Technical Specifications
Rev. B - 04/2021

# Mooney™ Regulators



Baker Hughes

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# Mooney Flowgrid

## Product Overview

Mooney *Flowgrid™* Regulator is an easy-to-maintain valve for self-contained pilot systems that allows users to maintain pressure and flow control of almost any gas or liquid. The Mooney Flowgrid Regulator is well-suited for pressure reducing (PRV), back pressure or relief (BPV) flow control and multi-function control applications where reliable regulation, simplicity and ease-of-maintenance are important. As a self-contained, pilot-operated device, this advanced technology solution can offer substantial energy savings when compared to conventional air-operated or electrically operated control valves.

Baker Hughes has secured global PED EN 334 certification for its Mooney Flowgrid regulators, demonstrating our commitment to quality and safety. The certification was awarded by DVGW (the German Technical and Scientific Association for Gas and Water), one of the world's most recognized industry certification bodies and the largest gas and water industry certification agency in Europe. Baker Hughes has also secured the following verifications; ISO 9001, ISO 14001, CRN, along with others testifying to the safety and quality of the Mooney Flowgrid regulator.

## General Data & Specifications

| | |
|---|---|
| **Sizes** | 1"-12" (25-300 mm) |
| **Body Styles** | Single Port: 1–8 in. (25-200 mm)<br>Dual Port: 10 & 12 in. (250 & 300 mm) |
| **ANSI/ASME Rating** | CL 150-600 |
| **End Connections** | Screwed, Socket Weld, Flanged, Flangeless |
| **Outlet Pressures** | 5" w.c. – 900 psi (0.01 bar - 62 bar) |
| **Maximum Operating Differential** | 800 psi (55 bar) |
| **Maximum Emergency Differential**[1] | 1000 psi (70 bar) |
| **Cracking Differential** | 4 ± 1 psid (0.28 ± 0.07 bar) |
| **Working Temperature** | -20°F to 150°F (-29°C to 66°C) |
| **Min/Max Temperature** | -40°F to 175°F (-40°C to 79°C) |
| **Flow Direction** | Bi-Directional |

1. Unless limited by body rating

## Materials of Construction

| | |
|---|---|
| **Body** | Steel, Stainless Steel, Ductile Iron |
| **Body & Spring Case** | ASTM A 216 GR WCB Carbon Steel |
| **Throttle Plate** | 17 – 4PH Stainless Steel or A515 Carbon Steel with ENC Coating |
| **Diaphragm** | Nitrile/Nylon[1] Optional (Viton/Nylon) |
| **O-Ring & Seals** | Nitrile, Optional (Viton) |
| **Bolting** | ASTM A 193 GR B-7 or Equal |
| **Spring** | 301 Stainless Steel |

1. Refer to the diaphragm selection chart on page 14.

## Specifications Overview

### Single Port Designs

| Nominal Size inches (mm) | Stock No. | End Connections | Max Pressure psig (bars) | Nominal Port Size inches (mm) | Face to Face inches (mm) | Valve Weight lbs (kg) |
|---|---|---|---|---|---|---|
| 1 (25) | FG11 & 12 | NPT/SWE | 1480 (102) | 1 (25) | 7.00 (180) | 11 (5) |
| 1 (25) | FG 54[1] | 150 CL FLG | 285 (19.6) | 1 (25) | 7.25 (180) | 14 (6) |
| 1 (25) | FG 55[1] | 300 CL FLG | 740 (51) | 1 (25) | 7.75 (200) | 16 (7) |
| 1 (25) | FG 56[1] | 600 CL FLG | 1480 (102) | 1 (25) | 8.25 (210) | 18 (8) |
| 2 x 1 (50 x 25) | FG 29 & 50 | NPT/SWE | 1480 (102) | 1 (25) | 7.00 (180) | 14 (6) |
| 2 x 1 (50 x 25) | FG 51 | 150 CL FLG | 285 (19.6) | 1 (25) | 10.00 (250) | 23 (10) |
| 2 x 1 (50 x 25) | FG 52 | 300 CL FLG | 740 (51) | 1 (25) | 10.50 (270) | 26 (11) |
| 2 x 1 (50 x 25) | FG 53 | 600 CL FLG | 1480 (102) | 1 (25) | 11.25 (290) | 30 (14) |
| 2 (50) | FG 27 & 28 | NPT/SWE | 1480 (102) | 2 LP (50) | 8.00 (200) | 25 (11) |
| 2 (50) | FG 29 | 150 CL FLG | 285 (19.6) | 2 LP (50) | 10.00 (250) | 34 (15) |
| 2 (50) | FG 30 | 300 CL FLG | 740 (51) | 2 LP (50) | 10.50 (270) | 37 (17) |
| 2 (50) | FG 31 | 600 CL FLG | 1480 (102) | 2 LP (50) | 11.25 (290) | 40 (18) |
| 2 x 3 (50 x 80) | FG 119 | 150 CL FLG | 285 (19.6) | 3 (80) | 10.00 (250) | 78 (35) |
| 2 x 3 (50 x 80) | FG 120 | 300 CL FLG | 740 (51) | 3 (80) | 10.50 (270) | 82 (37) |
| 2 x 3 (50 x 80) | FG 121 | 600 CL FLG | 1480 (102) | 3 (80) | 11.25 (290) | 88 (41) |
| 2 x 3 (50 x 80) | FG 117 | NPT CL 600 | 1480 (102) | 3 (80) | 8.00 (200) | 68 (31) |
| 2 x 3 (50 x 80) | FG 118 | SWE CL 600 | 1480 (102) | 3 (80) | 8.00 (200) | 68 (31) |
| 3 (80) | FG 16 | 150 CL FLG | 285 (19.6) | 3 (80) | 11.75 (300) | 73 (33) |
| 3 (80) | FG 17 | 300 CL FLG | 740 (51) | 3 (80) | 12.50 (320) | 85 (39) |
| 3 (80) | FG 18 | 600 CL FLG | 1480 (102) | 3 (80) | 13.25 (340) | 94 (43) |
| 4 (100) | FG 39 | 150 CL FLG | 285 (19.6) | 4 (100) | 13.88 (350) | 103 (47) |
| 4 (100) | FG 40 | 300 CL FLG | 740 (51) | 4 (100) | 14.50 (370) | 117 (53) |
| 4 (100) | FG 41 | 600 CL FLG | 1480 (102) | 4 (100) | 15.50 (400) | 143 (65) |
| 6 (150) | FG 44 | 150 CL FLG | 285 (19.6) | 6 (150) | 17.75 (450) | 200 (91) |
| 6 (150) | FG 45 | 300 CL FLG | 740 (51) | 6 (150) | 18.62 (470) | 240 (109) |
| 6 (150) | FG 46 | 600 CL FLG | 1480 (102) | 6 (150) | 20.00 (510) | 330 (150) |
| 8 (200) | FG 72 | 150 CL FLG | 285 (19.6) | 8 (200) | 21.38 (540) | 450 (204) |
| 8 (200) | FG 73 | 300 CL FLG | 740 (51) | 8 (200) | 22.38 (570) | 500 (227) |
| 8 (200) | FG 80 | 600 CL FLG | 1480 (102) | 8 (200) | 24.00 (610) | 650 (295) |

1. Special welded assembly

## Dual Port Designs

| Nominal Size inches (mm) | Stock No. | End Connections | Max Pressure psig (bar) | Nominal Port Size inches (mm) | Face to Face inches (mm) | Valve Weight lbs (kg) |
|---|---|---|---|---|---|---|
| 10 (250) | FG 57 | 150 CL FLG | 285 (20) | 6 (150) | 26.50 (673) | 590 (268) |
| 10 (250) | FG 58 | 300 CL FLG | 740 (51) | 6 (150) | 27.88 (708) | 670 (304) |
| 10 (250) | FG 59 | 600 CL FLG | 1480 (102) | 6 (150) | 29.60 (752) | 900 (408) |
| 12 (300) | FG 74 | 150 CL FLG | 285 (20) | 8 (200) | 29.00 (737) | 1097 (498) |
| 12 (300) | FG 75 | 300 CL FLG | 740 (51) | 8 (200) | 30.50 (775) | 1195 (542) |
| 12 (300) | FG 81 | 600 CL FLG | 1480 (102) | 8 (200) | 32.25 (819) | 1383 (627) |

## Flangeless Port Designs

| Nominal Size inches (mm) | Stock No. | End Connections | Max Pressure psig (bar) | Nominal Port Size inches (mm) | Face to Face inches (mm) | Valve Weight lbs (kg) |
|---|---|---|---|---|---|---|
| 4 x 3 (100 x 80) | FG 19 | 150 CL FLG | 285 (20) | 3 (80) | 5.81 (148) | 92 (42) |
| 4 x 3 (100 x 80) | FG 20 | 300 CL FLG | 740 (51) | 3 (80) | 5.81 (148) | 92 (42) |
| 6 x 4 (150 x 100) | FG 42 | 150 CL FLG | 285 (20) | 4 (100) | 8.00 (200) | 115 (52) |
| 6 x 4 (150 x 100) | FG 43 | 300 CL FLG | 740 (51) | 4 (100) | 8.00 (200) | 115 (52) |

## Type-A Flangeless Port Designs

| Nominal Size inches (mm) | Stock No. | End Connections | Max Pressure psig (bar) | Nominal Port Size inches (mm) | Face to Face Inches (mm) | Valve Weight lbs (kg) |
|---|---|---|---|---|---|---|
| 2 (50) | FG 100 | 150 CL FLG | 285 (20) | 2 LP (50) | 3.03 (80) | 29 (13) |
| 2 (50) | FG 101 | 300 CL FLG | 740 (51) | 2 LP (50) | 3.03 (80) | 29 (13) |
| 2 (50) | FG 102 | 600 CL FLG | 1480 (102) | 2 LP (50) | 3.41 (90) | 29 (13) |
| 3 (80) | FG 103 | 150 CL FLG | 285 (20) | 3 (80) | 3.72 (95) | 60 (27) |
| 3 (80) | FG 104 | 300 CL FLG | 740 (51) | 3 (80) | 3.72 (95) | 60 (27) |
| 4 (100) | FG 106 | 150 CL FLG | 285 (20) | 4 (100) | 4.50 (115) | 85 (39) |
| 4 (100) | FG 107 | 300 CL FLG | 740 (51) | 4 (100) | 4.50 (115) | 85 (39) |

Note: Same face-to-face dimensions as American Meter Axial® Flow Valves.

## Flow Coefficients & Constants

### Single Port Designs

| Size inches (mm) | End Connection | Port Size inches (mm) | Percent Capacity (%) | Cv | C1 | Cg | Swage Factor 1.5:1 | Swage Factor 2:1 |
|---|---|---|---|---|---|---|---|---|
| 1 (25) | CL 600 NPT<br>CL 600 SWE<br>CL 150-600 FLG | 1 (25) | 100 | 13.2 | 34 | 450 | 0.96 | 0.93 |
| | | | 75 | 10.6 | 30 | 320 | 0.97 | 0.95 |
| | | | 50 | 8.9 | 27 | 240 | 0.98 | 0.96 |
| | | | 35 | 5.4 | 26 | 140 | 1.00 | 0.99 |
| 2 x 1 (50 x 25) | CL 150-600 FLG<br>CL 600 NPT<br>CL 600 SWE | 1 (25) | 100 | 13.4 | 37 | 500 | 0.96 | 0.93 |
| | | | 75 | 10.7 | 30 | 320 | 0.97 | 0.95 |
| | | | 50 | 9.1 | 27 | 245 | 0.98 | 0.96 |
| | | | 35 | 5.5 | 26 | 144 | 1.00 | 0.99 |
| 2 (50) | CL 150-600 FLG<br>CL 600 NPT<br>CL 600 SWE<br>CL 600 BWE | 2 LP (50) | 100 | 40 | 35 | 1420 | 0.97 | 0.96 |
| | | | 75 | 34 | 33 | 1130 | 0.98 | 0.97 |
| | | | 50 | 27 | 30 | 820 | 0.99 | 0.98 |
| | | | 35 | 20 | 30 | 610 | 1.00 | 1.00 |
| 2 (50) | CL 150-600 FLG<br>CL 600 NPT<br>CL 600 SWE | 3 (80) | – | – | – | – | – | – |
| | | | 100 | 56 | 35 | 1970 | 0.96 | 0.93 |
| | | | – | – | – | – | – | – |
| 3 (80) | CL 150-600 FLG<br>CL 150-600 BWE | 3 (80) | 100 | 96 | 36 | 3450 | 0.98 | 0.95 |
| | | | 75 | 81 | 34 | 2730 | 1.00 | 1.00 |
| | | | 50 | 68 | 32 | 2150 | 1.00 | 1.00 |
| | | | 35 | 49 | 31 | 1530 | 1.00 | 1.00 |
| 4 (100) | CL 150-600 FLG<br>CL 150-600 BWE | 4 (10) | 100 | 172 | 38 | 6500 | 0.97 | 0.95 |
| | | | 75 | 142 | 37 | 5300 | 0.98 | 0.96 |
| | | | 50 | 100 | 35 | 3550 | 0.99 | 0.98 |
| | | | 35 | 76 | 35 | 2700 | 1.00 | 1.00 |
| 6 (150) | CL 150-600 FLG<br>CL 150-600 BWE | 6 (150) | 100 | 313 | 40 | 12500 | 0.99 | 0.97 |
| | | | 50 | 240 | 28 | 6750 | 1.00 | 0.98 |
| 8 (200) | CL 150-600 FLG | 8 (200) | 100 | 530 | 38 | 20200 | 0.97 | 0.95 |
| | | | 75 | 515 | 30 | 15200 | 0.98 | 0.96 |
| | | | 50 | 350 | 29 | 10000 | 0.99 | 0.98 |
| | | | 35 | 250 | 28 | 7100 | 1.00 | 1.00 |

## Flangeless Single Port Designs

| Size inches (mm) | End Connections | Port Size inches (mm) | Percent Capacity (%) | Cv | C1 | Cg | Swage Factor 1.5:1 | Swage Factor 2:1 |
|---|---|---|---|---|---|---|---|---|
| 2 (50) | CL 150-600 Flangeless | 2 LP (50) | 100 | 40 | 35 | 1400 | – | – |
| | | | 75 | 33 | 33 | 1083 | – | – |
| | | | 50 | 27 | 30 | 824 | – | – |
| | | | 35 | 20 | 30 | 590 | – | – |
| 4 x 3 (100 x 80) | CL 150-300 Flangeless | 3 (80) | 100 | 95 | 36 | 3400 | 0.99 | 0.98 |
| | | | 75 | 79 | 34 | 2690 | 1.00 | 0.99 |
| | | | 50 | 62 | 32 | 1980 | 1.00 | 1.00 |
| | | | 35 | 48 | 31 | 1515 | 1.00 | 1.00 |
| 6 x 4 (150 x 100) | CL 150-300 Flangeless | 4 (100) | 100 | 172 | 37 | 6400 | 0.97 | 0.95 |
| | | | 75 | 142 | 32 | 4500 | 0.98 | 0.96 |
| | | | 50 | 100 | 30 | 3000 | 1.00 | 0.98 |
| | | | 35 | 76 | 30 | 2250 | 1.00 | 1.00 |
| 2 Type-A[1] (50) | CL 150-600 Flangeless | 2 LP (50) | 100 | 40 | 35 | 1400 | 0.98 | 0.96 |
| | | | 75 | 33 | 33 | 1083 | 0.98 | 0.97 |
| | | | 50 | 27 | 30 | 824 | 0.99 | 0.98 |
| | | | 35 | 20 | 30 | 590 | 1.00 | 1.00 |
| 3 x 3 Type-A (80 x 80) | CL 150-300 Flangeless | 3 (80) | 100 | 92 | 35 | 3240 | 0.98 | 0.96 |
| | | | 75 | 80 | 33 | 2650 | 0.98 | 0.97 |
| | | | 50 | 68 | 32 | 2150 | 0.99 | 0.98 |
| | | | 35 | 49 | 31 | 1530 | 1.00 | 1.00 |
| 4 x 4 Type-A (100 x 100) | CL 150-300 Flangeless | 4 (100) | 100 | 168 | 35 | 5800 | 0.98 | 0.96 |
| | | | 75 | 135 | 37 | 5000 | 0.98 | 0.97 |
| | | | 50 | 100 | 35 | 3550 | 0.99 | 0.98 |
| | | | 35 | 76 | 35 | 2700 | 1.00 | 1.00 |

1. All Flangeless valves except FG-15 & FG-35 include Line Bolt Kits.

## Dual Port Designs

| Size inches (mm) | End Connections | Port Size inches (mm) | Percent Capacity (%) | Cv | C1 | Cg | Swage Factor 1.5:1 | Swage Factor 2:1 |
|---|---|---|---|---|---|---|---|---|
| 10 (250) | CL 150-600 FLG | 6 (150) | 100 | 650 | 33 | 22000 | 1.00 | 0.99 |
| | | | 75 | 550 | 30 | 16500 | 1.00 | 0.99 |
| | | | 50 | 472 | 28 | 13200 | 1.00 | 0.99 |
| | | | 35 | 290 | 27 | 7830 | 1.00 | 1.00 |
| 12 (300) | CL 150-600 FLG | 8 (200) | 100 | 1060 | 38 | 40400 | 0.97 | 0.95 |
| | | | 75 | 1030 | 30 | 30400 | 0.98 | 0.96 |
| | | | 50 | 700 | 29 | 20000 | 0.99 | 0.98 |
| | | | 35 | 500 | 28 | 14200 | 1.00 | 1.00 |

## Valve Performance

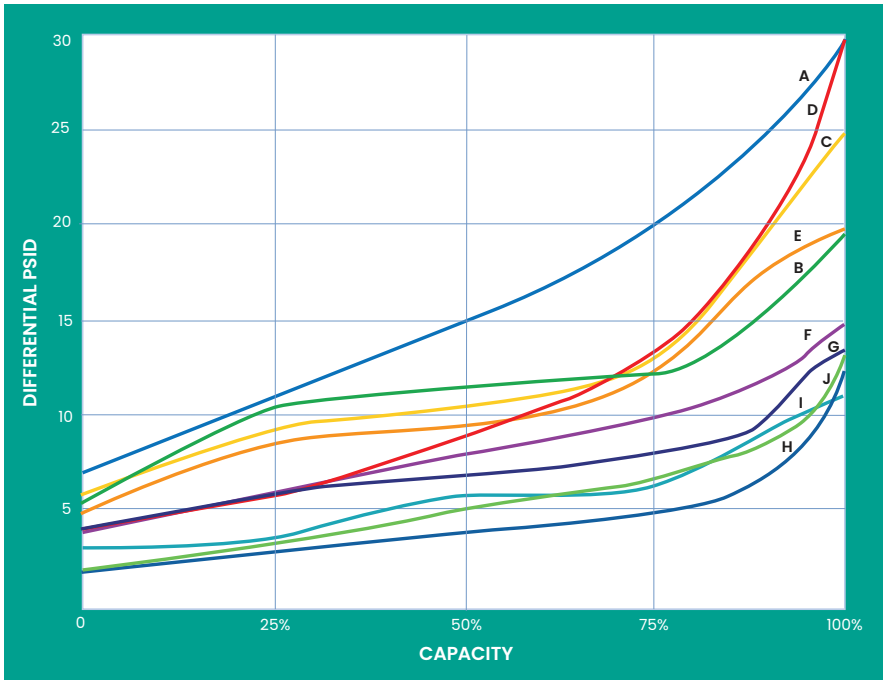
### Performance with Series 20L and Series 20 Pilot

| Mooney Series 20L Pilot | | Pressure Reducing Mode Restrictor Set at 4 | | |
|---|---|---|---|---|
| **Pilot Spring** | **Range** | **Lockup** | **Droop Max Capacity [1]** | **Boost @ Constant Flow [2]** |
| White | 5 i.w.c. - 15 i.w.c. | 1.0 i.w.c. | 0.5 i.w.c. | 0.7 i.w.c. |
| Brown | 10 i.w.c. - 40 i.w.c. | 1.0 i.w.c. | 2 i.w.c. | 0.7 i.w.c. |
| Yellow | 1-3 psig | 0.2 psig | 0.15 psig | 0.25 psig |
| Orange | 2-5 psig | 0.35 psig | 0.25 psig | 0.25 psig |
| Gray | 4-8 psig | .5 psig | 0.30 psig | 0.25 psig |

| Mooney Series 20 Pilot | | Pressure Reducing Mode Restrictor Set at 4 | | | Back Pressure Mode Restrictor Set at 4 | |
|---|---|---|---|---|---|---|
| **Pilot Spring** | **Range** | **Lockup** | **Droop Max Capacity[1]** | **Boost @ Constant Flow[2]** | **Build up Max Capacity** | **Lockup** |
| Red | 3-12 psig | 1.0 psig | .30 | .70 psig | Note 4 | Note 4 |
| Silver | 10-40 psig | 1.0 psig | .30 | .70 psig | +.50 psig | -1.0 psig |
| Blue | 25-90 psig | 2.0 psig | .60 | .70 psig | +.50 psig | -1.0 psig |
| Purple | 60-200 psig | 2.0 psig | 1.30 | .70 psig | +1.0 psig | -1.0 psig |
| Black | 100-260 psig | 5.0 psig | 2.00 | .70 psig | +3.0 psig | -1.5 psig |
| Green | 200-450 psig | 10.0 psig | 4.00 | .70 psig | +5.0 psig | -2.0 psig |
| HP Black | 200-520 psig | 10.0 psig | 4.00 | 1.50 psig | +5.0 psig[3] | -3.0 psig |
| HP Green | 400-900 psig | 20.0 psig | 8.00 | 1.50 psig | +12.0 psig[3] | -5.0 psig |

1. Inlet pressure (P1) constant  2. Per 100 psi decrease in inlet pressure (P1)  3. SST/Delrin trim required
4. Minimum set point for the Flowgrid Valve and Pilot when used as a relief valve is 15 psig or the minimum differential, whichever is greater.

### Minimum Pressure Differential Versus Capacity




A - 1" 75 Duro, STD Spring
B - 1" 60 Duro, Low Spring
C - 2" LP 75 Duro, STD Spring
D - 3" 75 Duro, STD Spring
E - 2" STD 75 Duro, STD Spring
F - 4", 6" 75 Duro, STD Spring
G - 2" STD 60 Duro, Low Spring
H - 4", 6" 60 Duro, Low Spring
I - 2" LP 60 Duro, Low Spring
J - 3" 60 Duro, Low Spring

Use the chart at left to determine the amount of available capacity through a Flowgrid valve when the differential pressure across the regulator falls below 30 psid.

For example: At 15 psid, a 1" single port valve with a standard main spring and 75 duro diaphragm (A) can flow 50% of total calculated capacity in this condition. With a low differential main spring and 60 durometer diaphragm installed (B), the valve can flow approximately 90% of its calculated capacity.

# Mooney Flowgrid Noise Controller (FG-NC)

## Product Overview

The FG-NC is a noise reducing device designed for use with the Mooney Flowgrid regulator. The FG-NC acts as an energy absorber that when used properly can reduce noise levels up to 25 dBA.

When gas flow exits the standard Flowgrid throttle plate, it passes through a series of flow channels created by the Noise Plate Assembly of the FG-NC. As the gas passes through these channels, the noise energy is dissipated, causing an overall reduction in noise.

The FG-NC is integrated into the top entry design of the Mooney Flowgrid regulator and can either be factory installed or ordered as a retrofit kit.

## General Data

| | |
|---|---|
| **Sizes (in)** | 1, 2, 2 (AC), 3, 4, 6, 8, 10, 12 |
| **Sizes (mm)** | 25, 50, 50 (AC), 80, 100, 150, 200, 250, 300 |
| **ANSI/ASME Rating** | CL 150-600 |
| **Working Temperature** | -20°F to 150°F (-29°C to 66°C) |
| **Min/Max Temperature** | -40°F to 175°F (-40°C to 79°C) |
| **Maximum Operating Differential** | 800 psi (55 bar)[1] |
| **Maximum Emergency Differential** | 1000 psi (69 bar)[1] |
| **Maximum Inlet Pressure** | 1480 psig (102 bar)[1] |
| **Flow Direction** | Unidirectional |

1. May be limited by body rating

## Materials of Construction

| | |
|---|---|
| **Housing** | Steel |
| **Plates** | Stainless Steel |
| **Plate Screws** | Stainless Steel |
| **Seals** | Nitrile |
| **Housing Studs** | ANSI B7 |

## Flow Coefficients & Constants

| **Flowgrid with 100% Throttle Plate and FG-NC** | | **Cv** | **C1** | **Cg** |
|---|---|---|---|---|
| **inches** | **mm** | | | |
| 1 | 25 | 7 | 35 | 250 |
| 2 | 50 | 24 | 35 | 840 |
| 2 AC | 50 | 44 | 35 | 1540 |
| 3 | 80 | 53 | 35 | 1860 |
| 4 | 100 | 89 | 35 | 3130 |
| 6 | 150 | 180 | 33 | 6000 |
| 8 | 200 | 295 | 36 | 10670 |
| 10 | 250 | 364 | 33 | 1200 |
| 12 | 300 | 593 | 36 | 21340 |

# Mooney Flowgrid Slam Shut

## Product Overview

The Mooney Flowgrid Slam Shut is a combination of a regulator and an automatic shut off device. In addition to pressure regulation, this pneumatically actuated device provides automatic downstream pressure protection. By separating the pneumatic controller and mechanical latching mechanism, shut off occurs only when designated set points are reached. The patent pending design prevents disruptive and costly “accidental shut offs”. Positive shut off is achieved instantly through the snap acting mechanism, and reset can be completed with common tools.

## General Data

| | |
|---|---|
| **Sizes** | 1” and 2” NPT and SWE, 1”- 6” (25-150 mm) RF Flanged |
| **Types** | Stand alone or integrated into Flowgrid regulator |
| **Body Styles** | Large Port, Single Port |
| **Pressure Protection** | Standard: Over Pressure<br>Optional: Over and/or Under |
| **Working Temperature** | -20°F to 150°F (-29°C to 66°C) |
| **Maximum Operating Inlet Pressure** | 1480 psig (102 bar)[1] |
| **Operating Sense Pressure 1-inch**<br>**2-4 inch** | 5 to 450 psig (0 .35 bar to 31 bar)<br>10 to 900 psig (0 .69 bar to 62 bar)[1] |
| **Flow Direction** | Unidirectional |
| **Taps** | Four ¼” – 18 NPT |
| **Response Time** | <0 .25 Seconds |
| **Main Shut-off Valve** | WCB Carbon Steel |
| **Flapper and Shaft** | 17-4 Ph Stainless Steel, A515 Carbon Steel w/ ENC Coating |
| **Controller Housing** | Aluminum |
| **O-Ring and Seals** | Nitrile |
| **Bushings** | Bronze |

1. May be limited by body rating

## Specifications Overview

With Series 41 (Single Function) or Series 41D (Dual Function) Controller

| Size inches (mm) | End Connections | Port Size inches (mm) | Stock No. (Flowgrid w/ Slam Shut) | Stock No. (Slam Shut only) | Stock No. (Retrofit kit) | Face to Face inches (mm) | Weight FG w/S.S. lbs (kg) |
|---|---|---|---|---|---|---|---|
| 1 (25) | CL 300 NPT | 1 (25) | SG-123 | SA-123 | SR-123 | 8.25 (210) | 21 (10) |
| | CL 300 SWE | | SG-125 | SA-125 | SR-125 | 8.25 (210) | 21 (10) |
| | CL 150 FLG | | SG-127 | SA-127 | SR-127 | 10.00 (250) | - |
| | CL 300 FLG | | SG-128 | SA-128 | SR-128 | 10.00 (250) | - |

With Series 50/51 (Single Function), Series 50D/51D (Dual Function), or Series 50DS/51DS (Dual Function Dual Sense) Controller

| Size inches (mm) | End Connections | Port Size inches (mm) | Stock No. (Flowgrid w/ Slam Shut) | Stock No. (Slam Shut only) | Stock No. (Retrofit kit) | Face to Face inches (mm) | Weight FG w/S.S. lbs (kg) |
|---|---|---|---|---|---|---|---|
| 2 (50) | CL 300 NPT | 2 LP (50) | SG-27 | SA-27 | SR-27 | 8.25 (203) | 58 (26) |
| | CL 300 SWE | | SG-28 | SA-28 | SR-28 | 8.25 (203) | 58 (26) |
| | CL 150 FLG | | SG-29 | SA-29 | SR-29 | 10.00 (250) | 69 (31) |
| | CL 300 FLG | | SG-30 | SA-30 | SR-30 | 10.50 (267) | 73 (33) |
| | CL 600 FLG | | SG-31 | SA-31 | SR-31 | 11.25 (287) | 82 (37) |
| | CL 300 BWE | | SG-77 | SA-77 | SR-77 | 11.25 (287) | 64 (30) |
| 3 (80) | CL 150 FLG | 3 (80) | SG-16 | SA-16 | SR-16 | 11.75 (299) | 136 (62) |
| | CL 300 FLG | | SG-17 | SA-17 | SR-17 | 12.50 (318) | 147 (67) |
| | CL 600 FLG | | SG-18 | SA-18 | SR-18 | 13.25 (337) | 154 (70) |
| | CL 300 BWE | | SG-61 | SA-61 | SR-61 | 13.25 (337) | 124 (56) |
| 4 (100) | CL 150 FLG | 4 (100) | SG-39 | SA-39 | SR-39 | 13.88 (353) | 197 (90) |
| | CL 300 FLG | | SG-40 | SA-40 | SR-40 | 14.50 (368) | 210 (95) |
| | CL 600 FLG | | SG-41 | SA-41 | SR-41 | 15.50 (394) | 222 (101) |
| | CL 300 BWE | | SG-63 | SA-63 | SR-63 | 15.50 (394) | 190 (86) |
| 6 (150) | CL 150 FLG | 6 (150) | SG-44 | SA-44 | SR-44 | 17.75 (451) | 498 (226) |
| | CL 300 FLG | | SG-45 | SA-45 | SR-45 | 18.65 (474) | 498 (226) |
| | CL 600 FLG | | SG-46 | SA-46 | SR-46 | 20.00 (508) | 524 (238) |
| | CL 300 BWE | | SG-65 | SA-65 | SR-65 | 20.00 (508) | 481 (218) |
| | CL 600 BWE | | SG-66 | SA-66 | SR-66 | 20.00 (508) | 481 (218) |

## Flow Coefficients & Constants – Flowgrid with Slam Shut

| Size inches (mm) | End Connection | Port Size inches (mm) | Percent Capacity (%) | Cv | C1 | Cg | Swage Factor 1.5:1 | Swage Factor 2:1 |
|---|---|---|---|---|---|---|---|---|
| 1 (25) | CL 300 NPT & SWE CL 150 FLG CL300 FLG CL 600 FLG | 1 (25) | 100 | 10.8 | 38 | 410 | 0.96 | 0.93 |
| | | | 75 | 8.0 | 35 | 280 | 0.97 | 0.95 |
| | | | 50 | 6.7 | 30 | 200 | 0.98 | 0.96 |
| | | | 35 | 3 .3 | 30 | 100 | 1.00 | 0.99 |
| 2 (50) | CL 300 NPT & SWE CL 150 FLG CL300 FLG CL 600 FLG | 2 LP (50) | 100 | 40 | 35 | 1420 | 0.97 | 0.96 |
| | | | 75 | 34 | 33 | 1130 | 0.98 | 0.97 |
| | | | 50 | 27 | 30 | 820 | 0.99 | 0.98 |
| | | | 35 | 20 | 30 | 610 | 1.00 | 1.00 |
| 3 (80) | CL 150 FLG CL 300 FLG CL 600 FLG CL 150 & 300 BWE | 3 (80) | 100 | 96 | 36 | 3450 | 0.98 | 0.95 |
| | | | 75 | 81 | 34 | 2730 | 1.00 | 1.00 |
| | | | 50 | 68 | 32 | 2150 | 1.00 | 1.00 |
| 4 (100) | CL 150 FLG CL 300 FLG CL 600 FLG CL 150 & 300 BWE | 4 (100) | 100 | 172 | 38 | 6500 | 0.97 | 0.95 |
| | | | 75 | 142 | 37 | 5300 | 0.98 | 0.96 |
| | | | 50 | 100 | 35 | 3550 | 0.99 | 0.98 |
| | | | 35 | 76 | 35 | 2700 | 1.00 | 1 .00 |
| 6 (150) | CL 150 FLG CL 300 FLG CL 600 FLG CL 150 & 300 BWE | 6 (150) | 100 | 313 | 40 | 12500 | 0.99 | 0.97 |
| | | | 50 | 240 | 28 | 67500 | 1.00 | 0.98 |

## Diaphragm Selection

| Compound | Temp. Range (°F) | Maximum Differential | Characteristics | Recommended Applications |
|---|---|---|---|---|
| 75 Duro | -20 to 150 | 1000 psid | Best all-around material | 60 psid to max. differential |
| 60 Duro | -25 to 150 | 300 psid | Best shutoff at low differential pressure | Low differential (100 psid or less) or low temperature |
| 80 Duro High ACN | -5 to 175 | 1000 psid | Higher abrasion and swelling resistance | High differential (400 psid or higher) or abrasive conditions with Distillates |
| 80 Duro Low ACN | -20 to 150 | 1000 psid | Higher abrasion resistance and low temperature flexibility | High differential (400 psid or higher) or abrasive conditions at low temperatures |

Note:

Minimum temperature is defined as the lowest temperature for normal valve operation. Valves will operate below this temperature, but response times may increase and bubble-tight shutoff may be impaired. At extreme low temperatures (below -40˚F), flexure of the diaphragm may result in cracking of the material. This will require replacement of the diaphragm.

Maximum differentials listed are recommended for best diaphragm life.

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# Mooney FlowMax

The Mooney *FlowMax™* regulator is a pressure reducing regulator that offers bubble tight shut off at all pressure differentials and full capacity at very low differential pressures. It is an equally innovative design that compliments the Flowgrid regulator. The FlowMax regulator maximizes capacity, speed of response, and accuracy while incorporating many of the same original maintenance and performance features for which the Flowgrid regulator is renowned.

## Overpressure Protection

The Mooney FlowMax regulator has a full rating of 250 psi (17 bar) on the inlet and outlet connections as well as the actuator housing assembly. Overpressure protection is required only if the pressure can exceed the flange or body rating. Anytime the FlowMax regulator or pilot system is exposed to pressures in excess of its rating it should be inspected for damage.

## General Data & Specifications

| | |
|---|---|
| **Sizes** | 2" – 6" (50–150 mm) |
| **Body Style** | Single Port |
| **End Connections** | NPT, RF Flanged, FF Flanged |
| **Working Temperature** | -20°F – 150°F (-29°C – 66°C) |
| **Min/Max Temperature** | -40°F – 175°F (-40°C – 79°C) |
| **Max. Operating Differential** | 250 psi (17 bar) |
| **Max. Casting Pressure** | 250 psi (17 bar) |
| **Min. Differential** | 3–4 psid (0.21 bar) |
| **Max. Inlet Pressure** | 250 psig (17 bar)[1] |
| **Outlet Pressure Range** | |
| **Series 20L** | 5" w.c. to 8 psi (0.01 bar to 0.55 bar) |
| **Series 20** | 3 psi to 248 psi (0.21 bar to 17 bar) |
| **Pilot Supply Body Tap** | One ¼" – 18 NPT |
| **Sense Line Tap** | One ½" – 14 NPT |

1. Limited by pilot or flange rating

## Materials of Construction

| | |
|---|---|
| **Body** | ASTM A 395 Ductile Iron |
| **Actuator Housing** | A 356-T6 Cast Aluminum |
| **Spring Case** | A 356-T6 Cast Aluminum |
| **Plug** | Nitrile |
| **Diaphragm** | Nitrile/Nylon |
| **O-Ring & Seals** | Nitrile |
| **Bolting** | ASTM B8 or equal |
| **Spring** | Music wire |

## Specifications Overview

| Size inches (mm) | End Connections | Orifice Size inches (mm) | Stock No. | Stock No. w/Indicator | Max Pressure psig (bar) | Min Differential psig (bar) | Face to Face inches (mm) | Valve Weight lbs. (kg) |
|---|---|---|---|---|---|---|---|---|
| 2 (50) | CL 150 RF FLG | 2 (50) | FM-1 | FM-1-T | 250 (17) | 3 (.21) | 10.00 (254) | 36 (16) |
| | NPT | | FM-2 | FM-2-T | – | – | 8.00 (203) | 31 (14) |
| | CL 150 FF FLG | | FM-3 | FM-3-T | – | – | 10.00 (254) | 36 (16) |
| 3 (80) | CL 150 RF FLG | 3 (80) | FM-4 | FM-4-T | 250 (17) | 4 (.28) | 11.75 (298) | 59 (27) |
| | CL 150 FF FLG | | FM-5 | FM-5-T | – | – | – | – |
| 4 (100) | CL 150 RF FLG | 4 (100) | FM-6 | FM-6-T | 250 (17) | 4 (.28) | 13.88 (352) | 103 (47) |
| | CL 150 FF FLG | | FM-7 | FM-7-T | – | – | – | – |
| 6 (150) | CL 150 RF FLG | 6 (150) | FM-8 | FM-8-T | 250 (17) | 4 (.28) | 17.75 (451) | 190 (86) |
| | CL 150 FF FLG | | FM-9 | FM-9-T | – | – | – | – |

## Flow Coefficients & Constants

| Size inches (mm) | End Connections | Percent Capacity (%) | Cv | C1 | Cg |
|---|---|---|---|---|---|
| 2 (50) | CL 150 RF FLG, FF FLG, NPT | 100 | 64 | 35 | 2250 |
| | | 75 | 47 | 34 | 1650 |
| | | 50 | 34 | 32 | 1200 |
| | | 25 | 17 | 28 | 600 |
| 3 (80) | | 100 | 114 | 37 | 4200 |
| | | 50 | 66 | 32 | 2100 |
| 4 (100) | | 100 | 212 | 35 | 7500 |
| | | 50 | 123 | 31 | 3800 |
| 6 (150) | | 100 | 393 | 37 | 14500 |
| | | 50 | 231 | 31 | 7200 |

# Mooney FlowMax Low Flow Range Extender (LFRX)

## Product Overview

Seasonal low flow demands on regulators in distribution networks can cause noisy vibrations and can send numerous high pressure waves downstream causing unstable flow conditions. The Mooney FlowMax regulator delivers high flow capacity with minimal pressure differential (2 psid - 4 psid) by design with a single top entry actuator. Our proprietary Flow Max Low Flow Range Extender (LRFX) improves the performance range of this regulator and allows it to deliver a smooth and accurate set point even when operating down to 1% of its top capacity.

## Capacity Comparison

| Flowmax Regulator Size inches (mm) | Standard P/N | Standard Max Cg | Standard Min Cg |
|---|---|---|---|
| 2 (50) | 132-055-01 | 2250 | 225 |
| 3 (80) | 133-043-01 | 4200 | 420 |
| 4 (100) | 134-043-01 | 7500 | 750 |
| 6 (150) | 136-043-01 | 14500 | 1450 |

| Flowmax Regulator Size inches (mm) | LFRX Kit[1] P/N | LFRX Max Cg | LFRX Min Cg |
|---|---|---|---|
| 2 (50) | 132-053-01 | 1901 | 57 |
| 3 (80) | 133-053-01 | 4074 | 122 |
| 4 (100) | 134-053-01 | 6900 | 207 |
| 6 (150) | 136-053-01 | 13630 | 408 |

1. LFRX is a full version kit that consists of a range extender, seat, O-rings, gasket and plug seal

# Mooney FlowMax HP

The Mooney FlowMax HP regulator is a high-pressure reducing regulator that offers a full Class 600 pressure rating, bubble tight shut-off at all pressure differentials and full capacity at very low differential pressures. This innovative Baker Hughes design compliments the Mooney Flowgrid regulator and FlowMax regulators. The FlowMax HP regulator maximizes capacity, speed of response, providing accuracy up to 1%[1] and incorporating many of the same original maintenance and performance features for which the Flowgrid regulator is renowned.

## Noise Control Options

Where a regulator application is controlling a high-pressure differential or high mass flow rate, noise may be a concern. In some cases, resulting noise generated may be high enough to require control. The Mooney FlowMax HP has two Lo-dB noise reduction options that can be specified. The Single Stage version provides noise attenuation of up to 20 dBA. For more severe applications a 2-Stage Lo-dB trim provides reductions up to 30 dBA. Both fit into the standard FlowMax HP without other modifications to allow field retrofit where required.

## Overpressure Protection

The Mooney FlowMax HP regulator has a full rating of 1480 psig (102 bar), for the CL600 version, on both the inlet and outlet connections as well as the actuator housing assembly. Overpressure protection is only required if the pressure can exceed the flange or body rating. Anytime the FlowMax HP regulator or pilot system is exposed to pressures in excess of its rating, it should be inspected for damage.

1. Accuracy is rated in accordance with EN 334 requirements.

## General Data & Specifications

| Body Size | 2" (DN 50) | 3" (DN 80) | 4" (DN 100) | 6" (DN 150) |
|---|---|---|---|---|
| End Connection | CL 300 RF<br>CL 600 RF | CL 300 RF<br>CL 600 RF | CL 300 RF<br>CL 600 RF | CL 300 RF<br>CL 600 RF |
| Body Material | Steel | Steel | Steel | Steel |
| **Maximum Inlet Pressure[1]** | | | | |
| CL 300 RF[1]<br>CL 600 RF[1] | 740 psig (51 bar)<br>1480 psig (102 bar) | 740 psig (51 bar)<br>1480 psig (102 bar) | 740 psig (51 bar)<br>1480 psig (102 bar) | 740 psig (51 bar)<br>1480 psig (102 bar) |
| **Maximum Outlet Pressure[1,2]** | | | | |
| Maximum Outlet Pressure[1,2]<br>Maximum Operating Differential[1]<br>Minimum Differential (fully open) | 1480 psi (102 bar)<br>1480 psi (102 bar)<br>3 psig (0.21 bar) | 1480 psi (102 bar)<br>1480 psi (102 bar)<br>4 psig (0.28 bar) | 1480 psi (102 bar)<br>1480 psi (102 bar)<br>4 psig (0.28 bar) | 1480 psi (102 bar)<br>1480 psi (102 bar)<br>4 psig (0.28 bar) |
| **Maximum Casing Pressure** | | | | |
| CL 300 RF[1]<br>CL 600 RF[1] | 740 psig (51 bar)<br>1480 psig (102 bar) | 740 psig (51 bar)<br>1480 psig (102 bar) | 740 psig (51 bar)<br>1480 psig (102 bar) | 740 psig (51 bar)<br>1480 psig (102 bar) |
| **Outlet Pressure Range** | | | | |
| Series 22 Pilot<br>FEP-1500-CH Pilot[2] | 3-900 psig (0.21-62 bar)<br>800-1300 psig (55-90 bar) | 3-900 psig (0.21-62 bar)<br>800-1300 psig (55-90 bar) | 3-900 psig (0.21-62 bar)<br>800-1300 psig (55-90 bar) | 3-900 psig (0.21-62 bar)<br>800-1300 psig (55-90 bar) |
| **Maximum Operating Differential Pressure** | | | | |
| Main Valve<br>Series 22 Pilot | 1480 psid (102 bard)<br>1000 psid (69 bard) between loading pressure in pilot and sense pressure | | | |
| **Temperature** | | | | |
| Operating Temperature<br>Emergency Temperature | -20°F to 150°F (-29°C to 66°C)<br>-40°F to 175°F (-40°C to 79°C) | -20°F to 150°F (-29°C to 66°C)<br>-20°F to 150°F (-29°C to 66°C) | -20°F to 150°F (-29°C to 66°C)<br>-20°F to 150°F (-29°C to 66°C) | -20°F to 150°F (-29°C to 66°C)<br>-20°F to 150°F (-29°C to 66°C) |

1. Do not exceed the pressure and temperature limits for the pressure class and body material as defined in ASME B16.34
2. Consult factory for outlet pressures (set pressure) above 900 psi (62 bar)

## Materials of Construction

| Ref. No. | Part Name | Material |
|---|---|---|
| 1 | Body | ASTM A216 GR WCC/WCB |
| 2 | Seat Ring | ASTM A479, Type 316 |
| 3 | Cage | ASTM A487 GR CA6NM, Chrome Plated |
| 4 | Plug | ASTM A564, Type 630, Condition H1075 (17-4PH) |
| 5 | Seat Insert, Soft Seat | Buna-N Nitrile |
| 6 | Plug Skirt | ASTM A479, Type 316 |
| 7 | Stem | ASTM A564, Type 630, Condition H1075 (17-4PH) |
| 8 | Housing Adapter | ASTM A216 GR WCC/WCB or ASTM A105 |
| 9 | Lower Diaphragm Housing | ASTM A216 GR WCC/WCB or ASTM A105 |
| 10 | Upper Diaphragm Housing, | ASTM A216 GR WCC/WCB or ASTM A105 |
| 11 | Stem Seal Housing | ASTM A479, Type 316 |
| 12 | Lower Diaphragm Support Plate | Anodized Aluminum ASTM B211 Alloy 6061-T6 |
| 13 | Upper Diaphragm Support Plate | Anodized Aluminum ASTM B211 Alloy 6061-T6 |
| 14 | Diaphragm | Nitrile with Nylon Fabric |
| 15 | Spring | ASTM A228, EN 10270-1-SH |
| 16 | Plug Seal | Nitrile Seal with Filled PTFE Backing Rings |
| 17 | Stem Seal | Nitrile Seal with Filled PTFE Backing Rings |
| 18 | Stem Glydring | Filled PTFE |
| 19 | Seal Housing Cover | ASTM A479, Type 316 |
| 20 | Diaphragm Washer | ASTM A564, Type 630, Condition H1075 (17-4PH) |
| 21 | Spring Guide | ASTM A564, Type 630, Condition H1075 (17-4PH) |
| 22 | Body & Housing Bolts | ASTM A193 GR B7 Zinc Plated |
| 23 | Seal Housing Bolts | 18-8 SST |
| 24 | Stem Nut | 18-8 SST |
| 25 | Seat & Body Gasket | 316L SST Spiral Wound Gasket with Graphite Filler |
| 26 | O-rings | Buna-N |
| 27 | X-ring | Buna-N |

## Specifications Overview

| Size inches (mm) | End Connections | Orifice Size inches (mm) | Stock No. | Stock No. w/Indicator | Max Pressure psig (bar) | Min Differential psig (bar) | Face to Face inches (mm) | Valve Weight lbs. (kg) |
|---|---|---|---|---|---|---|---|---|
| 2 (50) | CL 300 RFF | 2 (50) | FM-14 | FM-14T | 740 (51) | 3 (.21) | 10.50 (267) | 160 (73) |
| | CL 600 RFF | | FM-18 | FM-18T | 1480 (102) | 3 (.21) | 11.25 (286) | 163 (74) |
| 3 (80) | CL 300 RFF | 3 (80) | FM-15 | FM-15T | 740 (51) | 4 (.28) | 12.50 (317) | 302 (136) |
| | CL 600 RFF | | FM-19 | FM-19T | 1480 (102) | 4 (.28) | 13.25 (337) | 308 (140) |
| 4 (100) | CL 300 RFF | 4 (100) | FM-16 | FM-16T | 740 (51) | 4 (.28) | 14.50 (368) | 448 (203) |
| | CL 600 RFF | | FM-20 | FM-20T | 1480 (102) | 4 (.28) | 15.50 (394) | 469 (213) |
| 6 (150) | CL 300 RFF | 6 (150) | FM-17 | FM-17T | 740 (51) | 4 (.28) | 18.62 (473) | 654 (297) |
| | CL 600 RFF | | FM-21 | FM-21T | 1480 (102) | 4 (.28) | 20.00 (508) | 705 (320) |

## Flow Coefficients & Constants

| 100% Capacity | 2 (50) | 3 (80) | 4 (100) | 6 (150) |
|---|---|---|---|---|
| Cg | 2380 | 4970 | 7880 | 13720 |
| C1 | 34 | 36 | 36 | 36 |
| Cv | 70 | 138 | 219 | 381 |

# Flexflo Model 900TE

The Model 900TE (Top Entry) *Flexflo™* Regulator is a self-contained, pilot-operated pressure regulator that may be used in both gas and liquid applications. The 900TE Flexflo Regulator features a simple, top-entry design for easy inline maintenance and incorporates a cast steel body with integral flanged end connections. Multiple trim configurations are available to match a variety of applications. The 900TE Flexflo Regulator typically is used with a Pilot for pressure control applications. The environmentally friendly design of the Flexflo Regulator eliminates all atmospheric emissions by maintaining all gas/liquids within the piping system.

## General Data Overview

| | |
|---|---|
| **Sizes** | 2" - 6" (50 - 150 mm) |
| **End Connections** | 150, 300, 600 CL RF Flanged |
| **Working Temperature** | -20°F - 150°F (-29°C - 66°C) |
| **Min/Max Temperature** | -40°F - 175°F (-40°C - 79°C) |
| **Maximum Differential** | 1200 psid[1] |
| **Maximum Inlet Pressure** | 1480 psig[1] |
| **Outlet Pressure Range** | 1480 psig[2] |

1. Limited by Flexflo tube selection
2. Limited by Flexflo pilot selection

## Specifications Overview

| Size inches (mm) | End Connections | Face to Face inches (mm) | Valve Weight lbs. (kg) |
|---|---|---|---|
| 2 (50) | 150 CL RF FLG | 10 (250) | 40 (18) |
| | 300 CL RF FLG | 10.5 (267) | 45 (20) |
| | 600 CL RF FLG | 11.25 (286) | 49 (22) |
| 3 (80) | 150 CL RF FLG | 11.75 (298) | 96 (44) |
| | 300 CL RF FLG | 12.5 (318) | 103 (47) |
| | 600 CL RF FLG | 13.25 (337) | 119 (54) |
| 4 (100) | 150 CL RF FLG | 13.98 (352) | 124 (56) |
| | 300 CL RF FLG | 14.5 (368) | 144 (65) |
| | 600 CL RF FLG | 15.5 (394) | 164 (74) |
| 6 (150) | 150 CL RF FLG | 17.75 (451) | 294 (133) |
| | 300 CL RF FLG | 18.63 (473) | 338 (153) |
| | 600 CL RF FLG | 20 (500) | 373 (169) |

## Flow Coefficient Data

| Size inches (mm) | Max Cv (100% Core) | Qmax H20 (gpm) |
|---|---|---|
| 2 (50) | 58 | 300 |
| 3 (80) | 94 | 660 |
| 4 (100) | 128.5 | 1175 |
| 6 (150) | 304 | 2644 |

## Standard Flexflo Tube Materials

| REDQ Material (Code number) | 814 (C) | 846 (E) | 878 (A) | 893 (D) | 888 (B) | 725 (F) | 745 (M) 744 (L) 740 (K) | 644 (R) |
|---|---|---|---|---|---|---|---|---|
| Base Polymer | Nitrile | Nitrile | Hydrin | Hydrin | EPDM | Hydrin | HNBR | Nitrile |
| Nominal Durometer | 65 | 75 | 65 | 55 | 70 | 40 | 65, 75, 85 | 75 |
| Max. Differential (psid) | 740 | 1200 | 740 | 285 | 740 | 60 | 745, 744, 740, 285, 740, 1200 | 1200 |
| Temp. Range min/max °F | 10/150 | 10/150 | -20/150 | -20/150 | -40/120 | -40/48 | 10-212 | -40/150 |
| Temp. Range min/max °C | -12/65 | -12/65 | -29/65 | -40/65 | -29/79 | -40/48 | -12/100 | -40/65 |
| Hydrocarbon | | | | | | | | |
| Gaseous | OK | OK | OK | OK | NR | OK | OK | OK |
| Liquid | OK | OK | OK | OK | NY | OK | OK | OK |
| % Aromatic content Max | 20 | 15 | 30 | 15 | NR | 20 | 40 | NR |
| Max sulfur % wt | 0.5 | 0.5 | 5 | 0.5 | NR | 5 | 5 | NR |
| Fluid Compatibility | | | | | | | | |
| Water | OK | OK | NR | NR | OK | NR | OK | OK |
| Nitrogen | OK | OK | OK | OK | OK | OK | OK | OK |
| Air | OK | OK | OK | 120°F max | OK | OK | OK | OK |
| Synthetic Lubes (Phosphate Esters) | NR | NR | NR | OK | NR | NR | OK | OK |
| Peroxides (Sour Gasoline) | NR | NR | NR | NR | NR | NR | OK | OK |
| Ketones/Amines | NR | NR | NR | NR | NR | NR | NR | NR |
| Max H2S in water % wt | 0.5 | 0.5 | NR | NR | Unlimited | NR | 1.5 | NR |
| Methyl. Ethyl Alcohols | NR | NR | NR | NR | OK | NR | | NR |
| | Gen-Hydro-carbon Service, Water | Gen-Hydro-carbon Service, Water | Gen-Hydro-Carbon Service | Gen-Hydro-carbon Service | Std. Water Ammonia, $CO_2$ Service | Low ΔP Apps Only | White Petrol Products, Unleaded Gas w/ Alcohols (MTBE) Crude Oil | Gen-Hydro-carbon Service, Water |

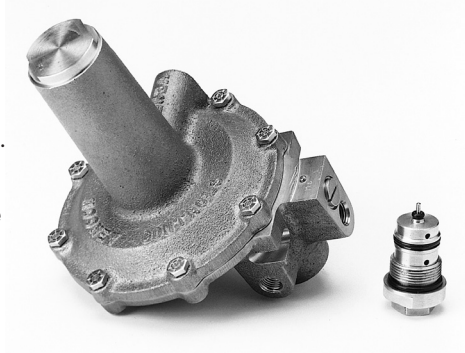
Notes:
- OK indicates material is compatible with corresponding fluid
- NR indicates material Not Recommended for specific Flexflo regulator model
- Nitrile, Hydrin and HNBR are standard
- *Suggestion only: Customer must choose best tube for the application*

# Pilots and Accessories

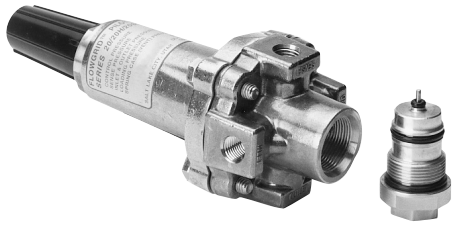
## Mooney Series 20, 20H, 20L

The Series 20 Flowgrid pilot is a reversible pressure-control regulator designed primarily for use as a control pilot for pressure-reducing (PRV), backpressure (BPV or Relief), and differential-pressure (DPV) applications. The Series 20 pilot is designed for both gas and liquid applications.

| | |
|---|---|
| Series 20 | Brass construction with 3 to 450 psig control pressure range |
| Series 20H | High pressure brass construction with a 200 to 900 psig control pressure range |
| Series 20S | Stainless steel construction with a 3 to 450 psig control pressure range |
| Series 20HS | High pressure, stainless steel construction with a 200 to 900 psig control pressure range. |
| Series 20L-B | Bronze construction with 5 i.w.c. to 8 psig control pressure range |
| Series 20L-A | Aluminum construction with 5 i.w.c. to 8 psig control pressure range |



Series 20L Pilot



Series 20 Pilot

| | Spring Color | Series 20 Pilot | Outlet Pressure Range |
|---|---|---|---|
|  | White | 20L | 5-15 i.w.c. (12 - 37 mbar) |
| | Brown | 20L | 10-40 i.w.c. (25 - 100 mbar) |
| | Yellow | 20L | 1-3 psig (0.07 - 0.21 bar) |
| | Orange | 20L | 2-5 psig (0.14 - 0.34 bar) |
| | Gray | 20L | 4-8 psig (0.28 - 0.55 bar) |
|  | Red | 20 | 3-12 psig (0.21 - 0.83 bar) |
| | Silver | 20 | 10-40 psig (0.69 - 2.8 bar) |
| | Blue | 20 | 25-90 psig (1.7 - 6.2 bar) |
| | Purple | 20 | 60-200 psig (4.1 - 13.8 bar) |
| | Black | 20 | 100-260 psig (6.9 - 18 bar) |
| | White/Green | 20 | 200-450 psig (13.8 - 31 bar) |
| | Black | 20HP | 200-520 psig (13.8 - 37 bar) |
| | White/Green | 20HP | 400-900 psig (28 - 62 bar) |

Note:

Pilots are available in
- 20L: Alumninium & Bronze
- 20 & 20HP: Brass & Stainless Steel

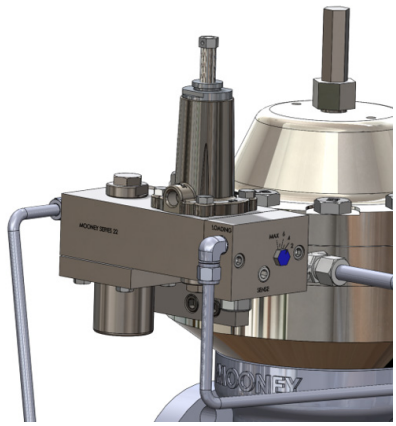
## Specifications

| 20 & 20H Pilot | | |
|---|---|---|
| **Max Inlet Pressure** | 1500 psig (103 bar) | |
| **Max Loading Connection Pressure** | 1500 psig (103 bar) | |
| **Max Outlet Pressure** | 1500 psig (103 bar) | |
| **Set Pressure Range** | | |
| Standard Pilot | 3 – 450 psig (.21-31 bar) | |
| HP Pilot | 200 – 900 psig (13.79 – 62 bar) | |
| **Max Emergency Sensing Pressure** | 1000 psig (69 bar) | |
| **Max Spring Housing Pressure** | 1000 psig (69 bar) | |
| **Port Size** | | |
| Standard | 0.15 in. (3.8 mm) | |
| Large | 0.17 in. (4.3 mm) | |
| **Working Temperature** | -20°F to 150°F (-29°C to 66°C) | |
| **Min/Max Temperature** | -40°F to 175°F (-40°C to 79°C) | |
| **Capacity** | **0.170 Orifice** | **0.150 Orifice** |
| Cg max | 11.2 | 9.6 |
| Cv max | 0.29 | 0.25 |
| C1 | 38 | 38 |

## Mooney Series 22, 22H

The Mooney Series 22 Pilot is a stainless steel, modular design which provides multiple regulating systems; pressure relieving, back pressure, standby monitor, and working monitor mode for the Flowmax HP. The Series 22 Pilot must be paired with the Type 27 variable restrictor which provides adjustable system gain, stability, and response. The Type 27 variable restrictor features a built-in check valve to prevent damage to diaphragm if the regulator sees high back pressure.

| | Spring Color | Series 22 pilot | Outlet Pressure Range |
|---|---|---|---|
| | Red | 22 | 3-12 psig (0.21 - 0 .83 bar) |
| | Silver | 22 | 10-40 psig (0.69 - 2 .8 bar) |
| | Blue | 22 | 25-90 psig (1 .7 - 6 .2 bar) |
| | Purple | 22 | 60-200 psig (4.1 - 13 .8 bar) |
| | Black | 22 | 100-260 psig (6.9 - 18 bar) |
| | White/Green | 22 | 200-450 psig (13.8 - 31 bar) |
| | Black | 22H | 200-520 psig (13.8 - 37 bar) |
| | White/Green | 22H | 400-900 psig (28 - 62 bar) |




## Specifications

| 22 & 22H Pilot | |
|---|---|
| **Max Inlet Pressure** | 1480 psig (102 bar) |
| **Max Loading Connection Pressure** | 1480 psig (102 bar) |
| **Max Outlet Pressure** | 1480 psig (102 bar) |
| **Set Pressure Range** | |
| Standard Pilot | 3 – 450 psig (.21 - 31 bar) |
| HP Pilot | 200 - 900 psig (13 .79 - 62 bar) |
| **Max Sensing Pressure** | 1000 psig (69 bar) |
| **Max Spring Housing Pressure** | 1000 psig (69 bar) |
| **Port Size** | |
| Standard | 0.15 in. (3.8 mm) |
| Large | 0.17 in. (4.3 mm) |
| **Working Temperature** | -20°F to 150°F (-29°C to 66°C) |
| **Min/Max Temperature** | -40°F to 175°F (-40°C to 79°C) |

## Series 22 Stock Numbers

| Spring Range - Color | PRV | | | BPV | | |
|---|---|---|---|---|---|---|
| | SST Orifice | | Delrin Orifice | SST Orifice | | Delrin Orifice |
| | .150" Orifice | .170" Orifice | .150" Orifice | .150" Orifice | .170" Orifice | .150" Orifice |
| 3-12 psig (0.2-0.8 barg) - Red | FP-248 | FP-264 | FP-280 | FP-256 | FP-272 | FP-288 |
| 10-40 psig (0.7-2.8 barg) - Plated | FP-249 | FP-265 | FP-281 | FP-257 | FP-273 | FP-289 |
| 25-90 psig (1.7-6.2 barg) - Blue | FP-250 | FP-266 | FP-282 | FP-258 | FP-274 | FP-290 |
| 60-200 psig (4.1-14 barg) - Purple | FP-251 | FP-267 | FP-283 | FP-259 | FP-275 | FP-291 |
| 100-260 psig (6.9-18 barg) - Black | FP-252 | FP-268 | FP-284 | FP-260 | FP-276 | FP-292 |
| 200-450 psig (14-31 barg) - White/Green | FP-253 | FP-269 | FP-285 | FP-261 | FP-277 | FP-293 |

Note: The letter "V" may be appended to any figure number to designate FKM soft goods (e.g. FP-248V or FP-293V)

## Series 22H Stock Numbers

| Spring Range - Color | PRV | | | BPV | | |
|---|---|---|---|---|---|---|
| | SST Orifice | | Delrin Orifice | SST Orifice | | Delrin Orifice |
| | .150" Orifice | .170" Orifice | .150" Orifice | .150" Orifice | .170" Orifice | .150" Orifice |
| 200-520 psig (14-36 barg)/Black | FP-254 | FP-270 | FP-286 | FP-262 | FP-278 | FP-294 |
| 400-900 psig (28-62 barg)/White/Green | FP-255 | FP-271 | FP-287 | FP-263 | FP-279 | FP-295 |

Note: The letter "V" may be appended to any figure number to designate FKM soft goods (e.g. FP-254V or FP-295V)

## Mooney Filters

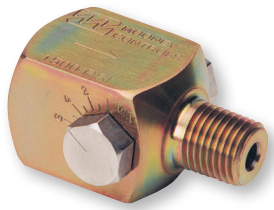
### Type 30A and 30S

The Type 30A and 30S Mooney Filters are designed to limit dirt and other debris particulates from entering the pilot supply which could affect the function of the restrictor or variable orifice in the pilot. Both Filters can be used in a variety of gas and liquid applications.

## Mooney Restrictor

### Type 24, 24S and 25

The Mooney Restrictor is an integral part of the Mooney Regulator Pilot System. It is usually located in the pilot supply and affects the response rate, stability, and sensitivity of the regulator. The Restrictor is available in both steel and stainless steel construction with a stainless steel rotor. The Type 24, 24S and 25 Restrictors can be used in many liquid and gas applications.

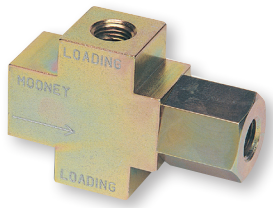


## Mooney Inspirator

### Type 26

Use of the Type 26 Inspirator in place of a Mooney Restrictor maximizes flow through the regulator at times when the pressure differential across the valve falls below the published valve minimum differential pressure for full capacity.

The Type 26 Inspirator incorporates a special nozzle design that reduces the loading (spring case) pressure to a value below the outlet pressure, allowing the valve to fully open even when the pressure differential is very small. The Inspirator acts like a differential amplifier with a gain of approximately 3.




## Specifications

| | Type 24 & 24S Restrictor | | Type 30A and 30S Filter | Type 26 Inspirator |
|---|---|---|---|---|
| **Pressure Rating** | 1,500 psig (103.4 bar) | | 1,500 psig (103.4 bar) | 1,500 psig (103.4 bar) |
| **Working Temperature** | -20°F to 150°F (-29°C to 66°C) | | -40°F to 175°F (-40°C to 79°C) | -20°F to 150°F (-29°C to 66°C) |
| **Flow Coefficient** | **Large** | **Std.** | | |
| Cg min | 1.60 | .75 | | 4.0 |
| Cg max | 7.3 | 5.8 | | |
| Cg | | | 19 | |
| C1 | | | 35 | |
| Cv | .18 | | .54 | |
| **Filter Element** | | | 10 Micron | |
| **Material** | Steel & Stainless Steel | | Aluminum, Stainless Steel | Steel |

# Sizing

## Universal Gas Sizing Equation

$$Q = \sqrt{\frac{520}{G \cdot T}} \quad Cg \cdot P_1 \cdot SIN \left[ \frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right] \text{deg.}$$

$$Cg = \frac{Q}{P_1 \sqrt{\frac{520}{G \cdot T}} \cdot SIN \left[ \frac{3417}{C_1} \sqrt{\frac{\Delta - P_2}{P_1}} \right] \text{deg.}}$$

**Simplifies 1.29**

Natural Gas at 60° F & 0.6 Sg

**Simplifies 1.00**

Critical Flow

| | |
|---|---|
| Q | Flow Rate (SCFH) |
| Cg | Gas Sizing Coefficient |
| $P_1$ | Inlet Pressure (psia) |
| ΔP | Pressure Drop Across Valve ( $\Delta P = P_1 - P_2$) (psid) |
| $P_2$ | Outlet Pressure (psia) |
| C1 | Valve Recovery Coefficient ($C_1 = Cg/C_v$) |
| Cv | Liquid Sizing Coefficient |
| G | Specific Gravity (0.6 for Natural Gas) (1.0 for Air) |
| T | Gas Temperature (°Rankine) (T = 460 + °F) |

## Simplified Gas Sizing Equation

If the following term $(P_1 - P_2) / P_1$ equals .64 or greater, then sonic velocity is present in the valve and the simplified version of the gas-sizing equation may be used.

**Air:** $Q = P_1 Cg$ **Natural Gas:** $Q = P_1 Cg\ 1.29$

Note: Valve sizing and selection software is available for download at: valves.bakerhughes.com/resource-center

## Liquid Sizing

$$Q = C_v F_p \sqrt{\frac{\Delta P_A}{G}}$$

| | |
|---|---|
| $\Delta P_A$ or ΔP | Allowable |
| $\Delta P_A$ | $P_1 - P_2$ or .8 $(P_1 - P_v)$ } whichever is less |
| Q | Flow gpm (gallons per minute) |
| Cv | Liquid Specific Gravity |

| | |
|---|---|
| G | Liquid Specific Gravity |
| $P_1$ | Inlet Pressure (psia) |
| $P_2$ | Outlet Pressure (psia) |
| Pv | Vapor Pressure (psia) |
| $F_P$ | Piping Swage Factor |

Use the minimum inlet and maximum flow conditions for a given application and solve the equation for Cg. For optimum performance, select a regulator to operate in the 10-80% range. A Baker Hughes representative can help you select and size a Flowgrid regulator.

## Gas Velocity

To avoid generating additional noise in the outlet piping, it is recommended that the body outlet velocity be limited to approximately 0.5 of Mach. This equates to approximately 500 ft/sec for air and 700 ft/sec for natural gas. Swages (reducers) should be used to further reduce the outlet piping velocity to approximately 200 ft/sec or less to minimize pressure loss. The formulas for velocity and pipe size are as follows:

$$V = \frac{748\ Q}{d^2 P_2}$$

| | |
|---|---|
| V | Velocity in ft/sec |
| d | Internal pipe diameter in inches |
| Q | Flow in MSCFH |
| $P_2$ | Outlet Pressure (psia) |

Note: To avoid the possibility of excessive noise, vibration, and damage to the regulator and piping, the outlet velocity should not exceed 70% of sonic velocity.

**Air:** 770 ft/sec **Natural Gas:** 1000 ft/sec

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