

GO REGULATOR

Technical Reference Material

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technical data

GO Regulator

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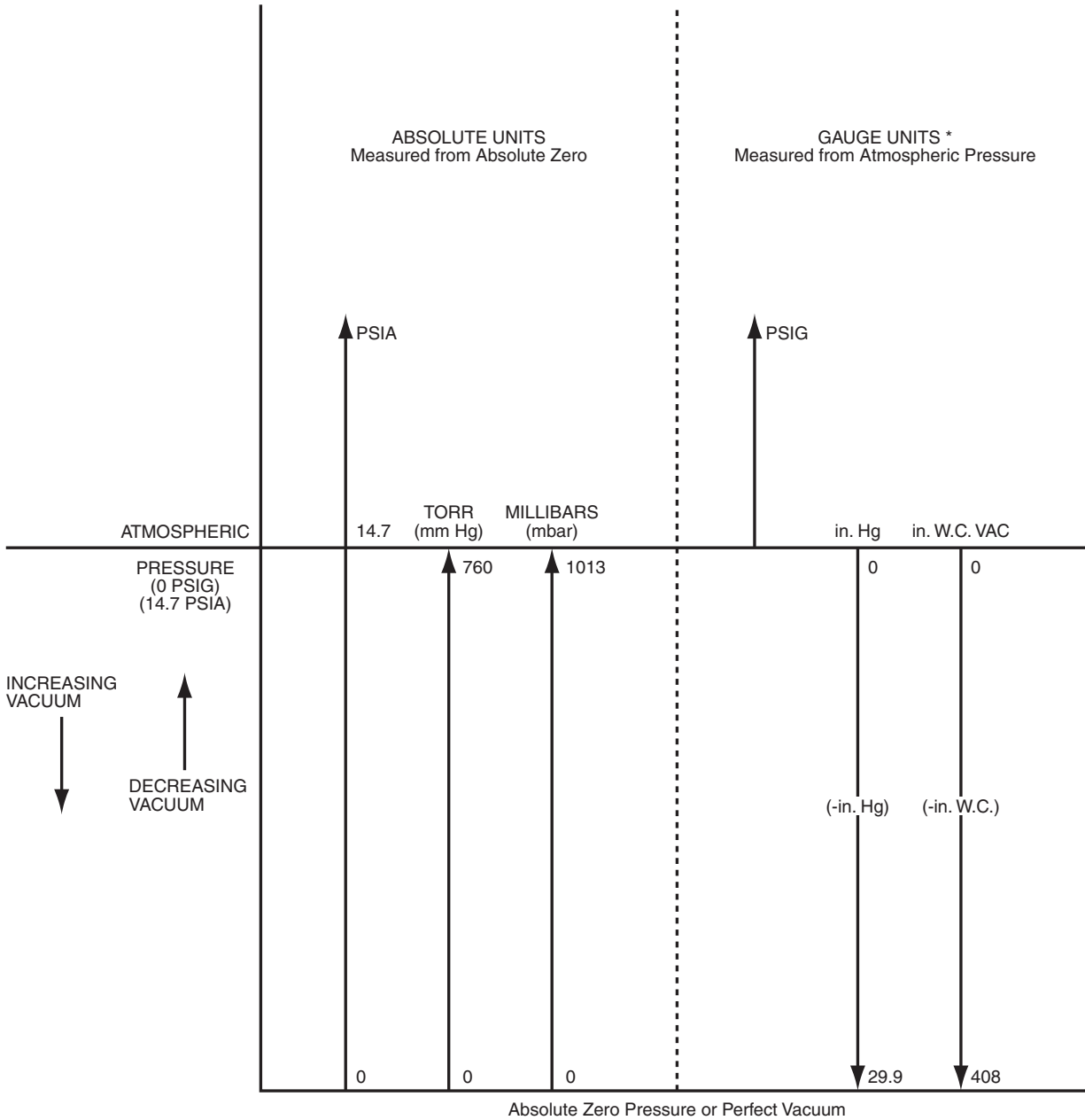
Mass Spectrometer Helium Leak Certification

Mass spectrometer helium leak certification is available on all products manufactured by GO Regulator. With this service, we can provide test certification up to 2×10^{-10} standard cc/sec helium. The choice of inboard or outboard testing is also available.

When requesting test certification, specify the desired leak specification and whether inboard or outboard testing is to be performed.

technical data

Subatmospheric Units of Measure



* Gauge unit values are shown as minus (-) values.
This minus sign is not used in normal industry practice

Flow Calculations for GO Regulator Products

Formulas and Examples

Liquid Flow Formulas: $C_v = \frac{Q_L \sqrt{S_L}}{\sqrt{\Delta P}} \therefore Q_L = \frac{C_v \sqrt{\Delta P}}{\sqrt{S_L}}$

Example: Determine liquid flow (assume water) through a regulator in gallons per minute with the following conditions:

Given:

$$P_1 = 1000 \text{ psia}$$

$$P_2 = 600 \text{ psia}$$

$$S_L = 1.0$$

$$C_v = .08$$

$$Q_L = \frac{C_v \sqrt{\Delta P}}{\sqrt{S_L}} = \frac{0.8 \sqrt{1000 - 600}}{\sqrt{1}} = \frac{0.8 \times 20}{1} = \mathbf{16 \text{ GPM (Water)}}$$

Gaseous Flow Formulas: a $C_v = \frac{Q_g \times 2 \sqrt{S_g}}{P_1}$ b $C_v = \frac{Q_g \sqrt{S_g}}{\sqrt{\Delta P \times P_1}}$

Example: Determine C_v required for a regulator when inlet pressure (P_1) is equal or greater than two times outlet pressure (P_2) and the following items are known:

Given:

$$P_1 = 1000 \text{ psia}$$

$$P_2 = 400 \text{ psia}$$

$$Q_g = 400 \text{ SCFM}$$

$$S_g = 1.0 \text{ (assume air in this example)}$$

$$C_v = \frac{Q_g \times 2 \sqrt{S_g}}{P_1} = \frac{400 \times 2}{1000} = \mathbf{0.8 C_v}$$

* **Caution:** When sizing components for flow applications, attention must also be directed to the size of the plumbing. When flow requirements are at low pressures, the plumbing may be the flow limiting item rather than the regulator or valve.

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Flow Calculations for GO Regulator Products

Definitions:

- C_v : Flow coefficient for regulators and valves that expresses flow capabilities of a unit at full open condition. For liquids, this coefficient is defined as the flow of water at 60° F in gallons per minute at a pressure drop of one psig. For gases, this coefficient is defined as the flow of air at standard conditions in standard cubic feet per minute for each psig of inlet pressure.
- S_L : Specific gravity of liquids relative to water, both at standard temperature of 60° F. (Specific gravity of water = 1.0 @ 60° F).
- S_g : Specific gravity of a gas relative to air; equals the ratio of the molecular weight of the gas to that of air. (Specific gravity of air = 1.0 @ 60° F).
- P: Line pressure (psia).
- P_1 : Inlet pressure expressed in psia.
- P_2 : Outlet pressure expressed in psia.
- DP: Differential pressure ($P_1 - P_2$).
- psia: Absolute pressure which is gauge pressure (PSIG) plus 14.7 (atmospheric pressure).
- Q_L : Liquid flow in gallons per minute (GPM).
- Q_g : Gas flow in standard cubic feet per minute (SCFM). (At standard conditions of 60° F and 14.7 psia).
- Q: Volume flow rate in cubic feet per minute (CFM).
- M: Mass flow rate in pounds per minute (lbs/min.).

CGA Connection Chart

CYLINDER GAS TYPE	CHEMICAL SYMBOL	CGA CONNECTION	
		STANDARD	ALTERNATIVE
Acetylene	C ₂ H ₂	510	300
Air	—	590	346
Allene	CH ₂ :C:CH ₂	510	
Ammonia anhydrous	NH ₃	240	705
Ammonia (VHP)	—	660	
Antimony pentafluoride	SbF ₅	330	
Argon	Ar	580	
Argon (research grade)	—	590	
Arsine	AsH ₃	350	660
Boron trichloride	BCl ₃	660	330
Boron trifluoride	BF ₃	330	
Bromine pentafluoride	BrF ₅	670	
Bromine trifluoride	BrF ₃	670	
Bromoacetone	BrCH ₂ COCH ₃	330	660
Bromochlorodifluoromethane	CBrClF ₂	668	660
Bromochloromethane	CH ₂ BrCl	668	660
Bromotrifluoroethylene	BrFC:CF ₂	510	660
Bromotrifluoromethane	CBrF ₃	668	320, 660
1, 3-butadiene	CH ₂ :CHCH:CH ₂	510	
Butane	CH ₃ CH ₂ CH ₂ CH ₃	510	
Butenes	CH ₃ CH ₂ CH:CH ₂	510	
Carbon dioxide	CO ₂	320	
Carbon monoxide	CO	350	
Carbonyl fluoride	COF ₂	660	750
Carbonyl sulfide	COS	330	
Chlorine	Cl ₂	660	
Chlorine pentafluoride	ClF ₅	670	
Chlorine trifluoride	ClF ₃	670	
Chlorodifluoroethane	CH ₃ CClF ₂	510	660
Chlorodifluoromethane	CHClF ₂	660	668
Chlorofluoromethane	CH ₂ ClF	510	
Chloroheptafluorocyclobutane	C ₄ F ₇ Cl	660	668
Chloropentafluoroethane	C ₂ ClF ₅	668	660
Chlorotrifluoromethane	CClF ₃	668	320, 660
Cyanogen	C ₂ N ₂	750	660
Cyanogen chloride	CNCl	750	660
Cyclobutane	C ₄ H ₈	510	
Cyclopropane	C ₃ H ₆	510	
Deuterium	D ₂	350	
Deuterium chloride	DCl	330	
Deuterium fluoride	DF	330	
Deuterium selenide	D ₂ Se	350	330
Deuterium sulfide	D ₂ S	330	
Diborane	B ₂ H ₆	350	
Dibromodifluoroethane	C ₂ H ₂ Br ₂ F ₂	668	660
Dibromodifluoromethane	CBr ₂ F ₂	668	660
1, 1-difluoroethylene	FCH:CHF	320	
Dichlorosilane	H ₂ SiCl ₂	330	510
Diethylzinc	(C ₂ H ₅) ₂ Zn	750	
Dimethylamine	(CH ₃) ₂ NH	705	240
Dimethyl ether	CH ₃ OCH ₃	510	
2, 2-dimethylpropane	C(CH ₃) ₄	510	
Diphosgene	ClCO ₂ CCl ₃	750	660

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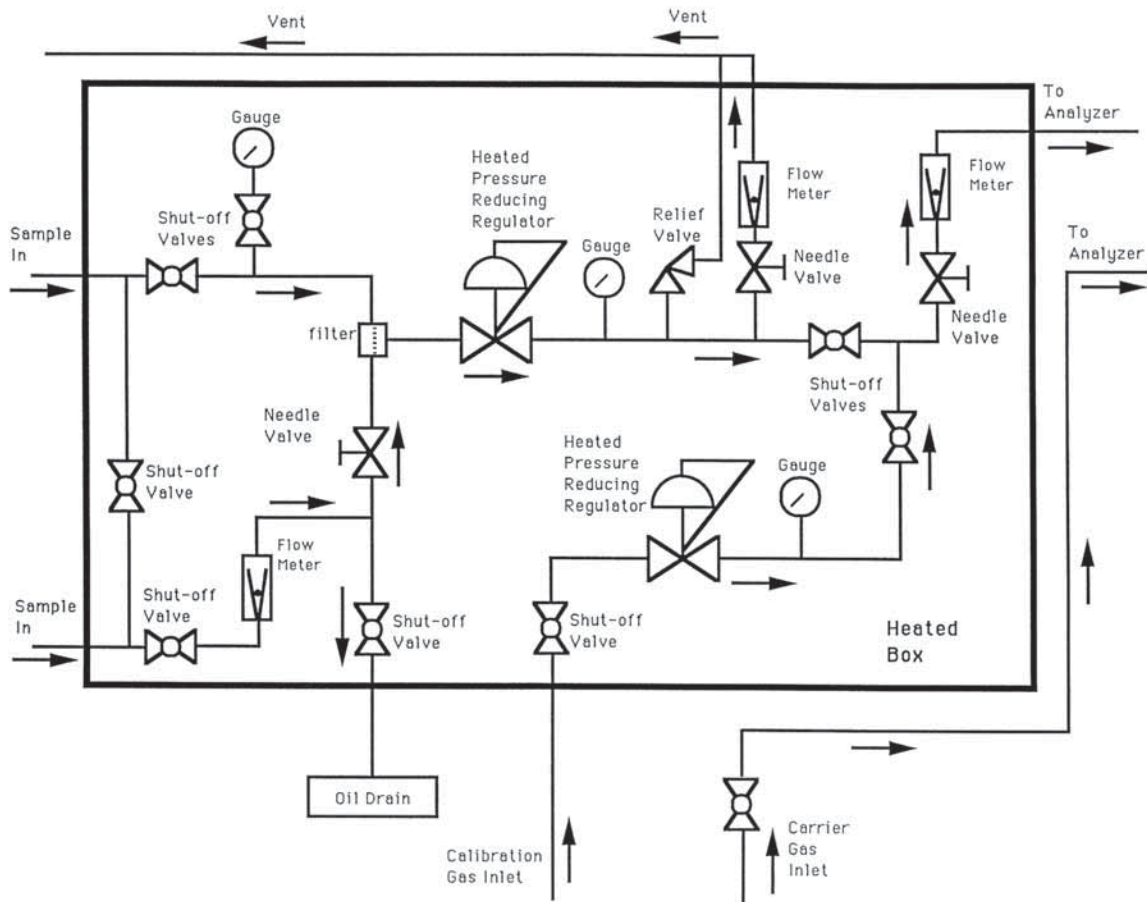
CGA Connection Chart

Ethane	C ₂ H ₆	350	
Ethane (research grade)	—	350	
Ethylacetylene	CH ₃ CH ₂ C:CH	510	
Ethylchloride	CH ₃ CH ₂ Cl	510	300
Ethylchloroarsine	C ₂ H ₅ AsCl ₂	750	660
Ethylene	CH ₂ :CH ₂	350	
Ethylene oxide	C ₂ H ₄ O	510	
Ethyl ether	(C ₂ H ₅) ₂ O	510	
Ethyl fluoride	C ₂ H ₅ F	750	660
Fluorine	F ₂	679	670
Freon® 12 (dichlorodifluoromethane)	CCl ₂ F ₂	660	
Freon® 13 (chlorotrifluoromethane)	CClF ₃	320	
Freon® 13B1 (bromotrifluoromethane)	CBrF ₃	320	
Freon® 14 (tetrafluoromethane)	CF ₄	320	
Freon® 22 (chlorodifluoromethane)	CHClF ₂	660	620
Freon® 114 (1, 2-dichlorotetrafluoroethane)	ClF ₂ CClF ₂	660	
Freon® 116 (hexafluoroethane)	C ₂ F ₆	320	
Freon® C318 (octafluorocyclobutane)	C ₄ F ₈	660	
Genetron® 21 (dichlorofluoromethane)	CHCl ₂ F	660	
Genetron® 23 (fluoroform)	CHF ₃	320	
Genetron® 115 (monochloropentafluoroethane)	BrF ₂ CCF ₃	660	
Genetron® 152A (1, 1-difluoroethane)	FCH ₂ CH ₂ F	660	
Germane	GeH ₄	660	750
Helium	He	580	677
Heptafluorobutyronitrile	C ₄ F ₇ N	750	660
Hexafluoroacetone	C ₃ F ₆ O	660	330
Hexafluorocyclobutene	C ₄ F ₆	750	660
Hexafluorodimethyl peroxide	CF ₃ OOCF ₃	755	660
Hexafluoroethane	C ₂ F ₆	660	668
Hexafluoropropylene	CF ₃ CF:CF ₂	668	660
Hydrogen	H ₂	350	
Hydrogen bromide	HBr	330	
Hydrogen chloride	HCl	330	
Hydrogen cyanide	HCN	750	160
Hydrogen fluoride	HF	330	660
Hydrogen iodide	HI	330	660
Hydrogen selenide	H ₂ Se	350	660
Hydrogen sulfide	H ₂ S	330	
Iodine pentafluoride	IF ₅	670	
Isobutane	C ₄ H ₁₀	510	
Isobutylene	C ₄ H ₈	510	
Krypton (research grade)	Kr	590	
"Manufactured gas B"	—	350	
"Manufactured gas C"	—	350	
Lewisite	ClCH:CHAsCl ₂	750	660
Methane	CH ₄	350	
Methylacetylene	CH ₃ C:CH	510	
Methyl bromide	CHBr	320	660
3-methyl 1-butene	(CH ₃) ₂ CHCH:CH ₂	510	
Methyl chloride	CH ₃ Cl	660	510
Methyldichloroarsine	CH ₂ AsCl ₂	750	
Methylene fluoride	CH ₂ F ₂	320	
Methyl ethylether	CH ₃ OC ₂ H ₅	510	
Methyl fluoride	CH ₃ F	350	
Methyl formate	HCOOCH ₃	510	660
Methyl mercaptan	CH ₂ SH	330	750
Monoethylamine	CH ₃ CH ₂ NH ₂	240	705
Monomethylamine	CH ₃ NH ₂	240	705
Mustard gas	S(C ₂ H ₄ Cl) ₂	750	350
Natural gas	—	350	677
Neon	Ne	590	580
Nickel carbonyl	Ni(CO) ₄	320	750
Nitric oxide	NO	660	750, 160
Nitrogen	N ₂	580	
Nitrogen (research grade)	—	590	
Nitrogen dioxide	NO ₂	660	160
Nitrogen trifluoride	NF ₃	679	
Nitrogen trioxide	N ₂ O ₃	660	160
Nitrosyl chloride	NOCl	660	330
Nitrosyl fluoride	NOF	330	
Nitrous oxide	N ₂ O	326	

CGA Connection Chart

Nitryl fluoride	NO ₂ F	330	
Octafluorocyclobutane	C ₄ F ₈	660	668
Octafluoropropane	C ₃ F ₈	660	668
Oxygen	O ₂	540	
Oxygen difluoride	OF ₂	679	
Ozone	O ₃	660	755
Pentaborane	B ₅ H ₉	660	750
Pentachloroethane	CCl ₃ CCl ₂ F	668	660
Pentafluoroethane	CF ₃ CHF ₂	668	660
Pentafluoroethyl iodide	CF ₃ CF ₂ I	668	660
Pentafluoropropionitrile	CF ₃ CF ₂ CN	750	660
Perchloryl fluoride	ClO ₃ F	670	
Perfluorobutane	C ₄ F ₁₀	668	
Perfluorobutene-2	C ₄ F ₈	660	
Phenylcarbylamine chloride	C ₆ H ₅ N:CCl ₂	330	660
Phosgene	COCl ₂	660	
Phosphine	PH ₃	660	350
Perfluoropropane	—	660	
Phosphorous pentafluoride	PF ₅	330	
Phosphorous trifluoride	PF ₃	330	
Propane	C ₃ H ₈	510	
Propylene	C ₃ H ₆	510	
Silane	SiH ₄	350	510
Silicone tetrafluoride	SiF ₄	330	
Stibine	SbH ₃	350	
Sulfur dioxide	SO ₂	660	668
Sulfur hexafluoride	SF ₆	590	668
Sulfur tetrafluoride	SF ₄	330	
Sulfuryl fluoride	SO ₂ F ₂	660	330
1, 1, 1, 2-tetrachlorodifluoroethane	C ₂ Cl ₄ F ₂	668	660
1, 1, 2, 2-tetrafluorochloroethane-1	C ₂ HClF ₄	668	660
Tetrafluoroethylene	C ₂ F ₄	350	660
Tetrafluorohydrazine	N ₂ F ₄	679	
Tetrafluoromethane	CF ₄	580	320
Tetramethyllead	(CH ₃) ₄ Pb	750	350
Trichlorofluoromethane	CCl ₃ F	668	660
Trichlorotrifluoroethane	CF ₃ CCl ₃	668	660
Triethylaluminum	(C ₂ H ₅) ₃ Al	750	350
Triethylborane	(C ₂ H ₅) ₃ B	750	350
Trifluoroacetonitrile	CF ₂ CN	750	350
Trifluoroacetyl chloride	CF ₃ COCl	330	
1, 1, 1-trifluoroethane	CH ₃ CF ₃	510	
Trifluoroethylene	C ₂ F ₃ H	510	
Trifluoromethyl hypofluorite	CF ₃ OF	679	
Trifluoromethyl iodide	CF ₃ I	668	660
Trimethylamine	(CH ₃) ₃ N	240	705
Trimethylstibine	(CH ₃) ₃ Sb	750	350
Tungsten hexafluoride	WF ₆	330	670
Uranium hexafluoride	UF ₆	330	
Vinyl bromide	C ₂ H ₃ Br	290	510
Vinyl chloride	C ₂ H ₃ Cl	290	510
Vinyl fluoride	C ₂ H ₃ F	320	350
Vinyl methyl ether	C ₂ H ₅ OCH ₃	290	510
Xenon	Xe	580	677
Xenon (research grade)	—	590	

Typical Pressure Regulator Applications



technical data

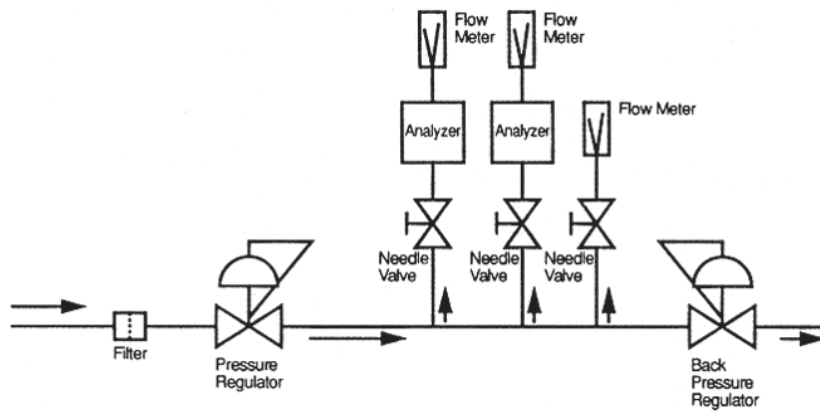
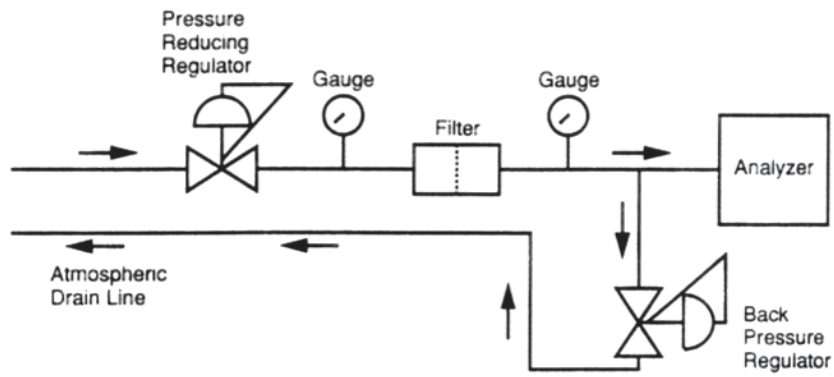
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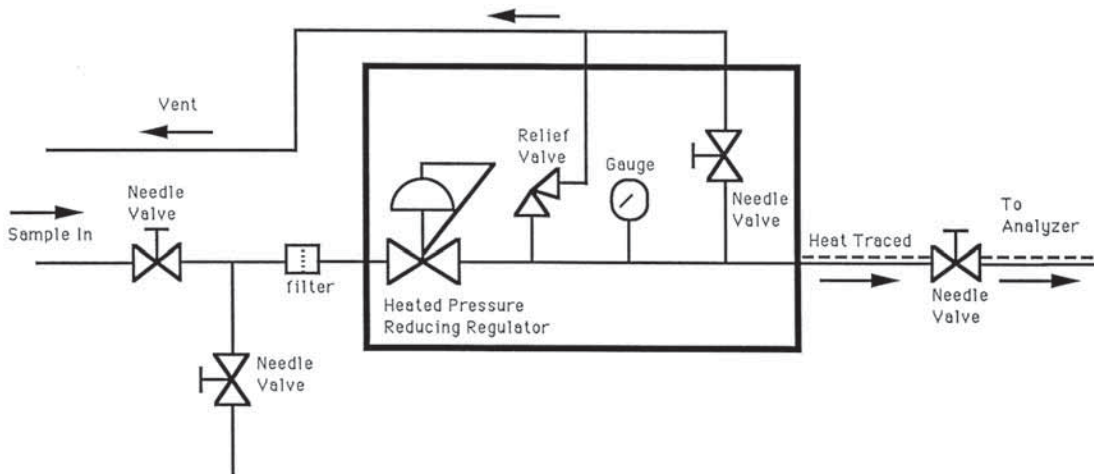
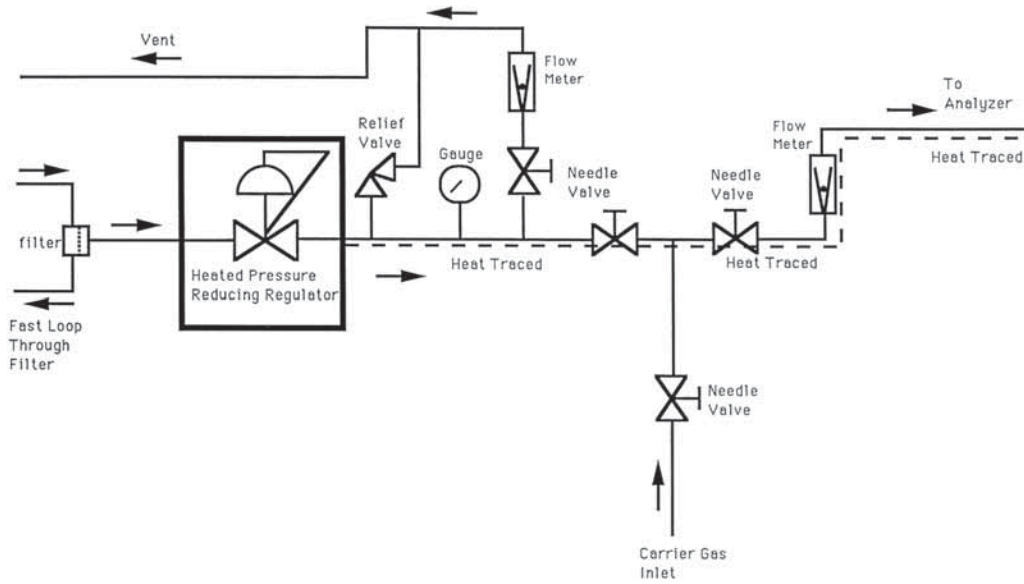
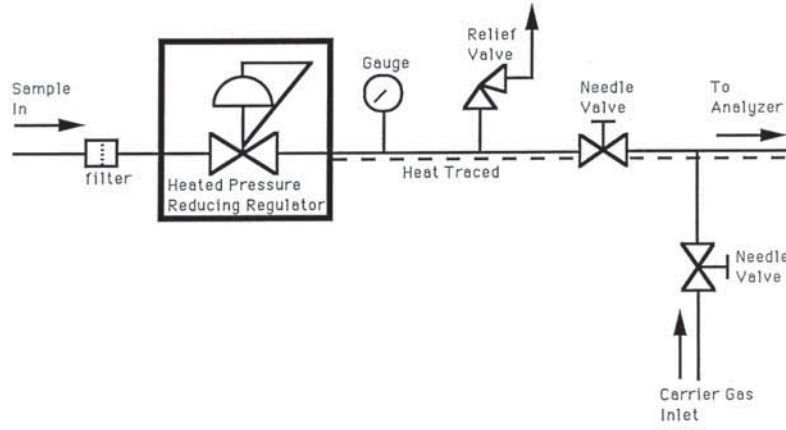
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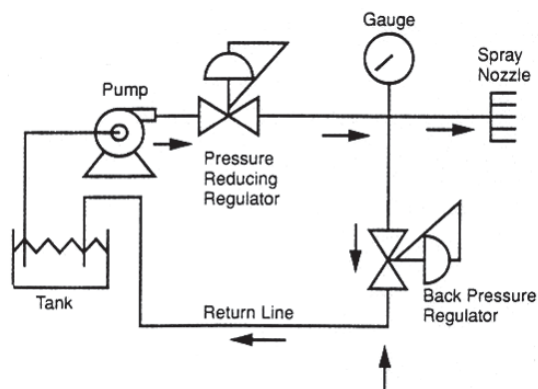
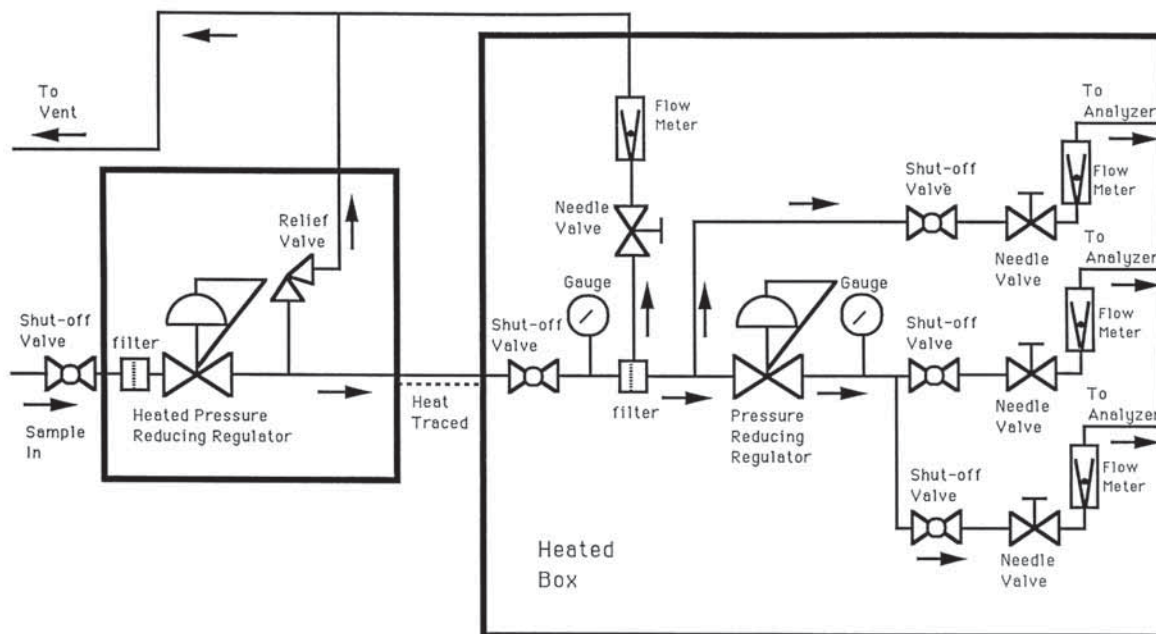
Typical Pressure Regulator Applications



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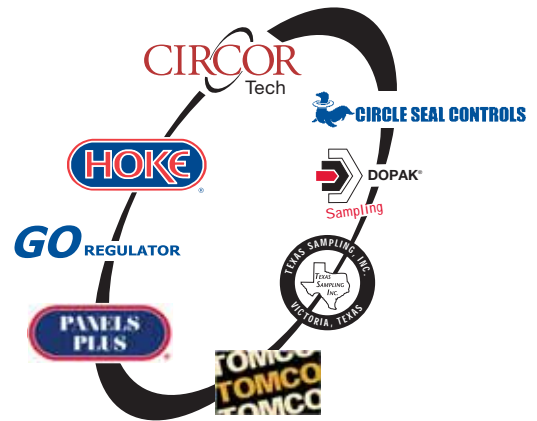


Typical Pressure Regulator Applications



For Your Safety

It is solely the responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. Material compatibility, product ratings and application details should be considered in the selection. Improper selection or use of products described herein can cause personal injury or property damage.



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CIRCOR Instrumentation Technologies

CIRCOR Instrumentation Technologies (CIT) is a product group of CIRCOR International (NYSE: CIR), specializing in fluid process control solutions with orifice sizes typically up to 1". Our main product lines include ball, needle, packless, diaphragm, solenoid, and metering valves, pressure regulators, quick couplers, Gyrolok® compression tube fittings, and fully integrated sampling systems.

CIT markets primarily to the petrochemical, refining, power generation, food and beverage, semiconductor, and pharmaceutical industries, and to OEM's. CIT separates itself from the competition by offering highly engineered components manufactured to exacting standards and a variety of custom options.