

# Equipment & Accessories

for specialty and industrial gas applications





*Advanced Specialty Gas Equipment*

This catalog includes only technology-driven products—with comprehensive, accurate specifications, and features that provide valuable performance and safety benefits. We reorganized parts of it too, based on suggestions from customers, making it easier than ever to use. Plus we added numerous pages of great new products.

#### **Extensive Product Inventory**

We stock the industry's most complete line of high performance, high purity gas handling equipment with a complete complement of supporting miscellaneous accessories.

#### **SAME DAY Delivery**

What many companies consider to be a rush order, we consider business as usual. Nearly every item you see in this catalog can be shipped on the same day you order it!

#### **Custom Design Services**

If you don't see what you need in this catalog, call us. We have extensive experience in the design and construction of specialized, high purity gas delivery systems and customized gas handling equipment. We'll put our engineering and fabrication talents to work for you to solve your unique gas handling challenges.

#### **National Distribution Network**

Our competitively priced products are available through a network of knowledgeable distributors. We work closely with them, to keep everyone up-to-speed, so they can recommend products that are sure to meet all of your application needs. We also provide product training to distributors and end users as part of our Premier Partnership Program.

#### **Commitment to Safety**

Equipment that works with one gas doesn't always work with another. Because we understand the characteristics of all types of gases, we recommend only equipment that will safely deliver the gases you use. We can even suggest products that will substantially reduce the hazards of handling certain gases. We periodically highlight these products to our customers in our *Safety Solution of the Month* program.

#### **Guarantee**

When all is said and done, your satisfaction is what's most important to us, which means: we're not happy until you are!

#### **Technical Customer Service**

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Let us know how we can be of assistance to you!



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LABD	26	SG6112 thru SG6129	190	TSC	66
LADE	27	SG6130 thru SG6135	198	TSD	25
LABH	52	SG6140 thru SG6143	196	VP2 Series	98
LB3534	60	SG6150 thru SG6151 Series	202	VREB thru VRSB	51
LB3550 thru LB3553	205	SG6160 thru SG6162 Series	201		
LB3580 thru LB3585	185	SG6171 thru SG6173	197		
LC	59	SG6180 thru SG6187	199		
LGC	126	SG6190 thru SG6195	200		
LGP Series	96	SG6200	205		
LMW	107	SG6202 thru SG6203	204		
MC-1	199	SG6204	205		
MC-1A	201	SG6206 thru SG6211	204		
MC-2	202	SG6215	132		
MC-3	198	SG6216	65		
MC-4	199	SG6220 thru SG6223	209		
MC-5-2	201	SG6224	132		
MS Series	218	SG6225	205		
MS-1001 thru MS-1034	220	SG6226	204		
MS-1069 thru MS-1156	221	SG6230 thru SG6240 Series	208		
MS-1179 thru MS-1212	222	SG6250 thru SG6252 Series	207		
MS-1220 thru MS-1239	223	SG6260 thru SG6262 Series	208		
MS-1328 thru MS-1375	224	SG6280 thru SG6282 Series	209		
MV5700 thru MV5930 Series	181	SG6300 thru SG6392	139		
OC100	63	SG6450 thru SG6469 Series	148		
P Series	95	SG6500	144		
P1 thru P3	97	SG6520 thru SG6521	137		
PCS Series	110	SG6537 thru SG6547 Series	145		
PCSA Series	116	SG6538	146		
PM3803	30	SG6540 thru SG6541	135		
PM3804	63	SG6548	146		
PMC Series	114	SG6551A thru SG6552	141		
PMCA Series	116	SG6554 thru SG65581	142		
PR	132	SG6627 thru SG6629	125		
PS-GFC	174	SG6630 thru SG6632	149		
PS-GFM	170	SG6638 thru SG6643	102		
RM Series	92	SG6644 thru SG6645	104		
RP1	43	SG6650 thru SG6652 Series	210		
RP2	46	SG6664 thru SG6667	102		
RV5570 thru RV5580 Series	186	SG6680 thru SG6681	112		
S1000A thru S1001A	159	SG6682 thru SG6691	93		
SC Series	131	SG6700 thru SG6774	150		
SG2500 Series	212	SG6780 thru SG6952	151		
SG3504 thru SG3505	60	SG7500	143		
SG3514 thru SG3515	61	SG9090 thru SG9091	72		
SG3540 thru SG3543	211	SG9093	70		
SG3600 thru SG3623	63	SN9100 thru SN9200	53		
SG3882 thru SG3883	69	SNSG5480N thru SNSG6851	53		
SG3890 thru SN3899	176	SNT2028-6 thru SNT4035-6	53		
SG4820 thru SG4821	50	SP014	54		
SG5340A thru SG5350A	182	SRH	104		
SG5400 thru SG5434 Series	184	SRS	102		

# Gas Data and Equipment Recommendations

The following information is provided as a guide to assist you in your choice of a pressure regulator for specific cylinder gases. It is divided into three distinct groupings—Pure Gases (pages 7–14); Pure Gases in Lecture Bottles (pages 15–17); and Two-Component Gas Mixtures (pages 18–20).

To use this guide, simply locate the gas or gas mixture you are using within the appropriate grouping. The tables for Pure Gases and Pure Gases in Lecture Bottles have their information initially arranged alphabetically by the gas of interest, and then secondarily alphabetized by the specific grade of that gas. The information in the Two-Component Gas Mixtures table is listed first alphabetically by minor component, and then alphabetically by the balance gas, or major component. For example, 2% Ammonia, 98% Helium would be listed first under Ammonia (the minor component), and then under “In Helium” (the balance gas) within the Ammonia grouping.

Across from each individual listing you will find that product's corresponding valve outlet connection number (CGA Connection); the recommended regulator model; and a reference page number directing you to where additional information and complete specifications on that regulator can be found. In the Pure Gas Table you will also find certain

physical properties of the gas, such as chemical formula, molecular weight, vapor pressure (for liquefied gases), specific gravity and specific volume. In certain cases, where pressure reduction is not desired or required—as with very low pressure products such as Boron Trichloride—a manual control valve has been recommended instead of a pressure regulator. Please remember that Manual Control Valves control flow, not pressure.

You should note that the recommendations contained herein are valid, and generally preferred for the more common applications of the products indicated; and consideration has been given to safety, materials compatibility, as well as to convenience and suitability for these common applications. However, the recommendations shown may not be the only models that are suitable, and your specific application may have subtleties that would indicate another selection is a more preferable choice. If you feel this is the case, or if you are using a product that is not listed within these tables, please do not hesitate to contact one of our Technical Representatives, or your Advanced Specialty Gas Equipment Distributor to discuss your requirements.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Acetylene (C <sub>2</sub> H <sub>2</sub> ) Atomic Absorption Commercial Grade, 98.0% Purified Technical	26.038	—	0.91 at 32°F	14.5	510 510 510 510	SSG9048 SSG9048 SSG9048 SSG9048	58 58 58 58
Air Blended Air CO <sub>2</sub> Free Compressed Air Dry High Pressure (3500 psig) High Pressure (6000 psig) Hydrocarbon Free Ultra Pure Carrier Ultra Zero Vehicle Emission Zero V.O.C. Free Air Zero	28.975	—	1.00	13.3	590 590 346 346/590* 347 702 346/590* 590 590 590 590 346/590*	TSD/LABE LABEL/ETS TSD/LABE TSD/LABE AG3850 Series SG3600 Series LABEL/ETS HPE HPE LABEL/ETS LABEL/ETS LABEL/ETS	25, 27 27, 29 25, 27 25, 27 62 63 27, 29 31 31 27, 29 27, 29 27, 29
Allene (C <sub>3</sub> H <sub>4</sub> )	40.065	116.7	1.415 at 68°F	9.6	510	SSE/LABD	24, 26
Ammonia (NH <sub>3</sub> ) Anhydrous Electronic Nitride Research Semiconductor Purity SFC Grade ULSI Purity Ultra-High Purity	17.031	114.1	0.597	22.7	705 660 660 660 660 660 660 660	CRH AG3870 Series AG3870 Series AG3870 Series AG3870 Series MV5800 Series AG3870 Series AG3870 Series	38 36 36 36 36 181 36 36

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Argon (Ar)	39.948	—	1.378	9.68	680 677 580 580 580 580 580 580 580 580 580 580	AG3850 Series SG3600 Series LABE/ETS LABE/ETS LABE/ETS HPD HPE HPE HPE HPE HPE ETS/HPE ETS/HPE	62 63 27, 29 27, 29 27, 29 30 31 31 31 31 31 29, 31 29, 31
High Pressure (3500 psig)							
High Pressure (6000 psig)							
High Purity							
Oxygen Free							
Prepurified							
Research							
Semiconductor Purity							
Sputtering							
ULSI Purity							
Ultra-High Purity							
Ultraplus®							
Ultra Pure Carrier							
Zero							
Arsine (AsH <sub>3</sub> )	77.946	205	2.69	5.0	350/632* 350/632*	AG3870 Series AG3870 Series	36 36
Electronic ULSI Purity							
Boron Trichloride (BCl <sub>3</sub> )	117.169	4.4	4.03	3.3	660 660 660 660	MV5800 Series MV5800 Series MV5800 Series MV5800 Series	181 181 181 181
CP							
Electronic							
Semiconductor Purity							
VLSI Etchant							
Boron Trifluoride (BF <sub>3</sub> )	67.805	—	2.387	5.7	330	ASB	39
CP							
1,3 Butadiene (C <sub>4</sub> H <sub>6</sub> )	54.092	21.4	1.915 at 60°F	6.9	510 510 510 510	SSE/LABD LABD/ESS LABD/ESS HPD	24, 26 26, 28 26, 28 30
CP							
High Purity (Inhibited)							
Instrument							
Research							
Butane (C <sub>4</sub> H <sub>10</sub> )	58.123	16.3	2.110 at 68°F	6.4	510 510 510	SSE/LABD LABD/ESS SSE/LABD	24, 26 26, 28 24, 26
CP							
Instrument							
Technical							
n-Butane See Butane							
iso-Butane See Isobutane							
1-Butene (C <sub>4</sub> H <sub>8</sub> )	56.108	23.5	1.937	6.7	510 510 510	SSE/LABD LABD/ESS HPD	24, 26 26, 28 30
CP							
High Purity							
Research							
cis-2-Butene (C <sub>4</sub> H <sub>8</sub> )	56.108	13	1.997 at 68°F	6.7	510 510	LABD/ESS SSE/LABD	26, 28 24, 26
High Purity							
Technical							
trans-2-Butene (C <sub>4</sub> H <sub>8</sub> )	56.108	15	1.997 at 68°F	6.7	510 510	LABD/ESS SSE/LABD	26, 28 24, 26
High Purity							
Technical							
(cis & trans) 2-Butene (C <sub>4</sub> H <sub>8</sub> )	56.108	14	1.997 at 68°F	6.7	510	SSE/LABD	24, 26
Technical							
iso-Butylene See Isobutylene							

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Carbon Dioxide (CO <sub>2</sub> )	44.011	830	1.522	8.76	320	LABE/ETS	27, 29
Anaerobic					320	LABH	52
Bone Dry					320	LABH	52
CP					320	LABH	52
Commercial					320	LABH	52
Electronic					320	HPE	31
Instrument (Coleman)					320	LABE/ETS	27, 29
Precision Aquarator®					320	HPE	31
Research					320	HPE	31
SFC Grade					320	MV5700 Series	181
SFE					320	MV5700 Series	181
Carbon Monoxide (CO)	28.010	—	0.968	13.8	350	LABE/ETS	27, 29
CP					350	TSD/LABE	25, 27
Commercial					350	HPD	30
Research					350	LABE/ETS	27, 29
Technical					350	HPE	31
Ultra-High Purity					350		
Carbon Tetrafluoride							
See Halocarbon 14							
Carbonyl Sulfide (COS)	60.070	160	2.10 at 68°F	6.4	330	CRH	38
Chlorine (Cl <sub>2</sub> )	70.906	85.3	2.473 at 68°F	5.4	660	CRH/ASB	38, 39
High Purity					660	AG3870 Series	36
Research					660	AG3870 Series	36
Semiconductor Purity					660	AG3870 Series	36
ULSI Purity					660	AG3870 Series	36
Ultra-High Purity					660	CRH/ASB	38, 39
Cyclopropane (C <sub>3</sub> H <sub>6</sub> )	42.081	75.0	1.453 at 68°F	9.2	510	SSE/LABD	24, 26
Deuterium (D <sub>2</sub> )	4.032	—	0.139 at 32°F	95.9	350	ETS/HPE	29, 31
CP					350	HPD	30
Research							
Dimethylamine (C <sub>2</sub> H <sub>7</sub> N)	45.085	11.3	1.557 at 77°F	8.6	705	CRH	38
Dimethyl Ether (C <sub>2</sub> H <sub>6</sub> O)	46.069	62.3	1.59	8.4	510	SSE/LABD	24, 26
2,2-Dimethylpropane (C <sub>5</sub> H <sub>12</sub> )	72.151	7.0	2.49 at 77°F	5.3	510	MV5700 Series	181
Ethane (C <sub>2</sub> H <sub>6</sub> )	30.07	544	1.047 at 60°F	12.8	350	LABD/ESS	26, 28
CP					350	HPD	30
Research					350	SSE/LABD	24, 26
Technical					350	HPD	30
Ultra-High Purity							
Ethyl Acetylene (C <sub>4</sub> H <sub>6</sub> )	54.092	8.5	1.93 at 77°F	7.2	510	MV5800 Series	181
Ethyl Chloride (C <sub>2</sub> H <sub>5</sub> Cl)	64.515	5.3	2.22 at 68°F	6.0	300	MV5700 Series	181
High Purity							

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Ethylene (C <sub>2</sub> H <sub>4</sub> ) CP Polymer Grade Research Technical	28.054	—	0.978 at 32°F	13.8	350 350 350 350	LABE/ETS LABE/ETS HPD TSD/LABE	27, 29 27, 29 30 25, 27
Ethylene Oxide (C <sub>2</sub> H <sub>4</sub> O) 99.90%	44.054	6.5	1.52	8.78	510	MV5800 Series	181
Halocarbon 12 (CCl <sub>2</sub> F <sub>2</sub> ) (Dichlorodifluoromethane)	120.914	70.2	4.26	3.14	660	SSE/LABD	24, 26
Halocarbon 13 (CClF <sub>3</sub> ) (Chlorotrifluoromethane)	104.459	458.7	3.70	3.61	320/660*	LABD	26
Halocarbon 13B1 (CBrF <sub>3</sub> ) (Bromotrifluoromethane)	148.910	189	5.30	2.6	320/660*	SSE/LABD	24, 26
Halocarbon 14 (CF <sub>4</sub> ) (Tetrafluoromethane) Electronic Semiconductor Purity Ultraplus® VLSI	88.005	—	3.038	4.39	320/660* 320/580* 320/660* 580	HPE HPE HPE HPE	31 31 31 31
Halocarbon 21 (CHCl <sub>2</sub> F) (Dichlorofluoromethane)	102.923	8.4	3.82 at 68°F	3.5	660	MV5700 Series	181
Halocarbon 22 (CHClF <sub>2</sub> ) (Chlorodifluoromethane)	86.469	123	3.08	4.4	660	SSE/LABD	24, 26
Halocarbon 23 (CHF <sub>3</sub> ) (Trifluoromethane) Technical Ultraplus® 99.90%	70.014	635	2.43	5.5	660 320/660* 320/660*	SSD/LABD HPD LABD/ESS	24, 26 30 26, 28
Halocarbon 114 (C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub> ) (1,2-Dichlorotetrafluoroethane)	170.922	12.9	5.93 at 77°F	2.3	660	SSE/LABD	24, 26
Halocarbon 115 (C <sub>2</sub> ClF <sub>5</sub> ) (Chloropentafluoroethane)	154.467	102	5.569	2.4	660	SSE/LABD	24, 26
Halocarbon 116 (C <sub>2</sub> F <sub>6</sub> ) (Hexafluoroethane) 99.90% Semiconductor Purity	138.012	430.3	4.773	2.8	320/660* 660	LABD HPD	26 30
Halocarbon 142B (C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub> ) (1-Chloro-1,1-Difluoroethane)	100.496	27.8	3.63	3.68	510	SSE/LABD	24, 26
Halocarbon 152A (C <sub>2</sub> H <sub>4</sub> F <sub>2</sub> ) (1,1-Difluoroethane)	66.051	63	2.36	5.85	510	SSE/LABD	24, 26

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft³/lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Halocarbon C-318 (C <sub>4</sub> F <sub>8</sub> ) (Octafluorocyclobutane)	200.031	25	7.33	1.85	660	SSE/LABD	24, 26
Halocarbon 500 (73.8 wt.% Halocarbon 12 26.2 wt.% Halocarbon 152A)	100.1	82.3	3.5	3.82	660/510*	SSE/LABD	24, 26
Halocarbon 502 (48.8 wt.% Halocarbon 22 51.2 wt.% Halocarbon 115)	111.63	132.2	3.87	3.45	320/660*	SSE/LABD	24, 26
Halocarbon 503 (60 wt.% Halocarbon 23 40 wt.% Halocarbon 13)	87.247	613	3.07	4.3	320	SSD/LABD	24, 26
Halocarbon 1113 (C <sub>2</sub> ClF <sub>3</sub> ) (Chlorotrifluoroethylene)	116.47	62	4.13	3.30	510	SSE/LABD	24, 26
Halocarbon 1132A (C <sub>2</sub> H <sub>2</sub> F <sub>2</sub> ) (1,1-Difluoroethylene)	64.035	518	2.21 at 77°F	6.0	350	SSD/LABD	24, 26
Helium (He)	4.003	—	0.138	96.7			
Carrier Grade				580	LABE/ETS	27, 29	
Chromatographic				580	HPE	31	
ECD Grade				580	HPE	31	
High Pressure (3500 psig)				680	AG3850 Series	62	
High Pressure (6000 psig)				677	SG3600 Series	63	
High Purity				580	LABE/ETS	27, 29	
Oxygen Free				580	LABE/ETS	27, 29	
Research				580	HPD	30	
Semiconductor Purity				580	HPE	31	
Ultra-High Purity				580	HPE	31	
Ultraplus®				580	HPE	31	
Ultra Pure Carrier				580	HPE	31	
ULSI				580	HPE	31	
Zero				580	LABE/ETS	27, 29	
Hexafluoropropylene (C <sub>3</sub> F <sub>6</sub> )	150.023	85	5.18 at 68°F	2.58	660	LABD/ESS	26, 28
Hydrogen (H <sub>2</sub> )	2.016	—	0.0696	191.7			
Carrier Grade				350	LABE/ETS	27, 29	
Extra Dry				350	LABE/ETS	27, 29	
High Pressure (3500 psig)				695	AG3850 Series	62	
High Pressure (6000 psig)				703	SG3600 Series	63	
High Purity				350	LABE/ETS	27, 29	
Prepurified				350	LABE/ETS	27, 29	
Purified				350	LABE/ETS	27, 29	
Research				350	HPD	30	
Semiconductor Purity				350	HPE	31	
ULSI Purity				350	HPE	31	
Ultra-High Purity				350	HPE	31	
Ultraplus®				350	HPE	31	
Ultra Pure Carrier				350	HPE	31	
Zero				350	LABE/ETS	27, 29	

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Hydrogen Bromide (HBr) Chemically Pure ULSI Purity	80.912	320	2.812 at 77°F	4.8	330 330	APC APC	34 34
Hydrogen Chloride (HCl) Electronic Research Technical ULSI Purity Ultra-High Purity	36.461	613	1.268 at 68°F	10.6	330 330 330 330 330	AG3870 Series AG3870 Series CRH/ASB AG3870 Series AG3870 Series	36 36 38, 39 36 36
Hydrogen Selenide (H <sub>2</sub> Se) Research Semiconductor Purity ULSI Purity	80.976	124.9	2.80 at 77°F	4.8	660 350 350	AG3870 Series AG3870 Series AG3870 Series	36 36 36
Hydrogen Sulfide (H <sub>2</sub> S) CP Research Technical	34.076	252	1.189 at 59°F	11.23	330 330 330	AP1/APC APC CRH	32, 34 32 38
Isobutane (C <sub>4</sub> H <sub>10</sub> ) CP Instrument Research Technical	58.124	30.7	2.01	6.5	510 510 510 510	SSE/LABD LABD/ESS HPD SSE/LABD	24, 26 26, 28 30 24, 26
Isobutylene (C <sub>4</sub> H <sub>8</sub> ) CP High Purity Research	56.108	24.3	1.997	6.7	510 510 510	SSE/LABD SSE/LABD HPD	24, 26 24, 26 30
Isopentane (C <sub>5</sub> H <sub>12</sub> ) CP	72.151	-3.2	2.48	—	510	MV5700 Series	181
Krypton (Kr) Purified Research	83.800	—	2.899	4.6	580 580	HPE HPD	31 30
Methane (CH <sub>4</sub> ) Commercial CP High Pressure (3500 psig) High Pressure (6000 psig) Instrument Purified Research Technical Ultra-High Purity Ultra Pure	16.043	—	0.554 at 32°F	23.7	350 350 695 703 350 350 350 350 350 350	TSD/LABE LABE/ETS AG3850 Series SG3600 Series LABE/ETS LABE/ETS HPD TSD/LABD HPE HPE	25, 27 27, 29 62 63 27, 29 27, 29 30 25, 27 31 31
Methyl Bromide (CH <sub>3</sub> Br)	94.939	13	3.355 at 77°F	4.1	330/320*	LABD/ESS	26, 28
Methyl Chloride (CH <sub>3</sub> Cl)	50.488	58.7	1.74 at 32°F	7.6	510/660*	LABD/ESS	26, 28
Methyl Mercaptan (CH <sub>3</sub> SH)	48.107	15	1.66 at 68°F	8.0	330	AP1/APC	32, 34
Monomethylamine (CH <sub>3</sub> NH <sub>2</sub> )	31.058	28.8	1.08 at 68°F	12.1	705	CRH	38

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Natural Gas	17.656	—	0.55	24	350	TSD/LABE	25, 27
Neon (Ne)	20.183	—	0.696	19.2	580	LABE/ETS	27, 29
CP					580	TSD/LABE	25, 27
First Run					580	ETS/HPE	29, 31
High Purity					580	HPD	30
Research					580	HPE	31
Ultra-High Purity					580	HPE	31
Ultra Pure					580		31
Nitric Oxide (NO)	30.006	—	1.04	1.04	660	CRH	38
CP							
Nitrogen (N <sub>2</sub> )	28.013	—	0.967	13.8	580	HPE	31
ECD Grade					580	LABE/ETS	27, 29
Extra Dry					680	AG3850 Series	62
High Pressure (3500 psig)					677	SG3600 Series	63
High Pressure (6000 psig)					580	LABE/ETS	27, 29
High Purity					580	LABE/ETS	27, 29
Low Oxygen					580	LABE/ETS	27, 29
Oxygen Free					580	LABE/ETS	27, 29
Prepurified					580	LABE/ETS	27, 29
Research					580	HPD	30
Semiconductor Purity					580	HPE	31
Ultra-High Purity					580	HPE	31
Ultraplus®					580	HPE	31
Ultra Pure Carrier					580	HPE	31
Ultra Zero Ambient Monitoring Zero					580	HPE	31
Vehicle Emission Zero					580	ETS/HPE	29, 31
VOC Free Nitrogen					580	ETS/HPE	29, 31
Zero					580	LABE/ETS	27, 29
Nitrogen Dioxide (NO <sub>2</sub> )	46.005	0.0 psig	1.58	4.7	660	MV5800 Series	181
CP							
Nitrous Oxide (N <sub>2</sub> O)	44.013	745	1.53 at 68°F	8.7	326	LABH	52
Atomic Absorption					326	LABH	52
CP					326	HPD	30
Electronic Grade					326	LABD/ESS	26, 28
High Purity					326	LABH	52
Industrial					326	HPD	30
Research					326	HPD	30
Semiconductor Purity					326	MV5700 Series	181
SFC Purity					326	LABH	52
Technical					326	HPD	30
Ultra-High Purity					326	HPD	30
Ultraplus®					326	HPD	30
Oxygen (O <sub>2</sub> )	32.00	—	1.105 at 77°F	12.1	540	LABE/ETS	27, 29
Extra Dry					540	ETS/HPE	29, 31
Hydrocarbon Free UHP					540	HPE	31
MOS					540	HPD	30
Research					540	HPE	31
Ultra-High Purity					540	HPD	31
Ultra Pure Carrier					540	HPE	31
Ultra Zero					540	HPE	31
Zero					540	LABE/ETS	27, 29
Perfluoropropane (C <sub>3</sub> F <sub>8</sub> )	188.020	100.1	6.69 at 68°F	2.02	660	HPD	30
Semiconductor Purity							

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases

Gas Grade	Mol. Weight	Vapor Pressure psig at 70°F	Specific Gravity Air = 1	Specific Volume ft <sup>3</sup> /lb at 70°F	CGA Connection Number	Equipment Recommendations	Page
Phosgene (COCl <sub>2</sub> )	98.916	10.7	3.48 at 77°F	3.9	660	MV5800 Series	181
Phosphine (PH <sub>3</sub> ) Electronic ULSI Purity	33.998	593	1.184	11.4	350/632* 350/632*	AG3870 Series AG3870 Series	36 36
Phosphorous (PF <sub>5</sub> ) Pentafluoride	125.966	400	4.46	3.1	330/660*	AG3870 Series	36
Propane (C <sub>3</sub> H <sub>8</sub> ) CP Instrument Natural Research	44.097	109	1.55 at 68°F	8.5	510 510 510 510	LABD/ESS LABD/ESS SSE/LABD HPD	26, 28 26, 28 24, 26 30
Propylene (C <sub>3</sub> H <sub>6</sub> ) CP Polymer Purity Research	42.081	136.6	1.48 at 68°F	9.06	510 510 510	LABD/ESS LABD/ESS HPD	26, 28 26, 28 30
Silicon Tetrafluoride (SiF <sub>4</sub> ) Semiconductor Purity	104.080	—	3.63 at 68°F	3.7	330	APC	34
Sulfur Dioxide (SO <sub>2</sub> ) Anhydrous Commercial	64.063	34.4	2.262	5.9	660 660	AP1/APC CRH	32, 34 38
Sulfur Hexafluoride (SF <sub>6</sub> ) Commercial CP Electronic Etchant Instrument Purity SFC ULSI Purity Ultraplus®	146.051	320	5.11 at 68°F	2.5	590 590 590 590 590 590 590 590	LABD/ESS LABD/ESS HPD HPD HPD LABD/ESS MV5700 Series HPD HPD	26, 28 26, 28 30 30 30 26, 28 181 30 30
Sulfur Tetrafluoride (SF <sub>4</sub> ) Technical	108.058	140	3.783 at 68°F	3.6	330	CRH	38
Trimethylamine (C <sub>3</sub> H <sub>9</sub> N)	59.112	13.3	2.087 at 68°F	6.4	705	CRH	38
Vinyl Methyl Ether (C <sub>3</sub> H <sub>6</sub> O)	58.080	10.6	1.99 at 68°F	6.7	290	MV5800 Series	181
Xenon (Xe) Purified Research	131.300	—	4.560	2.9	580 580	HPE HPD	31 30

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Pure Gases in Lecture Bottles

Gas Grade	CGA Connection	Equipment Recommendations	Page	Gas Grade	CGA Connection	Equipment Recommendations	Page
Air Zero Dry	170 170/180*	SG3504 or SG3505 SG3504 or SG3505	60 60	Dimethyl Ether	170	SG3504 or SG3505	60
Allene	170	SG3504 or SG3505	60	Ethane CP	170/180*	SG3504 or SG3505	60
Ammonia Anhydrous, 99.99%	110/180*	SG3514 or SG3515	61	Ethyl Chloride CP	170	LB3585	185
Argon Prepurified Ultra-High Purity	170/180* 180	SG3504 or SG3505 SG3504 or SG3505	60 60	Ethylene CP Technical	170/180* 170	SG3504 or SG3505 SG3504 or SG3505	60 60
Boron Trichloride CP	180	LB3585	185	Ethylene Oxide	180	LB3585	185
Boron Trifluoride CP	180	SG3514 or SG3515	61	Halocarbon 12 (CCl <sub>2</sub> F <sub>2</sub> )	170	SG3504 or SG3505	60
1,3 Butadiene CP Instrument	170 170	SG3504 or SG3505 SG3504 or SG3505	60 60	Halocarbon 13 (CClF <sub>3</sub> )	180	SG3504 or SG3505	60
Butane CP Instrument	170 180	SG3504 or SG3505 SG3504 or SG3505	60 60	Halocarbon 14 (CF <sub>4</sub> )	170	SG3504 or SG3505	60
1-Butene CP	170	SG3504 or SG3505	60	Halocarbon 22 (CHClF <sub>2</sub> )	170	SG3504 or SG3505	60
cis-2-Butene Technical	170	SG3504 or SG3505	60	Halocarbon 114 (C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub> )	170	LB3585	185
trans-2-Butene Technical	170	SG3504 or SG3505	60	Halocarbon 142B (C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub> )	170	SG3504 or SG3505	60
(cis & trans) 2-Butene Technical	170	SG3504 or SG3505	60	Halocarbon C-318 (C <sub>4</sub> F <sub>8</sub> )	170	SG3504 or SG3505	60
Carbon Dioxide Bone Dry CP	170/180* 180	SG3504 or SG3505 SG3504 or SG3505	60 60	Halocarbon 1113 (C <sub>2</sub> ClF <sub>3</sub> )	170	SG3504 or SG3505	60
Carbon Monoxide Commercial CP Research	170 170/180* 180	SG3504 or SG3505 SG3504 or SG3505 SG3504 or SG3505	60 60 60	Helium High Purity	170/180*	SG3504 or SG3505	60
Carbonyl Sulfide	180	SG3514 or SG3515	61	Hexafluoropropylene	170	SG3504 or SG3505	60
Chlorine High Purity Ultra-High Purity	110/180* 180	SG3514 or SG3515 SG3514 or SG3515	61 61	Hydrogen Prepurified Purified Ultra-High Purity	170/180* 170 180	SG3504 or SG3505 SG3504 or SG3505 SG3504 or SG3505	60 60 60
Cyclopropane	170	SG3504 or SG3505	60	Hydrogen Bromide	110/180*	SG3514 or SG3515	61
Deuterium CP	170/180*	SG3504 or SG3505	60	Hydrogen Chloride Electronic Technical	180 110/180*	SG3514 or SG3515 SG3514 or SG3515	61 61
Dimethylamine	180	LB3585	185				

\* CGA Connection may vary depending upon gas manufacturer.  
Check with your gas supplier to determine actual CGA connection.

## Pure Gases in Lecture Bottles

Gas Grade	CGA Connection	Equipment Recommendations	Page
Hydrogen Fluoride CP 99.90%	180 180	LB3585 LB3585	185 185
Hydrogen Sulfide CP	110/180*	SG3514 or SG3515	61
Isobutane CP Instrument	170 170	SG3504 or SG3505 SG3504 or SG3505	60 60
Isobutylene CP	170	SG3504 or SG3505	60
Krypton Research	180	SG3504 or SG3505	60
Methane CP Instrument Purified Technical Ultra-High Purity Ultra Pure	170/180* 180 170 170 170 170	SG3504 or SG3505 SG3504 or SG3505 SG3504 or SG3505 SG3504 or SG3505 SG3504 or SG3505 SG3504 or SG3505	60 60 60 60 60 60
Methyl Bromide	170	LB3585	185
Methyl Chloride	110/170/180*	SG3504 or SG3505	60
Methyl Mercaptan	180	LB3585	185
Monomethylamine	110/180*	SG3514 or SG3515	61
Nitrogen Prepurified Ultra-High Purity	170/180* 170/180*	SG3504 or SG3505 SG3504 or SG3505	60 60
Nitrous Oxide CP	170	SG3504 or SG3505	60
Oxygen Extra Dry Zero	170/180* 170	SG3504 or SG3505 SG3504 or SG3505	60 60
Phosphorous Pentafluoride	330	SG3514 or SG3515	61
Propane CP Instrument	170 170/180*	SG3504 or SG3505 SG3504 or SG3505	60 60
Propylene CP	170/180*	SG3504 or SG3505	60
Sulfur Dioxide Anhydrous	180	LB3585	185
Sulfur Hexafluoride CP	170	SG3504 or SG3505	60

Gas Grade	CGA Connection	Equipment Recommendations	Page
Sulfur Tetrafluoride	110/180*	SG3514 or SG3515	61
Trimethylamine	180	LB3585	185
Vinyl Bromide	180	LB3585	185
Vinyl Methyl Ether	180	LB3585	185

\* CGA Connection may vary depending upon gas manufacturer.  
Check with your gas supplier to determine actual CGA connection.

## Two Component Gas Mixtures

Minor Component Balance Gas	CGA Connection	Equipment Recommendations	Page
<b>Acetaldehyde</b>			
In Helium	350	AP2/APG	33, 35
In Nitrogen	350	AP2/APG	33, 35
<b>Acrylonitrile</b>			
In Helium	350	AP2/APG	33, 35
In Nitrogen	350	AP2/APG	33, 35
<b>Ammonia</b>			
In Air	660/705*	AP2/APG	33, 35
In Argon	705	AP2/APG	33, 35
In Helium	705	AP2/APG	33, 35
In Hydrogen	330/660/705*	AP2/APG	33, 35
In Nitrogen	330/660/705*	AP2/APG	33, 35
<b>Argon</b>			
In Helium	580	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	580	LABE/ETS/HPE	27, 29, 31
In Oxygen	296	LABE/ETS/HPE	27, 29, 31
<b>Benzene</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Butane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Carbon Dioxide</b>			
In Air	580/590*	LABE/ETS/HPE	27, 29, 31
In Argon	580	LABE/ETS/HPE	27, 29, 31
In Carbon Monoxide	350	LABE/ETS/HPE	27, 29, 31
In Helium	580	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	580	LABE/ETS/HPE	27, 29, 31
In Oxygen	296/540*	LABE/ETS/HPE	27, 29, 31
<b>Carbon Disulfide</b>			
In Argon	330	AP2/APG	33, 35
In Helium	330	AP2/APG	33, 35
In Nitrogen	330	AP2/APG	33, 35
<b>Carbon Monoxide</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Carbonyl Sulfide</b>			
In Argon	330	AP2/APG	33, 35
In Helium	330	AP2/APG	33, 35
In Nitrogen	330	AP2/APG	33, 35
<b>Chlorine</b>			
In Argon	660	AP2/APG	33, 35
In Helium	660	AP2/APG	33, 35
In Nitrogen	330/660*	AP2/APG	33, 35
<b>Ethane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Ethanol</b>			
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Two Component Gas Mixtures

Minor Component Balance Gas	CGA Connection	Equipment Recommendations	Page
<b>Ethylene</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Ethylene Oxide</b>			
In Air	590	AP2/APG	33, 35
In Nitrogen	350	AP2/APG	33, 35
<b>Halocarbon 12</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	580	LABE/ETS/HPE	27, 29, 31
In Helium	580	LABE/ETS/HPE	27, 29, 31
In Nitrogen	580	LABE/ETS/HPE	27, 29, 31
<b>Helium</b>			
In Argon	580	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	580	LABE/ETS/HPE	27, 29, 31
In Oxygen	296	LABE/ETS/HPE	27, 29, 31
<b>Hexane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Hydrogen</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Hydrogen Chloride</b>			
In Argon	330	AG3870 Series	36
In Helium	330	AG3870 Series	36
In Nitrogen	330	AG3870 Series	36
<b>Hydrogen Cyanide</b>			
In Helium	350	AG3870 Series	36
In Nitrogen	350	AG3870 Series	36
<b>Hydrogen Sulfide</b>			
In Air	330	AP2/APG	33, 35
In Argon	330	AP2/APG	33, 35
In Helium	330	AP2/APG	33, 35
In Hydrogen	330	AP2/APG	33, 35
In Methane	330	AP2/APG	33, 35
In Nitrogen	330	AP2/APG	33, 35
<b>Isobutane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Methane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Methanol</b>			
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Methyl Mercaptan</b>			
In Helium	330/350*	AP2/APG	33, 35
In Nitrogen	330/350*	AP2/APG	33, 35

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

## Two Component Gas Mixtures

Minor Component Balance Gas	CGA Connection	Equipment Recommendations	Page
<b>Moisture</b>			
In Argon	580	LABE/ETS/HPE	27, 29, 31
In Helium	580	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	580	LABE/ETS/HPE	27, 29, 31
<b>Nitric Oxide</b>			
In Argon	660	AP2/APG	33, 35
In Helium	660	AP2/APG	33, 35
In Nitrogen	660	AP2/APG	33, 35
<b>Nitrogen</b>			
In Argon	580	LABE/ETS/HPE	27, 29, 31
In Helium	580	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Oxygen	296	LABE/ETS/HPE	27, 29, 31
<b>Nitrogen Dioxide</b>			
In Air	660	AP2/APG	33, 35
In Argon	660	AP2/APG	33, 35
In Helium	660	AP2/APG	33, 35
In Nitrogen	660	AP2/APG	33, 35
<b>Nitrous Oxide</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Nitrogen	590	LABE/ETS/HPE	27, 29, 31
<b>Oxygen</b>			
In Argon	**	LABE/ETS/HPE	27, 29, 31
In Helium	**	LABE/ETS/HPE	27, 29, 31
In Nitrogen	**	LABE/ETS/HPE	27, 29, 31
<b>Pentane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Propane</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Propylene</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Hydrogen	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31
<b>Sulfur Dioxide</b>			
In Air	330/660*	AP2/APG	33, 35
In Argon	660	AP2/APG	33, 35
In Helium	660	AP2/APG	33, 35
In Nitrogen	330/660*	AP2/APG	33, 35
<b>Sulfur Hexafluoride</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Argon	580	LABE/ETS/HPE	27, 29, 31
In Helium	580	LABE/ETS/HPE	27, 29, 31
In Nitrogen	580	LABE/ETS/HPE	27, 29, 31
<b>Toluene</b>			
In Air	350	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350/510*	LABE/ETS/HPE	27, 29, 31
<b>Vinyl Chloride</b>			
In Air	590	LABE/ETS/HPE	27, 29, 31
In Helium	350	LABE/ETS/HPE	27, 29, 31
In Nitrogen	350	LABE/ETS/HPE	27, 29, 31

\* CGA Connection may vary depending upon cylinder size or gas manufacturer. Check with your gas supplier to determine actual CGA connection.

\*\* CGA 590 when oxygen concentration is ≤ 23%. CGA 296 when oxygen concentration is >23%.

# Regulator Purity Categories

## Electronic Purity Regulators

### EP

These Type 316L Stainless Steel bar stock body construction, 10 Ra surface finish and electronic grade cleaned regulators are most often used with the highest electronic (semiconductor) grade purity level gases (greater than 99.9995% or purity grade 5.5). The all-welded vacuum face seal (VCR®) connections with Type 316L SS metal-to-metal diaphragm seal design without threaded connections in flow path eliminate generation of unwanted particles and entrapment zones while providing zero axial clearance for ease of component installation and removal. EP Regulators are designed to meet  $<2 \times 10^{-9}$  atm cc/sec He external leak rate. Features include standard positionable captured pipe away vent bonnet(s) and optional tied-seat(s).

## Critical Purity Regulators

### CP

Bar stock body construction with all metal-to-metal diaphragm to body seal (without back-up o-ring) design, ensures minimum inboard and outboard leakage are highly recommended where purity and contamination free requirements are extremely important. CP Regulators are designed to meet  $<2 \times 10^{-9}$  atm cc/sec He external leak rate. Most often used with the highest purity level gases (greater than 99.9995% or purity grade 5.5) or with toxic, corrosive or flammable gases, where pipe away bonnet vents and/or optional relief valves are required from the regulator.

#### Standard Features

- Type 316 SS diaphragm to body seal ensures minimum inboard and outboard leakage
- Low internal volume improves purging efficiency
- Convoluted diaphragm for greater accuracy, sensitivity and long service life
- Pipe away bonnet vent port(s)
- Optional pipe away relief valve
- Optional captured venting configuration
- Optional mounting ring(s) for panel mounting

## Ultra-High Purity Regulators

### UP

Bar stock body construction regulators recommended for applications where diffusion resistance is an important factor in ensuring purity. They provide similar features as the Critical Purity regulators with the exception of a metal to o-ring back-up diaphragm seal design and fewer options. Most often used with ultra-high purity level gases (greater than 99.999% or purity grade 5.0) and toxic, corrosive or flammable gases where pipe away relief valves or bonnet vents are not required.

#### Standard Features

- Designed to meet  $<2 \times 10^{-8}$  atm cc/sec He external leak rate
- Type 316 SS diaphragm(s) with back-up o-ring to body seal ensures gas purity and integrity
- Low internal volume improves purging efficiency
- May include cartridge valve design which makes servicing simple and cost-effective

## High Purity Regulators

### HP

These regulators (typically forged body) are recommended for laboratory applications using high purity gases (greater than 99.995% or purity grade 4.5) and mixtures that require both high reliability and diffusion resistance. The stainless steel diaphragm minimizes diffusion of air into regulator and eliminates off gassing, commonly associated with elastomeric diaphragms, thus maintaining gas purity.

#### Standard Features

- Stainless Steel diaphragm(s) with back-up o-ring to body seal ensures gas purity and integrity
- Metal diaphragm seal outlet valve (when supplied)

## General Purity Regulators

### GP

Designed for use in noncorrosive gas service and recommended for general applications where high purity is not a consideration.

#### Standard Features

- Forged body construction
- Elastomeric diaphragm
- Packed outlet valve (when supplied)

# Selecting Pressure Regulators

Most specialty gases are supplied in cylinders compressed to high pressures. Pressure regulators reduce these high pressures to lower pressures that can be safely used in an operating system. Proper regulator selection is critical for both safety and effectiveness of operating systems.

Note: Regulators are designed to control pressure. Generally they are supplied with gauges that indicate pressure. Regulators do not measure or control flow unless equipped with devices (such as a metering valve, outlet orifice or flowmeter) specifically designed for those purposes.

Many variables are involved in selecting the proper pressure regulator. While certainly not a comprehensive list, the following provides some of the more important considerations. To further assist in making proper regulator selections, refer to the Equipment Recommendation tables in this catalog.

**1. Materials Compatibility:** Materials used to construct regulators must be compatible with the gas—especially those materials (wetted parts) in contact with the gas. Advanced offers a wide variety of regulators with various materials of construction to help ensure that the correct regulator is available for your needs.

Note: More information on “Gas Compatibility” can be found on page 226.

**2. Inlet Pressure Rating:** Regulators must be able to safely handle incoming gas pressure. Here again, a wide selection is available which includes regulators that handle inlet pressures of 6000 or even 10,000 psig.

**3. Delivery Pressure Range:** Regulators must be able to reduce pressure to levels compatible with the operating system and consistent with process needs. Advanced's extensive line of pressure regulators provides numerous choices with delivery pressure ranges available as low as 3.5–8" H<sub>2</sub>O, or as high as 300–6000 psig.

**4. Gas Purity:** Like all system components, regulators should be selected to protect the purity of the service gas. As an example, regulators with stainless steel diaphragms are recommended for high purity applications because they tend to be more “diffusion-resistant” than those with elastomeric diaphragms. For low particulate applications, consideration should be given to selecting regulators with machine welded VCR® connections. Optional Helium Leak Tests also help to ensure the integrity of regulator purchases.

**5. Single- or Two-Stage Design:** Single-stage regulators reduce pressure in one step. As gas is consumed, pressure in the cylinder (and therefore the inlet pressure to the regulator) decreases. This reduced inlet pressure provides less force against the regulator valve, causing the regulator to open wider, resulting in an increased delivery pressure setting.

Therefore, single-stage regulators are most useful in applications where:

- periodic manual adjustments to delivery pressure settings are not a problem or
- inlet pressure remains relatively constant, such as where the gas is a liquid under pressure (e.g., Carbon Dioxide or Propane).

Two-stage regulators are actually two regulators housed in one body. The first regulator (first stage) is nonadjustable and reduces incoming pressure to an intermediate setting (typically 250 to 300 psig).

The second stage is adjustable and reduces intermediate pressure to final desired delivery pressure. Because the second stage sees only relatively minor inlet pressure changes from the first stage, two-stage regulators maintain steady delivery pressure and do not require periodic adjustment. They are well suited for applications where constant delivery pressure is essential.

**6. Line or Cylinder Regulator:** Cylinder regulators, as their name implies, are connected directly to gas cylinders. Typically offered in both single and two-stage designs, cylinder regulators normally have inlet and delivery pressure gauges.

Line regulators, on the other hand, are used directly in piping systems, such as downstream of a manifold or bulk storage vessel. Because inlet pressure in piping systems is normally constant, line regulators are typically single-stage configurations with delivery pressure gauges only.

**7. Other Considerations:** Other criteria for consideration include operating temperature, flow requirements, regulatory issues (e.g., medical regulators manufactured to FDA standards), attached poppet configurations, and so on.

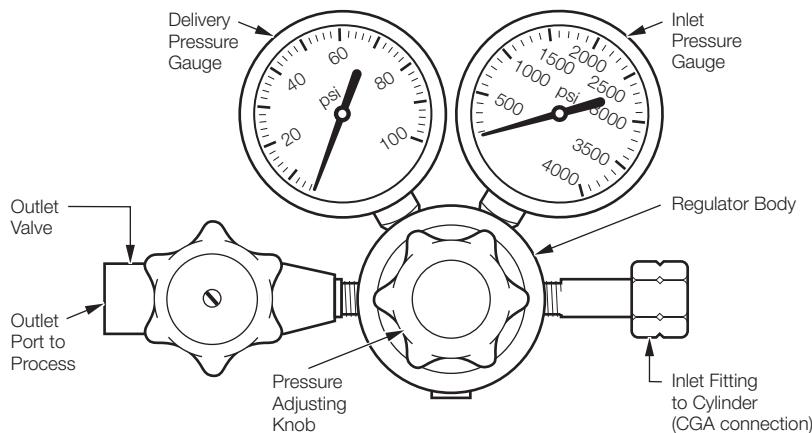


Figure 1, Front View – Typical Cylinder Pressure Regulator

# Mechanics of Pressure Regulators

## Single-Stage Regulators

Gas enters the inlet (high pressure) chamber and its pressure is indicated on the inlet pressure gauge. When the pressure adjusting knob is turned counterclockwise and completely backed out to the stop (Figure 2), a valve and seat assembly located between the inlet chamber and the delivery (low pressure) chamber prevents gas from moving any further. A filter, located at the inlet port or at the inlet to the valve and seat assembly, removes particulate matter from the gas stream to help protect the seat area.

Turning the pressure adjusting knob clockwise (Figure 3) causes the adjusting screw to push against a spring button which compresses the pressure adjusting spring. The force of the compressed spring, in turn, causes the diaphragm to flex and push against the poppet. This opens the regulator allowing gas to flow from the inlet chamber to the delivery chamber of the regulator.

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

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

## Two-Stage Regulators

These regulators incorporate all components of a single-stage regulator. In addition, however, they also contain a second pressure adjusting spring; diaphragm; and valve and seat assembly. The first stage is not user adjustable with the pressure adjusting spring "precompressed" at the factory. This allows the first stage to feed pressure at approximately 250 to 300 psig to the second (adjustable) stage. The second stage then performs in a manner similar to that of a single-stage regulator, except that the inlet pressure to the second stage is relatively constant.

Because of the two-step pressure reduction, final delivery pressure of a two-stage regulator shows little effect from changes in cylinder pressure.

Figure 2, Single-Stage Regulator in Closed Position

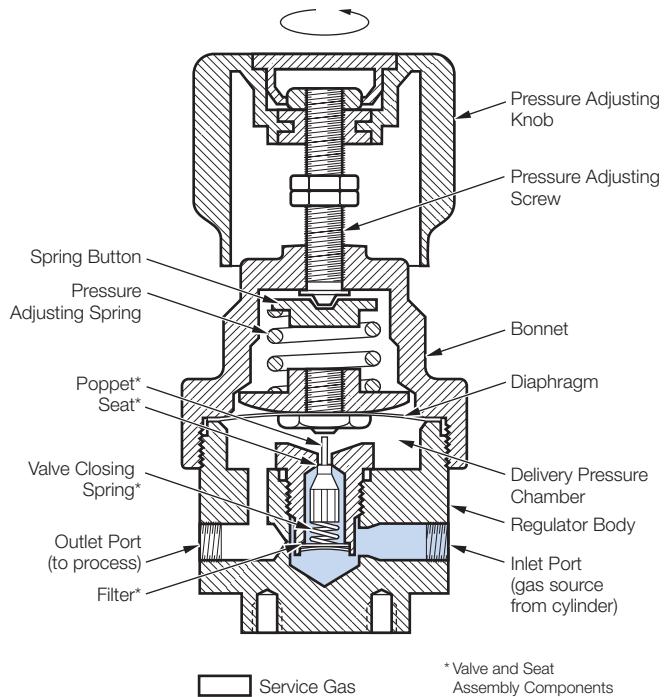
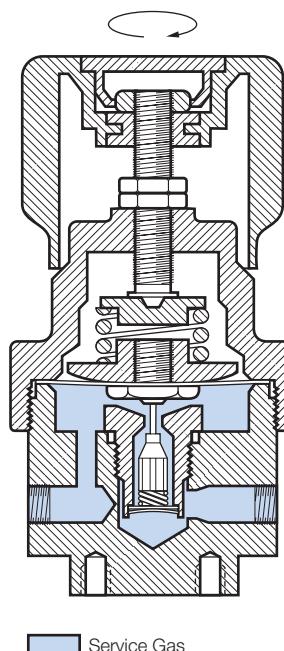


Figure 3, Single-Stage Regulator in Open Position



# General Purity Regulators

## Neoprene Diaphragm, Brass, Single-Stage

### Models SSD, SSE

General purpose single-stage regulators are designed for use in noncorrosive gas service. They are recommended for general laboratory use where inlet pressure does not vary greatly (such as liquefied gases) and where high purity is not a consideration.

#### Standard Features

- Filter in Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.
- Neoprene Diaphragm permits accurate delivery pressure settings.
- Outlet Metering Valve provides flow control.

#### Specifications

- Maximum Inlet Pressure:**  
 SSD: 3000 psig  
 SSE: 300 psig
- Inlet Pressure Gauge (dual scale):**  
 SSD: 0–4000 psig / 0–275 bar  
 SSE: 0–400 psig / 0–27 bar
- Delivery Pressure Range:** See Tables
- Delivery Pressure Gauge:** See Tables



SSE-50

**Gauge Size:** 2" Dial

**Operating Temperature Range:**

Regulators with Flowmeters: 32°F to 140°F  
 Regulators without Flowmeters:  
 -40°F to 140°F

**Flow Coefficient:**

Regulator: Cv = 0.18  
 Outlet Valve: Cv = 0.4

**Inlet Connection:**

SSD: CGA 296, 320, 326, 346, 350, 540,  
 580, 590 or 660 as ordered  
 SSE: CGA 300, 510 or 660 as ordered

**Outlet Connection:**

1/4" NPT male (on outlet valve)  
 1/8" NPT female (on flowmeter)

**Optional Relief Valve Vent Connection:**  
 1/4" NPT male

**Supply Pressure Effect:** 1.0 psi per 100 psi

**Weight (approx.):** 4 lbs

#### Materials of Construction

- Body:** Brass  
**Outlet Valve and Gauges:** Brass  
**Bonnet:** Painted Zinc  
**Other Metal Parts Exposed to Gas:** Brass and Stainless Steel  
**Seat and Seals:** PTFE  
**Diaphragm:** Neoprene  
**Flowmeter:** See Series 50 Flowmeter,  
 Model FMA4350 (page 156)

Table I, Regulators with Metering Valves

Part Number	Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
SSD-15-(CGA)	SSE-15-(CGA)	2–15	0–30	0–2
SSD-50-(CGA)	SSE-50-(CGA)	4–50	0–100	0–7
SSD-125-(CGA)	SSE-125-(CGA)	10–125	0–150	0–10
SSD-250-(CGA)	SSE-250-(CGA)	20–250	0–400	0–27

Table II, Regulators with Flowmeters

All regulators with flowmeters have a delivery pressure range of 4–50 psig and are equipped with 0–100 psig pressure gauge on the delivery side.

Part Number	Part Number	Flowmeter Range Air at 70°F and 14.7 psia
SSD-600-(CGA)	SSE-600-(CGA)	8–50 sccm
SSD-601-(CGA)	SSE-601-(CGA)	10–100 sccm
SSD-602-(CGA)	SSE-602-(CGA)	50–500 sccm
SSD-603-(CGA)	SSE-603-(CGA)	100–1000 sccm
SSD-604-(CGA)	SSE-604-(CGA)	0.2–2.0 slpm
SSD-605-(CGA)	SSE-605-(CGA)	0.4–4.0 slpm
SSD-606-(CGA)	SSE-606-(CGA)	1.0–10 slpm
SSD-607-(CGA)	SSE-607-(CGA)	1.6–16 slpm
SSD-608-(CGA)	SSE-608-(CGA)	2.5–25 slpm
SSD-609-(CGA)	SSE-609-(CGA)	4.0–40 slpm

Where "(CGA)" is indicated in Tables I and II, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SSD-15-580 or SSD-600-580. Order by complete number.

#### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves for SSD-15, SSE-15 for SSD-50, SSE-50, SSD-600 Series, SSE-600 Series for SSD-125, SSE-125 for SSD-250, SSE-250	RV5572-25i RV5572-90i RV5572-140i RV5572-300i	186

# General Purity Regulators

## Neoprene Diaphragm, Brass, Two-Stage

### Model TSD

General purpose two-stage regulators are designed for use with noncorrosive gases or gas mixtures. They are recommended for general laboratory use where high purity is not a consideration, and where constant delivery pressure is desired.

#### Standard Features

- Two-Stage Regulator Design ensures constant delivery pressure over varying inlet pressures.
- Filter in Each Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.
- Neoprene Diaphragm in Second Stage permits accurate delivery pressure settings.
- Outlet Metering Valve provides flow control.

#### Specifications

**Maximum Inlet Pressure:** 3000 psig  
**Inlet Pressure Gauge (dual scale):** 0–4000 psig / 0–275 bar  
**Delivery Pressure Range:** See Tables  
**Delivery Pressure Gauge:** See Tables  
**Gauge Size:** 2" Dial  
**Operating Temperature Range:**  
 Regulators with Flowmeters: 32°F to 140°F  
 Regulators without Flowmeters:  
 -40°F to 140°F



TSD-125



TSD-758

Table I, Regulators with Metering Valves

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
TSD-15-(CGA)	2–15	0–30	0–2
TSD-50-(CGA)	4–50	0–60	0–4
TSD-125-(CGA)	10–125	0–150	0–10
TSD-250-(CGA)	20–250	0–400	0–27

Table II, Regulators with Flowmeters

All regulators with flowmeters have a delivery pressure range of 4–50 psig and are equipped with 0–100 psig pressure gauge on the delivery side.

Part Number	Flowmeter Range Air at 70°F and 14.7 psia
TSD-750-(CGA)	8–50 sccm
TSD-751-(CGA)	10–100 sccm
TSD-752-(CGA)	50–500 sccm
TSD-753-(CGA)	100–1000 sccm
TSD-754-(CGA)	0.2–2.0 slpm
TSD-755-(CGA)	0.4–4.0 slpm
TSD-756-(CGA)	1.0–10 slpm
TSD-757-(CGA)	1.6–16 slpm
TSD-758-(CGA)	2.5–25 slpm
TSD-759-(CGA)	4.0–40 slpm

Where "(CGA)" is indicated in Tables I and II, insert appropriate Compressed Gas Association connection number to complete the part number. Example: TSD-15-580 or TSD-750-580. Order by complete number.

#### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves for TSD-15	RV5572-25i	
for TSD-50, TSD-750 Series	RV5572-60i	
for TSD-125	RV5572-140i	
for TSD-250	RV5572-300i	186

#### Flow Coefficient:

Regulator: Cv = 0.13  
 Outlet Valve: Cv = 0.4

**Inlet Connection:** CGA 296, 320, 326, 346, 350, 540, 580, 590 or 660 as ordered

#### Outlet Connection:

1/4" NPT male (on outlet valve)  
 1/8" NPT female (on flowmeter)

**Optional Relief Valve Vent Connection:**  
 1/4" NPT male

**Supply Pressure Effect:** 0.04 psi per 100 psi  
**Weight (approx.):** 5 lbs

#### Materials of Construction

**Body:** Brass Forging

**Outlet Valve and Gauges:** Brass

**Bonnet:** Painted Zinc

**Other Metal Parts Exposed to Gas:**  
 Brass and Stainless Steel

**Seat and Seals:** PTFE

**Diaphragms:** Neoprene

**Flowmeter:** See Series 50 Flowmeter,  
 Model FMA4350 (page 156)

# High Purity Regulators

## Single-Stage, Chrome-Plated Brass

### Model LABD

These metal diaphragm single-stage regulators are specially designed for laboratory applications requiring both high reliability and diffusion resistance. They are recommended for high purity noncorrosive gases where inlet pressure does not vary greatly (such as liquefied gases), or where periodic readjustment of delivery pressure setting does not present a problem.

#### Standard Features

- Stainless Steel Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- Regulator Design permits vacuum purging of regulator.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Chrome-Plated Surfaces provide polished appearance and ease of cleaning.
- Cartridge (Encapsulated) Seat Assembly provides for ease of maintenance and repair.
- Filter in Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.

#### Specifications

- Maximum Inlet Pressure:** See Table I  
**Inlet Pressure Gauge:** See Table I  
**Delivery Pressure Range:** See Table I  
**Delivery Pressure Gauge:** See Table I  
**Filter:** 10 micron  
**Gauge Size:** 2" Dial  
**Operating Temp. Range:** -40°F to 140°F  
**Flow Coefficient:**  
 Regulator: Cv = 0.18  
 Outlet Valve: Cv = 0.17  
**Inlet Connection:** CGA 296, 320, 326, 346, 350, 540, 580, 590 or 660 as ordered  
**Outlet Connection:** 1/4" NPT female (on outlet valve)  
**Optional Relief Valve Vent Connection:** 1/4" NPT male  
**Supply Pressure Effect:** 1.0 psi per 100 psi  
**Weight (approx.):** 3 lbs



LABD-3-15

#### Materials of Construction

- Body:** Chrome-Plated Brass  
**Gauges:** Chrome-Plated Brass  
**Bonnet:** Chrome-Plated Zinc  
**Filter:** Nickel-Plated Sintered Bronze  
**Other Metal Parts Exposed to Gas:** Brass and Stainless Steel  
**Seat and Seals:** PTFE  
**Diaphragm:** Type 304 SS  
**Outlet Valve:**  
 Body: Nickel-Plated Brass Bar Stock  
 Seat: PCTFE  
 Diaphragm: Type 316 SS

Table I

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig bar		Delivery Pressure Range psig	Gauge (dual scale) psig bar	
		0-4000	0-275		-30" Hg-0-30	-1-0-2
LABD-3-15-(CGA)	3000	0-4000	0-275	2-15	-30" Hg-0-100	-1-0-7
LABD-3-50-(CGA)	3000	0-4000	0-275	4-50	-30" Hg-0-200	-1-0-14
LABD-3-125-(CGA)	3000	0-4000	0-275	10-125	-30" Hg-0-30	-1-0-2
LABD-3-250-(CGA)	3000	0-4000	0-275	20-250	0-400	0-27
LABD-2-15-(CGA)	800	0-1000	0-69	2-15	-30" Hg-0-100	-1-0-7
LABD-2-50-(CGA)	800	0-1000	0-69	4-50	-30" Hg-0-200	-1-0-14
LABD-2-125-(CGA)	800	0-1000	0-69	10-125	-30" Hg-0-30	-1-0-2
LABD-2-250-(CGA)	800	0-1000	0-69	20-250	0-400	0-27
LABD-1-15-(CGA)	300	0-400	0-27	2-15	-30" Hg-0-100	-1-0-7
LABD-1-50-(CGA)	300	0-400	0-27	4-50	-30" Hg-0-200	-1-0-14
LABD-1-125-(CGA)	300	0-400	0-27	10-125	-30" Hg-0-30	-1-0-2
LABD-1-250-(CGA)	300	0-400	0-27	20-250	0-400	0-27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number.  
Example: LABD-3-15-580. Order by complete part number.

#### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves		186
for LABD-x-15 Series	RV5573-25i	
for LABD-x-50 Series	RV5573-90i	
for LABD-x-125 Series	RV5573-150i	
for LABD-x-250 Series	RV5573-300i	

# High Purity Regulators

## Two-Stage, Chrome-Plated Brass

### Model LABE

These metal diaphragm two-stage regulators are specially designed for laboratory applications requiring both high reliability and diffusion resistance. Recommended for high purity noncorrosive pure gases or gas mixtures, they provide constant outlet pressure regardless of changes in cylinder (inlet) pressure.

#### Standard Features

- Stainless Steel Diaphragm minimizes diffusion of air into regulator and eliminates "off gassing" associated with elastomeric diaphragms, thus maintaining gas purity.
- Regulator Design permits vacuum purging of regulator.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Two-Stage Regulator Design ensures constant delivery pressure over varying inlet pressures.
- Chrome-Plated Surfaces provide polished appearance and ease of cleaning.
- Cartridge (Encapsulated) Seat Assemblies provide for ease of maintenance and repair.
- Filter in Each Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.

#### Specifications

- Maximum Inlet Pressure: 3000 psig  
 Inlet Pressure Gauge (dual scale):  
 0–4000 psig / 0–275 bar  
 Delivery Pressure Range: See Table I  
 Delivery Pressure Gauge: See Table I  
 Filters: 10 micron  
 Gauge Size: 2" Dial  
 Operating Temp. Range: -40°F to 140°F  
 Flow Coefficient:  
   Regulator: Cv = 0.13  
   Outlet Valve: Cv = 0.17  
 Inlet Connection: CGA 296, 320, 326, 346,  
 350, 540, 580, 590 or 660 as ordered  
 Outlet Connection: 1/4" NPT female  
 (on outlet valve)  
 Optional Relief Valve Vent Connection:  
 1/4" NPT male  
 Supply Pressure Effect: 0.04 psi per 100 psi  
 Weight (approx.): 5 lbs



LABE-3-250

#### Materials of Construction

- Body: Chrome-Plated Brass Forging  
 Gauges: Chrome-Plated Brass  
 Bonnets: Chrome-Plated Zinc  
 Filters: Nickel-Plated Sintered Bronze  
 Other Metal Parts Exposed to Gas:  
 Brass and Stainless Steel  
 Seat and Seals: PTFE  
 Diaphragms: Type 304 SS  
 Outlet Valve:  
   Body: Nickel-Plated Brass Bar Stock  
   Seat: PCTFE  
 Diaphragm: Type 316 SS

Table I

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
LABE-3-15-(CGA)	2–15	-30" Hg–0–30	-1–0–2
LABE-3-50-(CGA)	4–50	-30" Hg–0–100	-1–0–7
LABE-3-125-(CGA)	10–125	-30" Hg–0–200	-1–0–14
LABE-3-250-(CGA)	20–250	0–400	0–27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: LABE-3-15-580. Order by complete number.

#### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves for LABE-3-15 for LABE-3-50 for LABE-3-125 for LABE-3-250	RV5573-25i RV5573-90i RV5573-150i RV5573-300i	186

# Ultra-High Purity Regulators

Economical, Single-Stage, Plated Brass Bar Stock

## Model ESS

These economical bar stock body cylinder regulators are specially suited for use in applications and environments requiring both high reliability and diffusion resistance. A sensitive, extra long-life stainless steel diaphragm ensures ultra-high purity and leak integrity with specialty gases. The cartridge valve design with integral filter protects the regulator seat from particulate contamination and makes servicing simple and cost-effective. This single-stage design is recommended for use where inlet pressure does not vary greatly such as with liquefied gases, or where periodic readjustment of delivery pressure setting does not present a problem.

### Standard Features

- Cartridge Valve Design with 10-micron filter protects regulator seat, extends regulator life, reduces maintenance and makes servicing simple.
- Rebuild Kits allow for cost-effective service and maintenance.
- Standard Feature Design allows regulator to be economically priced.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- Plated Brass Outlet Valve with stainless steel diaphragm provides on/off flow control while maintaining gas purity.

### Specifications

Maximum Inlet Pressure: See Table I

Inlet Pressure Gauge: See Table I

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 10 micron

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:

Regulator: Cv = 0.2

Outlet Valve: Cv = 0.17

Inlet Connections: CGA 296, 320, 326, 346, 350, 510, 540, 580, 590 or 660 as ordered

Outlet Connection: 1/4" NPT female (on outlet valve)

Other Regulator (plugged) Ports:  
1/4" NPT female (outlet port)

Supply Pressure Effect: 1.45 psi per 100 psi

Leakage:

Internal: Bubble-tight

External: Designed to meet  $<2 \times 10^{-8}$  atm cc/sec He

Weight (approx.): 4 lbs



ESS-3-50

### Materials of Construction

Body: Plated Brass Bar Stock

Gauges and Bonnet: Plated Brass

Diaphragm: Type 316 SS

Filter: Sintered Bronze

Other Metal Parts Exposed to Gas:  
Brass and Stainless Steel

Seat: PCTFE

Seals: PTFE

Outlet Valve:

Body: Plated Brass Bar Stock

Seat: PCTFE

Diaphragm: Type 316 SS

Table I

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig	Delivery Pressure Range psig	Gauge (dual scale) psig	bar	
ESS-3-15-(CGA)	3000	0-4000	0-275	2-15	-30" Hg-0-30	-1-0-2
ESS-3-50-(CGA)	3000	0-4000	0-275	4-50	-30" Hg-0-100	-1-0-7
ESS-3-125-(CGA)	3000	0-4000	0-275	10-125	-30" Hg-0-200	-1-0-14
ESS-3-250-(CGA)	3000	0-4000	0-275	20-250	0-400	0-27
ESS-2-15-(CGA)	800	0-1000	0-69	2-15	-30" Hg-0-30	-1-0-2
ESS-2-50-(CGA)	800	0-1000	0-69	4-50	-30" Hg-0-100	-1-0-7
ESS-2-125-(CGA)	800	0-1000	0-69	10-125	-30" Hg-0-200	-1-0-14
ESS-2-250-(CGA)	800	0-1000	0-69	20-250	0-400	0-27
ESS-1-15-(CGA)	300	0-400	0-27	2-15	-30" Hg-0-30	-1-0-2
ESS-1-50-(CGA)	300	0-400	0-27	4-50	-30" Hg-0-100	-1-0-7
ESS-1-125-(CGA)	300	0-400	0-27	10-125	-30" Hg-0-200	-1-0-14
ESS-1-250-(CGA)	300	0-400	0-27	20-250	0-400	0-27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number.

Example: ESS-3-15-580. Order by complete part number.

### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves for ESS-x-15 Series for ESS-x-50 Series for ESS-x-125 Series for ESS-x-250 Series	RV5573-30i RV5573-100i RV5573-150i RV5573-300i	186

# Ultra-High Purity Regulators

Economical, Two-Stage, Plated Brass Bar Stock

## Model ETS

These economical bar stock body cylinder regulators are specially designed for laboratory applications and environments requiring both high reliability and diffusion resistance. Sensitive, extra long-life stainless steel diaphragms ensure high purity and leak integrity with specialty gases. The cartridge valve design with integral filter protects the regulator seats from particulate contamination and makes servicing simple and cost-effective. Recommended for ultra-high purity noncorrosive gases or mixtures, they provide constant outlet pressure regardless of changes in cylinder (inlet) pressures.

### Standard Features

- Cartridge Valve Design with 10-micron filters protects regulator seats, extends regulator life, reduces maintenance and makes servicing simple.
- Rebuild Kits allow for cost-effective service and maintenance.
- Standard Feature Design allows regulator to be economically priced.
- Plated Brass Outlet Valve with stainless steel diaphragm provides on/off flow control while maintaining gas purity.

### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0–4000 psig / 0–275 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filters: 10 micron

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:

Regulator: Cv = 0.06

Outlet Valve: Cv = 0.17

Inlet Connections: CGA 296, 320, 326, 346, 350, 540, 580, 590 or 660 as ordered

Outlet Connection: 1/4" NPT female  
(on outlet valve)

Other Regulator (plugged) Ports:  
1/4" NPT female (inter-stage and inlet ports)

Supply Pressure Effect: 0.09 psi per 100 psi

Leakage:

Internal: Bubble-tight

External: Designed to meet  $<2 \times 10^{-8}$  atm cc/sec He

Weight (approx.): 5.5 lbs



ETS-3-125

### Materials of Construction

Body: Plated Brass Bar Stock

Gauges and Bonnets: Plated Brass

Diaphragms: Type 316 SS

Filters: Sintered Bronze

Other Metal Parts Exposed to Gas:  
Brass and Stainless Steel

Seats: PCTFE

Seals: PTFE

Outlet Valve:

Body: Plated Brass Bar Stock

Seat: PCTFE

Diaphragm: Type 316 SS

Table I

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
ETS-3-15-(CGA)	2–15	-30" Hg–0–30	-1–0–2
ETS-3-50-(CGA)	4–50	-30" Hg–0–100	-1–0–7
ETS-3-125-(CGA)	10–125	-30" Hg–0–200	-1–0–14
ETS-3-250-(CGA)	20–250	0–400	0–27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: ETS-3-15-580. Order by complete number.

# Critical Purity Regulators

## Metal Diaphragm Seal, Single-Stage, Brass

### Model HPD

These brass bar stock regulators are designed to regulate critical and ultra-high purity noncorrosive gases commonly used in analytical instrument applications. The all-metal diaphragm to body seal design assures maximum diffusion resistance. A convoluted stainless steel diaphragm provides enhanced performance and excellent accuracy. These regulators are specially suited for use in gas delivery systems requiring high leak integrity and minimal internal volume for maintaining guaranteed gas purity levels. Single-stage regulators are recommended for use with gases where inlet pressure does not vary greatly (such as liquefied gases), or where periodic readjustment of delivery pressure setting does not present a problem.



HPD-3-150

### Standard Features

- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Regulator Design permits vacuum purging of regulator.
- Low Internal Volume facilitates purging and reduces contamination potential.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- $\frac{1}{16}$ " NPT female Bonnet Vent Ports allow bonnets to be connected to a vent line or disposal system as a precaution in the unlikely event of a diaphragm failure.

### Specifications

#### Maximum Inlet Pressure:

HPD-3: 3000 psig

HPD-2: 800 psig

HPD-1: 300 psig

#### Inlet Pressure Gauge: See Table I

#### Delivery Pressure Range: See Table I

#### Delivery Pressure Gauge: See Table I

#### Filter: 10 micron

#### Gauge Size: 2" Dial

#### Operating Temp. Range: -40°F to 140°F

#### Flow Coefficient:

Regulator: Cv = 0.06

Outlet Valve: Cv = 0.17

#### Internal Volume:

Regulator (body only): 6.0 cc

#### Bonnet Vent Connection: $\frac{1}{16}$ " NPT female

#### Inlet Connection: CGA 296, 320, 326, 346, 350, 510, 540, 580, 590 or 660 as ordered

#### Outlet Connection: $\frac{1}{4}$ " NPT female

#### Supply Pressure Effect: 1 psi per 100 psi

#### Weight (approx.): 3 lbs

### Materials of Construction

**Body, Bonnet and Outlet Valve:**  
Brass Bar Stock  
**Gauges:** Brass  
**Filter:** Sintered Bronze

### Other Metal Parts Exposed to Gas:

Brass and Stainless Steel  
**Seats:** PCTFE  
**Friction Sleeve:** PTFE  
**Diaphragms:** Type 316 SS

Table I

Part Number	Inlet Pressure Gauge (dual scale)		Delivery Pressure Range Gauge (dual scale)		
	psig	bar	psig	bar	
HPD-3-30-(CGA)	0-4000	0-275	2-30	-30" Hg-0-60	-1-0-4
HPD-3-75-(CGA)	0-4000	0-275	4-75	-30" Hg-0-100	-1-0-7
HPD-3-150-(CGA)	0-4000	0-275	10-150	-30" Hg-0-200	-1-0-14
HPD-3-300-(CGA)	0-4000	0-275	20-300	0-400	0-27
HPD-3-500-(CGA)	0-4000	0-275	30-500	0-600	0-41
HPD-2-30-(CGA)	0-1000	0-69	2-30	-30" Hg-0-60	-1-0-4
HPD-2-75-(CGA)	0-1000	0-69	4-75	-30" Hg-0-100	-1-0-7
HPD-2-150-(CGA)	0-1000	0-69	10-150	-30" Hg-0-200	-1-0-14
HPD-2-300-(CGA)	0-1000	0-69	20-300	0-400	0-27
HPD-2-500-(CGA)	0-1000	0-69	30-500	0-600	0-41
HPD-1-30-(CGA)	0-400	0-27	2-30	-30" Hg-0-60	-1-0-4
HPD-1-75-(CGA)	0-400	0-27	4-75	-30" Hg-0-100	-1-0-7
HPD-1-150-(CGA)	0-400	0-27	10-150	-30" Hg-0-200	-1-0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: HPD-3-30-580. Order by complete number.

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings* (male connectors)		150
$\frac{1}{4}$ " NPT male x $\frac{1}{8}$ " compression	SG6703	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " compression	SG6704	
$\frac{1}{16}$ " NPT male x $\frac{1}{8}$ " compression	SG6705	
Safety Mounting Brackets*	RM Series	
Regulator Mounting Plate*	RP1	92
Relief Valves		186
for HPD-x-30	RV5572-60i	
for HPD-x-75	RV5572-100i	
for HPD-x-150	RV5572-200i	
for HPD-x-300	RV5572-400i	
for HPD-x-500	RV5572-600i	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Critical Purity Regulators

## Metal Diaphragm Seal, Two-Stage, Brass

### Model HPE

These brass bar stock regulators are designed to regulate critical and ultra-high purity noncorrosive gases commonly used in analytical instrument applications requiring both high reliability and diffusion resistance. The all-metal diaphragm to body seal design assures maximum diffusion resistance. Convoluted stainless steel diaphragms provide enhanced performance and excellent accuracy. The two-stage design provides constant pressure control regardless of changes in cylinder (inlet) pressure.

#### Standard Features

- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Regulator Design permits vacuum purging of regulator.
- Low Internal Volume facilitates purging and reduces contamination potential.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Filter traps foreign matter, extends regulator life and reduces maintenance.

- $\frac{1}{16}$ " NPT female Bonnet Vent Ports allow bonnets to be connected to a vent line or disposal system as a precaution in the unlikely event of a diaphragm failure.

#### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0-4000 psig / 0-275 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filters: 10 micron



HPE-3-75



HPE-3-500-580-QM

Table I

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
HPE-3-30-(CGA)	2-30	-30" Hg-0-60	-1-0-4
HPE-3-75-(CGA)	4-75	-30" Hg-0-100	-1-0-7
HPE-3-150-(CGA)	10-150	-30" Hg-0-200	-1-0-14
HPE-3-300-(CGA)	20-300	0-400	0-27
HPE-3-500-(CGA)	30-500	0-600	0-41

Note: To order regulator with quick mount assembly suffix regulator part number with QM.  
Example: HPE-3-30-580-QM. One 30" all-stainless steel flexible hose with check valve (nipple) – CGA connection will be included with each quick mount assembly.

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: HPE-3-30-580. Order by complete number.

#### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings* (male connectors)		150
$\frac{1}{4}$ " NPT male x $\frac{1}{8}$ " compression	SG6703	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " compression	SG6704	
$\frac{1}{16}$ " NPT male x $\frac{1}{8}$ " compression	SG6705	
Safety Mounting Brackets*	RM Series	92
Relief Valves		186
for HPE-x-30	RV5572-60i	
for HPE-x-75	RV5572-100i	
for HPE-x-150	RV5572-200i	
for HPE-x-300	RV5572-400i	
for HPE-x-500	RV5572-600i	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:

    Regulator: Cv = 0.05

    Outlet Valve: Cv = 0.17

Bonnet Vent Connection:  $\frac{1}{16}$ " NPT female

Inlet Connection: CGA 296, 320, 326, 346, 350, 540, 580, 590 or 660 as ordered

Outlet Connection:  $\frac{1}{4}$ " NPT female

Supply Pressure Effect: 0.04 psi per 100 psi

Weight (approx.): 5 lbs

#### Materials of Construction

Body, Bonnet and Outlet Valve:

Brass Bar Stock

Gauges: Brass

Filter: Sintered Bronze

Other Metal Parts Exposed to Gas:  
Brass and Stainless Steel

Seats: PCTFE

Friction Sleeves: PTFE

Diaphragms: Type 316 SS

# Ultra-High Purity Regulators

Economical, Single-Stage, Stainless Steel

## Model AP1

These economical bar stock body regulators are specially suited for use in applications and environments requiring corrosion and diffusion resistance. A sensitive, extra long-life stainless steel diaphragm ensures ultra-high purity and leak integrity with specialty gases. The cartridge valve design with integral filter protects the regulator seat from particulate contamination and makes servicing simple and cost-effective. This single-stage design is recommended for use where inlet pressure does not vary greatly such as with liquefied gases, or where periodic readjustment of delivery pressure setting does not present a problem.

### Standard Features

- Type 316 SS Bar Stock construction provides corrosion resistance.
- Cartridge Valve Design with 10-micron filter protects regulator seat, extends regulator life, reduces maintenance and makes servicing simple.
- Rebuild Kits allow for cost-effective service and maintenance.
- Standard Feature Design allows regulator to be economically priced.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- Diaphragm Seal Outlet Valve maintains gas purity.

### Specifications

**Maximum Inlet Pressure:** See Table I  
**Inlet Pressure Gauge:** See Table I  
**Delivery Pressure Range:** See Table I  
**Delivery Pressure Gauge:** See Table I  
**Filter:** 10 micron  
**Gauge Size:** 2" Dial  
**Operating Temp. Range:** -40°F to 140°F  
**Flow Coefficient:**  
 Regulator: Cv = 0.2  
 Outlet Valve: Cv = 0.17  
**Inlet Connections:** CGA 296, 320, 326, 330, 346, 350, 510, 540, 580, 590, 660 or 705 as ordered  
**Outlet Connection:**  
 1/4" NPT female (on outlet valve)  
**Other Regulator (plugged) Ports:**  
 1/4" NPT female (outlet port)  
**Supply Pressure Effect:** 1.45 psi per 100 psi  
**Leakage:**  
 Internal: Bubble-tight  
 External: Designed to meet  $<2 \times 10^{-8}$  atm cc/sec He  
**Weight (approx.):** 4 lbs

Table I

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig		Delivery Pressure Range psig	Gauge (dual scale) psig	
		bar	bar		psig	bar
AP1-3-15-(CGA)	3000	0-4000	0-275	2-15	-30" Hg-0-30	-1-0-2
AP1-3-50-(CGA)	3000	0-4000	0-275	4-50	-30" Hg-0-100	-1-0-7
AP1-3-125-(CGA)	3000	0-4000	0-275	10-125	-30" Hg-0-200	-1-0-14
AP1-3-250-(CGA)	3000	0-4000	0-275	20-250	0-400	0-27
AP1-2-15-(CGA)	800	0-1000	0-69	2-15	-30" Hg-0-30	-1-0-2
AP1-2-50-(CGA)	800	0-1000	0-69	4-50	-30" Hg-0-100	-1-0-7
AP1-2-125-(CGA)	800	0-1000	0-69	10-125	-30" Hg-0-200	-1-0-14
AP1-2-250-(CGA)	800	0-1000	0-69	20-250	0-400	0-27
AP1-1-15-(CGA)	300	0-400	0-27	2-15	-30" Hg-0-30	-1-0-2
AP1-1-50-(CGA)	300	0-400	0-27	4-50	-30" Hg-0-100	-1-0-7
AP1-1-125-(CGA)	300	0-400	0-27	10-125	-30" Hg-0-200	-1-0-14
AP1-1-250-(CGA)	300	0-400	0-27	20-250	0-400	0-27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number.  
 Example: AP1-3-15-580. Order by complete part number.



AP1-3-15

### Materials of Construction

**Body:** Type 316 SS Bar Stock  
**Gauges:** Type 316 SS  
**Bonnet:** Plated Brass  
**Diaphragm:** Type 316 SS  
**Filter:** Sintered Type 316 SS  
**Other Metal Parts Exposed to Gas:** 300 Series Stainless Steel  
**Seat:** PCTFE  
**Seals:** PTFE  
**Outlet Valve:**  
 Body: Type 316 SS Bar Stock  
 Seat: PCTFE  
 Diaphragm: Type 316 SS

# Ultra-High Purity Regulators

Economical, Two-Stage, Stainless Steel

## Model AP2

These economical bar stock body regulators are specially designed for laboratory applications and environments requiring corrosion and diffusion resistance. Sensitive, extra long-life stainless steel diaphragms ensure ultra-high purity and leak integrity with specialty gases. The cartridge valve design with integral filter protects the regulator seats from particulate contamination and makes servicing simple and cost-effective. Recommended for ultra-high purity gases or mixtures that have corrosive properties, the two-stage design provides constant outlet pressure regardless of changes in cylinder (inlet) pressures.

### Standard Features

- Type 316 SS Bar Stock construction provides corrosion resistance.
- Cartridge Valve Design with 10-micron filter protects regulator seat, extends regulator life, reduces maintenance and makes servicing simple.
- Rebuild Kits allow for cost-effective service and maintenance.
- Standard Feature Design allows regulator to be economically priced.
- Diaphragm Seal Outlet Valve maintains gas purity.

### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0–4000 psig / 0–275 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 10 micron

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:

Regulator: Cv = 0.06

Outlet Valve: Cv = 0.17

Inlet Connections: CGA 296, 320, 326, 330, 346, 350, 540, 580, 590, 660 or 705 as ordered

Outlet Connection:

1/4" NPT female (on outlet valve)

Other Regulator (plugged) Ports:

1/4" NPT female (inter-stage and inlet ports)

Supply Pressure Effect: 0.09 psi per 100 psi

Leakage:

Internal: Bubble-tight

External: Designed to meet <2 x 10<sup>-8</sup> atm cc/sec He

Weight (approx.): 5.5 lbs



AP2-3-125

### Materials of Construction

Body: Type 316 SS Bar Stock

Gauges: Type 316 SS

Bonnet: Plated Brass

Diaphragms: Type 316 SS

Filters: Sintered Type 316 SS

Other Metal Parts Exposed to Gas:  
300 Series Stainless Steel

Seat: PCTFE

Seals: PTFE

Outlet Valve:

Body: Type 316 SS Bar Stock

Seat: PCTFE

Diaphragm: Type 316 SS

Table I

Part Number	Delivery Pressure		
	Range psig	Gauge (dual scale) psig	bar
AP2-3-15-(CGA)	2–15	-30" Hg–0–30	-1–0–2
AP2-3-50-(CGA)	4–50	-30" Hg–0–100	-1–0–7
AP2-3-125-(CGA)	10–125	-30" Hg–0–200	-1–0–14
AP2-3-250-(CGA)	20–250	0–400	0–27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AP2-3-15-580. Order by complete number.

# Critical Purity Regulators

## Metal Diaphragm Seal, Single-Stage, Stainless Steel

### Model APC

These stainless steel bar stock regulators are designed for use in applications requiring both corrosion and diffusion resistance. They are specially suited for use in gas delivery systems requiring high leak integrity and minimal internal volume for maintaining guaranteed critical and ultra-high purity gas levels. These single-stage regulators are recommended for use with gases where inlet pressure does not vary greatly (such as liquefied gases), or where periodic readjustment of delivery pressure setting does not present a problem.

#### Standard Features

- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Type 316 SS Bar Stock Construction provides corrosion resistance.
- Regulator Design permits vacuum purging of regulator.
- Low Internal Volume facilitates purging and reduces contamination potential.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- $\frac{1}{16}$ " NPT female Bonnet Vent Ports allow bonnets to be connected to a vent line or disposal system as a precaution in the unlikely event of a diaphragm failure.

#### Specifications

##### Maximum Inlet Pressure:

APC-3: 3000 psig

APC-2: 800 psig

APC-1: 300 psig

##### Inlet Pressure Gauge: See Table I

##### Delivery Pressure Range: See Table I

##### Delivery Pressure Gauge: See Table I

##### Filter: 10 micron

##### Gauge Size: 2" Dial

##### Operating Temp. Range: -40°F to 140°F

##### Flow Coefficient:

Regulator: Cv = 0.06

Outlet Valve: Cv = 0.17

##### Internal Volume: Regulator (body only): 6.0 cc

##### Bonnet Vent Connection: $\frac{1}{16}$ " NPT female

##### Inlet Connection: CGA 296, 320, 326, 330, 346, 350, 510, 540, 580, 590, 660 or 705 as ordered

##### Outlet Connection: $\frac{1}{4}$ " NPT female

##### Weight (approx.): 3 lbs

#### Materials of Construction

**Body and Outlet Valve:** Type 316 SS Bar Stock

**Gauges:** Type 316 SS

**Bonnet:** 300 Series Stainless Steel

**Other Metal Parts Exposed to Gas:**  
Type 316 SS



APC-3-30

**Seats:** PCTFE

**Friction Sleeve:** PTFE

**Diaphragms:** Type 316 SS

Table I

Part Number	Inlet Pressure Gauge (dual scale)		Delivery Pressure Range Gauge (dual scale)		
	psig	bar	psig	psig	bar
APC-3-30-(CGA)	0-4000	0-275	2-30	-30" Hg-0-60	-1-0-4
APC-3-75-(CGA)	0-4000	0-275	4-75	-30" Hg-0-100	-1-0-7
APC-3-150-(CGA)	0-4000	0-275	10-150	-30" Hg-0-200	-1-0-14
APC-3-300-(CGA)	0-4000	0-275	20-300	0-400	0-27
APC-3-500-(CGA)	0-4000	0-275	30-500	0-600	0-41
APC-2-30-(CGA)	0-1000	0-69	2-30	-30" Hg-0-60	-1-0-4
APC-2-75-(CGA)	0-1000	0-69	4-75	-30" Hg-0-100	-1-0-7
APC-2-150-(CGA)	0-1000	0-69	10-150	-30" Hg-0-200	-1-0-14
APC-2-300-(CGA)	0-1000	0-69	20-300	0-400	0-27
APC-2-500-(CGA)	0-1000	0-69	30-500	0-600	0-41
APC-1-30-(CGA)	0-400	0-27	2-30	-30" Hg-0-60	-1-0-4
APC-1-75-(CGA)	0-400	0-27	4-75	-30" Hg-0-100	-1-0-7
APC-1-150-(CGA)	0-400	0-27	10-150	-30" Hg-0-200	-1-0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: APC-3-30-580. Order by complete number.

#### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings* (male connectors)		150
$\frac{1}{4}$ " NPT male x $\frac{1}{8}$ " compression	SG6713	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " compression	SG6714	
$\frac{1}{16}$ " NPT male x $\frac{1}{8}$ " compression	SG6715	
Safety Mounting Brackets*	RM Series	92
Regulator Mounting Plate*	RP1	
Relief Valves		186
for APC-x-30 Series	RV5574-60i	
for APC-x-75 Series	RV5574-100i	
for APC-x-150 Series	RV5574-200i	
for APC-x-300 Series	RV5574-400i	
for APC-x-500 Series	RV5574-600i	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Critical Purity Regulators

## Metal Diaphragm Seal, Two-Stage, Stainless Steel

### Model APG

These stainless steel bar stock regulators are specially suited for applications requiring both corrosion and diffusion resistance in a two-stage regulator. They are recommended for critical and ultra-high purity gases or gas mixtures that have corrosive properties. The two-stage design provides constant outlet pressure regardless of changes in cylinder (inlet) pressure.

#### Standard Features

- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Type 316 SS Bar Stock Construction provides maximum corrosion resistance.
- Regulator Design permits vacuum purging of regulator.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Filters trap foreign matter, extends regulator life and reduce maintenance.

- 1/16" NPT female Bonnet Vent Ports allow bonnets to be connected to a vent line or disposal system as a precaution in the unlikely event of a diaphragm failure.

#### Specifications

**Maximum Inlet Pressure:** 3000 psig

**Inlet Pressure Gauge (dual scale):**  
0-4000 psig / 0-275 bar

**Delivery Pressure Range:** See Table I

**Delivery Pressure Gauge:** See Table I

**Filters:** 10 micron



APG-3-150



APG-3-150-580-QM

Table I

Part Number	Delivery Pressure		
	Range psig	Gauge (dual scale) psig	bar
APG-3-30-(CGA)	2-30	-30" Hg-0-60	-1-0-4
APG-3-75-(CGA)	4-75	-30" Hg-0-100	-1-0-7
APG-3-150-(CGA)	10-150	-30" Hg-0-200	-1-0-14
APG-3-300-(CGA)	20-300	0-400	0-27
APG-3-500-(CGA)	30-500	0-600	0-41

Note: To order regulator with quick mount assembly suffix regulator part number with QM. Example: APG-3-30-580-QM. One 30" all-stainless steel flexible hose with check valve (nipple) – CGA connection will be included with each quick mount assembly. Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: APG-3-30-580. Order by complete number.

#### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings* (male connectors)		150
1/4" NPT male x 1/8" compression	SG6713	
1/4" NPT male x 1/4" compression	SG6714	
1/16" NPT male x 1/8" compression	SG6715	
Safety Mounting Brackets*	RM Series	92
Relief Valves		186
for APG-3-30	RV5574-60i	
for APG-3-75	RV5574-100i	
for APG-3-150	RV5574-200i	
for APG-3-300	RV5574-400i	
for APG-3-500	RV5574-600i	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:

Regulator: Cv = 0.05

Outlet Valve: Cv = 0.17

Bonnet Vent Connection: 1/16" NPT female

Inlet Connection: CGA 296, 320, 326, 330, 346, 350, 510, 540, 580, 590, 660 or 705 as ordered

Outlet Connection: 1/4" NPT female

Supply Pressure Effect: 0.04 psi per 100 psi

Weight (approx.): 5 lbs

#### Materials of Construction

Body and Outlet Valve: Type 316 SS Bar Stock

Gauges: Type 316 SS

Bonnet: 300 Series Stainless Steel

Other Metal Parts Exposed to Gas:  
Type 316 SS

Seats: PCTFE

Friction Sleeves: PTFE

Diaphragms: Type 316 SS

# Critical Purity Regulators

## Positive Seal (Tied-Seat), Single-Stage, Stainless Steel

### AG3870 Series

Designed for use with critical and ultra-high purity corrosive gases, such as those used in semiconductor manufacturing. These regulators are recommended for applications where inlet pressure does not vary greatly, as with liquefied gases. The AG3870 Series features a tied-seat (tied-diaphragm) design and a stainless steel diaphragm to ensure positive shutoff of the regulator with hazardous gases. Particle entrapment and droop are minimized by the welded diaphragm/link assembly.

### Standard Features

- Tied-Seat ensures positive shutoff if particulate matter should lodge in the seat, a common problem with corrosive gases.
- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Type 316 SS Bar Stock Construction provides corrosion resistance.
- $\frac{1}{16}$ " NPT female Bonnet Vent Port and Stem Packing allows for complete capturing of bonnet when connected to a vent line or disposal system.
- Low Internal Volume facilitates purging and reduces contamination potential.
- Regulator Design permits vacuum purging of regulator.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Threaded Holes in Rear of Regulator permit front panel mounting.

### Specifications

#### Maximum Inlet Pressure:

AG3870, AG3872, AG3873: 800 psig  
AG3874, AG3876, AG3877: 3000 psig

#### Inlet Pressure Gauge: See Table I

#### Delivery Pressure Range: See Table I

#### Delivery Pressure Gauge: See Table I

#### Filter: 10 micron

#### Gauge Size: 2" Dial

#### Operating Temp. Range: -40°F to 140°F

#### Flow Coefficient:

Regulator: Cv = 0.06  
Outlet Valve: Cv = 0.17

#### Internal Volume: Regulator (body only): 6.0 cc

#### Bonnet Vent Connection: $\frac{1}{16}$ " NPT female

#### Inlet Connection: CGA 320, 326, 330, 350, 580, 660 or 705 as ordered

#### Outlet Connection: $\frac{1}{4}$ " NPT female

#### Weight (approx.): 3 lbs

### Materials of Construction

**Body and Outlet Valve:** Type 316 SS Bar Stock  
**Gauges:** Type 316 SS  
**Bonnet:** 300 Series Stainless Steel  
**Other Metal Parts Exposed to Gas:** Type 316 SS  
**Seats:** PCTFE  
**Friction Sleeve:** PTFE  
**Diaphragms:** Type 316 SS



AG3872

Table I

Part Number	Inlet Pressure Gauge (dual scale)		Delivery Pressure Range Gauge (dual scale)		
	psig	bar	psig	psig	bar
AG3870-(CGA)	0-1000	0-69	2-30	-30" Hg-0-60	-1-0-4
AG3872-(CGA)	0-1000	0-69	4-75	-30" Hg-0-100	-1-0-7
AG3873-(CGA)	0-1000	0-69	10-150	-30" Hg-0-200	-1-0-14
AG3874-(CGA)	0-4000	0-275	2-30	-30" Hg-0-60	-1-0-4
AG3876-(CGA)	0-4000	0-275	4-75	-30" Hg-0-100	-1-0-7
AG3877-(CGA)	0-4000	0-275	10-150	-30" Hg-0-200	-1-0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AG3870-330. Order by complete number.

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings* (male connectors)		150
$\frac{1}{4}$ " NPT male x $\frac{1}{8}$ " compression	SG6713	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " compression	SG6714	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " VCR® male	SG6960	
$\frac{1}{16}$ " NPT male x $\frac{1}{8}$ " compression	SG6715	
Safety Mounting Bracket*	RM Series	92
Purge Assemblies* (cross purge assemblies recommended)	SG3890	176
Relief Valves		186
for AG3870, AG3874	RV5574-60i	
for AG3872, AG3876	RV5574-100i	
for AG3873, AG3877	RV5574-200i	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Critical Purity Regulators

## Positive Seal (Tied-Seat), Two-Stage, Stainless Steel

### Model AGD

Designed for use with critical and ultra-high purity corrosive gases, such as those used in semiconductor manufacturing. These regulators feature convoluted stainless steel diaphragms and tied-seats (tied-diaphragms) in both stages providing for greater sensitivity and sealing integrity. The two-stage design provides constant outlet pressure regardless of changes in cylinder (inlet) pressure.



AGD-3-150

### Standard Features

- Tied-Seats in both stages ensure positive shutoff if particulate matter should lodge in the seat, a common problem with corrosive gases.
- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Type 316 SS Bar Stock Construction provides corrosion resistance.
- $\frac{1}{16}$ " NPT female Bonnet Vent Ports and Stem Packing allow for complete capturing of bonnets when connected to a vent line or disposal system.
- Two-Stage Regulator Design ensures constant delivery pressure over varying inlet pressures.
- Regulator Design permits vacuum purging of regulator.
- Diaphragm Seal Outlet Valve maintains gas purity.
- Filters trap foreign matter, extend regulator life and reduce maintenance.

### Specifications

#### Maximum Inlet Pressure:

AGD-3: 3000 psig  
AGD-2: 800 psig

Inlet Pressure Gauge: See Table I

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filters: 10 micron

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:

Regulator: Cv = 0.05  
Outlet Valve: Cv = 0.17

Bonnet Vent Connection:  $\frac{1}{16}$ " NPT female

Inlet Connection: CGA 320, 326, 330, 350, 580, 660 or 705 as ordered

Outlet Connection:  $\frac{1}{4}$ " NPT female

Supply Pressure Effect: 0.06 psi per 100 psi

Weight (approx.): 4 lbs

### Materials of Construction

**Body and Outlet Valve:** Type 316 SS Bar Stock  
**Gauges:** Type 316 SS  
**Bonnet:** 300 Series Stainless Steel  
**Other Metal Parts Exposed to Gas:** Type 316 SS  
**Seats:** PCTFE  
**Friction Sleeves:** PTFE  
**Diaphragms:** Type 316 SS

Table I

Part Number	Inlet Pressure Gauge (dual scale)		Delivery Pressure Range Gauge (dual scale)		
	psig	bar	psig	psig	bar
AGD-3-30-(CGA)	0-4000	0-275	2-30	-30" Hg-0-60	-1-0-4
AGD-3-75-(CGA)	0-4000	0-275	4-75	-30" Hg-0-100	-1-0-7
AGD-3-150-(CGA)	0-4000	0-275	10-150	-30" Hg-0-200	-1-0-14
AGD-2-30-(CGA)	0-1000	0-69	2-30	-30" Hg-0-60	-1-0-4
AGD-2-75-(CGA)	0-1000	0-69	4-75	-30" Hg-0-100	-1-0-7
AGD-2-150-(CGA)	0-1000	0-69	10-150	-30" Hg-0-200	-1-0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AGD-3-30-660. Order by complete number.

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings* (male connectors)		150
$\frac{1}{4}$ " NPT male x $\frac{1}{8}$ " compression	SG6713	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " compression	SG6714	
$\frac{1}{4}$ " NPT male x $\frac{1}{4}$ " VCR® male	SG6960	
$\frac{1}{16}$ " NPT male x $\frac{1}{8}$ " compression	SG6715	
Safety Mounting Bracket*	RM Series	92
Purge Assemblies* (cross purge assemblies recommended)	SG3890	176
Relief Valves		186
for AGD-X-30 Series	RV5574-60i	
for AGD-X-75 Series	RV5574-100i	
for AGD-X-150 Series	RV5574-200i	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Corrosive Gas Regulators

## High Purity, High Flow, Tied-Seat, Stainless Steel

### Model CRH

The special internal design makes these corrosive-resistant single-stage regulators extremely reliable for use with so-called "dirty gases such as hydrogen chloride, sulfur dioxide or chlorine. They feature a large seat and attached poppet (tied-seat) design which reduces susceptibility to clogging from particulate matter. In the unlikely event that a seat leak occurs from contamination or other sources, the regulator provides for positive shut-off by pulling the poppet tighter against the seat as pressure rises. The large Cv factor also makes it an excellent choice for corrosive gas applications requiring high flow rates.



CRH-3-150

### Standard Features

- Tied-Seat (tied-diaphragm) ensures positive shutoff if particulate matter should lodge in the seat, a common problem with corrosive gases.
- Type 316 SS Bar Stock Construction provides corrosion resistance.
- High Purity Design assures high reliability, diffusion resistance and permits vacuum purging of regulator.
- Unique Regulator Design allows regulator to be used at very low inlet pressures.
- Diaphragm Seal Outlet Valve maintains gas purity.
- 2½" Stainless Steel Gauges read easily for more precise settings.
- Threaded Holes in Rear of Regulator permit front panel mounting.

### Flow Coefficient:

Regulator: Cv = 0.624  
Outlet Valve: Cv = 0.17

Inlet Connection: CGA 290, 330, 350, 510, 660 or 705 as ordered

Outlet Connection: ¼" NPT female

Supply Pressure Effect: 1 psi per 100 psi (approximate)

Weight (approx.): 7 lbs

### Materials of Construction

Body: Type 316 SS Bar Stock

Outlet Valve and Gauges: Type 316 SS

Bonnet: Anodized Aluminum

Other Metal Parts Exposed to Gas:  
Type 316 SS

Seats (Regulator and Outlet Valve): PCTFE

Diaphragm: Type 316 SS

Seals: PTFE

Table I

Part Number	Inlet Pressure (psig) Maximum	Gauge	Delivery Pressure (psig) Range	Gauge
CRH-3-75-(CGA)	3000	0-4000	3-75	0-100
CRH-3-150-(CGA)	3000	0-4000	10-150	0-200
CRH-2-75-(CGA)	800	0-1000	3-75	0-100
CRH-2-150-(CGA)	800	0-1000	10-150	0-200
CRH-1-75-(CGA)	300	0-400	3-75	0-100
CRH-1-150-(CGA)	300	0-400	10-150	0-200

Note: To order regulator with optional packed needle valve, suffix regulator part number with PV.  
Example CRH-3-75-330-PV.

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: CRH-3-75-330. Order by complete part number.

### Optional Equipment

Equipment	Part No.	Page No.
Bonnet Vent Connector*	SG5647V	
Helium Leak Test and Test Report Inboard Outboard	HT1000 HT1001	
CGA 240-705 Adapter*	0202-6102	
Outlet Fittings* (male connectors) 1/4" NPT male x 1/8" compression 1/4" NPT male x 1/4" compression	SG6713 SG6714	150
Check Valves*	CV5600	188
Filters*	SG6113 SG6112	190
2 micron 1/4" NPT female x 1/4" NPT male 15 micron 1/4" NPT female x 1/4" NPT male		
Safety Mounting Bracket*	RM Series	92
Packed Needle Valve	SG5424	184
Purge Assemblies* (cross purge assemblies recommended)	SG3890	176

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Corrosive Gas Regulators

## High Purity, High Flow, Tied-Seat, Aluminum-Silicon-Bronze

### Model ASB

Model ASB corrosive-resistant single-stage regulators have been specifically designed for use with acid-forming gases such as hydrogen chloride or boron trifluoride. They are constructed primarily of aluminum-silicon-bronze metal, which has shown superior corrosion-resistant properties in these demanding services.

They also feature a MONEL® nozzle along with a stainless steel diaphragm which has been lined with Hastelloy® C-22. This combination allows for use in high purity applications, while also enhancing its resistance to corrosion.

### Standard Features

- Aluminum-Silicon-Bronze Construction provides superior corrosion resistance to acid-forming gases such as HCl.
- Stainless Steel Diaphragm Lined with Hastelloy® C-22 maintains gas purity while also providing enhanced resistance to corrosion.
- High Purity Regulator Design permits vacuum purging of regulator.
- Tied-Seat (tied-diaphragm) ensures positive shutoff if particulate matter should lodge in the seat, a common problem with corrosive gases.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- Aluminum-Silicon-Bronze Diaphragm Seal Outlet Valve maintains gas purity.

### Specifications

**Maximum Inlet Pressure:** See Table I

**Inlet Pressure Gauge:** See Table I

**Delivery Pressure Range:** See Table I

**Delivery Pressure Gauge:** See Table I

**Gauge Size:** 2½" Dial

**Flow Coefficient:**

Regulator: Cv = 0.624

Outlet Valve: Cv = 0.17

**Inlet Connection:** CGA 330, 350 or 660 as ordered

**Outlet Connection:** ¼" NPT female

**Supply Pressure Effect:** 1 psi per 100 psi (approximate)

**Weight (approx.):** 7 lbs



ASB-3-75

### Materials of Construction

- Body and Outlet Valve:** Aluminum-Silicon-Bronze
- Gauges:** Type 316 SS
- Bonnet:** Anodized Aluminum
- Other Metal Parts Exposed to Gas:** Type 316 SS, MONEL® and Inconel®
- Seats (Regulator and Outlet Valve):** PCTFE
- Diaphragm:** Type 316 SS lined with Hastelloy® C-22
- Seals:** PTFE

Table I

Part Number	Inlet Pressure (psig) Maximum	Gauge	Delivery Pressure (psig) Range	Gauge
ASB-3-75-(CGA)	3000	0-4000	3-75	0-100
ASB-3-150-(CGA)	3000	0-4000	10-150	0-200
ASB-2-75-(CGA)	800	0-1000	3-75	0-100
ASB-2-150-(CGA)	800	0-1000	10-150	0-200
ASB-1-75-(CGA)	300	0-400	3-75	0-100
ASB-1-150-(CGA)	300	0-400	10-150	0-200
ASB-0-75-(CGA)	3000	none	3-75	0-100
ASB-0-150-(CGA)	3000	none	10-150	0-200

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: ASB-3-75-330. Order by complete part number.

### Optional Equipment

Equipment	Part No.	Page No.
Bonnet Vent Connector*	SG5647V	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Check Valves*	CV5600	188
Purge Assemblies* (cross purge assemblies recommended)	SG3890	176

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Electronic Purity Regulators

## Face Seal Connections, 10Ra Finish, Single-Stage

### AG2600, AG2800 Series

These 316L Stainless Steel bar stock body regulators are most often used with the highest electronic grade (greater than 99.9995% or purity grade 5.5) inert, toxic, corrosive and flammable semiconductor gases. They have a 10 Ra surface finish and are electronic-grade cleaned. The all-welded vacuum face seal (VCR®) connections provide metal-to-metal seals without threads in the flow path eliminating generation of unwanted particles and entrapment zones while providing zero axial clearance for ease of component installation and removal.

A complete line of stainless steel gauges, inlet CGA connections, diaphragm seal valves and filters with mating vacuum face seal connections are also available. These accessories enable Advanced to custom configure many regulator assemblies without using pipe threads or compression fittings to join components.

#### AG2600 Series

##### Single-Stage, Pressure-Reducing Regulator

- Welded vacuum face seal connections:  
1/4" female swivel inlet and outlet ports,  
1/4" male swivel gauges port(s) with installed  
1/4" female swivel gauges

#### AG2800 Series

##### Positive Seal (Tied-Seat), Single-Stage Pressure-Reducing Regulator

- Welded vacuum face seal connections:  
1/4" female swivel inlet and outlet ports,  
1/4" male swivel gauges port(s) with installed  
1/4" female swivel gauges

#### Standard Features

- Face Seal Configuration provides zero axial clearance allowing for ease of component installation and removal.
- Gasket/Face Seal Design provides a metal-to-metal seal with no entrapment zones.

- No Threads in Flow Path eliminate generation of unwanted metal particles.
- Face Seal Versatility permits use in both vacuum and positive pressure applications.
- Tied-Seat (AG2800 Series) ensures positive shut-off while minimizing droop and particle entrapment.
- Positionable Captured Vent Bonnet (AG2800 Series) provides greater sealing integrity and allows for 360° rotation of bonnet port without changing regulator position.

#### Specifications

**Internal Surface Finish:** 10 Ra microinch/0.25 micrometer

**Cleaning:** DI water electronic grade

**Design Proof Pressure:** 150% of maximum rated pressure

**Maximum Inlet Pressure:** See Tables

**Inlet Pressure Gauge:** See Tables



AG2602

**Delivery Pressure Range:** See Tables

**Delivery Pressure Gauge:** See Tables

**Gauge Size:** 2" Dial

**Operating Temp. Range:** -40°F to 140°F

**Flow Coefficient:** Cv = 0.06

**Inlet and Outlet Connections:**

1/4" female swivel vacuum face seal

**Supply Pressure Effect:** 0.7 psi per 100 psi

**Inboard Leak Rate:** 1 x 10<sup>-9</sup> atm cc/sec He

**Weight (approx.):** 4 lbs

#### Materials of Construction

**Body:** Type 316L SS Electropolished

**Gauges and Bonnet:** Type 316 SS

**Diaphragm:** Type 316L SS

**Other Metal Parts Exposed to Gas:**

Type 316 SS

**Seat:** PCTFE

Table I, AG2600 Series (Untied-Seat)

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig bar		Delivery Pressure Range psig	Gauge (dual scale) psig bar	
		0-4000	0-275		0-30	-30" Hg-0-60
AG2601	3000	0-4000	0-275	0-30	-30" Hg-0-60	-1-0-4
AG2602	3000	0-4000	0-275	0-100	-30" Hg-0-200	-1-0-14
AG2603	3000	0-4000	0-275	0-250	0-400	0-27
AG2604	3000	0-4000	0-275	0-500	0-600	0-41

Table II, AG2800 Series (Tied-Seat)

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig bar		Delivery Pressure Range psig	Gauge (dual scale) psig bar	
		0-4000	0-275		0-30	-30" Hg-0-60
AG2801	3000	0-4000	0-275	0-30	-30" Hg-0-60	-1-0-4
AG2802	3000	0-4000	0-275	0-100	-30" Hg-0-200	-1-0-14
AG2803	3000	0-4000	0-275	0-150	-30" Hg-0-200	-1-0-14

# Electronic Purity Regulators

## Face Seal Connections, 10Ra Finish, Two-Stage

### AG2700, AG2900 Series

These 316L Stainless Steel bar stock body regulators are most often used with the highest electronic grade (greater than 99.9995% or purity grade 5.5) inert, toxic, corrosive and flammable semiconductor gases. They have a 10 Ra surface finish and are electronic-grade cleaned. The all-welded vacuum face seal (VCR®) connections provide metal-to-metal sealing without threads in the flow path eliminating generation of unwanted particles and entrapment zones while providing zero axial clearance for ease of component installation and removal.

A complete line of stainless steel gauges, inlet CGA connections, diaphragm seal valves and filters with mating vacuum face seal connections are also available. These accessories enable Advanced to custom configure many regulator assemblies without using pipe threads or compression fittings to join components.

#### AG2700 Series

##### Two-Stage, Pressure-Reducing Regulator

- Welded vacuum face seal connections: 1/4" female swivel inlet and outlet ports, 1/4" male swivel gauges port(s) with installed 1/4" female swivel gauges

#### AG2900 Series

##### Positive Seal (Tied-Seat), Two-Stage Pressure-Reducing Regulator

- Welded vacuum face seal connections: 1/4" female swivel inlet and outlet ports, 1/4" male swivel gauges port(s) with installed 1/4" female swivel gauges

#### Standard Features

- Face Seal Configuration provides zero axial clearance allowing for ease of component installation and removal.
- Gasket/Face Seal Design provides a metal-to-metal seal with no entrapment zones.

- No Threads in Flow Path eliminate generation of unwanted metal particles.
- Face Seal Versatility permits use in both vacuum and positive pressure applications.
- Tied-Seat (AG9200 Series) ensures positive shut-off while minimizing droop and particle entrapment.
- Positionable Captured Vent Bonnets (AG2900 Series) provide greater sealing integrity and allow for 360° rotation of bonnet port without changing regulator position.

#### Specifications

**Internal Surface Finish:** 10 Ra microinch/0.25 micrometer

**Cleaning:** DI water electronic grade

**Design Proof Pressure:** 150% of maximum rated pressure

**Maximum Inlet Pressure:** See Tables

**Inlet Pressure Gauge:** See Tables



AG2702

**Delivery Pressure Range:** See Tables

**Delivery Pressure Gauge:** See Tables

**Gauge Size:** 2" Dial

**Operating Temp. Range:** -40°F to 140°F

**Flow Coefficient:** Cv = 0.06

**Inlet and Outlet Connections:**

1/4" female swivel vacuum face seal

**Supply Pressure Effect:** 0.4 psi per 100 psi

**Inboard Leak Rate:** 1 x 10<sup>-9</sup> atm cc/sec He

**Weight (approx.):** 6 lbs

#### Materials of Construction

**Body:** Type 316L SS Electropolished

**Gauges and Bonnet:** Type 316 SS

**Diaphragms:** Type 316L SS

**Other Metal Parts Exposed to Gas:**

Type 316 SS

**Seat:** PCTFE

Table I, AG2700 Series (Untied-Seat)

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig bar		Delivery Pressure Range psig	Gauge (dual scale) psig bar	
		0-4000	0-275		-30" Hg-0-60	-1-0-4
AG2701	3000	0-4000	0-275	0-30	-30" Hg-0-60	-1-0-4
AG2702	3000	0-4000	0-275	0-100	-30" Hg-0-200	-1-0-14
AG2703	3000	0-4000	0-275	0-250	0-400	0-27

Table II, AG2900 Series (Tied-Seat)

Part Number	Inlet Pressure Maximum psig	Gauge (dual scale) psig bar		Delivery Pressure Range psig	Gauge (dual scale) psig bar	
		0-4000	0-275		-30" Hg-0-60	-1-0-4
AG2901	3000	0-4000	0-275	0-30	-30" Hg-0-60	-1-0-4
AG2902	3000	0-4000	0-275	0-100	-30" Hg-0-200	-1-0-14
AG2903	3000	0-4000	0-275	0-150	-30" Hg-0-200	-1-0-14

# General Purity Regulators

Neoprene Diaphragm, Economical, Brass

## Model SSL

Model SSL regulators are designed for inert gases used in line applications at inlet pressures up to 3000 psig. These economical regulators are recommended for general purpose laboratory or industrial use such as purging, blanketing or pressure testing where high purity is not a consideration. They are not recommended for GC carrier gases or applications that may be sensitive to trace hydrocarbon, oxygen or moisture contamination in the gas stream. Please refer to the AG3800 Series regulators for applications using high purity gases.

### Standard Features

- Filter in Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.
- Neoprene Diaphragm permits accurate delivery pressure settings.
- In-line Porting permits direct installation of regulator in piping system.

### Specifications

Maximum Inlet Pressure: 3000 psig

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 10 micron

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 0.17

#### Inlet and Outlet Connections:

1/4" NPT female (standard). Compression fittings available as an option

Weight (approx.): 3 lbs

### Materials of Construction

- Body and Gauge: Brass
- Bonnet: Painted Zinc
- Other Metal Parts Exposed to Gas: Brass and Stainless Steel
- Seat and Seals: PTFE
- Diaphragm: Neoprene
- Filter: Nickel-Plated Sintered Bronze

Table I

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
SSL-15	2-15	0-30	0-2
SSL-50	4-50	0-60	0-4
SSL-125	10-125	0-150	0-10
SSL-250	20-250	0-400	0-27

### Optional Equipment

Equipment	Part No.	Page No.
Compression Fittings* (Two Required) 1/4" NPT male x 1/8" compression 1/4" NPT male x 1/4" compression	SG6703 SG6704	150
Relief Valves for SSL-15 for SSL-50 for SSL-125 for SSL-250	RV5572-25i RV5572-60i RV5572-140i RV5572-300i	186

\* If selected, these items are not installed on the regulator. They are shipped as separate items.



SSL-50

# Critical Purity Regulators

## Metal Diaphragm Seal, Brass and Stainless Steel

Models AG3800, AG3805, AG3810

These regulators are designed for critical and ultra-high purity gases in line applications at inlet pressures up to 3000 psig. The all metal-to-metal diaphragm to body seal design assures maximum diffusion resistance. Convoluted stainless steel diaphragms provide enhanced performance and excellent accuracy. These regulators are specially suited for point-of-use gas delivery systems requiring high leak integrity and minimal internal volume for maintaining guaranteed gas purity levels. Models AG3800 and AG3805 are for noncorrosive gases; Model AG3810 is suitable for use with most corrosive gases.

### Standard Features

- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Regulator Design permits vacuum purging of regulator.
- In-line Porting permits direct installation of regulator in piping system.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Threaded Holes in Rear of Regulator permit front panel mounting.

### Specifications

**Maximum Inlet Pressure:** 3000 psig  
**Delivery Pressure Range:** See Table I  
**Delivery Pressure Gauge:** See Table I  
**Filter:** 10 micron  
**Gauge Size:** 2" Dial  
**Operating Temp. Range:** -40°F to 140°F  
**Flow Coefficient:** Cv = 0.06  
**Bonnet Vent Connection:** 1/16" NPT female  
**Inlet and Outlet Connections:**  
 1/4"NPT female (standard), Compression fittings available as an option  
**Weight (approx.):** 2 lbs



AG3800-30



AG3810-100  
with optional mounting plate

Table I

Part Number	Nickel-Plated Brass	Stainless Steel	Delivery Pressure		
			Range psig	Gauge (dual scale) psig	bar
AG3800-30	AG3805-30	AG3810-30	4-30	0-60	0-4
AG3800-100	AG3805-100	AG3810-100	10-100	0-200	0-14
AG3800-300	AG3805-300	AG3810-300	20-300	0-400	0-27
AG3800-500	AG3805-500	AG3810-500	30-500	0-600	0-41

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Regulator Mounting Plate and Hardware*	RP1	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings (Two Required)*		150
1/8" compression for AG3800, AG3805	SG6703	
1/4" compression for AG3800, AG3805	SG6704	
1/8" compression for AG3810	SG6713	
1/4" compression for AG3810	SG6714	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

### Materials of Construction

#### Body:

AG3800: Brass Bar Stock  
 AG3805: Nickel-Plated Brass Bar Stock  
 AG3810: Type 316 SS Bar Stock

#### Gauges:

AG3800: Brass  
 AG3805: Chrome-Plated Brass  
 AG3810: Type 316 SS

#### Bonnet:

AG3800: Brass  
 AG3805: 300 Series Stainless Steel  
 AG3810: 300 Series Stainless Steel

#### Other Metal Parts Exposed to Gas:

AG3800, AG3805: Brass  
 AG3810: Type 316 SS

#### Seat: PCTFE

#### Diaphragm: Type 316 SS

#### Friction Sleeve: PTFE

# Critical Purity Regulators

## Back Ported, Metal Diaphragm Seal, Brass and Stainless Steel

Models AGR3800, AGR3810

The AGR3800 and AGR3810 Models are machined from bar stock and designed for use with critical and ultra-high purity gases in line applications at inlet pressures up to 3000 psig. They feature a back entry inlet port and threaded mounting holes providing flexibility with panel mounting configurations. The back port design allows front panel mounting of the regulator while concealing the inlet piping behind the panel.

These regulators are specially suited for point-of-use gas delivery systems requiring high leak integrity and minimal internal volume for maintaining guaranteed gas purity levels. Model AGR3800 is for noncorrosive gases; Model AGR3810 is suitable for use with most corrosive gases. These back entry line regulators are utilized in the design of our P Series panels shown on page 95.



AGR3810-100

### Standard Features

- Porting Design permits inlet piping to be installed in back (rear) of regulator body.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Filter traps foreign matter, extends regulator life and reduces maintenance.

### Specifications

Maximum Inlet Pressure: 3000 psig  
Delivery Pressure Range: See Table I  
Delivery Pressure Gauge: See Table I  
Filter: 10 micron  
Gauge Size: 2" Dial  
Operating Temp. Range: -40°F to 140°F  
Bonnet Vent Connection: 1/16" NPT female  
Flow Coefficient: Cv = 0.06

### Inlet and Outlet Connections:

1/4" NPT female (standard). Compression fittings available as an option

Weight (approx.): 2 lbs

### Materials of Construction

#### Body:

AGR3800: Brass Bar Stock

AGR3810: Type 316 SS Bar Stock

#### Gauge:

AGR3800: Brass

AGR3810: Type 316 SS

#### Bonnet:

AGR3800: Brass

AGR3810: 300 Series Stainless Steel

#### Other Metal Parts Exposed to Gas:

AGR3800: Brass & Stainless Steel

AGR3810: Type 316 SS

#### Seat: PCTFE

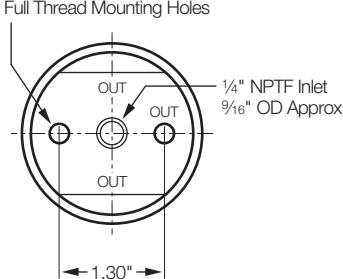
#### Diaphragm: Type 316 SS

#### Friction Sleeve: PTFE



AGR3800-30

2X 10-32 UNF  
.28 Full Thread Mounting Holes



Body Rear View

Table I

Part Number		Delivery Pressure Range psig	Gauge (dual scale) psig	bar
Brass	Stainless Steel			
AGR3800-30	AGR3810-30	4-30	0-60	0-4
AGR3800-100	AGR3810-100	10-100	0-200	0-14
AGR3800-300	AGR3810-300	20-300	0-400	0-27
AGR3800-500	AGR3810-500	30-500	0-600	0-41

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring*	PM3803	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings (each)*		150
1/4" male connector for AGR3800	SG6704	
1/4" male connector for AGR3810	SG6714	
1/4" male elbow connector for AGR3800	SG6744	
1/4" male elbow connector for AGR3810	SG6754	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Electronic Purity Regulators

## Face Seal Connections, 10Ra Finish

### AG1600, AG1800 Series

These 316L Stainless Steel bar stock body line regulators provide point-of-use regulation for the highest electronic grade (greater than 99.9995% or purity grade 5.5) inert, toxic, corrosive and flammable semiconductor gases. They have a 10 Ra surface finish and are electronic grade cleaned. The all-welded vacuum face seal (VCR®) connections provide metal-to-metal seals without threads in the flow path eliminating generation of unwanted particles and entrapment zones while providing zero axial clearance for ease of component installation and removal.

#### AG1600 Series

##### Pressure Reducing Line Regulator

- Welded vacuum face seal connections: 1/4" female swivel inlet and outlet ports, 1/4" male swivel gauge port with installed 1/4" female swivel gauge

Flow Coefficient: Cv = 0.13

Inlet Connection: 1/4" female swivel

Outlet Connection: 1/4" female swivel

Inboard Leak Rate: 1 x 10<sup>-9</sup> atm cc/sec He

Weight (approx.): 3 lbs



AG1602

#### AG1800 Series

##### Positive Seal (Tied-Seat), Line Regulator

- Welded vacuum face seal connections: 1/4" female swivel inlet and outlet ports, 1/4" male swivel gauge port with installed 1/4" female swivel gauge

#### Materials of Construction

Body: Type 316L SS Electropolished

Gauge and Bonnet: Type 316 SS

Diaphragm: Type 316L SS

Other Metal Parts Exposed to Gas:

Type 316 SS

Seat: PCTFE

Table I, AG1600 Series (Untied-Seat)

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
AG1601	0–30	-30" Hg–0–60	-1–0–4
AG1602	0–100	-30" Hg–0–200	-1–0–14
AG1603	0–250	0–400	0–27

Table II, AG1800 Series (Tied-Seat)

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
AG1801	0–30	-30" Hg–0–60	-1–0–4
AG1802	0–100	-30" Hg–0–200	-1–0–14
AG1803	0–150	-30" Hg–0–200	-1–0–14

#### Specifications

Internal Surface Finish: 10 Ra microinch/0.25 micrometer

Cleaning: DI water electronic grade

Design Proof Pressure: 150% of maximum rated pressure

Maximum Inlet Pressure: 3500 psig

Delivery Pressure Range: See Tables

Delivery Pressure Gauge: See Tables

Gauge Size: 2" Dial

Operating Temp. Range: -40°F to 140°F

# High Flow Regulators

## Ultra-High Purity, Brass and Stainless Steel

Models AG3820, AG3830

Capable of flow rates up to 1500 scfh at inlet pressures of 500 psig, these line regulators are ideal for high flow delivery systems requiring high leak integrity and guaranteed gas purity levels. Model AG3820 is suitable for noncorrosive service, while Model AG3830 is designed for corrosive gas applications.

### Standard Features

- Stainless Steel Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- Regulator Design permits vacuum purging of regulator.
- In-line Porting permits direct installation of regulator in piping system.
- 2½" Gauge reads easily for more precise settings.
- Threaded Holes in Rear of Regulator permit front panel mounting.

### Specifications

- Maximum Inlet Pressure: 3000 psig  
 Delivery Pressure Range: See Table I  
 Delivery Pressure Gauge: See Table I  
 Filter: 10 micron  
 Gauge Size: 2½" Dial  
 Operating Temp. Range: -40°F to 140°F  
 Flow Coefficient:  
   AG3820: Cv = 0.4  
   AG3830: Cv = 0.6  
 Inlet and Outlet Connections:  
   ¼" NPT female  
 Weight (approx.): 4 lbs



AGR3830-250  
with optional mounting plate



AGR3820-30

Table I

Part Number		Delivery Pressure		
Brass	Stainless Steel	Range psig	Gauge (dual scale) psig	bar
AG3820-30	AG3830-30	4-30	0-60	0-4
AG3820-75	AG3830-75	6-75	0-100	0-7
AG3820-150	AG3830-150	10-150	0-200	0-14
	AG3830-250	20-250	0-400	0-27
AG3820-300		20-300	0-400	0-27

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring for AG3830*	PM3803	
Regulator Mounting Plate and Hardware*	RP2	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings (two required)*		
¼" compression for AG3820	SG6704	150
¼" compression for AG3830	SG6714	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

### Materials of Construction

- Body:**  
 AG3820: Brass Bar Stock  
 AG3830: Type 316 SS Bar Stock
- Gauge:**  
 AG3820: Brass  
 AG3830: Type 316 SS
- Bonnet:**  
 AG3820: Brass  
 AG3830: 300 Series Stainless Steel
- Other Metal Parts Exposed to Gas:**  
 AG3820: Brass & Stainless Steel  
 AG3830: Type 316 SS
- Seat:**  
 AG3820: PTFE  
 AG3830: PCTFE
- Diaphragm:**  
 AG3820: Type 302 SS  
 AG3830: Type 316 SS
- Seals:** PTFE

# Ultra-High Flow Regulators

## Critical Purity, Metal Diaphragm Seal

Models AG1000, AG1010

Models AG1000 and AG1010 line regulators are ideal for high flow delivery (pipeline) systems requiring high leak integrity and guaranteed gas purity levels. The large main valve and flow capacity allow for flow rates up to 100 scfm at a maximum inlet pressure of 3000 psig. The all metal-to-metal diaphragm to body seal design assures maximum diffusion resistance. Convoluted stainless steel diaphragm provides enhanced performance and excellent accuracy. Model AG1000 is suitable for noncorrosive service, while Model AG1010 is designed for corrosive gas applications.



AG1010

### Standard Features

- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Regulator Design permits vacuum purging of regulator.
- In-line Porting permits direct installation of regulator in piping system.
- Balanced Poppet (stem) minimizes effect of changes in inlet pressure on delivery pressure settings.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Threaded Holes in Rear of Regulator permit front panel mounting.
- 2½" Gauge reads easily for more precise settings.

### Specifications

Maximum Inlet Pressure: 3000 psig

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 10 micron

Gauge Size: 2½" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 1.0

Inlet and Outlet Connections:

½" NPT female (standard)

Weight (approx.): 4 lbs

### Materials of Construction

#### Body:

AG1000: Brass Bar Stock  
AG1010: Type 316 SS Bar Stock

#### Gauge:

AG1000: Brass  
AG1010: Type 316 SS

Bonnet: 300 Series Stainless Steel

Other Metal Parts Exposed to Gas:

AG1000: Brass  
AG1010: Type 316 SS

Seat: PCTFE

Diaphragm: Type 316 SS

Seals: PTFE

Table I

Part Number	Brass	Stainless Steel	Delivery Pressure		
			Range psig	Gauge (dual scale) psig	bar
AG1000-30	AG1010-30		4–30	0–60	0–4
AG1000-100	AG1010-100		10–100	0–200	0–14
AG1000-200	AG1010-200		20–200	0–400	0–27

### Optional Equipment

Equipment	Part No.	Page No.
Panel Mounting Ring	PM3803	
Regulator Mounting Plate and Hardware*	RP2	
Helium Leak Test and Test Report		
Inboard	HT1000	
Outboard	HT1001	
Compression Fittings (two required)*		150
½" compression for AG1000	SG6708	
½" compression for AG1010	SG6718	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Pilot-Dome Regulators

Ultra-High Flow, Straight-Line Pressure Control, Brass

## DL Series

DL Series regulators are designed for direct installation to cryogenic vaporizer systems, to provide ultra-high downstream flows while maintaining constant delivery pressure. This unique unibody design with integral porting eliminates the need for an additional pilot regulator thus eliminating numerous connections. DL Series regulators supplied entirely installed on a stainless steel panel provide for convenient, wall-mounted installation.

An ideal application area is laser delivery either from cryogenic or high pressure supply. Here, the low pressure drop at high flow rates maximize throughput in a laser cutting or welding application. The flow versus pressure drop performance (straight-line pressure control) characteristic of the DL Series as compared to competitive brands, can be viewed by the curve below.

### Standard Features

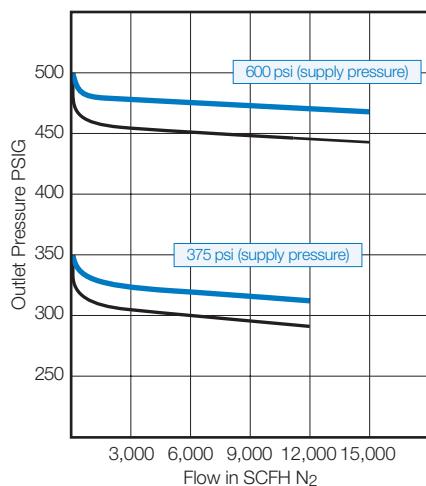
- High Flow Capacity allows flows in excess of 12,000 scfh of nitrogen at 400 psig inlet.
- Balanced Poppet (stem) minimizes effect of changes in inlet pressure on delivery pressure settings.
- Filter in Inlet traps foreign matter, extends regulator life and reduces maintenance.
- Extra Inlet Port allows connection to a purge regulator, pressure switch, purge valve or inlet pressure gauge.
- High Pressure Version (Model DLBH) accepts inlet pressures up to 3000 psig allowing it to be used on standard high pressure cylinders.
- Overall Compact Design allows for easy installation in areas where space is a premium.

### Materials of Construction

- Body and Bonnets: Brass Bar Stock
- Gauge: Brass Internals with Drawn Steel Case
- Other Metal Parts Exposed to Gas: Type 316 SS
- Seats:
  - Pilot Regulator: PTFE
  - Dome Regulator: PCTFE
- Sensing Element:
  - Pilot Regulator: Type 316 SS Diaphragm
  - Dome Regulator: Type 316 SS Piston
- Seals: Viton®
- Wall Bracket: Stainless Steel



DLB-0-500



### Specifications

- Maximum Inlet Pressure: See Table I
- Delivery Pressure Range: See Table I
- Delivery Pressure Gauge: See Table I
- Filter: 40 micron
- Gauge Size: 2" Dial
- Operating Temp. Range: -40°F to 140°F
- Flow Coefficient: Cv = 1.0
- Inlet and Outlet Connections: 1/2" NPT female
- Weight (approx.): 8 lbs
- Dimensions (with bracket):  
10.8" x 5.5" x 5.5"

Table I

Part Number	Inlet Pressure (psig) Maximum	Delivery Pressure (psig) Range	Delivery Pressure (psig) Gauge
DLB-0-500	1000	100–500	0–1000
DLBH-0-500	3000	100–500	0–1000

# Mega-High Flow Regulators

## High Sensitivity, Gylon® Diaphragm

### Models AGHB, AGHS

These line regulators are designed for applications requiring extremely high flow rates while providing very accurate pressure control with minimal droop. They have a high flow capacity ( $C_v = 5.0$ ) with a maximum inlet pressure of 500 psig. Typical uses include tank blanketing, bulk gas regulation and process air (CDA) control. The flow versus pressure droop performance can be viewed in the performance curve shown below.



AGHS

### Standard Features

- Ultra-High Flow Capacity allows flows in excess of 400 scfm of nitrogen at 300 psig inlet.
- Spare Outlet Ports provide versatility to install options such as pressure gauges, transducers, purge, vent or safety relief valves.

### Specifications

Maximum Inlet Pressure: 500 psig  
 Delivery Pressure Range: See Table I  
 Operating Temp. Range: -20°F to 165°F  
 Flow Coefficient:  $C_v = 5.0$   
 Inlet and Outlet Connections:  $\frac{3}{4}$ " NPT female  
 L.P. Plugged Access Ports (2):  
 $\frac{1}{4}$ " NPT female  
 Dimensions (approx.): 4" x  $7\frac{3}{4}$ "  
 Weight (approx.): 16 lbs

### Materials of Construction

Body, Bonnet, Back Cap:  
 AGHB: Brass Bar Stock  
 AGHS: Type 316 SS Bar Stock  
 Other Metal Parts Exposed to Gas:  
 300 Series Stainless Steel, Nitronic 60  
 Valve Seat and O-Rings: Buna-N  
 Diaphragm: Gylon®  
 Seals: Viton®

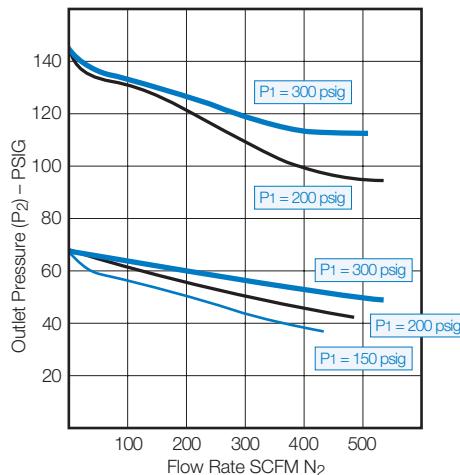


Table I

Part Number		Delivery Pressure Range (psig)
Brass	Stainless Steel	
AGHB-20	AGHS-20	2-20
AGHB-50	AGHS-50	5-50
AGHB-100	AGHS-100	10-100
AGHB-150	AGHS-150	20-150

# Instrumentation Regulators

## General Purity, Low Flow, High Precision

Models SG4820, SG4821

Instrumentation regulators are designed primarily for use in analytical instrument applications and are suitable for line or panel mounting. These high precision, direct acting, non-relieving regulators provide bubble-tight shutoff with helium at 100 psig.

### Standard Features

- High Resolution Design (0–15 turns over full delivery pressure range) provides precise pressure control necessary for use with analytical instruments.
- Filter Screens in Ports trap foreign matter, extend regulator life and reduce maintenance.
- Mounting Nuts permit regulator to be panel mounted.

### Specifications

Maximum Inlet Pressure: 250 psig

Delivery Pressure Range: See Table I

Maximum Operating Temperature: 140°F

Maximum Flow Capacity: 1000 sccm air

Inlet, Outlet and Gauge Ports:

1/8" NPT female

Supply Pressure Effect: 0.07 psi per 10 psi

Weight (approx.): 0.5 lb

### Materials of Construction

#### Body:

SG4820: Aluminum  
SG4821: Type 316 SS

#### Bonnet: Aluminum

Valve Stem and Valve Spring: Type 316 SS

#### Seat: PTFE

Diaphragm and Seals:  
SG4820: Buna-N  
SG4821: Viton®

Adjusting Spring: Zinc-Plated Music Wire



SG4821

Table I

Part Number Aluminum	Stainless Steel	Delivery Pressure Range (psig)
SG4820-10	SG4821-10	0-10
SG4820-30	SG4821-30	0-30
SG4820-60	SG4821-60	0-60
SG4820-100	SG4821-100	0-100
SG4820-200	SG4821-200	0-200

# Vaporizing Regulators

## Electric and Steam, Explosion-Proof, Metal Diaphragm Seal

### Models VREB, VRSB

Models VREB and VRSB spring-loaded pressure-reducing regulators are designed to heat and vaporize media before and after pressure reduction to keep condensable liquids in their gas phase. The media is heated while passing through coiled tubes within a heating chamber. Media contact materials of Type 316 SS, Elgiloy®, Vespel®, and Peek minimize the effects of extreme temperature and provide good corrosion resistance.

The Model VREB incorporates a 100–240 VAC, 50/60 Hz thermostatically controlled heating element, with a digital temperature display visible through a window in the junction box. It also has a 4–20 mA analog output capability for remote temperature monitoring and data acquisition. The controlling circuit is housed in an explosion-proof, dust tight junction box compliant with National Electric Code requirements for Class I, Div. 1 – Group B, C and D standards. The Model VRSB is a steam heat version of the vaporizing regulator.

These regulators are commonly used in gas chromatography, hydrocarbon sampling, fluid fractionalization, sample conditioning and to preheat light hydrocarbon streams.



VREB



VRSB

### Standard Features

- 270° Turn Potentiometer Adjustment allows high resolution in temperature control (Model VREB).
- Control Circuit is housed in an explosion-proof, dust tight junction box compliant with NEC requirements for Class I, Div. 1 – Groups B, C and D standards (Model VREB).
- LED Temperature Display and 4–20 mA analog output (Model VREB).
- Metal-to-Metal Diaphragm to Body Seal (no backup o-ring) assures maximum diffusion resistance.
- Pressure Rated per criteria of ANSI/ ASME B31.3.
- Cleaned to CGA 4.1 and ASTM G-93 Intermediate Level.
- Designed for 100–240 VAC, 50/60 Hz worldwide use.
- NACE MR0175/ISO 15156 compatible.

### Specifications

Maximum Inlet Pressure: 6000 psig

Operating Steam Pressure (Model VRSB):  
650 psig

Maximum Media Temperature: 500°F

Ambient Temperature Range:

Regulator Body: -40°F to 185°F

Electrical Housing: -40°F to 149°F

Heater Temperature Control:

270° Turn – 122°F to 752°F

Power Requirements:

100W at 120 VAC (0.83 amps)  
400W at 240 VAC (1.67 amps)

Filter: 10 micron

Flow Coefficient: Cv = 0.02

### Inlet and Outlet Connections:

1/4" NPT female

Steam Ports (Model VRSB): 1/4" NPT female

### Approximate Weight:

VREB: 6 lbs

VRSB: 3 lbs

### Materials of Construction

Body, Bonnet and Heat Exchanger Tube:

Type 316 SS

Other Metal Parts Exposed to Gas:

Type 316 SS

### Seat:

VREB: PEEK

VRSB: Vespel®

Diaphragm and Spring: Elgiloy®

Table I

Part Number Electric	Steam	Delivery Pressure Range (psig)
VREB-25	VRSB-25	2–25
VREB-50	VRSB-50	5–50
VREB-100	VRSB-100	10–100
VREB-250	VRSB-250	20–250
VREB-500	VRSB-500	30–500

### Optional Equipment

Equipment	Part No.
Panel Mounting Ring*	PM3803

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Electric Vaporizing Regulators

Nonflammable Gas Service, Two-Stage, Plated Brass

## LABH Series

These electrically-heated regulators are designed to relieve or eliminate "freeze-up" problems, a common condition experienced with applications using carbon dioxide (CO<sub>2</sub>) supplied from high pressure cylinders. A first stage cavity serves as a boiler to vaporize CO<sub>2</sub> liquid and eliminate or minimize any CO<sub>2</sub> solids in the second stage. The second stage chamber is then available to heat the CO<sub>2</sub> vapor before it reaches the outlet. The regulator has 200 watts of heat to provide continuous 100 scfh of CO<sub>2</sub> under the most severe freeze-up conditions, as well as higher flow rates under normal (intermittent) conditions.

Model LABH-PG is designed to provide adjustable pressure control and is supplied with an outlet pressure gauge. Models LABH-FM and LABH-FG provide adjustable flow control and are supplied with either a flowmeter or flow gauge. These regulators are suitable for inert gas purging, gas shield welding, Ph control, CO<sub>2</sub> incubators and chemical storage blanketing.

### Standard Features

- Filters trap foreign matter, extend regulator life and reduce maintenance.
- Diaphragm Seal Outlet Valve (Model LABH-PG) provides on/off flow control and maintains gas purity.
- Chrome-plated Surface provides polished appearance and ease of cleaning.
- Designed for Continuous Flow up to 100 scfh of CO<sub>2</sub>.
- UL-listed Electrical Components in regulator meet applicable safety standards.

### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0–4000 psig / 0–275 bar

Delivery Pressure Gauge/Flowmeter:  
See Table I

#### Compensated Pressure:

LABH-FM: 50 psig

#### Filters:

10 micron

#### Gauge Size:

2½" Dial

#### Flow Coefficient:

$Cv = 0.13$

#### Ambient Operating Temperature:

-4°F to 140°F

#### Heater:

200 watt cartridge-style

#### Power Requirements:

120 VAC or 240 VAC (optional order)

#### Heater Temperature:

90°F to 125°F (32°C to 52°C), ±8°F, nonadjustable

#### Inlet Connection:

Specify CGA

#### Outlet Connection:

LABH-PG: ¼" NPT female

LABH-FM, LABH-FG: ⅜"-18 RH(F)

#### Supply Pressure Effect:

0.9 psi per 100 psi

#### Weight (approx.):

7 lbs

Table I

Part Number	Configuration	Delivery Range	Delivery Gauge or Flowmeter
LABH-PG-(CGA)	Pressure gauge	10–125 psig	-30" Hg–0–200 psig
LABH-FM-(CGA)	Flowmeter	0–100 scfh (CO <sub>2</sub> )	0–100 scfh
LABH-FG-(CGA)	Flow gauge	0–100 scfh (CO <sub>2</sub> )	0–200 scfh

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: LABH-PG-320. Order by complete part number.

Note: This regulator is NOT designed for use with flammable gases, corrosive gases or oxygen.

### Optional Accessories

Equipment	Part No.
Outlet Fitting Adapter* ⅜"-18-RH-(M) x ¼" NPT male (brass)	IGF-58M4M
Pipe Fittings* ¼" NPT female x ¼" NPT female coupling (brass)	0202-5120

\* If selected, these items are not installed on the regulator. They are shipped as separate items.



LABH-PG



LABH-FG



LABH-FM

### Materials of Construction

Body: Chrome-Plated Brass Forging

Sensing Elements:

1st Stage: Brass Piston

2nd Stage: Type 304 SS Diaphragm

Seat: PTFE

Bonnet: Chrome-Plated Die Cast

Gauges: Chrome-Plated Brass

Flowmeter (Model LABH-FM):

Chrome-Plated Brass, Lexan® Plastic Tube and Shield

# SilcoNert® Treated Regulators

## Low Internal Volume, Single-Stage and Two-Stage

Models SN9100, SN9200

A patented SilcoNert® 2000 treatment applied to all internal metal surfaces including the diaphragm improves the inert characteristics of these regulators. Surface adsorption of low concentration reactive compounds\* certified in calibration standards is eliminated completely. The low internal volume design limits contact time and dead space, allowing for more accurate sampling and faster cycle times resulting in significant cost savings. Processes are more precisely controlled and instruments can be calibrated more accurately—yielding significant savings in time, labor and materials. Analytical accuracy and subsequent reliability of analysis data is therefore greatly improved.

Model SN9100 (single-stage) is recommended for use with intermittent sampling applications where readjustment of delivery pressure setting does not present a problem. Model SN9200 (two-stage) with larger internal volume, provides constant delivery pressure with no need for periodic readjustments.

\* Reactive Compounds: ammonia, dimethyl sulfide, hydrogen sulfide, methyl mercaptan, mercury, nitric oxides (NOx), sulfur dioxide (SOx)

### Standard Features

- SilcoNert® Treatment eliminates adsorption of reactive gases for unsurpassed analytical accuracy.
- Low Internal Volume shortens sampling cycle and purge times – saves gas too.
- High Purity Regulator Design permits vacuum purging of regulator.
- Lightweight and Compact Design permits easier handling.
- Complementary Treated Fittings and Valves available for adsorption-free gas handling.

### Specifications

Maximum Inlet Pressure:	3000 psig
Inlet Pressure Gauge (dual scale):	0-3000 psig / 0-207 bar
Delivery Pressure Range:	See Table I
Delivery Pressure Gauge:	See Table I
Filter:	10 micron
Gauge Size:	1½" Dial
Operating Temp. Range:	-40°F to 140°F
Flow Coefficient:	Cv = 0.06
Regulator (Body) Internal Volume:	
SN9100:	3 cc
SN9200:	8.6 cc



SN9100-75



SN9200-75

Table I

Part Number	Single-Stage	Two-Stage	Delivery Pressure Range psig	Gauge (dual scale) psig	Bar
SN9100-30-(CGA)	SN9200-30-(CGA)		5-30	0-60	0-4
SN9100-75-(CGA)	SN9200-75-(CGA)		10-75	0-100	0-7
SN9100-150-(CGA)	SN9200-150-(CGA)		15-150	0-200	0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SN9100-30-330. Order by complete part number.

### Optional SilcoNert® 2000 Accessories

Equipment	Part No.
Diaphragm Valve*	SNSG5480N
1/4" NPT male x 1/4" NPT female	
Compression Fittings*	
1/4" NPT male x 1/8" compression (male connector)	SNSG6713
1/4" NPT male x 1/4" compression (male connector)	SNSG6714
1/8" compression union	SNSG6791
1/4" compression union	SNSG6792
1/4" x 1/8" compression reducing union	SNSG6851
Type 316L SS Tubing (6' length each)	
1/8" OD x 0.028" wall	SNT2028-6
1/4" OD x 0.035" wall	SNT4035-6

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

Inlet Connection: CGA 180, 330, 350, 510, 580, 660 or 705 as ordered

Regulator Inlet Port: 1/4" NPT female

Outlet Connection: 1/4" NPT female

Gauge Ports: 1/8" NPT female

Supply Pressure Effect:

SN9100: 2 psi per 100 psi

SN9200: 0.4 psi per 100 psi

External Leakage: <2 x 10<sup>-8</sup> atm cc/sec He

Weight (approx.):

SN9100: 1.3 lbs

SN9200: 2.6 lbs

### Materials of Construction

Body: Type 316 SS

Gauges: Type 316 SS

Diaphragm: Type 316 SS

Filter: Type 316 SS

Other Metal Parts Exposed to Gas:  
Type 316 SS

Seat: PCTFE

Seals: PTFE

Bonnet: Black Anodized Aluminum

Please note: all wetted metal components (except gauges) have the SilcoNert® 2000 coating.

# Low Volume Regulators

## Compact, Piston-Diaphragm Seal, Two-Stage, Plated Brass

### Model SP014

Model SP014 regulators are recommended wherever precise and consistent delivery pressure is required. These (first stage) piston and (second stage) metal diaphragm sensed regulators feature a low internal volume making them ideal for use in portable calibration and analyzer applications. Compact, two-stage design provides constant delivery pressure with little effect from changes in cylinder pressure.

#### Standard Features

- Low Internal Volume of only 4.0 cubic centimeters allows rapid purging in analytical instrumentation applications.
- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Two-Stage Design eliminates the need to readjust delivery pressure setting as inlet pressure decreases.
- Plated Brass Surfaces provide polished appearance and ease of cleaning

#### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0–3000 psig / 0–207 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 10 micron

Gauge Size: 1½" Dial

Operating Temp. Range: -20°F to 140°F

Relief Valve Setting (interstage): 140 psig

Flow Coefficient: Cv = 0.014

Regulator (Body) Internal Volume: 4 cc

Inlet Connections: CGA 110, 170, 180, 320, 346, 350, 510, 580 or 590 as ordered

Regulator Inlet Port: ¼" NPT female

Outlet Connection: ½" NPT female

Gauge Ports: ½" NPT female

Supply Pressure Effect: 0.1 psi per 100 psi

Weight (approx.): 2 lbs

#### Materials of Construction

Body: Nickel-plated Brass

Gauges: Chrome-plated Brass

Diaphragm: Stainless Steel

Piston: Brass

Filter: Sintered Stainless Steel

Other Metal Parts Exposed to Gas:  
Type 316 SS

Seats: Viton® and PTFE

Seals: Viton®

Bonnet: Nickel-plated Brass

Relief Valve:

Body and Seat Retainer: Brass

Seat: Viton®

Spring: Stainless Steel

Table I

Part Number	Flow Capacity scfh	Delivery Pressure Range		
		psig	psig	bar
SP014-B-(CGA)	10	2–10	0–15	0–1
SP014-C-(CGA)	25	5–50	0–100	0–7
SP014-D-(CGA)	50	10–100	0–160	0–11

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SP014-B-580. Order by complete part number.



SP014

# Low Volume Regulators

## Compact, High Purity, Single-Stage, Brass and Stainless Steel

### AG9100, AG9110 Series

These metal diaphragm, single-stage regulators feature a scant internal volume of just 3 cubic centimeters, which makes them ideal for use in portable calibration and analyzer applications. The low internal volume and special cleaning process provides for ease of purging with minimal gas usage and reduced contamination potential.

The AG9100 Series is suitable for noncorrosive service, while the AG9110 Series is designed for mildly corrosive gases, ideal for EPA protocol standards, low level VOC analyses, and high purity applications.

#### Standard Features

- Low Internal Volume of only 3 cubic centimeters allows rapid purging in analytical instrumentation applications.
- Metal Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- High Purity Regulator Design permits vacuum purging of regulator.
- Special Cleaning Process eliminates organic film and any surface adhering particles to ensure a stable baseline in low level VOC analyses and high purity applications.
- Lightweight and Compact Design provides for ease of transportation with small cylinders.

#### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0-3000 psig / 0-207 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 1½" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 0.06

Inlet Connection:

AG9100 Series: CGA 110, 170, 180, 320, 326, 346, 350, 510, 580, 590 or 660 as ordered.

AG9110 Series: CGA 110, 180, 320, 326, 330, 346, 350, 510, 580, 590, 660 or 705 as ordered

Outlet Connection: ¼" NPT female

Dimensions (approx.):

Body only: 1⅜" x 3"

Weight (approx.): 2 lbs

#### Materials of Construction

##### Body:

AG9100 Series: Brass Bar Stock  
AG9110 Series: Type 316 SS Bar Stock

##### Gauges:

AG9100 Series: Brass  
AG9110 Series: Type 316 SS

##### Bonnet: Black Anodized Aluminum

##### Other Metal Parts Exposed to Gas:

AG9100 Series: Brass and Stn. Stl  
AG9110 Series: Type 316 SS

##### Seat: PCTFE

##### Diaphragm: Elgiloy®

##### Seals: PTFE



AG9100



AG9110

Table I

Part Number	Brass	Stainless Steel	Delivery Pressure		
			Range psig	Gauge (dual scale) psig	bar
AG9100-(CGA)	AG9110-(CGA)		5-30	0-60	0-4
AG9101-(CGA)	AG9111-(CGA)		10-75	0-100	0-7
AG9102-(CGA)	AG9112-(CGA)		15-150	0-200	0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AG9100-580. Order by complete part number.

#### Optional Equipment

Equipment	Part No.	Page No.
Compression Fittings* (male connectors)		150
1/4" NPT male x 1/8" compression for AG9100 Series	SG6703	
1/4" NPT male x 1/4" compression for AG9100 Series	SG6704	
1/4" NPT male x 1/8" compression for AG9110 Series	SG6713	
1/4" NPT male x 1/4" compression for AG9110 Series	SG6714	
Check Valves*		188

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Low Volume Regulators

## Compact, High Purity, Two-Stage, Brass and Stainless Steel

### AG9200, AG9210 Series

Two-stage regulators are ideal for applications where constant delivery pressure is essential and periodic manual adjustment to delivery pressure settings cannot be made. These regulators are commonly used with gases supplied in high pressure compressed gas cylinders and lecture bottles, where inlet pressure declines as product is used.

These metal diaphragm, miniature size high purity regulators feature a scant internal volume of just 8 cubic centimeters, making them ideal for use in portable calibration and analyzer applications. The low internal volume and special cleaning process provides for ease of purging with minimal gas usage and reduced contamination potential.

The AG9200 Series is suitable for noncorrosive service, while the AG9210 Series is designed for mildly corrosive gases, ideal for EPA protocol standards, low level VOC analyses, and high purity applications.

#### Standard Features

- Low Internal Volume of only 8 cubic centimeters allows rapid purging in analytical instrumentation applications.
- Metal Diaphragms minimize diffusion of air into regulator and eliminate off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- High Purity Regulator Design permits vacuum purging of regulator.
- Special Cleaning Process eliminates organic film and any surface adhering particles to ensure a stable baseline in low level VOC analyses and high purity applications.
- Lightweight and Compact Design provides for ease of transportation with small cylinders.

#### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):

0-3000 psig / 0-207 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 1½" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 0.06

Inlet Connection:

AG9200 Series: CGA 110, 170, 180, 320, 326, 346, 350, 510, 580, 590 or 660 as ordered.

AG9210 Series: CGA 110, 180, 320, 326, 330, 346, 350, 510, 580, 590, 660 or 705 as ordered.

Outlet Connection: ¼" NPT female

Dimensions (approx.):

Body only: 1 5/8" x 5 1/2"

Weight (approx.): 2.5 lbs



AG9210

#### Materials of Construction

##### Body:

AG9200 Series: Brass Bar Stock  
AG9210 Series: Type 316 SS Bar Stock

##### Gauges:

AG9200 Series: Brass  
AG9210 Series: Type 316 SS

##### Bonnets: Black Anodized Aluminum

##### Other Metal Parts Exposed to Gas:

AG9200 Series: Brass and Stainless Steel  
AG9210 Series: Type 316 SS

##### Seats: PCTFE

##### Diaphragms:

First Stage: Type 316 SS  
Second Stage: Elgiloy®

##### Seals: PTFE

#### Table I

Part Number	Delivery Pressure Range		
	Brass	Stainless Steel	Gauge (dual scale) psig
AG9200-(CGA)	AG9210-(CGA)	5-30	0-60 0-4
AG9201-(CGA)	AG9211-(CGA)	10-75	0-100 0-7
AG9202-(CGA)	AG9212-(CGA)	15-150	0-200 0-14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AG9200-580. Order by complete part number.

#### Optional Equipment

Equipment	Part No.	Page No.
Compression Fittings* (male connectors)		150
1/4" NPT male x 1/8" compression for AG9200 Series	SG6703	
1/4" NPT male x 1/4" compression for AG9200 Series	SG6704	
1/4" NPT male x 1/8" compression for AG9210 Series	SG6713	
1/4" NPT male x 1/4" compression for AG9210 Series	SG6714	
Check Valves*		188

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Four Stage Regulators

Reduces JT Cooling Effect, Portable, Stainless Steel

## Model AG144

This four stage regulator will help in achieving stable analytical results when working with condensable calibration mixtures. The regulation of gas from high pressure to a low pressure generally results in a temperature drop inside the regulator. The larger the pressure drop ( $P_1 - P_2 = \Delta P$ ), the lower the cooling effect. This is commonly known as Joule-Thompson (J/T) cooling effect. The J/T cooling effect may subject the gas mixture to temperatures below the dew point of one or more components resulting in separation and altering the composition of the mixture.

A common solution to maintain the temperature above the dew point when regulating these types of mixtures is with an electrically heated regulator. Electrically heated regulators will maintain the gas temperature above the mixture dew point but their use can pose other operational and intrinsic issues. Issues may include the need for an electric power source (not so portable), an explosion-proof rating (high cost and not portable) for use with a flammable mixtures and inherently large temperature swings caused by wide heating cycles (common with electrically controlled heated regulators) resulting in inconsistent analytical results.

The Model AG144 regulator reduces cylinder pressure in four stages. The design incorporates three piston sensed stages and a final fourth adjustable pressure stage with an Elgiloy® metal diaphragm. This technology provides for distribution of the Joules-Thomson (J/T) cooling effect between multiple stages. As a result, reduction in cooling maintains the gas mixture at temperatures above the dew point in the pressure regulator while preserving the composition of the mixture in analytical applications.

## Standard Features

- Four stages reduce J/T cooling effect to maintain mixture composition
- Check valve in cylinder connection prevents air and contaminants from entering the gas stream during cylinder change out
- Diaphragm seal outlet valve provides for flow shut-off and maintains gas purity
- Compact and lightweight design provides for easy transport
- Non-electrical allows for portability and use with flammable gases
- Pressure gauges monitor cylinder and delivery pressures

## Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0-3000 psig / 0-207 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 40 micron

Gauge Size: 1½" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient:  $C_v = 0.014$

Inlet Connection:

CGA 350, 510, 580, 590, 660

Regulator Inlet Port: ¼" NPT female

Outlet Port (Regulator Body): ⅛" NPT female

Outlet Connection: ¼" NPTF (on outlet valve)

Other (plugged) Ports: ⅛" NPTF (outlet port)

Weight (approx.): 2 lbs

## Materials of Construction

Body, Pistons, Gauges: Type 316 SS  
 Diaphragm (4th Stage): Elgiloy®  
 Bonnet: Nickel-Plated Brass  
 Seats: PFA  
 Seals: PTFE and Viton®  
 Filter: Type 316 SS

Table I

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
AG144-A-(CGA)	5-30	0-60	0-4
AG144-B-(CGA)	10-75	0-100	0-7

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AG144-A-350. Order by complete part number.



AG144-B

# Acetylene Regulator

Atomic Absorption, Sensitive Pressure Control, Brass

Model SSG9048

This regulator is specifically designed for use with Atomic Absorption or technical grades of acetylene. Although similar to our Model SSE regulator, its delivery pressure gauge features a red line warning above 15 psig to indicate unsafe delivery pressure for acetylene.

## Standard Features

- Limited Delivery Pressure Adjustment does not allow delivery pressure above 15 psig as recommended for acetylene service.
- Neoprene Diaphragm permits accurate delivery pressure settings.
- Cartridge (Encapsulated) Seat Assembly provides for ease of maintenance and repair.
- Filter in Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.
- "Red-Lined" Delivery Pressure Gauge provides visual indication should delivery pressure exceed allowable withdrawal pressure of 15 psig.
- Outlet Metering Valve provides flow control.

## Specifications

- Maximum Inlet Pressure: 300 psig  
 Inlet Pressure Gauge: 0–400 psig / 0–27 bar  
 Delivery Pressure Range: 2–15 psig  
 Delivery Pressure Gauge: 0–30 psig red-lined above 15 psig  
 Filter: 10 micron  
 Gauge Size: 2" Dial  
 Operating Temp. Range: -40°F to 140°F  
**Flow Coefficient:**  
 Regulator: Cv = 0.18  
 Outlet Valve: Cv = 0.4  
 Inlet Connection: CGA 510  
 Outlet Connection:  
 1/4" NPT male (on outlet valve)  
 Supply Pressure Effect: 1 psi per 100 psi  
 Weight (approx.): 4 lbs



SSG9048

## Materials of Construction

- Body: Brass Bar Stock  
 Outlet Valve and Gauges: Brass  
 Bonnet: Painted Zinc  
 Filter: Nickel-Plated Sintered Bronze  
 Other Metal Parts Exposed to Gas: Brass and Stainless Steel  
 Seat and Seals: PTFE  
 Diaphragm: Neoprene

Table I

Part Number
SSG9048

## Optional Equipment

Equipment	Part No.	Page No.
Compression Fittings* (female connectors)		
1/4" NPT female x 1/8" compression	SG6723	150
1/4" NPT female x 1/4" compression	SG6724	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Cryogenic Container Regulators

## Gaseous Withdrawal, High Flow, High Purity, Brass

### Model LC

Model LC Regulators are specially designed for use on the gaseous withdrawal port of cryogenic liquid containers. These metal diaphragm, single-stage regulators are ideal for applications requiring both high flow and diffusion resistant pressure regulation.

LC regulators have been specially designed to accept a maximum inlet pressure of 3000 psig, allowing them to be used on high pressure compressed gas cylinders as well. In addition to the high inlet pressure feature, new higher delivery pressure ranges of 350 psig and 500 psig are available for special laser cutting applications.

#### Standard Features

- Specially Designed for Gaseous Withdrawal from cryogenic liquid containers.
- High Pressure Regulator Design accepts inlet pressures up to 3000 psig allowing it to be used on high pressure cylinders as well as liquid containers.
- High Flow Capacity capable of flow rates in excess of 1500 scfh.
- Stainless Steel Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- Tamper Proof, Self-seating Internal Relief Valve protects regulator from over-pressurization.
- Filter in Seat Assembly traps foreign matter, extends regulator life and reduces maintenance.

#### Specifications

- Maximum Inlet Pressure: 3000 psig  
 Delivery Pressure Range: See Table I  
 Delivery Pressure Gauge: See Table I  
 Gauge Size: 2½" Dial  
 Flow Coefficient: Cv = 0.36  
 Inlet Connection: CGA 320, 540 or 580 as ordered  
 Outlet Connection: ¼" NPT female  
 Internal Relief Valve: Self Re-seating 600 psig  
 Weight (approx.): 4 lbs  
 Optional Diaphragm Valve: See Model SG5460N (Page 180)



LC-350

#### Materials of Construction

- Body: Forged Brass  
 Diaphragm: Type 316 SS  
 Gauge and Bonnet: Brass  
 Other Metal Parts Exposed to Gas: Brass and Stainless Steel  
 Seat and Seals: PTFE  
 Optional Diaphragm Valve: See Model SG5460N (Page 180)

Table I

Part Number	Delivery Pressure		
	Range psig	Gauge (dual scale) psig	bar
LC-125-(CGA)	10–125	0–200	0–14
LC-350-(CGA)	20–350	0–500	0–34
LC-500-(CGA)	20–500	0–600	0–41

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: LC-500-580. Order by complete part number.

#### Optional Equipment

Equipment	Part No.	Page No.
Diaphragm Seal Outlet Valve (Installed)	SG5460N-i	180

# Lecture Bottle Regulators

## Noncorrosive Gas Service, High Purity, Brass

Models SG3504, SG3505

These small lightweight regulators, designed for mounting directly on lecture bottles, are recommended for high purity, inert and noncorrosive gas service. They are available in two delivery pressure ranges (4–75 and 10–150 psig), and with either CGA 110, 170 or 180 connections.

### Standard Features

- Metal Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- High Purity Regulator Design permits vacuum purging of regulator.
- Filter in Inlet traps foreign matter, extends regulator life and reduces maintenance.
- Compact Miniature Size provides for ease of use with lecture bottles.

### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0–4000 psig / 0–275 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 1½" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 0.06

Inlet Connection: CGA 110, 170 or 180 as ordered

Outlet Connection: ¼" NPT female

Supply Pressure Effect: 1.0 psi per 100 psi

Weight (approx.): 2 lbs

### Materials of Construction

- Body: Brass Bar Stock
- Gauges: Brass
- Bonnet: Black Anodized Aluminum
- Other Metal Parts Exposed to Gas:  
Brass and Stainless Steel
- Seat: PCTFE
- Diaphragm: Elgiloy®
- Seals: PTFE



SG3505

Table I

Part Number	Delivery Pressure		
	Range psig	Gauge (dual scale) psig	bar
SG3504-(CGA)	4–75	0–100	0–7
SG3505-(CGA)	10–150	0–200	0–14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SG3504-110. Order by complete part number.

### Optional Equipment

Equipment	Part No.	Page No.
Adaptor: CGA 110 (male) to CGA 180 (male), including washers	LB3534	
PTFE washers (package of 25) for CGA 110	SG3540	211
for CGA 170	SG3542	
for CGA 180	SG3541	
Compression Fittings* (male connectors) 1/8" NPT male x 1/8" compression	SG6701	150
1/8" NPT male x 1/4" compression	SG6702	

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Lecture Bottle Regulators

## Corrosive Gas Service, High Purity, Stainless Steel

Models SG3514, SG3515

These small lightweight regulators, designed for mounting directly on lecture bottles, are recommended for high purity corrosive gas service. They are available in two delivery pressure ranges (2–30 and 4–75 psig), and with either CGA 110 or 180 connections.

### Standard Features

- Metal Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- High Purity Regulator Design permits vacuum purging of regulator.
- Filter in Inlet traps foreign matter, extends regulator life and reduces maintenance.
- Compact Miniature Size provides for ease of use with lecture bottles.

### Specifications

Maximum Inlet Pressure: 3000 psig

Inlet Pressure Gauge (dual scale):  
0–4000 psig / 0–275 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 1½" Dial

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 0.06

Inlet Connection: CGA 110 or 180 as ordered

Outlet Connection: ¼" NPT female

Weight (approx.): 2 lbs

### Materials of Construction

Body: Type 316 SS Bar Stock  
Gauges: Type 316 SS  
Bonnet: Black Anodized Aluminum  
Other Metal Parts Exposed to Gas:  
Type 316 SS  
Seat: PCTFE  
Diaphragm: Elgiloy®  
Seals: PTFE



SG3514

Table I

Part Number	Delivery Pressure		
	Range psig	Gauge (dual scale) psig	bar
SG3514-(CGA)	2–30	0–60	0–4
SG3515-(CGA)	4–75	0–100	0–7

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SG3514-110. Order by complete part number.

### Optional Equipment

Equipment	Part No.	Page No.
PTFE washers (package of 25) for CGA 110 for CGA 180	SG3540 SG3541	211
Compression Fittings* (male connectors) 1/4" NPT male x 1/8" compression 1/4" NPT male x 1/4" compression	SG6713 SG6714	150

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# High Delivery Pressure Regulators

## Piston Sensed, High Purity, Brass and Stainless Steel

### AG3840, AG3850, AG3900, AG3910 Series

These single-stage, piston sensed, pressure regulators are designed for applications requiring very high delivery pressures (up to 2500 psig). The AG3850 and AG3910 Series can be used with inlet pressures up to 4800 psig; such as required for use on 3500 psig (3K) and 4350 psig (300 bar) cylinders. Constructed of either brass or stainless steel, they are available in both cylinder and line configurations. These regulators are commonly used in high pressure sampling systems, calibration systems, aircraft service and test stand equipment.

#### Standard Features

- High Delivery Pressures up to 2500 psig.
- Piston Sensor Design ensures safe reliable service.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Diaphragm Seal Outlet Valve provides for on/off flow control (cylinder regulators only).
- $\frac{1}{16}$ " NPT female Bonnet Vent Port allows bonnet to be connected to a vent line or disposal system as a precaution in the unlikely event of a piston failure.

#### Specifications

Maximum Inlet Pressure: See Table I

Inlet Pressure Gauge (dual scale): See Table I

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Filter: 10 micron

Gauge Size: 2" Dial

Operating Temp. Range: -15°F to 140°F

#### Flow Coefficient:

Regulator: Cv = 0.06

Outlet Valve: Cv = 0.17

#### Inlet Connections:

Cylinder Regulators:

AG3840: CGA 320, 326, 346, 350, 540, 580 or 590 as ordered

AG3900: CGA 290, 320, 326, 346, 350, 540, 580 or 590 as ordered

AG3850 and AG3910: CGA 347, 350, 580, 680 or 695 as ordered

Line Regulators:  $\frac{1}{4}$ " NPT female

Outlet Connection:  $\frac{1}{4}$ " NPT female

Weight (approx.): 3 lbs



AG3900

#### Materials of Construction

##### Body and Outlet Valve:

AG3840 and AG3850: Brass Bar Stock  
AG3900 and AG3910: Type 316 SS Bar Stock

##### Gauges:

AG3840 and AG3850: Brass  
AG3900 and AG3910: Type 316 SS

##### Bonnet:

AG3840 and AG3850: Brass  
AG3900 and AG3910: 300 Series SS

##### Other Metal Parts Exposed to Gas:

AG3840 and AG3850: Brass and Stn. Stl.  
AG3900 and AG3910: Type 316 SS

##### Seat: PTFE

##### Seals: Viton® and PTFE

##### Outlet Valve:

Seat: PCTFE  
Diaphragm: Type 316 SS

Table 1

Part Number	Type	Inlet Pressure			Delivery Pressure			
		Maximum psig	Gauge (dual scale) psig	bar	Range psig	Gauge (dual scale) psig	bar	
Brass	Stainless Steel							
AG3840-(CGA)	AG3900-(CGA)	Cylinder	3000	0-4000	0-275	50-800	0-1000	0-69
AG3841-(CGA)	AG3901-(CGA)	Cylinder	3000	0-4000	0-275	100-1500	0-2000	0-138
AG3842-(CGA)	AG3902-(CGA)	Cylinder	3000	0-4000	0-275	200-2500	0-3000	0-207
AG3843	AG3903	Line	3000	-	-	50-800	0-1000	0-69
AG3844	AG3904	Line	3000	-	-	100-1500	0-2000	0-138
AG3845	AG3905	Line	3000	-	-	200-2500	0-3000	0-207
AG3850-(CGA)	AG3910-(CGA)	Cylinder	4800	0-5000	N/A	50-800	0-1000	0-69
AG3851-(CGA)	AG3911-(CGA)	Cylinder	4800	0-5000	N/A	100-1500	0-2000	0-138
AG3852-(CGA)	AG3912-(CGA)	Cylinder	4800	0-5000	N/A	200-2500	0-3000	0-207
AG3853	AG3913	Line	4800	-	-	50-800	0-1000	0-69
AG3854	AG3914	Line	4800	-	-	100-1500	0-2000	0-138
AG3855	AG3915	Line	4800	-	-	200-2500	0-3000	0-207

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number.  
Example: AG3840-580 or AG3910-680. Order by complete part number.

#### Optional Equipment

Equipment	Part No.
Panel Mounting Ring*	PM3803

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Ultra-High Pressure Regulators

## Piston Sensed, Non-Relieving and Self-Relieving

### SG3600 Series

These piston-type regulators are designed for use on 6000 psig (6K) cylinders. The stainless steel models are designed for applications requiring inlet pressures up to 10,000 psig. Both brass and stainless steel models are available as line regulators.

**Warning:** Self-relieving regulators should not be used in a confined area or with flammable gases. Injury or death may result.

#### Standard Features

- Large Low Torque Handle allows easy adjustment of delivery pressure.
- Filter traps foreign matter, extends regulator life and reduces maintenance.
- Outlet Metering Valve provides flow control (cylinder regulators only).
- Self-Relieving Models automatically vent downstream pressure should it exceed delivery pressure setting and permits operator to reduce pressure setting by venting downstream pressure through hand-knob.

#### Specifications

Maximum Inlet Pressure: See Tables

Inlet Pressure Gauge: See Tables

Delivery Pressure Range: See Tables

Delivery Pressure Gauge: See Tables

Gauge Size: 2½" Dial

Operating Temp. Range: -65°F to 140°F

#### Flow Coefficient:

Regulator: Cv = 0.06

Outlet Valve: Cv = 0.45

#### Inlet Connection:

Self-Relieving Cylinder Regulators:

CGA 347, 677, 680 or 702 as ordered

Non-Relieving Cylinder Regulators:

CGA 347, 677, 680, 695, 701\*, 702 or 703 as ordered

Line Regulators: ¼" NPT female

#### Outlet Connection:

Cylinder Regulators: ¼" NPT male (on outlet valve)

Line Regulators: ¼" NPT female

Supply Pressure Effect: 1.0 psi per 100 psi

Weight (approx.): 7 lbs

\* Special cleaning for oxygen service is required if inlet pressure exceeds 3000 psig and/or CGA 701 is requested. See Optional Equipment Table.

#### Materials of Construction

Body and Gauges: See Tables

Outlet Valve: Type 316 SS

#### Bonnet:

Brass Regulators: Brass

Stainless Steel Regulators: Electroless Nickel-Plated Brass

#### Other Metal Parts Exposed to Gas:

Brass Regulators: Brass and Stainless Steel

Stainless Steel Regulators: Type 303 SS and Type 316 SS

Seat: PCTFE

#### Seals:

Regulator: Viton®

Outlet Valve: PTFE



SG3612

Table I, Non-Relieving Cylinder Regulators

Part No.	Body Material	Gauge Material	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge
SG3610-(CGA)	Brass	Brass	6000	0-7500	400-6000	0-7500
SG3612-(CGA)	Brass	Brass	6000	0-7500	300-3500	0-4000
SG3614-(CGA)	Brass	Brass	6000	0-7500	200-1500	0-2000
SG3620-(CGA)	303 SS	316 SS	10,000	0-10,000	300-6000	0-7500
SG3622-(CGA)	303 SS	316 SS	10,000	0-10,000	200-3500	0-4000

Table II, Self-Relieving Cylinder Regulators

Part No.	Body Material	Gauge Material	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge
SG3600-(CGA)	Brass	Brass	6000	0-7500	400-6000	0-7500
SG3602-(CGA)	Brass	Brass	6000	0-7500	300-3500	0-4000
SG3604-(CGA)	Brass	Brass	6000	0-7500	200-1500	0-2000

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SG3610-677. Order by complete part number.

Table III, Line Regulators

Part No.	Body Material	Gauge Material	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge
SG3611	Brass	Brass	6000	None	400-6000	0-7500
SG3613	Brass	Brass	6000	None	300-3500	0-4000
SG3621	303 SS	316 SS	10,000	None	300-6000	0-7500
SG3623	303 SS	316 SS	10,000	None	200-3500	0-4000

#### Optional Equipment

Equipment	Part No.
Panel Mounting Ring*	PM3804
Oxygen Cleaning for inlet pressures above 3000 psig (required for CGA 701)	OC100

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Backpressure Regulators

Adjustable Control, Critical Purity, Brass and Stainless Steel

Models ABPB, ABPS

These metal diaphragm, critical purity backpressure regulators are specially designed to control inlet pressure. Unlike pressure reducing regulators, these devices control inlet pressure rather than outlet or downstream pressure. They operate like highly sensitive, adjustable relief valves. The inlet (system) pressure is controlled by relieving pressure through the regulator from the system to maintain pressure at or below a desired level.

Backpressure regulators are commonly used to prevent overpressurization of storage vessels, fluid sampling systems, compressor and pumping systems. Model ABPB is manufactured from brass bar stock and is designed for noncorrosive gases; Model ABPS, which is constructed from Type 316L SS bar stock, is suitable for use with corrosive gases.



ABPS

## Standard Features

- Convoluted Type 316 SS Diaphragm provides excellent accuracy, high sensitivity, and close tolerances on crack-reseat pressure relationships.
- Metal-to-Metal Diaphragm to Body Seal (without back-up o-ring) assures maximum diffusion resistance.
- Critical Purity Regulator Design permits vacuum purging of regulator.
- Threaded Holes in Rear of Regulator permit front panel mounting.

## Specifications

Maximum Rated Pressure: 250 psig

Design Proof Pressure: 150% of maximum rated pressure

Controlled (Relief) Pressure Range:

See Table I

Operating Temp. Range: -40°F to 140°F

Flow Coefficient: Cv = 0.08

Inlet and Outlet Connections:

1/4" NPT female

H.P. (inlet) Plugged Access Port:

1/4" NPT female

Weight (approx.): 2 lbs

## Materials of Construction

- Body:**  
ABPB: Brass Bar Stock  
ABPS: Type 316L SS Bar Stock
- Bonnet:**  
ABPB: Brass  
ABPS: 300 Series Stainless Steel
- Other Metal Parts Exposed to Gas:**  
ABPB: Brass and Stainless Steel  
ABPS: Type 316 SS
- Seat:** PCTFE  
**Diaphragm:** Type 316 SS

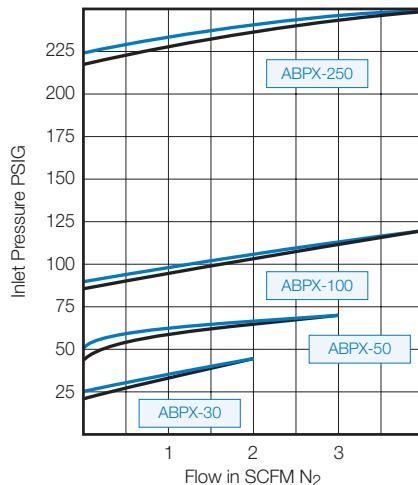


Table I

Part Number	Brass	Stainless Steel	Controlled Pressure Range (psig)
ABPB-30	ABPS-30		4–30
ABPB-50	ABPS-50		5–50
ABPB-100	ABPS-100		10–100
ABPB-250	ABPS-250		20–250

## Optional Equipment

Equipment	Part No.
Panel Mounting Ring*	PM3803
Regulator Mounting Plate and Hardware*	RP1
Helium Leak Test and Test Report	
Inboard	HT1000
Outboard	HT1001

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

# Low Delivery Pressure Regulators

High Flow, High Sensitivity, General Purity

## Model SSC

These regulators provide accurate control at very low delivery pressures and are available in five separate delivery pressure ranges: from 3.5"-8" H<sub>2</sub>O to 10-15 psig.

Model SSC is mainly designed for gas phase withdrawal of liquefied hydrocarbons such as propane, butane or isobutane. Although primarily used as a line regulator, it may be optionally ordered as a cylinder regulator for use with gases having cylinder pressures below 250 psig.

For high pressure cylinder products (e.g., nitrogen or argon) in applications requiring very low delivery pressures please refer to our Models TSC and THP Regulators.

**Warning:** Do not use this regulator with hydrogen or helium. Although these gases are compatible with the materials of construction, experience shows that the seals are not sufficient to prevent leakage of these gases. This regulator is also not recommended for oxygen service.

## Standard Features

- Large Molded Diaphragm allows for accurate control of delivery pressures as low as 3.5" H<sub>2</sub>O.
- Adjusting Screw is Concealed by Security Cap to help prevent adjustments by unauthorized personnel.
- Threaded Mounting Pads with screws permit panel mounting.
- Outlet Metering Valve provides flow control.
- 1" H<sub>2</sub>O Graduations on SSC-0 Gauge and 1 oz Graduations on SSC-1 Gauge allow for enhanced readability at very low pressure settings.
- 2½" Gauge reads easily for more precise settings.

## Specifications

Maximum Inlet Pressure: 250 psig\*

Minimum Inlet Pressure: 5 psig

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 2½" Dial

Operating Temp. Range: -40°F to 140°F

Inlet Connection: ¼" NPT female  
(CGA 510 cylinder connection; see "Optional Equipment")

Outlet Connection: ¼" NPT male (on outlet valve)

Weight (approx.): 4 lbs

## Materials of Construction

Body and Bonnet: Die Cast Zinc

Outlet Block, Outlet Valve and Gauge: Brass

Other Metal Parts Exposed to Gas:

Zinc, Brass and Stainless Steel

Diaphragm and Seat: Buna-N

Seals: Buna-N and PTFE

Table I

Part Number	Delivery Pressure (psig) Range	Gauge
SSC-0*	3.5-6" H <sub>2</sub> O	0-35" H <sub>2</sub> O
SSC-1*	0.5-1.0	0-32 oz
SSC-5	1.0-5.0	0-10
SSC-10	5.0-10.0	0-30
SSC-15	10.0-15.0	0-30

\* These models require inlet pressures below 80 psig to be able to provide the full delivery pressure range.

## Optional Equipment

Equipment	Part No.
Pressure Adjusting Wrench	SG6216
CGA 510 Cylinder Connection Installed on Inlet	**

\*\* Suffix regulator part number with 510. Example: SSC-5-510.



SSC-1

# Low Delivery Pressure Regulators

## General Purity, Brass, Two-Stage

### Model TSC

Model TSC regulators provide highly accurate pressure reduction of inlet pressures up to 3000 psig down to delivery pressures as low as 0.3 to 3 psig. The two-stage design provides constant outlet pressure regardless of changes in cylinder (inlet) pressures.

Model TSC is suitable for use with noncorrosive gases where high purity is not required. Typical applications include low pressure purging, inert blanketing of chemical or flammable storage units, or control of fuel to burners.

### Standard Features

- Large 2 3/4" Diaphragm in second stage, allows for accurate control of delivery pressures down to 0.3 psig.
- Two-Stage Regulator Design ensures constant delivery pressure over varying inlet pressures.
- Sintered Metal Filters trap foreign matter, extend regulator life, and reduce maintenance.
- 1-Ounce Graduations on a 2 1/2" Outlet Gauge allow for enhanced readability at very low pressure settings.
- Outlet Metering Valve provides flow control.

### Specifications

**Maximum Inlet Pressure:** 3000 psig

**Inlet Pressure Gauge:** 0–4000 psig

**Delivery Pressure Range:** 0.3–3 psig

**Delivery Pressure Gauge:** 0–5 psig

**Gauge Size:** 2 1/2" Dial

**Operating Temp. Range:** -20°F to 140°F

#### Flow Coefficient:

Regulator: Cv = 0.37

Outlet Valve: Cv = 0.35

**Inlet Connection:** CGA 296, 346, 350, 510, 540, 580, 590 or 660 as ordered.

#### Outlet Connection:

1/4" NPT male (on outlet valve)

**Maximum Flow Rate:** 98 scfh N<sub>2</sub> at 2000 psig inlet pressure

**Weight (approx.):** 7 lbs

### Materials of Construction

**Body, Bonnet and Outlet Valve:**  
Forged Brass

**Gauges:** Brass Internals with Drawn Steel Case

**Other Metal Parts Exposed to Gas:**  
Brass and Stainless Steel

#### Seats:

First Stage: PTFE

Second Stage: Neoprene

**Diaphragms:** Neoprene

**Seals:** PTFE



TSC

Table I

Part Number
TSC-(CGA)

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: TSC-580. Order by complete number.

### Optional Equipment

Equipment	Part No.	Page No.
Compression Fittings* (female connectors) 1/4" NPT female x 1/8" compression 1/4" NPT female x 1/4" compression	SG6723 SG6724	150
Check Valves* (see note)	CV5665N	188

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

Note: Recommended if downstream backpressure may exceed 5 psig to prevent overpressurizing the second stage diaphragm and gauge.

# Low Delivery Pressure Regulators

High Purity, Brass and Stainless Steel, Two-Stage

## Models THP, THPS

These stainless steel diaphragm, cylinder regulators are specially designed to provide highly accurate pressure reduction of inlet pressures from a maximum of 3000 psig down to delivery pressures as low as 0.2 to 2 psig. The large effective diaphragm sensing area provides quick response, accurate and dependable regulation, and long service life. The two-stage design provides constant outlet pressure regardless of change in cylinder (inlet) pressures.

The Model THP is suitable for use with high purity noncorrosive gases, while Model THPS is designed for mildly corrosive gases that are compatible with the materials of construction.



THPS

## Standard Features

- Type 304 SS Diaphragms minimize diffusion of air into regulator and eliminate off gassing associated with elastomeric diaphragms, thus maintaining gas purity.
- Large 3" Diaphragm in Second Stage, allows for accurate control of delivery pressures down to 0.2 psig.
- Two-Stage Design ensures constant delivery pressure over varying inlet pressures.
- Pressure Relief Valve protects regulator from overpressurization.
- Dual Scale 0.1 psi / 0.01 bar Graduations on Outlet Gauge allow for enhanced readability at extremely low settings.
- Low Torque Multi-turn Handknob provides sensitive outlet pressure control.

## Specifications

Maximum Inlet Pressure: 3500 psig

Inlet Pressure Gauge (dual scale):

0–4500 psig / 0–315 bar

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 1 1/4" Dial

Operating Temp. Range: -4°F to 140°F

Relief Valve Setting (interstage): 45 psig

Inlet Connection:

THP: CGA 296, 320, 326, 346, 350, 510, 580, 590 or 660 as ordered

THPS: CGA 320, 326, 330, 346, 350, 510, 580, 590, 660 or 705 as ordered

Outlet Connection: 1/4" NPT female

Maximum Flow Rate: 18 scfh N<sub>2</sub> at 2000 psig inlet pressure

Weight (approx.): 5 lbs

## Materials of Construction

### Body:

THP: Chrome-Plated Brass  
THPS: Type 316L SS

### Gauges:

THP: Plated Brass  
THPS: Type 316 SS

Bonnets: Black Anodized Aluminum

### Other Metal Parts Exposed to Gas:

THP: Brass and Stainless Steel  
THPS: Stainless Steel

### Seats:

1st Stage: PCTFE  
2nd Stage: Viton®

Diaphragms: Type 304 SS

### Seals:

THP: EPDM  
THPS: Viton®

Table I

Part Number	Delivery Pressure Range		Gauge (dual scale)		
	Brass	Stainless Steel	psig	bar	
THP-(CGA)	THPS-(CGA)	0.2–2.0	0.01–0.14	0–3	0–0.20

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: THP-580. Order by complete part number.

## Optional Equipment

Equipment	Part No.	Page No.
Compression Fittings* (male connectors) 1/4" NPT male x 1/8" compression for THP 1/4" NPT male x 1/4" compression for THP 1/4" NPT male x 1/8" compression for THPS 1/4" NPT male x 1/4" compression for THPS	SG6703 SG6704 SG6713 SG6714	150
Check Valves* (see note)		188

\* If selected, these items are not installed on the regulator. They are shipped as separate items.

Note: Recommended if downstream backpressure may exceed 2 psig to prevent overpressurizing the second stage diaphragm and gauge.

# High Flow Cylinder Regulators

Economical, Ultra-High Purity, Brass and Stainless Steel

Models EHFB, EHFS

These economical bar stock body single-stage cylinder regulators are specially suited for use in applications and environments requiring both high flow and diffusion resistance. A sensitive, extra long-life stainless steel diaphragm ensures ultra-high purity and leak integrity with specialty gases. The cartridge valve design with integral filter protects the regulator seat from particulate contamination and makes servicing simple and cost-effective. The Model EHFB is designed for use with noncorrosive gases, while Model EHFS is suitable for use with corrosive gases that are compatible with the materials of construction.

## Standard Features

- Cartridge Valve Design with 10-micron filter protects regulator seat, extends regulator life, reduces maintenance and makes servicing simple.
- Rebuild Kits allow for cost-effective service and maintenance.
- Exceptionally Low Decaying Inlet Characteristic provides a stable outlet pressure as inlet pressure varies.
- Standard Feature Design allows regulator to be economically priced.
- High Flow Capacity capable of flow rates in excess of 60 scfm of air (125 and 250 psig delivery models).
- Threaded Holes in Rear of Regulator permit front panel mounting.

## Specifications

- Maximum Inlet Pressure:** See Table I  
**Inlet Pressure Gauge:** See Table I  
**Delivery Pressure Range:** See Table I  
**Delivery Pressure Gauge:** See Table I  
**Filter:** 10 micron  
**Gauge Size:** 2" Dial  
**Operating Temp. Range:** -40°F to 140°F  
**Flow Coefficient:** Cv = 1.0  
**Inlet Connection:** CGA 296, 320, 326, 346, 350, 510, 540, 580, 590 or 660 as ordered  
**Regulator Inlet Port and Outlet Connection:** 1/2" NPT female  
**Other Regulator (plugged) Port:** 1/4" NPT female (outlet port)  
**Supply Pressure Effect:** 0.8 psi per 100 psi  
**Leakage:**  
 Internal: Bubble-tight  
 External: Designed to meet  $<2 \times 10^{-8}$  atm cc/sec He  
**Weight (approx.):** 6 lbs



EHFB-3-50

## Materials of Construction

### Body:

- EHFB: Plated Brass Bar Stock  
 EHFS: Type 316 SS Bar Stock

### Gauges:

- EHFB: Plated Brass  
 EHFS: Type 316 SS

### Bonnet:

- Plated Brass

### Diaphragm:

- Type 316 SS

### Filter:

- EHFB: Sintered Bronze  
 EHFS: Sintered Type 316 SS

### Other Metal Parts Exposed to Gas:

- EHFB: Brass and Stainless Steel  
 EHFS: 300 Series Stainless Steel

### Seat:

- PCTFE

### Seals:

- PTFE

Table I

Part Number		Inlet Pressure			Delivery Pressure		
Brass	Stainless Steel	Maximum psig	Gauge (dual scale) psig	bar	Range psig	Gauge (dual scale) psig	bar
EHFB-3-15-(CGA)	EHFS-3-15-(CGA)	3000	0-4000	0-275	2-15	-30" Hg-0-30	-1-0-2
EHFB-3-50-(CGA)	EHFS-3-50-(CGA)	3000	0-4000	0-275	4-50	-30" Hg-0-100	-1-0-7
EHFB-3-125-(CGA)	EHFS-3-125-(CGA)	3000	0-4000	0-275	10-125	-30" Hg-0-200	-1-0-14
EHFB-3-250-(CGA)	EHFS-3-250-(CGA)	3000	0-4000	0-275	20-250	0-400	0-27
EHFB-2-15-(CGA)	EHFS-2-15-(CGA)	800	0-1000	0-69	2-15	-30" Hg-0-30	-1-0-2
EHFB-2-50-(CGA)	EHFS-2-50-(CGA)	800	0-1000	0-69	4-50	-30" Hg-0-100	-1-0-7
EHFB-2-125-(CGA)	EHFS-2-125-(CGA)	800	0-1000	0-69	10-125	-30" Hg-0-200	-1-0-14
EHFB-2-250-(CGA)	EHFS-2-250-(CGA)	800	0-1000	0-69	20-250	0-400	0-27
EHFB-1-15-(CGA)	EHFS-1-15-(CGA)	300	0-400	0-27	2-15	-30" Hg-0-30	-1-0-2
EHFB-1-50-(CGA)	EHFS-1-50-(CGA)	300	0-400	0-27	4-50	-30" Hg-0-100	-1-0-7
EHFB-1-125-(CGA)	EHFS-1-125-(CGA)	300	0-400	0-27	10-125	-30" Hg-0-200	-1-0-14
EHFB-1-250-(CGA)	EHFS-1-250-(CGA)	300	0-400	0-27	20-250	0-400	0-27

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: EHFB-3-15-580. Order by complete part number.

# Ultra-High Flow Regulators

Balanced Stem, Piston Sensed, High Purity

Models SG3882, SG3883

These piston-type regulators are designed for use when very high flow rates are required. Typical uses include manifold or trailer applications. Model SG3882 is suitable for noncorrosive service, while Model SG3883 is designed for corrosive gases that are compatible with the materials of construction.

Warning: The Model SG3883 Regulator is not recommended for oxygen service.

## Standard Features

- High Flow Capacity allows flows in excess of 500 scfm of air at 3000 psig inlet.
- Balanced Poppet (stem) minimizes effect of changes in inlet pressure on delivery pressure settings.
- Pressure Relief Valve protects regulator components from the effects of overpressurization.
- Stainless Steel Filter in Inlet traps foreign matter, extends regulator life and reduces maintenance.
- Large Low Torque Handle allows easy adjustment of delivery pressure.

## Specifications

Maximum Inlet Pressure: 3750 psig

Inlet Pressure Gauge: 0–4000 psig

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Relief Valve: Self-Reseating,  
1/4" NPT male outlet

Gauge Size: 2 1/2" Dial

Operating Temperature Range: 0°F to 165°F

Flow Coefficient: Cv = 1.7

Inlet and Outlet Connections: 1/2" NPT female

Supply Pressure Effect: 1.0 psi per 100 psi

Weight (approx.): 7 lbs

## Materials of Construction

### Body:

SG3882: Brass Bar Stock  
SG3883: Type 303 SS Bar Stock

### Bonnet:

SG3882: Brass  
SG3883: 300 Series Stainless Steel

### Gauges:

SG3882: Brass  
SG3883: Type 316 SS

### Other Metal Parts Exposed to Gas:

SG3882: Brass and Stainless Steel  
SG3883: 300 Series Stainless Steel

### Seats: PTFE

Seals: Viton® and PCTFE

Filter: Type 316 SS



SG3883-500

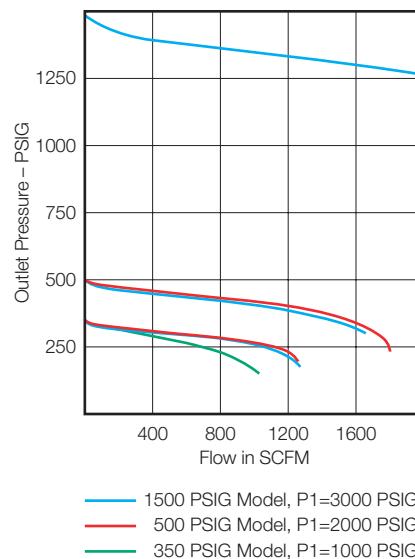


Table I

Part Number		Delivery Pressure (psig)	
Brass	Stainless Steel	Range	Gauge
SG3882-350	SG3883-350	20–350	0–400
SG3882-500	SG3883-500	40–500	0–600
SG3882-1500	SG3883-1500	200–1500	0–3000

## Optional Equipment

Equipment	Part No.
Panel Mounting Ring	PM3804

# Flow Control Regulator

Selectable Flow, Piston-Sensed, Aluminum, Single-Stage

## Model SG9093

The Model SG9093 regulator provides twelve selectable flow rates with nominal ranges up to 8 slpm. The built-in orifice plate with adjustable settings allows the user to change the flow rates with the simple rotation of the hand knob. These general service regulators provide an economical means to control flow of pure and mix calibration gases commonly used with fixed gas detection and industrial hygiene monitors.

Note: The regulator flow rates at the indicated flow settings are approximate and will vary with changes in inlet pressure and normal variations of internal components. An optional two-stage design provides increased flow stability by reducing the impact of variations in cylinder inlet pressure. These regulators should not be used for precise flow calibration purposes.

Warning: The Model SG9093 Regulator is not recommended for oxygen service.



SG9093

### Standard Features

- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Click Stop, 12 Position, Variable Flow Settings from 0 to 8.0 liters/min
- Self-resetting Integral Pressure Relief Valve protects regulator components from the effects of overpressurization.
- Machined Bar Stock Body, Bonnet and Piston eliminates porosity commonly found in castings.

### Optional Models

- Two-stage Models are available for increased pressure and flow stability by reducing the impact of variations in cylinder pressure.
- Models are available for mildly corrosive gases.

### Specifications

**Maximum Inlet Pressure:** 3000 psig

**Inlet Pressure Gauge:** 0–3000 psig

**Preset Control Outlet Pressure:**  
15 psig (nonadjustable)

**Selectable Flow Settings (Nominal):** 0, 0.3, 0.5, 1, 1.5, 2, 2.5, 3, 5, 6, 7, 8 slpm

**Filter:** 40 micron

**Gauge Size:** 1½" Dial

**Operating Temp. Range:** -20°F to 140°F

**Relief Valve Setting:** 35 psig

**Inlet Connections:** C-10 male (½"-18 UNF) and CGA 110, 170, 180, 320, 346, 350, 510, 580 or 590 as ordered

**Outlet Connection:** ¼" hose barb

**Regulator Inlet Port:** ¼" NPT female

**Regulator Gauge and Outlet Ports:**  
½" NPT female

**Weight (approx.):** 1 lb

### Materials of Construction

**Body:** 6061-T6 Aluminum, Clear Anodized  
**Gauge:** Brass Socket with Stainless Steel Case  
**Piston:** Brass  
**Filter:** Sintered Type 316 SS  
**Orifice Plate:** Ceramic  
**Other Metal Parts Exposed to Gas:**  
 Type 316 SS  
**Seat:** PTFE  
**Seals:** Viton®  
**Relief Valve:**  
 Spring and Seat Retainer: Type 303 SS  
 Seat: Viton®

Table I

Part Number
SG9093-(CGA)

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Insert C10 for C-10 regulator connection. Examples: SG9093-580, SG9093-C10. Order by complete part number.

# Demand Flow Regulators

## Gas Control for Sample Draw Pump Detectors, Two-Stage

### Model AG9300

These two-stage regulators are designed for use with instruments that utilize a pump to draw calibration gas and provide the exact amount of gas required by the instrument pump. Simple to use, they make calibration quick and easy by eliminating the need for sample bags, flowmeters or special operator training.

#### Standard Features

- Designed Specifically for Instruments utilizing a pump to draw calibration gas.
- Simple to Use Design makes calibration quick and easy.

#### Specifications

Maximum Inlet Pressure: See Table I

Demand Pressure: 3" H<sub>2</sub>O / 5.6 mm

Nominal Flow Rate Range: 0–3 LPM

Inlet Pressure Gauge: See Table I

Gauge Size: 1½" Dial

Operating Temp. Range: -20°F to 140°F

Inlet Connection: See Table I

Outlet Connection: ¾" hose barb

Weight (approx.): 1 lb

#### Materials of Construction

Body: Electrolysis Nickel-Plated Brass

Gauge: Chrome-Plated Brass

Bonnet: Aluminum

Piston: Brass

Other Metal Parts Exposed to Gas:

Brass and Stainless Steel

Seat and Seals: Viton® and PTFE

Diaphragm: Buna-N



AG9300-C10

Table I

Part Number	Inlet Pressure			Inlet Connection
	Maximum psig	Gauge (dual scale) psig	bar	
AG9300-(CGA)	3000	0–3000	0–207	Specify
AG9300-C10	1000	0–1000	0–70	C-10
AG9300-600	500	0–500	0–35	600 CGA

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: AG9300-590. Order by complete part number

# Preset Flow Regulators

C-10 Connection, Nickel-Plated Brass and Stainless Steel

Models SG9090, SG9091

These regulators are compact, lightweight and recommended for use with calibration gases filled in portable transportable cylinders with C-10 connections having a maximum service pressure of 1000 psig. These single-stage piston regulators are designed to provide nominal (air equivalent) flow rates of 0.3, 0.5, 0.7, 0.9, 1, 1.5 or 2.5 slpm with a preset outlet pressure setting of 60 psig. The Model SG9090 is ideal for use with noncorrosive gas mixtures that do not react with brass materials of construction. The Model SG9091 features stainless steel construction for critical applications where high accuracy mixtures containing mildly corrosive gases are used.



SG9090

## Standard Features

- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Outlet Orifice and Preset Delivery Pressure provide a nominal preset gas flow rate.
- Pressure Gauge monitors cylinder pressure.
- Push Button On/Off Outlet Valve (SG9090) permits a quick and safe shutoff of gas flow.
- Hand-Tightened Assembly to Cylinder provides ease of use for field applications.

## Optional Models

- Custom Flow Settings are available.

## Specifications

Maximum Inlet Pressure: 1000 psig

Inlet Pressure Gauge: 0–1200 psig

Preset Control Outlet Pressure:

60 psig (nonadjustable)

Preset Flow Settings (Nominal): See Table I

Filter: 40 micron

Gauge Size: 1½" Dial

Operating Temp. Range: -5°F to 140°F

Inlet Connection: C-10 male (5/8"-18 UNF)

Outlet Connection: 3/16" hose barb

Weight (approx.): 1 lb

## Materials of Construction

### Body:

SG9090: Nickel-Plated Brass

SG9091: Type 303 SS

### Gauge:

SG9090: Brass Socket with Stainless Steel Case

SG9091: Type 316 SS Socket and Case

### Piston:

SG9090: Brass

SG9091: Type 303 SS

### Filter: Type 316 Sintered Stainless Steel

### Other Metal Parts Exposed to Gas:

SG9090: Brass

SG9091: Type 303 SS

### Seat: PTFE

### Seals: Viton®

Table I

Part Number Brass	Stainless Steel	Nominal Flow Rate (slpm)
SG9090-03	SG9091-03	0.3
SG9090-05	SG9091-05	0.5
SG9090-07	SG9091-07	0.7
SG9090-09	SG9091-09	0.9
SG9090-10	SG9091-10	1.0
SG9090-15	SG9091-15	1.5
SG9090-25	SG9091-25	2.5

# Adjustable Pressure Regulators

CGA 160 and 165 Connections, Preset Knob, Brass

## Model AG24

Model AG24 regulators are compact, lightweight and recommended for use with noncorrosive gases filled in portable transportable cylinders with CGA 160 and 165 connections having a maximum service pressure of 240 psig. These single-stage diaphragm regulators are available with three adjustable pressure control ranges.

The hand-knob on these regulators can be used to avoid inadvertent changes to preset pressure settings. Once the set pressure is selected, the hand-knob can be pushed in to lock the setting. Pulling out the knob allows for readjusting the pressure setting.

### Standard Features

- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Pressure Gauge monitors cylinder pressure.
- Delivery Pressure Setting can be preset with locking hand-knob.
- Push-In/Pull-out Locking Hand-knob prevents inadvertent changes to selected (preset) pressure settings.

### Optional Models

- Hose Barb Connection with Orifice installed on outlet.
- Metering Valve installed on outlet.

### Specifications

Maximum Inlet Pressure: 300 psig

Inlet Pressure Gauge: 0–400 psig

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: None

Gauge Size: 1½" Dial

Operating Temp. Range: 40°F to 125°F

Inlet Connection: CGA 160 or 165 as ordered

Outlet Connection: ¼" NPT female

Weight (approx.): 1 lb

### Materials of Construction

**Body:** Brass  
**Gauge:** Brass Socket and Painted Steel Case  
**Diaphragm:** Buna-N  
**Other Metal Parts Exposed to Gas:** Brass  
**Seat:** Acetal  
**Seals:** Buna-N

Table I

Part Number	Delivery Pressure Range (psig)
AG24-A-(CGA)	1–10
AG24-B-(CGA)	2–25
AG24-C-(CGA)	5–50

Where "(CGA)" is indicated above, insert CGA 160 or 165 to complete the part number. Example: AG24-A-160.  
Order by complete part number



AG24

# Preset Flow Regulators

CGA 165 Connection, Brass

Model AG242

Model AG242 Regulators are compact, lightweight and recommended for use with noncorrosive gases filled in portable transportable cylinders having a maximum service pressure of 240 psig. They are preset to deliver the appropriate pressure and flow for auto emission analyzer calibration. Three preset flow rates with nominal delivery pressures are available.

## Standard Features

- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Outlet Orifice and Preset Delivery Pressure provide a nominal preset gas flow rate.
- Tamper Proof Stem prevents inadvertent changes to factory settings.
- Pressure Gauge monitors cylinder pressure.

## Optional Models

- Custom Flow Settings are available.

## Specifications

Maximum Inlet Pressure: 300 psig

Inlet Pressure Gauge: 0–400 psig

Preset Outlet Pressure (nonadjustable):

See Table I

Delivery Pressure Gauge: None

Gauge Size: 1½" Dial

Operating Temp. Range: 40°F to 125°F

Inlet Connection: CGA 165

Outlet Connection:

242A and 242B: ¼" hose barb

242C: ¾" hose barb

Weight (approx.): 1 lb

## Materials of Construction

Body: Brass  
 Gauge: Brass Socket and Painted Steel Case  
 Diaphragm: Viton®  
 Other Metal Parts Exposed to Gas: Brass  
 Seat: Acetal  
 Seals: Viton®



AG242

Table I

Part Number	Nominal Flow Rate (slpm)	Nominal Delivery Pressure (psig)
AG242-A	8	10
AG242-B	10	15
AG242-C	5	6

# Adjustable Pressure Regulators

CGA 165, 170 and 180 Connections, High Purity, Aluminum

## Model AG226

Model AG226 regulators are compact, lightweight and recommended for use with high accuracy mixtures filled in portable transportable cylinders containing mildly corrosive gases. These single-stage metal diaphragm regulators are available with three adjustable pressure control ranges with either a cylinder (inlet) or delivery (outlet) pressure gauge.

### Standard Features

- Metal Diaphragm minimizes diffusion of air into regulator and eliminates off gassing associated with elastomeric diaphragms, thus maintaining purity.
- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Available with Inlet or Outlet Gauge to monitor cylinder pressure or delivery pressure.

### Specifications

Maximum Inlet Pressure: See Table I

CGA 165: 500 psig

CGA 170 and 180: 3000 psig

Inlet Pressure Gauge: See Table I

Delivery Pressure Range: See Table I

Delivery Pressure Gauge: See Table I

Gauge Size: 1½" Dial

Operating Temp. Range: -40°F to 140°F

Inlet Connection: CGA 165, 170 or 180 as ordered

Outlet Connection: 1/8" NPT female

Weight (approx.): 1 lb

### Materials of Construction

Body: Aluminum

Gauge: Stainless Steel

Diaphragm: Elgiloy®

Other Metal Parts Exposed to Gas:

Stainless Steel

Seat: PCTFE

Seals: PTFE



AG226-B

Table I

Part Number	Inlet Pressure (psig) Maximum	Gauge	Delivery Pressure (psig) Range	Gauge
AG226-A-(CGA)	500	0-600	2-25	None
AG226-B-(CGA)	500	0-600	3-60	None
AG226-C-(CGA)	500	0-600	5-100	None
AG226-AS-(CGA)	1800	0-2000	2-25	None
AG226-AD-(CGA)	3000	None	2-25	0-60
AG226-BD-(CGA)	3000	None	3-60	0-100
AG226-CD-(CGA)	3000	None	5-100	0-200

Where "(CGA)" is indicated above, insert CGA 165, 170 or 180 to complete the part number.

Example: AG226-A-165. Order by complete part number

# Adjustable Pressure Regulator

CGA 600 Connection, Economical, Aluminum

Model AG262

The Model AG262 regulator is compact, lightweight and economical, and recommended for use with noncorrosive gases filled in portable transportable cylinders having a maximum pressure of 300 psig. A CGA 600 inlet connection is integrated into the regulator body and a restricted flow orifice in the outlet tube prevents the rapid flow and emptying of cylinder contents while in use.

## Standard Features

- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Orifice in Outlet Tube restricts flow and prevents rapid emptying of cylinder contents.
- CGA 600 Inlet is an integral part of the regulator body.

## Specifications

Maximum Inlet Pressure: 300 psig  
 Inlet Pressure Gauge: None  
 Delivery Pressure Range: 0–25 psig  
 Delivery Pressure Gauge: None  
 Operating Temp. Range: 40°F to 100°F  
 Inlet Connection: CGA 600  
 Outlet Connection: 1/4" tube  
 Outlet Orifice: 0.007" in  
 Weight (approx.): 0.5 lb

## Materials of Construction

Body and Piston: Aluminum  
 Other Metal Parts: Brass and Aluminum  
 Seat: PTFE  
 Seals: Buna-N  
 CGA Gasket: Cork



AG262

## Table I

Part Number
AG262

# Preset Flow Regulators

CGA 600 Connection, Economical, Aluminum

## Model AG261

Compact, lightweight and economical, Model AG261 regulators are recommended for use with noncorrosive gases filled in portable transportable cylinders having a maximum pressure of 300 psig. A CGA 600 inlet connection and an on/off shut-off valve are integrated into the regulator body. Three preset nominal flow rates are available.

### Standard Features

- Lightweight and Compact Design provides for ease of transportation with small cylinders.
- Available with inlet cylinder pressure gauge.
- On/Off Valve provides shut-off without removing the regulator.
- CGA 600 Inlet is an integral part of the regulator body.

### Materials of Construction

Body: Aluminum  
 Gauge: Brass  
 Diaphragm: Neoprene  
 Other Metal Parts: Brass and Aluminum  
 Seat: Neoprene  
 Seals: Buna-N  
 CGA Gasket: Cork



AG261-AG-03

### Specifications

Maximum Inlet Pressure: 300 psig

Inlet Pressure Gauge: See Table I

Nominal Delivery Pressure: 45 psig

Delivery Pressure Gauge: None

Gauge Size: 1½" Dial

Operating Temp. Range: 40°F to 100°F

Inlet Connection: CGA 600

Outlet Connection: ¼" hose barb

Weight (approx.): 0.5 lb

Table I

Part Number	Nominal Flow Rate (slpm)	Inlet Pressure Gauge (psig)
AG261-A-03	0.3	None
AG261-A-05	0.5	None
AG261-A-10	1.0	None
AG261-AG-03	0.3	0-300
AG261-AG-05	0.5	0-300
AG261-AG-10	1.0	0-300

# Medium Duty Regulators

## Economical, Single-Stage

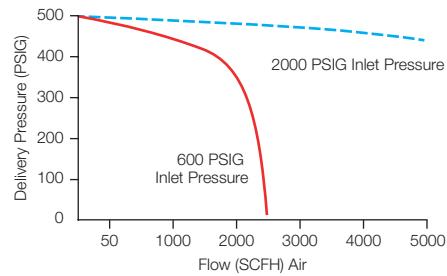
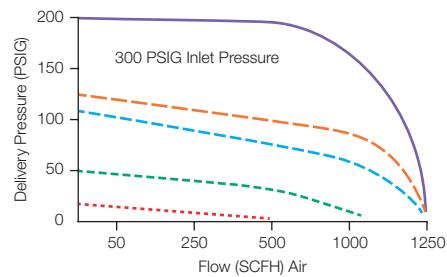
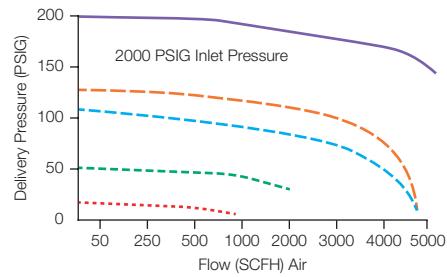
### Model A25

The time-proven performance of Model A25 regulators make it a true industry workhorse, and are recommended for use with all types of welding gases. Designed to provide years of economical yet reliable performance, these regulators set the standard for most welding, cutting, brazing and heat treating applications.

#### Benefits and Features

- Conforms to CGA E-4 and UL Listed.
- Chrome-plated bonnet with forged brass body.
- 2" dual-scale gauges (psi/kpa).
- Regulator designed for propane service (IGR-A25PB-510) can be used with any other welding-grade liquid petroleum gas, EXCEPT acetylene.
- Model A25E (IGR-A25E-580) is recommended for joint testing and purging on job sites.
- One-piece encapsulated seat design with internal filter and PTFE seat.

#### Typical Performance



IGR-A25C

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Inlet Gauge	Delivery Pressure (psig) Range	Delivery Gauge	Inlet CGA	Outlet Connection
IGR-A25AA-300	Acetylene	300	0–400	0–15	0–30	300	9/16"-18 LH
IGR-A25AA-510	Acetylene	300	0–400	0–15	0–30	510	9/16"-18 LH
IGR-A25PB-510	Propane	300	0–400	0–50	0–60	510	9/16"-18 LH
IGR-A25C-540	Oxygen	3000	0–4000	0–100	0–150	540	9/16"-18 RH
IGR-A25C-580	Argon, Helium, Nitrogen	3000	0–4000	0–100	0–150	580	5/8"-18 RH Female
IGR-A25C-590	Industrial Air	3000	0–4000	0–100	0–150	590	9/16"-18 RH
IGR-A25E-580	Nitrogen	3000	0–4000	0–500	0–1000	580	1/4" x 1/4" Flare

# Heavy Duty Regulators

## Stainless Steel Diaphragm, Single-Stage

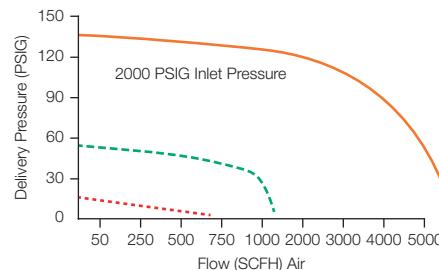
### Model A45

Model A45 medium to high capacity regulators deliver dependable performance in the harshest of environments and are recommended for use with all types of welding gases. Featuring a stainless steel diaphragm, these are the regulators of choice for even the most challenging welding, cutting, brazing and heat treating applications.

#### Benefits and Features

- Conforms to CGA E-4 and UL Listed.
- Stainless Steel diaphragm.
- Brass bonnet and bronze adjusting screw.
- 2.5" dual-scale gauges (psi/kpa).
- Tamper-proof, self-reseating internal high pressure safety valve.
- One-piece encapsulated seat design with an internal filter and a PTFE seat.

#### Typical Performance



IGR-A45AA

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge	Inlet CGA	Outlet Connection
IGR-A45AA-300	Acetylene	300	0–400	0–15	0–30	300	9/16"-18 LH
IGR-A45AA-510	Acetylene	300	0–400	0–15	0–30	510	9/16"-18 LH
IGR-A45PB-510	Propane	300	0–400	0–50	0–60	510	9/16"-18 LH
IGR-A45B-540	Oxygen	3000	0–4000	0–50	0–60	540	9/16"-18 RH
IGR-A45C-540	Oxygen	3000	0–4000	0–125	0–150	540	9/16"-18 RH
IGR-A45C-580	Argon, Helium, Nitrogen	3000	0–4000	0–125	0–150	580	5/8"-18 RH Female

# High Flow Regulators

## Cylinder and Manifold, Single-Stage

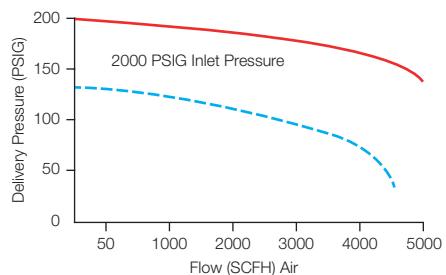
### Model A30

These specially-designed regulators provide high gas flows for cylinder and manifold gas supply systems, and are ideal for high flow applications such as heavy cutting and heating.

#### Benefits and Features

- Allows flow in excess of 2000 scfh at 2000 psi inlet and 300 scfh at 200 psi inlet.
- Operates on high pressure cylinders up to 3000 psig (maximum inlet pressure).
- Conforms to CGA E-4.
- Large 2.75" neoprene diaphragm.
- 2.5" dual-scale gauges (psi/kpa).
- Tamper-proof, self-reseating internal high pressure safety valve.
- One-piece encapsulated seat design with an internal filter and PTFE seat.

#### Typical Performance



IGR-A30C

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge	Inlet CGA	Outlet Connection
IGR-A30C-346	Air	3000	0–4000	0–125	0–200	346	1/16"-18 RH
IGR-A30C-350	Hydrogen, Methane	3000	0–4000	0–125	0–200	350	1/16"-18 LH
IGR-A30C-540	Oxygen	3000	0–4000	0–125	0–200	540	1/16"-18 RH
IGR-A30C-580	Inerts	3000	0–4000	0–125	0–200	580	5/8"-18 RH Female
IGR-A30D-580	Inerts	3000	0–4000	0–400	0–600	580	5/8"-18 NPT male*
IGR-A30E-580	Inerts	3000	0–4000	0–600	0–1000	580	5/8"-18 NPT male*

\* 5/8" male hex nipple installed 180° from inlet port.

# High Flow Regulators

## Manifold and Trailer, Single-Stage

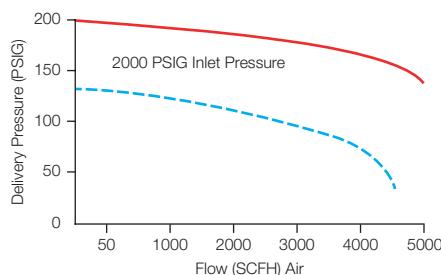
### Model A35

Model A35 regulators are specially designed to provide high gas flow rates for manifold and trailer gas supply systems.

#### Benefits and Features

- Conforms to CGA E-4.
- All brass construction of both body and bonnet.
- Neoprene diaphragm.
- 2.5" dual-scale gauges (psi/kpa).
- One-piece 1/4" encapsulated seat design.
- 1/2" NPT inlet and outlet body ports.
- 1.00–11.5 NPS fittings; CGA 1340 (RH) or 1350 (LH).
- Tamper-proof, self-reseating internal high pressure safety valve.

#### Typical Performance



IGR-A35C

Table I, Manifold Model

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge	Inlet CGA	Outlet CGA
IGR-A35AA-1350	Acetylene	300	0–400	0–15	0–30	1350 Male	1350 Female
IGR-A35PA-1350	Propane	300	0–400	0–15	0–30	1350 Male	1350 Female
IGR-A35C-1340	Inerts	3000	0–4000	0–125	0–200	1340 Male	1340 Female
IGR-A35C-1350	Flammables	3000	0–4000	0–125	0–200	1350 Male	1350 Female
IGR-A35D-1340	Inerts	3000	0–4000	0–200	0–400	1340 Male	1340 Female
IGR-A35D-1350	Flammables	3000	0–4000	0–200	0–400	1350 Male	1350 Female

Table II, Trailer Model

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge	Inlet CGA	Outlet CGA
IGR-A35TC-1340	Inerts	3000	0–4000	0–125	0–200	1340 Female	1340 Male
IGR-A35TC-1350	Flammables	3000	0–4000	0–125	0–200	1350 Female	1350 Male
IGR-A35TD-1340	Inerts	3000	0–4000	0–200	0–400	1340 Female	1340 Male
IGR-A35TD-1350	Flammables	3000	0–4000	0–200	0–400	1350 Female	1350 Male

# Dome Loaded Regulators

## Straight-Line Pressure Control, Ultra-High Flow

### Model A85

Model A85 is a high pressure, ultra-high flow regulator system featuring servo-dome-load technology. This feature allows the regulator to supply ultra-high downstream flows while maintaining constant delivery pressure. Typical applications include laser-assist gases, pressure transfer, blanketing and high flow manifolds.

An ideal application is laser assist gas delivery either from vaporized cryogenic or high pressure supply. Here, the low pressure drop at high flow rates maximize throughput in a laser cutting or welding application. The flow versus pressure drop performance characteristic of the Model A85 can be viewed by the curve below.



IGR-A85E

### Benefits and Features

- Maximum inlet pressure is 3000 psig.
- Conforms to CGA E-4.
- Ergonomic knob for improved grip.
- 2.5" dual-scale gauges (psi/bar).
- 1/2" NPT inlet and outlet body ports.
- Tamper-proof, self-reseating internal high pressure safety valve.
- One-piece encapsulated seat design with 10-micron filtration.

### Typical Performance

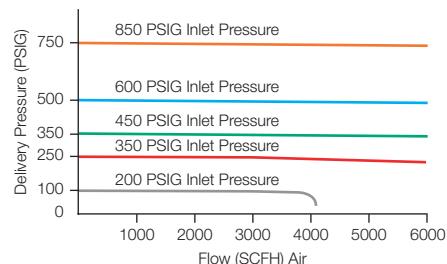


Table I

Part Number	Gas Service	Inlet Pressure (psig)		Delivery Pressure (psig)		Inlet	Outlet
		Max.	Gauge	Range	Gauge		
IGR-A85E	Inerts	3000	0–4000	0–600	0–200	1/2" NPT female	1/2" NPT female
IGR-A85F	Inerts	3000	0–4000	0–1000	0–2000	1/2" NPT female	1/2" NPT female

# Ultra-High Pressure Regulators

## Non-Relieving and Self Relieving

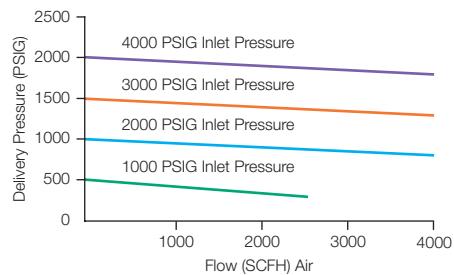
### Model A40

Model A40 regulators are designed to operate on high pressure cylinders up to 7500 psig. Inert and air models are self-relieving. Typical applications include high pressure testing, charging accumulators, and pressurizing aircraft struts.

#### Benefits and Features

- Conforms to CGA E-4.
- Several delivery pressures available.
- Ergonomic knob for improved grip.
- 2.5" dual-scale gauges (psi/bar).
- 1/4" NPT outlet port with stainless steel 1/4" tube fitting.
- One-piece encapsulated seat design with an internal filter and PTFE seat.
- Panel-mountable with optional panel nut (9100887).

#### Typical Performance



IGR-A40RHA

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge	Inlet CGA	Outlet Connection
IGR-A40RHA-677*	Inerts	7500	0–10,000	0–1500	0–3000	677*	1/4" Stn. Stl. compression
IGR-A40RHB-677*	Inerts	7500	0–10,000	0–3000	0–4000	677*	1/4" Stn. Stl. compression
IGR-A40RHC-677*	Inerts	7500	0–10,000	0–4500	0–6000	677*	1/4" Stn. Stl. compression
IGR-A40RHD-677*	Inerts	7500	0–10,000	0–6000	0–10,000	677*	1/4" Stn. Stl. compression
IGR-A40NMA-695	Hydrogen, Methane	5500	0–6000	0–1500	0–3000	695	1/4" Stn. Stl. compression
IGR-A40NMB-695	Hydrogen, Methane	5500	0–6000	0–3000	0–4000	695	1/4" Stn. Stl. compression
IGR-A40NMC-695	Hydrogen, Methane	5500	0–6000	0–4500	0–6000	695	1/4" Stn. Stl. compression

\* Models with CGA 677 inlet connections are self-relieving.

# Medium Duty Regulators

## General Purity, Two-Stage

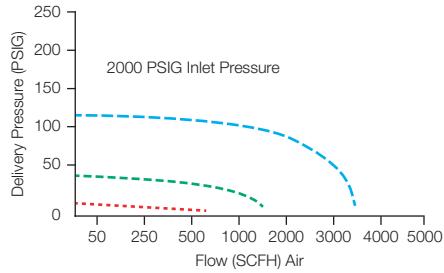
### Model A50

Model A50 regulators are recommended for applications where constant delivery pressure is required over a wide range of inlet pressures. This regulators set the standard for general purpose, laboratory, industrial and welding applications.

#### Benefits and Features

- Conforms to CGA E-4.
- Brass body and bonnets.
- 2.75" neoprene diaphragm.
- 2.5" dual-scale gauges (psi/kpa).
- Low pressure model (0–5 psig) uses neoprene seat.
- Tamper-proof, self-reseating internal high pressure safety valve.
- One-piece encapsulated seat design with an internal filter and PTFE seats.

#### Typical Performance



IGR-A50C

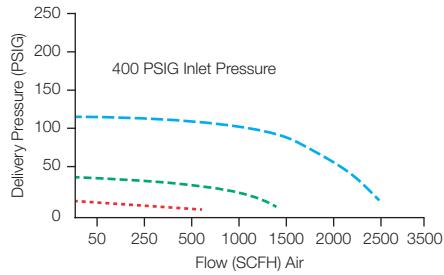


Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Inlet Pressure (psig) Gauge	Delivery Pressure (psig) Range	Delivery Pressure (psig) Gauge	Inlet CGA	Outlet Connection
IGR-A50AA-510	Acetylene	300	0–400	0–15	0–30	510	1/16"-18 LH
IGR-A50PA-510	Propane	300	0–400	0–15	0–30	510	1/16"-18 LH
IGR-A50PB-510	Propane	300	0–400	0–50	0–60	510	1/16"-18 LH
IGR-A50B-320	Carbon Dioxide	3000	0–4000	0–50	0–60	320	5/8"-18 RH Female
IGR-A50B-346	Air	3000	0–4000	0–50	0–60	346	1/16"-18 RH
IGR-A50B-350	Flammables	3000	0–4000	0–50	0–60	350	1/16"-18 LH
IGR-A50B-540	Oxygen	3000	0–4000	0–50	0–60	540	1/16"-18 RH
IGR-A50B-580	Inerts	3000	0–4000	0–50	0–60	580	5/8"-18 RH Female
IGR-A50B-590	Industrial Air	3000	0–4000	0–50	0–60	590	1/16"-18 RH
IGR-A50C-320	Carbon Dioxide	3000	0–4000	0–125	0–200	320	5/8"-18 RH Female
IGR-A50C-346	Air	3000	0–4000	0–125	0–200	346	1/16"-18 RH
IGR-A50C-350	Flammables	3000	0–4000	0–125	0–200	350	1/16"-18 LH
IGR-A50C-540	Oxygen	3000	0–4000	0–125	0–200	540	1/16"-18 RH
IGR-A50C-580	Inerts	3000	0–4000	0–125	0–200	580	5/8"-18 RH Female
IGR-A50C-590	Industrial Air	3000	0–4000	0–125	0–200	590	1/16"-18 RH

# Manifold Regulators

## High Flow, General Purity, Two-Stage

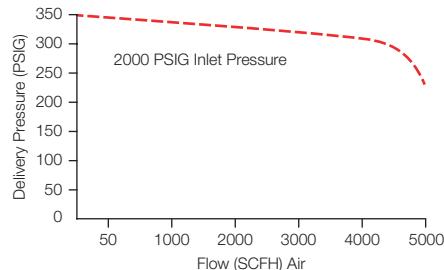
### Model A55

Capable of flow rates up to 3000 scfh, these high flow regulators provide constant delivery pressure over a wide range of inlet pressures for cylinders and manifold systems.

#### Benefits and Features

- Conforms to CGA E-4.
- Brass body and bonnets.
- 2.75" neoprene diaphragm.
- 2.5" dual-scale gauges (psi/kpa).
- $\frac{3}{8}$ " NPT outlet port, 180° from inlet with  $\frac{1}{4}$ " male hex nipple installed.
- Tamper-proof, self-reseating internal high pressure safety valve.
- One-piece encapsulated seat design with an internal filter and PTFE seats.

#### Typical Performance



IGR-A55E

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.      Gauge		Delivery Pressure (psig) Range      Gauge		Inlet CGA	Outlet
IGR-A55E-350	Flammables	3000	0–4000	0–350	0–600	350	$\frac{1}{4}$ " NPT male
IGR-A55E-540	Oxygen	3000	0–4000	0–350	0–600	540	$\frac{1}{4}$ " NPT male
IGR-A55E-580	Inerts	3000	0–4000	0–350	0–600	580	$\frac{1}{4}$ " NPT male

# Shielding Gas Regulators

## Adjustable Flow with Flow Gauge, Single-Stage

### Model A60

These compact regulators accurately control and measure shielding gas flows up to 60 scfh.

#### Benefits and Features

- Maximum inlet pressure is 3000 psig.
- Conforms to CGA E-4 and UL Listed.
- Lightweight, rugged design.
- 2" dual-scale inlet gauge (psi/kpa).
- 2" dual-scale (argon/carbon dioxide) scfh outlet gauge.
- One-piece encapsulated seat design with an internal filter and a PTFE seat.

#### Optional Equipment

##### Model IGA-IH10

- A single line hose for use with argon/carbon dioxide shielding gases.
- 10' of  $\frac{3}{16}$ " hose with  $\frac{5}{8}$ "-18 RH Male swivel end connections.
- Other lengths may be available. Contact your ASGE representative.



IGR-A6060

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (scfh) Range	Gauge	Inlet CGA	Outlet Connection
IGR-A6060-320	Carbon Dioxide	3000	0-4000	0-60*	0-60	320	$\frac{5}{8}$ "-18 RH Female
IGR-A6060-580	Argon	3000	0-4000	0-60	0-60	580	$\frac{5}{8}$ "-18 RH Female

\* On maximum continuous duty cycle, CO<sub>2</sub> flow to 20 scfh.

# Shielding Gas Regulators

## Adjustable Flow with Flowmeter, Single-Stage

### Model A65

The construction of Model A65 incorporates a regulator and flowmeter into one compact unit. It accurately controls and measures shielding gas flows to 70 scfh.

#### Benefits and Features

- Maximum inlet pressure is 3000 psig.
- Regulator is preset at 20 psig.
- Conforms to CGA E-4 and UL Listed.
- Flow tube and float are easily changed for different gases.
- Durable, easy-to-read flow tube and protective cover.
- Dual-calibration on argon/carbon dioxide flow tube.
- 2" dual-scale inlet gauge (psi/kpa).
- Sensitive needle valve for fingertip control.
- One-piece encapsulated seat design with an internal filter and a PTFE seat.

#### Optional Equipment

##### Model IGA-IH10

- A single line hose for use with argon/carbon dioxide shielding gases.
- 10' of  $\frac{5}{16}$ " hose with  $\frac{5}{8}$ "-18 RH Male swivel end connections.
- Other lengths may be available. Contact your ASGE representative.



IGR-A6570



IGA-IH10

Table I

Part Number	Gas Service	Inlet Pressure (psig)		Delivery Pressure (scfh)	Inlet CGA	Outlet Connection
		Max.	Gauge	Range		
IGR-A6570-320	Carbon Dioxide (Argon)	3000	0-4000	0-70*	320	$\frac{5}{8}$ "-18 RH Female
IGR-A6570-580	Argon (Carbon Dioxide)	3000	0-4000	0-70	580	$\frac{5}{8}$ "-18 RH Female

\* On maximum continuous duty cycle, CO<sub>2</sub> flow to 20 scfh.

# Carbon Dioxide Vaporizing Regulator

## Ambient Vaporizer with Flowmeter, Two-Stage

### Model A32

Carbon dioxide frequently causes ordinary regulators to freeze. The Model A32 regulator is designed to handle gas phase withdrawal of carbon dioxide from non-siphoned tube cylinders at flow rates up to 100 scfh at 70°F (21°C) without freeze-up or the need for electrical connections.

#### Benefits and Features

- Maximum inlet pressure is 3000 psig.
- Regulator is preset dynamically at 50 psig.
- Conforms to CGA E-4.
- Multi-finned aluminum black body design provides high rate of heat transfer into the regulator.
- Two-stage design spreads out the cooling effect of carbon dioxide pressure reduction.
- 2.5" dual-scale gauge (psi/kpa).
- Sensitive needle valve permits highly accurate flow settings.
- Durable, easy-to-read flow tube and protective cover.
- One-piece encapsulated seat design with an internal filter and PTFE seats.



IGR-A32100

Table I

Part Number	Gas Service	Inlet Pressure (psig)		Delivery Pressure (scfh)	Inlet CGA	Outlet Connection
		Max.	Gauge	Range		
IGR-A32100-320	Carbon Dioxide	3000	0–4000	0–100 (50 psig)	320	5/8"-18 RH Female

# Station Drop Regulators

## Economical, Back-Ported Inlet

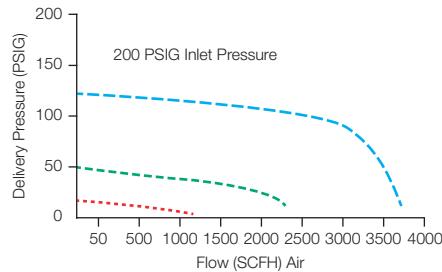
### Model A70

Model A70 regulators provide pressure control from gas distribution systems and are commonly used with Model SD station drops because of compatible mating connections. They are recommended for use with welding gas stations.

#### Benefits and Features

- Maximum inlet pressure is 200 psig.
- Conforms to CGA E-4.
- Chrome-plated bonnet with forged-brass body.
- Back entry inlet port.
- 2" dual-scale gauge (psi/kpa).
- Economically priced.
- One-piece encapsulated seat design with 10-micron filter prevents contamination.

#### Typical Performance



IGR-A70IC

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Delivery Pressure (psig) Range      Gauge		Inlet	Outlet
IGR-A70AA	Acetylene	200	0–15	0–30	7/8"-14 LH Female	5/16"-18 LH
IGR-A70AIB	Air	200	0–50	0–60	5/16"-18 RH Female	5/16"-18 RH
IGR-A70OB	Oxygen	200	0–50	0–60	7/8"-14 RH Female	5/16"-18 RH
IGR-A70PB	Fuel Gases	200	0–50	0–60	7/8"-14 LH Female	5/16"-18 LH
IGR-A70IB	Inerts	200	0–50	0–60	5/8"-18 RH Male	5/8"-18 RH Female
IGR-A70AIC	Air	200	0–125	0–200	5/16"-18 RH Female	5/16"-18 RH
IGR-A70OC	Oxygen	200	0–125	0–200	7/8"-14 RH Female	5/16"-18 RH
IGR-A70IC	Inerts	200	0–125	0–200	5/8"-18 RH Male	5/8"-18 RH Female

# Pipeline Regulators

## Economical, Back-Ported Inlet

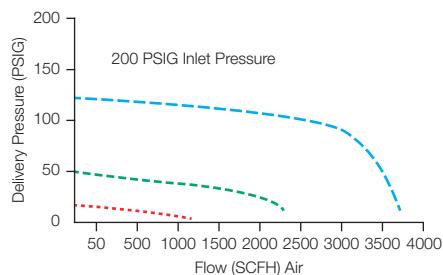
### Model A75

Model A75 regulators provide pressure control of high gas flows from gas distribution systems and are recommended for use with all types of welding gases.

#### Benefits and Features

- Maximum inlet pressure is 400 psig.
- Conforms to CGA E-4.
- Chrome-plated bonnet with forged-brass body.
- 1/4" NPT female back entry inlet port.
- 2" dual-scale gauge (psi/kpa).
- Economically priced.
- One-piece encapsulated seat design with 10-micron filter prevents contamination.

#### Typical Performance



IGR-A75OC

Table I

Part Number	Gas Service	Inlet Pressure (psig) Max.	Delivery Pressure (psig) Range	Gauge	Inlet	Outlet
IGR-A75AA	Acetylene	400	0–15	0–30	1/4" NPT female	5/16"–18 LH
IGR-A75OB	Oxygen	400	0–50	0–60	1/4" NPT female	5/16"–18 RH
IGR-A75PB	Fuel Gases	400	0–50	0–60	1/4" NPT female	5/16"–18 LH
IGR-A75IB	Air, Inerts	400	0–50	0–60	1/4" NPT female	5/8"–18 RH Female
IGR-A75OC	Oxygen	400	0–125	0–200	1/4" NPT female	5/16"–18 RH
IGR-A75IC	Air, Inerts	400	0–125	0–200	1/4" NPT female	5/8"–18 RH Female
IGR-A75I20P	Air, Inerts	400	20*	N/A	1/4" NPT female	5/8"–18 RH Female

\* IGR-A75I20P is preset at 20 psig and has no gauge. It is commonly used with our Model A10 flowmeters.

# High Flow Pipeline Regulators

## Stainless Steel Diaphragm, Single and Two Gauge

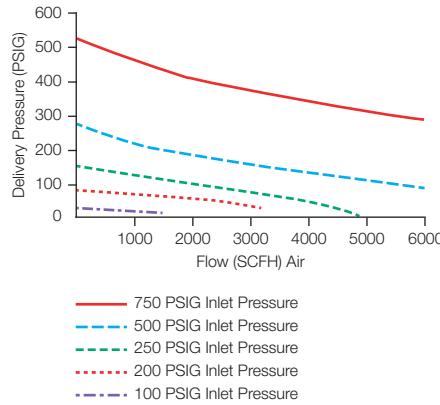
### Models A90 and A95

These in-line regulators provide high gas flows for pipelines and other applications up to 3000 psig inlet pressure. They are specifically designed for noncorrosive, high purity bulk applications requiring both high flow and diffusion resistance. The high delivery pressure ranges of 250 psig and 500 psig are ideal for special laser cutting applications.

#### Benefits and Features

- Maximum inlet pressure is 3000 psig.
- Brass bar stock body and bonnets.
- 2.75" stainless steel diaphragm.
- 2.5" dual-scale delivery pressure gauge (psi/bar).
- One-piece encapsulated seat design with an internal filter and PTFE seat.
- Self-seating safety relief valve.
- Regulator flow coefficient: Cv = 0.55.

#### Typical Performance



IGR-A95D



IGR-A90D

Table I, Single (Outlet) Gauge Model

Part Number	Gas Service	Inlet Pressure (psig) Max.	Delivery Pressure (psig) Range Gauge		Inlet	Outlet
IGR-A95B	Oxygen, Inerts, Fuels*	3000	0–50	0–60	1/2" NPT female	1/2" NPT female
IGR-A95C	Oxygen, Inerts, Fuels*	3000	0–125	0–200	1/2" NPT female	1/2" NPT female
IGR-A95D	Oxygen, Inerts, Fuels*	3000	0–250	0–300	1/2" NPT female	1/2" NPT female
IGR-A95E	Oxygen, Inerts, Fuels*	3000	0–500	0–600	1/2" NPT female	1/2" NPT female

\* Please note: Not for use with acetylene.

Table II, Two Gauge Model

Part Number	Gas Service	Inlet Pressure (psig) Max.	Gauge	Delivery Pressure (psig) Range	Gauge	Inlet	Outlet
IGR-A90B	Oxygen, Inerts, Fuels*	3000	0–4000	0–50	0–60	1/2" NPT female	1/2" NPT female
IGR-A90C	Oxygen, Inerts, Fuels*	3000	0–4000	0–125	0–200	1/2" NPT female	1/2" NPT female
IGR-A90D	Oxygen, Inerts, Fuels*	3000	0–4000	0–250	0–300	1/2" NPT female	1/2" NPT female
IGR-A90E	Oxygen, Inerts, Fuels*	3000	0–4000	0–500	0–600	1/2" NPT female	1/2" NPT female

\* Please note: Not for use with acetylene.

# Safety Mounting Brackets

## Single, Dual and Low Level Alarm

### RM Series

Regulator Safety Mounting Brackets help organize work areas, improve safety and ensure gas purity by eliminating the installment of a regulator directly onto a gas cylinder valve. The fixed mounting of a cylinder regulator to an Advanced RM Series Mounting Bracket eliminates potential hazards incurred with regulator and cylinder during change-outs while allowing fast and easy cylinder replacement.

The RM Series is available as a single or dual cylinder wall-mount configuration to provide versatility to meet any application requirement. Both configurations are furnished with CGA outlets suitable for direct mounting of a single or two-stage regulator (sold separately) with matching inlet CGA connection. Two diaphragm seal inlet isolation valves are provided standard with dual-cylinder wall mount models. The RMA version includes the addition of an audible and visual low level alarm to alert the user of product depletion. The alarm assembly utilizes a built-in, easily adjustable pressure switch gauge, wall mountable annunciator, 3 foot long interconnecting cable with quick connections and a 120 VAC wall transformer for use with nonflammable gases.

**Warning:** Do not use the RMA option with flammable gases. We strongly recommend the use of an explosion-proof switch (such as Models SG6541 or SG6549) and wiring system.

Note: Regulators are not included with RM Series.

### Standard Features

- Fixed Mounting eliminates recurring leaks, ensures proper regulator alignment and prevents damage to regulator.
- Bracket Dimensions allow for installment of single or two-stage regulators.
- Spare Access Port in Block provides versatility to install options such as pressure switches, valves or additional pigtails.

### Optional Features

- RMA Version includes an audible and visual alarm to alert of product depletion.
- Double Braided (all-metal) Stainless Steel Flexible Hose maintains gas purity and provides ease of connecting cylinder.
- PTFE-lined Stainless Steel Flexible Hose provides convenience while reducing cost (not recommended for high purity applications).
- Check Valve prevents discharge of gas from regulator and pigtail during cylinder change-out.
- Purge and Vent Assemblies enhance system purity and operator safety.

### Specifications

Maximum Inlet Pressure: 3000 psig

Valve (Dual Cyl. only): SG5460N and SG5480N Series (page 180)

Inlet Connection: CGA Connection as Specified

Outlet Connection: CGA Connection as Specified, (suitable for direct mounting of a pressure regulator with inlet CGA)

Plugged Access Port: 1/4" NPT female (on RM block) – not available on RMA version

Rigid Pigtail: 36" long, 0.25" OD tubing with 5" ID service loop, providing a 23" useable length

Flexible Hose (PTFE-lined): 36" long, 0.25" nominal ID, 0.375" nominal OD

Flexible Hose (all-metal): 30" long, 0.285" nominal ID, 0.445" nominal OD

Weight (approx.):

RMW-X-1: 3 lbs

RMW-X-2: 5 lbs

### Specifications (RMA Version)

Annunciator: Model SG6551A (see page 141)

Input Cable Length: 3'

Pressure Switch Gauge:

Dial Size: 2 1/2" nominal

Pressure Range: 0–3000 psig

Adjustable Setpoint: between 60 psig and 2700 psig

Temperature Range: -22°F to 165°F

Accuracy: ±2% full scale

Connection: 1/4 NPT male bottom

Maximum Power Rating: 10 watts DC, 10 volts AC

Max. Switching Current: 0.5 amps AC/DC noninductive

Switch Function: Normally Open (bypassing the switch pointer on decreasing pressure)



Wall Mount: Single Cylinder  
(Regulator Sold Separately)

### Materials of Construction

**Block and CGA Fittings:**

Brass Assemblies: Brass  
Stainless Steel Assemblies Type 316 SS

**Bracket:** 12-Gauge Hot Rolled Steel with Powder Coat Epoxy Finish

**Pigtails:**

Rigid: Brass with brass assemblies,  
Type 316L SS with Stn. Stl. assemblies

Flexible Hose (PTFE-lined): Extruded PTFE inner core with Type 304 SS single overbraid and Type 316 SS end fittings

Flexible Hose (all-metal): Type 316L SS inner core with Type 321 SS double overbraid and Type 316 SS end fittings

**Seats:**

Check Valves:  
EPDM with Brass systems  
Viton® with Stainless Steel systems  
Valves: PCTFE

**Pressure Switch Gauge:**

Brass Assemblies: Brass / bronze wetted parts, Type 304 SS case and ring, laminated safety glass lens

Stainless Steel Assemblies: Type 316 SS wetted parts, Type 304 SS case and ring, laminated safety glass lens

**Annunciator:** Model SG6551A (see page 141)

## Ordering Information

To order a regulator safety mounting bracket, complete the part number using the "Part Number Key" below. For example, to order a single cylinder wall-mount in brass, with rigid pigtails, check valve and a CGA 580 connection, the part number would be RMW-B1-CV-580.

Regulator Safety Mounting Bracket Assemblies for acetylene service require flashback arrestors (SG6545). All assemblies ordered with CGA 510 will be billed and shipped with optional flashback arrestors installed on each pigtail, unless the order specifies with which gas it will be used.

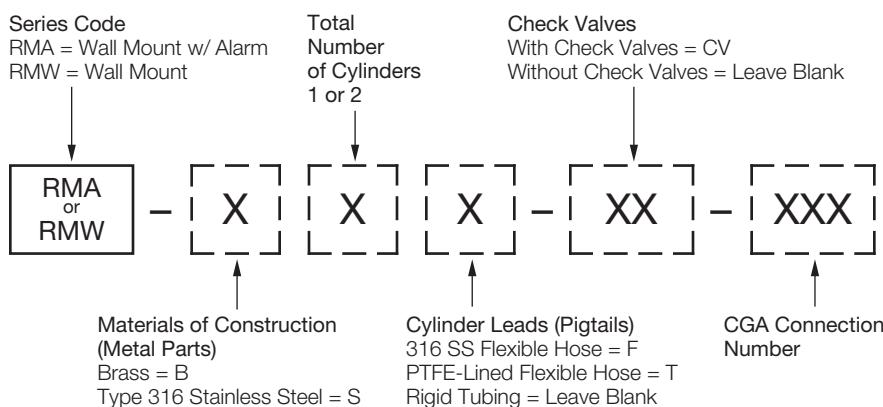
Advanced recommends the use of an optional purge and vent assembly without the check valve option when using toxic and/or corrosive gases. Advanced does not recommend the use of PTFE-lined stainless steel flexible hoses in bracket assemblies designed for oxygen service and will not provide such assemblies when ordered with CGA 540 connections.

Advanced does not recommend the use of PTFE-lined, stainless steel flexible hoses with hydrogen or helium and with high purity applications. Although these gases are compatible with the materials of construction, experience shows that permeation through the PTFE core can occur. Advanced does not recommend the use of RMA Series with flammable gases and will not provide such assemblies with flammable gas CGA (350, 330, 510) connections.



Alarmed Wall Mount: Single Cylinder  
(Regulator Sold Separately)

## Part Number Key for RM Series Mounting Brackets



Wall Mount: Dual Cylinder

## Optional Equipment and Replacement Parts

Equipment and Replacement Parts	Part No.	Page No.
Vent Valve (Installed in Access Port) Brass Valve Stainless Steel Valve	SG6684 SG6685	180
Purge Gas Inlet Valve (Installed in Access Port) Brass Valve Stainless Steel Valve	SG6690 SG6691	180
Isolation Valve (Installed Between Pigtail and Block on One Cylinder Units) Brass System with Rigid Type Pigtail Brass System with Type 316 SS Flexible or PTFE-lined Type Hose Stainless Steel System with Rigid Type Pigtail Stainless Steel System with Type 316 SS Flexible or PTFE-lined Type Hose	SG6686 SG6687 SG6688 SG6689	180
Purge & Vent Assembly with Check Valve (Installed in Access Port) Brass Assembly Stainless Steel Assembly	SG6682 SG6683	
Flashback Arrestor for Acetylene Service—One per Cylinder Installed between CGA and Pigtail on Brass Systems	SG6545	144

# Single Station Manifold

## Wall, Strut Mountable

### Model SSM

Single Station Manifolds provide a safe, cost-effective means of connecting and changing out cylinders by eliminating the need to repeatedly handle the regulator during cylinder change-out.

The Model SSM is available as a single or dual cylinder configuration to provide versatility to meet any application requirement. Both configurations are furnished in either brass or stainless steel construction, with CGA outlets suitable for direct mounting of a single or two-stage regulator (sold separately) and matching inlet CGA connection with check valve installed on a flexible stainless steel pigtail. Two diaphragm seal inlet isolation valves are provided standard with the dual-cylinder option.

Note: Regulators are not included with Model SSM.

### Standard Features

- Fixed Mounting eliminates recurring leaks, ensures proper regulator alignment and prevents damage to regulator.
- Bracket Dimensions allow for installment of single or two-stage regulators
- Check Valves prevent discharge of gas from manifold and pigtailed when changing cylinders.
- Two diaphragm seal inlet isolation valves are included with the dual-cylinder configuration.

### Specifications

**Maximum Inlet Pressure:** 3000 psig

**Valve (Dual Cyl. only):** SG5460N and SG5480N Series (page 180)

**Inlet Connection:** CGA Connection as specified

**Outlet Connection:** CGA Connection as Specified, (suitable for direct mounting of a pressure regulator with inlet CGA)

**Flexible Hose (all-metal):** 24" long, 0.285" nominal ID, 0.445" nominal OD

**Bracket Dimensions:** 2" x 4" x 9"

**Weight (approx.):**

SSM-X1: 4 lbs

SSM-X2: 6 lbs

### Materials of Construction

**Bracket:** Rigid flat stock with Type 316 SS 1/4" NPT male coupling

**Pigtails:** Flexible Hose (all-metal), Type 316L SS inner core with Type 321 SS double overbraid and Type 316 SS end fittings

**CGA Fittings:**

Brass Assemblies: Brass  
Stainless Steel Assemblies Type 316 SS

**Seats:**

Check Valves:  
EPDM with brass systems  
Viton® with stainless steel systems  
Isolation Valves: PCTFE



Single Cylinder Configuration  
(Regulator Sold Separately)

Table I

Part Number		Configuration
Brass	Stainless Steel	
SSM-B1-CV-(CGA)	SSM-S1-CV-(CGA)	Single Cylinder
SSM-B2-CV-(CGA)	SSM-S2-CV-(CGA)	Double Cylinder

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SSM-B1-CV-580. Order by complete part number.

# Point-of-Use Gas Delivery

## Selectable Size, Front Panel Mounted Regulators

### P Series

The P Series Panels are designed to provide a practical and economical means to control gas pressure and flow at the "point-of-use" in a process or laboratory application. The panels utilize the AGR3800 and AGR3810 Series ultra-high purity regulators that feature a back entry inlet port and rear threaded mounting holes. The back port design allows for front panel mounting of the regulator while concealing the inlet piping behind the panel.

The panels are custom configured to meet the user's installation and operating requirements. They are available in one, two, three or four regulator configurations with adjustable pressure range, inlet and outlet connection options. Panels are labeled for each gas with the appropriate NFPA "hazard diamond", CAS registry number, UN and DOT classifications. The panels have a durable construction and finish with predrilled holes for convenient inlet piping installation

### Specifications

Maximum Inlet Pressure: 3000 psig

Delivery Pressure Range:

See Part Number Key

Delivery Pressure Gauge (dual scale):

30 psig range: 0–60 psig / 0–4 bar

100 psig range: 0–200 psig / 0–14 bar

300 psig range: 0–400 psig / 0–27 bar

500 psig range: 0–600 psig / 0–41 bar

Gauge Size: 2" Dial

Operating Temperature Range:

-40°F to 140°F

Flow Coefficient:

Regulator: Cv = 0.06

Diaphragm Valve: Cv = 0.17

Needle Valve: Cv = 0.4

Regulator Filter: 10 micron

Inlet and Outlet Connections:

See Part Number Key

Panel:

Color: Light Gray

Paint: Polyurethane Enamel

Finish: Light Textured

Dimensions:

1-reg. panel: 12" x 6" x 4"

2-reg. panel: 12" x 12" x 4"

3-reg. panel: 12" x 18" x 4"

4-reg. panel: 12" x 24" x 4"

Weight (approx.):

1-reg. panel: 6 lbs

2-reg. panel: 12 lbs

3-reg. panel: 18 lbs

4-reg. panel: 24 lbs



P-B3BBBB0016

### Materials of Construction

Regulator:

Body: Brass or Type 316 SS Bar Stock

Gauges: Brass or Type 316 SS

Bonnet: Brass or 300 Series Stn. Stl.

Other Metal Parts Exposed to Gas:

Brass or Type 316 SS

Seat: PCTFE

Diaphragm: Type 316 SS

Seals: PTFE

Panel: 14-Gauge Steel

### Part Number Key

Series	Metal Parts	No. of Regulators	Pressure Range Each (left to right)	Inlet Connection	Outlet Connection	Outlet Valve	Outlet Location
P-	<b>B</b> Brass <b>S</b> 316 SS	1 One	A 30 psig (2 bar)	0 1/4" NPTF Port	0 1/4" NPTF Port	0 None	3 3 o'clock
		2 Two	B 100 psig (7 bar)	1 1/4" Compression	1 1/4" Compression	1 Diaphragm	6 6 o'clock
		3 Three	C 300 psig (20 bar)	2 1/8" Compression	2 1/8" Compression	2 Needle	9 9 o'clock
		4 Four	D 500 psig (34 bar)	3 SS Flexible Hose (30" x 1/4" NPTF)			

Note: When ordering, specify labeling of gas panel (left to right). For example, helium-hydrogen-carbon dioxide-argon.

### Ordering Information

The P Series part numbering system allows you to design a point-of-use panel to meet the needs of any application. To create a part number, use the codes listed in each column of the Part Number Key shown above.

For example, to order a 4-regulator panel, brass regulators (two with 30 psig, two with 100 psig delivery), 1/4" compression inlet and outlets with diaphragm valves located at 6:00 port location, the part number would be P-B4AABB1116. Order by complete part number.

### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves Brass (each) Stainless Steel (each)	RV5572i-(psig) RV5574i-(psig)	186

# Point-of-Use Lab Gas Systems

## Modular, Regulator, Purifier, Valve Panels

### LGP Series

The LGP Series modular snap-in panels function as building blocks that allow customization of your gas distribution system. A user selected system consists of any combination of regulators, purifiers or outlets to meet specific laboratory requirements. System components are selected, built and cleaned to maintain the highest level of purity for all gases utilized. The modular design consisting of individual panel sections snapped into place on a tube chase, allows for wall or benchtop installation. This provides unlimited flexibility while reducing overall component installation costs.

Panels are completely assembled and tested prior to shipment saving installation time and money. Each gas is labeled with the appropriate NFPA "hazard diamond", CAS registry number, UN and DOT classifications. The panels have a durable construction and finish with predrilled holes for convenient component assembly.



3-Section System



**Regulator Section** – consists of a ultra-high purity pressure regulator, gauge, and optional purifier by-pass valve. High purity, all-stainless steel flexible tubing allows for easy panel access for future upgrades or modifications.



**Purifier Section** – provides additional protection against contaminants. Oxygen, moisture, and hydrocarbon purification (AFS) systems are available.



**Outlet Section** – accommodates up to 4 outlets for same or multiple gases.



Regulator panel attached to 3-Section tube chase

### Features

All panels are pre-drilled to accommodate a variety of configurations. Laminate overlay is installed over pre-drilled holes to provide a quality appearance and easy access to ports for future expansion. Components are provided in both stainless steel and brass materials of construction.

### Tube Chase

- Panels are mounted on a prefabricated metal tube which functions as the backbone of the LGP system.
- Accommodates quick connect fasteners on all panels.
- Provides a permanent location for inlet gas connections.
- Inlet connections can be installed on any four sides of the tube chase.
- Provides a stable mounting surface for all installations.

### Benefits

- Installation costs are greatly reduced due to snap fit design and pre-assembled modules.
- Budget preparation and laboratory planning are made easy due to modular/building block design. Future expansions can be planned in advance for budgetary purposes.
- System allows for upgrades or modifications in a staged fashion.

### Specifications

#### Panel:

Material: 14-Gauge Steel  
Color: Light Gray  
Paint: Polyurethane Enamel  
Finish: Light Textured

Dimensions\*: 13.5" W x 17.25" H x 6" D

\* Actual width will vary according to the number of modules. Each module has a width of 4.5".

## Part Number Key – Regulator Panel Section

Regulator Section	Metal Parts	Gas Code	Number of Outlets	Outlet Pressure Gauge	Options*
P1-	B Brass/Copper S Stainless Steel	A Acetylene C Corrosive N Noncorrosive	1 One 2 Two	1 Acetylene 2 0–60 psig/bar 3 0–100 psig/bar 4 0–160 psig/bar 5 0–200 psig/bar 6 0–400 psig/bar	1 Purifier Bypass** 2 1/8" Outlet 3 Bottom Outlet 4 Top Outlet 5 No Valve

\* Standard outlet is 1/4" and located in front of panel

\*\* Must be used with a Purifier Section P2-XNX1

## Part Number Key – Purifier Panel Section

Purifier Section	Metal Parts	Gas Code	AFS Purifier System	Options*
P2-	B Brass/Copper S Stainless Steel	N Noncorrosive	AFS-1 Oxygen, Moisture, Hydrocarbon AFS-2 Moisture, Hydrocarbon AFS-3 Moisture	1 Purifier Bypass CV** 2 1/8" Outlet 3 Bottom Outlet 4 Top Outlet

\* Standard outlet is 1/4" and located in front of panel

\*\* Must be used with a Regulator Section with purifier bypass P1-XX1X1

## Part Number Key – Outlet Panel Section

Outlet Section	Metal Parts	Gas Code	Number of Outlets	Options*
P3-	B Brass/Copper S Stainless Steel	S Same Gas D Different Gas	1 One 2 Two 3 Three 4 Four	1 1/8" Outlet 2 Bottom Outlet (3 max) 3 Top Outlet (3 max)

\* Standard outlet is 1/4" and located in front of panel

## Ordering Information

The LGP Series part numbering system allows you to specify lab gas panel sections to meet the needs of any application. To create a part number, use the codes listed in the Part Number Key columns for the appropriate panel section(s) shown above.

For example, to select a regulator panel section, stainless steel construction for non-corrosive gas service, one outlet with purifier bypass, 0–100 psig gauge and 1/4" front outlet, the part number would be P1-SN131.

To select a purifier panel section, stainless steel construction for noncorrosive gas service, AFS-1 purifier system, bypass check valve and 1/8" front outlet, the part number would be P2-SNAFS-112.

To select an outlet valve panel section, stainless steel construction, three shut-off valves and 1/4" front outlets for the same gas, the part number would be P3-SS3.

Note: The part numbers above are to be used in specifying the panel sections. A tube chase is required with the panel section(s) to complete the assembly. After the panel section selections are forwarded to your Advanced representative, a final part number and quotation will be provided to you.



3-Section with regulator panel detached from tube chase.

# Process Panels

## Manual, Critical Purity, Cylinder Gas Control

### VP2 Series

ASGE process panels are manual, high pressure gas distribution systems designed to facilitate safe handling and control of inert, flammable, corrosive, toxic and reactive gases. VP2 Series gas delivery panels are ideal for gases used in laboratory or process control where a high level of purity must be maintained. Each panel can be mounted in a stand-alone configuration or in a gas cylinder cabinet which provides the extra safety of hazardous gas containment.

Panel components are selected, built and cleaned to maintain the highest level of purity for all gases utilized. The VP2 Series incorporates orbital welded joints that minimize the number of connections to ensure ultra-high purity and allow for easy and quick purging. Other components are installed using face seal and pipe thread connections making servicing simple and cost effective. All panels are completely assembled and tested prior to shipment saving installation time and money. The stainless steel back-plate has predrilled mounting holes and is labeled with valve identifiers to aid in the operation of the controls. Three standard panel configurations that can accommodate either single-stage or two-stage regulators are available to provide versatility to fit most any application requirements.

### Standard Features

- Available with single or two-stage model regulators to fit most application requirements.
- Available with tied diaphragm regulators designed to provide positive shut-off and resist attack from strong acid-forming gases.
- Bar stock body regulators with all metal-to-metal diaphragm to body seal (without back-up o-ring) design provides low internal volume and assures maximum diffusion resistance.
- $\frac{1}{4}$  Turn metal diaphragm seal valves never require packing adjustments and have lever-type color coded handles that serve as a visual aid in process control.
- Panels are designed to meet  $<2 \times 10^{-8}$  atm cc/sec helium external leak rate.

### Specifications

#### Maximum Inlet Pressure:

See Part Number Key

#### Delivery Pressure Range:

See Part Number Key

#### Delivery Pressure Gauge:

30 psig range:

-30" Hg-0-60 psig / -1-0-4 bar

75 psig range:

-30" Hg-0-100 psig / -1-0-7 bar

150 psig range:

30" Hg-0-200 psig / -1-0-14 bar

300 psig range: 0-400 psig / 0-27 bar

500 psig range: 0-600 psig / 0-34 bar

#### Gauge Size: 2" Dial

#### Operating Temp. Range: -40°F to 140°F

#### Flow Coefficient:

Regulators:

Single-stage: Cv = 0.06

Two-stage: Cv = 0.05

Diaphragm Valves: Cv = 0.17

#### Inlet Connection: Specify CGA

#### Outlet Connections: $\frac{1}{4}$ " compression

Pigtails:  $\frac{1}{4}$ " OD X .035" wall, 36" OAL

Panel Dimensions: 11" x 11" x 0.120"



VP2-5

### Materials of Construction

Regulator and Valves: Type 316 SS Bar Stock

Gauges: Type 316 SS

Regulator Bonnet: 300 Series Stainless Steel

Other Metal Parts Exposed to Gas:  
Type 316 SS

Seats: PCTFE

Diaphragms: Type 316 SS

Seals: PTFE and Viton®

Pigtails: Type 316L Stainless Steel

Brackets and Clamps: Stainless Steel

Panel: Brushed Type 304 SS

### Ordering Information

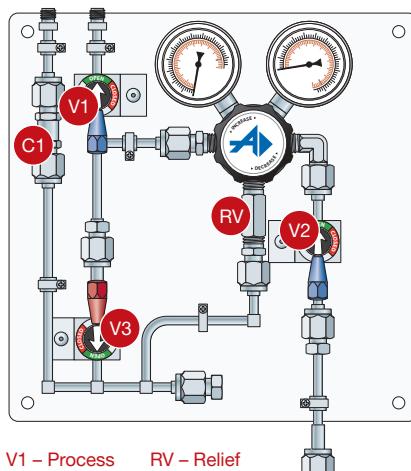
To order a VP2 Series Process Panel, complete the part number using the Part Number Key on next page. For example, to order a 5 valve panel with a single-stage, standard diaphragm regulator having a 3000 psig maximum inlet pressure, 75 psig maximum outlet range, with a CGA 330 connection, the part number would be VP2-5S12-75X-330. Order by complete part number.

Note: Available options include: e-stop, air operated and excess flow shut-off valves.

### Three Valve Panel – Model VP2-3

This panel is designed for gas processes that require purge capability using the service gas.

The three valve panel features a pressure regulator, on/off process valve (V1), high pressure inlet isolation valve (V2), low pressure vent valve (V3) and a pipe away relief valve (RV) providing regulator protection from excess pressure. The vent valve is connected to a pipe away vent line protected from backflow by a check valve (C1). The vent valve is protected from backflow with an integrated orbital welded check valve should the vent valve be inadvertently left open. The vent valve allows for purging of contaminants that may be introduced during cylinder change-out. The three valves can provide for total isolation of the pressure regulator.

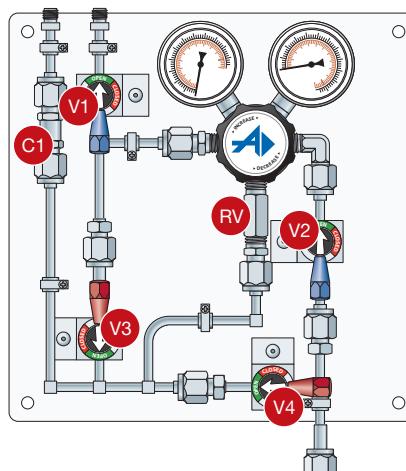


V1 – Process  
V2 – Isolation  
V3 – LP Vent  
V4 – HP Vent  
V5 – Purge

### Four Valve Panel – Model VP2-4

This panel is designed for use with gas processes that require the extra purity obtained with high pressure purging.

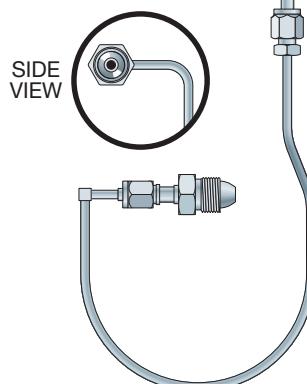
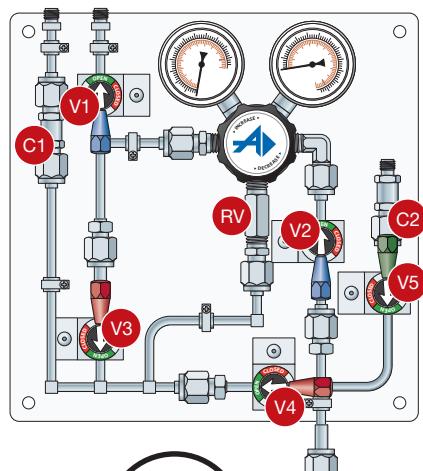
In addition to including the same components as the three valve panel, a high pressure vent valve (V4) is added to this panel. This feature utilizes the high pressure process gas to enhance purging after cylinder change-out.



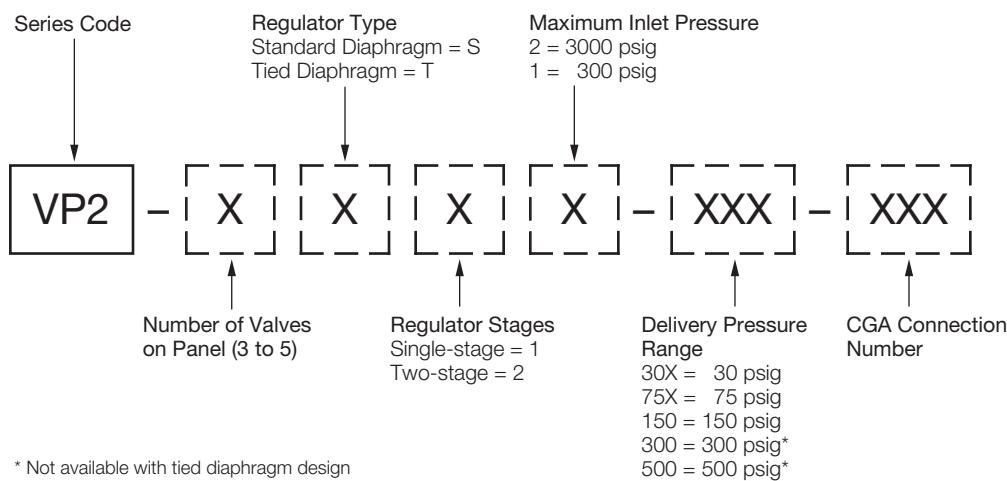
### Five Valve Panel – Model VP2-5

This panel is recommended when using toxic, corrosive and flammable gases.

The five valve panel has the same components as the four valve panel with the addition of a purge valve (V5) which connects to a regulated purge gas source. This allows the operator to flush the system with the purge gas to remove atmospheric contamination prior to start-up, before disconnecting an empty cylinder and after a cylinder change. A check valve (C2) prevents backflow of gas into the purge line should the purge valve be inadvertently left open.



### Part Number Key for VP2 Series Panels



# Brass Manifolds

## Single and Double Row, Modular, Ultra-High Purity

### BSR, BTR Series

Manifolds are used to connect two or more cylinders together for greater online storage capacity or higher flow rates. These brass constructed manifolds are available in either single or double (two) row configuration. The modular construction allows field installation of additional stations without welding or soldering. They are provided with ultra-high purity (pack-less) diaphragm seal station valves, 3 foot pigtailed (stainless steel flexible pigtail option) and mounting brackets as standard components. Single row manifolds are designed for wall mounting and double row are designed for pedestal mounting. Pigtailed are positioned 10" apart. The BSR Series is designed for "right side" cylinder orientation, where the gas flows from right to left through the manifold header. "Left side" set-up is available upon request.

The BSR and BTR Series manifolds are manufactured to meet the requirements of the ASME B31.3 Process Piping Code. The brass manifolds are constructed of  $\frac{7}{8}$  inch OD, 0.200 wall CDA-330 brass seamless tubing, NPT threaded and silver braze assembled. ASGE's enhanced manifold header design exceeds industry standards by providing a 4 to 1 - burst to maximum operating pressure safety factor.

**Warning:** Manifolds are designed to distribute a single gas from two or more cylinders. Never mix gases in a manifold. Injury to personnel or damage to equipment may result.



Double Row Manifold



Single Row Manifold

### Standard Features

- Modular Construction allows field installation of additional stations without welding or soldering.
- Enhanced Design exceeds industry standards by providing a 4 to 1 - burst to maximum operating pressure safety factor.
- Diffusion Resistant, Diaphragm Seal Station Valves ensure that gas purity is maintained and allow cylinder removal from a manifold without interrupting gas flow.

### Specifications

- Maximum Inlet Pressure: 3000 psig  
 Flow Coefficient (each station valve):  
 $C_v = 0.35$   
 Inlet Connections: CGA connection as specified  
 Outlet Connection: CGA connection as specified, suitable for direct mounting of a pressure regulator

Optional Pressure Switch: (page 135)

Optional Master Shut-off Valve:  
 SG5475N (page 180)

### Materials of Construction

- Metal Parts: Brass  
 Seals: PTFE  
 Seats:  
     Check Valves: EPDM  
     Station Valves: PCTFE  
 Optional Pressure Switch: (page 135)  
 Optional Master Shut-off Valve:  
 SG5475N (page 180)

### Optional Equipment and Replacement Parts

Equipment and Replacement Parts	Part No.	Page No.
Master Shut-off Valve (Installed)	SG5475i	180
Pressure Switches	SG6540	135
Annunciators	SG6541	
Annunciators	SG6551A	141
PTFE O-Ring Kits (package of 25) For modular manifold connection	SG6082B	
Replacement Pigtailed, Rigid Type Brass without Check Valves	AG6640-(CGA)	
Brass with Check Valves	AG6641-(CGA)	
Replacement Pigtailed, Flexible Type Without Check Valves	AG6638-(CGA)	
With Check Valves	AG6639-(CGA)	
Replacement Station Valves	462B346AN8	
Additional BSR Stations With Rigid Pigtail without Check Valve	AG6660-(CGA)	
With Rigid Pigtail with Check Valve	AG6661-(CGA)	
With Flexible Pigtail without Check Valve	AG6662-(CGA)	
With Flexible Pigtail with Check Valve	AG6663-(CGA)	
Additional BTR Stations With Two Rigid Pigtails without Check Valves	AG6668-(CGA)	
With Two Rigid Pigtails with Check Valves	AG6669-(CGA)	
With Two Flexible Pigtails without Check Valves	AG6670-(CGA)	
With Two Flexible Pigtails with Check Valves	AG6671-(CGA)	

Where "(CGA)" is indicated above, insert proper Compressed Gas Association connection number to complete the part number. Example: AG6638-580. Order by complete part number.

### Optional Features

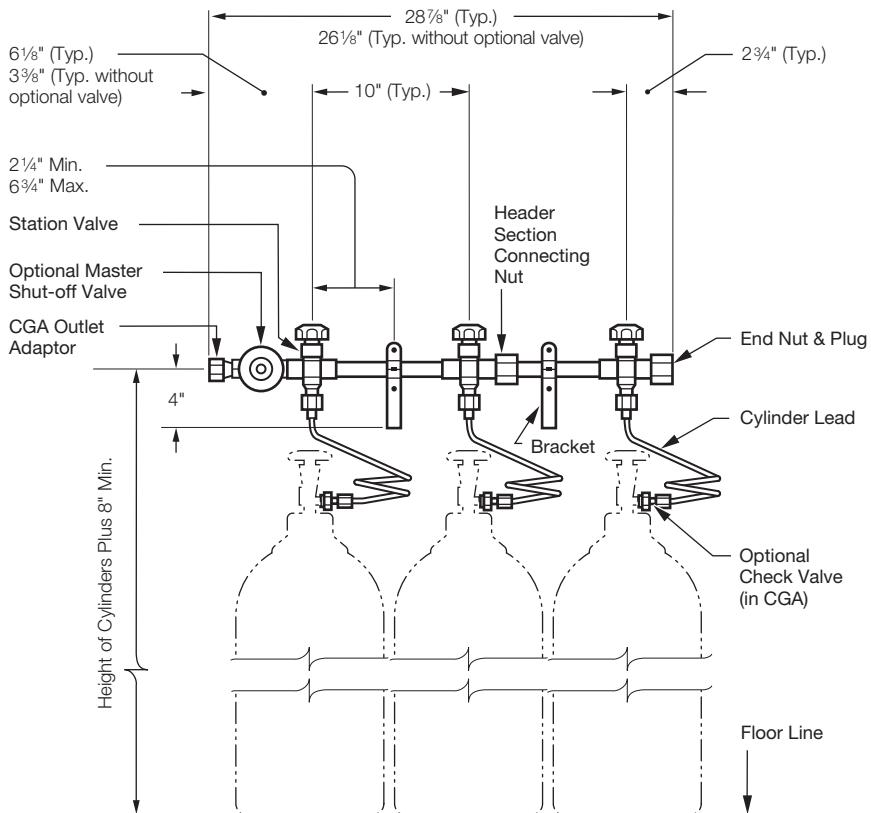
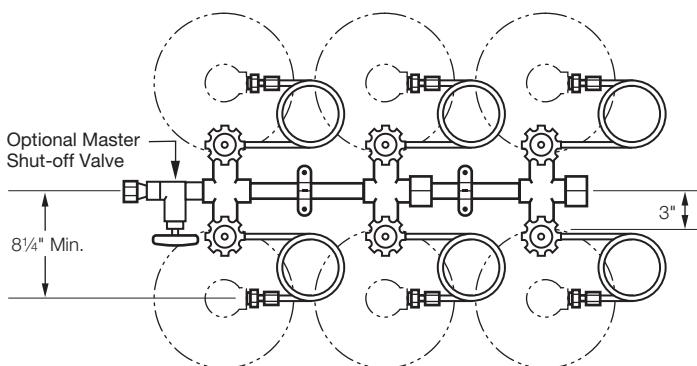
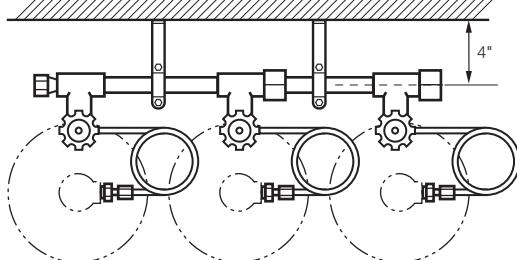
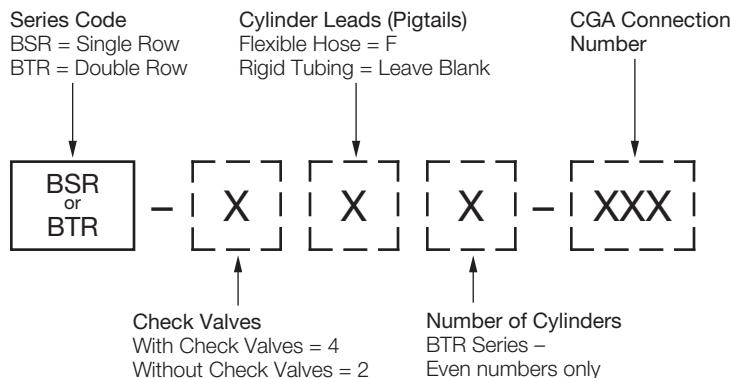
- Master Shut-off Valve allows manifold to be isolated from downstream system.
- Double Braided (all-metal) 3' Stainless Steel Flexible Hose Pigtailed maintain high purity, extend service life and provide ease of connecting cylinders.
- Check Valves prevent discharge of gas from manifold and pigtailed when changing cylinders (required for flammable gases).
- Pressure Switches monitor line pressure and can activate an external alarm (see pages 141-142) when a certain predetermined pressure is reached (see page 135).

## Ordering Information

To order a brass, ultra-high purity manifold, complete the part number using the "Part Number Key" to the right. For example, to order a 5 cylinder, single row manifold, with rigid pigtailed, check valves, and with CGA 580 connections, the part number would be BSR-4-5-580. Order by complete part number.

Manifolds for Acetylene Service require flashback arrestors (SG6545). All manifolds ordered with CGA 510 will be shipped with flashback arrestors installed on each pigtail, unless the order specifies with which gas it will be used.

## Part Number Key for BSR, BTR Series



# Stainless Steel Manifolds

## Single Row, Modular, Ultra-High Purity

### Model SRS

Manifolds are used to connect two or more cylinders together for greater online storage and higher flow capacities. The modular construction allows field installation of additional stations without welding or soldering. These single row manifolds are provided with ultra-high purity (pack-less) diaphragm seal station valves, 3 foot pigtails (stainless steel flexible pigtail option) positioned 10 inches apart and mounting brackets as standard components. The Model SRS is designed for wall mounting and has a "right side" cylinder orientation, where the gas flows from right to left through the manifold header. "Left side" set-up is available upon request.

Model SRS manifolds are manufactured to meet the requirements of the ASME B31.3 Process Piping Code and fabricated with  $\frac{5}{8}$  inch OD, 0.065 wall, Type 316L SS tubing and socket TIG weld assembled and electropolished. ASGE's enhanced manifold header design exceeds industry standards by providing a 4 to 1 - burst to maximum operating pressure safety factor.

**Warning:** Manifolds are designed to distribute a single gas from two or more cylinders. Never mix gases in a manifold. Injury to personnel or damage to equipment may result.



SRS-4F3-580

### Standard Features

- Modular Construction allows field installation of additional stations without welding or soldering.
- Enhanced Design exceeds industry standards by providing a 4 to 1 - burst to maximum operating pressure safety factor.
- Diffusion Resistant, Diaphragm Seal Station Valves ensure that gas purity is maintained and allow cylinder removal from a manifold without interrupting gas flow.

### Specifications

- Maximum Inlet Pressure: 3000 psig  
 Flow Coefficient (each station valve):  
 $C_v = 0.35$   
 Inlet Connections: CGA connection as specified  
 Outlet Connection: CGA connection as specified, suitable for direct mounting of a pressure regulator  
 Optional Pressure Switch: (page 135)  
 Optional Master Shut-off Valve:  
 SG5475N (page 180)

### Materials of Construction

- Metal Parts: Type 316L SS  
 Seals: PTFE  
 Seats:  
 Check Valves: Viton®  
 Station Valves: PCTFE  
 Optional Pressure Switch: (page 135)  
 Optional Master Shut-off Valve:  
 SG5475N (page 180)

### Optional Equipment and Replacement Parts

Equipment and Replacement Parts	Part No.	Page No.
Master Shut-off Valve (Installed)	SG5475i	180
Pressure Switches	SG6540 SG6541	135
Annunciators	SG6551A	141
PTFE O-Ring Kits (package of 25) For connection between pigtail and station valve For header connection	SG6081 SG6082S	
Replacement Pigtails, Rigid Type Stainless Steel without Check Valves Stainless Steel with Check Valves	SG6642-(CGA) SG6643-(CGA)	
Replacement Pigtails, Flexible Type Without Check Valves With Check Valves	SG6638-(CGA) SG6639-(CGA)	
Additional Stations – For adding stations with the following pigtail options Rigid Pigtails without Check Valves Rigid Pigtails with Check Valves Flexible Pigtails without Check Valves Flexible Pigtails with Check Valves	SG6664-(CGA) SG6665-(CGA) SG6666-(CGA) SG6667-(CGA)	

Where "(CGA)" is indicated above, insert proper Compressed Gas Association connection number to complete the part number. Example: SG6667-580. Order by complete part number.

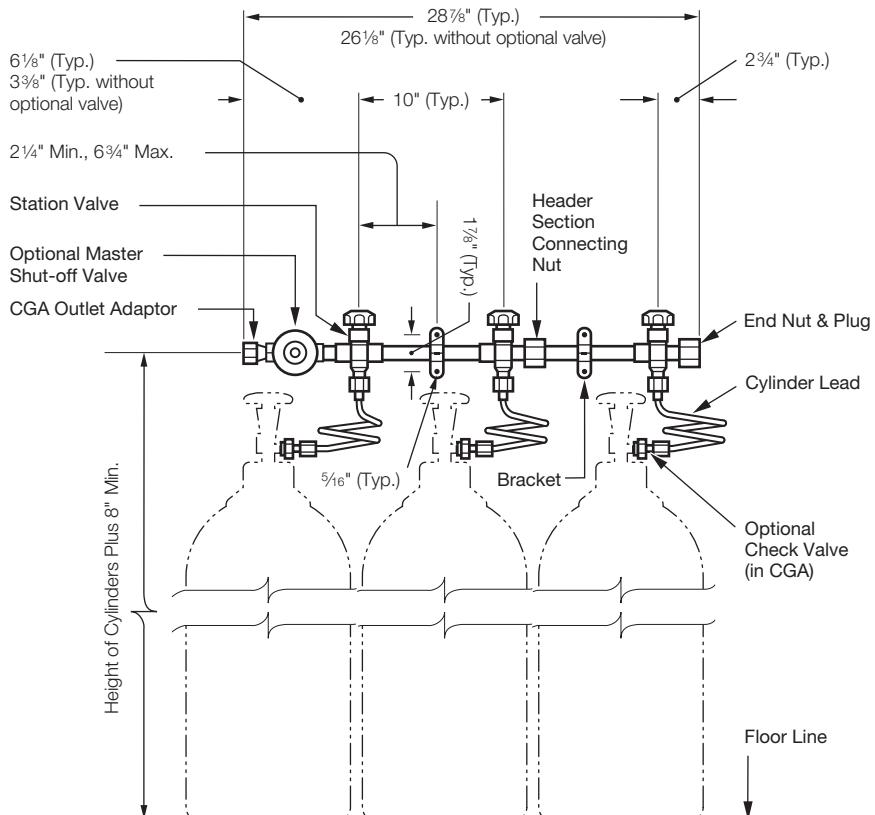
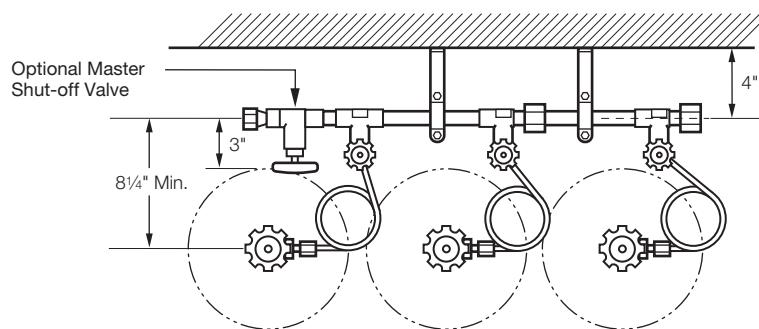
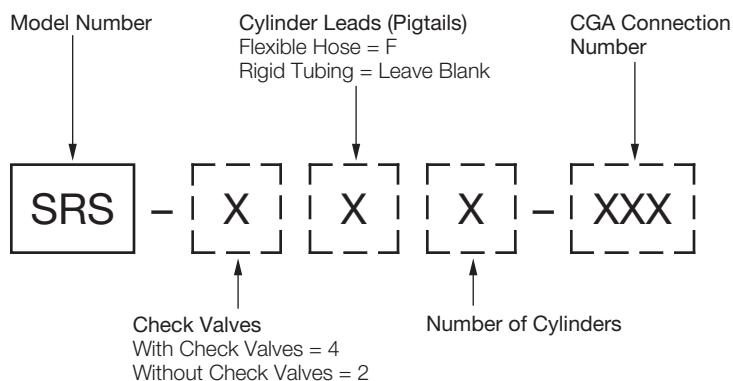
### Optional Features

- Master Shut-off Valve allows manifold to be isolated from downstream system.
- Double Braided (all-metal) 3' Stainless Steel Flexible Hose Pigtails maintain high purity, extend service life and provide ease of connecting cylinders.
- Check Valves prevent discharge of gas from manifold and pigtails when changing cylinders (required for flammable gases).
- Pressure Switches monitor line pressure and can activate an external alarm (see pages 141–142) when a certain predetermined pressure is reached (see page 135).

## Ordering Information

To order a stainless steel manifold, complete the part number using the "Part Number Key" to the right. For example, to order a 3 cylinder, single row manifold, with rigid pigtails, check valves, and with CGA 580 connections, the part number would be SRS-4-3-580. Order by complete part number.

## Part Number Key for Model SRS Manifolds



# Ultra-High Pressure Manifolds

## 6K Rated, Single Row, Stainless Steel

### Model SRH

SRH Manifolds are used to connect two or more high pressure (3500, 4500 or 6000 psig) cylinders together for greater storage capacity or higher flow rates. These single row, stainless steel wall-mounted manifolds are provided with brass station valves, 3 foot pigtails and wall mounting brackets as standard components. They are designed for "right side" cylinder orientation, where the gas flows from right to left through the manifold header. "Left side" set-up is available upon request.

**Warning:** Manifolds are designed to distribute a single gas from two or more cylinders. Never mix gases in a manifold. Injury to personnel or damage to equipment may result.

### Standard Features

- High Pressure Design allows operation up to 6000 psig.
- Station Valves allow cylinder removal from a manifold without interrupting gas flow.

### Optional Features

- Check Valves prevent discharge of gas from manifold and pigtails when changing cylinders.

### Specifications

Maximum Inlet Pressure: 6000 psig

Flow Coefficient (each station valve):  
Cv = 0.378

Inlet Connection: CGA 347, 677, 680, 695, 702 or 703 as specified

Outlet Connection: CGA 347, 677, 680, 695, 702 or 703 as specified, suitable for direct mounting of a regulator

### Materials of Construction

Manifolds: Type 304 SS

Station Valves: Brass

Seats:

Check Valves:

CGA 677: Viton®

All Other: EPDM

Station Valves: PCTFE

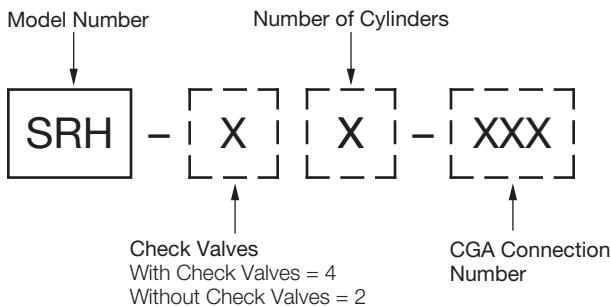
### Ordering Information

To order a SRH Series manifold, complete the part number using the "Part Number Key" below. For example, to order a 4 cylinder manifold with check valves and with CGA 677 connections, the part number would be SRH-4-4-677. Order by complete part number.



SRH-4-4-677

### Part Number Key for Model SRH Manifolds



### Optional Equipment

Equipment and Replacement Parts	Part No.
Rigid Type Replacement Pigtails Without Check Valves for SRH-2 manifolds With Check Valves for SRH-4 manifolds	SG6644-(CGA) SG6645-(CGA)

Where "(CGA)" is indicated above, insert proper Compressed Gas Association connection number to complete the part number. Example: SG6644-677. Order by complete part number.

# Header Manifolds

## Brass, Single Row, General Purity

### Model AH

Header manifolds are used to connect two or more cylinders of the same gas together for greater online storage capacity or higher flow rates. Model AH manifolds are provided with packed stem station valves and mounting brackets as standard components.

Flexible pigtails (either two or three foot) can be ordered separately. Manifolds are available with right or left header configuration. Right headers have outlets on the left (gas flows from right to left), left headers have outlets on the right (gas flows from left to right).

**Warning:** Manifolds are designed to distribute a single gas from two or more cylinders. Never mix gases in a manifold. Injury to personnel or damage to equipment may result.



IGAH-3R-1340

### Model H Manifolds

Number of Cylinders	Right Header CGA 1340 (Inert Gases)	CGA 1350 (Flammable Gases)	Left Header CGA 1340 (Inert Gases)	CGA 1350 (Flammable Gases)
2	IGAH-2R-1340	IGAH-2R-1350	IGAH-2L-1340	IGAH-2L-1350
3	IGAH-3R-1340	IGAH-3R-1350	IGAH-3L-1340	IGAH-3L-1350
4	IGAH-4R-1340	IGAH-4R-1350	IGAH-4L-1340	IGAH-4L-1350

### 24" Flexible Pigtails\* (sold separately)

Model Number	Cylinder CGA Connection	Inner Core	Pressure Rating (psig)
IGH-P24-300AF	300A	PTFE	500
IGH-P24-320	320	PTFE	3000
IGH-P24-326	326	PTFE	3000
IGH-P24-346	346	PTFE	3000
IGH-P24-350	350	PTFE	3000
IGH-P24-350H	350H	Stainless Steel	3000
IGH-P24-510	510	PTFE	500
IGH-P24-510AF	510A	PTFE	500
IGH-P24-540	540	Stainless Steel	3000
IGH-P24-580	580	PTFE	3000
IGH-P24-580H	580H	Stainless Steel	3000

### 36" Flexible Pigtails\* (sold separately)

Model Number	Cylinder CGA Connection	Inner Core	Pressure Rating (psig)
IGH-P36-300AF	300A	PTFE	500
IGH-P36-320	320	PTFE	3000
IGH-P36-326	326	PTFE	3000
IGH-P36-346	346	PTFE	3000
IGH-P36-350	350	PTFE	3000
IGH-P36-350H	350H	Stainless Steel	3000
IGH-P36-510	510	PTFE	500
IGH-P36-510AF	510A	PTFE	500
IGH-P36-540	540	Stainless Steel	3000
IGH-P36-580	580	PTFE	3000
IGH-P36-580H	580H	Stainless Steel	3000

### Benefits and Features

- Packed stem station valves with CGA 580 inlets allow cylinder removal without interrupting gas flow.
- Available in 2, 3 or 4 cylinder right or left header configurations.
- Constructed of 1/2" NPT silver-brazed pipe ensuring leak free service.
- Wall brackets included.
- Order pigtails separately (see tables below).
- CGA 1340 or 1350 female outlet connection.
- Removable plug allows for expansion or add-ons with 1/2" NPT female port.
- 10 inch center-to-center station spacing.

### Optional Equipment

**Model IG-ASR-1340:** Simplex Regulator Manifold with master shut-off valve and CGA 1340 female outlet for Model H right header manifolds.

**Model IG-ASR-1350:** Simplex Regulator Manifold with master shut-off valve and CGA 1350 female outlet for Model H right header manifolds.

**Model IG-ASL-1340:** Simplex Regulator Manifold with master shut-off valve and CGA 1340 female outlet for Model H left header manifolds.

**Model IG-ASL-1350:** Simplex Regulator Manifold with master shut-off valve and CGA 1350 female outlet for Model H left header manifolds.

\* Pigtails include check valve at cylinder connection. Acetylene pigtails (CGA 300A, 510A) include dry-type flash arrestor on cylinder end. All pigtails for hydrogen (350H), helium (580H) and oxygen (540) service are constructed with stainless steel inner core and a double overbraid.

Please note: manifold accessories are available—contact your ASGE representative for more information.

# Duplex Manifolds

## Manual Changeover Ready, Single Row, General Purity

### Model AD

Duplex manifolds provide an economical means to attach a high flow regulator (not included) to the outlet (between) of right and left Model AH header manifolds making them into a manual changeover. The configuration of the Model AD manifold with two master shutoff valves can be used to manually switch from an in-service to reserve side. This is an economical system for installations not requiring automatic changeover operation while allowing empty cylinders to be replaced without interruption of gas supply to the process.

Model AD manifolds are provided with left and right header manifolds, packed stem station valves, 24" flexible pigtails with check valve CGA connections, two master shutoff valves and mounting brackets as standard components. The outlet can be easily connected to a Model A35 (sold separately) regulator making the Model AD into a manual changeover system.

**Warning:** Manifolds are designed to distribute a single gas from one or more cylinders. Never mix gases in a manifold. Injury to personnel or damage to equipment may result.



IGAD-2L2R580

### Benefits and Features

- Maximum operating pressure is 3000 psig.
- Acetylene systems (CGA 510A) include dry-type flash arrestors on pigtail end.
- All systems include stainless steel flexible pigtails with a PTFE-lined inner core, except those for hydrogen, helium and oxygen systems which have a stainless steel inner core.
- All pigtails are 24" and include check valves at the cylinder connection.
- Regulator sold separately, see page 81 for more information on the Model A35.
- Wall brackets included.
- CGA 1340 or 1350 (flammable gases) female outlet connection.
- See Model AH header manifolds for additional specifications.

### Ordering Information

To create a part number, use the codes listed in each column of the Part Number Key shown below. For example, to order a manifold for two cylinders on the left and three cylinders on the right for hydrogen gas service, the part number would be IGAD-2L3R350H. Order by complete part number.

### Part Number Key

Model Number	No. of Cylinders		CGA Code	Gas Service*
	Left Header	Right Header		
IGAD-	2L	2R	510A	Acetylene
	3L	3R	346	Air
	4L	4R	590	Air (Industrial)
			580	Argon, Nitrogen
			320	Carbon Dioxide
			580H	Helium
			350H	Hydrogen
			510	LPG Fuel Gas
			350	Methane, Natural Gas
			540	Oxygen

\* Pigtails include check valve at cylinder connection. Acetylene pigtails (CGA 510A) include dry-type flash arrestor on cylinder end. All pigtails for hydrogen (350H), helium (580H) and oxygen (540) service are constructed with stainless steel inner core and a double overbraid.

Please note: manifold accessories are available—contact your ASGE representative for more information.

# Manual Changeover

## Critical Purity, Brass

### Model LMW

Model LMW Manual Changeover is an economical critical purity gas delivery system for installations not requiring automatic changeover operation. Each system is designed with a two-stage critical purity regulator for two cylinder banks that can be manually switched from an in-service to a reserve cylinder. When the in-service cylinder is exhausted, it can be shut off and the reserve cylinder can be manually opened to replenish the supply. Isolation and vent valves allow the empty cylinder to be replaced and purged without any interruption of gas supply to the process.

#### Standard Features

- Diaphragm Seal Isolation and Purge Valves allow cylinder replacement without interrupting gas flow.
- Critical Purity, Diffusion Resistant Design assures maximum diffusion resistance, maintaining gas purity.
- Double Braided (all-metal) Stainless Steel Flexible Hoses maintain gas purity and provide ease of connecting cylinders.
- Check Valves (built into CGA connection) prevent discharge of gas from pigtail during cylinder change-out.

#### Optional Features

- Outlet Filter traps foreign matter protecting downstream components from contamination and reduces maintenance.
- Relief Valve protects regulator components from the effects of over-pressurization.

#### Specifications

**Maximum Inlet Pressure:** 3000 psig  
**Operating Temp. Range:** -40°F to 140°F  
**Regulator:**  
 Inlet Pressure Gauge (dual scale):  
 0–4000 psig / 0–275 bar  
 Delivery Pressure Range: See Table I  
 Delivery Pressure Gauge: See Table I  
 Filter: 10 micron  
 Gauge Size: 2" Dial  
 Flow Coefficient: Cv = 0.05  
 Outlet Connection: 1/4" NPT female (on outlet valve)  
 Inlet Connection: CGA as specified  
 Valves: SG5460N Series (page 180)  
 Flexible Hose (all-metal): 30" long, 0.285" nominal ID, 0.445" nominal OD  
**Inlet Connections:** CGA (as specified) with check valve  
**Plugged Access Port:** 1/4" NPT female (on manifold block)



LMW-B-150 with optional outlet filter

Table I

Part Number	Delivery Pressure Range psig	Gauge (dual scale) psig	bar
LMW-B-30-(CGA)	2–30	-30" Hg–0–60	-1–0–4
LMW-B-75-(CGA)	4–75	-30" Hg–0–100	-1–0–7
LMW-B-150-(CGA)	10–150	-30" Hg–0–200	-1–0–14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: LMW-B-30-580. Order by complete part number.

#### Optional Equipment

Equipment	Part No.	Page No.
Relief Valves (installed) for LMW-B-30 for LMW-B-75 for LMW-B-150	RV5572-45i RV5572-90i RV5572-175i	186
Outlet Filter (installed)	SG6113i	190

#### Materials of Construction

**Regulator, Block and Valves:** Brass Bar Stock  
**Gauges and CGA Fittings:** Brass  
**Diaphragms:** Type 316 SS  
**Regulator Filter:** Sintered Bronze  
**Bracket:** 12-Gauge Hot Rolled Steel with Powder Coat Epoxy Finish  
**Flexible Hose (all-metal):** Type 316L SS inner core with Type 321 SS double overbraid and Type 316 SS welded end fittings  
**Seats:**  
 Check Valves: EPDM  
 Regulator and Valves: PCTFE

# Semi-Automatic Changeover

## Pressure Differential, Critical Purity

### AC Series

AC Series changeover systems are used to connect two or more cylinders together for uninterrupted gas flow. These semi-automatic, wall-mounted manifold systems are available in either Brass or Type 316 SS construction and are supplied with the appropriate wall mounting brackets.

The system uses two critical purity diffusion resistant regulators (one connected to each bank) which act as a changeover device. Delivery pressure of regulator No. 1 is set 10–15 psi higher than regulator No. 2. This causes regulator No. 1 to flow gas while holding regulator No. 2 closed. When the gas in bank No. 1 is exhausted, regulator No. 2 will begin to flow gas. Inlet pressure gauges on the regulators indicate pressure in each manifold bank. When gas in the first cylinder bank has been exhausted and a changeover has occurred, the empty cylinders are replaced and the delivery pressure settings of the regulators are readjusted. This will cause a reverse changeover when bank No. 2 is exhausted. Because delivery pressure drops slightly when a changeover occurs, a line regulator should be installed downstream to eliminate pressure variations.

### Standard Features

- Manifolds allow two or more cylinders on each side for greater online storage capacity.
- Diffusion Resistant, Diaphragm Seal Station Valves (on four cylinder or larger systems) ensure that gas purity is maintained and allow for isolation of individual cylinders on the manifold without interrupting gas flow.
- Critical Purity, Diffusion Resistant Regulators minimize diffusion of air into the system, maintaining gas purity. Brass changeover systems include two Model HPD Regulators (page 30). Stainless Steel changeover systems include two Model APC Regulators (page 34). Other regulators may be substituted for unique requirements, such as high delivery pressures or high flow rates. Contact your Advanced Representative for more information.

### Optional Features

- Manifold Master Shut-off Valves allow a manifold bank to be isolated from a changeover regulator.
- Double Braided (all-metal) 3' Stainless Steel Flexible Hose Pigtails maintain high purity, extend service life and provide ease of connecting cylinders.
- Check Valves prevent discharge of gas from manifold and pigtails when changing cylinders (required for flammable gases).
- Pressure Switches monitor line pressure and can activate an external alarm (see pages 141–142) when a certain predetermined pressure is reached (see page 135).

### Specifications

#### Manifolds:

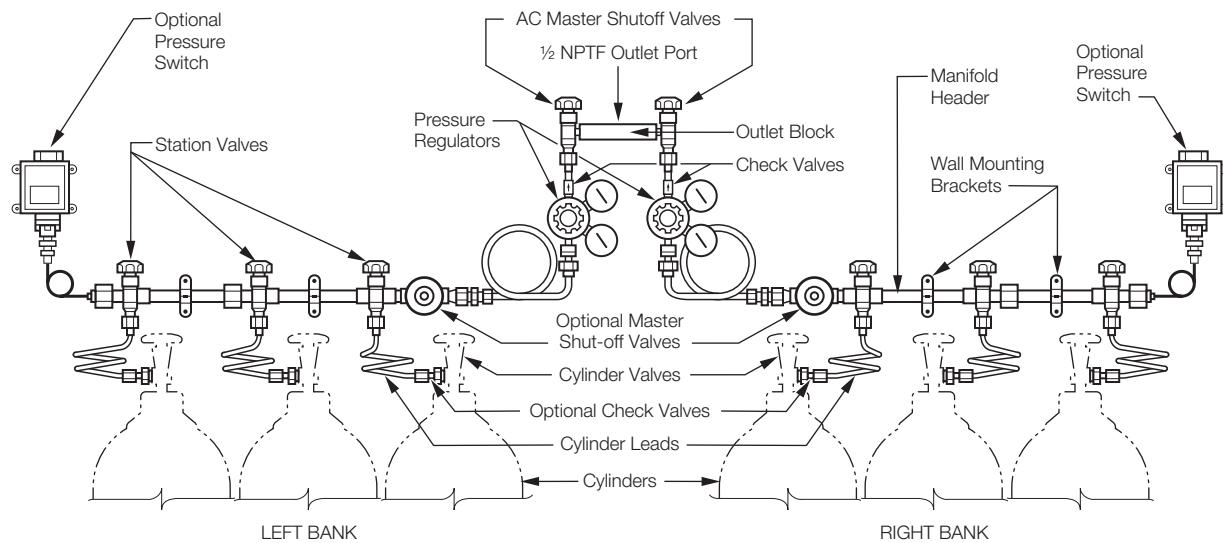
Maximum Inlet Pressure: 3000 psig  
Delivery Pressure Range: 50–150 psig  
(for higher delivery pressures, contact your Advanced Representative)  
Flow Coefficient (each station valve): 0.35  
Inlet Connections: CGA as specified  
Outlet Connection: ½" NPT female

#### Regulators:

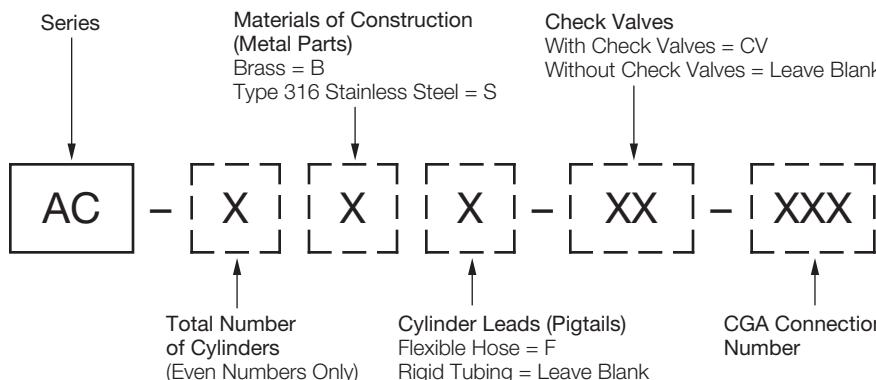
Brass Systems: HPD-3-150 (page 30)  
Stn. Stl. Systems: APC-3-150 (page 34)

#### Optional Pressure Switch:

(see page 135)  
Optional Master Shut-off Valve:  
Model SG5475 (page 180)



## Part Number Key for AC Series Changeover Systems



### Materials of Construction

#### Manifolds:

Metal Parts: Brass or Type 316 SS as specified

Seals: PTFE

#### Seats:

##### Check Valves:

Brass Manifolds: EPDM

Stainless Steel Manifolds: Viton®

Station Valves: PCTFE

#### Regulators:

Brass Systems: Model HPD (page 30)

Stn. Stl. Systems: Model APC (page 34)

#### Optional Pressure Switch:

#### Optional Master Shut-off Valve:

Model SG5475 (page 180)

### Ordering Information

To order a semi-automatic changeover manifold system, complete the part number using the "Part Number Key" above. For example, to order a 6 cylinder, brass changeover system, with flexible pigtails, with check valves, and with CGA 350 connections, the part number would be AC-6BF-CV-350. Order by complete part number.

Note: Two cylinder semi-automatic manifolds do not include manifold headers. Cylinders are connected directly to the regulator inlet pigtails (cylinder leads).

Manifolds for Acetylene Service require flashback arrestors (SG6545). All manifolds ordered with CGA 510 will be shipped with flashback arrestors installed on each pigtail, unless the order specifies with which gas it will be used.

### Optional Equipment and Replacement Parts

Equipment and Replacement Parts	Part No.	Page No.
Manifold Master Shut-off Valve – Installed (2 required) Brass Stainless Steel	Not Available SG5475i	180
Pressure Switches	SG6540 SG6541	135
Annunciators	SG6552	141
Flashback Arrestor (Required for Acetylene Service- one per cylinder)	SG6545	144
PTFE O-Ring Kit (package of 25) For connection between pigtail and station valve (Stainless Steel Manifolds only)	SG6081	
For modular manifold connection on Brass Manifolds Stainless Steel Manifolds	SG6082B SG6082S	
Replacement Pigtail, Rigid Type Brass without Check Valves for Brass Manifolds Brass with Check Valves for Brass Manifolds Stainless Steel without Check Valves for SS Manifolds Stainless Steel with Check Valves for SS Manifolds	AG6640-(CGA) AG6641-(CGA) SG6642-(CGA) SG6643-(CGA)	
Replacement Pigtail, Flexible Type Without Check Valves for Brass Manifolds With Check Valves for Brass Manifolds Without Check Valves for Stainless Steel Manifolds With Check Valves for Stainless Steel Manifolds	AG6638-(CGA) AG6639-(CGA) SG6638-(CGA) SG6639-(CGA)	
Replacement Station Valves Brass Stainless Steel	462B346AN8 Not Available	
Additional Stations – See Optional Equipment for BSR Series and Model SRS manifolds (specify left or right bank when ordering)		100, 102

Where "(CGA)" is indicated above, insert proper Compressed Gas Association connection number to complete the part number. Example: SG6642-580. Order by complete part number.

# Automatic Changeovers

Primary or with Secondary Regulation, Critical Purity

## PCS, CRS Series

Changeover Systems are designed to provide a continuous supply of gas from two or more cylinders containing compressed or liquefied gases with vapor pressures above 300 psig.

Advanced changeovers allow the user to deplete gas in a cylinder without the concerns of gas outages and of wasting unused gas as a result of premature change-outs.

Advanced Changeover Systems incorporate two diffusion resistant regulators with diaphragm seal inlet valves allowing for cylinder isolation when a change of cylinders is required. Available in either brass or stainless steel construction, they are supplied entirely installed on a stainless steel panel providing for convenient, wall-mounted installation. The overall compact design allows for installation in areas where space is at a premium.

## PCS Series

PCS Primary Changeover Systems are designed for use in processes incorporating downstream line or station regulators located at the point of use. The PCS Series incorporates two regulators set at slightly different delivery pressures. Gas discharges from the side with the higher setting first (primary side) which is indicated by the "In Service" arrow located on the hand knob. The side with the lower delivery pressure setting will remain closed until the primary side has been exhausted (approximately 150 psi residual pressure). The changeover will automatically switch to the reserve bank (secondary side). A fluctuation in pressure will occur at this point at the outlet of the changeover. Downstream line regulator(s) (not included) will eliminate pressure variations and provide final pressure control to the process.

Note: See page 116 for additional PCS Alarm Changeover Systems with prewired switches and annunciations.



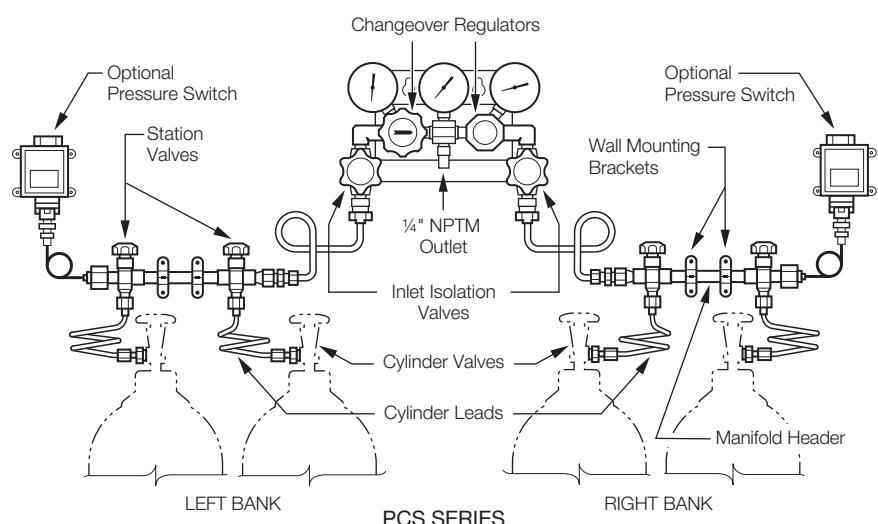
PCS Series



PCS Series with optional vent valves



CRS Series



## Standard Features

- Manifolds allow two or more cylinders to be connected on each side for greater online storage capacity.
- Diaphragm Seal Isolation Valves allow for complete isolation of the gas source when making a changeout.
- Diffusion Resistant, Diaphragm Seal Station Valves (on four cylinder or larger systems) ensure that gas purity is maintained and allow for isolation of individual cylinders on the manifold without interrupting gas flow.
- Critical Purity Diffusion Resistant Regulators minimize the diffusion of air into the system, maintaining the purity of the gas.

## Optional Features

- Double Braided (all-metal) 3' Stainless Steel Flexible Cylinder Hose Pigtails maintain high purity, extend service life and provide ease of connecting cylinders.
- Check Valves prevent discharge of gas from manifold and pigtails when changing cylinders (required for flammable gases).
- Alarmed Changeover Systems with pre-wired switches and annunciator allow for convenient and easy installation. (see page 116)
- Purge/Vent Valves allow for complete removal of entrapped air and moisture from the system upon start-up, or after a cylinder changeout thus maintaining the high purity nature of the system.

## Specifications

### Manifolds:

Maximum Inlet Pressure: 3000 psig  
Flow Coefficient (each station valve): 0.35  
Inlet Connections: CGA as specified

### Changeover Regulators:

Maximum Inlet Pressure: 3000 psig  
Inlet Pressure Gauge: 0–4000 psig / 0–275 bar  
Minimum Inlet Pressure: 300 psig  
Delivery Pressure Gauge (PCS Series only): 0–400 psig / 0–27 bar  
Delivery Pressure Range (PCS Series only): 150–180 nonadjustable  
Gauge Size: 2" Dial  
Operating Temp. Range: -40°F to 140°F  
Flow Coefficient: Cv = 0.06

### Line Regulators (CRS Series only):

Maximum Inlet Pressure: 3000 psig  
Delivery Pressure Range\*: 10–150 psig  
Delivery Pressure Gauge: 0–200 psig / 0–14 bar  
Gauge Size: 2" Dial  
Operating Temp. Range: -40°F to 140°F  
Flow Coefficient: Cv = 0.13  
Outlet Connection: 1/4" NPT female

## Materials of Construction

### Manifolds:

Metal Parts: Brass or Type 316 SS as specified

Seals: PTFE

Seats:

Check Valves:

Brass Manifolds: EPDM

Stainless Steel Manifolds: Viton®

Station Valves: PCTFE

### Regulators:

Body:

Brass Systems: Brass Bar Stock

Stn. Stl. Systems: Type 316 SS Bar Stock

Gauges:

Brass Systems: Brass

Stn. Stl. Systems: Type 316 SS

Bonnets:

Brass Systems: Brass Bar Stock

Stn. Stl. Systems: 300 Series SS Bar Stock

Internal Metal Parts Exposed to Gas:

Brass Systems: Brass and Stn. Stl.

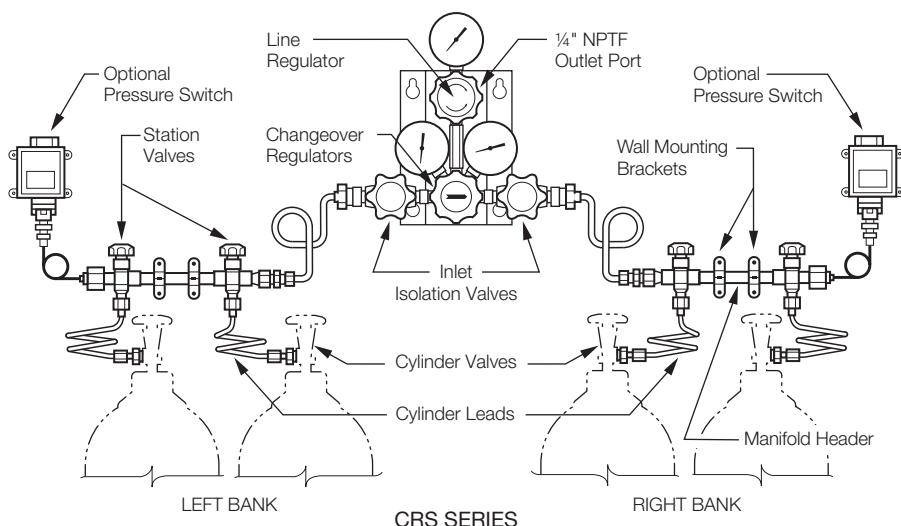
Stn. Stl. Systems: Type 316 SS

Seats: PTFE

Diaphragms: Type 316 SS

Friction Sleeve: PTFE

\* Optional delivery pressure ranges are available. Contact your Advanced Representative for more information.



## Ordering Information

To order a changeover system, complete the part number using the "Part Number Key" shown at right. For example, to order a 4 cylinder, CRS Series brass changeover regulator system, with flexible pigtailed, with check valves, and with CGA 580 connections, the part number would be CRS-B4F4-580. Order by complete part number.

Note: A two cylinder changeover system does not include manifold headers. The cylinders are connected directly to the regulator inlet pigtailed (cylinder leads).

## Operation

When both sides of the changeover are connected to a gas supply, gas will flow only from the primary side (bank no. 1), which will be indicated by the direction of the "In-Service" arrow located on the hand knob. The secondary side (bank no. 2) will remain closed.

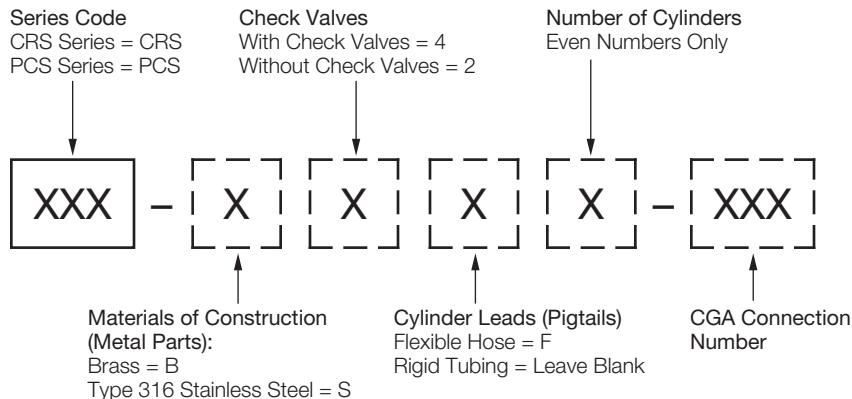
When the gas in the primary bank has been exhausted, the regulator will automatically switch to the secondary, or reserve bank. A fluctuation in outlet pressure will occur at this point. The CRS Series changeover incorporates a built-in line regulator which eliminates this fluctuation and ensures a constant delivery pressure to the use point. The PCS Series changeover, supplied without a line regulator, should be utilized for applications incorporating downstream line or station regulation.

Once a changeover has occurred, the hand knob on the changeover regulator should be turned 180° to indicate that bank no. 2 is now in service. This also resets the changeover regulator with bank no. 2 becoming the primary bank.

To replenish the gas supply in bank no. 1, the isolation valve is closed and the empty cylinder(s) is replaced with a full cylinder(s). The isolation valve is then reopened, with bank no. 1 now functioning as the secondary, or reserve side.

**Note:** The CRS is factory preset to changeover at approximately 200 psig. Liquefied gases or Cryogenic Liquids with vapor pressures less than 300 psig cannot be used with the standard changeover systems. Contact your Advanced distributor if lower factory settings are required for liquefied gas.

## Part Number Key for Automatic Changeover Systems



## Optional Equipment and Replacement Parts

Equipment and Replacement Parts	Part No.	Page No.
Annunciators	SG6552	141–142
Pressure Switches	SG6540 SG6541	135, 137
Purge/Vent Valves (set of 2 installed prior to isolation valves)		
For Brass CRS Series	SG6680	
For Brass PCS Series	SG6680PCS	
For Stainless Steel CRS Series	SG6681	
For Stainless Steel PCS Series	SG6681PCS	
PTFE O-Ring Kit (package of 25)		
For connection between pigtail and station valve (Stainless Steel Manifolds only)	SG6081	
For modular manifold connection on		
Brass Manifolds	SG6082B	
Stainless Steel Manifolds	SG6082S	
Replacement Pigtail, Rigid Type		
Brass without Check Valves for Brass Manifolds	AG6640-(CGA)	
Brass with Check Valves for Brass Manifolds	AG6641-(CGA)	
Stainless Steel without Check Valves for SS Manifolds	SG6642-(CGA)	
Stainless Steel with Check Valves for SS Manifolds	SG6643-(CGA)	
Replacement Pigtail, Flexible Type		
Without Check Valves for Brass Manifolds	AG6638-(CGA)	
With Check Valves for Brass Manifolds	AG6639-(CGA)	
Without Check Valves for Stainless Steel Manifolds	SG6638-(CGA)	
With Check Valves for Stainless Steel Manifolds	SG6639-(CGA)	
Replacement Station Valves		
Brass	462B346AN8	
Stainless Steel	Not Available	
Additional Stations – See Optional Equipment for BSR Series and Model SRS manifolds (specify left or right bank when ordering)		100, 102

Where "(CGA)" is indicated above, insert proper Compressed Gas Association connection number to complete the part number. Example: SG6638-580. Order by complete part number.

# High Flow Changeover

## Primary Regulation, Critical Purity

### HPC Series

HPC Series Primary Changeover Systems are designed to provide a continuous supply of gas from two separate banks of cylinders. Capable of flow rates up to 50 scfm, the changeover allows the user to deplete gas from one source without the concerns of gas outages and of wasting unused gas as a result of premature change-outs.

Primary changeover systems are designed for use in processes incorporating downstream line or station regulators located at the point of use. A downstream line regulator (not included) will eliminate pressure variations to the process. The HPC Series incorporates two high flow diffusion-resistant regulators available in either brass or stainless steel construction. They are supplied entirely installed on a stainless steel panel providing for convenient, wall-mounted installation.

The overall compact design allows for installation in areas where space is at a premium.

Note: See page 116 for additional HPC Alarm Changeover Systems with prewired switches and annunciations.

### Operation

The HPC Series incorporates two regulators set at slightly different delivery pressures. Gas discharges from the side with the higher setting first (primary side) which is indicated by the "In-Service" arrow located on the hand knob. The side with the lower delivery pressure setting will remain closed until the primary side has been exhausted (approximately 180–160 psi residual pressure) at which time the changeover will automatically switch to the reserve bank (secondary side). Since a fluctuation in outlet pressure will occur at this point, a downstream line regulator (not included) should be installed to eliminate pressure variations and allow final pressure control to the process. When the operator is ready to service the depleted primary supply, the "In-Service" arrow should be rotated 180° to indicate that the reserve bank is now in service. The first source can then be changed without interruption of the outlet pressure. Gas will continue to flow from the reserve bank until it is depleted and a changeover to the primary side occurs. The changeover process can be repeated continuously as long as the depleted supply is replaced.

### Ordering Information

To order a changeover system, complete the part number using the "Part Number Key" shown at the right. For example, to order a HPC Series 2-cylinder changeover regulator system for high pressure gases (>900psig), in brass construction, with flexible hoses, and with CGA 580 connections, the part number would be HPC-HBF2-580. Order by complete part number.

Note: A two-cylinder changeover system does not include manifold headers. The cylinders are connected directly to the changeover inlet leads (pigtailed).



HPC Series

### Specifications

**Maximum Inlet Pressure:**  
HPCH: 3000 psig  
HPCL: 900 psig

**Inlet Pressure Gauge:**  
HPCH: 0–4000 psig  
HPCL: 0–1000 psig

**Minimum Inlet Pressure:** 300 psig

**Delivery Pressure Gauge:** 0–400 psig

**Delivery Pressure Range:** 160–200 psig  
nonadjustable

**Gauge Size:** 2" Dial

**Operating Temp. Range:** -40°F to 140°F

**Flow Coefficient:** Cv = 1.2

**Flow Capacity:** Up to 50 scfm Air

**Cylinder Leads:** CGA connection with check valve nipple (standard)

**Rigid Pigtail:** 36" long w/ 5" dia. service loop, providing a 23" useable length

**Flexible Hose:** 36" long

**Inlet Connection:** ½" NPTF port (body) with CGA adapter installed and CGA connections (as specified) on pigtail

**Outlet Connection:** ½" NPT male with restricting flow orifice

**Weight (approx.):** 10 lbs

### Materials of Construction

**Body:** Brass or Type 316 SS Bar Stock

**Gauges:** Brass or Type 316 SS

#### Bonnets:

Brass Systems: Brass Bar Stock

Stn. Stl. Systems: 300 Series SS Bar Stock

#### Internal Metal Parts Exposed to Gas:

Brass Systems: Brass and Stn. Stl.

Stainless Steel Systems: Type 316 SS

#### Seats:

##### Regulators:

HPCH: PCTFE

HPCL: PTFE

##### Check Valve Nipple:

Brass Systems: EPDM

Stn. Stl. Systems: Viton®

#### Diaphragms:

##### Seals:

HPCH: EPR

HPCL: PTFE

#### Cylinder Leads:

##### Rigid Pigtail:

Brass with Brass assemblies

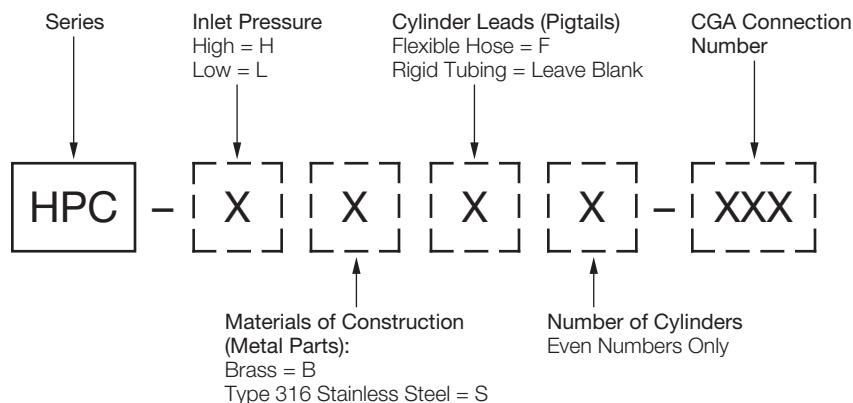
Type 316 SS with Stn. Stl. assemblies

##### Flexible Hose:

Type 316 SS inner core and end fittings

Type 304 SS double overbraid

### Part Number Key for HPC Series Changeover Systems



# Automatic Changeover Panels

## Secondary Regulation, Panel Mounted, Critical Purity

### PMC Series

This changeover system combines two changeover regulators in a single body, a secondary outlet line regulator and diaphragm-seal valves to create a critical purity gas delivery system in a panel mounted enclosure. It provides continuous gas flow from two separate sources (cylinders or banks) to your application. When one source empties, the changeover system automatically draws from the second source. The first source can then be changed without interruption to the outlet pressure.

The PMC Series includes high pressure inlet and vent valves, allowing for isolation and complete removal of entrapped air and moisture from start-up, or after a cylinder change-out. Auxiliary access ports provide versatility to change location of high pressure inlet ports or to add additional pigtails creating up to a four cylinder changeover without the added cost of header manifolds. Available in either brass or stainless steel construction, the changeover system is installed in a 12-gauge steel powder coated, silkscreen labeled panel with mounting slots, pigtails and outlet valve.

### Standard Features

- Eliminates Costly Downtime by providing constant uninterrupted gas flow.
- Critical Purity Design makes this system ideally suited for gas chromatography and laboratory gas applications.
- Prevents Gas Outages and Wasted Gas due to premature cylinder change-out.
- Optimizes System Purity by allowing line purge and cleaning during cylinder change-outs.
- Check Valves prevent discharge of gas from manifold and pigtails when changing cylinders.
- Auxiliary Access Ports provide versatility to change inlet location or assemble a four cylinder changeover without the added cost of header manifolds.

### Optional Features

- Alarmed Changeover Systems with prewired switches and annunciation allow for convenient and easy installation. (see page 116)
- Relief Valves protect regulator components from the effects of overpressurization.
- Flashback Arrestor provides protection against flashback of fuel gas or oxygen.

### Specifications

- Maximum Inlet Pressure: 3000 psig
- Inlet Pressure Gauges (dual scale): 0–4000 psig / 0–275 bar
- Minimum Inlet Pressure: 400 psig
- Delivery Pressure Gauge:
  - PMCX-1: 0–200 psig / 0–14 bar
  - PMCX-2: 0–400 psig / 0–28 bar
- Delivery Pressure Range:
  - PMCX-1: 10–100 psig / 0–7 bar
  - PMCX-2: 20–200 psig / 0–14 bar
- Gauge Size: 2½" Dial
- Operating Temp. Range: -40°F to 165°F
- Flow Coefficient: Cv = 0.06
- Flow Capacity: 240 scfh N<sub>2</sub>
- Cylinder Leads:
  - Rigid Pigtail: 36" long w/ 5" dia. service loop, providing a 23" useable length
  - Flexible Hose: 36" long
- Inlet Connections: CGA connections with check valve nipples (std.) as specified
- Outlet Connection: ¼" NPT female
- Weight (approx.): 20 lbs

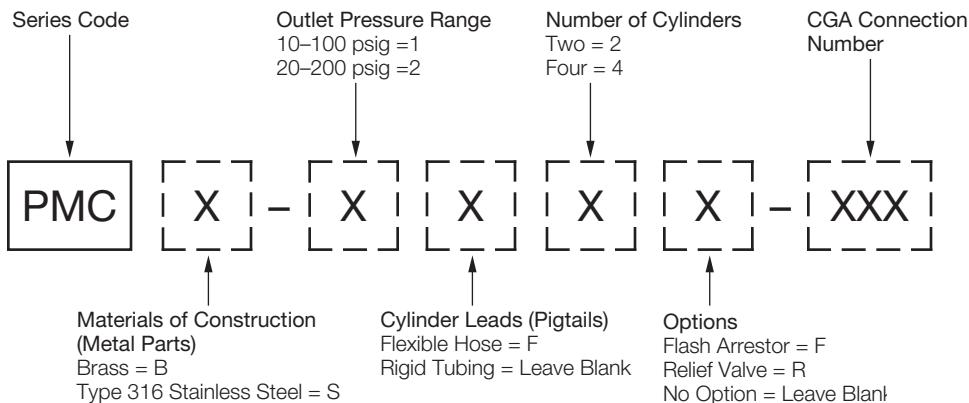


PMC Series

### Materials of Construction

- Body:**
  - Brass Systems: Brass Bar Stock
  - Stn. Stl. Systems: Type 316 SS Bar Stock
- Gauges:**
  - Brass Systems: Brass
  - Stn. Stl. Systems: Type 316 SS
- Bonnets:**
  - Brass Systems: Brass Bar Stock
  - Stn. Stl. Systems: 300 Series SS Bar Stock
- Internal Metal Parts Exposed to Gas:**
  - Brass Systems: Brass and SS
  - Stn. Stl. Systems: Type 316 SS
- Seats:**
  - Regulators: PTFE
  - Check Valve Nipple:
    - Brass Systems: EPDM
    - Stn. Stl. Systems: Viton®
- Diaphragms:** Type 316 SS
- Cylinder Leads:**
  - Rigid Pigtail:
    - Brass with Brass assemblies
    - Type 316 SS with Stn. Stl. assemblies
  - Flexible Hose:
    - Type 316 SS inner core and end fittings
    - Type 304 SS double overbraid
- CGA Connections:**
  - Brass Systems: Brass
  - Stainless Steel Systems: Type 316 SS
- Panel:** 12-Gauge Steel, Powder Coat Blue

## Part Number Key for PMC Series Changeover Systems



## Ordering Information

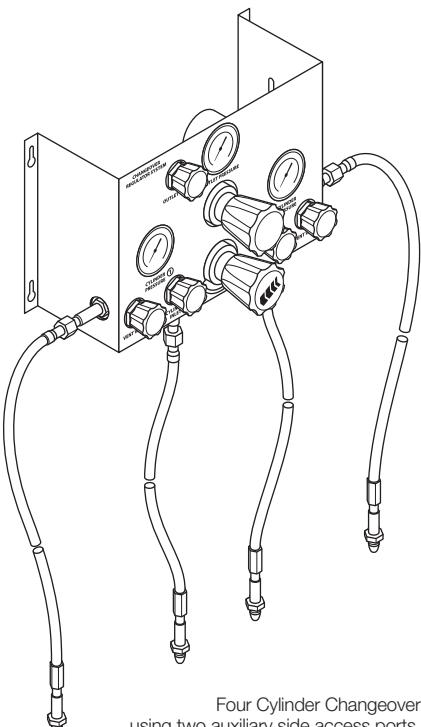
To order a changeover system, complete the part number using the "Part Number Key" shown above. For example, to order a PMC Series changeover system in brass construction, with a 10-100 psig delivery range, for two cylinders, with flexible hose pigtails, with relief valve and CGA 580 connections, the part number would be PMCB-1F2R- 580. Order by complete part number.

## Operation

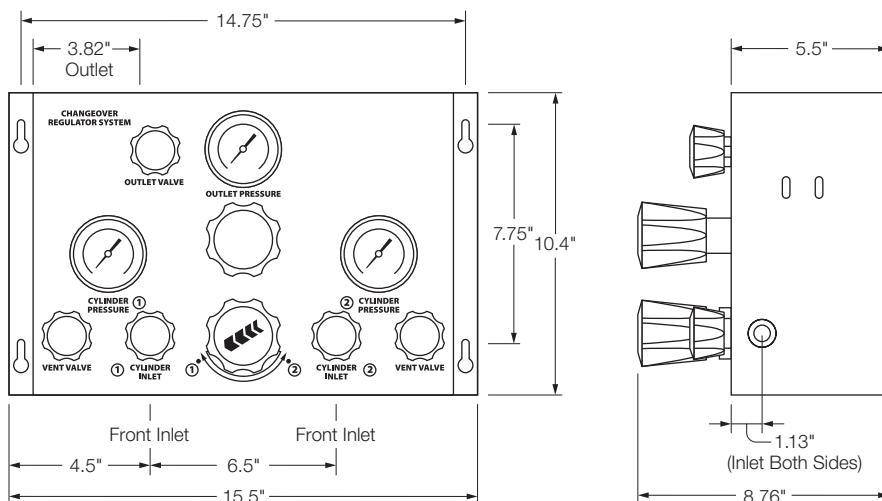
When both sides of the changeover are connected to a gas supply, gas will flow only from the primary side (bank no. 1), which will be indicated by the "In-Service" arrow located on the hand knob. The secondary side (bank no. 2) will remain closed.

When the gas in the primary bank has been exhausted, the regulator will automatically switch to the secondary, or reserve bank. Once a changeover has occurred, the hand knob on the changeover regulator should be rotated approximately 180° to indicate that bank no. 2 is now in service. This also resets the changeover regulator with bank no. 2 becoming the primary bank.

To replenish the gas supply in bank no. 1, the inlet isolation valve is closed and the empty cylinder(s) is replaced with a full cylinder(s). The process gas and vent valves can then be used to purge and vent entrapped air and moisture from the pigtails. The inlet isolation valve is then reopened, with bank no. 1 now functioning as the secondary, or reserve side.



Four Cylinder Changeover using two auxiliary side access ports.



Note: The PMC is factory preset to changeover at approximately 200 psig. Liquefied gases or cryogenic liquids with vapor pressures less than 400 psig cannot be used with the standard changeover systems. Contact your Advanced distributor if lower factory settings are required

# Changover Alarm Systems

## Automatic Changover Alarm Options

PCSA, CRSA, HPCA, PMCA Series

Advanced Changover Systems are available pre-wired with pressure switch gauges and quick-connect automatic alarms for convenient wall-mount installation. Visual and audible alarms alert the user of cylinder changeover and the need to replenish gas supply. The stand-alone annunciator can be located next to the changover or mounted remotely.

Electrical connection between the changover and annunciator is made with quick contact, miniature connectors. When purchased for local annunciator installation, a 3' interconnecting cable with mating connectors is supplied with each system. Optional cable lengths are available. If remote connection is required, two (3') interconnecting cables with mating connector and flying leads ends are provided, making it convenient to install electrical wiring.

Mechanical specifications for each changover series can be found on catalog pages 86–91. The changover alarm systems are assembled using Reed Switch Pressure Gauges, Models SG6520 or SG6521 (page 137) and Annunciator Alarm, Model SG6552 (page 141). Additional product information can be found on the referenced pages. The following part number keys are to be used for ordering changover alarm systems pre-wired with pressure switch gauges and quick-connect automatic alarms.

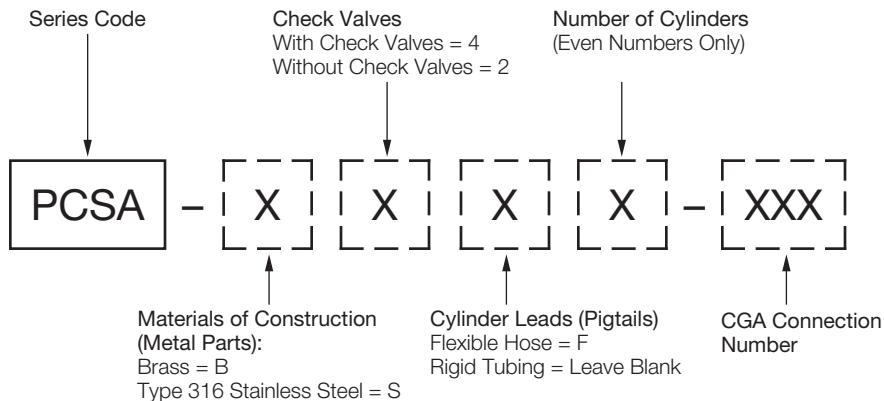
**Warning:** Do not use these systems for flammable gases. We strongly recommend the use of our Explosion-Proof Type Pressure Switch Model SG6541 (page 135) for all flammable applications.



Series CRSA with  
Mini Electrical Connector

### PCSA Series – Part Number Key for Primary Changover Alarm Systems

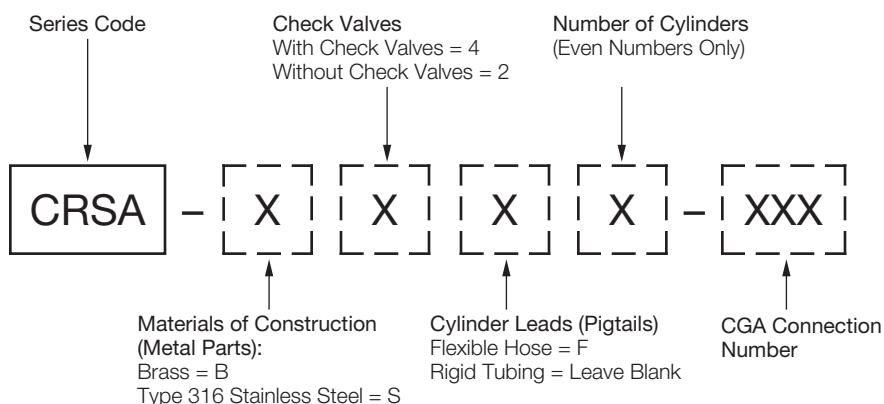
Primary Changover Alarm System assembled with Model PCS (page 110).



PCSA Series

### CRSA Series – Part Number Key for Automatic Changover Alarm Systems

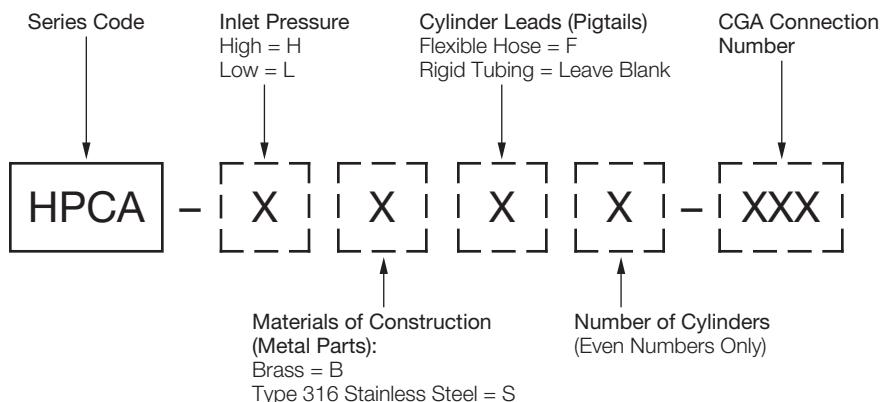
Automatic Changover Alarm System assembled with Model CRS (page 110).



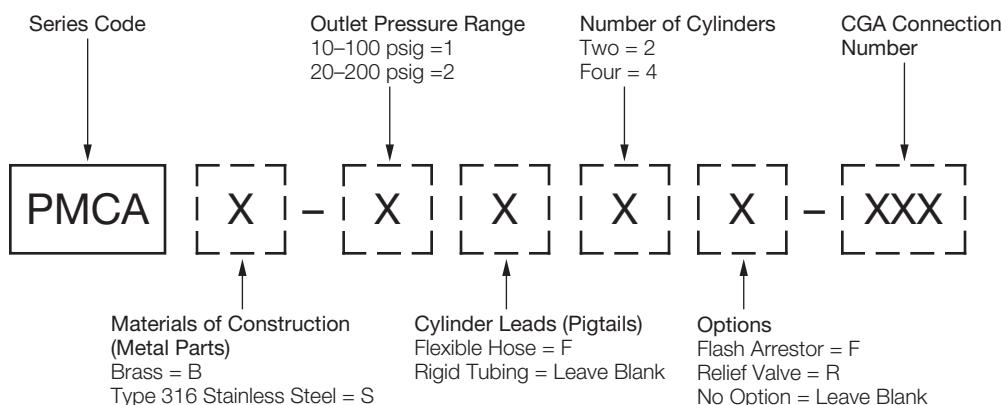
CRSA Series

**HPCA Series – Part Number Key for High Flow Primary Changeover Alarm Systems**

High Flow Primary Changeover Alarm System assembled with Model HPC (page 113).

**PMCA Series – Part Number Key for Automatic Changeover Panel Alarm Systems**

Automatic Changeover Panel Alarm System assembled with Model PMC (pages 114)

**Ordering Information**

To order a changeover alarm system, complete the part number using the appropriate Series "Part Number Key".

Note: When ordering, specify local or remote annunciation installation.



PMCA Series

# Changeover Manifolds

## Automatic, Panel Enclosure

### Model CBA

Model CBA manifolds are designed to prevent downtime by automatically switching gas supply from the primary cylinder bank to the reserve cylinder bank. All components including the delivery pressure regulator are enclosed and protected inside a tamper-resistant case. The delivery pressure is initially set by the operator by opening the front cover of the case and adjusting the stem of the delivery regulator clockwise until the desired pressure is registered on the delivery pressure gauge.

Green lights indicate the primary cylinder bank is functioning and the reserve cylinder bank is ready for service. A red light alerts the user that the unit has changed over and one or both banks are depleted (except on fuel gas units). When the empty cylinder bank is serviced, the user resets the primary bank by turning the knob which also indicates the side in service.

### Benefits and Features

- Integral visual alarm system is standard (except on fuel gas units).
- All manifolds include brass constructed regulators and stainless steel double braided flexible pigtail.
- Acetylene manifolds also include: pipeline dry-type flashback arrestor with check valves, ASME relief valve, and individual pigtail flashback arrestors.
- Remote audio-visual alarm is optional.

### Specifications

**Electrical:** 120 volts (AC), 1.25 amps, except for fuel gas. Power is not required for flammable gas systems.

**Heaters (Models CBA-H):** 120 volts (AC), (2) heaters @200W, 4A max

**Manifold Outlet:** ½" NPT male

**Relief Valve Outlet:** ¼" NPT male

**Manifold Inlets:** CGA 580 Adapter

**Flexible Hose Pigtailed (includes two):**

3' stainless steel inner core with double overbraid (other lengths available –please specify)

**Inlet CGA:** Standard with check valve nipple

**Inlet CGA Number:** See Table (page 119)

### Optional Equipment

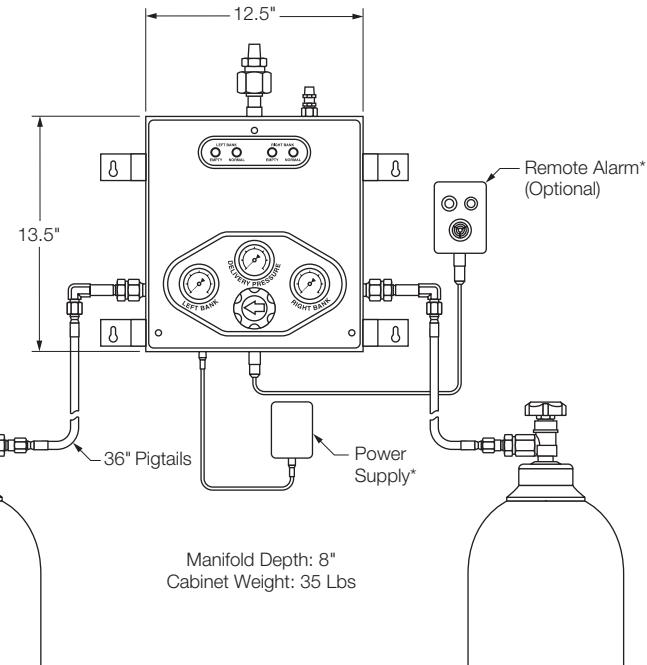
**Model IG-CBI-ALARM:** Remote Audio/Visual Alarm for nonflammable gas service with 120 VAC transformer and 10' interconnecting cable with mating connectors

**Model IG-CBAC-ALARM:** Remote Audio/Visual Alarm Kit for acetylene gas service

**Model IG-CBFG-ALARM:** Remote Audio/Visual Alarm Kit for Liquefied Petroleum Gas (LPG) service



Model CBA



\* Except with flammable gas service. Integral visual alarms (green and red alerts) are not included with flammable gas service.

Table I

Gas Service	Inlet Pressure Maximum psig	Flow Rate Maximum scfh	Delivery Range for Internal Adjustable Regulator psig	Switchover Pressure psig	Inlet Pressure Gauges psig	Delivery Pressure Gauge psig
Oxygen/Inert	3000	1200	30–125	170	0–4000	0–200
Oxygen/Inert-HP Version	3000	2000	50–200	230	0–4000	0–400
Flammable Gas	3000	1200	30–125	170	0–4000	0–200
Flammable Gas-HP Version	3000	2000	50–200	230	0–4000	0–400
Carbon Dioxide, Nitrous Oxide	2000	35	30–125	170	0–4000	0–200
Carbon Dioxide, Nitrous Oxide- High Flow Version	2000	500	50–200	230	0–4000	0–400
Acetylene	400	500	0–15	65	0–400	0–30
Liquefied Petroleum Gases	400	500	0–30	65	0–400	0–100

Use Table I as reference and following tables to select the appropriate part number for your order.

Part Number	Gas Service
CBA-I-1-(CGA)	Oxygen/Inert (30–125 psig)
CBA-I-2-(CGA)	Oxygen/Inert (50–200 psig)
CBA-F-1-350	Flammable Gases (30–125 psig)
CBA-F-2-350	Flammable Gases (50–200 psig)
CBA-H-1-(CGA)	Carbon Dioxide, Nitrous Oxide (30–125 psig)
CBA-H-2-(CGA)	Carbon Dioxide, Nitrous Oxide – High Flow Version (50–200 psig)
CBA-AC-510A	Acetylene (0–15 psig)
CBA-FG-510	Liquefied Petroleum Gases (Gas Phase Withdrawal) (0–30 psig)

CGA Number	Gas Service
510A	Acetylene
346	Air
590	Air Industrial
580	Argon, Nitrogen, Helium
320	Carbon Dioxide
350	Hydrogen, Methane, Natural Gas
510	LPG Fuel Gas
326	Nitrous Oxide
540	Oxygen

Where (CGA) is indicated above, insert appropriate Compressed Gas Association (CGA) connection number from the Pure Gas CGA chart to complete the model number. Example: CBA-I-1-580. Please order by complete part number.

Model CBA-AC-510A: Acetylene systems include pipeline dry-type flashback arrestor, ASME relief valve with check valve, and individual pigtail flashback arrestors on cylinder ends.

# Liquid Cylinder Changeovers

## Gas Phase Withdrawal-VGL Cylinders, Automatic

### Model CBCA

Model CBCA is designed to provide a continuous supply of vaporized gas from two or more VGL cryogenic containers. It automatically switches supply from the primary container to the reserve container allowing the user to deplete gas in a container without the concerns of gas outages and of wasting unused gas as a result of premature change-outs. When the system is in use, the built-in gas economizer circuit directs accumulated pressure from the reserve supply container(s) to the process before the container relief valve opens, venting useable product to the atmosphere. When the system is not operating, the gas economizer inactivates allowing both supplies (containers) to accumulate pressure and vent to atmosphere. Adequate ventilation should always be provided to safely remove or dispense the gaseous discharge from cryogenic container reliefs.

All components including the delivery pressure regulator are enclosed and protected inside a tamper-resistant case. The delivery pressure is initially set by the operator by opening the front cover of the case and adjusting the stem of the delivery regulator clockwise until the desired pressure is indicated on the delivery pressure gauge.

Green lights indicate the primary container is functioning and the reserve container is ready for service. A red light alerts the user that the unit has changed over and one or both containers (banks) are depleted. When the empty container is serviced, the user resets the primary container by turning the knob which also indicates the side in service.



Model CBCA

### Benefits and Features

- Integral visual alarm system is standard, remote audio-visual alarm optional.
- Gas economizer prevents reserve container pressure from being wastefully discharged to atmosphere during operation.
- All changeovers include brass constructed regulators and 72" stainless steel double braided flexible pigtailed.
- Adaptable with manifold headers up to 3 containers per side.
- Check valve in pigtail CGA prevents discharge of gas when changing containers.

Table I

Part Number	Inlet Pressure Maximum psig	Delivery Range psig	Switchover Pressure psig	Inlet Pressure Gauges psig	Delivery Pressure Gauge psig
CBCA-1-(CGA)**	235	20-100	140	0-400	0-200
CBCA-2-(CGA)**	350	40-180	240	0-600	0-400

\*\* CBCA-1 requires using 230 psi relief dewars only.  
CBCA-2 requires using 350 psi relief dewars only.

### Specifications

#### Flow Capacity\*:

IGCBCA-1: 750 scfh N<sub>2</sub>

IGCBCA-2: 800 scfh N<sub>2</sub>

Electrical: 120 volts (AC), 1.25 amps.

Manifold Outlet: 1/2" NPT male

Relief Valve Outlet: 1/4" NPT male

Manifold Inlets: CGA 580 Adapter

#### Flexible Hose Pigtailed (includes two):

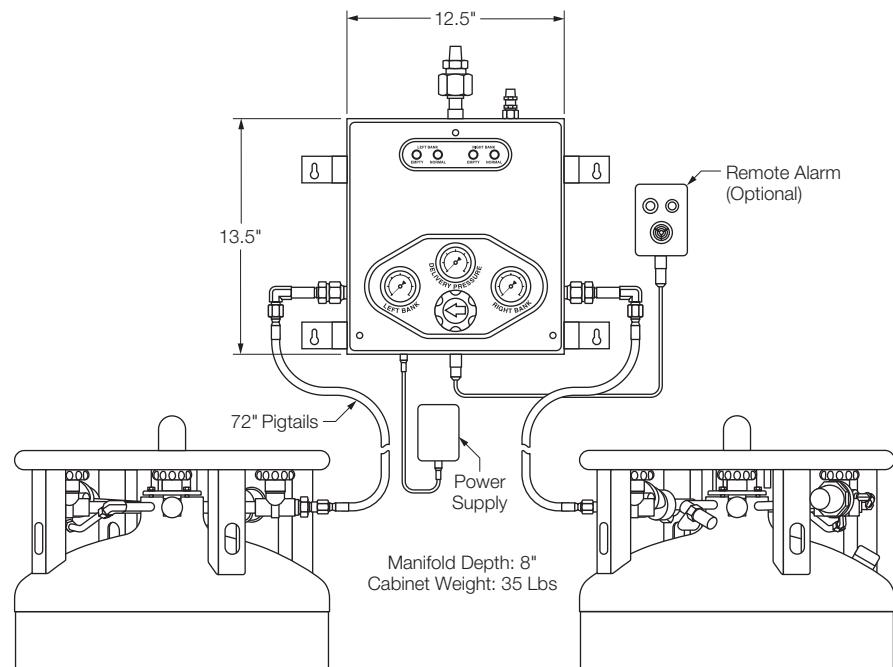
6' stainless steel inner core with double over-braid (other lengths available – please specify)

Inlet CGA: CGA 540 or 580 connections with integral check valve nipples (standard) as specified.

\* To obtain this flow capacity, the use of three cylinders with vents manifolded together are required.

### Optional Equipment

Model IG-CBI-ALARM: Remote Audio/Visual Alarm with 120 VAC transformer and 10' interconnecting cable with mating connectors.



# High Flow Switchover Manifolds

## Automatic, Primary and Secondary Regulation

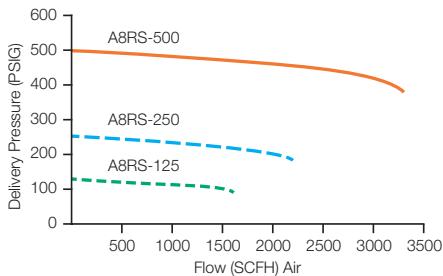
### Model A8RS

Switchover manifolds are ideal for providing continuous high flow of gas between a primary and secondary or backup supply. When the primary gas supply has been depleted, this unit automatically switches to the secondary supply—thus enabling the user to entirely deplete the gas contained in a single or multi-cylinder source without creating a gas outage. This also eliminates the possibility of wasting valuable gas due to premature cylinder change-out. Model A8RS manifold is highly recommended for use with all industrial or high purity noncorrosive gases to provide constant delivery pressure control to instrumentation by incorporating a secondary outlet line regulator. Downstream line or station regulation is not necessary unless various distribution point pressures are required. These automatic switchover manifolds handle flow rates up to 3000 scfh, at delivery pressures up to 500 psig. The unit is equipped with a heavy-duty, stainless steel bracket for convenient wall-mount installations.

### Benefits and Features

- Brass construction with ½" NPT inlet and outlet ports.
- Stainless Steel diaphragms.
- One-piece encapsulated seat design with internal filter and PTFE seat.
- Tamper-proof and self-reseating high pressure relief valve.
- Stainless Steel front panel.
- 72" stainless steel flexible pigtails with integral CGA check valves.
- 2.5" dual-scale gauges (psi/bar)

### Typical Performance

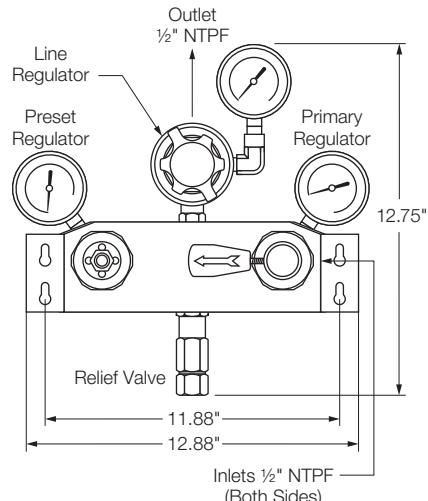


### Specifications

- Maximum Inlet Pressure:** 3000 psig  
**Inlet Pressure Gauges (dual scale):** 0–4000 psig / 0–275 bar  
**Operating Temp. Range:** -40°F to 140°F  
**Flow Capacity:** See typical performance flow curve  
**Filters:** 10 micron  
**Inlet Connection:** ½" NPT female port (body) with 580 CGA adapter installed and CGA connections (as specified) on pigtails  
**Outlet Connection:** ½" NPT female  
**Relief Valve Outlet:** ½" NPT female  
**Flexible Hose Pigtails (includes two):** 6' stainless steel inner core with double overbraid  
**Inlet CGA:** Standard with check valve nipple  
**Weight (approx.):** 22 lbs



Model A8RS



Part Number	Delivery Pressure Range psig	Delivery Pressure Gauge psig	Flow Rate Maximum scfh	Switch Over Pressure psig
IGA8RS-125-(CGA)	0–125	0–200	1600	260–160
IGA8RS-250-(CGA)	0–250	0–400	2200	400–300
IGA8RS-500-(CGA)	0–500	0–200	3000	680–560

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: IGA8RS-125-580. Order by complete part number.

# Semi-Automatic Switchover

Pressure Differential, Brass, High Flow, General Purity

## Model AS

The Model AS Manifold uses two high flow regulators (one connected to each bank) which act as a changeover device. Delivery pressure of regulator No. 1 is set 10–15 psi higher than regulator No. 2. This causes regulator No. 1 to flow gas while holding regulator No. 2 closed. When the gas in bank No. 1 is exhausted, regulator No. 2 will begin to flow gas. Inlet pressure gauges on the regulators indicate pressure in each manifold bank. When gas in the first cylinder bank has been exhausted and a changeover has occurred, the empty cylinders are replaced and the regulator delivery pressure settings are readjusted. This will cause a reverse changeover when bank No. 2 is exhausted. Because delivery pressure drops slightly when a changeover occurs, the outlet regulator (Model 35 ordered separately based upon delivery pressure requirements) will eliminate delivery pressure variations.

### Benefits and Features

- Maximum inlet pressure is 3000 psig.
- Acetylene systems (CGA 510A) include dry-type flash arrestors on pigtail end.
- Master shutoff valves included.
- Headers include 24" flexible pigtails, check valves and station valves. Hydrogen, helium and oxygen systems include stainless steel flexible pigtails. All other systems include stainless steel flexible pigtails with a PTFE-lined inner core.
- ½" brass construction with silver-brazed connections with two Model A30 high flow regulators (see page 80).
- Outlet regulator sold separately (see page 81).
- CGA 1340 or 1350 (flammable gases) female outlet connection.
- See Model AH header manifolds for additional specifications.

### Ordering Information

To create a part number, use the codes listed in each column of the Part Number Key shown below. For example, to order a switchover manifold for three cylinders on the left and three cylinders on the right for hydrogen gas service, the part number would be IGAS-3L3R350H. Order by complete part number.

### Part Number Key

Model Number	No. of Cylinders		CGA Code	Gas Service*
	Left Header	Right Header		
IGAS-	1L	1R	510A	Acetylene
	2L	2R	346	Air
	3L	3R	590	Air (Industrial)
	4L	4R	580	Argon, Nitrogen
			320	Carbon Dioxide
			580H	Helium
			350H	Hydrogen
			510	LPG Fuel Gas
			350	Methane, Natural Gas
			540	Oxygen

\* Pigtails include check valve at cylinder connection. Acetylene pigtails (CGA 510A) include dry-type flash arrestor on cylinder end. All pigtails for hydrogen (350H), helium (580H) and oxygen (540) service are constructed with stainless steel inner core and a double overbraid.

Please note: manifold accessories are available—contact your ASGE representative for more information.



# Line Station Drops

## Single and Double Outlet

### Model ASD

Line station drops provide a means of safely conveying gas from a centralized pipeline for use with welding gas stations. Model ASD Station Drops are available in either single or double outlet configuration. They come with a master shutoff valve, CGA specific pipeline fittings for regulators and flowmeters, cap and chain to protect the outlet fitting, and a drip leg and plug for the removal of moisture that can accumulate in gas piping systems. In addition, the devices are properly labeled to avoid the misapplication of gases.

Note: Line Station Drops are commonly used without Model A70 Station Drop Regulators. (see page 89)

### Benefits and Features

- Maximum inlet pressure is 200 psig.
- 1/4 turn in-line shutoff valve (1/2" NPT female inlet) controls on and off flow of gas at station drop.
- Each drop station is labeled for gas service for added safety.
- Gas-specific CGA outlet connection.
- Cap and chain plug included.
- Drip leg for moisture removal.
- Available in single or double outlet configurations.



IGASD-ILPG

Part Number			
Single Outlet (25" length)	Double Outlet (35" length)	Gas Service	Outlet Connection
IGASD-1C2H2	IGASD-2C2H2	Acetylene	7/8"-14 LH Male
IGASD-1AIR	IGASD-2AIR	Air (Compressed)	9/16"-18 RH Male
IGASD-1AR	IGASD-2AR	Argon	5/8"-18 RH Female
IGASD-1CD	IGASD-2CD	Carbon Dioxide	5/8"-18 RH Female
IGASD-1HE	IGASD-2HE	Helium	5/8"-18 RH Female
IGASD-1H2	IGASD-2H2	Hydrogen	7/8"-14 LH Male
IGASD-1LPG	IGASD-2LPG	LPG Gases	7/8"-14 LH Male
IGASD-1N2	IGASD-2N2	Nitrogen	5/8"-18 RH Female
IGASD-1O2	IGASD-2O2	Oxygen	7/8"-14 RH Male

# Backup Regulator System

## Two-Stage, Automatic, Secondary Regulation, Critical Purity

### BRS Series

The BRS System is designed to provide back-up gas supply where gas generators, compressors or house line gases are the primary source of process gas. The BRS Series allows supply systems to be turned off for service or maintenance without disturbing the gas flow or pressure to high purity applications. Unlike changeover systems, the Advanced BRS System automatically provides back-up gas on an as needed basis, buffering deficiencies in supply pressure. The system activates (backs-up) when the supply pressure drops below the BRS preset pressure and deactivates when the supply pressure rises above the preset pressure allowing for the primary source of gas to flow. Monitoring or operator adjustments are not required during the back-up activation or deactivation.

The BRS System design incorporates a two-stage regulator, line regulator and in-line check valves. Diaphragm seal valves allow for either supply pressure isolation or cylinder isolation when a change of cylinders is required. Available in either brass or stainless steel construction, they are supplied entirely installed on a stainless steel panel providing for convenient, wall-mounted installation. The overall compact design allows for installation in areas where space is at a premium.

### Standard Features

- Allows main gas supply to be turned off for service without disturbing gas flow to application.
- Critical Purity Diffusion Resistant Regulators assures maximum diffusion resistance of air into the system, maintaining the purity of the gas.
- Diaphragm Seal Isolation Valves allow for complete isolation of the gas source when making a changeout.
- Check Valves prevent backflow of gas from regulator and pigtail.

### Specifications

#### Maximum Inlet Pressure:

High Pressure Back-up Side: 3000 psig

Low Pressure Primary Supply Side:

See Table I

#### Flow Capacity:

BRS-X-50: 30 slpm N<sub>2</sub>

BRS-X-100: 60 slpm N<sub>2</sub>

BRSH-X-100: 250 slpm N<sub>2</sub>

#### Inlet Pressure Gauges (dual scale):

High Pressure Back-up Side: 0-4000 psig / 0-275 bar

Low Pressure Primary Supply Side:

See Table I

#### Minimum Inlet Pressure Required: 60 psig

#### Delivery Pressure Range: See Table I

#### Delivery Pressure Gauge: See Table I

#### Gauge Size: 2" Dial

#### Flow Coefficient:

Two-stage Back-up Regulator: Cv = 0.06

Line Regulator:

BRS: Cv = 0.13

BRSH: Cv = 1.8

#### Operating Temp. Range: -40°F to 140°F

#### Inlet Connections:

High Pressure Back-up: 3' Str. Stl.  
Flexible Hose with Inlet CGA connection  
as specified  
Low Pressure Primary Supply: 1/4" NPT  
female

#### Outlet Connection:

BRS: 1/4" NPT female  
BRSH: 3/4" NPT female

Weight (approx.): 10 lbs

### Materials of Construction

#### Regulator Bodies:

Brass Systems: Brass Bar Stock  
Stainless Steel Systems: Type 316 SS  
Bar Stock

#### Diaphragms:

Type 316 SS  
Brass Systems: Brass  
Stainless Steel Systems: Type 316 SS

#### Bonnets:

Brass Systems: Brass  
Stainless Steel Systems: 300 Series SS

#### Other Metal Parts Exposed to Gas:

Brass Systems: Brass and Stainless Steel  
Stainless Steel Systems: Type 316 SS

#### Seats and Seals: PTFE

#### Check Valve Seats:

L.P. Inlet: Viton®

CGA Nipple:

EPDM with Brass Systems

Viton® with Stainless Steel Systems

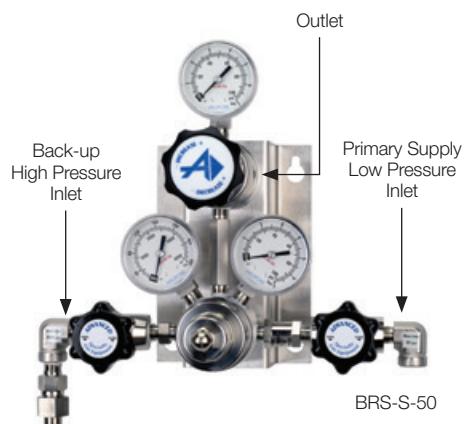
#### Isolation Valves:

##### Body:

Brass Systems: Brass Bar Stock  
Stainless Steel Systems: Type 316 SS  
Bar Stock

Diaphragms: Type 316 SS

Seats: PCTFE



Model BRS Installed as Back-up for Gas Generator  
(Generator tubing sold separately)

Table I

Part Number	BRS Preset Backup Pressure psig	Inlet – Low Pressure Primary Supply (Right Side)			Delivery Pressure		
		Maximum psig	Gauge (dual scale) psig	bar	Range psig	Gauge (dual scale) psig	bar
<b>Brass Systems</b>							
BRS-B-50-(CGA)	50	180	0–200	0–14	4–45	0–100	0–7
BRS-B-50D-(CGA)*	50	380	0–400	0–28	4–45	0–100	0–7
BRS-B-100-(CGA)	100	180	0–200	0–14	5–90	0–200	0–14
BRS-B-100D-(CGA)*	100	380	0–400	0–28	5–90	0–200	0–14
BRSH-B-100-(CGA)	100	180	0–200	0–14	5–90	0–200	0–14
BRSH-B-100D-(CGA)*	100	380	0–400	0–28	5–90	0–200	0–14
<b>Stainless Steel Systems</b>							
BRS-S-50-(CGA)	50	180	0–200	0–14	4–45	0–100	0–7
BRS-S-50D-(CGA)*	50	380	0–400	0–28	4–45	0–100	0–7
BRS-S-100-(CGA)	100	180	0–200	0–14	5–90	0–200	0–14
BRS-S-100D-(CGA)*	100	380	0–400	0–28	5–90	0–200	0–14
BRSH-S-100-(CGA)	100	180	0–200	0–14	5–90	0–200	0–14
BRSH-S-100D-(CGA)*	100	380	0–400	0–28	5–90	0–200	0–14

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number.  
Example: BRS-B-50-590. Order by complete part number.

\* Note: "D" in part number indicates dewar unit supplied with 0–400 psig inlet gauge

### Optional Equipment

Equipment	Part No.	Page No.
Annunciators	SG6551A, SG6552	141
Pressure Switches	SG6520, SG6521	137
Purge/Vent Valves (set of 2 installed prior to isolation valves)		
Brass Systems	SG6680	
Stainless Steel Systems	SG6681	
Replacement pigtauls, flexible 3' length, high pressure side		
Brass Systems	SG6629-CGA	
Stainless Steel Systems	SG6627-CGA	
Compression Fittings (male connectors)		150
Brass Systems		
1/4" NPT male x 1/8" compression	SG6703	
1/4" NPT male x 1/4" compression	SG6704	
Stainless Steel Systems		
1/4" NPT male x 1/8" compression	SG6713	
1/4" NPT male x 1/4" compression	SG6714	

Note: Pigtauls for the primary low pressure inlet connection are available. See page 148 or contact your Advanced Representative for more information.



Model BRS Installed as back-up for Cryogenic Container (Cryogenic container pigtail sold separately)

# Laboratory Gas Cylinder Cabinets

Expanded Size, Enhanced Features for Laboratory and Research

## Model LGC

Our new laboratory safety cabinets provide a safe and cost-effective means to isolate hazardous gas cylinders from the surrounding workplace and protect cylinders and delivery systems from accidental contact, unauthorized handling and tampering. The cabinet exhaust vent is designed to be coupled with a fan (not supplied) to provide a local exhaust gas control system to maximize operator safety when storing and working with hazardous gases.

Gas cylinder leaks due to improper handling, regulator failure, mechanical stress and corrosion can occur in laboratory facilities. Hazardous and corrosive gases such as hydrogen chloride, chlorine, hydrogen sulfide or ammonia should be isolated from the workplace to minimize personnel exposure to toxic leaks. Safe cylinder gas storage is addressed in Federal and local OSHA building and fire codes.

These new laboratory safety cabinets provide substantial enhancements to those offered by standard industrial gas cabinets. The extended size provides more useable space to accommodate larger cylinders and equipment installations; detachable plate(s) on the roof provides ease of access for custom drilling of conduit and gas piping installations; and a safety eye shield in access window(s) provides additional protection for the operator.

Model LGC cabinets are available in single, two and three cylinder configurations, and feature a removable back panel attached to strut channels. The removable panel or strut channels can be used for mounting regulators, valves, custom panels and other components of a gas delivery system. Window(s) permits visual inspection and access into cabinet for adjustments while minimizing operator exposure to potential toxic leaks. Water sprinkler head on the ceiling provides for extra fire protection, while adjustable cylinder brackets secure cylinders from falling in the event of a fire or earthquake.

### Standard Features

- All-welded Construction using 11-gauge steel (exceeds code requirements) provides for extra structural strength.
- Extended Height and Depth Design allows for additional space for larger cylinders and equipment installations.
- Detachable Plate on rear of roof provides ease of access for custom drilling of conduit and gas piping installations.
- Safety Eye Shield in Access Window provides additional protection for the operator.
- Powder-coat Painted Interior and Exterior Finish enhances cabinet appearance.
- Inlet Air-louvered Panel with Filter provides maximum coverage of air flow through cabinet while minimizing contamination from ambient air impurities.
- Removable Panel on inside rear of cabinet can be used to mount gas delivery systems.
- Adjustable Cylinder Bracket(s) with Chain(s) accommodate a large range of cylinder sizes and secures cylinders to prevent toppling.
- Neoprene Gaskets ensure positive seal around door(s) and window(s).
- Door(s) and Wire-reinforced Safety Glass access window(s) close and latch automatically, preventing them from being accidentally left open.
- Keyed Door and Window Latches prevent unauthorized entry.
- Fire Sprinkler Head provides an extra measure of fire protection.
- Exhaust Vent located on top of cabinet designed to connect to a local exhaust gas control system.

- Durable Zinc-plated Steel Diamond Deck Flooring for loading and unloading cylinders.
- Recessed Floor mounting Holes provide ease of installation.
- Oil-free Door and Window closer prevent oil contamination caused by leaking seals.

### Specifications

**Compliances:** Uniform Fire Code, Uniform Building Code, International Fire Code, Safety Guidelines for Semiconductor Manufacturing

**Integral Sprinkler:** 155°F activation, coated with wax for protection from corrosive environments

**Window:** 1/4" thick, wire-reinforced safety glass

**Safety Eye Shield:** Transparent 0.20" thick

**Door Latch:** Flush mounted, paddle type

**Locks:** Matching key lock for door and window

**Door and Window Closer:** Oil-free PTFE seals

**Exhaust Vent Dimensions:** See Table I

**Water Pipe Connection:** 1/2" NPTM

**Color:**

Cabinet: Light gray  
Window Frame: Dark gray

**Paint:** Powder coat

**Surface:** Textured finish

**Flooring:** Diamond deck steel over steel flooring with recessed floor mounting holes

**Dimensions:** See Table I

**Weight (approx.):** See Table I



LGC-2



Access window with safety eye shield

### Materials of Construction

**Cabinet:** 11-gauge cold-rolled steel

**Floor:** Zinc-plated steel

**Gaskets:** Neoprene

**Fasteners and Latch:** Stainless Steel and PTFE

**Removable Back Panel:** Schedule 12-aluminum painted gloss white

**Cylinder Straps:** 1" wide polypropylene strap and secondary zinc-plated steel safety chain

**Filter:** Rigid polyester

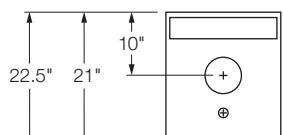
**Safety Eye Shield:** Polycarbonate

### Optional Features

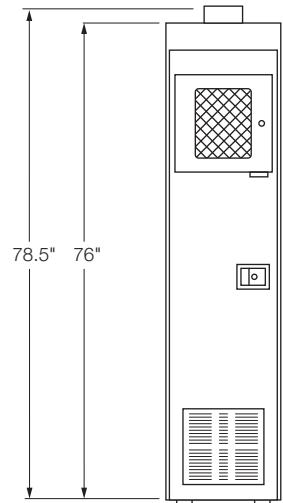
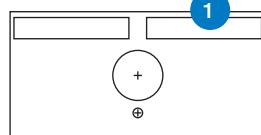
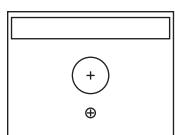
- Adjustable Cylinder Shelves to accommodate smaller sized gas cylinders.
- Fusible Link Fire Dampers automatically close air intake grill should a fire occur.
- Cylinder scales.
- Fixed Gas Detection and monitoring.
- Emergency shut-off and alarm systems.

Table I

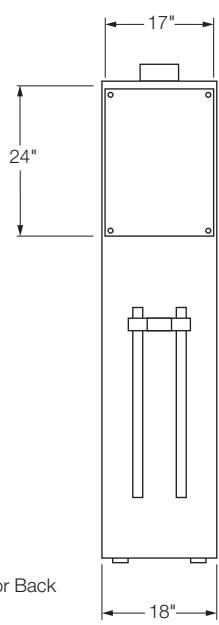
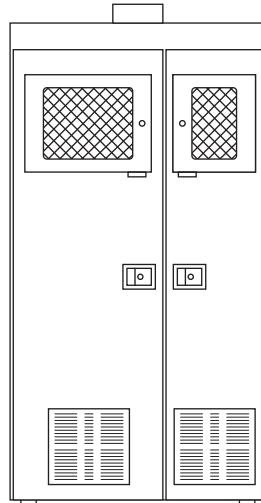
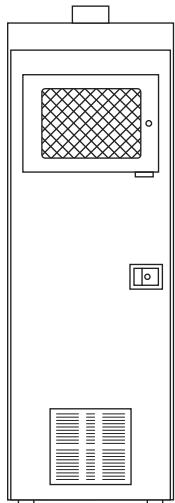
Part No.	Cabinet Type	Dimensions (H x D x W)	Exhaust Vent (diameter)	Approximate Weight (lbs)
LGC-1	1-Cylinder	78.5" x 21" x 18"	6"	280
LGC-2	2-Cylinder	78.5" x 21" x 26"	6"	360
LGC-3	3-Cylinder	78.5" x 21" x 40"	8"	495



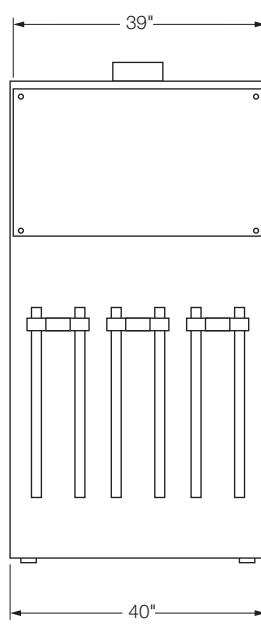
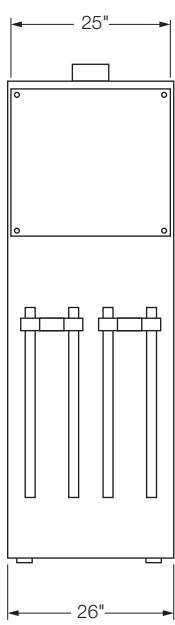
Top View



Front View



Interior Back View



1. Detachable Plate
2. Removable Panel
3. Safety Eye Shield
4. Adjustable Cylinder Brackets
5. Manual Holder
6. Filtered Louver
7. Oil-free Closer
8. Neoprene Gaskets
9. Diamond Deck Flooring

# Gas Cylinder Safety Cabinets

## Economical, Standard, Flat Top Design

### Models GC, GCLB

Gas cylinder cabinets are designed to provide a safe and cost-effective means to isolate hazardous gas cylinders from the surrounding workplace. The cabinet exhaust vent is designed to be coupled with a fan (not supplied) to provide a "local" exhaust gas control system to maximize operator safety when working with hazardous gases. These cabinets also protect cylinders and delivery systems from accidental contact, unauthorized handling and tampering.

Model GC cabinets are designed for standard size compressed gas cylinders and Model GCLB for two inch diameter lecture bottles and small capacity cylinder styles. Both models are available in single to four cylinder configurations. They feature a removable back panel inside the cabinet that may be used for mounting regulators, valves, and other components of the gas delivery system. Windows permit visual inspection and access into cabinet for adjustments while minimizing operator exposure to potential toxic leaks. Water sprinkler heads on the ceiling provide for extra fire protection, while adjustable cylinder brackets secure cylinders from falling in the event of a fire or earthquake.

### Standard Features

- All-welded Construction using 11-gauge steel (exceeds code requirements) provides for extra structural strength.
- Epoxy Painted Texture Finish on outside and smooth finish on inside enhances cabinet appearance.
- Louvered Panel on base of door(s) provides maximum coverage of air flow through cabinet.
- Removable White Back Panel on inside rear of cabinet can be used to mount the gas delivery system.
- Adjustable Cylinder Bracket(s) with Chain(s) accommodate a large range of cylinder sizes and secures cylinders from toppling.
- Door(s) and Access Window(s) Close and Latch Automatically preventing them from being accidentally left open.

### Optional Features

- Adjustable Perforated Shelves accommodate smaller sized gas cylinders.
- Keyed Door Latch prevents unauthorized entry.
- Air Intake Filter allows for process protection by minimizing contamination from ambient air impurities.
- Custom Cabinets and Colors are available to match users needs.
- Fusible Link Fire Dampers automatically close air intake grill should a fire occur.

### Optional Equipment

Equipment	Part No.
Adjustable Shelf	GC-AS
Keyed Door Latch	GC-KL
Air Intake Filter	GC-AF
Fusible Link Fire Damper	GC-FLD
Cylinder Bracket (Fits 7-10 inch diameter cylinders)	GC-CB
Cylinder Bracket (Fits 2 inch diameter lecture bottles)	GC-LBB



Model GC



Model GCLB

Table I

Part Number	Cabinet Type	Dimensions (H x D x W)	Approximate Weight (lbs)
GC-1	1-Cylinder	72" x 18" x 18"	240
GC-2	2-Cylinder	72" x 18" x 24"	285
GC-3	3-Cylinder	72" x 18" x 36"	370
GC-4	4-Cylinder*	72" x 18" x 48"	390

\*Note: Where a gas cabinet is required to meet compliance codes for the use to provide separation of gas hazards, or to increase the threshold quantity for a gas requiring special provisions; the maximum number of cylinders located in a gas cabinet shall not exceed three. Reference the specific code for details and exceptions.

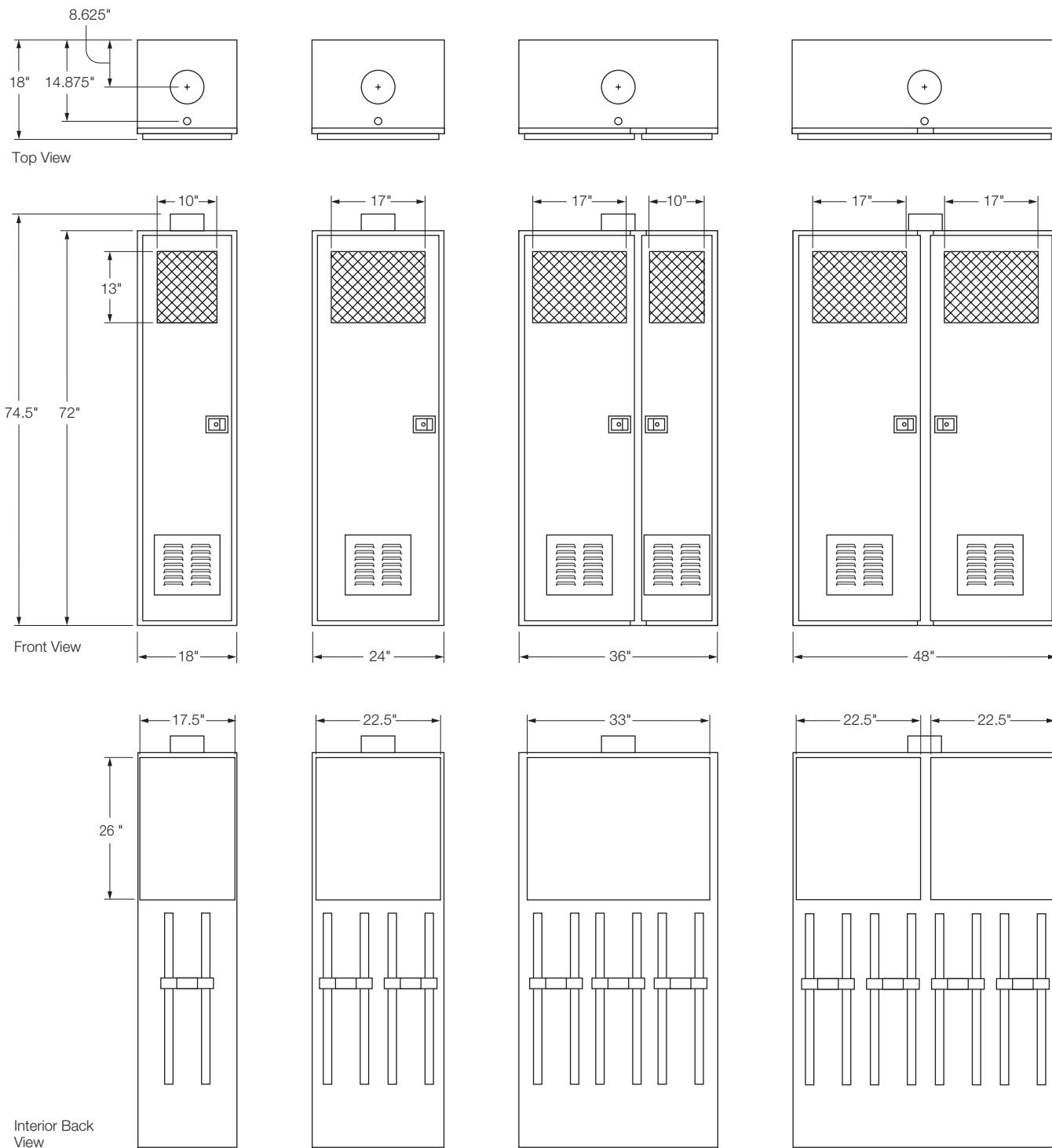
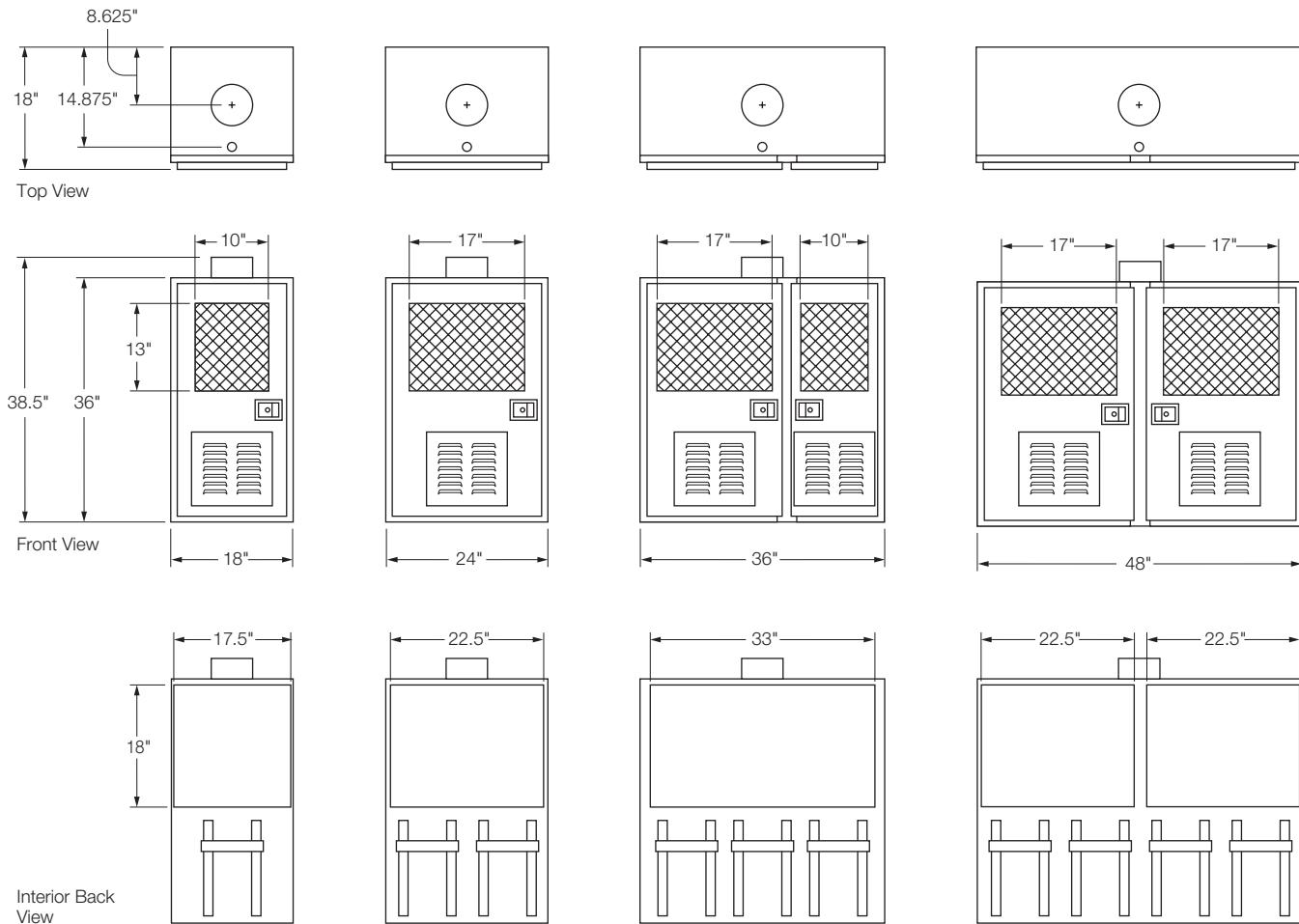


Table II

Part Number	Cabinet Style*	Dimensions (H x D x W)	Approximate Weight (lbs)
GCLB-1	1-Cylinder	36" x 18" x 18"	140
GCLB-2	2-Cylinder	36" x 18" x 24"	150
GCLB-3	3-Cylinder	36" x 18" x 36"	195
GCLB-4	4-Cylinder	36" x 18" x 48"	210

\* Additional cylinders may fit inside the cabinet depending on cylinder size and application. Please specify when ordering.



# Gas Cylinder Security Cages

Lockable, Portable and Cost-Effective

## SC Series

Cylinder security cages provide a convenient way to store high pressure cylinders safely and securely. Available features include: firewalls that meet OSHA compliance requirements for the safe storage of oxygen cylinders located next to fuel gas cylinders, and fork-lift bottoms and lifting ears to facilitate easy movement.

### Standard Features

- Provide secure yet portable storage of high pressure cylinders.
- Provide a cost-effective means to store and protect cylinders from unauthorized handling and tampering.
- E-Track ratchet straps secure cylinders inside cage.
- Polyester powder-coated paint and smooth gloss surface finish.

### Optional Features

- Forklift bottom & lifting ear models facilitate easy movement.
- Firewall models meet OSHA requirements for safe cylinder storage of oxygen cylinders next to fuel gas cylinders.
- Custom cages are available



SC-IN20FW

Models SC-9 and SC-12 – offer an economical option to secure cylinders in a stationary lockable storage container. These units feature 9-gauge expanded metal door and back wall with 14-gauge sheet metal sides. Cylinders are secured with E-Track ratchet straps.

Part No.	Description	No. of Cylinders	Dimensions (H x D x W)	Weight (lbs)
SC-9	Cylinder Storage Cage	9	72" x 34" x 32"	292
SC-12	Cylinder Storage Cage	12	72" x 32" x 42"	345

Models SC-IN20, SC-IN20DW, and SC-IN20FW – hold up to 20 high pressure cylinders. They feature expanded metal siding and are equipped with a forklift bottom and four-point lifting ears to facilitate easy movement. 9-gauge expanded metal sides combined with a lockable door and E-Track strapping system keep cylinders secure. The DW version incorporates a 14-gauge metal divider wall providing distinct cylinder separation. The FW model features OSHA-compliant Marinite® I fiberboard firewall design making it possible to securely store your oxygen with fuel gas or acetylene (130 to 300 CF) cylinders in the same cage.

Part No.	Description	No. of Cylinders	Dimensions (H x D x W)	Weight (lbs)
SC-IN20	Cylinder Storage Cage	20	79" x 50" x 50"	692
SC-IN20DW	Cylinder Storage Cage with Divider Wall	20	79" x 50" x 50"	697
SC-IN20FW	Cylinder Storage Cage with Fire Wall	20	79" x 50" x 50"	950



SC-9

Model SC-DL16 – features a pallet bottom to provide secure delivery from fill plants for delivering nitrous oxide and poison gases. 9-gauge expanded metal sides combined with a double lockable door and E-Track strapping system keep cylinders secure. These units function with pallet trailers.

Part No.	Description	No. of Cylinders	Dimensions (H x D x W)	Weight (lbs)
SC-DL16	Cylinder Security Cage with Pallet Bottom	16	74" x 42" x 39"	470



SC-DL16

Note: When ordering, specify what style pallet bottom to fit your requirements.

# Cylinder Stands & Process Racks

Stationary, Single and Double Sided, Fully Welded

Model PR

Stationary Cylinder Stands and Process Racks provide a safe and cost effective means to mount gas cylinders (from 4 inch to 12 inch diameter) and delivery systems where wall space is inaccessible. They are available in various cylinder configurations and can be supplied with or without process panels. The process panels can be used to mount changeovers, regulators, valves, and other components of a gas delivery system. These fully welded racks are constructed from 11-gauge and heavier plate steel finished in chemical resistant epoxy. Polypropylene straps with non-slip spring catches safely secure gas cylinders to racks. Steel safety chains can be added as an optional secondary support and security in case of fire. Each rack is supplied with predrilled holes for mounting to a floor. Floor mounting bolts are required (not included).

\* Smaller stands and racks are shipped partially assembled and will ship UPS for freight savings. Larger racks ship via freight carrier.

Part No.	Description	No. of Cylinders	Dimensions (H x D x W)	Weight (lbs)
PR-1	Single-Sided Wall/Floor Stand	1	30" x 13.5" x 19"	32
PR-2	Single-Sided Wall/Floor Stand	2	30" x 10.5" x 28"	41
PR-3	Single-Sided Wall/Floor Stand	3	30" x 10.5" x 40"	50
PR-4-IL	Single-Sided Wall/Floor Stand	4	30" x 14" x 55"	77
PR-4	Double-Sided Floor Stand	4	30" x 24" x 32"	64
PR-6	Double-Sided Floor Stand	6	30" x 23" x 44"	84
PR-8	Double-Sided Floor Stand	8	30" x 23" x 56"	100
PR2-PP	Single-Sided Process Rack with Panel	2	72" x 12" x 28"	70
PR3-PP	Single-Sided Process Rack with Panel	3	72" x 12" x 40"	80
PR-4-IL-PP	In-line, Single-Sided Rack with dual mounting struts	4	72" x 14" x 52"	115
PR-4-PP	Double-Sided Process Rack with Panel	4	72" x 24" x 37"	120
PR-6-PP	Double-Sided Process Rack with Panel	6	72" x 24" x 49"	140

## Optional Equipment

Equipment	Part No.
Safety Chain (1 Each)	SG6215
Cylinder Replacement Strap	SG6224



PR-2



PR-4-IL-PP



PR-6-PP

# Cylinder Barricade & Process Racks

## Stationary, Full Perimeter Welded, Double Level Chains

### Models SSR, SSPR

Cylinder Barricade Racks (Model SSR) are recommended where cylinders may be exposed to vehicular traffic or material handling equipment collisions. These racks fully surround cylinders with 2 inch square steel heavy gauge tubes welded and sealed with powder coated epoxy. Two levels of welded steel chains with bit snaps make cylinder racking easy and convenient. Available in standard and custom configurations from one to 16 cylinder capacity, all listed units meet or exceed requirements for UFC, NFPA, CGA, and OSHA, as well as Seismic Zone 4 construction and application requirements.

Cylinder Barricade Process Racks (Model SSPR) additionally include 2 strut mounting process rails at a 67 and 72 inch height from the floor. The process rails allow mounting of pressure reduction equipment, panels and other components of a gas delivery system for convenient accessibility.

All racks include: 2 by 2 inch 0.125 inch wall steel square tubes, fully welded (ASTM A-500) construction support structure, #2/0 twist loop plated steel chains with welded links and mounting holes on lower tube structure and are powder painted black semi-gloss with UV inhibitors and electro-deposition base coat protection. For seismic installations, S4 rated anchor bolts,  $\frac{3}{8}$  inch diameter by 5 inch long are recommended (not included). Racks are shipped fully assembled.

Table I, Cylinder Barricade Racks

Part No.	Cylinders (Wide x Deep)	Dimensions (H x D x W)	Weight (lbs)
SSR-11	1 (1 x 1)	30" x 16" x 16"	58
SSR-12	2 (1 x 2)	30" x 28" x 16"	82
SSR-13	3 (1 x 3)	30" x 38" x 16"	92
SSR-14	4 (1 x 4)	30" x 50" x 16"	110
SSR-21	2 (2 x 1)	30" x 16" x 30"	91
SSR-22	4 (2 x 2)	30" x 28" x 30"	120
SSR-23	6 (2 x 3)	30" x 38" x 30"	154
SSR-24	8 (2 x 4)	30" x 50" x 30"	190
SSR-31	3 (3 x 1)	30" x 16" x 42"	124
SSR-32	6 (3 x 2)	30" x 28" x 42"	165
SSR-33	9 (3 x 3)	30" x 40" x 42"	211
SSR-34	12 (3 x 4)	30" x 52" x 42"	308
SSR-41	4 (4 x 1)	30" x 16" x 58"	194
SSR-42	8 (4 x 2)	30" x 28" x 58"	249
SSR-43	12 (4 x 3)	30" x 40" x 58"	294
SSR-44	16 (4 x 4)	30" x 52" x 58"	339

Note: Cryogenic container racks are available. Contact your Advanced Representative for more information.

Table II, Cylinder Barricade Racks with Process Rails

Part No.	Cylinders (Wide x Deep)	Dimensions (H x D x W)	Weight (lbs)
SSPR-11	1 (1 x 1)	72" x 16" x 16"	88
SSPR-12	2 (1 x 2)	72" x 28" x 16"	112
SSPR-21	2 (2 x 1)	72" x 16" x 30"	126
SSPR-22	4 (2 x 2)	72" x 28" x 30"	155
SSPR-31	3 (3 x 1)	72" x 16" x 42"	164
SSPR-32	6 (3 x 2)	72" x 28" x 42"	205
SSPR-41	4 (4 x 1)	72" x 16" x 58"	239
SSPR-42	8 (4 x 2)	72" x 28" x 58"	294



SSR-21



SSR-34



SSPR-22

# Fire Resistant Barrier Partitions

## One Hour Fire Rated, Oxidizing/Fuel Gas Separator

### Model FRB

Fire Resistant Barrier Partitions meet and exceed NFPA and CGA requirements for cylinder fire separation partitions. Designed for use in combination with Model SSR Cylinder Barricade Storage Racks (sold separately), these fire resistant barriers also mount to exterior walls and floors using predrilled mounting holes (fasteners not included). One side is fabricated with an end wall connector while the other side is provided with a free standing wall brace to help stabilize unit during installation. Hoist hooks on top edging provide a means to lift and maneuver the partition into position.

Partitions are constructed of 14-gauge exterior wall sheathing with continuous rectangular tube frame around full circumference and Marinite® I fire block interior material. Each partition is fully welded and powder painted with ASA 61 gray for exceptional durability.



FRB-28

Table I, Fire Resistant Partitions

Part No.	Description	Dimensions (H x D x W)	Weight (lbs)
FRB-12	Fire Resistant Barrier (Sized for Oxygen/Fuel Gas Cylinder Separation)	60" x 1.25" x 12"	119
FRB-28	Fire Resistant Barrier (Narrow)	75" x 1.75" x 28"	150
FRB-52	Fire Resistant Barrier (Wide)	75" x 1.75" x 52"	188



FRB-52



Cylinder Barricade Rack with Firewall Barrier

# Pressure Switches

## General and Explosion-Proof Service

Models SG6540, SG6541

Pressure switches monitor line pressure and can activate an external alarm (not supplied) when a certain predetermined pressure is reached. They can be set to activate on either increasing or decreasing pressure.

Pressure switches are commonly used with cylinder manifolds to warn against product depletion. For example, a switch set to activate on decreasing pressure can alert the user that manifold pressure is low and that a cylinder changeout is required.

Two models of pressure switches are available; a general service version for nonflammable gases, and an explosion-proof version for flammable gases. The explosion-proof model has a hermetically sealed switching element capsule that is UL listed and CSA certified for use in hazardous locations Class I Groups A, B, C, D and Class II Groups E, F, G, Divisions 1 and 2. Each model has a single pole, double throw, electrical switch with a maximum rating of 15 amps at 250 VAC. Their weather-tight housings are constructed of aluminum.

Pressure switches are supplied with two compression-type male connectors and five feet of stainless steel tubing for connection to a manifold or pipeline.

### Specifications

**Maximum Inlet Pressure:** See Table I

**Operating Temp. Range:** -30°F to 200°F  
(+32°F to 400°F with Viton® seals)

**Adjustable Pressure Range:** See Table I

**Electrical Rating:** 15 amps at 250 VAC  
5 amps at 30 VDC (resistive)

**Minimum Current Required:** 100mA

**Housing:** NEMA 4, 4X, IP65

**Pressure Port Connection:** 1/4" NPT female

**Male Connectors (2 supplied):** 1/4" NPT male by 1/8" compression and 1/8" NPT male by 1/8" compression

**Tubing:** 5' x 1/8" OD x 0.028" wall

**Weight (approx.):**

SG6540: 2 lbs

SG6541: 3 lbs

### Materials of Construction

**Housing:** Aluminum

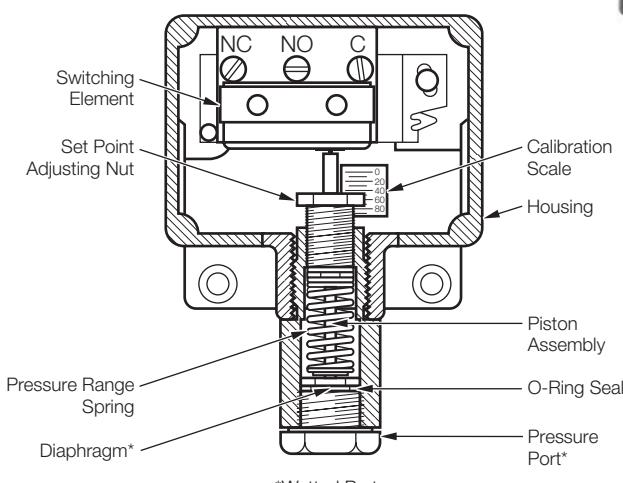
**Diaphragm:** Type 316 SS

**Pressure Port:** Type 316 SS

**Seal:** See Table I

**Male Connectors:** Type 316 SS

**Tubing:** Type 316 SS



Internal view of pressure switch

Table I

General Service Part No.	Explosion-Proof Service Part No.	Maximum Inlet Pressure	Adjustable Range**	O-Ring Seal Material
SG6540-2-N-(psig)	SG6541-2-N-(psig)	3000 psig	12–100 psig	Neoprene
SG6540-2-V-(psig)	SG6541-2-V-(psig)	3000 psig	12–100 psig	Viton®
SG6540-3-N-(psig)	SG6541-3-N-(psig)	3000 psig	45–550 psig	Neoprene
SG6540-3-V-(psig)	SG6541-3-V-(psig)	3000 psig	45–550 psig	Viton®
SG6540-4-N-(psig)	SG6541-4-N-(psig)	5000 psig	500–4000 psig	Neoprene
SG6540-4-V-(psig)	SG6541-4-V-(psig)	5000 psig	500–4000 psig	Viton®

Where "(psig)" is indicated above, insert desired pressure setting. Example: SG6540-2-N-20. Switch will be factory set to activate at 20 psig.

Note: Models SG6540-4 and SG6541-4 can be factory set to activate up to 2000 psig. Settings for pressures above 2000 must be field set.

\*\* Other ranges available on special order.



# Indicating Pressure Switch

Adjustable Setpoint, Critical Purity, 32Ra Finish Stainless Steel

Model AG6548

These indicating pressure switches are designed to provide economical pressure monitoring with setpoint indication for high purity, toxic and corrosive gases. In addition to providing accurate ( $\pm 2\%$  of span) indication of gas pressure, this 2 inch diameter instrument incorporates a magnetically actuated, switch capable of operating low voltage annunciators, lights or relays. When used with the appropriate pull-up or pull-down resistors, the monitor can be connected to the input port of a microprocessor or to a logic network. It may also be used as an input to a programmable controller.

Moving the colored index on the front dial to the desired setpoint sets the switch. A small magnet fastened to the indicating pointer actuates the switch. A magnetic latch on the switch permits the switch to remain "on" or "off" after the pointer passes the operating point, without restraint on the indicating pointer. The switch can be factory ordered to close on increasing pressure (HA) or close on decreasing pressure (LA). The switch action will be noted on the tail of the pointer.

**Warning:** We strongly recommend the use of our Explosion-Proof Type Pressure Switch Model SG6541 for all flammable applications.

## Specifications

### Mechanical

Dial Size: 2" diameter

Gauge Pressure Range: See Table I

Adjustable Setpoint: See Table I

Proof Pressure: 130%

Internal Surface: Type 316L SS

Case: 304 Stainless Steel, electropolished with pressure relief

Window: One piece, threaded polycarbonate

Setpoint Index: Adjustable from 5% to 80% of span

### Working Temperature:

Ambient: -4°F (-20°C) to 149°F (65°C)

Fluid: Maximum 212°F (100°C)

Movement: 300 Series Stainless Steel

Dial: White polycarbonate with pointer stop pin

Bourdon Tube: Seamless Type 316L SS

Connection: Type 316L SS 1/4" NPT, low mount

Surface Finish: 32 Ra

### Electrical

Connection: 26 AWG, PTFE, 10' leads

Maximum Power: 10 watts DC, 12 VA AC

Maximum Switching Current: 0.5 amps AC/DC noninductive

Maximum Switch Voltage: 28 V AC/DC

Indication Accuracy:  $\pm 2\%$  of span

Switch Point Accuracy: Switch will operate when pressure is within  $\pm 2\%$  span of full scale

Switch Operation: End user configurable for setpoint with factory set choices of: Closes on decreasing pressure/opens on increasing pressure (LA option); Closes on increasing pressure/opens on decreasing pressure (HA option)



AG6548HA-3000

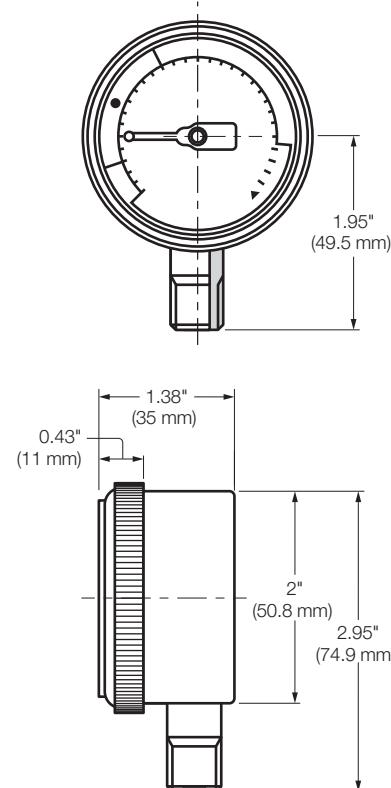


Table I

Part No.	Switch Action	Gauge Pressure Range (psig)	Adjustable Setpoint Min (psig)	Max (psig)
AG6548LA-200	Closes on decreasing pressure/opens on increasing pressure	0-200	10	160
AG6548LA-600	Closes on decreasing pressure/opens on increasing pressure	0-600	30	480
AG6548LA-3000	Closes on decreasing pressure/opens on increasing pressure	0-3000	150	2400
AG6548HA-200	Closes on increasing pressure/opens on decreasing pressure	0-200	10	160
AG6548HA-600	Closes on increasing pressure/opens on decreasing pressure	0-600	30	480
AG6548HA-3000	Closes on increasing pressure/opens on decreasing pressure	0-3000	150	2400

# Pressure Gauge Reed Switch

## Adjustable Setpoint, Economical, Brass and Stainless Steel

Models SG6520, SG6521

These indicating pressure gauges with reed contact assemblies are designed to provide economical pressure monitoring, setpoint indication and fast switching for low power electrical signals. In addition to providing accurate indication of gas pressure, these 2 1/2 inch diameter gauges incorporate a magnetically actuated reed switch capable of operating low voltage annunciations, lights or relays. They are commonly installed on regulators and manifolds to activate an external alarm (such as Models SG6551A, SG6552 Announciators) when a certain predetermined pressure is reached.

The switch setpoint can be adjusted to any pressure between 2% and 90% of the full scale value by moving the index on the front dial to the desired setpoint. On decreasing pressure only, the magnetic indicating pointer "opens" the switch when contact is made with the index. The gauge is designed to move further on the scale while permitting the switch to remain "open" after contact is made with the index.

**Warning:** We strongly recommend the use of our Explosion-Proof Type Pressure Switch Model SG6541 (page 135) for all flammable applications.

### Specifications

#### Mechanical

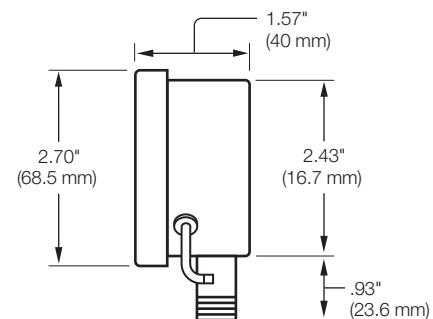
Dial Size: 2 1/2" diameter  
 Gauge Pressure Range: See Table I  
 Adjustable Setpoint: See Table I  
 Indication Accuracy:  $\pm 2\%$  of span  
 Operating Temp. Range: -20°F to 165°F  
 Case and Bayonet Ring: Type 304 SS  
 Window: Laminated safety glass retained in bayonet ring  
 Safety Feature: Solid front and full blow-out safety back  
 Dial: Aluminum alloy, white background, black markings  
 Bourdon Tube:  
     SG6520: Bronze  
     SG6521: Type 316 SS  
 Socket:  
     SG6520: Brass  
     SG6521: Type 316 SS  
 Connection Size: 1/4" NPT male

#### Electrical

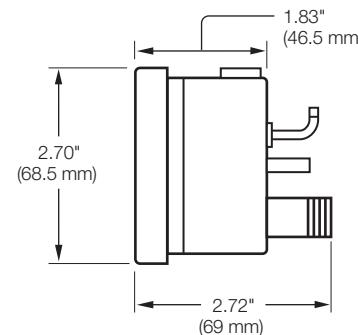
Connection: 39" lead connection cable with 2 wires  
**Maximum Switching:**  
 Capacity: 10 watts (DC), 10 VA (AC)  
 Current: 0.5 amps DC or AC with resistive load  
 Voltage: 75 Volts DC or 50 Volts AC  
 Dead Band: 2.5% maximum  
 Switch Operation: closes on increasing pressure / opens on decreasing pressure



SG6520-3000



Radial Configuration



Panel Mount Configuration

Table I

Part Number Brass	Stainless Steel	Pressure Range (psig)	Case Configuration	Connection Location	Adjustable Setpoint Min (psig)	Max (psig)
SG6520-200-P	SG6521-200-P	0-200	Panel Mount	Lower Back	4	180
SG6520-600-P	SG6521-600-P	0-600	Panel Mount	Lower Back	12	540
SG6520-3000-P	SG6521-3000-P	0-3000	Panel Mount	Lower Back	60	2700
SG6520-3000	SG6521-3000	0-3000	Radial	Bottom	60	2700

# Pressure Gauges

## Compressed Gas, Brass and Stainless Steel

1.5, 2.0 and 2.5 Inch

Brass and Type 316 SS pressure gauges are available with dial diameters of 1½", 2" and 2½". All gauges are of the bourdon tube type except gauges having a 10 psig range or less which have a phosphor bronze diaphragm sensing element.

Brass gauges have an accuracy of ±3–2–3% of full scale (the accuracy of the middle half of the dial range is ±2% and the remaining half of the scale is ±3%). Accuracy of the 2" and 2½" stainless steel gauges is ±2% of full scale. All gauges are cleaned for oxygen service and have bottom (lower) mount, ¼" or ⅛" NPT male or ¼" Welded Female Face Seal Swivel connections.

### Specifications

Design: ASME B40.100

#### Working Pressure:

Steady: ¾ of full scale range

Fluctuating: ⅔ of full scale range

Short Term: full scale value

#### Operating Temperature:

Ambient: -40°F to 140°F (-40°C to 60°C)

Media: 140°F (+60°C) maximum

### Materials of Construction

#### 1½" Dial Gauges

##### Brass Gauges:

Case: Black Plastic or Painted Steel

Dial: White Painted Steel or Plastic

Pointer: Black Aluminum or ABS Plastic

Window: Crystal-clear Plastic

Bourdon Tube: Copper Alloy

Pressure Connection (Socket): Copper Alloy

##### Stainless Steel Gauges:

Case: Stainless Steel

Dial: White Painted Steel or Aluminum

Pointer: Black Aluminum

Window: Snap-in Polycarbonate

Bourdon Tube: Type 316 SS

Pressure Connection (Socket): Type 316 SS

### Materials of Construction

#### 2" and 2½" Dial Gauges

##### Brass Gauges:

Models SG6300, SG6312 & SG6314

Case: Steel, black finish

Dial: Painted steel

Window: Acrylic, screw in

Diaphragm: Phosphor bronze

Socket: Brass

##### All Other Brass Models:

Case: Drawn Polished Brass or SS ZrN

Coated (brass polish appearance)

Dial: White Painted Steel or Aluminum

Pointer: Black Aluminum

Window: Twist-lock Clear Polycarbonate

Bourdon Tube:

30, 60, 400 and 600 psi ranges:

Admiralty Brass or Copper Alloy

All Others: Phosphor bronze or Copper Alloy

Pressure Connection (Socket): Brass or Copper Alloy

##### Stainless Steel Gauges:

1/4" NPT male Connection:

Case: Chrome-Plated Steel or Stn. Stl.

Dial: White Painted Steel or Aluminum

Pointer: Black Aluminum

Window: Twist-lock Clear Polycarbonate

Bourdon Tube: Type 316 SS

Pressure Connection (Socket): Type 316 SS

##### 1/4" Welded Female Face Seal Swivel Connection:

Case: Type 304 SS Electropolished

Dial: White Aluminum

Pointer: Black Aluminum

Window: Twist-lock Clear Polycarbonate

Bourdon Tube: Type 316L SS

Pressure Connection (Socket):

Face Seal Nut: Type 316 SS

Face Seal Gland: Type 316L SS



468EC4K



468C400



468B7500



468ES200VCR

Table I, 1½ inch Dial Dual Scale Gauges (½" NPT male Connection)

Pressure Range psig / bar	Brass – Painted Black Case		Type 316 SS	
	Part No.	Pressure Increments psig / bar	Part No.	Pressure Increments psig / bar
0–15*	468C15	0.5	—	—
0–30 / 0–2	468C30	0.5 / 0.1	468D30	1 / 0.1
0–60 / 0–4	468C60	1 / 0.1	—	—
0–100 / 0–7	468C100	2 / 0.1	468D100*	5
0–200 / 0–14	468C200	5 / 0.2	468D200	5 / 0.2
0–300 / 0–21	468C300	5 / 0.5	468D300*	5
0–400 / 0–27.5	468C400	10 / 0.5	—	—
0–600 / 0–40	468C600	10 / 1	468D600	10 / 1
0–1000*	468C1K	20	—	—
0–2000*	468C2K	50	468D2K	50 / 2
0–3000 / 0–200	468C3K	50 / 5	468D3K	50 / 5

\* This is a single scale (psig) gauge.

Table II, 2 inch Dial Single Scale Gauges (¼" NPT male Connection)

Pressure Range psig	Brass		Type 316 SS	
	Part No.	Pressure Increments psig	Part No.	Pressure Increments psig
30" Hg–0–30	SG6380	1	SG6361	1
0–30**	SG6381	1	—	—
0–30	SG6382	1	—	—
0–60	SG6383	2	SG6362	1
0–100	SG6384	2	SG6363	1
0–200	SG6385	5	SG6364	5
0–400	SG6386	10	SG6365	5
0–600	SG6387	10	SG6366	10
0–1000	SG6388	20	SG6367	10
0–2000	SG6389	100	SG6368	25
0–3000	SG6390	100	SG6369	50
0–4000	SG6391	100	SG6370	50
0–5000	SG6392	100	SG6371	100

\*\*\* This is a red lined gauge from 15–30 psig for high pressure acetylene gas warning.

Table III, 2 inch Dial Dual Scale Gauges (¼" NPT male Connection)

Pressure Range psig / bar	Brass		Plated Brass		Type 316 SS	Pressure Increments psig / bar
	Part No.	Part No.	Part No.	Pressure Increments psig / bar		
0–15 / 0–1	468EB15	468EC15	0.2 / 0.02	—	—	—
0–30 / 0–2	468EB30	468EC30	1 / 0.05	468ES30	0.5 / 0.05	—
0–30 / 0–2**	468EB30V	468EC30V	1 / 0.05	468ES30V	1 / 0.05	—
0–30 / 0–2***	—	468EC30R	0.5 / 0.05	—	—	—
0–60 / 0–4	468EB60	468EC60	1 / 0.1	468ES60	1 / 0.1	—
0–60 / 0–4**	468EB60V	—	1 / 0.1	468ES60V	2 / 0.1	—
0–100 / 0–7	468EB100	468EC100	2 / 0.1	468ES100	2 / 0.1	—
0–100 / 0–7**	468EB100V	468EC100V	2 / 0.1	468ES100V	2 / 0.1	—
0–200 / 0–14	468EB200	468EC200	5 / 0.5	468ES200	5 / 0.2	—
0–200 / 0–14**	468EB200V	468EC200V	5 / 1	468ES200V	5 / 0.5	—
0–300 / 0–21	—	—	—	468ES300	5 / 0.5	—
0–300 / 0–21**	—	—	—	468ES300V	5 / 0.5	—
0–400 / 0–28	468EB400	468EC400	10 / 0.5	468ES400	10 / 0.5	—
0–600 / 0–42	468EB600	468EC600	10 / 1	468ES600	10 / 1	—
0–1000 / 0–69	468EB1K	468EC1000	20 / 1	468ES1K	20 / 1	—
0–2000 / 0–138	468EB2K	—	50 / 2	—	—	—
0–4000 / 0–276	468EB4K	468EC4K	100 / 5	468ES4K	100 / 5	—

\*\* This is a compound gauge with a 30" Hg–0 vacuum scale in addition to the positive pressure range indicated.

\*\*\* This is a red lined gauge from 15–30 psig / 1–2 bar for high pressure acetylene gas warning.

Table IV, 2½ inch Dial Single Scale Gauges (¼" NPT male Connection)

Pressure Range psig	Brass Part No.	Pressure Increments psig	Type 316 SS Part No.	Pressure Increments psig
0–35 in H <sub>2</sub> O	SG6300	1 in	—	—
0–32 oz	SG6312	1 oz	—	—
0–5	SG6314	1 oz	—	—
0–10	SG6313	0.2	—	—
0–15	—	—	SG6337	0.25
30" Hg–0–30	SG6310	1	SG6336	1
0–30	SG6301	1	SG6338	0.5
0–60	SG6302	2	SG6339	1
0–100	SG6303	2	SG6340	2
0–200	SG6304	5	SG6341	2
0–300	—	—	SG6342	5
0–400	SG6305	10	SG6347	5
0–600	—	—	SG6343	10
0–1000	SG6306	20	SG6344	10
0–3000	—	—	SG6345	50
0–4000	SG6309	100	SG6346	50
0–7500	SG6311	100	SG6348	100
0–10000	--	—	SG6349	100

Table V, 2½ inch Dial Dual Scale Gauges (¼" NPT male Connection)

Pressure Range psig / bar	Brass Part No.	Pressure Increments psig / bar	Type 316 SS Part No.	Pressure Increments psig / bar
0–15 / 0–1	468B15	0.2 / 0.02	468S15	0.2 / 0.02
0–30 / 0–2	468B30	0.5 / 0.05	468S30	0.5 / 0.05
0–30 / 0–2**	—	—	468S30V	1 / 0.5
0–60 / 0–4	468B60	1 / 0.1	468S60	1 / 0.1
0–100 / 0–7	468B100	2 / 0.1	468S100	2 / 0.1
0–100 / 0–7**	468B100V	2 / 0.2	468S100V	2 / 0.2
0–200 / 0–14	468B200	5 / 0.2	468S200	5 / 0.2
0–400 / 0–28	468B400	10 / 0.5	468S400	10 / 0.5
0–600 / 0–42	468B600	10 / 1	—	—
0–1000 / 0–69	468B1000	20 / 1	—	—
0–2000 / 0–138	468B2K	50 / 2	—	—
0–3000 / 0–207	468B3000	50 / 5	468S3K	50 / 5
0–4000 / 0–276	468B4K	100 / 5	468S4K	100 / 5

\*\* This is a compound gauge with a 30" Hg–0 vacuum scale in addition to the positive pressure range indicated.

Table VI, 2 inch Dial Dual Scale Gauges (¼" Welded Female Face Seal Swivel Connection)

Pressure Range psig / bar	Type 316 SS Part No.	Pressure Increments psig / bar
0–60 / 0–4**	468ES60VCR	2 / 0.1
0–200 / 0–14**	468ES200VCR	5 / 0.2
0–400 / 0–28	468ES400VCR	10 / 0.5
0–600 / 0–42	468ES600VCR	10 / 1
0–4000 / 0–276	468ES4KVCR	100 / 5

\*\* This is a compound gauge with a 30" Hg–0 vacuum scale in addition to the positive pressure range indicated.

# Single Station Announciators

## One & Two Point, General Service for Indoors

Models SG6551A, SG6552

These general service single station annunciations are housed in wall mountable thermoplastic enclosures intended for indoor use only. They are typically used with regulator, cylinder manifold or changeover systems in combination with pressure switches to alert the user of product depletion. The annunciations can be configured to operate with either normally opened or normally closed pressure switch contacts.

Model SG6551A is a single point annunciation designed to work with a cylinder regulator or manifold system configured with one pressure switch. Model SG6552 is a two-point annunciation that provides operating status for both left and right banks when installed with a changeover incorporating two pressure switches.

The annunciations provide both an audible alarm and visual indication of pressure switch activation. When cylinder pressure is depleted to a user-selectable predetermined level, the contacts on a pressure switch activate the audible alarm and the red alarm lamp corresponding to the empty bank (pressure switch) illuminates. A reset button located on the front panel silences the audible alarm, while the red alarm lamp remains lit until the gas supply is re-pressurized and the pressure switch returns to the reset position. A green lamp confirms that power is on and the supply pressure is adequate for normal operation.

Both models contain a set of relay contacts for use to control a device that can be activated by a normally open or closed switch such as a telephone dialer, external buzzer, light or another alarm monitoring system. Connections to the annunciation are made through circular male input and output connectors. A 3 foot long input cable is supplied with the annunciation when purchased with an ASGE pressure control system for local connection. A 3 foot long input cable with flying lead ends is supplied when purchased separate or when installed for remote connection with customer supplied cabling.

### Standard Features

- Operates with either normally opened or closed pressure switch contacts.
- High profile audible alarm alerts user of pressure switch activation
- Reset button silences audible alarm
- One dry contact relay output for use with external monitoring devices
- Hi-Impact lightweight ABS plastic housing
- Furnished with UL Listed 120 VAC Class 2 Transformer.
- 3' input cable provided with each annunciation.

### Specifications

- Power Requirements:** 15 VDC @ 800 ma.  
(supplied with 120 VAC wall transformer)
- Audible Alarm (Sound Output):** 80–95 db
- Flammability Rating:** UL 94 HB
- Power Cord Length:** 8'
- Enclosure:** ABS plastic in a NEMA 1 adhesive-mounted housing — intended for indoor use only.
- Connections:**
- Input Connector: 6-pin male circular
  - Relay Output Connector: 4-pin male circular
  - Input Cable\*: 3' long with flying leads



SG6552



SG6551A

**Relay Contact:** Single pole, double throw (SPDT)

**Relay Contact Rating:** 1A @ 24 VDC

**Dimensions (approx. overall):** 3 1/4" x 6" x 1 3/4"

**Weight (approx.):** 1/2 lb

**Relay Cable Cord Connector (supplied):**  
4-pin female (requires soldering to customer supplied cables)

\* Note: A 3' input cable with female cable connections on both ends is supplied when purchased with an Advanced pressure control system for local connection.

Table I

Part No.	Description
SG6551A	One Point Annunciation
SG6552	Two Point Annunciation

### Optional Equipment

Equipment and Replacement Parts	Part No.
10' interconnecting input cable with 6-pin connectors for use with factory wired regulator and changeover systems	0202-CABLE10
10' interconnecting input cable with 6-pin female connector and flying lead ends for use with customer supplied cabling	CABLE6W10FL
3' interconnecting relay cable with 4-pin female connector and flying lead ends for use with customer supplied cabling	CABLE4W3FL

# Multiple Point Announciators

## Four & Eight Point, NEMA 12 & 13 Enclosures

Models SG6554, SG65581

Multiple Point Announciators are typically used in conjunction with pressure switches to provide both an audible alarm and visual indication of pressure switch activation. These annuncicators help prevent costly out-of-gas conditions by continuously monitoring gas pressure in cylinder manifolds or changeover systems.

When cylinder pressure in a manifold is depleted to a user-selectable, predetermined level, the contacts on the pressure switch trigger, thereby activating the annunciator's audible alarm and red alarm lamp. An "acknowledge" button located on the front panel silences the audible alarm, while the red alarm lamp remains lit until the manifold is re-pressurized and the pressure switch returns to the normal position. A green lamp confirms that power is on and the annunciator is ready to alarm. These annunciators feature a built-in SPDT relay for use to control a device such as a telephone dialer, external buzzer, light or another alarm monitoring system.

The annunciator electronics are panel mounted in a wall mountable enclosure. The wall mountable enclosure is rated for both NEMA Type 12 and Type 13, intended for use indoors primarily to provide a degree of protection against dust, falling dirt, sprayed water, oil and noncorrosive liquids.

### Standard Features

- Reduces Labor Costs by eliminating the frequent need to manually check gas pressure.
- Eliminates Down Time by alerting the operator prior to depletion of the gas supply.
- Continuously Monitors gas status.
- Operates with either normally open or normally closed pressure switch contacts.
- Reset Button suppresses audible alarm.
- Dry Output Contact for external device interface.

### Specifications

**Power Requirements:** 85 – 265 VAC, 50/60 Hz, hard-wiring required

#### Alarms:

Audible: 85 db internal horn  
Visual: (Qty. 4 or 8) red LED channel/point indicators next to each alarm point message

**Push Buttons:** Silence, acknowledge, reset

#### Enclosures:

Electronic Enclosure (mounted inside wall-mount enclosure): 1/8 DIN, high impact plastic UL 94V-0 (Type 4X, NEMA 4X front face)  
Wall-Mounted Enclosure: NEMA 12 and 13 rating

#### Connections:

Removable screw terminal blocks for 12 to 22 AWG wire  
Input Connector: NO or NC switches, no external excitation required

#### Relays:

Two SPDT relays for alarm activated devices  
Relay Rating: Two SPDT (Form C); rated 3A @30 VDC or 3A @250 VAC resistant load

**Mounting Feet:** External

**Hinge Type:** Continuous

**Dimensions (includes mounting feet):**  
7.25" W x 9.50" H x 6.5" D

**Weight (approx.):** 8 lbs

### Materials of Construction

**Electronics Enclosure (mounted):**  
High impact plastic

**Wall Mountable Enclosure:** 14-gauge steel painted with ANSI 61 gray polyester powder coating



SG6554



SG65581

Table I

Part Number	Configuration	Number of Inputs
SG6554	Four Point	4
SG65581	Eight Point	8

# High Flow Electric Heater

## Carbon Dioxide Service, General Purpose for Indoors

### Model SG7500

These High Flow Electric Heaters are designed for use with carbon dioxide to prevent regulator freeze-up and to assure uniform temperature under high flow conditions. Connected between the cylinder valve and a suitable regulator, the thermostatically controlled heater warms the gas stream allowing for flow rates up to 1000 scfh (see "Specifications: Max Flow Capacity") without regulator freeze-up.

The heater is designed with a dry heat exchange medium made of aluminum and continuous high pressure stainless steel tubing with no internal joints.

#### Standard Features

- Heavily Insulated Cabinet remains "cool".
- Flow can be in either direction without loss of efficiency.
- Mounting Bracket provides for convenient, wall mount installation.
- Heater can be left on indefinitely, even under no-flow conditions, without resultant damage.
- C.S.A. Approved.

Voltage: 120 VAC

Power: 1000 watts, 8.3 amps

Thermostat Setting: 170°F ±5°F

Power Cord: 6', 3-wire UL/CSA listed

Tubing: 5/16" OD x .049" wall x 7" long

Inlet and Outlet Connections:

Male tube connectors (2) supplied: 1/4" NPT male x 5/16" compression

Dimensions: 11" x 5 1/2" x 4 1/4"

Mounting Holes: 3" O/C

Weight (approx.): 11 lbs

#### Optional Features

- Manifold Adapter Block provides a means to install heater between gas cylinder and regulator with CGA connections.

#### Materials of Construction

Inlet and Outlet Connections: Type 316 SS

Tubing: Type 304 SS

Enclosure: Standard powder coated, steel box for interior applications.

#### Specifications

Maximum Operating Pressure: 3600 psig

#### Maximum Flow Capacity:

Heating: 1000 scfh; 17 CFM; 467 liters/min;  
115 lbs/hr (Heating valves are based on initial gas temperature of 0°F and outlet temperature of 170°F)

Vaporizing: 184 scfh; 3 CFM; 84 liters/min;  
22 lbs/hr (Vaporization valves are based on initial gas temperature of 0°F and outlet temperature of 170°F)



SG7500



Optional 14-SS-320

#### Table I

Part Number	Gas Service
SG7500	Carbon Dioxide

#### Optional Equipment

Equipment	Part No.
Brass Manifold Block with Brass CGA 320 x CGA 320 adapter	14-SS-320

# Inline Electric Gas Heater

## Standard Flow, Single Cylinder Service

### Model SG6500

The Model SG6500 Gas Heater is designed for use with either carbon dioxide or nitrous oxide to prevent regulator freeze-up under standard flow conditions. Installed between the cylinder valve and a suitable regulator, the heater warms the gas stream allowing for flow rates up to 160 scfh without regulator freeze-up.

The gas heater is thermostatically controlled at 160°F to prevent overheating of the gas. The heating element, encased in a polymeric body, efficiently radiates heat to the gas stream. The outer jacket of the heater provides insulation to allow the operator to install or remove the heater under warm conditions.

The Model SG6500 Heater may be used in conjunction with any regulator that is suitable for carbon dioxide or nitrous oxide use.

### Specifications

Maximum Operating Pressure: 3000 psig  
 Voltage: 110 VAC  
 Power: 120 watts, 1 amp  
 Maximum Flow Rate: 160 scfh (CO<sub>2</sub>)  
 Thermostat Setting: 160°F ±5°F  
 Power Cord Length: 5½ feet with standard 3 prong plug  
 Inlet and Outlet Connections: See Table I  
 Dimensions (approx.): 6½" x 2½" x 1¾"  
 Weight (approx.): 2 lbs

### Materials of Construction

Inlet and Outlet Connections: Brass  
 Other Metal Parts Exposed to Gas: Brass  
 Heater Block: Epoxy, Polymer



SG6500-320

Table I

Part Number	Gas Service	Inlet Connection	Outlet Connection
SG6500-320	Carbon Dioxide	CGA 320	CGA 320 Adapter*
SG6500-326	Nitrous Oxide	CGA 326	CGA 326 Adapter*

\* Suitable for direct mounting of a pressure regulator with specified CGA.

# Acetylene Flashback Arrestor

## Prevents Flashes or Flames into a Cylinder

### Model AG6545

Model AG6545 is designed for use with acetylene to prevent flashback into a cylinder. It meets the requirements according to TRAC 207, clause 8.1 "Decomposition Arrestors in Acetylene Plants" and EN ISO 15615:2002, Clause 6.4 "Acetylene Decomposition Test" and conforms to the Code of practice (EIGA acetylene IGC Doc 123/04). The design includes a large surface area flame arrestor of stainless steel construction that stops dangerous decomposition of acetylene and a spring loaded non-return valve that prevents slow or sudden reverse gas flow from forming explosive mixtures in the gas supply. Arrestors are 100% tested, can be mounted in any position or orientation and used in any cylinder lead not exceeding ¾" diameter with flow following in directional indicating arrow stamped on the housing.

Note: The flash arrestor must be replaced after a flash or when the pressure drop through the arrestor reaches 10 psi or greater. It cannot be cleaned or refilled.



AG6545

### Specifications

Max. Operating Pressure: 363 psig  
 Max. Ambient/Working Temperature: 158°F  
 Max. Flow Capacity: 1000 scfh at 160 psig  
 Pressure Drop at 150 psig inlet: 5 psid at 200 scfh Air  
 Cracking Pressure: 0.87 psig  
 Inlet and Outlet Connections: ¼" NPT female  
 Dimensions: 1⅓" OD x 3½" long  
 Weight (approx.): 1 lb

### Materials of Construction

Body: Brass  
 Seat and Seals: EPDM  
 Other Metal Parts Exposed to Gas: Stainless Steel

Table I

Part Number	Gas Service
AG6545	Acetylene

# Flashback Arrestors

## Standard Pressure, Fuel Gas and Oxygen

### SG6537, SG6547 Series

The SG6537 and SG6547 Series Flashback Arrestors are designed to provide protection against flashback of fuel gas or oxygen. The SG6537 Series is constructed of brass and the SG6547 Series is constructed of Type 316L SS. These arrestors are compact in design and provide the following safety elements when used in a delivery system: 100 micron filtration, reverse flow check valve, flame barrier and thermal cut-off valve.

The SG6537 and SG6547 Series arrestors are commonly installed downstream of regulators and on supply lines. They are listed by Underwriter Laboratories to U/L 23Y5 and can be used to help meet ANSI Z49.1, OSHA and NFPA safety requirements.

#### Standard Features

- 100 Micron Stainless Steel Inlet Filter helps prevent contaminants from blocking check valve and provides extended service life.
- Check Valve prevents hazardous backflow of gas into regulator or supply line.
- Flame Barrier extinguishes flashback within housing and prevents flame from reaching gas supply.
- Thermal Cut-Off Valve positively shuts off gas flow in the event of downstream fire reaching the arrestor.

#### Specifications

Approvals/Specifications: ISO 5175, BS 6158, EN 730 (BAM/DIN), AS 4603

Maximum Service Pressure: 285 psig  
For U/L 23Y5 Std. Limits: See Table II

Operating Temp. Range: -20° to 140°F

Flow Capacity: See Table I

Inlet Connection: 1/4" NPT female

Outlet Connection:

SG6537: 1/4" NPT female

SG6547: 1/4" NPT male

Dimensions:

SG6537: 7/8" Max OD x 3 5/8" long

SG6547: 1 1/4" Max OD x 3 7/8" long

Weight (approx.):

SG6537: 6 oz

SG6547: 12 oz



Table I, Air Flow Capacity

Inlet Pressure (psig)	Pressure Drop (psig)	Air Flow (scfh) SG6537	Air Flow (scfh) SG6547
10	5	130	250
20	10	250	500
30	15	400	750
50	22	660	1100
100	22	950	1700

Table II, Part Number and U/L 23Y5 Standard Pressure Limits

Part Number	Body Material	Gas Service	Working Pressure (psig)
SG6537-F	Brass	Acetylene Hydrogen LPG	15 50 50
SG6537-O	Brass	Oxygen	145
SG6547-F	Type 316L SS	Acetylene Hydrogen LPG	15 50 50
SG6547-O	Type 316L SS	Oxygen	145

# Flashback Arrestors

## High Pressure, Hydrogen and Fuel Gases

### Model SG6538, SG6548

Model SG6538 and SG6548 Flashback Arrestors are certified to EN 730-1 / ISO 5175 for higher pressures and are commonly used to protect gas supply and pipeline outlets against flashbacks and backfire. These arrestors are compact in design and provide the following safety elements when used in a delivery system: filter at the gas inlet, spring-loaded non-return valve, flame barrier and thermal cut-off valve. Arrestors are 100% tested and can be mounted in any position or orientation. The Model SG6548 is ideal for use with corrosive gases commonly used in the chemical, process technology and laboratory areas.

#### Specifications

Approvals/Specifications: EN 730-1 / ISO 5175, BAM certified

Maximum Service Pressure: See Table I

Maximum Ambient/Working Temp.: 158°F

Flow Capacity: 2894 scfh (air) – free flow off

Inlet and Outlet Connections: 1/4" NPT female

Dimensions: 1.3" x 3.78"

#### Materials of Construction

Body: See Table I

Seat and Seals: Elastomer

Other Metal Parts Exposed to Gas:

Stainless Steel



SG6548

Table I

Part Number	Body Material	Gas Service	Maximum Working Pressure	
			psig	bar
SG6538	Brass	Ethylene	72.5	5
		Hydrogen	145	10
		LPG	72.5	5
		Natural Gas	145	10
SG6548	Stainless Steel	Ethylene	72.5	5
		Hydrogen	145	10
		LPG	72.5	5
		Natural Gas	145	10

# Flash Arrestors

## Acetylene, Fuel Gas and Oxygen Gas

### Model AFA916

Designed to provide protection against flashback of fuel gas or oxygen, these flash arrestors are compact in design and are constructed of brass. They are commonly installed on the outlet of industrial regulators and are listed by Underwriter Laboratories to U/L 23Y5. When used in a delivery system, they help meet ANSI Z49.1, OSHA and NFPA safety requirements.

#### Benefits and Features

The following safety elements are provided when used in a delivery system.

- 100 micron filtration.
- Reverse flow check valve.
- Flame barrier.
- Thermal cut-off valve.

Rated air flow capacity is 260 scfh, at 50 psig inlet with a 5 psi pressure drop



IG-AFA916-LFM

Table I

Part Number	Gas Service	Inlet Pressure Max (psig)	Inlet Connection	Outlet Connection
IG-AFA916-LFM	Acetylene Fuel Gas	15 50	1/16"-18 LH F	1/16"-18 LH
IG-AFA916-RFM	Oxygen	143	1/16"-18 RH F	1/16"-18 RH

# Pipeline Protection Devices

## Flashback Arrestor, ASME Relief Valve and Check Valve

### Model APPD

Pipeline protection devices incorporate dry-type flashback arrestors, ASME relief valves and check valves. They are designed to meet requirements of NFPA 51 in fuel gas piping systems. Dry-type flash arrestors are maintenance free, do not require fluid, and provide continuous safe operation in fuel gas distribution systems.

#### Benefits and Features

- High surface area stainless steel flash arrestor material extinguishes flashback entering the device from any direction.
- Temperature sensitive shut-off valve extinguishes sustained flashbacks.
- Spring loaded check valve prevents reverse flow from forming explosive mixtures in the gas supply.
- May be mounted in any position.

Table I

Part Number	Gas Service	Flow Capacity (scfh – Air)	Inlet/Outlet Connection	Relief Valve Setting (psig)
IG-APPD-AC-05	Acetylene	500	1/2" NPTF	20
IG-APPD-AC-1	Acetylene	500	1" NPTF	20
IG-APPD-FG-05	LPG/Natural Gas/ Hydrogen	1000	1/2" NPTF	40
IG-APPD-FG-1	LPG/Natural Gas/ Hydrogen	1000	1" NPTF	40
IG-APPD-O2-05	Oxygen	5000	1/2" NPTF	225
IG-APPD-O2-1	Oxygen	5000	1" NPTF	225



APPD

1. Relief Valve 1/2" NPTF
2. Outlet
3. Flash Arrestor with Check Valve
4. Inlet

# Flexible Hoses

## All-Metal, Armor Cased and PTFE-Lined

### SG6450, SG6460, IGA-HT Series

Flexible hoses are used to transfer compressed and liquefied gases. They are available in various lengths, in either all-stainless steel construction or stainless steel braided lined with PTFE. Each hose is marked with a metal band noting the working pressure and date manufactured. All assemblies are pressure tested to 1½ times the working pressure and have a minimum burst pressure rating of 4 times the maximum working pressure.

SG6450 Series, all-stainless steel hoses feature a double overbraid and have end fittings heliarc welded to both the corrugated liner and the overbraid. This construction assures maximum diffusion resistance for use with critical, ultra-high purity gases and small molecular gases such as helium and hydrogen. For applications which require constant handling and flexing, our SG6450-A Series with an added armor casing provides protection from kinking, braid abrasion or stress at the ends. The armor casing also provides an added measure of protection for operators, exhibiting a smooth surface for handling and the capability to support a 600 lb load under tension.

SG6460 and IGA-HT Series, stainless steel braided PTFE lined hoses, have a single stainless steel overbraid with end fittings that are swaged to the liner and overbraid. SG6450 Series have stainless steel end fittings and IGA-HT Series has brass end fittings.

**Warnings for use:** SG6460 and IGA-HT Series Stainless Steel Flexible hoses lined with PTFE:

- Should note be used for hydrogen or helium service because of the potential for excessive effusion.
- Shall not be used with poisonous, toxic or pyrophoric gases because permeation of gas through the hose material creates a potential hazard.
- Should not be used with cryogenic liquids because of temperature incompatibility.
- Are not recommended for use with oxygen. If used in oxygen service, oxygen installation design considerations should be employed to reduce the risk of adiabatic compression and ignition. Refer to CGA E-9, 2017 Standard for additional information.



SG6450      SG6460

### Specifications

#### Maximum Working Pressure:

SG6450: 3850 psig @ 70°F  
SG6460: 3000 psig @ 70°F  
IGA-HT: 3000 psig @ 70°F

#### End Fittings:

SG6450: ¼" NPT female  
SG6460: ¼" NPT male  
IGA-HT: ¼" NPT female

#### Diameter:

SG6450: 0.28" nominal ID,
0.63" nominal OD
SG6450-A: 0.28" nominal ID,
0.73" nominal OD
SG6460: 0.25" nominal ID,
0.38" nominal OD
IGA-HT: 0.25" nominal ID,
0.38" nominal OD

#### Overbraid:

SG6450: Double Braided  
SG6450-A: Double Braided with Armor  
SG6460: Single Braided  
IGA-HT: Single Braided

#### Weight (approx.) (lbs):

SG6450: 0.3 per foot  
SG6450-A: 0.5 per foot  
SG6460: 0.1 per foot  
IGA-HT: 0.1 per foot

Table I

Part Number	Hose Material	Length (ft)
SG6450	Stn. Stl. Inner Core with Stn. Stl. Overbraid	2
SG6450-A	Stn. Stl. Inner Core with Stn. Stl. Overbraid and Armor Casing	2
SG6451	Stn. Stl. Inner Core with Stn. Stl. Overbraid	3
SG6451-A	Stn. Stl. Inner Core with Stn. Stl. Overbraid and Armor Casing	3
SG6457	Stn. Stl. Inner Core with Stn. Stl. Overbraid	5
SG6457-A	Stn. Stl. Inner Core with Stn. Stl. Overbraid and Armor Casing	5
SG6454	Stn. Stl. Inner Core with Stn. Stl. Overbraid	6
SG6466	PTFE Inner Core with SS Overbraid	3
SG6469	PTFE Inner Core with SS Overbraid	6
IGA-HT244F4F	PTFE Inner Core with SS Overbraid	2
IGA-HT364F4F	PTFE Inner Core with SS Overbraid	3

### Materials of Construction

#### End Fittings:

SG6450: Type 316 SS  
SG6460: Type 304 SS  
IGA-HT: Brass

#### Inner Core:

SG6450: Type 316 SS  
SG6460: Extruded PTFE  
IGA-HT: Extruded PTFE

#### Overbraid:

Type 304 SS

# Cylinder Lead Assemblies

## Brass, Stainless Steel and 6K Rated

Models SG6630, SG6631, SG6632

Cylinder leads (rigid pigtails) are available in brass or Type 316 SS construction. Model SG6630 pigtails are assembled with  $\frac{5}{16}$ " OD x .065" wall annealed brass tubing with silver brazed  $\frac{1}{4}$ " NPTF end fittings and threaded CGA connections installed. Model SG6631 pigtails are assembled with  $\frac{1}{4}$ " OD x .035" wall annealed Type 316 SS tubing. Model SG6632 pigtails are assembled with  $\frac{1}{4}$ " OD x .049" wall annealed Type 316 SS tubing. Both models are assembled with TIG welded  $\frac{1}{4}$ " NPTF end fittings and threaded CGA connections installed.

Models SG6630 and SG6631 have a maximum working pressure of 3000 psig. Model SG6632 has a maximum working pressure of 5500 psig or 6000 psig (see Table I). Cylinder leads are 36" long with a 5" diameter service loop, providing a 20" usable length, excluding CGA connections.

Note: Check valves can be provided in one end of all cylinder leads except those with CGA 290 connections. The direction of flow will be from cylinder into cylinder lead.

### Specifications

Maximum Working Pressure: See Table I

Inlet and Outlet Connections: CGA Connections (See Table I)

#### Tubing:

SG6630:  $\frac{5}{16}$ " OD x .065" wall

SG6631:  $\frac{1}{4}$ " OD x .035" wall

SG6632:  $\frac{1}{4}$ " OD x .049" wall

Length: 36" OAL with 5" diameter service loop

### Materials of Construction

#### Tubing:

SG6630: Brass

SG6631 & SG6632: Type 316 SS

#### End Fitting and CGA Connections:

SG6630: Brass

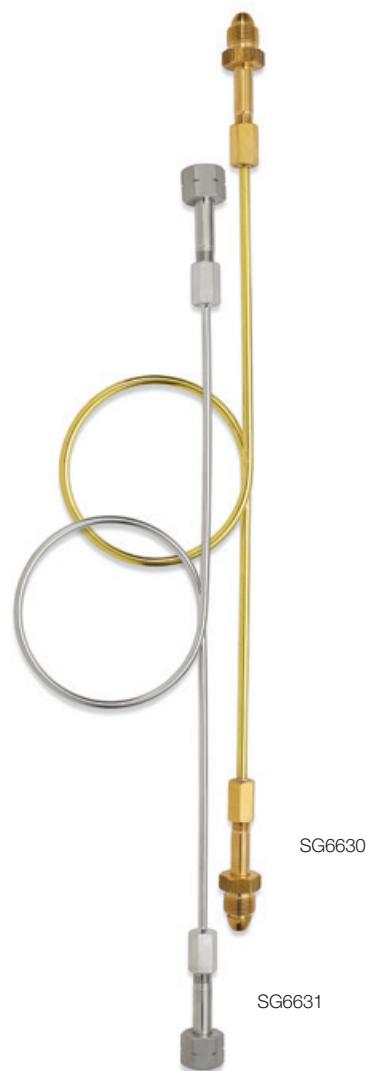
SG6631 & SG6632: Type 316 SS

### Optional Check Valves

To order a cylinder lead with a check valve, add "CV" to the part number. Example:  
SG6630-580CV

Table I

Part Number		Inlet and Outlet Connections CGA Number	Max. Working Pressure psig
Brass	Stainless Steel		
SG6630-280	—	280	3000
—	SG6631-290	290	500
SG6630-296	—	296	3000
SG6630-320	SG6631-320	320	3000
SG6630-326	SG6631-326	326	3000
SG6630-330	SG6631-330	330	3000
SG6630-346	SG6631-346	346	3000
—	SG6632-347	347	5500
SG6630-350	SG6631-350	350	3000
SG6630-500	—	500	3000
SG6630-510	SG6631-510	510	500
SG6630-540	—	540	3000
SG6630-580	SG6631-580	580	3000
SG6630-590	SG6631-590	590	3000
SG6630-660	SG6631-660	660	3000
—	SG6631-670	670	3000
—	SG6632-677	677	6000
—	SG6631-678	678	500
—	SG6632-680	680	5500
—	SG6632-695	695	5500
—	SG6632-702	702	6000
—	SG6632-703	703	6000
—	SG6631-705	705	3000



SG6630

SG6631

# Tube Compression Instrumentation Fittings

Compression type fittings are the type of fittings most commonly used in gas handling systems which use tubing. Suitable for high vacuum and high pressure applications, they require no special tools, soldering or welding for installation, and can be remade repeatedly. Used on thin or heavy walled tubing, these fittings are available in both brass or Type 316 Stainless Steel.

Where compression fitting size is indicated in Table I, it designates the outside diameter of the tubing it will accept. For example,  $\frac{1}{8}$ " compression will accept  $\frac{1}{8}$ " OD tubing.

Generally, Instrumentation tube fittings are rated for pressures equal to the maximum allowable working pressures of the tubing recommended for use with the fittings. Contact your Advanced distributor for more information regarding tubing and fitting pressure ratings.

**Table I**

Description	Part Number Brass	Type 316 SS
<b>Male Connector</b> For connecting female pipe threads to tubing		
$\frac{1}{16}$ " NPTM x $\frac{1}{8}$ " compression	SG6705	SG6715
$\frac{1}{8}$ " NPTM x $\frac{1}{16}$ " compression	SG6700	SG6710
$\frac{1}{8}$ " NPTM x $\frac{1}{8}$ " compression	SG6701	SG6711
$\frac{1}{8}$ " NPTM x $\frac{1}{4}$ " compression	SG6702	SG6712
$\frac{1}{4}$ " NPTM x $\frac{1}{8}$ " compression	SG6703	SG6713
$\frac{1}{4}$ " NPTM x $\frac{1}{4}$ " compression	SG6704	SG6714
$\frac{1}{4}$ " NPTM x $\frac{1}{2}$ " compression	SG6706	SG6716
$\frac{1}{2}$ " NPTM x $\frac{1}{4}$ " compression	SG6707	SG6717
$\frac{1}{2}$ " NPTM x $\frac{1}{2}$ " compression	SG6708	SG6718
<b>Female Connector</b> For connecting male pipe threads to tubing		
$\frac{1}{8}$ " NPTF x $\frac{1}{8}$ " compression	SG6721	SG6731
$\frac{1}{8}$ " NPTF x $\frac{1}{4}$ " compression	SG6722	SG6732
$\frac{1}{4}$ " NPTF x $\frac{1}{8}$ " compression	SG6723	SG6733
$\frac{1}{4}$ " NPTF x $\frac{1}{4}$ " compression	SG6724	SG6734
$\frac{1}{4}$ " NPTF x $\frac{3}{8}$ " compression	—	591FS64
$\frac{3}{8}$ " NPTF x $\frac{3}{8}$ " compression	—	591FS66
$\frac{1}{2}$ " NPTF x $\frac{1}{4}$ " compression	—	591FS48
<b>Male Elbow</b> For connecting female pipe threads to tubing at right angles		
$\frac{1}{8}$ " NPTM x $\frac{1}{16}$ " compression	SG6740	SG6750
$\frac{1}{8}$ " NPTM x $\frac{1}{8}$ " compression	SG6741	SG6751
$\frac{1}{8}$ " NPTM x $\frac{1}{4}$ " compression	SG6742	SG6752
$\frac{1}{4}$ " NPTM x $\frac{1}{8}$ " compression	SG6743	SG6753
$\frac{1}{4}$ " NPTM x $\frac{1}{4}$ " compression	SG6744	SG6754
$\frac{1}{2}$ " NPTM x $\frac{1}{2}$ " compression	—	591ES8C8M
<b>Female Elbow</b> For connecting male pipe threads to tubing at right angles		
$\frac{1}{8}$ " NPTF x $\frac{1}{8}$ " compression	SG6761	SG6771
$\frac{1}{8}$ " NPTF x $\frac{1}{4}$ " compression	SG6762	SG6772
$\frac{1}{4}$ " NPTF x $\frac{1}{8}$ " compression	SG6764	SG6773
$\frac{1}{4}$ " NPTF x $\frac{1}{4}$ " compression	SG6765	SG6774



Male Connector



Female Connector



Male Elbow



Female Elbow



Union  
(see next page)

Table I

Description	Part Number Brass	Type 316 SS	
<b>Union</b> For joining tubing 1/16" compression (both ends) 1/8" compression (both ends) 1/4" compression (both ends)	SG6780 SG6781 SG6782	SG6790 SG6791 SG6792	 Reducing Union
<b>Reducing Union</b> For joining tubing of different sizes 1/8" compression x 1/16" compression 1/4" compression x 1/8" compression	SG6840 SG6841	SG6850 SG6851	 Bulkhead Union
<b>Bulkhead Union</b> For connecting tubing through a panel or bulkhead 1/8" compression (both ends) 1/4" compression (both ends) 3/8" compression (both ends)	SG6801 SG6802 —	SG6811 SG6812 591BUS6	 Union Tee
<b>Union Tee</b> For joining tubing in "T" configurations 1/8" compression (all ends) 1/4" compression (all ends) 1/2" compression (all ends)	SG6820 SG6821 —	SG6830 SG6831 591TS8	 Reducer
<b>Reducer/Adapter</b> For reducing the size of a compression fitting 1/4" OD Tube x 1/8" compression	0202-3027	—	
<b>Port Connector</b> For connecting compression fittings 1/4" tube stub x 1/4" port connector 1/2" tube stub x 1/2" port connector	SG6860 —	SG6865 591SSPC811	 Port Connector
<b>Tube End Male Adapter</b> For converting female pipe threads to tubing 1/8" NPTM x 1/4" OD Tube 1/4" NPTM x 1/4" OD Tube	— 591TAB4M	SG6871 SG6870	 Tube End Male Adapter
<b>Tube End Female Adapter</b> For converting male pipe threads to tubing 1/4" NPTF x 1/4" OD Tube	591TAB4	591TASS4	 Tube End Female Adapter
<b>Compression Nut and Ferrule</b> 1/16" compression 1/8" compression 1/4" compression	SG6940-AL SG6941-AL SG6942-AL	SG6950-AL SG6951-AL SG6952-AL	 Compression Nut and Ferrules

# Pipe Instrumentation Fittings

Pipe fittings are typically used to join components together in a gas handling system – such as attaching a flowmeter to a regulator, or installing a relief valve. They are also used in systems which have been constructed using rigid pipe, as opposed to tubing.

The measurements specified in the Tables below conform to National Pipe Thread (NPT) designations, and may be either female (internal) type connections, or male (external) type connections – abbreviated as NPTF or NPTM accordingly. All pipe fittings shown have a maximum operating pressure of at least 3000 psig for temperatures from -20°F to 100°F (-28°C to 37°C) based on an allowable stress value of 20,000 psi (1378 bar) in accordance with ASME B31.3.

**Table I**

Description	Part Number Brass	Type 316 SS
<b>Male Elbow</b> For joining female pipe threads at a right angle		
1/4" NPTM x 1/4" NPTM	0202-5172	0202-5173
3/8" NPTM x 3/8" NPTM	0202-5104	—
1/2" NPTM x 1/2" NPTM	—	593ES8M
<b>Female Elbow</b> For joining male pipe threads at a right angle		
1/8" NPTF x 1/8" NPTF	0202-5112	0202-5114
1/4" NPTF x 1/4" NPTF	0202-5113	0202-5115
1/2" NPTF x 1/2" NPTF	593EB8	—
<b>Street Elbow</b> For joining female to male pipe threads at a right angle		
1/8" NPTM x 1/8" NPTF	0202-5095	0202-5127
1/8" NPTM x 1/4" NPTF	593SEB42	—
1/4" NPTM x 1/8" NPTF	—	593RESS4M2F
1/4" NPTM x 1/4" NPTF	0202-5096	0202-5122
1/2" NPTM x 1/2" NPTF	593SEB8	593SES8M
<b>Female Tee</b> To make a 3-way connection of male pipe threads		
1/8" NPTF x 1/8" NPTF x 1/8" NPTF	593FTB2	—
1/4" NPTF x 1/4" NPTF x 1/4" NPTF	0202-4987	0202-4299
1/2" NPTF x 1/2" NPTF x 1/2" NPTF	593TB8	593TSS8F
<b>Male Branch Tee</b> To make a 3-way connection of male by male by female pipe threads		
1/4" NPTF x 1/4" NPTF x 1/4" NPTM	0202-4984	0202-5116
<b>Street Tee</b> To make a 3-way connection of male by female by male pipe threads		
1/8" NPTF x 1/8" NPTM x 1/8" NPTF	0202-5098	593STS2
1/4" NPTF x 1/4" NPTM x 1/4" NPTF	0202-5117	0202-5118
1/2" NPTF x 1/2" NPTM x 1/2" NPTF	593STB8	0202-5139



Male Elbow



Female Elbow



Street Elbow



Female Tee



Male Branch Tee



Street Tee

Table I

Description	Part Number Brass	Type 316 SS	
<b>Pipe Cross</b> To make a 4-way connection of male pipe threads			 Pipe Cross
1/8" NPTF	0202-5188	0202-5190	
1/4" NPTF	0202-5189	0202-5099	
1/2" NPTF	—	593CRSS8	
<b>Male Hex Nipple</b> For joining female pipe threads			 Male Hex Nipple
1/8" NPTM x 1/8" NPTM	0202-5186	0202-5187	
1/4" NPTM x 1/4" NPTM	0202-5092	0202-5091	
3/8" NPTM x 3/8" NPTM	593HNB6	—	
1/2" NPTM x 1/2" NPTM	593HNB8	593HNS8	
<b>Reducing Adapter</b> Used to reduce the size of male pipe thread			 Reducing Adapter
1/4" NPTF x 1/8" NPTM	0202-5350	0202-5351	
3/8" NPTF x 1/4" NPTM	593RBB46F	593RBSS6F4M	
1/2" NPTF x 1/4" NPTM	—	593RBSS8F4M	
<b>Male Hex Reducing Nipple</b> For joining female pipe threads of different dimensions			 Male Hex Reducing Nipple
1/4" NPTM x 1/8" NPTM	0202-5185	0202-5108	
1/2" NPTM x 1/4" NPTM	0202-5094	593RBS84M	
<b>Male Hex Long Nipple</b> For joining female pipe threads at extended dimensions			 Male Hex Long Nipple
1/8" NPTM x 1/8" NPTM (3" Length)	—	0202-5184	
1/4" NPTM x 1/4" NPTM (3" Length)	0202-5105	0202-5107	
1/4" NPTM x 1/8" NPTM (3 1/2" Length)	0202-5106	—	
1/2" NPTM x 1/2" NPTM (4" Length)	593HNB84	—	
<b>Female Hex Coupling</b> To join male pipe threads			 Female Hex Coupling
1/8" NPTF x 1/8" NPTF	0202-5182	0202-5183	
1/4" NPTF x 1/4" NPTF	0202-5120	0202-5121	
3/8" NPTF x 1/4" NPTF	0202-5103	—	
<b>Reducing Bushing</b> Used to reduce the size of female pipe thread			 Reducing Bushing
1/4" NPTM x 1/8" NPTF	0202-5181	0202-5102	
1/2" NPTM x 1/4" NPTF	0202-5097	0202-5133	
<b>Pipe Plug (Hollow Hex)</b> To plug a female pipe thread			 Pipe Plug
1/8" NPTM	0202-3140	0202-3147	
1/4" NPTM	0202-3143	0202-3023	

# Mechanics of a Variable Area Flowmeter

A variable area flowmeter (Figure 1) is a device used for measuring the flow of gases or gas mixtures. Typically, it consists of a glass metering tube (1) which is internally tapered such that the inside diameter at the bottom of the tube is smaller than that at the top. A float or floats (2) placed inside the tube are contained by float stops (3) inserted into the inlet and outlet of the tube. The tube assembly is fitted between the two end blocks (6 & 7) and sealed by packing gaskets (4). The flowmeter assembly is held together by front, back and side plates (10, 11 & 12). Once assembled, the flowmeter tube is tightened against the packing gaskets via a seal spindle (5) to ensure leak free operation. Flowmeters may also be equipped with a metering valve (13) which adds the capability of controlling flow rate.

As gas enters the flowmeter tube, the float is lifted from the zero position at the bottom of the tube. The float (Figure 2) rises to a point where the area surrounding the float is sufficient to allow unrestricted flow of gas. The greater the flow of gas, the higher the float will rise.

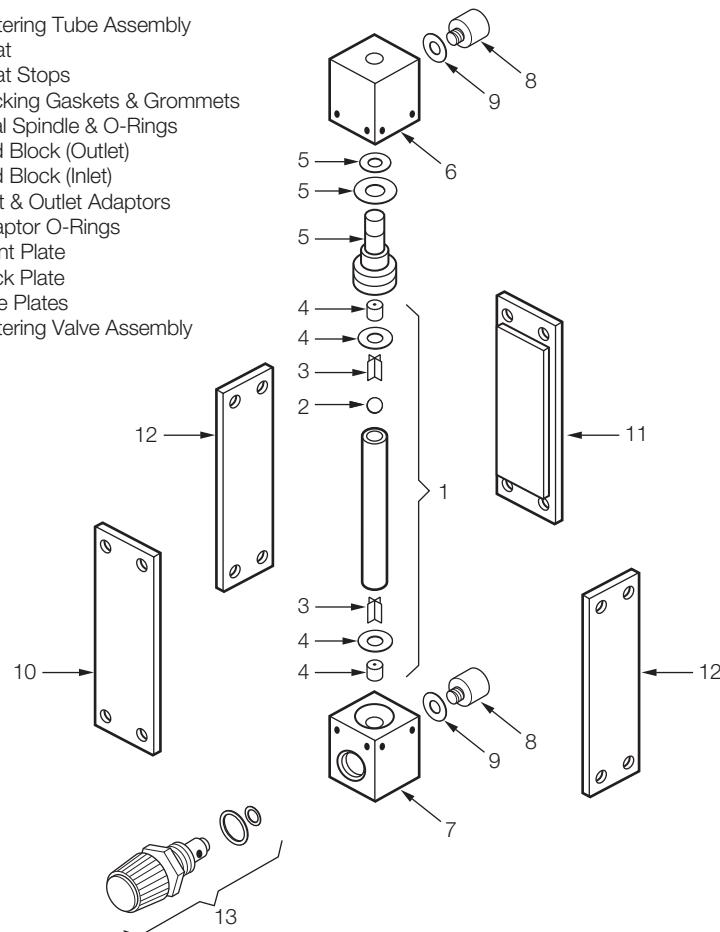
By knowing the variables involved (service gas, pressure, temperature, weight of float, tube diameter, etc.), the height of the float can be directly correlated to the flow of gas with relatively good accuracy. Generally, the tube is inscribed with a scale allowing the user to read the float position. The scale may be direct reading in flow units such as standard liters per minute (slpm) or standard cubic feet per hour (scfh). It may also be in a linear measurement such as millimeters (mm) which would require a calibration chart for

cross referencing the linear measurement to a corresponding flow rate.

The accuracy of a variable area flowmeter is contingent on both its operating pressure and temperature. Gases at higher pressures will be compressed, and therefore a greater volume of gas will pass through the same given area. Similarly, gases at higher temperatures will be less dense, and less gas will pass through a given area. Therefore, all variable area flowmeters are calibrated at specific temperature and pressure conditions—generally at normal temperature (70°F) and pressure (14.7 psia).

Figure 1, Variable Area Flowmeter

1. Metering Tube Assembly
2. Float
3. Float Stops
4. Packing Gaskets & Grommets
5. Seal Spindle & O-Rings
6. End Block (Outlet)
7. End Block (Inlet)
8. Inlet & Outlet Adaptors
9. Adaptor O-Rings
10. Front Plate
11. Back Plate
12. Side Plates
13. Metering Valve Assembly



# Flowmeter Selection

In selecting a flowmeter, the following items should be taken into consideration:

## 1. Materials Compatibility

As with all gas handling equipment, care must be taken to ensure that the materials used to construct the flowmeter are compatible with the service gas. Each of the flowmeters shown in this catalog is provided with a list of its Materials of Construction. This information should be used with the gas compatibility data provided under "Technical Information" (page 226).

## 2. Pressure and Temperature Ratings

The flowmeter must be capable of handling pressures and temperatures required by the particular application. Maximum operating pressures and temperatures are provided for each flowmeter under "Specifications."

## 3. Measuring Range

Flowmeters have specific measuring ranges associated with them. These ranges will vary depending on the flowmeter model as well as the tube and float combination selected. Obviously, the specific flowmeter chosen must be capable of measuring in the flow range required by the process. In general, for the best accuracy, it is suggested that the flowmeter be sized for operation in the upper part of its range.

## 4. Accuracy

The flowmeter should be accurate to the degree required by the application. Accuracy specifications are listed for each of our flowmeters. Generally, this will be  $\pm 2\%$ ,  $\pm 5\%$  or  $\pm 10\%$  of full scale (although the Series 150 flowmeters also have an optional  $\pm 1\%$  full scale calibration available.)

Full scale accuracy means that the accuracy specification is based on the flowmeter's maximum capacity. For example, a meter with a measuring range of 1–10 slpm and an accuracy specification of  $\pm 10\%$  will have an actual accuracy of  $\pm 1$  slpm across its entire range—that is,  $\pm 10\%$  of the maximum capacity of 10 slpm.

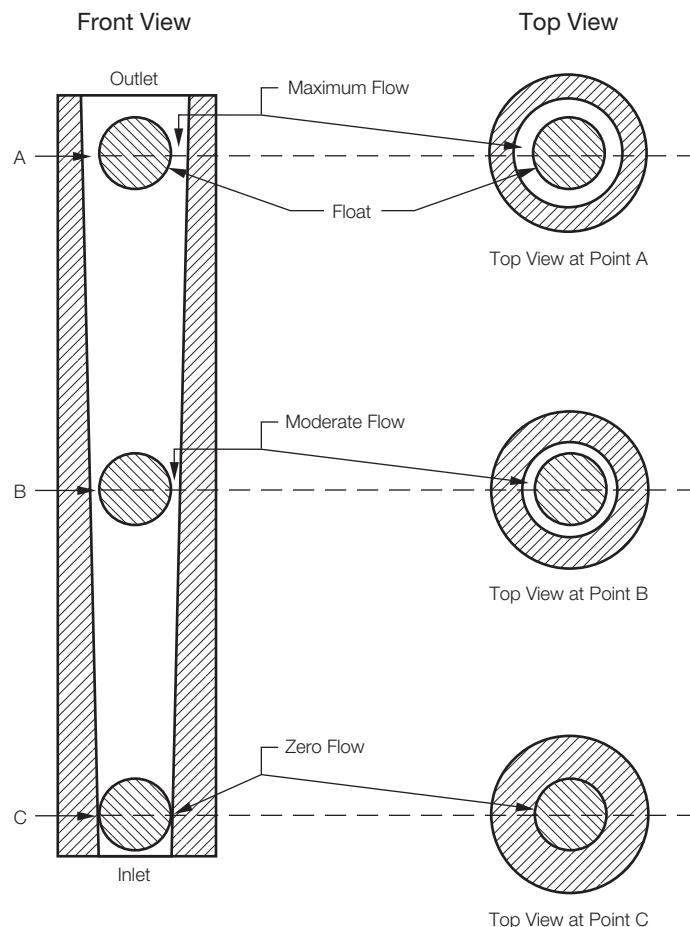
## 5. Repeatability

In many gas processes, the ability to duplicate flow measurements over time is more important than the absolute accuracy of the readings. The repeatability specification shown for each flowmeter refers to the degree to which a meter will repeat a previous flow reading. In general, variable area flowmeters have very good repeatability, many as high as  $\pm 0.5\%$  of full scale.

## 6. Metering Valves

Flowmeters only measure flow. If adjustments to flow rates are required, a flowmeter equipped with a metering valve should be selected.

Figure 2, Variable Area Flowmeter Principle of Operation



# 65 mm Flowmeters

## Direct Reading, Aluminum and Stainless Steel, Metering Valve

### 50A Series

50A Series flowmeters offer an economical means of measuring gas or liquid flow at low pressures where  $\pm 5\%$  accuracy is acceptable. They are suitable for plant and general laboratory applications. These flowmeters are direct reading for air; however, approximate flow ranges for other gases are listed in the Tube Selection Table on the following page.

#### Standard Features

- Ribbed Tubes stabilize float and improve accuracy and readability.
- Magnifier Lens in Front Shield enhances reading resolution.
- Borosilicate Glass Tubes allow operating temperatures up to 250°F.
- Threaded Fittings with Locking Nuts permit front panel mounting.
- Unique Valve Design allows bubble-tight shutoff.
- Availability of Aluminum or Stainless Steel Construction provides a wide material selection for maximum gas compatibility.

#### Specifications

Maximum Operating Pressure: 200 psig

Maximum Operating Temperature: 250°F

Minimum Operating Temperature: 32°F

Accuracy:  $\pm 5\%$  of full scale from 10% to 100% of range

Repeatability: Within 0.25% of full scale

Tube Graduations: Standard milliliters per minute or standard liters per minute of Air depending upon range. See Tube Selection Tables.

Scale Length: 65 mm

Inlet and Outlet Connections: See Table I

Weight (approx.): 0.75 lb

#### Materials of Construction

**Tubes:** Heavy Walled Borosilicate Glass with float stops of PTFE

**Floats:** Borosilicate Glass, Type 316 SS or Carboloy as specified in Tube Selection Tables

**End Blocks:** See Table I

**Inlet/Outlet Adaptors:** See Table I

**Side Plates:** Aluminum, black anodized

**Back Plate:** Acrylic

**Front Plate:** Lexan®

**Seals and Packing:** Viton® (other materials available on special order)

**Valve:** Type 316 SS



FMA4350



FMA4360

Table I

Part No.	Inlet and Outlet Connections	End Blocks Material	Inlet/Outlet Adaptor Material
FMA4350-( )	1/8" NPT female	Aluminum	Aluminum
FMA4354-( )	1/4" NPT female	Aluminum	Aluminum
FMA4360-( )	1/8" NPT female	Type 316 SS	Type 316 SS
FMA4364-( )	1/4" NPT female	Type 316 SS	Type 316 SS

Where "( )" is indicated above, complete the part number by inserting applicable tube number from Tube Selection Table. Example: FMA4350-5. Order by complete part number.

#### Optional Equipment

Equipment and Replacement Parts	Part No.	Page No.
Acrylic Tripod Baseplate with leveling screws	FMA4702	
Replacement Metering Valves		
Flowmeters with Tube Numbers FMA4340 – FMA4344	0202-4113A (L)	
Flowmeters with Tube Numbers FMA4345 – FMA4346	0202-4114A (M)	
Flowmeters with Tube Numbers FMA4347 – FMA4349	0202-4115A (H)	
Replacement Tubes	See Table	157

## Tube selection tables for 50A Series Flowmeters

Flow rates shown are at 70°F and 14.7 psia.

Tube No.	Float Material	Air (Actual Graduations)	Argon* (Approx. Range)	Carbon Dioxide* (Approx. Range)	Helium* (Approx. Range)
0	Type 316 SS	5–50 mLpm	4–43 mLpm	5–47 mLpm	6–61 mLpm
1	Glass	5–100 mLpm	4–83 mLpm	5–93 mLpm	8–160 mLpm
2	Carboloy	60–500 mLpm	51–426 mLpm	48–403 mLpm	70–583 mLpm
3	Glass	100–1000 mLpm	85–850 mLpm	81–807 mLpm	0.2–1.6 slpm
4	Glass	0.3–2.0 slpm	0.3–1.7 slpm	0.3–1.8 slpm	0.6–4.2 slpm
5	Type 316 SS	0.4–4.0 slpm	0.3–3.4 slpm	0.4–3.6 slpm	0.9–8.7 slpm
6	Type 316 SS	0.5–10 slpm	0.4–8.4 slpm	0.4–8.4 slpm	1.1–22 slpm
7	Type 316 SS	1–16 slpm	0.9–14 slpm	0.8–13 slpm	2–38 slpm
8	Type 316 SS	5–25 slpm	4–21 slpm	4–21 slpm	11–59 slpm
9	Type 316 SS	4–40 slpm	3–34 slpm	3–33 slpm	9–94 slpm

Tube No.	Hydrogen* (Approx. Range)	Nitrogen* (Approx. Range)	Oxygen* (Approx. Range)	Replacement Tubes and Packing Part No.
0	10–105 mLpm	5–51 mLpm	4–45 mLpm	FMA4340
1	11–209 mLpm	5–102 mLpm	5–109 mLpm	FMA4341
2	0.2–1.3 slpm	61–510 mLpm	56–467 mLpm	FMA4342
3	0.3–2.9 slpm	102–1020 mLpm	93–930 mLpm	FMA4343
4	1–6.7 slpm	0.3–2.0 slpm	0.3–1.9 slpm	FMA4344
5	1–13 slpm	0.4–4.1 slpm	0.4–3.9 slpm	FMA4345
6	2–34 slpm	0.5–10 slpm	0.6–12 slpm	FMA4346
7	4–56 slpm	1–16 slpm	1–19 slpm	FMA4347
8	18–88 slpm	5–26 slpm	6–30 slpm	FMA4348
9	14–141 slpm	4–41 slpm	5–48 slpm	FMA4349

\* 50A Series flow tubes are directly calibrated for air at 70°F and 14.7 psia. Flow rates shown for other gases are for reference purposes only. Flow capacities for gases not listed may be obtained by contacting your Advanced Representative.

Replacement Tubes  
and Packing Part No.

FMA4340  
FMA4341  
FMA4342  
FMA4343  
FMA4344  
FMA4345  
FMA4346  
FMA4347  
FMA4348  
FMA4349



FMA4347

# 150 mm Flowmeters

## Calibration Chart Referenced, Aluminum and Stainless Steel

### 150A Series

150A Series Flowmeters offer precise measurement of gas or liquid flow over a wide range of flow rates at low pressures. Suitable for plant and laboratory use, they are widely used in gas chromatography, atomic absorption spectroscopy and process control.

Each flowmeter consists of a replaceable glass metering tube and two standard floats (glass and stainless steel) which expand the range of the flowmeter. The linear scale allows each flowmeter to be used with a variety of gases via a calibration chart (see "Calibration" information box at bottom of page). Tube selection depends on the gas being metered and the range of flow rates required. See Tube Selection Table (pages 160–161).

### Standard Features

- Two Floats per Tube (Standard) expand range of flowmeter.
- Ribbed Tubes stabilize floats and improve accuracy and readability.
- Magnifier Lens in Front Shield enhances reading resolution.
- Borosilicate Glass Tubes allow operating temperatures up to 250°F
- Linear Scale (10–150 mm) allows each flowmeter to be used with a variety of gases via a calibration chart.
- Threaded Fittings with Locking Nuts permit front panel mounting.
- Unique Valve Design allows bubble-tight shutoff.
- Availability of Aluminum or Stainless Steel Construction provides a wide material selection for maximum gas compatibility.

### Specifications

Maximum Operating Pressure: 200 psig  
 Maximum Operating Temperature: 250°F  
 Minimum Operating Temperature: 32°F  
 Accuracy:  $\pm 2\%$  of full scale (standard) from 10% to 100% of range. Optional  $\pm 1\%$  of full scale calibration is available.  
 Repeatability: Within 0.25% of full scale  
 Tube Graduations: Millimeters (0–150)  
 Scale Length: 150 mm  
 Inlet and Outlet Connections:  $\frac{1}{8}$ " NPT female  
 Weight (approx.): 1 lb

### Materials of Construction

**Tubes:** Heavy Walled Borosilicate Glass with float stops of PTFE  
**Floats:** Borosilicate Glass and Type 316 SS are standard. Other materials are available—see Tube Selection Table (pages 160–161) and Optional Equipment  
**End Blocks:** See Table I  
**Inlet/Outlet Adaptors:** See Table I  
**Side Plates:** Black Anodized Aluminum  
**Back Plate:** White Acrylic  
**Front Plate:** Lexan®  
**Seals and Packing:** Viton® (other materials available on special order)  
**Valve(s):**  
 FMA4302, FMA4602: Chrome-Plated Brass  
 All Others: Type 316 SS



FMA4311 with optional baseplate



FMA4602 with optional baseplate

### Calibration

Standard ( $\pm 2\%$  accuracy) calibration is performed using Air at normal temperature (70°F) and pressure (14.7 psia). Calibrations for gases other than Air are mathematically derived from the Air calibration. Calibration charts for Air are shipped with each flowmeter or replacement tube. Calibration charts for many other gases and gas mixtures are available at no additional charge. Specify the required calibration charts when ordering. The accuracy of this calibration is  $\pm 5\%$  of full scale.

Table I

Single Tube Flowmeter Part No.	Four Tube Flowmeter Part No.	Configuration	End Blocks Material	Inlet/Outlet Adaptor Material
FMA4300-( )	FMA4600-( )	Without Metering Valve	Aluminum	Aluminum
FMA4310-( )	FMA4610-( )		Type 316 SS	Type 316 SS
FMA4301-( )	FMA4601-( )	With Standard Metering Valve	Aluminum	Aluminum
FMA4311-( )	FMA4611-( )		Type 316 SS	Type 316 SS
FMA4302-( )	FMA4602-( )	With High Accuracy (NRS) Metering Valve	Aluminum	Aluminum
FMA4312-( )	FMA4612-( )		Type 316 SS	Type 316 SS

Where "( )" is indicated above under "Single Tube Flowmeter," complete the part number by inserting applicable tube number from Tube Selection Table on pages 160–161. Example: FMA4300-1. Order by complete part number.

Where "( )" is indicated above under "Four Tube Flowmeter," complete the part number by inserting four applicable tube numbers from Tube Selection Table on pages 160–161. Place the desired tube numbers in the order in which they are to be installed in the flowmeter, from left to right. Example: FMA4601-2314 for tube nos. 2, 3, 1 and 4. Order by complete part number.

Table II, Replacement Metering Valves

Flowmeter Tube No.	Standard Metering Valve Part No. (Size)	Chrome-Plated Brass High Accuracy (NRS) Valve Part No. (Size)	Type 316 SS High Accuracy (NRS) Valve Part No. (Size)
FMA4331	0202-4113A (L)	0202-4080A (1)	0202-4086A (1)
FMA4332	0202-4113A (L)	0202-4081A (2)	0202-4087A (2)
FMA4333	0202-4113A (L)	0202-4082A (3)	0202-4088A (3)
FMA4333A	0202-4113A (L)	0202-4083A (4)	0202-4089A (4)
FMA4334	0202-4114A (M)	0202-4084A (5)	0202-4090A (5)
FMA4334B	0202-4114A (M)	0202-4085A (6)	0202-4091A (6)
FMA4335	0202-4115A (H)	0202-4085A (6)	0202-4091A (6)
FMA4336	0202-4115A (H)	0202-4085A (6)	0202-4091A (6)

#### Optional Equipment

Equipment and Replacement Parts	Part No.	Page No.
Acrylic Tripod Baseplate with leveling screws For Single Tube Flowmeters For Four Tube Flowmeters	FMA4702 FMA47024	
Replacement Metering Valves		See Table II 161
Replacement Tubes		
Floats*		
Sapphire Float Flowmeters with Tube Numbers FMA4331 – FMA4334B Flowmeters with Tube Numbers FMA4335 – FMA4336	S1000A S1001A	
Carboloy Float Flowmeters with Tube Numbers FMA4331 – FMA4334B Flowmeters with Tube Numbers FMA4335 – FMA4336	C1000A C1001A	
Tantalum Float Flowmeters with Tube Numbers FMA4331 – FMA4334B Flowmeters with Tube Numbers FMA4335 – FMA4336	T1000A T1001A	
±1% Full Scale Calibration** (one tube, both floats)	CC100	

\* Tubes are supplied standard with borosilicate glass and stainless steel floats. As an option, the glass float may be replaced by sapphire; the stainless steel float may be replaced by either carboloy or tantalum.

\*\* Specify gas, temperature and pressure when ordering a ±1% calibration. Please note the calibration accuracy available for tube No. 1 is ±2%.

## Tube Selection Table for 150A Series Flowmeters

Flow rates shown are maximum flow rates at 70°F and 14.7 psia. (Minimum flow rates = 1/10 of maximum)

Tube No.	Float Material*	Air slpm	scfh	Argon slpm	scfh	Carbon Dioxide slpm	scfh	Helium slpm	scfh
1	Glass	0.050	0.106	0.041	0.087	0.059	0.125	0.045	0.095
	Sapphire	0.077	0.163	0.063	0.134	0.088	0.186	0.071	0.130
	Type 316 SS	0.148	0.313	0.122	0.259	0.160	0.339	0.145	0.307
	Carboloy	0.251	0.531	0.208	0.441	0.268	0.568	0.269	0.570
	Tantalum	0.274	0.580	0.227	0.481	0.293	0.621	0.299	0.634
2	Glass	0.088	0.186	0.072	0.133	0.103	0.218	0.083	0.176
	Sapphire	0.136	0.288	0.111	0.235	0.134	0.326	0.130	0.275
	Type 316 SS	0.258	0.546	0.213	0.451	0.278	0.589	0.262	0.555
	Carboloy	0.439	0.929	0.363	0.769	0.446	0.945	0.483	1.02
	Tantalum	0.478	1.01	0.396	0.839	0.481	1.02	0.535	1.13
3	Glass	0.380	0.805	0.318	0.674	0.358	0.759	0.494	1.05
	Sapphire	0.518	1.10	0.433	0.918	0.482	1.02	0.759	1.61
	Type 316 SS	0.832	1.76	0.697	1.48	0.754	1.60	1.41	2.99
	Carboloy	1.24	2.62	1.04	2.20	1.10	2.33	2.29	4.85
	Tantalum	1.33	2.82	1.11	2.35	1.17	2.48	2.47	5.23
A	Glass	0.830	1.76	0.701	1.48	0.741	1.57	1.55	3.29
	Sapphire	1.10	2.33	0.926	1.96	0.974	2.06	2.15	4.56
	Type 316 SS	1.69	3.58	1.42	3.02	1.47	3.12	3.44	7.30
	Carboloy	2.44	5.17	2.06	4.37	2.11	4.49	5.16	11.0
	Tantalum	2.60	5.51	2.19	4.65	2.25	4.77	5.52	11.7
4	Glass	2.37	5.02	2.00	4.24	2.06	4.37	5.03	10.7
	Sapphire	3.08	6.52	2.60	5.51	2.68	5.68	6.69	14.2
	Type 316 SS	4.65	9.84	3.92	8.31	4.02	8.52	10.3	21.9
	Carboloy	6.67	14.1	5.64	12.0	5.65	12.0	15.0	31.7
	Tantalum	7.09	15.0	5.99	12.7	5.97	12.7	15.9	33.7
B	Glass	3.89	8.24	3.28	6.96	3.37	7.15	8.01	16.9
	Sapphire	5.06	10.7	4.27	9.06	4.35	9.23	10.7	22.7
	Type 316 SS	7.61	16.1	6.44	13.6	6.34	13.4	16.7	35.4
	Carboloy	10.65	22.6	9.03	19.1	8.79	18.6	24.5	51.9
	Tantalum	11.25	23.8	9.54	20.2	9.29	19.7	26.1	55.3
5	Glass	8.68	18.4	7.34	15.6	7.39	15.7	19.3	40.0
	Sapphire	11.2	23.7	9.46	20.1	9.47	20.1	25.3	53.6
	Type 316 SS	16.5	35.0	14.0	29.7	13.9	29.5	38.4	81.4
	Carboloy	23.2	49.1	19.6	41.5	19.4	41.1	55.1	116.8
	Tantalum	24.5	51.9	20.8	44.1	20.5	43.4	58.5	124.0
6	Glass	23.7	50.2	20.1	42.6	19.6	41.5	55.5	117.6
	Sapphire	30.1	63.7	25.5	54.0	25.0	53.0	72.7	154.1
	Type 316 SS	43.7	92.5	37.0	78.4	36.5	77.4	109.4	231.8
	Carboloy	61.1	129.3	51.8	109.8	50.9	107.9	153.2	324.7
	Tantalum	64.6	136.8	54.8	116.1	53.8	114.0	162.0	343.3

Flow capacities for gases not listed may be obtained from your Advanced Representative.

\* 150A Series flow tubes are supplied standard with both a glass and stainless steel float. Other float materials listed are optional.

See Optional Equipment on page 159.

Tube No.	Hydrogen slpm	scfh	Nitrogen slpm	scfh	Oxygen slpm	scfh	Water ccm	Replacement Tubes and Packing Part No.
1	0.101	0.214	0.051	0.108	0.044	0.093	0.551	FMA4331
	0.160	0.339	0.080	0.170	0.069	0.146	1.08	
	0.323	0.685	0.132	0.322	0.133	0.282	2.56	
	0.592	1.25	0.258	0.547	0.228	0.483	5.02	
	0.653	1.38	0.282	0.598	0.249	0.528	5.58	
2	0.185	0.392	0.091	0.193	0.078	0.165	1.01	FMA4332
	0.288	0.610	0.140	0.297	0.121	0.256	1.96	
	0.574	1.22	0.266	0.564	0.232	0.492	4.56	
	1.04	2.20	0.451	0.956	0.398	0.843	8.80	
	1.14	2.42	0.491	1.04	0.434	0.920	9.77	
3	1.03	2.18	0.389	0.824	0.351	0.744	5.94	FMA4333
	1.49	3.16	0.529	1.12	0.479	1.02	10.71	
	2.53	5.36	0.849	1.80	0.771	1.63	20.9	
	3.87	8.20	1.26	2.67	1.15	2.44	33.6	
	4.16	8.82	1.35	2.86	1.23	2.61	36.2	
A	2.62	5.55	0.848	1.80	0.777	1.65	17.0	FMA4333A
	3.53	7.48	1.12	2.37	1.03	2.18	26.6	
	5.55	11.8	1.72	3.64	1.58	3.35	46.6	
	8.15	17.3	2.49	5.28	2.30	4.87	71.3	
	8.70	18.4	2.64	5.60	2.44	5.17	76.4	
4	7.99	16.9	2.41	5.11	2.22	4.70	53.3	FMA4334
	10.5	22.2	3.14	6.65	2.89	6.12	80.2	
	15.9	33.7	4.74	10.0	4.36	9.24	134.0	
	22.8	48.4	6.81	14.4	6.27	13.3	199.7	
	24.3	51.5	7.23	15.3	6.66	14.1	213.2	
B	12.9	27.3	3.96	8.39	3.65	7.73	85.4	FMA4334B
	17.0	36.0	5.15	10.9	4.76	10.1	129.8	
	26.0	55.1	7.74	16.4	7.17	15.2	219.8	
	37.4	79.3	10.8	22.9	10.1	21.4	328.6	
	39.8	84.3	11.4	24.2	10.6	22.5	350.7	
5	29.9	63.4	8.85	18.8	8.16	17.3	202.1	FMA4335
	38.9	82.4	11.4	24.2	10.5	22.3	299.1	
	58.4	123.8	16.8	35.7	15.6	33.0	492.8	
	82.9	175.7	23.6	50.0	21.9	46.4	726.4	
	87.9	186.3	25.0	53.0	23.2	49.2	773.4	
6	85.4	181.0	24.2	51.3	22.5	47.7	580.4	FMA4336
	110.0	233.1	30.6	64.8	28.5	60.4	853.1	
	160.3	339.7	44.5	94.3	41.3	87.5	1362.0	
	222.0	470.5	62.2	131.8	57.7	122.3	1952.0	
	234.5	497.0	65.8	139.4	61.0	129.3	2069.0	



# 150 mm Two-Tube Gas Blenders

Calibration Chart Referenced, Back Pressure Compensated

## 150A Series

Two-Tube Gas Blenders (Proportioners) provide a simplified method of metering and blending two different gases into a homogeneous, two component gas mixture. The flow rate ratio of the two gases determines the concentration of the gas mixture.

The blender consists of two 150A Series Flowmeter Tubes, each with separate inlet fittings and metering valves, which control the flow rate of each gas. The two gases flow upward through the metering tubes, then down through the mixing tube (located between the two metering tubes) exiting at the bottom. The flow rates are not affected by downstream pressure variations as long as back pressures do not approach or exceed the input pressure (recommended at 50 psig).

The valves are installed at the outlets of each tube therefore the flow readings are only correct if the supply pressure remains at the same pressure as listed on the flow tube calibration chart. Input pressures of up to 200 psig can be used; however a 50 psig inlet pressure is usually convenient, and is the recommended setting for use. Specify the required gas calibration chart when ordering. Charts are supplied for 50 psig inlet pressure unless otherwise specified.

## Standard Features

- Two Floats per Tube (Standard) expand range of blender.
- Ribbed Tubes stabilize floats and improve accuracy and readability.
- Wide Tube Selection allows gases to be blended in a variety of ratios.
- Linear Scale (10–150 mm) allows each blender to be used with a variety of gases via calibration charts.
- Magnifier Lens in Front Shield enhances reading resolution.
- Threaded Fittings with Locking Nuts permit front panel mounting.
- Unique Valve Design allows bubble-tight shutoff.

## Specifications

Maximum Operating Pressure: 200 psig

Maximum Operating Temp: 250°F

Minimum Operating Temperature: 32°F

Accuracy:  $\pm 2\%$  of full scale from 10% to 100% of range (each tube). Optional  $\pm 1\%$  of full scale calibration is available

Repeatability: Within 0.25% of full scale (each tube)

Tube Graduations: Millimeters (0–150)

Scale Length: 150 mm

Inlet and Outlet Connections:  $\frac{1}{8}$ " NPT female (2 inlets, 1 outlet)

Weight (approx.): 2 lbs



FMA4620 with optional baseplate

Table I

Part No.	Configuration	End Blocks Material	Inlet/Outlet Adaptor Material
FMA4620-( )	With Standard Metering Valve	Aluminum	Aluminum
FMA4621-( )	With High Accuracy (NRS) Metering Valve	Aluminum	Aluminum
FMA4630-( )	With Standard Metering Valve	Type 316 SS	Type 316 SS
FMA4631-( )	With High Accuracy (NRS) Metering Valve	Type 316 SS	Type 316 SS

Where "( )" is indicated above, complete the part number by inserting the required tube numbers in the order in which they are to be installed. Select tubes from the Tube Selection Table on page 163. Example: FMA4620-12, tube no. 1 will be on the left and tube no. 2 on the right. Order by complete part number.

## Optional Equipment

Equipment and Replacement Parts	Part No.	Page No.
Acrylic Tripod Baseplate with leveling screws	FMAB4702	
Replacement Metering Valves		159
Replacement Tubes		163
Floats*		
Sapphire Float Tubes 1 thru B	S1000A	
Tubes 5 thru 6	S1001A	
Carboloy Float Tubes 1 thru B	C1000A	
Tubes 5 thru 6	C1001A	
Tantalum Float Tubes 1 thru B	T1000A	
Tubes 5 thru 6	T1001A	
$\pm 1\%$ Full Scale Calibration** (one tube, both floats)	CC100	

\* Tubes are supplied standard with borosilicate glass and stainless steel floats. As an option, the glass float may be replaced by sapphire; the stainless steel float may be replaced by either carbonyl or tantalum.

\*\* Specify gas, temperature and pressure when ordering a  $\pm 1\%$  calibration. A calibration should be ordered for each of the two tubes. Please note the calibration accuracy available for tube No.1 is  $\pm 2\%$ .

**Materials of Construction**

**Tubes:** Heavy Walled Borosilicate Glass with float stops of PTFE

**Floats:** Borosilicate Glass and Type 316 SS are standard. Other materials are available—see Tube Selection Table II and Optional Equipment

**End Blocks:** See Table I

**Inlet/Outlet Adaptors:** See Table I

**Side Plates:** Aluminum, black anodized

**Back Plate:** White Acrylic

**Front Plate:** Lexan®

**Seals and Packing:** Viton® (other materials available on special order)

**Valves:**

FMA-4621: Chrome-Plated Brass

All Others: Type 316 SS

**Table II, Tube Selection for 150A Series Two-Tube Gas Blenders**

Flow rates shown are maximum flow rates at 70°F and 50 psig  
(Minimum flow rates = 1/10 of maximum)

Tube No.	Float Material*	Air slpm	scfh	Replacement Tubes and Packing Part No.
1	Glass	0.196	0.415	FMA4331
	Sapphire	0.286	0.606	
	Type 316 SS	0.515	1.09	
	Carboloy	0.841	1.78	
	Tantalum	0.908	1.92	
2	Glass	0.343	0.727	FMA4332
	Sapphire	0.498	1.06	
	Type 316 SS	0.854	1.81	
	Carboloy	1.30	2.75	
	Tantalum	1.40	2.97	
3	Glass	1.02	2.16	FMA4333
	Sapphire	1.36	2.88	
	Type 316 SS	2.09	4.43	
	Carboloy	3.01	6.38	
	Tantalum	3.2	6.78	
A	Glass	2.05	4.34	FMA4333A
	Sapphire	2.67	5.66	
	Type 316 SS	4.04	8.56	
	Carboloy	5.78	12.2	
	Tantalum	6.13	13.0	
4	Glass	5.63	11.9	FMA4334
	Sapphire	7.31	15.5	
	Type 316 SS	10.7	22.7	
	Carboloy	14.9	31.6	
	Tantalum	15.7	33.3	
B	Glass	9.1	19.3	FMA4334B
	Sapphire	11.5	24.4	
	Type 316 SS	16.7	35.4	
	Carboloy	23.2	49.2	
	Tantalum	24.6	52.1	
5	Glass	19.7	41.7	FMA4335
	Sapphire	25.2	53.4	
	Type 316 SS	36.8	78.0	
	Carboloy	51.3	108.7	
	Tantalum	54.3	115.1	
6	Glass	52.2	110.6	FMA4336
	Sapphire	66.5	140.9	
	Type 316 SS	96.8	205.1	
	Carboloy	134.6	285.2	
	Tantalum	142.2	301.3	

Flow capacities for gases not listed may be obtained from your Advanced Representative.

\* 150A Series flow tubes are supplied standard with both a glass and stainless steel float.  
Other float materials listed are optional. See Optional Equipment.



# 75 mm High Capacity Flowmeters

Direct Reading, Brass and Stainless Steel, Metering Valve

## 50HC Series

50HC Series flowmeters offer an economical means of measuring gas or liquid flow at flow rates up to 15 standard cubic feet per minute (scfm) of air. Suitable for both plant and laboratory use, these flowmeters have an accuracy of  $\pm 10\%$ .

Each flowmeter consists of a replaceable glass metering tube with a Type 316 SS float and float stops. Either chrome-plated brass or Type 316 SS valves, end blocks and fittings are available. Tubes are calibrated with air and graduated directly in standard cubic feet per minute (scfm) at 70°F and 14.7 psia.

## Standard Features

- Large Diameter Flow Tubes permit flows as high as 15 standard cubic feet per minute (scfm) of air.
- Ribbed Tubes stabilize float and improve accuracy and readability.
- Borosilicate Glass Tubes allow operating temperatures up to 200°F.
- Brass or Stainless Steel Construction permits use in either corrosive or noncorrosive gas service.

## Specifications

**Maximum Operating Pressure:** 200 psig  
**Maximum Operating Temperature:** 200°F  
**Minimum Operating Temperature:** 32°F  
**Accuracy:**  $\pm 10\%$  of full scale from 10% to 100% of range  
**Repeatability:** Within 0.5% of full scale  
**Tube Graduations:** Standard cubic feet per minute of Air  
**Scale Length:** 75 mm  
**Inlet and Outlet Connections:**  $\frac{3}{8}$ " NPT female  
**Weight (approx.):** 2.5 lbs

## Materials of Construction

**Tube:** Borosilicate Glass  
**Float and Float Stops:** Type 316 SS  
**End Blocks:** See Table I  
**Inlet/Outlet Adaptors:** See Table I  
**Side Plates:** Aluminum  
**Back Plate:** White Plastic  
**Front Plate:** Clear Plastic  
**Seals and Packing:** Viton®  
**Valve:** See Table I



FM4480

Table I

Part Number	Metering Valve, End Blocks and Inlet/Outlet Adaptor Material
FM4470-( )	Chrome-Plated Brass
FM4480-( )	Type 316 SS

Where "( )" is indicated above, complete the part number by inserting applicable tube number from Table II.  
Example: FM4470-1 which has a flow range of 0.6 to 3.4 scfm. Order by complete part number.

Table II, Tube Selection Table

Tube No.	Air Flow Rate Range @ 70°F and 14.7 psia	Replacement Tubes Part No.
1	0.6–3.4 scfm	FM4471
2	0.6–6.0 scfm	FM4472
3	1.2–12.0 scfm	FM4473
4	1.5–15.0 scfm	FM4474

Table III, Gas Conversion Factors

To select proper tube for gases other than Air, multiply flow rate values for Air given in Table II by applicable conversion factor shown below. Then use these new flow rate values to select appropriate tube number.

Gas	Factor*	Gas	Factor*
Acetylene	1.04	Helium	2.69
Ammonia	1.30	Hydrogen	3.81
Argon	0.85	Methane	1.35
Butane	0.70	Neon	1.20
Carbon Dioxide	0.81	Nitrogen	1.01
Carbon Monoxide	1.01	Oxygen	0.95
Ethane	0.98	Propane	0.80
Ethylene	1.02	Sulfur Dioxide	0.66

\* Conversion factors are approximately equal to square root of the reciprocal of the specific gravity of the gas ( $\sqrt{\frac{1}{SG}}$ ).

# Acrylic Flowmeters

Economical, Built-in Metering Valve

## 50AM Series

50AM Series flowmeters are designed as a practical approach to low flow rate indication of noncorrosive gases at lowest possible cost. These flowmeters offer an economical means of measuring gas or liquid flow at low pressures where  $\pm 5\%$  accuracy is acceptable.

The metering tube for each flowmeter is machined directly from a clear acrylic block. Acrylic is resistant to impact and will not shatter like glass tube flowmeters. A direct reading scale for air in both standard liters per minute (sl/m) and standard cubic feet per hour (scfh) at 70°F and 14.7 psia is provided on the meter body. A unique valve design allows for accurate flow control and bubble-tight shutoff.

**Warning:** This flowmeter is constructed of acrylic. Make certain the gas you are using is compatible with the materials of construction. Injury to personnel or damage to equipment may result.



FMA4495A

## Standard Features

- Single Piece Body and Tube Construction allow for easy disassembly and assembly for cleaning.
- Threaded Fittings with Hex Nuts permit front panel mounting.
- Large Numbers and Graduations enhance readability.
- Dual Scale allows flow rate to be read in standard liters per minute and standard cubic feet per hour.
- Built-in Metering Valve allows bubble-tight shutoff.

Table I

Part Number	Float Material	Air Flow Rate Range @ 70°F and 14.7 psia (Actual Graduations)	
		scfh	sl/m
FMA4491A	Glass	2.8	1.4
FMA4492A	Stainless Steel	5.5	2.7
FMA4493A	Carboloy	7.0	3.5
FMA4494A	Glass	18.0	8.5
FMA4495A	Stainless Steel	32.5	16
FMA4496A	Carboloy	45	22
FMA4497A	Stainless Steel	100	50

## Specifications

Maximum Operating Pressure: 100 psig

Maximum Operating Temperature: 150°F

Accuracy:  $\pm 5\%$  of full scale from 10% to 100% of range

Tube Graduations: Standard liters per minute and standard cubic feet per hour of Air

Inlet and Outlet Connections:  $\frac{1}{8}$ " NPT female

Weight (approx.): 0.5 lbs

## Materials of Construction

Body and Tube: Machined Acrylic

Float: See Table I

Connection Fittings and Valve: Brass

Seals: Viton®

# Gas Flowmeters

## Pressure Compensated, Adjustable

### Model A10

Model A10 flowmeters deliver accurate measurement and flow control for gas shielded welding and other pipeline applications.

#### Benefits and Features

- Maximum inlet pressure is 75 psig.
- Flows to 140 scfh.
- Back pressure compensated at 20 or 50 psig.
- Sensitive needle valve for fingertip flow control.
- Durable, easy-to-read flow tube and protective cover.
- Tamper-proof, self-reseating high pressure safety valve.

#### Optional Equipment

##### Model IGA-IH10

- A single line hose for use with argon/carbon dioxide shielding gases.
- 10' of  $\frac{5}{16}$ " hose with  $\frac{5}{8}$ "-18 RH Male swivel end connections.

##### Model IGR-A75I20P

- Model A75 preset (20 psi) regulator for pipeline applications.
- 400 psig maximum inlet, 20 psig preset,  $\frac{1}{4}$ " NPT female inlet and  $\frac{5}{8}$ "-18 RH Female outlet (see Model A75, page 90)



Model A10



IGR-A75I20P

Table I

Part Number	Gas Service (Dual Scale)	Calibration Pressure (psig)	Delivery Flow Range (scfh)	Inlet Connection	Outlet Connection
IGF-A10ARC70	Argon/Carbon Dioxide	20	0-70*	$\frac{5}{8}$ "-18 RH Male	$\frac{5}{8}$ "-18 RH Female
IGF-A10ARC70M	Argon/Carbon Dioxide	20	0-70*	$\frac{1}{4}$ " NPT male	$\frac{5}{8}$ "-18 RH Female
IGF-A10ARC100	Argon/Carbon Dioxide	50	0-100*	$\frac{5}{8}$ "-18 RH Male	$\frac{5}{8}$ "-18 RH Female
IGF-A10NA100	Nitrogen/Air	20	0-100	$\frac{5}{8}$ "-18 RH Male	$\frac{5}{8}$ "-18 RH Female
IGF-A10HH2100	Helium/Hydrogen	20	0-100 / 0-140	$\frac{5}{8}$ "-18 RH Male	$\frac{5}{8}$ "-18 RH Female
IGF-A10ARH45	Argon/Helium	20	0-45 / 0-140	$\frac{5}{8}$ "-18 RH Male	$\frac{5}{8}$ "-18 RH Female

\* On maximum continuous duty cycle, CO<sub>2</sub> flow to 20 scfh.

# Mechanics of Mass Flow Measurement

Advanced mass flowmeters utilize the specific heat properties of gases to measure true mass flow rate. Our Mass Flowmeters and Flow Controllers both utilize the measuring principles illustrated in Figure 1. As shown, some of the gas entering the device splits away from the mainstream where it flows through a measuring tube before returning to the mainstream. Laminar flow principles are incorporated to keep the two streams proportional.

The measuring tube is wrapped with a heater coil which uniformly heats the gas stream. In addition, temperature sensors are placed around the tube, one upstream ( $T_1$ ) and one downstream ( $T_2$ ) of the heater coil.

With no gas flow through the device, the amount of heat reaching the temperature sensors is equal and a balanced bridge circuit is formed. As gas begins to flow, heat is carried from the heater coil toward  $T_2$ , thereby unbalancing the circuit. The temperature differential created can be correlated to mass flow rate by the following formula:

$$H = M C_p (T_2 - T_1), \text{ where...}$$

$H$  = Heat

$M$  = Mass

$C_p$  = Specific Heat of Gas

$T_1$  = Inlet Temperature

$T_2$  = Outlet Temperature

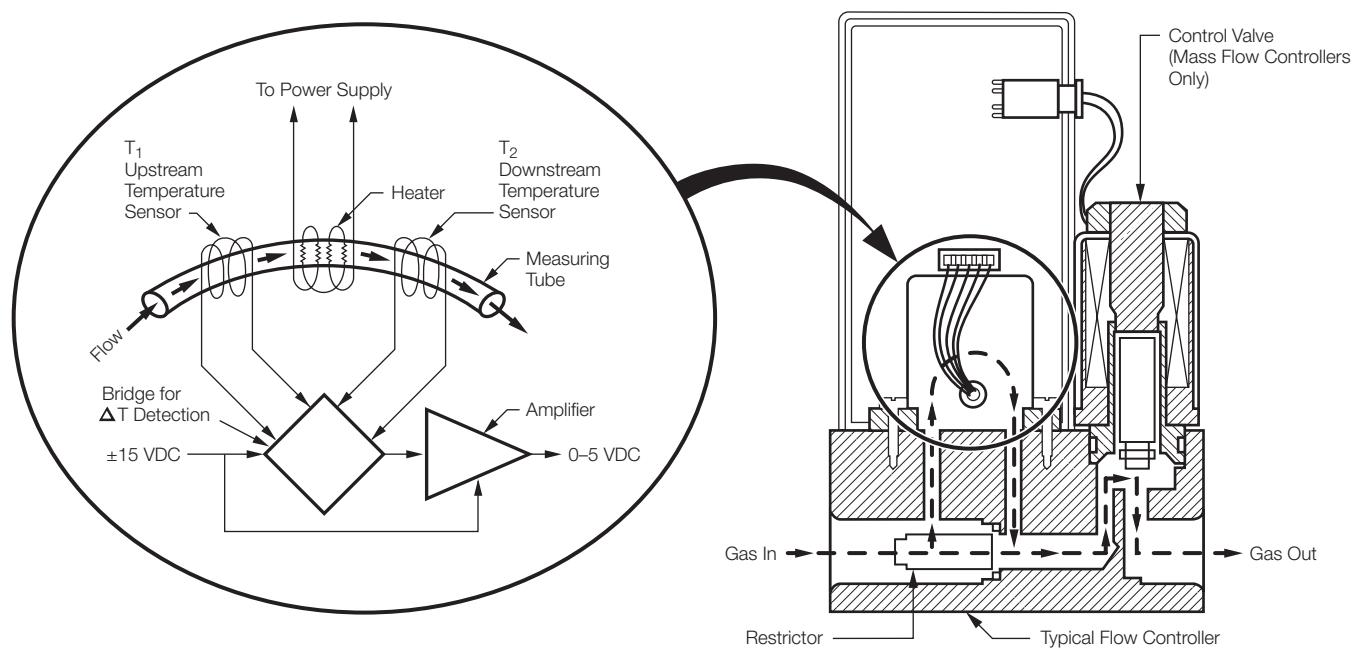
The resulting electrical signal is amplified, linearized and fed to the LCD readout as a 0–5 VDC signal which is proportional to flow rate—0 volts with no flow, and 5 volts at maximum flow.

Measuring tubes used in our Mass Flowmeters have an internal diameter of approximately 1/10,000 of an inch. Because of this small size, it is extremely important that gases entering the device are kept clean. Most of the more common noncorrosive gases (such as Nitrogen, Hydrogen or Helium) are relatively clean products. However, piping systems, cylinders and other equipment can contribute rust or other particulate contamination that could foul the device. Therefore, it is highly recommended that all gases be filtered before they enter a Mass Flowmeter.

In addition to the measuring principles described, our Mass Flow Controllers have an electromagnetic control valve at the outlet as shown in Figure 1. When the operator programs a flow rate setpoint into the controller it is translated into a command signal (also 0–5 VDC). A comparative amplifier in the controller compares this command signal against the flow signal and directs the control valve to throttle open or closed until the two signals are in equilibrium.

The built-in electromagnetic control valve allows the flow to be set to any desired flow rate within the range of the particular model. Setpoints are controlled either locally or remotely. The valve is normally closed as a safety feature to ensure that gas flow is shut off in case of a power outage.

Figure 1, Principles of Mass Flow Measurement



# Mass Flowmeters

## Built-in LCD Readout, Aluminum and Stainless Steel

### Model GFM

Compact, self-contained GFM mass flowmeters are designed to read flow rates of gases. The rugged design coupled with instrumentation grade accuracy provides a versatile and economical means of flow measurement. Aluminum or stainless steel models with readout options of either engineering units (standard) or 0 to 100 percent displays are available. The mechanical layout of the design includes an LCD readout built into the top of the transducer. This readout module is tiltable over 90 degrees to provide optimal reading comfort. It is connected to the transducer by a standard modular plug, and is also readily removable for remote reading installations.

### Operation

Metered gases are divided into two laminar flow paths—one through the primary flow conduit, and the other through a capillary sensor tube. Both flow conduits are designed to ensure laminar flows and therefore the ratio of their flow rates is constant.

Two precision temperature sensing windings on the sensor tube are heated, and when flow takes place, gas carries heat from the upstream to the downstream windings. The resulting temperature differential is proportional to the change in resistance of the sensor windings.

A Wheatstone bridge design is used to monitor the temperature-dependent resistance gradient on the sensor windings which is linearly proportional to the instantaneous rate of flow. Output signals of 0 to 5 VDC and 4 to 20mA are generated indicating mass molecular based flow rates of the metered gas. Flow rates are unaffected by temperature and pressure variations within stated limitations.

Model GFM Mass Flowmeters are available with flow ranges from 10 mL/min to 1000 L/min N<sub>2</sub>. Gases are connected by means of 1/4", 3/8" and 1/2" compression fittings, and 3/4" NPT female fittings. Optional fittings are available. These meters may be used as benchtop units or mounted by means of screws in the base. Transducer power supply ports are fuse and polarity protected.



GFM37

### Benefits/Features

- Rigid metallic construction.
- Maximum pressure of 1000 psig (70 bar).
- Leak integrity  $1 \times 10^{-9}$  atm cc/sec He.
- NIST-traceable certification.
- Built-in tiltable LCD readout.
- 0–5 VDC and 4–20mA signals.
- Circuit protection.
- Can be used as a portable device.
- Engineering units or 0–100% displays.
- TIO Totalizer option.



Models GFM 57, 67 and 77

**Specifications****Accuracy:**

17, 37, 47:  $\pm 1\%$  of full scale  
 57, 67, 77:  $\pm 1.5\%$  of full scale. Optional accuracy is available at  $\pm 1\%$  of full scale.

**Calibration:** Performed at standard conditions [14.7 psia (101.4 kPa) and 70°F (21.1°C)] unless otherwise requested

**Repeatability:**  $\pm 0.25\%$  of full scale

**Response Time:** Generally 2 seconds to within  $\pm 2\%$  of actual flow rate over 25 to 100% of full scale

**Temperature Coefficient:** 0.13% of full scale/ $^{\circ}\text{C}$

**Pressure Coefficient:** 0.01% of full scale/psi (0.07 bar)

**Pressure Drop (maximum):** See Table II

**Gas and Ambient Temperature:**

32°F to 122°F (0°C to 50°C)  
 Dry gases: 14°F to 122°F (-10°C to 50°C)

**Output Signals:** Linear 0-5 VDC (1000 ohms min. load impedance) and 4-20 mA (0-500 ohms loop resistance)

**Transducer Input Power:** Universal +12 VDC to +26 VDC, 200 mA maximum

**Time Constant:** 800 ms

**Gas Pressure:**

17, 37, 47: 1000 psig (70 bar) maximum;  
 20 psig (1.4 bar) optimum  
 57, 67, 77: 500 psig (34.5 bar) maximum;  
 20 psig (1.4 bar) optimum

**Materials in Fluid Contact:**

Aluminum Models: Anodized aluminum, Type 316 SS, Brass and Viton® O-Rings  
 Stainless Steel Models: Type 316 SS and Viton® O-Rings (optional O-Rings available: Buna, EPR and Kalrez®)

**Attitude Sensitivity:** No greater than  $\pm 15^{\circ}$  rotation from horizontal to vertical; standard calibration is in horizontal position

**Connections:**

17:  $\frac{1}{4}$ " compression (optional: 6 mm,  $\frac{3}{8}$ " and  $\frac{1}{2}$ " compression or  $\frac{1}{4}$ " VCR®)

37:  $\frac{1}{4}$ " compression (optional 6 mm and  $\frac{3}{8}$ " compression or  $\frac{1}{4}$ " VCR®)

47, 57:  $\frac{3}{8}$ " compression

67:  $\frac{1}{2}$ " compression

77:  $\frac{3}{4}$ " NPT female or  $\frac{3}{4}$ " compression

**Leak Integrity:**  $1 \times 10^{-9}$  atm cc/sec He maximum to the outside environment

**Display:** 3½ digit LCD, 0.5" (H) characters

**CE Compliant:** EN 55011 Class 1, Class B; EN50082-1

**Table I, Flow Ranges**

Model No.	Description	Code	Flow Range mL/min (N <sub>2</sub> )	L/min (N <sub>2</sub> )
17	Low Flow	01	0-10	—
		02	0-20	—
		03	0-50	—
		04	0-100	—
		05	0-200	—
		06	0-500	—
		07	—	0-1
		08	—	0-2
		09	—	0-5
		10	—	0-10
37	Medium Flow	11	—	0-15
		30	—	0-20
		31	—	0-30
		32	—	0-40
47	High Flow	33	—	0-50
		40	—	0-60
		41	—	0-80
57	High Flow	42	—	0-100
		50	—	0-200
		60	—	0-500
67	High Flow	70	—	0-1000
77	High Flow	—	—	—

For more information regarding specific flow ranges contact your ASGE representative.

**Table II, Pressure Drop**

Model No.	Flow Rate L/min	Maximum Pressure Drop mm H <sub>2</sub> O	psid	mbar
17	up to 10	25	0.04	2.5
	20	300	0.44	30
	30	800	1.18	81
	40	1480	2.18	150
	50	2200	3.23	223
37	60	3100	4.56	314
	80	4422	6.50	448
	100	5500	8.08	557
	200	2720	4.00	280
47	500	3400	5.00	340
	1000	6120	9.00	620
	—	—	—	—
57	—	—	—	—
67	—	—	—	—
77	—	—	—	—

# Mass Flowmeters

Model GFM

Table III, Dimensions

Model No.	Inlet and Outlet Connections	Dimensions (inches)							No LCD H	Hole Size Mounting J
		LCD Version A	B	C/*C	D/*D	E/*E	F	G		
17	1/4" Compression	5.60	1.00	1.00	3.00	5.02	0.69	2.69	4.50	6-32
37	1/4" Compression	5.98	1.37	1.25	4.13	6.15	0.69	2.69	4.88	6-32
47	3/8" Compression	5.98	1.37	1.25	4.13	6.27	0.69	2.69	4.88	6-32
57	3/8" Compression	6.60	2.00	1.75	6.69	8.83	0.99	4.69	5.50	10-24
67	1/2" Compression	7.60	3.00	3.00	7.25	9.67	2.25	6.75	6.50	1/4-20
77	3/4" NPT female	8.60	4.00	4.00	7.30	—	3.00	6.80	7.50	1/4-20

Table IV, Accessories: Power Supply, Battery Packs and Cables

Part Number	Description
PS-GFM-110NA-2	Power supply, 110 V/12 VDC   North America
PS-GFM-110NA-4	Power supply, 110 V/24 VDC   North America
PS-GFM-230EU-2	Power supply, 220 V/12 VDC   Europe
PS-GFM-230EU-4	Power supply, 220 V/24 VDC   Europe
PS-GFM-240UK-2	Power supply 240 V/12 VDC   United Kingdom
PS-GFM-240UK-4	Power supply 240 V/24 VDC   United Kingdom
BP110	Battery pack, 110 V (includes case)
BP220	Battery pack, 220 V (includes case)
CBL-D4	Cable with 9-pin D-conn. (4-20 mA)
CBL-D5	Cable with 9-pin D-conn. (0-5 VDC)
17/3RC	Remote cable, 3' long
17/R	Remote LCD readout with 3' cable

For more information regarding Totalizer input/output flow monitor and controller options contact your ASGE representative.

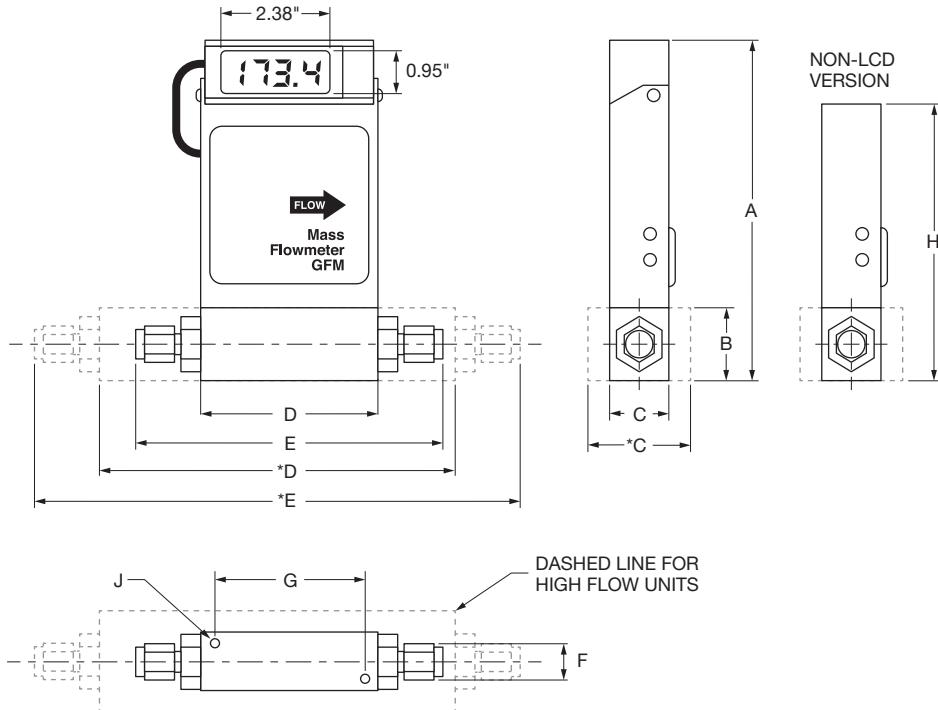


Table V, Ordering Information

GFM	Maximum Flow N <sub>2</sub>							
	17	10 L/min						
	37	50 L/min						
	47	100 L/min						
	57	200 L/min						
	67	500 L/min						
	77	1000 L/min						
	Material							
	A	Aluminum						
	S	Stainless Steel						
	Seals							
	V	Viton®						
	B	Buna						
	E	EPR						
	T	PTFE/Kalrez®						
	Fittings							
	A	1/4" Compression						
	B	1/8" Compression						
	C	1/4" VCR®						
	D	3/8" Compression						
	E	1/2" Compression						
	F	3/4" NPT female						
	G	3/4" Compression						
	H	6 mm Compression						
	GFM Model							
		17, 37						
		17						
		17, 37						
		17, 37, 47, 57						
		67						
		77						
		77						
		17, 37						
	Display							
	N	No display						
	L	LCD readout						
	Power							
	6	Universal +12 VDC to +26 VDC						
	Output Signal							
	A	0–5 VDC						
	B	4–20 mA						
	Digital Interference							
	0	None						
GFM	17	S	V	A	L	6	A	0

Example: GFM17S-VAL6-A0  
10 L/min (N<sub>2</sub>) 20 psig

Specify flow range, gas and pressure  
GFM17 with stainless steel, Viton® seals,  
1/4" compression fittings, display, 12–26 VDC  
power, 0–5 VDC output signal, no digital  
interface

# Mass Flow Controllers

## Built-in LCD Readout, Aluminum and Stainless Steel

### Model GFC

Model GFC Thermal Mass Flow Controllers are compact, self-contained flow controllers designed to indicate and control flow rates of gases. The rugged design coupled with instrumentation grade accuracy provides versatile and economical means of flow control. Aluminum or stainless steel models with readout options of either engineering units (standard) or 0 to 100 percent displays are available. The built-in electromagnetic valve allows the flow to be set to any desired flow rate within the range of the particular model. Zero and span adjustments are accessible from the outside of transmitters.

### Operation

Metered gases are divided into two laminar flow paths, one through the primary flow conduit, and the other through a capillary sensor tube. Both flow conduits are designed to ensure laminar flows and therefore the ratio of their flow rates is constant.

Two precision temperature sensing windings on the sensor tube are heated, and when flow takes place, gas carries heat from the upstream to the downstream windings. The resultant temperature differential is proportional to the change in resistance of the sensor windings.

A Wheatstone bridge design is used to monitor the temperature dependent resistance gradient on the sensor windings which is linearly proportional to the instantaneous rate of flow. Output signals of 0 to 5 VDC and 4 to 20mA are generated indicating mass molecular based flow rates of the metered gas. The combined gas streams flow through a proportionating electromagnetic valve with an appropriately selected orifice. The closed loop control circuit continuously monitors the mass flow output and maintains it at the set flow rate. Flow rates are unaffected by temperature and pressure variations within stated limitations.

Model GFC Mass Flow Controller setpoints are controlled either locally or remotely. The valve is normally closed as a safety feature to ensure that gas flow is shut off in case of a power outage. The LCD readout built into the top of the transducer is tiltable over 90 degrees to provide optimal reading comfort. It is connected to the transducer by a standard modular plug, and is readily removable for remote reading installations. Transducers without LCD readout are offered for OEM applications. GFC mass flow controllers are available with flow ranges from 10 mL/min to 1000 L/min nitrogen. Gases are connected by means of 1/4", 3/8", or optional 1/2" compression fittings and 3/4" NPT female fittings. Optional fittings are available. These controllers may be used as benchtop units or mounted by means of screws in the base. Transducer power supply ports are fuse and polarity protected.

### Benefits/Features

- Rigid metallic construction.
- Maximum pressure of 1000 psig (70 bar).
- Leak integrity  $1 \times 10^{-9}$  atm cc/sec He.
- NIST-traceable certification.
- Built-in tiltable LCD readout.
- Local or remote setpoint control.
- 0–5 VDC and 4–20mA signals.
- Circuit protection.
- Engineering units or 0–100% displays.
- TIO Totalizer option.



GFC37



Models GFC 57, 67 and 77

## Specifications

### Accuracy:

17, 37, 47:  $\pm 1\%$  of full scale (0–100% flow range)  
 57, 67, 77:  $\pm 1.5\%$  of full scale (20–100% flow range),  $\pm 3\%$  (0–20% flow range).  
 Optional accuracy is available at  $\pm 1\%$  of full scale (20–100% flow range),  
 REF DATA with  $\pm 1\%$  of full scale (0–20% flow range).

**Calibration:** Performed at standard conditions [14.7 psia (101.4 kPa) and 70°F (21.1 °C)] unless otherwise requested

**Repeatability:**  $\pm 0.25\%$  of full scale

**Response Time:** Generally 2 seconds to within  $\pm 2\%$  of actual flow rate over 25 to 100% of full scale

**Temperature Coefficient:** 0.13% of full scale/°C

**Pressure Coefficient:** 0.01% of full scale/psi

**Pressure Drop:** See Table II

### Maximum Gas Pressure:

17, 37, 47: 1000 psig (70 bar) maximum,  
 25 psig (1.73 bar) optimum  
 57, 67, 77: 500 psig (34.5 bar) maximum,  
 25 psig (1.73 bar) optimum

**Turn Down Ratio:** 40:1

### Differential Pressure (maximum):

17, 37, 57, 67, 77: 50 psi (3.4 bar)  
 47: 40 psi (2.7 bar)

### Gas and Ambient Temperature:

32°F to 122°F (0°C to 50°C)  
 Dry gases: 14°F to 122°F (-10°C to 50°C)

### Materials in Fluid Contact:

Aluminum Models: Anodized aluminum,  
 Type 316 SS, Brass and Viton® O-Rings  
 Stainless Steel Models: Type 316 SS and  
 Viton® O-Rings (optional O-Rings: Buna,  
 EPR and Kalrez®)

**Attitude Sensitivity:** No greater than  $\pm 15^\circ$  rotation from horizontal to vertical; standard calibration is in horizontal position

**Output Signals:** Linear 0–5 VDC (1000 ohms min. load impedance) and 4–20 mA (0–500 ohms loop resistance), max noise is  $\pm 20\text{mV}$

**Command Signals:** Analog 0–5 VDC or 4–20 mA for remote setpoint mode, NPN compatible purge/valve off

### Connections:

17:  $\frac{1}{4}$ " compression, optional 6 mm,  $\frac{3}{8}$ " and  $\frac{1}{2}$ " compression or  $\frac{1}{4}$ " VCR®  
 37:  $\frac{1}{4}$ " compression, optional 6 mm and  $\frac{3}{8}$ " compression or  $\frac{1}{4}$ " VCR®  
 47, 57:  $\frac{3}{8}$ " compression  
 67:  $\frac{1}{2}$ " compression  
 77:  $\frac{3}{4}$ " NPT female, optional  $\frac{3}{4}$ " compression

**Leak Integrity:**  $1 \times 10^{-9}$  atm cc/sec He maximum to the outside environment

### Transducer Input Power:

17, 37, 47: Universal +12 VDC to +26 VDC, 200 mA maximum  
 57, 67, 77: +12 VDC, 800mA, optional +24 VDC, 650 mA

**Circuit Protection:** Circuit boards have built-in polarity reversal protection, resettable fuses provide power input protection

**Display:** 3½ digit LCD, 0.5" (H) characters

**CE Compliant:** EN 55011 Class 1, Class B;  
 EN50082-1

Table I, Flow Ranges

Model No.	Description	Code	Flow Range mL/min (N <sub>2</sub> )	L/min (N <sub>2</sub> )
17	Low Flow	01	0–10	—
		02	0–20	—
		03	0–50	—
		04	0–100	—
		05	0–200	—
		06	0–500	—
		07	—	0–1
		08	—	0–2
		09	—	0–5
		10	—	0–10
37	Medium Flow	11	—	0–15
		30	—	0–20
		31	—	0–30
		32	—	0–40
		33	—	0–50
47	High Flow	40	—	0–60
		41	—	0–80
		42	—	0–100
57	High Flow	50	—	0–200
67	High Flow	60	—	0–500
77	High Flow	70	—	0–1000

Table II, Pressure Drop

Model No.	Flow Rate L/min	Maximum Pressure Drop mm H <sub>2</sub> O	psid	mbar
17	up to 10	720	1.06	75
	15	2630	3.87	266
	20	1360	2.00	138
	30	2380	3.50	241
	40	3740	5.50	379
	50	5440	8.00	551
47	60	7480	11.00	758
	100	12850	18.89	1302
57	200	7031	10.00	690
67	500	8437	12.00	827
77	1000	10547	15.00	1034

# Mass Flow Controllers

Model GFC

Table III, Dimensions

Model No.	Inlet and Outlet Connections	Dimensions (inches)							No LCD H	Hole Size Mounting J
		LCD Version	A	B	C/*C	D/*D	E/*E	F		
17	1/4" Compression		5.60	1.00	1.00	4.27	6.29	0.69	2.69	4.50
37	1/4" Compression		5.98	1.37	1.25	5.19	7.21	0.69	2.69	4.88
47	3/8" Compression		5.98	1.37	1.25	5.19	7.33	0.69	2.69	4.88
57	3/8" Compression		6.60	2.00	1.75	10.20	12.30	1.39	4.69	6.60
67	1/2" Compression		7.56	3.00	3.00	10.24	12.40	2.50	6.80	7.56
77	3/4" NPT female		8.56	4.00	4.00	10.50	—	3.00	6.80	8.56

Table IV, Accessories: Power Supply and Cables

Part Number	Description
PS-GFC-110NA-2	Power supply, 110 V/12 VDC   North America
PS-GFC-110NA-4	Power supply, 110 V/24 VDC   North America
PS-GFC-230EU-2	Power supply, 220 V/12 VDC   Europe
PS-GFC-230EU-4	Power supply, 220 V/24 VDC   Europe
PS-GFC-240UK-2	Power supply 240 V/12 VDC   United Kingdom
PS-GFC-240UK-4	Power supply 240 V/24 VDC   United Kingdom
PS-GFC-240AU-2	Power supply 240 V/12 VDC   Australia
PS-GFC-240AU-4	Power supply 240 V/24 VDC   Australia
CBL-DGS	Cable, shielded 15-pin D-connector/end terminated
17/3RC	Remote cable, 3' long
17/R	Remote LCD readout with 3' cable

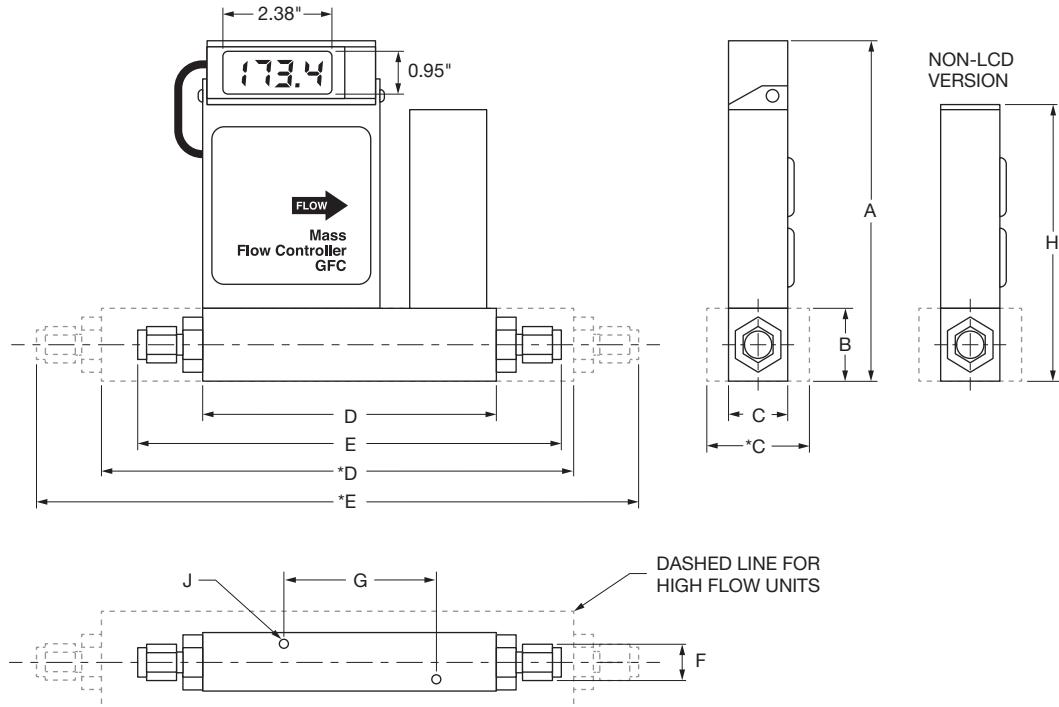


Table V, Ordering Information

GFC	Maximum Flow N <sub>2</sub>							
	17	10 L/min						
	37	50 L/min						
	47	100 L/min						
	57	200 L/min						
	67	500 L/min						
	77	1000 L/min						
	Material							
	A	Aluminum						
	S	Stainless Steel						
	Seals							
	V	Viton®						
	B	Buna						
	E	EPR						
	T	PTFE/Kalrez®						
	Fittings							
	A	1/4" Compression						
	B	1/8" Compression						
	C	1/4" VCR®						
	D	3/8" Compression						
	E	1/2" Compression						
	F	3/4" NPT female						
	G	3/4" Compression						
	H	6 mm Compression						
	GFM Model							
	17, 37							
	17							
	17, 37							
	17, 37, 47, 57							
	67							
	77							
	77							
	17, 37							
	Display							
	N	No display						
	L	LCD readout						
	Power							
	6	Universal +12 VDC to +26 VDC						
	2	12 VDC						
	4	24 VDC						
	GFM Model							
	17, 37, 47							
	57, 67, 77							
	57, 67, 77							
	Input/Output Signals							
	A	Local 0-5 VDC						
	B	Local 4-20 mA						
	C	0-5 VDC / 0-5 VDC						
	D	0-5 VDC / 4-20 mA						
	E	4-20 mA / 4-20 mA						
	F	4-20 mA / 0-5 VDC						
	Digital Interference							
	0	None						
GFC	17	S	V	A	L	6	A	0

Example: GFC17S-VAL6-A0  
10 L/min (N<sub>2</sub>) 20 psig

Specify flow range, gas and pressure  
GFC17 with stainless steel, Viton® seals,  
1/4" compression fittings, display, 12-26 VDC  
power, local 0-5 VDC signals, no digital  
interface

# Purge Assemblies

## Tee, Cross and SilcoNert® Cross Purge

### SG3890, SN3890 Series

Purging, meaning to cleanse, is an important procedure which is often overlooked in many gas processes. Before initial and subsequent system startups, purging should be done to remove contaminants (such as air and water vapor) from the gas delivery system. To enhance operator safety, purging should also be done before changing out cylinders to remove residual corrosive or toxic gases.

Oxygen and moisture can adversely affect many applications, reducing the quality of products being produced, or affecting the results of tests being performed. In addition, many gases such as Hydrogen Chloride or Chlorine will react with moisture to form highly corrosive acids. These acids will attack most metals, including stainless steel, thereby reducing the service life of pressure regulators and other system components. Proper purging techniques can avoid these and other related problems.

Purging is often done by simply flowing the service gas through the system and venting until the system has been cleansed. However, when the service gas is toxic, corrosive or otherwise hazardous, purging by this method is not practical. In these cases, purging is normally accomplished using an inert purge gas such as dry Nitrogen.

Purge assemblies provide a means to introduce the purge gas into the system after the service gas cylinder has been connected. Advanced offers purge assemblies in two basic configurations, tee type and cross type.

#### Tee Type Purge Assemblies

Tee type purge assemblies are used between the gas cylinder and pressure regulator. They feature a diaphragm seal valve which connects to a regulated purge gas source. This allows the operator to flush the system with the purge gas to remove atmospheric contamination prior to start-up or after a cylinder change.

Similarly, the purge gas is also used to flush the service gas from the system before disconnecting an "empty" cylinder, reducing the potential for operator exposure.

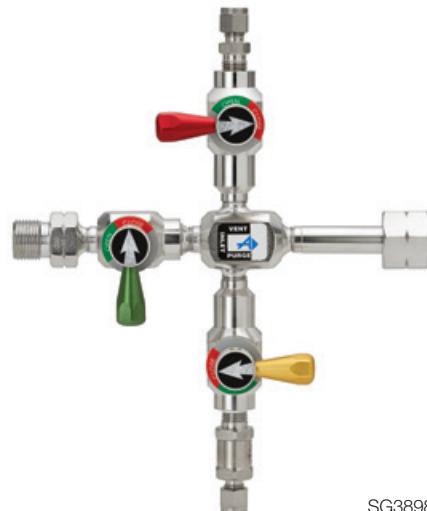
Tee type purge assemblies have a check valve installed in the purge inlet port to prevent backflow of gas into the purge line should the purge valve be inadvertently left open. They are available in either brass or stainless steel construction.

#### Cross Type Purge Assemblies

Cross type purge assemblies are also used between the gas cylinder and pressure regulator. In addition to providing the same functions as tee type purge assemblies, cross purge assemblies also feature an inlet isolation valve and a vent valve.

The inlet valve allows the operator to isolate the pressure regulator and downstream system prior to a cylinder change. As such, the amount of air entering the system (when changing cylinders) is limited to just the internal area of the purge assembly itself. This keeps downtime to a minimum since this small area can be purged rather quickly. The vent valve connects to a suitable disposal line. This allows the operator to remove the trapped service gas from the purge assembly when the isolation valve has been closed—a decided advantage when working with toxic or otherwise hazardous gases.

Cross type purge assemblies also have a check valve in the purge inlet port. They are available in Type 316 SS construction only. Additionally, the Model SG3898 purge assembly features 1/4 turn valves which allow for easy cycling, and provide a visual indication that the valves are opened or closed.



SG3898

#### SilcoNert® 2000 Purge Assemblies

SilcoNert® 2000 cross purge assemblies are used between the gas cylinder and pressure regulator to provide a means to introduce a purge gas into the system, isolate the regulator and flush contaminants through a vent valve. Model SN3899 purge assemblies are designed for incorporation into SilcoNert® 2000 regulators (Models SN9100 and SN9200) for use with low level reactive calibration gas mixtures. The SilcoNert® 2000 treatment eliminates surface adsorption of reactive gases for unsurpassed analytical accuracy. Processes are more precisely controlled, sample cycle times reduced, and false low and inaccurate analysis values are eliminated yielding significant savings in time, labor and materials.

**Specifications**

Maximum Operating Pressure: 3000 psig

**Inlet and Outlet Connections:**

SG3893: CGA 320, 330, 346, 350, 510, 540, 580, 590 or 660 as ordered

SG3894, SG3897, SG3898 and SN3899: CGA 320, 330, 346, 350, 510, 540, 580, 590, 660, 670, 678 or 705 as ordered

**Purge Gas and Vent Connections:**

1/4" compression type fittings

**Weight (approx.):**

SG3893 and SG3894: 1 1/2 lbs

SG3897 and SG3898: 3 lbs

SN3899: 2 1/2 lbs

**Materials of Construction**

Metal Parts Exposed to Gas: See Table I

**Valve Seats/Seals:**

Diaphragm Seal Valves: PCTFE/Stn. Stl.

Check Valves: Viton®/PTFE\*

Check Valve Spring: Type 302 SS\*

\* Under normal operation, check valves are exposed to the purge gas only.



SG3893



SG3897



SN3899

**Table I**

Part Number	Purge Assembly Configuration	Metal Parts Exposed to Gas	Valve Type
SG3893-(CGA)	Tee Type	Brass and Stainless Steel	Multi-Turn Diaphragm Seal
SG3894-(CGA)	Tee Type	Type 316 SS	Multi-Turn Diaphragm Seal
SG3897-(CGA)	Cross Type	Type 316 SS	Multi-Turn Diaphragm Seal
SG3898-(CGA)	Cross Type	Type 316 SS	1/4 Turn Diaphragm Seal
SN3899-(CGA)	Cross Type	Type 316 SS treated with SilcoNert® 2000	3/4 Turn Lever Type Handle Diaphragm Seal

Where "(CGA)" is indicated above, insert appropriate Compressed Gas Association connection number to complete the part number. Example: SG3897-350. Order by complete number.

**Options**

Equipment	Part No.
Inboard Helium Leak Test (cross purges only)	HT1000
Outboard Helium Leak Test (cross purges only)	HT1001

# Air-Operated Valves

## Critical Purity, High Pressure, Metal Diaphragm Seal

### SG5500 Series

Metal diaphragm seal valves are mandatory for critical and high purity gas handling systems where inboard diffusion of air or moisture must be kept to a minimum. Their pack-less design provides superior leak integrity for critical gas/fluid systems with pressure ranges from vacuum to 3500 psig.

The SG5500 Series valves allow for remote automated cycling and are provided in a normally closed configuration. The valve remains in a static (closed) state unless proper actuation pressure (70–125 psig) is continuously applied.

#### Standard Features

- Bar Stock Body, Metal Diaphragm Seal, Springless Design provides low internal volume while assuring maximum purity and diffusion resistance.
- Designed to meet  $<2 \times 10^{-8}$  atm cc/sec Helium leak rate.
- Valves are 100% leak tested and Ultrasonically DI Cleaned.
- Threaded Holes in Rear of Body (standard bottom mount) permit front panel mounting

#### Optional Features

- Special order valves are available in a variety of custom materials, normally open configuration, sizes and connections. Contact your ASGE representative for additional information.

#### Specifications

- Maximum Inlet Pressure: 3500 psig
- Actuation Pressure: 70–125 psig
- Operating Temp. Range: -65°F to 150°F
- Flow Coefficient: Cv = 0.14
- Seat Orifice Size: 0.125 in
- Maximum Allowable Seat Leakage:  $2 \times 10^{-8}$  atm cc/sec Helium
- Maximum Inboard Leakage:  $2 \times 10^{-8}$  atm cc/sec Helium
- Inlet & Outlet Connections: See Table I
- Actuation Port: 1/8" NPT female
- Actuation Configuration: See Table I
- Standard Bottom Mount: 2x #10-32 Tapped Holes on a 1" Bolt Circle
- Weight (approx.): 2 lbs

#### Materials of Construction

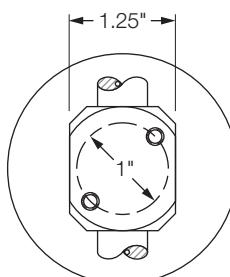
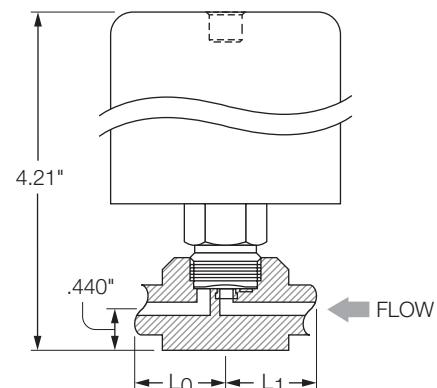
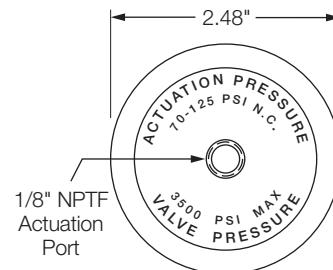
- Body: Type 316L SS
- Diaphragm (Wetted): Type 316L SS
- Actuator Housing: Nickel-Plated Aluminum
- Stem: Type 316 SS
- Seats: PCTFE

Table I

Part Number	Configuration	Connections Inlet (L <sub>1</sub> )	Outlet (L <sub>0</sub> )
SG5500NC-CC	Normally Closed	1/4" compression (0.91")	1/4" compression (0.91")
SG5501NC-FF	Normally Closed	1/4" NPT female (1.01")	1/4" NPT female (1.01")
SG5502NC-FM	Normally Closed	1/4" NPT female (1.01")	1/4" NPT male (1.36")
SG5503NC-VM	Normally Closed	1/4" male vacuum (1.15")	1/4" male vacuum (1.15")



SG5501NC-FF



# Excess Flow Shut-off Valves

## Critical Purity, High Pressure, Metal Diaphragm Seal

### FS Series

FS Series Excess Flow Shut-Off Valves are designed to automatically shut-off the delivery of gas in a line if the flow exceeds a preset limit. They are commonly used as a safety device to protect a system from excess flow in the event of equipment failure or to protect personnel and property in the event of a line rupture. The capability of operating from 10 to 3500 psig allows them to be used either in high or low pressure applications.

The Excess Flow Limit Valve is a two-position valve. In the "Open (Reset)" position, the valve provides a direct passage from inlet to outlet. In the other position, "Auto Shut-Off", the valve is set to sense the flow and automatically shuts off the passage if the flow exceeds a preset value (flow limit). The valve will stay shut-off until it has been reset.

Six flow ranges are offered: A, B, C, D, E & F. The actual flow shut-off value for each range is dependent upon the operating pressure. The graph below indicates, for each range, the relationship between operating pressure and the actual flow limit. It is suggested that the range selected provide shut-off at 2–6 times the anticipated flow rate to allow for short term flow surges not connected with equipment failure.

Note: Piping systems, cylinders and other equipment can contribute rust or other particulate contamination that could foul the device and cause imprecise shut-off. Therefore it is highly recommended that all gases be filtered before they enter the FS Series Valve. See Optional Equipment for additional information.

### Standard Features

- Type 316L SS Construction provides maximum corrosion resistance.
- Elgiloy® Diaphragm minimizes diffusion of air into valve and maintains gas purity.
- High Pressure Design allows for use between a gas cylinder and the inlet to a pressure regulator.
- Threaded Holes on Bottom of Valve permit front panel mounting.

### Optional Features

- High Purity Inlet Filter provides protection from particulate contamination.

### Specifications

**Maximum Inlet Pressure:** 3500 psig

**Minimum Inlet Pressure:** 10 psig

**Differential Pressure at Flow Limit:**

Ranges A , B, C and D: 5 psig

Ranges E and F: 12 psig

**Flow Limit Value:** See Table I

**Operating Temp. Range:** -10°F to 150°F

**Inlet and Outlet Connections:** 1/4" NPT female

**Weight (approx.):** 10 oz

**Surface Finish:** 15–20 Ra micro inch or less

### Materials of Construction

**Body:** Type 316L SS Bar Stock  
**Bonnet:** Type 316L SS  
**Seat:** PCTFE  
**Diaphragm:** Elgiloy® (or equivalent)  
**Spring:** Hastelloy® C-22  
**Other Metal Parts Exposed to Gas:**  
 Type 316L SS

### Flow Range Selection Graph

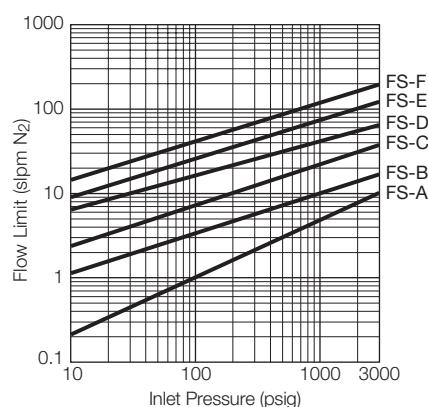


Table I

Part Number	Nominal Flow Limit Value for Nitrogen at 1000 psig inlet	Nominal Flow Limit Value for Nitrogen at 30 psig inlet
FS-A	4.8 slpm	0.4 slpm
FS-B	9.1 slpm	1.7 slpm
FS-C	21.8 slpm	3.9 slpm
FS-D	39.5 slpm	9.0 slpm
FS-E	72.3 slpm	14.4 slpm
FS-F	120.6 slpm	22.5 slpm

### Optional Equipment

Equipment and Replacement Parts	Part No.	Page No.
High Purity Stn. Stl. Inlet Filter (installed) 2 micron	SG6113i	190



FS Series

# Metal Diaphragm Seal Valves

## Critical Purity, High Pressure, Diffusion Resistant

Diaphragm seal valves are mandatory for high purity gas handling systems where inboard diffusion of air or moisture must be kept to a minimum. Their packless design maintains gas purity at maximum levels (typical inboard leakage is less than  $2 \times 10^{-8}$  cc/sec Helium) while permitting operation at pressures ranging from vacuum to 3000 psig. Advanced diaphragm seal valves are available in brass or Type 316L SS construction.

The multi-turn version has a hand wheel which operates from "fully closed" to "fully opened" in approximately  $\frac{3}{4}$  turn. The  $\frac{1}{4}$  turn version has a lever-type handle which operates from "fully closed" to "fully opened" in a  $90^\circ$  arc. The handle also serves as a visual aid in determining if the valve is open or closed. For example, the valve is open when the handle is parallel to the piping system. The  $\frac{1}{2}$ " NPT diaphragm seal valve can be used on manifolds or systems having higher flow requirements.

### Specifications

Operating Pressure Range: Vacuum to 3500 psig

Operating Temp. Range: -65°F to 150°F

Flow Coefficient: See Table I

Inlet and Outlet Connections: See Table I

### Materials of Construction

Body: See Table I

Other Metal Parts Exposed to Gas:

Brass Valves: Brass and Stainless Steel

Stainless Steel Valves: Type 316 SS

Seat: PCTFE

Diaphragm:

SG5475N: Elgiloy®

All Other Models: Type 316L SS



SG5461N



SG5480N



SG5441N



SG5492VR



SG5452N



SG5475N

Table I

Part Number	Body Material	Configuration	Connections Inlet	Outlet	Flow Coefficient (Cv)
SG5440N	Brass Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " NPT female	0.13
SG5441N	Brass Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " NPT female	$\frac{1}{4}$ " NPT female	0.13
SG5442	Brass Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " compression	$\frac{1}{4}$ " compression	0.13
SG5450N	Type 316L SS Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " NPT female	0.13
SG5451N	Type 316L SS Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " NPT female	$\frac{1}{4}$ " NPT female	0.13
SG5452N	Type 316L SS Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " compression	$\frac{1}{4}$ " compression	0.13
SG5453N	Type 316L SS Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " compression	0.13
SG5460N	Brass Bar Stock	Multi-Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " NPT female	0.13
SG5461N	Brass Bar Stock	Multi-Turn	$\frac{1}{4}$ " NPT female	$\frac{1}{4}$ " NPT female	0.13
SG5463N	Nickel-Plated Brass	Multi-Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " NPT female	0.13
SG5475N	Type 316L SS Forged	Multi-Turn	$\frac{1}{2}$ " NPT male	$\frac{1}{2}$ " NPT female	0.30
SG5480N	Type 316L SS Bar Stock	Multi-Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " NPT female	0.13
SG5481N	Type 316L SS Bar Stock	Multi-Turn	$\frac{1}{4}$ " NPT female	$\frac{1}{4}$ " NPT female	0.13
SG5482	Type 316L SS Bar Stock	Multi-Turn	$\frac{1}{4}$ " NPT male	$\frac{1}{4}$ " NPT male	0.13
SG5492VR	Type 316L SS Bar Stock	$\frac{1}{4}$ Turn	$\frac{1}{4}$ " male vacuum*	$\frac{1}{4}$ " male vacuum*	0.13

\* Connection is compatible with  $\frac{1}{4}$ " VCR® fittings.

# Manual Control Valves

## Positive Shut-off, Basic Metering Capability

MV5700, MV5800, MV5900 Series

Manual control valves provide a simple, economical means of controlling gas flow directly from a cylinder. They are manufactured with brass, stainless steel, or MONEL® bodies to accommodate both noncorrosive and corrosive gases. Valve stem packing is PTFE to keep operating torque at a minimum. These valves are available with or without an inlet (cylinder) pressure gauge.

Note: Although designed for direct connection to gas cylinders, these valves do not control pressure. They only control flow. If pressure control is required, USE A PRESSURE REGULATOR.

### Specifications

Maximum Operating Pressure:

See Tables I and II

Operating Temp. Range: -65°F to 450°F

Flow Coefficient: 0.35

Inlet Pressure Gauge: See Table II

Gauge Size: 2½" Dial

Inlet Connection: CGA connection as ordered

Outlet Connection: See Tables I and II

Weight (approx.): 1.5 lbs

### Leakage:

Seat (Max Allowable):  $1 \times 10^{-3}$  atm cc/sec N<sub>2</sub>

Inboard (Max Allowable):  $1 \times 10^{-3}$  atm cc/sec N<sub>2</sub>

### Materials of Construction

#### Body:

MV5700: Plated Brass

MV5800: Type 316 SS

MV5900: MONEL®

#### Gauges:

MV5700: Brass

MV5800: Type 316 SS

MV5900: Type 316 SS

#### Fittings:

MV5700: Brass

MV5800: Type 316 SS

MV5900: MONEL®

#### Stem:

MV5700: Type 303 SS

MV5800: Type 303 SS

MV5900: MONEL®

#### Packing:

PTFE



MV5721



MV5860

Table I, Manual Control Valves without Pressure Gauge

Outlet Connection	Maximum Operating Pressure (psig)	Inlet Pressure Gauge (psig)	Part Number Brass	Stainless Steel	MONEL®
1/4" NPT female	3000	N/A	MV5700-(CGA)	MV5860-(CGA)	MV5900-(CGA)
1/4" compression	3000	N/A	MV5701-(CGA)	MV5861-(CGA)	—

Table II, Manual Control Valves with Pressure Gauge

Outlet Connection	Maximum Operating Pressure (psig)	Inlet Pressure Gauge (psig)	Part Number Brass	Stainless Steel	MONEL®
1/4" NPT female	150	0–200	MV5710-(CGA)	MV5870-(CGA)	MV5910-(CGA)
1/4" compression	150	0–200	MV5711-(CGA)	MV5871-(CGA)	—
1/4" NPT female	800	0–1000	MV5720-(CGA)	MV5880-(CGA)	MV5920-(CGA)
1/4" compression	800	0–1000	MV5721-(CGA)	MV5881-(CGA)	—
1/4" NPT female	3000	0–4000	MV5730-(CGA)	MV5890-(CGA)	MV5930-(CGA)
1/4" compression	3000	0–4000	MV5731-(CGA)	MV5891-(CGA)	—

Where "(CGA)" is indicated in Tables I and II, insert appropriate Compressed Gas Association connection number to complete the part number.  
Example: MV5730-350. Order by complete part number.

# High Accuracy Metering Valves

## Non-Rotating Stem (NRS), Ultra Fine, Low Flow

Models SG5340A, SG5350A

Designed for extremely low flow gas and liquid applications, these valves provide smooth, non-pulsing flow control which is always proportional and absolutely constant at any given setting. They are particularly suited to the most precise control requirements of gas chromatography.

Six different needle tapers offer a wide choice of flow ranges (see Table II). Sixteen revolutions of the adjusting handle ("fully opened" to "fully closed") provide excellent resolution. The valves will shut off bubble-tight and cannot be damaged by over tightening.

Two Models are available. Model SG5340A has a chrome-plated brass body for noncorrosive service, and Model SG5350A has a Type 316 SS body for corrosive applications.



SG5350A

### Specifications

Maximum Operating Pressure: 500 psig

Maximum Operating Temperature:

SG5340A: 180°F

SG5350A: 250°F

Flow Coefficient: See Table II

Inlet & Outlet Connections: 1/8" NPT female

Weight (approx.): 0.5 lbs

### Materials of Construction

Body: See Table I

Valve Needle: Type 316 SS

Orifice: Type 316 SS with PTFE Liner

Seals:

SG5340A: Buna-N

SG5350A: Viton®

Table I, Metering Valves

Body Material	Part No.
Plated Brass	SG5340A-( )
Type 316 SS	SG5350A-( )

Where "( )" is indicated above, insert the applicable needle taper number from Table II to complete the part number. Example: SG5350A-2. Order by complete part number.

Table II, Flow Capacity

Needle Taper No.	Flow Coefficient (Cv)	Flow Capacity (sccm)*	
		Air	Water
1	0.0005	200	6
2	0.001	400	12
3	0.0025	1,000	30
4	0.0061	2,500	70
5	0.016	6,200	200
6	0.054	21,500	650

\* Measured with 10 psig inlet pressure and atmospheric outlet pressure.

# Two-Way Ball Valves

1/4 Turn On/Off Control, Bi-Directional Flow

Models SG5602, SG5622

These rugged, reliable, quick-acting valves provide high flow capacity. They are available with a brass body for noncorrosive gases or with a Type 316 SS body for corrosive gases and permit flow in either direction. These valves are supplied standard with a single hole panel mounting capability.

## Specifications

Maximum Operating Pressure:

SG5602:

3000 psig at 70°F

1500 psig at 225°F

600 psig at 300°F

SG5622:

6000 psig at 70°F

3000 psig at 225°F

1000 psig at 300°F

Operating Temp. Range: -65°F to 350°F

Flow Coefficient: Cv = 2.3 max

Pressure Drop (to atmosphere) with

1000 psig inlet pressure.:

10 psi at 230 scfm Air @ 60°F

50 psi at 490 scfm Air @ 60°F

100 psi at 650 scfm Air @ 60°F

Inlet and Outlet Connections: 1/4" NPT female

Weight (approx.): 9 oz

## Materials of Construction

Body: See Table I

Ball: Type 316 SS

Seat: PCTFE

Seals: PTFE



SG5602

Table I

Body Material	Part No.
Brass	SG5602
Type 316 SS	SG5622

# Metering Valves

Ball Seat, Forged Brass, Economical

## AG5400 Series

These economical metering valves are used where a shut-off or some degree of throttling is required. They can be used in a wide variety of applications such as instrument air lines, control panels and gas chromatography. They are constructed of brass forged bodies, PTFE packing and stainless steel stems with hardened steel ball seats to provide efficient and durable performance.

### Specifications

Maximum Operating Pressure: 3000 psig

Operating Temp. Range: -65°F to 165°F

Flow Coefficient: Cv = 0.37

Inlet and Outlet Connections: See Table I

Weight (approx.): 5 oz

### Materials of Construction

Body: Brass Forging

Stem: Type 316 SS

Packing: PTFE

Handle: Black Phenolic



AG5404

Table I

Part Number	Inlet and Outlet Connections.
AG5400	1/8" NPT male
AG5404	1/4" NPT male



SG5402

# Miniature Needle Valves

Fine Flow Control, Brass and Stainless Steel

## SG5400 Series

These miniature needle valves are used to control gas flow in a wide variety of applications such as instrument air lines, control panels and gas chromatography. They are available with either brass or Type 316 SS bodies and have PTFE packing.

### Specifications

Maximum Operating Pressure: 3000 psig

Operating Temp. Range: -65°F to 165°F

Flow Coefficient: Cv = 0.35

Inlet and Outlet Connections: See Table I

Weight (approx.): 5 oz

### Materials of Construction

Body: See Table I

Handle: Black Phenolic or ABS Plastic

Stem: Type 316 SS

Packing: PTFE



SG5407

Table I

Inlet and Outlet Connections	Pattern	Part Number Brass Body	Type 316 SS Body
1/8" NPT male	Angle	SG5402	—
1/4" NPT male	Straight	—	SG5424
1/4" NPT male	Angle	SG5434	SG5425
1/4" compression	Straight	SG5407	—



SG5424

# Lecture Bottle Control Valves

## Flow Control, Brass and Stainless Steel

### LB3580 Series

These valves provide a simple means of controlling gas flow directly from a lecture bottle. Models LB3581, LB3582 and LB3583 with brass bodies and PTFE packing, are designed for noncorrosive gas service and are available with either CGA 110, 170 or 180 inlet connections as shown in Table I. Models LB3584 and LB3585 with Type 316 SS bodies and PTFE packing, are designed for corrosive gas service and are available with either CGA 110 or 180 connections.

Note: Although designed for direct connection to lecture bottles, these valves do not control pressure. They only control flow. If pressure control is required, USE A PRESSURE REGULATOR.

#### Standard Features

Maximum Inlet Pressure: 3000 psig  
 Operating Temp. Range: -20°F to 350°F  
 Flow Coefficient: Cv = 0.43  
 Inlet Connection: See Table I  
 Outlet Connection: 1/4" compression  
 Weight (approx.): 0.5 lb

#### Materials of Construction

Body: See Table I  
 Valve Needle and Stem: Type 316 SS  
 Packing: PTFE



LB3585



LB3581

Table I

Part Number	Inlet Connection	Body Material
LB3581	CGA 110	Brass
LB3582	CGA 180	Brass
LB3583	CGA 170	Brass
LB3584	CGA 110	Type 316 SS
LB3585	CGA 180	Type 316 SS

#### Optional Equipment

Equipment	Part No.	Page No.
PTFE washers (package of 25) for CGA 110 for CGA 170 for CGA 180	SG3540 SG3542 SG3541	211

# Pressure Relief Valves

## Proportional, Adjustable, Brass and Stainless Steel

### RV5570, RV5580 Series

Relief valves are commonly used as control devices on regulators, process lines and distribution systems. They allow for accurate pressure relief while maintaining leak tight shut-off under a wide range of operating pressures. They may be used with compatible hazardous gases because they have 1/4" NPT outlets which provide a means to pipe vented gas to a safe disposal system. RV5570 Series are not field adjustable and must be adjusted prior to connection to the piping system. RV5580 Series are field adjustable allowing for easy external set pressure adjustment without removal from the piping system.

Note: These are proportional relief valves that open gradually as the pressure increases. Consequently, they do not have a capacity rating at a given pressure rise (accumulation), and they are not certified to ASME or any other codes. Some system applications require relief valves to meet specific safety codes. The system designer and user must determine when such codes apply and whether these relief valves conform to them.

Warning: These valves are designed to vent excess pressure from a regulator should a minor leak occur. This valve is recommended for use with regulators to protect the regulator and outlet pressure gauge and is not intended for applications where repeated or frequent venting is required. When installed as components of regulators, pressure relief valves are not intended to protect equipment or systems installed downstream of the regulator outlet.

Warning: For valves not actuated for a period of time, initial relief pressure may be higher than the set pressure.

### Specifications

Adjustable Range/Set Pressure: See Tables (page 187)

Accuracy/Repeatability:

RV5570 Series:  $\pm 20\%$

RV5580 Series:  $\pm 5\%$

Resealing Pressure: 50–70% of set pressure

Maximum Outlet Pressure\*:

RV5570 Series: 750 psig

RV5580-225: 225 psig

All other RV5580 Series ranges: 1500 psig

Flow Coefficient: See Tables (page 187)

Weight (approx.):

RV5570 Series: 2 oz

RV5580 Series: 8 oz

\* Outlet pressure should not exceed inlet pressure.

### Materials of Construction

Body: See Tables (page 187)

Spring: Stainless Steel

Seals: See Tables (page 187)



RV5571A



RV5575A



RV5580



RV5573

Table I, Non-Field Adjustable – RV5570 Series

Part No.	Adjustable Range (psig)	Body Material	Seal Material	Flow Coefficient (Cv)	Inlet	Outlet
RV5571A-20	10–20	Brass	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5571A-100	20–100	Brass	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5571A-250	100–250	Brass	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5571A-500	250–500	Brass	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5572-50	20–50	Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5572-100	50–100	Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5572-250	100–250	Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5572-500	250–500	Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5572-800	500–800	Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5573-50	20–50	Plated Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5573-100	50–100	Plated Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5573-250	100–250	Plated Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5573-500	250–500	Plated Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5573-800	500–800	Plated Brass	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5574-50	20–50	Type 316 SS	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5574-100	50–100	Type 316 SS	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5574-250	100–250	Type 316 SS	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5574-500	250–500	Type 316 SS	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5574-800	500–800	Type 316 SS	PTFE-Viton®	0.37	1/4" NPT male	1/4" NPT male
RV5575A-20	10–20	Type 316L SS	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5575A-100	20–100	Type 316L SS	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5575A-250	100–250	Type 316L SS	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5575A-500	250–500	Type 316L SS	Viton®	0.37	1/4" NPT male	1/4" NPT female
RV5576A-20	10–20	Type 316L SS	Kalrez®	0.37	1/4" NPT male	1/4" NPT female
RV5576A-100	20–100	Type 316L SS	Kalrez®	0.37	1/4" NPT male	1/4" NPT female
RV5576A-250	100–250	Type 316L SS	Kalrez®	0.37	1/4" NPT male	1/4" NPT female
RV5576A-500	250–500	Type 316L SS	Kalrez®	0.37	1/4" NPT male	1/4" NPT female

Table II, Field Adjustable – RV5580 Series

Part No.	Adjustable Range (psig)	Body Material	Seal Material	Flow Coefficient (Cv)	Inlet	Outlet
RV5580-225	10–225	Type 316 SS	Viton®	0.60	1/4" NPT male	1/4" NPT female
RV5580-350	50–350	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-750	350–750	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-1500	750–1500	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-2250	1500–2250	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-3000	2250–3000	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-4000	3000–4000	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-5000	4000–5000	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female
RV5580-6000	5000–6000	Type 316 SS	Viton®	0.41	1/4" NPT male	1/4" NPT female

# Check Valves

## Fixed Cracking Pressures, Assorted Materials and Connections

### CV5600 Series

Check valves ensure that gases or liquids flow in one direction only. When used on the outlet line of pressure regulators, they prevent backflow of fluids into the regulator. When used in cylinder pigtails, they prevent gas flow from one cylinder into another on the same manifold. They also stop air from entering the pigtail and manifold when a cylinder is removed.

These check valves are bubble tight against any back pressure.

Note: Check valves are also available housed within a CGA connection – see page 210 for additional information.



1/4" NPTM  
Check Valve

1/4" NPTF  
Check Valve



1/4" NPTM x 1/4" NPTF  
Check Valve



1/4" Male Vacuum  
Check Valve



1/4" Compression  
x 1/4" NPTM  
Check Valve



1/4" Compression  
Check Valve

### Specifications

Maximum Operating Pressure: See Table I

Cracking Pressure: See Table I

Flow Coefficient: See Table I

Inlet and Outlet Connections: See Table I

Weight (approx.): 4 oz

### Materials of Construction

Body: See Table I

Spring and Poppet:

Brass and Stn. Stl. Valves: Type 316L SS  
MONEL® Valve: MONEL® R-405

Seals: See Table I

Table I

Part No.	Maximum Operating Pressure (psig)	Cracking Pressure (psig)	Connections Inlet	Outlet	Body Material	Seal Material	Flow Coefficient (Cv)
CV5651	3000	1.0	1/4" NPT male	1/4" NPT male	Brass	Viton®	0.5
CV5652N	3000	1.0	1/4" NPT female	1/4" NPT female	Brass	Viton®	0.35
CV5653	3000	1.0	1/4" compression	1/4" compression	Brass	Viton®	0.5
CV5654	3000	5.0	1/4" NPT male	1/4" NPT female	Brass	Viton®	0.5
CV5660	6000	1.0	1/4" NPT male	1/4" NPT male	Type 316 SS	Buna-N	0.5
CV5661	6000	1.0	1/4" NPT male	1/4" NPT male	Type 316 SS	Viton®	0.5
CV5663N	3000	1.0	1/4" NPT female	1/4" NPT female	Type 316 SS	Viton®	0.35
CV5665N	3000	1.0	1/4" NPT female	1/4" NPT female	Type 316 SS	Neoprene	0.35
CV5666	6000	1.0	1/4" compression	1/4" compression	Type 316 SS	Viton®	0.5
CV5667	3000	1.0	1/4" compression	1/4" compression	Type 316 SS	Kalrez®	0.42
CV5668	6000	1.0	1/4" compression	1/4" compression	Type 316 SS	Buna-N	0.5
CV5669	6000	5.0	1/4" NPT male	1/4" NPT female	Type 316 SS	Viton®	0.5
CV5670	3000	1.0	1/4" compression	1/4" NPT male	Brass	Viton®	0.5
CV5672	6000	1.0	1/4" compression	1/4" NPT male	Type 316 SS	Viton®	0.5
CV5674	3000	1.0	1/4" male vacuum*	1/4" male vacuum*	Type 316L SS	Viton®	0.36
CV5675	3000	1.0	1/4" male vacuum*	1/4" male vacuum*	Type 316L SS	Kalrez®	0.36
CV5676N	3000	1.0	1/4" NPT female	1/4" NPT female	MONEL®	Viton®	0.35
CV5677N	3000	1.0	1/4" NPT female	1/4" NPT female	Type 316 SS	EPR	0.35

\* Connection is compatible with 1/4" VCR® fittings.

# Whisper Valves®

## Cryogenic Relief Valve Silencer

### Model CWV

Most cryogenic container relief valves issue a loud "bang" (over 100 dB) when activated that can startle and even frighten employees, causing disruptions in normal workflow.

Our Model CWV Whisper Valve installs easily on the existing vent valve of any cryogenic container to quietly relieve pressure at a pressure level that is set slightly below that of the standard installed valve. Activation blow-off sound is less than 50 dB (average library noise level is 40 dB).

The Whisper Valve also reduces gas loss to an average of less than 48 cubic feet over 24 hours. It is available in four standard psig settings: 22, 230, 350 and 500. Other settings are available on request.

### Benefits and Features

- Reduces cryogenic relief valve blow-off noise to 40–50 dB.
- Easily installs on any cryogenic argon, oxygen or nitrogen container.
- Available in four ranges to prevent most loud blow-offs.
- Reduces gas loss to average of less than 48 cubic feet per 24 hours.
- Convenient wall mount kit available to prevent damage during container change-out.

### Optional Equipment

**Model IG-CWV-KIT:** Wall mount kit for use with argon or nitrogen service Whisper Valves® (IG-CWV). Includes wall mount bracket, panel mount nut and 6' hose with CGA 295 connections.

**Model IG-CWVO2-KIT:** Wall mount kit for use with oxygen service Whisper Valves® (IG-CWVO2). Includes wall mount bracket, panel mount nut and 6' hose with CGA 440 connections.



IG-CWV



IG-CWV-KIT

Table I

Part Number	Gas Service	Cryogenic Container Relief Settings (psig)	Inlet CGA
IG-CWV-22	Argon, Nitrogen	22	295 Female
IG-CWV-230	Argon, Nitrogen	230 or 235	295 Female
IG-CWV-350	Argon, Nitrogen	350	295 Female
IG-CWV-500	Argon, Nitrogen	500	295 Female
IG-CWVO2-22	Oxygen	22	440 Female
IG-CWVO2-230	Oxygen	230 or 235	440 Female
IG-CWVO2-350	Oxygen	350	440 Female
IG-CWVO2-500	Oxygen	500	440 Female

# Stainless Steel Inline Filters

## High Pressure, High Purity, Welded, Wire Mesh Element

Models SG6112, SG6113, SG6114

These inline filters have a pleated wire mesh element which is easily cleaned by flushing the filter in the opposite direction to normal flow. Flow may be in either direction. All-metal welded construction makes these filters ideal for use in high purity and ultra-high purity gas systems.

### Specifications

Maximum Operating Pressure: 6000 psig

Operating Temperature Range:

-20°F to 100°F @ 6000 psig

-20°F to 900°F @ 3000 psig

Maximum Differential Pressure: 100 psi

Filtration Rating: See Table I

Filtration Area: 2.25 in<sup>2</sup>

Flow Coefficient (clean condition):

SG6112: Cv = 0.40

SG6113 and SG6114: Cv = 0.36

Pressure Drop (to atmosphere):

SG6112:

10 psi at 156 slpm Air

50 psi at 433 slpm Air

100 psi at 768 slpm Air

SG6113 and SG6114:

10 psi at 140 slpm Air

50 psi at 389 slpm Air

100 psi at 691 slpm Air

### Dimensions:

SG6112 and SG6113: 1 3/4" x 1" hex

SG6114: 2 1/32" x 1" hex

### Inlet and Outlet Connections:

See Table I

### Weight (approx.):

4 oz



SG6114



SG6113

### Materials of Construction

Body: Type 316 SS

Retainer Screens: Type 316 SS

Pleated Mesh Element:

SG6112: Type 316 SS

SG6113 and SG6114: Type 304 SS

### Table I

Part Number	Inlet and Outlet Connections*	Nominal Filtration Rating**
SG6112	1/4" NPT male by 1/4" NPT female	15 micron
SG6113	1/4" NPT male by 1/4" NPT female	2 micron
SG6114	1/4" male VCR® (both ends)	2 micron

\* Flow may be in either direction.

\*\* Elements remove 95% of particles larger than the nominal pore size.

# Brass Inline Filters

## High Pressure, Sintered Metal Element

SG6120 Series

These in-line filters feature a Sintered Type 316 SS element which is easily removed for cleaning or replacement. The 1/4" NPT female by male configuration makes these filters convenient for use upstream of pressure regulators. These filters will protect a regulator from particulate contamination which can build up and eventually cause seat leakage and regulator failure.

### Specifications

Maximum Operating Pressure: 3000 psig

Operating Temperature Range:

-15°F to 100°F @ 3000 psig

-15°F to 400°F @ 1500 psig

Filtration Rating: See Table I

Filtration Area: 0.70 in<sup>2</sup>

Flow Coefficient (clean condition):

SG6120: Cv = 0.171

SG6121: Cv = 0.117

SG6122: Cv = 0.057

SG6128: Cv = 2.292

SG6129: Cv = 2.292

### Dimensions:

SG6120, SG6121, SG6122: 2 1/4" x 3/4" hex

SG6128, SG6129: 3 9/16" x 1 1/4" hex

Inlet and Outlet Connections: See Table I

### Materials of Construction

Body: Brass

Spring, Element and Gasket: Type 316 SS

Guide Ring: PTFE

Seal: Viton®



SG6120

### Table I

Part Number	Connections Inlet	Outlet	Nominal Filtration Rating
SG6120	1/4" NPT female	1/4" NPT male	10 micron
SG6121	1/4" NPT female	1/4" NPT male	5 micron
SG6122	1/4" NPT female	1/4" NPT male	1 micron
SG6128	1/2" NPT male	1/2" NPT female	100 micron
SG6129	1/2" NPT male	1/2" NPT female	100 micron

# Replaceable Element Filter

High Pressure, Stainless Steel, Submicron

## Model AG6090

These inline filters feature a unique mechanism which combines Brownian motion and mechanical filtration to remove 99.99% of all particles 0.1 micron and larger. Particularly suited for use upstream of regulators, these filters protect the regulator from particulate contamination which can build up and eventually cause seat leakage and regulator failure. The filter housing includes a third port (supplied with 1/4" hex plug) to provide access to purge or bypass filtration.

The inexpensive element is easily replaced. The filter element has excellent resistance to water, high pH solutions, oxygenated solvents and strong acids. The "filter" configuration allows the element to be replaced without removing the filter from the process line.

### Specifications

Maximum Operating Pressure: 3000 psig  
 Operating Temp. Range: -58°F to 300°F  
 Maximum Differential Pressure: 100 psi  
 Filtration Rating: 0.1 micron at 99.99% efficiency (removes 99.99% of all particles 0.1 micron or larger)  
 Flow Coefficient (clean condition): Cv = 0.80  
 Inlet and Outlet Connections: 1/4" NPT female  
 Third Port: 1/4" NPT female supplied with high pressure (H.P.) male hex pipe plug  
 Weight (approx.): 1 lb

### Materials of Construction

Body, Cap and Retainer: Type 316 SS  
 Seal: PTFE  
 Filter Element: Borosilicate Glass Fibers with a Fluorocarbon Resin Binder



AG6090



AG6091N

### Optional Equipment

Equipment	Part No.
Replacement Element	AG6091N
Replacement Seal	0202-3270

# Replaceable Element Filter

Inline, High Pressure, Stainless Steel, Submicron

## Model AG6098

These low cost inline filters are designed for gas or liquid systems requiring a high level of filtration (0.1 micron). The filtration principles and elements are identical to those used in our Model AG6090 filter described above.

### Specifications

Maximum Operating Pressure: 3000 psig  
 Operating Temp. Range: -58°F to 300°F  
 Maximum Differential Pressure: 20 psi  
 Filtration Rating: 0.1 micron at 99.99% efficiency (removes 99.99% of all particles 0.1 micron or larger)  
 Flow Coefficient (clean condition): Cv = 0.95  
 Dimensions: 3.11" x 1.26"  
 Inlet and Outlet Connections: 1/4" NPT female  
 Weight (approx.): 8 oz

### Materials of Construction

Body and Retainer: Type 316 SS  
 Seals: Viton®  
 Filter Element: Borosilicate Glass Fibers with a Fluorocarbon Resin Binder



AG6098

### Optional Equipment

Equipment	Part No.
Replacement Element	AG6091N
Replacement Seal	0202-3271

# 0.01 Micron, Depth Filters

## Inline, Electropolished Stainless Steel, Glass Microfibers

Models AG7100, AG7101

These inline filters are ideal for precision filtration of reactive and halogen type gases used in the micro-electronics industry. Constructed exclusively of Type 316L SS and glass microfibers, there are no organic materials, binders or epoxies to contaminate or interfere with ultra-high purity processes. The depth filter design allows for a low delta P while providing a dirt holding capacity of 10–20 times that of membrane filters.

All Model AG7100 and AG7101 filters are electropolished, nitrogen purged and individually tested with a particle counter for guaranteed performance. To ensure maximum safety, all filters are helium leak checked to not exceed  $1 \times 10^{-9}$  cc/sec.



AG7100

### Specifications

Maximum Operating Pressure and Temperature:	250 psig at 250°F
Maximum Operating Temperature:	750°F
Filtration Rating:	0.01 micron at 99.9999% efficiency
Maximum Flow Capacity:	100 slpm
Pressure Drop (clean condition) at 75 psig inlet:	2 psid at 17 slpm Air 4 psid at 31 slpm Air 6 psid at 50 slpm Air
Inlet and Outlet Connections:	See Table I
Dimensions:	3.125" x 2.0"
Weight (approx.):	13 oz

### Materials of Construction

Body and Fittings:	Type 316L SS
Filter Medium:	Glass Fiber supported by Type 316L SS Fiber Mesh

Table I

Part Number	Inlet and Outlet Connections
AG7100	1/4" compression
AG7101	1/4" male vacuum*

\* Connection is compatible with 1/4" VCR® fittings.

# 0.003 Micron, Membrane Filters

## Inline, Electropolished Stainless Steel, PTFE Membrane

Models AG8100, AG8101

These inline filters are specifically designed for applications where an extreme level of filtration is required. They feature a PTFE membrane in a small pleated cartridge which effectively removes all particles 0.003 micron or larger. The housing is 10 Ra finish electropolished Type 316L SS and is totally welded. The final assembly is purged at a high flow rate with filtered nitrogen and helium leak checked to not exceed  $1 \times 10^{-9}$  cc/sec.



AG8101

### Specifications

Maximum Operating Pressure and Temperature:	750 psig at 250°F
Filtration Rating:	0.003 micron at 99.999999% efficiency
Effective Filtration Area:	0.5 ft <sup>2</sup>
Maximum Flow Capacity:	300 slpm
Pressure Drop (clean condition) at 75 psig inlet:	1 psid at 140 slpm Air 2 psid at 195 slpm Air 4 psid at 275 slpm Air
Inlet and Outlet Connections:	See Table I
Dimensions:	5.563" x 2.0"
Approximate Weight :	10 oz

### Materials of Construction

Body and Fittings:	Type 316L SS
Filter Medium:	PTFE

Table I

Part Number	Inlet and Outlet Connections
AG8100	1/4" compression
AG8101	1/4" male vacuum*

\* Connection is compatible with 1/4" VCR® fittings.

# Advanced Filter System I

## Oxygen, Moisture and Hydrocarbon Removal

### Model AFS1

Model AFS1 is a high capacity gas purifier that removes O<sub>2</sub>, H<sub>2</sub>O and hydrocarbons (with 5 or more carbons) to low ppb levels from inert and hydrogen gas streams. It is strongly recommended for use with gas chromatography (GC), inductively-coupled plasma spectroscopy (ICP) detector testing platforms and carrier gas supply lines. The high capacity and robust construction make it suitable for installations requiring multiple instruments.

The AFS1 is constructed in two parts, a stainless steel manifold that connects to the gas line which is intended to stay in place permanently, and a high capacity aluminum cartridge that is changed periodically when the filter bed is consumed. Brackets and hardware (included) are used to mount the manifold to a bench or wall. Once the manifold is installed, the easily replaceable cartridge is attached to the manifold with a clamping knob. The cartridge design features double seals at all joints, and a sealed polycarbonate shield to provide protection in the event of sight-glass breakage. Two high sensitivity indicators provide visual indications via distinct color changes for oxygen and moisture breakthrough.

### Standard Features

- Sensitive Visual Indicators for oxygen and moisture.
- Simple Cartridge Replacement with twist on/off assembly knob.
- Dual Sealing System.
- Check Valves protect gas lines during cartridge replacement.
- Stainless Steel Manifold Fittings.
- 10-micron frits on cartridge.
- 100% Helium Leak Tested and shipped filled with helium.

### Specifications

Source Gases Purified: He, Ar, N<sub>2</sub>, H<sub>2</sub>  
 Operating Pressure Range at 70°F: 10–200 psig  
 Operating Temp. Range: 60°–95°F  
 Removal Performance: See Table I  
 Volume: 250 cc  
 Maximum Flow Capacity: 2 slpm  
 Inlet and Outlet Connections: See Table II  
 Dimensions: 12" x 2" x 2"  
 Weight (approx.): 3 lbs

### Materials of Construction

Outer Body/Tube: Aluminum  
 Inner Tube: Stainless Steel  
 Seals: Fluoro-Elastomer  
 Manifold, Fittings and Frits: Stainless Steel



AFS1-4KIT

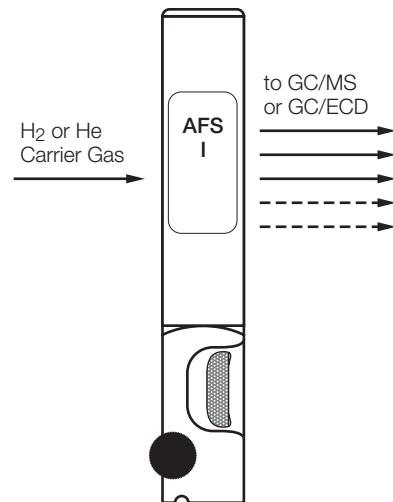


Table I

Removal Performance	Efficiency	Capacity
Oxygen	5 ppb	850 cc (0.7 gm)
Water	20 ppb	12 gm
Hydrocarbons	5 ppb	8 gm

Table II

Part Number	Description	Inlet and Outlet Connections
AFS1-2KIT	AFS1, Complete Kit includes AFS Manifold	1/8" compression
AFS1-4KIT	AFS1, Complete Kit includes AFS Manifold	1/4" compression
AFS1-RC	AFS1, Replacement Cartridge	Port holes (mate to AFS manifold)
AFS-2MAN	AFS Manifold Replacement	1/8" compression
AFS-4MAN	AFS Manifold Replacement	1/4" compression

# Advanced Filter System II

## Moisture and Hydrocarbon Removal

### Model AFS2

Model AFS2 is a high capacity gas purifier that removes H<sub>2</sub>O and hydrocarbons (with 5 or more carbons) to low ppb levels from inert, hydrogen and dry air gas streams. It is strongly recommended for use with gas chromatography (GC), inductively-coupled plasma spectroscopy (ICP) detector testing platforms and gas supply lines for flame ionization detectors (FID). The high capacity and robust construction make it suitable for installations requiring multiple instruments.

The AFS2 is constructed in two parts, a stainless steel manifold that connects to the gas line which is intended to stay in place permanently and a high capacity cartridge that is changed periodically when the filter bed is consumed. Brackets and hardware (included) are used to mount the manifold to a bench or wall. Once the manifold is installed, the easily replaceable cartridge is attached to the manifold with a clamping knob. The cartridge design features double seals at all joints, and a sealed polycarbonate shield to provide protection in the event of sight-glass breakage. A high sensitivity indicator provides visual indication via a distinct color change of moisture breakthrough.

### Standard Features

- Sensitive Visual Indicator for moisture.
- Simple Cartridge Replacement with twist on/off assembly knob.
- Dual Sealing System.
- Check Valves protect gas lines during cartridge replacement.
- Stainless Steel Manifold Fittings.
- 10-micron frits on cartridge.
- 100% Helium Leak Tested and shipped filled with helium.

### Specifications

**Source Gases Purified:** He, Ar, N<sub>2</sub>, H<sub>2</sub>, dry air (<50 ppm H<sub>2</sub>O)  
**Operating Pressure Range at 70°F:** 10–200 psig  
**Operating Temp. Range:** 60–95°F  
**Removal Performance:** See Table I  
**Volume:** 250 cc  
**Maximum Flow Capacity:** 2 slpm  
**Inlet and Outlet Connections:** See Table II  
**Dimensions:** 12" x 2" x 2"  
**Weight (approx.):** 3 lbs

AFS2-4KIT

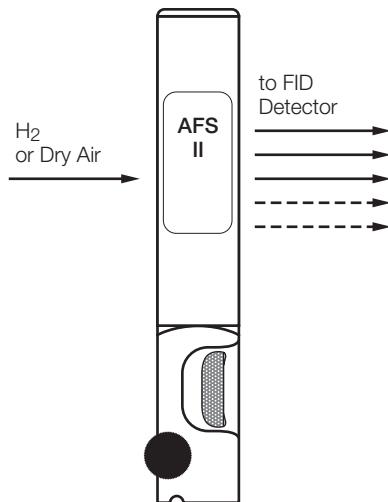


Table I

Removal Performance	Efficiency	Capacity
Water	20 ppb	8.8 gm
Hydrocarbons	5 ppb	13 gm

Table II

Part Number	Description	Inlet and Outlet Connections
AFS2-2KIT	AFS2, Complete Kit includes AFS Manifold	1/8" compression
AFS2-4KIT	AFS2, Complete Kit includes AFS Manifold	1/4" compression
AFS2-RC	AFS2, Replacement Cartridge	Port holes (mate to AFS manifold)
AFS-2MAN	AFS Manifold Replacement	1/8" compression
AFS-4MAN	AFS Manifold Replacement	1/4" compression

# Advanced Filter System III

## Moisture Removal

### Model AFS3

Model AFS3 is a high capacity gas purifier that removes H<sub>2</sub>O to low ppb levels from inert, dry air and hydrogen gas streams. It is commonly used in laboratory and ultra dry inert purging applications. The high capacity and robust construction make it suitable for installations requiring multiple use points.

The AFS3 is constructed in two parts, a stainless steel manifold that connects to the gas line which is intended to stay in place permanently and a high capacity cartridge that is changed periodically when the filter bed is consumed. Brackets and hardware (included) are used to mount the manifold to a bench or wall. Once the manifold is installed, the easily replaceable cartridge is attached to the manifold with a clamping knob. The cartridge design features double seals at all joints, and a sealed polycarbonate shield to provide protection in the event of sight-glass breakage. A high sensitivity indicator provides visual indication. When the cartridge is depleted the moisture indicator changes from blue to brown.



AFS3-4KIT

### Standard Features

- Sensitive Visual Indicator for moisture.
- Simple Cartridge Replacement with twist on/off assembly knob.
- Dual Sealing System.
- Check Valves protect gas lines during cartridge replacement.
- Stainless Steel Manifold Fittings.
- 10-micron frits on cartridge.
- 100% Helium Leak Tested and shipped filled with helium.

### Specifications

**Source Gases Purified:** He, Ar, N<sub>2</sub>, H<sub>2</sub>, dry air (<50 ppm H<sub>2</sub>O)  
**Operating Pressure Range at 70°F:** 10–200 psig  
**Operating Temp. Range:** 60–95°F  
**Removal Performance:** See Table I  
**Volume:** 250 cc  
**Maximum Flow Capacity:** 2 slpm  
**Inlet and Outlet Connections:** See Table II  
**Dimensions:** 12" x 2" x 2"  
**Weight (approx.):** 3 lbs

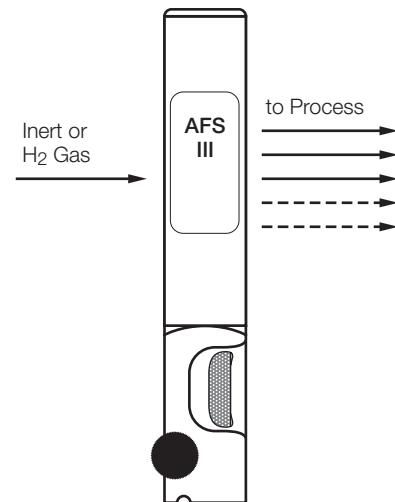


Table I

Removal Performance	Efficiency	Capacity
Water	20 ppb	22 gm*

\* Water capacity based on an inlet moisture concentration of 200 ppmv.

Table II

Part Number	Description	Inlet and Outlet Connections
AFS3-2KIT	AFS3, Complete Kit includes AFS Manifold	1/8" compression
AFS3-4KIT	AFS3, Complete Kit includes AFS Manifold	1/4" compression
AFS3-RC	AFS3, Replacement Cartridge	Port holes (mate to AFS manifold)
AFS-2MAN	AFS Manifold Replacement	1/8" compression
AFS-4MAN	AFS Manifold Replacement	1/4" compression

# High Pressure Purifier

## Moisture and Oil Removal, Brass Housing

### Model SG6140

Model SG6140 purifier is designed to remove water and/or oil from gas or liquid streams. In the laboratory, it protects delicate or sensitive instruments, prolongs service life and provides more accurate, reproducible test results. This purifier may be used with noncorrosive gases compatible with brass and Viton® at pressures up to 3000 psig.

Three different purifying elements are available (see Tables I and II). These elements can be replaced without removing the purifier from the process line.

Note: These purifiers are not suitable for use with oxygen. Model SG6140 cannot be used as a particulate filter. For particulate filters see pages 190–192.

#### Specifications

**Maximum Operating Pressure:** 3000 psig

**Pressure Drop:**

1.0 psi at 56 slpm Air  
2.4 psi at 85 slpm Air

**Dew Point Obtainable (4A and 13X Molecular Sieve):** -100°F

**Inlet & Outlet Connections:** 1/4" NPT female

**Dimensions:**

Height: 5 1/6"  
Diameter (Widest Point): 2"

**Mounting Holes (2):** 1/4" -20UNC x 3/8" deep

**Weight (approx.):** 3 lbs

#### Materials of Construction

**Purifier:**

Body and Cap: Brass O-Ring  
Seal: Viton®

**Purifier Element:**

Housing: Electrolytic Tin-Plated Cold-Rolled Steel

Retainer: Polyester Felt Backed by Type 316 SS

Screen Desiccant: 4A, 13X or Activated Charcoal as Ordered



AG6140 purifier and element

Table I

Part Number	Element Type
SG6140	None
SG6140-1	Type 13X Molecular Sieve
SG6140-2	Type 4A Molecular Sieve
SG6140-3	Activated Charcoal

Elements are shipped individually packed, hermetically sealed to prevent deterioration. They must be installed before using the purifier.

Table II

Element Type	Used for Removing	Water Capacity at Flow Rate of 2 scfm at 80°F
Type 13X Molecular Sieve	Oil and Water	5.5 grams
Type 4A Molecular Sieve	Water	6.0 grams
Activated Charcoal	Oil and Heavy Hydrocarbons*	N/A

\* Will remove trace amounts of Acetone in Acetylene for use in atomic absorption applications.

#### Optional Equipment

Equipment and Replacement Parts	Part No.
Replacement Equipment:	
Type 13X Molecular Sieve	SG6141
Type 4A Molecular Sieve	SG6142
Activated Charcoal	SG6143
Replacement Viton® O-Ring	0202-3268

# Low Pressure, High Flow Purifier

## Moisture and Oil Removal, Aluminum Housing

### Model AG6170

Model AG6170 purifier protects sensitive instruments from water and/or oil contamination which ensures more accurate, reproducible test results and prolongs instrument service life. This purifier (capable of removing up to 20 times more water than our Model SG6140), may be used with noncorrosive gases compatible with aluminum and neoprene at inlet pressures up to 350 psig.

Three different purifying elements are available (see Tables I and II). The elements can be replaced without removing the purifier from the process line.

Note: Model AG6170 cannot be used as a particulate filter. For particulate filters see pages 190–192. The Model AG6170 is not suitable for use with Oxygen.

### Specifications

**Maximum Operating Pressure:** 350 psig

**Operating Temp. Range:** -40°F to 200°F

**Maximum Flow Capacity:**

280 slpm for short periods (<15 mins)

85 slpm for continuous service

**Pressure Drop:**

0.12 psi at 85 slpm Air

1 psi at 226 slpm Air

**Dew Point Obtainable (4A and 13X M.S.):**  
-100°F (1.5 ppm)

**Inlet & Outlet Connections:** 1/4" NPT male

**Dimensions:**

Height: 15 5/8"

Diameter: 4 3/4"

**Weight (approx.):** 7 lbs

### Materials of Construction

**Purifier:**

Shell and Flange Plate: Aluminum

Seals: Neoprene

Strainer Assembly: MONEL® & Brass

**Purifier Element:**

Housing: Electrolytic Tin-Plated Cold-Rolled Steel

Retainer: Polyester Felt Backed by Type 316 SS Screen

Desiccant: 4A, 13X or Activated Charcoal as Ordered



AG6170 Purifier, Element Sealed in Can and Gaskets

**Table I**

Part Number	Element Type
AG6170	None
AG6170-1	Type 4A Molecular Sieve
AG6170-2	Type 13X Molecular Sieve
AG6170-3	Activated Charcoal

Elements are shipped in individually packed, hermetically sealed cans to prevent deterioration. They must be installed before using the purifier.

**Table II**

Element Type	Used for Removing	Water Capacity
Type 4A Molecular Sieve	Water	134 grams
Type 13X Molecular Sieve	Oil and Water	126 grams
Activated Charcoal	Oil and Heavy Hydrocarbons*	N/A

### Optional Equipment

Equipment and Replacement Parts	Part No.
Replacement Equipment (includes replacement gaskets):	
Type 4A Molecular Sieve	SG6171
Type 13X Molecular Sieve	SG6172
Activated Charcoal	SG6173

# Hydrocarbon Trap

## Hydrocarbon Removal, Aluminum Housing, Refillable

### Model SG6130

The Model SG6130 Refillable Hydrocarbon Trap is designed to remove trace levels of organics from carrier gases such as Helium, Argon, Nitrogen, Hydrogen and Air. The Model SG6130 is packed with a very high surface area activated carbon to effectively remove alcohols, aromatics, chlorinated hydrocarbons, ethers, hydrocarbons, ketones, mercaptans, and organic acids.

Service life of these traps will vary depending on the incoming hydrocarbon level in the carrier gas. However it is estimated that 1000 ft<sup>3</sup> (3–4 cylinders) of carrier gas can be purified before the absorbent needs replacing.

Each trap is pre-purged and pressure tested with ultra-high purity helium to ensure integrity. The all-metal construction eliminates potential contamination from outgassing or diffusion (a phenomena commonly associated with plastic body traps).



SG6130-4

### Standard Features

- Sintered Type 316 SS Inlet and Outlet Filters protect against adsorbent migration into the downstream system.
- Pre-purged and Pressure Tested with Ultra-High Purity Helium to ensure integrity.

Max. Flow Capacity: 35 slpm at 120 psi

Inlet and Outlet Connections: See Table I

Dimensions: 1½" OD x 14" long

Weight (approx.): 1 lb



MC-3

### Specifications

Maximum Operating Pressure: 250 psig

Maximum Operating Temperature: 212°F

Efficiency: <20 ppb hydrocarbon reduction

Hydrocarbon Capacity: 22 grams

Trap Volume: 200 cc

### Materials of Construction

Body and Caps: Aluminum

Seals: Viton®

Fittings: Brass

Filters (40 micron): Type 316 SS

Absorbent Material: Baked Coconut Shell Based Activated Carbon

Table I

Part Number	Inlet and Outlet Connections
SG6130-8	1/8" compression
SG6130-4	1/4" compression

### Optional Equipment

Equipment	Part No.
Absorbent Refill Kit*	SG6135
Mounting Clip**	MC-3

\* Kit contains enough absorbent to refill two traps.

\*\* For secure installation it is recommended that two mounting clips be used for each trap.

# Indicating Moisture Traps

## Moisture and Oil Removal, Polycarbonate Housing

### SG6180 Series

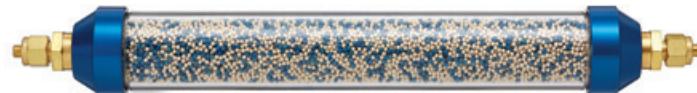
These refillable traps consist of a transparent polycarbonate body filled with adsorbent material. They are designed to remove oil, moisture and other contaminants from gas streams while providing a visual indication of the adsorbent's condition.

SG6180 Series traps are available in two refillable sizes with a choice of two adsorbents:

- Type 5A Molecular Sieve with Indicating Drierite for removing moisture, oil and hydrogen sulfide. When the Drierite changes from blue to pink as relative humidity approaches 40%, the material requires replacement.
- Type 13X Molecular Sieve Mixed with Type 4A Indicating Molecular Sieve for removing moisture and oil. When the adsorbent changes from blue to buff at 20% relative humidity, the material requires replacement.

In addition, the housings may be ordered empty and filled with other types of molecular sieves. For more information on Molecular Sieves, see pages 218–224.

**Warning:** Do not use these traps with Oxygen, hydrocarbons or solvents which attack polycarbonate.



SG6182



MC-1



MC-4

### Standard Features

- Transparent Polycarbonate Tube more inert and resistant to infusion than acrylic, permits quick observation of the adsorbent's condition.
- Sintered Type 316 SS Inlet and Outlet Filters retain the adsorbent within the column.
- All units are pressure tested with Helium.

### Materials of Construction

- Tube: Lexan® Polycarbonate Plastic
- End Caps: Aluminum
- Seals: Viton®
- Fittings: Brass
- Filters, 40 micron: Type 316 SS
- Adsorbent Material: See Table I

Table I

Size	Part Number	Type 13X with 4A Indicating Molecular Sieve	No Adsorbent
1½" OD x 13" long	SG6180	SG6182	SG6184
1¾" OD x 17" long	SG6181	SG6183	SG6185

### Optional Equipment

Equipment and Replacement Parts	Part No.
Adsorbent Refill Kit Type 5A with Drierite Type 13X with 4A Indicating	SG6186* SG6187**
Mounting Clip with Screws for SG6180, SG6182, SG6184 (2 required) for SG6181, SG6183, SG6185 (2 required)	MC-1 MC-4
Replacement O-Rings (2 required) for SG6180, SG6182 and SG6184 for SG6181, SG6183 and SG6185	0202-3207 0202-3208
Tube Reducer (2 required) brass*** 1/8" compression x 1/4" OD tube for inlet/outlet	0202-5100

\* Kit contains enough adsorbent to refill either two SG6180 traps or one SG6181 trap.

\*\* Kit contains enough adsorbent to refill either two SG6182 traps or one SG6183 trap.

\*\*\* If selected these items are not installed on the trap. They are shipped as separate items.

### Specifications

Maximum Operating Pressure: 125 psig at 70°F

Maximum Operating Temperature: 110°F

#### Efficiency:

SG6180 & SG6182: <20 ppb

SG6181: <17 ppb

SG6183: <15 ppb (with inlet levels of 30 ppm or less)

#### Water Capacity:

SG6180 & SG6182: 36 grams

SG6181 & SG6183: 72 grams

#### Trap Volume:

SG6180, SG6182 & SG6184: 200 cc

SG6181, SG6183 & SG6185: 400 cc

Maximum Flow Capacity: 25 slpm @ 100 psi inlet

Inlet and Outlet Connections: 1/4" compression (standard) 1/8" compression fittings available on special order

Weight (approx.): 2 lbs

# Glass Encased Moisture Traps

## Moisture Removal, High Purity, Low Pressure

### SG6190 Series

These traps consist of a silanized, borosilicate glass tube which is filled with Type 13X Molecular Sieve and Type 4A Indicating Molecular Sieve. The adsorbent material removes moisture from the gas stream while the chemically-inert glass tube eliminates potential contamination from outgassing or diffusion (a phenomenon commonly associated with plastic purifiers). The trap incorporates a band of indicating molecular sieve 4A which will undergo a color change (from blue to buff) to alert when the adsorbent requires replacement.

For operator safety, the glass housing has been encapsulated in a secondary clear plastic outer tube to provide protection from potential glass breakage while still providing a visual indication of the adsorbent's condition. These traps are available in two different sizes, as is indicated in Table I.



SG6191

#### Standard Features

- Borosilicate Glass Inner Housing eliminates contamination from diffusion or outgassing commonly associated with purifiers made of plastic.
- Transparent Housing permits quick observation of the adsorbent's condition.
- Sintered Type 316 SS Inlet and Outlet Filters retain the adsorbent within the column.
- Pre-purged and Pressure Tested with Ultra-High Purity Helium to ensure integrity.

#### Water Capacity:

SG6191: 16 grams  
SG6192: 40 grams

#### Trap Volume:

SG6191: 100 cc  
SG6192: 250 cc

**Maximum Flow Capacity:** 32 slpm at 125 psi inlet

#### Inlet and Outlet Connections:

1/4" compression (standard)  
Optional 1/4" x 1/8" tube reducers available

**Weight (approx.):** 3 lbs



MC-3

#### Specifications

**Maximum Operating Pressure:** 125 psig @ 70°F

**Maximum Operating Temperature:** 212°F

**Efficiency:** To <20 ppb water with inlet levels of 30 ppm or less

#### Materials of Construction

##### Housing:

Inner Tube: Silanized Borosilicate Glass  
Outer Tube: Polycarbonate Plastic

**Seals:** Zytel-A Nylon Resin

**Fittings:** Nickel-Plated Brass

**Filters (40 micron):** Type 316 SS

**Adsorbent Material:** Type 13X Molecular Sieve and 4A Indicating Molecular Sieve

Table I

Part Number	Size
SG6191	1 3/4" dia. x 12 1/2" long
SG6192	1 3/4" dia. x 17" long

#### Optional Equipment

Equipment and Replacement Parts	Part No.
Adsorbent Refill Kit*	SG6195
Tube Reducer (2 required) brass** 1/8" compression x 1/4" OD tube for inlet/outlet	0202-5100
Mounting Clip with Screws for SG6191 (2 required) for SG6192 (2 required)	MC-3 MC-4

\* Kit contains enough adsorbent to refill two (2) SG6191 traps or one (1) SG6192 trap.

\*\* If selected, these items are not installed on the trap. They are shipped as separate items.

# Oxygen/Moisture Traps

Oxygen and Moisture Removal, Aluminum Body, Disposable

## SG6160 Series

The SG6160 Series Oxygen Traps are designed to remove trace levels of Oxygen and moisture from carrier gases such as Argon, Carbon Dioxide, Carbon Monoxide, Helium, Hydrogen, Methane or Nitrogen. These traps are also ideal for use with argon-methane mixtures (i.e. P-5 or P-10 mixtures), commonly used with gas chromatographs utilizing electron capture detectors.

These traps incorporate a highly reactive, metal reagent, which is supported on an inert substrate, coupled with molecular sieves. Oxygen is removed by chemical reaction with the reagent to form a metal oxide. Oxygen levels can be effectively reduced to less than 2 ppb when starting levels are 10 ppm or less.

Service life of these traps will vary depending on the incoming Oxygen and moisture level in the carrier gas. However, it is estimated that when the starting Oxygen level is <10 ppm, the Model SG6160 can purify four cylinders (1200 ft<sup>3</sup>) of carrier gas, while the Model SG6162 can typically purify twenty-five cylinders (7500 ft<sup>3</sup>) or more. Actual Oxygen capacity can be found in the Specifications below. We also recommend, where the application's flow rates permit, using these traps upstream of our SG6150 Series Indicating Oxygen Traps (page 202) to provide a visual indication of Oxygen breakthrough, thus alerting of the need to replace the trap.

Note: Oxygen Traps are not recommended as a replacement for the use of proper high purity gases. Rather, they are designed to provide additional protection from Oxygen contamination which might result from system leaks or diffusion, or to achieve further reduction in Oxygen impurity levels for extremely sensitive instrumentation or processes.

## Specifications

**Maximum Operating Pressure:** 250 psig @ 70°F

**Efficiency:** To <2 ppb Oxygen when inlet levels are 10 ppm or less

### Oxygen Capacity:

SG6160: 450 mg  
SG6162: 3200 mg

### Moisture Capacity:

SG6160: 2 grams  
SG6162: 15 grams

### Maximum Flow Capacity:

SG6160: 5 slpm nitrogen at 125 psig  
SG6162-4: 20 slpm nitrogen at 80 psig  
SG6162-2: 60 slpm nitrogen at 80 psig

## Inlet and Outlet Connections: See Table I

### Dimensions (diameter by length):

SG6160: 1 1/4" x 10"

SG6162: 2 5/8" x 18"

### Weight (approx.):

SG6160: 12 oz  
SG6162: 3 lbs

## Materials of Construction

**Body:** Aluminum

**Inlet and Outlet Fittings:** Brass

**Filters (40 micron):** Type 316 SS



SG6160-4



MC-1A



MC-5-2

Table I

Part Number	Inlet and Outlet Connections
SG6160-4	1/4" compression
SG6160-8	1/8" compression
SG6162-2	1/2" compression
SG6162-4	1/4" compression

## Optional Equipment

Equipment and Replacement Parts	Part No.
Mounting Clip with Screws for SG6160 for SG6162 (set of 2)	MC-1A MC-5-2

# Indicating Oxygen Traps

## Glass Encased, High Purity, Low Pressure

### SG6150 Series

Indicating Oxygen Traps are normally recommended for use downstream of non-indicating oxygen traps (where application flow rates permit) to provide a visual indication of oxygen breakthrough. As it adsorbs oxygen, breakthrough is indicated via a color change in the adsorbent from a light green to a deep brown. Because of their relatively small capacity, SG6150 Series Indicating Oxygen Traps should be used by themselves only in very low volume applications.

These traps consist of a silanized borosilicate glass tube filled with a molecular sieve base and activated getter material. Oxygen and a wide range of oxides react with the getter material to form a manganese oxide. The glass tube is enclosed in a clear plastic outer shell to provide protection from glass breakage while still allowing for a visual indication of the trap's condition.

### Standard Features

- Transparent Glass Tube encased in a clear plastic outer shell permits quick observation of the adsorbent's condition.
- Sintered Type 316 SS Inlet and Outlet Filters protect against adsorbent migration into the downstream system.
- Pre-Purged and Pressure Tested with Ultra-High Purity Helium to ensure integrity.
- Expended Material is Nonhazardous, Nontoxic, Nonflammable, and Nonreactive permitting safe landfill disposal.

### Specifications

**Maximum Operating Pressure:** 100 psig

**Maximum Operating Temperature:** 212°F

**Efficiency:** To <1 ppb Oxygen with inlet levels of 10 ppm or less

### Oxygen Capacity:

SG6150: 50 mg  
SG6151: 150 mg

### Maximum Flow Capacity:

SG6150: 10 slpm at 100 psi  
SG6151: 21.5 slpm at 100 psi

### Inlet and Outlet Connections:

See Table I

### Dimensions (diameter by length):

SG6150: 1 1/4" x 9 1/2"  
SG6151: 1 3/4" x 10 9/16"

### Weight (approx.):

1 lb

### Materials of Construction

#### Housing:

Inner Tube: Silanized Borosilicate Glass  
Outer Tube: Polycarbonate Plastic

#### Seals:

Zytel-A Nylon Resin

#### Fittings:

Nickel-Plated Brass

#### Filters (40 micron):

Type 316 SS

Table I

Part Number	Inlet and Outlet Connections
SG6150-8	1/8" compression
SG6151-4	1/4" compression

### Optional Equipment

Equipment and Replacement Parts	Part No.
Mounting Clip with screws (2 required) for SG6150 for SG6151	MC-2 MC-3



SG6150-8



SG6151-4

(O<sub>2</sub> breakthrough indicated)

# Gas Cylinder Jackets

## Warming and Insulating, Self-limiting Heating Elements

### AGCJ Series

The AGCJ Series Jackets are designed to heat and insulate cylinders in order to prevent gases from condensing inside the cylinder. Cylinder jackets are commonly used with hydrocarbon and protocol mixtures to protect against inaccurate calibration and process control when cylinders are exposed to low temperatures.

These cylinder jackets are constructed with a self-limiting heating element that prevents over-heating. As temperature increases, element resistance rises resulting in lower amperage to the heater. Lower amperage causes a wattage drop, thus limiting maximum attainable temperatures. ASGE jackets may be used to maintain cylinders at 60°F during outdoor winter conditions or to heat cylinders up to 120°F in ambient temperatures. They are constructed of materials approved by Factory Mutual and CSA for Class I, Division 2, Group B, C and D hazardous locations.

Note: These jackets are NOT designed to heat up cylinders that have been stored in sub-freezing temperatures. Cold cylinders should be brought indoors to warm up BEFORE cylinder jacket is used.



AGCJ Series Cylinder Jacket

### Standard Features

- Heating Design will not produce "hot spots" that can cause dangerous cylinder heating conditions.
- Construction of closed-cell foam insulation, with silicon-impregnated fiberglass liner and polyester exterior jacket provides long-lasting weather protection.
- Velcro® seam flap and 6 each, D-ring closures ensure a snug fit.
- Includes 10 feet of three color-coded conductors housed in a flexible conduit ready for hardwiring by a licensed electrician.

### Specifications

- Electrical Power Requirements: 110/120 VAC  
 Power Cord Length: 10'  
 Power Cord: 3 color-coded 14 AWG conductors housed in a 3/8" Type "UA" flexible liquid tight conduit  
 Power Cord Connection: 3/8" straight connector with 1/2" male threads, sealing washer and locking nut  
 Heater: Self-regulating cable with tinned copper overbraid and over extruded corrosion barrier  
 Dimensions: See Table I  
 Jacket Maintain Temperature: See Table I



AGCJ-THERM Thermostat

### Optional Equipment

Equipment and Replacement Parts	Part No.
Thermostat in NEMA 4x/ NEMA 7 Housing	AGCJ-THERM
Cylinder Pad	AGCJ-INSPAD
Hood Cover	AGCJ-REGHOOD
Regulator Hood Cover	AGCJ-RHC



AGCJ-RHC

Table I

Part Number	Fits Cylinders with Dimensions OD x H	Jacket Dimensions (Approx) OD x H See Note 1	Jacket Maintain Temperature at 70°F Ambient See Note 2	Jacket Maintain Temperature at 0°F Ambient See Note 2
AGCJ-350H	14.5" x 44.5"	17.50" x 44.5"	120°F	60°F
AGCJ-300L	9.25" x 54.5"	12.25" x 54.5"	120°F	60°F
AGCJ-200L	9" x 50.5"	12" x 50.5"	120°F	60°F
AGCJ-150AL	8" x 47.5"	11" x 47.5"	120°F	60°F

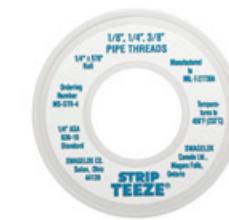
Note 1: Other sizes, temperature and voltage ratings are available. Contact your Advanced Representative.

Note 2: Jacket Maintain Temperatures are offered as guidelines and are based upon empirical testing in no wind, indoor conditions, with hood cover installed. Additional heat losses may impact the jacket's ability to reach the indicated temperature. Conditions that may create additional losses can include wind and moisture, incomplete flap seal, internal tank pressure fluctuations and conductive losses to surrounding piping.



**Cylinder Bench Clamp**  
(Part No. SG6202\*)

Made of cast aluminum, it can safely secure cylinders up to 14" OD to most bench and table tops. The bracket clamps to any flat surface up to 1½" thick with a minimum 1½" overhang and is tightened by two steel screws with sliding T-handles and swivel pads. The 1" wide by 54" long nylon strap has a nickel-plated, steel, non-slip spring catch and buckle for fast adjustment.



**PTFE Thread Sealant Tape**  
(Part No. 0202-5126)

Designed for application on 1/8", 1/4" and 3/8" male tapered pipe threads as a lubricant to prevent galling of pipe threads. The tape measures 1/4" wide x 576" long and is supplied in a plastic case.

Note: Tape is manufactured to conform to military specifications: MIL-T-27730A and for use with temperatures up to 450°F.



**Cylinder Wall Brackets**  
Two Cylinder (Part No. SG6207)  
Three Cylinder (Part No. SG6208)  
Four Cylinder (Part No. SG6211)

Forged from heavy 11 gauge HR steel, finished in chemical resistant epoxy, and fitted with steel reinforced polyethylene edge guards, they will safely support cylinders up to 12" OD. Each bracket includes 1½" wide by 40" long polypropylene straps with nickel-plated steel non-slip spring catches and buckles for fast adjustment.



**Cylinder Bench Clamp with Safety Chain**  
(Part No. SG6202C\*)

Same as our SG6202 Cylinder Wall Bracket, but includes a sturdy safety chain for extra security in case of fire.



**\*Replacement Strap**  
(Part No. SG6209)

The nylon replacement strap for Models SG6202 and SG6203.



**Cylinder Wall Bracket**  
(Part No. SG6203\*)

Made of cast aluminum, it can support cylinders up to 14" OD. The 1 inch wide by 54" long nylon strap has a nickel-plated, steel, non-slip spring catch and buckle for fast adjustment. Recessed mounting holes are located in each end of the bracket for mounting to a wall, or any vertical surface.



**8 Ounce Snoop® Liquid Leak Detector**  
(Part No. 0202-3032)

Designed for leak-testing pressurized gas systems, it is provided in a squeezable plastic bottle with an extendable 12" tube for detecting gas leaks in hard-to-reach places.

**1 Gallon Snoop® Liquid Leak Detector**  
(Part No. 0202-3031)

Designed for use in filling small trays or tanks for immersion leak-testing of pressurized components, or for refilling the smaller 8 oz bottles (0202-3032).

Note: Snoop® exceeds the performance requirements of military specifications: Mil-L-25567D Type 1, Leak Detection Compound, Oxygen Systems, for use over a temperature range of +27°F to 200°F.



**Cylinder Valve Wrench**  
(Part No. SG6226)

Safely assists in opening and closing high pressure cylinder valves while preventing over-tightening using a three pin safety design. One pin is made of copper that will deform prior to over-tightening of the cylinder valve. The other pins are made from stainless steel.



**Adjustable Cylinder Wall Bracket**  
(Part No. SG6206)

Molded from glass reinforced thermoplastic, it can be adjusted to fit any cylinder from 3.5" OD to 14" OD. The 1½" wide by 50" long polypropylene strap has a nickel-plated, steel, non-slip spring catch and buckle for fast adjustment. A steel chain with bitsnap closure is provided for secondary security. Recessed mounting holes are located in each end of the bracket for mounting to a wall.



**Cylinder Floor Stand**  
(Part No. SG6225)

Constructed from 11-gauge plate steel, welded and powder paint finished, the stand safely supports cylinders 4" to 10" OD. Uses adjustable compression bar and cylinder strap for excellent security. Floor mounting holes included.



**Four Wheel Double Cylinder Cart**  
(Part No. AG6214)

Designed to safely hold and easily transport two 12" maximum OD cylinders. The cart has two retractable 3" rear swivel casters that drop into place when needed for additional load handling safety or lock into the frame when not required. Construction is of heavy 10-gauge HR steel supports and 14-gauge round steel tube welded and powder paint finished. Heavy-duty polypropylene cylinder straps with steel cinch buckles secure cylinders in place and 10.5" fully pneumatic wheels provide for excellent all-surface control. The carts are packaged with upper handle section removed and can ship UPS for freight savings.



**Cylinder Floor Stand**  
(Part No. 610FE)

All-welded steel construction and paint finished, the stand safely supports cylinders 7" to 9½" OD. The cylinders can be rolled on or off with ease and firmly locked in place, or quickly unlocked with the PATENTED cylinder placement band and large plastic turning knobs.



**Manifold Brackets – Adjustable, Wall Mountable**  
(Part No. IG-AHWBA)

This L-shaped steel wall bracket includes u-bolt, strap and nuts. It is painted black with ¾" holes pre-drilled. 1.75" wide x 5" high x 3.5" deep. 1" ID zinc-plated steel u-bolt with 1.25" center-to-center width.



**Lecture Bottle Supports**  
Single Wall/Bench (Part No. LB3550)

Single Bench (Part No. LB3551)

Triple Wall/Bench (Part No. LB3552)

Six Portable Stand (Part No. LB3553)

Because of the rounded bases on lecture bottles, wall brackets or stands are recommended for securing them in place at their point of use. The LB3550 Series Lecture Bottle Stands, available in four different styles are made of lightweight, chemical resistant PVC and have non-slip foot pads.



**Adjustable Cylinder Stand**  
(Part No. SG6204)

Made of cast aluminum, the stand hinges open so it can be placed around the cylinder without lifting the cylinder. The three adjustable uprights can be adjusted to accommodate cylinders from 6" OD to 9½" OD.



**Cylinder Stand**  
(Part No. SG6200)

Used for securing cylinders where a wall or bench is not available, these stands are made of cast aluminum, and are hinged so they can be placed around the cylinder without lifting the cylinder. Four thumbscrews provide a tight fit after closing. The stand fits any cylinder with an 8" to 9" OD.



**Four Wheel Single Cylinder Cart**  
(Part No. AG6212)

Designed to safely hold and easily transport a cylinder up to 12" OD. The cart has two 3" rear swivel casters which fall into place automatically after removing a locking pin when the cart is leaned backward. The operator carries no load. The rear wheel assembly can be locked into the retracted position for fast wheeling if desired. Construction is of heavy 10-gauge HR steel supports and 14-gauge round steel tube welded and powder paint finished. A heavy-duty polypropylene cylinder strap with steel cinch buckle secures cylinder in place and 8" semi-pneumatic wheels provide for safe, convenient transport of gas cylinders. The carts are packaged with upper handle section removed and can ship UPS for freight savings.

**Four Wheel Single Cylinder Cart**  
(Part No. AG6211)

Designed to safely hold and easily transport a cylinder up to 12" OD. This cart is furnished with the same features included with Model AG6212 except it has 10.5" fully pneumatic wheels to provide for excellent all-surface control.

# Cryogenic Hoses and Accessories

Liquid Transfer Hoses for Argon, Nitrogen and Oxygen

Model CHS

## Benefits and Features

- Maximum operating pressure is 500 psig.
- Constructed with Type 316 SS for all wetted parts.
- Cleaned for oxygen service.
- Machined CGA stainless steel end connections.
- Exceptional flexibility, hose resists kinking.

Table I

Part Number	Gas Service	Length	Inlet CGA	Outlet CGA
IG-CHS48-295	Argon, Nitrogen	48"	295	295
IG-CHS60-295	Argon, Nitrogen	60"	295	295
IG-CHS72-295	Argon, Nitrogen	72"	295	295
IG-CHS120-295	Argon, Nitrogen	120"	295	295
IG-CHS144-295	Argon, Nitrogen	144"	295	295
IG-CHS48-440	Oxygen	48"	440	440
IG-CHS60-440	Oxygen	60"	440	440
IG-CHS72-440	Oxygen	72"	440	440
IG-CHS120-440	Oxygen	120"	440	440
IG-CHS144-440	Oxygen	144"	440	440



IG-CHS48-295  
Cryogenic Hose

## Accessories: Phase Separator and Fill Elbows

- Maximum operating pressure is 500 psig.
- Phase separator eliminates splashing and increases efficiency when filling dewars.
- 90° Fill elbow connects to container to prevent over-bending and abrasion.

Part Number	Gas Service	Description	Inlet	Outlet
IG-CPS-38*	Argon, Nitrogen, Oxygen	Phase Separator	3/8" NPTF	N/A
IG-CFE-295	Argon, Nitrogen	90° SS Fill Elbow	CGA 295 F	CGA 295 M
IG-CFE-440	Oxygen	90° SS Fill Elbow	CGA 440 F	CGA 440 M

\* To attach a phase separator (IG-CPS-38) to a transfer hose, use hose adapters IG-CF295M6M for CGA 295 or IG-CF440M6M for CGA 440



IG-CPS-38  
Phase Separator



IG-CFE-295 Fill Elbow

## Accessories: Hose Adapters

- Maximum operating pressure is 500 psig.
- Brass, JIC 37-degree flare x NPT.

Part Number	Cryogenic Service	Description	SAE Flare
IG-CF295M4M	Argon, Nitrogen	CGA 295 to 1/4" NPT male	1/2"
IG-CF295M6M	Argon, Nitrogen	CGA 295 to 3/8" NPT male	1/2"
IG-CF295M8M	Argon, Nitrogen	CGA 295 to 1/2" NPT male	1/2"
IG-CF440M4M	Oxygen	CGA 440 to 1/4" NPT male	5/8"
IG-CF440M6M	Oxygen	CGA 440 to 3/8" NPT male	5/8"
IG-CF440M8M	Oxygen	CGA 440 to 1/2" NPT male	5/8"
IG-CF440M12M	Oxygen	CGA 440 to 3/4" NPT male	5/8"



IG-CF295M6M Hose Adapter

# Firewall Cylinder Carts

## Oxygen, Fuel Gas, Firewall Compliant Cylinder Separator

### SG6250 Series

Oxygen cylinders are commonly positioned next to fuel gas cylinders on carts for use in welding and cutting applications. SG6250 Series carts are equipped with a firewall designed to prevent the spread of fire and multi-cylinder explosion in the event a single cylinder leaks and a fire begins. The firewall also restricts flame contact with the oxygen cylinder, preventing it from overheating, building excess pressure and activating the safety. The carts meet OSHA and NFPA compliance requirements for safe cylinder storage of oxygen cylinders located next to fuel gas cylinders.

The firewall is constructed using Marinite® I, a one-hour rated fire barrier material encased in steel panels and framing. Construction is of heavy 11 gauge steel,  $\frac{3}{16}$  inch steel supports and round steel tube welded and powder coated for durability. All models are perimeter braced enabling the foot plates to rest flat against the floor eliminating the need of lifting to load and unload cylinders.

### Standard Features

- Marinite® I Barrier Material provides a one hour rated fire barrier, twice the rating required by OSHA standards.
- 4-ply, 16 inch Pneumatic Wheels on  $\frac{3}{4}$  inch Diameter Solid State Axles provide for excellent all-surface control.
- Individual Polypropylene Straps with non-slip catches and welded twist loop chains safely secure each cylinder.
- Triple Handle Ergonomic Design aids in safety and maneuverability.
- Heavy 11 gauge hot rolled steel and  $\frac{3}{16}$  inch round steel tube all-welded construction.
- Electrostatically applied ASA 61 gray powder coat painted finish provides impact resistant, durable hard finish that is tougher than conventional paint.
- Foot plates rest flat against the floor eliminating the need of lifting to load and unload cylinders.

### Optional Features

- Two retractable rear casters drop into place when needed for additional load handling support or lock into the frame when not required.
- A built-in hoist ring balanced lifting system with cylinder locking rings holds cylinders securely in place.
- A toolbox with padlock capable locking lid for storing torches and tools.

### Two-Wheel Cart

(Part No. SG6250)

Designed to safely hold and easily transport two cylinders up to 12 inch (fuel) and 10 inch (oxygen) OD, the cart features 16 inch, 4-ply speed rated pneumatic wheels to provide for excellent all-surface control. Each cylinder is held in place with individual heavy-duty 1.5" polypropylene cylinder straps and welded twist loop chains.

Dimensions: 24" x 35" x 60"

Weight: 131 lbs



SG6250

### Four-Wheel Cart

(Part No. SG6251)

Furnished with the same features included with Model SG6250 except it has two retractable 5-inch rear casters that drop into place when needed for additional load handling support or lock into the frame when not required.

Dimensions: 24" x 35" x 60"

Weight: 155 lbs



SG6251

### Construction-Site Cart

(Part No. SG6252)

Furnished with the same features provided with our Model SG6250 except the additions of cylinder locking rings with posts to hold cylinders (from 38 to 62 inches in height) securely in place, a hoist ring balanced lifting system and a toolbox with padlock capable locking lid.

Dimensions: 24" x 35" x 64"

Weight: 165 lbs



SG6252

# Mobile Cylinder Carts, Stands

All Steel Construction, Four and Six Cylinder Capacity

SG6230, SG6240 Series

Mobile Cylinder Carts are designed to provide safe transport for multiple cylinders. They are made of welded 11 gauge steel construction and finished with impact resistant, electrostatically applied powder coat semi-gloss paint. All models use 1½" polypropylene straps with steel non-slip cinch buckles, the same as used in our two (Model 6207) and three (Model SG6208) cylinder wall brackets. The carts are shipped partially assembled and can ship UPS for freight savings.

## Four Cylinder Wheeled Cart (Part No. SG6230)

These carts are designed to safely transport four cylinders up to 12" OD. The cart features four, 4" caster wheels (two with wheel brakes) and a push handle to provide for good load control. Two polypropylene straps are supplied at each cylinder station to safely secure cylinders.

Dimensions: 24" x 40" x 36"

Weight: 144 lbs



SG6240

## Six Cylinder Wheeled Cart (Part No. SG6231)

These carts are designed to safely transport six cylinders up to 12" OD. The cart features four, 4" caster wheels (two with wheel brakes) and a push handle to provide for good load control. Two polypropylene straps are supplied at each cylinder station to safely secure cylinders.

Dimensions: 24" x 54" x 36"

Weight: 163 lbs

## Four Cylinder Forklift Portable Stand (Part No. SG6240)

These stands are designed to be carried by a forklift to safely transport four cylinders up to 12" OD. The cart features two-way fully enclosed forklift channels to provide for safe load control. Two polypropylene straps are supplied at each cylinder station to safely secure cylinders.

Dimensions: 24" x 39" x 32"

Weight: 130 lbs

# Forklift Cylinder Pallets

High Pressure Cylinders, Cryogenic Dewars

SG6260 Series

These cylinder pallets are designed to safely transport multiple cylinders with the use of a forklift. Available in three sizes to accommodate quantities of 4, 12 or 21 standard 9.25" diameter cylinders or for the transport of 1, 2, or 4 standard 21" diameter cryogenic dewars. A 10,000 lb rated ratchet strap is included and can be attached at three different heights. Steel construction with textured powder paint finish provides a non-skid surface. Two-way fully enclosed forklift channels welded from 11-gauge steel provide for safe load control.



SG6262

Table I

Part Number	Description	Dimensions (L x W x H)	Weight (lbs)
SG6260	Holds 4 – 300 ft <sup>3</sup> high pressure cylinders or one 21" cryogenic dewar	24" x 36" x 36"	136
SG6261	Holds 12 – 300 ft <sup>3</sup> high pressure cylinders or two 21" cryogenic dewars	32" x 48" x 36"	177
SG6262	Holds 21 – 300 ft <sup>3</sup> high pressure cylinders or four 21" cryogenic dewars	48" x 48" x 36"	272

# Cylinder Floor Savers

## Gas Cylinders, Cryogenic Dewars

### SG6280 Series

These floor savers are designed to protect and preserve all types of flooring from bacteria, rust, corrosion and condensation caused by industrial and medical gas cylinders and liquid dewars. They are ideal for use in biotech, pharmaceutical, medical and electronic work areas.

Floor savers are constructed of a custom blended chemical resistant, high impact thermoplastic crafted to eliminate the need to routinely clean and buff floors around cylinders. The moisture collection reservoir provides a protective barrier preventing transfer of cylinder or dewar contamination and moisture to the work area, providing a safer cleaner work environment.



SG6281

Table I

Part Number	Description	Cylinder Sizes Supported	Dimensions (L x W)	Weight (lbs)
SG6280	Floor Saver, Tan Color 10" diameter x 3/8" Reservoir, 1 Pint Capacity	10" Diameter or Smaller	11.25" x 11.25"	1
SG6281	Floor Saver, Tan Color 22" diameter x 5/8" Reservoir, 4 Quart Capacity	22" Diameter Dewars or Smaller	23.5" x 23.5"	6
SG6282	Floor Saver, Tan Color 30" x 30" x 3/4" Reservoir, 5 Quart Capacity	230L Dewars with Caster Base	32" x 33"	9

# Cylinder Safety Caps

## Lockable, Safety Yellow

### Models SG6220, SG6221, SG6222, SG6223

These locking caps ensure safety and reduce the possibility of misuse and vandalism with compressed gas cylinders by limiting access to the main cylinder control and regulator attachment. They are designed to fit most North American high and low pressure cylinders and meet standards of DOT and CGA by attaching securely to the collar of the cylinder. Cylinder Safety Caps are available with fine and coarse thread configurations. Stocked units are powder coat painted in safety yellow and are supplied with a weather resistant, keyed brass padlock.



Locked Safety Cap

Table I

Part Number	Cylinder Style	Collar Thread Style	Collar Threads (per in)	Dimensions	Weight (lbs)
SG6220	High Pressure	Fine	11	8" x 5" x 4.5"	5
SG6221	High Pressure	Coarse	7	8" x 5" x 4.5"	5
SG6222	Low Pressure	Fine	11	8" x 5" x 4.5"	5
SG6223	Low Pressure	Coarse	7	8" x 5" x 4.5"	5

# Cylinder Connections

## CGA Standard, Nut, Nipple, Integral Check Valve

### SG6650 Series

Cylinder connections are used for connecting various items of gas handling apparatus (such as pressure regulators or pigtails) directly to a high pressure gas cylinder. The actual connection varies depending on the gas in the cylinder and is designated by a three digit code (CGA Connection Number) as set forth in Compressed Gas Association publication V-1. Cylinder connections consist of a CGA nut and CGA nipple and in some cases require a washer for sealing purposes. Refer to pages 235–237 for CGA connection details.

Advanced offers cylinder connections in a variety of configurations and materials. One configuration, available in either brass or Type 316 SS, features an integral check valve housed within the CGA nipple. This configuration restricts flow to only one direction, and prevents backflow from the process to the cylinder.

Also offered are special Type 316L SS cylinder connections which end in a male vacuum-type face seal fitting for use in systems utilizing VCR® or VCR® compatible type fittings.

### Specifications

#### Pressure Range:

CGA 290, 510, 678 and 679: 0–500 psig

CGA 347, 680 and 695: 3001–5500 psig

CGA 701: 4001–5500 psig

CGA 677, 702 and 703: 5501–7500 psig

All Others: 0–3000 psig

#### Temperature Range:

SG6650-(CGA)CV: -70°F to 150°F

SG6651-(CGA)CV: -40°F to 150°F

### Materials of Construction

Part Number	CGA Nipple	CGA Nut	Check Valve Seat
SG6650-(CGA)	Brass	Brass	N/A
SG6650-(CGA)CV	Brass	Brass	EPDM
SG6651-(CGA)	Type 316 SS	Type 303 SS	N/A
SG6651-(CGA)CV	Type 316 SS	Type 303 SS	Viton®
SG6651-(CGA)VM	Type 316L SS	Type 303 SS	N/A
SG6652-(CGA)	MONEL®	MONEL®	N/A

"(CGA)" shown above indicates that the various CGA connections, listed in Tables I and II, are used to make up complete part numbers.



SS Nut and Nipple x 1/4" male vac



Brass CGA Nut and Nipple x 1/4" NPTM



SS Nut and Nipple x 1/4" NPTM



Cutaway of CGA with integral check valve

Table I, Cylinder Connections (Brass and MONEL®)

CGA No.	Brass Part No.	Outlet Connection	Brass with Check Valve Part No.	Outlet Connection	MONEL® Part No.	Outlet Connection	PTFE Washers* (Pkg. of 25) Part No.
170	SG6650-170	1/8" NPT male	—	—	—	—	SG3542
180	SG6650-180	1/8" NPT male	—	—	—	—	SG3541
280	SG6650-280**	1/4" NPT male	—	—	—	—	—
296	SG6650-296	1/4" NPT male	SG6650-296CV	1/4" NPT male	—	—	—
320	SG6650-320	1/4" NPT male	SG6650-320CV	1/4" NPT male	SG6652-320	1/4" NPT male	SG6076
326	SG6650-326	1/4" NPT male	SG6650-326CV	1/4" NPT male	—	—	—
330	—	—	—	—	SG6652-330	1/4" NPT male	SG6076
346	SG6650-346	1/4" NPT male	SG6650-346CV	1/4" NPT male	—	—	—
350	SG6650-350	1/4" NPT male	SG6650-350CV	1/4" NPT male	—	—	—
500	SG6650-500**	1/4" NPT male	—	—	—	—	—
510	SG6650-510	1/4" NPT male	SG6650-510CV	1/4" NPT male	—	—	—
540	SG6650-540	1/4" NPT male	SG6650-540CV	1/4" NPT male	—	—	—
580	SG6650-580	1/4" NPT male	SG6650-580CV	1/4" NPT male	—	—	—
590	SG6650-590	1/4" NPT male	SG6650-590CV	1/4" NPT male	—	—	—
660	SG6650-660	1/4" NPT male	—	—	SG6652-660	1/4" NPT male	SG6075
670	—	—	—	—	SG6652-670	1/4" NPT male	SG6075
701	SG6650-701	1/4" NPT male	—	—	—	—	—

\* Washers constructed of lead and PCTFE are available for certain CGA connections. Contact your Advanced Representative for additional information.

\*\* Connection is chrome-plated brass.

Table II, Cylinder Connections (Stainless Steel)

CGA No.	Stainless Steel Part No.	Outlet Connection	Stainless Steel with Check Valve Part No.	Outlet Connection	Stainless Steel Part No.	Outlet Connection	PTFE Washers* (Pkg. of 25) Part No.
110	SG6651-110	1/8" NPT male	—	—	—	—	SG3540
180	SG6651-180	1/8" NPT male	—	—	—	—	SG3541
290	SG6651-290	1/4" NPT male	—	—	—	—	—
296	SG6651-296	1/4" NPT male	—	—	—	—	—
320	SG6651-320	1/4" NPT male	SG6651-320CV	1/4" NPT male	SG6651-320VM	1/4" male vac**	SG6076
326	SG6651-326	1/4" NPT male	SG6651-326CV	1/4" NPT male	SG6651-326VM	1/4" male vac**	—
330	SG6651-330	1/4" NPT male	SG6651-330CV	1/4" NPT male	SG6651-330VM	1/4" male vac**	SG6076
346	SG6651-346	1/4" NPT male	SG6651-346CV	1/4" NPT male	SG6651-346VM	1/4" male vac**	—
347	SG6651-347	1/4" NPT male	—	—	—	—	—
350	SG6651-350	1/4" NPT male	SG6651-350CV	1/4" NPT male	SG6651-350VM	1/4" male vac**	—
510	SG6651-510	1/4" NPT male	SG6651-510CV	1/4" NPT male	SG6651-510VM	1/4" male vac**	—
540	SG6651-540	1/4" NPT male	SG6651-540CV	1/4" NPT male	SG6651-540VM	1/4" male vac**	—
580	SG6651-580	1/4" NPT male	SG6651-580CV	1/4" NPT male	SG6651-580VM	1/4" male vac**	—
590	SG6651-590	1/4" NPT male	SG6651-590CV	1/4" NPT male	SG6651-590VM	1/4" male vac**	—
660	SG6651-660	1/4" NPT male	SG6651-660CV	1/4" NPT male	SG6651-660VM	1/4" male vac**	SG6075
670	SG6651-670	1/4" NPT male	SG6651-670CV	1/4" NPT male	SG6651-670VM	1/4" male vac**	SG6075
677	SG6651-677	1/4" NPT male	SG6651-677CV	1/4" NPT male	—	—	—
678	SG6651-678	1/4" NPT male	—	—	SG6651-678VM	1/4" male vac**	SG6077
679	SG6651-679	1/4" NPT male	—	—	SG6651-679VM	1/4" male vac**	SG3543***
680	SG6651-680	1/4" NPT male	—	—	—	—	—
695	SG6651-695	1/4" NPT male	—	—	—	—	—
702	SG6651-702	1/4" NPT male	—	—	—	—	—
703	SG6651-703	1/4" NPT male	—	—	—	—	—
705	SG6651-705	1/4" NPT male	—	—	—	—	SG6078

\* Washers constructed of lead and PCTFE are available for certain CGA connections. Contact your Advanced Representative for additional information.

\*\* Male vacuum (male vac) connection is compatible with 1/4"VCR® fittings.

\*\*\* Washers are constructed of lead and can also be used with CGA 110 connections.

# Cylinder Connections

## CGA (DISS) Ultra-High Integrity Service, Nut, Nipple

### SG2500 Series

Ultra-High Integrity (DISS) Cylinder Connections provide higher purity and leak integrity than standard service CGA connections. The connection design is unique in appearance and utilizes a more precise and sophisticated sealing mechanism than standard CGA connections. The sealing mechanism uses a precision-machined gasket positioned between a pair of precision-machined polished circular ridges called toroids, one located in the cylinder valve outlet and one located in the nipple of the cylinder connection. Other design features include the use of the diameter index safety system (DISS), anti-rotational slots with matching keys or pins, leak testing holes in the nut, recesses to protect the toroid and retain the sealing gasket and a notch to facilitate gasket removal.

Ultra-High Integrity (DISS) connections are used for connecting various items of gas handling equipment (such as pressure regulators or pigtailed) directly to the cylinder valve outlet of a Semiconductor/High Purity—specialty gas cylinder. The actual connection varies depending on the gas in the cylinder and is designated by a three digit code (CGA Connection Number) as set forth in Compressed Gas Association publication V-1. Cylinder connections listed in Table I below consist of a CGA nut and nipple. The sealing gasket with a built-in stainless steel retaining clip listed in Table II is sold separately. Refer to CGA TB-9 Technical Bulletin "Guidelines for the Proper Handling and Use of CGA 630/710 Series Ultra-High Integrity Service Connections" for additional information.

Special order DISS connections are available in a variety of configurations and materials such as check valve or restricted flow orifices housed within the CGA nipple, end connections with face seal, tube socket or orbital tube weld end connections and MONEL® R405, Hastelloy® C-22 and Nickel 200 material options.

### Standard Features

- Critical Surfaces 100% Visually Inspected Under Magnification.
- Permanently Heat Code Marked and Traceable.
- DI Ultra Cleaned and Clean Room Packaged.
- Manufactured to CGA V-1 Standards.

### Optional Configurations

- Integral Check Valve.
- Integral Restricted Flow Orifice.
- End Connections: Face Seal, Tube Socket Weld and Orbital Tube Weld.
- Material Options: MONEL® R405, Hastelloy® C-22 and Nickel 200.

### Materials of Construction

**Nut:** Type 316L SS with Silver-Plated Threads

**Nipple:** Type 316L SS SCM (VIM/VAR)  
Electropolished

Table I, DISS Cylinder Connections

CGA Number	Part Number	Outlet Connection
632	SG2500-632	1/4" NPT male
634	SG2500-634	1/4" NPT male
636	SG2500-636	1/4" NPT male
638	SG2500-638	1/4" NPT male
640	SG2500-640	1/4" NPT male
642	SG2500-642	1/4" NPT male
712	SG2500-712	1/4" NPT male
714	SG2500-714	1/4" NPT male
716	SG2500-716	1/4" NPT male
718	SG2500-718	1/4" NPT male
720	SG2500-720	1/4" NPT male
722	SG2500-722	1/4" NPT male
724	SG2500-724	1/4" NPT male
726	SG2500-726	1/4" NPT male
728	SG2500-728	1/4" NPT male

Table II, DISS Sealing Gaskets\*

Part Number	Materials of Construction
SG2500-N	Nickel 200
SG2500-K	Virgin PCTFE

\* The entire CGA 630/710 Series uses the same size gasket.

Be certain the material of construction selected is compatible with the gas service.



SG2500-716



SG2500-K Sealing Gasket  
(sold separately)

# Trailer, Manifold Connections

## Brass, Nut, Nipple, Bushings

Models F1340 and F1350

Table I

Part Number	Gas Service	Description	CGA Number
IG-F1340CGA	Inerts	1.00-11.5 NPS union nut, RH with 1/2" NPT union nipple, 3" long	1340 Female*
IG-F1350CGA	Flammables	1.00-11.5 NPS union nut, LH with 1/2" NPT union nipple, 3" long	1350 Female*
IG-F1340M8M	Inerts	1.00-11.5 NPS x 1/2" NPT union bushing, RH	1340 Male
IG-F1350M8M	Flammables	1.00-11.5 NPS x 1/2" NPT union bushing, LH	1350 Male

\* Connections consist of CGA nut and nipple—refer to CGA Publication V-10.

Note: 3500 psig @ 70°F maximum pressure rating for connections



Union Nut and Nipple



Union Bushing

# Cryogenic Cylinder Carts

## Cylinder Delivery Cart

Model CC4W

Designed to deliver a single liquid cylinder (160–230L), this cart features an adjustable hook that can be used with a variety of cylinders with simple adjustment. Its pneumatic wheels roll easily over any surface while swivel casters on the trailing wheel make maneuverability easy. Small, front-mounted steel wheels make loading large liquid cylinders quick and easy.

### Specifications

Part Number: IG-CC4W

Height: 63" vertical

Width: 20"

Weight: 119 lbs

## EZ Load Cart

Model CC3W

The EZ Load Cart is the ultimate cart for any location where handling and maneuverability are paramount. Its phenolic wheels and swivel caster move easily and soundlessly over flat surfaces. Loading large liquid cylinders (160–230L) is simple because of the low front-loading platform. The cart can be used with platform scales to prevent the slamming of cylinders on scales.

### Specifications

Part Number: IG-CC3W

Height: 48"

Width: 29"

Weight: 79 lbs

## Flat Platform Cart

Model CCP4W

Built on the same concept as the EZ Load, the Model IG-CCP4W has a flat platform designed to move large liquid cylinders (160–230L) with ease. It utilizes four ultra quiet swivel casters to maximize maneuverability while minimizing noise, making it perfect for labs and hospitals.

### Specifications

Part Number: IG-CCP4W

Height: 6"

Width: 33"

Weight: 65 lbs

Baseplate: 22" x 22"



# Cylinder Scale

## Hydraulic – No Power Required, Corrosion Resistant

### Model CS-200

The only way to accurately measure a cylinder containing a liquefied gas (such as carbon dioxide, chlorine, propane, etc.) is by weight. This is because the cylinder pressure or vapor pressure of these gases remains constant as long as liquid is present in the cylinder. Therefore a pressure gauge, commonly used to measure the contents of nonliquefied gas cylinders, does not provide a means to measure the contents of cylinders containing liquefied gases.

The Model CS-200 cylinder scale is designed to accurately weigh product usage from a liquefied gas cylinder in plant and laboratory applications. It prevents the user from running out of gas in the middle of a process, or from returning partially full cylinders containing valuable product to the gas supplier.

The design of the CS-200 allows the user to subtract the tare weight (i.e. empty cylinder weight) by rotating the tare adjustment knob until the dial indicates the net contents of the cylinder. The scale's overall capacity of 300 pounds gross and 200 pound tare will accommodate most liquefied compressed gas cylinders.

### Standard Features

- Low Profile Platform Height of 1 $\frac{5}{8}$ " allows cylinders to be easily rolled on or off without lifting or using a cylinder ramp.
- Tare Adjustment Knob at the base of the indicator allows the operator to "zero off" the tare weight of the cylinder.
- Noncorrosive Platform constructed of PVC plastic and sized to accept any cylinder from 7" to 14" OD.
- Explosion-Proof, Hydraulic Load Cell System can be safely used with flammable and oxidizing products.
- Chaining Bracket with Integral Tool Rack provides for a safe installation by securing cylinder to a wall while providing spare hooks to serve as a tool rack for storing cylinder change-out tools.
- 4 $\frac{1}{2}$ " Diameter Dial Indicator can be easily read from as far away as 10 feet.

### Optional Features

- Reduced profile platform for use in GC Series Gas Safety Cabinets (contact your Advanced Representative for more information)
- 4–20 mA Transmitter, 100p powered for SCADA Integration (Requires 12–45 VDC)
- Battery Powered Digital Weight Indicator

### Specifications

#### Maximum Capacity:

Gross (Total) Weight: 300 lbs  
Net (Product) Weight: 200 lbs  
Tare (Empty Cyl.) Weight: 200 lbs

#### Standard Cylinder Sizes: 7" to 14" diameter

Accuracy:  $\pm 2$  lbs

Dial Size: 4 $\frac{1}{2}$ "

Dial Increments: 1 lb

Tubing Length: 6'

Platform Size: 18 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ " x 1 $\frac{5}{8}$ "

Weight: 25 lbs

### Materials of Construction

Platform: PVC (Type I, Class 1)

Load Cell: Aluminum and Stainless Steel

Tubing: PVC Coated Nylon

Dial Indicator: Cast Aluminum

Bracket: Aluminum

Chain: Galvanized Steel



CS-200

# Gas Leak Detector

## Portable, Thermal Conductivity, Nonflammable Gases

### Model 21070

The Model 21070 Gas Leak Detector easily and quickly pinpoints gas leaks emitting from pressurized systems. Utilizing a thermal conductivity detector, the instrument responds to any gas mixture with a thermal conductivity different from that of air.

Helium leaks of  $1 \times 10^{-5}$  cc/sec are easily detected, as are many others such as refrigerant leaks of  $1.1 \times 10^{-4}$  cc/sec and argon leaks of  $1.0 \times 10^{-4}$  cc/sec to name a few.

**Warning:** The Model 21070 (and 21072) is NOT designed to be used to determine leaks of combustible gases. This leak detector uses air as its reference and is designed to determine low level leaks of any gas having a thermal conductivity different from that of air, therefore, it is not specific to any gas or vapor. A combustible gas detector should be used for the determination of combustible gas leaks in possible hazardous conditions.



### Benefits/Features

- Easy to operate—just turn it on, zero and then probe for leaks
- Precision instrument with high sensitivity
- User-selectable hi/low sensitivity settings
- Flash memory for saving various settings including alarm mode, setpoint and volume, peak hold delay, LED brightness, sensitivity, and pump speed
- Miniature probe pinpoints exact leaks
- No messy soap solutions
- No system contamination
- Can be tested to NIST-traceable standards
- Optional carrying case is available

### Optional Features

- Carrying Case Model Q59-050
- Testing to a NIST-traceable standard

### Applications

- Testing and quality control
- Valves and manifolds
- Welds, seams, joints
- Pressure regulators
- Compression fittings
- High pressure vessels and gas lines
- Refrigeration and air conditioning

### Laboratory Applications

- Gas chromatographs
- Purge and trap systems
- Injection ports/septa
- Column and detector fittings
- Gas purifiers and traps
- Mass flow controllers
- Cylinder connections
- Tube fittings

### Specifications

**Detector:** Thermal conductivity cell with thermistors

**Operating Temperature:**  $70^{\circ}\text{F} \pm 20^{\circ}\text{F}$

**Visual Readout:** LED bar graph featuring adjustable brightness and peak hold with settable duration

**Pump:** Diaphragm type and pump speed control

#### Line Voltage:

21070: 115 V, 60 Hz, 4W  
21072: 230 V, 50 Hz, 4W

**Battery:** Rechargeable Ni-Cd, 7.36 V, 800 mAh

### Battery Life:

7 to 8 hours

Recharged to 95% of capacity in one hour

Low battery indicator

Very low battery shutdown

### Ranges:

Low: x1

High: x100

Adjustable sensitivity for low and high ranges

Time constant/average

**Zero:** Manual with drift elimination

**Audio Signal:** Audible alarm with adjustable setpoint and volume

### Features:

Flash memory for saving settings

Microprocessor controlled

**Dimensions:** 5.25" L x 3.25" W x 1.81" H

**Weight (approx.):** 1 lb

### Sensitivity

Minimum leak rate required to produce 10% deflection of full scale.

**Argon:**  $1.0 \times 10^{-4}$  cc/sec 10.110 ft<sup>3</sup>/yr

**Carbon Dioxide:**  $1.1 \times 10^{-4}$  cc/sec 10.123 ft<sup>3</sup>/yr

**Helium:**  $1.0 \times 10^{-5}$  cc/sec 10.012 ft<sup>3</sup>/yr

**Refrigerant:**  $1.1 \times 10^{-4}$  cc/sec 10.123 ft<sup>3</sup>/yr

Table I

Part Number	Description
21070	115 V mini gas leak detector
21072	230 V mini gas leak detector

# Air Check

## Oxygen Deficiency Monitor

### Model AG4000-O<sub>2</sub>

This compact oxygen monitor from ASGE should be installed in any confined space where inert gases might accumulate. This includes gas storage areas, freezers, confined spaces and other locations where low oxygen levels may pose an asphyxiation hazard.

Unlike electrochemical sensor cells, the Air Check features an exclusive, current limiting zirconium oxide oxygen sensor that will operate continuously for 10 or more years with little or no maintenance. It responds to low oxygen conditions within seconds, providing drift-free oxygen readings, even in areas where temperature, barometric pressure and humidity levels are variable.

With the Air Check monitoring system, there are no zero or span calibration pots to adjust.

Exposure to a reference gas is never necessary. Moreover, when compared to disposable-type sensors that are no longer effective after approximately one year of service, Air Check is easily the more cost-effective oxygen monitoring solution. Our Air Check monitor with long-life zirconium O<sub>2</sub> sensor pays for itself in as little as three years!

Air Check transmits continuous oxygen concentration levels to any system control data acquisition system or programmable logic controller. It can be configured as a display-only monitor or a full-featured monitor with dual-level, user-selectable alarm relays that can be operated remotely up to 1000 meters from centralized controllers. Suitable for both indoor and outdoor applications, Air Check electronics are housed in a Nema 4X housing, with an optional EX available for hazardous areas.



AG4000-O<sub>2</sub>

### Standard Features

- Zero maintenance zirconium cell.
- No calibration required.
- Unaffected by environmental temperature, humidity and barometric variations.
- Operates at -40°F (-40°C) in freezers.
- 10+ year sensor life.
- Local display, 4–20 mA output.
- Joystick adjustable dual-alarm system relays.
- Computer controlled electronics.
- Mounting feet can be oriented in any direction or removed for flush mounting.
- Furnished with UL listed 110 VAC/24 VDC regulated power adapter.

### Specifications

- Sampling Method and Range:** Diffusion, 0–25% O<sub>2</sub>  
**Accuracy:** ±0.5% of full scale  
**Operating Temperature:** -40°F to 131°F  
**Humidity:** 0–95%  
**Display:** ¾" backlit LCD digital  
**Audible Alarm (Sound Output):** 90 db  
**Response Time:** Within 1 second of any change in O<sub>2</sub>  
**Repeatability:** ±1%  
**Approvals:** Ce approved and factory-calibrated against a NIST-traceable reference standard  
**Required Calibration:** None (no zero or span pots supplied)

**Minimum Detection:** 1000 ppm signal

**Outputs:** DC 4–20 mA analog output; dual-level user-selectable alarm relays and one fault relay (2 amps @30 VDC/240 VAC)

**Power Requirements:** 24 VDC 100mA without relays, 500mA with relays (unit supplied with 110 VAC power adapter with 6' power cord)

**Enclosure:** ABS plastic, Nema 4X rated general purpose (optional: EX available for hazardous areas)

**Dimensions:** 5.5" W x 3.5" H x 3.25"D

**Weight (approx.):** 1.6 lbs

Table I

Part Number	Gas Detected	Factory Default Alarm Threshold Settings		
AG4000-O <sub>2</sub>	Oxygen	Alarm 1	19.5%*	Orange LED
		Alarm 2	18.0%*	Red LED
		Audible Alarm	19.5%*	90 db Alarm

\* Alarms are factory (default) set to automatically reset (non-latching) when level exceeds threshold settings.

# Dual Air Check

## Oxygen and Carbon Dioxide Monitor

### Model AG4000-O<sub>2</sub>CO<sub>2</sub>

This compact dual monitor from ASGE is ideal for the continuous monitoring of both O<sub>2</sub> and CO<sub>2</sub> gases simultaneously to alert and protect personnel from entering potentially hazardous situations where inert gases may accumulate. This includes nitrogen gas storage areas, CO<sub>2</sub> beverage gas distribution areas, confined spaces and other locations where low oxygen or elevated carbon dioxide levels may pose a health hazard.

Unlike continuously depleting electrochemical sensor cells, the Dual Air Check monitor features exclusive zirconium and patented NDIR cells to provide stable readings. O<sub>2</sub> and CO<sub>2</sub> readings are stable even in areas where temperature, barometric pressure and humidity levels are continually changing. The O<sub>2</sub> sensor requires no quarterly calibration or annual maintenance, while the CO<sub>2</sub> sensor automatically adjusts to ambient levels. Dual Air Check automatically adjusts to ambient CO<sub>2</sub> levels on a weekly basis, or on-demand if desired. In addition, there are no zero or span adjustments to make or expensive maintenance required. Simply plug Dual Air Check into any standard AC outlet and depend on continual, maintenance and error-free air monitoring.

Dual Air Check has individual dedicated user-selectable relays that can be used to operate on-off valves for the control of CO<sub>2</sub> injection in grow rooms while simultaneously activating alarms when O<sub>2</sub> levels get too low. The O<sub>2</sub> sensor can also be used for controlling nitrogen generators for hypobaric rooms while using the CO<sub>2</sub> sensor to alarm to TLV levels of CO<sub>2</sub>. A built-in CPU provides an inexpensive monitor with local display, safety alarms and control for both O<sub>2</sub> and CO<sub>2</sub> simultaneously.

### Standard Features

- Zero maintenance zirconium O<sub>2</sub> cell and long life CO<sub>2</sub> sensor.
- No calibration required for O<sub>2</sub>.
- Self-calibrating CO<sub>2</sub> sensor.
- Unaffected by environmental temperature, humidity and barometric variations.
- Three year warranty.
- 10+ year sensor life.
- Local backlit concentration display.
- Built-in visual LED alarm indicators and audible horn.
- Alarm level 1 and 2 for O<sub>2</sub> and CO<sub>2</sub>.
- Mounting feet can be oriented in any direction or removed for flush mounting.
- Furnished with UL listed 110 VAC/24 VDC regulated power adapter.

### Specifications

**Sampling Method and Range:** Diffusion, 0–25% O<sub>2</sub>, 0–10,000 ppm CO<sub>2</sub>  
**Accuracy:** ±1% of full scale  
**Operating Temperature:** 32°F to 131°F  
**Humidity:** 0–95% RH (nonconforming)  
**Display:** ¾" backlit LCD digital  
**Signal Outputs:**  
 Audible Alarm: 90 db  
 Alarm Indicator for O<sub>2</sub>: Red LED  
 Alarm Indicator for CO<sub>2</sub>: Orange LED  
**Response Time:** Within 1 second of any change in O<sub>2</sub>  
**Repeatability:** ±1%  
**Approvals:** Ce approved and factory-calibrated against a NIST-traceable reference standard  
**Required Calibration:**  
 O<sub>2</sub>: none  
 CO<sub>2</sub>: none when Auto Cal function is activated



AG4000-O<sub>2</sub>CO<sub>2</sub>

**Minimum Detection:** 200 ppm

**Signal Outputs:** One user-adjustable alarm relay for O<sub>2</sub>, one user adjustable alarm relay for CO<sub>2</sub> (rated at 2 amps @24 VDC/240 VAC)

**Analog Output:** 4–20 mA selectable for either O<sub>2</sub> or CO<sub>2</sub>

**Power Requirements:** 24 VDC 350mA (unit supplied with 110 VAC power adapter with 6' power cord)

**Enclosure:** Polycarbonate plastic, general purpose

**Dimensions:** 6.5" W x 3.5" H x 3.25" D

**Weight (approx.):** 1.6 lbs

Table I

Part Number	Gas Detected	Factory Default Alarm Threshold Settings		
AG4000-O <sub>2</sub> CO <sub>2</sub>	Oxygen Carbon Dioxide	Alarm 1 Alarm 2 Audible Alarm	19.5%* 5000 ppm* 19.5% O <sub>2</sub> or 5000 ppm CO <sub>2</sub> *	Red LED Orange LED 90 db Alarm

\* Alarms are factory (default) set to automatically reset (non-latching) when level exceeds (O<sub>2</sub>) or is below (CO<sub>2</sub>) threshold settings.

# UOP Molecular Sieves\*

## Beads, Powders, Pellets

### MS Series

UOP Molecular Sieves\* are synthetically produced, crystalline metal aluminosilicates that have been activated for adsorption by removing their water of hydration. Unlike other adsorbents, Molecular Sieves have a precise uniform size and molecular dimension. According to the size of these pores, molecules may be readily adsorbed, slowly adsorbed or completely excluded. This sieve-like selectivity, based on molecular size, plus a selectable preference for polar or polarizable molecules, gives Molecular Sieves an extremely high level of adsorption efficiency, and permits close tailoring of the adsorbent to the specific use. Pore sizes vary by the "type" of Molecular Sieve; for example, Type 4A has a uniform pore size of 4 angstroms while Type 13X has a uniform pore size of 10 angstroms.



Beads

### Forms

- Powders are white finely divided free flowing particles with an average diameter of 4–5 microns.
- Pellets are cylindrically formed products whose diameters are controlled ( $\frac{1}{16}$ " or  $\frac{1}{8}$ " as specified).
- Beads are spherically shaped products.\*\*

Table I

Screen Size	Opening (mm)
4	4.760
8	2.380
12	1.680



Powders



Pellets



# Molecular Sieve Applications

## Product Formulation

UOP is the world's largest supplier of activated molecular sieve powders for formulating and compounding applications. Activated powders provide moisture removal to extremely low levels with high adsorption capacity. Unlike chemical drying agents, these adsorbents function by a physical process only, so no reaction by-products are formed that can adversely affect product properties. MOLSIV powders can be added to plastic formulations to physically adsorb odor-source molecules that are generated from polymer oxidation, migration of external contaminants, or dissolution of additives.

**Coating, Adhesive, Sealant and Elastomeric Treating (CASE):** Molecular sieve powders remove moisture from epoxies, coatings, adhesives, sealants, elastomers, metal rich paints to eliminate curing problems such as CO<sub>2</sub> off-gassing, blistering and degradation of other physical properties.

**Vinyl Based Foam Dehydration:** Molecular sieve powders dehydrate to eliminate pinholes and blemishes on vinyl surfaces during high-temperature curing.

**Polymers:** Molecular sieve powders have been proven effective for their ability to reduce taste and odor problems in injection and extrusion blow-molded containers, tie-layer and sealant polymers, extrusion coatings and multi-layered packaging.



Polymers



Coating, Adhesive, Sealant and Elastomeric Treating

## Industrial Gas Purification + Air Separation

High purity industrial gases such as O<sub>2</sub>, N<sub>2</sub>, H<sub>2</sub> and CO are produced in a variety of ways. UOP's MOLSIV adsorbents play an essential role in these processes because of their high adsorption selectivity and capacity. In addition, UOP's aluminas are often used for dehydration applications.

**H<sub>2</sub> & CO Production:** Molecular sieves remove water and CO<sub>2</sub> to prevent freezing in downstream cryogenic separation processes.

**O<sub>2</sub> & N<sub>2</sub> Production:** Molecular sieves remove water and CO<sub>2</sub> from compressed air to prevent freezing in downstream cryogenic separation processes.

**H<sub>2</sub> Production:** Molecular sieves remove impurities such as hydrocarbons, CO and N<sub>2</sub> from gas phase H<sub>2</sub> production.

**Dehydration:** Spherical activated aluminas are used for dehydration systems as in pressure swing adsorption systems.



Industrial Gases

## Packaging + Storage

Molecular sieves physically adsorb water molecules, reducing water concentration levels to less than 1 ppm in many applications. MOLSIV adsorbents are incorporated directly into plastics packaging and used in desiccant dehumidifiers (dry boxes) to protect moisture-sensitive contents.

**Packaging:** Molecular sieves are added to protect products such as pharmaceuticals, batteries, film, fuel propellants, machine parts and electronic components. The selective adsorption characteristics of molecular sieves can be useful when it is necessary to dry a package without removing other desirable compounds from a system.

**Storage:** Molecular sieves are used in cabinets and enclosures as desiccants to trap airborne moisture. Common applications include the prevention and protection against oxidation (rust), growth of fungus on optics, the preservation of lab materials and protection of moisture sensitive devices.



Packaging

## Air Drying

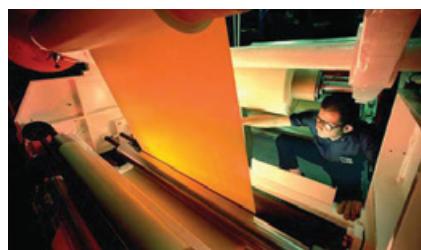
Compressed air is dried for use with plastics processing, air brakes, sterile environments, sensitive instruments, packaging and other critical process operations. UOP's MOLSIV adsorbents play an essential role in these processes because of their high dew point depression and dynamic drying capacity. High strength and attrition resistant characteristics guarantee thousands of cycles under extreme conditions over a long lifetime.

**Plastic Resin Drying:** Molecular sieves are used in desiccant dryers to dry hygroscopic plastic resins for applications such as PET pre-form molding, high-volume extrusion of sheet and film, or large part injection molding. Because of their high affinity for moisture at very low dewpoints, molecular sieve desiccant dried air can produce dewpoints of -40°F and lower.

**Instrument Air Drying:** Molecular sieves are used in desiccant dryers to produce instrument grade air from compressor air.

**Brake Air:** Molecular sieves are used in heavy and medium-duty truck, bus, and train air brakes as self-renewing dehydrators. Dehydrating the compressed air keeps the brake lines from freezing and corroding.

**Specialty Air Applications:** Molecular sieves are used to dry air for use in pharmaceutical, electronic and food packaging applications.



Plastic Resin Drying

# Type 3A Molecular Sieve

$K_{12}[(AlO_2)_{12}(SiO_2)_{12}] \bullet X H_2O$  – Molecular Sieve Type 3A, the potassium form of the Type A Crystal structure, is an alkali metal alumino-silicate. Available in powder and pellets for commercial dehydration of unsaturated hydrocarbon streams such as cracked gas, propylene, butadiene and acetylene. Type 3A is also used for drying polar liquids such as methanol and ethanol.

## Safety and Handling

See the UOP brochure entitled "Molecular Sieve Safety Bulletin for Manufacturers", or contact your Advanced representative.

## For More Information

For additional information, see SAFETY DATA SHEET (SDS) for this material listed on the Advanced website; [www.asge-online.com](http://www.asge-online.com) or contact your Advanced representative.

## Typical Physical Properties

	Powder	1/16" Pellets	1/8" Pellets
Nominal Pore Diameter (angstroms)	3	3	3
Particle Diameter *(mm)	—	1.6	3.2
Particle Size (microns)	<10	—	—
Bulk Density (lb/ft <sup>3</sup> )	35	40	40
Heat of Adsorption (Btu/lb H <sub>2</sub> O)	—	1800	1800
Crush Strength (lbs)	N/A	10	20
Equilibrium H <sub>2</sub> O Capacity** (wt-%)	25.5	21	21
Moisture Content (wt-%)	1	1	1
Molecules Adsorbed***	Molecules with an effective diameter <3 angstroms including H <sub>2</sub> O and NH <sub>3</sub>		
Molecules Excluded	Molecules with an effective diameter >3 angstroms (ethane)		

\* The length of the pellets is approximately twice the diameter.

\*\* Measured at 17.5 mm Hg and 25°C

\*\*\* Each type adsorbs listed molecules plus those of preceding type.

Part No.	Amount	Form	Part No.	Amount	Form
MS-1001	1/2 lb	Powder	MS-1028	1 lb	1/8" Pellets
MS-1002	1/2 lb-6 pk	Powder	MS-1029	1 lb-6 pk	1/8" Pellets
MS-1003	2 lb	Powder	MS-1030	5 lb	1/8" Pellets
MS-1004	2 lb-4 pk	Powder	MS-1031	5 lb-4 pk	1/8" Pellets
MS-1005	12 lb	Powder	MS-1032	25 lb	1/8" Pellets
MS-1006	30 lb	Powder	MS-1034	50 lb	1/8" Pellets
MS-1014	1 lb	1/16" Pellets			
MS-1015	1 lb-6 pk	1/16" Pellets			
MS-1016	5 lb	1/16" Pellets			
MS-1017	5 lb-4 pk	1/16" Pellets			
MS-1018	25 lb	1/16" Pellets			
MS-1020	50 lb	1/16" Pellets			

Type 3A Molecular Sieves are available packaged in 55 gallon drums – contact Advanced Specialty Gas Equipment for price and availability.

# Type 4A Molecular Sieve

$\text{Na}_{12}[(\text{AlO}_2)_{12}(\text{SiO}_2)_{12}] \bullet X \text{H}_2\text{O}$ —Molecular Sieve Type 4A, the sodium form of the Type A crystal structure, is an alkali metal alumino-silicate. Available in powder, pellets and beads for static dehydration in a closed gas or liquid system. Used in packaging of drugs, electronic components, and perishable chemicals; and as a water scavenger in paint and plastic systems. Type 4A is also used commercially in drying saturated hydrocarbon streams.

## Safety and Handling

See the UOP brochure entitled "Molecular Sieve Safety Bulletin for Manufacturers", or contact your Advanced representative.

## For More Information

For additional information, see SAFETY DATA SHEET (SDS) for this material listed on the Advanced website; [www.asge-online.com](http://www.asge-online.com) or contact your Advanced representative.

## Typical Physical Properties

	Powder	1/16" Pellets	1/8" Pellets	8 x 12 Beads	4 x 8 Beads
Nominal Pore Diameter (angstroms)	4	4	4	4	4
Particle Diameter *(mm)	—	1.6	3.2	2.0	4.0
Particle Size (microns)	<10	—	—	—	—
Bulk Density (lb/ft <sup>3</sup> )	32	44	44	44	44
Heat of Adsorption (Btu/lb H <sub>2</sub> O)	—	1800	1800	1800	1800
Crush Strength (lbs)	N/A	10	20	7	18
Equilibrium H <sub>2</sub> O Capacity ** (wt-%)	27	22	22	22	22
Moisture Content (wt-%)	1.5	1	1	1	1
Molecules Adsorbed***	Molecules with an effective diameter <4 angstroms including H <sub>2</sub> O, CO <sub>2</sub> , SO <sub>2</sub> , C <sub>2</sub> H <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , and C <sub>3</sub> H <sub>6</sub>				
Molecules Excluded	Molecules with an effective diameter >4 angstroms (propane)				

\* The length of the pellets is approximately twice the diameter.

\*\* Measured at 17.5 mm Hg and 25°C

\*\*\* Each type adsorbs listed molecules plus those of preceding type.

Part No.	Amount	Form	Part No.	Amount	Form
MS-1069	1/2 lb	Powder	MS-1124	1 lb	8 x 12 Beads
MS-1070	1/2 lb-6 pk	Powder	MS-1125	1 lb- 6 pk	8 x 12 Beads
MS-1071	2 lb	Powder	MS-1126	5 lb	8 x 12 Beads
MS-1072	2 lb-4 pk	Powder	MS-1127	5 lb- 4 pk	8 x 12 Beads
MS-1073	12 lb	Powder	MS-1128	25 lb	8 x 12 Beads
MS-1074	30 lb	Powder	MS-1130	50 lb	8 x 12 Beads
MS-1082	1 lb	1/16" Pellets	MS-1138	1 lb	4 x 8 Beads
MS-1083	1 lb-6 pk	1/16" Pellets	MS-1139	1 lb- 6 pk	4 x 8 Beads
MS-1084	5 lb	1/16" Pellets	MS-1140	5 lb	4 x 8 Beads
MS-1085	5 lb-4 pk	1/16" Pellets	MS-1141	5 lb-4 pk	4 x 8 Beads
MS-1086	25 lb	1/16" Pellets	MS-1142	25 lb	4 x 8 Beads
MS-1088	50 lb	1/16" Pellets	MS-1144	50 lb	4 x 8 Beads
MS-1096	1 lb	1/8" Pellets	MS-1152	1 lb	8 x 12 Beads <sup>†</sup>
MS-1097	1 lb-6 pk	1/8" Pellets	MS-1153	1 lb- 6 pk	8 x 12 Beadst
MS-1098	5 lb	1/8" Pellets	MS-1154	5 lb	8 x 12 Beadst
MS-1099	5 lb-4 pk	1/8" Pellets	MS-1155	5 lb- 4 pk	8 x 12 Beadst
MS-1100	25 lb	1/8" Pellets	MS-1156	25 lb	8 x 12 Beadst
MS-1102	50 lb	1/8" Pellets			

Type 4A Molecular Sieves are available packaged in 55 gallon drums – contact Advanced Specialty Gas Equipment for price and availability.

<sup>†</sup> Molecular Sieves with indicator contain beads that have been chemically impregnated to display a blue color when fully activated by removing the water of hydration. When a gas stream is dried using this product, the color blue will turn to pink as water is adsorbed denoting saturation of the sieve.

# Type 5A Molecular Sieve

$\text{Ca}_{4.5}\text{Na}_3[(\text{AlO}_2)_{12}(\text{SiO}_2)_{12}] \bullet X \text{ H}_2\text{O}$  – Molecular Sieve Type 5A, the calcium form of the Type A crystal structure, is an alkali metal aluminosilicate. Available in powder and pellets for separating normal paraffins from branched-chain and cyclic hydrocarbons through a selective adsorption process.

## Safety and Handling

See the UOP brochure entitled "Molecular Sieve Safety Bulletin for Manufacturers", or contact your Advanced representative.

## For More Information

For additional information, see SAFETY DATA SHEET (SDS) for this material listed on the Advanced website; [www.asge-online.com](http://www.asge-online.com) or contact your Advanced representative.

## Typical Physical Properties

	Powder	1/16" Pellets	1/8" Pellets
Nominal Pore Diameter (angstroms)	5	5	5
Particle Diameter *(mm)	—	1.6	3.2
Particle Size (microns)	<10	—	—
Bulk Density (lb/ft <sup>3</sup> )	32	44	44
Heat of Adsorption (Btu/lb H <sub>2</sub> O)	—	1800	1800
Crush Strength (lbs)	N/A	6	12
Equilibrium H <sub>2</sub> O Capacity ** (wt-%)	26	21.5	21.5
Moisture Content (wt-%)	1.5	1	1
Molecules Adsorbed***	Molecules with an effective diameter <5 angstroms including n-C <sub>4</sub> H <sub>9</sub> OH, n-C <sub>4</sub> H <sub>10</sub> , C <sub>3</sub> H <sub>8</sub> to C <sub>22</sub> H <sub>46</sub> , R-12		
Molecules Excluded	Molecules with an effective diameter >5 angstroms (iso compounds and all 4-carbon rings)		

\* The length of the pellets is approximately twice the diameter.

\*\* Measured at 17.5 mm Hg and 25°C

\*\*\* Each type adsorbs listed molecules plus those of preceding type.

Part No.	Amount	Form
MS-1179	1/2 lb	Powder
MS-1180	1/2 lb-6 pk	Powder
MS-1181	2 lb	Powder
MS-1182	2 lb-4 pk	Powder
MS-1183	12 lb	Powder
MS-1184	30 lb	Powder
MS-1192	1 lb	1/16" Pellets
MS-1193	1 lb-6 pk	1/16" Pellets
MS-1194	5 lb	1/16" Pellets
MS-1195	5 lb-4 pk	1/16" Pellets
MS-1196	25 lb	1/16" Pellets
MS-1198	50 lb	1/16" Pellets

Part No.	Amount	Form
MS-1206	1 lb	1/8" Pellets
MS-1207	1 lb-6 pk	1/8" Pellets
MS-1208	5 lb	1/8" Pellets
MS-1209	5 lb-4 pk	1/8" Pellets
MS-1210	25 lb	1/8" Pellets
MS-1212	50 lb	1/8" Pellets

Type 5A Molecular Sieves are available packaged in 55 gallon drums – contact Advanced Specialty Gas Equipment for price and availability.

# Type AW-500 Molecular Sieve

$\text{Ca}_2[(\text{AlO}_2)_x(\text{SiO}_2)_y] \bullet 13\text{H}_2\text{O}$  – Molecular Sieve Type AW-500 is a crystalline metal alumino-silicate available in pellet form. These acid-resistant zeolites were developed by UOP to dry and purify process streams containing strong acid contaminants such as hydrogen chloride, sulfur dioxide and the oxides of nitrogen. Their adsorption properties are typical of those found in other UOP Molecular Sieve products.

## Safety and Handling

See the UOP brochure entitled "Molecular Sieve Safety Bulletin for Manufacturers", or contact your Advanced representative.

## For More Information

For additional information, see SAFETY DATA SHEET (SDS) for this material listed on the Advanced website; [www.asge-online.com](http://www.asge-online.com) or contact your Advanced representative.

## Typical Physical Properties

	1/16" Pellets	1/8" Pellets
Nominal Pore Diameter (angstroms)	4	4
Heat of Adsorption (Btu/lb H <sub>2</sub> O)	1450	1450

Part No.	Amount	Form
MS-1220	1 lb	1/16" Pellets
MS-1221	1 lb-6 pk	1/16" Pellets
MS-1222	5 lb	1/16" Pellets
MS-1223	5 lb-4 pk	1/16" Pellets
MS-1224	25 lb	1/16" Pellets
MS-1226	50 lb	1/16" Pellets
MS-1233	1 lb	1/8" Pellets
MS-1234	1 lb-6 pk	1/8" Pellets
MS-1235	5 lb	1/8" Pellets
MS-1236	5 lb-4 pk	1/8" Pellets
MS-1237	25 lb	1/8" Pellets
MS-1239	50 lb	1/8" Pellets

# Type 13X Molecular Sieve

$\text{Na}_{86}[\text{AlO}_2]_{86}[\text{SiO}_2]_{106}$  • X  $\text{H}_2\text{O}$ —Molecular Sieve Type 13X, the sodium form of the Type X crystal structure, is an alkali metal aluminosilicate. Available in powder, pellets and beads. Used commercially for general gas drying; air plant feed purification (simultaneous removal of  $\text{H}_2\text{O}$  and  $\text{CO}_2$ ); and liquid hydrocarbon and natural gas sweetening ( $\text{H}_2\text{S}$  and mercaptan removal). The 13X can adsorb both the moisture and polymerization by-products such as acetaldehyde and ethylene glycol. Its exceptional product strength makes it ideal for sachet and other custom packaged desiccating needs.

## Safety and Handling

See the UOP brochure entitled "Molecular Sieve Safety Bulletin for Manufacturers", or contact your Advanced representative.

## For More Information

For additional information, see SAFETY DATA SHEET (SDS) for this material listed on the Advanced website; [www.asge-online.com](http://www.asge-online.com) or contact your Advanced representative.

## Typical Physical Properties

	Powder	$1/16"$ Pellets	$1/8"$ Pellets	4 x 8 Beads	8 x 12 Beads
Nominal Pore Diameter (angstroms)	8	8	8	8	8
Particle Diameter *(mm)	—	1.6	3.2	4.0	2.0
Particle Size (microns)	<10	—	—	—	—
Bulk Density (lb/ft <sup>3</sup> )	27	40	40	40	40
Heat of Adsorption (Btu/lb $\text{H}_2\text{O}$ )	1800	1800	1800	1800	1800
Crush Strength (lbs)	N/A	7	15	18	8
Equilibrium $\text{H}_2\text{O}$ Capacity ** (wt-%)	30	26	26	26	26
Moisture Content (wt-%)	2.5	1	1	1	1
Molecules Adsorbed***	Molecules with an effective diameter <8 angstroms including $\text{C}_6\text{H}_6$ , $\text{C}_7\text{H}_8$				
Molecules Excluded	Molecules with an effective diameter >8 angstroms ( $\text{C}_4\text{F}_9)_3\text{N}$				

\* The length of the pellets is approximately twice the diameter.

\*\* Measured at 17.5 mm Hg and 25°C

\*\*\* Each type adsorbs listed molecules plus those of preceding type.

Part No.	Amount	Form	Part No.	Amount	Form
MS-1328	1/2 lb	Powder	MS-1362	1 lb	4 x 8 Beads
MS-1329	1/2 lb-6 pk	Powder	MS-1363	1 lb-6 pk	4 x 8 Beads
MS-1330	2 lb	Powder	MS-1364	5 lb	4 x 8 Beads
MS-1331	2 lb-4 pk	Powder	MS-1365	5 lb-4 pk	4 x 8 Beads
MS-1332	12 lb	Powder	MS-1366	25 lb	4 x 8 Beads
MS-1333	30 lb	Powder	MS-1368	50 lb	4 x 8 Beads
MS-1341	1 lb	$1/16"$ Pellets	MS-1369	1 lb	8 x 12 Beads
MS-1342	1 lb-6 pk	$1/16"$ Pellets	MS-1370	1 lb-6 pk	8 x 12 Beads
MS-1343	5 lb	$1/16"$ Pellets	MS-1371	5 lb	8 x 12 Beads
MS-1344	5 lb-4 pk	$1/16"$ Pellets	MS-1372	5 lb-4 pk	8 x 12 Beads
MS-1345	25 lb	$1/16"$ Pellets	MS-1373	25 lb	8 x 12 Beads
MS-1347	50 lb	$1/16"$ Pellets	MS-1375	50 lb	8 x 12 Beads
MS-1355	1 lb	$1/8"$ Pellets			
MS-1356	1 lb-6 pk	$1/8"$ Pellets			
MS-1357	5 lb	$1/8"$ Pellets			
MS-1358	5 lb-4 pk	$1/8"$ Pellets			
MS-1359	25 lb	$1/8"$ Pellets			
MS-1361	50 lb	$1/8"$ Pellets			

Type 13X Molecular Sieves are available packaged in 55 gallon drums – contact Advanced Specialty Gas Equipment for price and availability.

# UOP Activated Aluminas\*

UOP Activated Alumina adsorbents are used in the drying and purification of gases and liquids in a wide range of industries. Because of the affinity of the alumina surface for water that provides the driving force for drying, UOP has developed products with optimal surface area and pore size distribution.



Spheres

## Type D-201 Activated Alumina

CAS No.      Al<sub>2</sub>O<sub>3</sub>—1344-28-1  
                 Na<sub>2</sub>O—1313-59-3  
                 SiO<sub>2</sub>—7631-86-9  
                 Fe<sub>2</sub>O<sub>3</sub>—1309-37-1

Activated Alumina Type D-201 is an abrasion resistant desiccant that has excellent adsorption and desorption characteristics. It is recommended for use in dehydration systems where the desiccant is subject to harsh mechanical conditions, and is especially suitable for heatless (pressure swing) air dryers. The Type D-201 is a spherical activated alumina with high surface area, high adsorption capacity and excellent abrasion resistance.

### For More Information

For additional information, see SAFETY DATA SHEET (SDS) for this material listed on the Advanced website; [www.asge-online.com](http://www.asge-online.com) or contact your Advanced representative.

\* Advanced Specialty Gas Equipment repackages and markets Type D-201 Activated Alumina manufactured by UOP.

### Typical Physical Properties

	5 x 8 Spheres
Surface Area (m <sup>2</sup> /gm)	350
Bulk Density (lb/ft <sup>3</sup> )	47
Crush Strength** (lbsf)	35
Abrasion Loss (wt-%)	0.2
Loss on Ignition (wt-%)	5.0

\*\* Crush strength varies with sphere diameter. It is reported for a 5-mesh (4.0 mm) sphere.

Table I

Screen Size	Opening (mm)
3	6.73
5	4.00
6	3.36
7	2.83
8	2.38
12	1.68

Part No.	Amount	Form	Part No.	Amount	Form
AA-2021	1 lb		AA-2011	1 lb	
AA-2022	1 lb-6 pk		AA-2012	1 lb-6 pk	
AA-2023	5 lb	7 x 12 Spheres*** (1/16" nominal)	AA-2013	5 lb	3 x 6 Spheres*** (3/16" nominal)
AA-2024	5 lb-4 pk		AA-2014	5 lb-4 pk	
AA-2025	25 lb		AA-2015	25 lb	
AA-2026	50 lb		AA-2016	50 lb	
AA-2001	1 lb				
AA-2002	1 lb-6 pk				
AA-2003	5 lb	5 x 8 Spheres*** (1/8" nominal)			
AA-2004	5 lb-4 pk				
AA-2005	25 lb				
AA-2006	50 lb				

Type D-201 Activated Alumina are available packaged in 55 gallon drums – contact Advanced Specialty Gas Equipment for price and availability.

\*\*\* The sizes of spheres are specified jointly by the screen sizes that the material will pass through and retained by. For example, an 5 x 8 product will pass through a 5 mesh screen, and be retained by a 8 mesh screen. Listed in Table I are the screen openings for some common screen sizes

# Gas Compatibility Data

The compatibility data\* shown on the following pages has been compiled to assist in evaluating the appropriate materials to use in handling various gases. It is extremely important that all gas control equipment be compatible with the gas being passed through it. The use of a device that is not compatible with the service gas may damage the unit and cause a leak that could result in property damage or personal injury. To reduce potentially dangerous situations, always check for compatibility of materials before using any gases in your gas control equipment.

Since combinations of gases are virtually unlimited, mixtures (except for Ethylene Oxide/Halocarbon and Ethylene Oxide/CO<sub>2</sub> sterilizing gas mixtures) are not listed in the Compatibility Chart. Before using a gas mixture or any gas not listed in the chart, we strongly urge you to contact your nearest Advanced Representative for information and assistance.

## Directions

To use this chart, proceed as follows:

1. Locate the gas you are using in the first column.
2. Compare the materials of construction for the equipment you intend to use with the "materials of construction" shown in the Compatibility Chart. Then use the "Key to Materials Compatibility" to determine compatibility.

## Key to Materials Compatibility

**S:** Satisfactory for use with the intended gas.

**U:** Unsatisfactory for use with the intended gas.

**I:** Insufficient data available to determine compatibility with the intended gas.

**D:** Suitability depends on condition of use.

**C1 thru C4:** Conditionally acceptable for use with the intended gas as follows:

**C1:** Satisfactory with brass having a low (65–70% maximum) copper content. Brass with higher copper content is unacceptable.

**C2:** Satisfactory with acetylene; however, cylinder acetylene is packaged dissolved in a solvent (generally acetone) which may be incompatible with these elastomers.

**C3:** Compatibility varies depending on specific Kalrez® compound used. Consult E.I. DuPont for information on specific applications.

**C4:** Satisfactory with brass, except where acetylene or acetylides are present.

\* This chart has been prepared for use with dry (anhydrous) gases at normal operating temperature of 70°F. Information may vary if different operating conditions exist. Systems and equipment used in oxidizer gas service (e.g., Oxygen or Nitrous Oxide) must be cleaned for oxidizer service.

## Important

This information is for experienced operators who know the general principles and the safety precautions to be observed in handling specialty gases and associated equipment. If you are not certain you fully understand these safety precautions, we urge you to obtain and read the applicable Safety Data Sheet (SDS) and Equipment Instruction Booklet.

The information contained in the Compatibility Chart has been compiled by Advanced from what it believes are authoritative sources and it is offered solely as a convenience to its customers. While Advanced believes that this information is accurate and factual as of the date of this publication, this information is intended to be used only as a guide in providing general information with respect to the products mentioned; and, therefore, it is not to be taken as a warranty or representation for which Advanced assumes legal responsibility.

Since the user's product formulation, specific use application, and conditions of use are all outside Advanced's control, Advanced makes no warranty or representation regarding the result which may be obtained by the user. It shall be the responsibility of the user to determine the suitability of the user's gas control equipment for use with the products mentioned.

# Gas Compatibility Chart

Common Name	Chemical Formula	Materials of Construction																
		Metals						Plastics					Elastomers					
		Brass	Stainless Steel	Aluminum	Zinc	Copper	MONEL®	PCTFE	PTFE	Tefzel®	Kynar®	PVC	Polycarbonate	Kalrez®	Viton®	Buna-N	Neoprene	Polyurethane
Acetylene	C <sub>2</sub> H <sub>2</sub>	C1	S	S	U	U	S	S	S	S	S	I	I	S	C2	C2	C2	C2
Air	—	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Allene	C <sub>3</sub> H <sub>4</sub>	S	S	S	I	U	S	S	S	S	S	I	I	S	S	S	S	I
Ammonia	NH <sub>3</sub>	U	S	S	U	U	S	S	S	S	U	S	U	C3	U	S	S	U
Argon	Ar	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Arsine	AsH <sub>3</sub>	S	S	I	I	S	S	S	S	S	S	S	I	S	S	S	S	U
Boron Trichloride	BCl <sub>3</sub>	D	S	I	I	D	S	S	S	S	I	S	I	C3	I	I	I	I
Boron Trifluoride	BF <sub>3</sub>	D	S	S	I	D	S	S	S	S	I	S	I	C3	I	I	I	I
1,3-Butadiene	C <sub>4</sub> H <sub>6</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	U	S	U
Butane	C <sub>4</sub> H <sub>10</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
1-Butene	C <sub>4</sub> H <sub>8</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Cis-2-Butene	C <sub>4</sub> H <sub>8</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Trans-2-Butene	C <sub>4</sub> H <sub>8</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Carbon Dioxide	CO <sub>2</sub>	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Carbon Monoxide	CO	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Carbonyl Sulfide	COS	S	S	S	I	S	S	S	S	S	S	S	I	I	S	I	I	I
Chlorine	Cl <sub>2</sub>	U	S	U	U	U	S	S	S	S	S	U	U	S	S	U	U	U
Deuterium	D <sub>2</sub>	S	S	S	S	S	S	S	S	S	S	S	I	S	S	S	S	S
Diborane	B <sub>2</sub> H <sub>6</sub>	S	S	S	I	S	S	S	S	S	I	I	I	S	I	I	I	I
Dichlorosilane	H <sub>2</sub> SiCl <sub>2</sub>	I	S	I	I	I	S	S	S	S	S	I	I	S	I	I	I	I
Dimethyl Ether	C <sub>2</sub> H <sub>6</sub> O	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	I
Ethane	C <sub>2</sub> H <sub>6</sub>	S	S	S	S	S	S	S	S	S	S	S	I	S	S	S	S	S
Ethyl Acetylene	C <sub>4</sub> H <sub>6</sub>	I	S	S	I	U	S	S	S	I	S	I	I	S	S	I	S	I
Ethyl Chloride	C <sub>2</sub> H <sub>5</sub> Cl	S	S	U	I	S	S	S	S	S	S	U	U	S	S	S	S	U
Ethylene	C <sub>2</sub> H <sub>4</sub>	S	S	S	S	S	S	S	S	S	S	I	I	S	S	S	S	I
Ethylene Oxide**	C <sub>2</sub> H <sub>4</sub> O	C4	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U

\*\* Satisfactory for use with EPR (Ethylene Propylene Rubber) and EPDM

# Gas Compatibility Chart (Continued)

Common Name	Chemical Formula	Materials of Construction																
		Metals						Plastics					Elastomers					
		Brass	Stainless Steel	Aluminum	Zinc	Copper	MONEL®	PCTFE	PTFE	Tefzel®	Kynar®	PVC	Polycarbonate	Kalrez®	Viton®	Buna-N	Neoprene	Polyurethane
Ethylene Oxide/Carbon Dioxide Mixtures**		C4	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U
Ethylene Oxide/Halocarbon Mixtures**		C4	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U
Ethylene Oxide/HCFC-124		C4	S	I	I	U	I	S	S	I	I	U	U	C3	U	U	U	U
Halocarbon 11	CCl <sub>3</sub> F	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	U	U
Halocarbon 12	CCl <sub>2</sub> F <sub>2</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 13	CClF <sub>3</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 13B1	CBF <sub>3</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 14	CF <sub>4</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 21	CHCl <sub>2</sub> F	S	S	D	I	S	S	S	S	S	S	U	U	C3	U	U	S	S
Halocarbon 22	CHClF <sub>2</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	U	U	S	U
Halocarbon 23	CHF <sub>3</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	I	I	I	S
Halocarbon 113	CCl <sub>2</sub> FCOIF <sub>2</sub>	S	S	D	U	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 114	C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 115	C <sub>2</sub> ClF <sub>5</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 116	C <sub>2</sub> F <sub>6</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	I	I	I	S
Halocarbon 142B	C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	U	S	S	S
Halocarbon 152A	C <sub>2</sub> H <sub>4</sub> F <sub>2</sub>	S	S	D	I	S	S	S	S	S	S	U	U	C3	U	S	S	S
Halocarbon C-318	C <sub>4</sub> F <sub>8</sub>	S	S	D	I	I	S	S	S	S	S	U	U	C3	S	S	S	S
Halocarbon 502	CHClF <sub>2</sub> /CClF <sub>2</sub> -CF <sub>3</sub>	I	S	D	I	I	S	S	S	I	S	U	U	C3	S	S	S	S
Halocarbon 1132A	C <sub>2</sub> H <sub>2</sub> F <sub>2</sub>	S	S	D	I	S	S	I	S	S	S	U	U	C3	I	I	I	S
Helium	He	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Hydrogen	H <sub>2</sub>	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Hydrogen Chloride	HCl	U	S	I	U	U	S	S	S	S	S	S	S	U	S	S	U	U
Hydrogen Sulfide	H <sub>2</sub> S	U	S	S	I	I	S	S	S	S	S	S	S	S	U	S	S	S
Isobutane	C <sub>4</sub> H <sub>10</sub>	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S
Isobutylene	C <sub>4</sub> H <sub>8</sub>	S	S	S	I	S	S	S	S	S	S	S	I	S	S	S	S	I

\*\* Satisfactory for use with EPR (Ethylene Propylene Rubber) and EPDM

# Gas Compatibility Chart (Continued)

Common Name	Chemical Formula	Materials of Construction															
		Metals						Plastics					Elastomers				
		Brass	Stainless Steel	Aluminum	Zinc	Copper	MONEL®	PCTFE	PTFE	Tefzel®	Kynar®	PVC	Polycarbonate	Kalrez®	Viton®	Buna-N	Neoprene
Isopentane	C <sub>5</sub> H <sub>12</sub>	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S
Krypton	Kr	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Methane	CH <sub>4</sub>	S	S	S	S	S	S	S	S	S	S	I	S	S	S	S	S
Methyl Chloride	CH <sub>3</sub> Cl	S	S	U	U	S	S	S	S	S	S	I	I	S	S	U	U
Methyl Mercaptan	CH <sub>3</sub> SH	S	S	U	I	U	U	S	S	S	I	I	I	S	I	I	S
Neon	Ne	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Nitric Oxide	NO	U	S	S	I	S	S	S	S	S	I	S	I	S	I	I	S
Nitrogen	N <sub>2</sub>	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Nitrogen Dioxide	NO <sub>2</sub>	I	S	S	I	I	I	S	S	I	I	U	I	S	U	U	U
Nitrous Oxide	N <sub>2</sub> O	S	D	D	S	S	S	S	S	S	S	S	I	C3	S	S	S
Oxygen	O <sub>2</sub>	S	D	D	S	S	S	S	S	S	S	S	S	C3	D	D	D
Perfluoropropane	C <sub>3</sub> F <sub>8</sub>	S	S	S	I	S	S	S	S	S	I	I	I	I	S	S	I
Phosphine	PH <sub>3</sub>	I	S	S	I	I	S	S	S	S	I	I	I	S	I	I	I
Phosphorous Pentafluoride	PF <sub>5</sub>	I	S	I	I	I	S	S	S	S	I	I	I	I	I	I	I
Propane	C <sub>3</sub> H <sub>8</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S
Propylene	C <sub>3</sub> H <sub>6</sub>	S	S	S	S	S	S	S	S	S	S	S	U	S	S	U	U
Propylene Oxide	C <sub>3</sub> H <sub>6</sub> O	I	S	I	I	I	I	S	S	S	I	U	S	C3	U	U	U
Refrigerant Gases	—	See Halocarbons															
Silane	SiH <sub>4</sub>	S	S	S	I	S	S	S	S	S	S	S	I	S	S	S	S
Silicon Tetrachloride	SiCl <sub>4</sub>	I	S	U	I	I	S	S	S	I	I	U	I	C3	I	I	I
Silicon Tetrafluoride	SiF <sub>4</sub>	I	S	U	I	U	S	S	S	S	S	S	I	C3	I	I	I
Sulfur Dioxide	SO <sub>2</sub>	U	S	S	U	U	S	S	S	S	S	S	U	S	S	U	U
Sulfur Hexafluoride	SF <sub>6</sub>	S	S	S	I	S	S	S	S	S	S	S	I	C3	S	S	S
Trichlorosilane	HSiCl <sub>3</sub>	I	S	U	I	I	S	S	S	I	I	U	I	C3	I	I	I
Vinyl Methyl Ether	C <sub>3</sub> H <sub>6</sub> O	S	S	S	I	U	S	S	S	S	I	I	U	C3	I	I	I
Xenon	Xe	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

# Conversion Factors

## Density

To Obtain

	gms/cm <sup>3</sup>	kg/m <sup>3</sup>	lbs/ft <sup>3</sup>	lbs/in <sup>3</sup>	lbs/U.S. gal
<b>Multiply</b>					<b>By</b>
gms/cm <sup>3</sup>	—	1000	62.428	0.0361273	8.3454
kg/m <sup>3</sup>	0.001	—	0.062428	$3.61273 \times 10^{-5}$	0.0083454
lbs/ft <sup>3</sup>	0.0160185	16.018463	—	$5.78704 \times 10^{-4}$	0.13368
lbs/in <sup>3</sup>	27.679905	27,679.9	1728	—	231
lbs/U.S. gal	0.1198264	119.8264	7.4805195	0.004329	—

## Flow

To Obtain

	cm <sup>3</sup> /min (ml/min)	cm <sup>3</sup> /sec (ml/sec)	ft <sup>3</sup> /hr	ft <sup>3</sup> /min	m <sup>3</sup> /hr	m <sup>3</sup> /min	L/hr	Lpm
<b>Multiply</b>								
cm <sup>3</sup> /min (ml/min)	—	0.0166667	0.0021189	0.0000353	0.00006	0.000001	0.06	0.001
cm <sup>3</sup> /sec (ml/sec)	60	—	0.1271340	0.0021189	0.0036	0.00006	3.6	0.06
ft <sup>3</sup> /hr	471.9474	7.865790	—	0.0166667	0.0283168	0.0004719	28.31685	0.4719474
ft <sup>3</sup> /min	28,316.85	471.9474	60	—	1.699008	0.0283168	1699.008	28.31685
m <sup>3</sup> /hr	16,666.67	277.7778	35.31467	0.5885777	—	0.0166667	1000	16.66667
m <sup>3</sup> /min	1,000,000	16,666.67	2118.876	35.31467	60	—	60,000	1000
L/hr	16.66667	0.2777778	0.0353147	0.0005885	0.001	0.0000167	—	0.0166667
Lpm	1000	16.66667	2.118876	0.0353147	0.06	0.001	60	—

## Length

To Obtain

	Å	cm	ft	in	m	micron	mm	yd
<b>Multiply</b>								
Å	—	$1 \times 10^{-8}$	$3.2808399 \times 10^{-10}$	$3.937008 \times 10^{-9}$	$1 \times 10^{-10}$	0.0001	0.0000001	$1.0936133 \times 10^{-10}$
cm	$1 \times 108$	—	0.0328084	0.3937008	0.01	10,000	10	0.0109361
ft	$3.048 \times 10^9$	30.48	—	12	0.3048	304,800	304.8	0.3333333
in	$2.54 \times 10^8$	2.54	0.0833333	—	0.0254	25,400	25.4	0.0277778
m	$1 \times 10^{10}$	100	3.2808399	39.3700787	—	1,000,000	1000	1.0936133
micron	10,000	0.0001	$3.2808399 \times 10^{-6}$	$3.9370079 \times 10^{-5}$	0.0000010	—	0.001	$1.0936133 \times 10^{-6}$
mm	10,000,000	0.1	0.00328084	0.03937008	0.001	1,000	—	0.0010936
yd	$9.144 \times 10^9$	91.44	3	36	0.9144	914,400	914.4	—

## Pressure

To Obtain

	atm	bars	ft of H <sub>2</sub> O at 60°F	in of Hg at 0°C	in of H <sub>2</sub> O at 60°F	kg/cm <sup>2</sup>	kpa	mm of Hg @ 0°C (torr)	psi
<b>Multiply</b>					<b>By</b>				
atm	—	1.01325	33.932	29.921	407.1827	1.0332	101.3171	760	14.696
bars	0.98692	—	33.4883	29.530	401.8596	1.019716	100	750.062	14.50368
ft of H <sub>2</sub> O at 60°F	0.02947	0.029891	—	0.882646	12	0.03048	2.9890	22.4198	0.433107
in of Hg at 0°C	0.03342	0.033864	1.1340	—	13.6	0.034532	3.376895	25.4	0.49115
in of H <sub>2</sub> O at 60°F	0.00246	0.002499	0.083333	0.073556	—	0.00254	0.249089	1.86832	0.03609
kg/cm <sup>2</sup>	0.96787	0.980665	32.8084	28.95903	393.7008	—	98.03922	735.5592	14.22334
kpa	0.00987	0.010	0.33456	0.29613	4.01472	0.01020	—	7.5006	0.14504
mm of Hg at 0°C (torr)	0.00132	0.001333	0.044603	0.03937	0.535240	0.001360	0.133322	—	0.019337
psi	0.06805	0.068948	2.3089	2.0360	27.70851	0.070307	6.89465	51.715	—

## Temperature

To Obtain

	°C	°F	°K	°R
<b>Multiply</b>				
°C + 17.78	—	1.8	—	—
°C + 273.16	—	—	1	—
°F - 32	5/9	—	—	—
°F + 459.72	—	—	—	1
°K - 273.16	1	—	—	—
°R - 459.72	—	1	—	—

## Volume

To Obtain

	cm <sup>3</sup> *	ft <sup>3</sup>	in <sup>3</sup>	m <sup>3</sup>	gal (U.S. liquid)	L
<b>Multiply</b>					<b>By</b>	
cm <sup>3</sup> *	—	0.00003531	0.0610237	0.000001	0.0002641	0.001
ft <sup>3</sup>	28,316.847	—	1728	0.02831685	7.480519	28.316847
in <sup>3</sup>	16.387064	0.0005787	—	0.00001637	0.0043290	0.0163871
m <sup>3</sup>	1,000,000	35.31467	61,023.74	—	264.172	1000
gal (U.S. liquid)	3785.412	0.13368056	231	0.00378541	—	3.785412
L	1000	0.03531467	61.02374	0.001	0.2641721	—

\* 1 cm<sup>3</sup> = 1 ml

# Conversion Factors

## Weight

	To Obtain					
	gms	kg	mg	oz*	lbs*	tons (short, U.S.)
<b>Multiply</b>		<b>By</b>				
gms	—	0.001	1000	0.0352740	0.0022046	1.102 x 10 <sup>-6</sup>
kg	1000	—	1,000,000	35.273962	2.2046226	0.0011023
mg	0.001	0.000001	—	3.5274 x 10 <sup>-5</sup>	2.2046 x 10 <sup>-6</sup>	1.102 x 10 <sup>-9</sup>
oz*	28.34952	0.0283495	28,349.5	—	0.0625	3.125 x 10 <sup>-5</sup>
lbs*	453.59237	0.4535924	453,592	16	—	0.0005
tons (short, U.S.)	907,185	907.18474	9.07185 x 10 <sup>8</sup>	32,000	2000	—

\* avoirdupois

## Concentration

Concentration	Equivalent
1,000,000 ppm	100%
100,000 ppm	10.0%
10,000 ppm	1.0%
1,000 ppm	0.1%
100 ppm	0.01%
10 ppm	0.001%
1 ppm	0.0001%
1,000 ppb	1 ppm
100 ppb	0.1 ppm
10 ppb	0.01 ppm
1 ppb	0.001 ppm

## Exponential Equivalents

Scientific Notation	Equivalent	Scientific Notation	Equivalent
1 x 10 <sup>10</sup>	10,000,000,000	1 x 10 <sup>-1</sup>	0.1
1 x 10 <sup>9</sup>	1,000,000,000	1 x 10 <sup>-2</sup>	0.01
1 x 10 <sup>8</sup>	100,000,000	1 x 10 <sup>-3</sup>	0.001
1 x 10 <sup>7</sup>	10,000,000	1 x 10 <sup>-4</sup>	0.0001
1 x 10 <sup>6</sup>	1,000,000	1 x 10 <sup>-5</sup>	0.00001
1 x 10 <sup>5</sup>	100,000	1 x 10 <sup>-6</sup>	0.000001
1 x 10 <sup>4</sup>	10,000	1 x 10 <sup>-7</sup>	0.0000001
1 x 10 <sup>3</sup>	1,000	1 x 10 <sup>-8</sup>	0.00000001
1 x 10 <sup>2</sup>	100	1 x 10 <sup>-9</sup>	0.000000001
1 x 10 <sup>1</sup>	10	1 x 10 <sup>-10</sup>	0.0000000001

## Miscellaneous Physical Constants

Numerical Constant	Value	Units
Avogadro's Number	6.022045 x 10 <sup>23</sup>	Molecules/grm-mole
Gas-Law Constant R	1.98719	cal/(gm-mole)(°K)
	1.98719	Btu/(lb-mole)(°R)
	82.0568	(cm <sup>3</sup> )(atm)/(gm-mole)(°K)
	0.0820568	(liter)(atm)/(gm-mole)(°K)
	10.7314	(ft <sup>3</sup> )(lb)/(in <sup>2</sup> )(lb-mole)(°R)
	0.730228	(ft <sup>3</sup> )(atm)/(lb-mole)(°R)

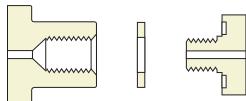
# Moisture Conversion Table

Dew Point °C	°F	Vapor Pressure (Water/Ice in Equilibrium) mm of Mercury	PPM on Volume Basis at 760 mm of Hg Pressure	Relative Humidity @ 70°F	PPM on Weight Basis in Air
-90	-130	0.00007	0.0921	0.00037	0.057
-88	-126	0.00010	0.132	0.00054	0.082
-86	-123	0.00014	0.184	0.00075	0.11
-84	-119	0.00020	0.263	0.00107	0.16
-82	-116	0.00029	0.382	0.00155	0.24
-80	-112	0.00040	0.562	0.00214	0.33
-78	-108	0.00056	0.737	0.00300	0.46
-76	-105	0.00077	1.01	0.00410	0.63
-74	-101	0.00105	1.38	0.00559	0.86
-72	-98	0.00143	1.88	0.00762	1.17
-70	-94	0.00194	2.55	0.0104	1.58
-68	-90	0.00261	3.43	0.0140	2.13
-66	-87	0.00349	4.59	0.0187	2.84
-64	-83	0.00464	6.11	0.0248	3.79
-62	-80	0.00614	8.08	0.0328	5.01
-60	-76	0.00808	10.6	0.0430	6.59
-58	-72	0.0106	13.9	0.0565	8.63
-56	-69	0.0138	18.2	0.0735	11.3
-54	-65	0.0178	23.4	0.0948	14.5
-52	-62	0.0230	30.3	0.123	18.8
-50	-58	0.0295	38.8	0.137	24.1
-48	-54	0.0378	49.7	0.202	30.9
-46	-51	0.0481	63.3	0.257	39.3
-44	-47	0.0609	80	0.325	49.7
-42	-44	0.0768	101	0.410	62.7
-40	-40	0.0966	127	0.516	78.9
-38	-36	0.1209	159	0.644	98.6
-36	-33	0.1307	198	0.804	122.9
-34	-29	0.1873	246	1.00	152
-32	-26	0.2318	305	1.24	189
-30	-22	0.2859	376	1.52	234
-28	-18	0.351	462	1.88	287
-26	-15	0.430	566	2.3	351
-24	-11	0.526	692	2.81	430
-22	-8	0.640	842	3.41	523
-20	-4	0.776	1020	4.13	633
-18	0	0.939	1240	5.00	770
-16	3	1.132	1490	6.03	925
-14	7	1.361	1790	7.25	1110
-12	10	1.632	2150	8.69	1335
-10	14	1.950	2570	10.4	1596
-8	18	2.326	3060	12.4	1900
-6	21	2.765	3640	14.7	2260
-4	25	3.280	4320	17.5	2680
-2	28	3.880	5100	20.7	3170
0	32	4.579	6020	24.4	3640
2	36	5.294	6970	28.2	4330
4	39	6.101	8030	32.5	4990
6	43	7.013	9230	37.4	5730
8	46	8.045	10590	42.9	6580
10	50	9.029	12120	49.1	7530
12	54	10.52	13840	56.1	8600
14	57	11.99	15780	63.9	9800
16	61	13.63	17930	72.6	11140
18	64	15.48	20370	82.5	12650
20	68	17.54	23080	93.5	14330

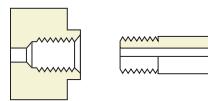
# Abbreviations and Symbols

Symbol	Definition	Symbol	Definition	Symbol	Definition
Å	angstrom(s)	in, ins	inch(es)	psid	pound(s)-force per square inch differential
ACGIH	American Conference of Governmental Industrial Hygienists	in <sup>3</sup>	cubic inch	psig	pound(s)-force per square inch gauge
ASTM	American Society for Testing Materials	kg	kilogram(s)	scc	standard cubic centimeters
atm	atmosphere(s)	kpa	kilopascal(s)	sccm	standard cubic centimeters per minute
avg	average	lb, lbs	pound(s)	sccs	standard cubic centimeters per second
Btu	British thermal unit(s)	L	liter(s)	scfh	standard cubic feet per hour
cal	calorie(s)	Lpm	liters per minute	scfm	standard cubic feet per minute
CAS	Chemical Abstract Services	m	meter(s)	scfs	standard cubic feet per second
cc	cubic centimeters	m <sup>3</sup>	cubic meter(s)	sec	second(s)
ccm	cubic centimeters per minute	mA	milliampere	sl	standard liters
CGA	Compressed Gas Association	max	maximum	slpm	standard liters per minute
cm	centimeter	mg	milligram(s)	sp. gr.	specific gravity
cm <sup>2</sup>	square centimeter	min	minute(s)	sp. vol.	specific volume
cm <sup>3</sup>	cubic centimeter	ml, mL	milliliter(s)	SS, Str. Stl.	Stainless Steel
CP	Chemically Pure	mLpm	milliliters per minute	STEL	Short Term Exposure Limit
Cp	specific heat at constant pressure	mm	millimeter(s)	STP	Standard Temperature and Pressure
CSA	Canadian Standards Association	mol. wt.	molecular weight	Temp.	Temperature
Cv	coefficient of flow	MOS	Metal Oxide Semiconductor	THC	Total Hydrocarbon Content
°C	degree(s) Centigrade	N/A	not applicable	TLV	Threshold Limit Value
°F	degree(s) Fahrenheit	nbp	normal boiling point	tp	triple point
°K	degree(s) Kelvin	NER	normal evaporation rate	TWA	Time Weighted Average
°R	degree(s) Rankin	NF	National Formulary	UHP	Ultra-High Purity
ea	each	NIST	National Institute of Standards and Technology	UN	United Nations
EPA	Environmental Protection Agency	No	number	USP	United States Pharmacopoeia
EPDM	Ethylene-Propylene Terpolymer	nom	nominal	VAC	volts alternating current
EPR	Ethylen Propylene Rubber	NOS	not otherwise specified	VDC	volts direct current
ft	foot, feet	NPT	national pipe thread	wt%	weight percent (percent by weight)
ft <sup>3</sup>	cubic foot (feet)	NTP	normal temperature and pressure	wt. ppm	weight parts per million
gal	gallon(s)	OD	outside diameter	yd	yard(s)
gms	gram(s)	OSHA	Occupational Safety and Health Administration	>	greater than
HCFC-124	Hydrochlorofluorocarbon	oz	ounce(s)	<	less than
hr	hour	PCTFE	PolyChloroTrifluoroEthylene	≥	greater than or equal to
Hz	hertz	ppb	part(s) per billion	≤	less than or equal to
ID	identification	ppm	part(s) per million		
ID	inside diameter	psi	pound(s) – force per square inch		
		psia	pound(s)-force per square inch absolute		

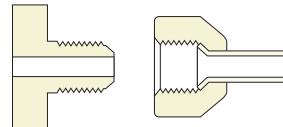
# CGA Connection Standards



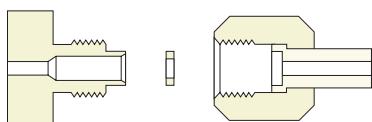
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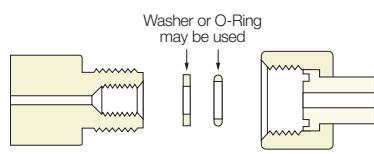
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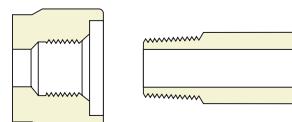
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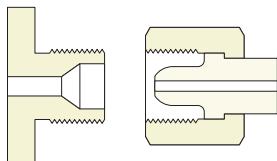
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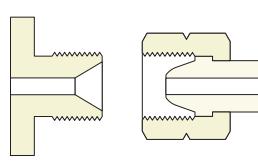
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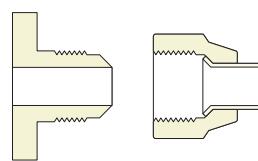
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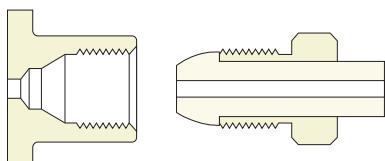
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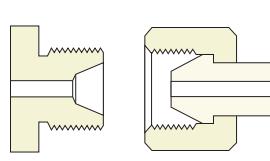
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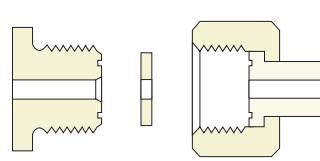
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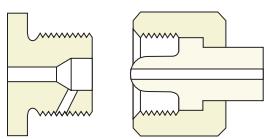
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.803-14UNS-2B-RH-INT



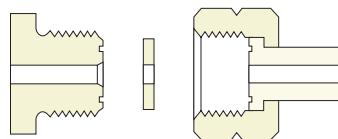
**CGA 300**  
.825-14NGO-RH-EXT (Conical Nipple)



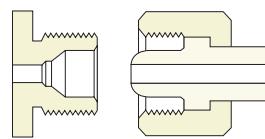
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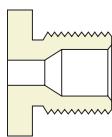
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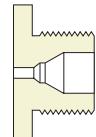
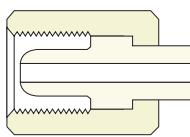
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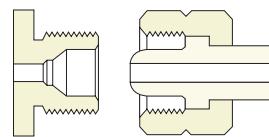
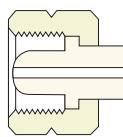
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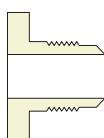
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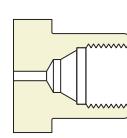
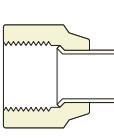
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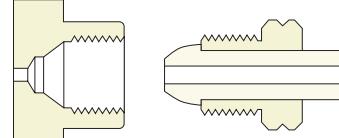
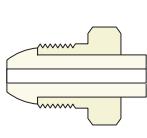
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.850-14 NGO-LH-EXT (Round Nipple)



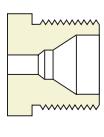
**CGA 440**  
.875-14UNF-2A-RH-EXT (5/8" SAE Flare)



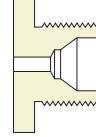
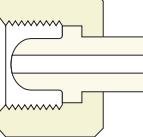
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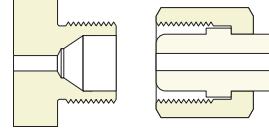
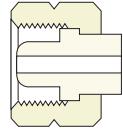
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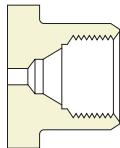
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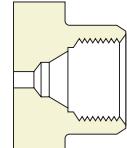
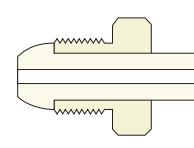
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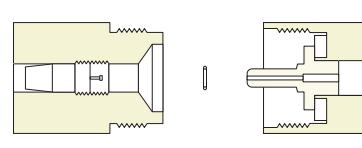
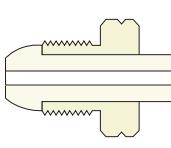
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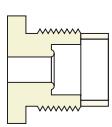
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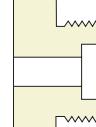
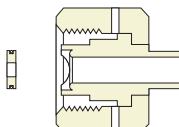
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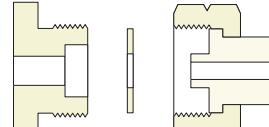
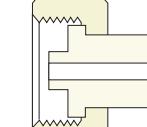
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1.000-20 UNEF-RH-EXT



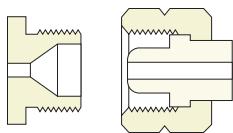
**CGA 630-640 Series** (Basic Diameter)  
1.030-14NGO-RH-EXT



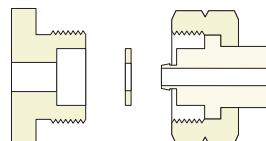
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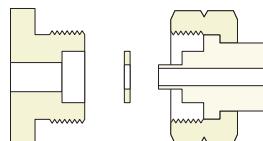
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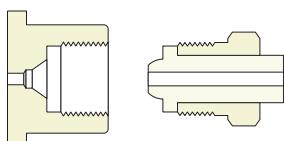
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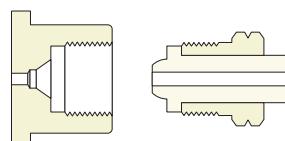
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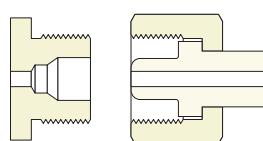
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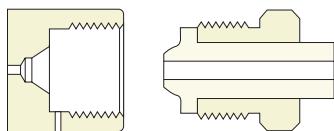
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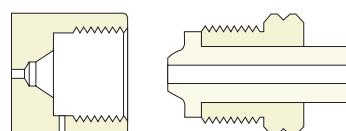
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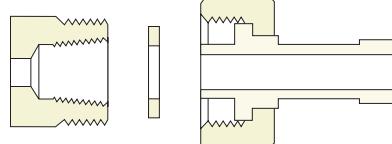
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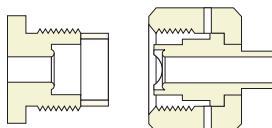
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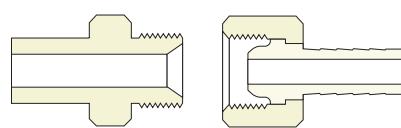
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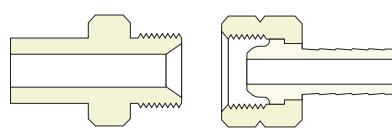
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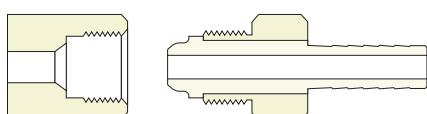
**CGA 710-720 Series** (Basic Diameter)  
1.125-14NGO-RH-EXT



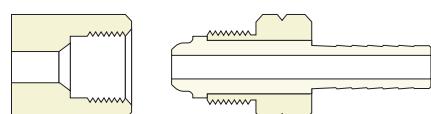
**CGA 024**  
.875-14UNF-2B-RH



**CGA 025**  
.875-14UNF-2B-LH



**CGA 034**  
.875-14UNF-2A-RH



**CGA 035**  
.875-14UNF-2A-LH

# Glossary of Terms

**Accuracy**— The degree of agreement of a measured value with the true or expected value of the quantity of concern.

**Adsorption**— Adherence of the atoms, ions or molecules of a gas or liquid to the surface of another substance, called the adsorbent. Molecular Sieves are adsorbents.

**American Conference of Governmental Industrial Hygienists (ACGIH)**— This Conference is a professional society, not an official Government Agency. It is an organization devoted to the development of administrative and technical aspects of worker protection.

**Anhydrous**— Descriptive of an inorganic compound that does not contain water.

**Attached Poppet (Tied-Seat; Tied-Diaphragm)**— A feature of certain regulators whereby the stem (poppet) is physically attached to the diaphragm.

**Back Pressure Regulator**— A pressure regulator which controls upstream (inlet) pressure. Similar in function to a relief valve.

**Balanced Poppet (Balanced Valve; Balanced Stem)**— A valve which has been designed to be pressure balanced; hence the valve spring provides the shutoff force. Used essentially to reduce or minimize decaying inlet pressure effect.

**Bonnet (Spring Housing)**— The part of a regulator which houses the control spring.

**Bourdon Tube**— A curved metal tube, sealed at one end, which flexes to a known degree when pressurized internally.

**Brass**— Copper/Zinc alloys of varying composition. Some brass also contains low percentages of other elements such as manganese, aluminum, silicon, lead and tin.

**Bursting Disk (Frangible Disk)**— A metal disk which is part of a safety device, and which is intended to burst and allow gas to escape within predetermined pressure limits to prevent rupture of the device it is installed on. Similar in function to a safety relief valve, except it has no reseat capability.

**Burst Pressure**— A design test pressure which allows for permanent deformation and leakage, but parts must remain assembled (i.e. no sudden ruptures). Normal industry standard is 3–4 times (300–400%) of maximum operating pressure. See also “PROOF PRESSURE” and “MAXIMUM OPERATING PRESSURE.”

**Calibration**— Comparison of a measurement standard or instrument with another standard or instrument to report or eliminate by adjustment any variation (deviation) in the accuracy of the item being compared.

**CGA Number**— Cylinder/container valve outlet connection number assigned by the Compressed Gas Association. CGA numbers are detailed in CGA Standard V-1.

**Chemical Abstract Service (CAS)**— CAS numbers represent chemical substances recorded in the CAS Chemical Registry System. This numbering system identifies chemical substances by an unambiguous computer language description of its molecular structure, including all stereochemical detail.

The CAS number, which has no chemical significance, is simply a number assigned in sequential order to each substance as it enters the Registry System. All specific substances reported in the world's scientific and technical literature and indexed in Chemical Abstracts (CA) since 1965 (when the Registry System began) are included in this master file.

**Coefficient of Flow (Cv)**— Defined as the actual flow performance in U.S. gallons of water per minute at 60°F when inlet pressure (P1) is 1 psig and outlet pressure (P2) is atmospheric (14.7 psia).

**Compressed Gas Association, Inc. (CGA)**— This is a nonprofit technical association whose membership includes many corporations active in all phases of the compressed gas industries. Founded in 1913, the CGA uses experience and knowledge of its members to promote industry wide standards and procedures for safety in the manufacture, storage, transport and use of compressed gases.

**Corrosive**— The ability of a chemical compound to attack and produce irreversible damage to human tissues, such as eyes, skin or mucous membranes. Also, the ability of a chemical compound to attack and eat away rubber, metal and other substances.

**Cracking Pressure**— A term used in back pressure control only (e.g. back pressure regulators, relief valves), for determining the inlet pressure at which flow starts.

**Creep**— Any increase in outlet pressure of a pressure regulator subsequent to lockup. Usually seen as a long term slow pressure increase. This generally indicates a seat leak which is an abnormal condition.

**Cryogenic**— Refers to the field of low temperatures, usually -130°F or below as defined by 173.300(f) of Title 49 of the Code of Federal Regulations.

**Cryogenic Liquid Container**— An insulated container designed to store, handle and transport liquids having boiling points below -130°.

**Cylinder**— A container designed to hold compressed gases or liquefied compressed gases. Cylinders are manufactured and tested according to DOT specifications.

**Dehydration**— Removal of one or more molecules of water from a chemical compound.

**Delivery Pressure**— See “OUTLET PRESSURE”.

**Density**— The ratio of the amount of anything per unit volume; e.g., mass of any substance per unit volume at any definite temperature. It is usually expressed in pounds per cubic foot (lbs/ft<sup>3</sup>). See also “SPECIFIC GRAVITY”.

**Dew Point**— The temperature at which the liquefaction of vapor begins; the term is usually applied to condensation of moisture from the water vapor in the atmosphere.

**Droop**— The decrease in outlet pressure of a pressure regulator which results from an increase in flow rate. Essentially the reverse of lockup. Also see “LOCKUP”.

**Environmental Protection Agency (EPA)**— This is a governmental agency that establishes environmental standards within the United States.

**EPA Hazard Categories**– The Hazard categories used throughout this catalog as defined under EPA SARA Title III and 1910.1200 of Title 29 of the Code of Federal Regulations are as follows:

“Immediate (Acute) Health Hazard” including highly toxic, corrosive, toxic, irritant, sensitizer, and other hazardous chemicals which cause an adverse effect to a target organ which manifests itself within a short period of time following a one-time, high exposure to the substance.

“Delayed (Chronic) Health Hazard” including carcinogens and other hazardous chemicals which cause an adverse effect to a target organ which manifests itself after a long period of time following or during repeated contacts with the substance.

“Fire Hazard” including flammable, combustible pyrophoric, and oxidizer.

“Sudden Release of Pressure Hazard” including explosive and compressed gas.

“Reactive Hazard” including unstable reactive, organic peroxide, and water reactive.

**Exposure Limits**– Concentrations of substances (and conditions) under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effects. ACGIH limits are called TLV and OSHA exposure limits are called PEL. See “THRESHOLD LIMIT VALUE”.

**Flow Capacity**– The maximum flow capacity of a control device established at a specific set of conditions.

**Fluid**– Any material or substance that changes shape uniformly in response to an external force imposed upon it. The term applies to liquids, gases and finely divided solids.

**Hydration**– The reaction of molecules of water with a substance in which the H-OH bond is not split.

**Inlet Pressure (P1; Supply Pressure; Upstream Pressure)**– The pressure of the fluid to the supply connection of a control element.

**Lockup**– The increase in outlet pressure of a pressure regulator that occurs when flow is stopped. Essentially the reverse of droop. Also see “DROOP”.

**Manifold**– A series of connectors to a common outlet allowing several cylinders to be used simultaneously.

**Maximum Operating Pressure**– The maximum allowable use pressure for which a system is designed. Also referred to as “working pressure”.

**Mixture**– Any combination of two or more chemicals if the combination is not, in whole or part, the result of a chemical reaction.

**Mole**– The weight of a substance equal numerically to its molecular weight. A gram-mole is the weight in grams equal to the molecular weight; a pound-mole is the weight in pounds equal to the molecular weight.

**Molecular Weight**– The sum of the atomic weights of all the constituent atoms in the molecule of an element or a compound.

**Normal Temperature and Pressure (NTP)**– A gas industry reference base. Normal temperature is 70°F. Normal pressure is one atmosphere or 14.696 psia.

**Outlet Pressure (P2; Delivery Pressure; Downstream Pressure)**– The pressure of the fluid from the discharge connection of a control element.

**Polar**– Descriptive of a molecule in which the positive and negative electrical charges are permanently separated, as opposed to non-polar molecules in which the charges coincide. Polar molecules ionize in solution and impart electrical conductivity.

**Proof Pressure**– A test pressure applied to control devices to verify structural integrity. No deformation or excessive leakage is permitted at this pressure and control element must function normally subsequent to this test. Normal industry standard is 1.5 times (150%) of working pressure. See also “BURSTING PRESSURE” and “MAXIMUM OPERATING PRESSURE”.

**Relief Valve**– A type of pressure relief device which is designed to relieve excessive pressure, and to reclose and reseal to prevent further flow of gas from the cylinder after reseating pressure has been achieved.

**Self-Relieving (Self-Venting)**– A feature incorporated in certain pressure reducing regulators which enables the unit to relieve the outlet pressure when adjusted in the decrease direction.

**Specific Gravity (Sp. Gr.)**– The ratio of the weight of one substance compared to the weight of an equal volume of another substance which is used as a standard. Usually gases are compared to air (air=1) while liquids and solids are compared to water ( $H_2O=1$ ).

**Specific Volume (Sp. Vol.)**– Volume occupied by a unit mass of a substance at a given temperature. It is usually expressed in cubic feet per pound or gallons per pound.

**Spring Housing**– See “BONNET”.

**Stainless Steel**– Alloy steels containing high percentages of chromium, from less than 10% to more than 25%.

**Standard Temperature and Pressure (STP)**– An internationally accepted reference base. Standard temperature is 0°C. Standard pressure is one atmosphere or 14.6960 psia.

**Tare Weight**– The weight of an empty cylinder without cap and valve.

**Threshold Limit Value (TLV)**– TLVs are measures of toxicity established by ACGIH. The TLV of a substance refers, in general, to airborne concentrations at or below which nearly all workers may be repeatedly exposed without adverse effect.

**Threshold Limit Value-Time Weighted Average (TLV-TWA)**– Refers to the time-weighted average concentration for a normal 8 hour workday and a 40 hour workweek to which nearly all worker may be repeatedly exposed, day after day, without adverse effect.

**Tied-Diaphragm**– See “ATTACHED POPPET”.

**Tied-Seat**– See “ATTACHED POPPET”.

**Upstream Pressure**– See “INLET PRESSURE”.

**Vapor Pressure**– The pressure characteristic at any given temperature of a vapor in equilibrium with its liquid or solid form.

**Working Pressure**– See “MAXIMUM OPERATING PRESSURE”.

# Application Requirements

## Quote Request

Date \_\_\_\_\_

Contact \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Email \_\_\_\_\_

## Parameters

Describe Application \_\_\_\_\_  
\_\_\_\_\_

Gas Service \_\_\_\_\_

Gas Mixture \_\_\_\_\_

Cylinder Size \_\_\_\_\_

Cylinder Connection (CGA No.) \_\_\_\_\_

Gas Properties:  Purity (specify) \_\_\_\_\_ Flammable     Toxic     Corrosive     Oxidizer

Inlet Pressure, Maximum (psig) \_\_\_\_\_

Delivery Pressure (psig) \_\_\_\_\_

Operating Temperature (°F) \_\_\_\_\_

Connection Size (ie: 1/4", 1/2") \_\_\_\_\_

Connection Type (ie: NPT, compression) \_\_\_\_\_

 Control Flow     Measure FlowFlow Requirements:  Maximum (slpm, scfm) \_\_\_\_\_

Flow Range (flowmeters) \_\_\_\_\_

Required Accuracy (flowmeters) \_\_\_\_\_

## Product Selection

	Model or Part No.	Catalog Page No.	Notes
<input type="checkbox"/> Regulating Pressure	_____	_____	_____
<input type="checkbox"/> Measuring Pressure	_____	_____	_____
<input type="checkbox"/> Controlling Flow Rate	_____	_____	_____
<input type="checkbox"/> Venting & Scrubbing	_____	_____	_____
<input type="checkbox"/> Purging	_____	_____	_____
<input type="checkbox"/> Detecting Gases	_____	_____	_____
<input type="checkbox"/> Distributing Gases	_____	_____	_____
<input type="checkbox"/> Blending Gases	_____	_____	_____
<input type="checkbox"/> Filtering	_____	_____	_____
<input type="checkbox"/> Purifying	_____	_____	_____
<input type="checkbox"/> Adsorbent	_____	_____	_____

Please fax or mail this form to your local ASGE distributor.

# Warranty Information

Advanced Specialty Gas Equipment Corp., (the Company), warrants to the initial purchaser of the products described herein, that such equipment will be free from defects in material and workmanship which result in breakdown or failure under normal use during a period of 12 months from date of shipment by the Company if used and maintained according to Advanced Specialty Gas Equipment written instructions. This warranty does not cover damage or malfunction due to corrosion. Purchaser is aware that this equipment is designed for specific applications and that using this equipment for the wrong application may damage or corrode the unit and cause personal injury. If there is any doubt about application, consult your Advanced Specialty Gas Equipment Corp. distributor.

The Company's liability under this warranty shall be limited to the repair, or at its option, replacement or refund of the purchase price, of such equipment which proves to be defective, provided; however, that this warranty shall only apply if the purchaser (1) gives the Company written notice within (10) days after discovery of such defect, (2) immediately on discovery of the claimed defect, discontinues all use of such equipment, and (3) returns such equipment freight prepaid to plant of manufacture.

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