



- > 1.50"-4.00" Bores
- > Adaptive Cushioning System "ACS"
- > Optional non-cushioned
- > Optional Ecology Seal
- > Magnetic Piston
- > Modular Mountings



Technical features

Medium:

Compressed air, filtered, clean, dry, lubricated or non-lubricated

Operation:

Double Acting
Adjustable Cushioning
Operating Pressure:
250 PSIG

Operating Temperature:

25°F to 175°F

Cylinder Diameters:

1.50", 2.00", 2.50",
3.25", 4.00"

Strokes:

0.125" - 100"

Ports:

3/8 NPT, 1/2 NPT

Lubrication:

None required.
P-Series cylinders are rated for non-lube service. All internal components are lubricated at the time of assembly with a Lithium based grease.

Materials:

Barrel: Anodized aluminum extrusion, hard coat anodized ID, clear anodized OD.

End Caps: Die cast aluminum

Piston Rod: Hard chrome plated steel

Seals: Urethane rod seal/wiper, Nitrile piston and tube end seals

Rod Bearing: Polymer

Piston: Polymer

Technical data

Bore Size (in.)	1.50	2.00	2.50	3.25	4.00
Rod Diameter (in.)	0.625	0.625	0.625	1.00	1.00
Port Size (NPT)	3/8	3/8	3/8	1/2	1/2
Piston Area - extend (in ²)	1.77	3.14	4.91	8.30	12.57
Piston Area - retract (in ²)	1.46	2.83	4.60	7.52	11.79

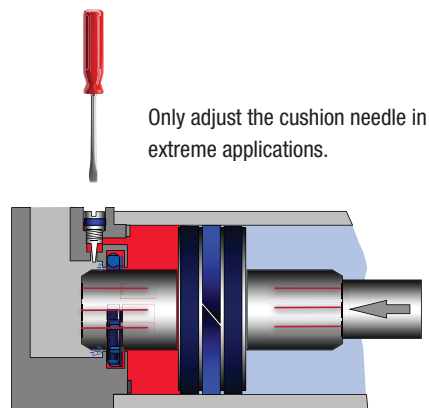
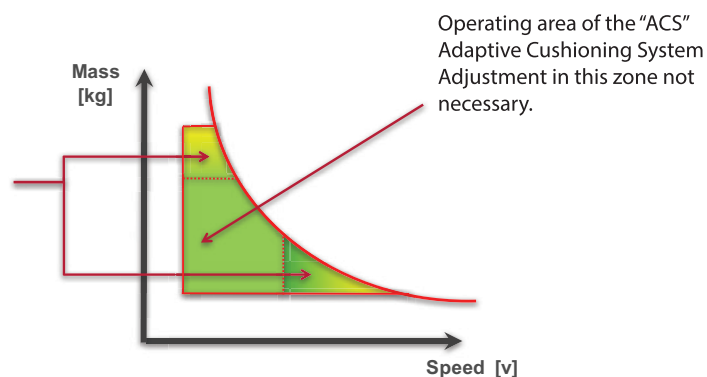
Theoretical Force Output (EXTEND) in Pounds					
At 40 psig	71	126	196	332	503
At 60 psig	106	189	295	498	754
At 80 psig	142	251	393	665	1005
At 100 psig	177	314	491	830	1257

Theoretical Force Output (RETRACT) in Pounds					
At 40 psig	59	114	184	301	472
At 60 psig	88	171	277	451	707
At 80 psig	117	226	368	602	942
At 100 psig	146	283	460	752	1179

P-SERIES ADAPTIVE CUSHIONING SYSTEM - "ACS"

P-Series NPFA Cylinders are equipped with the IMI Norgren Adaptive Cushioning System, "ACS". This uniquely designed internal air cushion auto-adapts to changing loads and conditions. This means cushion needle adjustment is not required, simplifying installation and set-up. The auto-adaptability of the ACS results in longer machine life and offers a fit and forget solution.

The ACS Adaptive Cushioning System provides a high performance pneumatic damping function. The cushion screw is preset at the factory and will cushion for a wide range of general applications. Manual adjustment of the cushion screw is still possible for extreme applications.



ACS Benefits

- > Simplifies installation
- > No specialist knowledge for set-up
- > No cushion setting required for many applications
- > Cylinder auto-adapts to changing loads and conditions
- > Fit and forget

Energy Absorption capacity of P-Series cylinders with the ACS adaptive cushion

*Usable Pounds Stoppable at the following piston speeds

This chart features energy absorption capacity of the P-Series with "ACS" adjustable cushions.

In/Sec.	Cylinder Bore				
	1.50	2.00	2.50	3.25	4.00
6	104	184	334	649	1007
12	26	46	84	162	252
18	12	20	37	72	112
24	7	12	21	41	63
30	4	7	13	26	40
36	3	5	9	18	28
42	2	4	7	13	21
48	2	3	6	12	18

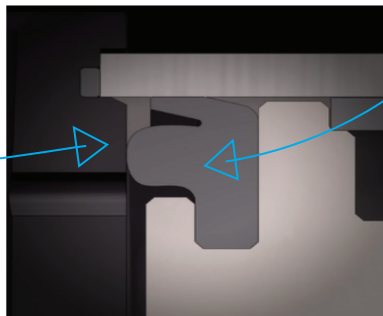
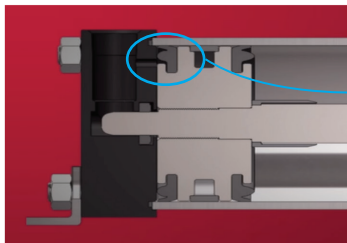
* The weight of the cylinder piston has been deducted from the figures shown above.

ECOLOGY SEAL ADVANTAGE

The Norgren Ecology Seal is an optional feature in P-Series NFPA Cylinders (EP, EDP).

What is it?

The Ecology seal is a specially engineered piston seal designed to absorb energy and reduce vibration in high speed applications. When used in conjunction with the ACS cushion, the Ecology seal enhances conventional cushioning technology to improve end of stroke deceleration.



*Eliminates piston impact
and absorbs energy at
the end of stroke!*

Benefits

- > Absorbs energy, eliminating impact forces, reducing vibration
- > Reduces noise by 25%
- > Reduces time through cushion to decrease cycle time, increasing productivity

Energy Absorption capacity of Ecology piston seals with an adjustable cushion

*Usable Pounds Stoppable at the following piston speeds

This chart features energy absorption capacity of the Ecology with "ACS" adjustable cushions

In/Sec.	Cylinder Bore				
	1.50	2.00	2.50	3.25	4.00
6	251	446	809	1570	2438
12	61	110	199	387	629
18	27	48	86	168	262
24	14	26	47	92	144
30	9	16	29	57	89
36	6	10.8	19	38	59
42	4.2	7.5	13	26	41
48	3.1	5.1	9.4	19	30

* The weight of the cylinder piston has been deducted from the figures shown above.

Application Tips

Use an Ecology Seal cylinder...

- > In high speed applications when load deceleration is a concern
- > When excess machine vibration due to pneumatic components is a concern
- > When cushions are required, but speed cannot be sacrificed
- > To reduce the effects of pneumatic bounce
- > To reduce noise levels

Noise Reduction

Sound Levels in Decibels

PSI Air Sound Pressure level in Decibels		2.00" x 6.00" Cylinder	
		Standard Seals	Ecology Seals
95	End	110	74
PSI	Side	110	81
50	End	113	74
PSI	Side	110	81

Effect of Impact Dampening Seals on Total Stroke of Cylinders

PSI	Cylinder Bore				
	1 1/2	2	2 1/2	3 1/4	4
0	.14	.15	.17	.19	.22
20	.10	.10	.12	.14	.16
40	.07	.07	.08	.09	.10
60	.04	.04	.05	.05	.06
80	.02	.02	.02	.02	.03
100	0	0	0	0	0

Note: These figures are for new cylinders. The impact dampening seals will take some compression set during operation of the cylinder and stroke loss will decrease. Also, the pressure for zero stroke loss will decrease to about 80 psi. To determine the stroke loss for either head or cap end, divide the values shown by 2.

DESIGN AND SIZING GUIDELINES

Basics to consider

When choosing a pneumatic cylinder, always consider the force required, the pressure available, the speed of movement, and air consumption. P-Series cylinders offer ACS adjustable cushioning and magnetic pistons. Cylinders are pre-lubricated at the factory and operate under normal conditions without additional lubrication. However, using a lubricator will extend the life of these products.

The adequate sizing of a pneumatic cylinder depends on the force required, and the applied pressure. Refer to page one for theoretical force output detail.

Load and Buckling

Applications requiring the movement of heavy loads should be supported and guided to prevent excessive side load. In this case, it is recommended to use an external guide system or incorporate a stop tube into the cylinder design. When a long stroke length is required, care must be taken to ensure the rod length is within the limits for prevention of rod buckling.

To determine the limits of the cylinder in your application, follow these steps:

- 1) Select the "Extend Force" from the "Maximum Effective Length" chart.
- 2) Select the stroke factor from the "Cylinder Mounting Diagram" chart.
- 3) To obtain the effective length "L", multiply the cylinder stroke by the appropriate stroke factor obtained in step 2.

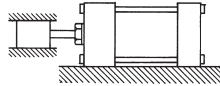
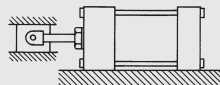
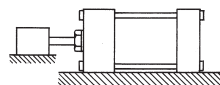
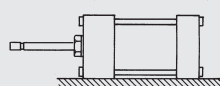
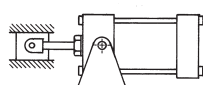
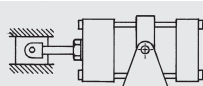
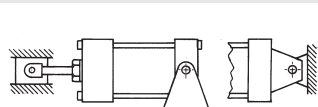
If the calculated effective "L" length exceeds L values in the "Maximum Effective Length" chart for the given extend force and rod diameter, the cylinder may require a larger rod diameter and/or a stop tube or external guides. In this case, please contact application engineering for further design consultation.

Maximum effective length "L"

Extended Force (lbs)	5/8"	1"
50	95	—
100	65	170
150	50	135
200	43	115
300	34	93
500	25	70
750	20	56
1000	17	48
1500	13	38
2000	11	33

Note: In some cases, it may be necessary to use a larger bore cylinder than is required for the force in order to obtain an adequate rod diameter.

Cylinder Mounting Diagram Chart

Cylinder Mounting	Rod End Connection	Mounting Style	Stroke Factor
Side Tapped, Head or Cap Flange, Tie Rod, Center or Side Lug	Fixed and Rigidly Guided		.50
Side Tapped, Head or Cap Flange, Tie Rod, Center or Side Lug	Pivoted and Rigidly Guided		.70
Side Tapped, Head or Cap Flange, Tie Rod, Center or Side Lug	Supported but not Rigidly Guided		2.00
Side Tapped, Head or Cap Flange, Tie Rod, Center or Side Lug	None		5.00
Head Trunnion	Pivoted and Rigidly Guided		1.00
Center Trunnion	Pivoted and Rigidly Guided		1.50
Cap Trunnion or Clevis	Pivoted and Rigidly Guided		2.00

VALVE SIZING GUIDELINE FOR P-SERIES CYLINDERS

There are many factors that affect the speed and performance of a cylinder. Some of these factors include: air pressure, tubing diameter and length, fittings, operating load, and valve type. Although all these factors could be taken into consideration, a more practical approach is to offer users a general guide for valve sizing.

The chart below offers general guidelines to assist in choosing the proper valve based on the cylinder bore size. The cylinder operating speed resulting from the use of each valve at 90 PSI with a 10 PSI pressure drop is rated in general terms:

Slow Speed Operation	S	~10-20 in/sec
Medium Speed Operation	M	~20-30 in/sec
High Speed Operation	F	~30-40 in/sec
Recommend using flow control on exhaust	*	
Not Recommended		

			P-Series NFPA Double Acting Cylinder Bore				
IMI Norgren Valve Range	CV	Tubing Diameter	1.5	2	2.5	3.25	4
V50 Inline 1/8" (Direct Ported)	0.03-0.05	5/32" - 4mm	S				
V60 Inline 1/8" (Direct Ported)							
VM10 5/32" Stacking manifold							
V50 Inline 1/8" (Direct Ported)	0.05-0.15	3/16" - 5mm	M	S			
V60 Inline 1/8" (Direct Ported)							
VM10 1/8" Stacking manifold							
V50 Inline 1/8" (Direct Ported)	0.15-0.35	1/4" - 6mm	F	M	S		
V60 Inline 1/8" (Direct Ported)							
VM10 1/4" Stacking manifold							
VS18 1/8" Subbase Manifold							
V51 Inline 1/4" (Direct Ported)	0.35-0.65	5/16" - 8mm	*	F	M	S	
V60 Inline 1/8" (Direct Ported)							
VS18 1/4" Subbase Manifold							
V51 Inline 1/4" (Direct Ported)	0.65-1	3/8" - 10mm	*	*	F	M	S
V61 Inline 1/4" (Direct Ported)							
Nugget 200 Inline 3/8" (Direct Ported)							
VS26 1/4" Subbase Manifold	1-1.3	3/8" - 10mm	*	*	*	M	M
V52 Inline 3/8" (Direct Ported)							
V61 Inline 1/4" (Direct Ported)							
Nugget 200 Inline 3/8" (Direct Ported)	1.3-1.7	1/2" - 12mm	*	*	*	F	M
VS26 3/8" Subbase Manifold							
V52 Inline 3/8" (Direct Ported)							
V62 Inline 3/8" (Direct Ported)	1.7-2.5	1/2" - 12mm	*	*	*	F	F
Nugget 200 Inline 1/2" (Direct Ported)							
V53 Inline 1/2" (Direct Ported)							
V62 Inline 3/8" (Direct Ported)	2.5-3	1/2" - 12mm	*	*	*	*	F
Nugget 500 Inline 1/2" (Direct Ported)							

Valve sizing recommendations are based on 90 psig input pressure at 10 psig pressure drop, and assume a 3 foot tubing length.

Options Selector

EP 16 7 7 A 1-1.50X6.000-PS-RX(1.250)

Series	Substitute	Options
Series P Cylinder	P	Back-to-Back cylinder configuration BB (**)
Series P Double Rod End Cylinder	DP	Piston rod stud - Medium strength threadlocker BL
Series EP Cylinder (Ecology seals)	EP	Case Hardened Piston Rod HR
Series EP Double Rod End Cylinder (Ecology Seals)	EDP	Passive Rod Lock ¹ LE
Mount	Substitute	Magnetic Piston (Standard/Required) PS
Universal (Standard – MS4 & SNC)	16 ‡	Piston rod stud - High strength threadlocker RS
Head Rectangular Flange (MF1)	03	Rod Extension (Specify additional length of rod) RX()
Cap Rectangular Flange (MF2)	04	303 Stainless Steel Piston Rod (Hard Chrome Plated) SS
Tie Rods Ext. Both Ends (MX1)	06	Special Rod Thread (Specify thd. type) T()
Tie Rods Ext. Cap End (MX2)	6C	Thread Extension (Specify additional length of thd.) TX()***
Tie Rods Ext. Head End (MX3)	6R	Stroke
(2) Tie Rods Ext. Both Ends (MX4)	6B	Stroke in inches to three decimal places up to 100"
Side Lugs (MS2)	09	Bore
Side End Angle (MS1)	11	1-1/2" Bore 1.50
Cap Clevis (MP1)	12	2" Bore 2.00
Cap Clevis (MP2)	22	2-1/2" Bore 2.50
Cap Eye (MP4)	42	3-1/4" Bore 3.25
Head Cushion	Substitute	4" Bore 4.00
No Cushion*	3	Rod Thread
Adjustable Adaptive Cushion (Standard)	7	Small Male – Solid (KK) (Standard) 1
Cap Cushion	Substitute	Intermediate Male – Solid (CC) 2
No Cushion*	3	Female (KK) 3
Adjustable Adaptive Cushion (Standard)	7	Full Thread Male – Solid (FF) 6
Rod Diameter	Substitute	Plain Rod End – No Thread 7
0.625" diameter rod (1.50", 2.00", 2.50" Bores)	A	
1.00" diameter rod (3.25", 4.00" Bores)	B	

‡ Universal mount cylinders include MS4 mounting holes and sleeve nut construction. Mounting kits should be ordered separately on Universal mount cylinders.

* Non cushioned cylinders are only available with Ecology Piston seals. Cushion seal will be removed. **Note:** It is recommended to use cushions for applications with operating speeds in excess of 20" per second.

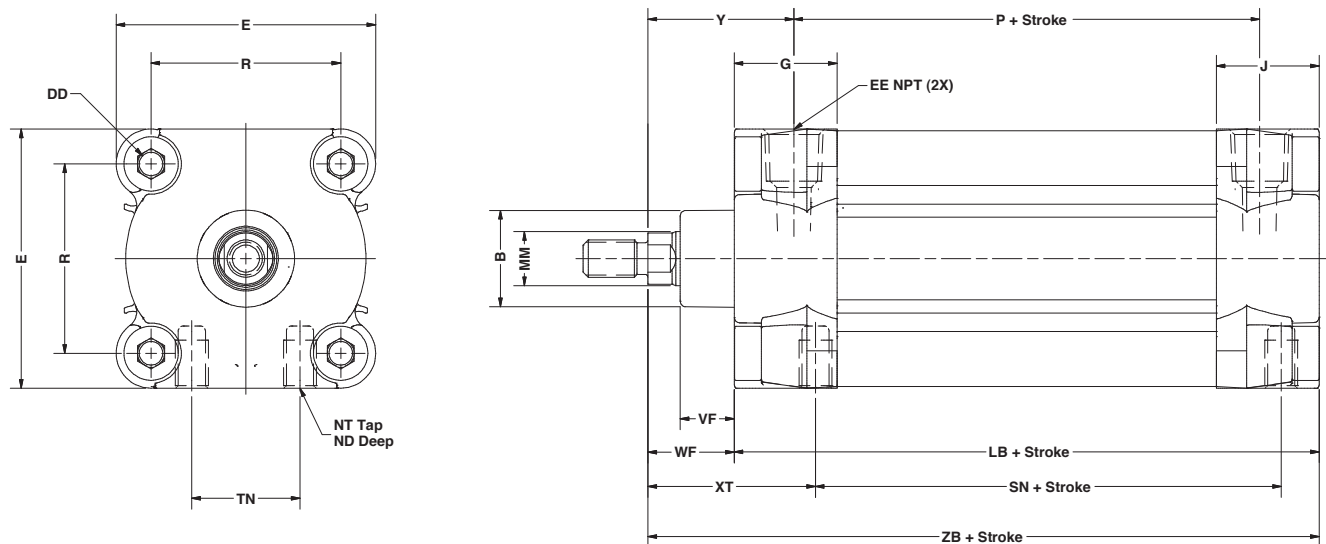
** BB option must reference 2nd stroke. If mounting is selected, mount will be assembled with respect to the primary stroke.

*** Thread extension in increments of 0.125" up to 2.00" max.

¹ Option HR (case hardened piston rod) required with LE rod lock option

BASIC DIMENSIONS

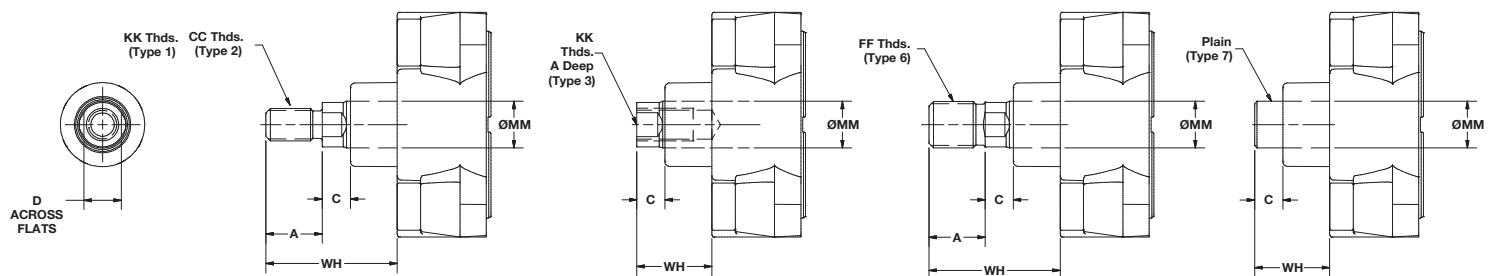
Universal Mount (16) - NFPA MS4 & Sleeve Nut Construction



Bore	MM Ø	B Ø	DD	E	EE	G	J	LB	NT	ND
1.50	0.625	1.124	1/4-28	2.000	3/8 NPT	1.188	1.188	3.625	1/4-20	0.375
2.00	0.625	1.124	5/16-24	2.500	3/8 NPT	1.188	1.188	3.625	5/16-18	0.375
2.50	0.625	1.124	5/16-24	3.000	3/8 NPT	1.228	1.147	3.750	3/8-16	0.500
3.25	1.00	1.499	3/8-24	3.750	1/2 NPT	1.438	1.438	4.250	1/2-13	0.750
4.00	1.00	1.499	3/8-24	4.500	1/2 NPT	1.438	1.438	4.250	1/2-13	0.750

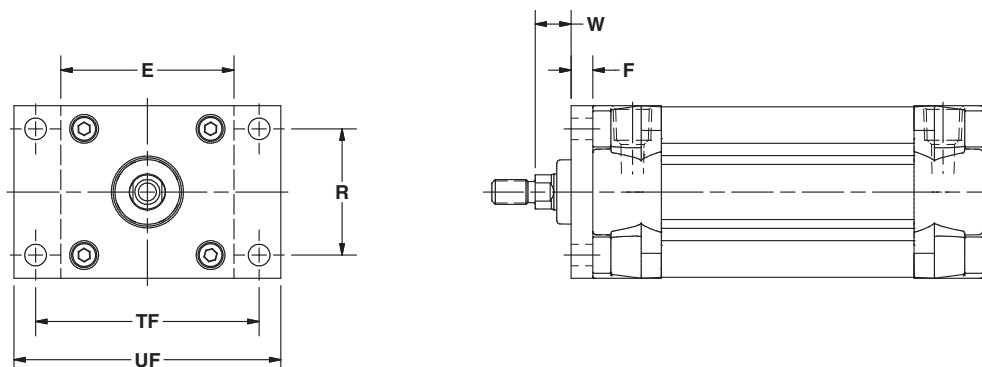
Bore	P	R	SN	TN	VF	WF	XT	Y	ZB
1.50	2.391	1.428	2.250	0.625	0.625	1.000	1.938	1.618	4.625
2.00	2.250	1.838	2.250	0.875	0.625	1.000	1.938	1.688	4.625
2.50	2.375	2.192	2.375	1.250	0.625	1.000	1.938	1.688	4.750
3.25	2.576	2.758	2.625	1.500	0.875	1.375	2.438	2.213	5.625
4.00	2.576	3.324	2.625	2.063	0.875	1.375	2.438	2.213	5.625

Rod Ends



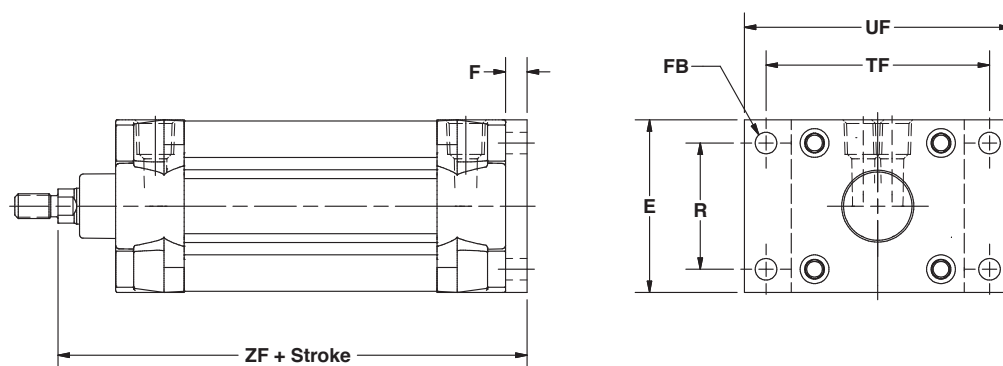
Bore	MM Ø	Thread Type	Rod Thread	A	C	D (Flats)	WH
1.50 2.00 2.50	0.625	1 KK	7/16-20	0.75	0.375	0.50	1.75
		2 CC	1/2-20	0.75	0.375	0.50	1.75
		3 KK	7/16-20	0.75	0.375	0.50	1.00
		6 FF	5/8-18	0.75	0.375	0.50	1.75
		7 Plain	—	—	0.375	—	1.00
3.25 4.00	1.00	1 KK	3/4-16	1.125	0.50	0.813	2.50
		2 CC	7/8-14	1.125	0.50	0.813	2.50
		3 KK	3/4-16	1.125	0.50	0.813	1.375
		6 FF	1-14	1.125	0.50	0.813	2.50
		7 Plain	—	—	0.50	—	1.375

NFPA (MF1) - 03 Head Rectangular Flange

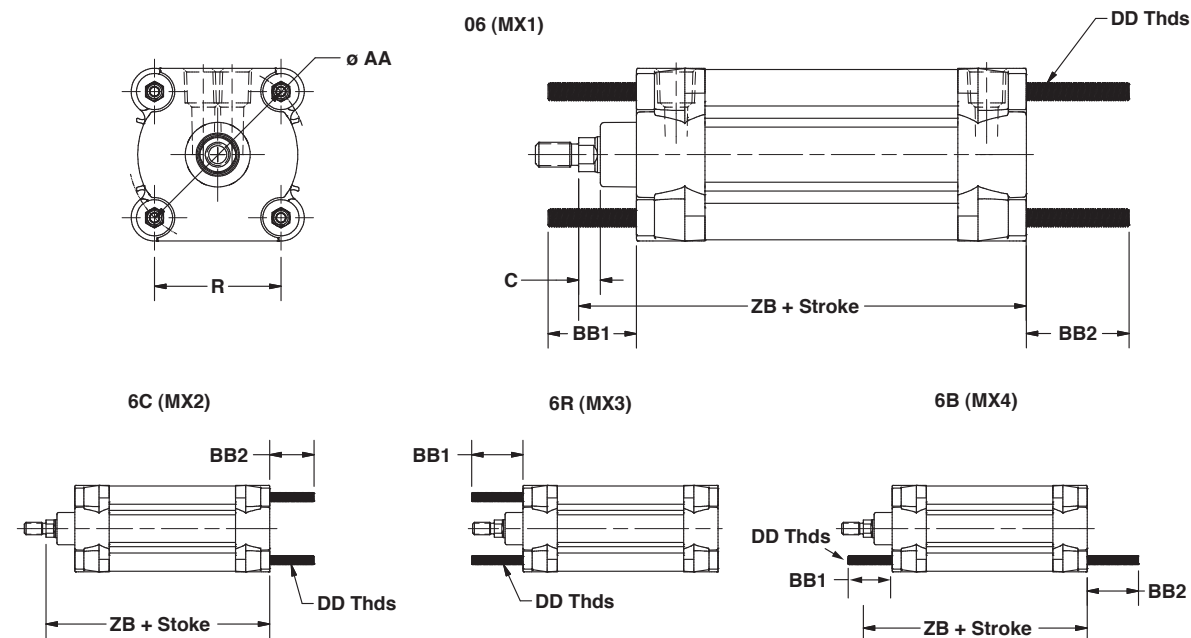


Bore	E	F	FB	R	TF	UF	W
1.50	2.000	0.375	0.312	1.428	2.750	3.375	0.625
2.00	2.500	0.375	0.375	1.838	3.375	4.125	0.625
2.50	3.000	0.375	0.375	2.192	3.875	4.625	0.625
3.25	3.750	0.625	0.438	2.758	4.688	5.500	0.750
4.00	4.500	0.625	0.438	3.324	5.438	6.250	0.750

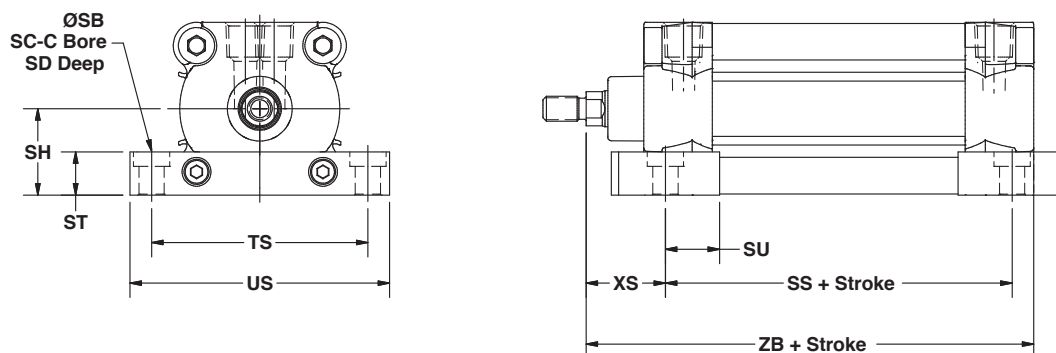
NFPA (MF2) - 04 Cap Rectangular Flange



Bore	E	F	FB	R	TF	UF	ZF
1.50	2.000	0.375	0.312	1.428	2.750	3.375	5.000
2.00	2.500	0.375	0.375	1.838	3.375	4.125	5.000
2.50	3.000	0.375	0.375	2.192	3.875	4.625	5.125
3.25	3.750	0.625	0.438	2.758	4.688	5.500	6.250
4.00	4.500	0.625	0.438	3.324	5.438	6.250	6.250

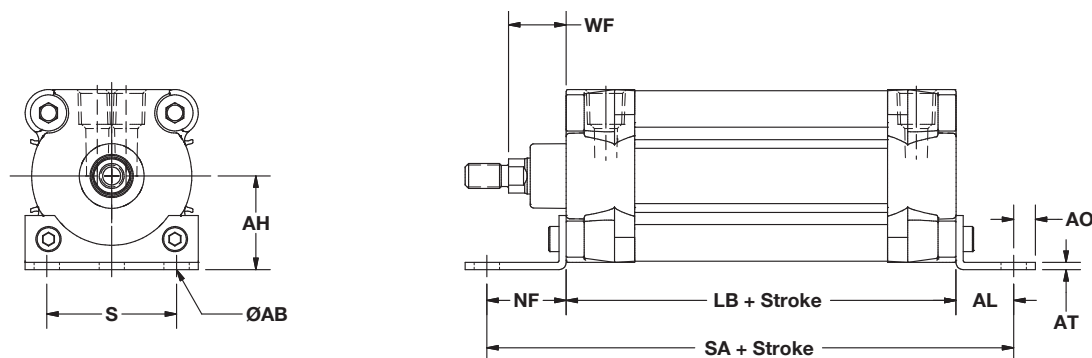
NFPA
(MX1) - 06 Tie rods Ext. Both ends
(MX2) - 6C Tie rods Ext. Cap end
(MX3) - 6R Tie rods Ext. Head end
(MX4) - 6B (2) Bottom Tie rods Ext. Both ends


Bore	AA	BB1	BB2	C	DD	R	VF	ZB
1.50	2.020	1.375	1.000	0.375	1/4-28	1.428	0.625	4.625
2.00	2.600	1.500	1.125	0.375	5/16-24	1.838	0.625	4.625
2.50	3.100	1.500	1.125	0.375	5/16-24	2.192	0.625	4.750
3.25	3.900	2.000	1.375	0.500	3/8-24	2.758	0.875	5.625
4.00	4.700	2.000	1.375	0.500	3/8-24	3.324	0.875	5.625

NFPA (MS2) - 09 Side Lugs


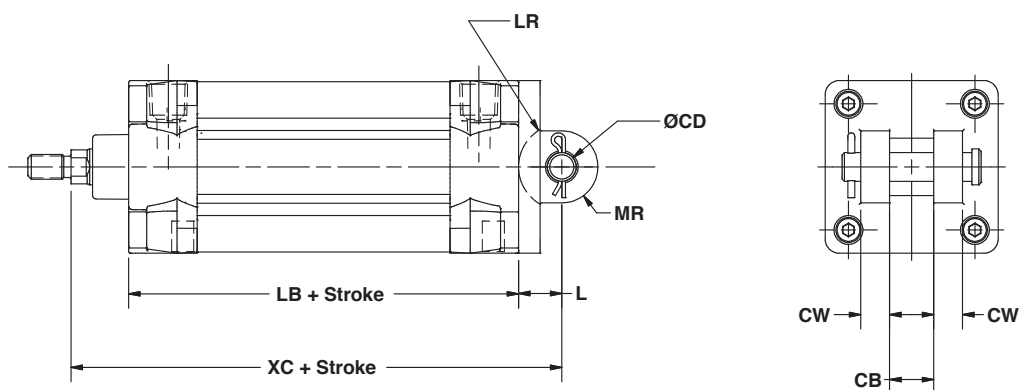
Bore	SB	SC	SD	SH	SW	SS	ST	SU	TS	US	XS	ZB
1.50	0.438	0.625	0.125	1.000	0.375	2.875	0.625	0.938	2.750	3.500	1.375	4.625
2.00	0.438	0.625	0.125	1.250	0.375	2.875	0.625	0.938	3.250	4.000	1.375	4.625
2.50	0.438	0.625	0.250	1.500	0.375	3.000	0.750	0.938	3.750	4.500	1.375	4.750
3.25	0.563	0.813	0.250	1.875	0.500	3.250	1.000	1.250	4.750	5.750	1.875	5.625
4.00	0.563	0.813	0.250	2.250	0.500	3.250	1.000	1.250	5.500	6.500	1.875	5.625

NFPA (MS1) - 11 Side End Angles

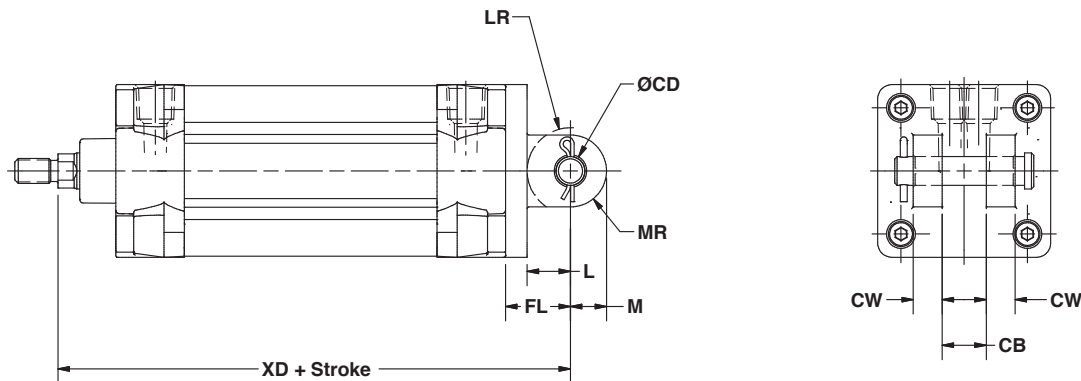


Bore	AB	AH	AL	AO	AT	LB	NF	S	SA	WF
1.50	0.438	1.188	1.000	0.375	0.125	3.625	1.375	1.250	6.000	1.000
2.00	0.438	1.438	1.000	0.375	0.125	3.625	1.375	1.750	6.000	1.000
2.50	0.438	1.625	1.000	0.375	0.125	3.750	1.375	2.250	6.125	1.000
3.25	0.563	1.938	1.250	0.500	0.125	4.250	1.875	2.750	7.375	1.375
4.00	0.563	2.250	1.250	0.500	0.125	4.250	1.875	3.500	7.375	1.375

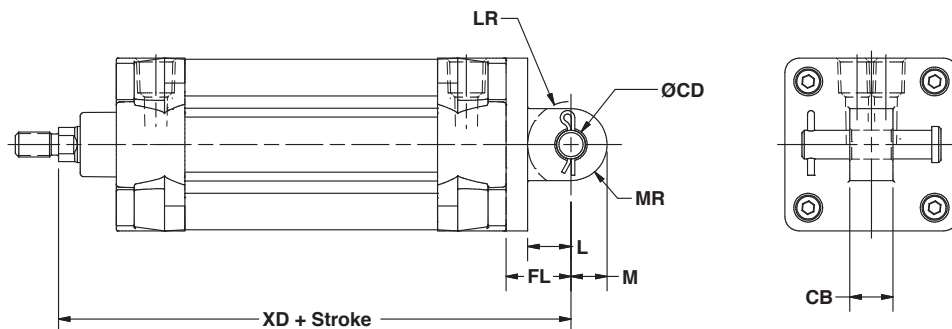
NFPA (MP1) - 12 Rear Clevis



Bore	CB	CD	CW	L	LB	LR	MR	XC
1.50	0.750	0.500	0.500	0.750	3.625	0.625	0.625	5.375
2.00	0.750	0.500	0.500	0.750	3.625	0.625	0.625	5.375
2.50	0.750	0.500	0.500	0.750	3.750	0.625	0.625	5.500
3.25	1.250	0.750	0.625	1.250	4.250	0.875	0.875	6.875
4.00	1.250	0.750	0.625	1.250	4.250	0.875	0.875	6.875

NFPA (MP2) - 22 Rear Clevis


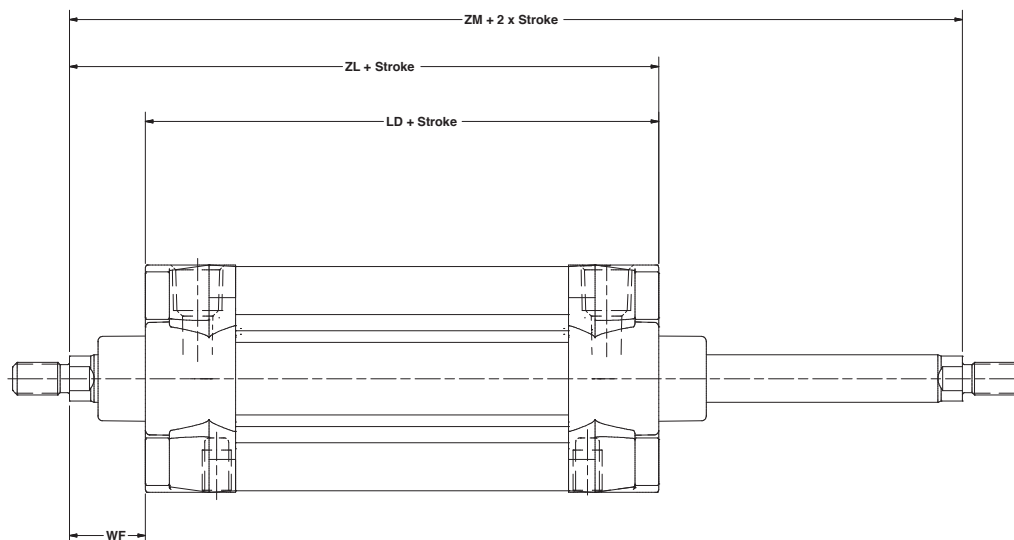
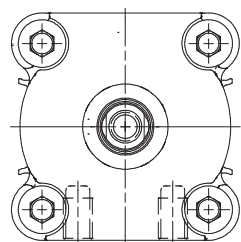
Bore	CB	CD	CW	FL	L	LR	M	MR	XD
1.50	0.750	0.500	0.500	1.125	0.750	0.750	0.625	0.625	5.750
2.00	0.750	0.500	0.500	1.125	0.750	0.750	0.625	0.625	5.750
2.50	0.750	0.500	0.500	1.125	0.750	0.750	0.625	0.625	5.875
3.25	1.250	0.750	0.625	1.875	1.250	1.250	0.875	0.875	7.500
4.00	1.250	0.750	0.625	1.875	1.250	1.250	0.875	0.875	7.500

NFPA (MP4) - 42 Rear Eye


Bore	CB	CD	FL	L	LR	M	MR	XD
1.50	0.750	0.500	1.125	0.750	0.750	0.625	0.625	5.750
2.00	0.750	0.500	1.125	0.750	0.750	0.625	0.625	5.750
2.50	0.750	0.500	1.125	0.750	0.750	0.625	0.625	5.875
3.25	1.250	0.750	1.875	1.250	1.250	0.875	0.875	7.500
4.00	1.250	0.750	1.875	1.250	1.250	0.875	0.875	7.500

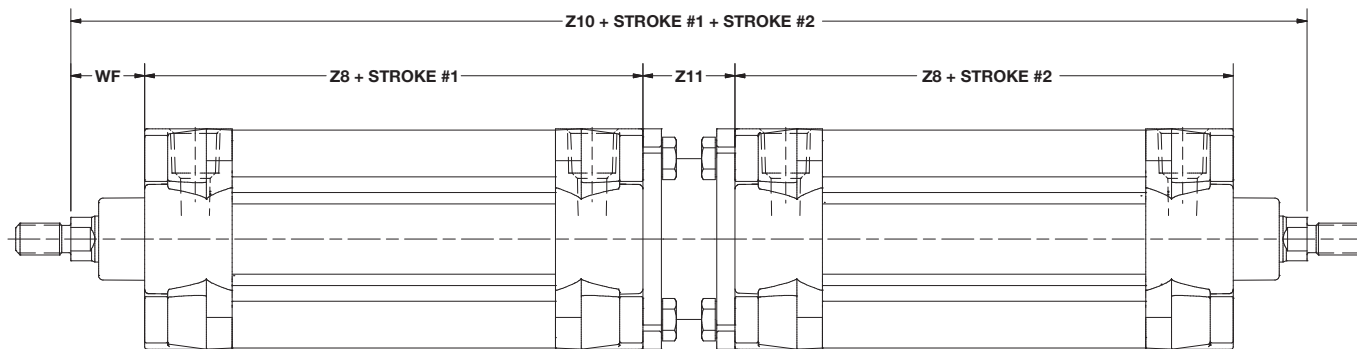
CYLINDER VARIANTS

Double Rod End (DP, EDP)



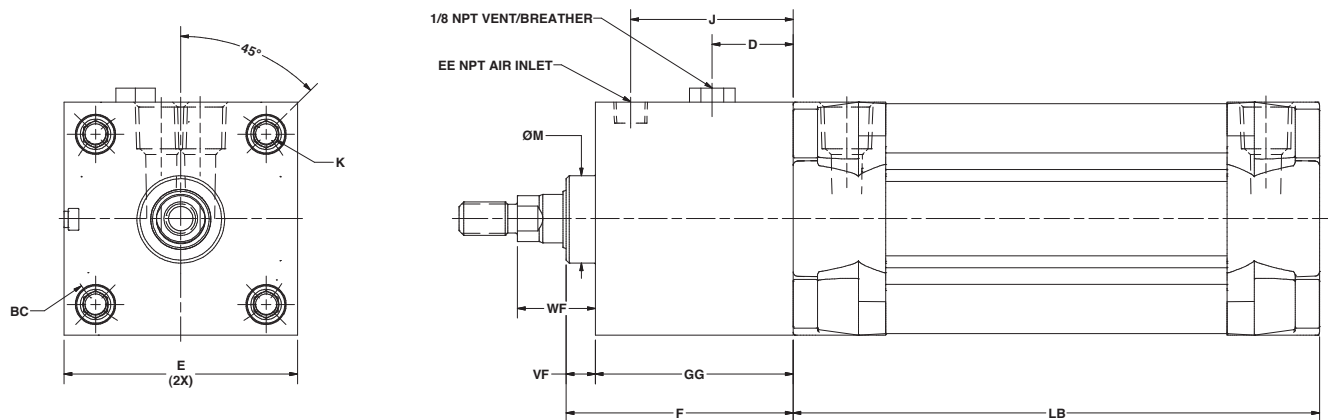
Bore	LD	WF	ZL	ZM
1.50	4.125	1.000	5.375	6.125
2.00	4.125	1.000	5.438	6.125
2.50	4.250	1.000	5.563	6.250
3.25	4.750	1.375	6.500	7.500
4.00	4.750	1.375	6.500	7.500

Back to Back Assembly (BB option)



Bore	Z8	Z10	Z11	WF	Adapter Kit Part Number
1.50	3.625	10.375	1.125	1.000	PMK-BB-150
2.00	3.625	10.500	1.250	1.000	PMK-BB-200
2.50	3.750	10.750	1.250	1.000	PMK-BB-250
3.25	4.250	12.750	1.500	1.375	PMK-BB-325
4.00	4.250	12.750	1.500	1.375	PMK-BB-400

Cylinder with Passive Rod Lock (LE option)



Bore	BC	D	E	EE	F	GG	J	K	LB	M	VF	WF	Holding Force* (lbs.)
1.50	2.022	1.010	2.000	1/8	2.772	2.397	1.910	1/4-28	3.625	1.124	0.375	1.000	180
2.00	2.602	1.000	2.500	1/8	2.797	2.422	1.980	5/16-24	3.625	1.124	0.375	1.000	314
2.50	3.097	1.040	3.000	1/8	2.915	2.540	2.090	5/16-24	3.750	1.124	0.375	1.000	491
3.25	3.903	1.370	3.750	1/8	4.476	3.976	2.760	3/8-24	4.250	1.499	0.500	1.375	830
4.00	4.695	1.690	4.500	1/4	4.476	3.976	2.830	3/8-24	4.250	1.499	0.500	1.375	1257

*CAUTION: Rated holding force corresponds to static load conditions. If the rated value is exceeded, slipping may occur.

Rod Lock Technical Specifications

Rod lock release pressure:

60-120 psi

Caution: Rod lock will not hold a load when mounted to cylinders with operating pressures in excess of 100 psi. Refer to holding force in dimensional chart.

Temperature Range:

33°F to 150°F

Rod Lock Operation:

Operates in both directions

Note: If personal safety is required, an unrelated, redundant safety system should be used.

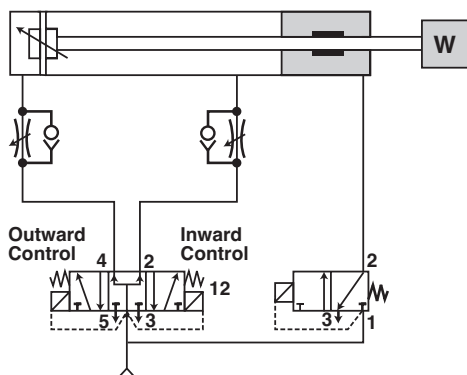
Rod locks require clean, dry, pressure regulated air, lubrication is not required.

The rod must be kept clean and dry to maintain optimum holding forces.

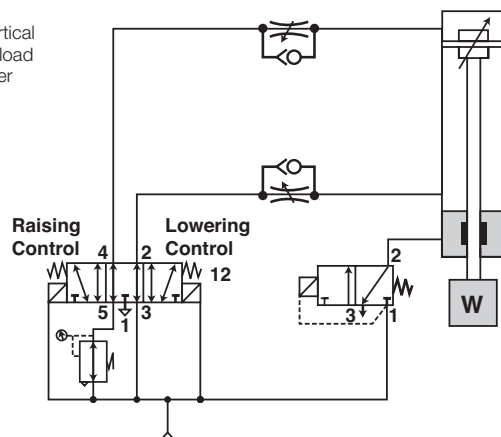
Rod rotation is not allowed when rod lock is engaged (not intended for torsional braking).

Rod Lock Schematics

System shown:
Cylinder control using a 5/3 valve with the center open on the central port

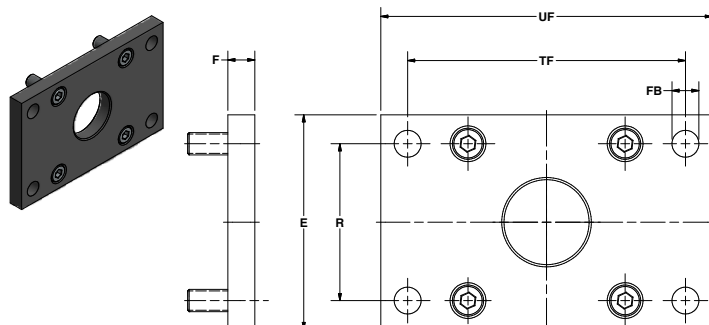


System shown: vertical mounting with the load beneath the cylinder



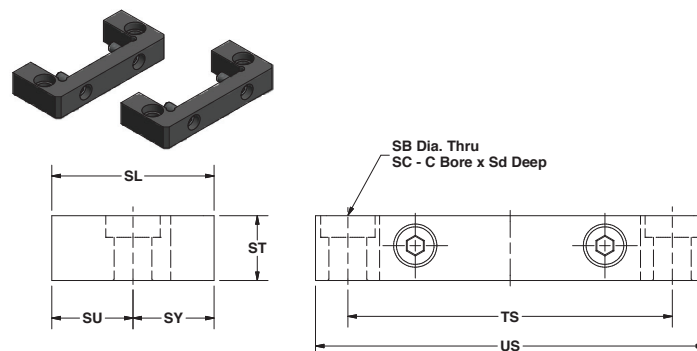
MOUNTING KITS

NFPA (MF1) - 03 Head Rectangular Flange NFPA (MF2) - 04 Cap Rectangular Flange



Bore	E	F (Thickness)	FB	R	TF	UF	Part Number
1.50	2.000	0.375	0.313	1.428	2.750	3.375	PMK-MF1-150
2.00	2.500	0.375	0.375	1.842	3.375	4.125	PMK-MF1-200
2.50	3.000	0.375	0.375	2.192	3.875	4.625	PMK-MF1-250
3.25	3.750	0.625	0.438	2.758	4.688	5.500	PMK-MF1-325
4.00	4.500	0.625	0.438	3.323	5.438	6.250	PMK-MF1-400

NFPA (MS2) - Side Lugs



Bore	SB	SC	SD	SY	ST	SU	TS	US	Part Number
1.50	0.438	0.625	0.125	0.938	0.625	0.938	2.750	3.500	PMK-MS2-150
2.00	0.438	0.625	0.125	0.938	0.625	0.938	3.250	4.000	PMK-MS2-200
2.50	0.438	0.625	0.250	0.938	0.750	0.938	3.750	4.500	PMK-MS2-250
3.25	0.563	0.813	0.250	1.250	1.000	1.250	4.750	5.750	PMK-MS2-325
4.00	0.563	0.813	0.250	1.250	1.000	1.250	5.500	6.500	PMK-MS2-400

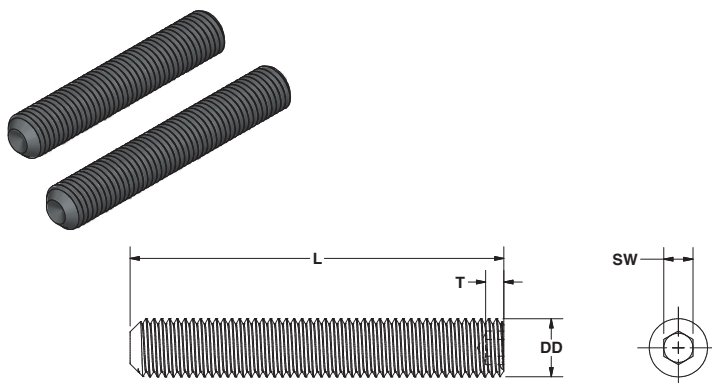
NFPA

(MX1) - 06 Tie rods Ext. Both ends

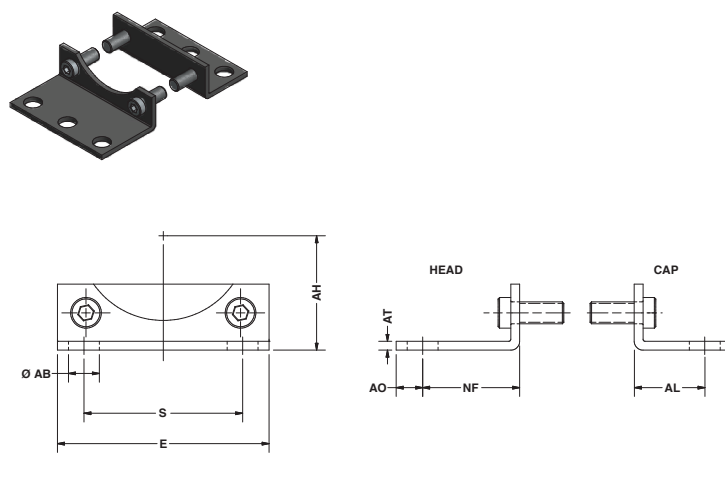
(MX2) - 6C Tie rods Ext. Cap end

(MX3) - 6R Tie rods Ext. Head end

(MX4) - 6B (2) Tie rods Ext. Both ends



NFPA (MS1) - Side End Angles

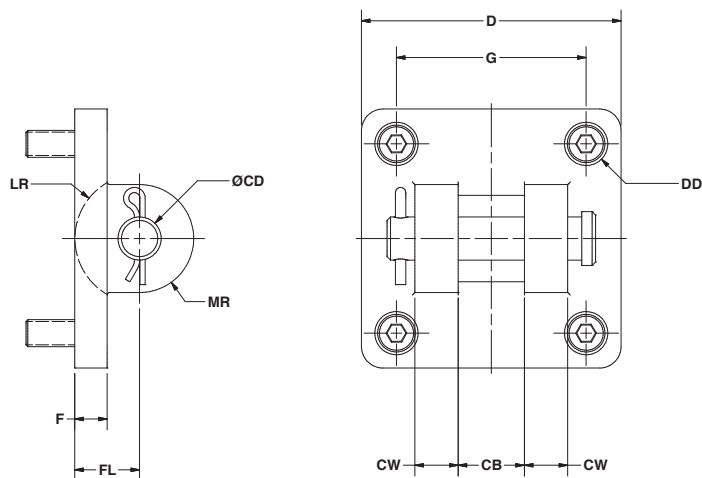
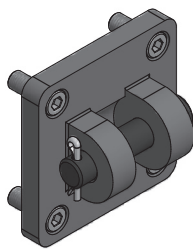


Kit Part Numbers							Part Number	
Bore	END	DD	L	SW	T	Single Rod End	Double Rod End	
1.50	HEAD	1/4-28	2.000	0.125	0.125	PMK-MX1-150	PMK-MX1-150D	
	CAP	1/4-28	1.500	0.125	0.125			
2.00	HEAD	5/16-24	2.000	0.156	0.156	PMK-MX1-200	PMK-MX1-200D	
	CAP	5/16-24	1.750	0.156	0.156			
2.50	HEAD	5/16-24	2.000	0.156	0.156	PMK-MX1-200	PMK-MX1-200D	
	CAP	5/16-24	1.750	0.156	0.156			
3.25	HEAD	3/8-24	2.625	0.188	0.188	PMK-MX1-325	PMK-MX1-325D	
	CAP	3/8-24	2.000	N/A	N/A			
4.00	HEAD	3/8-24	2.625	0.188	0.188	PMK-MX1-325	PMK-MX1-325D	
	CAP	3/8-24	2.000	N/A	N/A			

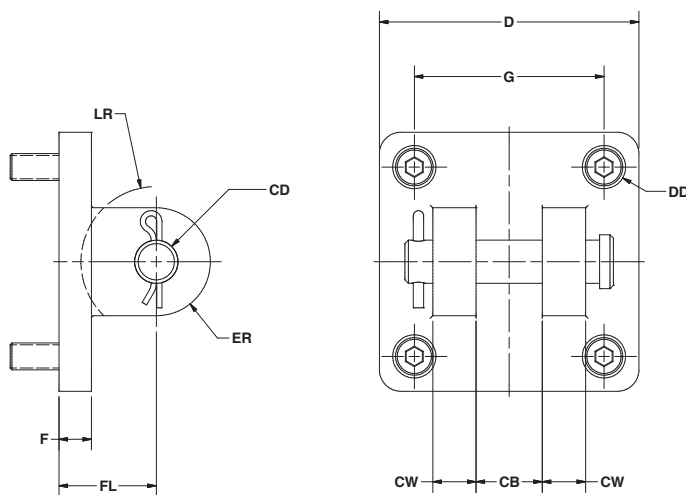
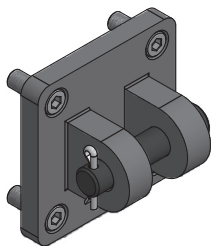
Note: Single rod end kits include 4 head bolts and 4 cap bolts
 Double rod end kits include 8 head bolts

Part Number												Part Number	
Bore	Ø AB	AH	AO	AL	AT	NF	E	S	MS1 Single Rod	MS1 Double Rod			
1.50	0.438	1.188	0.375	1.00	0.125	1.375	2.000	1.250	PMK-MS1-150	PMK-MS1-150D			
2.00	0.438	1.438	0.375	1.00	0.125	1.375	2.500	1.750	PMK-MS1-200	PMK-MS1-200D			
2.50	0.438	1.625	0.375	1.00	0.125	1.375	3.000	2.250	PMK-MS1-250	PMK-MS1-250D			
3.25	0.563	1.938	0.500	1.25	0.125	1.875	3.750	2.750	PMK-MS1-325	PMK-MS1-325D			
4.00	0.563	2.250	0.500	1.25	0.125	1.875	4.500	3.500	PMK-MS1-400	PMK-MS1-400D			

Note: Single rod end kits include 1 head and 1 cap bracket.
 Double rod end kits include 2 head brackets.

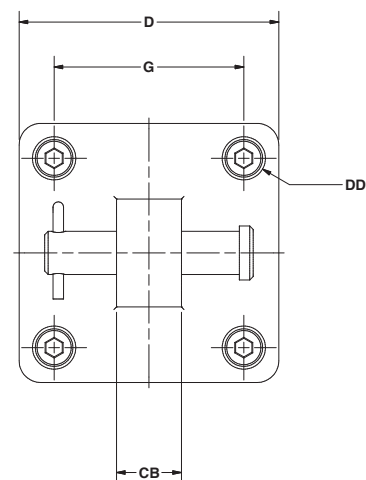
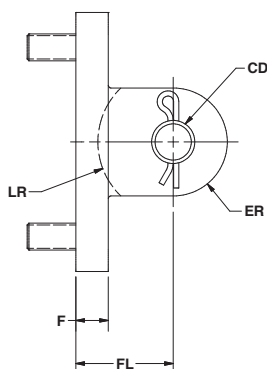
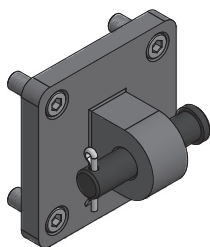
NFPA (MP1) - Rear Clevis


Bore	CB	CD	CW	D	DD	F	FL	G	LR	MR	Part Number
1.50	0.750	0.500	0.500	2.000	1/4-28	0.375	0.750	1.428	0.625	0.625	PMK-MP1-150
2.00	0.750	0.500	0.500	2.500	5/16-24	0.375	0.750	1.838	0.625	0.625	PMK-MP1-200
2.50	0.750	0.500	0.500	3.000	5/16-24	0.375	0.750	2.192	0.625	0.625	PMK-MP1-250
3.25	1.250	0.750	0.625	3.750	3/8-24	0.500	1.250	2.758	0.875	0.875	PMK-MP1-325
4.00	1.250	0.750	0.625	4.500	3/8-24	0.500	1.250	3.324	0.875	0.875	PMK-MP1-400

NFPA (MP2) Rear Clevis


Bore	CB	CD	DD	ER	G	F	FL	LR	M	MR	Part Number
1.50	0.750	0.500	1/4-28	0.625	1.428	0.375	1.125	0.750	0.625	0.625	PMK-MP2-150
2.00	0.750	0.500	5/16-24	0.625	1.838	0.375	1.125	0.750	0.625	0.625	PMK-MP2-200
2.50	0.750	0.500	5/16-24	0.625	2.192	0.375	1.125	0.750	0.625	0.625	PMK-MP2-250
3.25	1.250	0.750	3/8-24	0.875	2.758	0.500	1.875	1.250	0.875	0.875	PMK-MP2-325
4.00	1.250	0.750	3/8-24	0.875	3.324	0.500	1.875	1.250	0.875	0.875	PMK-MP2-400

NFPA (MP4) Rear Eye



Bore	CB	CD	DD	ER	G	F	FL	LR	M	MR	Part Number
1.50	0.750	0.500	1/4-28	0.625	1.428	0.375	1.125	0.750	0.625	0.625	PMK-MP4-150
2.00	0.750	0.500	5/16-24	0.625	1.838	0.375	1.125	0.750	0.625	0.625	PMK-MP4-200
2.50	0.750	0.500	5/16-24	0.625	2.192	0.375	1.125	0.750	0.625	0.625	PMK-MP4-250
3.25	1.250	0.750	3/8-24	0.875	2.758	0.500	1.875	1.250	0.875	0.875	PMK-MP4-325
4.00	1.250	0.750	3/8-24	0.875	3.324	0.500	1.875	1.250	0.875	0.875	PMK-MP4-400

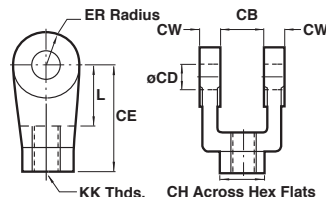
Recommended Mounting Screw Torque

Bore	Mounting Screw Thread	Torque (ft-lbs)
1.50	1/4-28	2
2.00	5/16-24	4.5
2.50	5/16-24	4.5
3.25	3/8-24	8.5
4.00	3/8-24	8.5

MOUNTING ACCESSORIES

NFPA Rod Clevis

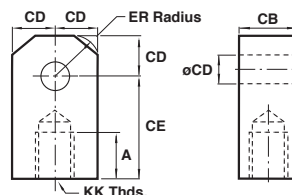
Note: Includes standard pin assembly



Bore	Rod Ø	KK	CB	CD	CE	CH	CW	ER	L	Part Number
1.50										
2.00	0.625	7/16-20	0.75	0.50	1.50	1.00	0.50	0.50	0.75	PMK-RC-A1
2.50										
3.25	1.00	3/4-16	1.25	0.75	2.375	1.25	0.625	0.75	1.25	PMK-RC-B1
4.00										

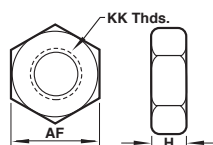
NFPA Rod eye

Note: Includes standard pin assembly



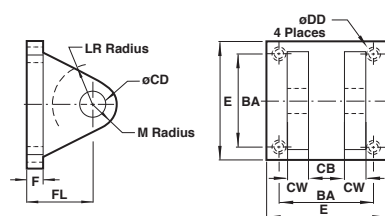
Bore	Rod Ø	KK	A	CB	CD	CE	ER	Part Number
1.50								
2.00	0.625	7/16-20	0.75	0.75	0.50	1.50	0.563	PMK-RE-A1
2.50								
3.25	1.00	3/4-16	1.125	1.25	0.75	2.063	0.938	PMK-RE-B1
4.00								

Rod Jam Nut



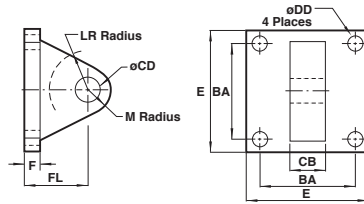
Bore	KK	AF	H	Part Number
1.50				
2.00	7/16-20	0.688	0.25	52025
2.50				
3.25	3/4-16	1.125	0.422	52010
4.00				

NFPA Clevis Bracket



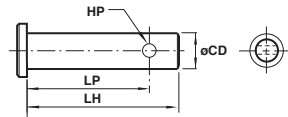
Bore	BA	CB	CD	CW	DD	E	F	FL	LR	M	Part Number
1.50											
2.00	1.625	0.75	0.50	0.50	3/8-24	2.50	0.375	1.125	0.75	0.5	PMK-CB-A
2.50											
3.25	2.563	1.25	0.75	0.625	1/2-20	3.50	0.625	1.875	1.25	0.813	PMK-CB-B
4.00											

NPFA Eye Bracket



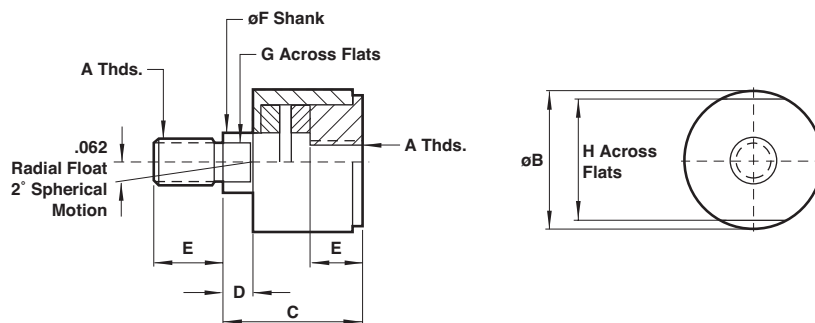
Bore	BA	CB	CD	DD	E	F	FL	LR	M	Part Number
1.50										
2.00	1.625	0.75	0.50	0.406	2.50	0.375	1.125	0.75	0.50	PMK-EB-A
2.50										
3.25	2.563	1.25	0.75	0.531	3.50	0.625	1.875	1.25	0.75	PMK-EB-B
4.00										

Standard Pin Assembly



Bore	CD	HP	LH	LP	Part Number
1.50					
2.00	0.5	0.126	2.25	2.093	49206
2.50					
3.25	0.75	0.126	3.00	2.843	49205
4.00					

Rod Alignment Coupler



Bore	A	B	C	D	E	F	G	H	Max Pull (lbs.)	Part Number
1.50										
2.00	7/16-20	1.25	2.00	0.50	0.75	0.625	0.50	1.125	10,000	CC-1-07
2.50										
3.25	3/4-16	1.75	2.312	0.50	1.125	0.969	0.812	1.50	34,000	CC-1-12
4.00										



P-SERIES REPAIR KITS

Single Rod End

P-Series	EP-Series
PRK-150	EPRK-150
PRK-200	EPRK-200
PRK-250	EPRK-250
PRK-325	EPRK-325
PRK-400	EPRK-400

Double Rod End

DP-Series	EDP-Series
DPRK-150	EDPRK-150
DPRK-200	EDPRK-200
DPRK-250	EDPRK-250
DPRK-325	EDPRK-325
DPRK-400	EDPRK-400

Repair kits include: Rod bearing, piston seals, cushion seals, tube seals, rod seal/wiper

- > Reed and Solid State functionality
- > LED indicator
- > Flush with tube profile
- > Flying lead or quick disconnect
- > Auto select versions



Materials

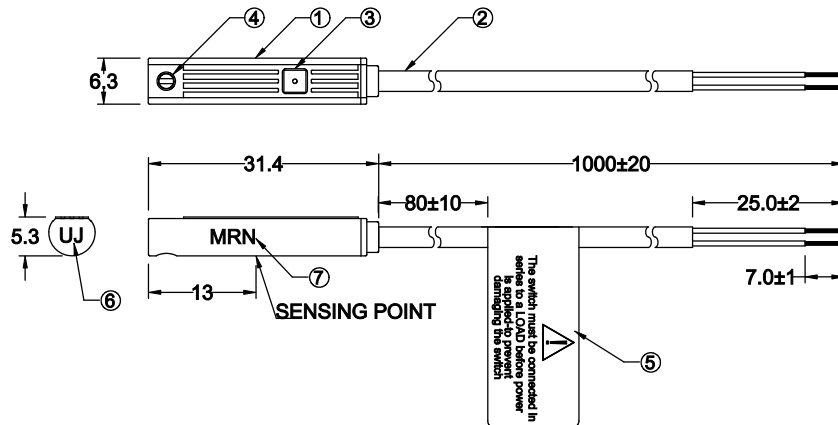
Housing

ABS - Acrylonitrile butadiene styrene

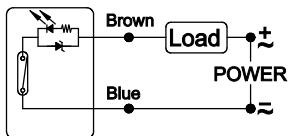
Switch P/N	Type	Voltage	Current Maximum (mA)	Function	Operating Temperature (°F)	LED	Protection Class	Plug	Cable Length
MRN	Reed, 2-Wire Flying Lead	240V AC/DC	100	Normally Open	25 to 158°F	RED	IP69K		1000 mm
MRNQS	Reed, 2-Wire M8	240V AC/DC	100	Normally Open	25 to 158°F	RED	IP69K	M8, 3 pin	300 mm
MDN	Solid State, 2-Wire Flying Lead	10 - 28V DC	50	Normally Open	25 to 158°F	RED	IP69K		1000 mm
MDNQS	Solid State, 2-Wire M8	10 - 28V DC	50	Normally Open	25 to 158°F	RED	IP69K	M8, 3 pin	300 mm
MSN	Solid State auto select, 3-Wire Flying Lead	5 - 30V DC	200	NPN or PNP	25 to 158°F	RED	IP69K		1000 mm
MSNQS	Solid State auto select, 3-Wire M8	5 - 30V DC	200	NPN or PNP	25 to 158°F	RED	IP69K	M8, 3 pin	300 mm



MRN Reed, 2-Wire Flying Lead

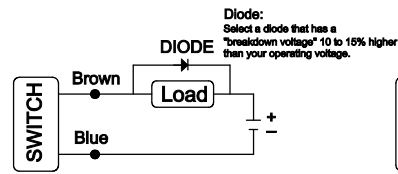


Circuit & Connect Diagram

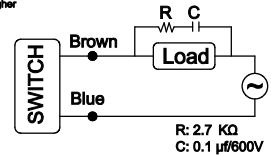


The brown wire series load to the positive (+) and the blue to the negative (-) of power source.

External Protect Circuit

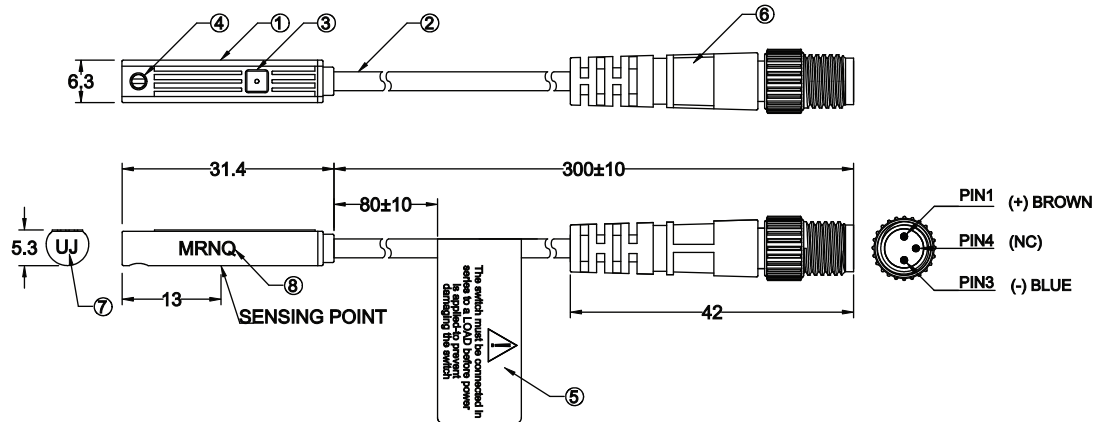


Applicably to
DC Conductive Load

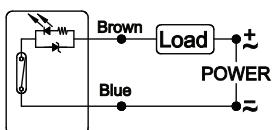


Applicably to
AC Conductive Load

MRNQS Reed, 2-Wire M8

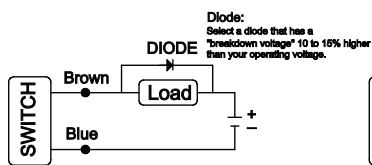


Circuit & Connect Diagram

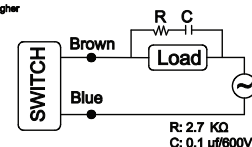


The brown wire series load to the positive (+) and the blue to the negative (-) of power source.

External Protect Circuit

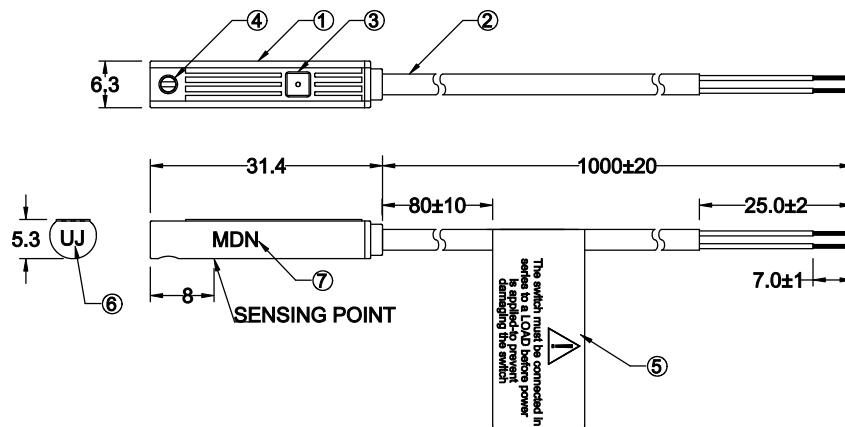


Applicably to
DC Conductive Load

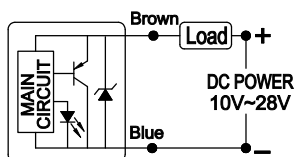


Applicably to
AC Conductive Load

MDN Solid State, 2-Wire Flying Lead

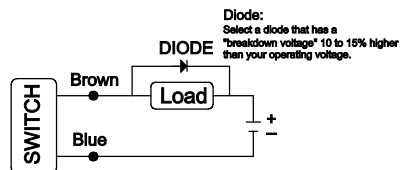


Circuit & Connect Diagram



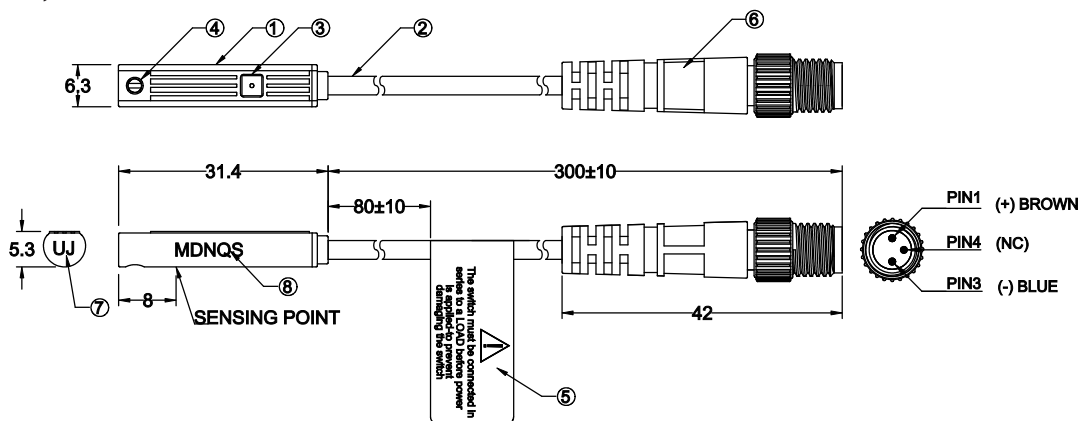
The brown wire series load to the positive (+) and the blue to the negative (-) of power source.

External Protect Circuit

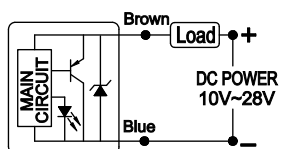


Applicable to
DC Conductive Load

MDNQS Solid State, 2-Wire M8

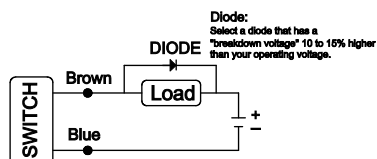


Circuit & Connect Diagram



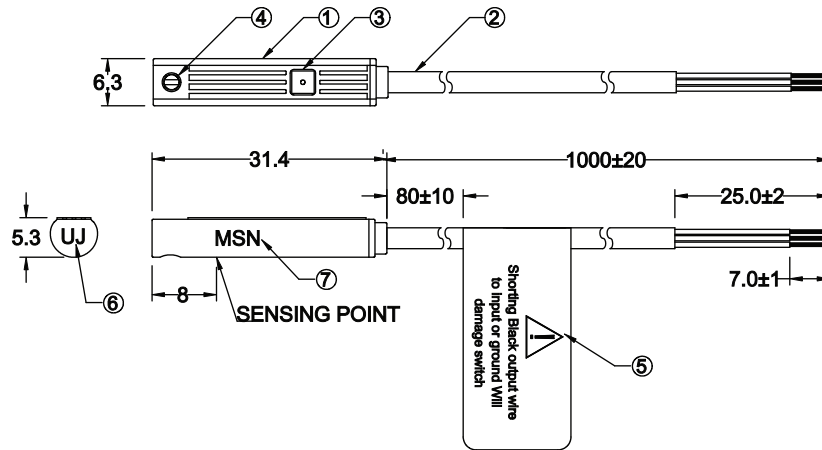
The brown wire series load to the positive (+) and the blue to the negative (-) of power source.

External Protect Circuit

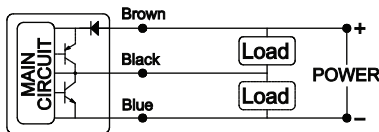


Applicable to
DC Conductive Load

MSN Solid State auto select, 3-Wire Flyind Lead

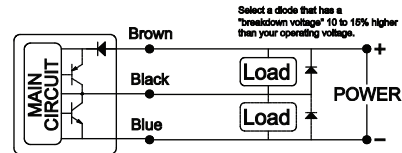


Circuit & Connect Diagram



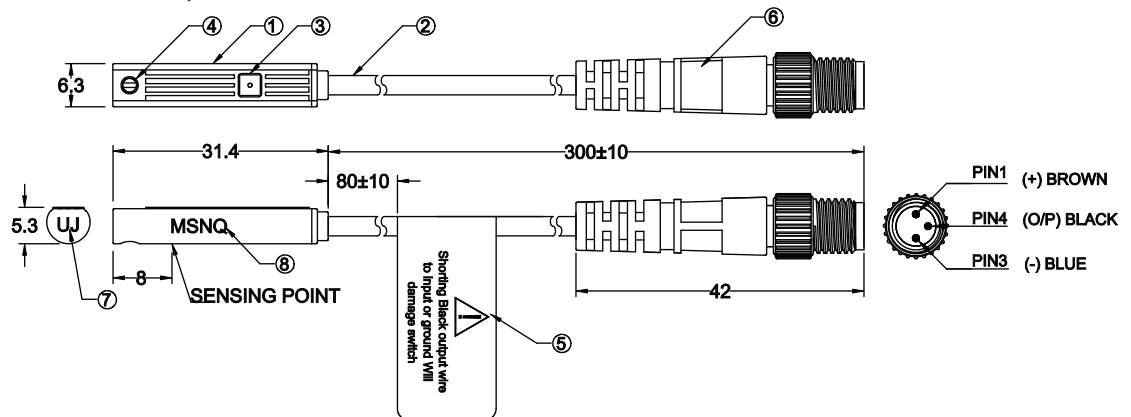
The brown wire to the positive (+) and the blue to the negative (-) from DC power.
The black wire have to connect to the load.

External Protect Circuit

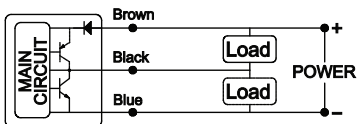


Applicably to Conductive Load
Attach an external diode between Brown(+) and Black(out) when NPN connection
Attach an external diode between Blue(-) and Black(out) when PNP connection

MSNQS Solid State auto select, 3-Wire M8

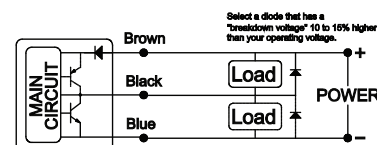


Circuit & Connect Diagram



The brown wire to the positive (+) and the blue to the negative (-) from DC power.
The black wire have to connect to the load.

External Protect Circuit



Applicably to Conductive Load
Attach an external diode between Brown(+) and Black(out) when NPN connection
Attach an external diode between Blue(-) and Black(out) when PNP connection



Warning

Improper selection, misuse, age or malfunction of components used in systems can cause failure in various modes. The system designer is warned to consider the failure modes of all component parts and to provide adequate safeguards to prevent personal injury or damage to equipment or property in the event of such failure modes. System designers and end users are cautioned to consult instruction sheets and specifications available from the factory. The system designer/end user is responsible for verifying that all requirements for the application are met.

Warranty

The products described herein are warranted subject to seller's Standard Terms and Condition of Sale, available at seller's website.

Proposition 65: These products may contain chemicals known to the state of California to cause cancer, or birth defects, or other reproductive harm.