

HYDRO-LINE TSaver Cylinders

Pneumatic and Medium Pressure Hydraulic

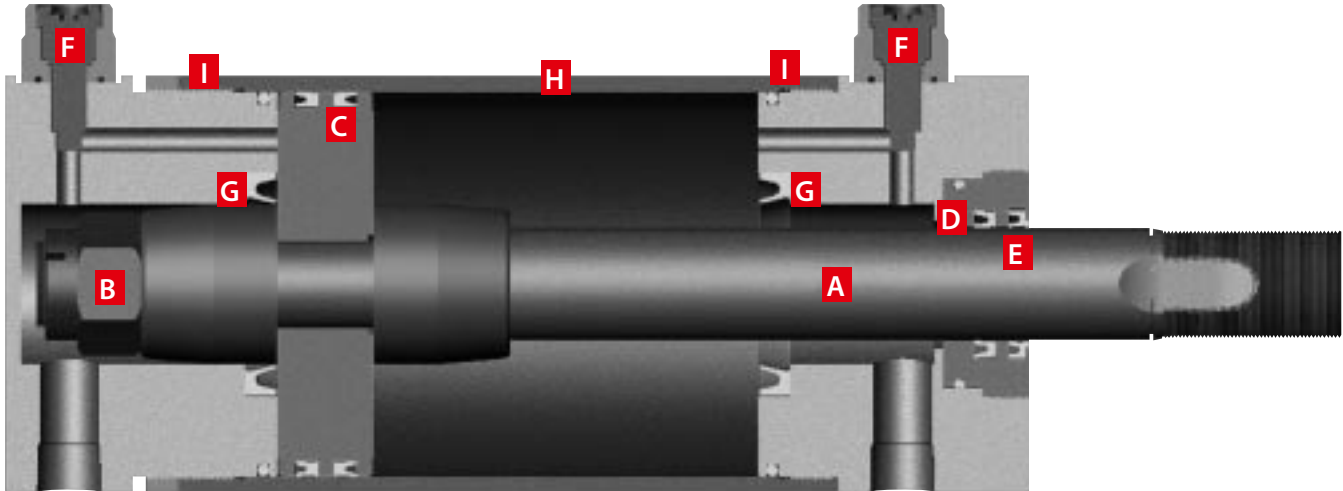


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TS/HTS Design Features



A High Yield Piston Rod

- Piston rod is machined from high yield, turned, ground and polished C-1045/50 microalloy steel.
- Piston rods are hard chrome plated a minimum of .001" diametrically to insure superior cylinder operation and life.

B Secured Piston

- Ductile iron piston is secured to the piston rod with a torqued self-locking nut.

C Nitrile Lip Type Piston Seals

- Nitrile lip type piston seals are pressure energized and are standard on all TS/HTS cylinders.
- Cast iron rings are available as an option.

D Rod Seal

- Pressure energized nitrile lip type rod seal, and its supportive back-up, provides exceptional rod sealing performance, whether used on air or medium pressure hydraulics.
- SAE 660 bronze rod bearing is easily removed for access to rod seals without disassembling cylinder.

E Rod Wiper

- High durometer double lip urethane material has four times the abrasion resistance of more conventional rod wiper materials.
- Unique snap-in type design provides an excellent wiping lip, plus a secondary sealing lip in one component.

F Cushion Adjustments

- Adjustments are easily made externally with a standard Hex wrench.

G Flexible Cushion Seals

- Flexible, elastomeric lip seals are used on the TS series.
- Floating metallic design is used on the HTS series.
- Both designs provide excellent cushioning and immediate response on return stroke.

H High Yield Steel Tubing

- Produced to exceed ASTM 513 specifications.
- Hydraulically straightened before honing.
- I.D. is hard chrome plated a minimum of .001" diametrically.
- This combination of superior base material and processing increases cylinder life.

I Threaded Body & Heads

- Threaded body and heads eliminate the need for tie rods.
- Saves the space typically consumed by tie rods.

Specifications

Bore Sizes:	1" through 8"
Pressure Ratings:	TS – 200 psi Nominal Air Service HTS – 1,000 psi Nominal Hydraulic Service

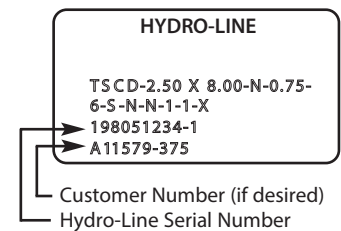
How to Order a TS/HTS Cylinder

Hydro-Line standard cylinders can be completely and accurately identified with a model number that encodes construction specifications. To develop the model number for ordering a cylinder, see the following example:

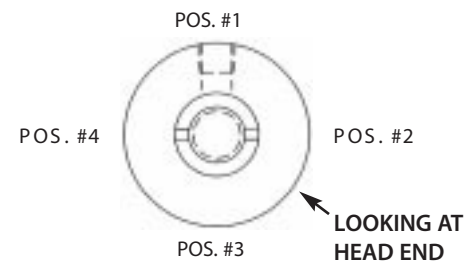
Feature	Description	Symbol
Rod Diameter	Specify in inches (2 position decimal)	0.50
		0.75
		1.00
		1.25
		1.50
		1.75
		2.25
Cushions	Non-cushioned	N
	Cushioned both ends	B
	Cushioned Head end	H
	Cushioned Cap end	C
Stroke	Specify in inches (2 position decimal)	-
Bore	Specify in inches (2 position decimal)	1.00
		1.50
		2.00
		2.50
		3.00
		4.00
		5.00
		6.00
		8.00
Double Rod	Include ONLY for double-rod cylinder	D
Mounting Style	Side Mount	EE
	Head Square Mount	GG
	Clevis Mount	CF
	Cap Square Mount	PP
	Intermediate Fixed Trunnion Mount	IT
	Tapped Head Mount	FM
	Threaded Head Mount	TH
	Special Mount	X
Model Series	Air	TS
	Hydraulic Medium Pressure	HTS
Rod End Style	Male, full	6
	Female	4
	Modified	M
Ports	BSP/G	G
	NPT	N
	SAE	S
	Special	X
Rod Seals	Nitrile Lip Type	N
	Viton Lip Type	V
	Special	X
Piston Seals	Nitrile Lip Type	N
	Viton Lip Type	V
	Cast iron rings	R
	Special	X
Port Locations	Head end position	1-4
	Cap end position	1-5
Special	Include ONLY if special modifications are required	X

HOW TO ORDER

1. Quantity
2. Model number
3. Special modifications (if required)
4. Required ship date



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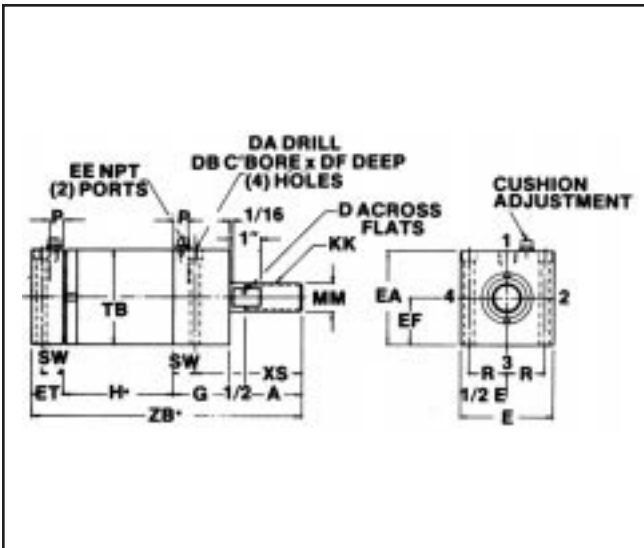
Port & Cushion Locations

Port location 5 is on the center of the back face of the end cap.

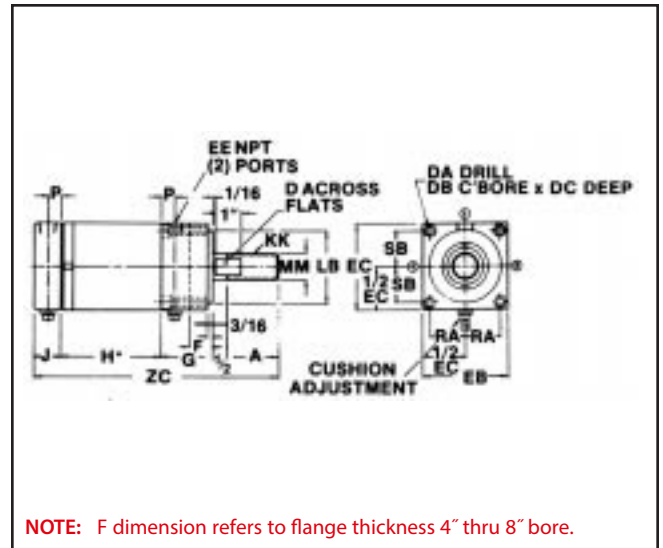
Normal cushion adjustment (mounting permitting) is opposite the port position. (Ref. pages 4 and 5.)

TS/HTS Series Mounting Dimensions

1" - 8" bore cylinders

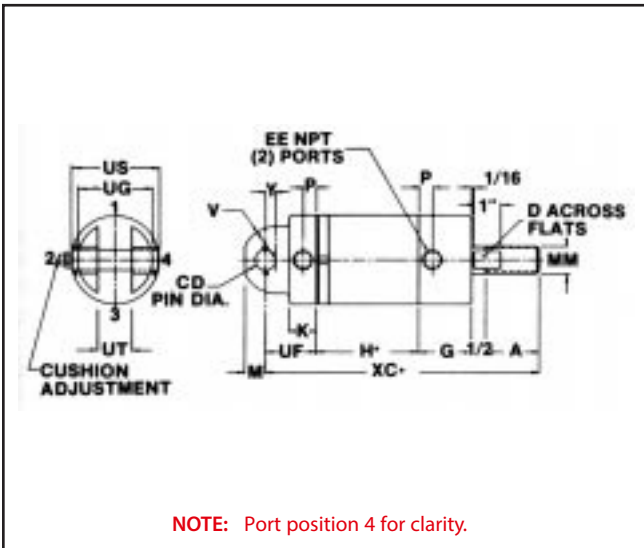


TSEE - Side Mount



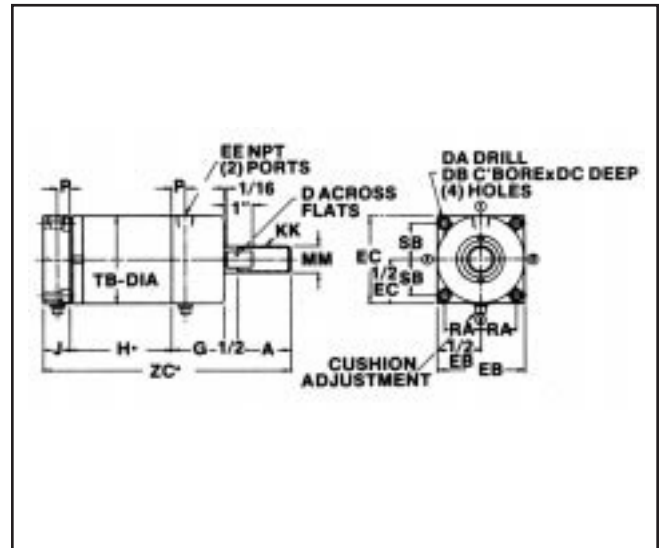
NOTE: F dimension refers to flange thickness 4" thru 8" bore.

TSGG - Head Square Mount

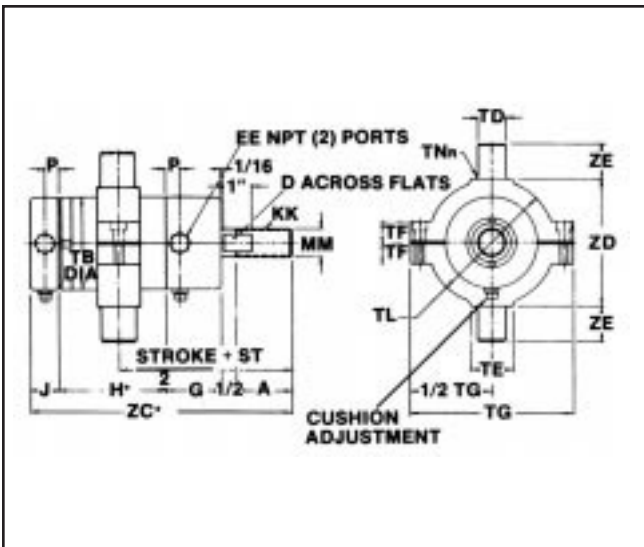


NOTE: Port position 4 for clarity.

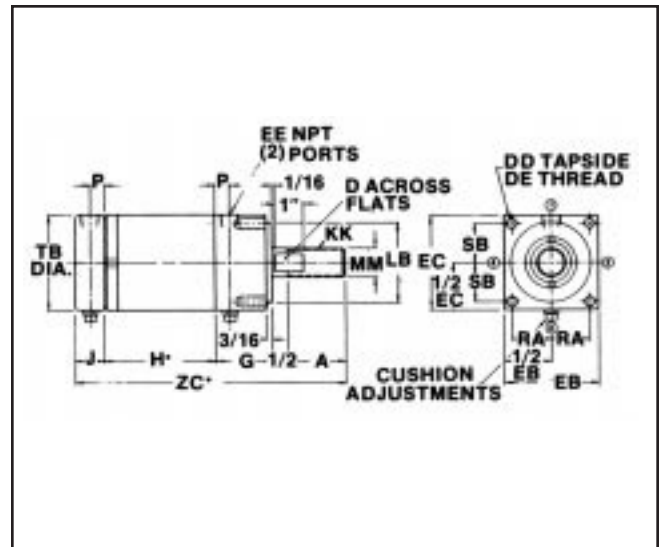
TSCF - Clevis Mount



TSPP - Cap Square Mount



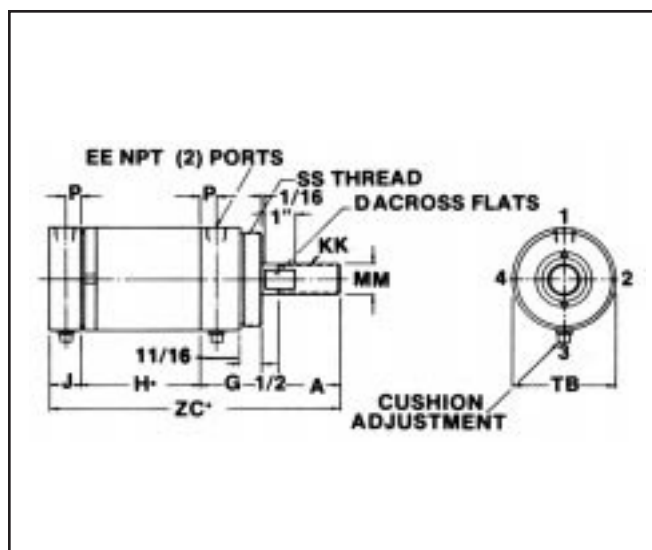
TSIT - Intermediate Fixed Trunnion Mount



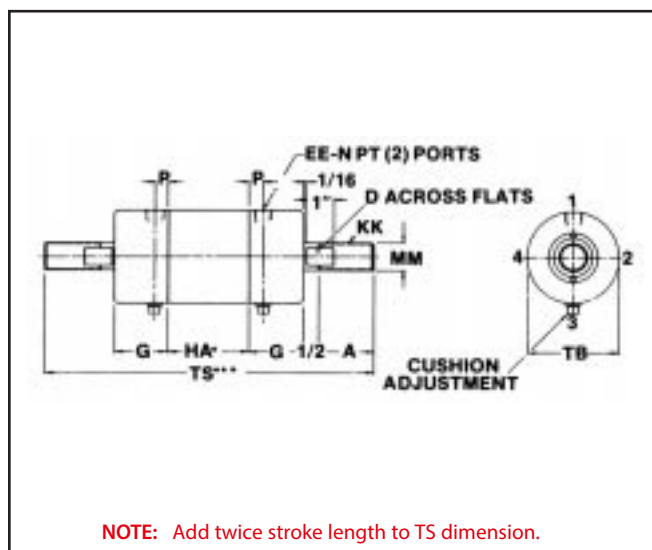
TSFM - Tapped Head Mount

All Mountings

Cylinder Dimensions



TSTH – Threaded Head Mount



NOTE: Add twice stroke length to TS dimension.

TSD – Double Rod

NOTE: Mounting Styles are NOT NFPA Interchangeable.

BORE	1	1 1/2	2	2 1/2	3	4	5	6	8
A	1	1	1 1/2	1 1/2	2	2 1/2	2 1/2	3	3 1/2
CD	5/16	3/8	1/2	1/2	3/4	3/4	1	1 1/4	1 1/2
D	7/16	7/16	5/8	5/8	7/8	1 1/16	1 1/16	1 5/16	1 1/2
DA	7/32	9/32	11/32	11/32	11/32	13/32	17/32	17/32	25/32
DB	11/32	13/32	1/2	1/2	1/2	19/32	25/32	25/32	1 3/16
DC	3/16	1/4	5/16	5/16	5/16	11/32	15/32	15/32	11/16
DD	1/4-28	5/16-24	3/8-24	3/8-24	3/8-24	1/2-20	5/8-18	5/8-18	7/8-14
DE	5/8	3/4	7/8	7/8	7/8	1	1 1/4	1 1/4	1 1/2
DF	3/16	1/4	5/16	5/16	5/16	4	5	5 5/8	7 3/4
E	1 1/4	1 3/4	2 1/4	2 3/4	3 1/4	4 1/2	5 1/2	6 1/2	8 1/2
EA	1 1/4	1 3/4	2 1/4	2 3/4	3 1/4	4 5/8	5 5/8	6 5/8	8 5/8
EB	1 1/4	1 3/4	2 1/2	3	3 1/4	4 1/2	5 11/16	6 11/16	8 11/16
EC	2	2 1/2	2 1/2	3	3 3/4	4 1/2	5 11/16	6 11/16	8 11/16
EE (NPT)	1/8	1/4	1/4	3/8	3/8	1/2	1/2	3/4	3/4
EF	2 1/32	29/32	1 5/32	1 13/32	1 21/32	2 9/32	2 25/32	3 9/32	4 9/32
ET	5/8	15/16	1 1/16	1 1/16	1 1/16	1 1/4	1 1/4	1 1/2	1 1/2
F*	—	—	—	—	—	1	1 1/4	1 1/4	1 1/2
G	1 7/16	1 1/2	1 3/4	1 15/16	1 15/16	2 1/4	2 1/4	2 11/16	2 13/16
H	2 15/16	3 3/16	3 9/16	3 9/16	3 11/16	4 1/2	4 1/2	4 1/2	5 1/16
HA	2 5/8	2 7/8	3 1/4	3 1/4	3 3/4	4 1/32	4 1/32	4 1/32	4 19/32
J	5/8	3/4	1 1/16	1 1/16	1	1 1/4	1 1/4	1 1/2	1 1/2
K	5/8	3/4	1 1/16	1 1/16	1	1 5/16	1 13/32	1 5/8	1 5/8
KK	1/2-20	1/2-20	3/4-16	3/4-16	1-14	1 1/4-12	1 1/4-12	1 1/2-12	1 3/4-10
L	—	—	—	—	—	1 1/2	1 1/2	1 3/4	2
LB	1.219	1.625	2.000	2.375	2.750	4.125	4.875	5.750	7.375
M	5/16	7/16	1/2	1/2	3/4	3/4	1	1 1/4	1 1/2
MM	1/2	1/2	3/4	3/4	1	1 1/4	1 1/4	1 1/2	1 3/4
P	5/16	3/8	3/8	1/2	1/2	5/8	5/8	3/4	3/4
R	29/64	43/64	55/64	1 1/16	1 5/16	1 7/8	2 1/4	2 3/4	3 1/2
RA	3/8	19/32	31/32	1 5/32	1 11/32	1 27/32	2 1/4	2 5/8	3 1/16
SB	3/4	31/32	31/32	1 5/32	1 11/32	1 27/32	2 1/4	2 5/8	3 1/16
SS	1 1/4-24	1 1/2-16	2-16	2 1/2-16	3-16	—	—	—	—
ST	4 1/4	4 7/16	5 3/8	5 9/16	6 1/8	7 1/4	7 1/4	8 3/16	9 3/32
SW	5/16	11/16	3/4	3/4	3/4	7/8	3/4	1	1 15/16
TB	1 1/4	1 3/4	2 1/4	2 3/4	3 1/4	4 1/2	5 1/2	6 1/2	8 1/2
TD	1/2	5/8	7/8	1	1 1/4	1 1/2	1 3/4	2	2 3/4
TE	11/16	7/8	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/4	3
TF	1/2	1/2	5/8	3/4	3/4	1	1	1	1 1/2
TG	2 7/8	3 5/8	4 1/2	5 1/8	5 3/4	7 7/8	9 7/8	9 7/8	13 1/4
TL	2	2 3/4	3 3/8	3 3/8	4 1/2	6 1/4	7 1/4	8 1/2	11 1/2
TN	1/32	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
TS*	8 1/2	8 7/8	10 3/4	11 1/8	12 1/4	14 11/32	14 11/32	16 13/32	18 7/32
UF	1 1/16	1 5/16	1 11/16	1 15/16	1 7/8	2 1/4	2 1/2	3	3 1/4
UG	1 1/4	1 5/8	1 7/8	2 1/4	2 3/4	3 1/4	3 1/2	4 3/4	6
US†	1 5/8	2	2 1/4	2 5/8	3 3/16	3 15/16	4 1/4	5 1/2	6 3/4
UT	1/2	3/4	3/4	1	1 1/4	1 1/2	1 1/2	2	2 1/2
V	9/16	23/32	7/8	1	1 1/32	1 5/8	1 1/16	1 5/16	1 5/8
XC	6 15/16	7 1/2	9	9 5/16	10	12	12 1/4	13 11/16	15 1/8
XS	2 5/8	2 5/16	3	3 3/16	3 11/16	4 7/8	4 1/2	5 1/16	5 7/8
Y	7/32	1/4	5/16	3/8	3/8	3/4	—	—	—
ZB	6 1/2	7 1/8	8 3/8	8 9/16	9 3/16	11	11	12 3/16	13 3/8
ZC	6 1/2	6 15/16	8 3/8	8 9/16	9 1/8	11	11	12 3/16	13 3/8
ZD	2	2 3/4	3 3/8	3 3/8	4 1/2	6 1/4	7 3/4	9 1/4	12
ZE	7/16	5/8	3/4	1	1 1/4	1 3/8	1 1/2	1 3/4	2 1/8

Dimensions shown in red are mounting dimensions.

★ Add stroke to all starred dimensions.

† Clevis pin length.

NOTE: Overall length dimensions that require addition of stroke may vary from dimensions shown, due to manufacturing tolerances.

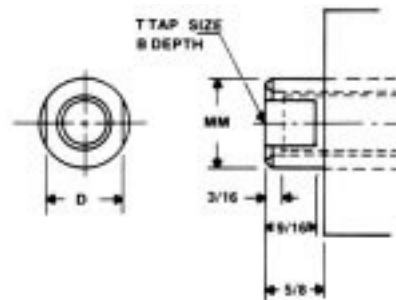
TS/HTS Series Rod End Selection

All Dimensions in inches

Cylinder Bore	Standard Rod	Alternate Rod Dia.
1	1/2	N/A
1 1/2	1/2	N/A
2	3/4	1*
2 1/2	3/4	1
3	1	1 1/4
4	1 1/4	1 1/2
5	1 1/4	1 1/2
6	1 1/2	1 3/4
8	1 3/4	2 1/4

*2 Bore with 1" Rod Offered Cushioned Head End Only

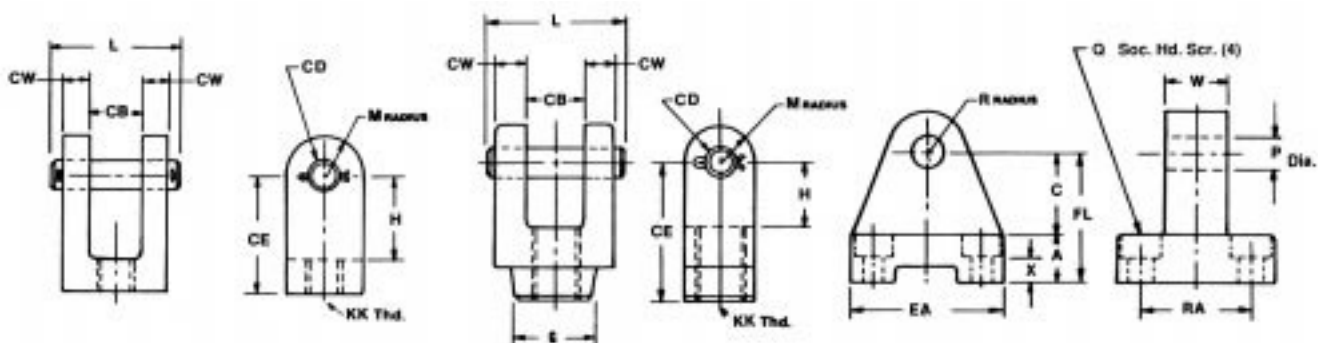
ALTERNATE STYLE #4



MM (ROD DIAMETER)	D	T	B
1/2	7/16	3/8 -24	1
3/4	5/8	1/2 -20	1 1/2
1	3/8	5/8 -18	1 1/2
1 1/4	1 1/16	3/4 -16	1 1/2
1 1/2	1 5/16	1 -14	1 1/2
1 3/4	1 1/2	1 1/4 -12	2

TS/HTS Series Mounting Accessories

All Dimensions in inches



ROD CLEVIS
(for bore sizes 1 thru 1 1/2)

ROD CLEVIS
(for bore sizes 2 thru 8)

MOUNTING BRACKET
(for clevis mount cylinders)

PART NUMBERS		BORE SIZE	ROD SIZE	A	C	CB	CD	CE	CW	EA	FL	G	H	KK Thd.	L	M	P	Q	R	RA	W	X
Mtg. Brk.	Rod Clevis																					
TS-125	TS-126	1	1/2	7/16	11/16	17/32	5/16	1 1/2	1/4	1 1/4	1 1/8	13/16	3/4	1/2 -20	1 7/16	11/32	11/32	#10	3/8	7/8	1/2	1/4
TS-1525	TS-1526	1 1/2	1/2	1/2	15/16	25/32	3/8	1 1/2	5/16	1 3/4	1 7/16	13/16	3/4	1/2 -20	1 13/16	7/16	13/32	1/4	7/16	1 1/4	1/2	1/4
TS-225	TS-226	2	3/4	1/2	1 1/16	3/4	1/2	2 1/8	1/2	2 1/4	1 9/16	1 1/4	1	3/4 -16	2 1/4	9/16	17/32	5/16	1/2	1 5/8	3/4	5/16
TS-2525	TS-2526	2 1/2	3/4	1/2	1 1/16	1 1/32	1/2	2 1/8	1/2	2 1/4	1 9/16	1 3/8	1	3/4 -16	2 5/8	5/8	17/32	5/16	1/2	1 5/8	1	5/16
TS-325	TS-326	3	1	11/16	1 9/16	1 9/32	3/4	2 3/4	1/2	3 1/4	2 1/4	1 5/8	1 1/4	1 -14	3	7/8	25/32	3/8	3/4	2 3/8	1 1/4	3/8
TS-425	TS-426	4	1 1/4	11/16	1 9/16	1 17/32	3/4	3 1/2	13/16	3 1/4	2 1/4	2	1 5/8	1 1/4 -12	3 5/8	15/16	25/32	3/8	3/4	2 3/8	1 1/2	3/8
TS-525	TS-526	5	1 1/4	3/4	1 3/4	1 17/32	1	3 3/4	7/8	4	2 1/2	2 1/4	1 7/8	1 1/4 -12	4	1 1/8	1 1/32	1/2	1	2 7/8	1 1/2	1/2
TS-625	TS-626	6	1 1/2	13/16	2 3/16	2 1/32	1 1/4	4 3/8	1 1/16	5	3	2 5/8	2 1/8	1 1/2 -12	4 7/8	1 3/8	1 9/32	9/16	1 1/4	3 5/8	2	9/16
TS-825	TS-826	8	1 3/4	15/16	2 11/16	2 17/32	1 1/2	5	1 1/8	6	3 5/8	3	2 3/8	1 3/4 -10	5 9/16	1 5/8	1 17/32	3/4	1 1/2	4 3/8	2 1/2	3/4
-	TS-826 AL	8	2 1/4	-	-	2 17/32	1 1/2	5 3/4	1 1/8	-	-	3 1/2	2 3/8	2 1/4 -8	5 9/16	1 5/8	-	-	-	-	-	-

TS/HTS Series Seal Kits

BORE	ROD DIA.	SEAL KIT	
		ROD SEAL KIT	PISTON SEAL KIT
1 1/2	1/2	TS92050875HAC	SS01533USK
2	3/4	TS92075125HAC	SS02033USK
	1	TS92100150HAC	SS02033USK
2 1/2	3/4	TS92075125HAC	SS02533USK
	1	TS92100150HAC	SS02533USK
3	1	TS92100150HAC	SS03033USK
	1 1/4	TS92125175HAC	SS03033USK
4	1 1/4	TS92125175HAC	SS04033USK
	1 1/2	TS92150212HALAC	SS04033USK
5	1 1/4	TS92125175HAC	SS05033USK
	1 1/2	TS92150212HALAC	SS05033USK
6	1 1/2	TS92150212HALAC	SS06033USK
	1 3/4	TS92175237HALAC	SS06033USK
8	1 3/4	TS92175237HAC	SS08033USK
	2 1/4	TS92225287HALAC	SS08033USK

NOTE: Seal material is nitrile standard. If you require viton, specify "V" at the end of the kit number.

Example: 1.5 - 1/2 = TS92050875HAC V

ROD SEAL KIT INCLUDES:

- (1) ROD BEARING
- (1) ROD SEAL
- (1) ROD WIPER
- (1) ROD BEARING O-RING

TS/HTS Mounting Symbol Interchange Chart

AIR-DRO SPACE SAVER		HYDRO-LINE TSAVER		VICKERS/TJ SPACEMAKER	
Mount Name	Symbol	Mount Name	Symbol	Mount Name	Symbol
Foot	A	Side	EE	Front	0
Front Flange	B	Head Square	GG	Rod End Flange	07
Clevis	C	Clevis	CF	Clevis	10
Rear Flange	D	Cap Square	PP	Blind End Flang	12
Center Trunnion	E	Intermediate Fixed Trunnion	IT	Intermediate Trunnion	15
Tapped Front Flange	F	Tapped Head	FM	Rod End Tapped Flang	18
Threaded Head	G	Threaded Head	TH	Rod End Threaded Hea	20

ONE YEAR LIMITED WARRANTY

One Year Normal Use

Hydro-Line Products are warranted for a period of one year from date of shipment from our plant to be free from defects in workmanship and material under correct use, normal operating conditions and proper applications. This warranty does not extend to goods damaged, or subjected to accident, abuse, or misuse after shipment from our factory, nor to goods altered or repaired by anyone other than authorized Hydro-Line representatives.

Disclaimers

This one year limited warranty is the only warranty extended by Hydro-Line in connection with any sale by Hydro-Line. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, notwithstanding disclosure to Hydro-Line of the product's intended use. An affirmation of fact or promise made on behalf of Hydro-Line shall not be deemed to create an expressed warranty that the goods shall conform to the affirmation of promise; any description of the goods is for the sole purpose of identifying them and shall not be deemed to create an expressed warranty that the goods shall conform to such description; any sample or model is for illustrative purposes only and shall not be deemed to create an expressed warranty that the goods shall conform to the sample or model; and no affirmation or promise, or description, or sample or model, shall be deemed part of the basis of the bargain.

Exclusive Remedy

Hydro-Line's obligation upon breach of warranty shall be limited to replacing or repairing at our option, free of charge,

but not including installation, dismantling, reassembling or any other charge, the particular product or part which inspection discloses to have been defective at time of shipment. Inspection may be at the place of installation and use, or at our plant if requested (if returned to us at our expense including lowest transportation cost). Written notice of such defect shall be given by customer to Hydro-Line within 30 days after such defect(s) appear. Written permission for any warranty claim return must be first obtained from authorized Hydro-Line representatives. All returns must be accompanied with a complete written explanation of claimed defects and the circumstances of operational failure. Replacement of cylinders or parts thereof repaired under this warranty shall be warranted under the terms of this warranty for the remainder of the term of the original warranty or for a period of six months after such repair or replacement, whichever is longer. Upon expiration of the warranty, all of Hydro-Line's obligations hereunder shall terminate.

IN NO EVENT SHALL HYDRO-LINE HAVE ANY LIABILITY FOR PAYMENT OF ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR TORT DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO, ANY LOSS OF PROFITS, TO THE EXTENT EXCLUSION IS PERMITTED BY LAW.

This warranty states our entire and exclusive liability and buyer's exclusive remedy for any claim of damages in connection with the sale or furnishing of Hydro-Line's products or parts, their design, suitability for use, installations or operation, or for any claimed defects therein. Goods not manufactured by Hydro-Line are furnished subject only to the Manufacturer's warranties, if any, and without warranties, expressed or implied, by Hydro-Line.

Products we offer:

- Cartridge valves
- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1® controllers
- PLUS+1® displays
- PLUS+1® joysticks and pedals
- PLUS+1® operator interfaces
- PLUS+1® sensors
- PLUS+1® software
- PLUS+1® software services, support and training
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electric components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the marine sector. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of applications. We help you and other customers around the world speed up system development, reduce costs and bring vehicles and vessels to market faster.

Danfoss Power Solutions – your strongest partner in mobile hydraulics and mobile electrification.

Go to www.danfoss.com for further product information.

We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Local address:

Hydro-Gear

www.hydro-gear.com

Daikin-Sauer-Danfoss

www.daikin-sauer-danfoss.com

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