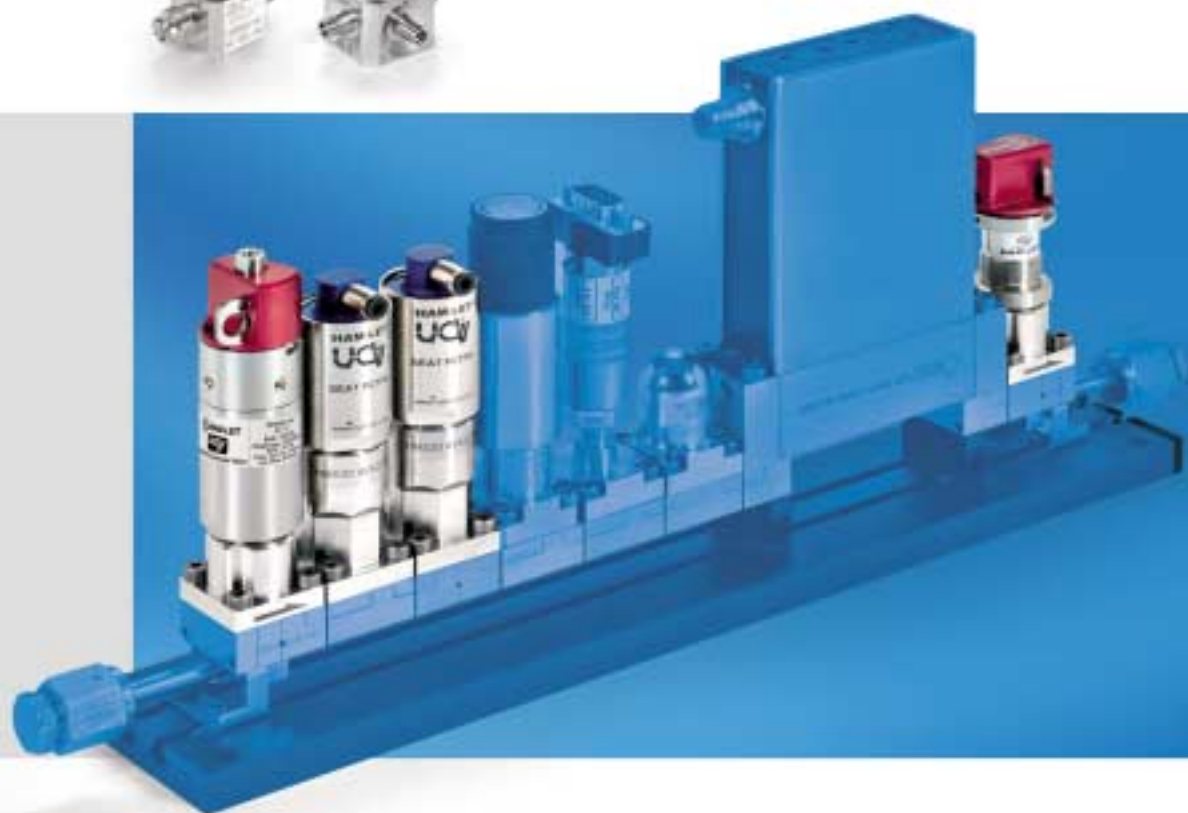


UCV - HM SERIES

ULTRA-HIGH PURITY, METAL-DIAPHRAGM VALVES
FOR GAS DELIVERY SYSTEMS



HM & HMS - SERIES METAL DIAPHRAGM VALVES

The HM & HMS Series Valves are Metal-Diaphragm, Ultra-Clean Valves, size 1/4". The HM & HMS Series Valves are suitable for low and high-pressure applications in multi-port configurations (2 port, L-port, 3-port, 4-port). The valves can be operated manually or pneumatically. UCV valves are assembled, inspected, tested and packaged in a Class 10 Clean Room. Each valve is individually assembled and submitted to pressure testing, functionality tests and a helium leak test.



THE UCV HM & HMS SERIES SPECIFICATIONS

MATERIAL

UCV Series Valves meet the chemical composition and the mechanical properties of stainless steel 316L according to ASTM A276 specification.

Chemical Composition: The body material of the UCV Series Valves complies with SEMI F20 - Sulfur content is lower or equal to 0.01 percent.

MECHANICAL SIZE - DIMENSIONAL SPECIFICATION

UCV Series Valves meet the end-to-end length and overall envelope and they comply with SEMATECH Technology Transfer 96063137-ENG.

PACKAGING

HAM-LET's standard for packing the UCV Series Valves is a double bag, and the inner bag contains ultra-pure nitrogen. All end fittings, threads and sealing surfaces are protected with a cap to prevent any damage.

ELECTROPOLISHED SURFACES - SURFACE FINISH

UCV Valves meet a **surface defect level** of maximum 25 for any one location, with a maximum average of 15. This test is done in accordance with SEMASPEC 90120401-STD.

UCV Valves meet the **Chromium Enhancement** ratio as the chromium-to-iron ratio of $\geq 2:1$, and the chromium oxide-to-iron oxide ratio of $\geq 3:1$. This test is done in accordance with SEMASPEC 90120403-STD.

UCV Valves meet the **oxide layer depth** and surface contamination as the depth of the oxide layer ≥ 20 angstroms after subtraction of the carbon layer. The carbon layer is ≤ 10 angstroms.

THE MAXIMUM SURFACE CONTAMINATION IS ACCORDING TO:

Element	Atomic Percentage
Carbon	30.0
Sulfur	1.0
Phosphorus	2.0
Silicon	1.5
Nitrogen	2.0

This test is done in accordance with SEMASPEC 91060573-STD.

SURFACE ROUGHNESS

All wetted parts of the UCV Series Valves have an average surface roughness (Ra avg) of 5 micro inch Ra, and maximum surface roughness (Ra max) of 10 microinch Ra, complying with ISO 4288.

HELIUM LEAK TEST

All UCV Series Valves are 100% helium leak tested. Helium-leak tests are performed using a helium-leak detector machine with a sensitivity of 0.1×10^{-10} atm cc He/sec. The standard leak-rate tests are listed below.

(Lower leak rates are optional on request)

Maximum Helium (**He**) leak ratings:

Inboard leak integrity $\leq 1 \times 10^{-9}$ atm cc/sec. Complies with SEMI F1. Outboard leak integrity $\leq 3 \times 10^{-10}$ atm cc/sec. Complies with SEMI F1. Leak across the seat $\leq 3 \times 10^{-10}$ atm cc/sec. This test is done in accordance with SEMASPEC 90120391B-STD (held for at least 15 seconds).

PARTICLES

The UCV Series valves standard particles contribute ≤ 5 particles/ft³ for particles $\geq 0.1 \mu\text{m}$ and ≤ 20 particles $\geq 0.02 \mu\text{m}$ for static and dynamic tests, according to SEMASPEC 90120390-STD.

MOISTURE TESTING

The standard moisture level is ≤ 20 ppbv H₂O in Nitrogen baseline or less, within 2 hours after 2 ppmv spike for 1 minute at flow rate of 1.5 SLM or less, according to SEMASPEC 90120397-STD.

CLEANING

All CNC machined valve parts are cleaned to ensure that they are free of emulsion composition and residues involved in the machining process.

RELIABILITY

The valves demonstrate a MTTF of more than 1 million cycles for pneumatic valves and more than 100,000 cycles for manual valves, in accordance with SEMASPEC 90120395-STD and 90120390-STD.

HM SERIES
METAL DIAPHRAGM
MANUAL HANDLE VALVES

The manually operated Ultra-Clean Viaphragm Valves are for High and low-pressure applications. The HM series is designed and manufactured per SEMI F-20 material specifications. The valves include a flexible port design with butt-weld and face-seal end connections.



MATERIALS

Item No.	Part No.	Material
1*	Body	**Stainless steel, 316L Vim/Var
2*	Seat	**PTFE, Vespel [®]
3*	Seat Holder	Stainless steel, 316L Vim/Var
4*	Diaphragm	Elgiloy
5	Act. Button	Stainless steel, AISI 304, ball AISI 440C
6	Act. Button Holder	Stainless steel, ASTM 630 H900
7	Handle & Stem Assembly	A6061T6, ASTM 630 H900

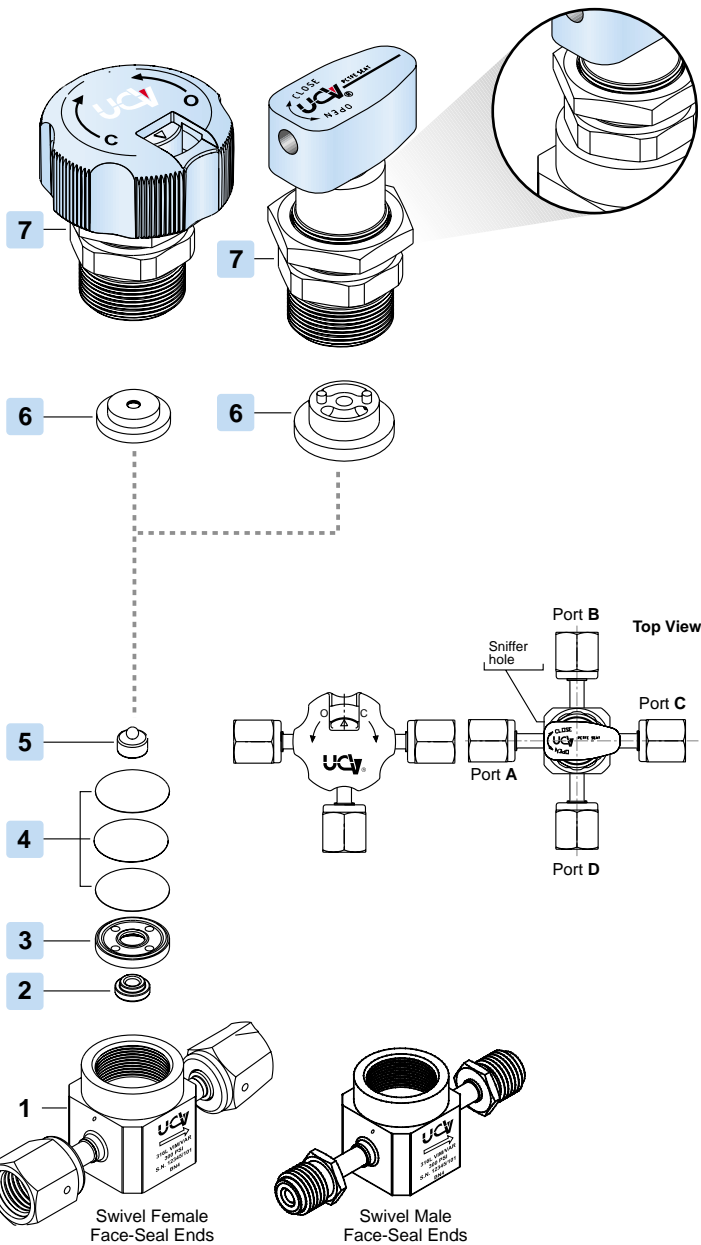
*Wetted parts, ** Standard material

PANEL MOUNTING

Each manual valve has an upper panel mounting as well as a bottom mounting, as standard.

The upper panel mounting has a stainless steel nut, which requires a minimum width of 0.04" for panel.

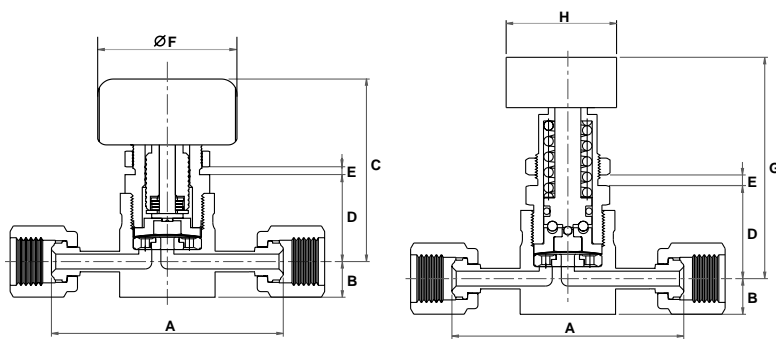
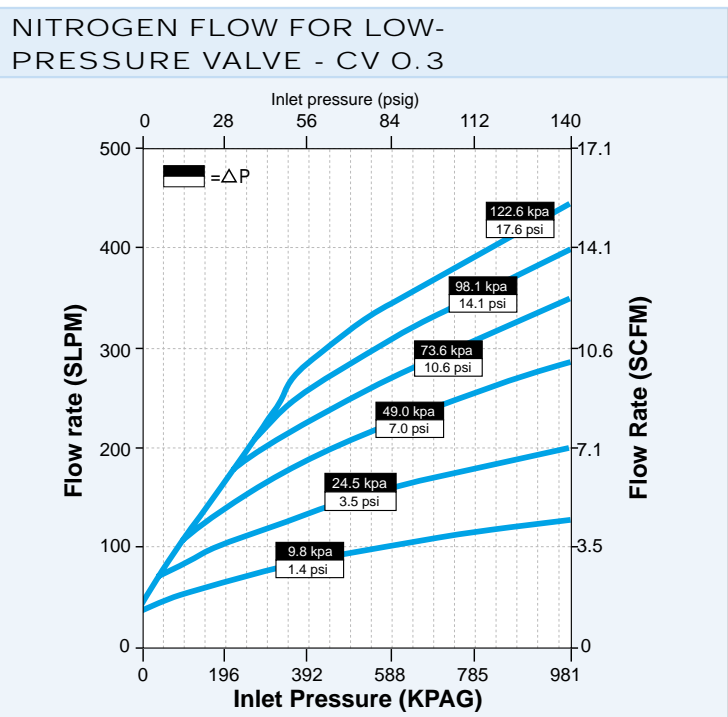
For multi port valve, select the End Connection for each port, starting with port A which is indicated by the sniffer hole in the body. Continue with the other ports (B,C,D).



Elgiloy, Vespel and PCTFE are trade marks.

HM SERIES
METAL DIAPHRAGM
MANUAL HANDLE VALVES (Cont.'d)

UCV SPECIFICATIONS	
Structure	Direct-seal metal-diaphragm valve without seal packing Manually operated
Item Pressure - Low Pressure	Vacuum to 300 psi (20 bar)
Item Pressure - High Pressure	Vacuum to 3060 psi (208 bar)
Temperature: Standard	14 to 104°F, -10 to 60°C (PCTFE Seat)
Available	32 to 302°F, -10 to 150°C (*Vespel® Seat)
Leakage: Inboard Leakage	$\leq 1 \times 10^{-9}$ atm cc He/sec
Outboard Leakage	$\leq 1 \times 10^{-9}$ atm cc He/sec
Leakage across the seat	$\leq 1 \times 10^{-9}$ atm cc He/sec
Particle Operated	No particle detected above 0.1µm. Round handle 1/4 and 3/4 turn **Oval handle 1/4 turn
Connections	Face seal or tube weld
CV value - Low Pressure	0.3
CV value - High Pressure	0.23
Valve Lift	LP-0.024", 0.6 mm; HP-0.01", 0.3mm
Direction	2 port straight, 2 port L, 3 port, 4 port
Surface Finish Ra (Ave)-Standard	5µin
Surface Finish Ra (Max)-Standard	10µin
*Used with Viton O-ring **Currently available for low pressure	
LP-Low pressure, HP-High pressure	



VALVE DIMENSIONS - Inch, mm

Size	Connection	A		B		C		D		E*		F		G		H	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/4"	Swivel Female Face-Seal	2.78	70.6	0.44	11.0	2.48	63.0	1.14	29.0	0.04	1.00	1.77	45.0	2.68	68.0	1.34	34.0
1/4"	Male Face-Seal	2.30	58.4	0.44	11.0	2.48	63.0	1.14	29.0	0.04	1.00	1.77	45.0	2.68	68.0	1.34	34.0
1/4"	Swivel Male Face-Seal	2.78	70.6	0.44	11.0	2.48	63.0	1.14	29.0	0.04	1.00	1.77	45.0	2.68	68.0	1.34	34.0
1/4"	Buttweld	1.75	44.4	0.44	11.0	2.48	63.0	1.14	29.0	0.04	1.00	1.77	45.0	2.68	68.0	1.34	34.0

Dimensions are for reference only, and are subject to change.

*Minimum height for panel

HM SERIES
METAL DIAPHRAGM
AIR-OPERATED VALVES

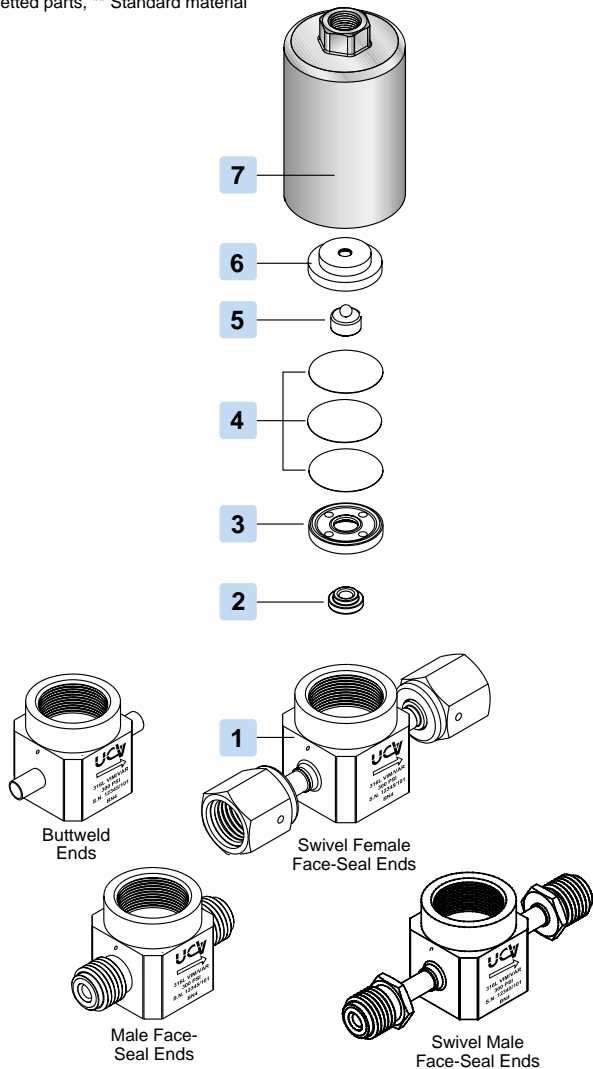
The pneumatically operated Ultra-Clean Diaphragm Valve is for high and low-pressure applications. The HM series is designed and manufactured per SEMI F-20 material specifications, and it offers a flexible port design with butt-weld and face-seal end connections.



MATERIALS

Item No.	Part No.	Material
1*	Body	**Stainless steel, 316L Vim/Var
2*	Seat	**PCTFE, Vespel [®] , Metal
3*	Seat Holder	Stainless steel, 316L Vim/Var
4*	Diaphragm	Elgiloy
5	Act. Button	Stainless steel, AISI 304, ball AISI 440C
6	Act. Button Holder	Stainless steel, ASTM 630 H900
7	Actuator Assembly	A6061T6

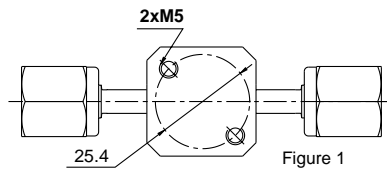
*Wetted parts, ** Standard material



Elgiloy, Vespel and PCTFE are trade marks.

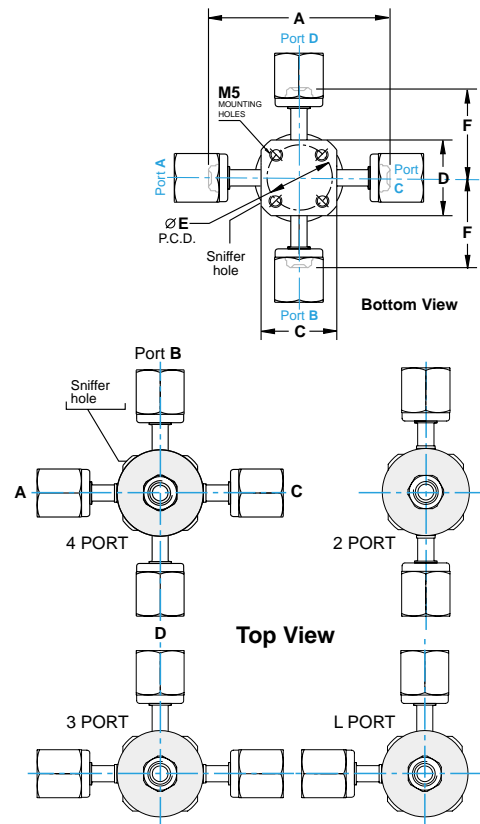
STANDARD PANEL MOUNTING FOR TWO-PORT STRAIGHT VALVE

- Optional, four threaded holes.
- All the other valve types have standard four threaded holes.
- According to SEMATECH 96063137-ENG.



The M5 threaded mounting holes will accept 10-32 screws.

® Registered trademark: PCTFE, VESPEL-TM Dupont, KEL-F TM 3M Company.



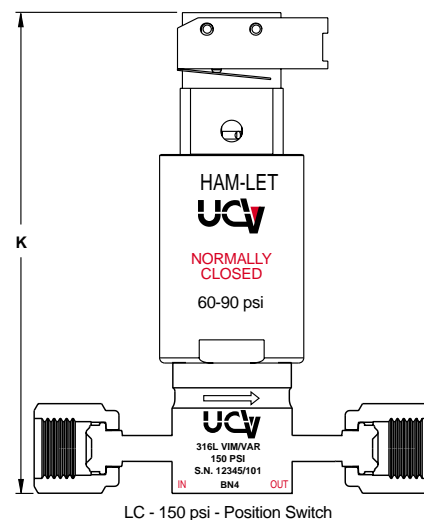
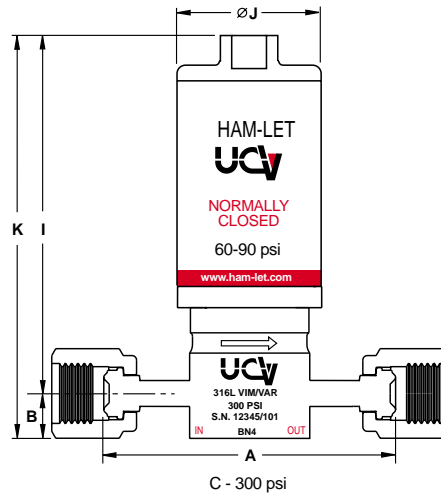
HM SERIES
METAL DIAPHRAGM
AIR-OPERATED VALVES (Cont.'d)

UCV SPECIFICATIONS	
Structure	Direct-seal metal-diaphragm valve without seal packing Pneumatically operated
Item Pressure - Low Pressure	Vacuum to 300 psi (20 bar)
Item Pressure - High Pressure	Vacuum to 3060 psi (208 bar)
Temperature: Standard	14 to 140°F, -10 to 60°C (PCTFE Seat)
Available	14 to 302°F, -10 to 150°C (*Vespe [®] Seat)
Leakage: Inboard Leakage	≤ 1x10 ⁻⁹ atm cc He/sec
Outboard Leakage	≤ 1x10 ⁻⁹ atm cc He/sec
Leakage across the seat	≤ 1x10 ⁻⁹ atm cc He/sec
Particulate	No particulate detected above 0.1µm.
Operated	Pneumatic, **NC/NO
Connections	Face Seal or Tube Weld
CV value - Low Pressure	0.3
CV value - High Pressure	0.23
Valve Lift	LP-0.024" , 0.6 mm
Direction	2 port straight, 2 port L, 3 port, 4 port
Surface Finish Ra (Ave)-Standard	5µin
Surface Finish Ra (Max)-Standard	10µin
Air Supply	60-90 psig , 4 - 6 bar
Air Connection	1/8" NPT
*Used with Viton O-ring **NC-Normally Closed ***Currently available LP-Low pressure NO-Normally Open	

ACTUATOR DIMENSIONS - INCH (MM)					
Actuator type	I	∅J	K	Effective Area	Output Force
Low Pressure	3.54 (90)	1.33 (34)	3.98 (101)	1.58 in ²	550 psig
High Pressure	3.50 (89)	1.57 (40)	3.93 (100)	1.58 in ²	550 psig
AO-Position switch			4 (101.95)		

VALVE DIMENSIONS - INCH (MM)													
Size	Connection	A		B		C		D		E*		F	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/4"	Swivel Female Face-Seal	2.78	70.6	0.44	11.0	1.16	29.4	1.16	29.4	1.00	25.4	1.40	35.3
1/4"	Male Face-Seal	2.30	58.4	0.44	11.0	1.16	29.4	1.16	29.4	1.00	25.4	1.15	29.2
1/4"	Swivel Male Face-Seal	2.78	70.6	0.44	11.0	1.16	29.4	1.16	29.4	1.00	25.4	1.40	35.3
1/4"	Buttweld	1.75	44.4	0.44	11.0	1.16	29.4	1.16	29.4	1.00	25.4	0.87	22.2

The dimensions apply to pneumatic and manual valves.
Dimensions are for reference only, and are subject to change.



ORDERING INFORMATION - HM SERIES

Your safety is important to us. Please ensure proper reference to our latest catalogue.

Valves Description
Example:

HM 2 1 - 4 V K R - BW 4 GF 4 - LS - U

Valve series
HM - UCV Valves

Valve Type
2 - 2-Port Valve
3 - 3-Port Valve
4 - 4-Port Valve

Port Designator
0, 1, 2, 3, 4, 5

Body Size
4 - 1/4"

Body Material
V - 316L VIM/VAR (Bar Stock)

V Standard

Seat Material
K - PCTFE (KEL-F®)
*S - VESPEL®

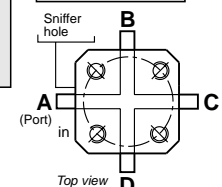
K Standard, *Available

Port A Port B

End Connection
BW - Buttweld
GF - Swivel female Face-seal
GM - Swivel male Face-seal
M - Male Face-seal

Surface Roughness
H - 5 micro inch
U - 4 micro inch

End Size
4 - 1/4"
6 - 3/8"



Actuation Device
LC - Air Operated N.C. 150 psi
C - Air Operated N.C. 300 psi
O - Air Operated N.O. 300 psi
LR - Round Handle 3/4 turn 300 psi
LQ - Oval Handle 1/4 turn 300 psi
HC - Air Operated N.C. 3060 psi
HO - Air Operated N.O. 3060 psi
HR - Round Handle 3/4 turn 3060 psi
HQ - Oval Handle 1/4 turn 3060 psi

Features
LS - Position Switch
*LD - Locking Device
V - Actuator for high temp. with Vitor® O-ring
ISLT - LOTO handle

Handle color can be delivered by request.
NC-Normally closed, NO-Normally open

PORT DESIGNATOR - (TOP VIEW)

Valve Configuration	Port Designator	Schematic Flow Chart	Valve Configuration	Port Designator	Schematic Flow Chart	Valve Configuration	Port Designator	Schematic Flow Chart
2 Port Valve HM2__ 	0		3 Port Valve HM3__ 	0		4 Port Valve HM4__ 	0	
	1 L-Port			1			1	
	2 L-Port			2			2	
				3			3	
				4				
			5					

Elgiloy, Vespel and PCTFE are trade marks.