HARRIS SPECIALTY GAS EQUIPMENT CONDENSED CATALOG

The Harris Products Group, A Lincoln Electric company, is one of the largest independent manufacturers of pressure and flow control equipment in the world.

HARRIS SPECIALTY GAS Equipment

High Purity Pressure Regulator Selection

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

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

Materials Compatibility

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

Inlet Pressure Rating

Inlet pressures can range from low pressure in pipeline usage to high pressure from compressed gas cylinders. Regulators used in a pipeline will normally have only one gauge to indicate delivery pressure while a cylinder regulator will have two gauges; one to show inlet pressure and the other to show delivery pressure. An exception to this would be the use of regulators for liquid gas cylinders. In this application, only the delivery pressure gauge would be required since the supply pressure is generally constant. When selecting the regulator it must be capable of handling the incoming inlet pressure. When the gas is supplied from a cylinder the CGA (Compressed Gas Association) inlet connection number will dictate the maximum supply pressure. This pressure can range from 100 PSI to over 6000 PSI.

Delivery Pressure Range

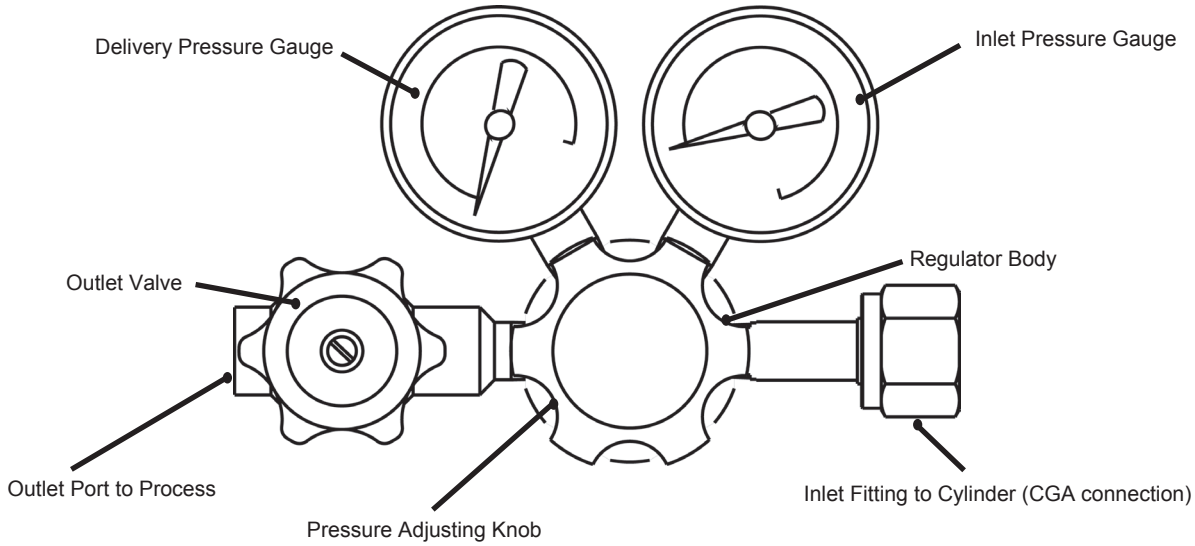
The desired working pressure for the operation may range from low pressure up to 15 PSIG to a much higher working pressure (7500-PSIG). The regulator selected must be able to supply the proper working pressure consistent with the requirements of the process.

Gas Purity

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

Pressure regulation, single-stage or two-stage design

All regulators are designed to reduce the inlet pressure to a desired working pressure. The regulator can reduce the pressure in either one step or two steps. A single-stage regulator reduces the pressure in one step and a



two-stage regulator reduces the pressure in two steps, either may be suitable for the application based on the desired pressure control. Single-Stage regulators are best suited for applications where manual periodic adjustment of the delivery pressure settings is not a problem and the inlet pressure remains constant, such as the case in gas withdrawal from liquid cylinders.

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

Operation of Pressure Regulators Single-Stage Regulators

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

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

Gas entering the delivery pressure chamber begins to build pressure and creates a counter-force (counter to the pressure adjusting spring) on the diaphragm. This pressure is indicated on the delivery pressure gauge attached to the delivery chamber. When pressure builds sufficiently to counteract the spring tension, it pushes the diaphragm away from the poppet allowing the regulator valve 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.

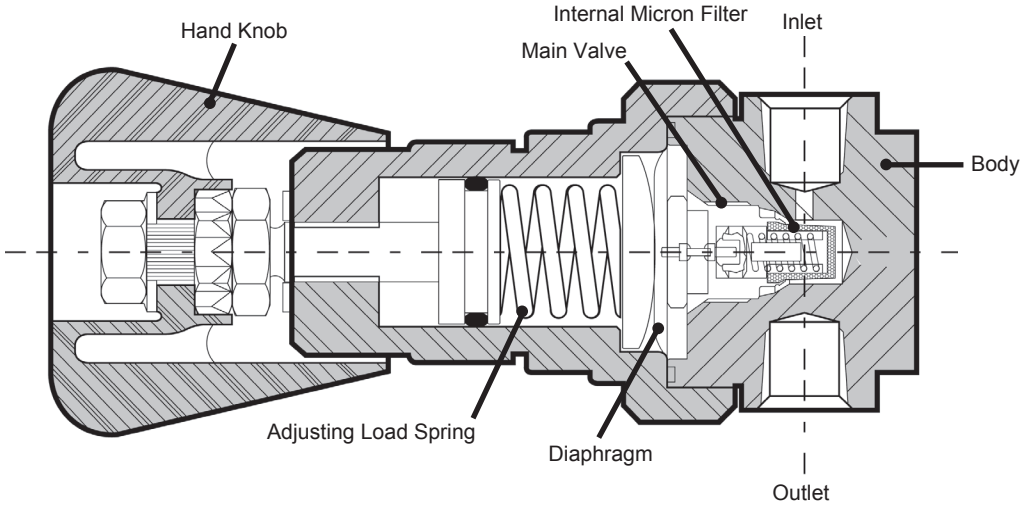
When gas from the delivery pressure chamber is sent to the end process, the resulting decrease in gas volume in the delivery chamber causes a pressure reduction in the chamber. When this occurs, the spring tension again causes the diaphragm to push the valve open, allowing additional gas to enter the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

Two-Stage Regulators

These regulators incorporate all components of a single-stage regulator. In addition, however, they also contain a second pressure adjusting spring, diaphragm, and valve seat assembly. The first stage is not user adjustable with the pressure adjusting spring “pre-compressed” at the factory. This allows the first stage to feed pressure to the second (adjustable) stage. The normal maximum delivery pressure for two-stage regulators is 500 PSI.

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

SINGLE STAGE REGULATOR



PURE GAS

Recommended Regulators for Pure Gas Service

Gas Service	Grade	Cylinder Pressure (psi)	CGA	Recommended Equipment
Acetylene (C2H2)	Atomic Absorption	250	510	HP717
	Commercial Grade, 98.0%		510	HP717
Air	Blended Air	3000	590	GP402
	CO2 Free	3000	590	HP702
	Compressed Air	3000	346	GP402
	Dry	3000	346/590 #	GP402
	High Pressure (4500 psig)	4500	347	HP8700
	High Pressure (6000 psig)	6000	702	HP8700
	Hydrocarbon Free	3000	346/590 #	HP702
	Ultra Pure Carrier 590 HPE 27	3000	590	HP722/HP722C
	Ultra Zero	3000	590	HP722/HP722C
	Vehicle Emission Zero	3000	590	HP702
	V.O.C. Free Air	3000	590	HP702
	Zero	3000	346/590 #	HP702
Allene (C3H4)		117	510	GP401
Ammonia (NH3)	Anhydrous	114	240/705	HP701EN
	Electronic		660	HP746 w/ Cross Purge
	Nitride		660	HP746 w/ Cross Purge
	Research		660	HP746 w/ Cross Purge
	Semiconductor		660	HP746 w/ Cross Purge
	Ultra High Purity		660	HP746 w/ Cross Purge
Argon (Ar)	High Pressure (4500 psig)	4500	680	HP8700
	High Pressure (6000 psig)	6000	677	HP8700
	High Purity	3000	580	HP702
	Prepurified	3000	580	HP702
	Research	3000	580	HP722/HP722C
	Semiconductor	3000	580	HP722/HP722C
	Sputtering	3000	580	HP722/HP722C
	Ultra High Purity	3000	580	HP722/HP722C
	Ultra Pure Carrier	3000	580	HP722/HP722C
	Zero	3000	580	HP722/HP722C
Arsine (AsH3)	Electronic	205	350	HP741
	ULSI Purity		350	HP741
Boron Trichloride (BCl3)	Chemically Pure	4.4	660	HP746 w/ Cross Purge
Boron Trifluoride (BF3)	Chemically Pure	800	330	HP746 w/ Cross Purge
1,3 Butadiene (C4H6)	Chemically Pure	21.4	510	GP401
	High Purity	21.4	510	HP701
	Instrument	21.4	510	HP701
	Research	21.4	510	HP7021 / HP721C
Butane (C4H10)		16		
n-Butane	Chemically Pure		510	GP401
	Research		510	HP701
	Instrument		510	GP401
1-Butene (1- C4H8)	Chemically Pure	23.5	510	GP401
	High Purity		510	HP701
	Instrument		510	HP721 / HP721C

Gas Service	Grade	Cylinder Pressure (psi)	CGA	Recommended Equipment
2-Butene (2-C4H8)	Chemically Pure	15	510	GP401
cis-2-Butene (C4H8)	Chemically Pure	15.2	510	HP701
trans-2-Butene (C4H8)	Chemically Pure	12.7	510	HP701
Carbon Dioxide (CO2)	Anaerobic	835	320	HP702
	Bone Dry	835	320	HP705
	Chemically Pure	835	320	HP705
	Instrument (Coleman)	835	320	HP705
	Pure Clean	835	320	HP722 / HP722C
	Research	835	320	HP722 / HP722C
	SFC	835	320	SFC/SFE Valve kit
	SFE	835	320	SFC/SFE Valve kit
Carbon Monoxide (CO)	Chemically Pure	1650	350	HP702
	Industrial	1650	350	HP702
	Research	1650	350	HP722 / HP722C
	Semiconductor	1650	350	HP722 / HP722C
	Ultra High Purity	1650	350	HP722 / HP722C
Carbonyl Sulfide (COS)		160	330	HP701EN
Chlorine (Cl2)	Electronic	85	660	HP746 w/ Cross Purge
	High Purity		660	HP746 w/ Cross Purge
	Ultra High Purity		660	HP746 w/ Cross Purge
Cyclopropane (C3H6)		75	510	GP401
Deuterium (D2)	Chemically Pure	Various	350	HP722 / HP722C
	Research	Various	350	HP722 / HP722C
Dichlorosilane (H2SiCl2)	Electronic	3.83	678	HP746 w/ Cross Purge
	Semiconductor Purity		678	HP746 w/ Cross Purge
Dimethylamine (C2H3)2NH		26		
			705	HP746 w/ Cross Purge
Dimethyl Ether (C2H6O)		8.4	510	GP401
Ethane (C2H6)	Chemically Pure	543	350	HP701
	Research		350	HP721/HP721C
	Technical		350	HP701
	Ultra High Purity		350	HP721/HP721C
Ethyl Chloride (C2H5Cl)	Chemically Pure	5.6	300	Manual Control Valve
Ethylene (C2H4)	Chemically Pure	1200	350	HP702
	Plant Growth		350	HP702
	Research		350	HP722/HP722C
	Ultra High Purity		350	HP722/HP722C
Ethylene Oxide (C2H4O)		6.5	510	Manual Control Valve
Halocarbon 12 (CCl2F2)		70	660	GP401
(Dichlorodifluoromethane)				
Halocarbon 13 (CClF3)		459	320/660 *	HP701
(Chlorotrifluoromethane)				
Halocarbon 13B1 (CBrF3)		189	320/660 *	GP401
(Bromotrifluoromethane)				
Halocarbon 14 (CF4)	Semiconductor		320/580 *	HP722/HP722C
(Tetrafluoromethane)	Ultra High Purity		320/580 *	HP722/HP722C

Gas Service	Grade	Cylinder Pressure (psi)	CGA	Recommended Equipment
Halocarbon 21 (CHCl2F)		8.4	660	Brass Manual Control Valve
(Dichlorofluoromethane)				
Halocarbon 22 (CHClF2)		123	660	GP401
(Chlorodifluoromethane)				
Halocarbon 23 (CHF3)	Electronic	635	660	HP721/HP721C
(Trifluoromethane)	Semiconductor		660	HP721/HP721C
	Technical		660	HP701
Halocarbon 114 (C2Cl2F4)		13	660	GP401
(1,2-Dichlorotetrafluoroethane)				
Halocarbon 115 (C2ClF5)		102	660	GP401
(Chloropentafluoroethane)				
Halocarbon 116 (C2F6)	Semiconductor	417	660	HP721/HP721C
(Hexafluoroethane)				
Halocarbon 142B (C2H3ClF2)		28	510	GP401
(1-Chloro-1,1-Difluoroethane)				
Halocarbon 152A (C2H4F2)		63	510	GP401
(1,1-Difluoroethane)				
Halocarbon -218 (C3F8)	Semiconductor	100	660	HP721/HP721C
(Perfluorpropane)				
Halocarbon C-318 (C4F8)		25	660	GP401
(Octafluorocyclobutane)				
Halocarbon 500		82.3	510/660 *	GP401
(73.8 wt.% Halocarbon 12				
26.2 wt.% Halocarbon 152A)				
Halocarbon 502		132	320/660 *	GP401
(48.8 wt.% Halocarbon 22				
51.2 wt.% Halocarbon 115)				
Halocarbon 503		613	320	GP401
(60 wt.% Halocarbon 23				
40 wt.% Halocarbon 13)				
Halocarbon 1113 (C2ClF3)		62	510	GP401
(Chlorotrifluoroethylene)				
Halocarbon 1132A (C2H2F2)		518	350	GP401
(1,1-Difluoroethylene)				
Halocarbon 1216 (C3F6)		85	660	HP721/HP721C
(Hexafluoropropylene)				
Helium (He)	Carrier Grade	3000	580	HP702
	Chromatographic	3000	580	HP722/HP722C
	High Pressure (4500 psig)	4500	680	HP8700
	High Pressure (6000 psig)	6000	677	HP8700
	High Purity	3000	580	HP722/HP722C
	Research	3000	580	HP722/HP722C
	Semiconductor	3000	580	HP722/HP722C
	Ultra High Purity	3000	580	HP722/HP722C
	Ultra Pure Carrier	3000	580	HP722/HP722C
	Zero	3000	580	HP722/HP722C
Hexafluoropropylene (C3F6)		85	660	HP702

Gas Service	Grade	Cylinder Pressure (psi)	CGA	Recommended Equipment
Hydrogen (H2)	Carrier Grade	3000	350	HP702
	Extra Dry	3000	350	HP702
	High Pressure (4500 psig)	4500	695	HP8700
	High Pressure (6000 psig)	6000	703	HP8700
	High Purity	3000	350	HP722/HP722C
	Prepurified	3000	350	HP722/HP722C
	Research	3000	350	HP722/HP722C
	Semiconductor	3000	350	HP722/HP722C
	Ultra High Purity	3000	350	HP722/HP722C
	Ultra Pure Carrier	3000	350	HP722/HP722C
	Zero	3000	350	HP722/HP722C
Hydrogen Bromide (HBr)		320	330	HP741
Hydrogen Chloride (HCl)	Electronic	611	330	HP746 w/ Cross Purge
	Research		330	HP746 w/ Cross Purge
	Technical		330	HP746 w/ Cross Purge
	Ultra High Purity		330	HP746 w/ Cross Purge
Hydrogen Selenide (H2Se)	Research	125	660	HP746 w/ Cross Purge
	Semiconductor		350	HP746 w/ Cross Purge
Hydrogen Sulfide (H2S)	Chemically Pure	247	330	HP741
	Research		330	HP741
	Technical		330	HP741
Isobutane (C4H10)	Chemically Pure	31	510	GP401
	Research		510	HP701
	Technical		510	GP401
Isobutylene (C4H8)	Chemically Pure	24	510	GP401
	Research		510	HP701
	Technical		510	GP401
Isopentane (C5H12)	Chemically Pure		510	Brass Manual Control Valve
Krypton (Kr)	Purified	220-1050	580	HP722 / HP722C
	Research		580	HP722 / HP722C
	Window		580	HP722 / HP722C
Methane (CH4)	Commercial	3000	350	GP402
	Chemically Pure	3000	350	HP702
	High Pressure (4500 psig)	4500	695	HP8700
	High Pressure (6000 psig)	6000	703	HP8700
	Instrument	3000	350	HP722/HP722C
	Research	3000	350	HP722/HP722C
	Technical	3000	350	HP722/HP722C
	Ultra High Purity	3000	350	HP722/HP722C
Methyl Bromide (CH3Br)		13	320/330 #	HP701
Methyl Chloride (CH3Cl)	Chemically Pure	59	510/660 #	HP701
Methyl Mercaptan (CH3SH)		15	330	HP741
Monomethylamine (CH3NH2)	Chemically Pure	30	705	HP746 w/ Cross Purge
Natural Gas		300	350	GP402
Neon (Ne)	Chemically Pure	Various	580	HP702
	High Purity	Various	580	HP722/HP722C
	Research	Various	580	HP722/HP722C

Gas Service	Grade	Cylinder Pressure (psi)	CGA	Recommended Equipment
Nitric Oxide (NO)	Chemically Pure	500	660	HP741 / HP742
Nitrogen (N2)	Continuous Emission Monitoring	3000	580	HP722/HP722C
	Extra Dry	3000	580	HP702
	High Pressure (4500 psig)	4500	680	HP8700
	High Pressure (6000 psig)	6000	677	HP8700
	High Purity	3000	580	HP722/HP722C
	Prepurified	3000	580	HP722/HP722C
	Research	3000	580	HP722/HP722C
	Semiconductor	3000	580	HP722/HP722C
	Ultra High Purity	3000	580	HP722/HP722C
	Ultra Pure Carrier	3000	580	HP722/HP722C
	Ultra Zero Ambient Monitoring Zero	3000	580	HP722/HP722C
	Vehicle Emission Zero	3000	580	HP722/HP722C
	VOC Free Nitrogen	3000	580	HP722/HP722C
	Zero	3000	580	HP722/HP722C
Nitrogen Dioxide (NO2)		0	660	Manual Control Valve
Nitrous Oxide (N2O)	Atomic Absorption	745	326	HP705
	Chemically Pure		326	HP705
	Electronic		326	HP721/HP721C
	High Purity		326	HP721/HP721C
	Industrial		326	HP702
	Research		326	HP721/HP721C
	Semiconductor		326	HP721/HP721C
	Technical		326	HP702
	Ultra High Purity		326	HP721/HP721C
Oxygen (O2)	Extra Dry	3000	540	HP702
	Hydrocarbon Free	3000	540	HP702
	Research	3000	540	HP722/HP722C
	Ultra High Purity	3000	540	HP722/HP722C
	Ultra Pure Carrier	3000	540	HP722/HP722C
	Ultra Zero	3000	540	HP722/HP722C
	Zero	3000	540	HP722/HP722C
Perfluoropropane (C3F8)	Semiconductor	100	660	HP701
Phosgene (COCl2)		11	660	Manual Control Valve
Phosphine (PH3)	Electronic	593	350	HP746 w/ Cross Purge
Phosphorous (PF5)		400	330/660 #	HP746 w/ Cross Purge
Propane (C3H8)		110		
	Chemically Pure		510	HP701
	Instrument		510	HP701
	Research		510	HP721/HP721C
Propylene (C3H6)	Chemically Pure	138	510	HP701
	Electronic		510	HP701
	Polymer Purity		510	HP701
	Research		510	HP721/HP721C

Gas Service	Grade	Cylinder Pressure (psi)	CGA	Recommended Equipment
Silane (SiH4)	Electronic	1250	350	HP746 w/ Cross Purge
	Semiconductor	1250	350	HP746 w/ Cross Purge
	Solar	1250	350	HP746 w/ Cross Purge
Silicon Tetrafluoride (SiF4)	Semiconductor	1000	330	HP741
Sulfur Dioxide (SO2)	Anhydrous	34	660	HP741
	Commercial		660	HP741
Sulfur Hexafluoride (SF6)	Commercial	298	590	HP701
	Chemically Pure		590	HP701
	Electronic		590	HP721/HP721C
	Intrument		590	HP701
	Technical		590	HP721/HP721C
Sulfur Tetrafluoride (SF4)	Technical	140	330	HP746 w/ Cross Purge
Trimethylamine (C3H3)3N	Chemically Pure	13	705	HP746 w/ Cross Purge
Vinyl Methyl Ether (C3H6O)		11	290	Manual Control Vlave
Xenon (Xe)	Propulsion	800	580	HP722/HP722C
	Purified	800	580	HP722/HP722C
	Research	800	580	HP722/HP722C
# CGA connection may vary upon cyinder size or gas manufacturer - check with your gas supplier to determine the CGA connection.				

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1.800.733.4043 OPTION 2

MIXTURES

Recommended Regulators for Mixtures

Minor Component Balance Gas	CGA Connection Number	Equipment Recommendations
Acetaldehyde		
In Helium	350	HP742
In Nitrogen	350	HP742
Acrylonitrile		
In Helium	350	HP742
In Nitrogen	350	HP742
Ammonia		
In Air	590/660/705 *	HP742
In Argon	705	HP742
In Helium	705	HP742
In Hydrogen	330/660/705 *	HP742
In Nitrogen	330/660/705 *	HP742
Argon		
In Helium	580	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	580	HP702/HP722/HP722C
In Oxygen	296	HP702/HP722/HP722C
Benzene		
In Air	590	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Butane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Carbon Dioxide		
In Air	580/590 *	HP702/HP722/HP722C
In Argon	580	HP702/HP722/HP722C
In Carbon Monoxide	350	HP702/HP722/HP722C
In Helium	580	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	580	HP702/HP722/HP722C
In Oxygen	296/540 *	HP702/HP722/HP722C
Carbon Disulfide		
In Argon	330	HP742
In Helium	330	HP742
In Nitrogen	330	HP742
Carbon Monoxide		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Carbonyl Sulfide		
In Argon	330	HP742
In Helium	330	HP742
In Nitrogen	330	HP742
Minor Component Balance Gas	**CGA Connection Number**	**Equipment Recommendations**
Chlorine		
In Argon	660	HP742
In Helium	660	HP742
In Nitrogen	330/660 *	HP742
Ethane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Ethanol		
In Nitrogen	350	HP702/HP722/HP722C
Ethylene		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Ethylene Oxide		
In Air	590	HP742
In Nitrogen	350	HP742
Halocarbon 12		
In Air	590	HP702/HP722/HP722C
In Argon	580	HP702/HP722/HP722C
In Helium	580	HP702/HP722/HP722C
In Nitrogen	580	HP702/HP722/HP722C
Helium		
In Argon	580	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	580	HP702/HP722/HP722C
In Oxygen	296	HP702/HP722/HP722C
Hexane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Hydrogen		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Hydrogen Chloride		
In Argon	330	HP746
In Helium	330	HP746
In Nitrogen	330	HP746
Hydrogen Cyanide		
In Helium	350	HP746

Minor Component Balance Gas	CGA Connection Number	Equipment Recommendations
In Nitrogen	350	HP746
Hydrogen Sulfide		
In Air	330	HP742
In Argon	330	HP742
In Helium	330	HP742
In Hydrogen	330	HP742
In Methane	330	HP742
In Nitrogen	330	HP742
Isobutane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Methane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Methanol		
In Nitrogen	350	HP702/HP722/HP722C
Methyl Mercaptan		
In Helium	330/350 *	HP742
In Nitrogen	330/350 *	HP742
Moisture		
In Argon	580	HP702/HP722/HP722C
In Helium	580	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	580	HP702/HP722/HP722C
Nitric Oxide		
In Argon	660	HP742
In Helium	660	HP742
In Nitrogen	660	HP742
Nitrogen		
In Argon	580	HP702/HP722/HP722C
In Helium	580	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Oxygen	296	HP702/HP722/HP722C
Nitrogen Dioxide		
In Air	660	HP742
In Argon	660	HP742
In Helium	660	HP742
In Nitrogen	660	HP742
Nitrous Oxide		
In Air	590	HP702/HP722/HP722C
In Nitrogen	590	HP702/HP722/HP722C

Minor Component Balance Gas	CGA Connection Number	Equipment Recommendations
Oxygen		
In Argon	**	HP702/HP722/HP722C
In Helium	**	HP702/HP722/HP722C
In Nitrogen	**	HP702/HP722/HP722C
Pentane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Propane		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Propylene		
In Air	590	HP702/HP722/HP722C
In Argon	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Hydrogen	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C
Sulfur Dioxide		
In Air	330/660 *	HP742
In Argon	660	HP742
In Helium	660	HP742
In Nitrogen	330/660 *	HP742
Sulfur Hexafluoride		
In Air	590	HP702/HP722/HP722C
In Argon	580	HP702/HP722/HP722C
In Helium	580	HP702/HP722/HP722C
In Nitrogen	580	HP702/HP722/HP722C
Toluene		
In Air	350	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Nitrogen	350/510 *	HP702/HP722/HP722C
Vinyl Chloride		
In Air	590	HP702/HP722/HP722C
In Helium	350	HP702/HP722/HP722C
In Nitrogen	350	HP702/HP722/HP722C

* CGA connection may vary upon cyinder size or gas manufacturer - check with your gas supplier to determine the CGA connection.

** Cylinder valve <5% Oxygen - CGA 580; 5% -<23.5% Oxygen - CGA 590; >-23.5% Oxygen - CGA 296

REGULATORS

Recommended Regulators

GP 403 General Purpose Series

General Purpose Brass Line Regulator

Non-Corrosive Applications

These non-corrosive general-purpose brass bar stock single stage line regulators provide a constant pressure at the point of use when the inlet pressure does not vary. The Neoprene diaphragm is perfect to provide greater sensitivity.

Model Number	Delivery Pressure (PSI)
GP 403-015	15
GP 403-050	50
GP 403-125	125
GP 403-250	250

GP 401 General Purpose Series

Single-Stage General Purpose Brass Regulator

Non-Corrosive Applications

These non-corrosive general-purpose brass bar stock single-stage cylinder regulators are suitable for closely monitored, short-run applications. The Neoprene diaphragm is perfect to provide greater sensitivity.

Model Number	Delivery Pressure (PSI)
GP 401-015	15
GP 401-050	50
GP 401-125	125
GP 401-250	250

GP 402 General Purpose Series

Two-Stage General Purpose Brass Regulator

Non-Corrosive Applications

These non-corrosive general-purpose brass two-stage cylinder regulators will provide a precise pressure control from full to an almost empty cylinder. The Neoprene diaphragm is perfect for general plant, and pilot plant.

Model Number	Delivery Pressure (PSI)
GP 402-015	15
GP 402-050	50
GP 402-125	125
GP 402-250	250

HP 703 High-Purity Series

High Purity Brass Line Regulator

Non-Corrosive Applications

The high-purity brass bar stock single-stage line regulators are prefect for non-corrosive gases for chromatographic carrier gas applications. The stainless steel diaphragm is perfect for industrial and analytical applications.

Model Number	Delivery Pressure (PSI)
HP 703-015	15
HP 703-050	50
HP 703-125	125
HP 703-250	250

HP 701 High-Purity Series

Single-Stage High Purity Brass Regulator

Non-Corrosive Applications

These high-purity brass bar stock single-stage cylinder regulators are suitable for closely monitored, short-run applications. The stainless steel diaphragm is perfect for analytical applications.

Model Number	Delivery Pressure (PSI)
HP 701-015	15
HP 701-050	50
HP 701-125	125
HP 701-250	250

HP 702 High-Purity Series

Two-Stage High Purity Brass Regulator

Non-Corrosive Applications

This high-purity brass bar stock two-stage cylinder regulators will provide a precise pressure control from full to an almost empty cylinder. The stainless steel diaphragm is perfect for analytical applications.

Model Number	Delivery Pressure (PSI)
HP 702-015	15
HP 702-050	50
HP 702-125	125
HP 702-250	250

HP 723C Ultra High-Purity Series

Ultra High-Purity Brass Regulator

Non-Corrosive Applications

The ultra high purity chrome plated brass bar stock single stage line regulators are perfect for non-corrosive gasses for chromatography carrier gas applications. This chrome plated brass regulator offers a low internal volume and eliminates large cavities that are associated with forged-body designs.

Model Number	Delivery Pressure (PSI)
HP 723C-015	15
HP 723C-050	50
HP 723C-125	125
HP 723C-250	250
HP 723C-500	500

HP 721C Ultra High-Purity Brass Series

Single-Stage Ultra High-Purity Brass

Non-Corrosive Applications

These chrome plate brass, single-stage, ultra high-purity regulators are recommended for non-corrosive analytical and process applications where precise flow control is not critical. A specially designed, convoluted, stainless steel diaphragm provides good regulating performance and maximum purity integrity.
These regulators are capable of withstanding an internal vacuum and can be provided with a diffusion-resistant valve.

Model Number	Delivery Pressure (PSI)
HP 721C-015	15
HP 721C-050	50
HP 721C-125	125
HP 721C-250	250
HP 721C-500	500

HP 722C Ultra High-Purity Series

Two-Stage Ultra High-Purity Brass

Non-Corrosive Applications

This series of two-stage, ultra high-purity regulators is designed for non-corrosive analytical and process applications requiring precise, stable delivery pressure control. The two-stage design yields a delivery pressure of less than 0.05/100 psi inlet change.

This regulator also has both a front and rear panel mount bonnet to allow for easy panel mounting. Convoluted stainless steel diaphragms provide excellent regulating characteristics and allow for internal vacuum purging. The diaphragm prevents contamination and provides a leak-rate design of less than 2 x 10-9 ccs helium. This minimizes cleanup time in vacuum purging and yields lower residual contaminant levels. Captured bonnet ports with optional vent adaptors are standard on both stages and allow for the venting of hazardous gases in the event of diaphragm failure. These regulators are ultrasonically cleaned for the most demanding high-purity service.

Model Number	Delivery Pressure (PSI)
HP 722C-015	15
HP 722C-050	50
HP 722C-125	125
HP 722C-250	250
HP 722C-500	500

HP 743 High-Purity Stainless Steel Series

High-Purity Stainless Steel Line Regulator

Non-Corrosive and Corrosive Applications

These stainless steel high-purity single-stage line regulators are recommended for applications where diffusion resistance is required. This regulator is perfect for applications that require low-pressure pipelines serving gas chromatograph, mass spectrometers, research sampling and semiconductor processing.

The specially-designed, convoluted 316L stainless steel diaphragm provides accurate, stable delivery pressure at the point of use when the inlet pressure does not vary. This regulator is capable of withstanding internal vacuum purging and is easily mounted to panels using the optional panel mounting nuts with threaded bonnets. There are two 10 x 32 UNF-thread holes in the body which allow for bracket or external panel mounting.

Model Number	Delivery Pressure (PSI)
HP 743-015	15
HP 743-050	50
HP 743-125	125
HP 743-250	250
HP 743-500	500

HP 741 High-Purity Stainless Steel Series

Single-Stage Stainless Steel Regulator

Non-Corrosive and Corrosive Applications

These stainless steel high-purity single-stage cylinder regulators are recommended for closely monitored, short-run applications for non-corrosive and mildly corrosive gases.

The specially-designed, convoluted 316L

stainless steel diaphragm provides accurate, stable delivery pressure at the point of use when the inlet pressure does not vary. This regulator is capable of withstanding internal vacuum purging. Th bonnet vent port enables venting hazardous gases in the event of diaphragm failure.

Model Number	Delivery Pressure (PSI)
HP 741-015	15
HP 741-050	50
HP 741-125	125
HP 741-250	250
HP 741-500	500

HP 742 High-Purity Stainless Steel Series

Two-Stage Stainless Steel Regulator

Non-Corrosive and Corrosive Applications

These stainless steel high-purity two-stage cylinder regulators are recommended for applications where precise pressure control from full to an almost empty cylinder are required for non-corrosive and mildly corrosive gases.

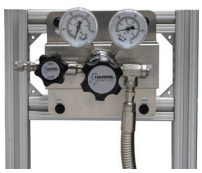
The specially-designed, convoluted 316L stainless steel diaphragm provides accurate, stable delivery pressure at the point of use when the inlet pressure does not vary. This regulator is capable of withstanding internal vacuum purging. The optional bonnet vent adapter enables venting hazardous gases in the event of diaphragm failure.

Model Number	Delivery Pressure (PSI)
HP 742-015	15
HP 742-050	50
HP 742-125	125
HP 742-250	250
HP 742-500	500

Regulator Mounting

EZ Mount Option

Brass and Stainless Steel



The EZ Mount option enables a practical and safe wall-mounted installation of any analytical, high-purity, or ultra high-purity cylinder regulator. This allows out-of-the box installation of the regulator assembly onto a wall or existing structure.

The convenient, compact design significantly minimizes the amount of valuable wall space normally required to wall mount regulators.

EZ Mount options include 36" stainless steel flexible pigtails, an appropriate wall-mount bracket, a stainless steel street elbow fitting and a CGA connection with integrated check valve to prevent contaminates from entering the gas delivery supply during cylinder change out. The wall-mount brackets are fabricated from 304 stainless steel for durable, long-life service and are suitable for most environments and locations.

NOTE: Only available with the ultra high purity brass & high-purity stainless steel regulators. ***Regulator is not included; must be ordered separately.***

Model Number	# Cyls	Material
SG910EZB1	1	Brass
SG910EZB2	2	Brass
SG910EZS1	1	Stainless Steel
SG910EZS2	2	Stainless Steel

Special Application Regulators HP 8700 High Delivery Pressure Models

Designed for a wide range of pressure settings, these single-stage regulators are recommended for use in petroleum field applications, research laboratories for hydrogenation, catalytic reduction, accelerated age testing, calorimetric testing, component testing, and pressure charging applications. These regulators feature a rugged brass piston, which provides increased safety and reliability at high delivery pressures. A 10 micron inlet filter protects internal components.

Model Number	Delivery Pressure (PSI)
8700-1500	1500
8700-2500	2500
8700-3000	3000
8700-4500	4500
8700-6000	6000

HP 705 High Purity Two-Stage Electrically Heated Regulators

This regulator can be used with gasses that encounter the Joule-Thompson effect created in pressure drops across the internal orifices in a regulator. The regulator will maintain the gas in the vapor phase by supplying heat at the regulator's internal orifice while providing a constant delivery pressure.

Model Number	Max Inlet (PSI)	Max outlet (PSI)
HP705-125	3,000	125
This regulator is not suitable for flammable gases.		

HP 9200 Ultra-Low Delivery Pressure Models

This two-stage regulator is recommended for use with non-corrosive gases in applications where an ultra-low delivery pressure is required. It maintains an accurate delivery pressure over the life of the cylinder. The two-stage design limits the variations in the outlet pressure to 0.06 psig for every 100 psig of inlet pressure decay. Made of durable, long-lasting forged brass, this regulator is perfect for non-corrosive, ultra-low delivery pressure gases. A needle valve is included on the outlet.

Model Number	Delivery Pressure (PSI)
9200-002	2
9200-006	6

HP 750 High-Flow Dome-Loaded Regulator

The Special Service Regulator is a high-flow dome-loaded design. This regulator has an integral remote sensing pilot which yields high flow capacity with near perfect pressure regulation, unique in a compact unit.

Since this regulator is dome loaded by a remote sensing pilot regulator, it becomes a servo-regulator, and the overall performance is determined by the performance of the pilot regulator.

This Regulator is a key component in laser applications.

Model Number	Max Inlet (PSI)	Max Outlet (PSI)
750-250	3,000	250
750-500	3,000	500
750-1000	3,000	1,000

Changeover Manifolds

905 Changeover Manifold

Changeover Manifold *0-125 psi Delivery Pressure*

This automatic switch over panel is designed to supply a continuous supply of high-purity gas at a constant delivery pressure. This unit has an adjustable outlet line regulator. The pigtails are 316 corrugated bellows with check valve cylinder connections. There are optional alarms and purges available.

Model Number	Cyl's	Max Inlet Press (PSI)	Mat'l	Del Press (PSI)
905BR-1R-1L-XXX	2	3000	BR	10 - 125
905SS-1R-1L-XXX	2	3000	SS	10 - 125

920 High Purity Changeover Manifold

Changeover Manifold

Non-Corrosive and Corrosive Applications

These high-purity changeover manifolds are available in brass and 316 stainless steel construction. These changeover manifolds are adjustable from 10-200 PSI. The pigtails that are supplied with these units are leak-tight 316 stainless steel with check valve cylinder connections. The flow rate is rated at 200 SCFH of air. Alarm boxes sold separately. Comes standard with inlet/outlet isolation valve sand alarm gauges

Model Number	Cyl's	Max Inlet Press (PSI)	Mat'l	Del Press (PSI)
920BR-1R-1L-XXX	2	3000	BR	10 - 200
920SS-1R-1L-XXX	2	3000	SS	10 - 200

240 Automatic Liquid Cylinder Gas Phase Changeover Manifolds

The Series 240 Manifold is designed specifically to regulate and monitor vaporized gas from cryogenic cylinders. The Series 240 Manifold prevents downtime by automatically switching over when the primary cylinder banks is depleted.

A green light indicates the primary cylinder service bank is functioning and the reserve cylinder bank is ready for service. A red light signals that the system has changed over and one or both banks are depleted. The user resets the primary bank by turning the knob.

Model Number	Max Inlet (PSI)
240 (CGA)	235
240HP (CGA)	350
4300698	Remote Alarm Box
4300699	Remote Alarm Cable (10ft)

701EN Single Stage Regulator

The Model HP 701EN is a single stage regulator with a electroless nickel plated brass body for primary pressure control of corrosive and acid forming gases or gas mixtures.

Model Number	Del Press (PSI)
HP701EN-015	0 - 15
HP701EN-050	0 - 50
HP701EN-125	0 - 125
HP701EN-250	0 - 250

3520 High Flow Two Gauge Regulator

Model HP3520 is a brass bar-stock manifold regulator for pipeline and other applications up to 3000 PSIG inlet pressure. The two gauge style allows the operator to read inlet pressure. This regulator is recommended for non-corrosive gases and purity levels 99.999% and higher.

Model Number	Del Press (PSI)
HP3520-050	0 - 50
HP3520-125	0 - 125
HP3520-250	0 - 250
HP3520-500	0 - 500

3530 High Flow Single Gauge Regulator

Model HP3530 is a brass bar-stock manifold regulator for pipe line and other applications up to 3000 PSIG inlet pressures. The single gage style allows the operator to read the delivery pressures easily. This regulator is recommended for non-corrosive gases and purity levels 99.999% and higher.

Model Number	Del Press (PSI)
HP3530-050	0 - 50
HP3530-125	0 - 125
HP3530-250	0 - 250
HP3530-500	0 - 500

Harris Specialty Gas Products

Harris has been serving the specialty gas equipment needs of analytical, research, life science, and nanotech laboratories for more than three decades. Our dedicated staff of laboratory and specialty gas equipment technicians are focused on providing the right equipment and custom-systems solutions for your specific needs. From analytical pressure regulators (general-purpose, high-pressure, and special service) to manifolds assemblies, flow meters, pressure gauges, valves, pigtails, hoses and more.

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Specialty Gas Regulator Selection Guide

X 1 = Single Stage 2 = Two Stage 3 = Line

SERIES	MODEL NO.	PRODUCT TYPE	BODY MATERIAL	BONNET MATERIAL	DIAPHRAGM MATERIAL	Cv (FLOW CAPACITY)	AVAILABLE DELIVERY PRESSURE	RECOMMENDED FOR GAS PURITY LEVELS OF:
40X	GP 401 GP 403	GENERAL PURPOSE REGULATOR	BRASS BARSTOCK	PAINTED DIE CAST	NEOPRENE	0.17	0-15 0-50 0-125 0-250	UP TO GRADE 4.0
	GP 402		FORGED BRASS			0.15		
70X	HP 701 HP 703	HIGH PURITY	BRASS BARSTOCK	CHROME PLATED DIE CAST	316L STAINLESS STEEL	0.17	0-15 0-50 0-125 0-250	UP TO GRADE 5.0
	HP 702		FORGED BRASS			0.15		
72X	HP 721 HP 723	ULTRA HIGH PURITY	BRASS BARSTOCK	BRASS BARSTOCK	316L STAINLESS STEEL	0.08	0-15 0-50 0-125 0-250 0-500	UP TO GRADE 5.0
	HP 722					0.06		
72XC	HP 721C HP 723C	ULTRA HIGH PURITY	CHROME PLATED BRASS BARSTOCK	CHROME PLATED BRASS BARSTOCK	316L STAINLESS STEEL	0.08	0-15 0-50 0-125 0-250 0-500	UP TO GRADE 5.0
	HP 722C					0.06		
74X	HP 741 HP 743	RESEARCH GRADE AND / OR CORROSIVE	316L STAINLESS STEEL	CHROME PLATED BRASS BARSTOCK	316L STAINLESS STEEL	0.08	0-15 0-50 0-125 0-250 0-500	GRADE 6.0 AND HIGHER
	HP 742					0.06		

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