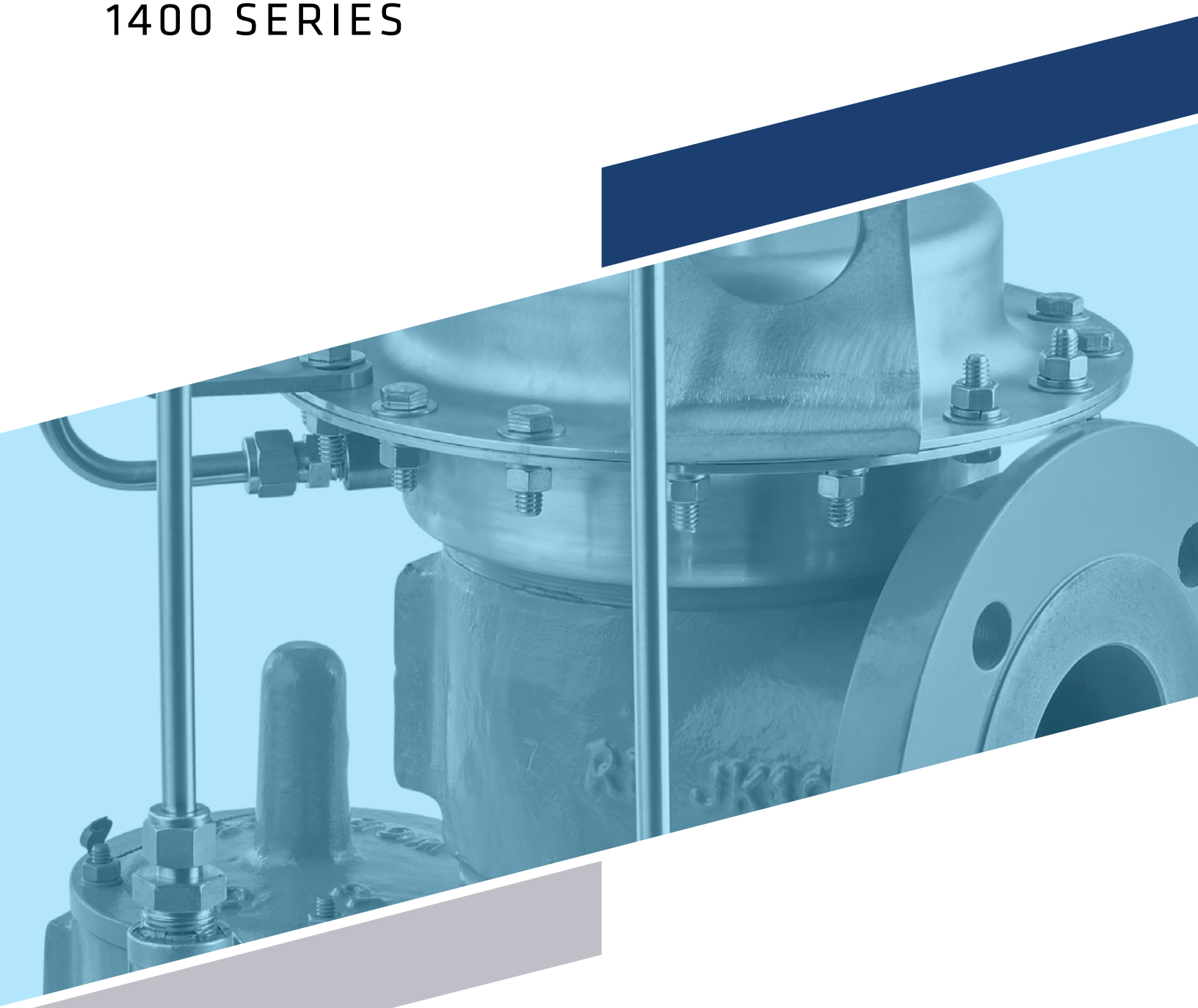
GROTH®
CORPORATION

# PILOT RELIEF VALVE

## 1400 SERIES



# 1400 SERIES

The Groth 1400 Series Pilot-Operated Relief Valves are used to replace weight-loaded or spring loaded valves in many applications to increase efficiency and reduce evaporation losses. Several advantages are obtained over the traditional valves. For example, the process pressures may be closer to the set pressure than would be considered prudent and safe with the traditional valve. Additionally, greater conservation is obtained due to minimum product loss which in turn provides increased profits.

**Technical Details**

- Size: 2" (DN 50) through 12" (DN 300)
- Material: Standard body materials are carbon steel, stainless steel, aluminum and fiberglass
- Pressure: from 2.0* InWC to 15 psig * Requires 1402 Pilot for minimum settings
- Vacuum: from 7.0 InWC to 1 psig
- Certification: ATEX and PED Approval

**Features**

- Ease of precision settings
- Only the pilot needs to be set
- Lower profile and weight than spring operated models for high settings
- Remote pilot sensing option allows the pilot to sense the true system pressure
- Remote or manual blowdown available
- Main valve remains tight to set pressure
- Full open at 10% overpressure
- Modulating action conserves product
- Soft seating creates tight seal to conserve product and minimize valve wear
- Top entry allows valve to be services without removal from mounting

**Options**

- 150# ANSI, PN10, PN16, JIS drilling classes
- Pilot exhaust piped to discharge header
- Field test connection
- Manual blow down
- Remote sense pickup
- Pilot supply filter

Model 1400

Model 1420

Model 1430

Model 1460

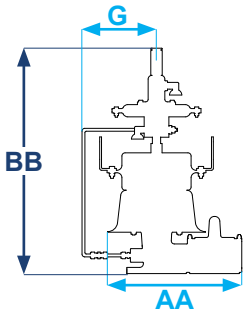
# SPECIFICATIONS

## Models 1400 and 1430

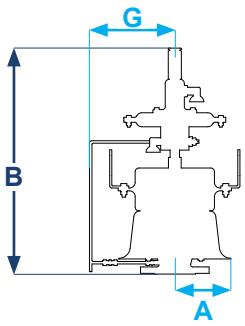
| Size In (mm) | STANDARD SETTINGS | | | | A In (mm) | B In (mm) | G In (mm) | AA In (mm) | BB In (mm) | Approx. Ship Wt. Lbs (kg)* |
|---|---|---|---|---|---|---|---|---|---|---|
| | PRESSURE | | VACUUM | | | | | | | |
| | MAX. | **MIN. | MAX. | MIN. | | | | | | |
| 2 (50) | 15 psig (1.035 barg) | 7 InWC (.17.5 mb) | 12 psig (.828 barg) | 0.5 oz/in2 (2.16 mb) | 4.75 (121) | 25.50 (648) | 7 (178) | 13.50 (343) | 27.50 (699) | 30 (14) |
| 3 (80) | | | | | 5.75 (146) | 26.50 (673) | 7.75 (197) | 17.75 (451) | 29 (737) | 35 (16) |
| 4 (100) | | | | | 6.50 (165) | 27.50 (699) | 8.50 (216) | 19.50 (495) | 30.25 (768) | 40 (18) |
| 6 (150) | | | | | 8.50 (216) | 29.50 (749) | 10.50 (267) | 26.50 (673) | 34 (864) | 50 (23) |
| 8 (200) | | | | | 9.75 (248) | 32.50 (826) | 11.75 (298) | 31.50 (800) | 40 (1016) | 6 (30) |
| 10 (250) | | | | | 11.75 (298) | 34.50 (876) | 13.75 (349) | 37 (940) | 43.75 (1111) | 95 (43) |
| 12 (300) | | | | | 12.75 (324) | 36.50 (927) | 14.75 (375) | 40.50 (1029) | 48 (1219) | 125 (57) |

*Approximate weight of aluminum Model 1400. **2 InWC minimum set with 1402 Pilot

Model 1400




Model 1430

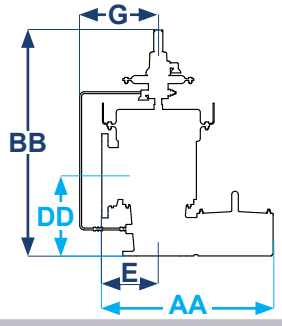



## Models 1420 and 1460

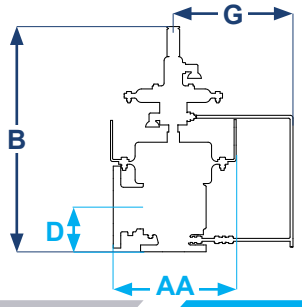
| Size In (mm) | | Standard Settings | | | | A In (mm) | B In (mm) | D In (mm) | E In (mm) | G In (mm) | AA In (mm) | BB In (mm) | DD In (mm) | Approx. Ship Wt. Lbs (kg)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pressure | | VACUUM | | | | | | | | | | |
| Inlet | Outlet | Max | **Min | Max | Min | | | | | | | | | |
| 2 (50) | 3 (80) | 15 psig (1.035 barg) | 7 InWC (17.5 mb) | 12 psig (.828 barg) | 0.5 oz/in2 (2.16 mb) | 10.50 (267) | 23.50 (587) | 4.12 (105) | 5.50 (140) | 7 (178) | 14.50 (368) | 26.50 (673) | 7 (178) | 35 (16) |
| 3 (80) | 4 (100) | | | | | 11.50 (292) | 25.50 (648) | 5 (127) | 6 (152) | 7.50 (191) | 18 (457) | 28.75 (730) | 8.12 (206) | 40 (18) |
| 4 (100) | 6 (150) | | | | | 12.50 (318) | 28.50 (724) | 6.50 (165) | 6.50 (165) | 8 (203) | 19.25 (489) | 31.50 (800) | 9.50 (241) | 50 (23) |
| 6 (150) | 8 (200) | | | | | 16.75 (425) | 32.25 (819) | 8.50 (216) | 8.50 (216) | 10.25 (260) | 26.50 (673) | 36.50 (927) | 12.75 (324) | 70 (32) |
| 8 (200) | 10 (250) | | | | | 20.50 (521) | 36.75 (933) | 9.75 (248) | 10.75 (273) | 11.75 (298) | 32.50 (826) | 42.25 (1073) | 15.25 (387) | 90 (41) |
| 10 (250) | 12 (300) | | | | | 20.25 (514) | 38.75 (984) | 10.25 (260) | 12.50 (318) | 13.75 (349) | 37.75 (959) | 46.50 (1181) | 18 (457) | 125 (57) |
| 12 (300) | 14 (350) | | | | | 27.75 (705) | 42.75 (1086) | 11 (279) | 15 (381) | 14.75 (375) | 42.75 (1086) | 52.50 (1334) | 20.62 (524) | 150 (69) |

*Approximate weight of aluminum Model 1420. **2 InWC minimum set with 1402 Pilot.

Model 1420




Model 1460



# OPERATION

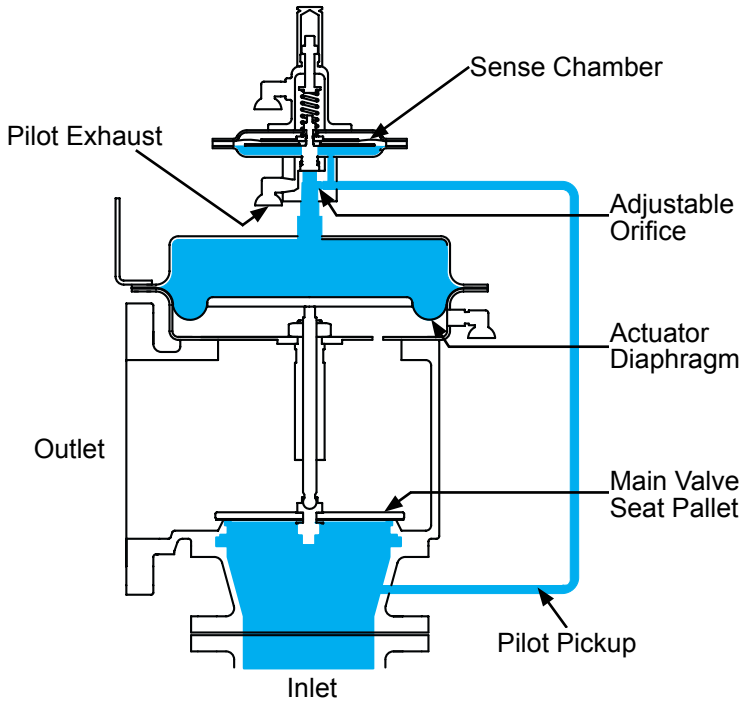
The pilot operated valve is a self-contained system which does not require any external power or pressure source. The pilot valve, using system medium and pressure, automatically controls the actuator pressure to either open or close the main valve depending on the pressure setting of the pilot vs. the actual system pressures.

System medium and pressure is sensed at the pickup fitting just above the inlet flange. In the case of remote sensing, the pickup point is directly on the vessel and usually close to the valve inlet. The medium and pressure is then channeled to the pilot inlet and is redistributed to the sense chamber and to the actuator.

Under normal system operating conditions, the same pressure is acting downward against the actuator and upwards against the seat pallet. Since the actuator has a larger area than the seat pallet, the net force is downward which will press the pallet against the seat and thus keep the main valve closed. While the pilot and main valve are closed, there is no bleed to the atmosphere.

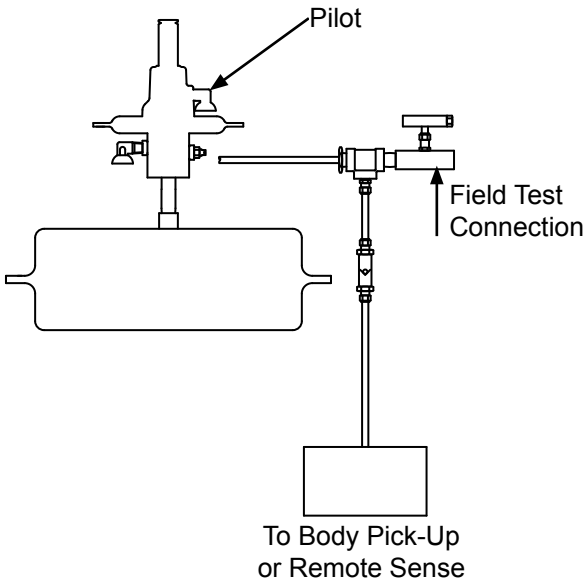
When the system pressure rises to the pilot set point due to an overpressure condition, the upward force in the pilot sense chamber will overcome the downward spring force to lift the pilot stem. As the stem lifts, it opens the pilot seat to allow flow through the pilot and out to the atmosphere (in applications where nothing is permitted to discharge directly into the atmosphere, the pilot discharge may be plumbed to the main valve outlet for channeling to a collection header. Notify the vendor if this is the situation in case compensating adjustments need to be made). The flow through the pilot and adjustable orifice will cause a pressure drop downstream of the orifice which in turn causes the pressure in the actuator to drop. When the actuator pressure decreases to a point where the upward force on the seat pallet is greater than the downward force of the actuator, the main valve will open. The amount the main valve opens depends on the system overpressure. The greater the overpressure, the wider the main valve opens, until full open is obtained at approximately 10% overpressure.

After the excess pressure has been relieved and the system pressure is again below the set point of the pilot, the valve will return to its normal closed position.

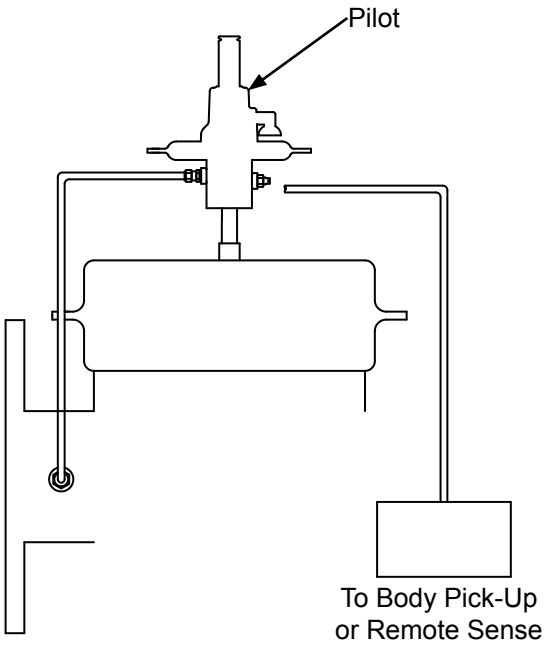


# CONFIGURATIONS

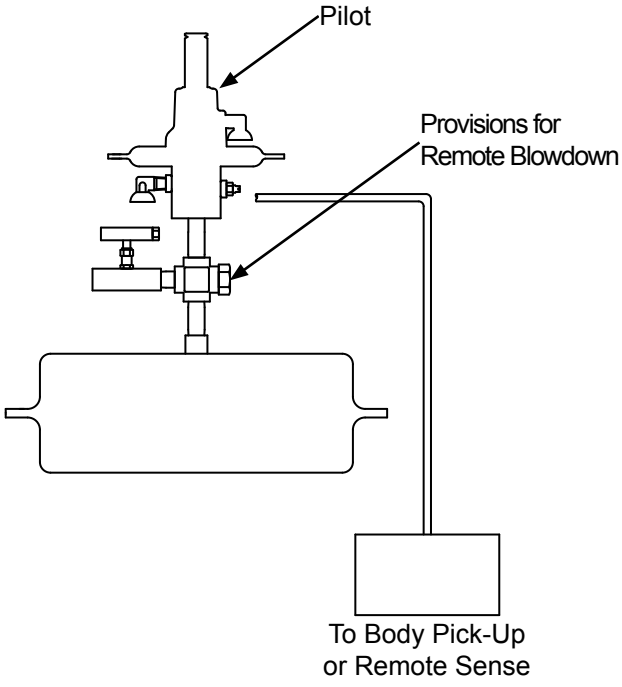
Field Test Connection (Backflow Prevention Included)



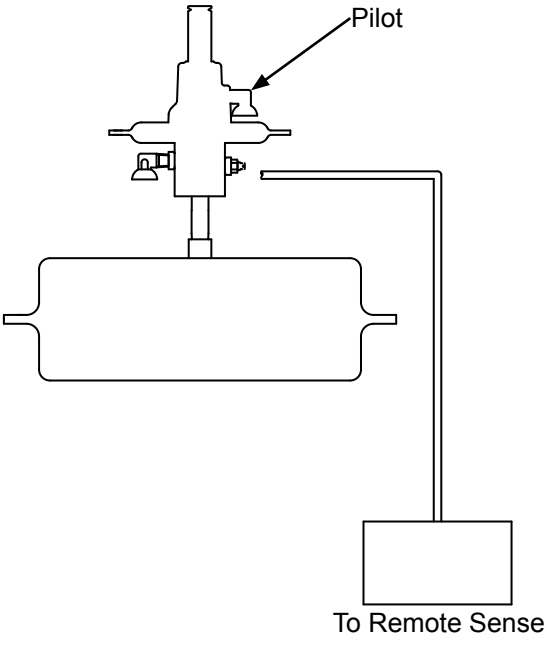

Pilot Discharge Tubed to Main Valve Outlet




Manual or Remote Blowdown




Remote Pickup for Pilot



# SIZING TABLES

## Models 1400 and 1430

| Pressure Setting psig | Valve Size (Orifice Size) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2" (2.976 in²) | 3" (7.013 in²) | 4" (12.35 in²) | 6" (28.51 in²) | 8" (49.65 in2) | 10" (78.47 in²) | 12" (112.7 in²) |
| 0.07 | 5082 | 12000 | 21180 | 48840 | 85080 | 134460 | 193080 |
| 0.2 | 8460 | 19980 | 35220 | 81300 | 141600 | 223800 | 321360 |
| 0.4 | 12420 | 29280 | 51600 | 119100 | 207420 | 327840 | 470820 |
| 0.6 | 15540 | 36600 | 64500 | 148860 | 259260 | 409800 | 588540 |
| 0.8 | 18180 | 42900 | 75540 | 174420 | 303720 | 480000 | 689400 |
| 1.0 | 20580 | 48480 | 85380 | 197160 | 343320 | 542400 | 779340 |
| 1.2 | 22740 | 53580 | 94380 | 217920 | 379440 | 599700 | 861300 |
| 1.4 | 24780 | 58320 | 102720 | 237120 | 412920 | 652620 | 937260 |
| 1.6 | 26640 | 62760 | 110520 | 255120 | 444240 | 702120 | 1008420 |
| 1.8 | 28380 | 66900 | 117840 | 272100 | 473820 | 748860 | 1075500 |
| 2.0 | 30060 | 70920 | 124860 | 288180 | 501900 | 793260 | 1139280 |
| 3.0 | 37500 | 88440 | 155700 | 359520 | 626040 | 989460 | 1421100 |
| 4.0 | 43860 | 103380 | 182040 | 420240 | 731820 | 1156620 | 1661100 |
| 5.0 | 49500 | 116580 | 205320 | 474000 | 825540 | 1304700 | 1873860 |
| 6.0 | 54060 | 127440 | 224460 | 518160 | 902340 | 1426140 | 2048220 |
| 7.0 | 58260 | 137340 | 241800 | 558240 | 972180 | 1536480 | 2206680 |
| 8.0 | 62160 | 146400 | 257880 | 595260 | 1036680 | 1638420 | 2353080 |
| 9.0 | 65760 | 154920 | 272820 | 629820 | 1096800 | 1733460 | 2489640 |
| 10.0 | 69120 | 162900 | 286860 | 662220 | 1153320 | 1822740 | 2617860 |
| 11.0 | 72300 | 170460 | 300120 | 692880 | 1206660 | 1907100 | 2739000 |
| 12.0 | 75360 | 177600 | 312720 | 721980 | 1257300 | 1987140 | 2853960 |
| 13.0 | 78240 | 184440 | 324780 | 749700 | 1305600 | 2063400 | 2963520 |
| 14.0 | 81000 | 190920 | 336240 | 776220 | 1351740 | 2136360 | 3068280 |
| 15.0 | 83700 | 197160 | 347220 | 801600 | 1395960 | 2206320 | 3168720 |

## Models 1400 and 1430

| Pressure Setting psig | Valve Size (Orifice Size) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2" (2.976 in²) | 3" (7.013 in²) | 4" (12.35 in²) | 6" (28.51 in²) | 8" (49.65 in2) | 10" (78.47 in²) | 12" (112.7 in²) |
| 0.07 | 4614 | 10860 | 19200 | 44220 | 76080 | 118800 | 168540 |
| 0.2 | 7680 | 18120 | 31920 | 73620 | 126660 | 197760 | 280500 |
| 0.4 | 11040 | 26040 | 45840 | 105840 | 182100 | 284280 | 403200 |
| 0.6 | 13680 | 32220 | 56760 | 130980 | 225360 | 351840 | 499080 |
| 0.8 | 15900 | 37500 | 66060 | 152520 | 262380 | 409560 | 580920 |
| 1.0 | 17940 | 42240 | 74340 | 171660 | 295320 | 460980 | 653880 |
| 1.2 | 19740 | 46500 | 81960 | 189120 | 325920 | 507960 | 720480 |
| 1.4 | 21420 | 50520 | 88980 | 205380 | 353340 | 551580 | 782340 |
| 1.6 | 23040 | 54240 | 95580 | 220620 | 379500 | 592500 | 840360 |
| 1.8 | 24540 | 57840 | 101820 | 235020 | 404340 | 631200 | 895320 |
| 2.0 | 25980 | 61200 | 107760 | 248760 | 427980 | 668160 | 947700 |
| 3.0 | 32400 | 76320 | 134400 | 310260 | 533760 | 833220 | 1181820 |
| 4.0 | 37980 | 89460 | 157560 | 363720 | 625740 | 976860 | 1385520 |
| 5.0 | 43020 | 101400 | 178560 | 412140 | 709080 | 1106940 | 1570080 |
| 6.0 | 47700 | 112440 | 198000 | 457080 | 786360 | 1227600 | 1741260 |
| 7.0 | 52140 | 122820 | 216300 | 499380 | 859140 | 1341240 | 1902420 |
| 8.0 | 56340 | 132720 | 233760 | 539640 | 928440 | 1449360 | 2055780 |
| 9.0 | 60360 | 142260 | 250500 | 578280 | 994860 | 1553100 | 2202900 |
| 10.0 | 64260 | 151380 | 266640 | 615540 | 1058940 | 1653120 | 2344800 |
| 11.0 | 68040 | 160320 | 282300 | 651600 | 1121040 | 1750080 | 2482320 |
| 12.0 | 71700 | 168960 | 297480 | 681780 | 1172100 | 1828380 | 2591340 |
| 13.0 | 75240 | 177360 | 310620 | 707940 | 1217040 | 1898520 | 2690820 |
| 14.0 | 78480 | 184920 | 321600 | 732960 | 1260060 | 1965660 | 2785980 |
| 15.0 | 81060 | 190980 | 332100 | 756960 | 1301340 | 2030040 | 2877180 |

| Vacuum Setting InWC | Valve Size | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2" | 3" | 4" | 6" | 8" | 10" | 12" |
| 0.87 | 4680 | 10320 | 16020 | 34680 | 60480 | 91080 | 129000 |
| 1.00 | 5040 | 10980 | 17220 | 37320 | 64980 | 97920 | 138000 |
| 1.73 | 6660 | 14520 | 22620 | 49020 | 85320 | 129000 | 181980 |
| 2.00 | 7140 | 15600 | 24180 | 52620 | 91620 | 138000 | 195000 |
| 3.00 | 8700 | 19020 | 29580 | 64200 | 112020 | 169020 | 238020 |
| 4.00 | 10020 | 21900 | 34080 | 73980 | 129000 | 193980 | 274020 |
| 6.00 | 12180 | 26700 | 41520 | 90120 | 157020 | 237000 | 334020 |
| 8.00 | 13980 | 30600 | 47700 | 103020 | 180000 | 271980 | 384000 |
| 10.00 | 15600 | 34020 | 52980 | 115020 | 199980 | 301980 | 427020 |

It is suggested that API Standard 2000 be utilized to obtain the required flow capacity. SCFH Air Capacity @ 10% Overpressure and 60°F . For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

# SIZING TABLES

## Models 1400 and 1430

| Pressure Setting mbar | Valve Size (Orifice Size) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2" | 3" | 4" | 6" | 8" | 10" | 12" |
| 5 | 148 | 350 | 618 | 1428 | 2484 | 3924 | 5634 |
| 10 | 210 | 496 | 876 | 2016 | 3510 | 5550 | 7980 |
| 20 | 308 | 726 | 1278 | 2952 | 5142 | 8100 | 11700 |
| 30 | 385 | 906 | 1602 | 3690 | 6420 | 10140 | 14580 |
| 40 | 451 | 1062 | 1872 | 4326 | 7560 | 11880 | 17100 |
| 50 | 511 | 1200 | 2118 | 4890 | 8520 | 13440 | 19320 |
| 100 | 726 | 1716 | 3024 | 6960 | 12120 | 19200 | 27600 |
| 150 | 900 | 2118 | 3726 | 8580 | 15000 | 23700 | 34020 |
| 200 | 1044 | 2460 | 4332 | 10020 | 17400 | 27540 | 39540 |
| 250 | 1170 | 2766 | 4872 | 11220 | 19560 | 30960 | 44460 |
| 300 | 1290 | 3048 | 5364 | 12360 | 21540 | 34080 | 48960 |
| 350 | 1422 | 3348 | 5898 | 13620 | 23700 | 37500 | 53820 |
| 400 | 1536 | 3624 | 6360 | 14760 | 25680 | 40560 | 58260 |
| 450 | 1644 | 3876 | 6840 | 15780 | 27480 | 43380 | 62340 |
| 500 | 1728 | 4080 | 7200 | 16560 | 28860 | 45660 | 65580 |
| 550 | 1812 | 4272 | 7500 | 17340 | 30240 | 47760 | 68580 |
| 600 | 1890 | 4446 | 7860 | 18060 | 31500 | 49740 | 71460 |
| 650 | 1962 | 4620 | 8160 | 18780 | 32700 | 51660 | 74220 |
| 700 | 2028 | 4782 | 8400 | 19440 | 33840 | 53460 | 76800 |
| 750 | 2094 | 4938 | 8700 | 20040 | 34920 | 55200 | 79320 |
| 800 | 2160 | 5088 | 8940 | 20700 | 36000 | 56880 | 81720 |
| 850 | 2220 | 5232 | 9180 | 21240 | 37020 | 58500 | 84060 |
| 900 | 2280 | 5370 | 9480 | 21840 | 37980 | 60060 | 86280 |
| 1000 | 2394 | 5646 | 9960 | 22980 | 39960 | 63180 | 90720 |

## Models 1400 and 1430

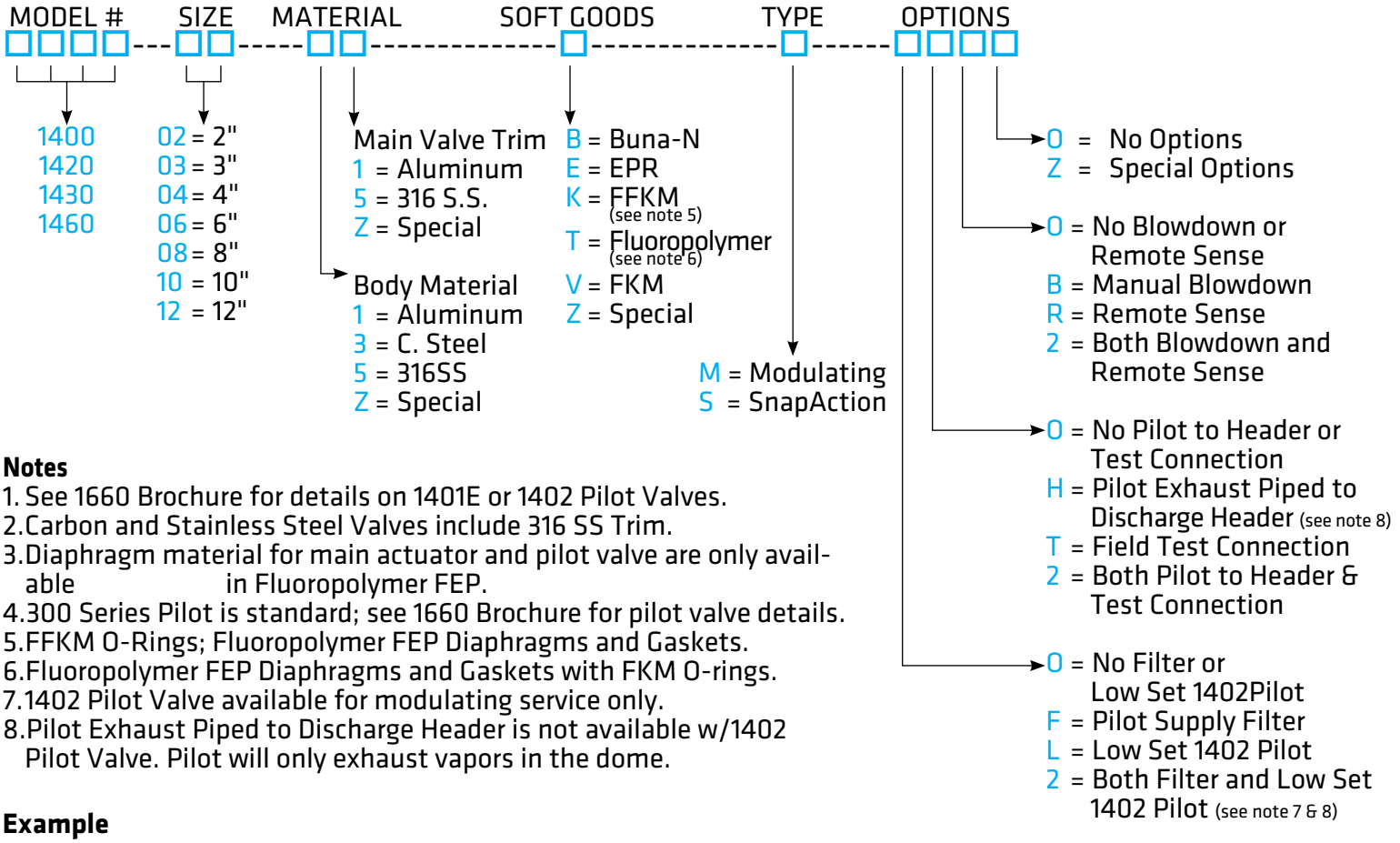
| Pressure Setting mbar | Valve Size (Orifice Size) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2" | 3" | 4" | 6" | 8" | 10" | 12" |
| 5 | 134 | 318 | 560 | 1290 | 2220 | 3468 | 4920 |
| 10 | 190 | 449 | 792 | 1824 | 3138 | 4902 | 6960 |
| 20 | 274 | 648 | 1134 | 2622 | 4518 | 7020 | 10020 |
| 30 | 339 | 798 | 1410 | 3246 | 5586 | 8700 | 12360 |
| 40 | 394 | 930 | 1638 | 3780 | 6480 | 10140 | 14400 |
| 50 | 445 | 1050 | 1842 | 4254 | 7320 | 11460 | 16200 |
| 100 | 630 | 1488 | 2622 | 6060 | 10440 | 16260 | 23040 |
| 150 | 780 | 1836 | 3228 | 7440 | 12840 | 20040 | 28380 |
| 200 | 906 | 2124 | 3750 | 8640 | 14880 | 23220 | 32940 |
| 250 | 1014 | 2388 | 4206 | 9720 | 16740 | 26100 | 37020 |
| 300 | 1116 | 2628 | 4626 | 10680 | 18360 | 28680 | 40680 |
| 350 | 1230 | 2892 | 5088 | 11760 | 20220 | 31560 | 44760 |
| 400 | 1332 | 3138 | 5526 | 12780 | 21960 | 34260 | 48600 |
| 450 | 1434 | 3372 | 5940 | 13740 | 23580 | 36840 | 52260 |
| 500 | 1530 | 3600 | 6360 | 14640 | 25200 | 39300 | 55740 |
| 550 | 1620 | 3816 | 6720 | 15540 | 26700 | 41700 | 59160 |
| 600 | 1710 | 4032 | 7080 | 16380 | 28200 | 44040 | 62460 |
| 650 | 1800 | 4242 | 7440 | 17220 | 29640 | 46260 | 65640 |
| 700 | 1884 | 4440 | 7800 | 18060 | 31080 | 48480 | 68820 |
| 750 | 1968 | 4644 | 8160 | 18840 | 32460 | 50700 | 71880 |
| 800 | 2052 | 4836 | 8520 | 19500 | 33540 | 52380 | 74220 |
| 850 | 2136 | 5028 | 8820 | 20100 | 34500 | 53820 | 76320 |
| 900 | 2208 | 5202 | 9060 | 20580 | 35460 | 55260 | 78360 |
| 1000 | 2322 | 5466 | 9480 | 21660 | 37260 | 58140 | 82380 |

| Vacuum Setting InWC | Valve Size | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2" | 3" | 4" | 6" | 8" | 10" | 12" |
| 2 | 132 | 288 | 449 | 972 | 1698 | 2556 | 3612 |
| 3 | 161 | 353 | 549 | 1194 | 2076 | 3126 | 4422 |
| 4 | 186 | 406 | 630 | 1374 | 2394 | 3606 | 5094 |
| 5 | 208 | 454 | 708 | 1536 | 2676 | 4026 | 5694 |
| 7 | 245 | 536 | 834 | 1812 | 3156 | 4752 | 6720 |
| 10 | 292 | 636 | 996 | 2160 | 3762 | 5664 | 7980 |
| 15 | 356 | 780 | 1212 | 2628 | 4584 | 6900 | 9780 |
| 20 | 409 | 894 | 1392 | 3018 | 5262 | 7920 | 11220 |
| 25 | 455 | 996 | 1548 | 3354 | 5850 | 8820 | 12480 |

It is suggested that API Standard 2000 be utilized to obtain the required flow capacity. NCMH AIR CAPACITY @10% OVERPRESSURE AND 0° C For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

# HOW TO ORDER

For easy ordering, select proper model numbers




**Notes**

1. See 1660 Brochure for details on 1401E or 1402 Pilot Valves.
2. Carbon and Stainless Steel Valves include 316 SS Trim.
3. Diaphragm material for main actuator and pilot valve are only available in Fluoropolymer FEP.
4. 300 Series Pilot is standard; see 1660 Brochure for pilot valve details.
5. FFKM O-Rings; Fluoropolymer FEP Diaphragms and Gaskets.
6. Fluoropolymer FEP Diaphragms and Gaskets with FKM O-rings.
7. 1402 Pilot Valve available for modulating service only.
8. Pilot Exhaust Piped to Discharge Header is not available w/1402 Pilot Valve. Pilot will only exhaust vapors in the dome.

**Example**

| 1 | 4 | 3 | 0 | – | 0 | 6 | – | 3 | 5 | – | V | – | S | – | O | O | R | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Indicates a 6" Model 1430 with carbon steel body and 316SS trim using FKM soft goods, snap action with remote pilot pickup and no other options.

GROTH CORPORATION®

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