

IP Series

ISO 6431 Metric Pneumatic Cylinders



Up to 10 Bar Pressure
Bore Sizes 32mm through 200 mm

Miller IP Series Pneumatic Cylinders

Table of Contents

Selecting a Miller Pneumatic Cylinder	page 3
Pneumatic Cylinder Features	4-5
Mounting Styles	6
Array of Models	7
Tie Rods Extended/Double Rod End	8-9
Rectangular Flange/Head End/Cap End	10-11
End Angle/Intermediate Trunnion	12-13
Removable Clevis/Removable & Spherical Eye	14-15
Cylinder Switches	16-17
Rod End Accessories	18
How To Order	19
Assembly Torque	19

Miller Warranty

Subject to the conditions below, Miller Fluid Power Corporation ("Miller") warrants to the first end user (the "Buyer") that Miller's products are free from defects in material and workmanship.

Miller will either repair or replace a defective product, including lowest transportation costs but not including installation or any other similar charges, provided that (1) the Buyer notifies Miller in writing of the claimed defect within one year from shipment from Miller's factory (three years for Series A, J & H cylinders), (2) provides a complete explanation of the defect, the application of the product, and such other information concerning use of the product as Miller may request, and (3) returns the product to Miller in accordance with Miller's specific written instructions and authorization obtained from Miller prior to return of the product, and Miller's inspection confirms that the product was defective.

This warranty applies only if the product was used and applied correctly under normal operating conditions and good engineering practice; was installed, operated and maintained in accordance with all instructions issued or published by Miller; was used within stated pressure, media and operating limitations published by Miller and in effect on the date of shipment; and was not subject to abuse, misuse or unauthorized modification.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, not withstanding any disclosure to Miller of the use to which the product is to be put. The Buyer's SOLE AND EXCLUSIVE REMEDY on any claim of any kind for any loss or damage arising out of the manufacture, sale, delivery or use of Miller's products shall be for the repair or replacement of any defective products as provided herein.

IN NO EVENT SHALL MILLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. There are no warranties, express or implied, made by Miller other than the warranty against defects in material and workmanship set forth above, and Miller neither assumes nor authorizes any other person or firm to assume for it any other obligations or liability.

A Series Cylinders

Up to 250 PSI Permanently lubricated



Series A steel air cylinders are available in bore sizes from 1 1/2" through 20" and up to 250 psi operating pressure. Standard NFPA dimensions and proven Miller design features. (File 7619)

AL Series Cylinders

Up to 200 PSI Permanently lubricated



Our aluminum AL Series air cylinders are available in bore sizes from 1 1/2" through 8". Operating pressures up to 200 PSI. Dimensions are NFPA Standard. (File 8564)

J Series Cylinders

500-2500 PSI



Our popularly-priced line of medium pressure hydraulic cylinders, with bore sizes from 1 1/2" to 20". (File 7620)

H Series Cylinders

3000-5000 PSI



Miller's heavy-duty cylinder line for the most demanding hydraulic applications. Bore sizes from 1 1/2" to 20". Heavy-duty construction. (File 7622)

MH Series Cylinders

Up to 210 BAR



Miller's heavy-duty ISO Metric cylinder line for hydraulic applications. Bore sizes from 25 mm-200 mm. Heavy-duty construction. (File 9787)

Miller IP Series Pneumatic Cylinder Selection Guide

Selecting a Miller Pneumatic Cylinder

Miller pneumatic cylinders are selected and sized primarily based on force requirements and available operating pressure. The IP Series is an economical design intended for normal industrial service at internal operating pressures up to 10 BAR. It is available in 9 mounting styles and bore sizes from 32 mm-200 mm.

Series Pressure Rating

Moderate Service (non-shock) — 10 BAR

Certified Dimensions

The information in this catalog is intended primarily to provide the engineer with information specific to the IP Series cylinders — mounting styles, dimensions, performance features, and available options and accessories. When required, special certified drawings are available at extra cost.

Steps in Selecting the Correct Cylinder

Step 1—Determine the correct cylinder bore size required based upon operating pressure and thrust required.

Step 2—Select the mounting style which is required for your application (see page 7).

Step 3—In the appropriate catalog section for the mounting style selected, review bore and rod sizes.

Step 4—Choose rod end accessories, if desired.

Step 5—Consider the application conditions, listed below, which may require further modifications to the cylinder you have selected. Application assistance is readily available by contacting any of the Miller facilities listed on the back cover of this catalog.

Step 6—Refer to "How to Order" section on Page 19 to develop part number and place your order.

Application Condition	Check the following	Application Condition	Check the following
Long Push Stroke	Check whether stop tube may be required to prevent excess bearing loads and wear.	Long Horizontal Stroke	Check to see if a non-sag piston rod is required to prevent excess sagging and resultant premature bushing and piston wear.
High Column Loading-Long Push Stroke	Determine if piston rod is strong enough to accommodate intended load without buckling.	Operating Temperatures	The standard operating temperature range of the Nitrile seals used in the IP Series is -40°C to + 93°C. For temperatures Between 93°C & 149°C use high temperature Viton seals.
High Side Loads	When high side loads and similar severe or unusual operating conditions are anticipated, please consult a Miller application engineer for recommendations concerning optional bushing material and design.	Sufficient Speed	Confirm that standard port size permits sufficient flow to accommodate speed requirements.

Miller IP Series Pneumatic Cylinders

Standard Design Features to
Maximize Performance and Uptime

Permanent Piston Magnet Option*

Permanent magnet installed for the rod mounted adjustable position sensing switch installation. Maximum temperature rating on magnet is 79°C.

Piston

One-piece aluminum piloted piston provides maximum strength and protection against shock loads.

Tie Rods

High strength, 690,000 kPa minimum yield material. Provide protection against shock pressures. E-coated for corrosion resistance.

Wear Band

Piston wear band reduces possibility of damaging piston which can score tubing. Reduces need for piston replacement.

Cushions

The radial seal cushion on both ends permits smooth deceleration and quick out-of-cushion starts. Cushion adjust screws located on side of cylinder.

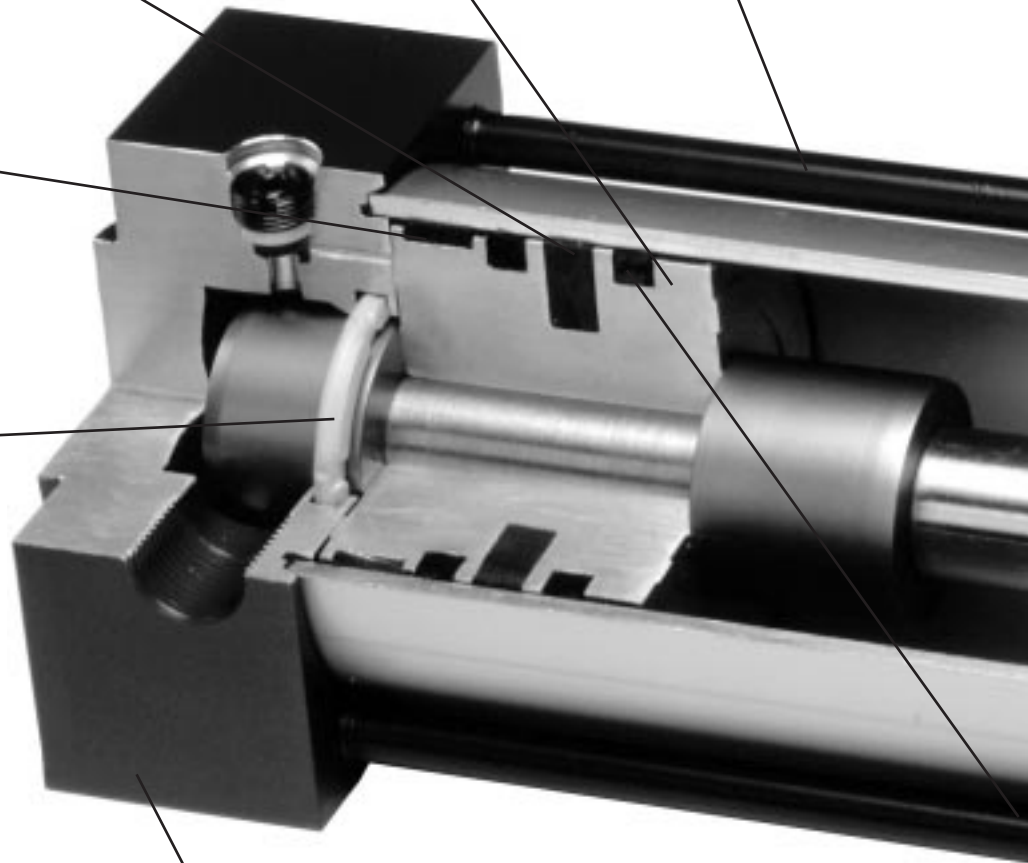
Pre-Lubricated

A generous quantity of a water resistant lubricant is added during assembly, assuring long life lubrication.

* Magnet option must be specified when placing order.

Head and Cap

High quality, precision machined from aluminum alloy bar stock and blue anodized.



Miller IP Series Pneumatic Cylinders

Standard Design Features to
Maximize Performance and Uptime

Tube

Sturdy hard coat aluminum is standard (optional chrome plated steel available). It is precision machined for long packing life. The tube is piloted into the head and cap to ensure concentricity.

Bushing

Piloted bushing provides protection for piston rod in side load conditions. Removes easily using a common Allen wrench. Cylinder tie-rods not disturbed with bolted design. Externally removable high-density iron, tin plated rod bushing protects against corrosion.

Rod Wiper

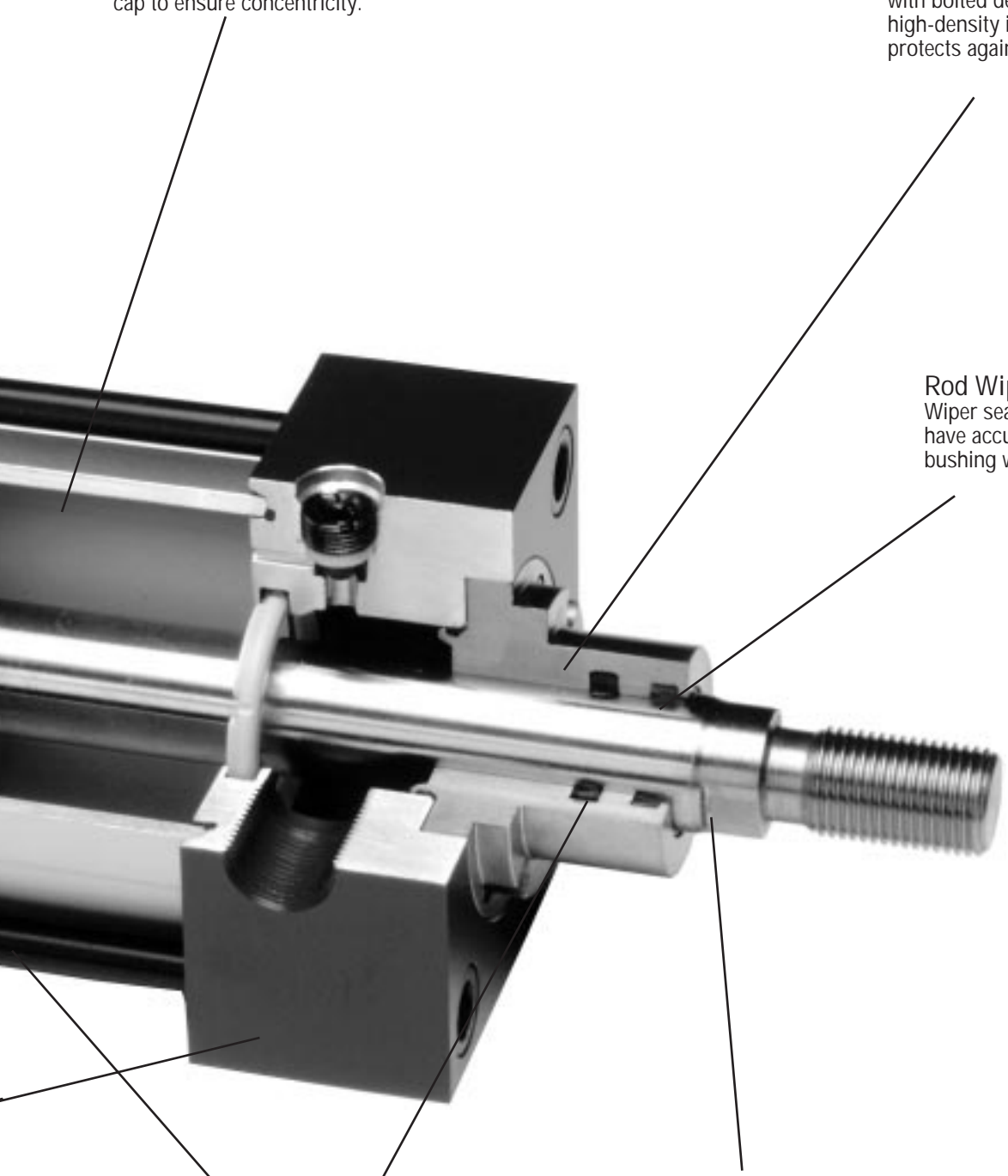
Wiper seal wipes away dirt that may have accumulated on the rod, reducing bushing wear.

Piston Rod

Hard chrome-plated rod resists wear from side loads. Optional case hardened rod available upon request.

Piston and Rod Seals

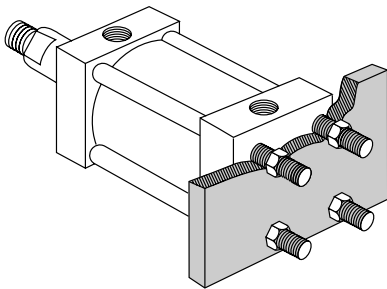
Carboxilated Nitrile dynamic seal lip is rounded to prevent scraping grease off lubricated surfaces.



Centerline

The preferred cylinder installation method, centerline mounting places the mounting bolts in simple shear or simple tension so that the mounting mechanism is protected from compound forces. Centerline mounting is a rigid mounting style and thus requires accurate cylinder alignment to prevent damage to the cylinder working parts.

Miller Series IP mounting configurations that provide centerline support are tie-rod mounts or flange mounts with rectangular flange fastened to the cylinder head or cap.

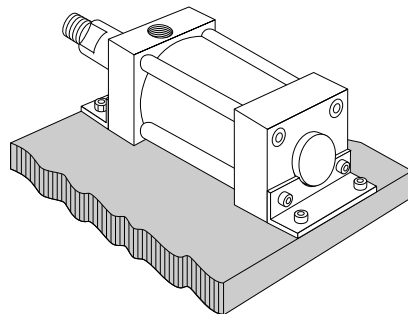


Centerline mounting is preferable since it prevents compound forces from acting on the mounting bolts (tie rod model shown).

Foot

Foot mounting secures the cylinder along its side. Since the mounting surface plane is thus not centered directly on the line of force, the mounting bolts are subjected to a significant amount of combined stress.

Because foot mounts are rigid, they require accurate cylinder alignment.



Foot mounting secures the cylinder on its side, but can subject the mounting bolts to combined stress (cylinder end angle shown).

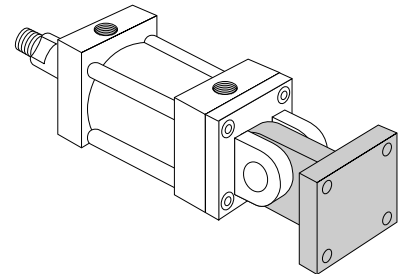
Pivot

Pivot mounting is used when the cylinder must pivot during piston motion.

The clevis end design locates the pivot point at the cap end of the cylinder.

Clevis mounting configurations allow the cylinder to pivot in one plane only.

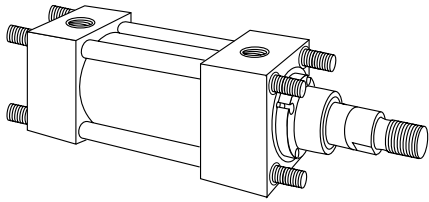
The rear eye cylinder is an additional pivot-mounted cylinder. Essentially a reversal of the fixed clevis assembly, the rear eye cylinder locates a clevis eye on the cylinder cap and mounts to a clevis bracket on the load surface.



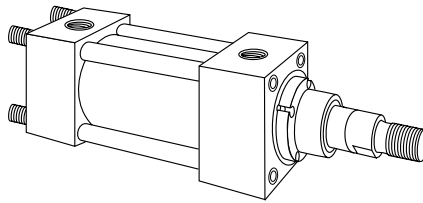
Pivot mounting allows the cylinder to pivot during piston motion (clevis method shown).

Miller IP Series Pneumatic Cylinders

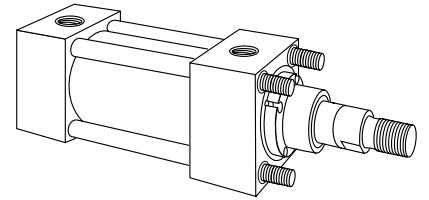
An Array of Models
In Each Mounting Style



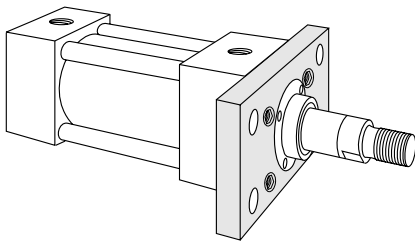
Model 51 - Tie Rods
Extended Head & Cap (ISO MX1)



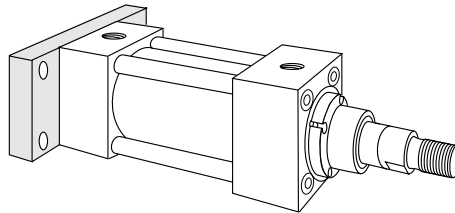
Model 52 - Tie Rods
Extended Cap End Only
(ISO MX2)



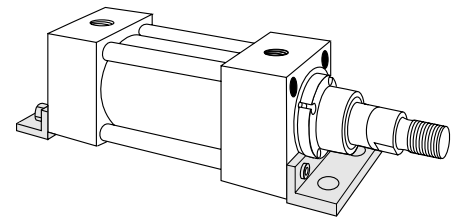
Model 53 - Tie Rods
Extended Head End Only
(ISO MX3)



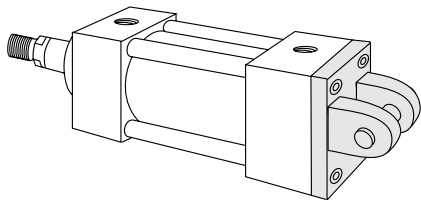
Rectangular Flange/Head End
Model 61 (ISO MF1)



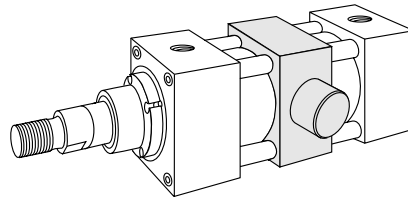
Rectangular Flange/Cap End
Model 62 (ISO MF2)



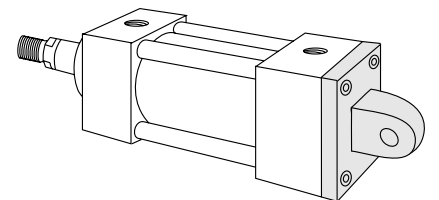
Side End Angle
Model 71 (ISO MS1)



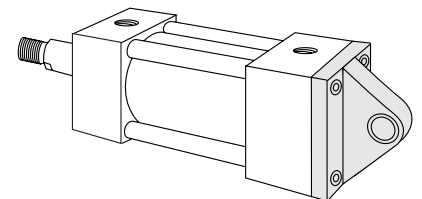
Detachable Clevis
Model 84 (ISO MP2)



Intermediate Fixed Trunnion
Model 89 (ISO MT4)



Rear Eye
Model 96 (ISO MP4)

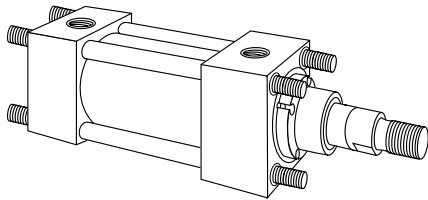


Spherical Eye
Model 94

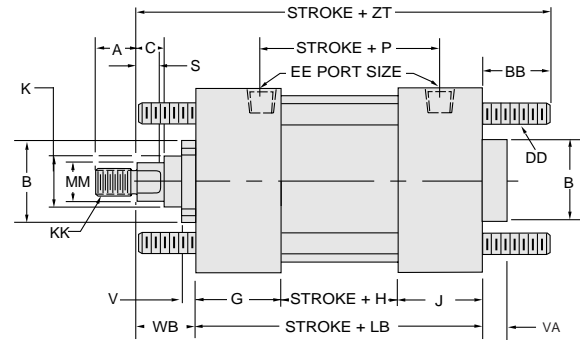
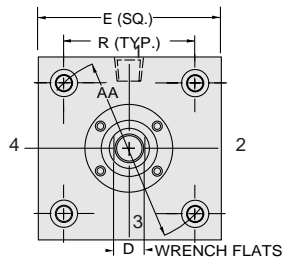
Miller IP Series Pneumatic Cylinders

Tie Rods Extended
32-200 mm Bore Cylinders

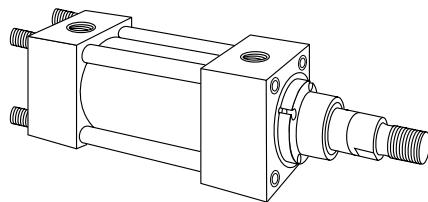
Tie Rod Mounts
Model 51 (ISO MX1)



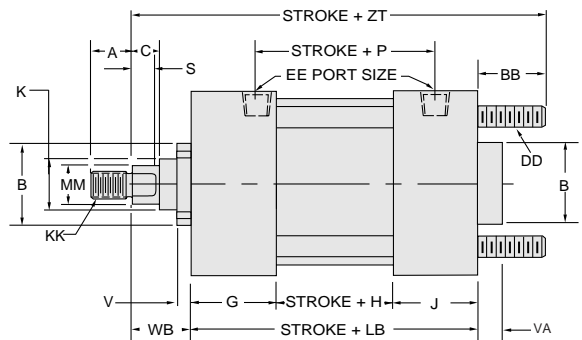
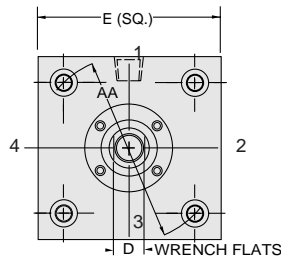
See tables on next page
for Dimensions



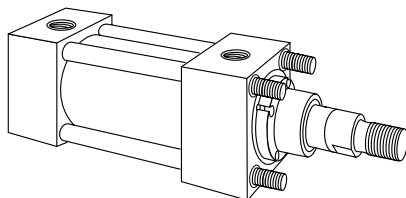
Tie Rod Mounts
Model 52 (ISO MX2)



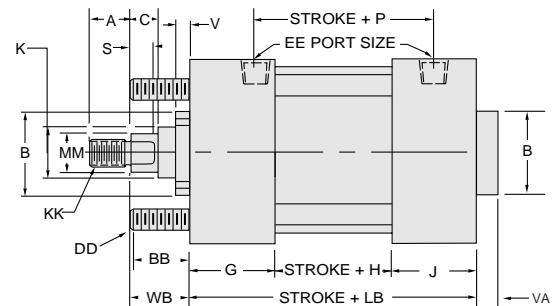
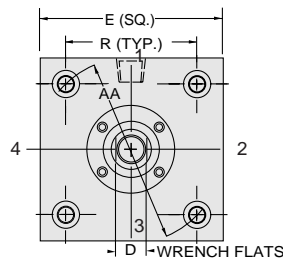
See tables on next page
for Dimensions



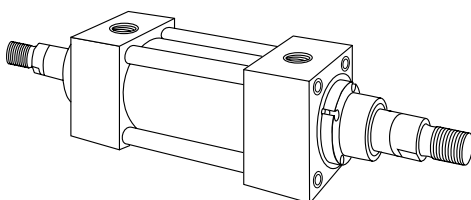
Tie Rod Mounts
Model 53 (ISO MX3)



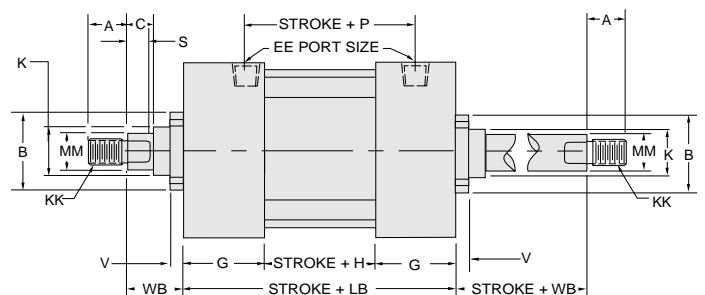
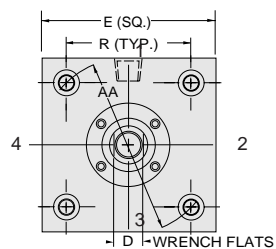
See tables on next page
for Dimensions



Double Rod End
Model 50



See tables on next page
for Dimensions



Cylinder Body Dimensions

Bore Dia.	Dimensions					
	AA	E	EE BSPP	G	J	R
32	46	48	G 1/8	32.5	32.5	32.5 ±0.5
40	53.7	56	G 1/4	38	38	38 ±0.5
50	65.8	66	G 1/4	38	38	46.5 ±0.6
63	79.9	76	G 3/8	39	39	56.5 ±0.7
80	101.8	96	G 3/8	44	44	72 ±0.7
100	125.9	116	G 1/2	48	48	89 ±0.7
125	155.6	141	G 1/2	59	59	110 ±1.1
160	198	181	G 3/4	66	66	140 ±1.1
200	247.5	220	G 3/4	66	66	175 ±1.1

Mounting Dimensions

BB	DD
17 +3/-0	M6 x 1
17 +3/-0	M6 x 1
23 +3/-0	M8 x 1.25
23 +3/-0	M8 x 1.25
28 +3/-0	M10 x 1.5
28 +3/-0	M10 x 1.5
34 +5/-0	M12 x 1.75
42 +5/-0	M16 x 2
42 +5/-0	M16 x 2

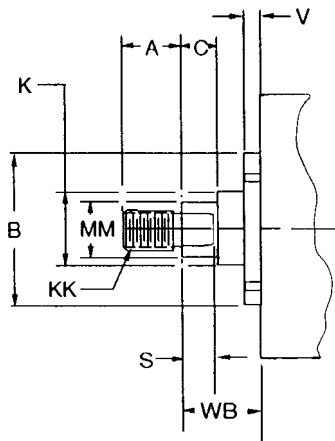
Rod End Dimensions

Bore Dia.	Rod Dia. MM	A +0/-2	B e10	C	D	K	VA	S	V	KK	KF	WB
32	12	22	30	8	10	28	4	6	5	M10x1.25	M8 x 1	26
40	16	24	35	10.5	13	30	4	6.5	5	M12x1.25	M10 x 1.25	30
50	20	32	40	11.5	16	33.5	4	8	5	M16x1.5	M14 x 1.5	37
63	20	32	45	11.5	16	33.5	4	8	5	M16x1.5	M14 x 1.5	37
80	25	40	45	12.5	21	40	4	10	5	M20x1.5	M18 x 1.5	46
100	25	40	55	17.5	21	47	4	10	5	M20x1.5	M18 x 1.5	51
125	32	54	60	23	27	50	6	13	7	M27x2	M24 x 2	65
160	40	72	65	28	36	55	6	16	7	M36x2	M33 x 2	80
200	40	72	75	38	36	62	6	16	7	M36x2	M33 x 2	95

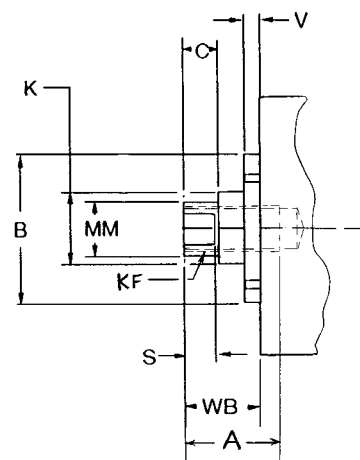
Add Stroke

H	P	LB	ZT MAX
29	55	94 ±0.4	140
29	57	105 ±0.7	155
30	58	106 ±0.7	169
43	72	121 ±0.8	184
40	72	128 ±0.8	205
42	77	138 ±1.0	220
42	82	160 ±1.0	264
48	96	180 ±1.1	307
48	96	180 ±1.6	322

Rod End Style #2



Rod End Style #4

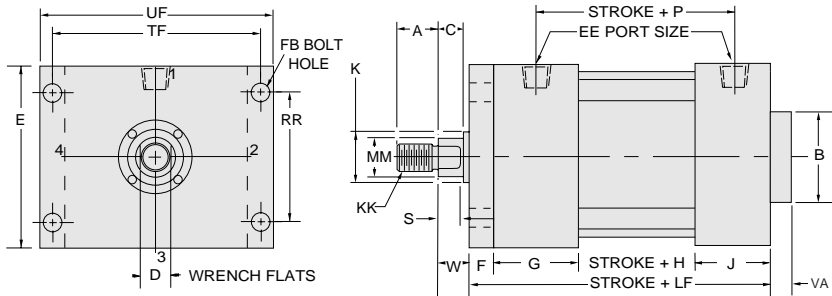
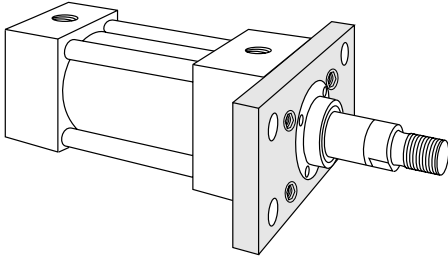


Miller IP Series Pneumatic Cylinders

Rectangular Flange/Head End/Cap End
32-200 mm Bore Cylinders

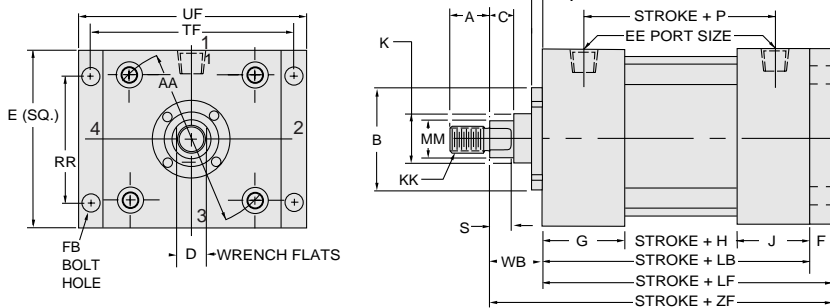
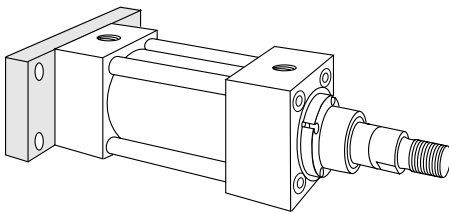
Rectangular Flange/Head End
Model 61 (ISO MF1)

See tables on next page
for Dimensions



Rectangular Flange/Cap End
Model 62 (ISO MF2)

See tables on next page
for Dimensions



Miller IP Series Pneumatic Cylinders

Rectangular Flange/Head End/Cap End
32-200 mm Bore Cylinders

Cylinder Body Dimensions

Bore Dia.	Dimensions				
	AA	E	EE BSPP	G	J
32	46	48	G ¹ / ₈	32.5	32.5
40	53.7	56	G ¹ / ₄	38	38
50	65.8	66	G ¹ / ₄	38	38
63	79.9	76	G ³ / ₈	39	39
80	101.8	96	G ³ / ₈	44	44
100	125.9	116	G ¹ / ₂	48	48
125	155.6	141	G ¹ / ₂	59	59
160	198	181	G ³ / ₄	66	66
200	247.5	220	G ³ / ₄	66	66

Mounting Dimensions

F ±0.2	FB H13	TF JS14	UF	RR JS14
10	7	64	80	32
10	9	72	90	36
12	9	90	110	45
12	9	100	120	50
16	12	126	150	63
16	14	150	170	75
20	16	180	205	90
20	18	230	260	115
25	22	270	300	135

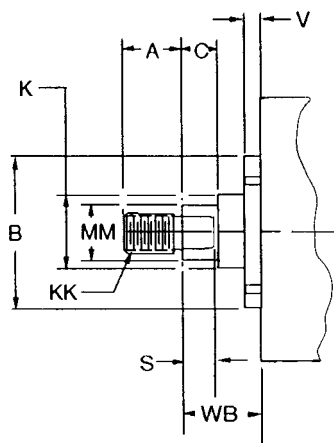
Rod End Dimensions

Bore Dia.	Rod Dia. MM	A +0/-2	B e10	C	D	K	VA	S	V	KK	KF	W	WB
32	12	22	30	8	10	28	4	6	5	M10x1.25	M8 x 1	16	26
40	16	24	35	10.5	13	30	4	6.5	5	M12x1.25	M10 x 1.25	20	30
50	20	32	40	11.5	16	33.5	4	8	5	M16x1.5	M14 x 1.5	25	37
63	20	32	45	11.5	16	33.5	4	8	5	M16x1.5	M14 x 1.5	25	37
80	25	40	45	12.5	21	40	4	10	5	M20x1.5	M18 x 1.5	30	46
100	25	40	55	17.5	21	47	4	10	5	M20x1.5	M18 x 1.5	35	51
125	32	54	60	23	27	50	6	13	7	M27x2	M24 x 2	45	65
160	40	72	65	28	36	55	6	16	7	M36x2	M33 x 2	60	80
200	40	72	75	38	36	62	6	16	7	M36x2	M33 x 2	70	95

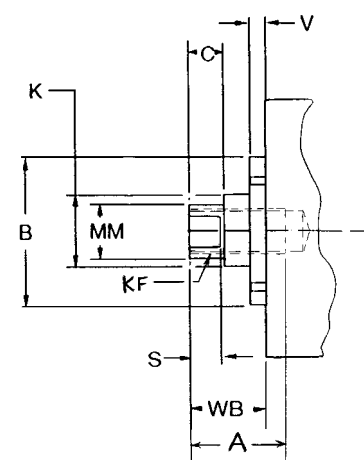
Add Stroke

H	P	LB	LF	ZF
29	55	94 ±0.4	104	130 ±1.25
29	57	105 ±0.7	115	145 ±1.25
30	58	106 ±0.7	118	155 ±1.25
43	72	121 ±0.8	133	170 ±1.6
40	72	128 ±0.8	144	190 ±1.6
42	77	138 ±1	154	205 ±1.6
42	82	160 ±1	180	245 ±2
48	96	180 ±1.1	200	280 ±2
48	96	180 ±1.6	205	300 ±2

Rod End Style #2



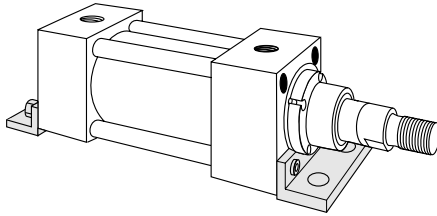
Rod End Style #4



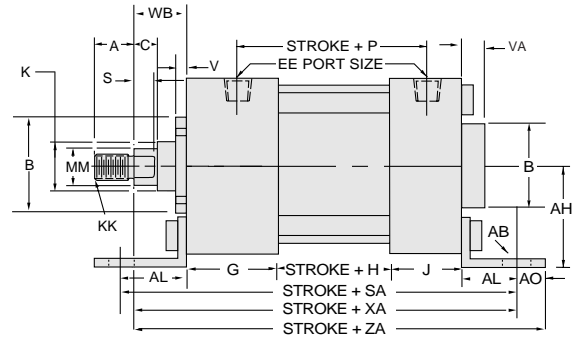
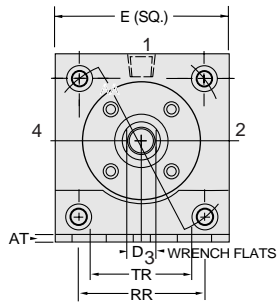
Miller IP Series Pneumatic Cylinders

End Angles/ Intermediate Trunnion
32-200 mm Bore Cylinders

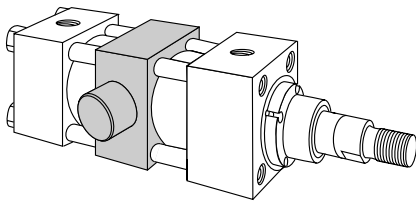
End Angles
Model 71 (ISO MS1)



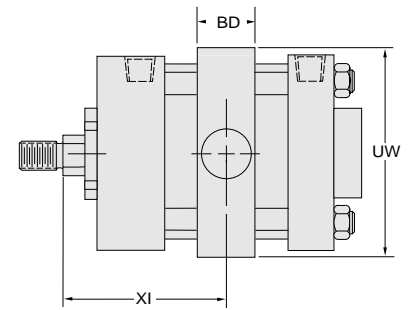
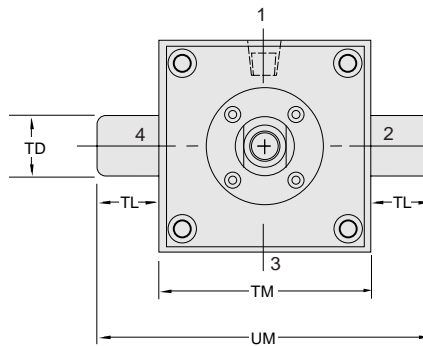
See tables on next page
for Dimensions



Intermediate Trunnion
**Model 89 (ISO MT4)



See tables on next page
for Dimensions



**Note: Customer to specify XI dimension.

Miller IP Series Pneumatic Cylinders

End Angles/ Intermediate Trunnion
32-200 mm Bore Cylinders

Cylinder Body Dimensions

Bore Dia.	Dimensions				
	AA	E	EE BSPP	G	J
32	46	48	G ¹ / ₈	32.5	32.5
40	53.7	56	G ¹ / ₄	38	38
50	65.8	66	G ¹ / ₄	38	38
63	79.9	76	G ³ / ₈	39	39
80	101.8	96	G ³ / ₈	44	44
100	125.9	116	G ¹ / ₂	48	48
125	155.6	141	G ¹ / ₂	59	59
160	198	181	G ³ / ₄	66	66
200	247.5	220	G ³ / ₄	66	66

Mounting Dimensions

AB H14	AH JS 15	AL ±0.2	AO	AT ±0.5	TR JS 14	BD	TD e9	TL h14	TM h14	UM	UW	RR
7	32	24	11	4	32	15	12	12	50	74	46	32.5 ±0.2
9	36	28	8	4	36	20	16	16	63	95	59	38 ±0.2
9	45	32	15	5	45	20	16	16	75	107	69	46.5 ±0.2
9	50	32	13	5	50	25	20	20	90	130	84	56.5 ±0.2
12	63	41	14	6	63	25	20	20	110	150	102	72 ±0.2
14	71	41	16	6	75	30	25	25	132	182	125	89 ±0.2
16	90	45	25	8	90	32	25	25	160	210	155	110 ±0.3
18	115	60	15	10	115	40	32	32	200	264	190	140 ±0.3
22	135	70	30	12	135	40	32	32	250	314	240	175 ±0.3

Rod End Dimensions

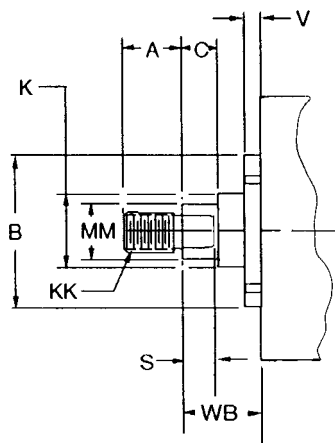
Bore Dia.	Rod Dia. MM	A +0/-2	B e10	C	D	K	VA	S	V	KK	KF	WB
32	12	22	30	8	10	28	4	6	5	M10x1.25	M8 x 1	26
40	16	24	35	10.5	13	30	4	6.5	5	M12x1.25	M10 x 1.25	30
50	20	32	40	11.5	16	33.5	4	8	5	M16x1.5	M14 x 1.5	37
63	20	32	45	11.5	16	33.5	4	8	5	M16x1.5	M14 x 1.5	37
80	25	40	45	12.5	21	40	4	10	5	M20x1.5	M18 x 1.5	46
100	25	40	55	17.5	21	47	4	10	5	M20x1.5	M18 x 1.5	51
125	32	54	60	23	27	50	6	13	7	M27x2	M24 x 2	65
160	40	72	65	28	36	55	6	16	7	M36x2	M33 x 2	80
200	40	72	75	38	36	62	6	16	7	M36x2	M33 x 2	95

Add to Stroke

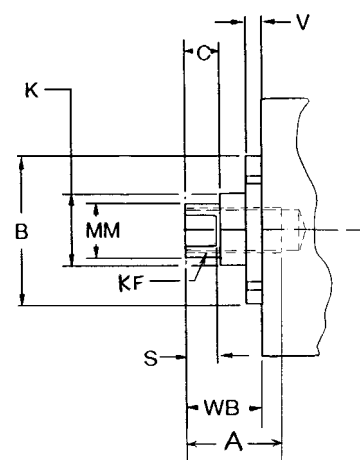
H	P	SA	XA	ZA	MIN XI **
29	55	142 ±1.25	144 ±1.25	155	68
29	57	161 ±1.25	163 ±1.25	171	80
30	58	170 ±1.25	175 ±1.25	190	87
43	72	185 ±1.6	190 ±1.6	203	91
40	72	210 ±1.6	215 ±1.6	229	104
42	77	220 ±1.6	230 ±1.6	246	116
42	82	250 ±2	270 ±2	295	142
48	96	300 ±2	320 ±2	335	168
48	96	320 ±2	345 ±2	375	183

** Contact Miller Fluid Power if shorter XI dimension is required.

Rod End Style #2



Rod End Style #4

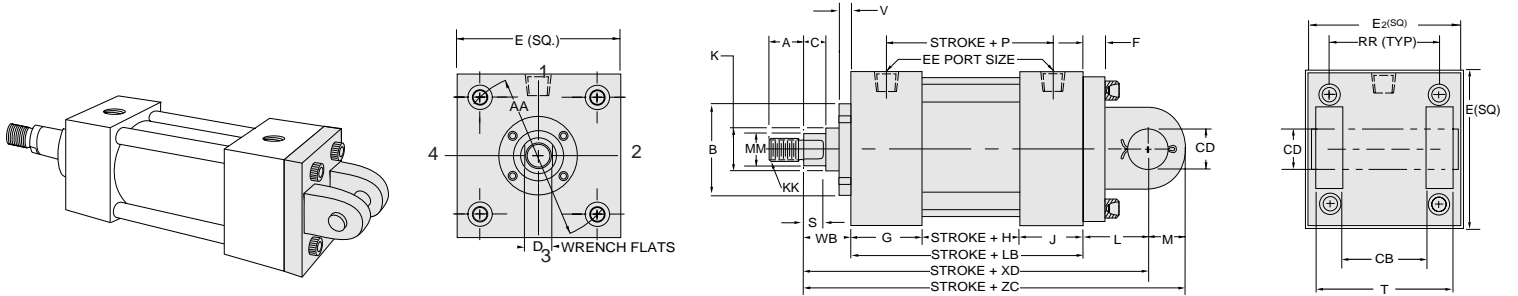


Miller IP Series Pneumatic Cylinders

Detachable Clevis/Rear Eye
32-200mm Bore Cylinders

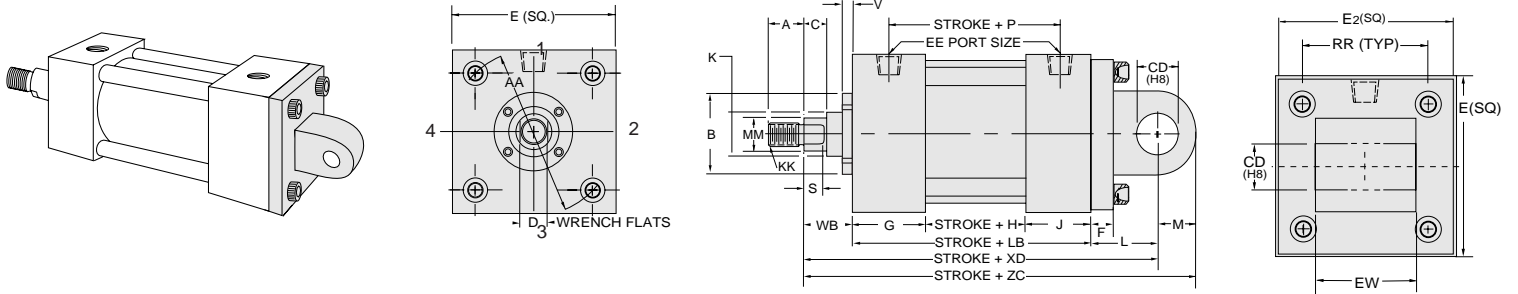
Detachable Clevis
Model 84 (ISO MP2)

See tables on next page
for Dimensions



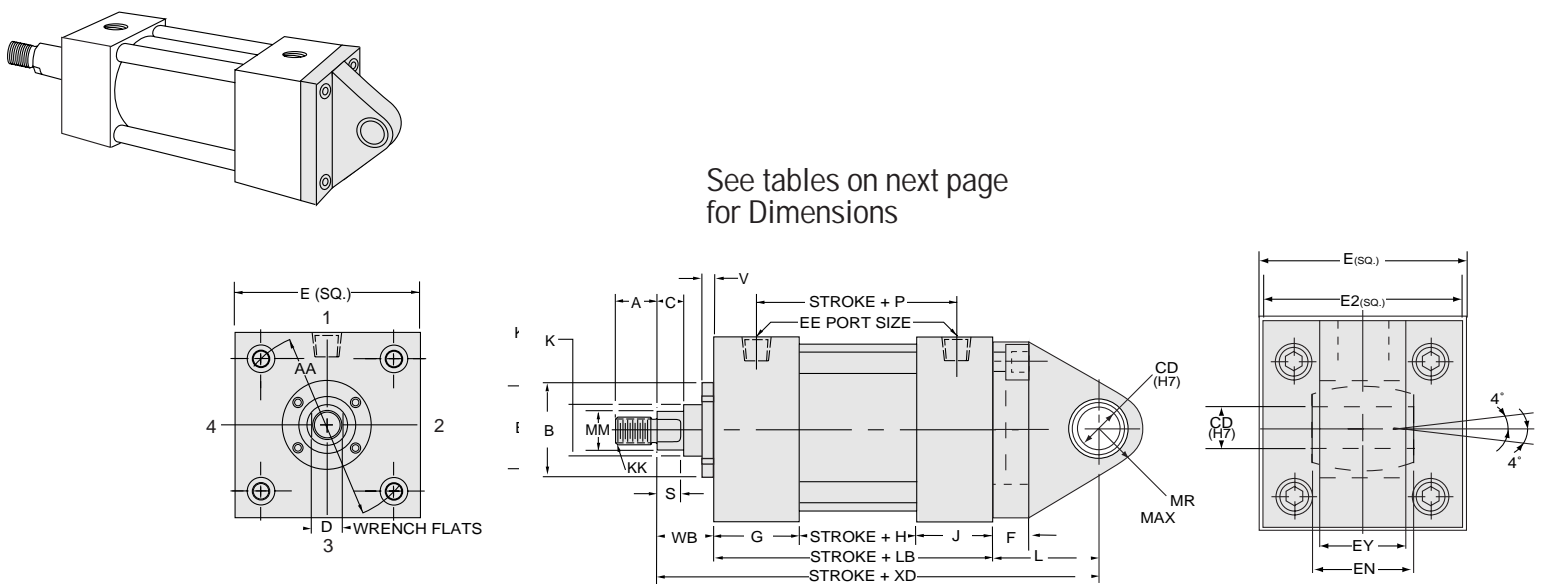
Detachable Eye
Model 96 (ISO MP4)

See tables on next page
for Dimensions



Spherical Eye
Model 94 (32mm-125mm Bore Sizes)

See tables on next page
for Dimensions



Miller IP Series Pneumatic Cylinders

Detachable Clevis/Rear Eye
32-200mm Bore Cylinders

Cylinder Body Dimensions

Bore Dia.	Dimensions			
	E	EE BSPP	G	J
32	48	G ¹ / ₈	32.5	32.5
40	56	G ¹ / ₄	38	38
50	66	G ¹ / ₄	38	38
63	76	G ³ / ₈	39	39
80	96	G ³ / ₈	44	44
100	116	G ¹ / ₂	48	48
125	141	G ¹ / ₂	59	59
160	181	G ³ / ₄	66	66
200	220	G ³ / ₄	66	66

Mounting Dimensions

EN	EW	EY MAX	E2	L ±0.2	M	MR MAX	CB H14	CD	T h14	F	RR
14	26 ^{-0.2} / _{-0.6}	10.5	45	22	10	15	26	10	45	10	32.5 ±0.2
16	28 ^{-0.2} / _{-0.6}	12	55	25	12	18	28	12	52	10	38 ±0.2
21	32 ^{-0.2} / _{-0.6}	15	65	27	12	20	32	12	60	10	46.5 ±0.2
21	40 ^{-0.2} / _{-0.6}	15	75	32	16	23	40	16	70	12	56.5 ±0.2
25	50 ^{-0.2} / _{-0.6}	18	95	36	16	27	50	16	90	14	72 ±0.2
25	60 ^{-0.2} / _{-0.6}	18	115	41	20	30	60	20	110	16	89 ±0.2
37	70 ^{-0.5} / _{-1.2}	25	140	50	25	40	70	25	130	20	110 ±0.3
NA	90 ^{-0.5} / _{-1.2}	NA	180	55	25	NA	90	30	170	20	140 ±0.3
NA	90 ^{-0.5} / _{-1.2}	NA	220	60	25	NA	90	30	170	*	175 ±0.3

* F=21 for model 84 and F=25 for model 94 & 96.

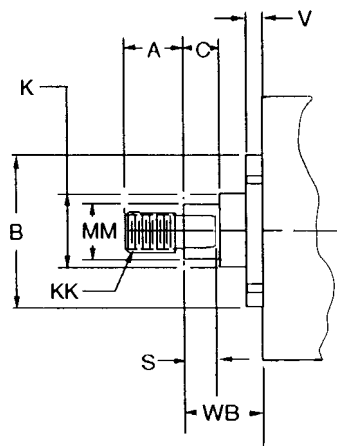
Rod End Dimensions

Bore Dia.	Rod Dia. MM	A +0/-2	B e10	C	D	K	S	V	KK	KF	WB
32	12	22	30	8	10	28	6	5	M10x1.25	M8x1	26
40	16	24	35	10.5	13	30	6.5	5	M12x1.25	M10x1.25	30
50	20	32	40	11.5	16	33.5	8	5	M16x1.5	M14x1.5	37
63	20	32	45	11.5	16	33.5	8	5	M16x1.5	M14x1.5	37
80	25	40	45	12.5	21	40	10	5	M20x1.5	M18x1.5	46
100	25	40	55	17.5	21	47	10	5	M20x1.5	M18x1.5	51
125	32	54	60	23	27	50	13	7	M27x2	M24x2	65
160	40	72	65	28	36	55	16	7	M36x2	M33x2	80
200	40	72	75	38	36	62	16	7	M36x2	M33x2	95

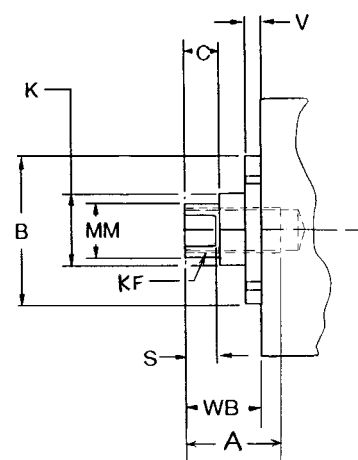
Add to Stroke

H	P	LB	XD	ZC MAX
29	55	94 ±0.4	142 ±1.25	153
29	57	105 ±0.7	160 ±1.25	173
30	58	106 ±0.7	170 ±1.25	183
43	72	121 ±0.8	190 ±1.6	208
40	72	128 ±0.8	210 ±1.6	228
42	77	138 ±1	230 ±1.6	252
42	82	160 ±1	275 ±2	302
48	96	180 ±1.1	315 ±2	342
48	96	180 ±1.6	335 ±2	362

Rod End Style #2



Rod End Style #4



Limit Switches Non-Contact, External, Adjustable Position

Miller limit switches are compact and reliable. Because of their low profile, and secure mounting brackets, the chances of being damaged by inadvertent physical abuse is remote. They have been thoroughly tested and proven for years of trouble-free service.

The piston contains a ring magnet which closes the switch when the piston passes underneath. These switches are hermetically sealed and all electrical components are epoxy encapsulated.

These limit switches may be used, in any number, with a Miller IP Series cylinder that is equipped with the magnetic piston. The switches are easily attached to the tie rods. Piston magnet must be specified when ordering the cylinder.



Provides high accuracy
in detection of piston position.

One and Bi-color-Proximity switches
available to meet your production needs.

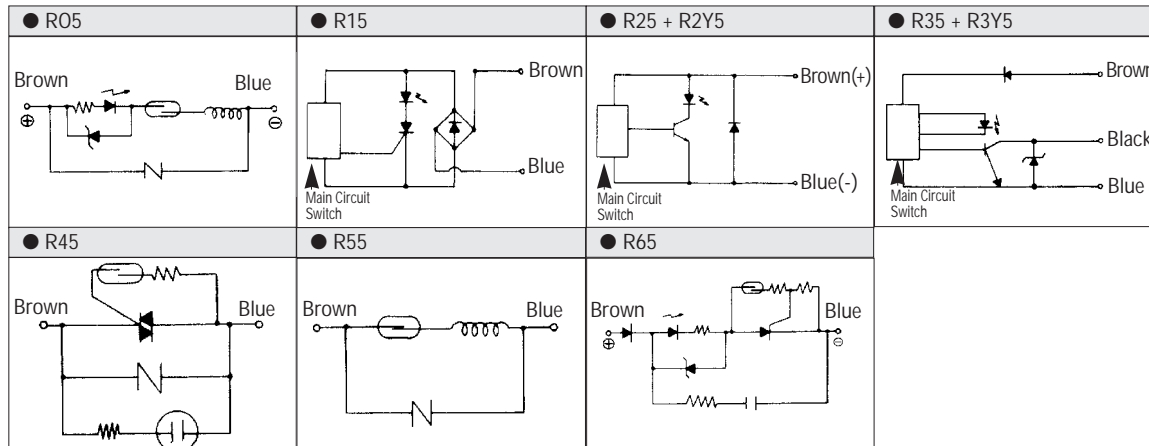
Switch Specifications ●●

	Contactless Switches				Reed Switches				
	R15	R25	R2Y5	R35	R3Y5	R05	R45	R55	R65
Usage	Prog. cont. relay small solenoid valve	PC excl.		PC relay IC net solenoid valve		Relay, PC	High capacity relay solenoid valve	PC IC net (w/o lamp), serial connect	PC excl. (w/ self hold func.)
Supply voltage	—	—		4.5-28V DC		—	—	—	—
Lead voltage/ Current	85-265 VAC 5-100mA	10-30 VDC 5-30mA		Max 30 VDC; max 200mA max 150 mA		24 VDC, 5-50mA; 100 VAC, 7-20mA; 200 VAC, 7-10mA;	100 VAC, 20-200mA; 200 VAC, 10-200mA;	24 VDC, max 50mA; 100 VAC, max 20mA; 200 VAC, max 10mA;	24 VDC, 5-50mA
Current consumption	—	—		10mA 16mA As switched on with 24 VDC		—	—	—	—
Int. volt. drop	7V max.	4V max.		.5V max w/ 150 mA	.5V max	2.4V max	2V max	0V	5V max
Indicator lamp	LED (lights when switched on)		①	LED (lights when switched on)	①	LED (lights when switched on)	Neon lamp (lights when switched off)	None	LED (lights when switched on)
Leak Current	Max 1mA for 100 VAC Max 2mA for 200 VAC	Max 1mA	Max 1.2mA	Max 10mA		0	Max 10mA	0	Max 0.1mA
Lead length	5M (oilproof 2-ply PVC tire cord. 0.3 sq. mm)			5M oilproof 3-ply PVC tire cord. 0.15 sq. mm)		5M (oilproof 2-ply PVC tire cord. 0.3 sq. mm)			
Ambient temp.	-10° — +60° C (+14° — +140° F)								

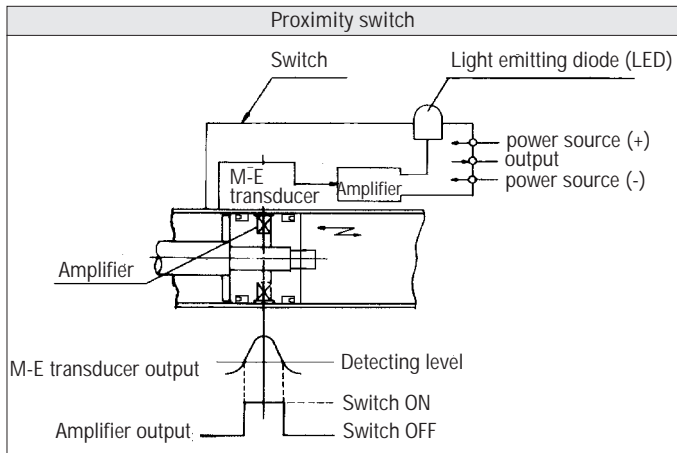
① = Bi-Color (Lights when switched on)

*:R2Y and R3Y are bi-color display.

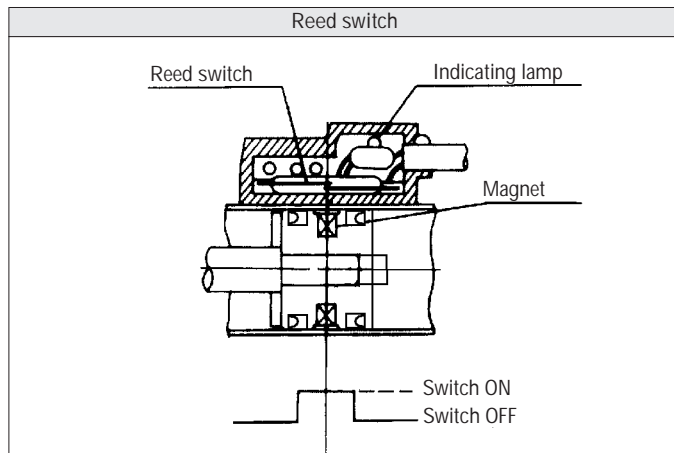
Switch internal circuit



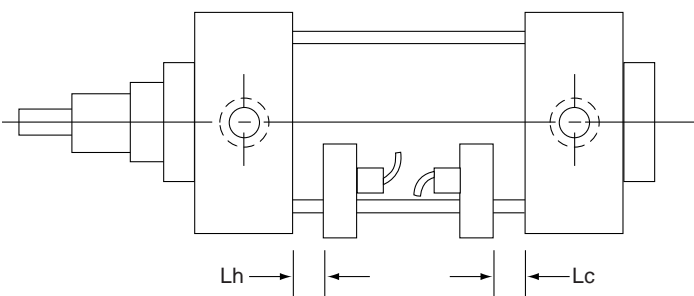
Operating principle



An approaching piston magnet will cause a change in the magnetic field crossing the switch. Output voltage from the M-E (magneto-electrical) transducer will make a corresponding level change as shown above. The voltage signal is then amplified to produce the switching output pulse, as shown.



An approaching piston magnet will generate a magnetic field crossing the switch. The opposing contacts are then magnetized, mutually attracted and closed.



Bore Dia.	Rod Dia MM	Lh HEAD	Lc CAP
32	12	0	1.5
40	16	0	1.5
50	20	0	2
63	20	3	10
80	25	0	10
100	25	0	10
125	32	0	10
160	40	3	12
200	40	3	13

Switch mounting position

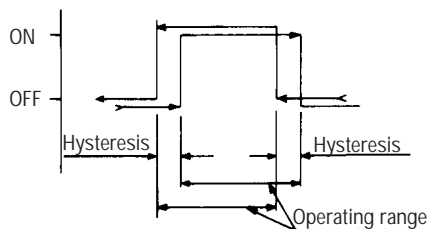
- For End of Stroke Sensing
To obtain end of stroke sensing, mount the switches on the tie rods at each end of the cylinder with the lead wires of the switches extending inward toward the center of the cylinder. Position the switches so that the switches are activated each end of the cylinder stroke. The maximum sensitivity switch mounting position is shown in above table.

- For Mid-stroke Sensing
(1) For switches R05, R15, R25, R35, R45, R55, and R65: To sense piston movement in its mid-stroke position, move the piston to its desired stop position. Move the switch above the fixed piston to the location of initial switch actuation. The midpoint between the initial switch actuation and the center of the piston gives you the point of maximum sensitivity and the switch should be located at that position.

- (2) For bi-color proximity switches R2Y5 and R3Y5: Move the switch to a position of initial lighting of the green indication lamp. This gives you the point of maximum sensitivity: the optimum point for switch installation.

Operating range

- As the cylinder moves through its stroke, the piston may move to turn on a switch and then move further in the same direction and turn the switch off again. The range between such on and off positions is called the operating range. The center of the operating range gives the exact point of maximum sensitivity. Setting a piston stop at this point will best stabilize the switching



action because the least external disturbance acts at this point. With the bi-color proximity switch, the operating range is signaled by the lighting of the red lamp, and the maximum sensitivity point (best mounting position) by the lighting of the green lamp.

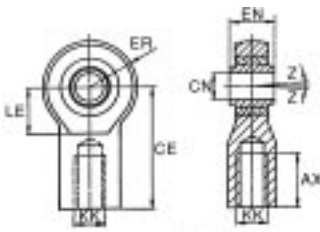
Hysteresis

- In its travel cycle the piston may move to turn on the cylinder switch, then reverse its direction and move back to turn off the switch. The zone within such ON and OFF actions is called the "hysteresis". The hysteresis should be carefully noted because a piston stop in this area may harm the switching action due to increased external disturbance.

Miller IP Series Pneumatic Cylinders

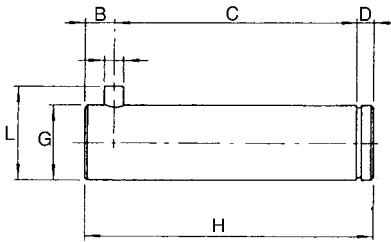
Accessories

Spherical Rod Eye



Cyl. Bore mm	KK	CN	EN	CE	LE	ER	AX	Titling Angle Z	Part Number	Assembly Torque Nm (dry)
32	M10 x 1.25	10	14	43	16	14.5	20	13°	100-SRE01-M10-125	10
40	M12 x 1.25	12	16	50	19	17	22	13°	100-SRE01-M12-125	15
50 & 63	M16 x 1.5	16	21	64	24	21	28	15°	100-SRE01-M16-150	20
80 & 100	M20 x 1.5	20	25	77	29	25	33	14°	100-SRE01-M20-150	40
125	M27 x 2	30	37	110	42	35	51	17°	100-SRE01-M27-200	80

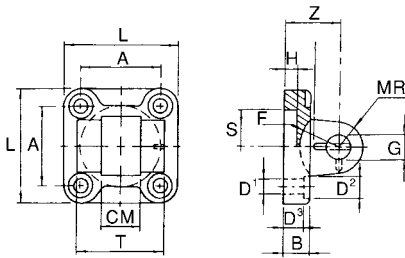
Pivot Pin For Clevis Bracket



Material: Steel AVP

Cyl. Bore mm	A H12	B $\begin{matrix} 0 \\ -1 \end{matrix}$	C $\begin{matrix} +0.5 \\ +0.3 \end{matrix}$	G f7	D	H	L $\begin{matrix} 0 \\ -0.5 \end{matrix}$	Part Number
32	3	4.5	32.5	10	4	41	14	100-PP002-32-10
40	4	6	38	12	4	48	16	100-PP002-40-12
50	4	6	43	16	5	54	20	100-PP002-50-16
63	4	6	49	16	5	60	20	100-PP002-63-16
80	4	6	63	20	6	75	24	100-PP002-80-20
100	4	6	73	20	6	85	24	100-PP002-100-20
125	6	$9 \begin{matrix} 0 \\ -2 \end{matrix}$	94	30	7	110	36	100-PP002-125-30

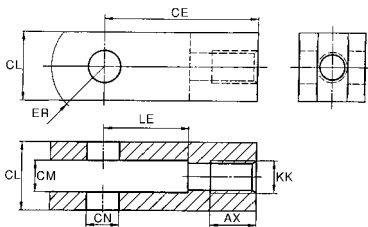
Clevis Bracket For Spherical Rod Eye



Material: Steel

Cyl. Bore mm	L ± 0.6	T d12	CM H14	A ± 0.2	Z ± 0.2	H +1	D ³ ± 0.5	S H11	G F7	MR +1	D ¹ H13	D ² H13	F min.	B	Part Number
32	45	34	14	32.5	22	5	5.5	30	10	10	6.6	10.5	17	10	100-SMB01-32-10
40	55	40	16	38	25	5	5.5	35	12	12	6.6	11	20	10	100-SMB01-40-12
50	65	45	21	46.5	27	5	6.5	40	16	14	9	15	22	10	100-SMB01-50-16
63	75	51	21	56.5	32	5	6.5	45	16	18	9	15	25	12	100-SMB01-63-16
80	95	65	25	72	36	5	10	45	20	20	11	18	30	16	100-SMB01-80-20
100	115	75	25	89	41	5	10	55	20	22	11	18	32	16	100-SMB01-100-20
125	140	97	37	110	50	7	10	60	30	25	13.5	20	42	20	100-SMB01-125-30

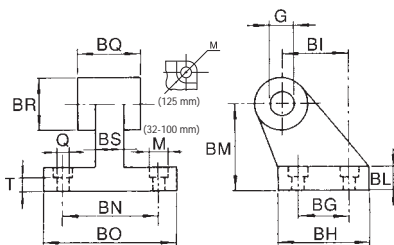
Female Rod Clevis Kit*



Cyl. Bore mm	KK	AX min.	CN H9	CE	CL max.	CM $\begin{matrix} +0.50 \\ +0.15 \end{matrix}$	LE min.	ER max.	Part Number	Assembly Torque Nm (dry)
32	M10 x 1.25	20	10	40	20	$10 \begin{matrix} +0.50 \\ +0.15 \end{matrix}$	20	16	100-RCK01-M10-125	10
40	M12 x 1.25	22	12	48	24	$12 \begin{matrix} +0.50 \\ +0.15 \end{matrix}$	24	19	100-RCK01-M12-125	15
50 & 63	M16 x 1.5	28	16	64	32	$16 \begin{matrix} +0.50 \\ +0.15 \end{matrix}$	32	25	100-RCK01-M16-150	20
80 & 100	M20 x 1.5	33	20	80	40	$20 \begin{matrix} +0.60 \\ +0.15 \end{matrix}$	40	32	100-RCK01-M20-150	40
125	M27 x 2	51	30	110	55	$30 \begin{matrix} +0.60 \\ +0.15 \end{matrix}$	54	45	100-RCK01-M27-200	80
160	M36 x 2	56	35	144	70	$35 \begin{matrix} +0.60 \\ +0.15 \end{matrix}$	72	57	100-RCK01-M36-200	220

* Furnished as kit with pin, retaining rings and clevis. (No jam nut.)

Hinge Bracket for Model 84 (MP2)



Material: Steel A 105, forged (32-100mm)
Aluminum (125mm)

Cyl. Bore mm	Q H13	M H13	BG JS14	BH max.	BI JS15	BL	BM JS15	BN JS14	BO max.	BS max.	BR	BQ $\begin{matrix} -0.2 \\ -0.6 \end{matrix}$	G H9	T $\begin{matrix} +0.5 \\ 0 \end{matrix}$	Part Number
32	6.6	11	18	31	21	8	32	38	51	10	20	26	10	6.5	100-EB001-32-10
40	6.6	11	22	35	24	10	36	41	54	10	22	28	12	8.5	100-EB001-40-12
50	9	15	30	45	33	12	45	50	65	14	26	32	12	10.5	100-EB001-50-12
63	9	15	35	50	37	12	50	52	67	14	30	40	16	10.5	100-EB001-63-16
80	11	18	40	60	47	14	63	66	86	18	30	50	16	11.5	100-EB001-80-16
100	11	18	50	70	55	15	71	76	96	20	36	60	20	12.5	100-EB001-100-20
125	14	20	60	90	70	20	90	94	124	30	45	70	25	16.8	100-EB002-125-25

Miller IP Series Pneumatic Cylinders

How To Order

Example: IP-84B2N-050-0600-020-B111C-20

IP	84	B	2	N	-	050	-	0600	-	020	B	1	1	C	2	0
Series	Mounting Style	Bushing	Rod End Style	Cushions	Bore Dia. mm	Stroke mm	Rod Dia. mm	Port Type	Port Location		Magnet and/or Switch Type	Switch Quantity	Modified			
IP DIP (D=Double Rod End)		B=Externally Removable Bushing	#2 (Std) #4	R=Rod End Cushioned C=Cap End Cushioned B=Both Ends Cushioned N=Non-Cushioned				B=BSPP	Head End Cap End	1 (Std.) 1 2 3 4	A=R05 B=R15 C=R25 D=R2Y5 E=R35 F=R3Y5 G=R45 H=R55 J=R65 M=Magnet Only O=No Magnet		0=Standard 9=Modified			

Note: The Standard (#1) port location is at the top of the cylinder in relation to the mountings as shown on the mounting dimensional pages in this catalog. These numbered locations are shown within the end views of the cylinders for each of the mountings indicated. If multiple ports are required, the last number of the part number above should be 9 indicating modified and location of multiple ports identified.

The standard cushion adjustment screw location is position #2.

The number 9 refers to any modifications from standard design. Non-Standard Modifications and options not identified in the part number identification above must be included on all orders.

How To Order

Switch Kits

Kits include switch with 5m lead, mounting bracket and screws.

Example: Switch for 50 mm Bore Cylinder

020-SWK01-50-R05

020-SWK01	-	50	-	R05
Switch Series	Mtg. Bkt. Size	Switch Type		
	32-40mm Bore = 32	R05	R3Y5	
	50-63mm Bore = 50	R15	R45	
	80-100mm Bore = 80	R25	R55	
	125-200mm Bore = 125	R2Y5	R65	
		R35		

Switches Only

(Switch has 5m lead)

Example: Switch only for Cylinder

415-SW-R05

415-SW	-	R05
Switch Series	Switch Type	
	R05	R3Y5
	R15	R45
	R25	R55
	R2Y5	R65
	R35	

IP Cylinder Repair Kits

To restore your IP cylinder to top performance, the single rod end cylinder will require a complete cylinder repair kit consisting of a bore kit and a rod seal kit. If only the rod bushing or rod seals require replacement, a rod seal repair kit may be ordered. Double rod end cylinders require one complete cylinder repair kit plus one rod seal repair kit. If only the rod bushing or rod seals need replacement in a double rod cylinder, two rod seal repair kits are necessary.

Bore Kits No. 1 and No. 4 include: 2 Piston Seals and 2 Tube End Seals. Bore Kits No. 2 and No. 3 include: 2 Piston Seals, 2 Tube End Seals, and a Wear Ring.

Rod Seal Kits No. 1 and No. 4 include: Wiper, Rod Seal and Static Bushing Seal. Rod Seal Kits No. 2 and No. 3 include: Wiper, Rod Seal, Static Bushing Seal and Bushing

Repair Kit Part Number

Bore	Bore Kit No. 1	Bore Kit No. 2	Bore Kit No. 3 High Temp.	Bore Kit No. 4 High Temp.	Rod Seal Kit No. 1	Rod Seal Kit No. 2	Rod Seal Kit No. 3 High Temp.	Rod seal Kit No. 4 High Temp.
32	100-KB002-32	100-KB001-32	100-KB003-32	100-KB004-32	100-BRK02-32-12	100-BRK01-32-12	100-BRK03-32-12	100-BRK04-32-12
40	100-KB002-40	100-KB001-40	100-KB003-40	100-KB004-40	100-BRK02-40-16	100-BRK01-40-16	100-BRK03-40-16	100-BRK04-40-16
50	100-KB002-50	100-KB001-50	100-KB003-50	100-KB004-50	100-BRK02-50-20	100-BRK01-50-20	100-BRK03-50-20	100-BRK04-50-20
63	100-KB002-63	100-KB001-63	100-KB003-63	100-KB004-63	100-BRK02-63-20	100-BRK01-63-20	100-BRK03-63-20	100-BRK04-63-20
100	100-KB002-100	100-KB001-100	100-KB003-100	100-KB004-100	100-BRK02-100-25	100-BRK01-100-25	100-BRK03-100-25	100-BRK04-100-25
125	100-KB002-125	100-KB001-125	100-KB003-125	100-KB004-125	100-BRK02-125-32	100-BRK01-125-32	100-BRK03-125-32	100-BRK04-125-32
160	100-KB002-160	100-KB001-160	100-KB003-160	100-KB004-160	100-BRK02-160-40	100-BRK01-160-40	100-BRK03-160-40	100-BRK04-160-40
200	100-KB002-200	100-KB001-200	100-KB003-200	100-KB004-200	100-BRK02-200-40	100-BRK01-200-40	100-BRK03-200-40	100-BRK04-200-40

Bore and Rod Seal Kits No. 1 & No. 2 are for temperatures up to 93°C (200°F).

Bore and Rod Seal Kits No. 3 & No. 4 are for High Temperature Seals up to 149°C (300°F).

Miller Fluid Power
Main Plant
800 North York Road
Bensenville, IL 60106
(630) 766-3400—Local
(800) 323-2520—Elsewhere
(630) 350-0294—FAX

Miller Fluid Power
33067 Industrial Road
Livonia, MI 48150
(800) 323-2520

Miller Fluid Power
2050 Del Rio
Ontario, CA 91761
(800) 323-2520

Miller Fluid Power Canada Ltd.
1214 Kamato
Mississauga, Ontario, Canada L4W1Y1
(800) 268-0205—Ontario & Quebec
(905) 625-2780—Elsewhere
(905) 625-8724—FAX

Miller Potencia Fluida, S.A. de C.V.
Israel No. 301 Esq. Damasco
Col. Ricardo B. Anaya 2A. SECC
Apartado Postal F-1241
78090 San Luis Potosi, S.L.P. Mexico
(48) 21-19-21, 22, 37
(48) 21-21-60—FAX

Miller Potencia Fluida, S.A. de C.V.
Nogal No. 45—Despacho 202
Col. Sant Maria La Ribera
Delegacion: Cuauhtemoc
Mexico, D.F. 06400
(5) 547-2474
(5) 541-1123—FAX

Miller Fluid Power (UK) Ltd.
Unit 3, Bailey Drive
Norwood Industrial Estate
Killamarsh, Sheffield
South Yorkshire, England S31 8HB
441-462-438303
441-462-420901—FAX

All specifications and information subject to
change without notice or prior obligation.

File 9817 010003

