



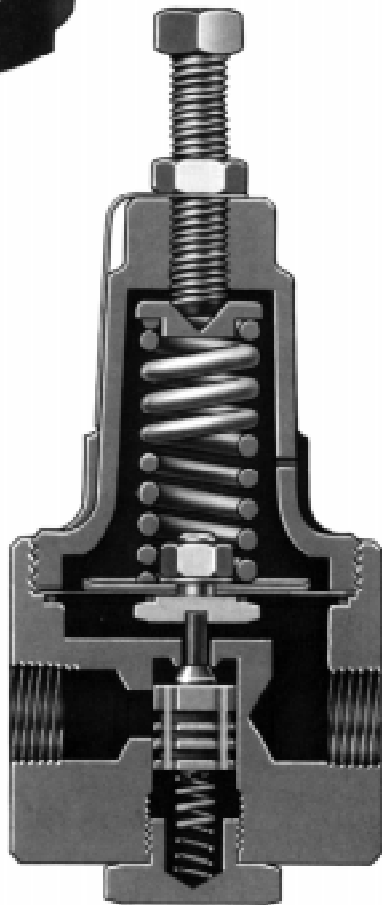
MODEL 4381

PRESSURE REDUCING REGULATOR

The Model 4381 is a stainless steel pressure reducing regulator designed to handle small to mid-capacity flow rates in general, chemical, or cryogenic services. This unit is capable of controlling outlet pressure to a level between 5 and 500 psig (.34 and 34.5 Barg).

FEATURES

- High Stability:** High mass plug allows dampening of high frequency disturbances from inlet or outlet side of regulator.
- Trim Removal:** Easily removeable trim from regulator while in-line.
- Trim Selections:** Seven different trim combinations for metallic or composition seated designs.
- Non-Asbestos Construction:** Standard gasketing of non-asbestos material.



APPLICATIONS

Designed to control a wide range of fluids including industrial gases, air, oil, steam, water, and many chemicals. See Table 1 for more information. Available for cryogenic service.

STANDARD/GENERAL SPECIFICATIONS

Body Size: 1/4" (DN8) or 3/8" (DN10) with NPT female pipe connections.

Body Materials: Standard - Wrought Barstock; ASTM A479, Type 316L stainless steel.

Spring Chamber Materials: Standard - Cast Bronze; ASTM B62, Alloy C83600.
Optional - SST; see *Options -37, -37S, and -60*

Diaphragms: 302 SST, Neoprene, EPDM, TFE coated SST. See *Table 3*.

Trim: SST; metallic seated or composition seated. See *Table 3*.

Gaskets: Standard: non-asbestos; TFE O-rings at diaphragm and pusher plate locations. Applicable temperature range -20 to +400°F (-29° to +205°C).

Operating Temperatures: Standard: -20 to +400°F (-29° to +205°C). See *Tables 2 and 3*.
Cryogenic: See *Option -36*.

Inlet Pressure 1000 psig (69 Barg) maximum.

Range Springs & Maximum Pressure Drop: Standard: Plated Steel.
Cryogenic: SST; See *Option -36*.

Spring Range		Recommended Max Pressure Drop	
		Comp Seat	Metal Seat
psig	(Barg)	psig (Barg)	psig (Barg)
5-30	(.34-2.1)	400 (27.6)	400 (27.6)
20-80	(1.4-5.5)	400 (27.6)	500 (34.5)
70-140	(4.8-9.6)	400 (27.6)	600 (41.0)
130-200	(9.0-13.8)	400 (27.6)	700 (48.3)
1190-300	(13.1-20.7)	400 (27.6)	800 (55.2)
Option -80			
1270-400	(18.6-27.6)	400 (27.6)	600 (41.0)
1360-500	(24.8-34.5)	400 (27.6)	500 (34.5)

¹Not available in SST.

Cv's/Capacities: See *Tables 4, 5, 6, 7 and 8*.

NOTE: Refer to "OPTION SPECIFICATIONS" for alternative designs, and to the "TECHNICAL SPECIFICATIONS" tables for a more complete description of the above specifications.

OPTION SPECIFICATIONS

Option -2: HANDWHEEL. Plastic handwheel on standard unit; iron handwheel for Option-2+80. Utilize for frequent set-point changes.

Option -20: DOME LOADING. Spring chamber and range spring replaced by bronze dome for external pressure loading up to 100 psig (6.9 Barg); 1/4" NPT loading connection. Maximum capacity 0.5 Cv.

Option -22: PANEL MOUNTING. Includes a mounting nut and a handwheel. Not available with Option-80.

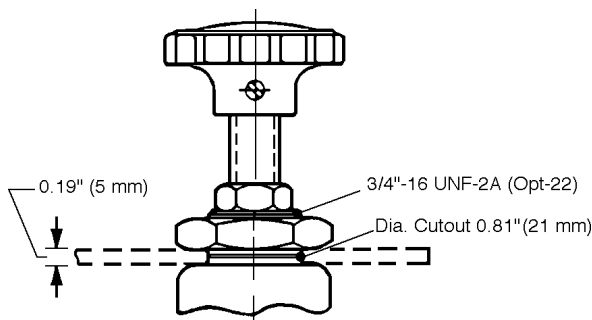


Figure 1: Option -22 Panel Mounting (Handwheel portion is same for Option -2 Handwheel)

Option -36: CRYOGENIC SERVICE. Includes SST body and spring chamber. All wetted internal parts are of SST materials suitable for cryogenic service. The range spring, adjusting screw and locknut are SST; spring button and pressure plate are brass. TFE/SST spring loaded seal for diaphragm and pressure plate. Cleaned and packaged for oxygen service per Cashco Spec. #S-1134. **Suitable for cryogenic fluids from -325°F to +100°F (-198°C to +38°C).** The spring chamber has a 1/8" NPT female connection for purge gas plus a 1/8" NPT drilled drain hole. Mount in horizontal piping with the adjusting screw oriented downwards. Use S1 or S36 trims. Suitable for outlet pressures up to 200 psig (13.8 Barg).

Option -37: ALL SST/CLEAN UNIT FOR LIQUIDS & GASES. 1/4" NPT (DN8) and 3/8" NPT (DN10) sizes only. Uses SST body and spring chamber, S6 trim only. SST T-handle, spring, spring button, pressure plate, nuts and bolts. All wetted and external

castings are electro-polished and unit is cleaned to Cashco Spec. #S-1576. Suitable for fluids of -20° to +100°F (-29° to +38°C); inlet pressures to 250 psig (17.2 Barg) and outlet pressures adjustable from 5 to 80 psig (.34 to 5.5 Barg) with multiple range springs. Complete with 1/4" NPT outlet gauge connection and 1-1/2" (40 mm) diameter SST pressure gauge, 0-100 psig (0-6.9 Barg).

Option -37S: ALL SST/CLEAN UNIT FOR STEAM. Similar to Option -37 except uses S1 trim with graphite diaphragm gasket. Does not include gauge connection or gauge. Suitable for steam/condensate service up to 350°F (170°C), inlet pressures to 100 psig (6.9 Barg) and outlet pressures adjustable from 5 to 80 psig (.34 to 5.5 Barg) with multiple range springs.

Option -55: SPECIAL CLEANING. Cleaned per Cashco Spec. #S-1134. With properly selected materials, cleanliness level suitable for oxygen service.

Option -56: SPECIAL CLEANING. Cleaned per Cashco Spec. #S-1542. Utilize when cleanliness level better than normal is required and unit is NOT FOR OXYGEN SERVICE.

Option -60: SST SPRING CHAMBER. Standard bronze spring chamber is replaced with cast SST material per ASTM A351, Grade CF3M. SST adjusting

screw and locknut. Not for use with Option -80. Use steel range spring.

Option -80: HIGH OUTLET PRESSURE. For controlling outlet pressure between 270 and 500 psig (18.6 to 34.5 Barg). Includes a cast aluminum bronze spring chamber with material per ASTM B-148, Alloy C95500. Not available with Option -22.

Option -85: OUTLET GAUGE TAP. 1/4" NPT female connection on side of body, outlet end, for incorporation of gauge. Gauge not included.

Option -86: OUTLET PRESSURE GAUGE. Liquid filled pressure gauge. SST case, bourdon tube, socket, and movement. 2 1/2" (64 mm) dial size. Glycerine filled. Service application temperature range of -0 to +150°F (-17 to +66°C) maximum. Rear case 1/4" male NPT connection. Dual range scales of PSIG and BAR. Includes Option -85 body gauge tap when specified. DO NOT SPECIFY WITH OPTIONS -36, -37S OR -55.

Spring Range		Nominal ¹	
psig	(Barg)	Gauge Range	(Barg)
5-30	(.34-2.1)	0-55	(0-4)
20-80	(1.4-5.5)	0-140	(0-10)
70-140	(4.8-9.6)	0-220	(0-16)
130-200	(9.0-13.8)	0-350	(0-25)
190-300	(13.1-20.7)	0-550	(0-40)
270-400	(18.6-27.6)	0-550	(0-40)
360-500	(24.8-34.5)	0-850	(0-60)

¹Cashco will purchase gauges to the above specs.; ranges may vary from vendor to vendor.

APPLICATION AND SELECTION

The following procedure will help determine a suitable selection for an application.

STEP 1. FIVE KNOWNNS. The following minimal parameters / information must be available before a selection procedure can begin:

- Service Fluid - What is it? Liquid or gas? SG (std. cond.).
- Inlet Pressure - P₁ (upstream pressure).
- Outlet Pressure - P₂ (downstream pressure). How much can P₂ vary as flow varies?

STEP 2. INLET PRESSURE. Ensure that the actual design inlet pressure and temperature limits do not exceed the limits established in Table 2 and Table 1 for steam service. Both body and spring chamber must comply.

- Desired capacity - Cv, GPM, SCFH; minimum & maximum.
- Fluid temperature - T₁, SG (actual).

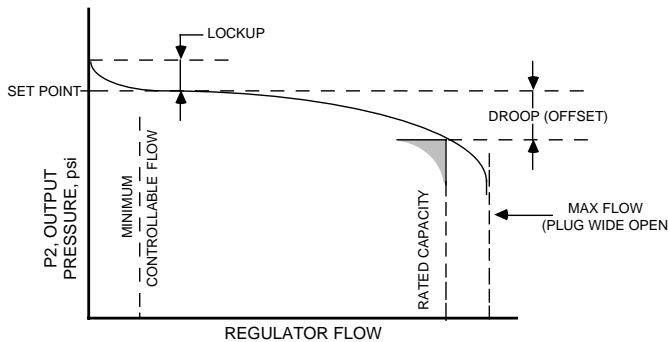
STEP 3. PRESSURE DROP. Check the maximum pressure drop ($P_1 - P_2$) against limits established in the "Standard/General Specifications" section to assure not exceeding.

STEP 4. OUTLET PRESSURE. All self-contained pressure reducing regulators "droop" or "falloff" from a setpoint pressure level at a given flow as the flow rate increases.

This deviation in setpoint is described as "% droop". Droop is expressed on increasing flow, starting from a minimum flow level.

The "% droop" must be known to enter the capacity tables. The acceptable level of setpoint deviation should be known for the min-to-max flow variation.

A regulator may have a setpoint up to 15% below the lower stated range spring level. (Tags will show the standard ranges.) A setpoint above the higher range spring level is not recommended. Setpoint at the upper limit of a range spring is acceptable. If final setpoint is questionable and expected near the upper limit, the next higher range spring should be utilized. Best performance will be obtained when the lowest range spring is utilized.



STEP 5. DIAPHRAGM MATERIAL. Select the diaphragm first considering its pressure-temperature limits. See Tables 2 and 3.

Composition diaphragms will give approximately an extra 50% in capacity over a metal diaphragm at equal levels of droop.

STEP 6. GASKET MATERIAL. Considering the fluid, determine the compatibility of the gasket material. (**NOTE:** Composition diaphragms do not require gasket selection.)

STEP 7. CAPACITY. The five knowns of Step 1 allow proper sizing of the regulator. (Specific gravity tables are required.) With P_1 , P_2 , % droop, flow rate (Cv, GPM, SCFH or #/HR), and diaphragm type in accordance with Step 5, enter the capacity tables and confirm Model 4381 capability. Refer to Tables 4 thru 8 for capacities.

STEP 8. TRIM MATERIAL. Combining diaphragm material choice of Step 5, and the use of Table 3 allows proper selection of "Trim Designation Numbers" for materials and temperatures. See "Standard/General Specifications" and Table 1 for type of service and allowable pressure drops.

Composition trim will initially provide bubble-tight shutoff in clean service and without downstream over-pressurization. Minute leakage should be expected with metal seated designs. A downstream safety relief valve is always recommended. For pressures above 400 psig (27.6 Barg) inlet, it is always required. See Table 8 for sizing and selection of safety relief valve criteria.

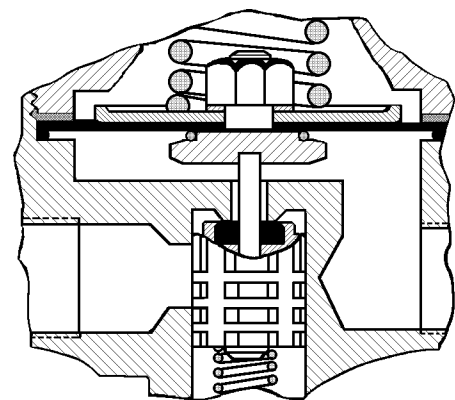


Figure 2: Composition Seat Design

TECHNICAL SPECIFICATIONS

**TABLE 1
APPLICATIONS**

Fluid	Recommended Construction	Trim Designation Number
Air, Inert or Industrial Gases	Metal Seat & Diaphragm	S1
	Metal Seat & Composition Diaphragm	S8
	Composition Seat & Metal Diaphragm	S36
	Composition Seat & Diaphragm	S3, S6
Cryogenic Gases or Liquids	Metal Seat & Diaphragm	S1
	Composition Seat & Metal Diaphragm	S36
Hydrocarbons, Chemicals	Metal Seat & Diaphragm	S1, S0
	Metal Seat & Composition Diaphragm	S8
	Composition Seat & Metal Diaphragm	S36, S9
	Composition Seat & Diaphragm	S3
Water and Condensate	Metal Seat & Diaphragm	S1
	Metal Seat & Composition Diaphragm	S8
	Composition Seat & Metal Diaphragm	S36
	Composition Seat & Diaphragm	S3, S6
Saturated Steam ¹ (240 psig (16.5 Barg) & lower)	Metal Seat & Diaphragm	S1

¹ Pressure drops above 150 psid (10.3 Bard) may cause accelerated trim and body wear.

**TABLE 2
BODY AND SPRING CHAMBER
MAXIMUM PRESSURE WITH TEMPERATURE RATINGS**

Materials of Construction Abbreviation - (Body/Sp. Chmbr.)	Inlet Pressure		Temperature	
	psig	(Barg)	°F	(°C)
SST / BRZ (Std. and Option -80)	1000	(68.9)	-20 to +400	(-29 to +205)
SST / SST (Option -36)	1000	(68.9)	-325 to +100	(-198 to +38)
SST / SST (Option -37)	250	(17.2)	-20 to +100	(-29 to +38)
SST / SST (Option -37S)	100	(6.9)	-20 to +350	(-29 to + 177)
SST / SST (Option -60)	1000	(68.9)	-20 to +400	(-29 to +205)

**TABLE 3
SST TRIM MATERIAL COMBINATIONS**

Part	SST Trim Designation Number						
	S0	S1	S3	S6	S8	S9	S36
Diaphragm	TFE coated 302 SST	302 SST	Neoprene	EPDM	Neoprene	TFE coated 302 SST	302 SST
Piston	316L SST	316L SST	316L SST	316L SST	316L SST	316L SST	316L SST
Seat ¹	316L SST	316L SST	TFE	EPDM	316L SST	TFE	TFE
Spring	302 SST	302 SST	302 SST	302 SST	302 SST	302SST	302 SST
Pusher Plate	316L SST	316L SST	316L SST	316L SST	316L SST	316L SST	316L SST
Body Cap	316L SST	316L SST	316L SST	316L SST	316L SST	316L SST	316L SST
Temperature Range °F (°C)	-20 to +400 (-29 to +205)	-325 to +400 (-198 to +205)	-20 to +180 (-29 to +82)	-20 to +300 (-29 to +149)	-20 to +180 (-29 to +82)	-20 to 400 (-29 to 205)	-325 to +400 (-198 to +205)

¹ The fixed portion of the seat is integral to the body. Indicated seat is the moving portion, and is attached or integral with the piston.

TABLE 4
CAPACITY - Cv
(F_L = 0.95) — 1/4" or 3/8" Sizes

Outlet (P ₂) Pressure (psig)	METAL DIAPHRAGM			COMPOSITION DIAPHRAGM		
	% Droop			% Droop		
	10%	20%	30%	10%	20%	30%
10	.05	.09	.15	.13	.22	.35
25	.13	.24	.33	.35	.47	.50
50	.07	.15	.22	.35	.47	.50
75	.12	.23	.32	.45	.50	.50
100	.11	.21	.30	.39	.49	.50
125	.13	.24	.33	.42	.50	.50
150	.10	.19	.28	.38	.48	.50
200	.11	.21	.30	.35	.47	.50
250	.13	.24	.34	.40	.49	.50
300	.16	.28	.38	.42	.50	.50
350	.15	.27	.37	.30	.45	.50
450	.18	.32	.42	.33	.46	.50
500	.19	.34	.43	.35	.47	.50

TABLE 5
WATER CAPACITY - GPM
S.G. = 1.0 T - 60°F F_L = 0.95
All Sizes - Composition Diaphragm Only

Outlet Flowing Pressure (psig)	Inlet Pressure (psig)	1/4" Body Size			3/8" Body Size		
		10% Droop	20% Droop	30% Droop	10% Droop	20% Droop	30% Droop
5	50	0.9	1.5	2.3	0.9	1.5	2.3
	75	1.1	1.8	2.9	1.1	1.8	2.9
	100	1.3	2.1	HI VEL	1.3	2.1	3.4
	125	1.4	2.4	HI VEL	1.4	2.4	3.8
	150	1.6	2.6	HI VEL	1.6	2.6	HI VEL
	175	1.7	2.9	HI VEL	1.7	2.9	HI VEL
200	1.8	3.1	HI VEL	1.8	3.1	HI VEL	
10	50	2.2	3.0	3.2	2.2	3.0	3.2
	75	2.8	HI VEL	HI VEL	2.8	3.8	4.0
	100	HI VEL	HI VEL	HI VEL	3.3	HI VEL	HI VEL
	125	HI VEL	HI VEL	HI VEL	3.8	HI VEL	HI VEL
	150	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL
15	50	2.1	2.8	3.0	2.1	2.8	3.0
	75	2.7	HI VEL	HI VEL	2.7	3.6	3.9
	100	3.2	HI VEL	HI VEL	3.2	HI VEL	HI VEL
	125	HI VEL	HI VEL	HI VEL	3.7	HI VEL	HI VEL
	150	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL
25	50	2.3	2.5	2.5	2.3	2.5	2.5
	75	3.2	HI VEL	HI VEL	3.2	3.5	3.5
	100	HI VEL	HI VEL	HI VEL	3.9	HI VEL	HI VEL
	125	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL
35	50	1.5	1.9	1.9	1.5	1.9	1.9
	75	2.5	3.1	3.2	2.5	3.1	3.2
	100	3.1	HI VEL	HI VEL	3.1	4.0	4.0
	125	HI VEL	HI VEL	HI VEL	3.7	HI VEL	HI VEL
50	75	1.9	2.4	2.5	1.9	2.4	2.5
	100	2.7	HI VEL	HI VEL	2.7	3.4	3.5
	125	HI VEL	HI VEL	HI VEL	3.3	HI VEL	HI VEL
	150	HI VEL	HI VEL	HI VEL	3.8	HI VEL	HI VEL
	175	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL
75	100	1.8	2.4	2.5	1.8	2.4	2.5
	125	2.5	HI VEL	HI VEL	2.5	3.3	3.5
	150	3.0	HI VEL	HI VEL	3.0	HI VEL	HI VEL
	175	HI VEL	HI VEL	HI VEL	3.5	HI VEL	HI VEL
	200	HI VEL	HI VEL	HI VEL	3.9	HI VEL	HI VEL
100	125	2.0	2.5	2.5	2.0	2.5	2.5
	150	2.8	HI VEL	HI VEL	2.8	3.5	3.5
	175	HI VEL	HI VEL	HI VEL	3.5	HI VEL	HI VEL
	200	HI VEL	HI VEL	HI VEL	4.0	HI VEL	HI VEL
125	150	2.1	2.5	2.5	2.1	2.5	2.5
	175	3.0	HI VEL	HI VEL	3.0	3.5	3.5
	200	HI VEL	HI VEL	HI VEL	3.6	HI VEL	HI VEL

NOTE: Where "HI VEL" is indicated, the flow has reached or exceeded the velocities to the right based on Schedule 40 pipe.

Size	Max. Vel.
1/4"	10 fps
3/8"	12.5 fps

TABLE 6
AIR CAPACITY - SCFH
S.G. = 1.0 T - 60°F F_L - 0.95
All Sizes - Composition Diaphragm Only

Outlet Flowing Pressure (psig)	Inlet Pressure (psig)	1/4" Body Size			3/8" Body Size		
		10% Droop	20% Droop	30% Droop	10% Droop	20% Droop	30% Droop
5	25	200	300	500	200	300	500
	50	300	500	800	300	500	800
	75	400	700	1100	400	700	1100
	100	500	900	1400	500	900	1400
	150	800	1300	2000	800	1300	2000
	200	1000	1700	2700	1000	1700	2700
	300	1500	2500	SONIC	1500	2500	SONIC
	400	1900	3200	SONIC	1900	3200	SONIC
10	25	500	600	700	500	600	700
	50	800	1100	1100	800	1100	1100
	75	1100	1500	1600	1100	1500	1600
	100	1400	1900	2000	1400	1900	2000
	150	2000	2700	2900	2000	2700	2900
	200	2700	3600	3800	2700	3600	3800
	300	3900	SONIC	SONIC	3900	5300	SONIC
	400	SONIC	SONIC	SONIC	5200	6900	SONIC
15	25	400	600	600	400	600	600
	50	800	1100	1100	800	1100	1100
	75	1100	1500	1600	1100	1500	1600
	100	1400	1900	2000	1400	1900	2000
	150	2000	2700	2900	2000	2700	2900
	200	2700	3600	3800	2700	3600	3800
	300	3900	5300	5600	3900	5300	5600
	400	5200	SONIC	SONIC	5200	6900	SONIC
25	50	1000	1100	1100	1000	1100	1100
	75	1400	1600	1600	1400	1600	1600
	100	1800	2000	2000	1800	2000	2000
	150	2600	2900	2900	2600	2900	2900
	200	3400	3800	3800	3400	3800	3800
	300	5000	5600	5600	5000	5600	5600
	400	6600	7400	7400	6600	7400	7400
	500	SONIC	SONIC	SONIC	8300	9200	SONIC
35	50	700	900	900	700	900	900
	75	1200	1500	1500	1200	1500	1500
	100	1600	2000	2000	1600	2000	2000
	150	2300	2900	2900	2300	2900	2900
	200	3000	3700	3800	3000	3700	3800
	300	4400	5500	5600	4400	5500	5600
	400	5800	7200	7400	5800	7200	7400
50	50	7200	9000	9200	7200	9000	9200
	75	1000	1300	1300	1000	1300	1300
	100	1500	1800	1900	1500	1800	1900
	150	2200	2800	2900	2200	2800	2900
	200	2900	3600	3800	2900	3600	3800
	300	4200	5400	5600	4200	5400	5600
	400	5600	7100	7400	5600	7100	7400
500	7000	8800	9200	7000	8800	9200	

NOTE: Where "SONIC" is indicated within the above capacity tables, outlet velocity with Schedule 160 pipe has reached sonic velocity of 1118 fps. Additional flow cannot be obtained, and pipeline velocity is in excess of customary pipe velocity design limits. Flow will be approximately the last indicated value in the column above "Sonic".

TABLE 6 (Cont.)
AIR CAPACITY - SCFH
S.G. = 1.0 T - 60°F F_L - 0.95
All Sizes - Composition Diaphragm Only

Outlet Flowing Pressure (psig)	Inlet Pressure (psig)	1/4" Body Size			3/8" Body Size		
		10% Droop	20% Droop	30% Droop	10% Droop	20% Droop	30% Droop
75	100	1100	1400	1500	1100	1400	1500
	150	1900	2600	2700	1900	2600	2700
	200	2600	3500	3700	2600	3500	3700
	300	3900	5200	5600	3900	5200	5600
	400	5200	6900	7400	5200	6900	7400
	500	6400	8600	9200	6400	8600	9200
	625	8000	10700	11400	8000	10700	11400
100	150	2000	2400	2400	2000	2400	2400
	200	2900	3500	3600	2900	3500	3600
	300	4400	5400	5500	4400	5400	5500
	400	5900	7200	7400	5900	7200	7400
	500	7300	9000	9200	7300	9000	9200
	625	9100	11200	11400	9100	11200	11400
150	200	2400	2900	2900	2400	2900	2900
	300	4400	5300	5300	4400	5300	5300
	400	6100	7200	7200	6100	7200	7200
	500	7700	9100	9100	7700	9100	9100
	625	9600	11400	11400	9600	11400	11400
	750	11500	13700	13700	11500	13700	13700
200	300	3300	4400	4700	3300	4400	4700
	400	4900	6600	6900	4900	6600	6900
	500	6300	8500	9000	6300	8500	9000
	625	7900	10800	11300	7900	10800	11300
	750	9500	13000	13600	9500	13000	13600
	1000	12700	17200	18200	12700	17200	18200
250	300	2800	3500	3600	2800	3500	3600
	400	5000	6300	6400	5000	6300	6400
	500	6700	8500	8600	6700	8500	8600
	625	8700	10900	11100	8700	10900	11100
	750	10600	13300	13500	10600	13300	13500
	1000	14100	17800	18100	14100	17800	18100
300	400	4700	5600	5600	4700	5600	5600
	500	6800	8100	8100	6800	8100	8100
	625	9100	10800	10800	9100	10800	10800
	750	11200	13300	13300	11200	13300	13300
	1000	14100	17800	18100	14100	17800	18100
350	400	2500	3800	4200	2500	3800	4200
	500	4400	6700	7400	4400	6700	7400
	625	6200	9400	10400	6200	9400	10400
	750	7800	11700	13100	7800	11700	13100
450	500	3100	4300	4700	3100	4300	4700
	625	5900	8300	9000	5900	8300	9000
	750	8000	11200	12100	8000	11200	12100

TABLE 7
STEAM - LBS/HR
S.G. = Actual T = Saturated F_L = 0.95
All Sizes - Metal Diaphragm Only

Outlet Flowing Pressure (psig)	Inlet Pressure (psig)	1/4" Body Size			3/8" Body Size		
		10% Droop	20% Droop	30% Droop	10% Droop	20% Droop	30% Droop
5	25	2	3	5	2	3	5
	50	3	6	9	3	6	9
	75	5	8	13	5	8	13
	100	6	10	16	6	10	16
	125	7	12	20	7	12	20
	150	9	15	23	9	15	23
	175	10	17	27	10	17	27
	200	11	19	30	11	19	30
240	13	22	36	13	22	36	
10	25	4	5	8	4	5	8
	50	7	8	14	7	8	14
	75	9	12	20	9	12	20
	100	12	15	25	12	15	25
	125	15	19	31	15	19	31
	150	17	22	36	17	22	36
	175	20	25	42	20	25	42
	200	23	28	47	23	28	47
240	27	33	56	27	33	56	
15	25	4	10	14	4	10	14
	50	8	19	28	8	19	28
	75	12	27	39	12	27	39
	100	15	35	50	15	35	50
	125	19	43	62	19	43	62
	150	22	51	73	22	51	73
	175	25	58	83	25	58	83
	200	28	66	94	28	66	94
240	33	78	111	33	78	111	
25	50	13	25	30	13	25	30
	75	20	38	46	20	38	46
	100	26	49	59	26	49	59
	125	31	60	72	31	60	72
	150	37	71	85	37	71	85
	175	43	83	100	43	83	100
	200	49	94	113	49	94	113
240	58	111	134	58	111	134	
35	50	6	10	15	6	10	15
	75	10	17	26	10	17	26
	100	14	23	35	14	23	35
	125	17	29	43	17	29	43
	150	20	34	51	20	34	51
	175	23	39	58	23	39	58
	200	26	45	67	26	45	67
240	31	53	80	31	53	80	
50	75	10	21	30	10	21	30
	100	15	31	44	15	31	44
	125	19	40	56	19	40	56
	150	22	47	67	22	47	67
	175	26	55	77	26	55	77
	200	29	62	88	29	62	88
240	35	74	104	35	74	104	
75	100	17	32	45	17	32	45
	125	24	46	65	24	46	65
	150	30	58	82	30	58	82
	175	36	69	97	36	69	97
	200	41	79	111	41	79	111
240	50	95	133	50	95	133	
100	125	16	36	50	16	36	50
	150	23	51	72	23	51	72
	175	29	64	90	29	64	90
	200	34	76	107	34	76	107
	240	42	93	130	42	93	130
150	175	19	37	53	19	37	53
	200	27	52	76	27	52	76
	240	38	72	104	38	72	104
200	240	33	60	83	33	60	83

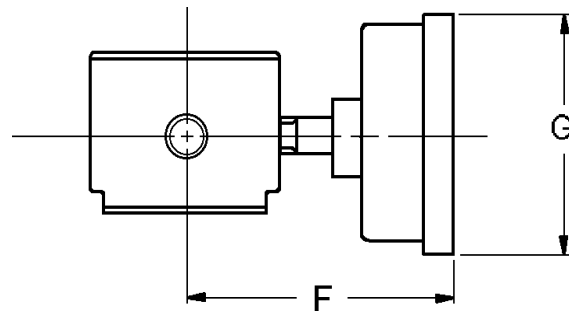
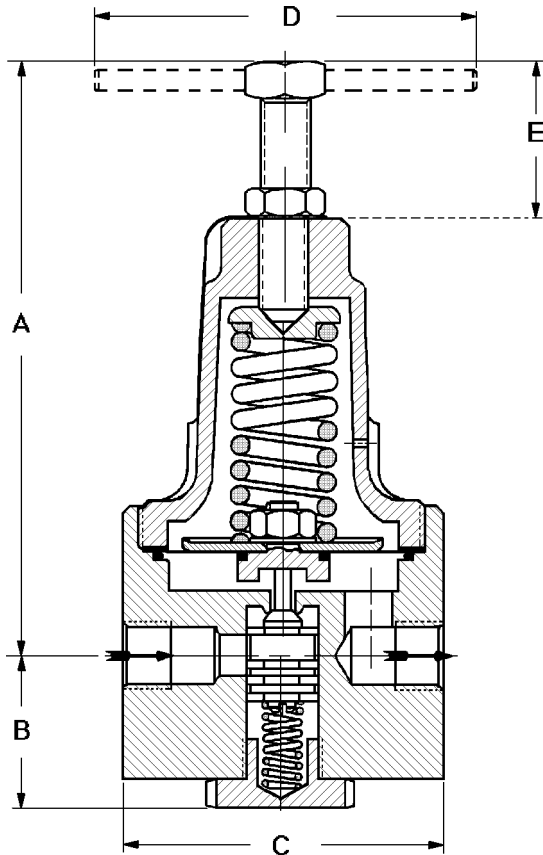
**TABLE 8
OUTLET PRESSURE LIMIT-
SAFETY RELIEF VALVE SIZING & SETPOINT**

Range Spring (psig)	Diaphragm Material	Emergency ¹ Over-Pressure (psig)	Maximum Cv with Valve Plug Wide Open
5-30, 20-80, 70-140, 130-200, 190-300	ALL	1.5 x UVRS ²	0.5
270-400, 360-500	ALL	1.2 x UVRS ²	0.5

¹ "Emergency Over-Pressure" is defined as the level of pressure, which if exceeded, may cause internal mechanical damage.

² UVRS - "Upper Value of Range Spring"; i.e. 130-200 psig (9 -13.8 Barg) range spring, value would be 200 psig (13.8 Barg).

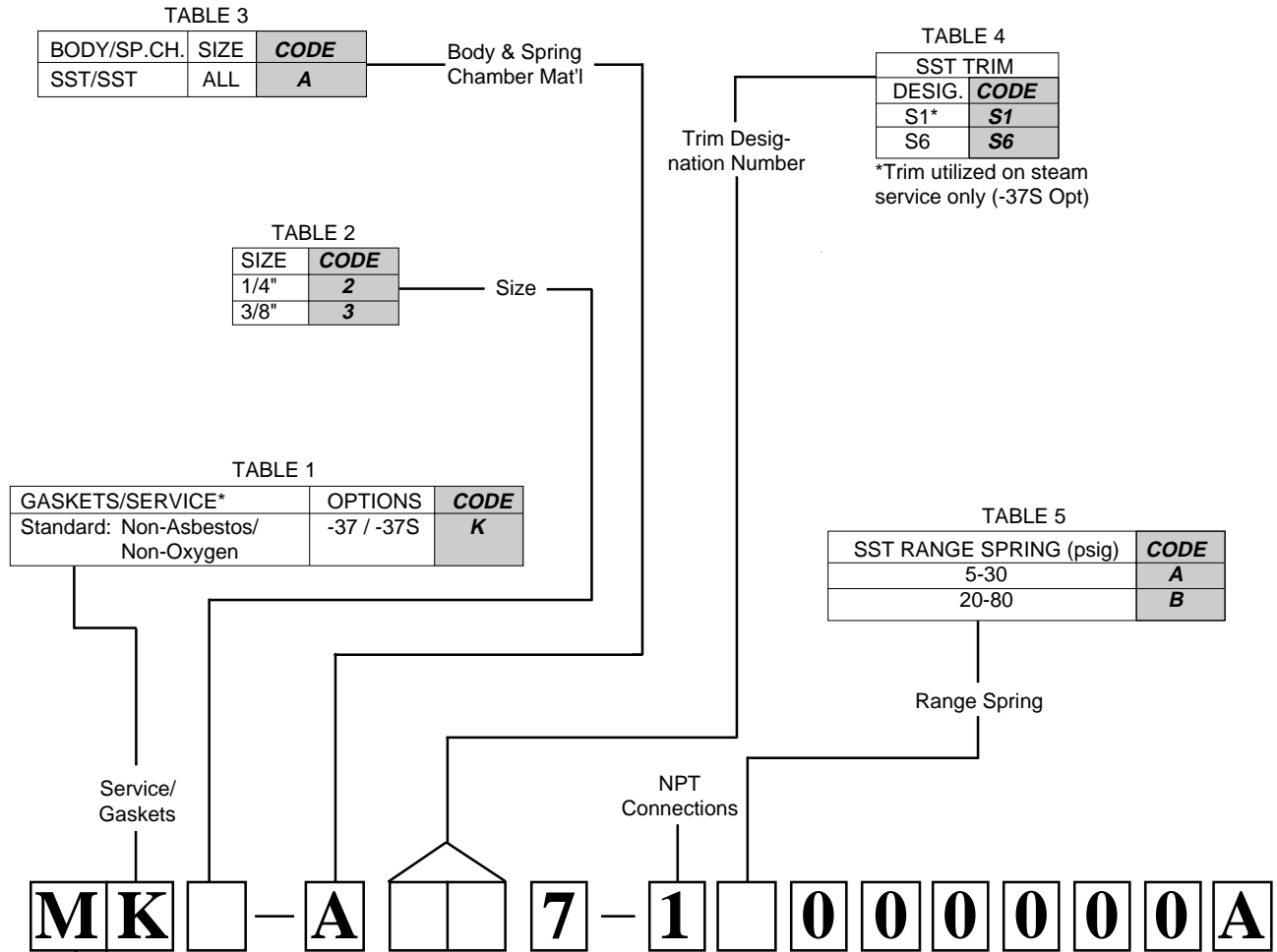
DIMENSIONS AND WEIGHTS



Opt-86 Outlet Pressure Gauge

ENGLISH UNITS (Inches)								
Body Size 1/4" & 3/8"	A	B	C	D	E	F	G	Shipping Weight
Standard	5.12	1.22	2.50	—	—	—	—	3 lbs.
-2 (Handwheel)	5.56	1.22	2.50	—	—	—	—	
-20 (Dome Load)	2.00	1.22	2.50	—	—	—	—	
-22 (Panel Mount)	5.56	1.22	2.50	—	2.22	—	—	5 lbs
-2+80 (Handwheel + High Outlet Pressure)	8.19	1.22	2.50	—	2.38	—	—	
-37/-37S (Food & Pharmaceutical)	4.69	1.22	2.50	3.50	—	3.62	2.88	3 lbs
-80 (High Outlet Pressure)	7.44	1.22	2.50	—	—	—	—	5 lbs.
METRIC UNITS (mm)								
Body Size DN8 & DN10	A	B	C	D	E	F	G	Shipping Weight
Standard	130	31	64	—	—	—	—	1.36 kgs.
-2 (Handwheel)	141	31	64	—	—	—	—	
-20 (Dome Load)	51	31	64	—	—	—	—	
-22 (Panel Mount)	141	31	64	—	56	—	—	2.3 kgs.
-2+80 (Handwheel + High Outlet Pressure)	208	31	64	—	60	—	—	
-37/-37S (Food & Pharmaceutical)	119	31	64	89	—	92	73	1.36 kgs.
-80 (High Outlet Pressure)	189	31	64	—	—	—	—	2.3 kgs.

PRODUCT CODE 12/01/91



MODEL "4381" PRESSURE REDUCING REGULATOR FOR THE FOOD AND PHARMACEUTICAL INDUSTRY

PRODUCT CODE 10/30/92

TABLE 3

BODY/SP CH	OPT.	CODE
SST/BRZ	STD OR -80	8
SST/SST*	-36, -60	A

*Utilized w/cryo -36 Opt

Body & Spring Chamber Material

TABLE 2

SIZE	CODE
1/4"	2
3/8"	3

Size

TABLE 1

SERVICE*	GASKETS	OPTIONS	CODE
Basic (Above -20°F)	Std: Non-Asbestos	—	B
Cryogenic (Below -20°F)	Non-Asbestos TFE/SST	-36**	C

*Refer to Tech Bulletin for complete temperature range.

**Cryo. Const. includes Special Cleaning #S-1134 (-55 Opt).

Service & Gaskets

NPT Conn.

Range Spring

TABLE 4

SST TRIM	
DESIG.	CODE
S0	S0
S1*	S1
S3	S3
S6	S6
S8	S8
S9	S9
S36*	36

* Suitable for -36 Opt.

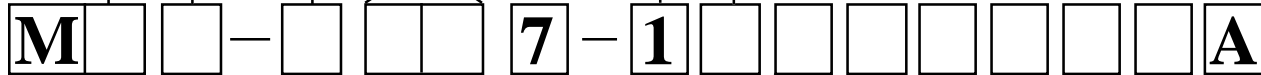
Trim Designation Number

TABLE 5

STANDARD		CRYO -36 OPT.	
STEEL RANGE	CODE	SST RANGE	CODE
5-30	1	5-30	A
20-80	2	20-80	B
70-140	3	70-140	C
130-200	4	130-200	D
190-300	5	-20 OPT**	Y
270-400*	6	Dome Loaded	
360-500*	7		

*Utilize w/-80 Opt. Must specify in Table 6

** Must specify in Table 6.



MODEL "4381" PRESSURE REDUCING REGULATOR

Options

ASSIGNMENT OF "OPTION" CODES

- When ordering a valve per one of Cashco's special drawings, the code "X" and the 5-digit number following override all other options. Otherwise, proceed with the following.
- NUMERIC digits assigned first in "ascending" order.
- ALPHA designations are assigned second (excluding the "X" in "alphabetical order".
- Left justify.
- Add "0" to all unused squares.
- If insufficient quantity of squares, consult factory for proper code.

TABLE 6

DESCRIPTION	OPTION	CODE
SPECIAL CONSTRUCTION	—	X
HANDWHEEL	-2	2
AIR PRESSURE (DOME) LOADED	-20	B
PANEL MOUNTING	-22	C
Not available with -80 Opt.		
SPECIAL CLEANING: Per Cashco Spec #S-1134. W/properly selected materials, this procedure suitable for oxygen service.	-55	M
SPECIAL CLEANING: Per Cashco Spec. #S-1542	-56	N
HIGH PRESSURE SP.CH. CONST.	-80	U
Not available with -22 Opt.		
OUTLET GAUGE TAP-1/4" NPT (No Gauge)	-85	V
OUTLET PRESSURE GAUGE	-86	Y