

ITT Industries

AUTOMOTIVE
DEFENSE & ELECTRONICS
FLUID TECHNOLOGY

ITT CONOFLOW

Highway 78 · P.O. Box 768
St. George, South Carolina 29477-0768
Telephone: (803) 563-9281
FAX (803) 563-2131

WARNING

Conoflow's products are designed and manufactured using materials and workmanship required to meet all applicable industry standards. The use of these products should be confined to services specified and/or recommended in the Conoflow catalogs, instructions or by Conoflow application engineers (i.e. exceeding pressure-temperature rating or using device for services other than those specified).

To avoid personal injury or equipment damage due to misuse or misapplication of a product, it is necessary to select the proper materials of construction and pressure-temperature ratings which are consistent with performance requirements.

INSTRUCTION AND MAINTENANCE MANUAL

HP610 HIGH PRESSURE REGULATOR HIGH PURITY MODEL

These instructions should be read carefully before installation or maintenance.

GENERAL

The HP610 Regulator is a handwheel adjustable, spring loaded, self-contained pressure reducing regulator. This diaphragm sensed, HIGH PURITY, model is designed for units requiring high flow rates and ability to relieve outlet fluid pressure. Non-relieving models are available.

This regulator uses a Teflon main valve seat and a convoluted 316 stainless steel diaphragm which provides accurate and reliable regulation.

MATERIALS OF CONSTRUCTIONS

When the relieving style seat is used, hazardous or corrosive fluids should not be used. When the non-relieving model is used the HP610 will operate with any fluid (liquid or gas) which is compatible with the materials of construction. To identify the materials of construction, refer to control Engineering Data contained on Page 3.

Body	316SS Electropolish
Bonnet	Brass, Nickel Plated
Main Valve Seat	Teflon
Vent Valve Seat	Teflon
Diaphragm and Trim	316 Stainless Steel
Filter	316 Stainless Steel (120 Mesh)

REGULATOR CLEANING

The HP610 Series High Pressure Regulator is cleaned to ITT Conoflow Specification ES8A 01 294.

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.

**CAUTION: Maximum Supply Pressure
250 PSIG(1.73 MPa)**

WARNING: The HP610 is a relieving regulator and should not be used with hazardous gases.

An internal filter screen is provided in the inlet ("IN") port only to stop random contamination resulting from installation. An auxiliary filter is recommended for all but the cleanest fluid. Gaseous fluid must be free of excessive moisture to prevent internal icing or condensation during operation.

OUTLET PRESSURE RANGES

OPTION CODE	RANGE
"B"	0- 50 PSIG(.345 MPa)

PORTING CONFIGURATIONS

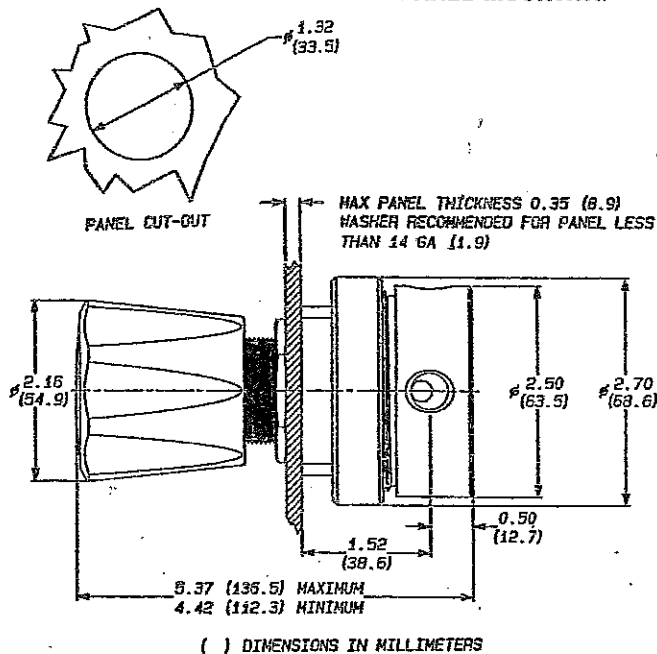
There are three (3) 1/4" NPTF connections on the HP610. The supply connection port is labeled "IN" (stamped on the bottom of the regulator body). There are two (2) outlet ports, labeled "OUT". Both outlet ports have the same flow capacity, but the central port is generally used for an outlet pressure gauge connection.

Teflon thread tape is the preferred thread sealant when the regulator is installed.

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TECHNICAL DATA SUBJECT TO EAR CONTROLS. THIS DOCUMENT CONTAINS TECHNICAL DATA WHOSE EXPORT IS RESTRICTED BY THE EXPORT ADMINISTRATION ACT OF 1979, AS AMENDED (TITLE 50, U.S.C., APP.2401 ET SEQ.) VIOLATION OF THIS EXPORT CONTROL LAW IS SUBJECT TO SEVERE CRIMINAL PENALTIES.

PANEL MOUNTING



INSTALLATION

The HP610 can be line or panel mounted. For line mounted applications refer to porting configurations for proper orientation of ports.

PANEL MOUNTING

1. Remove handwheel and insert regulator from rear of panel.
2. Project regulator through the panel and install panel mounting hardware.
3. Replace handwheel.
4. Connect inlet, outlet and gauge port.

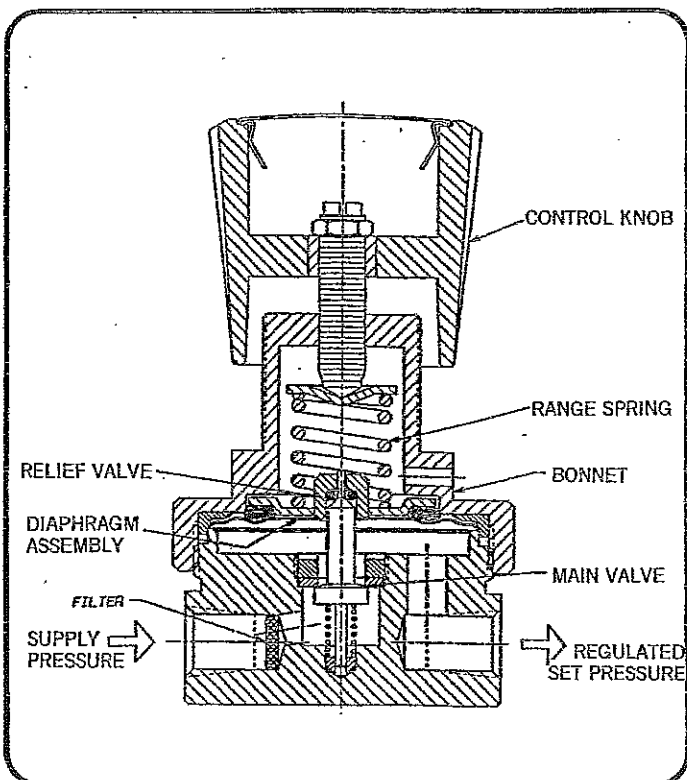
PRINCIPLE OF OPERATION

The HP610 is a high-purity, self-contained, spring-loaded pressure reducing unit. This regulator is designed for use in applications requiring high flow rates and the ability to relieve outlet fluid 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 counterclockwise 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. 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 move up and allow the main valve to close. In equilibrium, the diaphragm will assume a position which will supply the flow required to maintain outlet pressure.

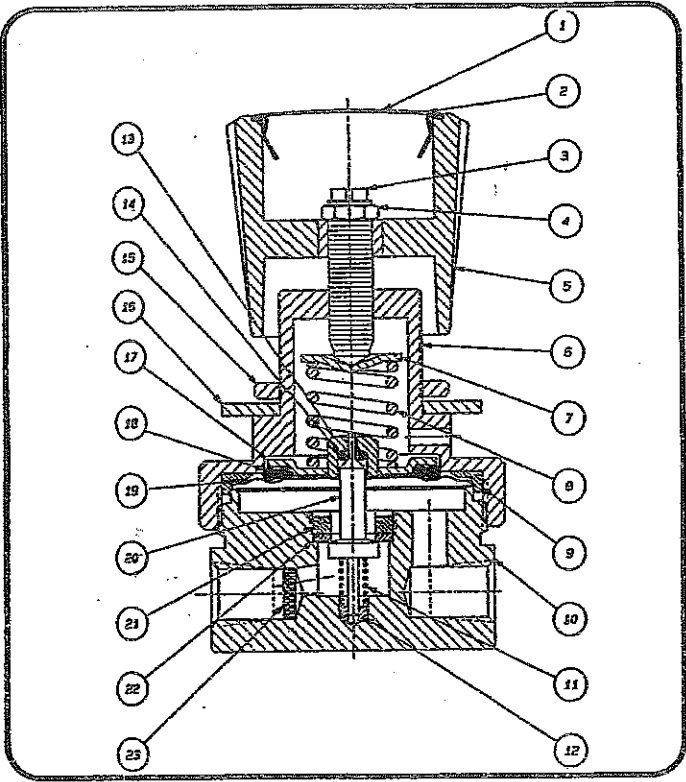
When the outlet pressure is equal to the set pressure, the main valve will close and flow will cease. If the outlet pressure rises above the set pressure, the diaphragm will rise further and unseat the relief valve. When the outlet pressure decreases to the set pressure, the valve will close and the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



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, diaphragm and elastomer 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. All Catalog Numbers as received must contain fifteen (15) characters.

1-5 Basic Model Number	HP610 = Pressure Reducing Regulator High Purity Diaphragm Type			12 Mounting	P = Panel Mounting (1-nut)
6 Materials of Construction	Body/Bonnet/Trim H = 316 Stainless Steel/Nickel Plated Brass/316 Stainless Steel			13 Cleaning	A = Regulator is cleaned to ITT Conoflow Specification ES8A 01 294. B = Oxygen Cleaning Specification of materials in regulators is the users 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 price to performing cleaning operations. Specification of materials is the USER'S RESPONSIBILITY.
7-8 Elastomers & Diaphragm	Seals and Diaphragm 11 = 316 SS	Main & Vent Valve Seat(s) Teflon	O-Ring Buna-N		
9 Relieving Option	N = Non-relieving V = Relieve to atmosphere (Standard)			14 Adjustment Selection	B = Handwheel (Large)
10-11 Inlet/Outlet Gauge Ports	Inlet/Outlet/1-Outlet Gauge Ports (90 degrees) - See Note 1.			15 Regulated Output Range	B = 0- 50 PSI (0-0.345 MPa)
	NPT Connections 91 = 1/4"				
NOTE: 1. Gauge port connections is 1/4" NPT.					



PRINCIPLE OF OPERATION

Setting limit on maximum outlet (control) pressure

The handwheel on the HP610 Regulator can be adjusted to limit the maximum outlet pressure attainable to any value between 50 and 100% of the rated outlet pressure range. To set this limit, connect the regulator to a pressure source and a gauge to indicate the regulator outlet pressure. Apply an inlet pressure to the regulator equal to the maximum inlet pressure expected in service. Remove hole plug (2) from handwheel (5) and loosen jamnut (4) using a 9/16" socket. Using a screwdriver, turn adjusting screw (3) clockwise until the indicated outlet pressure is 5 to 10% higher than the pressure at which the limit is desired. Spin handwheel (5) clockwise until it stops against top bonnet (6). Then turn the handwheel back about 1/8 turn counterclockwise and hold it in this position with one hand. While doing so, tighten jamnut (4) against handwheel (5) with 70 - 120 in.lbs. torque. Turn handwheel counterclockwise until it is no longer seated against the top of bonnet (6). Check by adjusting handwheel clockwise to insure that it stops when outlet pressure reaches desired maximum pressure.

NOTES:

Blank lined area for notes, consisting of two columns of horizontal lines.

SCHEDULED MAINTENANCE

All regulators require scheduled maintenance to remove deposits left by the media and to replace parts worn or damaged as a result of use. Annual maintenance is recommended when the regulator is used under normal conditions. More frequent maintenance may be required due to the condition, cleanliness and/or corrosiveness of the media.

TOOLS REQUIRED

75061CV Spanner tool (seat gland) obtain from
ITT Conoflow
9/16" Socket (locknut)
1-3/4" Wrench (bonnet)
Tweezers (inner friction bushing)
Krytox 240 AB grease or equivalent

CAUTION - MAINTENANCE

It is recommended that maintenance be performed by a person experienced in the operation and repair of high pressure regulators.

Maintenance of this unit is best performed by gripping a protruding end of a pipe fitting installed into the regulator body.

WARNING: Bleed System Pressure Prior To Removing Regulator For Servicing.

MAINTENANCE PROCEDURE

1. Adjust handwheel (5) to the full counterclockwise position until handwheel (5), hole plug (2), jamnut (4) and adjusting screw (3) are fully disengaged.
2. Using a 1-3/4" wrench, loosen and remove bonnet (6). When removing bonnet (6) note that seal ring (9) may drop free. If not remove and inspect.
3. Remove spring button (7), range spring (8), diaphragm assembly (13), relief seat O-Ring (14), diaphragm backup plate (17) and support diaphragm O-Rings (18) and (19). Note when removing diaphragm assembly (13) relief seat O-Ring (14) may need to be freed with use of tweezers.
4. Using a special, slot driver spanner tool loosen and remove seat gland (21), then lift out main valve seat (22), valve plug (20) and plug spring (11). Tweezers may be needed to remove inner friction bushing (12).

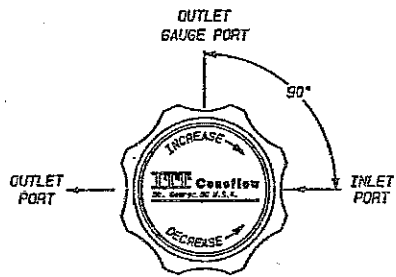
THE REGULATOR IS REASSEMBLED IN THE REVERSE ORDER OF DISASSEMBLY, OBSERVING THE FOLLOWING PRECAUTIONS:

1. Inspect all component parts and replace those worn or damaged with ITT Conoflow replacement parts.
2. All component parts should be cleaned to the cleanliness level required for safe operation with the media used. All parts in the flow stream must be free of particles which could prevent proper seating of the main valve.
3. Place the inner friction bushing (12) (pointed end down) in the center hole in body (10) so it mates with the drill point. Place plug spring (11) on inner friction bushing (12).
4. Lubricate (using Krytox grease) the threads of the seat gland (21). Place the seat gland (21) and main valve seat (22) over valve plug (20) and lower the three components into the center of body (10). Push the valve plug down (so the end engages the inner friction bushing) while screwing the seat gland in hand tight. Make sure the valve plug can move freely down and is pushed back up to the seated position by plug spring (11). Using a special, slot drive spanner tool, tighten the seat gland to 15 ft.lbs.
5. Lightly lubricate with Krytox grease O-Ring (14) and seat it in diaphragm assembly (13). Lubricate seal ring (9) and install it in bonnet (6). Lubricate the bonnet mounting threads and seal ring. Place diaphragm assembly (13) on body (10) making sure the end of valve plug (20) is centered in the relief portion of the diaphragm assembly. Place O-Rings (18 and 19) on the diaphragm so they are concentric. Place diaphragm backup plate (17) on the O-Rings. Place range spring (8) and spring button (7) on the diaphragm backup plate. Put a dab of Krytox grease in the spring button.
6. Screw bonnet (6) and seal ring (9) on the body (10) hand tight. Torque the bonnet three times to 100 ft.lbs. to insure a good seal.
7. Lubricate and install handwheel assembly onto bonnet (6). The handwheel assembly consist of handwheel (5), hole plug (2), adjusting screw (3) and jamnut (4).
8. Install a filter screen (23) in the inlet port of the body.

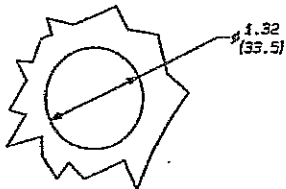
Prior to re-installation, the regulator should be connected to a pressure source with a media compatible with the use of the regulator and pressurized to check for internal and external leakage and operating characteristics. To assure a leak tight main valve, pressurize supply port to 400 PSIG (2.76 MPa) and maintain this pressure for ten (10) minutes.

Item No.	Description	Qty. Req'd	Part No.
1	Handwheel Label	1	76601MY
2	Hole Plug	1	76401SN
3	Adjusting Screw	1	71070S3
4	Jam Nut	1	75850NB
5	Handwheel	1	71450PP
6	Bonnet	1	71200NB
7	Spring Button	1	71550S6
8	Range Spring (0-50 PSIG / 0-0.35 MPa)	1	72161CS
9	Seal Ring	1	71860S6
10	Body-Inlet/Outlet/One-Gauge Port (90°) All 1/4" NPT	1	70001S6EP
11	Plug Spring	1	72720S2EP
12(2)	Inner Friction Bushing	1	73400TF
13(3)(4)	Diaphragm Assembly (Relieving Style)	1	74461S6EP
14(2)(4)	Relief Seat O-Ring	1	77006TF
15	Panel Locknut	1	6017636
16	Panel Mount Washer	1	75361S8
17	Diaphragm Backup Plate	1	72961S6
18(2)	O-Ring (Diaphragm Support)	1	79219BN
19(2)	O-Ring (Diaphragm Support)	1	79215BN
20(4)	Valve Plug	1	73161S6EP
21	Seat Gland	1	73500S6EP
22(2)	Main Valve Seat	1	73661TF
23(3)(4)	Screen (Inlet)	1	73861S6EP
--(1)	Product Label(Not Shown)	1	76604MY

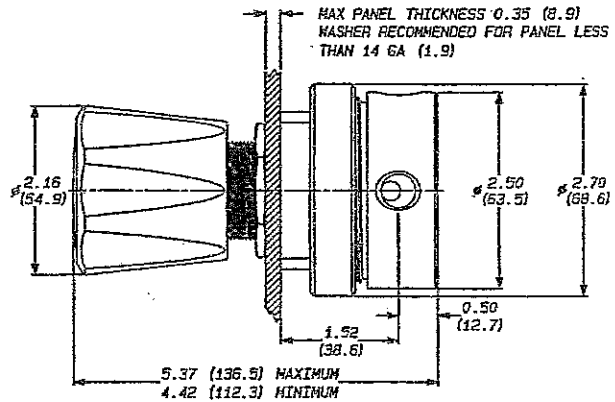
- NOTES:
1. Product Label- When ordering a product label specify complete catalog number so proper nameplate stampings can be made.
 2. Soft Goods Repair Kit-Soft goods can be purchases individually or as a kit under kit number: 80610TF (For all control ranges) Consist of items 12, 14, 18, 19 and 22.
 3. Repair Kit- Repair kit parts can be purchased individually or as a kit under kit number: 81610TF (For all control ranges) Consist of a soft goods kit 80610KF and items 13 and 23.
 4. When using the Non-relieving feature (OPTION CODE "N") proceed using the following instructions:
 - A. Use diaphragm assembly 74162S6 (Non-relieving)
 - B. Use valve plug 73162S6.
 - C. Remove relief seat O-Ring 77006TF
 - D. Use diaphragm backup plate 72962S6



SHOWN WITH 90° OUTLET GAUGE PORT OPTION
SEE CED SHEET FOR ORDERING INFORMATION



PANEL CUT-OUT



() DIMENSIONS IN MILLIMETERS

SHEET METAL CONVERSION:
14 GA = 0.0747 (1.9)

For certified dimensional drawing, refer to HP610-C

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