VWR®
We Enable Science

VWR® GAS REGULATORS

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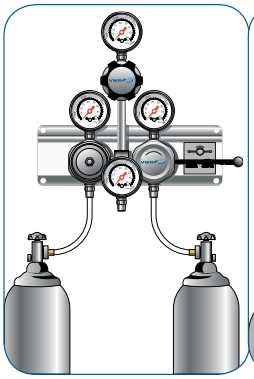
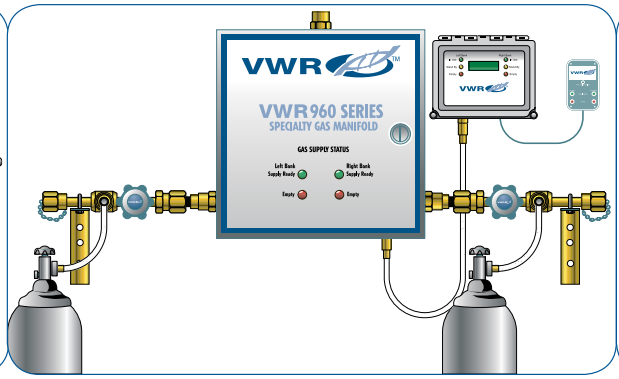




SELECTION OF PRESSURE REGULATORS

Gases can be supplied in compressed gas high-pressure cylinders, liquid low-pressure cylinders or from low-pressure pipeline supply. The pressure from the supply source must be reduced to the desired working pressure for the application. To accomplish this, a pressure reducing valve commonly referred to a regulator needs to be selected. Proper selection is critical for a safe and effective transfer of the gas from the cylinder or pipeline to the instrument. Regulators are designed to control pressure. Regulators will not measure or control flow. An external device such as a flowmeter or metering valve specifically designed for flow control should be used for that purpose.

Selection of the correct regulator involves many variables. All items below should be considered in making the proper regulator selection.

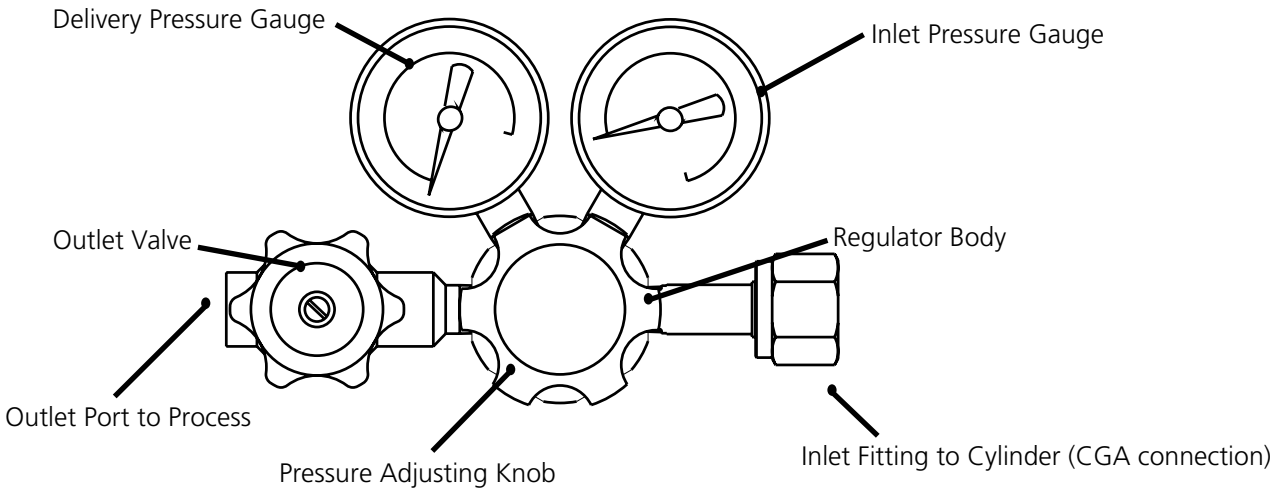
1-Materials Compatibility. Materials used to construct the pressure regulator need to be compatible with the intended gas service. All the wetted areas (parts of the regulator in contact with the gas) must be selected to avoid any reaction with the gas that can cause contamination in the gas stream of deterioration of the regulator components. Refer to Gas Materials Compatibility Table.

2-Inlet Pressure Rating. Inlet pressure can range from low pressure in pipeline usage to high pressure from compressed gas cylinders. The regulator may be for line use or cylinder use. Regulators for use in line will normally have only one gauge, to indicate delivery pressure, while a cylinder regulator would have two gauges; one to show inlet pressure and the other to show delivery pressure. An exception to this would be the use of regulators for liquid gas cylinder, in this application only the delivery pressure gauge would be required since the supply pressure is generally constant. When selecting the regulator it must be capable of handling the incoming inlet pressure. When the gas is supplied from a cylinder the CGA (Compressed Gas Association) inlet connection will dictate the maximum supply pressure, this pressure can range from 200 PSI to over 6000 PSI.

3-Delivery Pressure Range. The desired working pressure range for the application may range from low pressure (0-15 PSI) to a much higher working pressure (6000PSI). The regulator selected must be able to supply the proper working pressure consistent with the requirements of the process.

4-Gas Purity. Maintaining the purity level of the gas is of primary importance in the selection of the regulator. The selected regulator must be resistant to any introduction of contaminants that can be detrimental to the process. In addition to the proper selection of materials for gas compatibility the design, assembly and testing of the regulator are critical items to consider in the proper regulator selection. Clean room assembly and Helium Leak testing are the common procedures used to insure the integrity of the regulator.

5-Pressure regulation, single-stage or two-stage design. All regulators are designed to reduce the inlet pressure to a desired working pressure. The regulator can reduce the pressure in either one step or two steps. A single-stage regulator reduces the pressure in one step and a two-stage regulator reduces the pressure in two steps, either may be suitable for the application based on the desired pressure control.



Single-Stage regulators are best suited for applications in which:

1) Manual periodic adjustment of the delivery pressure settings is not a problem, or
2) The inlet pressure remains constant, such as the case in gas withdrawal from liquid cylinders.

Two-stage regulators are two regulators built into a single regulator body. The first regulator (first stage) is preset at a non-adjustable pressure to reduce the incoming pressure to a lower pressure referred to as the intermediate stage. The second regulator (second stage) is adjustable within the desired delivery range. The two-stage regulator allows for steady delivery pressure without periodic adjustment, well suited for applications requiring constant pressure from full to nearly empty cylinder.

OPERATION OF PRESSURE REGULATORS

Single-Stage Regulators

Gas enters the inlet (high pressure) chamber and its pressure is indicated on the high pressure gauge. When the pressure adjusting knob is turned counterclockwise and completely backed out to the stop, a valve and seat assembly located between the inlet chamber and the delivery (low pressure) chamber prevents gas from moving any further. A filter located at the inlet to the valve and seat assembly, removes particulate matter from the gas stream to help protect the seat area.

Turning the pressure-adjusting knob clockwise causes the adjusting screw to push against a spring button that compresses the pressure adjusting spring. The force of the compressed spring, in turn, causes the diaphragm to flex and push against the valve. This opens the regulator allowing gas to flow from the inlet chamber to the delivery chamber of the regulator.

Gas entering the delivery pressure chamber begins to build pressure and creates a counter-force (counter to the pressure adjusting spring) on the diaphragm. This pressure is indicated on the delivery pressure gauge attached to the regulator body. When pressure builds sufficiently to counteract the spring compression, it pushes the diaphragm away from the valve poppet allowing the regulator valve to close. In this matter, pressure in the delivery chamber is controlled or regulated by the amount of spring compression placed on the diaphragm, and is selectable by turning the pressure adjusting knob until desired pressure is indicated on the delivery pressure gauge.

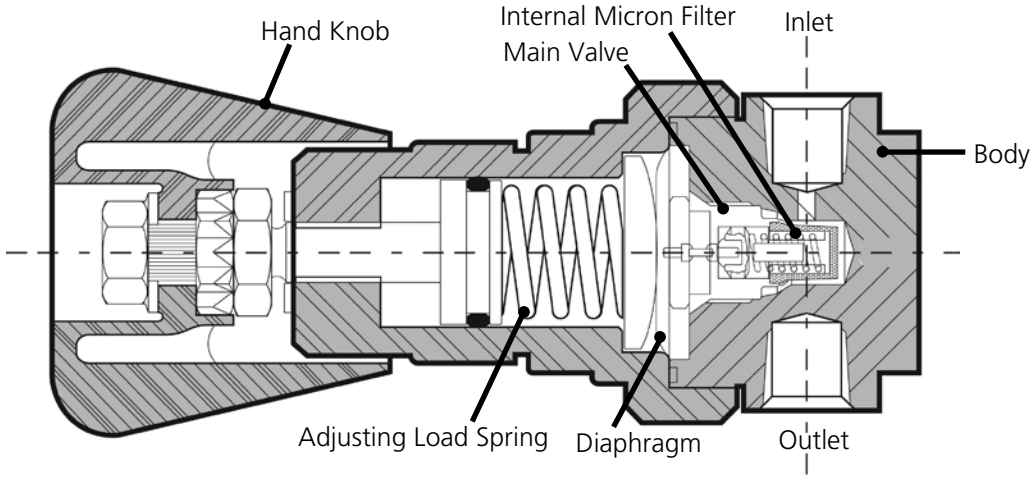
When gas from the delivery pressure chamber is sent to the end process, the resulting decrease in gas volume in the delivery chamber causes a pressure reduction in the chamber. When this occurs, the spring compression causes the diaphragm to push the valve open, allowing additional gas to enter the delivery chamber.

Two-Stage Regulators

These regulators incorporate all components of a single-stage regulator. In addition, however, they also contain a second pressure adjusting spring, diaphragm and valve seat assembly. The first stage is not user adjustable with the pressure adjusting spring "pre-compressed" at the factory. This allows the first stage to feed pressure at approximately 250 to 350 psig to the second (adjustable) stage, the inter-stage pressure will be higher when the desired pressure is higher.

The second stage then performs in a manner similar to that of a single-stage regulator, except that the inlet pressure to the second stage is relatively constant. The two-step pressure reduction produces a final delivery pressure showing effect from changes in cylinder pressure.

SINGLE STAGE REGULATOR



PRESSURE — TO OBTAIN

	atm	bar	ft of H_2O	in of hg	in of H_2O	kg/cm^2	kPa	mm of Hg	PSI
MULTIPLY				BY					
atm	....	1.01325	33.932	29.921	407.1827	1.0332	101.3171	760	14.696
bar	0.98692	....	33.4883	29.530	401.8596	1.019716	100	750.062	14.50368
Ft. of H_2O	0.02947	0.029891	....	0.882646	12	0.03048	2.9890	22.4198	0.433107
in of Hg	0.03342	0.033864	1.1340	....	13.6	0.034532	3.376895	25.4	0.49115
in of H_2O	0.00246	0.002499	0.083333	0.073556	....	0.00254	0.0249089	1.86832	0.03609
kg/cm^2	0.9678	0.980665	32.8084	28.95903	393.7008	....	98.03922	735.5592	14.22334
kPa	0.00987	0.010	0.33456	0.29613	4.01472	0.01020	....	7.5006	0.14504
mm of Hg	0.00132	0.001333	0.044603	0.03937	0.535240	0.001360	0.133322	....	0.019337
PSI	0.06805	0.068948	2.3089	2.0360	27.70851	0.070307	6.89465	51.175	....

FLOW — TO OBTAIN

	cm3/min	cm3/sec	ft3/hr	ft3/min	m3/hr	m3/min	L/hr	Lpm
MULTIPLY				BY				
cm3/min	....	0.0166667	0.0021189	0.0000353	0.00006	0.000001	0.06	0.001
cm3/sec	60	....	0.1271340	0.0021189	0.0036	0.00006	3.6	0.06
ft3/hr	471.9474	7.865790	....	0.0166667	0.0283168	0.0004719	28.31685	0.4719474
ft3/min	28,316.85	471.9474	60	....	1.699008	0.0283168	1699.008	28.31686
m3/hr	16,666.67	277.7778	35.31467	0.5885777	....	0.0166667	1000	16.66667
m3/min	1,000,000	16,666.67	2118.876	35.31467	60	....	60,000	1000
L/hr	16.66667	0.2777778	0.0353147	0.0005885	0.001	0.0000167	....	0.0166667
Lpm	1000	16.66667	2.118876	0.0353147	0.06	0.001	60	....

DENSITY — TO OBTAIN

	gms/cm3	kg/m3	lbs/ft3	lbs/in3	lbs/U.S. gal
MULTIPLY			BY		
gms/cm3	....	1000	62.428	0.0361273	8.3454
kg/m3	0.001	....	0.062428	3.61273 x 10-5	0.0083454
lbs/ft3	0.0160185	16.018463	....	5.78704 x 10-4	0.13368
lbs/in3	27.679905	27.679.9	1728	....	231
lbs/U.S. gal	0.1198264	119.8264	7.4805195	0.004329	....

NEOPRENE DIAPHRAGM

Regulators have a brass body and are suitable for a wide variety of applications where small changes in the gas delivery pressure will not effect performance. Gauges are easy to read. Regulators are supplied with shut-off valves. Particulates are eliminated from gas stream with a 10 micron sintered metal inlet filter.
Note: For noncorrosive gases only.

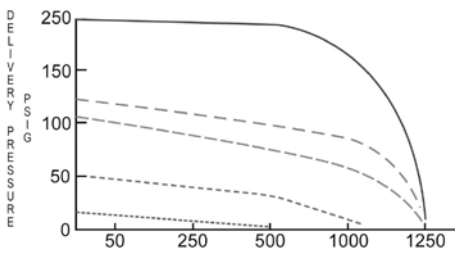
Material:

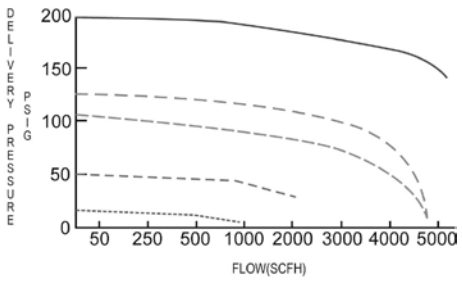
Body:	Brass
Bonnet:	Chrome-plated die cast
Seat:	One-piece encapsulated seat design with an internal filter and a PTFE Teflon seat
Diaphragm:	Reinforced neoprene 2¾"
Gauge:	2"
Outlet:	Needle valve with ¼" male outlet thread - ¼" hose barb also included
Max Inlet:	3000 PSIG

Gas	Inlet CGA	Flow Capacity, Standard CF	Delivery Range, PSI	Delivery Pressure Gauge, psig	Supply Pressure Gauge, psig	Catalog No.
Acetylene	510	800	0–15	30	400	**55850-200**
Carbon Dioxide	320	1,700	0–50	60	4000	**55850-215**
Carbon Dioxide	320	2,700	0–100	150	4000	**55850-220**
Ar/He/N	580	5,640	0–50	60	4000	**55850-205**
Ar/He/N	580	11,300	0–100	150	4000	**55850-210**
Hydrogen	350	8400	0–50	60	4000	**55850-225**
Hydrogen	350	15,200	0–100	150	4000	**55850-230**
Hydrogen	350	20,500	0–500	600	4000	**55850-275**
Nitrogen	580	5500	0–500	600	4000	**55850-277**
Oxygen	540	1900	0–50	60	4000	**55850-235**
Oxygen	540	3700	0–100	150	4000	**55850-240**
Oxygen	540	5100	0–500	600	4000	**55850-270**
Propane*	510	500	0–50	60	400	**55850-245**
Nitrous Oxide	326	1700	0–50	60	4000	**55850-250**
Breathing Air	346	2100	0–50	60	4000	**55850-255**
Industrial Air	590	2100	0–50	60	4000	**55850-260**

*Can be used with any of the other welding-grade petroleum fuel gases.

FLOW DATA





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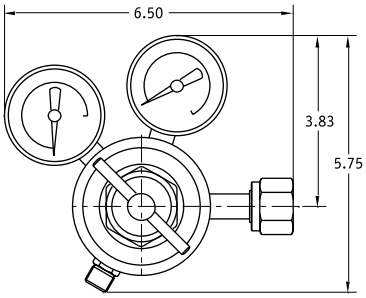

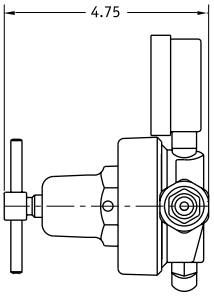

MULTISTAGE GAS REGULATORS - NEOPRENE DIAPHRAGM

Designed for applications where a constant working pressure is critical over a wide range of inlet pressures and flow rates. VWR multistage gas regulators feature safe, accurate and sensitive pressure control. Solid forged brass body contains two regulators. First stage reduces full cylinder pressure. Second stage delivers a constant pressure to the regulator outlet. Particulates, tank scale, and rust are eliminated from gas stream with sintered inlet filter.

Material:

Body:	Brass
Bonnet:	Die Cast
Seat:	One-piece encapsulated seat design with an internal filter and a PTFE Teflon seat
Diaphragm:	Neoprene 2 ¾"
Gauge:	2"
Outlet:	Needle Valve with ¼"male outlet thread ¼" Hose Barb also included
Max Inlet:	3000 PSIG

Note: For noncorrosive gases only

Gas	Inlet CGA	Flow Capacity, Standard CF	Delivery Range, PSI	Delivery Pressure Gauge, psig	Supply Pressure Gauge, psig	Catalog No.
Acetylene	510	1100	0–15	30	500	**55850-472**
Arg/Nit/Hel	580	1500	0–50	60	4000	**55850-474**
Arg/Nit/Hel	580	3200	0–100	200	4000	**55850-476**
Arg/Nit/Hel	580	4400	0–250	400	4000	**55850-478**
Carbon Dioxide	320	1800	0–50	60	4000	**55850-480**
Carbon Dioxide	320	3800	0–125	200	4000	**55850-482**
Hydrogen	350	4560	0–50	60	4000	**55850-484**
Hydrogen	350	6460	0–125	200	4000	**55850-486**
Oxygen	540	1140	0–50	60	4000	**55850-488**
Oxygen	540	1615	0–100	200	4000	**55850-490**
Oxygen	540	2185	0–250	400	4000	**55850-492**
Nitrous Oxide	326	970	0–50	60	4000	**55850-494**
Breathing Air	346	1400	0–50	60	4000	**55850-496**
Industrial Air	590	1200	0–50	60	4000	**55850-498**
Medical Oxygen Mix— Includes O2 and CO2 (less than 7%)	280	1140	0–50	60	4000	**55850-388**
Industrial Oxygen Mix	280	1650	0-125	200	4000	**55850-390**
Industrial Medical Oxygen Mix— Includes O2 and CO2 (greater than 7%)	296	1200	0–50	60	4000	**55850-392**
	500	1100	0–50	60	4000	**55850-396**
	500	1600	0–125	200	4000	**55850-398**

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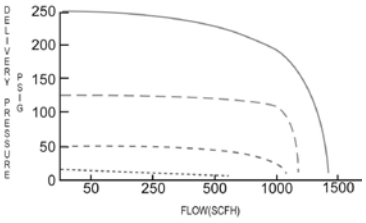

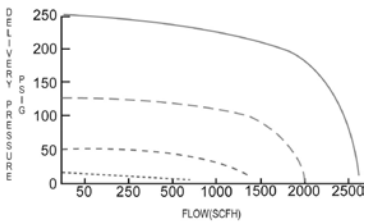

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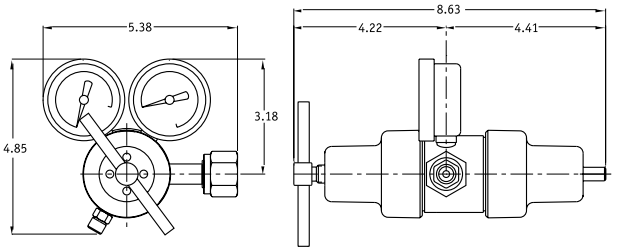

MULTISTAGE GAS REGULATORS - STAINLESS STEEL DIAPHRAGM

Designed for gas chromatography application where a constant working Pressure is important over a side range of inlet pressures and flow rates. Designed for applications where a constant working pressure is critical over a wide range of inlet pressures and flow rates. VWR multistage gas regulators feature safe, accurate and sensitive pressure control. Solid forged brass body contains two regulators. First stage reduces full cylinder pressure. Second stage delivers a constant pressure to the regulator outlet. Particulates, tank scale, and rust are eliminated from gas stream with sintered inlet filter.

Material:

Body:	Brass
Bonnet:	Die Cast
Seat:	One-piece encapsulated seat design with an internal filter and a PTFE Teflon seat
Diaphragm:	Stainless Steel
Gauge:	2″
Outlet:	Needle valve with ¼″ NPT male outlet thread ¼″ Hose barb also included

Features:

Conforms to CGA E-4
Self-reseating internal relief valve

Gas	Inlet CGA	Flow Capacity, Standard CFH	Delivery Range, psi	Delivery Pressure Gauge, psig	Supply Pressure Gauge, psig	Catalog No.
Arg/Nit/Hel	580	255/305/1350	0–15	30	4000	**55850-420**
Arg/Nit/Hel	580	765/915/2430	0–50	60	4000	**55850-422**
Arg/Nit/Hel	580	1445/1730/4590	0–125	200	4000	**55850-424**
Carbon Dioxide	320	240	0–15	30	4000	**55850-412**
Carbon Dioxide	320	1377	0–125	200	4000	**55850-416**
Carbon Dioxide	320	1863	0–250	400	4000	**55850-418**
Hydrogen	350	1140	0–15	30	4000	**55850-428**
Hydrogen	350	3420	0–50	60	4000	**55850-430**
Hydrogen	350	6460	0–125	200	4000	**55850-432**
Hydrogen	350	8740	0–250	400	4000	**55850-434**
Oxygen	540	285	0–15	30	4000	**55850-436**
Oxygen	540	855	0–50	60	4000	**55850-438**
Oxygen	540	1615	0–125	200	4000	**55850-440**
Oxygen	540	2185	0–250	400	4000	**55850-442**
Industrial Oxygen Mix	296	300	0–15	30	4000	**55850-452**
Industrial Oxygen Mix	296	1700	0–125	200	4000	**55850-456**
Industrial Oxygen Mix	296	2300	0–250	400	4000	**55850-458**
Medical Oxygen Mix—Includes O2 and CO2 (less than 7%)						
	280	285	0–15	30	4000	**55850-444**
	280	855	0–50	60	4000	**55850-446**
	280	2185	0–250	400	4000	**55850-450**
Medical Oxygen Mix— (Includes O2 and CO2 greater than 7%)						
	500	290	0–15	30	4000	**55850-460**
	500	880	0–50	60	4000	**55850-462**
	500	1600	0–125	200	4000	**55850-464**
	500	2200	0–250	400	4000	**55850-468**

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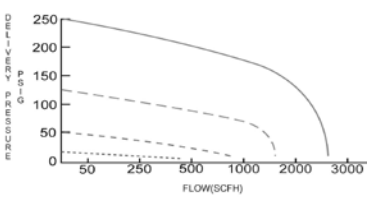

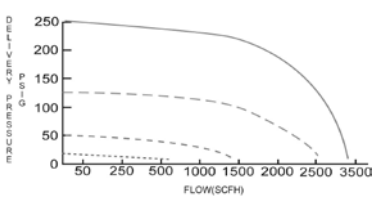

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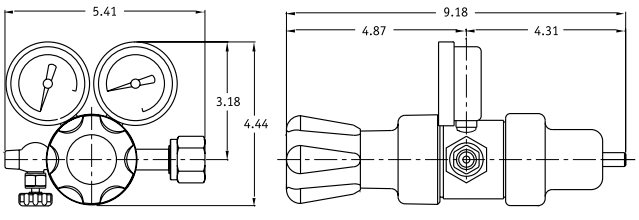

HIGH PURITY SINGLE-STAGE GAS REGULATORS - BRASS

Regulators have a brass barstock body and are suitable for a variety of applications where slight pressure variations in delivery pressure can be tolerated , such as high-purity gas applications, research sample systems, process analyzers, gas chromatography, EPA protocol mixes, laser gas systems, and emission monitoring systems. A stainless steel diaphragm eliminates contamination from diffusion or out-gassing. A one-piece PTFE encapsulated seat design includes a sintered filter to protect the seat from particulate contamination. The 1x10^{-9}cc/sec inboard helium leak rate maintains gas purity levels. Front or back panel mountable.

Material:

Body:	Brass Barstock
Bonnet:	Brass Barstock
Seat:	PTFE Teflon®
Diaphragm:	Type 316L Stainless Steel
Gauge:	2"
Outlet:	Diaphragm Valve with ¼ Tube Fitting (Swagelok®)
Max Inlet:	3000 PSIG

Gas	Inlet CGA	Flow Capacity, Standard CFH	Delivery Pressure, psig	Catalog No.
Arg/Nit/Hel	580	1020/1220/3200	1-50	**55850-600**
Arg/Nit/Hel	580	2500/3000/8000	1-125	**55850-602**
Carbon Dioxide	320	970	1-50	**55850-604**
Carbon Dioxide	320	2400	1-125	**55850-606**
Hydrogen	350	4500	1-50	**55850-608**
Hydrogen	350	11,430	1-125	**55850-610**
Oxygen	540	1100	1-50	**55850-612**
Oxygen	540	2800	1-125	**55850-614**
Nitrous Oxide	326	970	1-50	**55850-616**
Industrial Air	590	1200	1-50	**55850-618**
Breathing Air	346	1200	1-50	**55850-620**

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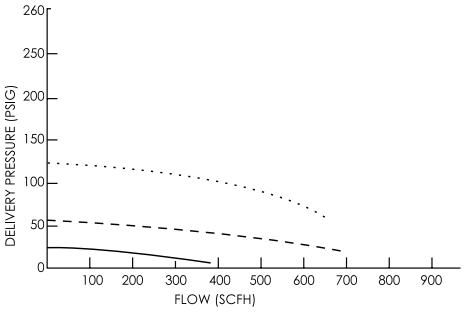

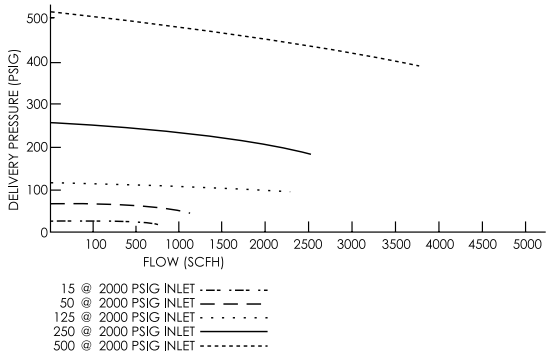

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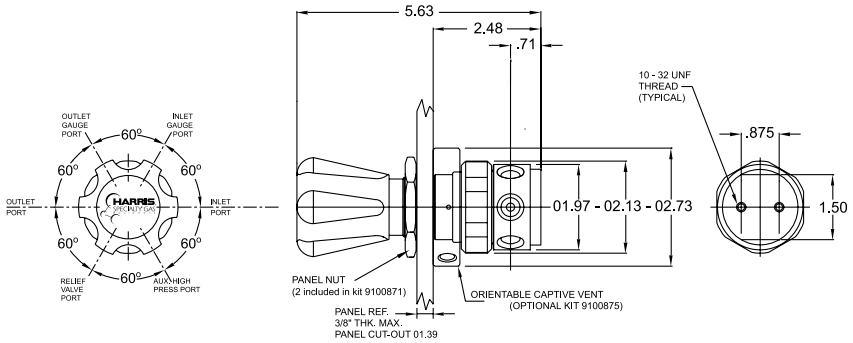

Regulators have a brass barstock body and are suitable for high-purity applications, research sample systems, process analyzers, gas analyzers, gas chromatography, EPA protocol mixes, laser gas systems, and emission monitoring systems. The two-stage design provides constant outlet pressure regardless of change in cylinder pressure. A stainless steel diaphragm eliminates contamination from diffusion or out-gassing. A one-piece PTFE encapsulated seat design includes a sintered filter to protect the seat from particulate contamination. The 1x10^{-9}cc/sec inboard Helium leak rate maintains gas purity levels. Front panel mountable.

Material:

Body:	Brass Barstock
Bonnet:	Brass Barstock
Seat:	PTFE Teflon
Diaphragm:	Type 316L Stainless Steel
Gauge:	2"
Outlet:	Diaphragm Valve with ¼ Tube Fitting (Swagelok)
Max Inlet:	3000 PSIG

Gas	Inlet CGA	Flow Capacity, Standard CFH	Delivery Pressure, psig	Catalog No.
Arg/Nit/Hel	580	1020/1220/3200	1-50	**55850-622**
Arg/Nit/Hel	580	1020/1220/3200	1-125	**55850-624**
Carbon Dioxide	320	970	1-50	**55850-626**
Carbon Dioxide	320	970	1-125	**55850-628**
Hydrogen	350	4500	1-50	**55850-630**
Hydrogen	350	4500	1-125	**55850-632**
Oxygen	540	1100	1-50	**55850-634**
Oxygen	540	1100	1-125	**55850-636**
Nitrous Oxide	326	970	1-50	**55850-638**
Industrial Air	590	1200	1-50	**55850-640**
Breathing Air	346	1200	1-50	**55850-642**

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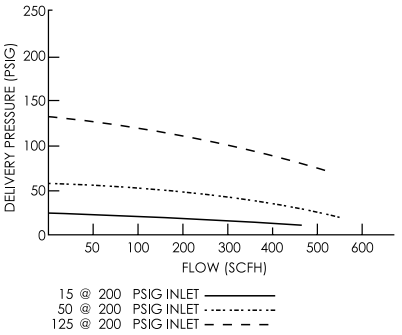

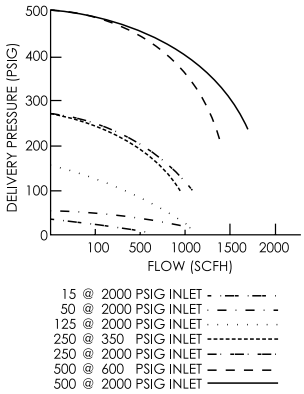

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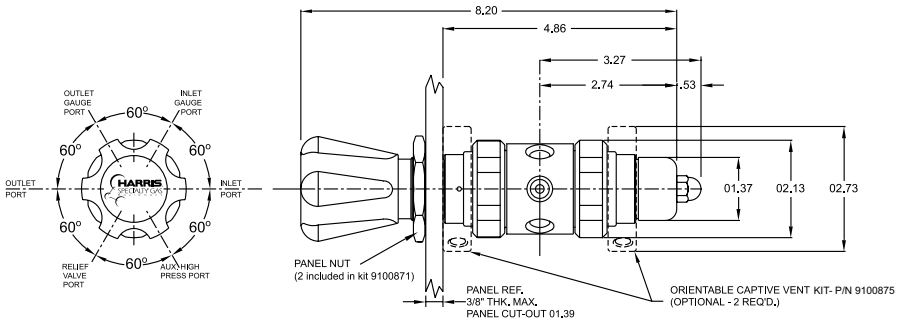

HIGH PURITY SINGLE-STAGE REGULATORS - STAINLESS STEEL

Regulators have a stainless steel barstock body and are suitable for a variety of applications where slight pressure variations in delivery pressure can be tolerated. They may be used in corrosive gas applications. The regulators are also ideal for high-purity gas applications, research sample systems, process analyzers, gas chromatography, EPA protocol mixes, laser gas systems, and emission monitoring systems. A stainless steel diaphragm eliminates contamination from diffusion or out-gassing. A one-piece PTFE encapsulated seal design includes a sintered filter to protect the seat from particulate contamination. The 1x10-9cc/sec inboard helium leak test rate maintains gas purity levels. Front or back panel mountable.

Material:

Body:	316L Stainless Steel Barstock
Bonnet:	Chrome Plated Brass Barstock
Seat:	PTFE Teflon
Diaphragm:	316L Stainless Steel
Gauge:	2″
Outlet:	Stainless Diaphragm Valve with ¼″ Tube Fitting (Swagelok)
Max Inlet:	3000 PSIG

Gas	Inlet CGA	Flow Capacity, Standard CFH	Delivery Pressure, psig	Catalog No.
Arg/Nit/Hel	580	1020/1220/3200	1-50	**55850-650**
Arg/Nit/Hel	580	2500/3000/8000	1-125	**55850-652**
Carbon Dioxide	320	970	1-50	**55850-654**
Carbon Dioxide	320	2400	1-125	**55850-656**
Hydrogen	350	4500	1-50	**55850-658**
Hydrogen	350	11,430	1-125	**55850-660**
Oxygen	540	1100	1-50	**55850-662**
Oxygen	540	2800	1-125	**55850-664**
Corrosive	330	700-1000	1-50	**55850-666**
Corrosive	330	1900-2700	1-125	**55850-668**
Corrosive	660	700-1000	1-50	**55850-670**

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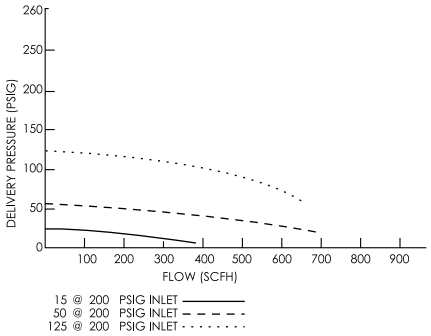

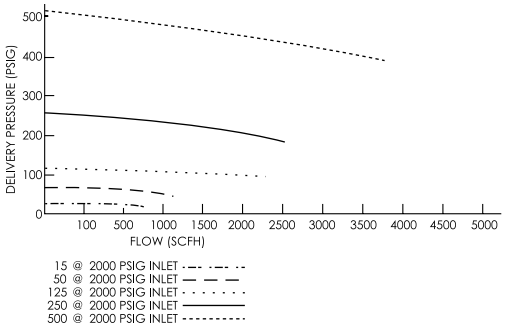

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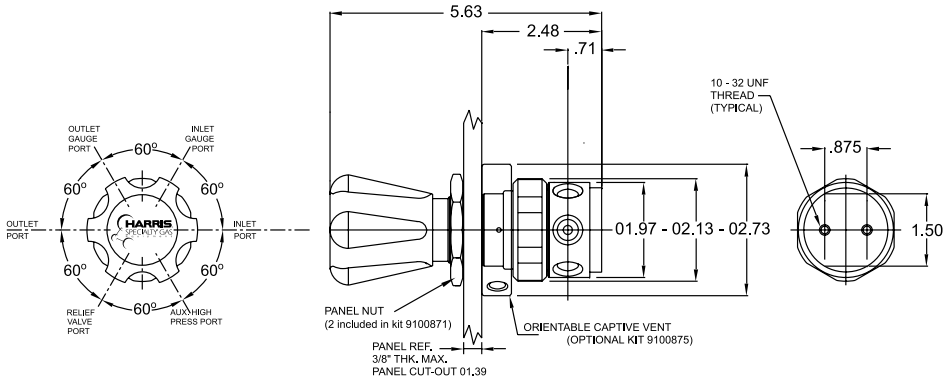

HIGH PURITY TWO-STAGE GAS REGULATOR - STAINLESS STEEL

Regulators have a stainless steel barstock body and are suitable for corrosive gas applications, high-purity gas applications, research sample systems, process analyzers, gas chromatography, EPA protocol mixes, laser gas systems, and emission monitoring systems. The two-stage design provides constant outlet pressure regardless of change in cylinder pressure. They may be used with corrosive gas applications. A stainless steel diaphragm eliminates contamination from diffusion or out-gassing. A one-piece PTFE encapsulated seat design includes a sintered filter to protect the seat from particulate contamination. The 1x109cc/sec inboard helium leak rate maintains gas purity levels. Front panel mountable.

Material:

Body:	316L Stainless Steel Barstock
Bonnet:	Chrome Plated Brass Barstock
Seat:	PTFE Teflon
Diaphragm:	316L Stainless Steel
Gauge:	2″
Outlet:	Stainless Diaphragm Valve with ¼″ Tube Fitting (Swagelok)
Max Inlet:	3000 PSIG

Gas	Inlet CGA	Flow Capacity, Standard CFH	Delivery Pressure, psig	Catalog No.
Arg/Nit/Hel	580	1020/1220/3200	1-50	**55850-674**
Arg/Nit/Hel	580	1020/1220/3200	1-125	**55850-676**
Carbon Dioxide	320	970	1-50	**55850-678**
Carbon Dioxide	320	970	1-125	**55850-680**
Hydrogen	350	4500	1-50	**55850-682**
Hydrogen	350	4500	1-125	**55850-684**
Oxygen	540	1100	1-50	**55850-686**
Oxygen	540	1100	1-125	**55850-688**
Corrosive	330	700-1000	1-50	**55850-690**
Corrosive	330	700-1000	1-125	**55850-692**
Corrosive	660	700-1000	1-50	**55850-694**

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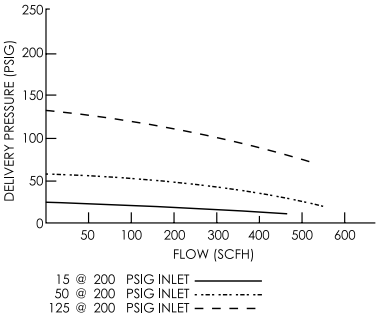

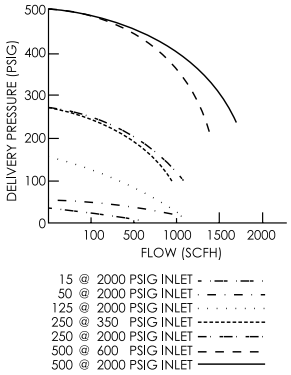

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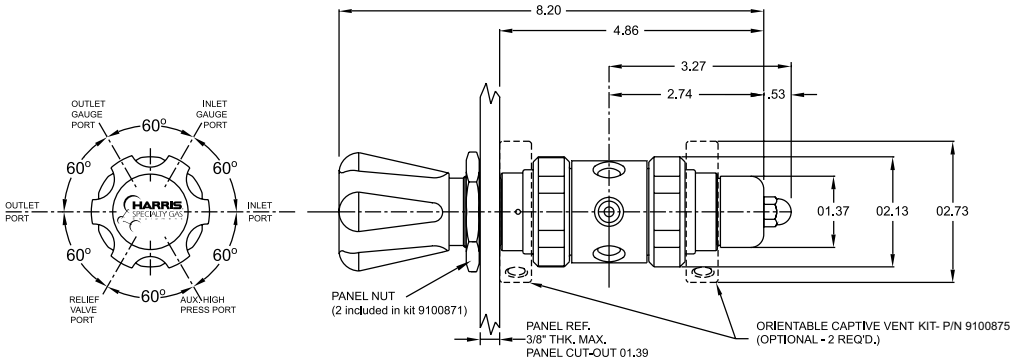


Needle Valves

These valves are used where a shut off feature or some degree of throttling is required.

Description	Catalog No.	Specifications
Outlet Needle Valves		Inlet/Outlet: 1/4 MNPT
Brass, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") NPTM	**82023-798**	Max. Inlet Pressure: 3000 PSIG
Chrome Plated, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") NPTM	**82023-802**	Packing Material: PTFE
		Body Material: Brass

Diaphragm Valves

These valves are used in high purity systems where gas leakage and in-board diffusion of air or moisture must be kept to a minimum. The packless design has an in-board Helium leak rate of 1.0 x 10-9 cc/sec.

Description	Catalog No.	Specifications
Outlet Diaphragm Valves		Inlet: 1/4 MNPT or 1/4 FNPT
Brass, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") NPTF	**82023-804**	Outlet: 1/4 FNPT
Chrome Plated, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") NPTM	**82023-806**	Max. Inlet Pressure: 3500 PSIG
Stainless Steel, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") NPTM	**82023-808**	Seat Material: PCTFE (Kel-FTM)

Outlet Hose Barbs

Description	Catalog No.
Outlet Hose Barbs	
Brass, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") Hose Barb	**82023-810**
Brass, 6.4 mm (1/4") NPTM to 3.2 mm (1/8") Hose Barb	**82023-812**
Brass, 6.4 mm (1/4") NPTF to 6.4 mm (1/4") Hose Barb	**82023-814**

Outlet Tube Fittings

Description	Catalog No.
Outlet Tube Fittings	
Brass, 6.4 mm (1/4") NPTM to 6.4 mm (1/4") Tube Fitting	**82023-816**
Brass, 6.4 mm (1/4") NPTM to 3.2 mm (1/8") Tube Fitting	**82023-818**
Stainless Steel, 6.4 mm (1/4") NPTM to 3.2 mm (1/4") Tube Fitting	**82023-820**
Stainless Steel, 6.4 mm (1/4") NPTM to 3.2 mm (1/8") Tube Fitting	**82023-822**

Gaskets

Description	Catalog No.
Gaskets	
CO_2 Packaging of 25	**82023-825**

When specialty gases are used in significant volumes, a centralized gas delivery system is a practical necessity. A well-conceived delivery system will reduce operating costs, increase productivity and enhance safety.

A centralized system will allow the consolidation of all cylinders into one storage location. With all the cylinders in one place, inventory control will be streamlined and cylinder handling will be simplified and improved. Gases can be separated by type to enhance safety.

The frequency of cylinder change-outs is reduced in a centralized system. This is achieved by connecting multiple cylinders to manifolds in banks in such a way that one bank can be safely vented, replenished and purged, while a second bank provides continuous gas service. Such a manifold system can supply gas to multiple instruments and even entire laboratories, eliminating the need for separate cylinders and/or regulators for each instrument.

Since cylinder switchover can be accomplished automatically by the manifold, cylinders in a bank will be uniformly exhausted, resulting in improved gas utilization and lower costs. Further, the integrity of the delivery system will be better protected since cylinder change-outs will be done in an isolated, controlled environment. The gas manifolds used in these systems should be equipped with check valves to prevent gas back-flow and purge assemblies to eliminate contaminants from the system during change-out. In addition, most gas delivery systems can be configured with alarms to indicate when a cylinder or bank of cylinders needs replacing.

Purity

The level of gas purity required at end-use point is extremely important in designing a gas delivery system. Maintaining this gas purity is simplified with a centralized system as described above. Selection of materials of construction should be consistent throughout (please see the Gas Compatibility Guide). For example, if a research grade gas is being utilized, all stainless steel construction and diaphragm pack-less shut off valves should be used to eliminate contamination of the gas stream.

In general, three levels of purity are sufficient to describe nearly any application.

The first level, usually described as a multi-purpose application, has the least stringent purity requirement. Typical applications are AA, ICP and general gas chromatography. Manifolds for multi-purpose applications are economically designed for safety and convenience. Acceptable materials of construction include brass, copper, Teflon®, Tefzel® and Viton®. Packed valves such as needle valves and ball valves are often used for flow shutoff. Gas distribution systems manufactured to this level should not be used with high purity or ultra-high purity gases.

The second level, called high purity, requires a higher level of protection against contamination. Applications include gas chromatography where capillary columns are used and system integrity is important. Materials of construction are similar to multi-purpose manifolds except flow shut-off valves are diaphragm pack-less to prevent diffusion of contaminants into the gas stream.

Manifold Selection Guide

Manifold Series	No. of Banks	Alarm Systems			Materials of Construction	
		Local	Remote	Telemetry	Brass	Stainless Steel
SG 910	1	N/A	N/A	N/A	X	X
SG 900	2	N/A	N/A	N/A	X	X
SG 900 A	2	N/A	X	N/A	X	X
SG 960	2	X	X	X	X	N/A
SG 960 LE	2	X	X	X	X	N/A
SG 960 LAM	2	X	X	X	X	N/A
SG 960 SS	2	X	X	X	N/A	X
SG 2106	2	N/A	N/A	N/A	N/A	X
SG 2006	2	N/A	N/A	N/A	N/A	X

Note: X = available

The third level is referred to as ultra-high purity. This level requires the highest level of purity for components in a gas delivery system. Trace measurement in gas chromatography is an example of an ultra-high purity application. Wetted materials for manifolds at this level must be selected to minimize trace components adsorption. These materials include 316 Stainless Steel, Teflon®, Tefzel® and Viton®. All tubing should be 316SS cleaned and passivated. Flow shut-off valves must be diaphragm pack less.

It is particularly important to recognize that components that are suitable for multi-purpose applications may adversely affect results in high or ultra-high purity applications. For example, out-gassing from neoprene diaphragms in regulators can cause excessive baseline drift and unresolved peaks.

Types of Gas Delivery Systems

Single-Station Systems - In some applications, a gas is used only to calibrate instrumentation. For example, a continuous emissions monitoring system (CEMS) may only require calibration gases to flow for a few minutes each day. Such an application clearly does not require a large-scale automatic changeover manifold. However, the delivery system should be designed to protect against contamination of the calibration gas and to minimize costs and problems associated with cylinder change outs.

A single station manifold with bracket is an ideal solution for this type of application. It provides a safe and cost-effective means of connecting and changing out cylinders by eliminating the need to struggle with the regulator. When the calibration gas includes corrosive components such as HCl or NO, a purge assembly should be incorporated into the manifold to allow the regulator to be purged with an inert gas (usually nitrogen) to protect it from corrosion. The single-station manifold can also be equipped with a second pigtail. This arrangement allows an additional cylinder to be connected or held in reserve. Switchover is accomplished manually using the cylinder shut off valves. This configuration is usually desirable with calibration gases since the precise mix of components generally varies somewhat from cylinder to cylinder, and a cylinder change may require resetting the instrument.

Semi-Automatic Switchover Systems - Many applications require larger volumes of gases beyond what is practical for a single station manifold. Any pause in the gas supply results in lost or ruined experiments, a loss of productivity and even downtime for an entire laboratory. Semi-automatic switchover systems provide the capability to switch from a primary to a reserve cylinder or bank without interrupting the gas supply minimizing costly downtime. Once the primary cylinder or bank is depleted, the system automatically switches to the reserve cylinder or bank for continuous gas flow. The user then changes the empty cylinders out for new cylinders while the gas is still flowing from the reserve side. A bi-directional valve is used to indicate the primary or reserve side upon cylinder change out.

Fully Automatic Programmable Switchover Systems – In some critical manufacturing and laboratory processes, an uninterrupted gas supply is an absolute necessity. Failure of the gas supply in these cases could result in loss of an entire lab's in-process experiments or even shutdown of a production line. The potential cost of either of these events is so high that the installation of a gas delivery system designed to provide an uninterrupted gas supply is clearly justified. A fully automatic programmable switchover system is generally selected for these applications.

These systems perform similar to the semi-automatic systems, but offer added features such as programmable switchover between the primary and reserve banks, automatic leak detection and telemetry options for remote sensing and gas level detection.

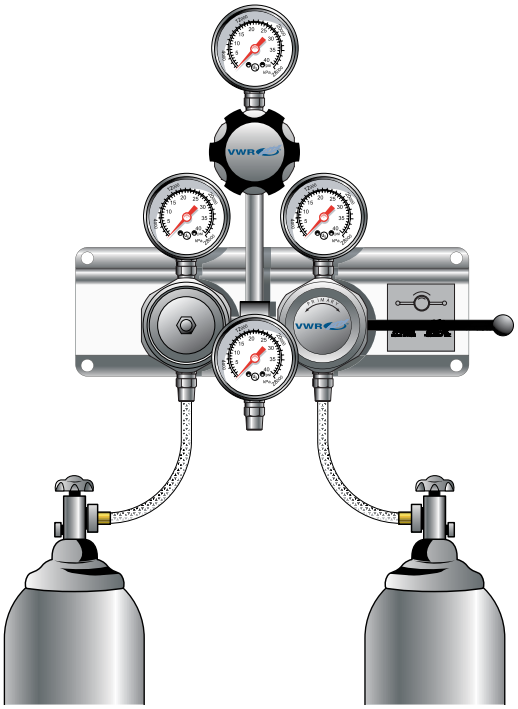
Switchover Method			**Standard PSIG Delivery**	**Gas Compatibility**				
Pressure Differential	Manual	Fully Automatic	**Pressure Ranges**	Inert	Oxy	Fuel Gas	Corrosive Gases	Liquid Cyl.
N/A	N/A	N/A	0-15 to 0-500	X	X	X	X	X
X	N/A	N/A	0-15 to 0-125	X	X	X	X	X
X	N/A	N/A	0-15 to 0-125	X	X	N/A	X	X
N/A	N/A	X	30-100 to 50-200	X	X	X	N/A	X
N/A	N/A	X	30-100 to 50-200	X	X	N/A	N/A	X
N/A	N/A	X	0-225	X	X	N/A	N/A	X
N/A	N/A	X	0-225	X	X	X	X	X
X	N/A	N/A	0-4500	X	N/A	X	N/A	N/A
N/A	X	N/A	0-4500	X	N/A	X	N/A	N/A

NONCORROSIVE GASES

SG900 Designed to prevent running out of gas during testing also prevents downtime while changing out empty cylinders. The manifold will automatically switch gas supply from the Primary Cylinder (right side) to the Reserve Cylinder when the gas in the Primary Side is depleted. This will happen when the pressure on the Primary Gauge drops down to approximately 160 PSI. When the user changes the empty to a new cylinder; you must then turn the black lever over to the (left side) and this is now the Primary use side. Repeat the process when the Left Side Gauge drops down to approximately 160 PSI. This manifold is available in Chrome Plated Brass and Stainless Steel for (Corrosive Gases) All the Pigtails have a reverse flow check valve installed to prevent back flow of gases while changing cylinders. The outlet fitting on the delivery regulator is ¼" NPT Female Pipe.

Features:

- Wall mounting panel
- Maximum inlet pressure 3000 psig
- Switchover pressure
- Ideal for CO2 incubators
- Includes delivery pressure regulator
- All systems include stainless steel pigtails with a stainless steel inner core

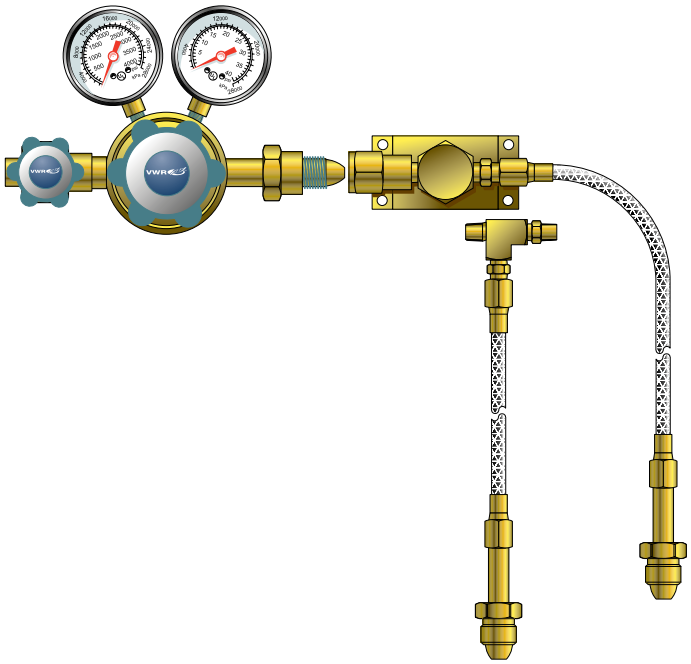


Catalog No.	Description	Gas Service	CGA Inlet
Semi - Automatic Manifold - Chrome Plated Brass - Includes delivery pressure regulator and pigtails			
82023-734	1x1-0-15 psi delivery	Carbon Dioxide	320
82023-736	1x1-0-50 psi delivery	Carbon Dioxide	320
82023-738	1x1-0-125 psi delivery	Carbon Dioxide	320
82023-742	1x1-0-50 psi delivery	Oxygen	540
82023-744	1x1-0-125 psi delivery	Oxygen	540
82023-746	1x1-0-15 psi delivery	Argon / N2 / He	580
82023-748	1x1-0-50 psi delivery	Argon / N2 / He	580
82023-750	1x1-0-125 psi delivery	Argon / N2 / He	580

NONCORROSIVE AND CORROSIVE GASES

Single Regulator Manifolds are for use with cylinders with a maximum inlet of 3000 PSIG. May be used with single- and two-stage general purpose, high-purity brass, high-purity stainless steel pressure regulators as well as two-stage analytical pressure regulators. One-cylinder systems include one 36" pigtail; two-cylinder systems include two 36" pigtails.

Ordering information: Regulators must be purchased separately.



Features:

- Wall bracket included
- Maximum inlet pressure 3000 psig
- Includes 36" stainless steel lined stainless steel pigtail

Materials:

- Pigtails 36" Stainless Steel Corrugated Bellows
- Bracket 304 Stainless Steel
- Fittings Brass or 316 Stainless Steel

Catalog No.	Description	Gas Service	CGA Inlet
Brass Protocol Station - One Cylinder (order regulators separately)			
82023-694	Includes brass wall bracket and 1 pigtail	Carbon Dioxide	320
82023-702	Includes brass wall bracket and 1 pigtail	Oxygen	540
82023-704	Includes brass wall bracket and 1 pigtail	Argon / N2 / He	580
Brass Protocol Station - Two Cylinder (order regulators separately)			
82023-708	Includes brass wall bracket and 2 pigtail	Carbon Dioxide	320
82023-718	Includes brass wall bracket and 2 pigtail	Argon / N2 / He	580
Stainless Steel Protocol Station - One Cylinder (order regulators separately)			
82023-722	Includes stainless steel wall bracket and 1 pigtail	Argon / N2 / He	580

This is an all steel construction bracket with many quality construction features. The edges are protected with steel reinforced vinyl edge guarding to maintain and protect your cylinders and provide extra grip. Steel parts are sealed with epoxy powder paint to assure long service life and chemical resistance. Straps and cinch style buckles are chosen as primary means of support as they enable the cylinders to be held tight and secure against the brackets. Support straps are 1.5 inch wide by 54 inch long polypropylene with steel cinch buckle and rate a robust 1200 PSIG strength. Supports hold cylinders from 4.0 to 12.0 inch diameter.

Description	Dimensions, W x D x H cm(in.)	Catalog No.
Single Cylinder Wall Bracket	20.3 x 5.7 x 10.8 (8" x 2-1/4" x 4-1/4")	**82023-826**

Mounting Hole Size:
3/8" inch /10 mm

DOUBLE CYLINDER ADJUSTABLE BRACKET

Mounting Hole Size:
3/8"inch / 10 mm

Description	Dimensions, W x D x H cm(in.)	Catalog No.
Double Cylinder Wall Bracket	61 x 5.1 x 10.2 (24" x 2" x 4")	**82023-828**

TRIPLE CYLINDER ADJUSTABLE BRACKET

Mounting Hole Size:
3/8"inch / 10 mm

Description	Dimensions, W x D x H cm(in.)	Catalog No.
Triple Cylinder Wall Bracket	91.4 x 5.7 x 10.8 (36" x 2-1/4" x 4-1/4")	**82023-830**

SINGLE CYLINDER ADJUSTABLE BRACKET

Molded from reinforced polypropylene, the G 110 bracket can be adjusted to snugly support any cylinder from 4.0 to 14.0 inch diameter. Unit is first set to designated cylinder diameter with recessed set screws locking in width position. Permanently mounts to wall using fasteners. Fastener type depends on mounting surface (fasteners supplied by customer). Strap and security chain sets included.

Description	Dimensions, W x D x H cm(in.)	Catalog No.
Single Cylinder Adjustable Wall Bracket	22.9 x 10.2 x 12.7 (9" x 4" x 5")	**82023-832**

SINGLE CYLINDER FLOOR STAND

This stand, safely supports 4 inch through 10-inch diameter cylinders using a combination of cinch buckle, polypropylene strap, and 10 gauge steel bar. Designed and built for the safe storage of industrial and commercial use gas cylinders, this stationary rack is constructed from cold rolled steel. One cylinder capacity stands share the 1½ - inch polypropylene straps and steel cinch buckles used in our brackets. All welded construction and quality epoxy powder paint finishes provide structural integrity and long service life. As with our cylinder brackets, surfaces coming into direct contact with the cylinders are protected with steel reinforced vinyl edge guards, protecting your equipment.

Description	Dimensions, W x D x H cm(in.)	Catalog No.
Single Cylinder Floor Stand	40.6 x 40.6 x 38.1 (16" x 16" x 15")	**82023-836**

SINGLE STAGE / MULTISTAGE REGULATORS

General Purpose Single-Stage Gas Regulators
Catalog No. 55850-200 for Acetylene AA / FID / ICP
Catalog No. 55850-260 for Air ICP

High Purity Single-Stage Gas Regulators - Brass
Calibration Gases - Shop vwr.com for a complete selection

High Purity Single-Stage Regulators - Stainless Steel
Ultra - High Purity / Corrosive Gases - Shop vwr.com for a complete selection

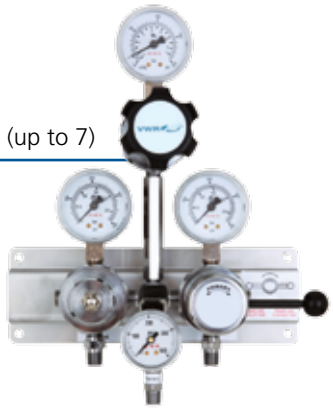
General Purpose Multistage Gas Regulator
Constant Delivery Pressure - No Fluctuation
Shop vwr.com for a complete selection

Multistage Gas Regulator
Catalog No. 55850-414 Recommended
For CO2 Incubators

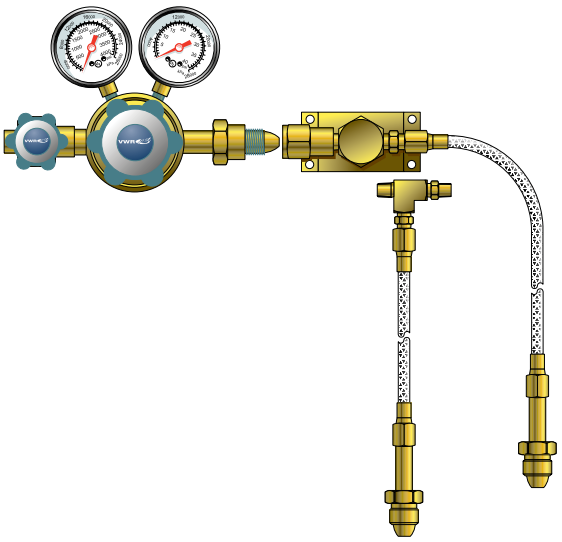
High Purity Two-Stage Gas Regulators For GC / MS
Catalog No. 55850-624 for Helium / Nitrogen
Catalog No. 55850-632 for Hydrogen
Catalog No. 55850-642 for Zero Air

High Purity Two-Stage Gas Regulators - Stainless Steel
For Ultra High Purity (6.0) or Corrosive Gases - Shop vwr.com for a complete selection

Semiautomatic Switchover Manifolds
for Noncorrosive Gases
Catalog No. 82023-736 for CO2 Incubators (up to 7)



Single Regulator Manifolds for High-Purity
Noncorrosive and Corrosive Gases
Shop vwr.com for a complete selection



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