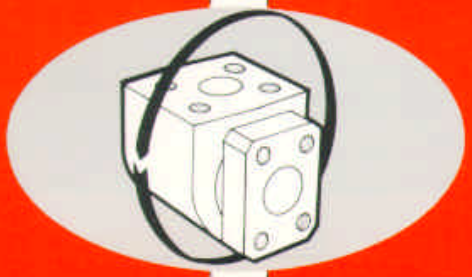


SAE 4-BOLT FLANGED FLUID CONDUCTING SWIVEL JOINTS

3000 PSI – 6000 PSI
CODE 61 & CODE 62

FLANGED HEADS & FLANGED PORTS
SIZES: 1/2 thru 2 1/2 INCHES

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110-4104

Hydraulics, Inc. Fluid Conducting Swivel Joints described in this catalog incorporate SAE 4-Bolt flange connections rated for fluid pressures of 3000 and 6000 PSI. Connectors comply to SAE J518 flanged plumbing code 61 and code 62 specifications.

Important to success in severe applications, the product is manufactured with absence of weld and braze joints. Quality levels are to usual high stancards of Hydraulics, Inc. Durable materials provide service life demanded of heavy equipment in construction, mining and other tough applications. The result is rugged swivel joint performance for continouus duty high horsepower fluid power transmission systems.

Equipment designers select this product for structural integrity and equally, for the reliable connecting of fluid conductors.

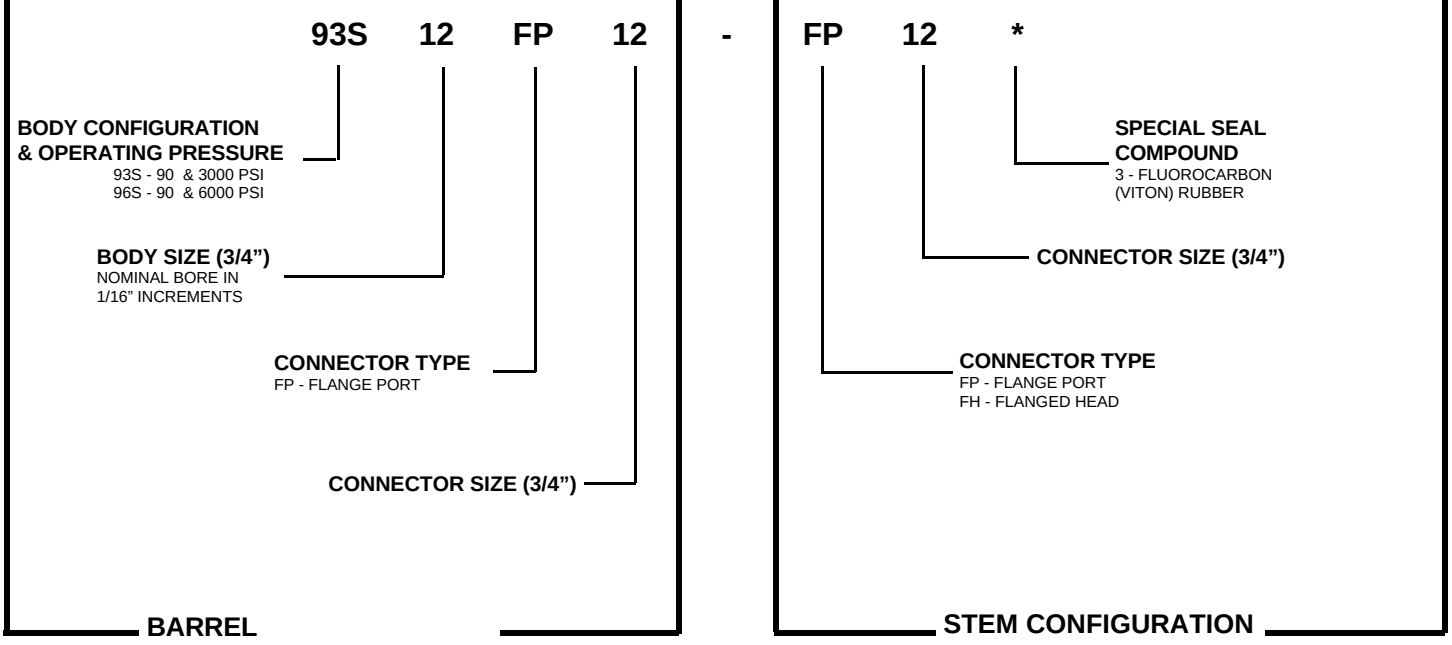
FLUID CONDUCTING SWIVELS PROVIDE

- Design versatility
- Simplified plumbing
- Longer flex hose life
- Ease of maintenance

PRODUCT RECOMMENDED FOR LIQUID FLUID POWER SYSTEMS

"Because of technological progress and product improvements, all design and dimensional data shown in this catalog is subject to change without notice. Technical information has been prepared from actual test results under controlled environmental conditions and data is considered to be reliable, but no responsibility can be assumed for its accuracy under varied field conditions."

EXAMPLE OF PART NUMBER SYSTEM



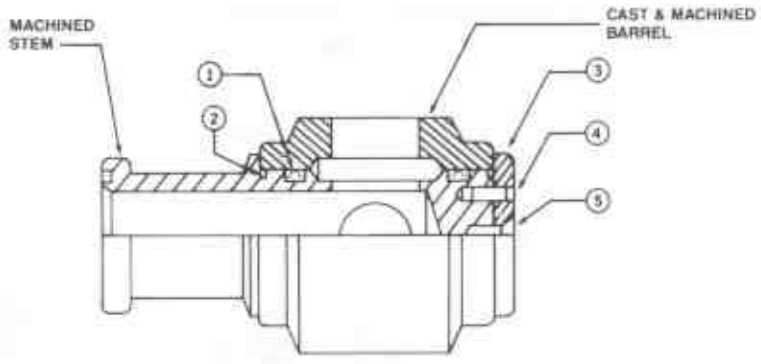
SAE 4-BOLT FLANGE CONNECTED FLUID CONDUCTING SWIVEL JOINTS

SAE FLANGE PORT TO SAE FLANGE PORT SERIES

	CODE 61	CODE 62
Sizes	3/4" thru 2 1/2"	1/2" thru 2"
Operating Pressures	3000 PSI	6000 PSI
Operating Temp.		-40 to +200 F

SAE FLANGE PORT TO SAE FLANGE HEAD

	CODE 61	CODE 62
Sizes	3/4" thru 2 1/2"	1/2" thru 2"
Operating Pressures	3000 PSI	6000
PSI		
Operating Temp.		-40 to +200 F



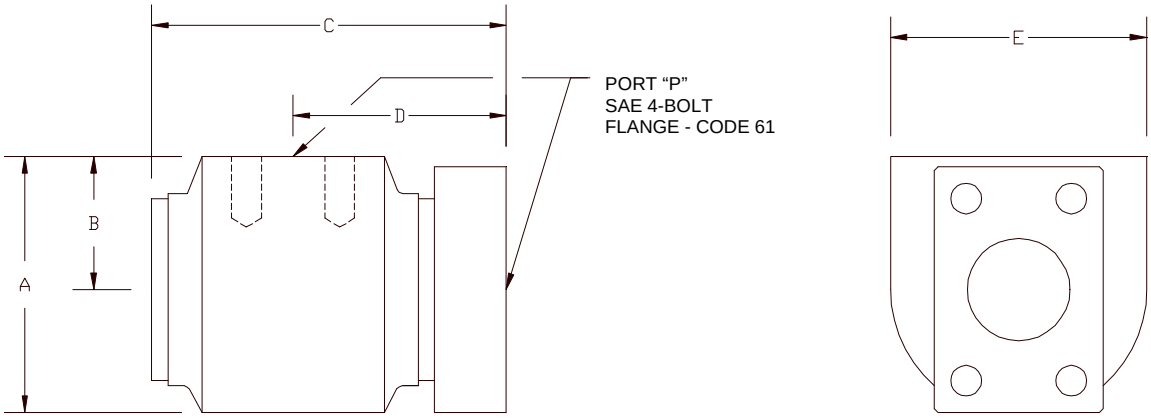
1 SYNTHETIC RUBBER T-RING SEAL ASSEMBLY (TWO)
2 DUST SEAL (TWO)
3 RETAINER PLATE
4 KEEPER PIN
5 RETAINER BOLT

PRODUCT FEATURES

- One Piece Barrel and Stem - No Weld or Braze Joint
- Burnished Barrel Bore - Extended Seal Life
- Heavy Duty Retainer Plate & Broad Wear Lands
- Resists Mechanical Loads
- Protective Treatment Meets SAE Hose Fitting Standards
- Recessed and Protected Dust Seals
- Pressure Balanced For Low Rotational Torques - See Page 7
- Excellent Flow Characteristics - See Page 7
- Field Replaceable Seal Kits - See Page 6

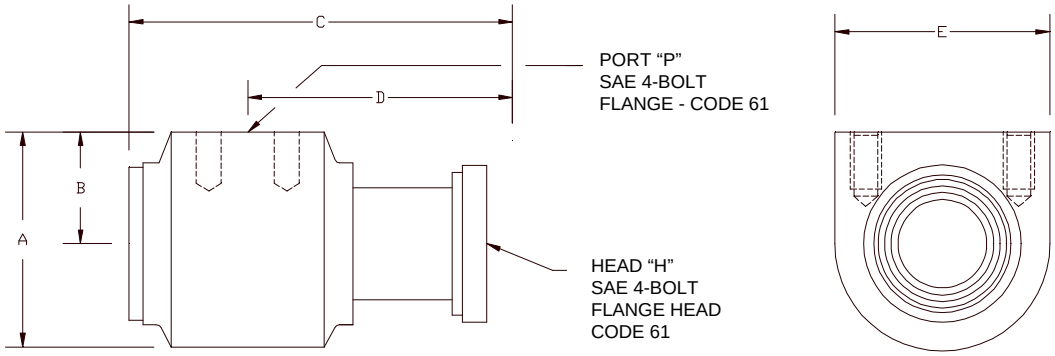
93S SERIES / 3000 PSI / SAE CODE 61 FLANGE

FLANGE PORT TO FLANGE PORT
3000 PSI



PART NUMBER	A	B	C	D	E	P	WT/LBS
93S12FP12-FP12	2.86	1.58	3.26	2.00	2.60	3/4	3.75
93S16FP16-FP16	3.04	1.64	3.73	2.21	2.84	1	4.50
93S20FP20-FP20	3.35	1.75	4.32	2.57	3.30	1 1/4	6.25
93S24FP24-FP24	3.87	2.00	4.93	2.88	3.80	1 1/2	10.25
93S32FP32-FP32	5.05	2.67	6.65	3.89	4.80	2	20.00
93S40FP40-FP40	6.37	3.37	7.39	4.17	6.03	2 1/2	33.25

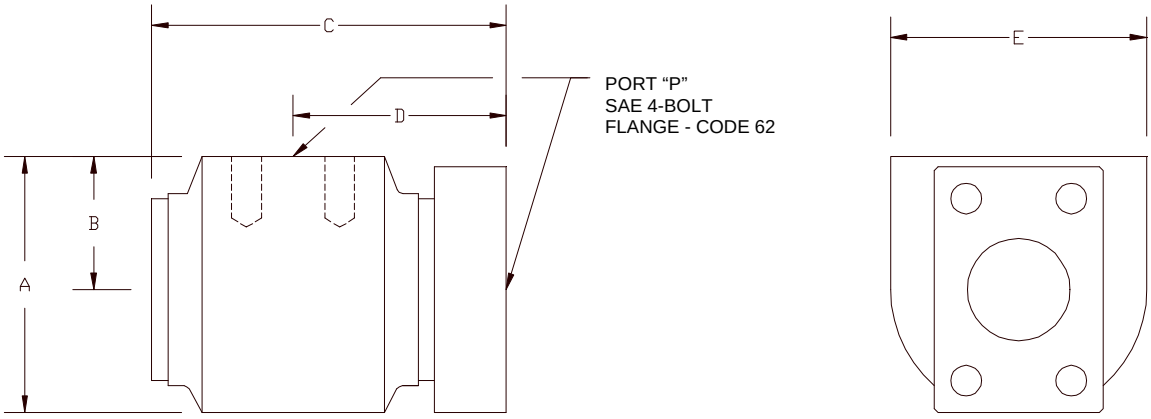
FLANGE PORT TO FLANGE HEAD
3000 PSI



PART NUMBER	A	B	C	D	E	P	H	WT/LBS
93S12FP12-FH12	2.86	1.58	4.18	2.92	2.60	3/4	3/4	3.50
93S16FP16-FH16	3.04	1.64	4.63	3.12	2.84	1	1	4.20
93S20FP20-FH20	3.34	1.75	5.40	3.65	3.30	1 1/4	1 1/4	5.80
93S24FP24-FH24	3.87	2.00	6.05	4.00	3.80	1 1/2	1 1/2	9.60
93S32FP32-FH32	5.04	2.67	7.56	4.80	4.80	2	2	18.30
93S40FP40-FH40	6.37	3.37	8.64	5.24	6.03	2 1/2	2 1/2	32.00

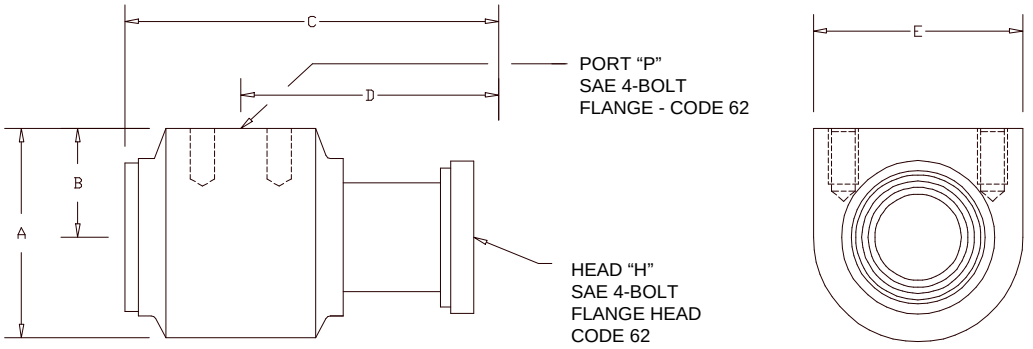
96S SERIES / 6000 PSI / SAE CODE 62 FLANGE

FLANGE PORT TO FLANGE PORT
6000 PSI



PART NUMBER	A	B	C	D	E	P	WT/LBS
96S8FP8-FP8	2.86	1.58	3.13	1.88	2.60	1/2	3.75
96S12FP12-FP12	3.04	1.64	3.73	2.21	2.84	3/4	4.75
96S16FP16-FP16	3.35	1.75	4.24	2.50	3.30	1	6.60
96S20FP20-FP20	3.87	2.00	4.93	2.88	3.80	1 1/4	10.60
96S24FP24-FP24	5.04	2.67	6.84	4.08	4.80	1 1/2	22.30
96S32FP32-FP32	6.37	3.37	7.71	4.48	6.03	2	37.75

FLANGE PORT TO FLANGE HEAD
6000 PSI



PART NUMBER	A	B	C	D	E	P	H	WT/LBS
96S8FP8-FH8	2.86	1.58	4.13	2.87	2.60	1/2	1/2	3.38
96S12FP12-FH12	3.04	1.64	4.88	3.37	2.84	3/4	3/4	4.38
96S16FP16-FH16	3.35	1.75	5.64	3.89	3.30	1	1	6.12
96S20FP20-FH20	3.87	2.00	6.31	4.25	3.80	1 1/4	1 1/4	11.00
96S24FP24-FH24	5.04	2.67	8.40	5.64	4.80	1 1/2	1 1/2	24.00
96S32FP32-FH32	6.37	3.37	9.88	6.65	6.03	2	2	34.50

FLANGED CONNECTORS AND SEAL KITS

CONNECTORS

Swivel Joint Flange Ports And Flange Heads Mate With SAE 4-Bolt Split Flanges And 4-Bolt Solid Flanges. The Flanges Offer Practical Solutions For Connecting Swivels To A Variety Of Mating Fluid Conductors.

REPLACEMENT SEAL KITS

Kits As Listed Contain Dust And Fluid Seals, Retaining Plate And Retaining Screw.

93S SERIES

BODY SIZE	93S12	93S16	93S20	93S24	93S32	93S40
KIT No.	SK93S12-8	SK93S-16-12	SK93S-20-16	SK93S24-20	SK93S-32-24	SK93S-40-32

96S SERIES

BODY SIZE	93S12	93S16	93S20	93S24	93S32	93S40
KIT No.	SK93S12-8	SK93S-16-12	SK93S-20-16	SK93S24-20	SK93S-32-24	SK93S-40-32

NOTE: SPECIAL SEALS

To obtain kits with seal compounds other than standard buna-n, suffix the replacement seal kit part number with the applicable seal material code number. Example: S6-1 kit would become S6-1-9 for a neoprene seal. See chart on Page 2.

PRODUCT INSTALLATION AND PERFORMANCE

INSTALLATION

Rotational Speeds —

Hydraulics, Inc. swivel joints are for low speed rotation as in most fluid powered material handling systems. Maximum speed of rotation depends upon system environment. Fluid types and extreme conditions related to temperatures and pressures are of prime consideration. Questionable applications should be proven by laboratory or prototype testing.

Mechanical Loading —

Wear of swivel components from mechanical loading encourages short seal life through increased clearances between mating surfaces. Minimize mechanical loading from connecting plumbing. Check hose lengths, hose twist and hard tubing alignment for cause of accelerated swivel wear. Do not use the swivel as a structural member.

PERFORMANCE

Pressure Drop At Rated Fuid Flow —

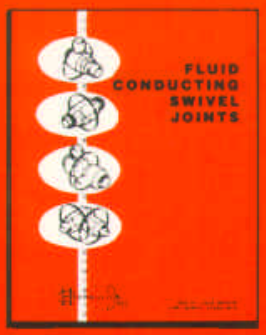
Pressure drop (ΔP) in PSIG of fluid flowing through the swivel at 15 feet per second velocity through the nominal bore size is as follows;

SERIES	SIZE & ΔP IN PSIG AT RATED FLOW						
	8	12	16	20	24	32	40
93S (CODE 61)		6.7	8.0	7.1	8.7	7.5	7.9
96S (CODE 62)	5.1	3.6	5.3	5.3	4.7	4.9	

Rotational Torque At Rated Operating Pressure —

Rotational torque are within the limits of fluid pressure generated flex hose rigidity. Strength of fluid piping restraining devices must be considered.

SERIES	SIZE & TORQUE IN INCH/LBS.						
	8	12	16	20	24	32	40
93S (CODE 61)		46	70	87	370	456	480
96S (CODE 62)	60	90	110	420	520	636	



HC-100

HC-102

HC-103

HC-104A

HYDRAULICS Inc.

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Fax: 817/927-8002

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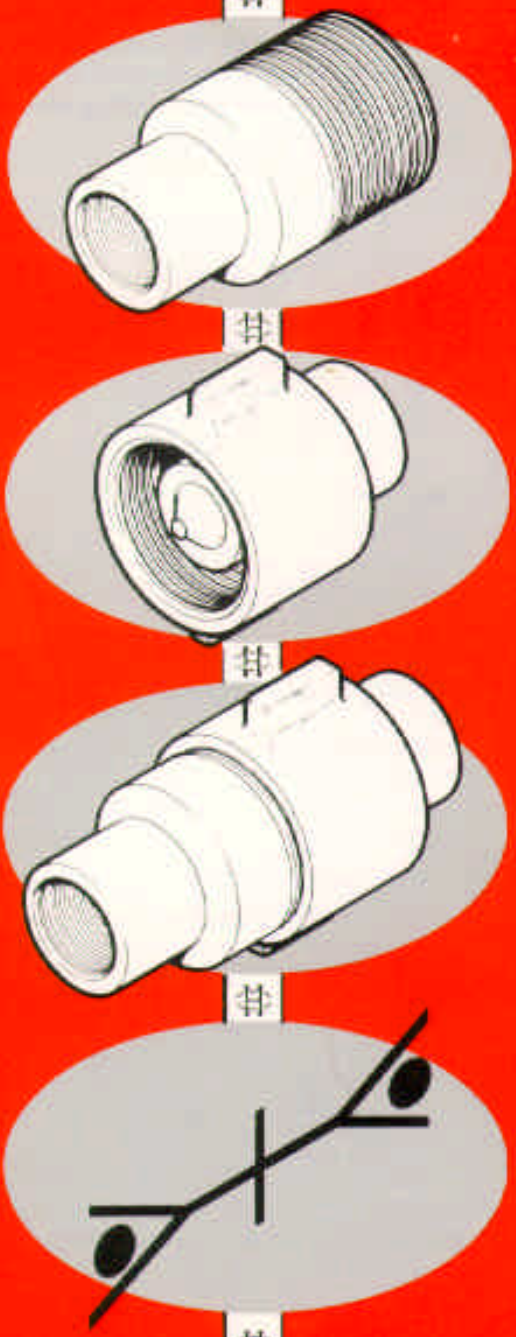
LITHO IN USA 7/91

CATALOG HC-107



FLUID CONDUCTING QUICK DISCONNECT COUPLING

SELF SEALING 5000 P.S.I.

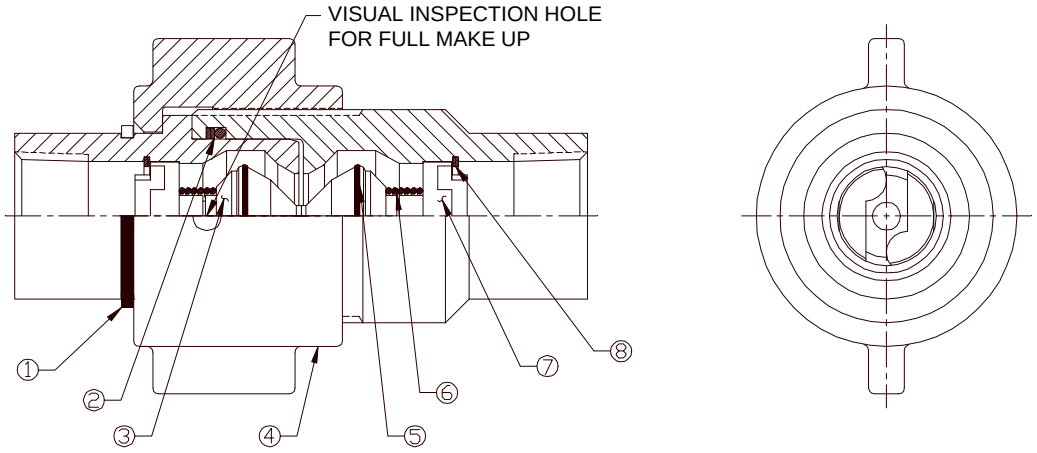
SIZES: 3/4 TO 3 INCH

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110

PRODUCT DATA — 5TV SERIES COUPLINGS

The 5TV series high pressure hydraulic coupling is designed for rugged hydrostatic drive applications in the mining and oil industries. Service in many such applications has proven the design compatible to extreme pressures, structural and system induced shockloads. The construction makes the coupling attractive in applications having low operating pressures. NOTE — Not for use with gaseous fluids.



1 NUT RETAINER RING

2 NIPPLE SEAL (O-RING/BACK UP RING)

3 POPPET VALVE

4 HIGH STRENGTH CAST STEEL NUT

5 VALVE SEAL SWAGED IN AGAINST WASHOUT

6 VALVE SPRING

7 EXCLUSIVE FOUR POINT CONTACT POPPET GUIDE

8 2-TURN LOCK RING

OPERATING LIMITS

- 5,000 P.S.I. operating pressure — all sizes
  20,000 P.S.I. minimum burst — coupled
- Vacuum to 28” Hg
- Standard seal — temperature range — 40°F to +250°F
- Buna-N seals — standard

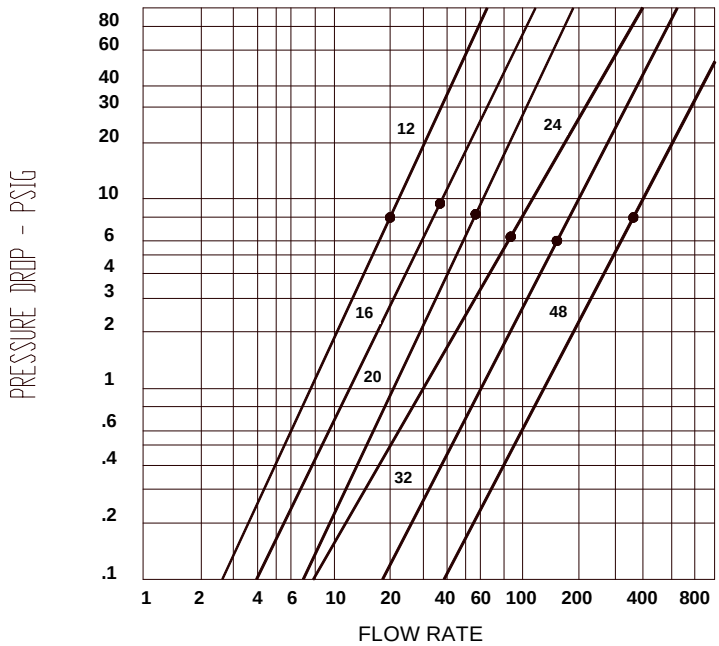
DESIGN FEATURES

- Excellent flow characteristics for continuous duty applications. See flow chart.
- High strength steel poppet guides prevent break up and washout of coupling valving during high surge and shock conditions.
- Exclusive four point support design of poppet guide provides positive alignment of valving during surging flow conditions
- Flat crested stub-acme threads and all steel construction withstand storage and rig-up damage.
- Protective treatment equal to industry standards for SAE steel hose fittings
- Structurally compatible with weight of 5,000 P.S.I. flex-hose and system induced shockloads.

SIZES AND CONNECTION TYPE

- 3/4” thru 3” — female NPTF pipe thread

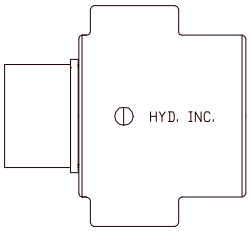
PRESSURE DROP vs FLOW (GPM) —



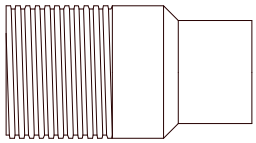
- Pressure drop thru coupling based on flow giving 15 FPS fluid velocity thru nominal bore size.

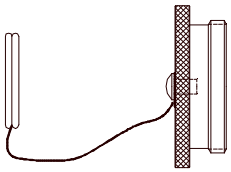
HIGH PRESSURE HYDRAULIC COUPLINGS

COUPLER

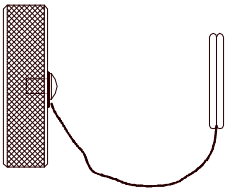


NIPPLE





DUST PLUG



DUST CAP

ASSEMBLY PART NUMBERS					REPAIR PARTS PART NO.	
COUPLING PART NO.	**NIPPLE PART NO.**	**COUPLER PART NO.**	**DUST PLUG PART NO.**	**DUST CAP PART NO.**	**VALVE ASS'Y *PART NO.**	**NIPPLE SEAL PART NO.**
5TV-CN-12	5TV-N-12	5TV-C-12	5TV-DP-12	5TV-DC-12	5TV-VA-12	5TV-NS-12
5TV-CN-16	5TV-N-16	5TV-C-16	5TV-DP-16	5TV-DC-16	5TV-VA-16	5TV-NS-16
5TV-CN-20	5TV-N-20	5TV-C-20	5TV-DP-20	5TV-DC-20	5TV-VA-20	5TV-NS-20
5TV-CN-24	5TV-N-24	5TV-C-24	5TV-DP-24	5TV-DC-24	5TV-VA-24	5TV-NS-24
5TV-CN-32	5TV-N-32	5TV-C-32	5TV-DP-32	5TV-DC-32	5TV-VA-32	5TV-NS-32
5TV-CN-40	5TV-N-40	5TV-C-40	5TV-DP-40	5TV-DC-40	5TV-VA-40	5TV-NS-40
5TV-CN-48	5TV-N-48	5TV-C-48	5TV-DP-48	5TV-DC-48	5TV-VA-48	5TV-NS-48

*INCLUDES POPPET, POPPET GUIDE, SPRING AND RETAINER FOR ONE HALF ONLY

COUPLING PART NO.	**DIMENSIONS**				**THREAD SIZES**	**WEIGHT POUNDS**
	COUPLING LENGTH	**NIPPLE LENGTH**	**COUPLER LENGTH**	**DIM. ACROSS WING NUT**	**FEMALE PIPE THREAD**	**"CN"**
5TV-CN-12	4.86	3.27	2.84	3.00	¾-14	2
5TV-CN-16	6.05	4.18	3.35	3.75	1-11½	5
5TV-CN-20	7.75	5.35	4.42	4.50	1¼-11½	9
5TV-CN-24	8.62	5.97	5.02	4.75	1½-11½	14
5TV-CN-32	10.00	7.05	6.07	6.25	2-11½	28
5TV-CN-40	12.00	8.70	6.94	8.00	2½-8	65
5TV-CN-48	14.81	10.60	9.25	9.75	3-8	148

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HC-100

HC-104A

HC-103

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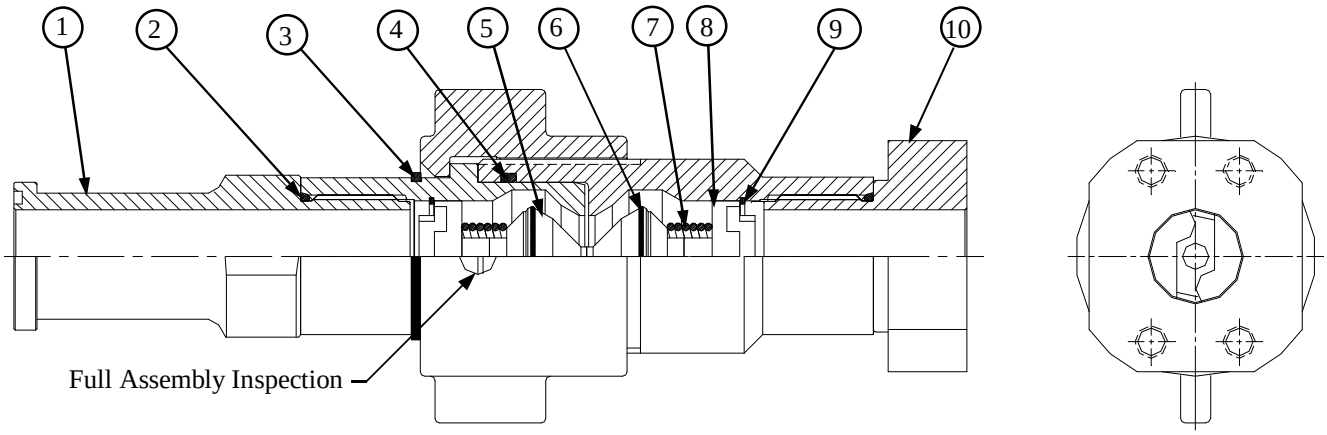
CATALOG HC-103

PRODUCT DATA - 6TV SERIES COUPLINGS

6TV series thread to connect steel couplings provides for high flow and low energy loss in fluid power systems common to mining, oil, construction and other natural resource sectors. Rated operating pressure for these couplings is 6,000 PSI. World class SAE J518 code 61 and code 62 four bolt flange end ports provide leak free solutions at pressures from 2,000 thru 6,000 psi. NOTE - *Not For Gas Fluid Form.*



1. **FLANGE HEAD ADAPTER**
2. **ELASTOMERIC SEAL**
3. **NUT RETAINING RING**
4. **NIPPLE SEAL (O-RING/BACK UP RING)**
5. **POPPET VALVE**
6. **VALVE SEAL (SWAGED IN AGAINST WASHOUT)**
7. **VALVE SPRING**
8. **FOUR-POINT CONTACT POPPET GUIDE**
9. **2-TURN LOCK RING**
10. **FLANGE PORT ADAPTER**

pub142 12-12-02

Features

• Couplers and nipple are supplied as individual items. They also mate the 5TV series rated at 5,000 psi.

• Coupler and nipple end ports are four bolt flange connections to SAE J518, code 61 or code 62, either flange head or flange ports.

• Elastomeric seals greatly reduce end port leakage potential.

• High grade steel construction provides a four to one design factor. It extends fluid port, coupler nut, and nipple thread life, allows for assembly under an amount of pressure and secures valves against wash-out under fluid surge or shock conditions.

• The hammer lug wing nut aids in assembly of coupling against an amount of pressure. Full assembly is visually verified at the coupler nut inspection ports.

• Flat crest stub-acme threads prevent galling and resist rig-up and storage damage. Coupler and Nipple dust plugs are recommended.

• Protective treatment is zinc plate to standards for S.A.E. steel hose fittings.

Physical Characteristics

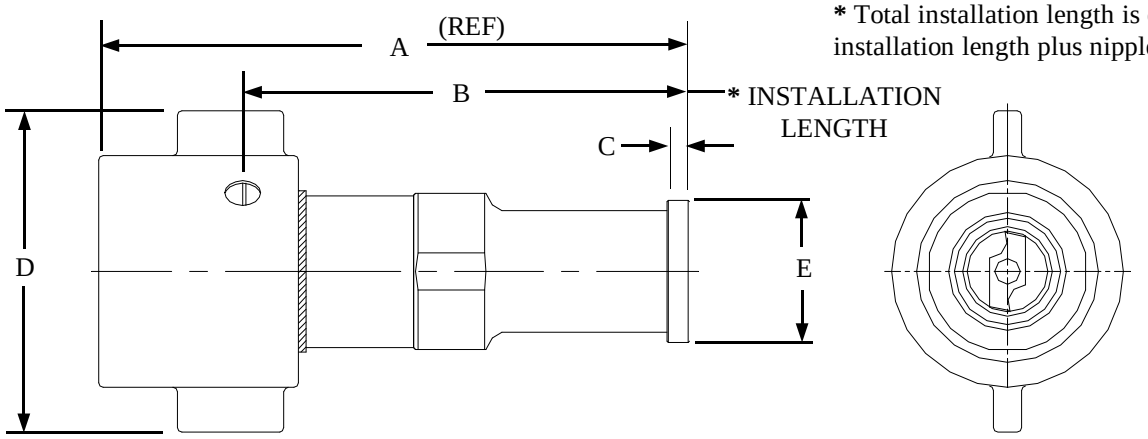
Coupling Sizes	Maximum Operating Pressure (psi)	Minimum Burst Pressure (psi)	Vacuum (in. / Hg)	Rated Flow (gpm @ 20 fps)
-16	6,000	24,000	28	50
-20	6,000	24,000	28	78
-24	6,000	24,000	28	110
-32	6,000	24,000	28	196
-40	6,000	24000	28	306

SAE J518 Ports - Rated Working Pressures

SAE CODE 62 PORTS			SAE CODE 61 PORTS		
Size Inches	Dash Size	Pressure PSI	Size Inches	Dash Size	Pressure PSI
3/4	12	6,000	3/4	12	5,000
1	16	6,000	1	16	5,000
1-1/4	20	6,000	1-1/4	20	4,000
1-1/2	24	6,000	1-1/2	24	3,000
2	32	6,000	2	32	3,000
			2-1/2	40	2,500

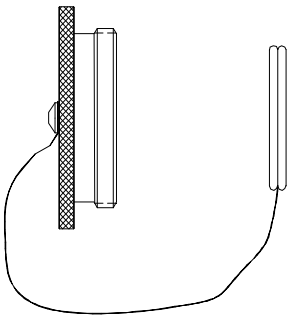
®

6TV SERIES CODE 61 FLANGE HEAD COUPLERS & NIPPLES



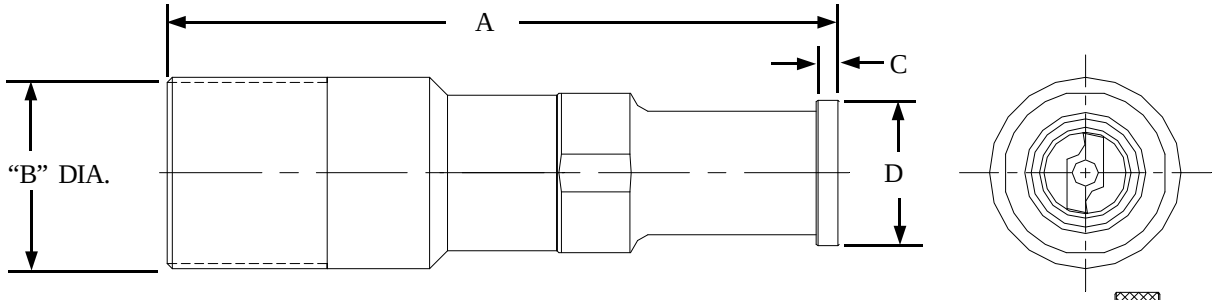
***** Total installation length is coupler installation length plus nipple length.

Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	Wt. in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC5-FH12**	12	6.04	4.79	.265	3.00	1.50		5,000	**5TV-DP-12**
16	**6TVC5-FH16**	16	6.85	5.26	.315	3.75	1.75	4.25	5,000	**5TV-DP-16**
20	**6TVC4-FH20**	20	8.30	6.28	.315	4.51	2.00	6.82	4,000	**5TV-DP-20**
24	**6TVC3-FH24**	24	8.72	6.42	.315	4.75	2.38	9.90	3,000	**5TV-DP-24**
32	**6TVC3-FH32**	32	10.00	6.93	.375	6.75	2.81	19.47	3,000	**5TV-DP-32**
40	**6TVC2/5-FH40**	40	11.10	7.60	.375	8.01	3.31	35.93	2,500	**5TV-DP-40**
48	**6TVC2-FH48**	48							2,000	**5TV-DP-48**

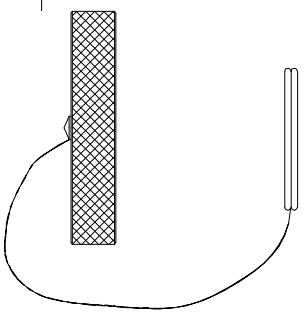


5TV COUPLING PORT DUST PLUG
Dust plugs not included unless specified.

*In an assembly where 6TV type coupling halves include SAE J518 *(June 93)* Code 61 or 62 four bolt split flange ports, the coupling working pressure should not exceed the lower of its port's rated values as noted here.

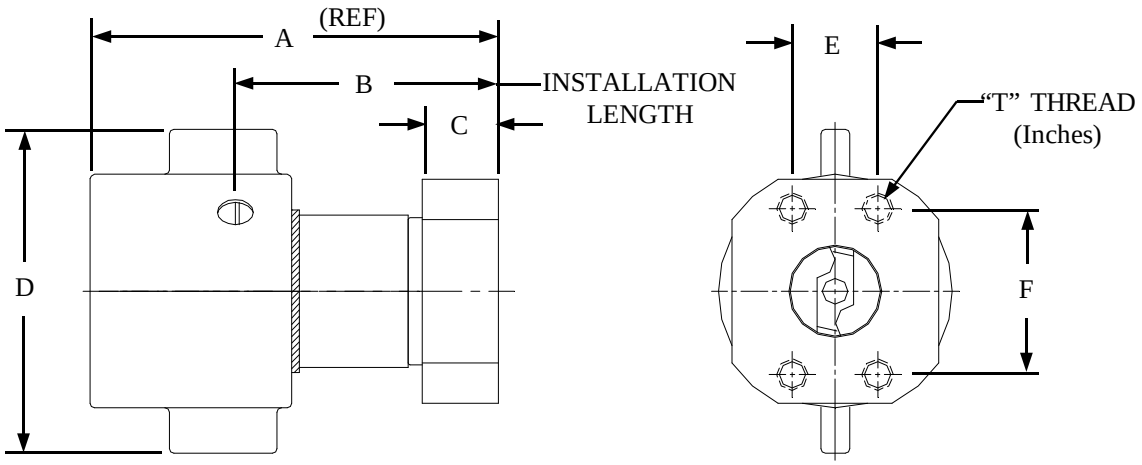


Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	D	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN5-FH12**	12	6.46	1.75	.265	1.50		5,000	**5TV-DC-12**
16	**6TVN5-FH16**	16	7.58	2.25	.315	1.75	3.96	5,000	**5TV-DC-16**
20	**6TVN4-FH20**	20	9.23	2.63	.315	2.00	6.09	4,000	**5TV-DC-20**
24	**6TVN3-FH24**	24	9.67	3.25	.315	2.38	9.50	3,000	**5TV-DC-24**
32	**6TVN3-FH32**	32	10.98	4.00	.375	2.81	15.81	3,000	**5TV-DC-32**
40	**6TVN2/5-FH40**	40	12.93	4.25	.375	3.31	26.10	2,500	**5TV-DC-40**
48	**6TVN2-FH48**	48						2,000	**5TV-DC-48**

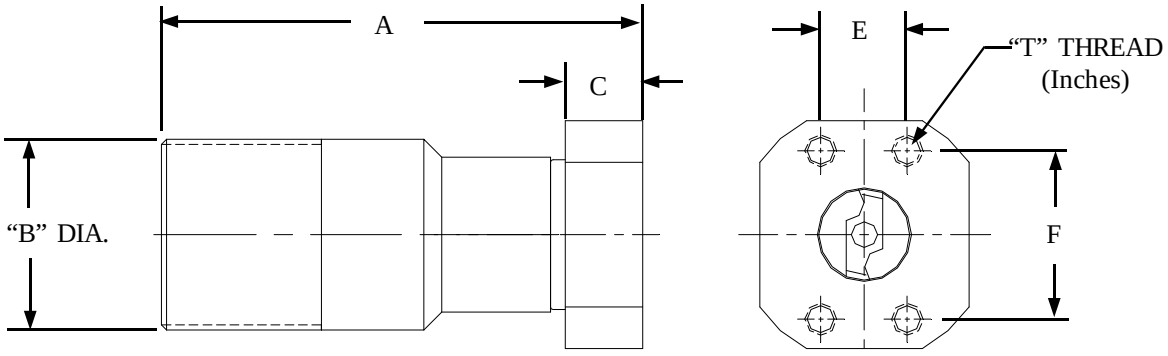


5TV COUPLING PORT DUST CAP
Dust caps not included unless specified.

6TV SERIES CODE 61 FLANGE PORT COUPLERS & NIPPLES

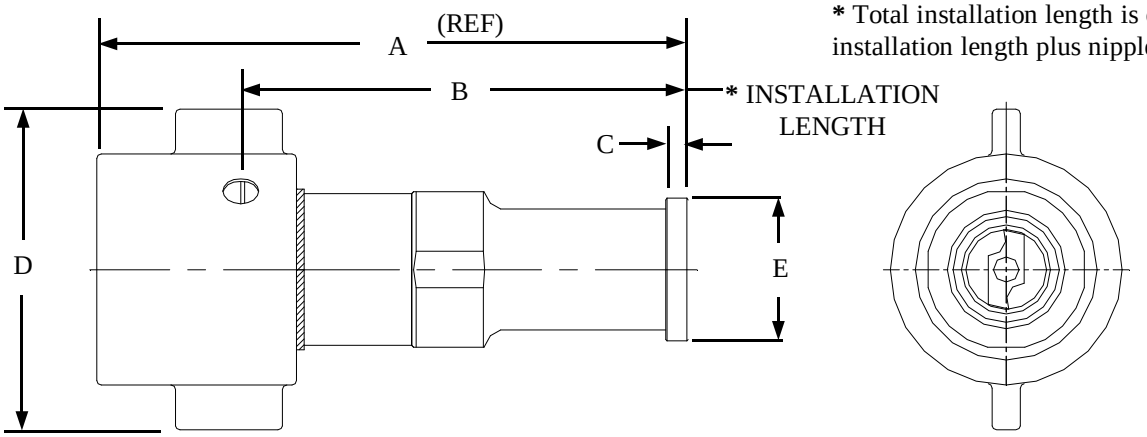


Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	F	T Thread Size-UNC	Wt. in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC5-FP12**	12	4.00	2.75	.88	3.00	.88	1.88	3/8-16		5,000	**5TV-DP-12**
16	**6TVC5-FP16**	16	4.61	3.02	.88	3.75	1.03	2.06	3/8-16	4.29	5,000	**5TV-DP-16**
20	**6TVC4-FP20**	20	5.68	3.66	1.06	4.51	1.19	2.31	7/16-14	7.22	4,000	**5TV-DP-20**
24	**6TVC3-FP24**	24	6.38	4.08	1.06	4.75	1.41	2.75	1/2-13	10.51	3,000	**5TV-DP-24**
32	**6TVC3-FP32**	32	7.41	4.34	1.06	6.75	1.69	3.06	1/2-13	19.73	3,000	**5TV-DP-32**
40	**6TVC2/5-FP40**	40	8.56	5.07	1.69	8.01	2.00	3.50	1/2-13	38.47	2,500	**5TV-DP-40**
48	**6TVC2-FP48**	48									2,000	**5TV-DP-48**



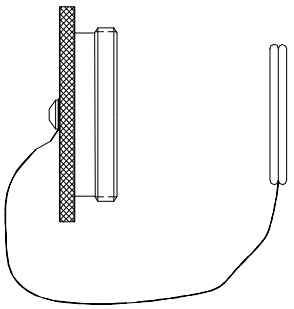
Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	E	F	T Thread Size-UNC	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN5-FP12**	12	4.43	1.75	.88	.88	1.88	3/8-16		5,000	**5TV-DC-12**
16	**6TVN5-FP16**	16	5.33	2.25	.88	1.03	2.06	3/8-16	4.00	5,000	**5TV-DC-16**
20	**6TVN4-FP20**	20	6.61	2.63	1.06	1.19	2.31	7/16-14	6.49	4,000	**5TV-DC-20**
24	**6TVN3-FP24**	24	7.33	3.25	1.06	1.41	2.75	1/2-13	10.11	3,000	**5TV-DC-24**
32	**6TVN3-FP32**	32	8.39	4.00	1.06	1.69	3.06	1/2-13	16.07	3,000	**5TV-DC-32**
40	**6TVN2/5-FP40**	40	10.39	5.25	1.69	2.00	3.50	1/2-13	28.64	2,500	**5TV-DC-40**
48	**6TVN2-FP48**	48								2,000	**5TV-DC-48**

6TV SERIES CODE 62 FLANGE HEAD COUPLERS & NIPPLES



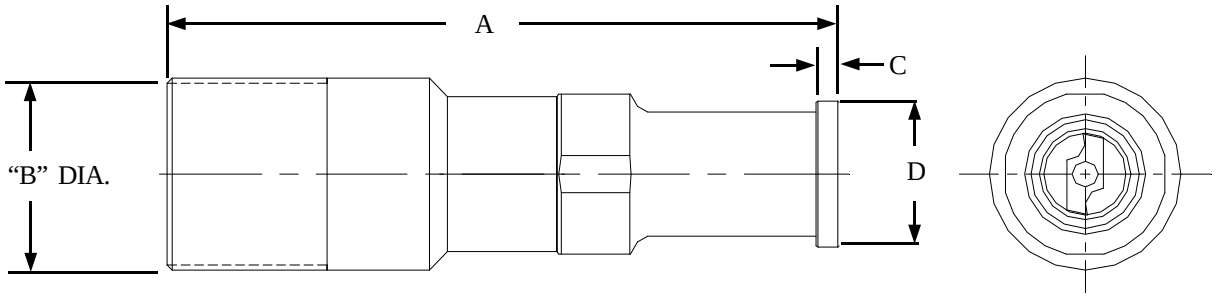
***** Total installation length is coupler installation length plus nipple length.

Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	Wt. in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC6-FH12**	12	6.48	5.23	.345	3.00	1.25		6,000	**5TV-DP-12**
16	**6TVC6-FH16**	16	7.70	6.11	.375	3.75	1.88	4.63	6,000	**5TV-DP-16**
20	**6TVC6-FH20**	20	8.64	6.63	.405	4.51	2.13	7.10	6,000	**5TV-DP-20**
24	**6TVC6-FH24**	24	9.16	6.86	.495	4.75	2.50	10.38	6,000	**5TV-DP-24**
32	**6TVC6-FH32**	32	10.82	7.75	.495	6.75	3.13	20.97	6,000	**5TV-DP-32**
40	**640C6-FH32**	32	11.62	8.13	.495	8.01	3.13	39.4	6,000	**5TV-DP-40**

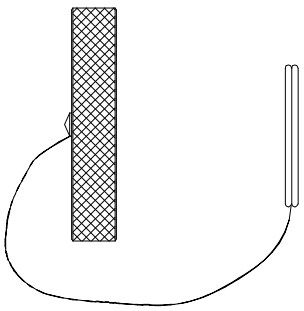


5TV COUPLING PORT DUST PLUG
Dust plugs not included unless specified.

*****In an assembly where 6TV type coupling halves include SAE J518 *(June 93)* Code 61 or 62 four bolt split flange ports, the coupling working pressure should not exceed the lower of its port's rated values as noted here.

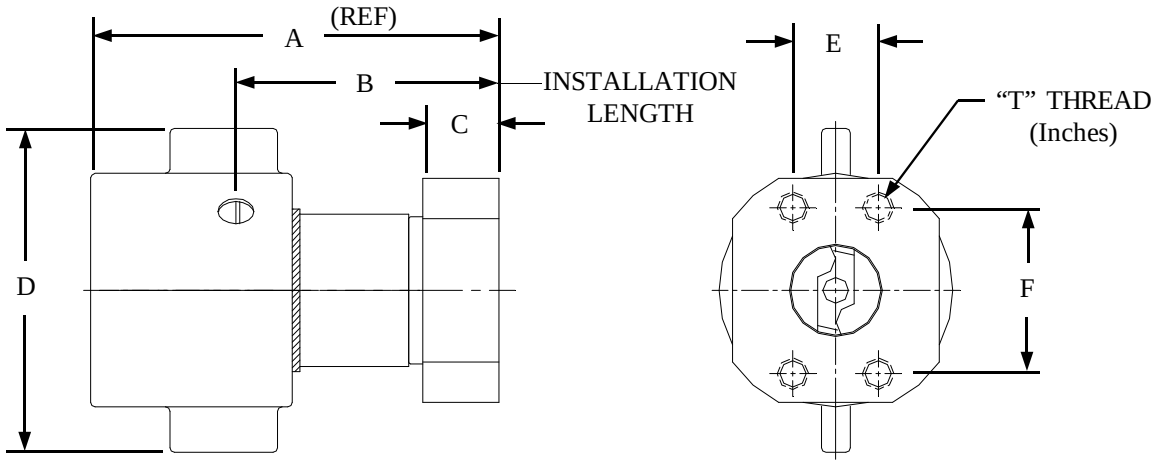


Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	D	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN6-FH12**	12	6.90	1.75	.345	1.25		6,000	**5TV-DC-12**
16	**6TVN6-FH16**	16	8.42	2.25	.375	1.88	4.34	6,000	**5TV-DC-16**
20	**6TVN6-FH20**	20	9.57	2.63	.405	2.13	6.37	6,000	**5TV-DC-20**
24	**6TVN6-FH24**	24	10.11	3.25	.495	2.50	9.98	6,000	**5TV-DC-24**
32	**6TVN6-FH32**	32	11.80	4.00	.495	3.13	17.31	6,000	**5TV-DC-32**
40	**640N6-FH32**	32	13.45	5.25	.495	3.13	29.4	6,000	**5TV-DC-40**

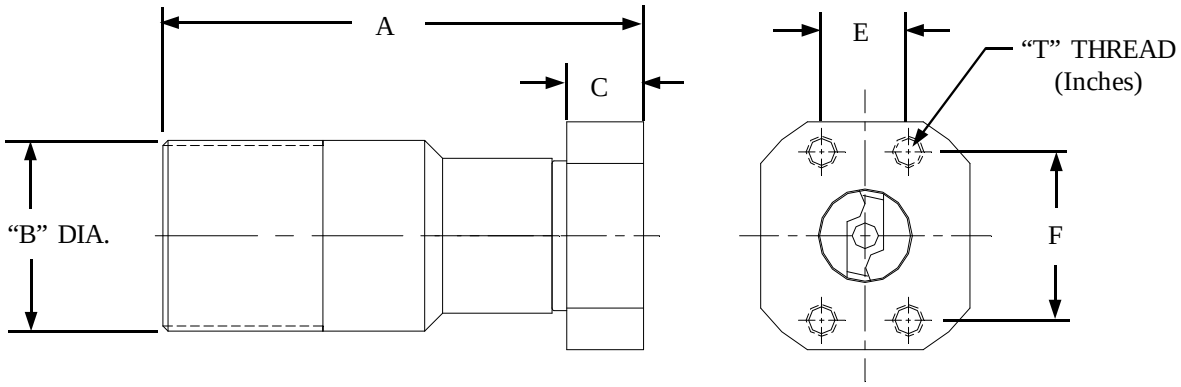


5TV COUPLING PORT DUST CAP
Dust caps not included unless specified.

6TV SERIES CODE 62 FLANGE PORT COUPLERS & NIPPLES



Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	F	T Thread Size-UNC	Wt in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC6-FP12**	12	4.13	2.88	0.94	3.00	0.94	2.00	3/8-16		6,000	**5TV-DP-12**
16	**6TVC6-FP16**	16	4.85	3.26	1.06	3.75	1.09	2.25	7/16-14	5.25	6,000	**5TV-DP-16**
20	**6TVC6-FP20**	20	5.88	3.86	1.12	4.51	1.25	2.63	1/2-13	8.26	6,000	**5TV-DP-20**
24	**6TVC6-FP24**	24	6.80	4.50	1.38	4.75	1.44	3.13	5/8-11	13.11	6,000	**5TV-DP-24**
32	**6TVC6-FP32**	32	8.07	5.00	1.50	6.75	1.75	3.81	3/4-10	24.62	6,000	**5TV-DP-32**
40	**640C6-FP32**	32	8.87	5.38	2.00	8.01	1.75	3.81	3/4-10	45.0	6,000	**5TV-DP-40**



Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	E	F	T Thread Size-UNC	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN6-FP12**	12	4.56	1.75	0.94	0.94	2.00	3/8-16		6,000	**5TV-DC-12**
16	**6TVN5-FP16**	16	5.57	2.25	1.06	1.09	2.25	7/16-14	4.96	6,000	**5TV-DC-16**
20	**6TVN6-FP20**	20	6.81	2.63	1.12	1.25	2.63	1/2-13	7.53	6,000	**5TV-DC-20**
24	**6TVN6-FP24**	24	7.75	3.25	1.38	1.44	3.13	5/8-11	12.71	6,000	**5TV-DC-24**
32	**6TVN6-FP32**	32	9.05	4.00	1.50	1.75	3.81	3/4-10	20.96	6,000	**5TV-DC-32**
40	**640N6-FP32**	32	10.70	5.25	2.00	1.75	3.81	3/4-10	35.0	6,000	**5TV-DC-40**

HYDRAULICS Inc.

Tel: 817-923-1965
Fax: 817-927-8002

Plant & Offices
2935 St. Louis Ave
P.O. Box 6479
Ft. Worth, TX 76115-0479

OFFER OF SALE

This offer for sale by Hydraulics Inc. to the Original Equipment Manufacturer (OEM) is for items described in Hydraulics Inc. Coupling Catalog HC-111. This offer and its acceptance by the OEM ("Buyer") shall be governed by all the following Terms and Conditions. Buyers order for any item described by the catalogs, when communicated to Hydraulics Inc. ("Seller") verbally or in writing, shall constitute acceptance of this offer.

PUB142

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

2. Payment: Payment for goods purchased by Buyer shall be due in 30 days from date of shipment with 1/ 2 % discount off goods purchased if paid in 10 days from the date of shipment. Buyer claims 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: Delivery shall be made F.O.B. sellers plant, Ft. Worth TX. Regardless of the method of delivery, however, risk of loss shall pass to the Buyer upon Seller's delivery to the carrier. Any delivery dates shown are approximate only and seller shall have no liability for any delays in delivery. All offers and payments are in U.S.A. dollars.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material and workmanship for a period of 365 days from the date of shipment to Buyer. 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.

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 the Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at the Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Returns: Buyer may request to return items sold hereunder, however no such requests shall become part of the contract between Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement.

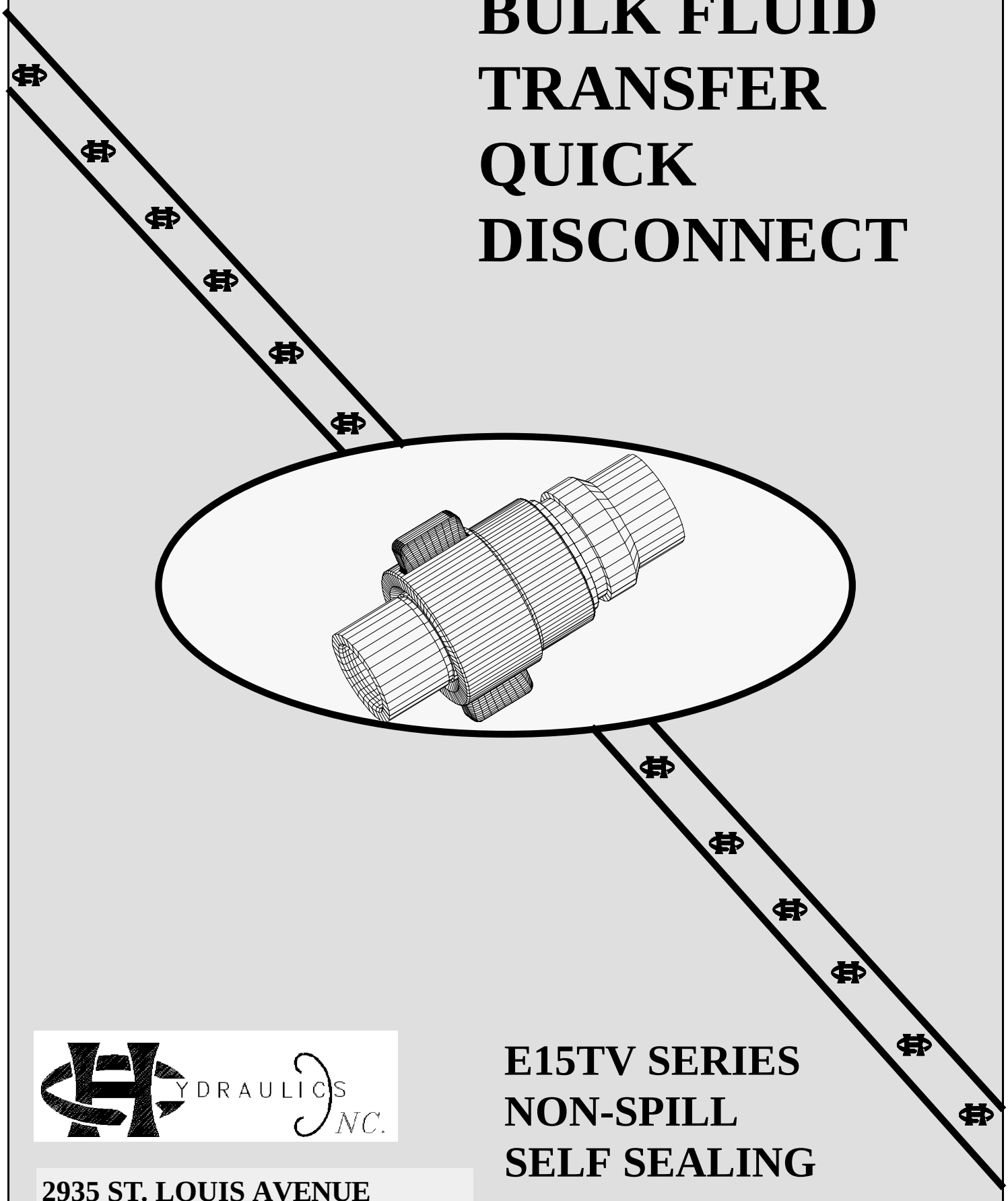
8. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such tax must be paid by the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

9. 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 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 agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyonds Seller's control.

10. Entire Agreement / Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any 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 Texas. 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 the action accrues.

LITHO IN USA 3/2003

BULK FLUID TRANSFER QUICK DISCONNECT

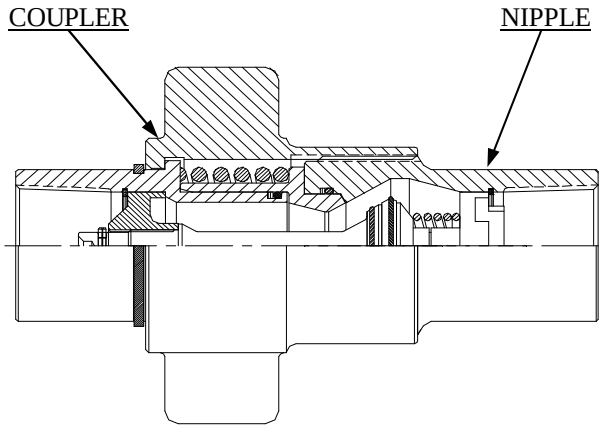


E15TV SERIES NON-SPILL SELF SEALING

HYDRAULICS INC.

2935 ST. LOUIS AVENUE
FORT WORTH, TX 76110

Thread To Connect - E15TV Series Couplings

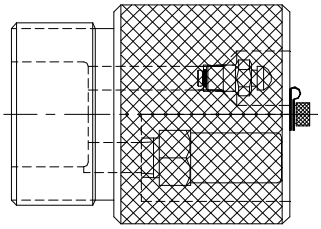


COUPLING ASSEMBLY

Hydraulics Inc. E15TV Couplings were specifically designed for use in transfer of refrigerant from transport to storage vessels. **CAUTION! User must assure compatability of coupling body and seal materials with fluid. Consult fluid manufacturer to determine compatibility.**

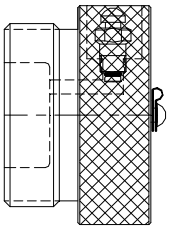
A key safety feature of this hand assembled coupling is that during Coupler and Nipple disconnect, the shut off valves close before the assembly seal vents. Virtually no fluid spill occurs. Should a valve not seal the two halves can be re-connected.

The Caps and Plugs including retention chains and rings are designed to limit Coupler and Nipple contamination and they provide safety features. Also the Coupling halves can be arranged on fluid lines to prevent liquid and vapor line cross-over errors at transfer hook up.



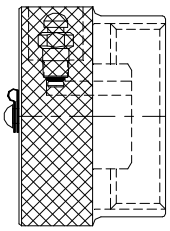
When fully inserted, the Coupler Pressure Relief Plug is designed to open the Coupler valve and communicate refrigerant trapped in the transfer hose bore. Thermal induced pressure build-up is then controlled by the plugs 400 psi relief valve. The plug also guards against contaminants and a button exhaust valve allows trapped gas release before plug removal.

COUPLER PRESSURE RELIEF PLUG



The Coupler Safety Plug is optional to the Relief Plug. It guards against contaminants and is designed to prevent product loss should the coupler valve fail. The safety plug button exhaust valve allows release of trapped gas before plug removal.

COUPLER SAFETY PLUG



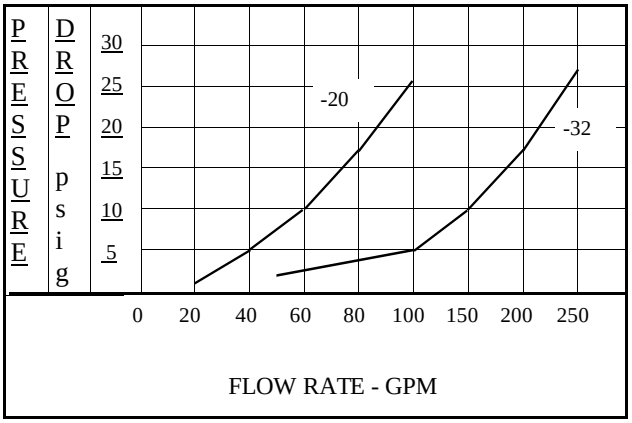
The Nipple Safety Cap is a contaminant safeguard and is designed to prevent product loss should the nipple valve fail. The cap's button exhaust valve allows release of trapped gas before removing the cap.

NIPPLE SAFETY CAP

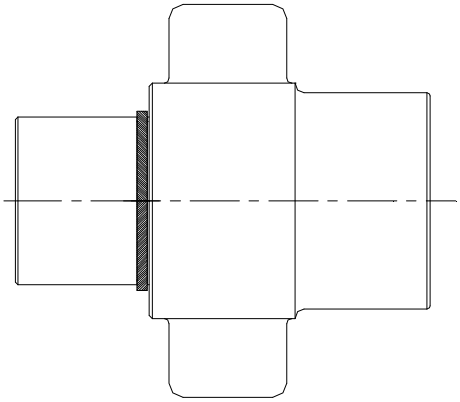
E15TV-CN-20 Coupling

E15TV-CN-32 Coupling

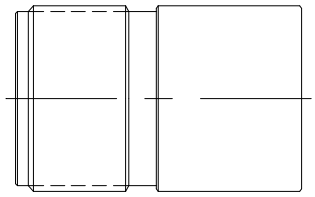
PRESSURE DROP Vs. FLOW
FLUID AT 150 SSU



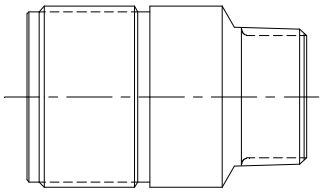
Thread To Connect - E15TV Series Couplings



COUPLER



NIPPLE



NIPPLE (CN-20-24 only)

Pressure Limitations
Coupled & Uncoupled-1500 psi max.
Safety Caps & Plug-500 psi max.
Operating Temp.
-40º F to + 150º F
Seals (other available)
Fluorolon coated Neoprene o-rings
Teflon back-up rings
Fluid Loss @ Disconnect
E15TV-CN-20 - 0.68ML
E15TV-CN-32 - 1.74 ML
Material-Coupling - Caps & Plugs
Bodies - Anodized Aluminum
All other cadmium plated carbon steel.

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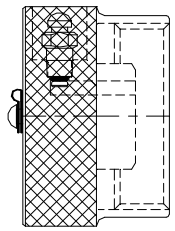
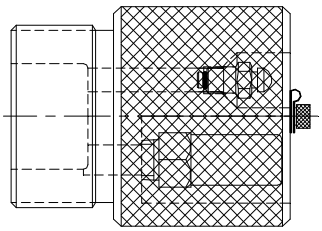
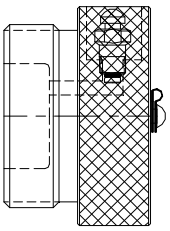


NIPPLE SAFETY CAP
CHAIN & RING



COUPLER PRESSURE RELIEF PLUG
CHAIN & RING

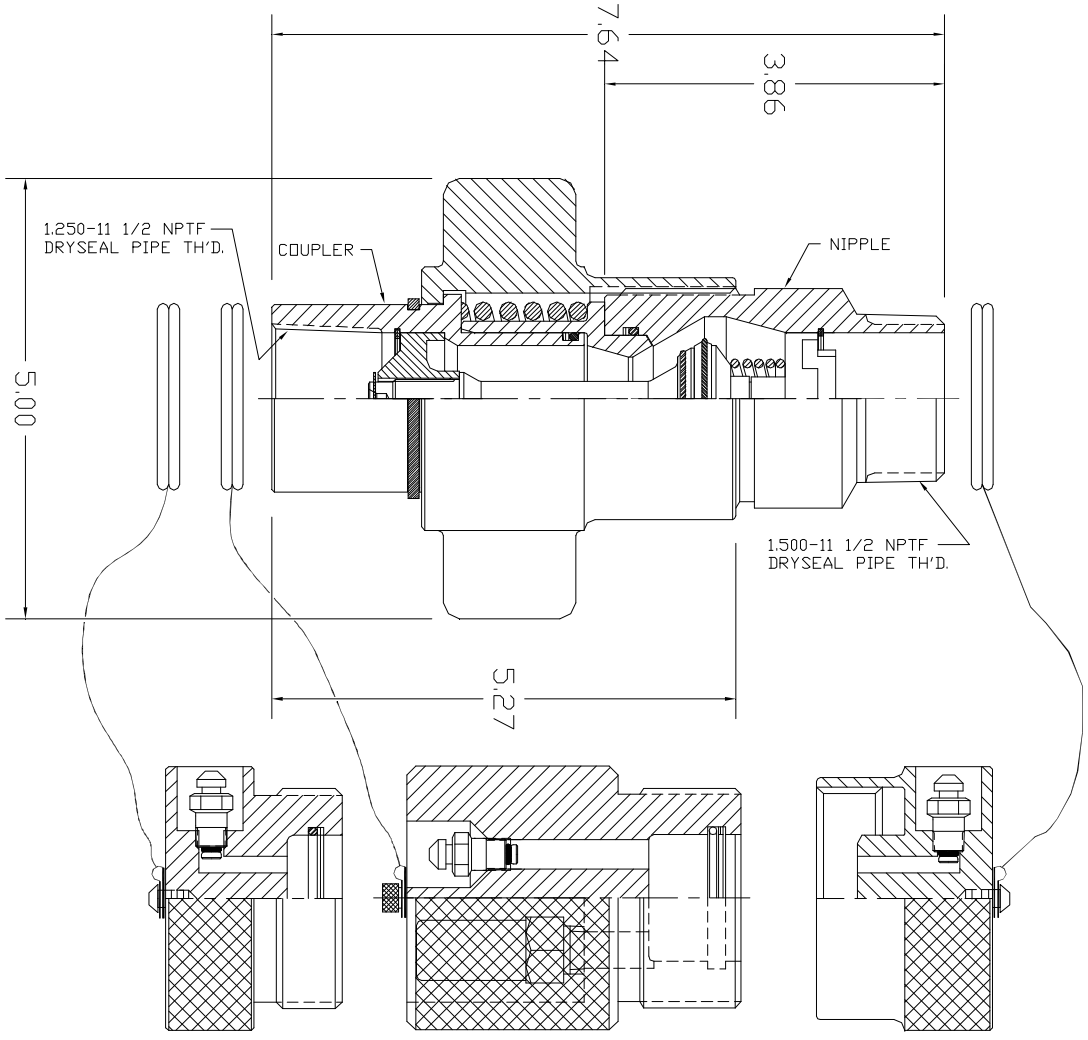


COUPLER SAFETY PLUG
CHAIN & RING

BODY SIZE	COUPLING PART No.	COUPLER PART No.	NIPPLE PART No.	SAFETY CAP PART No.	SAFETY PLUG PART No.	PRESSURE RELIEF PLUG PART No.
1-1/4”	E15TV-CN-20-24	E15TV-C-20	E15TV-N-20-24	E15TV-SC-20	E15TV-SP-20	E15TV-PRP-20
I-1/4”	E15TV-CN-20	E15TV-C-20	E15TV-N-20	E15TV-SC-20	E15TV-SP-20	E15TV-PRP-20
2.0”	E15TV-CN-32	E15TV-C-32	E15TV-N-32	E15TV-SC-32	E15TV-SP-32	E15TV-PRP-32

BODY SIZE	COUPLING PART No.	DIMENSIONS - INCHES				FEMALE PIPE THD SIZE	MALE PIPE THD SIZE	WEIGHT POUNDS
		COUPLING LENGTH	COUPLER LENGTH	NIPPLE LENGTH	ACROSS WING NUT			
1-1/4”	E15TV-CN-20-24	7.64	5.27	3.86	5.00	1-1/4:11-1/2	1-1/2:11-1/2	5
1-1/4”	E15TV-CN-20	7.64	5.27	3.86	5.00	1-1/4:11-1/2		5
2.0”	E15TV-CN-32	11.53	8.17	5.75	6.16	2:11-1/2		14

LTR	REVISION DESCRIPTION	DATE	APPROVED
A	ECN-486	8-17-00	



▷1◁ MUST BE FULLY INSERTED FOR PROPER FUNCTION

NOTES:

1. PART NUMBERS:

E15TV-CN-20-24	COUPLING
E15TV-C-20	COUPLER
E15TV-N-20-24	NIPPLE
E15TV-SP-20	SAFETY PLUG
E15TV-SC-20	SAFETY CAP
▷1◁ E15TV-PRP-20	PRESSURE RELIEF PLUG

2. MATERIAL: ALUMINUM BODY W/STEEL VALVES, NUT, RINGS AND SPRINGS.
3. PLATING: COUPLER & NIPPLE - COMBINATION OF HARD ANODIZE AND ANODIZE WITH BLACK DICHROMATE SEAL
   NUT & VALVE ASSEMBLIES - ZINC WITH DICHROMATE SEAL
4. SEALS: PRODUCT PRICED WITH NEOPRENE -- SUFFIX PART NUMBERS WITH COMPOUND LETTER DESIGNATOR FOR OTHER TYPE - B= BUNA-N, K= KALREZ
5. COUPLING OPERATING LIMITATIONS:
   FLUID LOSS AT DISCONNECT: .68 ml.
   FLUID PRESSURE (MAX.) COUPLED - MINUS 28"Hg TO 1500 P.S.I.G.
   FLUID PRESSURE (MAX.) UNCOUPLED - MINUS 12"Hg TO 1500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
6. SAFETY CAP AND SAFETY PLUG OPERATING LIMITATIONS:
   FLUID PRESSURE (MAX.) - 500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
7. PRESSURE RELIEF PLUG VALVE SET AT 400 P.S.I.
8. WEIGHTS
   COUPLER: 4 lbs.
   NIPPLE: 1 lb.
   SAFETY CAP: 1 lb.
   SAFETY PLUG: 1 lb.
   PRESSURE RELIEF PLUG: 1 lb. 3 oz.

SIGNATURE:	DATE
DRAWN: S. WESTOVER	6-8-00
CHECKED: D.F. HOWETH	6-16-00
APPROVED: D.F. HOWETH	6-16-00
CAD FILE 07H00270	6-16-00

UNLESS OTHERWISE NOTED

1. REMOVE ALL BURRS AND SHARP CORNERS
2. CORNER RADII .015
3. DO NOT SCALE DWG.
4. ALL DIMENSIONS ARE IN INCHES
5. MACHINE FIN .125
6. TOLERANCES
   FRAC +/-.030
   .X +/-.015
   .XX +/-.010
   .XXX +/-.005
   ANG. +/-1/2
   MACH. DIA. TO BE CONCENTRIC TO EACH OTHER WITHIN .010 F.I.M.

WT. REF. ANSI Y14.5-1982 FOR SYMBOLS

HYDRAULICS INC.
2935 ST. LOUIS AVE.
FT. WORTH, TEXAS 76115

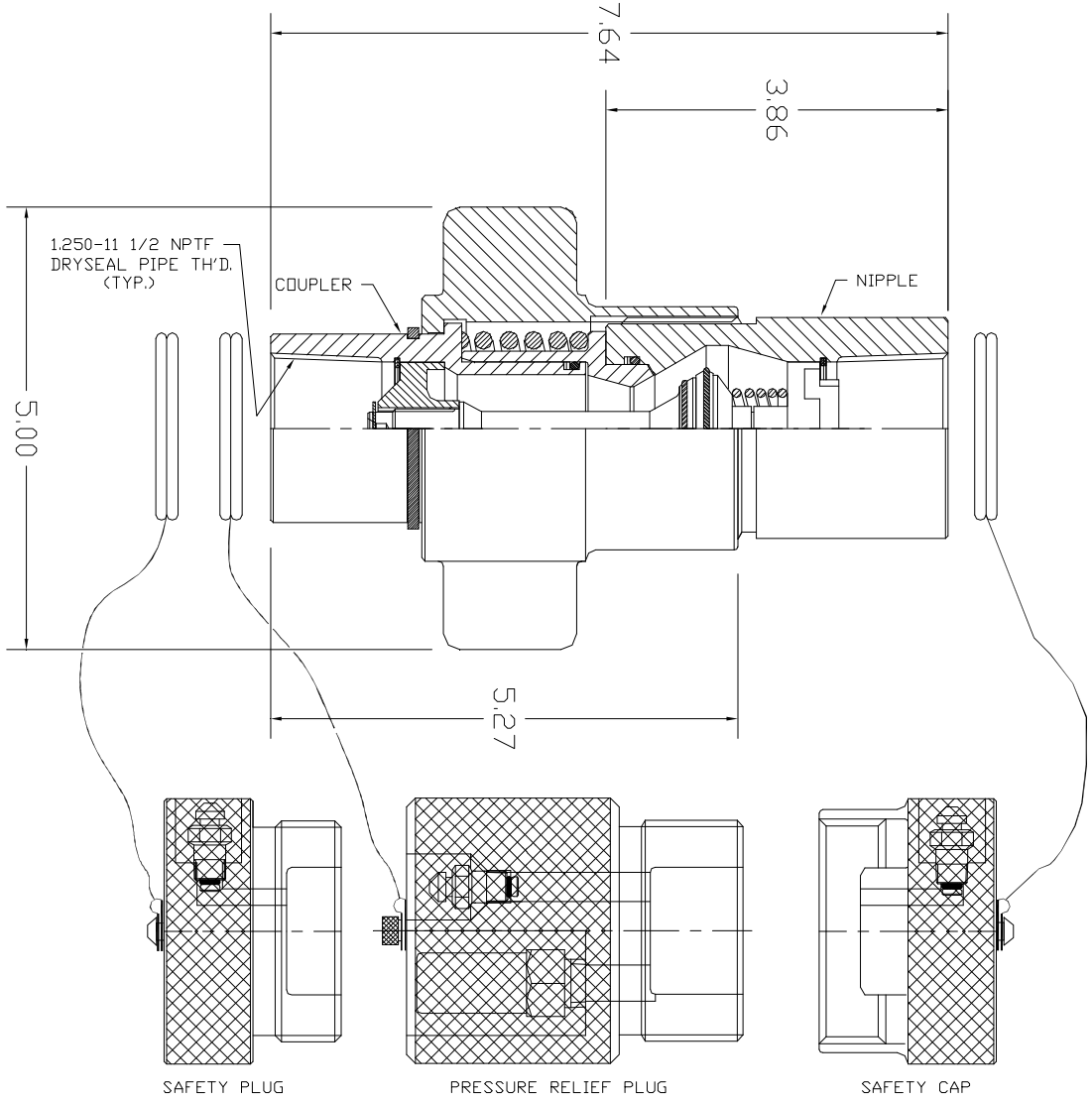
TITLE
E15TV SERIES SELF-SEAL COUPLING
1-1/4" EQUIVALENT BORE SIZE W/SEALS

MTL:	SEE NOTE 2
PLATE:	SEE NOTE 3
HEAT TREAT:	NONE
OTHER:	NONE

SIZE C | NEXT ASSEMBLY NONE | SCALE NONE | SHEET 1 OF 1

DWG. NO. E15TV-CN-20-24 | ORG 1 | CHG A

LTR	REVISION DESCRIPTION	DATE	APPROVED
A	ECN-486	8-17-00	



1 MUST BE FULLY INSERTED FOR PROPER FUNCTION.

NOTES:

1. PART NUMBERS:

E15TV-CN-20	COUPLING
E15TV-C-20	COUPLER
E15TV-N-20	NIPPLE
E15TV-SP-20	SAFETY PLUG
E15TV-SC-20	SAFETY CAP
1 E15TV-PRP-20	PRESSURE RELIEF PLUG

2. MATERIAL: ALUMINUM BODY W/STEEL VALVES, NUT, RINGS AND SPRINGS.
3. PLATING: COUPLER & NIPPLE - COMBINATION OF HARD ANODIZE AND ANODIZE WITH BLACK DICHROMATE SEAL
   NUT & VALVE ASSEMBLIES - ZINC WITH DICHROMATE SEAL
4. SEALS: PRODUCT PRICED WITH NEOPRENE -- SUFFIX PART NUMBERS WITH COMPOUND LETTER DESIGNATOR FOR OTHER TYPE - B= BUNA-N, K= KALREZ
5. COUPLING OPERATING LIMITATIONS:
   FLUID LOSS AT DISCONNECT: .68 ml.
   FLUID PRESSURE (MAX.) COUPLED - MINUS 28"Hg TO 1500 P.S.I.G.
   FLUID PRESSURE (MAX.) UNCOUPLED - MINUS 12"Hg TO 1500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
6. SAFETY CAP AND SAFETY PLUG OPERATING LIMITATIONS:
   FLUID PRESSURE (MAX.) - 500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
7. PRESSURE RELIEF PLUG VALVE SET AT 400 P.S.I.
8. WEIGHTS

COUPLER:	4 lbs.
NIPPLE:	1 lb.
SAFETY CAP:	1 lb.
SAFETY PLUG:	1 lb.
PRESSURE RELIEF PLUG:	1 lb. 3 oz.

SIGNATURE:		DATE
DRAWN:	S. WESTOVER	6-8-00
CHECKED:	D.F. HOWETH	6-16-00
APPROVED:	D.F. HOWETH	6-16-00
CAD FILE	07H00271	6-16-00

UNLESS OTHERWISE NOTED

1. REMOVE ALL BURRS AND SHARP CORNERS
2. CORNER RADII .015
3. DO NOT SCALE DWG.
4. ALL DIMENSIONS ARE IN INCHES
5. MACHINE FIN 125
6. TOLERANCES
   FRAC. +/-.030
   .X +/-.015
   .XX +/-.010
   .XXX +/-.005
   ANG. +/-1/2
   MACH. DIA. TO BE CONCENTRIC TO EACH OTHER WITHIN .010 F.I.M.

WT. | REF. ANSI Y14.5-1982 FOR SYMBOLS

HYDRAULICS INC.
2935 ST. LOUIS AVE.
FT. WORTH, TEXAS 76115

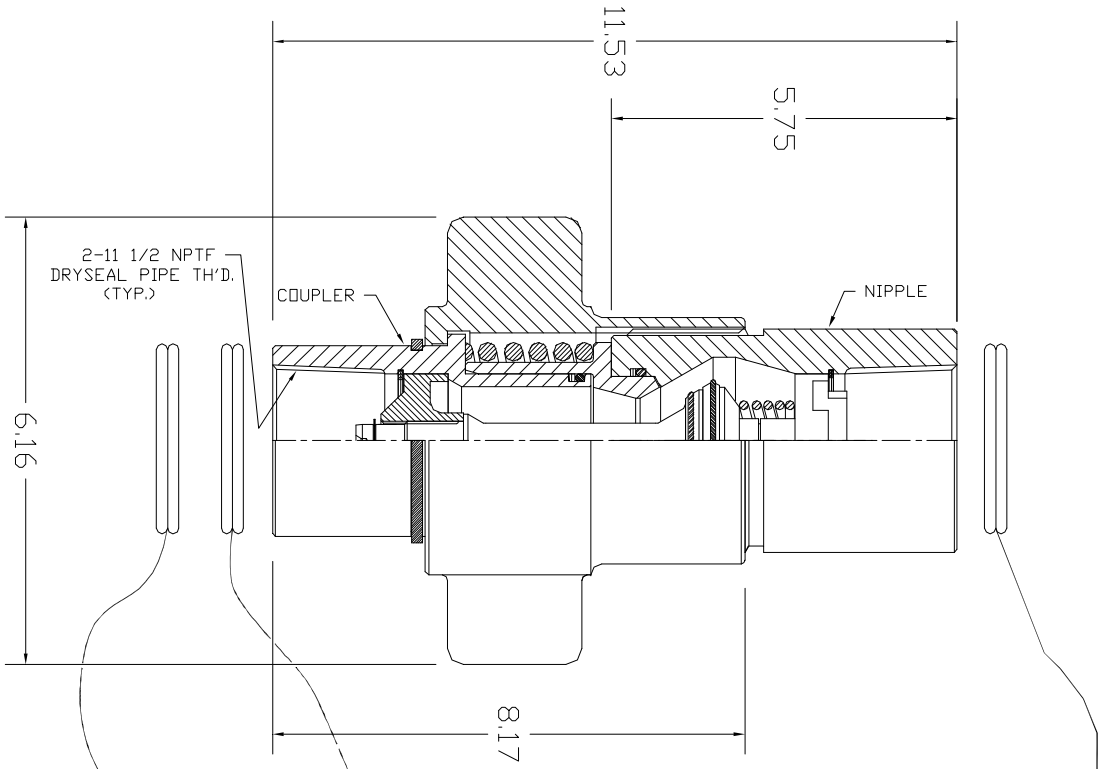
TITLE
E15TV SERIES SELF-SEAL COUPLING
1-1/4" EQUIVALENT BORE SIZE W/SEALS

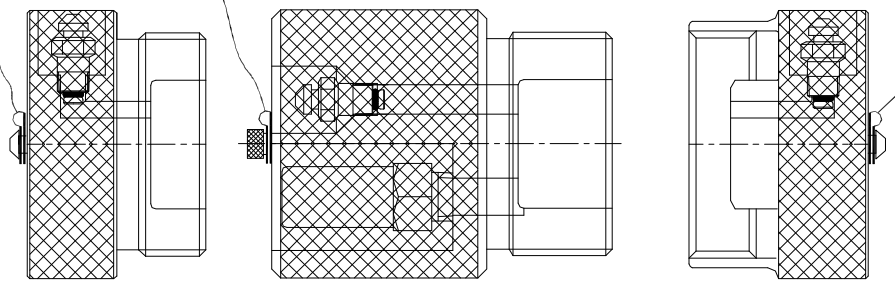
MTL:	SEE NOTE 2
PLATE:	SEE NOTE 3
HEAT TREAT:	NONE
OTHER:	NONE

SIZE C | NEXT ASSEMBLY NONE | SCALE NONE | SHEET 1 OF 1

DWG. NO. E15TV-CN-20 | ORG 1 | CHG A

LTR	REVISION DESCRIPTION	DATE	APPROVED
A	ECN-486	8-17-00	
B	ADDED FLAG NOTES	10-10-01	





SAFETY PLUG PRESSURE RELIEF PLUG SAFETY CAP

NOTES:

1. PART NUMBERS:

	E15TV-CN-32	COUPLING
	E15TV-C-32	COUPLER
	E15TV-N-32	NIPPLE
1	E15TV-SP-32	SAFETY PLUG
1	E15TV-SC-32	SAFETY CAP
2	E15TV-PRP-32	PRESSURE RELIEF PLUG

2. MATERIAL: ALUMINUM BODY W/STEEL VALVES, NUT, RINGS AND SPRINGS.

3. PLATING: COUPLER & NIPPLE - COMBINATION OF HARD ANODIZE AND ANODIZE WITH BLACK DICHROMATE SEAL
NUT & VALVE ASSEMBLIES - ZINC WITH DICHROMATE SEAL

4. SEALS: PRODUCT PRICED WITH NEOPRENE -- SUFFIX PART NUMBERS WITH COMPOUND LETTER DESIGNATOR FOR OTHER TYPE - B= BUNA-N, K= KALREZ

5. COUPLING OPERATING LIMITATIONS:
FLUID LOSS AT DISCONNECT: 1.74 ml.
FLUID PRESSURE (MAX.) COUPLED - MINUS 28"Hg TO 1500 P.S.I.G.
FLUID PRESSURE (MAX.) UNCOUPLED - MINUS 12"Hg TO 1500 P.S.I.G.
TEMPERATURE RANGE - -40°F TO 150°F

6. SAFETY CAP AND SAFETY PLUG OPERATING LIMITATIONS:
FLUID PRESSURE (MAX.) - 500 P.S.I.G.
TEMPERATURE RANGE - -40°F TO 150°F

7. PRESSURE RELIEF PLUG VALVE SET AT 400 P.S.I.

8. WEIGHTS
COUPLER: 12 lbs.
NIPPLE: 3 lbs. 11 oz.
SAFETY CAP: 2 lbs. 10 oz.
SAFETY PLUG: 2 lbs. 11 oz.
PRESSURE RELIEF PLUG: 5 lbs.

1 SAFETY PLUG & CAP POPPET VALVES TO VENT TRAPPED GAS BEFORE REMOVING THESE ARTICLES.

2 MUST BE FULLY INSERTED IN COUPLER TO LIMIT PRESSURE IN HOSE BORE TO 400 PSI.

SIGNATURE:		DATE
DRAWN: S. WESTOVER		6-8-00
CHECKED: D.F. HOWETH		6-16-00
APPROVED: D.F. HOWETH		6-16-00
CAD FILE 07H00272		6-16-00

UNLESS OTHERWISE NOTED

1. REMOVE ALL BURRS AND SHARP CORNERS
2. CORNER RADII .015
3. DO NOT SCALE DWG.
4. ALL DIMENSIONS ARE IN INCHES
5. MACHINE FIN 125
6. TOLERANCES FRAC. +/-.030 X +/-.015 XX +/-.010 XXX +/-.005 ANG. +/-1/2 MACH. DIA. TO BE CONCENTRIC TO EACH OTHER WITHIN .010 F.I.M.

WT. REF. ANSI Y14.5-1982 FOR SYMBOLS

HYDRAULICS INC. 2935 ST. LOUIS AVE, FT. WORTH, TEXAS 76115

TITLE
E15TV SERIES SELF-SEAL COUPLING
2" EQUIVALENT BORE SIZE W/SEALS

MTL: SEE NOTE 2
PLATE: SEE NOTE 3
HEAT TREAT: NONE
OTHER: NONE

SIZE C | NEXT ASSEMBLY NONE
SCALE NONE | SHEET 1 OF 1
DWG. NO. E15TV-CN-32 | DRG 1 | CHG B

HYDRAULICS Inc.

Tel: 817-923-1965
Fax: 817-927-8002

Plant & Offices
2935 St. Louis Ave
P.O. Box 6479
Ft. Worth, TX 76115-0479

OFFER OF SALE

The items described in this document are hereby offered for sale at prices to be established by Hydraulics inc. and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all the following Terms and Conditions. Buyer's order for any item described in this document, when communicated to Hydraulics inc., or any 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 sellers products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyers acceptance of any offer to sell is limited to these terms and conditions. Any terms and conditions in addition to, or inconsistent with those stated herein, proposed by the Buyer in any acceptance of an offer by Seller, are hereby objected to. No other such additional, different or inconsistent terms and conditions shall become a part of the contract between Buyer and seller unless expressly accepted in writing by Seller. Sellers acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in the Buyers offer. Acceptance of Sellers products shall in all events constitute such assent.

2. Payment: Payment for goods purchased by Buyer shall be due in 30 days from date of shipment with 1/ 2 % discount off goods purchased if paid in 10 days from the date of shipment. Buyer claims 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: Delivery shall be made F.O.B. sellers plant, Ft. Worth TX. Regardless of the method of delivery, however, risk of loss shall pass to the Buyer upon Seller's delivery to the carrier. Any delivery dates shown are approximate only and seller shall have no liability for any delays in delivery. All offers and payments are in U.S.A. dollars.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material and workmanship for a period of 365 days from the date of shipment to Buyer. 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.

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 the Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at the Seller's discretion, and shall be upon such terms and conditions as Seller may require.

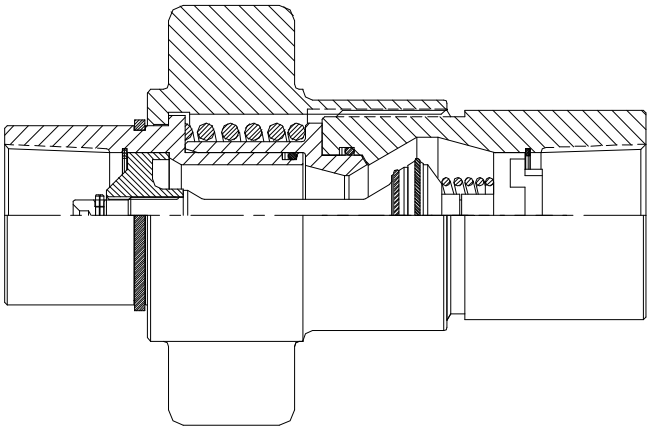
7. Returns: Buyer may request to return items sold hereunder, however no such requests shall become part of the contract between Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement.

8. 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 tax must be paid by the Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts of 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 against such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

9. 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 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 agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyonds Seller's control.

10. Entire Agreement / Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any 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 Texas. 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 the action accrues.

E15TV SERIES
BULK FLUID TRANSFER
QUICK CONNECT COUPLING



HYDRAULICS Inc.

Plant & Offices
2935 St. Louis Ave.
P.O. Box 6479
Ft. Worth, TX 76115-0479

Tel: 817-923-1965
Fax: 817-927-8002
Website:
http://www.hydraulicsinc.com

CONTACT OUR FORT WORTH OFFICE FOR ADDITIONAL PRODUCT INFORMATION ☐ ASK FOR OUR NEAREST STOCKING DISTRIBUTOR

LITHO IN USA 12/06 CATALOG HC-109C

FLUID CONDUCTING SWIVEL JOINTS

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110-4104

Hydraulics, Inc. fluid conducting swivel joints described in this catalog encompass one of the most complete range of sizes and configurations available to industry. Considerable thought has been given to actual needs and because of this, certain types of swivels previously not available to the equipment designer are now standard to Hydraulics, Inc.

The same standards of quality that has been a company tradition since 1955 are prevalent in these products and laboratory testing with hours of actual services has proven the design. In the interest of efficient energy transfer, particular attention has been given to flow characteristics. Rotational torques have been held to limits compatible to flexible hose standards of the industry. Materials and manufacturing process have been selected to provide a most attractive service life when compared to alternate methods.

To the designer of hydraulic powered equipment, these products offer an opportunity to improve existing concepts and take a different approach to new equipment design.

FLUID CONDUCTING SWIVELS PROVIDE

- **Design versatility**
- **Simplified plumbing**
- **Longer flex hose life**
- **Ease of maintenance**

NOTE! THESE PRODUCTS FOR LIQUID FLUID POWER SYSTEMS ONLY

"Because of technological progress and product improvements, all design and dimensional data shown in this catalog is subject to change without notice. Technical information has been prepared from actual test results under controlled environmental conditions and data is considered to be reliable, but no responsibility can be assumed for its accuracy under varied field conditions."

EXAMPLE OF PART NUMBER SYSTEM

9S 6 PF 6 - PF 6 *

BODY CONFIGURATION
S - INLINE
9S - 90°
9SS - DUAL PLANE
18S - 180°

BODY SIZE (3/8")
NOMINAL BORE IN
1/16" INCREMENTS

CONNECTOR TYPE
PF — FEMALE PIPE NPTF
P — MALE PIPE NPTF
J — MALE JIC
O — MALE SAE O-RING
PU — PIPE UNION NPSM
F — MALE SAE O-RING FACE SEAL
FF — FEMALE 0-RING FACE SEAL

SIZE (3/8")

BARREL CONFIGURATION

SPECIAL SEAL COMPOUND NUMBER
3 - FLUOROCARBON (VITON) RUBBER
7 - ETHYLENE PROPYLENE
9 - NEOPRENE
OTHERS ON REQUEST

SIZE (3/8")

CONNECTOR TYPE
(TYPICAL)

STEM CONFIGURATION

MANUFACTURER OF COMPONENTS FOR FLUID POWER SYSTEMS

HIGH PRESSURE HYDRAULIC SWIVEL JOINTS

"S" Series/In-Line Swivel Joint

Sizes - ¼" through 2" pipe size
Connection types - JIC, pipe, SAE O-Ring face seal (male & female)
Operating pressures - vacuum & to 3,000 PSI
Operating temperatures - 40° to 200° F

"9S" Series/90° Swivel Joint

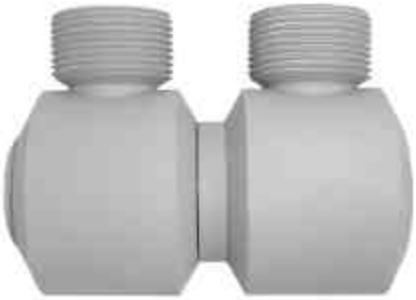
Sizes - ¼" through 2" pipe size
Connection types - JIC & O-Ring (male), pipe and SAE O-Ring face seal (male & female) & pipe union
Operating pressures - vacuum & to 3,000 PSI
Operating temperatures - 40° to 200° F

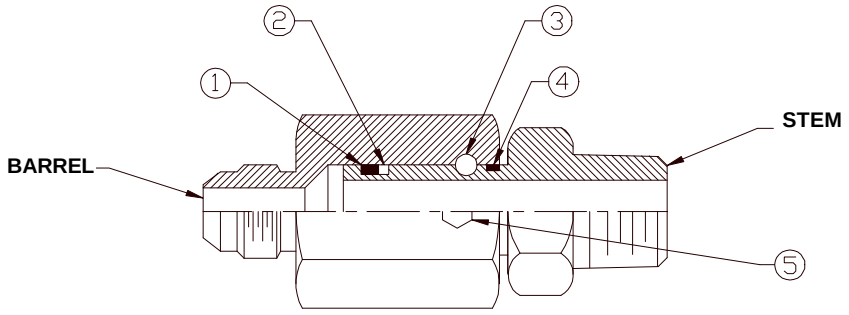
"9SS" Series/Dual Plane Swivel Joint

Sizes - ¼" through 1¼" pipe size
Connection types - JIC & O-Ring (male), pipe & SAE O-Ring face seal (male & female)
Operating Pressures - vacuum & to 3,000 PSI
Operating Temperatures - 40° to 200° F

"18S" Series/180° Swivel Joint

Sizes - ¼" through 2" pipe size
Connection types - JIC (male), pipe & SAE O-Ring face seal (male & female) & pipe union
Operating pressures - vacuum & to 3,000 PSI
Operating temperatures - 40° to 200° F



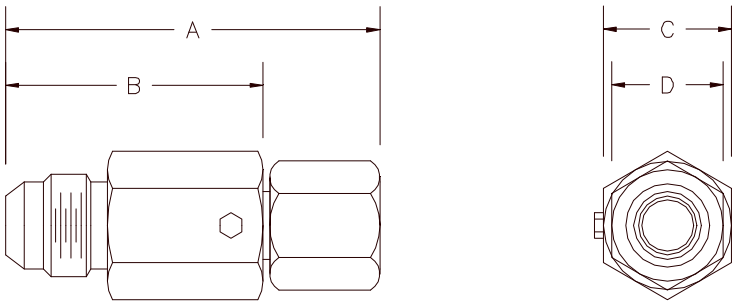


1 SYNTHETIC RUBBER O-RING
2 TEFLON BACK UP RING
3 RETAINER BALLS
4 DUST SEAL
5 BALL HOLE PLUG

HYDRAULICS, INC. Design Features

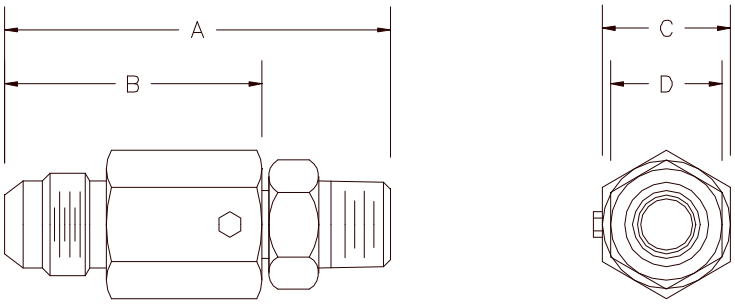
- **Hardened carbon steel barrel and stem - Large wear surface**
- **Protective treatment meeting SAE hose fitting standards**
- **Chrome retainer balls - Long life**
- **Standard O-Ring and back up ring - Field replaceable seal kits - Page 26**
- **Burnished barrel bore - Extended seal life**
- **Optional seal material - Page 2**
- **Low pressure drop - See in-line pressure drop chart - Page 27**
- **Low rotational torque - see in-line torque chart - Page 27**
- **Optonal grease fitting - Page 26**

MALE JIC TO FEMALE PIPE



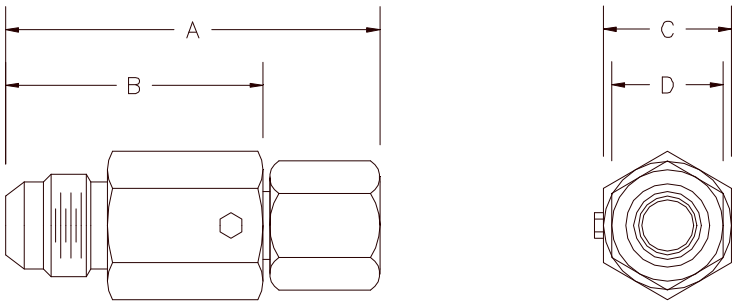
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6J6-PF4	9/16 - 18	1/4 - 18	2.67	1.77	1.00	1.00
S6J8-PF6	3/4 - 16	3/8 - 18	2.81	1.90	1.00	1.00
S8J10-PF8	7/8 - 14	1/2 - 14	3.14	2.00	1.25	1.25
S8J12-PF12	1 1/16 - 12	3/4 - 14	3.23	2.09	1.25	1.25
S16J16-PF16	1 5/16 - 12	1 - 11 1/2	3.75	2.58	1.75	1.62
S20J20-PF20	1 5/8 - 12	1 1/4 - 11 1/2	4.08	2.74	2.25	2.00
S24J24-PF24	1 7/8 - 12	1 1/2 - 11 1/2	4.82	3.12	2.75	2.37
S32J32-PF32	2 1/2 - 12	2 - 11 1/2	6.16	4.39	3.50	3.00

MALE JIC TO MALE PIPE



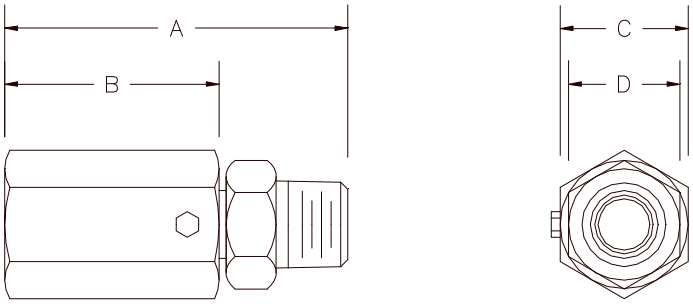
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6J6-P4	9/16 - 18	1/4 - 18	2.61	1.77	1.00	1.00
S6J8-P6	3/4 - 16	3/8 - 18	2.76	1.90	1.00	1.00
S8J10-P8	7/8 - 14	1/2 - 14	3.09	2.00	1.25	1.25
S8J12-P12	1 1/16 - 12	3/4 - 14	3.31	2.09	1.25	1.25
S16J16-P16	1 5/16 - 12	1 - 11 1/2	4.10	2.60	1.75	1.62
S20J20-P20	1 5/8 - 12	1 1/4 - 11 1/2	4.49	2.74	2.25	2.00
S24J24-P24	1 7/8 - 12	1 1/2 - 11 1/2	5.17	3.12	2.75	2.37
S32J32-P32	2 1/2 - 12	2 - 11 1/2	6.96	4.39	3.50	3.00

MALE JIC TO FEMALE JIC



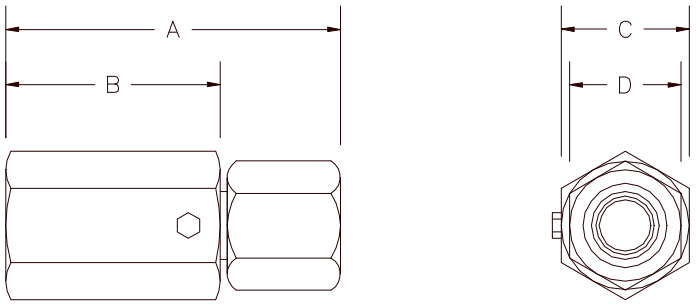
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6J6-JF6	9/16 - 18	9/16 - 18	2.37	1.77	1.00	1.00
S6J8-JF8	3/4 - 16	3/4 - 16	2.56	1.90	1.00	1.00
S8J10-JF10	7/8 - 14	7/8 - 14	2.78	2.00	1.25	1.25
S8J12-JF12	1 1/16 - 12	1 1/16 - 12	2.89	2.09	1.25	1.25
S14J14-JF14	1 3/16 - 12	1 3/16 - 12	2.89	2.09	1.37	1.37
S16J16-JF16	1 5/16 - 12	1 5/16 - 12	3.40	2.60	1.75	1.62
S20J20-JF20	1 5/8 - 12	1 5/8 - 12	3.65	2.74	2.25	2.00
S24J24-JF24	1 7/8 - 12	1 7/8 - 12	4.12	3.12	2.75	2.37
S32J32-JF32	2 1/2 - 12	2 1/2 - 12	5.68	4.39	3.50	3.00

FEMALE PIPE TO MALE PIPE



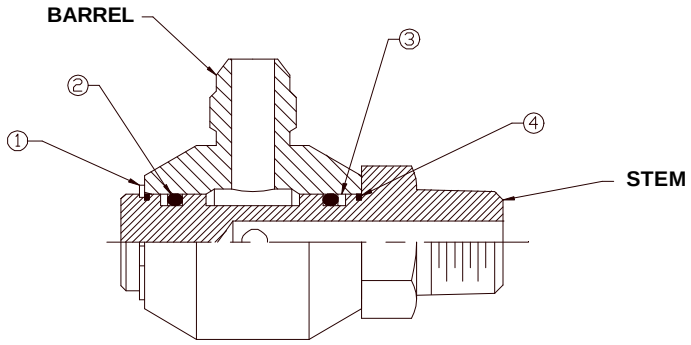
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6PF4-P4	1/4 - 18	1/4 - 18	2.34	1.50	1.00	1.00
S6PF6-P6	3/8 - 18	3/8 - 18	2.34	1.50	1.00	1.00
S8PF8-P8	1/2 - 14	1/2 - 14	2.77	1.68	1.25	1.25
S8PF12-P12	3/4 - 14	3/4 - 14	2.89	1.68	1.25	1.25
S16PF16-P16	1 - 11 1/2	1 - 11 1/2	3.89	2.37	1.75	1.63
S20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.35	2.60	2.25	2.00
S24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.27	3.22	2.75	2.37
S32PF32-P32	2 - 11 1/2	2 - 11 1/2	6.87	4.30	3.50	3.00

FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6PF4-PF4	1/4 - 18	1/4 - 18	2.45	1.55	1.00	1.00
S6PF6-PF6	3/8 - 18	3/8 - 18	2.45	1.55	1.00	1.00
S8PF8-PF8	1/2 - 14	1/2 - 14	2.85	1.70	1.25	1.25
S8PF12-PF12	3/4 - 14	3/4 - 14	2.85	1.70	1.25	1.25
S16PF16-PF16	1 - 11 1/2	1 - 11 1/2	3.55	2.40	1.75	1.63
S20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.00	2.60	2.25	2.00
S24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.92	3.22	2.75	2.37
S32PF32-PF32	2 - 11 1/2	2 - 11 1/2	6.07	4.30	3.50	3.00

9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

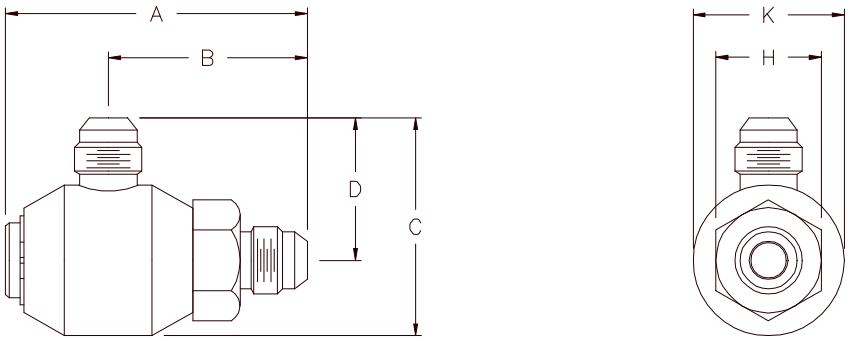


1 NON-LOAD BEARING RETAINING RING
2 SYNTHETIC RUBBER 0-RING (TWO)
3 TEFLON BACK UP RING (TWO)
4 DUST SEAL (TWO)

HYDRAULICS, INC. Design Features

- **Hardened carbon steel barrel - Large wear surface**
- **Barrel thread boss and stem annealed - Reduced breakage from shock and vibration**
- **Burnished barrel bore - Extended seal life**
- **Copper filled furnace braze joints**
- **Heavy duty retainer ring**
- **Protective treatment meeting SAE hose fitting standards**
- **Standard O-Ring and back up ring - Field replaceable seal kits - Page 26**
- **Optional seal material - Page 2**
- **Recessed and protected dust seals**
- **Pressure balanced for low rotational torque - See 90° torque chart - Page 27**
- **Excellent flow characteristics - See 90° pressure drop chart - Page 27**

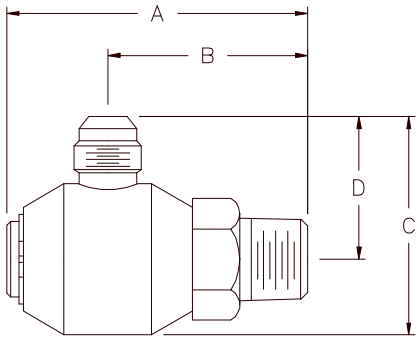
MALE JIC TO MALE JIC

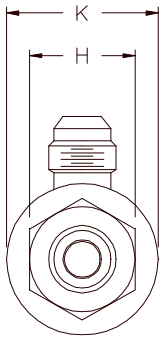


PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-J5	1/2 - 20	1/2 - 20	2.50	1.65	1.80	1.17	.87	1.25
9S6J5-J6	1/2 - 20	9/16 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-J5	9/16 - 18	1/2 - 20	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-J6	9/16 - 18	9/16 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J6-J8	9/16 - 18	3/4 - 16	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-J8	3/4 - 16	3/4 - 16	2.50	1.65	1.91	1.28	.87	1.25
9S8J10-J10	7/8 - 14	7/8 - 14	2.83	1.99	2.26	1.50	1.00	1.50
9S12J12-J12	1 1/16 - 12	1 1/16 - 12	3.40	2.37	3.05	1.99	1.25	2.12
9S16J16-J16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	3.36	2.18	1.62	2.37
9S20J20-J20	1 5/8 - 12	1 5/8 - 12	4.12	2.80	3.70	2.33	2.00	2.75
9S24J24-J24	1 7/8 - 12	1 7/8 - 12	5.27	3.51	4.65	2.90	2.37	3.50
9S32J32-J32	2 1/2 - 12	2 1/2 - 12	6.25	4.16	5.67	3.54	3.12	4.25

9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

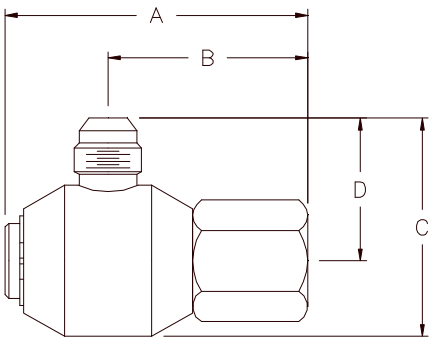
MALE JIC TO MALE PIPE

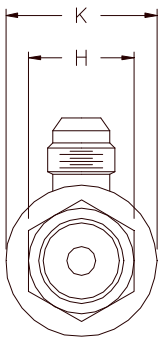




PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-P4	1/2 - 20	1/4 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J5-P6	1/2 - 20	3/8 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-P4	9/16 - 18	1/4 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J6-P6	9/16 - 18	3/8 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-P6	3/4 - 16	3/8 - 18	2.50	1.65	1.91	1.28	.87	1.25
9S8J8-P8	3/4 - 16	1/2 - 14	2.83	1.99	2.20	1.44	1.00	1.50
9S8J10-P8	7/8 - 14	1/2 - 14	2.83	1.99	2.26	1.50	1.00	1.50
9S12J12-P12	1 1/16 - 12	3/4 - 14	3.40	2.37	3.05	1.99	1.25	2.12
9S16J16-P16	1 5/16 - 12	1 - 11 1/2	3.82	2.70	3.36	2.18	1.62	2.37
9S20J20-P20	1 5/8 - 12	1 1/4 - 11 1/2	4.18	2.86	3.70	2.33	2.00	2.75
9S24J24-P24	1 7/8 - 12	1 1/2 - 11 1/2	5.32	3.55	4.65	2.90	2.37	3.50
9S32J32-P32	2 1/2 - 12	2 - 11 1/2	6.20	4.10	5.67	3.54	3.12	4.25

MALE JIC TO FEMALE PIPE

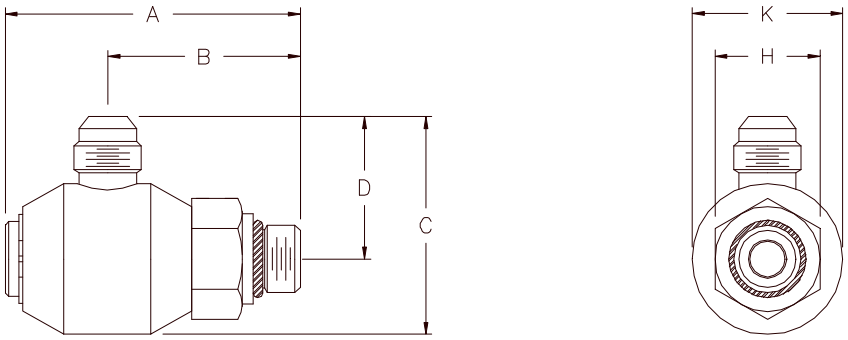




PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-PF4	1/2 - 20	1/4 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J5-PF6	1/2 - 20	3/8 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-PF4	9/16 - 18	1/4 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J6-PF6	9/16 - 18	3/8 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-PF6	3/4 - 16	3/8 - 18	2.50	1.65	1.91	1.28	.87	1.25
9S8J8-PF8	3/4 - 16	1/2 - 14	2.62	1.78	2.20	1.44	1.00	1.50
9S8J10-PF8	7/8 - 14	1/2 - 14	2.62	1.78	2.26	1.50	1.00	1.50
9S12J12-PF12	1 1/16 - 12	3/4 - 14	3.00	2.00	3.05	1.99	1.25	2.12
9S16J16-PF16	1 5/16 - 12	1 - 11 1/2	3.40	2.28	3.36	2.18	1.62	2.37
9S20J20-PF20	1 5/8 - 12	1 1/4 - 11 1/2	4.08	2.76	3.70	2.33	2.00	2.75
9S24J24-PF24	1 7/8 - 12	1 1/2 - 11 1/2	4.89	3.12	4.66	2.91	2.37	3.50
9S32J32-PF32	2 1/2 - 12	2 - 11 1/2	5.50	3.41	5.67	3.53	3.12	4.25

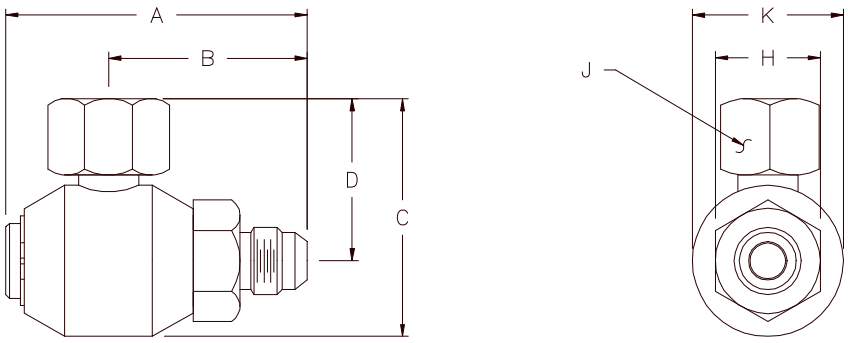
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

MALE JIC TO MALE O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-O6	1/2 - 20	9/16 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-O6	9/16 - 18	9/16 - 18	2.50	1.65	1.80	1.18	.87	1.25
9S6J6-O8	9/16 - 18	3/4 - 16	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-O8	3/4 - 16	3/4 - 16	2.50	1.65	1.91	1.28	.87	1.25
9S8J10-O10	7/8 - 14	7/8 - 14	2.58	1.74	2.26	1.50	1.00	1.50
9S12J12-O12	1 1/16 - 12	1 1/16 - 12	3.24	2.21	3.05	1.99	1.25	2.12
9S16J16-O16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	3.36	2.18	1.62	2.37
9S20J20-O20	1 5/8 - 12	1 5/8 - 12	3.76	2.44	3.70	2.33	2.00	2.75
9S24J24-O24	1 7/8 - 12	1 7/8 - 12	4.78	3.02	4.65	2.90	2.37	3.50
9S32J32-O32	2 1/2 - 12	2 1/2 - 12	5.50	3.41	5.67	3.54	3.12	4.25

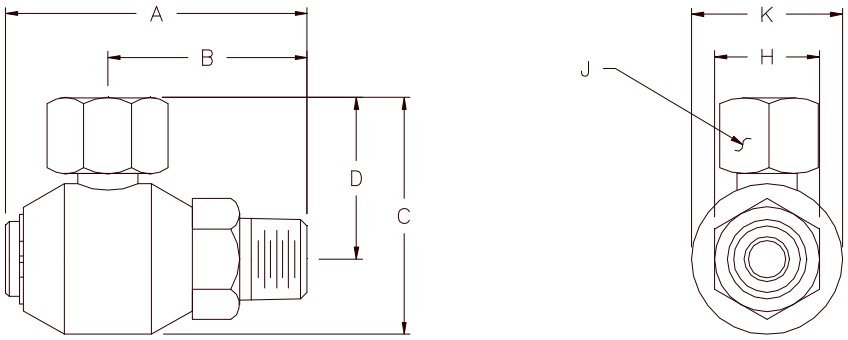
FEMALE PIPE UNION TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-J5	1/4 - 18	1/2 - 20	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU4-J6	1/4 - 18	9/16 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-J5	3/8 - 18	1/2 - 20	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-J6	3/8 - 18	9/16 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-J8	3/8 - 18	3/4 - 16	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-J10	1/2 - 14	7/8 - 14	2.83	1.99	2.26	1.51	1.00	1.00	1.50
9S12PU12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	3.09	2.03	1.25	1.25	2.12
9S16PU16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.31	2.12	1.62	1.50	2.37
9S20PU20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	3.89	2.52	2.00	1.87	2.75
9S24PU24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.71	3.51	4.73	2.98	2.37	2.25	3.50
9S32PU32-J32	2 - 11 1/2	2 1/2 - 12	6.25	4.16	5.65	3.52	3.12	2.75	4.25

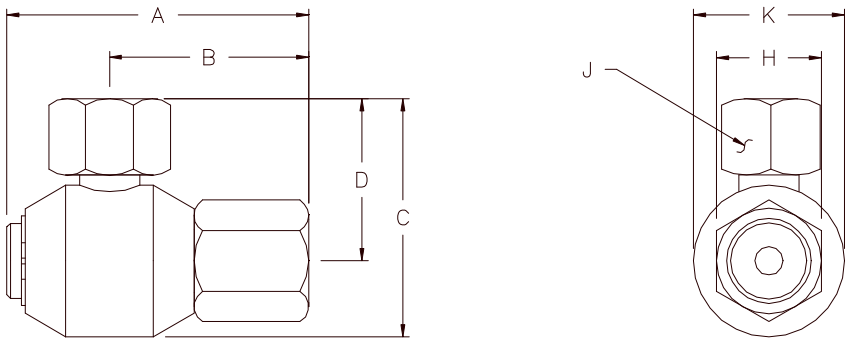
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE UNION TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-P4	1/4 - 18	1/4 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU4-P6	1/4 - 18	3/8 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-P4	3/8 - 18	1/4 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-P6	3/8 - 18	3/8 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-P8	1/2 - 14	1/2 - 14	2.83	1.99	2.26	1.51	1.00	1.00	1.50
9S12PU12-P12	3/4 - 14	3/4 - 14	3.40	2.37	3.09	2.03	1.25	1.25	2.12
9S16PU16-P16	1 - 11 1/2	1 - 11 1/2	3.82	2.70	3.31	2.12	1.62	1.50	2.37
9S20PU20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.86	3.89	2.52	2.00	1.87	2.75
9S24PU24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	4.73	2.98	2.37	2.25	3.50
9S32PU32-P32	2 - 11 1/2	2 - 11 1/2	6.20	4.11	5.65	3.52	3.12	2.75	4.25

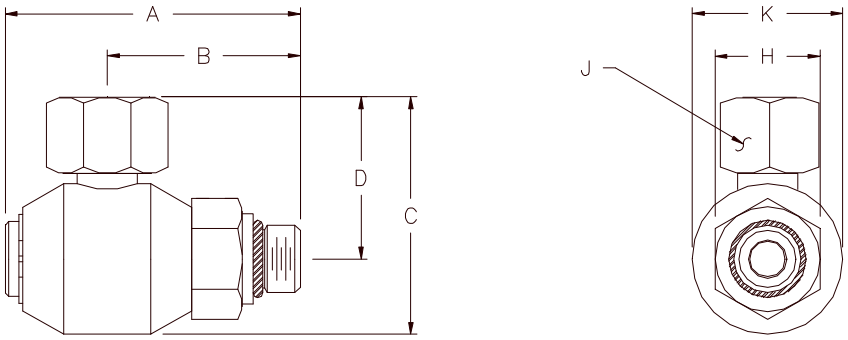
FEMALE PIPE UNION TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	2.26	1.51	1.00	1.00	1.50
9S12PU12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	3.09	2.03	1.25	1.25	2.12
9S16PU16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	3.31	2.12	1.62	1.50	2.37
9S20PU20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	3.89	2.52	2.00	1.87	2.75
9S24PU24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	4.73	2.98	2.37	2.25	3.50
9S32PU32-PF32	2 - 11 1/2	2 - 11 1/2	5.50	3.41	5.65	3.52	3.12	2.75	4.25

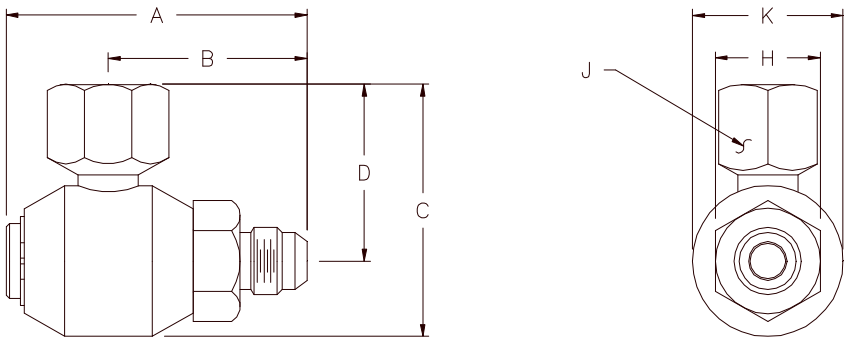
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE UNION TO O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-O6	1/4 - 18	9/16 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-O6	3/8 - 18	9/16 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-O8	3/8 - 18	3/4 - 16	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-O10	1/2 - 14	7/8 - 14	2.58	1.74	2.26	1.51	1.00	1.00	1.50
9S12PU12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	3.09	2.03	1.25	1.25	2.12
9S16PU16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.31	2.12	1.62	1.50	2.37
9S20PU20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.44	3.89	2.52	2.00	1.87	2.75
9S24PU24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	4.73	2.98	2.37	2.25	3.50
9S32PU32-O32	2 - 11 1/2	2 1/2 - 12	5.50	3.41	5.65	3.52	3.12	2.75	4.25

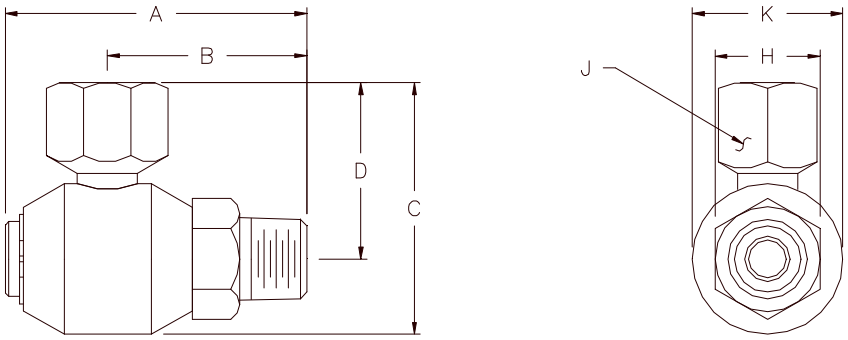
FEMALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-J5	1/4 - 18	1/2 - 20	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF4-J6	1/4 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-J5	3/8 - 18	1/2 - 20	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-J6	3/8 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-J8	3/8 - 18	3/4 - 16	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-J10	1/2 - 14	7/8 - 14	2.83	1.99	2.59	1.84	1.00	1.00	1.50
9S12PF12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	3.30	2.24	1.25	1.37	2.12
9S16PF16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.64	2.46	1.62	1.62	2.37
9S20PF20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	3.98	2.61	2.00	2.00	2.75
9S24PF24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.27	3.51	5.20	3.45	2.37	2.37	3.50
9S32PF32-J32	2 - 11 1/2	2 1/2 - 12	6.25	4.16	6.06	3.94	3.12	2.87	4.25

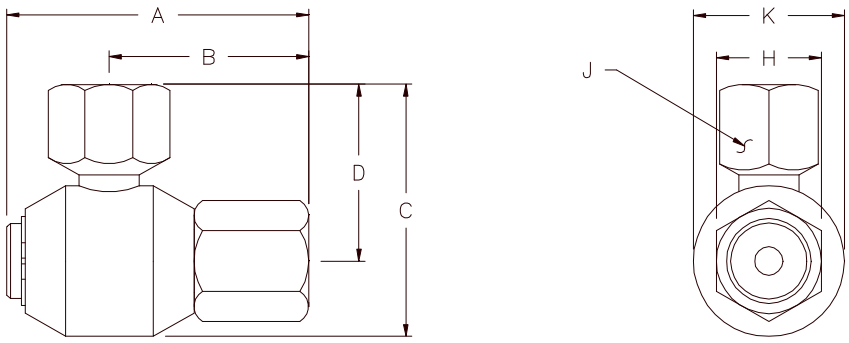
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-P4	1/4 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF4-P6	1/4 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-P4	3/8 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-P6	3/8 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-P8	1/2 - 14	1/2 - 14	2.83	1.99	2.59	1.84	1.00	1.00	1.50
9S12PF12-P12	3/4 - 14	3/4 - 14	3.40	2.37	3.30	2.24	1.25	1.37	2.12
9S16PF16-P16	1 - 11 1/2	1 - 11 1/2	3.82	2.70	3.64	2.46	1.62	1.62	2.37
9S20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.86	3.98	2.61	2.00	2.00	2.75
9S24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	5.20	3.45	2.37	2.37	3.50
9S32PF32-P32	2 - 11 1/2	2 - 11 1/2	6.20	4.11	6.06	3.94	3.12	2.87	4.25

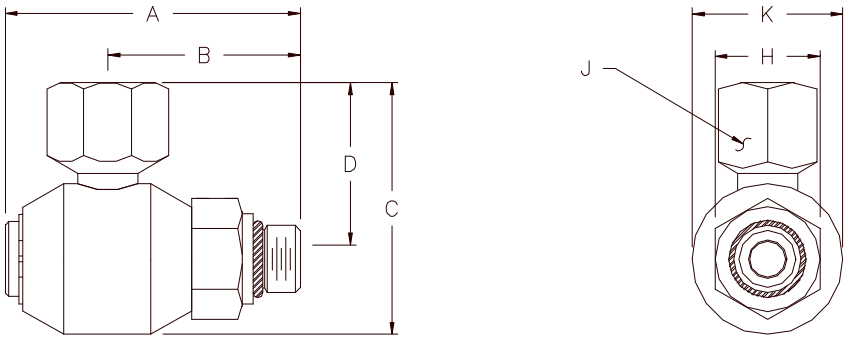
FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	2.59	1.84	1.00	1.00	1.50
9S12PF12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	3.30	2.24	1.25	1.37	2.12
9S16PF16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	3.64	2.46	1.62	1.62	2.37
9S20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	3.98	2.61	2.00	2.00	2.75
9S24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	5.20	3.45	2.37	2.37	3.50
9S32PF32-PF32	2 - 11 1/2	2 - 11 1/2	5.50	3.41	6.06	3.94	3.12	2.87	4.25

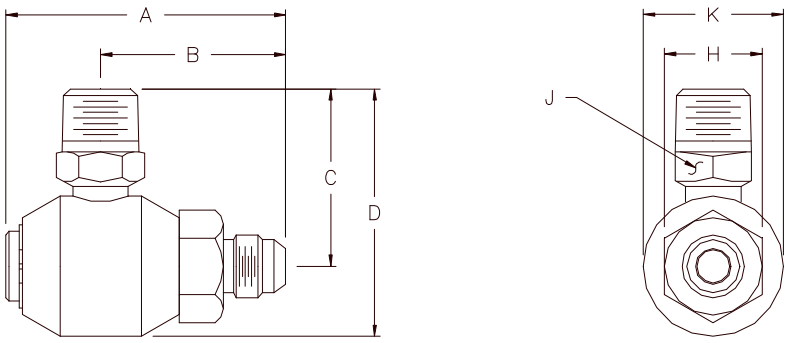
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE TO O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-O6	1/4 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-O6	3/8 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-O8	3/8 - 18	3/4 - 16	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-O10	1/2 - 14	7/8 - 14	2.58	1.74	2.59	1.84	1.00	1.00	1.50
9S12PF12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	3.30	2.24	1.25	1.37	2.12
9S16PF16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.64	2.46	1.62	1.62	2.37
9S20PF20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.44	3.98	2.61	2.00	2.00	2.75
9S24PF24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	5.19	3.44	2.37	2.37	3.50
9S32PF32-O32	2 - 11 1/2	2 1/2 - 12	5.50	3.41	6.06	3.94	3.12	2.87	4.25

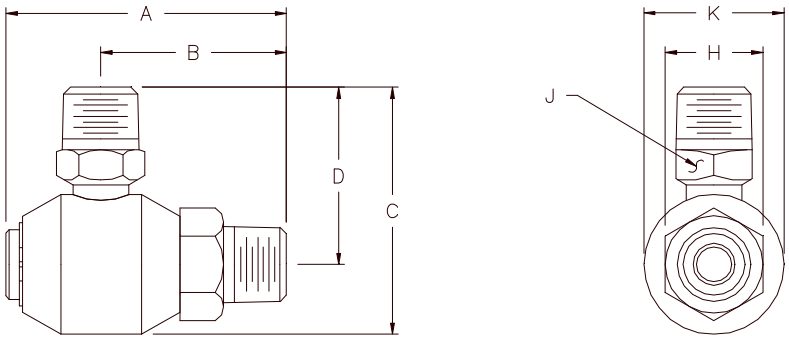
MALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-J5	1/4 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P4-J6	1/4 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-J5	3/8 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-J6	3/8 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-J10	1/2 - 14	7/8 - 14	2.83	1.99	2.65	1.90	1.00	.87	1.50
9S12P12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	3.32	2.26	1.25	1.12	2.12
9S16P16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.81	2.62	1.62	1.37	2.37
9S20P20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	4.31	2.93	2.00	1.75	2.75
9S24P24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.27	3.51	5.45	3.70	2.37	2.37	3.50
9S32P32-J32	2 - 11 1/2	2 1/2 - 12	6.25	4.16	6.55	4.42	3.12	2.87	4.25

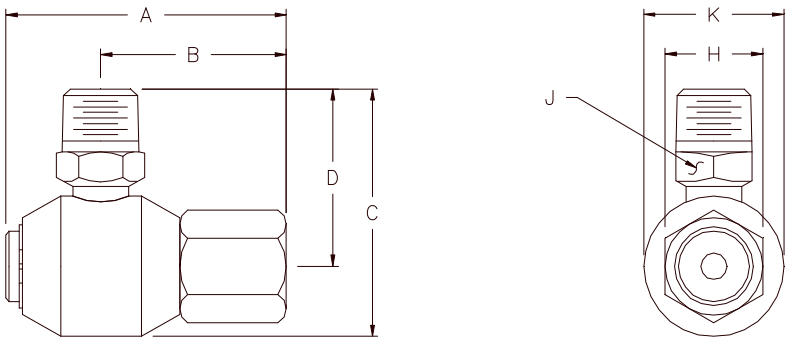
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

MALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-P4	1/4 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P4-P6	1/4 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-P4	3/8 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-P6	3/8 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-P8	1/2 - 14	1/2 - 14	2.83	1.99	2.65	1.90	1.00	.87	1.50
9S12P12-P12	3/4 - 14	3/4 - 14	3.40	2.37	3.32	2.26	1.25	1.12	2.12
9S16P16-P16	1 - 11 1/2	1 - 11 1/2	3.82	2.70	3.81	2.62	1.62	1.37	2.37
9S20P20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.86	4.31	2.93	2.00	1.75	2.75
9S24P24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	5.45	3.70	2.37	2.37	3.50
9S32P32-P32	2 - 11 1/2	2 - 11 1/2	6.20	4.10	6.55	4.42	3.12	2.87	4.25

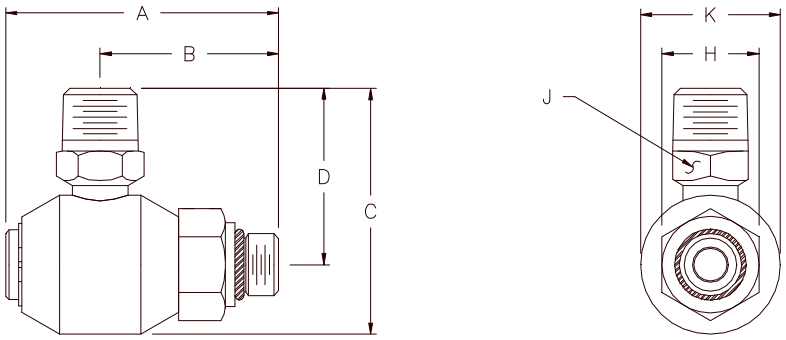
MALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	2.65	1.90	1.00	.87	1.50
9S12P12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	3.32	2.26	1.25	1.12	2.12
9S16P16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	3.81	2.62	1.62	1.37	2.37
9S20P20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	4.31	2.93	2.00	1.75	2.75
9S24P24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	5.44	3.69	2.37	2.37	3.50
9S32P32-PF32	2 - 11 1/2	2 - 11 1/2	5.50	3.41	6.55	4.42	3.12	2.87	4.25

9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

MALE PIPE TO O-RING



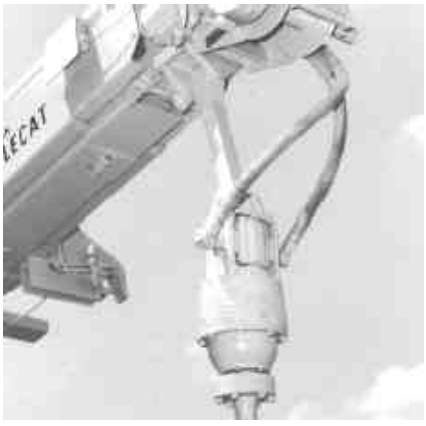
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-O5	1/4 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P4-O6	1/4 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-O5	3/8 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-O6	3/8 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-O8	3/8 - 18	3/4 - 16	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-O10	1/2 - 14	7/8 - 14	2.58	1.75	2.65	1.90	1.00	.87	1.50
9S12P12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	3.32	2.26	1.25	1.12	2.12
9S16P16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.81	2.62	1.62	1.37	2.37
9S20P20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.45	4.31	2.93	2.00	1.75	2.75
9S24P24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	5.45	3.70	2.37	2.37	3.50
9S32P32-O32	2 - 11 1/2	2 1/2 - 12	5.50	3.41	6.55	4.42	3.12	2.87	4.25

INSTALLATION INFORMATION

Hydraulics, Inc. swivel joints are generally considered low speed rotation as encountered in fluid power systems. Maximum speed of rotation depends upon system enviromnent, with fluid types and extreme conditions as related to temperatures and pressures being of prime consideration. Questionable applications should be proven by laboratory or prototype testing.

Contamination at installation should be avoided and connecting plumbing should not cause undue loading. The swivel should not be used as a load bearing or structural member.

TYPICAL INSTALLATIONS

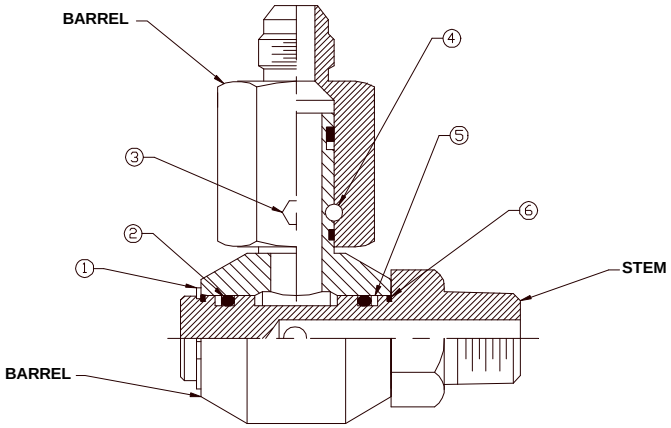


Earth boring auger on utility truck compensates movement in all planes by using "9SS" Series swivel.

Log loader utilizes limited boom rotation and "S" Series swivel on hoses through spindle.

Coal mining equipment manufacturer extends hose life with "9S" Series swivels allowing hose to take natural form for flexing.

9SS SERIES / 90° 3000 PSI / DUAL PLANE

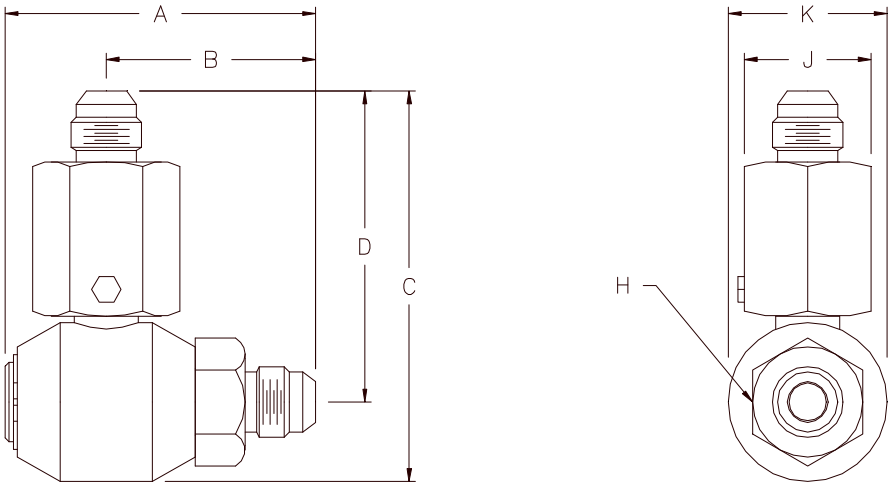


1 NON-LOAD BEARING RETAINING RING
2 SYNTHETIC RUBBER 0-RING (THREE)
3 BALL HOLE PLUG
4 RETAINING BALLS
5 TEFLON BACK UP RING (THREE)
6 DUST SEAL (THREE)

HYDRAULICS, INC. Design Features

- Hardened carbon steel barrel and in-line stem
- Stem annealed - Reduced breakage from shock and vibration
- Burnished barrel bores - Extended seal life
- Copper filled furnace braze joints
- Protective treatment meeting SAE hose fitting standards
- Standard O-Ring and back up ring - Field replaceeable seal kits - Page 26
- Optional seal material - Page 2
- Recessed and protected dust seals
- Low rotational torque - See in-line and 90° torque chart - Page 27
- Low pressure drop - Combine in-line and 90° pressure drop chart - Page 27
- Optional grease fitting - Page 26

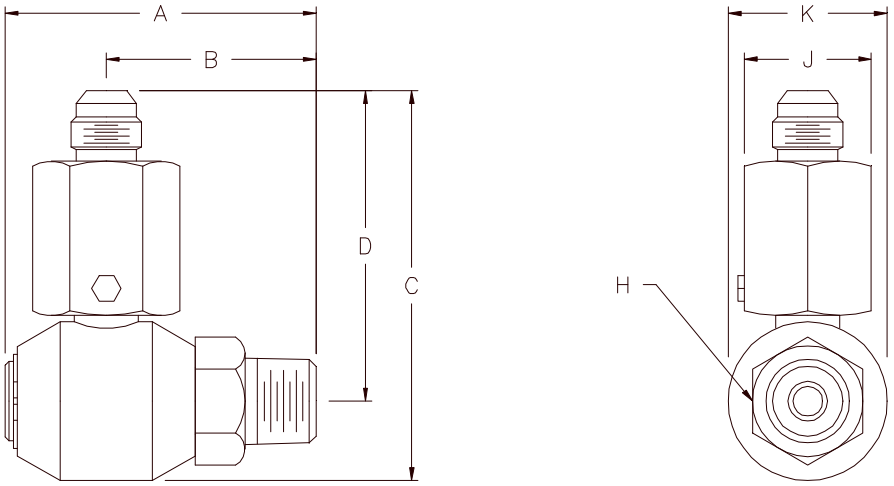
MALE JIC TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-J5	9/16 - 18	1/2 - 20	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-J6	9/16 - 18	9/16 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-J8	9/16 - 18	3/4 - 16	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS8J10-J10	7/8 - 14	7/8 - 14	2.83	2.00	3.60	2.96	1.00	1.25	1.50
9SS12J12-J12	1 1/16 - 12	1 1/16 - 12	3.40	2.37	4.30	3.23	1.25	1.37	2.12
9SS16J16-J16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	5.10	3.90	1.62	1.75	2.37
9SS20J20-J20	1 5/8 - 12	1 5/8 - 12	4.12	2.81	5.72	4.44	2.00	2.25	2.75
9SS24J24-J24	1 7/8 - 12	1 7/8 - 12	5.27	3.51	6.87	5.12	2.37	2.75	3.50

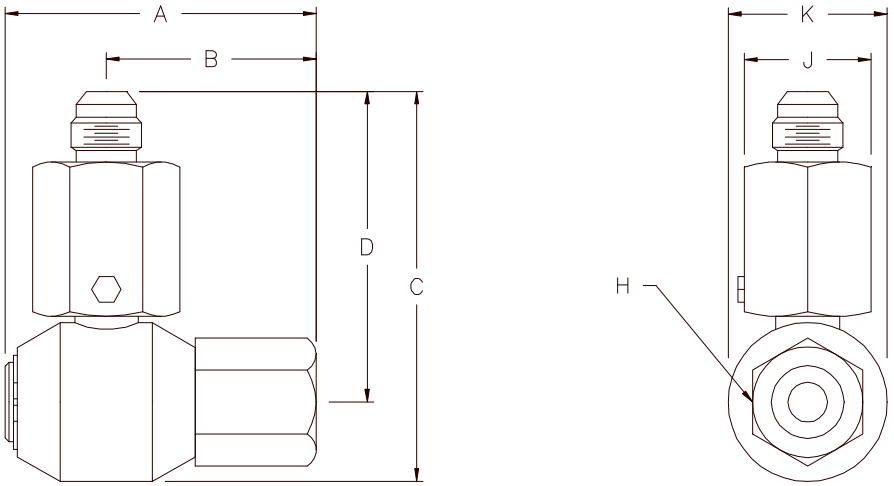
9SS SERIES / 90° 3000 PSI / DUAL PLANE

MALE JIC TO MALE PIPE



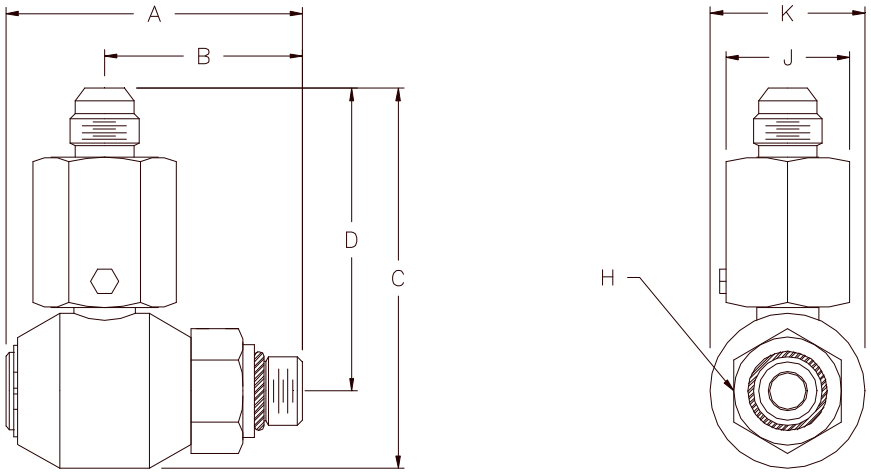
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-P4	9/16 - 18	1/4 - 18	2.50	1.62	3.06	2.44	.87	1.00	1.25
9SS6J8-P6	3/4 - 16	3/8 - 18	2.50	1.62	3.06	2.44	.87	1.00	1.25
9SS8J10-P8	7/8 - 14	1/2 - 14	2.83	1.99	3.63	2.88	1.00	1.25	1.50
9SS12J12-P12	1 1/16 - 12	3/4 - 14	3.40	2.37	4.30	3.23	1.25	1.25	2.12
9SS16J16-P16	1 5/16 - 12	1 - 11 1/2	3.80	2.65	5.10	3.90	1.62	1.75	2.37
9SS20J20-P20	1 5/8 - 12	1 1/4 - 11 1/2	4.18	2.76	5.72	4.44	1.75	2.00	2.75
9SS24J24-P24	1 7/8 - 12	1 1/2 - 11 1/2	5.32	3.55	6.87	5.12	2.37	2.75	3.50

MALE JIC TO FEMALE PIPE



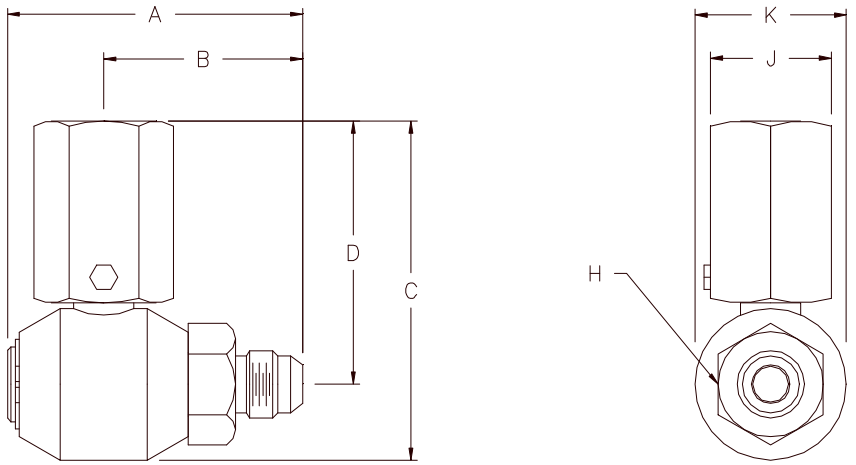
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-PF4	9/16 - 18	1/4 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-PF6	9/16 - 18	3/8 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J8-PF6	3/4 - 16	3/8 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS8J10-PF8	7/8 - 14	1/2 - 14	2.62	1.79	3.63	2.88	1.00	1.25	1.50
9SS12J12-PF12	1 1/16 - 12	3/4 - 14	3.00	1.97	4.30	3.23	1.25	1.37	2.12
9SS16J16-PF16	1 5/16 - 12	1 - 11 1/2	3.40	2.28	5.10	3.90	1.62	1.75	2.37
9SS20J20-PF20	1 5/8 - 12	1 1/4 - 11 1/2	4.08	2.76	5.72	4.44	2.00	2.25	2.75
9SS24J24-PF24	1 7/8 - 12	1 1/2 - 11 1/2	4.89	3.12	6.87	5.12	2.37	2.75	3.50

MALE JIC TO MALE O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-O6	9/16 - 18	9/16 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-O8	9/16 - 18	3/4 - 16	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J8-O8	3/4 - 16	3/4 - 16	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS8J10-O10	7/8 - 14	7/8 - 14	2.58	1.74	3.63	2.88	1.00	1.25	1.50
9SS12J12-O12	1 1/16 - 12	1 1/16 - 12	3.24	2.21	4.30	3.23	1.25	1.37	2.12
9SS16J16-O16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	5.10	3.90	1.62	1.75	2.37
9SS20J20-O20	1 5/8 - 12	1 5/8 - 12	3.76	2.45	5.72	4.44	2.00	2.25	2.75
9SS24J24-O24	1 7/8 - 12	1 7/8 - 12	4.78	3.02	6.87	5.12	2.37	2.75	3.50

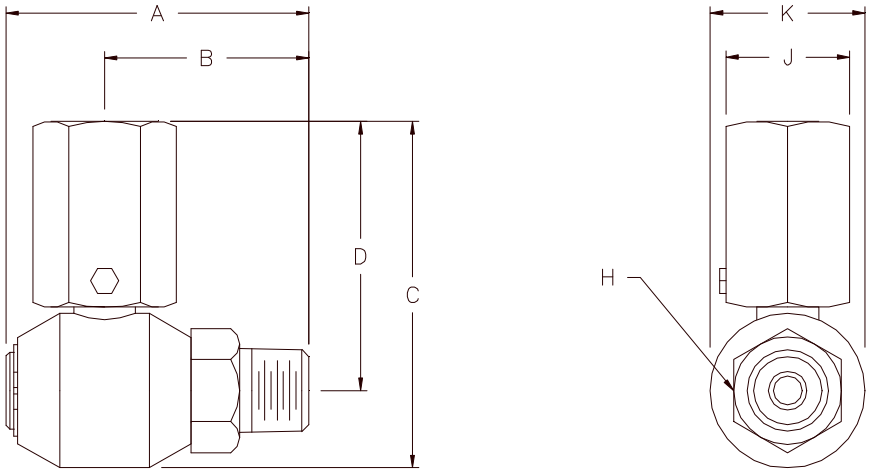
FEMALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-J5	1/4 - 18	1/2 - 20	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF4-J6	1/4 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-J5	3/8 - 18	1/2 - 20	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-J6	3/8 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-J8	3/8 - 18	3/4 - 16	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS8PF8-J10	1/2 - 14	7/8 - 14	2.83	1.99	3.42	2.67	1.00	1.25	1.50
9SS12PF12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	4.09	3.02	1.25	1.25	2.12
9SS16PF16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	4.89	3.69	1.62	1.75	2.37
9SS20PF20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	5.51	4.23	2.00	2.25	2.75
9SS24PF24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.27	3.51	6.93	5.18	2.37	2.75	3.50

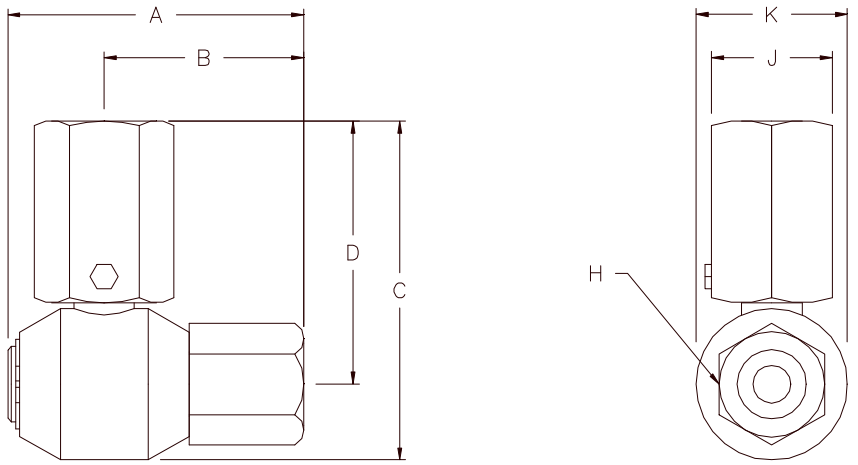
9SS SERIES / 90° 3000 PSI / DUAL PLANE

FEMALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-P4	1/4 - 18	1/4 - 18	2.50	1.62	2.85	2.23	.87	1.00	1.25
9SS6PF6-P4	3/8 - 18	1/4 - 18	2.50	1.62	2.85	2.23	.87	1.00	1.25
9SS6PF6-P6	3/8 - 18	3/8 - 18	2.50	1.62	2.85	2.23	.87	1.00	1.25
9SS8PF8-P8	1/2 - 14	1/2 - 14	2.83	1.99	3.42	2.67	1.00	1.25	1.50
9SS12PF12-P12	3/4 - 14	3/4 - 14	3.40	2.37	4.09	3.02	1.25	1.25	2.12
9SS16PF16-P16	1 - 11 1/2	1 - 11 1/2	3.80	2.65	4.89	3.69	1.62	1.75	2.37
9SS20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.76	5.51	4.23	2.00	2.25	2.75
9SS24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	6.93	5.18	2.37	2.75	3.50

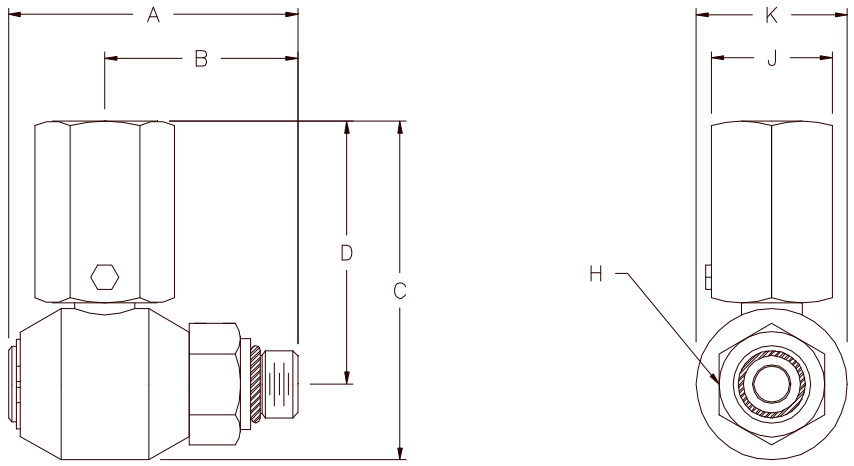
FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS8PF8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	3.42	2.67	1.00	1.25	1.50
9SS12PF12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	4.09	3.02	1.25	1.25	2.12
9SS16PF16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	4.89	3.69	1.62	1.75	2.37
9SS20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	5.51	4.23	2.00	2.25	2.75
9SS24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	6.93	5.18	2.37	2.75	3.50

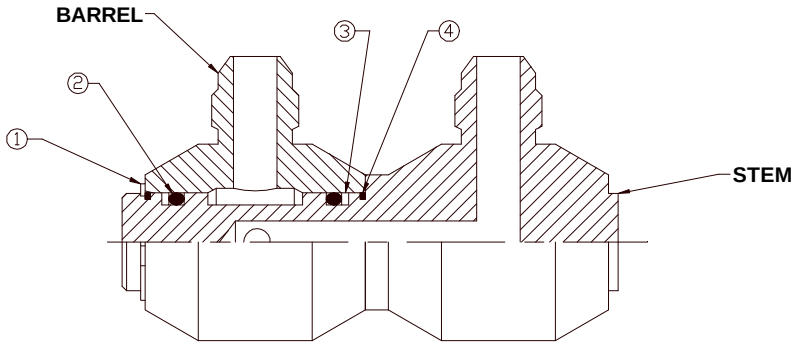
9SS SERIES / 90° 3000 PSI / DUAL PLANE

FEMALE PIPE TO O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-O6	1/4 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-O6	3/8 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-O8	3/8 - 18	3/4 - 16	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS8PF8-O10	1/2 - 14	7/8 - 14	2.58	1.75	3.42	2.67	1.00	1.25	1.50
9SS12PF12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	4.09	3.02	1.25	1.25	2.12
9SS16PF16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	4.89	3.69	1.62	1.75	2.37
9SS20PF20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.45	5.51	4.23	2.00	2.25	2.75
9SS24PF24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	6.93	5.18	2.37	2.75	3.50

18S SERIES / 180° 3000 PSI / PARALLEL PLANE

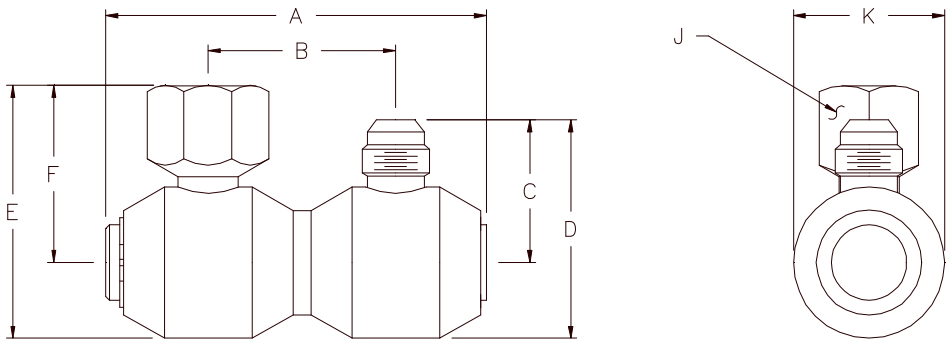


1 NON-LOAD BEARING RETAINING RING
2 SYNTHETIC RUBBER 0-RING (TWO)
3 TEFLON BACK UP RING (TWO)
4 DUST SEAL (TWO)

HYDRAULICS, INC. Design Features

- **Hardened carbon steel barrel - Large wear surface**
- **Barrel thread boss and stem annealed - Reduced breakage from shock and vibration**
- **Burnished barrel bore - Extended seal life**
- **Copper filled furnace braze joints**
- **Heavy duty retainer ring**
- **Protective treatment meeting SAE hose fitting standards**
- **Standard O-Ring and back up ring - Field replaceable seal kits - Page 26**
- **Optional seal material - Page 26**
- **Recessed and protected dust seals**
- **Pressure balanced for low rotational torque - See 90° torque chart - Page 27**
- **Low pressure drop - See 90° pressure drop chart - Page 27**

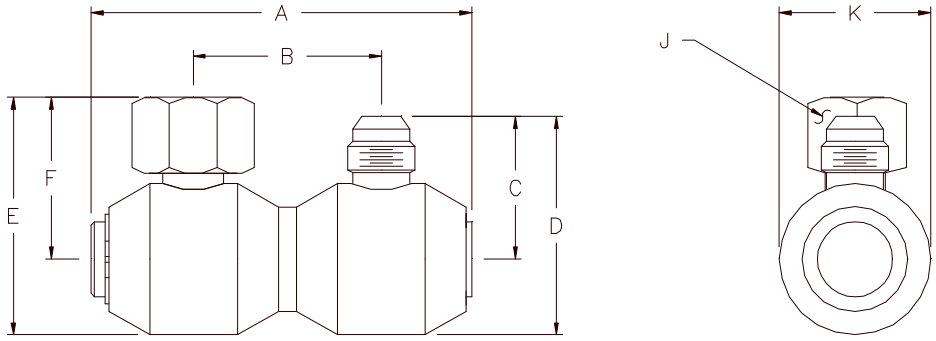
FEMALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	J HEX.	K DIA.
18S6PF4-J5	1/4 - 18	1/2 - 20	3.15	1.50	1.17	1.80	2.00	1.37	.75	1.25
18S6PF4-J6	1/4 - 18	9/16 - 18	3.15	1.50	1.17	1.80	2.00	1.37	.75	1.25
18S6PF6-J5	3/8 - 18	1/2 - 20	3.15	1.50	1.17	1.80	2.00	1.37	.87	1.25
18S6PF6-J6	3/8 - 18	9/16 - 18	3.15	1.50	1.17	1.80	2.00	1.37	.87	1.25
18S6PF6-J8	3/8 - 18	3/4 - 16	3.15	1.50	1.28	1.91	2.00	1.37	.87	1.25
18S8PF8-J10	1/2 - 14	7/8 - 14	3.12	1.50	1.50	2.26	2.59	1.84	1.00	1.50
18S12PF12-J12	3/4 - 14	1 1/16 - 12	3.86	1.87	1.99	3.05	3.30	2.24	1.37	2.12
18S16PF16-J16	1 - 11 1/2	1 5/16 - 12	4.68	2.25	2.18	3.36	3.64	2.46	1.62	2.37
18S20PF20-J20	1 1/4 - 11 1/2	1 5/8 - 12	5.29	2.50	2.33	3.70	3.98	2.61	2.00	2.75
18S24PF24-J24	1 1/2 - 11 1/2	1 7/8 - 12	7.17	3.37	2.90	4.67	5.20	3.45	2.37	3.50
18S32PF32-J32	2 - 11 1/2	2 1/2 - 12	8.29	3.87	3.54	5.67	6.06	3.94	2.87	4.25

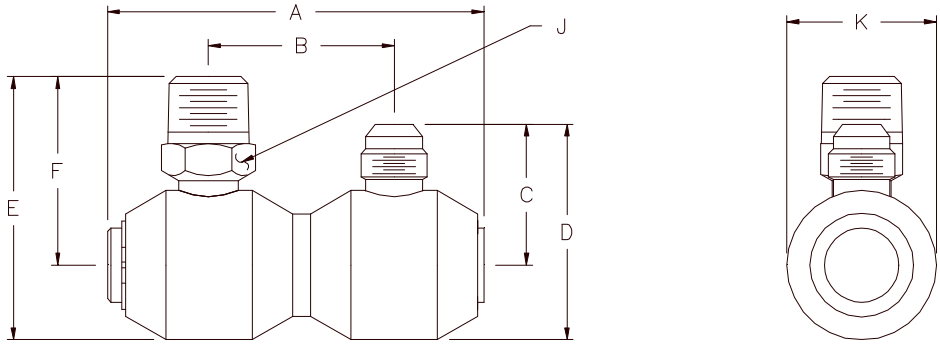
18S SERIES / 180° 3000 PSI / PARALLEL PLANE

FEMALE PIPE UNION TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	J HEX.	K DIA.
18S6PU4-J5	1/4 - 18	1/2 - 20	3.15	1.50	1.17	1.80	1.89	1.27	.75	1.25
18S6PU4-J6	1/4 - 18	9/16 - 18	3.15	1.50	1.17	1.80	1.89	1.27	.75	1.25
18S6PU6-J5	3/8 - 18	1/2 - 20	3.15	1.50	1.17	1.80	1.94	1.31	.87	1.25
18S6PU6-J6	3/8 - 18	9/16 - 18	3.15	1.50	1.17	1.80	1.94	1.31	.87	1.25
18S6PU6-J8	3/8 - 18	3/4 - 16	3.15	1.50	1.28	1.91	1.94	1.31	.87	1.25
18S8PU8-J10	1/2 - 14	7/8 - 14	3.12	1.50	1.50	2.26	2.26	1.51	1.00	1.50
18S12PU12-J12	3/4 - 14	1 1/16 - 12	3.86	1.87	1.99	3.05	3.09	2.03	1.25	2.12
18S16PU16-J16	1 - 11 1/2	1 5/16 - 12	4.68	2.25	2.18	3.36	3.31	2.12	1.50	2.37
18S20PU20-J20	1 1/4 - 11 1/2	1 5/8 - 12	5.29	2.50	2.33	3.70	3.89	2.52	1.87	2.75
18S24PU24-J24	1 1/2 - 11 1/2	1 7/8 - 12	7.17	3.37	2.90	4.65	4.73	2.98	2.25	3.50
18S32PU32-J32	2 - 11 1/2	2 1/2 - 12	8.29	3.87	3.54	5.67	5.65	3.52	2.75	4.25

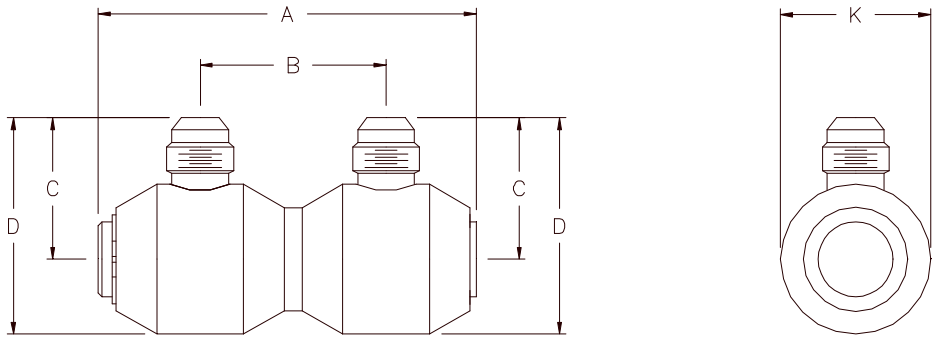
MALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	J HEX.	K DIA.
18S6P4-J5	1/4 - 18	1/2 - 20	3.15	1.50	1.17	1.80	2.12	1.50	.56	1.25
18S6P4-J6	1/4 - 18	9/16 - 18	3.15	1.50	1.17	1.80	2.12	1.50	.56	1.25
18S6P6-J8	3/8 - 18	3/4 - 16	3.15	1.50	1.28	1.91	2.12	1.50	.68	1.25
18S8P8-J10	1/2 - 14	7/8 - 14	3.12	1.50	1.50	2.26	2.65	1.90	.87	1.50
18S12P12-J12	3/4 - 14	1 1/16 - 12	3.86	1.87	1.99	3.05	3.32	2.26	1.12	2.12
18S16P16-J16	1 - 11 1/2	1 5/16 - 12	4.68	2.25	2.18	3.36	3.81	2.62	1.37	2.37
18S20P20-J20	1 1/4 - 11 1/2	1 5/8 - 12	5.29	2.50	2.33	3.70	4.31	2.93	1.75	2.75
18S24P24-J24	1 1/2 - 11 1/2	1 7/8 - 12	7.17	3.37	2.90	4.65	5.45	3.70	2.37	3.50
18S32P32-J32	2 - 11 1/2	2 1/2 - 12	8.29	3.87	3.54	5.67	6.55	4.42	2.87	4.25

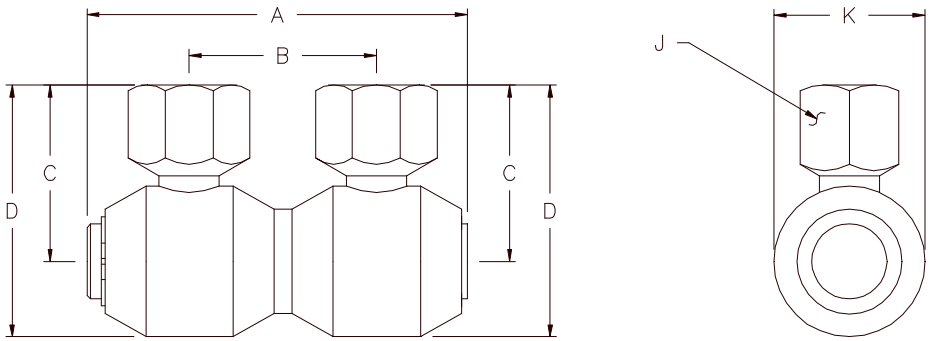
18S SERIES / 180° 3000 PSI / PARALLEL PLANE

MALE JIC TO MALE JIC



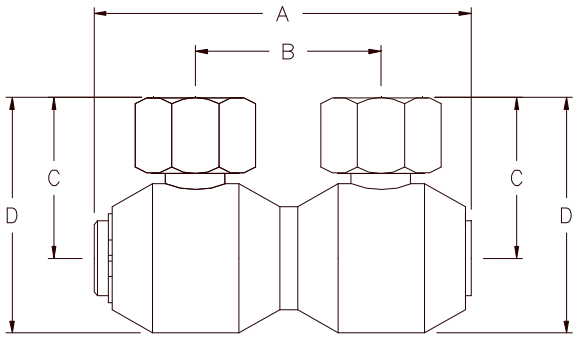
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	K DIA.
18S6J5-J5	1/2 - 20	1/2 - 20	3.15	1.50	1.17	1.80	1.25
18S6J6-J6	9/16 - 18	9/16 - 18	3.15	1.50	1.17	1.80	1.25
18S6J8-J8	3/4 - 16	3/4 - 16	3.15	1.50	1.28	1.91	1.25
18S8J8-J10	3/4 - 16	7/8 - 14	3.12	1.50	1.44	2.20	1.50
18S8J10-J10	7/8 - 14	7/8 - 14	3.12	1.50	1.50	2.26	1.50
18S12J12-J12	1 1/16 - 12	1 1/16 - 12	3.86	1.87	1.99	3.05	2.12
18S16J16-J16	1 5/16 - 12	1 5/16 - 12	4.68	2.25	2.18	3.36	2.37
18S20J20-J20	1 5/8 - 12	1 5/8 - 12	5.29	2.50	2.33	3.70	2.75
18S24J24-J24	1 7/8 - 12	1 7/8 - 12	7.17	3.37	2.90	4.65	3.50
18S32J32-J32	2 1/2 - 12	2 1/2 - 12	8.29	3.87	3.54	5.67	4.25

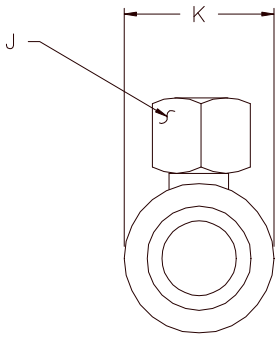
FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	J HEX.	K DIA.
18S6PF4-PF4	1/4 - 18	1/4 - 18	3.15	1.50	1.37	2.00	.75	1.25
18S6PF6-PF6	3/8 - 18	3/8 - 18	3.15	1.50	1.37	2.00	.87	1.25
18S8PF8-PF8	1/2 - 14	1/2 - 14	3.12	1.50	1.84	2.59	1.00	1.50
18S12PF12-PF12	3/4 - 14	3/4 - 14	3.86	1.87	2.24	3.30	1.37	2.12
18S16PF16-PF16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.46	3.64	1.62	2.37
18S20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.61	3.98	2.00	2.75
18S24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.45	5.20	2.37	3.50
18S32PF32-PF32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	3.94	6.06	2.87	4.25

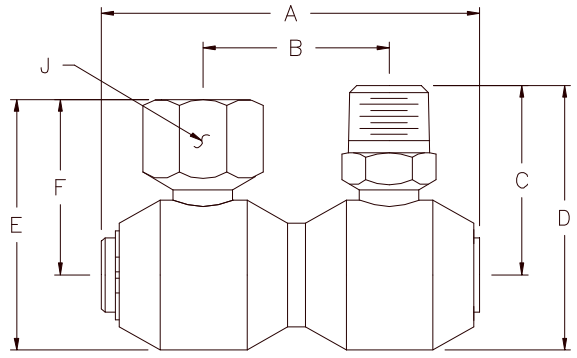
FEMALE PIPE UNION TO FEMALE PIPE UNION

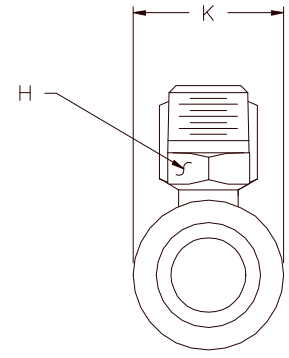




PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	J HEX.	K DIA.
18S6PU4-PU4	1/4 - 18	1/4 - 18	3.15	1.50	1.27	1.89	.75	1.25
18S6PU6-PU6	3/8 - 18	3/8 - 18	3.15	1.50	1.31	1.94	.87	1.25
18S8PU8-PU8	1/2 - 14	1/2 - 14	3.12	1.50	1.51	2.26	1.00	1.50
18S12PU12-PU12	3/4 - 14	3/4 - 14	3.86	1.87	2.03	3.09	1.25	2.12
18S16PU16-PU16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.12	3.31	1.50	2.37
18S20PU20-PU20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.52	3.89	1.87	2.75
18S24PU24-PU24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	2.98	4.73	2.25	3.50
18S32PU32-PU32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	3.52	5.65	2.75	4.25

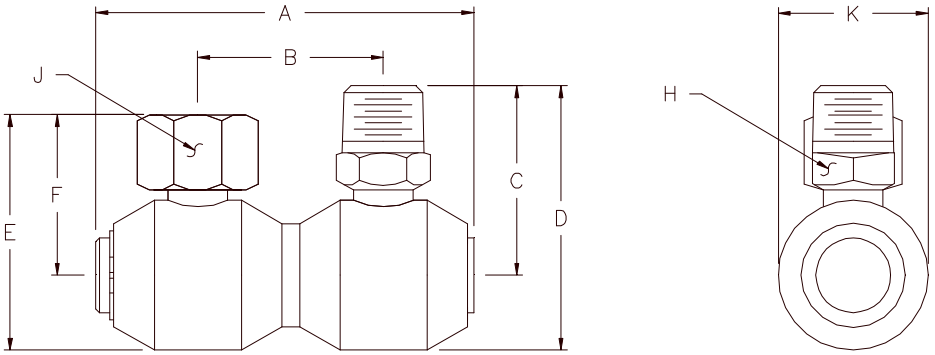
FEMALE PIPE TO MALE PIPE





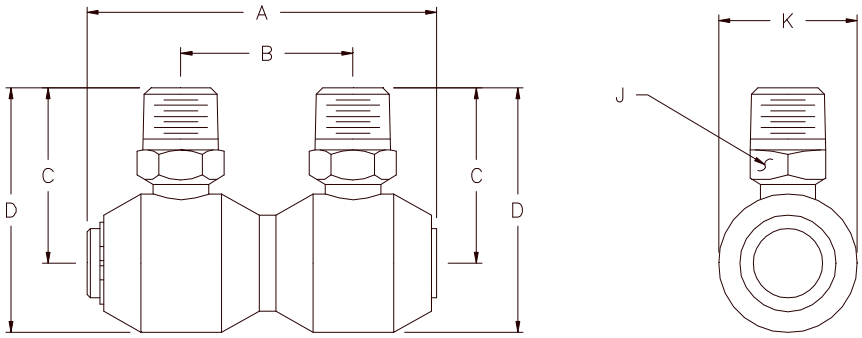
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	H HEX.	J HEX.	K DIA.
18S6PF4-P4	1/4 - 18	1/4 - 18	3.15	1.50	1.50	2.12	2.00	1.37	.56	.75	1.25
18S6PF6-P4	3/8 - 18	1/4 - 18	3.15	1.50	1.50	2.12	2.00	1.37	.56	.87	1.25
18S6PF6-P6	3/8 - 18	3/8 - 18	3.15	1.50	1.50	2.12	2.00	1.37	.68	.87	1.25
18S8PF8-P8	1/2 - 14	1/2 - 14	3.12	1.50	1.90	2.65	2.59	1.84	.87	1.00	1.50
18S12PF12-P12	3/4 - 14	3/4 - 14	3.86	1.87	2.26	3.32	3.30	2.24	1.12	1.37	2.12
18S16PF16-P16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.62	3.81	3.64	2.46	1.37	1.62	2.37
18S20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.93	4.31	3.98	2.61	1.75	2.00	2.75
18S24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.70	5.45	5.20	3.45	2.37	2.37	3.50
18S32PF32-P32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	4.18	6.55	6.06	3.94	2.87	2.87	4.25

FEMALE PIPE UNION TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	H HEX.	J HEX.	K DIA.
18S6PU4-P4	1/4 - 18	1/4 - 18	3.15	1.50	1.50	2.12	1.89	1.27	.56	.75	1.25
18S6PU4-P6	1/4 - 18	3/8 - 18	3.15	1.50	1.50	2.12	1.89	1.27	.68	.75	1.25
18S6PU6-P4	3/8 - 18	1/4 - 18	3.15	1.50	1.50	2.12	1.94	1.31	.56	.87	1.25
18S6PU6-P6	3/8 - 18	3/8 - 18	3.15	1.50	1.50	2.12	1.94	1.31	.68	.87	1.25
18S8PU8-P8	1/2 - 14	1/2 - 14	3.12	1.50	1.90	2.65	2.26	1.51	.87	1.00	1.50
18S12PU12-P12	3/4 - 14	3/4 - 14	3.86	1.87	2.26	3.32	3.09	2.03	1.12	1.25	2.12
18S16PU16-P16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.62	3.81	3.31	2.12	1.37	1.50	2.37
18S20PU20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.93	4.31	3.89	2.52	1.75	1.87	2.75
18S24PU24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.70	5.45	4.73	2.98	2.37	2.25	3.50
18S32PU32-P32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	4.42	6.55	5.65	3.52	2.87	2.75	4.25

MALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	J HEX.	K DIA.
18S6P4-P4	1/4 - 18	1/4 - 18	3.15	1.50	1.50	2.12	.56	1.25
18S6P6-P6	3/8 - 18	3/8 - 18	3.15	1.50	1.50	2.12	.68	1.25
18S8P8-P8	1/2 - 14	1/2 - 14	3.12	1.50	1.90	2.65	.87	1.50
18S12P12-P12	3/4 - 14	3/4 - 14	3.86	1.87	2.26	3.32	1.12	2.12
18S16P16-P16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.62	3.81	1.37	2.37
18S20P20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.93	4.31	1.75	2.75
18S24P24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.70	5.45	2.37	3.50
18S32P32-P32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	4.42	6.55	2.87	4.25

SEAL KITS AND GREASE FITTINGS

KITS AS ISTED CONTAIN DUST AND FLUID SEALS WITH RETAINING RINGS, BALLS, AND PLUGS AS APPLICABLE.

S-SERIES

BODY SIZE	S6	S8	S14	S16	S20	S24	S32
KIT NO.	S6-1	S8-1	S14-1	S16-1	S20-1	S24-1	S32-1

9S-SERIES

BODY SIZE	9S6	9S8	9S12	9S16	9S20	9S24	9S32
KIT NO.	9S6-1	9S8-1	9S12-1	9S16-1	9S20-1	9S24-1	9S32-1

9SS-SERIES

BODY SIZE	9SS6	9SS8	9SS12	9SS16	9SS20	9SS24	9SS32
KIT NO.	9SS6-1	9SS8-1	9SS12-1	9SS16-1	9SS20-1	9SS24-1	9SS32-1

18S-SERIES

BODY SIZE	18S6	18S8	18S12	18S16	18S20	18S24	18S32
KIT NO.	9S6-1	9S8-1	9S12-1	9S16-1	9S20-1	9S24-1	9S32-1

NOTE: SPECIAL SEALS

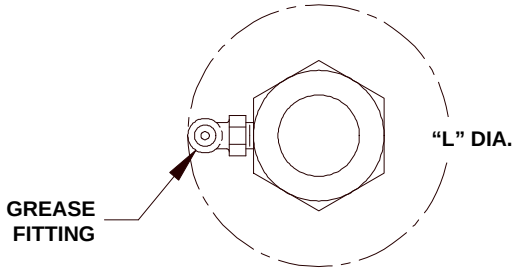
To obtain kits with seal compounds other than standard buna-n, suffix the replacement seal kit part number with the applicable seal material code number. Example: S6-1 kit would become S6-1-9 for a neoprene seal. See chart on Page 2.

GREASE FITTINGS FOR "S" & "9SS" SERIES

To specify grease fittings prefix part number with letter "G" as in example:

GS6J8-PF6 or
G9SS16J16-P16

Allow additional diametrial barrel clearance as shown in chart.

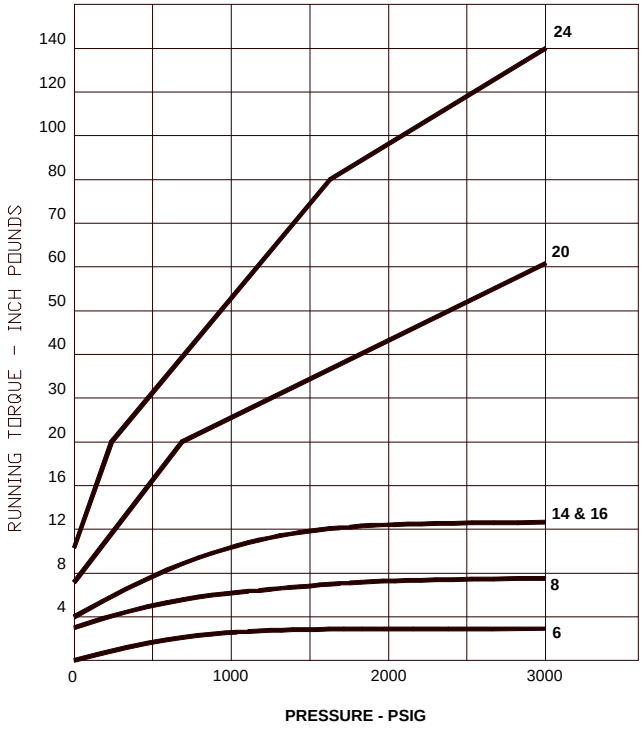


BODY SIZE	6	8	12	14	16	20	24	32
"L" DIA.	2.21	2.46	2.46	2.59	2.96	3.46	3.96	4.71

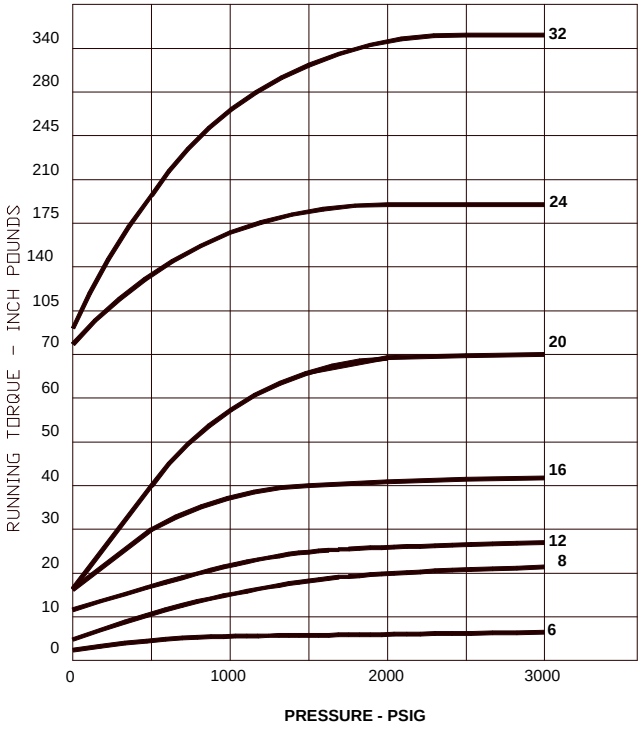
"Because of technological progress and product improvements, all design and dimensional data shown in this catalog is subject to change without notice. Technical information has been prepared from actual test results under controlled environmental conditions and is considered to be reliable, but no responsibility can be assumed for its accuracy under varied field conditions."

ROTATIONAL TORQUE AND PRESSURE DROP CHART

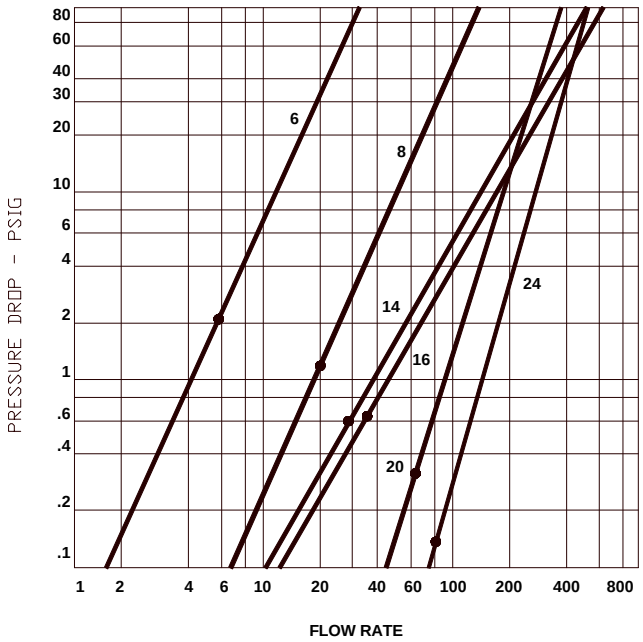
ROTATIONAL TORQUE vs PRESSURE - IN-LINE



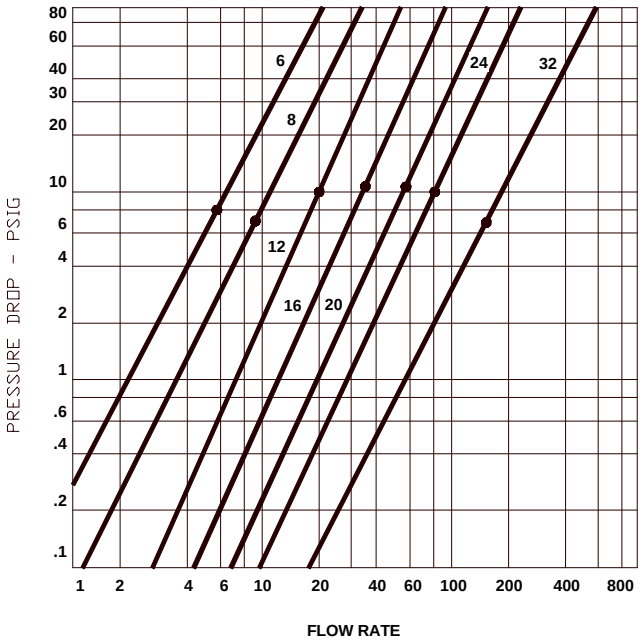
ROTATIONAL TORQUE vs PRESSURE - 90°



PRESSURE DROP vs FLOW (GPM) - IN-LINE



PRESSURE DROP vs FLOW (GPM) - 90°



- Pressure Drop Thru Swivel Based on Flows Giving 15 FPS Fluid Velocity Thru Nominal Bore Size

- Pressure Drop Thru Swivel Based on Flows Giving 15 FPS Fluid Velocity Thru Nominal Bore Size

HC-104A

HC-102

HC-103

HYDRAULICS Inc.

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Fax: 817/927-8002

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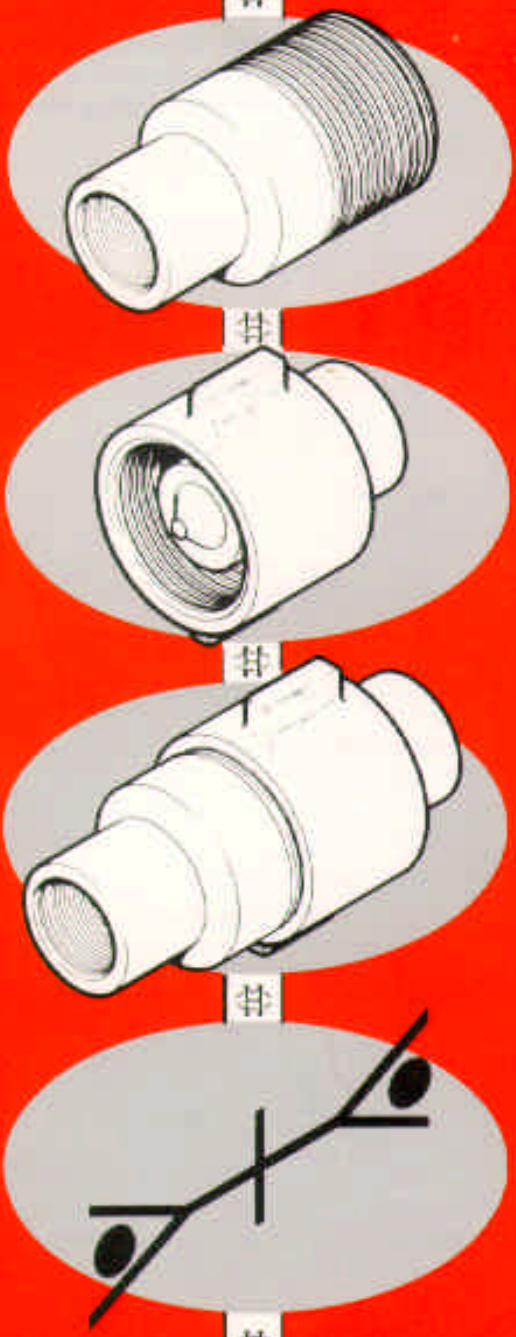
LITHO IN USA 7/91



FLUID CONDUCTING QUICK DISCONNECT COUPLING

SELF SEALING 5000 P.S.I.

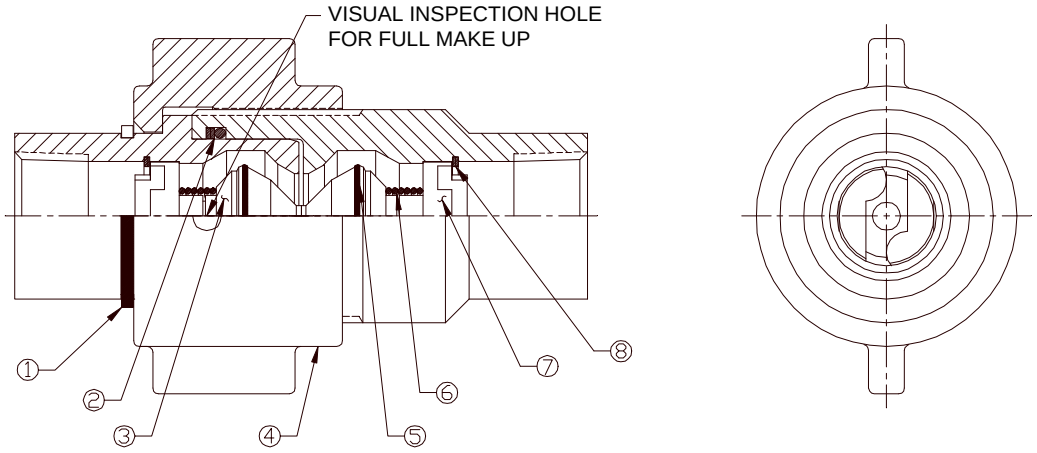
SIZES: 3/4 TO 3 INCH

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110

PRODUCT DATA — 5TV SERIES COUPLINGS

The 5TV series high pressure hydraulic coupling is designed for rugged hydrostatic drive applications in the mining and oil industries. Service in many such applications has proven the design compatible to extreme pressures, structural and system induced shockloads. The construction makes the coupling attractive in applications having low operating pressures. NOTE — Not for use with gaseous fluids.



1 NUT RETAINER RING

2 NIPPLE SEAL (O-RING/BACK UP RING)

3 POPPET VALVE

4 HIGH STRENGTH CAST STEEL NUT

5 VALVE SEAL SWAGED IN AGAINST WASHOUT

6 VALVE SPRING

7 EXCLUSIVE FOUR POINT CONTACT POPPET GUIDE

8 2-TURN LOCK RING

OPERATING LIMITS

- 5,000 P.S.I. operating pressure — all sizes
  20,000 P.S.I. minimum burst — coupled
- Vacuum to 28” Hg
- Standard seal — temperature range — 40°F to +250°F
- Buna-N seals — standard

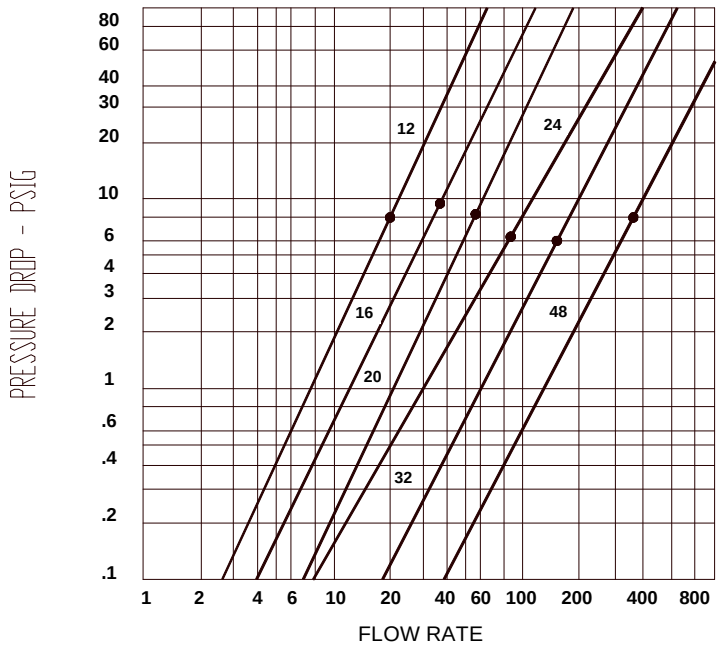
DESIGN FEATURES

- Excellent flow characteristics for continuous duty applications. See flow chart.
- High strength steel poppet guides prevent break up and washout of coupling valving during high surge and shock conditions.
- Exclusive four point support design of poppet guide provides positive alignment of valving during surging flow conditions
- Flat crested stub-acme threads and all steel construction withstand storage and rig-up damage.
- Protective treatment equal to industry standards for SAE steel hose fittings
- Structurally compatible with weight of 5,000 P.S.I. flex-hose and system induced shockloads.

SIZES AND CONNECTION TYPE

- 3/4” thru 3” — female NPTF pipe thread

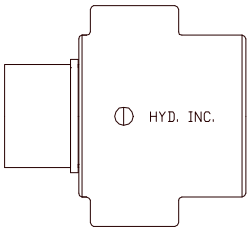
PRESSURE DROP vs FLOW (GPM) —



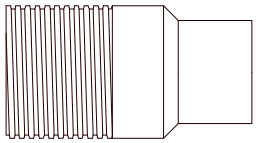
- Pressure drop thru coupling based on flow giving 15 FPS fluid velocity thru nominal bore size.

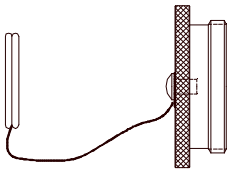
HIGH PRESSURE HYDRAULIC COUPLINGS

COUPLER

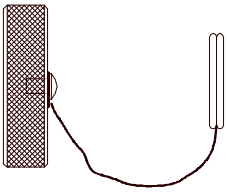


NIPPLE





DUST PLUG



DUST CAP

ASSEMBLY PART NUMBERS					REPAIR PARTS PART NO.	
COUPLING PART NO.	**NIPPLE PART NO.**	**COUPLER PART NO.**	**DUST PLUG PART NO.**	**DUST CAP PART NO.**	**VALVE ASS'Y *PART NO.**	**NIPPLE SEAL PART NO.**
5TV-CN-12	5TV-N-12	5TV-C-12	5TV-DP-12	5TV-DC-12	5TV-VA-12	5TV-NS-12
5TV-CN-16	5TV-N-16	5TV-C-16	5TV-DP-16	5TV-DC-16	5TV-VA-16	5TV-NS-16
5TV-CN-20	5TV-N-20	5TV-C-20	5TV-DP-20	5TV-DC-20	5TV-VA-20	5TV-NS-20
5TV-CN-24	5TV-N-24	5TV-C-24	5TV-DP-24	5TV-DC-24	5TV-VA-24	5TV-NS-24
5TV-CN-32	5TV-N-32	5TV-C-32	5TV-DP-32	5TV-DC-32	5TV-VA-32	5TV-NS-32
5TV-CN-40	5TV-N-40	5TV-C-40	5TV-DP-40	5TV-DC-40	5TV-VA-40	5TV-NS-40
5TV-CN-48	5TV-N-48	5TV-C-48	5TV-DP-48	5TV-DC-48	5TV-VA-48	5TV-NS-48

*INCLUDES POPPET, POPPET GUIDE, SPRING AND RETAINER FOR ONE HALF ONLY

COUPLING PART NO.	**DIMENSIONS**				**THREAD SIZES**	**WEIGHT POUNDS**
	COUPLING LENGTH	**NIPPLE LENGTH**	**COUPLER LENGTH**	**DIM. ACROSS WING NUT**	**FEMALE PIPE THREAD**	**"CN"**
5TV-CN-12	4.86	3.27	2.84	3.00	¾-14	2
5TV-CN-16	6.05	4.18	3.35	3.75	1-11½	5
5TV-CN-20	7.75	5.35	4.42	4.50	1¼-11½	9
5TV-CN-24	8.62	5.97	5.02	4.75	1½-11½	14
5TV-CN-32	10.00	7.05	6.07	6.25	2-11½	28
5TV-CN-40	12.00	8.70	6.94	8.00	2½-8	65
5TV-CN-48	14.81	10.60	9.25	9.75	3-8	148

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HC-100

HC-104A

HC-103

HYDRAULICS Inc.

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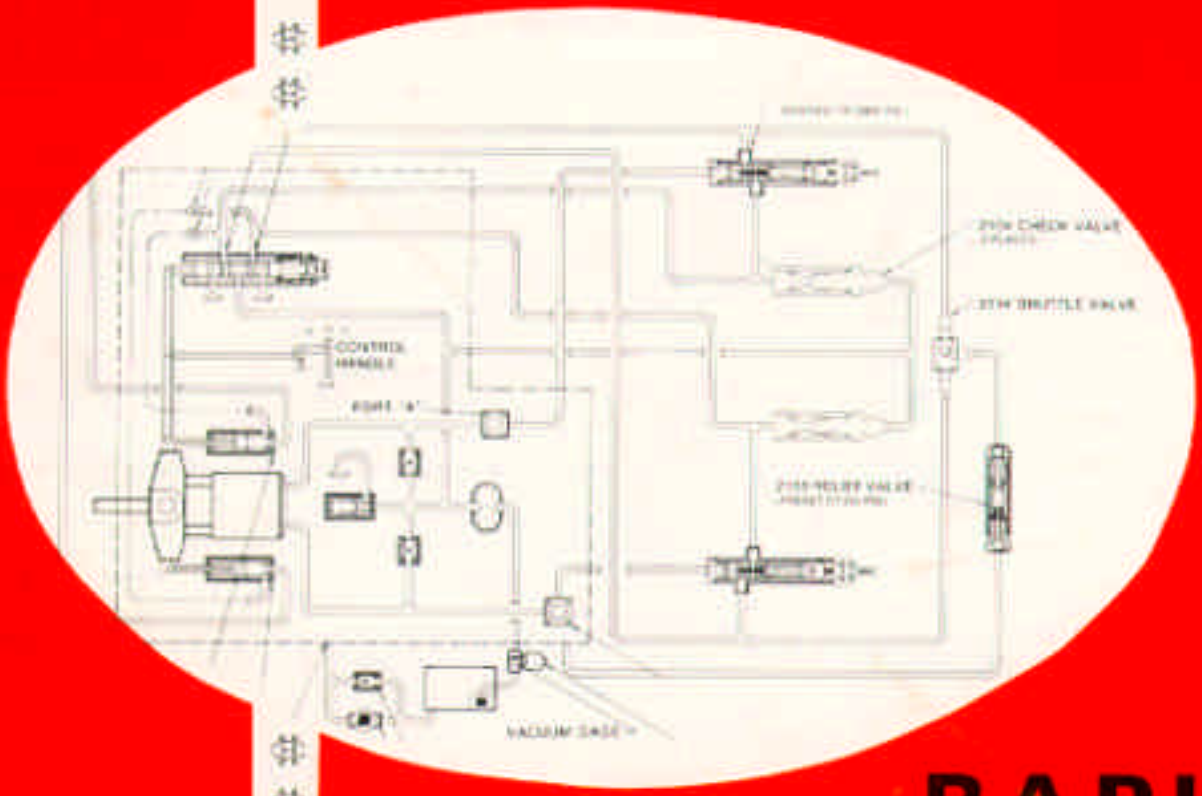
LITHO IN USA 1/87

CATALOG HC-103



RAPID RESPONSE TORQUE CONTROL

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110-4104

RAPID RESPONSE TORQUE CONTROL

GENERAL

The Hydraulics, Inc. Rapid Response Torque Control (pressure compensator) provides control of the swashplate angle within the pump of a hydrostatic closed-loop system, thereby giving precise control of the output pressure of the pump. The speed at which the pressure control system reacts, provides protection for the prime mover and the driven load. The rapid response torque control will work even in the systems that may require the pump to be driven over-center in order to maintain constant pressure in the high pressure loop.

Torque control kits are available to provide pressure control for one or both ports of the hydrostatic pump, and for systems involving two transmissions driving a common load.

APPLICATION

The torque control system has been applied to Dynapower, Eaton, and Sundstrand hydrostatic drives. The schematics shown herein are as applied to Sundstrand Series 20 thru 27 and are for reference to other manufacturers systems.

Hydraulics, Inc. is not responsible for the effects of applications of the rapid response control to Dynapower, Eatonk, Sundstrand, or other company products and their warranties.

CATALOG INDEX:

Rapid Response Torque Control Data For Controlling Pump Output pressure at:

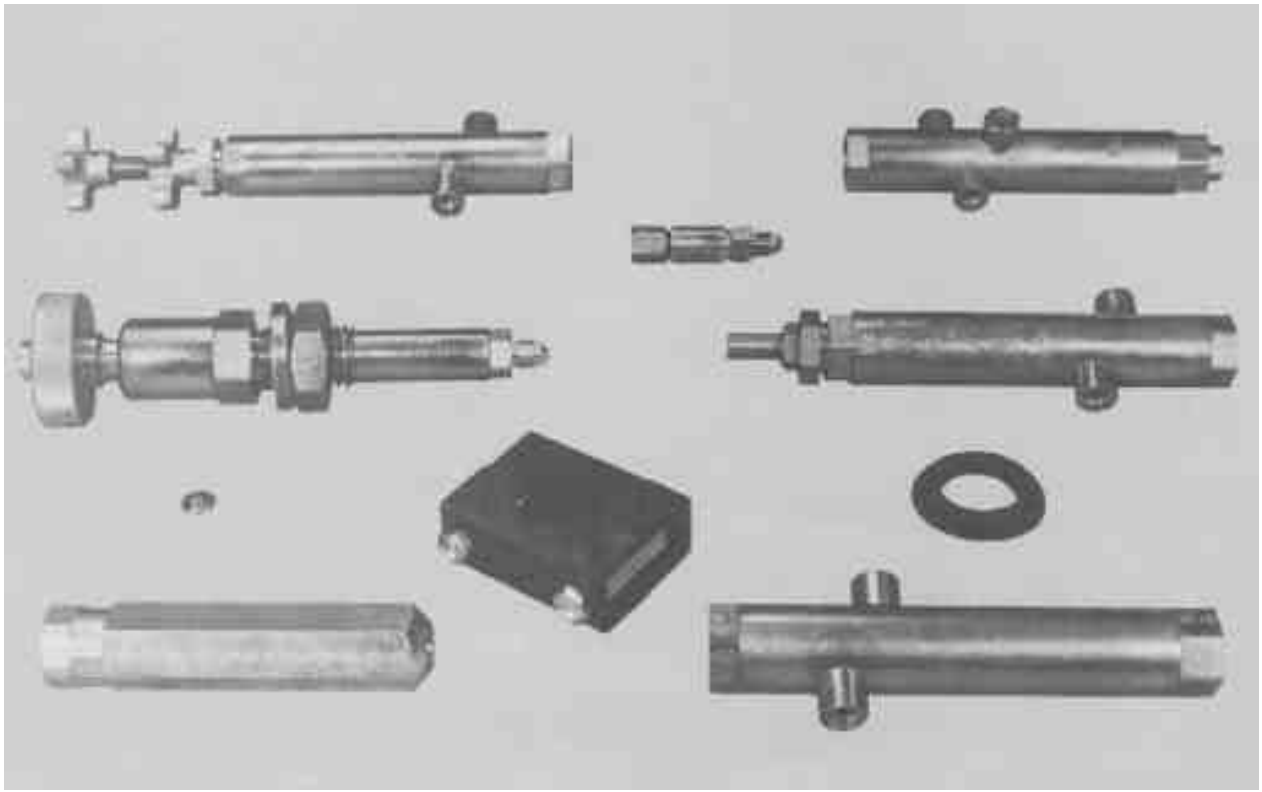
Port “A” Or “B”
- Parts List — Page 3
- Schematic — 3
- Pictorial Schematic — 4

Port “A” & “B”
- Parts List — Page 4
- Schematic — 4
- Pictorial Schematic

Port “A” Slaved (Two Transmissions Driving Common Load)
- Parts List — Page 7
- Schematic — 7
- Pictorial Schematic — 8

Components — Page 9, 10, & 11

NOTE:
Special packaging and adaptations are available for OEM applications. See back cover.



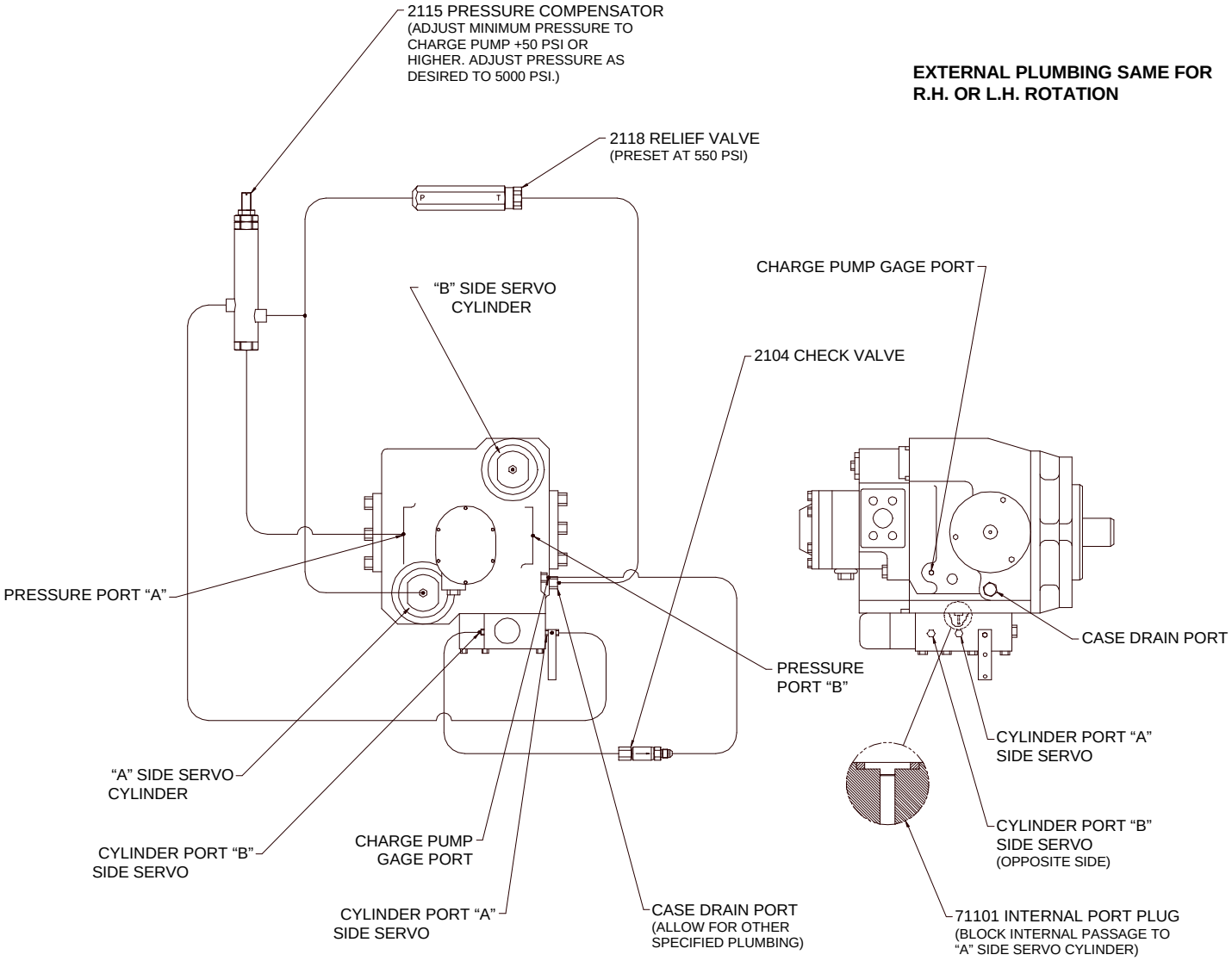
TORQUE CONTROL FOR PORT “A” OR “B”

KITS FOR PORT “A” OR “B”

The following chart lists components for controlling port “A” or “B” in a manual, remote, or panel mount kit.

		PORT “A” OR “B”		
		KIT A2115	KIT A2115R	KIT A2115P
Part No.	Description	Manual	Remote	Panel Mount
2104	Check Valve	1	1	1
2106	Remote Pressure Control		1	
2115	Compensator (Manual)	1		
2115A	Compensator (Remote)		1	
2115C	Compensator (Panel Mount)			1
2118	Relief Valve	1	1	1
71101	Internal Port Plug	1	1	1

TORQUE CONTROL FOR PORT “A” OR “B”
(SCHEMATIC)

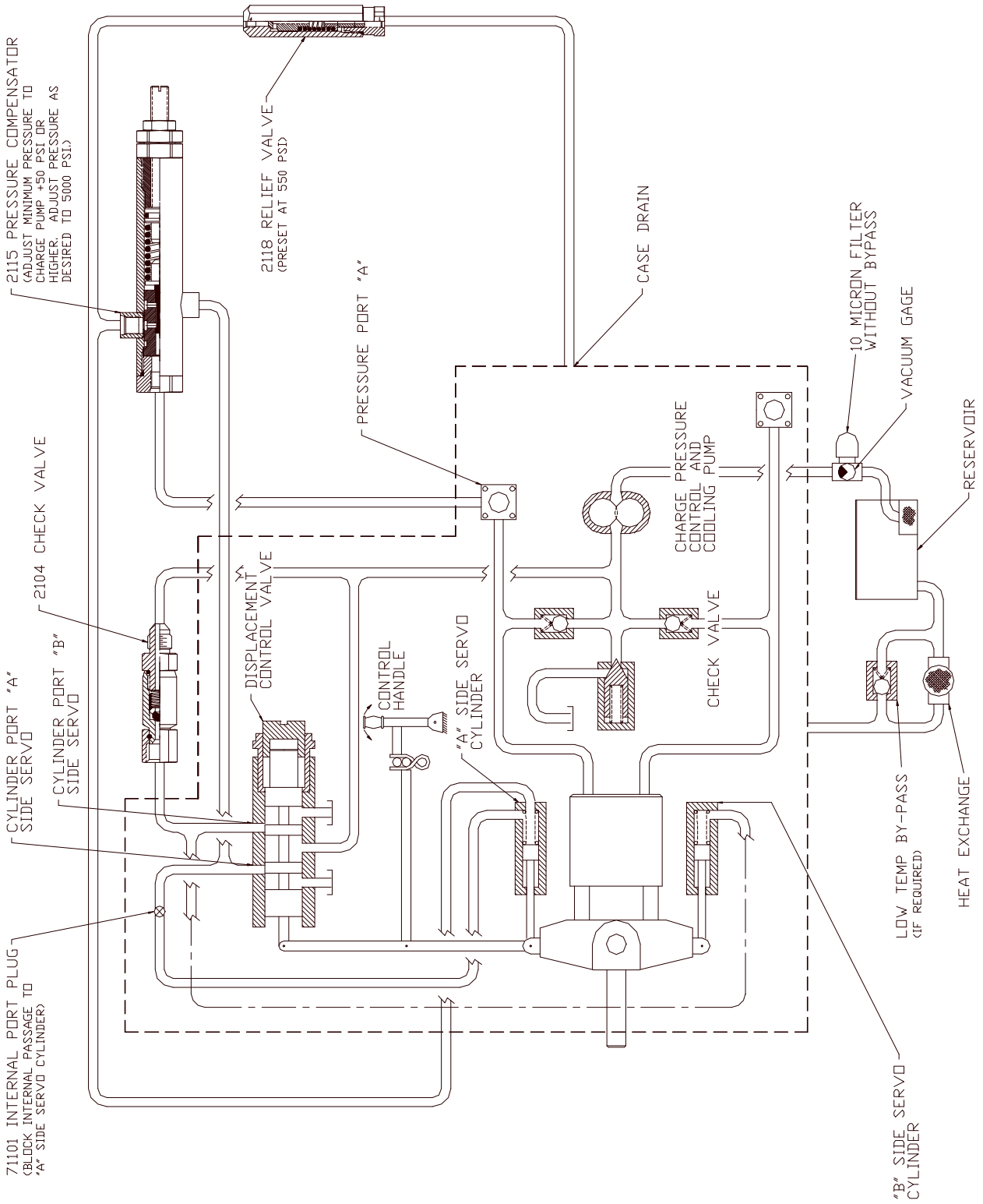


HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTE: PLUMBING LAYOUT IS FOR CONTROL OF PUMP PORT “A”

TORQUE CONTROL FOR PORT “A” OR “B”

(SCHEMATIC)



RAPID RESPONSE TORQUE CONTROL FOR SUNDSTRAND HYDRO-TRANSMISSION - SERIES 20 THRU 27

HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTES:

1. All connecting plumbing to be 1/4" tube size.
2. Control cylinder end caps must be ported with -4 S.A.E. O-Ring port for external plumbing. Consult pump mfg.
3. Plumbing layout is for control of pump port "A".

TORQUE CONTROL FOR PORT “A” & “B”

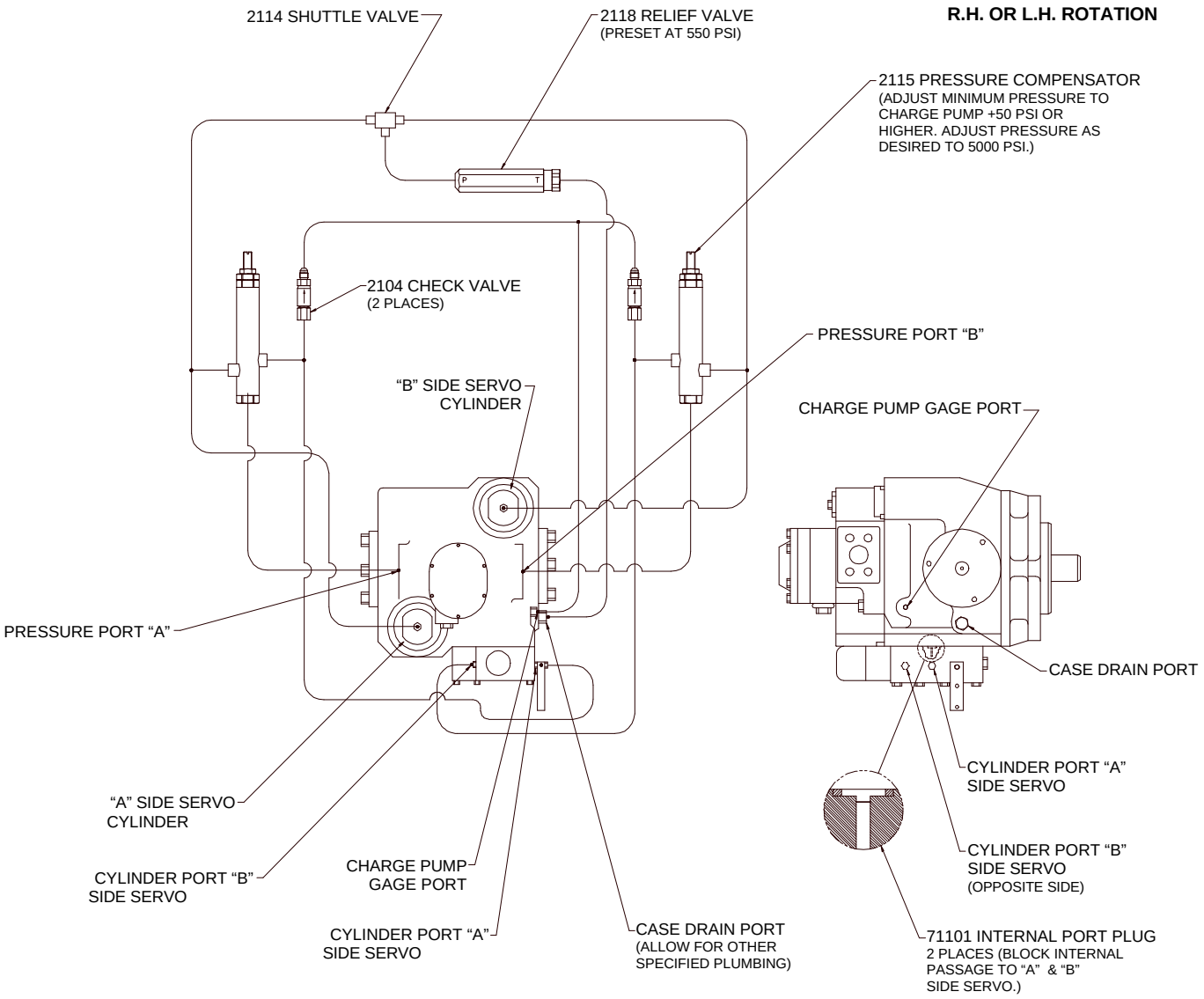
KITS FOR PORT “A” & “B”

The following chart lists components for controlling port “A” & “B” in a manual, remote, or panel mount kit.

		PORT “A” & “B”		
		KIT B2115	KIT B2115R	KIT B2115P
Part No.	Description	Manual	Remote	Panel Mount
2104	Check Valve	2	2	2
2106	Remote Pressure Control		2	
2114	Shuttle Valve	1	1	1
2115	Compensator (Manual)	2		
2115A	Compensator (Remote)		2	
2115C	Compensator (Panel Mount)			2
2118	Relief Valve	1	1	1
71101	Internal Port Plug	2	2	2

TORQUE CONTROL FOR PORT “A” & “B”
(SCHEMATIC)

EXTERNAL PLUMBING SAME FOR R.H. OR L.H. ROTATION

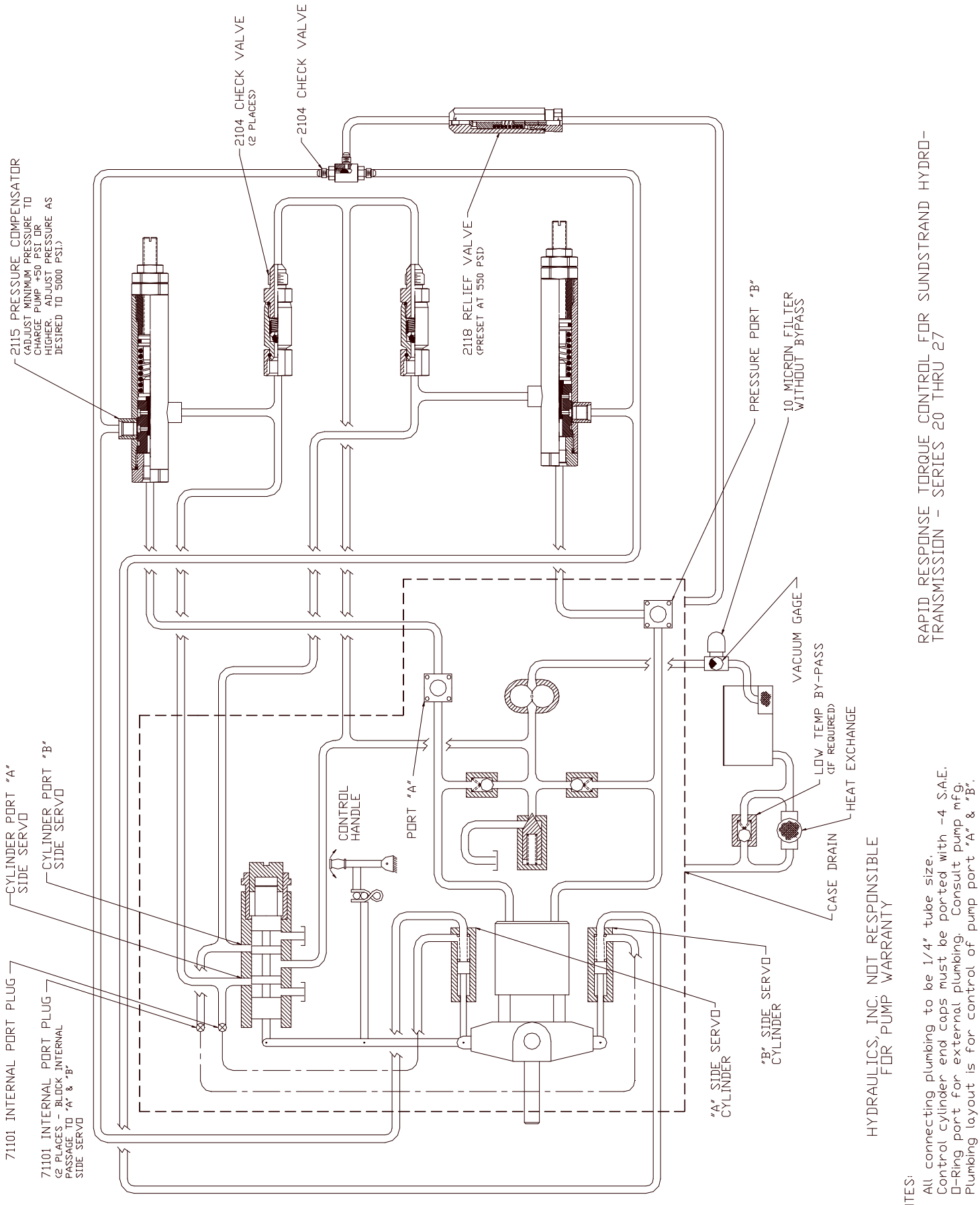


HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTE: PLUMBING LAYOUT IS FOR CONTROL OF PUMP PORT “A” & “B”

TORQUE CONTROL FOR PORT “A” & “B”

(SCHEMATIC)



RAPID RESPONSE TORQUE CONTROL FOR SUNDSTRAND HYDRO-TRANSMISSION - SERIES 20 THRU 27

HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTES:

1. All connecting plumbing to be 1/4" tube size.
2. Control cylinder end caps must be ported with -4 S.A.E. O-Ring port for external plumbing. Consult pump mfg.
3. Plumbing layout is for control of pump port "A" & "B".

TORQUE CONTROL FOR PORT “A” SLAVED

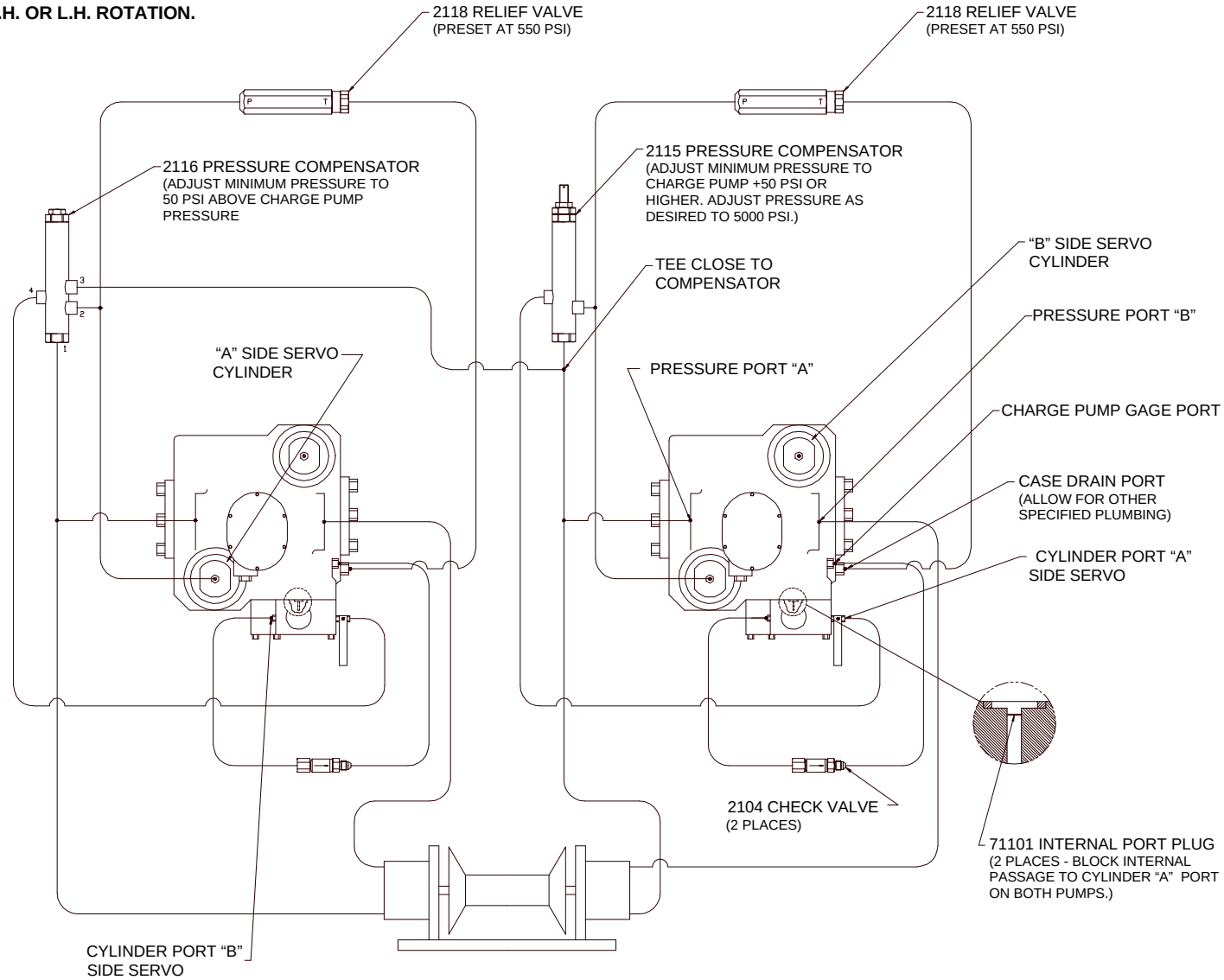
KITS FOR PORT “A” SLAVED

The following chart lists components for controlling port “A” slaved in a manual, remote, or panel mount kit.

		PORT “A” SLAVED		
		KIT C2115	KIT C2115R	KIT C2115P
Part No.	Description	Manual	Remote	Panel Mount
2104	Check Valve	2	2	2
2106	Remote Pressure Control	1	1	1
2115	Compensator (Manual)	1		
2115A	Compensator (Remote)		1	
2115C	Compensator (Panel Mount)			1
2116D	Compensator Slave (Preset)	1	1	1
2118	Relief Valve	2	2	2
71101	Internal Port Plug	2	2	2

TORQUE CONTROL FOR PORT “A” SLAVED
(SCHEMATIC)

EXTERNAL PLUMBING SAME FOR R.H. OR L.H. ROTATION.

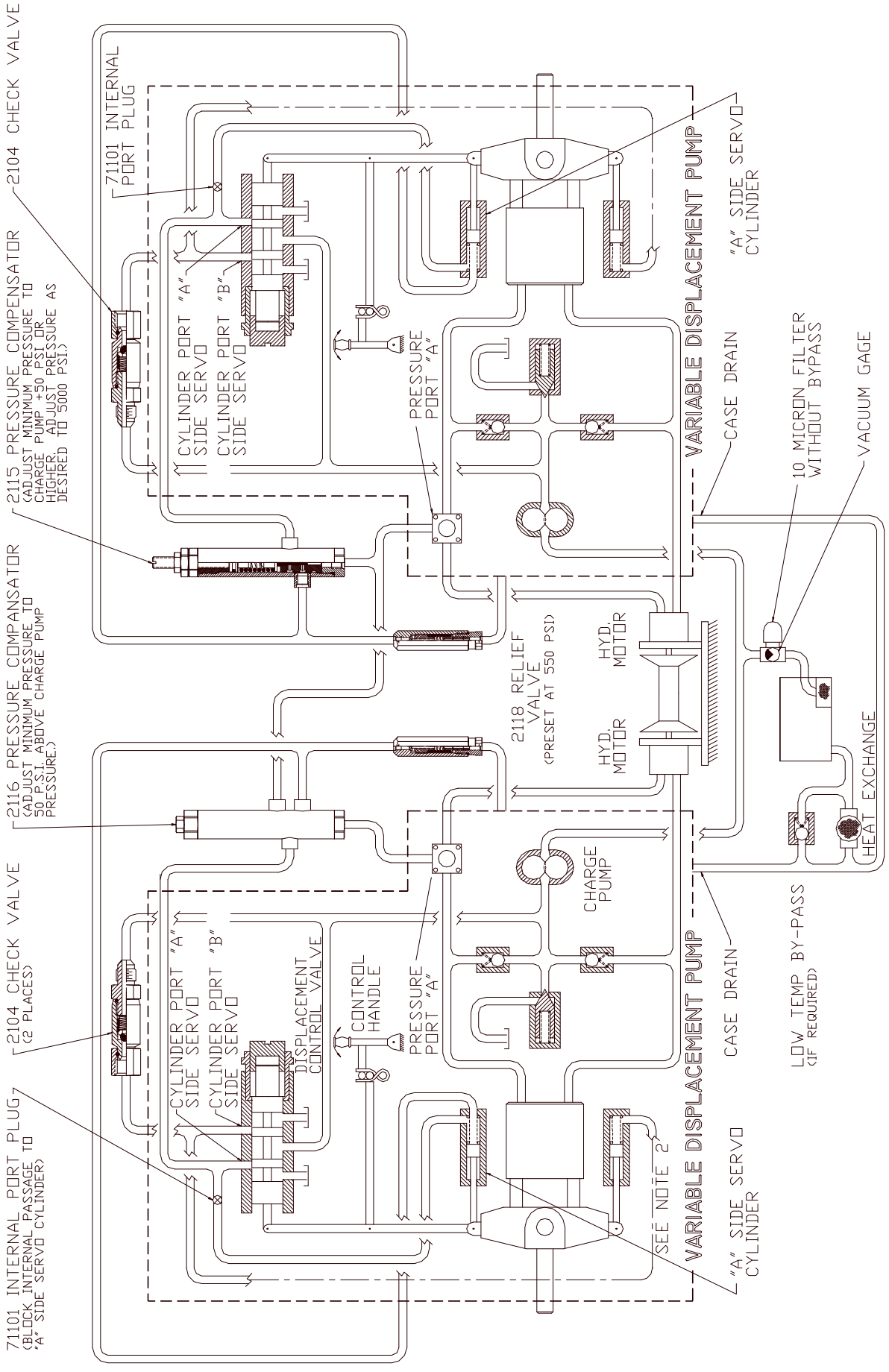


HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTE: PLUMBING LAYOUT IS FOR CONTROL OF PUMP PORT “A” & “B”

TORQUE CONTROL FOR PORT "A" SLAVED

(SCHEMATIC)



RAPID RESPONSE TORQUE CONTROL FOR SUNDSTRAND HYDRO-TRANSMISSION - SERIES 20 THRU 27

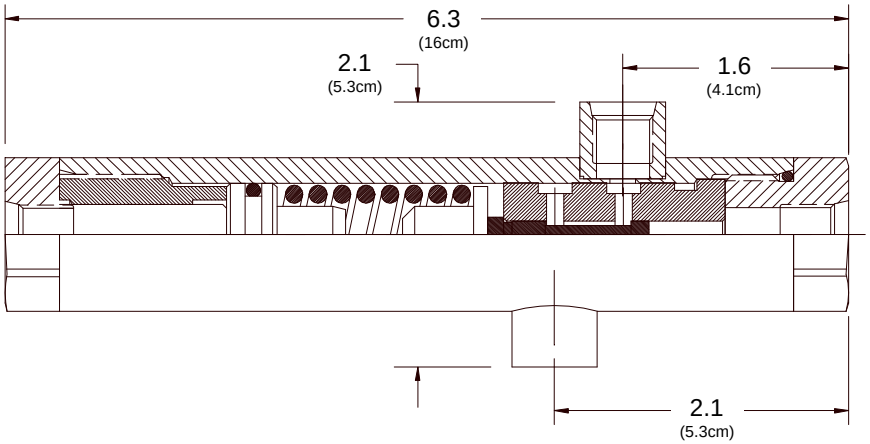
HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTES:

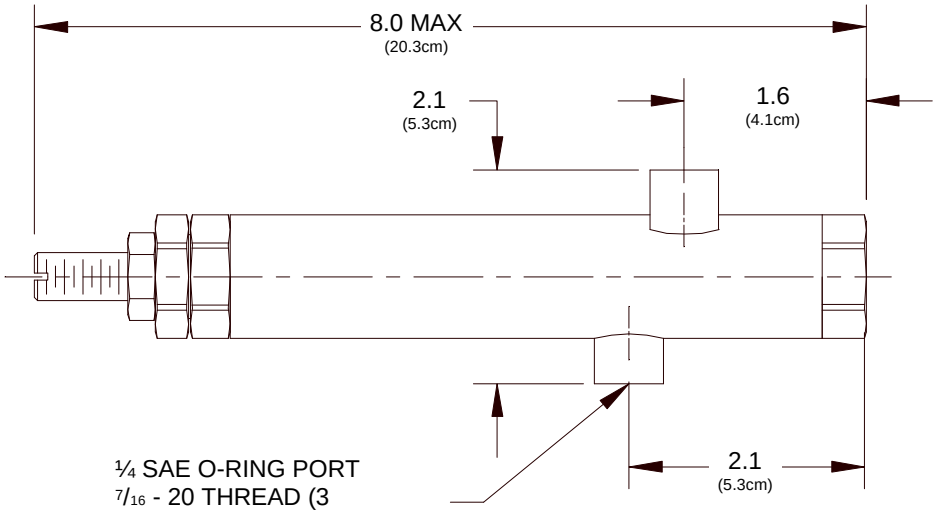
1. All connecting plumbing to be 1/4" tube size
2. Control cylinder end caps must be ported with -4 S.A.E. O-Ring port for external plumbing. Consult pump mfg.
3. Tee close to master compensator
4. Plumbing layout is for slaved control of "A" port on dual pumps.

TORQUE CONTROL COMPONENTS

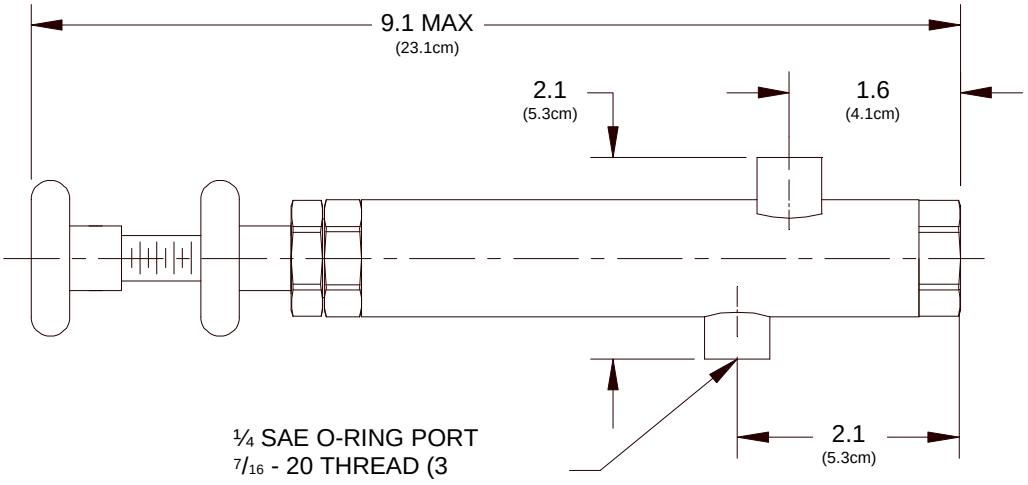
PART NO. 2115-A
2 PORT COMPENSATOR
REMOTE CONTROL
SEAL KIT SK-2115



PART NO. 2115
2 PORT COMPENSATOR
MANUAL CONTROL
SEAL KIT SK-2115

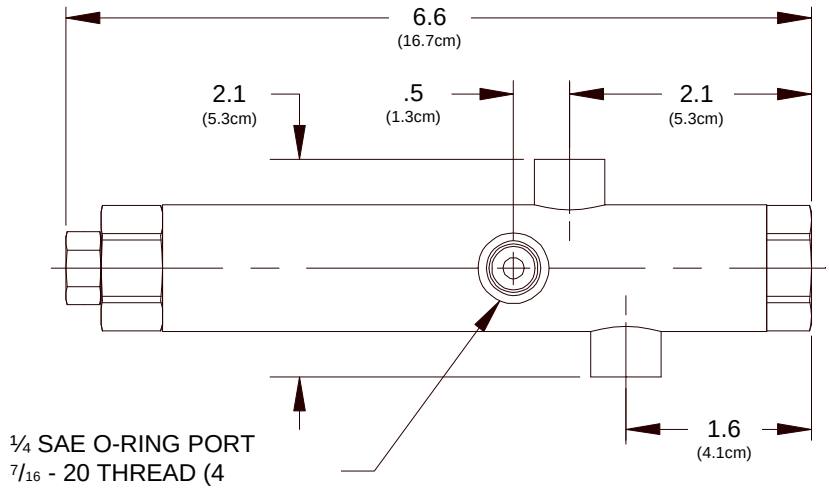


PART NO. 2115-C
2 PORT COMPENSATOR
PANEL MOUNT CONTROL
SEAL KIT SK-2115

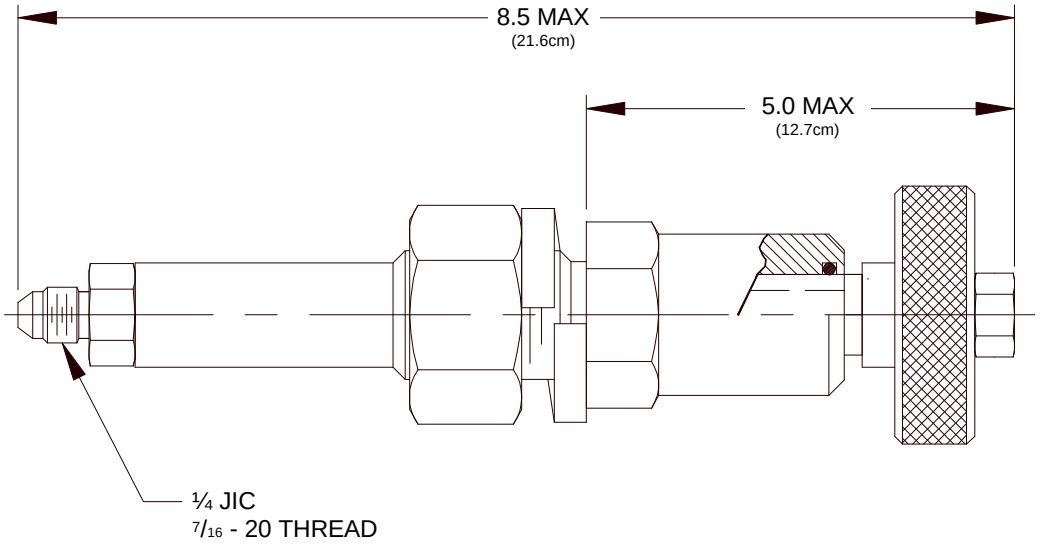


TORQUE CONTROL COMPONENTS

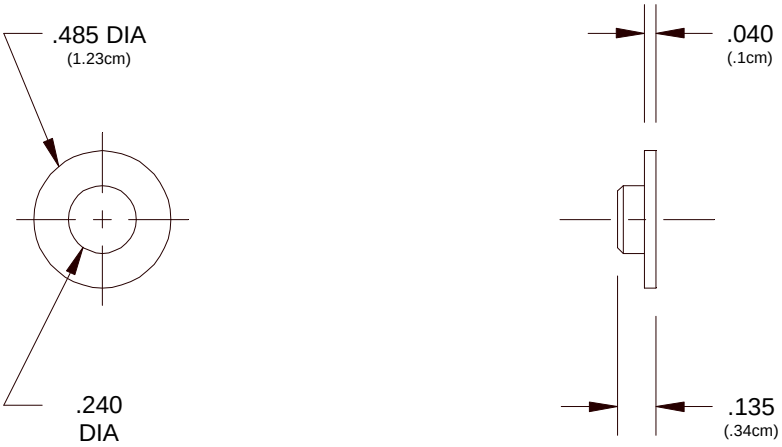
PART NO. 2116-D
3 PORT COMPENSATOR
SLAVE CONTROL
SEAL KIT SK-2116



PART NO. 2106
PRESSURE CONTROL
REMOTE CONTROL
SEAL KIT SK-2106

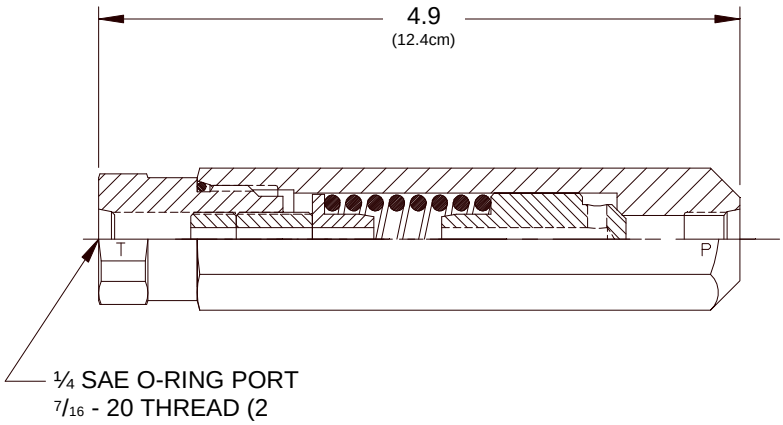


PART NO. 71101
INTERNAL PORT PLUG

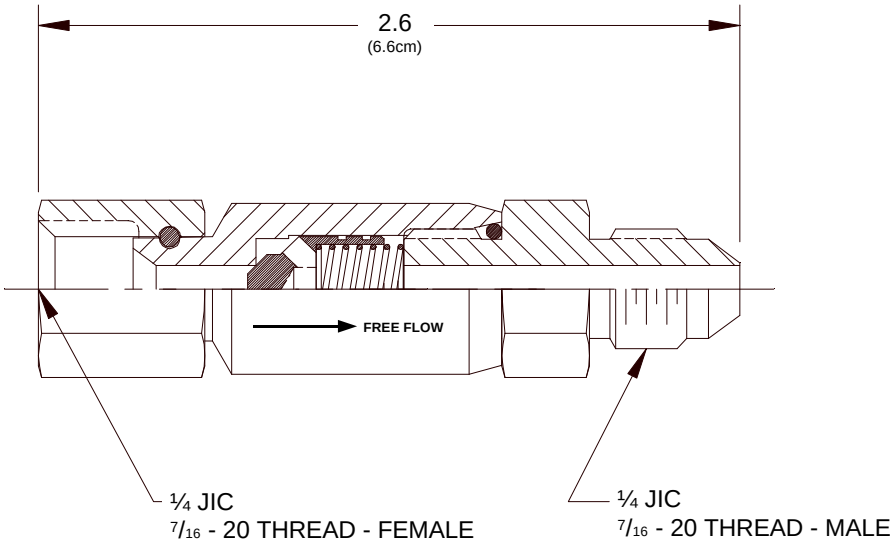


TORQUE CONTROL COMPONENTS

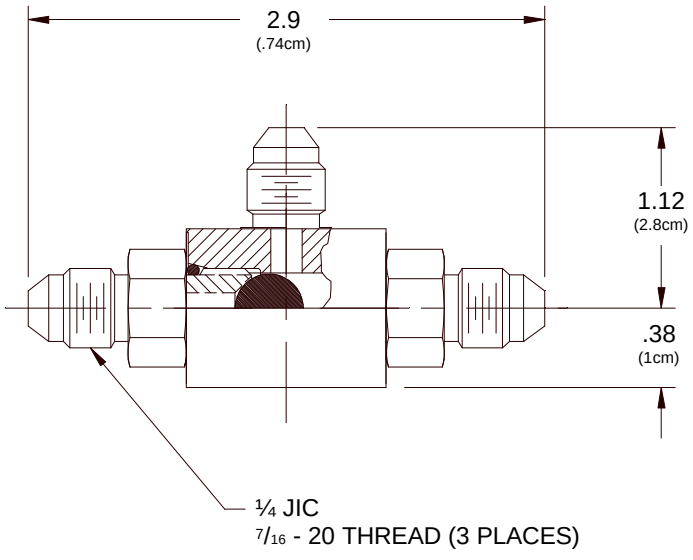
PART NO. 2118
RELIEF VALVE
SEAL KIT SK-2118

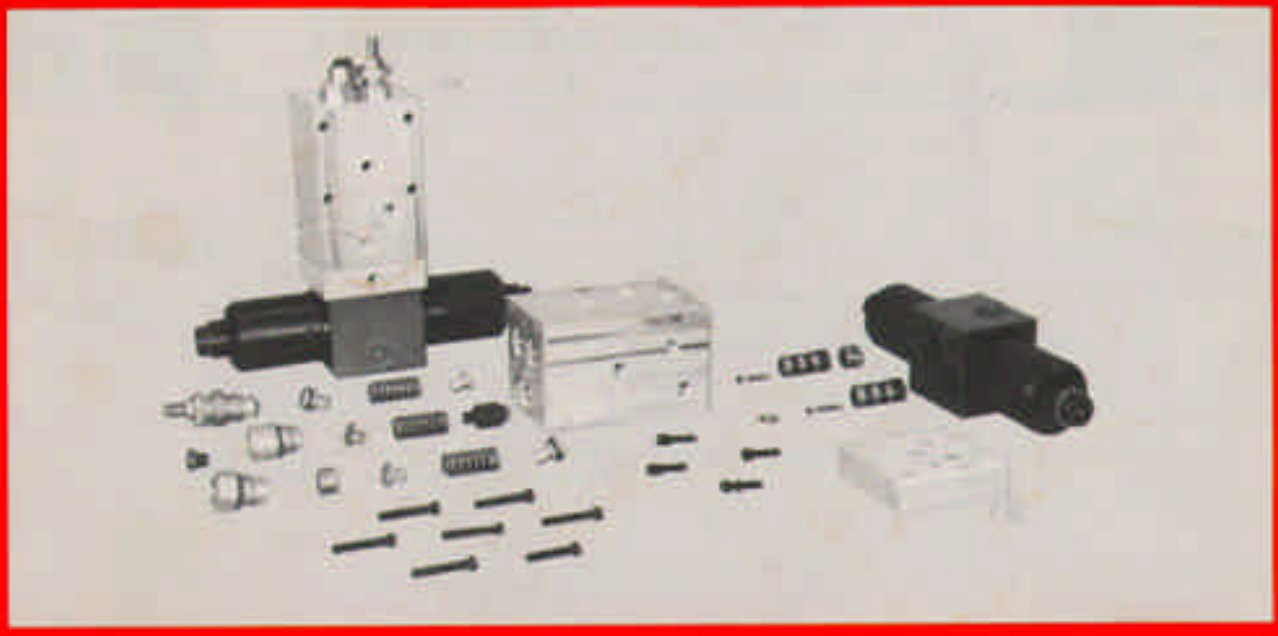


PART NO. 2104
CHECK VALVE
SEAL KIT SK-2104



PART NO. 2114
SHUTTLE VALVE
SEAL KIT SK-2114





HC-100

HC-102

HC-103

HYDRAULICS Inc.

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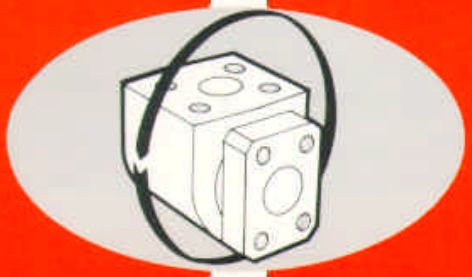
Fax: 817/927-8002

CONTACT OUR FORT WORTH OFFICE FOR ADDITIONAL PRODUCT INFORMATION • SWIVELS, COUPLINGS, AND CONTROLS FOR HYDRAULIC SYSTEMS • ASK FOR THE NEAREST REPRESENTATIVE.

PRINTED IN USA 5/91

CATALOG HC-104-A



SAE 4-BOLT FLANGED FLUID CONDUCTING SWIVEL JOINTS

3000 PSI – 6000 PSI
CODE 61 & CODE 62

FLANGED HEADS & FLANGED PORTS
SIZES: 1/2 thru 2 1/2 INCHES

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110-4104

Hydraulics, Inc. Fluid Conducting Swivel Joints described in this catalog incorporate SAE 4-Bolt flange connections rated for fluid pressures of 3000 and 6000 PSI. Connectors comply to SAE J518 flanged plumbing code 61 and code 62 specifications.

Important to success in severe applications, the product is manufactured with absence of weld and braze joints. Quality levels are to usual high stancards of Hydraulics, Inc. Durable materials provide service life demanded of heavy equipment in construction, mining and other tough applications. The result is rugged swivel joint performance for continouus duty high horsepower fluid power transmission systems.

Equipment designers select this product for structural integrity and equally, for the reliable connecting of fluid conductors.

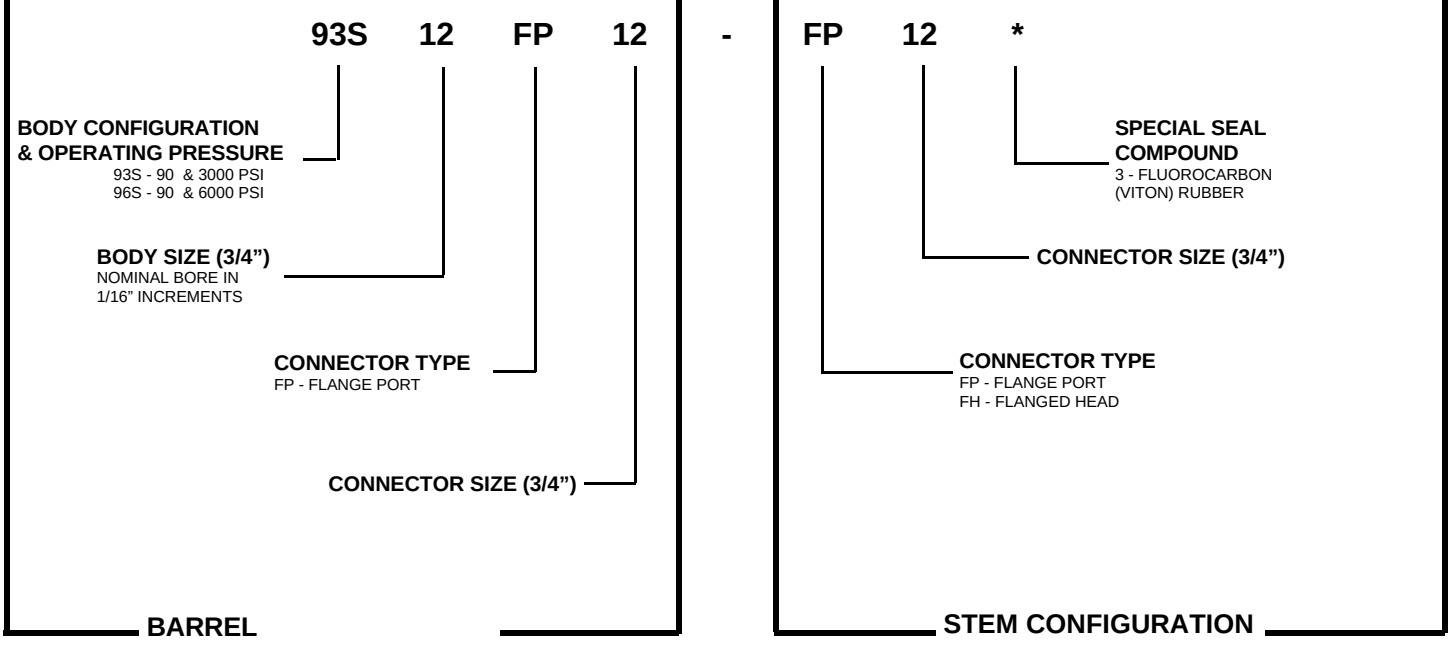
FLUID CONDUCTING SWIVELS PROVIDE

- Design versatility
- Simplified plumbing
- Longer flex hose life
- Ease of maintenance

PRODUCT RECOMMENDED FOR LIQUID FLUID POWER SYSTEMS

"Because of technological progress and product improvements, all design and dimensional data shown in this catalog is subject to change without notice. Technical information has been prepared from actual test results under controlled environmental conditions and data is considered to be reliable, but no responsibility can be assumed for its accuracy under varied field conditions."

EXAMPLE OF PART NUMBER SYSTEM



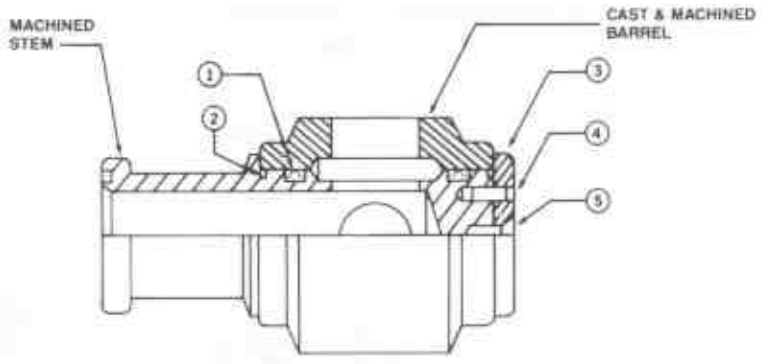
SAE 4-BOLT FLANGE CONNECTED FLUID CONDUCTING SWIVEL JOINTS

SAE FLANGE PORT TO SAE FLANGE PORT SERIES

	CODE 61	CODE 62
Sizes	3/4" thru 2 1/2"	1/2" thru 2"
Operating Pressures	3000 PSI	6000 PSI
Operating Temp.		-40 to +200 F

SAE FLANGE PORT TO SAE FLANGE HEAD

	CODE 61	CODE 62
Sizes	3/4" thru 2 1/2"	1/2" thru 2"
Operating Pressures	3000 PSI	6000
PSI		
Operating Temp.		-40 to +200 F



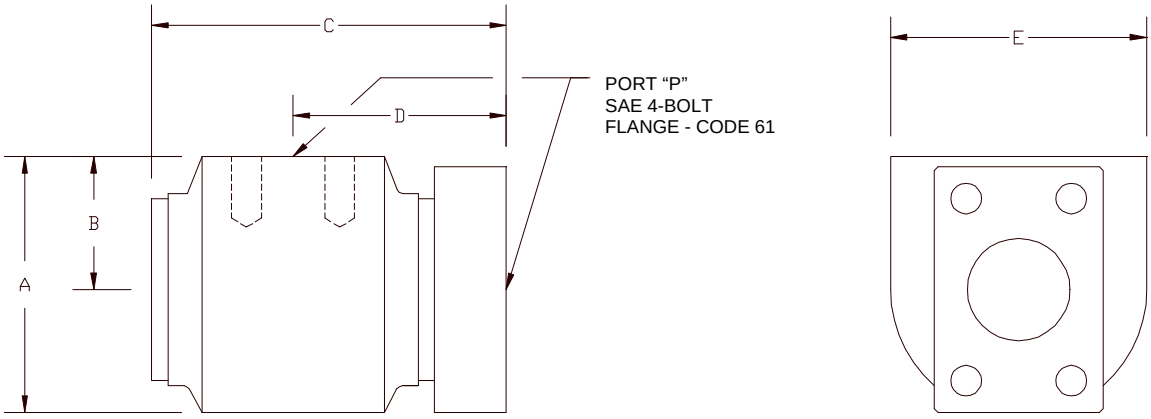
1 SYNTHETIC RUBBER T-RING SEAL ASSEMBLY (TWO)
2 DUST SEAL (TWO)
3 RETAINER PLATE
4 KEEPER PIN
5 RETAINER BOLT

PRODUCT FEATURES

- One Piece Barrel and Stem - No Weld or Braze Joint
- Burnished Barrel Bore - Extended Seal Life
- Heavy Duty Retainer Plate & Broad Wear Lands
- Resists Mechanical Loads
- Protective Treatment Meets SAE Hose Fitting Standards
- Recessed and Protected Dust Seals
- Pressure Balanced For Low Rotational Torques - See Page 7
- Excellent Flow Characteristics - See Page 7
- Field Replaceable Seal Kits - See Page 6

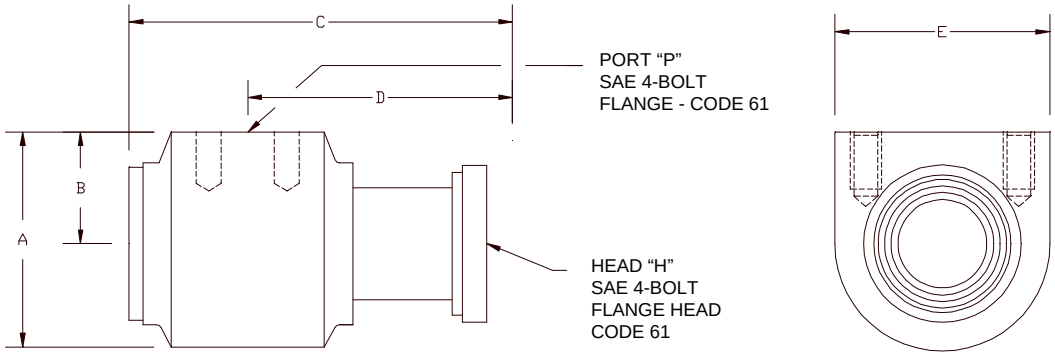
93S SERIES / 3000 PSI / SAE CODE 61 FLANGE

FLANGE PORT TO FLANGE PORT
3000 PSI



PART NUMBER	A	B	C	D	E	P	WT/LBS
93S12FP12-FP12	2.86	1.58	3.26	2.00	2.60	3/4	3.75
93S16FP16-FP16	3.04	1.64	3.73	2.21	2.84	1	4.50
93S20FP20-FP20	3.35	1.75	4.32	2.57	3.30	1 1/4	6.25
93S24FP24-FP24	3.87	2.00	4.93	2.88	3.80	1 1/2	10.25
93S32FP32-FP32	5.05	2.67	6.65	3.89	4.80	2	20.00
93S40FP40-FP40	6.37	3.37	7.39	4.17	6.03	2 1/2	33.25

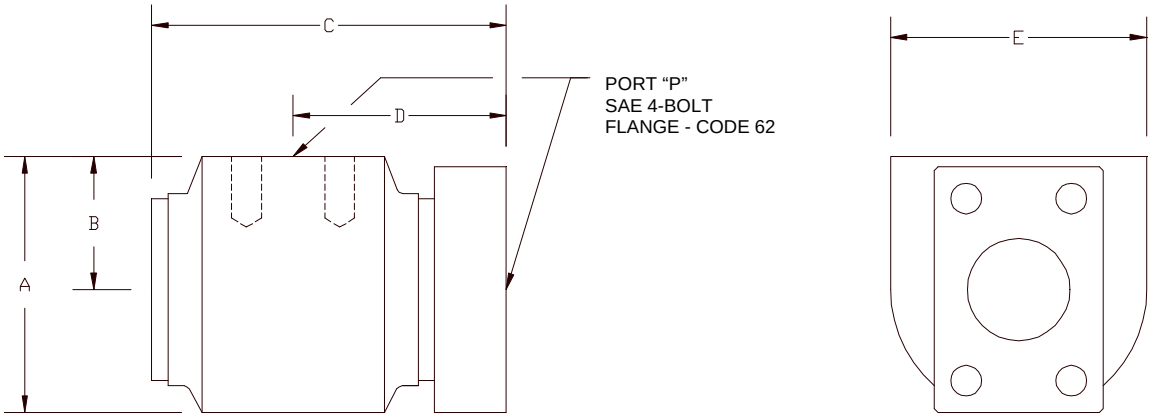
FLANGE PORT TO FLANGE HEAD
3000 PSI



PART NUMBER	A	B	C	D	E	P	H	WT/LBS
93S12FP12-FH12	2.86	1.58	4.18	2.92	2.60	3/4	3/4	3.50
93S16FP16-FH16	3.04	1.64	4.63	3.12	2.84	1	1	4.20
93S20FP20-FH20	3.34	1.75	5.40	3.65	3.30	1 1/4	1 1/4	5.80
93S24FP24-FH24	3.87	2.00	6.05	4.00	3.80	1 1/2	1 1/2	9.60
93S32FP32-FH32	5.04	2.67	7.56	4.80	4.80	2	2	18.30
93S40FP40-FH40	6.37	3.37	8.64	5.24	6.03	2 1/2	2 1/2	32.00

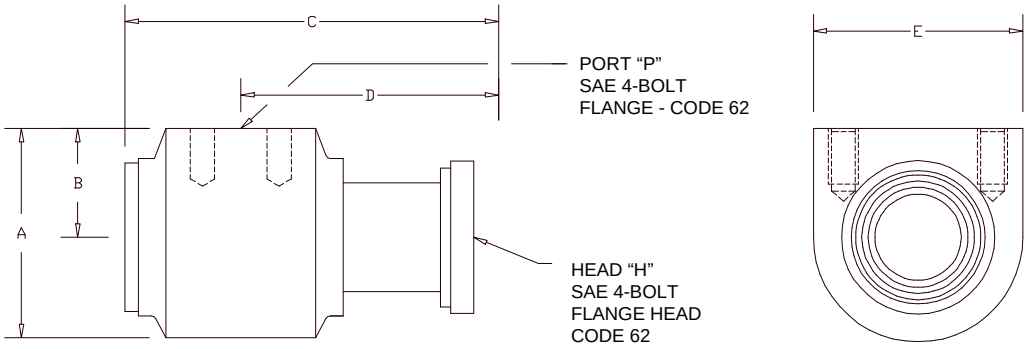
96S SERIES / 6000 PSI / SAE CODE 62 FLANGE

FLANGE PORT TO FLANGE PORT
6000 PSI



PART NUMBER	A	B	C	D	E	P	WT/LBS
96S8FP8-FP8	2.86	1.58	3.13	1.88	2.60	1/2	3.75
96S12FP12-FP12	3.04	1.64	3.73	2.21	2.84	3/4	4.75
96S16FP16-FP16	3.35	1.75	4.24	2.50	3.30	1	6.60
96S20FP20-FP20	3.87	2.00	4.93	2.88	3.80	1 1/4	10.60
96S24FP24-FP24	5.04	2.67	6.84	4.08	4.80	1 1/2	22.30
96S32FP32-FP32	6.37	3.37	7.71	4.48	6.03	2	37.75

FLANGE PORT TO FLANGE HEAD
6000 PSI



PART NUMBER	A	B	C	D	E	P	H	WT/LBS
96S8FP8-FH8	2.86	1.58	4.13	2.87	2.60	1/2	1/2	3.38
96S12FP12-FH12	3.04	1.64	4.88	3.37	2.84	3/4	3/4	4.38
96S16FP16-FH16	3.35	1.75	5.64	3.89	3.30	1	1	6.12
96S20FP20-FH20	3.87	2.00	6.31	4.25	3.80	1 1/4	1 1/4	11.00
96S24FP24-FH24	5.04	2.67	8.40	5.64	4.80	1 1/2	1 1/2	24.00
96S32FP32-FH32	6.37	3.37	9.88	6.65	6.03	2	2	34.50

FLANGED CONNECTORS AND SEAL KITS

CONNECTORS

Swivel Joint Flange Ports And Flange Heads Mate With SAE 4-Bolt Split Flanges And 4-Bolt Solid Flanges. The Flanges Offer Practical Solutions For Connecting Swivels To A Variety Of Mating Fluid Conductors.

REPLACEMENT SEAL KITS

Kits As Listed Contain Dust And Fluid Seals, Retaining Plate And Retaining Screw.

93S SERIES

BODY SIZE	93S12	93S16	93S20	93S24	93S32	93S40
KIT No.	SK93S12-8	SK93S-16-12	SK93S-20-16	SK93S24-20	SK93S-32-24	SK93S-40-32

96S SERIES

BODY SIZE	93S12	93S16	93S20	93S24	93S32	93S40
KIT No.	SK93S12-8	SK93S-16-12	SK93S-20-16	SK93S24-20	SK93S-32-24	SK93S-40-32

NOTE: SPECIAL SEALS

To obtain kits with seal compounds other than standard buna-n, suffix the replacement seal kit part number with the applicable seal material code number. Example: S6-1 kit would become S6-1-9 for a neoprene seal. See chart on Page 2.

PRODUCT INSTALLATION AND PERFORMANCE

INSTALLATION

Rotational Speeds —

Hydraulics, Inc. swivel joints are for low speed rotation as in most fluid powered material handling systems. Maximum speed of rotation depends upon system environment. Fluid types and extreme conditions related to temperatures and pressures are of prime consideration. Questionable applications should be proven by laboratory or prototype testing.

Mechanical Loading —

Wear of swivel components from mechanical loading encourages short seal life through increased clearances between mating surfaces. Minimize mechanical loading from connecting plumbing. Check hose lengths, hose twist and hard tubing alignment for cause of accelerated swivel wear. Do not use the swivel as a structural member.

PERFORMANCE

Pressure Drop At Rated Fuid Flow —

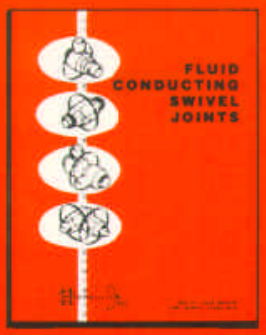
Pressure drop (ΔP) in PSIG of fluid flowing through the swivel at 15 feet per second velocity through the nominal bore size is as follows;

SERIES	SIZE & ΔP IN PSIG AT RATED FLOW						
	8	12	16	20	24	32	40
93S (CODE 61)		6.7	8.0	7.1	8.7	7.5	7.9
96S (CODE 62)	5.1	3.6	5.3	5.3	4.7	4.9	

Rotational Torque At Rated Operating Pressure —

Rotational torque are within the limits of fluid pressure generated flex hose rigidity. Strength of fluid piping restraining devices must be considered.

SERIES	SIZE & TORQUE IN INCH/LBS.						
	8	12	16	20	24	32	40
93S (CODE 61)		46	70	87	370	456	480
96S (CODE 62)	60	90	110	420	520	636	



HC-100

HC-102

HC-103

HC-104A

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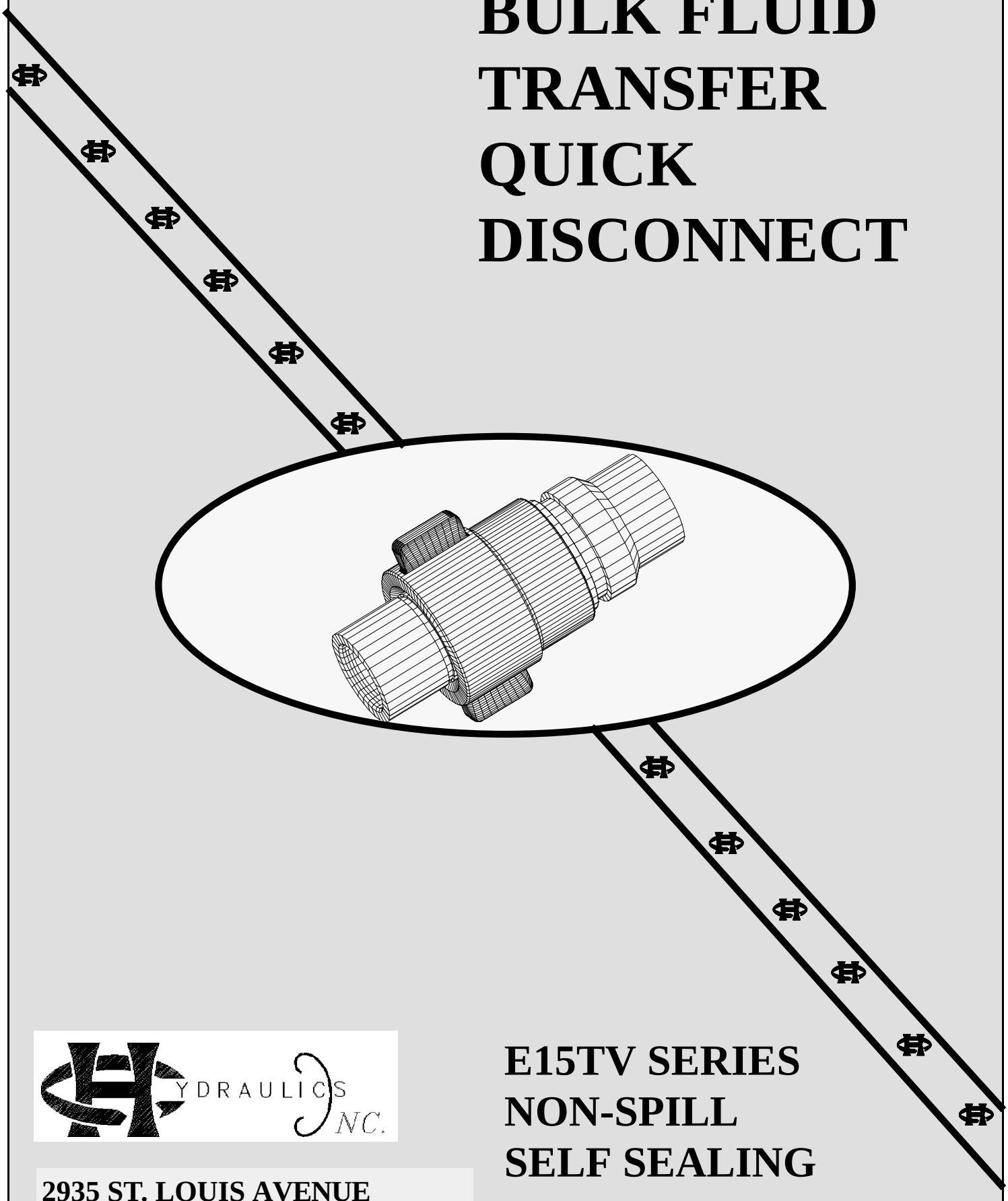
CATALOG HC-107

BULK FLUID TRANSFER QUICK DISCONNECT

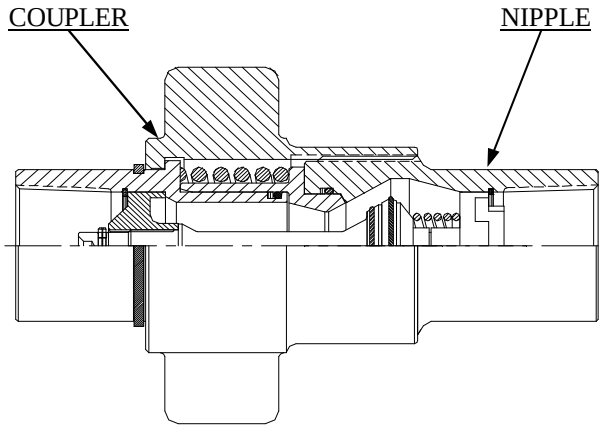


E15TV SERIES NON-SPILL SELF SEALING

HYDRAULICS INC.

2935 ST. LOUIS AVENUE
FORT WORTH, TX 76110

Thread To Connect - E15TV Series Couplings

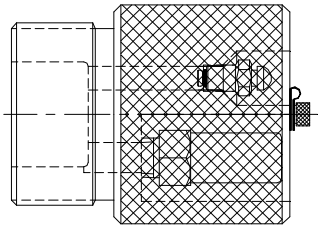


COUPLING ASSEMBLY

Hydraulics Inc. E15TV Couplings were specifically designed for use in transfer of refrigerant from transport to storage vessels. **CAUTION! User must assure compatability of coupling body and seal materials with fluid. Consult fluid manufacturer to determine compatibility.**

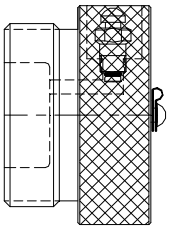
A key safety feature of this hand assembled coupling is that during Coupler and Nipple disconnect, the shut off valves close before the assembly seal vents. Virtually no fluid spill occurs. Should a valve not seal the two halves can be re-connected.

The Caps and Plugs including retention chains and rings are designed to limit Coupler and Nipple contamination and they provide safety features. Also the Coupling halves can be arranged on fluid lines to prevent liquid and vapor line cross-over errors at transfer hook up.



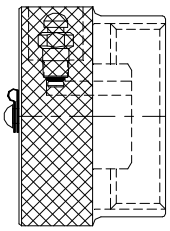
When fully inserted, the Coupler Pressure Relief Plug is designed to open the Coupler valve and communicate refrigerant trapped in the transfer hose bore. Thermal induced pressure build-up is then controlled by the plugs 400 psi relief valve. The plug also guards against contaminants and a button exhaust valve allows trapped gas release before plug removal.

COUPLER PRESSURE RELIEF PLUG



The Coupler Safety Plug is optional to the Relief Plug. It guards against contaminants and is designed to prevent product loss should the coupler valve fail. The safety plug button exhaust valve allows release of trapped gas before plug removal.

COUPLER SAFETY PLUG



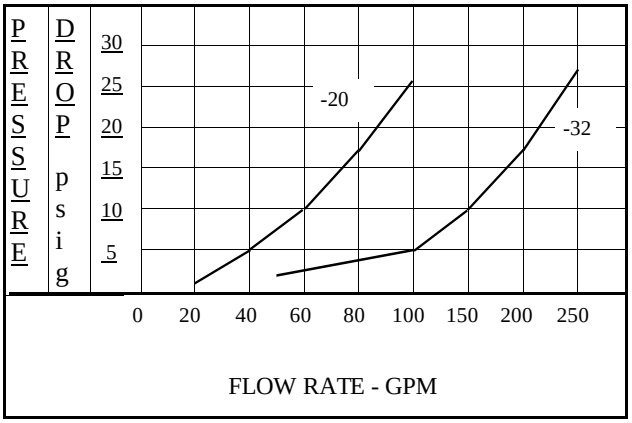
The Nipple Safety Cap is a contaminant safeguard and is designed to prevent product loss should the nipple valve fail. The cap's button exhaust valve allows release of trapped gas before removing the cap.

NIPPLE SAFETY CAP

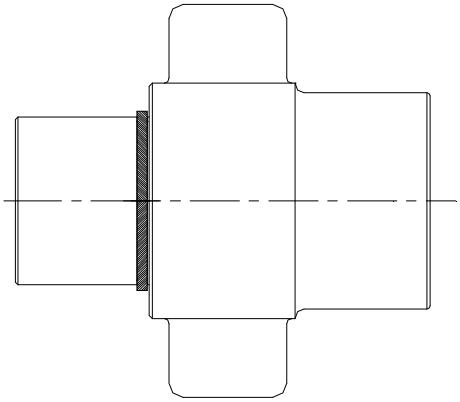
E15TV-CN-20 Coupling

E15TV-CN-32 Coupling

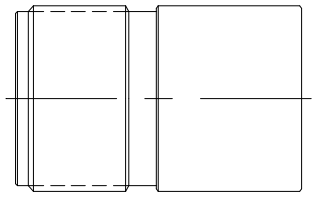
PRESSURE DROP Vs. FLOW
FLUID AT 150 SSU



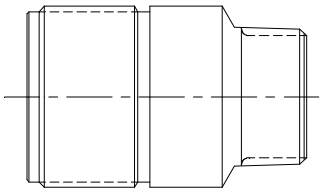
Thread To Connect - E15TV Series Couplings



COUPLER



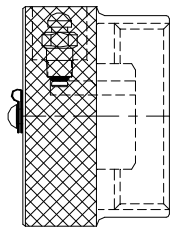
NIPPLE



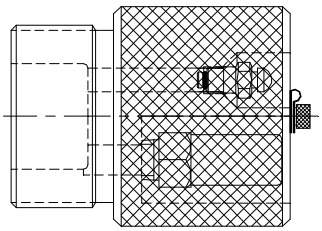
NIPPLE (CN-20-24 only)

Pressure Limitations
Coupled & Uncoupled-1500 psi max.
Safety Caps & Plug-500 psi max.
Operating Temp.
-40º F to + 150º F
Seals (other available)
Fluorolon coated Neoprene o-rings
Teflon back-up rings
Fluid Loss @ Disconnect
E15TV-CN-20 - 0.68ML
E15TV-CN-32 - 1.74 ML
Material-Coupling - Caps & Plugs
Bodies - Anodized Aluminum
All other cadmium plated carbon steel.

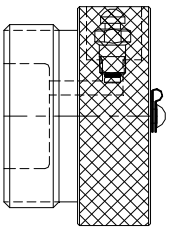
pub78



NIPPLE SAFETY CAP
CHAIN & RING



COUPLER PRESSURE RELIEF PLUG
CHAIN & RING

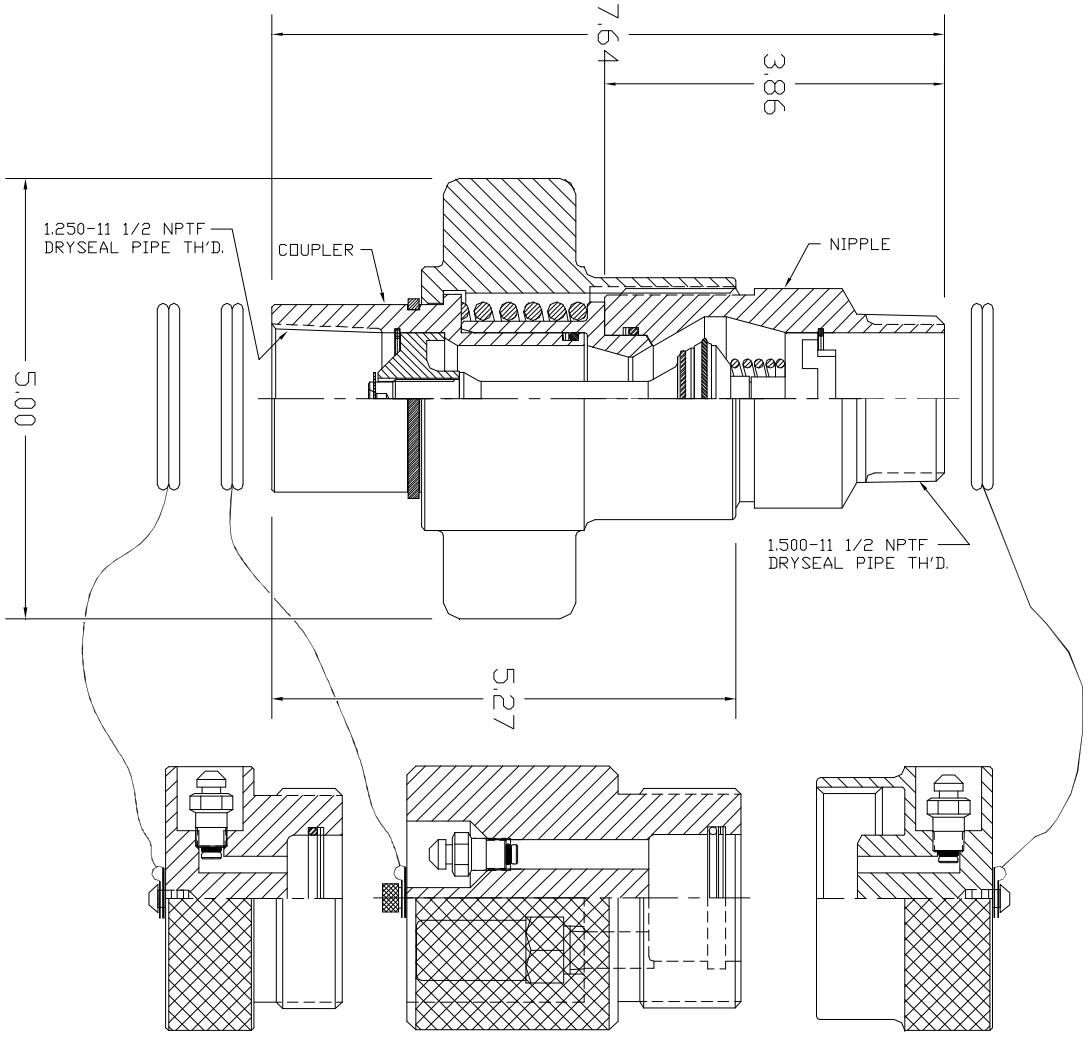


COUPLER SAFETY PLUG
CHAIN & RING

BODY SIZE	COUPLING PART No.	COUPLER PART No.	NIPPLE PART No.	SAFETY CAP PART No.	SAFETY PLUG PART No.	PRESSURE RELIEF PLUG PART No.
1-1/4”	E15TV-CN-20-24	E15TV-C-20	E15TV-N-20-24	E15TV-SC-20	E15TV-SP-20	E15TV-PRP-20
I-1/4”	E15TV-CN-20	E15TV-C-20	E15TV-N-20	E15TV-SC-20	E15TV-SP-20	E15TV-PRP-20
2.0”	E15TV-CN-32	E15TV-C-32	E15TV-N-32	E15TV-SC-32	E15TV-SP-32	E15TV-PRP-32

BODY SIZE	COUPLING PART No.	DIMENSIONS - INCHES				FEMALE PIPE THD SIZE	MALE PIPE THD SIZE	WEIGHT POUNDS
		COUPLING LENGTH	COUPLER LENGTH	NIPPLE LENGTH	ACROSS WING NUT			
1-1/4”	E15TV-CN-20-24	7.64	5.27	3.86	5.00	1-1/4:11-1/2	1-1/2:11-1/2	5
1-1/4”	E15TV-CN-20	7.64	5.27	3.86	5.00	1-1/4:11-1/2		5
2.0”	E15TV-CN-32	11.53	8.17	5.75	6.16	2:11-1/2		14

LTR	REVISION DESCRIPTION	DATE	APPROVED
A	ECN-486	8-17-00	



▷1◁ MUST BE FULLY INSERTED FOR PROPER FUNCTION

NOTES:

1. PART NUMBERS:

E15TV-CN-20-24	COUPLING
E15TV-C-20	COUPLER
E15TV-N-20-24	NIPPLE
E15TV-SP-20	SAFETY PLUG
E15TV-SC-20	SAFETY CAP
▷1◁ E15TV-PRP-20	PRESSURE RELIEF PLUG

2. MATERIAL: ALUMINUM BODY W/STEEL VALVES, NUT, RINGS AND SPRINGS.
3. PLATING: COUPLER & NIPPLE - COMBINATION OF HARD ANODIZE AND ANODIZE WITH BLACK DICHROMATE SEAL
   NUT & VALVE ASSEMBLIES - ZINC WITH DICHROMATE SEAL
4. SEALS: PRODUCT PRICED WITH NEOPRENE -- SUFFIX PART NUMBERS WITH COMPOUND LETTER DESIGNATOR FOR OTHER TYPE - B= BUNA-N, K= KALREZ
5. COUPLING OPERATING LIMITATIONS:
   FLUID LOSS AT DISCONNECT: .68 ml.
   FLUID PRESSURE (MAX.) COUPLED - MINUS 28"Hg TO 1500 P.S.I.G.
   FLUID PRESSURE (MAX.) UNCOUPLED - MINUS 12"Hg TO 1500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
6. SAFETY CAP AND SAFETY PLUG OPERATING LIMITATIONS:
   FLUID PRESSURE (MAX.) - 500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
7. PRESSURE RELIEF PLUG VALVE SET AT 400 P.S.I.
8. WEIGHTS
   COUPLER: 4 lbs.
   NIPPLE: 1 lb.
   SAFETY CAP: 1 lb.
   SAFETY PLUG: 1 lb.
   PRESSURE RELIEF PLUG: 1 lb. 3 oz.

SIGNATURE:	DATE
DRAWN: S. WESTOVER	6-8-00
CHECKED: D.F. HOWETH	6-16-00
APPROVED: D.F. HOWETH	6-16-00
CAD FILE 07H00270	6-16-00

UNLESS OTHERWISE NOTED

1. REMOVE ALL BURRS AND SHARP CORNERS
2. CORNER RADII .015
3. DO NOT SCALE DWG.
4. ALL DIMENSIONS ARE IN INCHES
5. MACHINE FIN .125
6. TOLERANCES
   FRAC +/-.030
   .X +/-.015
   .XX +/-.010
   .XXX +/-.005
   ANG. +/-1/2
   MACH. DIA. TO BE CONCENTRIC TO EACH OTHER WITHIN .010 F.I.M.

WT. REF. ANSI Y14.5-1982 FOR SYMBOLS

HYDRAULICS INC.
2935 ST. LOUIS AVE.
FT. WORTH, TEXAS 76115

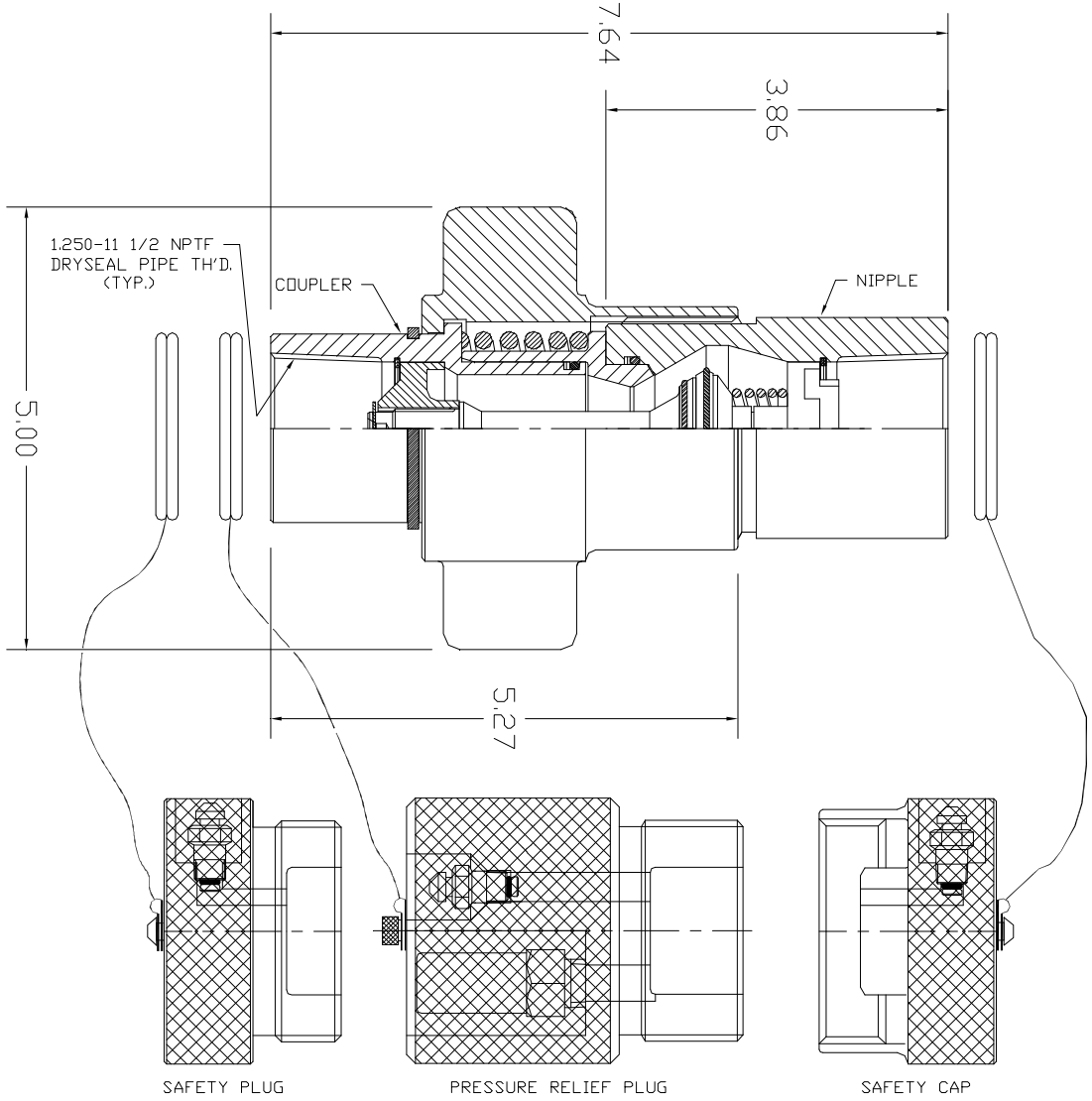
TITLE
E15TV SERIES SELF-SEAL COUPLING
1-1/4" EQUIVALENT BORE SIZE W/SEALS

MTL:	SEE NOTE 2
PLATE:	SEE NOTE 3
HEAT TREAT:	NONE
OTHER:	NONE

SIZE C | NEXT ASSEMBLY NONE | SCALE NONE | SHEET 1 OF 1

DWG. NO. E15TV-CN-20-24 | ORG 1 | CHG A

LTR	REVISION DESCRIPTION	DATE	APPROVED
A	ECN-486	8-17-00	



1 MUST BE FULLY INSERTED FOR PROPER FUNCTION.

NOTES:

1. PART NUMBERS:

E15TV-CN-20	COUPLING
E15TV-C-20	COUPLER
E15TV-N-20	NIPPLE
E15TV-SP-20	SAFETY PLUG
E15TV-SC-20	SAFETY CAP
1 E15TV-PRP-20	PRESSURE RELIEF PLUG

2. MATERIAL: ALUMINUM BODY W/STEEL VALVES, NUT, RINGS AND SPRINGS.
3. PLATING: COUPLER & NIPPLE - COMBINATION OF HARD ANODIZE AND ANODIZE WITH BLACK DICHROMATE SEAL
   NUT & VALVE ASSEMBLIES - ZINC WITH DICHROMATE SEAL
4. SEALS: PRODUCT PRICED WITH NEOPRENE -- SUFFIX PART NUMBERS WITH COMPOUND LETTER DESIGNATOR FOR OTHER TYPE - B= BUNA-N, K= KALREZ
5. COUPLING OPERATING LIMITATIONS:
   FLUID LOSS AT DISCONNECT: .68 ml.
   FLUID PRESSURE (MAX.) COUPLED - MINUS 28"Hg TO 1500 P.S.I.G.
   FLUID PRESSURE (MAX.) UNCOUPLED - MINUS 12"Hg TO 1500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
6. SAFETY CAP AND SAFETY PLUG OPERATING LIMITATIONS:
   FLUID PRESSURE (MAX.) - 500 P.S.I.G.
   TEMPERATURE RANGE - -40°F TO 150°F
7. PRESSURE RELIEF PLUG VALVE SET AT 400 P.S.I.
8. WEIGHTS

COUPLER:	4 lbs.
NIPPLE:	1 lb.
SAFETY CAP:	1 lb.
SAFETY PLUG:	1 lb.
PRESSURE RELIEF PLUG:	1 lb. 3 oz.

SIGNATURE:		DATE
DRAWN:	S. WESTOVER	6-8-00
CHECKED:	D.F. HOWETH	6-16-00
APPROVED:	D.F. HOWETH	6-16-00
CAD FILE	07H00271	6-16-00

UNLESS OTHERWISE NOTED

1. REMOVE ALL BURRS AND SHARP CORNERS
2. CORNER RADII .015
3. DO NOT SCALE DWG.
4. ALL DIMENSIONS ARE IN INCHES
5. MACHINE FIN 125
6. TOLERANCES
   FRAC. +/-.030
   .X +/-.015
   .XX +/-.010
   .XXX +/-.005
   ANG. +/-1/2
   MACH. DIA. TO BE CONCENTRIC TO EACH OTHER WITHIN .010 F.I.M.

WT. | REF. ANSI Y14.5-1982 FOR SYMBOLS

HYDRAULICS INC.
2935 ST. LOUIS AVE.
FT. WORTH, TEXAS 76115

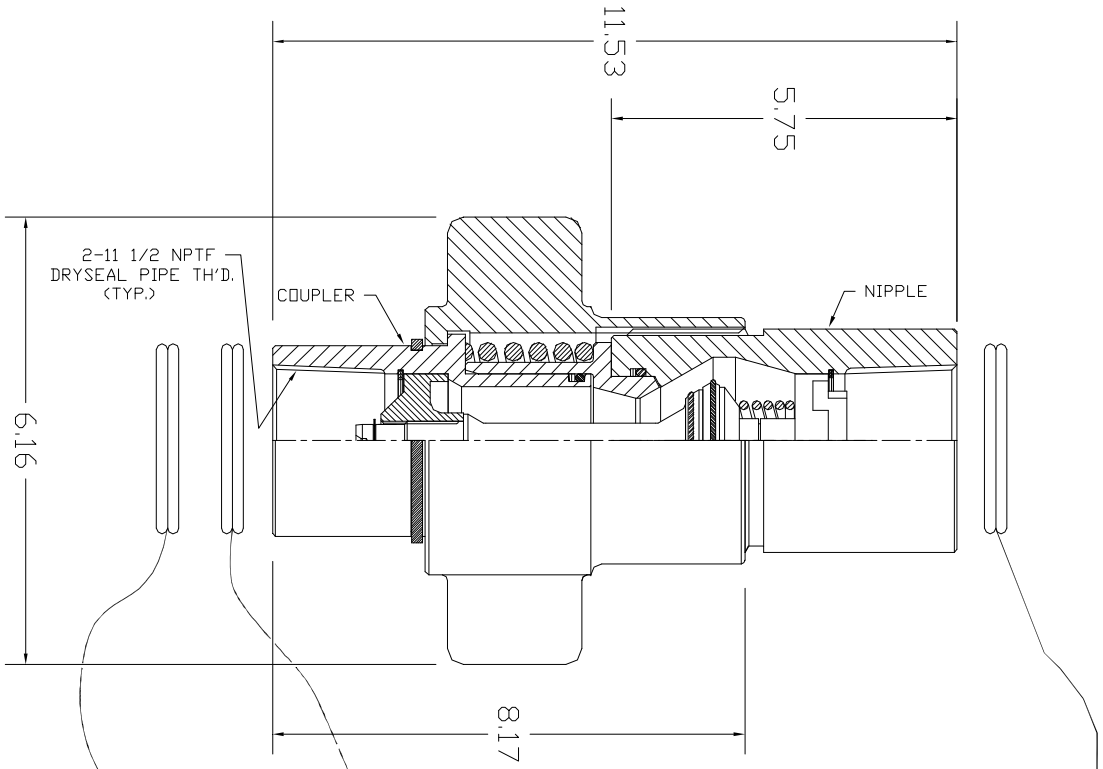
TITLE
E15TV SERIES SELF-SEAL COUPLING
1-1/4" EQUIVALENT BORE SIZE W/SEALS

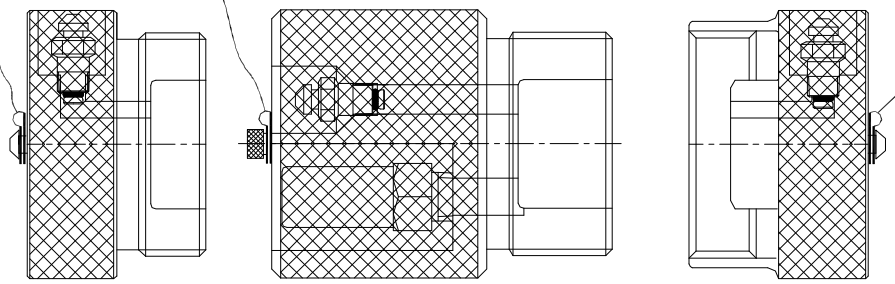
MTL:	SEE NOTE 2
PLATE:	SEE NOTE 3
HEAT TREAT:	NONE
OTHER:	NONE

SIZE C | NEXT ASSEMBLY NONE | SCALE NONE | SHEET 1 OF 1

DWG. NO. E15TV-CN-20 | ORG 1 | CHG A

LTR	REVISION DESCRIPTION	DATE	APPROVED
A	ECN-486	8-17-00	
B	ADDED FLAG NOTES	10-10-01	





SAFETY PLUG PRESSURE RELIEF PLUG SAFETY CAP

NOTES:

1. PART NUMBERS:

	E15TV-CN-32	COUPLING
	E15TV-C-32	COUPLER
	E15TV-N-32	NIPPLE
1	E15TV-SP-32	SAFETY PLUG
1	E15TV-SC-32	SAFETY CAP
2	E15TV-PRP-32	PRESSURE RELIEF PLUG

2. MATERIAL: ALUMINUM BODY W/STEEL VALVES, NUT, RINGS AND SPRINGS.

3. PLATING: COUPLER & NIPPLE - COMBINATION OF HARD ANODIZE AND ANODIZE WITH BLACK DICHROMATE SEAL
NUT & VALVE ASSEMBLIES - ZINC WITH DICHROMATE SEAL

4. SEALS: PRODUCT PRICED WITH NEOPRENE -- SUFFIX PART NUMBERS WITH COMPOUND LETTER DESIGNATOR FOR OTHER TYPE - B= BUNA-N, K= KALREZ

5. COUPLING OPERATING LIMITATIONS:
FLUID LOSS AT DISCONNECT: 1.74 ml.
FLUID PRESSURE (MAX.) COUPLED - MINUS 28"Hg TO 1500 P.S.I.G.
FLUID PRESSURE (MAX.) UNCOUPLED - MINUS 12"Hg TO 1500 P.S.I.G.
TEMPERATURE RANGE - -40°F TO 150°F

6. SAFETY CAP AND SAFETY PLUG OPERATING LIMITATIONS:
FLUID PRESSURE (MAX.) - 500 P.S.I.G.
TEMPERATURE RANGE - -40°F TO 150°F

7. PRESSURE RELIEF PLUG VALVE SET AT 400 P.S.I.

8. WEIGHTS
COUPLER: 12 lbs.
NIPPLE: 3 lbs. 11 oz.
SAFETY CAP: 2 lbs. 10 oz.
SAFETY PLUG: 2 lbs. 11 oz.
PRESSURE RELIEF PLUG: 5 lbs.

1 SAFETY PLUG & CAP POPPET VALVES TO VENT TRAPPED GAS BEFORE REMOVING THESE ARTICLES.

2 MUST BE FULLY INSERTED IN COUPLER TO LIMIT PRESSURE IN HOSE BORE TO 400 PSI.

SIGNATURE:		DATE
DRAWN: S. WESTOVER		6-8-00
CHECKED: D.F. HOWETH		6-16-00
APPROVED: D.F. HOWETH		6-16-00
CAD FILE 07H00272		6-16-00

UNLESS OTHERWISE NOTED

1. REMOVE ALL BURRS AND SHARP CORNERS
2. CORNER RADII .015
3. DO NOT SCALE DWG.
4. ALL DIMENSIONS ARE IN INCHES
5. MACHINE FIN 125
6. TOLERANCES FRAC. +/-.030 X +/-.015 XX +/-.010 XXX +/-.005 ANG. +/-1/2 MACH. DIA. TO BE CONCENTRIC TO EACH OTHER WITHIN .010 F.I.M.

WT. REF. ANSI Y14.5-1982 FOR SYMBOLS

HYDRAULICS INC. 2935 ST. LOUIS AVE, FT. WORTH, TEXAS 76115

TITLE
E15TV SERIES SELF-SEAL COUPLING
2" EQUIVALENT BORE SIZE W/SEALS

MTL: SEE NOTE 2
PLATE: SEE NOTE 3
HEAT TREAT: NONE
OTHER: NONE

SIZE C | NEXT ASSEMBLY NONE
SCALE NONE | SHEET 1 OF 1
DWG. NO. E15TV-CN-32 | DRG 1 | CHG B

HYDRAULICS Inc.

Tel: 817-923-1965
Fax: 817-927-8002

Plant & Offices
2935 St. Louis Ave
P.O. Box 6479
Ft. Worth, TX 76115-0479

OFFER OF SALE

The items described in this document are hereby offered for sale at prices to be established by Hydraulics inc. and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all the following Terms and Conditions. Buyer's order for any item described in this document, when communicated to Hydraulics inc., or any 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 sellers products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyers acceptance of any offer to sell is limited to these terms and conditions. Any terms and conditions in addition to, or inconsistent with those stated herein, proposed by the Buyer in any acceptance of an offer by Seller, are hereby objected to. No other such additional, different or inconsistent terms and conditions shall become a part of the contract between Buyer and seller unless expressly accepted in writing by Seller. Sellers acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in the Buyers offer. Acceptance of Sellers products shall in all events constitute such assent.

2. Payment: Payment for goods purchased by Buyer shall be due in 30 days from date of shipment with 1/ 2 % discount off goods purchased if paid in 10 days from the date of shipment. Buyer claims 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: Delivery shall be made F.O.B. sellers plant, Ft. Worth TX. Regardless of the method of delivery, however, risk of loss shall pass to the Buyer upon Seller's delivery to the carrier. Any delivery dates shown are approximate only and seller shall have no liability for any delays in delivery. All offers and payments are in U.S.A. dollars.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material and workmanship for a period of 365 days from the date of shipment to Buyer. 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.

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 the Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at the Seller's discretion, and shall be upon such terms and conditions as Seller may require.

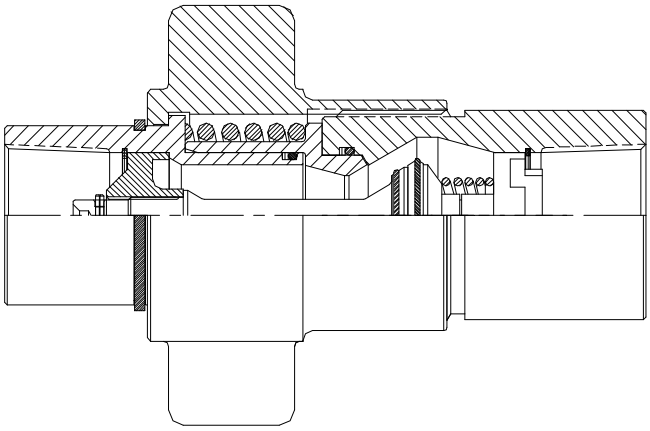
7. Returns: Buyer may request to return items sold hereunder, however no such requests shall become part of the contract between Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement.

8. 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 tax must be paid by the Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts of 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 against such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

9. 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 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 agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyonds Seller's control.

10. Entire Agreement / Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any 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 Texas. 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 the action accrues.

E15TV SERIES
BULK FLUID TRANSFER
QUICK CONNECT COUPLING



HYDRAULICS Inc.

Plant & Offices
2935 St. Louis Ave.
P.O. Box 6479
Ft. Worth, TX 76115-0479

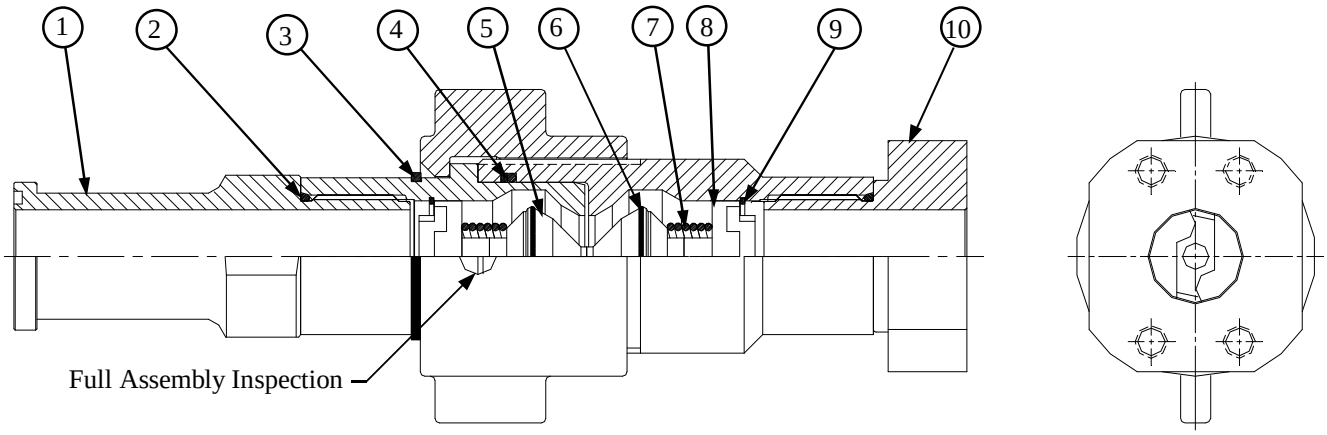
Tel: 817-923-1965
Fax: 817-927-8002
Website:
http://www.hydraulicsinc.com

CONTACT OUR FORT WORTH OFFICE FOR ADDITIONAL PRODUCT INFORMATION ☐ ASK FOR OUR NEAREST STOCKING DISTRIBUTOR

LITHO IN USA 12/06 CATALOG HC-109C

PRODUCT DATA - 6TV SERIES COUPLINGS

6TV series thread to connect steel couplings provides for high flow and low energy loss in fluid power systems common to mining, oil, construction and other natural resource sectors. Rated operating pressure for these couplings is 6,000 PSI. World class SAE J518 code 61 and code 62 four bolt flange end ports provide leak free solutions at pressures from 2,000 thru 6,000 psi. NOTE - *Not For Gas Fluid Form.*



1. **FLANGE HEAD ADAPTER**
2. **ELASTOMERIC SEAL**
3. **NUT RETAINING RING**
4. **NIPPLE SEAL (O-RING/BACK UP RING)**
5. **POPPET VALVE**
6. **VALVE SEAL (SWAGED IN AGAINST WASHOUT)**
7. **VALVE SPRING**
8. **FOUR-POINT CONTACT POPPET GUIDE**
9. **2-TURN LOCK RING**
10. **FLANGE PORT ADAPTER**

pub142 12-12-02

Features

• Couplers and nipple are supplied as individual items. They also mate the 5TV series rated at 5,000 psi.

• Coupler and nipple end ports are four bolt flange connections to SAE J518, code 61 or code 62, either flange head or flange ports.

• Elastomeric seals greatly reduce end port leakage potential.

• High grade steel construction provides a four to one design factor. It extends fluid port, coupler nut, and nipple thread life, allows for assembly under an amount of pressure and secures valves against wash-out under fluid surge or shock conditions.

• The hammer lug wing nut aids in assembly of coupling against an amount of pressure. Full assembly is visually verified at the coupler nut inspection ports.

• Flat crest stub-acme threads prevent galling and resist rig-up and storage damage. Coupler and Nipple dust plugs are recommended.

• Protective treatment is zinc plate to standards for S.A.E. steel hose fittings.

Physical Characteristics

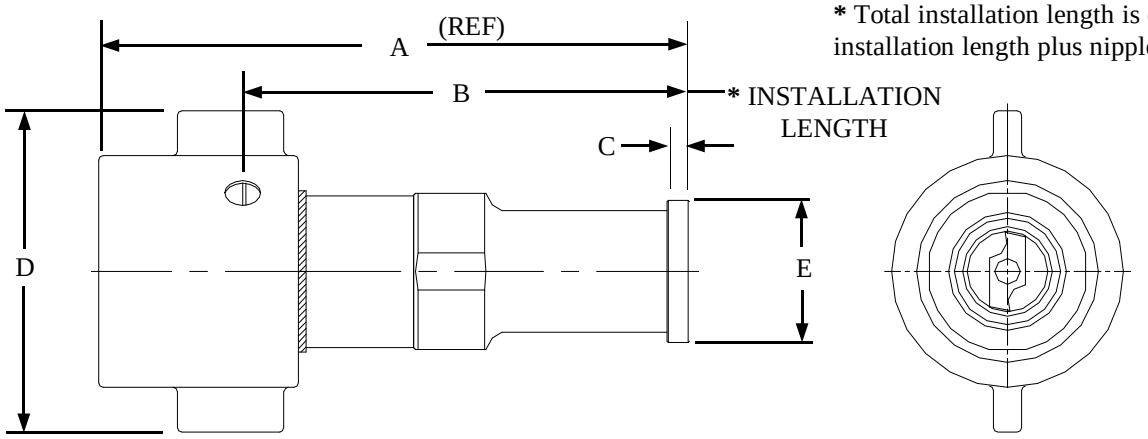
Coupling Sizes	Maximum Operating Pressure (psi)	Minimum Burst Pressure (psi)	Vacuum (in. / Hg)	Rated Flow (gpm @ 20 fps)
-16	6,000	24,000	28	50
-20	6,000	24,000	28	78
-24	6,000	24,000	28	110
-32	6,000	24,000	28	196
-40	6,000	24000	28	306

SAE J518 Ports - Rated Working Pressures

SAE CODE 62 PORTS			SAE CODE 61 PORTS		
Size Inches	Dash Size	Pressure PSI	Size Inches	Dash Size	Pressure PSI
3/4	12	6,000	3/4	12	5,000
1	16	6,000	1	16	5,000
1-1/4	20	6,000	1-1/4	20	4,000
1-1/2	24	6,000	1-1/2	24	3,000
2	32	6,000	2	32	3,000
			2-1/2	40	2,500

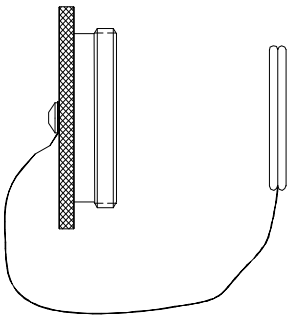
®

6TV SERIES CODE 61 FLANGE HEAD COUPLERS & NIPPLES



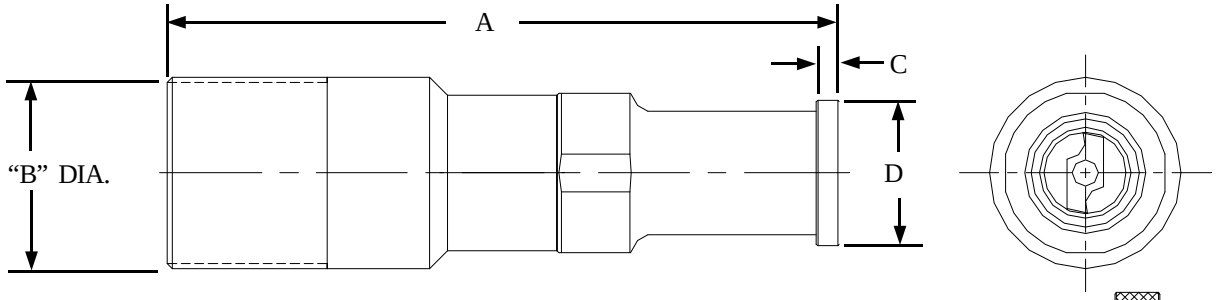
***** Total installation length is coupler installation length plus nipple length.

Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	Wt. in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC5-FH12**	12	6.04	4.79	.265	3.00	1.50		5,000	**5TV-DP-12**
16	**6TVC5-FH16**	16	6.85	5.26	.315	3.75	1.75	4.25	5,000	**5TV-DP-16**
20	**6TVC4-FH20**	20	8.30	6.28	.315	4.51	2.00	6.82	4,000	**5TV-DP-20**
24	**6TVC3-FH24**	24	8.72	6.42	.315	4.75	2.38	9.90	3,000	**5TV-DP-24**
32	**6TVC3-FH32**	32	10.00	6.93	.375	6.75	2.81	19.47	3,000	**5TV-DP-32**
40	**6TVC2/5-FH40**	40	11.10	7.60	.375	8.01	3.31	35.93	2,500	**5TV-DP-40**
48	**6TVC2-FH48**	48							2,000	**5TV-DP-48**

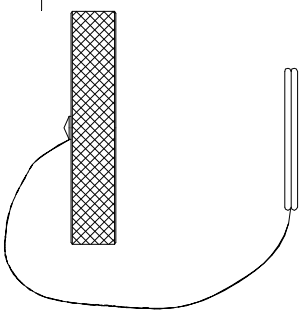


5TV COUPLING PORT DUST PLUG
Dust plugs not included unless specified.

*In an assembly where 6TV type coupling halves include SAE J518 *(June 93)* Code 61 or 62 four bolt split flange ports, the coupling working pressure should not exceed the lower of its port's rated values as noted here.

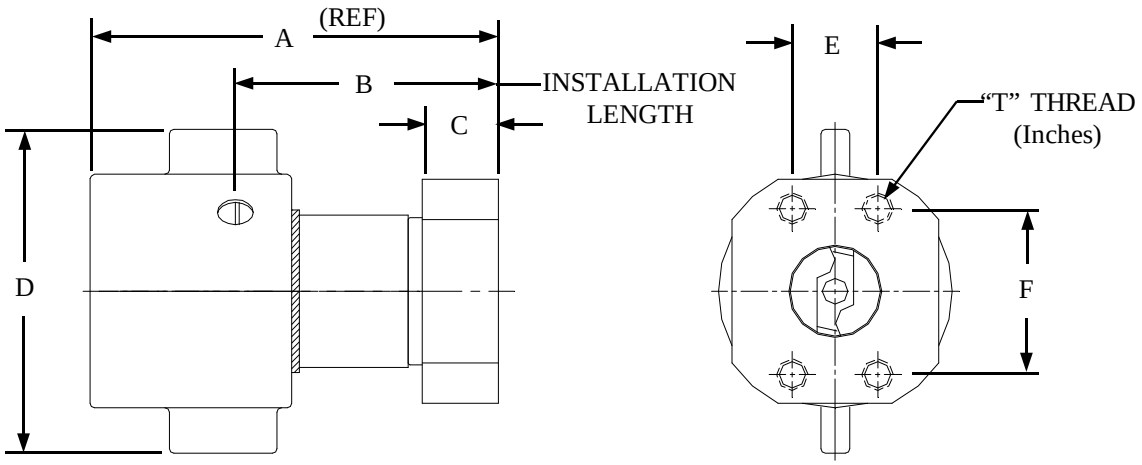


Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	D	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN5-FH12**	12	6.46	1.75	.265	1.50		5,000	**5TV-DC-12**
16	**6TVN5-FH16**	16	7.58	2.25	.315	1.75	3.96	5,000	**5TV-DC-16**
20	**6TVN4-FH20**	20	9.23	2.63	.315	2.00	6.09	4,000	**5TV-DC-20**
24	**6TVN3-FH24**	24	9.67	3.25	.315	2.38	9.50	3,000	**5TV-DC-24**
32	**6TVN3-FH32**	32	10.98	4.00	.375	2.81	15.81	3,000	**5TV-DC-32**
40	**6TVN2/5-FH40**	40	12.93	4.25	.375	3.31	26.10	2,500	**5TV-DC-40**
48	**6TVN2-FH48**	48						2,000	**5TV-DC-48**

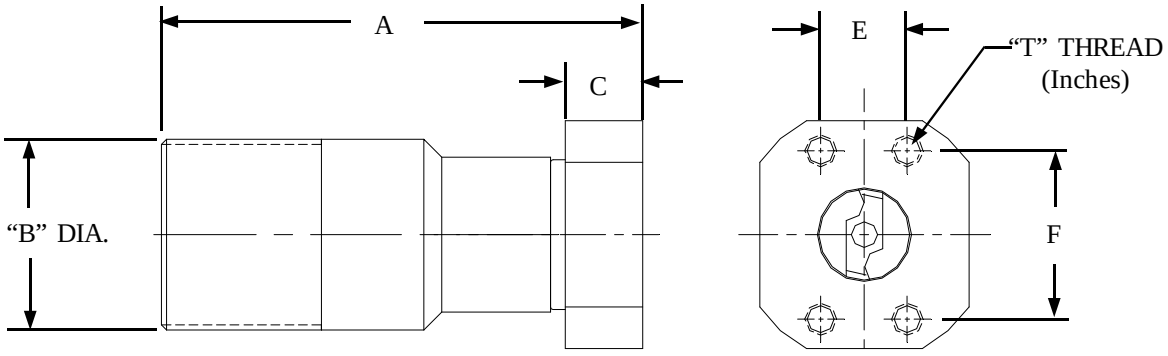


5TV COUPLING PORT DUST CAP
Dust caps not included unless specified.

6TV SERIES CODE 61 FLANGE PORT COUPLERS & NIPPLES

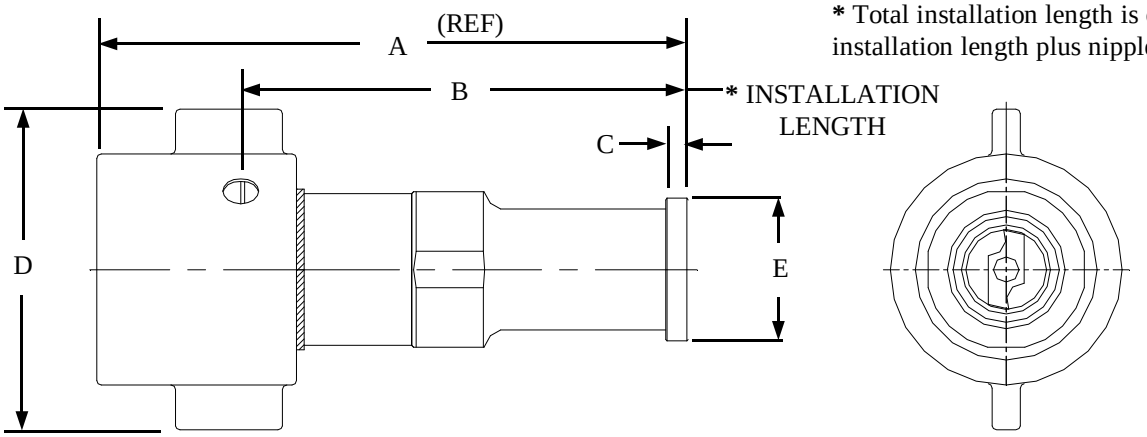


Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	F	T Thread Size-UNC	Wt. in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC5-FP12**	12	4.00	2.75	.88	3.00	.88	1.88	3/8-16		5,000	**5TV-DP-12**
16	**6TVC5-FP16**	16	4.61	3.02	.88	3.75	1.03	2.06	3/8-16	4.29	5,000	**5TV-DP-16**
20	**6TVC4-FP20**	20	5.68	3.66	1.06	4.51	1.19	2.31	7/16-14	7.22	4,000	**5TV-DP-20**
24	**6TVC3-FP24**	24	6.38	4.08	1.06	4.75	1.41	2.75	1/2-13	10.51	3,000	**5TV-DP-24**
32	**6TVC3-FP32**	32	7.41	4.34	1.06	6.75	1.69	3.06	1/2-13	19.73	3,000	**5TV-DP-32**
40	**6TVC2/5-FP40**	40	8.56	5.07	1.69	8.01	2.00	3.50	1/2-13	38.47	2,500	**5TV-DP-40**
48	**6TVC2-FP48**	48									2,000	**5TV-DP-48**



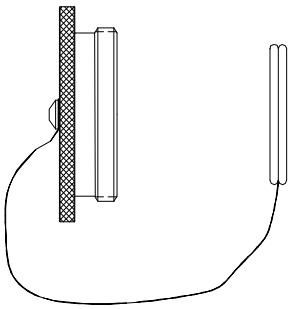
Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	E	F	T Thread Size-UNC	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN5-FP12**	12	4.43	1.75	.88	.88	1.88	3/8-16		5,000	**5TV-DC-12**
16	**6TVN5-FP16**	16	5.33	2.25	.88	1.03	2.06	3/8-16	4.00	5,000	**5TV-DC-16**
20	**6TVN4-FP20**	20	6.61	2.63	1.06	1.19	2.31	7/16-14	6.49	4,000	**5TV-DC-20**
24	**6TVN3-FP24**	24	7.33	3.25	1.06	1.41	2.75	1/2-13	10.11	3,000	**5TV-DC-24**
32	**6TVN3-FP32**	32	8.39	4.00	1.06	1.69	3.06	1/2-13	16.07	3,000	**5TV-DC-32**
40	**6TVN2/5-FP40**	40	10.39	5.25	1.69	2.00	3.50	1/2-13	28.64	2,500	**5TV-DC-40**
48	**6TVN2-FP48**	48								2,000	**5TV-DC-48**

6TV SERIES CODE 62 FLANGE HEAD COUPLERS & NIPPLES



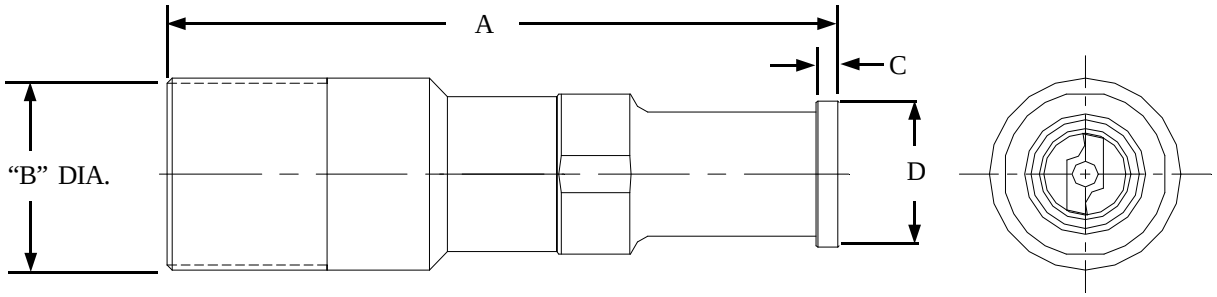
***** Total installation length is coupler installation length plus nipple length.

Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	Wt. in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC6-FH12**	12	6.48	5.23	.345	3.00	1.25		6,000	**5TV-DP-12**
16	**6TVC6-FH16**	16	7.70	6.11	.375	3.75	1.88	4.63	6,000	**5TV-DP-16**
20	**6TVC6-FH20**	20	8.64	6.63	.405	4.51	2.13	7.10	6,000	**5TV-DP-20**
24	**6TVC6-FH24**	24	9.16	6.86	.495	4.75	2.50	10.38	6,000	**5TV-DP-24**
32	**6TVC6-FH32**	32	10.82	7.75	.495	6.75	3.13	20.97	6,000	**5TV-DP-32**
40	**640C6-FH32**	32	11.62	8.13	.495	8.01	3.13	39.4	6,000	**5TV-DP-40**

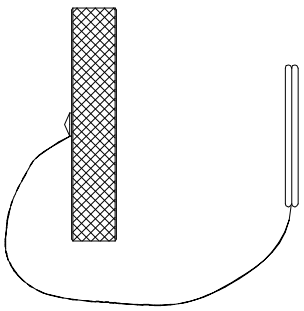


5TV COUPLING PORT DUST PLUG
Dust plugs not included unless specified.

*****In an assembly where 6TV type coupling halves include SAE J518 *(June 93)* Code 61 or 62 four bolt split flange ports, the coupling working pressure should not exceed the lower of its port's rated values as noted here.

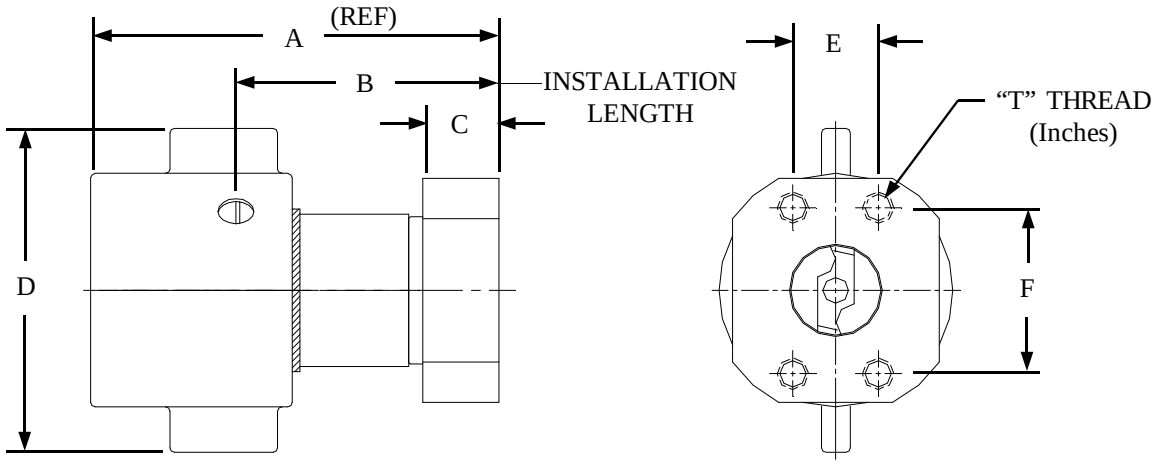


Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	D	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN6-FH12**	12	6.90	1.75	.345	1.25		6,000	**5TV-DC-12**
16	**6TVN6-FH16**	16	8.42	2.25	.375	1.88	4.34	6,000	**5TV-DC-16**
20	**6TVN6-FH20**	20	9.57	2.63	.405	2.13	6.37	6,000	**5TV-DC-20**
24	**6TVN6-FH24**	24	10.11	3.25	.495	2.50	9.98	6,000	**5TV-DC-24**
32	**6TVN6-FH32**	32	11.80	4.00	.495	3.13	17.31	6,000	**5TV-DC-32**
40	**640N6-FH32**	32	13.45	5.25	.495	3.13	29.4	6,000	**5TV-DC-40**

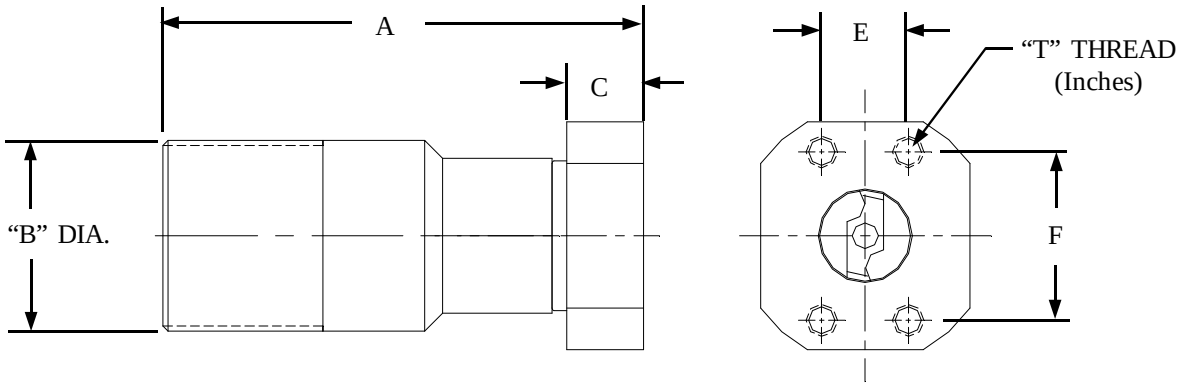


5TV COUPLING PORT DUST CAP
Dust caps not included unless specified.

6TV SERIES CODE 62 FLANGE PORT COUPLERS & NIPPLES



Coupler Dash Size	Coupler Part Number	Flange Dash Size	A	B	C	D	E	F	T Thread Size-UNC	Wt in Lbs.	Working Pressure Max. PSI	Dust Plug Part Number
12	**6TVC6-FP12**	12	4.13	2.88	0.94	3.00	0.94	2.00	3/8-16		6,000	**5TV-DP-12**
16	**6TVC6-FP16**	16	4.85	3.26	1.06	3.75	1.09	2.25	7/16-14	5.25	6,000	**5TV-DP-16**
20	**6TVC6-FP20**	20	5.88	3.86	1.12	4.51	1.25	2.63	1/2-13	8.26	6,000	**5TV-DP-20**
24	**6TVC6-FP24**	24	6.80	4.50	1.38	4.75	1.44	3.13	5/8-11	13.11	6,000	**5TV-DP-24**
32	**6TVC6-FP32**	32	8.07	5.00	1.50	6.75	1.75	3.81	3/4-10	24.62	6,000	**5TV-DP-32**
40	**640C6-FP32**	32	8.87	5.38	2.00	8.01	1.75	3.81	3/4-10	45.0	6,000	**5TV-DP-40**



Nipple Dash Size	Nipple Part Number	Flange Dash Size	A	B	C	E	F	T Thread Size-UNC	Wt. in Lbs.	Working Pressure Max. PSI	Dust Cap Part Number
12	**6TVN6-FP12**	12	4.56	1.75	0.94	0.94	2.00	3/8-16		6,000	**5TV-DC-12**
16	**6TVN5-FP16**	16	5.57	2.25	1.06	1.09	2.25	7/16-14	4.96	6,000	**5TV-DC-16**
20	**6TVN6-FP20**	20	6.81	2.63	1.12	1.25	2.63	1/2-13	7.53	6,000	**5TV-DC-20**
24	**6TVN6-FP24**	24	7.75	3.25	1.38	1.44	3.13	5/8-11	12.71	6,000	**5TV-DC-24**
32	**6TVN6-FP32**	32	9.05	4.00	1.50	1.75	3.81	3/4-10	20.96	6,000	**5TV-DC-32**
40	**640N6-FP32**	32	10.70	5.25	2.00	1.75	3.81	3/4-10	35.0	6,000	**5TV-DC-40**

HYDRAULICS Inc.

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Fax: 817-927-8002

Plant & Offices
2935 St. Louis Ave
P.O. Box 6479
Ft. Worth, TX 76115-0479

OFFER OF SALE

This offer for sale by Hydraulics Inc. to the Original Equipment Manufacturer (OEM) is for items described in Hydraulics Inc. Coupling Catalog HC-111. This offer and its acceptance by the OEM ("Buyer") shall be governed by all the following Terms and Conditions. Buyers order for any item described by the catalogs, when communicated to Hydraulics Inc. ("Seller") verbally or in writing, shall constitute acceptance of this offer.

PUB142

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

2. Payment: Payment for goods purchased by Buyer shall be due in 30 days from date of shipment with 1/ 2 % discount off goods purchased if paid in 10 days from the date of shipment. Buyer claims 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: Delivery shall be made F.O.B. sellers plant, Ft. Worth TX. Regardless of the method of delivery, however, risk of loss shall pass to the Buyer upon Seller's delivery to the carrier. Any delivery dates shown are approximate only and seller shall have no liability for any delays in delivery. All offers and payments are in U.S.A. dollars.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material and workmanship for a period of 365 days from the date of shipment to Buyer. 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.

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 the Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at the Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Returns: Buyer may request to return items sold hereunder, however no such requests shall become part of the contract between Buyer and Seller unless accepted by the Seller in a written amendment to this Agreement.

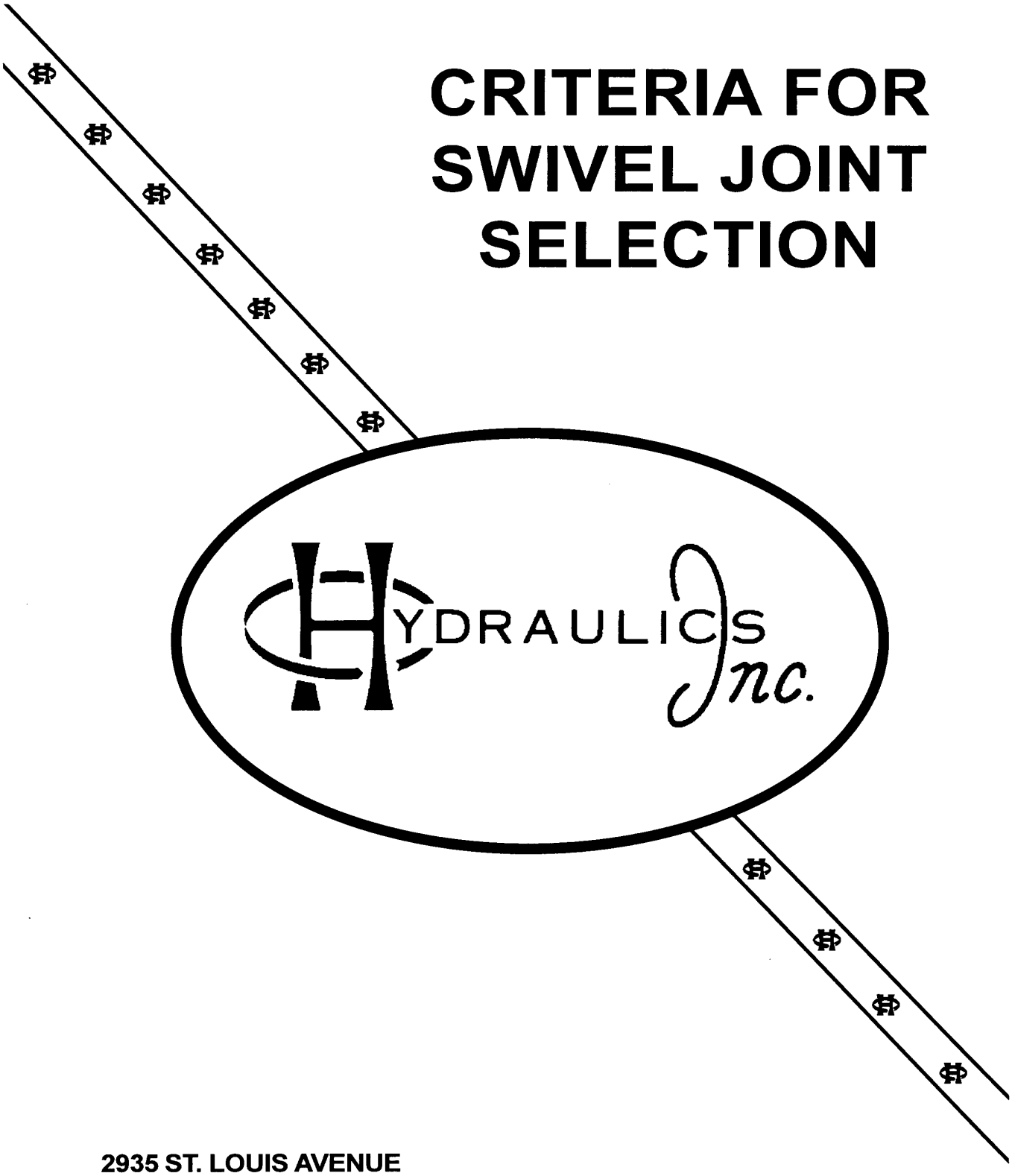
8. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such tax must be paid by the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

9. 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 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 agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyonds Seller's control.

10. Entire Agreement / Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any 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 Texas. 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 the action accrues.

LITHO IN USA 3/2003

CRITERIA FOR SWIVEL JOINT SELECTION



2935 ST. LOUIS AVENUE
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CRITERIA FOR SWIVEL JOINT SELECTION

Advantages of using Hydraulics Inc. Swivel Joints

Swivel joints needs in fluid powered equipment usually arise because stress is being imparted to flex hose by cyclic movement between system components. Fluid power swivel joint applications are rarely identical due to fluid types, pressure, flow volume, temperature, and due to the endless variety of piping needs. With all these application differences, the system planner's selection criteria for the most correct type and kind of swivel to fill the need, is best served through an extensive line of swivel products.

Simplified System Plumbing

- Swivels connect directly to hose lines and can eliminate adapters.
- Less hose is needed, thus less space is needed.
- Tubing can often be eliminated because swivels offer fluid port rotation on a variety of plains relative to other piping components.

Longer Hose Life

- Hose life is extended by swivel action that eliminates effects of torque and bending stress on hose as created by cyclic movement between fluid system components.

Saves Money

- Simplified plumbing reduces system cost.
- Longer hose life.
- Less down time
- Increased reliability.

Selecting The Most Correct Type and Kind of Swivel Joint

"Because applications are different" and because fluid power swivels is our business, the focus is on continuous advancement of the swivel product lines. This endless goal is supported by technology, manufacturing, and market know how. The desire is to sustain a broad line of products and a high level of service in providing the "most correct type and kind of swivel for the need".

Selection Criteria:

Pressure

The pressure rating for a selected swivel must be equal or greater than the system maximum pressure to which applied. This includes peak or surge pressure, the momentary high pressure encountered in a system that would otherwise shorten swivel life.

Swivel Fluid Port Pressure Rating

There are several swivel fluid port connection options and there are differences in the pressure ratings for these connections. Consider also, that tube and hose female unions for several of these connections have pressure ratings below their male ports. Accordingly, to define a swivel with fluid ports that will qualify for a system's pressure, it is strongly suggested that associated female hose connections and tube connections also be qualified in order to support port compliance.

Temperature Range

Both fluid and ambient temperatures are important in swivel selection. The fluid temperature rating is determined by the swivel's seals. If the fluid temperature exceeds the seal temperature rating, the seals will deteriorate and the swivel will leak. Transient temperatures also have potential for damaging seals, especially during system shut down. High temperatures can precipitate swivel housing corrosion by damaging protective plating.

Fluid Compatibility

Swivel selection must assure body and seal materials are compatible with the system's fluid media. Seal materials other than standard may be required.

Side Loading

Swivel bearings can be subjected to stress from angular deflection in piping systems. Swivel life is predominantly dependent on bearing life. Care should be taken to arrange system plumbing to maximize swivel life. Selection of swivel type and kind, as explained herein, is important to application adaptability. The goal is to permit unrestricted freedom of swivel rotation.

CRITERIA FOR SWIVEL JOINT SELECTION

Selection Criteria: (continued)

Rotation Torque

As fluid system pressure increases, so does swivel rotation torque drag. Torque values are presented in swivel catalogs. Rarely is torque drag an application problem in that fluid pressure also increases rigidity of attached flex hose in a manner to counteract torque drag.

Rate of Rotation

Swivel seal and bearing life is relative to the factors of angular deflection, fluid pressure, temperature, and speed of rotation. The slower the rotation, the longer the seals and bearings survive. Given the potential for extremes in any one factor, applications should probably be qualified by prototype or laboratory tests.

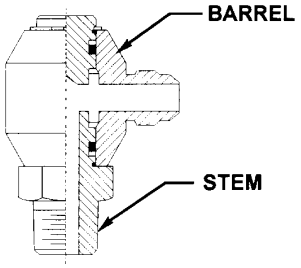
Pressure Drop

Pressure drop, or differential pressure, is the loss of pressure between any two points in a fluid system or component. Measured as a loss in pounds per square inch, it is the resistance to flow of fluid through a swivel. The swivels are designed to be flow efficient and respective values are pre sented in swivel catalogs.

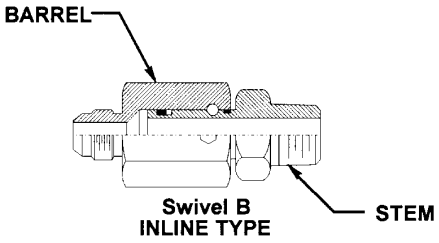
Corrosion Resistance

Standard swivels receive an exterior coating of zinc, with an overlay of yellow dichromate seal. Both the fluid media, and the fluid system operating environment, should be considered for compatibility of carbon steel products. If corrosion is an issue, then alternate swivel materials should be considered.

How to Distinguish Types of Swivel Joints



Swivel A
90° TYPE



Swivel B
INLINE TYPE

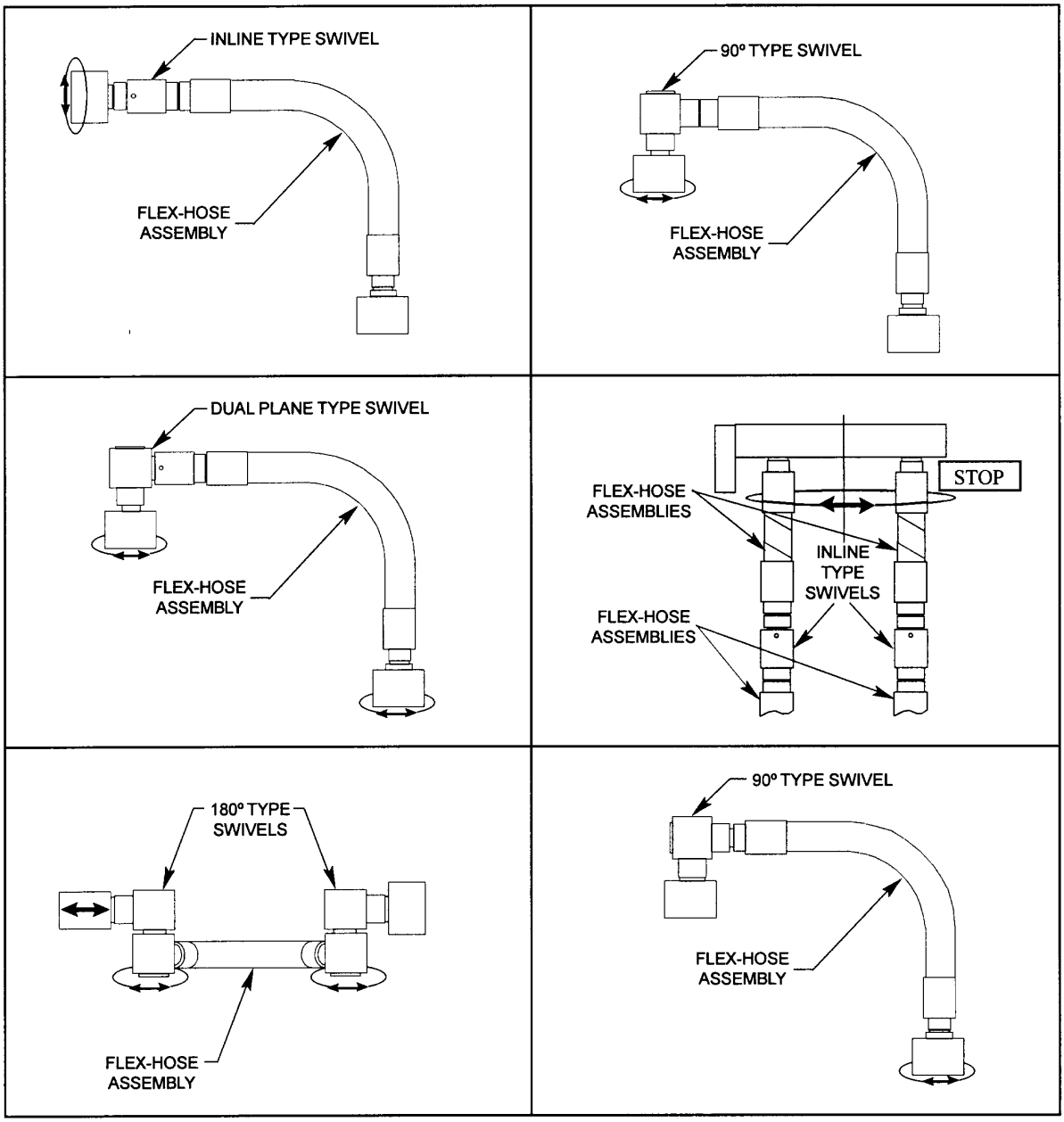
The two types of swivel joints discussed here are distinguished by their load bearing mechanisms. Both types require at least two components, commonly referred to as the stem and the barrel.

The first type swivel (Swivel A), is comprised of a barrel fluid port positioned to rotate on a plane 90° to the stem axis. This swivel includes two load bearing mechanisms classed as journal bearings. The swivel's barrel bore includes two load bearing lands separated by a fluid passage. The stem's outer diameter includes bearing lands, complementing the barrel and with space to allow the stem fluid passage to communicate fluid to the barrel port. The two stem bearing lands further include equal size seals for containing the fluid. By nature of equal seal size, the effect of fluid pressure on the stem and barrel creates no load on the bearings. This desirable feature leaves bearing life relative to stress from angular deflection induced through the piping system.

The second type swivel (Swivel B), is distinguished by opposed barrel and stem fluid ports on a common axis. This in-line port relation depends on a single load bearing mechanism, classed as a combination radial-thrust bearing. The swivel's barrel bore provides an axial ball bearing raceway that is distanced from the barrel's seal gland area. The swivel's stem provides an axial ball raceway and a seal groove to coincide with the barrel bore. In assembly, the balls retain the barrel to the stem while permitting axial rotation between the two components. These features require the bearing to withstand both thrust and stress from angular deflection of piping. With absence of deflection, bearing life is related to thrust from fluid pressure.

See back cover for applications

WHY SO MANY TYPE SWIVELS?
BECAUSE APPLICATIONS ARE DIFFERENT!



FLUID CONDUCTING SWIVEL JOINTS

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110-4104

Hydraulics, Inc. fluid conducting swivel joints described in this catalog encompass one of the most complete range of sizes and configurations available to industry. Considerable thought has been given to actual needs and because of this, certain types of swivels previously not available to the equipment designer are now standard to Hydraulics, Inc.

The same standards of quality that has been a company tradition since 1955 are prevalent in these products and laboratory testing with hours of actual services has proven the design. In the interest of efficient energy transfer, particular attention has been given to flow characteristics. Rotational torques have been held to limits compatible to flexible hose standards of the industry. Materials and manufacturing process have been selected to provide a most attractive service life when compared to alternate methods.

To the designer of hydraulic powered equipment, these products offer an opportunity to improve existing concepts and take a different approach to new equipment design.

FLUID CONDUCTING SWIVELS PROVIDE

- **Design versatility**
- **Simplified plumbing**
- **Longer flex hose life**
- **Ease of maintenance**

NOTE! THESE PRODUCTS FOR LIQUID FLUID POWER SYSTEMS ONLY

"Because of technological progress and product improvements, all design and dimensional data shown in this catalog is subject to change without notice. Technical information has been prepared from actual test results under controlled environmental conditions and data is considered to be reliable, but no responsibility can be assumed for its accuracy under varied field conditions."

EXAMPLE OF PART NUMBER SYSTEM

9S 6 PF 6 - PF 6 *

BODY CONFIGURATION
S - INLINE
9S - 90°
9SS - DUAL PLANE
18S - 180°

BODY SIZE (3/8")
NOMINAL BORE IN
1/16" INCREMENTS

CONNECTOR TYPE
PF — FEMALE PIPE NPTF
P — MALE PIPE NPTF
J — MALE JIC
O — MALE SAE O-RING
PU — PIPE UNION NPSM
F — MALE SAE O-RING FACE SEAL
FF — FEMALE 0-RING FACE SEAL

SIZE (3/8")

BARREL CONFIGURATION

SPECIAL SEAL COMPOUND NUMBER
3 - FLUOROCARBON (VITON) RUBBER
7 - ETHYLENE PROPYLENE
9 - NEOPRENE
OTHERS ON REQUEST

SIZE (3/8")

CONNECTOR TYPE
(TYPICAL)

STEM CONFIGURATION

MANUFACTURER OF COMPONENTS FOR FLUID POWER SYSTEMS

HIGH PRESSURE HYDRAULIC SWIVEL JOINTS

"S" Series/In-Line Swivel Joint

Sizes - ¼" through 2" pipe size
Connection types - JIC, pipe, SAE O-Ring face seal (male & female)
Operating pressures - vacuum & to 3,000 PSI
Operating temperatures - 40° to 200° F

"9S" Series/90° Swivel Joint

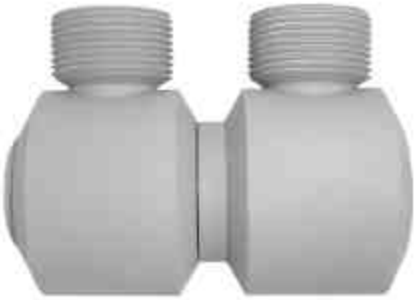
Sizes - ¼" through 2" pipe size
Connection types - JIC & O-Ring (male), pipe and SAE O-Ring face seal (male & female) & pipe union
Operating pressures - vacuum & to 3,000 PSI
Operating temperatures - 40° to 200° F

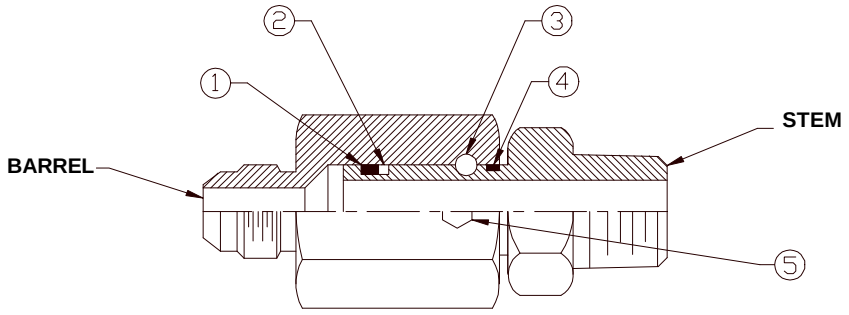
"9SS" Series/Dual Plane Swivel Joint

Sizes - ¼" through 1¼" pipe size
Connection types - JIC & O-Ring (male), pipe & SAE O-Ring face seal (male & female)
Operating Pressures - vacuum & to 3,000 PSI
Operating Temperatures - 40° to 200° F

"18S" Series/180° Swivel Joint

Sizes - ¼" through 2" pipe size
Connection types - JIC (male), pipe & SAE O-Ring face seal (male & female) & pipe union
Operating pressures - vacuum & to 3,000 PSI
Operating temperatures - 40° to 200° F



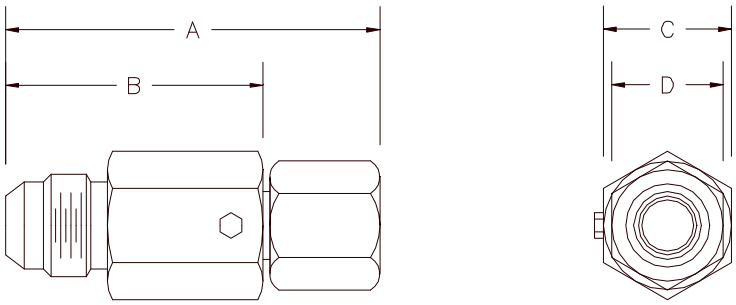


1 SYNTHETIC RUBBER O-RING
2 TEFLON BACK UP RING
3 RETAINER BALLS
4 DUST SEAL
5 BALL HOLE PLUG

HYDRAULICS, INC. Design Features

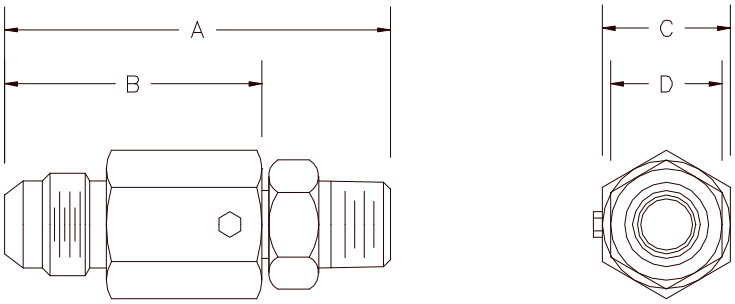
- **Hardened carbon steel barrel and stem - Large wear surface**
- **Protective treatment meeting SAE hose fitting standards**
- **Chrome retainer balls - Long life**
- **Standard O-Ring and back up ring - Field replaceable seal kits - Page 26**
- **Burnished barrel bore - Extended seal life**
- **Optional seal material - Page 2**
- **Low pressure drop - See in-line pressure drop chart - Page 27**
- **Low rotational torque - see in-line torque chart - Page 27**
- **Optonal grease fitting - Page 26**

MALE JIC TO FEMALE PIPE



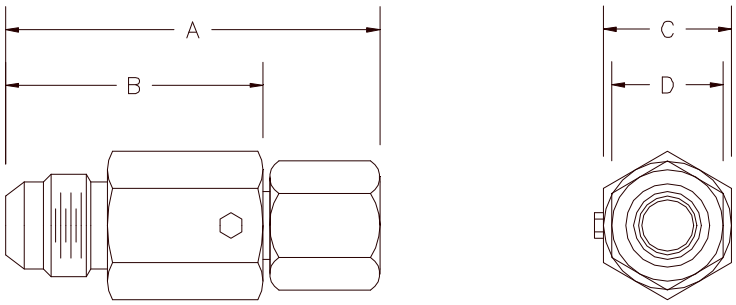
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6J6-PF4	9/16 - 18	1/4 - 18	2.67	1.77	1.00	1.00
S6J8-PF6	3/4 - 16	3/8 - 18	2.81	1.90	1.00	1.00
S8J10-PF8	7/8 - 14	1/2 - 14	3.14	2.00	1.25	1.25
S8J12-PF12	1 1/16 - 12	3/4 - 14	3.23	2.09	1.25	1.25
S16J16-PF16	1 5/16 - 12	1 - 11 1/2	3.75	2.58	1.75	1.62
S20J20-PF20	1 5/8 - 12	1 1/4 - 11 1/2	4.08	2.74	2.25	2.00
S24J24-PF24	1 7/8 - 12	1 1/2 - 11 1/2	4.82	3.12	2.75	2.37
S32J32-PF32	2 1/2 - 12	2 - 11 1/2	6.16	4.39	3.50	3.00

MALE JIC TO MALE PIPE



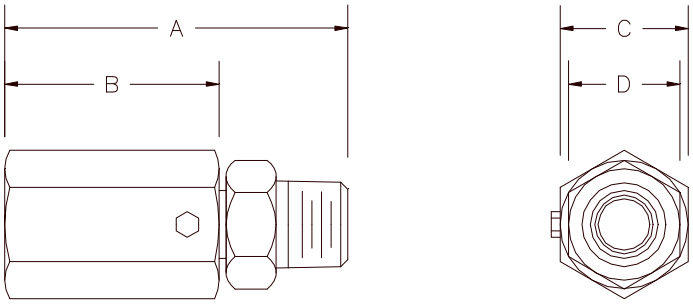
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6J6-P4	9/16 - 18	1/4 - 18	2.61	1.77	1.00	1.00
S6J8-P6	3/4 - 16	3/8 - 18	2.76	1.90	1.00	1.00
S8J10-P8	7/8 - 14	1/2 - 14	3.09	2.00	1.25	1.25
S8J12-P12	1 1/16 - 12	3/4 - 14	3.31	2.09	1.25	1.25
S16J16-P16	1 5/16 - 12	1 - 11 1/2	4.10	2.60	1.75	1.62
S20J20-P20	1 5/8 - 12	1 1/4 - 11 1/2	4.49	2.74	2.25	2.00
S24J24-P24	1 7/8 - 12	1 1/2 - 11 1/2	5.17	3.12	2.75	2.37
S32J32-P32	2 1/2 - 12	2 - 11 1/2	6.96	4.39	3.50	3.00

MALE JIC TO FEMALE JIC



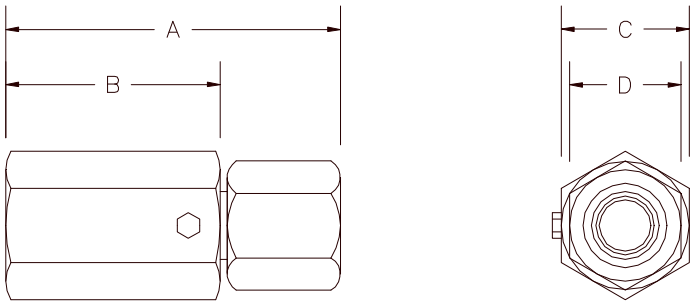
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6J6-JF6	9/16 - 18	9/16 - 18	2.37	1.77	1.00	1.00
S6J8-JF8	3/4 - 16	3/4 - 16	2.56	1.90	1.00	1.00
S8J10-JF10	7/8 - 14	7/8 - 14	2.78	2.00	1.25	1.25
S8J12-JF12	1 1/16 - 12	1 1/16 - 12	2.89	2.09	1.25	1.25
S14J14-JF14	1 3/16 - 12	1 3/16 - 12	2.89	2.09	1.37	1.37
S16J16-JF16	1 5/16 - 12	1 5/16 - 12	3.40	2.60	1.75	1.62
S20J20-JF20	1 5/8 - 12	1 5/8 - 12	3.65	2.74	2.25	2.00
S24J24-JF24	1 7/8 - 12	1 7/8 - 12	4.12	3.12	2.75	2.37
S32J32-JF32	2 1/2 - 12	2 1/2 - 12	5.68	4.39	3.50	3.00

FEMALE PIPE TO MALE PIPE



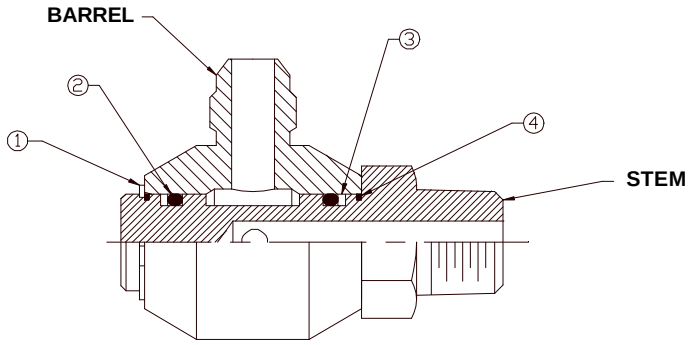
PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6PF4-P4	1/4 - 18	1/4 - 18	2.34	1.50	1.00	1.00
S6PF6-P6	3/8 - 18	3/8 - 18	2.34	1.50	1.00	1.00
S8PF8-P8	1/2 - 14	1/2 - 14	2.77	1.68	1.25	1.25
S8PF12-P12	3/4 - 14	3/4 - 14	2.89	1.68	1.25	1.25
S16PF16-P16	1 - 11 1/2	1 - 11 1/2	3.89	2.37	1.75	1.63
S20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.35	2.60	2.25	2.00
S24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.27	3.22	2.75	2.37
S32PF32-P32	2 - 11 1/2	2 - 11 1/2	6.87	4.30	3.50	3.00

FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C HEX	D HEX
S6PF4-PF4	1/4 - 18	1/4 - 18	2.45	1.55	1.00	1.00
S6PF6-PF6	3/8 - 18	3/8 - 18	2.45	1.55	1.00	1.00
S8PF8-PF8	1/2 - 14	1/2 - 14	2.85	1.70	1.25	1.25
S8PF12-PF12	3/4 - 14	3/4 - 14	2.85	1.70	1.25	1.25
S16PF16-PF16	1 - 11 1/2	1 - 11 1/2	3.55	2.40	1.75	1.63
S20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.00	2.60	2.25	2.00
S24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.92	3.22	2.75	2.37
S32PF32-PF32	2 - 11 1/2	2 - 11 1/2	6.07	4.30	3.50	3.00

9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

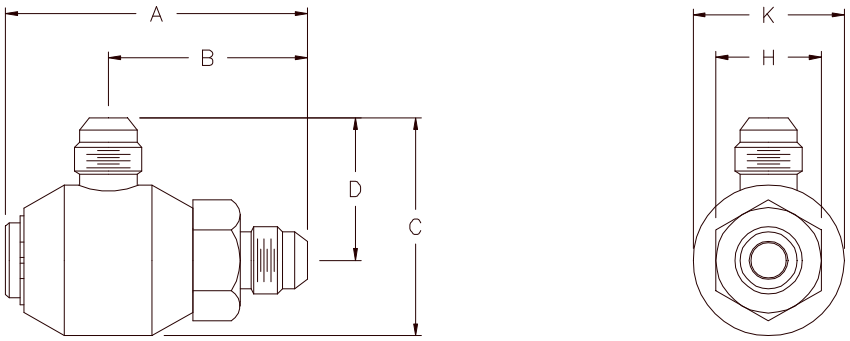


1 NON-LOAD BEARING RETAINING RING
2 SYNTHETIC RUBBER 0-RING (TWO)
3 TEFLON BACK UP RING (TWO)
4 DUST SEAL (TWO)

HYDRAULICS, INC. Design Features

- **Hardened carbon steel barrel - Large wear surface**
- **Barrel thread boss and stem annealed - Reduced breakage from shock and vibration**
- **Burnished barrel bore - Extended seal life**
- **Copper filled furnace braze joints**
- **Heavy duty retainer ring**
- **Protective treatment meeting SAE hose fitting standards**
- **Standard O-Ring and back up ring - Field replaceable seal kits - Page 26**
- **Optional seal material - Page 2**
- **Recessed and protected dust seals**
- **Pressure balanced for low rotational torque - See 90° torque chart - Page 27**
- **Excellent flow characteristics - See 90° pressure drop chart - Page 27**

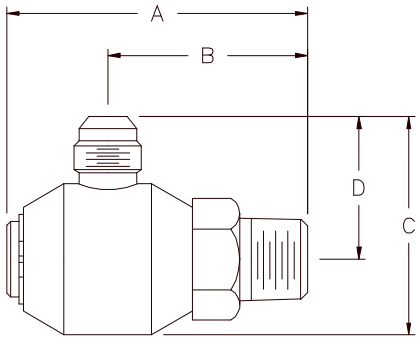
MALE JIC TO MALE JIC

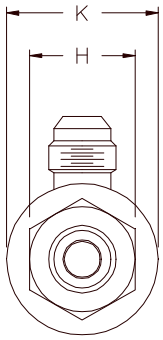


PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-J5	1/2 - 20	1/2 - 20	2.50	1.65	1.80	1.17	.87	1.25
9S6J5-J6	1/2 - 20	9/16 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-J5	9/16 - 18	1/2 - 20	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-J6	9/16 - 18	9/16 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J6-J8	9/16 - 18	3/4 - 16	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-J8	3/4 - 16	3/4 - 16	2.50	1.65	1.91	1.28	.87	1.25
9S8J10-J10	7/8 - 14	7/8 - 14	2.83	1.99	2.26	1.50	1.00	1.50
9S12J12-J12	1 1/16 - 12	1 1/16 - 12	3.40	2.37	3.05	1.99	1.25	2.12
9S16J16-J16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	3.36	2.18	1.62	2.37
9S20J20-J20	1 5/8 - 12	1 5/8 - 12	4.12	2.80	3.70	2.33	2.00	2.75
9S24J24-J24	1 7/8 - 12	1 7/8 - 12	5.27	3.51	4.65	2.90	2.37	3.50
9S32J32-J32	2 1/2 - 12	2 1/2 - 12	6.25	4.16	5.67	3.54	3.12	4.25

9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

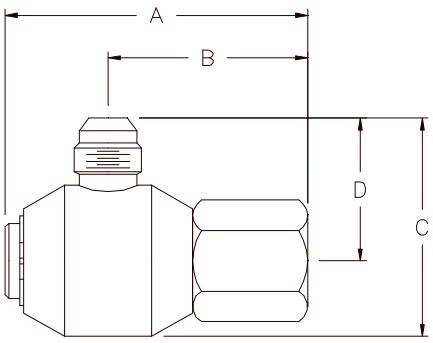
MALE JIC TO MALE PIPE

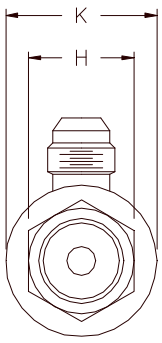




PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-P4	1/2 - 20	1/4 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J5-P6	1/2 - 20	3/8 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-P4	9/16 - 18	1/4 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J6-P6	9/16 - 18	3/8 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-P6	3/4 - 16	3/8 - 18	2.50	1.65	1.91	1.28	.87	1.25
9S8J8-P8	3/4 - 16	1/2 - 14	2.83	1.99	2.20	1.44	1.00	1.50
9S8J10-P8	7/8 - 14	1/2 - 14	2.83	1.99	2.26	1.50	1.00	1.50
9S12J12-P12	1 1/16 - 12	3/4 - 14	3.40	2.37	3.05	1.99	1.25	2.12
9S16J16-P16	1 5/16 - 12	1 - 11 1/2	3.82	2.70	3.36	2.18	1.62	2.37
9S20J20-P20	1 5/8 - 12	1 1/4 - 11 1/2	4.18	2.86	3.70	2.33	2.00	2.75
9S24J24-P24	1 7/8 - 12	1 1/2 - 11 1/2	5.32	3.55	4.65	2.90	2.37	3.50
9S32J32-P32	2 1/2 - 12	2 - 11 1/2	6.20	4.10	5.67	3.54	3.12	4.25

MALE JIC TO FEMALE PIPE

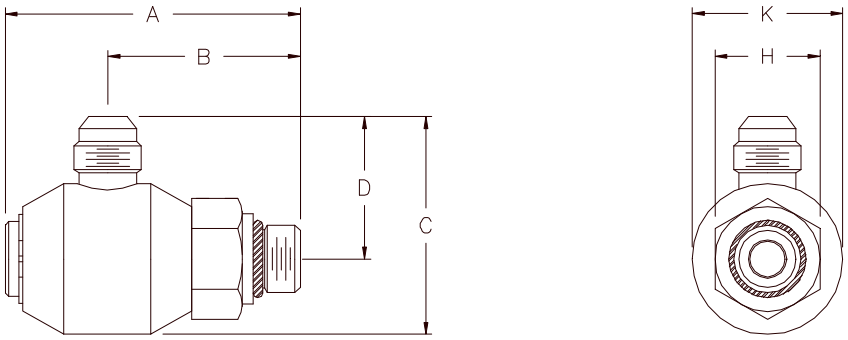




PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-PF4	1/2 - 20	1/4 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J5-PF6	1/2 - 20	3/8 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-PF4	9/16 - 18	1/4 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J6-PF6	9/16 - 18	3/8 - 18	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-PF6	3/4 - 16	3/8 - 18	2.50	1.65	1.91	1.28	.87	1.25
9S8J8-PF8	3/4 - 16	1/2 - 14	2.62	1.78	2.20	1.44	1.00	1.50
9S8J10-PF8	7/8 - 14	1/2 - 14	2.62	1.78	2.26	1.50	1.00	1.50
9S12J12-PF12	1 1/16 - 12	3/4 - 14	3.00	2.00	3.05	1.99	1.25	2.12
9S16J16-PF16	1 5/16 - 12	1 - 11 1/2	3.40	2.28	3.36	2.18	1.62	2.37
9S20J20-PF20	1 5/8 - 12	1 1/4 - 11 1/2	4.08	2.76	3.70	2.33	2.00	2.75
9S24J24-PF24	1 7/8 - 12	1 1/2 - 11 1/2	4.89	3.12	4.66	2.91	2.37	3.50
9S32J32-PF32	2 1/2 - 12	2 - 11 1/2	5.50	3.41	5.67	3.53	3.12	4.25

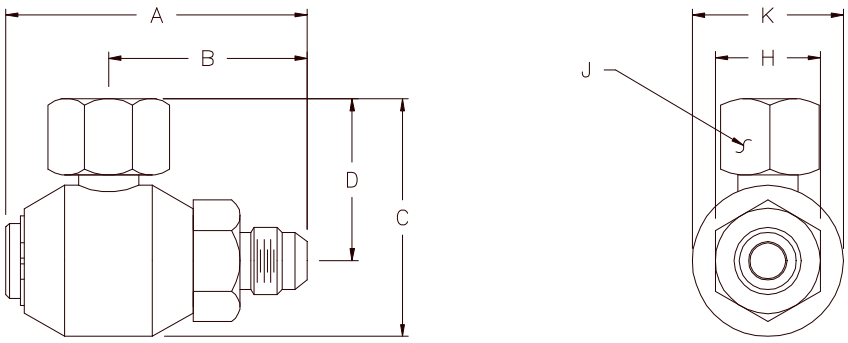
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

MALE JIC TO MALE O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	K DIA.
9S6J5-O6	1/2 - 20	9/16 - 18	2.50	1.65	1.80	1.17	.87	1.25
9S6J6-O6	9/16 - 18	9/16 - 18	2.50	1.65	1.80	1.18	.87	1.25
9S6J6-O8	9/16 - 18	3/4 - 16	2.50	1.65	1.81	1.18	.87	1.25
9S6J8-O8	3/4 - 16	3/4 - 16	2.50	1.65	1.91	1.28	.87	1.25
9S8J10-O10	7/8 - 14	7/8 - 14	2.58	1.74	2.26	1.50	1.00	1.50
9S12J12-O12	1 1/16 - 12	1 1/16 - 12	3.24	2.21	3.05	1.99	1.25	2.12
9S16J16-O16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	3.36	2.18	1.62	2.37
9S20J20-O20	1 5/8 - 12	1 5/8 - 12	3.76	2.44	3.70	2.33	2.00	2.75
9S24J24-O24	1 7/8 - 12	1 7/8 - 12	4.78	3.02	4.65	2.90	2.37	3.50
9S32J32-O32	2 1/2 - 12	2 1/2 - 12	5.50	3.41	5.67	3.54	3.12	4.25

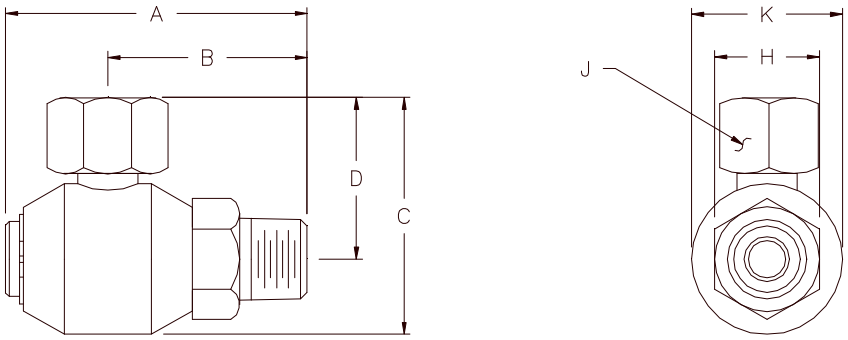
FEMALE PIPE UNION TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-J5	1/4 - 18	1/2 - 20	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU4-J6	1/4 - 18	9/16 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-J5	3/8 - 18	1/2 - 20	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-J6	3/8 - 18	9/16 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-J8	3/8 - 18	3/4 - 16	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-J10	1/2 - 14	7/8 - 14	2.83	1.99	2.26	1.51	1.00	1.00	1.50
9S12PU12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	3.09	2.03	1.25	1.25	2.12
9S16PU16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.31	2.12	1.62	1.50	2.37
9S20PU20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	3.89	2.52	2.00	1.87	2.75
9S24PU24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.71	3.51	4.73	2.98	2.37	2.25	3.50
9S32PU32-J32	2 - 11 1/2	2 1/2 - 12	6.25	4.16	5.65	3.52	3.12	2.75	4.25

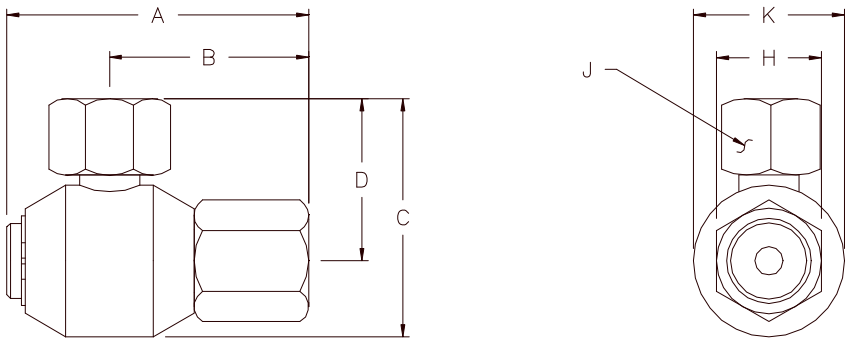
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE UNION TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-P4	1/4 - 18	1/4 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU4-P6	1/4 - 18	3/8 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-P4	3/8 - 18	1/4 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-P6	3/8 - 18	3/8 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-P8	1/2 - 14	1/2 - 14	2.83	1.99	2.26	1.51	1.00	1.00	1.50
9S12PU12-P12	3/4 - 14	3/4 - 14	3.40	2.37	3.09	2.03	1.25	1.25	2.12
9S16PU16-P16	1 - 11 1/2	1 - 11 1/2	3.82	2.70	3.31	2.12	1.62	1.50	2.37
9S20PU20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.86	3.89	2.52	2.00	1.87	2.75
9S24PU24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	4.73	2.98	2.37	2.25	3.50
9S32PU32-P32	2 - 11 1/2	2 - 11 1/2	6.20	4.11	5.65	3.52	3.12	2.75	4.25

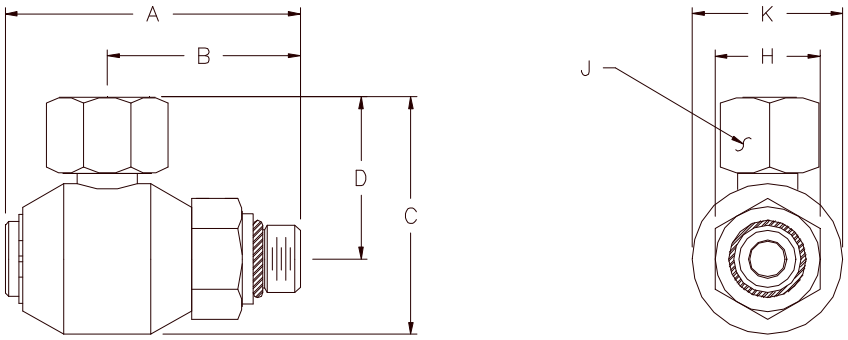
FEMALE PIPE UNION TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	2.26	1.51	1.00	1.00	1.50
9S12PU12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	3.09	2.03	1.25	1.25	2.12
9S16PU16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	3.31	2.12	1.62	1.50	2.37
9S20PU20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	3.89	2.52	2.00	1.87	2.75
9S24PU24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	4.73	2.98	2.37	2.25	3.50
9S32PU32-PF32	2 - 11 1/2	2 - 11 1/2	5.50	3.41	5.65	3.52	3.12	2.75	4.25

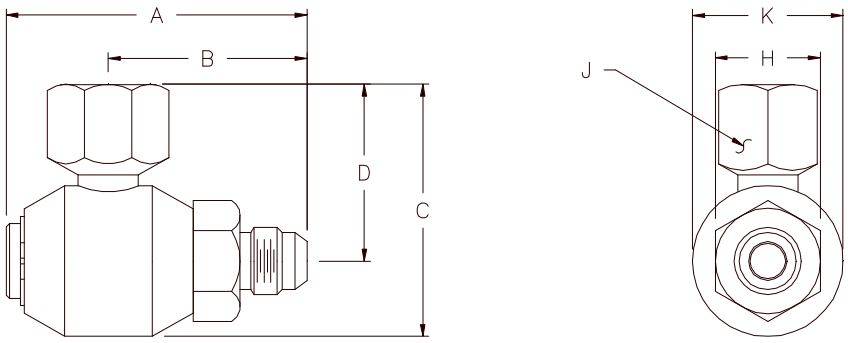
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE UNION TO O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PU4-O6	1/4 - 18	9/16 - 18	2.50	1.65	1.89	1.27	.87	.75	1.25
9S6PU6-O6	3/8 - 18	9/16 - 18	2.50	1.65	1.94	1.31	.87	.87	1.25
9S6PU6-O8	3/8 - 18	3/4 - 16	2.50	1.65	1.94	1.31	.87	.87	1.25
9S8PU8-O10	1/2 - 14	7/8 - 14	2.58	1.74	2.26	1.51	1.00	1.00	1.50
9S12PU12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	3.09	2.03	1.25	1.25	2.12
9S16PU16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.31	2.12	1.62	1.50	2.37
9S20PU20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.44	3.89	2.52	2.00	1.87	2.75
9S24PU24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	4.73	2.98	2.37	2.25	3.50
9S32PU32-O32	2 - 11 1/2	2 1/2 - 12	5.50	3.41	5.65	3.52	3.12	2.75	4.25

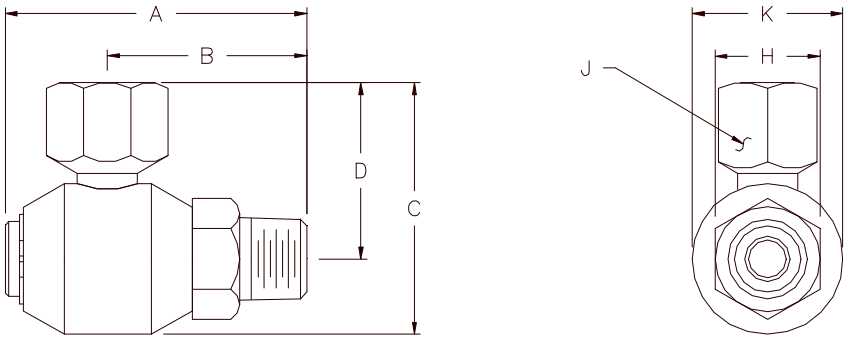
FEMALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-J5	1/4 - 18	1/2 - 20	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF4-J6	1/4 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-J5	3/8 - 18	1/2 - 20	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-J6	3/8 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-J8	3/8 - 18	3/4 - 16	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-J10	1/2 - 14	7/8 - 14	2.83	1.99	2.59	1.84	1.00	1.00	1.50
9S12PF12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	3.30	2.24	1.25	1.37	2.12
9S16PF16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.64	2.46	1.62	1.62	2.37
9S20PF20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	3.98	2.61	2.00	2.00	2.75
9S24PF24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.27	3.51	5.20	3.45	2.37	2.37	3.50
9S32PF32-J32	2 - 11 1/2	2 1/2 - 12	6.25	4.16	6.06	3.94	3.12	2.87	4.25

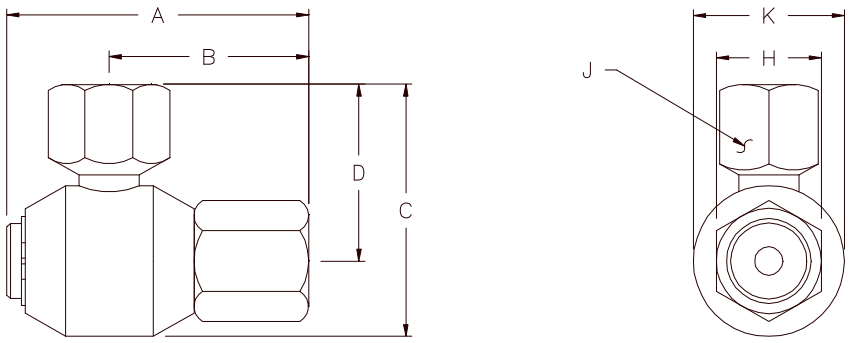
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-P4	1/4 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF4-P6	1/4 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-P4	3/8 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-P6	3/8 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-P8	1/2 - 14	1/2 - 14	2.83	1.99	2.59	1.84	1.00	1.00	1.50
9S12PF12-P12	3/4 - 14	3/4 - 14	3.40	2.37	3.30	2.24	1.25	1.37	2.12
9S16PF16-P16	1 - 11 1/2	1 - 11 1/2	3.82	2.70	3.64	2.46	1.62	1.62	2.37
9S20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.86	3.98	2.61	2.00	2.00	2.75
9S24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	5.20	3.45	2.37	2.37	3.50
9S32PF32-P32	2 - 11 1/2	2 - 11 1/2	6.20	4.11	6.06	3.94	3.12	2.87	4.25

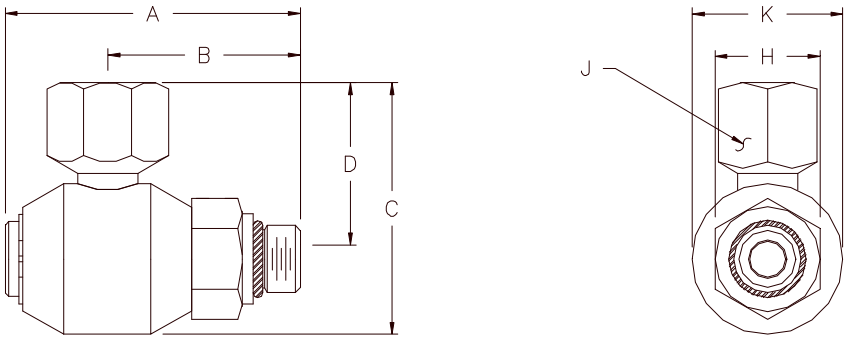
FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	2.59	1.84	1.00	1.00	1.50
9S12PF12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	3.30	2.24	1.25	1.37	2.12
9S16PF16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	3.64	2.46	1.62	1.62	2.37
9S20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	3.98	2.61	2.00	2.00	2.75
9S24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	5.20	3.45	2.37	2.37	3.50
9S32PF32-PF32	2 - 11 1/2	2 - 11 1/2	5.50	3.41	6.06	3.94	3.12	2.87	4.25

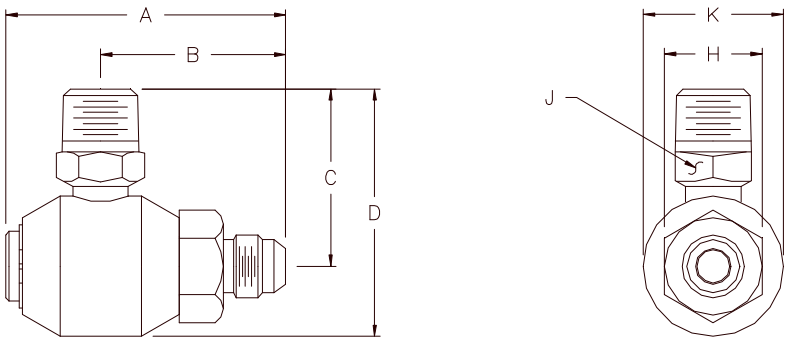
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

FEMALE PIPE TO O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6PF4-O6	1/4 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.75	1.25
9S6PF6-O6	3/8 - 18	9/16 - 18	2.50	1.65	2.00	1.37	.87	.87	1.25
9S6PF6-O8	3/8 - 18	3/4 - 16	2.50	1.65	2.00	1.37	.87	.87	1.25
9S8PF8-O10	1/2 - 14	7/8 - 14	2.58	1.74	2.59	1.84	1.00	1.00	1.50
9S12PF12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	3.30	2.24	1.25	1.37	2.12
9S16PF16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.64	2.46	1.62	1.62	2.37
9S20PF20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.44	3.98	2.61	2.00	2.00	2.75
9S24PF24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	5.19	3.44	2.37	2.37	3.50
9S32PF32-O32	2 - 11 1/2	2 1/2 - 12	5.50	3.41	6.06	3.94	3.12	2.87	4.25

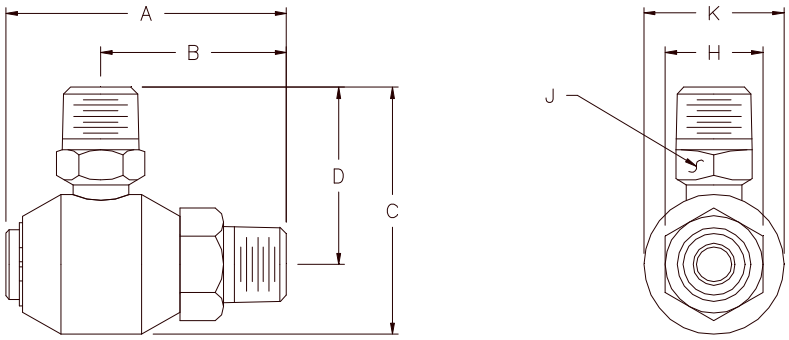
MALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-J5	1/4 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P4-J6	1/4 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-J5	3/8 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-J6	3/8 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-J10	1/2 - 14	7/8 - 14	2.83	1.99	2.65	1.90	1.00	.87	1.50
9S12P12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	3.32	2.26	1.25	1.12	2.12
9S16P16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.81	2.62	1.62	1.37	2.37
9S20P20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	4.31	2.93	2.00	1.75	2.75
9S24P24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.27	3.51	5.45	3.70	2.37	2.37	3.50
9S32P32-J32	2 - 11 1/2	2 1/2 - 12	6.25	4.16	6.55	4.42	3.12	2.87	4.25

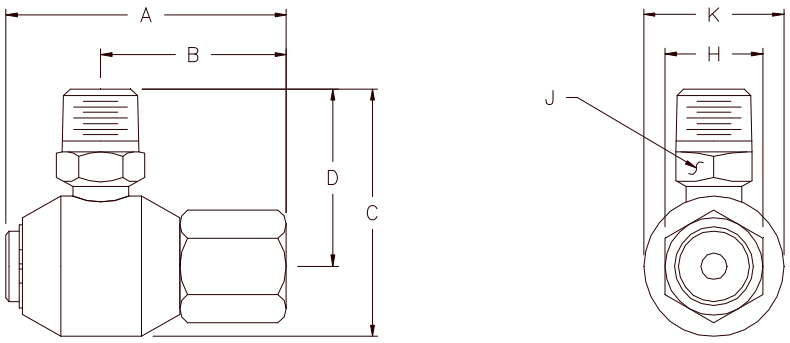
9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

MALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-P4	1/4 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P4-P6	1/4 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-P4	3/8 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-P6	3/8 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-P8	1/2 - 14	1/2 - 14	2.83	1.99	2.65	1.90	1.00	.87	1.50
9S12P12-P12	3/4 - 14	3/4 - 14	3.40	2.37	3.32	2.26	1.25	1.12	2.12
9S16P16-P16	1 - 11 1/2	1 - 11 1/2	3.82	2.70	3.81	2.62	1.62	1.37	2.37
9S20P20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.86	4.31	2.93	2.00	1.75	2.75
9S24P24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	5.45	3.70	2.37	2.37	3.50
9S32P32-P32	2 - 11 1/2	2 - 11 1/2	6.20	4.10	6.55	4.42	3.12	2.87	4.25

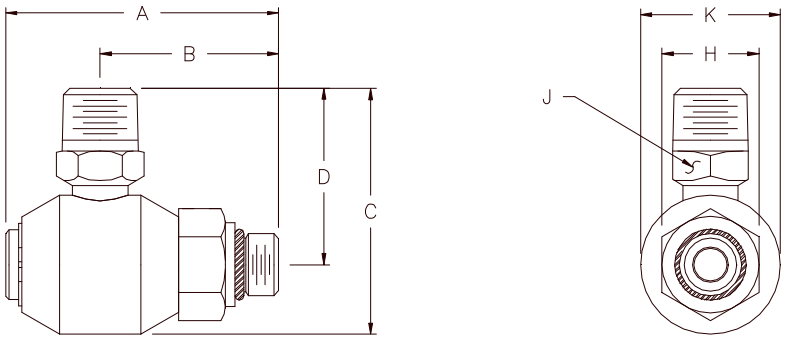
MALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	2.65	1.90	1.00	.87	1.50
9S12P12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	3.32	2.26	1.25	1.12	2.12
9S16P16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	3.81	2.62	1.62	1.37	2.37
9S20P20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	4.31	2.93	2.00	1.75	2.75
9S24P24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	5.44	3.69	2.37	2.37	3.50
9S32P32-PF32	2 - 11 1/2	2 - 11 1/2	5.50	3.41	6.55	4.42	3.12	2.87	4.25

9S SERIES / 90° 3000 PSI /PRESSURE BALANCED

MALE PIPE TO O-RING



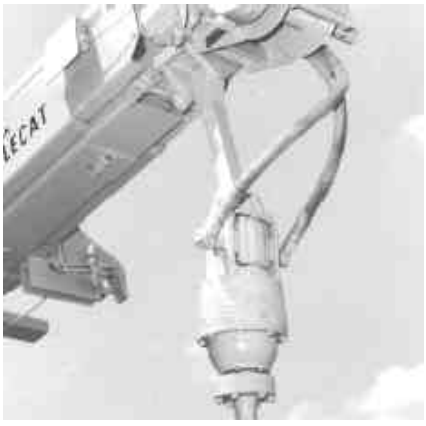
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9S6P4-O5	1/4 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P4-O6	1/4 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.56	1.25
9S6P6-O5	3/8 - 18	1/2 - 20	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-O6	3/8 - 18	9/16 - 18	2.50	1.65	2.12	1.50	.87	.68	1.25
9S6P6-O8	3/8 - 18	3/4 - 16	2.50	1.65	2.12	1.50	.87	.68	1.25
9S8P8-O10	1/2 - 14	7/8 - 14	2.58	1.75	2.65	1.90	1.00	.87	1.50
9S12P12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	3.32	2.26	1.25	1.12	2.12
9S16P16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	3.81	2.62	1.62	1.37	2.37
9S20P20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.45	4.31	2.93	2.00	1.75	2.75
9S24P24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	5.45	3.70	2.37	2.37	3.50
9S32P32-O32	2 - 11 1/2	2 1/2 - 12	5.50	3.41	6.55	4.42	3.12	2.87	4.25

INSTALLATION INFORMATION

Hydraulics, Inc. swivel joints are generally considered low speed rotation as encountered in fluid power systems. Maximum speed of rotation depends upon system enviromnent, with fluid types and extreme conditions as related to temperatures and pressures being of prime consideration. Questionable applications should be proven by laboratory or prototype testing.

Contamination at installation should be avoided and connecting plumbing should not cause undue loading. The swivel should not be used as a load bearing or structural member.

TYPICAL INSTALLATIONS

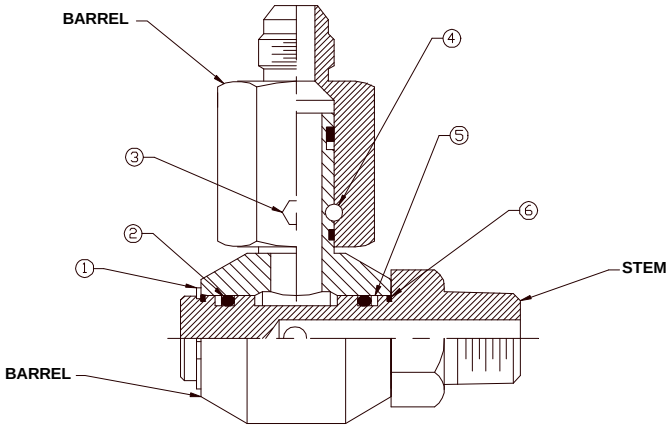


Earth boring auger on utility truck compensates movement in all planes by using "9SS" Series swivel.

Log loader utilizes limited boom rotation and "S" Series swivel on hoses through spindle.

Coal mining equipment manufacturer extends hose life with "9S" Series swivels allowing hose to take natural form for flexing.

9SS SERIES / 90° 3000 PSI / DUAL PLANE

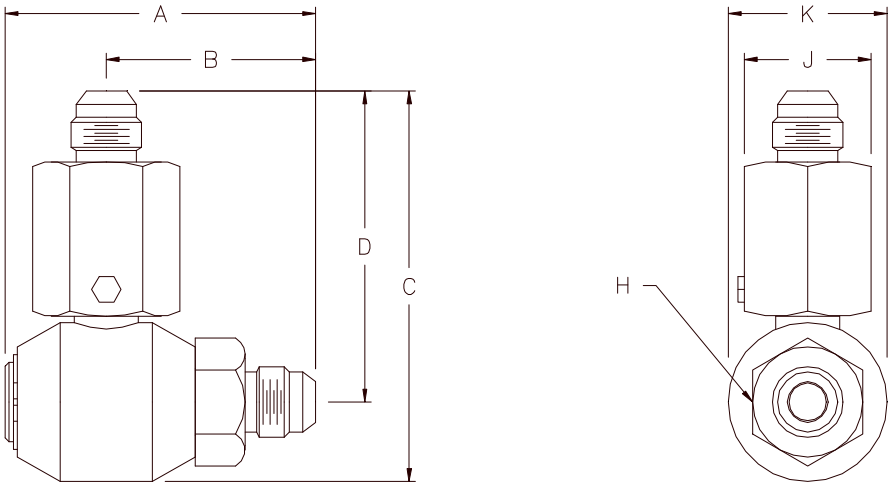


1 NON-LOAD BEARING RETAINING RING
2 SYNTHETIC RUBBER 0-RING (THREE)
3 BALL HOLE PLUG
4 RETAINING BALLS
5 TEFLON BACK UP RING (THREE)
6 DUST SEAL (THREE)

HYDRAULICS, INC. Design Features

- Hardened carbon steel barrel and in-line stem
- Stem annealed - Reduced breakage from shock and vibration
- Burnished barrel bores - Extended seal life
- Copper filled furnace braze joints
- Protective treatment meeting SAE hose fitting standards
- Standard O-Ring and back up ring - Field replaceeable seal kits - Page 26
- Optional seal material - Page 2
- Recessed and protected dust seals
- Low rotational torque - See in-line and 90° torque chart - Page 27
- Low pressure drop - Combine in-line and 90° pressure drop chart - Page 27
- Optional grease fitting - Page 26

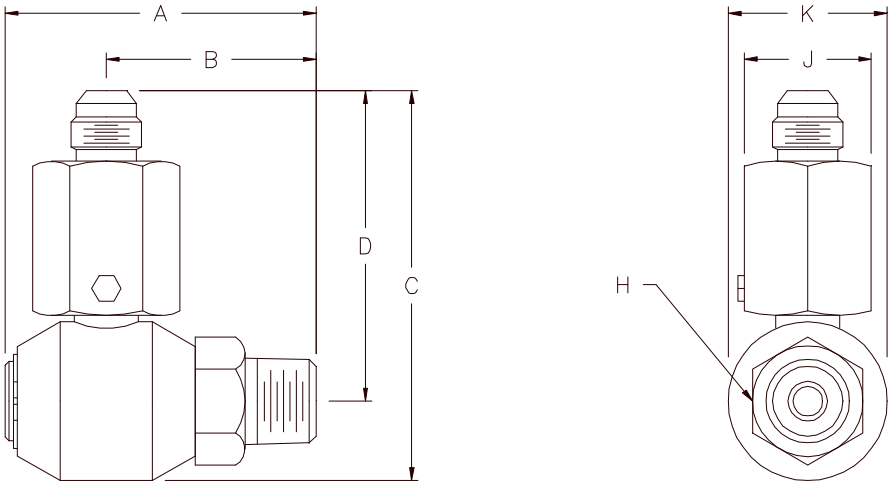
MALE JIC TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-J5	9/16 - 18	1/2 - 20	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-J6	9/16 - 18	9/16 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-J8	9/16 - 18	3/4 - 16	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS8J10-J10	7/8 - 14	7/8 - 14	2.83	2.00	3.60	2.96	1.00	1.25	1.50
9SS12J12-J12	1 1/16 - 12	1 1/16 - 12	3.40	2.37	4.30	3.23	1.25	1.37	2.12
9SS16J16-J16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	5.10	3.90	1.62	1.75	2.37
9SS20J20-J20	1 5/8 - 12	1 5/8 - 12	4.12	2.81	5.72	4.44	2.00	2.25	2.75
9SS24J24-J24	1 7/8 - 12	1 7/8 - 12	5.27	3.51	6.87	5.12	2.37	2.75	3.50

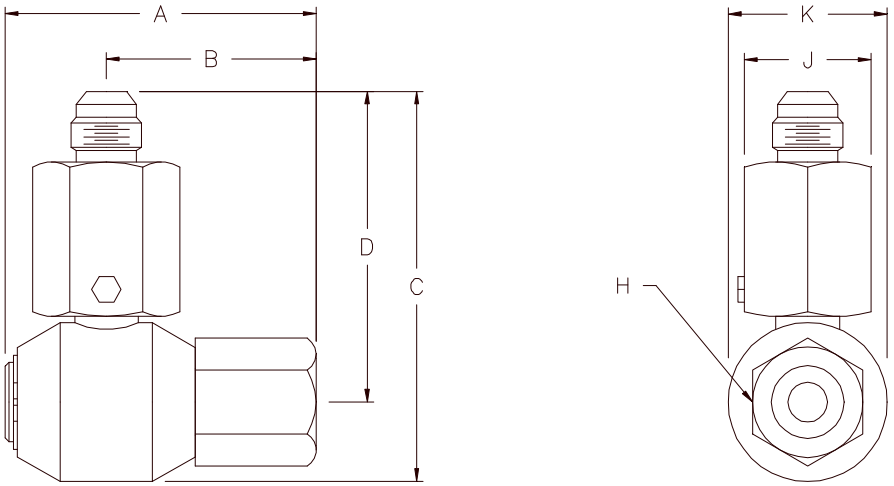
9SS SERIES / 90° 3000 PSI / DUAL PLANE

MALE JIC TO MALE PIPE



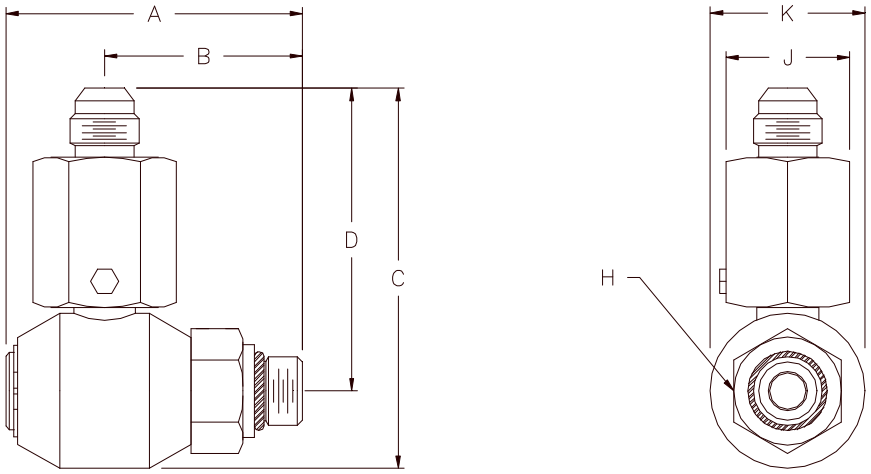
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-P4	9/16 - 18	1/4 - 18	2.50	1.62	3.06	2.44	.87	1.00	1.25
9SS6J8-P6	3/4 - 16	3/8 - 18	2.50	1.62	3.06	2.44	.87	1.00	1.25
9SS8J10-P8	7/8 - 14	1/2 - 14	2.83	1.99	3.63	2.88	1.00	1.25	1.50
9SS12J12-P12	1 1/16 - 12	3/4 - 14	3.40	2.37	4.30	3.23	1.25	1.25	2.12
9SS16J16-P16	1 5/16 - 12	1 - 11 1/2	3.80	2.65	5.10	3.90	1.62	1.75	2.37
9SS20J20-P20	1 5/8 - 12	1 1/4 - 11 1/2	4.18	2.76	5.72	4.44	1.75	2.00	2.75
9SS24J24-P24	1 7/8 - 12	1 1/2 - 11 1/2	5.32	3.55	6.87	5.12	2.37	2.75	3.50

MALE JIC TO FEMALE PIPE



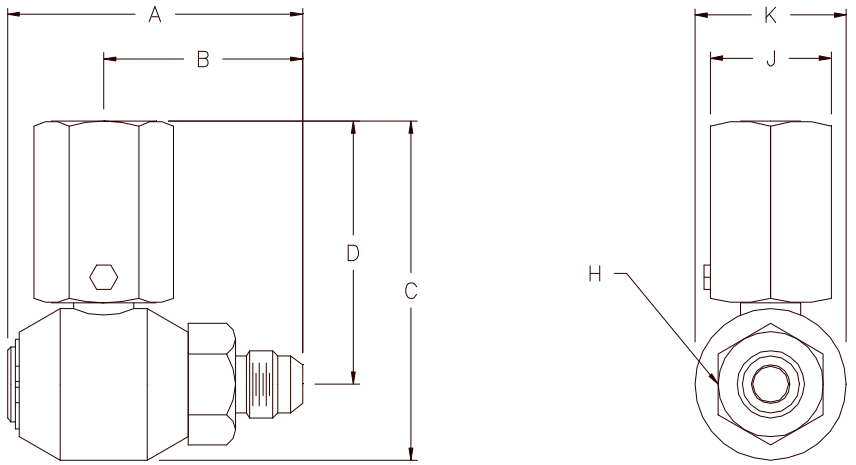
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-PF4	9/16 - 18	1/4 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-PF6	9/16 - 18	3/8 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J8-PF6	3/4 - 16	3/8 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS8J10-PF8	7/8 - 14	1/2 - 14	2.62	1.79	3.63	2.88	1.00	1.25	1.50
9SS12J12-PF12	1 1/16 - 12	3/4 - 14	3.00	1.97	4.30	3.23	1.25	1.37	2.12
9SS16J16-PF16	1 5/16 - 12	1 - 11 1/2	3.40	2.28	5.10	3.90	1.62	1.75	2.37
9SS20J20-PF20	1 5/8 - 12	1 1/4 - 11 1/2	4.08	2.76	5.72	4.44	2.00	2.25	2.75
9SS24J24-PF24	1 7/8 - 12	1 1/2 - 11 1/2	4.89	3.12	6.87	5.12	2.37	2.75	3.50

MALE JIC TO MALE O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6J6-O6	9/16 - 18	9/16 - 18	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J6-O8	9/16 - 18	3/4 - 16	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS6J8-O8	3/4 - 16	3/4 - 16	2.50	1.65	3.06	2.44	.87	1.00	1.25
9SS8J10-O10	7/8 - 14	7/8 - 14	2.58	1.74	3.63	2.88	1.00	1.25	1.50
9SS12J12-O12	1 1/16 - 12	1 1/16 - 12	3.24	2.21	4.30	3.23	1.25	1.37	2.12
9SS16J16-O16	1 5/16 - 12	1 5/16 - 12	3.82	2.70	5.10	3.90	1.62	1.75	2.37
9SS20J20-O20	1 5/8 - 12	1 5/8 - 12	3.76	2.45	5.72	4.44	2.00	2.25	2.75
9SS24J24-O24	1 7/8 - 12	1 7/8 - 12	4.78	3.02	6.87	5.12	2.37	2.75	3.50

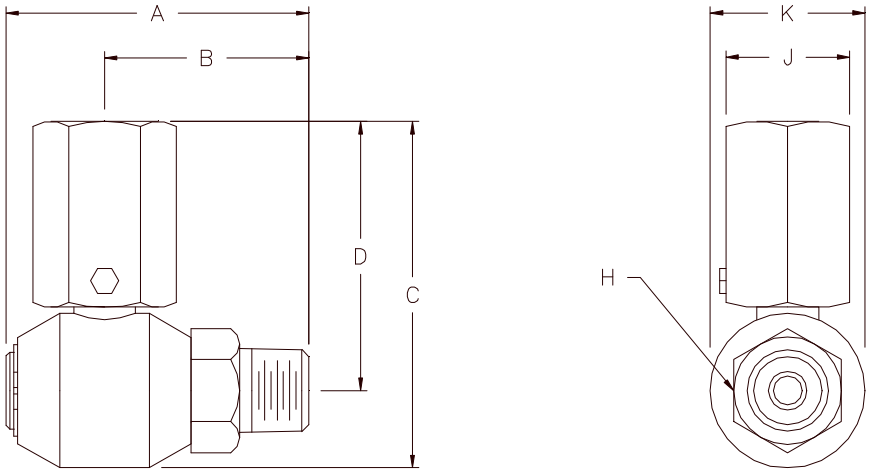
FEMALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-J5	1/4 - 18	1/2 - 20	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF4-J6	1/4 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-J5	3/8 - 18	1/2 - 20	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-J6	3/8 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-J8	3/8 - 18	3/4 - 16	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS8PF8-J10	1/2 - 14	7/8 - 14	2.83	1.99	3.42	2.67	1.00	1.25	1.50
9SS12PF12-J12	3/4 - 14	1 1/16 - 12	3.40	2.37	4.09	3.02	1.25	1.25	2.12
9SS16PF16-J16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	4.89	3.69	1.62	1.75	2.37
9SS20PF20-J20	1 1/4 - 11 1/2	1 5/8 - 12	4.12	2.81	5.51	4.23	2.00	2.25	2.75
9SS24PF24-J24	1 1/2 - 11 1/2	1 7/8 - 12	5.27	3.51	6.93	5.18	2.37	2.75	3.50

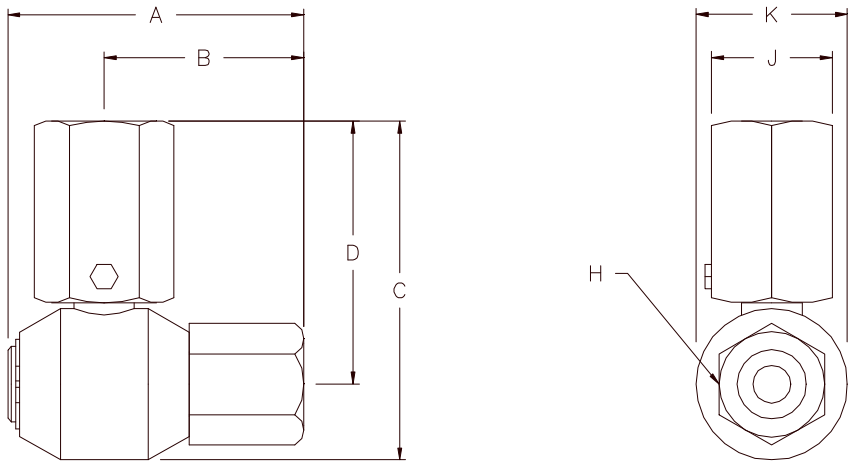
9SS SERIES / 90° 3000 PSI / DUAL PLANE

FEMALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-P4	1/4 - 18	1/4 - 18	2.50	1.62	2.85	2.23	.87	1.00	1.25
9SS6PF6-P4	3/8 - 18	1/4 - 18	2.50	1.62	2.85	2.23	.87	1.00	1.25
9SS6PF6-P6	3/8 - 18	3/8 - 18	2.50	1.62	2.85	2.23	.87	1.00	1.25
9SS8PF8-P8	1/2 - 14	1/2 - 14	2.83	1.99	3.42	2.67	1.00	1.25	1.50
9SS12PF12-P12	3/4 - 14	3/4 - 14	3.40	2.37	4.09	3.02	1.25	1.25	2.12
9SS16PF16-P16	1 - 11 1/2	1 - 11 1/2	3.80	2.65	4.89	3.69	1.62	1.75	2.37
9SS20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.18	2.76	5.51	4.23	2.00	2.25	2.75
9SS24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	5.32	3.55	6.93	5.18	2.37	2.75	3.50

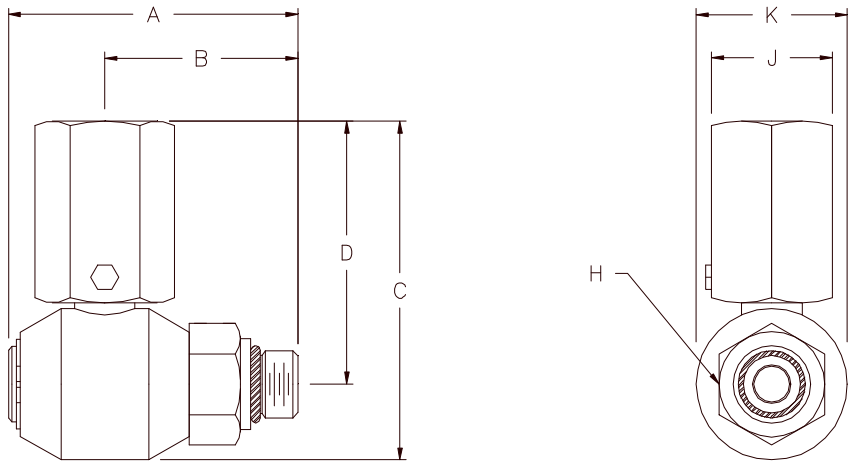
FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-PF4	1/4 - 18	1/4 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF4-PF6	1/4 - 18	3/8 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-PF4	3/8 - 18	1/4 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-PF6	3/8 - 18	3/8 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS8PF8-PF8	1/2 - 14	1/2 - 14	2.62	1.78	3.42	2.67	1.00	1.25	1.50
9SS12PF12-PF12	3/4 - 14	3/4 - 14	3.00	2.00	4.09	3.02	1.25	1.25	2.12
9SS16PF16-PF16	1 - 11 1/2	1 - 11 1/2	3.40	2.28	4.89	3.69	1.62	1.75	2.37
9SS20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	4.08	2.76	5.51	4.23	2.00	2.25	2.75
9SS24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	4.89	3.12	6.93	5.18	2.37	2.75	3.50

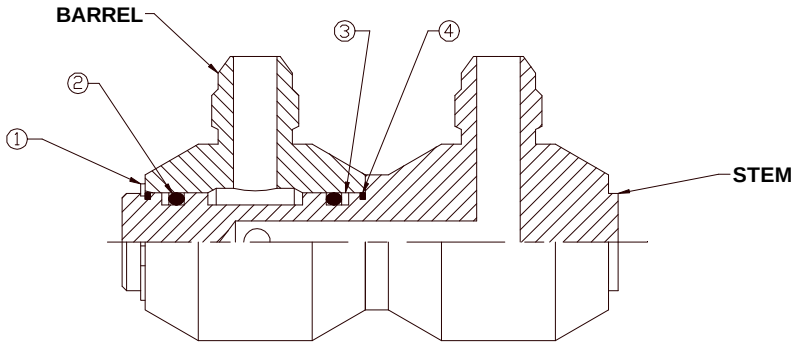
9SS SERIES / 90° 3000 PSI / DUAL PLANE

FEMALE PIPE TO O-RING



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	H HEX.	J HEX.	K DIA.
9SS6PF4-O6	1/4 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-O6	3/8 - 18	9/16 - 18	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS6PF6-O8	3/8 - 18	3/4 - 16	2.50	1.65	2.85	2.23	.87	1.00	1.25
9SS8PF8-O10	1/2 - 14	7/8 - 14	2.58	1.75	3.42	2.67	1.00	1.25	1.50
9SS12PF12-O12	3/4 - 14	1 1/16 - 12	3.24	2.21	4.09	3.02	1.25	1.25	2.12
9SS16PF16-O16	1 - 11 1/2	1 5/16 - 12	3.82	2.70	4.89	3.69	1.62	1.75	2.37
9SS20PF20-O20	1 1/4 - 11 1/2	1 5/8 - 12	3.76	2.45	5.51	4.23	2.00	2.25	2.75
9SS24PF24-O24	1 1/2 - 11 1/2	1 7/8 - 12	4.78	3.02	6.93	5.18	2.37	2.75	3.50

18S SERIES / 180° 3000 PSI / PARALLEL PLANE

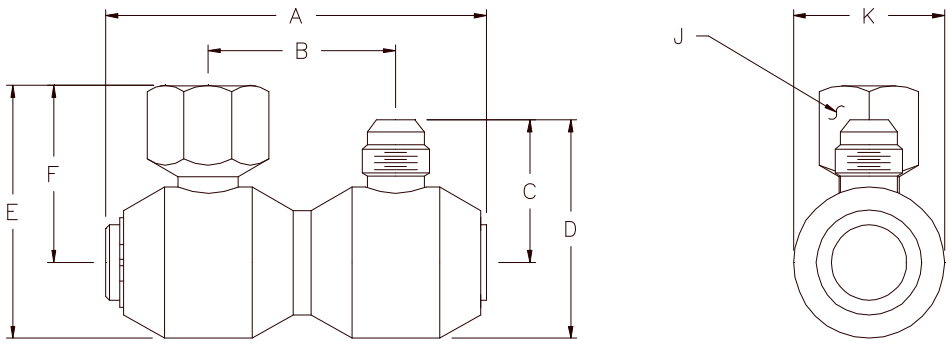


1 NON-LOAD BEARING RETAINING RING
2 SYNTHETIC RUBBER 0-RING (TWO)
3 TEFLON BACK UP RING (TWO)
4 DUST SEAL (TWO)

HYDRAULICS, INC. Design Features

- **Hardened carbon steel barrel - Large wear surface**
- **Barrel thread boss and stem annealed - Reduced breakage from shock and vibration**
- **Burnished barrel bore - Extended seal life**
- **Copper filled furnace braze joints**
- **Heavy duty retainer ring**
- **Protective treatment meeting SAE hose fitting standards**
- **Standard O-Ring and back up ring - Field replaceable seal kits - Page 26**
- **Optional seal material - Page 26**
- **Recessed and protected dust seals**
- **Pressure balanced for low rotational torque - See 90° torque chart - Page 27**
- **Low pressure drop - See 90° pressure drop chart - Page 27**

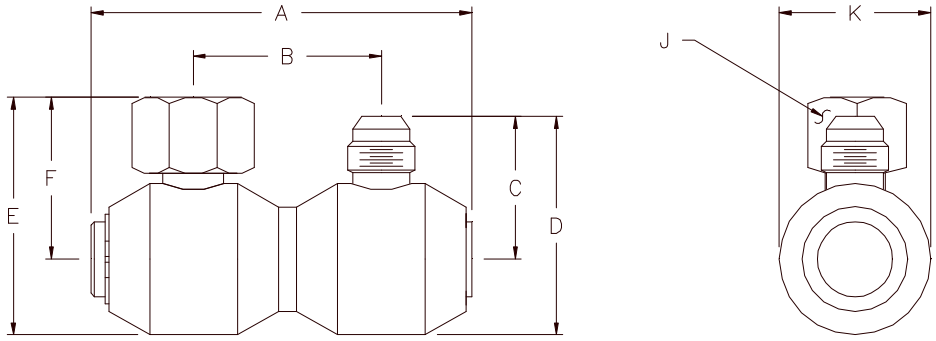
FEMALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	J HEX.	K DIA.
18S6PF4-J5	1/4 - 18	1/2 - 20	3.15	1.50	1.17	1.80	2.00	1.37	.75	1.25
18S6PF4-J6	1/4 - 18	9/16 - 18	3.15	1.50	1.17	1.80	2.00	1.37	.75	1.25
18S6PF6-J5	3/8 - 18	1/2 - 20	3.15	1.50	1.17	1.80	2.00	1.37	.87	1.25
18S6PF6-J6	3/8 - 18	9/16 - 18	3.15	1.50	1.17	1.80	2.00	1.37	.87	1.25
18S6PF6-J8	3/8 - 18	3/4 - 16	3.15	1.50	1.28	1.91	2.00	1.37	.87	1.25
18S8PF8-J10	1/2 - 14	7/8 - 14	3.12	1.50	1.50	2.26	2.59	1.84	1.00	1.50
18S12PF12-J12	3/4 - 14	1 1/16 - 12	3.86	1.87	1.99	3.05	3.30	2.24	1.37	2.12
18S16PF16-J16	1 - 11 1/2	1 5/16 - 12	4.68	2.25	2.18	3.36	3.64	2.46	1.62	2.37
18S20PF20-J20	1 1/4 - 11 1/2	1 5/8 - 12	5.29	2.50	2.33	3.70	3.98	2.61	2.00	2.75
18S24PF24-J24	1 1/2 - 11 1/2	1 7/8 - 12	7.17	3.37	2.90	4.67	5.20	3.45	2.37	3.50
18S32PF32-J32	2 - 11 1/2	2 1/2 - 12	8.29	3.87	3.54	5.67	6.06	3.94	2.87	4.25

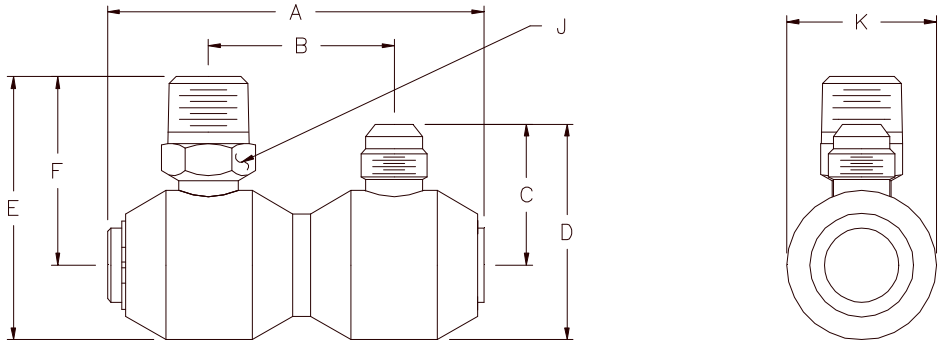
18S SERIES / 180° 3000 PSI / PARALLEL PLANE

FEMALE PIPE UNION TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	J HEX.	K DIA.
18S6PU4-J5	1/4 - 18	1/2 - 20	3.15	1.50	1.17	1.80	1.89	1.27	.75	1.25
18S6PU4-J6	1/4 - 18	9/16 - 18	3.15	1.50	1.17	1.80	1.89	1.27	.75	1.25
18S6PU6-J5	3/8 - 18	1/2 - 20	3.15	1.50	1.17	1.80	1.94	1.31	.87	1.25
18S6PU6-J6	3/8 - 18	9/16 - 18	3.15	1.50	1.17	1.80	1.94	1.31	.87	1.25
18S6PU6-J8	3/8 - 18	3/4 - 16	3.15	1.50	1.28	1.91	1.94	1.31	.87	1.25
18S8PU8-J10	1/2 - 14	7/8 - 14	3.12	1.50	1.50	2.26	2.26	1.51	1.00	1.50
18S12PU12-J12	3/4 - 14	1 1/16 - 12	3.86	1.87	1.99	3.05	3.09	2.03	1.25	2.12
18S16PU16-J16	1 - 11 1/2	1 5/16 - 12	4.68	2.25	2.18	3.36	3.31	2.12	1.50	2.37
18S20PU20-J20	1 1/4 - 11 1/2	1 5/8 - 12	5.29	2.50	2.33	3.70	3.89	2.52	1.87	2.75
18S24PU24-J24	1 1/2 - 11 1/2	1 7/8 - 12	7.17	3.37	2.90	4.65	4.73	2.98	2.25	3.50
18S32PU32-J32	2 - 11 1/2	2 1/2 - 12	8.29	3.87	3.54	5.67	5.65	3.52	2.75	4.25

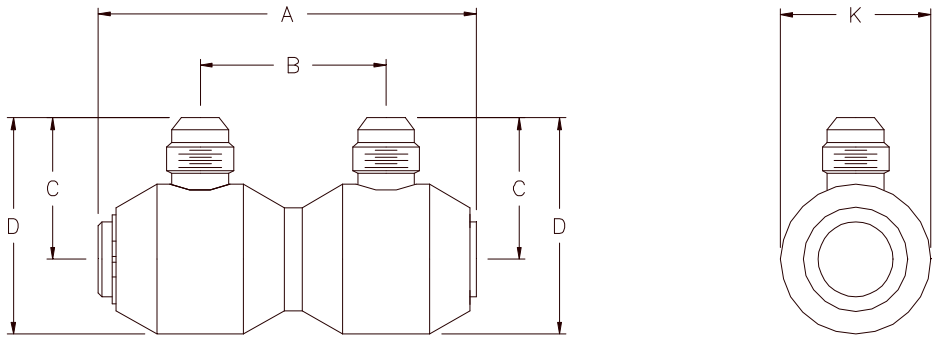
MALE PIPE TO MALE JIC



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	J HEX.	K DIA.
18S6P4-J5	1/4 - 18	1/2 - 20	3.15	1.50	1.17	1.80	2.12	1.50	.56	1.25
18S6P4-J6	1/4 - 18	9/16 - 18	3.15	1.50	1.17	1.80	2.12	1.50	.56	1.25
18S6P6-J8	3/8 - 18	3/4 - 16	3.15	1.50	1.28	1.91	2.12	1.50	.68	1.25
18S8P8-J10	1/2 - 14	7/8 - 14	3.12	1.50	1.50	2.26	2.65	1.90	.87	1.50
18S12P12-J12	3/4 - 14	1 1/16 - 12	3.86	1.87	1.99	3.05	3.32	2.26	1.12	2.12
18S16P16-J16	1 - 11 1/2	1 5/16 - 12	4.68	2.25	2.18	3.36	3.81	2.62	1.37	2.37
18S20P20-J20	1 1/4 - 11 1/2	1 5/8 - 12	5.29	2.50	2.33	3.70	4.31	2.93	1.75	2.75
18S24P24-J24	1 1/2 - 11 1/2	1 7/8 - 12	7.17	3.37	2.90	4.65	5.45	3.70	2.37	3.50
18S32P32-J32	2 - 11 1/2	2 1/2 - 12	8.29	3.87	3.54	5.67	6.55	4.42	2.87	4.25

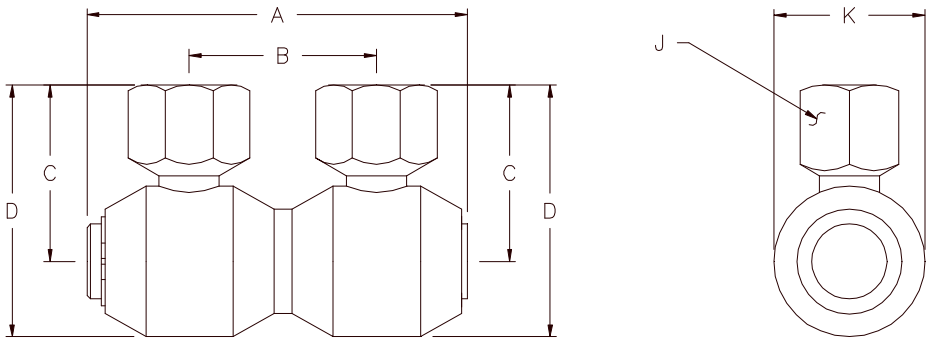
18S SERIES / 180° 3000 PSI / PARALLEL PLANE

MALE JIC TO MALE JIC



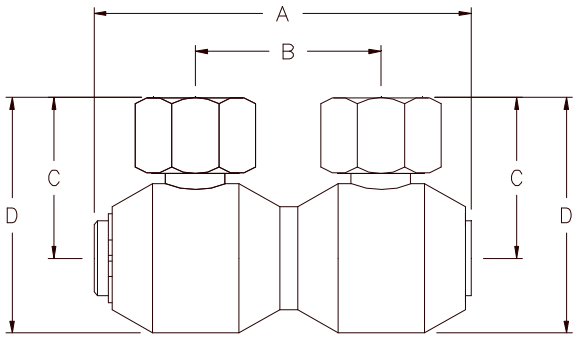
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	K DIA.
18S6J5-J5	1/2 - 20	1/2 - 20	3.15	1.50	1.17	1.80	1.25
18S6J6-J6	9/16 - 18	9/16 - 18	3.15	1.50	1.17	1.80	1.25
18S6J8-J8	3/4 - 16	3/4 - 16	3.15	1.50	1.28	1.91	1.25
18S8J8-J10	3/4 - 16	7/8 - 14	3.12	1.50	1.44	2.20	1.50
18S8J10-J10	7/8 - 14	7/8 - 14	3.12	1.50	1.50	2.26	1.50
18S12J12-J12	1 1/16 - 12	1 1/16 - 12	3.86	1.87	1.99	3.05	2.12
18S16J16-J16	1 5/16 - 12	1 5/16 - 12	4.68	2.25	2.18	3.36	2.37
18S20J20-J20	1 5/8 - 12	1 5/8 - 12	5.29	2.50	2.33	3.70	2.75
18S24J24-J24	1 7/8 - 12	1 7/8 - 12	7.17	3.37	2.90	4.65	3.50
18S32J32-J32	2 1/2 - 12	2 1/2 - 12	8.29	3.87	3.54	5.67	4.25

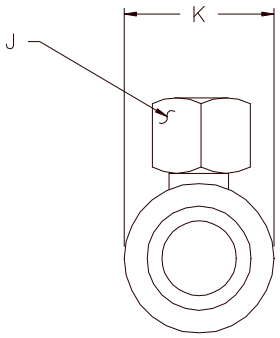
FEMALE PIPE TO FEMALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	J HEX.	K DIA.
18S6PF4-PF4	1/4 - 18	1/4 - 18	3.15	1.50	1.37	2.00	.75	1.25
18S6PF6-PF6	3/8 - 18	3/8 - 18	3.15	1.50	1.37	2.00	.87	1.25
18S8PF8-PF8	1/2 - 14	1/2 - 14	3.12	1.50	1.84	2.59	1.00	1.50
18S12PF12-PF12	3/4 - 14	3/4 - 14	3.86	1.87	2.24	3.30	1.37	2.12
18S16PF16-PF16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.46	3.64	1.62	2.37
18S20PF20-PF20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.61	3.98	2.00	2.75
18S24PF24-PF24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.45	5.20	2.37	3.50
18S32PF32-PF32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	3.94	6.06	2.87	4.25

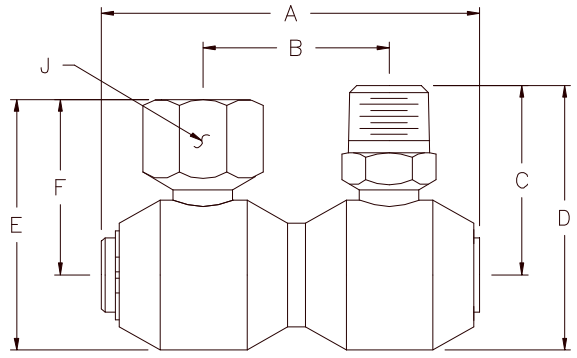
FEMALE PIPE UNION TO FEMALE PIPE UNION

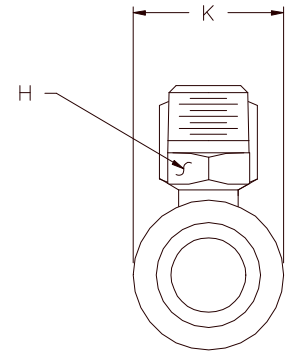




PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	J HEX.	K DIA.
18S6PU4-PU4	1/4 - 18	1/4 - 18	3.15	1.50	1.27	1.89	.75	1.25
18S6PU6-PU6	3/8 - 18	3/8 - 18	3.15	1.50	1.31	1.94	.87	1.25
18S8PU8-PU8	1/2 - 14	1/2 - 14	3.12	1.50	1.51	2.26	1.00	1.50
18S12PU12-PU12	3/4 - 14	3/4 - 14	3.86	1.87	2.03	3.09	1.25	2.12
18S16PU16-PU16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.12	3.31	1.50	2.37
18S20PU20-PU20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.52	3.89	1.87	2.75
18S24PU24-PU24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	2.98	4.73	2.25	3.50
18S32PU32-PU32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	3.52	5.65	2.75	4.25

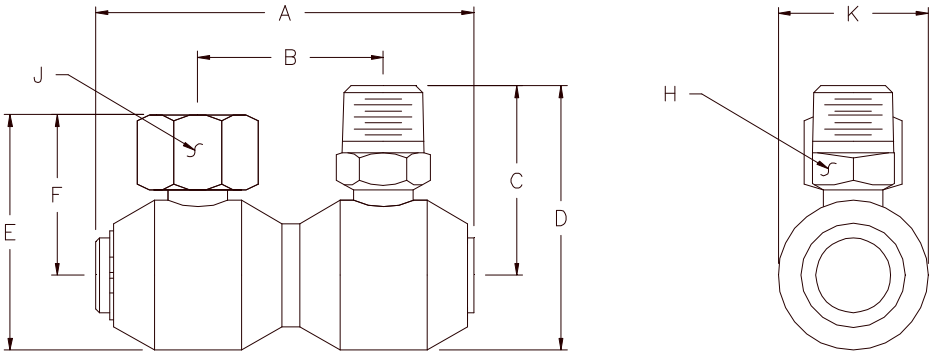
FEMALE PIPE TO MALE PIPE





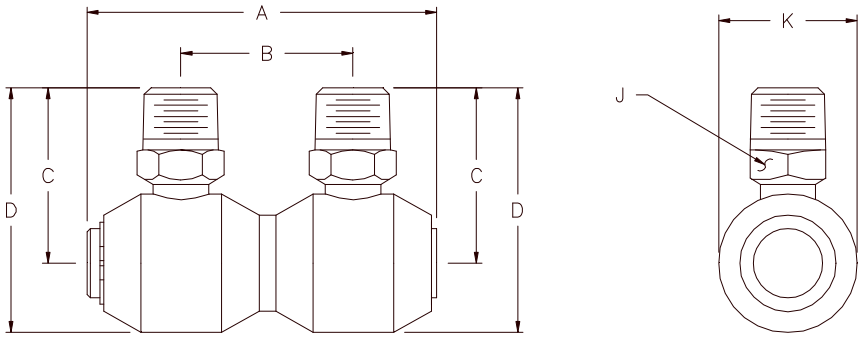
PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	H HEX.	J HEX.	K DIA.
18S6PF4-P4	1/4 - 18	1/4 - 18	3.15	1.50	1.50	2.12	2.00	1.37	.56	.75	1.25
18S6PF6-P4	3/8 - 18	1/4 - 18	3.15	1.50	1.50	2.12	2.00	1.37	.56	.87	1.25
18S6PF6-P6	3/8 - 18	3/8 - 18	3.15	1.50	1.50	2.12	2.00	1.37	.68	.87	1.25
18S8PF8-P8	1/2 - 14	1/2 - 14	3.12	1.50	1.90	2.65	2.59	1.84	.87	1.00	1.50
18S12PF12-P12	3/4 - 14	3/4 - 14	3.86	1.87	2.26	3.32	3.30	2.24	1.12	1.37	2.12
18S16PF16-P16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.62	3.81	3.64	2.46	1.37	1.62	2.37
18S20PF20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.93	4.31	3.98	2.61	1.75	2.00	2.75
18S24PF24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.70	5.45	5.20	3.45	2.37	2.37	3.50
18S32PF32-P32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	4.18	6.55	6.06	3.94	2.87	2.87	4.25

FEMALE PIPE UNION TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	E	F	H HEX.	J HEX.	K DIA.
18S6PU4-P4	1/4 - 18	1/4 - 18	3.15	1.50	1.50	2.12	1.89	1.27	.56	.75	1.25
18S6PU4-P6	1/4 - 18	3/8 - 18	3.15	1.50	1.50	2.12	1.89	1.27	.68	.75	1.25
18S6PU6-P4	3/8 - 18	1/4 - 18	3.15	1.50	1.50	2.12	1.94	1.31	.56	.87	1.25
18S6PU6-P6	3/8 - 18	3/8 - 18	3.15	1.50	1.50	2.12	1.94	1.31	.68	.87	1.25
18S8PU8-P8	1/2 - 14	1/2 - 14	3.12	1.50	1.90	2.65	2.26	1.51	.87	1.00	1.50
18S12PU12-P12	3/4 - 14	3/4 - 14	3.86	1.87	2.26	3.32	3.09	2.03	1.12	1.25	2.12
18S16PU16-P16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.62	3.81	3.31	2.12	1.37	1.50	2.37
18S20PU20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.93	4.31	3.89	2.52	1.75	1.87	2.75
18S24PU24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.70	5.45	4.73	2.98	2.37	2.25	3.50
18S32PU32-P32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	4.42	6.55	5.65	3.52	2.87	2.75	4.25

MALE PIPE TO MALE PIPE



PART NO.	BARREL THREAD	STEM THREAD	A	B	C	D	J HEX.	K DIA.
18S6P4-P4	1/4 - 18	1/4 - 18	3.15	1.50	1.50	2.12	.56	1.25
18S6P6-P6	3/8 - 18	3/8 - 18	3.15	1.50	1.50	2.12	.68	1.25
18S8P8-P8	1/2 - 14	1/2 - 14	3.12	1.50	1.90	2.65	.87	1.50
18S12P12-P12	3/4 - 14	3/4 - 14	3.86	1.87	2.26	3.32	1.12	2.12
18S16P16-P16	1 - 11 1/2	1 - 11 1/2	4.68	2.25	2.62	3.81	1.37	2.37
18S20P20-P20	1 1/4 - 11 1/2	1 1/4 - 11 1/2	5.29	2.50	2.93	4.31	1.75	2.75
18S24P24-P24	1 1/2 - 11 1/2	1 1/2 - 11 1/2	7.17	3.37	3.70	5.45	2.37	3.50
18S32P32-P32	2 - 11 1/2	2 - 11 1/2	8.29	3.87	4.42	6.55	2.87	4.25

SEAL KITS AND GREASE FITTINGS

KITS AS ISTED CONTAIN DUST AND FLUID SEALS WITH RETAINING RINGS, BALLS, AND PLUGS AS APPLICABLE.

S-SERIES

BODY SIZE	S6	S8	S14	S16	S20	S24	S32
KIT NO.	S6-1	S8-1	S14-1	S16-1	S20-1	S24-1	S32-1

9S-SERIES

BODY SIZE	9S6	9S8	9S12	9S16	9S20	9S24	9S32
KIT NO.	9S6-1	9S8-1	9S12-1	9S16-1	9S20-1	9S24-1	9S32-1

9SS-SERIES

BODY SIZE	9SS6	9SS8	9SS12	9SS16	9SS20	9SS24	9SS32
KIT NO.	9SS6-1	9SS8-1	9SS12-1	9SS16-1	9SS20-1	9SS24-1	9SS32-1

18S-SERIES

BODY SIZE	18S6	18S8	18S12	18S16	18S20	18S24	18S32
KIT NO.	9S6-1	9S8-1	9S12-1	9S16-1	9S20-1	9S24-1	9S32-1

NOTE: SPECIAL SEALS

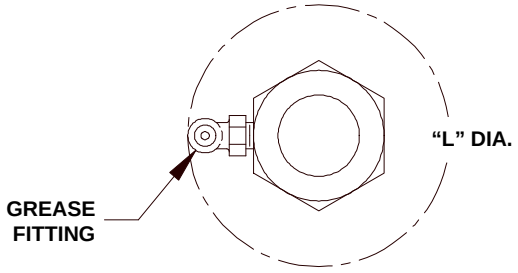
To obtain kits with seal compounds other than standard buna-n, suffix the replacement seal kit part number with the applicable seal material code number. Example: S6-1 kit would become S6-1-9 for a neoprene seal. See chart on Page 2.

GREASE FITTINGS FOR "S" & "9SS" SERIES

To specify grease fittings prefix part number with letter "G" as in example:

GS6J8-PF6 or
G9SS16J16-P16

Allow additional diametrial barrel clearance as shown in chart.

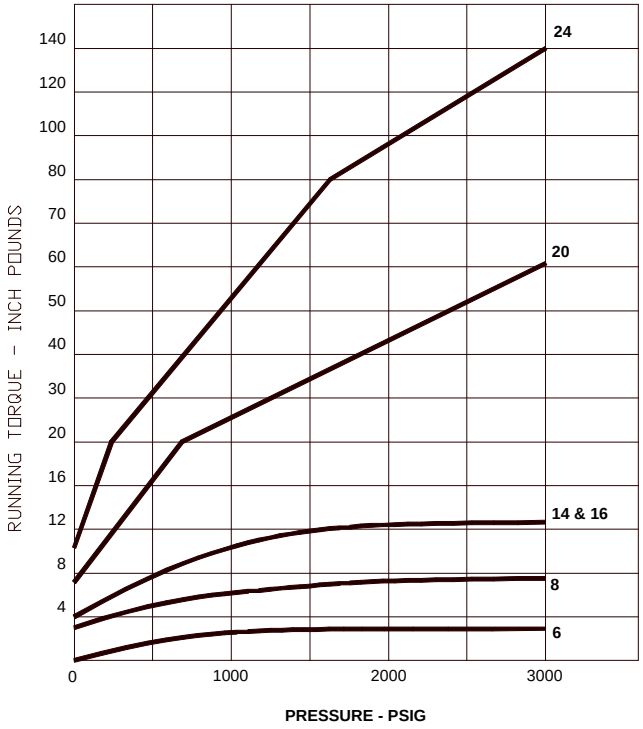


BODY SIZE	6	8	12	14	16	20	24	32
"L" DIA.	2.21	2.46	2.46	2.59	2.96	3.46	3.96	4.71

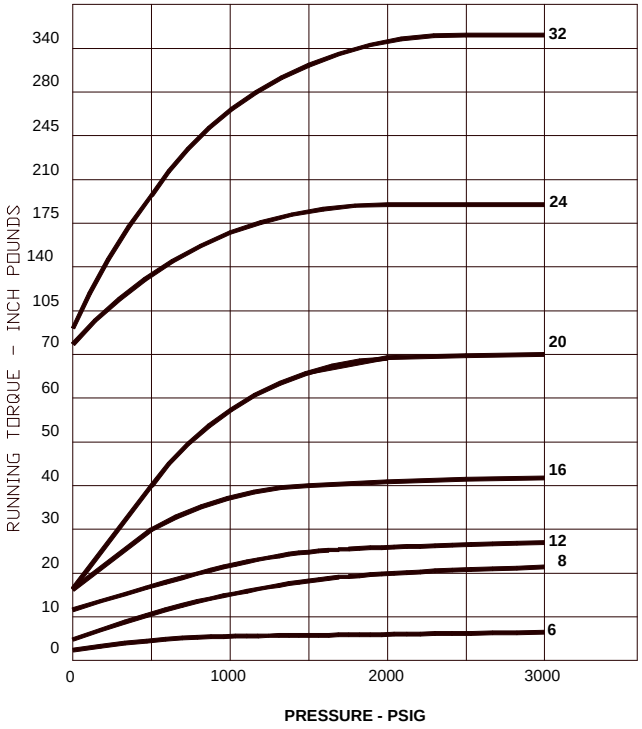
"Because of technological progress and product improvements, all design and dimensional data shown in this catalog is subject to change without notice. Technical information has been prepared from actual test results under controlled environmental conditions and is considered to be reliable, but no responsibility can be assumed for its accuracy under varied field conditions."

ROTATIONAL TORQUE AND PRESSURE DROP CHART

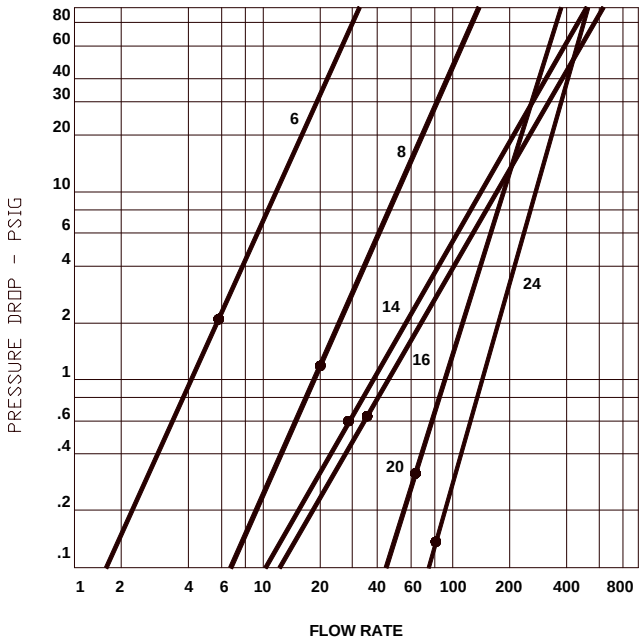
ROTATIONAL TORQUE vs PRESSURE - IN-LINE



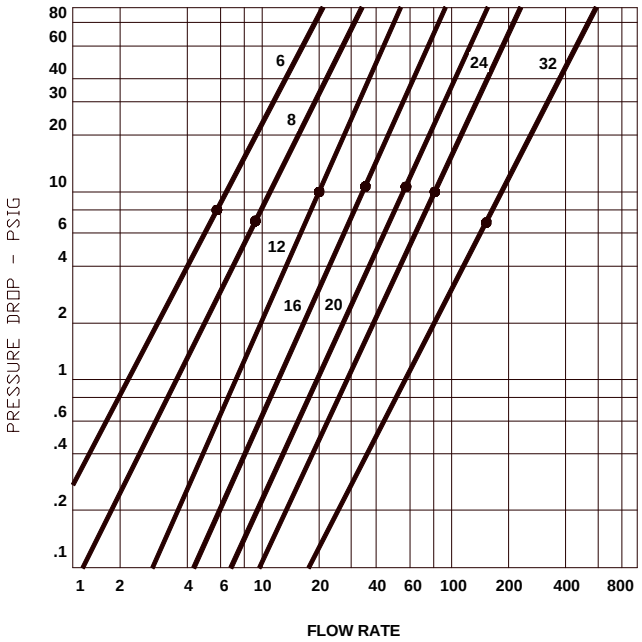
ROTATIONAL TORQUE vs PRESSURE - 90°



PRESSURE DROP vs FLOW (GPM) - IN-LINE



PRESSURE DROP vs FLOW (GPM) - 90°



- Pressure Drop Thru Swivel Based on Flows Giving 15 FPS Fluid Velocity Thru Nominal Bore Size

- Pressure Drop Thru Swivel Based on Flows Giving 15 FPS Fluid Velocity Thru Nominal Bore Size

HC-104A

HC-102

HC-103

HYDRAULICS Inc.

Plant and Offices:
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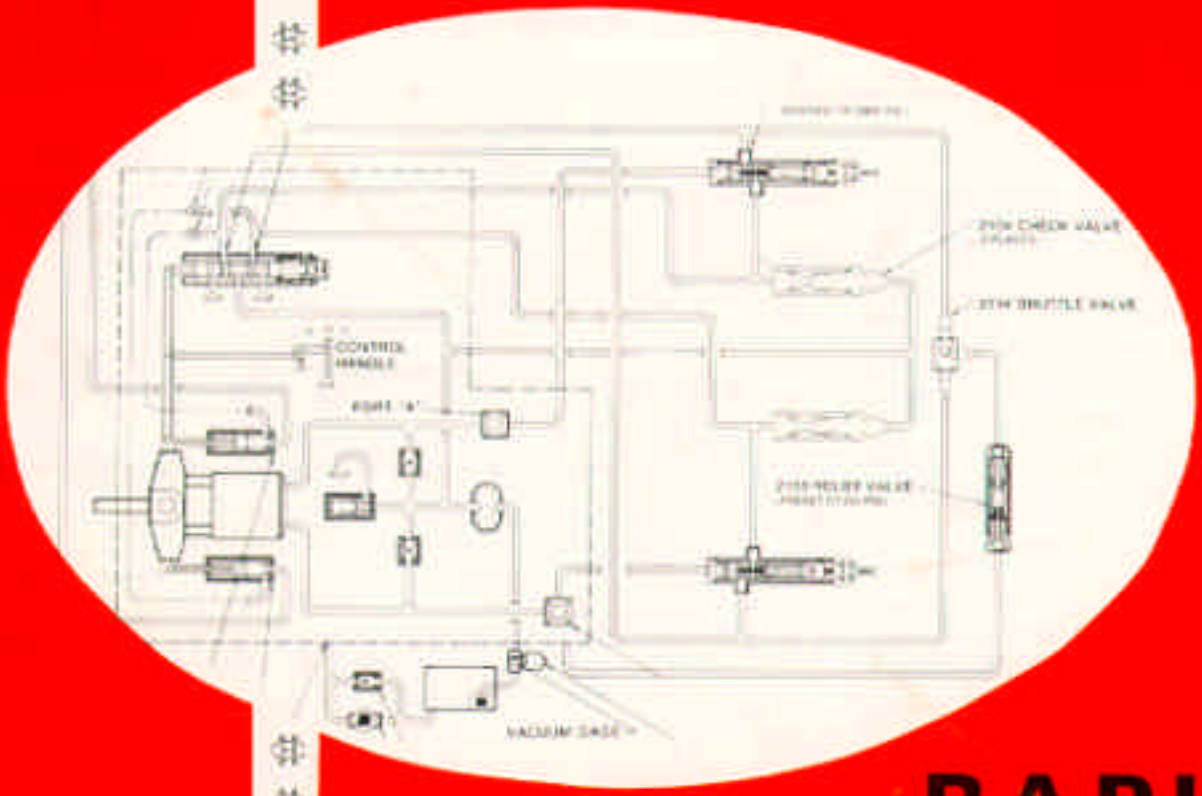
Fort Worth, TX 76115-0479
Tel: 817/923-1965
Fax: 817/927-8002

CONTACT OUR FORT WORTH OFFICE FOR ADDITIONAL PRODUCT INFORMATION • SWIVELS, COUPLINGS, AND CONTROLS FOR HYDRAULIC SYSTEMS • ASK FOR THE NEAREST REPRESENTATIVE.

LITHO IN USA 7/91



RAPID RESPONSE TORQUE CONTROL

HYDRAULICS Inc.

2935 ST. LOUIS AVENUE
FORT WORTH, TEXAS 76110-4104

RAPID RESPONSE TORQUE CONTROL

GENERAL

The Hydraulics, Inc. Rapid Response Torque Control (pressure compensator) provides control of the swashplate angle within the pump of a hydrostatic closed-loop system, thereby giving precise control of the output pressure of the pump. The speed at which the pressure control system reacts, provides protection for the prime mover and the driven load. The rapid response torque control will work even in the systems that may require the pump to be driven over-center in order to maintain constant pressure in the high pressure loop.

Torque control kits are available to provide pressure control for one or both ports of the hydrostatic pump, and for systems involving two transmissions driving a common load.

APPLICATION

The torque control system has been applied to Dynapower, Eaton, and Sundstrand hydrostatic drives. The schematics shown herein are as applied to Sundstrand Series 20 thru 27 and are for reference to other manufacturers systems.

Hydraulics, Inc. is not responsible for the effects of applications of the rapid response control to Dynapower, Eatonk, Sundstrand, or other company products and their warranties.

CATALOG INDEX:

Rapid Response Torque Control Data For Controlling Pump Output pressure at:

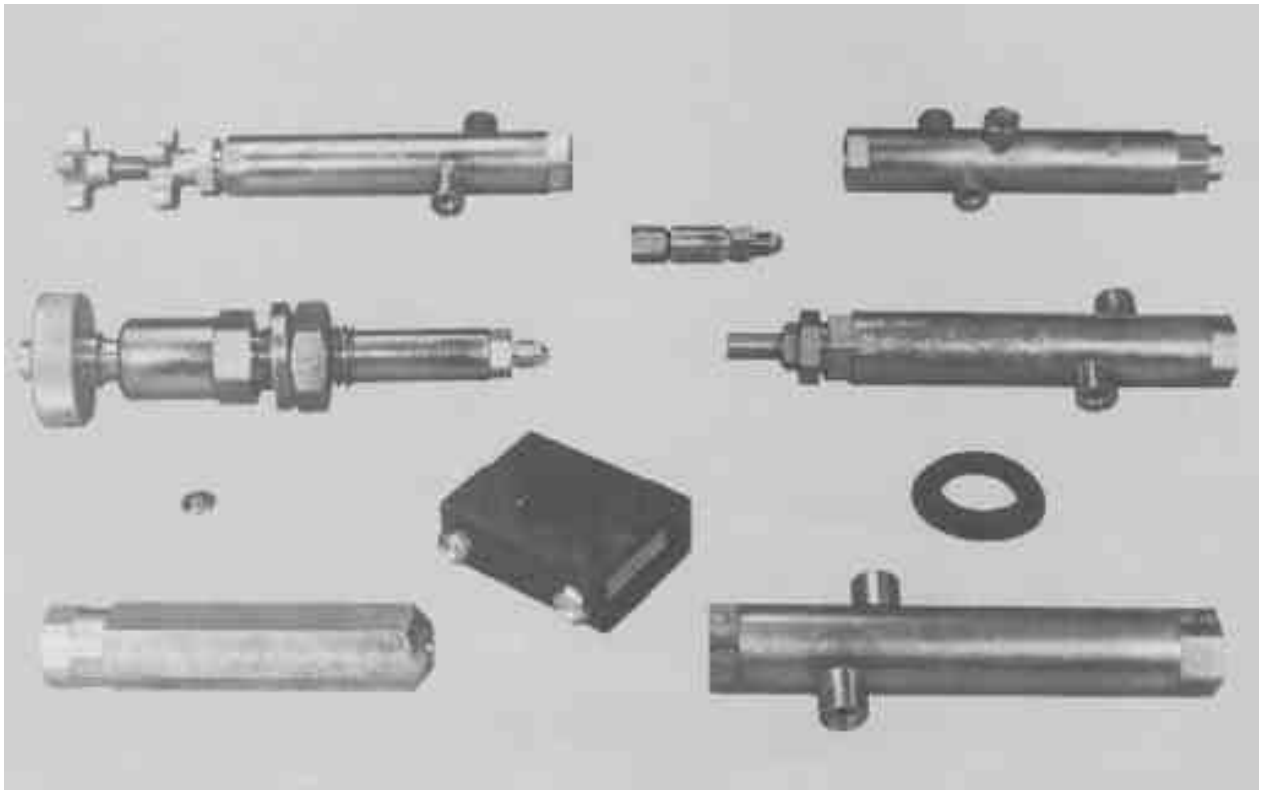
Port “A” Or “B”
- Parts List — Page 3
- Schematic — 3
- Pictorial Schematic — 4

Port “A” & “B”
- Parts List — Page 4
- Schematic — 4
- Pictorial Schematic

Port “A” Slaved (Two Transmissions Driving Common Load)
- Parts List — Page 7
- Schematic — 7
- Pictorial Schematic — 8

Components — Page 9, 10, & 11

NOTE:
Special packaging and adaptations are available for OEM applications. See back cover.



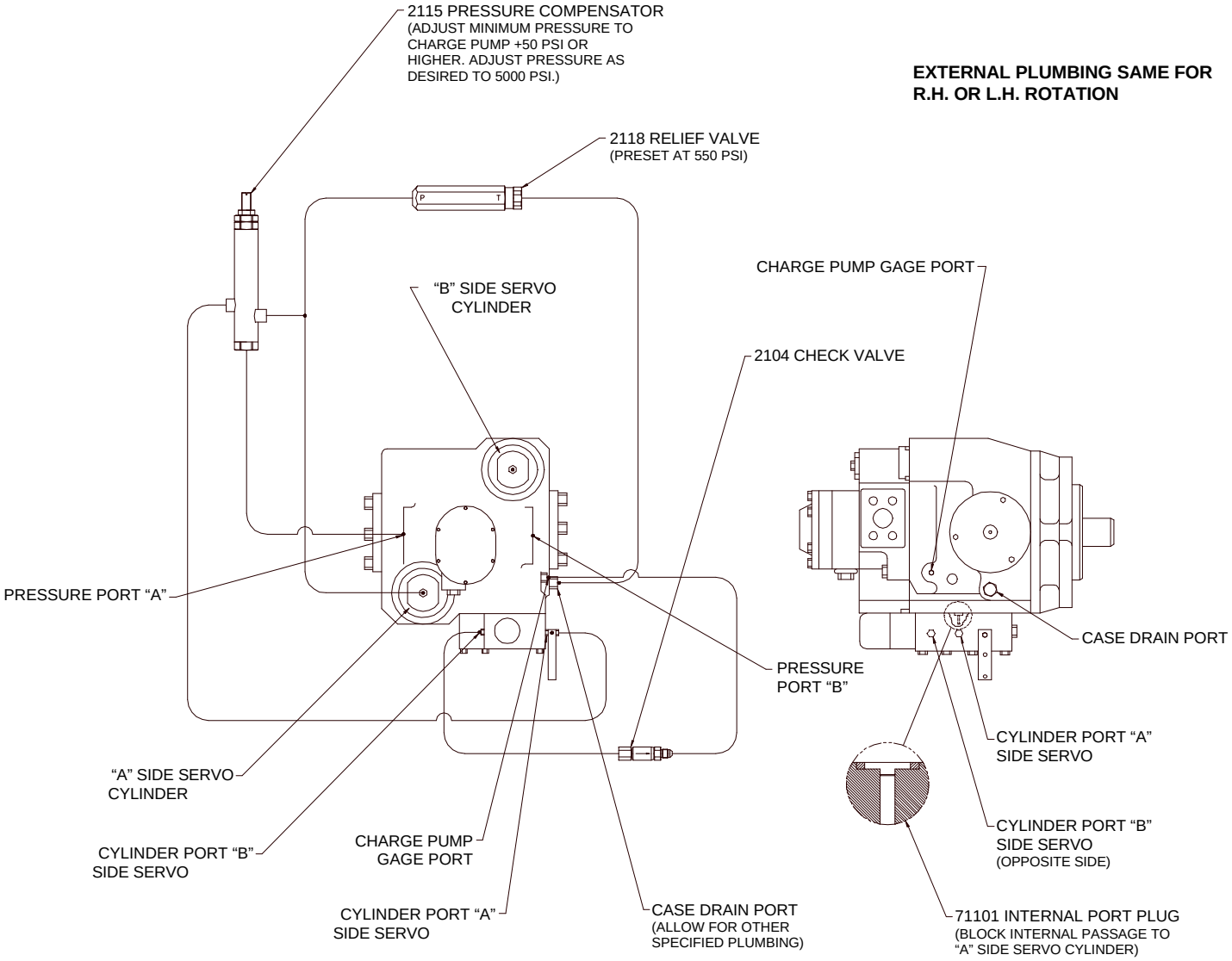
TORQUE CONTROL FOR PORT “A” OR “B”

KITS FOR PORT “A” OR “B”

The following chart lists components for controlling port “A” or “B” in a manual, remote, or panel mount kit.

		PORT “A” OR “B”		
		KIT A2115	KIT A2115R	KIT A2115P
Part No.	Description	Manual	Remote	Panel Mount
2104	Check Valve	1	1	1
2106	Remote Pressure Control		1	
2115	Compensator (Manual)	1		
2115A	Compensator (Remote)		1	
2115C	Compensator (Panel Mount)			1
2118	Relief Valve	1	1	1
71101	Internal Port Plug	1	1	1

TORQUE CONTROL FOR PORT “A” OR “B”
(SCHEMATIC)

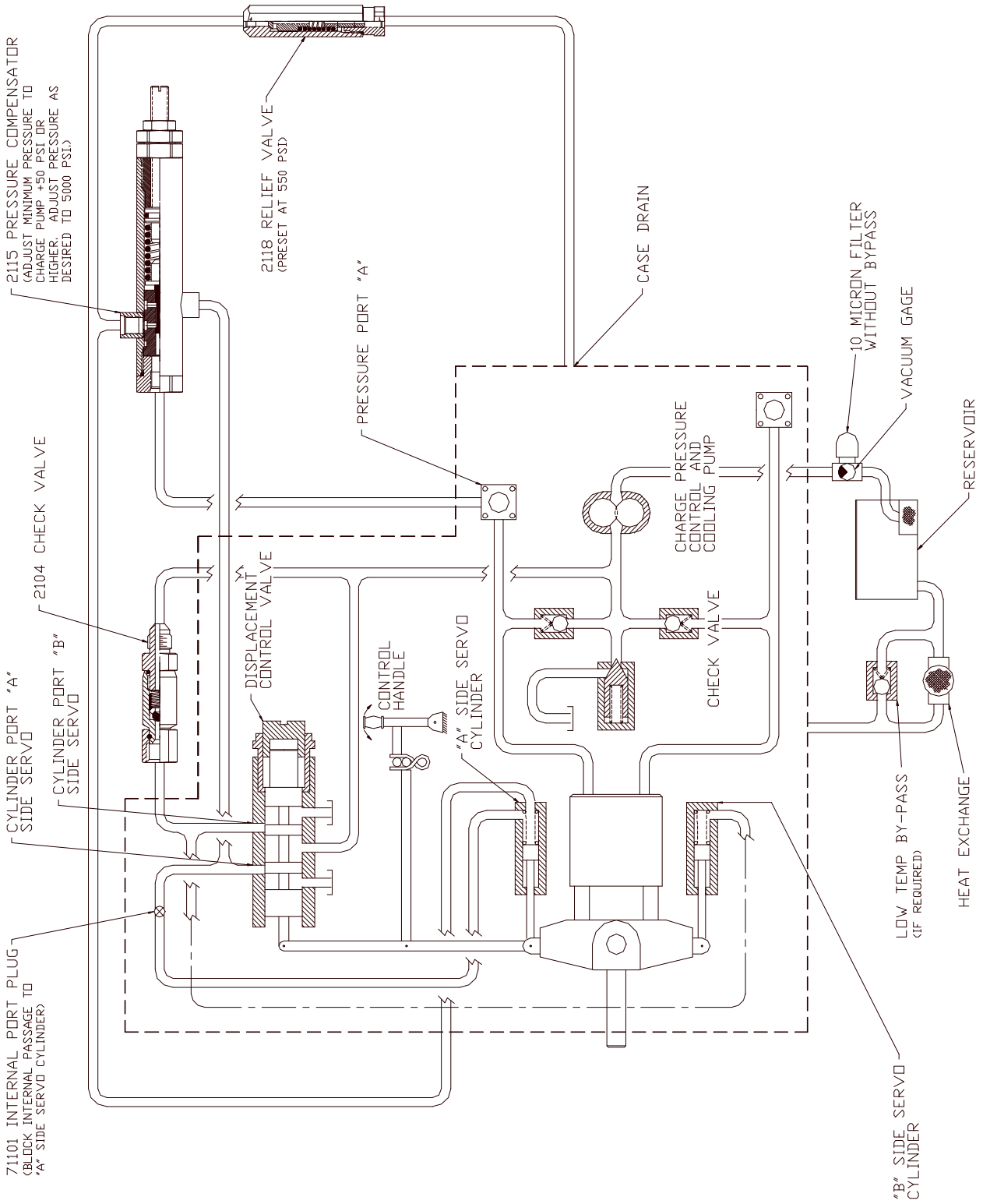


HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTE: PLUMBING LAYOUT IS FOR CONTROL OF PUMP PORT “A”

TORQUE CONTROL FOR PORT “A” OR “B”

(SCHEMATIC)



RAPID RESPONSE TORQUE CONTROL FOR SUNDSTRAND HYDRO-TRANSMISSION - SERIES 20 THRU 27

HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTES:

1. All connecting plumbing to be 1/4" tube size.
2. Control cylinder end caps must be ported with -4 S.A.E. O-Ring port for external plumbing. Consult pump mfg.
3. Plumbing layout is for control of pump port "A".

TORQUE CONTROL FOR PORT “A” & “B”

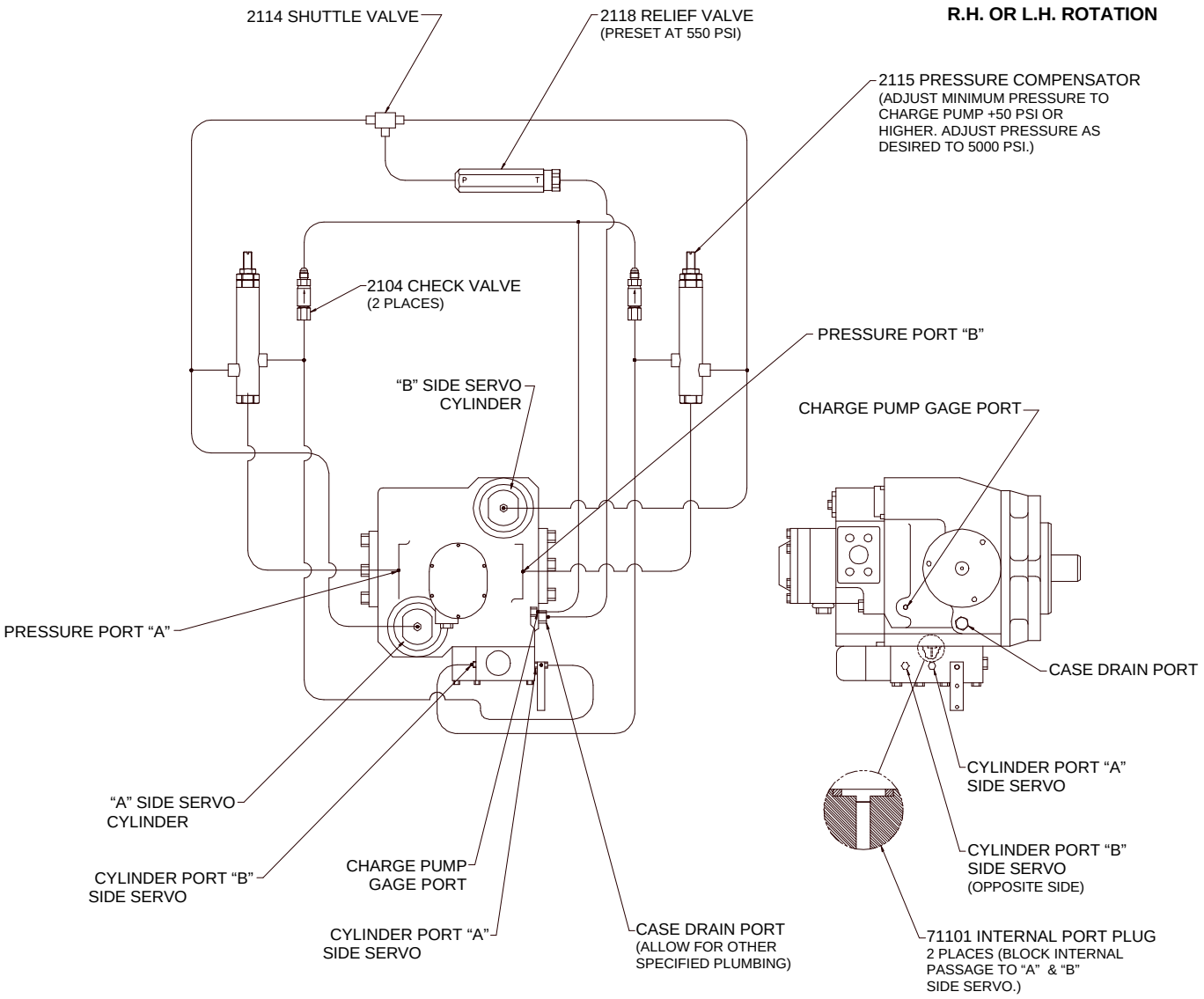
KITS FOR PORT “A” & “B”

The following chart lists components for controlling port “A” & “B” in a manual, remote, or panel mount kit.

		PORT “A” & “B”		
		KIT B2115	KIT B2115R	KIT B2115P
Part No.	Description	Manual	Remote	Panel Mount
2104	Check Valve	2	2	2
2106	Remote Pressure Control		2	
2114	Shuttle Valve	1	1	1
2115	Compensator (Manual)	2		
2115A	Compensator (Remote)		2	
2115C	Compensator (Panel Mount)			2
2118	Relief Valve	1	1	1
71101	Internal Port Plug	2	2	2

TORQUE CONTROL FOR PORT “A” & “B”
(SCHEMATIC)

EXTERNAL PLUMBING SAME FOR R.H. OR L.H. ROTATION

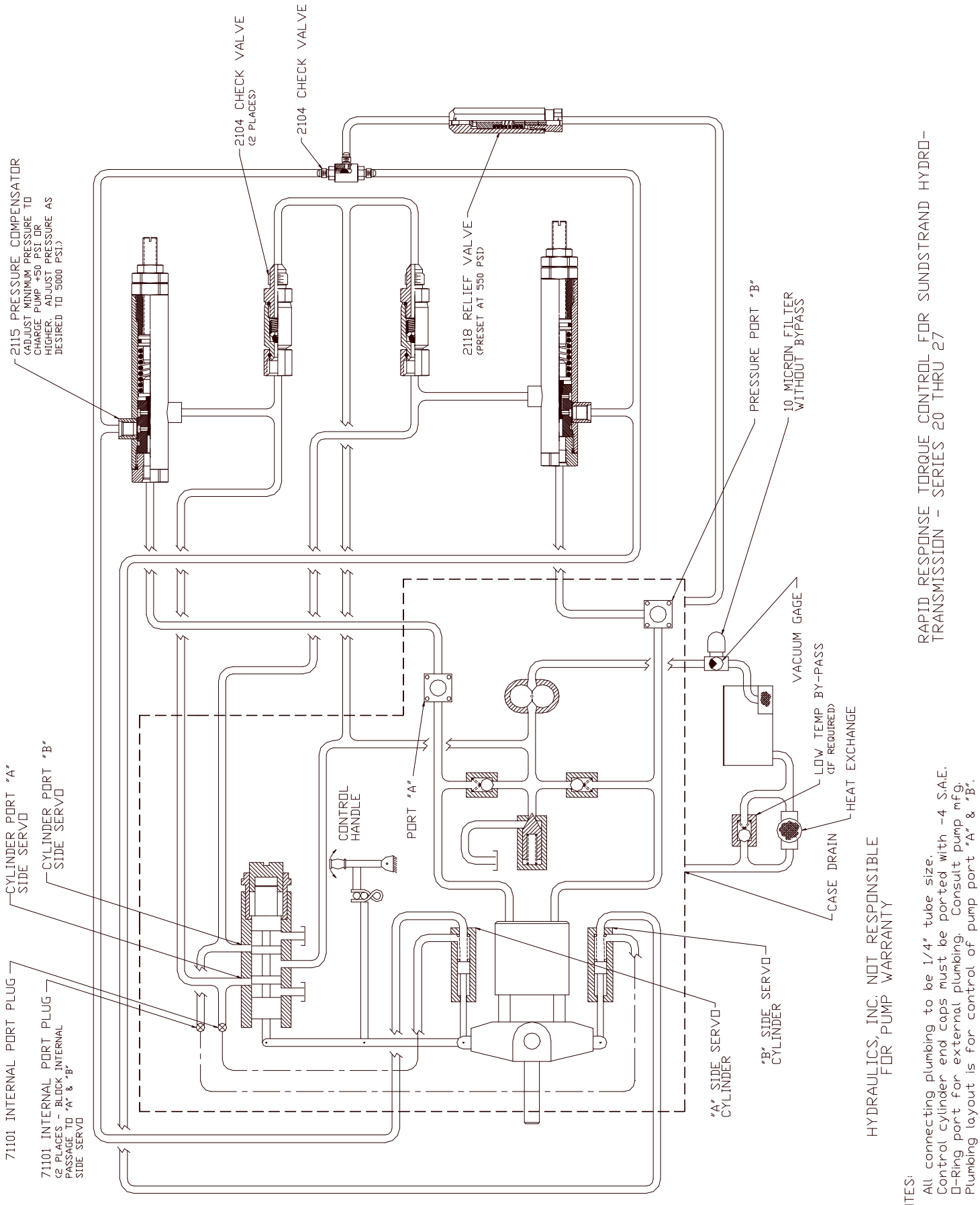


HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTE: PLUMBING LAYOUT IS FOR CONTROL OF PUMP PORT “A” & “B”

TORQUE CONTROL FOR PORT “A” & “B”

(SCHEMATIC)



RAPID RESPONSE TORQUE CONTROL FOR SUNDSTRAND HYDRO-TRANSMISSION - SERIES 20 THRU 27

HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTES:

1. All connecting plumbing to be 1/4" tube size.
2. Control cylinder end caps must be ported with -4 S.A.E. O-Ring port for external plumbing. Consult pump mfg.
3. Plumbing layout is for control of pump port "A" & "B".

TORQUE CONTROL FOR PORT “A” SLAVED

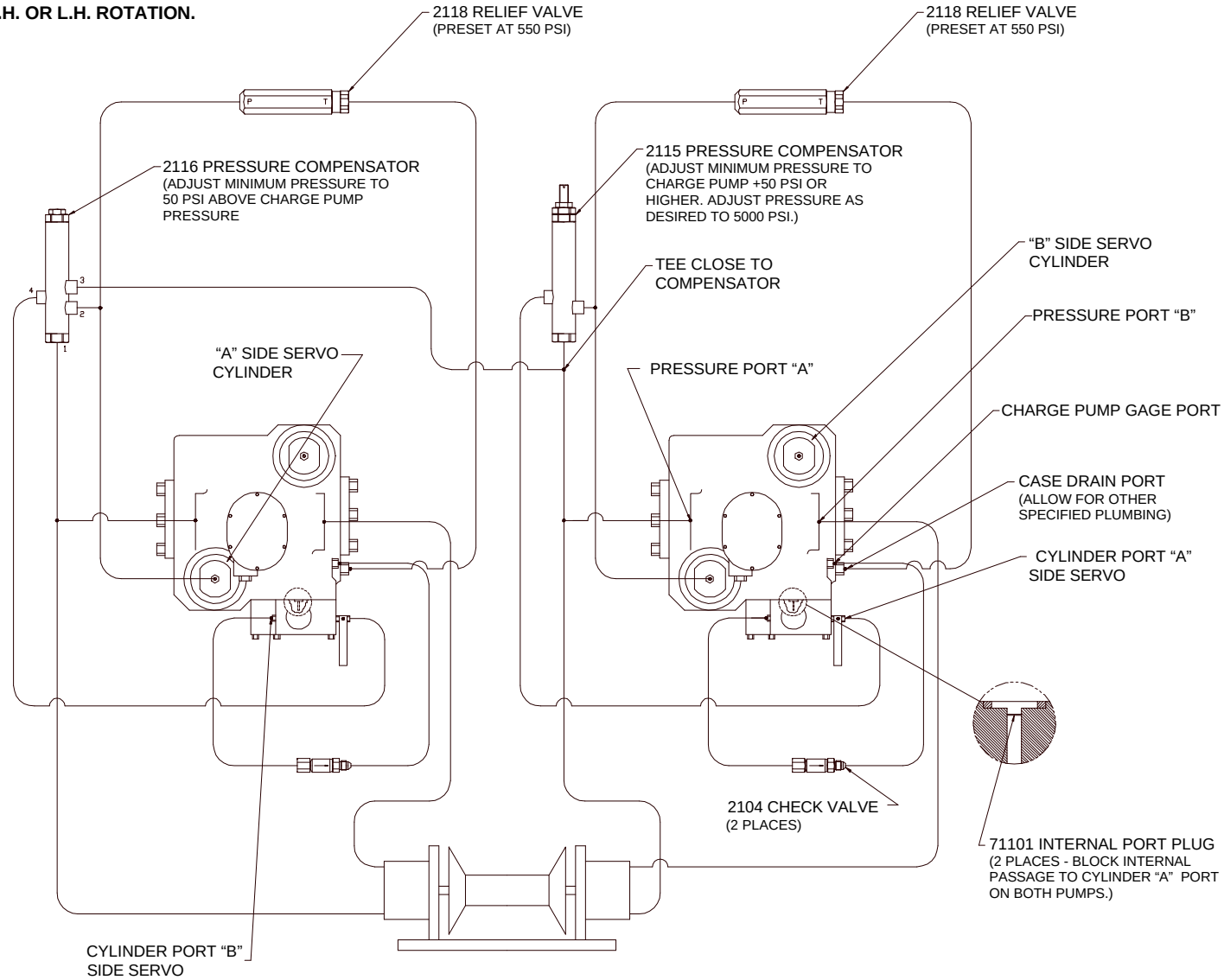
KITS FOR PORT “A” SLAVED

The following chart lists components for controlling port “A” slaved in a manual, remote, or panel mount kit.

		PORT “A” SLAVED		
		KIT C2115	KIT C2115R	KIT C2115P
Part No.	Description	Manual	Remote	Panel Mount
2104	Check Valve	2	2	2
2106	Remote Pressure Control	1	1	1
2115	Compensator (Manual)	1		
2115A	Compensator (Remote)		1	
2115C	Compensator (Panel Mount)			1
2116D	Compensator Slave (Preset)	1	1	1
2118	Relief Valve	2	2	2
71101	Internal Port Plug	2	2	2

TORQUE CONTROL FOR PORT “A” SLAVED
(SCHEMATIC)

EXTERNAL PLUMBING SAME FOR R.H. OR L.H. ROTATION.

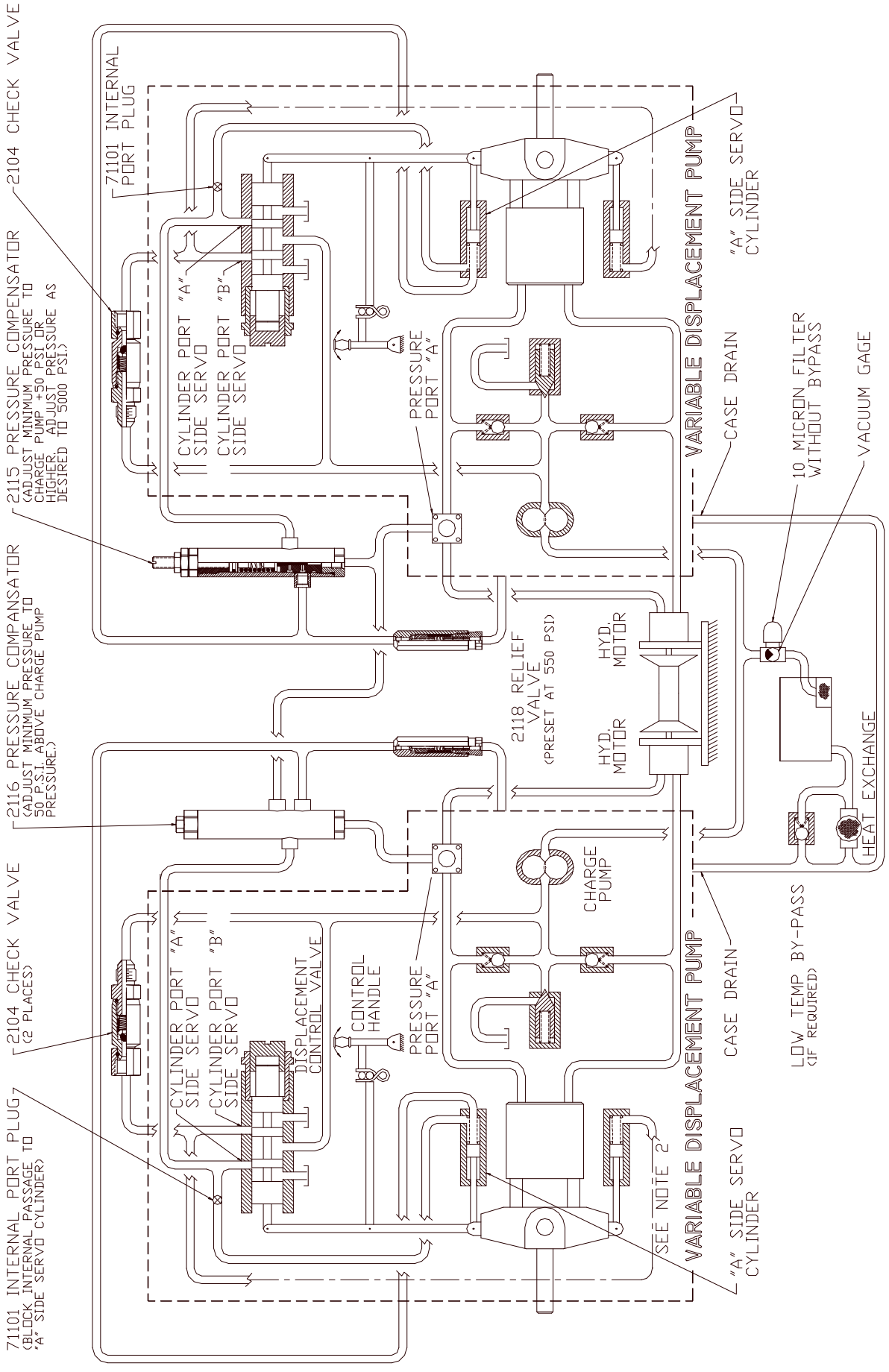


HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTE: PLUMBING LAYOUT IS FOR CONTROL OF PUMP PORT “A” & “B”

TORQUE CONTROL FOR PORT "A" SLAVED

(SCHEMATIC)



RAPID RESPONSE TORQUE CONTROL FOR SUNDSTRAND HYDRO-TRANSMISSION - SERIES 20 THRU 27

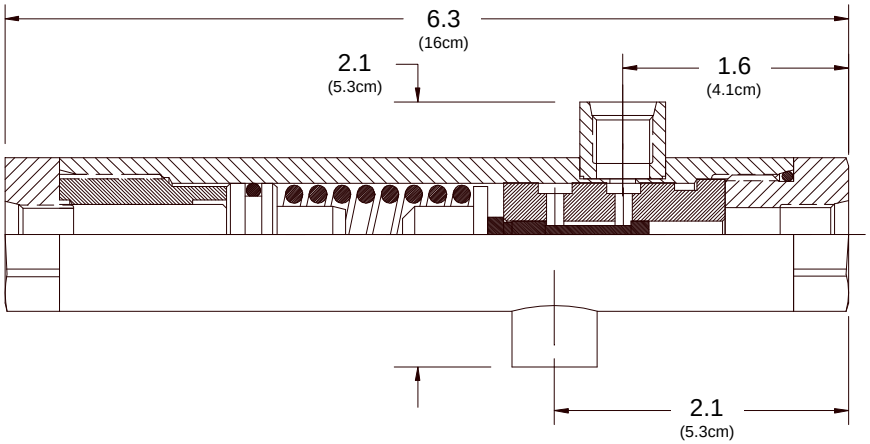
HYDRAULICS, INC. NOT RESPONSIBLE FOR PUMP WARRANTY

NOTES:

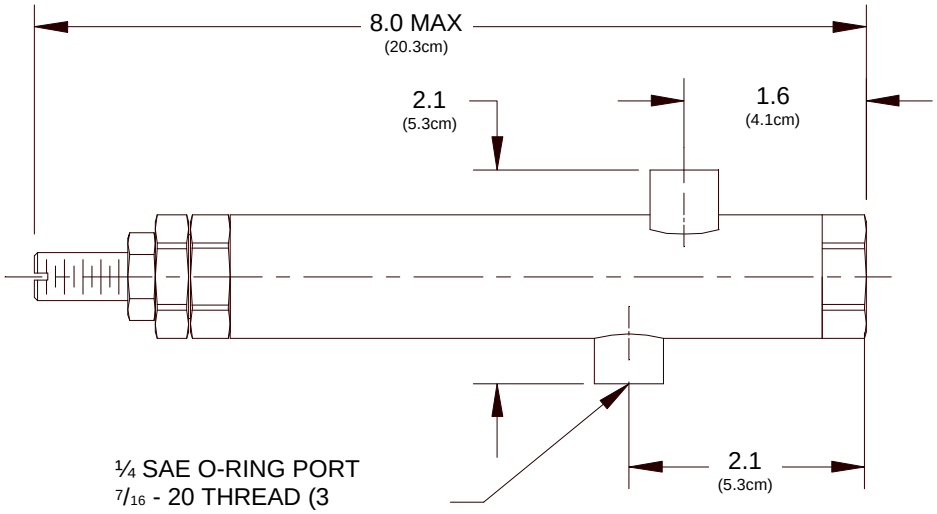
1. All connecting plumbing to be 1/4" tube size
2. Control cylinder end caps must be ported with -4 S.A.E. O-Ring port for external plumbing. Consult pump mfg.
3. Tee close to master compensator
4. Plumbing layout is for slaved control of "A" port on dual pumps.

TORQUE CONTROL COMPONENTS

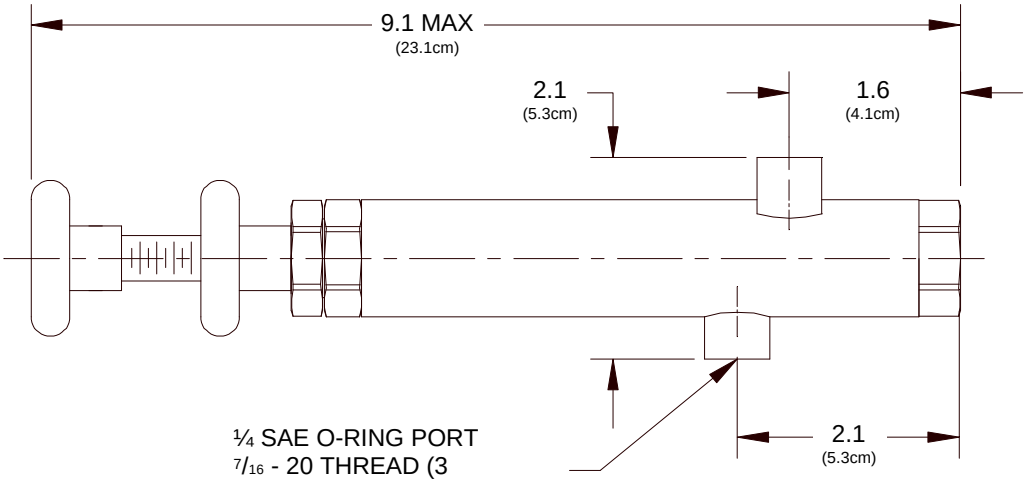
PART NO. 2115-A
2 PORT COMPENSATOR
REMOTE CONTROL
SEAL KIT SK-2115



PART NO. 2115
2 PORT COMPENSATOR
MANUAL CONTROL
SEAL KIT SK-2115

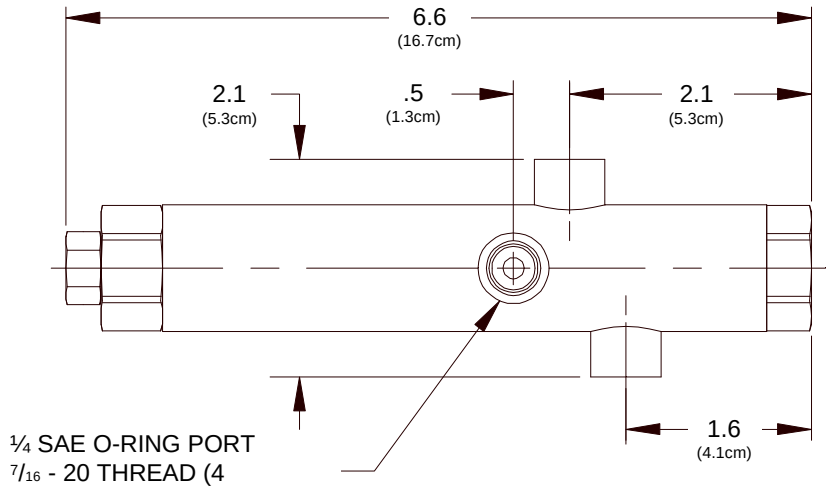


PART NO. 2115-C
2 PORT COMPENSATOR
PANEL MOUNT CONTROL
SEAL KIT SK-2115

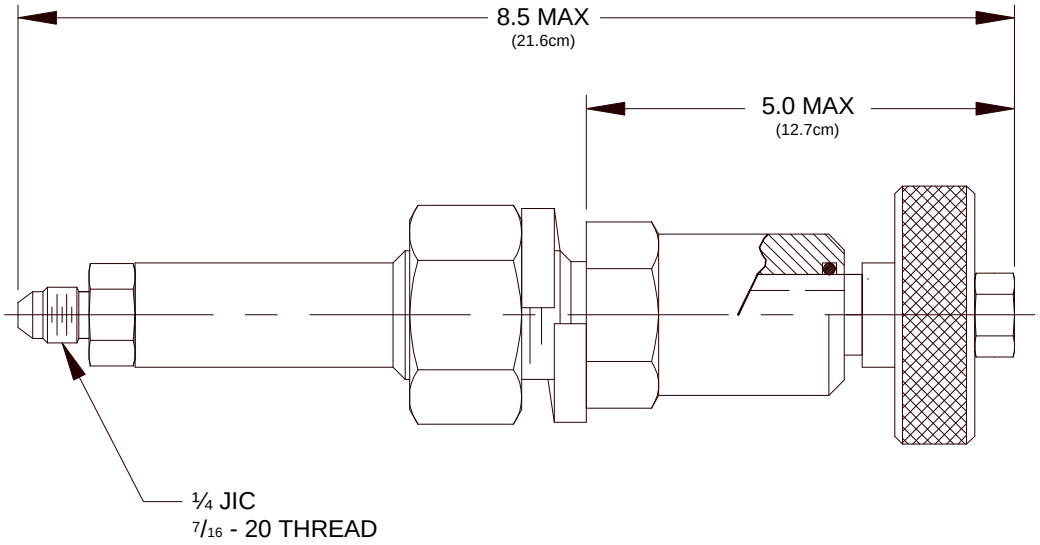


TORQUE CONTROL COMPONENTS

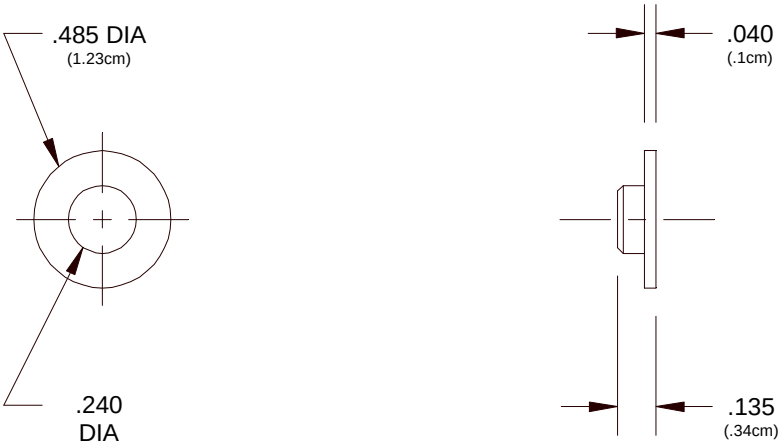
PART NO. 2116-D
3 PORT COMPENSATOR
SLAVE CONTROL
SEAL KIT SK-2116



PART NO. 2106
PRESSURE CONTROL
REMOTE CONTROL
SEAL KIT SK-2106

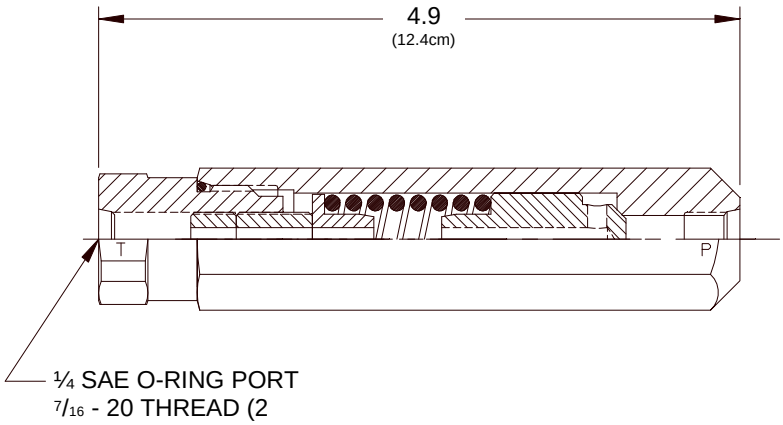


PART NO. 71101
INTERNAL PORT PLUG

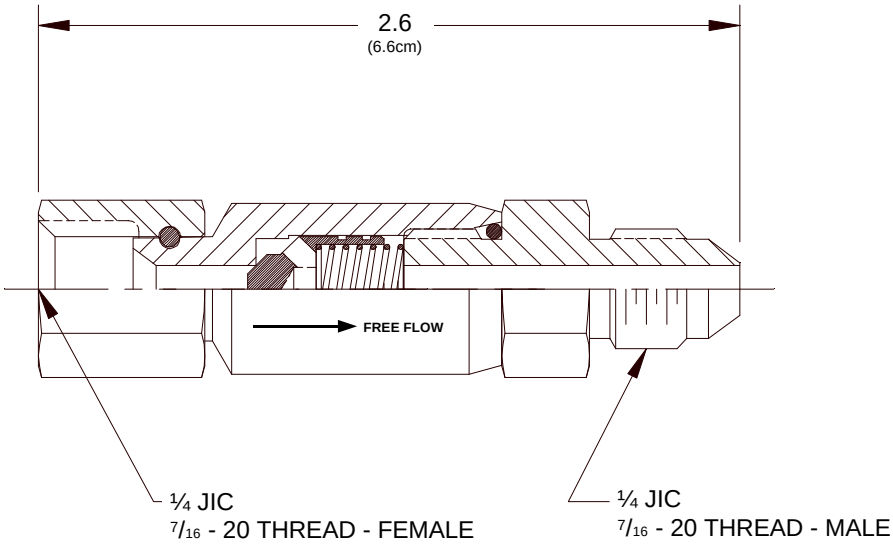


TORQUE CONTROL COMPONENTS

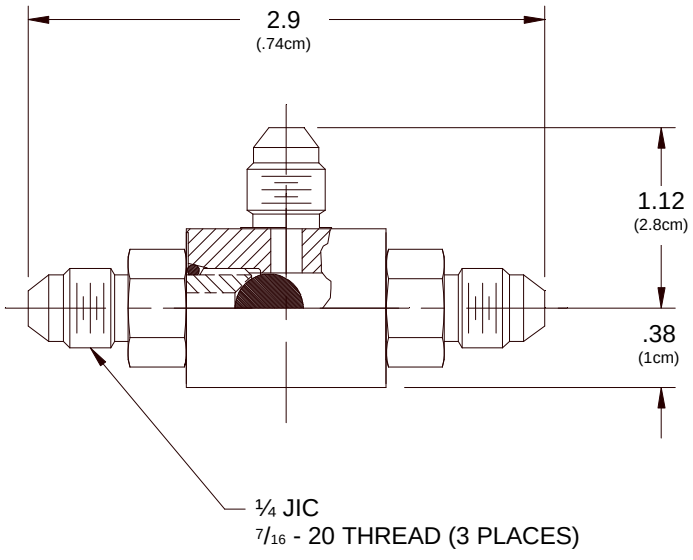
PART NO. 2118
RELIEF VALVE
SEAL KIT SK-2118

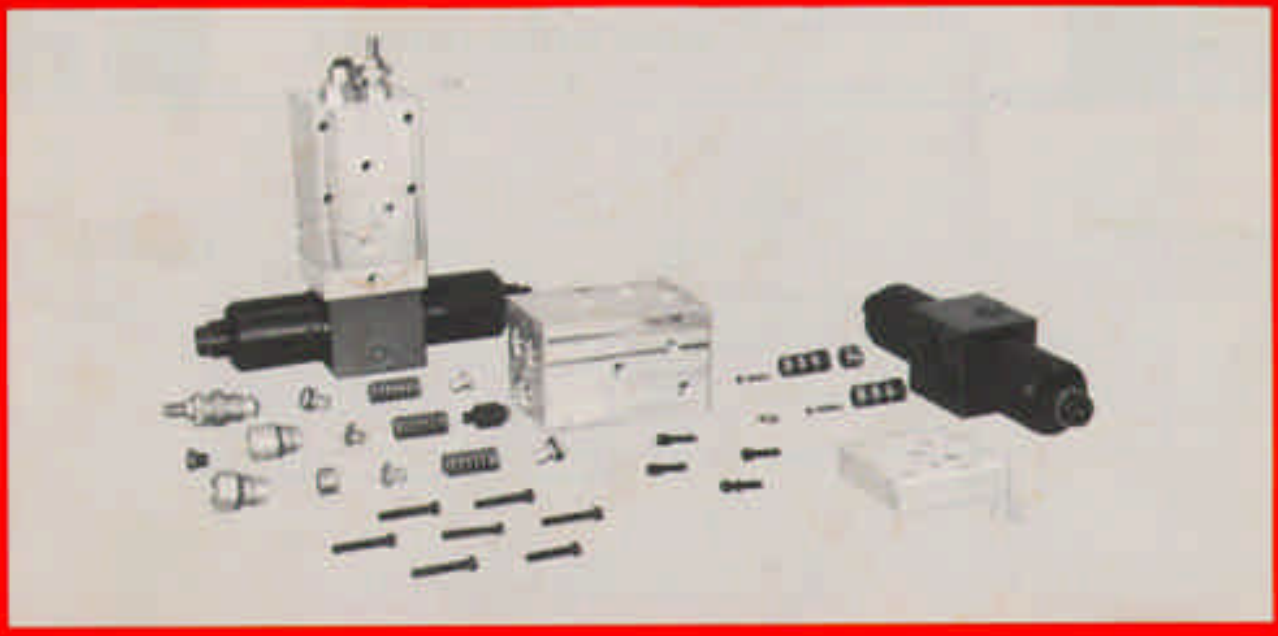


PART NO. 2104
CHECK VALVE
SEAL KIT SK-2104



PART NO. 2114
SHUTTLE VALVE
SEAL KIT SK-2114





HC-100

HC-102

HC-103

HYDRAULICS Inc.

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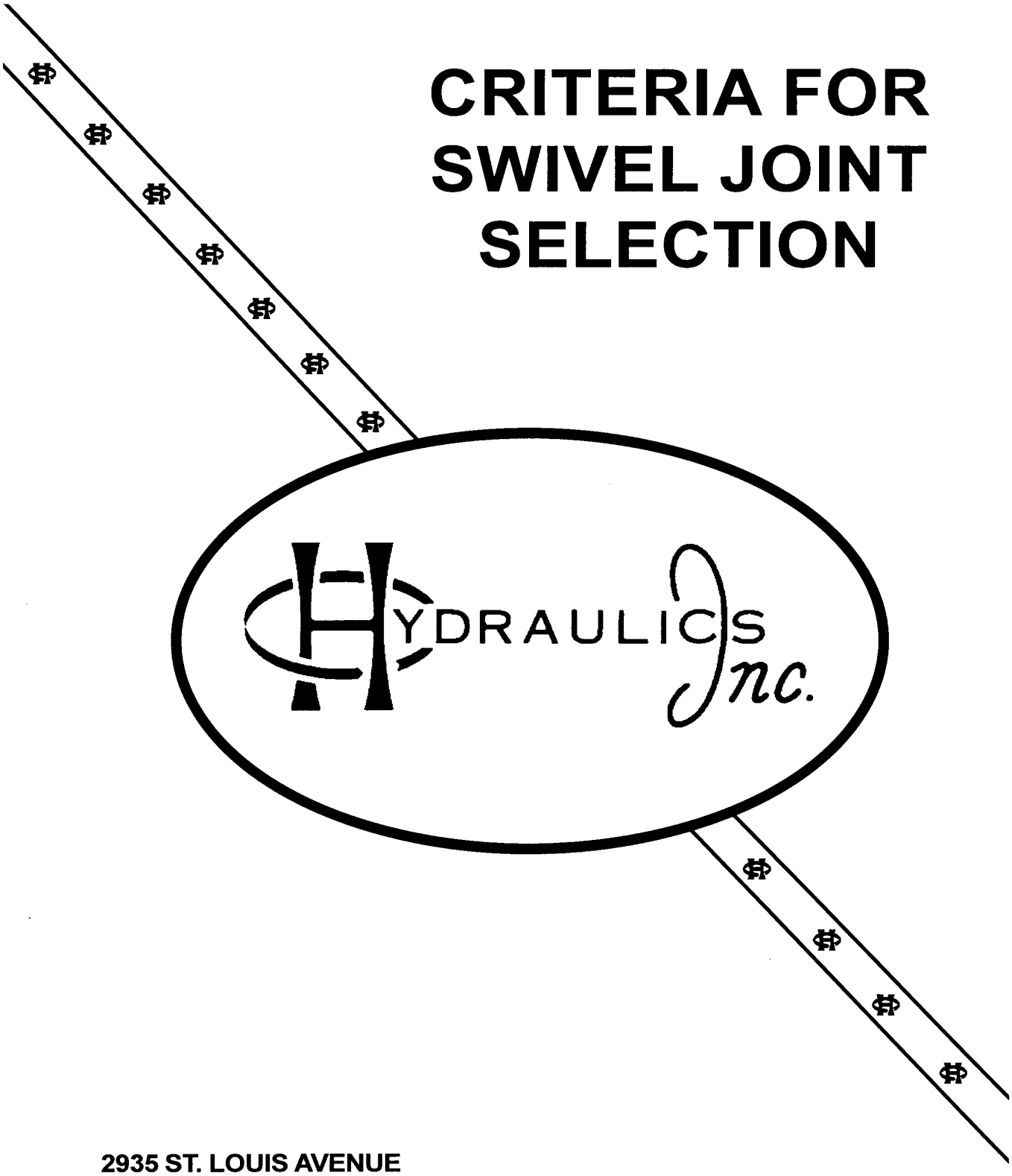
CONTACT OUR FORT WORTH OFFICE FOR ADDITIONAL PRODUCT INFORMATION • SWIVELS, COUPLINGS, AND CONTROLS FOR HYDRAULIC SYSTEMS • ASK FOR THE NEAREST REPRESENTATIVE.

PRINTED IN USA 5/91

CATALOG HC-104-A

CRITERIA FOR SWIVEL JOINT SELECTION



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CRITERIA FOR SWIVEL JOINT SELECTION

Advantages of using Hydraulics Inc. Swivel Joints

Swivel joints needs in fluid powered equipment usually arise because stress is being imparted to flex hose by cyclic movement between system components. Fluid power swivel joint applications are rarely identical due to fluid types, pressure, flow volume, temperature, and due to the endless variety of piping needs. With all these application differences, the system planner's selection criteria for the most correct type and kind of swivel to fill the need, is best served through an extensive line of swivel products.

Simplified System Plumbing

- Swivels connect directly to hose lines and can eliminate adapters.
- Less hose is needed, thus less space is needed.
- Tubing can often be eliminated because swivels offer fluid port rotation on a variety of plains relative to other piping components.

Longer Hose Life

- Hose life is extended by swivel action that eliminates effects of torque and bending stress on hose as created by cyclic movement between fluid system components.

Saves Money

- Simplified plumbing reduces system cost.
- Longer hose life.
- Less down time
- Increased reliability.

Selecting The Most Correct Type and Kind of Swivel Joint

"Because applications are different" and because fluid power swivels is our business, the focus is on continuous advancement of the swivel product lines. This endless goal is supported by technology, manufacturing, and market know how. The desire is to sustain a broad line of products and a high level of service in providing the "most correct type and kind of swivel for the need".

Selection Criteria:

Pressure

The pressure rating for a selected swivel must be equal or greater than the system maximum pressure to which applied. This includes peak or surge pressure, the momentary high pressure encountered in a system that would otherwise shorten swivel life.

Swivel Fluid Port Pressure Rating

There are several swivel fluid port connection options and there are differences in the pressure ratings for these connections. Consider also, that tube and hose female unions for several of these connections have pressure ratings below their male ports. Accordingly, to define a swivel with fluid ports that will qualify for a system's pressure, it is strongly suggested that associated female hose connections and tube connections also be qualified in order to support port compliance.

Temperature Range

Both fluid and ambient temperatures are important in swivel selection. The fluid temperature rating is determined by the swivel's seals. If the fluid temperature exceeds the seal temperature rating, the seals will deteriorate and the swivel will leak. Transient temperatures also have potential for damaging seals, especially during system shut down. High temperatures can precipitate swivel housing corrosion by damaging protective plating.

Fluid Compatibility

Swivel selection must assure body and seal materials are compatible with the system's fluid media. Seal materials other than standard may be required.

Side Loading

Swivel bearings can be subjected to stress from angular deflection in piping systems. Swivel life is predominantly dependent on bearing life. Care should be taken to arrange system plumbing to maximize swivel life. Selection of swivel type and kind, as explained herein, is important to application adaptability. The goal is to permit unrestricted freedom of swivel rotation.

CRITERIA FOR SWIVEL JOINT SELECTION

Selection Criteria: (continued)

Rotation Torque

As fluid system pressure increases, so does swivel rotation torque drag. Torque values are presented in swivel catalogs. Rarely is torque drag an application problem in that fluid pressure also increases rigidity of attached flex hose in a manner to counteract torque drag.

Rate of Rotation

Swivel seal and bearing life is relative to the factors of angular deflection, fluid pressure, temperature, and speed of rotation. The slower the rotation, the longer the seals and bearings survive. Given the potential for extremes in any one factor, applications should probably be qualified by prototype or laboratory tests.

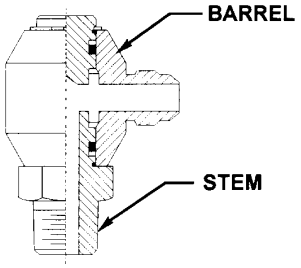
Pressure Drop

Pressure drop, or differential pressure, is the loss of pressure between any two points in a fluid system or component. Measured as a loss in pounds per square inch, it is the resistance to flow of fluid through a swivel. The swivels are designed to be flow efficient and respective values are pre sented in swivel catalogs.

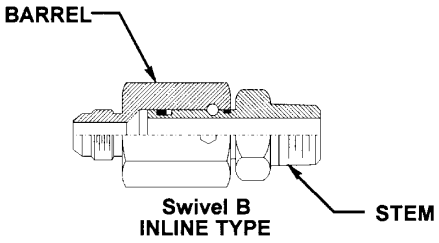
Corrosion Resistance

Standard swivels receive an exterior coating of zinc, with an overlay of yellow dichromate seal. Both the fluid media, and the fluid system operating environment, should be considered for compatibility of carbon steel products. If corrosion is an issue, then alternate swivel materials should be considered.

How to Distinguish Types of Swivel Joints



Swivel A
90° TYPE



Swivel B
INLINE TYPE

The two types of swivel joints discussed here are distinguished by their load bearing mechanisms. Both types require at least two components, commonly referred to as the stem and the barrel.

The first type swivel (Swivel A), is comprised of a barrel fluid port positioned to rotate on a plane 90° to the stem axis. This swivel includes two load bearing mechanisms classed as journal bearings. The swivel's barrel bore includes two load bearing lands separated by a fluid passage. The stem's outer diameter includes bearing lands, complementing the barrel and with space to allow the stem fluid passage to communicate fluid to the barrel port. The two stem bearing lands further include equal size seals for containing the fluid. By nature of equal seal size, the effect of fluid pressure on the stem and barrel creates no load on the bearings. This desirable feature leaves bearing life relative to stress from angular deflection induced through the piping system.

The second type swivel (Swivel B), is distinguished by opposed barrel and stem fluid ports on a common axis. This in-line port relation depends on a single load bearing mechanism, classed as a combination radial-thrust bearing. The swivel's barrel bore provides an axial ball bearing raceway that is distanced from the barrel's seal gland area. The swivel's stem provides an axial ball raceway and a seal groove to coincide with the barrel bore. In assembly, the balls retain the barrel to the stem while permitting axial rotation between the two components. These features require the bearing to withstand both thrust and stress from angular deflection of piping. With absence of deflection, bearing life is related to thrust from fluid pressure.

See back cover for applications

WHY SO MANY TYPE SWIVELS?
BECAUSE APPLICATIONS ARE DIFFERENT!