



Swagelok®

Improve the Safety and Efficiency of Your Gas Distribution Systems



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14 years with Swagelok

Housekeeping

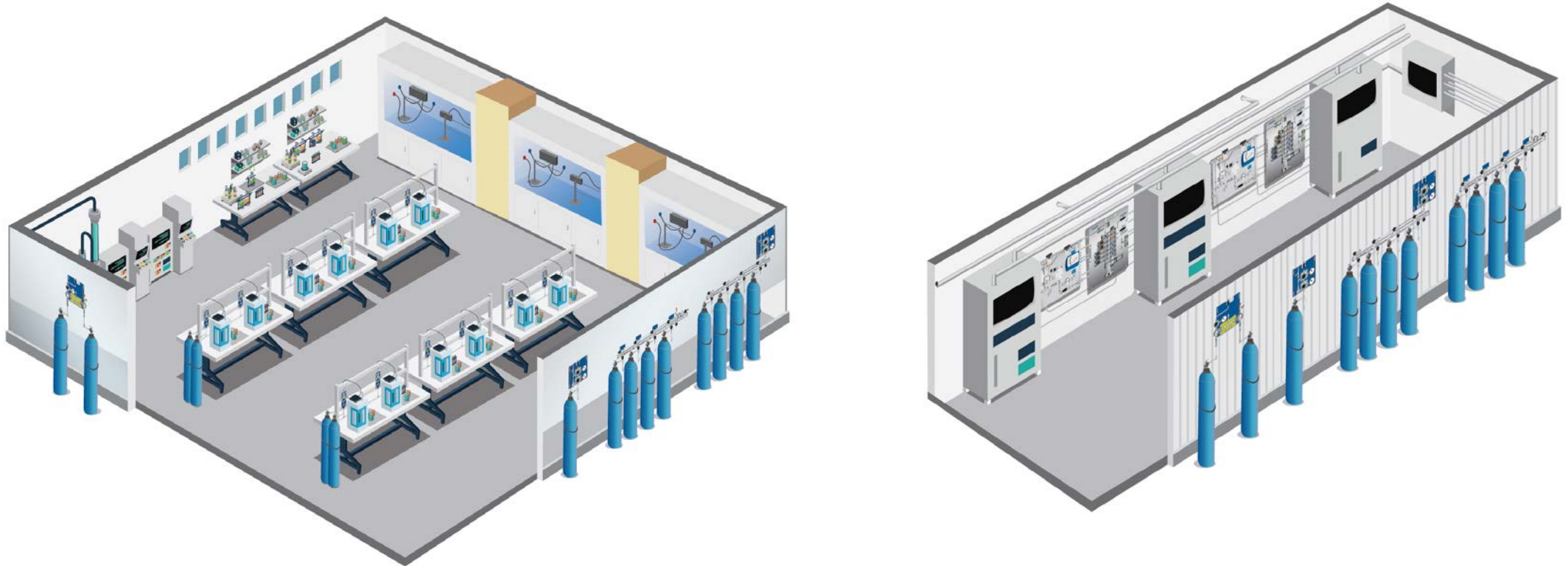
- Questions are encouraged and will be addressed at the of the presentation
 - Please use the **Q&A** function in the upper right-hand corner of the screen to send in your questions
 - **Please be sure to list your first and last** name so that we know how to address you and follow up your questions
- Your local SSC will follow up with you as necessary after today's webinar

Agenda

- What is a gas distribution system?
- Importance of these systems and why you should make it a priority
- Benefits and advantages
- Role of pressure regulators in gas distribution performance
- Standard designs to address and avoid leaks
- Q&A

What is a Gas Distribution System?

Gas distribution systems are the network of tubes and pipes which transport pressurized gas from the source to a desired point of use (e.g., inside a laboratory or test facility).



Gas Distribution System in Processes

Gas Panels Locations:

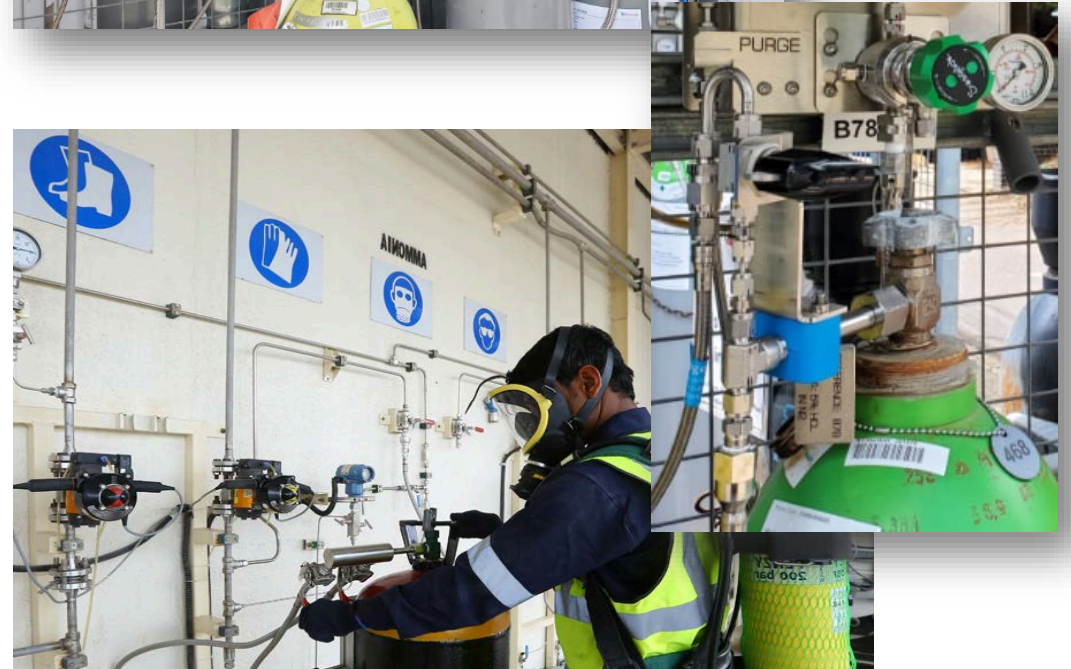
- Onsite laboratories
- Operations
- Research facilities
- Gas companies
- Medical facilities



The Use of Gas Distribution Systems

Why Gas Panels?

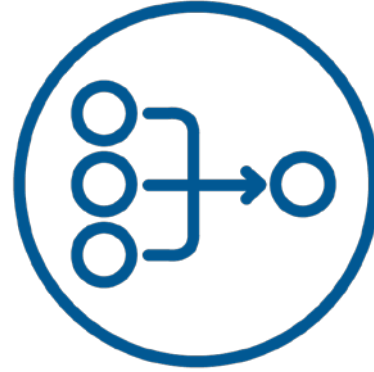
- Provide access point to a gas supply system
- Reduce the source pressure to a lower constant
- Enable an uninterrupted supply of gases
- Handle reactive, toxic and corrosive gases
- Properly handle expensive high-purity gases



Gas Distribution Systems Advantages



Improve safety



Maximize resources



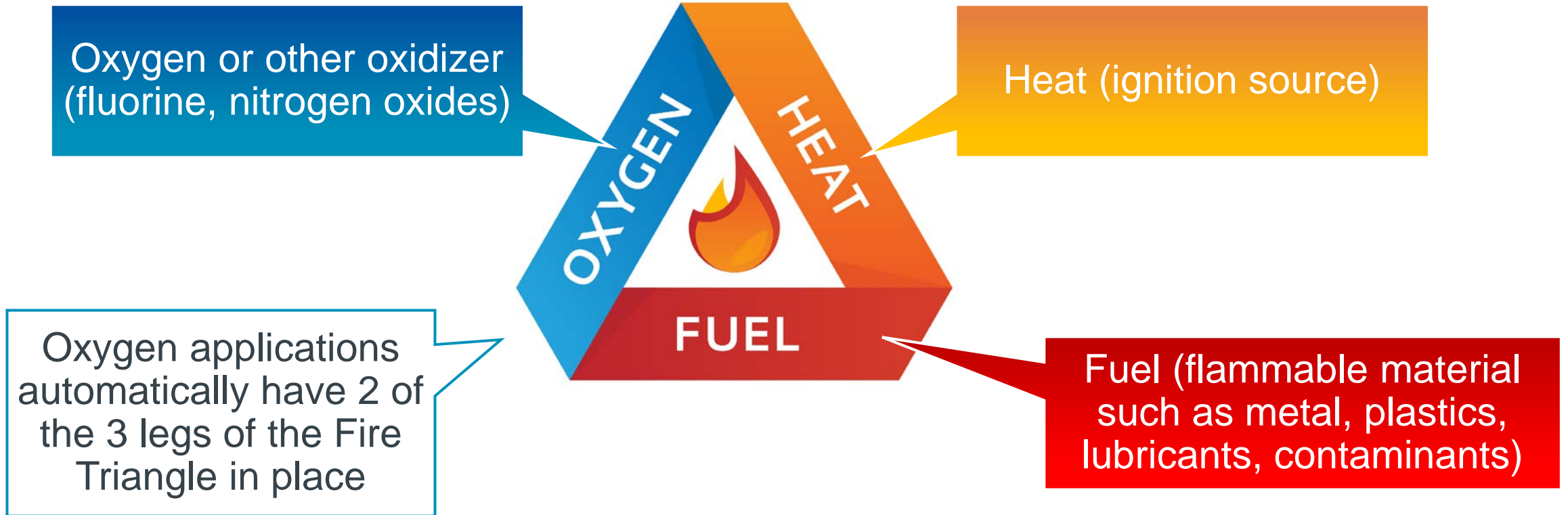
Increase uptime



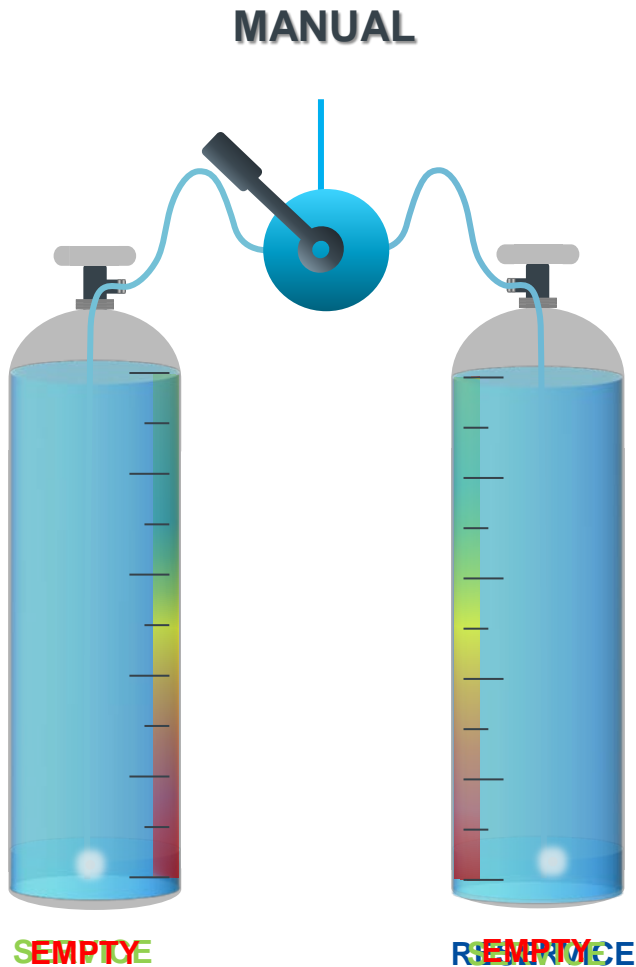
Reduce costs

Fire Triangle – SAFETY

The Fire Triangle is a simple method of raising awareness of how and why fire can spread so quickly in a system; something which could **save lives**.

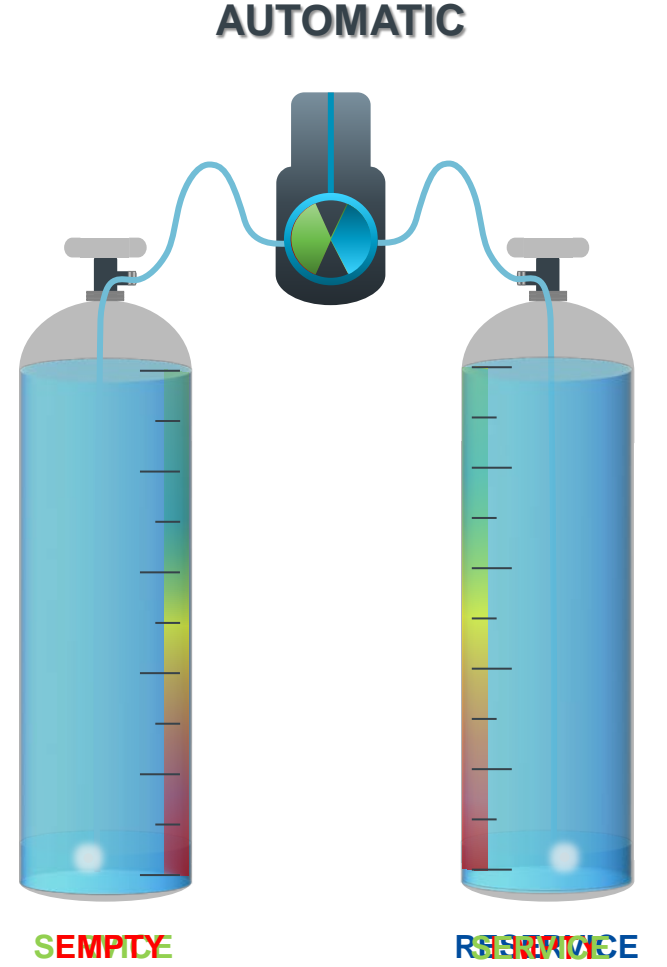


Changeover – Increase Uptime and Maximize Resources



- Need to manually reset the valve when the first bottle is empty
- Opening/closing isolation valve
- More time consuming
- Risk of running out of critical gas in some cases

- Allow uninterrupted gas or liquid supply
- Automatically switch to a secondary supply
- Highly configurable / alarms, automation



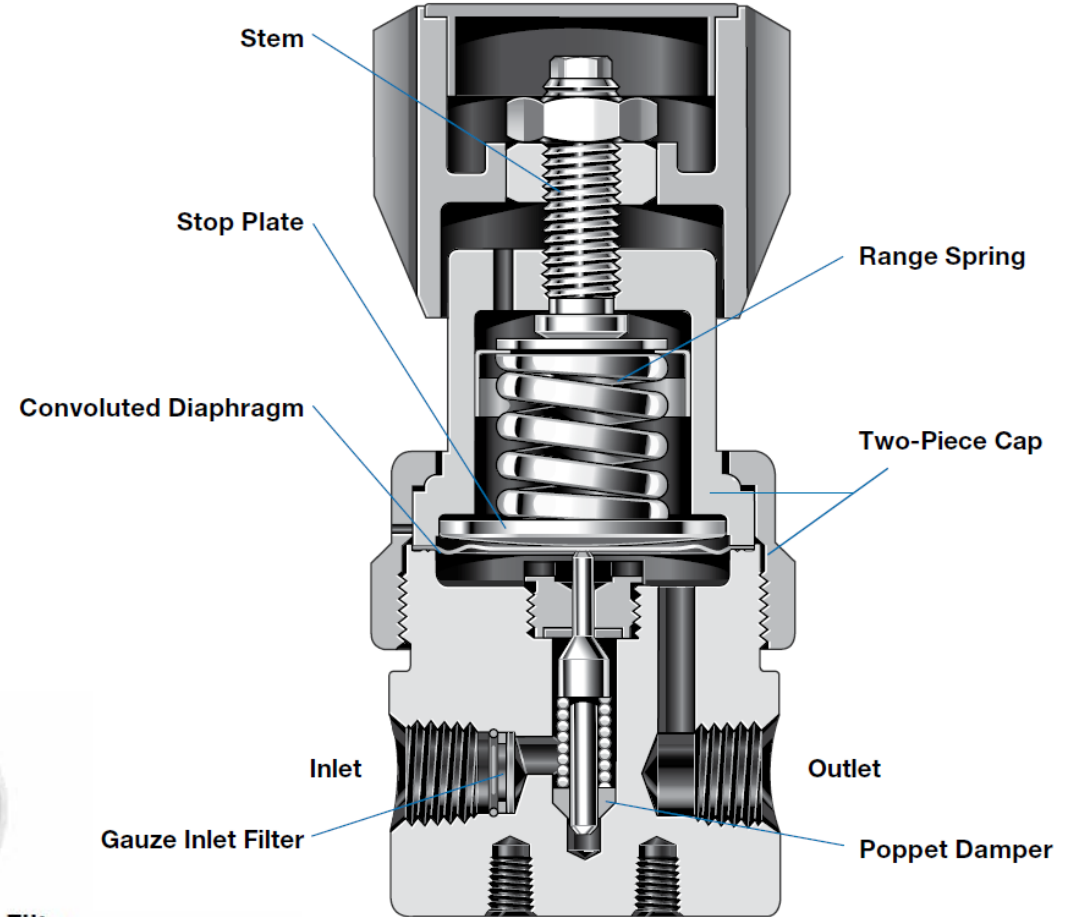
Filtration – Increase Uptime and Improve Safety

Filters are used to remove particulate matter from the gas stream in which they are deployed.

Match the filter to the task



Filter



Gas Distribution System

Regulator Basics

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What is a Pressure Regulator?

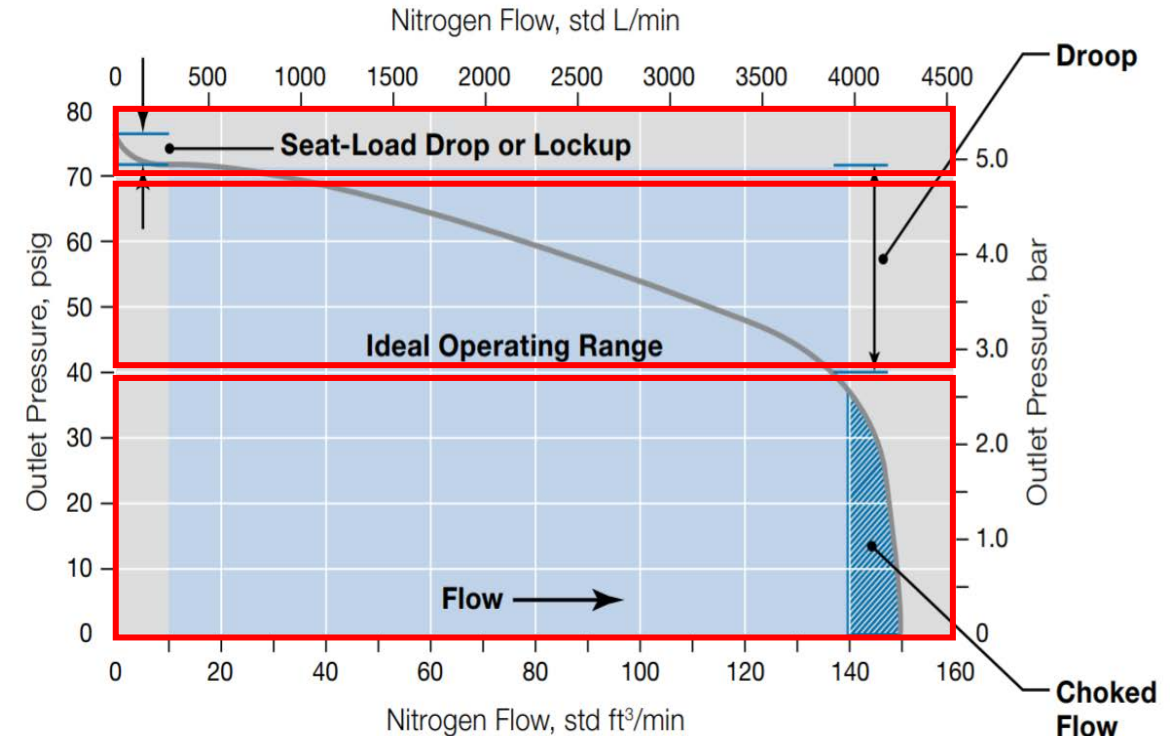
A pressure regulator is a mechanical device designed to regulate system pressure in response to upstream or downstream pressure changes.



The Important Aspects of Performance

Flow curve consists of three parts:

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

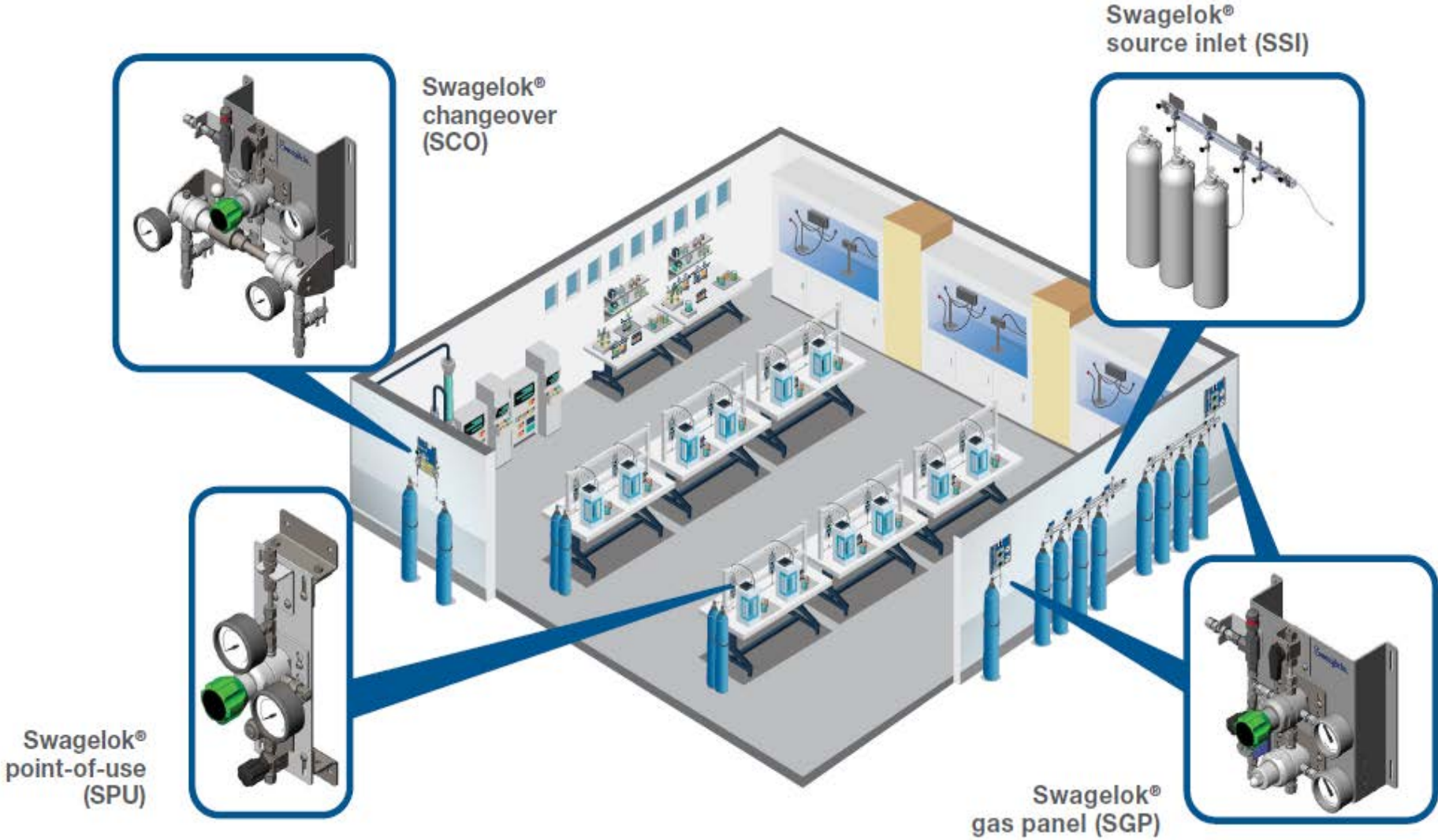


Gas Distribution System

Standard Panel Designs

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Gas Distribution System Types and Features



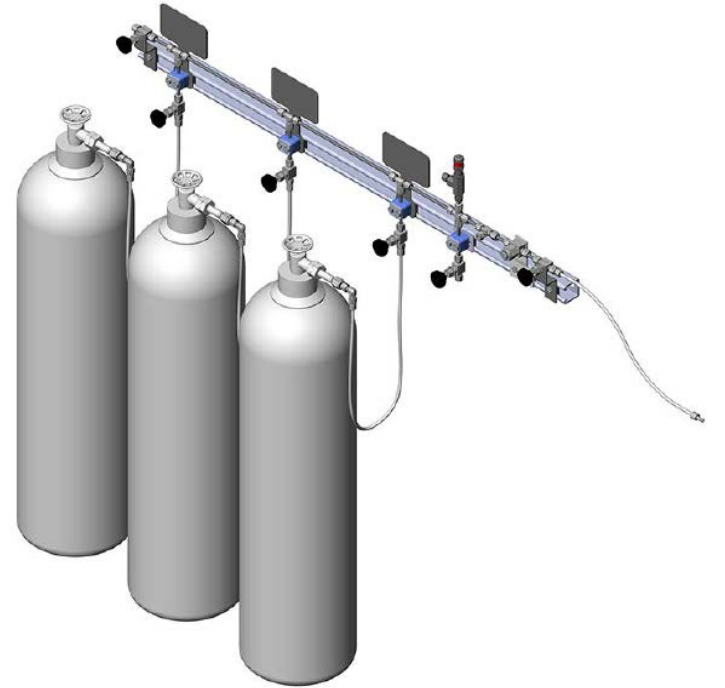
Swagelok Source Inlet (SSI)

Operation:

- Establishes a connection between the high-pressure gas source and the distribution system
- Can be one bottle or multiple

Key Features:

- Highly configurable options help ensure operator safety
- Option to vent individual lines to maximize uptime



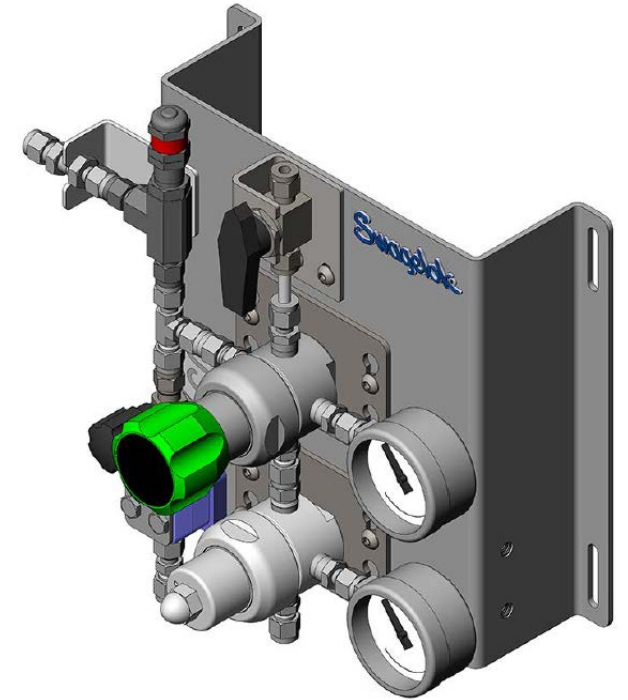
Swagelok Gas Panel (SGP)

Operation:

- Primary gas pressure control, either in one stage or two stages

Key Features:

- Modular panel is easy to service and maintain, helping to improve uptime
- Configurable options for pressure relief, venting, lockable isolation, and more
- Enhance safety with upstream and downstream pressure indicators



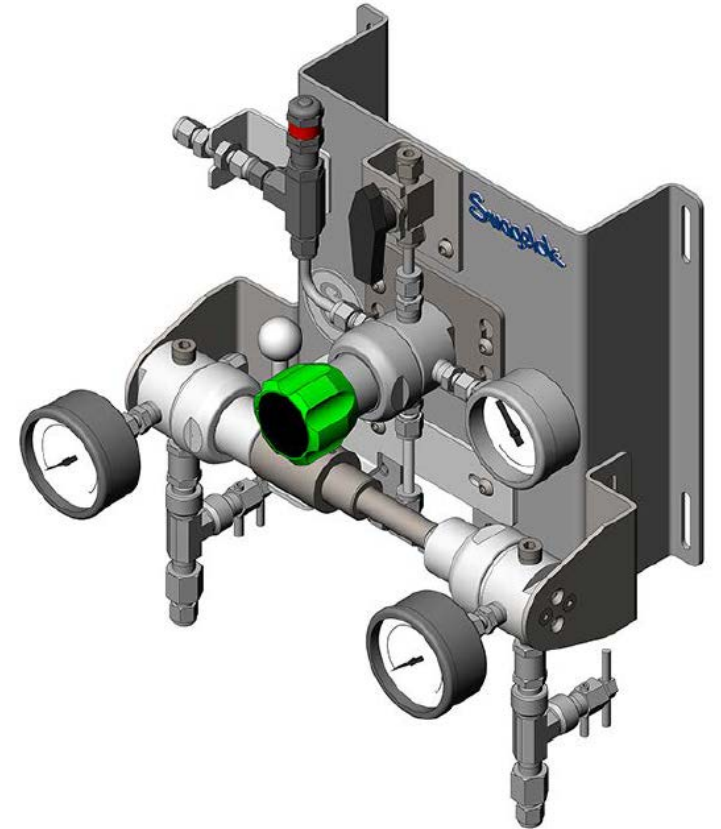
Swagelok Changeover (SCO)

Operation:

- Automatic changeover system seamlessly switches from one gas source to another to ensure an uninterrupted supply

Key Features:

- Changeover pressure remains constant, regardless of primary source selection
- Flexibility to set changeover pressure to your spec helps maximize resources
- Optional line regulation available



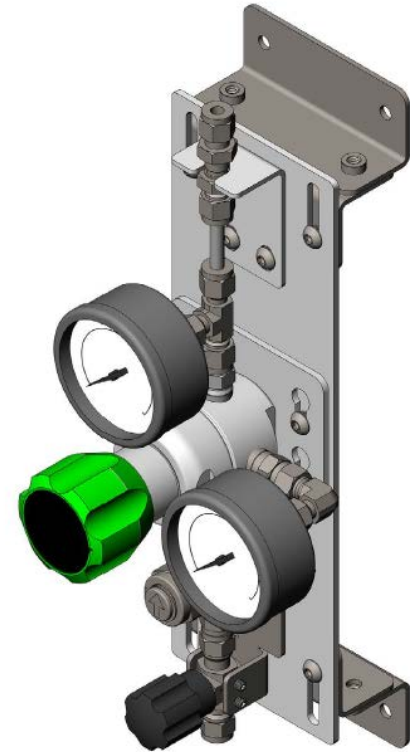
Swagelok Point of Use (SPU)

Operation:

- Critical last-stage pressure control

Key Features:

- Provides standardization and consistent operation, increasing uptime
- Can be set up for either top-down or down-top flow to help improve safety
- Compact design saves space
- Multiple mounting options



Documentation

- User manual
- Sales/as-built drawings
- Complete bill of materials
 - Spare parts list if needed



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REV.		DESCRIPTION		DATE		APPROVED	
01		INITIAL RELEASE		7/14/2014		MLJ	

REVISIONS

NOTES: 1. HOSE ENDS AND CGA FITTINGS ARE NOT SHOWN FOR CLARITY
2. USE STANDARD BEND RADIUS FOR ALL BENDS
3. PRESSURE TEST WITH N2 TO 15PSI

ITEM	PART NUMBER	DESCRIPTION	SUPPLIER	QTY
1	KCM1DFL412AD0010	KCM REGULATOR MNLD	SWAGelok SOUTHWEST CO.	1
2	MLJ140S09-3	ALMN MNT PNL	EXCELFAB	1
3	CBALBUQ140710-1	1/4" PRV SET @ 15PSI	SWAGelok SOUTHWEST CO.	5
4	SS-43G54	1/4" BALL VALVE	SWAGelok SOUTHWEST CO.	6
5	SS-400-3	1/4" UNION TEE	SWAGelok SOUTHWEST CO.	6
6	SS-400-4	1/4" TUBE FITTING CROSS	SWAGelok SOUTHWEST CO.	1
7	SS-4-1A-1-4	1/4" MNPT TUBE ADAPTER	SWAGelok SOUTHWEST CO.	2
8	SS-400-1-4	1/4" UNION	SWAGelok SOUTHWEST CO.	1
9	MLJ131014-8	.47" WHT DELRN TUBE CLAMP	EXCELFAB	4
10	MLJ131014-2	1/4" DELRN TUBE BRKT	EXCELFAB	7
11	SS-401-PC	1/4" PORT CONN	SWAGelok SOUTHWEST CO.	10
12	SS-14-S-03S-1FT	1/4" SS TUBING .035W	SWAGelok SOUTHWEST CO.	A/R
13	SS-FJ4TA4SL4-48	1/4" FJ HOSE 48'L	SWAGelok SOUTHWEST CO.	4
14	SS-FM4TA4PF4-48	1/4" TUBE X 1/4" FNPT FM HOSE 48'L	SWAGelok SOUTHWEST CO.	2
15	SS-92	580 CGA NUT	SWAGelok SOUTHWEST CO.	2
16	SS-15-3	580 CGA SS NIPPLE	SWAGelok SOUTHWEST CO.	2
17	98437A10B	#10 LK WSHR .3"OD	MCMMASTER (ANY)	26
18	90945A740	#10 FLAT WSHR .36"OD	MCMMASTER (ANY)	4
19	92196A269	10-32 SHCS 1/2'L SS	MCMMASTER (ANY)	4
20	92196A278	10-32 SHCS 1 3/4'L SS	MCMMASTER (ANY)	22
21	SS-400-3-6-4	3/8" X 1/4" REDUCING TEE	SWAGelok SOUTHWEST CO.	4
22	SS-400-9	1/4" ELBOW	SWAGelok SOUTHWEST CO.	1
23	SS-400-R-6	1/4" X 3/8" REDUCER	SWAGelok SOUTHWEST CO.	1
24	SS-401-PC	3/8" PORT CONNECTOR	SWAGelok SOUTHWEST CO.	1

CONCEPT DRAWING

Swagelok

1. DRAWING NOT TO SCALE.
2. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
3. DRAWING IS SUBJECT TO CHANGE WITHOUT NOTICE.
4. ANGLES @ 1/4" .0010.
5. ONE PLACE DECIMAL . @ 1/16"
6. TWO PLACE DECIMAL . @ 1/32"
7. THREE PLACE DECIMAL . @ 1/64"

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DRAWN BY: MLJ DATE: 07/14/14 DESCRIPTION: N2 CHNG OVR MNLD
APPROVED BY: DATE: PART NO: ARIZN140501-10 REV: 01
SCALE: 1:1
SHEET 1 OF 3 PAGES TBA

Part Numbering – Gas Distribution System

SPU **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12**
 N T O E S4 S4 4 0 X 0 5 E

- 1 Gas Type**
 N = Inert
 O = Oxygen[Ⓛ]
Ⓛ A gas type of oxygen may limit selections available for other components.
- 2 Flow Direction**
 T = Top-to-Bottom
 B = Bottom-to-Top
- 3 Gauges**
 O = Outlet only
 B = Inlet and Outlet
- 4 Pressure Control Range**
 D = 0 to 25 psig (0 to 1.7 bar)
 E = 0 to 50 psig (0 to 3.4 bar)
 F = 0 to 100 psig (0 to 6.8 bar)
 G = 0 to 250 psig (0 to 17.2 bar)
- 5 Inlet Connection**
 S4 = 1/4 in. Swagelok tube fitting
 S6 = 3/8 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M1 = 10 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 N4 = 1/4 in. Male NPT
 F4 = 1/4 in. Female NPT
- 6 Outlet Connection**
 S4 = 1/4 in. Swagelok tube fitting
 S6 = 3/8 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M1 = 10 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 N4 = 1/4 in. Male NPT
 F4 = 1/4 in. Female NPT
- 7 Inlet Isolation Valve**
 0 = No valve
 4 = 1/4-turn ball valve
 L = 1/4-turn ball valve - lockable
 X = 3-way ball valve
 T = 3-way ball valve - lockable
 D = Multi-turn needle valve
- 8 Vent**
 0 = No vent
 D = Multiturn downstream vent
- 9 Inlet Filter**
 X = None
 1 = Filter - 60 micron (Inert)/10 micron (Oxygen)
- 10 Mounting**
 0 = Flat plate
 W = Wall-mount wings
 T = Top (L. plate)
 B = Bottom (L. plate)
- 11 C_v (Flow Coefficient)**
 1 = 0.02
 2 = 0.06
 5 = 0.2
- 12 Options**
 C = Captured regulator vent
 H = Helium leak test
 E = ASME 3.1 material certification
Note: Multiple options can be added to the end of an ordering number.

SGP **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**
 2 H R G 5 4 1 S4 S4 S4 E

- 1 Panel Type**
 1 = Single-stage
 2 = Dual-stage
 Y = Dual-stage single body[Ⓛ]
Ⓛ A Cv of 0.02 and the captured pressure regulator vent option are not available with this panel type.
- 2 Gas Type**
 N = Inert
 O = Oxygen[Ⓛ]
Ⓛ A gas type of oxygen may limit selections available for other components.
- 3 Max Inlet Pressure**
 L = 1000 psig (68.9 bar)
 R = 3600 psig (248 bar)
 T = 4351 psig (300 bar)
- 4 Outlet Control Range**
 E = 0 to 50 psig (0 to 3.4 bar)
 F = 0 to 100 psig (0 to 6.8 bar)
 G = 0 to 250 psig (0 to 17.2 bar)
 J = 0 to 500 psig (0 to 34.4 bar)
- 5 C_v (Flow Coefficient)**
 1 = 0.02
 2 = 0.06
 5 = 0.2
- 6 Outlet Valve**
 0 = No valve
 4 = 1/4-turn ball valve
 L = 1/4-turn ball valve - lockable
 X = 3-way ball valve (vent/isolation)
 T = 3-way ball valve (vent/isolation) - lockable
 D = Multi-turn needle valve
- 7 Pressure Relief Valve**
 0 = None
 1 = R3A series relief valve (Inert)/CPA series check valve (Oxygen)
 2 = Country/regional standard
- 8 Inlet Connection**
 S4 = 1/4 in. Swagelok tube fitting
 S6 = 3/8 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M1 = 10 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 N4 = 1/4 in. Male NPT
 F4 = 1/4 in. Female NPT
- 9 Outlet Connection**
 S4 = 1/4 in. Swagelok tube fitting
 S6 = 3/8 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M1 = 10 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 N4 = 1/4 in. Male NPT
 F4 = 1/4 in. Female NPT
- 10 Vent Connection**
 S4 = 1/4 in. Swagelok tube fitting
 S6 = 3/8 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M1 = 10 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 N4 = 1/4 in. Male NPT
 F4 = 1/4 in. Female NPT
- 11 Options**
 C = Captured pressure regulator vent
 H = Helium leak test
 E = ASME 3.1 material certification
Note: Multiple options can be added to the end of an ordering number.

SCO **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13**
 N F R 2 5 P S4 S4 5 L 1 0 E

- 1 Gas Type**
 N = Inert
 O = Oxygen[Ⓛ]
Ⓛ A gas type of oxygen may limit selections available for other components.
- 2 Pressure Control Range**
 0 = None
 F = 0 to 100 psig (0 to 6.8 bar)
 G = 0 to 250 psig (0 to 17.2 bar)
 J = 0 to 500 psig (0 to 34.3 bar)
- 3 Maximum Inlet Pressure**
 L = 1000 psig (68.9 bar)
 R = 3600 psig (248 bar)
 T = 4351 psig (300 bar)
- 4 5 Changeover Pressure**
 ex. 25 (bar)
Note: Select the desired changeover pressure by entering two digits in fields 4 and 5. Select the pressure units in field 6. For example, 25B will specify a 25 bar changeover pressure.
- 6 Unit for Changeover Pressure**
 P = psig
 B = bar
Note: When selecting a changeover pressure in units of psig, the numbers in fields 4 and 5 will represent 10x the desired pressure. For example, to select a 50 psig changeover pressure, enter 05P in fields 4, 5 and 6.
- 7 Inlet Connection**
 S4 = 1/4 in. Swagelok tube fitting
 S6 = 3/8 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M1 = 10 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 N4 = 1/4 in. Male NPT
- 9 C_v (Flow Coefficient)**
 1 = 0.02
 2 = 0.06
 5 = 0.2
- 10 Outlet Isolation Valve**
 0 = No valve
 4 = 1/4-turn ball valve
 L = 1/4-turn ball valve - lockable
 D = Multi-turn needle valve
- 11 Inlet Vent**
 1 = Captured
 2 = Noncaptured
- 12 Pressure Relief Valve**
 0 = None
 1 = R3A series relief valve (Inert)/CPA series check valve (Oxygen)
 2 = Country/regional standard
- 13 Options**
 C = Captured pressure regulator vent (on all system regulators)
 H = Helium leak test
 E = ASME 3.1 material certification
Note: Multiple options can be added to the end of an ordering number.

SSI **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12**
 N 4 C2 8 1 1 0 1 1 TH S8 E

- 1 Gas Type**
 N = Inert
 O = Oxygen[Ⓛ]
Ⓛ A gas type of oxygen may limit selections available for other components.
- 2 Number of Bottles**
- 3 Desired Bottle Connection**
 See reference tables below
- 4 Tube OD**
 4 = 1/4 in.
 8 = 1/2 in.
 A = 6 mm
 B = 12 mm
- 5 Isolation Valve**
 0 = None
 1 = On main line
 2 = On individual bottles
 3 = On main line and individual bottles
- 6 Vent Valve**
 0 = None
 1 = On main vent
- 7 Purge Valve**
 0 = None
 1 = On main line
- 8 Relief Valve**
 0 = None
 1 = Yes
 2 = Country/regional standard
- 9 Pressure Gauge**
 0 = None
 1 = Yes
- 10 Inlet Connection**
 TH = TH hose
 XT = XT hose
 FM = FM hose
 FX = FX hose
 8R = Thermoplastic hose
 FP = Pigtail
 FR = Rectoil
 MR = Metric rectoil
- 11 Outlet Connection**
 00 = None
 S4 = 1/4 in. Swagelok tube fitting
 S8 = 1/2 in. Swagelok tube fitting
 M6 = 6 mm Swagelok tube fitting
 M2 = 12 mm Swagelok tube fitting
 F4 = 1/4 in. Female NPT
 TH = TH hose
 XT = XT hose
 FM = FM hose
 FX = FX hose
 8R = Thermoplastic hose
 FP = Pigtail
 FR = Rectoil
 MR = Metric rectoil
- 12 Options**
 H = Helium leak test
 E = ASME 3.1 material certification
Note: Multiple options can be added to the end of an ordering number.

Some of Our Available Products and Services

Gas Distribution Program Quick Look

Application Capabilities  swagelok.com



Ensure your facility is running safely and efficiently

Backed by 70-plus years of fluid system expertise and a global network of pressure control specialists, Swagelok® is uniquely positioned to provide gas distribution systems and pressure control advisory services that help you ensure your facilities and sites are operating safely and efficiently.

Ensure safety
Designed to reduce the potential for gas leaks and maximize operator safety, Swagelok gas distribution systems are fully assembled and tested by certified fluid system experts. Systems are designed and labeled to be both easy to understand and safe to use.

Improve uptime and reliability
The design and quality of Swagelok gas distribution systems help ensure the reliability and uptime of your instruments. These systems allow ease of maintenance and troubleshooting to keep systems reliably delivering the pressure and flow required for each application.

Reduce cost
Swagelok gas distribution systems help maximize efficiency of gas usage and minimize costly leakage. Assembled prior to delivery with leak-tight Swagelok components and tested, these systems are constructed to provide long-lasting performance while helping you reduce operating costs.

Save time and resources
Certified pressure control experts at Swagelok design, assemble, and test gas distribution systems prior to delivery, limiting the need for you to build systems on site and allowing your specialists to focus their efforts elsewhere. The reliability of these systems can also lead to a reduced need for maintenance, saving you additional time and resources.




Configurable. Local. Reliable.



Gas Distribution Program Application Guide



Gas Distribution Systems

Application Guide

Configurable. Local. Reliable.



Gas Distribution Program Case Study

Customer Spotlight  swagelok.com

200 Gas Lines. 1 Comprehensive Solution.

The Challenge
A leading chemical company was experiencing issues with a system designed to deliver dozens of specialty gases throughout a research and development facility. They needed to prevent leaks of hazardous gases to protect their workers while also finding ways to reduce their gas panel replacement and maintenance costs.

Replacing just 10% of gas panels cost an average of \$58,500 (£45,000) per year.

The Solution
Through the Swagelok® gas distribution program, advisors identified the opportunity to standardize gas panel design throughout the system:

- Incorporated dedicated lines for safer purging
- Easier access to critical relief valves enabled easier maintenance
- A common panel footprint improved workflow

The Result
Through the Swagelok gas distribution program, the customer achieved:

- Enhanced system and site safety
- \$52,000 (£40,000) saved on panel replacement every five years
- 75% reduction in gas panel maintenance time
- Panel standardization, allowing their team to focus on more critical tasks
- Reduced carbon footprint by eliminating leaks and frequent panel replacement

Let's get started today. Visit edmontonvalve.swagelok.com to learn more about the Gas Distribution Program or contact us today - Drayton: 780.542.7888, Edmonton: 780.437.0640, Fort McMurray: 780.790.0640. Email: marketing@edmontonvalve.com



View Our Virtual Field Advisory Services

Questions?



