SPECIALTY

Gas Regulation Equipment Catalog

24HR Shipping
For Most Regulator Configurations!

- General Purpose
- High Purity Analytical
- High Purity, Corrosion Resistant Stainless Steel
- High Purity, Brass
- High Pressure Regulator
- Cryogenic Regulator

ISO 9001 Certified Quality System
Made In The U.S.A.
www.smithequipment.com

SMITH® EQUIPMENT Silverline

Rev. 8/06

Smith Equipment Manufacturing was founded by Elmer Smith as Smith Inventions in 1916. Located in a garage in Minneapolis, it was primarily a design and manufacturing operation building a line of oxy-acetylene welding and cutting equipment. Over the years, Mr. Smith added other products and businesses but, for the most part, oxy-fuel gas apparatus was the primary product that stood the test of time.

In the late 1950's, a decision was made to expand the business into markets outside the welding industry and a "high pressure" regulator business was formed. Also, the name of the company was changed to TESCOM Corporation that is an acronym for The Elmer Smith Company of Minnesota. Eventually, Tescom consisted of four antonymous divisions, one of which was Smith Equipment Manufacturing which relocated to Watertown, SD in 1981.

Smith Equipment offers an extensive line of cutting torches, gas regulators, and tips. Smith also serves the HVAC and jewelry industries with a line of specialty products developed specifically for these unique applications. Other Smith products include gas mixing devices, aircraft pitot tubes and a complete line of specialty gas regulators. Smith serves the following industries: construction, steel fabrication, shipbuilding, maintenance, railroad, salvage, process chemical manufacturing, refining, aerospace, jewelry, hobby, HVAC, and general industry. Smith Equipment currently has 125 employees located at the Watertown South Dakota facility.

Smith's manufacturing operation consists of cellular business units for each product line, producing in high volume, "mass production" metal working equipment (CNC, automatic screw machines, line drilling), plating, swaging, assembly and test.

In 1998 Illiniois Tool Works (ITW) purchased Smith Equipment. Illinois Tool Works Inc. (NYSE:ITW) designs and produces an array of highly engineered fasteners and components, equipment and consumable systems, and specialty products and equipment for customers around the world. A Fortune 200 diversified manufacturing company with more than 90 years of history, ITW's 650 decentralized business units in 45 countries employ nearly 49,000 men and women who are focused on creating value-added products and innovative customer solutions.

We strongly believe the "future history" of Smith Equipment depends on every employee subscribing to the 80/20 rule and the five principles of focus, flow, simplify, empower and trust!!

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HOW TO SELECT

A SMITH EQUIPMENT SPECIALTY GAS REGULATOR

STEP 1 Determine gas and materials compatibility

Material compatibility between the gas being used and the materials of construction of the regulator is essential. Regulator components that come in contact with the gas stream called "wetted surfaces" must be compatible with the gas being used. Depending on the environment the regulator is being operated in, external materials of construction must be considered as well. Smith Equipment manufactures a wide variety of regulators from various materials to meet most any application. For more information on materials compatibility please refer to the "Material Compatibility Reference" located on page 11 of this catalog.

Types of inlet connections (CGA connections) are determined by the type of gas being used. You can determine what CGA connection you need by locating the gas you will be using in the "Regulator CGA Connections guide located on page 12 of this catalog.

STEP 2 Determine gas purity needs

The higher the purity grade of gas selected, the more "diffusion resistant" the system components need to be. Maintaining gas stream purity is directly related to the materials of construction in the equipment selected. For example when high purity gas is required, regulators with non-stainless steel diaphragms should not be used. Elastomeric (rubber based) diaphragms tend to absorb and outgas which may compromise the gas purity. Regulators with stainless steel metal to metal diaphragms prevent particulates from being absorbed and later diffused into the gas stream maintaining gas purity. To define the grade of regulator purity required, consider the following as a guide:

GENERAL PURPOSE REGULATORS- Are recommended for use with non-corrosive and non-hazardous pure and mixed gas applications where elastomeric outgassing is not critical. These regulators are not recommend for analytical or high purity applications. Typical applications included general laboratory or plant use. These regulators contain a self resetting safety relief valve vented to atmosphere to protect downstream equipment from over-pressurization and are available with optional needle valves.

HIGH PURITY ANALYTICAL REGULATORS- Are recommended for use with non-corrosive pure and mixed gas application. Typical applications include gas management of analytical instrumentation, chromatographic carrier gas, and process gas regulation. These units minimize outgassing and inboard diffusion through the use of stainless steel convoluted diaphragms and high purity seats and seal rings. These regulators contain a self resetting safety relief valve vented to atmosphere to protect downstream equipment from over-pressurization and are available with optional needle valves.

HIGH PURITY REGULATORS- Are recommended for use with non-corrosive pure and mixed gas application. Typical applications include gas management of analytical instrumentation, chromatographic carrier gas, and process gas regulation. These units minimize outgassing and inboard diffusion through the use of stainless steel convoluted diaphragms, high purity seats and seal rings. These regulators may be fitted with optional captured safety relief vents to safely vent away hazardous gasses and protect downstream equipment from over-pressurization in the event the diaphragm failures. Optional packless diaphragm valves are also available for these regulators.

HIGH PURITY CORROSION RESISTANT REGULATORS- Are recommended for use with mildly corrosive and non-corrosive gas applications. The stainless steel convoluted metal to metal diaphragm seal provides superior leak performance and eliminates the need for seal rings. The metal to metal seal eliminates outgassing and inboard diffusion in the gas stream. These regulators may be fitted with optional captured relief vents to safely vent away hazardous gasses and protect downstream equipment from over-pressurization in the event of a diaphragm failure. Optional packless diaphragm valves are also available for these regulators.

HOW TO SELECT

A SMITH EQUIPMENT SPECIALTY GAS REGULATOR

DELUXE CORROSION REGULATORS- Are recommended to control the pressure of highly corrosive and reactive gasses. All wetted surfaces of the deluxe corrosive service regulators are constructed of Monel, Inconel or PCTFE materials and are protected by two sintered Monel filters. These regulators are recommended for use with halogen gases.

STEP 3 Determine delivery pressure needs

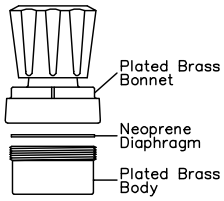
Single stage regulators reduce pressure by passing through one pressure reducing valve area in a single step to deliver a pressure within a specific range. Regulators designed in this way will show a slight increase in delivery pressure as the cylinder pressure falls during use. This phenomenon is known as decay/rise. This reduced inlet pressure provides less force against the regulator valve causing it to open wider resulting in increased pressure. If constant pressure is required, periodic adjustment of the regulator is required as the cylinder pressure is reduced. Two stage or dual stage regulators perform the same function as single stage regulators however; they are actually two regulators in the same housing. In two stage regulators delivery pressure remains constant as the cylinder pressure decreases. Greater accuracy in pressure control is maintained because the pressure is reduced by passing through two pressure reducing valves instead of one. The first stage reduces the incoming high pressure down from 3,000 psi to around 200-300 psi. The second stage is adjustable and reduces the remaining pressure down to the desired working pressure. Because the inlet pressure on the second stage is relatively stable from the first stage, two stage regulators maintain stable delivery pressure and do not require periodic adjustment as the cylinder pressure decreases.

In summary a single stage regulator will automatically increase outlet pressure as the cylinder pressure drops. A two stage regulator outlet pressure will remain constant when the cylinder pressure drops.

STEP 4 Determine outlet fitting requirements

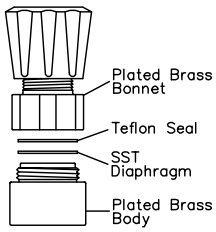
Specific outlet connections are determined by the gasses used as well as application and down stream requirements. Most regulators are available with or without outlet fittings and are configured at the time of ordering. Smith Equipment offers a wide variety of outlet fittings including standard hose fittings, needle valves, diaphragm valves, and tube fittings. Refer to the available options shown on the catalog page for the specific regulator chosen. Other options and accessories are also available as listed on specific regulator pages.

100 Series



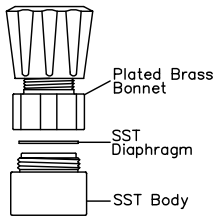
General Purpose
Low Leak Rate:
1 x 10^{-5}

200 Series



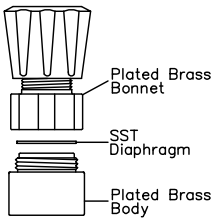
High Purity
Analytical
Low Leak Rate:
1 x 10^{-5}

300 Series



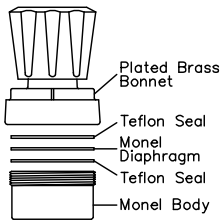
High Purity Stainless Steel
Corrosion Resistant
Low Leak Rate:
2 x 10^{-8} ccs

600 Series



High Purity Brass
Corrosion Resistant
Low Leak Rate:
2 x 10^{-8} ccs

700 Series



High Purity Monel Deluxe
Corrosion Resistant
Low Leak Rate:
1 x 10^{-5}

REGULATOR QUICK REFERENCE CHART

		Materials of Construction												
		Body			Diaphragm									
Regulator Series	Application	Stainless Steel	Electroless Nickel Plated Brass	Monel	Neoprene	Stainless Steel	Stainless Steel with O-Ring Seals	Piston	Monel	Single Stage	Two Stage	Line	Other	Catalog Page
100 Series	General Purpose		X		X							X		13
110 Series	General Purpose		X		X					X				14
120 Series	General Purpose		X		X						X			15
200 Series	High Purity Analytical		X				X					X		16
210 Series	High Purity Analytical		X				X			X				17
220 Series	High Purity Analytical		X				X				X			18
250 Series	High Purity Analytical		X				X			X			Rear Entry	19
300 Series	High Purity Corrosion Ressistant	X				X						X		20
310 Series	High Purity Corrosion Resistant	X				X				X				21
320 Series	High Purity Corrosion Resistant	X				X					X			22
420 Series	General Purpose		X		X					X			Lecture Bottle	23
520 Series	General Purpose		X				X			X			Lecture Bottle	24
600 Series	High Purity		X			X						X		25
610 Series	High Purity		X			X				X				26
620 Series	High Purity		X			X				X				27
630 Series	High Purity Analytical		X			X		X				X	Piston	28
700 Series	Deluxe Corrosion			X					X		X			29
820 Series	High Pressure		X					X		X			Piston	30

REGULATOR SELECTION GUIDE

The following information is provided as a guide to assist you in determining which regulator should be used for a given application. It should be noted however, that this information is based on SMITH EQUIPMENT'S experience to date and is believed to be reliable. These applications are only suggestions by SMITH EQUIPMENT and the user accepts full responsibility for their use and does so at his own discretion and risk.

SMITH EQUIPMENT strongly recommends that tests be run under actual operating conditions to determine the regulator's performance and compatibility with the gas to be used.

PURE GASES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
ACETYLENE				
Atomic absorption 99.6%	HP200	HP210	HP220	510
AIR				
Dry	GP100	GP110	GP120	590
Hydrocarbon Free	HP600/200	HP610/210	HP620/220	590
Zero	HP600/200	HP610/510	HP620/220	590
AMMONIA				
Anhydrous	HP300	HP 310	HP320	240/705
ARGON				
Research 99.9995%	HP600/200	HP610/210	HP620/220	580
U.H.P. 99.999%	HP600/200	HP610/210	HP620/220	580
Prepurified 99.998%	HP600/200	HP610/210	HP620/220	580
Zero 99.998%	HP600/200	HP610/210	HP620/220	580
High Purity 99.995%	HP600/200	HP610/210	HP620/220	580
BORON TRIFLUORIDE				
Minimum Purity 99.5%	HP300	HP310	HP320	330
1.3 BUTADIENE				
Instrument 99.5%	GP100	GP110	GP120	510
C.P. 99.0%	GP100	GP110	GP120	510
N-BUTAINE				
Research 99.9%	GP100	GP110	GP120	510
C.P. 99.0%	GP100	GP110	GP120	510
CARBON DIOXIDE				
Research 99.998%	HP600/200	HP610/210	HP620/220	320
Instrument (Coleman) 99.99%	HP600/200	HP610/210	HP620/220	320
C.P. 99.8%	GP100	GP110	GP120	320
CARBON MONOXIDE				
Ultra High Purity 99.9%	HP600/200	HP610/210	HP620/220	350
C.P. 99.0%	HP600/200	HP610/210	HP620/220	350
Commercial 98.0%	GP100	GP110	GP120	350
CHLORINE				
High Purity 99.5%	HP300	HP310	HP320	660
DEUTERIUM				
C.P. 99.5%	HP600/200	HP610/210	HP620/220	350
DIMETHYL ETHER				
Purity 99.5%	GP100	GP110	GP120	510
ETHANE				
Research 99.98%	NONE	HP610/210	HP620/220	350
C.P. 99.0%	NONE	HP610/210	HP620/220	350
Technical 97.5%	NONE	GP110	GP120	350
ETHYLENE				
Research 99.98%	NONE	HP610/210	HP620/220	350
C.P. 99.5%	NONE	HP610/210	HP620/220	350
Technical 98.55%	NONE	GP110	GP120	350
HELIUM				
Research 99.9995%	HP600/200	HP610/210	HP620/220	580
Ultra High 99.999%	HP600/200	HP610/210	HP620/220	580
Zero 99.995%	HP600/200	HP610/210	HP620/220	580
High Purity 99.995%	HP600/200	HP610/210	HP620/220	580

REGULATOR SELECTION GUIDE

PURE GASES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
HYDROGEN				
Research 99.9999%	HP600/200	HP610/210	HP620/220	350
Ultra High 99.999%	HP600/200	HP610/210	HP620/220	350
Zero 99.99%	HP600/200	HP610/210	HP620/220	350
Prepurified 99.99%	HP600/200	HP610/210	HP620/220	350
Extra Dry 99.95%	HP600/200	HP610/210	HP620/220	350
HYDROGEN CHLORIDE				
Chemical 99.0%	HP300	HP310	HP320	330
KRYPTON				
Research 99.995%	HP600/200	HP610/210	HP620/220	580
METHANE				
Research 99.99%	HP600/200	HP610/210	HP620/220	350
U.H.P. 99.97%	HP600/200	HP610/210	HP620/220	350
C.P. 99.0%	HP600/200	HP610/210	HP620/220	350
Technical 98.0%	GP100	GP110	GP120	350
Commercial 93.0%	GP100	GP100	GP120	350
NEON				
Research 99.999%	HP600/200	HP610/210	HP620/220	580
U.H.P. 99.996%	HP600/200	HP610/210	HP620/220	580
Purified 99.89%	HP600/200	HP610/210	HP620/220	580
NITROGEN				
Research 99.9995%	HP600/200	HP610/210	HP620/220	580
Ultra High 99.999%	HP600/200	HP610/210	HP620/220	580
Prepurified 99.998%	HP600/200	HP610/210	HP620/220	580
Zero 99.998%	HP600/200	HP610/210	HP620/220	580
High Purity 99.99%	HP600/200	HP610/210	HP620/220	580
Oxygen Free 99.99%	HP600/200	HP610/210	HP620/220	580
Extra Dry 99.7%	HP600/200	HP610/210	HP620/220	580
NITROUS OXIDE				
U.H.P. 99.99%	HP600/200	HP610/210	HP620/220	326
Atomic Absorption 99.0%	GP100	GP110	GP120	326
OXYGEN				
Research 99.995%	HP600/200	HP610/210	HP620/220	540
U.H.P. 99.99%	HP600/200	HP610/210	HP620/220	540
Zero 99.6%	HP600/200	HP610/210	HP620/220	540
Extra Dry 99.6%	HP600/200	HP610/210	HP620/220	540
PROPANE				
Research 99.99%	HP200	HP210	HP220	510
Instrument 99.5%	GP100	GP110	GP120	510
C.P. 99.0%	GP100	GP110	GP120	510
Natural 96.0%	GP100	GP110	GP120	510
PROPYLENE				
Research	HP200	HP210	HP220	510
C.P. 99.0%	GP100	GP110	GP120	510
SULFUR HEXAFLUORIDE				
Instrument 99.99%	HP600/200	HP610/210	HP620/220	590
C.P. 99.8%	GP100	GP110	GP120	590
XENON				
Research 99.995%	HP600/200	HP610/210	HP320/220	580

REGULATOR SELECTION GUIDE

MIXED GASES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
AMMONIA				
in Argon	HP300	HP310	HP320	705
in Helium	HP300	HP310	HP320	705
in Hydrogen	HP300	HP310	HP320	705
in Nitrogen	HP300	HP310	HP320	705
ARGON				
in Helium	HP600/200	HP610/210	HP620/220	580
in Hydrogen	HP600/200	HP610/210	HP620/220	580
in Nitrogen	HP600/200	HP610/210	HP620/220	580
in Oxygen	HP600/200	HP610/210	HP620/220	296
BUTANE				
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
CARBON DIOXIDE				
in Air	HP600/200	HP610/210	HP620/220	580
in Argon	HP600/200	HP610/210	HP620/220	580
in Helium	HP600/200	HP610/210	HP620/220	580
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	580
in Oxygen	HP600/200	HP610/210	HP620/220	296
CARBON MONOXIDE				
in Air	HP600/200	HP610/210	HP620/220	590
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	H600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
CHLORINE				
in Argon	HP300	HP310	HP320	330
in Helium	HP300	HP310	HP320	330
in Nitrogen	HP300	HP310	HP320	330
ETHANE				
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
ETHYLENE				
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
HELIUM				
in Argon	HP600/200	HP610/210	HP620/220	580
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	580
in Oxygen	HP/200	HP610/210	HP620/220	296
HEXANE				
in Air	HP600/200	HP610/210	HP620/220	350
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
HYDROGEN				
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350

REGULATOR SELECTION GUIDE

MIXED GASES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
HYDROGEN CHLORIDE				
in Argon	HP300	HP310	HP320	330
in Helium	HP300	HP310	HP320	330
in Nitrogen	HP300	HP310	HP320	330
HYDROGEN SULFIDE				
in Argon	HP300	HP310	HP320	330
in Helium	HP300	HP310	HP320	330
in Nitrogen	HP300	HP310	HP320	330
ISOBUTANE				
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
METHANE				
in Air	HP600/200	HP610/210	HP620/220	350 / 590
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
NITRIC OXIDE				
in Argon	HP300	HP310	HP320	660
in Helium	HP300	HP310	HP320	660
in Nitrogen	HP300	HP310	HP320	660
NITROGEN				
in Argon	HP600/200	HP610/210	HP620/220	580
in Hydrogen	HP600/200	HP610/210	HP620/220	580
in Helium	HP600/200	HP610/210	HP620/220	350
in Oxygen	HP600/200	HP610/210	HP620/220	296
NITROGEN DIOXIDE				
in Air	HP300	HP310	HP320	660
in Argon	HP300	HP310	HP320	660
in Helium	HP300	HP310	HP320	660
in Nitrogen	HP300	HP310	HP320	660
OXYGEN				
in Argon	HP600/200	HP610/210	HP620/220	590 / 296
in Helium	HP600/200	HP610/210	HP620/220	590 / 296
in Nitrogen	HP600/200	HP610/210	HP620/220	590 / 296
PROPANE				
in Air	HP600/200	HP610/210	HP620/220	590
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
PROPYLENE				
in Air	HP600/200	HP610/210	HP620/220	590
in Argon	HP600/200	HP610/210	HP620/220	350
in Helium	HP600/200	HP610/210	HP620/220	350
in Hydrogen	HP600/200	HP610/210	HP620/220	350
in Nitrogen	HP600/200	HP610/210	HP620/220	350
SULFUR DIOXIDE				
in Air	HP300	HP310	HP320	660
in Argon	HP300	HP310	HP320	660
in Helium	HP300	HP310	HP320	660
in Nitrogen	HP300	HP310	HP320	660

INSTRUMENT MIXTURES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
CHROMATOGRAPH CARRIER GAS 8.5% Hydrogen 91.5% Helium	HP600/200	HP610/210	HP620/220	350
ELECTRON CAPTURE MIXTURE P-5 Gas Mixture 5 % Methane	HP600/200	HP610/210	HP620/220	350
FLAME IONIZATION FUEL MIXTURES 40 % Hydrogen 60 % Helium	HP600/200	HP610/210	HP620/220	350
40 % Hydrogen 60 % Nitrogen	HP600/200	HP610/210	HP620/220	350
FURNACE ATMOSPHERE MIXTURES 40 % Carbon Dioxide 60 % Carbon Monoxide	HP600/200	HP610/210	HP620/220	350
GEIGER GAS MIXTURE .95 % ISO Butane 99.05 % Helium	HP600/200	HP610/210	HP620/220	350
LEAK DETECTION MIXTURE 1 - 10 % Helium in Nitrogen	HP600/200	HP610/210	HP620/220	580

NUCLEAR COUNTER MIXTURE	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
P-10 Gas Mixture 10 % Methane 90 % Argon	HP600/200	HP610/210	HP620/220	350
Proportional Counting Mixture 4 % ISO Butane 96 % Helium	HP600/200	HP610/210	HP620/220	350
1.5 % ISO Butane 98.5% Helium	HP600/200	HP610/210	HP620/220	350

AUTO EMISSION TEST GASES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
1-8 % Carbon Monoxide 500-5,000 ppm Propane in Nitrogen	NONE	HP610	HP620/220	350
1-8 % Carbon Monoxide 10-20 % Carbon Dioxide 500-5,000 ppm Propane in Nitrogen	NONE	HP610	HP620/220	350
I/M Field Calibration Gas 1.6 % Carbon Monoxide 11.0 % Carbon Dioxide 600 ppm Propane Balance Nitrogen	NONE	HP610	HP620/220	350

LASER GASES	LINE REGULATOR	CYLINDER REGULATOR		
	SINGLE STAGE	SINGLE STAGE	TWO STAGE	CGA INLET
EXCIMER LASER GAS MIXTURES Hydrogen Chloride in Helium	HP300	HP310	HP320	330
MOLECULAR LASER GAS MIXTURES 4.5 % Carbon Dioxide 13.5 % Nitrogen in Helium	HP600/200	HP610/210	HP620/220	580

MATERIAL COMPATIBILITY CHART

KEY

I = Insufficient data available to determine the compatibility with the intended gas.
U = Unsatisfactory for use with the intended gas.
S = Satisfactory for use with the intended gas (dry anhydrous) at normal operating temperature of 70°F.
C = Compatibility depends on condition of use

NOTE: *This chart is intended as a guide only. Actual applications may include variables which can effect the compatibility of certain materials with particular gases. Contact your gas supplier for additional compatibility information regarding the gases being used.*
** The user should be throughly familiar with the specific properties of the gas material compatability depends on condition of use.*

Gas	Primary Hazards					Metals					Plastics				Elastomers		
	Asphyxiant	Toxic	Flammable	Corrosive	Oxidizer	Aluminum	Brass	Copper	Monel	Stainless Steel	Kel-F/PCTFE	Teflon	Tefzel	Kynar	Viton	Buna-N	Neoprene
Acetylene	•		•			S	S	U	S	S	S	S	S	S	S	S	S
Air					•	S	S	S	S	S	S	S	S	S	S	S	S
Ammonia		•	•	•		S	U	U	S	S	S	S	S	S	S	S	S
Argon	•					S	S	S	S	S	S	S	S	S	S	S	S
*Arsine		•	•			I	S	S	S	S	S	S	S	S	S	S	S
Boron Trichloride		•		•		U	C	C	S	S	S	S	S	I	I	I	I
Boron Trifluoride		•		•		I	C	C	S	S	S	S	S	I	I	I	I
Boron-11 Trifluoride		•		•		I	C	C	S	S	S	S	S	I	I	I	I
*Bromine Trifluoride		•		•	•	C	C	C	S	S	C	C	S	U	U	U	U
1,3-Butadiene		•	•			S	S	S	S	S	S	S	S	S	S	S	S
n-Butane	•		•			S	S	S	S	S	S	S	S	S	S	S	S
1-Butene			•			S	S	S	S	S	S	S	S	S	S	S	S
cis-2-Butene			•			S	S	S	S	S	S	S	S	S	S	S	S
trans-2-Butene			•			S	S	S	S	S	S	S	S	S	S	S	S
Carbon Dioxide	•					S	S	S	S	S	S	S	S	S	S	C	C
Carbon Monoxide		•	•			S	S	S	S	S	S	S	S	S	S	S	S
Chlorine		•		•		U	U	U	S	S	S	S	S	S	S	U	U
*Chlorine Trifluoride		•		•	•	U	I	I	S	S	C	C	S	U	U	U	U
Deuterium	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Dichlorosilane		•	•	•		U	I	I	S	S	S	S	S	S	I	I	I
Di-, Mono-, and Trimethylamines		•	•	•		U	U	U	S	S	S	S	S	S	U	U	I
Disilane			•			S	S	S	S	S	S	S	S	S	S	S	S
Ethane	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Ethyl Chloride			•			S	S	S	S	S	S	S	S	S	S	S	S
Ethylene	•		•			S	S	S	S	S	S	S	S	S	S	S	S
*Fluorine		•		•	•	C	C	C	S	S	C	C	C	C	U	U	U
Halobarbon-14						S	S	S	S	S	S	S	S	S	S	S	S
Halocargon-23	•					S	S	S	S	S	S	S	S	S	S	S	S
Halocarbon-116	•					S	S	S	S	S	S	S	S	S	S	S	S
Helium	•					S	S	S	S	S	S	S	S	S	S	S	S
Hydrogen	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Hydrogen Bromide		•		•		U	U	U	S	S	S	S	S	S	S	U	U
Hydrogen Chloride		•		•		U	U	U	S	S	S	S	S	S	S	U	U
*Hydrogen Fluoride		•		•		U	U	U	S	S	S	S	S	S	U	U	U
*Hydrogen Sulfide		•	•	•		S	S	I	S	S	S	S	S	S	U	S	S
Isobutane	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Isobutylene	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Krypton	•					S	S	S	S	S	S	S	S	S	S	S	S
Methane	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Methyl Chloride		•	•			U	S	S	S	S	S	S	S	S	S	U	U
Methyl Fluoride		•	•			S	S	S	S	S	S	S	S	S	I	I	I
Neon	•					S	S	S	S	S	S	S	S	S	S	S	S
Nitrogen	•					S	S	S	S	S	S	S	S	S	S	S	S
Nitrogen Dioxide		•		•	•	S	U	U	U	S	S	S	I	I	U	U	U
Nitrogren Trifluoride		•			•	I	S	S	S	S	S	S	S	S	S	I	I
Nitrous Oxide					•	S	S	S	S	S	S	S	S	S	S	S	S
Octafluorocyclobutane	•					S	S	S	S	S	S	S	S	S	S	S	S
Octafluoropropane	•					S	S	S	S	S	S	S	S	I	I	S	S
*Oxygen					•	U	S	S	S	C	S	S	S	S	C	U	U
*Phosphine		•	•			S	I	I	S	S	S	S	S	I	I	I	I
Propane	•		•			S	S	S	S	S	S	S	S	S	S	S	S
Propylene	•		•			S	S	S	S	S	S	S	S	S	S	S	U
*Silane			•			S	S	S	S	S	S	S	S	S	S	S	S
Silicone Tetrachloride		•		•		U	U	U	S	S	S	S	S	S	U	U	U
Silicone Tetrafluoride		•		•		U	U	U	S	S	S	S	S	S	U	U	U
Sulfur Dioxide		•		•		S	U	S	S	S	S	S	S	S	S	U	U
Sulfur Hexafluoride	•					S	S	S	S	S	S	S	S	S	S	S	S
Sulfur Tetrafluoride		•		•		U	U	U	S	S	S	S	S	S	U	U	U
Tungsten Hexafluoride		•		•		U	U	U	S	S	S	S	S	S	U	U	U
Xenon	•					S	S	S	S	S	S	S	S	S	S	S	S

REGULATOR
CGA CONNECTIONS

GAS	CGA Inlet Connection
Acetylene	510
Air (Industrial)	590
Air (Breathing Air)	346
Allene	510
Ammonia	705, 240
Argon	580
Arsine	350
Boron Trichloride	660
Boron Trifluoride	330
Bromine Trifluoride	670
Bromine Pentafluoride	670
Bromotrifluoroethylene	510
1-3 Butadine	510
Butane	510
Butenes	510
Carbon Dioxide	320
Carbon Monoxide	350
Carbonyl Fluoride	750
Carbonyl Sulfide	330
Chlorine	660
Chlorine Trifluoride	670
Chlorotrifluoroethylene	510
Cyanogen	750
Cyanogen Chloride	750
Cyclopropane	510
Deuterium	350
Diborane	350
1,2-Dibromodifluoromethane	668
Dimethylamine	705
Dimethyl Ether	510
2-2 Dimethyl Propane	510
Ethane	350
Ethyl Acetylene	510
Ethyl Chloride	510
Ethylene	350
Ethylene Oxide	510
Fluorine	679
"Freon 12" (Dichlorodifluoromethane)	660
"Freon 13" (Chlorotrifluoromethane)	660
"Freon 13B1" (Bromotrifluoromethane)	660
"Freon 14" (Tetrafluoromethane)	580
"Freon 22" (Chlorodifluoromethane)	660
"Freon 114" (1, 2 Dichlorotetrafluoroethane)	660
"Freon 116" (Hexafluoroethane)	660
"Freon RC318" (Octafluorocyclobutane)	660
"Genetron 21" (Dichlorofluoromethane)	660
"Genetron 23" (Fluoroform)	660
"Genetron 115" (Monochloropentafluoroethane)	660
"Genetron 152A" (1, 1-Difluoroethylene)	350
"Genetron 1132A" (1, 1-Difluoroethylene)	350
Germane	350
Helium	580
Hexafluoroacetone	330
Hexafluoropropylene	660
Hydrogen	350
Hydrogen Bromide	330
Hydrogen Chloride	330
Hydrogen Fluoride	670
Hydrogen Selenide	350
Hydrogen Sulfide	330
Iodine Pentafluoride	670
Isobutane	510
Isobutylene	510
Krypton	580
Methane	350
Methyl Acetylene	510
Methyl Bromide	330
3-Methyl Butene-1	510
Methyl Chloride	510
Methyl Mercaptan	330
Monoethylamine	705
Monomethylamine	705
Natural Gas	350
Neon	580
Nickel Carbonyl	660
Nitric Oxide	660
Nitrogen	580
Nitrogen Dioxide	660
Nitrogen Trioxide	660
Nitrosyl Chloride	330
Nitrous Oxide (Formerly1320)	326
Oxygen	540
Perfluoro-2-Butene	660
Perfluoropropane	660
Phosgene	660
Phosphine	350
Phosphorous Pentafluoride	330
Propane	510
Propylene	510
Silane	350
Silicon Tetrafluoride	330
Sulfur Dioxide	660
Sulfur Hexafluoride	590
Sulfur Tetrafluoride	330
Sulfuryl Fluoride	660
Tetrafluoroethylene	350
Trimethylamine	705
Vinyl Bomide	510
Vinyl Chloride	510
Vinyl Fluoride	350
Vinyl Methyl Ether	510
Xenon	580

NOTE: The above are standard CGA connections and are designated by the Compressed Air Association

100 SERIES

GENERAL PURPOSE SINGLE STAGE LINE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These general purpose single stage regulators are recommended for inert and non-corrosive gas applications where precise control of delivery is not necessary. These regulators are not recommended for applications where inboard diffusion of air or outgassing of elastomeric components would adversely affect the work being done.

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Large 1 - 3/4″ diaphragm for precise control of pressure
- Large 2 - 1/2″ easy to read single scale gauges
- Rugged brass construction with bar stock body
- Plated body, bonnet, and gauges for superior protection

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100, 0-200 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/4" FNPT
Design Leak Rate	Bubble tight (1×10^{-5} ccs Helium)
Flow Coefficient Cv	0.20
Inlet Decay Rate	.138/100 PSIG
Weight	3 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Forging
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Neoprene
Gauge	2-1/2" Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

103 - 80 - 11

OPTION 1: MODEL SERIES & OUTLET PRESSURE

100	15 PSIG
101	50 PSIG
102	100 PSIG
103	200 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
04	1/4" MPT x 1/8" brass tube fitting
80	1/4" MPT x 1/8" brass tube fitting
81	1/4" MPT x 1/8" stainless

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
04	1/4" MPT x 1/8" brass tube fitting
11	1/4" MPT x 1/8" brass tube fitting
12	1/4" MPT x 1/8" stainless steel tube fitting

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 100 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
100	3000	15	--	--	0-30	1
101	3000	50	--	--	0-60	2
102	3000	100	--	--	0-200	5
103	3000	200	--	--	0-400	10

110 SERIES

GENERAL PURPOSE SINGLE STAGE CYLINDER REGULATORS

Sure-Seat™
technology for maximum life and gas purity

The general purpose single stage regulators are recommended for control of inert and non-corrosive gas applications. They are well suited for closely monitored analytical work and are ideal for use with liquefied hydrocarbon gases. These regulators are not recommended for applications where inboard diffusion of air or outgassing of elastomeric components would adversely affect the work being done. A preset safety relief valve vents to atmosphere, which makes this regulator suitable for only nonhazardous gases.

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Large 1 - 3/4″ diaphragm for precise control of pressure
- Large 2 - 1/2″ easy to read single scale gauges
- Built in capturable preset safety relief valve
- Rugged brass construction with bar stock body
- Plated body, bonnet, and gauges for superior protection

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100, 0-250 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (4)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" needle valve
Design Leak Rate	Bubble tight (1×10^{-5} ccs Helium)
Flow Coefficient Cv	0.20
Inlet Decay Rate	.58/100 PSIG
Weight	3.32 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Forging
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Neoprene
Gauge	2-1/2" Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel
Outlet Valve	Chrome Plated Brass

110 - 40 - 06

OPTION 1: MODEL SERIES & OUTLET PRESSURE

110	15 PSIG
111	50 PSIG
112	100 PSIG
113	250 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
20	Chrome Needle Valve with male 1/4" NPT outlet
40	Chrome Needle Valve with female 1/4" NPT outlet
41	Chrome Needle Valve with 1/8" brass tube fitting
42	Chrome Needle Valve with 1/8" stainless steel tube fitting
82	Chrome "B" fitting (9/16" - 18RH)
*84	Nickel Fuel Hose Connection (9/16" - 18LH)

** Only available and used with #110 body*

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
01	CGA 300*
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
07	CGA 510*
08	CGA 540
09	CGA 580
10	CGA 590

** Only available and used with #110 main body*

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 110 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
110	3000	15	0-3000	100	0-30	1
111	3000	50	0-3000	100	0-60	2
112	3000	100	0-3000	100	0-200	5
113	3000	250	0-3000	100	0-400	10

120 SERIES

GENERAL PURPOSE TWO STAGE CYLINDER REGULATORS

Sure-Seat™
technology for maximum life and gas purity

The general purpose two stage regulators are recommended for control of inert and non-corrosive pure gases in laboratories, general plant and maintenance shops where constant delivery pressures are required. These regulators are not recommended for applications where inboard diffusion of air or outgassing of elastomeric components would adversely affect the work being done. A preset safety relief valve vents to atmosphere, which makes this regulator suitable for only nonhazardous gases.

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Large 1 - 3/4″ diaphragm for precise control of pressure
- Large 2 - 1/2″ easy to read single scale gauges
- Built in capturable preset safety relief valve
- Rugged brass construction with bar stock body
- Plated body, bonnet, and gauges for superior protection

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100, 0-250 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (4)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" needle valve
Design Leak Rate	Bubble tight (1×10^{-5} ccs Helium)
Flow Coefficient Cv	0.20
Inlet Decay Rate	.042/100 PSIG
Weight	5 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet 1st Stage	Electroless Nickel Plated Brass Bar Stock
Bonnet 2nd Stage	Electroless Nickel Plated Brass Forging
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Neoprene
Gauge	2-1/2" Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel
Outlet Valve	Chrome Plated Brass

123 - 82 - 08

OPTION 1: MODEL SERIES & OUTLET PRESSURE

120	15 PSIG
121	50 PSIG
122	100 PSIG
123	250 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
20	Chrome Needle Valve with male 1/4" NPT outlet
40	Chrome Needle Valve with female 1/4" NPT outlet
41	Chrome Needle Valve with 1/8" brass tube fitting
42	Chrome Needle Valve with 1/8" stainless steel tube fitting
82	Chrome "B" fitting (9/16" - 18RH)
*84	Nickel Fuel Hose Connection (9/16" - 18LH)

** Only available and used with #120 body*

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
01	CGA 300*
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
07	CGA 510*
08	CGA 540
09	CGA 580
10	CGA 590

** Only available and used with #120 main body*

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 120 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
120	3000	15	0-3000	100	0-30	1
121	3000	50	0-3000	100	0-60	2
122	3000	100	0-3000	100	0-200	5
123	3000	250	0-3000	100	0-400	10

200 SERIES

HIGH PURITY ANALYTICAL BRASS LINE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These high purity single stage line regulators are recommended for low inlet pressure and pressure sensitive applications where diffusion resistance is required. They are recommended for low pressure pipelines serving gas chromatographs, mass spectrometers, and research sampling systems where brass construction is acceptable. These regulators are recommended for high purity inert and non-corrosive applications. The regulators are able to withstand vacuums generated during purging operations.

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Convoluted stainless steel diaphragm for precise control of pressure
- Large 2 - 1/2″ easy to read single scale gauges
- Bonnet is threaded for rear bracket mounting
- Body is threaded for rear bracket mounting
- Rugged all brass bar stock construction
- Plated body, bonnet, and gauges for superior protection
- Built in capturable preset safety relief valve

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/4" FNPT
Design Leak Rate	Bubble tight (1×10^{-5} ccs Helium)
Flow Coefficient Cv	0.157
Inlet Decay Rate	.023/100 PSIG
Weight	3 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Bar Stock
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Stainless Steel
Gauge	2-1/2" Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel
Seals	Teflon®

200 - 80 - 11

OPTION 1: MODEL SERIES & OUTLET PRESSURE

200	15 PSIG
201	50 PSIG
202	100 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
04	1/4" MPT x 1/8" brass tube fitting
80	1/4" MPT x 1/8" brass tube fitting
81	1/4" MPT x 1/8" stainless steel tube fitting
82	Nickel "B" fitting (9/16" -18RH)
83	1/4" MPT x 1/4" Stainless Steel Tube Fitting

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
04	1/4" MPT x 1/8" brass tube fitting
11	1/4" MPT x 1/8" brass tube fitting
12	1/4" MPT x 1/8" stainless steel tube fitting

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 200 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
200	3000	15	--	--	30" Hg 0-30	1
201	3000	50	--	--	0-60	2
202	3000	100	--	--	0-200	5

210 SERIES

HIGH PURITY ANALYTICAL BRASS SINGLE STAGE CYLINDER REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These high purity single stage regulators are designed to control high purity, non-corrosive gases for applications where precise control of delivery pressure is not necessary. Recommended applications are in instrument analysis, automotive emissions testing, biological laboratories and chemical process plants where brass construction is acceptable. The materials of construction will not contaminate the gas stream, and are highly resistant to inboard diffusion of atmospheric contamination. These regulators are able to withstand vacuums generated during purging operations

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Convoluted stainless steel diaphragm for precise control of pressure
- Large 2 - 1/2" easy to read single scale gauges
- Bonnet is threaded for panel mounting
- Body is tapped for rear bracket mounting
- Rugged all brass bar stock construction
- Plated body, bonnet, and gauges for superior protection
- Built in capturable preset safety relief valve

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100, 0-150 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (4)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" needle valve
Design Leak Rate	Bubble tight (1 x 10^{-5} ccs Helium)
Flow Coefficient Cv	0.178
Inlet Decay Rate	0.35/100 PSIG
Weight	3.32 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Bar Stock
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Stainless Steel
Gauge	2-1/2" Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Outlet Valve	Chrome Plated Brass
Seals	Teflon®

212 - 41 - 09

OPTION 1: MODEL SERIES & OUTLET PRESSURE

210	15 PSIG
211	50 PSIG
212	100 PSIG
213	150 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
01	1/4" FNPT Chrome Diaphragm Valve
20	Chrome Needle Valve with male 1/4" NPT outlet
40	Chrome Needle Valve with female 1/4" NPT outlet
41	Chrome Needle Valve with 1/8" brass tube fitting
42	Chrome Needle Valve with 1/8" stainless steel tube fitting
82	Nickel "B" fitting (9/16" - 18RH)
*84	Nickel Fuel Hose Connection (9/16" - 18LH)

** Only available and used with #210 body*

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
01	CGA 300*
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
07	CGA 510*
08	CGA 540
09	CGA 580
10	CGA 590
13	CGA 296*

** Only available and used with #210 series*

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 210 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
210	3000	15	0-3000	50	30" Hg 0-30	1
211	3000	50	0-3000	50	0-60	2
212	3000	100	0-3000	50	0-200	5
213	3000	150	0-3000	50	0-200	5

220 SERIES

HIGH PURITY ANALYTICAL TWO STAGE BRASS CYLINDER REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These high purity two stage regulators are recommended for high purity, non-corrosive pure gases and mixtures in applications where constant delivery pressures are required. These regulators are ideally suited for the control of carrier gases or calibration mixtures used in gas chromatography such as thermal conductivity, flame ionization, flame photometry, and electron capture. This two stage design allows for precise control from full to nearly empty cylinders and is recommended in applications where constant delivery pressures, regardless of fluctuations in cylinder pressure, are required. An automatic reseating safety relief valve protects the regulator components from over pressurization. These regulators are able to withstand vacuums generated during purging operations.

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Convoluted stainless steel diaphragm for precise control of pressure
- Large 2 - 1/2" easy to read single scale gauges
- Front and rear bonnet is threaded for panel mounting
- Rugged all brass bar stock construction
- Plated body, bonnet, and gauges for superior protection
- Built in capturable preset safety relief valve

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100 0-150 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (4)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" needle valve
Design Leak Rate	Bubble tight (1×10^{-5} ccs Helium)
Flow Coefficient Cv	0.05
Inlet Decay Rate	0.025/100 PSIG
Weight	5 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet 1st Stage	Electroless Nickel Plated Brass Bar Stock
Bonnet 2nd Stage	Electroless Nickel Plated Brass Bar Stock
Seat	Teflon®
Seat Retainer	Brass
Diaphragm 1st Stage	Stainless Steel
Diaphragm 2nd Stage	Stainless Steel
Gauge	2-1/2" Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel
Outlet Valve	Chrome Plated Brass
Seals	Teflon®

222 - 40 - 03

OPTION 1: MODEL SERIES & OUTLET PRESSURE

220	15 PSIG
221	50 PSIG
222	100 PSIG
223	150 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
01	1/4" FNPT Chrome Diaphragm Valve
20	Chrome Needle Valve with male 1/4" NPT outlet
40	Chrome Needle Valve with female 1/4" NPT outlet
41	Chrome Needle Valve with 1/8" brass tube fitting
42	Chrome Needle Valve with 1/8" stainless steel tube fitting
82	Nickel "B" fitting (9/16" - 18RH)
*84	Nickel Fuel Hose Connection (9/16" - 18LH)

** Only available and used with #220 body*

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
07	CGA 510*
08	CGA 540
09	CGA 580
10	CGA 590
13	CGA 296*

** Only available and used with #220 series*

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 220 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
220	3000	15	0-3000	50	30" Hg 0-30	1
221	3000	50	0-3000	50	0-60	2
222	3000	100	0-3000	50	0-200	5
223	3000	150	0-3000	50	0-200	5

250 SERIES

HIGH PURITY ANALYTICAL BRASS LIQUID CYLINDER REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These high purity single stage regulators are designed for use on liquid cylinders. The regulator has rear entry which allows for easy connection to the liquid cylinder. The stainless steel diaphragm will provide a long service life in cryogenic applications.
This regulator controls the delivery of gasses not liquids.
Typical applications include high purity gas handling, bulk gas distribution, liquid cylinders and laboratories.

DESIGN FEATURES

- Filtered seat for added gas stream purity, and extended service life
- Large 2 - 1/8″ diaphragm for precise control of pressure
- Large 2 - 1/2″ easy to read single scale gauges
- Rugged all brass bar stock construction
- Plated body, bonnet, and gauges for superior protection
- Built in capturable preset safety relief valve

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/4" FNPT
Design Leak Rate	Bubble tight (1×10^{-5} ccs Helium)
Flow Coefficient Cv	0.157
Inlet Decay Rate	0.23/100 PSIG
Weight	3 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Bar Stock
Diaphragm	Stainless Steel
Seat	Teflon®
Seat Retainer	Brass
Gauge	Chrome Plated
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

252 - 20 - 08

OPTION 1: MODEL SERIES & OUTLET PRESSURE		OPTION 2: OUTLET FITTINGS		OPTION 3: CGA INLET FITTINGS	
252	100 PSIG	00	1/4" FNPT	00	1/4" FNPT
254	200 PSIG	20	Chrome Needle Valve with male 1/4" NPT outlet	02	CGA 320
255	350 PSIG			08	CGA 540
256	500 PSIG			09	CGA 580

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 250 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
252	3000	100	0-200	5
254	3000	200	0-400	10
255	3000	350	0-400	10
256	3000	500	0-1000	20

300 SERIES

HIGH PURITY CORROSION RESISTANT STAINLESS STEEL LINE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These stainless steel high purity, single stage line regulators are recommended for applications where diffusion resistance is required. These regulators are recommended for chromatographs, mass spectrometers, research sampling systems and semi-conductor processing that is being serviced by a low pressure pipeline system. These regulators are able to withstand internal vacuums generated during purging operations. There is a 1/16" FNPT bonnet port to allow for the venting of hazardous gases. This regulator may be panel mounted by using a bonnet mounting nut or the threaded holes in the back of the regulator.

DESIGN FEATURES

- 316 Stainless steel filtered seat for added gas stream purity, and extended service life
- Convoluted stainless steel diaphragm for precise control of pressure
- Metal to metal diaphragm seal for maximum leak integrity
- Large 2 - 1/2″ easy to read single scale gauges
- Bonnet is threaded for front panel mounting
- Body is threaded for rear bracket mounting
- 316 stainless steel bar stock body
- Captured vent port in bonnet (1/16″ FNPT) allows for safe venting of hazardous gases

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-25, 0-100 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/4" FNPT
Design Leak Rate	2 x 10^{-8} ccs Helium
Flow Coefficient Cv	0.15
Weight	2 lbs.

MATERIALS OF CONSTRUCTION

Body	316 Stainless Steel
Bonnet	Electroless Nickel Plated Brass
Seat	Teflon®
Seat Retainer	316 Stainless Steel
Diaphragm	Stainless Steel
Gauge	2-1/2" Stainless Steel
Filter	316 Stainless Steel
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

300 - 81 - 12 - 01 - 00

OPTION 1: MODEL SERIES & OUTLET PRESSURE		OPTION 2: OUTLET FITTINGS		OPTION 3: CGA INLET FITTINGS		OPTION 4: ACCESSORIES		OPTION 5: OPTIONS	
300	25 PSIG	00	1/4" FNPT	00	1/4" FNPT	00	None	00	None
302	100 PSIG	81	1/4" MPT x 1/8" Stainless Steel tube fitting	12	1/4" MPT x 1/8" Stainless Steel tube fitting	01	Panel Mount Kit	01	Captured vent fitting 1/16" MPT x 1/8" tube
		83	1/4" MPT x 1/4" Stainless Steel tube fitting	25	660 Stainless Steel	02	Helium Leak Certification		
						03	Panel Mount Kit and Certification		

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 300 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
300	3000	25	--	--	30" Hg 0-30	1
302	3000	100	--	--	0-200	5

310 SERIES

HIGH PURITY CORROSION RESISTANT STAINLESS STEEL SINGLE STAGE REGULATOR

Sure-Seat™
technology for maximum life and gas purity

NOTE: A Cross Purge Assembly must be used with this series of regulators to ensure effective purging of hazardous gas traces during cylinder changes.

This single stage high purity regulator is designed to prevent contamination of high purity systems and provide accurate regulation of corrosive, non-corrosive or toxic gases. For corrosive applications, all parts in this regulator exposed to the flowing media are constructed of 316 Stainless Steel and Teflon®. The specially designed and convoluted stainless steel diaphragm gives maximum accuracy and provides stable regulation of delivery pressure. This regulator is capable of withstanding an internal vacuum and available with diffusion resistant, packless diaphragm outlet valve to maintain system purity. A 1/16" FNPT port in the bonnet is provided to vent hazardous gases in the event of a diaphragm failure.

DESIGN FEATURES

- 316 Stainless steel filtered seat for added gas stream purity, and extended service life
- Convoluted stainless steel diaphragm for precise control of pressure
- Metal to metal diaphragm seal for maximum leak integrity
- Large 2 - 1/2" easy to read single scale gauges
- Bonnet is threaded for front panel mounting
- Body is tapped for rear bracket mounting
- 316 stainless steel bar stock body
- Captured vent port in bonnet (1/16" FNPT) allows for safe venting of hazardous gases

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-25, 0-50, 0-100, 0-250 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (5)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" Stainless steel diaphragm valve
Design Leak Rate	(2 x 10^{-8} ccs Helium)
Flow Coefficient Cv	0.06
Inlet Decay Rate	0.75/100 PSIG
Weight	3.32 lbs.

MATERIALS OF CONSTRUCTION

Body	316 Stainless Steel bar stock
Bonnet	Electroless Nickel Plated Brass
Seat	Teflon®
Seat Retainer	316 Stainless Steel
Diaphragm	Stainless Steel
Gauge	2-1/2" Stainless Steel
Filter	316 Stainless Steel
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel
Outlet Valve	316 Stainless Steel

313 - 67 - 23 - 01 - 01

OPTION 1: MODEL SERIES & OUTLET PRESSURE

310	25 PSIG
311	50 PSIG
312	100 PSIG
313	250 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
66	1/4" MPT Stainless Steel Needle Valve
67	1/4" MPT Stainless Steel Diaphragm Valve
68	1/4" FPT Stainless Steel Needle Valve with 1/8" tube fitting
69	1/4" FPT Stainless Steel Diaphragm Valve with 1/8" tube fitting
70	1/4" FNPT Stainless Steel Diaphragm Valve
81	1/4" MPT x 1/8" Stainless Steel tube fitting
83	1/4" MPT x 1/4" Stainless Steel tube fitting
85	1/4" FPT Stainless Steel Diaphragm Valve with 1/4" tube fitting

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
20	CGA SS 320
21	CGA SS 326
22	CGA SS 330
23	CGA SS 350
24	CGA SS 580
25	CGA SS 660
30	CGA SS 240
31	CGA SS 705
32	CGA SS 590
33	CGA SS 540

OPTION 4: ACCESSORIES

00	None
01	Panel Mount Kit
02	Helium Leak Certification
03	Panel Mount Kit and Certification

OPTION 5: OPTIONS

00	1/4" FNPT
01	Captured vent fitting 1/16" MPT x 1/8" tube

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 310 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
310	3000	25	0-3000	50	30° Hg-0-30	1
311	3000	50	0-3000	50	0-100	2
312	3000	100	0-3000	50	0-200	5
313	3000	250	0-3000	50	0-200	10

320 SERIES

HIGH PURITY CORROSION RESISTANT STAINLESS STEEL TWO STAGE REGULATOR

Sure-Seat™
technology for maximum life and gas purity

This high purity two stage regulator is designed for corrosive and non-corrosive gases requiring precise and stable delivery pressure control. These regulators provide constant pressure regardless of inlet pressure fluctuations. This stainless steel regulator offers high corrosion resistance and wetted parts of 316 Stainless Steel and Teflon® for high purity applications. This regulator features a unique metal diaphragm seal. Captured vent ports are provided for both stages to allow for venting of hazardous gases in the event of a diaphragm failure. This regulator is designed to withstand internal vacuums during purging operations.

Note: A Cross Purge Assembly must be used with this series of regulators to ensure effective purging of hazardous gas traces during cylinder changes.

DESIGN FEATURES

- 316 Stainless steel filtered seat for added gas stream purity, and extended service life
- Convoluted stainless steel diaphragm for precise control of pressure
- Metal to metal diaphragm seal for maximum leak integrity
- Large 2 - 1/2″ easy to read single scale gauges
- Front bonnet is threaded for front panel mounting
- 316 stainless steel bar stock body
- Captured vent port in bonnet (1/16″ FNPT) allows for safe venting of hazardous gases

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-25, 0-50, 0-100, 0-250 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (5)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" Stainless steel diaphragm valve
Design Leak Rate	(2 x 10^{-8} ccs Helium)
Flow Coefficient Cv	0.05
Inlet Decay Rate	0.04/100 PSIG
Weight	5 lbs.

MATERIALS OF CONSTRUCTION

Body	316 Stainless Steel bar stock
Bonnet 1st Stage	Electroless Nickel Plated Brass
Bonnet 2nd Stage	Electroless Nickel Plated Brass
Seat	Teflon®
Seat Retainer	316 Stainless Steel
Diaphragm 1st Stage	Stainless Steel
Diaphragm 2nd Stage	Stainless Steel
Gauge	2-1/2" Stainless Steel
Filters (2)	316 Stainless Steel
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

322 - 68 - 25 - 00 - 01

OPTION 1: MODEL SERIES & OUTLET PRESSURE

320	25 PSIG
321	50 PSIG
322	100 PSIG
323	250 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
66	1/4" MPT Stainless Steel Needle Valve
67	1/4" MPT Stainless Steel Diaphragm Valve
68	1/4" FPT Stainless Steel Needle Valve with 1/8" tube fitting
69	1/4" FPT Stainless Steel Diaphragm Valve with 1/8" tube fitting
70	1/4" FNPT Stainless Steel Diaphragm Valve
81	1/4" MPT x 1/8" Stainless Steel tube fitting
83	1/4" MNPT x 1/4" Stainless Steel Tube Fitting
85	1/4" FPT x 1/4" Stainless Steel Diaphragm Valve with 1/4" tube fitting

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
20	CGA SS 320
21	CGA SS 326
22	CGA SS 330
23	CGA SS 350
24	CGA SS 580
25	CGA SS 660
30	CGA SS 240
31	CGA SS 705
32	CGA SS 590
33	CGA SS 540

OPTION 4: ACCESSORIES

00	None
01	Panel Mount Kit
02	Helium Leak Certification
03	Panel Mount Kit and Certification

OPTION 5: OPTIONS

00	1/4" None
02	Captured vent fitting 1/16" MNPT x 1/8" tube

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 320 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
320	3000	25	0-3000	50	30" Hg 0-30	1
321	3000	50	0-3000	50	0-100	2
322	3000	100	0-3000	50	0-200	5
323	3000	250	0-3000	50	0-200	10

420 SERIES

SINGLE STAGE GENERAL PURPOSE ECONOMY LECTURE BOTTLE REGULATOR

These single stage general purpose regulators are light weight and compact making them ideal for lecture bottles or other small cylinders. They are recommended for inert and non-corrosive gas application where precise control of delivery is not necessary. The internal needle valve built into the regulator body makes this regulator both functional and economical; includes CGA 180 connections and 1/8″ tube fitting outlet. These regulators are not recommended for applications were inboard diffusion of air or outgassing of elastromeric components would adversely affect the work being done.

DESIGN FEATURES

- Built in non-lubricated needle valve
- 1-1/4″ Nylon Reinforced Diaphragm
- Stem Type Seat Mechanism
- 1-1/2″ Gauges
- Large Adjusting knob for easy yet sensitive pressure adjustment
- Rugged brass bar stock construction
- Plated body and bonnet for superior protection.

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-100 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/8" FNPT
Design Leak Rate	Bubble Tight Helium
Flow Coefficient Cv	0.08
Inlet Decay Rate	.58/100 PSI
Weight	1.5 lbs.
Outlet	1/8" tube fitting

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Brass Bar Stock
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Neoprene
Gauge	1-1/2" Black ABS
Filters	Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

ORDERING INFORMATION FOR 420 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
420	3000	15	0-3000	50	0-30	1
421	3000	100	0-3000	50	0-100	5

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

520 SERIES

HIGH PURITY ANALYTICAL SINGLE STAGE BRASS ECONOMY LECTURE BOTTLE REGULATORS

These single stage high purity analytical brass regulators are light weight and compact making them ideal for lecture bottles or other small cylinders. They are recommended for inert and mildly corrosive gas application where precise control of delivery is not necessary. The internal needle valve built into the regulator body makes this regulator both functional and economical; includes CGA 180 connections and 1/8″ tube fitting outlet.

DESIGN FEATURES

- Built in non-lubricated needle valve
- 1-1/8″ 316 Stainless Steel Diaphragm
- Stem Type Seat Mechanism
- 1-1/2″ Gauges
- Large Adjusting knob for easy yet sensitive pressure adjustment
- Rugged brass bar stock construction
- Plated body and bonnet for superior protection.

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-100 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/8" FNPT
Design Leak Rate	Bubble Tight Helium
Flow Coefficient Cv	0.08
Inlet Decay Rate	.58/100 PSI
Weight	1.5 lbs.
Outlet	1/8" tube fitting

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Brass Bar Stock
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Stainless Steel
Gauge	1-1/2" Black ABS
Filters	Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

ORDERING INFORMATION FOR 520 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
520	3000	15	0-3000	50	0-30	1
521	3000	100	0-3000	50	0-100	5

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

600 SERIES

HIGH PURITY BRASS LINE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These brass high purity, single stage line regulators are recommended for applications where diffusion resistance is required. These regulators are recommended for chromatographs, mass spectrometers, research sampling systems and semiconductor processing that is being serviced by a low pressure pipeline system. These regulators are able to withstand internal vacuums generated during purging operations. There is a 1/16" FNPT bonnet port to allow for the venting of hazardous gases. This regulator may be panel mounted by using a bonnet mounting nut or the threaded holes in the back of the regulator.

DESIGN FEATURES

- Filtered seat for added gas stream purity
- Stainless steel diaphragm
- 2 1/2″ dual scale gauges
- 316 stainless steel filter
- Brass nickel plated bar stock body
- Threaded bonnet for panel mounting
- Body is tapped for rear bracket mounting
- Captured vent in bonnet (1/16″ FNPT)
- Metal to metal body to diaphragm seal

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-25, 0-50, 0-100 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (3)	1/4" FNPT
Outlet	1/4" FNPT
Outlet valve	1/4" Brass diaphragm valve
Design Leak Rate	(2 x 10^{-8} ccs Helium)
Flow Coefficient Cv	0.15
Weight	2.39 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass
Bonnet	Electroless Nickel Plated Brass
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Stainless Steel
Gauge	2-1/2" Nickel Plated Brass
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

600 - 80 - 11 - 01 - 00

OPTION 1: MODEL SERIES & OUTLET PRESSURE

600	25 PSIG
601	50 PSIG
602	100 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
04	1/4" MNPT x 1/8" Brass Tube Fitting
80	1/4" MNPT x 1/8" Brass Tube Fitting
81	1/4" MNPT x 1/8" Stainless Steel Tube Fitting
83	1/4" MNPT x 1/4" Stainless Steel Tube Fitting

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
04	1/4" MNPT x 1/8" Brass Tube Fitting
11	1/4" MNPT x 1/8" Brass Tube Fitting
12	1/4" MNPT x 1/8" Stainless Steel Tube Fitting

OPTION 4: ACCESSORIES

00	None
01	Panel Mount Kit
02	Helium Leak Certification
03	Panel Mount Kit and Certification

OPTION 5: OPTIONS

00	None
01	Captured vent fitting 1/16" MPT x 1/8" tube

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 600 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
600	300	25	--	--	30" Hg 0-30	1
601	300	50	--	--	0-60	2
602	300	100	--	--	0-200	5

610 SERIES

HIGH PURITY BRASS SINGLE STAGE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

This single stage high purity regulator is designed to prevent contamination of high purity systems and provide accurate regulation of non-corrosive gases. The specially designed stainless steel diaphragm gives maximum accuracy and provides stable regulation of delivery pressure. This regulator is capable of withstanding an internal vacuum and is available with a diffusion resistant, packless diaphragm outlet valve to maintain system purity. A 1/16" FNPT port in the bonnet is provided to vest hazardous gases in the event of a diaphragm failure.

DESIGN FEATURES

- Filtered seat for added gas stream purity
- Stainless steel diaphragm
- 2 1/2" dual scale gauges
- 316 stainless steel filter
- Brass nickel plated bar stock body
- Threaded bonnet for panel mounting
- Body is tapped for rear bracket mounting
- Captured vent in bonnet (1/16" FNPT)
- Metal to metal body to diaphragm seal

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-25, 0-50, 0-100, 0-250, 0-500 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (5)	1/4" FNPT
Outlet	1/4" MNPT
Outlet Valve	1/4" Stainless steel diaphragm valve
Design Leak Rate	(2 x 10^{-8} ccs Helium)
Flow Coefficient Cv	0.06
Inlet Decay Rate	.75/100 PSIG
Weight	3.32 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass
Seat	Teflon®
Seat Retainer	Brass
Diaphragm	Stainless Steel
Gauge	2-1/2" Nickel Plated Brass
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel
Outlet Valve	Chrome plated brass

613 - 01 - 09 - 01 - 01

OPTION 1: MODEL SERIES & OUTLET PRESSURE

610	25 PSIG
611	50 PSIG
612	100 PSIG
613	250 PSIG
614	500 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
01	1/4" FNPT Chrome Diaphragm Valve
02	1/4" FNPT Chrome Diaphragm Valve with 1/8" Tube Fitting
03	1/4" FNPT Diaphragm Valve with 1/4" tube fitting
20	1/4" MNPT Chrome Needle Valve
42	1/4" FNPT Chrome Needle Valve with 1/8" Tube Fitting
81	1/4" MPT x 1/8" Stainless Steel Tube Fitting
83	1/4" MPT x 1/4" Stainless Steel Tube Fitting

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
07	CGA 510*
08	CGA 540
09	CGA 580
10	CGA 590
13	CGA 296*

** Only available and used with #610 body*

OPTION 4: ACCESSORIES

00	None
01	Panel Mount Kit
02	Helium Leak Certification
03	Panel Mount Kit and Certification

OPTION 5: OPTIONS

00	None
01	Captured vent fitting 1/16" MNPT x 1/8" tube

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 610 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
610	3000	25	0-3000	50	30" Hg 0-30	1
611	3000	50	0-3000	50	0-60	2
612	3000	100	0-3000	50	0-200	5
613	3000	250	0-3000	50	0-400	10
614	3000	500	0-3000	50	0-1000	20

620 SERIES

HIGH PURITY BRASS TWO STAGE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

This high purity two stage regulator is designed for non-corrosive gases requiring precise and stable delivery pressure control. These regulators provide constant outlet pressure regardless of inlet pressure fluctuations. This regulator features a unique, specially designed stainless steel diaphragm that gives maximum accuracy and provides stable regulation of delivery pressure. A nickle plated brass, diffusion resistant, packless diaphragm shut-off valve is available for flow control and to maintain system purity. Captured 1/16" FNPT vent ports are provided for both stages to allow for venting of hazardous gases in the event of a diaphragm failure. This regulator is capable of withstanding internal vacuums during purging operations.

DESIGN FEATURES

- Filtered seat for added gas stream purity
- Stainless steel diaphragm
- 2 1/2″ dual scale gauges
- 316 stainless steel filter
- Brass nickel plated bar stock body
- Threaded bonnet for panel mounting
- Body is threaded for rear bracket mounting
- Captured vent in bonnet (1/16″ FNPT)
- Metal to metal body to diaphragm seal

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-25, 0-50, 0-100, 0-250 PSIG
Temp. Operating Range	-40°F to +165°F
Ports (4)	1/4" FNPT
Outlet	1/4" MNPT
Outlet valve	1/4" Brass diaphragm valve
Design Leak Rate	(2 x 10^{-8} ccs Helium)
Flow Coefficient Cv	0.05
Inlet Decay Rate	.02/100 PSIG
Weight	5.22 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Bar Stock
Bonnet 1st Stage	Electroless Nickel Plated Brass
Bonnet 2nd Stage	Electroless Nickel Plated Brass
Seat	Teflon®
Seat Retainer	Brass
Diaphragm 1st Stage	Stainless Steel
Diaphragm 2nd Stage	Stainless Steel
Gauge	2-1/2" Nickel Plated Brass
Filters (2)	316 Stainless Steel/Brass
Valve Stem	316 Stainless Steel
Valve Spring	316 Stainless Steel

622 - 01 - 09 - 00 - 01

OPTION 1: MODEL SERIES & OUTLET PRESSURE

620	25 PSIG
621	50 PSIG
622	100 PSIG
623	250 PSIG

OPTION 2: OUTLET FITTINGS

00	None
01	1/4" FNPT Chrome Diaphragm Valve
02	1/4" FNPT Chrome Diaphragm Valve with 1/8" Tube Fittings
03	1/4" FNPT Diaphragm Valve with 1/4" tube fitting
20	1/4" MNPT Chrome Needle Valve
42	1/4" FNPT Chrome Needle Valve with 1/8" Tube Fittings
81	1/4" MPT x 1/8" Stainless Steel Tube Fittings
83	1/4" MPT x 1/4" Stainless Steel Tube Fittings

OPTION 3: CGA INLET FITTINGS

00	None
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
07	CGA 510*
08	CGA 540
09	CGA 580
10	CGA 590
13	CGA 296*

** Only available and used with #620 body*

OPTION 4: ACCESSORIES

00	None
01	Panel Mount Kit
02	Helium Leak Certification
03	Panel Mount Kit and Certification

OPTION 5: OPTIONS

00	None
02	Captured vent fitting 1/16" MNPT x 1/8" tube

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 620 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
620	3000	25	0-3000	50	30" Hg 0-30	1
621	3000	50	0-3000	50	0-60	2
622	3000	100	0-3000	50	0-200	5
623	3000	250	0-3000	50	0-400	10

630 SERIES

HIGH PURITY TWO STAGE BRASS LECTURE BOTTLE REGULATORS

These two stage regulators are ideal where precise delivery pressure is critical in low flow applications of non-corrosive gases. The slim design makes it ideal for lab application where space is a consideration. The design features included a stainless steel diaphragm in the second stage, brass piston first stage, capturable preset safety relief vent,sintered brass filters for added protection of internal components.

DESIGN FEATURES

- 1″ 316 stainless steel diaphragm
- Large adjusting knob for easy yet precise control of pressure
- Monel filter
- 1-1/2″ chrome plate gauges
- Built in capturable preset safety relief valve
- Rugged brass bar stock construction
- Plated body, bonnet and gauges for superior protection.

SPECIFICATIONS

Maximum Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-15, 0-50, 0-100 PSIG
Temp. Operating Range	-20°F to +140°F
Ports (4)	1/8" FNPT & 1/4" FMPT
Inlet	1/4" FNPT
Outlet	1/4" FNPT
Design Leak Rate	$1x10^{-4}$ css Helium
Flow Coefficient Cv	0.075
Inlet Decay Rate	.026/100 PSI
Weight	3 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Brass Bar Stock
Seat	Teflon®
Seat Retainer	Brass
Valve Stem	316 Stainless Steel
Piston	Brass
Piston O-ring	Viton-A®
Diaphragm	316 Stainless Steel
Gauge	1-1/2" chrome plated steel
Filters	Monel
Outlet	1/4" FNPT

631 - 40 - 08

OPTION 1: MODEL SERIES & OUTLET PRESSURE

631	10 PSIG
632	50 PSIG
633	100 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
20	Chrome Needle Valve with 1/4" MNPT outlet
40	Chrome Needle Valve with 1/4" FNPT outlet
41	Chrome Needle Valve with male 1/8" brass tube fitting
42	Chrome Needle Valve with male 1/8" stainless steel tube fitting
82	Nickel "B" fitting (9/16" - 18H)

OPTION 3: CGA INLET FITTINGS

00	1/4" FNPT
02	CGA 320
03	CGA 326
05	CGA 346
06	CGA 350
08	CGA 540
09	CGA 580
10	CGA 590

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 630 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
631	3000	10	0-3000	50	30" Hg 0-15	0.2
632	3000	50	0-3000	50	0-100	2
633	3000	100	0-3000	50	0-200	5

700 SERIES

DELUXE CORROSION SERVICE MONEL SINGLE STAGE REGULATORS

Sure-Seat™
technology for maximum life and gas purity

These regulators are designed to control the pressure of highly corrosive and reactive gases. The deluxe corrosive service regulators have all wetted parts constructed of Monel, Inconel or PCTFE materials and are protected by two sintered Monel filters. These regulators are recommended for use with halogen gases.

Note: A deep purge assembly is highly recommended to be used in conjunction with these models in order to ensure effective purging of hazardous gases during cylinder change outs.

NOTE: A cross purge assembly must be used with this series of regulators to ensure effective purging of hazardous trace gases during cylinder changes.

DESIGN FEATURES

- PCTFE seats
- 2-1/2″ duel scale monel gauges for easy and accurate readings
- Large adjusting knob for easy yet precise control of pressure
- Monel needle valve
- Monel filtered seat assembly for added gas stream purity

SPECIFICATIONS

Maximum Rated Inlet Pressure	3000 PSIG
Outlet Pressure Ranges	0-50, 0-200 PSIG
Temp. Operating Range	-20°F to +150°F
Ports (4)	1/4" FMPT
Inlet	1/4" FNPT
Outlet	1/4" FNPT
Design Leak Rate	$1x10^{-5}$ css Helium
Flow Coefficient Cv	0.06
Inlet Decay Rate	.0.35/100 PSI
Weight	3.75 lbs.

MATERIALS OF CONSTRUCTION

Body	Monel
Bonnet	Electroless Nickel Plated Brass Brass Bar Stock
Seat	PCTFE
Seat Retainer	Monel
Valve Stem	Monel
Diaphragm	Monel
Valve Spring	Inconel
Gauge	2-1/2" Monel
Filters	Sintered Monel
Outlet	1/4" FNPT

701 - 75 - 15

OPTION 1: MODEL SERIES & OUTLET PRESSURE		OPTION 2: OUTLET FITTINGS		OPTION 3: CGA INLET FITTINGS	
700	50 PSIG	00	1/4" FNPT	00	1/4" FNPT
701	200 PSIG	75	Monel Needle Valve with 1/4" MNPT outlet	15	CGA 330

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 700 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
700	3000	50	0-3000	50	0-100	2
701	3000	200	0-3000	50	0-300	10

820 SERIES

SERIES HIGH PRESSURE ANALYTICAL BRASS SINGLE STAGE REGULATORS

These regulators are designed to control high pressures from a wide variety of non-corrosive inert gases. Typical applications for this regulator included purging and charging, calibration kits, R&D laboratories, high pressure testing, chemical plants and manufacturing processes. The piston sensor design gives structural reliability in high pressure use. Low torque controls adjusting screws permits easy adjustment of pressures in closed or dead end systems.

DESIGN FEATURES

- Self relieving adjusting knob for easy low torque adjustment of pressure
- Nickel plated body, bonnet, and gauges for superior protection
- 2-1/2″ single scale gauges for easy and accurate readings

SPECIFICATIONS

Maximum Rated Inlet Pressure	6000 PSIG
Outlet Pressure Ranges	0-500, 1000, 2000, 4000, 6000 PSIG
Ports (4)	1/4" FMPT
Inlet	1/4" FNPT
Outlet	1/4" FNPT
Weight	8 lbs.

MATERIALS OF CONSTRUCTION

Body	Electroless Nickel Plated Brass Brass Bar Stock
Bonnet	Electroless Nickel Plated Brass Brass Bar Stock
O-Rings	Buna-N
Valve Stem	316 Stainless Steel
Piston	Brass
Valve Spring	316 Stainless Steel
Gauge	2-1/2" Nickel Plated Brass
Filter	Brass
Outlet	1/4" FNPT

825 - 66 - 26

OPTION 1: MODEL SERIES & OUTLET PRESSURE

823	500 PSIG
824	1000 PSIG
825	2000 PSIG
826	4000 PSIG
827	6000 PSIG

OPTION 2: OUTLET FITTINGS

00	1/4" FNPT
66	1/4" Male NPT Stainless Steel Needle Valve

OPTION 3: CGA INLET FITTINGS

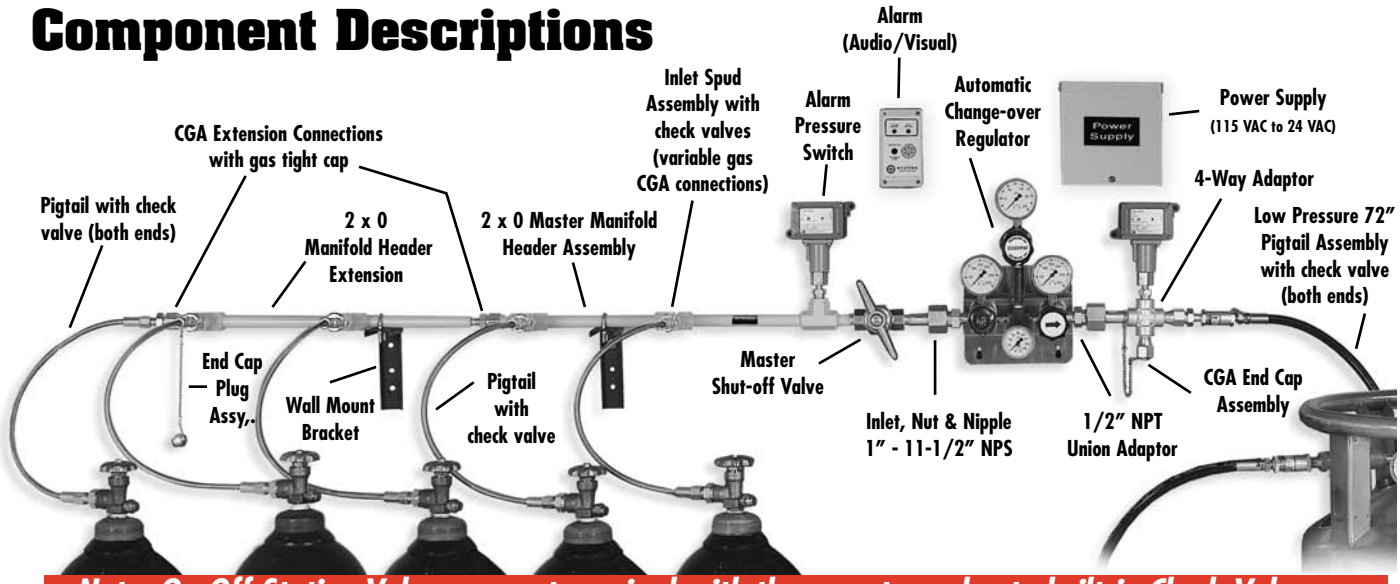
00	1/4" FNPT
09	CGA 580 Brass
26	CGA 347 SST
27	CGA 677 SST
28	CGA 680 SST

To order additional inlet/outlet and accessories options which are available and sold separately; please see page 38-39 of this catalog.

ORDERING INFORMATION FOR 820 SERIES REGULATORS

Product Number	Max. Inlet Pressure PSIG	Max. Outlet Pressure PSIG	Inlet Gauge Range PSIG	Inlet Gauge Graduations PSIG	Delivery Gauge Range PSIG	Delivery Gauge Graduations PSIG
823	6000	500	0-10000	200	0-3000	100
824	6000	1000	0-10000	200	0-3000	100
825	6000	2000	0-10000	200	0-3000	100
826	6000	4000	0-10000	200	0-6000	100
827	6000	6000	0-10000	200	0-6000	100

Component Descriptions



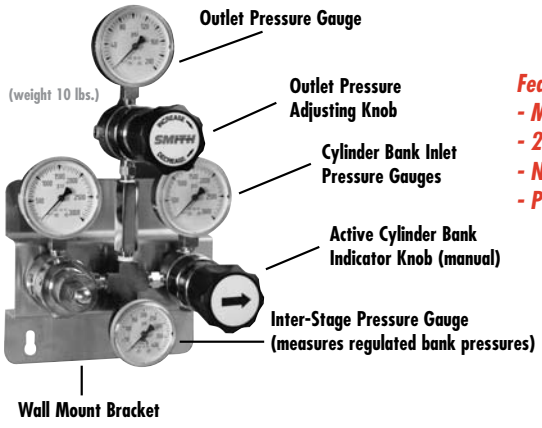
Note: On-Off Station Valves are not required with these systems due to built-in Check Valves.

High Purity, Automatic Change-Over Regulator System

This high-purity brass automatic changeover system is designed to provide a continuous, uninterrupted supply of high purity, non-corrosive gas. The unit consist of two identical high pressure regulators, one delivers gas at a slightly higher pressure then the other. When the first cylinder empties the unit will automatically switch to the second cylinder and continue to supply an uninterrupted flow of gas. The integral line regulator is designed to maintain a constant downstream pressure due to pressure differentials created during the changeover process.

NOTE: Works with most header bars and CGA connections.

1 Year Limited Warranty



Features:

- *Metal to Metal Seal Diaphragms*
- *2-1/2" Chrome Plated Gauges*
- *Nickel Plated Brass Bodies and Bonnets*
- *Plated Wall Mount*

Regulator Part No.	Outlet Pressure Range PSIG	Applicable Gases
ACS6015	0-15	Acetylene/LP
ACS6040	0-40	LPG, Oxygen CO_2 Inert
ACS6125	0-125	Oxygen CO_2 Inert

Stainless Steel Enclosure 16076

For Stainless Steel Enclosure option order Part No. 16076 along with desired Change-Over Regulator ACS 6125 or ACS 6040. Regluators ship assembled in Enclosure.
Dimension: 11 3/4"D X 13 1/2"W X 19"H

Specifications:

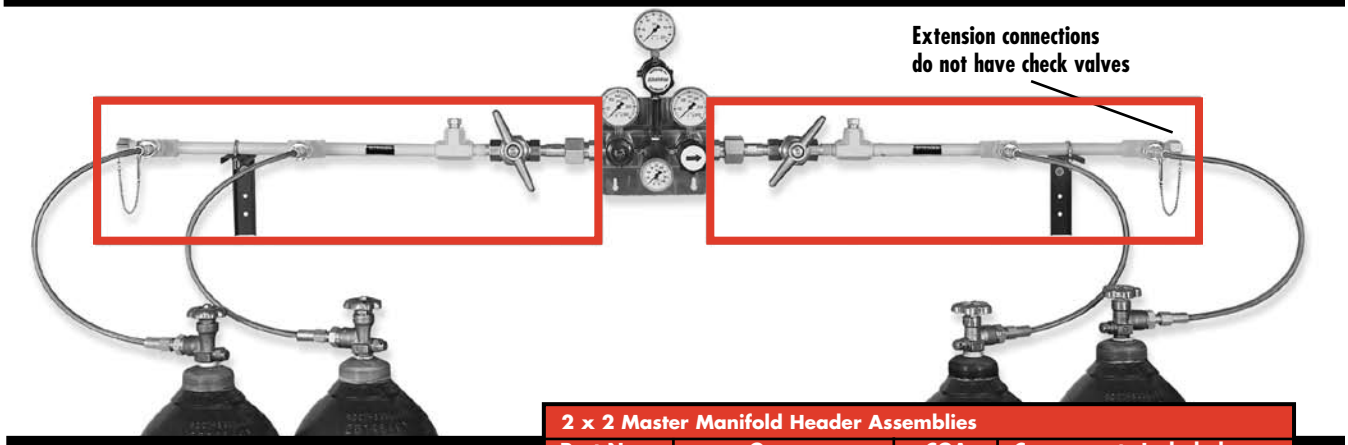
Maximum Inlet Pressure ..... Acetylene 400 PSIG, Other Gases 3,000 PSIG
Outlet Pressure Ranges ..... Acet. 0-15 PSIG, Other Gases 0-40 & 0-125 PSIG
Inter-stage Change-over Pressure..... Right 190 PSIG
Inter-stage Change-over Pressure, Acetylene ..... Right 50 PSIG
Inlet Ports..... 1/2" FNPT
Outlet Ports..... 1/4" FNPT
Temperature Range..... -40° F to 140° F (-40° C to 60° C)

Materials of Construction:

Bodies & Bonnets ..... Electroless Nickel Plated Brass Bars Stock
Seats..... Teflon®
Seat retainers ..... Brass
Diaphragms..... Stainless Steel
Gauges ..... 2-1/2" Chrome plated
Filters, Valve Stems & Springs ..... 316 Stainless Steel

Basic Manifold Configurations

2 x 2 Master Manifold Header Assembly



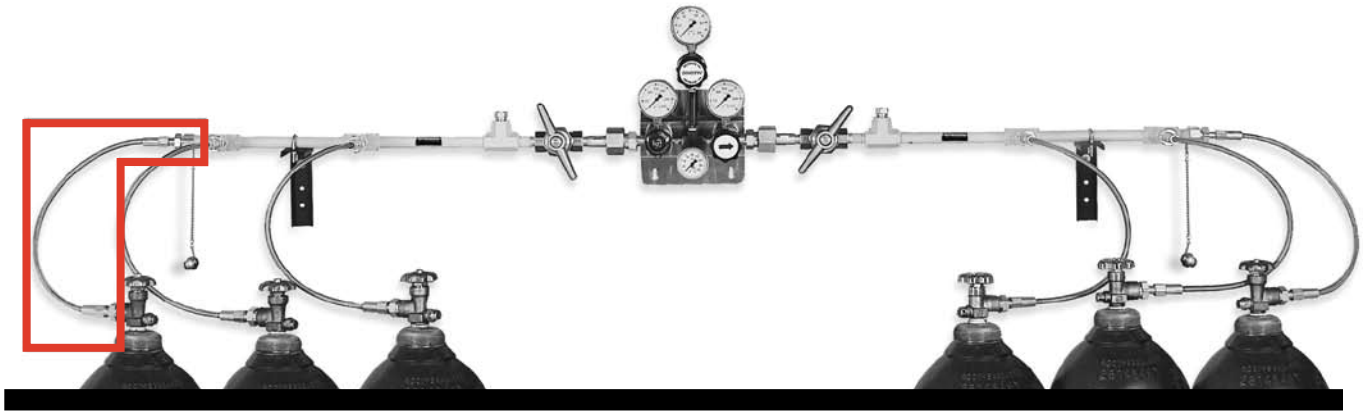
For complete system as shown above:

- Select 2 x 2 Master Manifold Header Assembly for desired gas from table at right.
- Select appropriate length Pigtails for (liquid) low or high pressure gases to connect cylinders to spud assemblies from table on page 71.
- Select appropriate Change-over Regulator for desired gas & outlet pressure range.

2 x 2 Master Manifold Header Assemblies

Part No.	Gases	CGA	Components Included as Outlined Above
15880	Nitrogen, Inert Helium, Argon	580	(2) Complete Left & Right Bank Master Manifold Header Assemblies (4) Inlet Spud Assemblies with built-in Check Valves (2) Master Shut-Off Valves (2) CGA Header Connections (2) Wall Mount Brackets (2) Union Adaptor Assembly (2) Manifold End Cap Assemblies (2) Nut & Nipple Assemblies **Note: Pigtails not included.**
15881	Oxygen	540	
15882	Acetylene, LP	510	
15883	Acetylene	300	
15884	Carbon Dioxide	320	

Add On Pigtails For 3 x 3 Manifold System



For complete assembly as shown above:

- Select 2 x 2 Master Manifold Header Assembly for desired gas from table above.
- Select appropriate length Pigtails for desired (liquid) low or high pressure gases from right for attaching cylinders to spud assemblies.
- Select appropriate Change-over Regulator for desired gas & outlet pressure range.

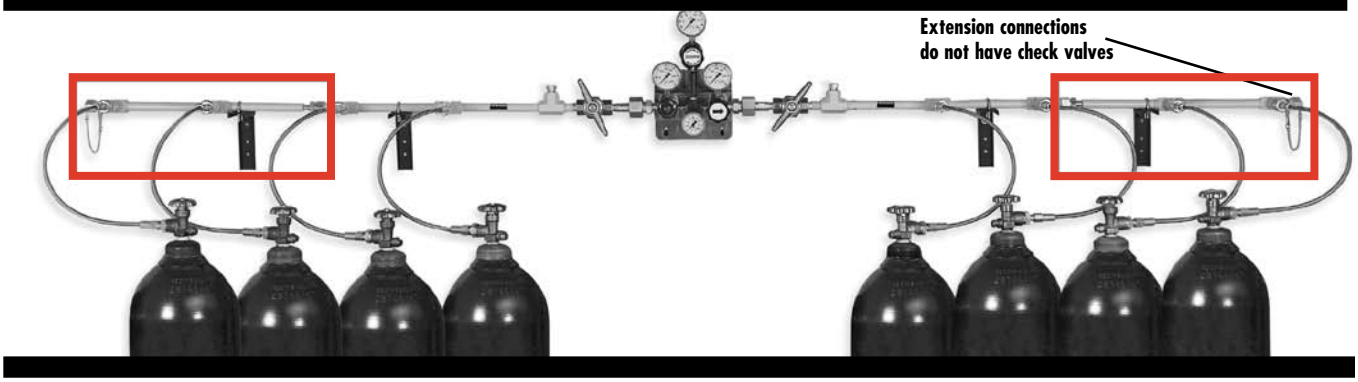
Add On Pigtail Assemblies with Dual Check Valves

Pigtail Part No.	High Pressure Gases	CGA	Length	Components Included as Outlined Above
15909	Nitrogen, Inert Helium, Argon	580	72″	(1) Flexible Stainless Steel Pigtail with Teflon® liner & built-in Check Valves on both ends. # Heat Sink attachment assembly, standard on high pressure Oxygen manifold Pigtail connection for reducing heat of recompression.
15901			24″	
15910	Oxygen #	540	72″	
15902			24″	
15906	Acetylene/LP	510	72″	
15897			24″	
15907	Acetylene	300	72″	
15898			24″	
15911	Carbon Dioxide	320	72″	
15903			24″	

Note: Acetylene/LP manifolds require Pigtails with built-in Flashback Arrestors.

Basic Manifold Configurations

2 x 2 Manifold Extensions



2 x 2 Manifold Extensions			
Part No.	**Gases**	**CGA**	**Components Included as Outlined Above**
15885	Nitrogen, Inert Helium, Argon	580	(2) Complete Extension Assemblies (4) Inlet Spud Assemblies with built-in Check Valves (2) Wall Mount Brackets (2) CGA Header Connections (2) Manifold CGA End Cap Assemblies ***Note: Pigtails not included***
15886	Oxygen	540	
*15887	Acetylene, LPG	510	
*15888	Acetylene	300	
15889	Carbon Dioxide	320	

*Acetylene & LP Fuel Gases Pigtails include built-in Flashback Arrestors.

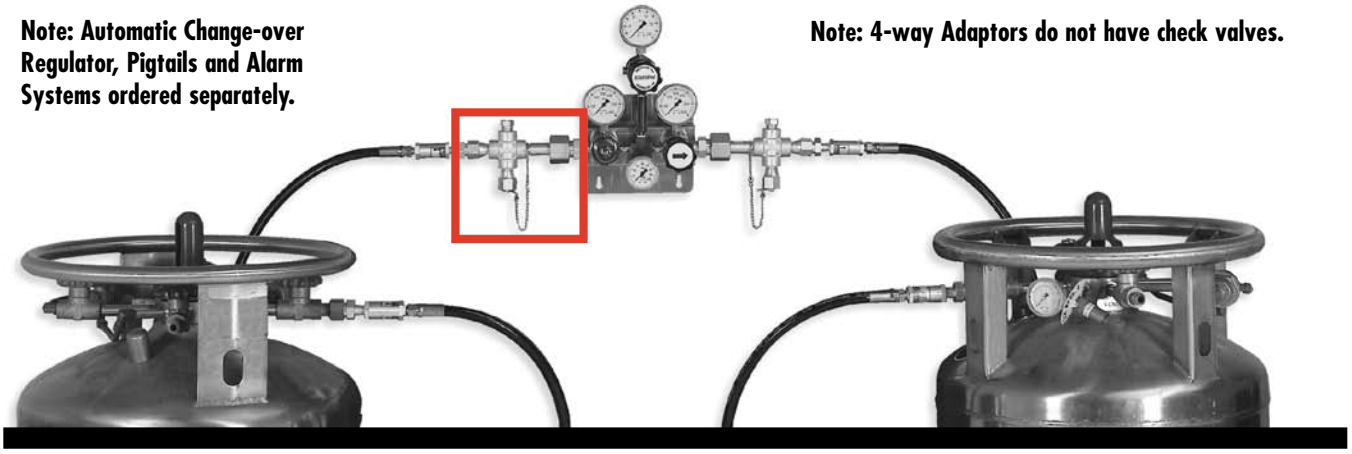
For complete system as shown above:

- **Select 2 x 2 Master Manifold Header Assemblies for desired gas from page 67.**
- **Select 2 x 2 Manifold Extension Assemblies for same gas from table at left.**
- **Select appropriate (CGA) Pigtails to connect cylinders to spud assemblies.**
- **Select appropriate Change-over Regulator for desired gas & outlet pressure range.**

1 x 1 Liquid Cylinder Manifold System With 4-way Adaptors

Note: Automatic Change-over Regulator, Pigtails and Alarm Systems ordered separately.

Note: 4-way Adaptors do not have check valves.



4-way Adaptor			
Part No.	**Gases**	**CGA**	**Components Included as Outlined Above**
15893	Nitrogen, Inert Helium, Argon	580	(1) Complete 4-way adaptor (1) Plug (1) CGA End Cap Assembly (1) Union Adaptor Assembly **Note: From page 71 choose appropriate 72" low pressure gas Pigtails to connect 4-Way adaptor to cylinders.**
15894	Oxygen	540	
15878	Carbon Dioxide	320	

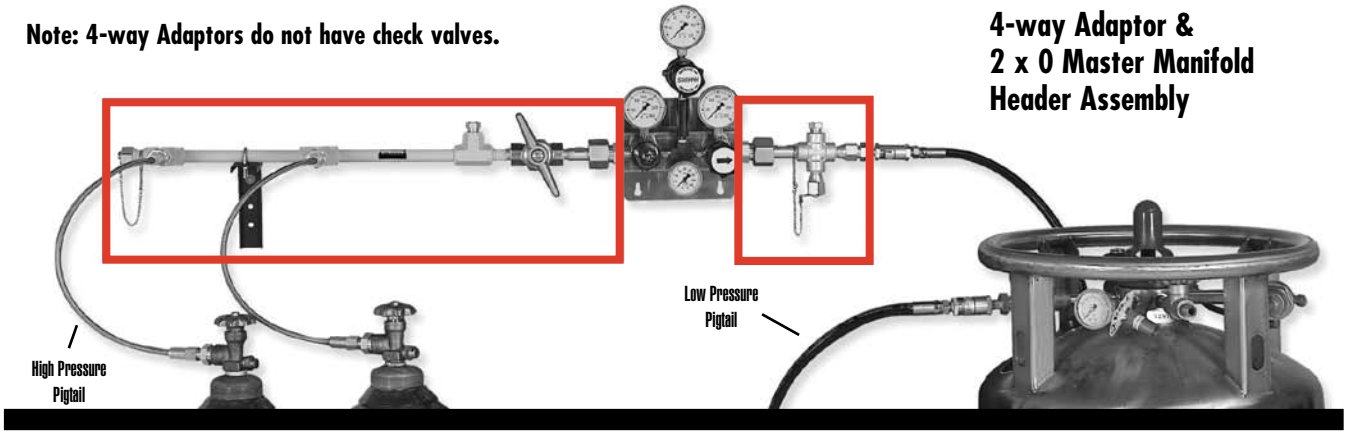
For complete system as shown above:

- **Select (2) 4-way Adaptors for desired gas from table to the left.**
- **Select (2) appropriate CGA 72" Pigtails for (liquid) low pressure gases from page 71.**
- **Select appropriate Change-over Regulator for gas used.**

Basic Manifold Configurations

2 x 1 Liquid/Pressurized Cylinder Manifold System

Note: 4-way Adaptors do not have check valves.



For complete system as shown above:

- Select (1) 4-way Adaptor for desired gas from table at right.
- Select appropriate Pigtails for desired high & (liquid) low pressure gases.
- Select appropriate Change-over Regulator for desired gas
- Select appropriate Left 2 x 0 Master Manifold Header Assembly for desired gas.

Note: Single sales Master Manifold Header Assembly designed for left side installation, but may be used for right side installation. ("T" fitting will be inverted)

CAUTION: When using liquid oxygen, tips may require greater gas volume than a single cylinder is capable of producing. External evaporators or manifolding multiple cylinders may be necessary to supply sufficient gas flows.

4-way Adaptor

Part No.	Gases	CGA	Components Included as Outlined Above
15893	Nitrogen, Inert Helium, Argon	580	(1) Complete 4-way Adaptor (1) Cap Assembly (1) CGA End Cap Assembly (1) Adaptor Bushing Note: Choose appropriate dual check valve 72" low pressure gas Pigtails from page 71 to connect 4-way Adaptors to cylinders.
15894	Oxygen	540	
15878	Carbon Dioxide	320	

Note: 4-way adaptors work for either left or right side installations.

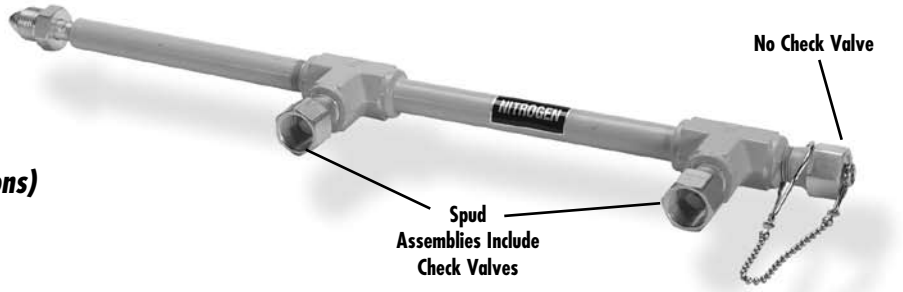
2x0 Master Manifold Header

Part No.	Gases	CGA	Components Included as Outlined Above
15890	Nitrogen, Inert Helium, Argon	580	(1) Complete left side Master Manifold Header Assembly (2) Inlet Spud Assemblies with built-in Check Valves (1) Master Shut-Off Valve (1) Wall Mount Bracket (1) Union Adaptor Assembly (1) Manifold End Cap Assembly (1) Nut & Nipple Assembly Note: Pigtails not included
15891	Oxygen	540	
15892	Carbon Dioxide	320	

Note: Header may also be used on right side installations.

2 x 0 Manifold Extension Assemblies

(works in either left or right side installations)

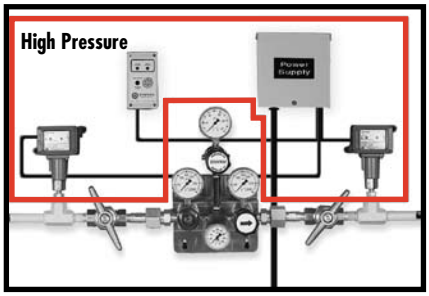


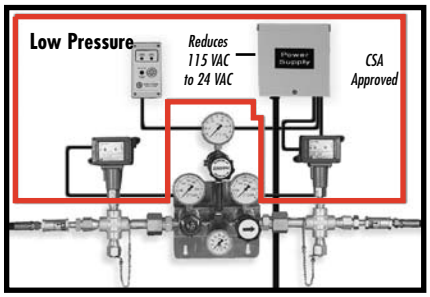
2x0 Manifold Extension Assembly

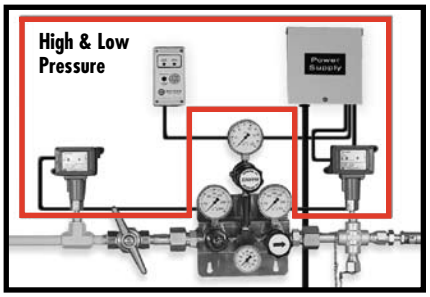
Part No.	Gases	CGA	Components Included
15875	Nitrogen, Inert Helium, Argon	580	(1) Complete Manifold Extension Assembly (2) Inlet Spud Assemblies with built-in Check Valves (1) Wall Mount Bracket (1) CGA Header Connection (1) Manifold End Cap Assembly
15876	Oxygen	540	
15877	Carbon Dioxide	320	

MANIFOLD SYSTEMS

Alarm Configuration Examples







Note: Alarm Kits complete with installation manual. Wiring Not Included.

Alarm Kits		
Part No.	**Item Description**	**Gases**
15912 (High Pressure) 15921 (Low Pressure) 15930 (Low/High Pressure Combination)	Audio / Visual Alarm Kit for non-fuel gases. Inert Alarm Kits include two general purpose Pressure Switches, adaptors to attach pressure switches to manifold, Power Supply and Alarm Panel.	Oxygen, Argon Helium, CO_2, N2,
15913	Audio / Visual Alarm Kit for Acetylene. Includes two Explosion Proof Pressure Switches, two Adaptors, brass tubing to attach explosion proof pressure switches to manifold, Power Supply and Alarm Panel.	Acetylene/LPG

Pressure Switch for Acetylene/LP Application

Designed for use with gas pressure manifolds to activate remote alarm systems. Operates when cylinder/line pressure is below minimum pressure setting. Available for explosion proof or general purpose service. Electrical rating for all switches is SPDT 15 amps 24/125/250/480 VAC resistive. CSA approved. Pressure port connection 1/4" NPT.
Note: Switches may be wired "normally open" or "normally closed."

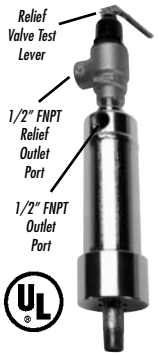
Pressure Switch Technical Data for Alarm Kits:			
For Alarm Kit Part No.	**Inlet Pressure – Maximum PSIG**	**Pressure Setting Range PSIG**	**Enclosure Classifications**
15912	3,000	100-1,000	NEMA 4
*15921	250	20-200	NEMA 4
15930	250/3,000	20-200/100-1,000	NEMA 4
15913	800	20-300	NEMA 4, 7, 9, IP66

For (liquid) low pressure gas applications only.

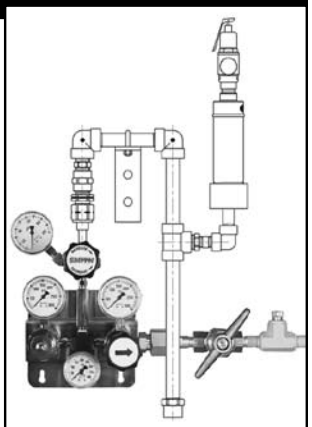
Accessories

Flashback Arrestor Kits		
Part No.	**Item Description**	**Gases**
15914	Acetylene Dry Flashback Arrestor Kit, Includes 300 SCFH Flow Capacity Mechanical Flashback Arrestor device complete with piping. Inlet/Outlet 1/2" NPT. Relief valve set pressure 20 psig.	Acetylene
15915	LPG / Propane Dry Flashback Arrestor Kit, Includes 300 SCFH Flow Capacity Mechanical Flashback Arrestor device complete with piping. Inlet/Outlet 1/2" NPT. Relief valve set pressure 35 psig.	LPG / Hydrogen

Dry flashback arrestors are designed for use on Acetylene or Fuel Gas manifold systems, as well as station drops, to protect the main fuel gas supply from the dangers of reverse flow and flashbacks. A safety relief valve is included with each arrestor and is installed on the outlet side. In the event excessive pressure does occur, the gas is vented away to a safe location.

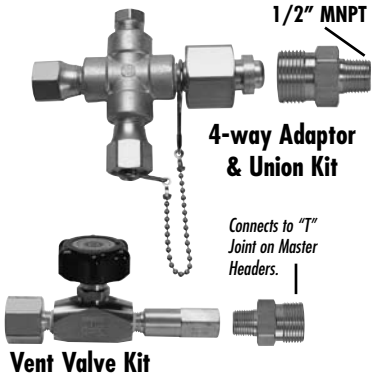


Over-all height 14"
excluding mounting nipple



Example of Flashback Arrestor Assembly Installation

4-way Adaptor & Purge Valves Assembly		
Part No.	**Item Description**	**Gases**
15893	4-way Adaptor Assy,., 1/2" FNPT (Plugged); 2-CGA-580 inlets, CGA End Cap Assy,., Union Adaptor Assy,. with 1/2" MPT Regulator Connection	Nitrogen, Helium, Argon, Inert
15894	4-way Adaptor Assy,., 1/2" FNPT (Plugged); 2-CGA-540 inlets, CGA End Cap Assy,., Union Adaptor Assy,. with 1/2" MPT Regulator Connection	Oxygen
15878	4-way Adaptor Assy,., 1/2" FNPT (Plugged); 2-CGA-320 inlets, CGA End Cap Assy,., Union Adaptor Assy,. with 1/2" MPT Regulator Connection	CO_2
15879	Vent Valve Kit, includes one Vent Valve Assembly and one 1/2" MPT x 1/4" MPT adaptor to fit Master Header Assembly.	Not for use with Fuel Gases



Vent Valve Kit

Pigtail Assemblies

Flexible 24″ Standard Pigtails with Single Check Valve (High Pressure)

Part No.	Item Description	CGA	Gases
15895	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-580, one Check Valve	580	Nitrogen, Helium Argon, Inert
15896	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-540, one Check Valve	540	Oxygen
15897	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-510, with Flashback Protection, one Check Valve	510	Acetylene/LP
15898	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-300, with Flashback Protection, one Check Valve	300	Acetylene
15900	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-320, one Check Valve	320	CO_2

Stainless Steel 24″ Pigtail for attaching cylinders to inlet spuds

Stainless Steel 24″ Pigtail for Acetylene/LP Gases

Flexible 24″ Standard Pigtails with Dual Check Valves (High Pressure) See note at bottom of page.

Part No.	Item Description	CGA	Gases
15901	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-580, 2 Check Valves	580	Nitrogen, Helium, Argon, Inert
15902	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-540, 2 Check Valves, with Brass Safety Extension	540	Oxygen
15903	24″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-320, 2 Check Valves	320	CO_2

Stainless Steel 24″ Pigtail for attaching cylinders to manifold ends

Note: Pigtails with Dual Check Valves, used to eliminate the need for purging where compromise of gas purity during cylinder change operations is of concern.

Flexible 72″ Standard Pigtails with Single Check Valve (High Pressure)

Part No.	Item Description	CGA	Gases
15904	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-580, one Check Valve	580	Nitrogen, Helium, Argon, Inert
15905	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-540, one Check Valve	540	Oxygen
15906	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-510, with Flashback Protection, one Check Valve	510	Acetylene/LP
15907	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-300, with Flashback Protection, one Check Valve	300	Acetylene
15908	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-320, one Check Valve	320	CO_2

Stainless Steel 72″ Pigtail for attaching cylinders to inlet spuds

Stainless Steel 72″ Pigtail for Acetylene/LP gases

Flexible 72″ Standard Pigtails with Dual Check Valves (High Pressure) See note at bottom of page.

Part No.	Item Description	CGA	Gases
15909	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-580, 2 Check Valves	580	Nitrogen, Helium, Argon, Inert
15910	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-540, 2 Check Valves	540	Oxygen
15911	72″ Standard Pigtail, Stainless Steel Braid, wrench tight, CGA-320, 2 Check Valves	320	CO_2

Stainless Steel 72″ Pigtail for attaching cylinders to manifold ends

Flexible 72″ Standard Pigtails with Dual Check Valves (Low Pressure) See note at bottom of page.

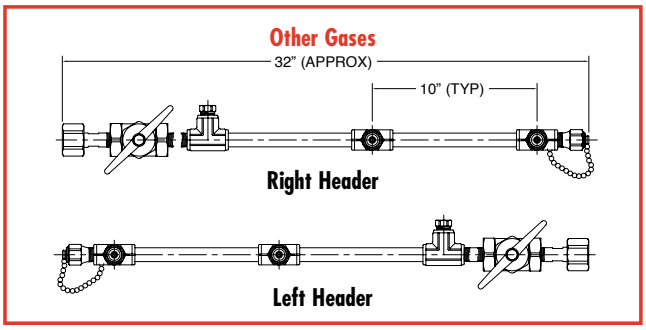
Part No.	Item Description	CGA	Gases
15922	72″ Standard Pigtail, wrench tight, CGA-580, 2 Check Valves	580	Nitrogen, Helium, Argon, Inert
15923	72″ Standard Pigtail, wrench tight, CGA-540, 2 Check Valves	540	Oxygen
15924	72″ Standard Pigtail, wrench tight, CGA-320, 2 Check Valves	320	CO_2

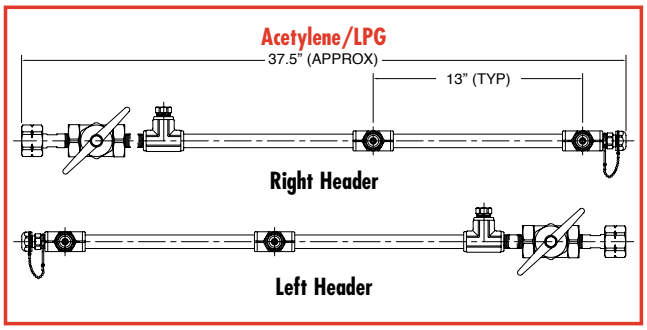
Low Pressure 72″ Pigtail for attaching liquid cylinders to 4-way Adaptors

Note: Dual Check Valve Pigtails are required when connecting to the header extensions.

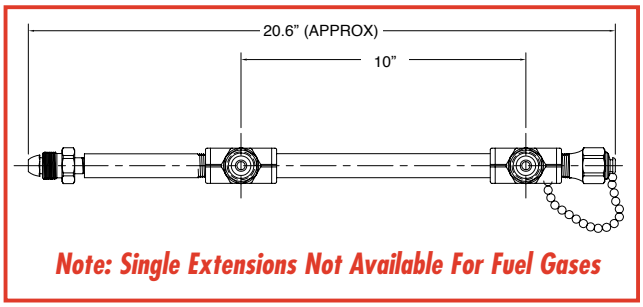
Dimensions

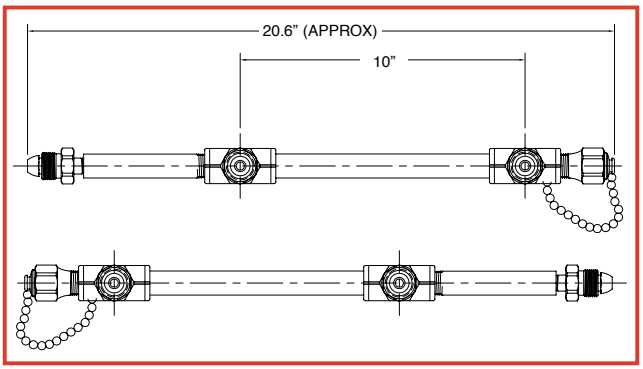
Master Header Assemblies





Manifold Extension Assemblies





Regulator Warranty Information

1 – Year Limited Regulator Warranty:
Smith Equipment warrants to the purchaser, all Smith Equipment Gas Regulators against defects in materials and workmanship (parts and labor) for a period of one year. All metallic regulator components are warranted for a period of one year (parts only.)

3 – Year Limited Regulator Warranty:
Smith Equipment warrants to the purchaser, all Smith Equipment Gas Regulators against defects in materials and workmanship (parts and labor) for a period of three years. All metallic regulator components are warranted for a period of three years (parts only).

The warranty period is established by the manufactures date code which is imprinted on the product or date of purchase if proof of purchase date is provided by the purchaser with the warranty claim. Smith Equipment makes no other warranty of any kind, expressed or implied, including without limitation no warranty of merchantability or fitness for any purpose. During the warranty period, Smith Equipment agrees, at its option, to repair, replace or refund the purchase price of any product found defective upon inspection by Smith Equipment. This is the sole and exclusive remedy of the purchaser and the sole and exclusive liability of Smith Equipment, whether in contract, in tort, under any warranty, in negligence or otherwise. Smith Equipment shall not be liable under any circumstances for any incidental, consequential, special, indirect or other damages, or for loss of use, revenue or profit even if Smith Equipment has been advised of the possibility of such damages. The warranty and remedies provided herein shall not apply if a product is damaged by accident, abuse or misuse, if a product is modified in any way except by personnel authorized by Smith Equipment, or if anything except genuine Smith Equipment replacement parts, tips, and consumables are used with the equipment.

P SERIES GAS FLOWMETERS

Designed for low flow rates, the model "P" flowmeter is a precision instrument embodying the inherent simplicity, versatility and economy of the classical variable area meter. It is particularly suitable for metering carrier gases in chromatography, indicating and controlling gases in manufacturing processes, liquid and gas measurement in laboratories, pilot plants, flow and level indicating, etc. All flowmeters contain dual floats constucted of different material offering dual readings within the same flowmeter.

DESIGN FEATURES

- Rib-guided or fluted glass metering tubes facilitate stable and accurate readings
- Magnifier lens in front shield to enhance reading resolution
- OPTIGRAD™ scales minimize parallax and eye fatigue
- Chemical compatibility
- Capable of being panel mounted

Specifications	
STANDARD ACCURACY	±2% FS (mm scales) ±5% FS (direct reading scales)
CALIBRATED ACCURACY	±1% FS
REPEATABILITY	±0.25%
USEFUL FLOW RANGE	10:1 minimum with one float and better than 20:1 with combination of two floats installed in meters.
MAXIMUM OPERATING PRESSURE	200 psig/13.8 bars.
MAXIMUM OPERATING TEMPERATURE	250ºF/ 121ºC.

Metering Valves

Meters are available with built-in standard needle valves or high precision metering valves with "non-rising stems". The higher precision metering valves have 16 full turns compared to our 6 turn standard valves and are justified whenever high sensitivity control and resolution is desirable particularly in conjunction with metering tubes of very low flow-rates.

Conversion charts for air and water are supplied with each flow-meter.
Conversion charts for routine gases are supplied on requst.

Part Number	Size	Frame Material	Valve Style	Float Material	Max Flow Rate AIR		Max Pressure
					ML/MIN	SCFH	
16000	150mm	Aluminum	Standard	Glass/Stainless Steel	49/143	.104/.303	200psig
16001	150mm	Aluminum	Standard	Glass/Stainless Steel	374/814	.792/1.725	200 psig
16002	150mm	Aluminum	Standard	Glass/Stainless Steel	2313/4562	4.90/9.66	200psig
16003	150mm	Aluminum	Standard	Glass/Stainless Steel	8505/16,737	18.02/35.46	200psig
16004	150mm	Aluminum	Standard	Glass/Stainless Steel	23,742/45,227	50.30/95.83	200psig
16005	150mm	Aluminum	High Res.	Glass/Stainless Steel	49/143	.104/.303	200psig
16006	150mm	Aluminum	High Res.	Glass/Stainless Steel	374/814	.792/1.725	200psig
16007	150mm	Aluminum	High Res.	Glass/Stainless Steel	2313/4562	4.90/9.66	200psig
16008	150mm	Aluminum	High Res.	Glass/Stainless Steel	8505/16,737	18.02/35.46	200psig
16009	150mm	Aluminum	High Res.	Glass/Stainless Steel	23,742/45,227	50.30/95.83	200psig
16010	150mm	Stainless Steel	Standard	Glass/Stainless Steel	49/143	.104/.303	200psig
16011	150mm	Stainless Steel	Standard	Glass/Stainless Steel	374/814	.792/1.725	200psig
16012	150mm	Stainless Steel	Standard	Glass/Stainless Steel	2313/4562	4.90/9.66	200psig
16013	150mm	Stainless Steel	Standard	Glass/Stainless Steel	8505/16,737	18.02/35.46	200psig
16014	150mm	Stainless Steel	Standard	Glass/Stainless Steel	23,742/45,227	50.30/95.83	200psig
16015	150mm	Stainless Steel	High Res.	Glass/Stainless Steel	49/143	.104/.303	200psig
16016	150mm	Stainless Steel	High Res.	Glass/Stainless Steel	374/814	.792/1.725	200psig
16017	150mm	Stainless Steel	High Res.	Glass/Stainless Steel	2313/4562	4.90/9.66	200psig
16018	150mm	Stainless Steel	High Res.	Glass/Stainless Steel	8505/16,737	18.02/35.46	200psig
16019	150mm	Stainless Steel	High Res.	Glass/Stainless Steel	23,743/45,227	50.30/95.83	200psig

NOTE: ***Specific Gravity Conversion chart available on Smith website.***

T SERIES GAS FLOWMETERS

These rugged flowmeters are constructed of chemically inert PTFE-Glass wetted parts. They offer solutions for low to medium flow range measurements of highly corrosive and ultra-pure gases. Designed for low flow rates, the model "T" flowmeter is a precision instrument embodying the inherent simplicity, versatility and economy of the classical variable area meter. It is particularly suitable for metering carrier gases in chromatography, indicating and controlling gases in manufacturing processes, liquid and gas measurement in laboratories, pilot plants, flow and level indicating, etc.

DESIGN FEATURES

- Constructed of chemically inert wetted parts; borosilicate glass,PTFE and PCTFE
- Rugged black anodized aluminum frame
- Rib-guided or fluted metering tubes facilitate stable/ accurate readings
- Magnifier lens in front shield to enhance reading resolution
- OPTIGRAD™ scales minimize parallax and eye fatigue
- Capable of being panel mounted

Specifications	
STANDARD ACCURACY	±2% FS (mm scales) ±5% FS (direct reading scales)
REPEATABILITY	±0.25%
USEFUL FLOW RANGE	10:1 minimum with one float and better than 20:1 with combination of two floats installed in meters.
MAXIMUM OPERATING PRESSURE	100 psig/6.7 bars.
MAXIMUM OPERATING TEMPERATURE	150°F/ 65°C.
LEAK INTEGRITY	Individually pressure and leak tested and certified to a rating of 1 x 10^{-7} sccs Helium.

Metering Valves

Meters come with built-in standard needle valves with "non-rising stems" which feature a 6 turn. The higher precision metering valves have 16 full turns compared to our 6 turn standard valves and are justified whenever high sensitivity control and resolution is desirable particularly in conjunction with metering tubes of very low flow-rates.

Conversion charts for air and water ar supplied with each flow-meter.
Conversion charts for routine gases are supplied on request.

Part Number	Size	Frame Material	Float Material	Max Flow Rate AIR		Max Pressure
				ML/MIN	SCFH	
15990	150mm	Aluminum	Sapphire	73	.155	200psi
15991	150mm	Aluminum	Sapphire	513	1.087	200psi
15992	150mm	Aluminum	Sapphire	3079	6.524	200psi
15993	150mm	Aluminun	Sapphire	11,357	24.064	200psi
15994	150mm	Aluminum	Sapphire	30,711	65.074	200psi

OPTIONAL ACCESSORIES

Part Number	Description	Materials of Construction
15995	Tripod for single channel flowmeter	N/A
15996	1/8" MNPT X 1/4" tube fitting	Stainless Steel
15997	1/8" MNPT X 1/4" tube fitting	Brass
15998	1/8" MNPT X 1/4" hose barb fitting	Stainless Steel
15999	1/8" MNPT X 1/4" hose barb fitting	Brass

NOTE: ***Specific Gravity Conversion chart available on Smith website.***

EFR 1000 SERIES ACRYLIC FLOWMETERS

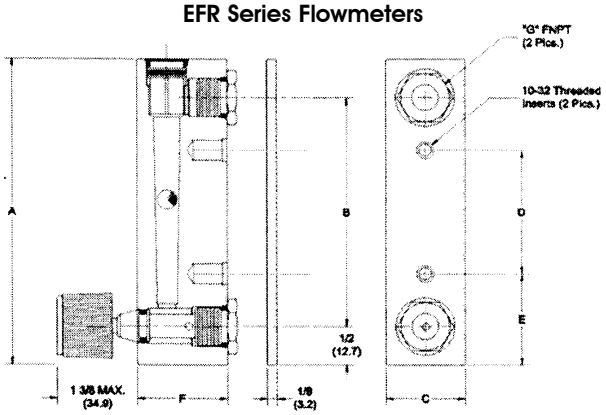
The EFR 1000 series of flowmeters are an ideal low cost solution for measuring flow rates of inert and non-corrosive gases. These flowmeters are machined from solid acrylic blocks that have integral metering tubes that provide precise readings even in challenging service applications. The 1/8" FNPT inlet and outlet connections are contained in brass inserts to ensure a secure, leak-free connection to prevent cracking of the acrylic body.

Specifications and Materials of Construction

Accuracy	+/-5% of Full Scale
Repeatability	+/-1% of Scale Reading
Maximum Inlet Pressure	100 PSIG
Temperature Operating Range	0° - 150°F
Floats	See Table
Body	Clear Machined Acrylic
Seals	Buna-N
Fittings	Brass
Inlet and Outlet	1/8" NPT Female Standard on 3" Centers

Part Number	Float Range Air	Float
16021	0.1 - 1 SCFH	Glass
16022	0.2 - 2 SCFH	Stainless Steel
16023	0.4 - 5 SCFH	Glass
16024	0.5 - 10 SCFH	Glass
16025	2 - 20 SCFH	Stainless Steel
16026	3 - 30 SCFH	Stainless Steel
16027	4 - 50 SCFH	Glass
16028	10 - 100 SCFH	Stainless Steel
16029	20 - 200 SCFH	Stainless Steel
16030	0.04 - 0.5 LPM	Glass
16031	0.1 - 1 LPM	Stainless Steel
16032	0.4 - 5 LPM	Glass
16033	1 - 10 LPM	Glass
16034	2 - 25 LPM	Stainless Steel
16035	4 - 50 LPM	Glass
16036	10 - 100 LPM	Stainless Steel
16037	0.2 - 2.5 LPM	Stainless Steel

EFR Series Flowmeters



Dimensions in inches (mm)

DIMENSIONS INCHES MILLIMETERS (MM)

Model	A	B	C	D	E	F	G
FR1000	4" (102)	3" (76.2)	1" (25.4)	1-5/8" (41.3)	1-3/16" (30.2)	1-1/8" (28.6)	1/8"

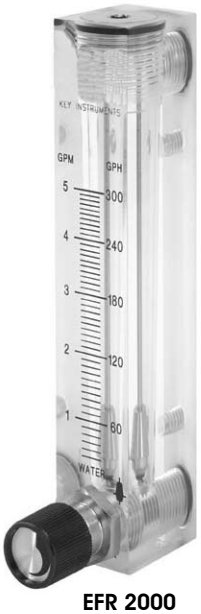
OPTIONAL ACCESSORIES

Part Number	Description	Materials of Construction
15995	Tripod for single channel flowmeter	N/A
15996	1/8" MNPT X 1/4" tube fitting	Stainless Steel
15997	1/8" MNPT X 1/4" tube fitting	Brass
15998	1/8" MNPT X 1/4" hose barb fitting	Stainless Steel
15999	1/8" MNPT X 1/4" hose barb fitting	Brass

NOTE: ***Specific Gravity Conversion chart available on Smith website.***

EFR 2000 AND 3000 SERIES ACRYLIC FLOWMETERS

The EFR 2000 & 3000 series of flowmeters are an ideal low cost solution for measuring flow rates of inert and non-corrosive gases where flow rates exceed those of traditional laboratory flowmeters. These flowmeters all have direct reading scales in SLPM or SCFM of air. Conversion factors for other gases are available on the Smith website.



EFR 2000

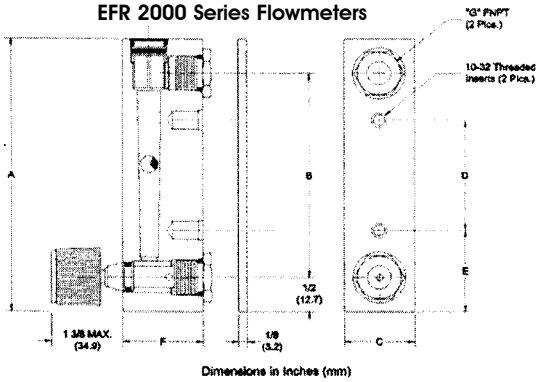
Specifications and Materials of Construction

Accuracy	EFR 2000 +/-3% of Full Scale EFR 3000 +/-2% of Full Scale
Maximum Inlet Pressure	100 PSIG
Temperature Operating Range	0˚ - 150˚F
Body	Clear Machined Acrylic
Seals	Buna-N
Fittings	EFR 2000 Brass EFR 3000 PVC

EFR 2000

Part Number	Flow Range on Air	Flow Range on Air
16038	1 - 10 SCFM	60 - 600 SCFH
16039	0.5 - 5 SCFM	30 - 300 SCFH
16040	4 - 20 SCFM	240 - 1200 SCFH
16041	30 - 280 LPM	1800 - 16,800 LPH
16042	14 - 140 SCFM	840 - 8,400 LPH
16043	100 - 560 LPM	6,000 - 33,600 LPH

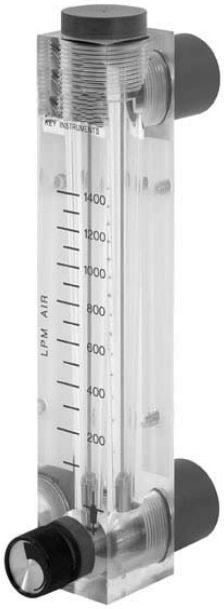
EFR 2000 Series Flowmeters



Dimensions in Inches (mm)

DIMENSIONS INCHES MILLIMETERS (MM)

Model	A	B	C	D	E	F	G
EFR2000	6-5/8" (165)	5-1/2" (140)	1-3/8" (34.9)	3-1/2" (88.9)	1-1/2" (38.1)	1-1/8" (28.6)	1/8"

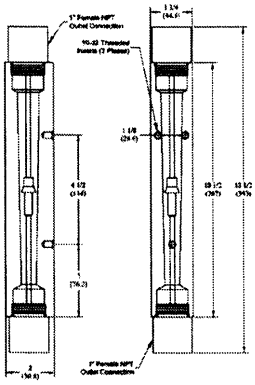


EFR 3000

EFR 3000 1" Inlet/Outlet Fittings

Part Number	Flow Range on Air
16044	3 - 25 SCFM
16045	4 - 50 SCFM
16046	10 - 100 SCFM
16047	100 - 700 LPM
16048	100 - 1,400 LPM
16049	400 - 4,000 LPM

EFR 3000 Series Flowmeters



Part Number	Description	Materials of Construction
15995	Tripod for single channel flowmeter	N/A
15996	1/8" MNPT X 1/4" tube fitting	Stainless Steel
15997	1/8" MNPT X 1/4" tube fitting	Brass
15998	1/8" MNPT X 1/4" hose barb fitting	Stainless Steel
15999	1/8" MNPT X 1/4" hose barb fitting	Brass

NOTE: ***Specific Gravity Conversion chart available on Smith website.***

NEEDLE VALVES

These instrument valves are used in a wide variety of laboratory and industrial application. All valves come with Teflon® packing for leak proof performance.

SPECIFICATIONS

Maximum Inlet Pressure . . . . . 3000 PSIG
Temp. Operating Range . . . . -65°F to +165°F

MATERIALS OF CONSTRUCTION

Body	Stem	Part Number	Outlet	Inlet	Orifice	Cv
Brass Nickel Plated	316 SST	15535	¼" MNPT	¼" MNPT	0.170	0.35
Brass Nickel Plated	316 SST	15536	¼" FNPT	¼" MNPT	0.170	0.35
Monel	Monel	Y34-311	¼" FNPT	¼" MNPT	0.140	0.27
316 Stainless Steel	316 SST	15552	¼" MNPT	¼" MNPT	0.140	0.27
316 Stainless Steel	316 SST	14803	¼" FNPT	¼" MNPT	0.140	0.27

DIAPHRAGM VALVES

The multiple metal diaphragm design and PCTFE seats are key elements to the high success of these valves. These valves are recommended where the diffusion of atmospheric gases and moisture into the gas stream are undesirable. They are a must in all high purity applications including gas chromatography carrier gases, samples, and calibration standards. Available in multi-turn version that has a hand wheel which operates from full open to fully closed in 3/4 turn and 1/4 turn version that has a lever type handle with flow indicator to determine if valve is open or closed.

Multi-Turn Valve

1/4 - Turn Valve

SPECIFICATIONS

Maximum Inlet Pressure . . . . . 3000 PSIG
Temp. Operating Range . . . . -40°F to +200°F
Body. . . . . Brass ir 316 Stainless Steel
Seat . . . . . PCTFE

MATERIALS OF CONSTRUCTION

Body	Part Number	Outlet	Outlet	Inlet	Orifice	Cv
Brass	15503	Multi-Turn	¼" FNPT	¼" MNPT	0.140	0.27
316 Stainless Steel	14804	Multi-Turn	¼" MNPT	¼" MNPT	0.094	0.13
316 Stainless Steel	14805	Multi-Turn	¼" FNPT	¼" MNPT	0.094	0.13
Brass Bar Stock	16084	¼ - Turn	¼" FNPT	¼" MNPT	0.094	0.13
Brass Bar Stock	16085	¼ - Turn	¼" FNPT	¼" FNPT	0.094	0.13
Brass Bar Stock	16086	¼ - Turn	¼" MNPT	¼" MNPT	0.094	0.13
Brass Bar Stock	16087	¼ - Turn	¼" Tube Fitting	¼" Tube Fitting	0.094	0.13
316 SST Bar Stock	16088	¼ - Turn	¼" FNPT	¼" MNPT	0.094	0.13
316 SST Bar Stock	16089	¼ - Turn	¼" FNPT	¼" FNPT	0.094	0.13
316 SST Bar Stock	16090	¼ - Turn	¼" MNPT	¼" MNPT	0.094	0.13
316 SST Bar Stock	16091	¼ - Turn	¼" Tube Fitting	¼" Tube Fitting	0.094	0.13

CHECK VALVES

In Line; One Directional Flow

Check Valves prevent the return flow of gas from re-entering the gas stream. This keeps foreign substances out of lines, regulators, and cylinders located upstream from valves. Check valves are available in brass and 316 stainless steel.

MATERIALS OF CONSTRUCTION

Body	O-Ring	Part Number	Outlet	Inlet
Brass Nickel Plated	Viton-A	16054	¼" FNPT	¼" FNPT
316 Stainless Steel	Viton-A	16055	¼" FNPT	¼" FNPT
316 Stainless Steel	ERP	16056	¼" FNPT	¼" FNPT
316 Stainless Steel	Neoprene	16057	¼" FNPT	¼" FNPT

ACCESSORIES

Chrome Plated Brass CGA Connections

CGA	Nipple	Nut	Filter	Washer
180	CGA180-2EP	CGA180-1P	N/A	
296	CGA296-2	CGA296-1	8203	
300	16072	16071	8203	
320	E99-320C13	CGA320-1P	Factory Installed	Factory Installed
326	E99-326C13	CGA320-1P	H713-23	
346	Y99-346C13C	CGA320-1P	8203	
350	CGA350-2EP	CGA350-1P	Factory Installed	
540	CGA540-2EP	CGA540-1P	H713-23	
580	CGA510-2EP	CGA580-1P	H713-23	
590	CGA510-2EP	CGA590-1P	H713-23	

CGA 540-2EP CGA 540-1P

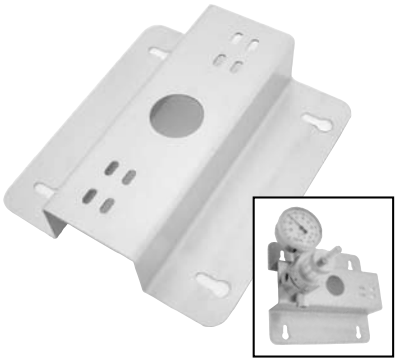
Stainless Steel CGA Connections

CGA	Nipple	Nut	Washer	Filter
320	E99-320C43	E99-320C44	15200	14491
326	E99-326C43	E99-320C44		14491
330	E99-330C43	E99-330C44	15200	14491
347	E99-347C43	E99-347C44		14491
350	E99-350C43	E99-350C44		14491
540	16083	16082		14491
580	E99-580C43	E99-580C44		14491
590	E99-580C43	E99-590C44		14491
660	E99-660C43	E99-660C44	E99-660W5	14491
677	E99-677C43	E99-677C44		14491
680	E99-680C43	E99-680C44		14491

14791

Accessories

Part Number	Description
15685	Stainless Steel Regulator Wall Mounting Bracket
14791	Panel Mounting Kit



15685
Stainless Steel Regulator Wall Mounting Bracket
Mounting Screws size 10-32

Monel CGA Connections

CGA	Nipple	Nut	Washer	Filter
330	Y99-330C33	Y99-330C34	15200	N/A
360	Y99-660C33	Y99-660C34	E99-660W5	N/A

Tube Fittings

Part Number	Description
14324	1/4" MNPT x 1/8" tube, brass
14745	1/16" MNPT x 1/8" tube, stainless steel
15188	1/4" MNPT x 1/4" tube, brass
15166	1/4" MNPT x 1/4" tube, stainless steel
Y99-26462	1/4" MNPT x 1/8" tube, stainless steel

15166

Gauges

Part Number	2 1/2" Chrome Plated, 1/4" MNPT
GA062-07	0-30 PSIG
GA086-07	30-0-30 PSIG
GA087-07	0-60 PSIG
GA088-07	0-200 PSIG
GA056-07	0-400 PSIG
GA090-07	0-3000 PSIG

Part Number	2 1/2" Stainless Steel, 1/4" MNPT
GA096-07	30-0-30 PSIG
GA097-07	0-100 PSIG
GA098-07	0-200 PSIG
GA099-07	0-400 PSIG
GA0100-07	0-3000 PSIG

GA056-07

PURGE ASSEMBLIES

The installation of a purge assembly on the inlet side of the pressure regulator, pigtail inlet, or gas control system is highly recommended anytime a toxic, corrosive, flammable, or ultra high purity gas is to be used in the system. Purge assemblies perform the following multiple functions in your gas system during cylinder change overs:

TEE-PURGE ASSEMBLIES

Contamination of the gas stream can often occur during cylinder change outs allowing oxygen and moisture to enter the regulator. These contaminents can cause disruption to processes and inaccurate data readings. These tee-purge assemblies are designed to be installed between the cylinder valve and the pressure regulator. They enable the user to purge the system through the regulator with an inert gas after cylinder changes leaving the gas stream pure and free of contaminents.

All models have a multi-turn diaphragm valve and a check valve to prevent backflow of the process gas into the purge line.

PART NUMBER	MATERIALS	MAX PRESSURE (PSIG)
16050 (CGA)	Brass	3,000
16051 (CGA)	Stainless Steel	3,000

IMPORTANT NOTE: To order, add CGA number for the applicable gas to the end of the part number for the selected tee-purge
Example: For a CGA 580 the part number would be 16050-580

CROSS-PURGE ASSEMBLIES

These compact cross-purge assemblies provide effective purging during cylinder change out. These units can be used in a wide variety of applictations where contamination must be avoided. They are an ideal accessory installed between the cylinder and the regulator of ultra high purity carrier lines for gas chromatography systems that cannot tolerate even minimal amounts of oxygen or moisture that can enter the system during cylinder changes.

They can also be used with gas mixtures that contain reactive components to ensure that no moisture enters the sampling system preventing deterioration of the reactive components that can lead to
concentration inaccuracies.

Each cross-purge assembly incorporates the use of an integrated check valve to prevent backflow of process gas into the purge line.

PART NUMBER	MATERIALS	MAX PRESSURE (PSIG)
16052 (CGA)	Stainless Steel	3,000
16053 (CGA)	Monel	3,000

IMPORTANT NOTE: To order, add CGA number for the applicable gas to the end of the part number for the selected tee-purge
Example: For a CGA 580 the part number would be 16050-580

SAFETY & TECHNICAL

GAS PROPERTIES

			THERMOPHYSICAL PROPERTIES							HAZARDOUS PROPERTIES			
Product	Formula	State	Molecular Weight	Vapor Pressure at 70˚ F (psig)	Specific Gravity at 70˚ F (1atm)	Critical Temp. (˚F)	Critical Pressure (psia)	Specific Volume (cf/lb)	Heat Capacity (Btu/lb. Mole ˚F)	Ignition Temp., (˚F)	Flammable Limits in Air (Vol.%)	Threshold Limit Value (ppm)	Physiological Properties
Acetylene	C_2H_2	Dissolved Gas	26.04	635	0.905	97.3	905.3	14.7	10.6	581	2.5-81	SA	
Air		Compressed Gas	28.97	*	1.00	-221.1	546.8	13.3					Oxidant
Ammonia	NH_3	Liquefied Gas	17.03	114	0.60	270.4	1639	22.6	8.6	1204	15-28	25	Corrosive and Toxic
Argon	Ar	Compressed Gas	39.95	*	1.38	-188.1	710	9.7	4.97			SA	Inert
Arsine	AsH_3	Liquefied Gas	77.95	205	2.69	211.8	957	5.0			4-64	0.05	Poison
n-Butane	C_4H_{10}	Liquefied Gas	58.12	16	2.08	305.6	550.8	6.4		788	1.8-8.4	800	Narcotic
Carbon Dioxide	CO_2	Liquefied Gas	44.01	838	1.52	87.8	1071	8.74	8.97			5,000	Inert
Carbon Monoxide	CO	Compressed Gas	28.01	*	0.97	-220.4	507.4	13.8	6.96	1204	12.5-74	50	Toxic
Chlorine	Cl_2	Liquefied Gas	70.91	85.3	2.47	291.2	1118.7	5.4	8.2			1	Oxidant and Toxic
Deuterium	D_2	Compressed Gas	4.03	*	0.139	-390.7	241	96.0	6.97	1058	4.9-75	SA	
Diborane	B_2H_6	Compress Gas	27.67	*	0.95	62.1	581			100	0.8-98	0.05	Highly Toxic
Ethane	C_2H_6	Liquefied Gas	30.07	543	1.047	90.1	708	12.8	12.6	986	3-12.4	SA	
Ethyl Chloride	C_2H_5Cl	Liquefied Gas	64.52			368.96	764.4				3.8-15.4	1000	
Ethylene	C_2H_4	Compressed Gas	28.05	*	0.974	49.8	742	13.8	10.4	1009	3.1-32	SA	
Helium	He	Compressed Gas	4.003	*	0.138	-450.3	33.2	96.7	4.98			SA	Inert
Hydrogen	H_2	Compressed Gas	2.02	*	0.0696	-399.96	190.8	192	6.89	1085	4-75	SA	
Hydrogen Chloride	HCl	Liquefied Gas	36.46	613	1.27	124.6	1200	10.6	6.9			5	Corrosive and Toxic
Hydrogen Sulfide	H_2S	Liquefied Gas	34.08	252	1.189	212.7	1308	11.2	8.2	500	4.3-45	10	Irritant and Toxic
Isobutane	C_4H_{10}	Liquefied Gas	58.12	30.8	2.0	275	592.2	6.5		864	1.8-8.4	SA	Anaesthetic
Krypton	Kr	Compressed Gas	83.8	*	2.898	-82.8	798	4.6	5.0			SA	Inert
Methane	CH_4	Compressed Gas	16.04	*	0.555	-115.8	673	23.7		1000	5-15	SA	
Methyl Chloride	CH_3Cl	Liquefied Gas	50.49	58.7	1.74	289.6	968	7.6	9.97	1170	10.7-17.4	50	Toxic
Neon	Ne	Compressed Gas	20.18	*	0.696	-379.8	384.9	19.2	4.97			SA	Inert
Nitrogen	N_2	Compressed Gas	28.01	*	0.967	-232.4	492.9	13.8	6.97			SA	Inert
Nitrous Oxide	N_20	Liquefied Gas	44.01	745	1.53	97.6	1054	8.7	9.2			25	Oxidant
Oxygen	O_2	Compressed Gas	32.0	*	1.105	-181.1	736.9	12.1	7.03				Oxidant
Phosphine	PH_3	Liquefied Gas	34.0	592.7	1.184	124.3	948	11.4		122	Treat as Pyrophoric	0.3	Poison
Propane	C_3H_8	Liquefied Gas	44.1	109	1.55	206.2	617.4	8.5	17.4	874	2.1-9.5	SA	
Silane	SiH_4	Compressed Gas	32.12	*	1.11	24.8	702.7	12.0			Pyrophoric	0.5	
Sulfur Dioxide	SO_2	Liquefied Gas	64.06	34.4	2.26	315	1143	5.9	9.6			2	Irritant and Toxic
Sulfur Hexafluoride	SF_6	Liquefied Gas	146.05	310	5.11	114	545	2.5				1000	Inert
Xenon	Xe	Compressed Gas	131.3	*	4.56	61.9	852.6	2.9	5.02			SA	Inert

* Above critical temperature @ 21.1 ˚C. SA Simple asphyxiant

CONVERSION TABLES

Multiply unit in left column by select applicable factor at right

VOLUME

	cu in	cu ft	cu yd	cu cm	cu meter	liter	US gal
1 cu in	1	-	-	16.387	-	0.02	-
1 cu ft	1,728.0	1	0.0370	28,317	0.0283	28.32	7.481
1 cu yd	46,656	27	1	-	0.7646	764.5	202.0
1 cu cm	0.06	-	-	1	-	0.001	-
1 cu meter	61,024	35.31	1.308	1,000,000	1	1,000	264.2
1 liter	61.024	0.0353	-	1,000	0.001	1	0.2642
1 gallon (US)	231	0.1337	0.00495	3,785.4	0.00379	3.785	1

PRESSURE

	psi	bar	atm	mm Hg	inch Hg	inch water	kPa
1 psi	1	0.0689	0.0680	51.713	2.0359	27.68	6.895
1 bar	14.504	1	0.9869	750.06	29.530	401.48	100
1 atm	14.696	1.01325	1	760	29.921	406.8	101.325
1 mm Hg (torr)	0.0193	0.0013	0.00132	1	0.0394	0.5352	0.133
1 in Hg	0.4912	0.0339	0.0334	25.4	1	13.596	3
1 in water	5.202	0.3587	0.0025	269.02	10.591	1	35.808
1 kPa	0.145	0.01	0.0099	7.519	0	4.015	1

WEIGHT

	grain	oz	lb	ton	gram	kg	metric ton
1 grain	1	0.00229	-	-	0.0648	-	-
1 ounce	437.5	1	0.0625	-	28.35	0.02835	-
1 pound	7,000	16.00	1.00	0.0005	453.60	0.4536	-
1 ton	-	32,000	2,000	1	-	907.2	0.9072
1 gram	15.43	0.04	-	-	1	0.001	-
1 kilogram	-	35.274	2.205	-	1,000	1	0.001
1 metric ton	-	35.274	2,205	1.102	-	1,000	1

FLOW

	scc/min	LPM	SCFM	L/hr	Nm^3/hr	SCFH
1 scc/min	1	0.001	-	0.06	-	0.00212
1 LPM	1,000	1	0.0353	60	0.06	2.119
1 SCFM	28,317	28	1	1,699	1.699	60
1 L/hr	16.667	0.01667	-	1	0.001	0.0353
1 Nm^3/hr	16,667	16.667	0.589	1,000	1	35.314
1 SCFH	471.95	0.472	0.0167	28.317	0.0283	1

SCFM Standard Cubic Feet per Minute
SCFH Standard Cubic Feet per Hour

scc/min Standard Cubic Centimeters per Minute
LPM Liters per Minute
Nm^3/hr Normal Cubic Meters per Hour

DENSITY

	lb/cu in	lb/cu ft	lb/gal	g/cm^3	g/liter
1 lb/cu in	1	1,728	231.00	27.68	27,680
1 lb/cu ft	-	1	0.1337	0.0160	16.019
1 lb/gal	0.00433	7.481	1	0.1198	119.83
1 g/cm^3	0.03613	62.43	8.345	1	1,000
1 g/liter	-	0.06243	0.008345	0.001	1

CONVERSION TABLES

PARTS PER MILLION CONVERSION OF WATER VAPOR TO DEW POINTS

Dew Point (F°)		Moisture (C°)	Dew Point (F°)		Moisture (C°)	Dew Point (F°)		Moisture (C°)
ppm (v/v)			ppm (v/v)			ppm (v/v)		
-130	-90	0.1	-74	-59	12.3	-40	-40	128
-120	-84	0.25	-73	-58	13.3	-39	-39	136
-110	-79	0.63	-72	-58	14.3	-38	-39	144
-105	-76	1.00	-71	-57	15.4	-37	-38	164
-104	-76	1.08	-70	-57	16.6	-36	-38	164
-103	-75	1.18	-69	-56	17.9	-35	-37	174
-102	-74	1.29	-68	-56	19.2	-34	-37	185
-101	-74	1.40	-67	-55	20.6	-33	-36	196
-100	-73	1.53	-66	-54	22.1	-32	-36	210
-99	-73	1.66	-65	-54	23.6	-31	-35	222
-98	-72	1.81	-64	-53	25.6	-30	-34	235
-97	-72	1.96	-63	-53	27.5	-29	-34	250
-96	-71	2.15	-62	-52	29.4	-28	-33	265
-95	-71	2.35	-61	-52	31.7	-27	-33	283
-94	-70	2.54	-60	-51	34.0	-26	-32	300
-93	-69	2.76	-59	-51	36.5	-25	-32	317
-92	-69	3.00	-58	-50	39.0	-24	-31	338
-91	-68	3.28	-57	-49	41.8	-23	-31	358
-90	-68	3.53	-56	-49	44.6	-22	-30	378
-89	-67	3.84	-55	-48	48.0	-21	-29	400
-88	-67	4.15	-54	-48	51	-20	-29	422
-87	-66	4.50	-53	-47	55	-19	-28	448
-86	-66	4.78	-52	-47	59	-18	-28	475
-85	-65	5.30	-51	-46	62	-17	-27	500
-84	-64	5.70	-50	-46	67	-16	-27	530
-83	-64	6.20	-49	-45	72	-15	-26	560
-82	-63	6.60	-48	-44	76	-14	-26	590
-81	-63	7.20	-47	-44	82	-13	-25	630
-80	-62	7.80	-46	-43	87	-12	-24	660
-79	-62	8.40	-45	-43	92	-11	-24	700
-78	-61	9.10	-44	-42	98	-10	-23	740
-77	-61	9.80	-43	-42	105	-9	-23	780
-76	-60	10.5	-42	-41	113	-8	-22	820
-75	-59	11.4	-41	-41	119	-7	-22	870

Conversion of parts per million (ppm) to percent:

1 ppm	=	0.0001%
10 ppm	=	0.001%
100 ppm	=	0.01%
1,000 ppm	=	0.1%
10,000 ppm	=	1%

Temperature scale conversions

°F	=	(1.8 °C) + 32
°F	=	1.8 (K) - 459.67
°C	=	$\frac{°F - 32}{1.8}$
°C	=	K - 273.15
K	=	°C + 273.15
K	=	$\frac{°F + 459.67}{1.8}$

CONVERSION
LIQUID TO GAS

ARGON

	WEIGHT		GAS		LIQUID	
	Pounds (lbs)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm3)	Gallons (Gal)	Liters (L)
1 Pound	1	0.4536	9.671	0.2543	0.086	0.3255
1 Kilogram	2.205	1	21.32	0.5605	0.18957	0.7176
1 SCF Gas	0.1034	0.0469	1	0.02628	0.008893	0.03366
1 Nm^3 Gas	3.933	1.784	38.04	1	0.3382	1.2802
1 Gal Liquid	11.63	5.276	112.5	2.957	1	3.785
1 L Liquid	3.072	1.3936	29.71	0.7812	0.2642	1

CARBON DIOXIDE

	WEIGHT		GAS		LIQUID	
	Pounds (lbs)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm3)	Gallons (Gal)	Liters (L)
1 Pound	1.0	0.4536	8.741	0.2294	0.11806	0.4469
1 Kilogram	2.205	1.0	19.253	0.5058	0.2603	0.9860
1 SCF Gas	0.1144	0.05189	1.0	0.02628	0.013506	0.05113
1 Nm^3 Gas	4.359	1.9772	38.04	1.0	0.5146	1.9480
1 Gal Liquid	8.470	3.842	74.04	1.9431	1.0	3.785
1 L Liquid	2.238	1.0151	19.562	0.5134	0.2642	1.0

NITROGEN

	WEIGHT		GAS		LIQUID	
	Pounds (lbs)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm3)	Gallons (Gal)	Liters (L)
1 Pound	1.0	0.4536	13.803	0.3627	0.1481	0.5606
1 Kilogram	2.205	1.0	30.42	0.7996	0.3262	1.2349
1 SCF Gas	0.07245	0.03286	1.0	0.02628	0.01074	0.04065
1 Nm^3 Gas	2.757	1.2506	38.04	1.0	0.408	1.5443
1 Gal Liquid	6.745	3.060	93.11	2.447	1.0	3.785
1 L Liquid	1.782	0.8083	24.60	0.6464	0.2642	1.0

OXYGEN

	WEIGHT		GAS		LIQUID	
	Pounds (lbs)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm3)	Gallons (Gal)	Liters (L)
1 Pound	1.0	0.4536	12.076	0.3174	0.1050	0.3977
1 Kilogram	2.205	1.0	26.62	0.6998	0.2316	0.8767
1 SCF Gas	0.08281	0.03756	1.0	0.02628	0.008691	0.0329
1 Nm^3 Gas	3.151	1.4291	38.04	1.0	0.3310	1.2528
1 Gal Liquid	9.527	4.322	115.1	3.025	1.0	3.785
1 L Liquid	2.517	1.1417	30.38	0.7983	0.2642	1.0

SCF (Standard Cubic Foot) gas measured at 1 atmosphere and 70°F. Nm3 (normal cubic meter) measured at 1 atmosphere and 0°C. Liquid Argon, Oxygen and Nitrogen measured at 1 ATM and Boiling Point of Liquid Carbon Dioxide measured at 21.42 ATM and 1.7°F.

WARRANTY

SMITH EQUIPMENT SPECIALTY GAS REGULATOR MANUFACTURERS WARRANTY

SMITH EQUIPMENT SPECIALTY GAS REGULATOR MANUFACTURERS WARRANTY

General Purpose, High Purity Analytical, and High Purity Regulators
Smith Equipment warrants the initial user of the products sold that such products are free from defects in material and workmanship under normal use and service for a period of two years from the date of installation of the equipment or two years from the date of shipment from the factory, whichever comes first.

Corrosive Service Regulators
Smith Equipment warrants the initial user of the products sold that such products are free from defects in material and workmanship under normal use and service (see note #1) for a period of three months from the date of installation of the equipment or three months from the date of shipment from the factory, whichever comes first.

Note #1 A Cross-Purge Assembly must be used in conjunction with these models in order to ensure effective purging of hazardous gas traces during cylinder change out.

Within said warranty period, Smith Equipment agrees to replace or repair free of charge at its factory, any product or part that is found to have defects in workmanship or materials.

Smith Equipment will not pay for or warrant repairs made by anyone other than personnel authorized by Smith Equipment to make such repairs. SMITH EQUIPMENT SHALL NOT BE LIABLE FOR CONSEQUENTIAL, SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES, TO THE EXTENT PERMITTED BY LAW. EXCEPT AS OTHERWISE PROVIDED BY LAW, THIS EXPRESS WARRANTY SHALL BE THE EXCLUSIVE WARRANTY AND SHALL BE IN LIEU OF ALL IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES OF FITNESS FOR PARTICULAR PURPOSE AND MERCHANTABILITY. The warranty and remedies provided in this express warranty shall not apply to any product which has been damaged by accident, abuse or misuse, or modified or changed in any way except by personnel authorized by Smith Equipment. THE REMEDIES STATED HEREIN SHALL BE EXCLUSIVE REMEDIES OF THE INITIAL USER UNDER THE EXPRESS WARRANTY CONTAINED HEREIN AND UNDER ANY OTHER WARRANTIES EXPRESS OR IMPLIED REQUIRED BY LAW.

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