Conoflow Products

ITT

ENGINEERED FOR LIFE

ITT Conoflow, a unit of ITT Control Technologies, serves the chemical processing, CNG Market, food and beverage, petroleum, medical, pulp and paper and other industries through an extensive network of stocking distributors and factory trained regional sales managers.

We design and manufacture low pressure and high pressure regulators along with filter and specialty regulators. Our positioners, transducers and actuators provide durable and reliable operation, while our diaphragm seals come in a wide variety of materials and configurations to meet your broad range of application requirements.

Solutions for chem-processing, food and beverage, medical, pulp and paper and other industries.

CONTENTS

Low Pressure Regulators

Air Consumption: The maximum rate at which air is vented or bled from the device in order to operate within its specifications.

Ambient Temperature Range: The minimum and maximum temperature of the medium surrounding a device.

Back Pressure Regulator: A pressure regulator which controls an inlet (supply) pressure. Conceptually, back pressure regulators are similar to relief valves, since these devices relieve inlet pressure when a set point is reached. Unlike relief valves, a back pressure regulator setting is not proportional to the difference between inlet (upstream) and exhaust (downstream) pressure. Back pressure regulators are much more accurate than a relief valve since the pressure sensing element is considerably larger than the valving element within the device.

Diaphragm, Bleed: A diaphragm assembly feature which contains a small orifice which allows a constant exhaust through the diaphragm. This constant exhausting increases responsiveness and stability of the regulator by keeping the nozzle in a dynamic state. See figure 1.1.

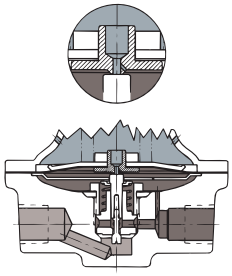


Figure 1.1
Diaphragm Seat Feature
Bleed Style Seat

Diaphragm, Relief: Diaphragm assembly feature that allows exhausting to atmosphere when regulated output pressure exceeds set point pressure. See figure 1.2.

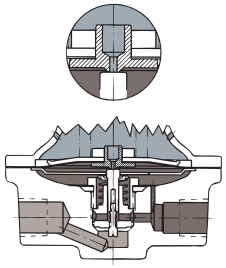


Figure 1.2
Diaphragm Seat Feature
Relief Style Seat

Diaphragm, No Bleed - No Relief: A diaphragm assembly that does not allow process medium to exit through the diaphragm. See figure 1.3.

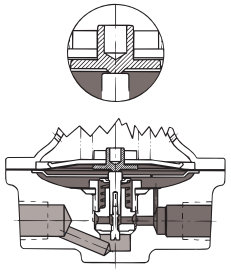


Figure 1.3
Diaphragm Seat Feature
No Bleed - No Relief Style Seat

Differential Pressure: The output difference between two or more independent pressure sources.

Droop: The deviation of output from set point pressure as downstream flow requirements change. See figure 2.1.

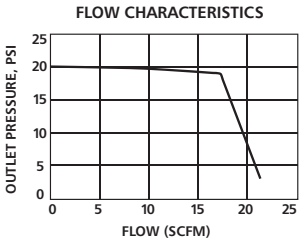


Figure 2.1
Typical curve for a 0-50 PSI unit with a 20 PSI set pressure and 100 PSI supply

Exhaust Capacity: The relief flow capability of the output to atmosphere in situations where the output pressure is greater than the regulated set pressure.

Flow Capacity - Dynamic: The rate which a volume will pass forward through a given device within a unit of time while variables are undergoing a change. Typically expressed in SCFM for gases or GPM for liquids.

Flow Chart: A set of regulator performance curves depicting droop under different inlet pressures, set points and flow rates.

GPM: Acronym for Gallons Per Minute.

Leakage: Flow of gas or fluid past a seat or seal, in the closed position.

Maximum Supply Pressure: The maximum safe pressure that may be applied to the signal port of a device to create a predetermined signal at the output of the device.

Pressure Reducing Regulator: A pressure regulator which controls an output (discharge) pressure from a higher supply (inlet) pressure.

Ratios: The relation between two similar magnitudes in respect to the number of times the first contains the second (i.e. 1:2, 2:1).

Regulated Vacuums: Control of pressure in a vessel at pressures less than atmospheric.

Sensitivity: The least change in the variable to which the device will respond.

SCFH: Acronym for Standard Cubic Feet per Hour.

SCFM: Acronym for Standard Cubic Feet per Minute

Set Point: (Control setting ranges/control back pressure ranges). The output or control pressure under non-flowing conditions.

Single Stage Regulator: A pressure reducing regulator which reduces supply (inlet) pressure to output (controlled) pressure with a single pressure sensing element and control valve. Single stage regulators are typically used when supply pressure is constant (such as a pipeline regulator), or where frequent adjustment is not a problem.

Static: See Steady-State.

Steady-State: A characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibiting only negligible change over an arbitrary long period.

Supply Pressure Effect: The effect of supply pressure variations relative to output pressure at a constant set point.

Vent Port: A feature of some regulators which permits the user to install a fluid connector into the regulator bonnet (control spring chamber) and pipe away any fluid which enters the bonnet. Capture ports are used when the user needs to contain the regulated media in case of catastrophic failure of the pressure sensing element, or when self-relieving is required. Capture ports may be user positionable, or fixed, depending on the model.

GFH45 Series Airpak® Filter Regulators

Conoflow's GFH Series Airpak® Filter Regulators are widely used to provide clean, regulated air pressure to instruments and controls, automatic machinery and other pneumatic devices.

These ruggedly built units are available in either brass or stainless steel construction affording versatility in meeting today's instrument and industrial applications. The brass model has a maximum pressure rating of 300 PSI (2068 kPa) (GFH45).

Buna "N" elastomers are standard for the GFH45 and incorporate a 35 micron polypropylene filter. Cellulose (10 micron) and stainless steel (40 micron) filters are available. Consult the factory for details. Three regulated pressure ranges of 0-25, 0-60, 0-125 (0-172, 0-414, and 0-862 kPa) are available with adjustments made by means of a wrench knob. Handwheel adjustment. Preset and tamperproof versions are available.

The unit incorporates four ¼" NPT connections. The additional porting allows installation of a gauge for monitoring output pressure. Brass, steel and stainless steel case gauges are available.

The GFH45 is designed for reliability with an absolute minimum of maintenance. The characteristics are a result of Conoflow's high standards of manufacturing and years of experience as a leading producer of pneumatic instrumentation.

GFH45

Options:

Pressure Gauges
2" Diameter – Steel, Brass or Stainless Steel Case
Ranges: 0-30, 0-60, and 0-160 PSI (0-207, 0-414, 0-1103 kPa)

Mounting
Line – All Variations
Wall – GFH45 (Standard)
Flush-back panel mounted (3-hole) (Optional)

Adjustment
Knob – Optional
Handwheel – Standard
Preset – Factory output setting CAN be field adjusted
Tamperproof – Factory output setting CANNOT be field adjusted

Dimensional Data – Advertising Drawings
GFH45: A17-83

The filter regulator shown in Figure 1 operate in the same manner. Turning the knob changes the force exerted by the range spring on the diaphragm assembly. In equilibrium, the force exerted by the range spring is balanced by the force from the output pressure acting underneath the diaphragm assembly.

An unbalance between the output pressure and the range spring force causes a corresponding reaction in the diaphragm and nozzle assemblies. If the output pressure rises above the set pressure, the diaphragm seat is lifted from the plug, venting the excess pressure to atmosphere until equilibrium is reached. If the output pressure drops below the set pressure, the unbalanced force from the range spring acts through the diaphragm assembly unseating the nozzle plug. This allows supply pressure to flow through the nozzle to the downstream port increasing the output pressure. The output pressure increases until it balances the force on the diaphragm assembly by the range spring. At equilibrium, the plug assumes a position which supplies the required flow while maintaining the output pressure at the set pressure.

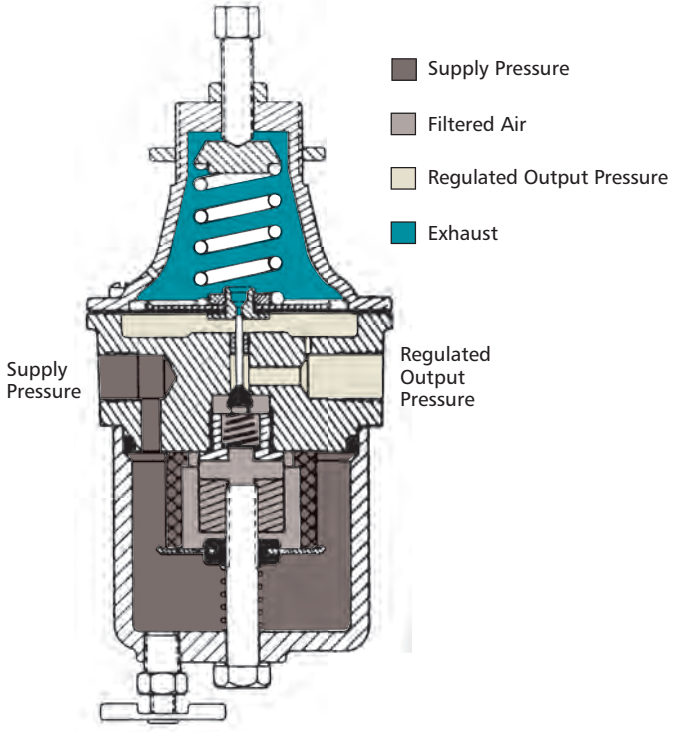
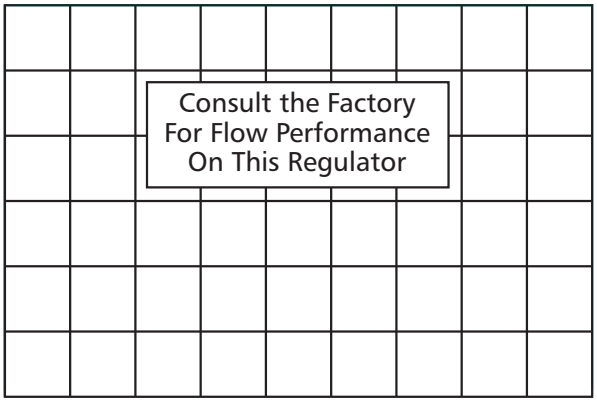


Figure 1
GFH45 Relief – No Bleed/Soft Seat Nozzle

FLOW GRAPH



Specifications

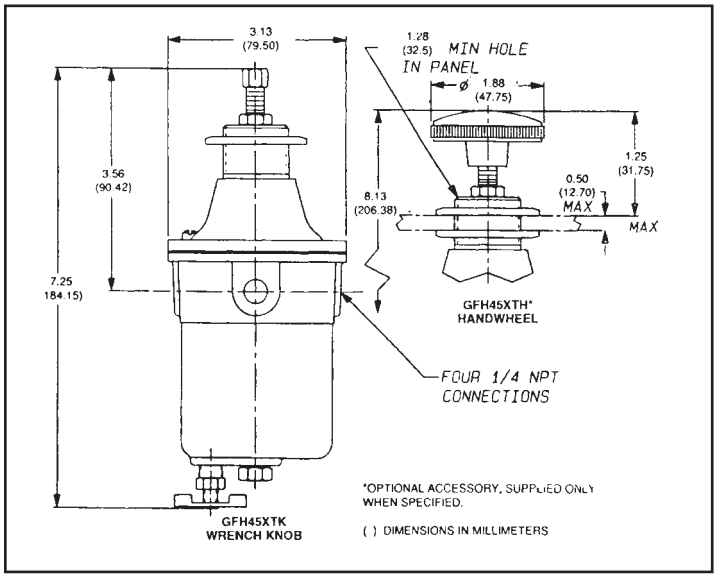
Operating Characteristics

Maximum Supply Pressure	300 PSI (2068 kPa)
Connections	¼" NPT
Regulated Output Pressure Ranges	0-25, 0-60, 0-125 PSI (0-172, 0-414, 0-862 kPa)
Flow Capacity [100 PSI (690 kPa) Supply]	20 SCFM (0.566 m^3/min)
Sensitivity	0.02 PSI (0.14 kPa)
Supply Pressure Effect for 25 PSI (172 kPa) Change in Supply Pressure	0.30 PSI (2.07 kPa)
Ambient Temperature Range	-20ºF to +150ºF (-29ºC to +66ºC)
Filter Rating (See Note 1)	35 Micron - Polypropylene
Approximate Shipping Weight	3.4 lbs. (1.54 Kg-cm)

Materials of Construction

	GFH45 (See Note 3)
Body	Brass
Bonnet	Brass
Diaphragm Assembly	Buna "N"
Nozzle	Brass w/ Buna "N" Seat
Range Spring	Steel Zinc Plated
Bowl and Draincock	Brass/Brass

Notes:
1. Optional 10 micron (Cellulose) or 40 micron (Stainless Steel) filters available.
2. When the GFH45 Regulator is supplied with a Viton elastomer option, the diaphragm assembly, o-ring and nozzle will be Viton and the grommet will be Neoprene.



For Certified Dimensional Drawing, refer to A17-83 (GFH45)

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to material of construction, diaphragm selection and filtering capabilities, it also provides all necessary data regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain twelve (12) characters.

1-5 Models	GFH45 = Airpak® - Filter, Regulator Combination (Replaces GFH20) (Brass Construction - Soft Seat Nozzle - Buna "N")
6 Filter Options	A = Filter - Cellulose (10 Micron) B = Filter - Stainless Steel (40 Micron - Cleaned for Oxygen Service) C = Filter - Stainless Steel (40 Micron) X = Filter - Polypropylene (35 Micron) (Standard)
7 Bonnet Type	F = Tapped Bonnet for Flush-Back Panel Mounting T = Threaded Bonnet (Standard for GFH45)
8 Adjustment Selections	H = Handwheel K = Knob (Wrench Style) (Standard)
9 Diaphragm Selections	E = Buna "N" (w/Relief, No Bleed) (Standard) F = Viton on Nomex (No Bleed, No Relief) J = Viton on Nomex (w/ Relief, No Bleed) M = Buna "N" (No Bleed, No Relief)
10 Gauge Selections	X = Absence of Specification - No Gauge (Standard)
11 Filter Bowl Options	1 = Standard
12 Range Selections	C = 0-25 PSI (0-172 kPa) F = 0-60 PSI (0-414 kPa) G = 0-125 PSI (0-862 kPa)

GFX02/GFX04 Series Filters

Conoflow's GFX Series Filters are used to provide clean air to instruments and other pneumatic devices. The 35 micron filter removes foreign particles from the air allowing intermediate and final control devices to operate at peak efficiency.

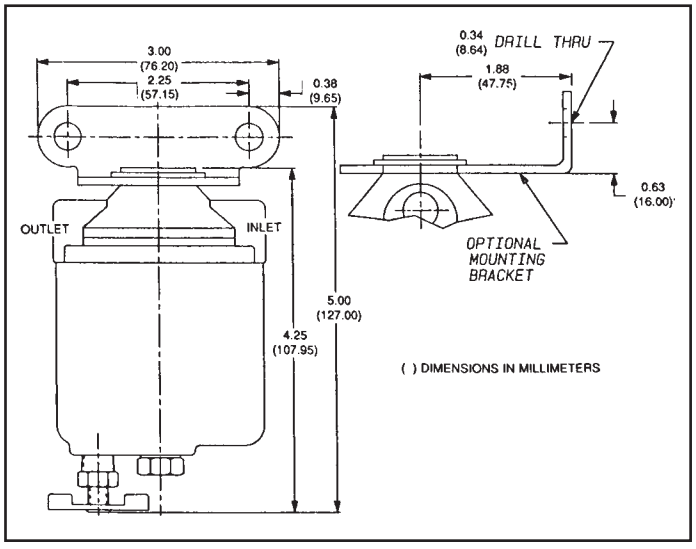
Available in either brass or aluminum construction, the GFX Series Filters cover most of today's instrument and industrial applications. Each filter has a maximum supply pressure rating of 300 PSI (2068 kPa).

These units have two ¼" NPT connections with an arrow on the cap denoting air flow direction. An optional center port is available.

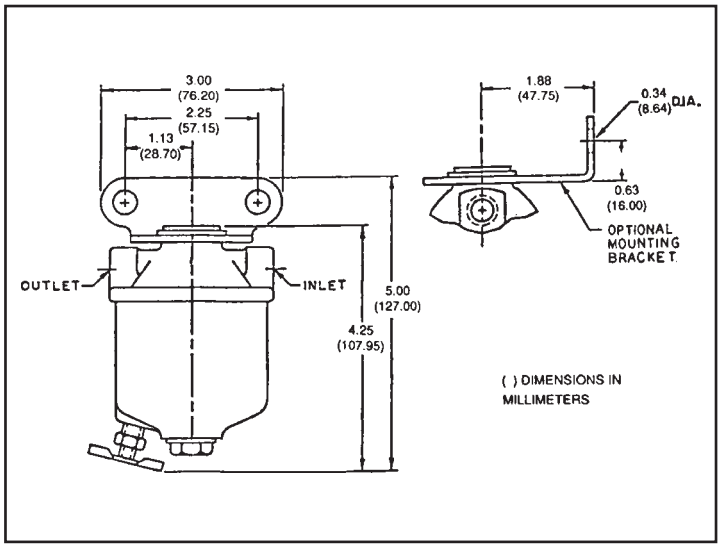
Designed for reliable, almost maintenance-free service, these filters are backed by Conoflow's high standards of manufacture and years of experience as a producer of precision instruments.

Options

Mounting: Bracket for wall mounting
Connection Port: Center ¼" NPT



For Certified Dimensional Drawing, refer to A15-3 (GFX02)



For Certified Dimensional Drawing, refer to A15-3 (GFX04)

Specifications

Operating Characteristics

Maximum Supply Pressure
300 PSI (2068 kPa)

Connections
¼" NPT

Flow Capacity
(100PSI Supply): Chart 1

Filter Rating
35 micron (Polypropylene) (See Note 1)

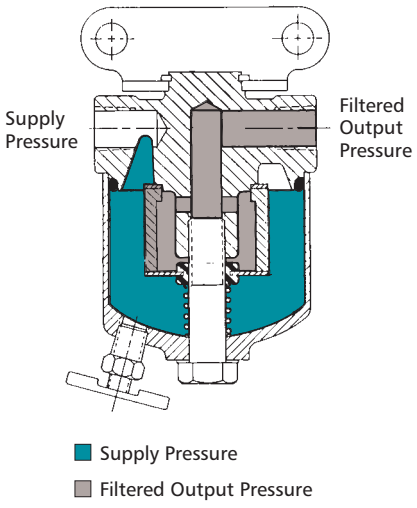
Ambient Temperature Range
-20ºF to +150ºF (-29ºC to +66ºC)

Approximate Shipping Weight
GFX02 - 2 lbs. (0.91 kg)
GFX04 - 2 lbs. (0.91 kg)

Notes:
1. Optional 10 Micron Filter (Cellulose) available.
2. Optional 40 Micron Filter (Stainless Steel) available.

Materials of Construction

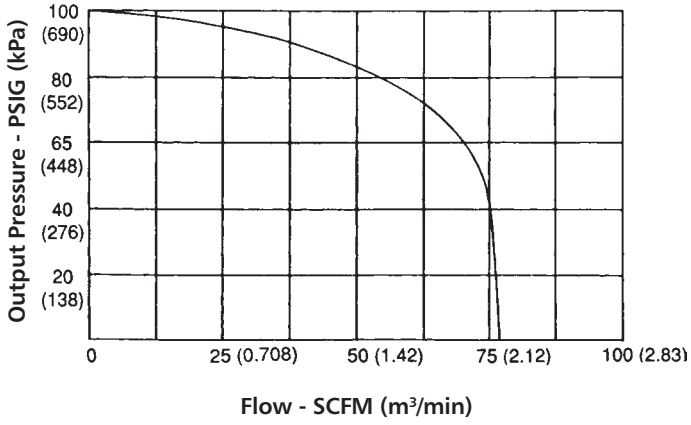
Model	GFX02	GFX04
Bonnet	Brass	Aluminum
Bowl	Brass	Aluminum
Draincock	Brass	Brass



GFX02/GFX04 Filters
Filtration Only - No Regulation

The Conoflow GFX Series Filters provide instrument quality air by directing the supply air through a 35 micron filter. Remove moisture in the dripwell periodically by opening the draincock while the unit is under pressure.

Chart 1. Flow Characteristics



Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction, it also provides all necessary data, regarding porting and mounting selections. Control Engineering Data also provides a means of communicating by way of a code number, which is fully descriptive of the product selection.

1-5 Models

GFX02 = Filter-Filtration Only (No Regulation) Replaces GFX01 (Brass Construction)
GFX04 = Filter-Filtration Only (No Regulation) Replaces GFX03 (Aluminum Construction)
Note: 1. For dimensional data, refer to drawings A15-4 (GFX02) and A15-3 (GFX04).

6 Filter Options

A = Filter - Cellulose (10 Micron)
B = Filter - Stainless Steel (40 Micron - Cleaned for Oxygen Service)
C = Filter - Stainless Steel (40 Micron)
X = Absence of Specification
Notes: 1. If options A, B or C are not specified, a 35 Micron, polypropylene filter will be supplied.

7 Mounting Options

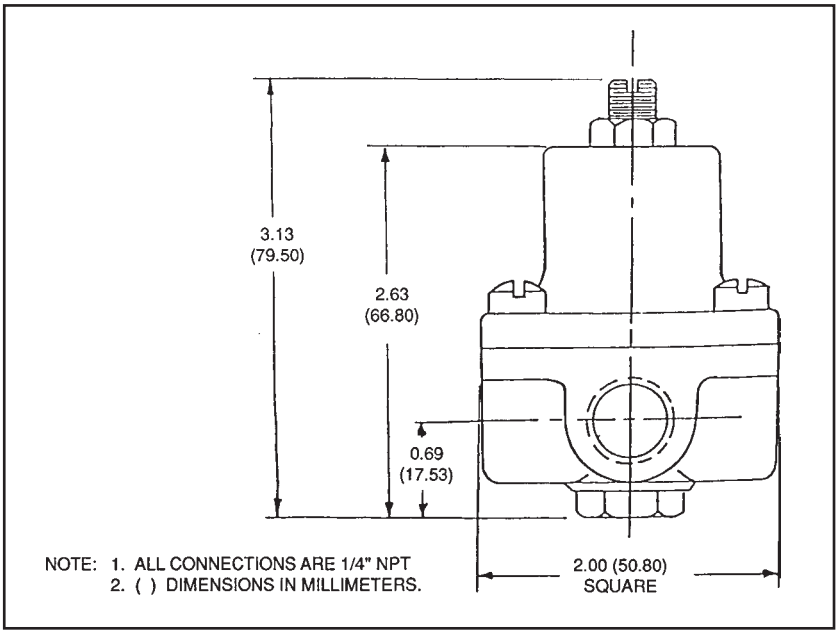
R = Mounting Bracket
X = Absence of Specification
Notes: 1. The body for the GFX02/GFX04 Series Filters are not machined to accept the mounting bracket. Unit(s) must be originally ordered with the "R" specified for field adapting the mounting bracket.

GH04 Series Cushion Loading Regulator

The model GH04 Cushion Loading Regulator is a compact unit designed for industrial and commercial services requiring a constant, regulated air pressure. Primarily used as a cushion loading device for Conoflow Piston Actuators, this unit's design and high exhaust capabilities lend itself to many other application requirements.

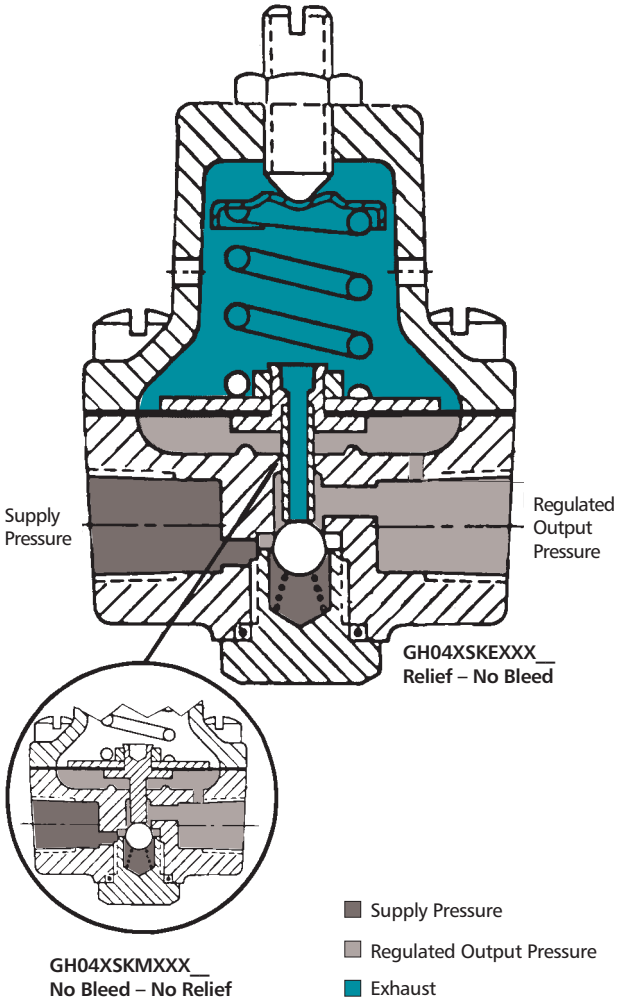
Constructed of all aluminum, this lightweight unit offers versatility in line mounting and gauge mounting with dual input and output ¼" NPT connections. It is available with a 0-60 PSI (0-414 kPa) regulated pressure range and Buna "N" elastomers. The controlling ball valve is Viton.

Backed by Conoflow's years of experience as a leading producer of precision built instruments.



For Certified Dimensional Drawing, refer to A17-75

Principle of Operation



Turning the adjusting screw changes the force exerted by the range spring on the diaphragm assembly. In equilibrium, the force exerted by the range spring is balanced by the force from the output pressure acting underneath the diaphragm assembly.

An unbalance between the output pressure and the set pressure causes a corresponding reaction in the diaphragm and nozzle assemblies. If the output pressure rises above the set pressure, the diaphragm seat is lifted from the ball, venting the excess pressure to atmosphere until equilibrium is reached. If the output pressure drops below the set pressure, the unbalanced force from the range spring acts through the diaphragm assembly unseating the nozzle ball. This allows supply pressure to flow to the downstream port increasing the output pressure. The output pressure increases until it balances the force on the diaphragm assembly by the range spring. At equilibrium, the ball assumes a position which supplies the required flow while maintaining the output pressure at the set pressure.

A no bleed/no relief diaphragm assembly is used to prevent the process media from exhausting to atmosphere. This option is typically used with liquids and hazardous gases. The principle of operation is the same as above except that excess output pressure is not vented to atmosphere. Instead, as the diaphragm seat lifts off the ball and the ball is forced against its seat by the nozzle spring the excess pressure is relieved downstream.

Materials of Construction

Body: Aluminum
Bonnet: Aluminum
Diaphragm Assembly: Buna "N"
Ball Valve: Viton
Range Spring: Steel Zinc Plated

Specifications

Operating Characteristics

Maximum Supply Pressure:	300 PSI (2068 kPa)
Regulated Output Pressure:	0-60 PSI (0-414 kPa)
Connections:	¼" NPT (Four)
Flow Capacity:	2 SCFM (0.57 m^3/min) with 100 PSI (690 kPa) Supply Pressure
Exhaust Capacity:	6 SCFM (0.170 m^3/min)
Sensitivity:	0.1 PSI (0.689 kPa)
Supply Pressure Effect:	1.6 PSI (11.03 kPa) for 25 PSI (172 kPa)
Ambient Temperature Range:	-20ºF to +150ºF (-29ºC to +66ºC)
Approximate Shipping Weight:	1 lb. (25.4 Kg)

Control Engineering Data

GH04	=	Cushion Loading Regulator
X	=	Absence of Specification
S	=	Plain Bonnet - No Thread
K	=	Knob (Screwdriver slot type
E	=	w/Relief - No Bleed **OR** M = No Bleed - No Relief
XXX	=	Absence of Specification
F	=	0-60 PSI (0-414 kPa) Range

Manual Loading Regulators and Manual Loading Stations

Conoflow's GH10 Manual Loading Regulators are precision units designed for use in laboratory environments, remote loading of pneumatic devices, speed changers and other general purpose applications.

Available in brass, aluminum or stainless steel construction and combinations of the same, the GH10 Regulators cover a wide variety of applications. Maximum supply pressure ratings on the brass units are 200 PSI (1379 kPa) and the stainless steel models are rated at 300 PSI (2068 kPa). The brass units use Buna "N" diaphragms with Teflon/Buna "N" diaphragms with Teflon/Buna "N" sandwich type diaphragms used in the stainless steel models. Other diaphragm materials are available upon request. Regulated pressure ranges of 0-3, 5, 15, 25, 35, 50, and 125 PSI (0-21, 35, 103, 172, 241, 345, and 862 kPa) are standard.
For precise and accurate regulation the diaphragms incorporate a relief and constant bleed feature. The constant bleed is an engineered orifice to increase sensitivity by keeping the nozzle plug in a dynamic state, nullifying hysteresis and deadband. For applications with corrosive and/or toxic media, the regulators are available with a no bleed/no relief diaphragm which maintains the medium heat in the system. Tapped bonnets are available for remote venting of the exhaust gas.

Each unit has two ¼" NPT connections and can be line, wall or flush-back panel mounted. The easily adjustable handwheels are standard with wrench knob, preset and tamperproof options available.

These products are guaranteed by Conoflow's high standards of manufacture and years of experience as a leading producer of precision instruments.

Options:

Mounting
Line – All Variations
Wall – Bracket required
Panel – All Variations (Standard)
Flush-back panel mounted (3-hole)

Adjustment
Knob (Wrench Style) – Optional
Handwheel – Standard
Preset – Factory output setting CAN be field adjusted
Tamperproof – Factory output setting CANNOT be field adjusted

Dimensional Data – Advertising Drawings
GH10: A17-2

Figure 1
Turning the handwheel changes the force exerted by the range spring on the diaphragm assembly. In equilibrium, the force exerted by the range spring is balanced by the force from the output pressure acting underneath the diaphragm assembly.

An unbalance between the output pressure and the range spring force causes a corresponding reaction in the diaphragm and nozzle assemblies. If the output pressure rises above the set pressure, the diaphragm seat is lifted from the plug, venting the excess pressure to atmosphere until equilibrium is reached. If the output pressure drops below the set pressure, the unbalanced force from the range spring acts through the diaphragm assembly unseating the nozzle plug. This allows supply pressure to flow through the nozzle to the downstream port increasing the output pressure. The output pressure increases until it balances the force on the diaphragm assembly by the range spring. At equilibrium, the ball assumes a position which supplies the required flow while maintaining the output pressure at the set pressure.

The constant bleed feature is used in applications where the flow demand is low. The constant bleed keeps the diaphragm in a dynamic state by preventing the nozzle from closing completely. This increases both the sensitivity and the stability of the regulator.

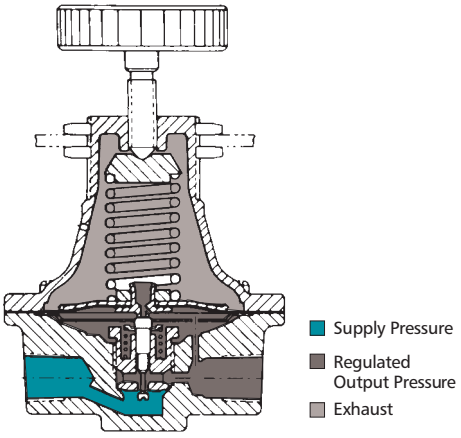
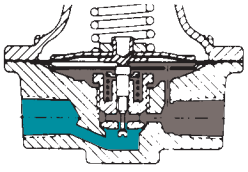
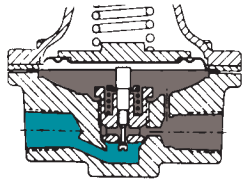


Figure 1
GH10 Series
Bleed and Relief Diaphragm

Figure 2
A no bleed/no relief diaphragm assembly is used to prevent the process medium from exhausting to atmosphere. This option is typically used with liquids and hazardous gases. The principle of operation is the same as above except that excess output pressure is not vented to atmosphere. Instead, as the diaphragm seat lifts off of the plug and the nozzle closes, the excess pressure is relieved downstream.



GH10XTHM and GH10XT1014
GH10XT2230



GH10XT1166

Figure 2
GH10 Series
No Bleed/ No Relief Diaphragm

Chart 1: Flow Characteristics – GH10, 0-5 PSIG Range

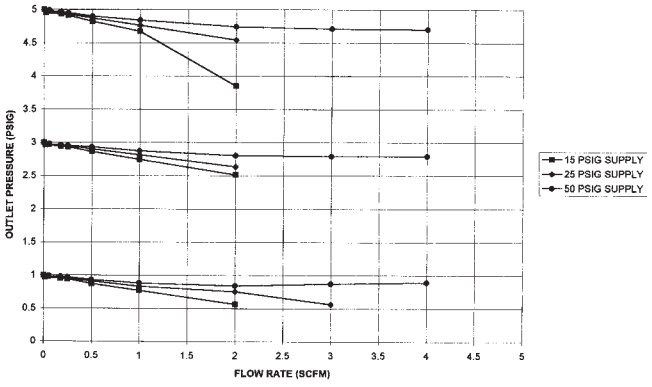


Chart 2: Flow Characteristics – GH10, 0-25 PSIG Range

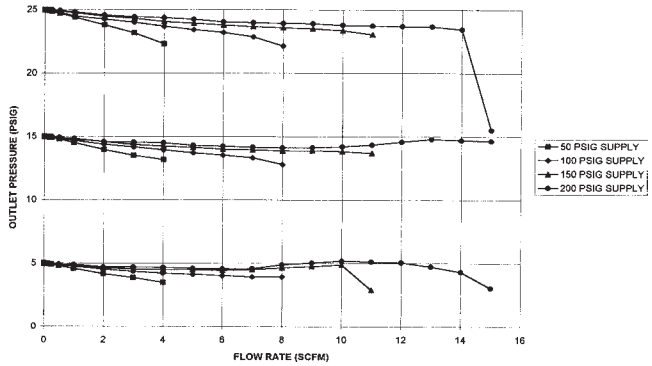
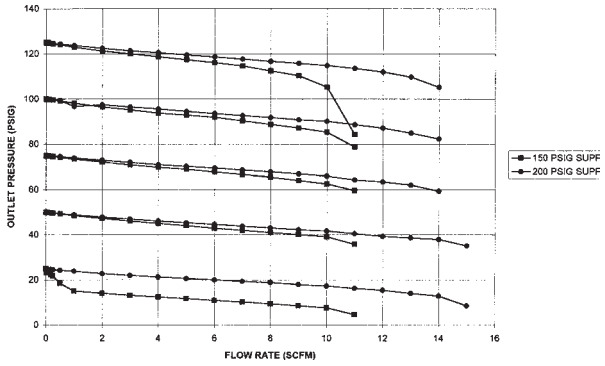


Chart 3: Flow Characteristics – GH10, 0-125 PSIG Range



Specifications

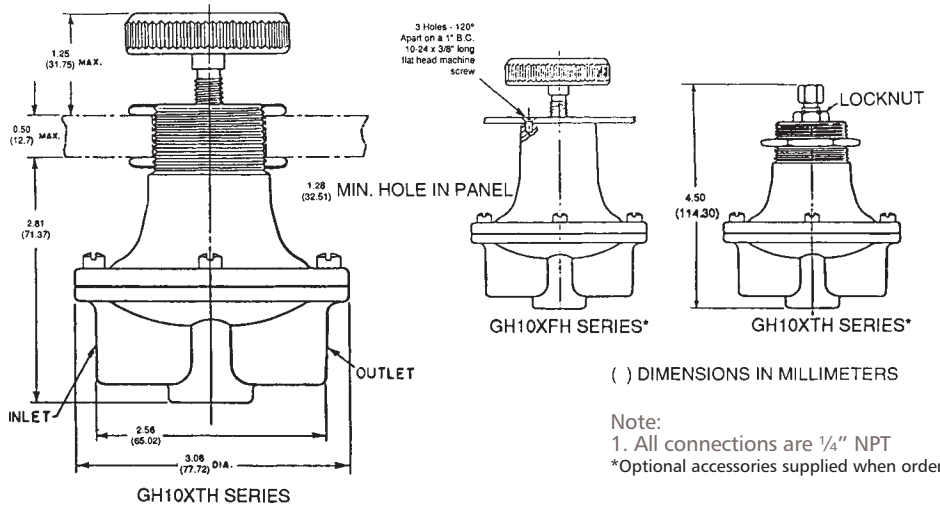
Operating Characteristics

	GH10XTHCXXX_ GH10XTHMXXX_	GH10XTHCXBX_	GH10XT1014_(1)	GH10XT2230_(1)	GH10XTHRXKX	GH10XTHHXSX
Maximum Supply Pressure (3)	200 PSI (1379 kPa)		300 PSI (2068 kPa)			
Connections	¼" NPT (No Gauge Ports)					
Regulated Output Pressure Ranges	0-3, 5, 15, 25, 35, 50 and 125 PSI 0-21, 35, 103, 172, 241, 345 and 862 kPa)				0-3, 5, 15, 25, 35, 50 and 125 PSI (0-21, 35, 103, 172, 241, 345 and 862 kPa)	
Flow Capacity	See Flow Graphs					
Sensitivity	0.20" (0.51 cm) H_2O (with relief and bleed)					
Supply Pressure Effect	0.1 PSI for 25 PSI (0.69 kPa for 172 kPa) Change in Supply Pressure					
Ambient Temperature Range	-20ºF to +150ºF (29ºC to +66ºC) (with Buna "N" diaphragm)					
Approximate Shipping Weight	1.75 lbs. (0.79 Kg)	2.00 lbs. (0.91 Kg)				

Notes: 1. These units are supplied with No Bleed/No Relief diaphragms only.
2. This unit is cleaned for oxygen service as a standard.
3. For Maximum Supply Pressure Ratings greater than 200 or 300 PSIG, consult the factory.

Materials of Construction

	GH10XTHCXXX_ GH10XTHMXXX_	GH10XTHCXBX_	GH10XT1014_(1)	GH10XT2230_(1)	GH10XTHRXKX	GH10XTHHXSX
Body	Brass	Brass	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel
Bonnet	Aluminum	Brass	Brass	Brass	316 Stainless Steel	316 Stainless Steel
Diaphragm Assembly	Buna "N"	Buna "N"	Buna "N" Teflon Faced Process Side Only	Buna "N" Teflon Faced Process Side Only	Teflon/Buna "N"/ Teflon	Teflon/Buna "N"/ Teflon
Nozzle Assembly	Brass Body Stainless Steel Plug	Brass Body Stainless Steel Plug	302/303 Stainless Steel	316 Stainless Steel	302/303 Stainless Steel	316 Stainless Steel
Range Spring	Steel Zinc Plated	Steel Zinc Plated	Steel Zinc Plated	Steel Zinc Plated	316 Stainless Steel	316 Stainless Steel



Note:
1. All connections are ¼" NPT
*Optional accessories supplied when ordered only.

Standard Ranges:

0-3 PSI	(0-21 kPa)
0-5 PSI	(0-35 kPa)
0-15 PSI	(0-103 kPa)
0-25 PSI	(0-172 kPa)
0-35 PSI	(0-241 kPa)
0-50 PSI	(0-345 kPa)
0-125 PSI	(0-862 kPa)

For Certified Dimensional Drawing, refer to A17-2 (GH10)

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain twelve (12) characters.

1-4 Model
GH10 = Regulator - Manual Loading - For dimensional data, refer to Drawing A17-2

5 Operational Features
X= Standard

6 Bonnet Options
A = Bonnet with 1/8" NPT Tapped Vent
F = Tapped Bonnet for Flush Back Panel Mounting (**Note:** 1. This option is standard on the GH10XF.)
S = Plain Bonnet
T = Threaded Bonnet (Standard)

7 Adjustment Selections
B = Long Handwheel with Full Hex Nut
H = Handwheel (Standard)
K = Knob (Wrench Style)

8 Diaphragm Selections
The catalog number(s) listed under each diaphragm option is the standard diaphragm used in that regulator. These options apply to all output ranges of that unit.
A = Teflon (Rubber Backed) Corrosive Service on Process Side (No Bleed, No Relief) GH10XT1014_, GHXT2230_
B = Silicone on Glass (No Bleed, No Relief)
C = Buna "N" (with Relief and Bleed) (See Note 1) GH10XTHCXXX_, GH10XFHCXXX_, GH10XTHCXBX_
D = Neoprene (with Relief, No Bleed)
E = Buna "N" (with Relief, No Bleed)
F = Viton on Nomex (No Bleed, No Relief)
G = Silicone on Glass (with Relief, No Bleed)
H = Teflon (Sandwich Type - with Relief, No Bleed) GH10XTHHXSX_
J = Viton on Nomex (with Relief, No Bleed)
L = Nordel on Nomex (EPDM) (with Relief, No Bleed)
M = Buna "N" (No Bleed, No Relief) GH10XTHMXXX_, GH10XFHMXXX_
N = Nordel on Nomex (EPDM) (No Bleed, No Relief)
P = Neoprene (No Bleed, No Relief)
R = Teflon (Sandwich Type - with Relief and Bleed GH10XTHRXKX_ (See Note 1)
Note: 1. This option cannot be supplied in 316 Stainless Steel construction.

9 Seat Selections
A = Buna "N"
B = Neoprene
C = Viton
D = Low Leak Nozzle with Metal Seat GH10/20 - 20CC Air/Min.
F = Low Leak Nozzle with Metal Seat GH10/20 - Less than 15CC Air/Min. (See Note 1)
N = Nordel
X = Standard - Unless option code is specified
Notes: 1. Option "F" is not available in 316 Stainless Steel construction.

10 Material Options
B = Brass Construction
K = Stainless Steel Construction (302/303 Stainless Steel Internals)
S = Stainless Steel Construction (316 Stainless Steel Internals)
X = Standard - Unless option code is specified

11 Cleaning Options
A = Cleaned for Oxygen Service
X = Standard - Unless option code is specified

12 Range Selections
A = 0-5 PSI (0-35 kPa)
B = 0-15 PSI (0-103 kPa)
C = 0-25 PSI (0-172 kPa)
D = 0-35 PSI (0-241 kPa)
E = 0-50 PSI (0-345 kPa)
F = 0-60 PSI (0-414 kPa)
G = 0-125 PSI (0-862 kPa)
L = 0-3 PSI (0-21 kPa)

GH20/GH40 Series Regulators

Service and Pressure Reducing Regulators

Conoflow's Service (GH20 Series) Regulators are rugged units with flow capabilities and performance characteristics which allow the units to operate in both instrument and industrial applications. For applications where positive shut-off and minimum air consumption are required, the soft-seated nozzle GH40 versions are available.

The GH20/40 Series units are available in brass/aluminum combinations, all brass or all stainless steel constructions. Maximum supply pressure ratings for the GH20 Series are 200 PSI (1379 kPa), 300 PSI (2068 kPa) for stainless steel models and the diaphragms are standard in the brass and aluminum units with Teflon/Buna "N"/Teflon sandwich diaphragms used in the stainless steel models. Other diaphragm materials are available. Consult the factory.

Connections for the GH20/40 Series are ¼" NPT. Each unit has an easily adjustable wrench knob with handwheels, tamperproof and preset versions available.

These units are manufactured to Conoflow's high standards and are backed by years of experience as a leading producer of precision built instruments.

Options:

Mounting

Line – All Variations

Flush-back panel mounting

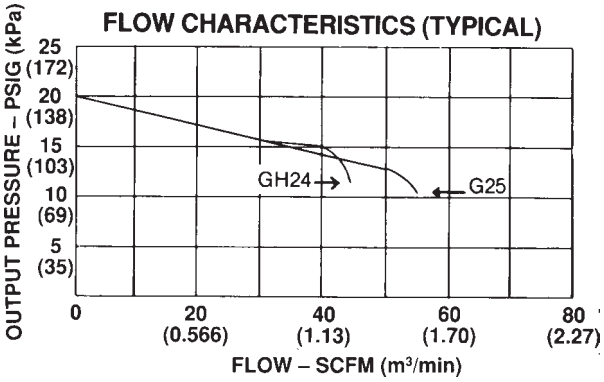
GH20/40 – 3 Hole (Refer to Drawing A17-2)

Adjustment

Knob:	Standard GH20/4- (Optional GH20/40)
Handwheel:	(Optional GH20/40)

Dimensional Data – Advertising Drawings:

GH20/40: A17-3



Typical curves for a 0-60 PSI (0-414 kPa) unit with a 20 PSI (138 kPa) set pressure and 100 PSI (690 kPa) supply.

Chart 1: Flow Characteristics – GH20, 0-25 PSIG Range

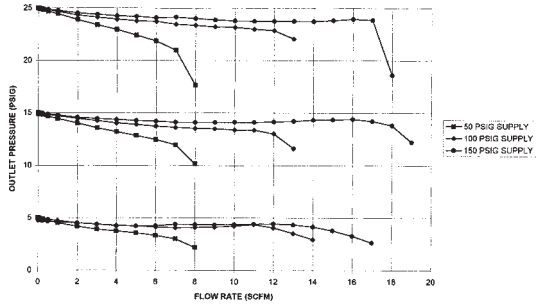


Chart 2: Flow Characteristics – GH20, 0-60 PSIG Range

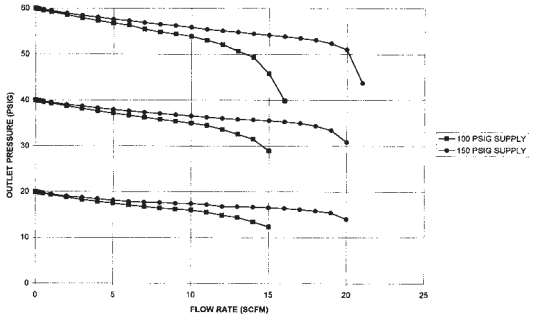
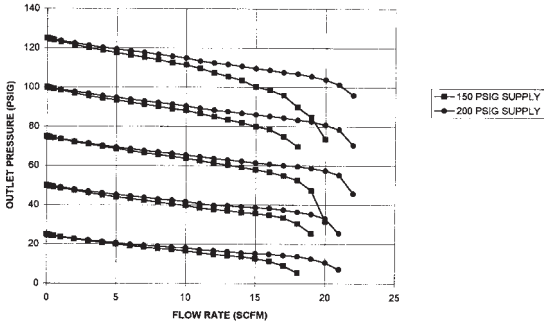


Chart 3: Flow Characteristics – GH20, 0-125 PSIG Range



Refer to Figure 1

Turning the handwheel changes the force exerted by the range spring on the diaphragm assembly. In equilibrium, the force exerted by the range spring is balanced by the force from the output pressure acting underneath the diaphragm assembly.

An unbalance between the output pressure and the range spring force causes a corresponding reaction in the diaphragm and nozzle assemblies. If the output pressure rises above the set pressure, the diaphragm seat is lifted from the plug, venting the excess pressure to atmosphere until equilibrium is reached. If the output pressure drops below the set pressure, the unbalanced force from the range spring acts through the diaphragm assembly unseating the nozzle plug. This allows supply pressure to flow through the nozzle to the downstream port increasing the output pressure. The output pressure increases until it balances the force on the diaphragm assembly by the range spring. At equilibrium, the plug assumes a position which supplies the required flow while maintaining the output pressure at the set pressure.

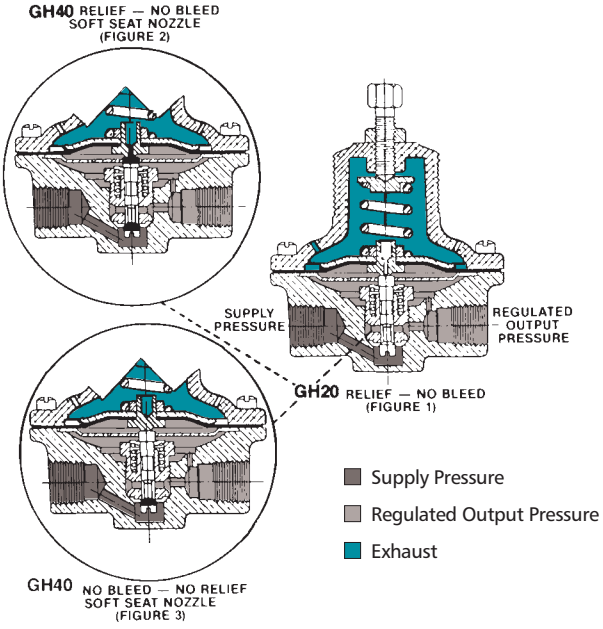
Refer to Figure 2

For applications where positive shut-off and minimum air consumption are required, molded rubber seats on the top and bottom of the nozzle plug are available.

Refer to Figure 3

A no bleed/no relief diaphragm assembly is used to prevent the process medium from exhausting to atmosphere. This option is typically used with liquids and toxic gases. The principle of operation is the same as above except that excess output pressure is not vented to atmosphere. Instead, as the diaphragm seat lifts off of the plug and the nozzle closes, the excess pressure is relieved downstream.

A molded rubber seat on the nozzle plug is available for applications where positive shut-off is required.



Specifications

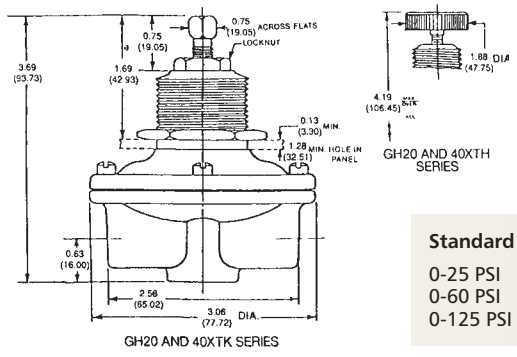
Operating Characteristics

	GH20XTKEXXX_ GH20XTKEXBX_	GH20XTKHXKX_	GH20XTKHXSX_	GH40XTKEAXX_ GH40XTKMAXX_ GH40CTKEAXX_
Maximum Supply Pressure	200 PSI (1379 kPa)	300 PSI (2068 kPa)		200 PSI (1379 kPa)
Connections	¼" NPT (No Gauge Ports)			
Regulated Output Pressure Ranges	0-25, 60 and 125 PSI (0-172, 414 and 862 kPa)			
Flow Capacity	See Flow Graphs			
Sensitivity	0.05 PSI (0.345 kPa)			
Supply Pressure Effect	0.12 PSI (0.827 kPa) for 25 PSI (172 kPa) change in Supply Pressure			
Ambient Temperature Range	-20ºF to +150ºF (29ºC to +66ºC) (with Buna "N" diaphragm)			
Approximate Shipping Weight	1.75 lbs.(0.79 Kg)			

Materials of Construction

Body	Brass	Brass	316 Stainless Steel	316 Stainless Steel	Brass
Bonnet	Aluminum	Brass	316 Stainless Steel	316 Stainless Steel	Aluminum
Diaphragm Assembly (1)	Buna "N"	Buna "N"	Teflon Buna "N" Teflon	Teflon Buna "N" Teflon	Buna "N"
Nozzle Assembly	Brass Body Stainless Steel Plug	Brass Body Stainless Steel Plug	302/303 Stainless Steel	316 Stainless Steel	Brass Body Stainless Steel Plug
Range Spring	Steel Zinc Plated	Steel Zinc Plated	316 Stainless Steel	316 Stainless Steel	Steel Zinc Plated

Note: 1. Other diaphragm materials available, consult the factory.



Standard Ranges:

0-25 PSI	(0-172 kPa)
0-60 PSI	(0-414 kPa)
0-125 PSI	(0-862 kPa)

Notes: 1. All connections are ¼" NPT
2. () dimensions are in millimeters
3. When the GH20/40 regulators are supplied in stainless steel construction, a high bonnet from the GH10 Series is used. Refer to Drawing A 17-2 for correct dimensional data.
*Option accessory. Only supplied when specified

For Certified Dimensional Drawing, refer to A17-3 (GH20/40)

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain twelve (12) characters.

1-4 Models

GH20 = Regulator - Service (For Dimensional Data, refer to Drawing A17-3) (See Note 1)
GH40 = Regulator - Service (Soft Seat) (For Dimensional Data, refer to Drawing A17-3) (See Note 1)
Note: 1. (Refer to Note 2 in Position 10).

5 Operational Features

X = Standard

6 Bonnet Options

A = Bonnet with $^{1}/_{8}$" NPT Tapped Vent
F = Tapped Bonnet for Flush Back Panel Mounting (3 Hole - GH20)
T = Threaded Bonnet - Standard GH20/40

7 Adjustment Selections

H = Handwheel - Standard
K = Knob (Wrench Style) - Standard GH20/40

8 Diaphragm Selections

The catalog number(s) listed under each diaphragm option is the standard diaphragm used in that regulator.
These options apply to all output ranges of that unit.
A = Teflon (Rubber Backed) Corrosive Service on Process Side (No Bleed, No Relief) (See Note 1)
B = Silicone on Glass (No Bleed, No Relief) (See Note 1)
D = Neoprene (with Relief, No Bleed) (See Note 1)
E = Buna "N" (with Relief, No Bleed) (GH20XTKEXBX_, GH40CTKEAXX_, GH40XTKEAXX_
F = Viton on Nomex (No Bleed, No Relief) (See Note 1)
G = Silicone on Glass (with Relief, No Bleed) (See Note 1)
H = Teflon (Sandwich Type - with Relief, No Bleed) (See Note 1) GH20XTKHXKX_, GH20XTKHXSX_
J = Viton on Nomex (with Relief, No Bleed) (See Note 1)
K = Teflon (Sandwich Type - No Relief, No Bleed) (See Note 1)
L = Nordel on Nomex (EPDM) (with Relief, No Bleed) (See Note 1)
M = Buna "N" (No Bleed, No Relief) GH40XTKMAXX__
N = Nordel on Nomex (EPDM) (No Bleed, No Relief) (See Note 1)
P = Neoprene (No Bleed, No Relief) (See Note 1)
R = Teflon (Sandwich Type - with Relief and Bleed) GH20XTHRXKX_ (See Notes 1)
Note: 1. This option cannot be supplied in 316 Stainless Steel construction.

9 Seat Selections

A = Buna "N"
B = Neoprene
C = Viton
D = Low Leak Nozzle with Metal Seat GH20 - 20CC Air/Min.
F = Low Leak Nozzle with Metal Seat GH20 - Less than 15CC Air/Min.
N = Nordel
X = Standard - Unless option code is specified
Notes: 1. All GH40 Models are standardly supplied with Buna "N" Soft Seats. If options B or C are required, specify accordingly. GH20 with soft seats are supplied as GH40.
2. Option "F" is not available in 316 Stainless Steel construction.

10 Material Options

B = Brass Construction (GH20 Only)
K = Stainless Steel Construction (302/303 Stainless Steel Internals) (See Notes 1 and 2)
S = Stainless Steel Construction (316 Stainless Steel Internals) (See Notes 1 and 2)
X = Standard - Unless option code is specified
Notes: 1. When the GH20/40 Regulators are supplied in Stainless Steel Construction, a High Bonnet from the GH10. Series is used. Refer to Drawing A17-3 for correct Dimensional Data.

11 Cleaning Options

A = Cleaned for Oxygen Service
X = Standard - Unless option code is specified

12 Range Selections

C = 0-25 PSI (0-172 kPa)
F = 0-60 PSI (0-414 kPa)
G = 0-125 PSI (0-862 kPa)

Differential Pressure Regulators

Conoflow's Differential Pressure Regulators are used to maintain a constant pressure differential across a variable or fixed orifice, providing a constant flow rate regardless of variations in upstream or downstream pressure. Various forms of differential pressure regulators are available.

The GH21XT maintains a fixed differential of 3 PSI (21 kPa) across the bonnet connection and body outlet. Adjustment of the flow rate is made downstream of the system. These units are normally used with flow rate indicators having built in needle valves.

These units are available in brass and aluminum construction, (GH21XTXM), all stainless steel (GH21XTXKXK, GH21XTXKXKS) or all aluminum construction (GH26/27XFXM). The GH21 Series has ¼" NPT connections and is rated for a 200 PSI (1379 kPa) maximum supply pressure, 300 PSI (2068 kPa) for stainless steel models. The GH26XF has ⅜" NPT connections with the GH27XF having ½" NPT (Signal Port ¼" NPT). Both units (GH26/27) are rated for 100 PSI (1379 kPa) maximum supply pressure.

The GH21F maintains a fixed differential of 3 PSI (21 kPa) across the bonnet connection and the body outlet, plus an integral needle valve is provided to allow flow rate adjustment within the regulator. This unit is normally used with flow rate indicators without needle valves. Construction of this unit is brass. The maximum supply pressure rating is 200 PSI (1379 kPa) and connections are ¼" NPT.

The GH21At provides an adjustable differential pressure across the bonnet connection and body outlet within the limits of the regulator range. The flow rate is controlled by adjusting the range spring to vary the pressure drop across a fixed orifice instead of using a needle valve.

These units are available in brass (GH21ATXEXXX_) or stainless steel (GH21ATXKXKX_, GH21ATXKXSX_) construction. The brass units have a maximum supply pressure rating of 200 PSI (1379) with the stainless steel units being rated at 300 PSI (2068 kPa). The body connections are ¼" NPT with an ⅛" NPT signal port connection. Regulated ranges are 0-5, 15, 25, 35, 50 and 0-125 PSI (0-35, 103, 172, 241, 345 and 862 kPa).

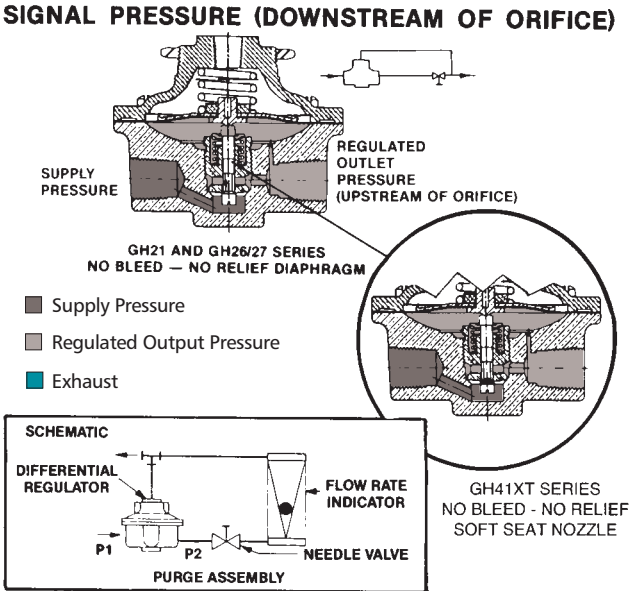
The GH31XT provides a 3 PSI (21 kPa) upstream differential pressure across a needle valve or other orifice to maintain a constant flow rate independent of line pressure variations. These units are also available in brass (GH31XTCM) or stainless steel (GH31XTXKXK, GH31XTXKXS) construction. Connections are ¼" NPT and both are rated at a maximum supply pressure rating of 100 PSI (690 kPa).

The brass or brass/aluminum combination units use Buna "N" diaphragms as standard with the stainless steel units having Teflon/Buna "N"/Teflon sandwich type diaphragms. Other diaphragm materials are available.

For purging systems using air, water or gas, the Conoflow GDH21 Differential Purge Assemblies are available. These units incorporate a GH21XT Regulator, needle valve and flow rate indicator, completely piped and ready for installation. A variety or ranges and styles of flow rate indicators are available. Refer to Charts 1 and 2 on Page 37.

Dimensional Data – Advertising Drawings:

GH21F:		A17-7
GH21/31/41:		A17-18
GH21AT:		A17-19
GDH21	1 and 2:	A13-4
GDH21	5 and 6:	A13-5
GDH21	7 and 8:	A13-8
GDH21	9 and 10:	A13-7
GDH21	11 and 12:	A13-9
GDH214:		A13-10
GDH213:		A13-11



The GH21XT, GH41XT and GH26/27XF are used to maintain a fixed differential pressure across a needle valve downstream from the regulator. The spring in the bonnet of the regulator exerts a force on the diaphragm assembly which requires approximately 3 PSI (21 kPa) underneath the diaphragm to balance with zero signal pressure. As signal pressure is applied to the bonnet connection, an increase in output pressure is required to keep the forces on the diaphragm assembly balanced. In equilibrium, the force due to the output pressure will be equal to the force from the spring plus the force due to the signal pressure. Since the spring force is equivalent to 3 PSI (21 kPa), the output pressure will always be 3 PSI (21 kPa) *greater* than the signal pressure.

If the output pressure drops below the equilibrium point, there is a net downward force on the diaphragm assembly. This force causes the nozzle plug to open allowing supply pressure to flow downstream until the output pressure returns to its equilibrium value.

The operation of the GH41XT is the same as the GH21XT except that a molded rubber seat is provided on the nozzle plug for applications requiring positive shut-off.

Purge Assemblies

Assembly consists of Conoflow Series GH21 Differential Regulators 3 PSI (21 kPa) fixed differential piped with metering devices as listed. Needle valve for flow adjustment is integral with meter, except Model GDH21FR5 and 6; needle valve is integral with regulator.

Chart 1

Model	Mounting	Range
GDH211	Line	20 to 200 cc/min. (Water)
GDH212	Line	0.25 to 2.5 SCFH
GDH213	Line	Sight Feed Bubbler
GDH214	Panel	Sight Feed Bubbler
GDH215	Line	25 to 250 cc/min. (Water)
GDH216	Line	0.1 to 2.0 SCFH
GDH217	Line	0.5 to 4.0 GPH
GDH218	Line	0.2 to 2.0 SCFH
GDH219	Panel	0.5 to 4.0 GPH
GDH2110	Panel	0.2 to 2.0 SCFH
GDH21FR5	Line	20 to 200 cc/min.
GDH21FR6	Line	0.1 to 2.0 SCFH
GDH2111	Line	0.4 to 4.0 GPH
GDH2112	Line	0.2 to 2.0 SCFH

*For other ranges, consult factory
**Maximum pressure rating is 50 PSIG

Stainless Steel Purge Assemblies
(Wetted parts S.S. with Teflon diaphragm) (1)

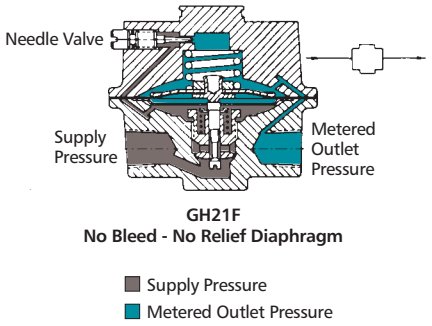
Chart 2

Model	Mounting	Range
GDH2113	Line	20 to 200 cc/min. (Water)
GDH2114	Line	0.2 to 2.0 SCFH
GDH2117	Line	25 to 250 cc/min. (Water)
GDH2118	Line	0.1 to 2.0 SCFH
GDH2119	Line	0.5 to 4.0 GPH
GDH2120	Line	0.2 to 2.0 SCFH
GDH2121	Panel	0.5 to 4.0 GPH
GDH2122	Panel	0.2 to 2.0 SCFH
GDH2123	Line	0.4 to 4.0 GPH
GDH2124	Line	0.2 to 2.0 SCFH

Note: 1. Maximum rating for flow meter is 100 PSI

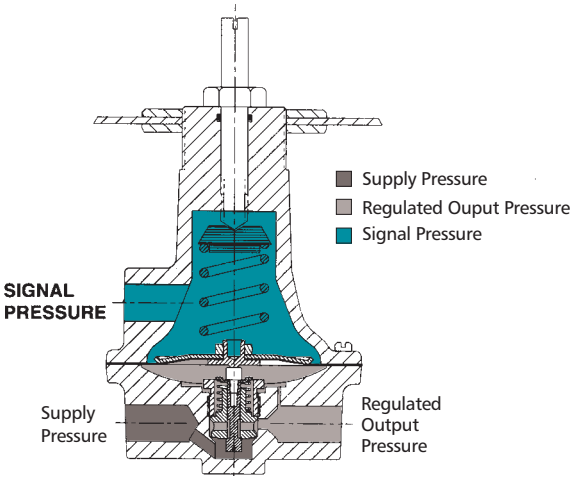
Principle of Operation

The GH21F maintains a 3 PSI (21 kPa) differential pressure, but has an integral needle valve for flow rate adjustment.



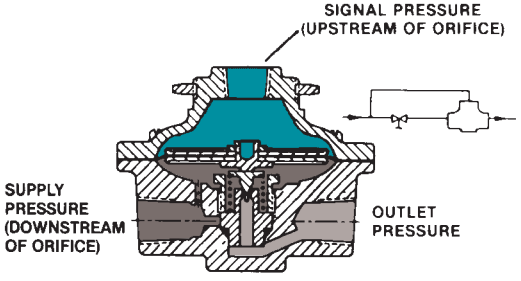
GH21F
No Bleed - No Relief Diaphragm

The GH21AT is used to maintain a constant differential pressure across a needle valve downstream from the regulator. The spring in the bonnet of the regulator exerts a force on the diaphragm assembly which can be adjusted to provide the required differential. With zero signal pressure, the regulator output pressure will be equivalent to the force from the range spring. As signal pressure is applied to the bonnet connection, an increase in output pressure is required to keep the forces on the diaphragm assembly balanced. In equilibrium, the force due to the output pressure will be equal to the force from the spring plus the force due to the signal pressure. The output pressure will therefore always be *greater* than the signal pressure.

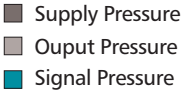


GH21AT
No Bleed - No Relief Diaphragm

The Conoflow Model GH31 regulator maintains a constant pressure differential across an external needle valve or other restriction, providing a constant flow rate, regardless of variations in upstream pressure. The pressure upstream of the needle valve is applied to the bonnet of the regulator and acts on the effective area of the diaphragm to create a downward force. This force is opposed by the pressure acting on the underside of the diaphragm and the compressed spring located under the plug which exerts an upward force equivalent to 3 PSI (21 kPa). Under operating conditions, the pressure downstream of the needle valve is always 3 PSI (21 kPa) less than the upstream pressure, thus the flow will remain constant for any setting of the needle valve.



GH31XT
No Bleed - No Relief Diaphragm



Flow Capacity

	Minimum	Maximum
Water	5 cc/min.	100 cc/min.
Air	10 cc/min.	1000 cc/min.
Total Pressure Drop PSI (kPa)	2 (14)	3 (21)

Operating Characteristics

	GH21XTXM GH41XTXM	GH21XTXKXK	GH21XTXKXS	GH26XFXM GH27XFXM	GH21FXFM GH21ATXMXXX*	GH21ATXKXKX*	GH21ATXKXSX*	GH31XTXM	GH31XTXKXK	GH31XTXKXS
Maximum Supply Pressure	200 PSI (1379 kPa)	200 PSI (2068 kPa)		200 PSI (1379 kPa)		300 PSI (2068 kPa)		100 PSI (690 kPa)		
Connections	¼" NPT			⅜" NPT to ½" NPT ¼" NPT Signal Port	¼" NPT	¼" NPT ⅛" NPT Signal Port		¼" NPT		
Differential Pressure	3 PSI (21 kPa)				0-5, 0-15, 0-25, 0-35, 0-50 and 0-125 PSI (0-35, 0-103, 0-172, 0-241, 0-345 and 0-862 kPa)			3 PSI (21 kPa)		
Flow Capacity	Consult Factory									
Sensitivity	0.2 H_2O (0.51 cm H_2O)									
Ambient Temperature Range	-20ºF to +150ºF (-29ºC to +66ºC)									
Approximate Shipping Weight	1 lb. (.45 Kg)	2 lbs. (.91 Kg)	2 lbs. (.91 Kg)	3 lbs. (1.36 Kg)	3 lbs. (1.36 Kg)	2 lbs. (.91 Kg)	2.75 lbs. (1.25 Kg)	3 lbs. (1.36 Kg))	3 lbs. (1.36 Kg)	1.75 lbs. (.79 Kg)	1.75 lbs. (.79 Kg)	1.75 lbs. (.79 Kg)

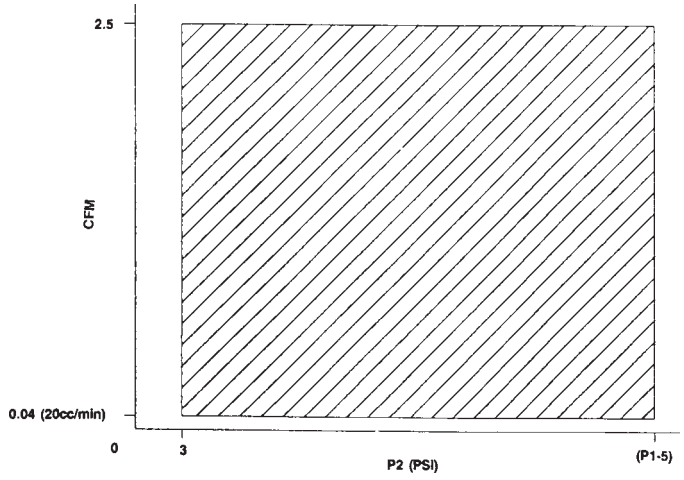
*These units are adjustable differential models. Specify desired output pressure when ordering, refer to Page 40.

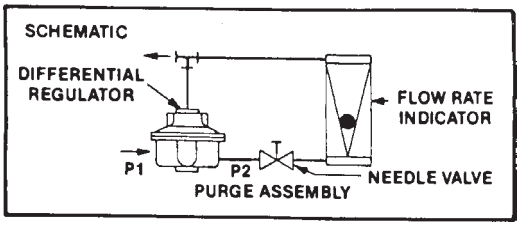
Materials of Construction

	GH21XTXM GH41XTXM	GH21XTXKXK	GH21XTXKXS	GH26XFXM GH27XFXM	GH21FXFM GH21ATXMXXX*	GH21ATXKXKX*	GH21ATXKXSX*	GH31XTXM	GH31XTXKXK	GH31XTXKXS
Body	Brass	316 St. Stl.	316 St. Stl.	Aluminum Aluminum	Brass Brass	316 St. Stl.	316 St. Stl.	Brass	316 St. Stl.	316 St. Stl.
Bonnet	Aluminum	316 St. Stl.	316 St. Stl.	Aluminum Aluminum	Brass Brass	316 St. Stl.	316 St. Stl.	Aluminum	316 St. Stl.	316 St. Stl.
Diaphragm Assembly (1)	Buna "N"	Buna "N" Teflon Sandwich Type	Buna "N" Teflon Sandwich Type	Buna "N" Buna "N"	Buna "N" Buna "N"	Buna "N" Teflon Sandwich Type	Buna "N" Teflon Sandwich Type	Buna "N"	Buna "N" Teflon Sandwich Type	Buna "N" Teflon Sandwich Type
Nozzle Assembly	Brass Body St. Stl. Valve Plug GH41 Buna "N" Seat	302 St. Stl. 303 St. Stl.	316 St. Stl.	Brass Body St. Stl. Valve Plug Brass Body St. Stl. Valve Plug	Brass Body St. Stl. Valve Plug Brass Body St. Stl. Valve Plug	302 St. Stl. 303 St. Stl.	316 St. Stl. St. Cad. Plt.	Brass Body St. Stl. Valve Plug	302 St. Stl. 303 St. Stl.	316 St. Stl.
Range Spring	St. Zinc Plt.	St. Zinc Plt.	St. Zinc Plt.	St. Zinc Plt. St. Zinc Plt.	St. Zinc Plt. St. Zinc Plt.	St. Zinc Plt.	St. Zinc Plt.	St. Zinc Plt.	St. Zinc Plt.	St. Zinc Plt.

Note: 1. Other diaphragm materials are available, consult the factory.
2. The only diaphragm selection for the GH26/27 Series is a Buna "N"

GH21XT/GH41XT Useful Operating Area





Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

1-4 Models

GH21 = Regulator - Differential (For Dimensional Data, refer to Drawing A17-18)
GH31 = Regulator - Back Pressure - Differential (For Dimensional Data, refer to Drawing A17-18)
GH41 = Regulator - Differential - Soft Seat (For Dimensional Data, refer to Drawing A17-18)

5 Operational Features

A = Adjustable Differential (GH21/41 Only)
F = Flow Adjust (GH21 Only)
X = Standard - Unless Option Code is Specified

6 Bonnet Options

F = Tapped Bonnet for Flush Back Panel Mounting (Not available on GH21F) (See Note 1)
T = Threaded Bonnet
X = Standard doe GH21F Series
Note: 1. This option is standard on the GH26 and GH27 (2 Hole).

7 Mounting Options

R = Mounting Bracket (GH21F Only)
X = Absence of Specification - Standard

8 Diaphragm Selections

The catalog number(s) listed under each diaphragm option is the standard diaphragm used in that regulator. These options apply to all output ranges of that unit.
B = Silicone on Glass (No Bleed, No Relief)
F = Viton on Nomex (No Bleed, No Relief)
K = Teflon (Sandwich Type - No Relief, No Bleed) GH21XTXKXK, GH21XTXKXS, GH21ATXKXKX, GH31XTXKXK, GH31XTXKXS
M = Buna "N" (No Bleed, No Relief) GH21XTXM, GH41XTXM, GH21FXXM, GH21ATXMXXX_, GH26XFXM, GH31XTXM
N = Nordel on Nomex (EPDM) (No Bleed, No Relief)
P = Neoprene (No Bleed, No Relief) (See Note 1)

9 Seat Selections

A = Buna "N"
B = Neoprene
C = Viton
D = Low Leak Nozzle with Metal Seat GH21 - 20CC Air/Min.
F = Low Leak Nozzle with Metal Seat GH21 - Less than 15CC Air/Min.
N = Nordel
X = Standard - Unless option code is specified
Notes: 1. All GH40 Models are standardly supplied with Buna "N" Soft Seats. If options B or C are required, specify accordingly. GH20 with soft seats are supplied as GH40.
2. Option "F" is not available in 316 Stainless Steel construction.

10 Material Options

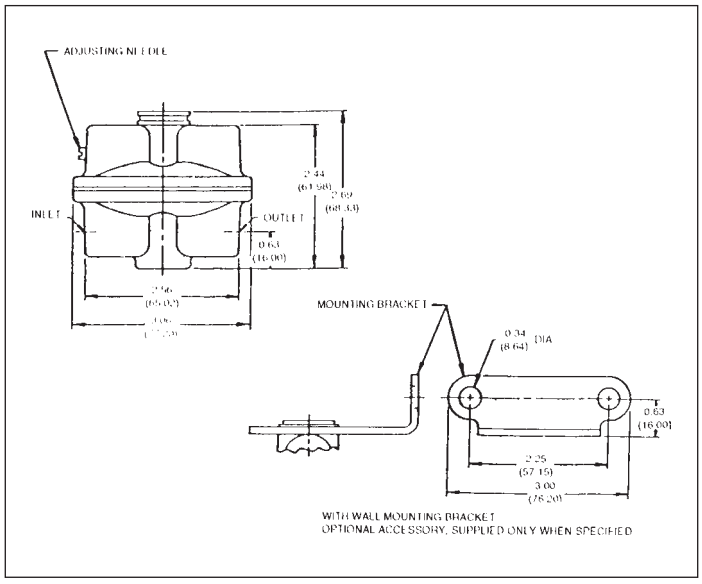
K = Stainless Steel Construction (302/303 Stainless Steel Internals)
S = Stainless Steel Construction (316 Stainless Steel Internals)
X = Standard - Unless option code is specified

11 Cleaning Options

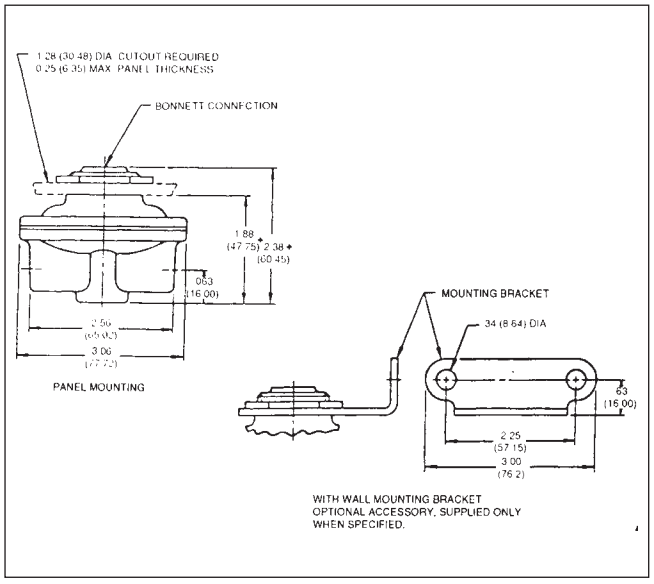
A = Cleaned for Oxygen Service
X = Standard - Unless option code is specified

12 Range Selections

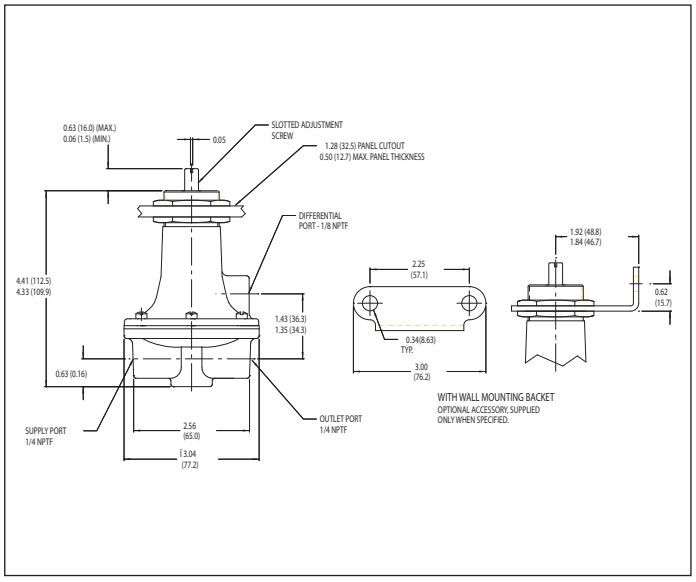
These codes are applied to the GH21AT Series Regulator.
A = 0-5 PSI (0-35 kPa)
B = 0-15 PSI (0-103 kPa)
C = 0-25 PSI (0-172 kPa)
D = 0-35 PSI (0-241 kPa)
E = 0-50 PSI (0-345 kPa)
G = 0-125 PSI (0-862 kPa)



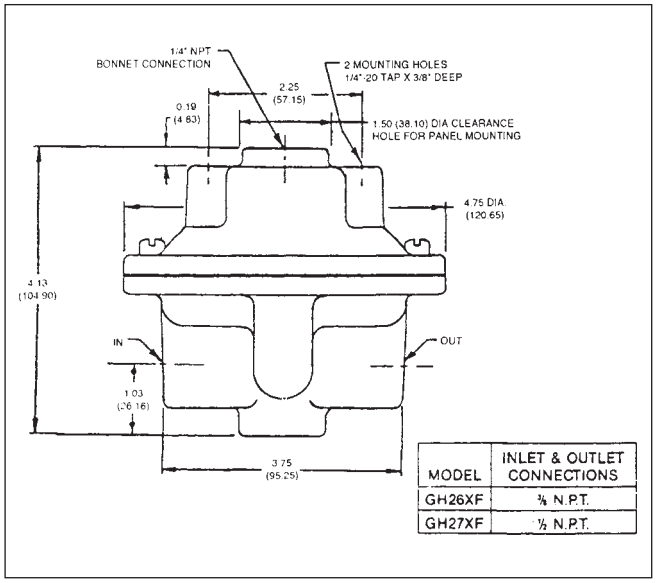
For Certified Dimensional Drawing, refer to A17-7 (GH21F)



For Certified Dimensional Drawing, refer to A17-18 (GH21/31/41)



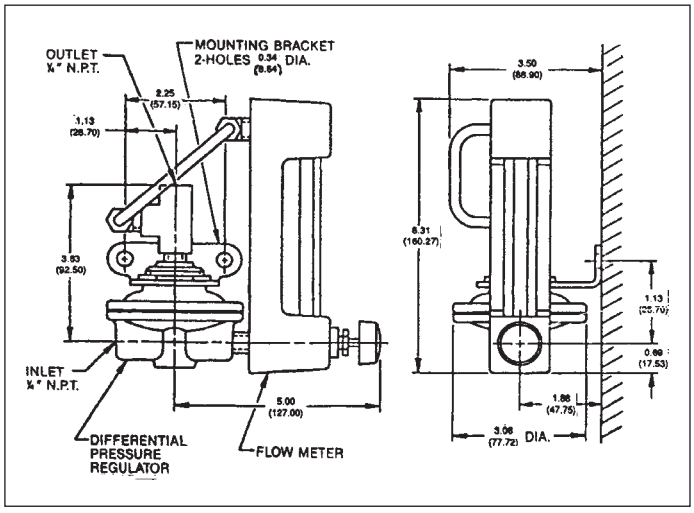
For Certified Dimensional Drawing, refer to A17-19 (GH21AT)



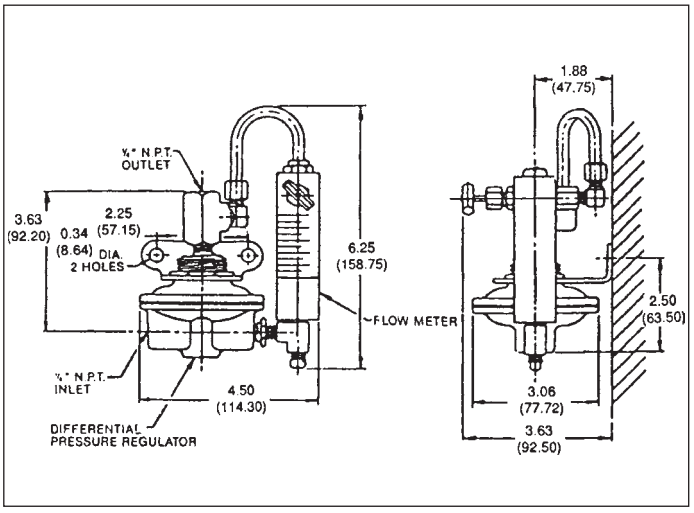
For Certified Dimensional Drawing, refer to (GH226/27)

() Dimensions in Millimeters

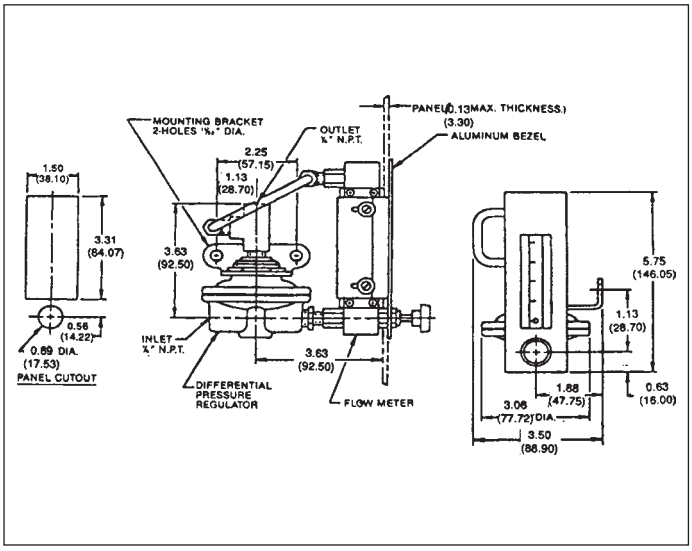
Drawings



For Certified Dimensional Drawing, refer to A13-4 (GDH211/212)

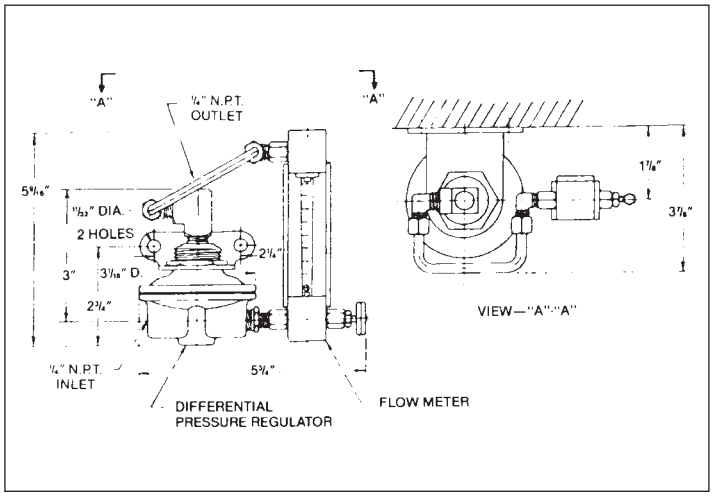


For Certified Dimensional Drawing, refer to A13-5 (GDH215/216)

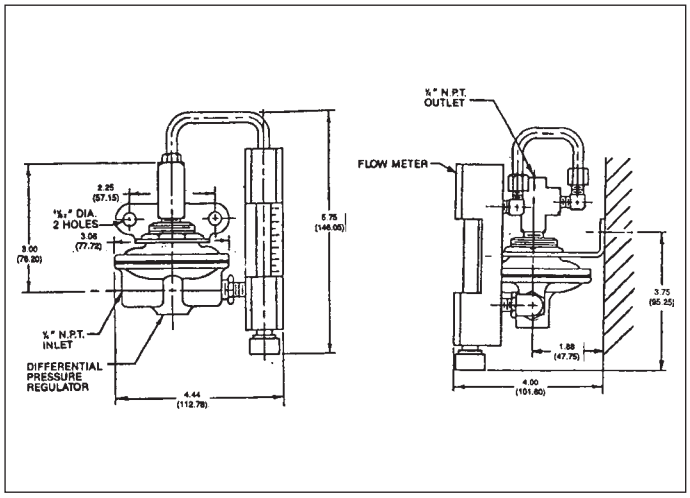


For Certified Dimensional Drawing, refer to A13-7 (GDH219/2110)

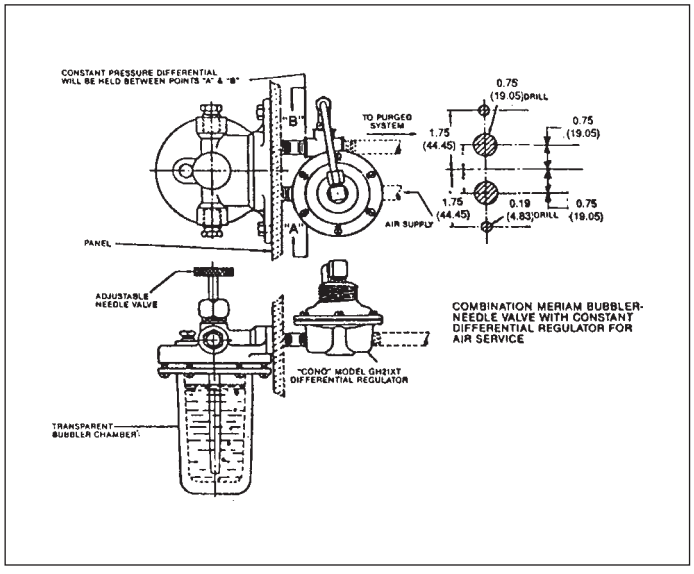
() Dimensions in Millimeters



For Certified Dimensional Drawing, refer to A13-8 (GDH217/218)



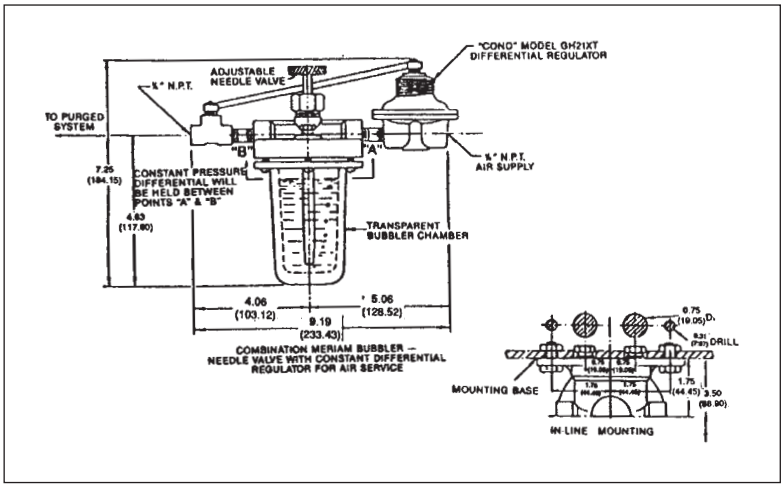
For Certified Dimensional Drawing, refer to A13-9 (GDH2111/2112)



For Certified Dimensional Drawing, refer to A13-10 (GDH214)

() Dimensions in Millimeters

Drawings



For Certified Dimensional Drawing, refer to A13-11 (GDH213)

GH20VT/GH28VT Series Vacuum Regulator

Conoflow's Vacuum Regulators are designed to accurately regulate the sub-atmospheric pressure of a vessel being evacuated. These units are especially suited for laboratory work and test standards for simulation of high altitude conditions.

Standard construction of the Model GH28VT is aluminum with Buna "N" diaphragms. The GH20VT Series is available in either brass or stainless steel construction. The brass units are supplied with Buna "N" diaphragms and the stainless steel versions utilize Teflon/Buna "N"/Teflon sandwich diaphragms. Regulated vacuum ranges of 0-15" and 0-30" Hg (38.1 and 76.2 cm Hg) are standard.

Connections for the GH20VT Series are ¼" NPT with the bonnet sensing port having an ⅛" NPT connection. The Model GH28VT has four ¼" NPT connections (this unit has no bonnet sensing port). An easily adjustable handwheel or knob (wrench style) is available.

These units are backed by Conoflow's high standards of manufacture and years of experience as a leading producer of precision instrumentation.

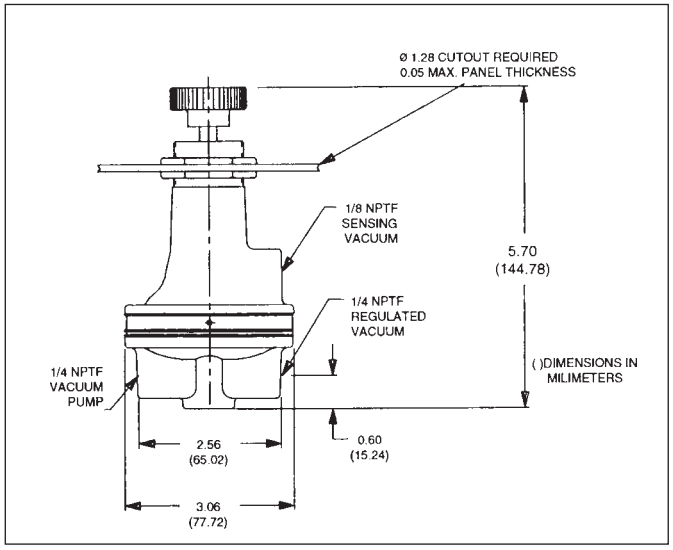
Options:

Adjustment

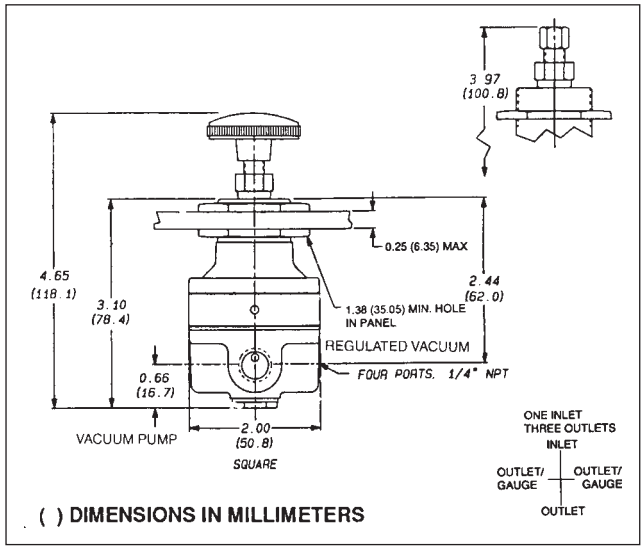
Screwdriver Slot (Optional)

Dimensional Data – Advertising Drawings:

GH20VT: A17-5
GH28VT: A17-90



For Certified Dimensional Drawing, refer to A17-5 (GH20VT)



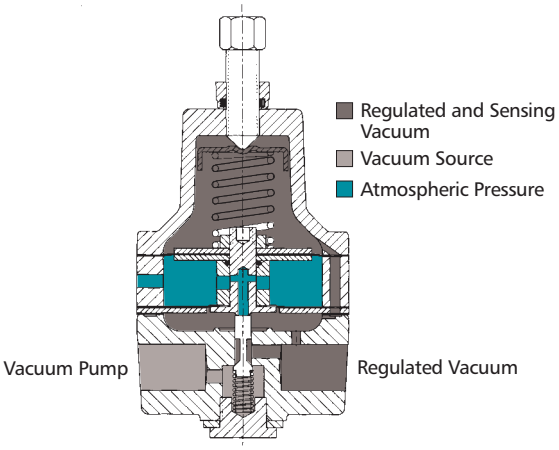
For Certified Dimensional Drawing, refer to A17-90 (GH28VT)

Principle of Operation

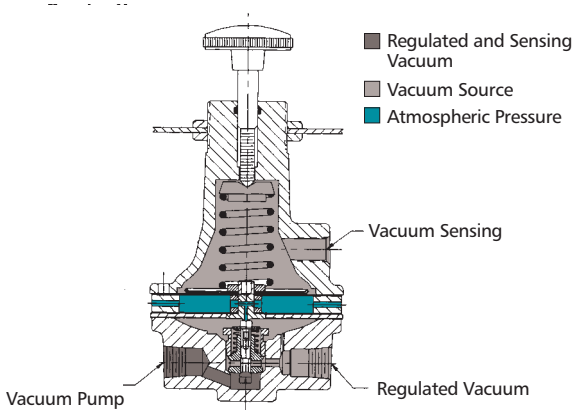
These units are used to provide a regulated vacuum. Turning the handwheel changes the force exerted by the range spring on the diaphragm assembly. Additional forces are exerted on the diaphragm assembly at atmospheric pressure underneath the top diaphragm and the regulated vacuum above it. Equilibrium is reached when all three of these forces are in balance. The forces from the lower diaphragm are negligible due to its reduced effective area.

If the regulated vacuum drops below the set point, there is a net downward force on the diaphragm assembly which causes the nozzle to open. This allows the vacuum pump to increase the vacuum in the control chamber and in the regulator bonnet. As the vacuum increases, the upward force on the diaphragm assembly increases. This causes the diaphragm assembly to move upward allowing the nozzle to close. In equilibrium, the nozzle assumes a position to provide the required flow while maintaining the vacuum at the set point.

If the regulated vacuum rises above the set point, the resulting upward force on the diaphragm assembly causes the diaphragm seat to lift off the plug. This allows air at atmospheric pressure to enter the lower diaphragm decreasing the vacuum until the set point is reached.



GH28VT Series – Relief - No Bleed Diaphragm



GH20VT Series – Relief - No Bleed Diaphragm

Specifications

Operating Characteristics

	GH20VTHEXXX_	GH20VTHHXKX_	GH28VTHEXXX_
Connections	¼" NPT with ⅛" NPT Vacuum Sensing Port		¼" NPT - 4 Ports
Regulated Vacuum	0-15" and 30" Hg (38.1 and 76.2 cm Hg)		
Flow Capacity (Max.)	1.5 SCFM (0.04 m^3/min.)		
Sensitivity	0.2" H_2O (0.51 cm)		
Ambient Temperature Range	-20°F to +150°F (-29°C to +66°C) (with Buna Diaphragm)		
Approximate Shipping Weight	2¾ lbs. (1.3 Kg)	3 lbs. (1.4 Kg)	1 lb. (0.45 Kg)

Materials of Construction

Body	Brass	316 Stainless Steel	Aluminum
Bonnet	Brass	316 Stainless Steel	Aluminum
Diaphragm Assembly (1)	Buna "N"	Teflon/Buna "N"/Teflon	Buna "N"
Nozzle Assembly	Brass Body/St. Stl. Plug	302/303 Stainless Steel	303 Stainless Steel
Range Spring	Steel Zinc Plate	316 Stainless Steel	Steel Zinc Plate

Note: 1. Other diaphragm materials available, consult the factory.

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain twelve (12) characters.

1-4 Models	GH20 = Regulator - Vacuum (For Dimensional Data, refer to Drawing A17-5) GH28 = Regulator - Miniature Vacuum (For Dimensional Data, refer to Drawing A17-90)
5 Operational Feature	V = Vacuum Service
6 Bonnet Options	F = Tapped Bonnet for Flush Back Panel Mounting (GH20V Series Only) S = Plain Bonnet T = Threaded Bonnet (Standard)
7 Adjustment Options	H = Handwheel (Standard) K = Knob (Wrench Style)
8 Diaphragm Selections	The catalog number(s) listed under each diaphragm option is the standard diaphragm used in that regulator. These options apply to all output ranges of that unit. D = Neoprene (with Relief, No Bleed) (See Note 1) E = Buna "N" (with Relief, No Bleed) GH20VTHEXXX_, GH28VTHEXXX_ G = Silicone on Glass (with Relief, No Bleed) (See Note 1) H = Teflon (Sandwich Type - with Relief, No Bleed) (See Note 1) GH20VTHEXKX_ J = Viton on Nomex (with Relief, No Bleed) (See Note 1) L = Nordel on Nomex (EPDM) (with Relief, No Bleed) (See Note 1) **Note:** 1. These options are not available on the GH28.
9 Seat Selections	A = Buna "N" B = Neoprene C = Viton D = Low Leak Nozzle with Metal Seat GH20 - 20CC Air/Min. F = Low Leak Nozzle with Metal Seat GH20 - Less than 15CC Air/Min. N = Nordel X = Standard - Unless option code is specified **Notes:** 1. All GH40 Models are standardly supplied with Buna "N" Soft Seats. If options B or C are required, specify accordingly. GH20 with soft seats are supplied as GH40. 2. Soft Seats are not available on the GH28VT Regulator.
10 Material Options	K = Stainless Steel Construction (303 Stainless Steel Internals) X = Standard - Unless option code is specified **Notes:** 1. Options "K" is not available on the GH28.
11 Cleaning Options	A = Cleaned for Oxygen Service X = Standard - Unless option code is specified
12 Range Selections	N = 0-15" Hg (0-5 PSI) P = 0-30" Hg (0-15 PSI)

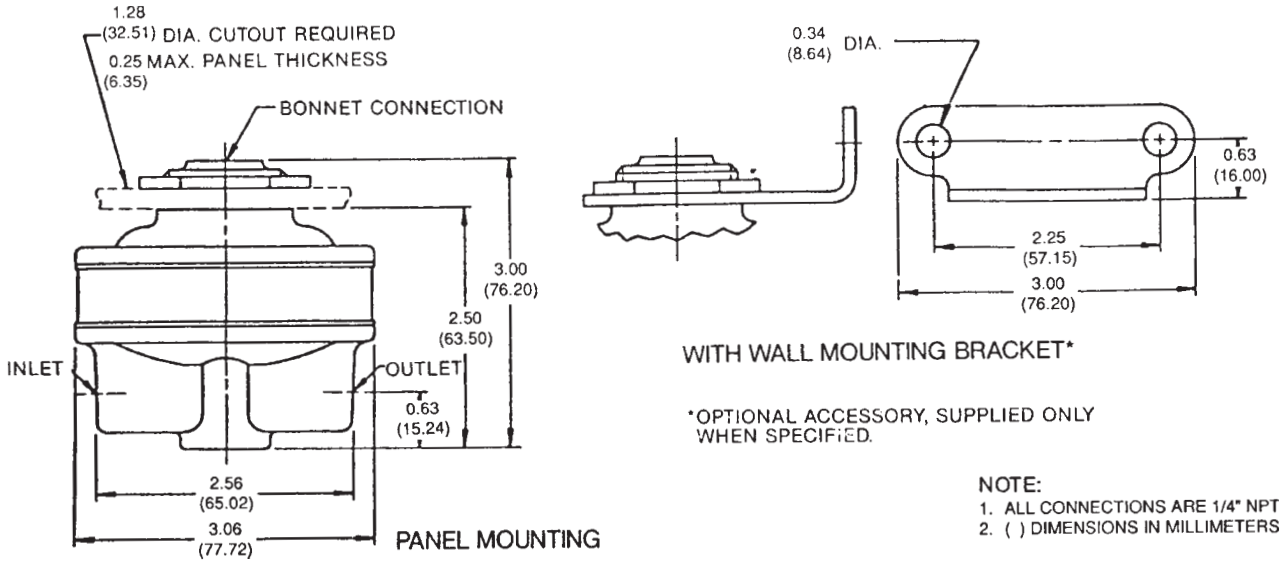
GH22 Series Ratio/Flow Boosting Relay

The Conoflow GH22 Series Relay is used to boost, amplify or reduce the pneumatic signal of a controller or similar instrument in a predetermined ratio. Using an independent supply of pressure for greater flow volume, the unit relays an instrument signal to a final control element such as a valve actuator.

The GH22 is supplied in a brass/aluminum combination and has a maximum supply pressure rating of 200 PSI (1379 kPa). Buna "N" diaphragms are standard. Connections are ¼" NPT. Maximum signal pressures are 150 PSI (1034 kPa) (ratio 3:1, 2:1, 1:1), 75 PSI (517 kPa) (ratio 1:2) and 50 PSI (345 kPa) for ratio 1:3.

A large selection of ratios, 1:1 (flow boosting), 1:2 and 1:3 (multiplying) and a 2:1 and 3:1 (dividing), meets a wide range of application requirements.

These units are backed by Conoflow's years of experience as a leading manufacturer of precision built instruments.



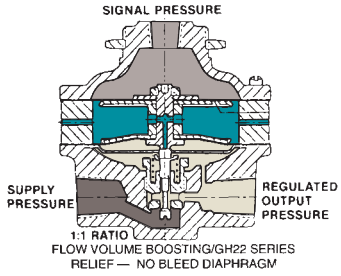
For Certified Dimensional Drawing, refer to A17-12 (GH22)

Principle of Operation

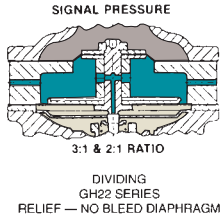
The Conoflow Model GH22XT Ratio Relay provides an output pressure proportional to the signal pressure applied to the bonnet connection. The ratio of signal pressure to output pressure is determined by the ratio of effective areas of the top and bottom diaphragms. In the 1:1 ratio model the effective areas of the two diaphragms are equal. Therefore, in equilibrium, the output pressure is equal to the signal pressure. If the signal pressure is increased above the output pressure, there is a net downward force on the diaphragm assembly causing the nozzle to open. Supply pressure flows through the nozzle to the output port until the output pressure equals the signal pressure. The nozzle remains in a position to supply the required flow while maintaining the output pressure equal to the signal pressure. If the signal drops below the output pressure, there is a net upward force on the diaphragm assembly which causes the diaphragm seat to lift off of the nozzle plug. This allows the excess pressure to vent to atmosphere until equilibrium is again established.

In the 3:1 and 2:1 ratio models the effective area of the top diaphragm is proportionally less than the effective area of the bottom diaphragm. Since force is equal to pressure times area, less output is required to balance the force resulting from a given signal pressure. For example, in the 2:1 ratio model, a signal pressure of 2 PSI (14 kPa) would result in an output pressure of only 1 PSI (7 kPa) since the effective area of the bottom diaphragm is twice that of the top diaphragm.

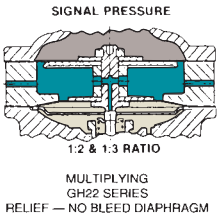
In the 1:3 and 1:2 ratio models, the effective area of the top diaphragm is proportionally larger than the area of the bottom diaphragm which results in an output pressure proportionately higher than the signal pressure.



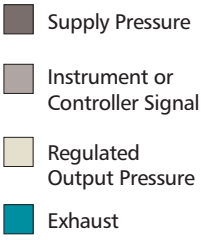
Flow Volume Boosting/GH22 Series Relief - No Bleed Diaphragm



Dividing/GH22 Series Relief - No Bleed Diaphragm



Multiplying/GH22 Series Relief - No Bleed Diaphragm



Specifications

Operating Characteristics

Maximum Supply Pressure: 200 PSI (1379 kPa)

Maximum Signal Pressure Ratio (Signal Output):

3:1	150 PSI	(1034 kPa)
2:1	150 PSI	(1034 kPa)
1:1	150 PSI	(1034 kPa)
1:2	75 PSI	(517 kPa)
1:3	50 PSI	(345 kPa)

Connections:
¼" NPT

Flow Capacity (See Graph):
16 SCFM (0.453 m^3/min.) with 100 PSI (690 kPa) Supply

Sensitivity: 0.05 PSI (0.345 kPa)

Accuracy: 5% (All ratios)

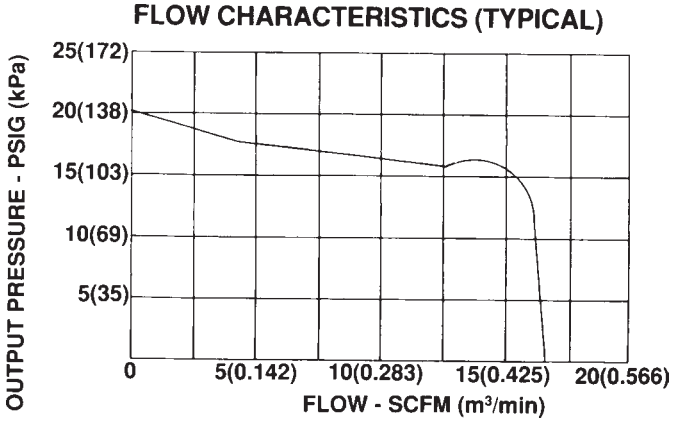
Supply Pressure Effect: 0.5 PSI (3.45 kPa) for 25 PSI (172 kPa) Change in Supply Pressure

Ambient Temperature Range:
-20ºF to +150ºF (-29ºC to +66ºC) (with Buna "N" Diaphragm)

Approximate Shipping Weight:
1¾ lbs. (45 Kg)

Materials of Construction

Body:	Brass
Bonnet:	Aluminum
Diaphragm Assembly:	Buna "N"
Nozzle Assembly:	Brass Body/Stainless Steel Valve Plug



Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain twelve (12) characters.

1-4 Models	GH22 = Regulator - Ratio/Booster (For Dimensional Data, refer to Drawing A17-12) GH42 = Regulator - Ratio/Booster (Soft Seat) (For Dimensional Data, refer to Drawing A17-12)
5 Operational Feature	X = Absence of Specification
6 Bonnet Option	T = Threaded Bonnet
7 Future Option	X = Absence of Specification
8 Diaphragm Selections	The catalog number(s) listed under each diaphragm option is the standard diaphragm used in that regulator. These options apply to all output ranges of that unit. E = Buna "N" (with Relief, No Bleed) GH22XTEXXX_ M = Buna "N" (No Bleed, No Relief)
9 Seat Selections	A = Buna "N" B = Neoprene C = Viton D = Low Leak Nozzle with Metal Seat GH22 - 20CC Air/Min. F = Low Leak Nozzle with Metal Seat GH22 - Less than 15CC Air/Min. N = Nordel X = Standard - Unless option code is specified **Notes:** 1. All GH40 Models are standardly supplied with Buna "N" Soft Seats. If options B or C are required, specify accordingly. GH22 with soft seats are supplied as GH42.
10 Material Options	X = Absence of Specification
11 Cleaning Options	A = Cleaned for Oxygen Service X = Standard - Unless option code is specified
12 Range Selections	R = 3:1 S = 2:1 T = 1:1 W = 1:2 Y = 1:3

GH30 Series Back Pressure Regulator

The Conoflow Series GH30 Back Pressure Regulator is used to maintain a constant upstream pressure of gas, vapor or liquid. Designed for accurate regulation under low flow conditions, these units are widely used for protection of analysis instrumentation or as a relief valve in supply pressure lines to control devices.

The GH30 Regulator is available in brass/aluminum combinations or all stainless steel construction. Buna "N" diaphragms are standard with Teflon/Buna "N"/Teflon used in the stainless steel models for corrosive services. Regulated pressure ranges are 0-3, 5, 15, 25, 35, 50 and 125 PSI (0-21, 35, 103, 241, 345 and 862 kPa). Connections are ¼" NPT.

These units are backed by Conoflow's years of experience as a leading manufacturer of precision built instruments.

Options:

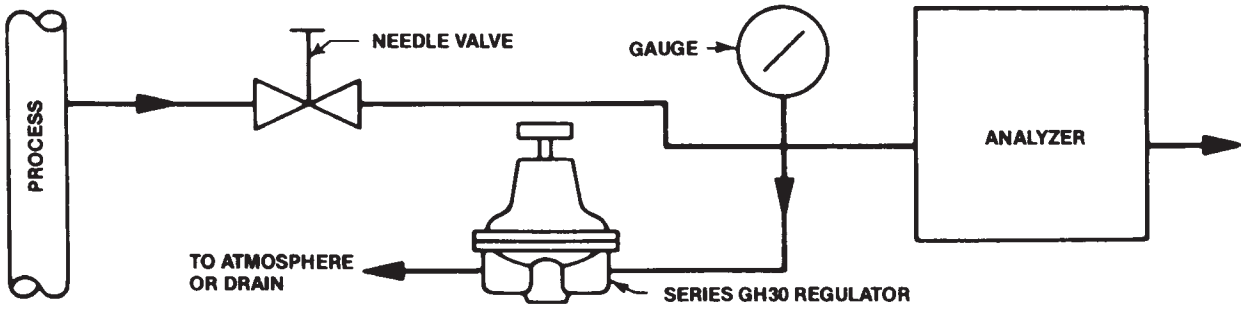
Adjustment

Handwheel (Standard)
Wrench Knob

Dimensional Data – Advertising Drawings:

GH30: A17-2

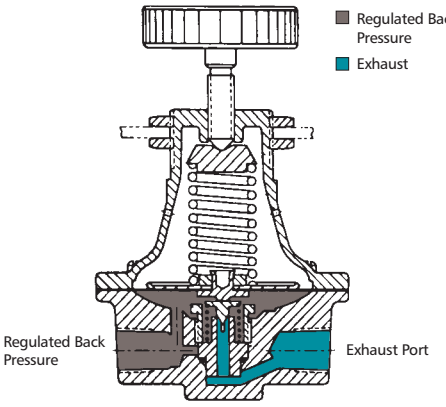
TYPICAL APPLICATION



In the above application, the Conoflow GH30 Back Pressure Regulator is maintaining a constant upstream pressure on the sample stream by relieving the excess pressure prior to its arrival at the analyzer.

Principle of Operation

Turning the handwheel changes the force exerted by the range spring on the diaphragm assembly. In equilibrium, the force exerted by the range spring is balanced by the force from back pressure acting underneath the diaphragm assembly. If the back pressure rises above the set pressure, the diaphragm seat is lifted allowing the nozzle plug to open. The excess pressure flows through the exhaust port until the back pressure is reduced to the set point. While the back pressure is at or below the set point, the range spring holds the nozzle plug against its seat, shutting off the flow to the exhaust port.



Specifications

Operating Characteristics

	GH30XTHMXXX_	GH30XTHAXKX_	GH30XTHAXSX_
Connections	¼" NPT		
Regulated Back Pressure Ranges	0-3, 5, 15, 25, 35, 50 and 125 PSI (0-21, 35, 103, 172, 241, 345 and 862 kPa)		
Flow Capacity	See Flow Graphs		
Sensitivity	0.05 PSI (0.345 kPa)		
Ambient Temperature Range	-20ºF to +150ºF (-29ºC to +66ºC)		
Approximate Shipping Weight	1¾ lbs. (0.79 Kg)	2 lbs. (0.91 Kg)	2 lbs. (0.91 Kg)

Materials of Construction

Body	Brass	316 Stainless Steel	316 Stainless Steel
Bonnet	Aluminum	Aluminum	Aluminum
Diaphragm Assembly (1)	Buna "N"	Buna "N" Teflon Faced Process Side Only	Buna "N" Teflon Faced Process Side Only
Nozzle Assembly	Brass Body/St. Stl. Plug	302/303 Stainless Steel	316 Stainless Steel
Range Spring	Steel Zinc Plate	Steel Zinc Plate	Steel Zinc Plate

Note: 1. Other diaphragm materials available, consult the factory.

Chart 1. Flow Characteristics – GH30, 0-5 PSI Range

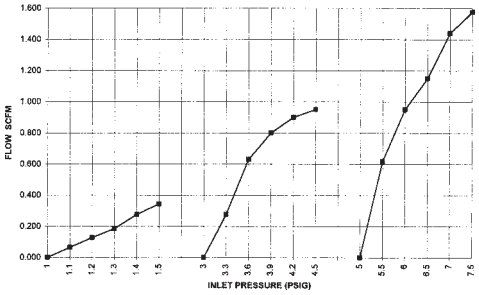


Chart 2. Flow Characteristics – GH30, 0-25 PSI Range

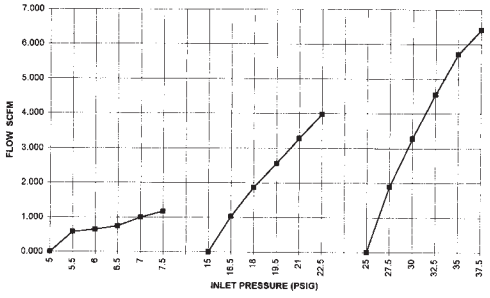


Chart 3. Flow Characteristics – GH30, 0-50 PSI Range

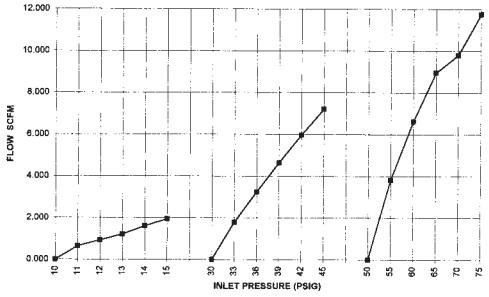
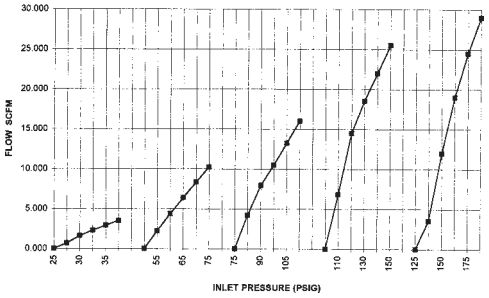


Chart 4. Flow Characteristics – GH30, 0-125 PSI Range



Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain twelve (12) characters.

1-4 Model	GH30 = Regulator - Back Pressure (For Dimensional Data, refer to Drawing A17-2)
5 Future Option	X = Absence of Specification
6 Bonnet Options	F = Tapped Bonnet for Flush Back Panel Mounting (3 Hole) S = Plain Bonnet T = Threaded Bonnet (Standard)
7 Adjustment Selections	H = Handwheel (Standard) K = Knob (Wrench Style)
8 Diaphragm Selections	The catalog number(s) listed under each diaphragm option is the standard diaphragm used in that regulator. These options apply to all output ranges of that unit. A = Teflon (Rubber Backed) Corrosive Service on Process Side (No Bleed, No Relief) GH30XTHAXKX_, GH30XTHAXSX_ B = Silicone on Glass (No Bleed, No Relief) F = Viton on Nomex (No Bleed, No Relief) M = Buna "N" (No Bleed, No Relief) GH30XTHMXXX_ N = Nordel on Nomex (EPDM) (No Bleed, No Relief) P = Neoprene (No Bleed, No Relief)
9 Future Options	X = Specification
10 Material Options	K = Stainless Steel Construction (302/303 Stainless Steel Internals) S = Stainless Steel Construction (316 Stainless Steel Internals) X = Standard - Unless option code is specified
11 Cleaning Options	A = Cleaned for Oxygen Service X = Standard - Unless option code is specified
12 Range Selections	A = 0-5 PSI (0-35 kPa) B = 0-15 PSI (0-103 kPa) C = 0-25 PSI (0-122 kPa) D = 0-35 PSI (0-241 kPa) E = 0-50 PSI (0-345 kPa) G = 0-125 PSI (0-862 kPa) L = 0-3 PSI (0-21 kPa)

Notes

High Pressure Regulators

Terminology

Ambient Temperature Range: The minimum and maximum temperature of the medium surrounding a device.

Back Pressure Regulator: A pressure regulator which controls an inlet (supply) pressure. Conceptually, back pressure regulators are similar to relief valves, since these devices relieve inlet pressure when a set point is reached. Unlike relief valves, a back pressure regulator setting is not proportional to the difference between inlet (upstream) and exhaust (downstream) pressure. Back pressure regulators are much more accurate than a relief valve since the pressure sensing element is considerably larger than the valving element within the device.

Balanced Valve: A valve design within a pressure reducing regulator which considerably reduces the supply pressure effect. Balanced valves use an additional seal within the regulator which offsets, or balances, the force due to the difference between inlet and outlet across the valve orifice area. Balanced valves are used when the flow required is greater than the capacity of a two stage regulator, yet frequent pressure adjustment is undesirable.

Bubble Tight: Leakage too low to be indicated with liquid leak detection solution. In relation to helium leakage, bubble tight is less than 10^{-5} atm cc/sec. when tested with a quality leak detection solution.

Burst Pressure: The maximum pressure above which the device may no longer withstand pressure. The device may leak, but will not rupture or release components at levels below burst pressure.

Capture Port: A feature of some regulators which permits the user to install a fluid connector into the regulator bonnet (control spring chamber) and pip away any fluid which enters the bonnet. Capture ports are used when the user needs to contain the regulated media in case of catastrophic failure of the pressure sensing element, or when self-relieving is required. Capture ports may be user positionable, or fixed, depending on the model.

Control Kit: The component kit required to change the control range of a particular model pressure regulator.

CV: A Flow Coefficient Rating. The C_V is calculated at maximum flow conditions (beyond pressure regulation, i.e., wide open valve position) as follows: Flow of water per 1 PSI (0.0069 MPa) Pressure Drop.

Droop: The deviation of output from set point pressure as downstream flow requirements change. See Figure 2.1.

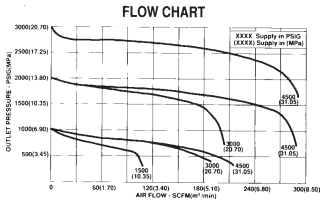


Figure 2.1
Typical Curve for varying set points and supply pressures

(HP 300 Regulator)

Flow Chart: A set of regulator performance curves depicting droop under different inlet pressures, set points and flow rates.

GPM: Acronym for Gallons per Minute.

Leakage: Flow of gas or fluid past a seat or seal in the closed position.

Inboard Leakage: A measure of leakage into the regulator when the regulator is subjected to a purge vacuum.

Maintenance Kit: The component kit required to perform routine cleaning and maintenance of a particular model pressure regulator.

Maximum Signal Pressure: The maximum safe pressure that may be applied to the signal port of a device to create a predetermined signal at the output of the device.

Non-Relieving: A feature of some regulators which does not permit downstream fluid pressure from escaping or venting through the regulator. Non-relieving regulators are desirable when regulating corrosive, toxic or other hazardous gasses.

Operating Temperature Range: The minimum and maximum temperature at which a device will operate with defined specifications.

Overhaul Kit: The component kit required to perform cleaning, maintenance and repair of a particular model pressure regulator. An overhaul kit contains all the components of a maintenance kit, plus the components which wear or fatigue in continuous or severe service.

Pressure Reducing Regulator: A pressure regulator which controls an output (discharge) pressure from a higher supply (inlet) pressure.

Proof Pressure: The maximum pressure the device can be exposed to without damage, leakage or loss of flow function.

Relieving: A feature of some regulators which permit downstream pressure, in excess of the regulator setting, to escape from the downstream volume. Relieving regulators can be user adjustable or non-adjustable. Relieving regulators vent downstream pressure when the downstream pressure is greater than the set point as the set point is reduced, such as the user decreasing the set point. For this reason, self relieving regulators are necessary when no other means are available to bleed off the downstream pressure.

SCFH: Acronym for Standard Cubic Feet per Hour.

SCFM: Acronym for Standard Cubic Feet per Minute.

Set Point: (Control setting ranges/Control back pressure ranges) The output or control pressure under non-flowing conditions.

Single Stage Regulator: A pressure reducing regulator which reduces supply (inlet) pressure to output (controlled) pressure with a single pressure sensing element and control valve. Single stage regulators are typically used when supply pressure is constant (such as a pipeline regulator), or where frequent adjustment is not a problem.

Steady-State: A characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibiting only negligible change over an arbitrary long period of time.

Supply Pressure Effect: The effect of supply pressure variations relative to output pressure at a constant set point.

Two Stage Regulator: A pressure reducing regulator which reduces supply (inlet) pressure to output (controlled) pressure in two steps or stages. Conceptually, two stage regulators are two single stage regulators in series, with the first stage being factory preset. The first stage feeds regulated pressure to the final (second) stage, which is generally user adjustable. Two stage regulators are primarily used when the supply pressure can change dramatically (such as bottled gas cylinders), and frequent pressure adjustment to compensate for changing supply pressure is unacceptable.

Trademarks

®Trademark registration of:

Monel	Inco
Hastelloy	Haynes Stellite Co.
Kel-F	3-M Company
Elgiloy	Elgiloy Limited Partnership
Teflon	Dupont
Viton	Dupont
Vespel	Dupont
Ultra Seal	Parker
Vacuseal	Parker
VCR	Cajon

Principle of Operation

HP300 Series – Relieving Piston

Turning the control knob clockwise will increase the force on the range spring and, in turn, the outlet set pressure. Conversely, turning the control knob counter-clockwise will decrease the force on the range spring and decrease the outlet set pressure. In equilibrium, the force exerted by the range spring is balanced by the outlet pressure.

An unbalance between the outlet pressure and the set pressure causes a corresponding reaction on the sensor and valve. If the outlet pressure rises above the set pressure, the piston sensor with lift allowing the main valve to seat. This action causes the relief valve to open relieving the excess pressure to atmosphere until equilibrium is reached.

If the outlet pressure falls below the set pressure, the range spring will push the sensor down and unseat the main valve. This allows supply pressure to flow through the main valve to the downstream port increasing the set pressure. At equilibrium, the valve plug assumes a position which supplies the required flow while maintaining the outlet pressure at the set pressure.

Specifications

Maximum Supply Pressure:
Stainless Steel: 10,000 PSIG (69 MPa)
Brass/N.A.C.E.: 6,000 PSIG (41.4 MPa)

Control Setting Ranges:
8-500 PSIG (0.060-3.45 MPa)
9-800 PSIG (0.062-5.52 MPa)
10-1500 PSIG (0.069-10.35 MPa)
15-2500 PSIG (0.104-17.25 MPa)
25-4000 PSIG (0.173-27.60 MPa)
30-6000 PSIG (0.207-41.40 MPa)

Proof Pressure:
150% Maximum operating

Burst Pressure:
400% Maximum operating

Flow Capacity:
C_V-0.14 (See Flow Graph)
Orifice Diameter: 0.110"

Supply Pressure Effect:
2.2 PSIG (0.015 MPa) increase for a 100 PSIG (0.690 MPa) supply decrease

Operating and Fluid Temperature Range:
-40°F to +165°F (-40°C to +74°C)

Leakage:
Bubble Tight (In Board and Main Valve)

Maximum Operating Torque:
55 in/lbs. (63.2 Kg-cm)

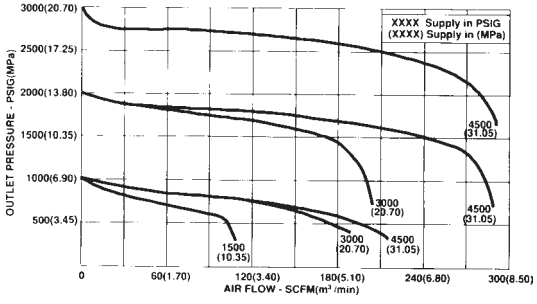
Ports:
¼" NPTF supply, outlet and two gauge ports (60°)

Weight (Without Gauges):
4.6 lbs. (2.12 Kg)

Materials of Construction

Body: Brass/303 Stainless Steel/N.A.C.E. 316 Stainless Steel
Bonnet: Brass/Plated Brass
Main Valve Seat: Vespel (Kel-F optional)
Relief Valve Seat: Kel-F
Sensor and Trim: 300 Series Stainless Steel
Seals: Buna N/Teflon (Viton optional)
Filter: Bronze (20 micron) - Brass Models
316L Stainless Steel (20 micron) - Stainless Steel Models

FLOW CHART



Oxygen Service

Specification of materials in regulators used for oxygen service is the **user's responsibility**. Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. Cleaning for service above 3500 PSIG (24.20 MPa) may be performed to the user's specifications at an additional cost through an outside source.

For special cleaning requirements, the customer must supply specifications for desired level of cleanliness. Cost will be advised prior to performing the cleaning operation.

Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain fifteen (15) characters.

1-5 Model

HP300 = Pressure Regulator – Piston Type

6 Materials of Construction

Body/Bonnet/Trim
B = Brass/Brass/300 Stainless Steel
S = 303 Stainless Steel/Nickel Plated Brass/300 Stainless Steel
R = N.A.C.E. 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel (See Note 1)

Notes:
1. National Association of Corrosion Engineers.
2. Maximum supply pressure must not exceed the maximum pressure rating of the supply connection and supply gauge connection.

7-8 Elastomers

	Main Valve Seat(s)	Vent Valve Seat)	Backup	O-Rings	Notes
11 =	Vespel	Kel-F	Buna-N/Teflon	Buna-N	(Standard)
12 =	Kel-F	Kel-F	Buna-N/Teflon	Buna-N	2
13 =	Vespel	Kel-F	Viton/Teflon	Viton	—
14 =	Kel-F	Kel-F	Viton/Teflon	Viton	2
15 =	Vespel	—	Buna-N/Teflon	Buna-N	1
16 =	Kel-F	—	Buna-N/Teflon	Buna-N	1 and 2
17 =	Vespel	—	Viton/Teflon	Viton	1
18 =	Kel-F	—	Viton/Teflon	Viton	1 and 2

Notes:
1. These options are offered for non-relieving units.
2. These options cannot be used for 10,000 PSIG (69.00 MPa) applications. Use Vespel main valve seats for applications above 6000 PSIG (41.40 MPa).

9 Relieving Options

N = Non-Relieving (Optional)
V = Relieve to atmosphere

10-11 Inlet/Outlet

Inlet/Outlet/2-Gauge Ports (60°) Gauge Port Configuration – Inlet (Low) Outlet (High)
NPT Connections
61 = ¼"

12 Mounting Options

P = Bracket Mount
S = Port Pipe Mounting (Standard)

13 Cleaning Options

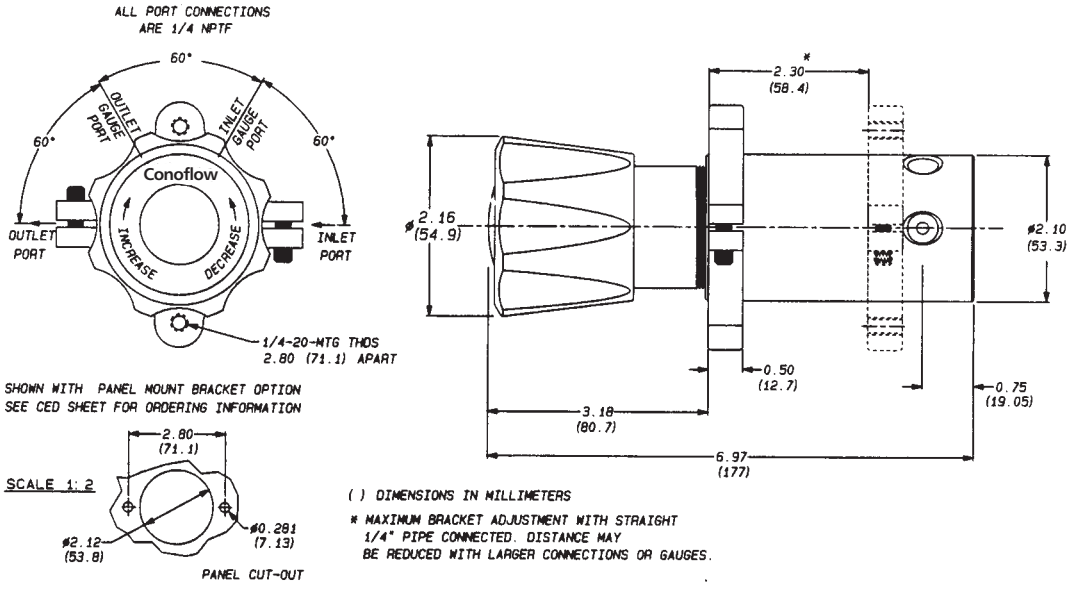
A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294
B = **Oxygen Cleaning** - Specification of material in regulators used for cleaning for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost.
C = **Customer Specified Cleaning** - Customer to specify the desired level of cleanliness. ITT Conoflow will advise cost prior to performing cleaning operation. Specification of materials is the **user's responsibility.**

14 Adjustment Selections

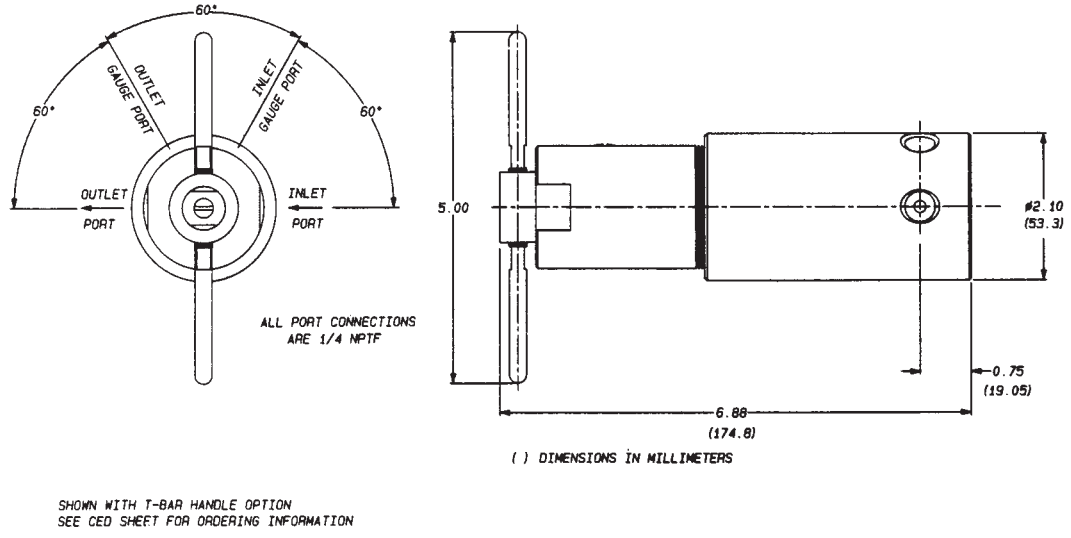
B = Handwheel (Standard)
T = "T" bar handle (Optional)

15 Control Setting Ranges

F = 8 - 500 PSIG (0.060 - 3.45 MPa)
G = 9 - 800 PSIG (0.062 - 5.52 MPa)
H = 10 - 1500 PSIG (0.069 - 10.35 MPa)
J = 15 - 2500 PSIG (0.104 - 17.25 MPa)
K = 25 - 4000 PSIG (0.173 - 27.60 MPa)
L = 30 - 6000 PSIG (0.207 - 41.40 MPa)



For certified dimensional drawing, refer to HP300-C1.



For certified dimensional drawing, refer to HP300-C2.

HP400 Regulator

Pressure Reducing - Piston Type

Conoflow's HP400 is a piston-sensing, self-contained pressure reducing regulator. High inlet and outlet pressures allow use of this regulator in component testing, calibration systems, manufacturing processes and other applications that require an economical regulator having reliable and safe operating characteristics.

The brass constructed HP400 Regulator has a maximum supply pressure rating of 3500 PSIG (24.2 MPa). Control setting range for this unit is 20 to 2500 PSIG (0.138-17.25 MPa). Adjustments within the range are made with a large handwheel furnished with the standard unit. Optional adjustment devices include a wrench style knob with a locking device or a "T" bar handle.

This unit is supplied with ¼" NPT inlet and outlet connections. Inlet and outlet gauge ports (¼" NPT) are standard. The regulator is non-relieving with a captured bonnet.

Feature Summary

High inlet pressure 3500 PSIG (24.2 MPa)
6000 PSIG (41.40 MPa) inlet pressure available
High outlet pressure 2500 PSIG (17.25 MPa)
Piston sensing for safe and reliable service life
Economical brass construction
Captured bonnet - standard
Mounting nuts available for optional panel mounting
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)
CGA cylinder connections available

Dimensional Data – Advertising Drawings:
HP400-C1: Standard unit
HP400-C2: "T" bar handle
HP400-C3: Wrench Knob with locking device

Options:

Mounting
Line – All variations (Supplied with plain bonnet)
Panel – (2 Panel mounting nuts) Optional

Adjustments
Handwheel (Large)
Knob (Wrench style - with locking device) – Optional
"T" bar handle – Optional

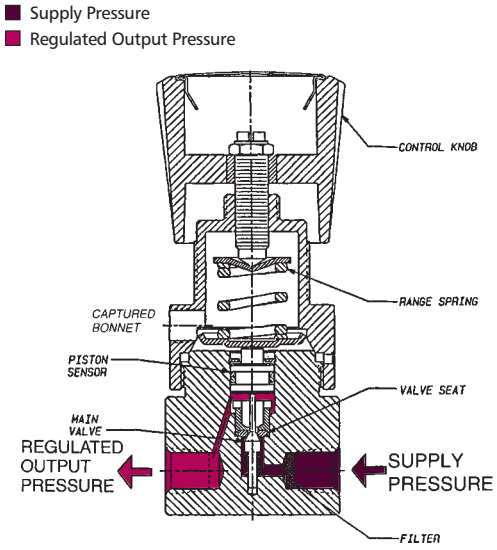
Cylinder Connections
CGA connections are available

HP400 Maintenance Kit

80400-11, 12, 13, 14, 15, 16, 17, 18 - For all control setting ranges

HP400 Overhaul Kit

81400-11, 12, 13, 14, 15, 16, 17, 18 For all control setting ranges



HP400 Series – Non-Relieving Piston

Turning the control knob clockwise will increase the force on the range spring and, in turn, the outlet set pressure. Conversely, turning the control knob counter-clockwise will decrease the force on the range spring and decrease the outlet set pressure. In equilibrium, the force exerted by the range spring is balanced by the outlet pressure.

An unbalance between the outlet pressure and the set pressure causes a corresponding reaction in the piston sensor and valve. If the outlet pressure rises above the set pressure, the piston sensor will lift allowing the main valve to seat. If the outlet pressure falls below the set pressure, the range spring will push the piston down and unseat the valve. At equilibrium, the valve plug assumes a position which supplies the required flow while maintaining the outlet pressure at the set pressure.

Specifications

Maximum Supply Pressure:
3500 PSIG (24.2 MPa), 6000 PSIG (41.40 MPa) available, refer to Control Engineering Data

Control Setting Range:
20-2500 PSIG (0.138-17.25 MPa)

Proof Pressure:
150% Maximum operating

Burst Pressure:
400% Maximum operating

Flow Capacity:
C_V-0.06 (See Flow Graph)
Orifice Diameter: 0.110"

Supply Pressure Effect:
3.6 PSIG (0.025 MPa) increase for a 100 PSIG (0.690 MPa) supply decrease

Operating and Fluid Temperature Range:
-15°F to +165°F (-26°C to +74°C)

Leakage:
Bubble Tight (In Board and Main Valve)

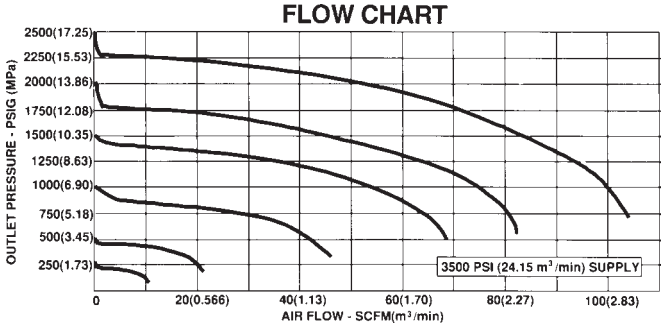
Maximum Operating Torque:
30 in/lbs. (34.5 Kg-cm)

Ports:
¼" NPTF supply, outlet and two gauge ports (80°)

Weight (Without Gauges):
2.25 lbs. (1.02 Kg)

Materials of Construction

Body/Bonnet: Brass
Main Valve Seat: Kel-F (Vespel optional)
Sensor and Trim: 300 Series Stainless Steel
Seals: Teflon/Viton (Buna N optional)
Filter: 316 Stainless Steel Screen (120 Mesh)



Oxygen Service

Specification of materials in regulators used for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. Special cleaning may be performed to the user's specifications at an additional cost through an outside source.

Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain fifteen (15) characters.

1-5 Model

HP400 = Pressure Reducing Regulator - Piston Type (Low Flow)
Note: 1. For a maximum inlet pressure rating of 6000 PSIG (41.40 MPa), refer to positions (7-8) Elastomers.

6 Materials of Construction

Body/Bonnet/Trim
B = Brass/Brass/300 Stainless Steel
Note: 1. Maximum supply pressure must not exceed the maximum pressure rating of the supply connection and supply gauge connection.

7-8 Elastomers

	Main Valve Seat(s)	Backup Rings	O-Rings
11 =	Kel-F/Teflon	Buna-N	
12 =	Vespel	Teflon	Buna-N (See Note 1)
13 =	Kel-F/Buna-N	Buna-N	
14 =	Vespel	Buna-N	Buna-N (See Note 1)
17 =	Vespel	Teflon	Viton (See Note 1)
18 =	Kel-F/Teflon	Viton (Standard)	

Note: 1. The use of a Vespel main valve seat increases the maximum inlet pressure rating to 6000 PSIG (41.40 MPa).

9 Relieving Options

R = Non-Relieving, captured bonnet

10-11 Inlet/Outlet/Gauge Ports

Inlet/Outlet/2-Gauge Ports (80°) Gauge Port Configuration – Inlet (High) Outlet (Low)
NPT Connections
81 = ¼"
Note: 1. All gauge port connections are 1/4" NPT.

12 Mounting Options

P = Panel Mounting (2-nut) (Optional)
S = Plain bonnet (no threads) - Standard

13 Cleaning Options

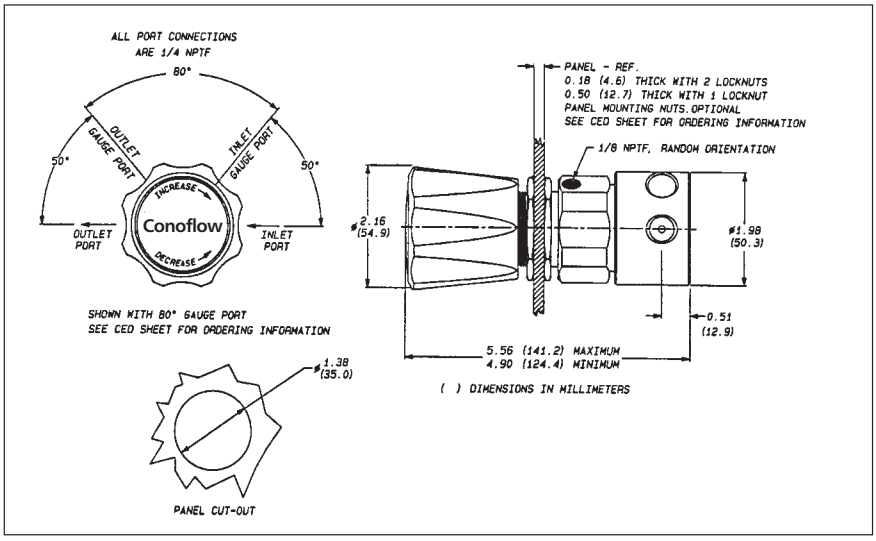
A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294
B = **Oxygen Cleaning** - Specification of material in regulators used for cleaning for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost.
C = **Customer Specified Cleaning** - Customer to specify the desired level of cleanliness. ITT Conoflow will advise cost prior to performing cleaning operation. Specification of materials is the **user's responsibility.**

14 Adjustment Selections

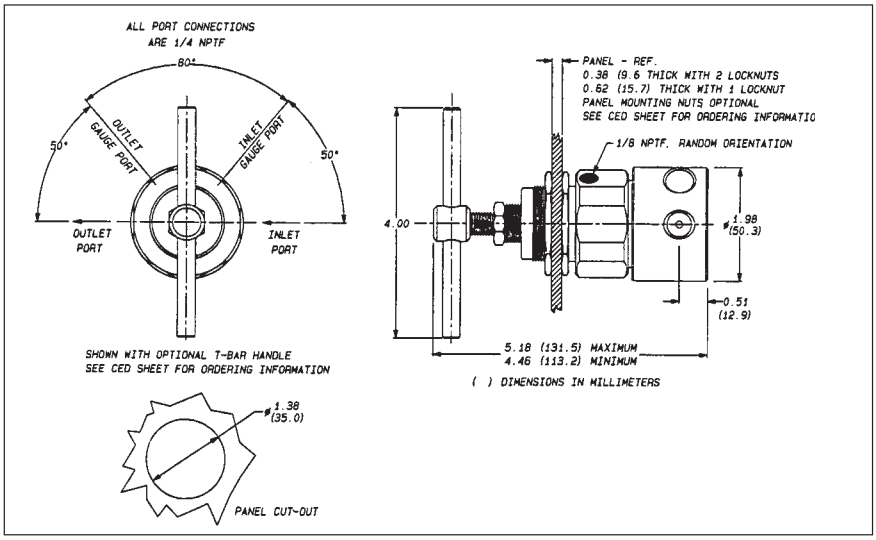
B = Handwheel (Standard)
K = Wrench knob with locking device (Optional)
T = "T" bar handle (Optional)

15 Control Setting Ranges

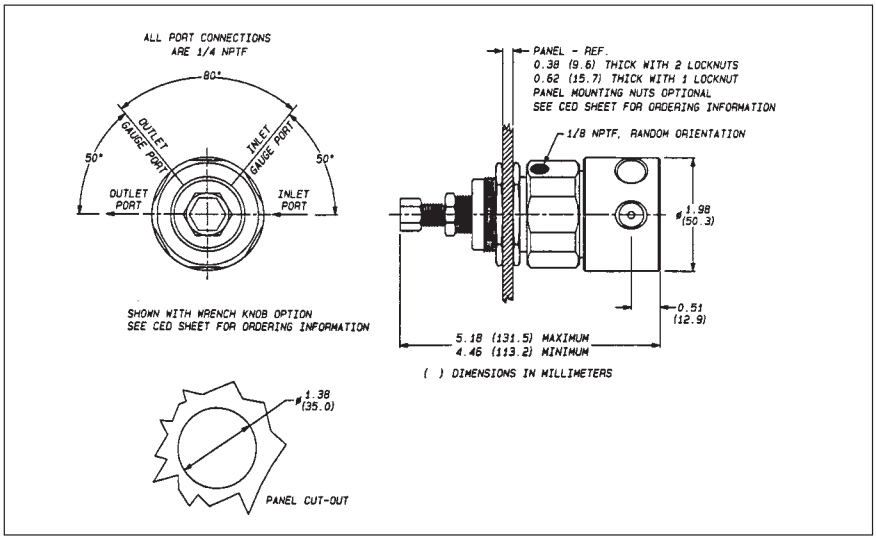
J = 20 - 2500 PSIG (0.138 - 17.25 MPa)



For certified dimensional drawing, refer to HP400-C1.



For certified dimensional drawing, refer to HP400-C2.



For certified dimensional drawing, refer to HP400-C3.

HP500 Regulator

Pressure Reducing - Diaphragm Type - High Purity

The HP500 Regulator is a self-contained, diaphragm sensing high purity regulator. A broad offering of materials of construction and five control pressure ranges allow use of this unit in applications that include the regulating of specialty gases, gas chromatography, research labs as well as the regulation of corrosive and non-corrosive gases and liquids.

Material options include brass, 316 stainless steel and 316L stainless steel. N.A.C.E., Monel and Hastelloy constructions are available upon request. The brass units are rated for a maximum supply pressure of 5,000 PSIG (34.5 MPa) and the stainless steel units are rated to 6,000 PSIG (41.40 MPa). Optional 15 Ra microinch wetted surfaces are available.

This high purity, pressure regulator is designed to accurately control pressure ranges of 4-25, 4-50, 5-100, 6-250 and 10-500 (0-0.173, 0-0.345, 0-0.690, 0-1.73 and 0-3.45 MPa). The HP500 has ¼" NPT inlet and outlet connections. Gauge ports are optional. To suit high purity applications, Vacuseal, VCR and Ultra Seal welded fittings are available. Adjustments within each range are made with a standard large handwheel. A wrench style knob with a locking device and a "T" bar handle are optional adjustments.

These products are guaranteed by Conoflow's high standards of manufacture and years of experience as a leading producer of precision instruments.

Feature Summary

Relieving and non-relieving diaphragms offered
Brass, 316 Stainless Steel, 316L Stainless Steel, N.A.C.E., Monel and Hastelloy constructions available
Design leak rate 2 x 10^{-8} atm cc/sec of helium
High purity internal connections optional
Vacuseal, VCR, Ultra Seal welded fittings optional
Five regulated outlet ranges from 4-25 PSIG to 10-500 PSIG (0.03-0.173 MPa to 0.069-3.45 MPa)
15 Ra microinch wetted surfaces available
Optional ¼" gauge ports
Metal-to-metal diaphragm to body seal
Line and rear mountings are standard
Panel mounting is optional
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)
CGA cylinder connections available

Options:

Mounting
Line – All variations (Supplied with plain bonnet)
Panel – (2 Panel mounting nuts) Optional
Rear Mounting – Standard

Adjustments
Handwheel (Large) – Standard
Knob (Wrench style - with locking device) – Optional
"T" bar handle – Optional

Gauges
2" and 2½" diameters
Brass, steel and stainless steel construction

Cylinder Connections
CGA Cylinder connections are available

HP500 Control Kit (Non-Relieving Diaphragm)

83500-11 thru 16 - For control setting range:
4 - 25 PSIG (0.03 - 0.173 MPa)

83501-11 thru 16 - For control setting range:
4 - 50 PSIG (0.03 - 3.45 MPa)

83502-11 thru 16 - For control setting range:
5 - 100 PSIG (0.04 - 0.690 MPa)

83503-11 thru 16 - For control setting range:
6 - 250 PSIG (0.04 - 1.730 MPa)

83504-11 thru 16 - For control setting range:
10 - 500 PSIG (0.069 - 3.450 MPa)

HP500 Control Kit (Relieving Diaphragm)

80510-11 thru 13 - For control setting range:
4 - 25 PSIG (0.03 - 0.173 MPa)

83511-11 thru 13 - For control setting range:
4 - 50 PSIG (0.03 - 3.45 MPa)

83512-11 thru 13 - For control setting range:
5 - 100 PSIG (0.04 - 0.690 MPa)

83513-11 thru 13 - For control setting range:
6 - 250 PSIG (0.04 - 1.730 MPa)

83514-11 thru 13 - For control setting range:
10 - 500 PSIG (0.069 - 3.450 MPa)

HP500 Maintenance Kit (Non-Relieving Diaphragm)

80500-11 thru 16 - For all control setting ranges

HP500 Maintenance Kit (Relieving Diaphragm)

803510-11 thru 13 - For all control setting ranges

HP500 Overhaul Kit (Non-Relieving Diaphragm)

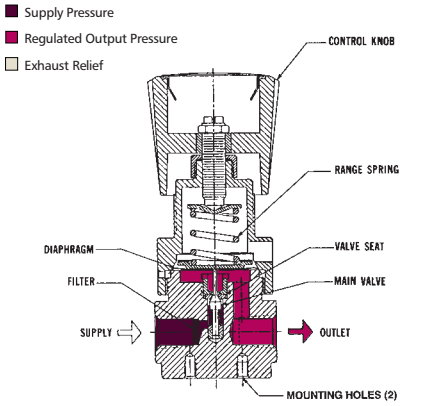
81500-11 thru 16 - For all control setting ranges

HP500 Overhaul Kit (Non-Relieving Diaphragm)

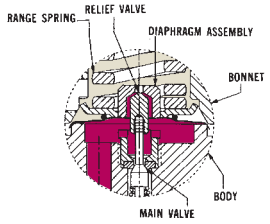
813510-11 thru 13 - For all control setting ranges

Dimensional Data – Advertising Drawings:
HP500-C1: Standard Unit (Large Handwheel)
HP500-C2: "T" Bar Handle
HP500-C3: Wrench Knob with Locking Drive

Principle of Operation



HP500 Series – Non-Relieving Diaphragm



HP500 Series – Relieving Diaphragm

The HP500 is a self-contained, spring loaded, high-purity pressure regulator. Turning the control knob clockwise will increase the force on the range spring and, in turn, the outlet set pressure will increase. With a relieving option, when the outlet pressure is greater than the set pressure, the diaphragm will rise and unseat the relief valve. As the outlet pressure approaches the set pressure, the diaphragm will move down and close the relief valve. Conversely, turning the control knob counter-clockwise will decrease the outlet set pressure. In equilibrium, the force exerted by the range spring is balanced by the outlet pressure.

An unbalance between the outlet pressure and the set pressure causes a corresponding reaction in the diaphragm and main valve. If the outlet pressure rises above the set pressure, the metal diaphragm will lift allowing the main valve to seat. If the outlet pressure falls below the set pressure, the range spring will push the diaphragm down, unseating the main valve, allowing supply pressure to flow through the main valve to the downstream port increasing the set pressure.

At equilibrium, the valve plug assumes a position which supplies the required flow while maintaining the outlet pressure.

Oxygen Service

Specification of materials in regulators used for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. Special cleaning may be performed to the user's specifications at an additional cost through an outside source.

For special cleaning requirements, the customer must supply specifications for desired level of cleanliness. Cost will be advised prior to performing the cleaning operation.

High Purity Internal Connections

Available at additional cost. ITT Conoflow High Purity Internal Connections are machined into the regulator body to accommodate ¼" Vacuseal, VCR, Ultra Seal or equivalent male vacuum fittings (fittings supplied by the customer).

Welded Fittings

Available at additional cost. Straight tubing, 90° elbows, Vacuseal, VCR, Ultra Seal or equivalent compatible fittings are available butt welded in the regulator body (ITT Conoflow to provide fitting).

Electronic Grade Cleaning

Available at additional cost. ITT Conoflow will perform electronic grade cleaning to customer supplied specifications. Cost will be advised prior to performing cleaning.

Leak Rate Certification (ES8A 01 295)

Available at additional cost. ITT Conoflow will certify a leak rate to 2 x 10^{-8} atm cc/sec o Helium.

Internal Surface Finish

Available at additional cost. ITT Conoflow can provide an internal surface finish, on wetted components, of 15 Ra microinch. Other surface finishes available, consult the factory.

Specifications

Materials of Construction

Body: Brass/316 Stainless Steel/316L Stainless Steel
N.A.C.E./Monel/Hastelloy
Bonnet: Brass/Plated Brass/316 Stainless Steel
Main Valve Seat: Kel-F (Teflon/Vespel optional)
Diaphragm and Trim: 316 Stainless Steel/Elgiloy - N.A.C.E.
Inner Friction Bushing: PFA Teflon
Filter Screen: 316 Stainless Steel (120 Mesh)

Maximum Supply Pressure:
Stainless Steel: 6,000 PSIG (41.4 MPa)
Bras: 5,000 PSIG (34.5 MPa)

Control Setting Ranges:
4 - 25 PSIG (0.3 - 0.173 MPa)
4 - 50 PSIG (0.3 - 0.345 MPa)
5 - 100 PSIG (0.04 - 0.690 MPa)
6 - 250 PSIG (0.04 - 1.73 MPa)
10 - 500 PSIG (0.069 - 3.45 MPa)

Proof Pressure: 150% Maximum operating

Burst Pressure: 400% Maximum operating

Flow Capacity: C_V-0.16 (See Flow Graph)
Orifice Diameter:
HP500 (Non-Relieving): 0.110"
HP500 (Relieving): 0.128"

Supply Pressure Effect:
1.0 PSIG (0.007 MPa) increase for a 100 PSIG (0.690 MPa) supply decrease

Operating and Fluid Temperature Range:
-40°F to +165°F (-40°C to +74°C)

Leakage: 2 x 8^{-10} atm cc/sec helium (In Board and Main Valve)

Maximum Operating Torque: 35 in/lbs. (40.3 Kg-cm)

Ports:
¼" NPTF supply/outlet. ¼" gauge ports optional (80°).
Other porting sizes and configurations available.

Weight (Without Gauges): 2.0 lbs. (0.91 Kg)

Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain fifteen (15) characters.

1-5 Model

HP500 = Pressure Reducing Regulator - High Purity - Diaphragm Type

6 Materials of Construction

Body/Bonnet/Trim

F = Brass/Brass/316 SS
M = Brass/316 SS316 SS
B = Brass/Nickel Plated Brass/316 SS
H = 316 SS/Nickel Plated Brass/316 SS
3 = 316 SS/Nickel Plated Brass/316 SS - 15 Ra (See Note 3)
R = N.A.C.E. 316 SS/Nickel Plated Brass/316 SS (See Note 1)
P = 316 SS/316 SS/316 SS
7 = 316 SS/316 SS/316 SS - 15 Ra (See Note 3)
N = N.A.C.E. 316 SS/316 SS/316 SS (See Note 1)
L = 316L SS/Nickel Plated Brass/316 SS (See Note 4)
5 = 316L SS/Nickel Plated Brass/316 SS - 15 Ra (See Notes 3 and 4)
J = N.A.C.E. 316L SS/Nickel Plated Brass/316 SS (See Notes 1 and 4)
T = 316L SS/316 SS/316 SS (See Note 4)
8 = 316L SS/316 SS/316 SS - 15 Ra (See Notes 3 and 4)
W = N.A.C.E. 316L SS/316 SS/316 SS (See Notes 1 and 4)
E = Monel/Nickel Plated Brass/Monel & Inconel
K = Hastelloy/Nickel Plated Brass/Hastelloy & Inconnel

Notes:
1. National Association of Corrosion Engineers.
2. Maximum supply pressure must not exceed the maximum pressure rating of the supply connection and supply gauge connection.
3. These options are offered when a 15 Ra microinch finish is required. This finish will apply to the wetted surfaces only. Refer to price sheets for list price adder.
4. 316L Stainless Steel is offered for welded connections. Refer to position 10-11.

7-8 Elastomers & Diaphragms

	Diaphragm	Main Valve Seat(s)
11 =	316 Stainless Steel	Kel-F
12 =	316 Stainless Steel	Teflon (Optional) (See Note 1)
13 =	316 Stainless Steel	Vespel
14 =	Elgiloy (See Notes 2 and 3)	Kel-F
15 =	Elgiloy (See Notes 2 and 3)	Teflon (See Note 1)
16 =	Elgiloy (See Notes 2 and 3)	Vespel

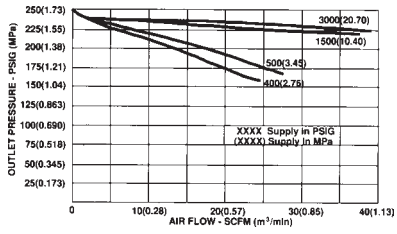
Notes:
1. Utilizing this option will reduce the maximum supply pressure rating to 400 PSIG (2.76 MPa).
2. A relieving diaphragm is not available in Elgiloy.
3. Elgiloy diaphragm required for N.A.C.E.

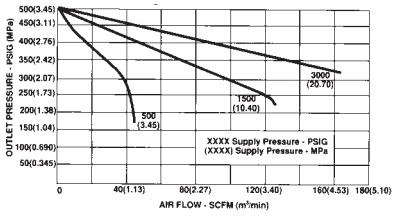
9 Relieving Options

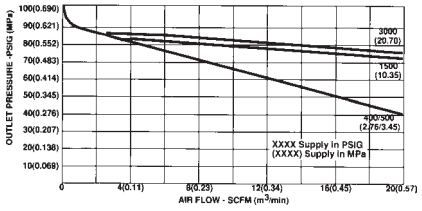
R = Non-Relieving, captured bonnet
V = Relieving, captured bonnet

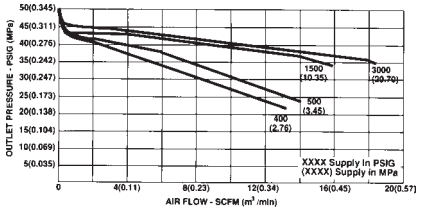
Note:
1. Maximum supply pressure rating is 3000 PSIG (20.7 MPa) if relieving option is chosen, unless a Teflon main valve seat is also chosen.

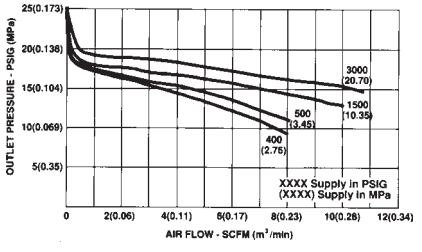
Flow Charts











Control Engineering Data continued on next page...

10-11 Inlet/Outlet/Gauge Ports

Inlet/Outlet Ports (No Gauge Ports)

NPT Connections	Butt Welded Tubing Connections (6)	Field Welded Connections (1)
N1 = ¼" (Standard)	B1 = 316L Stainless Steel ¼" x 4" Tubing welded per port	W1 = ¼" Butt Weld preparation
	B2 = 316L Stainless Steel ¼" x 4" Tubing welded per port 15 Ra microinch finish	W2 = ¼" Socket Weld preparation
High Purity Internal Connections (5)	**Butt Weld (Zero Clearance) High Purity Connections (2, 6)**	**Butt Weld 90° Elbow (3,6)**
H1 = ¼" Vacuseal - Preparation	Z1 = ¼" Vacuseal	91 = ¼" Butt Weld 90° Elbow
H2 = ¼" VCR - Preparation	Z2 = ¼" VCR	
H3 = ¼" Ultra Seal - Preparation	Z3 = ¼" Ultra Seal	

Inlet/Outlet/2-Gauge Ports (80°) Gauge Port Configuration – Inlet (High) Outlet (Low)

NPT Connections	Butt Welded Tubing Connections (6)	Field Welded Connections (1)
81 = ¼" (Standard)	82 = 316L Stainless Steel ¼" x 4" Tubing welded per port	84 = ¼" Butt Weld preparation
	83 = 316L Stainless Steel ¼" x 4" Tubing welded per port 15 Ra microinch finish	85 = ¼" Socket Weld preparation
High Purity Internal Connections (5)	**Butt Weld (Zero Clearance) High Purity Connections (2, 6)**	**Butt Weld 90° Elbow (3)**
86 = ¼" Vacuseal - Preparation	89 = ¼" Vacuseal	8H = ¼" Butt Weld 90° Elbow
87 = ¼" VCR - Preparation	8A = ¼" VCR	
88 = ¼" Ultra Seal - Preparation	8F = ¼" Ultra Seal	

Notes:
1. Weld preparation to standard tubing tolerance.
2. Fitting(s) supplied by ITT Conoflow. (Female Nuts).
3. Fittings are installed down away from control handle.
4. All gauge port connections are ¼" NPT.
5. Customer to supply fitting(s).
6. The maximum pressure rating of ¼" welded connections is 3500 PSIG (24.2 MPa) to assure a minimum of a 4:1 safety factor.

12 Mounting Options

R = Rear Mounting (Standard)
P = Panel Mounting (2-nut) (Optional)

13 Cleaning Options

A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294
B = **Oxygen Cleaning** - Specification of material in regulators used for cleaning for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost.
C = **Customer Specified Cleaning** - Customer to specify the desired level of cleanliness. ITT Conoflow will advise cost prior to performing cleaning operation. Specification of materials is the **user's responsibility.**

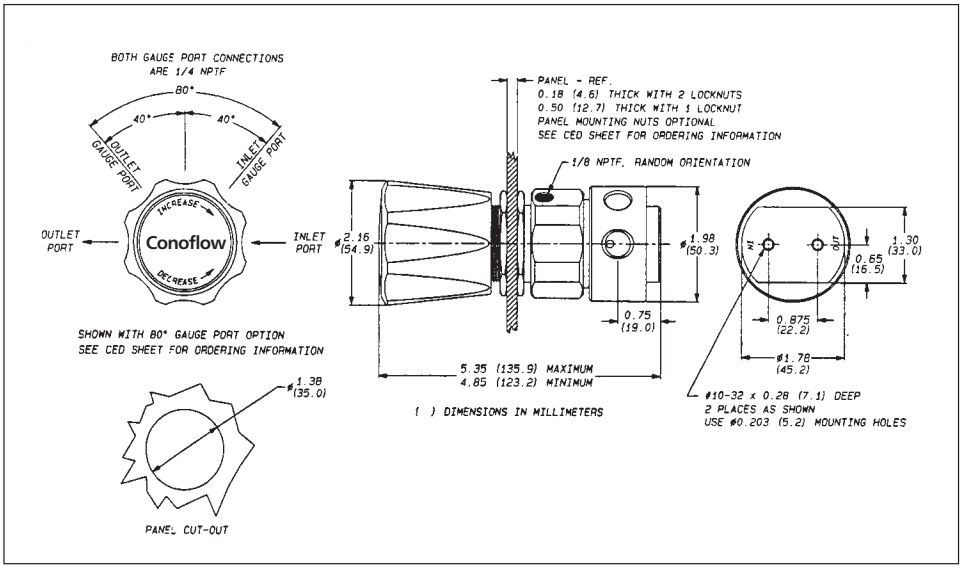
14 Adjustment Selections

B = Handwheel (Standard)
K = Wrench knob with locking device (Optional)
T = "T" bar handle (Optional)

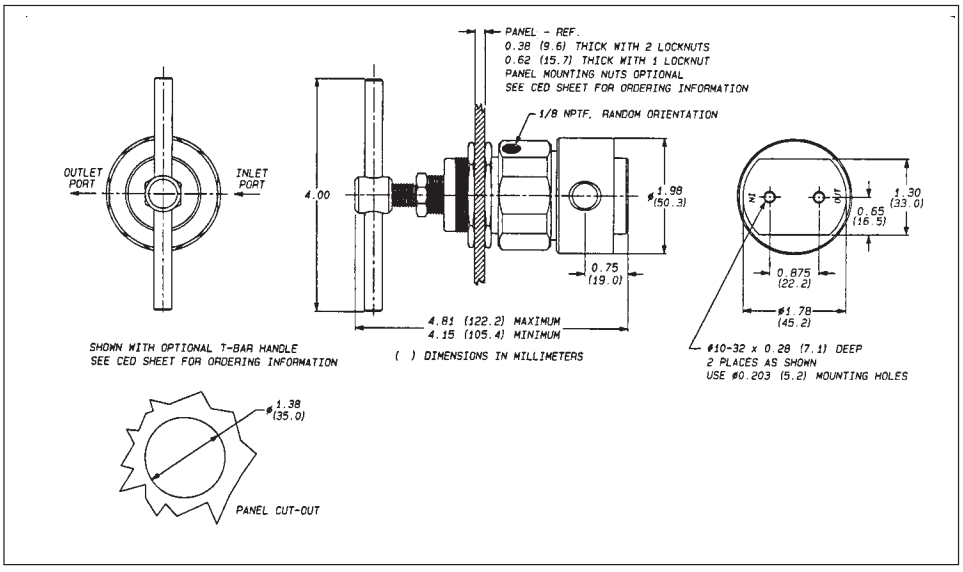
15 Control Setting Ranges

A	= 4	- 25	PSIG	(0.03	- 0.173	MPa)
B	= 4	- 50	PSIG	(0.03	- 0.345	MPa)
C	= 5	- 100	PSIG	(0.04	- 0.690	MPa)
E	= 6	- 250	PSIG	(0.04	- 1.730	MPa)
F	= 10	- 500	PSIG	(0.069	- 3.450	MPa)

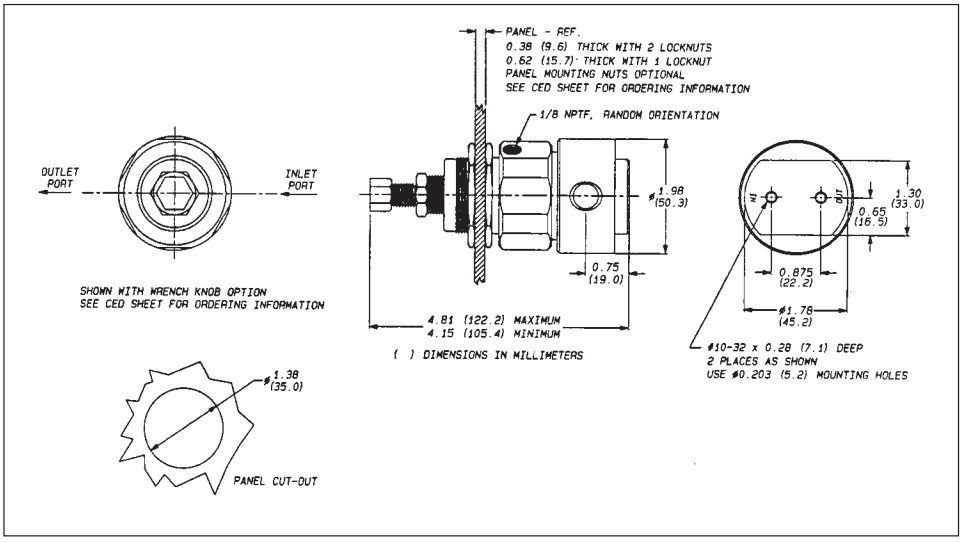
Drawings



For certified dimensional drawing, refer to HP500-C1.



For certified dimensional drawing, refer to HP500-C2.



For certified dimensional drawing, refer to HP500-C3.

Pressure Reducing - Tied Diaphragm Type - High Purity

The HP600 High Purity model is a self-contained, pressure reducing regulator which incorporates a tied diaphragm design.

This style of mechanical link between the diaphragm and main valve assists in preventing pressure "creep" even when media accumulation has occurred on the valve seat. Applications for this regulator are high purity gas handling, regulation of HCL, silane, phosphine and ammonia, semiconductor manufacturing, research labs, and regulation of corrosive and specialty gases.

The 316 Stainless Steel constructed unit has a maximum supply pressure rating of 3000 PSIG (20.7 MPa). The convoluted 316 Stainless Steel diaphragm provides accurate and reliable regulation over four control setting ranges from 2-25, 3-50, 3-100 and 4-150 PSIG (0.014-0.173, 0.021-0.345, 0.021-0.690 and 0.028-1.04 MPa)

Pressure adjustments are made with a large handwheel or by an optional wrench style knob with a locking device or an optional "T" bar handle.

The HP600 has ¼" NPT inlet and outlet connections. Inlet and outlet gauge ports are standard. High purity internal connections and VCR, Vacuseal and Ultra Seal welded fittings are available upon request. Line and rear mounting are standard for this regulator.

Options

Mounting
Line – All variations
Rear Mounting (Standard)

Adjustments
Handwheel (Large)
Knob (Wrench style - with locking device) – Optional
"T" bar handle – Optional

Cylinder Connections
CGA connections are available

Gauges
2" and 2½" diameters
Brass, steel and stainless steel construction

Dimensional Data – Advertising Drawings:
HP600-C1: Standard unit

Feature Summary

316 Stainless Steel, 316L Stainless Steel and N.A.C.E. constructions available
High purity internal connections - optional
VCR, Vacuseal, Ultra Seal welded fittings - optional
Leakage to 2 x 10^{-8} atm cc/sec helium
Multiple control ranges available
In-line and rear mounting are standard
Non-Relieving, positionable captured bonnet (Standard)
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)
CGA cylinder connections available
5,000 PSIG (34.50 MPa) inlet pressure available

HP600 Control Kit

83600-11 - For control setting range 2 - 25 PSIG (0.014 - 0.173 MPa)
83601-11 - For control setting range 3 - 50 PSIG (0.021 - 0.345 MPa)
83602-11 - For control setting range 3 - 100 PSIG (0.021 - 0.690 MPa)
83603-11 - For control setting range 5 - 150 PSIG (0.028 - 1.040 MPa)

HP600 Maintenance Kit

80600-11 - For all control setting ranges

HP600 Overhaul Kit

81600-11 - For all control setting ranges

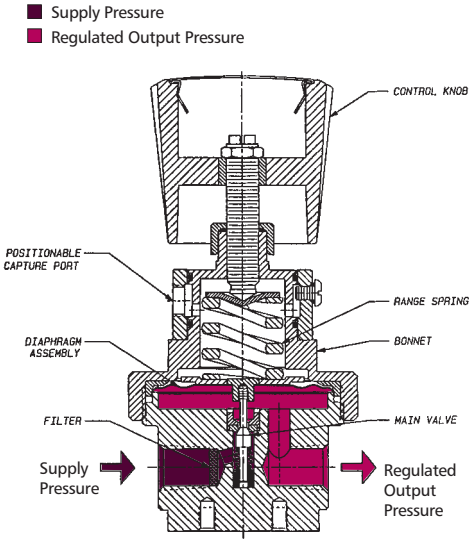
Principle of Operation

Turning the control knob clockwise will increase the force on the internal range spring and, in turn, increase the outlet set pressure. Conversely, turning the control knob counter-clockwise will reduce the force on the range spring and reduce the outlet set pressure.

An unbalance between the force of the range spring and the outlet pressure acting upon the diaphragm will cause a corresponding reaction in the main valve. When the force of the range spring overcomes the force exerted on the diaphragm by the outlet pressure, the diaphragm will move down and open the main valve.

The difference between the supply pressure and the outlet pressure will allow flow when the main valve opens. When the outlet pressure reaches set pressure, the force exerted by the outlet pressure acting on the diaphragm will balance the force of the range spring at the set pressure position and permit the diaphragm to rise. As the diaphragm rises, the main valve moves toward the closed position. When the main valve closes, the flow path will close and flow will cease.

When the outlet pressure acting on the diaphragm exceeds the force on the range spring, the diaphragm will rise beyond the valve closed position. Since the diaphragm is positively linked (tied) to the main valve plug, the additional load of the outlet pressure acting on the diaphragm will pull the valve plug against the seat. With the valve positively closed, no flow can occur.



HP600 Series – Non-Relieving Diaphragm

Specifications

Maximum Supply Pressure:
3000 PSIG (20.70 MPa), 5000 PSIG (34.50 MPa) available, refer to Control Engineering Data

Control Setting Ranges:
2 - 25 PSIG (0.014 - 0.173 MPa)
3 - 50 PSIG (0.021 - 0.345 MPa)
3 - 100 PSIG (0.021 - 0.690 MPa)
4 - 150 PSIG (0.028 - 1.04 MPa)

Proof Pressure: 150% Maximum operating

Burst Pressure: 400% Maximum operating

Flow Capacity: C_V-0.15 (See Flow Graph)

Orifice Diameter: 0.128"

Supply Pressure Effect: 0.8 PSIG (0.005 MPa) increase for a 100 PSIG (0.690 MPa) supply decrease

Operating and Fluid Temperature Range:
-40°F to +165°F (-40°C to +74°C)

Leakage:
2 x 10^{-8} atm cc/sec helium (In Board and Main Valve)

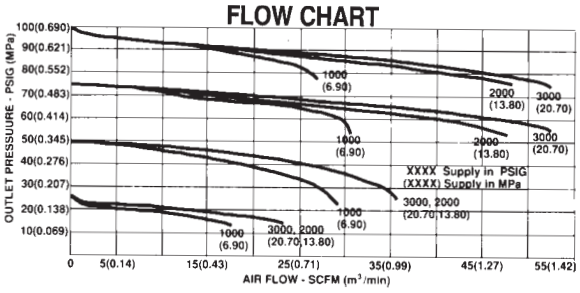
Maximum Operating Torque: 30 in/lbs. (34.5 Kg-cm)

Ports:
¼" NPTF supply and outlet. Two gauge ports at 60°.
Other porting sizes and configurations available.

Weight (Without Gauges): 3.0 lbs. (1.0235 Kg)

Materials of Construction

Body: 316 Stainless Steel/316L Stainless Steel/N.A.C.E.
Bonnet: Brass, Nickel Plated
Main Valve Seat: Kel-F (Teflon/Vespel optional)
Diaphragm and Trim: 316 Stainless Steel/Elgiloy - N.A.C.E.
Filter: 316L Stainless Steel (40 micron)



Oxygen Service
Specification of materials in regulators used for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. Special cleaning may be performed to the user's specifications at an additional cost through an outside source.

High Purity Internal Connections
Available at additional cost. ITT Conoflow High Purity Internal Connections are machined into the regulator body to accommodate ¼" Vacuseal, VCR, Ultra Seal or equivalent male vacuum fittings (fittings supplied by the customer).

Welded Fittings
Available at additional cost. Straight tubing, 90° elbows, Vacuseal, VCR, Ultra Seal or equivalent compatible fittings are available butt welded in the regulator body (ITT Conoflow to provide fitting).

Electronic Grade Cleaning
Available at additional cost. ITT Conoflow will perform electronic grade cleaning to customer supplied specifications. Cost will be advised prior to performing cleaning.

Leak Rate Certification (ES8A 01 295)
Available at additional cost. ITT Conoflow will certify a leak rate to 2 x 10^{-8} atm cc/sec of helium.

Internal Surface Finish
Available at additional cost. ITT Conoflow can provide an internal surface finish, on wetted components, of 15 Ra microinch. Other surface finishes available, consult the factory.

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain fifteen (15) characters.

1-5 Model

HP600 = Pressure Reducing Regulator - High Purity - Tied Diaphragm Type
Note: 1. For a maximum inlet pressure rating of 5000 PSIG (34.50 MPa), refer to positions (7-8) Elastomers & Diaphragms.

6 Materials of Construction

Body/Bonnet/Trim
H = 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel
3 = 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel - 15 Ra (See Note 2)
R = N.A.C.E. 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel (See Note 1)
L = 316L Stainless Steel/Nickel Plated Brass/316 Stainless Steel (See Note 3)
5 = 316L Stainless Steel/Nickel Plated Brass/316 Stainless Steel - 15 Ra (See Notes 2 and 3)
J = N.A.C.E. 316L Stainless Steel/Nickel Plated Brass/316 Stainless Steel (See Notes 2 and 3)
Notes: 1. National Association of Corrosion Engineers.
2. These options are offered when a 15 Ra microinch finish is required. This finish will apply to the wetted surfaces only. Refer to price sheets for list price adder.
3. 316L Stainless Steel is required for welded connections. Refer to position 10-11.
4. Maximum supply pressure must not exceed the maximum pressure rating of the supply connections and supply gauge connection.

7-8 Elastomers & Diaphragms

	Diaphragm	Main Valve Seat(s)
11 =	316 Stainless Steel	Kel-F (Standard)
12 =	316 Stainless Steel	Teflon (See Note 1)
13 =	316 Stainless Steel	Vespel (See Note 3)
14 =	Elgiloy (See Note 2)	Kel-F
15 =	Elgiloy (See Note 2)	Teflon (See Note 1)
16 =	Elgiloy (See Note 2)	Vespel (See Note 3)

Notes: 1. Utilizing this option will reduce the maximum supply pressure rating to 400 PSIG (2.76 MPa).
2. Elgiloy diaphragm required for N.A.C.E.
3. The use of a Vespel main valve seat increases the maximum inlet pressure rating to 5000 PSIG (34.50 MPa).

9 Relieving Options

R = Non-Relieving, captured bonnet
Note: 1. Captured bonnet vent is positionable.

10-11 Inlet/Outlet/Gauge Ports

Inlet/Outlet Ports 2-Gauge Ports (60°) Gauge Port Configuration – Inlet (High) Outlet (Low)

NPT Connections (4)	Butt Welded Tubing Connections (6)	Field Welded Connections (1)
61 = ¼" (Standard)	62 = 316L Stainless Steel ¼" x 4" Tubing welded per port	64 = ¼" Butt Weld preparation
	63 = 316L Stainless Steel ¼" x 4" Tubing welded per port 15 Ra microinch finish	65 = ¼" Socket Weld preparation

High Purity Internal Connections (5)	Butt Weld (Zero Clearance) High Purity Connections (2)	Butt Weld 90° Elbow (3)
66 = ¼" Vacuseal - Preparation	69 = ¼" Vacuseal	8H = ¼" Butt Weld 90° Elbow
67 = ¼" VCR - Preparation	6A = ¼" VCR	
68 = ¼" Ultra Seal - Preparation	6F = ¼" Ultra Seal	

Notes: 1. Weld preparation to standard tubing tolerance.
2. Fitting(s) supplied by ITT Conoflow. (Female Nuts).
3. Fittings are installed down away from control handle.
4. All gauge connections are ¼" NPT.
5. Customer to supply fittings.
6. The maximum pressure rating of ¼" welded connections is 3500 PSIG (24.2 MPa) to assure a minimum of a 4:1 safety factor.

12 Mounting Options

R = Rear Mounting (Standard)

13 Cleaning Options

A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294
B = **Oxygen Cleaning** - Specification of material in regulators used for cleaning for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost.
C = **Customer Specified Cleaning** - Customer to specify the desired level of cleanliness. ITT Conoflow will advise cost prior to performing cleaning operation. Specification of materials is the **user's responsibility.**

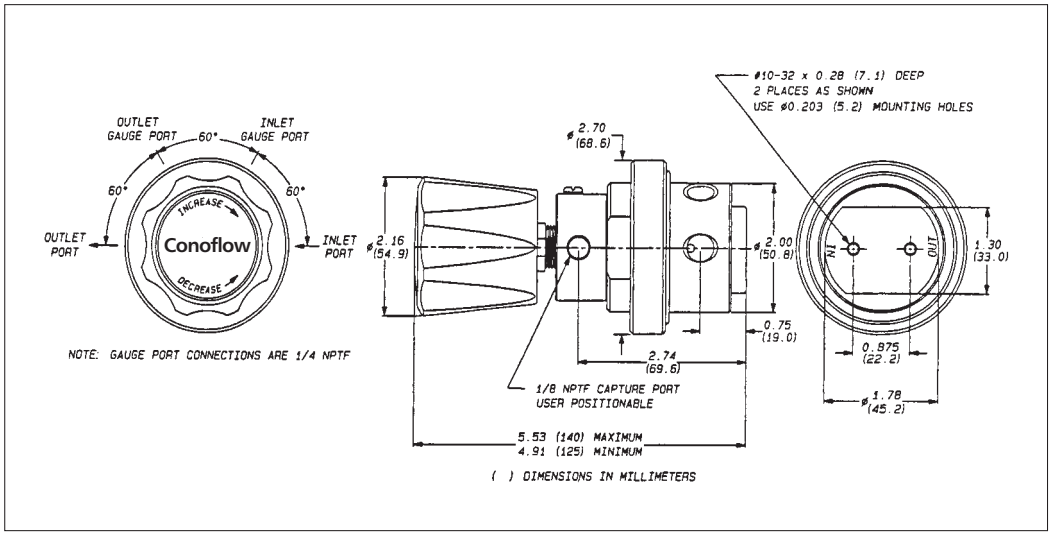
14 Adjustment Selections

B = Handwheel (Large)
K = Wrench knob with locking device (Optional)
T = "T" bar handle (Optional)

15 Control Setting Ranges

A	= 2	- 25	PSIG	(0.014	- 0.173	MPa)
B	= 3	- 50	PSIG	(0.021	- 0.345	MPa)
C	= 3	- 100	PSIG	(0.021	- 0.690	MPa)
D	= 4	- 150	PSIG	(0.028	- 1.730	MPa)

Drawings



For certified dimensional drawing, refer to HP600-C1

HP610 Regulator

Pressure Reducing - Diaphragm Type - High Purity

The HP610 is a high purity, self-contained, spring-loaded, pressure reducing regulator. This unit is designed for use in applications requiring high flow rates and the ability to relieve outlet media pressure. Non-relieving models are also available.

The 316 Stainless Steel constructed unit has a maximum supply pressure rating to 250 PSIG (1.73 MPa). The convoluted 316 Stainless Steel diaphragm provides accurate and reliable regulation over a control setting range of 0 - 50 PSIG (0 - 0.35 MPa).

The HP610 has one ¼" NPT inlet connection and two ¼" NPT outlet connections. Both outlet ports provide the same flow capacity with the central port generally being used as a gauge port.

Options

Mounting
Line – All variations
Panel – 1 nut - Standard

Adjustments
Handwheel (Large)

Gauges
2" and 2½" diameters
Brass, steel and stainless steel construction

HP610 Maintenance Kit (Relieving)
80610-11 - For all control setting ranges

HP610 Maintenance Kit (Non-Relieving)
80615-11 - For all control setting ranges

HP610 Overhaul Kit (Relieving)
81610-11 - For all control setting ranges

HP610 Overhaul Kit (Non-Relieving)
81615-11 - For all control setting ranges

Feature Summary

Relieving style diaphragm provides accurate regulation in dead-ended applications

Internal finish on wetted components is 20 Ra

Inboard leakage to 2 x 10^{-8} atm cc/sec helium

High flow rate capability

Non-relieving model available

Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)

Dimensional Data – Advertising Drawings:
HP610-C: Standard unit

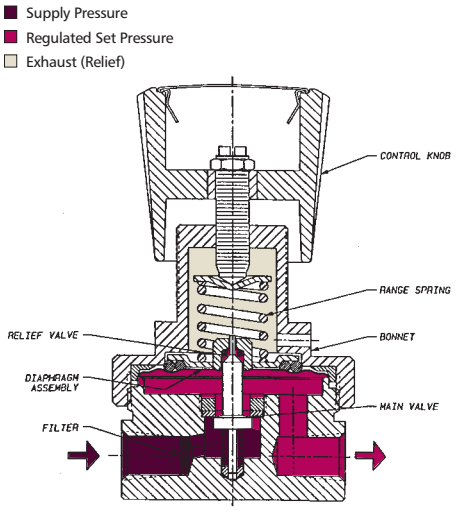
Principle of Operation

The HP610 is a high purity, self-contained, spring-loaded pressure reducing unit. The regulator is designed for use in applications requiring high flow rates and the ability to relieve outlet media pressure.

Turning the control knob clockwise will increase the force on the internal range spring and in turn will close the relief valve and increase the outlet set pressure of the regulator. Conversely, turning the control knob counter-clockwise will reduce the force on the range spring and will decrease the set pressure of the regulator. When the outlet pressure exceeds the set pressure, the internal diaphragm assembly will rise and open the relief valve, relieving the excess pressure to atmosphere until equilibrium is reached. In equilibrium, the force exerted by the range spring is balanced by the outlet pressure force on the diaphragm.

An unbalance between the outlet pressure and the set pressure will cause a corresponding reaction in the diaphragm and valves. If the outlet pressure falls below the set pressure, the diaphragm will be moved down by the range spring and open the main valve. As the outlet pressure increases, the diaphragm will assume a position which will supply the flow required to maintain the outlet pressure.

When the outlet pressure is equal to the set pressure, the main valve will close and flow will cease. If the outlet pressure rises above the set pressure, the diaphragm will rise further and unseat the relief valve. When the outlet pressure decreases to the set pressure, the valve will close and the relieving will stop.



HP610 Series – Relieving Diaphragm

Specifications

Maximum Supply Pressure:
250 PSIG (1.73 MPa)

Control Setting Range:
0 - 50 PSIG (0 - 0.345 MPa)

Proof Pressure: 200% Maximum operating

Burst Pressure: 400% Maximum operating

Flow Capacity: C_V-0.95 (See Flow Graph)

Orifice Diameter: 0.391"

Supply Pressure Effect: 12 PSIG (0.08 MPa) increase for a 100 PSIG (0.690 MPa) supply decrease

Operating and Fluid Temperature Range:
-40ºF to +165ºF (-40ºC to +74ºC)

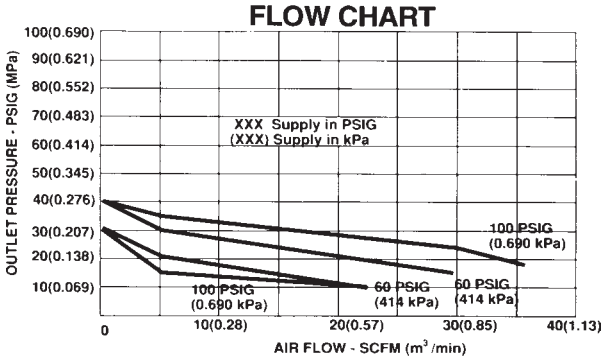
Leakage:
Main Valve: 2 x 10^{-8} atm cc/sec helium
Vent Valve: Bubble tight
Diaphragm: 2 x 10^{-8} atm cc/sec helium

Ports:
¼" NPTF supply and outlet. One gauge ports at 90º.

Weight (Without Gauges): 2.6 lbs. (1.2 Kg)

Materials of Construction

Body: 316 Stainless Steel - Electropolish
Bonnet: Brass, Nickel Plated
Main Valve Seat: Teflon
Vent Valve Seat: Teflon
Diaphragm: 316 Stainless Steel
Trim: 316 Stainless Steel
Filter: 316 Stainless Steel (120 mesh)



Oxygen Service
Specification of materials in regulators used for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. Special cleaning may be performed to the user's specifications at an additional cost through an outside source.

Electronic Grade Cleaning
Available at additional cost. ITT Conoflow will perform electronic grade cleaning to customer supplied specifications. Cost will be advised prior to performing cleaning.

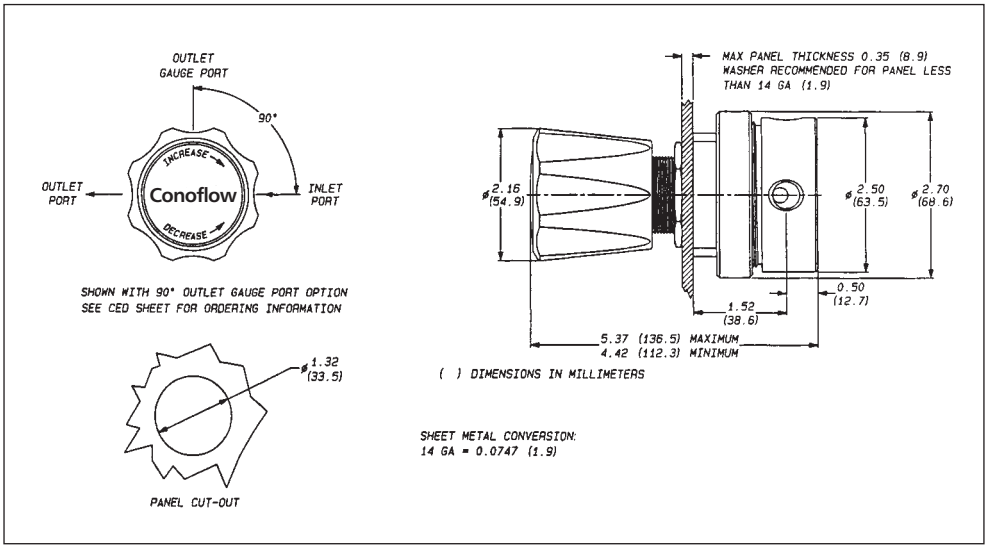
Leak Rate Certification (ES8A 01 295)
Available at additional cost. ITT Conoflow will certify a leak rate to 2 x 10^{-8} atm cc/sec of helium. For non-relieving option only.

Internal Surface Finish
The Model HP610 Regulator has an internal surface finish of 20 Ra on wetted surfaces.

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain fifteen (15) characters.

1-5 Model	HP610 = Pressure Reducing Regulator - High Purity - Diaphragm Type
6 Materials of Construction	**Body/Bonnet/Trim** H = 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel
7-8 Elastomers & Diaphragms	**Seals and Diaphragms** / **Main Valve Seat** / **Valve Seat O-Ring** 11 = 316 Stainless Steel / Teflon / Buna-N
9 Relieving Options	N = Non-Relieving V = Relieve to atmosphere (Standard)
10-11 Inlet/Outlet/Gauge Ports	**Inlet/Outlet/1-Gauge Ports (90°)** **(See Note 1)** NPT Connections 91 = ¼" Notes: 1. Gauge port connection is ¼" NPT.
12 Mounting Options	P = Panel Mounting (1-nut)
13 Cleaning Options	A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294 B = **Oxygen Cleaning** - Specification of material in regulators used for cleaning for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. C = **Customer Specified Cleaning** - Customer to specify the desired level of cleanliness. ITT Conoflow will advise cost prior to performing cleaning operation. Specification of materials is the **user's responsibility.**
14 Adjustment Selections	B = Handwheel (Large)
15 Control Setting Ranges	B = 0 - 50 PSIG (0 - 0.35 MPa)



For Certified Dimensional Drawing, refer to HP610-C

HP700 Regulator

Two Stage - Diaphragm Type - High Purity

Conoflow's HP700 Series regulator is a two stage, high purity unit designed to provide constant outlet pressure regardless of inlet pressure fluctuations. This unit is available in either brass or stainless steel construction. Maximum supply pressure rating for either material is 3500 PSIG (24.2 MPa). To provide optimum performance in specific applications, this unit is offered with relieving, non-relieving, and tied (non-relieving) diaphragm options.

Typical applications for the HP700 regulator are gas chromatography, calibration systems, cylinder gases, and precise regulation of corrosive and non-corrosive media. Adjustment within each of five available ranges is made with a standard large handwheel. A wrench style knob with a locking device and a "T" bar handle are available as optional adjustments.

This unit is supplied with ¼" inlet and outlet connections. Inlet and outlet gauge ports (¼" NPT) are standard. High purity internal connections and VCR, Vacuseal and Ultra Seal welded fittings are optional.

Captured bonnets for both stages are standard.

This regulator is designed for reliability with an absolute minimum of maintenance. The characteristics are a result of Conoflow's high standards of manufacturing and years of experience as a leading manufacturer of pneumatic instrumentation.

Options

Mounting
Line - All variations
Panel Mounting - No panel mounting nuts
Panel Mounting - 2 nuts - Optional

Adjustments
Handwheel (Large)
Knob (Wrench style - with locking device) - Optional
"T" Bar Handle - Optional

Cylinder Connections :CGA cylinder connections are available

Gauges
2" and 2½" diameters
Brass, steel and stainless steel construction

HP700 Control Kit
83700-11 thru 18 - For control setting range 4-25 PSIG (0.03-0.173 MPa)
83701-11 thru 18 - For control setting range 4-50 PSIG (0.03-0.345 MPa)
83702-11 thru 18 - For control setting range 5-100 PSIG (0.04-0.690 MPa)
83703-11 thru 18 - For control setting range 5-150 PSIG (0.04-1.040 MPa)
83704-11 thru 18 - For control setting range 6-250 PSIG (0.04-1.730 MPa)

HP700 Maintenance Kit
80700-11 thru 18 - For all control setting ranges

HP700 Overhaul Kit
81700-11 thru 18 For all control setting ranges

Feature Summary

Maximum rated inlet 3500 PSIG (24.2 MPa)
6000 PSIG (41.40 MPa) inlet pressure available
Captured bonnets (Standard)
Leak rate 2 x 10^{-8} atm cc/sec helium
Brass and stainless steel construction
Optional - VCR, Vacuseal and Ultra Seal welded fittings or high purity internal connections
Control pressure ranges: 4-25, 4-50, 5-100 and 6-250 PSIG (0.03-0.173, 0.03-0.345, 0.04-0.690, 0.04-1.04 and 0.04-1.73 MPa)
In-line mounting is standard. Panel mounting hardware is optional.
CGA cylinder connections available

Dimensional Data – Advertising Drawings:
HP700-C1: Standard Unit (Large Handwheel)
HP700-C2: "T" Bar Handle
HP700-C3: Wrench Knob with Locking Device

Principle of Operation

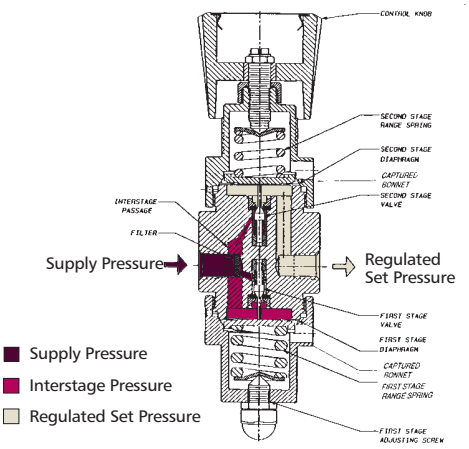
The HP700 is a self-contained, spring loaded, two stage, pressure reducing regulator. Turning the control knob clockwise will increase the force on the second stage range spring and in turn increase the outlet set pressure. Conversely, turning the control knob counter-clockwise will decrease the force on the second stage range spring and in turn decrease the outlet set pressure. In equilibrium, the force exerted by the second stage range spring is balanced by the outlet pressure acting on the second stage diaphragm.

Non-Relieving (Tied/Non-Relieving)
An unbalance between the outlet pressure and the outlet set pressure will cause corresponding reaction in the diaphragm and valves. If the outlet pressure rises above the set pressure, the second stage diaphragm will lift, allowing the second stage main valve plug to seat. When the second stage main valve plug seats, the interstage pressure will equal the first stage set pressure and the first stage main valve plug will also seat. *When the outlet pressure reaches the set point of the regulator, the diaphragm will rise and the valve will close. When the outlet pressure is above the set point, the diaphragm will be restrained by the main valve and will pull the valve closed against the seat.*

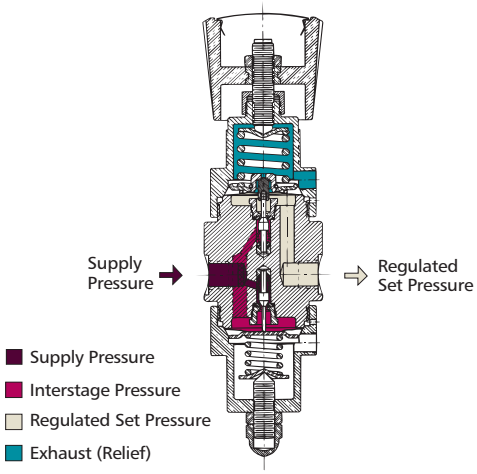
Relieving
An unbalance between the outlet pressure and the outlet set pressure will cause corresponding reaction in the diaphragm and valves. If the outlet pressure rises above the set pressure, the second stage diaphragm will lift, allowing the second stage main valve plug to seat. When the second stage main valve plug seats, the interstage pressure will equal the first stage set pressure and the first stage main valve plug will also seat. *When the outlet pressure is above the set point, the diaphragm will lift, opening the relief valve, and vent the excess outlet pressure into the bonnet.*

If the outlet pressure falls below the outlet set pressure, the force of the range spring will overcome the outlet pressure acting on the second stage diaphragm, allowing the second stage diaphragm to move down and open the second stage valve. When the second stage valve opens, the interstage pressure falls below the first stage set pressure. The unbalance in the first stage allows the first stage diaphragm to move down and unseat the first stage valve plug.

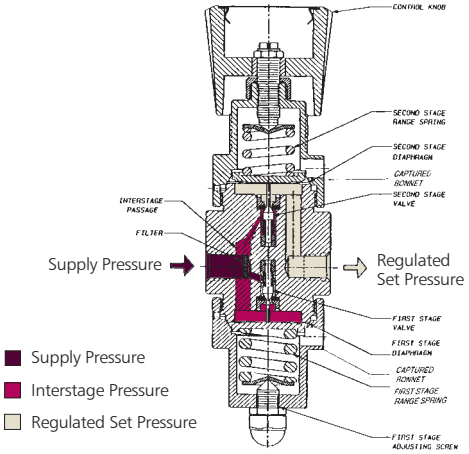
In equilibrium, both the first stage and second stage diaphragms and valve plugs assume positions which will supply the required flow while maintaining the set pressure.



HP700 Series - Non-Relieving Diaphragm



HP700 Series - Relieving Diaphragm



HP700 Series - Tied Diaphragm Non-Relieving

Maximum Supply Pressure: 3500 PSIG (24.2 MPa)
6000 PSIG (41.40 MPa) available, refer to Control Engineering Data

Control Setting Ranges:
4 - 25 PSIG (0.03 - 0.173 MPa)
4 - 50 PSIG (0.03 - 0.345 MPa)
5 - 100 PSIG (0.04 - 0.690 MPa)
5 - 150 PSIG (0.04 - 1.04 MPa)
6 - 250 PSIG (0.04 - 1.73 MPa)

Proof Pressure: 150% Maximum operating

Burst Pressure: 400% Maximum operating

Flow Capacity: C_V-0.14 (See Flow Graph)

Orifice Diameter: 0.110" (Both Stages)

Supply Pressure Effect: 0.03 PSIG (0.0002 MPa) decrease for a 100 PSIG (0.690 MPa) supply decrease

Operating and Fluid Temperature Range: -40°F to +165°F (-40°C to +74°C)

Leakage: 2 x 10^{-8} atm cc/sec helium (In Board and Main Valve)

Ports:
¼" NPTF supply and outlet. ¼" gauge ports (80°). Other porting sizes and configurations available.

Weight (Without Gauges): 3.25 lbs. (1.5 Kg)

Materials of Construction

Body: Brass/316 Stainless Steel/316L Stainless Steel/N.A.C.E. Stainless Steel
Bonnet: Brass/Plated Brass
Main Valve Seat: Kel-F/Teflon (All Kel-F design optional)
Diaphragm and Trim: 316 Stainless Steel/Elgiloy - N.A.C.E.
Inner Friction Bushings: PFA Teflon
Filter: 316 Stainless Steel Screen (120 mesh)

Oxygen Service
Specification of materials in regulators used for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost. Special cleaning may be performed to the user's specifications at an additional cost through an outside source.

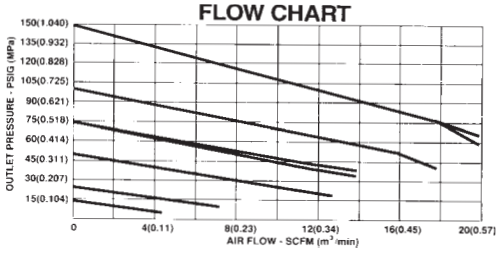
High Purity Internal Connections
Available at additional cost. ITT Conoflow High Purity Internal Connections are machined into the regulator body to accommodate ¼" Vacuseal, VCR, Ultra Seal or equivalent male vacuum fittings (fittings supplied by the customer).

Welded Fittings
Available at additional cost. Straight tubing, 90° elbows, Vacuseal, VCR, Ultra Seal or equivalent compatible fittings are available butt welded in the regulator body (ITT Conoflow to provide fitting).

Electronic Grade Cleaning
Available at additional cost. ITT Conoflow will perform electronic grade cleaning to customer supplied specifications. Cost will be advised prior to performing cleaning.

Leak Rate Certification (ES8A 01 295)
Available at additional cost. ITT Conoflow will certify a leak rate to 2 x 10^{-8} atm cc/sec of helium. For non-relieving option only.

Internal Surface Finish
The Model HP610 Regulator has an internal surface finish of 20 Ra on wetted surfaces.



Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain fifteen (15) characters.

1-5 Models

HP700 = Pressure Reducing Regulator - High Purity - Diaphragm Type
HP710 = Pressure Reducing Regulator - High Purity - Tied Diaphragm
Note: 1. For a maximum inlet pressure rating of 6000 PSIG (41.40 MPa), refer to positions (7-8) Elastomers & Diaphragms.

6 Materials of Construction

Body/Bonnet/Trim
F = Brass/Brass/316 Stainless Steel
H = 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel
L = 316L Stainless Steel (Welded)/Nickel Plated Brass/316 Stainless Steel (See Note 4)
J = N.A.C.E. 316 Stainless Steel (Welded)/Nickel Plated Brass/316 Stainless Steel (See Notes 1 and 4)
R = N.A.C.E. 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel (See Note 1)
P = 316 Stainless Steel/316 Stainless Steel/316 Stainless Steel
3 = 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel - 15 Ra (See Note 3)
5 = 316L Stainless Steel (Welded)/Nickel Plated Brass/316 Stainless Steel - 15 Ra (See Notes 3 and 4)
Notes: 1. National Association of Corrosion Engineers.
2. Maximum supply pressure must not exceed the maximum pressure rating of the supply connections and supply gauge connection.
3. These options are offered when a 15 Ra microinch finish is required. This finish will apply to the wetted surfaces only. Refer to price sheets for list price adder.
4. 316L Stainless Steel is offered for welded connections. Refer to position 10-11.

7-8 Elastomers & Diaphragms

	Diaphragm	Main Valve Seat(s)
11 =	316 Stainless Steel	Kel-F/Teflon (Standard)
12 =	316 Stainless Steel	Kel-F/Kel-F (Optional)
13 =	Elgiloy	Kel-F/Teflon (See Note 1)
14 =	Elgiloy	Kel-F/Kel-F (See Note 1)
15 =	316 Stainless Steel	Vespel/Teflon (See Note 2)
16 =	316 Stainless Steel	Vespel/Kel-F (See Note 2)
17 =	Elgiloy	Vespel/Teflon (See Notes 1 and 2)
18 =	Elgiloy	Vespel/Kel-F (See Notes 1 and 2)

Notes: 1. Elgiloy diaphragm required for N.A.C.E.
2. The use of a Vespel main valve seat increases the maximum inlet pressure rating to 6000 PSIG (41.40 MPa).

9 Relieving Options

R = Non-Relieving, captured bonnet
V = Relieving. captured bonnet
Note: 1. Relieving option not available in HP710 series (Tied Diaphragm).

10-11 Inlet/Outlet/Gauge Ports

Inlet/Outlet/2-Gauge Ports (80°)

NPT Connections
81 = ¼"

Butt Welded Tubing Connections (6)
82 = 316L Stainless Steel ¼" x 4" Tubing welded per port
83 = 316L Stainless Steel ¼" x 4" Tubing welded per port 15 Ra microinch finish

Field Welded Connections (1)
84 = ¼" Butt Weld preparation
85 = ¼" Socket Weld preparation

High Purity Internal Connections (5)
86 = ¼" Vacuseal - Preparation
87 = ¼" VCR - Preparation
88 = ¼" Ultra Seal - Preparation

Butt Weld (Zero Clearance) High Purity Connections (2)
89 = ¼" Vacuseal
8A = ¼" VCR
8F = ¼" Ultra Seal

Butt Weld 90° Elbow (3)
8H = ¼" Butt Weld 90° Elbow

Notes: 1. Weld preparation to standard tubing tolerance.
2. Fitting(s) supplied by ITT Conoflow. (Female Nuts).
3. Fittings are installed down away from control handle.
4. All gauge connections are ¼" NPT.
5. Customer to supply fittings.
6. The maximum pressure rating of ¼" welded connections is 3500 PSIG (24.2 MPa) to assure a minimum of a 4:1 safety factor.

12 Mounting Options

N = Panel Mounting
P = Panel Mounting (2 nuts) (Optional)

13 Cleaning Options

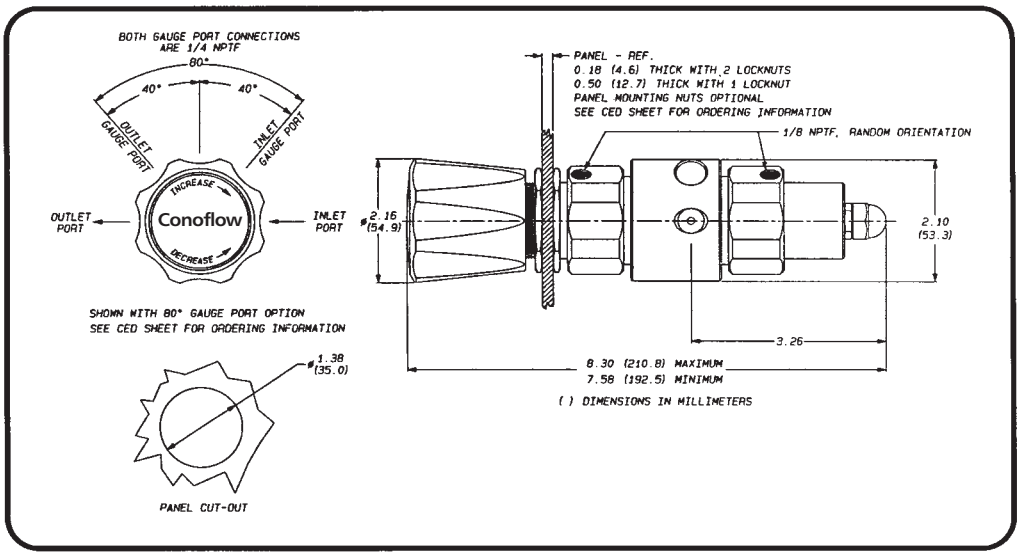
A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294
B = **Oxygen Cleaning** - Specification of material in regulators used for cleaning for oxygen service is the **user's responsibility.** Cleaning for oxygen service **(Per ES8A 01 297)** to 3500 PSIG (24.20 MPa) is supplied by ITT Conoflow at no additional cost.
C = **Customer Specified Cleaning** - Customer to specify the desired level of cleanliness. ITT Conoflow will advise cost prior to performing cleaning operation. Specification of materials is the **user's responsibility.**

14 Adjustment Selections

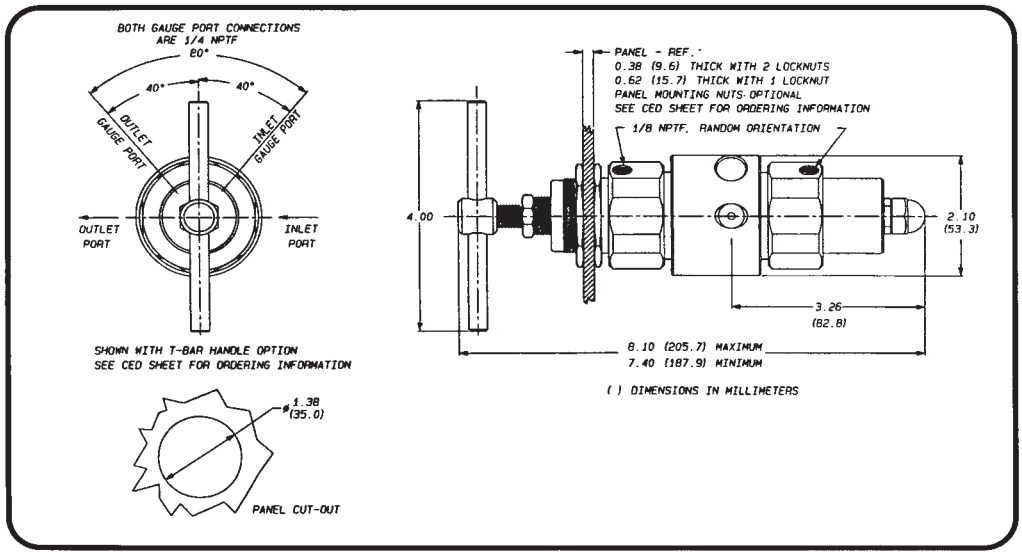
B = Handwheel (Large)
K = Wrench knob with locking device (Optional)
T = "T" bar handle (Optional)

15 Control Setting Ranges

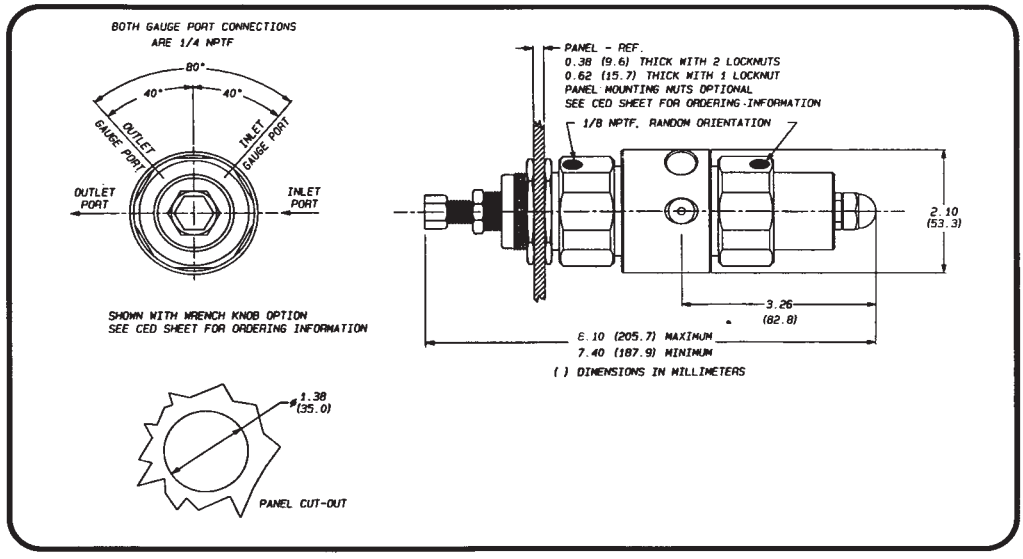
A	= 4 - 25	PSIG	(0.03 - 0.173	MPa)
B	= 4 - 50	PSIG	(0.03 - 0.345	MPa)
C	= 5 - 100	PSIG	(0.04 - 0.690	MPa)
D	= 5 - 150	PSIG	(0.04 - 1.040	MPa)
E	= 6 - 250	PSIG	(0.04 - 1.730	MPa)



For certified dimensional drawing, refer to HP700-C1.



For certified dimensional drawing, refer to HP700-C2.



For certified dimensional drawing, refer to HP700-C3.

High Pressure Regulator Accessory Listing

Pressure Gauges

ITT Conoflow pressure gauges are designed for most industrial, process and laboratory applications involving the measurement of compressed gases compatible with the materials of construction. These pressure gauges are offered in both brass and stainless steel constructions.

Control Engineering Data

92001

(1 - 5) Base Number	Gauge Case Size	Span
92001	2″	30
92002	2″	60
92003	2″	100
92004	2″	200
92005	2″	300
92006	2″	600
92007	2″	1000
92008	2″	3000
92009	2″	5000
92501	2½″	30
92502	2½″	60
92503	2½″	100
92504	2½″	200
92505	2½″	600
92506	2½″	1500
92507	2½″	3000
92508	2½″	5000
92509	2½″	6000
92510	2½″	10000

S6

(6 - 7) Bourdon Tube/Connection Material
B3 = Brass (See Note 2)
S4 = 304 Stainless Steel (See Note 3)
S6 = 316 Stainless Steel (See Note 3)

IV

(8 - 9) Cleaning
XX = Not Applicable
IV = Cleaned to ANSI B40.1, Level IV
YY = Special Customer Cleaning Requirement. Customer to provide cleaning specifications. Cost adders will be advised.

XX

(10 - 11) Optional Gauge Connections (See Note 4)
XX = Not Applicable
VF = ¼″ VCR (Female Nut)
VM = ¼″ VCR (Male Nut)

Notes: 1. All gauges are ¼″ NPT lower mount connected, unless otherwise specified.
2. Brass gauges have an accuracy to ANSI B40.1 - Grade B of 3% - 2% - 3%.
3. Stainless Steel gauges have an accuracy to ANSI B40.1 - Grade A of 2% - 1% - 2%.
4. VCR connections are available with 316 Stainless Steel gauges only.

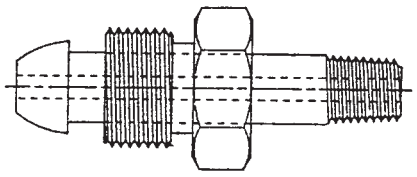
High Pressure Regulator Accessory Listing

Compressed Gas Association (CGA) Fittings:

Part Number	CGA Connection	Standard Gas Reference
85300B3	CGA300	Acetylene, Liquid Propane
85320B3	CGA320	CO_2
85350B3	CGA350	Hydrogen
85350S6	CGA350	Hydrogen (316 SS)
85510B3	CGA510	Acetylene, Propane
85540B3	CGA540	Oxygen
85580B3	CGA580	Argon, Helium, Nitrogen
85580S6	CGA580	Argon, Helium, Nitrogen (316 SS)
85590B3	CGA590	Argon, Helium, Nitrogen
85660B3	CGA660	Nitric Oxide
85677S6	CGA677	Nitrogen 6000 PSIG (316 SS)

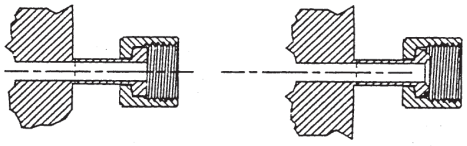
Notes: 1. Regulator bodies requiring CGA fittings must have ¼" NPT port connections. CGA fitting will be shipped loose.
2. Other CGA fittings available upon request.

GAS CYLINDER CONNECTION



CGA 580 CONNECTION

FITTING BUTT WELDED TO REGULATOR



PARKER ULTRASEAL

PARKER VACUSEAL CAJON VCR

HIGH PURITY INTERNAL CONNECTION

PARKER ULTRASEAL

PARKER VACUSEAL CAJON VCR

High Purity Connections and Fittings

Transducers

Accuracy: Conformity of an indicated value to an accepted standard value, or true value. It is usually measured in terms of inaccuracy and expressed as accuracy. As a performance specification, accuracy is expressed as a maximum deviation percentage of span.

Air Consumption - Static: The maximum rate at which air is consumed by a device within its operating range during steady-state (static) signal conditions.

Air Consumption - Dynamic: The maximum rate at which air is consumed by a device within its operating range while the device is in motion.

Air Delivery Rate (Max.): See Flow Capacity.

Ambient Temperature Range: The minimum and maximum temperature of the medium surrounding a device.

Compensated Temperature Range: See Operating Temperature Range.

Duration: The time a signal is applied to the input of a device, element or system.

Exhaust Capacity: The rate which a volume will exhaust from a given device. Typically expressed in SCFM for gases or GPM for liquids.

Exhaust Rate: See Exhaust Capacity.

Explosion Proof: An enclosure placed around the electrical or electronic device that might lead to ignition as a result of a fault, creating sufficient electrical or thermal energy to ignite the gases or vapors present in the hazardous location. In the event of abnormal or fault conditions within the electrical package, the gas or vapors will explode; that small explosion is contained within the housing.

Failure Mode: The reaction of a device in the event of a power source loss, either electrical or pneumatic.

Flow Capacity - Static: The rate which a volume will pass forward through a given device within a unit of time while variables are in a steady-state. Typically expressed in SCFM for gases or GPM liquids.

Input Range: A signal applied to the input of a device, element or system to create a predetermined signal at the output of the device, element or system.

Intrinsically Safe: An electrical or electronic device that is designed to operate so that neither the electrical or thermal energy, real or potential, is sufficient to ignite the gas or vapors within the hazardous location.

Linearity: The closeness to which a curve approximates a straight line.

Maximum Supply Pressure: The maximum pressure that can be supplied to a device above which will result in malfunction of the device.

Minimum Operating Current: The lowest value of current that can be supplied to a device, element or system while achieving a corresponding expected output signal.

Nominal Input Impedance: The combined effects of resistance, inductance, and capacitance of a device as seen by the source.

Operating Temperature Range: The minimum and maximum temperature at which a device will operate with defined specifications.

Position Effect: The resulting performance of a device when physical orientation of the device has been changed.

Power Consumption: The maximum wattage used by a device within its operating range during steady-state signal condition.

Power Supply: A source of power where the power is defined as a product of the voltage and current.

Power Supply Stability: The change of an output signal, as a percent of full scale, of a device, element or system as a result of changing the power applied to the device, element or system by a predetermined magnitude.

Repeatability: The maximum difference between a number of consecutive reaction indications for the same applied inputs, approaching from the same direction. It is usually measured in terms of non-repeatability and expressed in repeatability error as a percentage of span.

Set Point: An input variable which sets the desired value of the controlled variable.

Shock Effect: When a non-repetitive force or motion is applied to a device, the device will respond to the energy from the force, but in addition, it will also exhibit a transient mechanical vibration which reflects the natural frequency of the assembly. Performance is typically stated in terms of a unit of acceleration and its affect on the output as a percentage of span.

Span: The algebraic difference between maximum and minimum limits of a scale.

Steady State: A characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibiting only negligible change over an arbitrary long period.

Supply Pressure Effect: The effect of supply pressure variations relative to output pressure at a constant set point.

Temperature Stability: The deviation of device performance relative to changes in temperature. Expressed in percentage of span per range of temperature change.

Vibration Sensitivity: The reaction of a device when subjected to a continuous oscillating motion. Performance is typically stated in terms of a frequency at a unit of acceleration and its affect on the span of the device while in a state of equilibrium.

GT210 Series Transducers

Miniature I/P - E/P Transducers

Conoflow's Electro-pneumatic Transducers accept a variety of electrical input signals and convert them to proportional pneumatic output signals.

The miniature transducer is available with two different circuit boards. One board accepts current inputs of 4-20/10-50 mA DC and the other accepts inputs of 0-5 or 1-9 VDC input, respectively.

Connection of electrical source is made through a ½" NPSM conduit connection in two different manners. One unit is offered with a metal cover having a removable top access cover for direct connection to the internal terminal block. The second option is made through connection to 2 leads which are 20" long (#18 GA. wire - 20" long/positive red - negative black). All operation adjustments (zero and span adjustments) are accessible from the front of the transducer. As an added feature, the conduit connection is optionally available equipped with a Hirschmann connector.

These units are available with output signals of 3-15, 3-27, or 6-30 PSIG (21-103, 21-186, or 41-207 kPa). Special output signals are available, consult the factory. The unit can be mounted in any position and output signals are field reversible. Supply pressure up to 40 PSI (276 kPa) can be used. Optional gauge ports are available for monitoring the output signal.

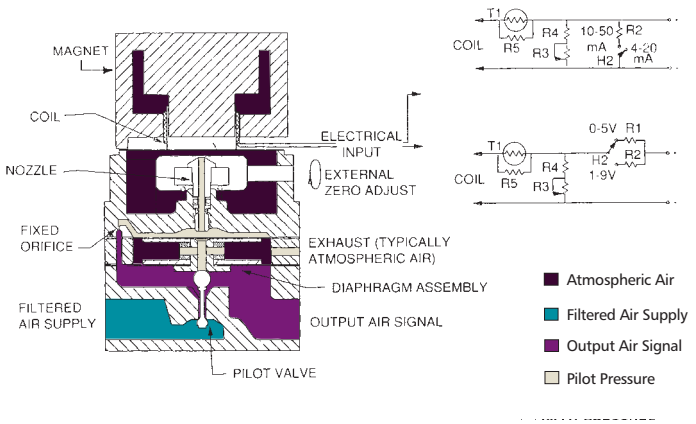
Intrinsically Safe approvals are listed for both incendive and non-incendive barriers.

The GT210 (with metal cover) Series Transducer, when purchased with an EMI-RFI Adaptor (6386522), conforms to SAMA PMC33.1-1978 for Classes 1 and 2, Bands A, B and C with less that 0.25% error.

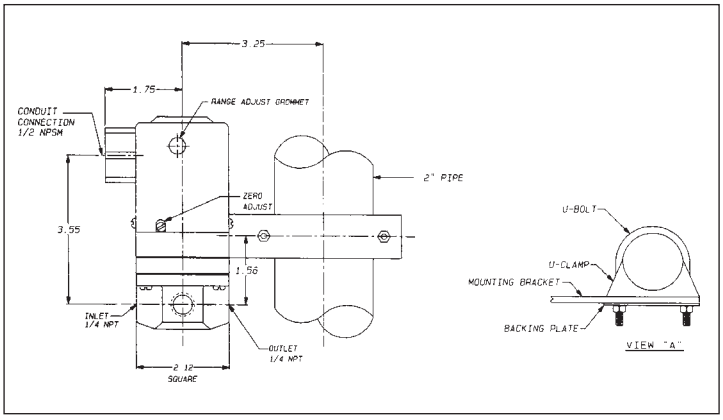
Typical applications for these units include controllers, relays, HVAC systems, energy management systems, valve actuators and control room applications.

Dimensional Data – Advertising Drawings:
GT210: A28-45 Metal cover with top access cover
GT210: A28-46 Metal cover with 20" leads
GT210: A28-50 2" Pipe Mounting Bracket

Principle of Operation



GT210 Series Transducer



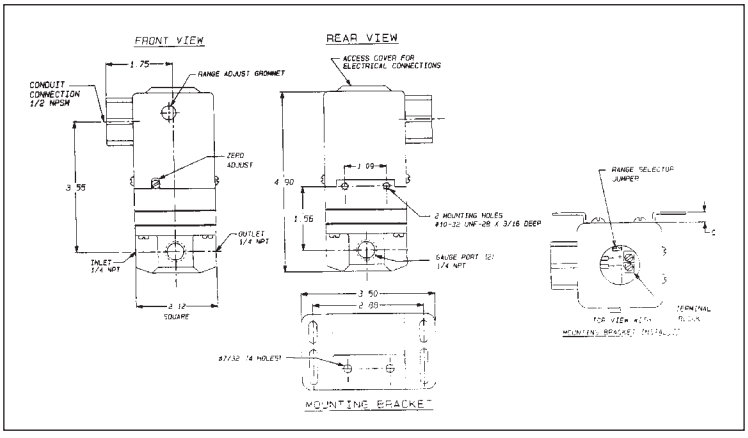
For Certified Dimensional Drawing, refer to A28-50

The Conoflow GT210 Series Transducers are force balance units which accept 4-20 mA DC, 10-50 mA DC, 0-5 VDC or 1-9 VDC inputs and convert them to a proportional 3-15, 3-27, or 6-30 PSIG (21-103, 21-186, or 41-207 kPa) output signal.

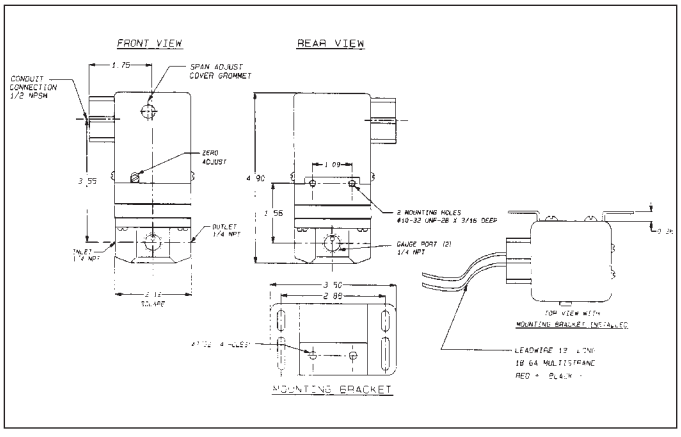
In the direct acting mode, an increase in the input signal causes the coil to move away from the magnet which moves the flexure assembly toward the nozzle. This reduces the flow through the nozzle increasing the back pressure in the top chamber of the booster. The increased pressure in the booster causes the diaphragm assembly to move downward, opening the pilot valve and increasing the output pressure. The output pressure will continue to increase until it is equal to the nozzle back pressure and the forces on the diaphragm assembly are balanced.

A decrease in the input signal allows the coil to move toward the magnet which moves the flexure assembly away from the nozzle. This allows the flow through the nozzle to increase which reduces the back pressure in the top of the booster. Since the output pressure is greater than the nozzle back pressure, there is a net upward force on the diaphragm assembly which causes it to move upward allowing the pilot valve to close and the relief port to close. The excess output pressure is vented to atmosphere through the relief port until equilibrium is established.

In the reverse acting mode, an increase in the input signal causes the coil to move toward the magnet instead of away from it since the direction of the current through the coil is reversed. An increasing signal, therefore, causes a proportionally decreasing output.



For Certified Dimensional Drawing, refer to A28-45



For Certified Dimensional Drawing, refer to A28-46

Specifications

Operating Characteristics

	GT2108ED GT2108FD	GT4108ED GT4108FD	GT6108ED GT6108FD	GT2102HD GT2102JD	GT4102HD GT4102JD	GT6102HD GT6102JD
Input Range (4)	4 - 20 mA DC 10 - 50 mA DC			0 - 5 VDC 1 - 9 VDC		
Nominal Input Impedance	225 ohms 91 ohms			385 ohms 535 ohms		
Output Signal	3 - 15 PSI (21 - 103 kPa)	3 - 27 PSI (21 - 186 kPa)	6 - 30 PSI (41 - 207 kPa)	3 - 15 PSI (21 - 103 kPa)	3 - 27 PSI (21 - 186 kPa)	6 - 30 PSI (41 - 207 kPa)
Position Effect	3 PSIG Output - Output decreases by 0.65 PSIG at 45° tilt. - Output decreases by 2.03 PSIG at 90° tilt. 15 PSIG Output - Output decreases by 0.78 PSIG at 45° tilt. - Output decreases by 2.54 PSIG at 90° tilt.					
Supply Pressure Effect	0.08 PSIG decrease for every 10 PSIG increase in supply pressure					
Required Regulated Air Supply Pressure	20 PSI (138 kPa)	35 PSI (241 kPa)		20 PSI (138 kPa)	35 PSI (241 kPa)	
Air Consumption	0.1 SCFM (0.003 m^3/min)					
Air Delivery Rate (Max.)	4 SCFM (0.1113 m^3/min)					
Exhaust Rate (Max.)	1.5 SCFM (0.042 m^3/min)					
Linearity	±0.75% of Span					
Ambient Temperature Range	0° to +130°F (-17° to +55°C					
Approximate Shipping Weight	1.7 lbs. (0.77 Kg)					

Notes:
1. Refer to Control Engineering Data for catalog number make-up.
2. An ITT Conoflow Model FR95 Airpak®, Filter-Regulator or equal is recommended.
3. Minimum piping requirements are ⅜" tubing or ¼" pipe.
4. Intrinsically Safe Approvals:
   a. The GT210, GT410, and GT610 Series Transducers have been Factory Mutual approved intrinsically safe for Class 1, Division 1 and non-incendive for Class 1, Division 2, applicable groups when interfaced with one of the barriers listed below.

Barrier	Groups
Pepperland Fuchs, Inc. No. 1072	C & D
ABB Inc. No. 76610AAAV1	D
Invensys Interface Module NO's 2AO-V21-FGB, 2AO-VA1-FGB 2AO-V31-FGB, 2AT-SBU-FBG 3A2-D31 CS-E/FGB-A, 3A2-D21 CS-E/FGB-A	D
Pepperland and Fuchs, GmbH Model KHP-104/Ex-2A (Single and Dual Channel)	D
Stahl Barriers 8901/31-280/100/70 8901/33-293/000/79	D

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain a minimum of (8) characters.

1-5 Models

GT210 = 3 - 15 PSI (21 - 103 kPa) Output
GT410 = 3 - 27 PSI (21 - 186 kPa) Output
GT610 = 6 - 30 PSI (41 - 247 kPa) Output
GT810 = Special Output (See Note 1)
GT21R = 15 - 3 PSI (103 - 21 kPa) Output
GT41R = 27 - 3 PSI (186 - 21 kPa) Output
GT61R = 30 - 6 PSI (247 - 41 kPa) Output
GT81R = Special Output (Reverse Acting) (See Note 1)
Note: 1. Customer to specify output span required (Consult Factory).

6 Electrical Characteristics

2 = 0 - 5 and 1 - 9 VDC Voltage Input
8 = 4 - 20 and 10 - 50 mA DC Milliampere Input
9 = Special Input - Customer to specify input required (Consult Factory).
Note: 1. See position 7 for input range coding.

7 Electrical Inputs

E = 4 - 20 mA DC
F = 10 - 50 mA DC
H = 0 - 5 VDC
J = 1 - 9 VDC
Y = Special Input (Consult Factory)

8 Accessories

A = FR95XSKEG1C 0-25 PSI (0-172 kPa) Airpak® (See Note 1)
B = FR95XSKEGIF 0-60 PSI (0-414 kPa) Airpak® (See Note 2)
C = GFX04 Filter only - No Regulation Desired
D = No Filter-Regulator or Filter Desired
E = FR95XSKEXIC 0-25 PSI (0-172 kPa) Airpak® (See Note 1)
F = FR95XSKEXIF 0-60 PSI (0-414 kPa) Airpak® (See Note 2)
Notes: 1. For use with 3-15 PSI (21-103 kPa) Output (12 PSI (83 kPa) Span).
2. For use with 3-27 and 6-30 PSI (21-186 and 1-207 kPa) Outputs (24 PSI (166 kPa) Span).
3. For catalog number make-up of accessories, refer to applicable sales literature.

9 Mounting Accessories

A = 2" U-Clamp for Pipe Mounting
X = Standard - Unless Option Code is Specified

10 Operation Modes

A = Factory Mutual Approved - Intrinsically Safe
X = Standard - Unless Option Code is Specified

11 Housings

X = Standard - Unless Option Code is Specified (See Note 1)
M = Metal Cover having no Top Access Cover (See Note 2)
Notes: 1. This cover is used when electrical connection is made directly to the internal terminal block.
2. This cover is used when electrical connection is made to 2-Leads 20" Long - #18GA. Wire/1 Positive (Red) - 1 Negative (Black).
3. For dimensional data, refer to drawing:
A28-45 = Metal Cover with Top Access Cover.
A28-46 = Metal Cover with 20" Leads.

12 Special Range (Input)

1. When option "Y" in position 7 is used, the factory will apply four digit code defining the product selection.

GT_8 Series Milliampere Transducers

Conoflow's Electro-pneumatic Transducers accept a variety of electrical input signals and convert them to proportional output signals of 3-15, 3-27 or 6-30 PSIG (21-103, 21-186 or 41-207 kPa)

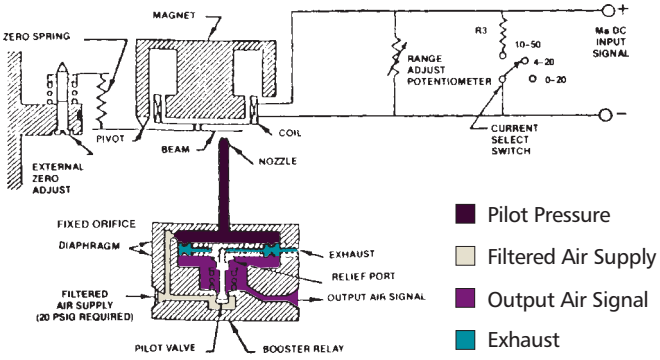
The GT_8 Series Transducers incorporate low impedance circuitry and a range selector jumper switch which can be positioned to accept 4-20 or 10-50 mADC current inputs. The selector feature permits stocking only one unit that can be used in various locations throughout the plant. For easy field adjustment these units are equipped with an external zero setting and a built-in potentiometer on the circuit board for span adjustment. Optional input signal of 0-20 mA is available on the GT-8 Series.

These transducers are available in either high or low capacity configurations (Maximum Air Delivery Rate). The high capacity models incorporate a booster relay which eliminates the need for additional boosters or relays when operating air actuated valves. The low capacity versions use a fixed orifice and are utilized for input signals to pneumatic positioners. NEMA 3R housing requirements are optional.

The GT_8 Series Transducer, when purchased with an EMI-RFI Adaptor (6386522), conforms to SAMA PMC-33.1-1978 for Classes 1 and 2, Bands A, B and C with less than 0.25% error.

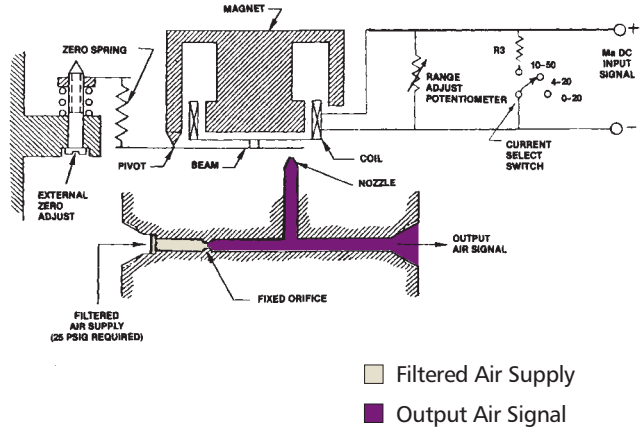
The GT_8 Series Transducers are approved intrinsically safe by Factory Mutual, Canadian Standard Association, and CENELEC. For explosionproof models, refer to Pages 114-117.

Dimensional Data – Advertising Drawings:
GT Series - High Capacity: A28-7
GT Series - Low Capacity: A28-9
GT Series - 2" Pipe Mounting Bracket



High Capacity: Series GT28, GT48 and GT68

Intrinsically safe models are not field reversible but can be purchased in the direct or reverse acting mode. Refer to Control Engineering Data for proper identification.



Low Capacity: Series GT18, GT38 and GT58

The Conoflow GT_8 Series Transducers are force balance units which accept a 4-20 or 10-50 mA DC input signal and convert it to a proportional 3-15, 3-27, or 6-30 PSIG (21-103, 21-186, or 41-207 kPa) output signal.

Operation - High Capacity Models

In the direct acting mode, an increase in the input signal causes the coil to move away from the magnet which moves the balance beam toward the nozzle. This reduces the flow through the nozzle increasing the back pressure in the top chamber of the booster. The increased pressure in the booster causes the diaphragm assembly to move downward, opening the pilot valve and increasing the output pressure. The output pressure will continue to increase until it is equal to the nozzle back pressure and the forces on the diaphragm assembly are balanced.

A decrease in the input signal allows the coil to move toward the magnet which moves the balance beam away from the nozzle. This allows the flow through the nozzle to increase which reduces the back pressure in the top of the booster. Since the output pressure is greater than the nozzle back pressure, there is a net upward force on the diaphragm assembly which causes it to move upward allowing the pilot valve to close and the relief port to open. The excess output pressure is vented to atmosphere through the relief port until equilibrium is established.

In the reverse acting mode, an increase in the input signal causes the coil to move toward the magnet instead of away from it since the direction of the current through the coil is reversed. An increasing signal, therefore, causes a proportionally decreasing output.

Operation - Low Capacity Models

In the direct acting mode, an increase in the input signal causes the coil to move away from the magnet which moves the balance beam toward the nozzle. This reduces the flow through the nozzle increasing the output pressure.

A decrease in the input signal allows the coil to move toward the magnet which moves the balance beam away from the nozzle. This allows the flow through the nozzle to increase reducing the output pressure.

In the reverse acting mode, an increase in the input signal causes the coil to move toward the magnet instead of away from it since the direction of the current through the coil is reversed. An increasing signal, therefore, causes a proportionally decreasing output.

Specifications

Operating Characteristics

	GT18 (3)	GT28	GT38 (3)	GT48	GT58 (3)	GT68
Input Range	4 - 20 mA DC, 10 - 50 mA DC					
Nominal Input Impedance	145 ohms 60 ohms					
Output Signal	3 - 15 PSI (21 - 103 kPa)		3 - 27 PSI (21 - 186 kPa)		6 - 30 PSI (41 - 207 kPa)	
Required Regulated Air Supply Pressure	25 PSI (172 kPa)		35 PSI (241 kPa)			
Air Consumption	0.2 SCFM (0.006 m^3/min)		0.3 SCFM (0.009 m^3/min)			
Air Delivery Rate (Max.)	0.15 SCFM (0.004 m^3/min)	5 SCFM (0.142 m^3/min)	0.15 SCFM (0.004 m^3/min)	5 SCFM (0.142 m^3/min)	0.15 SCFM (0.004 m^3/min)	5 SCFM (0.142 m^3/min)
Exhaust Rate (Max.)	0.17 SCFM (0.005 m^3/min)	1.7 SCFM (0.05 m^3/min)	0.2 SCFM (0.006 m^3/min)	2.3 SCFM (0.065 m^3/min)	0.2 SCFM (0.006 m^3/min)	2.3 SCFM (0.065 m^3/min)
Linearity	±1%					
Temperature Effect	0.2%FS/10ºF (-12ºC) change for a 2ºF/minute rate of change (2)					
Ambient Temperature Range	0º to +150ºF (-18º to +66ºC)					
Approximate Shipping Weight	1.7 lbs. (0.77 Kg)					

Notes:
1. A Conoflow Model FR95 Airpak® Filter-Regulator or equal is recommended.
2. 0.1%FS/10ºF (-12ºC) for 30ºF (17ºC) change in 15 minutes for models without booster relay.
3. These models DO NOT have booster relay and should be used in low volume applications.
4. 1-5 or 0-20 mA DC input signals are available, refer to price list CP1002 for adder.
5. Minimum piping requirements are ⅜" tubing or ¼" pipe.
6. All ranges are available as intrinsically safe versions. These models have been Factory Mutual, Canadian Standards Association and CENELEC approved intrinsically safe when interfaced with applicable barriers as outlined below. Consult the factory if approval with other barriers is required.
7. For Factory Mutual (Intrinsically Safe) Models, the Ambient Temperature Range is 0ºF to 140ºF (-18ºC to +60ºC).

Factory Mutual (FM)

Barrier	Class	Division	Group
Bailey Controls No. 76601AAAV1	I, II, III	1 & 2*	B, C, D, E, F & G
Leeds and Northrups P/N 316569 & 316747	I, II, III	1 & 2*	B, C, D, E, F & G
Foxboro Interface Module No's 2AO-V21-FGB, 2AO-VA1-FGB, 2AO-V31-FGB, 2AT-SBU-FGB, 3A2-D31 CS-E/FGB-A 3A2-D21 CS-E/FGB-A	I, II, III	1 & 2*	B, C, D, E, F & G
Honeywell No's 38545-0000-0110-111-F5D5 38545-0000-0110-112-F5D5 38545-0000-0110-113-F5D5	I, II, III	1 & 2*	B, C, D, E, F & G
Stahl No's 8901/31-280/165/80 8901/33-293/000/79	I, II, III	1 & 2*	C & D A, B, C & D
Taylor Instrument Company No's 1130FF21000, 1130FF22000 1135FF21000, 1135FF22000	I, II, III	1 & 2*	C, D, E, F & G
MTL - Model 728	I, II, III	1 & 2*	B & D

In Division 2 locations, the hazardous gas or dust is present only under accident conditions and a barrier may not be required depending on the application. The GT_8 Series units can be approved for Division 2 locations as long as an approved barrier listed is used. In a Division 2 location where a barrier is not being used the maximum voltage must be less than 33 volts and the maximum current must be less than 175 milliamps.

Canadian Standards Associations (CSA)

Honeywell No's 3845-0000-0110-111-F5D5 3845-0000-0110-112-F5D5 3845-0000-0110-113-F5D5	I II I II	– – – –	C & D F & G A, B, C, & D F & G
Foxboro Interface Module No. E4B-P	I II	– –	A, B, C & D F & G
Bailey Controls No. 766 00AAAX1	I II	– –	C & D F & G

CENELEC

The GT28 (only) is CENELEC approved intrinsically safe per EEx ia II C Certificate INIEX 84.101.046.U.

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain six (6) characters.

1-3 Models

GT1 = Low Capacity (Note 1), 3-15 PSI (21-103 kPa) Output
GT2 = High Capacity, 3-15 PSI (21-103 kPa) Output
GT3 = Low Capacity (Note 1), 3-27 PSI (21-186 kPa) Output
GT4 = High Capacity, 3-27 PSI (21-186 kPa) Output
GT5 = Low Capacity (Note 1), 6-30 PSI (41-207 kPa) Output
GT6 = High Capacity, 6-30 PSI (41-207 kPa) Output
GT7 = Low Capacity (Notes 1 and 2), Special Output
GT8 = High Capacity, Special Output

Notes:
1. These models DO NOT have booster relay and should be employed in low volume applications.
2. Customer to specify output span required (Consult Factory).

4 Electrical Selections

5 = 1 - 5 mA VDC Voltage Input
8 = 0 - 20, 4 - 20 and 10 - 50 mA DC Milliampere Input - Low Impedance Coil
9 = Special Input - Customer to specify input required (Consult Factory).

5 Electrical Inputs

Input Milliampere - DC
A = 0-20 mA DC - 130 Ohms
B = 1-5 mA DC - 2230 Ohms; GT_5 Series only (Note 1)
E = 4-20 mA DC - 145 Ohms
F = 10-50 mA DC - 60 Ohms
Y = Special Input (Consult Factory)

Notes:
1. Codes A, E, G and Y are for use with GT_8 Series.
2. Code B used with GT_5 Series.

6 Accessories

A = FR95XSKEGIC 0-25 PSI (0-172 kPa) Airpak® (See Note 1)
B = FR95XSKEGIF 0-60 PSI (0-414 kPa) Airpak® (See Note 2)
C = GFX04 Filter only - No Regulation Desired
D = No Filter-Regulator Desired
E = FR95XSKEXIC 0-25 PSI (0-172 kPa) Airpak® (See Note 1)
F = FR95XSKEXIF 0-60 PSI (0-414 kPa) Airpak® (See Note 2)

Notes:
1. For use with 3-15 PSI (21-103 kPa) Output (12 PSI (83 kPa) Spans).
2. For use with 3-27 PSI (21-186 kPa) and 6-30 PSI (41-207 kPa) Output (24 PSI (166 kPa) Spans).

7 Housing Options

A = Light Weight Sheet Metal Cover
R = NEMA 3R Housing (See Note 1)
X = Standard - Unless Option Code is Specified

Notes:
1. Can be used with Intrinsically Safe Models, refer to position 9.
2. If option A or R is not specified, the standard cover will be supplied.

8 Mounting Options

A = 2" U-Clamp for Pipe Mounting (See Notes 1 and 2)
X = Standard - Unless Option Code is Specified

Notes:
1. This option cannot be used when option "A" in position 7 is specified.
2. For Dimensional Data, refer to Advertising Drawing A28-22.

9 Operation Modes

R = Reverse Acting Output [15-3, 27-3 or 30-6 PSI (103-21, 186-21 or 207-41 kPa)]
X = Standard - Unless Option Code is Specified

10 Future Options

X = Standard - Unless Option Code is Specified

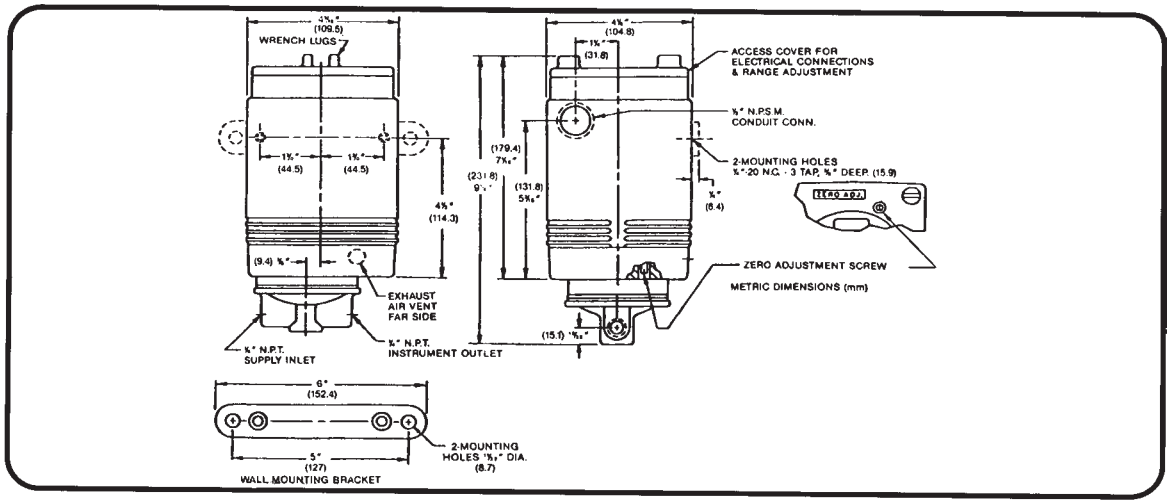
11 Operation Modes

A = Low Capacity Air Delivery Rate [2.5 SCFM (0.071 m^3/min)]
X = Standard - Unless Option Code is Specified

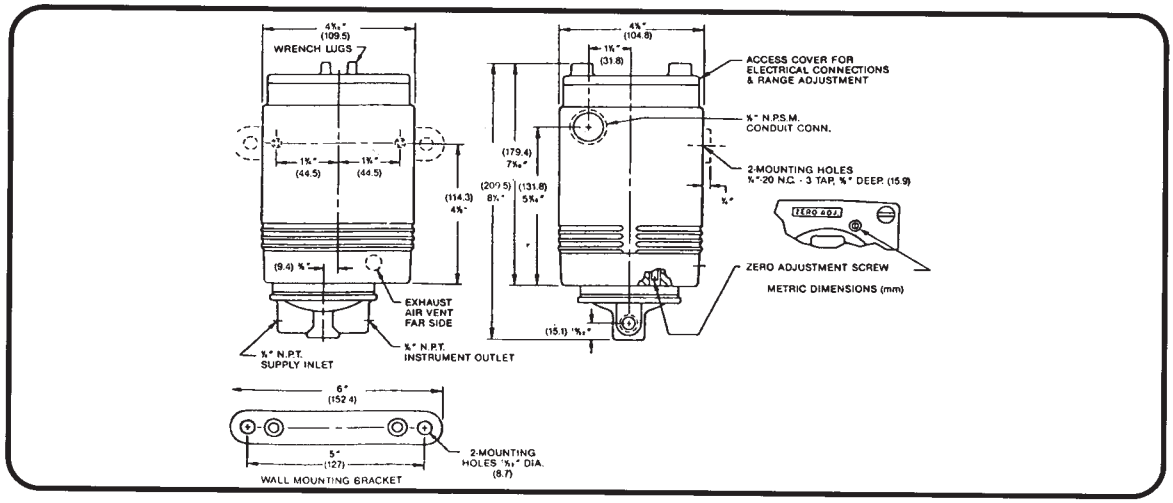
12 Special Range (input)

1. When option "Y" in position 5 is used, factory will apply four digits.

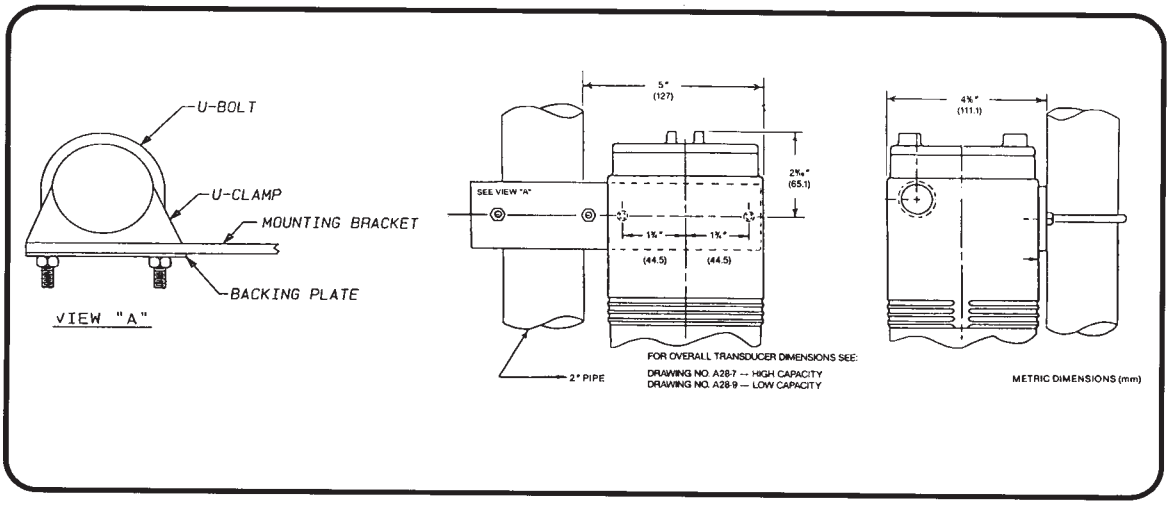
Drawings



HIGH CAPACITY - For Certified Dimensional Data, Refer to A28-7.



LOW CAPACITY - For Certified Dimensional Data, Refer to A28-9.



For Certified Dimensional Data, Refer to A28-22.

GT_8 Series Milliampere Transducers

Dimensional Data – Advertising Drawings:
GT Series - High Capacity: A28-26

Explosionproof

Conoflow's GT_8 Series Transducers are explosionproof approved by Factory Mutual (FM), Canadian Standards Association (CSA) and CENELEC. These units incorporate the same high-quality standards as our other I/P Transducer lines and are backed by Conoflow's years of experience as a leading manufacturer of instrumentation.

These units accept a variety of electrical input signals and convert them to proportional output signals of 3-15, 3-27 or 3-60 PSIG (21-103, 21-186 or 41-207 kPa). Other output signals are also available. Consult the factory for details.

The GT_8 Series Transducers incorporate low impedance circuitry and a range selector jumper switch which can be positioned to accept 4-20 or 10-50 mA DC current inputs. The selector feature permits stocking only one unit that can be used in various locations throughout the plant. For easy field adjustment these units are equipped with an external zero setting and a built-in potentiometer on the circuit board for span adjustment. Optional input signal of 1-5 or 0-20 mA DC are available upon request.

These transducers are available in either high or low capacity configurations (Maximum Air Delivery Rate). The high capacity models incorporate a booster relay which eliminates the need for additional boosters or relays when operating air actuated valves. The low capacity versions use a fixed orifice and are utilized for input signals to pneumatic positioners.

Principle of Operation

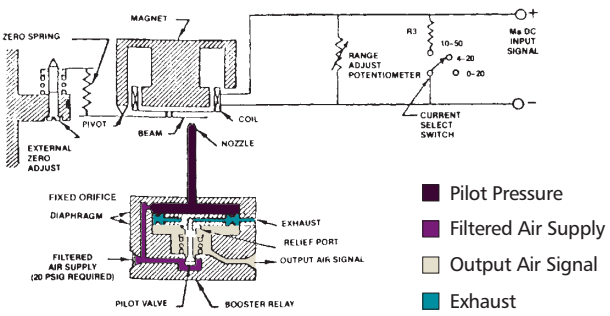
The Conoflow GT_8 Series Transducers are force balance units which accept a 4-20 or 10-50 mA DC input signal and convert it to a proportional 3-15, 3-27, or 6-30 PSIG (21-103, 21-186, or 41-207 kPa) output signal.

Operation - High Capacity Models

In the direct acting mide, an increase in the input signal causes the coil to move away from the magnet which moves the balance beam toward the nozzle. This reduces the flow through the nozzle increasing the back pressure in the top chamber of the booster. The increased pressure in the booster causes the diaphragm assembly to move downward, opening the pilot valve and increasing the output pressure. The output pressure will continue to increase until it is equal to the nozzle back pressure and the forces on the diaphragm assembly are balanced.

A decrease in the input signal allows the coil to move toward the magnet which moves the balance beam away from the nozzle. This allows the flow through the nozzle to increase which reduces the back pressure in the top of the booster. Since the output pressure is greater than the nozzle back pressure, there is a net upward force on the diaphragm assembly which causes it to move upward allowing the pilot valve to close and the relief port to open. The excess output pressure is vented to atmosphere through the relief port until equilibrium is established.

In the reverse acting mode, an increase in the input signal causes the coil to move toward the magnet instead of away from it since the direction of the current through the coil is reversed. An increasing signal, therefore, causes a proportionally decreasing output.



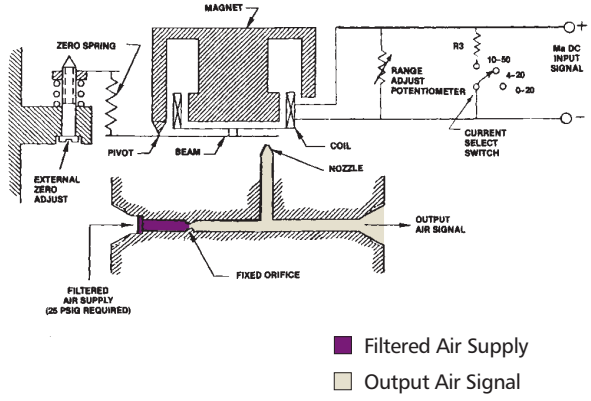
High Capacity: Series GT28, GT48 and GT68

Operation - Low Capacity Models

In the direct acting mode, an increase in the input signal causes the coil to move away from the magnet which moves the balance beam toward the nozzle. This reduces the flow through the nozzle increasing the output pressure.

A decrease in the input signal allows the oil to move toward the magnet which moves the balance beam away from the nozzle. This allows the flow through the nozzle to increase reducing the output pressure.

In the reverse acting mode, an increase in the input signal causes the coil to move toward the magnet instead of away from it since the direction of the current through the coil is reversed. An increasing signal, therefore, causes a proportionally decreasing output.



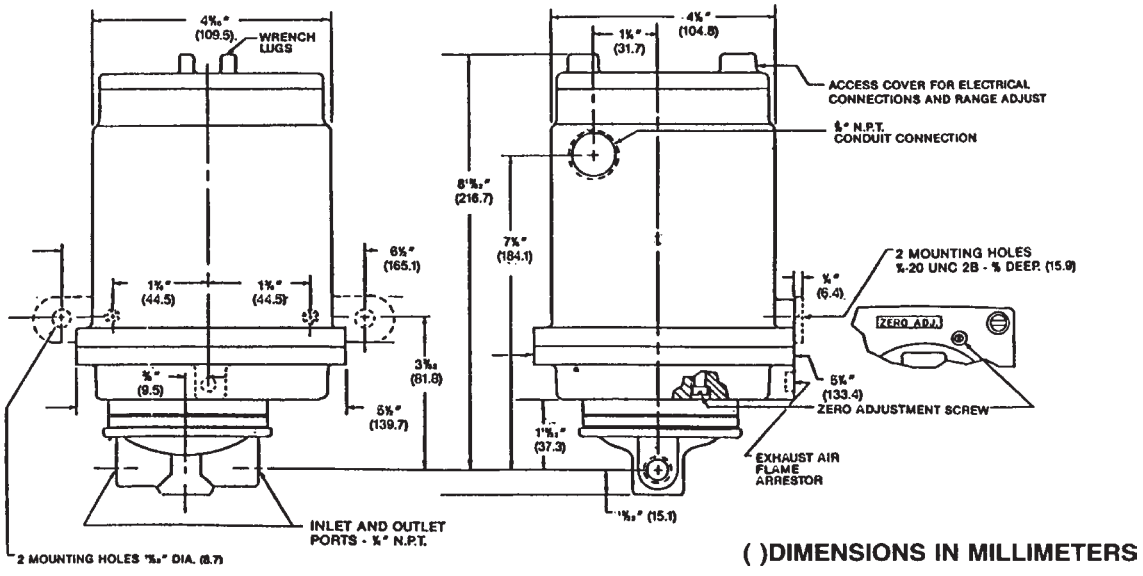
Low Capacity: Series GT18, GT38 and GT58

Operating Characteristics

	GT18 (3)	GT28	GT38 (3)	GT48	GT58 (3)	GT68
Input Range	4 - 20 mA DC, 10 - 50 mA DC					
Nominal Input Impedance	145 ohms, 60 ohms					
Output Signal	3 - 15 PSI (21 - 103 kPa)		3 - 27 PSI (21 - 186 kPa)		6 - 30 PSI (41 - 207 kPa)	
Required Regulated Air Supply Pressure	25 PSI (172 kPa)		35 PSI (241 kPa)			
Air Consumption	0.2 SCFM (0.006 m³/min)		0.3 SCFM (0.009 m³/min)			
Air Delivery Rate (Max.)	0.17 SCFM (0.005 m³/min)	5 SCFM (0.142 m³/min)	0.15 SCFM (0.004 m³/min)	5 SCFM (0.142 m³/min)	0.15 SCFM (0.004 m³/min)	5 SCFM (0.142 m³/min)
Exhaust Rate (Max.)	0.17 SCFM (0.005 m³/min)	1.7 SCFM (0.05 m³/min)	0.2 SCFM (0.006 m³/min)	2.3 SCFM (0.065 m³/min)	0.2 SCFM (0.006 m³/min)	2.3 SCFM (0.065 m³/min)
Linearity	±1%					
Temperature Effect	0.2%FS/10ºF (-12ºC) change for a 30ºF (-1ºC) change in 15 minutes					
Ambient Temperature Range	0º to +140ºF (-18º to +60ºC)					
Approximate Shipping Weight	13 lbs. (5.9 Kg)					

Notes:
1. A Conoflow Model FR95 Airpak® Filter-Regulator or equal is recommended.
2. 0.1%FS/10ºF (-12ºC) for 30ºF (-1ºC) change in 15 minutes for models without booster relay.
3. These models DO NOT have booster relay and should be used in low volume applications.
4. Minimum piping requirements are ⅜" tubing or ¼" pipe.
5. Explosionproof Approvals;
   - A. Conoflow's GT_8 Series Transducers have been Factory Mutual approved explosion-proof for Class I, Divisions 1 and 2, Groups B, C and D and dust-ignition-proof for Class II, Divisions 1 and 2, Groups E, F and G indoor hazardous locations.
   - B. Conoflow's GT_8 Series Transducers have been Canadian Standards Association approved explosion-proof for Class I, Groups B, C and D and Class II, Groups E, F and G, indoor hazardous locations.
   - C. Conoflow's GT28 (only) Transducer has been CENELEC approved explosionproof per EEx d IIb T6 for indoor hazardous locations.

DIMENSIONAL DATA



For Certified Dimensional Data, refer to Drawing A28-26

Control Engineering Data

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Note: I. Catalog numbers as received must contain six (6) characters.

1-3 Models

GT1 = Low Capacity (Note 1), 3-15 PSI (21-103 kPa) Output
GT2 = High Capacity, 3-15 PSI (21-103 kPa) Output
GT3 = Low Capacity (Note 1), 3-27 PSI (21-186 kPa) Output
GT4 = High Capacity, 3-27 PSI (21-186 kPa) Output
GT5 = Low Capacity (Note 1), 6-30 PSI (41-207 kPa) Output
GT6 = High Capacity, 6-30 PSI (41-207 kPa) Output
Note: 1. These model DO NOT have booster relay and should be employed in low volume applications.

4 Electrical Characteristics

8 = 0-20, 4-20 and 10-50 mA DC Milliampere Input - Low Impedance Coil

5 Electrical Inputs

Input Milliampere - DC
A = 0-20 mA DC - 130 Ohms
E = 4-20 mA DC - 145 Ohms
F = 10-50 mA DC - 60 Ohms

6 Accessories

A = FR95SKEGIC 0-25 PSI (0-172 kPa) Airpak® (Note 1)
B = FR95XSKEGIF 0-60 PSI (0-414 kPa) Airpak® (Note 2)
C = GFX04 Filter Only - No Regulation Desired
D = No Filter - Regulator Desired
E = FR95XSKEXIC 0-25 PSI (0-172 kPa) Airpak® (Note 1)
F = FR95XSKEXIF 0-60 PSI (0-414 kPa) Airpak® (Note 2)
Notes: 1. For use with 3-15 PSI (21-103 kPa) Output [12 PSI (83 kPa) Spans].
2. For use with 3-27 PSI (21-186 kPa) and 6-30 PSI (41-207 kPa) Output [24 PSI (166 kPa)] Spans.

7 Housing Options

C = CENELEC Approved - Indoor Explosionproof Housing (See Note 1)
F = Factory Mutual (FM) Approved - Indoor Explosion-Proof Housing
Note: 1. Applies to GT28 only.

8 Mounting Options

A = 2" U-Clamp for Pipe Mounting
X = Standard - Unless Option Code is Specified

9-12 Special Range (Input)

Note: 1. When special, non-codable options are requested, factory will apply four digits.

Terminology

Air Consumption - Static: The maximum rate at which air is consumed by a device within its operating range during stead-state (static) signal conditions.

Air Consumption - Dynamic: The maximum rate at which air is consumed by a device within its operating range while the device is in motion.

Air Delivery Rate (Max.): See Flow Capacity.

Ambient Temperature Range: The minimum and maximum temperature of the medium surrounding a device.

Control Action: The nature of the change of the output effected by the input.

Effective Area: The wetted area of the piston for use in thrust calculations.

Exhaust Capacity: The rate which a volume will exhaust from a given device. Typically expressed in SCFM for gases or GPM for liquids.

Exhaust Rate: See Exhaust Capacity.

Fail Safe System: In the event of power source loss, either electrical or pneumatic, an additional apparatus designed to direct a device to take a specific action.

Failure Mode: The reaction of a device in the event of a power source loss, either electrical or pneumatic.

Flow Capacity - Dynamic: The rate which a mass will pass forward through a given device within a unit of time while variables are in a steady-state. Typically expressed in SCFM for gases or GPM for liquids.

Piston Diameter: The effective diameter of the piston wetted area for use in thrust calculations.

Position Effect: The resulting performance of a device when physical orientation of the device has been changed.

Repeatability: The maximum difference between a number of consecutive reaction indications for the same applied inputs, approaching from the same direction. It is usually measured in terms of non-repeatability and expressed in repeatability error as a percentage of span.

Steady State: A characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibiting only negligible change over an arbitrary long period.

Stroke Length: The full travel length of the actuator stem defined as full actuator stem extension minus full actuator stem retraction.

Thrust: The amount of force available at the actuator stem as a function of the piston area times the differential pressure across the piston.

Pneumatic Piston Actuators

Conoflow's Pneumatic Piston Actuators are compact units designed to function in today's high performance instrument systems.

Piston diameters of 3" to 8" are available with standard strokes up to 10" (for stroke lengths greater than 10", consult the factory). Integral positioners are standard for modulating service.

Force produced is a function of the supply pressure which can be varied from 20 to 100 PSI (138 to 690 kPa). Fast stroking speeds are made possible through the use of a high capacity positioner coupled with a unique cushion-loading regulator. The GB50 Series Piston Actuators are designed for use in corrosive atmospheres or adverse weather conditions.

Optional Accessories:

1. Model FR95XBKEX(C,F,G) Airpak® (Filter Regulator) with gauge. Specify 0-60 or 0-125 PSI (0-414 or 0-861 kPa) range. (Bracket mounting is standard).

2. I/P or E/P Transducer. Specify range. (See Transducer Data Sheets).

3. Airlock Feature, Solenoid Valve, Limit Switch and other accessories are available, consult the factory.

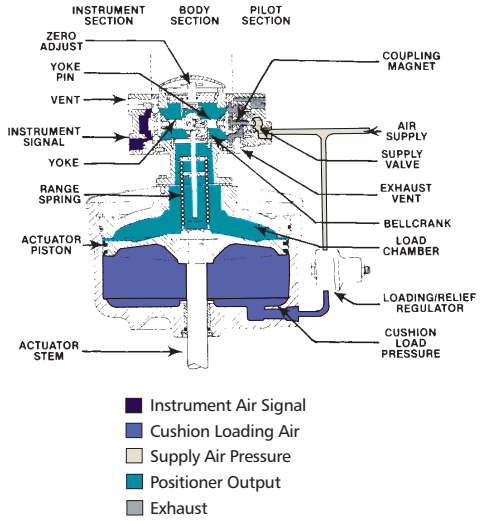
Dimensional Data – Advertising Drawings:
GB50: A7-107, 108, 108 and 110
GB51: A7-114, 115, 116, and 117
GB50 Series (Yoke Type): A7-100, 101, 102 and 103
GB50 Series (On/Off): A6-41 and 113
Piping: A50-48

Principle of Operation

These units are actuated by a differential pressure across the moving piston. The piston is forced upward by a pressure from a cushion-loading regulator. This pressure can be adjusted to accommodate force requirements of the stem. The chamber above the piston is dynamically loaded through the positioner which operates on the force-balance principle. In the most conventional positioner form, an increase in instrument signal permits air flow into the chamber above the piston, increasing the pressure and moving the piston downward. This extends the range spring until the positioner is brought back into balance, at which point it is in a position corresponding to the instrument signal. A decrease in instrument signal reverses the procedure.

Actuators may also be supplied with a reverse acting positioner allowing the piston to retract with an increase or decrease in instrument signal.

When stem strokes are greater than 10", or when characterization is required, consult the factory for catalog number and pricing.



Specifications

Operating Characteristics

	GB50 (1)	GB51 (1)	GB52 (1)	GB53 (1)
Piston Diameter	3"	4"	6"	8"
Effective Area	7 in^2 (6.45 cm^2)	12 in^2 (77.42 cm^2)	28.5 in^2 (183.87 cm^2)	50 in^2 (322.58 cm^2)
Stroke Length	¼" to 10". Longer strokes are available, consult the factory.			
Supply Pressure	20 to 100 PSI (138 to 690 kPa)			
Air Consumption with Positioner	**Static:** 0.30 SCFM (0.008 m^3/min) at 40 PSI (275 kPa) supply **Dynamic:** 5 SCFM (0.142 m^3/min) at 100 PSI (690 kPa) supply			
Thrust	Thrust, T, equals the product of piston effective area, A, multiplied by supply pressure differential, ΔP, [up to 100 PSI (690 kPa)]. T = (A)ΔP. Example: Develop the thrust of a GB51 actuator with a 100 PSI (690 kPa) supply and a 20 PSI (138 kPa) cushion load. 12 in^2 x 80 PSI = 960 lbs. (77.42 cm^2 x 551 kPa = 435 Kg) of thrust.			
Positioner	Suitable for all standard instrument air signals; direct or reverse acting, top or bottom loading (3)			
Standard Accessories	Integrally piped cushion-loading regulator and gauge (for units with positioners only)			
Materials of Construction	Cylinder: Aluminum Piston: Aluminum Stem: 303 Stainless Steel Lipseals: Buna "N" Spacer Bars: Steel			
Approximate Shipping Weight	2" = 15 lbs. (6.80 Kg) 5" = 15 lbs. (6.8 Kg) 8" = 25 lbs. (11.34 Kg)	3" = 20 lbs. (9.1 Kg) 4" = 20 lbs. (9.1 Kg)	1⅛" = 15 lbs. (6.80 Kg) 4" = 25 lbs. (11.34 Kg) 6" = 35 lbs. (15.9 Kg) (4)	1½" = 20 lbs. (9.1 Kg) 4" = 30 lbs. (13.6 Kg) (5) 6" = 40 lbs. (18.1 Kg) (5) 8" = 45 lbs. (20.4 Kg) (5) 10" = 50 lbs. (22.7 Kg) (5)

Notes:
1. For catalog number make-up, refer to Control Engineering Data Sheets.
2. Weights for Yoke Style Mounting Actuators are as follows:
   GB52U_: 15 lbs. (6.80 Kg)
   GB53U_: 15 lbs. (6.80 Kg)
3. For proper positioner selection, refer to Positioner Data Sheets.
4. Maximum piston travel is 6.750" (without collars).
5. Maximum piston travel without collars is:
   4" Stroke = 4.125"
   6" Stroke = 6.750"
   8" Stroke = 8.750"
   10" Stroke = 10.750"
6. For proper positioner selection, refer to Positioner Data Sheets.

Dimensional Data – Advertising Drawings:
GB52SC - GB53SC: A7-111
Piping: A50-48

Pneumatic Lever Actuators

Conoflow's Pneumatic Lever Actuators are rugged and powerful units used to automatically position dampers, louvers, variable pitch fans and to make various mechanical adjustments to process machinery. Low profile (only 18" high) requires less headroom. A sturdy ductile iron yoke with large mounting base provides rigid mounting. The steel lever arm has eight take-off positions for stroke flexibility.

The Lever Actuator is a combination piston actuator and lever mechanism. These actuators are available in piston diameters of 6" and 8" with a maximum lever travel of 12". Force produced is a function of the supply pressure which may be varied from 20 to 100 PSI (137 to 690 kPa) and the lever take-off position.

The actuator assembly is completely enclosed to protect all moving parts from corrosive atmospheres and adverse weather conditions. All exterior parts are coated with a corrosion-resistant paint.

Optional Accessories:

1. Model FR95 Airpak® (Filter Regulator) with gauge, specify 0-60 or 0-125 PSI (0-414 or 0-861 kPa) range. (Bracket mounting is standard).

2. I/P or E/P Transducer. Specify range. (See Transducer Data Sheets).

3. Airlock Feature, Solenoid Valve, Limit Switch and other accessories are available, consult the factory.

Specifications

Operating Characteristics

	GB52SC (1)	GB53SC (1)
Piston Diameter	6″	8″
Effective Area	28.5 in² (183.37 cm²)	50 in² (322.58 cm²)
Air Consumption with Positioner	**Static:** 0.30 SCFM (0.008 m³/min) at 40 PSI (275 kPa) supply **Dynamic:** 5.0 SCFM (0.142 m³/min) at 100 PSI (690 kPa) supply	
Positioner	Suitable for all standard instrument air signals; direct or reverse acting, top or bottom loading (2)	
Standard Accessories (For units with Positioners only)	Integrally piped cushion-loading regulator and gauge (for units with positioners only)	
Materials of Construction	Cylinder: Aluminum Piston: Aluminum Stem: 303 Stainless Steel	Lipseals: Buna "N" Yoke and Base: One Piece Ductile Iron Lever: Steel	Fulcrum Arm: Steel Lever and Fulcrum Pins: Steel
Approximate Shipping Weight	30 lbs. (14 Kg)	40 lbs. (18 Kg)

Notes: 1. For catalog number make-up, refer to Control Engineering Data Sheets.
A. Lever type actuators utilize clevis and fulcrum with 8 take-off positions. Lower stem guide on base assures constant alignment.
B. Lever Actuator mounting is base type with four ½″ holes on a 3¾″ bolt circle.
C. Maximum lever travel is 12″.
2. For proper positioner selection, refer to positioner data sheets.

Travel and Forces Developed

Lever Holes (⅜″ Dia.)	Lever Travel	Available Force (lbs.) Differential Pressure Across Piston			
		GB52SC		GB53SC	
		50 PSI (345 kPa)	70 PSI (483 kPa)	50 PSI (345 kPa)	70 PSI (483 kPa)
G	5″	315	445	755	1,060
H	6″	265	375	630	880
J	7″	225	320	540	755
K	8″	200	280	475	660
L	9″	175	250	420	590
M	10″	160	225	375	530
N	11″	150	200	345	480
P	12″	135	185	315	440

Formula For Forces Not Shown In Chart

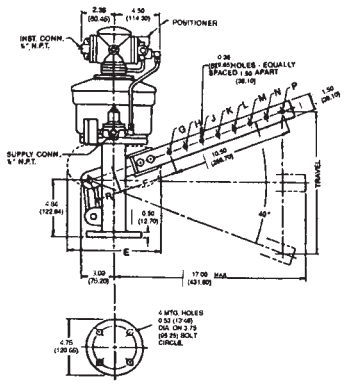
F1 = Force as shown in chart (at known ΔP1)
F2 = Force to be determined
ΔP1 = ΔP as shown in chart
ΔP2 = Known ΔP (not shown in chart)

F2 = F1(ΔP1/ΔP2)

e.g., Forces available at 5″ (127 mm) travel with 60 PSI (414 kPa) differential across GB53SC Actuator:

F2 = 1060 x 60/70
F2 = 908.5 lbs. of thrust

DIMENSIONS



Positioner Type	Normal Lever Position	As Instrument Signal Increases Lever Moves	On Air Failure (With Airlock) Lever Moves
GJ1103 GC31 GJ2103	Up	Down	Up
GJ1215 GJ1230 GC32 GC3230 GJ1315 GJ1330	Down	Up	Up
GC33 GC3330 GJ2215 GJ2230	Down	Up	Down
GJ14 GC34	Up	Down	Down

MODEL	A	B	C	D	E	F	R
GB52SC	18.38 (466.85)	7.25 (184.15)	6.13 (155.70)	6.75 (171.45)	8.13 (206.50)	5.75 (146.05)	1.64 (41.66)
GB53SC	19.25 (488.95)	9.38 (238.25)	7.25 (184.15)	6.75 (171.45)	8.13 (206.50)	5.19 (131.83)	2.19 (55.63)

TRAVEL AND FORCES DEVELOPED					
		AVAILABLE FORCE (lbs.)			
		DIFFERENTIAL PRESSURE ACROSS PISTON			
		GB52SC		GB53SC	
LEVER HOLES (3/8" Dia.)	LEVER TRAVEL In. (mm)	50 PSI (348 kPa)	70 PSI (483 kPa)	60 PSI (348 kPa)	70 PSI (483 kPa)
G	5 (127)	315	448	756	1,060
H	6 (152)	265	375	630	880
J	7 (178)	225	320	540	775
K	8 (203)	200	280	475	660
L	9 (229)	175	250	420	590
M	10 (254)	160	225	375	530
N	11 (279)	150	200	345	480
P	12 (305)	135	185	315	440

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line. In addition to materials of construction and diaphragm selection, it also provides all necessary data, regarding adjustment options and range selections. Control Engineering Data also provides a means of communicating, by way of a code number, which is fully descriptive of the product selection.

Notes: I. GB50X_ - GB55X_ Series Actuator will be supplied with spacer bars and lower flange. Specify stroke after catalog number (See position 11 for standard strokes - special strokes are available, consult the factory).
2. Stroke lengths must be specified after all catalog numbers.
3. Catalog numbers as received must contain fifteen (15) characters.

1-4 Models

GB50 = 3.0"	Piston Diameter	7.0	sq. in. Effective Area
GB51 = 4.0"	Piston Diameter	12.0	sq. in. Effective Area
GB52 = 6.0"	Piston Diameter	28.5	sq. in. Effective Area
GB53 = 8.0"	Piston Diameter	50.0	sq. in. Effective Area

5 Standard Options

A = Yoke Type - Drilled for Isolating and Lubricator Valve (GB52-GB53 only)
N = Airlock on Yoke (GB52-GB53 only)
P = Airpak® Mounted to Positioner (GB52-GB53 only - Yoke Style)
R = Airpak® Mounted to Positioner, Airlock on Yoke (GB52-GB53 only - Yoke Style)
S = Lever Operation (GB52 and GB53 only)
T = Airpak® Mounted to Positioner (GB5_XX_ and GB5_XXA_Series)
U = Yoke Type - GB52 1¼" Yoke Mount
- GB53 1 11/16" Yoke Mount
— The same yoke mount dimensions apply to Options N, P, and R
W = Airpak® Mounted to Positioner (GB52S_ and GB53S_ Lever Style)
X = Standard (If none of the above are selected)

6 Positioner Selections (Continued on next page)

Commandaire® "C" Series Positioners

C =	GC31 Positioner	:	3-9, 3-15, 3-27, 6-30 PSI
H =	GC32 Positioner	:	3-9, 3-15 PSI
7 =	GC3230 Positioner	:	3-27, 6-30 PSI
K =	GC33 Positioner	:	3-9, 3-15 PSI
8 =	GC3330 Positioner	:	3-27, 6-30 PSI
V =	GC34 Positioner	:	3-9, 3-15, 3-27, 6-30 PSI

Notes: 1. When ordering specify model number and range required.
2. For positioner action, refer to chart below.

Model		GC31	GC32 GC3230	GC33 GC3330	GC34
As Instrument Signal Increases	Positioner Output	Increases	Decreases	Increases	Decreases
	Actuator Stem	Extends	Retracts	Retracts	Extends
Positioner Output Loading to Actuator		Top	Top	Bottom	Bottom
On Air Supply Failure (w/ Airlock) Actuator Stem		Retracts	Retracts	Extends	Extends
Letter Designation in Actuator Model No.		C & R	H, S & 9	K, 8, T & I	V & U

Notes: 3. Refer to Drawing A50-48 for piping schematic for GC_Series Positioners.

6 Positioner Selections (Continued from previous page)

Full Reversal Positioners
F = GC313182 Positioner : 3-9, 3-15, 3-27 PSI
G = GC333183 Positioner : 3-9, 3-15 PSI

Operational Characteristics		GC313182	GC333183
As Instrument Signal Increases	Positioner Output	Increases Pressure in Top Chamber	Decreases Pressure in Top Chamber
		Decreases Pressure in Bottom Chamber	Increases Pressure in Bottom Chamber
	Actuator Stem	Extends	Retracts
On Air Supply Failure (w/ Airlock) Actuator Stem		Retracts or Extends. Specify when ordering	

On/Off Series
W = On/Off : Full extend or full retract operation
6 = On/Off : Throttling Type Headplate without Positioner
Note: 1. When specifying Option 6, note the Range Spring Ass'y and Cushion-Loading Regulator will not be supplied.

7 Mounting Options

A = No Spacer Bars or Lower Flange
X = Absence of Specification (If characters in position 5 or "A" in position 7 are not specified, spacer bars will be provided.

8 Range Selections

A = 3-7 PSI (21-48 kPa)
B = 3-9 PSI (21-62 kPa)
C = 3-15 PSI (21-103 kPa)
D = 3-27 PSI (21-186 kPa)
F = 6-18 PSI (41-124 kPa)
G = 6-30 PSI (41-207 kPa)
H = 7-11 PSI (48-76 kPa)
J = 9-15 PSI (62-103 kPa)
K = 14-22 PSI (97-152 kPa)
L = 18-30 PSI (124-207 kPa)
M = 22-30 PSI (152-207 kPa)
K = Standard for On/Off Operation

9 Airlock Selections (Continued on next page)

Airlock - Extend or Retract or Air Failure
Airlock - Lock in Last Positioner

For GC31/34 and On/Off Only (See Note 1)
A = 57 cu. in. system
C = 180 cu. in. system
E = 400 cu. in. system
G = 1000 cu. in. system
J = 2100 cu. in. system

Full Reversal Series Only (Extended Stem) (See Note 2)
B = 57 cu. in. system
D = 180 cu. in. system
F = 400 cu. in. system
H = 1000 cu. in. system
K = 2100 cu. in. system

Full Reversal Series Only (Retract Stem) (See Note 2)
T = 57 cu. in. system
M = 180 cu. in. system
N = 400 cu. in. system
P = 1000 cu. in. system
R = 2100 cu. in. system

L = Airlock - Lock in Last Position (See Note 3)

X = Absence of Specification

Tank Size	Cylinder Bore Diameter	Stroke
57 Cu. In.	GB50 - 3"	2" + 5"
	GB51 - 4"	3" + 4"
	GB52 - 6"	1 1/8"
180 Cu. In.	GB50 - 3"	8"
	GB52 - 6"	4" + 6"
	GB53 - 8"	1 1/2"
400 Cu. In.	GB53 - 8"	4" + 6"
	GB54 - 10"	2 1/2" + 4"
1000 Cu. In.	GB53 - 8"	8" + 10"
	GB54 - 10"	10"
	GB55 - 12.5"	4"

9
Airlock Selections
(Continued from
previous page)

Notes:
1. Airlock Assembly includes Capacity Tank, Check Valve and Regulator. Refer to Drawing A50-4 and A50-48 for Piping Schematic.
2. Airlock Assembly includes Tank Capacity, Check Valve, Regulator and GVB12 Relay.
3. Airlock Assembly consists of GVB12 Relay.

10
Optional Accessories

X = Absence of Specification

11
Stroke Lengths

Standard Stroke Lengths

GB50	2", 5", 8"
GB51	3", 4"
GB52	1 1/8", 4", 6"
GB53	1½", 4", 6", 8", 10" (3)

Notes:
1. For stroke lengths longer than listed, consult the factory.
3. Maximum Piston Travel without Collars is:
   - 4" Stroke = 4.125"
   - 6" Stroke = 6.750"
   - 8" Stroke = 8.750"
   - 10" Stroke = 10.750"

Actuators with Yokes for Valve Mounting

GB52	Maximum Stroke 1 1/8"
GB53	Maximum Stroke 1½"

Lever Actuators

GB52	Maximum Lever Travel 12"
GB53	Maximum Lever Travel 12"

For Dimensional Data, refer to Drawing:

A6-15	GB2700/2800
A6-41	GB51/55 On/Off
A6-113	GB50 On/Off
A7-100	GB50 with Yoke - GC31
A7-101	GB50 with Yoke - GC32
A7-102	GB50 with Yoke - GC33
A7-103	GB50 with Yoke - GC34
A7-107	GB50 Series - with GC31
A7-108	GB50 Series - with GC32
A7-109	GB50 Series - with GC33
A7-110	GB50 Series - with GC34
A7-111	Lever Actuator
A7-114	GB51-55 with GC31
A7-115	GB51-55 with GC32
A7-116	GB51-55 with GC33
A7-117	GB51-55 with GC34

Positioners

Air Consumption - Dynamic: The maximum rate at which air is consumed by a device within its operating range while the device is in motion.

Air Delivery Rate (Max.): See Flow Capacity.

Ambient Temperature Range: The minimum and maximum temperature of the medium surrounding a device.

Control Action: The nature of the change of the output effected by the input.

Controller Signal: The output of a device which operates automatically to regulate a controlled variable.

Exhaust Capacity: The rate which a volume will exhaust from a given device. Typically expressed in SCFM for gases or GPM for liquids.

Exhaust Rate: See Exhaust Capacity.

Fail Safe System: In the event of power source loss, either electrical or pneumatic, an additional apparatus designed to direct a device to take a specific action.

Failure Mode: The reaction of a device in the event of a power source loss, either electrical or pneumatic.

Flow Capacity - Dynamic: The rate which a mass will pass forward through a given device within a unit of time while variables are in a steady-state. Typically expressed in SCFM for gases or GPM for liquids.

Flow Capacity - Static: The rate which a volume will pass forward through a given device within a unit of time while variables are undergoing a change. Typically expressed in SCFM for gases or GPM for liquids.

Maximum Supply Pressure: The maximum pressure that can be supplied to a device above which will result in malfunction of device.

Power Amplification: The change in input required to produce a full range change in output, due to proportional control action.

Proportional Control Action: Control action in which there is a continuous linear relation between the input and the output.

Proportional Gain: The ratio of the change in output due to proportional control action to the change in input.

Repeatability: The maximum difference between a number of consecutive reaction indications for the same applied inputs, approaching from the same direction. It is usually measured in terms of non-repeatability and expressed in repeatability error as a percentage of span.

Reproducibility: See Repeatability.

Span: The algebraic difference between maximum and minimum limits of a scale.

Static: See Steady-State.

Steady State: A characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibiting only negligible change over an arbitrary long period.

Supply Pressure Effect: The effect of supply pressure variations relative to output pressure at a constant set point.

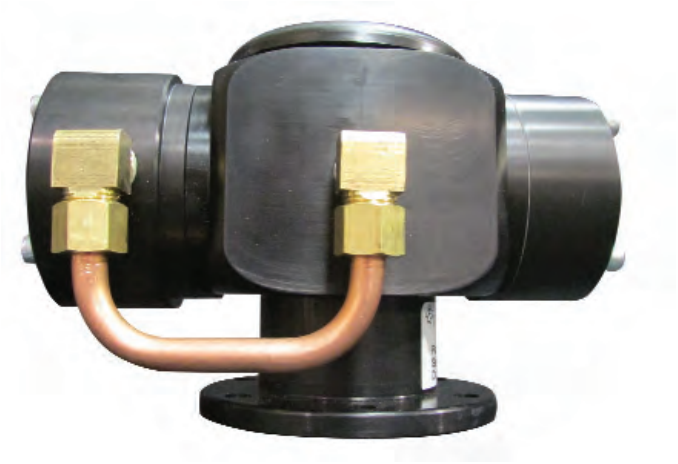
Zero Suppression: The condition in which the zero of the measured variable is less than the lower range-value.

GC31/GC34 Commandaire® Positioners

The Commandaire® Positioner is a top mounted, integral positioner used with piston or spring and diaphragm actuators. Utilizing a force balance principle this unit provides proportional positioning of an actuator with stroke lengths up to 10". The completely enclosed design eliminates exposed levers or linkages making the Commandaire® Positioner rugged and reliable.

This unit has a single-stage pilot which affords a high degree of stability and excellent positioning accuracy. This high capacity 5 SCFM (0.14 m^3/min) at 100 PSI (690 kPa) pilot valve exhausts or feeds supply pressure 20 to 100 PSI (138 to 690 kPa) to the actuator producing fast response. Small changes in the instrument signal are amplified by the high volume pilot assuring fast, stable and precise positioning of the actuator stem.

Available in four versions, the Commandaire® Positioner can be top or bottom loading, direct or reverse acting. Refer to chart below for details:



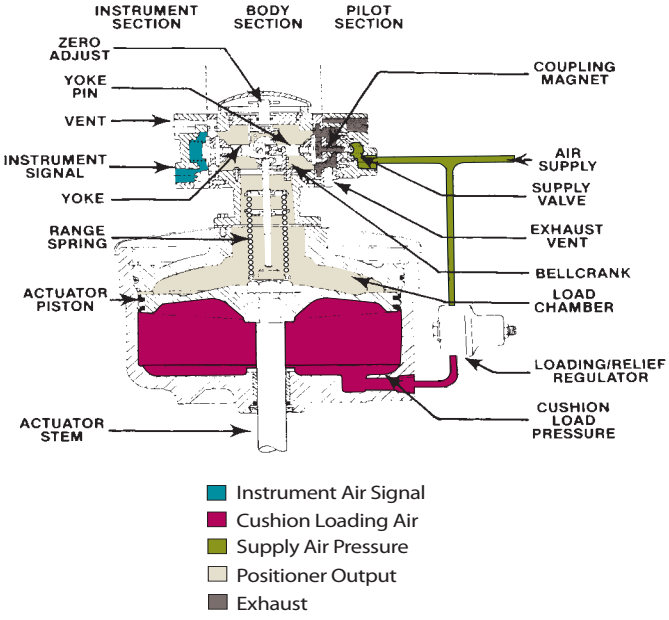
Dimensional Data – Advertising Drawings:
Fail Safe Schematic: A50-48
GC31: A50-49
GC32: A50-50
GC33: A50-51
GC34: A50-52

Operational Characteristics		GC31	GC32 GC3230	GC33 GC3330	GC34
As Instrument Signal Increases	Positioner Output	Increases	Decreases	Increases	Decreases
	Actuator Stem Moves	Out	In	In	Out
Positioner Output (Loading to Actuator)		Top	Top	Bottom	Bottom
On Air Failure (w/ Airlock) Actuator Stem Moves		In	In	Out	Out

Adjustable of stroke lengths of ¼" to 10" (other strokes are available, consult the factory) an instrument spans of 6 to 24 PSI (41 to 166 kPa).

Stable performance is maintained by the force-balance positioning and high capacity pilot. This design makes the Commandaire® Positioner a rugged and reliable unit for today's control instruments.

Principle of Operation



The Commandaire® Model GC31 positions the actuator by applying sufficient air pressure above the piston to overcome cushion-loading pressure (pressure below piston set by an adjustable pressure reducing/relief type regulator) plus any external forces or load acting on the stem. An increase in air signal creates a force on the instrument diaphragm moving yoke to right, closing exhaust port and opening supply valve. Air flows through supply valve into chamber above the piston and moves it downward. This extends a calibrated range spring causing the bellcrank to pivot counterclockwise, exerting force against the yoke pin, restoring the yoke to normal balanced position. A decrease in instrument air pressure reverses the procedure, closing supply valve and opening exhaust port venting to atmosphere excess air pressure above the actuator piston.

Specifications

Supply Pressure Effect:
Less than 0.15% per PSI

Power Amplification - (Proportional Band):
Less than 5.0% deviation in signal or stroke produces full output pressure change

Ambient Temperature Range:
-20ºF to +150ºF (-29ºC to +66ºC)

Flow Capacity (Dynamic):
Up to 5.0 SCFM (0.14 m^3/min) in either direction with a 100 PSI (690 kPa) supply

Air Consumption (Static):
0.3 SCFM at 40 PSI supply (0.008 m^3/min at 276 kPa)

Air Supply:
20 PSI to 100 PSI (138 to 690 kPa)

Controller Signal:
All standard spans and split ranges available

Zero Suppression:
0 to 18 PSI (0 to 124 kPa)

Control Actions:
Direct or reverse, top or bottom loading

Actuator Travels:
¼" to 10" (6.35 to 254 mm)

Connections:
¼" NPT

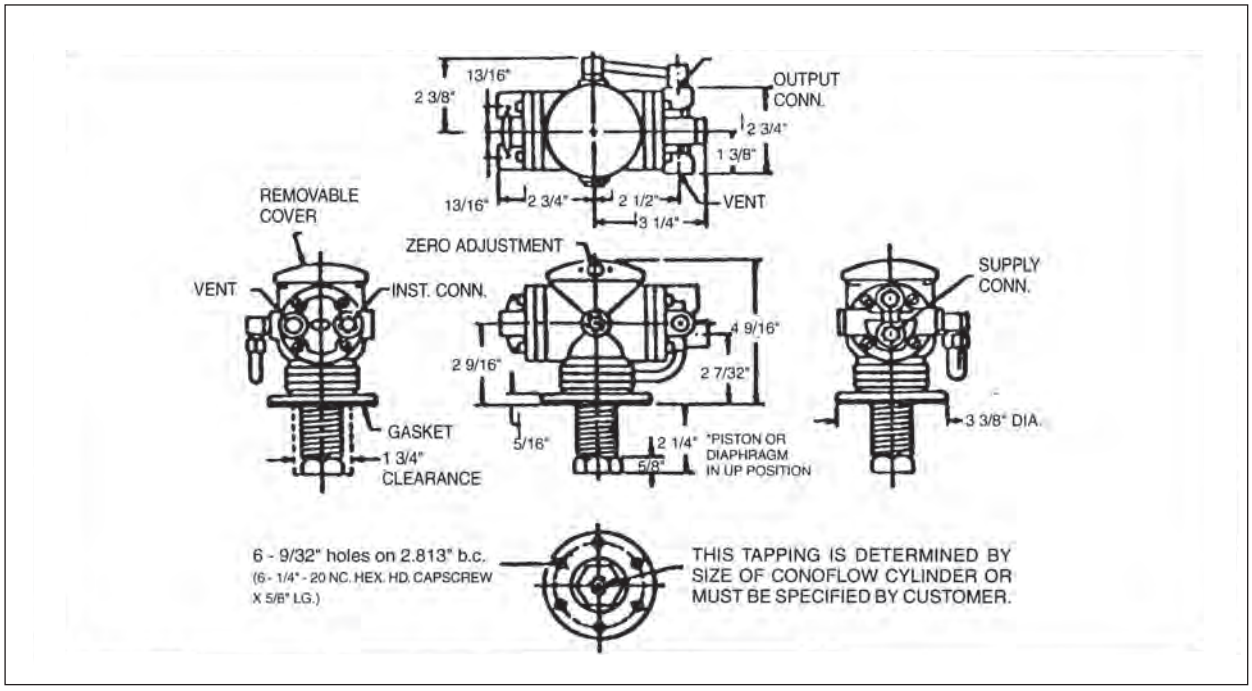
Adjustment:
Zero adjust is external and can be made without tools

Mounting:
Mounted integrally to top of cylinder or spring and diaphragm actuator with 2¼" dimension between positioner mounting flange and actuator stem in retracted position

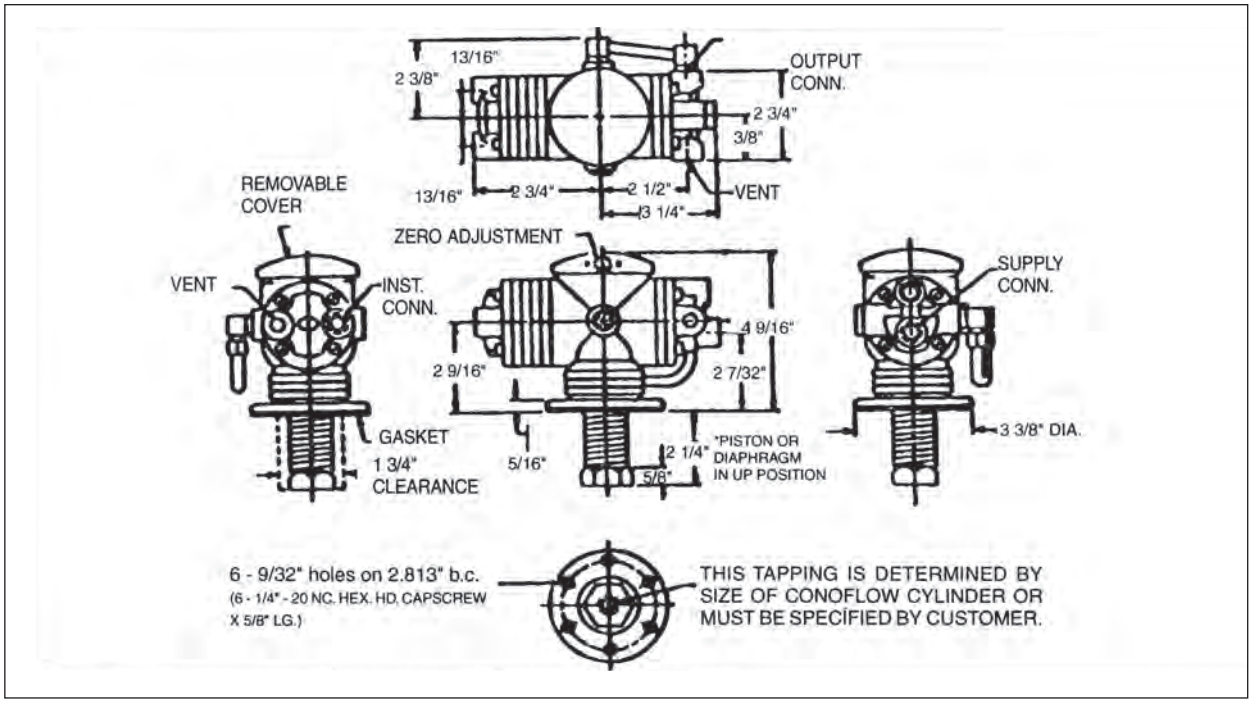
Weight:
Approximate Shipping Weight: 2¾ lbs. (1.25 Kg)

Note:
Specifications are typical values based on the use of a Conoflow GB50 Series Actuator. Use of other actuators may affect performance.

Drawings

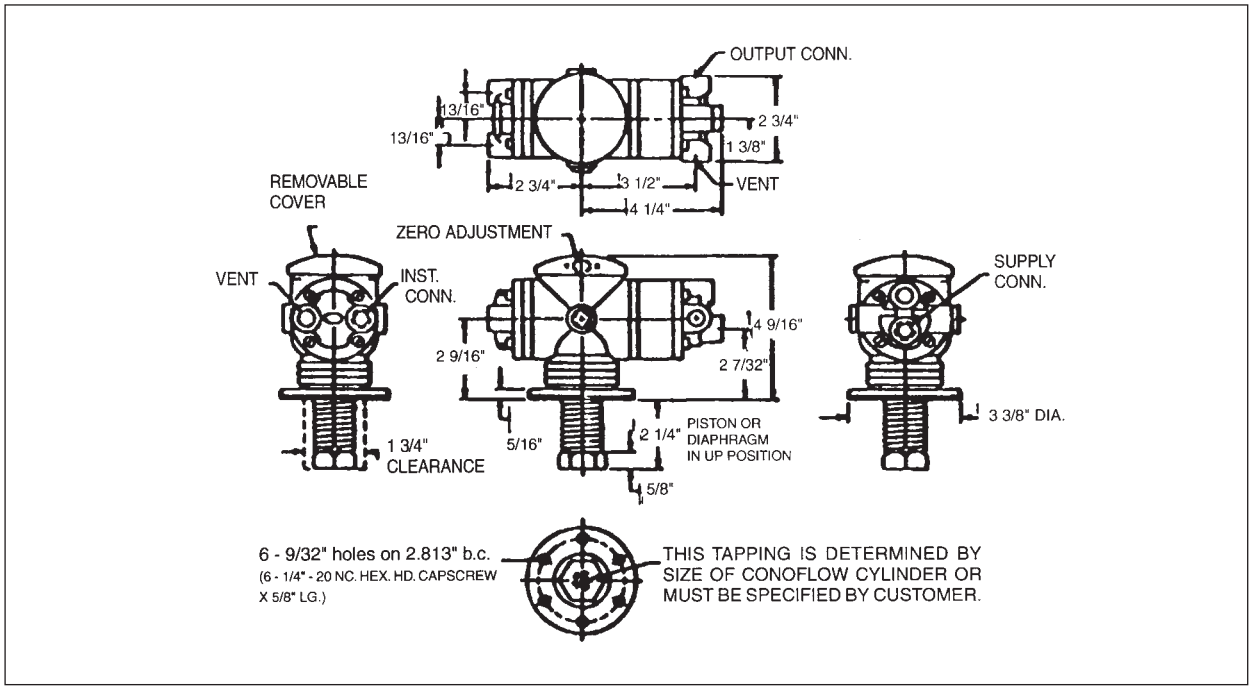


For Certified Dimensional Data, refer to Drawings A50-49 (GC31)

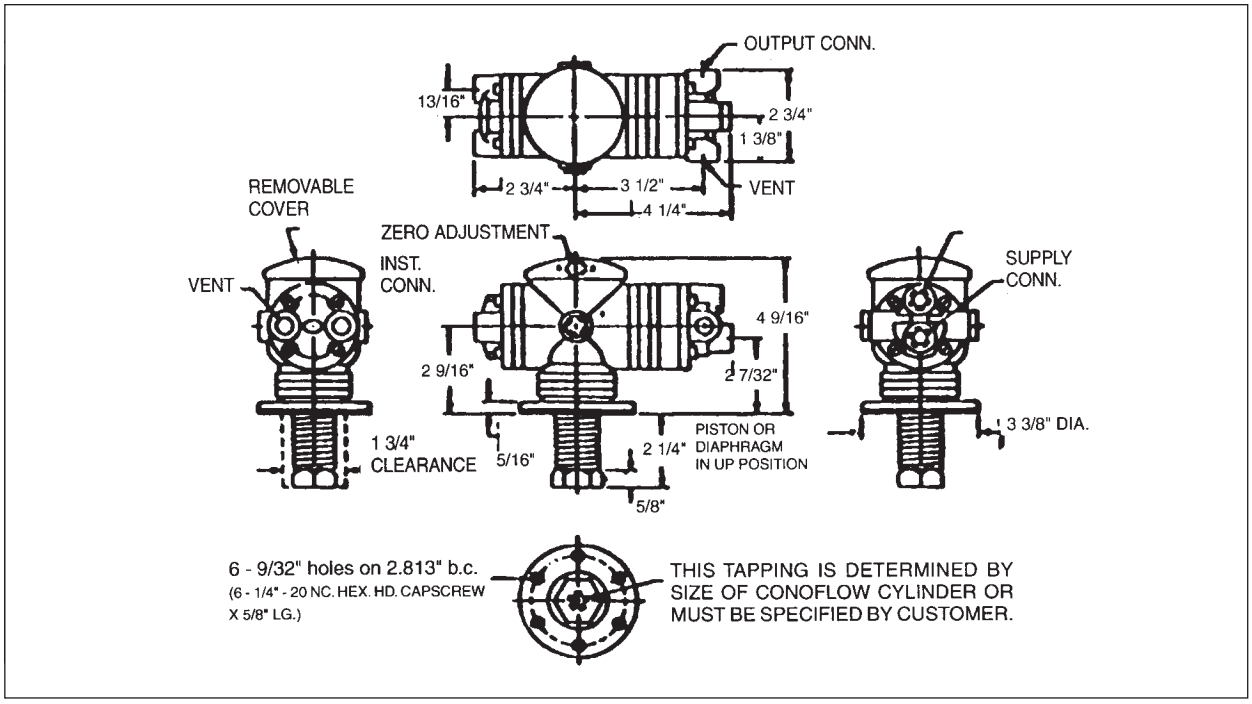


For Certified Dimensional Data, refer to Drawings A50-50 (GC32)

Notes:
1. All connections are ¼" NPT unless otherwise noted.
2. When ordering, specify model, range and stroke.
3. For piping schematics See A50-48.
4. Vents can be tapped ¼" NPT for Gas Service.



For Certified Dimensional Data, refer to Drawings A50-50 (GC33)



For Certified Dimensional Data, refer to Drawings A50-52 (GC34)

Notes:
1. All connections are ¼" NPT unless otherwise noted.
2. When ordering, specify model, range and stroke.
3. For piping schematics See A50-48.
4. Vents can be tapped ¼" NPT for Gas Service.

Accessories

Air Consumption - Static: The maximum rate at which air is consumed by a device within its operating range during steady-state (static) signal conditions.

Air Consumption - Dynamic: The maximum rate at which air is consumed by a device within its operating range while the device is in motion.

Air Delivery Rate (Max.): See Flow Capacity.

Ambient Temperature Range: The minimum and maximum temperature of the medium surrounding a device.

Exhaust Capacity: The rate which a volume will exhaust from a given device. Typically expressed in SCFM for gases or GPM for liquids.

Exhaust Rate: See Exhaust Capacity.

Fail Safe System: In the event of power source loss, either electrical or pneumatic, an additional apparatus designed to direct a device to take a specific actions.

Failure Mode: The reaction of a device in the event of a power source loss, either electrical or pneumatic.

Flow Capacity - Dynamic: The rate which a mass will pass forward through a given device within a unit of time while variables are in a steady-state. Typically expressed in SCFM for gases or GPM for liquids.

Flow Capacity - Static: The rate which a volume will pass forward through a given device within a unit of time while variables are in a steady-state. Typically expressed in SCFM for gases or GPM for liquids.

Lock in Last Position: The ability of a device to maintain its position, as set by the control signal, in the event of power loss.

Maximum Supply Pressure: The maximum pressure that can be supplied to a device above which will result in malfunction of device.

Operating Temperature Range: The minimum and maximum temperature at which a device will operate with defined specifications.

Set Point Pressure (Set Pressure): An input variable which sets the desired value of a controlled variable.

Steady State: A characteristic of a condition, such as value, rate, periodicity, or amplitude, exhibiting only negligible change over an arbitrary long period.

Airlock Fail-Safe System

Today's systems demand ultimate performance from all components in the system. These include not only the primary instruments, but also the final control element, an integral part of the control loop. To meet these demands the actuator positioning the final control element must provide true proportional control in response to a signal regardless of the stem load and stuffing box friction. Without precise actuator positioning, the critical function of the final control element is reduced.

In many applications, spring and diaphragm actuators, due to their inherent lack of power, cannot offer precise positioning performance. Adding a positioner will improve this performance, but it is restricted by the power-absorbing spring. Conversely, a springless actuator such as Conoflow's Pneumatic Piston Actuator, which utilizes air pressures up to 100 PSI (690 kPa), can deliver thrusts in excess of 12,000 pounds, and strokes up to 10". (For stroke lengths greater than 10", consult the factory.) Positioning accuracy meets the requirements of modern day instrumentation.

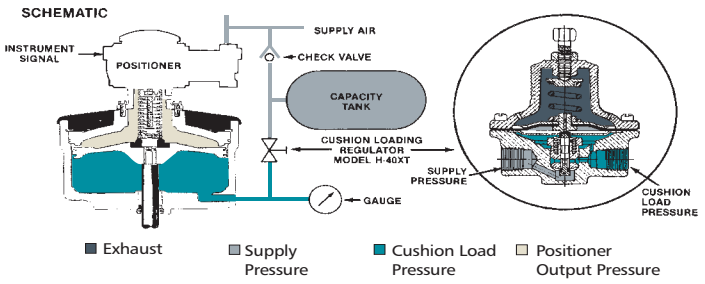
The springless Piston Actuator utilizes a cushion of air under the piston whose pressure is maintained by a loading regulator. Output from an integrally mounted positioner determines the position of the piston. A differential pressure across the piston determines the direction and speed of motion. Balance is achieved by an equalization of forces as determined by stem position and instrument signal pressure.

To provide a fail-safe system (extend or retract the stem in the event of air supply failure), Conoflow offers their Airlock Fail-Safe System. Integrally mounted on the actuator, this compact unit provides positive action to open or close a valve. For lock in last position feature, refer to page 159.

Principle of Operation

During operation, the supply pressure to the Actuator (up to 100 PSI) is fed through the positioner and a cushion-loading regulator. This regulator provides a constant pressure to one side of the piston regardless of its position to give a constant force in one direction. The amount of force available is determined by the pressure setting and the effective area of the piston.

The Positioner will provide proportional positioning of the actuator stem in response to instrument signal changes by applying or relieving pressure on the piston. The air pressure required is dependant upon the cushion loading pressure and the direction of the external force to be overcome.



For Piping Schematics, refer to Drawings A50-4, A50-16 and A50-48

The high volume capacity tank, which stores air at supply pressure, acts as an auxiliary source to the cushion loading system. In the event of air supply failure, the pressure on top of the piston bleeds to atmosphere and the pressure from the capacity tank through the cushion loading regulator forces the stem to extend or retract depending on the positioner being used (refer to tables below). Since it is a completely sealed system, the stem will remain in that position until supply pressure is restored (up to 24 hours). The stem can also extend on air failure by selecting the proper positioner and applying the cushion loading system to the top of the piston (refer to the chart below).

Airlock Assemblies can be purchased as individual assemblies (components shipped loose) for field replacement or for mounting to actuators other than conoflow units.

Actions Available

Positioner Model No.	Stem Position with Increasing Signal	Stem Position on Air Failure
GC31	Extends	Retracts
GC32	Retracts	Retracts
GC33	Retracts	Extends
GC34/	Extends	Extends

Actions Available

Model	GC313182	GC333183
As Instrument Signal Increases, Actuator Stem	Extends	Retracts
Stem Position On Air Failure	Can be piped to Extend or Retract. Specify when ordering.	

Note: 1. Capacity tanks are sized to provide a maximum pressure equal to 50% of the supply pressure for full extension or retraction of the actuator stem.

Throttling and On/Off - GB50 Series Units
With spacer bars and lower flange (GB5_XCXC) | Without spacer bars and lower flange (GB5_XCAC)

Airlock Assembly Number	Actuator Model - Bore Size	Applicable Stroke Lengths	Tank Size
GB216400	GB50 Series - 3" Bore GB52 Series - 6" Bore GB53 Series - 8" Bore	8" Stroke 4" and 6" Stroke 1½" Stroke	180 cubic inch
GB216401	GB53 Series - 8" Bore	4" and 6" Stroke	400 cubic inch
GB216402	GB53 Series - 8" Bore	8" Stroke	1000 cubic inch
GB216403	GB50 Series - 3" Bore GB51 Series - 4" Bore GB52 Series - 6" Bore	2" and 5" Stroke 3" and 4" Stroke 1⅛" Stroke	57 cubic inch

Note:
1. Each assembly consists of capacity tank, cushion-loading regulator, check valve, draincock and mounting hardware.

Throttling and On/Off - GB52, GB53 and GB54 Series
Lever Actuators (GB52S_) | Yoke Style Actuators (GB52U_)

Airlock Assembly Number	Actuator Model - Type	Tank Size
GB216404	GB53S (1) - Lever Actuator GB53U (1) - Yoke Style Actuator	180 cubic inch
GB216405	GB52S (1) - Lever Actuator GB52U (1) - Yoke Style Actuator	57 cubic inch

Notes:
1. Positioner model selection, refer to chart at left.
2. Each assembly consists of capacity tank, cushion-loading regulator, check valve, draincock, mounting bracket and mounting hardware.

Principle of Operation

Designed for pneumatic systems, Conoflow Series GVB Snap-Acting Relays change ports to switch or lock in secondary air source when the main supply pressure falls below a predetermined set point. In the event of supply or pilot pressure failure, the positive action relay with one common and two inlet or outlet ports will automatically:

- Switch from main to auxiliary supply pressure
- Lock an actuator in its last position
- Extend or retract an actuator stem
- Divert flow or pressure from one device to another

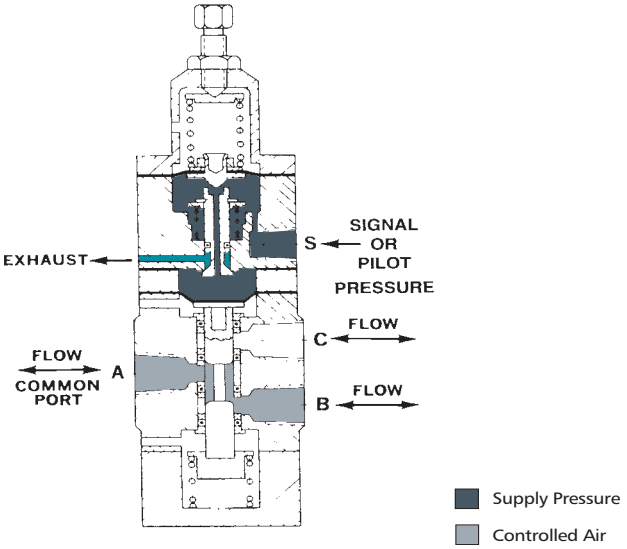
The Series GVB Snap-Acting Relays have an integral pilot which eliminates the extra piping and connections required with other lock-up valves. Compact and lightweight, the relays are easily piped and mounted.

Principle of Operation (GVB11)

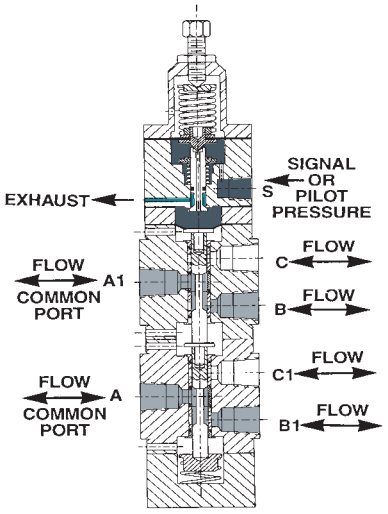
The pressure at which the relays will actuate can be adjusted at any point between 25 PSI (172 kPa) and 85 PSI (586 kPa). Signal or pilot pressure acting in the upper diaphragm overcomes the force of the spring in the bonnet and permits air to flow into the lower chamber. This pressure buildup forces the spring-loaded spool valve to open common Port "A" to "B". When the pressure drops below the preset point, the exhaust port opens and common Port "A" is switched from "B" to "C" be releasing the spring loaded spool valve.

The spool valve will return to its original position ("A" to "B" when the pressure to the pilot is less than or equal to 20% greater than the set point. For example, if the set pressure is 50 PSI (345 kPa), the units will return to its original position when the pressure to the pilot builds up to approximately 60 PSI (414 kPa).

Model GVB12 Relay has two spool sections mounted in tandem with the lower ports designated as "A1", "B1" and "C1".



GVB11



GVB12

Supply Pressure
Controlled Air
Exhaust

Set Pressure:
25 to 85 PSI (172 to 586 kPa)

Maximum Supply Pressure (1):
150 PSI (1034 kPa)

Maximum Operating Pressure:
150 PSI (1034 kPa)

Port Diameter:
$^{3}/_{16}$" (C_V 0.38)

Max. Pilot Air Consumption:
3.1 SCFH (0.060 m^3/min)

Ambient Temperature Range:
0ºF to +150ºF (-18ºC to +66ºC)

Connections:
Sensing Port: $^{1}/_{8}$" NPT
All Others: ¼" NPT

Weight:
GVB11: 1¾ lbs. (0.79 Kg)
GVB12: 2¾ lbs. (1.25 Kg)

Note: 1. Supply (Pilot) pressure must be at least 20% greater than set pressure.

Materials of Construction

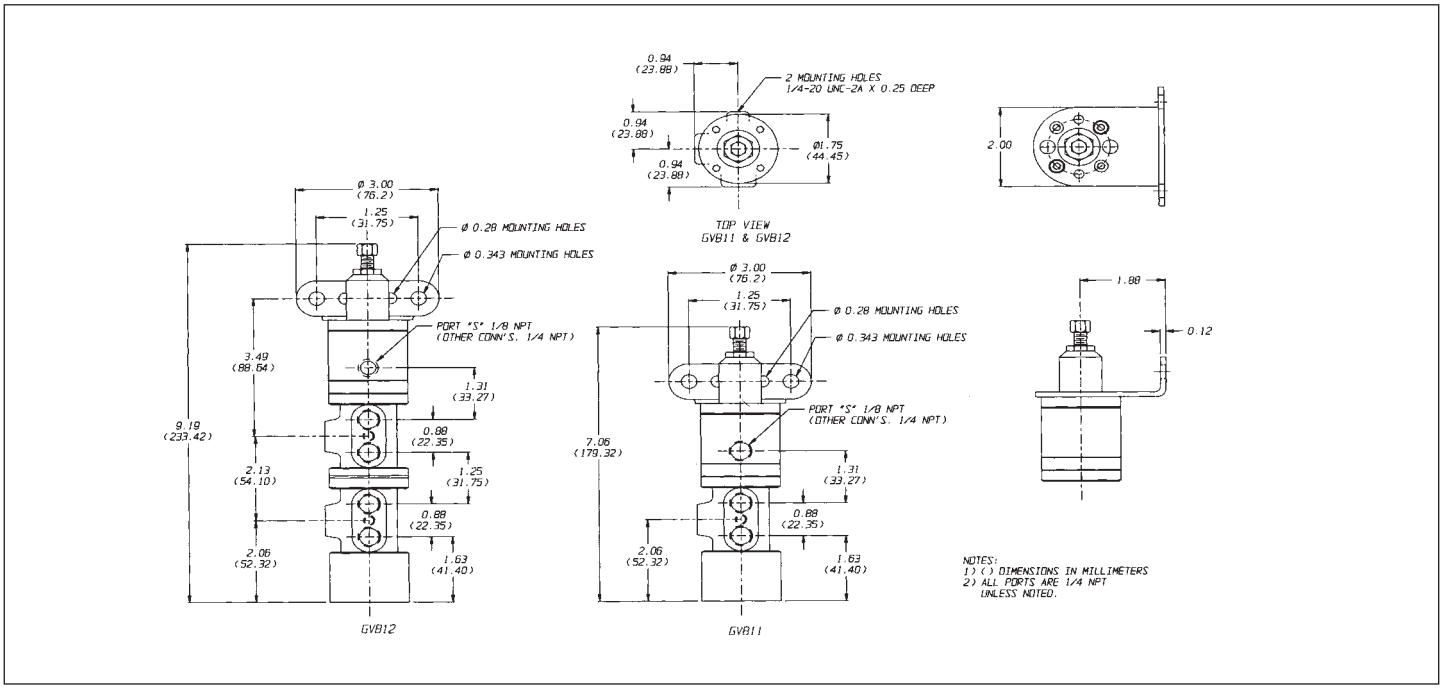
Pilot: */**
Body and Bonnet: Aluminum
Inner Valve: $^{3}/_{16}$" (C_V 0.38)
Range Spring: Steel
Diaphragm: Buna "N"

Valve: */**
Body: Brass
Spool: 303 Stainless Steel
Diaphragm: Buna "N"
Bottom Cap: Aluminum

* Stainless Steel Construction available, consult the factory.
** Viton and Silicone Elastomers available, consult the factory.

Canadian Registration Numbers

The GVB11 and GVB12 have received the following Canadian Registration Numbers:
Alberta – OHO266-92
British Columbia – OHO266-91
Manitoba – OHO266.94
New Brunswick – OHO266.97
New Foundland – OHO266.90
Northwest Territory – OHO266.9T
Nova Scotia – OHO266.98
Prince Edward Island – OHO266.99
Saskatchewan – OHO266.93
Yukon – OHO266.9Y



For Certified Dimensional Drawing, refer to A29-1

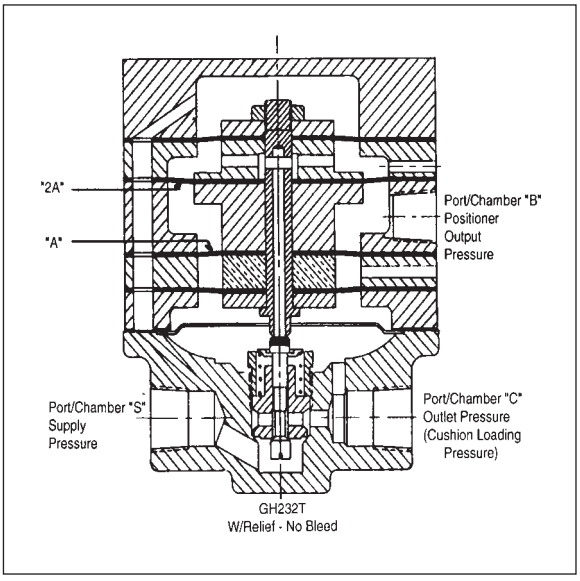
Principle of Operation

The purpose of the GH232T is to reduce the cushion load to the actuator in proportion to the positioner output pressure. This effectively provides the advantage of a full reversal positioner by providing full differential pressure across the actuator piston if necessary.

There are three active pressure chambers in the GH232T. The chambers are labeled S, B and C on the sectional drawing. The supply pressure is connected to the port marked “IN”. Note that this port is also connected to the chamber designated “S”. The positioner output pressure is connected to the middle port marked “B”. The output of the GH232T is ported to chamber “C”.

The operation of the GH232T can be explained by evaluating the balance of forces on the diaphragm assembly. In equilibrium, the upward forces must balance the downward forces. Note that there are two sizes of diaphragm area in this device. The effective area of the larger diaphragm is equal to two times the area of the smaller diaphragm.

Let the various pressures in each chamber be designated by the letter assigned to each. The smaller diaphragm area will be designated as “A”, and the larger area will therefore be equal to 2A. Balancing the resulting upward and downward forces provides the following result:
(S•A) + (B•A) = (B•2A) + (C•A)
Dividing through by the area “A” are rearranging yields: C = S - B
In other words, the output of the GH232T, “C”, is equal to the supply pressure minus the positioner output pressure. Therefore, as the positioner output pressure increases, the cushion load pressure provided by the GH232T decreases accordingly. As the positioner output reaches its maximum which is the full differential pressure, the output of the GH232T goes to zero providing the full differential pressure across the actuator piston. At intermediate positioner output pressures, the cushion load is adjusted as necessary to provide the actuator force required.

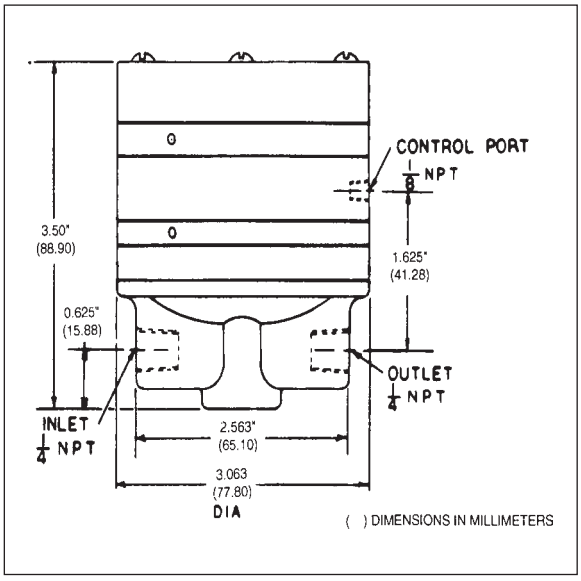


Installation

Caution: Maximum Supply Pressure is 100 PSI.

Unit has two ¼” NPT connections. Port “B” is ⅛” NPT.
It is recommended that a filtered air supply be used.

Check all connections for leakage after installation.



For Certified Dimensional Drawing, refer to A17-85

ITT Conoflow
105 Commerce Way
Westminster, SC 29693
Phone: 864.647.9521
Fax: 864.647.7620
www.conoflow.com

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