

HydraForce offers standard cartridge valve housings and custom integrated circuit manifolds in aluminum, ductile iron, and steel.

ALUMINUM HOUSINGS:

Standard high tensile 6061T6 alloy housings are rated for 240 bar (3500 psi) for a minimum of one million impulse cycles. 2024 alloy can be substituted for slightly higher fatigue requirements. Standard aluminum housings have a thin, clear-coat anodized finish which enhances quality as follows:

Increased Surface Hardness: Added tensile strength of cavity threads and reduced galling which can occur when a hard steel cartridge or fitting is screwed into a relatively soft supporting aluminum thread. Also, the increased surface hardness can be effective against minor internal erosion due to high oil transit velocities. Extensive laboratory testing and FEA have found no material fatigue issues affecting the system pressure ratings of the material as a result of the anodizing process.

Improved Surface Finish: Cartridge O-rings slide more freely into harder, smooth-sealed cavity surfaces, reducing the potential for damage, rolling, etc., which sometimes occur on untreated, as-machined surfaces. Also, any subsequent paints and coatings adhere better to anodized vs. non-anodized aluminum.

More Effective Deburring and Cleaning: Where there are burrs, anodizing hardens them, making them more brittle and therefore easier to break off. This can help to speed up the deburring process. Also, the light acid dip involved in the anodizing process acts as an additional cleaning operation, removing additional cutting oils and loose contaminants.

Better Appearance: Clear-coat anodizing produces a clean, neutral color and surface appearance. Supplemental stamping or marking normally produce no degradation of appearance. Colored anodizing is available on request, although we do not recommend it because it increases inspection difficulty, and color uniformity is difficult to maintain from lot to lot.

DUCTILE IRON AND STEEL HOUSINGS:

HydraForce has converted from steel to ductile iron for most standard housings and for custom manifolds designed for pressures up to 345 bar (5000 psi). Both ductile iron and steel housings are zinc-plated for corrosion resistance and surface sealing.

HOUSINGS & ACCESSORY PRODUCTS

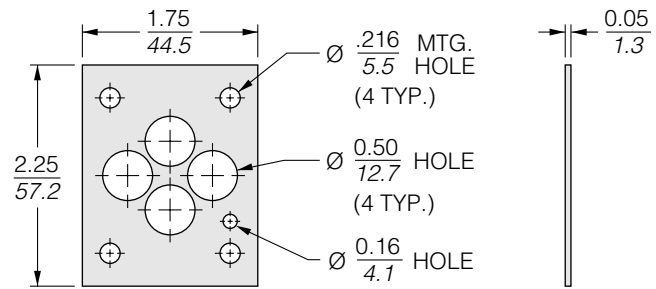
08-Size Housings	8.008.1
10-Size Housings	8.010.1
12-Size Housings	8.012.1
16-Size Housings	8.016.1
20-Size Housings	8.020.1
42-Size Housings	8.042.1
Spacer Plates for In-Line Housings	8.250.1
2-By-2 Blocks	8.300.1
CAD Library	8.400.1
Cavity Plugs	8.450.1
Orifice Discs, Installation & Sizing	8.460.1
Port Plugs, Orifice Plugs, Orifice Plates, Adapter Lock Kits, Pilot Pistons, Screen Cartridges	8.500.1
Hand Pumps	8.550.1
Cavity Form Tools	8.600.1
Seal Kits, Installation & Ordering	8.650.1

D03 (NG6) SANDWICH VALVES

Sandwich Valve Accessories

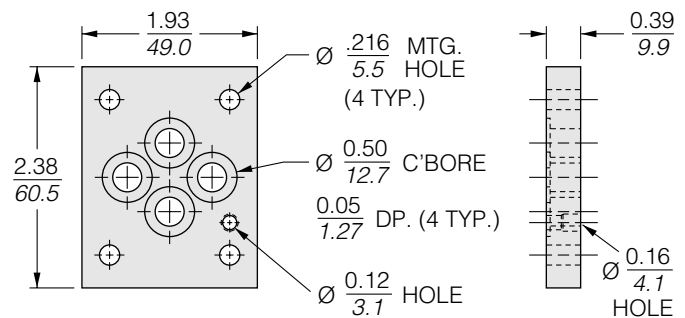
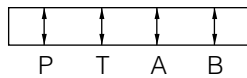
SEAL PLATE KITS

Kit Part No.	Plate Part No.	O-Ring Part No.	Qty.
6299011	7018716	6001012 (Buna)	4
6299013	7018716	6003012 (Viton)	4



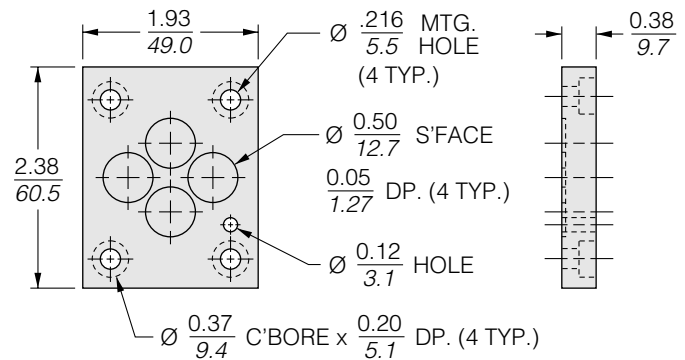
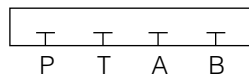
SPACER PLATE KITS

Kit Part No.	Plate Part No.	O-Ring Part No.	Qty.
6299021	7018721	6001012 (Buna)	4
6299023	7018721	6003012 (Viton)	4



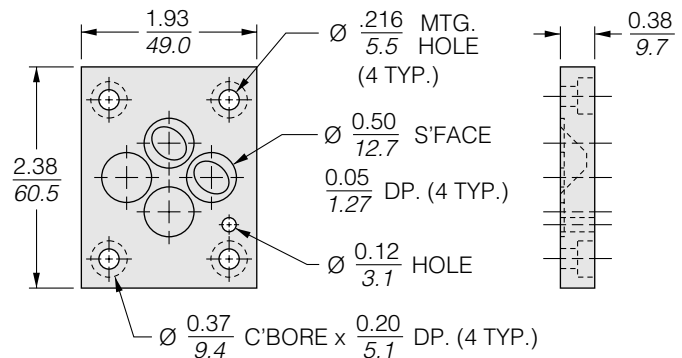
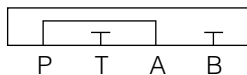
BLOCKING PLATE KITS

Kit Part No.	Plate Part No.	O-Ring Part No.	Qty.
6299031	7018731	6001012 (Buna)	4
6299033	7018731	6003012 (Viton)	4



P-A LINKING PLATE KITS

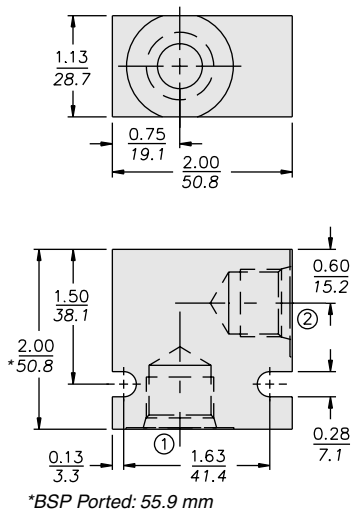
Kit Part No.	Plate Part No.	O-Ring Part No.	Qty.
6299060	7018760	6001012 (Buna)	4
6299061	7018760	6003012 (Viton)	4



HOUSINGS AND ACCESSORY PRODUCTS

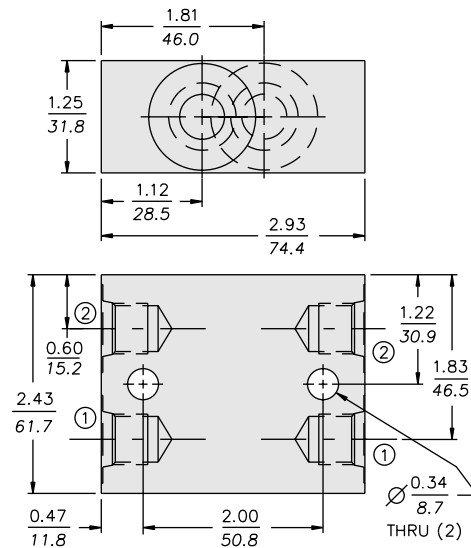
Series 08 Valve Housings

2-WAY



SAE 8 Ported Housing Illustrated

2 WAY CROSS-OVER



7070160 CRV Housing

INCH
MILLIMETRE

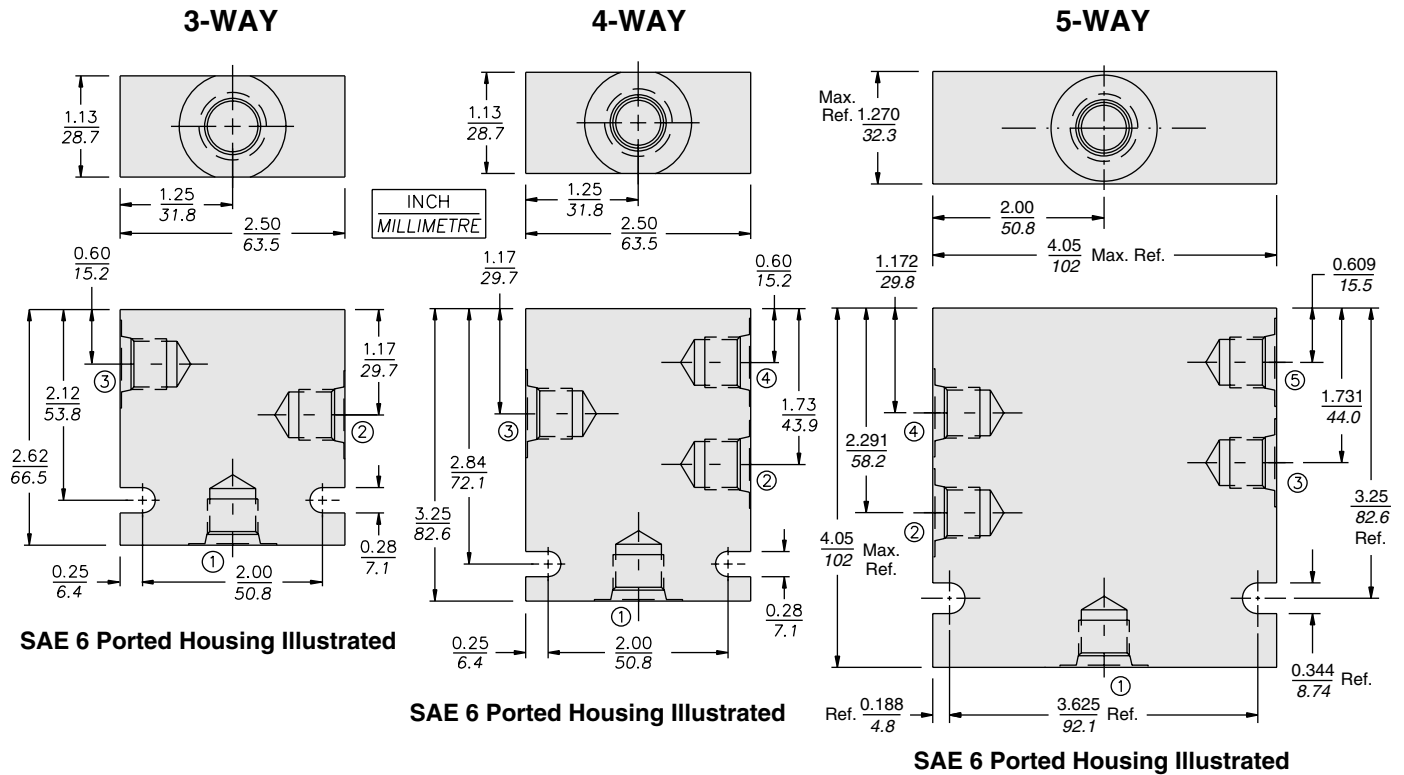
SERIES 08 2-WAY HOUSINGS					
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
4T	7024640	Alum.	SAE 4	SAE 4	U.S.
5T	7024650	Alum.	SAE 5	SAE 5	U.S.
6T	7024660	Alum.	SAE 6	SAE 6	U.S.
8T	7024680	Alum.	SAE 8	SAE 8	U.S.
2B	7028620	Alum.	1/4" BSP	1/4" BSP	U.K.
3B	7028630	Alum.	3/8" BSP	3/8" BSP	U.K.
6TD	7151010	Ductile	SAE 6	SAE 6	U.S.
8TD	7151020	Ductile	SAE 8	SAE 8	U.S.
2BD	7151040	Ductile	1/4" BSP	1/4" BSP	U.K.
3BD	7151050	Ductile	3/8" BSP	3/8" BSP	U.K.
6TS	7026660	Steel	SAE 6	SAE 6	U.S.
8TS	7026680	Steel	SAE 8	SAE 8	U.S.
2BS	7026920	Steel	1/4" BSP	1/4" BSP	U.K.
3BS	7026930	Steel	3/8" BSP	3/8" BSP	U.K.

SERIES 08 2-WAY CROSS-OVER HOUSINGS					
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
6T	7070160	Alum.	SAE 6 (2)	SAE 6 (2)	U.S.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HYDRAFORCE STANDARD VALVE HOUSINGS			
MATERIAL	OPERATING PRESSURE	PORTS	MFG. LOCATION
Aluminum, 6061 T6511, Clear Anodized	210 bar (3000 psi)	SAE	U.S.
Aluminum, 6082 TF, Gold Tint	210 bar (3000 psi)	BSP	U.K.
Ductile Iron,	350 bar (5000 psi)	SAE	U.S.
Ductile Iron,	350 bar (5000 psi)	BSP	U.K.
Steel, Low carbon	350 bar (5000 psi)	SAE	U.S.
Steel, 220 M 07, Zinc Plated	350 bar (5000 psi)	BSP	U.K.

Series 08 Valve Housings



SERIES 08 3-WAY HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
4T	7024740	Alum.	SAE 4	SAE 4	SAE 4	U.S.
6T	7024760	Alum.	SAE 6	SAE 6	SAE 6	U.S.
3B	7028730	Alum.	3/8" BSP	3/8" BSP	3/8" BSP	U.K.
6TD	7151110	Ductile	SAE 6	SAE 6	SAE 6	U.S.
6TS	7026760	Steel	SAE 6	SAE 6	SAE 6	U.S.

SERIES 08 4-WAY HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
6T	7024860	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
2B	7028820	Alum.	1/4" BSP	1/4" BSP	1/4" BSP	1/4" BSP	U.K.
3B	7028830	Alum.	3/8" BSP	3/8" BSP	3/8" BSP	3/8" BSP	U.K.
6TD	7151210	Ductile	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
6TS	7026860	Steel	SAE 6	SAE 6	SAE 6	SAE 6	U.S.

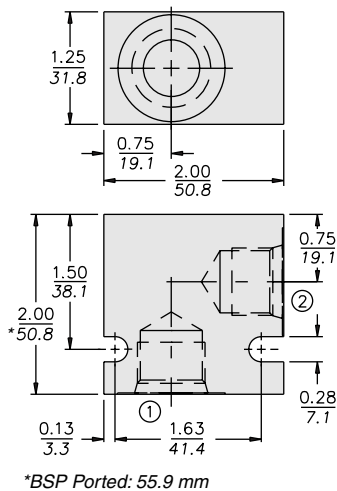
SERIES 08 5-WAY HOUSINGS								
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Mfg. Loc.
4T	7025840	Alum.	SAE 4	SAE 4	SAE 4	SAE 4	SAE 4	U.S.
6T	7025860	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	SAE 6	U.S.

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HOUSINGS AND ACCESSORY PRODUCTS

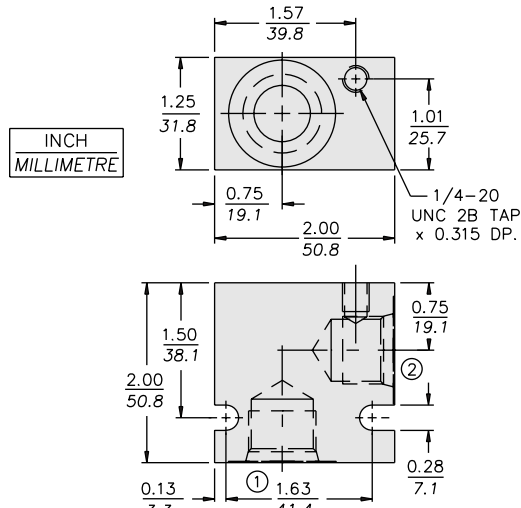
Series 10 Valve Housings

2-WAY



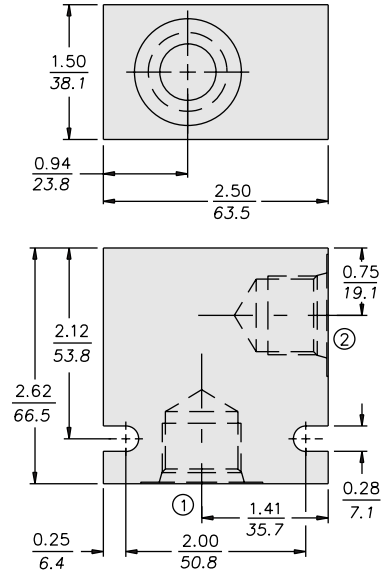
SAE 8 Ported Housing Illustrated

2-WAY MR



7026180 – MR
For Lock-Down Bracket Use

2-WAY OVERSIZED PORTS



7029240 & 7024290

SERIES 10 2-WAY HOUSINGS

Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
6T	7024260	Alum.	SAE 6	SAE 6	U.S.
8T	7024280	Alum.	SAE 8	SAE 8	U.S.
8TL	7026180	Alum.	SAE 8	SAE 8	U.S.*
2B	7028220	Alum.	1/4" BSP	1/4" BSP	U.K.
3B	7028230	Alum.	3/8" BSP	3/8" BSP	U.K.
4B	7028240	Alum.	1/2" BSP	1/2" BSP	U.K.
6TD	7151400	Ductile	SAE 6	SAE 6	U.S.
8TD	7151410	Ductile	SAE 8	SAE 8	U.S.
3BD	7151440	Ductile	3/8" BSP	3/8" BSP	U.K.
6TS	7026260	Steel	SAE 6	SAE 6	U.S.
8TS	7026280	Steel	SAE 8	SAE 8	U.S.
3BS	7028530	Steel	3/8" BSP	3/8" BSP	U.K.

*Drilled and tapped for lock-down bracket

SERIES 10 2-WAY MR HOUSINGS

Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
8T	7026180	Alum.	SAE 8	SAE 8	SAE 8	U.S.

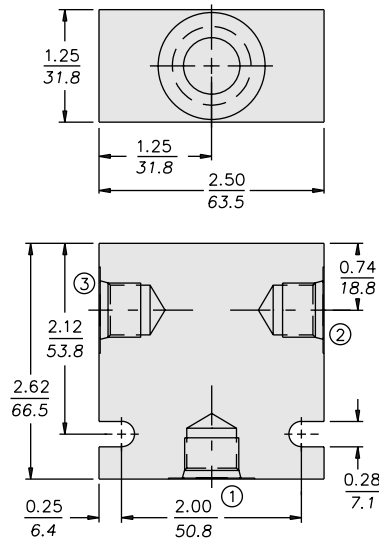
SERIES 10 2-WAY WITH OVERSIZED PORTS

Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
10T	7029240	Alum.	SAE 10	SAE 10	U.S.
12T	7024290	Alum.	SAE 12	SAE 12	U.S.

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Series 10 Valve Housings

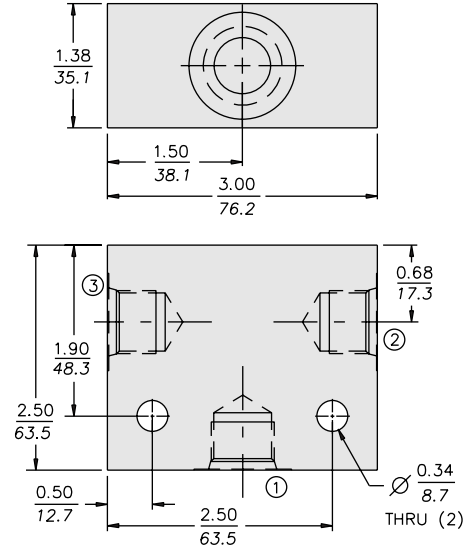
2-WAY THRU-PORTED



7025680 Illustrated

2-WAY THRU-PORTED OVERSIZED PORTS

INCH
MILLIMETRE



7027080 Illustrated

SERIES 10 2-WAY THRU-PORTED HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
6T	7025660	Alum.	SAE 6	SAE 6	SAE 6	U.S.
8T	7025680	Alum.	SAE 8	SAE 8	SAE 8	U.S.

SERIES 10 2-WAY THRU-PORTED WITH OVERSIZED PORTS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
10T	7027080	Alum.	SAE 10	SAE 10	SAE 10	U.S.

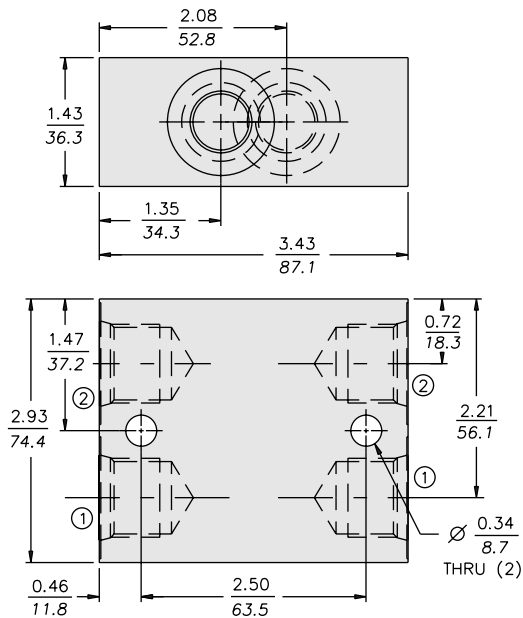
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HYDRAFORCE STANDARD VALVE HOUSINGS			
MATERIAL	OPERATING PRESSURE	PORTS	MFG. LOCATION
Aluminum, 6061 T6511, Clear Anodized	210 bar (3000 psi)	SAE	U.S.
Aluminum, 6082 TF, Gold Tint	210 bar (3000 psi)	BSP	U.K.
Ductile Iron,	350 bar (5000 psi)	SAE	U.S.
Ductile Iron,	350 bar (5000 psi)	BSP	U.K.
Steel, Low carbon	350 bar (5000 psi)	SAE	U.S.
Steel, 220 M 07, Zinc Plated	350 bar (5000 psi)	BSP	U.K.

HOUSINGS AND ACCESSORY PRODUCTS

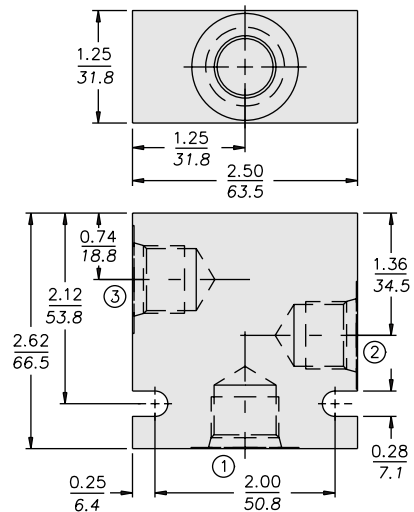
Series 10 Valve Housings

2-WAY CROSS-OVER



7070170 CRV Housing

3-WAY



SAE 8 Ported Housing Illustrated

INCH
MILLIMETRE

SERIES 10 2-WAY CROSS-OVER HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.	
10T	7070170	Alum.	SAE 10 (2)	SAE 10 (2)	U.S.	

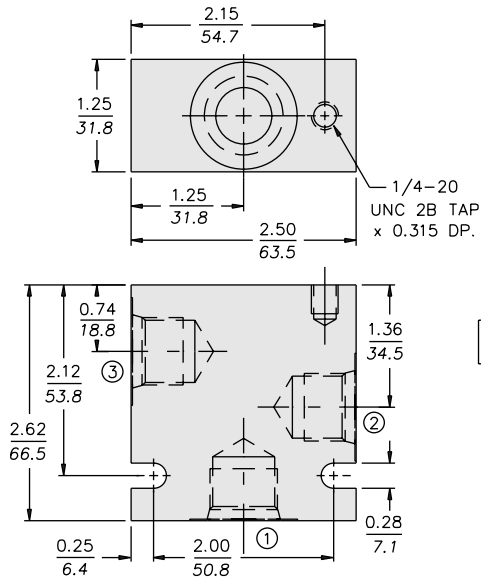
SERIES 10 3-WAY HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
6T	7024360	Alum.	SAE 6	SAE 6	SAE 6	U.S.
8T	7024380	Alum.	SAE 8	SAE 8	SAE 8	U.S.
8TL	7020980	Alum.	SAE 8	SAE 8	SAE 8	U.S.*
2B	7028320	Alum.	1/4" BSP	1/4" BSP	1/4" BSP	U.K.
3B	7028330	Alum.	3/8" BSP	3/8" BSP	3/8" BSP	U.K.
6TD	7151500	Ductile	SAE 6	SAE 6	SAE 6	U.S.
6TS	7026360	Steel	SAE 6	SAE 6	SAE 6	U.S.

*Drilled and tapped for lock-down bracket

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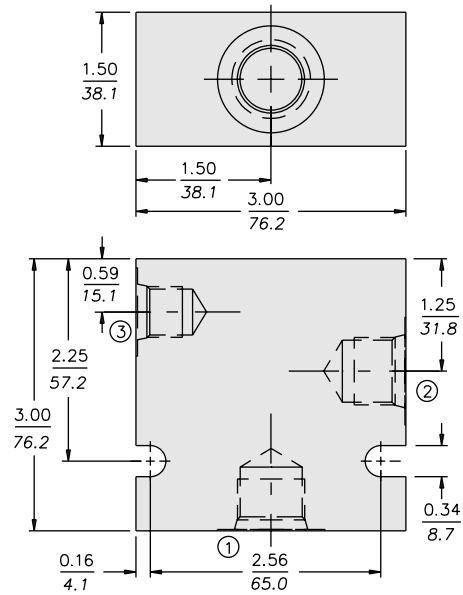
Series 10 Valve Housings

3-WAY MR



7020980 – MR
For Lock-Down Bracket Use

3-WAY SHORT



SAE 8 Ported Housing Illustrated

INCH
MILLIMETRE

SERIES 10 3-WAY MR HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
8T	7020980	Alum.	SAE 8	SAE 8	SAE 8	U.S.

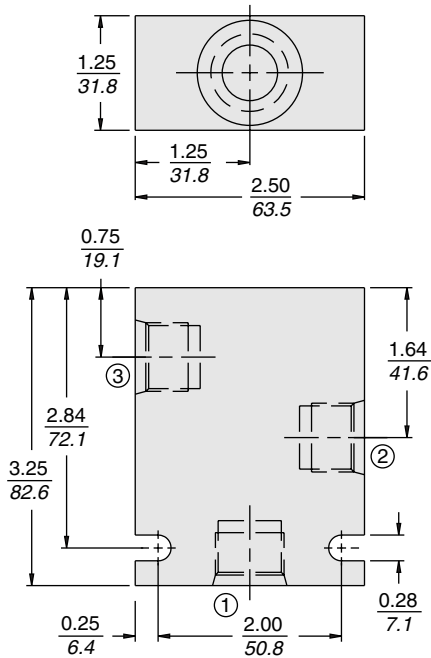
SERIES 10 3-WAY SHORT HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
8T	7026520	Alum.	SAE 8	SAE 8	SAE 6	U.S.
10T	7026530	Alum.	SAE 10	SAE 10	SAE 6	U.S.

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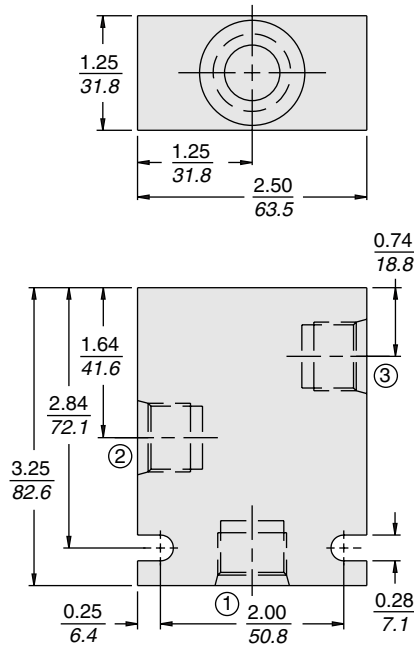
HOUSINGS AND ACCESSORY PRODUCTS

Series 10 Valve Housings

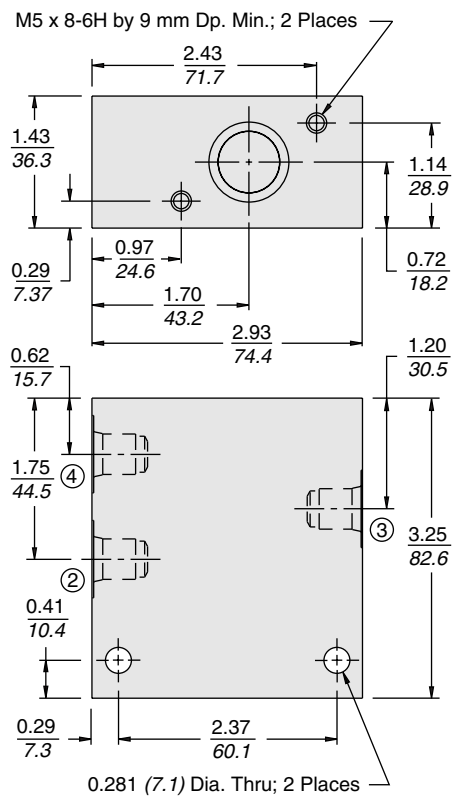
3-WAY TS98-3x



3-WAY 10-L3



3-WAY TS98-T3x DROP-IN



INCH
MILLIMETRE

SERIES 10 3-WAY TS98-3x HOUSINGS

Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
6T	7021680	Alum.	SAE 6	SAE 6	SAE 6	U.S.
8T	7021690	Alum.	SAE 8	SAE 8	SAE 8	U.S.

SERIES 10 3-WAY 10-L3 HOUSINGS*

Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
6T	7025460	Alum.	SAE 6	SAE 6	SAE 6	U.S.
8T	7025480	Alum.	SAE 8	SAE 8	SAE 8	U.S.

* Used only for ZL70-33 and ZL70-36

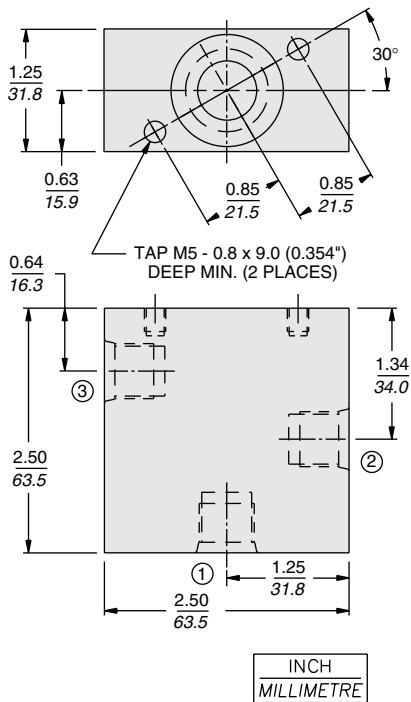
SERIES 10 3-WAY TS98-T3x DROP-IN HOUSING

Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
6T	7150120	Alum.	SAE 6	SAE 6	SAE 6	U.S.

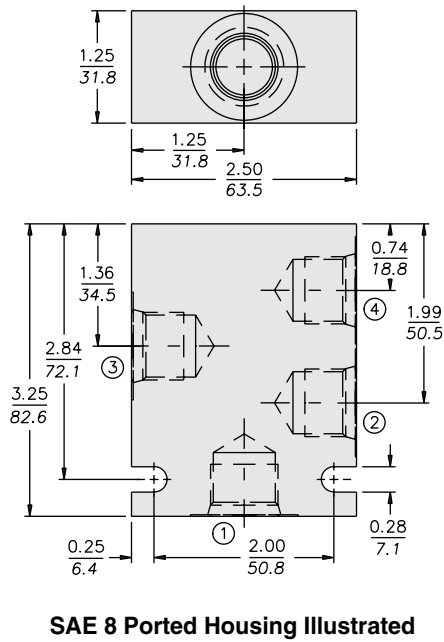
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Series 10 Valve Housings

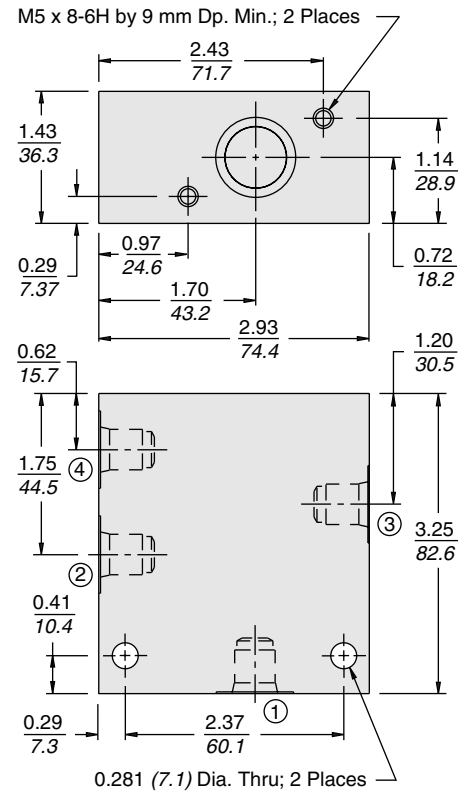
3-WAY 98-T3



4-WAY



4-WAY SV98-T40



SERIES 10 3-WAY 98-T3 HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
6T	4502500	Alum.	SAE 6	SAE 6	SAE 6	U.S.

SERIES 10 4-WAY HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
6T	7024460	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
8T	7024480	Alum.	SAE 8	SAE 8	SAE 8	SAE 8	U.S.
8TL	7023380	Alum.	SAE 8	SAE 8	SAE 8	SAE 8	U.S.*
2B	7028420	Alum.	1/4" BSP	1/4" BSP	1/4" BSP	1/4" BSP	U.K.
3B	7028430	Alum.	3/8" BSP	3/8" BSP	3/8" BSP	3/8" BSP	U.K.
6TD	7151700	Ductile	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
6TS	7026460	Steel	SAE 6	SAE 6	SAE 6	SAE 6	U.S.

*Drilled and tapped for lock-down bracket

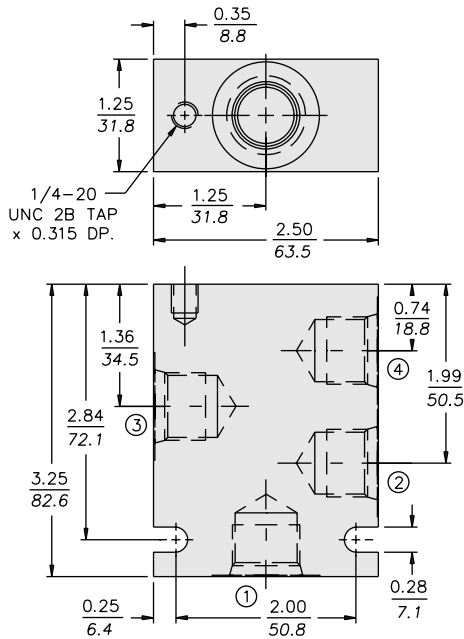
SERIES 10 4-WAY SV98-T40 HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
6T	7150020	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	U.S.

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HOUSINGS AND ACCESSORY PRODUCTS

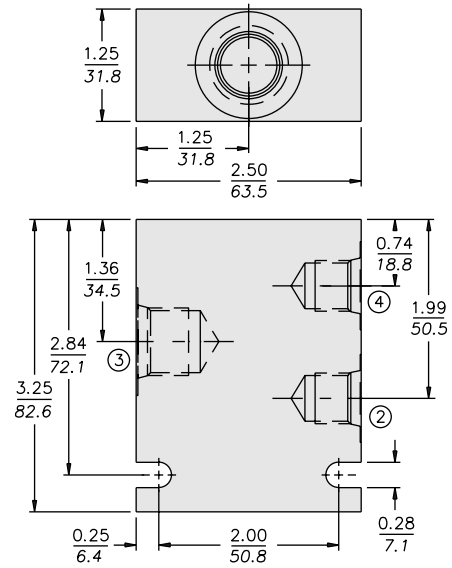
Series 10 Valve Housings

4-WAY MR



INCH
MILLIMETRE

4-WAY 3-PORTED



SAE 8 Ported Housing Illustrated

7023380 – MR
For Lock-Down Bracket Use

SERIES 10 4-WAY MR HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
8T	7023380	Alum.	SAE 8	SAE 8	SAE 8	SAE 8	U.S.

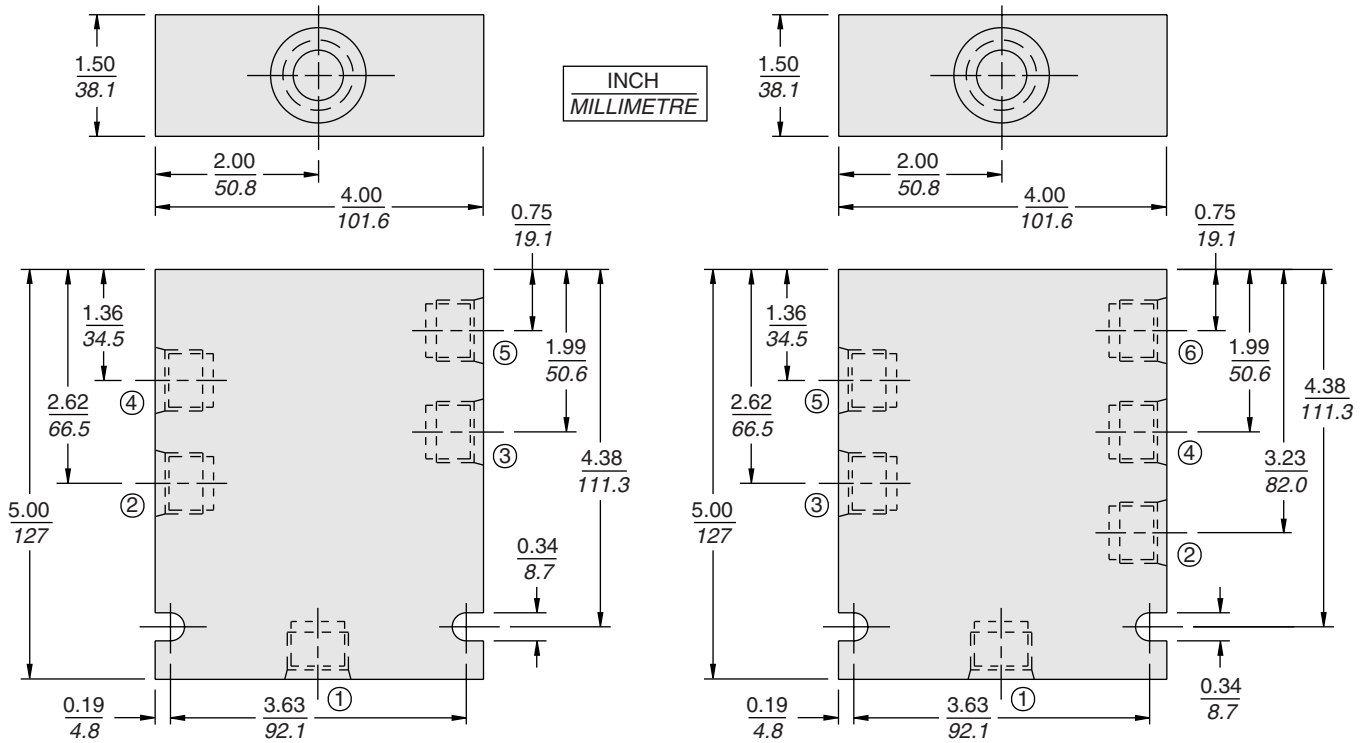
SERIES 10 4-WAY 3-PORTED SPECIAL HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
6T	7027000	Alum.	—	SAE 6	SAE 6	SAE 6	U.S.
8D	7024980	Alum.	—	SAE 6	SAE 8	SAE 6	U.S.
5B	7028540	Alum.	—	3/8" BSP	1/2" BSP	3/8" BSP	U.K.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only.
Ductile Iron and Steel housings are dimensionally different. Consult factory.

Series 10 Valve Housings

5-WAY

6-WAY



SERIES 10 5-WAY HOUSINGS								
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Mfg. Loc.
6T	7022820	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
8T	7022830	Alum.	SAE 8	SAE8	SAE 8	SAE 8	SAE 8	U.S.

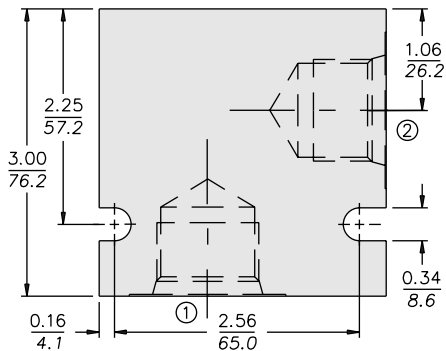
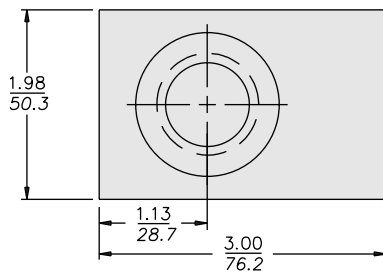
SERIES 10 6-WAY HOUSINGS									
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Mfg. Loc.
6T	4552980	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
8T	4552990	Alum.	SAE 8	SAE8	SAE 8	SAE 8	SAE 8	SAE 8	U.S.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HOUSINGS AND ACCESSORY PRODUCTS

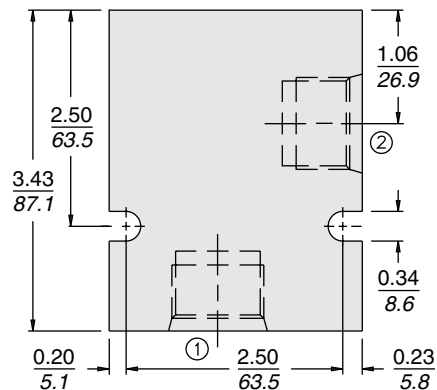
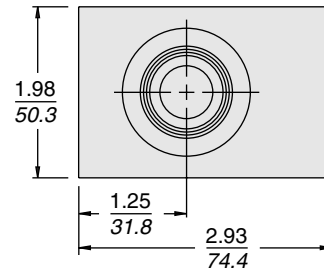
Series 12 Valve Housings

2-WAY



SAE 12 Ported Housing Illustrated

2-WAY 12-L2



INCH
MILLIMETRE

SERIES 12 2-WAY HOUSINGS					
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
10T	7022240	Alum.	SAE 10	SAE 10	U.S.
12T	7022250	Alum.	SAE 12	SAE 12	U.S.
16T	7022260	Alum.	SAE 16	SAE 16	U.S.
4B	7022510	Alum.	1/2" BSP	1/2" BSP	U.K.
6B	7022520	Alum.	3/4" BSP	3/4" BSP	U.K.
8B	7022530	Alum.	1" BSP	1" BSP	U.K.

SERIES 12 2-WAY 12-L2 HOUSINGS*					
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
08T	7020650	Alum.	SAE 08	SAE 08	U.S.
10T	7020660	Alum.	SAE 10	SAE 10	U.S.
12T	7020670	Alum.	SAE 12	SAE 12	U.S.

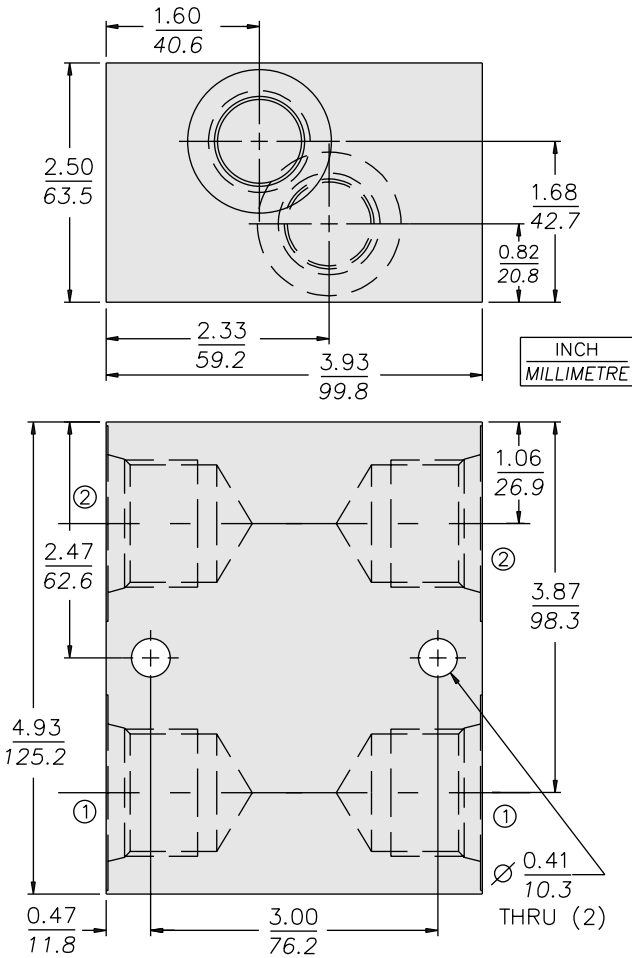
* Designed for use with PV72-20, PV72-21 and FR12-23 valves.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HYDRAFORCE STANDARD VALVE HOUSINGS			
MATERIAL	OPERATING PRESSURE	PORTS	MFG. LOCATION
Aluminum, 6061 T6511, Clear Anodized	210 bar (3000 psi)	SAE	U.S.
Aluminum, 6082 TF, Gold Tint	210 bar (3000 psi)	BSP	U.K.
Ductile Iron,	350 bar (5000 psi)	SAE	U.S.
Ductile Iron,	350 bar (5000 psi)	BSP	U.K.
Steel, Low carbon	350 bar (5000 psi)	SAE	U.S.
Steel, 220 M 07, Zinc Plated	350 bar (5000 psi)	BSP	U.K.

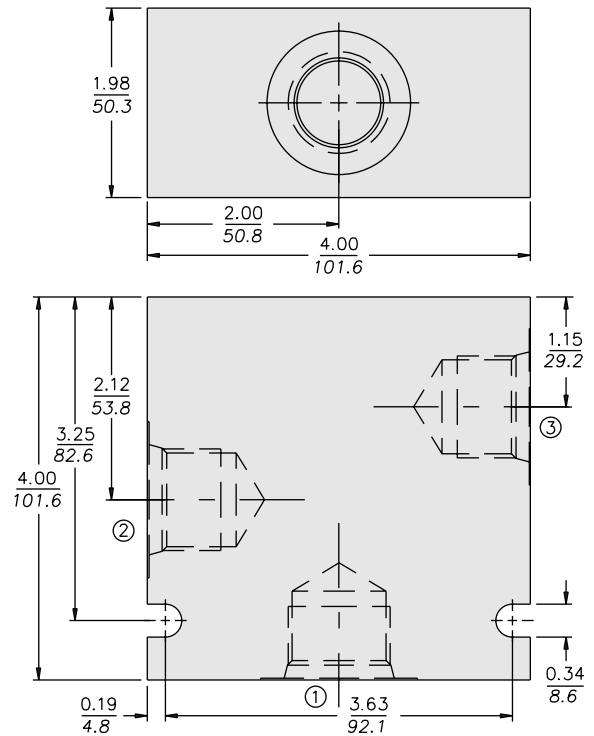
Series 12 Valve Housings

2-WAY CROSS-OVER



7170670 CRV Housing

3-WAY



SAE 12 Ported Housing Illustrated

SERIES 12 CROSS-OVER HOUSINGS					
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
10T	7170670	Alum.	SAE 12 (2)	SAE 12 (2)	U.S.

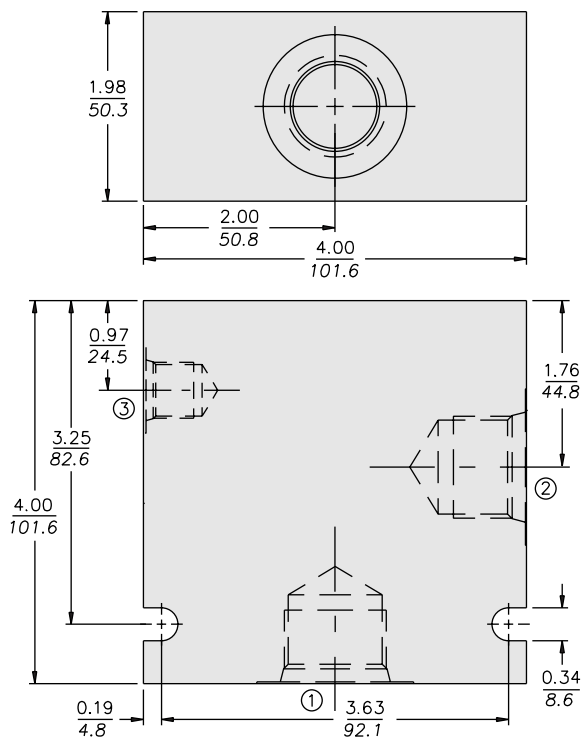
SERIES 12 3-WAY HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
8T	7022320	Alum.	SAE 8	SAE 8	SAE 8	U.S.
10T	7022330	Alum.	SAE 10	SAE 10	SAE 10	U.S.
12T	7022340	Alum.	SAE 12	SAE 12	SAE 12	U.S.
8TD	7155100	Ductile	SAE 8	SAE 8	SAE 8	U.S.
12TD	7155120	Ductile	SAE 12	SAE 12	SAE 12	U.S.
8TS	7029310	Steel	SAE 8	SAE 8	SAE 8	U.S.
12TS	7029340	Steel	SAE 12	SAE 12	SAE 12	U.S.
4B	7022610	Alum.	1/2" BSP	1/2" BSP	1/2" BSP	U.K.
6B	7022620	Alum.	3/4" BSP	3/4" BSP	3/4" BSP	U.K.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

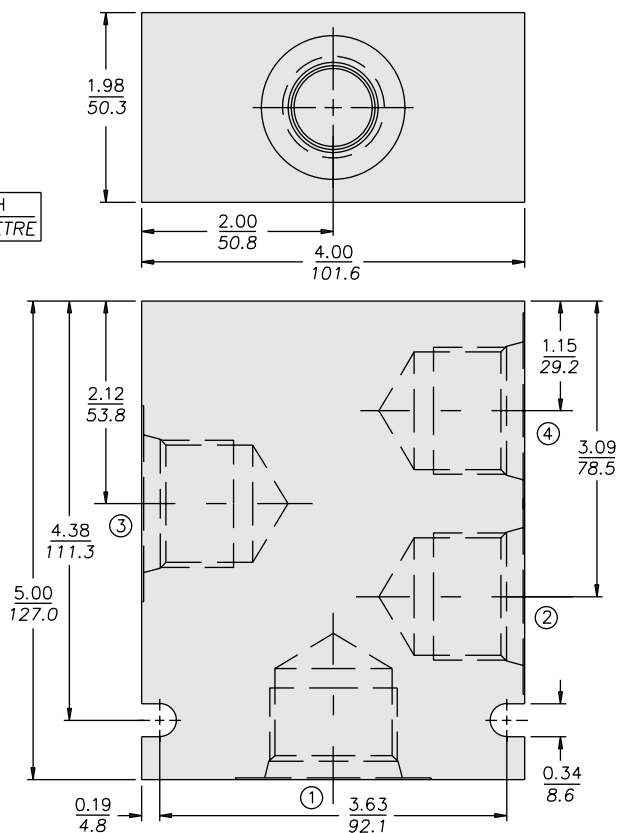
HOUSINGS AND ACCESSORY PRODUCTS

Series 12 Valve Housings

3-WAY SHORT



4-WAY



INCH
MILLIMETRE

SAE 12 Ported Housing Illustrated

SERIES 12 3-WAY SHORT HOUSING						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
12T	7027400	Alum.	SAE 12	SAE 12	SAE 6	U.S.

SERIES 12 4-WAY HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
6B	7022720	Alum.	3/4" BSP	3/4" BSP	3/4" BSP	3/4" BSP	U.K.
10T	7022480	Alum.	SAE 10	SAE 10	SAE 10	SAE 10	U.S.
12T	7022470	Alum.	SAE 12	SAE 12	SAE 12	SAE 12	U.S.
10T*	7022460	Alum.	SAE 6	SAE 10	SAE 10	SAE 10	U.S.
12T*	7022440	Alum.	SAE 6	SAE 12	SAE 12	SAE 12	U.S.

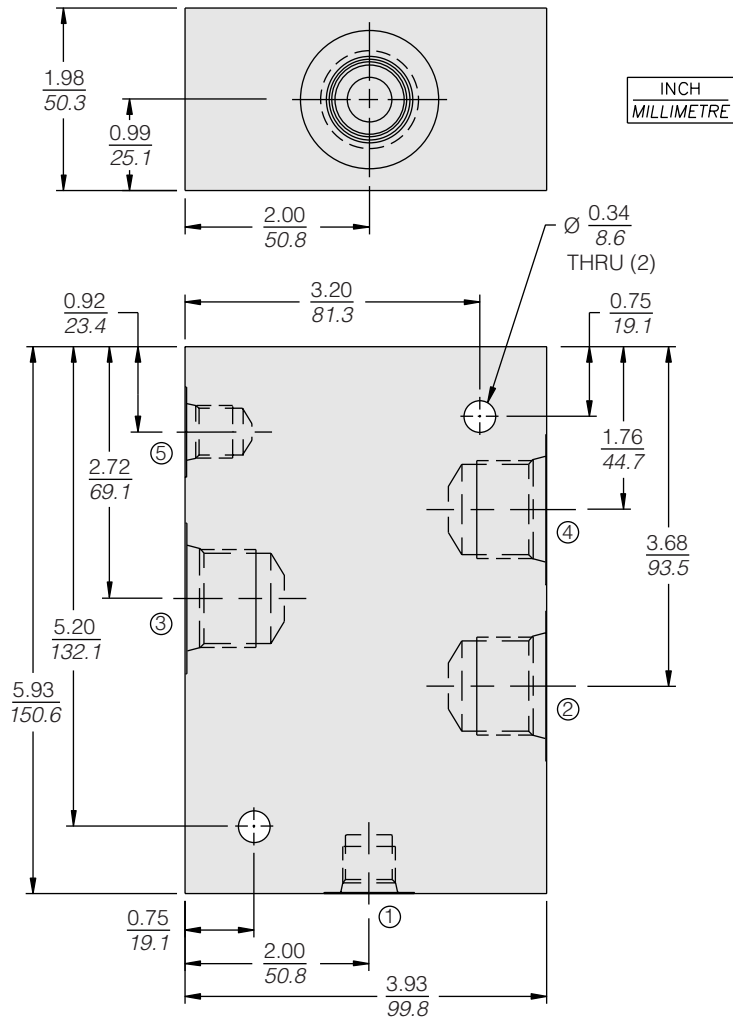
*PD-TYPE BODY

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HOUSINGS AND ACCESSORY PRODUCTS

Series 12 Valve Housings

5-WAY PD TYPE

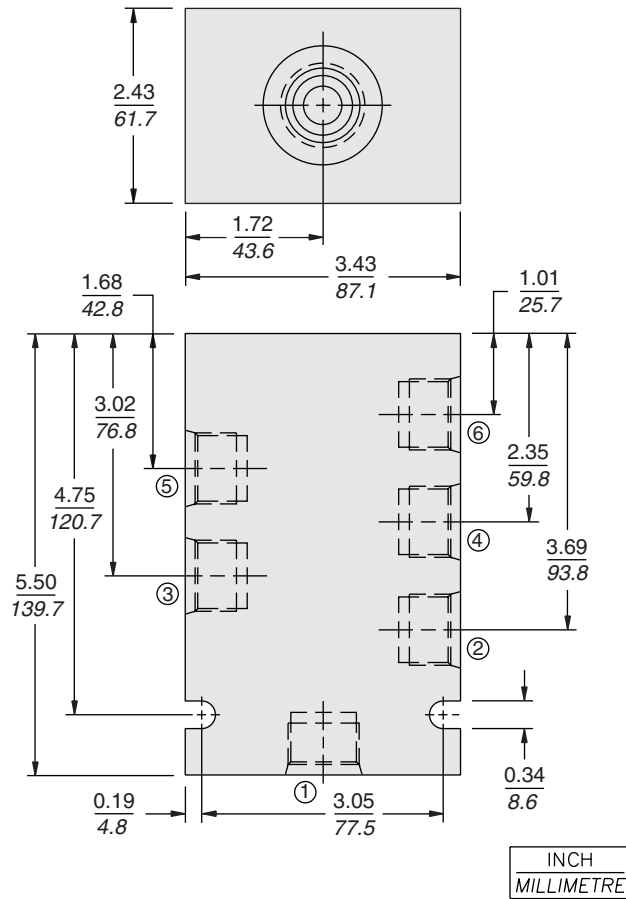


SERIES 12 5-WAY PD-TYPE HOUSINGS								
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Mfg. Loc.
10T	7029900	Alum.	SAE 6	SAE 10	SAE 10	SAE 10	SAE 6	U.S.
12T	7029910	Alum.	SAE 6	SAE 12	SAE 12	SAE 12	SAE 6	U.S.

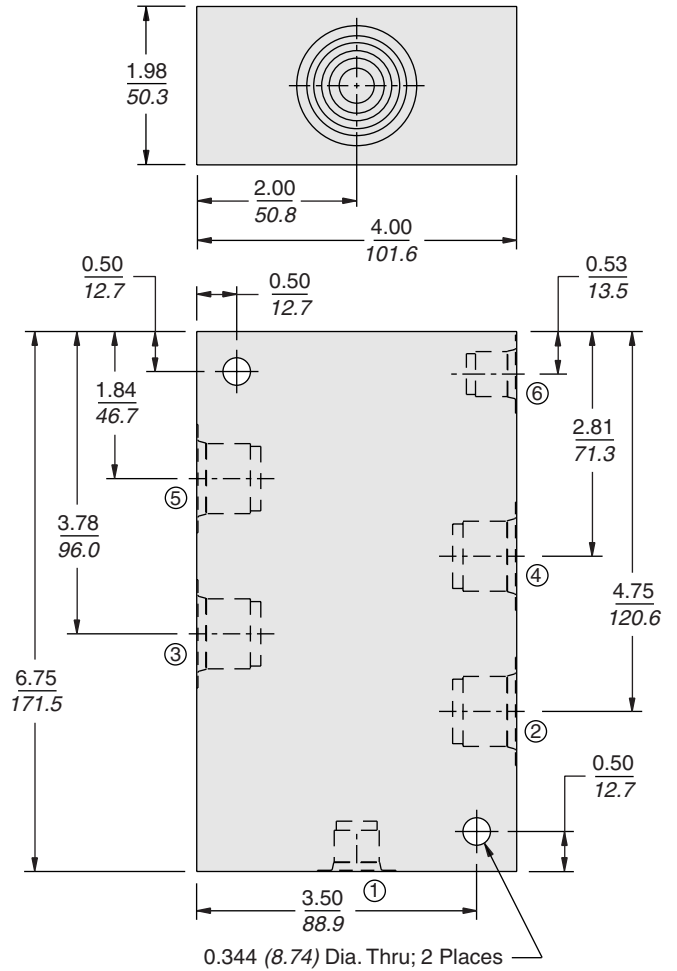
Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

Series 12 Valve Housings

6-WAY



6-WAY PD/PE-TYPE 12-S6 TEST HOUSINGS



SERIES 12 6-WAY HOUSINGS									
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Mfg. Loc.
6T	7021460	Alum.	SAE 6	SAE 6	SAE 6	SAE 6	SAE 6	SAE 6	U.S.
8T	7021470	Alum.	SAE 8	SAE 8	SAE 8	SAE 8	SAE 8	SAE 8	U.S.
10T	7021480	Alum.	SAE 10	SAE 10	SAE 10	SAE 10	SAE 10	SAE 10	U.S.

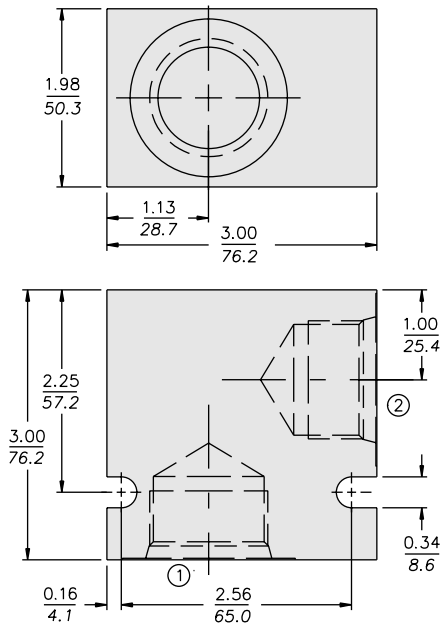
SERIES 12 6-WAY PD/PE-TYPE 12-S6 TEST HOUSINGS									
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Mfg. Loc.
6B	7150220	Alum.	1/4 BSP	3/4 BSP	3/4 BSP	3/4 BSP	3/4 BSP	1/4 BSP	U.K.
8T	7150240	Alum.	SAE 6	SAE 8	SAE 8	SAE 8	SAE 8	SAE 6	U.S.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HOUSINGS AND ACCESSORY PRODUCTS

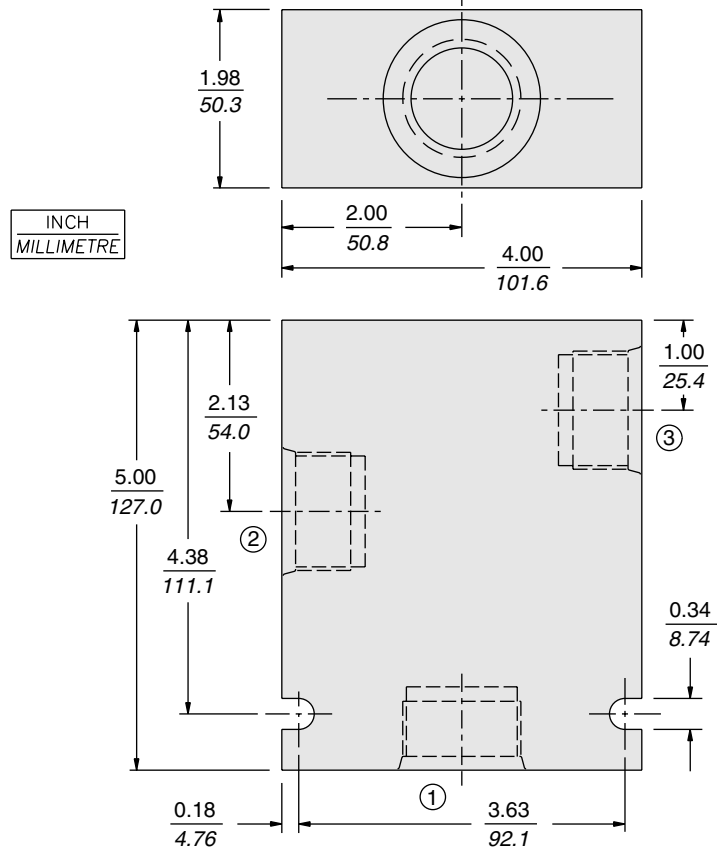
Series 16 Valve Housings

2-WAY STANDARD



SAE 16 Ported Housing Illustrated

3-WAY STANDARD



INCH
MILLIMETRE

SERIES 16 2-WAY HOUSINGS

Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
12T	7023230	Alum.	SAE 12	SAE 12	U.S.
12TD	7152010	Ductile	SAE 12	SAE 12	U.S.
12TS	7029230	Steel	SAE 12	SAE 12	U.S.
16T	7023240	Alum.	SAE 16	SAE 16	U.S.
6B	7023610	Alum.	3/4" BSP	3/4" BSP	U.K.
6BD	7152040	Ductile	3/4" BSP	3/4" BSP	U.K.
6BS	7150510	Steel	3/4" BSP	3/4" BSP	U.K.
8B	7023620	Alum.	1" BSP	1" BSP	U.K.

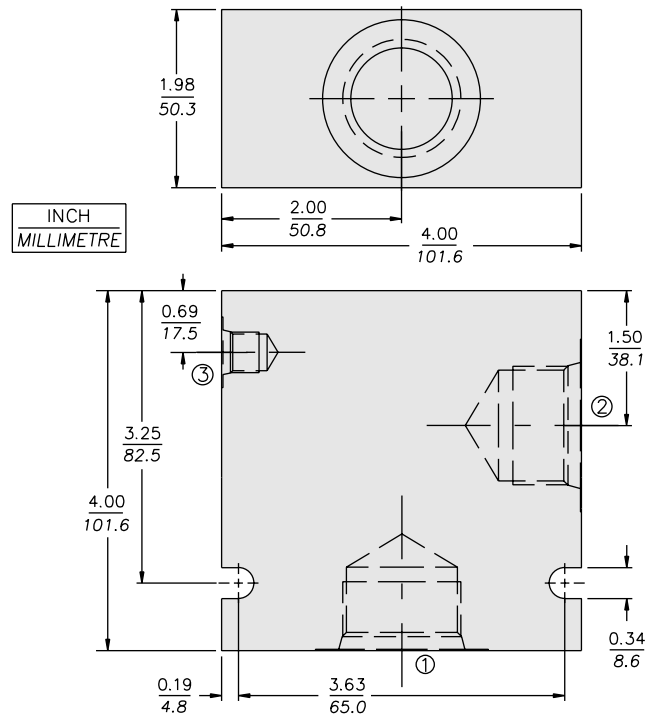
SERIES 16 3-WAY HOUSINGS

Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
12T	7022650	Alum.	SAE 12	SAE 12	SAE 12	U.S.
16T	7022660	Alum.	SAE 16	SAE 16	SAE 16	U.S.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

Series 16 Valve Housings

3-WAY SHORT



SAE 16 Ported Housing Illustrated

SERIES 16 3-WAY SHORT HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
16T	7023340	Alum.	SAE 16	SAE 16	SAE 6	U.S.

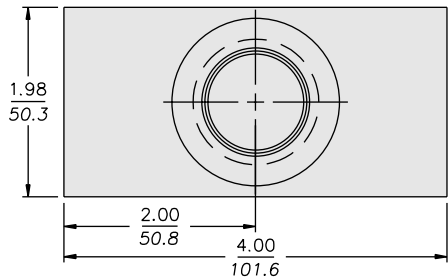
Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HYDRAFORCE STANDARD VALVE HOUSINGS			
MATERIAL	OPERATING PRESSURE	PORTS	MFG. LOCATION
Aluminum, 6061 T6511, Clear Anodized	210 bar (3000 psi)	SAE	U.S.
Aluminum, 6082 TF, Gold Tint	210 bar (3000 psi)	BSP	U.K.
Ductile Iron,	350 bar (5000 psi)	SAE	U.S.
Ductile Iron,	350 bar (5000 psi)	BSP	U.K.
Steel, Low carbon	350 bar (5000 psi)	SAE	U.S.
Steel, 220 M 07, Zinc Plated	350 bar (5000 psi)	BSP	U.K.

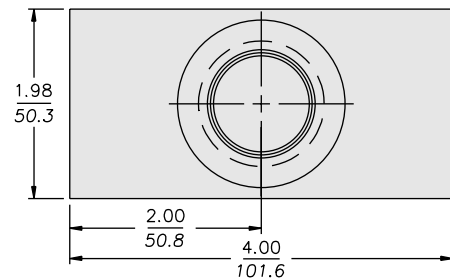
HOUSINGS AND ACCESSORY PRODUCTS

Series 16 Valve Housings

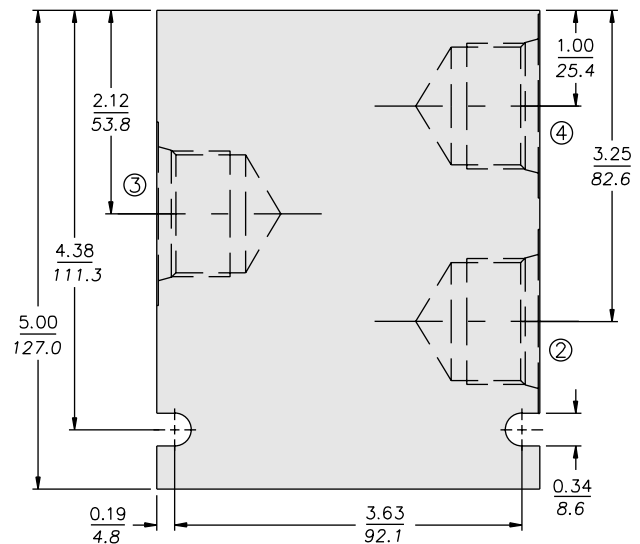
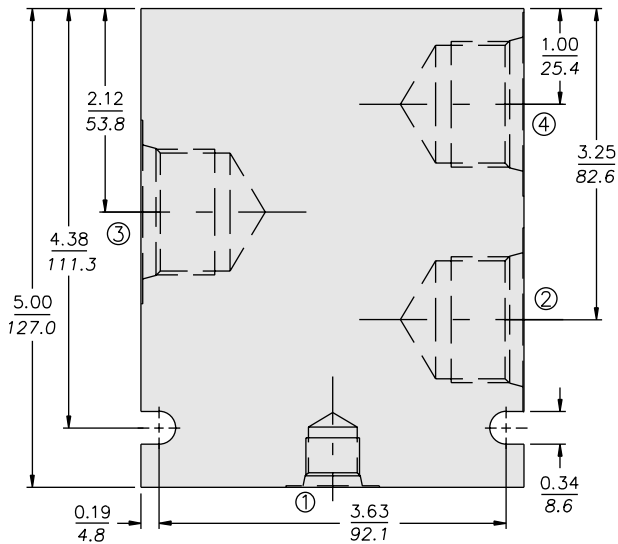
4-WAY STANDARD



4-WAY 3-PORT SPECIAL PURPOSE



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MILLIMETRE



PD Type with SAE 16 Ported Housing Illustrated

SAE 16 Ported Housing Illustrated

SERIES 16 4-WAY HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
6B	7023810	Alum.	3/8" BSP	3/4" BSP	3/4" BSP	3/4" BSP	U.K.
8B	7023820	Alum.	3/8" BSP	1" BSP	1" BSP	1" BSP	U.K.
12T*	7023450	Alum.	SAE 6	SAE 12	SAE 12	SAE 12	U.S.
16T*	7023470	Alum.	SAE 6	SAE 16	SAE 16	SAE 16	U.S.

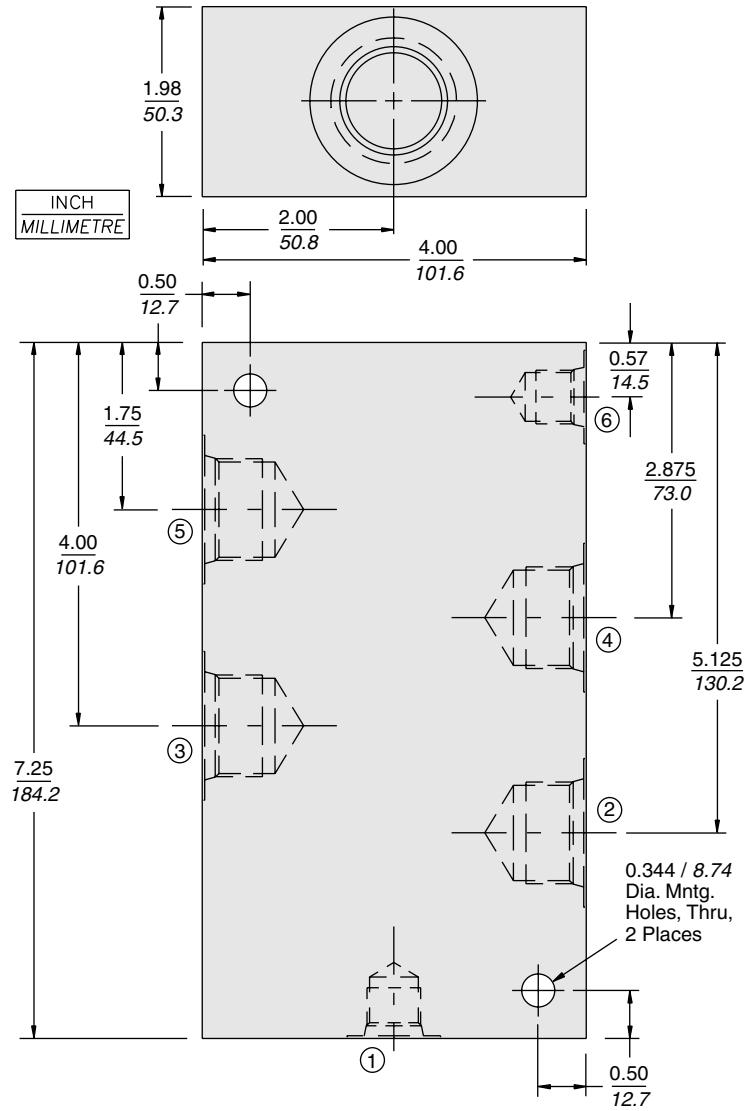
*PD-TYPE BODY

SERIES 16 4-WAY 3-PORT SPECIAL PURPOSE HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
12T	7023440	Alum.	—	SAE 12	SAE 12	SAE 12	U.S.
16D	7023480	Alum.	—	SAE 12	SAE 16	SAE 12	U.S.
16T	7023460	Alum.	—	SAE 16	SAE 16	SAE 16	U.S.
6B	7029140	Alum.	—	3/4" BSP	3/4" BSP	3/4" BSP	U.K.
7B	7029160	Alum.	—	3/4" BSP	1" BSP	3/4" BSP	U.K.
8B	7029150	Alum.	—	1" BSP	1" BSP	1" BSP	U.K.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

Series 16 Valve Housings

6-WAY PD/PE-TYPE 16-S6 TEST HOUSINGS



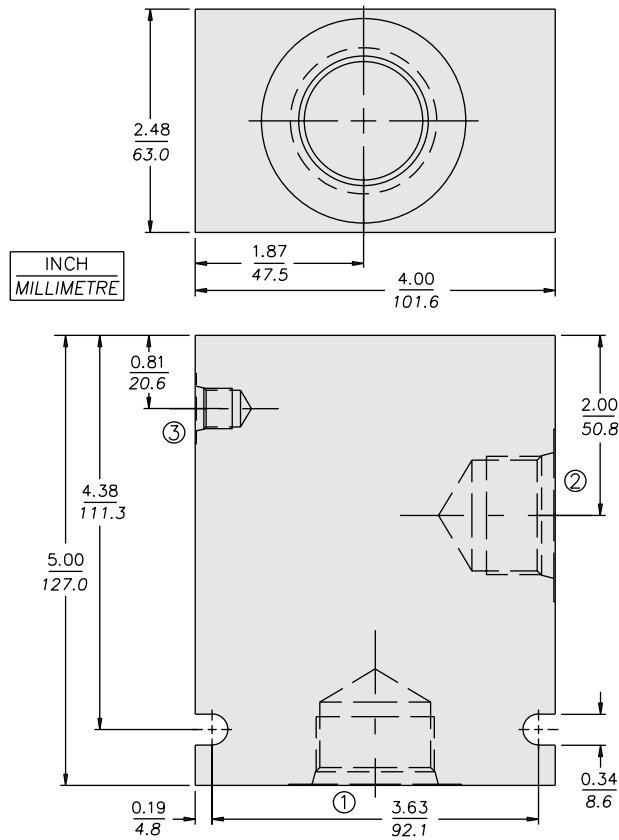
SAE 12 Ported Housing Illustrated

SERIES 16 6-WAY PD/PE-TYPE 16-S6 TEST HOUSINGS									
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Mfg. Loc.
6BD	7150310	Ductile Iron	1/4 BSP	3/4 BSP	3/4 BSP	3/4 BSP	3/4 BSP	1/4 BSP	U.K.
8BD	7150320	Ductile Iron	3/8 BSP	1 BSP	1 BSP	1 BSP	1 BSP	3/8 BSP	U.K.
12TD	7150350	Ductile Iron	SAE 6	SAE 12	SAE 12	SAE 12	SAE 12	SAE 6	U.S.
16TD	7150360	Ductile Iron	SAE 8	SAE 16	SAE 16	SAE 16	SAE 16	SAE 8	U.S.

HOUSINGS AND ACCESSORY PRODUCTS

Series 20 Valve Housings

3-WAY SHORT



H20S3A with SAE 16 Porting

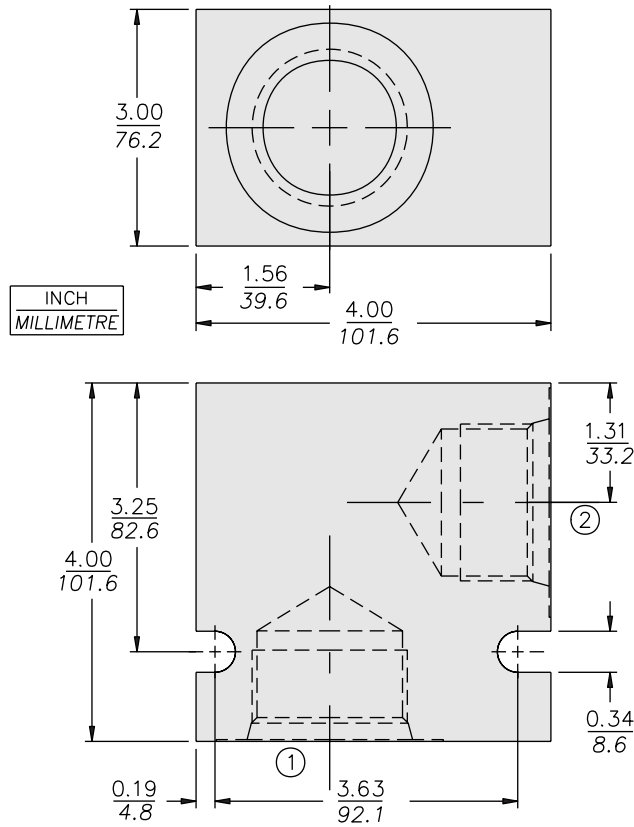
SERIES 20 3-WAY SHORT HOUSINGS						
Code	Part No.	Material	Port 1	Port 2	Port 3	Mfg. Loc.
16T	7023130	Alum.	SAE 16	SAE 16	SAE 6	U.S.
16T	7153210	Ductile	SAE 16	SAE 16	SAE 6	U.S.
16T	7072570	Steel	SAE 16	SAE 16	SAE 6	U.S.
16T	7072580	Durabar	SAE 16	SAE 16	SAE 6	U.S.

Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HYDRAFORCE STANDARD VALVE HOUSINGS			
MATERIAL	OPERATING PRESSURE	PORTS	MFG. LOCATION
Aluminum, 6061 T6511, Clear Anodized	210 bar (3000 psi)	SAE	U.S.
Aluminum, 6082 TF, Gold Tint	210 bar (3000 psi)	BSP	U.K.
Ductile Iron,	350 bar (5000 psi)	SAE	U.S.
Ductile Iron,	350 bar (5000 psi)	BSP	U.K.
Steel, Low carbon	350 bar (5000 psi)	SAE	U.S.
Steel, 220 M 07, Zinc Plated	350 bar (5000 psi)	BSP	U.K.

Series 42 Valve Housings

2-WAY



SERIES 42 2-WAY HOUSINGS					
Code	Part No.	Material	Port 1	Port 2	Mfg. Loc.
20T	7022580	Alum.	SAE 20	SAE 20	U.S.

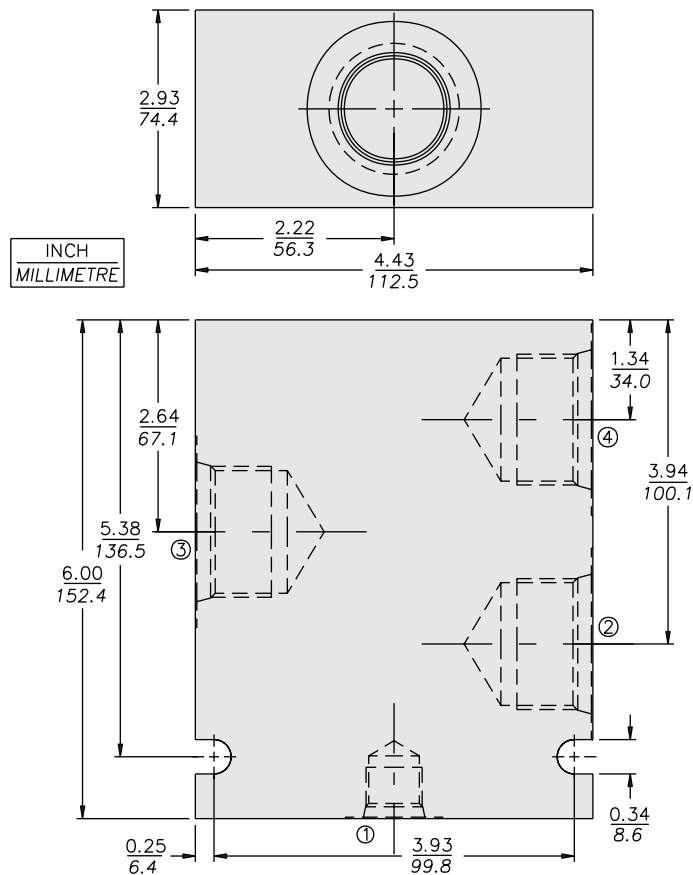
Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

HYDRAFORCE STANDARD VALVE HOUSINGS			
MATERIAL	OPERATING PRESSURE	PORTS	MFG. LOCATION
Aluminum, 6061 T6511, Clear Anodized	210 bar (3000 psi)	SAE	U.S.
Aluminum, 6082 TF, Gold Tint	210 bar (3000 psi)	BSP	U.K.
Ductile Iron,	350 bar (5000 psi)	SAE	U.S.
Ductile Iron,	350 bar (5000 psi)	BSP	U.K.
Steel, Low carbon	350 bar (5000 psi)	SAE	U.S.
Steel, 220 M 07, Zinc Plated	350 bar (5000 psi)	BSP	U.K.

HOUSINGS AND ACCESSORY PRODUCTS

Series 42 Valve Housings

4-WAY

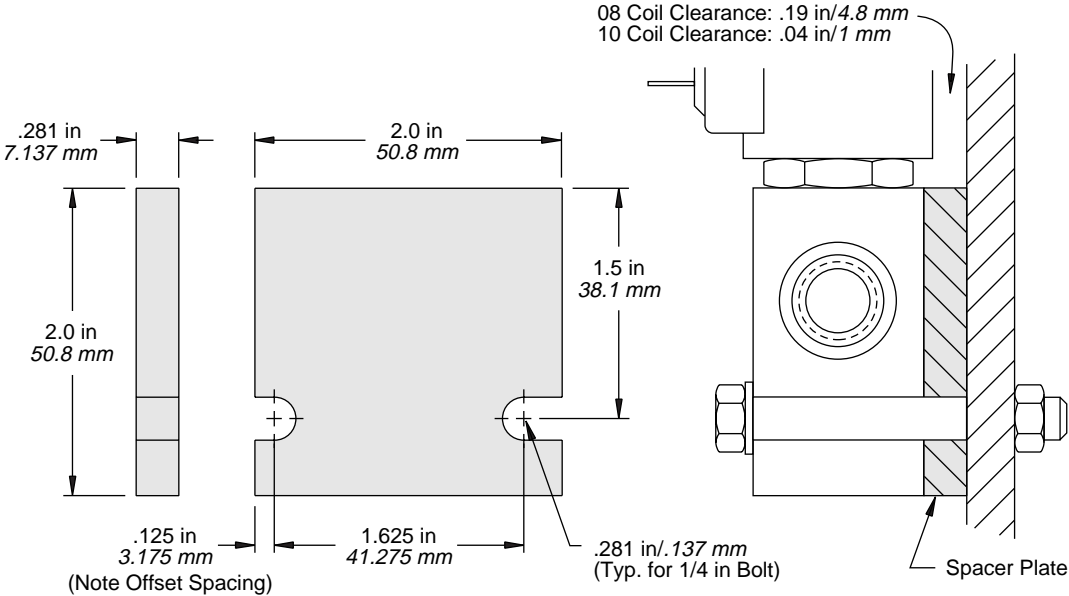


SERIES 42 4-WAY HOUSINGS							
Code	Part No.	Material	Port 1	Port 2	Port 3	Port 4	Mfg. Loc.
16T	7029540	Alum.	SAE 6	SAE 16	SAE 16	SAE 16	U.S.
16TD	7154310	Ductile	SAE 6	SAE 16	SAE 16	SAE 16	U.S.
16TS	7029760	Steel	SAE 6	SAE 16	SAE 16	SAE 16	U.S.
20T	7029550	Alum.	SAE 6	SAE 20	SAE 20	SAE 20	U.S.
20TD	7154320	Ductile	SAE 6	SAE 20	SAE 20	SAE 20	U.S.
20TS	7029770	Steel	SAE 6	SAE 20	SAE 20	SAE 20	U.S.

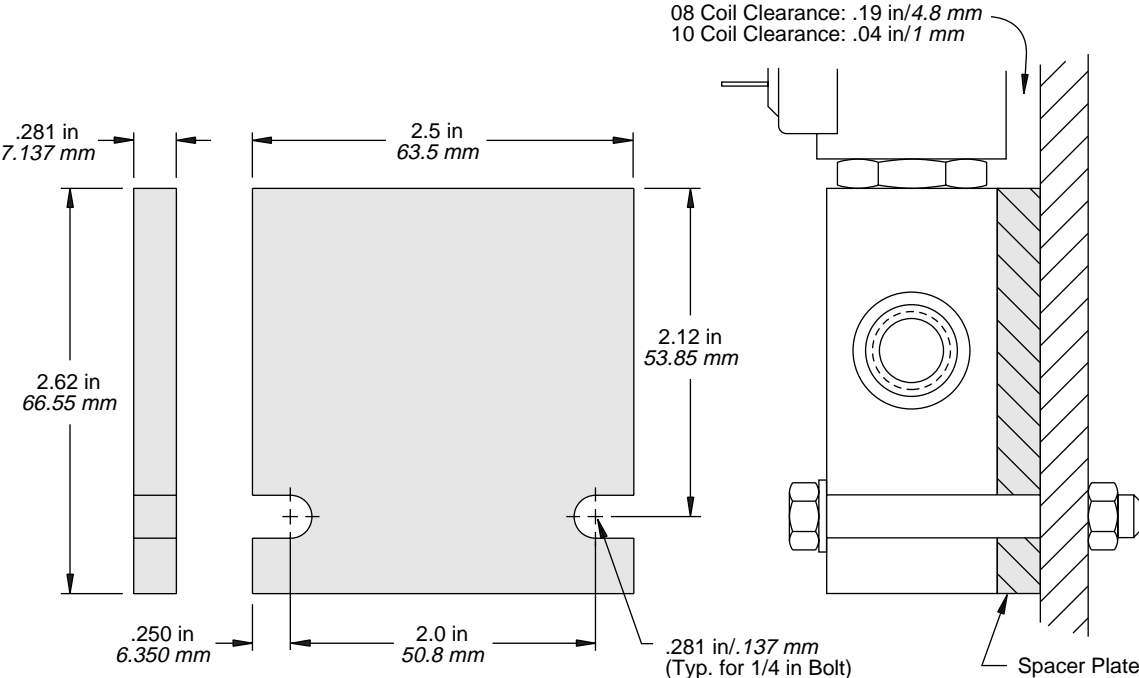
Note: Illustrations and dimensions shown on these pages are for Aluminum housings only. Ductile Iron and Steel housings are dimensionally different. Consult factory.

Spacer Plates for In-Line Housings

PART NO. 7040400
08 and 10 Series 2-Way Spacer Plate
Unanodized Aluminum



PART NO. 7040410
08 and 10 Series 3 and 4-Way Spacer Plate
Unanodized Aluminum



HOUSINGS AND ACCESSORIES PRODUCTS

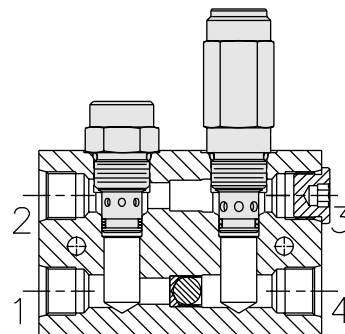
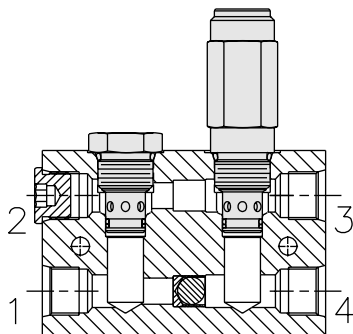
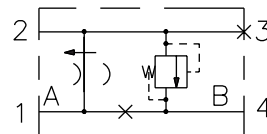
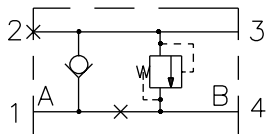
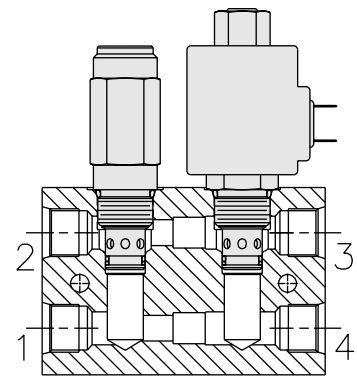
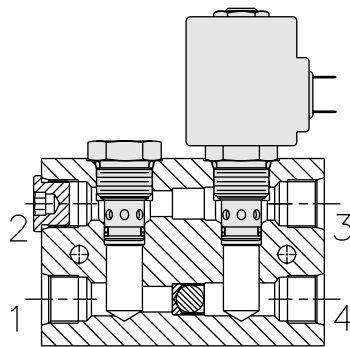
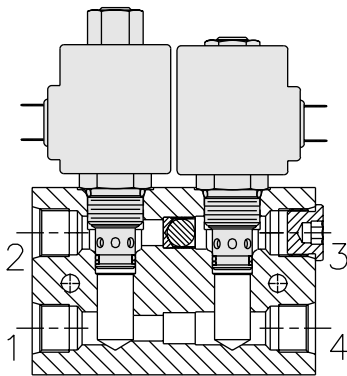
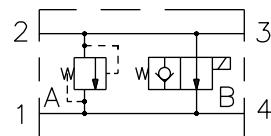
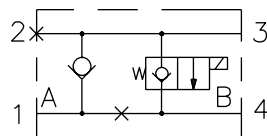
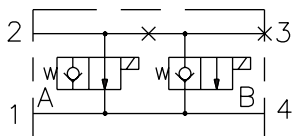
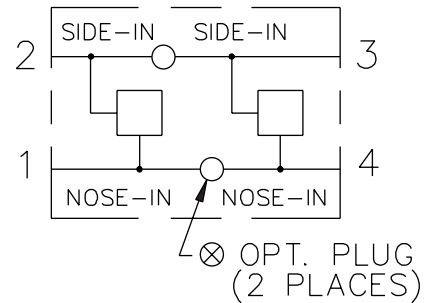
2-By-2 Bodies, Parallel-Type

DESCRIPTION

2-by-2 bodies are standardized valve bodies which have multi-functional (multiple circuit) potential. They are available in three sizes to house standard -10, -12, or -16 size two-way cartridge valves. Given the wide variety of potential cartridges, the application potential for the 2-by-2 body blocks is quite large. Dimensions for the blocks are illustrated below.

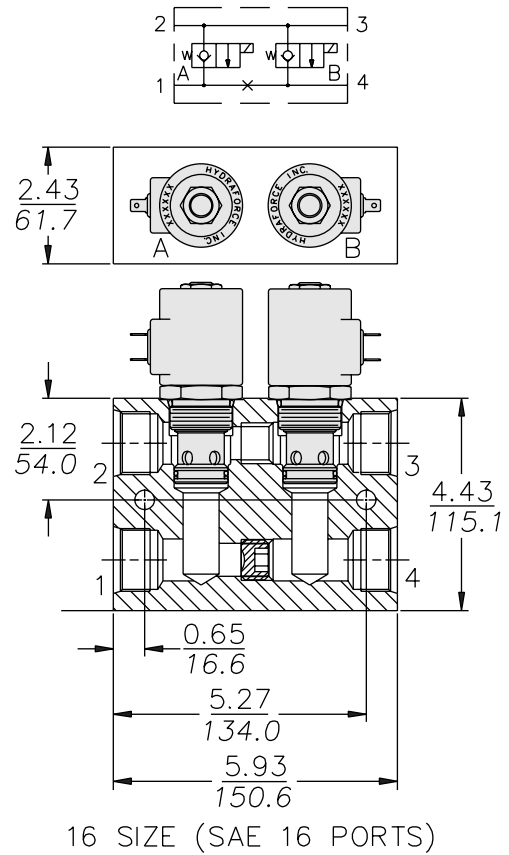
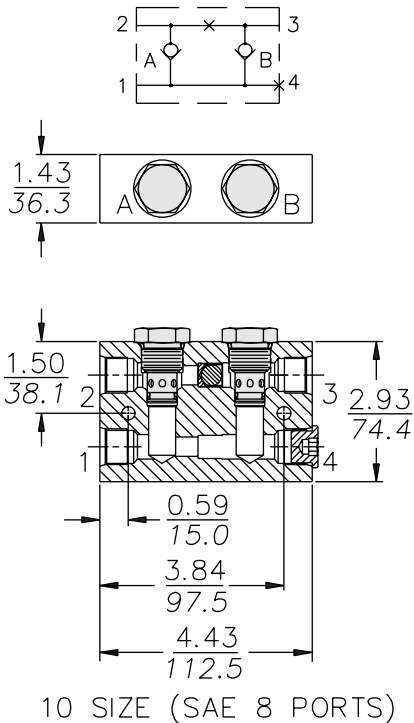
APPLICATIONS

Illustrated on these pages are a few common applications for 2-by-2 bodies.

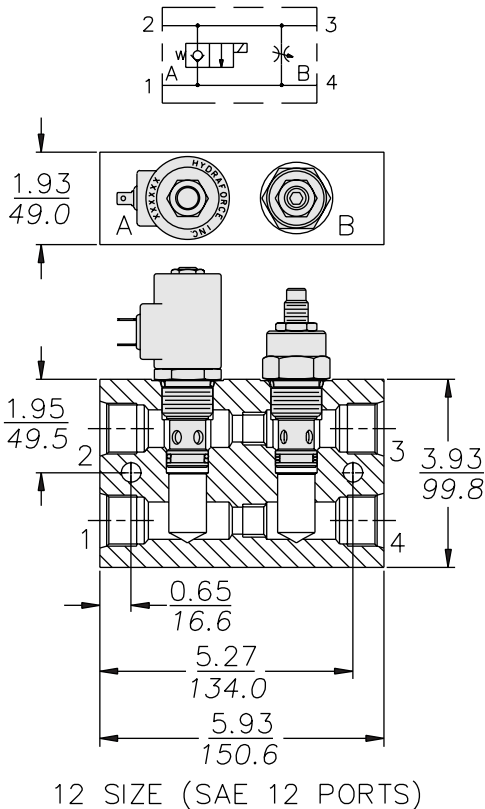


2-By-2 Bodies, Parallel-Type (cont'd)

TYPICAL DIMENSIONS



INCH
MILLIMETRE



ORDERING INFORMATION

The following 2-by-2 component parts are ordered individually.

Size	Part Numbers			
	Body	Pipe Plug	Expander Plug	SAE Plug
-08 Size	7073910	—	6108090	6103006
-10 Size	7070110	—	6108120	6103008
-12 Size	7070120	6102038	—	6103012
-16 Size	7070130	6102048	—	6103016

NOTE: EUROPEAN MANUFACTURED VERSION
MAY DIFFER IN DESIGN/DIMENSIONS.
CONSULT HYDRAFORCE HYDRAULICS LTD.

HOUSINGS AND ACCESSORIES PRODUCTS

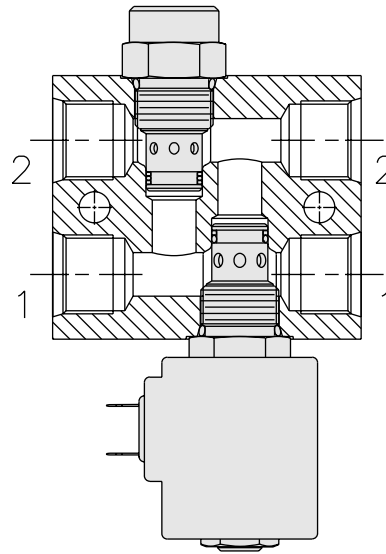
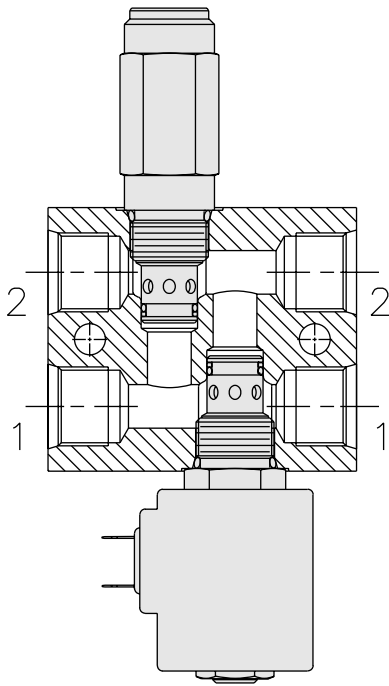
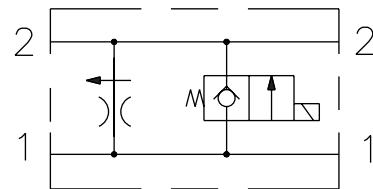
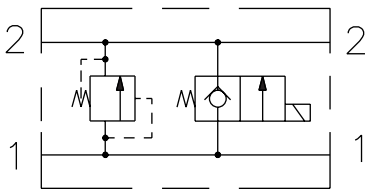
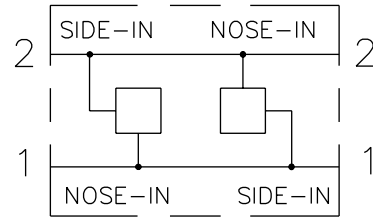
2-By-2 Bodies, Cross-Over Type

DESCRIPTION

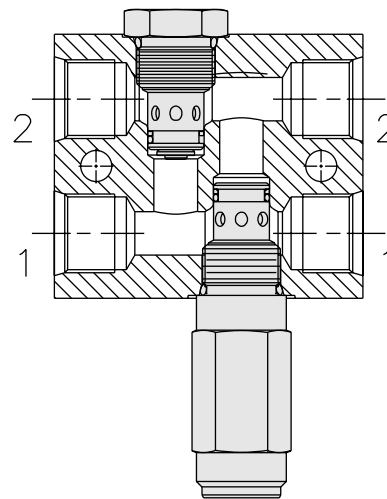
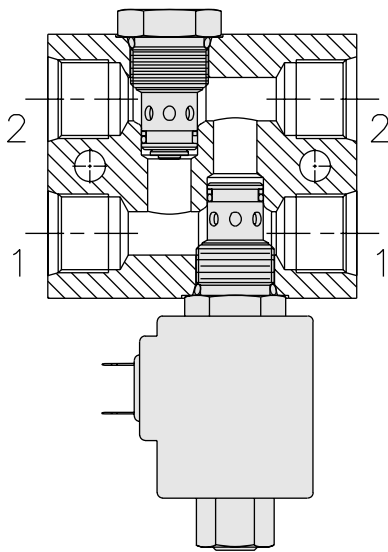
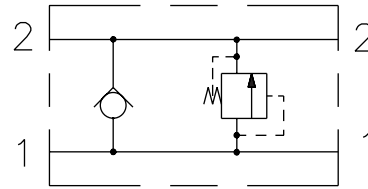
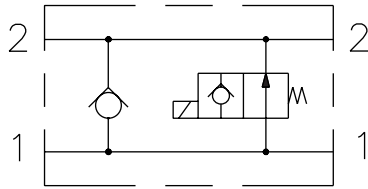
Commonly used for cross-over relief applications, these standard bodies can also be used for alternate purposes.

APPLICATIONS

Illustrated on this page are a few common applications for the cross-over type 2-by-2 bodies.



2-By-2 Bodies, Cross-Over Type (cont'd)



ORDERING INFORMATION

The following cross-over type 2-by-2 bodies are ordered individually.

Size	Part Number	Port Size
-08 Size	7070160	SAE 6
-10 Size	7070170	SAE 10
-12 Size	7170670	SAE 12

See CRV pages 6.250.1 to 6.280.2 for dimension information.

HOUSINGS AND ACCESSORY PRODUCTS

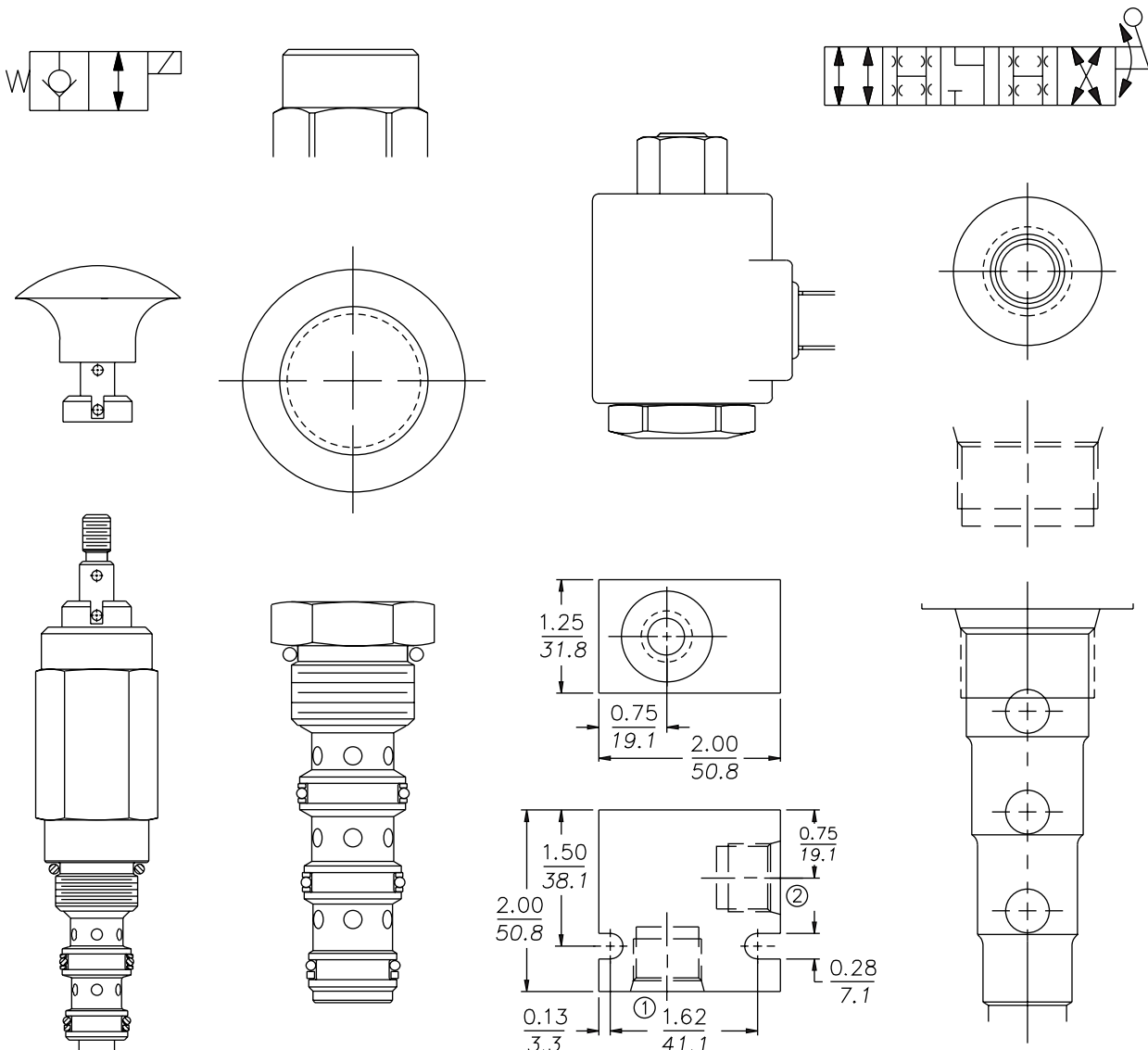
CAD Library

The HydraForce library of CAD-generated parts and schematics is available to all CAD system designers.

- Call up virtually any HydraForce cartridge, cavity, port, symbol or housing in various 2D views;
- Insert it on your drawing;
- Rotate, edit, move or scale it to your specifications.

Using the HydraForce CAD library can help you eliminate guess-work regarding sizes and dimensions. You'll no longer waste time duplicating drawings that we have on file.

The CAD library is available on the CD-ROM version of this catalog. Files are in AutoCAD DWG format as well as DXF format.



Cavity Plugs

STANDARD CAVITY PLUGS

Standard HydraForce cavity plugs seal all access to a cavity.

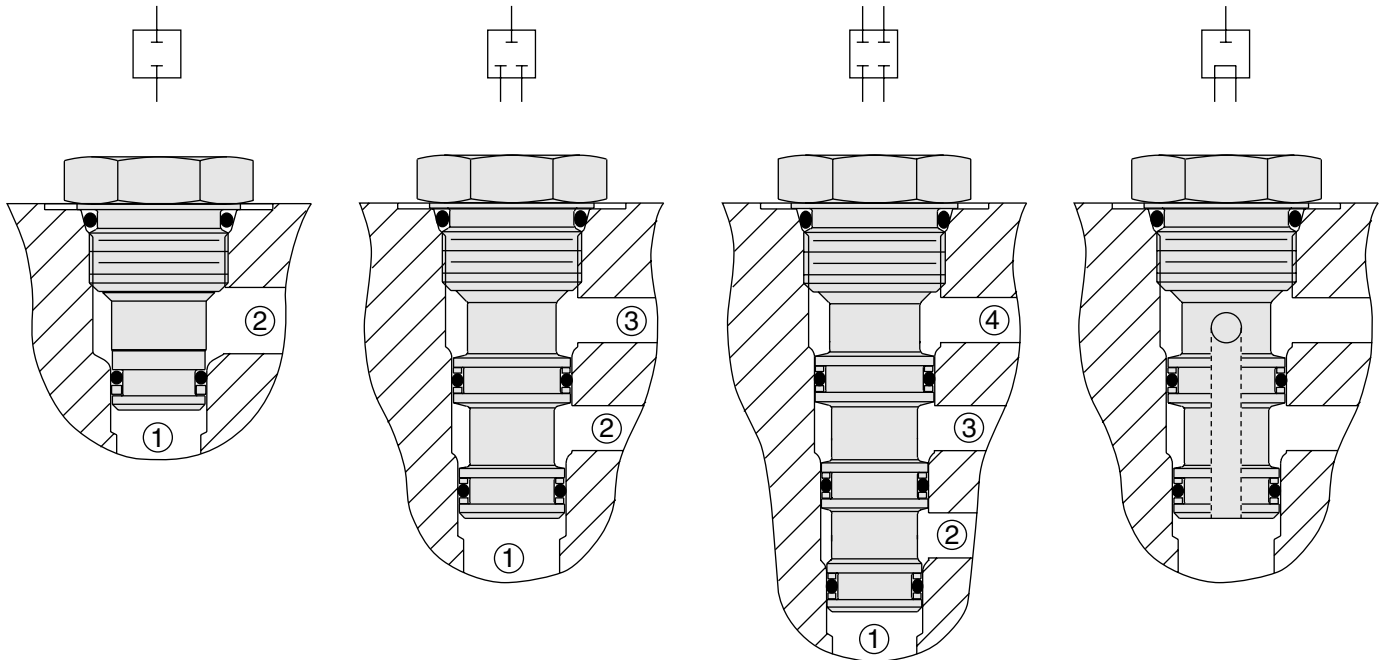
2-Way Cavity CPXX-20-X

3-Way Cavity CPXX-30-X

4-Way Cavity CPXX-40-X

OPTIONAL PLUGS

Special-purpose plugs are available; See Ordering Table.



ORDERING INFORMATION

CP		Seals	
Cavity Thread Size		N	Buna N (Std.)
3/4—16	08	V	Fluorocarbon
7/8—14	10	P	Polyurethane
1-1/16—12	12		
1-5/16—12	16		
1-5/8—12	20		
M42 x 2	42		
Cavity Type		Design Type (X = Blocked; O = Open)	
Two-Way	2		
Three-Way	3		
Three-Way Short	S3		
Four-Way	4		
**Five-Way	5		
**Six-Way	6		
** Consult factory			

	2-Ways		3-Ways			4-Ways			
	1	2	1	2	3	1	2	3	4
0	x	x	x	x	x	x	x	x	x
A			o	o	x	o	o	o	x
B†			o	x	o	o	o	x	o
C			x	o	o	o	x	o	o
D						x	o	o	o
E						o	o	x	x
F						o	x	o	x
G						x	o	o	x
H						o	x	x	o
I						x	o	x	o
J						x	x	o	o
K	o	o							
L*						o	o	o	o

† For CP08-4B, use CP08-3B

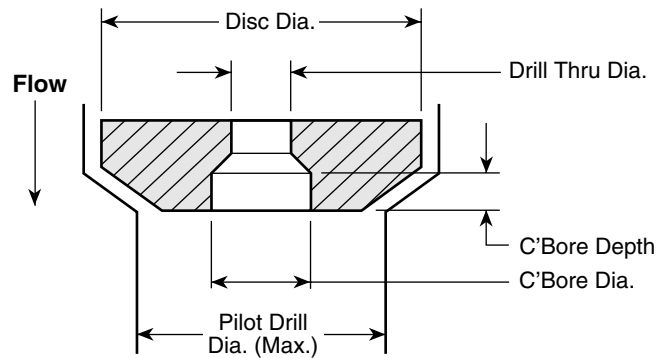
* Open 1 to 2; Open 3 to 4

HOUSINGS AND ACCESSORY PRODUCTS

Orifice Disc Installation & Sizing Guide

FLOW-LIMITING ORIFICE DISCS

Standard HydraForce cavity forming tools enable the designer to make convenient use of flow-limiting orifice discs, installed immediately under the cartridge when pilot drill diameters shown on housing details, or smaller, are used.



Orifice Discs – 5000 PSID Max.

Orifice Disc Part No.*	Disc Dia. (Max.)	Pilot Drill Dia. (Max.)	Drill-Thru Dia.	Counterbore Dia./ Counterbore Depth
7051_ _ _ for cavities: VC08-2 VC08-4	.500	.437	None	None
			.015 to .062	.125 Dia./ .074 Dp.
			.063 to .109	.2187 Dia./ .050 Dp.
			.110 & Up	None
7057_ _ _ for cavity: VC08-3	.562	.500	None	None
			.015 to .062	.125 Dia./ .074 Dp.
			.063 to .109	.2187 Dia./ .050 Dp.
			.110 & Up	None
7063_ _ _ for cavities: VC10-2 VC10-3 VC10-4	.625	.562	None	None
			.015 to .062	.125 Dia./ .074 Dp.
			.063 to .109	.2187 Dia./ .050 Dp.
			.110 & Up	None
7087_ _ _ for cavities: VC12-2 VC12-3	.872	.781	None	None
			.015	.125 Dia./ .084 Dp.
			.016 to .062	.125 Dia./ .084 Dp.
			.063 to .109	.2197 Dia./ .060 Dp.
7081_ _ _ for cavity: VC12-4)	.810	.718	None	None
			.015	.125 Dia./ .084 Dp.
			.016 to .062	.125 Dia./ .084 Dp.
			.063 to .109	.2197 Dia./ .060 Dp.
			.110 & Up	None

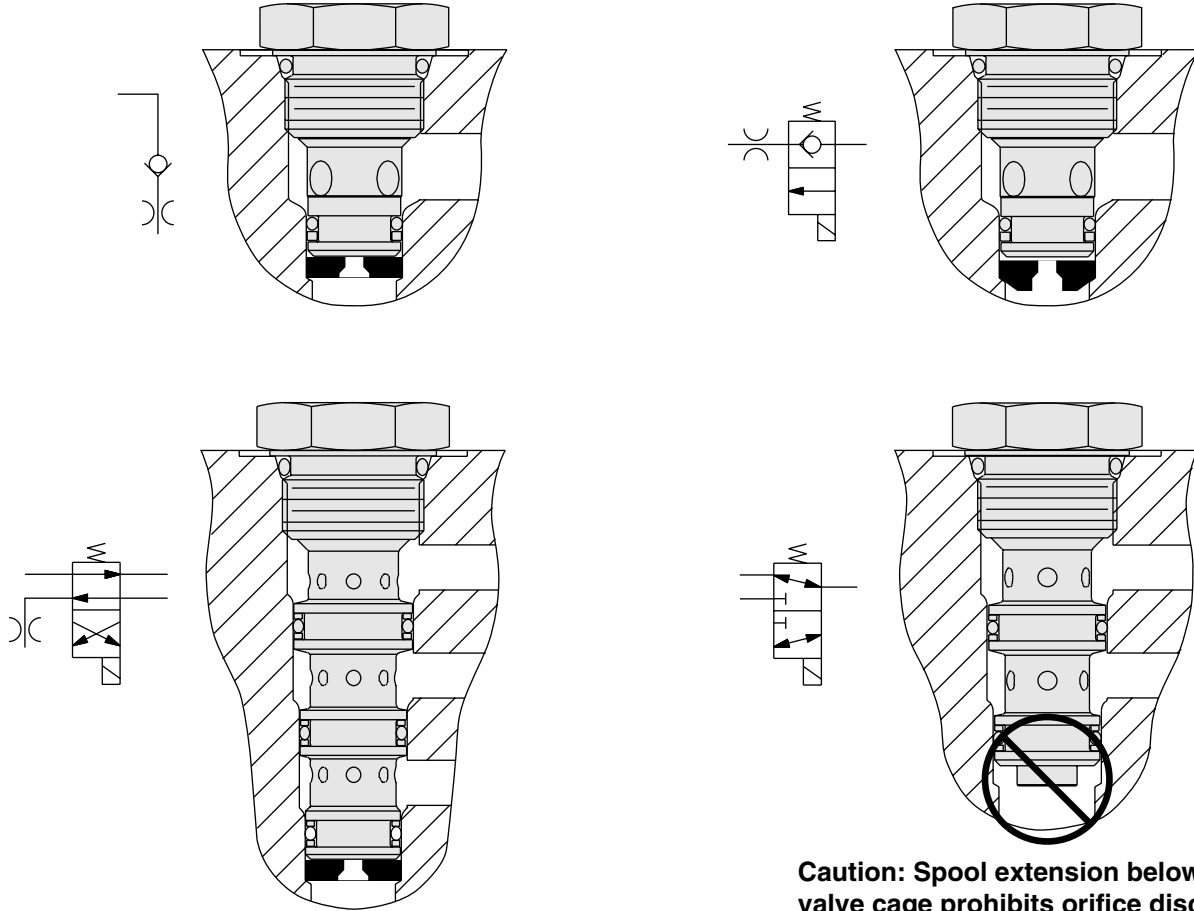
*Last 3 digits determined by drill-thru diameter.

All dimensions shown in inches.

Orifice Disc Installation & Sizing Guide (cont'd)

TYPICAL INSTALLATIONS

See specific product pages to determine if orifice disc can be used with a particular valve.



Caution: Spool extension below the valve cage prohibits orifice disc use.

ORDERING INFORMATION

See Orifice Sizing Guide charts on pages 8.460.3 and 8.460.4 for information necessary to specify Drill-Thru Diameter.

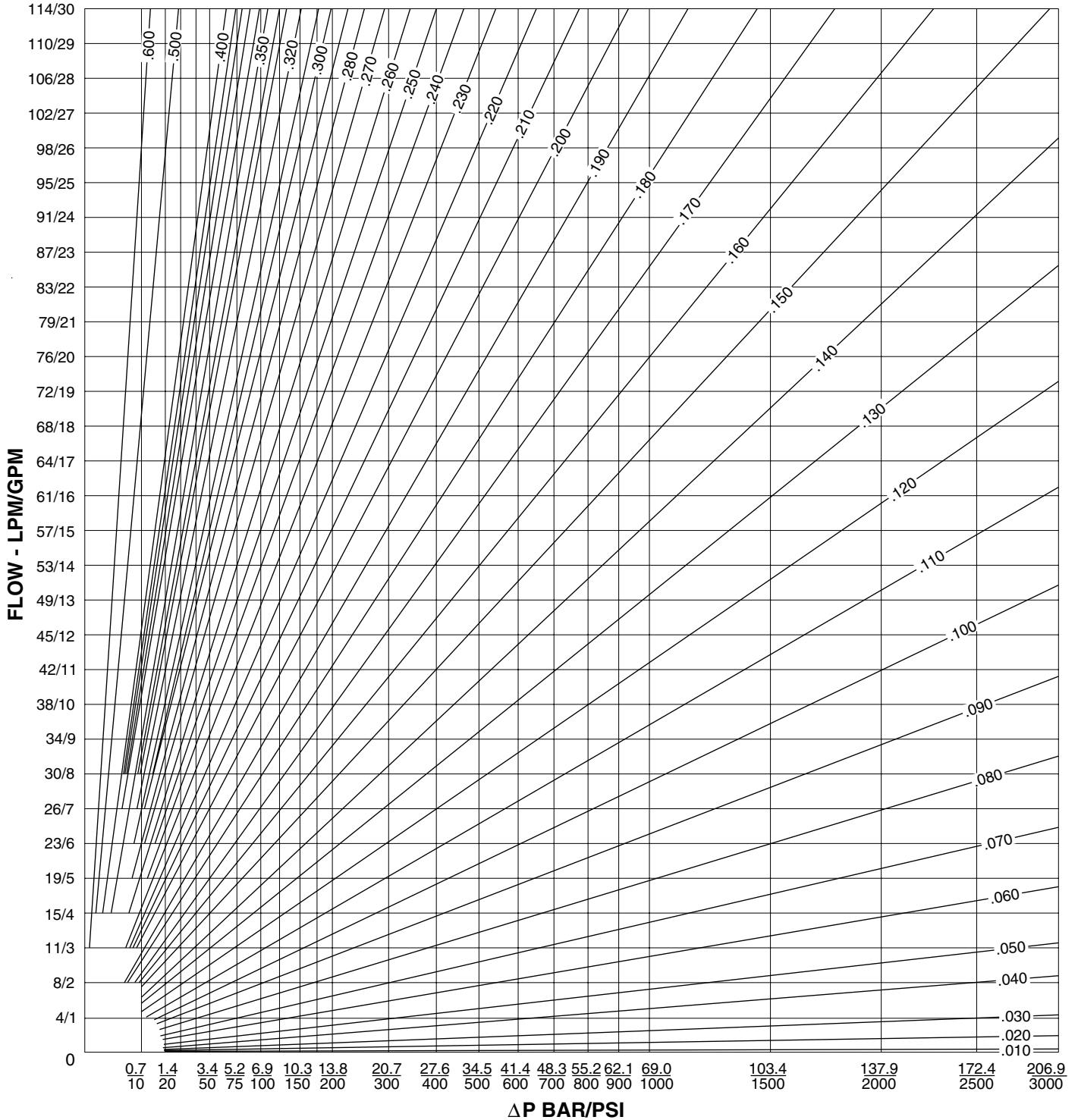
	70	
	┌───┐ ┌───┐	
	│ │	
Disc Dia.		Drill-Thru Diameter
.500 in. 51		Specify in thousandths of an inch;
.562 in. 57		For example:
.625 in. 63		000 Blank
.810 in. 81		031 .031 in. Drill-Thru Diameter
.875 in. 88		

HOUSINGS AND ACCESSORY PRODUCTS

Orifice Disc Sizing Guides

ORIFICE DISC SIZING GUIDE (Inches)

Curves represent orifice disc drill-thru diameters.

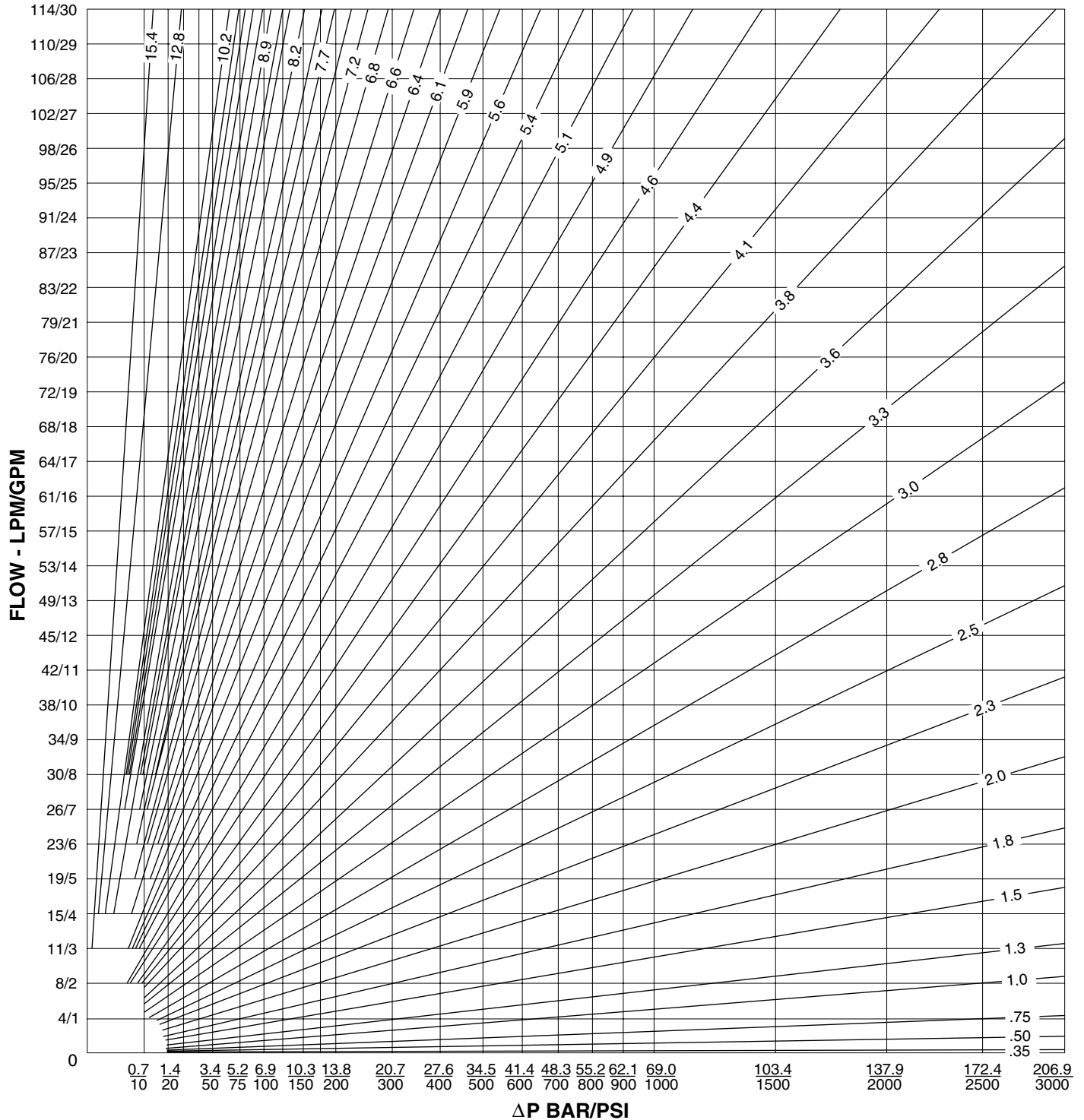


Note: Table is calculated at 32 cSt (150 SSU) oil at 40°C. Values will change with viscosity changes.

Orifice Disc Sizing Guides (cont'd)

ORIFICE DISC SIZING GUIDE (mm)

Curves represent orifice disc drill-thru diameters.



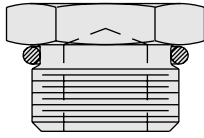
Note: Table is calculated at 32 cSt (150 SSU) oil at 40°C. Values will change with viscosity changes.

HOUSINGS AND ACCESSORY PRODUCTS

Manifold Accessories

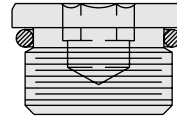
SAE PORT PLUGS

Available in Hex Head or Hex Socket Versions.



**Hex Head
O-Ring Boss Plug**

Size	Part No.
SAE 2	6103102
SAE 4	6103104
SAE 6	6103106
SAE 8	6103108
SAE 10	6103110
SAE 12	6103112
SAE 16	6103116
SAE 20	6103120

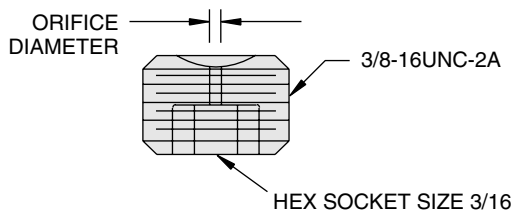


**Hex Socket
O-Ring Boss Plug**

Size	Part No.
SAE 2	6103002
SAE 4	6103004
SAE 6	6103006
SAE 8	6103008
SAE 10	6103010
SAE 12	6103012
SAE 16	6103016
SAE 20	6103020

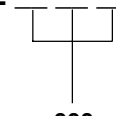
ORIFICE PLUGS

Made from a 3/16" hex socket plug, orifice plugs can be pre-drilled or ordered as blanks. Orifice diameters can range from .020" to .180".



To Order:

6112



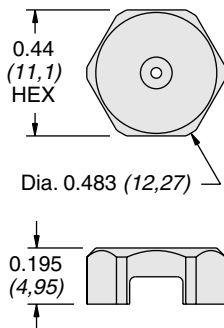
000
XXX

Orifice Size
Blank (No Orifice) or . . .
Specify Orifice Diameter
from .020 to .187

Note: Minimum drill diameter is 0.020 in.
For smaller orifice sizes consult factory.

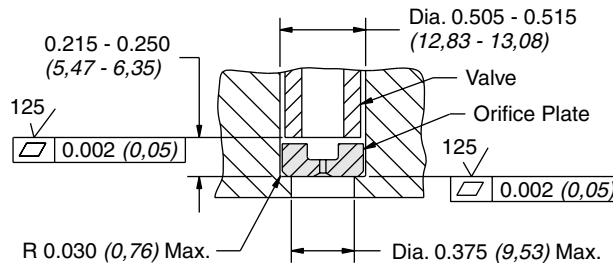
ORIFICE PLATES

Orifice Plates produce a higher restriction in one direction and a lower restriction in the other direction.

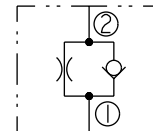


Inch
(mm)

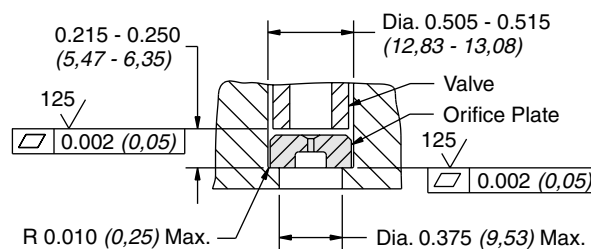
STANDARD POSITION



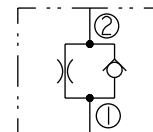
Flow is regulated from a hydraulic cylinder or motor, to the control valve



INVERTED POSITION



Flow is regulated from the control valve, to a hydraulic cylinder or motor



Orifice Plates

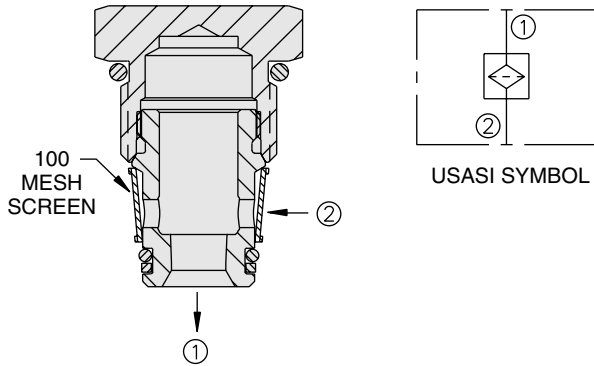
Orifice Dia.	Part No.
0.037 ±0.002	4500210
0.046 ±0.002	4500220
0.059 ±0.002	4500230
0.030 ±0.002	4531610
0.120 ±0.002	4531840
0.156 ±0.002	4531850
0.032 ±0.002	4536440

Manifold Accessories (cont'd)

SCREEN CARTRIDGES

These 100-mesh screen cartridges are not recommended substitutes for hydraulic filters. However, they are good low-cost "rock catchers" for shielding control orifices, pilot lines, etc.

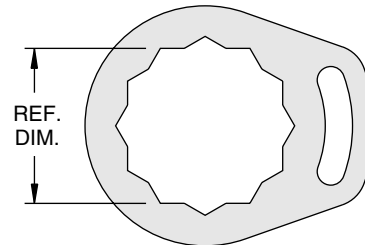
Use SCxx cartridges for flow from port 2 to port 1 only.



Size	Model	Part No.
08	SC08-20-0-N-100	5290210
10	SC10-20-0-N-100	5291210

ADAPTER LOCK KITS

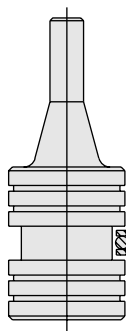
Lock kits can be used to help prevent valves from backing out of the cavity. Kits include adapter plate, lock washer and machine screw.



Valve Type	Ref. Dim.	Kit Part No.
MR10	1 in.	5399000
PD12	1 ¹ / ₄ in.	5960110
PD16	1 ¹ / ₂ in.	5960108
EP20 & PD42	1 ⁷ / ₈ in.	5960109

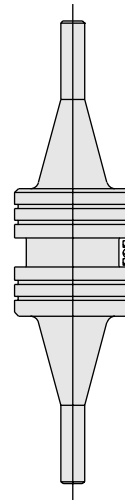
PILOT PISTONS

Pilot pistons can be successfully applied in aluminum housings if the designer and the fabricator prepare the bore correctly.



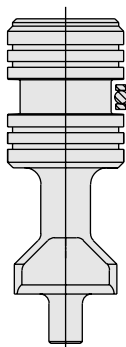
Single Piston

Size	Without Seals Part No.	With Seals Part No.
08	7013280	7013280S
10	7013200	7013200S
12	7013360	7013360S
16	7013170	7013170S



Double Piston

Size	Without Seals Part No.	With Seals Part No.
08	7013380	7013380S
10	7013300	7013300S
12	7013340	7013340S



Heavy Duty Piston

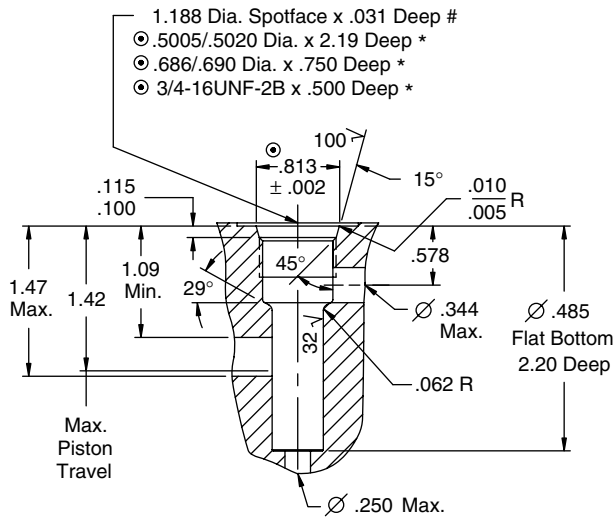
Includes oil passage in nose for use with center-hole poppets.

Size	Without Seals Part No.	With Seals Part No.
10	7030310	7030310S

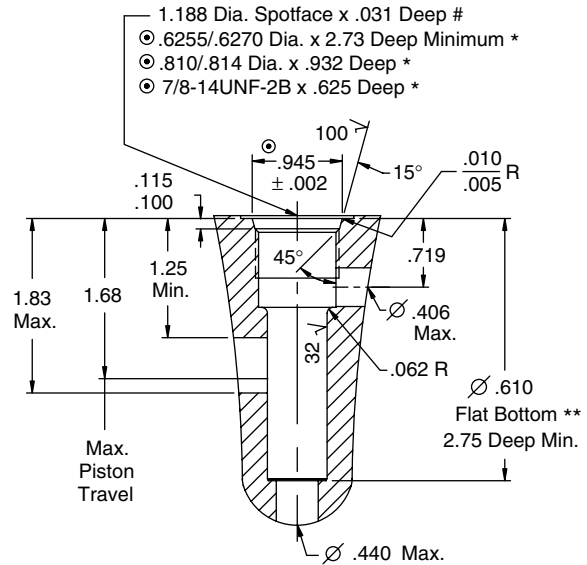
See Pilot Piston Cavity details on the following pages (8.500.3-4)

Manifold Accessories—Pilot Piston Cavities

VC08-PCV

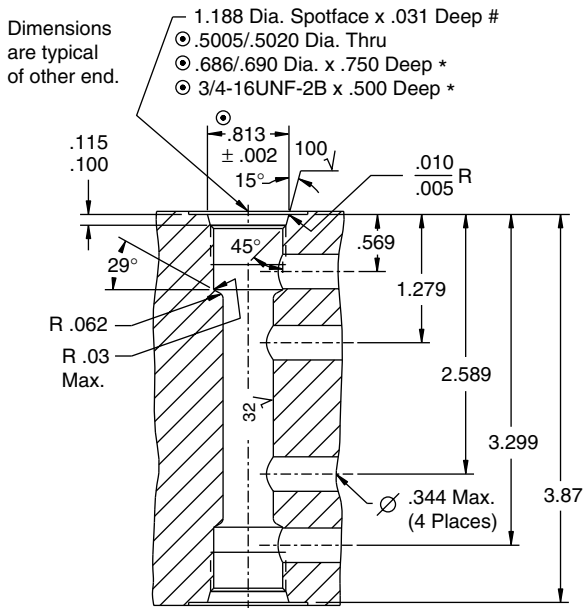


VC10-PCV

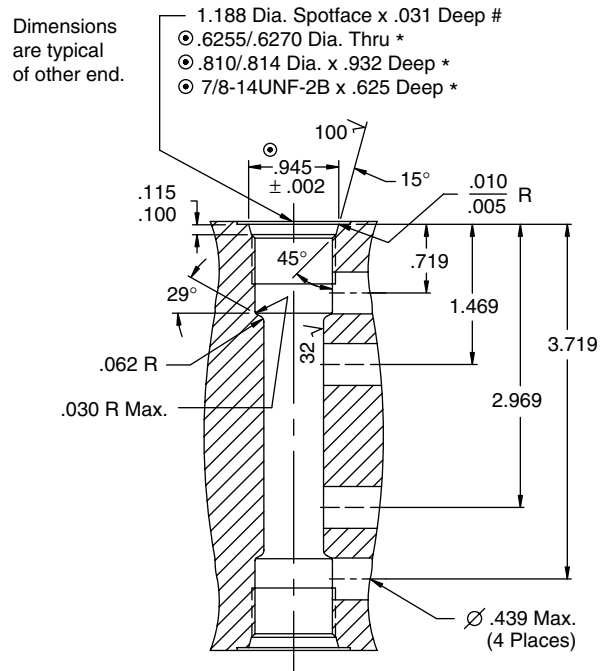


** Flat Bottom Dia. is used as the PCV Piston stop.
 Alternate stop can be up to .025 inch deeper.

VC08-DCV



VC10-DCV



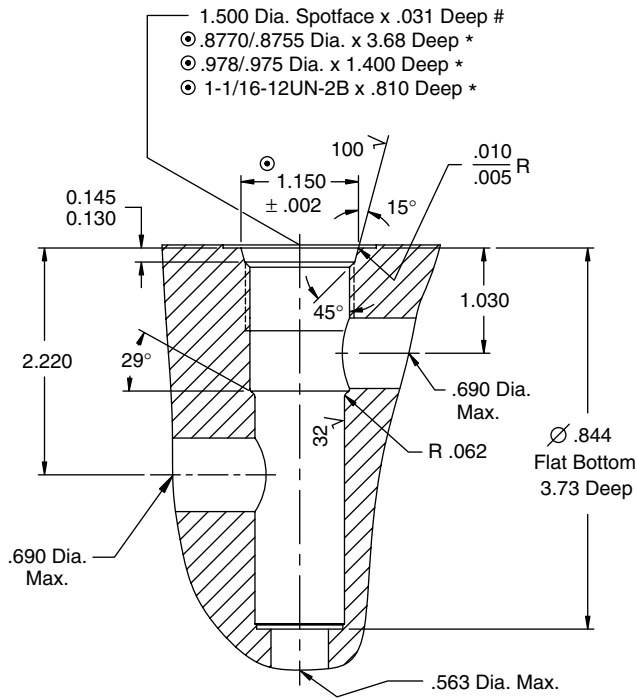
Notes:

1. These Diameters to be Concentric within .002 T.I.R. and Perpendicular to Spotface within .001 T.I.R.
- * 2. Depths are from Spotface.
3. Unspecified Tolerances are ±.005.
- # 4. Unless Otherwise Specified on Machining Drawing
5. All Dimensions shown in inches unless otherwise noted.

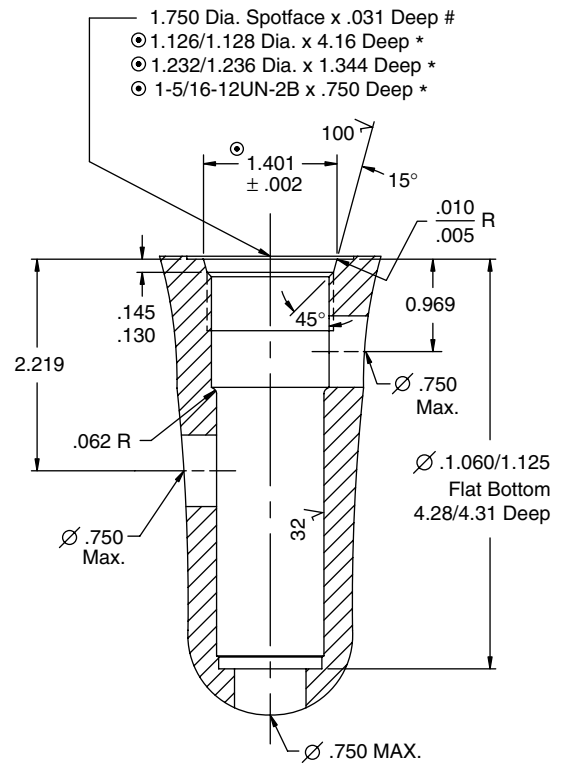
Cavity features (except for pilot drill and cross drills) can be machined simultaneously using HydraForce form tools. Consult factory.

Manifold Accessories—Pilot Piston Cavities (cont'd)

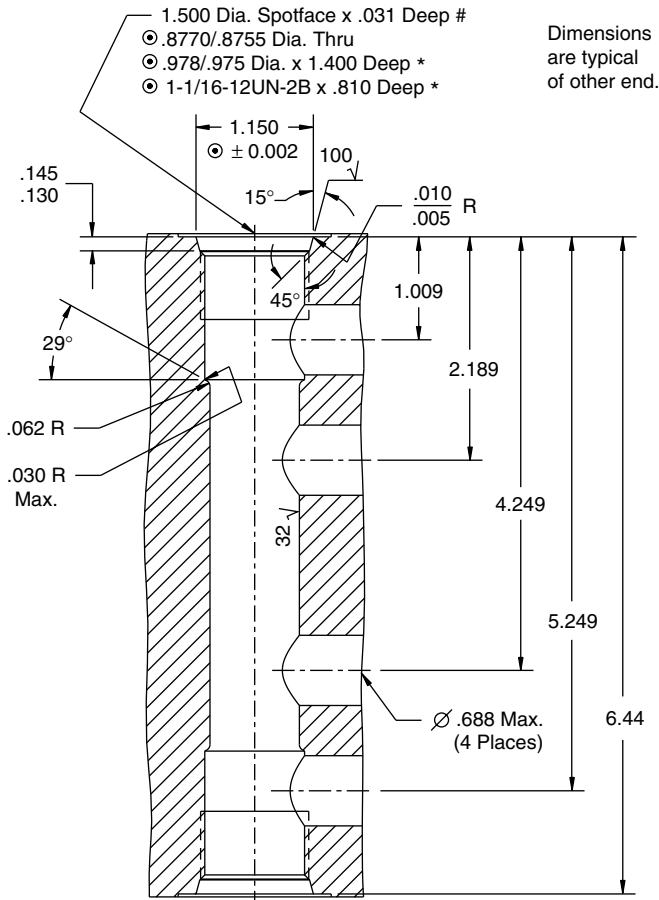
VC12-PCV



VC16-PCV



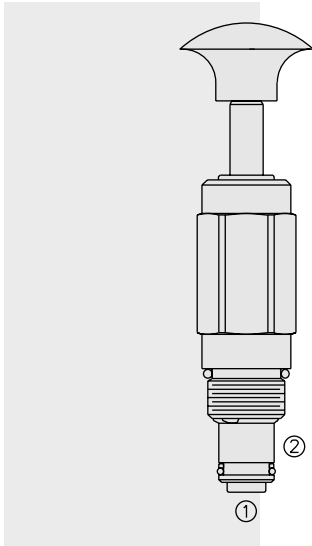
VC12-DCV



Notes:

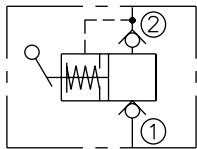
- ◎ 1. These Diameters to be Concentric within .002 T.I.R. and Perpendicular to Spotface within .001 T.I.R.
 - * 2. Depths are from Spotface.
 - 3. Unspecified Tolerances are ±.005.
 - # 4. Unless Otherwise Specified on Machining Drawing
 - 5. All Dimensions shown in inches unless otherwise noted.
- Cavity features (except for pilot drill and cross drills) can be machined simultaneously using HydraForce form tools. Consult factory.

HP10-20 Hand Pump



SYMBOLS

USASI/ISO:



DESCRIPTION

A screw-in, cartridge-style, push and release type hand pump with two built-in checks.

OPERATION

The HP10-20 will provide a specific displacement of oil to port ①.

Note: As with any mechanical hydraulic actuator (piston rods, rotating pump shaft, etc.) the shaft will become coated with a minute amount of oil from the internal high pressure system. The rod protruding from the hand pump may feel damp with oil after use. This is desirable because the oil coating serves to lubricate the shaft seal, reducing friction and assuring extended seal life.

FEATURES

- Hardened parts for long life.
- Heavy duty construction.
- Industry common cavity.

RATINGS

Operating Pressure: Port ① to 207 bar/3000 psi; Port ② to 69 bar/1000 psi

Displacement: 1.36 cc/0.083 cu. in. per stroke

Force Required: 30 lbs. to attain 17 bar/250 psi

Internal Leakage: From port ① to port ②: 0.15 cc/3 drops per minute maximum at 207 bar/3000 psi

Temperature: -40 to 120°

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus)

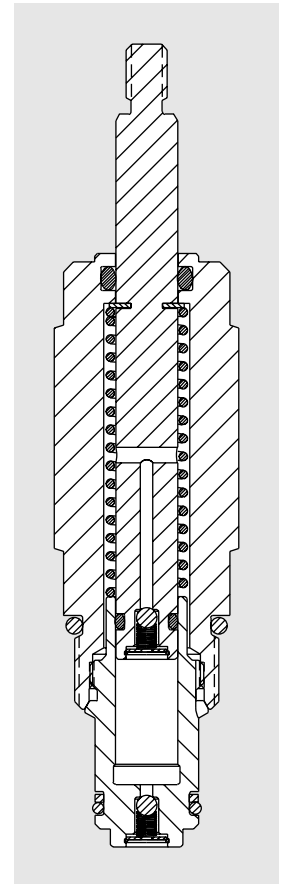
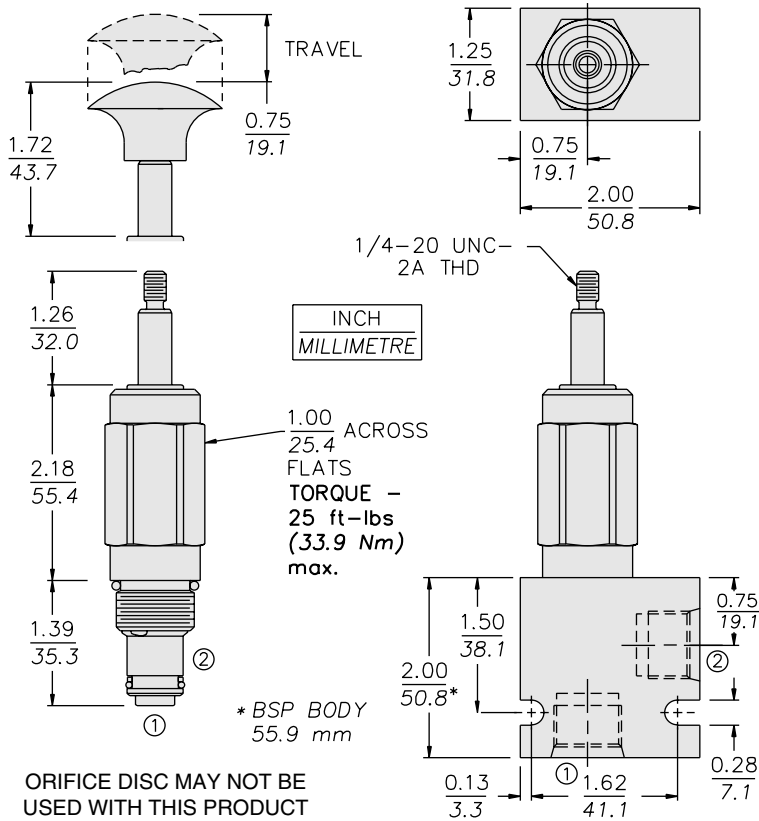
Installation: No restrictions; See page 9.020.1

Cavity: VC10-2, Variation "A"; See page 9.110.1

Cavity Tool: CT10-2XX; See page 8.600.1

Seal Kit: SK10-2x-T; See page 8.650.1

DIMENSIONS

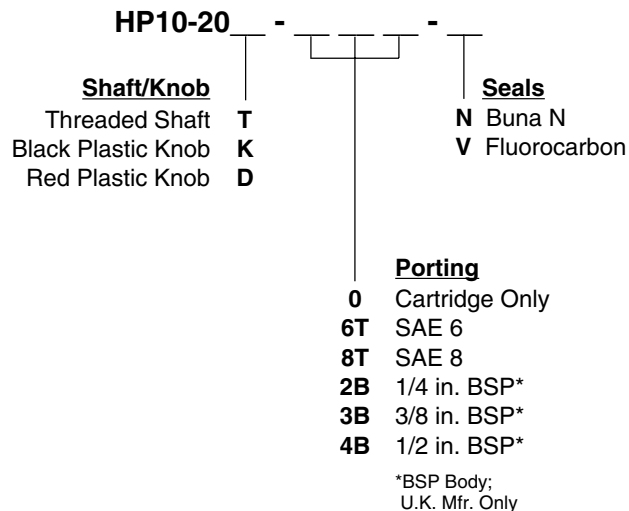


MATERIALS

Cartridge: Weight: 0.27 kg. (0.60 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard. Anodized aluminum knobs.

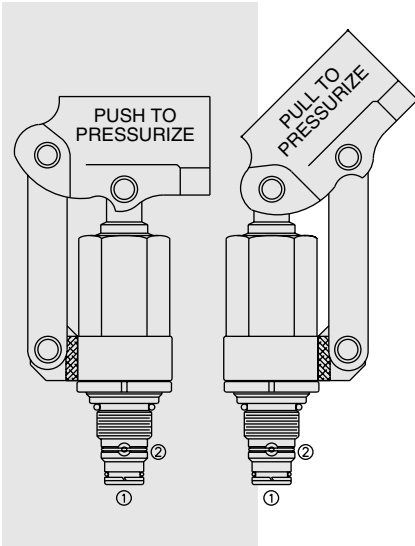
Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 240 bar (3500 psi); See page 8.010.1. Ductile iron and steel bodies available; dimensions may differ; consult factory.

TO ORDER



HOUSINGS AND ACCESSORY PRODUCTS

HP10-21 Hand Pump



DESCRIPTION

A screw-in, cartridge-style, push or pull type hand pump with two built-in checks.

OPERATION

The **HP10-21** provides hydraulic flow to 0.65 cu. in. per stroke, at pressures to 207 bar (3000 psi). Integral suction and outlet checks provide a compact device which delivers true operational system flows. See chart for handle torque requirements.

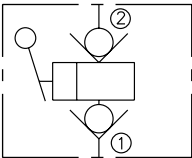
Note: As with any mechanical hydraulic actuator (piston rods, rotating pump shaft, etc.) the shaft will become coated with a minute amount of oil from the internal high pressure system. The rod protruding from the hand pump may feel damp with oil after use. This is desirable because the oil coating serves to lubricate the shaft seal, reducing friction and assuring extended seal life.

FEATURES

- Hardened parts for long life.
- Handle Beam rotates 360°
- Push or pull linkage standard.
- Heavy duty construction.
- Industry common cavity.
- Displacement up to 10.6 cc (0.65 cu in.) per stroke.

SYMBOLS

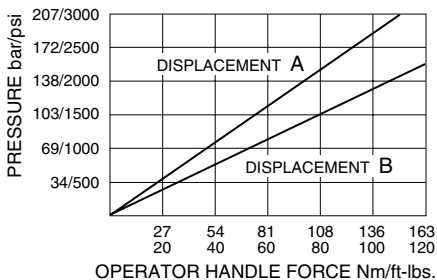
USASI/ISO:



PERFORMANCE (Cartridge Only)

PUMP SELECTION CHART

Max. Operating Pressure: 207 bar (3000 psi)
Max. Handle Force: 305 Nm (225 ft-lbs.)



RATINGS

Operating Pressure: 207 bar (3000 psi)

Flow: Up to 10.6 cc (0.65 cu. in.) per stroke

Leakage: At outlet check, 5 drops/minute

Suction Pressure: 194 mm Hg (7.6 in. Hg, 104 in. H₂O) less than atmospheric pressure

Temperature: -40 to 120°

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus)

Installation: No restrictions; See page 9.020.1

Cavity: VC10-2; See page 9.110.1

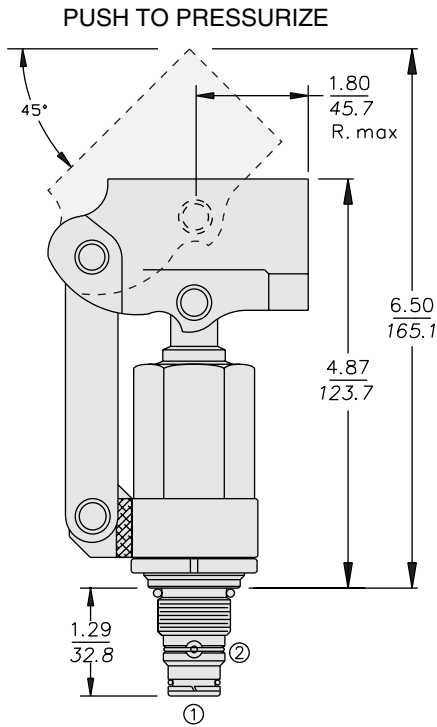
Cavity Tool: CT10-2XX; See page 8.600.1

Seal Kit: SK10-2X-T; See page 8.650.1

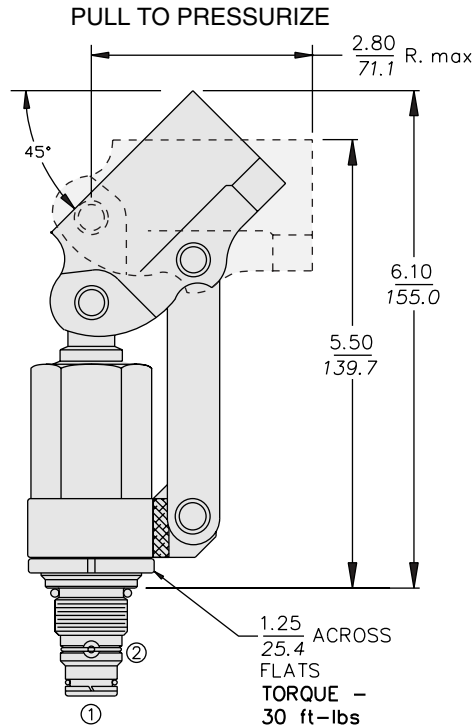
Handle Kit: 16 in. handle, 2.65 kg. (1.2 lbs.), Part no. 6502340

HP10-21

DIMENSIONS

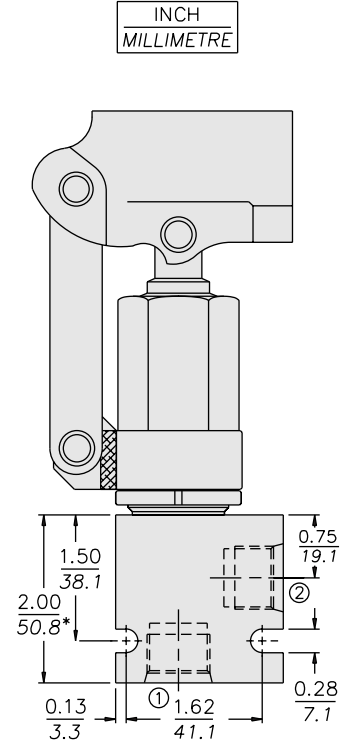


The Beam (Handle Socket)
 Inside Diameter 0.85" (21.6 mm)
 Beam Rotates around Vertical Axis
 for 360° Handle Positioning



**ORIFICE DISC
 SHOULD NOT BE USED
 WITH THIS PRODUCT**

1.25 ACROSS
 25.4
 FLATS
 TORQUE -
 30 ft-lbs
 (40.5 Nm)
 max.



MATERIALS

Cartridge: Weight: 4.19 kg. (1.9 lbs.);
 Steel with hardened work surfaces.
 Zinc-plated exposed surfaces. Buna
 N O-rings and polyester elastomer
 back-ups standard. Anodized
 aluminum knobs.

Standard Ported Body: Weight:
 0.16 kg. (0.35 lbs.); Anodized high-
 strength 6061 T6 aluminum alloy,
 rated to 240 bar (3500 psi); See
 page 8.010.1. Ductile iron and steel
 bodies available; dimensions may
 differ; consult factory.

TO ORDER

HP10-21

****Push or Pull**
 Push Handle Actuation **A**
 Pull Handle Actuation **B**
 *Shipped as kit for installation

Displacement

A 7.4 cc (0.45 cu. in.) per stroke
B 10.6 cc (0.65 cu. in.) per stroke

Seals

N Buna N (Std.)
V Fluorocarbon

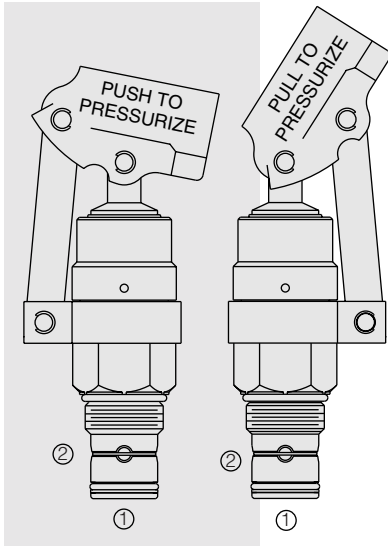
Porting

0 Cartridge Only
6T SAE 6
8T SAE 8
2B 1/4 in. BSP*
3B 3/8 in. BSP*
4B 1/2 in. BSP*

*BSP Body;
 U.K. Mfr. Only

HOUSINGS AND ACCESSORY PRODUCTS

HP16-21 Hand Pump



DESCRIPTION

A screw-in, cartridge-style, push or pull type hand pump with two built-in checks.

OPERATION

The HP16-21 provides hydraulic flow to 1.3 cu. in. per stroke, at pressures to 96 bar (1500 psi).

Note: As with any mechanical hydraulic actuator (piston rods, rotating pump shaft, etc.) the shaft will become coated with a minute amount of oil from the internal high pressure system. The rod protruding from the hand pump may feel damp with oil after use. This is desirable because the oil coating serves to lubricate the shaft seal, reducing friction and assuring extended seal life.

FEATURES

- Hardened parts for long life.
- Handle Beam rotates 360°
- Push or pull linkage standard.
- Heavy duty construction.
- Industry common cavity.
- Displacement up to 21.3 cc (1.3 cu in.) per stroke.

RATINGS

System Pressure: 207 bar (3000 psi)

Pressure Generated by HP16-21: 96 bar (1500 psi) maximum

Proof Pressure: 345 bar (5000 psi)

Internal Leakage: From port ② to the inside of the pump: 5 drops/minute (0.25 cc/minute) max. at 207 bar (3000 psi)

Suction Pressure: 194 mm Hg (7.6 in. Hg, 104 in. H₂O) less than atmospheric pressure

Temperature: -40 to 120°

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 ssu)

Installation: No restrictions; See page 9.020.1

Cavity: VC16-2; See page 9.116.1

Cavity Tool: CT16-2XX; See page 8.600.1

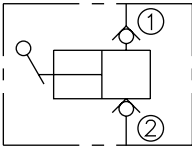
Seal Kit: SK16-2X-T; See page 8.650.1

Seal Rating: 125,000 cycles

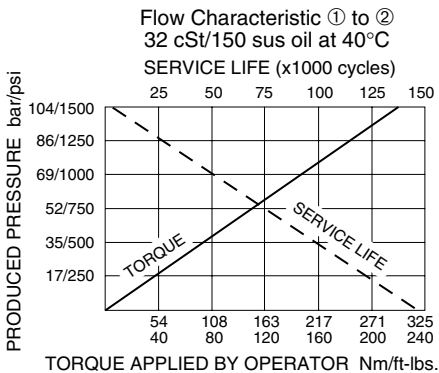
Handle Kit: 16 in. handle, 2.65 kg. (1.2 lbs.), Part no. 6502340

SYMBOLS

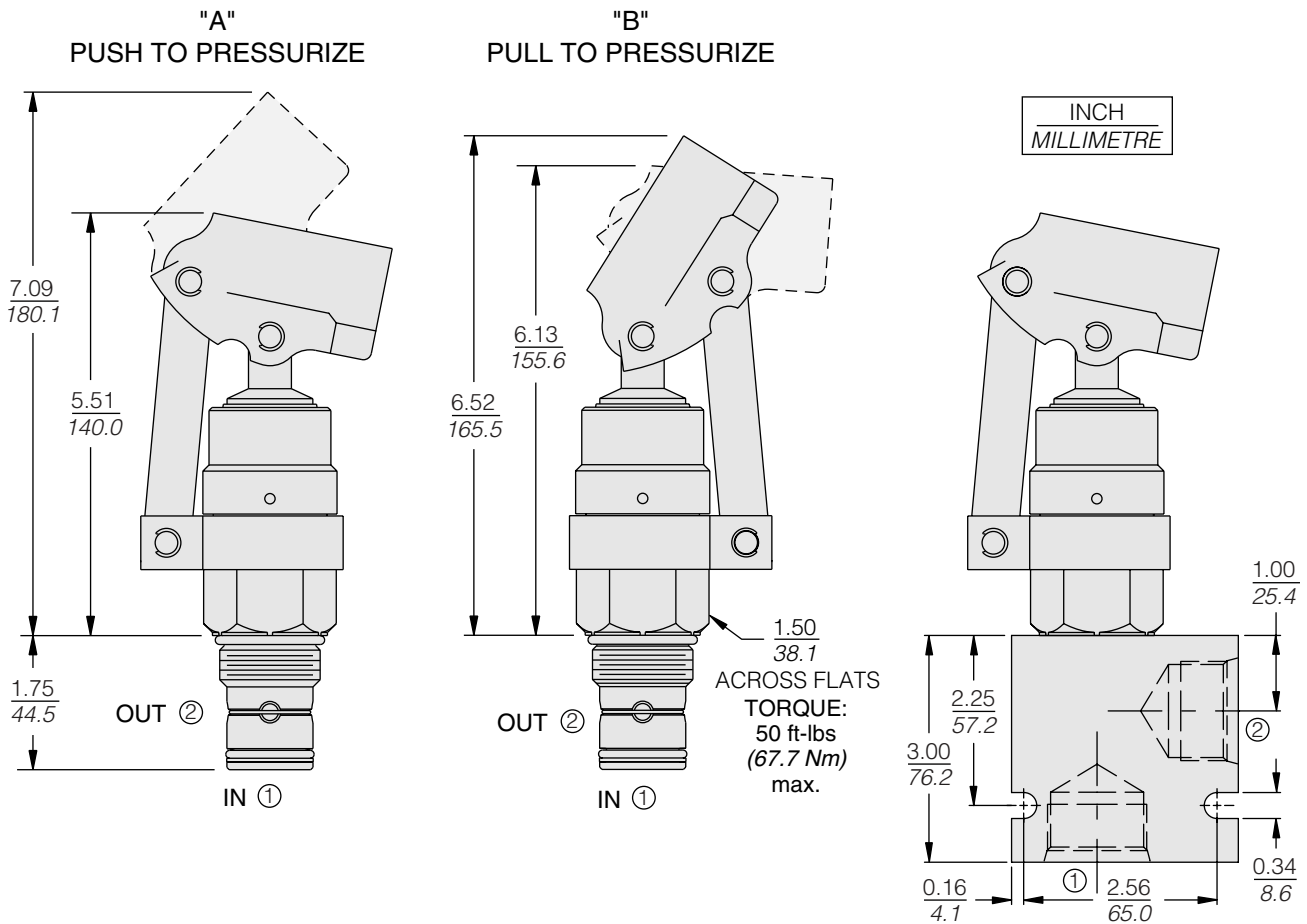
USASI/ISO:



PERFORMANCE (Cartridge Only)



DIMENSIONS



MATERIALS

Cartridge: Weight: 1.27 kg. (2.8 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard.

Standard Ported Body: Weight: 0.57 kg. (1.25 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 240 bar (3500 psi); See page 8.016.1. Ductile iron and steel bodies available; dimensions may differ; consult factory.

TO ORDER

HP16-21 - -

**Push or Pull

Push Handle Actuation **A**
Pull Handle Actuation **B**

*Shipped as kit for installation

Seals

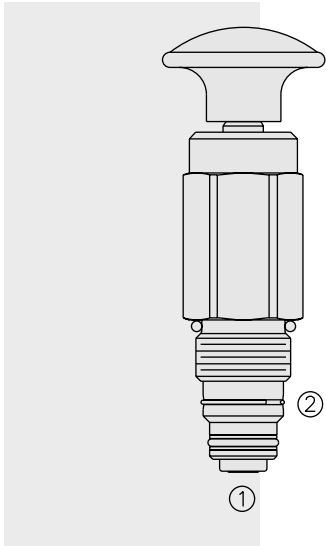
N Buna N (Std.)
V Fluorocarbon

Porting

0 Cartridge Only
12T SAE 12
16T SAE 16
6B 3/4 in. BSP*
8B 1 in. BSP*

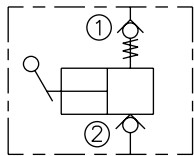
*BSP Body;
U.K. Mfr. Only

HP10-22 Hand Pump



SYMBOLS

USASI/ISO:



DESCRIPTION

A screw-in, cartridge-style, push and pull type hand pump with two built-in checks.

OPERATION

The HP10-22 will provide a specific displacement of oil from port ②.

Note: As with any mechanical hydraulic actuator (piston rods, rotating pump shaft, etc.) the shaft will become coated with a minute amount of oil from the internal high pressure system. The rod protruding from the hand pump may feel damp with oil after use. This is desirable because the oil coating serves to lubricate the shaft seal, reducing friction and assuring extended seal life.

FEATURES

- Hardened parts for long life.
- Heavy duty construction.
- Industry common cavity.

RATINGS

Operating Pressure: Port ① to 6.9 bar/100 psi; Port ② to 241 bar/3500 psi

Displacement: 1.36 cc/0.083 cu. in. per stroke

Force Required: 30 lbs. to attain 17 bar/250 psi

Internal Leakage: From port ② to port ①: 0.15 cc/3 drops per minute maximum at 207 bar/3000 psi

Temperature: -40 to 120°

Filtration: See page 9.010.1

Fluids: Mineral-based or synthetics with lubricating properties at viscosities of 7.4 to 420 cSt (50 to 2000 sus)

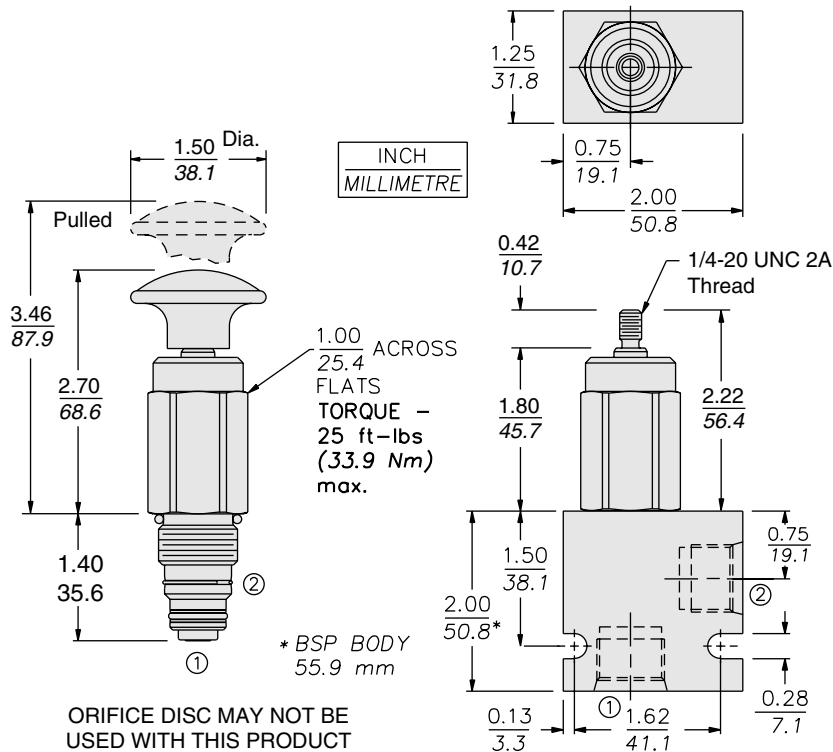
Installation: No restrictions; See page 9.020.1

Cavity: VC10-2, Variation "A"; See page 9.110.1

Cavity Tool: CT10-2XX; See page 8.600.1

Seal Kit: SK10-2x-T; See page 8.650.1

DIMENSIONS

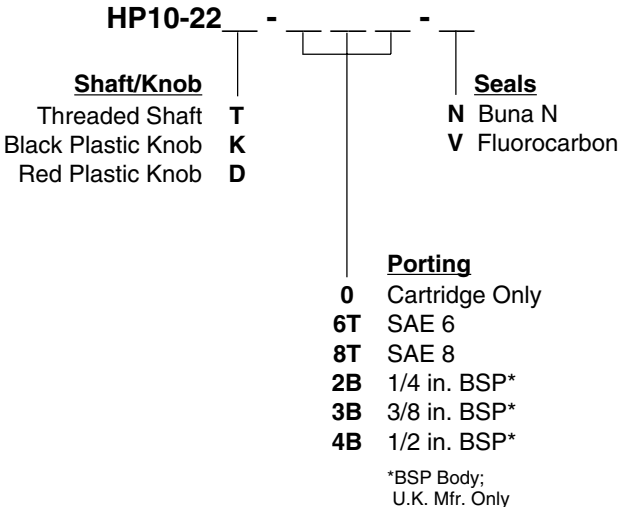


MATERIALS

Cartridge: Weight: 0.27 kg. (0.60 lbs.); Steel with hardened work surfaces. Zinc-plated exposed surfaces. Buna N O-rings and polyester elastomer back-ups standard. Anodized aluminum knobs.

Standard Ported Body: Weight: 0.16 kg. (0.35 lbs.); Anodized high-strength 6061 T6 aluminum alloy, rated to 240 bar (3500 psi); See page 8.010.1. Ductile iron and steel bodies available; dimensions may differ; consult factory.

TO ORDER

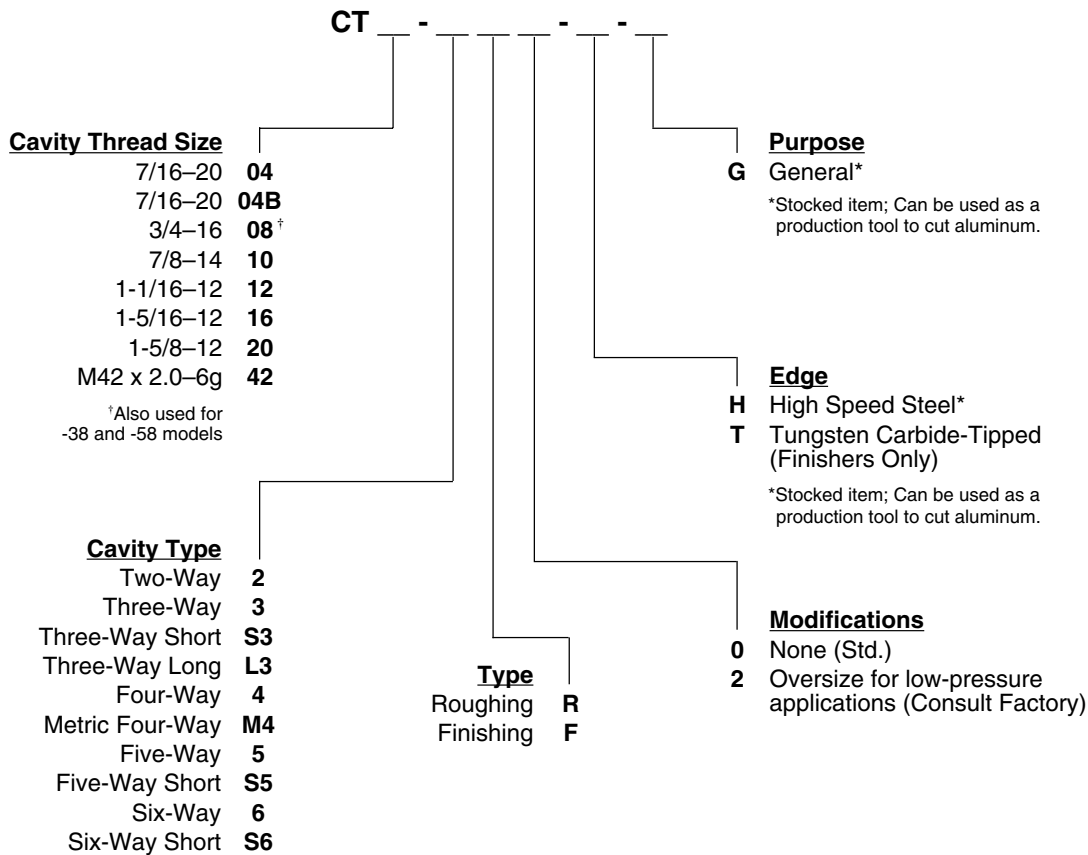


HOUSINGS AND ACCESSORY PRODUCTS

Cavity Form Tools

HydraForce normally stocks standard straight-shanked, tangless shafts in the sizes indicated. Drawings for standard tools are available upon request. Special tools can be supplied; consult factory for cost and leadtime quotations.

ORDERING INFORMATION



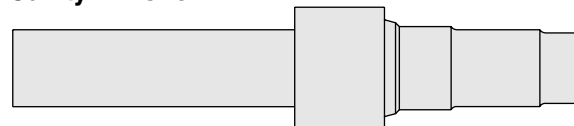
Tool Shank Diameter

Cavity	Rougher	Finisher
08	0.687"	0.750"
10	0.812"	0.750"
12	0.875"	0.750"
16	1.000"	0.750"
20	1.437"	1.500"
M42	1.546"	1.750"

Cavity Rougher

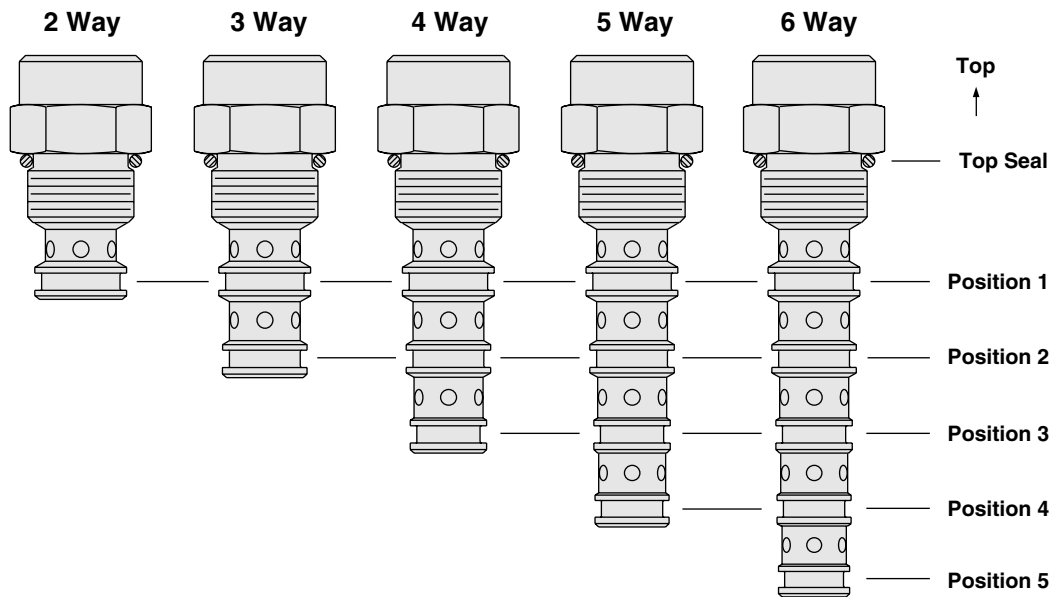


Cavity Finisher



Seal Kit Installation & Ordering Guide

O-RING/BACKUP RING POSITION



STANDARD O-RING SIZES

Cavity Size	Type	Top Seal	Position 1	Position 2	Position 3	Position 4	Position 5
08	2-Way	-908	-012	—	—	—	—
	3-Way	-908	-014	-013	—	—	—
	4-Way	-908	-014	-013	-012	—	—
10	2-Way	-910	-014	—	—	—	—
	3-Way	-910	-015	-014	—	—	—
	3-Way Long	-910	-015	-014	—	—	—
	4-Way	-910	-016	-015	-014	—	—
	5-Way	-910	-116	-015	-014	-013	—
	6-Way	-910	-116	-015	-014	-013	-012
	6-Way Short	-910	-116	-015	-014	-013	-012
12	2-Way	-912	-115	—	—	—	—
	2-Way Long	-912	-115	—	—	—	—
	3-Way	-912	-019	-018	—	—	—
	4-Way	-912	-019	-018	-017	—	—
	5-Way Short	-912	-019	-018	-017	-016	—
	6-Way Short	-912	-019	-018	-017	-016	-015
16	2-Way	-916	-119	—	—	—	—
	3-Way Short	-916	-119	-117	—	—	—
	3-Way	-916	-119	-117	—	—	—
	4-Way	-916	-119	-118	-117	—	—
	5-Way Short	-916	-125	-119	-118	-117	—
	6-Way Short	-916	-125	-119	-118	-117	-116
20	3-Way Short	M2.9	-122	-124	—	—	—
42	4-Way Metric	M2.4 x 38.6	-125	M2.4 x 31.6	M2.4 x 29.6	—	—
	6-Way Metric	-131	-125	M2.4 x 31.6	M2.4 x 29.6	M2.9 x 38.6	M2.4 x 27.6
98	3-Way Metric	M1.5 x 21.5	M2.2 x 18.0	M1.6 x 15.1	M1.6 x 14.1	—	—

Seal Kit information continued on following page.

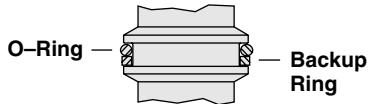
HOUSINGS AND ACCESSORY PRODUCTS

Seal Kit Installation & Ordering Guide

O-RING/BACKUP RING INSTALLATION

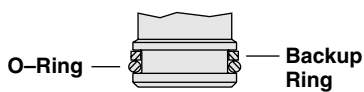
Installation Type T

O-Ring installed toward top of cavity



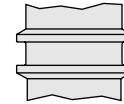
Installation Type B

O-Ring installed toward bottom of cavity



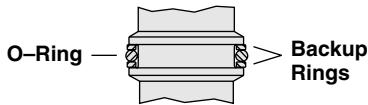
Installation Type X

No seals this location



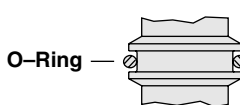
Installation Type M

O-Ring installed between backups



Installation Type O

O-Ring only; no back-ups



Note: Cartridges which are originally built with polyester elastomer (black) back-up rings, are serviced with single-turn (white) Fluorocarbon back-up rings. This facilitates field installation of the back-up rings, since the original production rings require special tools for installation.

Type "M" back-up rings are 1/2 size single-turn Fluorocarbon rings on all cavities **except** VC12-3, VC12-4, VC16-S3, VC20-S3 and VC98-3.

ORDERING INFORMATION

Cavity Thread Size	Cavity Type	Seals	Position 1 Installation Type (Required for 2, 3, 4, 5 & 6-Way Valves)	Position 2 Installation Type (Required for 3, 4, 5 & 6-Way Valves)	Position 3 Installation Type (Required for 4, 5 & 6-Way Valves)	Position 4 Installation Type (Required for 5 & 6-Way Valves)	Position 5 Installation Type (Required for 6-Way Valves Only)
7/16-20	04	2-Way 2	Buna N (Std.) N	O-Ring toward top of cavity T	O-Ring toward top of cavity T	O-Ring toward top of cavity T	O-Ring toward top of cavity T
5/8-18	07	3-Way 3	Fluorocarbon V	O-Ring between backups M	O-Ring between backups M	O-Ring between backups M	O-Ring between backups M
3/4-16	08	4-Way 4	Polyurethane P	O-Ring toward bottom of cavity B	O-Ring toward bottom of cavity B	O-Ring toward bottom of cavity B	O-Ring toward bottom of cavity B
	38	5-Way 5		O-Ring; no back-ups O	O-Ring; no back-ups O	O-Ring; no back-ups O	O-Ring; no back-ups O
	58	6-Way 6		No seals this location X	No seals this location X	No seals this location X	No seals this location X
	78						
7/8-14	10						
	50						
	70						
	80						
1-1/16-12	12						
	52						
	72						
1-5/16-12	16						
	56						
1-5/8-12	20						
M42 x 2.0	42						