

## ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

A 3-valve differential pressure manifold with integral metal seats or replaceable, roddable soft seats for applications requiring remote mounting from the instrument



### FEATURES

- Cost savings of 20-30% when unitizing the manifolding by eliminating several parts used in conventional methods of 'piping up'.
- Roddable soft seats for services prone to plugging.
- Protective bonnet cap protects against atmospheric contamination; reduces thread galling by containment of stem lubricant and increases valve life.
- Fewer leak points reduce the chances of leakage from a unitized design.
- All packing is below stem threads, body-to-bonnet seal is below the threads minimizing process fluid corrosion.
- Replaceable soft seat design is bubble-tight with a 3/16" (4.8 mm) diameter orifice as standard.
- Rolled stem threads provide a stronger, more durable thread area, increasing valve life.
- Integral hard back seat protects against stem blowout and provides a secondary packing seal.
- Adjustable stem packing for leak-proof and long service life.
- 1/4" FNPT test ports may be used as test connections.
- AGCO Mount option available.

### GENERAL APPLICATION

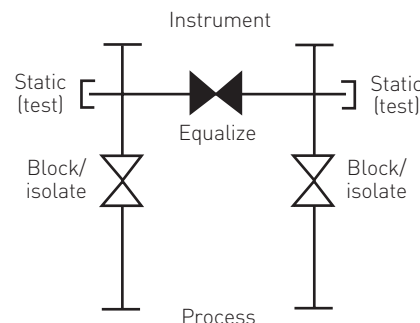
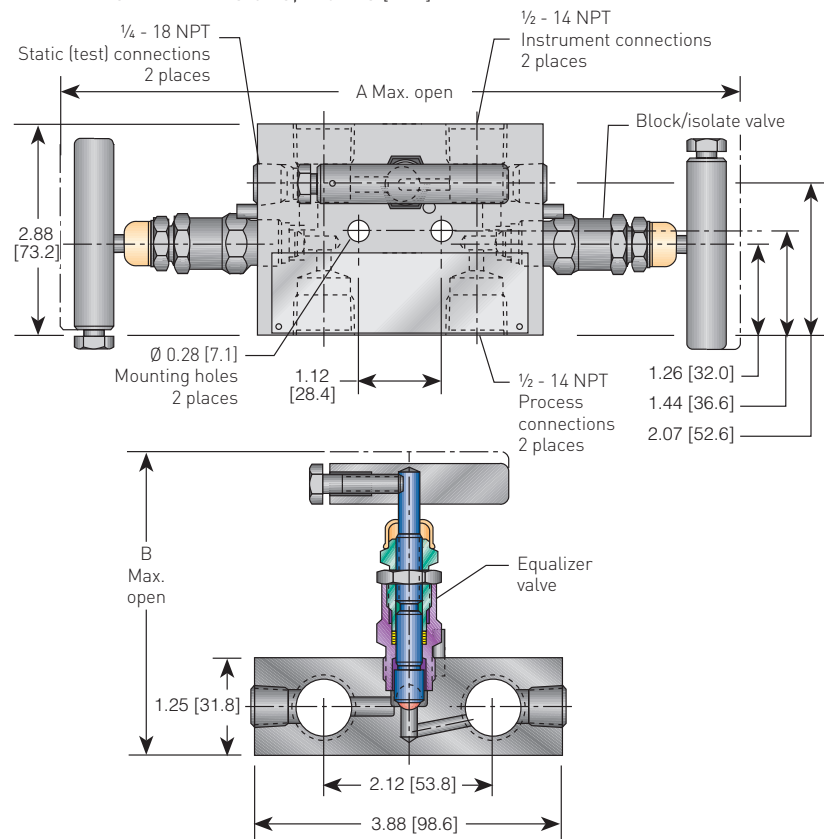
The M1 is designed to mount to the signal lines and an instrument with connections different to 2 1/8" (54 mm) between signal taps. These include recording orifice meters, small differential pressure indicators and some differential pressure switches.

### TECHNICAL DATA

Materials:	CS, SS, Monel <sup>®</sup> , Hastelloy <sup>®</sup>
Seats:	Metal or soft
Connections	
Instrument:	1/2" NPT
Process:	1/2" NPT
Pressure (max):	10,000 psig (689 barg)
Temperature range:	-70° to 1000°F (-57° to 538°C)

# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## M1 METAL SEAT DIMENSIONS, INCHES [mm]



## DIMENSIONS, INCHES [mm]

Packing	A	B
GRAFOIL®/	10.38	4.50
Low emissions graphite	[263.7]	[114.3]
PTFE	9.08	3.85
	[230.6]	[97.8]

## MINIMUM TEMPERATURE

Carbon steel	-20°F [-29°C]
316 SS O-ring seal	-20°F [-29°C]
316 SS, Monel®, Hastelloy®	-70°F [-57°C]
PTFE packed	
316 SS, Monel®, Hastelloy®	-70°F [-57°C]
Grafoil® packed	

## STANDARD MATERIALS

Valve	Packing	Body/bonnet	Stem/ball
CS <sup>[2]</sup>	PTFE or O-ring	A108/A108	A581-303/17-4PH
CS <sup>[2]</sup>	GRAFOIL®/Low emissions graphite	A105/A105	A581-303/17-4PH
SS	PTFE or O-ring	A479-316/A479-316	A276-316/316 SS
SS	GRAFOIL®/Low emissions graphite	A479-316/A479-316 A	A276-316/316 SS
Monel®	PTFE	Monel® 400/Monel® R405	Monel® 400/Monel® K500
Monel®	GRAFOIL®/Low emissions graphite	Monel® 400/Monel® R405	Monel® 400/Monel® K500
SG <sup>[3]</sup>	PTFE	A479-316/A479-316	Monel® 400/Monel® K500
SG <sup>[3]</sup>	GRAFOIL®/Low emissions graphite	A479-316/A479-316	Monel® 400/Monel® K500
SG <sup>[3]</sup>	PTFE	A479-316/Hastelloy® C276	Hastelloy® C276/Elgiloy®
SG <sup>[3]</sup>	GRAFOIL®/Low emissions graphite	A479-316/Hastelloy® C276	Hastelloy® C276/Elgiloy®

## NOTES

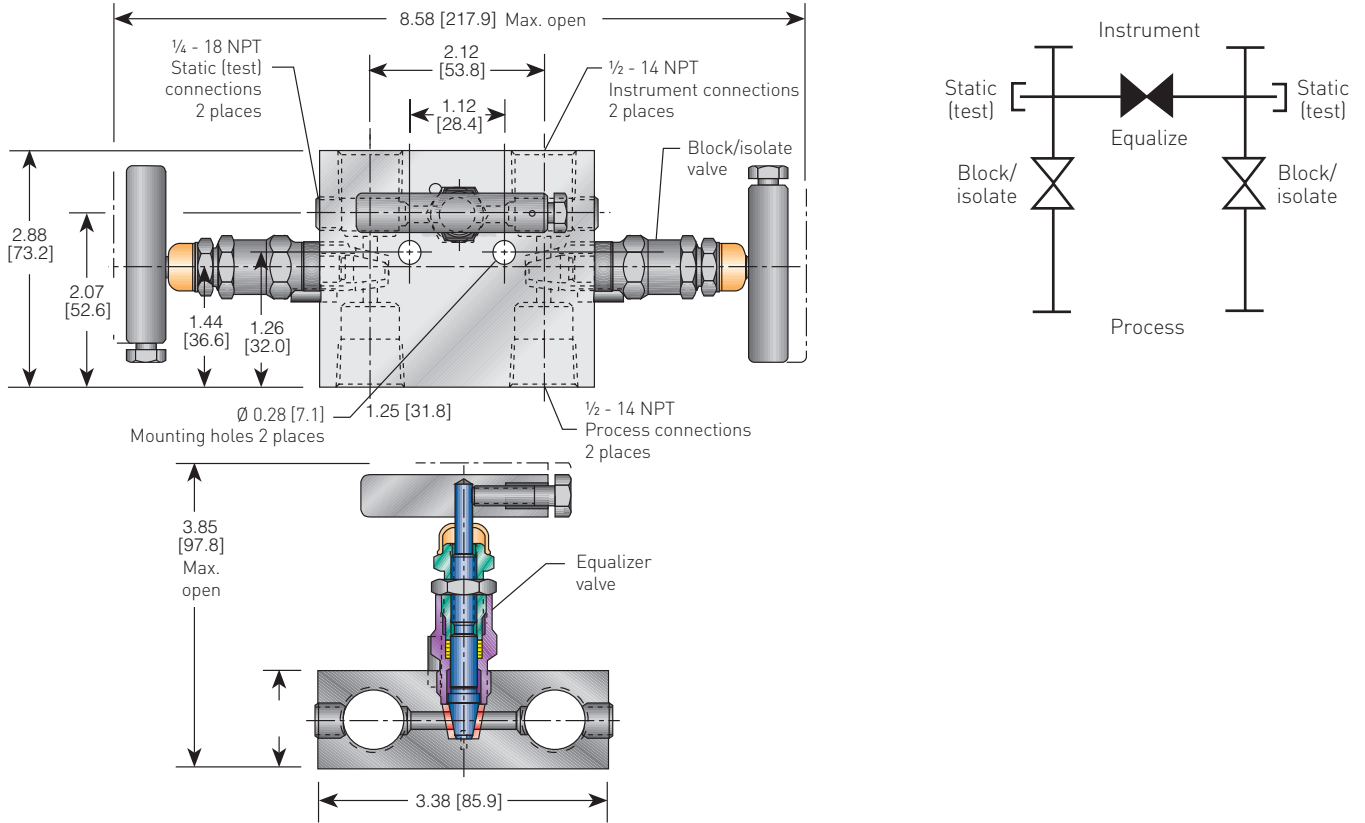
- Approximate valve weight: 4.0 lb [1.8 kg].  
0.187-inch [4.8 mm] diameter orifice.  
Valve C<sub>v</sub> 0.52 maximum.
- CS parts are zinc chromate plated to prevent corrosion.
- SG (Sour Gas) meets the requirements of NACE MR0175/ISO 15156 (for Chloride conditions < 50 mg/l [ppm]) and NACE MR0103.
- SG3 (Sour Gas) meets the requirements of NACE MR0175/ISO 15156 (for Chloride conditions > 50 mg/l [ppm]).

## PRESSURE AND TEMPERATURE RATINGS

Valve <sup>[1]</sup>	Packing	Ratings
CS <sup>[2]</sup>	PTFE or O-ring	6000 psig at 200°F [414 barg at 93°C] 4000 psig at 500°F [276 barg at 260°C]
CS <sup>[2]</sup>	GRAFOIL®/Low emissions graphite	6000 psig at 200°F [414 barg at 93°C] 1500 psig at 850°F [103 barg at 454°C]
SS	PTFE or O-ring	6000 psig at 200°F [414 barg at 93°C] 4000 psig at 500°F [276 barg at 260°C]
SS	GRAFOIL®/Low emissions graphite	6000 psig at 200°F [414 barg at 93°C] 1500 psig at 1000°F [103 barg at 538°C]
Monel®	PTFE	6000 psig at 200°F [414 barg at 93°C] 4000 psig at 500°F [276 barg at 260°C]
Monel®	GRAFOIL®/Low emissions graphite	6000 psig at 200°F [414 barg at 93°C] 1500 psig at 800°F [103 barg at 427°C]
SG <sup>[3]</sup>	PTFE	6000 psig at 200°F [414 barg at 93°C] 4000 psig at 500°F [276 barg at 260°C]
SG <sup>[3]</sup>	GRAFOIL®/Low emissions graphite	6000 psig at 200°F [414 barg at 93°C] 1500 psig at 1000°F [103 barg at 538°C]

# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

M1 SOFT SEAT DIMENSIONS, INCHES [mm]



## STANDARD MATERIALS

Valve <sup>(1)</sup>	Body and Bonnet	Stem	Packing	Seat
CS <sup>(2)</sup>	A108 CS	A581-303	PTFE or FKM O-ring w/PTFE backup	Delrin <sup>®(4)</sup>
SS	A479-316	A276-316	PTFE or FKM O-ring w/PTFE backup	Delrin <sup>®(4)</sup>
SG <sup>(3)</sup>	A479-316	Monel <sup>®</sup> 400	PTFE	Delrin <sup>®(4)</sup>
SG3 <sup>(5)</sup>	Hastelloy <sup>®</sup> C276	Hastelloy <sup>®</sup> C276	PTFE	Delrin <sup>®(4)</sup>

## MINIMUM TEMPERATURE

Carbon steel	-20°F (-29°C)
316 SS O-ring seal	-20°F (-29°C)
316 SS, Monel <sup>®</sup> , Hastelloy <sup>®</sup>	-70°F (-57°C)
PTFE packed	
316 SS, Monel <sup>®</sup> , Hastelloy <sup>®</sup>	-70°F (-57°C)
Grafoil <sup>®</sup> packed	

## PRESSURE AND TEMPERATURE RATINGS

Seat	Pressure and Temperature Ratings
Delrin <sup>®</sup> and PCTFE	6000 psig at 200°F [414 barg at 93°C]
PEEK	6000 psig at 200°F [414 barg at 93°C] 2000 psig at 400°F [138 barg at 204°C]
PTFE	1000 psig at 150°F [69 barg at 66°C] 200 psig at 500°F [14 barg at 260°C]

## NOTES

1. Approximate valve weight: 4.0 lb [1.8 kg]. 0.187-inch [4.8 mm] diameter orifice. Valve C<sub>v</sub> 0.83 maximum.
2. CS parts are zinc chromate plated to prevent corrosion.
3. SG (Sour Gas) meets the requirements of NACE MR0175/ISO 15156 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103.
4. PCTFE [Polychlorotrifluoroethylene is exact equivalent of Kel-F<sup>®</sup>], PEEK and PTFE are also available.
5. SG3 (Sour Gas) meets the requirements of NACE MR0175/ISO 15156 (for Chloride conditions > 50 mg/l [ppm]).

# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## BONNET ASSEMBLY OPTIONS

The M1 offers the option of metal or roddable soft seats. The high pressure all stainless M110 has integral metal seats. All stem threads are rolled and lubricated to prevent galling and reduce operating torque. The stem seal is a patented PTFE packing gland which is adjustable in service. All bonnets are assembled with a bonnet locking pin to prevent accidental removal while in service and a protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants.

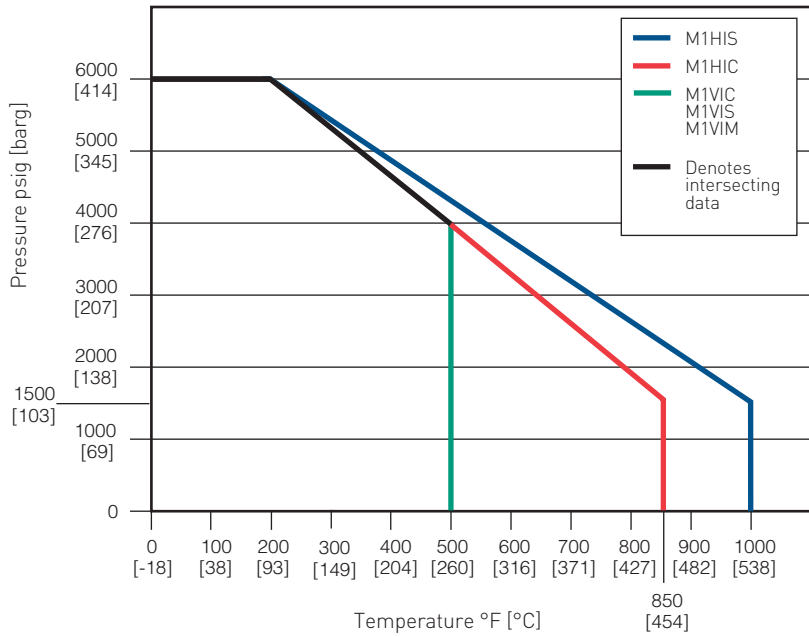
### Soft-seated bonnet assemblies

The soft-seated bonnet assemblies have a one-piece rotating stem and plug. In addition to the adjustable PTFE packing gland, the bonnets are available with a FKM O-ring and PTFE back-up ring.

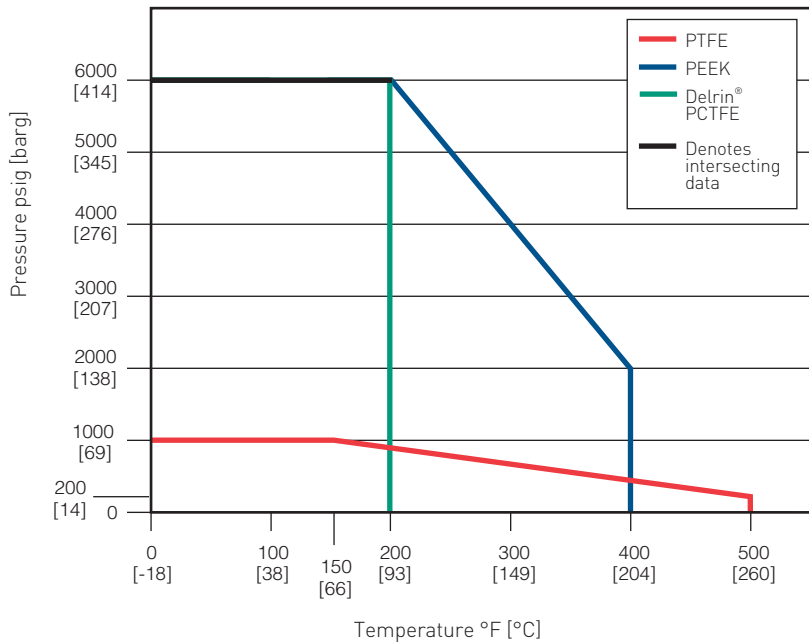
### Metal-seated bonnet assemblies

The metal-seated bonnet assemblies have a rotating stem with free swivel ball-type seat for long service life. The specially hardened ball seat is ideal for both gas and liquid service. The high pressure M110 bonnet assemblies use a strengthened stem and bonnet which is fitted with a larger size T-bar handle. The M1's high-temperature bonnet assemblies utilize a similarly designed stem and bonnet, incorporating adjustable graphite O-rings and back-up pressure rings to ensure a leak-free stem seal.

PRESSURE VS. TEMPERATURE - METAL SEAT



PRESSURE VS. TEMPERATURE - SOFT SEAT



# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## SELECTION GUIDE - M1 METAL SEAT; 3/16-INCH (4.8 mm) DIAMETER ORIFICE

Example:	M1	H	I	S	- 4	- SG
<b>Packing</b>						
<b>V</b>	PTFE					
<b>H</b>	Grafoil®					
<b>E</b>	Low emissions graphite					
<b>R</b>	O-ring (FKM)					
<b>Seat</b>						
<b>I</b>	Integral (body material)					
<b>Body material<sup>(1)</sup></b>						
<b>C</b>	CS, A108 (PTFE packed) CS, A105 (GRAFOIL® and Low emissions graphite packed)					
<b>S</b>	SS, A479-316					
<b>M</b>	Monel®					
<b>W</b>	316L SS - maximum pressure 5000 psig [345 barg]					
<b>J</b>	Hastelloy®					
<b>Connection</b>						
<b>4</b>	1/2-inch FNPT					
<b>Options</b>						
<b>-AM</b>	AGCO Mount Kit for 2-inch pipe stand mounting of manifold					
<b>-BC</b>	Accessory bracket - mount conduit with -AM					
<b>-BL</b>	Bonnet lock device GRAFOIL® only					
<b>-BP</b>	Accessory bracket - mount purge meters with -AM					
<b>-CL00</b>	Chlorine cleaning (CL)					
<b>-HD</b>	Hydrostatic testing (100%) (MSS-SP-61)					
<b>-MS</b>	Monel® stem					
<b>-OC00</b>	Oxygen clean (OC)					
<b>-OC01</b>	Gaseous oxygen clean (GOC)					
<b>-PMI00</b>	PMI body only					
<b>-SG</b>	[Sour Gas] Nace edition 2003 /MR0103					
<b>-SG3</b>	[Sour Gas] Nace MR0175/ISO 15156-3 (latest edition)					
<b>-SS</b>	All 316 SS construction					

### NOTES

1. Call factory for optional materials.

# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## SELECTION GUIDE - M1 SOFT SEAT REPLACEABLE, RODDABLE; 3/16-INCH [4.8 mm] DIAMETER ORIFICE

Example:	M1	V	D	S	- 4	- SG
<b>Packing</b>						
V	PTFE					
R	O-ring (FKM)					
<b>Seat</b>						
D	Delrin®					
V	PTFE					
E	PEEK					
K	PCTFE <sup>(1)</sup>					
<b>Body material<sup>(2)</sup></b>						
C	A108 CS					
S	A479-316 SS					
W	316L SS - maximum pressure 5000 psig [345 barg]					
J	Hastelloy®					
<b>Connection</b>						
4	1/2-inch FNPT					
<b>Options</b>						
-AM	AGCO Mount kit for 2-inch pipe stand mounting of manifold					
-BC	Accessory bracket - mount conduit with -AM					
-BL	Bonnet lock device GRAFOIL® only					
-BP	Accessory bracket - mount purge meters with -AM					
-CL00	Chlorine cleaning (CL)					
-HD	Hydrostatic testing (100%) (MSS-SP-61)					
-MS	Monel® stem					
-OC00	Oxygen clean (OC)					
-OC01	Gaseous oxygen clean (GOC)					
-PM100	PMI body only					
-SG	(Sour Gas) Nace edition 2003 /MR0103					
-SG3	(Sour Gas) Nace MR0175/ISO 15156-3 (latest edition)					
-SS	All 316 SS construction					

### NOTES

1. Polychlorotrifluoroethylene is the exact equivalent of Kel-F®.
2. Call factory for optional materials.

# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## SELECTION GUIDE - POWER INDUSTRY APPLICATIONS ASME B31.1 AND B31.3

### SPECIFICATIONS MEETS MSS SP-105

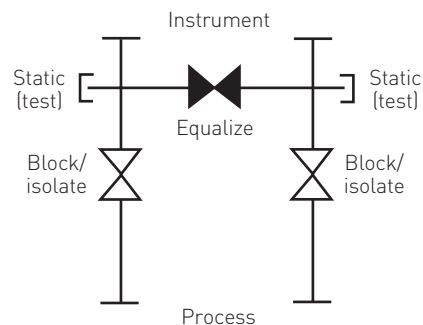
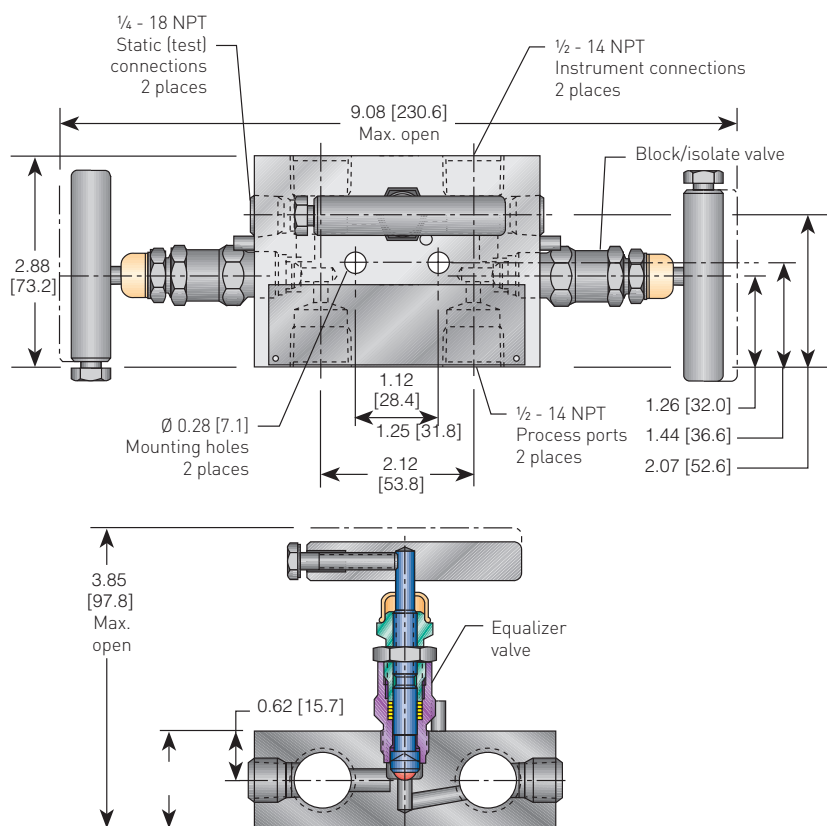
Example:	M1HP	S	-4	-XP	-SG
<b>Valve type</b>					
<b>M1HP</b>					
<b>Body material<sup>[1]</sup></b>					
<b>C</b>	CS, A105				
<b>S</b>	SS, A479-316				
<b>W</b>	316L SS - maximum pressure 5000 psig [345 barg]				
<b>J</b>	Hastelloy®				
<b>Connection</b>					
<b>4</b>	1/2-inch FNPT x 1/2-inch FNPT x 1/2-inch FNPT				
<b>3TC4</b>	3/8-inch Tube stub x 1/2-inch FNPT x 1/2-inch FNPT <sup>[2]</sup>				
<b>3TB4</b>	3/8-inch Tube S.W. x 1/2-inch FNPT x 1/2-inch FNPT				
<b>4TC4</b>	1/2-inch Tube stub x 1/2-inch FNPT x 1/2-inch FNPT <sup>[3]</sup>				
<b>4TB4</b>	1/2-inch Tube S.W. x 1/2-inch FNPT x 1/2-inch FNPT				
<b>4B</b>	1/2-inch FSW x 1/2-inch FSW				
<b>Options</b>					
<b>-AM</b>	AGCO Mount kit for 2-inch pipe stand mounting of bracket				
<b>-BC</b>	Accessory bracket – mount conduit with -AM				
<b>-BP</b>	Accessory bracket – mount purge meters with -AM				
<b>-CL00</b>	Chlorine cleaning (CL)				
<b>-HD</b>	Hydrostatic testing (100%) (MSS-SP-61)				
<b>-MS</b>	Monel® stem				
<b>-OC00</b>	Oxygen clean (OC)				
<b>-OC01</b>	Gaseous oxygen clean (GOC)				
<b>-PMI00</b>	PMI body only				
<b>-SG</b>	(Sour Gas) Nace edition 2003 /MR0103				
<b>-SG3</b>	(Sour Gas) Nace MR0175/ISO 15156-3 (latest edition)				
<b>-SS</b>	All 316 SS construction				
<b>-XP</b>	ASME B31.1				

### NOTES

- All manifolds come standard with GRAFOIL® packing, integral seats, bonnet locks, and are subjected to hydrostatic testing.
- Tube stubs are 6-inch long x 0.065-inch wall.
- Tube stubs are 6-inch long x 0.095-inch wall.
- Manifold ratings:
  - SST
    - 6000 psig at 100°F [414 barg at 38°C]
    - 3030 psig at 1000°F [209 barg at 538°C]
  - STL
    - 6170 psig at 100°F [425 barg at 38°C]
    - 3430 psig at 800°F [236 barg at 427°C]

# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## M110 DIMENSIONS, INCHES [mm]



### STANDARD MATERIALS

Valve <sup>[1]</sup>	Body and bonnet	Stem and ball	Packing
SS	A479-316 body A479-316 bonnet	A276-316 stem 316 SS ball	PTFE
SG <sup>[2]</sup>	A479-316 body A479-316 bonnet	Monel <sup>®</sup> 400 stem Monel <sup>®</sup> K500 ball	PTFE
SG3 <sup>[3]</sup>	Hastelloy <sup>®</sup> C276 body Hastelloy <sup>®</sup> C276 bonnet	Hastelloy <sup>®</sup> C276 stem Elgiloy <sup>®</sup> ball	PTFE

### MINIMUM TEMPERATURE

316 SS, PTFE packed -70°F (-57°C)

### PRESSURE AND TEMPERATURE RATINGS

Valve <sup>[1]</sup>	Packing	Pressure and temperature ratings
SS	PTFE	10,000 psig at 200°F [689 barg at 93°C] 4000 psig at 500°F [276 barg at 260°C] 10,000 psig at 200°F [689 barg at 93°C]
SG <sup>[2]</sup> , SG3 <sup>[3]</sup>	PTFE	4000 psig at 500°F [276 barg at 260°C]

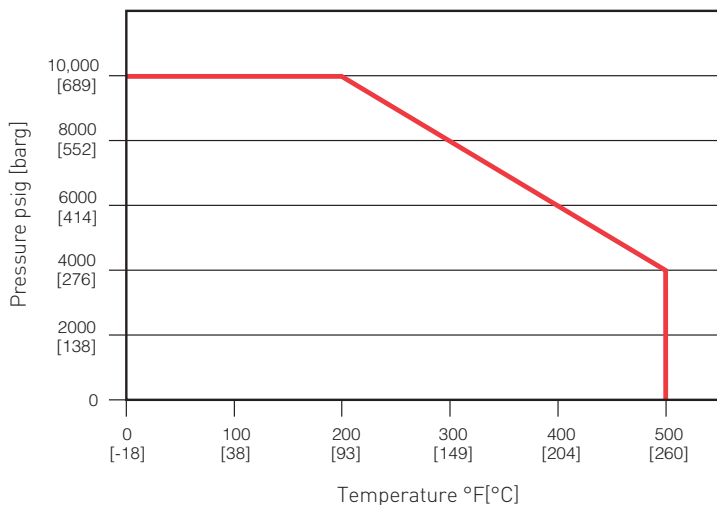
### NOTES

- Approximate valve weight: 4 lb [1.8 kg].  
0.187-inch [4.8 mm] diameter orifice.  
Valve C<sub>v</sub> 0.52 maximum.
- SG (Sour Gas) meets the requirements of NACE MR0175/ISO 15156 (for chloride conditions < 50 mg/l [ppm]) and NACE MR0103-2005.
- SG3 (Sour Gas) meets the requirements of NACE MR0175/ISO 15156 (for Chloride conditions > 50 mg/l [ppm]).



# ANDERSON GREENWOOD M1/M110 DIFFERENTIAL PRESSURE MANIFOLDS

## PRESSURE VS. TEMPERATURE



## SELECTION GUIDE - M110 (10,000 PSI SPECIFICATIONS)

**Example:** M110 V I S - 4 - SG

<b>Packing</b>	V	PTFE
<b>Seat</b>	I	Integral (body material)
<b>Body material</b>	S	SS, A479-316
<b>Connection</b>	4	½-inch FNPT

- Options**
- AM AGCO Mount kit for 2-inch pipe stand mounting of manifold
  - BC Accessory bracket - mount conduit with -AM
  - BL Bonnet lock device GRAFOIL® only
  - BP Accessory bracket - mount purge meters with -AM
  - CL00 Chlorine cleaning (CL)
  - HD Hydrostatic testing (100%) (MSS-SP-61)
  - MS Monel® stem
  - OC00 Oxygen clean (OC)
  - OC01 Gaseous oxygen clean (GOC)
  - PMI00 PMI body only
  - SG (Sour Gas) Nace edition 2003 /MR0103
  - SG3 (Sour Gas) Nace MR0175/ISO 15156-3 (latest edition)
  - SS All 316 SS construction

## NOTES

Delrin® is a registered trademark of E.I. du Pont de Nemours and Company.  
 Grafoil® is a registered trademark of GrafTech International.  
 Hastelloy® is a registered trademark of Haynes International, Inc.  
 Kel-F® is a registered trademark of 3M Company.  
 Monel® is a registered trademark of the Special Metals Corporation.

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