ANDERSON GREENWOOD

A simple, high performance and cost effective pilot operated valve.

Introduction

The Anderson Greenwood MLCP (Modulating Large Capacity Pilot Valve) is one of the first internal sensed pilot operated pressure relief valves to be released to the market. The MLCP provides many of the benefits of more complex valves, but in a simple, high performance, cost effective design.

The MLCP is a modulating pilot operated valve designed for gas and vapor service. It is ideal to protect gas distribution pipelines and positive displacement blowers. Moreover, with a set pressure range of 3 psig to 14.99 psig [0.2 to 1.03 barg], it is perfect for applications that normally require spring loaded conservation vents.

The MLCP will maintain zero leakage in excess of 92% of set pressure, while conservation vents will show leakage at 70% of set pressure.

Features

- Rigid Pilot Mounting: The MLCP pilot, being integral to the main valve, eliminates the need for mounting brackets and lowers the center of gravity.
- Viton® Soft Seats and Seals: Reduces emissions and product loss, while minimizing maintenance costs.
- Simple Design: Reduces maintenance time.
- Full Bore Orifices: Provide for maximum capacity in a given size, often reducing the size of the valve required and the size of associated piping.
- Internal Sensing: Reduces maintenance time, provides for a more compact design, and eliminates concerns related to tubing and fittings.
- Modulating Action: Reduces product loss and maintains pressure stability in the system.
- Full Rated Capacity at 10% Overpressure: Allows for increased set pressures and/or a smaller valve in a given application.

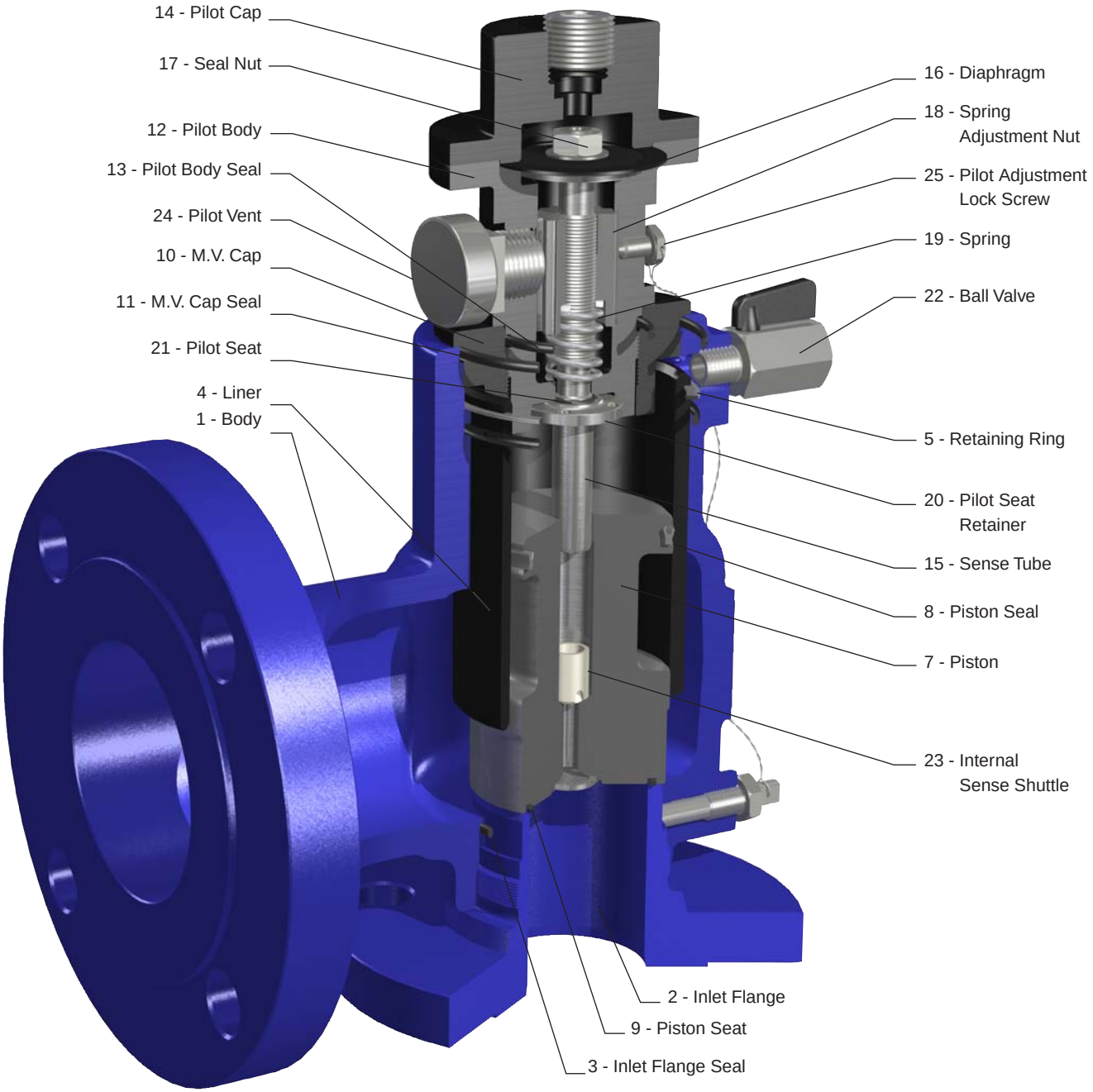
Options

- Field test connection (standard).
- Manual blowdown via field test connection.
- Provide normally-closed solenoid valve at field test connection to remotely open the valve.

tyco / Flow Control

Total Flow Control Solutions™

Parts and Materials



Normal Closed Position

U.S. Patent Number 6,318,406

Parts and Materials

Operating Pressures and Temperatures

Set pressure ranges are from 3 to 14.99 psig [0.207 to 1.03 barg]. Operating temperature is between -20°F to 400°F [-29 to +204°C].

Body Sizes and ANSI Flange Ratings

- 2” 150# x 3” 150#
- 3” 150# x 4” 150#
- 4” 150# x 6” 150#
- 6” 150# x 8” 150#

Recommended Soft Goods Limits

Material: Viton®

Continuous Process Temperature: -20°F to +400°F [-29°C to +204°C]

Pressure Range: 3 to 14.99 psig [0.207 to 1.03 barg]

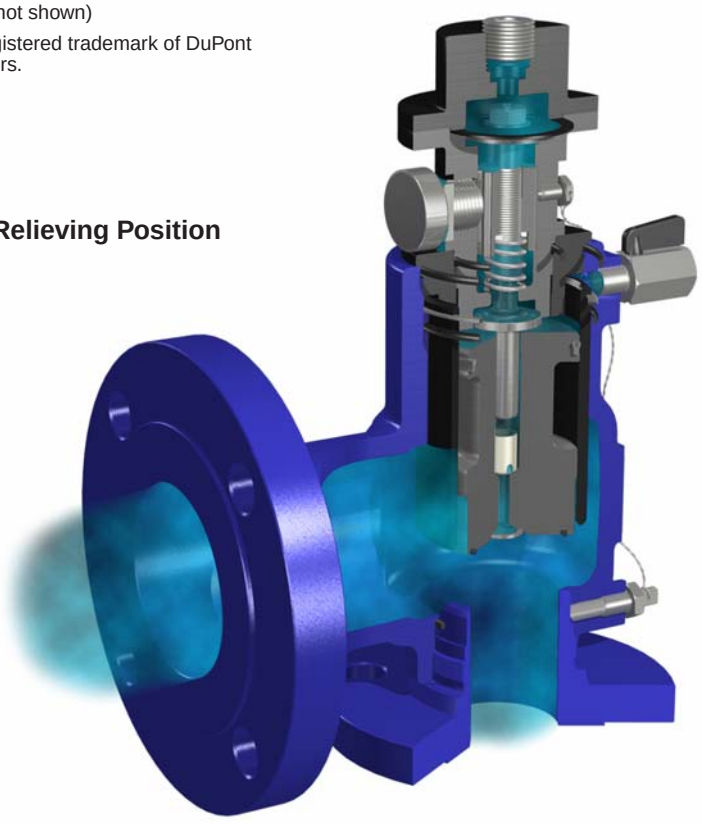
Parts and Materials

No.	Part	Material
1	Body	WCB
2	Inlet Flange	Carbon Steel
3	Inlet Flange Seal	Viton®
4	Liner	Steel
5	Retaining Ring	Carbon Steel
6	Backup Ring[1]	Viton®
7	Piston	Aluminum/Anodized
8	Piston Seal	Viton®
9	Piston Seat	Viton®
10	M.V. Cap	Aluminum/Anodized
11	M.V. Cap Seal	Viton®
12	Pilot Body	Aluminum/Anodized
13	Pilot Body Seal	Viton®
14	Pilot Caps	Aluminum/Anodized
15	Sense Tube	Stainless Steel
16	Diaphragm	Viton®
17	Seal Nut	Stainless Steel/Viton®
18	Spring Adjustment Nut	Aluminum
19	Spring	Stainless Steel
20	Pilot Seat Retainer	Stainless Steel
21	Pilot Seat	Viton®
22	Ball Valve	Brass/Chrome Plated
23	Internal Sense Shuttle	PEEK
24	Pilot Vent	Aluminum
25	Pilot Adjustment Lock Screw	Stainless Steel

Note

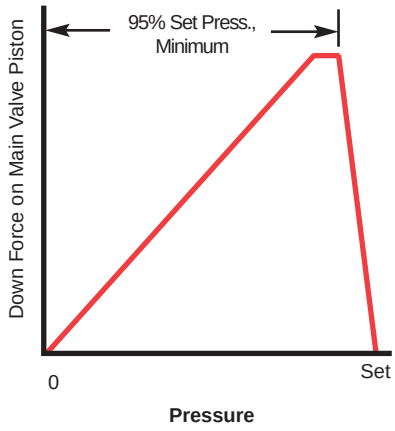
1. 6” valve only (not shown)
2. Viton® is a registered trademark of DuPont Dow Elastomers.

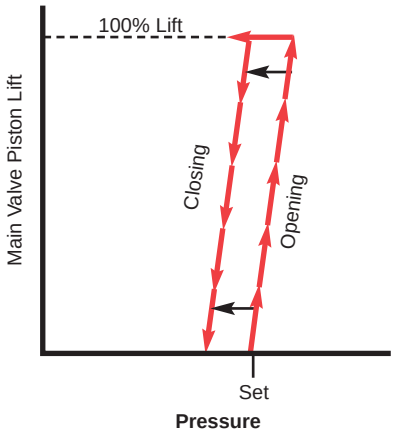
Relieving Position



Operation

In the normal closed position, full system pressure is sensed through the bottom of the piston. This pressure is seen on top of the piston or in the dome area. The area on top of the piston is greater than the seat area and thus, the piston is held closed. The same system pressure is sensed through the sense tube up into the sense cavity of the pilot. This pressure acts down on the pilot sense diaphragm and is opposed by a spring. Just prior to set pressure, the system pressure working down on the sense diaphragm will be great enough to compress the spring and open the pilot seat, creating dome pressure reduction. The pressure in the dome will continue to be reduced to the point where the force created by the system pressure acting up on the piston will be equal to the force created by the dome pressure acting down on the piston. Then any increase in the system pressure will lift the piston and allow the system pressure to vent through the main valve. This piston lift occurs at set pressure. Once the system pressure is reduced, dome pressure recovers, pushing the piston into the closed position.





Sizing Data

Sizing Formulas

English Units

$$A = \frac{V\sqrt{MTZ}}{4645\, K_d\, P_1\, F}$$

Metric Units

$$A = \frac{V\sqrt{MTZ}}{12{,}510\, K_d\, P_1\, F}$$

Subsonic Flow Factor

$$F = \sqrt{\frac{k}{k-1}\left[\left(\frac{P_2}{P_1}\right)^{\frac{2}{k}} - \left(\frac{P_2}{P_1}\right)^{\frac{k+1}{k}}\right]}$$

Subsonic Flow Coefficient

$$K_d = 0.717\left(\frac{P_2}{P_1}\right)^{-0.290}$$

For 6" Valve Only

$$K_d = 0.6958\left(\frac{P_2}{P_1}\right)^{-0.2189}$$

Orifice Areas

Valve Size in	[mm]	Orifice Area in²	[cm²]
2 x 3	[50 x 80]	3.141	[20.26]
3 x 4	[80 x 100]	7.069	[45.60]
4 x 6	[100 x 150]	12.567	[81.07]
6 x 8	[150 x 200]	28.274	[182.41]

Nomenclature

Symbol	Description	English Units	Metric Units
A	Calculated orifice area	in²	cm²
V	Required capacity	SCFM	Nm³/hr
M	Molecular weight	—	—
T	Relieving temperature (°R = °F + 460 or °K = °C + 273)	°R	°K
Z	Compressibility factor	—	—
K_d	Actual subsonic flow coefficient	—	—
P	Set pressure	psig	barg
P_1	Inlet flowing pressure (P + allowable overpressure - inlet pressure loss + atmospheric pressure)	psia	bara
P_2	Outlet flowing pressure	psia	bara
F	Subsonic flow factor	—	—
k	Ratio of Specific heats $\left(k = \frac{C_p}{C_v}\right)$	—	—

Air Capacities*

Valve Size, in	2 x 3	3 x 4	4 x 6	6 x 8
Orifice Size, in²	3.141	7.069	12.567	28.274
Set Pressure				
3	624	1405	2497	5375
4	731	1646	2926	6271
5	829	1865	3316	7079
6	920	2069	3679	7824
7	1005	2262	4022	8523
8	1087	2446	4349	9185
9	1166	2623	4663	9815
10	1241	2793	4966	10420
11	1315	2958	5259	11003
12	1386	3118	5544	11566
13	1455	3274	5822	12112
14	1523	3427	6093	12643
15	1589	3576	6358	13160

*SCFM, 10 percent overpressure, 60°F, Z = 1.00

Ordering Information

MLCP	06	A	1	A	1	D	1	V	0	C	S

Size
02 – 2 x 3 Full Bore
03 – 3 x 4 Full Bore
04 – 4 x 6 Full Bore
06 – 6 x 8 Full Bore

Inlet Pressure Class
A – ANSI Class 150 Inlet Flanges
X – Special Pressure Class

Inlet Flange Face
1 – Raised Face (Spiral Serations)
X – Special Flange Face

Outlet Pressure Class
A – ANSI Class 150 Inlet Flanges
X – Special Pressure Class

Outlet Flange Face
1 – Raised Face (Spiral Serations)
X – Special Flange Face

Pressure Setting Ranges
A – 3.00 to 4.99 psig Setting Range
B – 5.00 to 7.99 psig Setting Range
C – 8.00 to 10.99 psig Setting Range
D – 11.00 to 14.99 psig Setting Range

Material of Construction
1 – Carbon Steel/Stainless Steel/Aluminum

Soft Goods Material
V – Viton®
X – Special Elastomer Material

Design Revision
0 – Current Design Revision Code

Accessories
N – No Accessories Required
A – Remote Sense
B – Remote Blowdown
C – Remote Sense and Blowdown

Valve Profile
S – Standard Valve (No “X” Codes in Model Number)
X – Special Valve (“X” Codes in Model Number)

Tyco Valves & Controls

www.tycovalves.com