | | | | |
| 20 | Filter | 316L SS | | | | | | | |
| 21 | Filter Ring | PTFE/ASTM D1710 | | | | | | | |
| 22 | Retaining Ring | 316L SS | | | | | | | |

Features

- Convoluted diaphragm to provide accurate pressure adjustment
- O Spring loaded
- 316L SS filter installed at inlet
- Some regulators are fitted with captured-vent, such as FCR-1S, FLR-3 and FLR-5 series and self-venting FCR-2 and FLR-2 series
- Users can connect the captured vent port so that the media can be contained or redirected if self-vented or the diaphragm accidentally breaks
- Optional sealing material for different gases and purity class
- Hastelloy diaphragm to provide higher burst pressure and corrosion resistance
- O Low leak rates

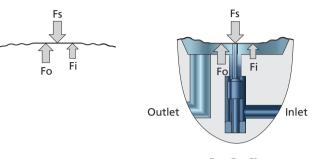
Internal: $\leq 1x10^{-7}$ mbar·l/s helium External: $\leq 1x10^{-9}$ mbar·l/s helium



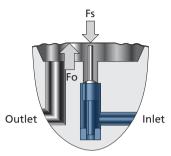
When the regulator is in operation, the inlet pressure (Fi) plus the out pressure (Fo) should be equal to the downward force on the diaphragm by the compressed spring (Fs), namely Fi+Fo=Fs to reach an equilibrium.

When the outlet pressure (Fo) is lower than the set pressure, the poppet would be pushed away from the seat by the excess downward force, allowing more high pressure gas to enter the chamber so as to increase the outlet pressure.

As soon as the outlet pressure (Fo) exceeds the set pressure, the excess upstream force shall lift the poppet back to the seat to limit high pressure gas entering, so as to reduce the outlet pressure.





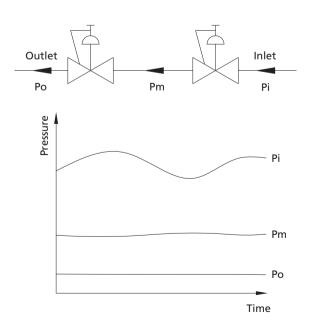


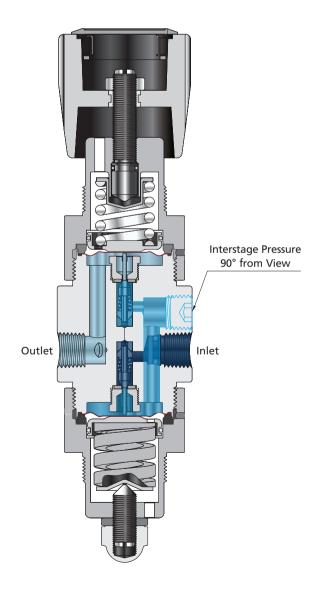
Fs < Fo+Fi (in this figure, inlet pressure doesn't act on diaphragm)

Dual-stage Diaphragm Regulators

When the inlet pressure (Pi) decreases, the outlet pressure (Po) shall increase. Even though the increase may not be significant, the dual-stage regulator would be a better option when more stable pressure required, and the upstream pressure fluctuates violently.

The function of a dual-stage regulator is similar to that of two single-stage regulators in series. The 1st-stage regulator reduces the inlet pressure to an intermediate level for the 2nd-stage regulator to adjust to a constant output, which at the most extent ensures the stability of the outlet pressure.



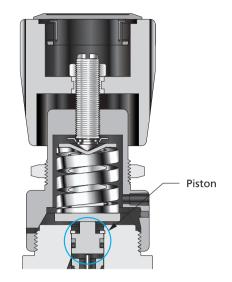




Piston Regulators

Although diaphragm regulators have many advantages such as precision, sealing effect, cleanliness and etc., in order to ensure sensitivity, the structural strength of the diaphragm regulators is low so as not being able to withstand high pressure. Therefore, it is recommended to utilize the piston regulators for high pressure applications.

A piston regulator has the same working principle as a diaphragm regulator. The key distinction is that the diaphragm is changed to a piston to satisfy the needs for high pressure applications. The inlet pressure of a piston regulator can reach 6000 psig. Its construction is simple and reliable with multiple options of O-rings to fulfill the various requirements of different media.



Series of Products

Cylinder Pressure Regulators (FCR)

Cylinder pressure regulators are designed to reduce the pressure of the cylinders to a lower level. The regulator is connected to the cylinder normally through a cylinder connection.

Line Pressure Regulators (FLR)

Line pressure regulators are used to further control the pressure in line.

Pressure Control Panels (FSR)

Pressure control panels are installed in the gas storage area (cylinder stock room or gas cabinet). They reduce cylinder or tank pressure to the desired line pressure for in-house use. Via the subsequent piping system, the gas will be guided to the point-of-use.

Changeover Systems (FDR)

There are manual changeover system and automatic changeover system.

Manual changeover system can connect with several independent gas sources at a time. When one gas source is depleted, it could be switched to another source quickly through a shutoff valve.

Automatic changeover system is installed onto gas pipelines which need continuous gas supply. It can connect with two independent gas sources at a time. When the gas source from one side is depleted, it can automatically switch to the gas source from the other side. Subsequently, replacing the exhausted gas source.

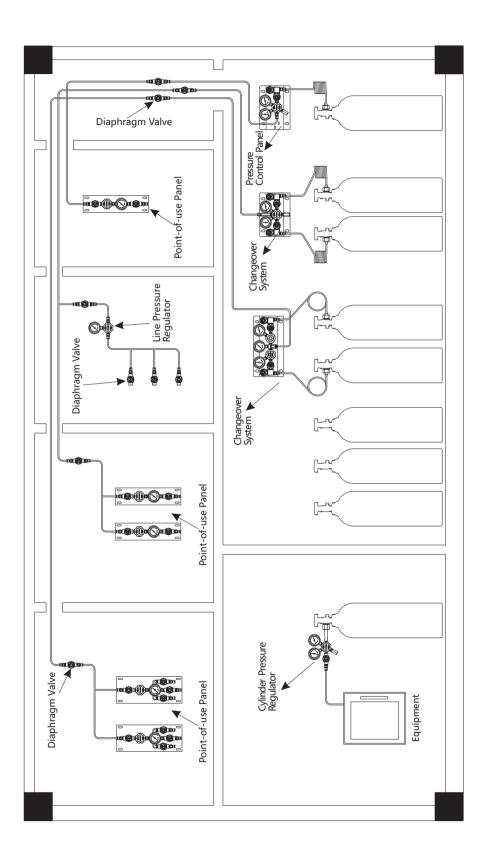
Point-of-use Panels (FPR)

Its function is to most precisely regulate the pressure and shut off at the point-of-use.



Products Practical Application

Gas Supply System





Selection Guide

| Series | | | | | | | | | | | | | | | | | | |
|------------------------------|---------------|-------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|--------|-------|----------|
| | | FCR-1 | FCR-15 | FCR-2 | FCR-1D | FLR-1 | FLR-2 | FLR-3 | FSR-1 | FSR-2 | FDR-1 | FDR-2 | FDR-1L | FDR-1T | FPR-1 | FPR-15 | BPR-1 | BPR-2 |
| Material | Brass | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SS | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | Hastelloy | √ | | | √ | √ | | | | | | | | | √ | | | |
| Pressure Reduction Design | Diaphragm | √ | √ | | √ | √ | | √ | √ | | √ | | √ | √ | √ | √ | √ | |
| | Piston | | | √ | | | √ | | | √ | | √ | | | | | | √ |
| | Preset | | | | | | | | | | | | √ | | | | √ | √ |
| Pressure uction De | Adjustable | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Redi | Single-Stage | √ | √ | √ | | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | | |
| | Dual-Stage | | | | √ | | | | | | | | | √ | | | | |
| Regulator Type | Cylinder | √ | √ | √ | √ | | | | | | | | | | | | | |
| | In-Line | | | | | √ | √ | √ | | | | | | | | | | |
| | Control Panel | | | | | | | | √ | √ | √ | √ | √ | √ | | | | |
| | Point-of-use | | | | | | | | | | | | | | √ | √ | | |
| | Back Pressure | | | | | | | | | | | | | | | | √ | √ |
| | 6000 psig | | | √ | | | | | | | | | | | | | | |
| Inlet e | 4500 psig | √ | √ | √ | √ | | √ | | √ | √ | √ | √ | √ | √ | | | | |
| Maximum Inlet Pressure | 3000 psig | √ | √ | | √ | | √ | √ | √ | √ | √ | √ | √ | √ | | | | |
| | 1500 psig | | | | | √ | | | | | | | | | √ | √ | | |
| | 500 psig | | | | | √ | | √ | | | | | | | | | | |
| | 0~25 psig | √ | √ | | √ | √ | | √ | √ | | √ | | | √ | √ | √ | √ | |
| | 0~50 psig | √ | √ | | √ | √ | | √ | √ | | √ | | | √ | √ | √ | √ | |
| Control Pressure Range | 0~100 psig | √ | √ | | √ | √ | | √ | √ | | √ | | | √ | √ | √ | √ | |
| | 0~150 psig | | √ | | √ | | | √ | | | | | | √ | | √ | | |
| | 0~200 psig | | √ | | | | | √ | | | | | | | | √ | | |
| | 0~250 psig | √ | | | √ | √ | √ | | √ | | √ | | See | | √ | | √ | |
| | 0~300 psig | | | | | | | | | | | | A-50 | | | | | √ |
| | 0~500 psig | √ | | | | | √ | | √ | | √ | | | | √ | | | √ |
| | 0~750 psig | | | √ | | | √ | | | √ | | √ | | | | | | |
| | 0~1000 psig | | | | | | √ | | | | | | | | | | | √ |
| | 0~1500 psig | | | √ | | | | | | √ | | √ | | | | | | |
| | 0~2500 psig | | | √ | | | | | | √ | | √ | | | | | | |
| Page No. | | A-08 | A-11 | A-14 | A-17 | A-20 | A-23 | A-26 | A-38 | A-41 | A-44 | A-47 | A-50 | A-54 | A-58 | A-61 | A-64 | A-68 |



Cylinder Pressure Regulators

FCR-1 Series General Diaphragm Regulators

Features

- Metal-to-metal seal to minimize external leak
- Convoluted diaphragm design to improve regulation precision and cycle life
- O Applicable to corrosive or toxic gases
- With special cleaning and packaging, applicable to oxygen-enriched environments
- Adjustable relief pressure
- O 20 µm filter installed at inlet

FITOK

Model: FCR-16L-30-100-C330-B-B-00-R-P

Technical Data

- Single-stage regulator
- O Maximum inlet pressure: 3000 or 4500 psig
- Outlet pressure range: 0~25, 0~50, 0~100, 0~250 or 0~500 psig
- Material of the internal components:

Seat: PCTFE

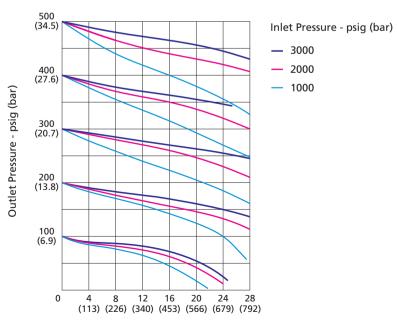
Diaphragm: Hastelloy

Filter: 316L

- Temperature: -40°F~+165°F (-40°C~+74°C)
- O Leak rates:

Internal: $\leq 1x10^{-7}$ mbar·l/s helium External: $\leq 1x10^{-9}$ mbar·l/s helium

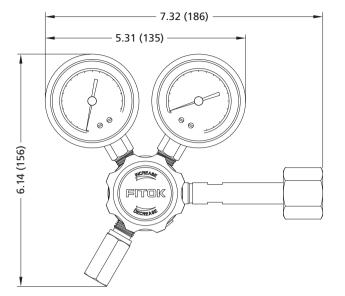
- Flow coefficient (Cv): 0.06
- \bigcirc Weight (regulator only): \approx 1.98 lbs (0.9 kg)
- O Body ports: 1/4" female NPT for inlet, outlet, gauge and relief valve

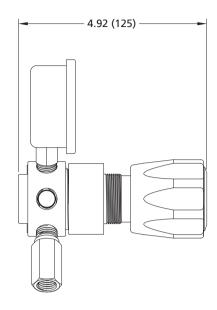


Flow Rate - SCFM (SLPM) Nitrogen

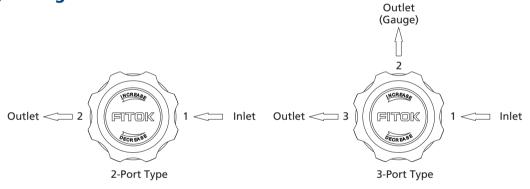


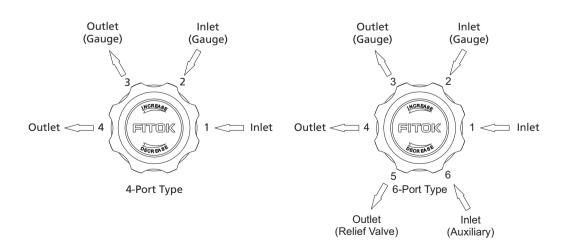
Dimensions, in inches (millimeters), are for reference only.





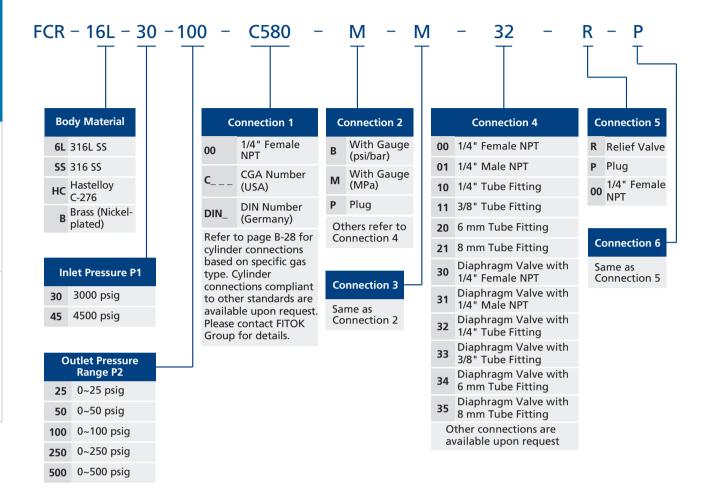
Porting Configurations







Part Number Description



Note: Most configurations are available.

Examples of part number:

a. 2-port type (1 in, 1 out): FCR-16L-45-100-C580-00 b. 3-port type (1 in, 2 out): FCR-1SS-30-500-C330-B-00

c. 4-port type (2 in, 2 out): FCR-1B-45-250-00-B-B-34



Cylinder Pressure Regulators

FCR-1S Series Sensitive Diaphragm Regulators

Features

- Large diameter convoluted diaphragm to increase pressure sensitivity and minimize pressure drop
- O Fitted with captured vent as standard
- O 316L SS and Brass available for valve
- With special cleaning and packaging, applicable to oxygen-enriched environments
- O Die spring for stable outlet pressure
- 20 µm filter installed at inlet



Model: FCR-1S6L-30-50-C580-B-B-00-R-P

Technical Data

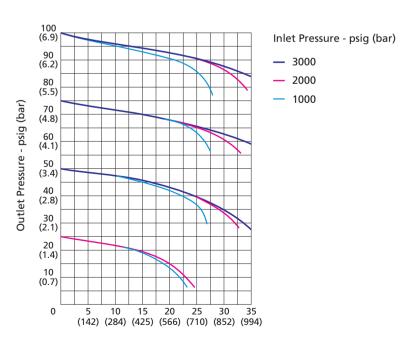
- O Single-stage regulator
- Maximum inlet pressure: 3000 or 4500 psig
- Outlet pressure range: 0~25, 0~50, 0~100, 0~150 or 0~200 psig
- Material of the internal components:

Seat: PCTFE Diaphragm: 316L Filter: 316L

- Temperature: -40°F~+165°F (-40°C~+74°C)
- Calculate Leak rates:

Internal: $\leq 1x10^{-7}$ mbar·l/s helium External: $\leq 1x10^{-9}$ mbar·l/s helium

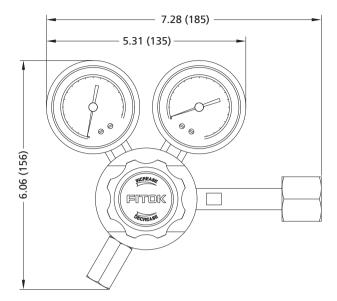
- O Flow coefficient (Cv): 0.06
- Weight (regulator only): ≈2.87 lbs (1.3 kg)
- O Body ports: 1/4" female NPT for inlet, outlet, gauge and relief valve

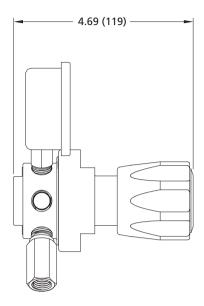


Flow Rate - SCFM (SLPM) Nitrogen

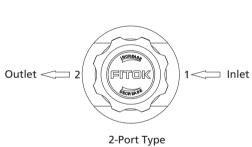


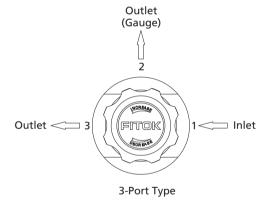
Dimensions, in inches (millimeters), are for reference only.

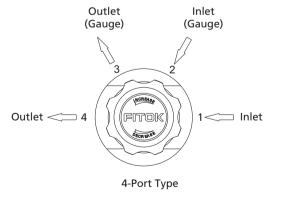


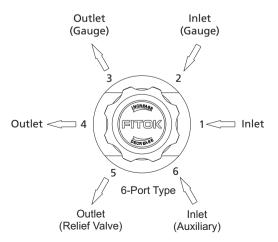


Porting Configurations



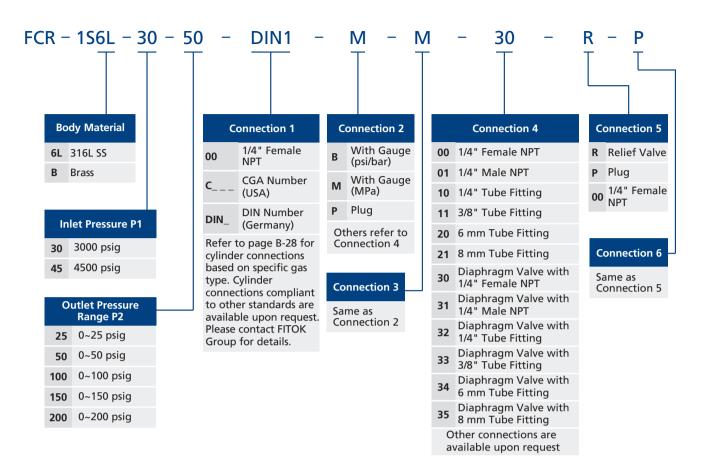








Part Number Description



Note: Most configurations are available.

Examples of part number:

a. 2-port type (1 in, 1 out): FCR-1S6L-45-25-C580-00

b. 3-port type (1 in, 2 out): FCR-1SB-30-150-C330-B-00

c. 4-port type (2 in, 2 out): FCR-1SB-45-200-00-00-00

Cylinder Pressure Regulators

FCR-2 Series High Pressure Piston Regulators

Features

- O For high pressure applications
- O Robust piston-sensed design to ensure safety and reliability
- ◎ 316L SS or Nickel-plated Brass body optional
- O For non-corrosive gases (due to seal limit)
- With special cleaning and packaging, applicable to oxygen-enriched environments
- O Venting model available
- O 20 µm filter installed at inlet

Technical Data

- O Single-stage regulator
- O Maximum inlet pressure: 4500 or 6000 psig
- Outlet pressure range: 0~750, 0~1500 or 0~2500 psig
- Material of the internal components:

Main Seat: PCTFE (PEEK for Venting Model)

Vent Seat: PCTFE Piston: 316L

O-ring: Viton or Kalrez

Filter: 316L

- Temperature: -15°F~+165°F (-26°C~+74°C)
- Calculate Leak rates:

Internal: Bubble-tight
External: Bubble-tight

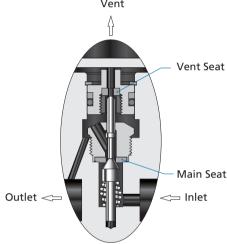
Flow coefficient (Cv):

Without vent: 0.06

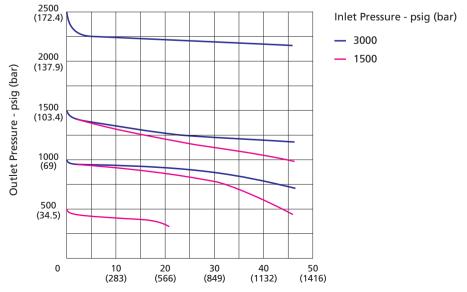
Vent: 0.1

- \bigcirc Weight (regulator only): \approx 1.98 lbs (0.9 kg)
- O Body ports: 1/4" female NPT for inlet, outlet and gauge





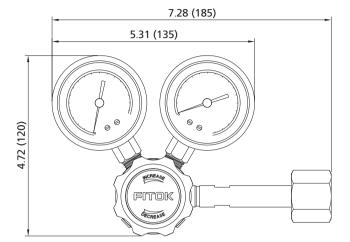
Construction Drawing with Venting Model

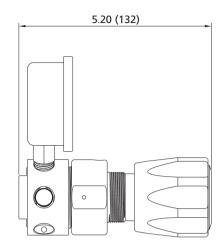


Flow Rate - SCFM (SLPM) Nitrogen



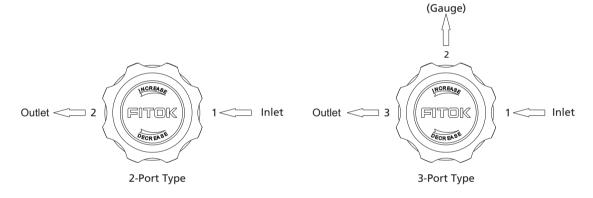
Dimensions, in inches (millimeters), are for reference only.

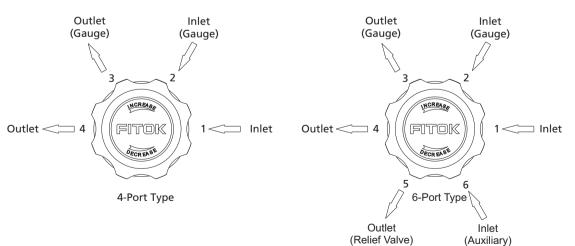




Outlet

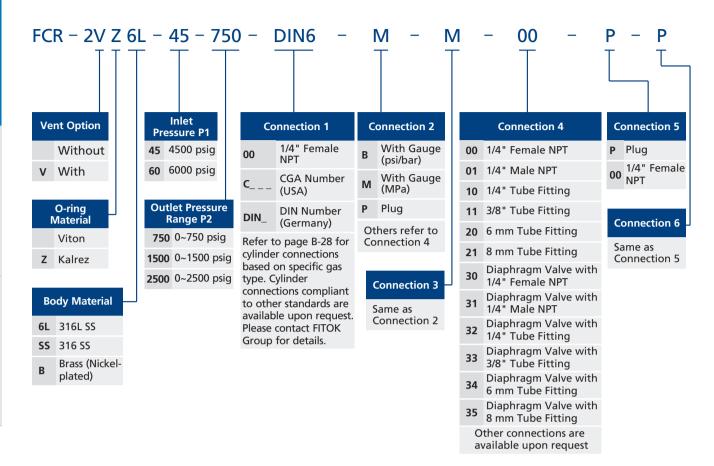
Porting Configurations







Part Number Description



Note: Most configurations are available.

Examples of part number:

a. 2-port type (1 in, 1 out): FCR-26L-45-1500-C580-00

b. 3-port type (1 in, 2 out): FCR-2VB-45-750-C660-00-00

c. 4-port type (2 in, 2 out): FCR-2VZSS-60-2500-00-B-B-32



Cylinder Pressure Regulators

FCR-1D Series Dual-stage Diaphragm Regulators

Features

- O Compact design
- Dual-stage pressure reducing construction to provide accurate and stable pressure
- © 20 µm filter installed at inlet
- With special cleaning and packaging, applicable to oxygen-enriched environments



Model: FCR-1D6L-30-100-C660-B-B-00-R-P

Technical Data

- O Maximum inlet pressure: 3000 or 4500 psig
- 1st stage outlet pressure range: 480~500 psig2nd stage outlet pressure range: 0~25, 0~50, 0~100, 0~150, 0~250 psig
- Material of the internal components:

Seat: PCTFE

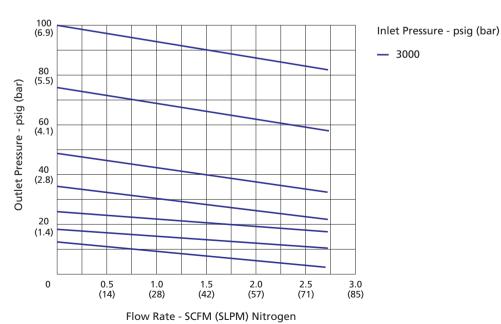
Diaphragm: Hastelloy

Filter: 316L

- Temperature: -40°F~+165°F (-40°C~+74°C)
- O Leak rates:

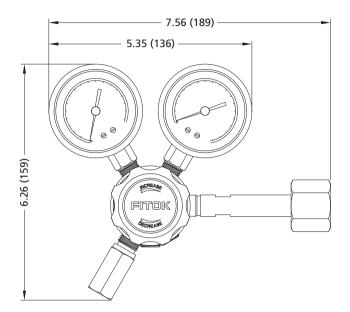
Internal: $\leq 1x10^{-7}$ mbar·l/s helium External: $\leq 1x10^{-9}$ mbar·l/s helium

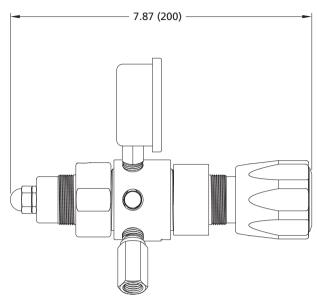
- O Flow coefficient (Cv): 0.05
- \bigcirc Weight (regulator only): \approx 3.3 lbs (1.5 kg)
- O Body ports: 1/4" female NPT for inlet, outlet, gauge and relief valve



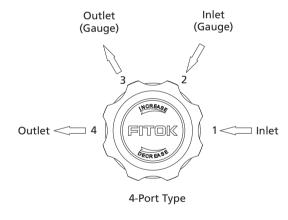


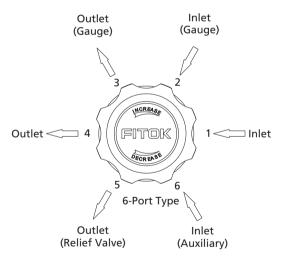
Dimensions, in inches (millimeters), are for reference only.



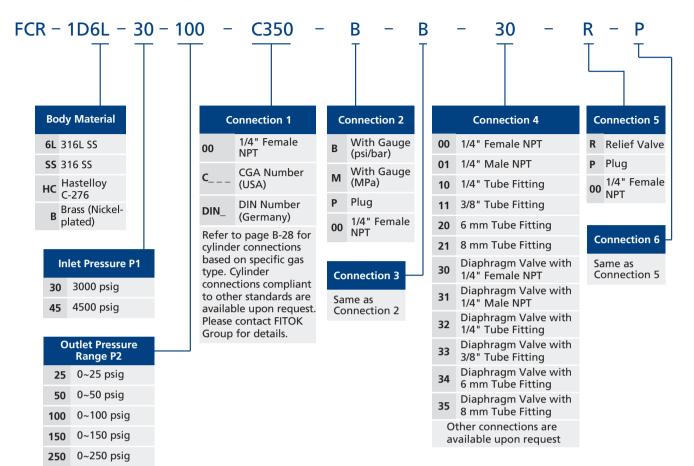


Porting Configurations





Part Number Description



Note: Most configurations are available. Examples of part number:

a. 4-port type (2 in, 2 out): FCR-1DB-45-150-DIN1-B-B-30

b. 6-port type (3 in, 3 out): FCR-1DSS-30-50-C580-B-B-00-R-P

Line Pressure Regulators

FLR-1 Series Compact Diaphragm Regulators

Features

- O Similar to FCR-1 Series Regulators with larger orifice to provide higher flow capacity
- Three porting configurations available
- 316L SS body for corrosive or toxic gases,
 Nickel-plated Brass body for non-corrosive gases
- With special cleaning and packaging, applicable to oxygen-enriched environments
- O Configuration with filter installed at inlet as standard
- O Panel mounted or installed with screw at the bottom

Technical Data

- Single-stage regulator
- O Maximum inlet pressure: 500 or 1500 psig
- Outlet pressure range: 0~25, 0~50, 0~100 or 0~250 psig
- Material of the internal components:

Seat: PCTFE

Diaphragm: Hastelloy

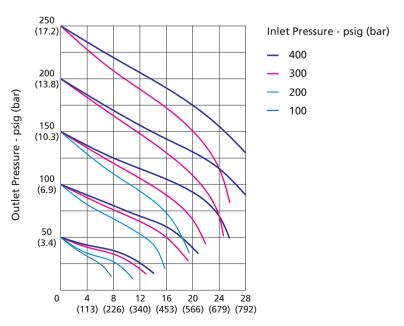
Filter: 316L

- Temperature: -40°F~+165°F (-40°C~+74°C)
- O Leak rates:

Internal: $\leq 1x10^{-7}$ mbar·l/s helium External: $\leq 1x10^{-9}$ mbar·l/s helium

- O Flow coefficient (Cv): 0.14
- \bigcirc Weight (regulator only): \approx 1.98 lbs (0.9 kg)
- O Body ports: 1/4" female NPT for inlet, outlet and gauge

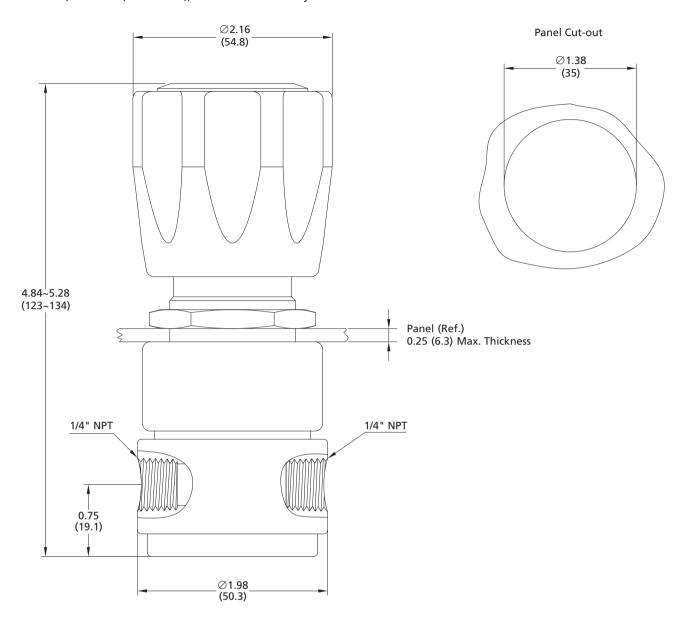
Model: FLR-16L-15-100-00-00-Z

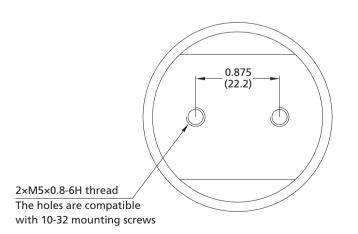


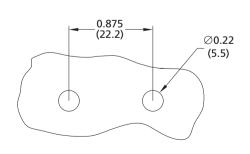
Flow Rate - SCFM (SLPM) Nitrogen



Dimensions, in inches (millimeters), are for reference only.



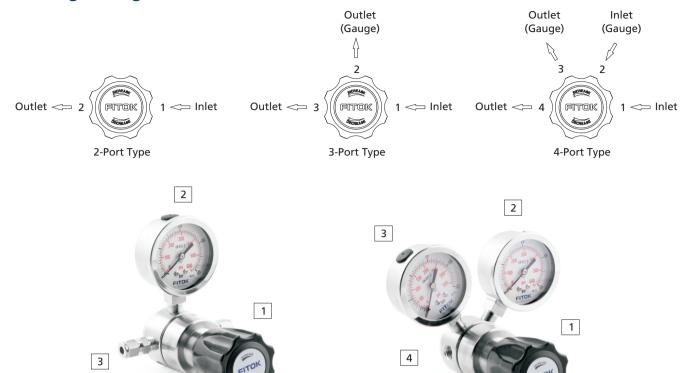




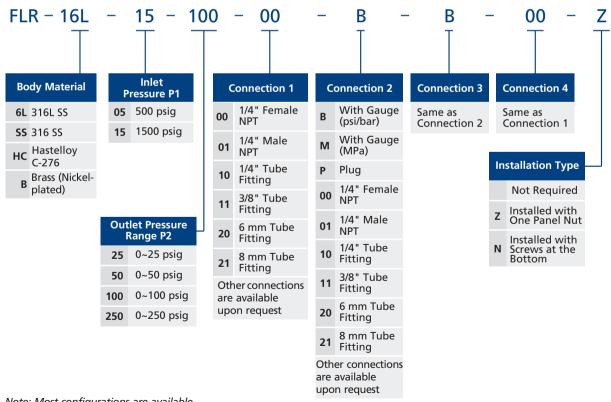
Bottom Panel Cut-outs



Porting Configurations



Part Number Description



Note: Most configurations are available.

Examples of part number:

a. 2-port type (1 in, 1 out): FLR-16L-15-25-00-00

b. 3-port type (1 in, 2 out): FLR-16L-05-100-00-B-00



Line Pressure Regulators

FLR-2 Series Piston Regulators

Features

- Applicable to non-corrosive gases or low-viscosity liquids
- Easy to assemble and disassemble, convenient replacement of springs with different output ranges
- O Robust piston-sensed design to provide safety and reliability
- With special cleaning and packaging, applicable to oxygen-enriched environments
- Three porting configurations available
- O Panel mounted or installed with screws at the bottom

Technical Data

- O Single-stage regulator
- Maximum inlet pressure: 3000 or 4500 psig
- Outlet pressure range: 0~250, 0~500, 0~750 or 0~1000 psig
- Material of the internal components:

Main Seat: PCTFE (PEEK for Venting Model)

Vent Seat: PCTFE Piston: 316L

O-ring: Viton or Kalrez

Filter: 316L

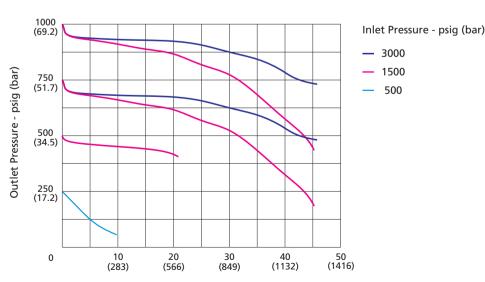
- Temperature: -15°F~+165°F (-26°C~+74°C)
- O Leak rates:

Internal: Bubble-tight
External: Bubble-tight

Flow coefficient (Cv):
Without vent: 0.06

Vent: 0.1

- Weight (regulator only): ≈1.98 lbs (0.9 kg)
- O Body ports: 1/4" female NPT for inlet, outlet and gauge



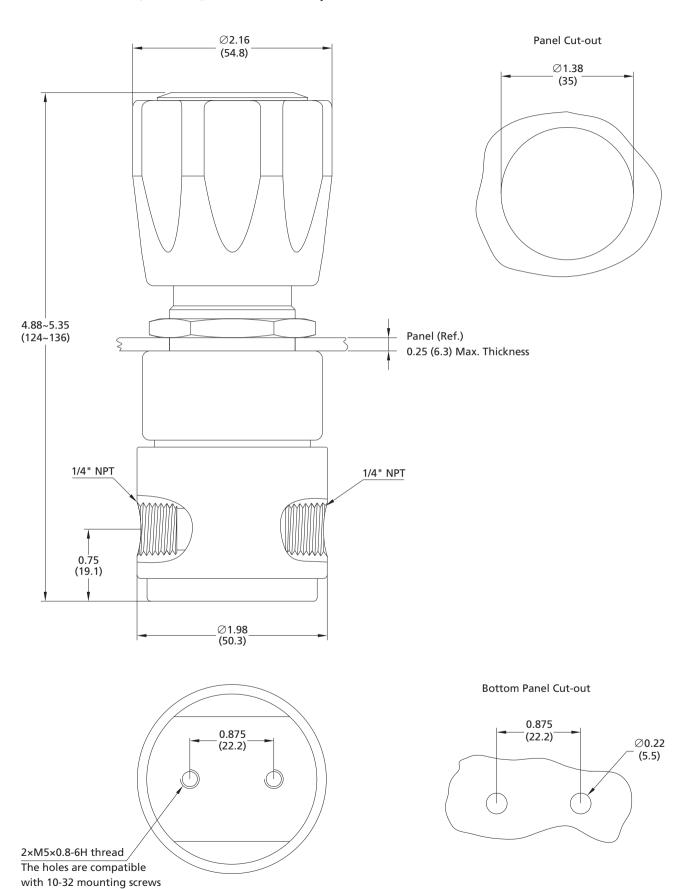




Model: FLR-2SS-45-1000-00-00-Z

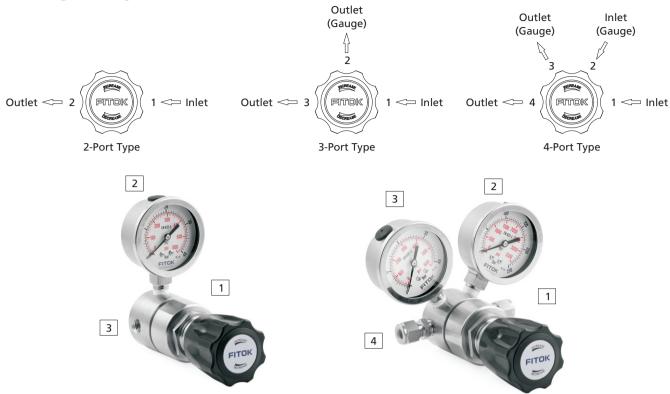


Dimensions, in inches (millimeters), are for reference only.

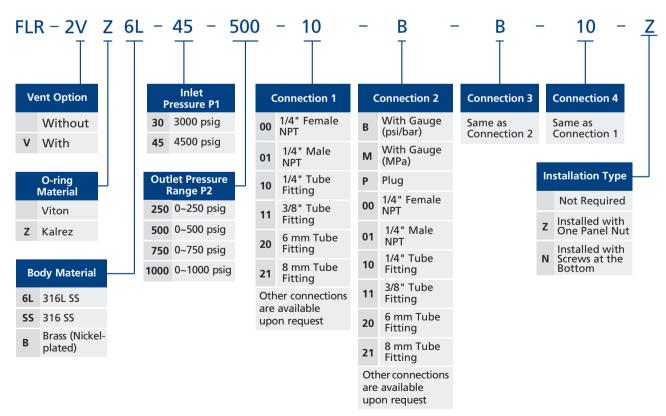




Porting Configurations



Part Number Description



Note: Most configurations are available. Examples of part number:

a. 2-port type (1 in, 1 out): FLR-26L-30-250-00-00

b. 3-port type (1 in, 2 out): ,FLR-2SS-45-1000-00-00



Line Pressure Regulators

FLR-3 Series Medium Flow Diaphragm Regulators

Features

- For high inlet pressure applications
- Balanced poppet
- With large orifice to minimize outlet pressure change when inlet pressure reduces
- Large diameter convoluted diaphragm to increase pressure sensitivity
- 316L SS body for corrosive or toxic gases, Brass body for non-corrosive gases
- With special cleaning and packaging, applicable to oxygen-enriched environments
- Three porting configurations available
- O Panel mounted or installed with screws at the bottom
- Fitted with captured vent as standard

Technical Data

- Single-stage regulator
- O Maximum inlet pressure: 500 or 3000 psig
- Outlet pressure range: 0~25, 0~50, 0~100, 0~150 or 0~200 psig
- Material of the internal components:

Seat: PCTFE

Diaphragm: Hastelloy

- Temperature: -40°F~+140°F (-40°C~+60°C)
- Calculate Leak rates:

Internal: Bubble-tight

External: ≤1x10⁻⁹ mbar·l/s helium

- O Flow coefficient (Cv): 1.0
- \bigcirc Weight (regulator only): \approx 3.53 lbs (1.6 kg)
- Body ports: 1/2" female NPT for inlet, outlet

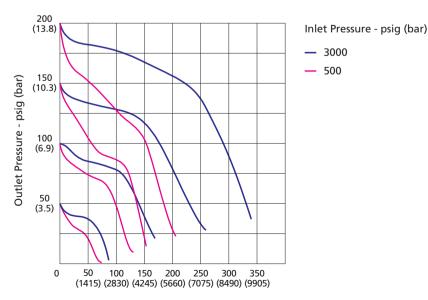
 1/4" female NPT for gauge

1/4" female NPT for gauge

Parmet.

Model: FLR-3SS-30-100-04-04-Z

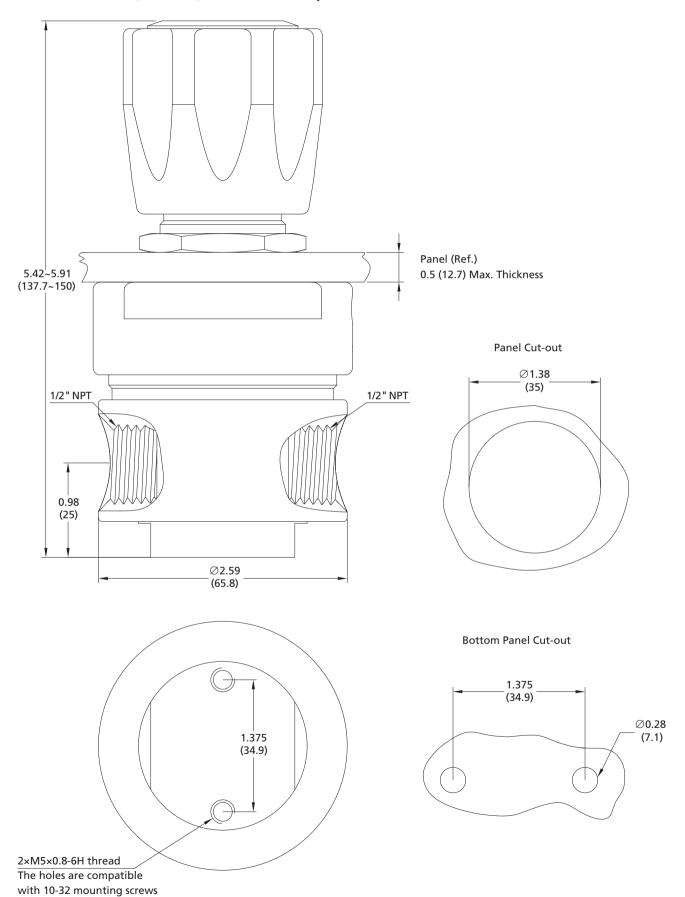
Typical Flow Chart



Flow Rate - SCFM (SLPM) Nitrogen

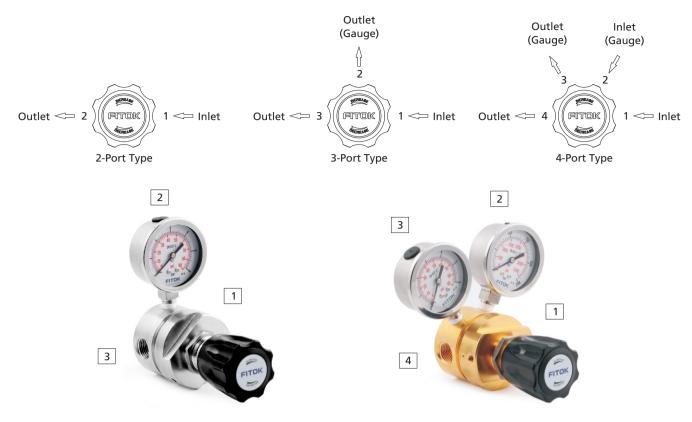


Dimensions, in inches (millimeters), are for reference only.





Porting Configurations



Part Number Description

