

# Compact Hydraulic Cylinders

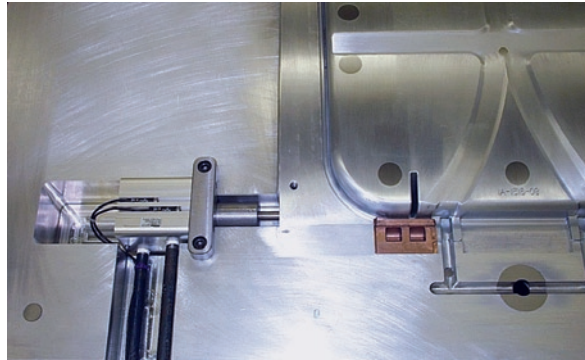
Series CHE/CHD

aerospace  
 climate control  
 electromechanical  
 filtration  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding

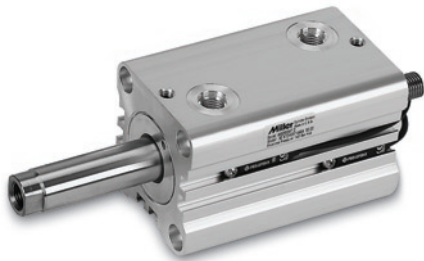


ENGINEERING YOUR SUCCESS.

## Choose Series CHE & CHD Compact Hydraulic Cylinders



**When mounting space is at a premium and the application demands a high force cylinder...**



**Series CHE** is your choice when cylinder position indication is required and when operating pressures are up to 140 bar (depending on bore size).



**Series CHD** steel body cylinders are your best choice for high force requirements with operating pressures up to 207 bar. Available foot mounting with manifold ports enhances machine design flexibility.

### **Warning**

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

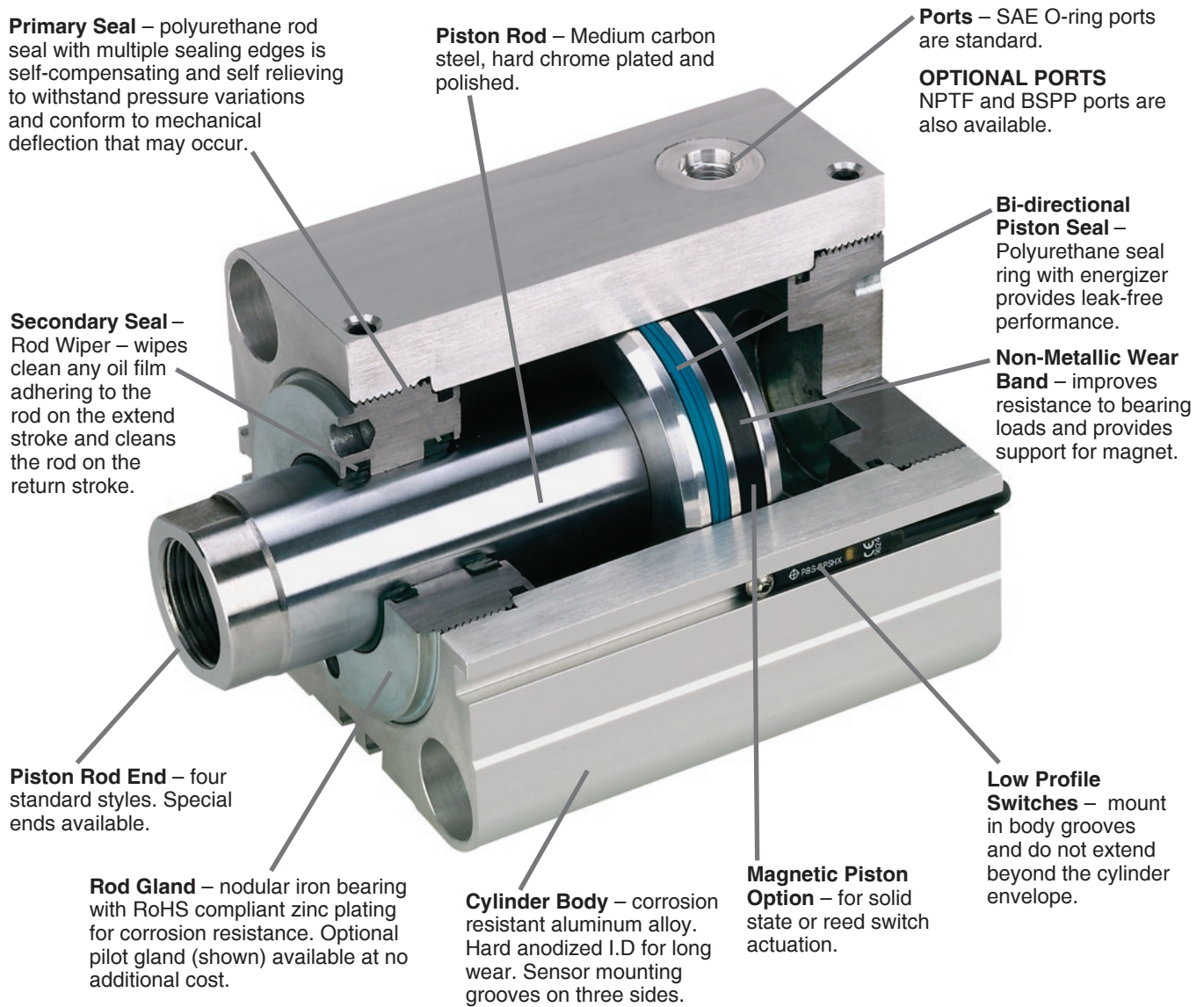
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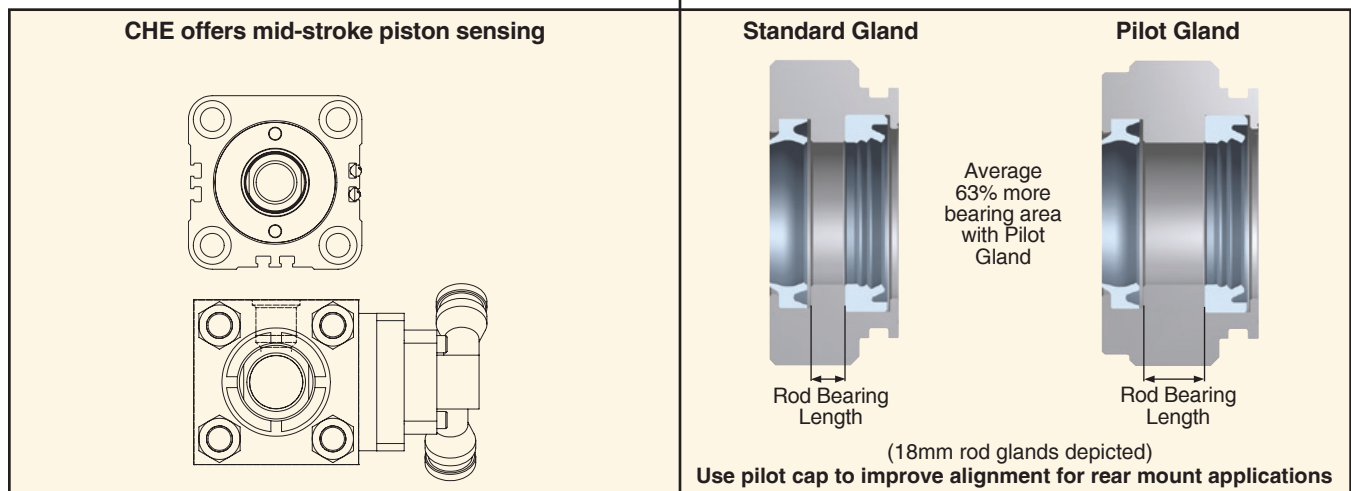
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<b>Table of Contents</b>	<b>Page No.</b>
CHE Cylinder Features.....	2
CHD Cylinder Features .....	3
CHE Theoretical Push/Pull Forces, Cylinder Weights.....	4
CHE Model Numbers, Standard Specifications.....	5
CHE T Through Bolt Mount – Single & Double Rod End .....	6 - 7
CHE TN & TR Through Bolt Mount with pilot gland or pilot cap – Single Rod End.....	8
CHE TN Through Bolt Mount with pilot gland – Double Rod End .....	9
CHE J & H Head Flange & Cap Flange Mount – Single Rod End.....	10
CHE J Head Flange Mount – Double Rod End .....	11
CHE CA Side Lug Mount – Single & Double Rod End.....	12 - 13
Solid State Switches.....	16
Reed Switches.....	17
Switch Cordsets.....	18
Switch Mounting, End-of-Stroke Switch Location.....	19
CHD Theoretical Push/Pull Forces, Cylinder Weights.....	20
CHD Model Numbers, Standard Specifications.....	21
CHD T Through Bolt Mount – Single & Double Rod End .....	22 - 23
CHD TN & TR Through Bolt Mount with pilot gland or pilot cap – Single Rod End.....	24
CHD TN Through Bolt Mount with pilot gland – Double Rod End .....	25
CHD A Imperial Tapped Mount – Single & Double Rod End.....	26 - 27
CHD AN & AR Imperial Tapped Mount with pilot gland or pilot cap – Single Rod End.....	28
CHD AN Body Imperial Tapped Mount with pilot gland – Double Rod End .....	29
CHD M Metric Tapped Mount – Single & Double Rod End.....	30 - 31
CHD MN & MR Metric Tapped Mount with pilot gland or pilot cap – Single Rod End.....	32
CHD MN Metric Tapped Mount with Pilot Gland – Double Rod End.....	33
CHD J & H Head Flange & Cap Flange Mount – Single Rod End .....	34
CHD J Head Flange Mount – Double Rod End.....	35
CHD C Foot Mount – Single & Double Rod End .....	36 - 37
CHD CN Foot Mount with pilot gland – Single & Double Rod End.....	38 - 39
CHD C & CN Mount – Interface Machining .....	40
Minimum Rod Extension.....	41
Mounting Bolt Size & Torque Recommendations.....	42
Bolt Kits for T, TN & TR Mounts .....	42
Parts Identification .....	43
Seal Kits / Gland & Cap Spanner Holes .....	44
Cylinder Safety Guide.....	47 - 48
Offer of Sale .....	IBC



**CHE Compact Hydraulic Cylinders...** have a lower profile than tie rod construction cylinders with switches installed.

**Optional Pilot Gland...** offers added bearing area to increase service life and also improves alignment of cylinder and load.



**Cylinder Features**

**Compact Hydraulic Cylinders  
Series CHD**

**Primary Seal** – polyurethane rod seal with multiple sealing edges is self-compensating and self relieving to withstand pressure variations and conform to mechanical deflection that may occur.

**Piston Rod** – Medium carbon steel, hard chrome plated and polished.

**Ports** – SAE O-ring ports are standard.

**OPTIONAL PORTS**  
NPTF and BSPP ports are also available. Manifold ports are available on mounting styles C & CN.

**Secondary Seal – Rod Wiper** – wipes clean any oil film adhering to the rod on the extend stroke and cleans the rod on the return stroke.

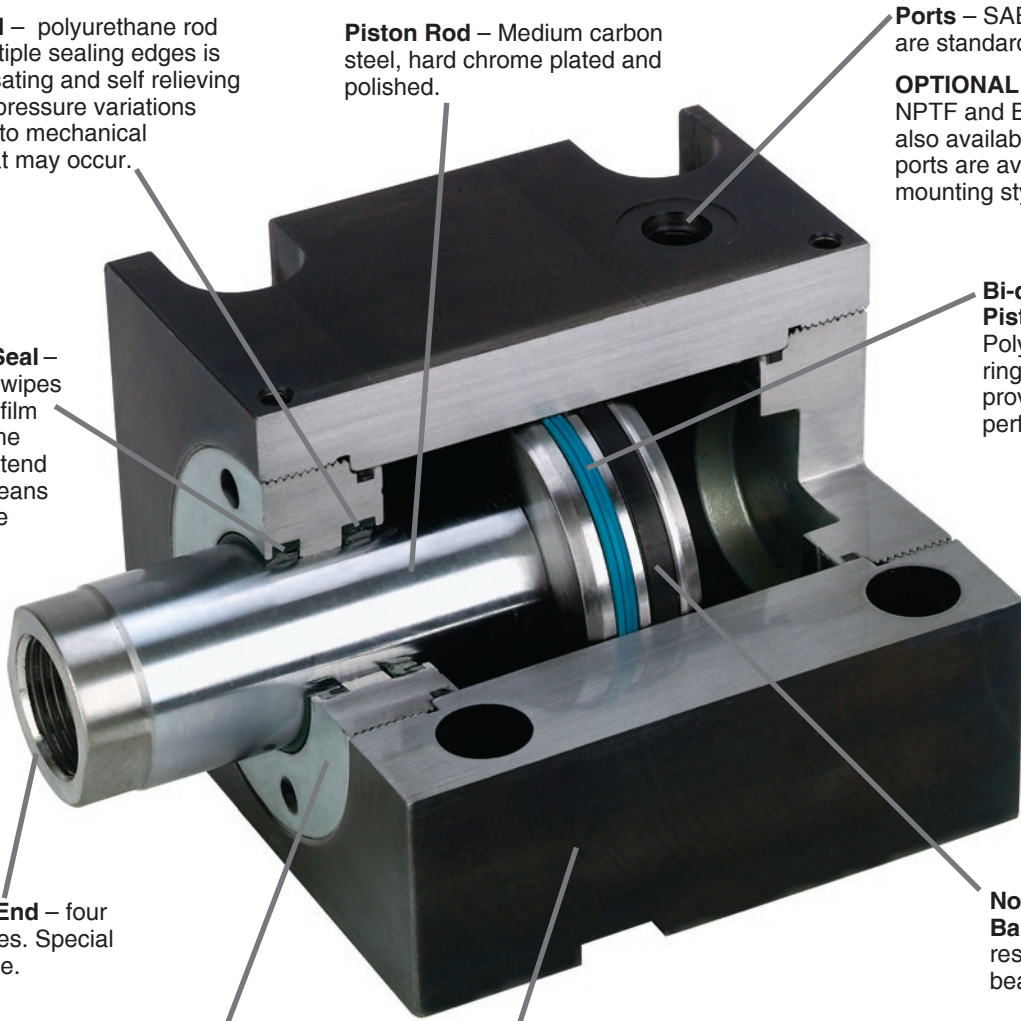
**Bi-directional Piston Seal** – Polyurethane seal ring with energizer provides leak-free performance.

**Piston Rod End** – four standard styles. Special ends available.

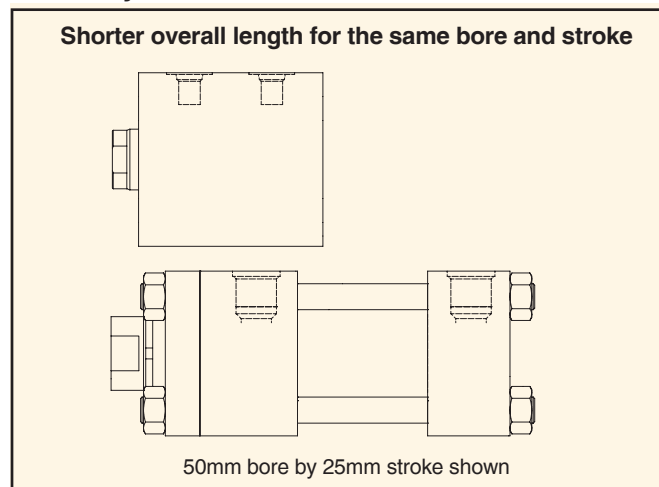
**Non-Metallic Wear Band** – improves resistance to bearing loads.

**Rod Gland** – nodular iron bearing with RoHS compliant zinc plating for corrosion resistance. Optional pilot gland available at no additional cost.

**Cylinder Body** – steel with black oxide exterior surface treatment.



**CHD Compact Hydraulic Cylinders...  
Require less mounting space than conventional  
tie rod cylinders.**



**Theoretical Push and Pull Forces**

The cylinder output forces are derived from the formula:

$$F = \frac{P \times A}{10000}$$

Where F = Force in kN.

P = Pressure at the cylinder in bar.

A = Effective area of cylinder piston in square mm.

To determine the bore size for the application take the following steps.

1. Select the Operating Pressure column closest to that desired.

2. In the same column, identify the force required to move the load (always rounding up). If the piston rod is in compression use the 'Push' row and if the piston rod is in tension use the 'Pull' row.

3. In the row to the left is the bore required.

If the cylinder envelope dimensions are too large for the application, increase the operating pressure to the maximum pressure in the table below, if possible, and repeat steps 1 - 3.

**Push and Pull Force in kN**

Bore Ø	Rod Ø	Operating Direction	Piston Area (mm²)	Operating Pressure (Bar)						
				20	40	60	80	100	120	140
20	12	Push	314	0.63	1.26	1.88	2.51	3.14	3.77	4.40
		Pull	201	0.40	0.80	1.21	1.61	2.01	2.41	2.81
25	14	Push	491	0.98	1.96	2.95	3.93	4.91	5.89	6.87
		Pull	337	0.67	1.35	2.02	2.70	3.37	4.04	4.72
32	18	Push	804	1.61	3.22	4.83	6.43	8.04	9.65	11.3
		Pull	550	1.10	2.20	3.30	4.40	5.50	6.60	7.70
40	22	Push	1,257	2.51	5.03	7.54	10.1	12.6	15.1	17.6
		Pull	877	1.75	3.51	5.26	7.01	8.77	10.5	12.3
50	28	Push	1,963	3.93	7.85	11.8	15.7	19.6	23.6	-
		Pull	1,348	2.70	5.39	8.09	10.8	13.5	16.2	-
63	36	Push	3,117	6.23	12.5	18.7	24.9	31.2	-	-
		Pull	2,099	4.20	8.40	12.6	16.8	21.0	-	-
80	45	Push	5,027	10.1	20.1	30.2	40.2	50.3	-	-
		Pull	3,436	6.87	13.7	20.6	27.5	34.4	-	-
100	56	Push	7,854	15.7	31.4	47.1	62.8	78.5	-	-
		Pull	5,391	10.8	21.6	32.3	43.1	53.9	-	-

**Series CHE  
Pressure Rating**

Bore Ø	Maximum Working Pressure in bar
20	140
25	140
32	140
40	140
50	120
63	100
80	100
100	100

**Equivalents**

- 1 kN = 224.81 pounds force
- 1 bar = 14.50 psi
- 1 mm = .03937 inch
- 1 mm² = .00155 inch²

**Cylinder Weights**

To determine the weight of a Series CHE cylinder, first select the proper basic zero stroke weight for the mounting required, and then calculate the weight of the

cylinder stroke and add the result to the basic weight. For extra rod extension, use piston rod weights per mm in Table C.

**Table A** Single Rod End CHE Cylinder Weights in kg.

Bore Ø	Rod Ø	Single Rod Cylinders									
		Basic Weight at Zero Stroke				Per mm Stroke	Basic Weight at Zero Stroke				Per mm Stroke
		T		TN, TR			J, H		CA		
		PC 3 <sup>1</sup>	PC B <sup>1</sup>	PC 3 <sup>1</sup>	PC B <sup>1</sup>		PC 3 <sup>1</sup>	PC B <sup>1</sup>	PC 3 <sup>1</sup>	PC B <sup>1</sup>	
20	12	0.24	0.25	0.25	0.26	0.004	0.51	0.52	0.48	0.49	0.005
25	14	0.34	0.36	0.35	0.37	0.005	0.71	0.73	0.69	0.71	0.006
32	18	0.62	0.66	0.64	0.68	0.009	1.14	1.18	1.28	1.33	0.009
40	22	0.92	0.99	0.95	1.02	0.011	1.86	1.93	2.00	2.06	0.013
50	28	1.38	1.50	1.44	1.55	0.015	2.97	3.09	3.12	3.24	0.017
63	36	2.33	2.54	2.42	2.62	0.021	4.33	4.54	5.14	5.34	0.025
80	45	4.20	4.66	4.34	4.80	0.031	7.68	8.14	8.67	9.13	0.036
100	56	8.02	8.86	8.23	9.08	0.045	14.7	15.6	15.6	16.4	0.051

**Table C** Piston rod weights in kg.

Rod Ø	Piston Rod Weight per mm
12	0.001
14	0.001
18	0.002
22	0.003
28	0.005
36	0.008
45	0.012
56	0.019

**Table B** Double Rod End CHE Cylinder Weights in kg.

Bore Ø	Rod Ø	Double Rod Cylinders									
		Basic Weight at Zero Stroke				Per mm Stroke	Basic Weight at Zero Stroke				Per mm Stroke
		T		TN			J		CA		
		PC 3 <sup>1</sup>	PC B <sup>1</sup>	PC 3 <sup>1</sup>	PC B <sup>1</sup>		PC 3 <sup>1</sup>	PC B <sup>1</sup>	PC 3 <sup>1</sup>	PC B <sup>1</sup>	
20	12	0.26	0.28	0.28	0.29	0.005	0.53	0.55	0.50	0.51	0.006
25	14	0.37	0.40	0.39	0.41	0.007	0.75	0.77	0.72	0.75	0.008
32	18	0.68	0.72	0.71	0.75	0.011	1.21	1.25	1.35	1.39	0.011
40	22	1.02	1.09	1.06	1.13	0.014	1.97	2.04	2.10	2.17	0.016
50	28	1.59	1.70	1.64	1.75	0.020	3.18	3.29	3.33	3.44	0.022
63	36	2.75	2.95	2.84	3.04	0.029	4.75	4.95	5.56	5.76	0.033
80	45	5.00	5.45	5.14	5.59	0.043	8.48	8.93	9.47	9.92	0.048
100	56	9.64	10.5	9.86	10.7	0.065	16.3	17.2	17.2	18.1	0.071

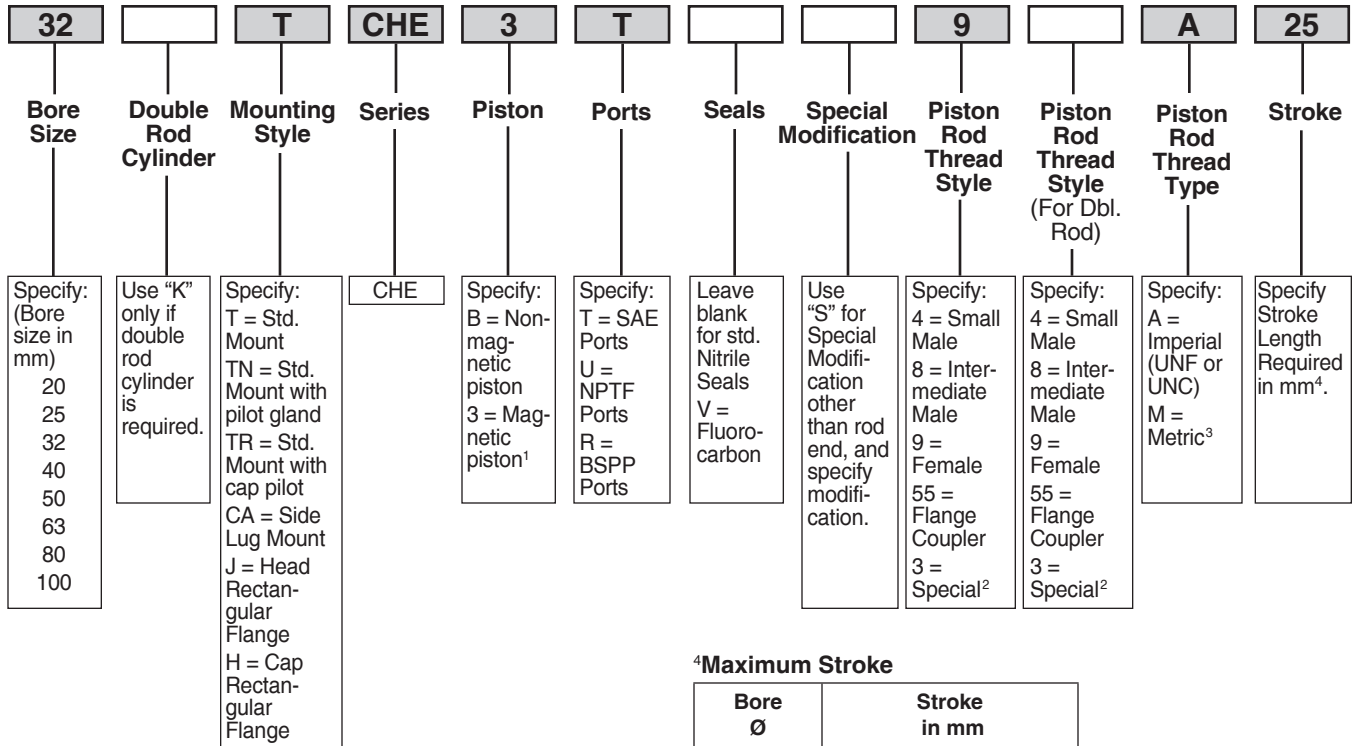
**Equivalent**

1 kg = 2.2046 pounds

Note 1: PC 3 = with Piston Code 3 (Magnetic Piston), PC B = with Piston Code B (Non-Magnet Piston)

Model Code & Standard Specifications

Model Ordering Code for CHE



<sup>4</sup>Maximum Stroke

Bore Ø	Stroke in mm
20	50
25	75
32	150
40	150
50	150
63	150
80	140
100	130

Shaded boxes identify required model number fields.

<sup>1</sup> Order required Solid State or Reed Switches as separate items. See reed switch & solid state switch pages for specifications and part numbers.

<sup>2</sup> To order thread style 3, specify "3" and give the desired dimensions for KK, A, and W (or WP or WR depending on mounting) or furnish a dimensioned sketch.

<sup>3</sup> Always use M for rod style 55.

Strokes in 1mm increments are available.

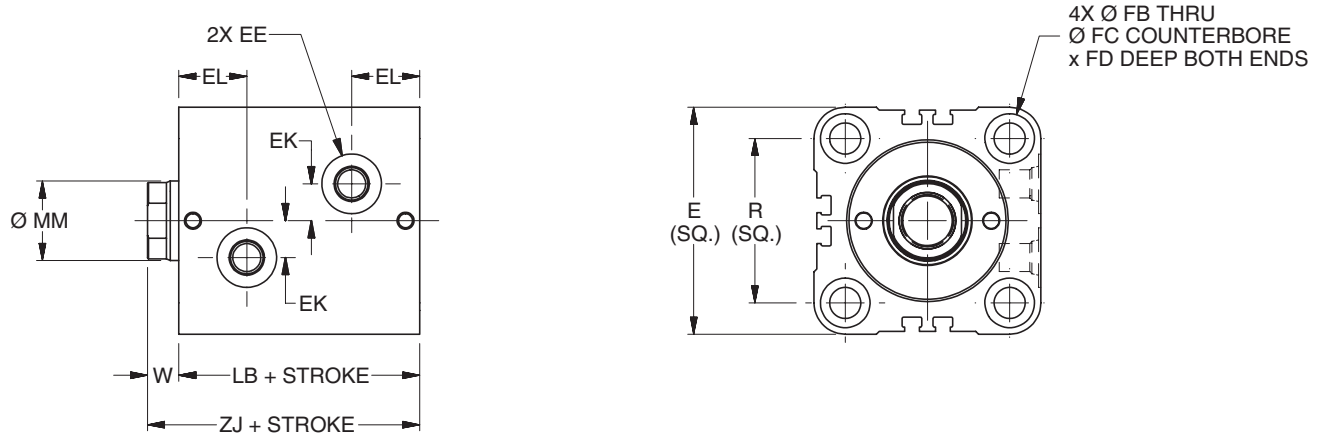
Standard Specifications

- 6 Standard mounting styles
- Bore sizes – 20mm to 100mm
- Piston Rod Diameter – 12mm to 56mm
- Single and double rod construction available
- Strokes up to 150mm depending on bore size (see table above).
- Working pressure up to 140 bar (depending on bore size)
- Temperature range – -23°C to +121°C (depending on seal class)
- Reference ISO 16656: 2004

Seal Classes	Typical Fluids	Temperature Range
1 – Standard Nitrile & Polyurethane	Hydraulic Oil, MIL-H-5606 Oil	-23°C (-10°F) to +74°C (+165°F)
5 – Optional (At extra cost) Fluorocarbon Seals	High Temperature	-23°C (-10°F) to +121°C (+250°F) Class 5 seals may be operated up to +204°C (+400°F) with reduced service life

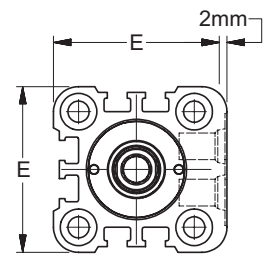
Note: Class 5 seals are not suitable for use with Skydrol fluid, but can be used with hydraulic oil if desired.

**Style T Through Bolt Mount – Single Rod End – 20mm to 100mm Bore Size**



**T Mount Single Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	FB	FC	FD	R	W	Add Stroke	
		SAE	NPTF	BSP								LB	ZJ
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	8	43	51
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	8	45	53
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	10	51	61
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	10	55	65
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	11	60	71
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	13	67	80
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	17	78	95
100	138	#6	3/8	G-3/8	25	35	18	26	17.5	106	26	96	122



**Port Face Extension  
20mm Bore Only**

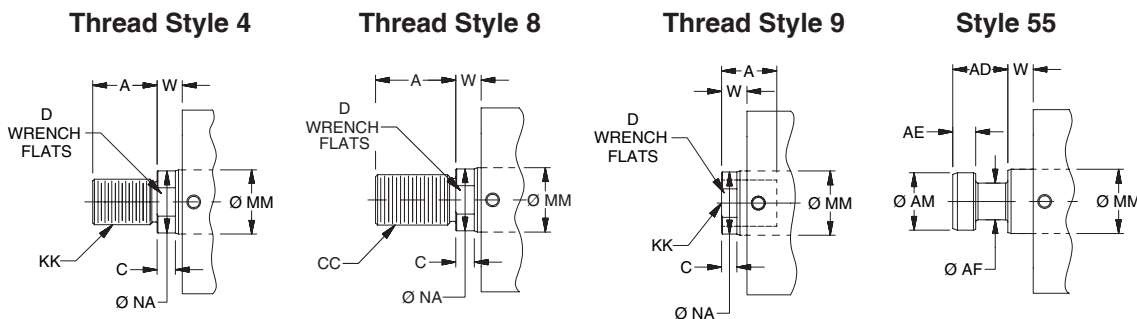
<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing.

<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**T Mount Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

**Rod End Dimensions**

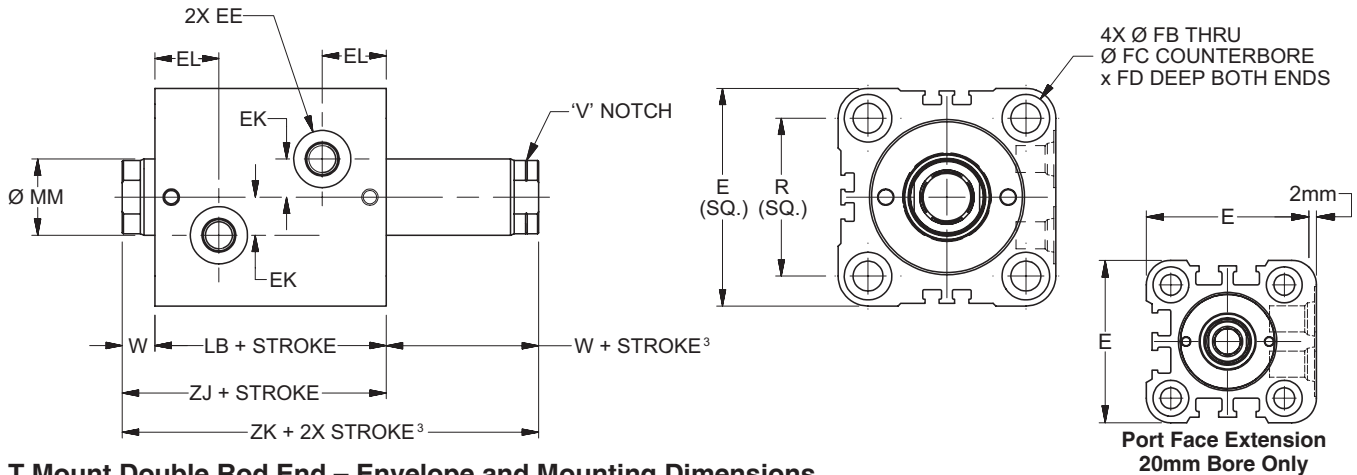


**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.



**T Mount – Double Rod End**

**Style T Through Bolt Mount – Double Rod End – 20mm to 100mm Bore Size**



**T Mount Double Rod End – Envelope and Mounting Dimensions**

Bore $\varnothing$	E	EE			EK	EL	FB	FC	FD	LB	R	W <sup>3</sup>	Add Stroke		Add 2X Stroke ZK <sup>3</sup>
		SAE	NPTF	BSP									LB	ZJ	
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	43	30	8	43	51	59
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	45	36	8	45	53	61
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	51	47	10	51	61	71
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	55	52	10	55	65	75
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	60	58	11	60	71	82
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	67	69	13	67	80	93
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	78	86	17	78	95	112
100	138	#6	3/8	G-3/8	25	35	18	26	17.5	96	106	26	96	122	148

<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing.

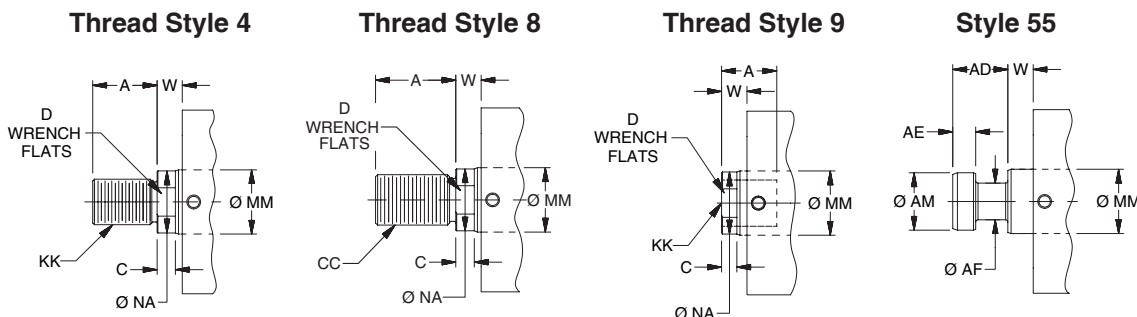
<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>3</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**T Mount Double Rod End – Rod Dimensions**

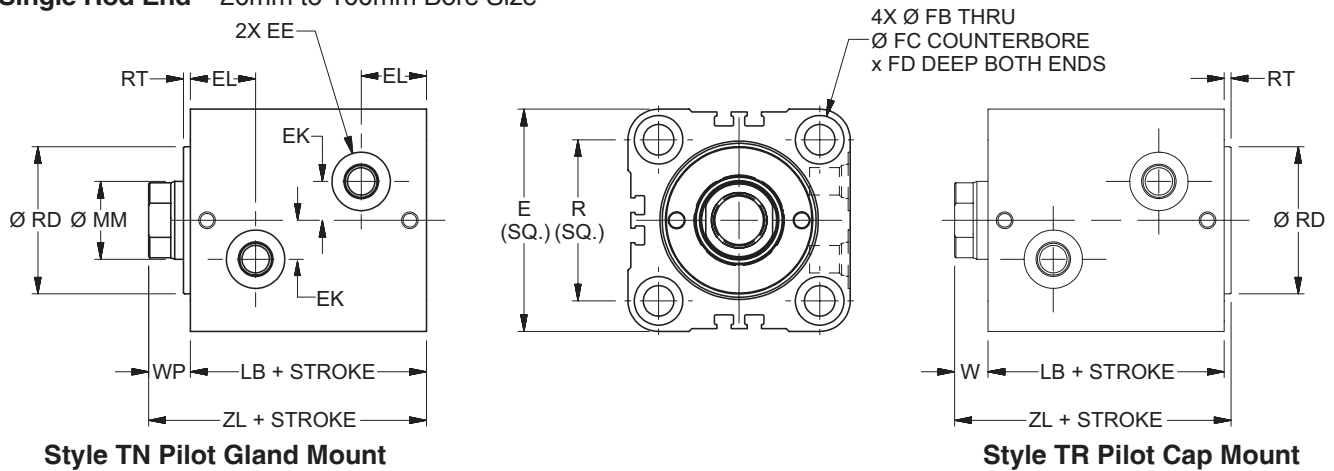
Bore $\varnothing$	MM Rod $\varnothing$	Rod End														Rod Extension Dimensions		
		Style 9M <sup>3</sup>		Style 4M		Style 9A <sup>3</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

**Rod End Dimensions**



**"Special" Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify "Style 3" and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**Styles TN and TR Through Bolt Mount with Pilot Gland or Pilot Cap –  
Single Rod End – 20mm to 100mm Bore Size**



**Style TN Pilot Gland Mount**

**Style TR Pilot Cap Mount**

**TN and TR Mount Single Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	FB	FC	FD	R	RD f9	RT	W	WP	Add Stroke	
		SAE	NPTF	BSP											LB	ZL
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	24	3	8	11	43	54
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	27	3	8	11	45	56
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	36	3	10	13	51	64
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	43	3	10	13	55	68
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	53	3	11	14	60	74
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	66	3	13	16	67	83
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	83	3	17	20	78	98
100	138	#6	3/8	G-3/8	25	35	18	26	17.5	106	103	3	26	29	96	125

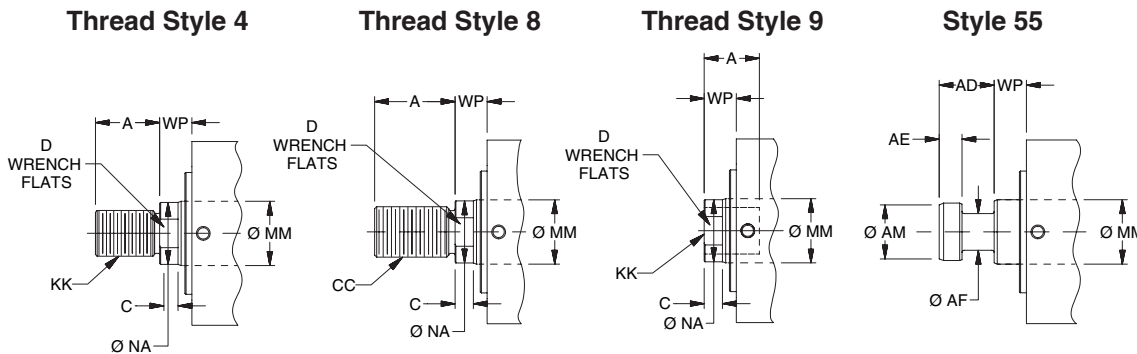
<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing on T Mount page.

<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**TN and TR Mount Single Rod End – Rod Dimensions**

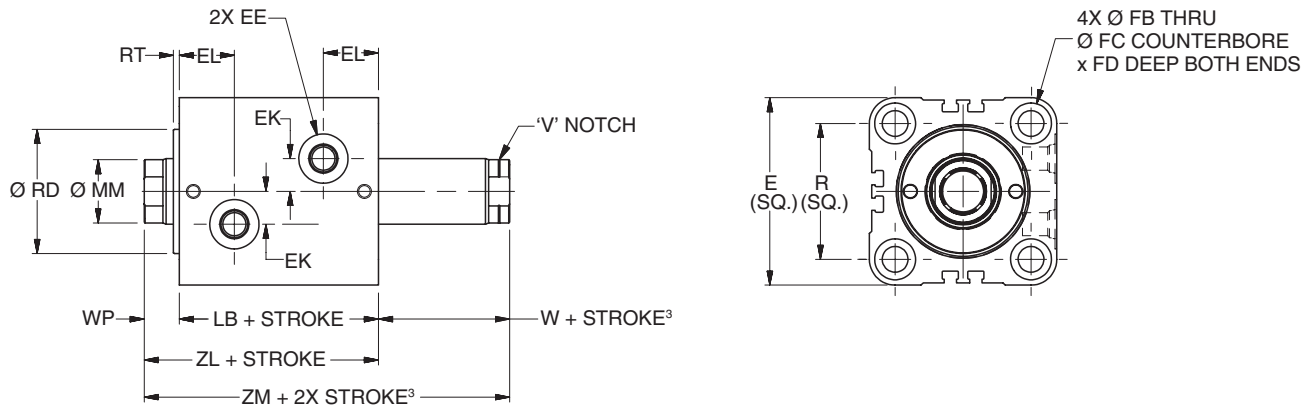
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W (TR Mount) or WP (TN Mount) If otherwise special furnish dimensional sketch.

**Style TN Through Bolt Mount with Pilot Gland – Double Rod End – 20mm to 100mm Bore Size**



**TN Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	FB	FC	FD	R	RD f9	RT	W <sup>3</sup>	WP	Add Stroke		Add 2X Stroke ZM <sup>3</sup>
		SAE	NPTF	BSP											LB	ZL	
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	24	3	8	11	43	54	62
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	27	3	8	11	45	56	64
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	36	3	10	13	51	64	74
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	43	3	10	13	55	68	78
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	53	3	11	14	60	74	85
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	66	3	13	16	67	83	96
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	83	3	17	20	78	98	115
100	138	#6	3/8	G-3/8	25	35	18	26	17.5	106	103	3	26	29	96	125	151

<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing on T Mount page.

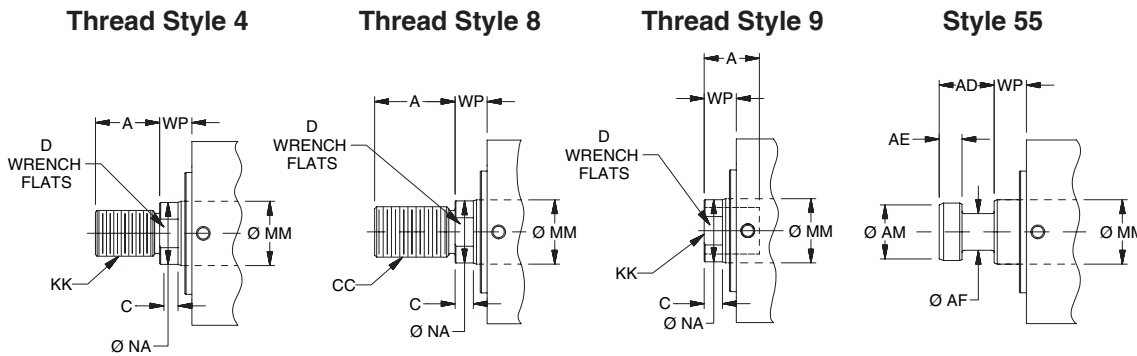
<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>3</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**TN Mount Double Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>3</sup>		Style 4M		Style 9A <sup>3</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

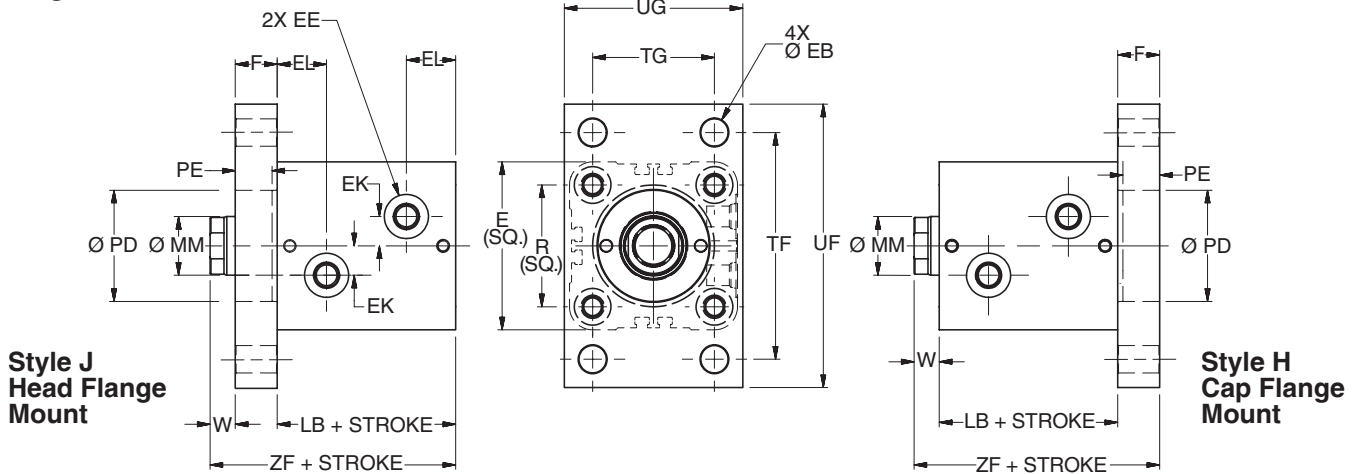
**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & WP. If otherwise special furnish dimensional sketch.

**J & H Mounts – Single Rod End**

**Styles J Rectangular Head Flange & H Rectangular Cap Flange Mounts – Single Rod End – 20mm to 100mm Bore Size**



**J & H Mounts Single Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	F	EB	PD H9	PE	R	TF	TG	UF	UG	W	Add Stroke	
		SAE	NPTF	BSP													LB	ZF
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	10	5.5	24	7	30	60	30	75	46	8	43	61
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	12	5.5	27	9	36	66	36	80	52	8	45	65
32	62	#4	1/4	G-1/4	11	20.5	12	6.8	36	9	47	80	40	95	62	10	51	73
40	70	#4	1/4	G-1/4	12	21	16	11	43	13	52	96	46	118	70	10	55	81
50	80	#4	1/4	G-1/4	14	22.5	20	13.5	53	17	58	108	58	135	85	11	60	91
63	94	#4	1/4	G-1/4	17	26	20	15	66	17	69	124	65	150	98	13	67	100
80	114	#6	3/8	G-3/8	20	29.5	25	17	83	21	86	154	87	185	118	17	78	119
100	138	#6	3/8	G-3/8	25	35	30	21.5	103	27	106	190	109	230	150	26	96	152

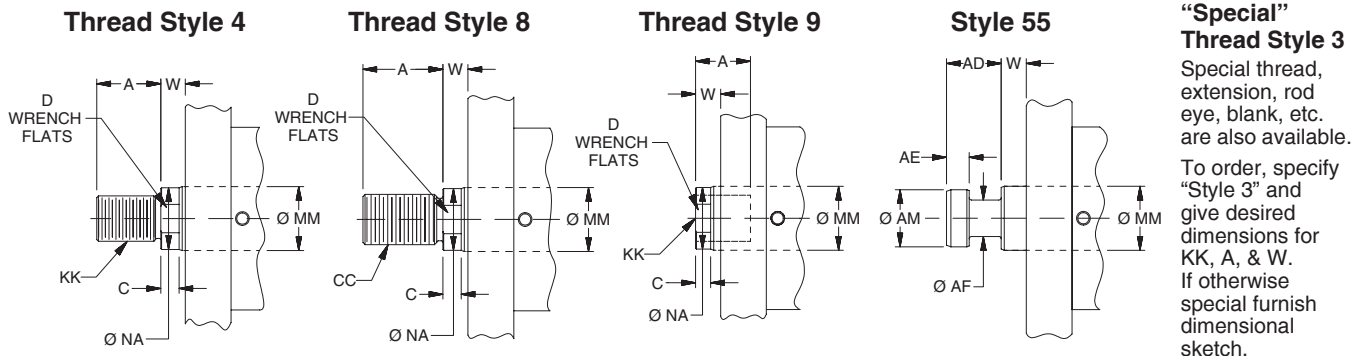
<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing on T Mount page.

<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**J & H Mounts Single Rod End – Rod Dimensions**

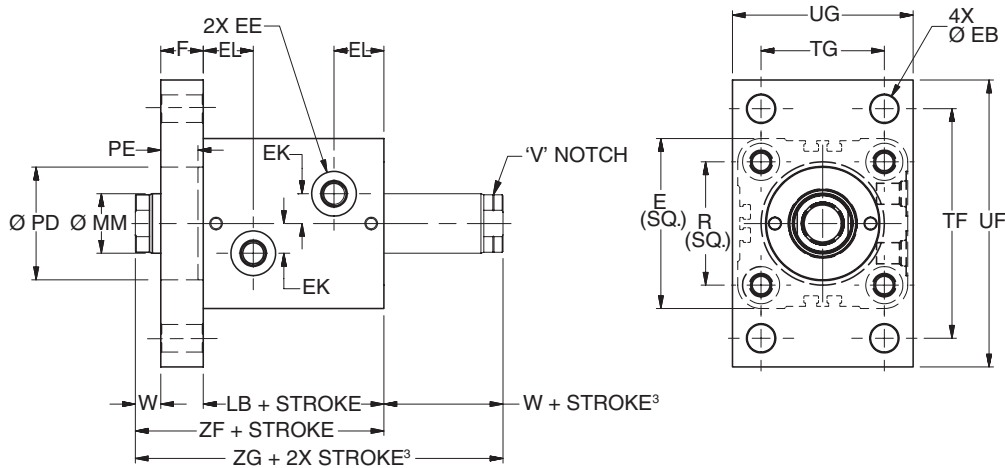
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

**Rod End Dimensions**



**J Mount – Double Rod End**

**Style J Rectangular Head Flange Mount – Double Rod End – 20mm to 100mm Bore Size**



**J Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	F	EB	PD H9	PE	R	TF	TG	UF	UG	W <sup>3</sup>	Add Stroke		Add 2X Stroke ZG <sup>3</sup>
		SAE	NPTF	BSP													LB	ZF	
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	10	5.5	24	7	30	60	30	75	46	8	43	61	69
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	12	5.5	27	9	36	66	36	80	52	8	45	65	73
32	62	#4	1/4	G-1/4	11	20.5	12	6.8	36	9	47	80	40	95	62	10	51	73	83
40	70	#4	1/4	G-1/4	12	21	16	11	43	13	52	96	46	118	70	10	55	81	91
50	80	#4	1/4	G-1/4	14	22.5	20	13.5	53	17	58	108	58	135	85	11	60	91	102
63	94	#4	1/4	G-1/4	17	26	20	15	66	17	69	124	65	150	98	13	67	100	113
80	114	#6	3/8	G-3/8	20	29.5	25	17	83	21	86	154	87	185	118	17	78	119	136
100	138	#6	3/8	G-3/8	25	35	30	21.5	103	27	106	190	109	230	150	26	96	152	178

<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing on T Mount page.

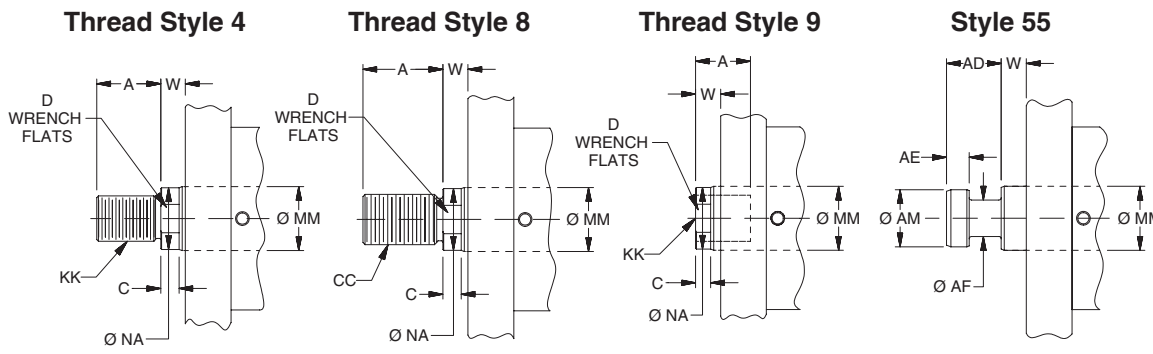
<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>3</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**J Mount Double Rod End – Rod Dimensions**

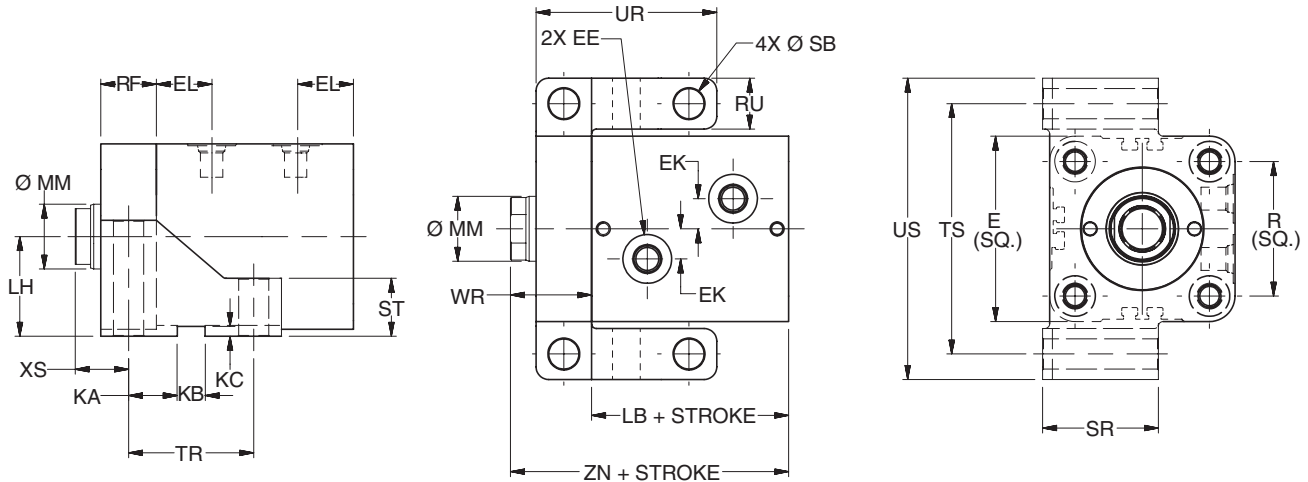
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>3</sup>		Style 4M		Style 9A <sup>3</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**Style CA Side Lug Mount – Single Rod End – 20mm to 100mm Bore Size**



**CA Mount Single Rod End – Envelope and Mounting Dimensions**

Bore	E	EE			EK	EL	KA	KB	KC	LH	R	RF	RU	SB	SR	ST	TR	TS	UR	US	WR	XS	Add Stroke	
		SAE	NPTF	BSP																			LB	ZN
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	12	5	2.75	24	30	10	10	5.5	25	10	29	58	39	68	18	13	43	61
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	13.5	6	3.25	27	36	12	12	6.8	30	12	33	66	45	78	20	14	45	65
32	62	#4	1/4	G-1/4	11	20.5	16.5	8	3.75	34	47	16	15	9	35	15	41	82	57	97	26	18	51	77
40	70	#4	1/4	G-1/4	12	21	18.5	10	4.25	38	52	20	18	11	40	20	47	94	67	112	30	20	55	85
50	80	#4	1/4	G-1/4	14	22.5	21	12	4.25	43	58	24	22	13.5	50	25	54	108	78	130	35	23	60	95
63	94	#4	1/4	G-1/4	17	26	25	14	4.75	51	69	28	26	16	60	30	64	128	92	154	41	27	67	108
80	114	#6	3/8	G-3/8	20	29.5	30	16	5.25	61	86	32	30	18	70	35	76	152	108	182	49	33	78	144
100	138	#6	3/8	G-3/8	25	35	36.5	20	6.25	75	106	38	36	22	80	40	93	186	131	222	64	45	96	160

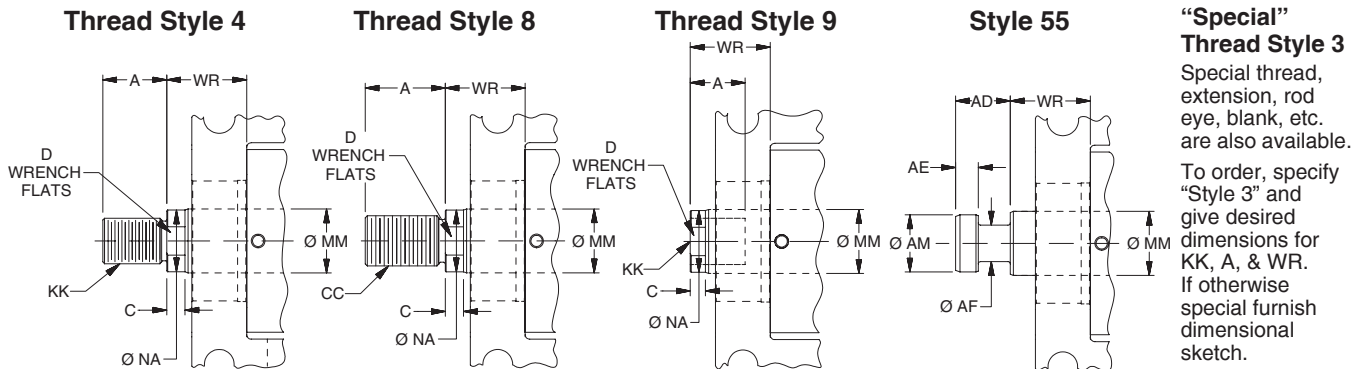
<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing on T Mount page.

<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**CA Mount Single Rod End – Rod Dimensions**

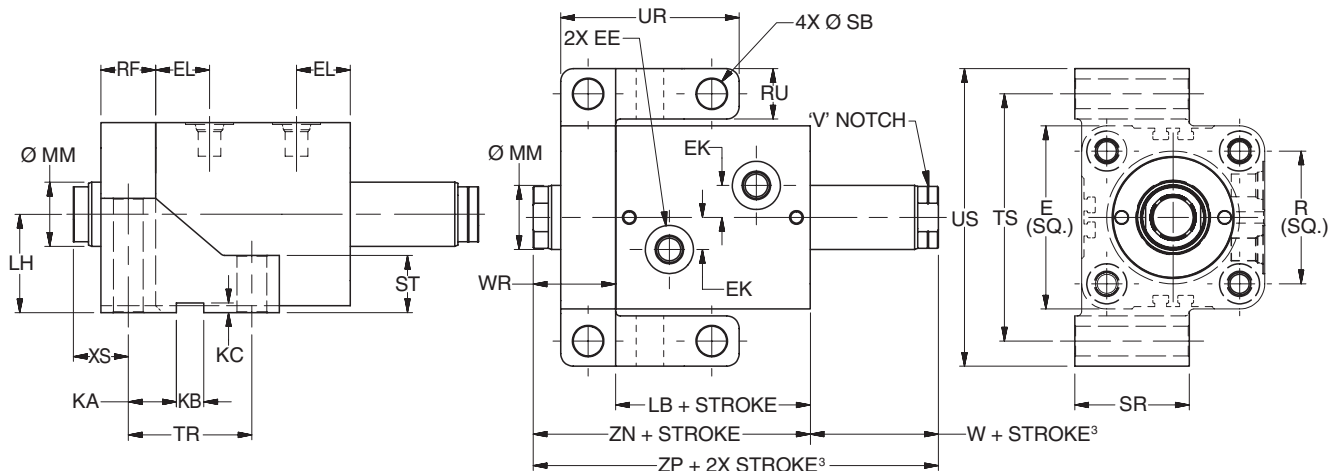
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

**Rod End Dimensions**



CA Mount – Double Rod End

Style CA Side Lug Mount – Double Rod End – 20mm to 100mm Bore Size



CA Mount Double Rod End – Envelope and Mounting Dimensions

Bore Ø	E	EE			EK	EL	KA	KB	KC	LH	R	RF	RU	SB	SR	ST	TR	TS	UR	US	W <sup>3</sup>	WR	XS	Add Stroke			Add 2X Stroke		
		SAE	NPTF	BSP																				LB	ZN	ZP <sup>3</sup>			
																											LB	ZN	ZP <sup>3</sup>
20	43 <sup>1</sup>	#2 <sup>2</sup>	1/8	G-1/8	6	16.5	12	5	2.75	24	30	10	10	5.5	25	10	29	58	39	68	8	18	13	43	61	69			
25	49	#2 <sup>2</sup>	1/8	G-1/8	8	17.5	13.5	6	3.25	27	36	12	12	6.8	30	12	33	66	45	78	8	20	14	45	65	73			
32	62	#4	1/4	G-1/4	11	20.5	16.5	8	3.75	34	47	16	15	9	35	15	41	82	57	97	10	26	18	51	77	87			
40	70	#4	1/4	G-1/4	12	21	18.5	10	4.25	38	52	20	18	11	40	20	47	94	67	112	10	30	20	55	85	95			
50	80	#4	1/4	G-1/4	14	22.5	21	12	4.25	43	58	24	22	13.5	50	25	54	108	78	130	11	35	23	60	95	106			
63	94	#4	1/4	G-1/4	17	26	25	14	4.75	51	69	28	26	16	60	30	64	128	92	154	13	41	27	67	108	121			
80	114	#6	3/8	G-3/8	20	29.5	30	16	5.25	61	86	32	30	18	70	35	76	152	108	182	17	49	33	78	144	144			
100	138	#6	3/8	G-3/8	25	35	36.5	20	6.25	75	106	38	36	22	80	40	93	186	131	222	26	64	45	96	160	186			

<sup>1</sup> Port face on 20mm bore is extended 2mm. See port face extension drawing on T Mount page.

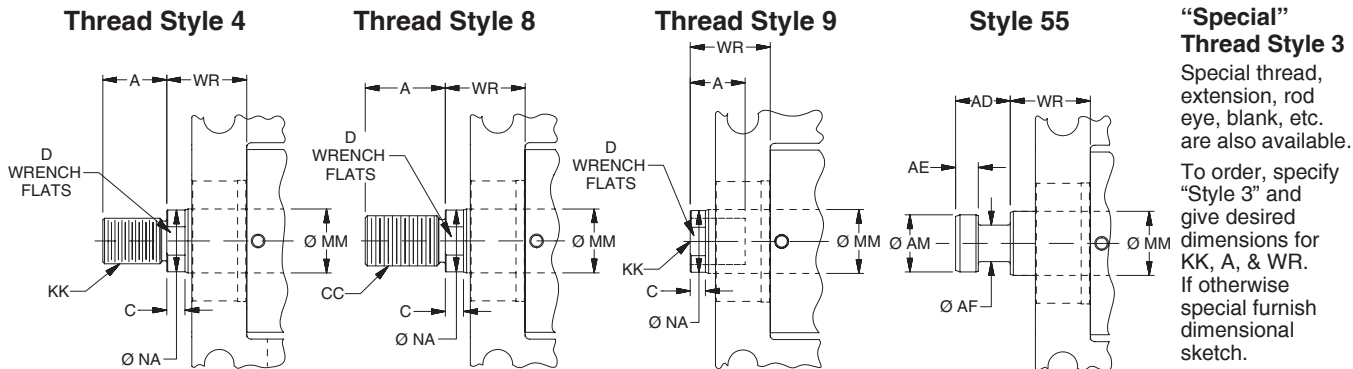
<sup>2</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>3</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

CA Mount Double Rod End – Rod Dimensions

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>3</sup>		Style 4M		Style 9A <sup>3</sup>		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43
100	56	M42x4.5	45	M42x2	56	1 1/2-12	45	1 1/2-12	56	1 3/4-12	70	42	16	35	52	22	48	54

Rod End Dimensions



**Notes**



# Global Position Sensing Switches



- Low Profile Keeps Switch Within Cylinder Envelope
- Both Reed and Solid State Switch Versions
- Switches Available World-Wide
- Solid State Switches use GMR Technology
- 5 Different Connection Styles
- Allow Position Sensing Anywhere Along Cylinder Stroke
- CE Approved

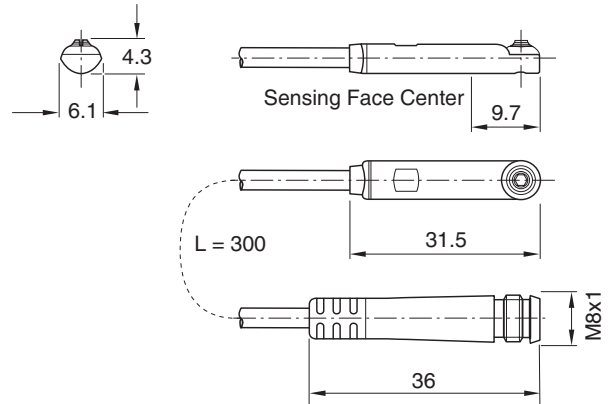
**Global Drop-In Solid State Switches**  



Wiring	PNP Switch	NPN Switch	PNP Switch ATEX Certified
3m Flying Leads	P8S-GPFLX	P8S-GNFLX	P8S-GPFLX/EX
10m Flying Leads	P8S-GPFTX	P8S-GNFTX	N/A
0.3m Lead with 8mm Connector	P8S-GPSHX	P8S-GNSHX	
0.3m Lead with 12mm Connector	P8S-GPMHX	P8S-GNMHX	
1m Lead with 8mm Connector	P8S-GPSCX	P8S-GNSCX	

**Specifications**

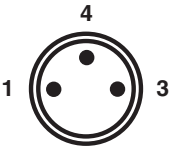
Type..... Electronic  
 Output Function ..... Normally Open  
 Switch Output ..... PNP/NPN  
 Operating Voltage..... 10 - 30VDC  
 Continuous Current ..... 100 mA max.  
 Response Sensitivity ..... 28 Gauss min.  
 Switching Frequency ..... 5 KHz  
 Power Consumption ..... 10 mA max.  
 Voltage Drop..... 2.5 VDC max.  
 Ripple ..... 10% of Operating Voltage  
 Hysteresis..... 1.5 mm max.  
 Repeatability..... 0.1 mm max.  
 EMC..... EN 60 947-5-2  
 Short-circuit Protection ..... Yes  
 Power-up Pulse Suppression ..... Yes  
 Reverse Polarity Protection ..... Yes  
 Enclosure Rating..... IP 68  
 Shock and Vibration Stress ..... 30g, 11 ms, 10 to 55 Hz, 1 mm  
 Operating Temperature Range..... -25°C to +75°C (-13°F to 167°F)  
 Housing Material ..... PA 12, Black  
 Connector Cable..... PVC  
 Connector..... PUR cable w/8 or 12 mm connector



Global solid state switch outputs may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

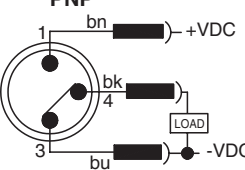
**Solid State Switch – Wiring Connection**

**Flying Lead or 8 mm Connector (shown)**

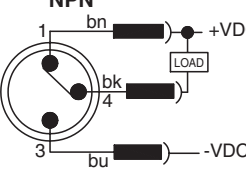


Pin	Wire	Function
1	Brown	Operating Voltage (+VDC)
4	Black	Output signal (N.O.)
3	Blue	-VDC

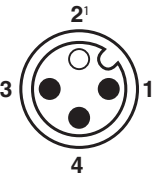
**PNP**



**NPN**



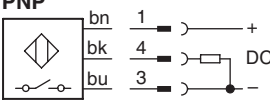
**12 mm Connector**



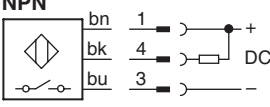
Pin	Wire	Function
1	Brown	Operating Voltage (+VDC)
4	Black	Output Signal (N.O.)
2 <sup>1</sup>	White	Not Used
3	Blue	-VDC

<sup>1</sup>Pin 2 not present.

**PNP**



**NPN**



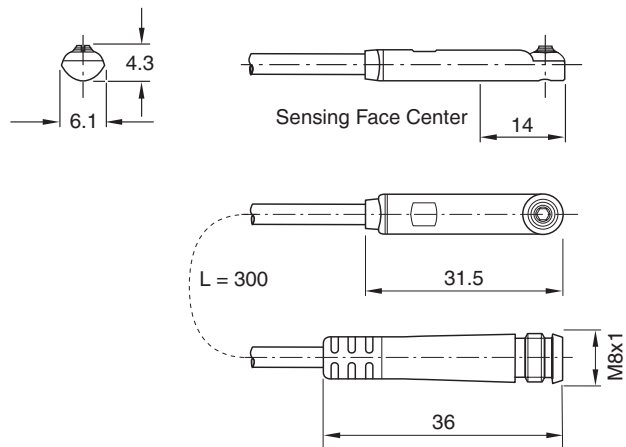
**Global Drop-In Reed Switches** 

Wiring	Reed Switch
3m Flying Leads	P8S-GRFLX
10m Flying Leads	P8S-GRFTX
0.3m Lead with 8mm Connector	P8S-GRSHX
0.3m Lead with 12mm Connector	P8S-GRMHX
1m Lead with 8mm Connector	P8S-GRSCX

**Specifications**

- Type.....2-Wire Reed
- Output Function.....Normally Open
- Operating Voltage.....10 - 120 VAC<sup>1</sup>  
10 - 30 VDC
- Switching Power.....6 W/VA
- Continuous Current.....100 mA max.
- Response Sensitivity.....30 Gauss min.
- Switching Frequency.....400 Hz
- Voltage Drop.....2.5 V max.
- Ripple.....10% of Operating Voltage
- Hysteresis.....1.5 mm max.
- Repeatability.....0.2 mm max.
- EMC.....EN 60 947-5-2
- Reverse Polarity Protection.....Yes
- Enclosure Rating.....IP 68
- Shock and Vibration Stress.....30g, 11 ms, 10 to 55 Hz, 1 mm
- Operating Temperature Range.....-25°C to +75°C (-13°F to 167°F)
- Housing Material.....PA 12, Black
- Connector Cable.....PVC
- Connector.....PUR cable with 8 or 12 mm connector

Global Reed Switch output may be influenced by external magnetic fields. Care must be taken to avoid external magnetic field exposure.



**Reed Switch – Wiring Connection**

**Flying Lead or 8 mm Connector<sup>1</sup>**

Pin	Wire	Function
1	Brown	Operating Voltage (+V)
4	Black	Not Used
3	Blue	Output Signal (-V or Ground)

<sup>1</sup>8mm connector rated for 50 VAC max.

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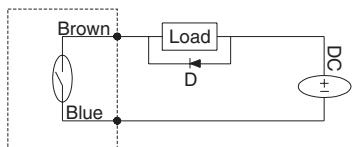
**12 mm Connector**

Pin	Wire	Function
1	Brown	Operating Voltage (+V)
2 <sup>2</sup>	White	Not Used
3	Blue	Output Signal (-V or Ground)
4	Black	Not Used

<sup>2</sup>Pin 2 not present.

**Circuit for Switching Contact Protection (Inductive Loads)**

**(Required for proper operation 24V DC)**  
Put Diode parallel to loads following polarity as shown below.

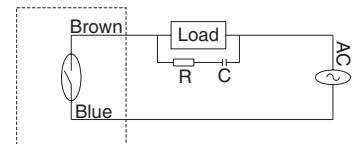


D: Diode: select a Diode with the breakdown voltage and current rating according to the load.

**Typical Example—**100 Volt, 1 Amp Diode  
CR: Relay coil (under 0.5W coil rating)

**(Recommended for longer life 120 VAC)**  
Put a resistor and capacitor in parallel with the load. Select the resistor and capacitor according to the load.

**Typical Example:**  
CR: Relay coil (under 2W coil rating)  
R: Resistor 1 KΩ - 5 KΩ, 1/4 W  
C: Capacitor 0.1 μF, 600 V



**⚠ Caution**

- Use an ammeter to test reed switch current. Testing devices such as incandescent light bulbs may subject the reed sensor to high in-rush loads.
- **NOTE:** When checking an unpowered reed switch for continuity with a digital ohmmeter the resistance reading will change from infinity to a very large resistance (2 M ohm) when the sensor is activated. This is due to the presence of a diode in the reed switch.
- Anti-magnetic shielding is recommended for reed switches exposed to high external RF or magnetic fields.
- The magnetic field strength of the piston magnet is designed to operate with our switches. Other manufacturers' switches may not operate correctly in conjunction with these magnets.
- Use relay coils for reed switch contact protection.
- The operation of some 120 VAC PLC's (especially some older Allen-Bradley PLC's) can overload the reed switch. The switch may fail to release after the piston magnet has passed. This problem may be corrected by the placement of a 700 to 1K OHM resistor between the switch and the PLC input terminal. Consult the manufacturer of the PLC for appropriate circuit.
- Switches with long wire leads (greater than 15 feet) can cause capacitance build-up and sticking will result. Attach a resistor in series with the reed switches (the resistor should be installed as close as possible to the switches). The resistor should be selected such that R (ohms) > E/0.3.
- Global reed switch outputs may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

**8mm and 12mm Cordset for Global Switches**

A female connector is available for all switches with the male 8mm and 12mm quick connect option. The cordsets are available with a right angle or straight connector. Cordset part numbers are listed below.

**8mm Cordset**

Cable Length	Threaded Connector	Snap On Connector
5 meters	086620T005	086620S005
2 meters	086620T002	086620S002

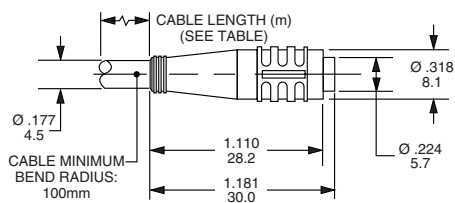
**12mm Cordset**

Cable Length	Threaded Connector	Right Angle Connector
5 meters	9126487205	9126487305
2 meters	9126487202	9126487302

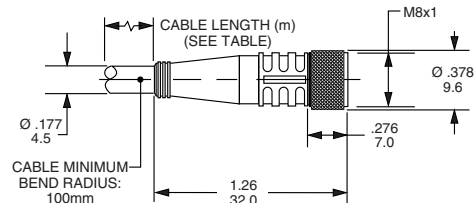
**Cordset Specifications**

- Connector.....Oil resistant polyurethane body material, PA 6 (Nylon) contact carrier, spacings to VDE 0110 Group C, (150 AC/DC)
- Contacts .....Gold plated beryllium copper, machined from solid stock
- Coupling Method..... Snap-Lock or chrome plated brass nut
- Cord Construction ..... Oil resistant black PUR jacket, non-wicking, non-hygroscopic, 300V. Cable end is stripped and tinned.
- Conductors.....Extra high flex stranding, PVC insulation
- Temperature.....-40 to 194°F (-40 to 90°C)
- Protection.....NEMA 1, 3, 4, 6P and IEC 1P67
- Cable Length.....6.56 ft (2m) or 16.4 ft (5m)

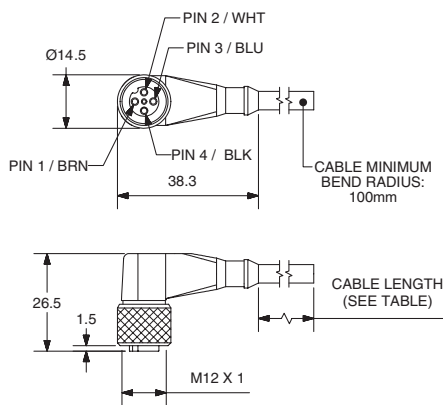
**8mm Snap-On Straight Connector**



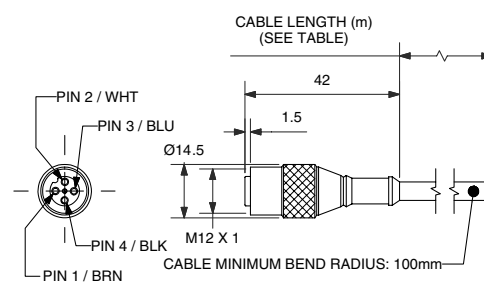
**8mm Threaded Straight Connector**

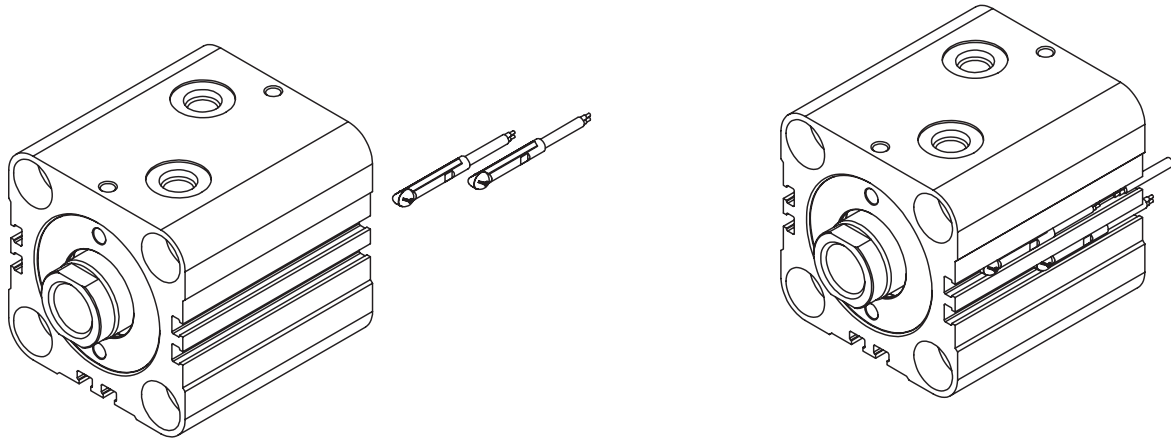


**12mm Right Angle Connector**



**12mm Straight Connector**





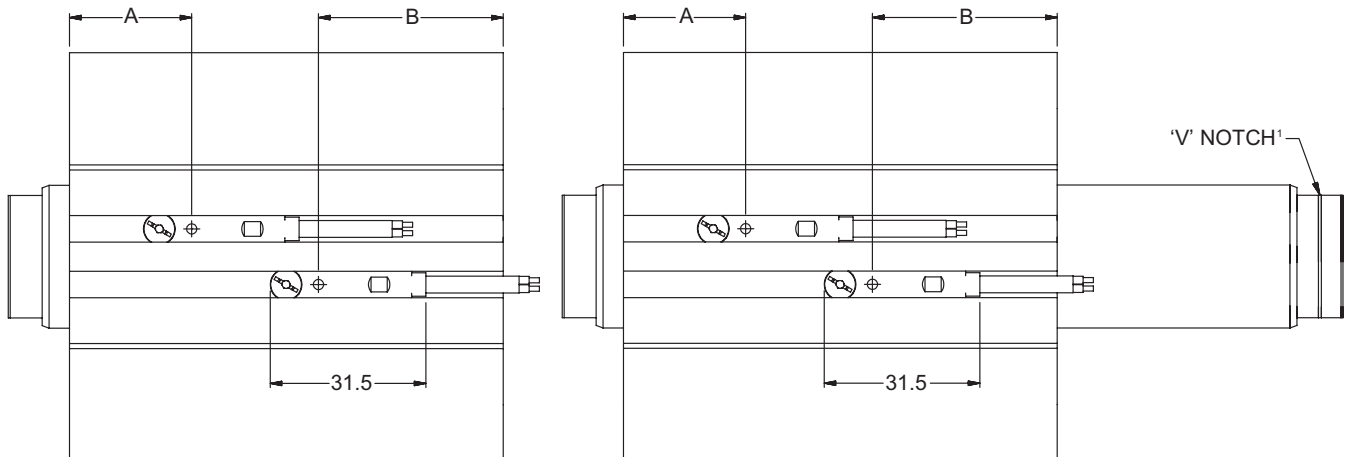
- Slide the switch into any of the six mounting grooves provided.
- For end of stroke sensing, position cross hairs of target symbol  $\oplus$  on the switch at the specified distance from the cylinder body end as listed in the table below.
- Locate the switch as required for intermediate stroke position sensing.
- Turn the locking screw clockwise to secure the switch in place.

**Minimum Stroke for Cylinders with Switches**

All Bores	One Switch	Two Switches
	5mm	10mm

**Switch Location for End-of-Stroke Sensing**

Bore	A	B
20	18.5	24
25	19.5	25
32	22.5	28
40	23.5	31
50	26	33.5
63	29.5	37
80	35	42.5
100	42.5	53



<sup>1</sup> The rod side for switch location 'B', on double rod end cylinders, is identified by a 'V' notch in the 'NA' diameter of rod end styles #4, #8, and #9. The 'V' notch will be in the 'AM' diameter of rod end style #55.

**Cylinder Weights and Force**

**Theoretical Push and Pull Forces**

The cylinder output forces are derived from the formula:

$$F = \frac{P \times A}{10000}$$

Where F = Force in kN.

P = Pressure at the cylinder in bar.

A = Effective area of cylinder piston in square mm.

To determine the bore size for the application take the following steps.

1. Select the Operating Pressure column closest to that desired.

2. In the same column, identify the force required to move the load (always rounding up). If the piston rod is in compression use the 'Push' row and if the piston rod is in tension use the 'Pull' row.

3. In the row to the left is the bore required.

If the cylinder envelope dimensions are too large for the application, increase the operating pressure to the maximum pressure in the table below, if possible, and repeat steps 1 - 3.

**Push and Pull Force in kN**

Bore Ø	Rod Ø	Operating Direction	Piston Area (mm²)	Operating Pressure (Bar)						
				50	75	100	125	150	175	207
20	12	Push	314	1.57	2.36	3.14	3.93	4.71	5.50	6.50
		Pull	201	1.01	1.51	2.01	2.51	3.02	3.52	4.16
25	14	Push	491	2.45	3.68	4.91	6.14	7.36	8.59	10.2
		Pull	337	1.68	2.53	3.37	4.21	5.05	5.90	6.97
32	18	Push	804	4.02	6.03	8.04	10.1	12.1	14.1	16.6
		Pull	550	2.75	4.12	5.50	6.87	8.25	9.62	11.4
40	22	Push	1,257	6.28	9.42	12.6	15.7	18.8	22.0	26.0
		Pull	877	4.38	6.57	8.8	11.0	13.1	15.3	18.1
50	28	Push	1,963	9.82	14.7	19.6	24.5	29.5	34.4	40.6
		Pull	1,348	6.74	10.1	13.5	16.8	20.2	23.6	27.9
63	36	Push	3,117	15.6	23.4	31.2	39.0	46.8	54.6	64.5
		Pull	2,099	10.5	15.7	21.0	26.2	31.5	36.7	43.5
80	45	Push	5,027	25.1	37.7	50.3	62.8	75.4	88.0	104
		Pull	3,436	17.2	25.8	34.4	43.0	51.5	60.1	71.1

**Series CHD Pressure Rating**

Bore Ø	Maximum Working Pressure in bar
20	207
25	207
32	207
40	207
50	207
63	207
80	207

**Equivalents**

- 1 kN = 224.81 pounds force
- 1 bar = 14.50 psi
- 1 mm = .03937 inch
- 1 mm² = .00155 inch²

**Cylinder Weights**

To determine the weight of a Series CHD cylinder, first select the proper basic zero stroke weight for the mounting required, and then calculate the weight of the

cylinder stroke and add the result to the basic weight. For extra rod extension, use piston rod weights per mm in Table C.

**Table A** Single Rod End CHD Cylinder Weights in kg.

Bore Ø	Rod Ø	Single Rod Cylinders									
		Basic Weight at Zero Stroke				Per mm Stroke	Basic Weight at Zero Stroke	Per mm Stroke	Basic Weight at Zero Stroke		Per mm Stroke
		T	TN, TR	A, M	AN, AR, MN, MR				C	CN	
20	12	0.57	0.58	0.61	0.62	0.013	0.84	0.013	-	-	-
25	14	0.80	0.81	0.84	0.85	0.016	1.17	0.017	0.71	0.73	0.015
32	18	1.39	1.42	1.45	1.48	0.024	1.92	0.025	1.41	1.43	0.026
40	22	1.87	1.90	1.97	2.01	0.029	2.81	0.031	1.93	1.96	0.033
50	28	2.61	2.67	2.79	2.85	0.036	4.20	0.038	2.82	2.88	0.044
63	36	4.11	4.20	4.34	4.42	0.047	6.11	0.051	4.69	4.78	0.063
80	45	7.19	7.33	7.49	7.62	0.067	10.7	0.072	-	-	-

**Table C** Piston rod weights in kg.

Rod Ø	Piston Rod Weight per mm
12	0.001
14	0.001
18	0.002
22	0.003
28	0.005
36	0.008
45	0.012

**Table B** Double Rod End CHD Cylinder Weights in kg.

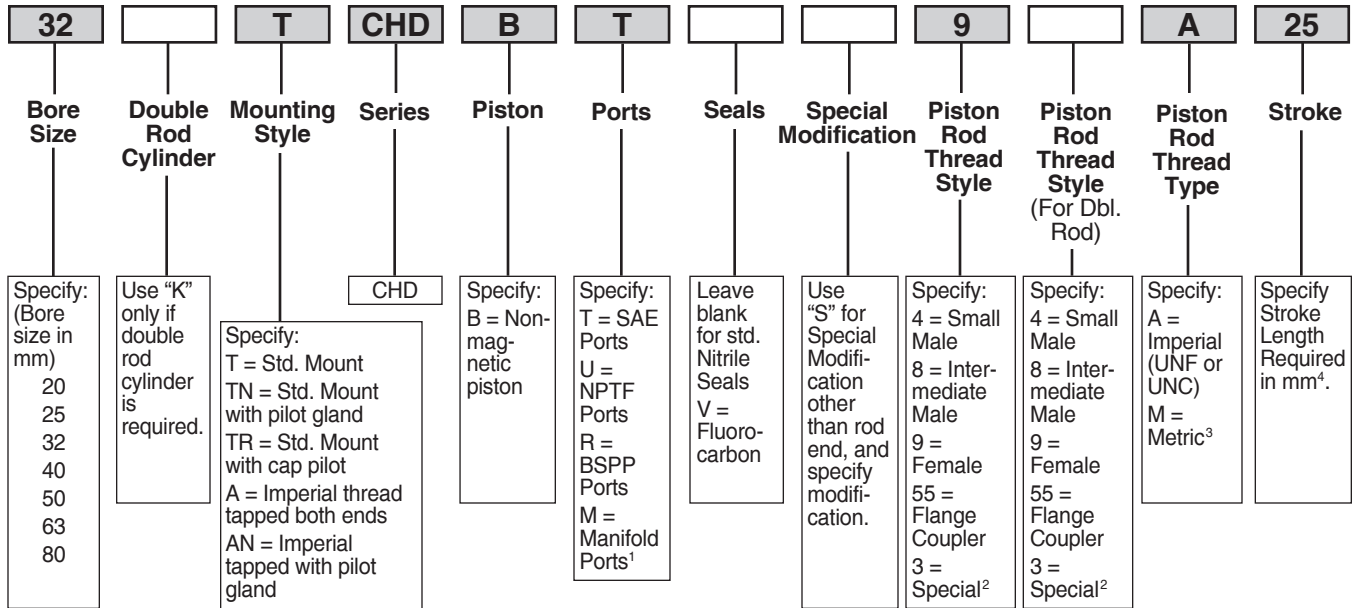
Bore Ø	Rod Ø	Double Rod Cylinders									
		Basic Weight at Zero Stroke				Per mm Stroke	Basic Weight at Zero Stroke	Per mm Stroke	Basic Weight at Zero Stroke		Per mm Stroke
		T	TN	A, M	AN, MN				J	C	
20	12	0.60	0.61	0.64	0.65	0.013	0.87	0.014	-	-	-
25	14	0.83	0.85	0.87	0.89	0.017	1.21	0.018	0.75	0.77	0.016
32	18	1.46	1.48	1.52	1.54	0.026	1.98	0.027	1.47	1.50	0.028
40	22	1.97	2.01	2.08	2.11	0.032	2.92	0.034	2.03	2.07	0.036
50	28	2.81	2.87	2.99	3.05	0.041	4.40	0.043	3.02	3.08	0.049
63	36	4.52	4.61	4.75	4.83	0.055	6.53	0.059	5.10	5.19	0.071
80	45	7.99	8.12	8.28	8.42	0.080	11.5	0.085	-	-	-

**Equivalent**

1 kg = 2.2046 pounds

Model Code & Standard Specifications

Model Ordering Code for CHD



Shaded boxes identify required model number fields.

<sup>1</sup> Manifold ports are only available on Foot Mounting Styles C & CN.

<sup>2</sup> To order thread style 3, specify "3" and give the desired dimensions for KK, A, and W (or WP depending on mounting) or furnish a dimensioned sketch.

<sup>3</sup> Always use M for rod style 55.

<sup>4</sup>Maximum Stroke

Bore Ø	Stroke in mm
20	50
25	50
32	100
40	100
50	100
63	100
80	100

Strokes in 1mm increments are available.

Standard Specifications

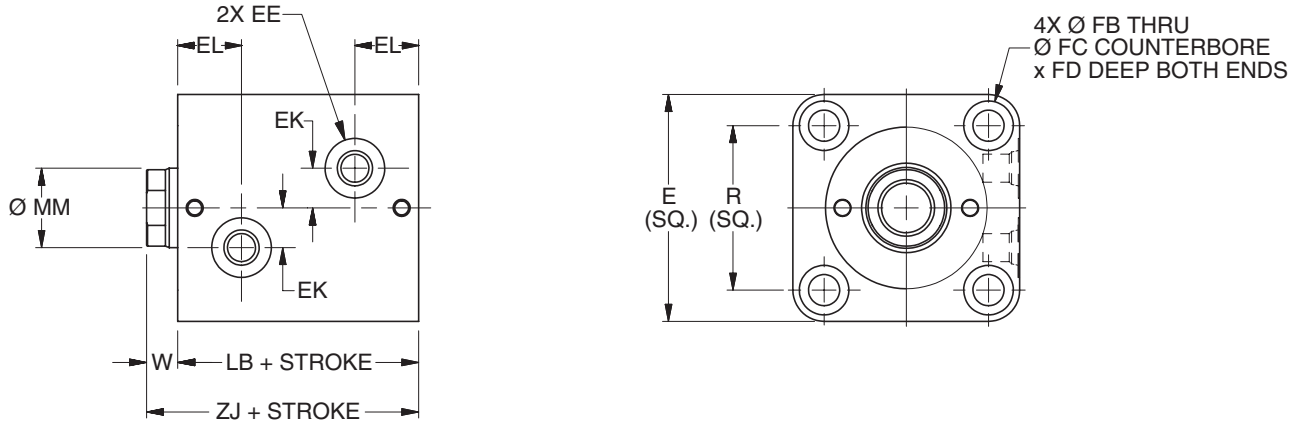
- 13 Standard mounting styles
- Bore sizes – 20mm to 80mm
- Piston Rod Diameter – 12mm to 45mm
- Single and double rod construction available
- Strokes up to 100mm depending on bore size (see table above)

- Working pressure up to 207 bar
- Temperature range – -23°C to +121°C (depending on seal class)
- Reference ISO 16656: 2004

Seal Classes	Typical Fluids	Temperature Range
1 – Standard Nitrile & Polyurethane	Hydraulic Oil, MIL-H-5606 Oil	-23°C (-10°F) to +74°C (+165°F)
5 – Optional (At extra cost) Fluorocarbon Seals	High Temperature	-23°C (-10°F) to +121°C (+250°F) Class 5 seals may be operated up to +204°C (+400°F) with reduced service life

Note: Class 5 seals are not suitable for use with Skydrol fluid, but can be used with hydraulic oil if desired.

**Style T Through Bolt Mount – Single Rod End – 20mm to 80mm Bore Size**



**T Mount Single Rod End – Envelope and Mounting Dimensions**

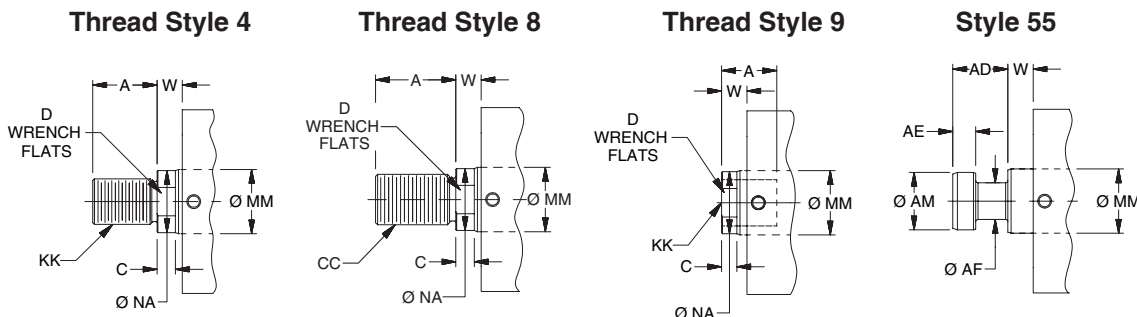
Bore Ø	E	EE			EK	EL	FB	FC	FD	R	W	Add Stroke	
		SAE	NPTF	BSP								LB	ZJ
20	44	#2 <sup>1</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	8	43	51
25	50	#2 <sup>1</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	8	45	53
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	10	51	61
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	10	55	65
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	11	60	71
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	13	67	80
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	17	78	95

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**T Mount Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod Thread														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**

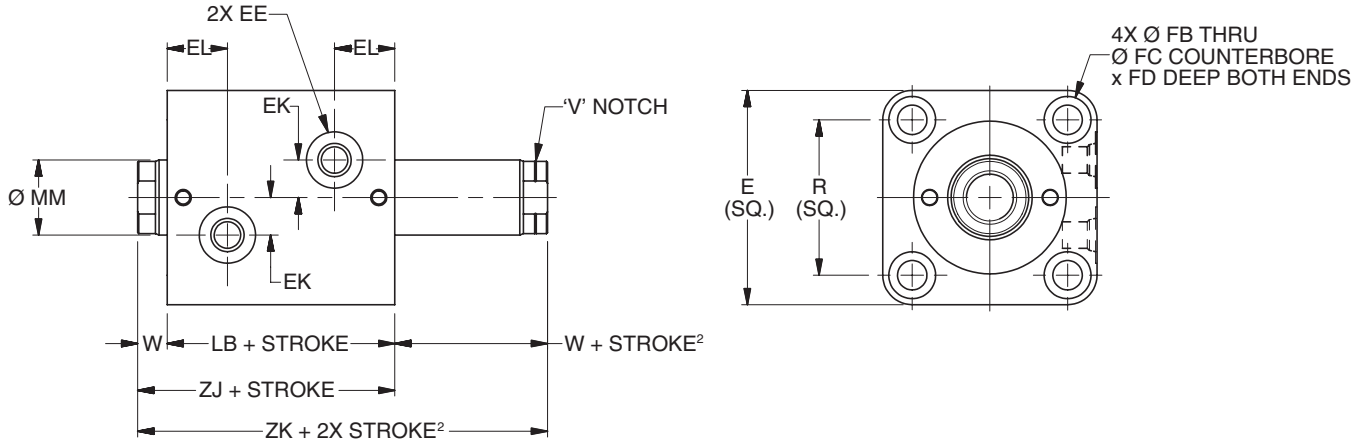


**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.



**T Mount – Double Rod End**

**Style T Through Bolt Mount – Double Rod End – 20mm to 80mm Bore Size**



**T Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	FB	FC	FD	R	W <sup>2</sup>	Add Stroke		Add 2X Stroke ZK <sup>2</sup>
		SAE	NPTF	BSP								LB	ZJ	
20	44	#2 <sup>1</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	8	43	51	59
25	50	#2 <sup>1</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	8	45	53	61
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	10	51	61	71
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	10	55	65	75
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	11	60	71	82
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	13	67	80	93
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	17	78	95	112

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required.

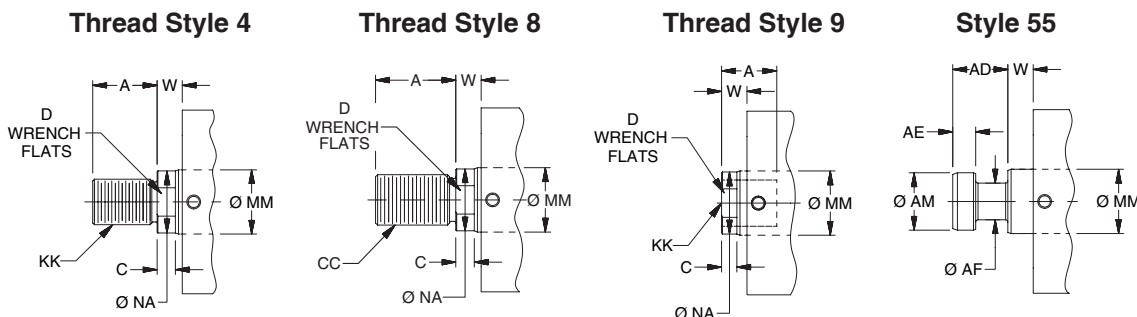
Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**T Mount Double Rod End – Rod Dimensions**

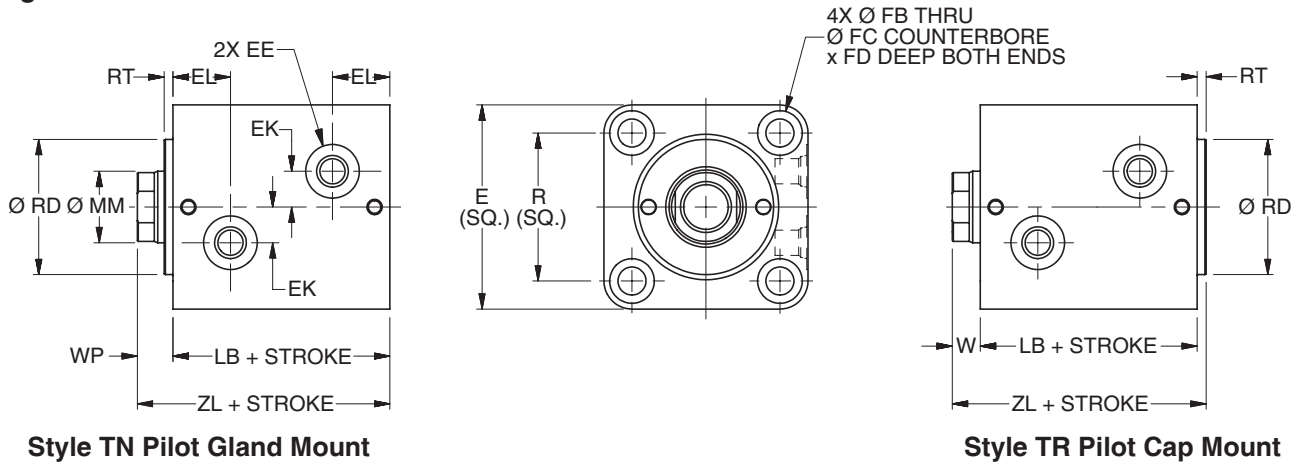
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**Styles TN and TR Through Bolt Mount with Pilot Gland or Pilot Cap –  
Single Rod End – 20mm to 80mm Bore Size**



**Style TN Pilot Gland Mount**

**Style TR Pilot Cap Mount**

**TN and TR Mount Single Rod End – Envelope and Mounting Dimensions**

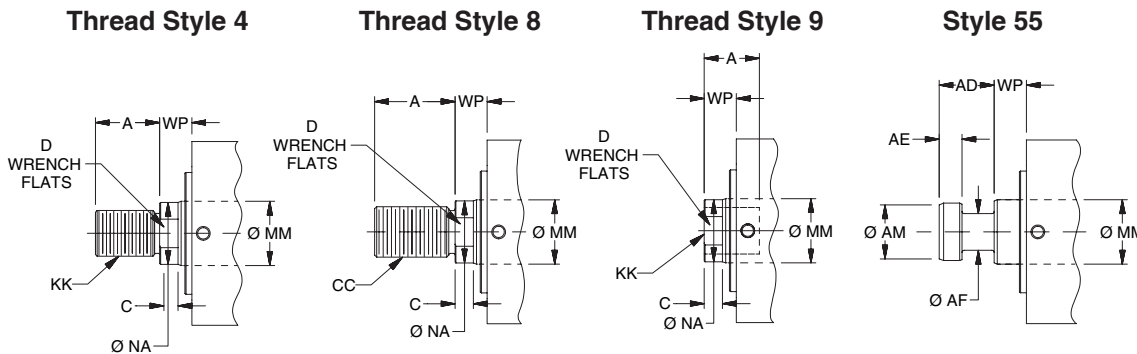
Bore Ø	E	EE			EK	EL	FB	FC	FD	R	RD f9	RT	W	WP	Add Stroke	
		SAE	NPTF	BSP											LB	ZL
20	44	#2 <sup>1</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	24	3	8	11	43	54
25	50	#2 <sup>1</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	27	3	8	11	45	56
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	36	3	10	13	51	64
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	43	3	10	13	55	68
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	53	3	11	14	60	74
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	66	3	13	16	67	83
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	83	3	17	20	78	98

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**TN and TR Mount Single Rod End – Rod Dimensions**

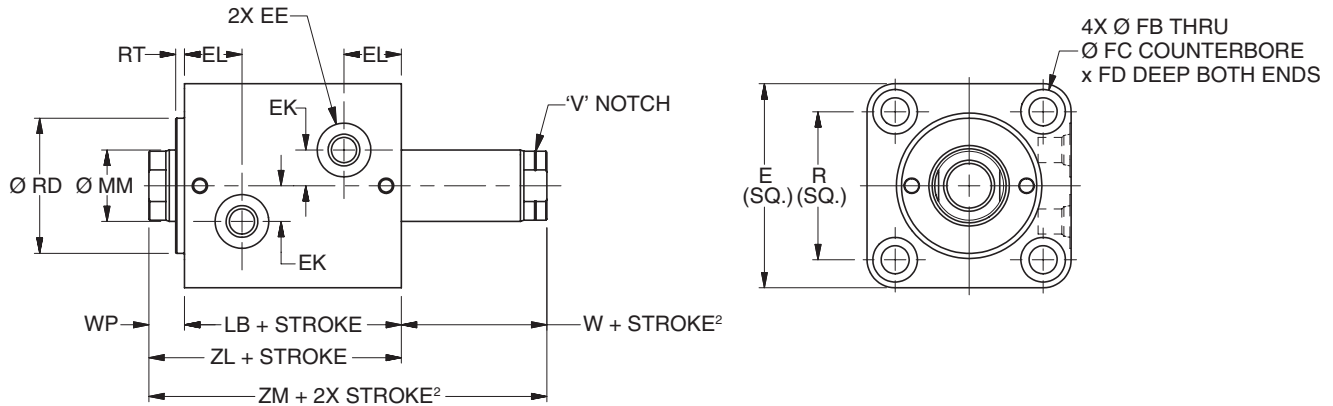
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W (TR Mount) or WP (TN Mount) If otherwise special furnish dimensional sketch.

**Style TN Through Bolt Mount with Pilot Gland – Double Rod End – 20mm to 80mm Bore Size**



**TN Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	FB	FC	FD	R	RD f9	RT	W <sup>2</sup>	WP	Add Stroke		Add 2X Stroke
		SAE	NPTF	BSP											LB	ZL	ZM <sup>2</sup>
20	44	#2 <sup>1</sup>	1/8	G-1/8	6	16.5	5.5	9.5	5.4	30	24	3	8	11	43	54	62
25	50	#2 <sup>1</sup>	1/8	G-1/8	8	17.5	5.5	9.5	5.4	36	27	3	8	11	45	56	64
32	62	#4	1/4	G-1/4	11	20.5	7	11	6.5	47	36	3	10	13	51	64	74
40	70	#4	1/4	G-1/4	12	21	9	14	8.6	52	43	3	10	13	55	68	78
50	80	#4	1/4	G-1/4	14	22.5	11	17.5	10.8	58	53	3	11	14	60	74	85
63	94	#4	1/4	G-1/4	17	26	13.5	20	13	69	66	3	13	16	67	83	96
80	114	#6	3/8	G-3/8	20	29.5	16	23	15.2	86	83	3	17	20	78	98	115

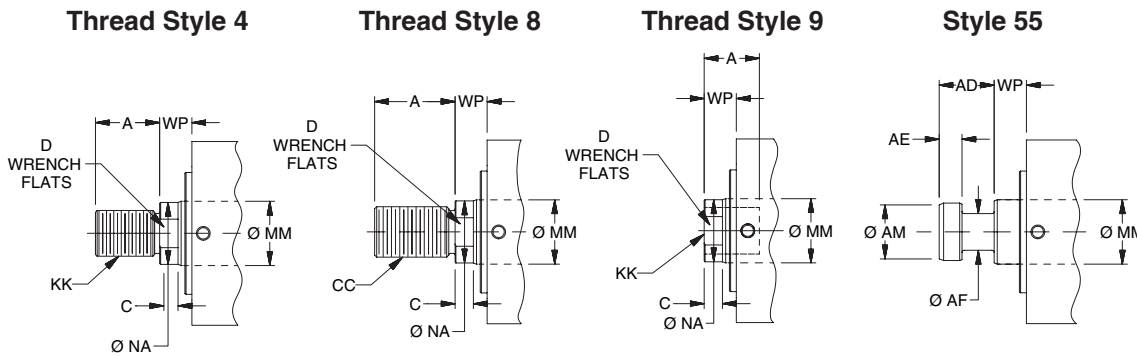
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**TN Mount Double Rod End – Rod Dimensions**

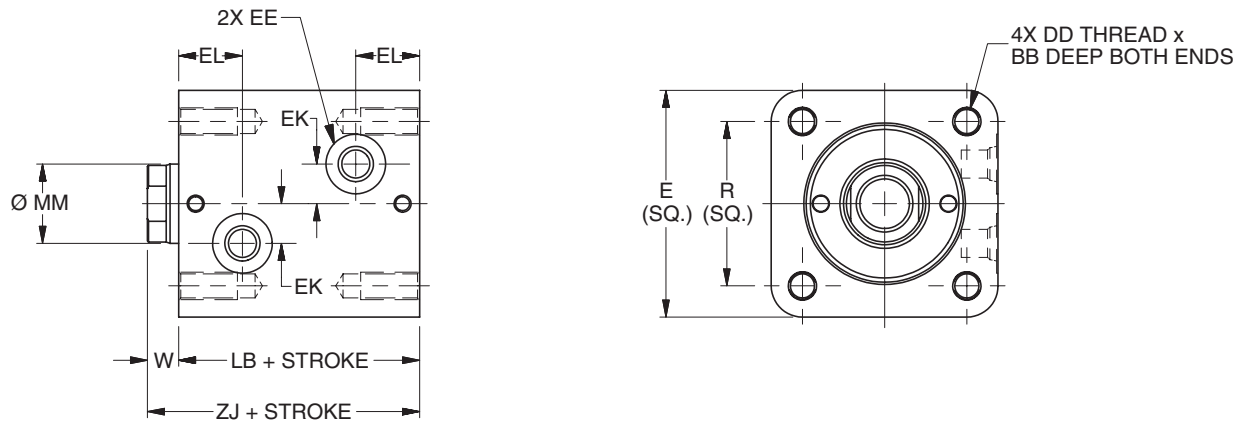
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & WP. If otherwise special furnish dimensional sketch.

**Style A Imperial Tapped Both Ends Mount – Single Rod End – 20mm to 80mm Bore Size**



**A Mount Single Rod End – Envelope and Mounting Dimensions**

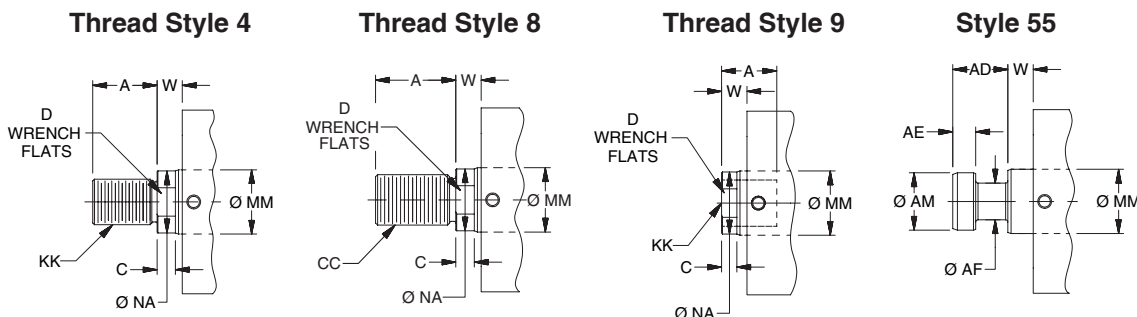
Bore Ø	BB	DD	E	EE			EK	EL	R	W	Add Stroke	
				SAE	NPT	BSP					LB	ZJ
20	10.1	10-32 UNF - 2B	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	8	43	51
25	10.5	10-32 UNF - 2B	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	8	45	53
32	12.5	1/4-28 UNF - 2B	62	# 4	1/4	G-1/4	11	20.5	47	10	51	61
40	16.6	5/16-24 UNF - 2B	70	# 4	1/4	G-1/4	12	21	52	10	55	65
50	20.8	3/8-24 UNF - 2B	80	# 4	1/4	G-1/4	14	22.5	58	11	60	71
63	24.3	1/2-20 UNF - 2B	94	# 4	1/4	G-1/4	17	26	69	13	67	80
80	28.8	5/8-18 UNF - 2B	114	# 6	3/8	G-3/8	20	29.5	86	17	78	95

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**A Mount Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

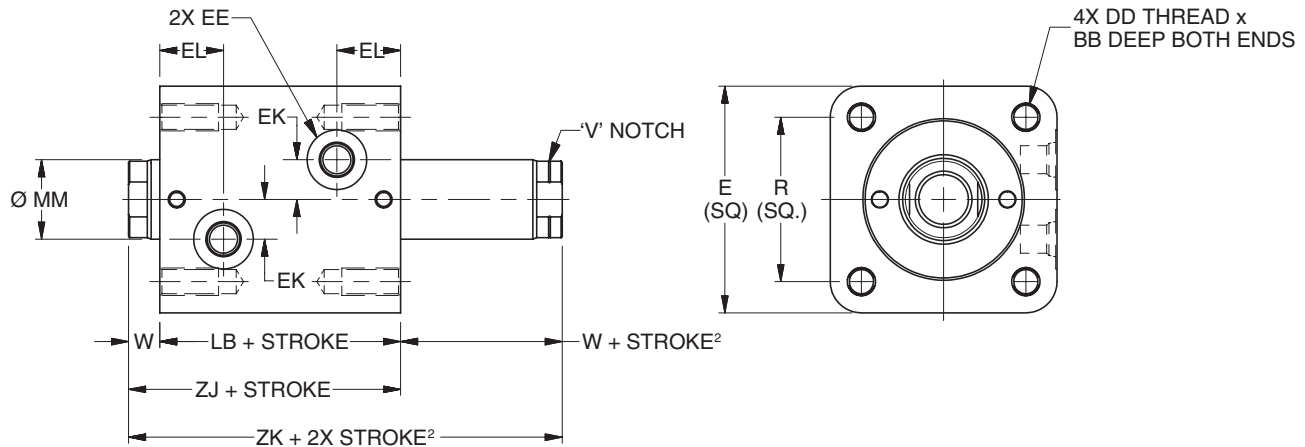
**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**A Mount – Double Rod End**

**Style A Imperial Tapped Both Ends Mount – Double Rod End – 20mm to 80mm Bore Size**



**A Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	BB	DD	E	EE			EK	EL	R	W <sup>2</sup>	Add Stroke		Add 2X Stroke
				SAE	NPT	BSP					LB	ZJ	ZK <sup>2</sup>
20	10.1	10-32 UNF - 2B	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	8	43	51	59
25	10.5	10-32 UNF - 2B	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	8	45	53	61
32	12.5	1/4-28 UNF - 2B	62	# 4	1/4	G-1/4	11	20.5	47	10	51	61	71
40	16.6	5/16-24 UNF - 2B	70	# 4	1/4	G-1/4	12	21	52	10	55	65	75
50	20.8	3/8-24 UNF - 2B	80	# 4	1/4	G-1/4	14	22.5	58	11	60	71	82
63	24.3	1/2-20 UNF - 2B	94	# 4	1/4	G-1/4	17	26	69	13	67	80	93
80	28.8	5/8-18 UNF - 2B	114	# 6	3/8	G-3/8	20	29.5	86	17	78	95	112

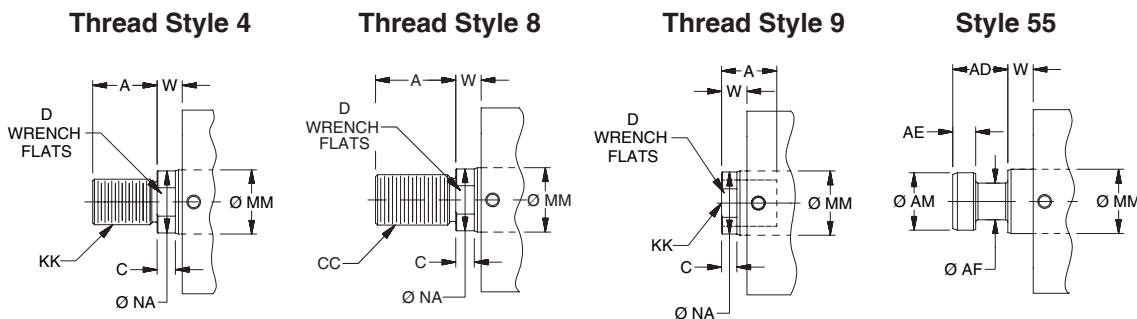
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**A Mount Double Rod End – Rod Dimensions**

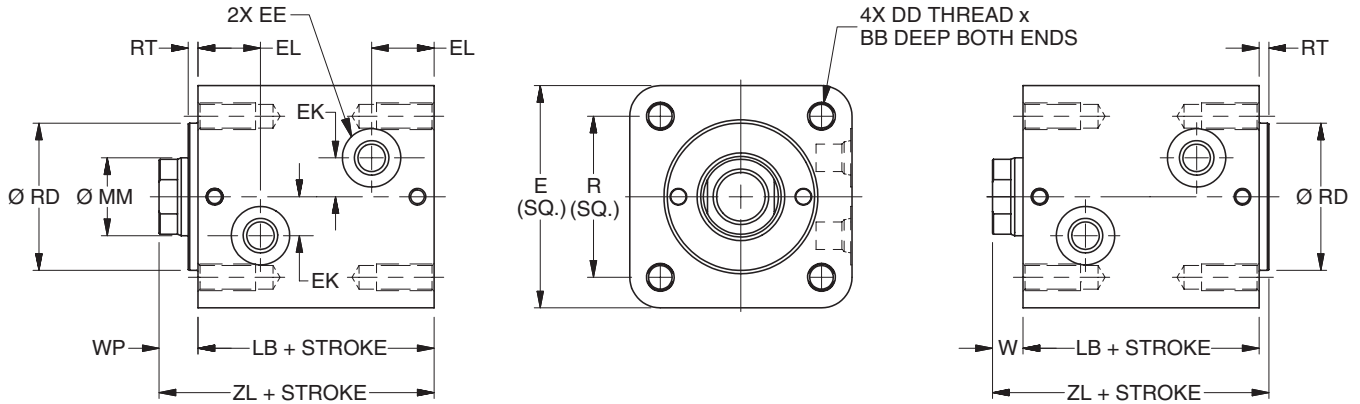
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**Styles AN and AR Imperial Tapped Both Ends Mounts with Pilot Gland or Pilot Cap –  
Single Rod End – 20mm to 80mm Bore Size**



**Style AN Imperial Tapped Both Ends Mount with Pilot Gland**

**Style AR Imperial Tapped Both Ends Mount with Pilot Cap**

**AN and AR Mount Single Rod End – Envelope and Mounting Dimensions**

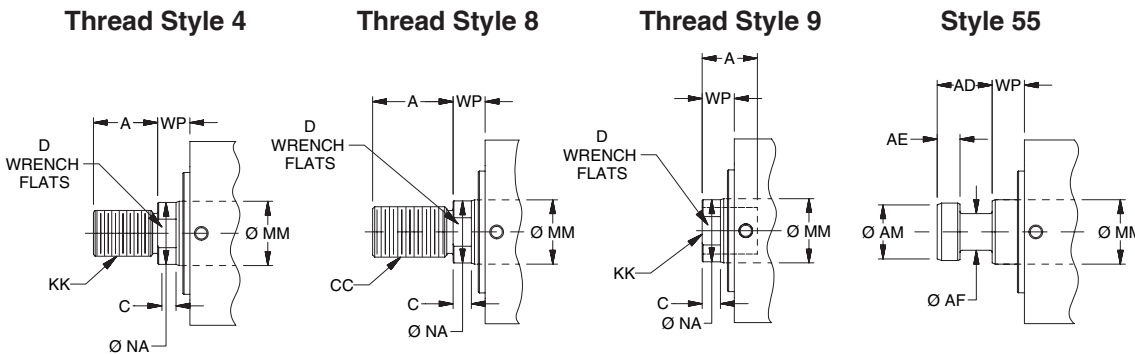
Bore Ø	BB	DD	E	EE			EK	EL	R	RD f9	RT	W	WP	Add Stroke	
				SAE	NPT	BSP								LB	ZL
20	10.1	10-32 UNF - 2B	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	24	3	8	11	43	54
25	10.5	10-32 UNF - 2B	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	27	3	8	11	45	56
32	12.5	1/4-28 UNF - 2B	62	# 4	1/4	G-1/4	11	20.5	47	36	3	10	13	51	64
40	16.6	5/16-24 UNF - 2B	70	# 4	1/4	G-1/4	12	21	52	43	3	10	13	55	68
50	20.8	3/8-24 UNF - 2B	80	# 4	1/4	G-1/4	14	22.5	58	53	3	11	14	60	74
63	24.3	1/2-20 UNF - 2B	94	# 4	1/4	G-1/4	17	26	69	66	3	13	16	67	83
80	28.8	5/8-18 UNF - 2B	114	# 6	3/8	G-3/8	20	29.5	86	83	3	17	20	78	98

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**AN and AR Mount Single Rod End – Rod Dimensions**

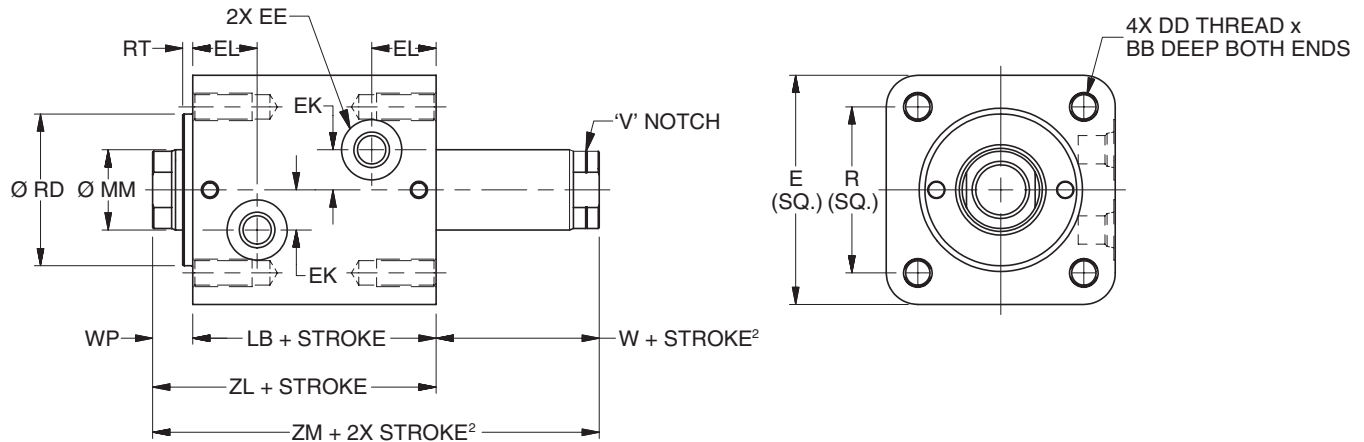
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W (AR Mount) or WP (AN Mount) If otherwise special furnish dimensional sketch.

**Style AN Imperial Tapped Both Ends Mount with Pilot Gland – Double Rod End – 20mm to 80mm Bore Size**



**AN Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	BB	DD	E	EE			EK	EL	R	RD f9	RT	W <sup>2</sup>	WP	Add Stroke		Add 2X Stroke ZM <sup>2</sup>
				SAE	NPTF	BSP								LB	ZL	
20	10.1	10-32 UNF - 2B	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	24	3	8	11	43	54	62
25	10.5	10-32 UNF - 2B	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	27	3	8	11	45	56	64
32	12.5	1/4-28 UNF - 2B	62	# 4	1/4	G-1/4	11	20.5	47	36	3	10	13	51	64	74
40	16.6	5/16-24 UNF - 2B	70	# 4	1/4	G-1/4	12	21	52	43	3	10	13	55	68	78
50	20.8	3/8-24 UNF - 2B	80	# 4	1/4	G-1/4	14	22.5	58	53	3	11	14	60	74	85
63	24.3	1/2-20 UNF - 2B	94	# 4	1/4	G-1/4	17	26	69	66	3	13	16	67	83	96
80	28.8	5/8-18 UNF - 2B	114	# 6	3/8	G-3/8	20	29.5	86	83	3	17	20	78	98	115

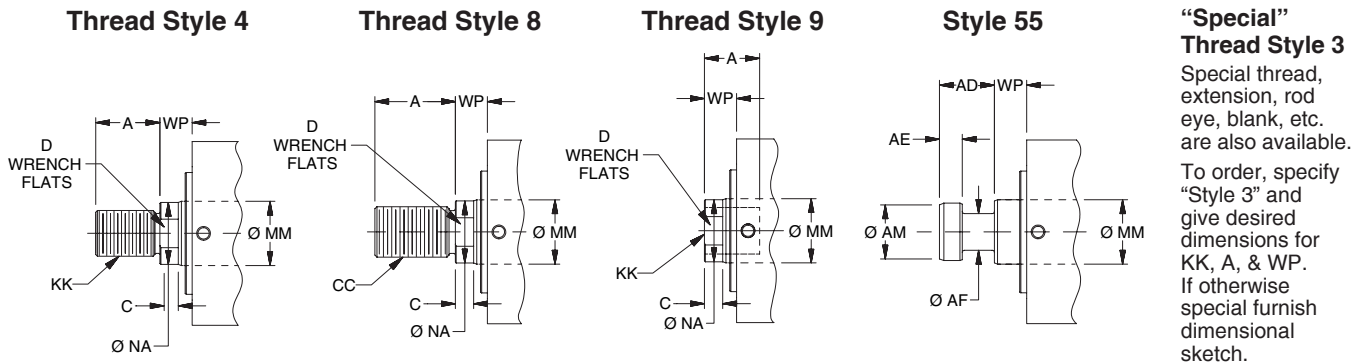
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to ¼" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

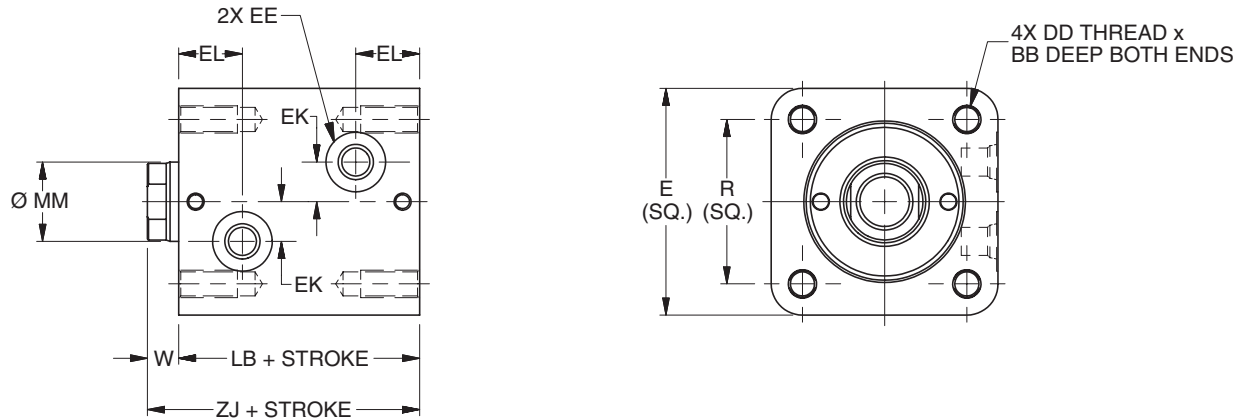
**AN Mount Double Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**Style M Metric Tapped Both Ends Mount – Single Rod End – 20mm to 80mm Bore Size**



**M Mount Single Rod End – Envelope and Mounting Dimensions**

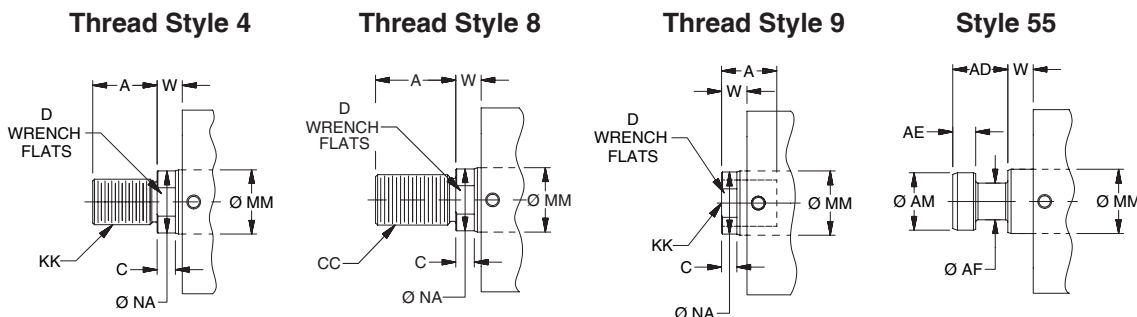
Bore Ø	BB	DD	E	EE			EK	EL	R	W	Add Stroke	
				SAE	NPT	BSP					LB	ZJ
20	10	M5x0.8 - 6H	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	8	43	51
25	10.4	M5x0.8 - 6H	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	8	45	53
32	12.5	M6x1 - 6H	62	# 4	1/4	G-1/4	11	20.5	47	10	51	61
40	16.6	M8x1.25 - 6H	70	# 4	1/4	G-1/4	12	21	52	10	55	65
50	20.7	M10x1.5 - 6H	80	# 4	1/4	G-1/4	14	22.5	58	11	60	71
63	24.9	M12x1.75 - 6H	94	# 4	1/4	G-1/4	17	26	69	13	67	80
80	29.0	M14x2 - 6H	114	# 6	3/8	G-3/8	20	29.5	86	17	78	95

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**M Mount Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

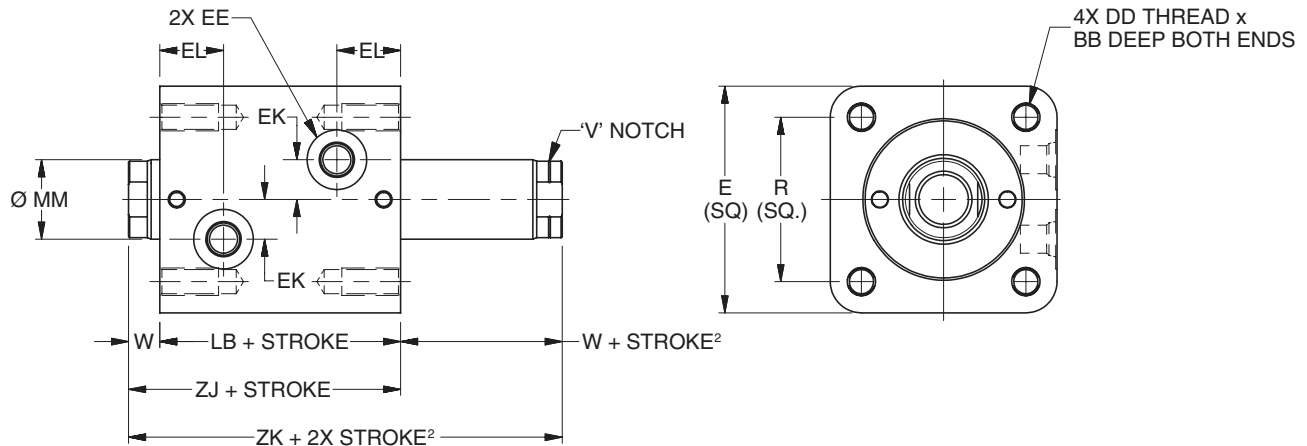
**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.



**Style M Metric Tapped Both Ends Mount – Double Rod End – 20mm to 80mm Bore Size**



**M Mount Double Rod End – Envelope and Mounting Dimensions**

Bore	BB	DD	E	EE			EK	EL	R	W <sup>2</sup>	Add Stroke		Add 2X Stroke ZK <sup>2</sup>
				SAE	NPT	BSP					LB	ZJ	
20	10	M5x0.8 - 6H	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	8	43	51	59
25	10.4	M5x0.8 - 6H	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	8	45	53	61
32	12.5	M6x1 - 6H	62	# 4	1/4	G-1/4	11	20.5	47	10	51	61	71
40	16.6	M8x1.25 - 6H	70	# 4	1/4	G-1/4	12	21	52	10	55	65	75
50	20.7	M10x1.5 - 6H	80	# 4	1/4	G-1/4	14	22.5	58	11	60	71	82
63	24.9	M12x1.75 - 6H	94	# 4	1/4	G-1/4	17	26	69	13	67	80	93
80	29.0	M14x2 - 6H	114	# 6	3/8	G-3/8	20	29.5	86	17	78	95	112

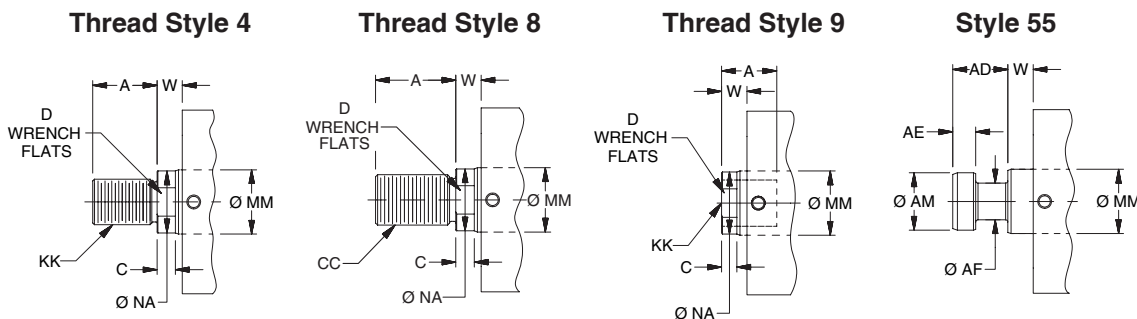
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**M Mount Double Rod End – Rod Dimensions**

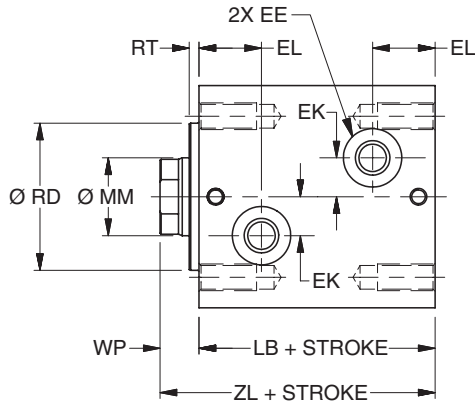
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**

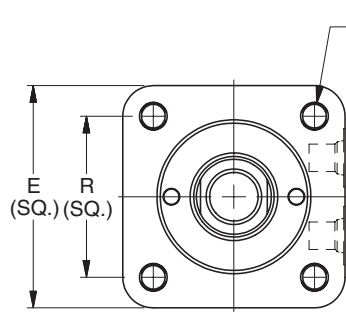


**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

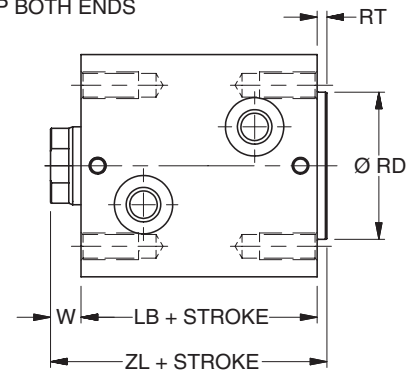
**Styles MN and MR Metric Tapped Both Ends Mounts with Pilot Gland or Pilot Cap –  
Single Rod End – 20mm to 80mm Bore Size**



**Style MN Metric Tapped Both Ends Mount with Pilot Gland**



4X DD THREAD x BB DEEP BOTH ENDS



**Style MR Metric Tapped Both Ends Mount with Pilot Cap**

**MN and MR Mount Single Rod End – Envelope and Mounting Dimensions**

Bore	BB	DD	E	EE			EK	EL	R	RD f9	RT	W	WP	Add Stroke	
				SAE	NPT	BSP								LB	ZL
20	10	M5x0.8 - 6H	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	24	3	8	11	43	54
25	10.4	M5x0.8 - 6H	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	27	3	8	11	45	56
32	12.5	M6x1 - 6H	62	# 4	1/4	G-1/4	11	20.5	47	36	3	10	13	51	64
40	16.6	M8x1.25 - 6H	70	# 4	1/4	G-1/4	12	21	52	43	3	10	13	55	68
50	20.7	M10x1.5 - 6H	80	# 4	1/4	G-1/4	14	22.5	58	53	3	11	14	60	74
63	24.9	M12x1.75 - 6H	94	# 4	1/4	G-1/4	17	26	69	66	3	13	16	67	83
80	29.0	M14x2 - 6H	114	# 6	3/8	G-3/8	20	29.5	86	83	3	17	20	78	98

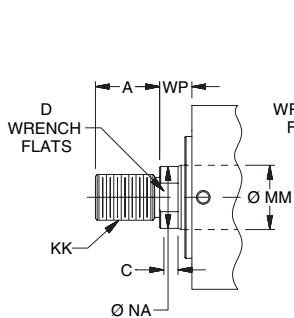
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**MN and MR Mount Single Rod End – Rod Dimensions**

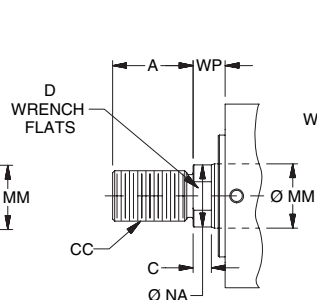
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**

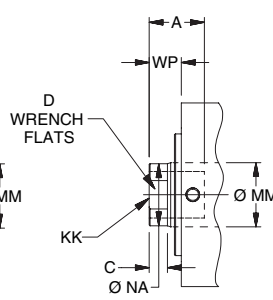
**Thread Style 4**



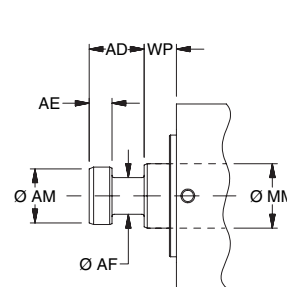
**Thread Style 8**



**Thread Style 9**



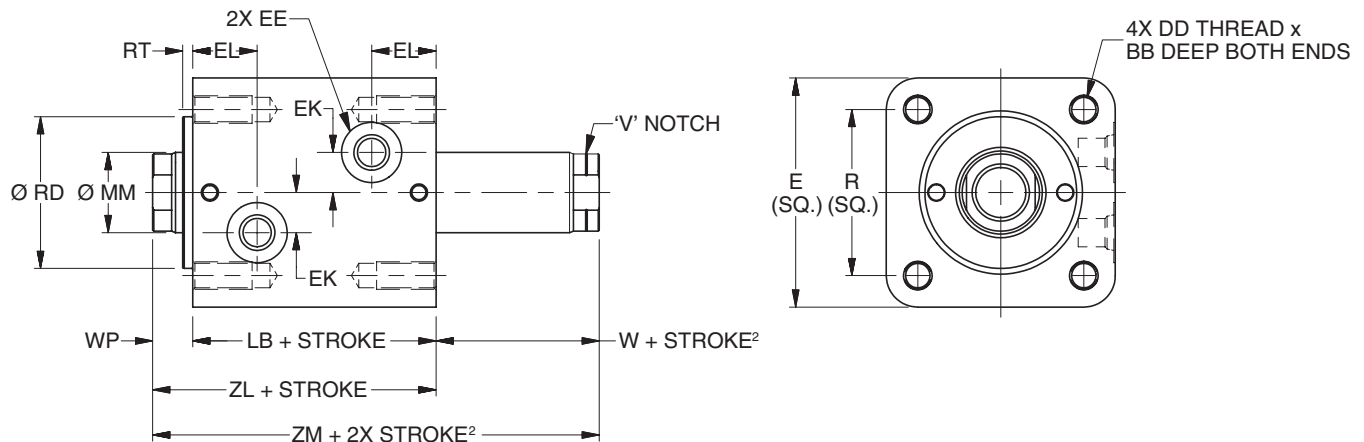
**Style 55**



**“Special”  
Thread Style 3**

Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W (MR Mount) or WP (MN Mount) If otherwise special furnish dimensional sketch.

**Style MN Metric Tapped Both Ends Mount with Pilot Gland – Double Rod End – 20mm to 80mm Bore Size**



**MN Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	BB	DD	E	EE			EK	EL	R	RD f9	RT	W <sup>2</sup>	WP	Add Stroke		Add 2X Stroke ZM <sup>2</sup>
				SAE	NPTF	BSP								LB	ZL	
20	10	M5x0.8 - 6H	44	# 2 <sup>1</sup>	1/8	G-1/8	6	16.5	30	24	3	8	11	43	54	62
25	10.4	M5x0.8 - 6H	50	# 2 <sup>1</sup>	1/8	G-1/8	8	17.5	36	27	3	8	11	45	56	64
32	12.5	M6x1 - 6H	62	# 4	1/4	G-1/4	11	20.5	47	36	3	10	13	51	64	74
40	16.6	M8x1.25 - 6H	70	# 4	1/4	G-1/4	12	21	52	43	3	10	13	55	68	78
50	20.7	M10x1.5 - 6H	80	# 4	1/4	G-1/4	14	22.5	58	53	3	11	14	60	74	85
63	24.9	M12x1.75 - 6H	94	# 4	1/4	G-1/4	17	26	69	66	3	13	16	67	83	96
80	29.0	M14x2 - 6H	114	# 6	3/8	G-3/8	20	29.5	86	83	3	17	20	78	98	115

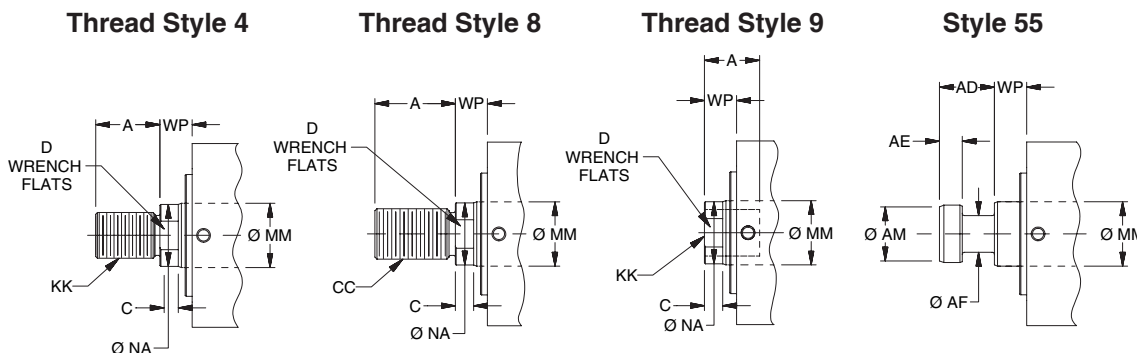
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**MN Mount Double Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

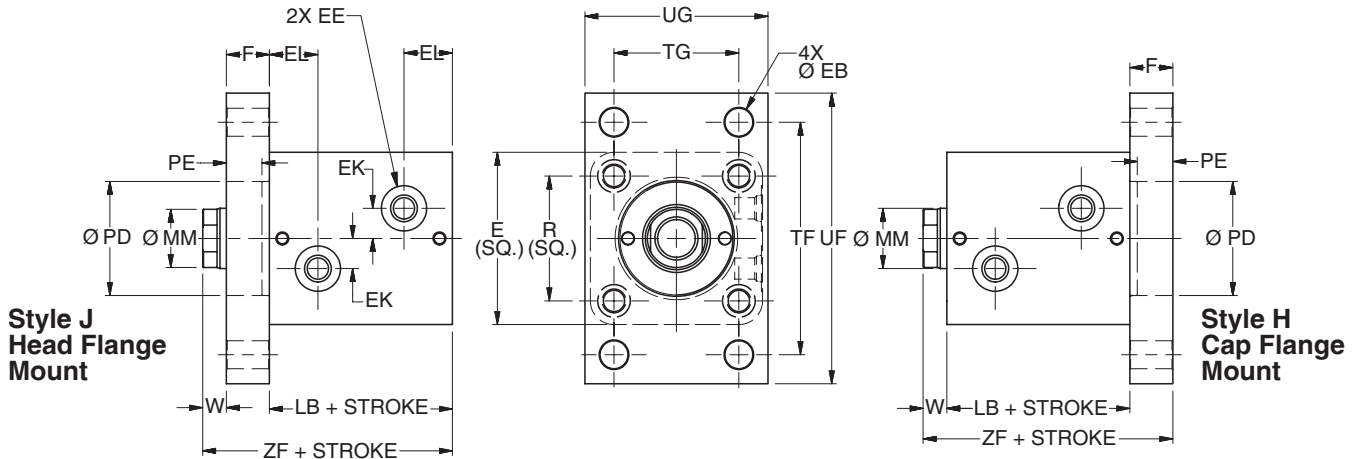
**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & WP. If otherwise special furnish dimensional sketch.

**J & H Mounts – Single Rod End**

**Styles J Rectangular Head Flange & H Rectangular Cap Flange Mounts – Single Rod End – 20mm to 80mm Bore Size**



**J & H Mounts Single Rod End – Envelope and Mounting Dimensions**

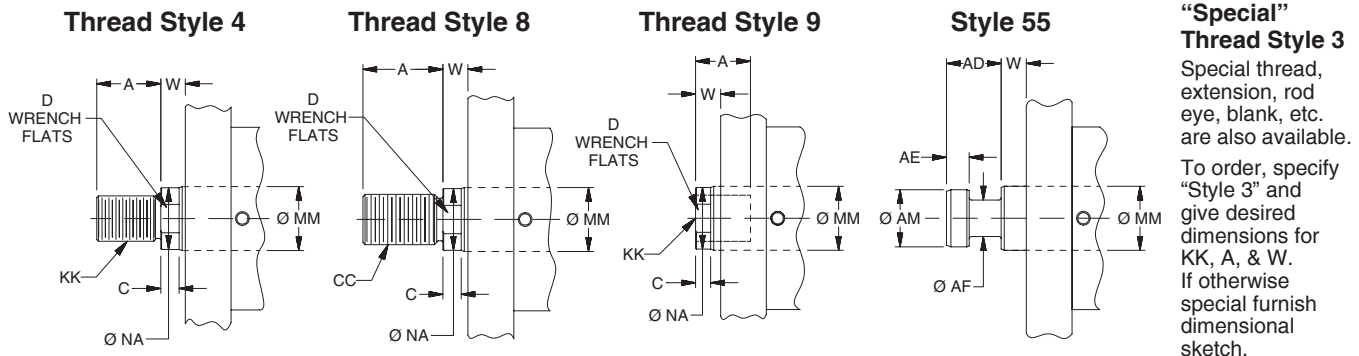
Bore Ø	E	EE			EK	EL	F	EB	PD H9	PE	R	TF	TG	UF	UG	W	Add Stroke	
		SAE	NPTF	BSP													LB	ZF
20	44	#2 <sup>1</sup>	1/8	G-1/8	6	16.5	10	5.5	24	7	30	60	30	75	46	8	43	61
25	50	#2 <sup>1</sup>	1/8	G-1/8	8	17.5	12	5.5	27	9	36	66	36	80	52	8	45	65
32	62	#4	1/4	G-1/4	11	20.5	12	6.8	36	9	47	80	40	95	62	10	51	73
40	70	#4	1/4	G-1/4	12	21	16	11	43	13	52	96	46	118	70	10	55	81
50	80	#4	1/4	G-1/4	14	22.5	20	13.5	53	17	58	108	58	135	85	11	60	91
63	94	#4	1/4	G-1/4	17	26	20	15	66	17	69	124	65	150	98	13	67	100
80	114	#6	3/8	G-3/8	20	29.5	25	17	83	21	86	154	87	185	118	17	78	119

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

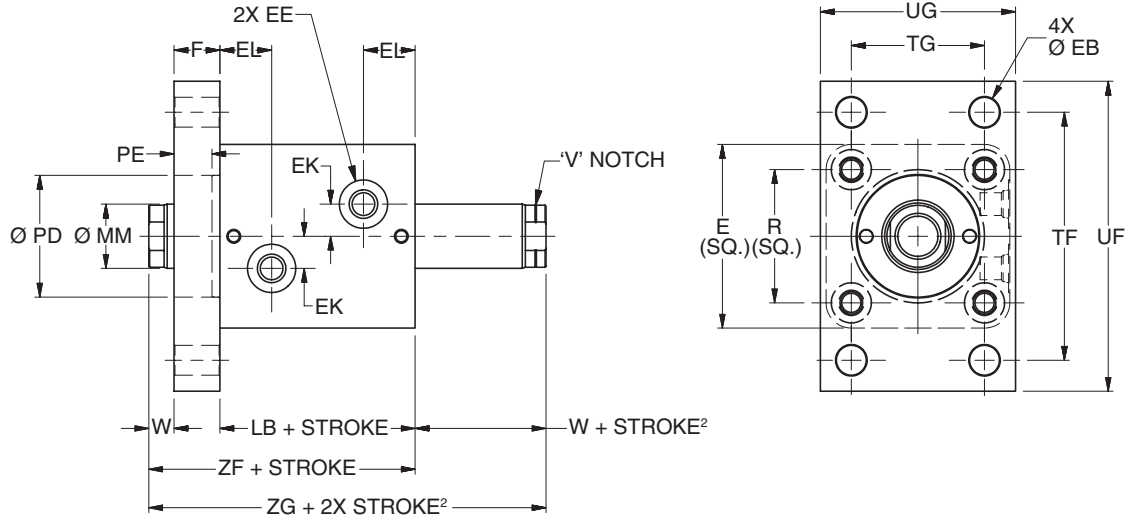
**J & H Mounts Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

**Rod End Dimensions**



**Style J Rectangular Head Flange Mount – Double Rod End – 20mm to 80mm Bore Size**



**J Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	EE			EK	EL	F	EB	PD H9	PE	R	TF	TG	UF	UG	W <sup>2</sup>	Add Stroke		Add 2X Stroke ZG <sup>2</sup>
		SAE	NPTF	BSP													LB	ZF	
20	44	#2 <sup>1</sup>	1/8	G-1/8	6	16.5	10	5.5	24	7	30	60	30	75	46	8	43	61	69
25	50	#2 <sup>1</sup>	1/8	G-1/8	8	17.5	12	5.5	27	9	36	66	36	80	52	8	45	65	73
32	62	#4	1/4	G-1/4	11	20.5	12	6.8	36	9	47	80	40	95	62	10	51	73	83
40	70	#4	1/4	G-1/4	12	21	16	11	43	13	52	96	46	118	70	10	55	81	91
50	80	#4	1/4	G-1/4	14	22.5	20	13.5	53	17	58	108	58	135	85	11	60	91	102
63	94	#4	1/4	G-1/4	17	26	20	15	66	17	69	124	65	150	98	13	67	100	113
80	114	#6	3/8	G-3/8	20	29.5	25	17	83	21	86	154	87	185	118	17	78	119	136

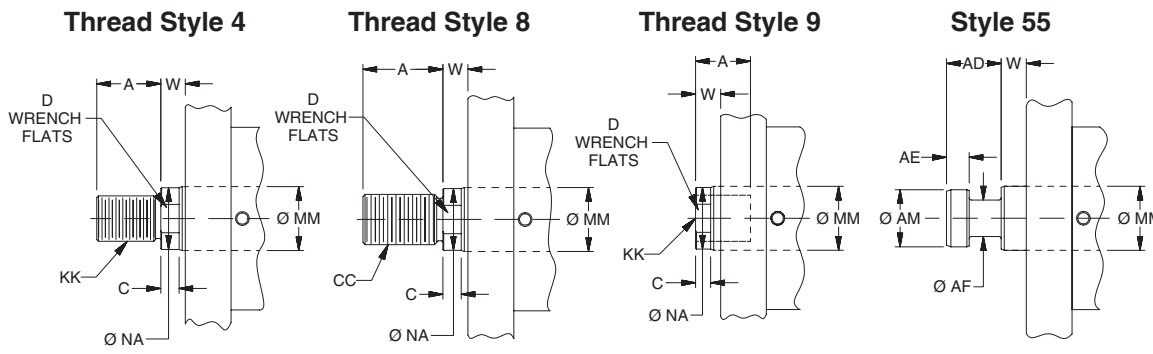
<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**J Mount Double Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
20	12	M8x1.25	10	M8x1	14	5/16-24	10	5/16-24	14	3/8-24	16	8	3	6	11	6	10	11
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35
80	45	M33x3.5	35	M33x2	45	1 1/4-12	35	1 1/4-12	45	1 1/2-12	56	34	14	28	41	13	39	43

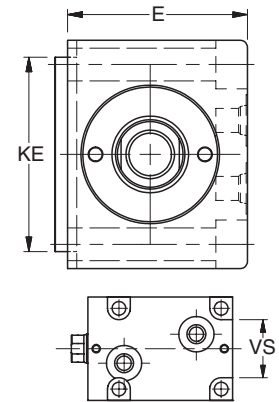
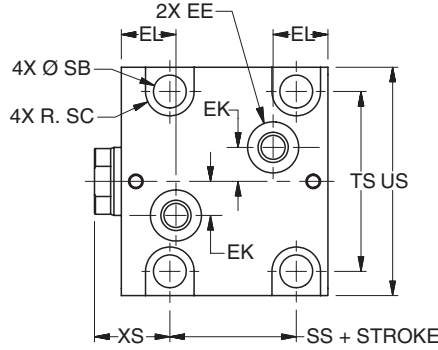
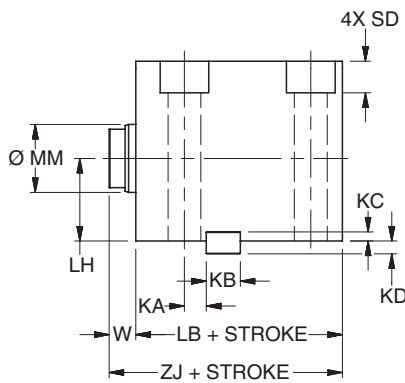
**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**C Mount – Single Rod End**

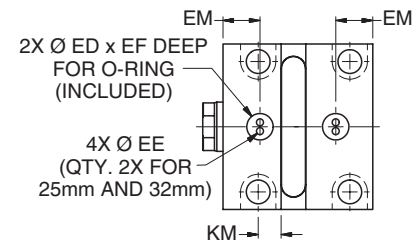
**Style C Foot Mount – Single Rod End – 25mm to 63mm Bore Size**



**25mm & 32mm  
BOLT HOLE DETAIL**

**C Mount Single Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	ED Ø	EE				EF	EK	EL	EM	KA	KB	KC	KD	KE
			SAE	NPT	BSP	Mani-fold									
25	45	10	# 2 <sup>1</sup>	1/8	G-1/8	3	2	7	17.5	15.8	8.5	8	3.25	3.75	45
32	56	10	# 4	1/4	G-1/4	3	2	11	20.5	18.5	8	12	3.25	4.75	63
40	64	12	# 4	1/4	G-1/4	3	2	12	21	19	8	12	3.25	4.75	70
50	74	15	# 4	1/4	G-1/4	4	2	14	22.5	21	9	14	3.75	5.25	80
63	89	15	# 4	1/4	G-1/4	4	2	17	26	24.5	11	16	4.25	5.75	100



**MANIFOLD PORT OPTION DETAIL**

CAUTION: KM key slot location is for manifold ports only. Do not use for top mounted ports. KA key slot location is for top mounted ports. Do not use for manifold ports.

<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**C Mount Single Rod End – Rod Dimensions**

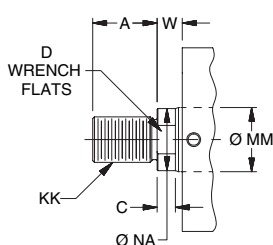
Bore Ø	KM	LH	SB Ø	SC	SD	TS	US	VS	W	XS	Add Stroke			Min. Stroke For M Port
											LB	SS	ZJ	
25	8.5	20	6.8	5.5	6.5	39	50	28	8	23	45	24.5	53	10
32	8	25	9	7	8.6	56	70	42	10	30	51	24	61	15
40	8	29	11	8.75	10.8	62	80	-	10	30	55	23	65	15
50	13	34	13.5	10	13	74	94	-	11	31	60	27	71	20
63	15.5	42	16	11.5	15.2	90	114	-	13	33	67	32	80	20

**C Mount Single Rod End – Rod Dimensions**

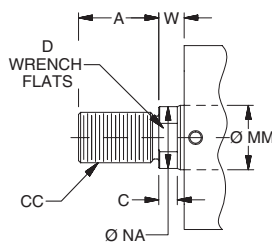
Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35

**Rod End Dimensions**

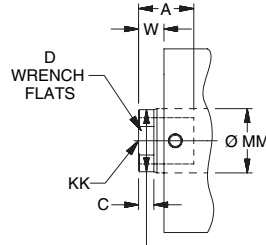
**Thread Style 4**



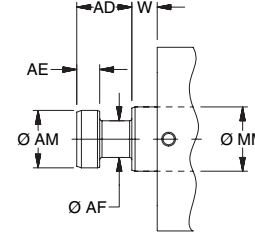
**Thread Style 8**



**Thread Style 9**



**Style 55**



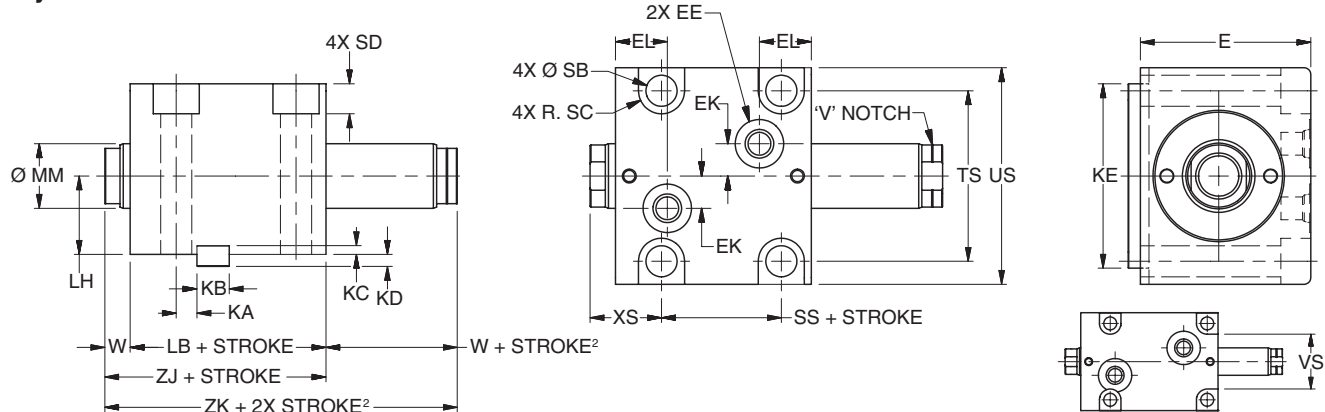
**“Special” Thread Style 3**

Special thread, extension, rod eye, blank, etc. are also available.

To order, specify “Style 3” and give desired dimensions for KK, A, & W. If otherwise specify furnish dimensional sketch.

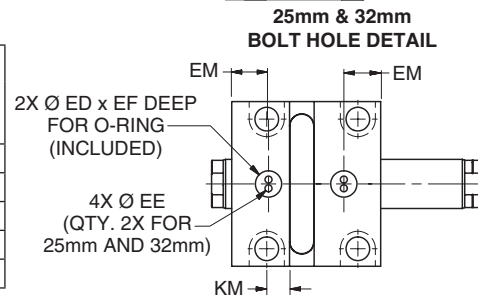
**C Mount – Double Rod End**

**Style C Foot Mount – Double Rod End – 25mm to 63mm Bore Size**



**C Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	ED Ø	EE				EF	EK	EL	EM	KA	KB	KC	KD	KE
			SAE	NPT	BSP	Manifold									
25	45	10	# 2 <sup>1</sup>	1/8	G-1/8	3	2	7	17.5	15.8	8.5	8	3.25	3.75	45
32	56	10	# 4	1/4	G-1/4	3	2	11	20.5	18.5	8	12	3.25	4.75	63
40	64	12	# 4	1/4	G-1/4	3	2	12	21	19	8	12	3.25	4.75	70
50	74	15	# 4	1/4	G-1/4	4	2	14	22.5	21	9	14	3.75	5.25	80
63	89	15	# 4	1/4	G-1/4	4	2	17	26	24.5	11	16	4.25	5.75	100



<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**MANIFOLD PORT OPTION DETAIL**  
CAUTION: KM key slot location is for manifold ports only. Do not use for top mounted ports. KA key slot location is for top mounted ports. Do not use for manifold ports.

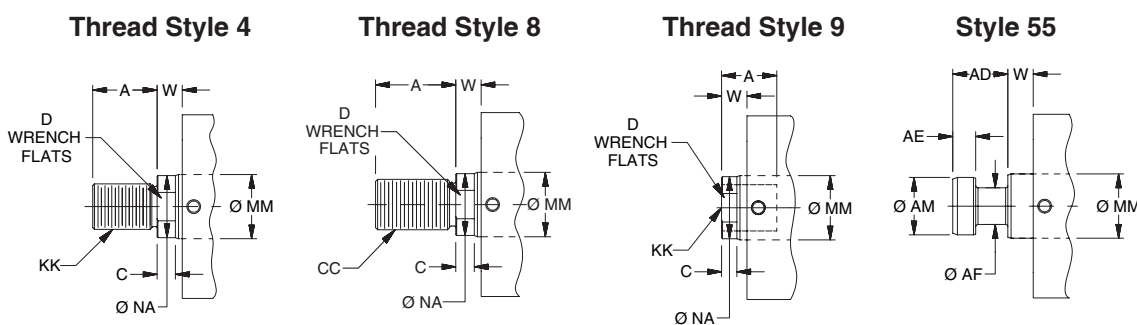
**C Mount Double Rod End – Rod Dimensions**

Bore Ø	KM	LH	SB Ø	SC	SD	TS	US	VS	W <sup>2</sup>	XS	Add Stroke			Add 2X Stroke	Min. Stroke For M Port
											LB	SS	ZJ	ZK <sup>2</sup>	
25	8.5	20	6.8	5.5	6.5	39	50	28	8	23	45	24.5	53	61	10
32	8	25	9	7	8.6	56	70	42	10	30	51	24	61	71	15
40	8	29	11	8.75	10.8	62	80	-	10	30	55	23	65	75	15
50	13	34	13.5	10	13	74	94	-	11	31	60	27	71	82	20
63	15.5	42	16	11.5	15.2	90	114	-	13	33	67	32	80	93	20

**C Mount Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35

**Rod End Dimensions**

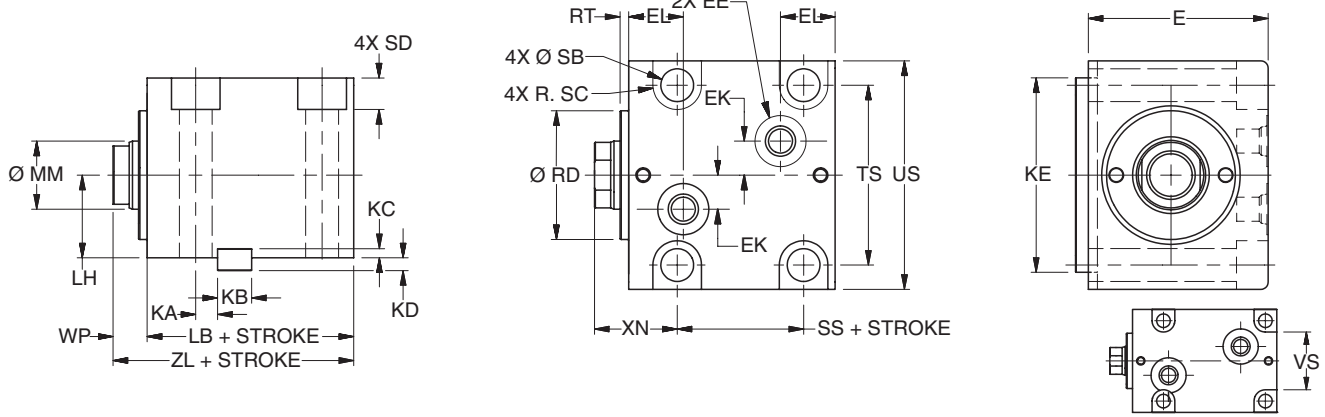


**"Special" Thread Style 3**

Special thread, extension, rod eye, blank, etc. are also available.

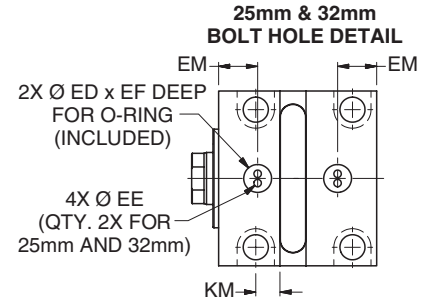
To order, specify "Style 3" and give desired dimensions for KK, A, & W. If otherwise special furnish dimensional sketch.

**Style CN Foot Mount with Pilot Gland – Single Rod End – 25mm to 63mm Bore Size**



**CN Mount Single Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	ED Ø	EE				EF	EK	EL	EM	KA	KB	KC	KD	KE
			SAE	NPT	BSP	Mani-fold									
25	45	10	# 2 <sup>1</sup>	1/8	G-1/8	3	2	7	17.5	15.8	8.5	8	3.25	3.75	45
32	56	10	# 4	1/4	G-1/4	3	2	11	20.5	18.5	8	12	3.25	4.75	63
40	64	12	# 4	1/4	G-1/4	3	2	12	21	19	8	12	3.25	4.75	70
50	74	15	# 4	1/4	G-1/4	4	2	14	22.5	21	9	14	3.75	5.25	80
63	89	15	# 4	1/4	G-1/4	4	2	17	26	24.5	11	16	4.25	5.75	100



<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

**MANIFOLD PORT OPTION DETAIL**  
CAUTION: KM key slot location is for manifold ports only. Do not use for top mounted ports. KA key slot location is for top mounted ports. Do not use for manifold ports.

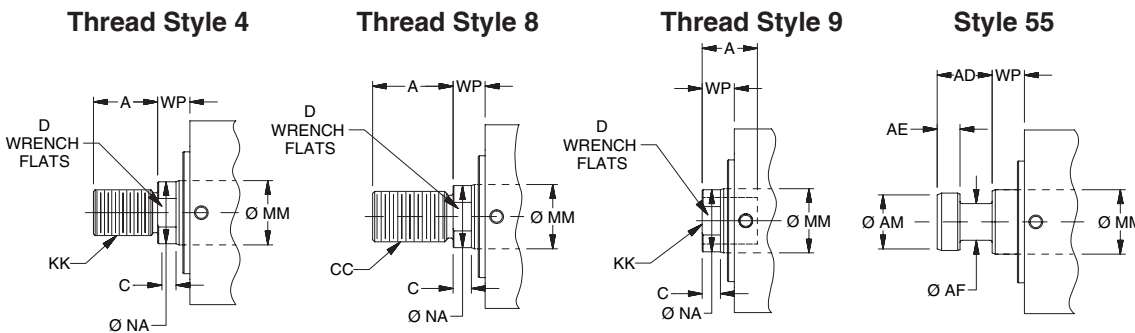
**CN Mount Single Rod End – Rod Dimensions**

Bore Ø	KM	LH	RD f9	RT	SB Ø	SC	SD	TS	US	VS	WP	XN	Add Stroke			Min. Stroke For M Port
													LB	SS	ZL	
25	8.5	20	27	3	6.8	5.5	6.5	39	50	28	11	26	45	24.5	56	10
32	8	25	36	3	9	7	8.6	56	70	42	13	33	51	24	64	15
40	8	29	43	3	11	8.75	10.8	62	80	-	13	33	55	23	68	15
50	13	34	53	3	13.5	10	13	74	94	-	14	34	60	27	74	20
63	15.5	42	66	3	16	11.5	15.2	90	114	-	16	36	67	32	83	20

**CN Mount Single Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M		Style 4M		Style 9A		Style 4A		Style 8A		Style 55M				C	D	NA
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM			
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35

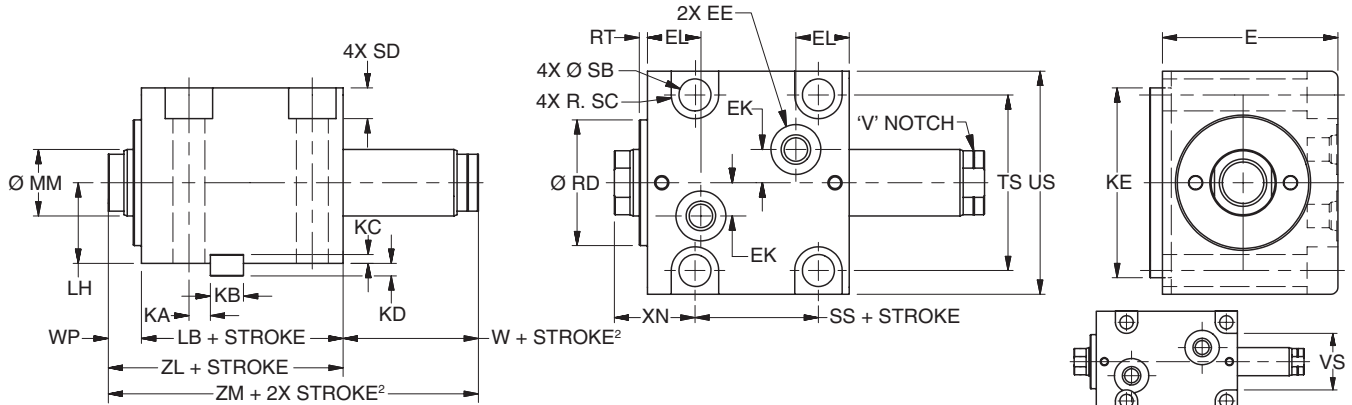
**Rod End Dimensions**



**“Special” Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify “Style 3” and give desired dimensions for KK, A, & WP. If otherwise special furnish dimensional sketch.

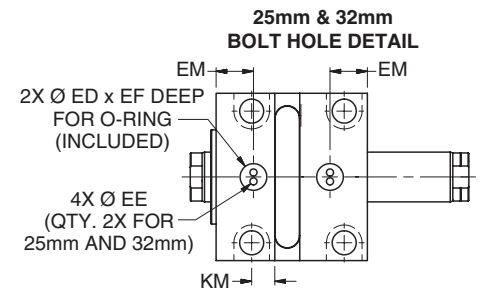


**Style CN Foot Mount with Pilot Gland – Double Rod End – 25mm to 63mm Bore Size**



**CN Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	E	ED	EE				EF	EK	EL	EM	KA	KB	KC	KD	KE
			SAE	NPT	BSP	Manifold									
25	45	10	# 2'	1/8	G-1/8	3	2	7	17.5	15.8	8.5	8	3.25	3.75	45
32	56	10	# 4	1/4	G-1/4	3	2	11	20.5	18.5	8	12	3.25	4.75	63
40	64	12	# 4	1/4	G-1/4	3	2	12	21	19	8	12	3.25	4.75	70
50	74	15	# 4	1/4	G-1/4	4	2	14	22.5	21	9	14	3.75	5.25	80
63	89	15	# 4	1/4	G-1/4	4	2	17	26	24.5	11	16	4.25	5.75	100



<sup>1</sup> Parker Triple-Lok® Straight Thread Connector SAE #2 to 1/4" 37° flare can be used when this port thread is required. Contact your local Parker Tube Fitting distributor and specify part number 4-2 F5OX.

<sup>2</sup> Minimum 'W + Stroke' on V notch rod side may apply. See minimum rod extension page for details.

**MANIFOLD PORT OPTION DETAIL**  
CAUTION: KM key slot location is for manifold ports only. Do not use for top mounted ports. KA key slot location is for top mounted ports. Do not use for manifold ports.

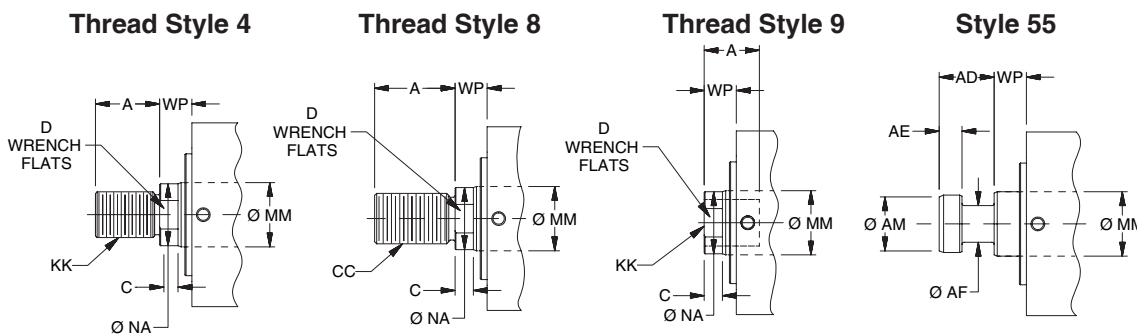
**CN Mount Double Rod End – Envelope and Mounting Dimensions**

Bore Ø	KM	LH	RD f9	RT	SB	SC	SD	TS	US	VS	W <sup>2</sup>	WP	XN	Add Stroke			Add 2X Stroke		Min. Stroke For M Port
														LB	SS	ZL	ZM <sup>2</sup>		
25	8.5	20	27	3	6.8	5.5	6.5	39	50	28	8	11	26	45	24.5	56	64	10	
32	8	25	36	3	9	7	8.6	56	70	42	10	13	33	51	24	64	74	15	
40	8	29	43	3	11	8.75	10.8	62	80	-	10	13	33	55	23	68	78	15	
50	13	34	53	3	13.5	10	13	74	94	-	11	14	34	60	27	74	85	20	
63	15.5	42	66	3	16	11.5	15.2	90	114	-	13	16	36	67	32	83	96	20	

**CN Mount Double Rod End – Rod Dimensions**

Bore Ø	MM Rod Ø	Rod End														Rod Extension Dimensions		
		Style 9M <sup>2</sup>		Style 4M		Style 9A <sup>2</sup>		Style 4A		Style 8A		Style 55M						
		KK	A	KK	A	KK	A	KK	A	CC	A	AD	AE	AF	AM	C	D	NA
25	14	M10x1.5	12	M10x1.25	16	3/8-24	12	3/8-24	16	1/2-20	18	12	4	8	13	6	12	13
32	18	M12x1.75	15	M12x1.25	18	7/16-20	15	7/16-20	18	9/16-18	25	16	6	10	16	8	15	17
40	22	M16x2	20	M16x1.5	22	5/8-18	20	5/8-18	22	3/4-16	30	20	8	12	20	8	19	21
50	28	M20x2.5	24	M20x1.5	28	3/4-16	24	3/4-16	28	7/8-14	35	24	10	16	25	9	24	27
63	36	M27x3	30	M27x2	36	1-14	30	1-14	36	1 1/4-12	45	28	12	22	33	11	32	35

**Rod End Dimensions**

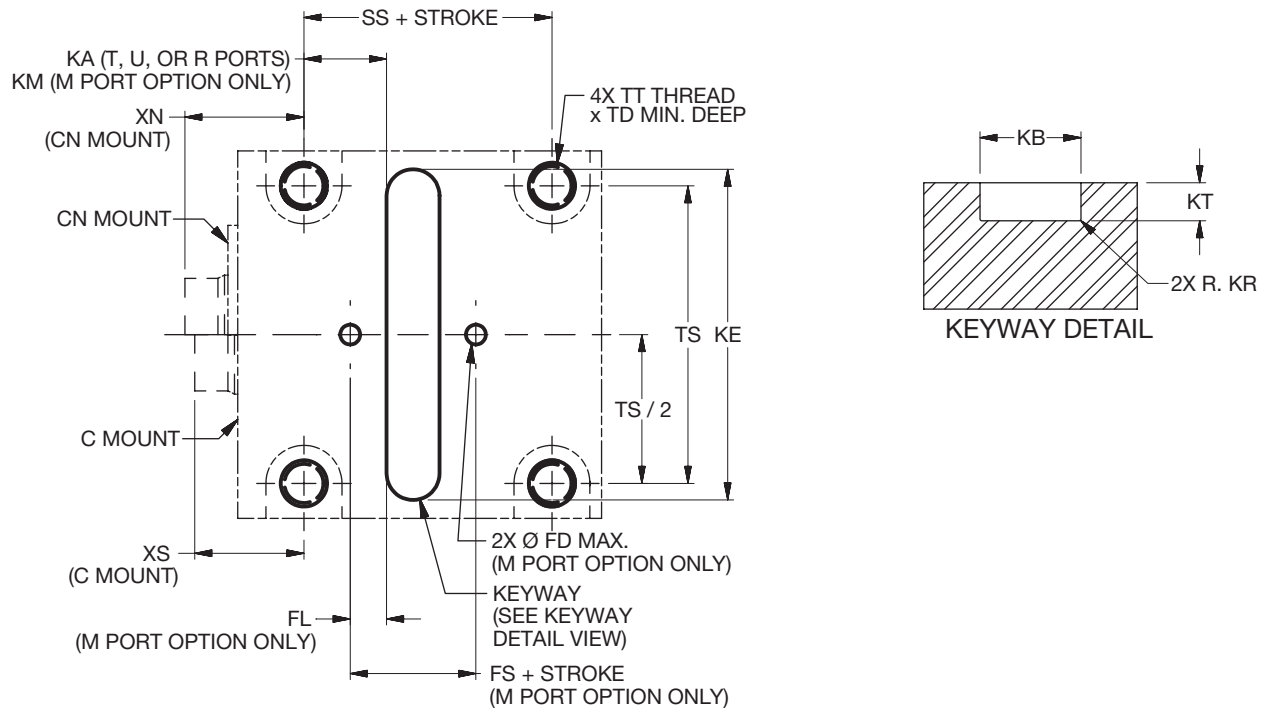


**"Special" Thread Style 3**  
Special thread, extension, rod eye, blank, etc. are also available. To order, specify "Style 3" and give desired dimensions for KK, A, & WP. If otherwise special furnish dimensional sketch.

### Suggested Machining for Mounting Series CHD Styles C & CN Cylinders

The drawings and dimensions can be used as a suggested guide for preparing the mounting interface for a mounting style C or CN cylinder. Take care to note that the keyway location varies between top threaded port and bottom manifold port types. The KA keyway location is for top ports only and should not be

used for manifold ports. And, the KM keyway location is for bottom manifold ports and should not be used for top threaded ports. Also the XS rod dimension applies only to the C mount and the XN rod dimension applies only to the CN mount.



### Machining Interface Dimensions

Bore Ø	FD <sup>2</sup>	FL <sup>2</sup>	KA <sup>1</sup>	KB -0.043	KE +0.5	KM <sup>2</sup>	KR	KT +0.2	TD	TS	TT	XN <sup>3</sup>	XS <sup>3</sup>	Add Stroke	
														FS <sup>2</sup>	SS
25	3	7.8	8.5	8	45	8.5	0.16 +.09	4	14	39	M6x1-6H	26	23	13.5	24.5
32	3	9.5	8	12	63	8	0.25 +.15	5	16	56	M8x1.25-6H	33	30	14	24
40	5	9	8	12	70	8	0.25 +.15	5	20	62	M10x1.5-6H	33	30	17	23
50	6	12	9	14	80	13	0.25 +.15	5.5	22	74	M12x1.75-6H	34	31	18	27
63	6	11	11	16	100	15.5	0.25 +.15	6	24	90	M14x2-6H	36	33	18	32

<sup>1</sup> KA keyway location is for top ports only - do not use for 'M' manifold port option.

<sup>2</sup> KM keyway location, FD flow hole Ø and FL / FS flow hole locations apply to 'M' manifold port option only.

<sup>3</sup> XS dimension is used for C mount; XN dimension is used for CN mount.

### Mounting Hardware

Bore Ø	Nominal Key Dimensions	Mounting SHCS <sup>4</sup>
25	8 x 7 x 45	M6 x 50
32	12 x 8 x 63	M8 x 60
40	12 x 8 x 70	M10 x 70
50	14 x 9 x 80	M12 x 80
63	16 x 10 x 100	M14 x 95

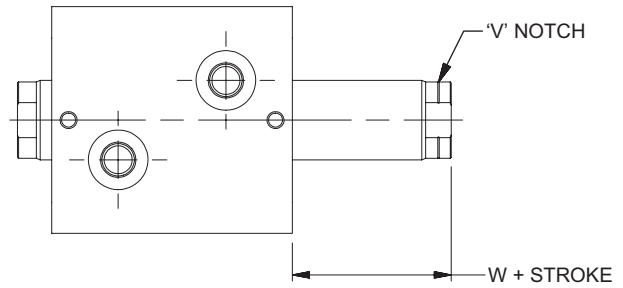
<sup>4</sup> Customer supplied (4x)

**Minimum Rod Extension**

Double rod cylinders with Style 9 on V notch side of cylinder

When a rod end Style 9 is specified on the V notch side of a double rod cylinder, a minimum  $W + \text{Stroke}$  dimension is required. This bore and stroke dependent value is shown in the following table.

Bore Ø	Minimum W + Stroke	For Strokes Equal-to or Less-than
20	18	10
25	23	15
32	25	15
40	30	20
50	31	20
63	38	25
80	42	25
100	51	25



Style 3 (special) rod ends with female thread depth equal to the standard A dimension are also subject to this minimum. For deeper threads, the minimum  $W + \text{Stroke}$  will increase by the depth increase beyond the standard A dimension. No other rod end styles have this limitation.

### Cylinder Mounting

Always mount Series CHE & CHD cylinders using high tensile alloy steel socket head screws and torque them to the values shown. In addition to bolts, styles C, CA & CN cylinders should be keyed to the mounting surface with a thrust key, utilizing the groove provided in the

cylinder body or mounting bracket. Bolt kits for T, TN, and TR mounts are offered and can be specified by kit part numbers below. Refer to CHE or CHD mounting style pages for bore and mounting availability.

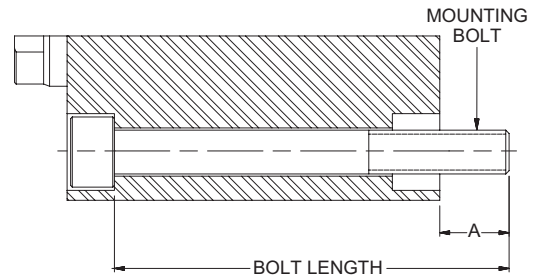
### Mounting Bolt Torques

Mount	Bore Ø	Mounting Bolt Size		Tightening Torque	
		Metric	Inch	N-m	ft. lbs.
Inch only A, AN, AR	20	M5 x 0.8	#10	4-5	3-4
	25	M5 x 0.8	#10	4-5	3-4
	32	M6 x 1.0	1/4	10-11	7-8
Metric only M, MN, MR	40	M8 x 1.25	5/16	20-21	14-16
	50	M10 x 1.5	3/8	39-41	29-31
	63	M12 x 1.75	1/2	58-62	43-45
Metric or Inch T, TN, TR	80 (ex. A, AN, AR)	M14 x 2.0	1/2 <sup>1</sup>	88-92	64-68
	80 (A, AN, AR)	-	5/8	118-122	87-91
	100	M16 x 2.0	5/8	118-122	87-91
J, H	20	M5 x 0.8	#10	4-5	3-4
	25	M5 x 0.8	#10	4-5	3-4
	32	M6 x 1.0	1/4	10-11	7-8
	40	M10 x 1.5	3/8	39-41	29-31
	50	M12 x 1.75	1/2	58-62	43-45
	63	M14 x 2.0	1/2 <sup>1</sup>	88-92	64-68
	80	M16 x 2.0	5/8	118-122	87-91
	100	M20 x 2.5	3/4	178-182	131-135
C, CA, CN	20	M5 x 0.8	#10	4-5	3-4
	25	M6 x 1.0	1/4	10-11	7-8
	32	M8 x 1.25	5/16	20-21	14-16
	40	M10 x 1.5	3/8	39-41	29-31
	50	M12 x 1.75	1/2	58-62	43-45
	63	M14 x 2.0	1/2 <sup>1</sup>	88-92	64-68
	80	M16 x 2.0	5/8	118-122	87-91
	100	M20 x 2.5	3/4	178-182	131-135

<sup>1</sup> When using 1/2" socket head cap screws with 80mm T mount or 63mm C, CA, CN, J and H mount, flat washers are required. Flat washer OD must be .866" ±.020 (22mm ±0.5).

### Mounting Bolt Kits for Series CHE & CHD – Styles T, TN & TR (Kits include four bolts.)

Bore Ø	Bolt Size	Bolt Length	A Thread Length <sup>3</sup>	Kit Part Number
20	M5 x 0.8	45mm + Stroke	7.4mm	CHEB020 <sup>2</sup>
25	M5 x 0.8	50mm + Stroke	10.4mm	CHEB025 <sup>2</sup>
32	M6 x 1.0	55mm + Stroke	10.5mm	CHEB032 <sup>2</sup>
40	M8 x 1.25	60mm + Stroke	13.6mm	CHEB040 <sup>2</sup>
50	M10 x 1.5	65mm + Stroke	15.8mm	CHEB050 <sup>2</sup>
63	M12 x 1.75	70mm + Stroke	16.0mm	CHEB063 <sup>2</sup>
80	M14 x 2.0	85mm + Stroke	22.2mm	CHEB080 <sup>2</sup>
100	M16 x 2.0	105mm + Stroke	26.5mm	CHEB100 <sup>2</sup>

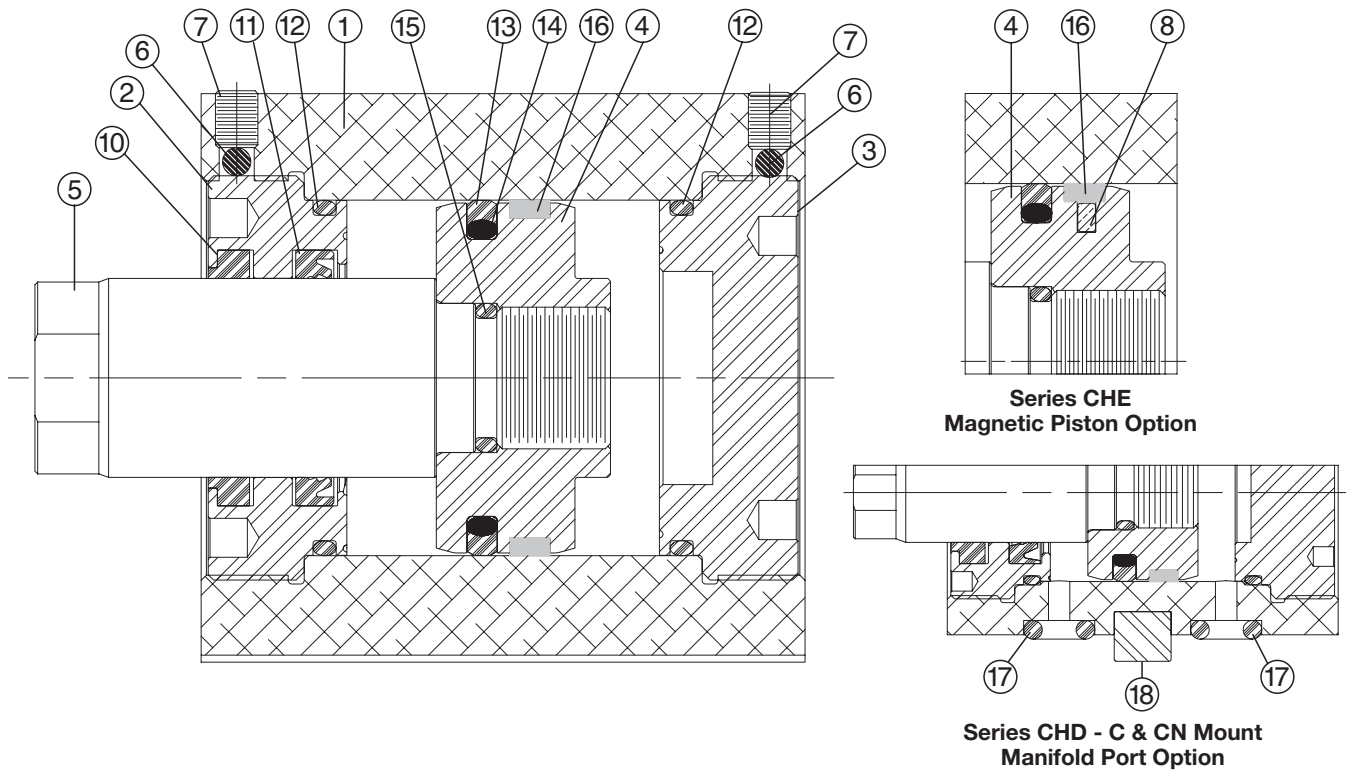


<sup>2</sup> The last three digits of the kit part number are to be supplied as the cylinder stroke in 5mm increments. When specifying a bolt kit for intermediate stroke lengths, use the next longer 5mm stroke increment.

E.g. Kit number for 20mm bore, 35mm stroke – CHEB020035  
 Kit number for 50mm bore, 72mm stroke – CHEB050075

<sup>3</sup> For intermediate stroke lengths the 'A' exposed thread length will be therefore increased by the difference between the actual stroke and the next longer 5mm bolt stroke length increment.

**Parts Identification Drawing – Standard Piston**



Item No.	Description	Material	Item No.	Description	Material	
					Standard	Fluorocarbon
1	Cylinder Body - CHE	Aluminum Alloy (Hard Anodized)	10	Rod Wiper	PUR	Fluorocarbon
	Cylinder Body - CHD	Steel	11	Rod Seal	PUR	Fluorocarbon
2	Gland	Nodular Iron	12	End Seal	PUR	Fluorocarbon
3	Cap	Nodular Iron	13	Piston Seal	PUR	Filled PTFE
4	Piston – Standard	Nodular Iron	14	PS Energizer	NBR	Fluorocarbon
	Piston – with Magnet	Aluminum Alloy				
5	Piston Rod	Carbon Steel (Hard Chrome Plated)	15	Piston-to-Rod o-ring	PUR	Fluorocarbon
6	Ball	Nylon	16	Piston Wear Band	Glass-reinforced nylon	Glass-reinforced nylon
7	Set Screw	Alloy Steel				
8	Magnet	Sintered NdFeB <sup>1</sup>	17	Manifold Port Seal	PUR	Fluorocarbon
			18	C & CN Mount Key	Steel	

<sup>1</sup> Neodymium Iron Boron

**Seal Kits For Series CHE & CHD**

See Standard Specifications Page for fluid and temperature compatibility. Cylinder gland and cap are threaded into the cylinder body. To service rod seal, rod wiper, piston seal, or end seals the gland or cap must be removed. Spanner holes in the gland and cap are available for the purpose of removing and installing

these components. Be sure to torque the gland or cap to the specifications below and replace the nylon ball and set screw to further lock them in place. Refer to CHE or CHD mounting style pages for Bore and Rod Diameter availability.

**Rod Gland and Rod Seal Kits for Series CHE & CHD**

Rod Ø	Rod Gland (w/o pilot') Kits		Rod Seal Kits	
	Class 1	Class 5	Class 1	Class 5
	Consists of 1 ea. of items #2, 6, 10, 11, & 12		Consists of 1 ea. of items #6, 10, 11, & 12	
12	CHE-KR100-12	CHE-KR200-12	CHE-KR300-12	CHE-KR400-12
14	CHE-KR100-14	CHE-KR200-14	CHE-KR300-14	CHE-KR400-14
18	CHE-KR100-18	CHE-KR200-18	CHE-KR300-18	CHE-KR400-18
22	CHE-KR100-22	CHE-KR200-22	CHE-KR300-22	CHE-KR400-22
28	CHE-KR100-28	CHE-KR200-28	CHE-KR300-28	CHE-KR400-28
36	CHE-KR100-36	CHE-KR200-36	CHE-KR300-36	CHE-KR400-36
45	CHE-KR100-45	CHE-KR200-45	CHE-KR300-45	CHE-KR400-45
56	CHE-KR100-56	CHE-KR200-56	CHE-KR300-56	CHE-KR400-56

<sup>1</sup> Pilot gland is required for AN, CA, CN, J, MN and TN mounting styles. For Gland Kit with pilot change 'KR100' or 'KR200' in kit number to 'KR20P'. E.g. CHE-KR10P-12.

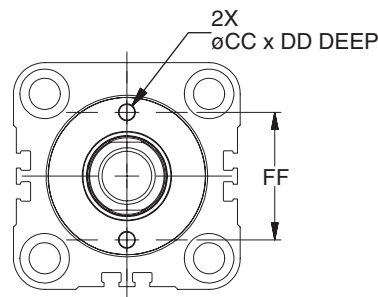
**Complete Seal Kits for Series CHE & CHD**

Bore Ø	Class 1	Class 5	Gland & Cap Torque Specifications	
	Consists of 1 ea. of items #10, 11, 13, 14, 16 & 2 ea. of items #6 & 12		N-m	ft. lbs.
20	CHE-CRK10-20	CHE-CRK20-20	8-11	6-8
25	CHE-CRK10-25	CHE-CRK20-25	12-25	9-11
32	CHE-CRK10-32	CHE-CRK20-32	20-24	15-18
40	CHE-CRK10-40	CHE-CRK20-40	41-47	30-35
50	CHE-CRK10-50	CHE-CRK20-50	61-67	45-50
63	CHE-CRK10-63	CHE-CRK20-63	108-122	80-90
80	CHE-CRK10-80	CHE-CRK20-80	217-230	160-170
100	CHE-CRK10-100	CHE-CRK20-100	434-461	320-340

**Spanner Hole Dimensions**

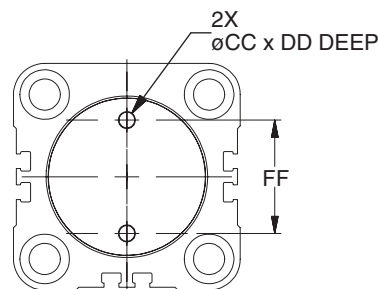
**Gland Spanners**

Bore Ø	CC	DD	FF
20	2.25	2.5	22
25	2.75	3	25
32	3.5	3.5	30
40	4.5	4.5	35
50	5.5	5.5	45
63	6.5	6.5	55
80	8.5	8.5	70
100	10.5	10.5	85



**Cap Spanners**

Bore Ø	CC	DD	FF
20	2.25	2.5	15
25	2.75	3	18
32	3.5	3.5	25
40	4.5	4.5	32
50	5.5	5.5	40
63	6.5	6.5	50
80	8.5	8.5	63
100	10.5	10.5	80



**Notes**

**Notes**



## Safety Guide for Selecting and Using Hydraulic, Pneumatic Cylinders and Their Accessories

**WARNING:** ⚠ FAILURE OF THE CYLINDER, ITS PARTS, ITS MOUNTING, ITS CONNECTIONS TO OTHER OBJECTS, OR ITS CONTROLS CAN RESULT IN:

- Unanticipated or uncontrolled movement of the cylinder or objects connected to it.
- Falling of the cylinder or objects held up by it.
- Fluid escaping from the cylinder, potentially at high velocity.

**THESE EVENTS COULD CAUSE DEATH OR PERSONAL INJURY BY, FOR EXAMPLE, PERSONS FALLING FROM HIGH LOCATIONS, BEING CRUSHED OR STRUCK BY HEAVY OR FAST MOVING OBJECTS, BEING PUSHED INTO DANGEROUS EQUIPMENT OR SITUATIONS, OR SLIPPING ON ESCAPED FLUID.**

Before selecting or using Parker Hannifin Corporation (the Company) cylinders or related accessories, it is important that you read, understand and follow the following safety information. Training is advised before selecting and using the Company's products.

### 1.0 General Instructions

**1.1 Scope** – This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) cylinder products. This safety guide is a supplement to and is to be used with the specific Company publications for the specific cylinder products that are being considered for use.

**1.2 Fail Safe** – Cylinder products can and do fail without warning for many reasons. All systems and equipment should be designed in a fail-safe mode so that if the failure of a cylinder product occurs people and property won't be endangered.

**1.3 Distribution** – Provide a free copy of this safety guide to each person responsible for selecting or using cylinder products. Do not select or use the Company's cylinders without thoroughly reading and understanding this safety guide as well as the specific Company publications for the products considered or selected.

**1.4 User Responsibility** – Due to very wide variety of cylinder applications and cylinder operating conditions, the Company does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The hydraulic and pneumatic cylinders outlined in this catalog are designed to the Company's design guidelines and do not necessarily meet the design guideline of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

**1.5 Additional Questions** – Call the appropriate Company technical service department if you have any questions or require any additional information. See the Company publication for the product being considered or used, or call 1-847-298-2400, or go to [www.parker.com](http://www.parker.com), for telephone numbers of the appropriate technical service department.

### 2.0 Cylinder and Accessories Selection

**2.1 Seals** – Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection, consult the "seal information page(s)" of the publication for the series of cylinders of interest.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is mis-aligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

**2.2 Piston Rods** – Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.

- Failure of the pressurized fluid delivery system (hoses, fittings, valves, pumps, compressors) which maintain cylinder position.
- Catastrophic cylinder seal failure leading to sudden loss of pressurized fluid.
- Failure of the machine control system.

Follow the recommendations of the "Piston Rod Selection Chart and Data" in the publication for the series of cylinders of interest. The suggested piston rod diameter in these charts must be followed in order to avoid piston rod buckling.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

On occasion cylinders are ordered with double rods (a piston rod extended from both ends of the cylinder). In some cases a stop is threaded on to one of the piston rods and used as an external stroke adjuster. On occasions spacers are attached to the machine member connected to the piston rod and also used as a stroke adjuster. In both cases the stops will create a pinch point and the user should consider appropriate use of guards. If these external stops are not perpendicular to the mating contact surface, or if debris is trapped between the contact surfaces, a bending moment will be placed on the piston rod, which can lead to piston rod failure. An external stop will also negate the effect of cushioning and will subject the piston rod to impact loading. Those two (2) conditions can cause piston rod failure. Internal stroke adjusters are available with and without cushions. The use of external stroke adjusters should be reviewed with our engineering department.

The piston rod to piston and the stud to piston rod threaded connections are secured with an anaerobic adhesive. The strength of the adhesive decreases with increasing temperature. Cylinders which can be exposed to temperatures above +250°F (+121°C) are to be ordered with a non studded piston rod and a pinned piston rod joint.

**2.3 Cushions** – Cushions should be considered for cylinder applications when the piston velocity is expected to be over 4 inches/second.

Cylinder cushions are normally designed to absorb the energy of a linear applied load. A rotating mass has considerably more energy than the same mass moving in a linear mode. Cushioning for a rotating mass application should be reviewed by our engineering department.

**2.4 Cylinder Mountings** – Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

**2.5 Port Fittings** – Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at piston rod end.

The rod end pressure is approximately equal to:

$$\frac{\text{operating pressure} \times \text{effective cap end area}}{\text{effective rod end piston area}}$$

Contact your connector supplier for the pressure rating of individual connectors.

### 3.0 Cylinder and Accessories Installation and Mounting

#### 3.1 Installation

**3.1.1** – Cleanliness is an important consideration, and cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations.

**3.1.2** – Cylinders operating in an environment where air drying materials are present such as fast-drying chemicals, paint, or weld splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

**3.1.3** – Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear. On fixed mounting cylinders attaching the piston rod while the rod is retracted will help in achieving proper alignment.

**3.1.4** – Sometimes it may be necessary to rotate the piston rod in order to thread the piston rod into the machine member. This operation must always be done with zero pressure being applied to either side of the piston. Failure to follow this procedure may result in loosening the piston to rod-threaded connection. In some rare cases the turning of the piston rod may rotate a threaded piston rod gland and loosen it from the cylinder head. Confirm that this condition is not occurring. If it does, re-tighten the piston rod gland firmly against the cylinder head.

For double rod cylinders it is also important that when attaching or detaching the piston rod from the machine member that the torque be applied to the piston rod end of the cylinder that is directly attaching to the machine member with the opposite end unrestrained. If the design of the machine is such that only the rod end of the cylinder opposite to where the rod attaches to the machine member can be rotated, consult the factory for further instructions.

### 3.2 Mounting Recommendations

**3.2.1** – Always mount cylinders using the largest possible high tensile alloy steel socket head screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

**3.2.2** – Side-Mounted Cylinders – In addition to the mounting bolts, cylinders of this type should be equipped with thrust keys or dowel pins located so as to resist the major load.

**3.2.3** – Tie Rod Mounting – Cylinders with tie rod mountings are recommended for applications where mounting space is limited. The standard tie rod extension is shown as BB in dimension tables. Longer or shorter extensions can be supplied. Nuts used for this mounting style should be torqued to the same value as the tie rods for that bore size.

**3.2.4** – Flange Mount Cylinders – The controlled diameter of the rod gland extension on head end flange mount cylinders can be used as a pilot to locate the cylinders in relation to the machine. After alignment has been obtained, the flanges may be drilled for pins or dowels to prevent shifting.

**3.2.5** – Trunnion Mountings – Cylinders require lubricated bearing blocks with minimum bearing clearances. Bearing blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end should also be pivoted with the pivot pin in line and parallel to axis of the trunnion pins.

**3.2.6** – Clevis Mountings – Cylinders should be pivoted at both ends with centerline of pins parallel to each other. After cylinder is mounted, be sure to check to assure that the cylinder is free to swing through its working arc without interference from other machine parts.

### 4.0 Cylinder and Accessories Maintenance, Troubleshooting and Replacement

**4.1 Storage** – At times cylinders are delivered before a customer is ready to install them and must be stored for a period of time. When storage is required the following procedures are recommended.

**4.1.1** – Store the cylinders in an indoor area which has a dry, clean and noncorrosive atmosphere. Take care to protect the cylinder from both internal corrosion and external damage.

**4.1.2** – Whenever possible cylinders should be stored in a vertical position (piston rod up). This will minimize corrosion due to possible condensation which could occur inside the cylinder. This will also minimize seal damage.

**4.1.3** – Port protector plugs should be left in the cylinder until the time of installation.

**4.1.4** – If a cylinder is stored full of hydraulic fluid, expansion of the fluid due to temperature changes must be considered. Installing a check valve with free flow out of the cylinder is one method.

**4.1.5** – When cylinders are mounted on equipment that is stored outside for extended periods, exposed unpainted surfaces, e.g. piston rod, must be coated with a rust-inhibiting compound to prevent corrosion.

### 4.2 Cylinder Trouble Shooting

#### 4.2.1 – External Leakage

**4.2.1.1** – Rod seal leakage can generally be traced to worn or damaged seals. Examine the piston rod for dents, gouges or score marks, and replace piston rod if surface is rough.

Rod seal leakage could also be traced to gland wear. If clearance is excessive, replace rod bushing and seal. Rod seal leakage can also be traced to seal deterioration. If seals are soft or gummy or brittle, check compatibility of seal material with lubricant used if air cylinder, or operating fluid if hydraulic cylinder. Replace with seal material, which is compatible with these fluids. If the seals are hard or have lost elasticity, it is usually due to exposure to temperatures in excess of 165°F. (+74°C). Shield the cylinder from the heat source to limit temperature to 350°F. (+177°C.) and replace with fluorocarbon seals.

**4.2.1.2** – Cylinder body seal leak can generally be traced to loose tie rods. Torque the tie rods to manufacturer's recommendation for that bore size.

Excessive pressure can also result in cylinder body seal leak. Determine maximum pressure to rated limits. Replace seals and retorque tie rods as in paragraph above. Excessive pressure can also result in cylinder body seal leak. Determine if the pressure rating of the cylinder has been exceeded. If so, bring the operating pressure down to the rating of the cylinder and have the tie rods replaced.

Pinched or extruded cylinder body seal will also result in a leak. Replace cylinder body seal and retorque as in paragraph above.

Cylinder body seal leakage due to loss of radial squeeze which shows up in the form of flat spots or due to wear on the O.D. or I.D. – Either of these are symptoms of normal wear due to high cycle rate or length of service. Replace seals as per paragraph above.

#### 4.2.2 – Internal Leakage

**4.2.2.1** – Piston seal leak (by-pass) 1 to 3 cubic inches per minute leakage is considered normal for piston ring construction. Virtually no static leak with lipseal type seals on piston should be expected. Piston seal wear is a usual cause of piston seal leakage. Replace seals as required.

**4.2.2.2** – With lipseal type piston seals excessive back pressure due to over-adjustment of speed control valves could be a direct cause of rapid seal wear. Contamination in a hydraulic system can result in a scored cylinder bore, resulting in rapid seal wear. In either case, replace piston seals as required.

**4.2.2.3** – What appears to be piston seal leak, evidenced by the fact that the cylinder drifts, is not always traceable to the piston. To make sure, it is suggested that one side of the cylinder piston be pressurized and the fluid line at the opposite port be disconnected. Observe leakage. If none is evident, seek the cause of cylinder drift in other component parts in the circuit.

#### 4.2.3 – Cylinder Fails to Move the Load

**4.2.3.1** – Pneumatic or hydraulic pressure is too low. Check the pressure at the cylinder to make sure it is to circuit requirements.

**4.2.3.2** – Piston Seal Leak – Operate the valve to cycle the cylinder and observe fluid flow at valve exhaust ports at end of cylinder stroke. Replace piston seals if flow is excessive.

**4.2.3.3** – Cylinder is undersized for the load – Replace cylinder with one of a larger bore size.

#### 4.3 Erratic or Chatter Operation

**4.3.1** – Excessive friction at rod gland or piston bearing due to load misalignment – Correct cylinder-to-load alignment.

**4.3.2** – Cylinder sized too close to load requirements – Reduce load or install larger cylinder.

**4.3.3** – Erratic operation could be traced to the difference between static and kinetic friction. Install speed control valves to provide a back pressure to control the stroke.

**4.4 Cylinder Modifications, Repairs, or Failed Component** – Cylinders as shipped from the factory are not to be disassembled and or modified. If cylinders require modifications, these modifications must be done at company locations or by the Company's certified facilities. The Cylinder Division Engineering Department must be notified in the event of a mechanical fracture or permanent deformation of any cylinder component (excluding seals). This includes a broken piston rod, tie rod, mounting accessory or any other cylinder component. The notification should include all operation and application details. This information will be used to provide an engineered repair that will prevent recurrence of the failure.

It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies. However, this work must be done by strictly following all the instructions provided with the seal kits.

## Offer of Sale

The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and Divisions ("Company") and its authorized distributors, are hereby offered for sale at prices to be established by the Company, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such item, when communicated to the Company, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

**1. Terms and Conditions of Sale:** All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

**2. Payment:** Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from the Company. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

**NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGN OR SPECIFICATIONS.**

**5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.**

**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**7. Special Tooling:** A tooling charge may be imposed for any special tooling, including without limitations, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer, or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**10. Indemnity For Infringement of Intellectual Property Rights:** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgements resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

**12. Entire Agreement/Governing Law:** The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

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