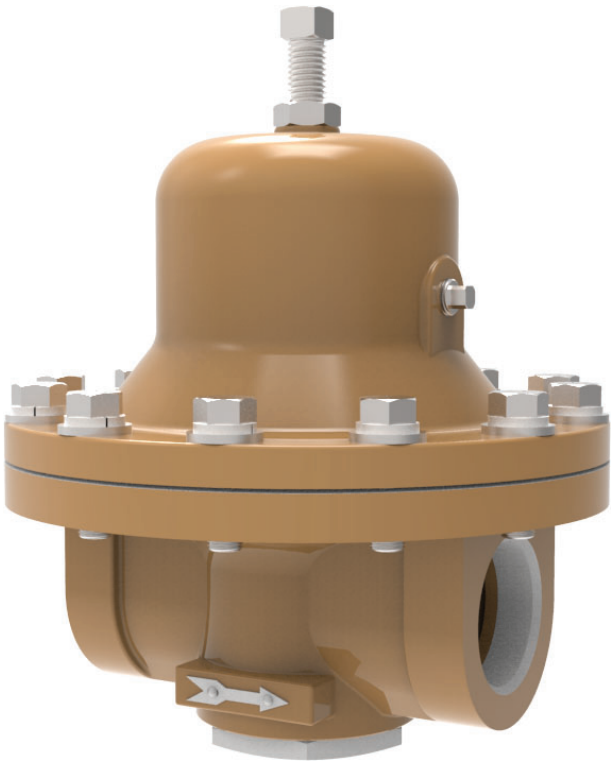
ISO Registered Company

TECHNICAL BULLETIN

DL-TB
09-21

# MODEL DL

## PRESSURE REDUCING REGULATOR BODY SIZES 1-1/2" & 2"(DN40 & 50)



MODEL DL

The Model DL is a basic, general service, self-contained regulator. Unit handles inlet pressure of up to 740 psig (51 Barg) and outlet pressures from 2-150 psig (.14-10.3 Barg) in multiple spring ranges. Model DL is the Cashco reducing regulator product utilized for the majority of industrial applications. A time-proven product with 80+ years of experience.

## FEATURES

**Versatile:** Four body materials and twenty two trim material combinations to select from.

**Tight Shutoff:** Composition seats of PTFE, Buna-N (NBR), FKM or EPDM available.

**Capacity:** Handles mid-range flow rates on a line size basis.

**Pressure Drop:** Handles mid-range pressure drops while maintaining good stability.

**Flow-to-Close Plug:** Incorporates the typical reducing regulator internal design.

**Incorporated Cylinder:** Plug is guided through its travel by the cylinder, which also serves to block harmful debris from entry to the seating surfaces.

**Overpressure Travel Stop:** In the event of downstream overpressurization, diaphragm over-travel is restricted by mechanical stops.

## APPLICATIONS

Used in all types of fluids, including sour gas, industrial gases, chemicals, as well as the common industrial fluids - water, oil, steam and compressed air.

## STANDARD/GENERAL SPECIFICATIONS

**Line Sizes:** 1-1/2" (DN40) and 2" (DN50).

**End Connections:**
NPT: Female Pipe Threads.
Flanged: Mates with ASME 150, ASME 300, or PN40 flanged end connections. 14" (356 mm) face to face dimension only.
Option-31: BSPT Tapered Thread.
Option-31P: BSPP Parallel Thread.
Opt-32: Extended Pipe Nipples.

**Body/Spring Chamber** DI/DI, BRZ/DI, CS/DI, SST/DI, BRZ/BRZ, CS/CS, SST/CS, and SST/SST

**Material Combinations**:
DI = Cast Ductile Iron
ASTM A395 60-40-18
CS = Cast Carbon Steel
ASTM A352 LCC
BRZ = Cast Bronze
ASTM B62 C83600
SST = Cast Stainless Steel
ASTM A351 CF8M

**Body Cap Materials**
Brass: For use with bronze bodies.
ASTM B16 C36000

Stainless Steel: For use with all other body materials.
ASTM A479 316/316L

**Inlet Pressure:** Up to 740 psig (51 Barg). See Table 1 for pressure specifications.

**Gaskets** Standard: Gylon 3502 gasket for use with metal diaphragms only. PTFE cylinder gasket.

**Range Springs**
Carbon Steel: For use with carbon steel and ductile iron spring chambers.

Stainless Steel: For use with bronze and stainless steel spring chambers.

**Flange Bolting** Standard: 304 Stainless Steel
ASTM F593 Group 1

**Painting** Standard: All non-corrosion resistant body, spring chamber/cover dome materials are epoxy coated per Cashco specification S-1606.

**Ported Spring Chamber:** Spring chamber port threaded 1/4" (DN8) NPT for use with vented plug or piping to a remote location. Removable vented plug included. Not suitable for capturing flammable or lethal media.

**Temperature:** See Tables 1, 3, 4(a), and 4(b) for temperature limitations.

**Outlet Pressure:** Standard: 2-150 psig (0.14 - 10.3 Barg) in four range springs. See Table 2.

**Pressure Drop:** Up to 150 psid (10.3 Bard). Dependent on range spring selection. See Table 2.

**Trim Designs:** Metal or composition seats with brass or stainless steel materials. Metal or composition diaphragms. See Tables 3, 4(a), and 4(b).

**Capacities:** Up to 10 Cv. See Table 7 for Cv vs. outlet pressure vs. body size vs. diaphragm material.

Flow Tables
Water - See Table 8.
Compressed Air - See Table 9.
Steam - See Table 10.

See Table 6 for wide open capacities for use for safety relief sizing.

**Seat Leakage:**
Composition (soft) seated: Meets ANSI/FCI 70-3 Class VI.

Metal Seated: Meets or exceeds ANSI/ FCI 70-3 Class IV.

**Spring Chamber Vented Plug:** 1/4" (DN8) NPT polyethylene vented plug to allow for spring chamber displacement. Use stainless steel vented plug (Opt-25S) for cryogenic service.

## OPTION SPECIFICATIONS

**Option -3:** HANDWHEEL & LOCKING LEVER: For use when outlet pressure setting changes are frequent.

**Option -25S:** STAINLESS STEEL VENTED PLUG: 1/4" (DN8) NPT stainless steel vented plug to allow spring chamber displacement. Required for cryogenic service.

**Option -31:** BSPT END CONNECTIONS: British Standard Pipe Taper threads per ISO 7-1.

**Option -31P:** BSPP END CONNECTIONS: British Standard Pipe Parallel threads per ISO 7-1. Not available on 1-1/2” (DN40) line size.

**Option -32:** PLAIN END EXTENDED NIPPLES: Schedule 80 plain end extended pipe nipples available for carbon steel or stainless steel bodies. Not available with cryogenic construction.

**NACE MR0175** Internal wetted portions meet NACE standard MR0175, when exterior of the regulator is not directly exposed to a sour gas environment, buried, insulated, or otherwise denied direct atmospheric exposure. Carbon steel and stainless steel body/spring chamber materials with S40, S40B, S40C, S40T, and S40V trims only.

**Option -45:** CRYOGENIC CONSTRUCTION: Bronze or stainless steel body/spring chamber materials only. Spring chamber includes condensate drain hole near adjusting screw. Requires stainless steel vented plug (Opt-25S). Assembled with lubricants suitable for cryogenic service. Special cleaning not included. Requires spring chamber oriented downwards in horizontal piping installations.

**Option -55:** OXYGEN CLEANING: Cleaning per Cashco specification S-1134 for oxygen service. Includes sealed enclosure bag and notification tag. Stainless steel or bronze body/spring chamber materials only.

**Option -56:** NON-OXYGEN CLEANING: Cleaning per Cashco specification S-1542. Cleaning identical to that of Opt-55, but not labeled nor suitable for oxygen service. For use with all body/spring chamber materials.

**Option -87:** GAUGE PORTS: Includes two 1/8” NPT (DN6) body taps. One located on the inlet, one on the outlet for gauge connections. Plugs included.

**ATEX 2014/34/EU:** Declaration of Conformity certificate and appropriate nameplate markings available. See Model D IOM for more details.

**PED 2014/68 /EU:** Declaration of Conformity certificate available up to Hazard Category II.

# TECHNICAL SPECIFICATIONS

## TABLE 1
## MODEL D DESIGN PRESSURE VS. TEMPERATURE RATINGS
## RATINGS PER ASME B31.3

| End Connection | Materials of Construction (Body/Spring Chamber) | Design Conditions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Inlet | | | | Outlet | | | |
| | | Containment Pressure | | Temperature | | Containment Pressure | | Temperature | |
| | | PSIG | (Barg) | °F | (°C) | PSIG | (Barg) | °F | (°C) |
| NPT, BSPT, BSPP, & PE NIPPLES | DI/DI | 740 | (51.0) | -20 to +100 | (-29 to +40) | 175 | (12.1) | -20 to +100 | (-29 to +40) |
| | | 700 | (48.2) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 660 | (45.5) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 625 | (43.1) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 585 | (40.3) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 550 | (37.9) | 600 | (316) | 175 | (12.1) | 600 | (316) |
| | BRZ/DI | 740 | (51.0) | -20 to +100 | (-29 to +40) | 175 | (12.1) | -20 to +100 | (-29 to +40) |
| | | 730 | (50.3) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 640 | (44.1) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 585 | (40.3) | 400 | (200) | 175 | (12.1) | 400 | (200) |
| | BRZ/BRZ | 740 | (51.0) | -325 to +150 | (-198 to +65) | 175 | (12.1) | -325 to +150 | (-198 to +65) |
| | | 730 | (50.3) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 680 | (46.8) | 250 | (121) | 175 | (12.1) | 250 | (121) |
| | | 640 | (44.1) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 610 | (42.0) | 350 | (177) | 175 | (12.1) | 350 | (177) |
| | | 585 | (40.3) | 400 | (200) | 175 | (12.1) | 400 | (200) |
| | CS/DI, CS/CS, SST/CS, & SST/DI | 740 | (51.0) | -20 to +200 | (-29 to +93) | 175 | (12.1) | -20 to +200 | (-29 to +93) |
| | | 740 | (51.0) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 740 | (51.0) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 740 | (51.0) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 740 | (51.0) | 600 | (316) | 175 | (12.1) | 600 | (316) |
| | SST/SST | 740 | (51.0) | -325 to +200 | (-198 to +93) | 175 | (12.1) | -325 to +200 | (-198 to +93) |
| | | 740 | (51.0) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 740 | (51.0) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 740 | (51.0) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 740 | (51.0) | 600 | (316) | 175 | (12.1) | 600 | (316) |
| | CS/BRZ | 740 | (51.0) | -20 to +150 | (-29 to +65) | 175 | (12.1) | -20 to +150 | (-29 to +65) |
| | | 740 | (51.0) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 740 | (51.0) | 250 | (121) | 175 | (12.1) | 250 | (121) |
| | | 740 | (51.0) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 740 | (51.0) | 350 | (177) | 175 | (12.1) | 350 | (177) |
| | | 740 | (51.0) | 400 | (200) | 175 | (12.1) | 400 | (200) |
| | DI/BRZ | 740 | (51.0) | -20 to +100 | (-29 to +40) | 175 | (12.1) | -20 to +100 | (-29 to +40) |
| | | 700 | (48.2) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 660 | (45.5) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 625 | (43.1) | 400 | (200) | 175 | (12.1) | 400 | (200) |
| | SST/BRZ | 740 | (51.0) | -325 to +150 | (-198 to +65) | 175 | (12.1) | -325 to +150 | (-198 to +65) |
| | | 740 | (51.0) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 740 | (51.0) | 250 | (121) | 175 | (12.1) | 250 | (121) |
| | | 740 | (51.0) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 740 | (51.0) | 350 | (177) | 175 | (12.1) | 350 | (177) |
| | | 740 | (51.0) | 400 | (200) | 175 | (12.1) | 400 | (200) |

NOTES:

1.) CS can be either ASTM A216 WCB or ASTM A352 LCC. With properly selected materials, valves using ASTM A352 LCC have a minimum teperature rating of -50°F (-46°C).

2.) Pressure rating shall not exceed 375 psig (26 Barg) when body is stainless steel and process medium is oxygen. Temperature rating shall not exceed 400°F (200°C) for all above materials when the process medium is oxygen. (CGA G-4.4)

## TABLE 1 (Continued)
## MODEL D DESIGN PRESSURE VS. TEMPERATURE RATINGS
## RATINGS PER ASME B31.3

| End Connection | Materials of Construction (Body/Spring Chamber) | Design Conditions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Inlet | | | | Outlet | | | |
| | | Containment Pressure | | Temperature | | Containment Pressure | | Temperature | |
| | | PSIG | (Barg) | °F | (°C) | PSIG | (Barg) | °F | (°C) |
| Class 150 Flanged | CS/CS | 285 | (19.6) | -50 to +100 | (-45 to +38) | 175 | (12.1) | -20 to +100 | (-29 to +38) |
| | | 260 | (17.9) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 230 | (15.8) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 200 | (13.7) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 170 | (11.7) | 500 | (260) | 170 | (11.7) | 500 | (260) |
| | | 140 | (9.6) | 600 | (316) | 140 | (9.6) | 600 | (316) |
| | SST/SST | 275 | (19.0) | -325 to +100 | (-198 to +38) | 175 | (12.1) | -325 to +100 | (-198 to +38) |
| | | 235 | (16.2) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 215 | (14.8) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 195 | (13.4) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 170 | (11.7) | 500 | (260) | 170 | (11.7) | 500 | (260) |
| | | 140 | (9.6) | 600 | (316) | 140 | (9.6) | 600 | (316) |
| | CS/BRZ | 285 | (19.6) | -20 to +100 | (-29 to +38) | 175 | (12.1) | -20 to +100 | (-29 to +38) |
| | | 260 | (17.9) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 230 | (15.8) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 200 | (13.7) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | SST/BRZ | 275 | (19.0) | -325 to +100 | (-198 to +38) | 175 | (12.1) | -325 to +100 | (-198 to +38) |
| | | 235 | (16.2) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 215 | (14.8) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 195 | (13.4) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| Class 300 Flanged | CS/CS | 740 | (51.0) | -50 to +100 | (-45 to +38) | 175 | (12.1) | -20 to +100 | (-29 to +38) |
| | | 680 | (46.8) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 655 | (45.1) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 635 | (43.7) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 605 | (41.7) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 570 | (39.3) | 600 | (316) | 175 | (12.1) | 600 | (316) |
| | SST/SST | 720 | (49.6) | -325 to +100 | (-198 to +38) | 175 | (12.1) | -325 to +100 | (-198 to +38) |
| | | 620 | (42.7) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 560 | (38.6) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 515 | (35.5) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 480 | (33.1) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 450 | (31.0) | 600 | (316) | 175 | (12.1) | 600 | (316) |
| | CS/BRZ | 740 | (51.0) | -20 to +100 | (-29 to +38) | 175 | (12.1) | -20 to +100 | (-29 to +38) |
| | | 680 | (46.8) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 655 | (45.1) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 635 | (43.7) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | SST/BRZ | 720 | (49.6) | -325 to +100 | (-198 to +38) | 175 | (12.1) | -325 to +100 | (-198 to +38) |
| | | 620 | (42.7) | 200 | (93) | 175 | (12.1) | 200 | (93) |
| | | 560 | (38.6) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 515 | (35.5) | 400 | (204) | 175 | (12.1) | 400 | (204) |

NOTES:

1.) CS can be either ASTM A216 WCB or ASTM A352 LCC. With properly selected materials, valves using ASTM A352 LCC have a minimum temperature rating of -50°F (-46°C).

2.) Pressure rating shall not exceed 375 psig (26 Barg) when body is stainless steel and process medium is oxygen. Temperature rating shall not exceed 400°F (200°C) for all above materials when the process medium is oxygen. (CGA G-4.4)

## TABLE 1 (Continued)
## MODEL D DESIGN PRESSURE VS. TEMPERATURE RATINGS
## RATINGS PER ASME B31.3

| End Connection | Materials of Construction (Body/Spring Chamber) | Design Conditions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Inlet | | | | Outlet | | | |
| | | Containment Pressure | | Temperature | | Containment Pressure | | Temperature | |
| | | PSIG | (Barg) | °F | (°C) | PSIG | (Barg) | °F | (°C) |
| PN40 Flanged | CS/CS | 580 | (40.0) | -50 to +392 | (-45 to +200) | 175 | (12.1) | -20 to +392 | (-29 to +200) |
| | | 565 | (38.2) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 490 | (34.1) | 600 | (315) | 175 | (12.1) | 600 | (315) |
| | SST/SST | 580 | (40.0) | -325 to +300 | (-198 to +149) | 175 | (12.1) | -325 to +300 | (-198 to +149) |
| | | 535 | (37.2) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | | 505 | (35.0) | 500 | (260) | 175 | (12.1) | 500 | (260) |
| | | 480 | (33.2) | 600 | (315) | 175 | (12.1) | 600 | (315) |
| | CS/BRZ | 580 | (40.0) | -20 to +250 | (-29 to +121) | 175 | (12.1) | -20 to +250 | (-29 to +121) |
| | | 580 | (40.0) | 302 | (150) | 175 | (12.1) | 300 | (149) |
| | | 580 | (40.0) | 392 | (200) | 175 | (12.1) | 392 | (200) |
| | | 575 | (39.9) | 400 | (204) | 175 | (12.1) | 400 | (204) |
| | SST/BRZ | 580 | (40.0) | -325 to +250 | (-198 to +121) | 175 | (12.1) | -325 to +250 | (-198 to +121) |
| | | 580 | (40.0) | 300 | (149) | 175 | (12.1) | 300 | (149) |
| | | 535 | (37.2) | 400 | (204) | 175 | (12.1) | 400 | (204) |

NOTES:

1.) CS can be either ASTM A216 WCB or ASTM A352 LCC. With properly selected materials, valves using ASTM A352 LCC have a minimum temperature rating of -50°F (-46°C).

2.) Pressure rating shall not exceed 375 psig (26 Barg) when body is stainless steel and process medium is oxygen. Temperature rating shall not exceed 400°F (200°C) for all above materials when the process medium is oxygen. (CGA G-4.4)

**TABLE 2**
**RANGE SPRINGS WITH RECOMMENDED PRESSURE DROPS**

| Range Spring | | Recommended Max. Pressure Drop | | | | | |
|---|---|---|---|---|---|---|---|
| | | Liquid Service (Non-Cavitating) | | Gaseous Service | | Steam Service[1] | |
| psig | (Barg) | psid | (Bard) | psid | (Bard) | psid | (Bard) |
| 2-15 | (0.14-1.03) | 100 | (6.9) | 125 | (8.6) | 100 | (6.9) |
| 10-40 | (0.69-2.8) | 125 | (8.6) | 150 | (10.3) | 125 | (8.6) |
| 30-80 | (2.1-5.5) | 150 | (10.3) | 150 | (10.3) | 150 | (10.3) |
| 70-150 | (4.8-10.3) | 150 | (10.3) | 150 | (10.3) | 150 | (10.3) |
| NOTES: 1) B0 and B1 trim: 100 psid (3.4 Bard) max when used on steam service. | | | | | | | |

**TABLE 3**
**BRASS TRIM MATERIAL COMBINATIONS**

| PART | BRASS TRIM # | | | | | | |
|---|---|---|---|---|---|---|---|
| | METAL SEAT | | COMPOSITION SEAT | | | | |
| | B0[1] | B1[1] | B2 (Air/H2O) | B4 | B5 (Oxygen) | BB (Fuel-Oils) | BK |
| Diaphragm | Phos Brz | 302 SST | BC | FKM | Phos Brz | NBR | FKM |
| Diaphgragm Gasket | Gylon 3502 | Gylon 3502 | None | None | Gylon 3502 | None | None |
| Cylinder | Brass | Brass | Brass | Brass | Brass | Brass | Brass |
| Cylinder Gasket | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE |
| Piston | Brass | Brass | Brass | Brass | Brass | Brass | Brass |
| Seat Disc | None (Metal) | None (Metal) | NBR | PTFE | PTFE | NBR | FKM |
| Piston Spring | 302 SST | 302 SST | Phos. Brz | 302 SST | Phos Brz | Phos Brz | Phos Brz |
| Pusher Plate | Brass | Brass | Brass | Brass | Brass | Brass | Brass |
| Temperature Range | -325 to +200°F<br>-198 to +93°C | -325 to +400°F<br>-198 to +204°C | -20 to +200°F<br>-29 to 93°C | 0 to +400°F<br>-18 to +204°C | -325 to +200°F<br>-198 to +93°C | -20 to 200°F<br>-29 to +93°C | 0 to +200°F<br>-18 to +93°C |
| NOTES:<br>1) B0 and B1 trim: 100 psid (6.9 Bard) max when used on steam service.<br>2) Metal seated trim is not recommended on any service where the flow will be dead ended down stream of the pressure reducing regulator. | | | | | | | |

**= Most common use - See Table 5**

**TABLE 4(a)**
**STAINLESS STEEL TRIM MATERIAL COMBINATION – METAL SEAT**

| PART | STAINLESS STEEL TRIM# | | | | | |
|---|---|---|---|---|---|---|
| | S0 | S1 | S2 (Steam) | S2N | S40 (NACE) | S40B (NACE) |
| Diaphragm | TFE Coated 302 SST | 302 SST | 302 SST | BC | BC | Low Temp BC |
| Diaphgragm Gasket | Gylon 3502 | Gylon 3502 | Gylon 3502 | None | None | None |
| Cylinder | 316 SST | 316 SST | 416 SST | 416 SST | 316 SST | 316 SST |
| Cylinder Gasket | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE |
| Piston | 316 SST | 316 SST | 416 SST | 416 SST | 316 SST | 316 SST |
| Piston Spring | 302 SST | 302 SST | 302 SST | 302 SST | Inconel X-750 | Inconel X-750 |
| Pusher Plate | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST |
| Temperature Range | -325 to +400°F<br>-198 to +204°C | | -20 to +400°F<br>-29 to +93°C | -20 to +200°F<br>-29 to +93°C | | -65 to +250°F<br>-54 to +121°C |
| NOTES:<br>1) Metal seated trim is not recommended on any service where the flow will be dead ended down stream of the pressure reducing regulator. | | | | | | |

**= Most common use - See Table 5**

**TABLE 4(b)**
**MONEL & STAINLESS STEEL TRIM MATERIAL COMBINATION – COMPOSITION (SOFT) SEAT**

| PART | STAINLESS STEEL TRIM# | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **S3** | **S4** | **S4N** (Air/H2O) | **S6** | **S9** | **S36** | **S40T** (NACE) | **S40V** (NACE) | **S40C** (NACE) | **SB** | **SK** |
| Diaphragm | BC | BC | BC | EPDM | TFE Coated 302 SST | 302 SST | FKM | FKM | Low Temp BC | NBR | FKM |
| Diaphgragm Gasket | None | None | None | None | Gylon 3502 | Gylon 3502 | None | None | None | None | None |
| Cylinder | 316 SST | 416 SST | 416 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 416 SST | 316 SST |
| Cylinder Gasket | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE | PTFE |
| Piston | 316 SST | 416 SST | 416 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 416 SST | 316 SST |
| Seat Disc | PTFE | PTFE | NBR | EPR | PTFE | PTFE | PTFE | FKM | PTFE | NBR | FKM |
| Piston Spring | 302 SST | 302 SST | 302 SST | 302 SST | 302 SST | 302 SST | Inconel X-750 | Inconel X-750 | Inconel X-750 | 302 SST | 302 SST |
| Pusher Plate | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST | 316 SST |
| Temperature Range | -20 to +200°F<br>-29 to +93°C | | | -60 to +300°F<br>-51 to +149°C | -325 to +400°F<br>-198 to +204°C | | -0 to +400°F<br>-18 to +204°C | | -65 to +250°F<br>-54 to +121°C | -20 to +200F<br>-29 to +93C) | -20 to +300°F<br>-29 to +149°C |

**ABBREVIATIONS**
NBR = Buna-N BC = Neoprene EPDM = Ethylene Propylene Diene EPR = Ethylene Propylene PTFE = Polytetrafluoroethylene
FK = Fluorosilicone FKM = Fluorocarbon Elastomer Phos Brz = Phosphor Bronze

**TABLE 5**
**APPLICATIONS**

| FLUID | RECOMMENDED CONSTRUCTION | TRIM DESIGNATION# |
|---|---|---|
| Air or Inert Gases | Composition Seat and Diaphragm<br>Metal Seat and Composition Diaphragm<br>Metal Seat and Diaphragm | BB, BK, **B2**, B4, SB, SK, S4N<br>S2N<br>B0, B1 |
| Oxygen | Metal Seat and Diaphragm<br>Composition Seat and Metal Diaphragm<br>Composition Seat and Diaphragm | S1<br>**B5**, S36<br>BK, **B4**, **S40T**, SK |
| Chemicals | Metal Seat and Diaphragm<br>Metal Seat and Composition Diaphragm<br>Composition Seat and Diaphragm<br>TFE Seat and Metal Diaphragm | S1, S2, S0<br>S40<br>S3, S4, S4N, SB, SK, S40T<br>S6, S9 |
| Sour Gas | Metal Seat and Composition Diaphragm<br>Composition Seat and Diaphragm | S40, S40B<br>S40T, S40V, S40C |
| Fuel Oil[1] | Compossition Seat and Diaphragm | **BB**, B4, **SB**, S3, S4, S4N |
| Hydrocarbon Gas or Liquids [1] | Composition Seat and Diaphragm | BB, B4, SK, S3, S4, S4N |
| Saturated Steam, Low Pressures up to 50 psig (3.4 Barg) | Metal Seat and Diaphragm | **S2**, S1, S6, B0 |
| Saturated Steam, Pressures up to 100 psig (6.8 Barg)<br>50 psid (3.4 Barg) | Metal Seat and Diaphragm | **S2**, S1, B0 |
| Steam Pressures above 100 psig (6.9 Barg) Saturated or Superheated | Metal Seat and Diaphragm | **S2**, S1 |
| Water and Condensate<br>Low Temperature<br>32-180°F (0-83°C) | Composition Seat and Diaphragm<br>Metal Seat and Composition Diaphragm<br>Metal Seat and Diaphragm | BB, **B2**, SB, **S3**, S4, S4N<br>S2N<br>S1, S2 |
| Water and Condensate<br>High Temperature<br>180-300°F (83-149°C) | Metal Seat and Diaphragm | **S1**, S2 |

**NOTES:**
1) Trim designation numbers in bold are used most common and have been successfully applied in similar applications. Consult factory for the suitability of certain trims for specific services; however, the end user has final responsibility for materials selected.
2) Metal seated trim is not recommended on any service where the flow will be dead ended down stream of the pressure reducing regulator.

**TABLE 6**
**MAXIMUM CAPACITY WITH PLUG WIDE OPEN**
**(Use for Relief Valve Sizing)**

| Line Size | Cv | kv |
|---|---|---|
| 1-1/2" (DN40) | 7.0 | 6.1 |
| 2" (DN50) | 10.0 | 8.7 |

## TABLE 7
## CAPACITY (Cv)
## AT FLOWING PRESSURE ($F_L$ = 0.95)

| METAL DIAPHRAGM | | | | | | |
|---|---|---|---|---|---|---|
| Outlet Pressure psig | 1-1/2" (DN40) Body | | | 2" (DN50) Body | | |
| | % Droop | | | % Droop | | |
| | 10% | 20% | 30% | 10% | 20% | 30% |
| 5 | 0.54 | 1.22 | 1.94 | 0.60 | 1.46 | 2.55 |
| 10 | 0.69 | 1.60 | 2.70 | 0.85 | 2.05 | 3.70 |
| 15 | 0.84 | 1.98 | 3.41 | 1.05 | 2.64 | 4.80 |
| 25 | 0.67 | 1.53 | 2.60 | 0.77 | 1.91 | 3.54 |
| 35 | 0.80 | 1.86 | 3.20 | 0.97 | 2.43 | 4.36 |
| 50 | 1.14 | 2.60 | 4.31 | 1.50 | 3.79 | 7.01 |
| 75 | 1.50 | 3.41 | 5.52 | 2.00 | 5.17 | 9.07 |
| 100 | 1.14 | 2.66 | 4.46 | 1.50 | 3.89 | 7.28 |
| 150 | 1.56 | 3.65 | 5.92 | 2.15 | 5.58 | 9.59 |

| COMPOSITION DIAPHRAGM | | | | | | |
|---|---|---|---|---|---|---|
| Oulet Pressure psig | 1-1/2" (DN40) Body | | | 2" (DN50) Body | | |
| | % Droop | | | % Droop | | |
| | 10% | 20% | 30% | 10% | 20% | 30% |
| 5 | 0.90 | 2.04 | 3.23 | 1.00 | 2.44 | 4.26 |
| 10 | 1.16 | 2.67 | 4.51 | 1.42 | 3.41 | 6.16 |
| 15 | 1.34 | 3.30 | 5.68 | 1.75 | 4.40 | 7.99 |
| 25 | 1.12 | 2.55 | 4.34 | 1.28 | 3.18 | 5.90 |
| 35 | 1.34 | 3.10 | 5.34 | 1.62 | 4.05 | 7.26 |
| 50 | 1.89 | 4.34 | 7.00 | 2.49 | 6.32 | 10.00 |
| 75 | 2.49 | 5.68 | 7.00 | 3.33 | 8.61 | 10.00 |
| 100 | 1.89 | 4.43 | 7.00 | 2.49 | 6.48 | 10.00 |
| 150 | 2.61 | 6.09 | 7.00 | 3.59 | 9.30 | 10.00 |

**METRIC CONVERSION FACTORS: psi / 14.5 = Bar; Cv / 1.16 = kv**

## TABLE 8
## WATER CAPACITIES - (GPM)
## S.G. =1.0 T = 60° $F_L$ = 0.95

| COMPOSITION DIAPHRAGM ONLY | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outlet Pressure P2, psig | Inlet Pressure P1, psig | 1-1/2" (DN40) Body | | | 2" (DN50) Body | | |
| | | DROOP | | | DROOP | | |
| | | 10% | 20% | 30% | 10% | 20% | 30% |
| 5 | 25 | 4 | 9 | 14 | 5 | 11 | 19 |
| | 50 | 6 | 14 | 22 | 7 | 16 | 29 |
| | 75 | 8 | 17 | 27 | 8 | 20 | 36 |
| | 100 | 9 | 20 | 32 | 10 | 24 | 42 |
| | 125 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 10 | 25 | 5 | 10 | 18 | 6 | 13 | 24 |
| | 50 | 7 | 17 | 29 | 9 | 22 | 39 |
| | 75 | 9 | 22 | 36 | 11 | 28 | 50 |
| | 100 | 11 | 25 | 43 | 14 | 32 | 58 |
| | 125 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 15 | 25 | 4 | 10 | 18 | 6 | 14 | 25 |
| | 500 | 8 | 20 | 34 | 10 | 26 | 47 |
| | 75 | 10 | 26 | 44 | 14 | 34 | 62 |
| | 100 | 12 | 30 | 52 | 16 | 41 | 74 |
| | 125 | 14 | 35 | 60 | 18 | 46 | 84 |
| | 150 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 25 | 50 | 6 | 13 | 22 | 6 | 16 | 30 |
| | 75 | 8 | 18 | 31 | 9 | 23 | 42 |
| | 100 | 10 | 22 | 38 | 11 | 28 | 51 |
| | 125 | 11 | 26 | 43 | 13 | 32 | 59 |
| | 150 | 13 | 29 | 49 | 14 | 36 | 66 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 35 | 50 | 5 | 12 | 21 | 6 | 16 | 28 |
| | 75 | 9 | 20 | 34 | 10 | 26 | 46 |
| | 100 | 11 | 25 | 43 | 13 | 33 | 59 |
| | 125 | 13 | 29 | 51 | 15 | 38 | 69 |
| | 150 | 14 | 33 | 57 | 17 | 43 | 78 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 50 | 75 | 10 | 22 | 35 | 13 | 32 | 50 |
| | 100 | 13 | 31 | 50 | 18 | 45 | 71 |
| | 125 | 16 | 38 | 61 | 22 | 55 | 87 |
| | 150 | 19 | 43 | 70 | 25 | 63 | 100 |
| | 175 | 21 | 49 | 78 | 28 | 71 | 112 |
| | 200 | 23 | 53 | 86 | 31 | 77 | 123 |
| 75 | 100 | 13 | 28 | 35 | 17 | 43 | 50 |
| | 125 | 18 | 40 | 50 | 24 | 61 | 71 |
| | 150 | 22 | 49 | 61 | 29 | 75 | 87 |
| | 175 | 25 | 57 | 70 | 33 | 86 | 100 |
| | 200 | 28 | 64 | 78 | 37 | 96 | 112 |
| 100 | 125 | 10 | 22 | 35 | 13 | 32 | 50 |
| | 150 | 13 | 31 | 50 | 18 | 46 | 71 |
| | 175 | 16 | 38 | 61 | 22 | 56 | 87 |
| | 200 | 19 | 44 | 70 | 25 | 65 | 100 |
| 135 | 150 | 9 | 22 | 27 | 13 | 33 | 39 |
| | 175 | 15 | 35 | 44 | 21 | 53 | 63 |
| | 200 | 19 | 45 | 56 | 26 | 68 | 81 |
| 150 | 175 | 13 | 31 | 35 | 18 | 47 | 50 |
| | 200 | 19 | 43 | 50 | 25 | 66 | 71 |

**NOTE:** Where "HI DP" is indicated, the actual pressure drop has exceeded the recommended limits of Table 2.

**METRIC CONVERSION FACTORS: psi / 14.5 = Bar; GPM X 3.785 = LPM**

## TABLE 9
## AIR CAPACITY - SCFH
## S.G = 1.0 T = 60°F $F_L$ = 0.95

| COMPOSITION DIAPHRAGM ONLY | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outlet Pressure P2, psig | Inlet Pressure P1, psig | 1-1/2" (DN40) Body Size | | | 2" (DN50) Body Size | | |
| | | DROOP | | | DROOP | | |
| | | 10% | 20% | 30% | 10% | 20% | 30% |
| 2 | 25 | 500 | 1000 | 1600 | 500 | 1200 | 2100 |
| | 50 | 700 | 1700 | 2700 | 800 | 2000 | 3500 |
| | 75 | 1000 | 2300 | 3700 | 1100 | 2800 | 4900 |
| | 100 | 1300 | 3000 | 4700 | 1500 | 3600 | 6200 |
| | 125 | 1600 | 3600 | 5700 | 1800 | 4400 | 7600 |
| | 150 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 5 | 25 | 1100 | 2600 | 4100 | 1300 | 3100 | 5400 |
| | 50 | 1900 | 4200 | 6700 | 2100 | 5000 | 8800 |
| | 75 | 2600 | 5800 | 9200 | 2900 | 7000 | 12200 |
| | 100 | 3300 | 7500 | 11800 | 3700 | 8900 | 15600 |
| | 125 | 4000 | 9100 | 14400 | 4500 | 10900 | 19000 |
| | 150 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 10 | 25 | 1500 | 3400 | 5700 | 1800 | 4300 | 7800 |
| | 50 | 2400 | 5500 | 9300 | 2900 | 7000 | 12700 |
| | 75 | 3300 | 7600 | 12900 | 4100 | 9700 | 17600 |
| | 100 | 4200 | 9800 | 16500 | 5200 | 12500 | 22500 |
| | 125 | 5200 | 11900 | 20100 | 6300 | 15200 | 27400 |
| | 150 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 15 | 25 | 1600 | 3900 | 6700 | 2100 | 5200 | 9500 |
| | 50 | 2800 | 6800 | 11700 | 3600 | 9100 | 16500 |
| | 75 | 3800 | 9400 | 16200 | 5000 | 12600 | 22800 |
| | 100 | 4900 | 12100 | 20700 | 6400 | 16100 | 29200 |
| | 125 | 6000 | 14700 | 25300 | 7800 | 19600 | 35600 |
| | 150 | 7000 | 17300 | 29800 | 9200 | 23100 | 41900 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 25 | 50 | 2300 | 5100 | 8800 | 2600 | 6400 | 11900 |
| | 75 | 3200 | 7300 | 12400 | 3700 | 9100 | 16800 |
| | 100 | 4100 | 9300 | 15800 | 4700 | 11600 | 21500 |
| | 125 | 5000 | 11300 | 19300 | 5700 | 14200 | 26300 |
| | 150 | 5900 | 13400 | 22800 | 6700 | 16700 | 31000 |
| | 175 | 6800 | 15400 | 26300 | 7700 | 19200 | 35700 |
| | 200 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 35 | 50 | 2400 | 5500 | 9500 | 2900 | 7200 | 13000 |
| | 75 | 3800 | 8800 | 15100 | 4600 | 11400 | 20500 |
| | 100 | 4900 | 11300 | 19500 | 5900 | 14800 | 26500 |
| | 125 | 6000 | 13800 | 23800 | 7200 | 18000 | 32300 |
| | 150 | 7000 | 16300 | 28000 | 8500 | 21300 | 38100 |
| | 175 | 8100 | 18800 | 32300 | 9800 | 24500 | 43900 |
| | 200 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 50 | 75 | 4800 | 11100 | 17900 | 6400 | 16100 | 25500 |
| | 100 | 6800 | 15500 | 25100 | 8900 | 22600 | 35800 |
| | 125 | 8400 | 19300 | 31100 | 11100 | 28100 | 44400 |
| | 150 | 9900 | 22800 | 36700 | 13100 | 33200 | 52500 |
| | 175 | 11400 | 26300 | 42300 | 15100 | 38200 | 60500 |
| | 200 | 12900 | 29700 | 47900 | 17100 | 43300 | 68500 |
| | 250 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 75 | 100 | 7400 | 16900 | 20800 | 9900 | 25600 | 29800 |
| | 125 | 10400 | 23700 | 29200 | 13900 | 36000 | 41800 |
| | 150 | 12800 | 29200 | 36000 | 17100 | 44300 | 51500 |
| | 175 | 15000 | 34200 | 42200 | 20100 | 51900 | 60200 |
| | 200 | 17100 | 38900 | 47900 | 22800 | 59000 | 68500 |
| | 250 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 100 | 125 | 6300 | 14800 | 23400 | 8300 | 21700 | 33400 |
| | 150 | 8900 | 20800 | 32900 | 11700 | 30400 | 47000 |
| | 175 | 10900 | 25600 | 40400 | 14400 | 37400 | 57700 |
| | 200 | 12700 | 29800 | 47000 | 16700 | 43500 | 67200 |
| | 250 | 15900 | 37400 | 59100 | 21000 | 54700 | 84400 |
| | 300 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 135 | 150 | 5600 | 13100 | 20700 | 7300 | 19100 | 29500 |
| | 175 | 9000 | 21200 | 33400 | 11900 | 31000 | 47800 |
| | 200 | 11500 | 26900 | 42600 | 15100 | 39400 | 60800 |
| | 250 | 15400 | 36200 | 57200 | 20300 | 52900 | 81700 |
| | 300 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 150 | 175 | 10400 | 24200 | 27800 | 14200 | 36900 | 39700 |
| | 200 | 14600 | 34000 | 39100 | 20100 | 51900 | 55900 |
| | 250 | 20700 | 48300 | 55500 | 28500 | 73800 | 79300 |
| | 300 | 25700 | 60000 | 69000 | 35400 | 91700 | 98500 |

NOTE: Where "HI DP" is indicated, the actual pressure drop has exceeded the recommended limits of Table 2.

**METRIC CONVERSION FACTORS: psi / 14.5 = Bar; SCFH / 35.31 = $Sm^3/Hr$; SCFH / 37.32 = $Nm^3/Hr$**

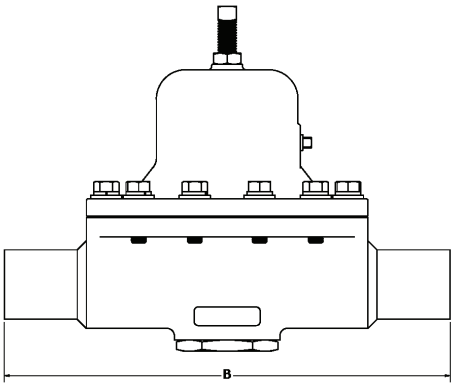
## TABLE 10
## STEAM - LBS/HR
## S.G. = Actual T = Saturated $F_L$ = 0.95

| METAL DIAPHRAGM ONLY | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outlet Pressure P2, psig | Inlet Pressure P1, psig | 1-1/2" (DN40) Body Size | | | 2" (DN50) Body Size | | |
| | | DROOP | | | DROOP | | |
| | | 10% | 20% | 30% | 10% | 20% | 30% |
| 2 | 25 | 14 | 31 | 42 | 15 | 34 | 66 |
| | 50 | 23 | 51 | 69 | 25 | 57 | 110 |
| | 75 | 32 | 71 | 96 | 35 | 79 | 153 |
| | 100 | 40 | 90 | 122 | 44 | 100 | 194 |
| | 125 | 49 | 109 | 148 | 53 | 121 | 235 |
| | 150 | 57 | 128 | 173 | 63 | 142 | 276 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 5 | 25 | 36 | 81 | 129 | 40 | 97 | 170 |
| | 50 | 60 | 135 | 214 | 66 | 161 | 282 |
| | 75 | 85 | 192 | 305 | 94 | 230 | 401 |
| | 100 | 108 | 244 | 388 | 120 | 292 | 510 |
| | 125 | 131 | 296 | 470 | 145 | 354 | 618 |
| | 150 | 154 | 347 | 551 | 171 | 415 | 725 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 10 | 25 | 43 | 100 | 168 | 53 | 127 | 230 |
| | 50 | 76 | 176 | 296 | 93 | 225 | 406 |
| | 75 | 106 | 246 | 415 | 131 | 315 | 569 |
| | 100 | 138 | 320 | 540 | 170 | 410 | 740 |
| | 125 | 167 | 388 | 654 | 206 | 497 | 897 |
| | 150 | 196 | 455 | 768 | 242 | 583 | 1052 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 15 | 25 | 46 | 108 | 186 | 57 | 144 | 261 |
| | 50 | 91 | 214 | 368 | 113 | 285 | 518 |
| | 75 | 127 | 300 | 516 | 159 | 400 | 727 |
| | 100 | 166 | 392 | 674 | 208 | 522 | 949 |
| | 125 | 204 | 480 | 826 | 254 | 640 | 1163 |
| | 150 | 239 | 563 | 969 | 299 | 750 | 1364 |
| | 175 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 25 | 50 | 67 | 153 | 261 | 77 | 191 | 355 |
| | 75 | 100 | 228 | 387 | 115 | 284 | 527 |
| | 100 | 129 | 294 | 500 | 148 | 367 | 681 |
| | 125 | 158 | 360 | 612 | 181 | 450 | 834 |
| | 150 | 190 | 435 | 739 | 219 | 543 | 1006 |
| | 175 | 219 | 500 | 849 | 252 | 624 | 1156 |
| | 200 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 35 | 50 | 68 | 157 | 271 | 82 | 205 | 369 |
| | 75 | 114 | 265 | 457 | 138 | 347 | 622 |
| | 100 | 152 | 353 | 607 | 184 | 461 | 827 |
| | 125 | 186 | 433 | 745 | 226 | 566 | 1015 |
| | 150 | 219 | 510 | 877 | 266 | 666 | 1195 |
| | 175 | 258 | 599 | 1031 | 313 | 783 | 1405 |
| | 200 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 50 | 75 | 142 | 323 | 535 | 186 | 470 | 870 |
| | 100 | 206 | 469 | 778 | 271 | 684 | 1265 |
| | 125 | 260 | 593 | 983 | 342 | 865 | 1599 |
| | 150 | 310 | 707 | 1172 | 408 | 1031 | 1906 |
| | 175 | 358 | 817 | 1354 | 471 | 1191 | 2203 |
| | 200 | 405 | 924 | 1532 | 533 | 1348 | 2492 |
| | 250 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 75 | 100 | 216 | 492 | 796 | 288 | 746 | 1308 |
| | 125 | 311 | 707 | 1145 | 415 | 1072 | 1881 |
| | 150 | 389 | 884 | 1431 | 518 | 1340 | 2351 |
| | 175 | 460 | 1045 | 1692 | 613 | 1585 | 2780 |
| | 200 | 527 | 1198 | 1939 | 703 | 1816 | 3186 |
| | 250 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 100 | 125 | 184 | 430 | 721 | 242 | 629 | 1176 |
| | 150 | 263 | 614 | 1030 | 347 | 899 | 1682 |
| | 175 | 328 | 765 | 1282 | 431 | 1118 | 2093 |
| | 200 | 385 | 899 | 1508 | 507 | 1315 | 2461 |
| | 250 | 490 | 1144 | 1918 | 645 | 1673 | 3130 |
| | 300 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 135 | 150 | 198 | 474 | 799 | 269 | 693 | 1216 |
| | 175 | 326 | 779 | 1281 | 442 | 1139 | 1999 |
| | 200 | 419 | 1003 | 1650 | 569 | 1467 | 2576 |
| | 250 | 572 | 1369 | 2252 | 776 | 2002 | 3514 |
| | 300 | HI DP | HI DP | HI DP | HI DP | HI DP | HI DP |
| 150 | 175 | 299 | 699 | 1133 | 412 | 1068 | 1836 |
| | 200 | 426 | 996 | 1615 | 587 | 1522 | 2616 |
| | 250 | 615 | 1438 | 2332 | 847 | 2198 | 3778 |
| | 300 | 773 | 1808 | 2932 | 1064 | 2763 | 4749 |

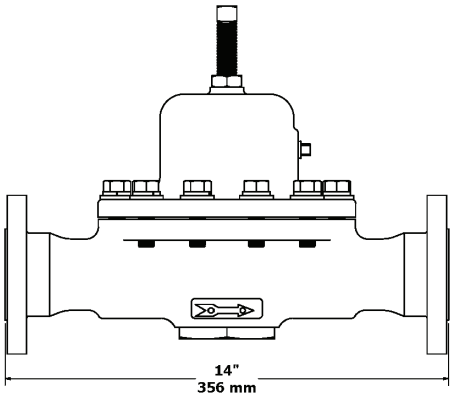
**NOTE:** Where "HI DP" is indicated, the actual pressure drop has exceeded the recommended limits of Table 2.

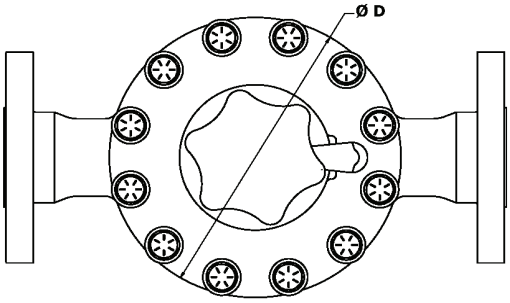
**Metric Conversion Factors: psi / 14.5 = Bar; LBS/HR X 0.4536 = KG/HR**

## DIMENSIONS & WEIGHTS

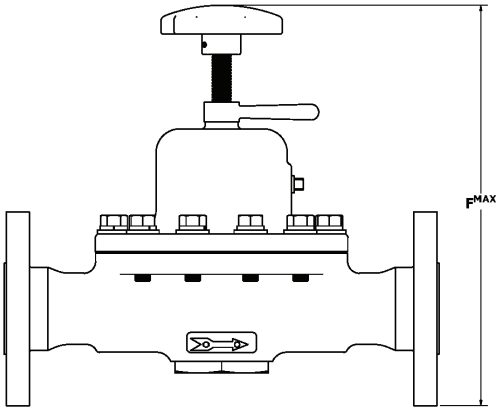



**OPTION - 32**
**EXTENDED NIPPLES**

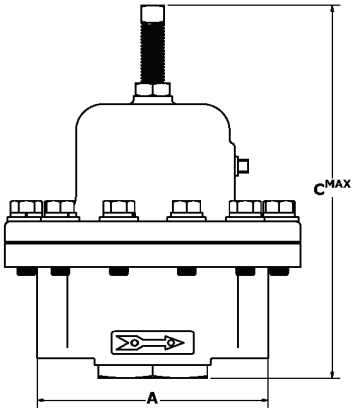



**OPTION - 3**
**HANDWHEEL & LOCKING LEVER**
**(TOP VIEW)**




**OPTION - 3**
**HANDWHEEL & LOCKING LEVER**




| SIZE INCH | DIMENSIONS - ENGLISH (in.) | | | | | Shipping Weight (lbs) | |
|---|---|---|---|---|---|---|---|
| | A | B | $C^{MAX}$ | D | $F^{MAX}$ | NON-FLANGED | FLANGED |
| 1-1/2 | 6 3/8 | N/A | 10 1/2 | 8 1/2 | 12 5/8 | 29 | 48 |
| 2 | 7 3/16 | 15 1/4 | 11 13/16 | 9 5/8 | 14 3/8 | 48 | 67 |
| **SIZE DN** | **DIMENSIONS - METRIC (mm)** | | | | | **Shipping Weight (kgs)** | |
| | A | B | $C^{MAX}$ | D | $F^{MAX}$ | NON-FLANGED | FLANGED |
| 40 | 161 | N/A | 266 | 207 | 321 | 13 | 22 |
| 50 | 182 | 387 | 300 | 245 | 266 | 22 | 31 |

## MODEL DL - Cryogenic Service (Option -45) 09/02/21

| 2 | M | POS 3 | — | POS 5 | POS 6 & 7 | 7 | — | POS 10 | POS 11 | 0 | 0 | H | POS 15 | POS 16 | 0 | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| POSITION 3 - SIZE | | |
|---|---|---|
| Size | | CODE |
| in. | (DN) | |
| 1-1/2" | (40) | 8 |
| 2" | (50) | 9 |

| POSITION 5 - BODY & SPRING CHAMBER MATERIALS | |
|---|---|
| Body/Sp. Ch. | CODE |
| BRZ/BRZ | 3 |
| SST/SST | A |

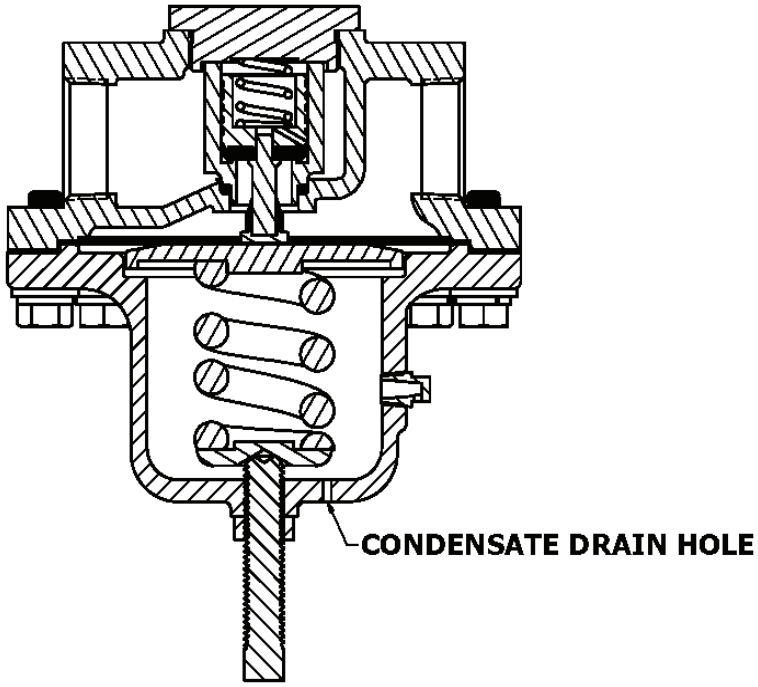
| POSITION 6 & 7 - TRIM DESIGNATION NUMBERS | | | |
|---|---|---|---|
| Brass Trim | | Stainless Steel Trim | |
| Desig. | CODE | Desig. | CODE |
| B0 | B0 | S0 | S0 |
| B1 | B1 | S1 | S1 |
| B5 | B5 | S9 | S9 |
| | | S36 | 36 |

| POSITION 10 - END CONNECTIONS | |
|---|---|
| Description | CODE |
| NPT - Threaded | 1 |
| ASME 150 Flanges (14" Face to Face Dimension) | V |
| ASME 300 Flanges (14" Face to Face Dimension) | W |
| PN40 Flanges (356 mm Face to Face Dimension) | A |
| Opt. -31P: BSPT Taper Threaded | B |
| Opt. -31P: BSPP Parallel Threaded | P |

| POSITION 11 - RANGE SPRING | | |
|---|---|---|
| SST Range Spring | | CODE |
| psig | (Barg) | |
| 2-15 | (.14-1.0) | A |
| 10-40 | (.69-2.8) | B |
| 30-80 | (2.1-5.5) | C |
| 70-150 | (4.8-10.3) | D |

| POSITION 15 - BODY OPTIONS | | |
|---|---|---|
| Description | OPTION | CODE |
| No Option | — | 0 |
| Gauge Ports Included | -87 | V |

| POSITION 16 - CERTIFICATE OPTIONS | | |
|---|---|---|
| Description | OPTION | CODE |
| No Option | — | 0 |
| Oxygen Cleaning Per Cashco Specification S-1134. | -55 | M |
| Non-oxygen Cleaning Per Cashco Specification S-1542 | -56 | N |




CRYOGENIC SERVICE

*** For information on ATEX see pages 8 & 9 on the IOM.**

## MODEL DL - General Service 09/02/21

| 2 | H | POS 3 | — | POS 5 | POS 6 & 7 | 7 | — | POS 10 | POS 11 | 0 | POS 13 | POS 14 | POS 15 | POS 16 | 0 | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| POSITION 3 - SIZE | | |
|---|---|---|
| Size | | CODE |
| in. | (DN) | |
| 1-1/2" | (40) | 8 |
| 2" | (50) | 9 |

| POSITION 5 - BODY & SPRING CHAMBER MATERIALS | |
|---|---|
| Body/Sp. Ch. | CODE |
| DI/DI | 1 |
| BRZ/DI | 2 |
| BRZ/BRZ | 3 |
| CS/DI | 4 |
| CS/CS | 5 |
| SST/DI | 7 |
| SST/CS | 9 |
| SST/SST | A |

| POSITION 6 & 7 - TRIM DESIGNATION NUMBERS | | | |
|---|---|---|---|
| Brass Trim | | Stainless Steel Trim | |
| Desig. | CODE | Desig. | CODE |
| B0 | B0 | S0 | S0 |
| B1 | B1 | S1 | S1 |
| B2 | B2 | S2 | S2 |
| B4 | B4 | S2N | SN |
| B5 | B5 | S3 | S3 |
| BB | BB | S4 | S4 |
| BK | BK | S4N | SD |
| | | S6 | S6 |
| | | S9 | S9 |
| | | SK | SK |
| | | S36 | 36 |
| | | S40 | 40 |
| | | S40T | 4T |
| | | S40V | 4V |
| | | SB | SB |

| POSITION 10 - END CONNECTIONS | |
|---|---|
| Description | CODE |
| NPT - Threaded | 1 |
| ASME 150 Flanges (14" Face to Face Dimension) | V |
| ASME 300 Flanges (14" Face to Face Dimension) | W |
| PN40 Flanges (356 mm Face to Face Dimension) | A |
| Opt. -31: BSPT - Taper Threaded | B |
| Opt. -31P: BSPP Parallel Threaded | P |
| Opt. -32: Plain End Extended Nipples | E |

| POSITION 11 - RANGE SPRINGS | | |
|---|---|---|
| SST Range Spring | | CODE |
| psig | (Barg) | |
| 2-15 | (.14-1.0) | A |
| 10-40 | (.69-2.8) | B |
| 30-80 | (2.1-5.5) | C |
| 70-150 | (4.8-10.3) | D |

| POSITION 13 - FEATURE OPTIONS | | |
|---|---|---|
| Description | OPTION | CODE |
| No Option | — | 0 |
| Handwheel & Locking Lever. | -3 | 3 |

| POSITION 14 - SPRING CHAMBER OPTIONS | | |
|---|---|---|
| Description | OPTION | CODE |
| Polyethylene Vented Plug | — | 0 |
| Stainless Steel Vented Plug | -25S | H |

| POSITION 15 - BODY OPTIONS | | |
|---|---|---|
| Description | OPTION | CODE |
| No Option | — | 0 |
| Gauge Ports Included | -87 | V |

| POSITION 16 - CERTIFICATE OPTIONS | | |
|---|---|---|
| Description | OPTION | CODE |
| No Option | — | 0 |
| Oxygen Cleaning Per Cashco Specification S-1134 | -55 | M |
| Non-oxygen Cleaning Per Cashco Specification S-1542 | -56 | N |

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